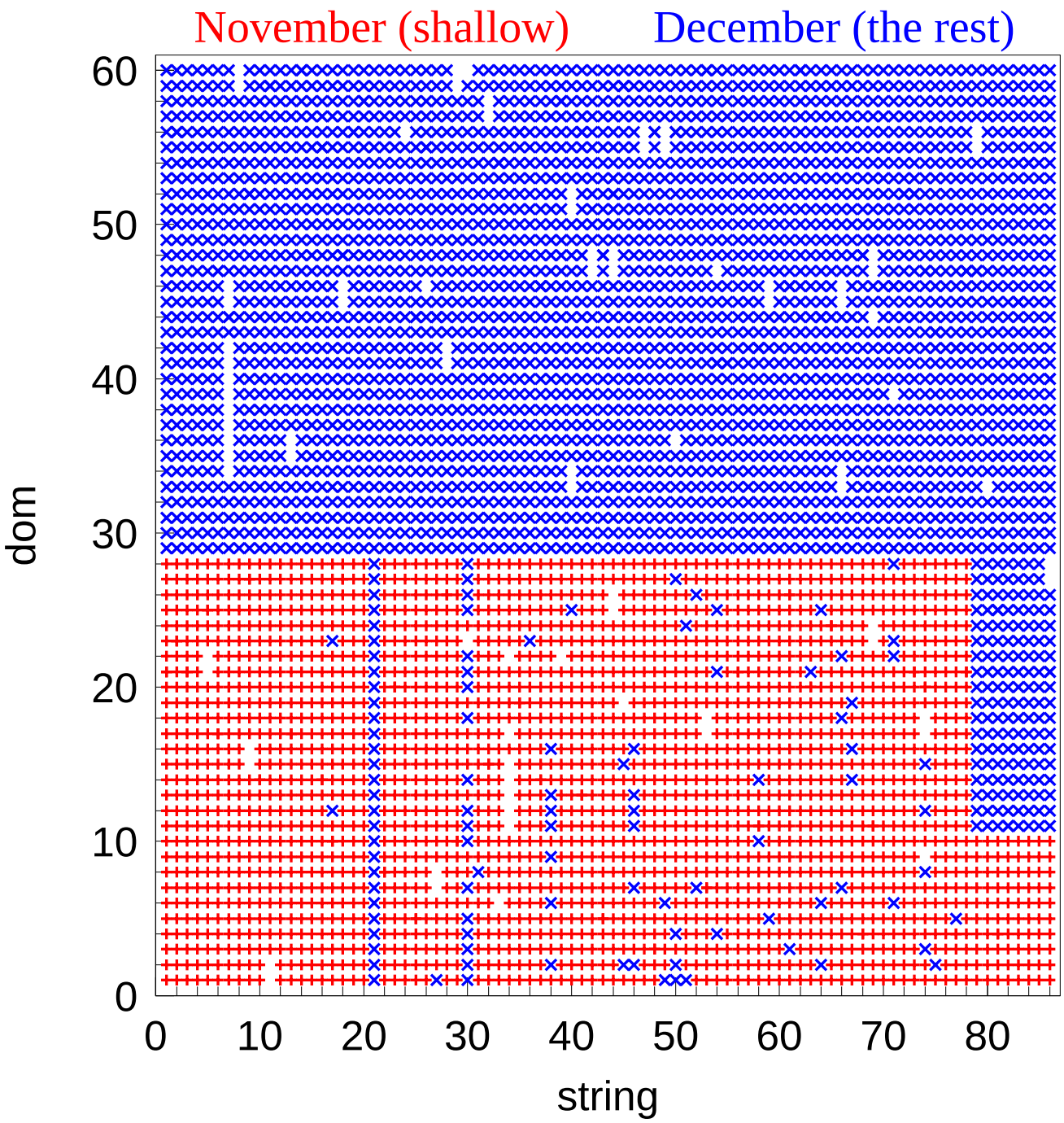
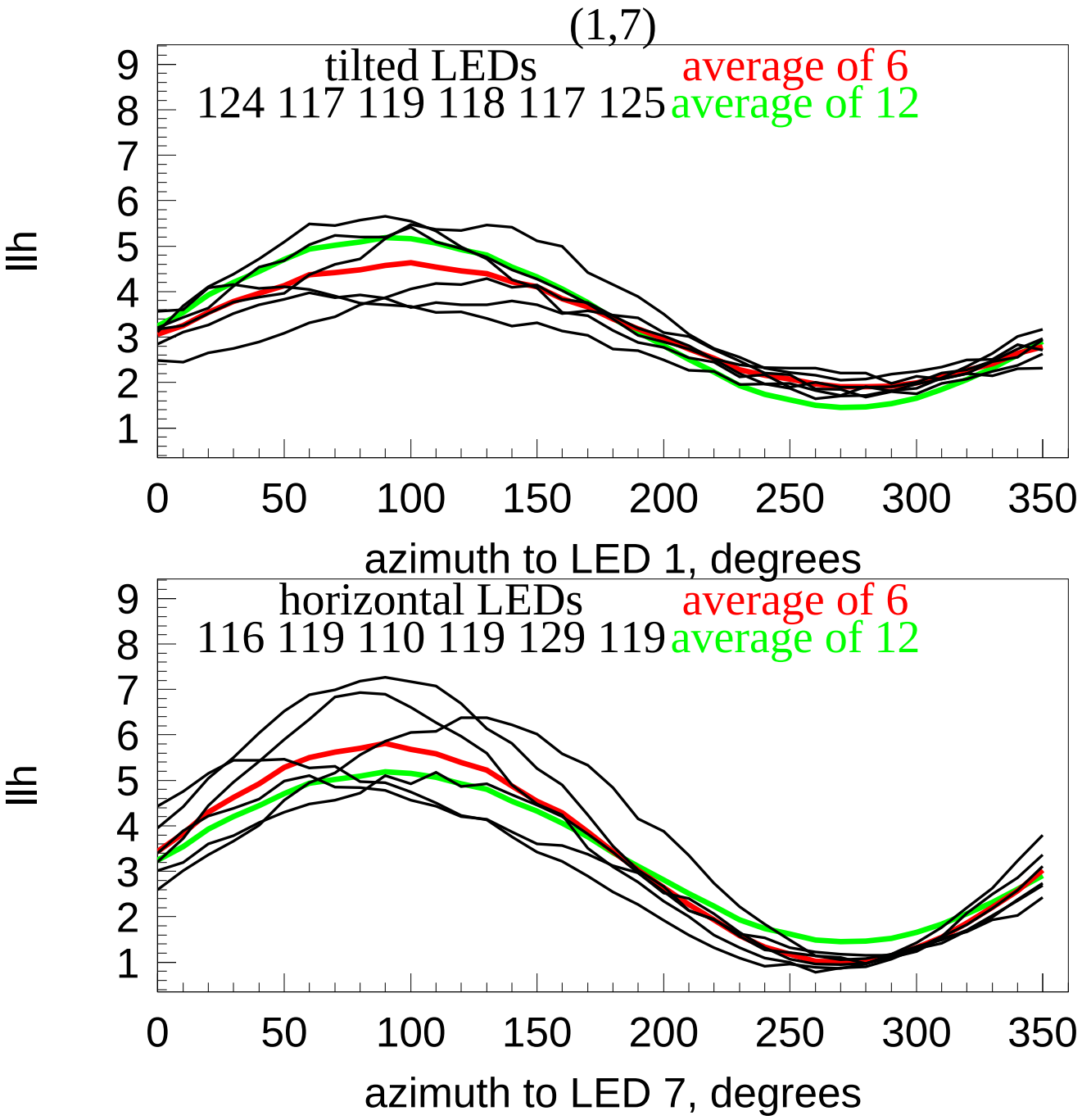
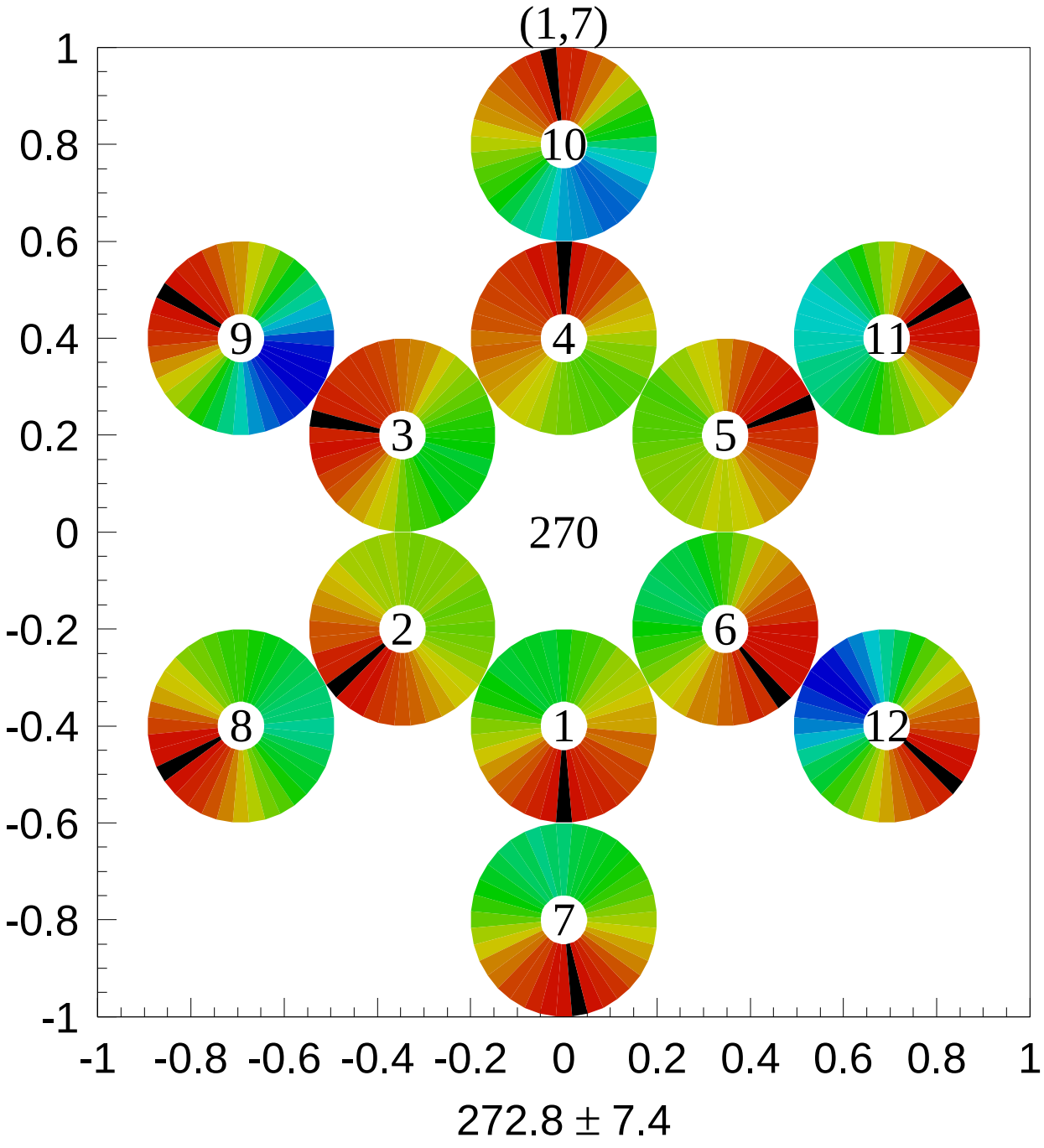
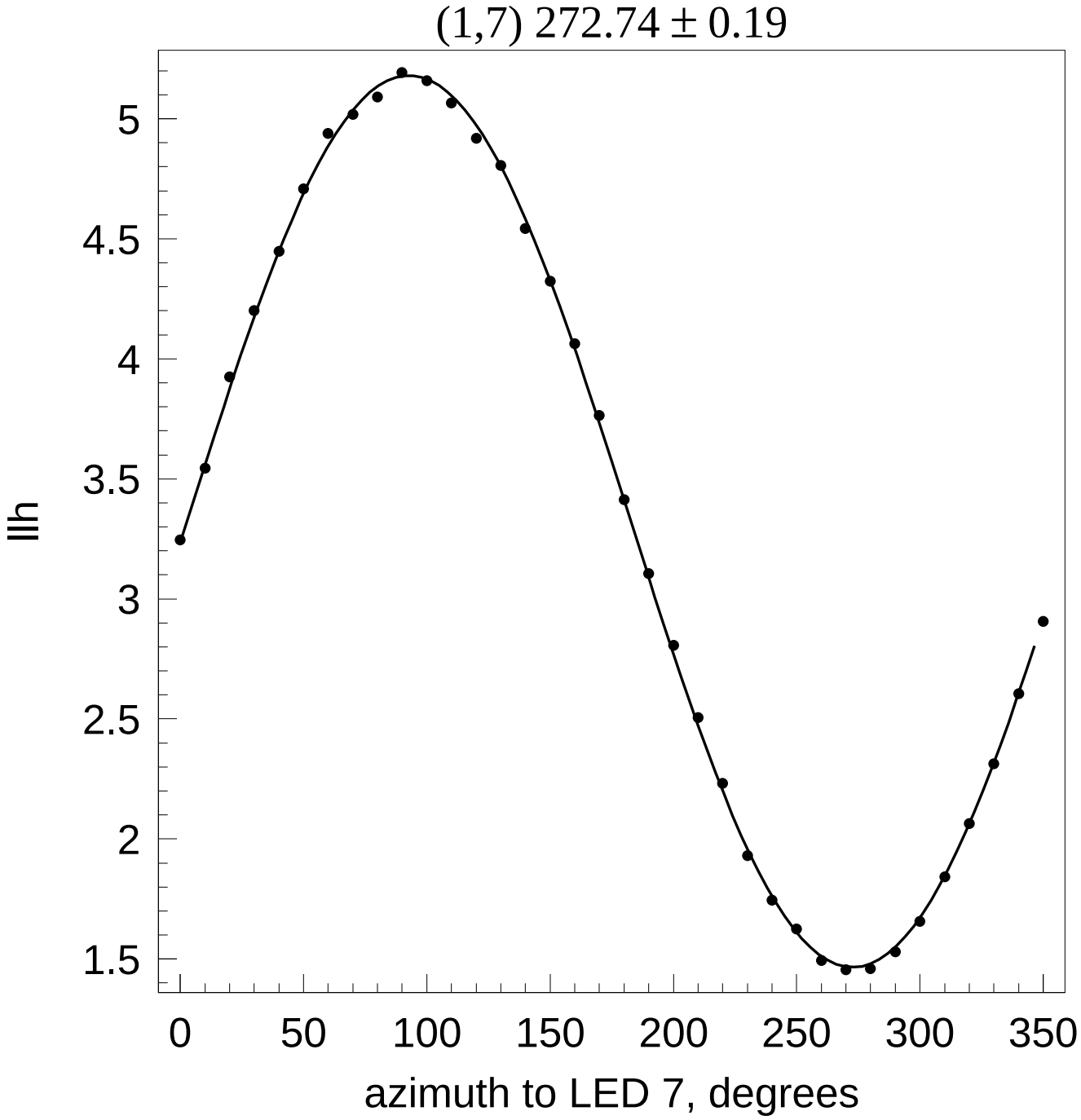
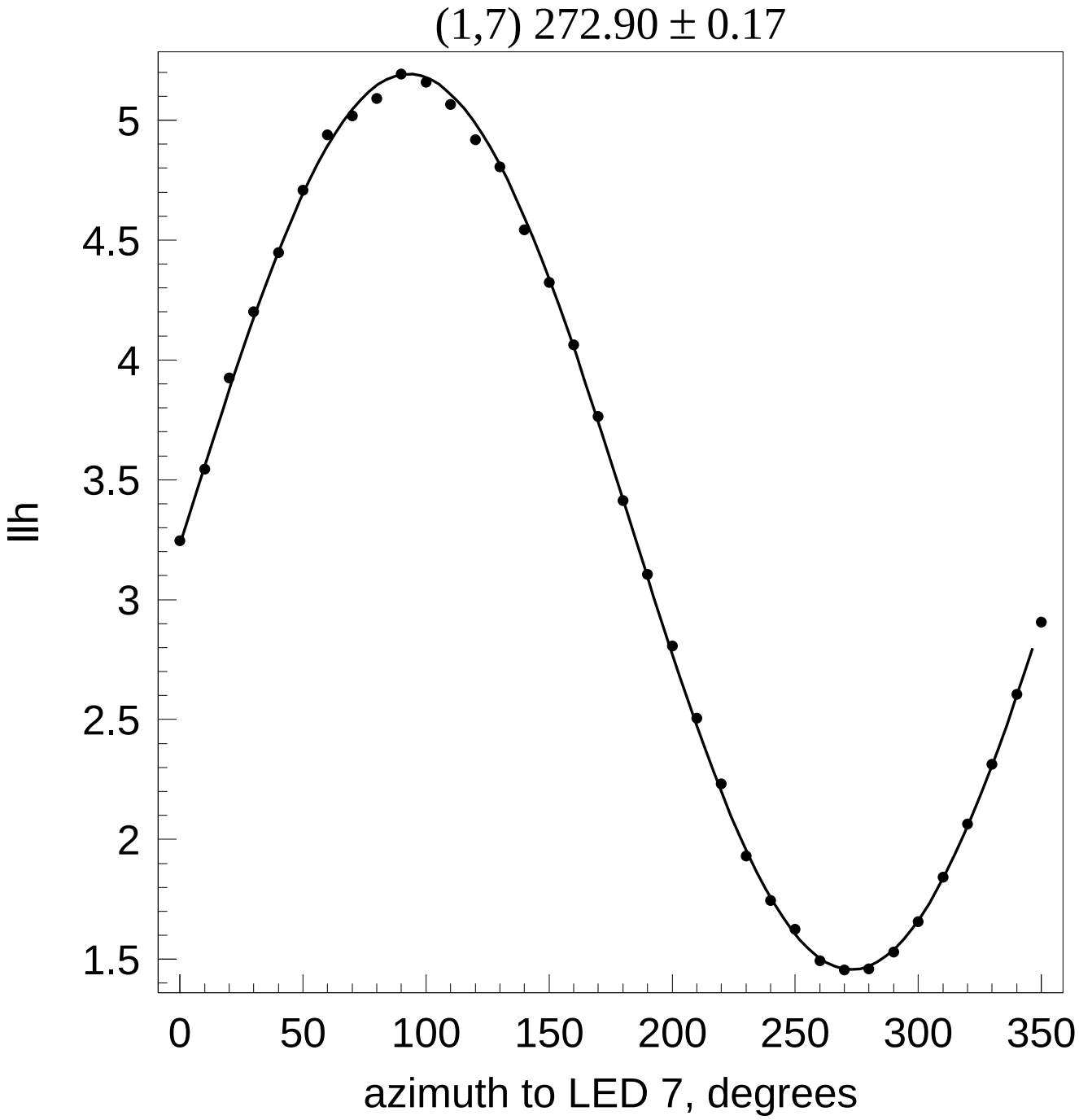
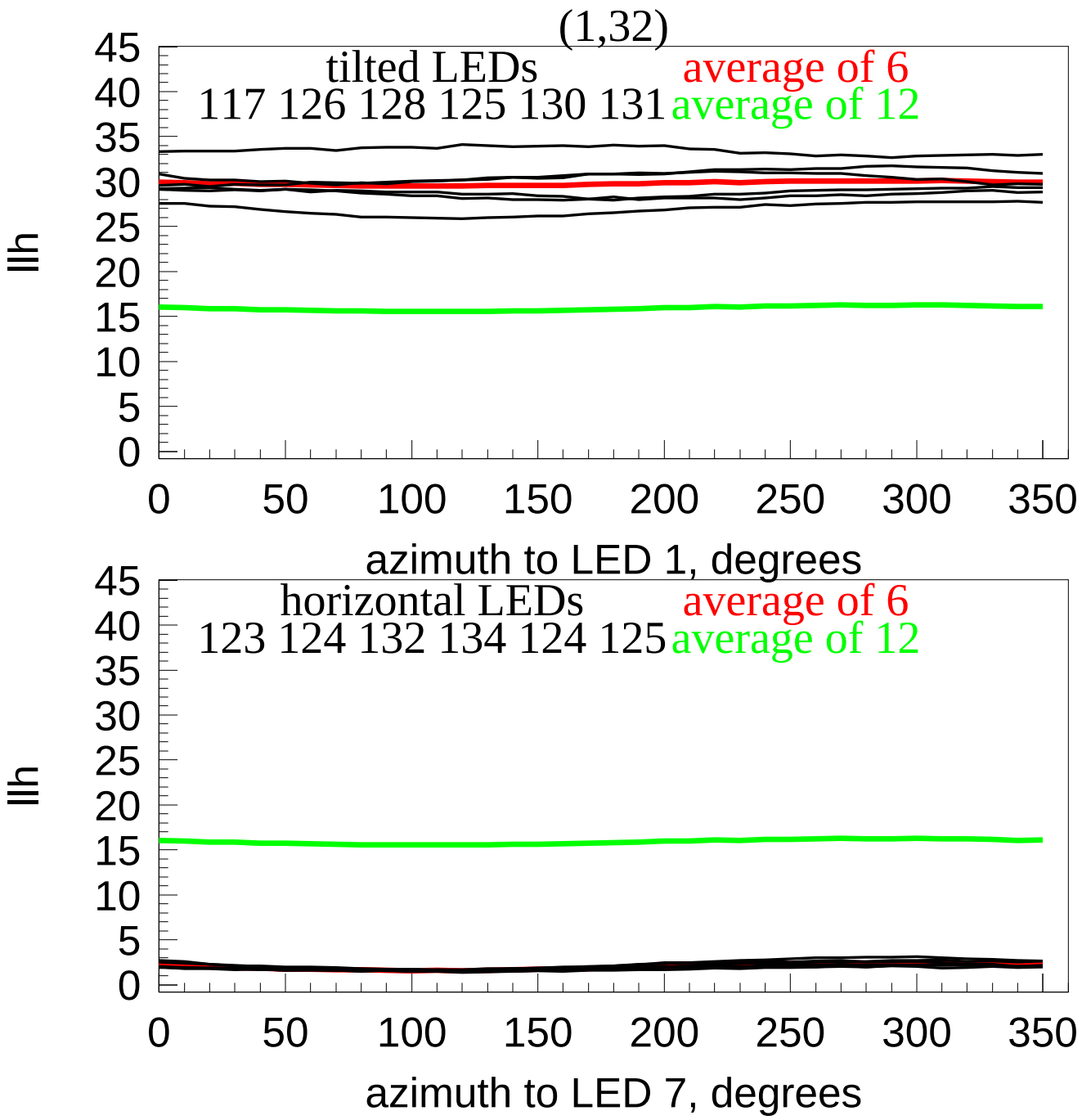

November (shallow)
December (the rest)
dom
string
0
10
20
30
40
50
60
70
80

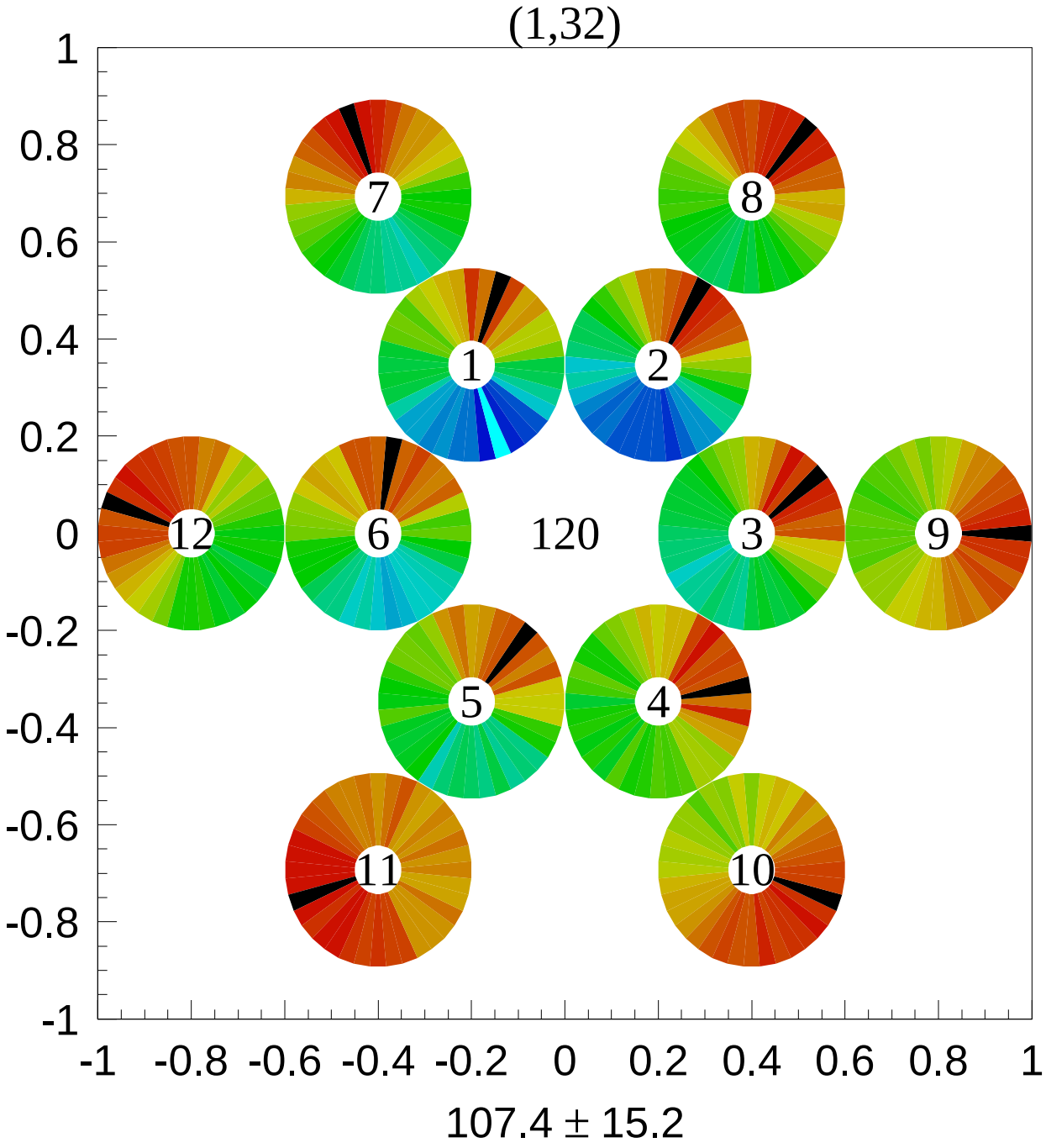

(1,7)
tilted LEDs
124 117 119 118 117 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
116 119 110 119 129 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

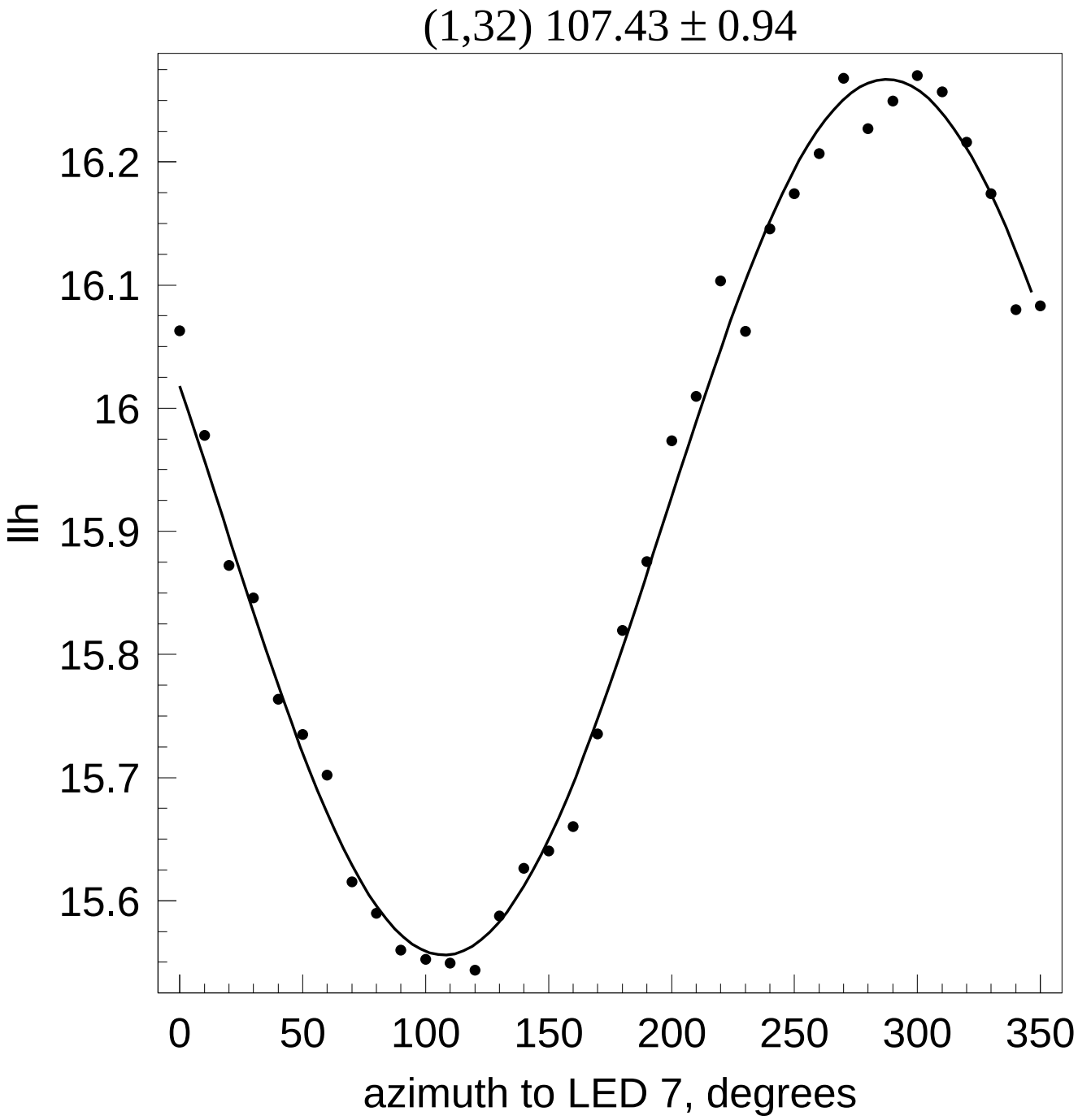

(1,7)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
272.8 ± 7.4

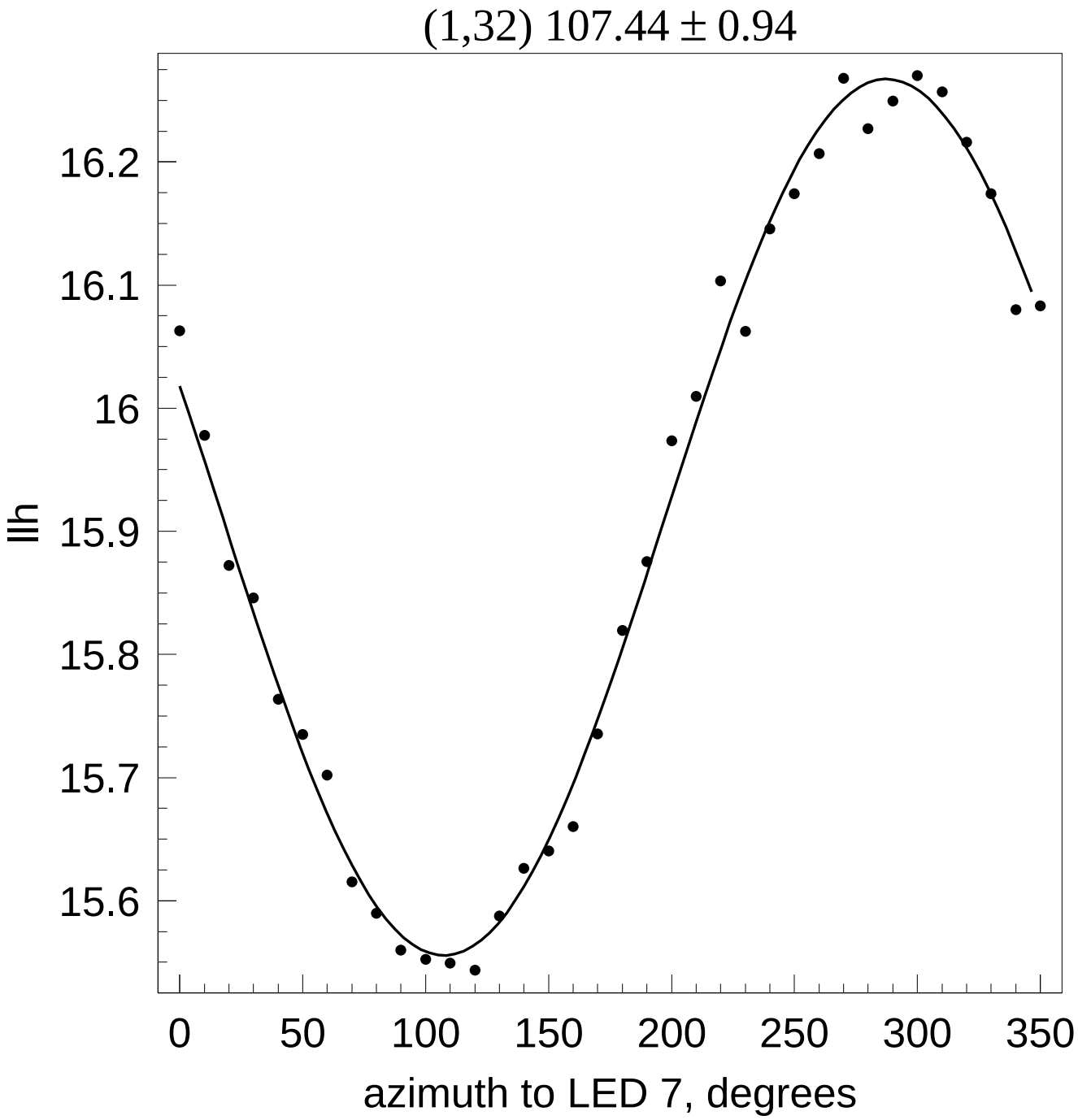

(1,7) 272.74 ± 0.19
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

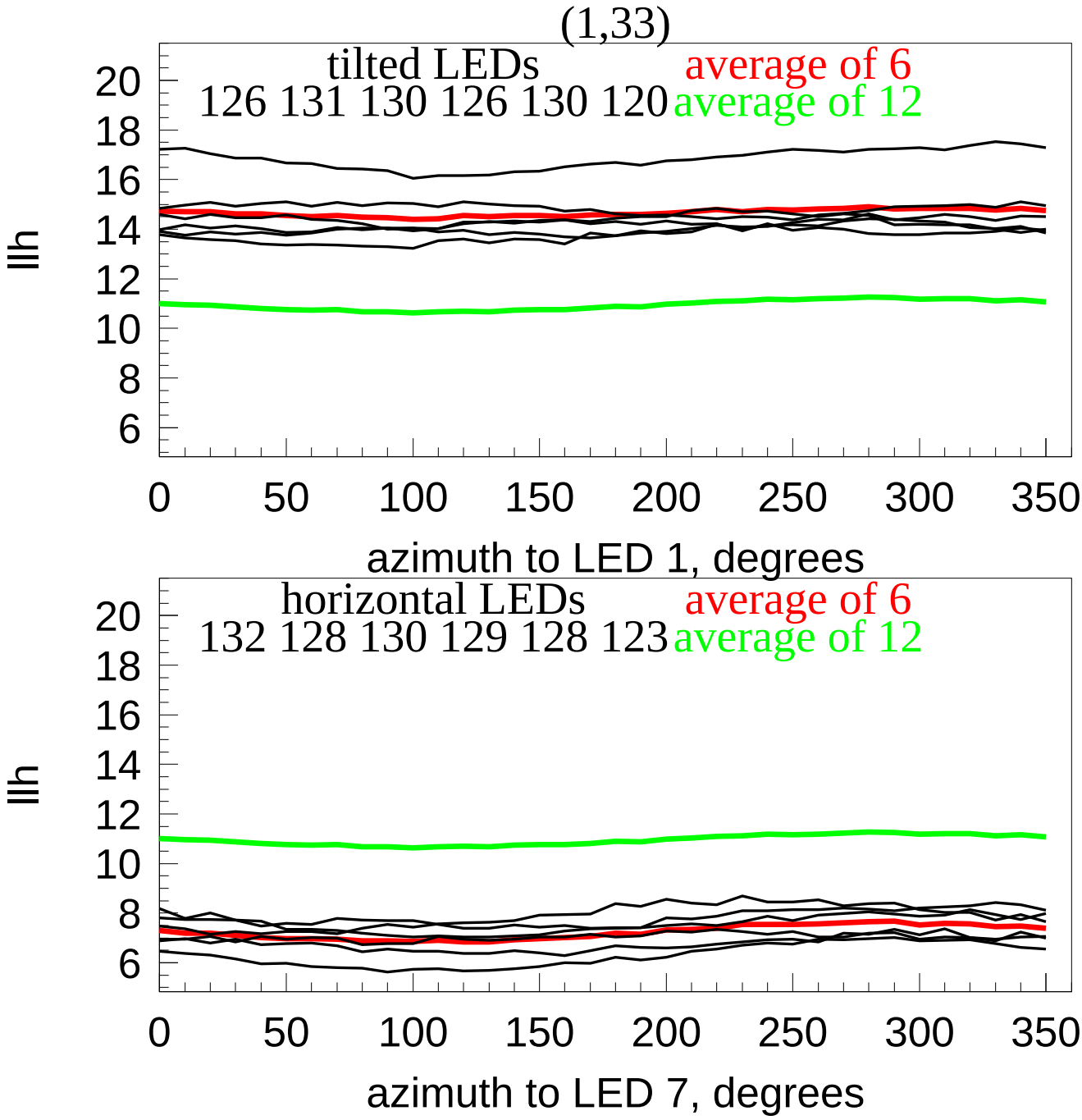

(1,7) 272.90 ± 0.17
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

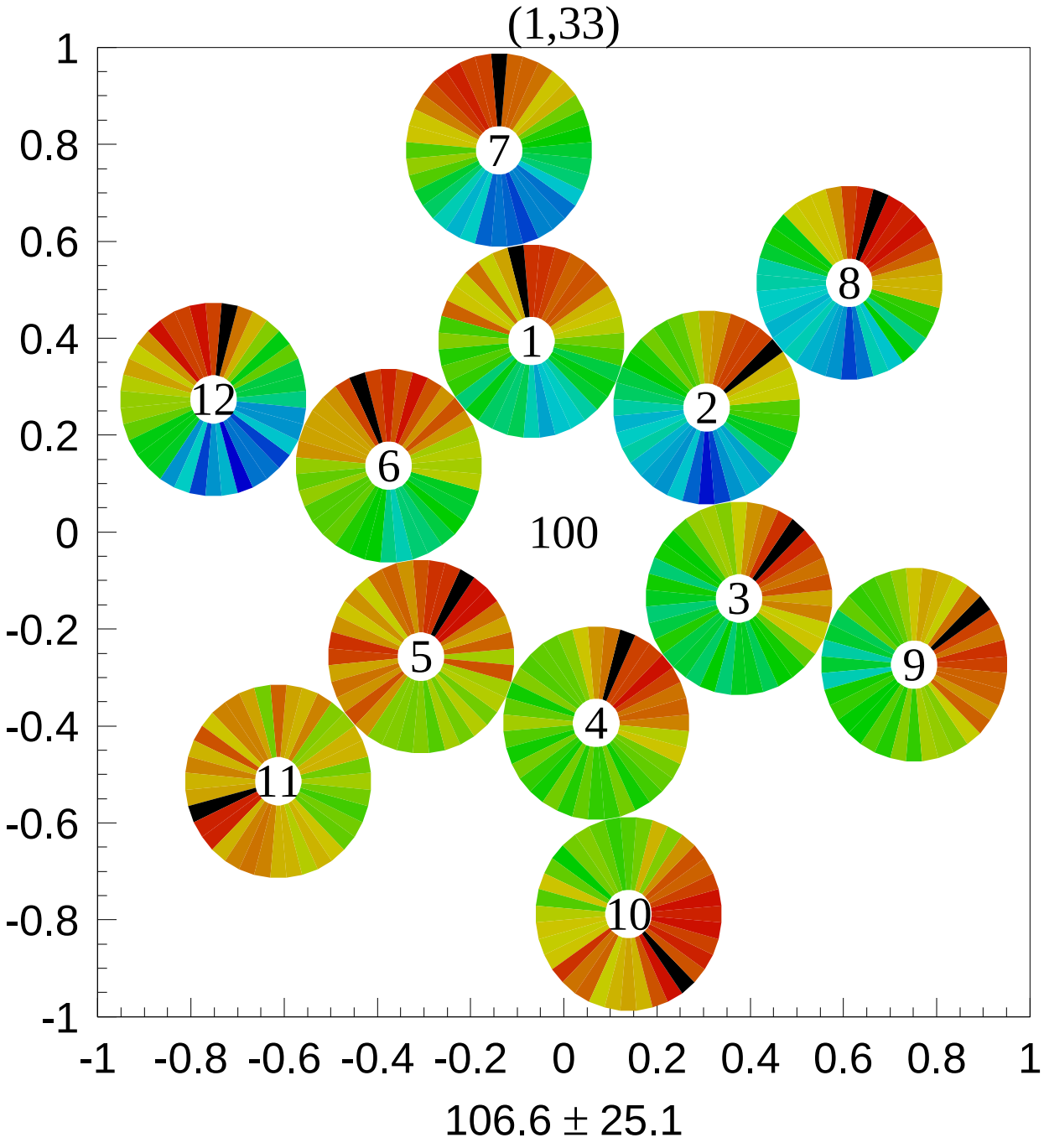

(1,32)
tilted LEDs
117 126 128 125 130 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 124 132 134 124 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

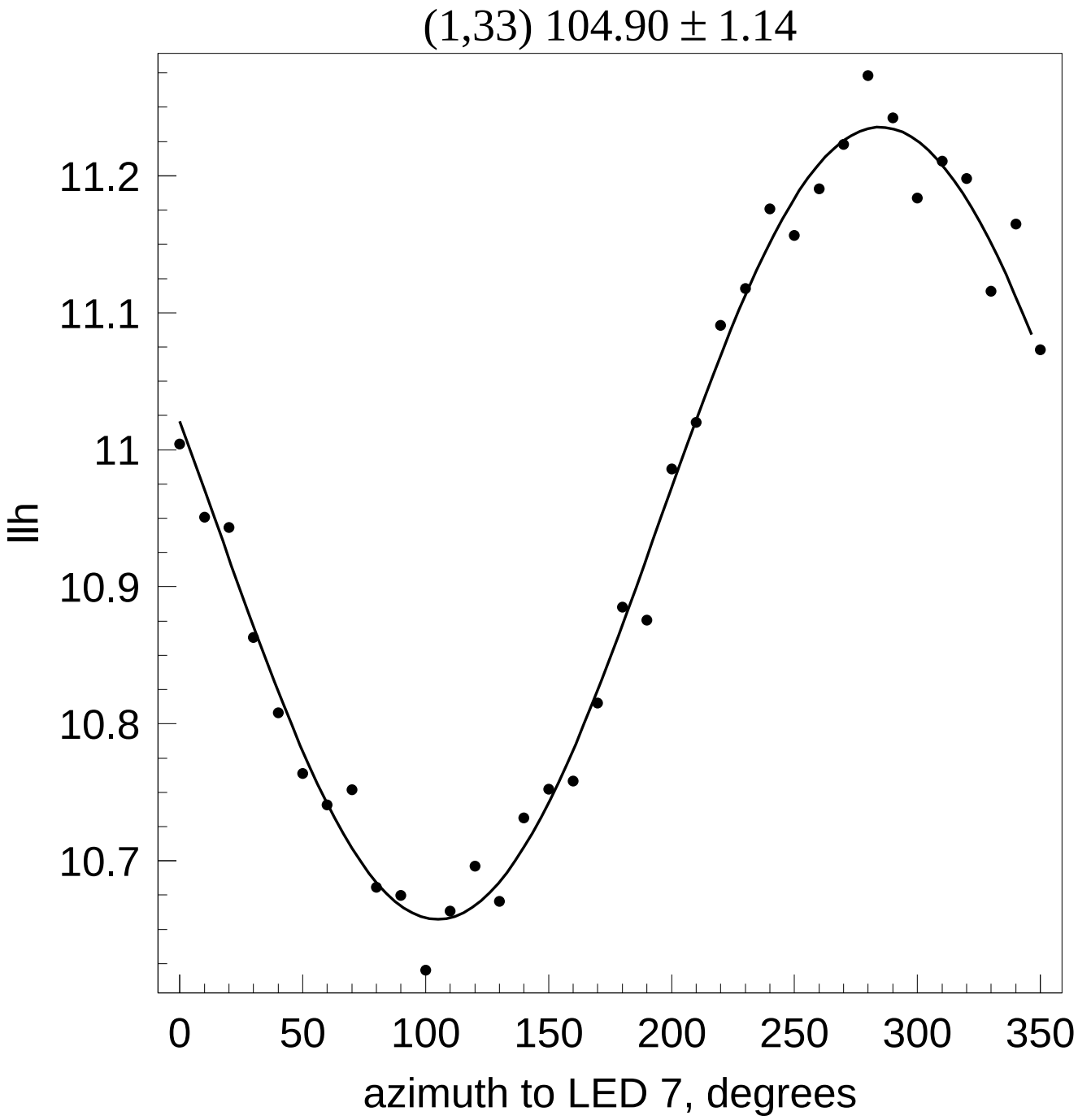

(1,32)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
107.4 ± 15.2

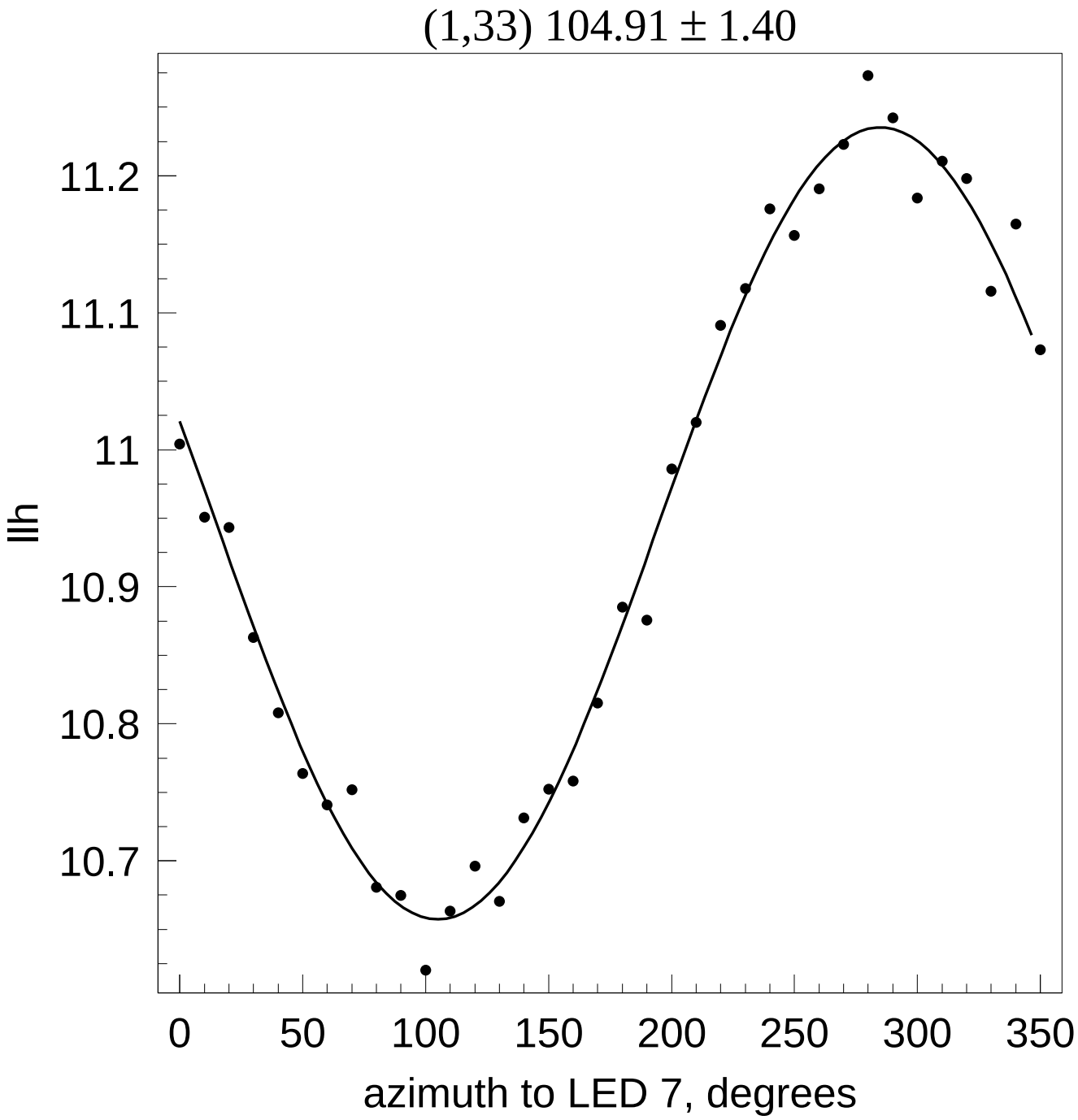

(1,32) 107.43 ± 0.94
16.2
16.1
16
15.9
15.8
15.7
15.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

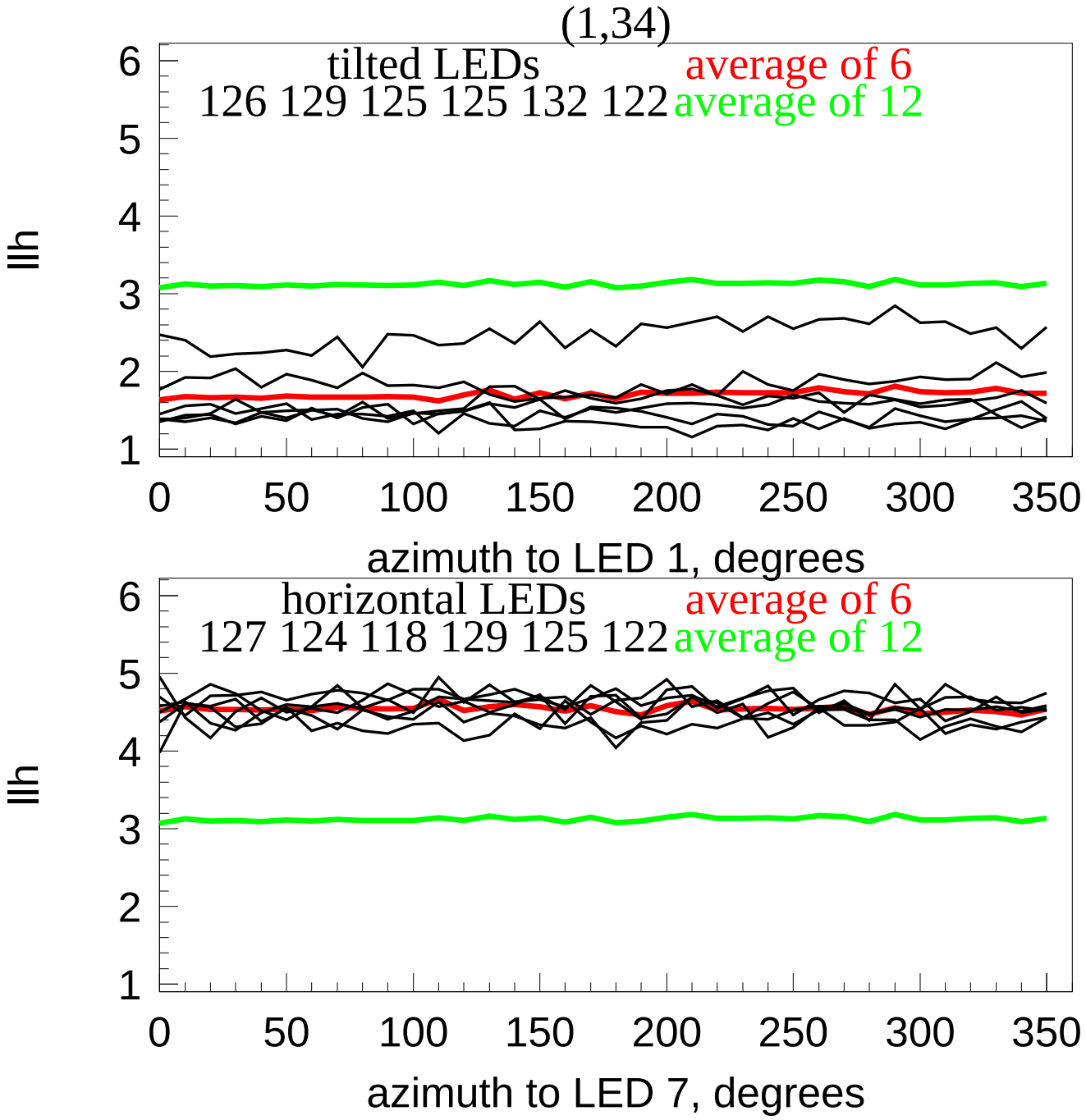

(1,32) 107.44 ± 0.94
16.2
16.1
16
15.9
15.8
15.7
15.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

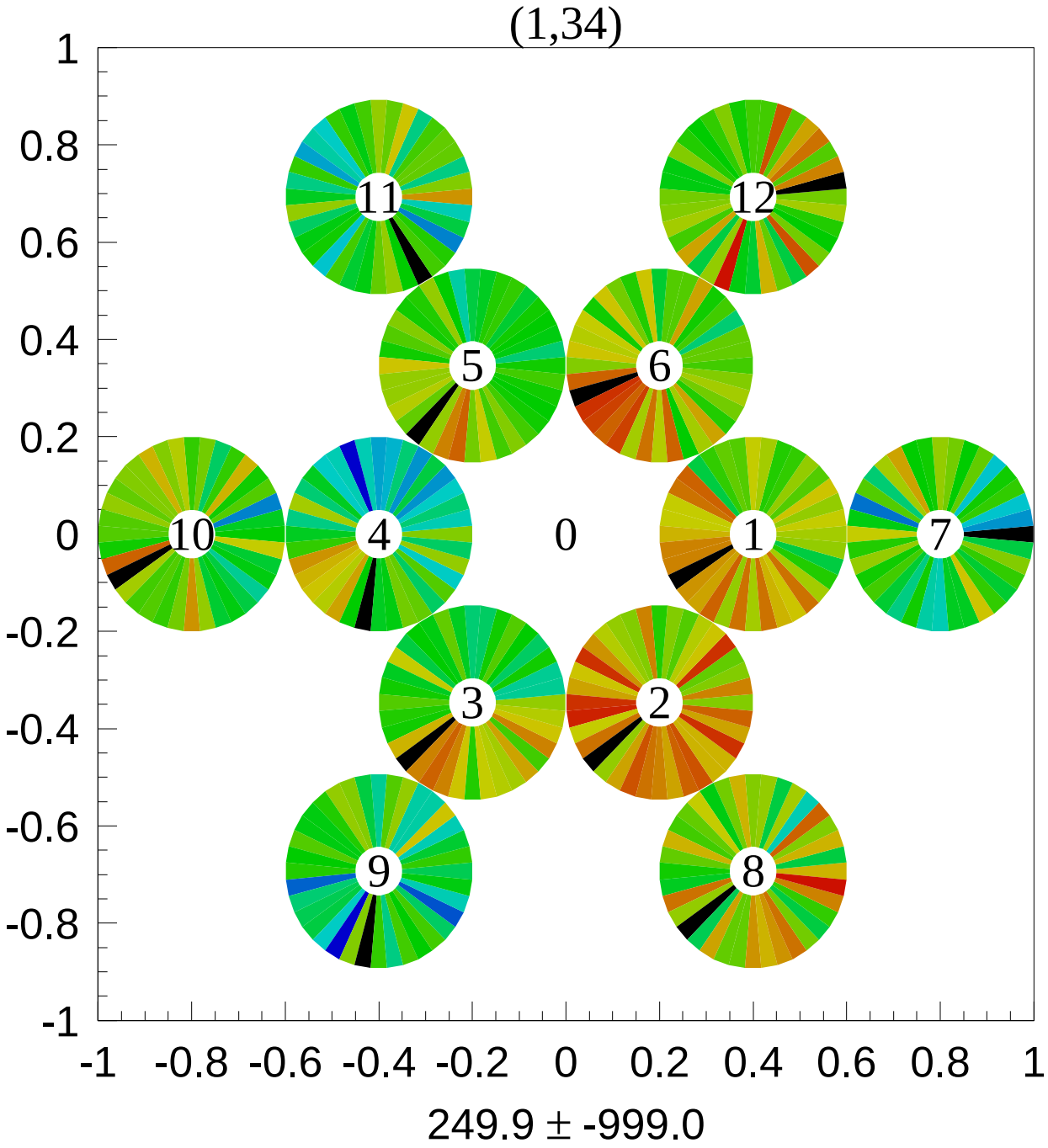

(1,33)
tilted LEDs
126 131 130 126 130 120
average of 6
average of 12
llh
20
18
16
14
12
10
8
6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 128 130 129 128 123
average of 6
average of 12
llh
20
18
16
14
12
10
8
6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

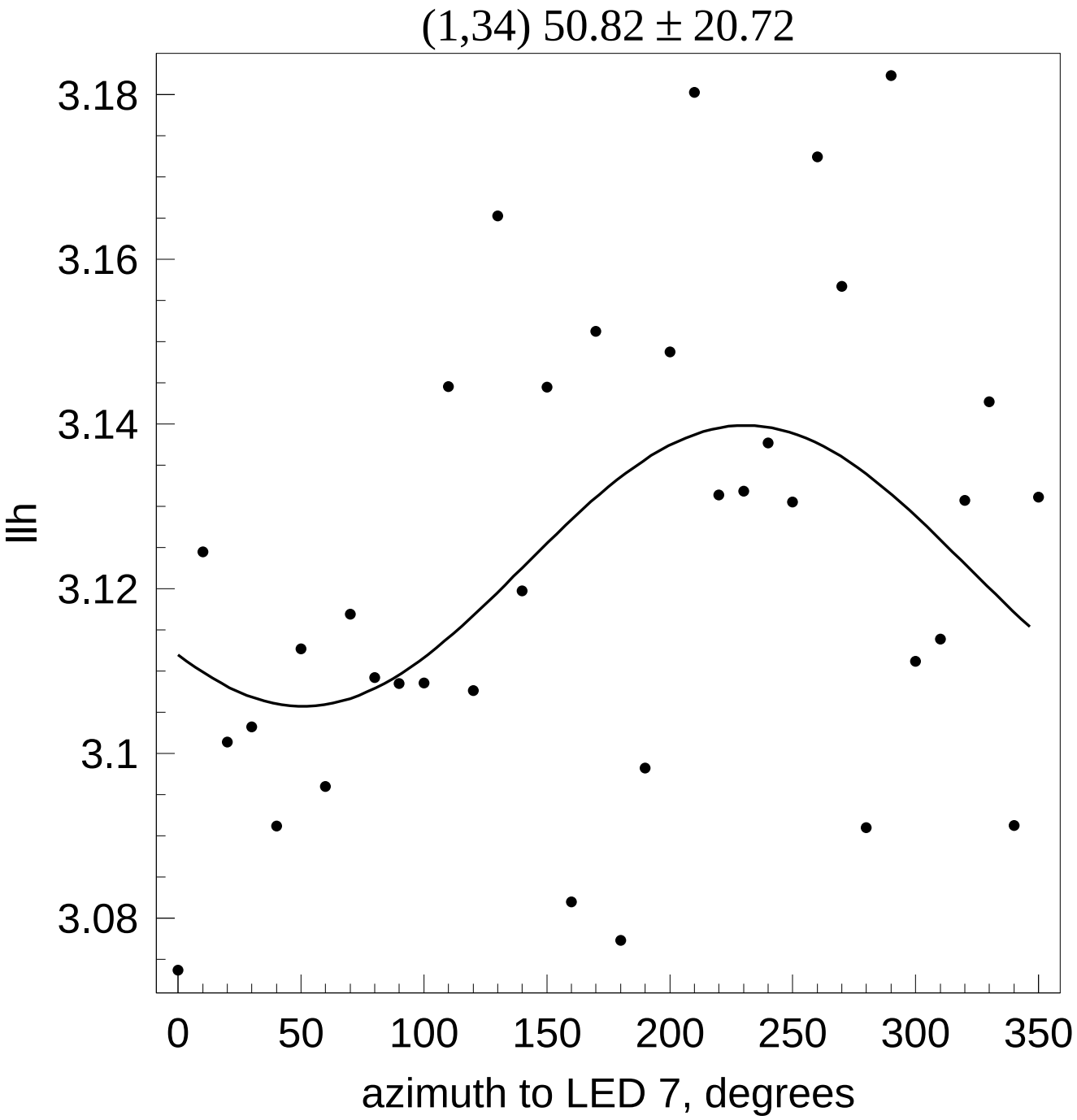

(1,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
106.6 ± 25.1

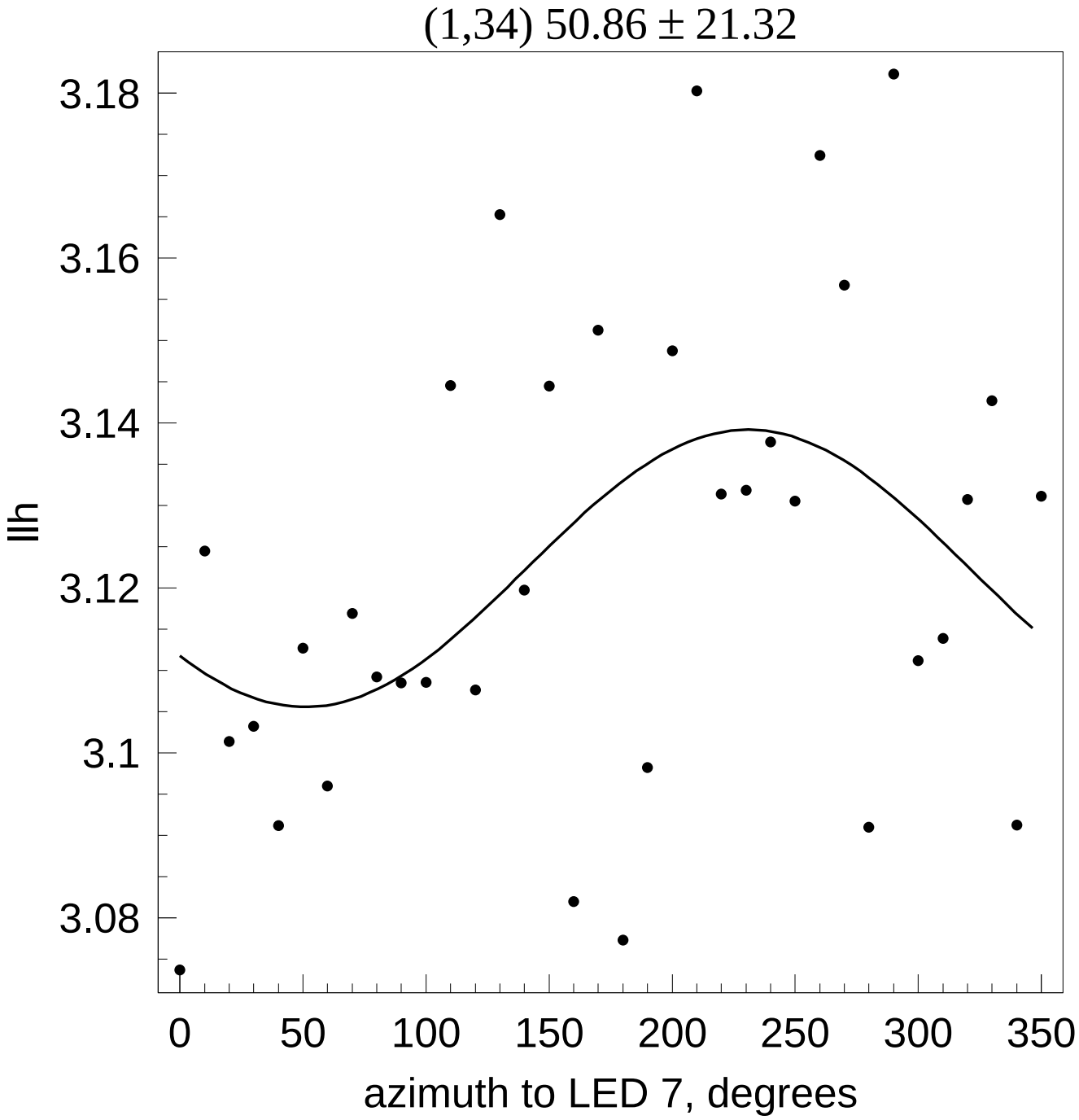

(1,33) 104.90 ± 1.14
11.2
11.1
11
10.9
10.8
10.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

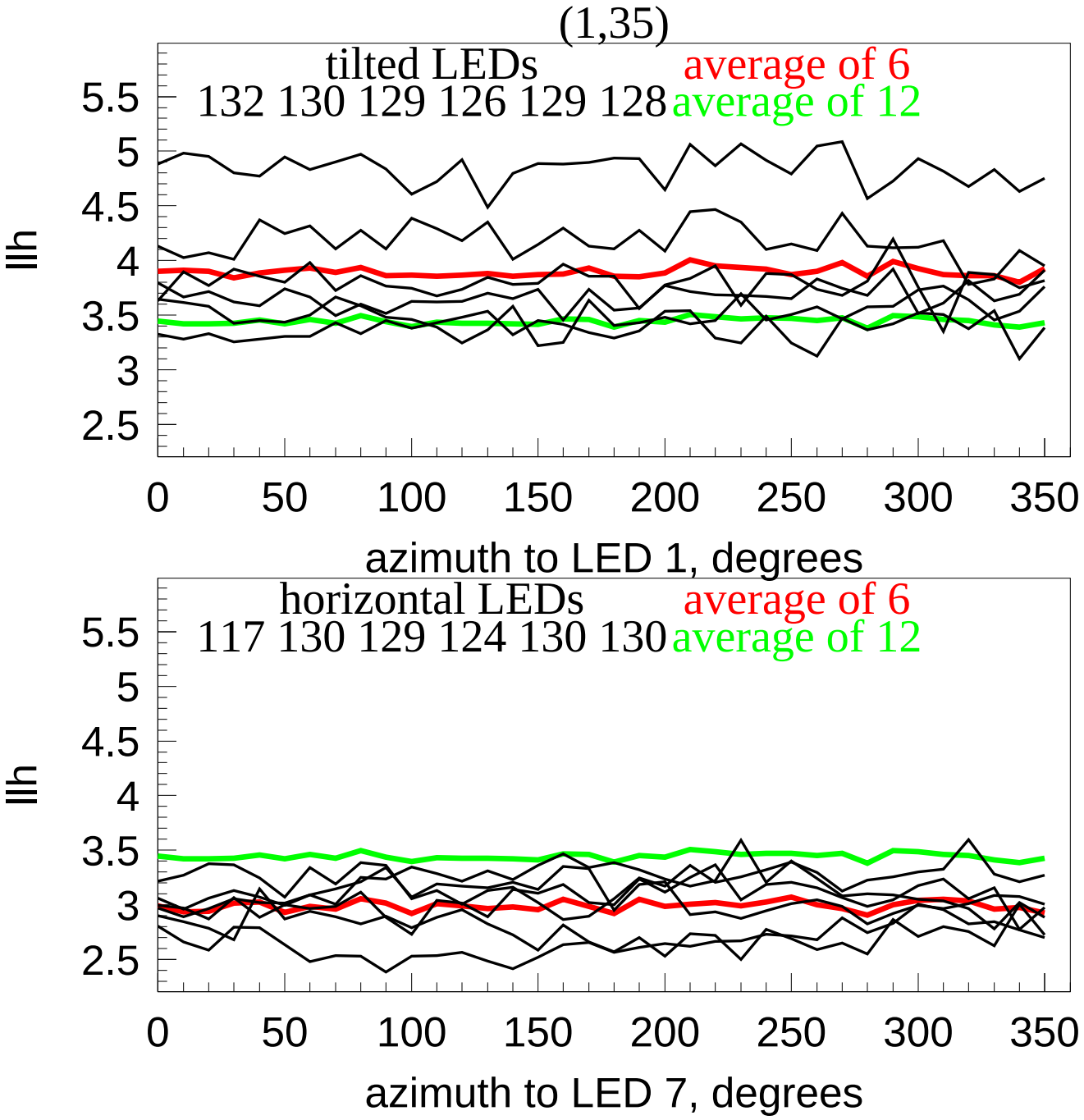

(1,33) 104.91 ± 1.40
11.2
11.1
11
10.9
10.8
10.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

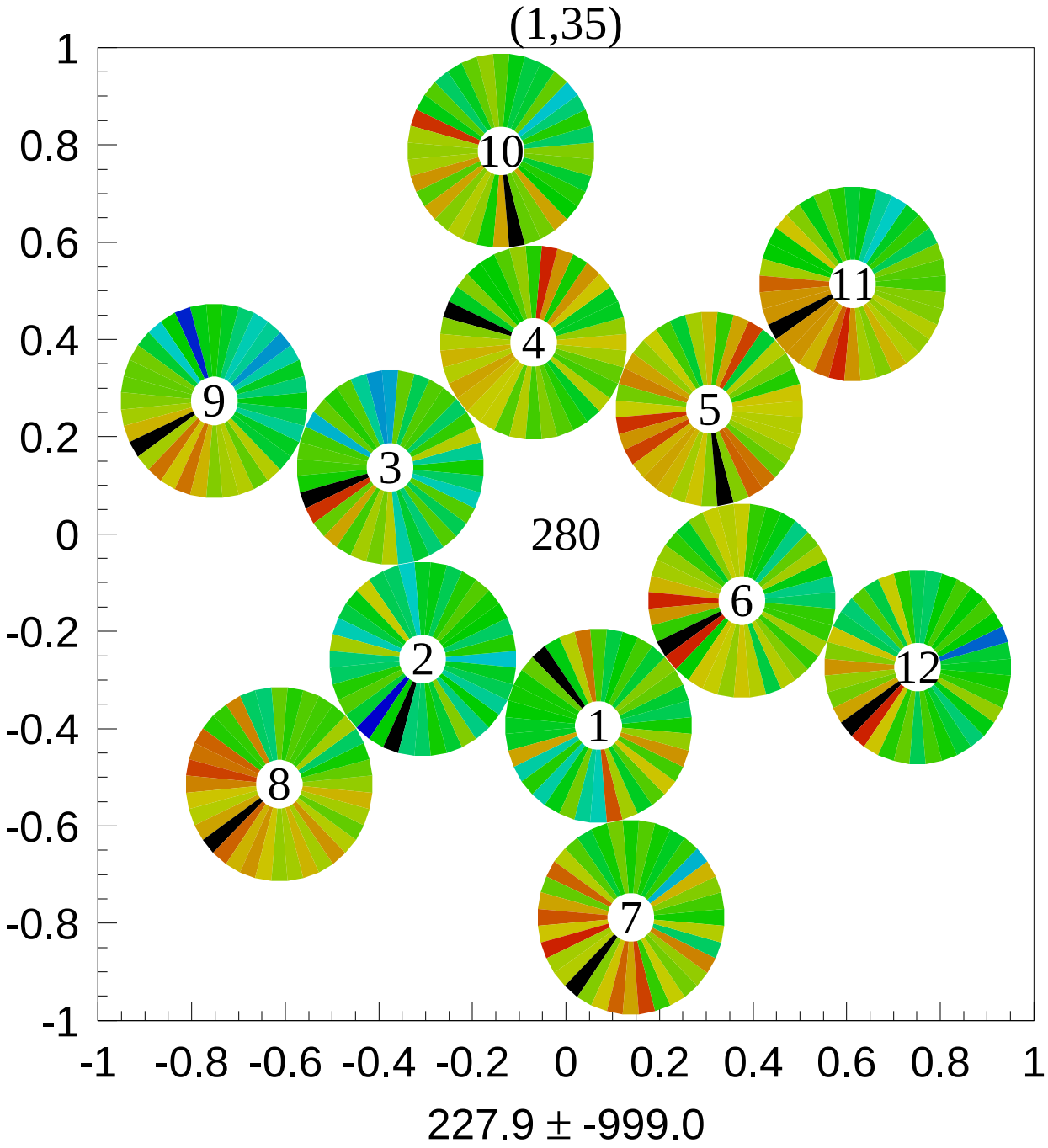

(1,34)
tilted LEDs
126 129 125 125 132 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 124 118 129 125 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

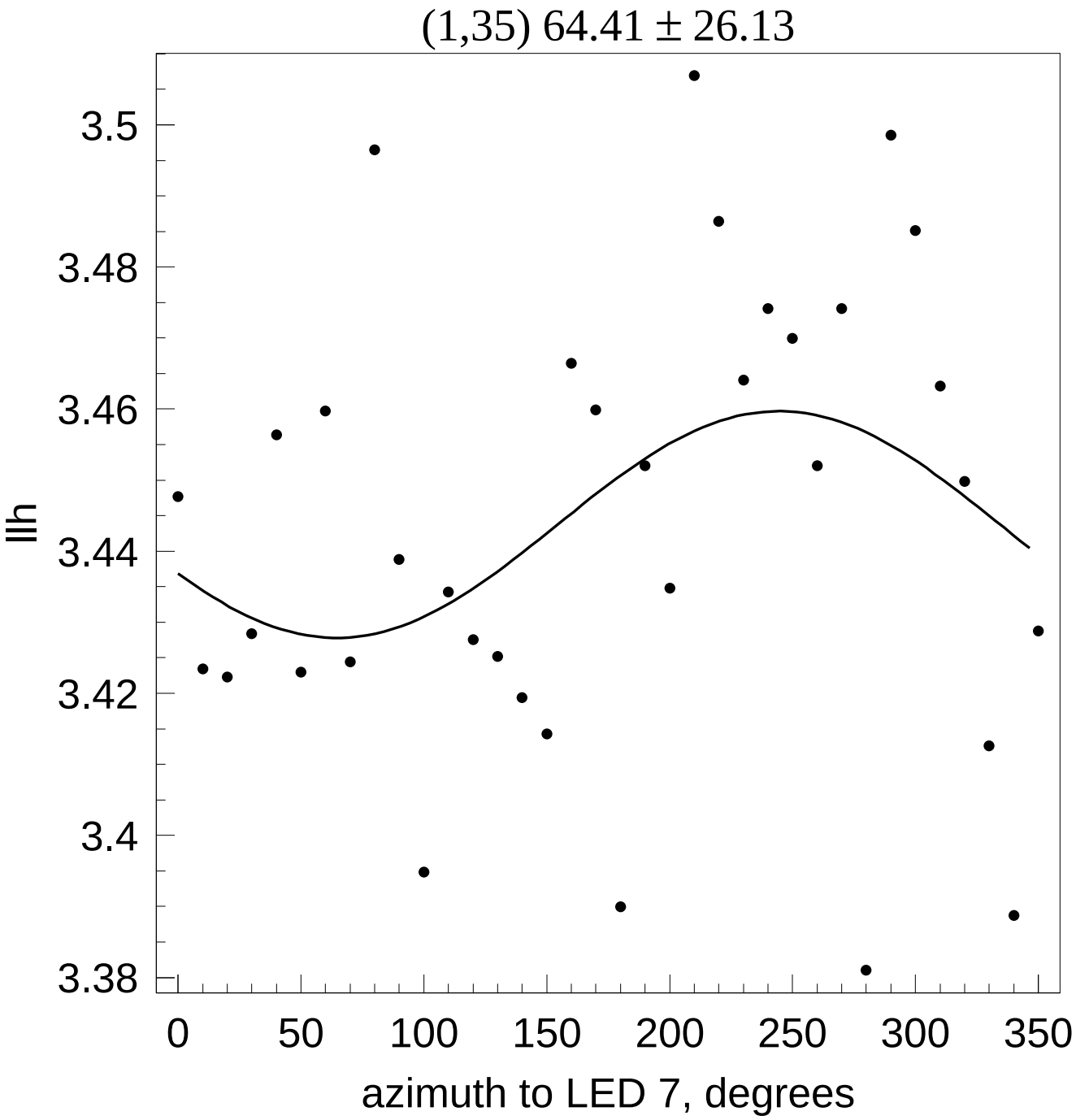

(1,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
249.9 ± -999.0
11
12
5
6
10
4
0
1
7
3
2
9
8

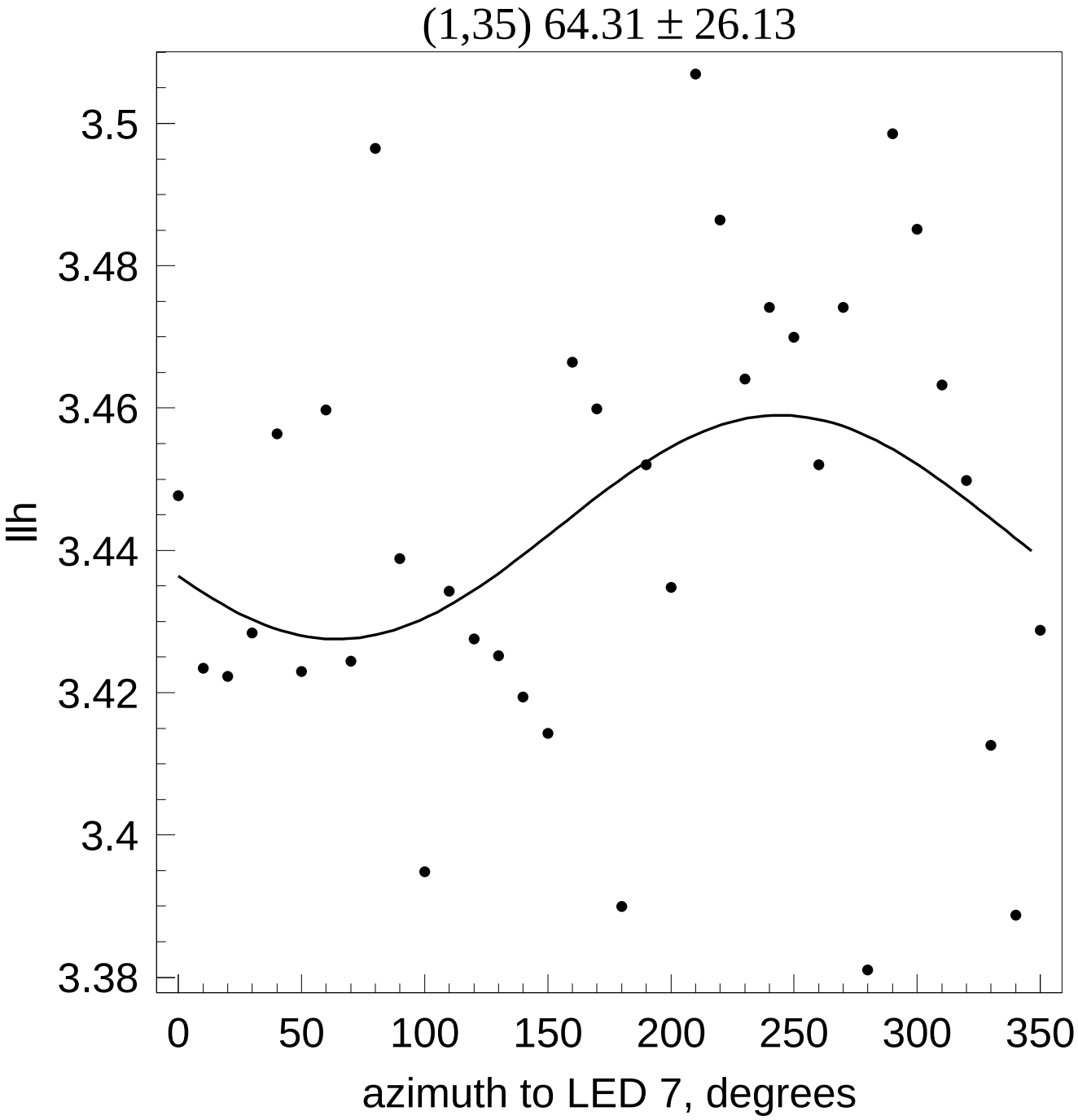

(1,34) 50.82 ± 20.72
3.18
3.16
3.14
3.12
3.1
3.08
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

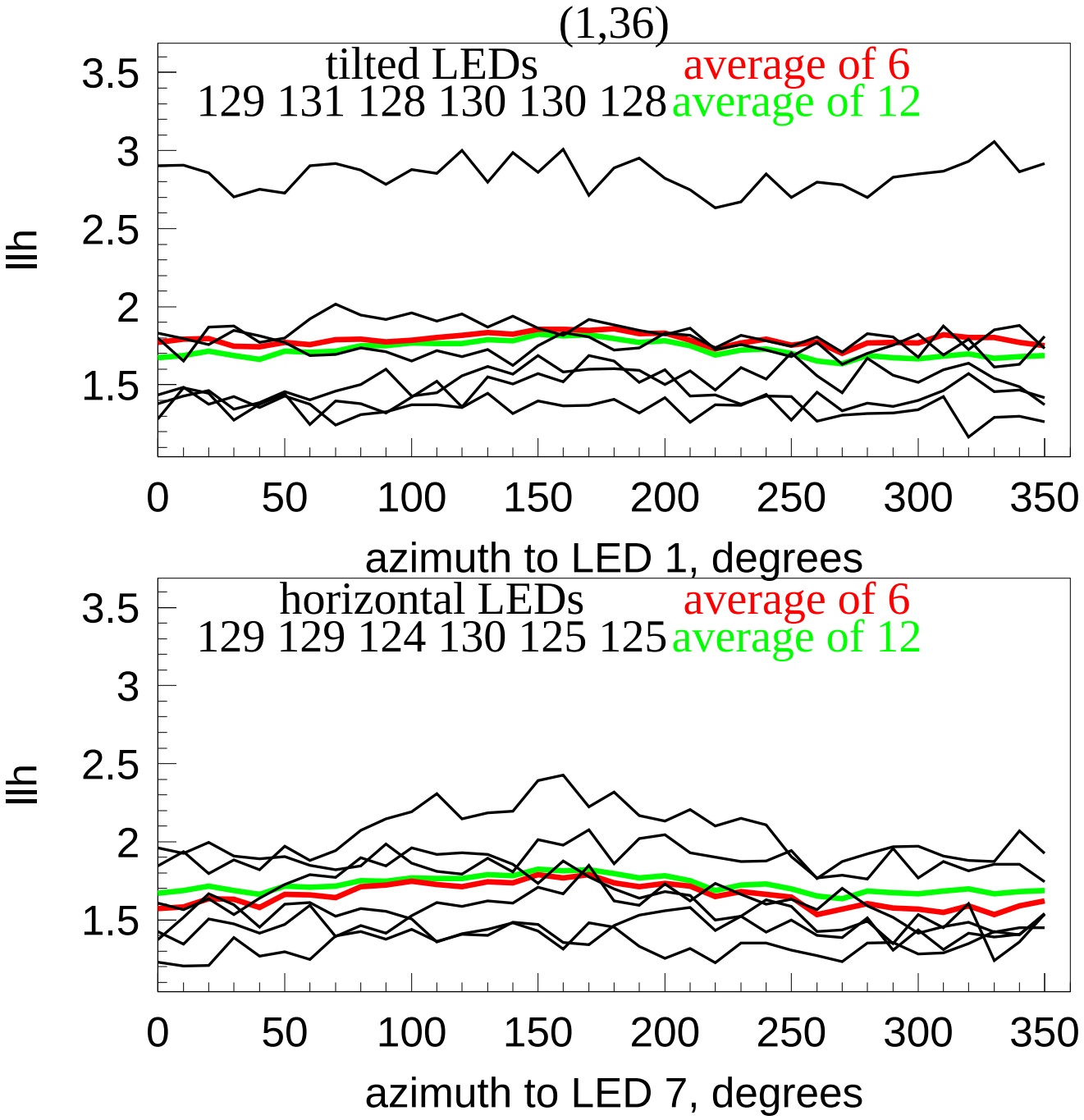

(1,34) 50.86 ± 21.32
3.18
3.16
3.14
3.12
3.1
3.08
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

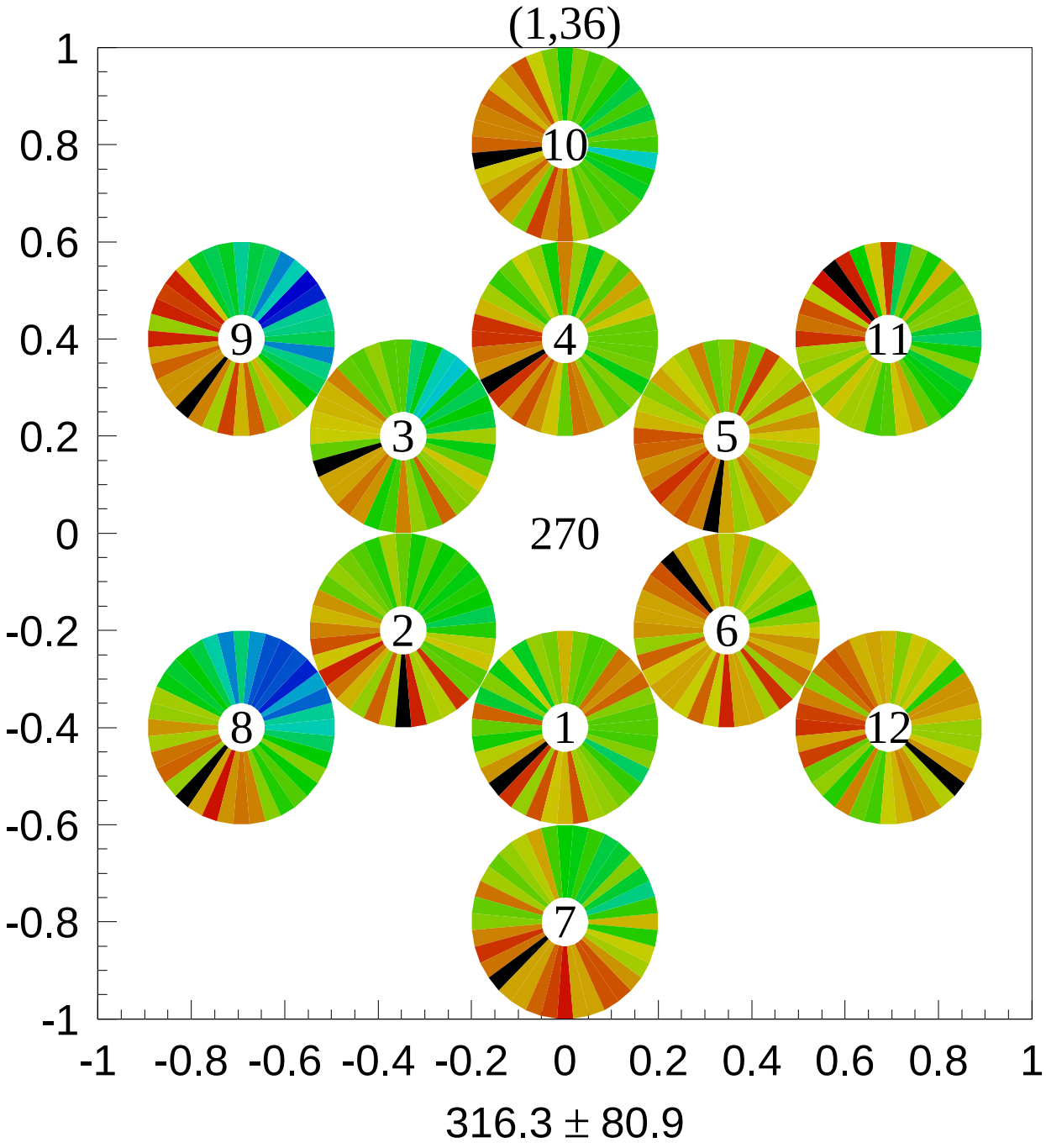

(1,35)
tilted LEDs
132 130 129 126 129 128
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
117 130 129 124 130 130
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

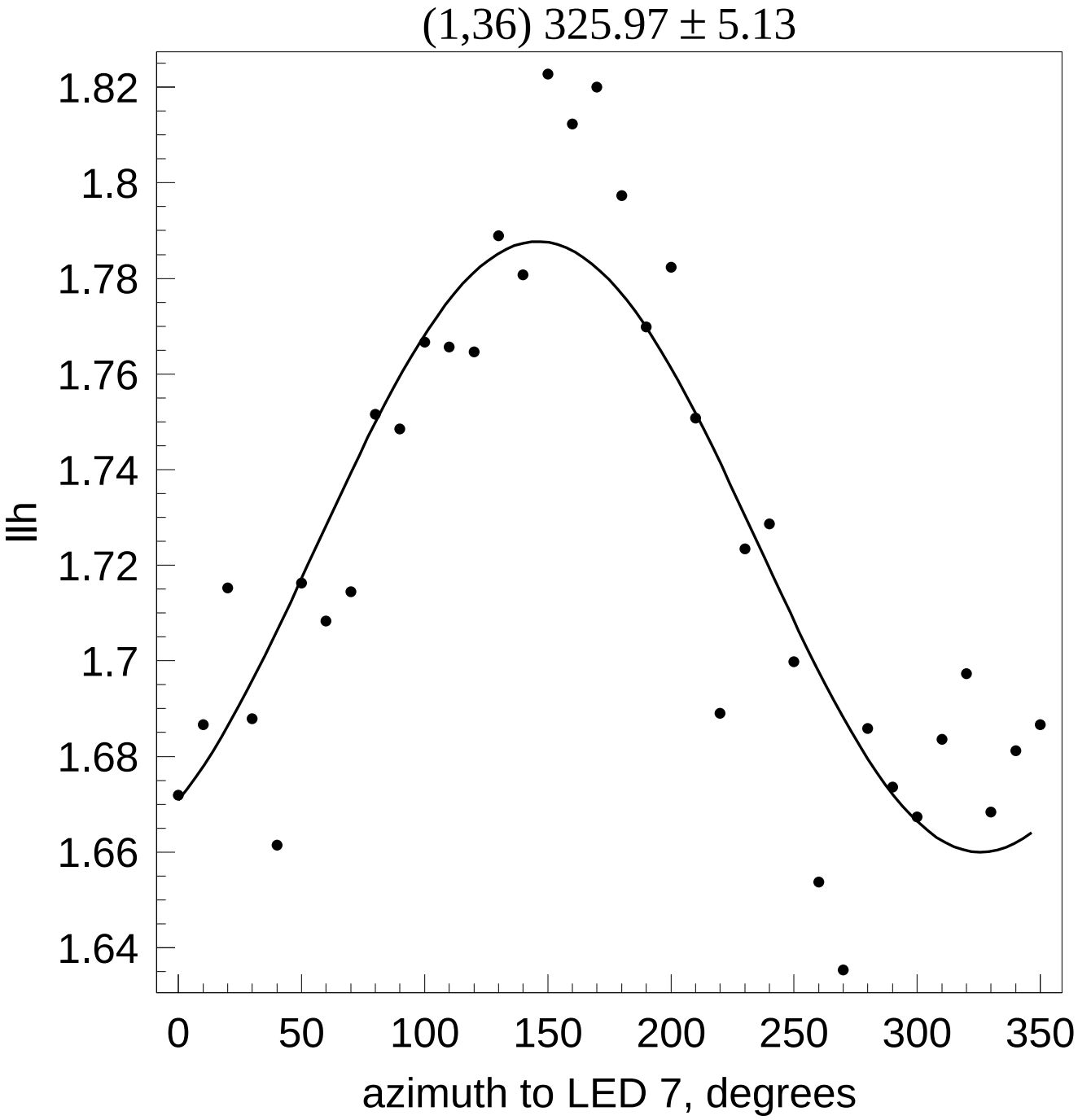

(1,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
227.9 ± -999.0
10
11
4
9
5
3
280
6
12
2
1
8
7

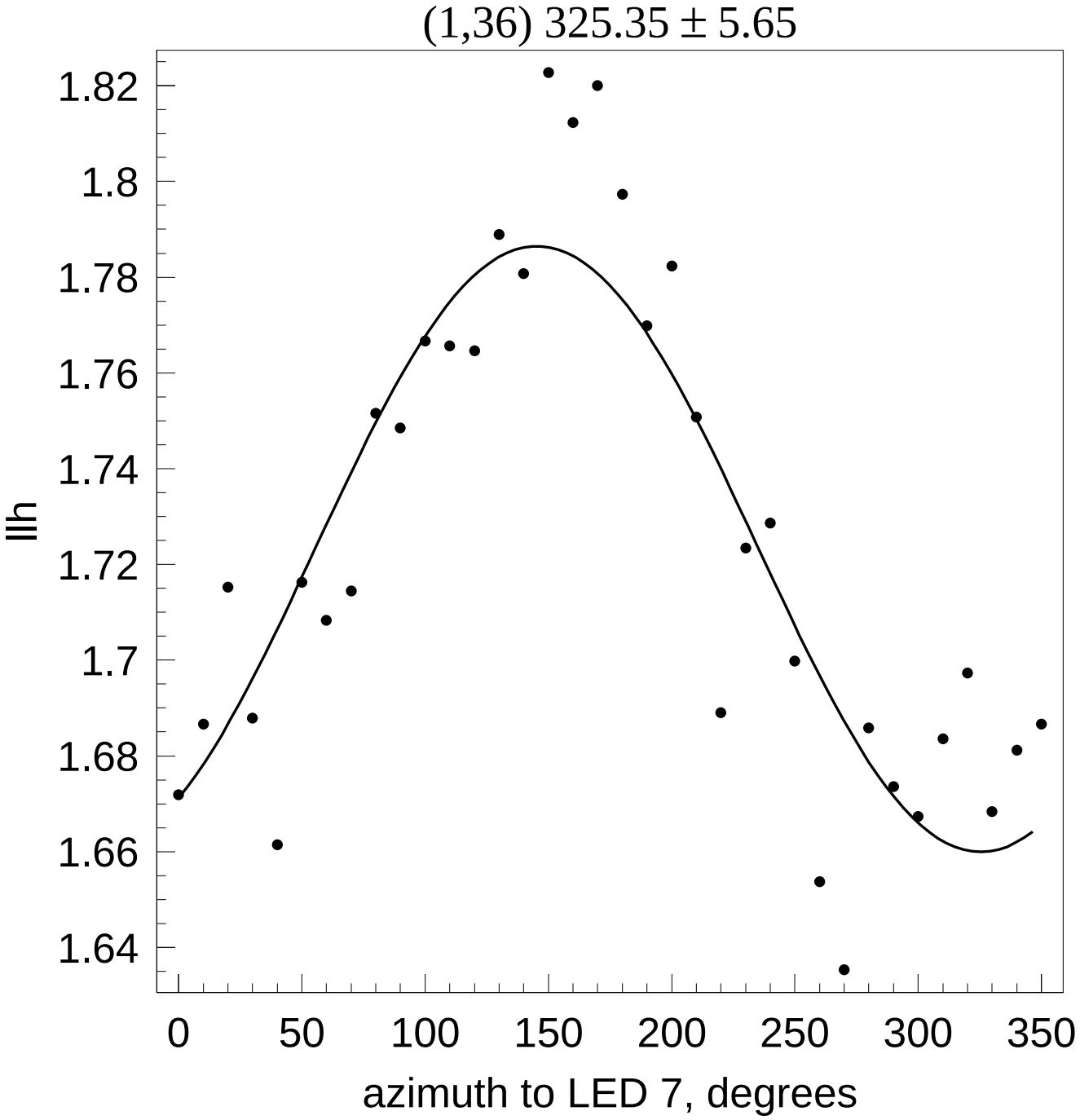

(1,35) 64.41 ± 26.13
3.5
3.48
3.46
3.44
3.42
3.4
3.38
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

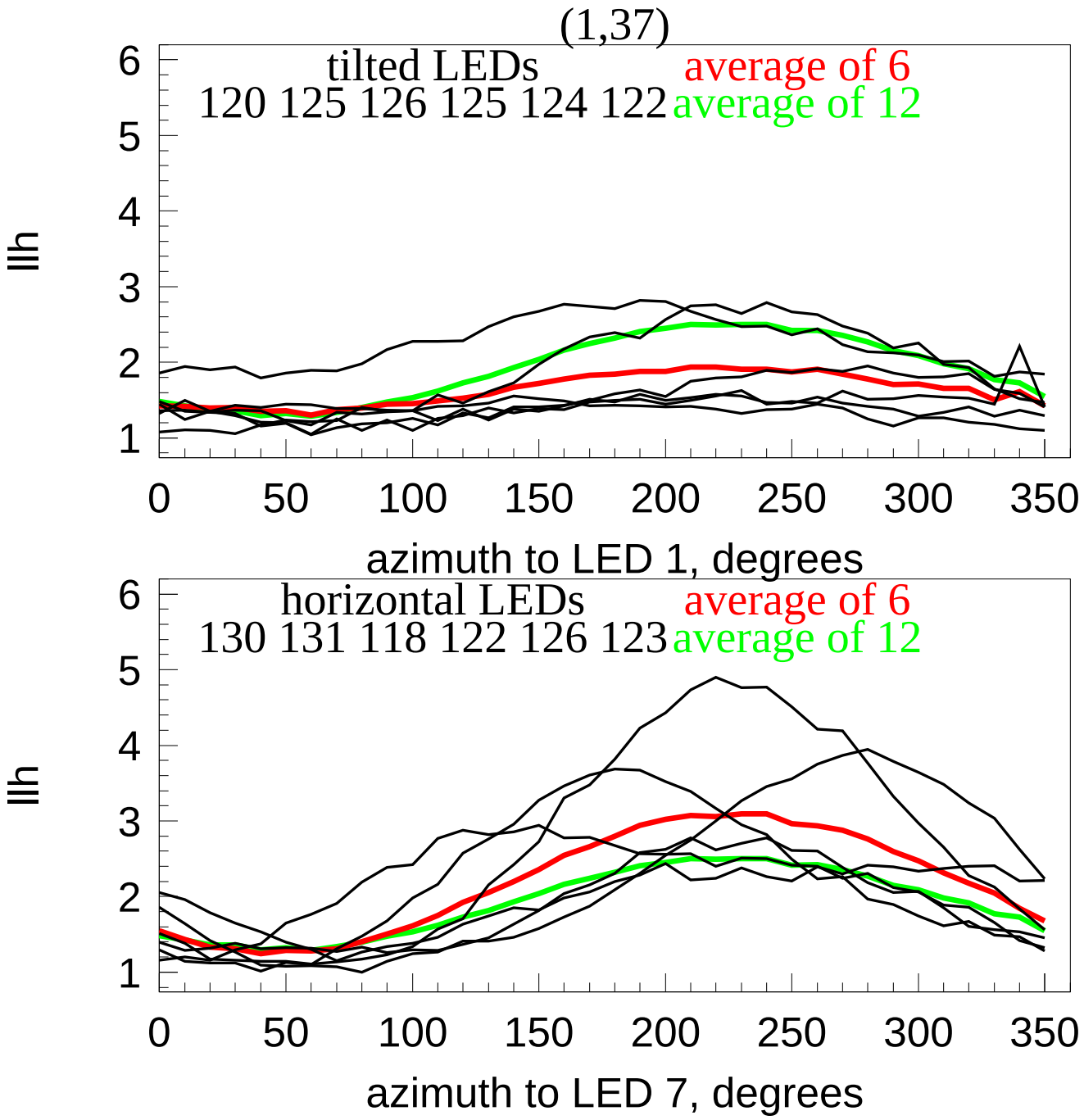

(1,35) 64.31 ± 26.13
3.5
3.48
3.46
3.44
3.42
3.4
3.38
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

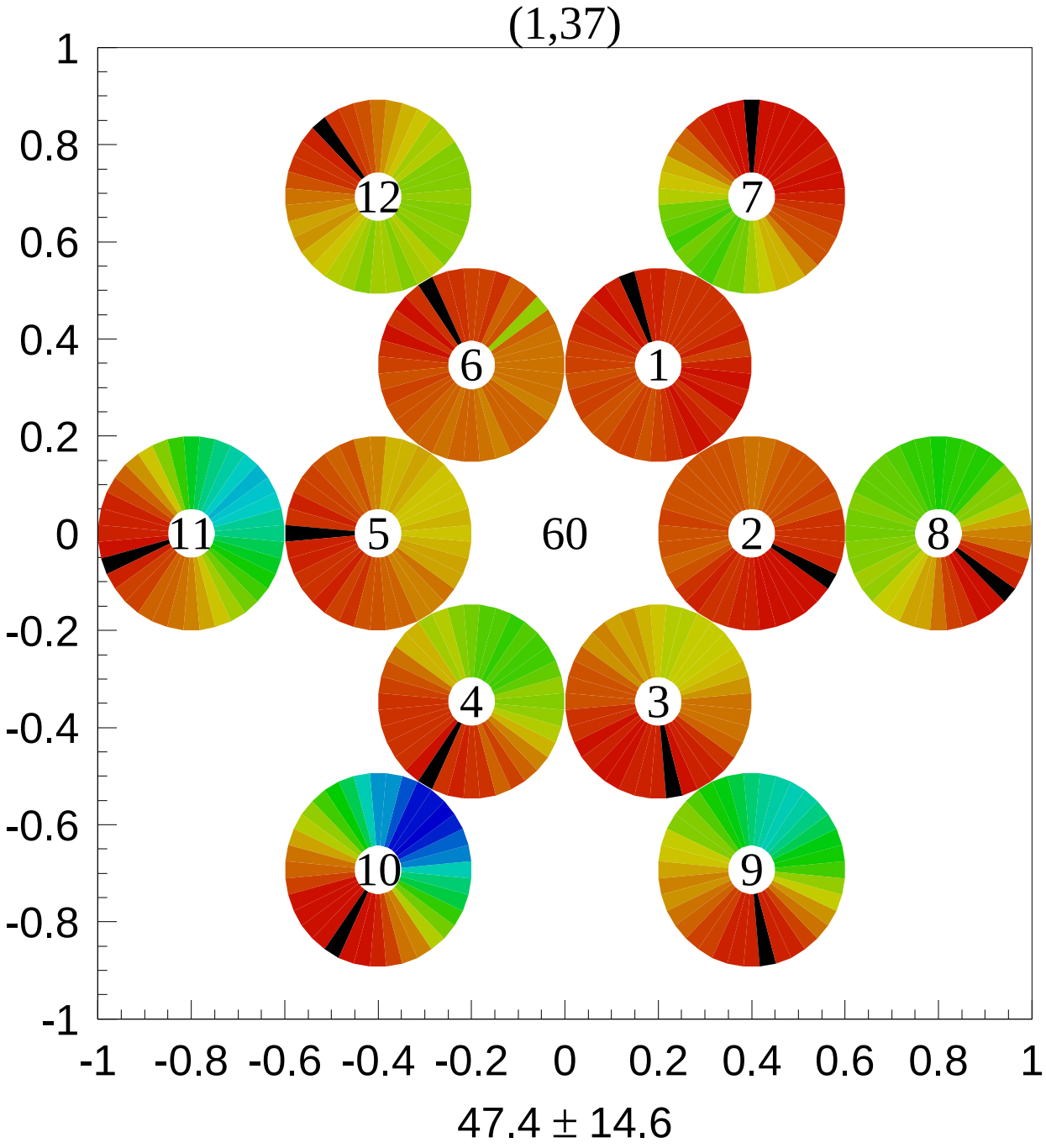

(1,36)
tilted LEDs
129 131 128 130 130 128
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 129 124 130 125 125
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

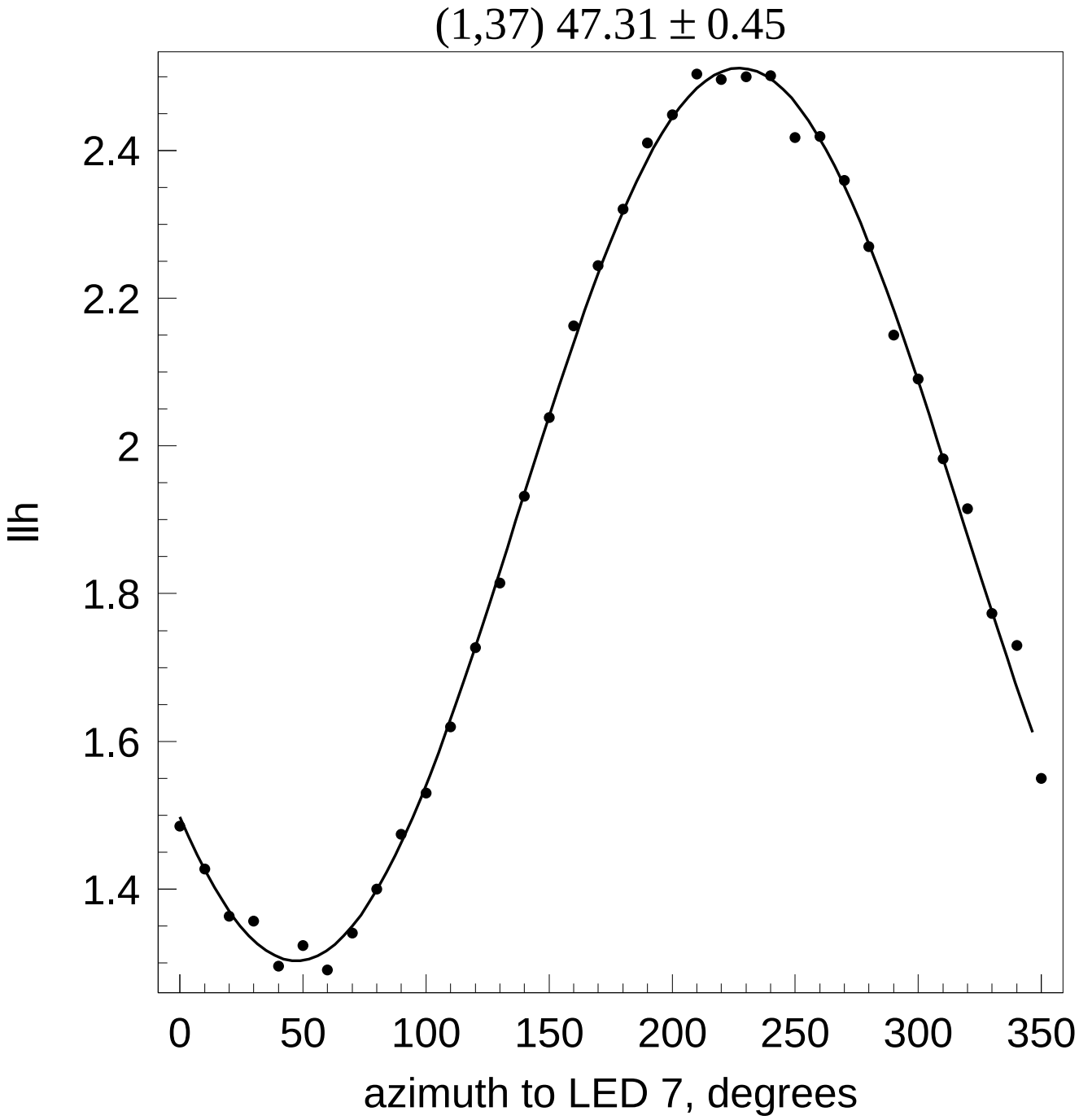

(1,36)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
316.3 ± 80.9

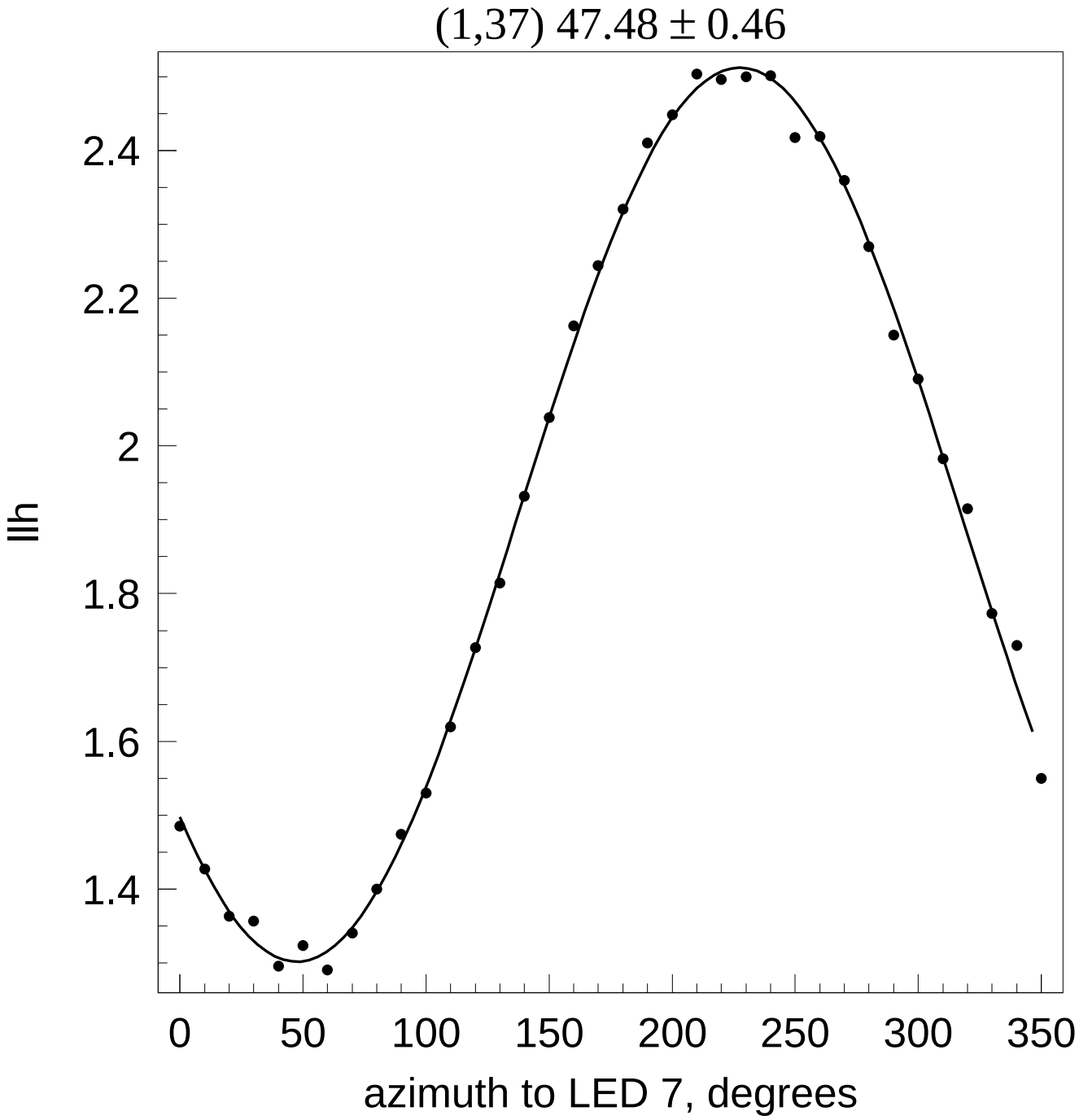

(1,36) 325.97 ± 5.13
1.82
1.8
1.78
1.76
1.74
1.72
1.7
1.68
1.66
1.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

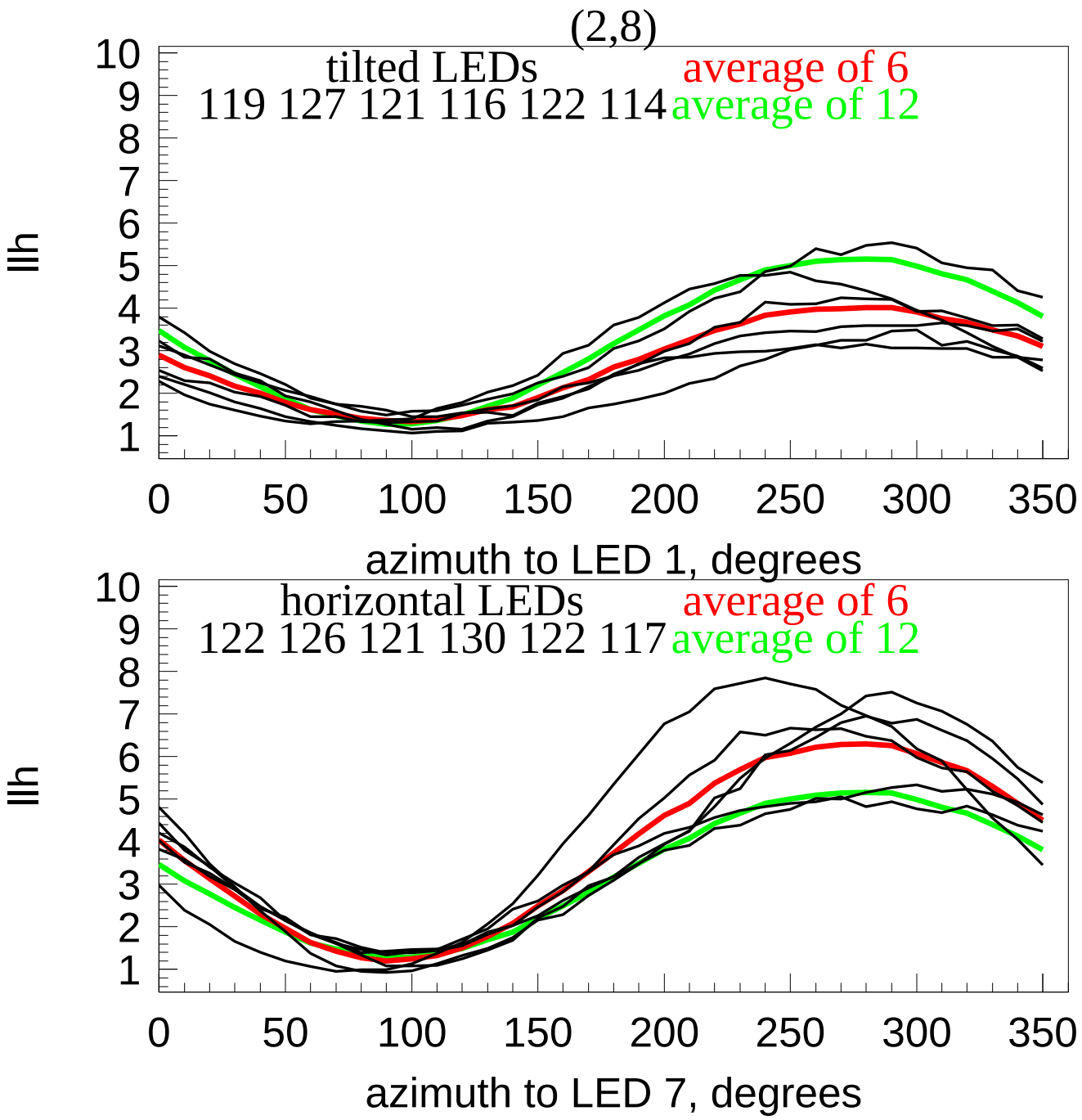

(1,36) 325.35 ± 5.65
1.82
1.8
1.78
1.76
1.74
1.72
1.7
1.68
1.66
1.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

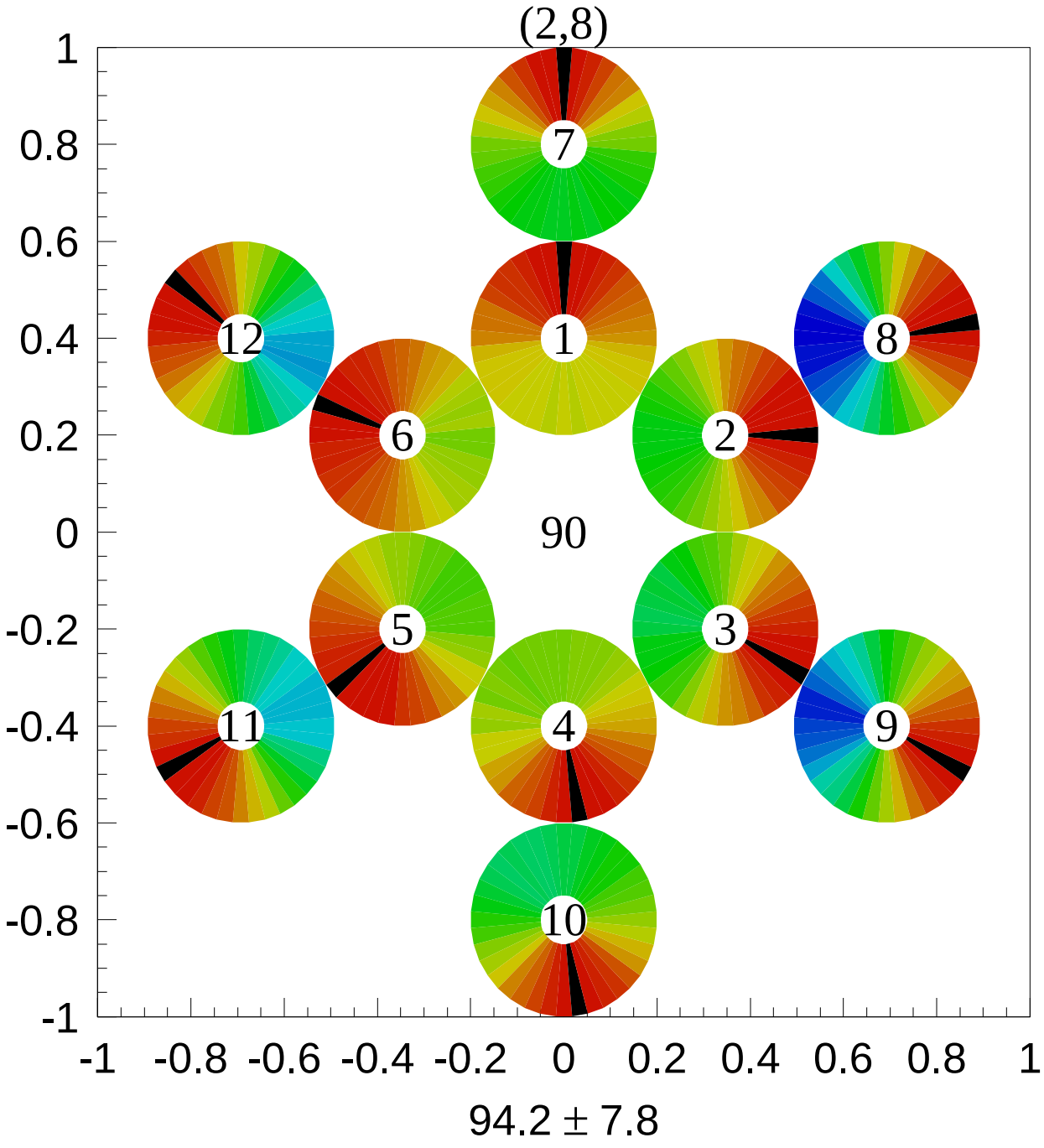

(1,37)
tilted LEDs
120 125 126 125 124 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 131 118 122 126 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

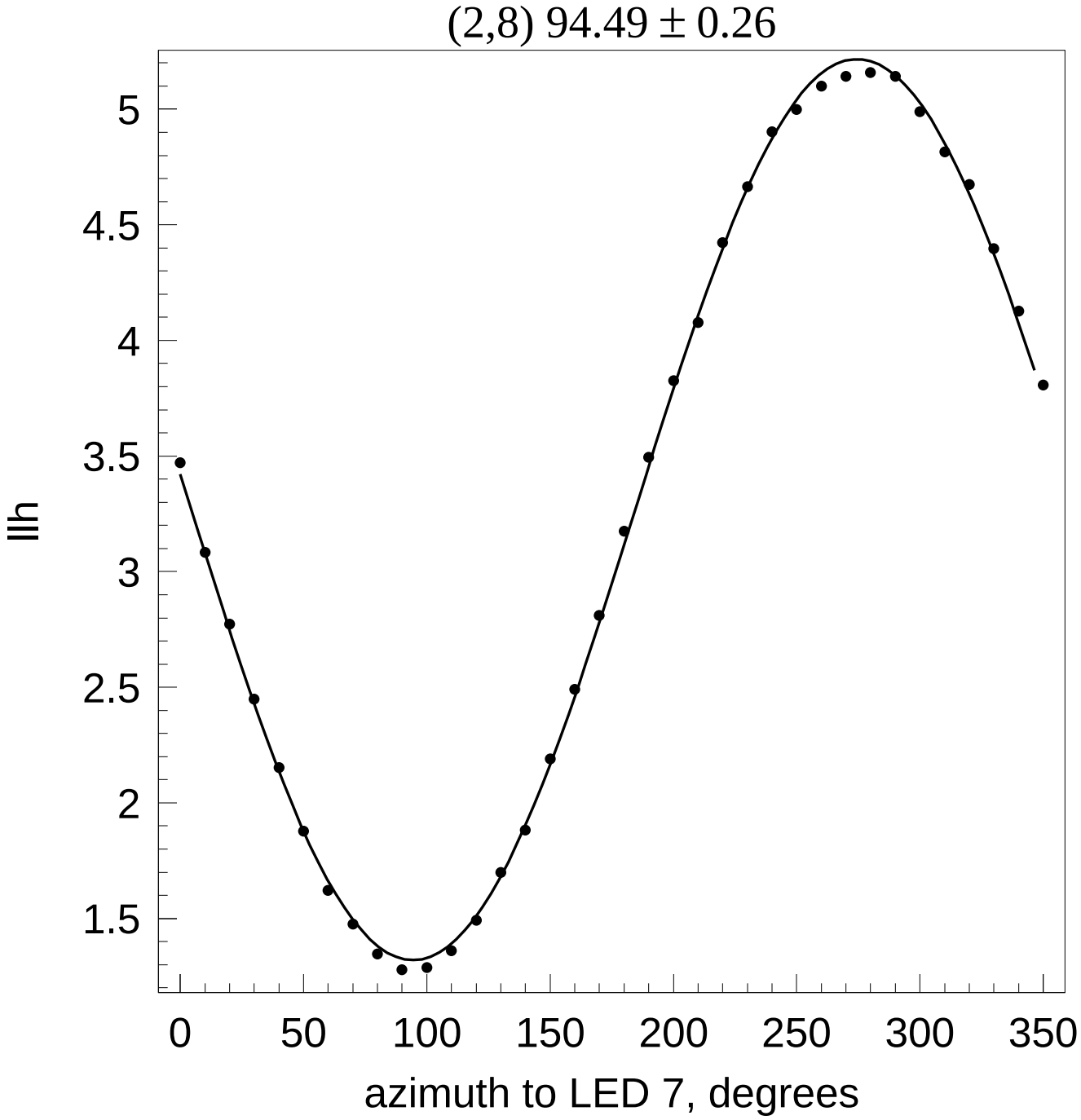

(1,37)
12
7
6
1
11
5
60
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
47.4 ± 14.6

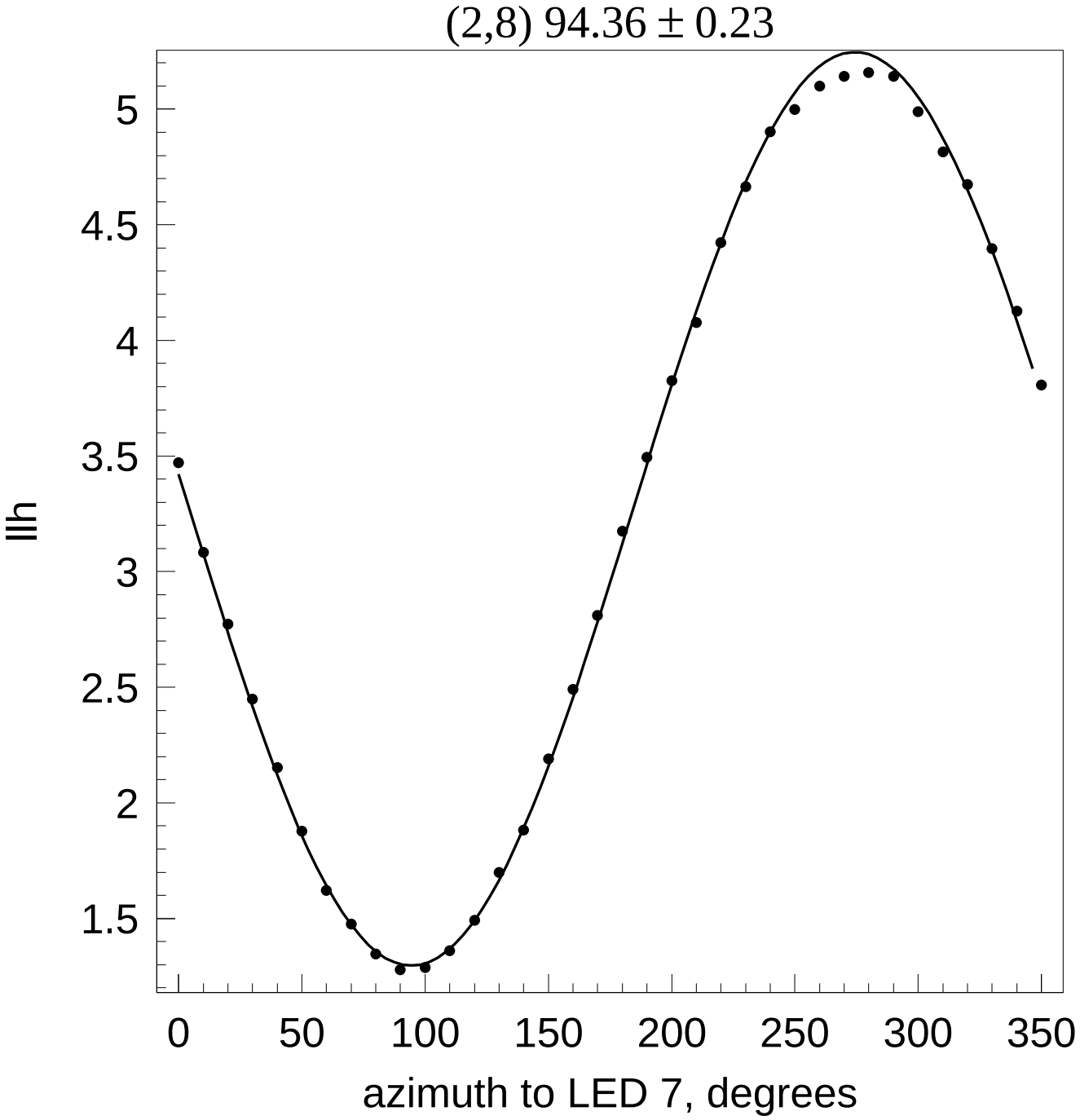

(1,37) 47.31 ± 0.45
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

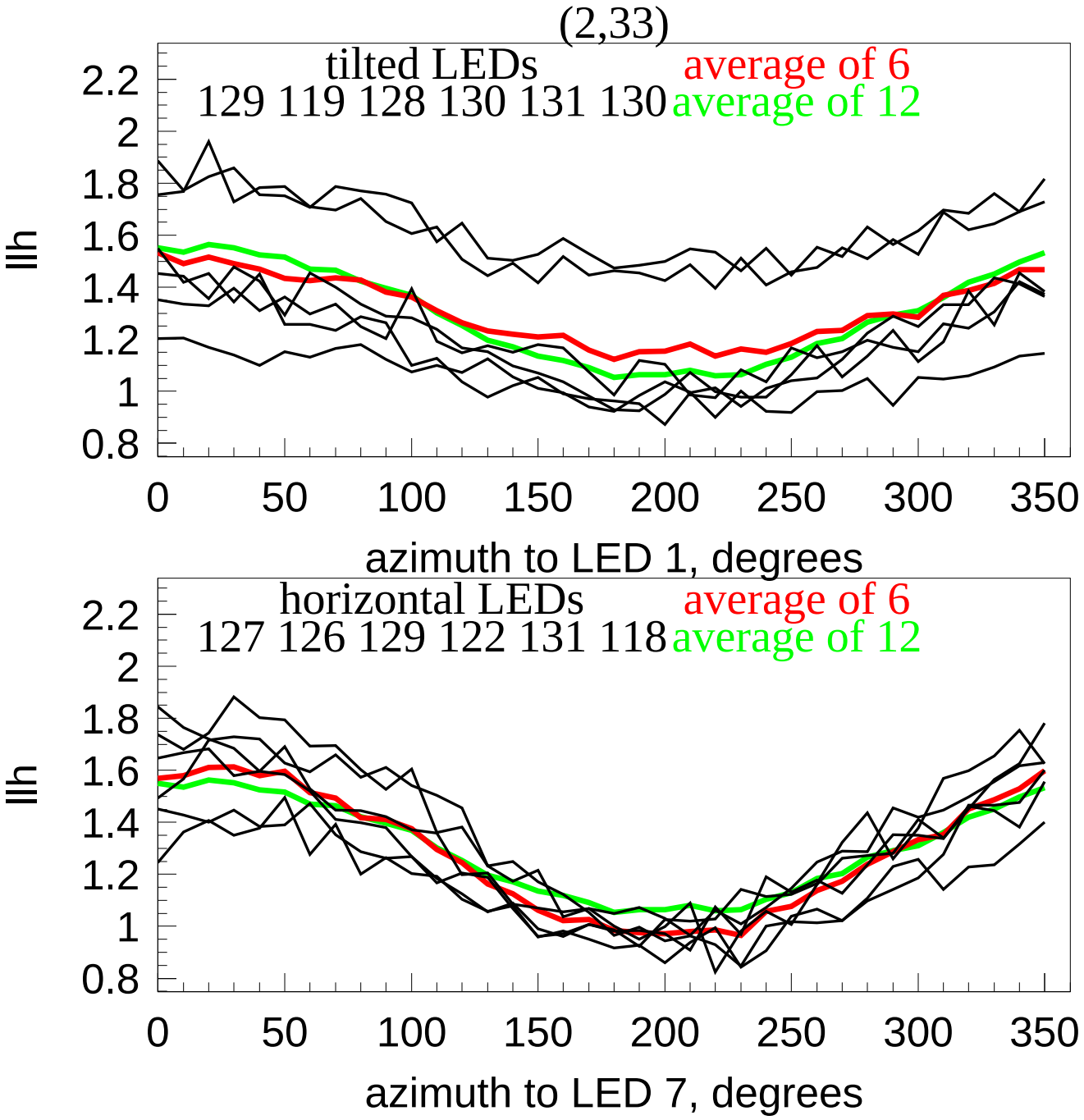

(1,37) 47.48 ± 0.46
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

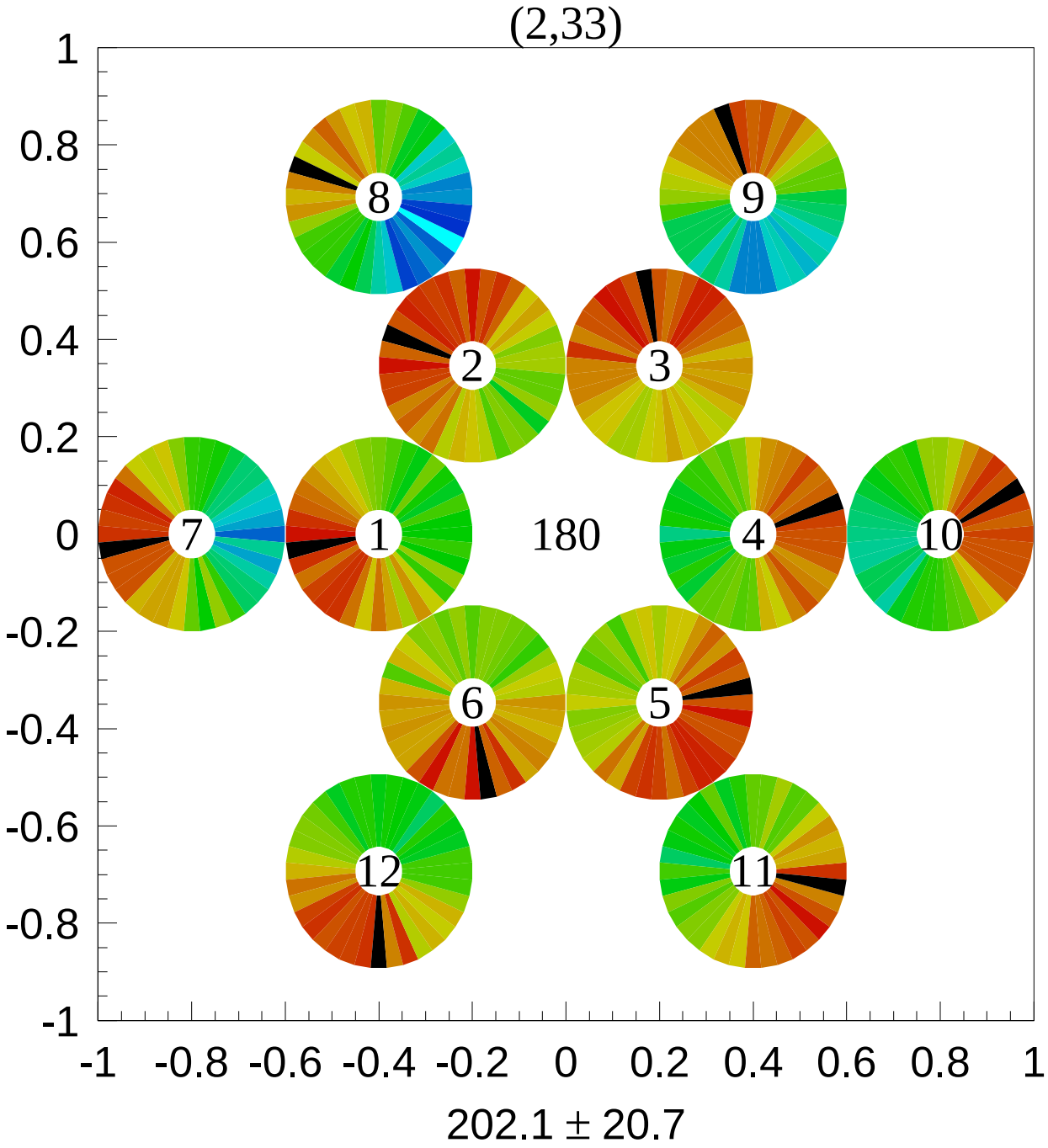

(2,8)
tilted LEDs
119 127 121 116 122 114
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
122 126 121 130 122 117
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

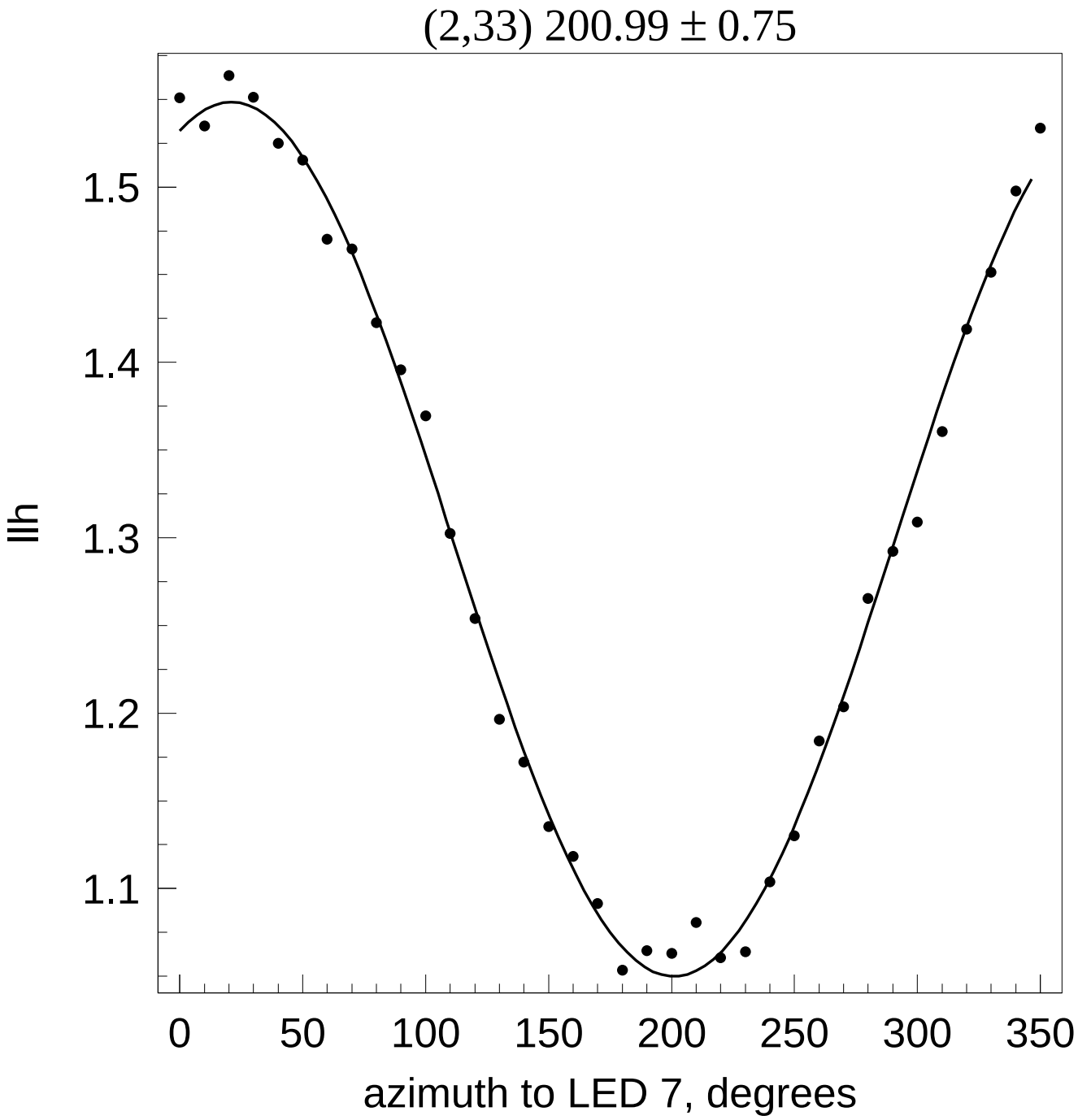

(2,8)
7
12
1
8
6
2
90
5
3
11
4
9
10
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
94.2 ± 7.8

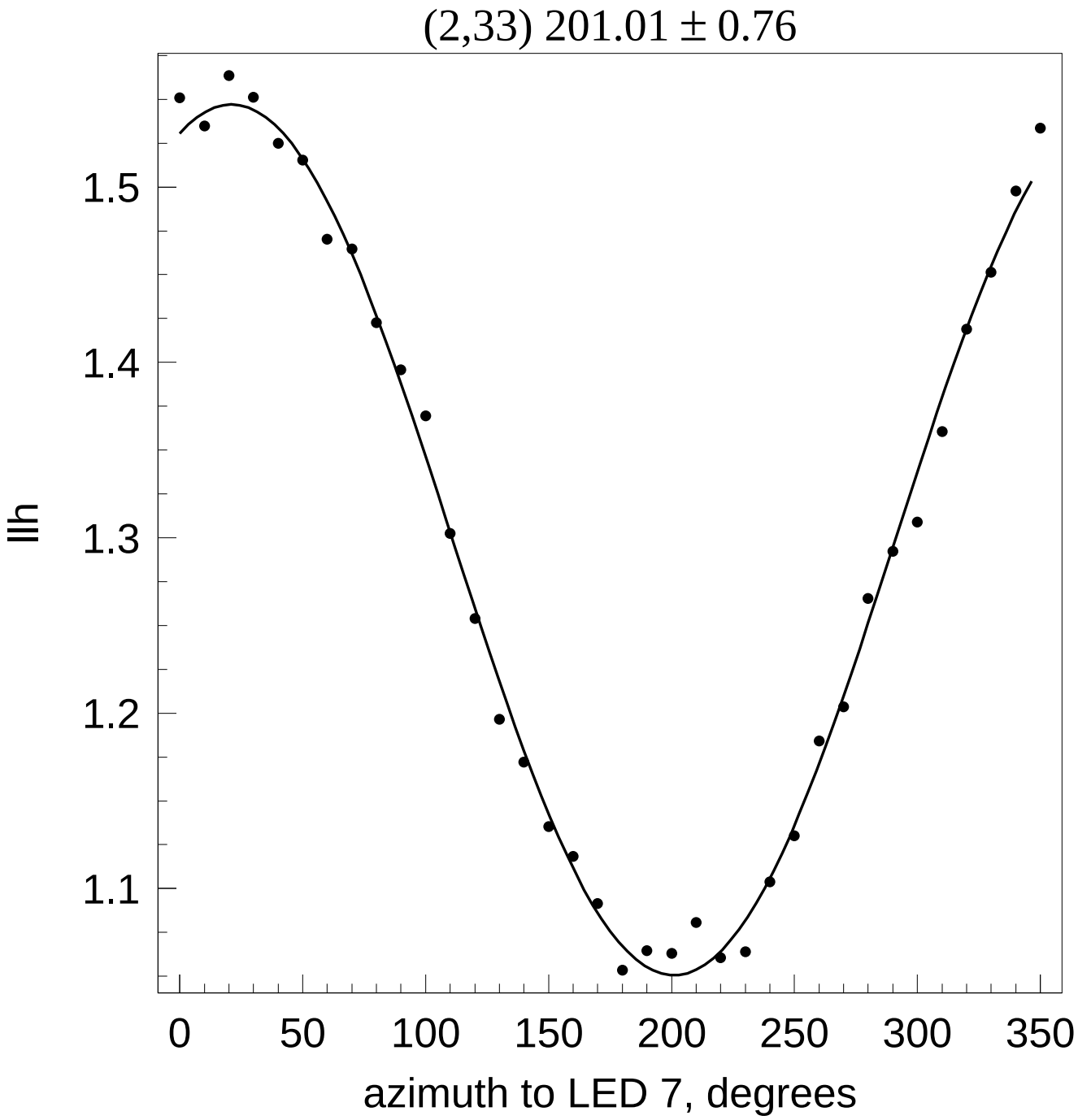

(2,8) 94.49 ± 0.26
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

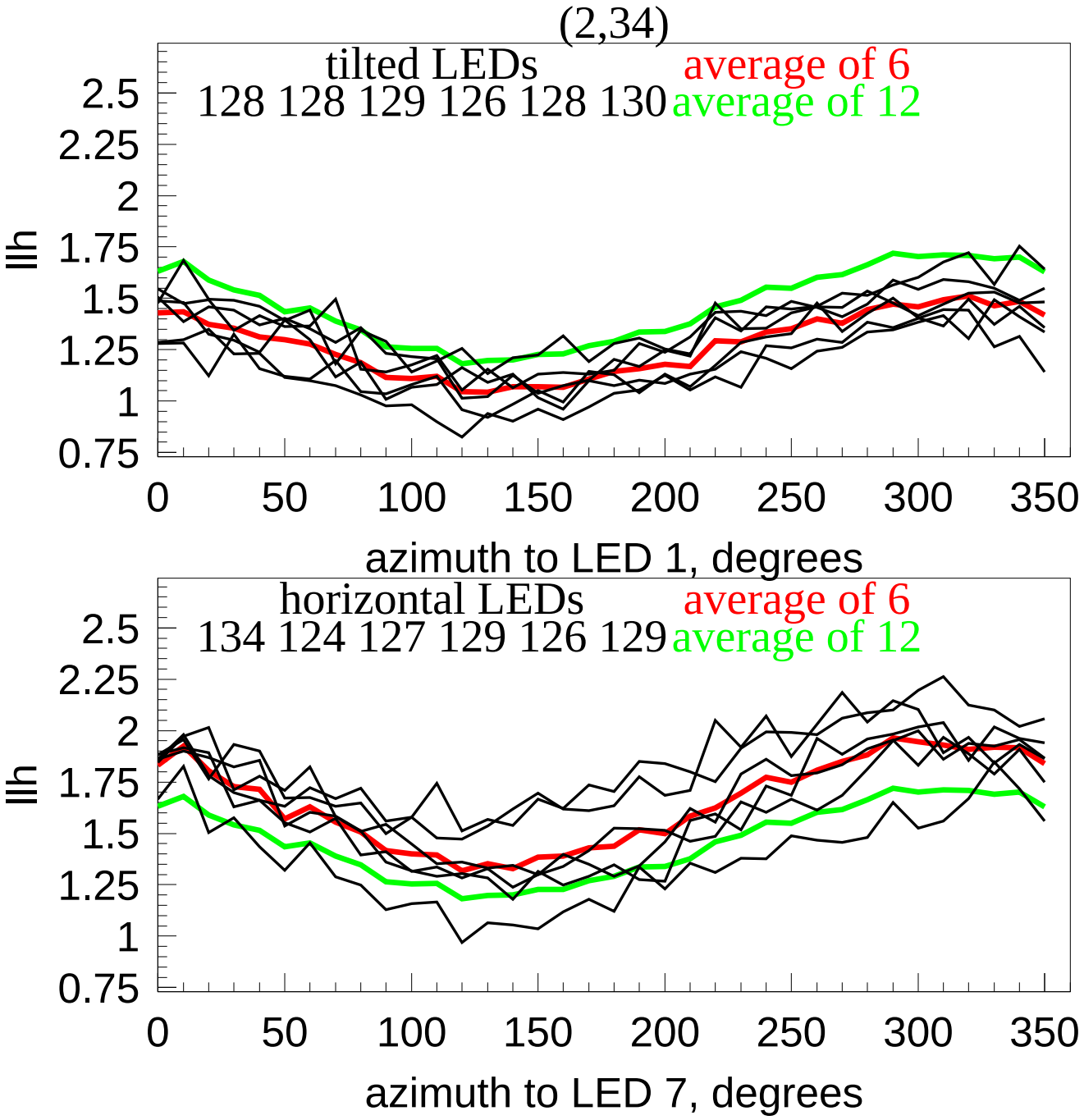

(2,8) 94.36 ± 0.23
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

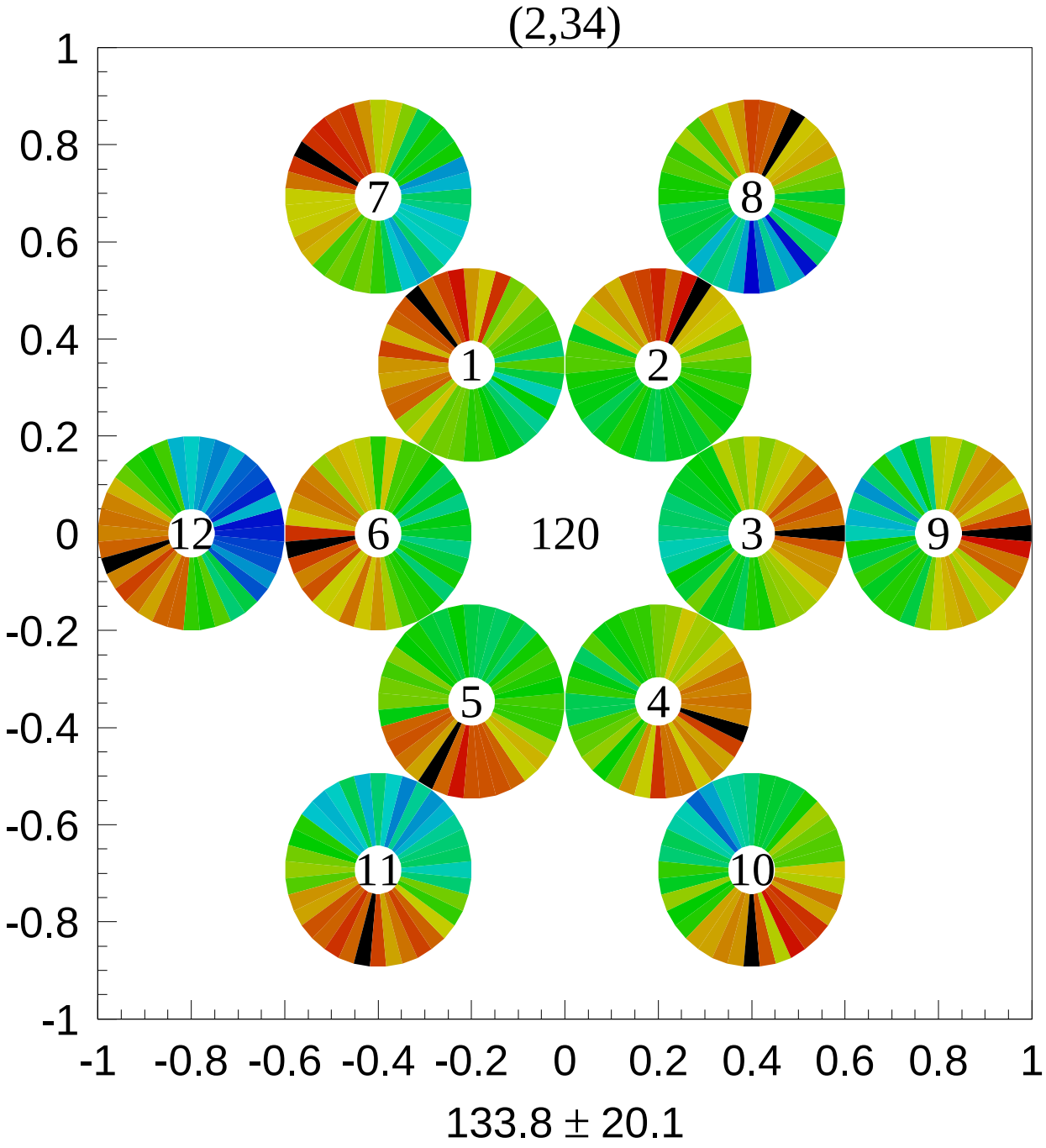

(2,33)
tilted LEDs
129 119 128 130 131 130
average of 6
average of 12
Ilh
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 126 129 122 131 118
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

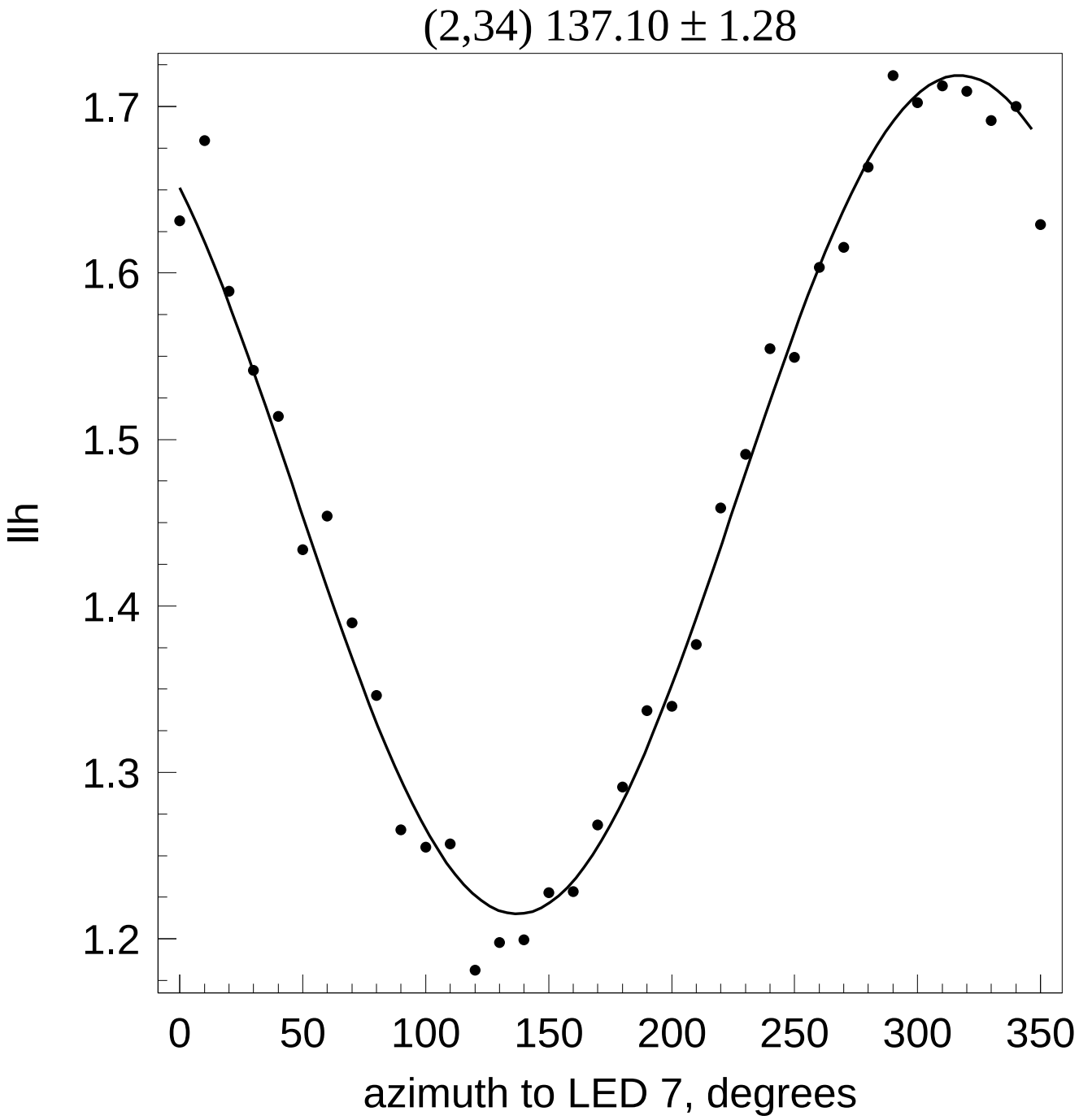

(2,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
202.1 ± 20.7

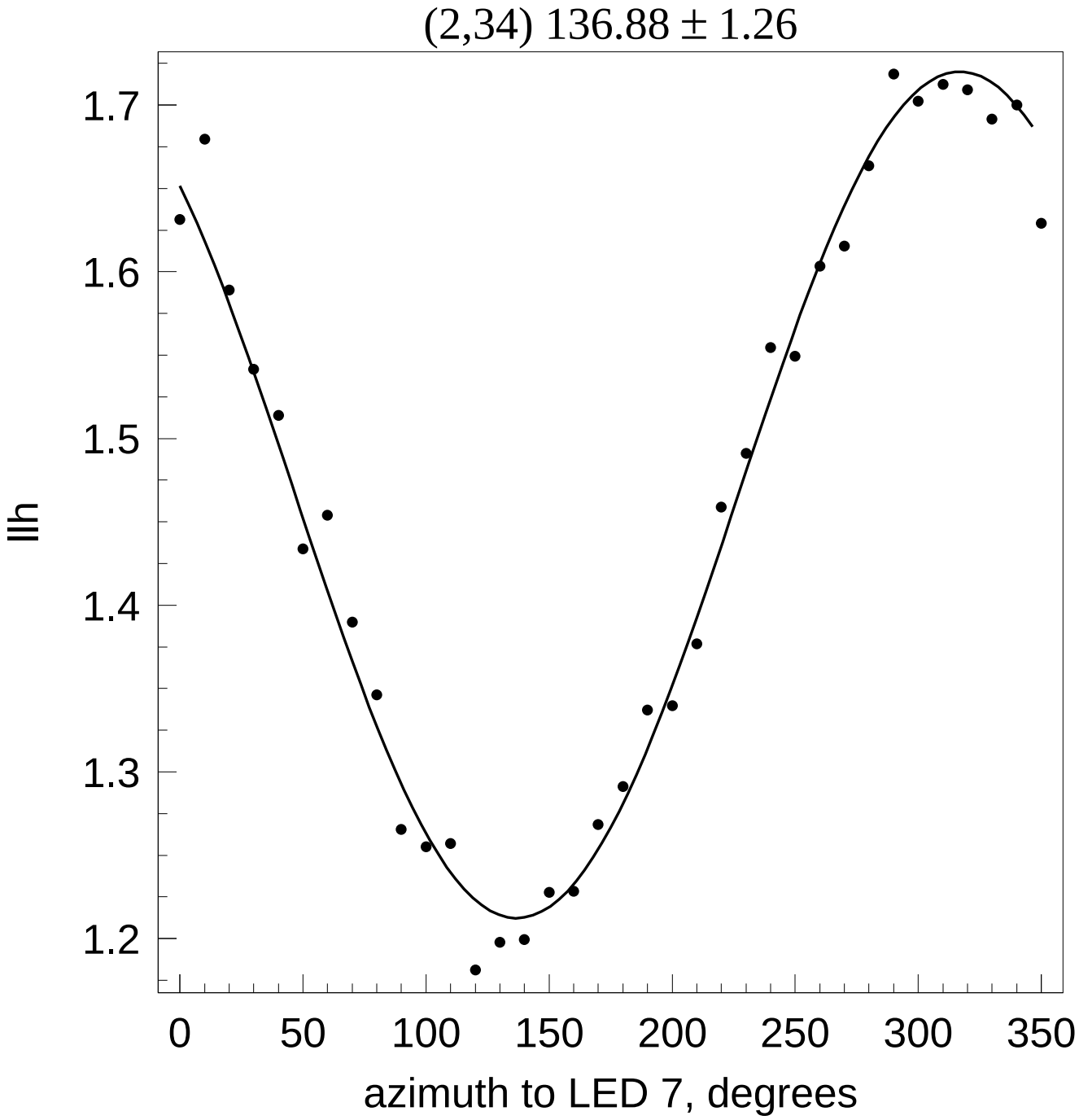

(2,33) 200.99 ± 0.75
1.5
1.4
1.3
1.2
1.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

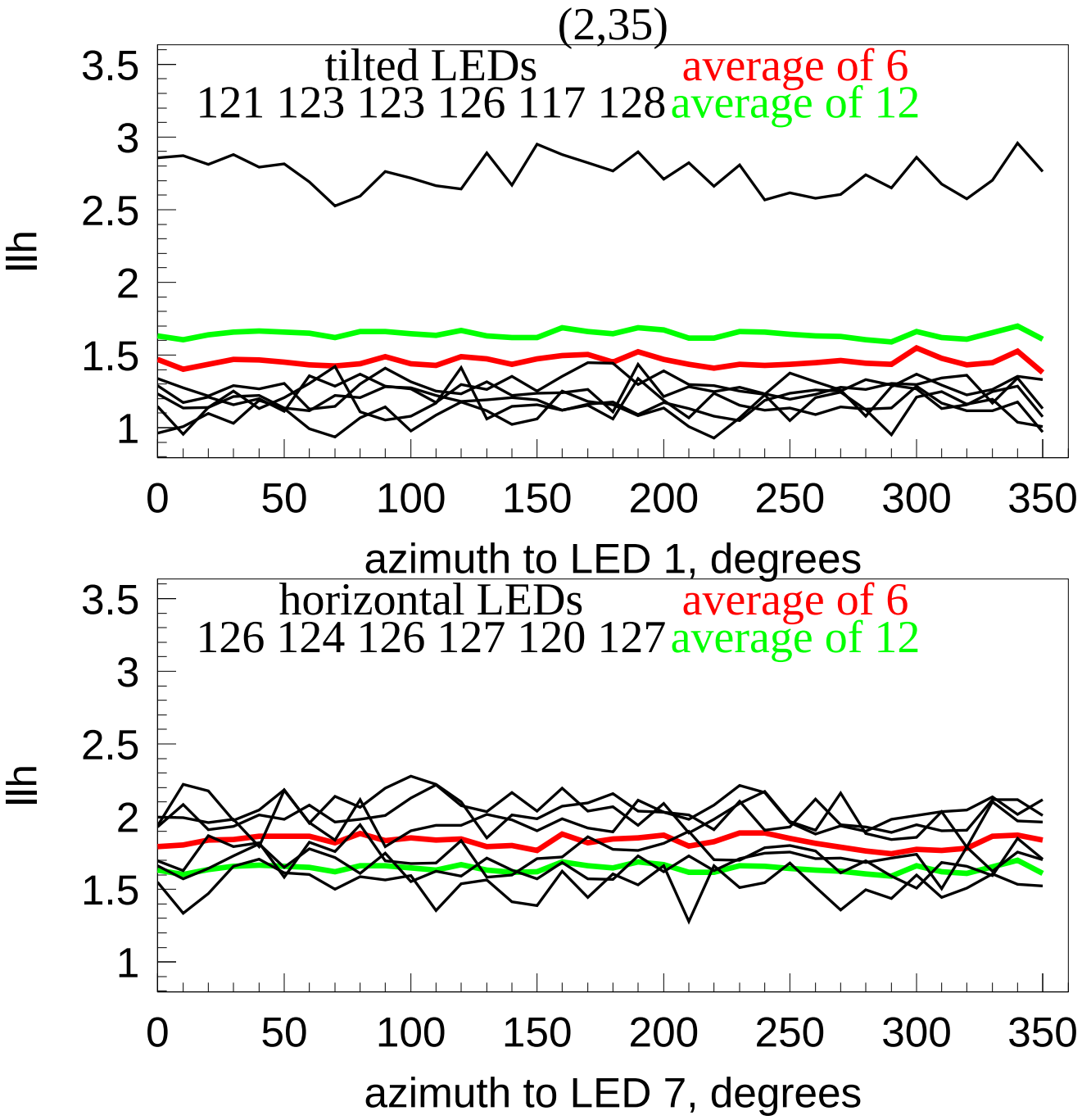

(2,33) 201.01 ± 0.76
1.5
1.4
1.3
1.2
1.1
Ilh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

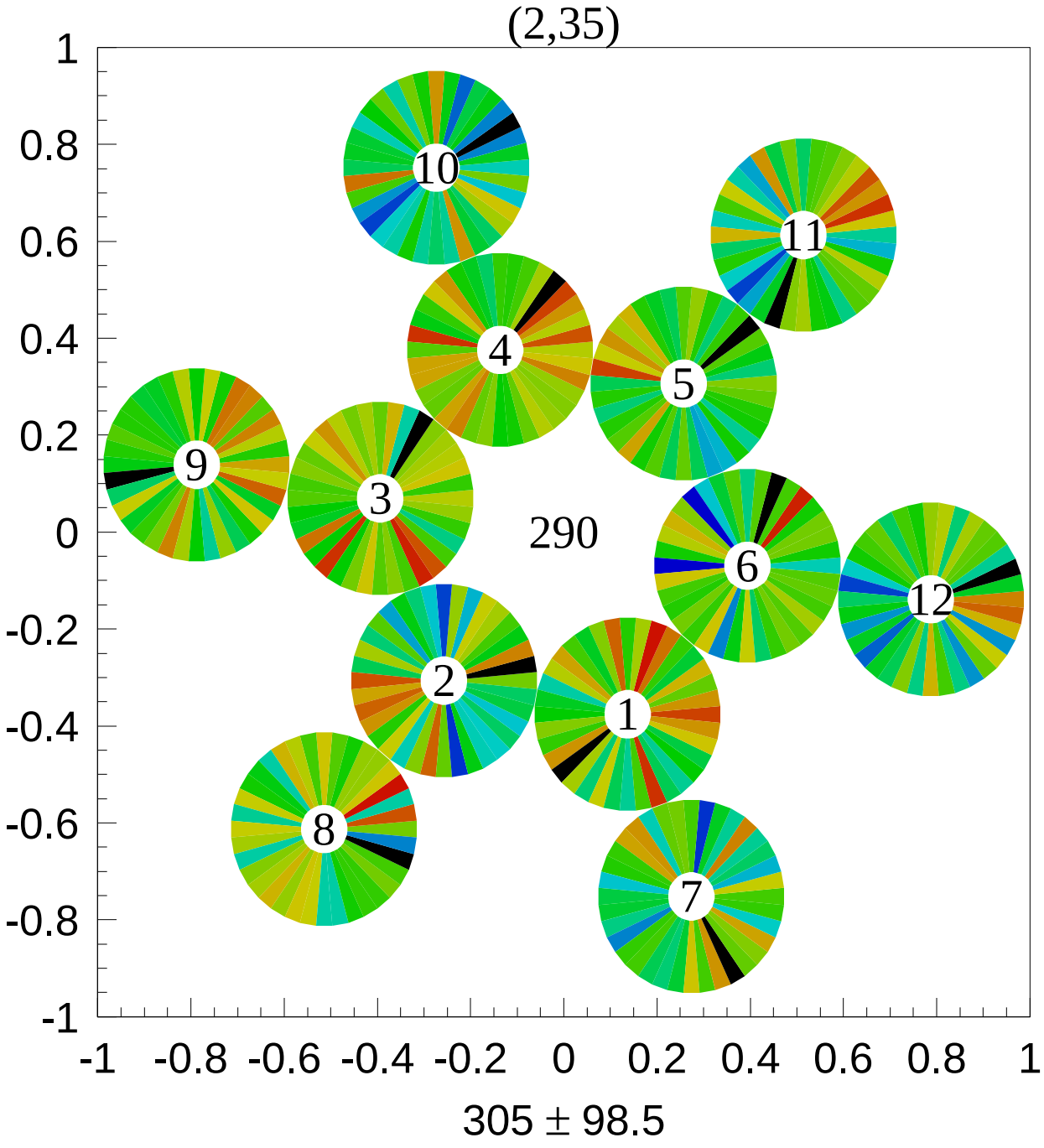

(2,34)
tilted LEDs
128 128 129 126 128 130
average of 6
average of 12
IIh
2.5
2.25
2
1.75
1.5
1.25
1
0.75
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
134 124 127 129 126 129
average of 6
average of 12
IIh
2.5
2.25
2
1.75
1.5
1.25
1
0.75
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

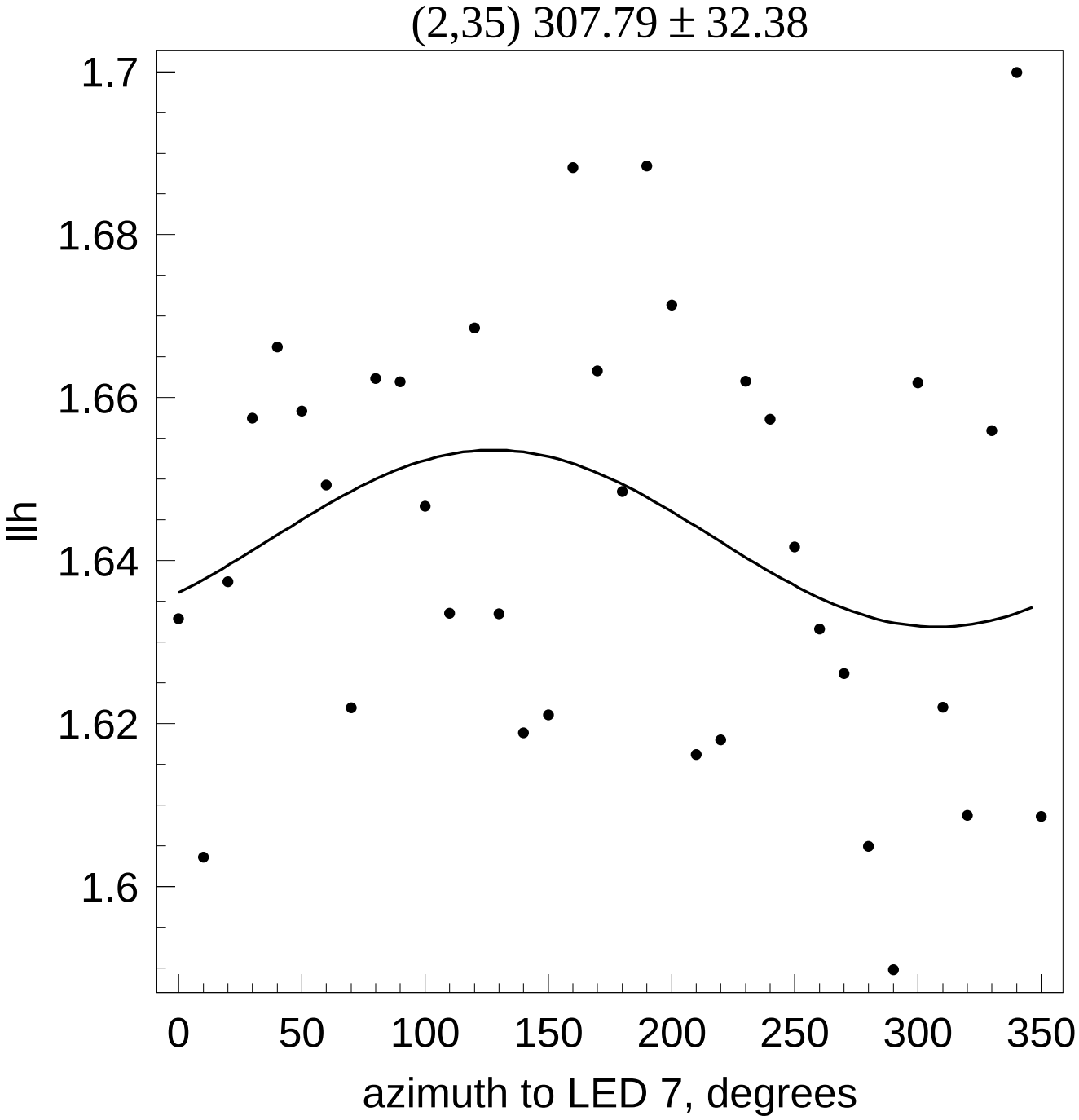

(2,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
133.8 ± 20.1

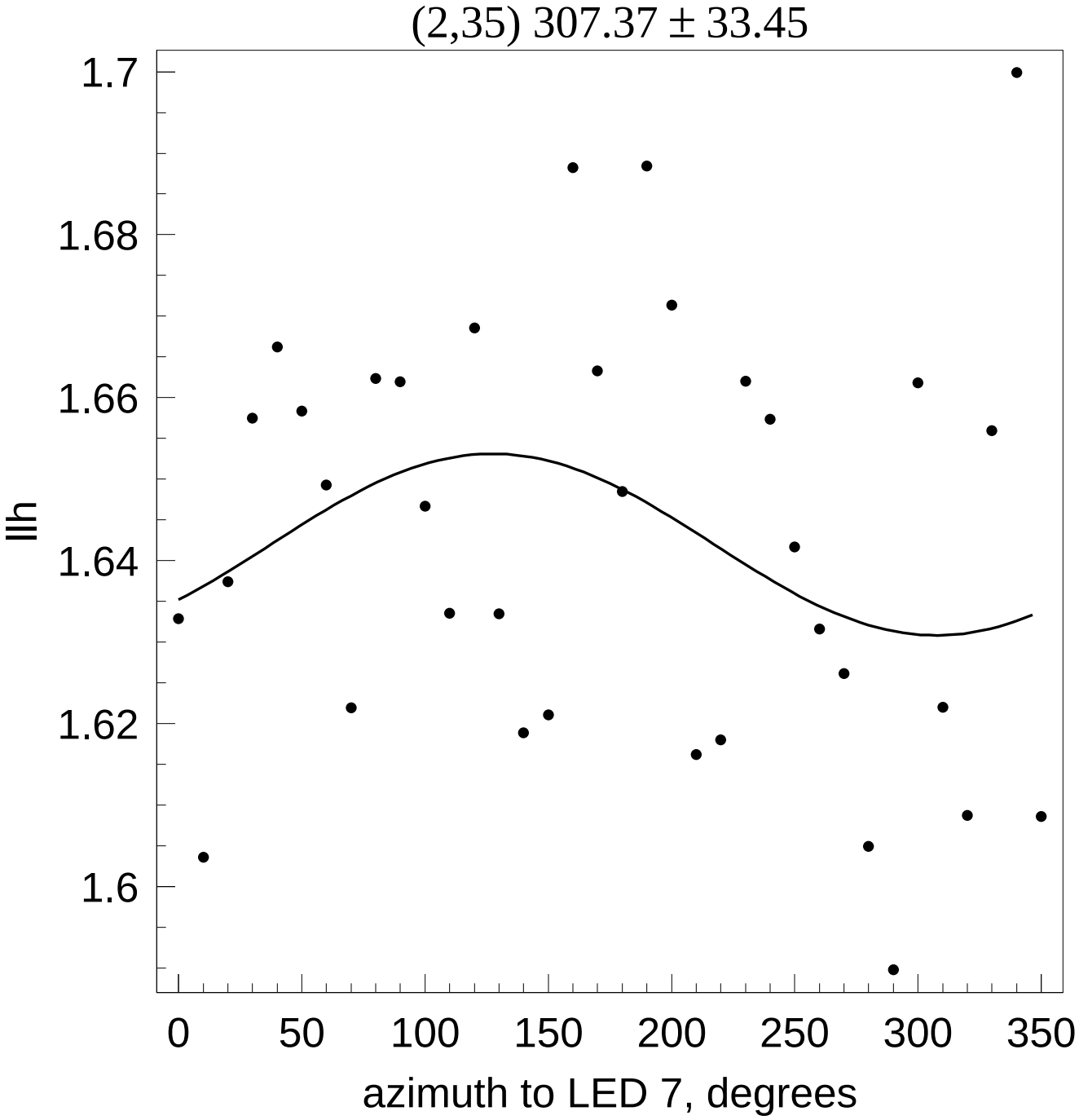

(2,34) 137.10 ± 1.28
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

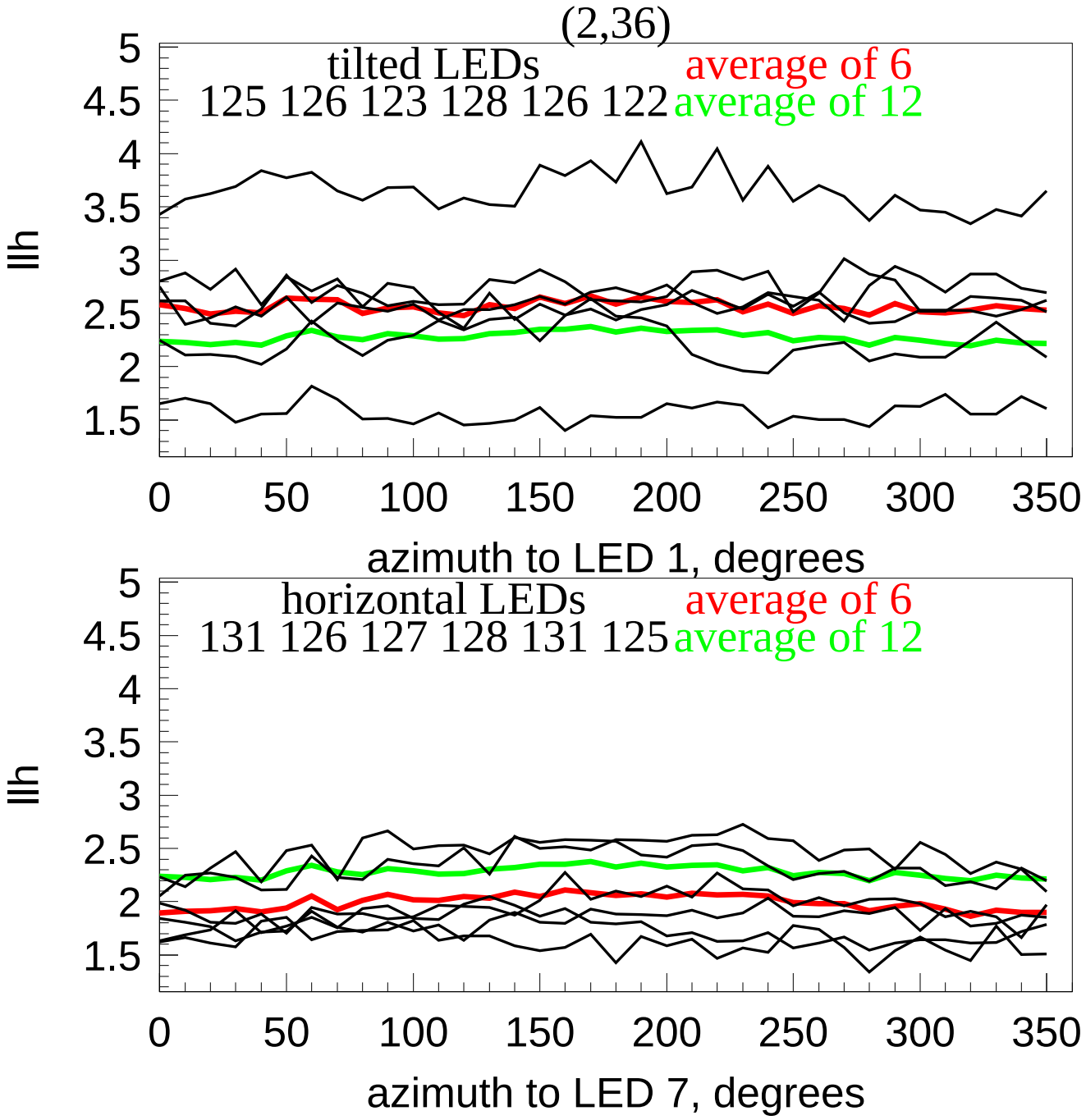

(2,34) 136.88 ± 1.26
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

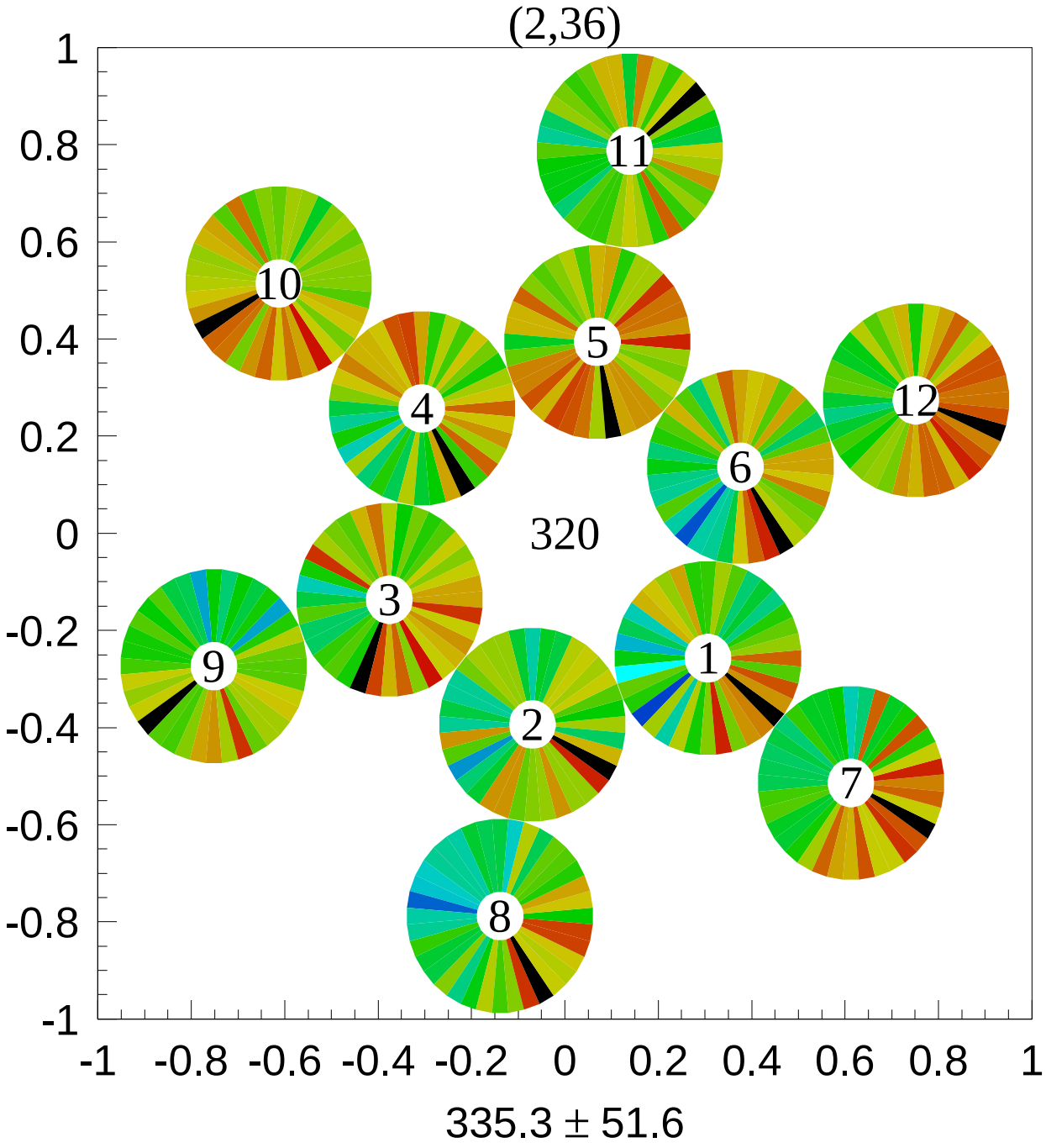

(2,35)
tilted LEDs
121 123 123 126 117 128
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 124 126 127 120 127
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

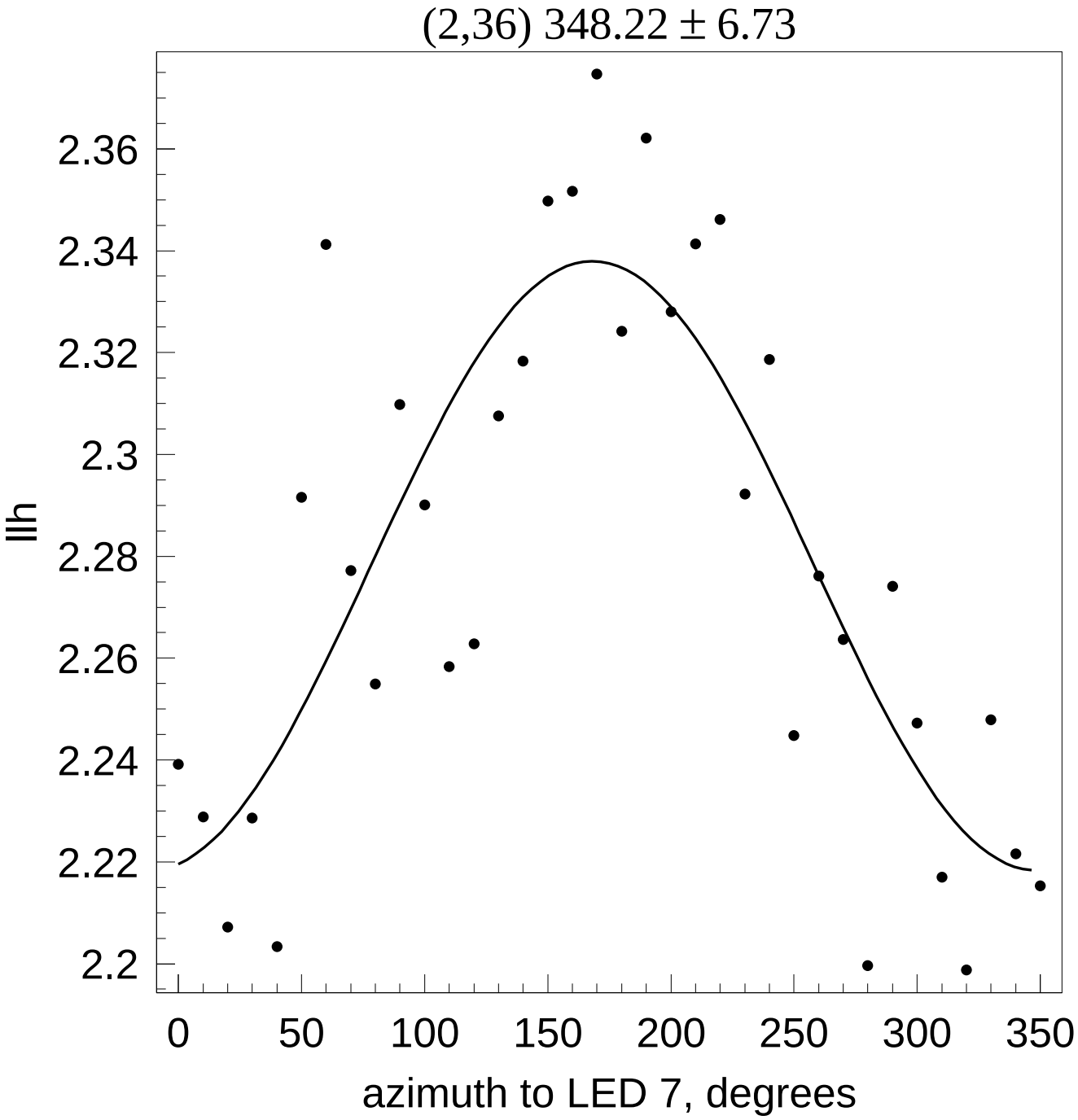

(2,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
290
6
12
2
1
8
7
305 ± 98.5

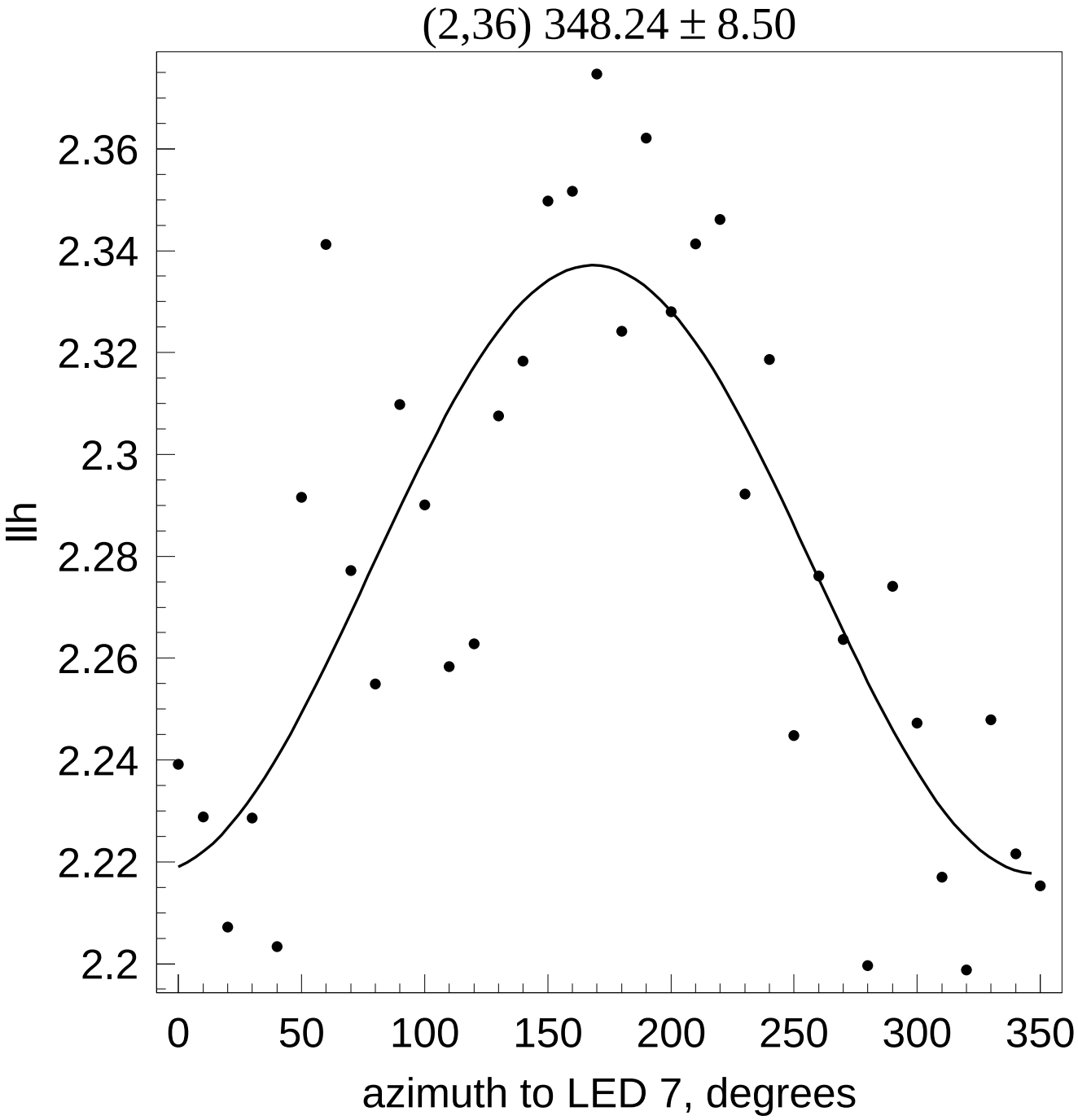

(2,35) 307.79 ± 32.38
1.7
1.68
1.66
1.64
1.62
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

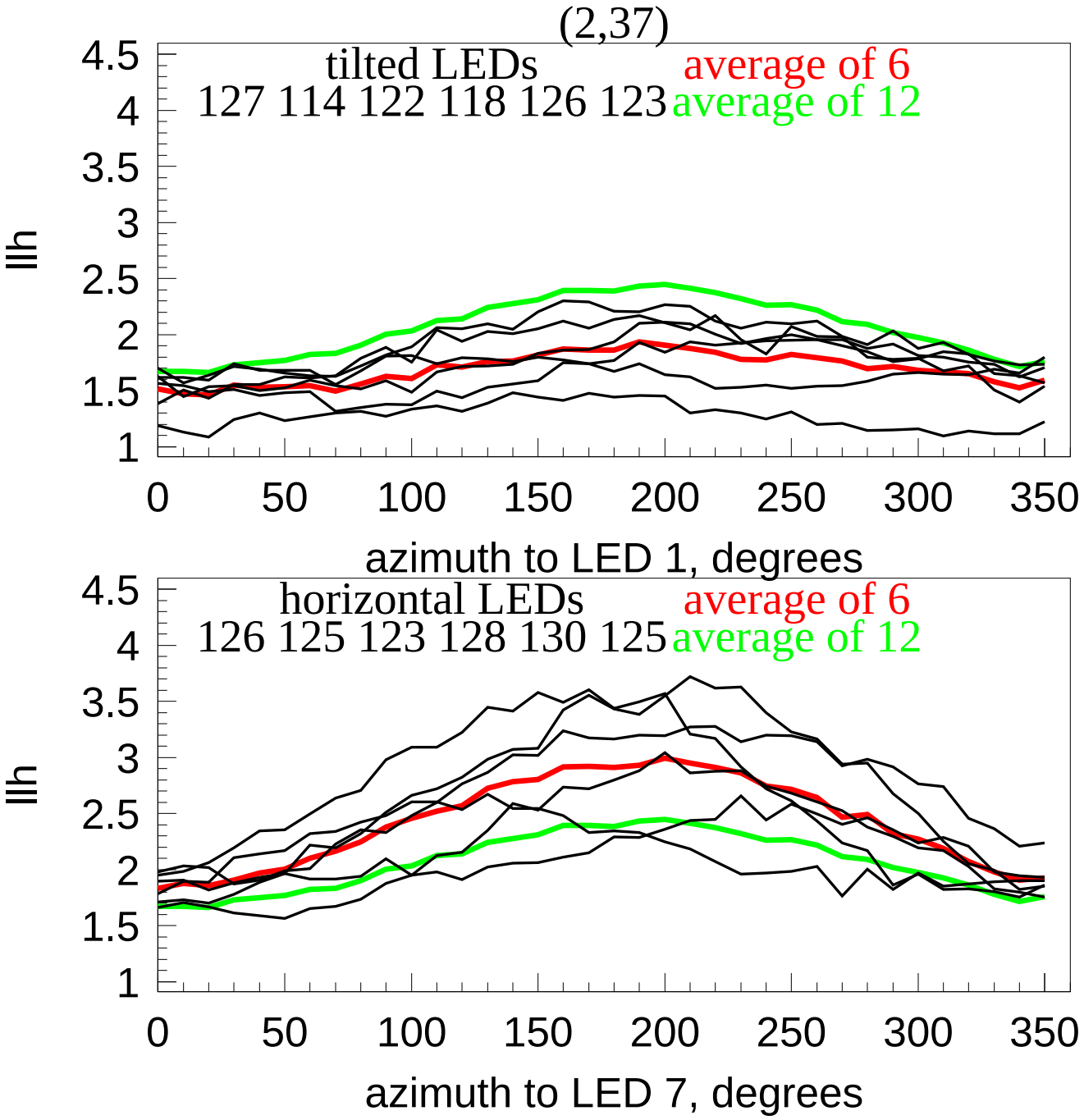

(2,35) 307.37 ± 33.45
1.7
1.68
1.66
1.64
1.62
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

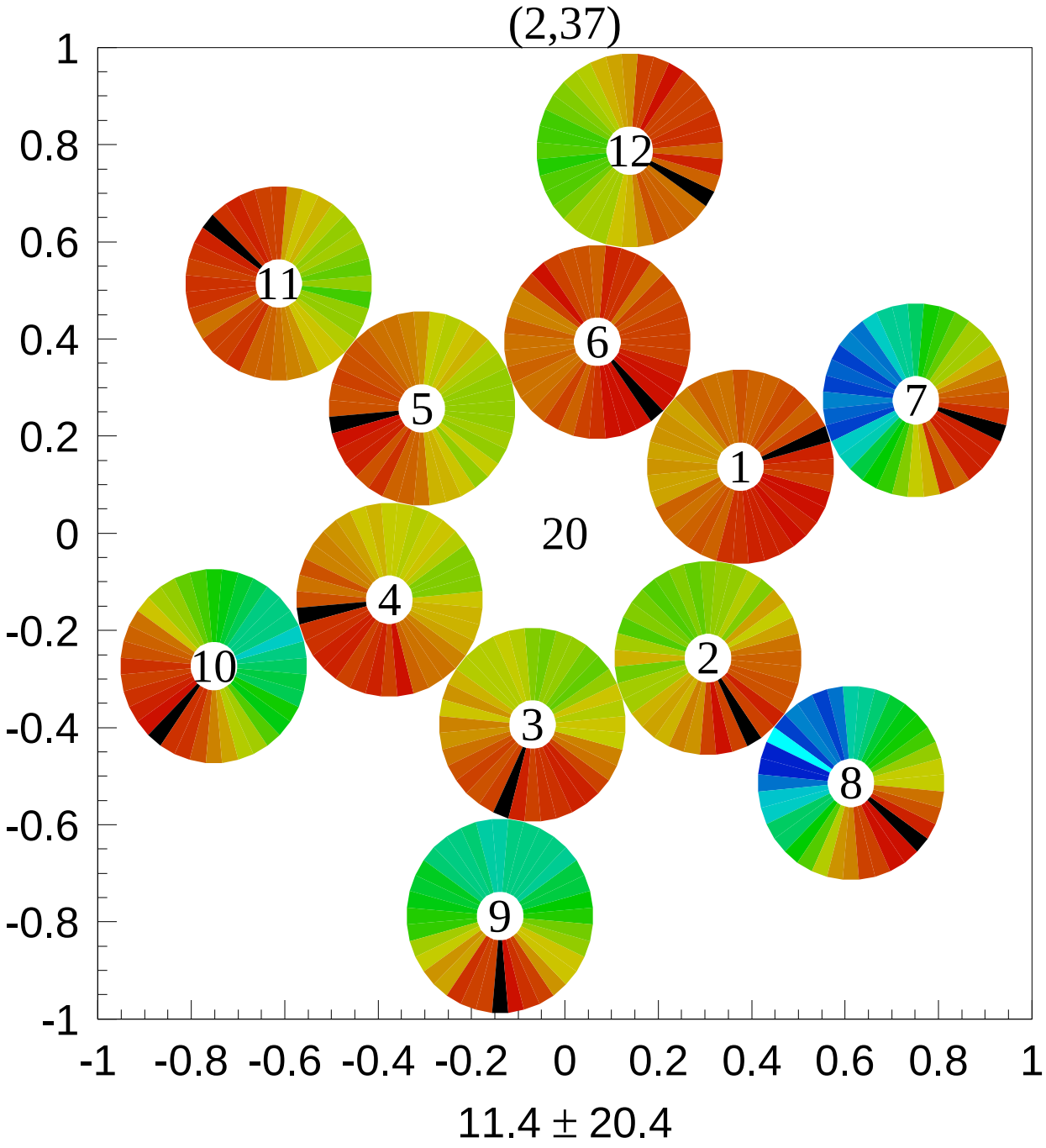

(2,36)
tilted LEDs
125 126 123 128 126 122
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 126 127 128 131 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

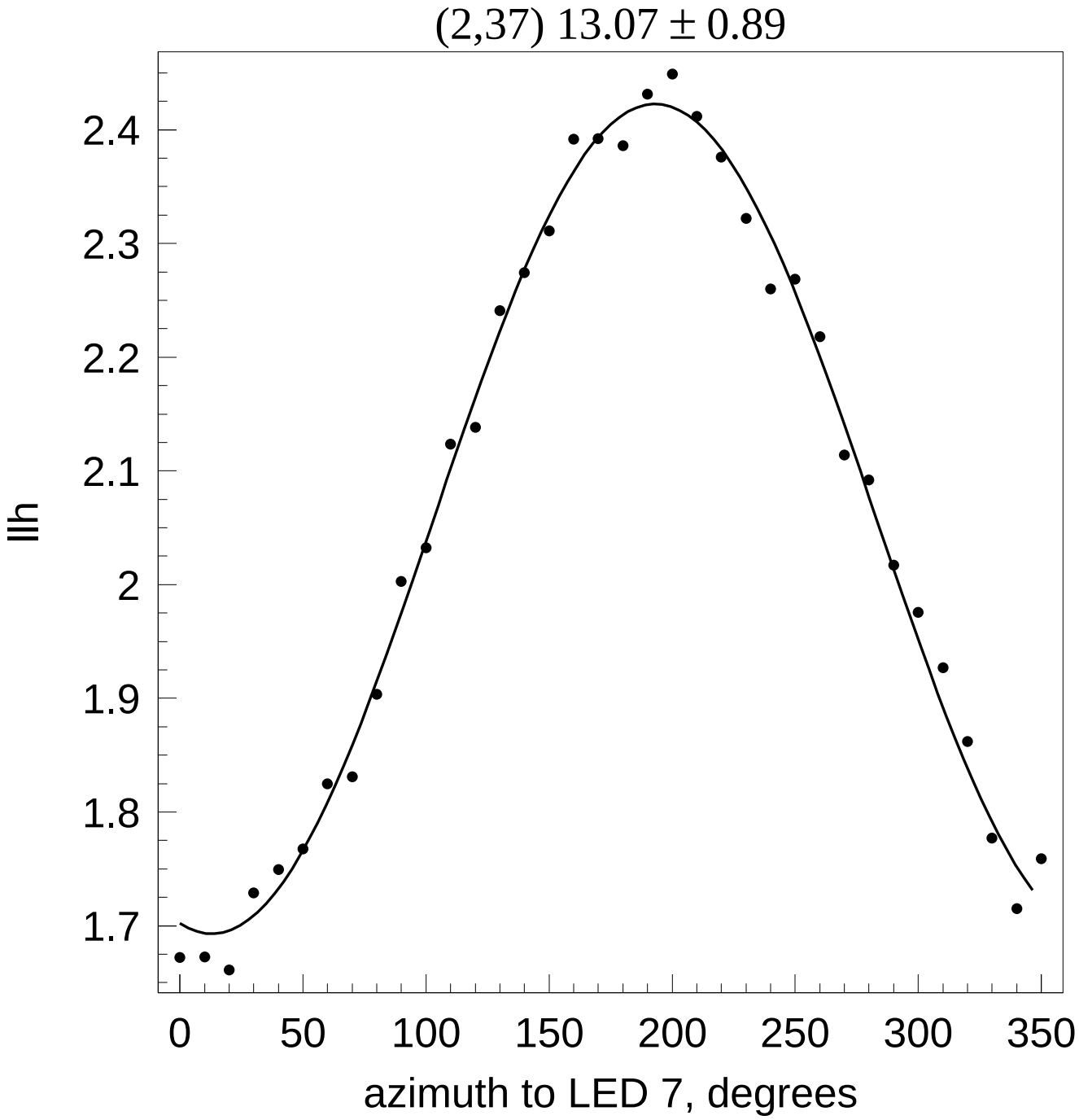

(2,36)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
335.3 ± 51.6

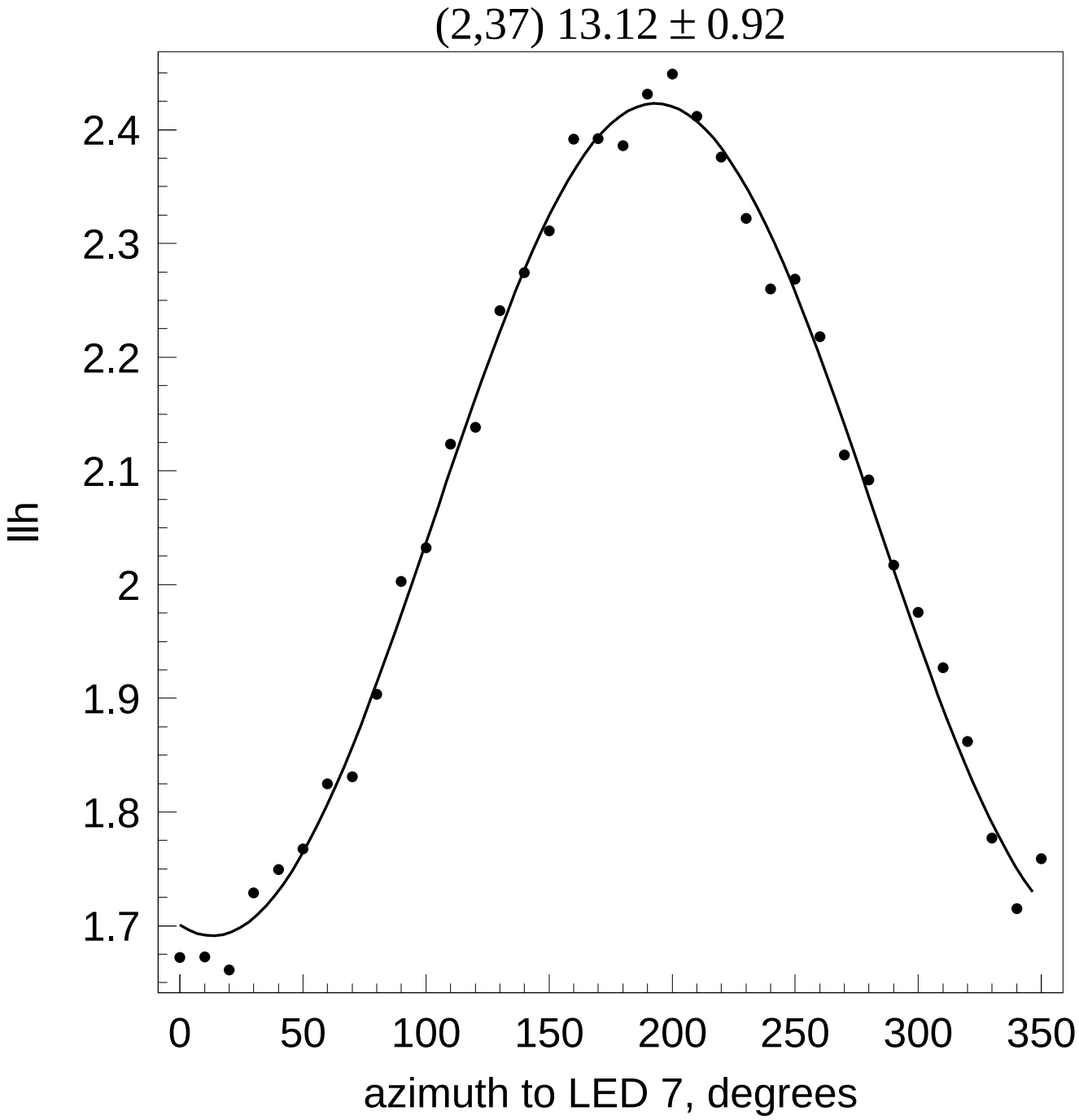

(2,36) 348.22 ± 6.73
2.36
2.34
2.32
2.3
2.28
2.26
2.24
2.22
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

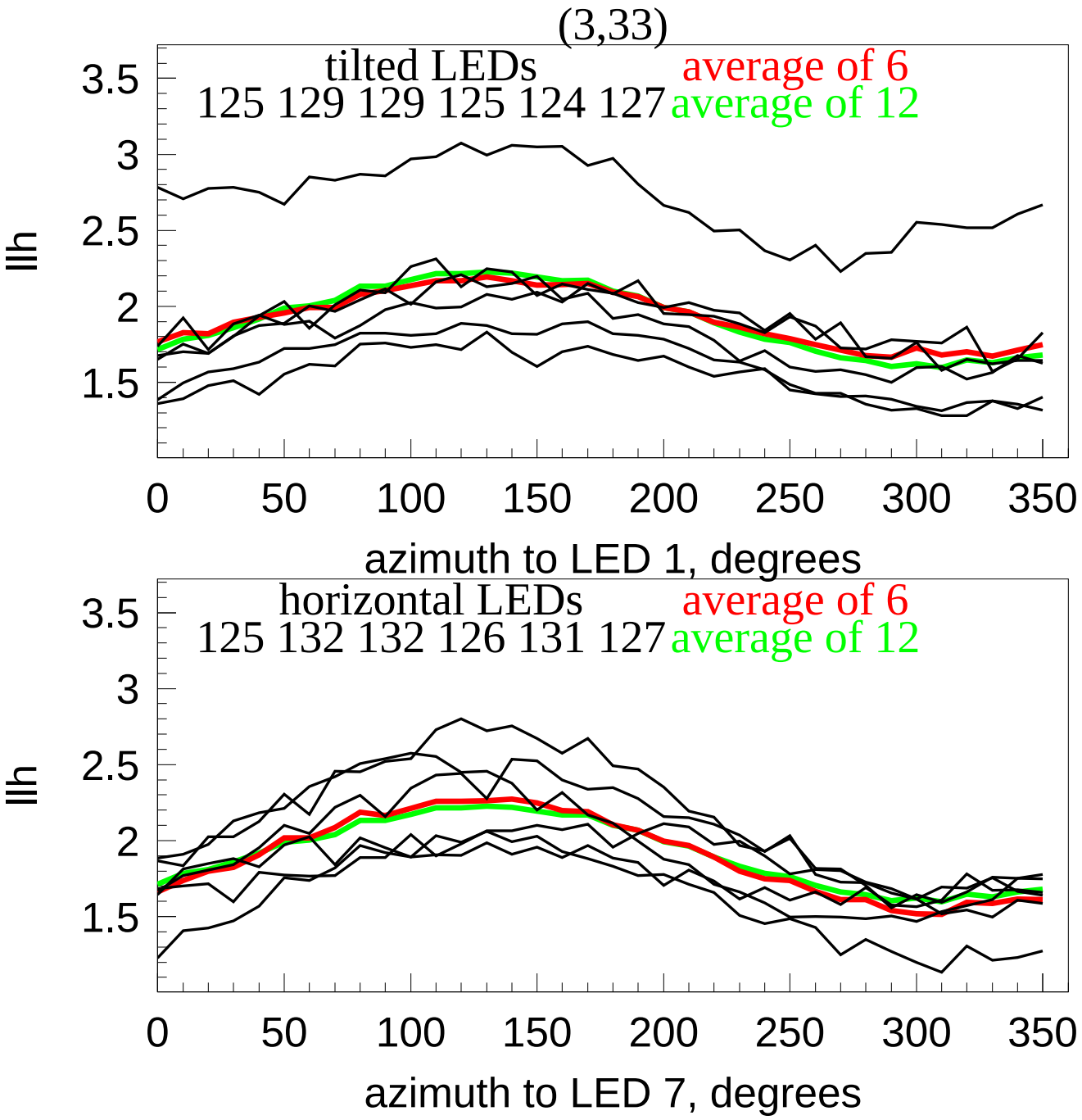

(2,36) 348.24 ± 8.50
2.36
2.34
2.32
2.3
2.28
2.26
2.24
2.22
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

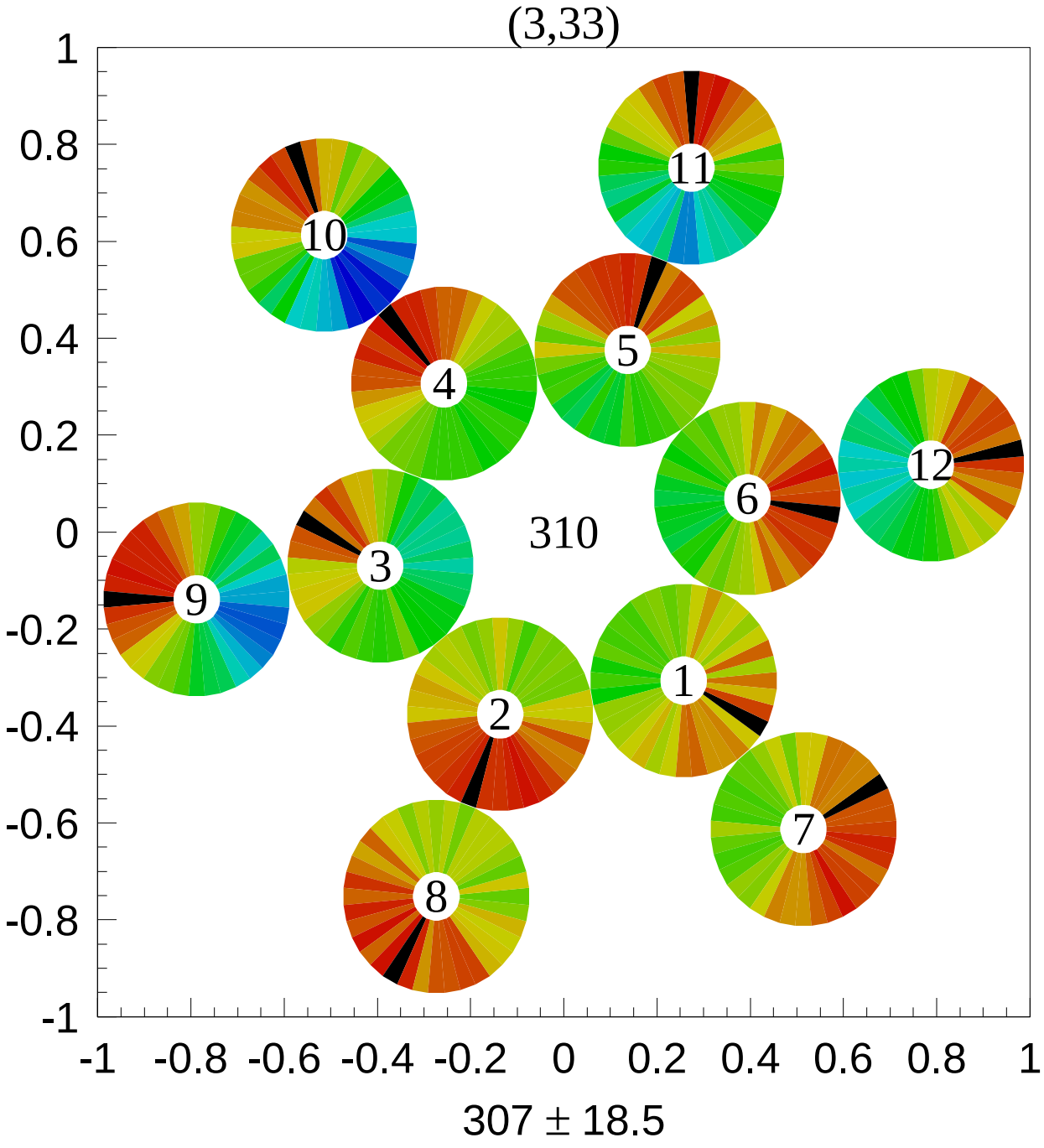

(2,37)
tilted LEDs
127 114 122 118 126 123
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 125 123 128 130 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

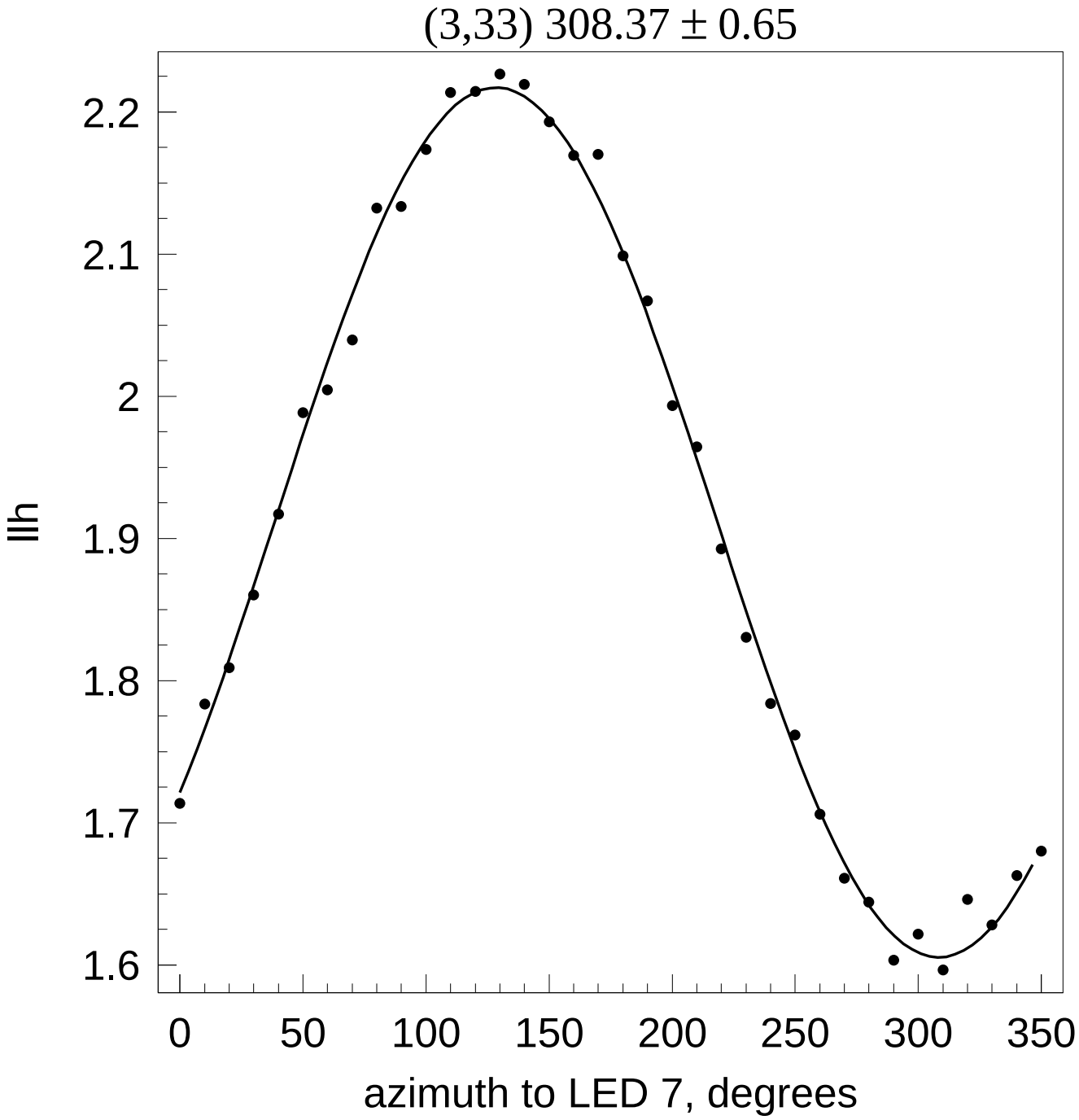

(2,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11.4 ± 20.4
12
11
6
5
7
1
20
4
10
2
3
8
9

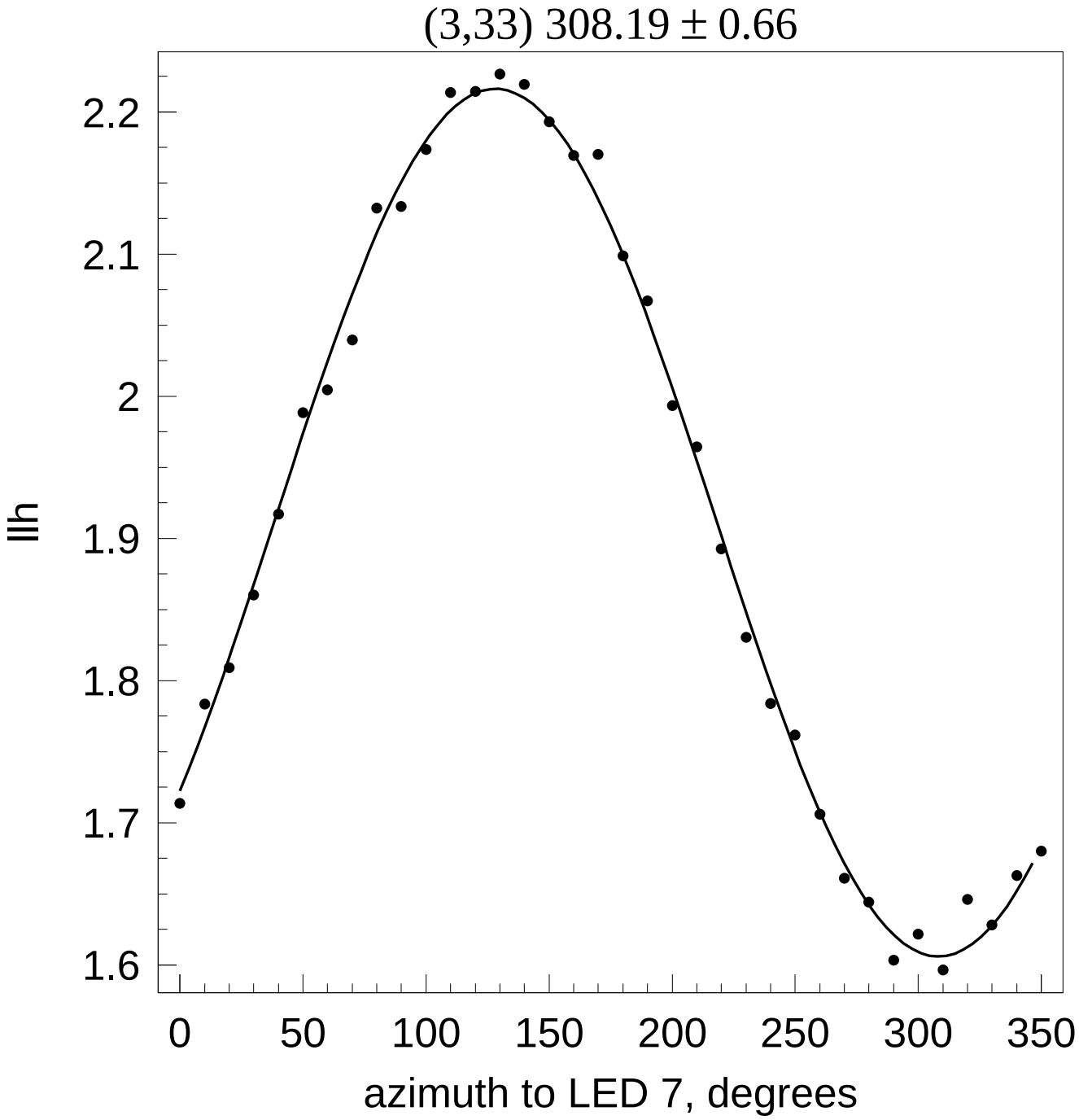

(2,37) 13.07 ± 0.89
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

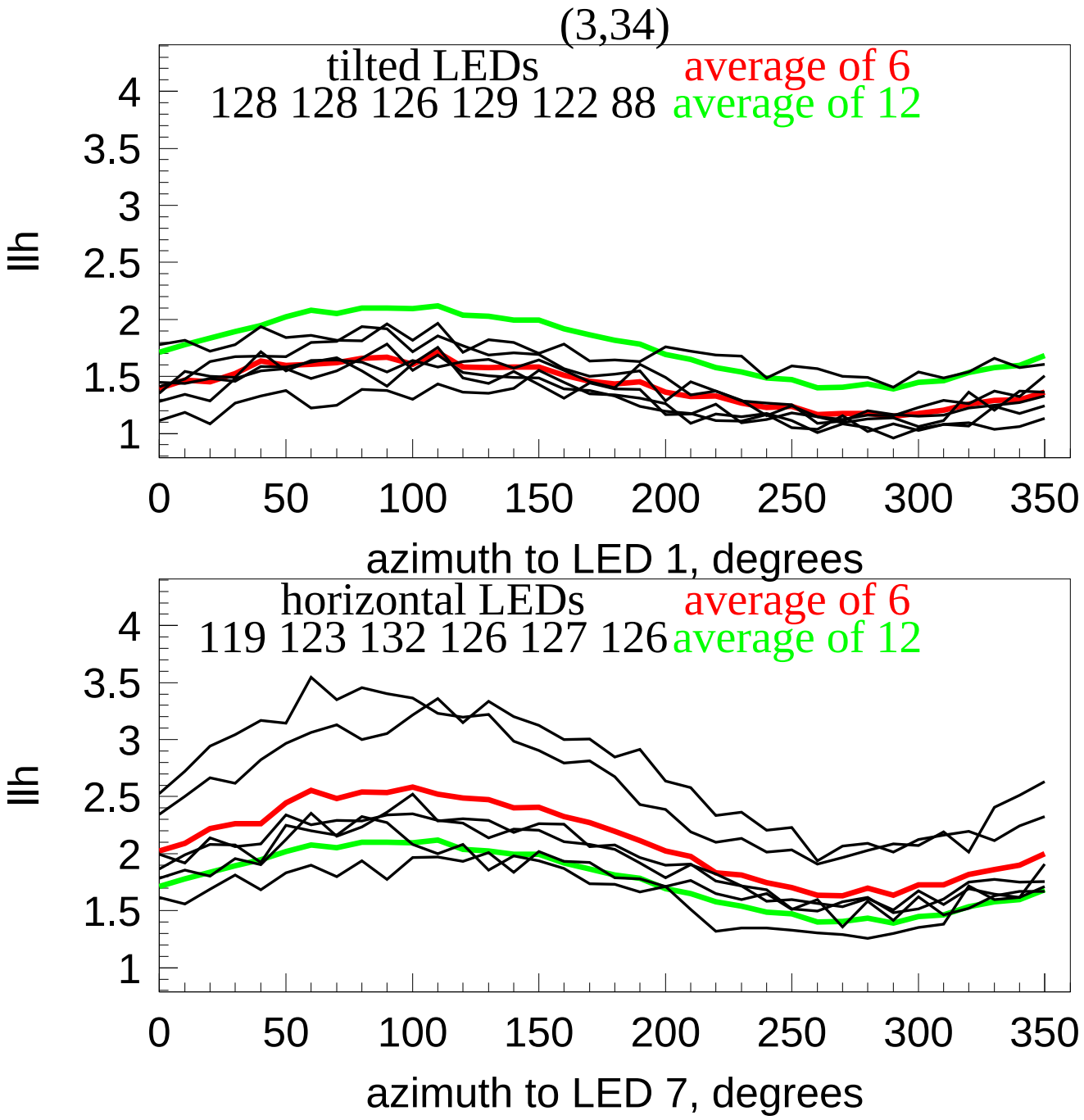

(2,37) 13.12 ± 0.92
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

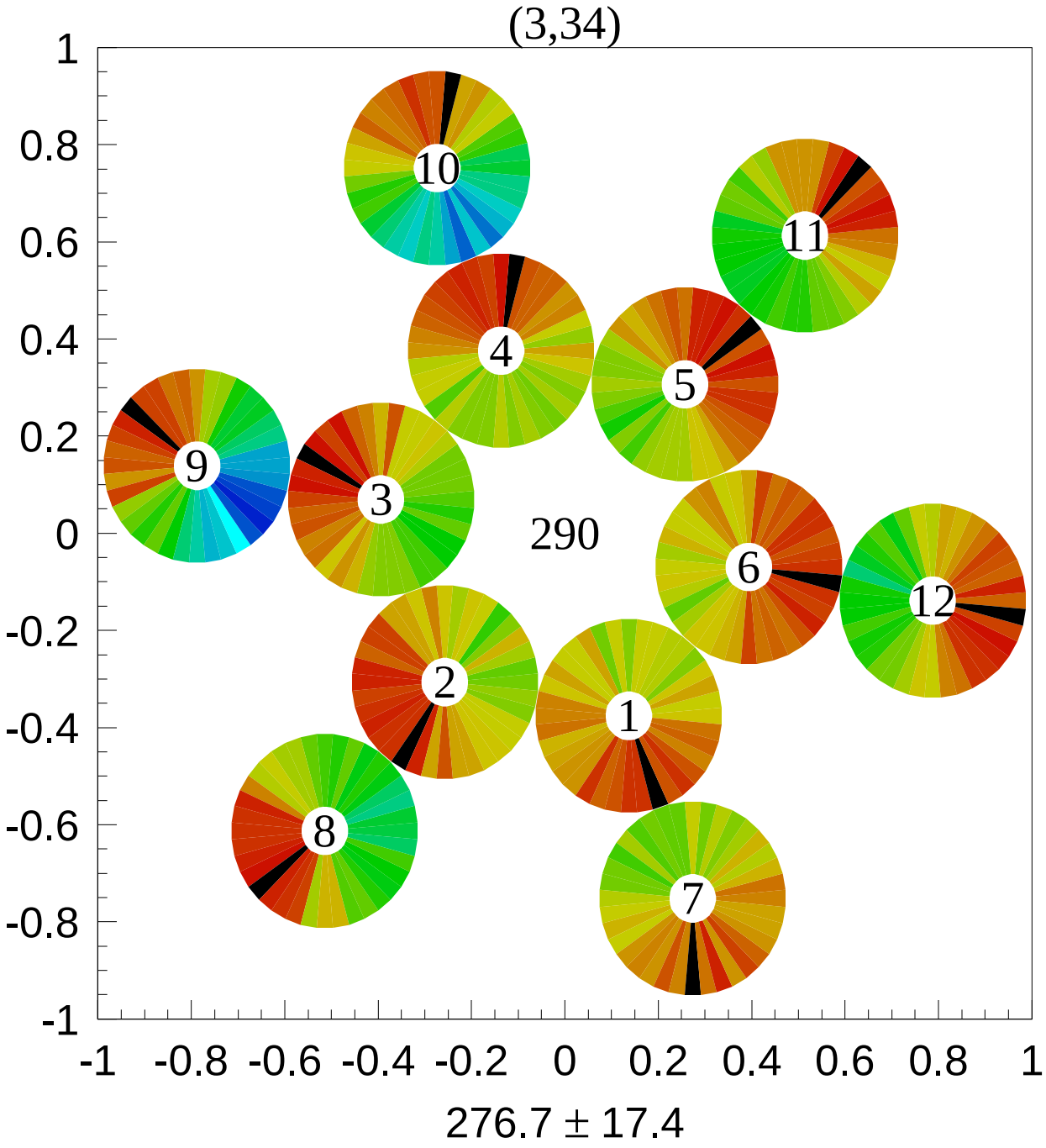

(3,33)
tilted LEDs
125 129 129 125 124 127
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 132 132 126 131 127
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

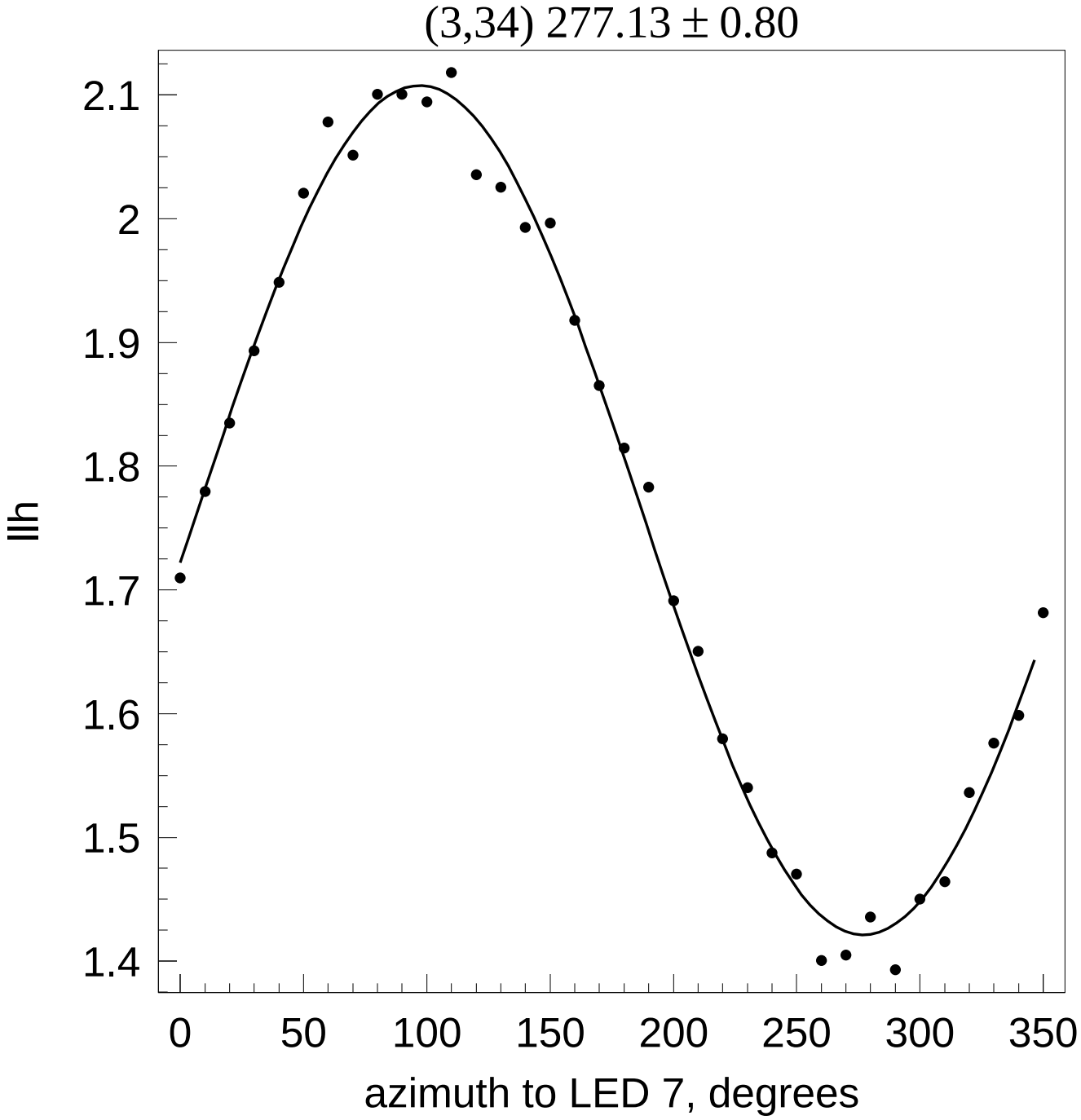

(3,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
310
9
2
1
7
8
307 ± 18.5

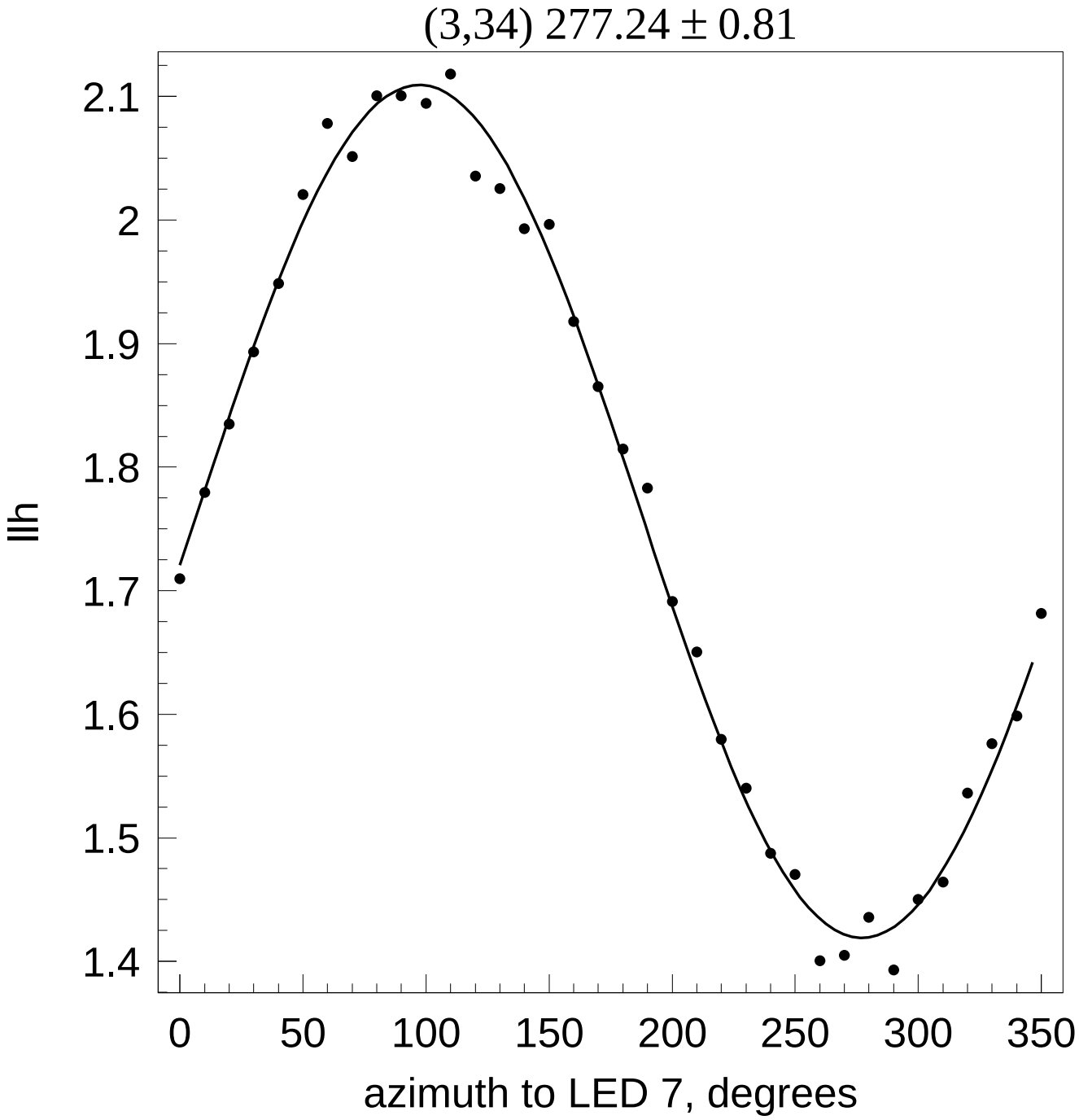

(3,33) 308.37 ± 0.65
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

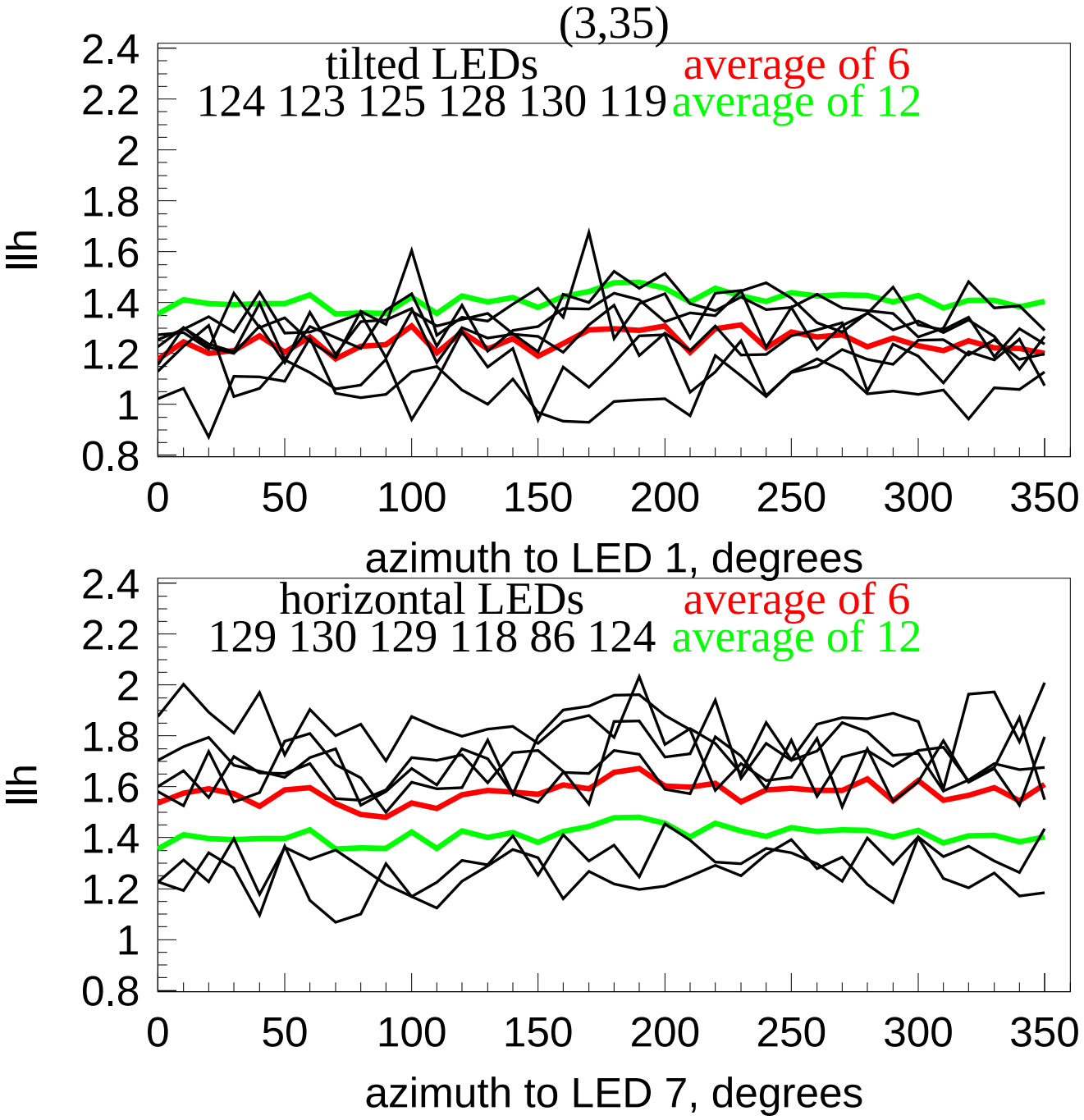

(3,33) 308.19 ± 0.66
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

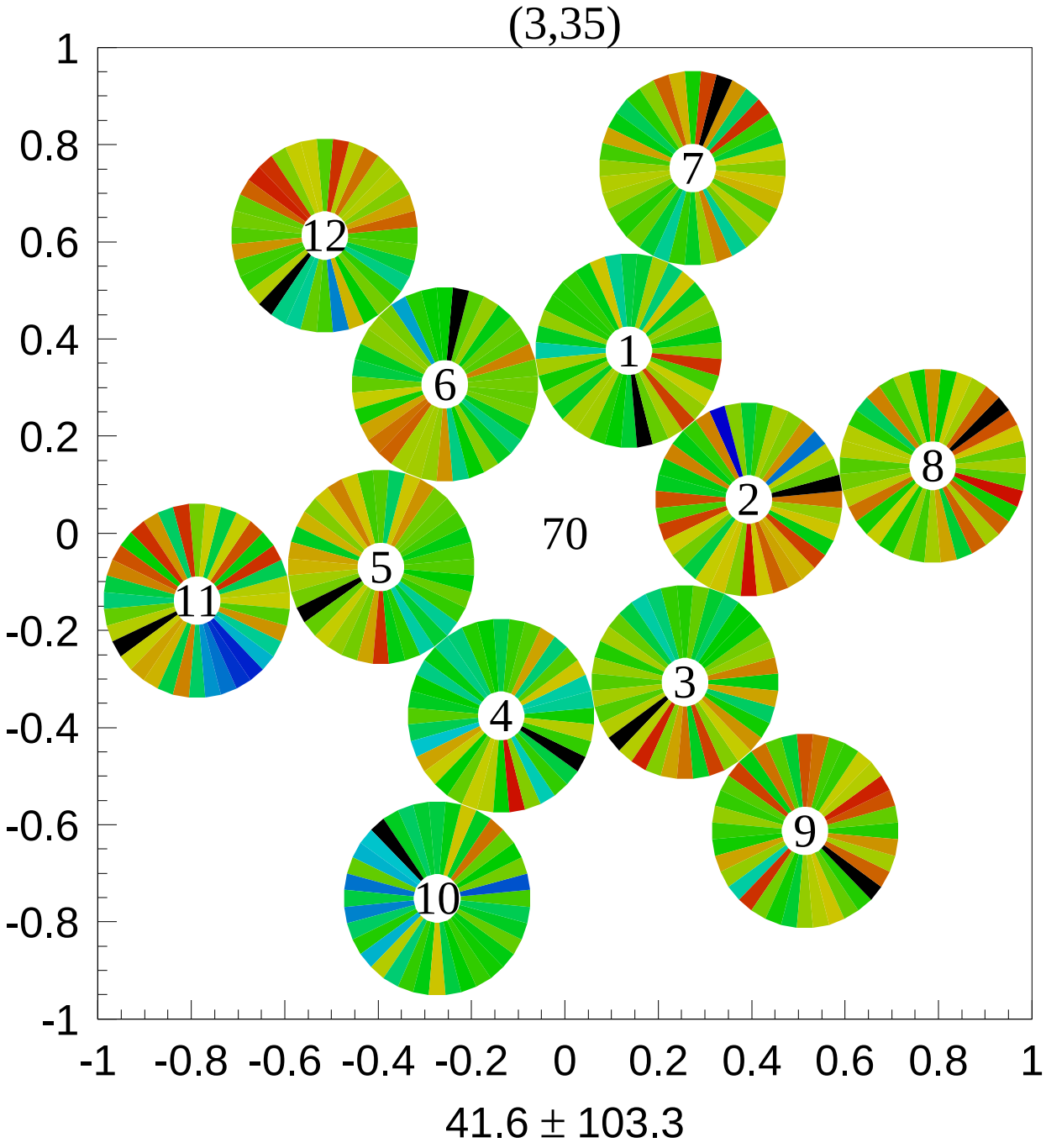

(3,34)
tilted LEDs
128 128 126 129 122 88
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 123 132 126 127 126
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

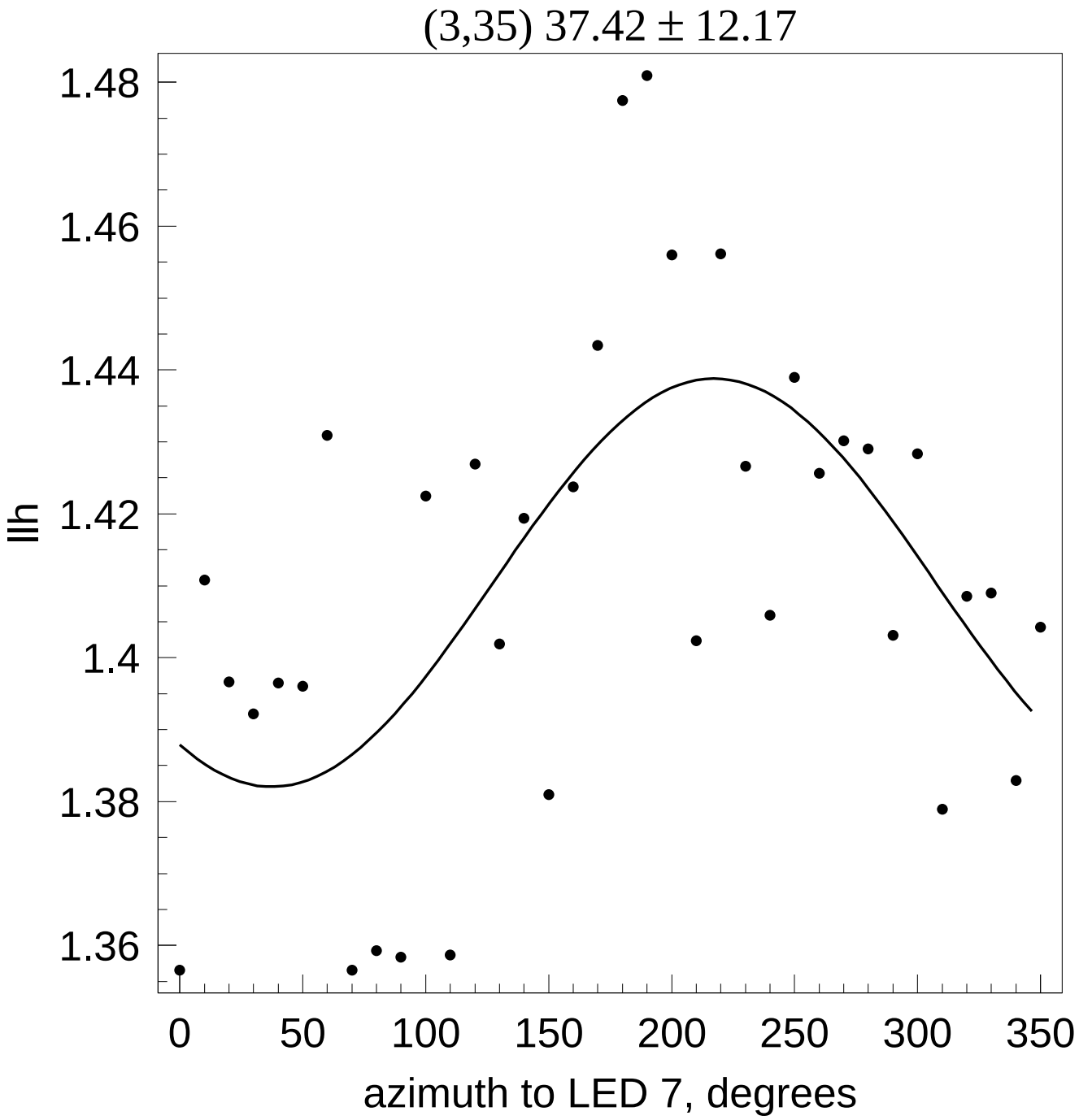

(3,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
290
6
12
2
1
8
7
276.7 ± 17.4

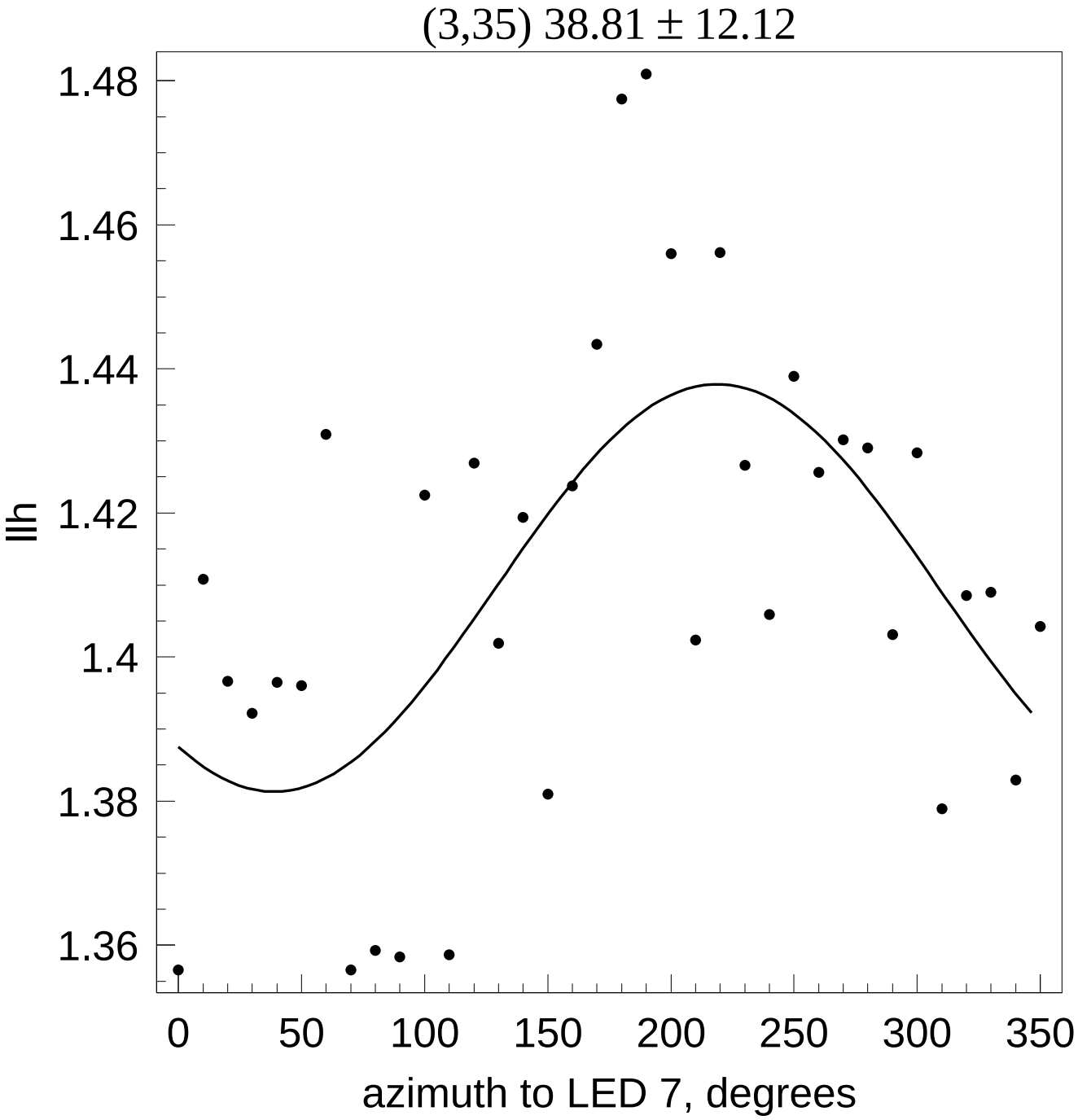

(3,34) 277.13 ± 0.80
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

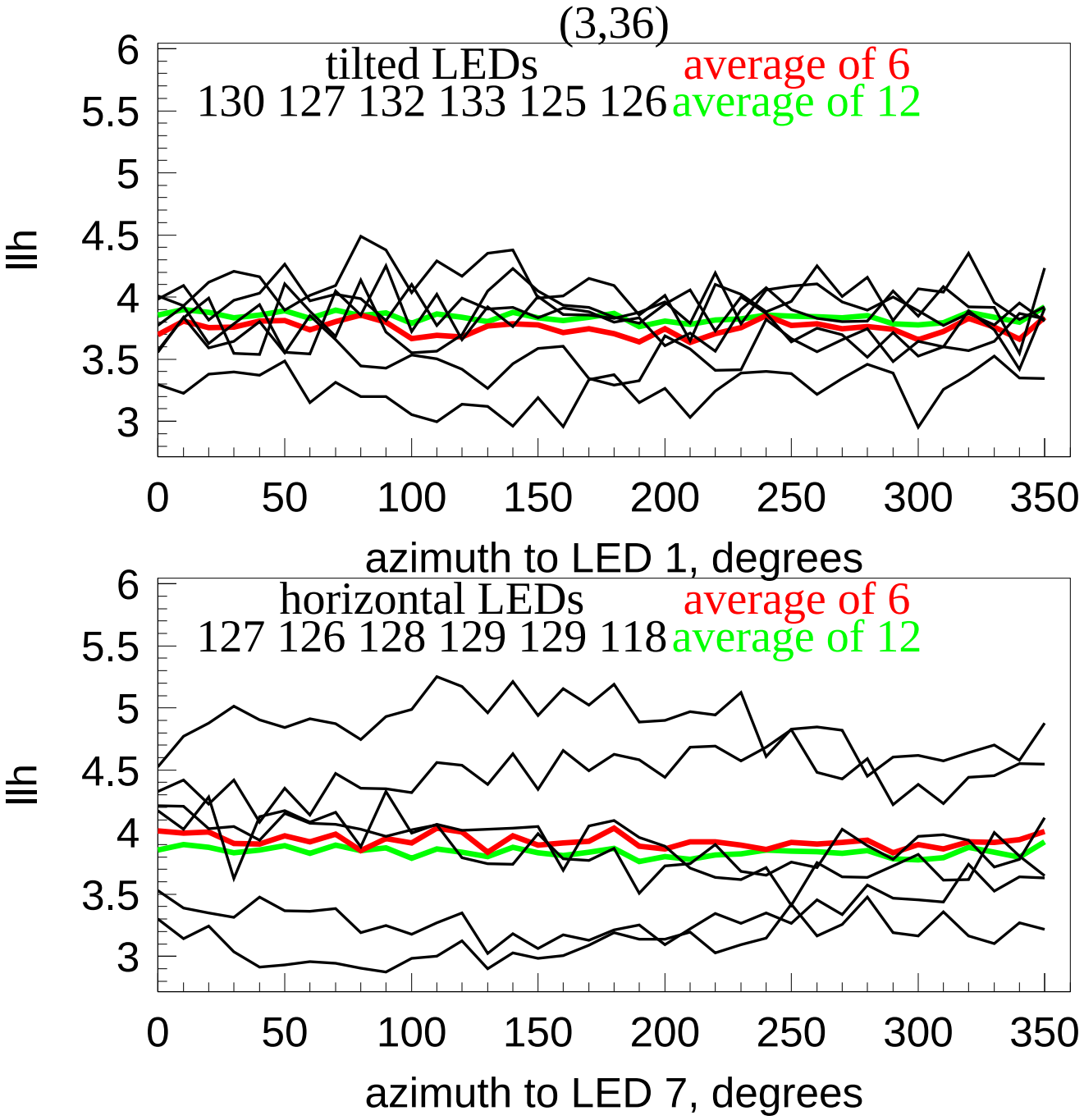

(3,34) 277.24 ± 0.81
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

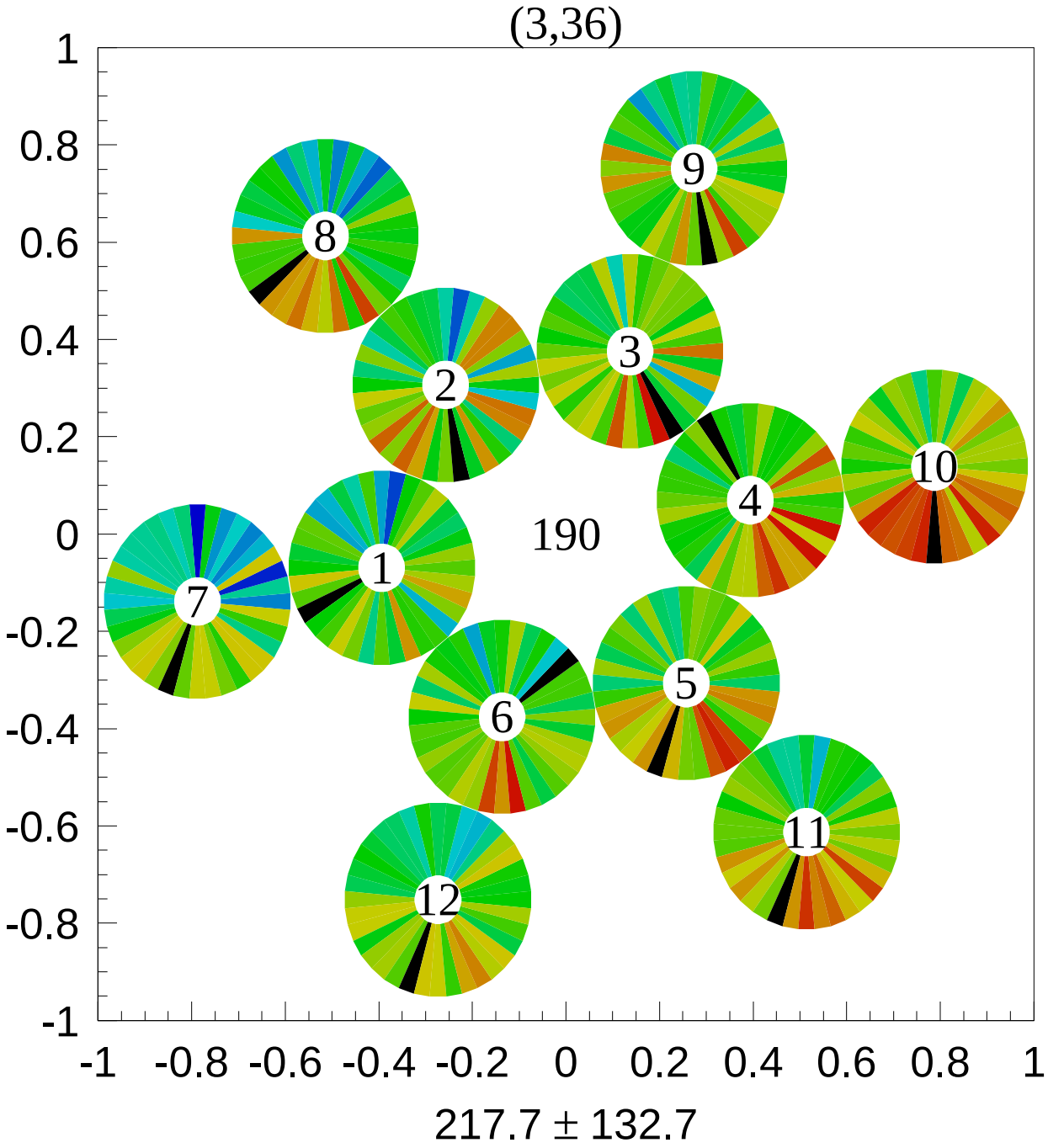

(3,35)
tilted LEDs
124 123 125 128 130 119
average of 6
average of 12
IIh
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 130 129 118 86 124
average of 6
average of 12
IIh
azimuth to LED 7, degrees

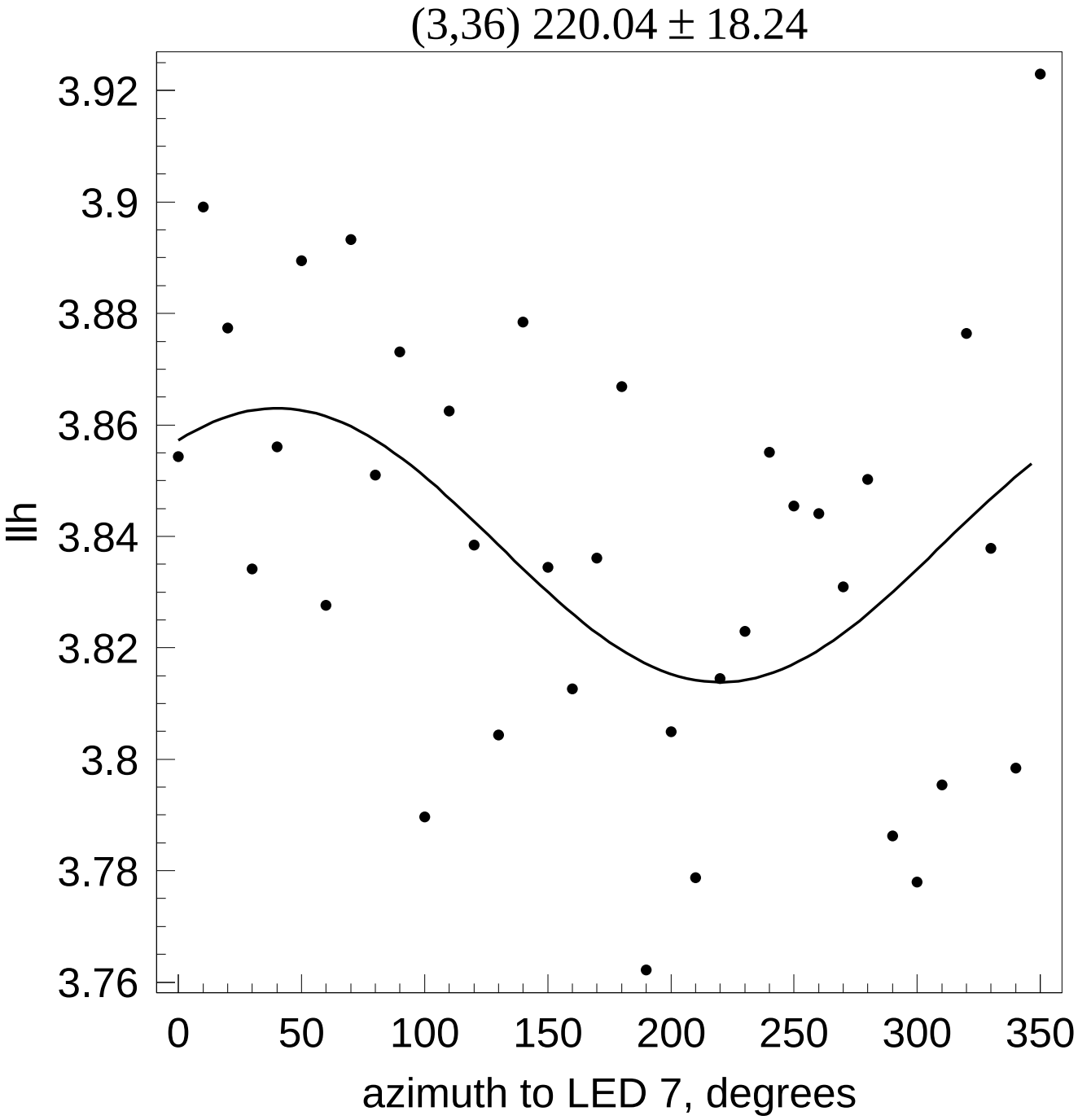

(3,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
70
5
11
3
4
9
10
41.6 ± 103.3

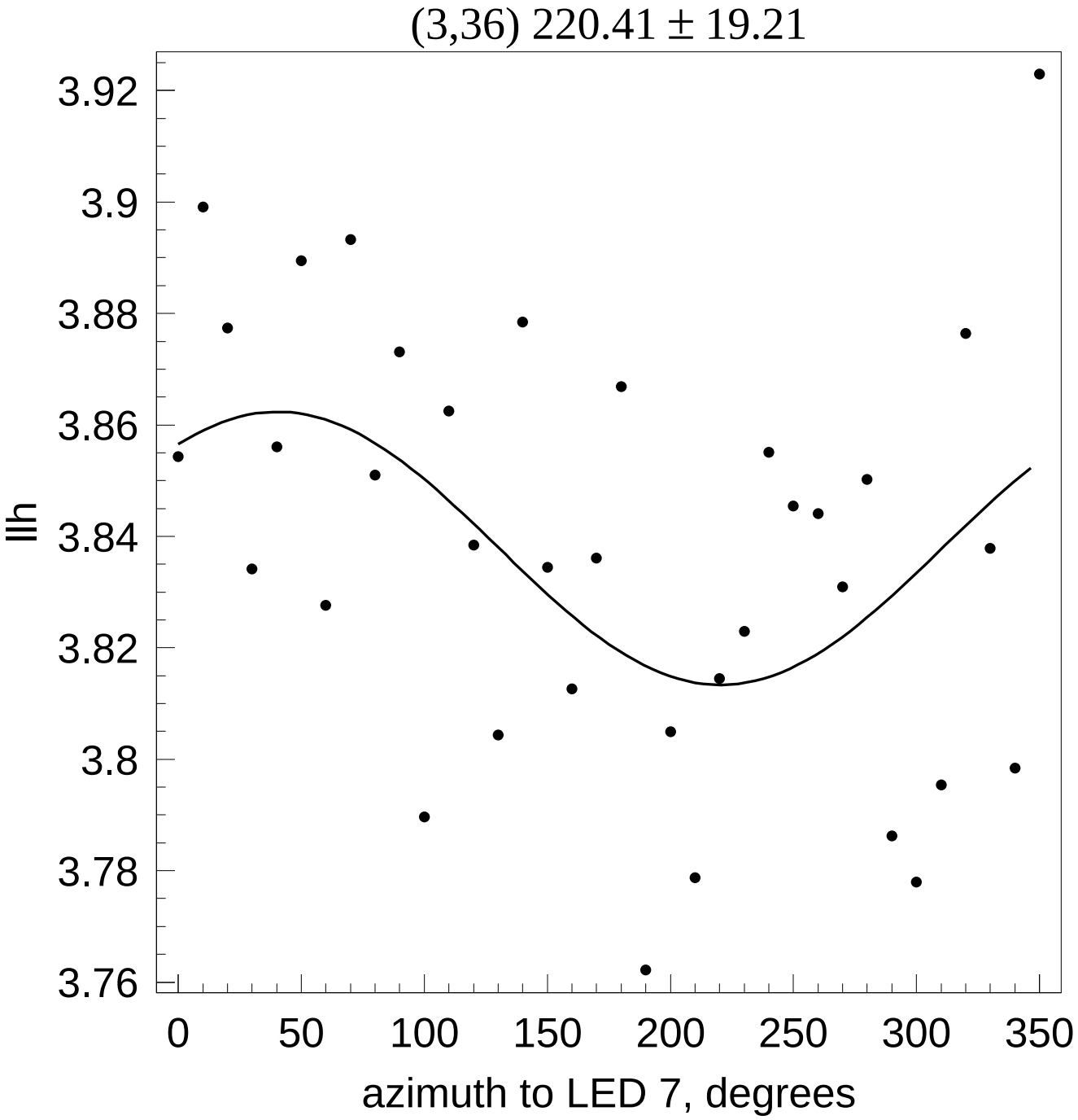

(3,35) 37.42 ± 12.17
1.48
1.46
1.44
1.42
1.4
1.38
1.36
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

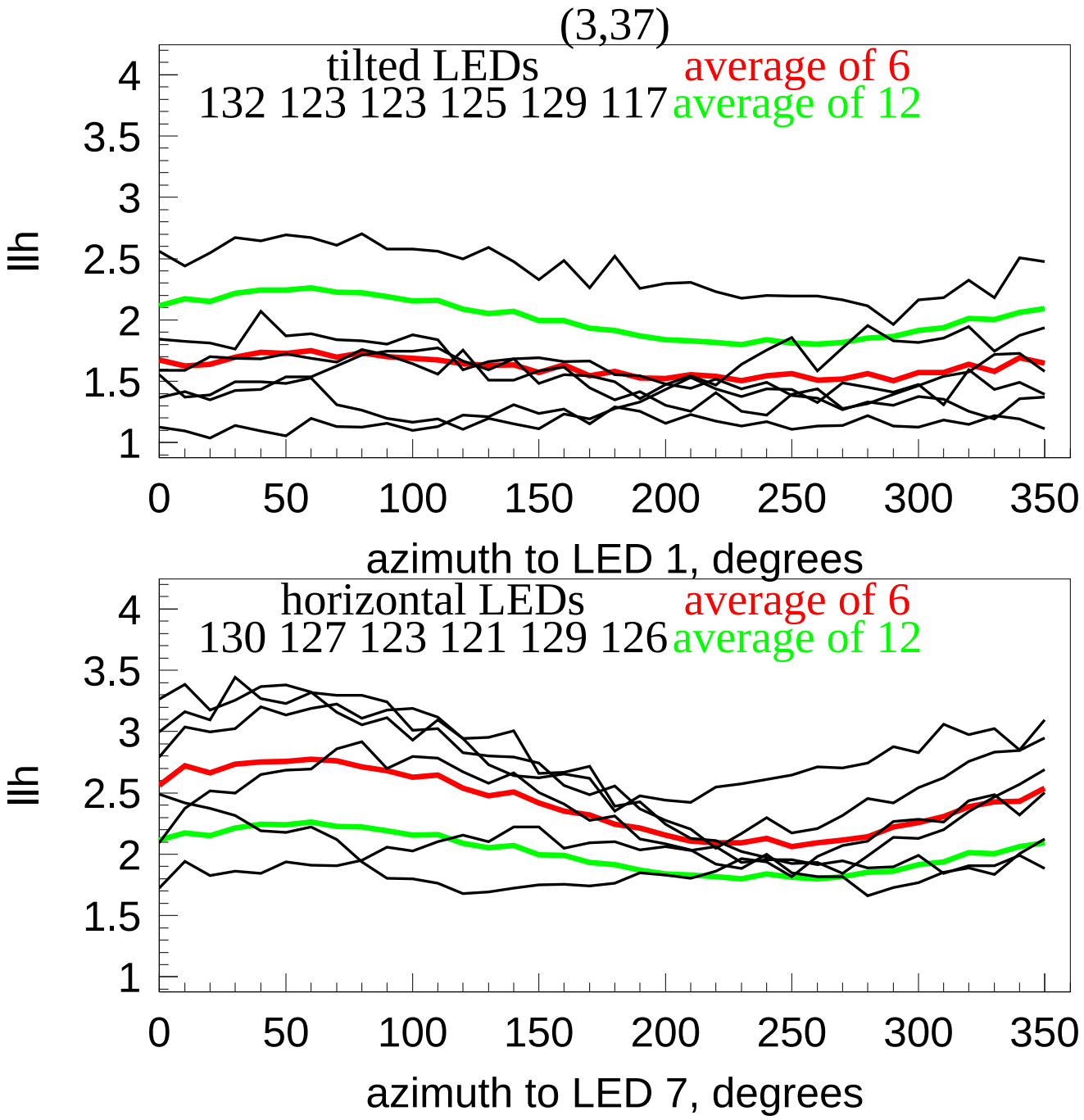

(3,35) 38.81 ± 12.12
1.48
1.46
1.44
1.42
1.4
1.38
1.36
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

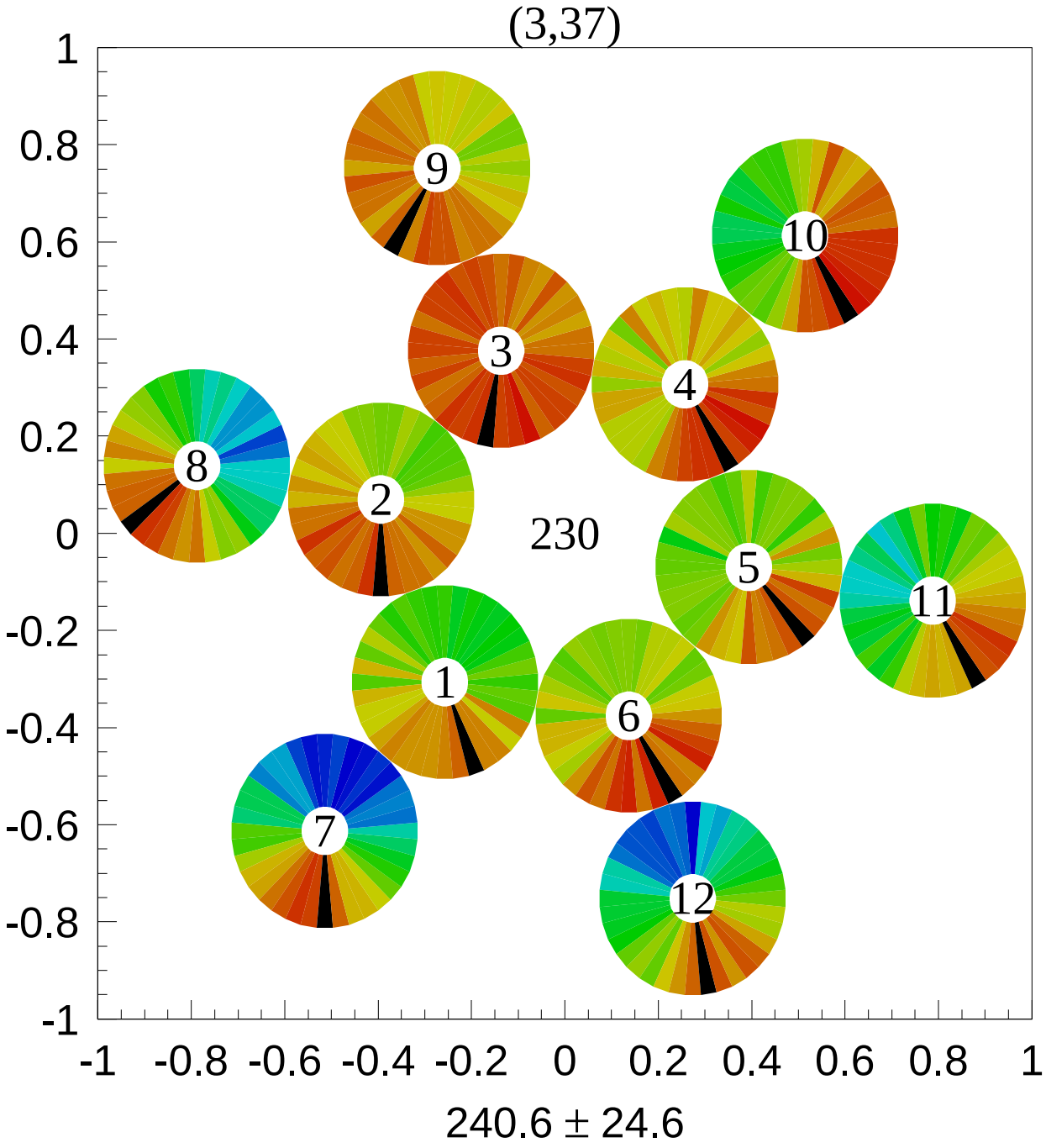

(3,36)
tilted LEDs
130 127 132 133 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 126 128 129 129 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

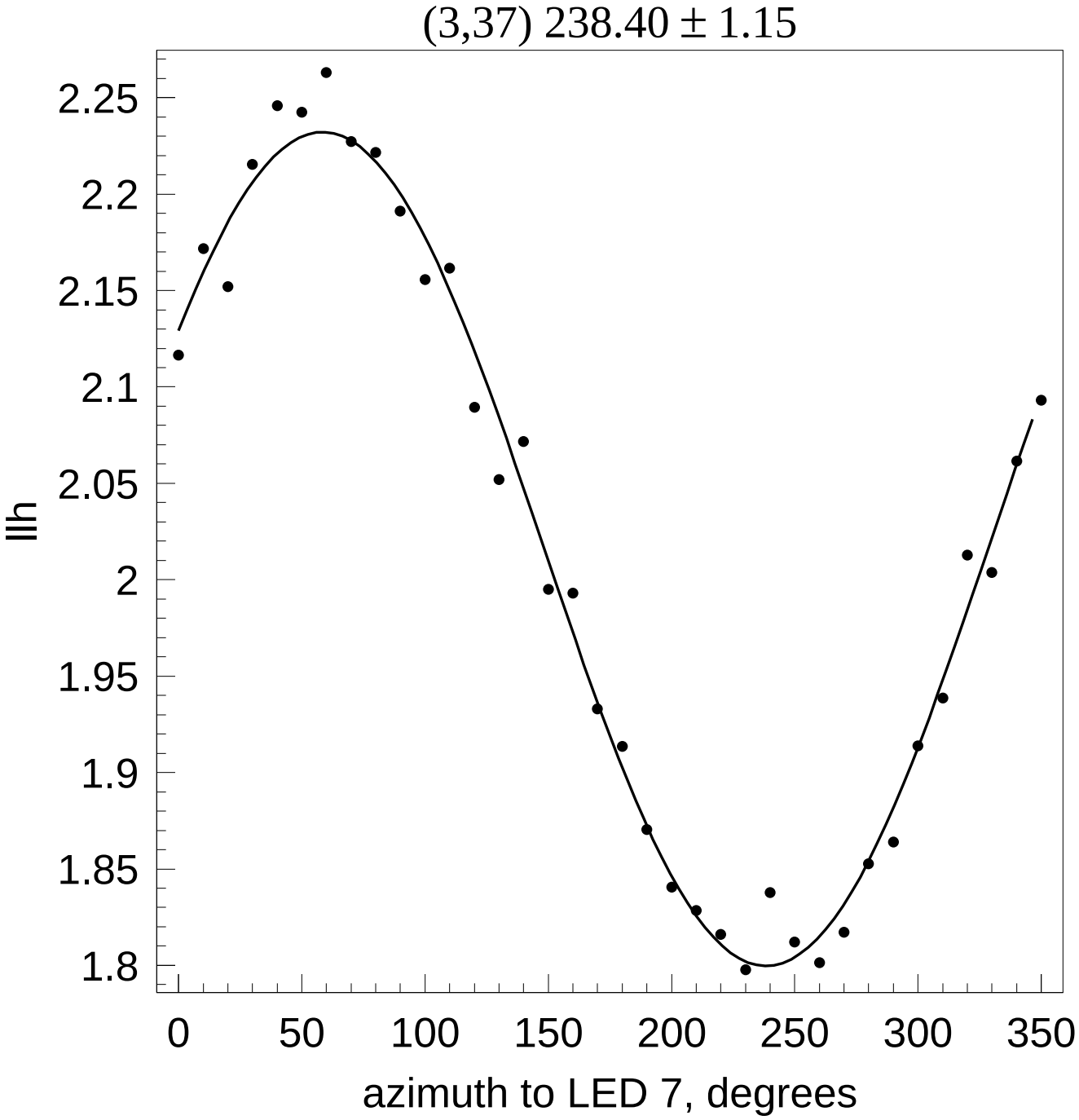

(3,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
190
1
2
3
4
5
6
7
8
9
10
11
12
217.7 ± 132.7

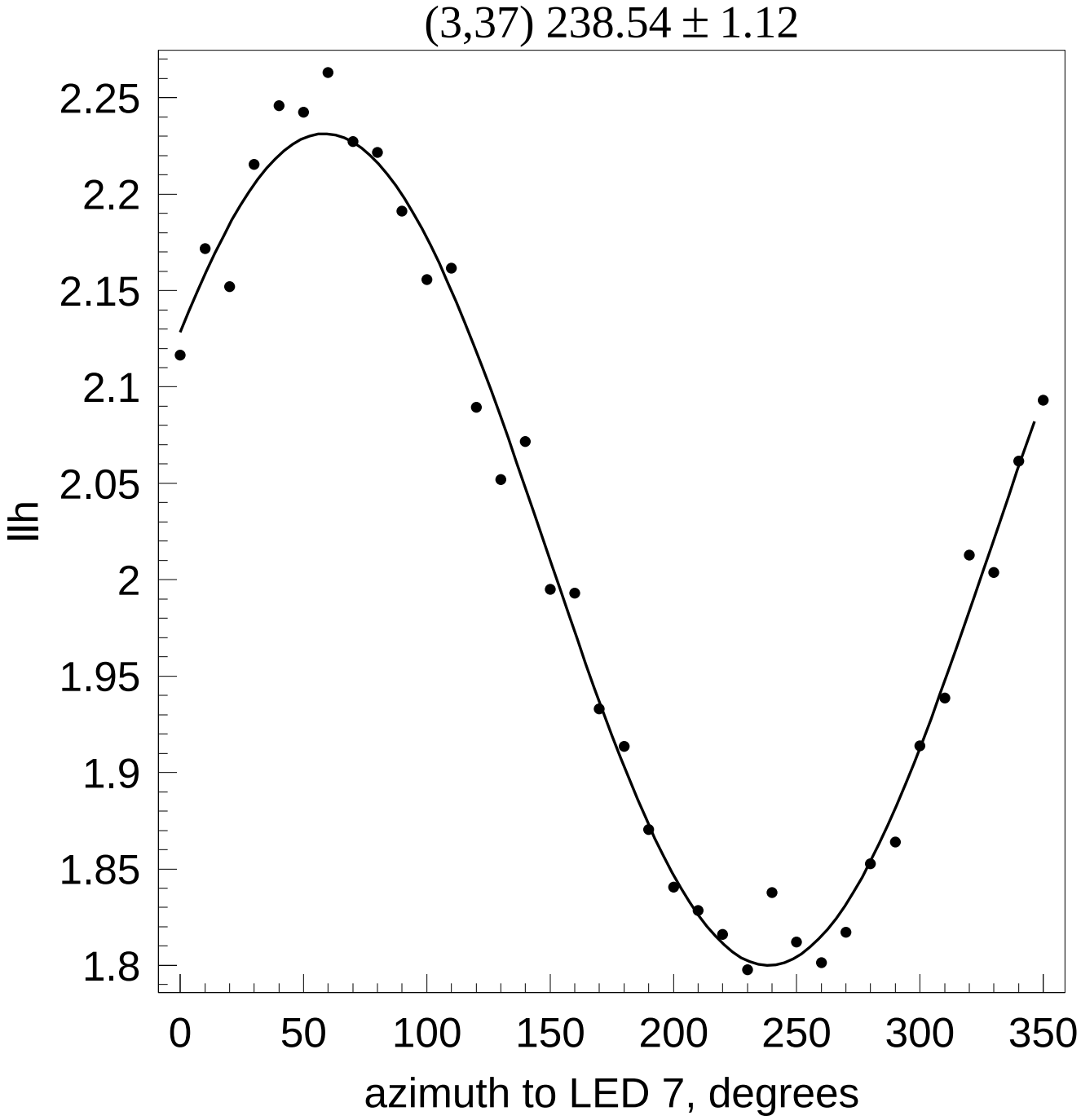

(3,36) 220.04 ± 18.24
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

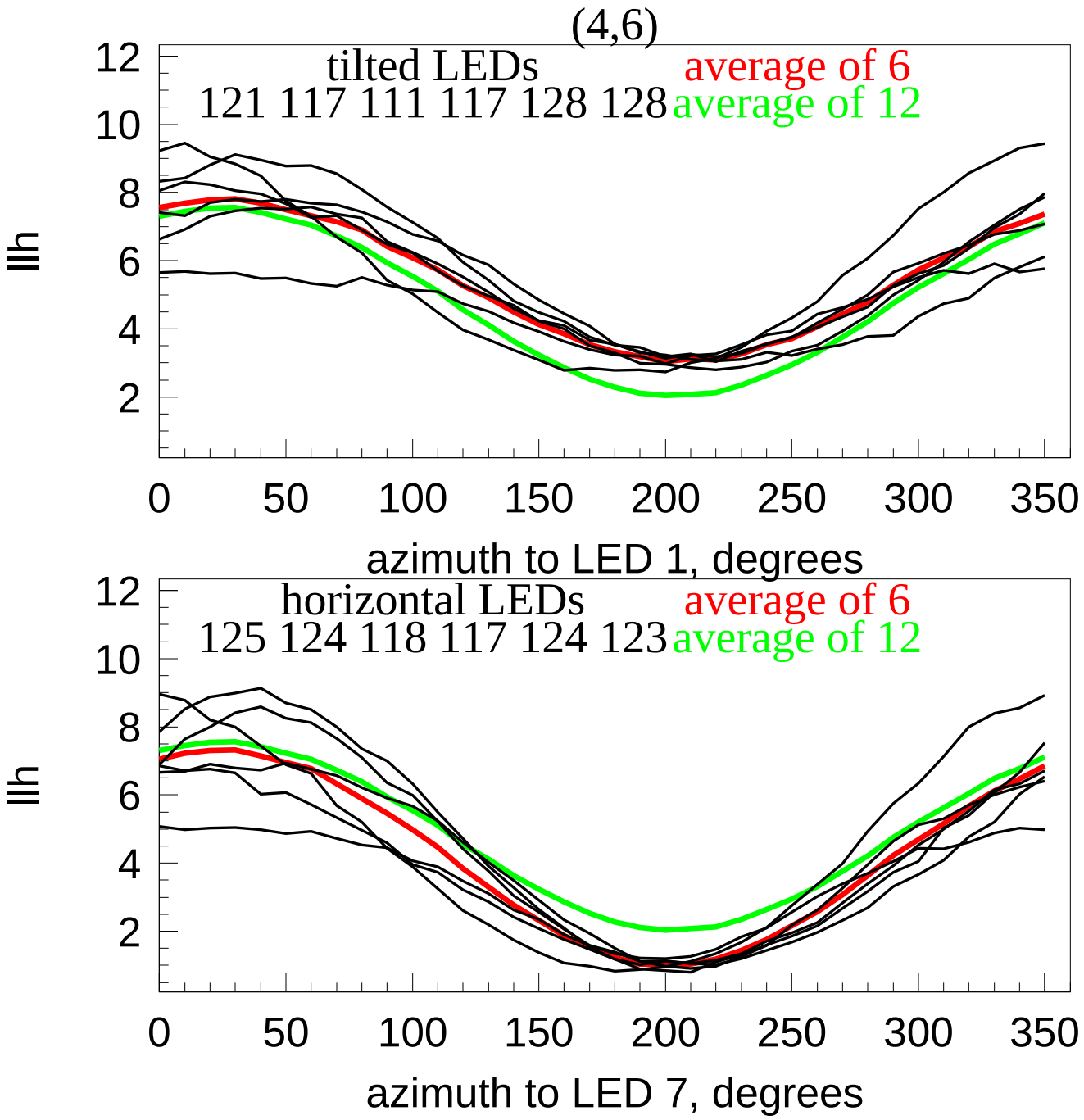

(3,36) 220.41 ± 19.21
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

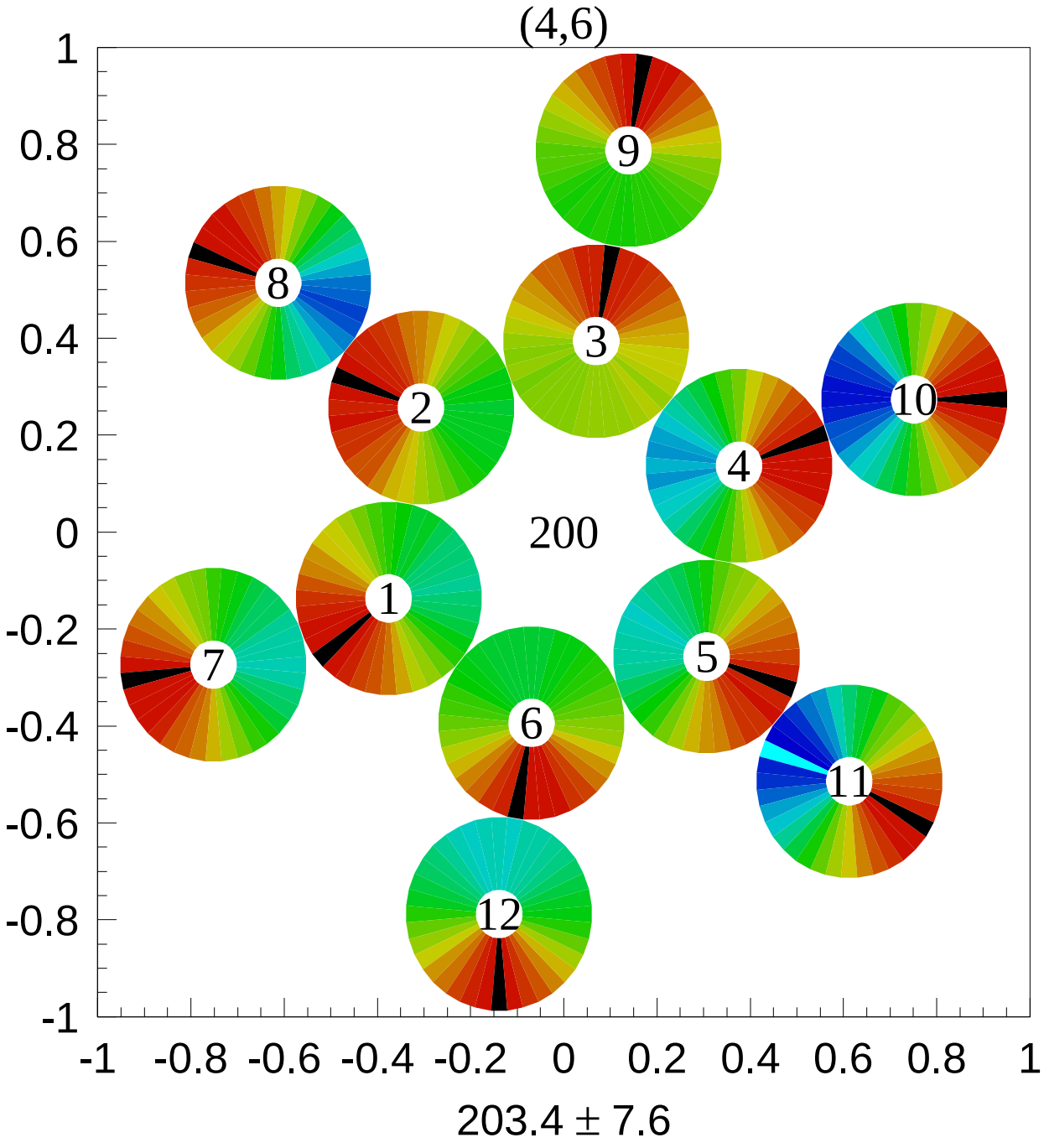

(3,37)
tilted LEDs
132 123 123 125 129 117
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
130 127 123 121 129 126
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

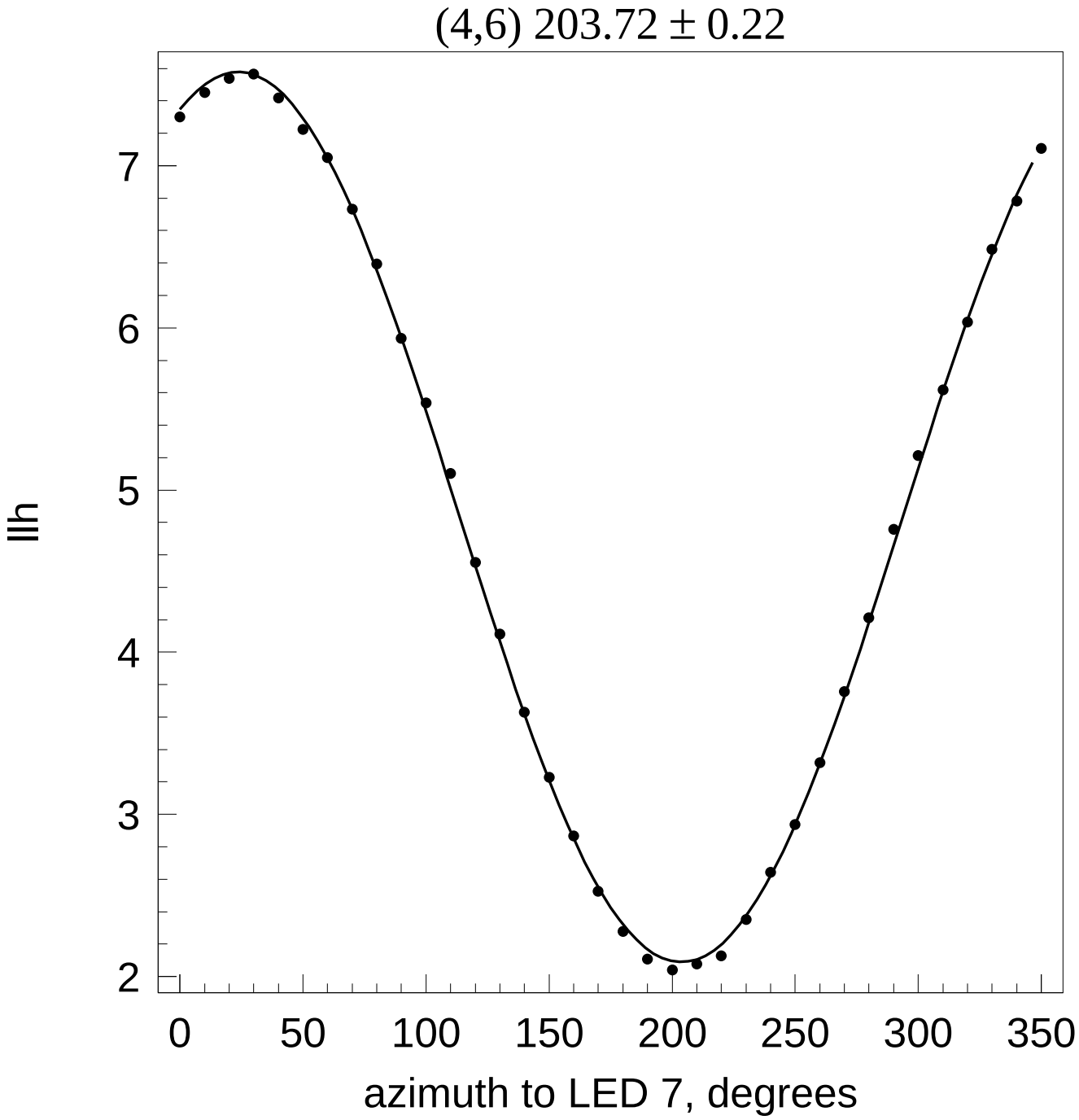

(3,37)
9
10
3
4
8
2
230
5
11
1
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
240.6 ± 24.6

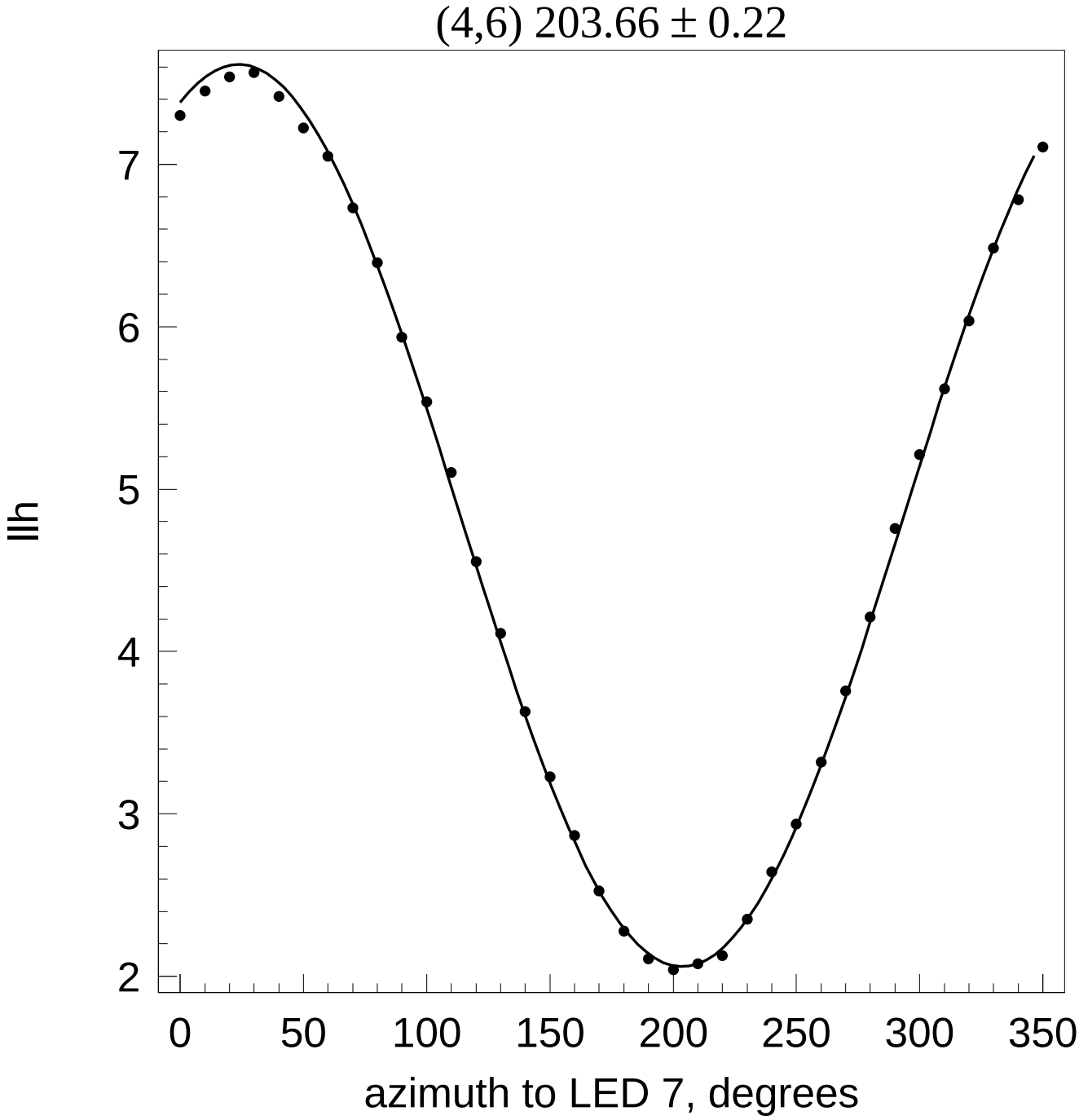

(3,37) 238.40 ± 1.15
2.25
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

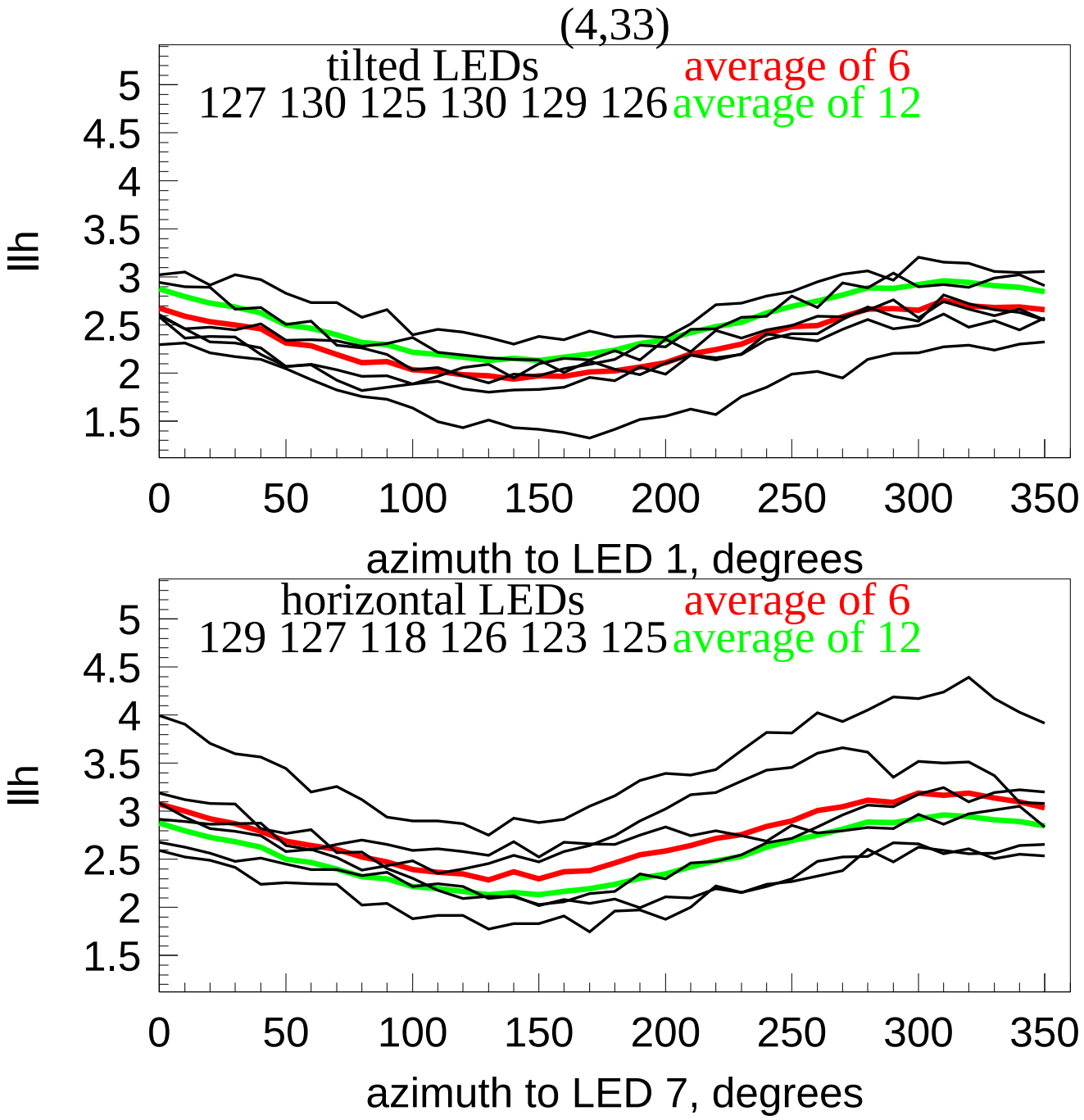

(3,37) 238.54 ± 1.12
2.25
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

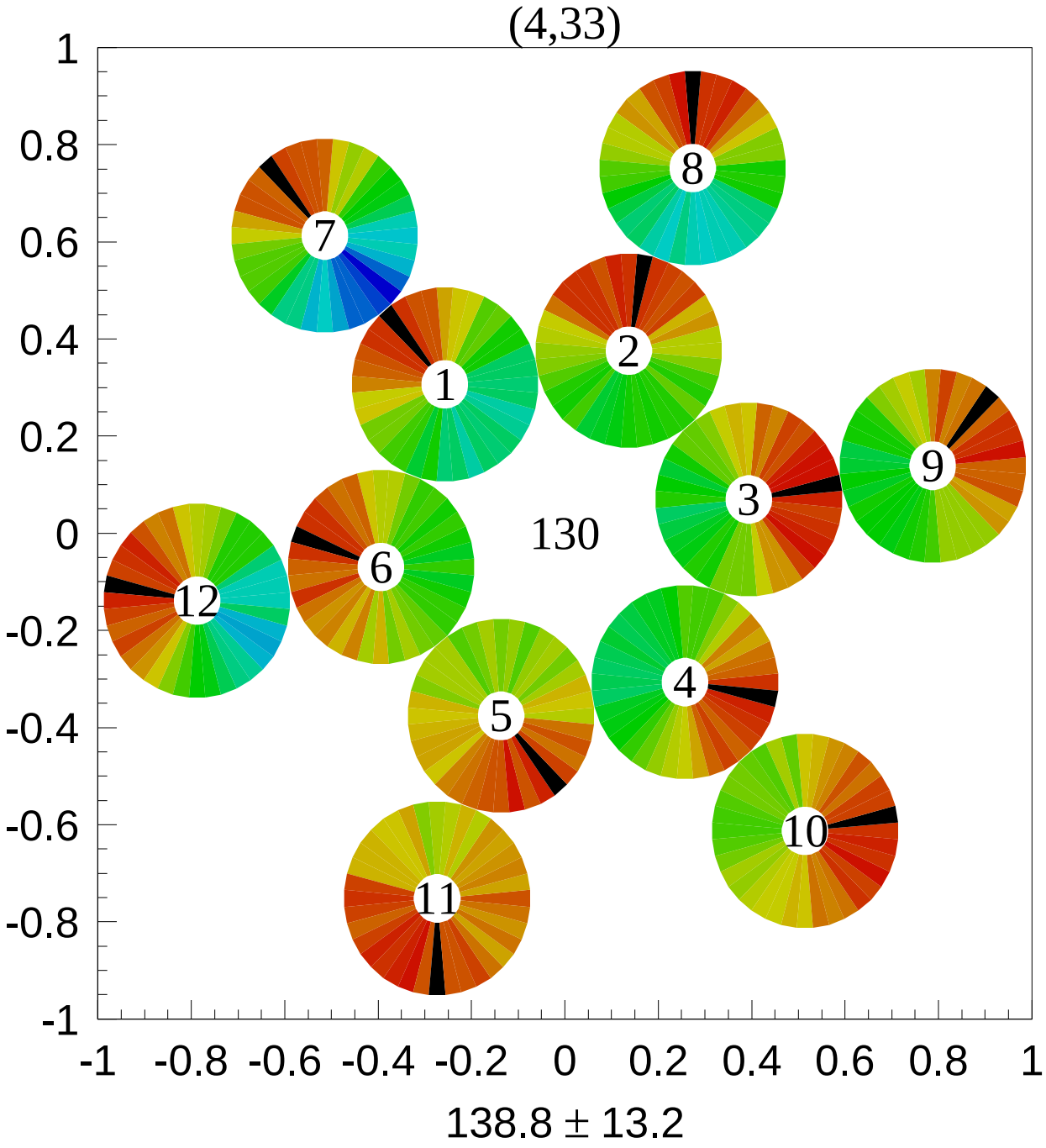

(4,6)
tilted LEDs
121 117 111 117 128 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 124 118 117 124 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

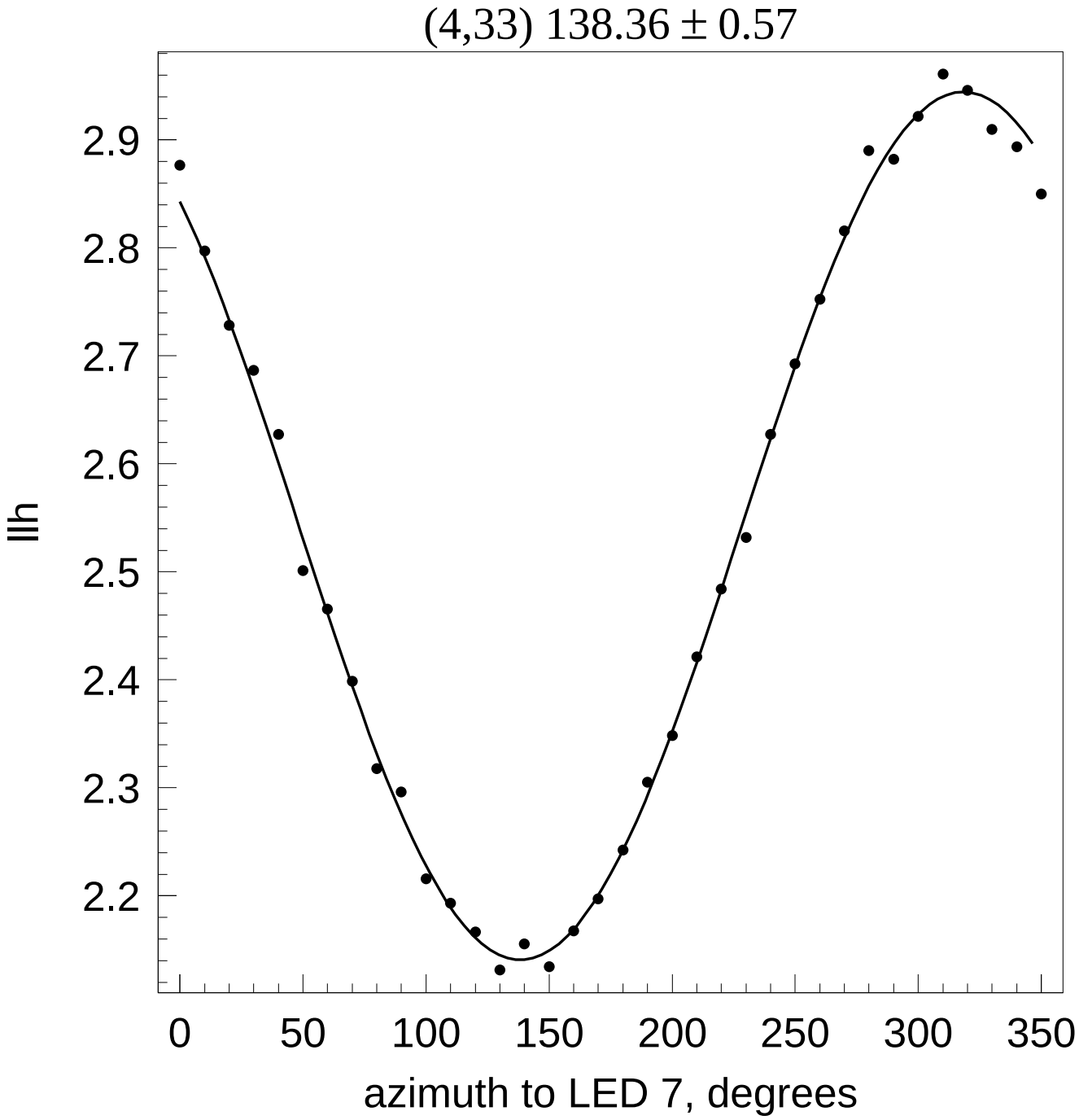

(4,6)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
8
3
2
10
4
200
1
7
5
6
11
12
203.4 ± 7.6

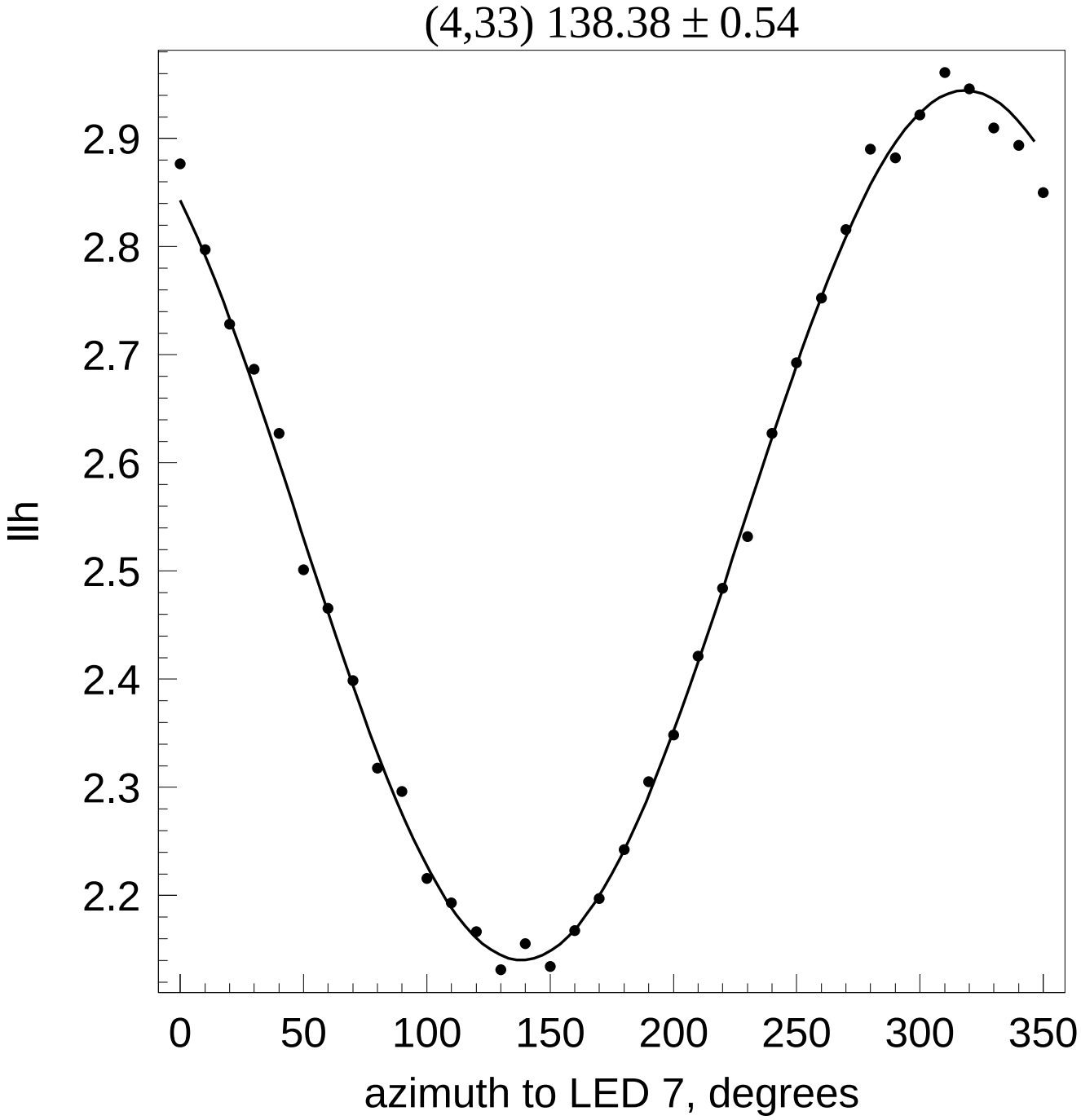

(4,6) 203.72 ± 0.22
llh
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

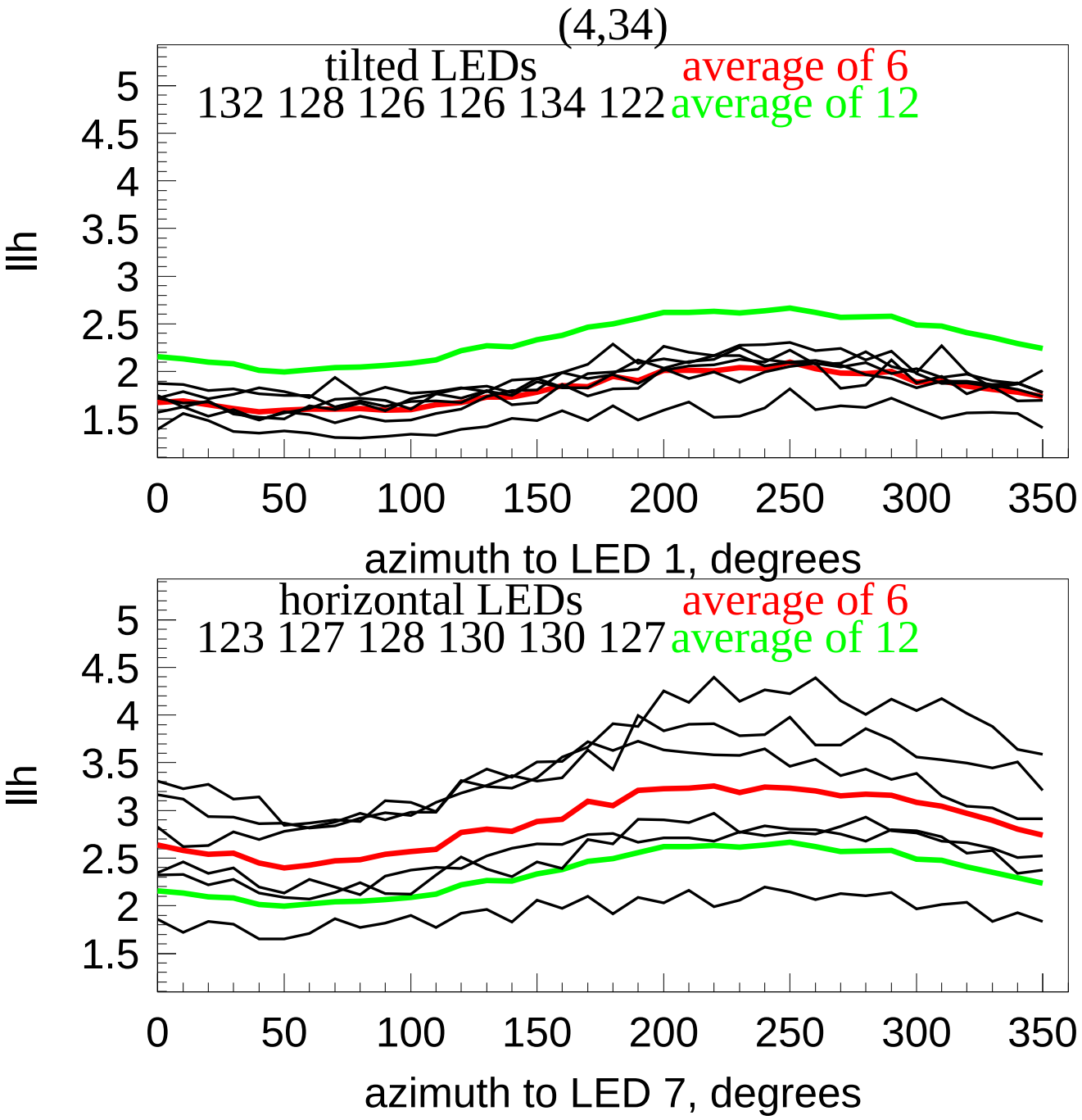

(4,6) 203.66 ± 0.22
llh
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

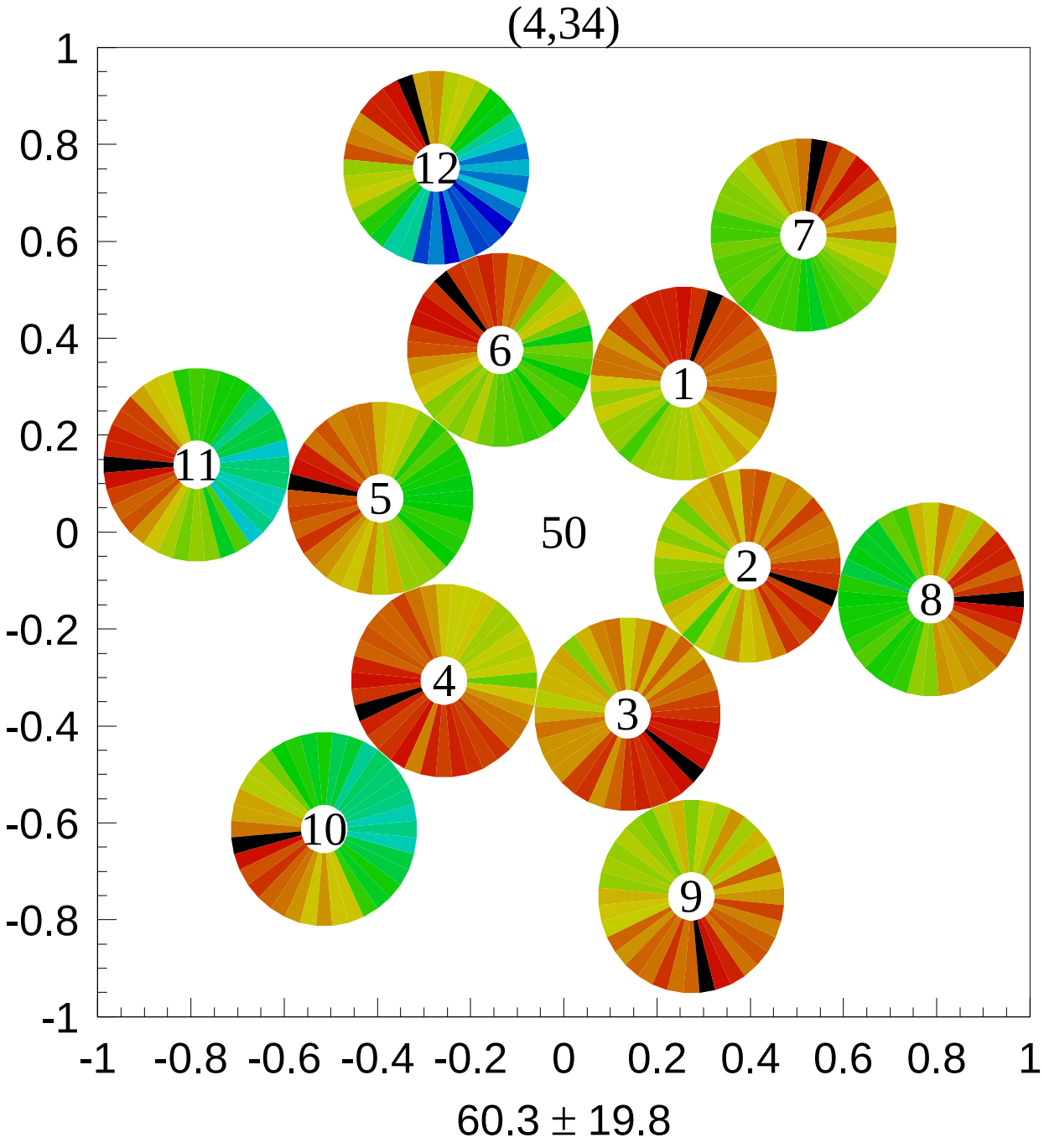

(4,33)
tilted LEDs
127 130 125 130 129 126
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 127 118 126 123 125
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

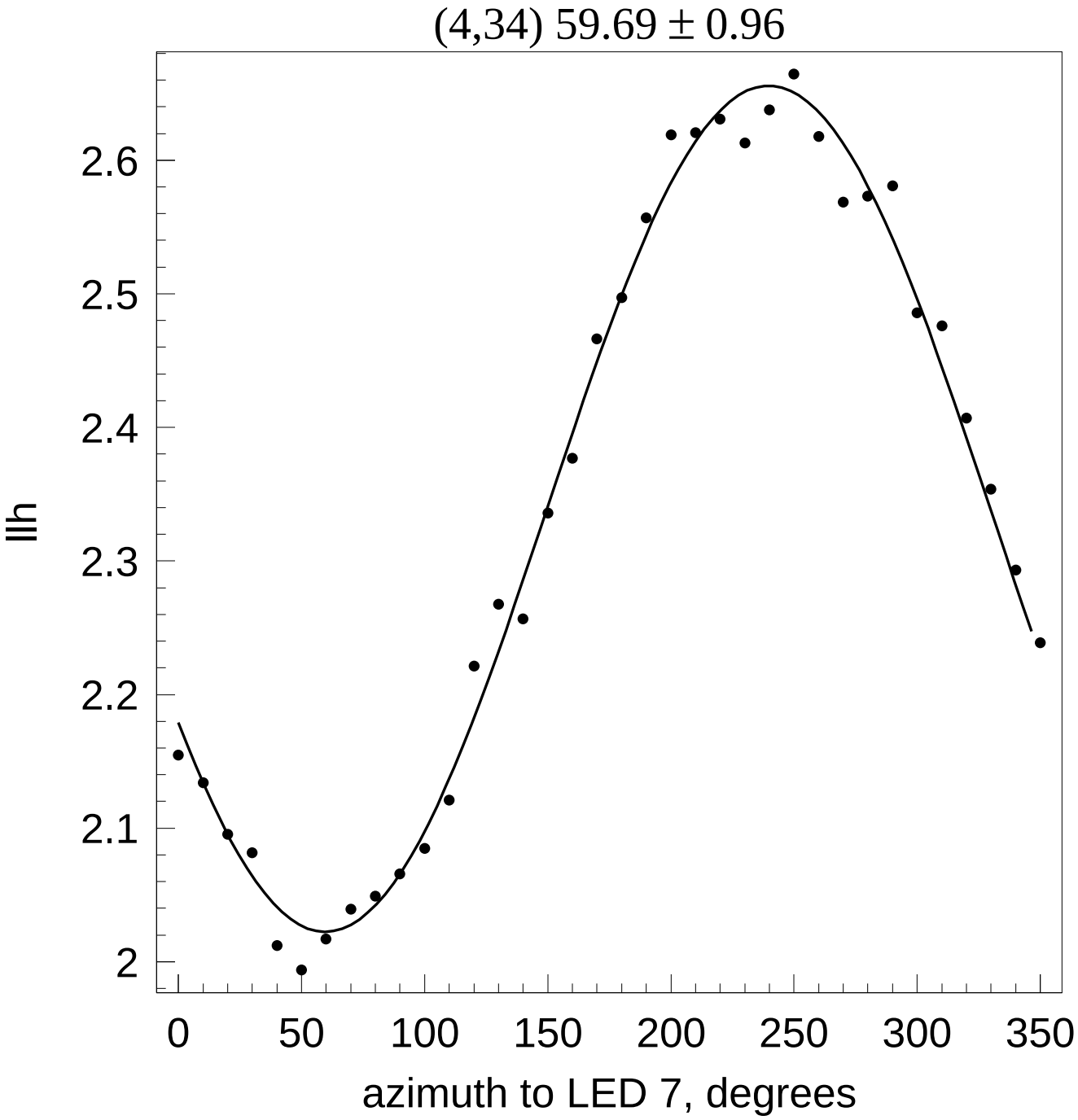

(4,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
138.8 ± 13.2
130
1
2
3
4
5
6
7
8
9
10
11
12

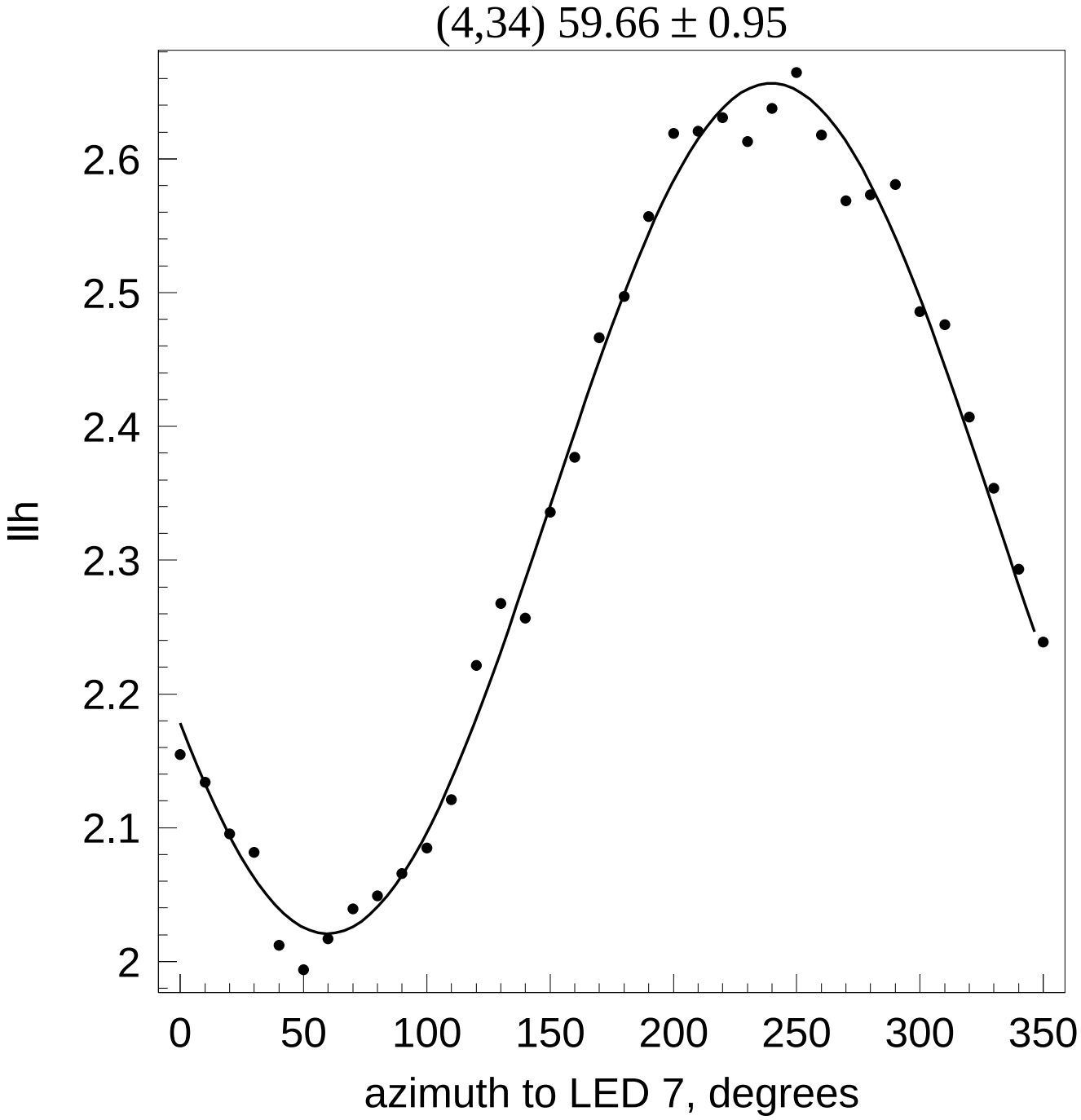

(4,33) 138.36 ± 0.57
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

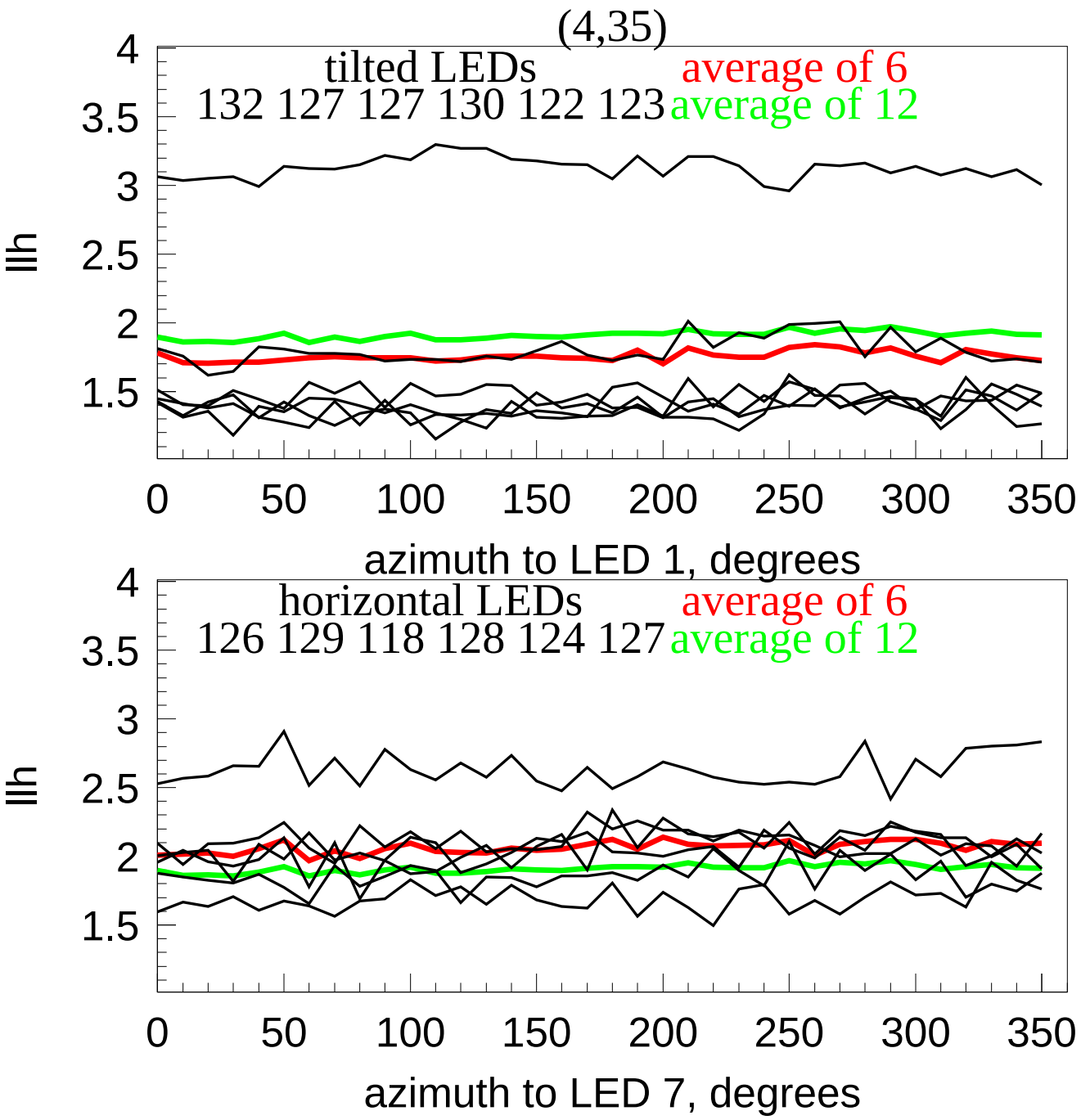

(4,33) 138.38 ± 0.54
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

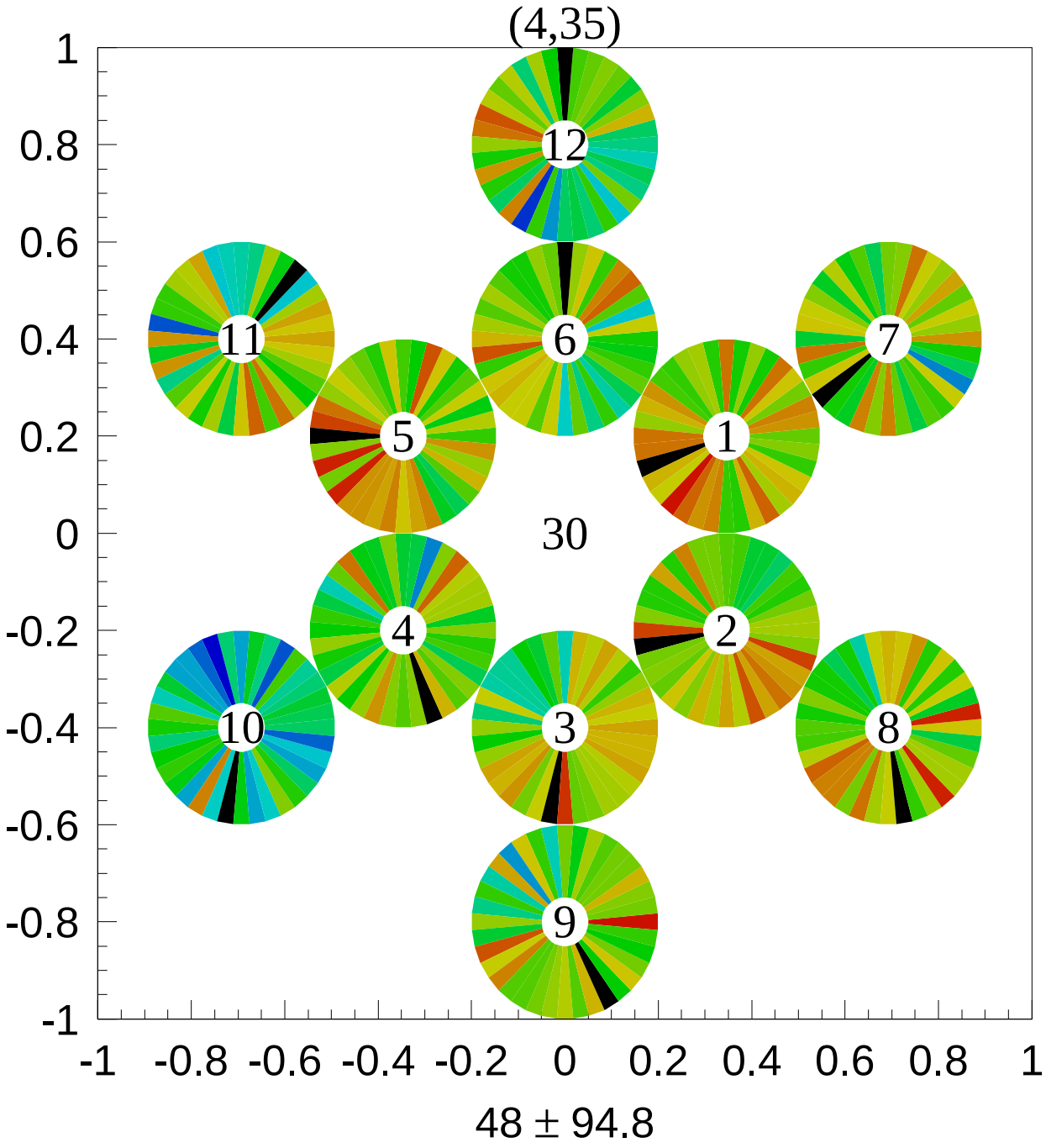

(4,34)
tilted LEDs
132 128 126 126 134 122
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 127 128 130 130 127
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

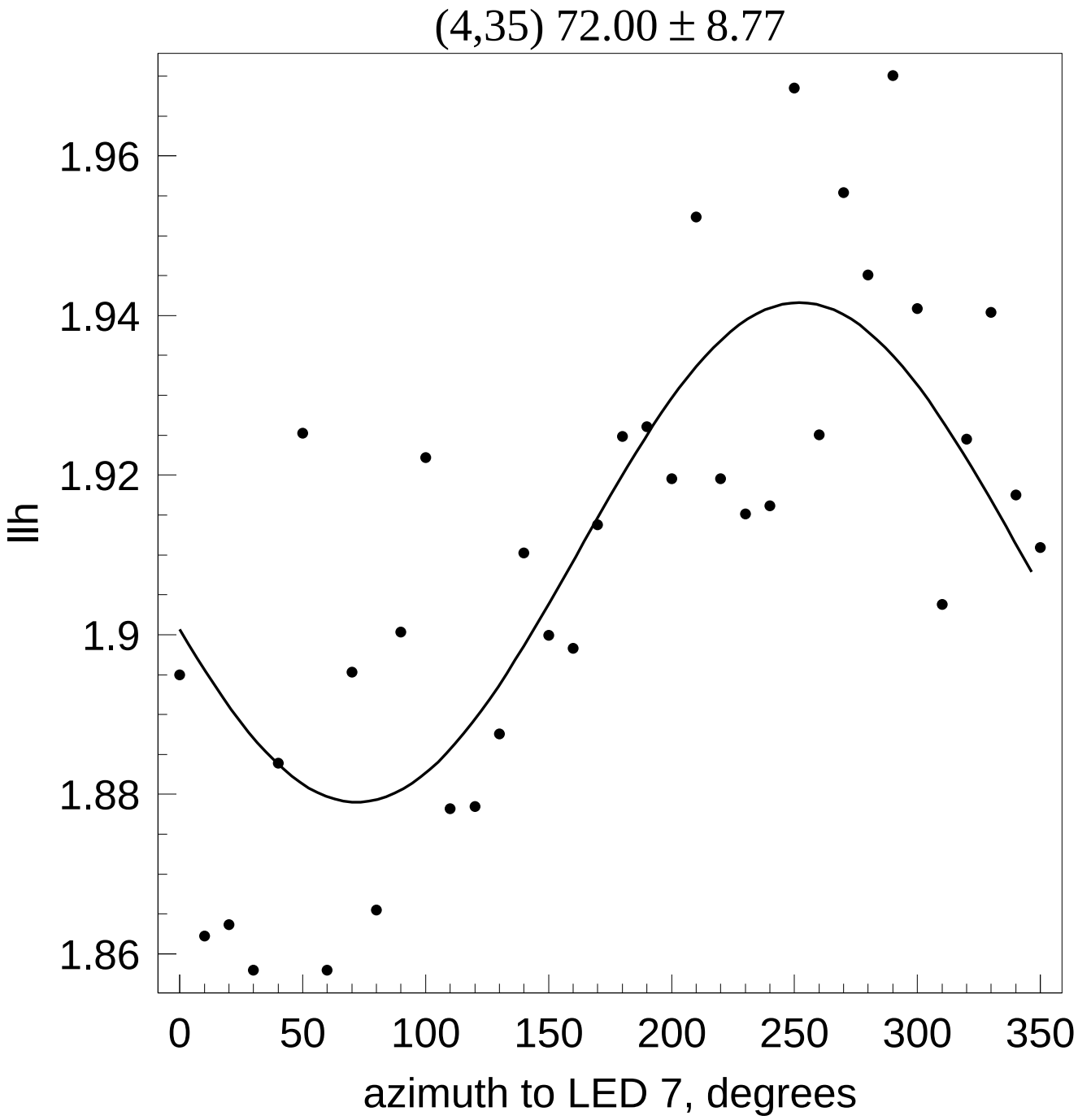

(4,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
60.3 ± 19.8

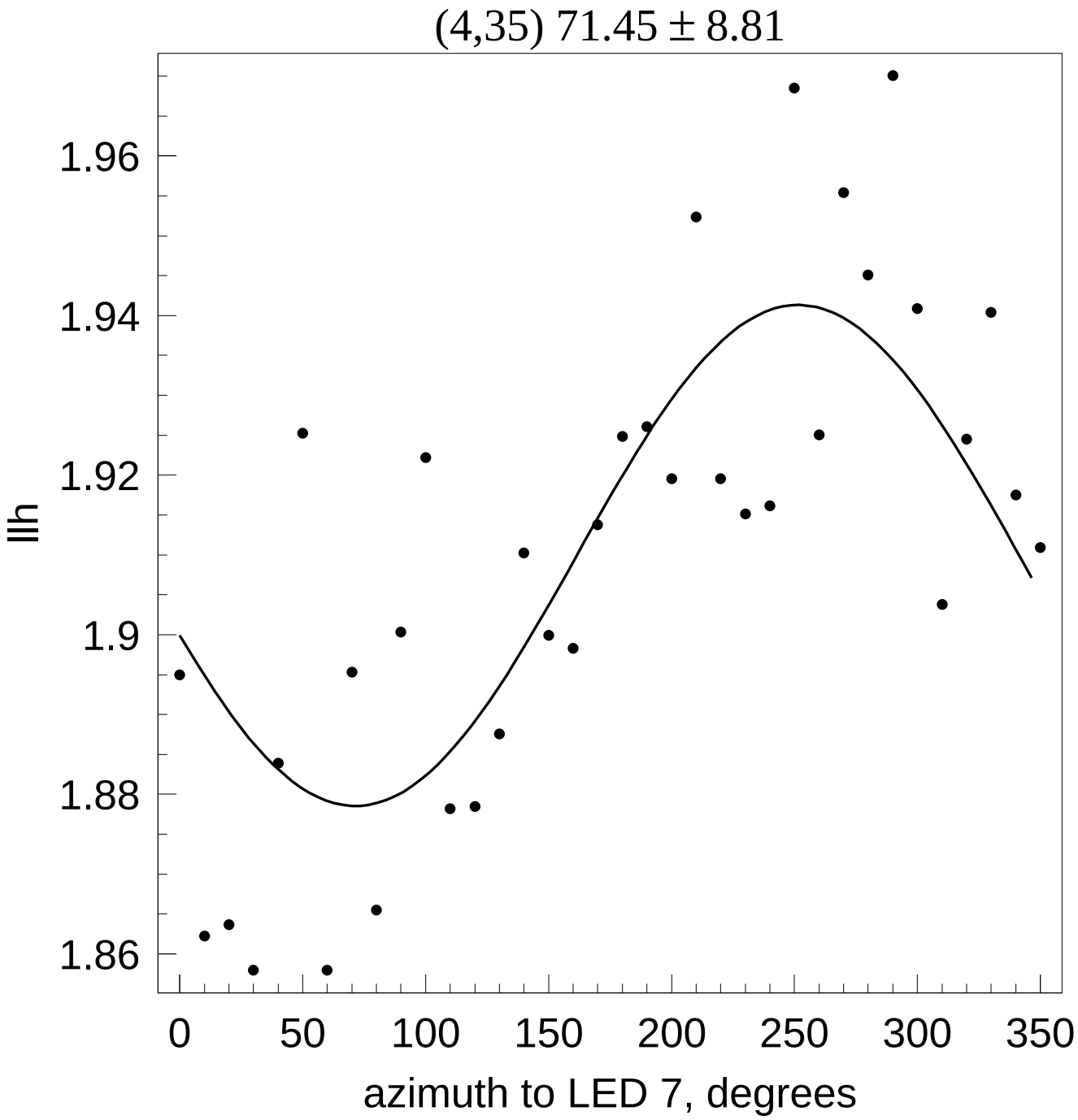

(4,34) 59.69 ± 0.96
llh
2.6
2.5
2.4
2.3
2.2
2.1
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

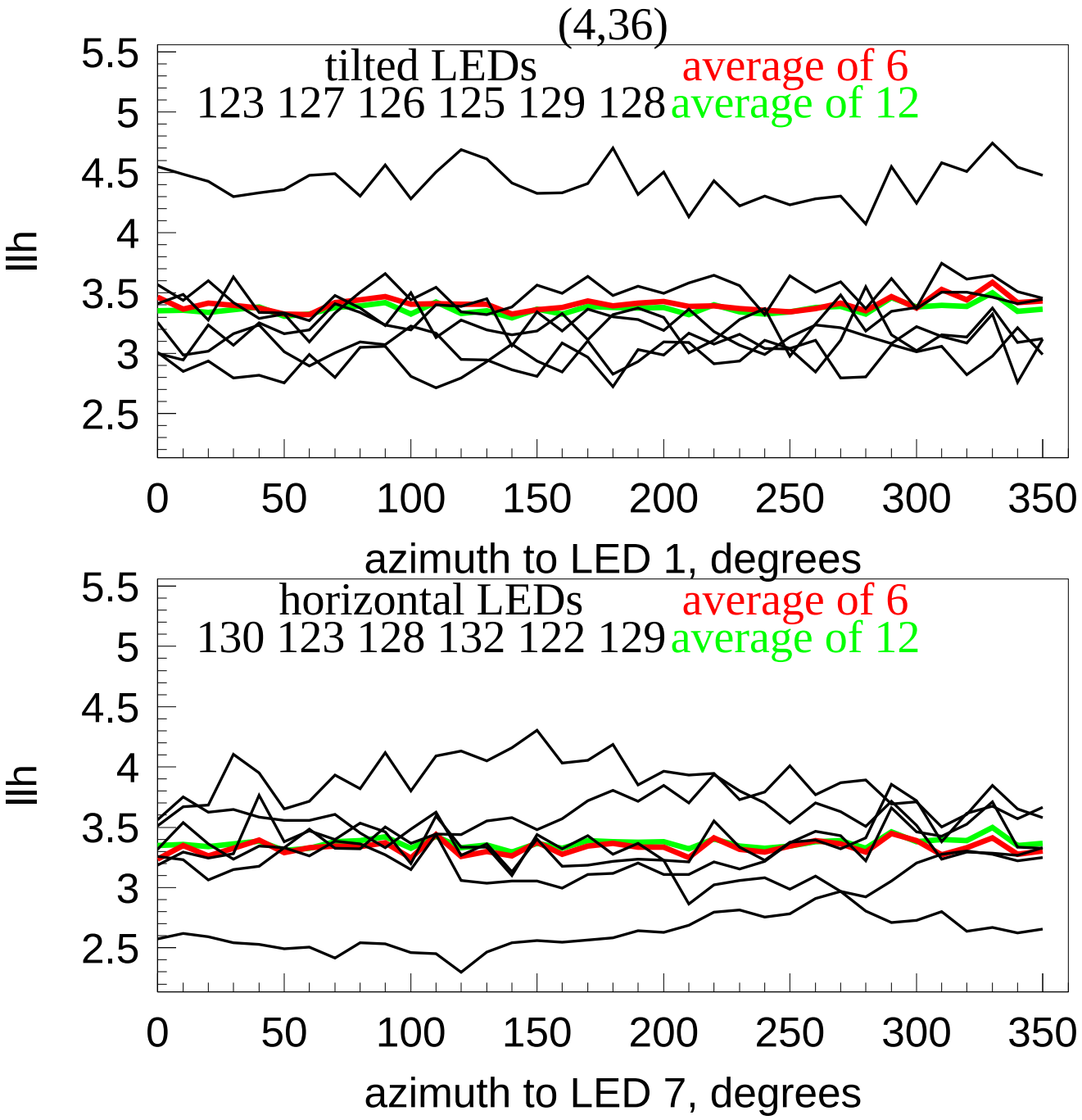

(4,34) 59.66 ± 0.95
llh
2.6
2.5
2.4
2.3
2.2
2.1
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

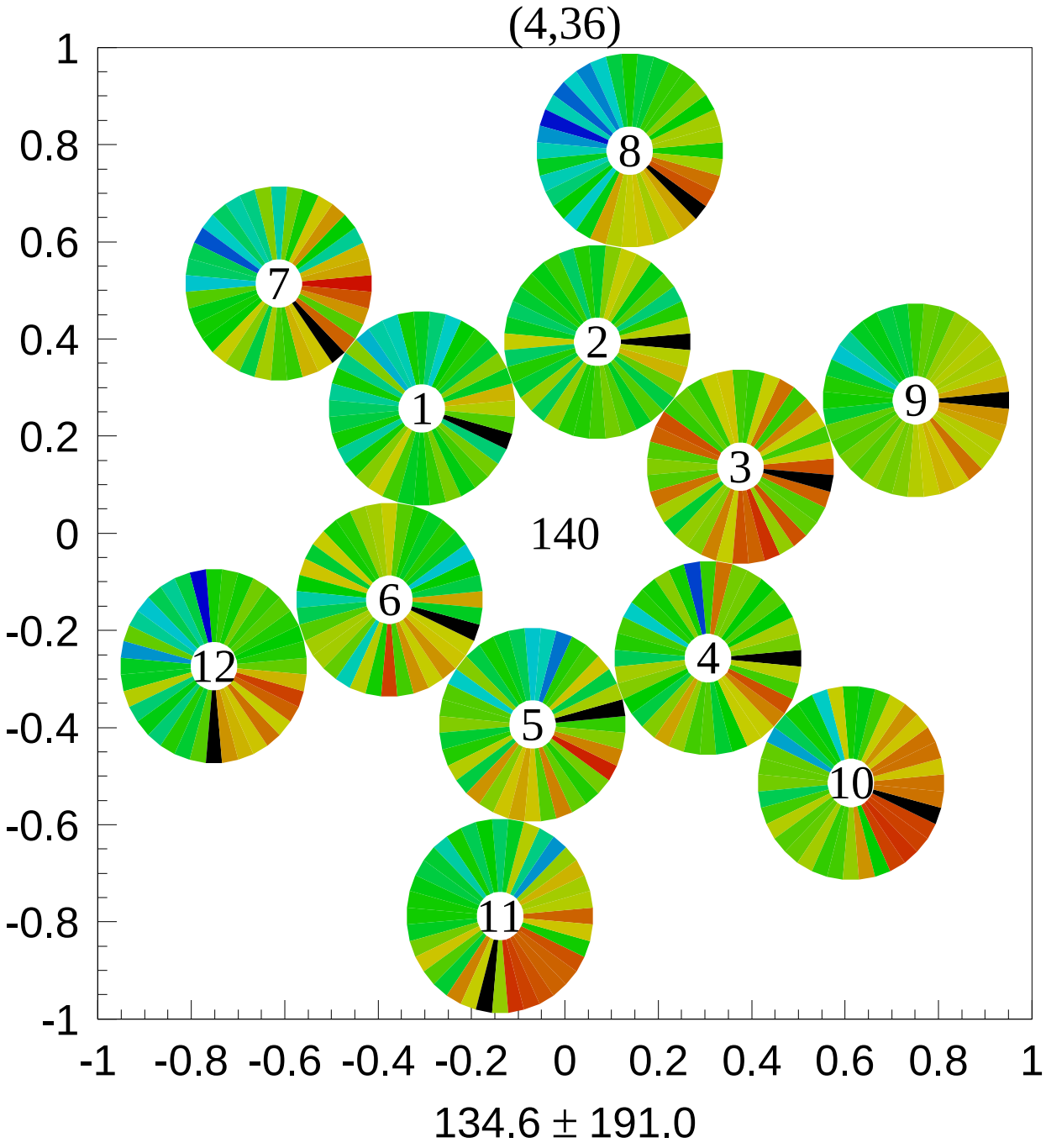

(4,35)
tilted LEDs
132 127 127 130 122 123
average of 6
average of 12
IIh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 129 118 128 124 127
average of 6
average of 12
IIh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

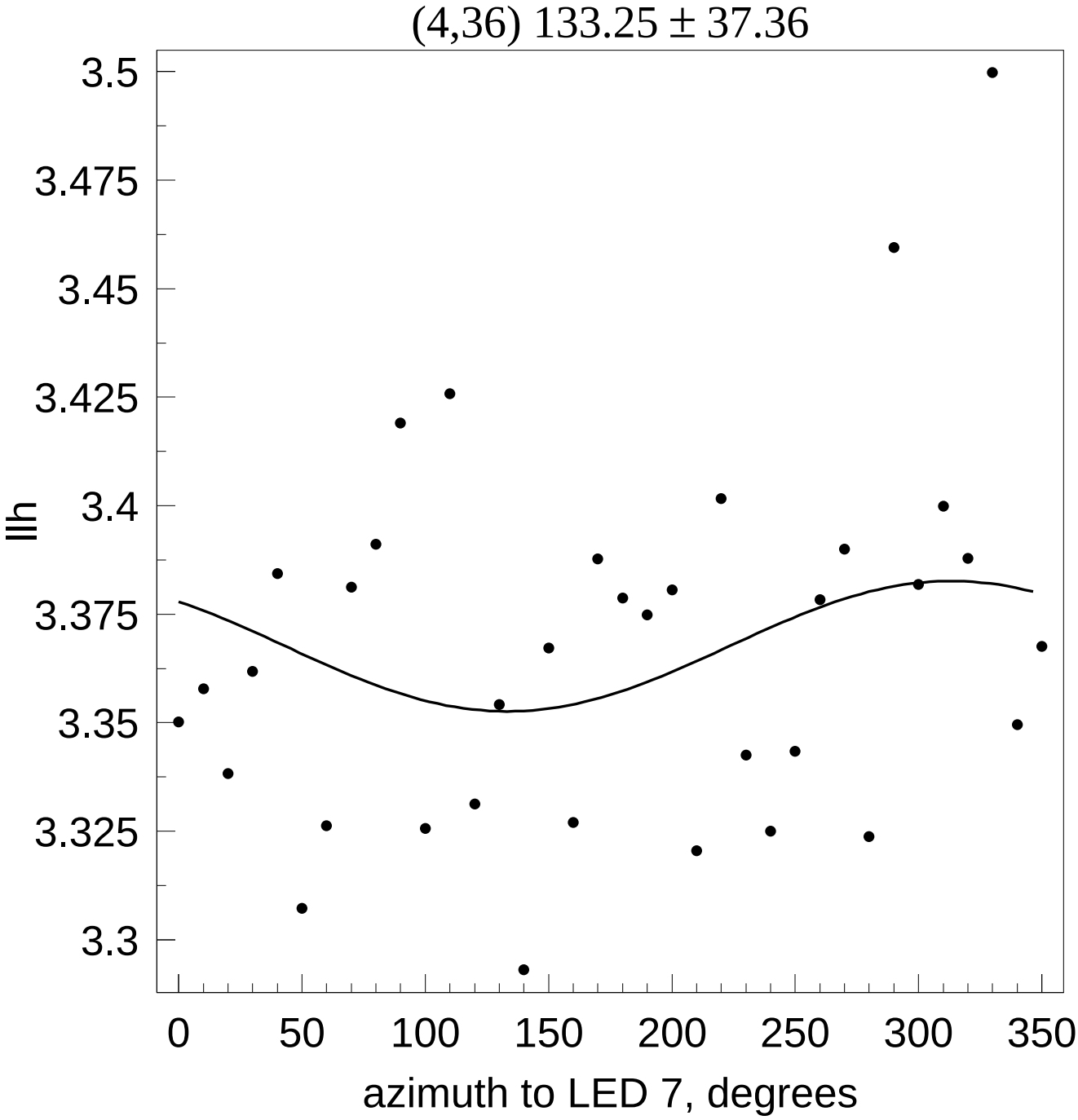

(4,35)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
48 ± 94.8

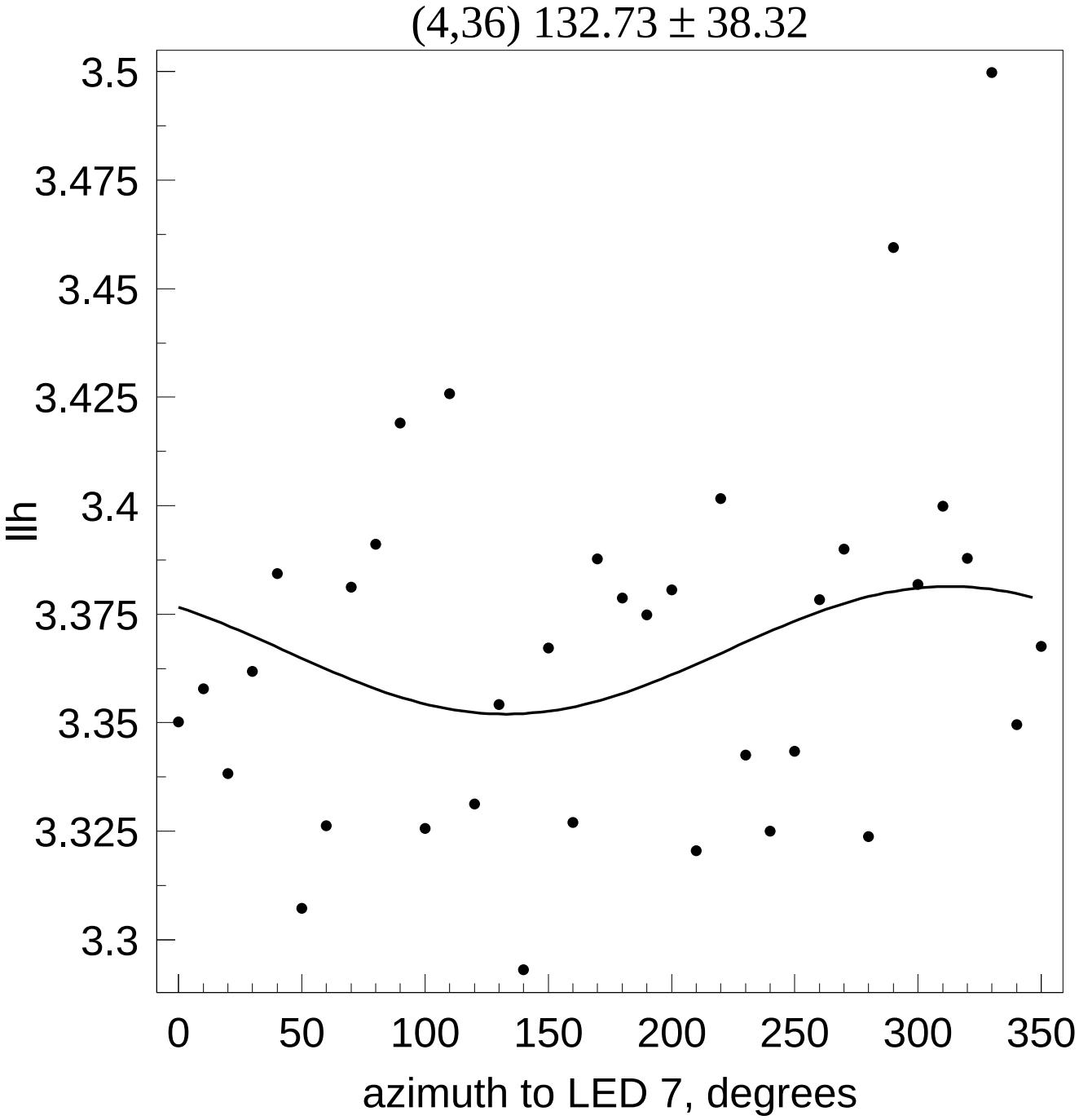

(4,35) 72.00 ± 8.77
1.96
1.94
1.92
1.9
1.88
1.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

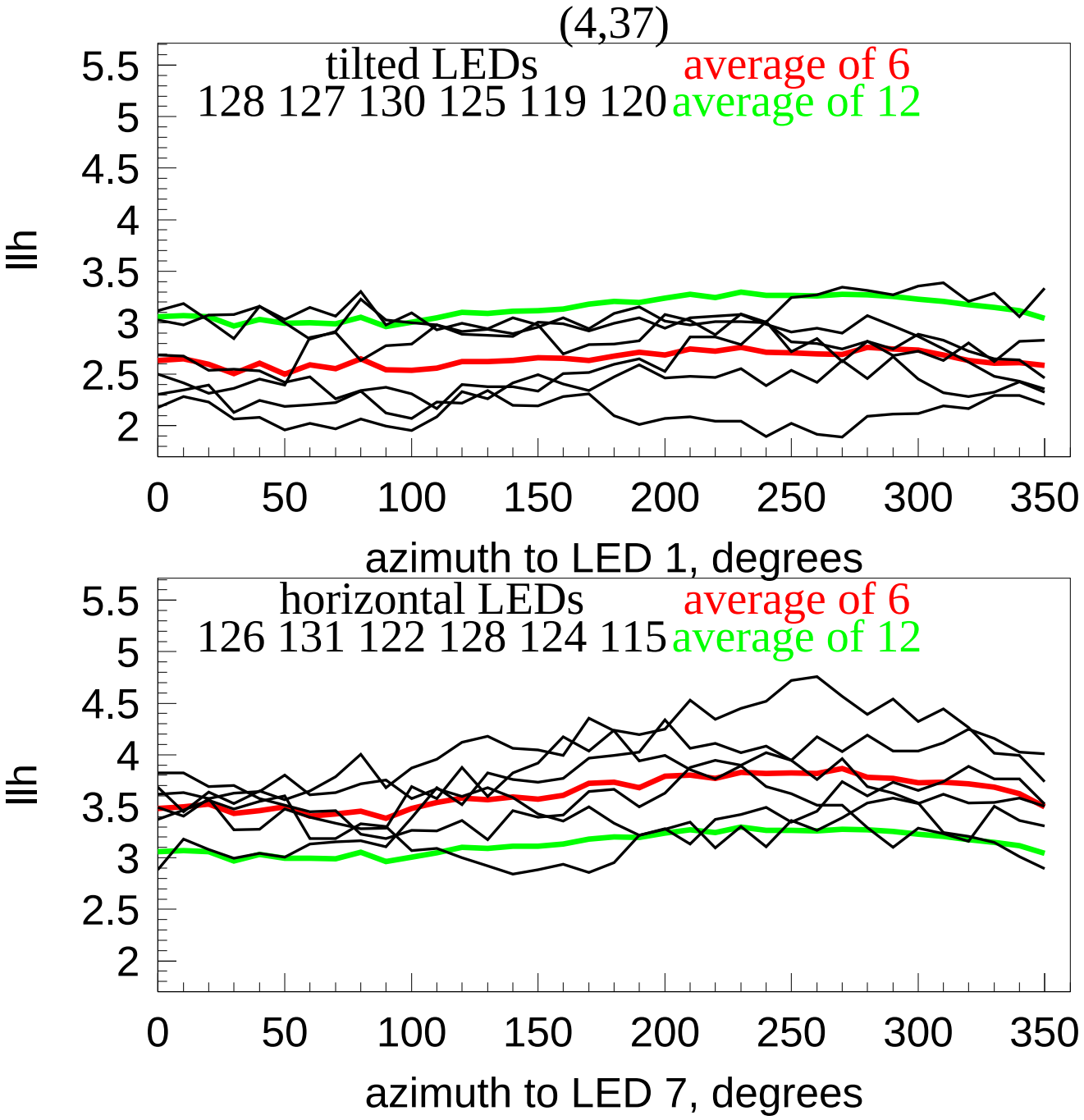

(4,35) 71.45 ± 8.81
1.96
1.94
1.92
1.9
1.88
1.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

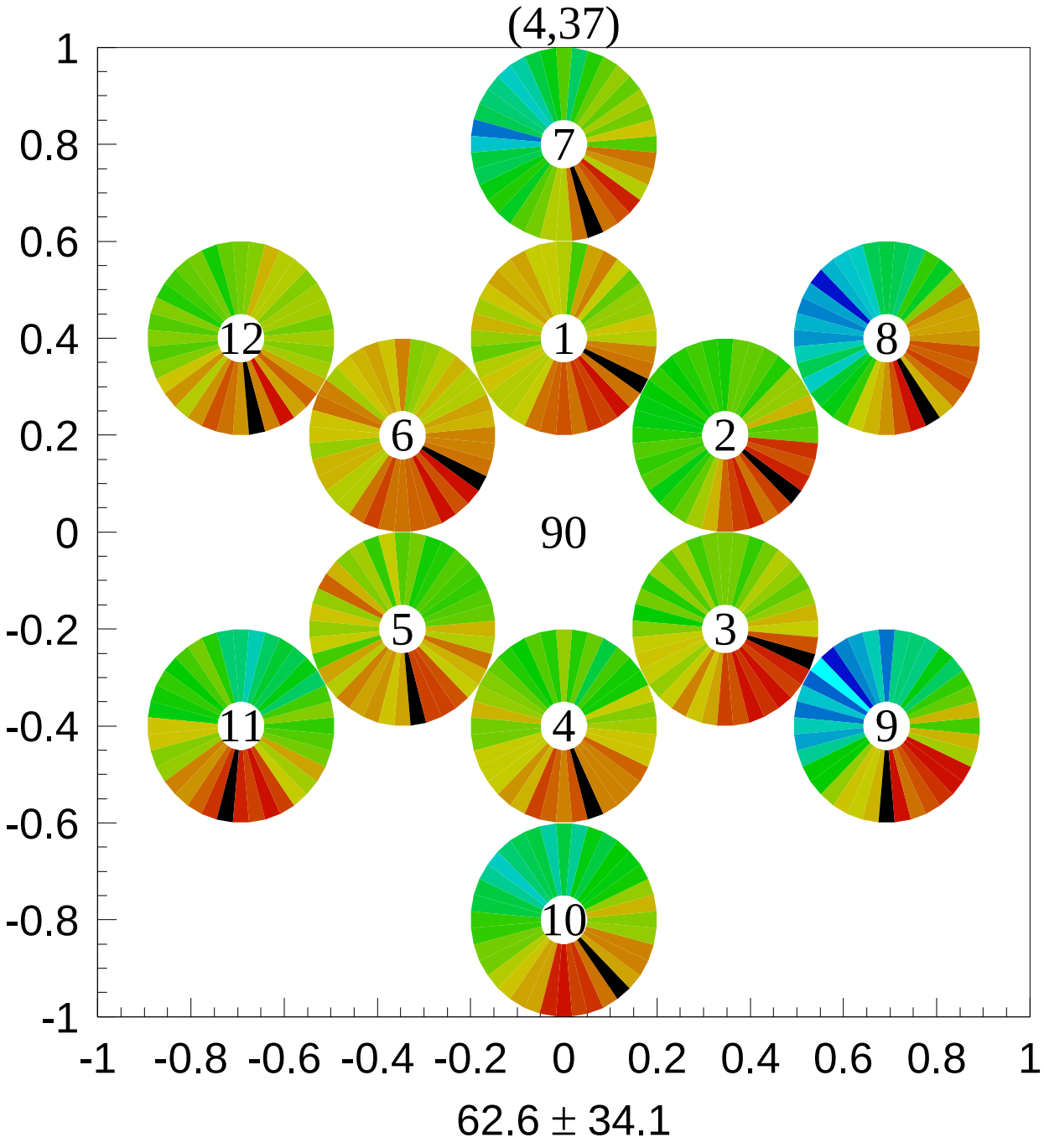

(4,36)
tilted LEDs
123 127 126 125 129 128
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 123 128 132 122 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

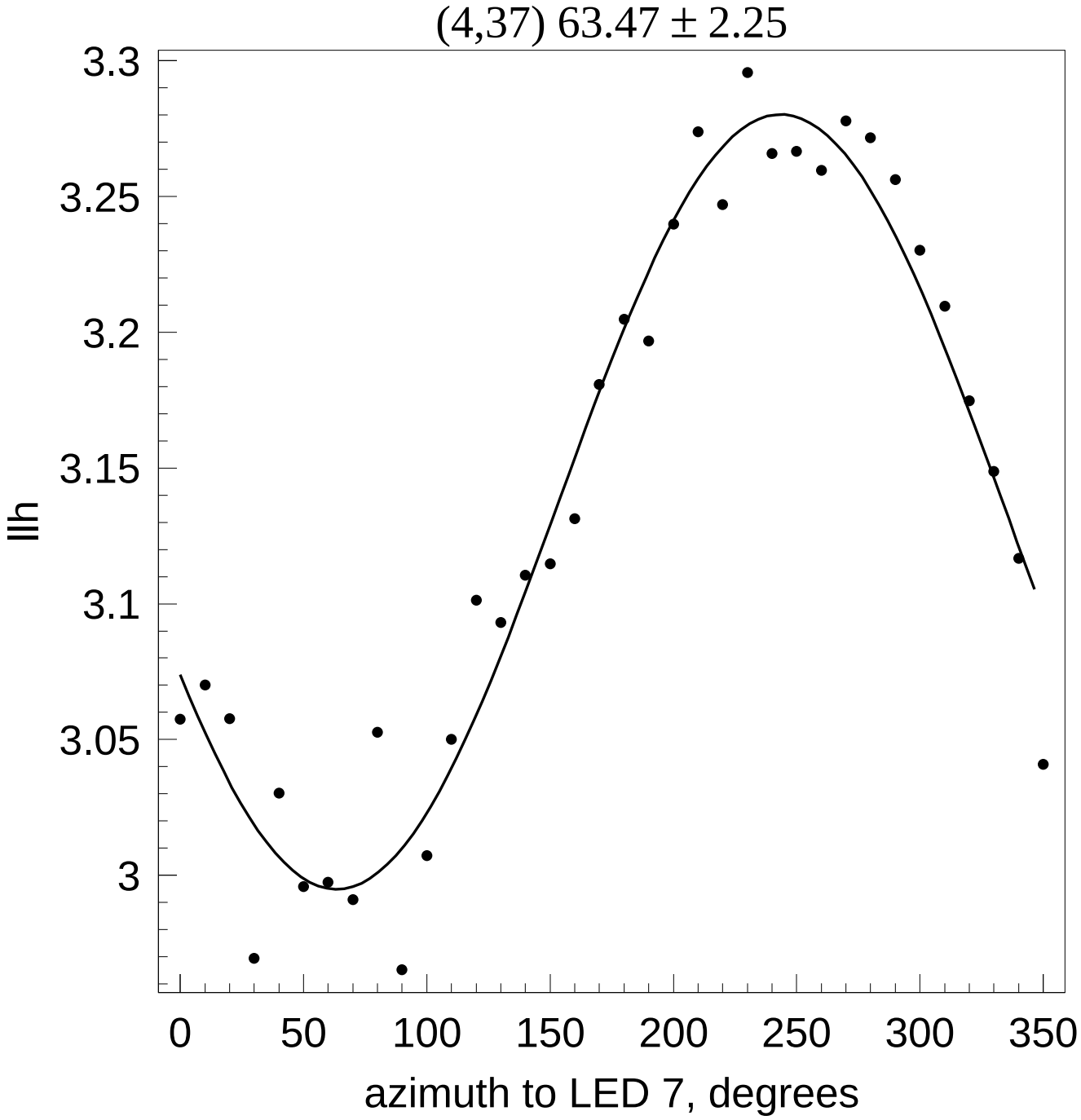

(4,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
134.6 ± 191.0
140
1
2
3
4
5
6
7
8
9
10
11
12

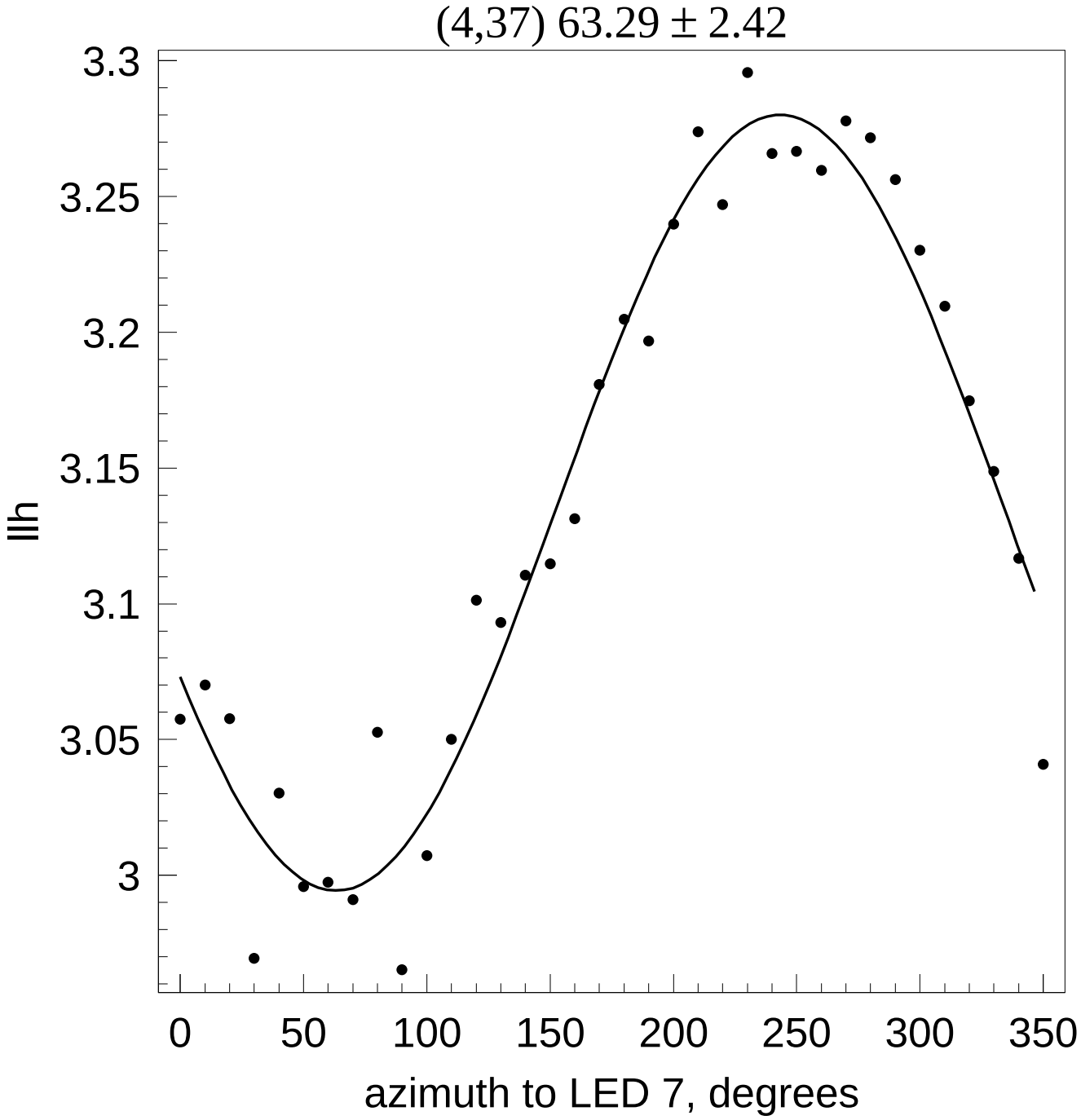

(4,36) 133.25 ± 37.36
3.5
3.475
3.45
3.425
3.4
3.375
3.35
3.325
3.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

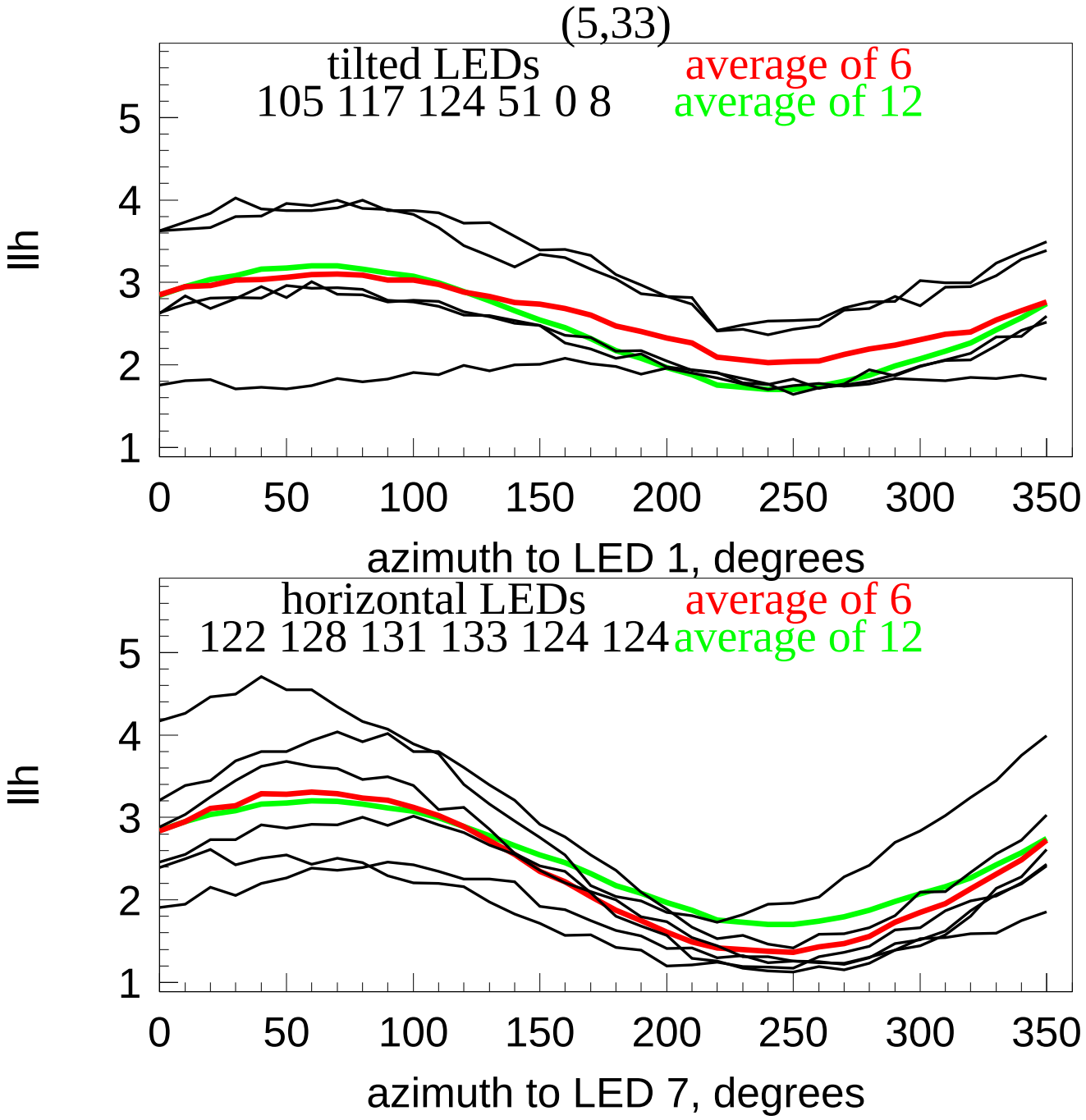

(4,36) 132.73 ± 38.32
3.5
3.475
3.45
3.425
3.4
3.375
3.35
3.325
3.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

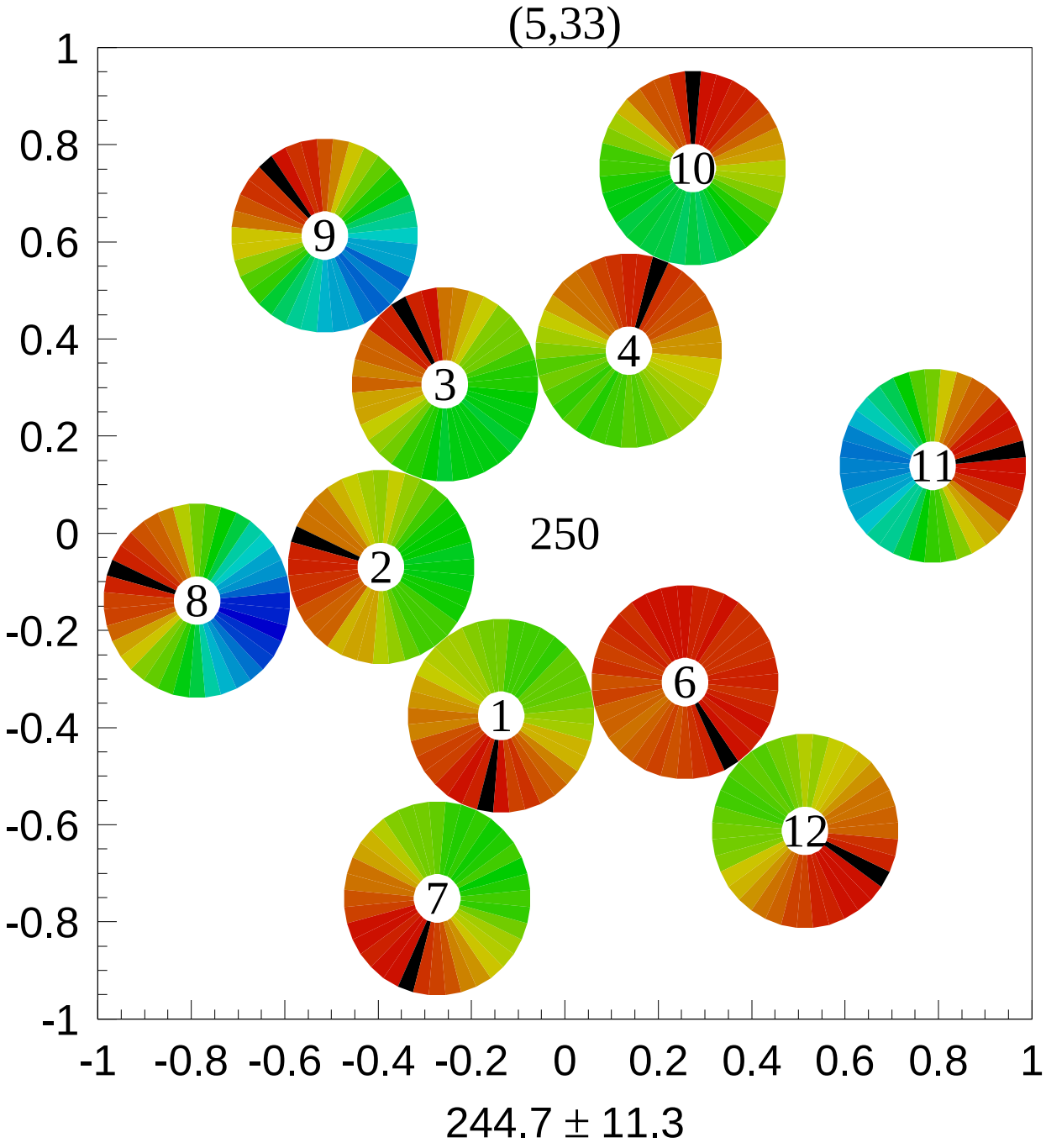

(4,37)
tilted LEDs
128 127 130 125 119 120
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 131 122 128 124 115
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

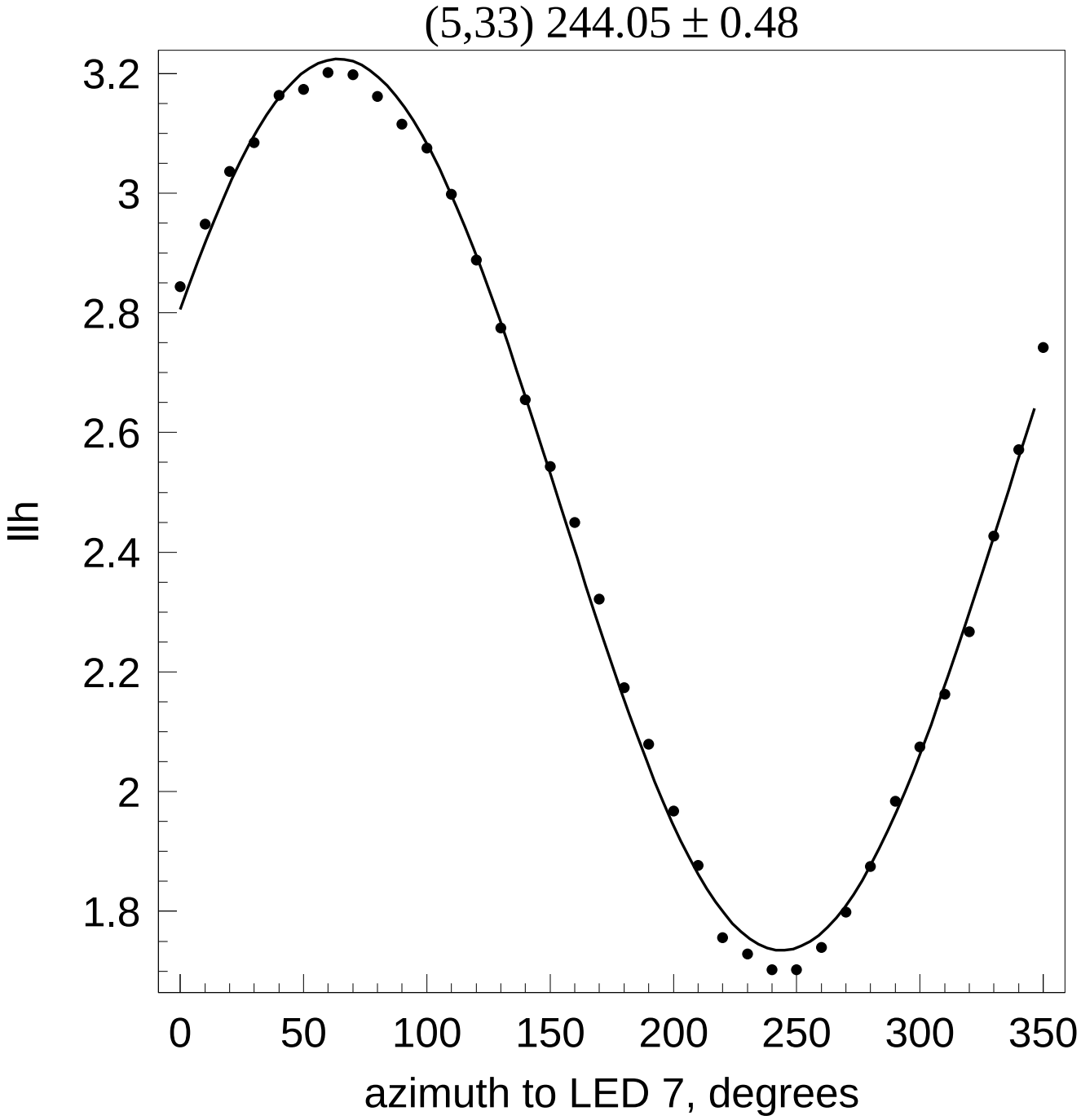

(4,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
7
12
1
8
6
2
90
5
3
11
4
9
10
62.6 ± 34.1

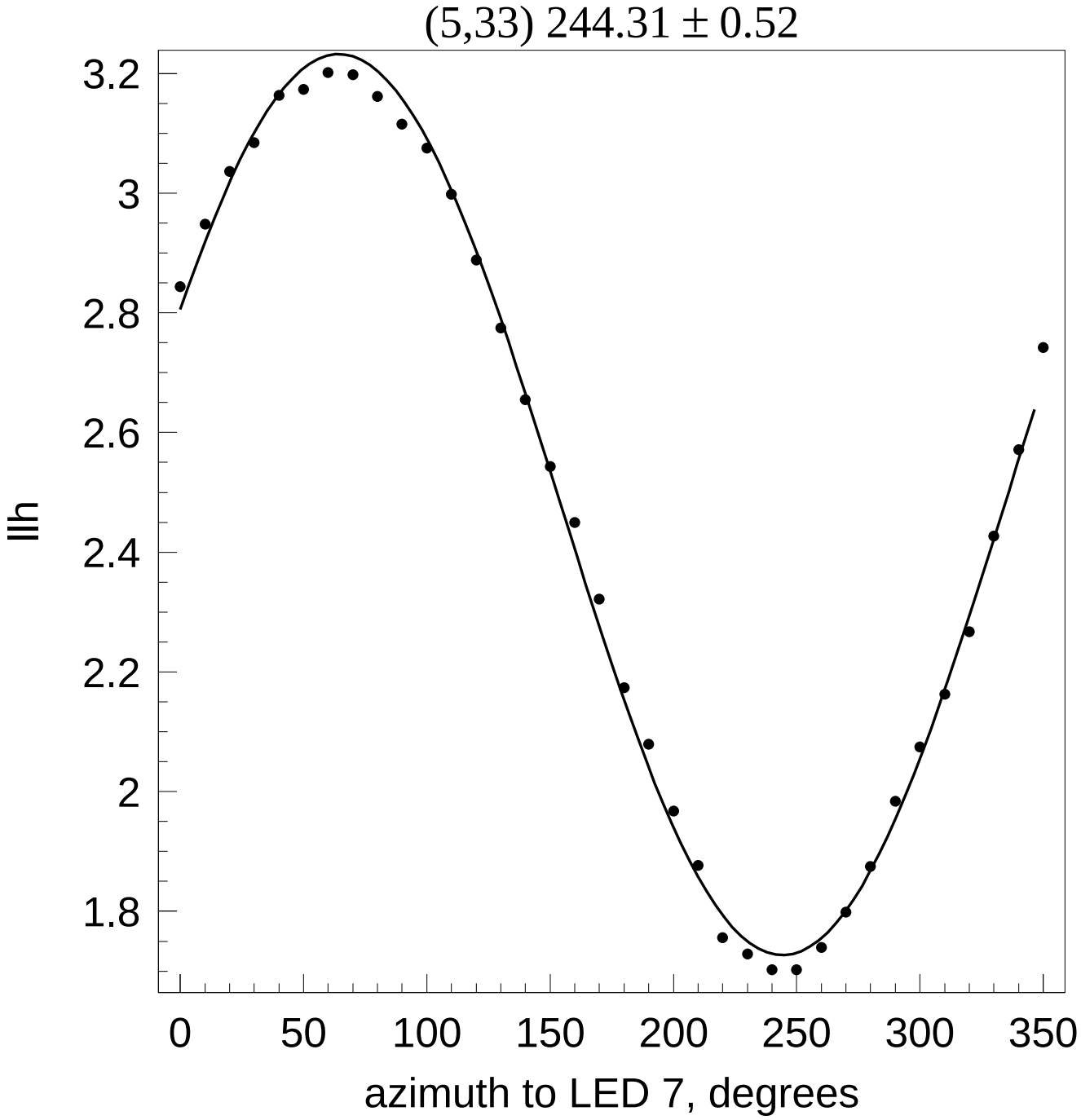

(4,37) 63.47 ± 2.25
3.3
3.25
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

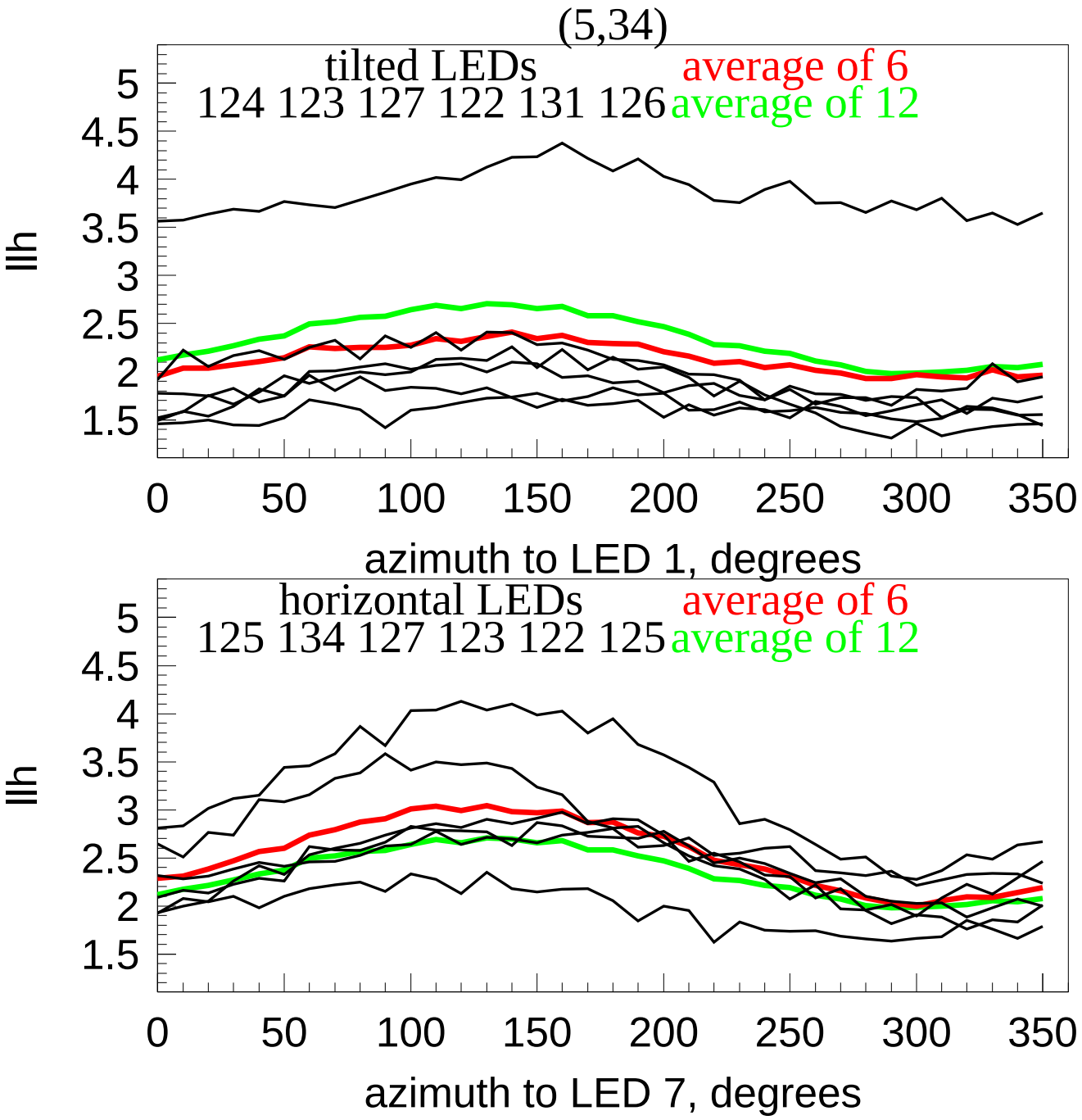

(4,37) 63.29 ± 2.42
3.3
3.25
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

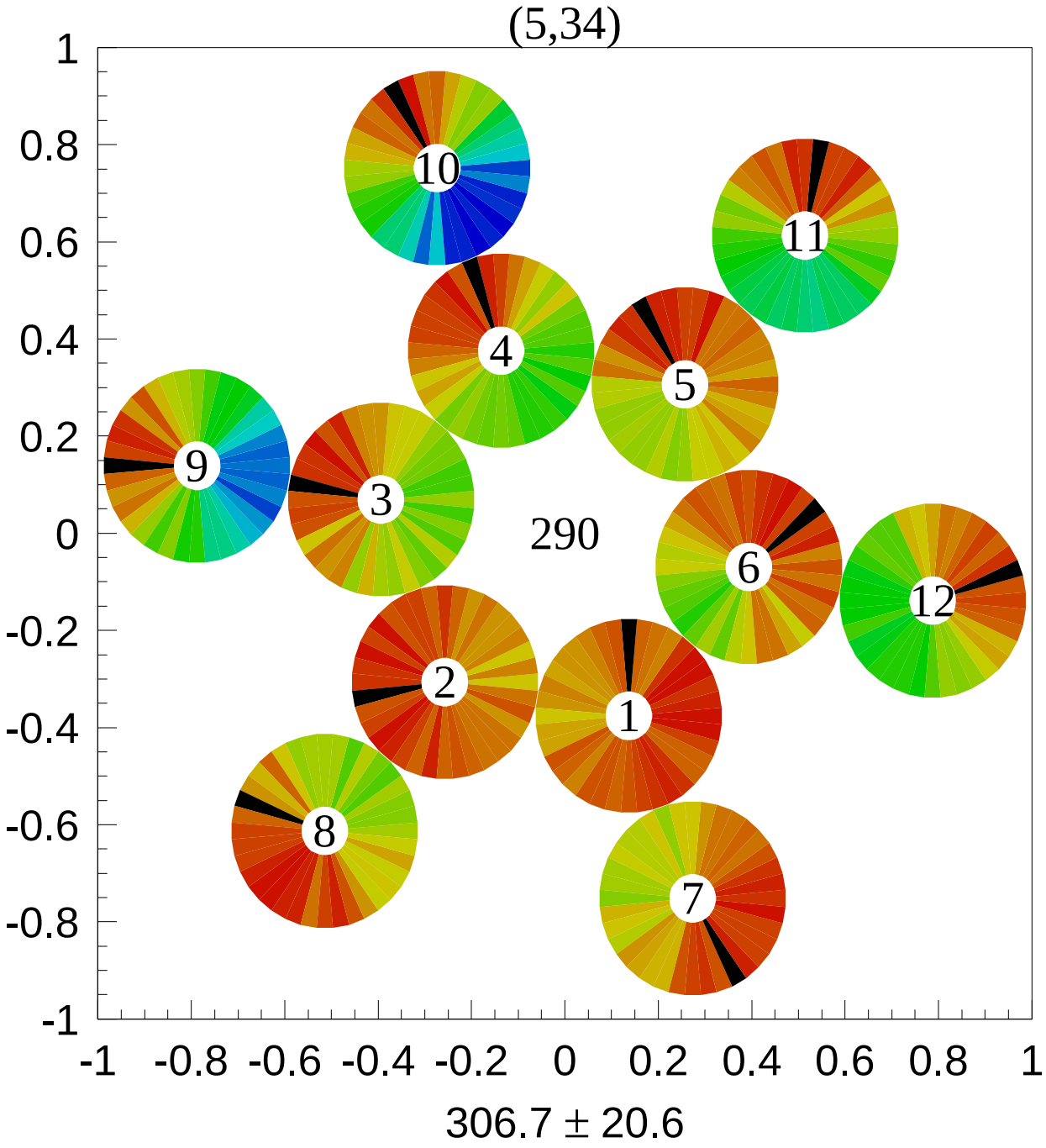

(5,33)
tilted LEDs
105 117 124 51 0 8
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 128 131 133 124 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

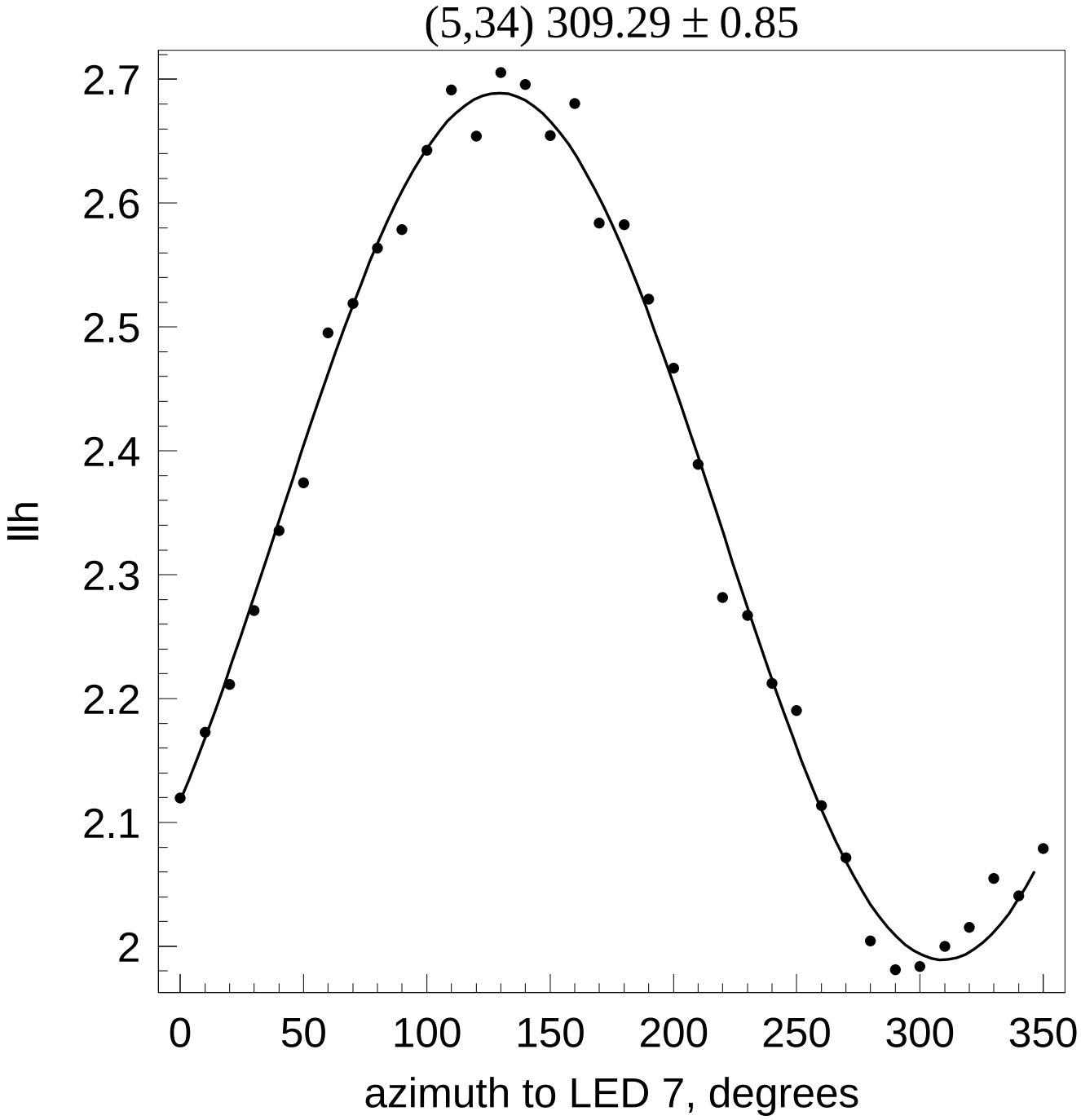

(5,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
11
2
250
8
1
6
12
7
244.7 ± 11.3

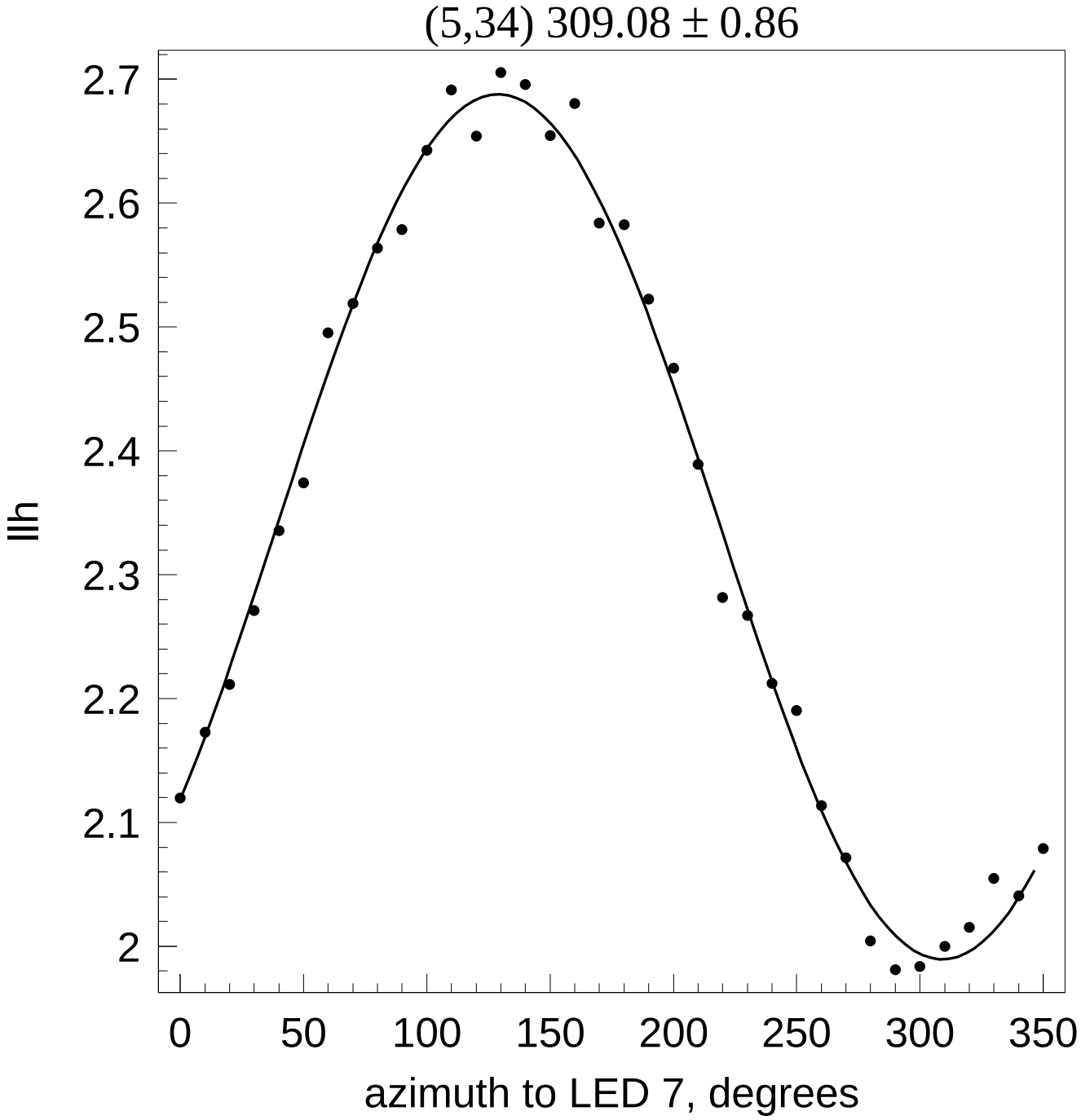

(5,33) 244.05 ± 0.48
3.2
3
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

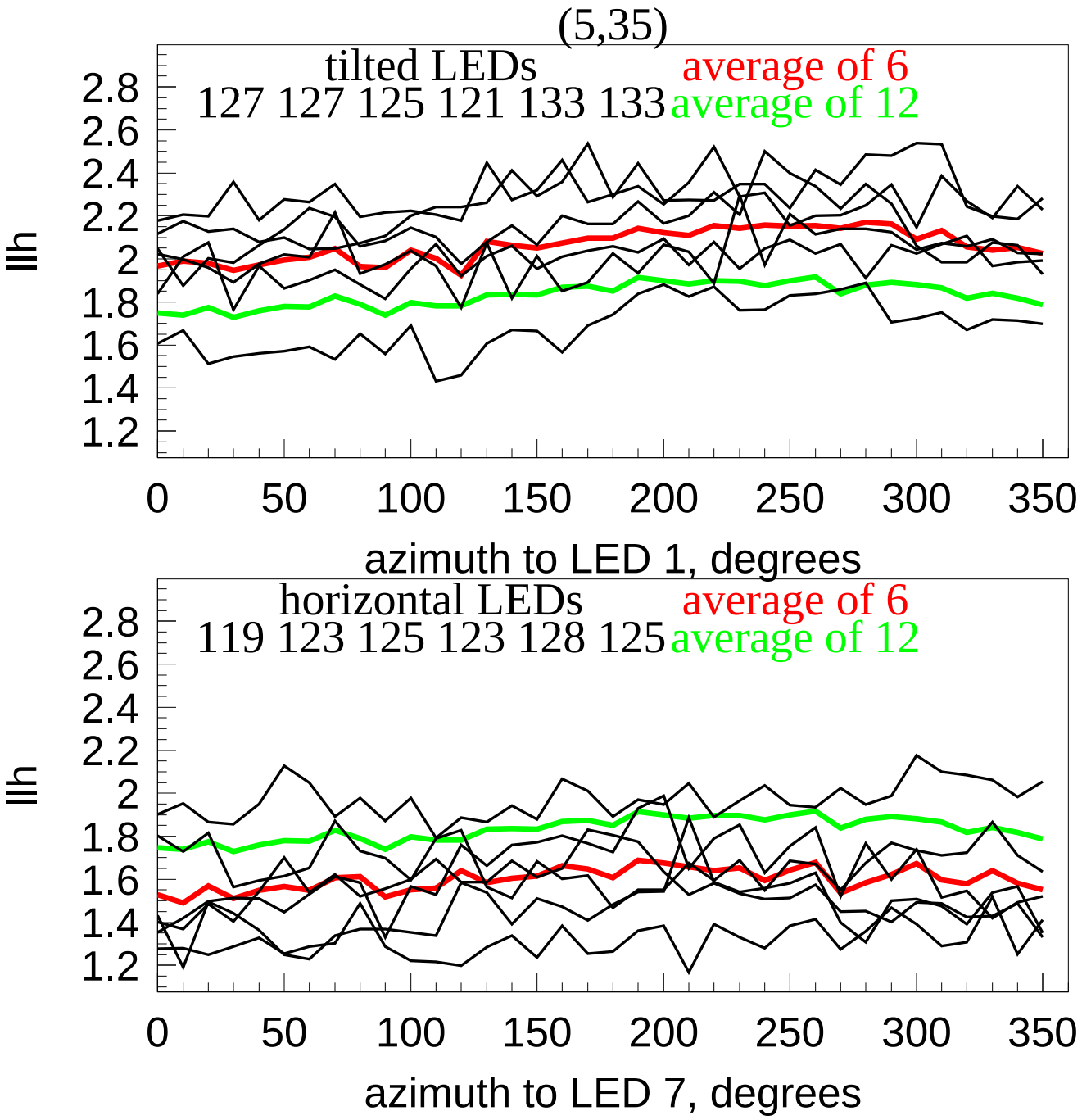

(5,33) 244.31 ± 0.52
3.2
3
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

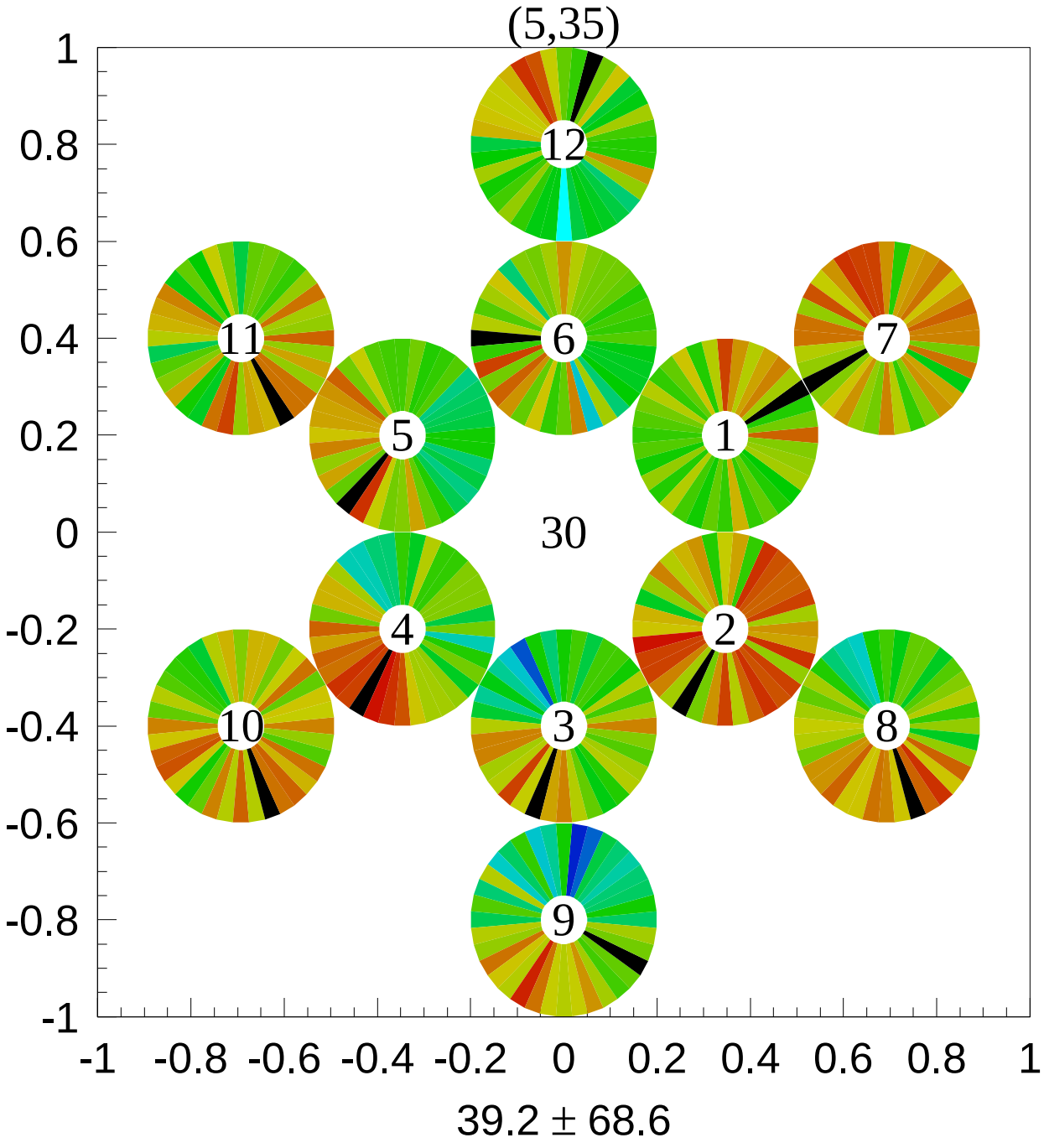

(5,34)
tilted LEDs
124 123 127 122 131 126
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 134 127 123 122 125
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

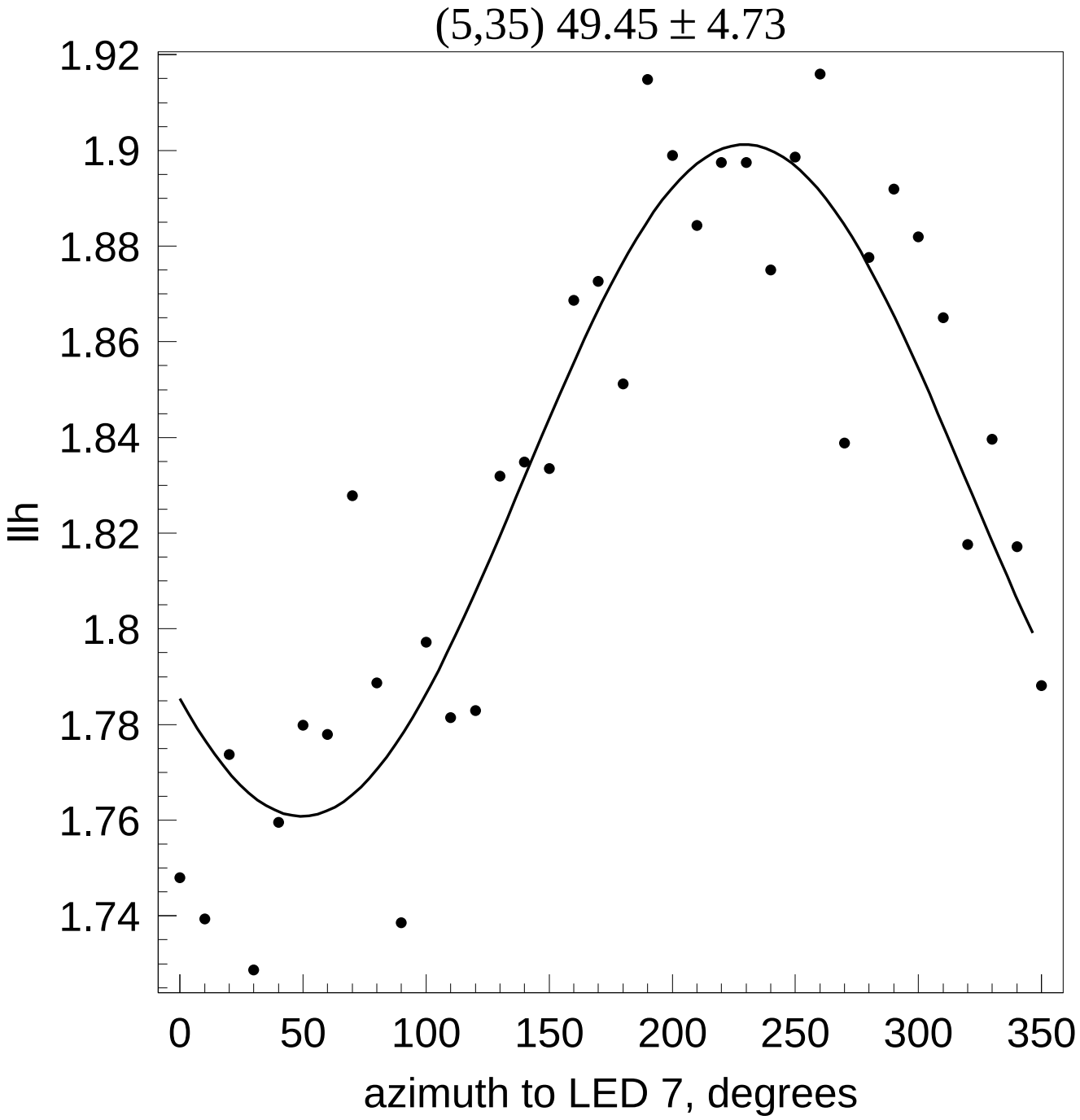

(5,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
290
6
12
2
1
8
7
306.7 ± 20.6

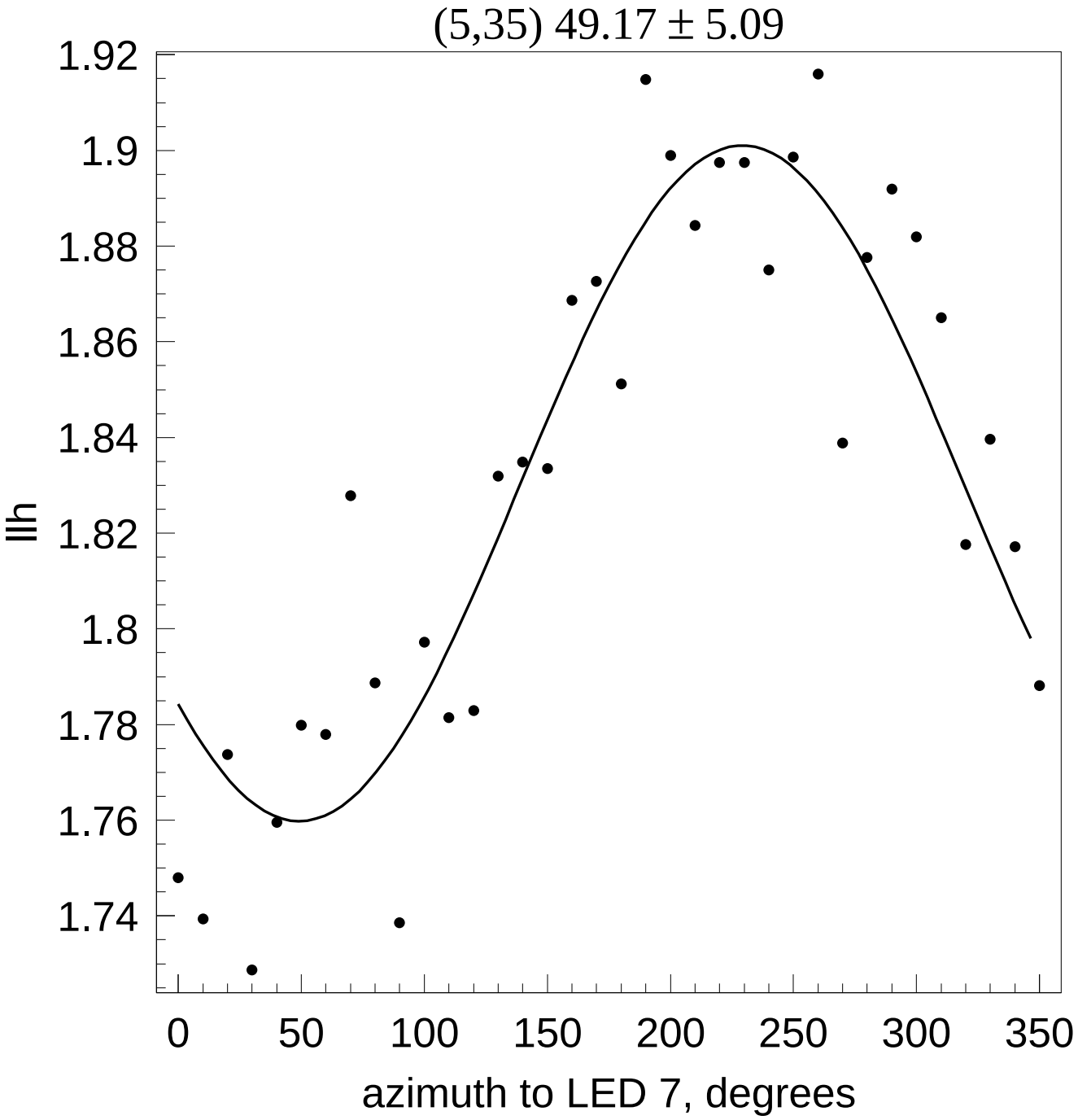

(5,34) 309.29 ± 0.85
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

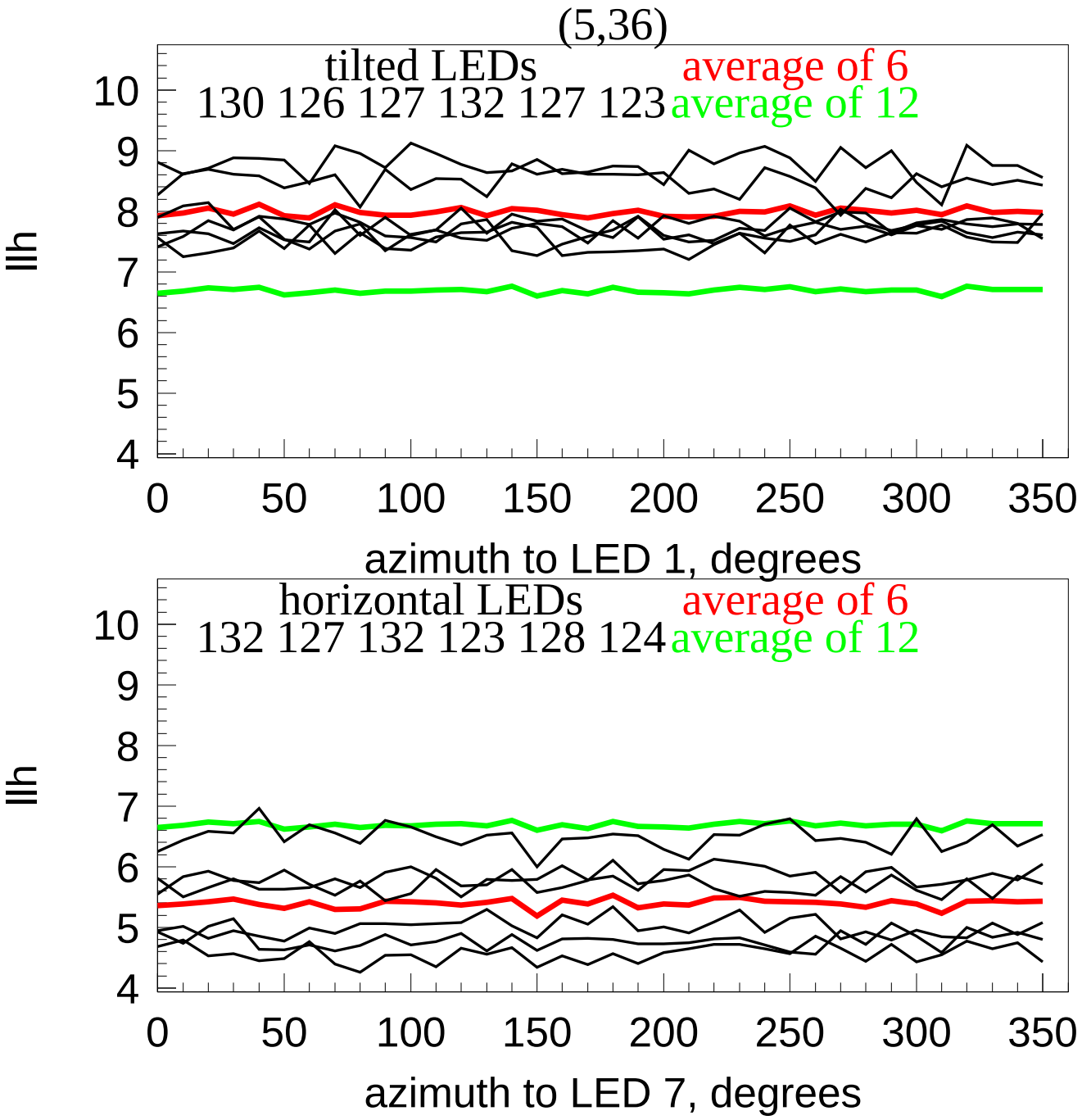

(5,34) 309.08 ± 0.86
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

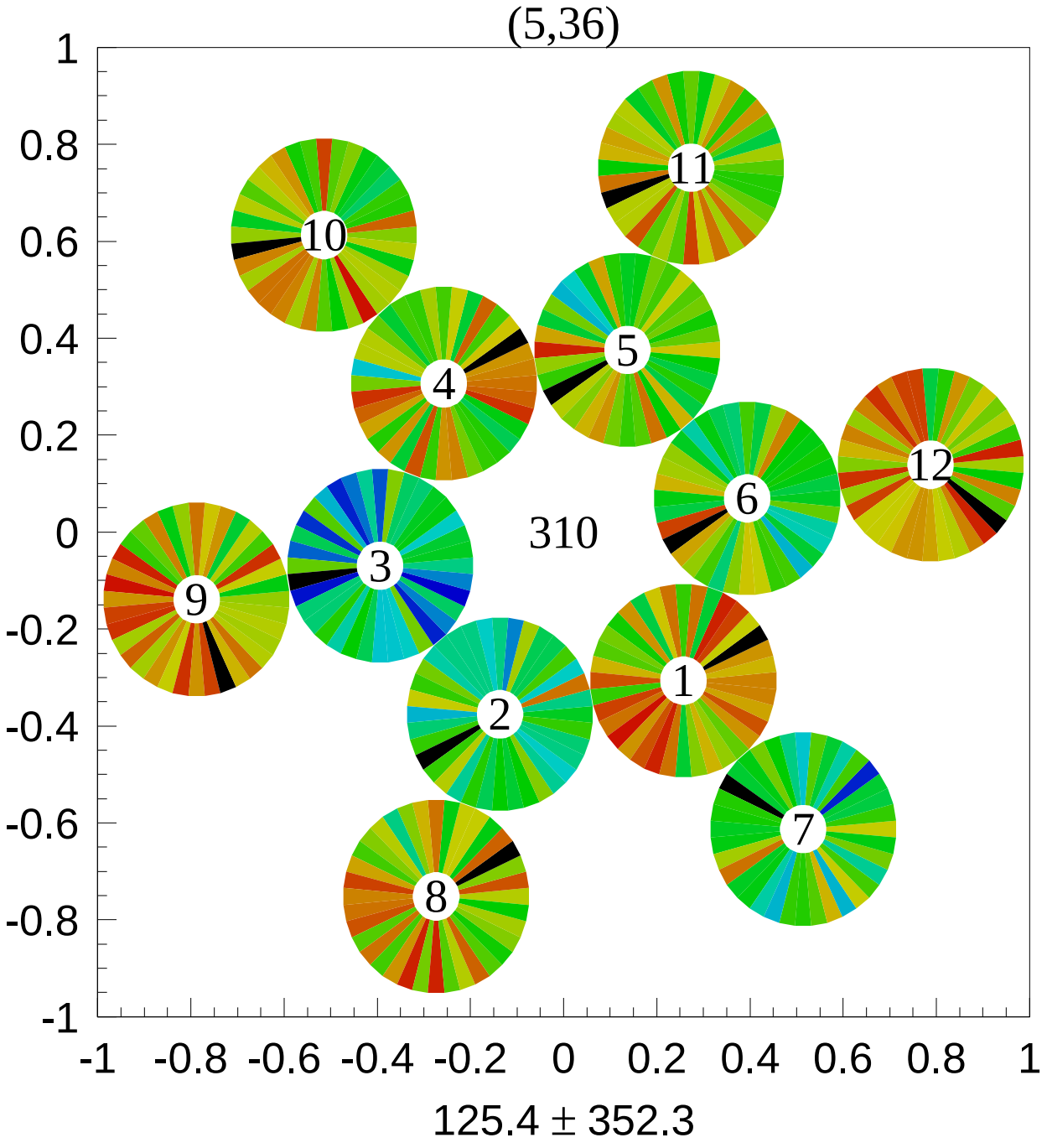

(5,35)
tilted LEDs
127 127 125 121 133 133
average of 6
average of 12
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 123 125 123 128 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

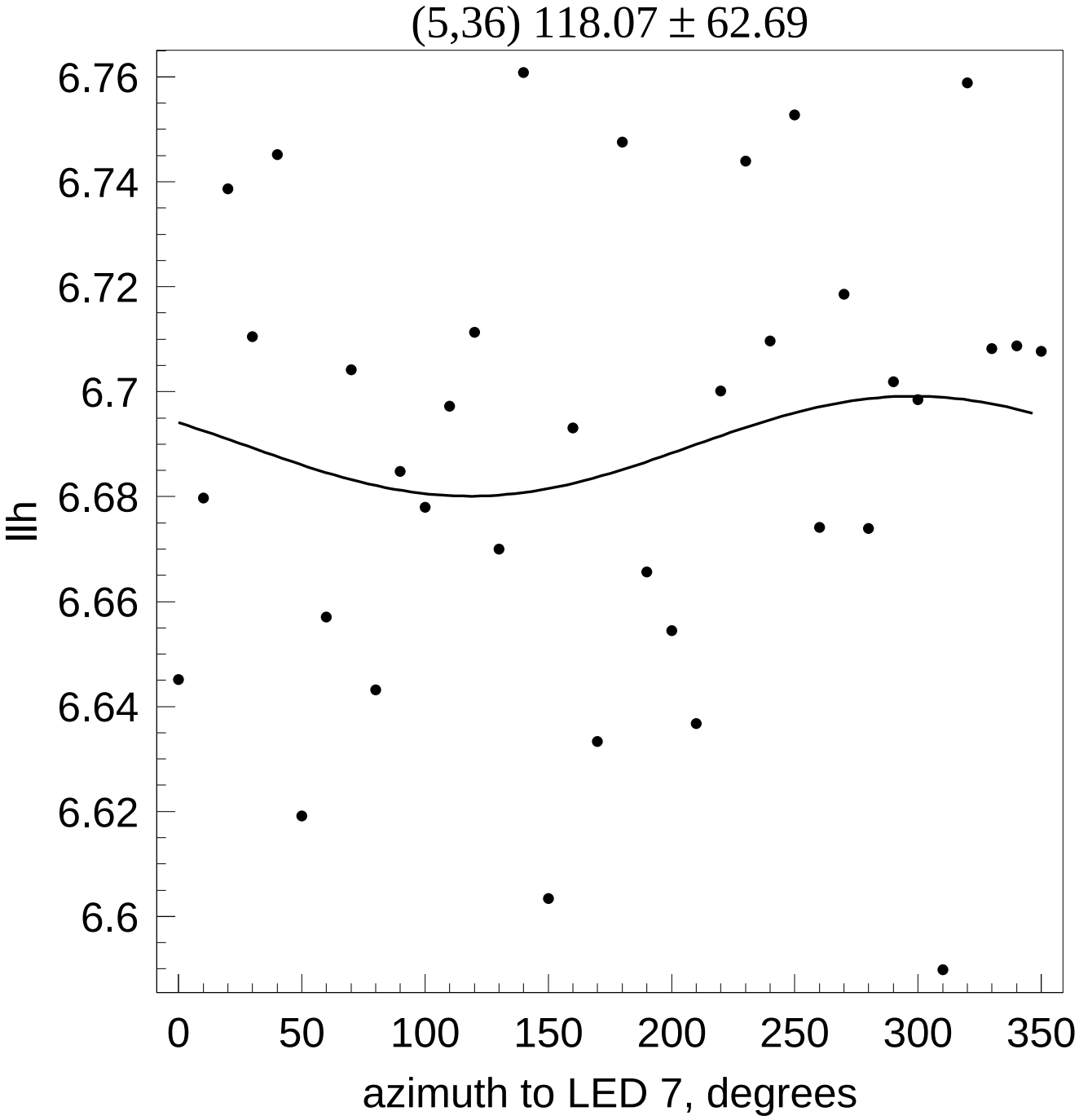

(5,35)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
39.2 ± 68.6

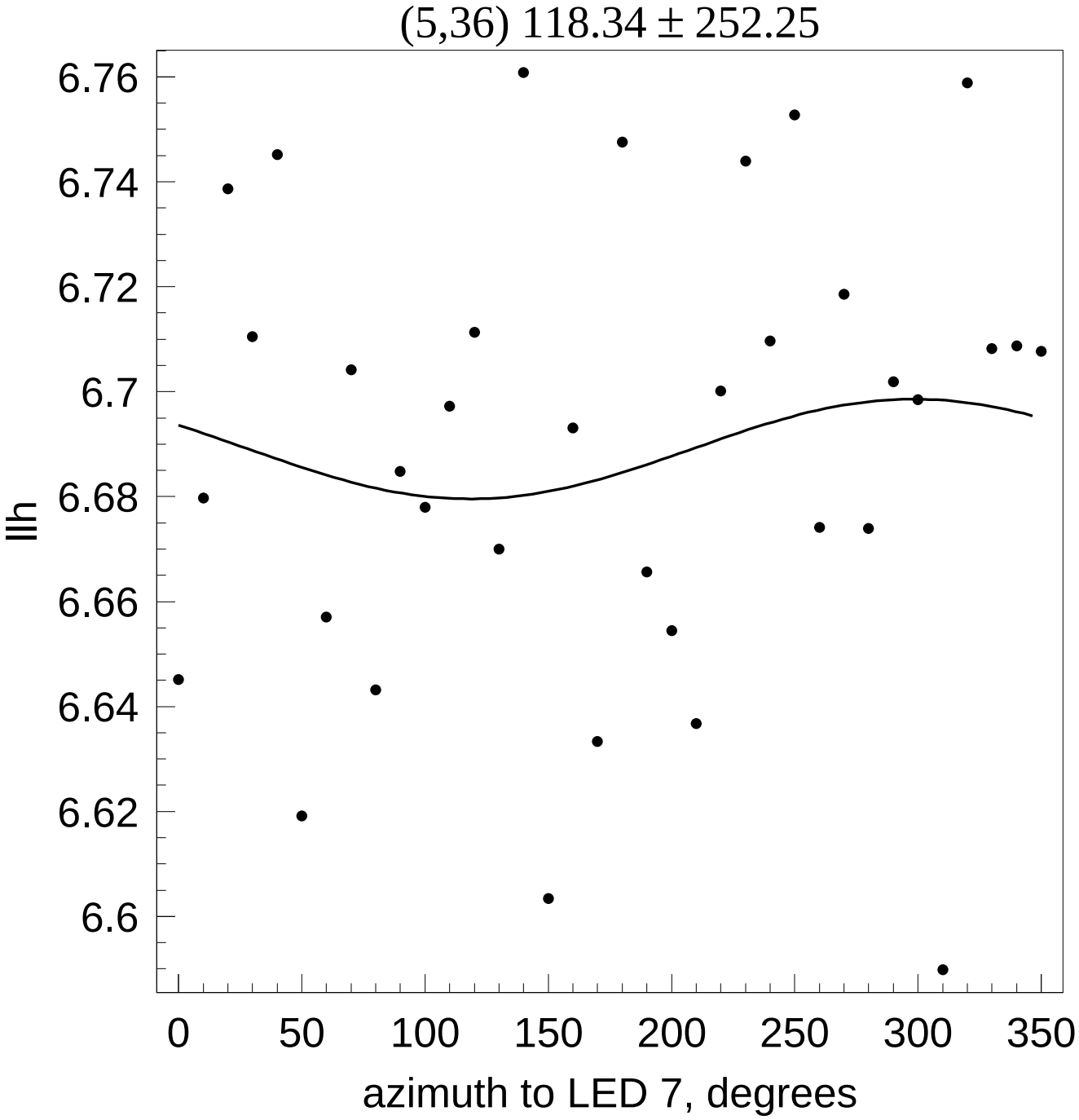

(5,35) 49.45 ± 4.73
1.92
1.9
1.88
1.86
1.84
1.82
1.8
1.78
1.76
1.74
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

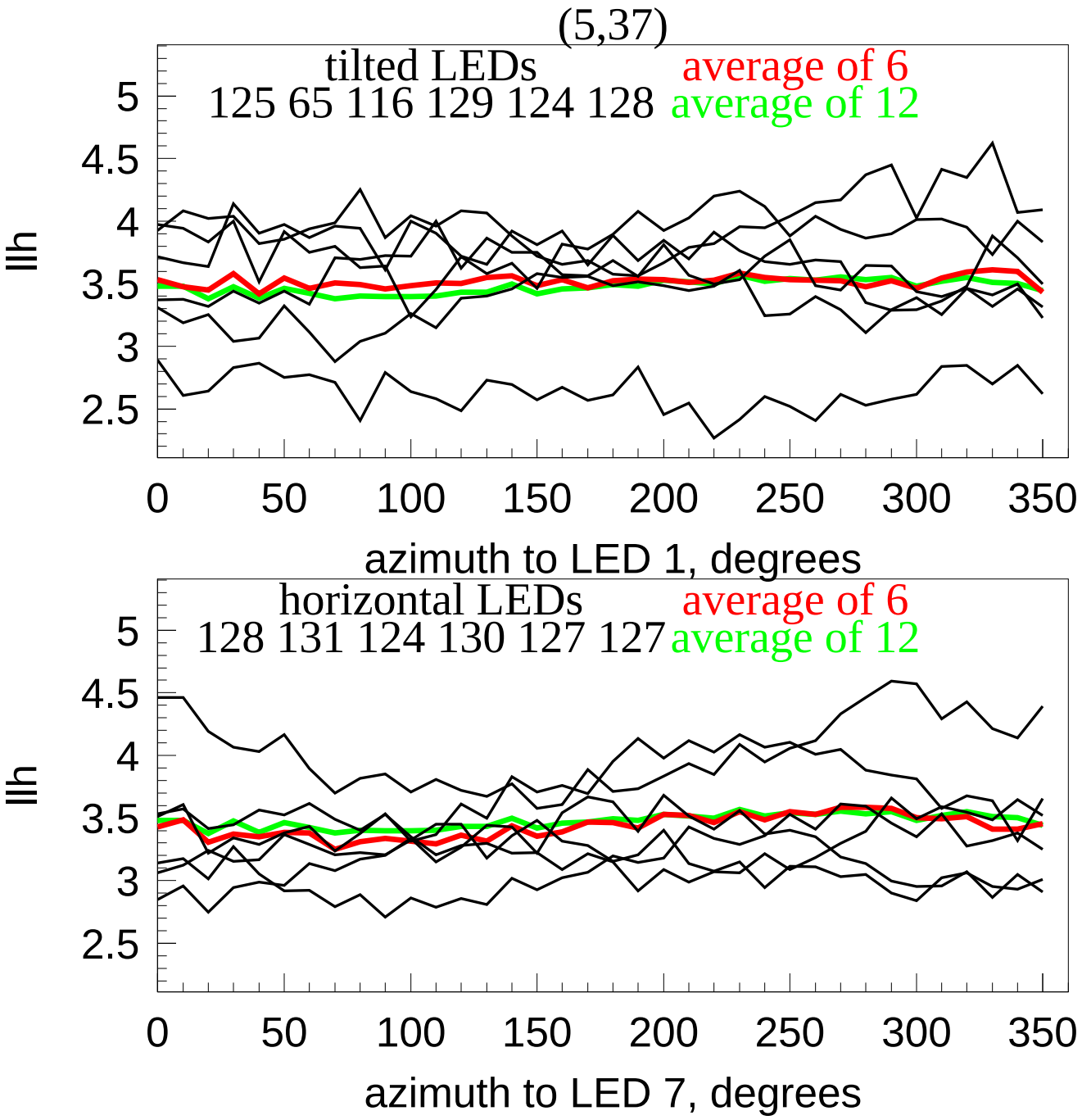

(5,35) 49.17 ± 5.09
1.92
1.9
1.88
1.86
1.84
1.82
1.8
1.78
1.76
1.74
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

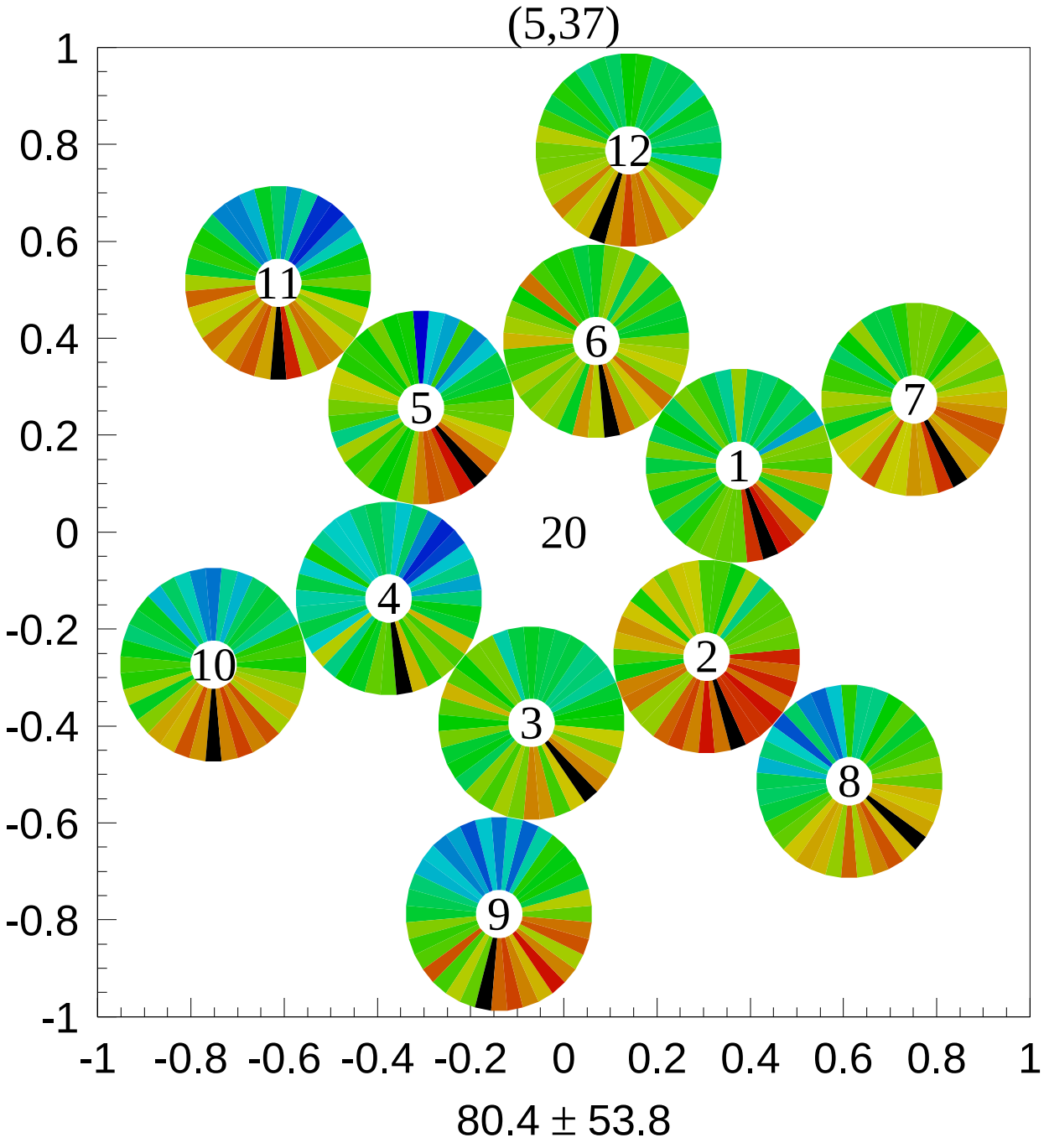

(5,36)
tilted LEDs
130 126 127 132 127 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 127 132 123 128 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

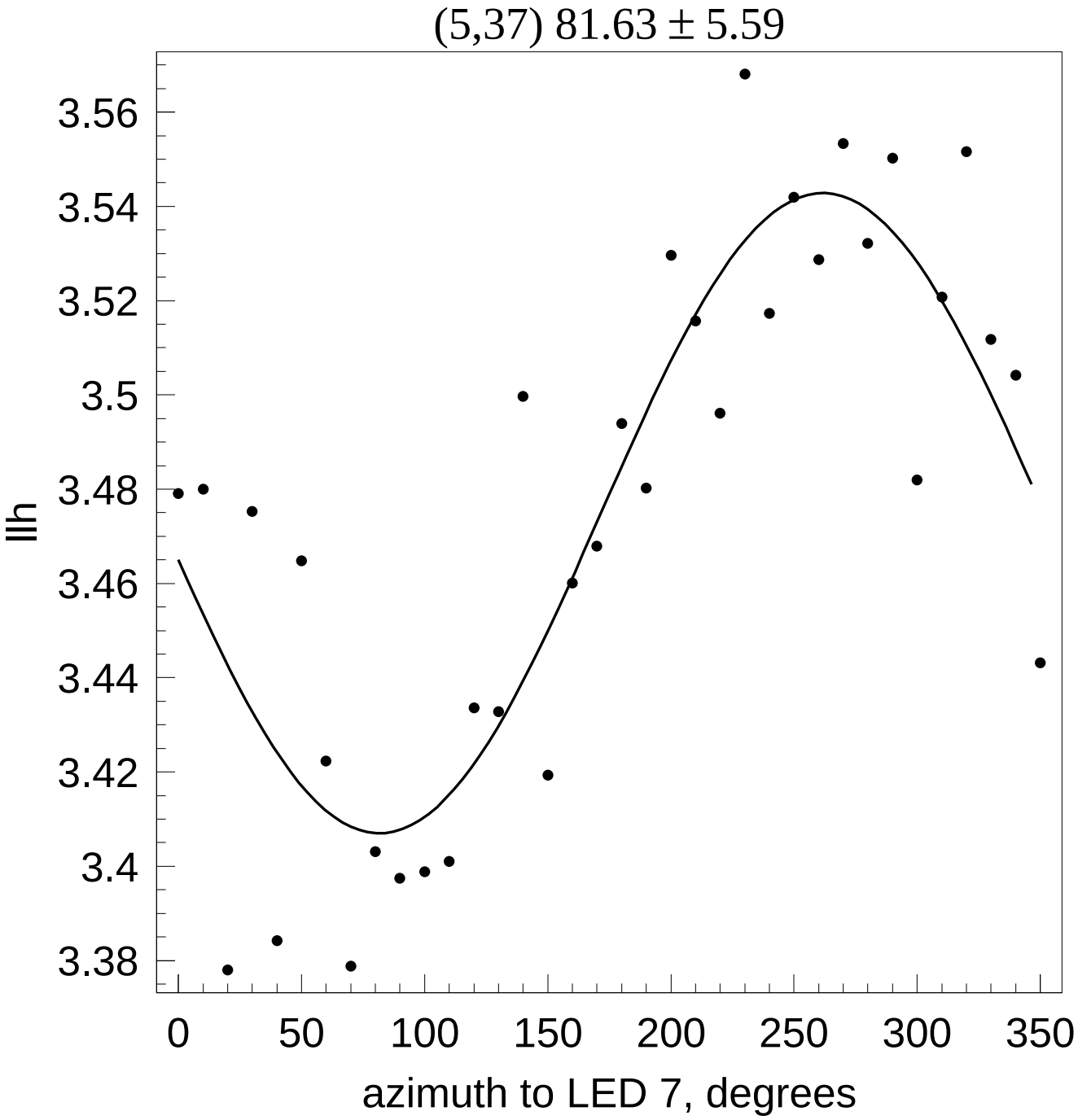

(5,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
125.4 ± 352.3
310
1
2
3
4
5
6
7
8
9
10
11
12

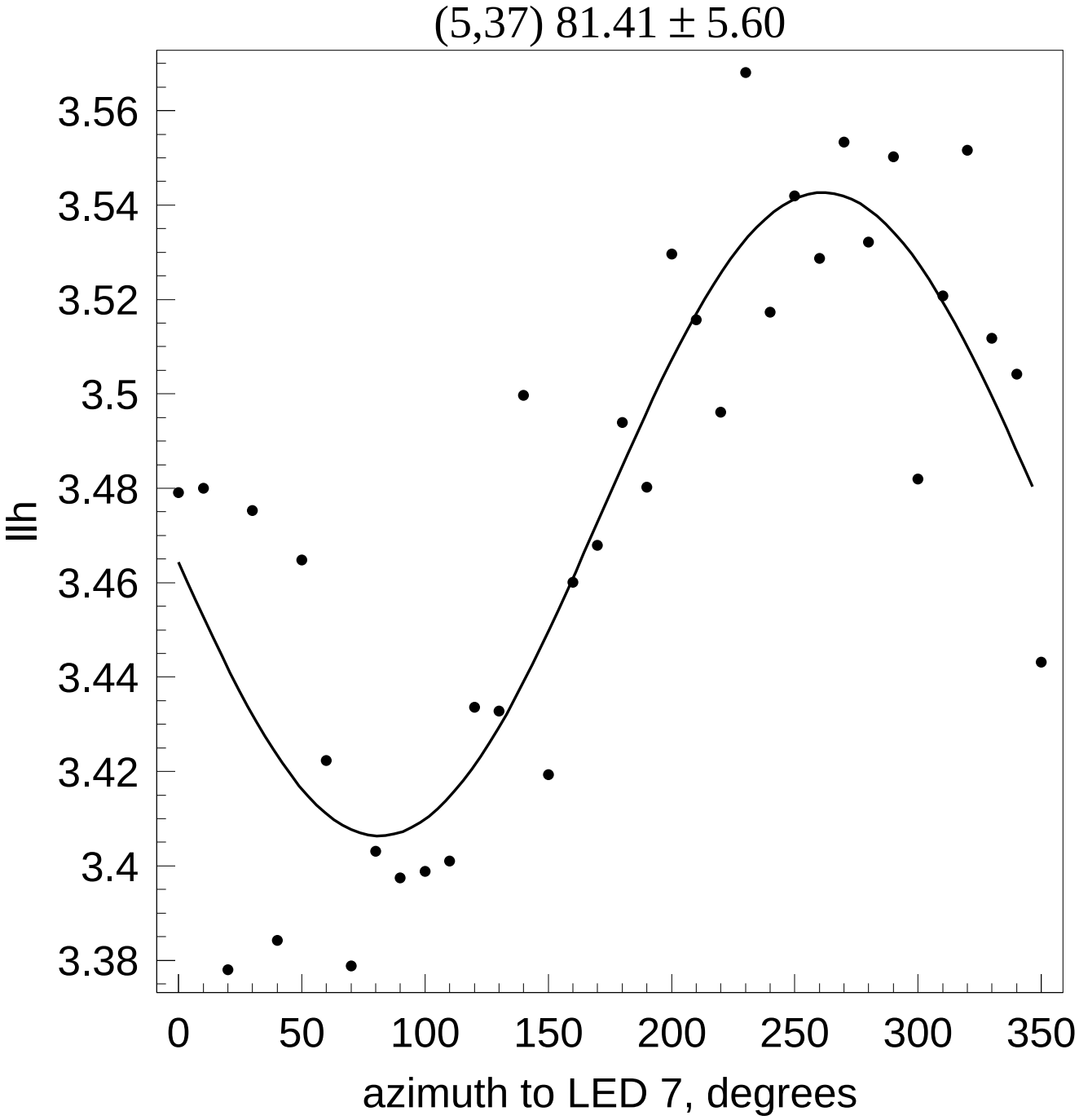

(5,36) 118.07 ± 62.69
6.76
6.74
6.72
6.7
6.68
6.66
6.64
6.62
6.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

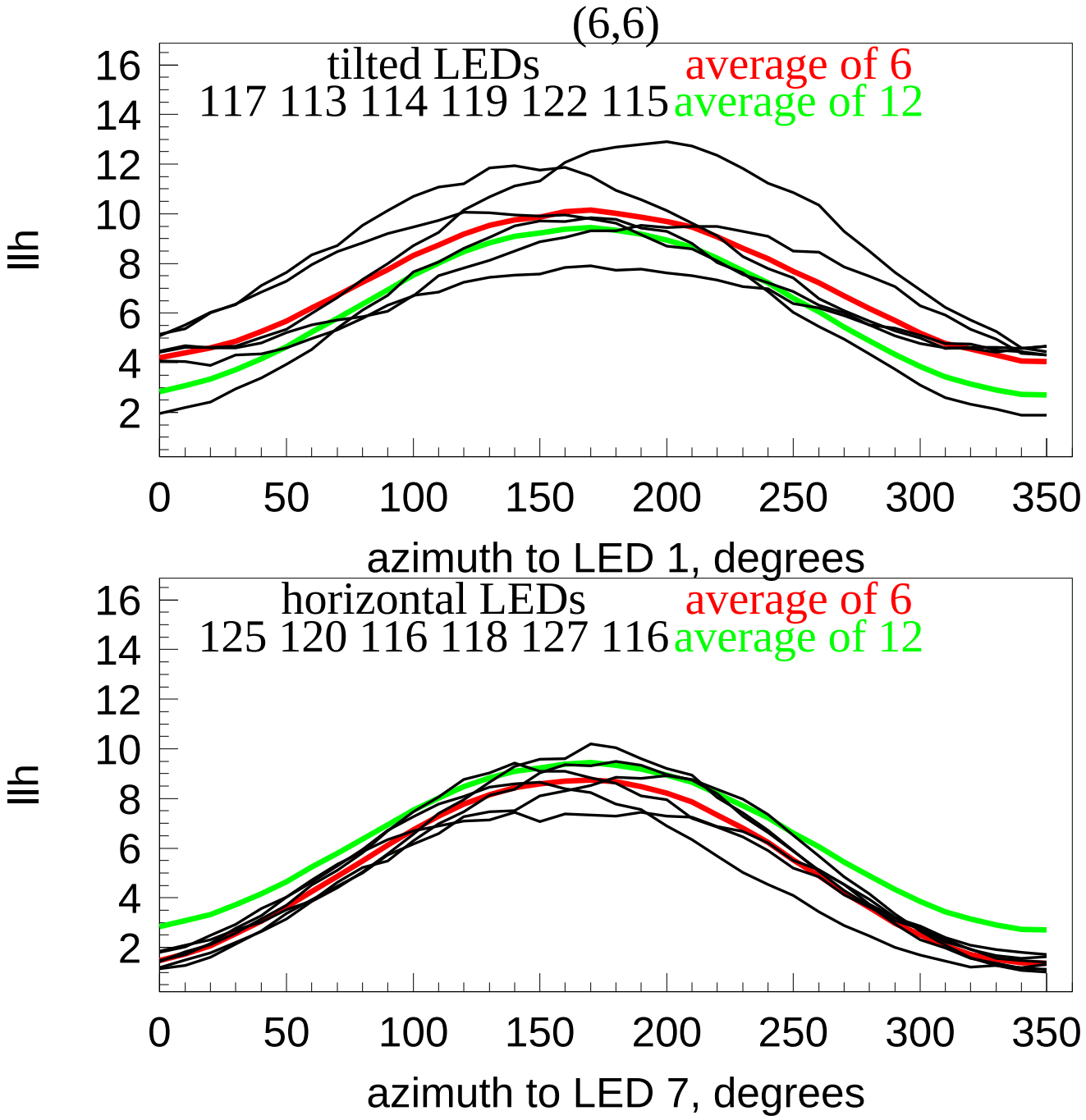

(5,36) 118.34 ± 252.25
6.76
6.74
6.72
6.7
6.68
6.66
6.64
6.62
6.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

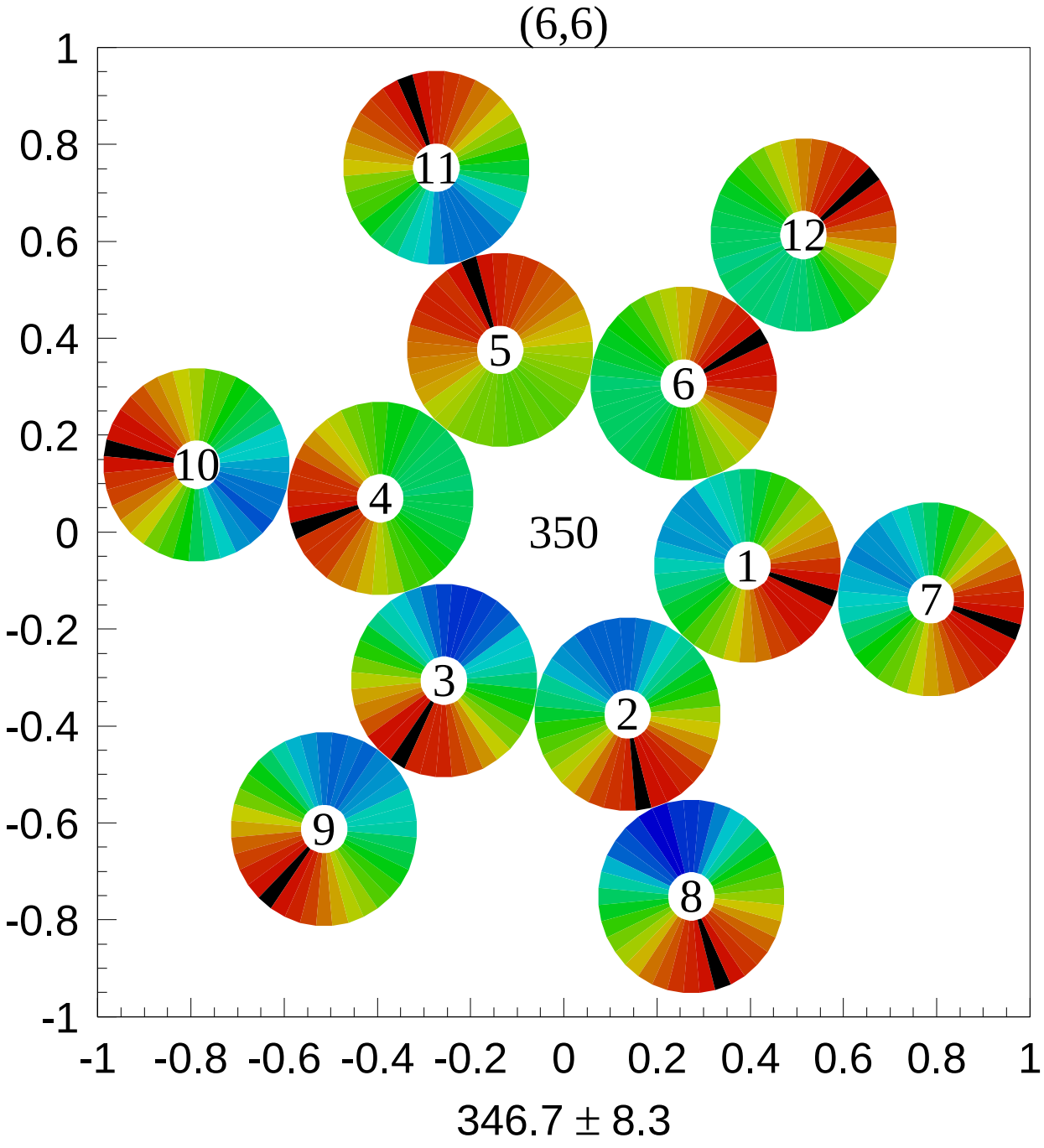

(5,37)
tilted LEDs
125 65 116 129 124 128
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 131 124 130 127 127
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

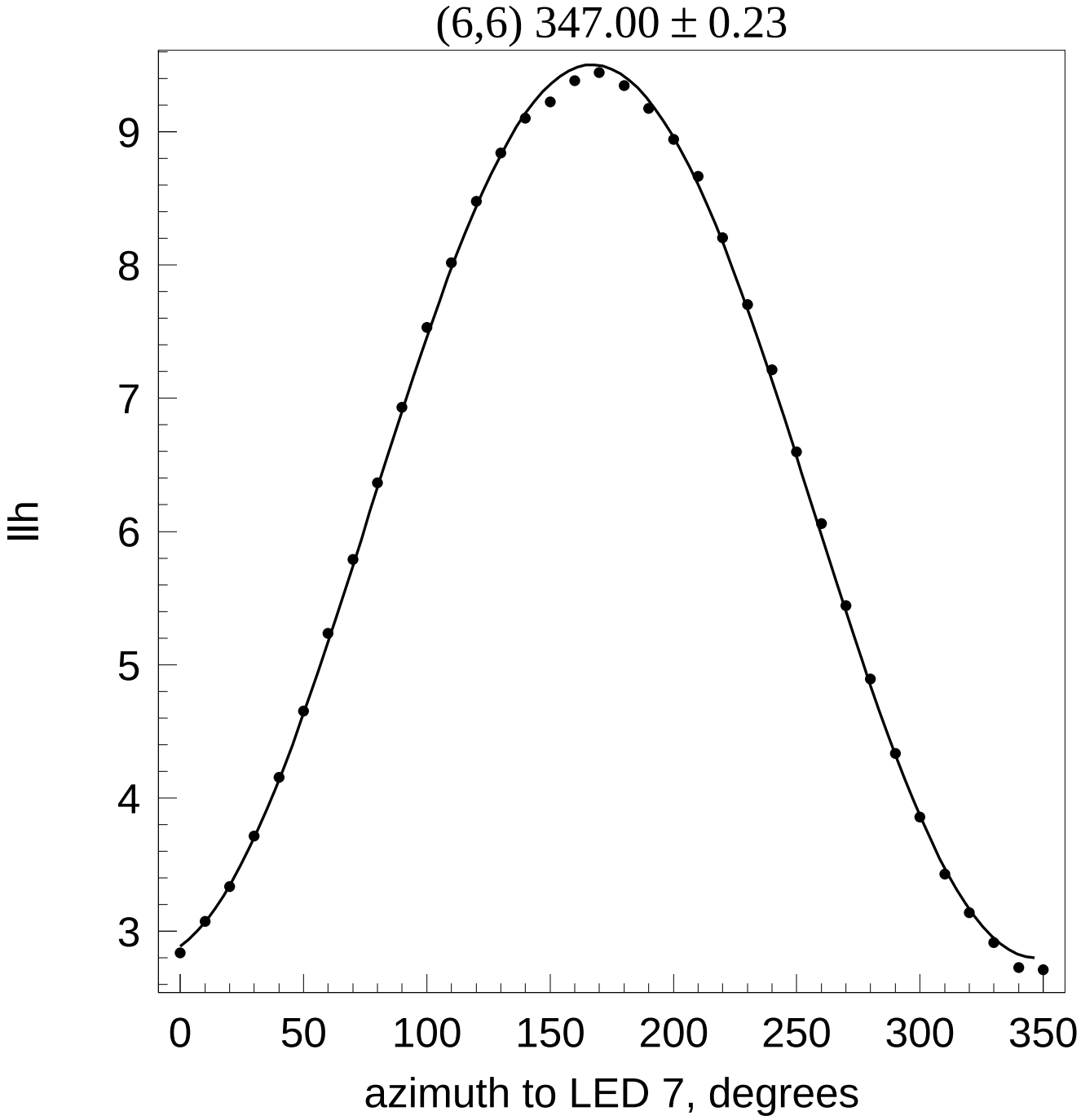

(5,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
20
4
10
2
3
8
9
80.4 ± 53.8

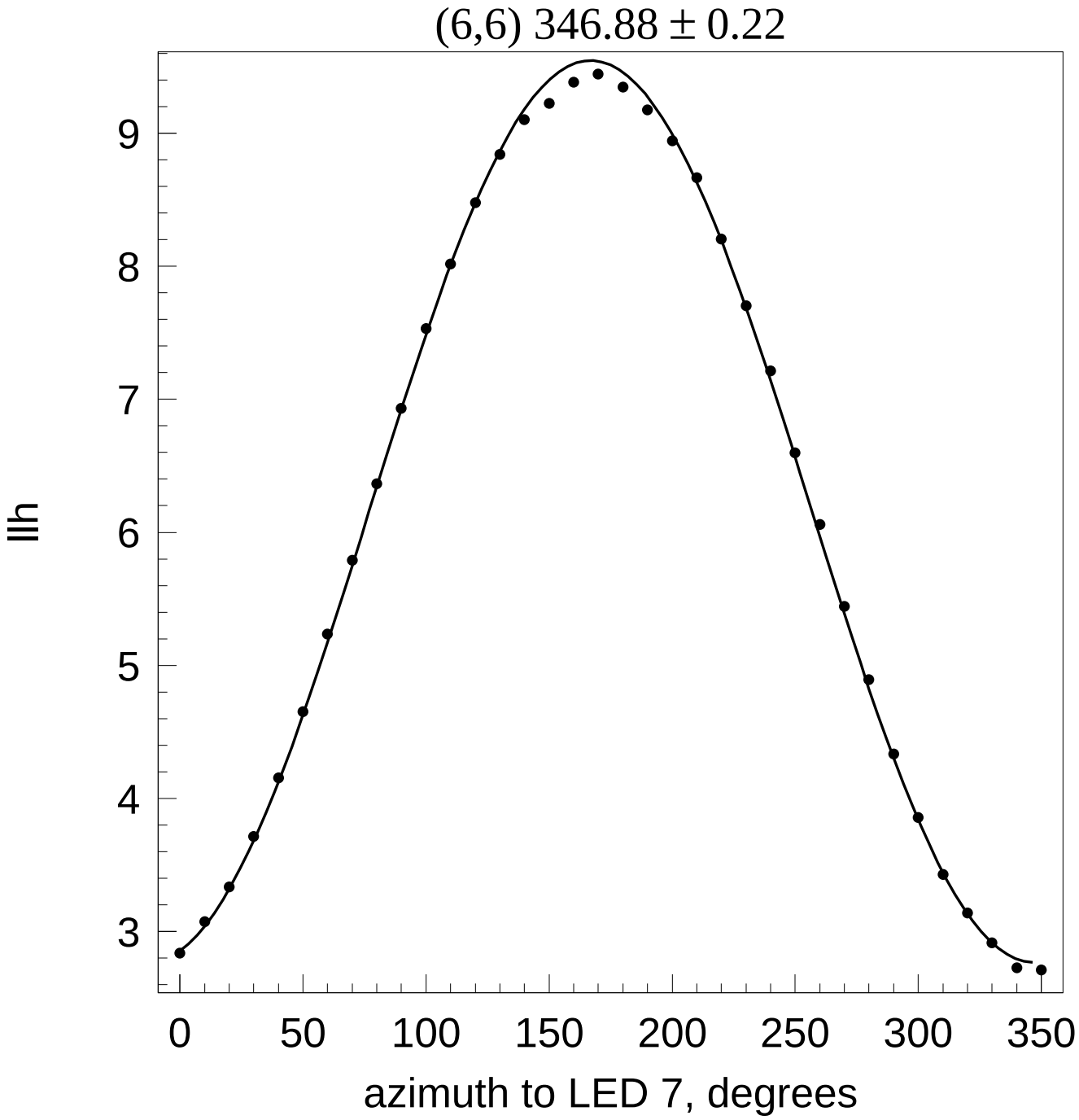

(5,37) 81.63 ± 5.59
llh
3.56
3.54
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

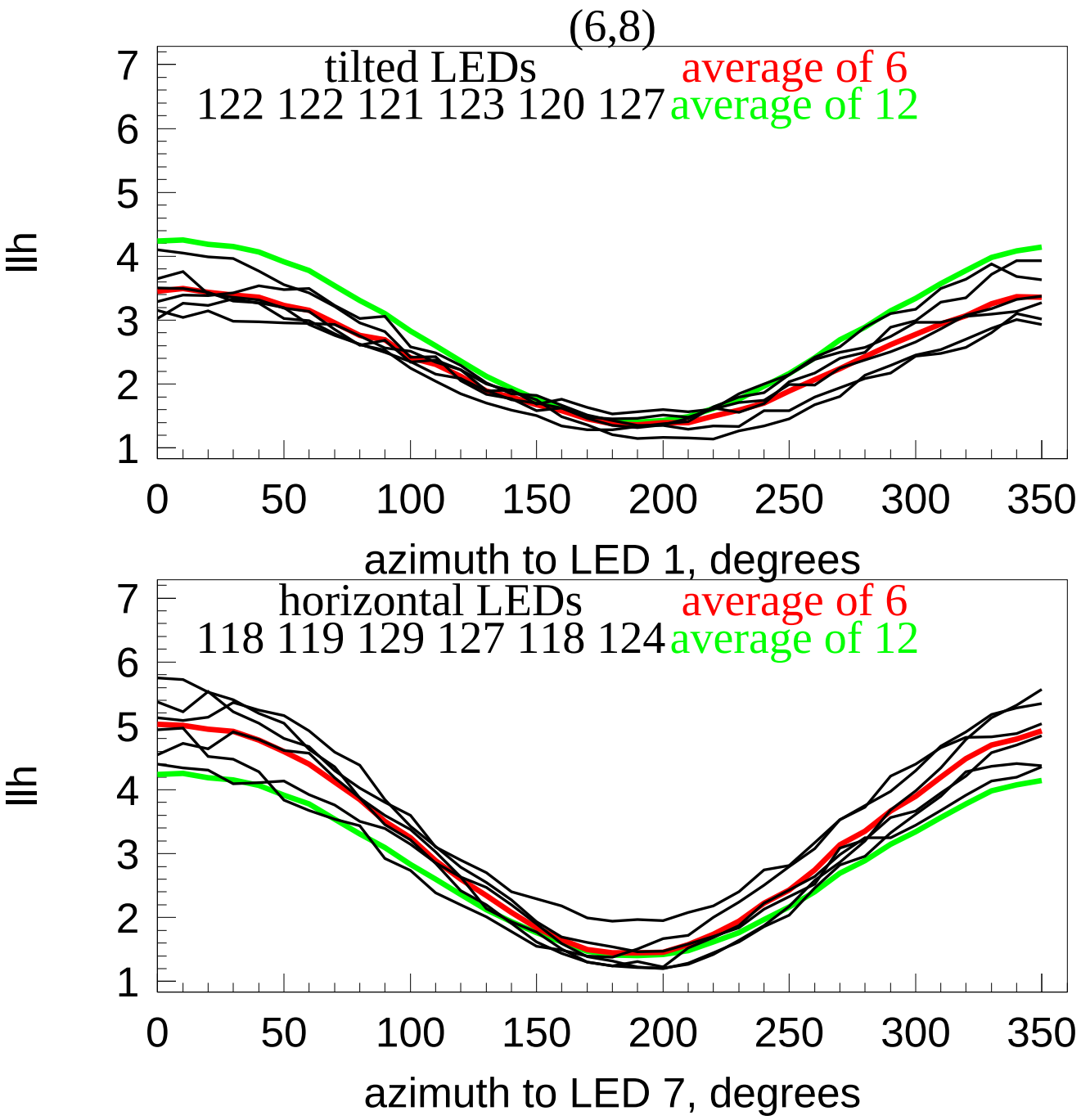

(5,37) 81.41 ± 5.60
3.56
3.54
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

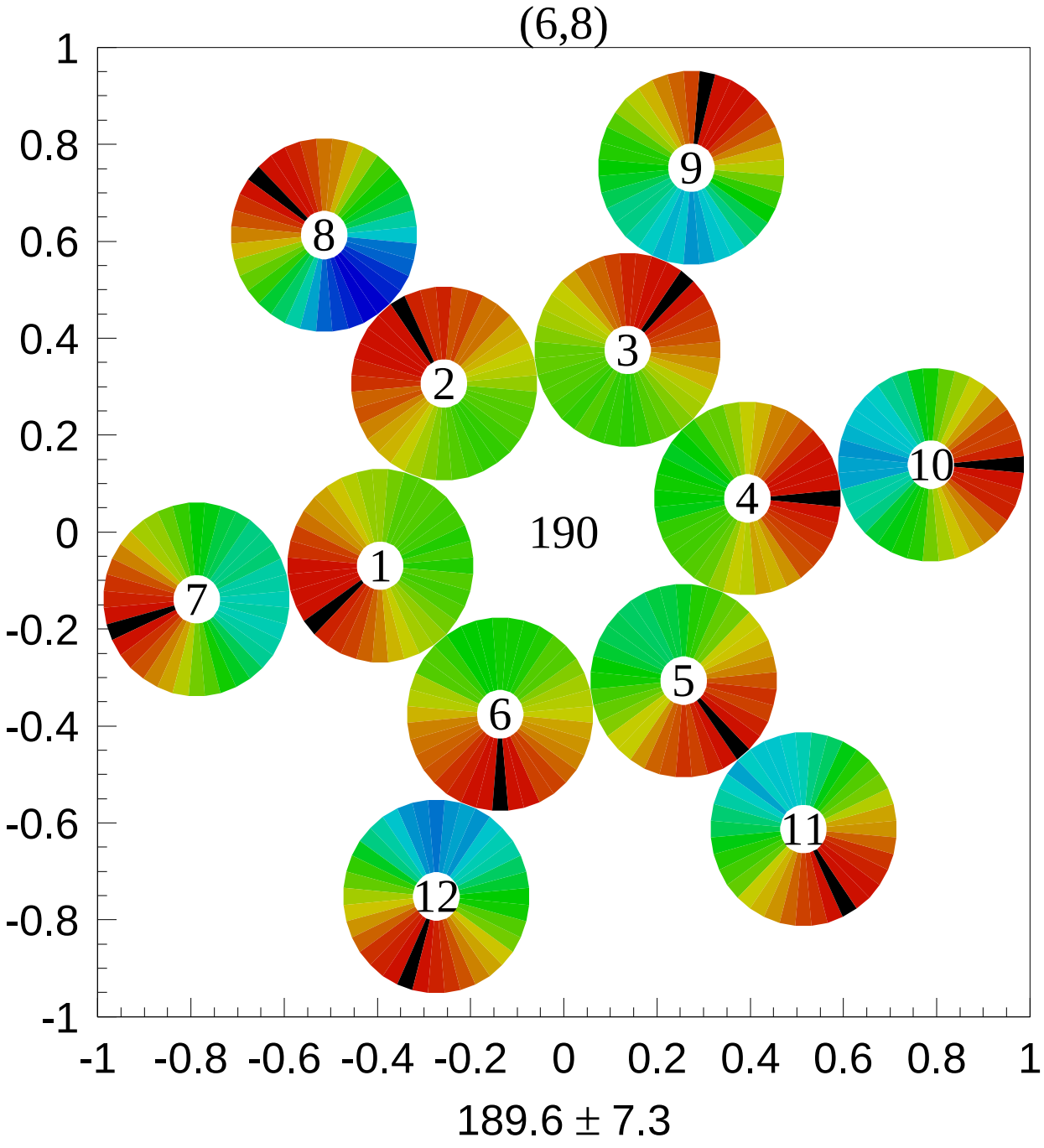

(6,6)
tilted LEDs
117 113 114 119 122 115
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 120 116 118 127 116
average of 6
average of 12
llh
azimuth to LED 7, degrees

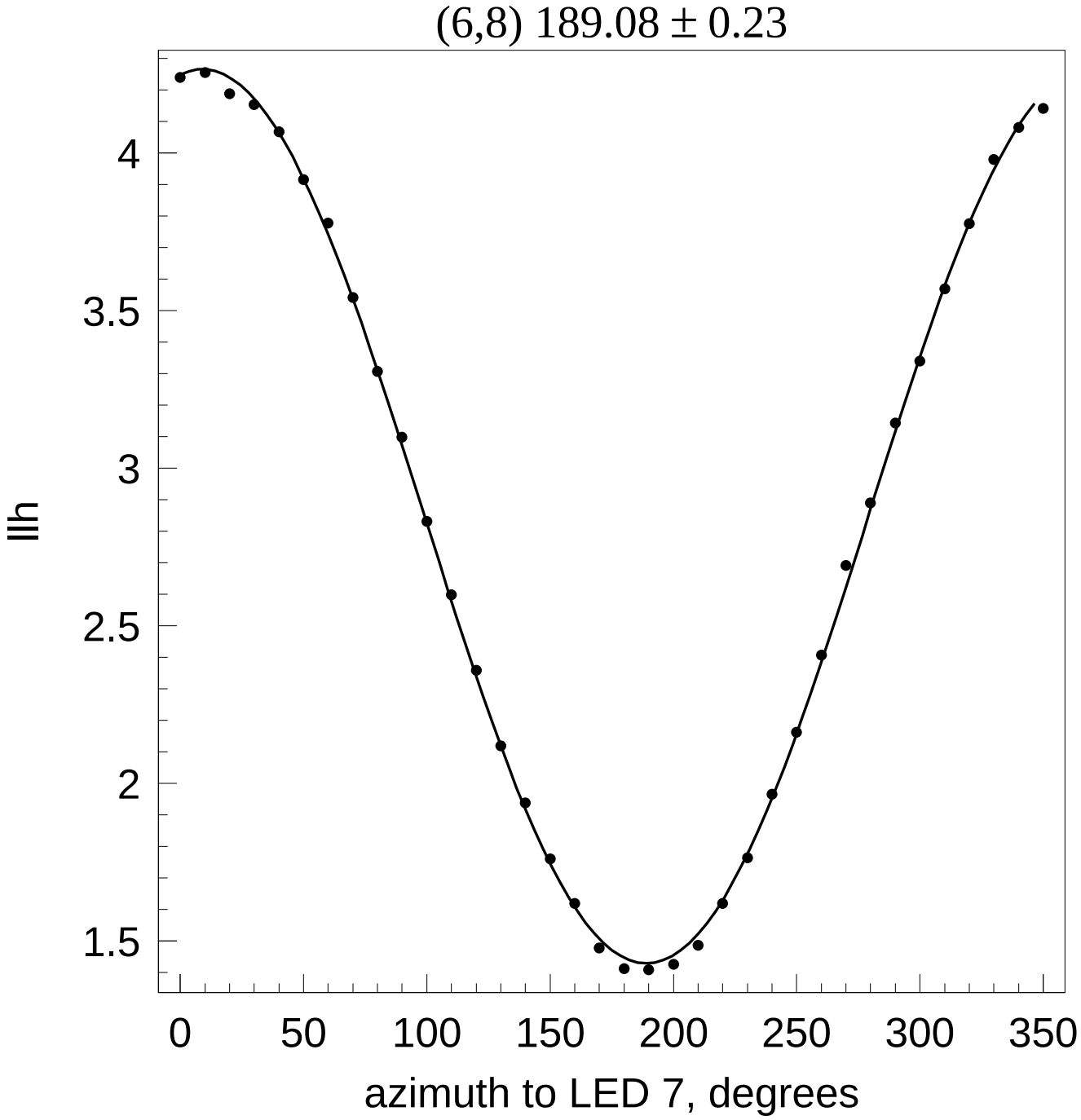

(6,6)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
346.7 ± 8.3

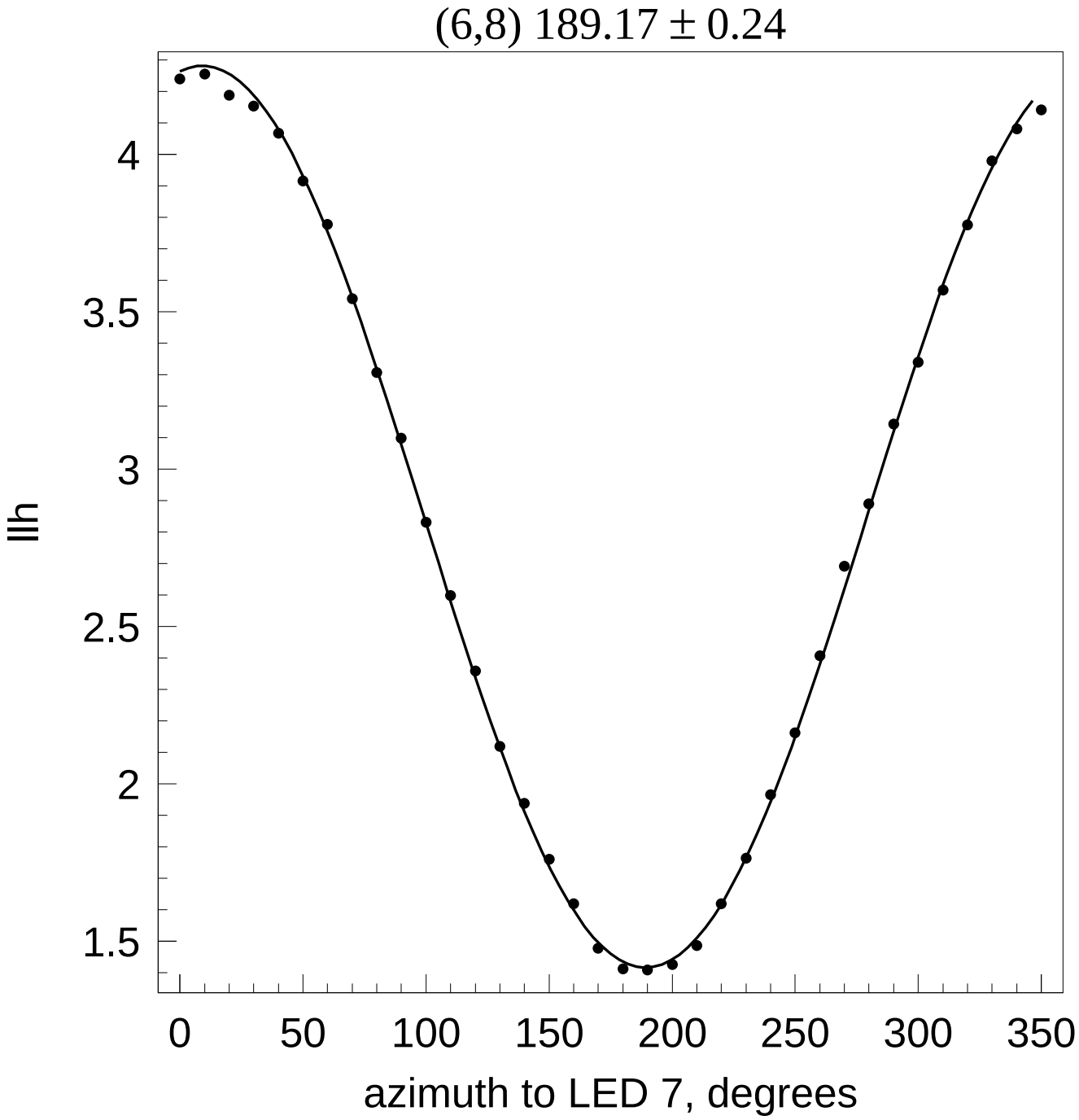

(6,6) 347.00 ± 0.23
llh
9
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

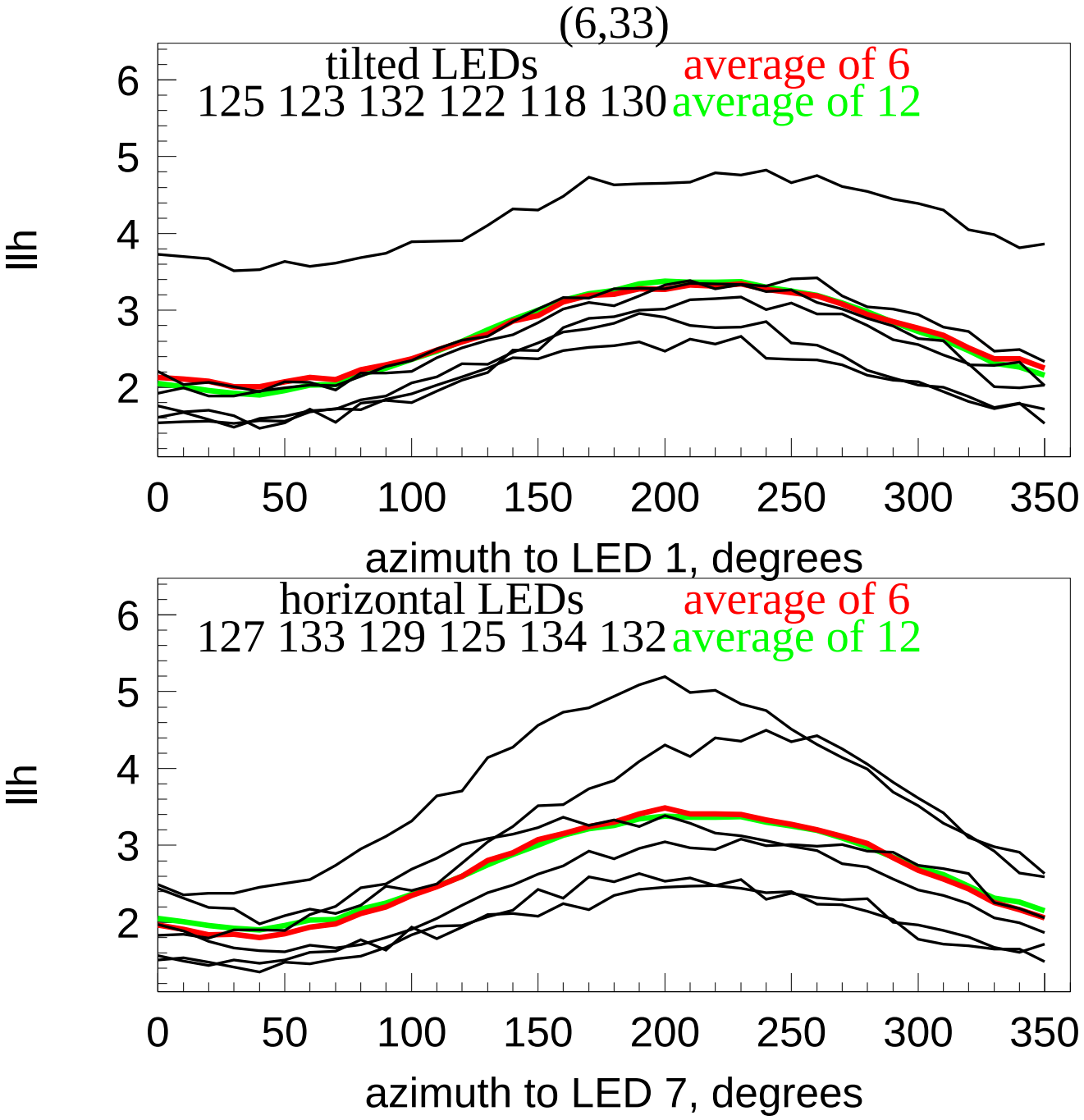

(6,6) 346.88 ± 0.22
llh
9
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

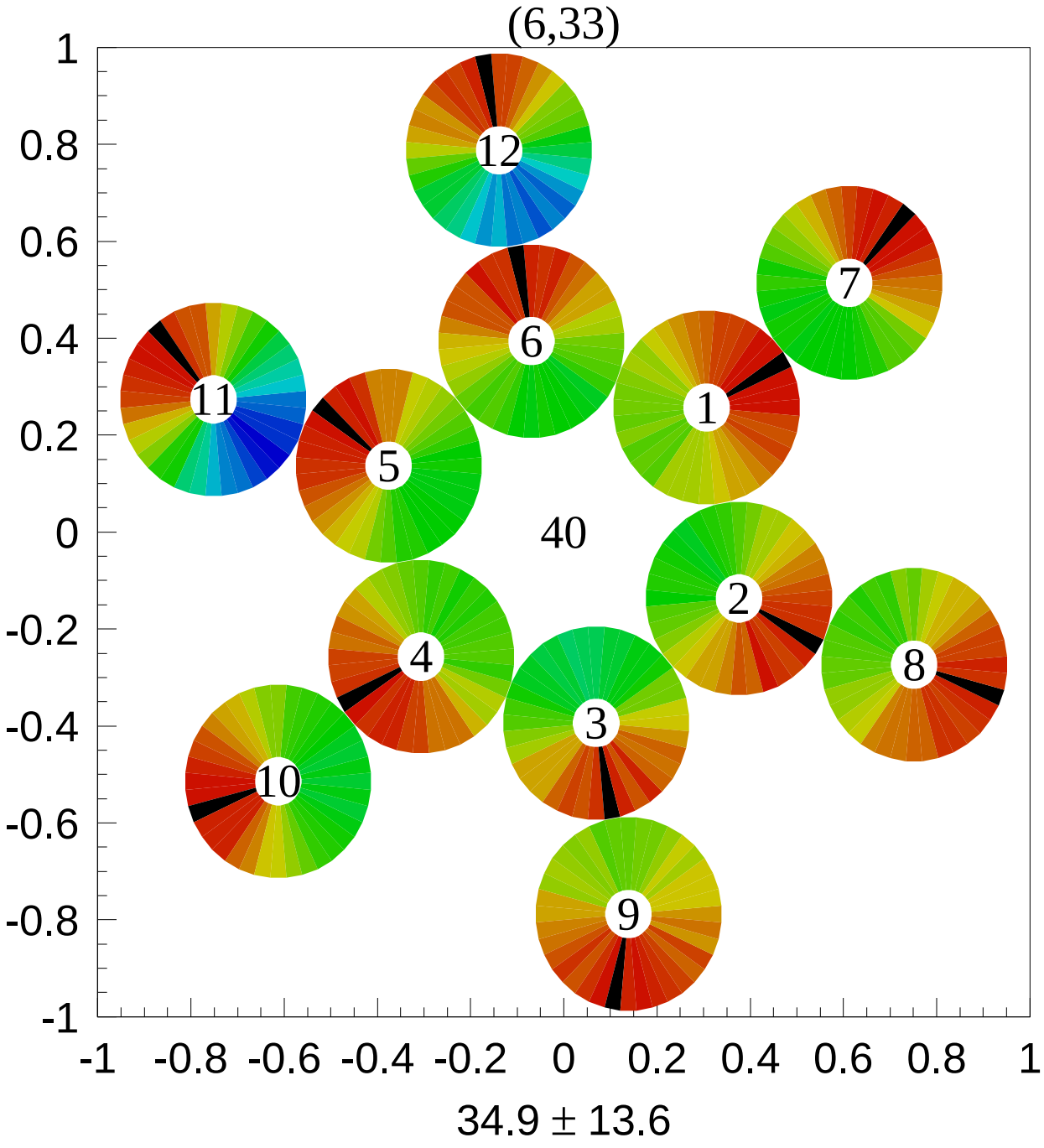

(6,8)
tilted LEDs
122 122 121 123 120 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
118 119 129 127 118 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

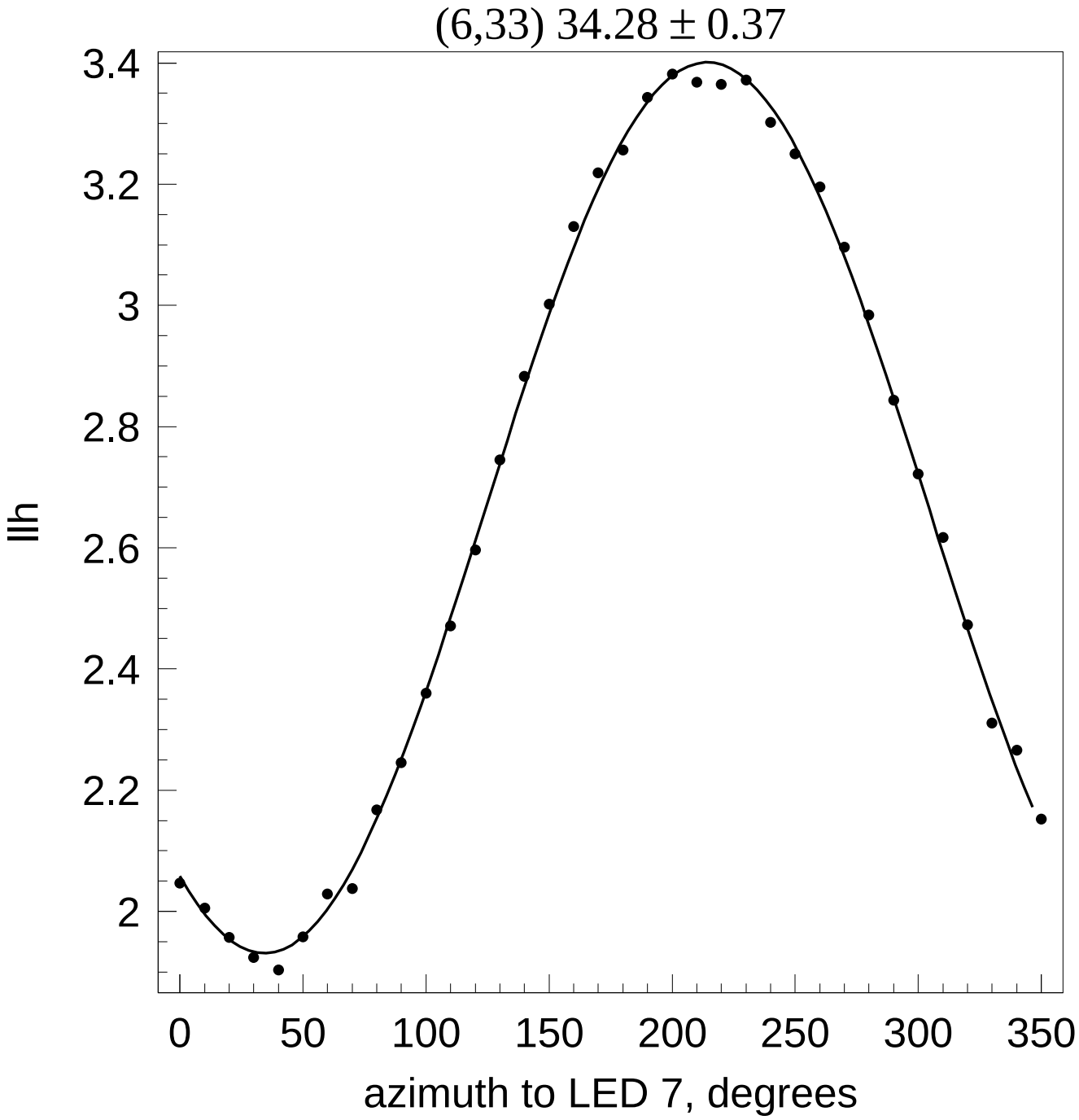

(6,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
1
2
3
4
5
6
7
8
9
10
11
12
190
189.6 ± 7.3

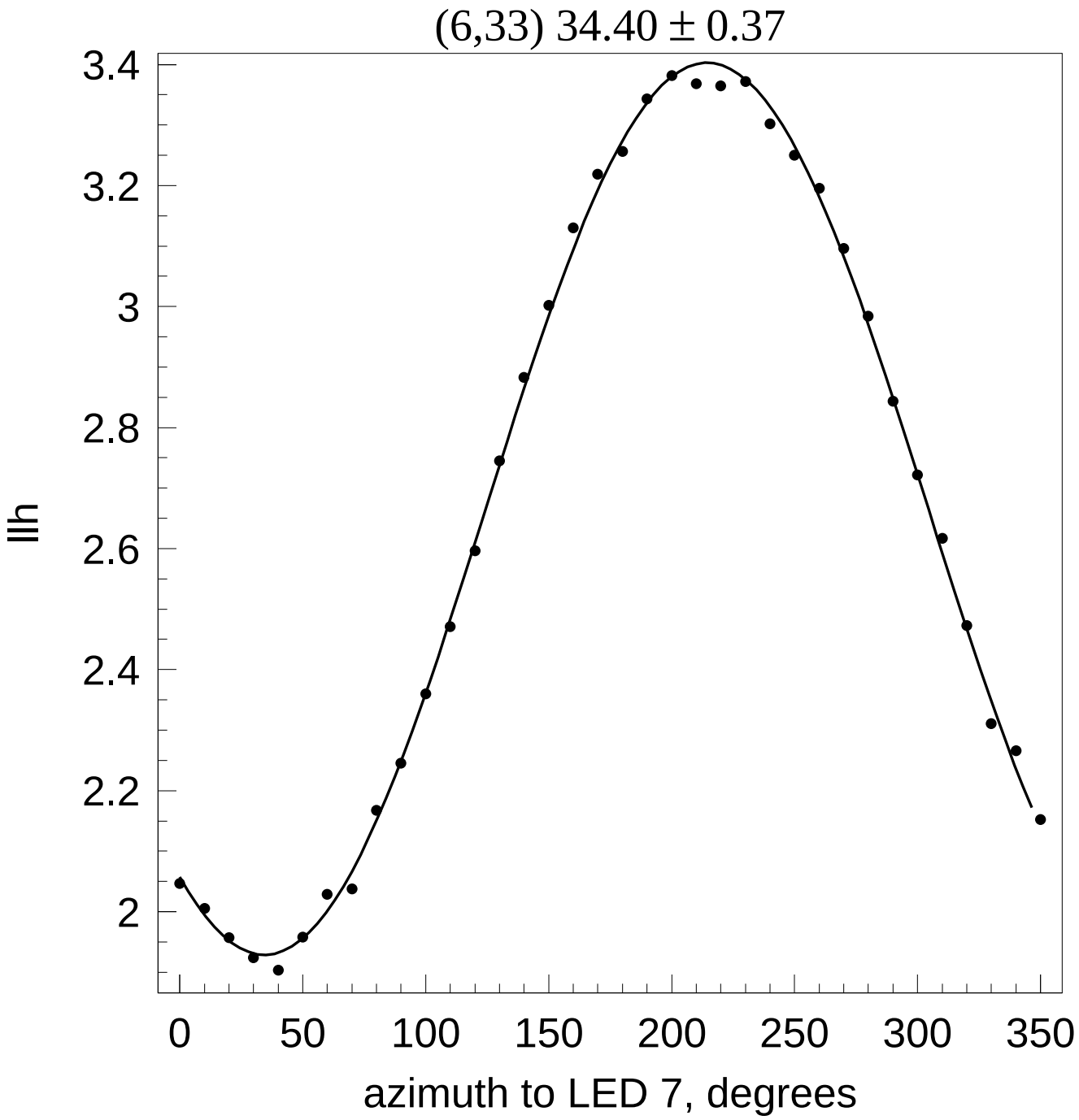

(6,8) 189.08 ± 0.23
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

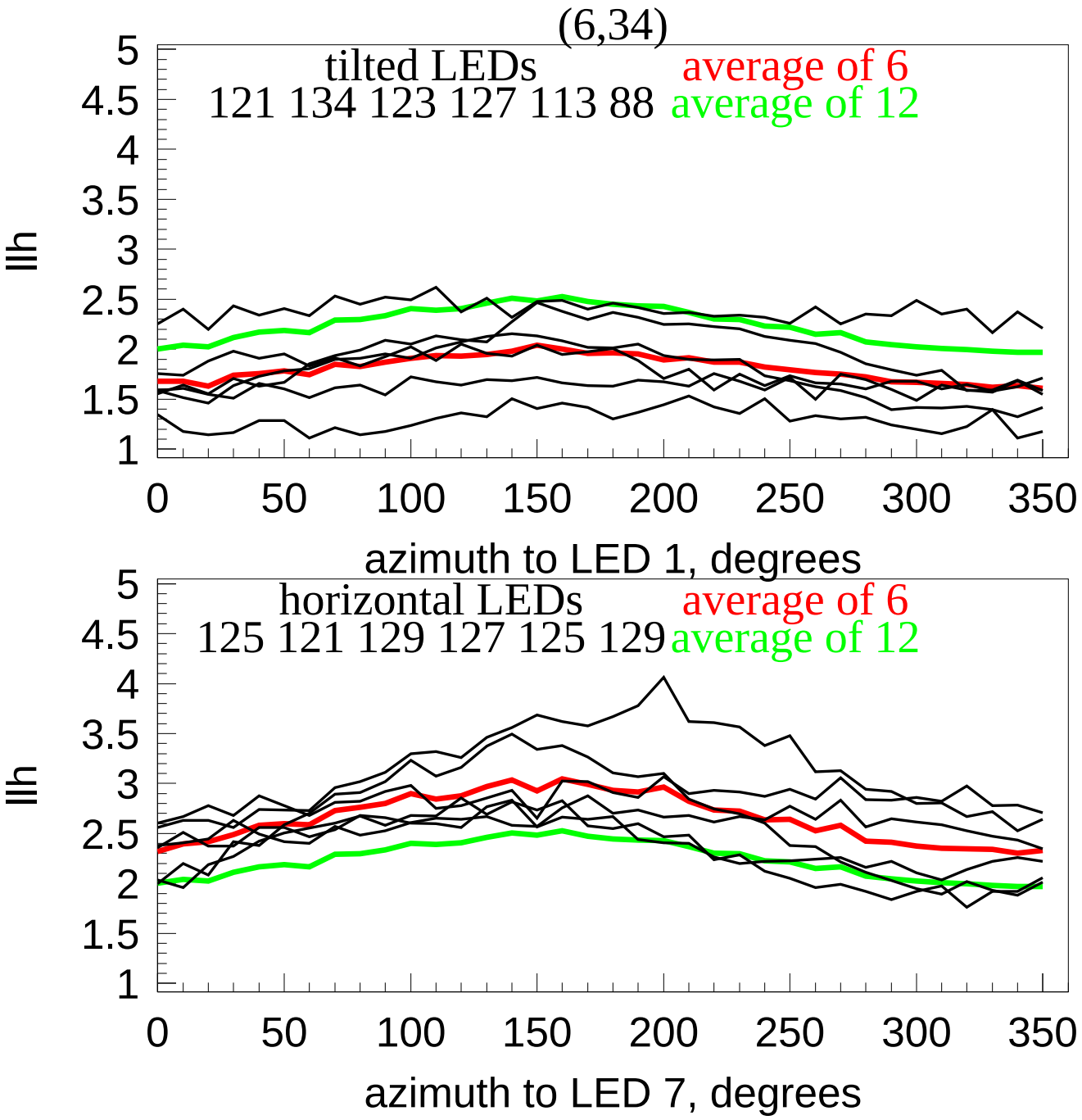

(6,8) 189.17 ± 0.24
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

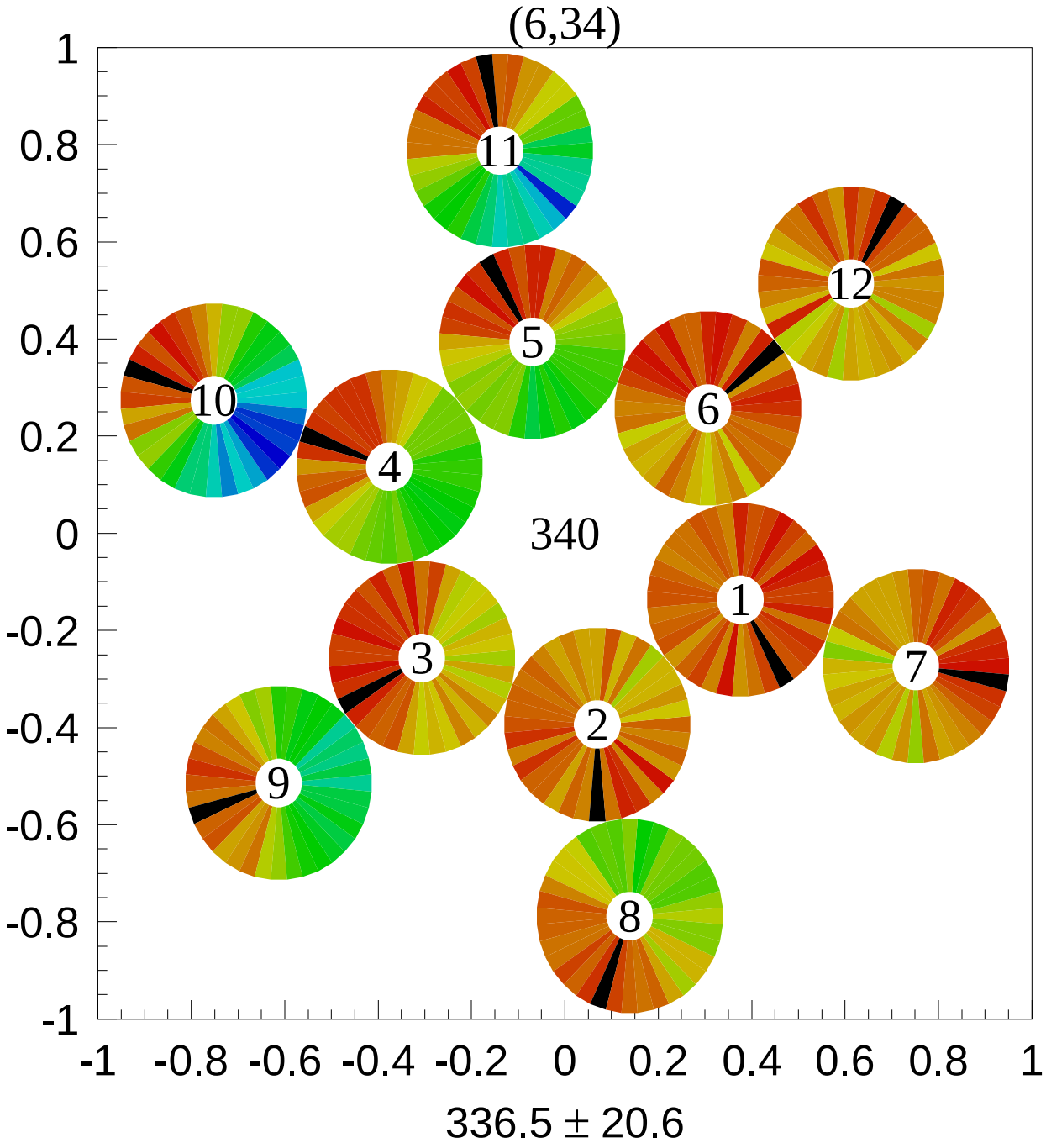

(6,33)
tilted LEDs
125 123 132 122 118 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 133 129 125 134 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

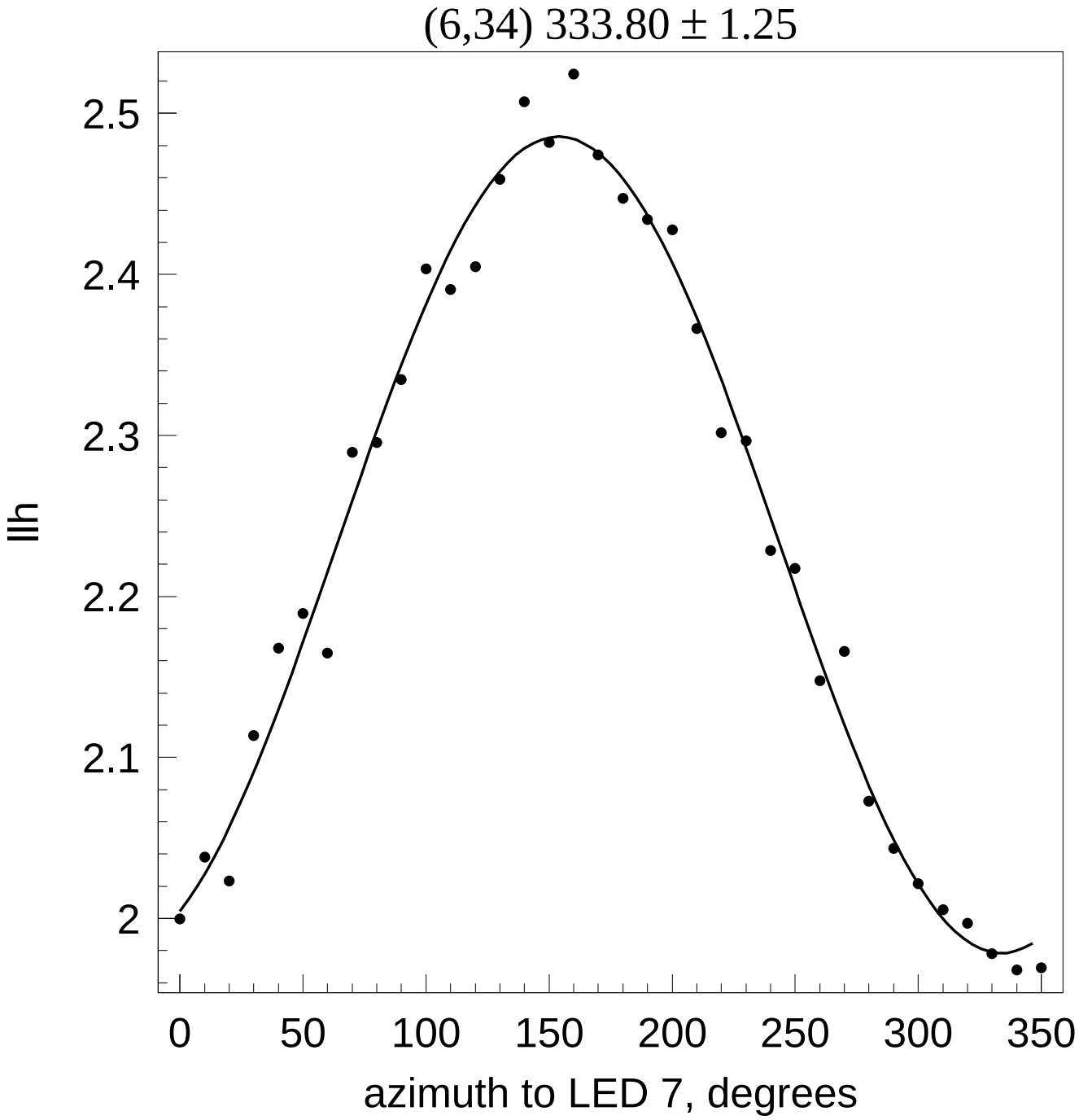

(6,33)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
34.9 ± 13.6

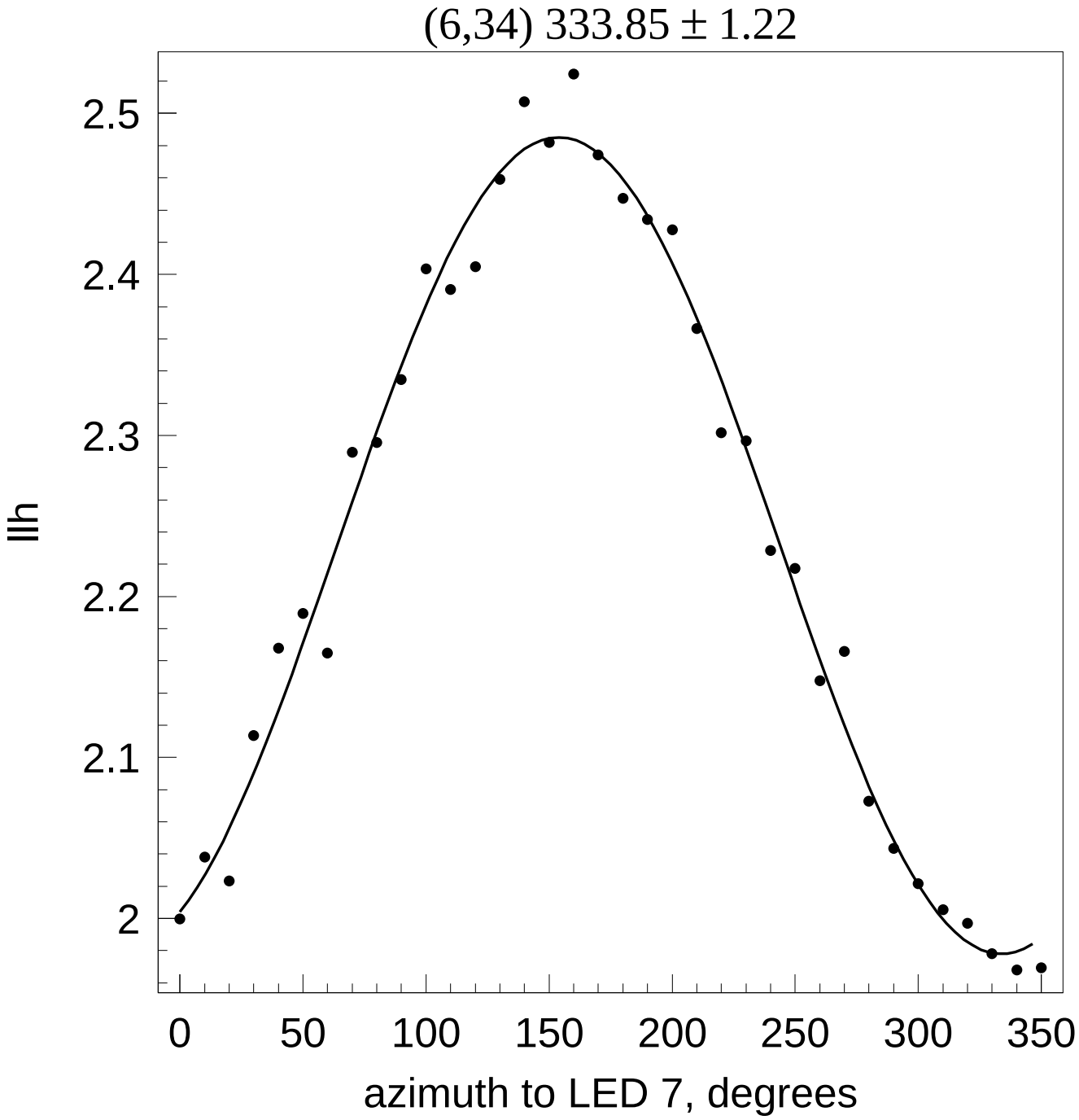

(6,33) 34.28 ± 0.37
3.4
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

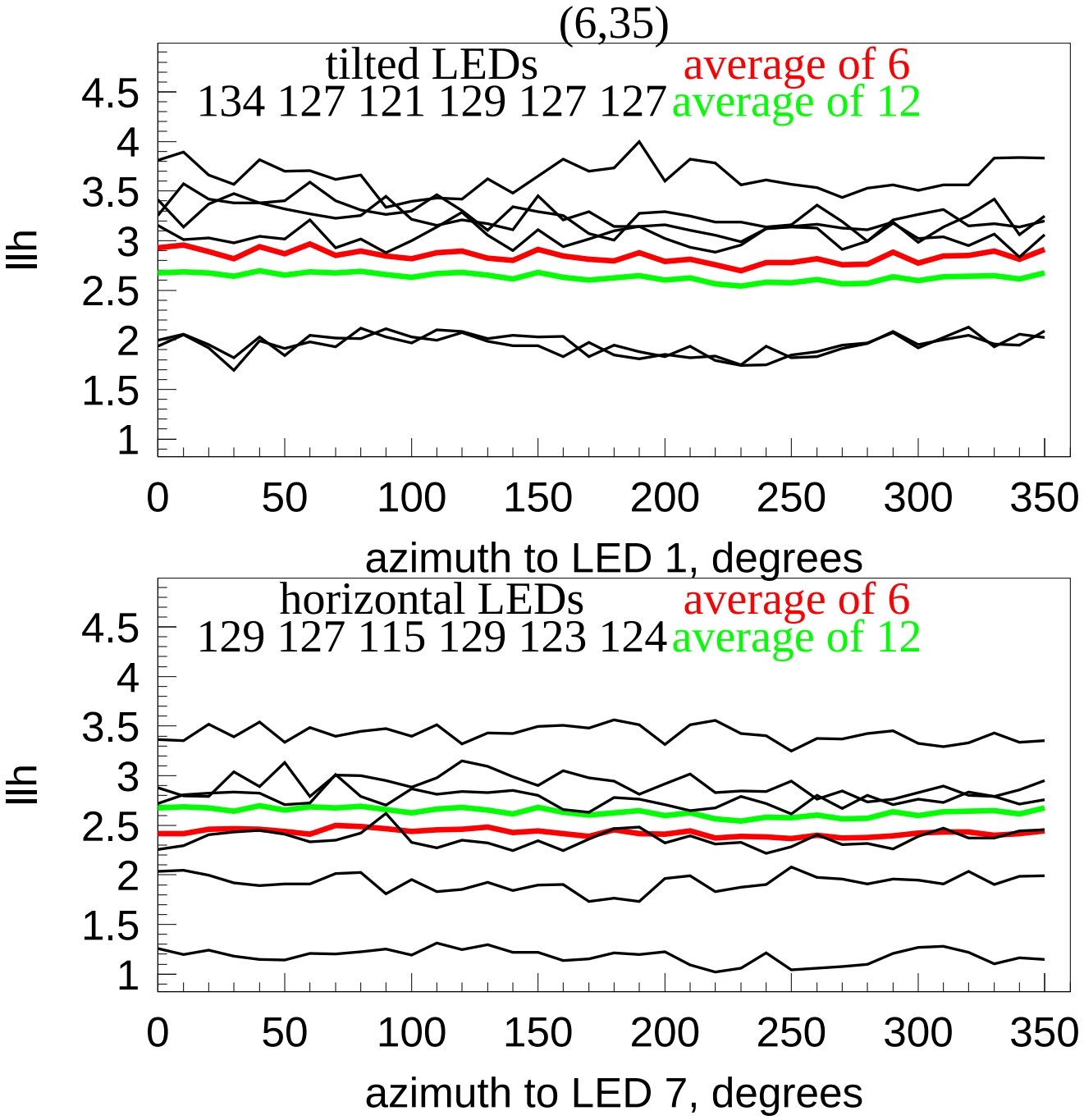

(6,33) 34.40 ± 0.37
3.4
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

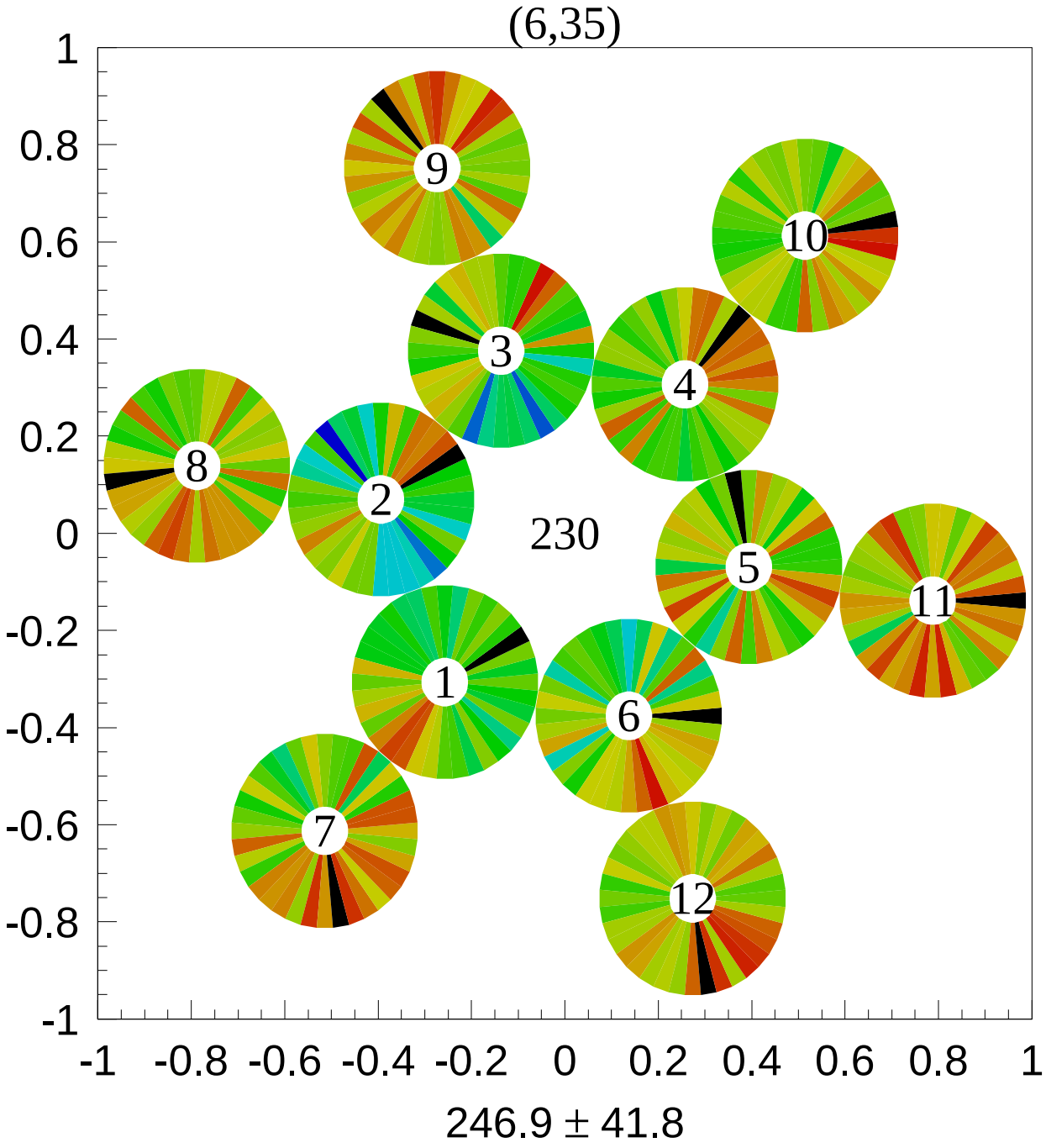

(6,34)
tilted LEDs
121 134 123 127 113 88
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
125 121 129 127 125 129
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

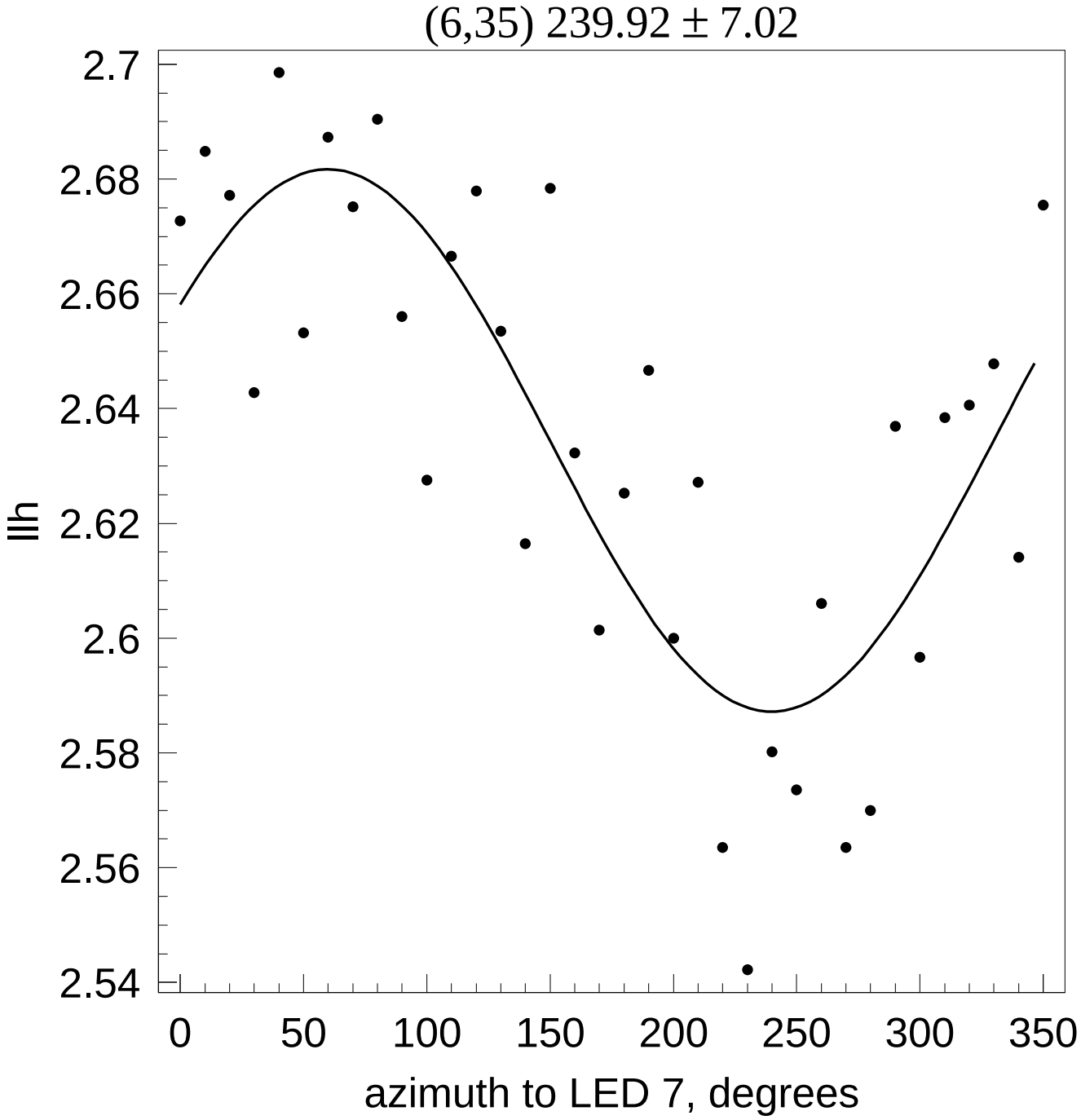

(6,34)
11
12
5
10
6
4
340
1
3
7
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
336.5 ± 20.6

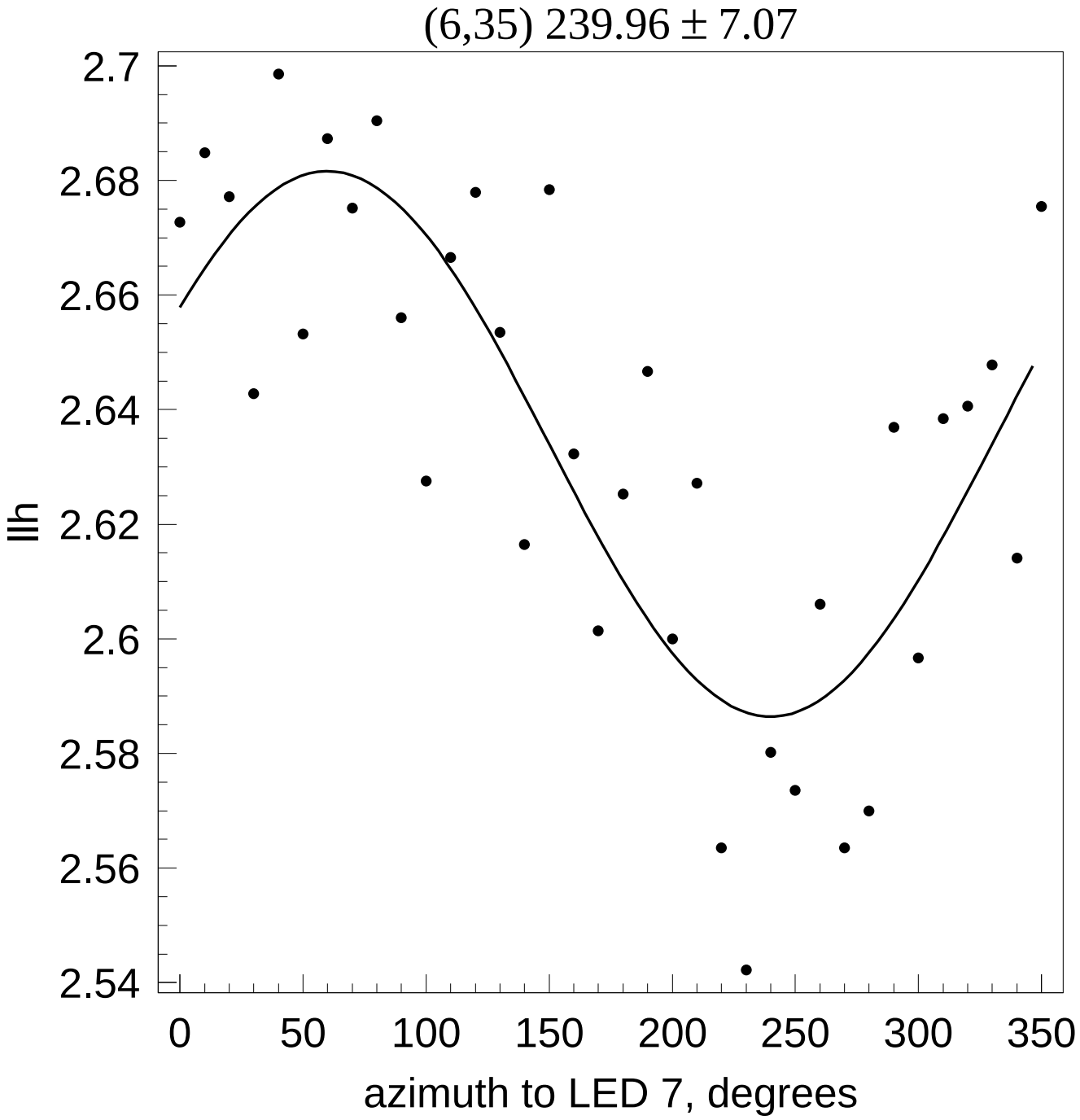

(6,34) 333.80 ± 1.25
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

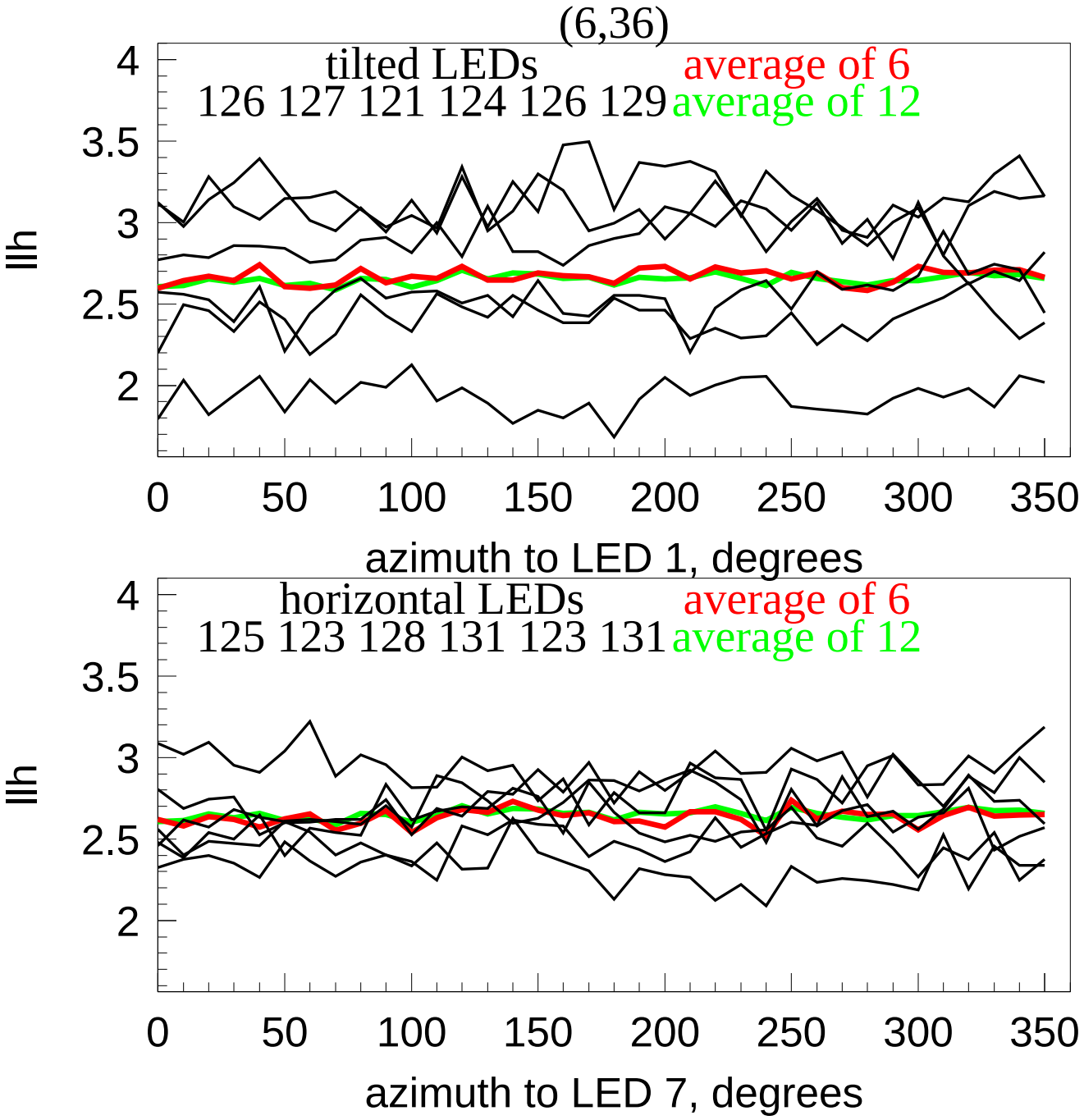

(6,34) 333.85 ± 1.22
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

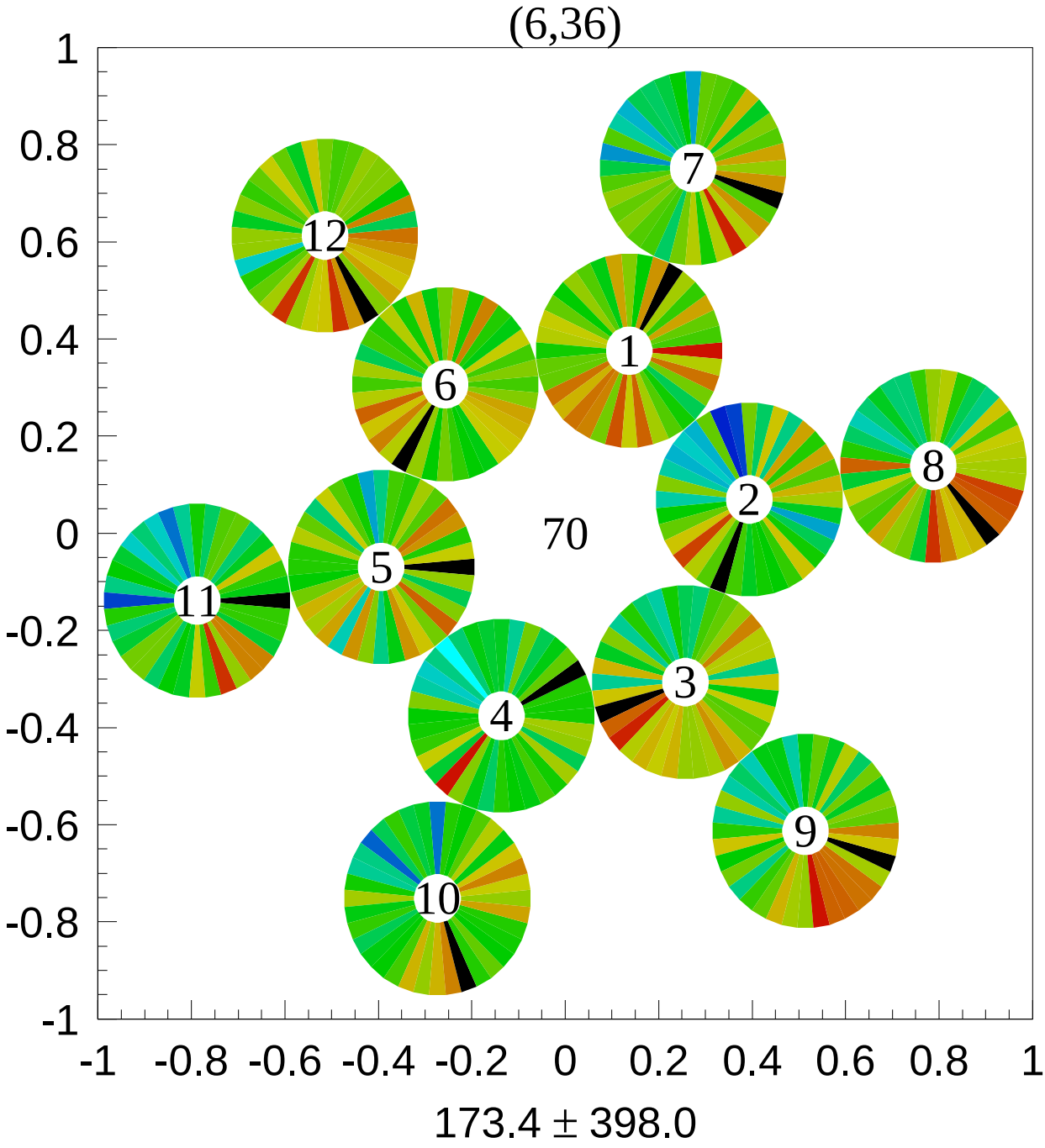

(6,35)
tilted LEDs
134 127 121 129 127 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 127 115 129 123 124
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

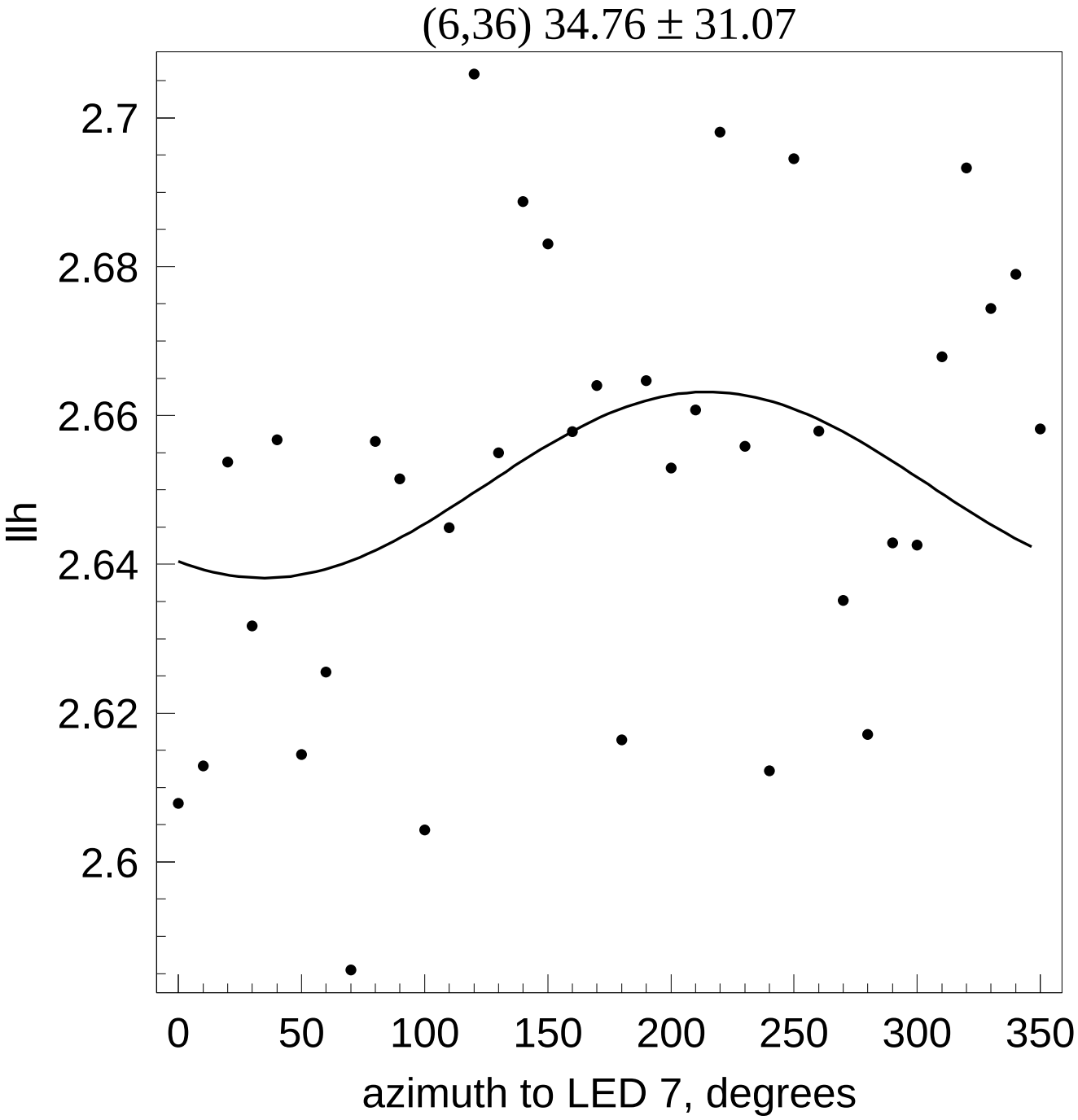

(6,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
246.9 ± 41.8

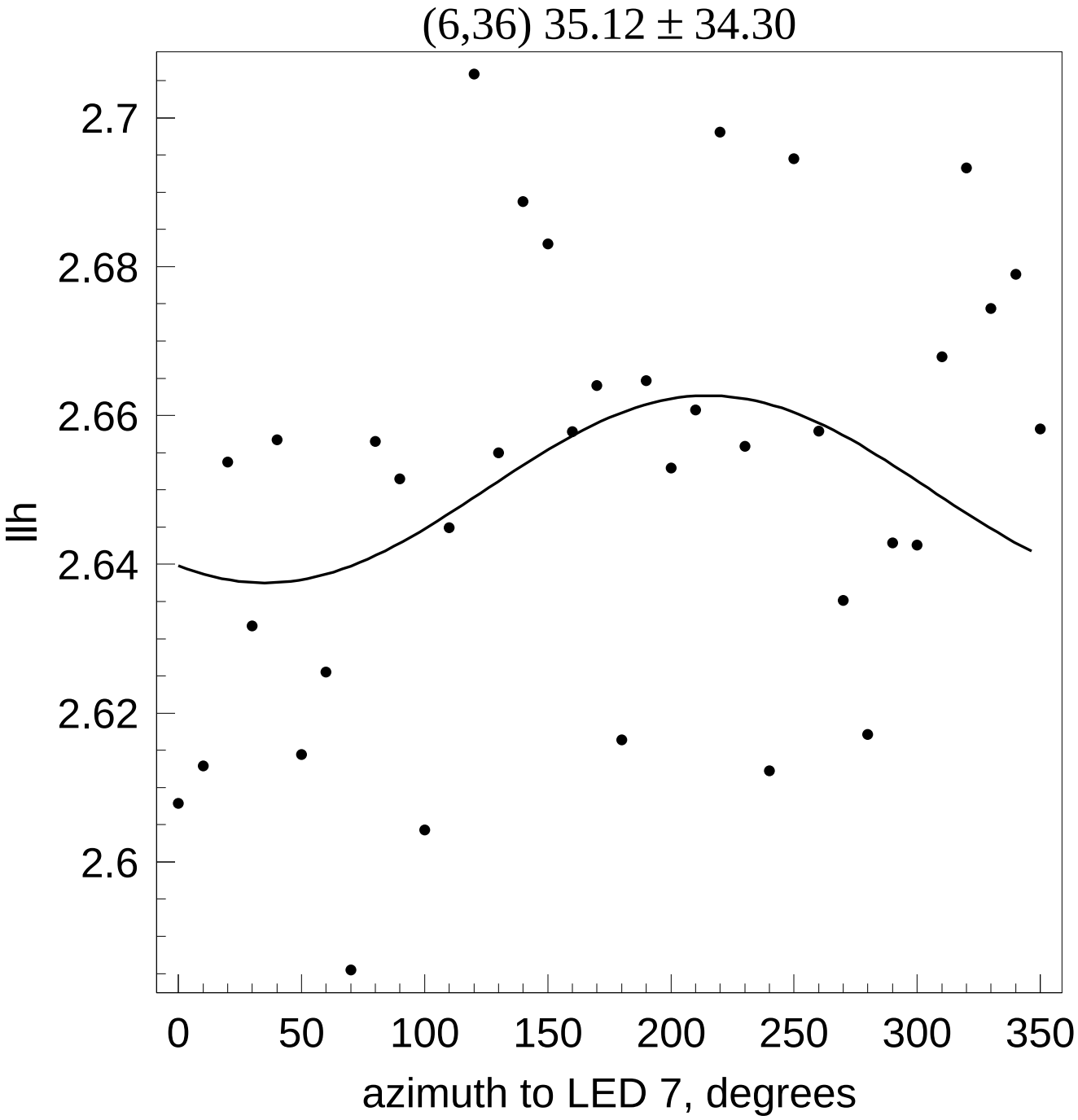

(6,35) 239.92 ± 7.02
2.7
2.68
2.66
2.64
2.62
2.6
2.58
2.56
2.54
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

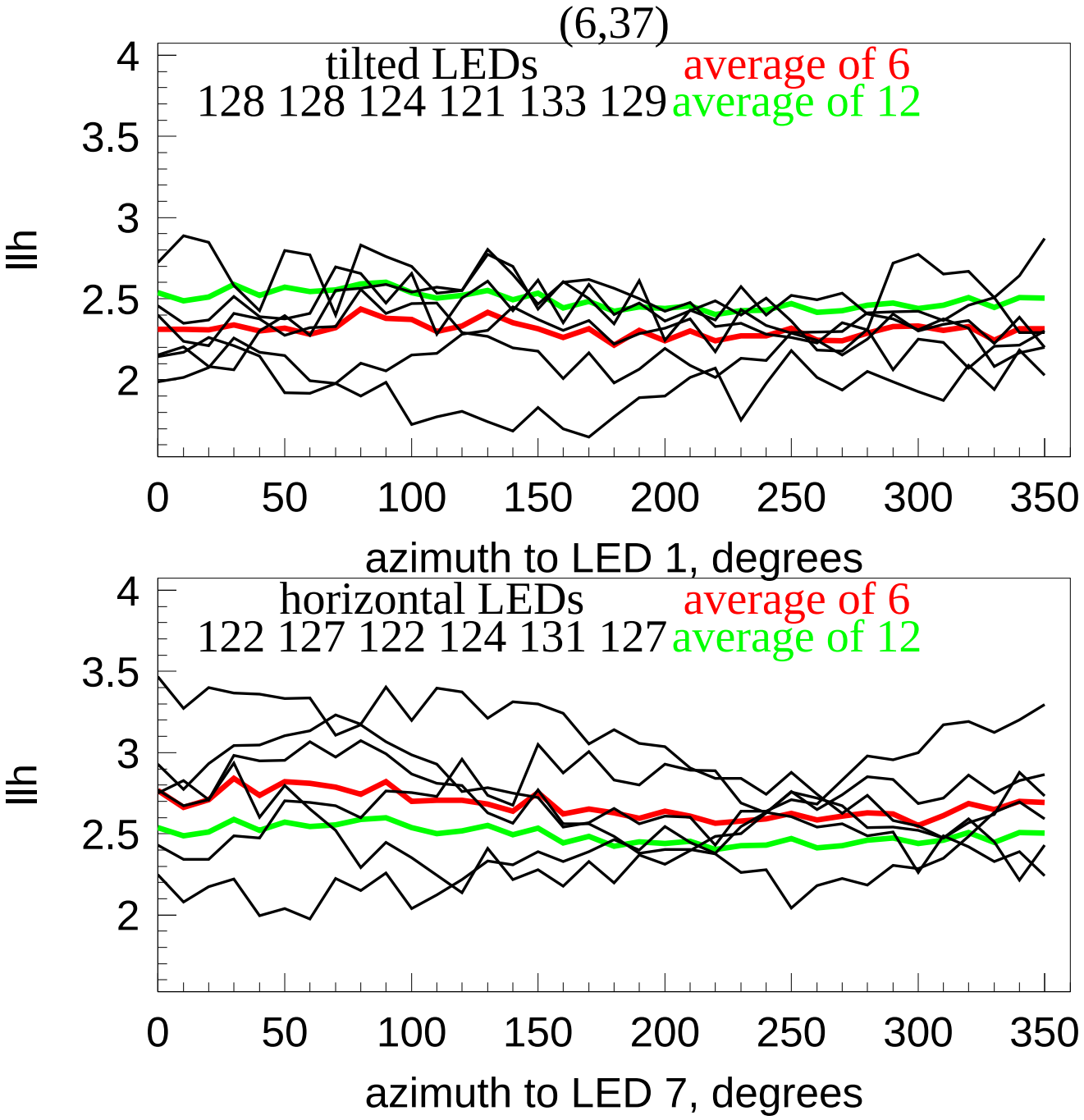

(6,35) 239.96 ± 7.07
2.7
2.68
2.66
2.64
2.62
2.6
2.58
2.56
2.54
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

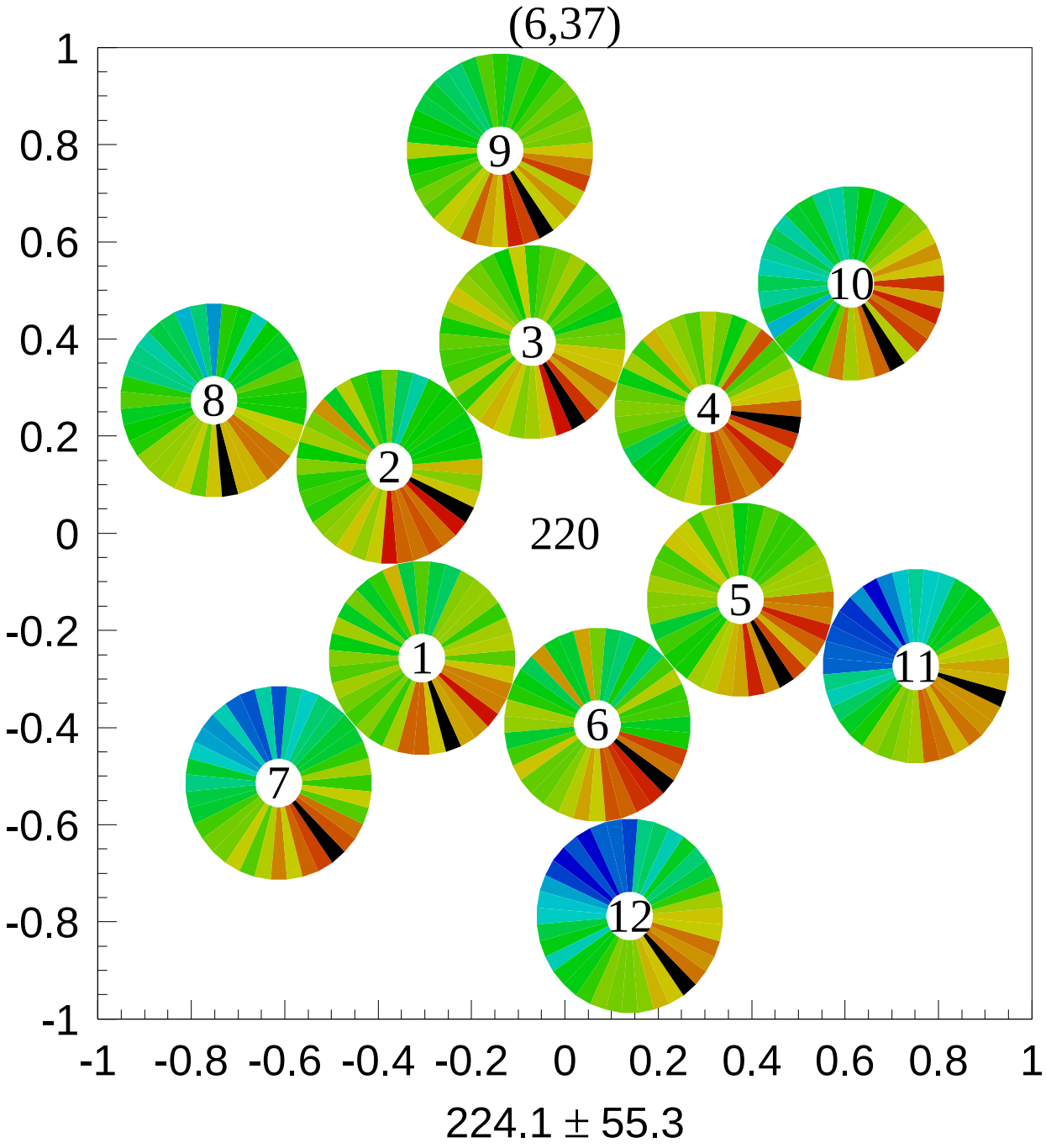

(6,36)
tilted LEDs
126 127 121 124 126 129
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 123 128 131 123 131
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

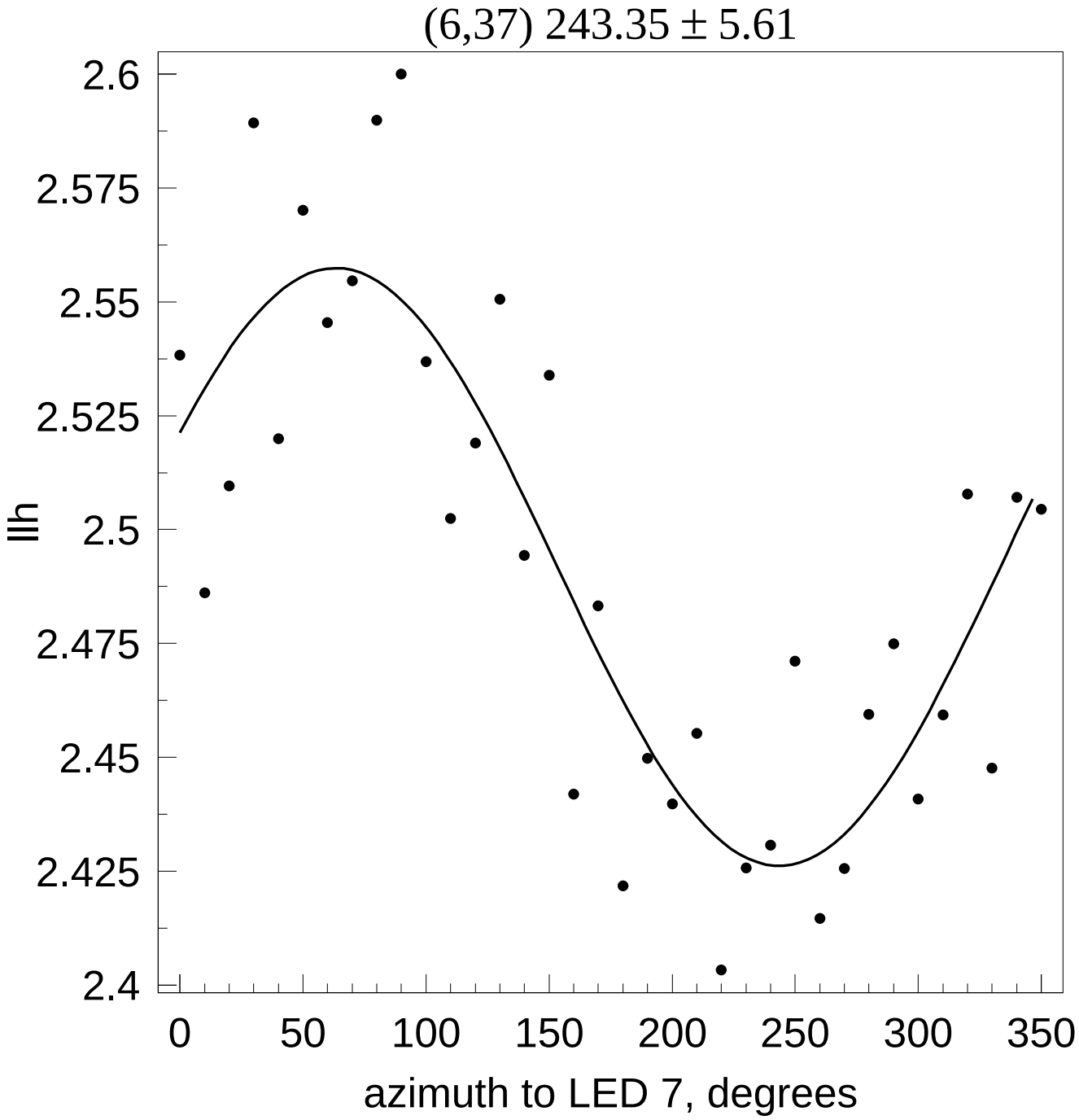

(6,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
70
5
11
3
4
9
10
173.4 ± 398.0

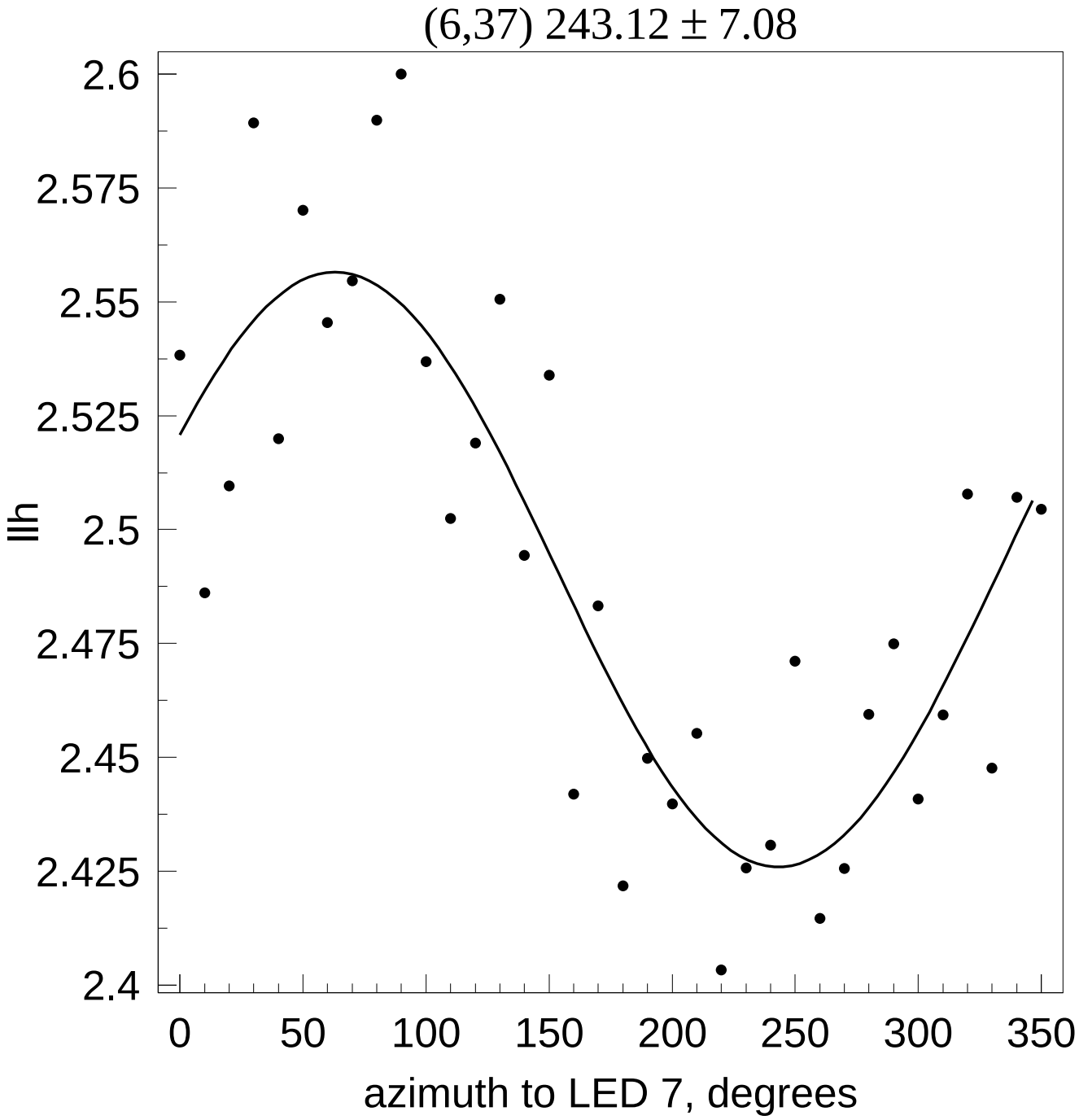

(6,36) 34.76 ± 31.07
2.7
2.68
2.66
2.64
2.62
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

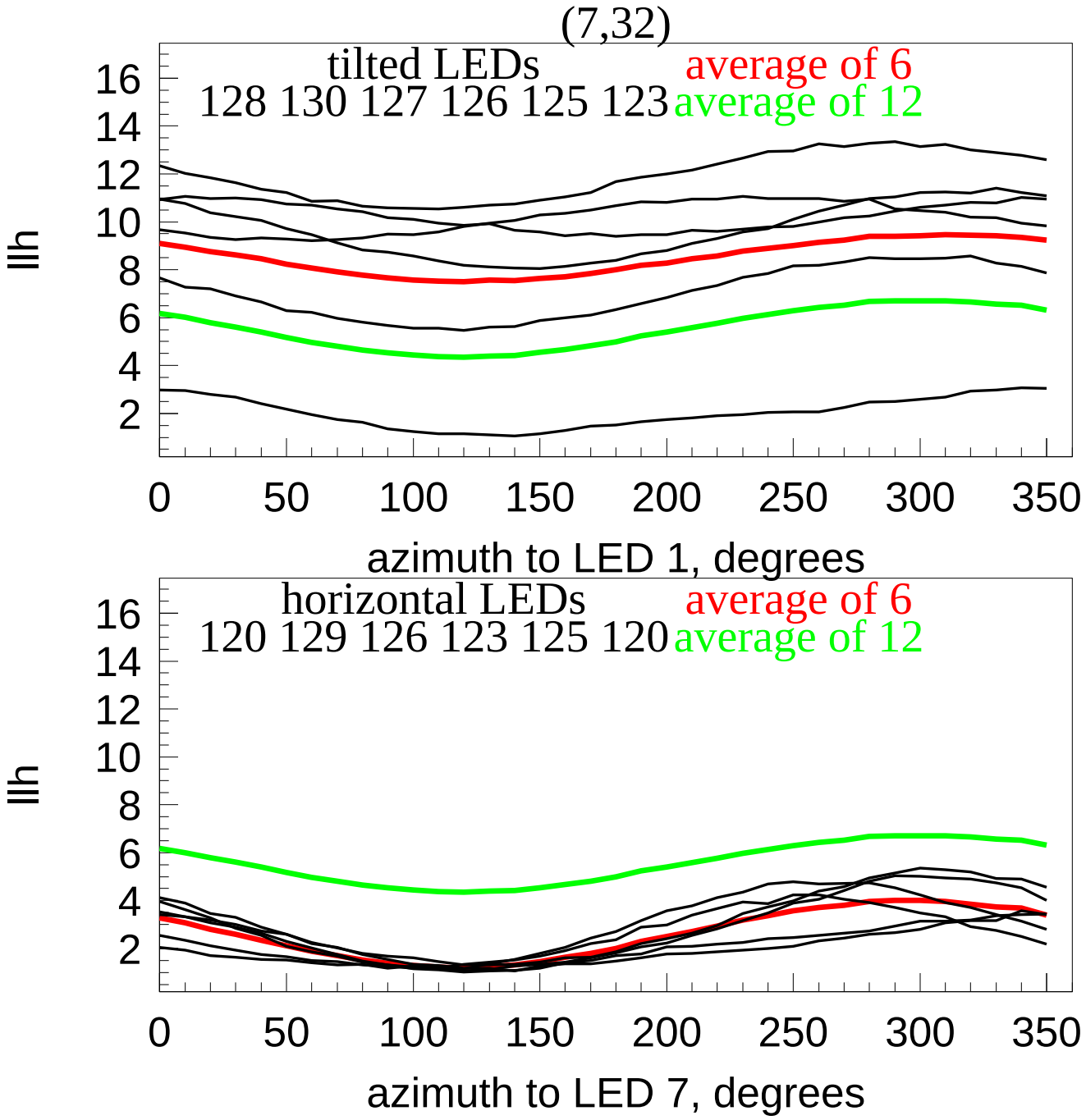

(6,36) 35.12 ± 34.30
2.7
2.68
2.66
2.64
2.62
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

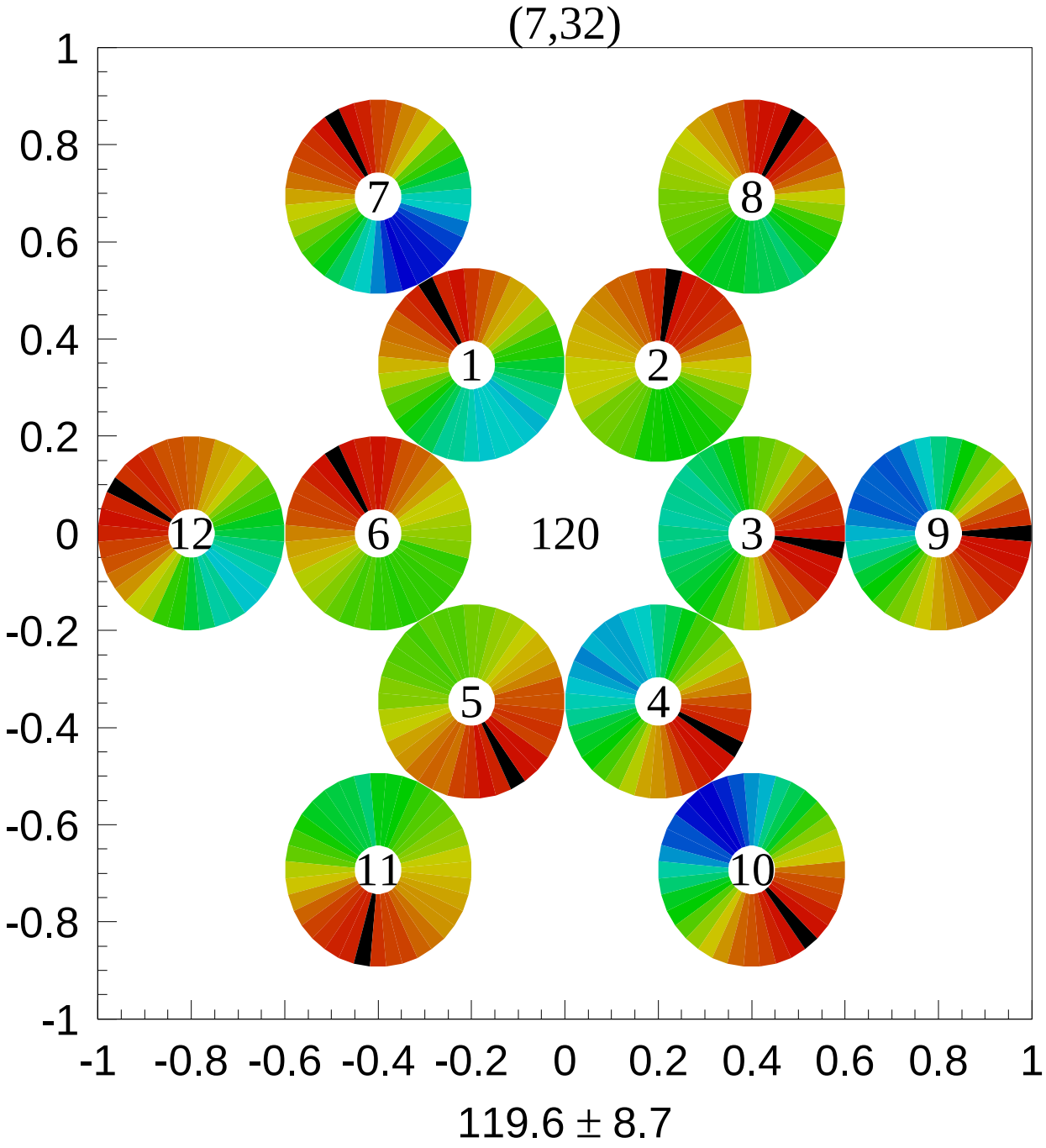

(6,37)
tilted LEDs
128 128 124 121 133 129
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 127 122 124 131 127
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

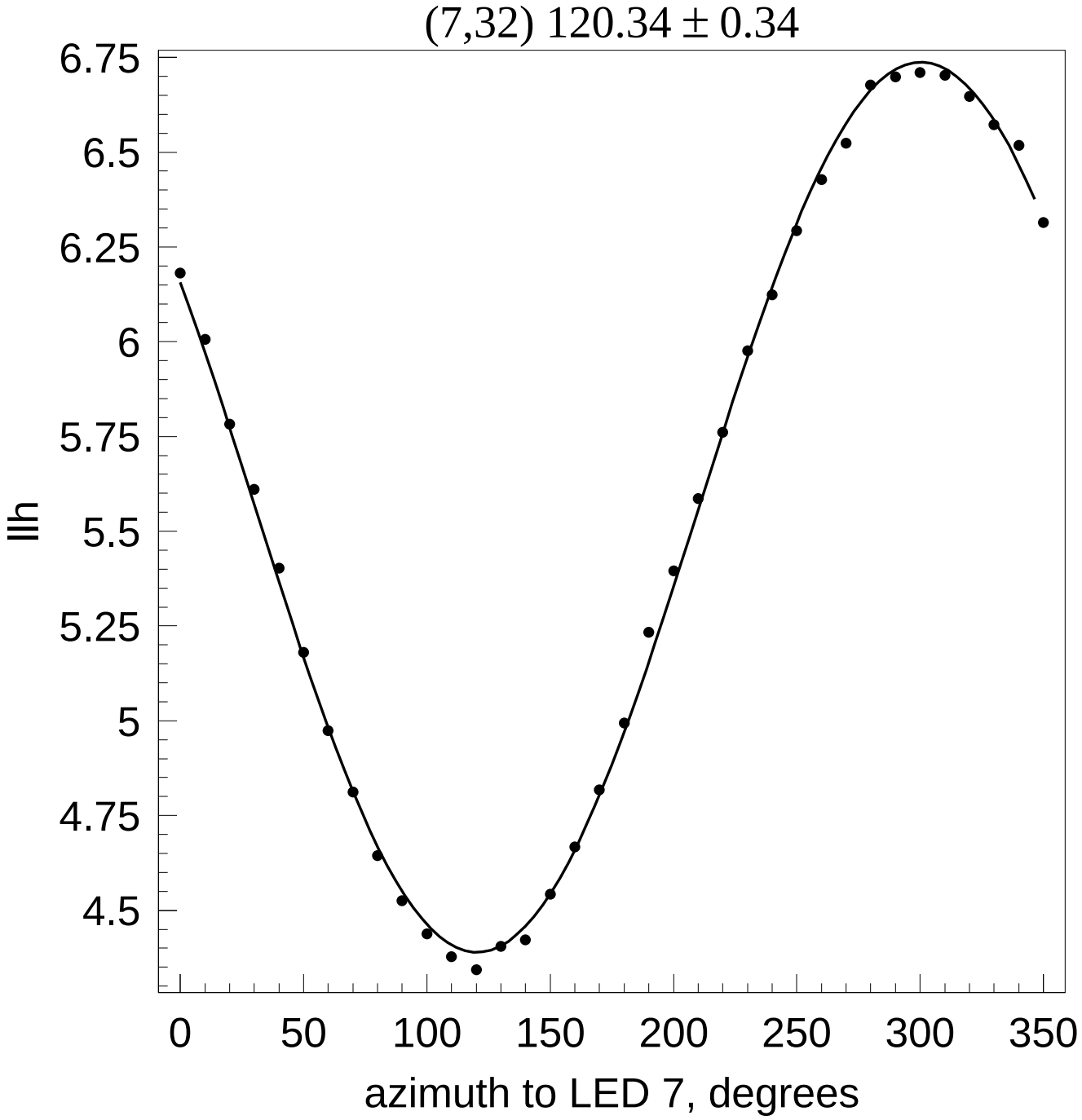

(6,37)
9
10
3
8
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
224.1 ± 55.3

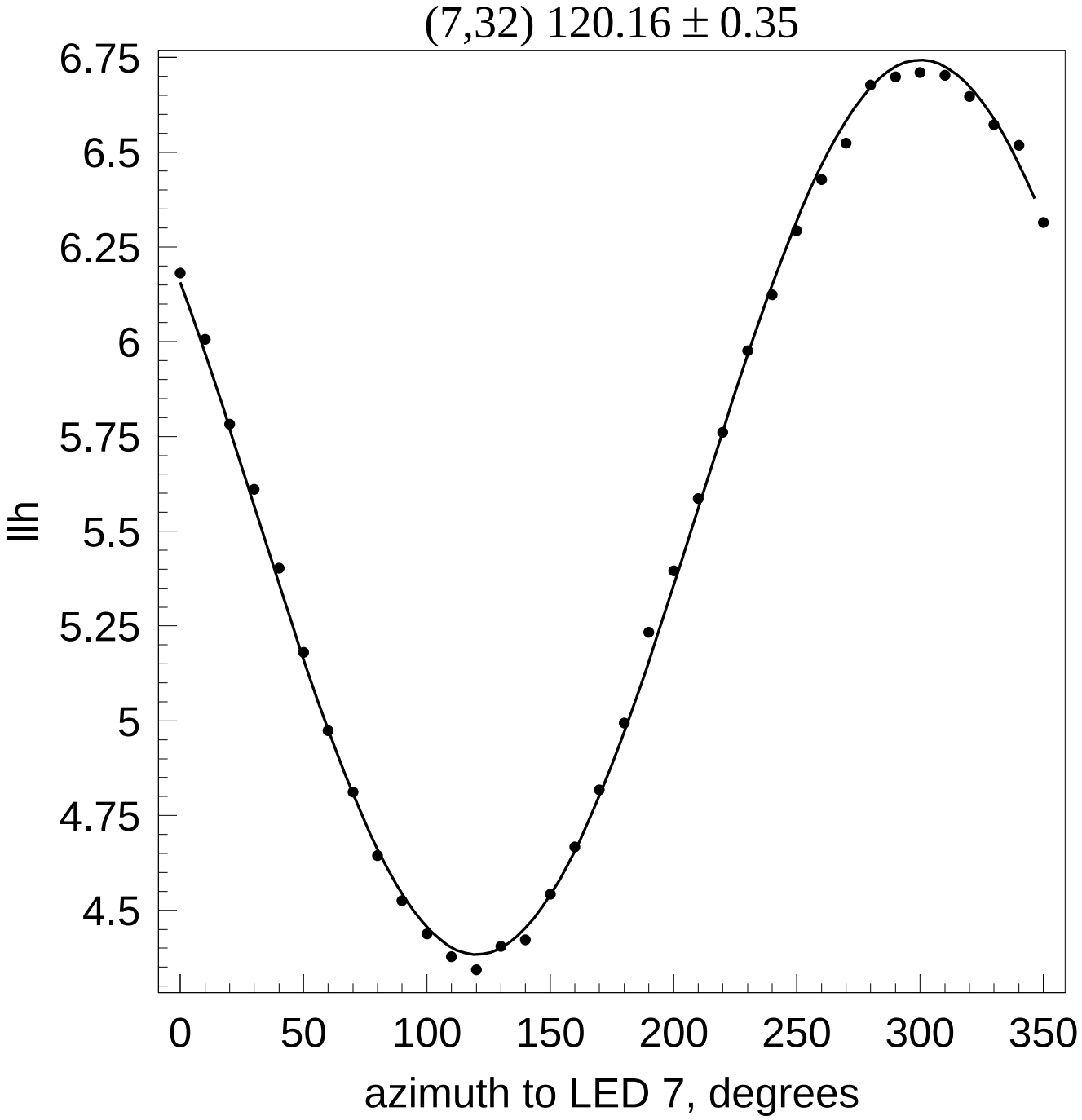

(6,37) 243.35 ± 5.61
2.6
2.575
2.55
2.525
2.5
2.475
2.45
2.425
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

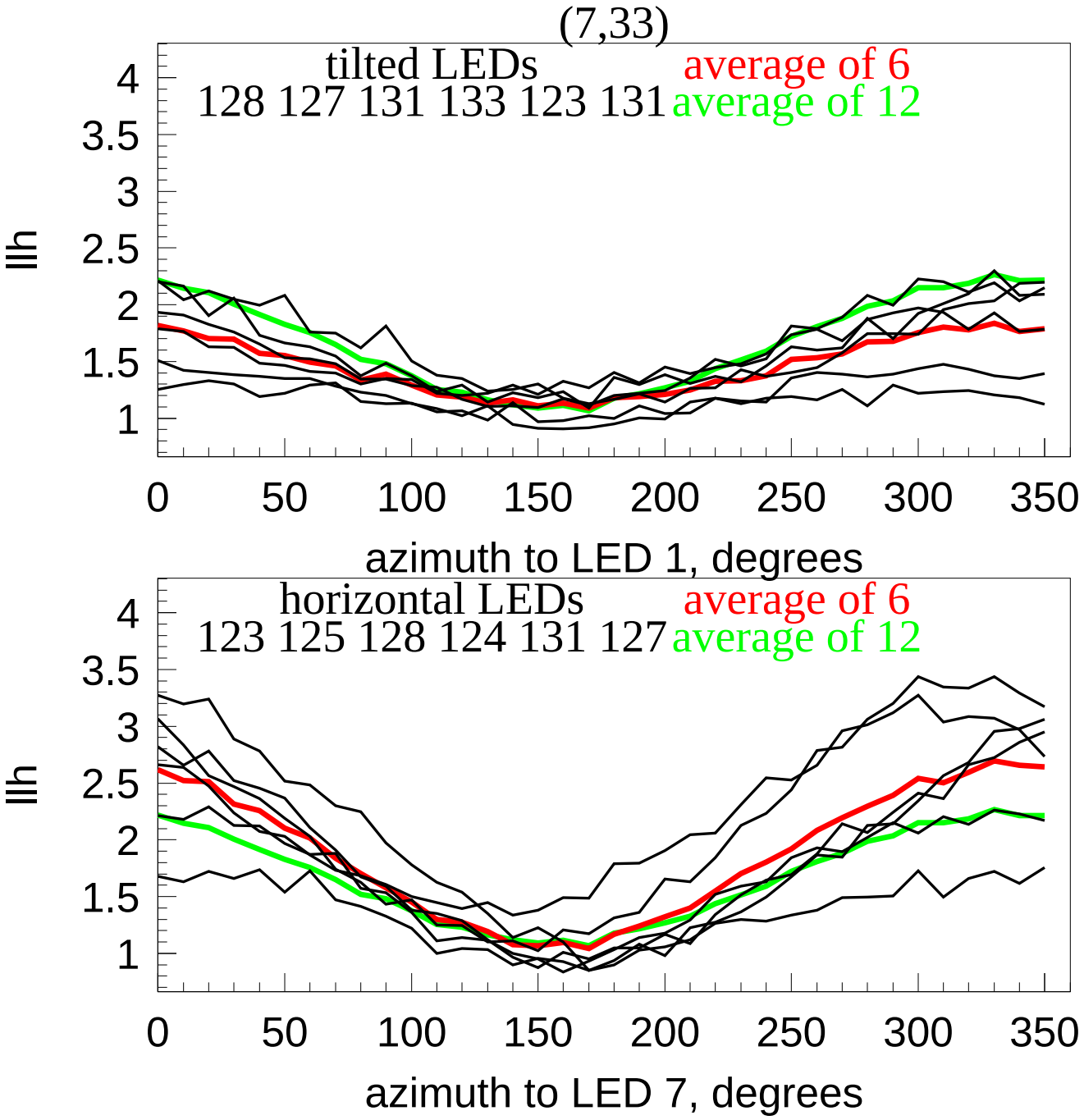

(6,37) 243.12 ± 7.08
2.6
2.575
2.55
2.525
2.5
2.475
2.45
2.425
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

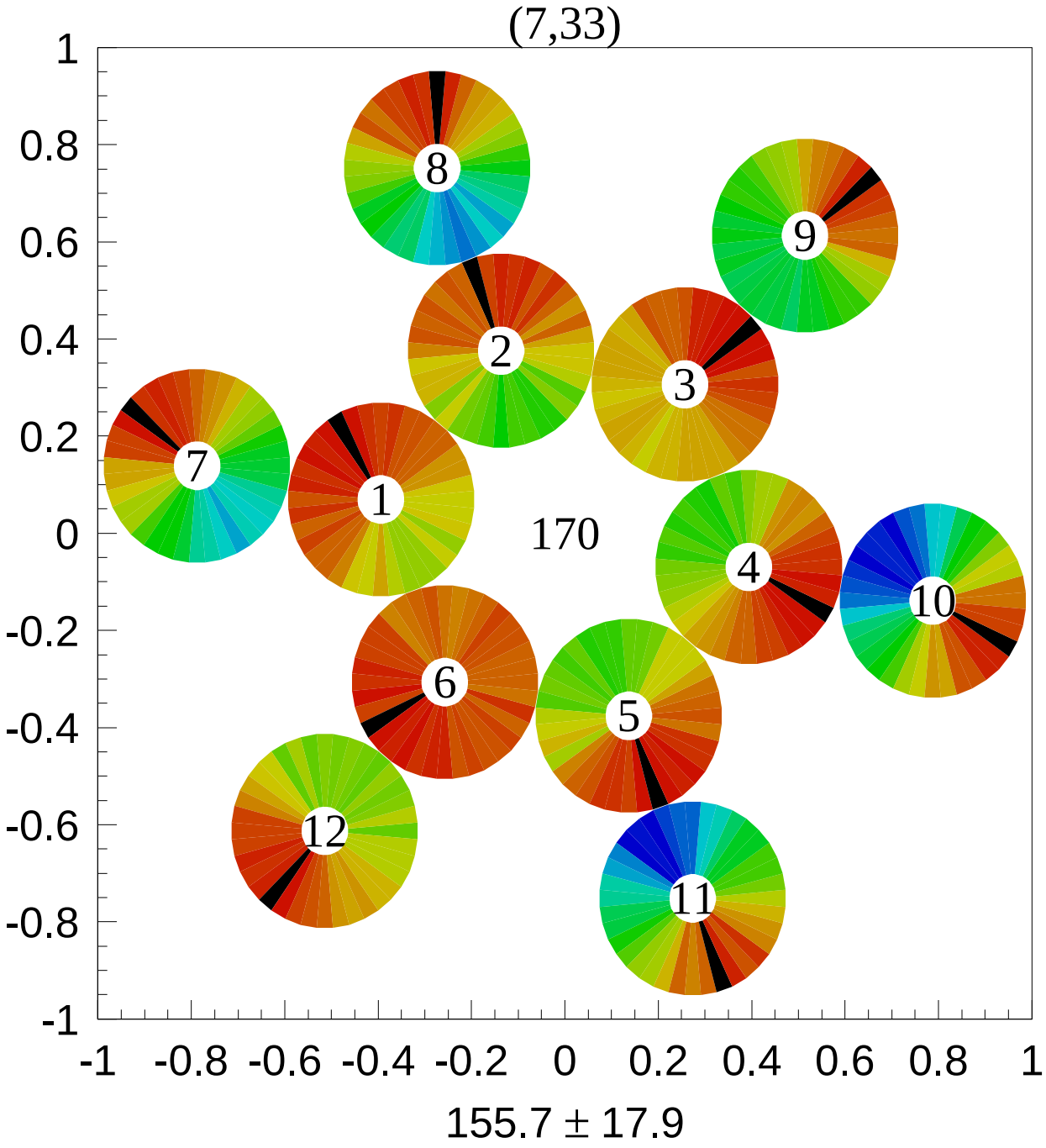

(7,32)
tilted LEDs
128 130 127 126 125 123
average of 6
average of 12
llh
16
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
120 129 126 123 125 120
average of 6
average of 12
llh
16
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

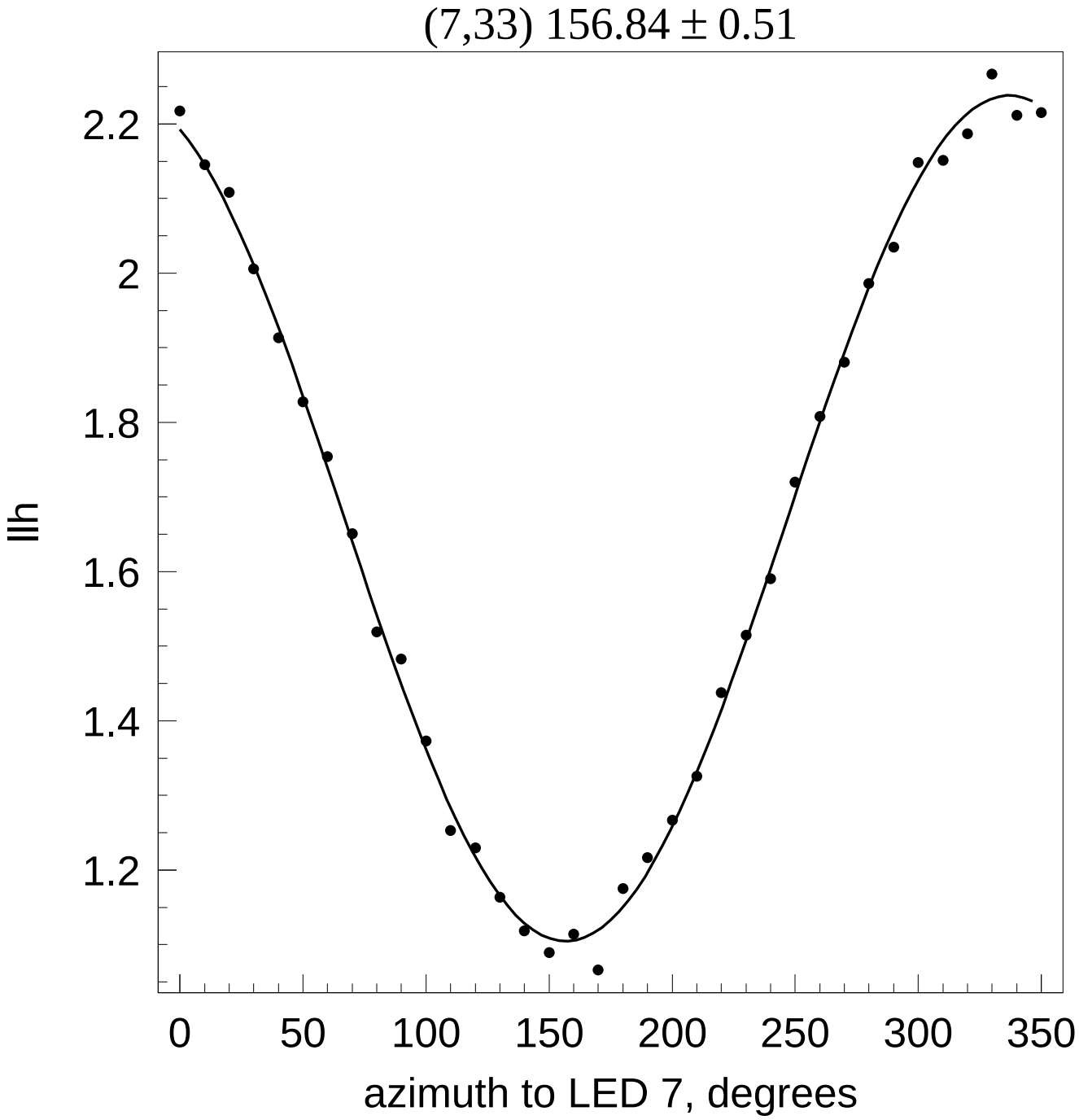

(7,32)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
119.6 ± 8.7

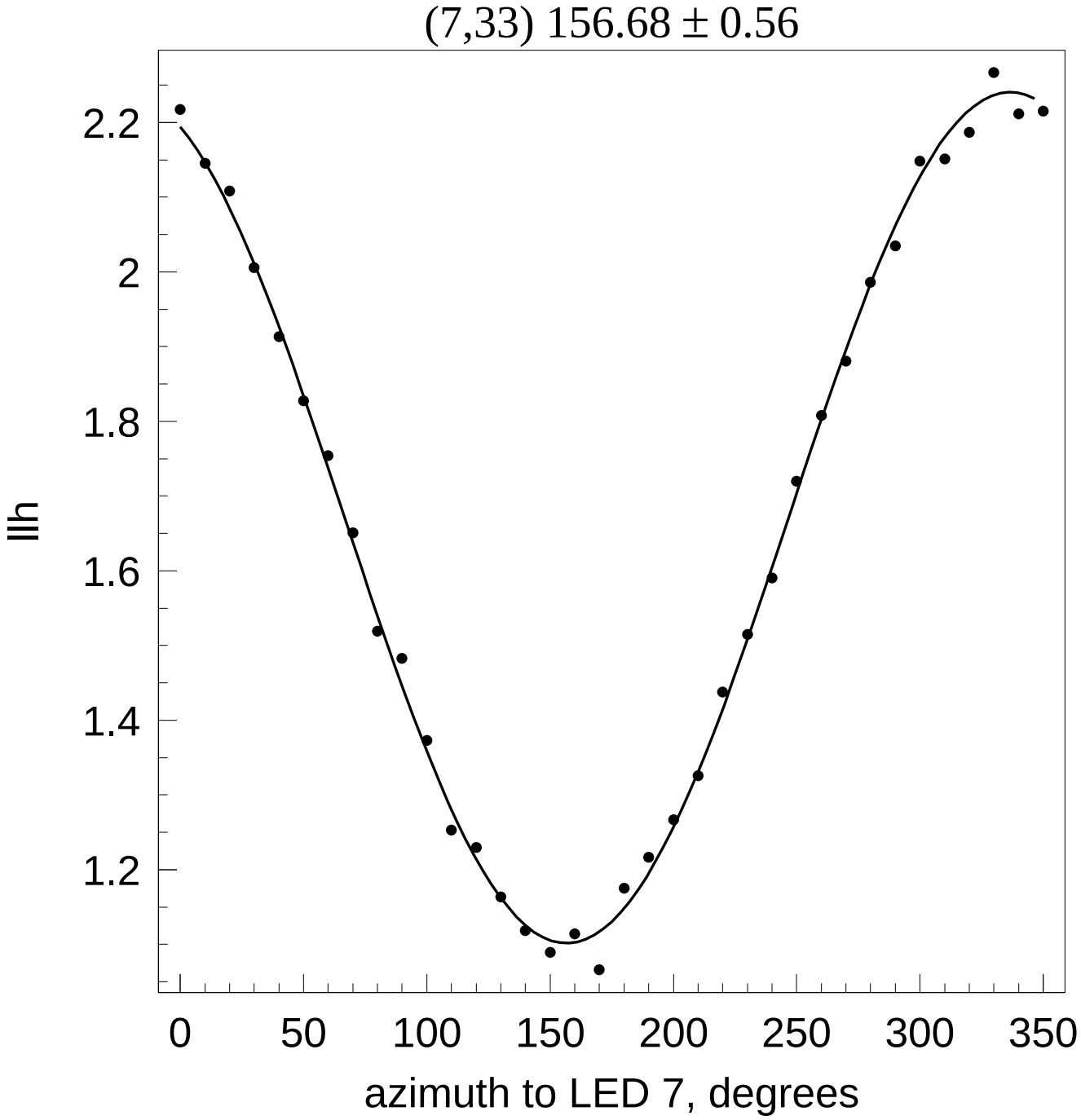

(7,32) 120.34 ± 0.34
6.75
6.5
6.25
6
5.75
5.5
5.25
5
4.75
4.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

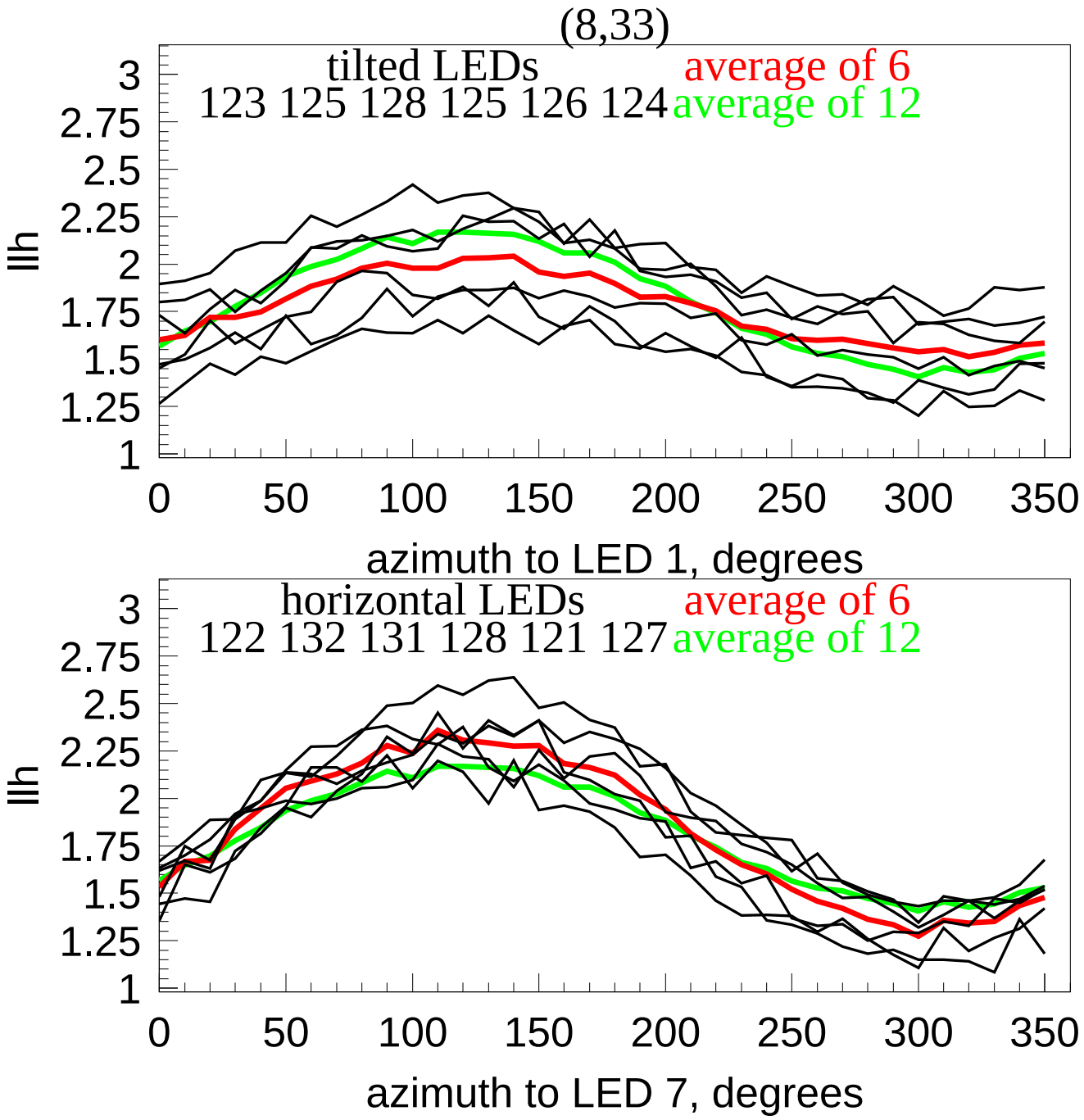

(7,32) 120.16 ± 0.35
6.75
6.5
6.25
6
5.75
5.5
5.25
5
4.75
4.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

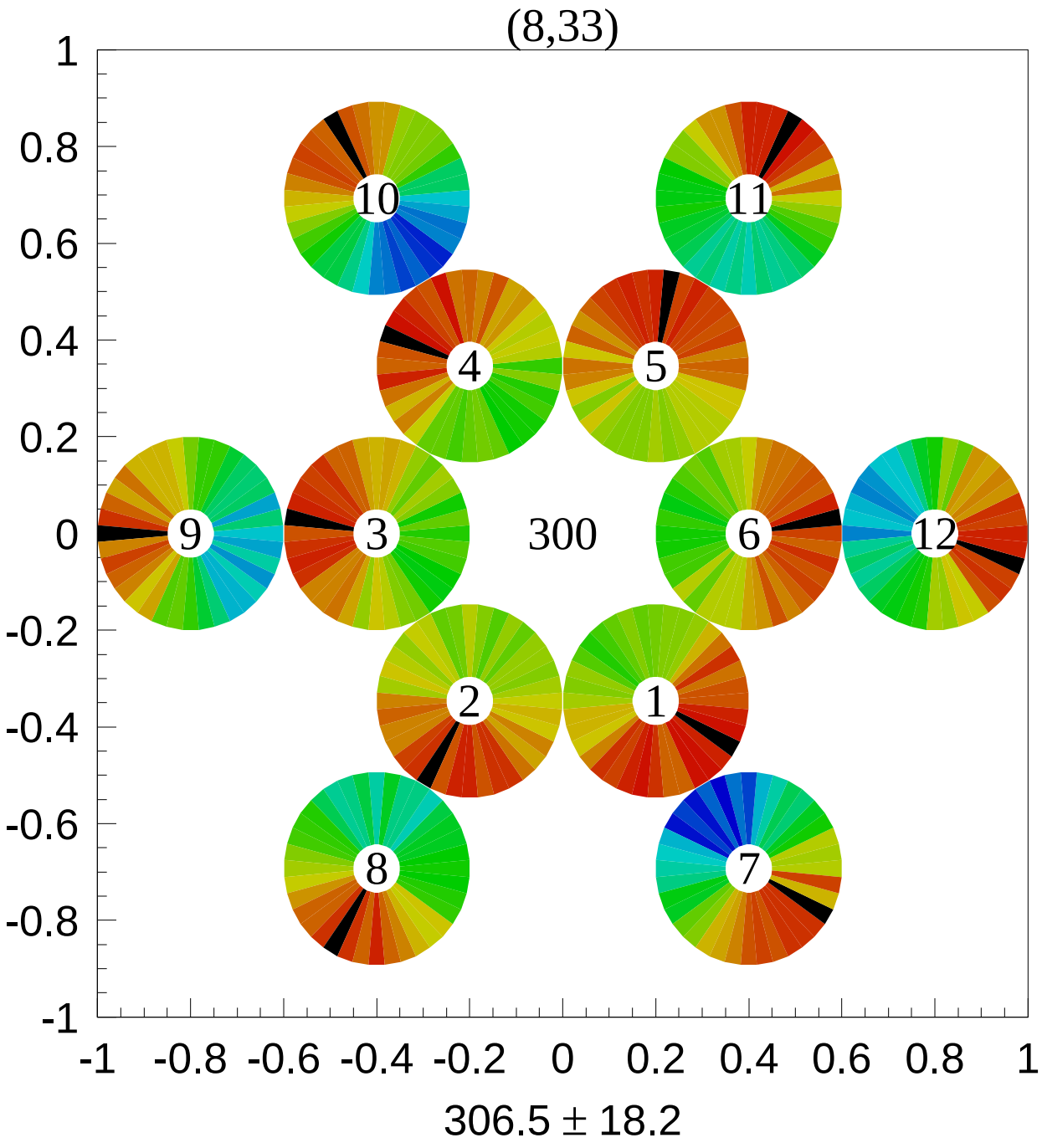

(7,33)
tilted LEDs
128 127 131 133 123 131
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
123 125 128 124 131 127
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

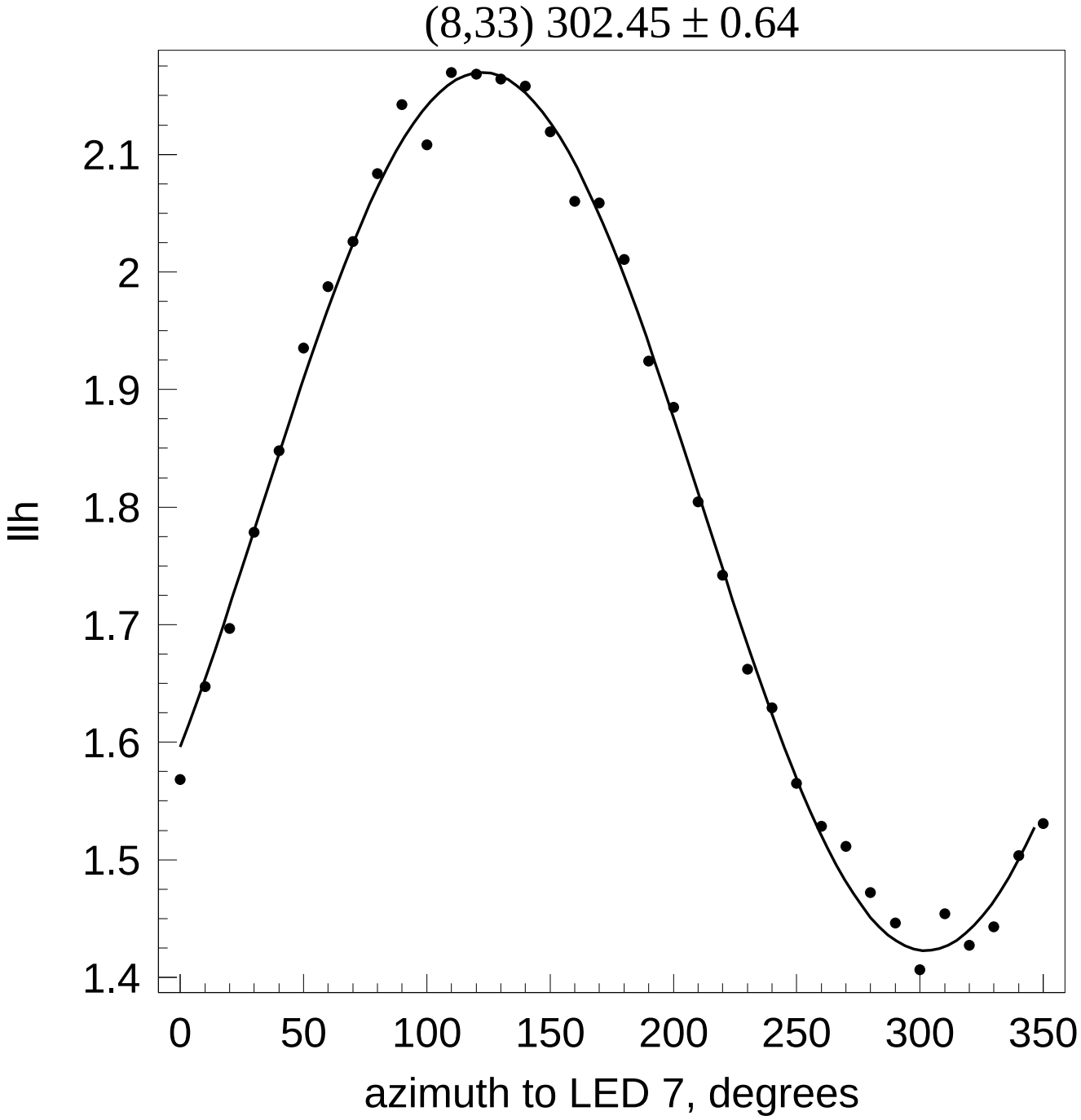

(7,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
155.7 ± 17.9

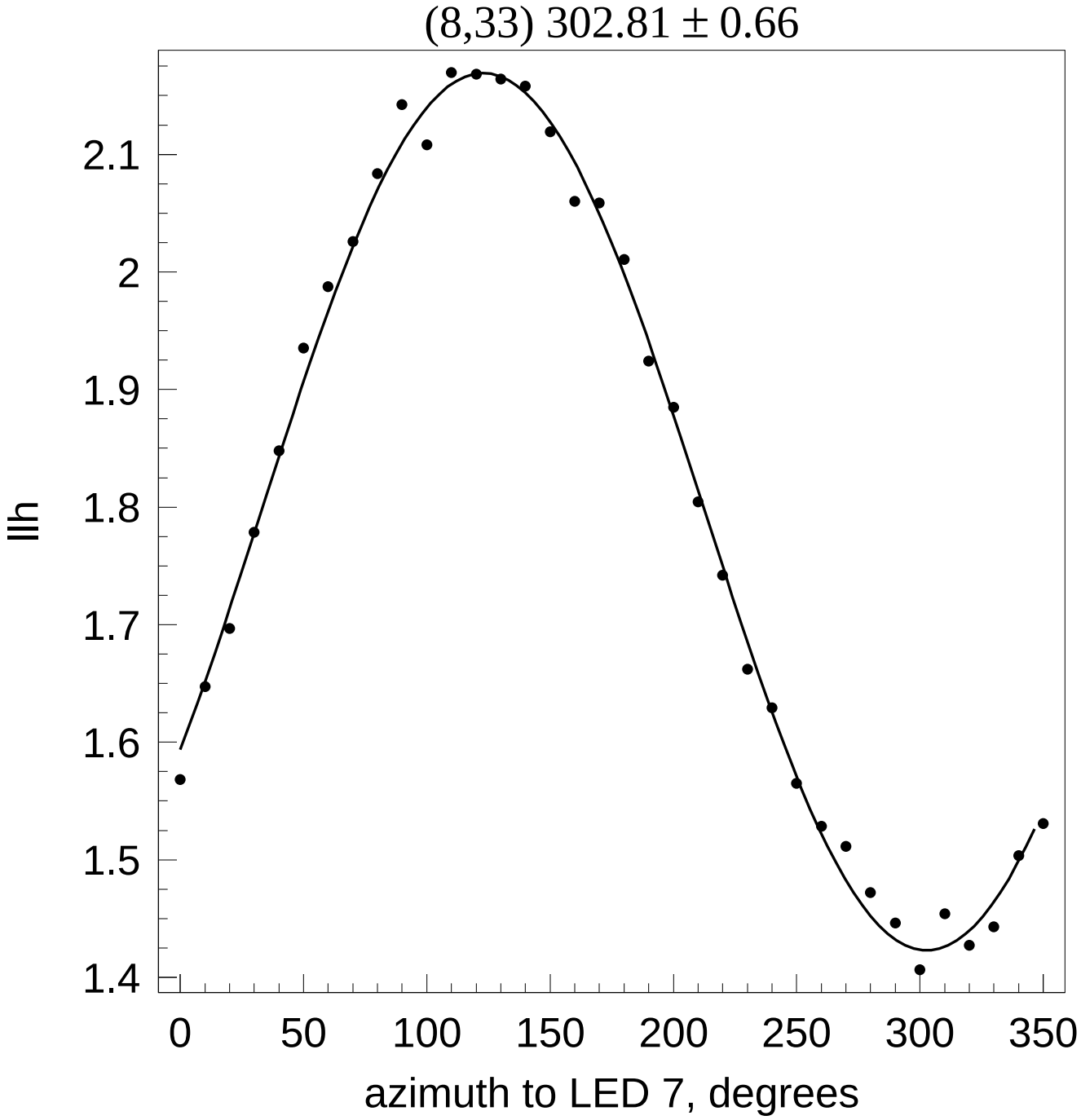

(7,33) 156.84 ± 0.51
2.2
2
1.8
1.6
1.4
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

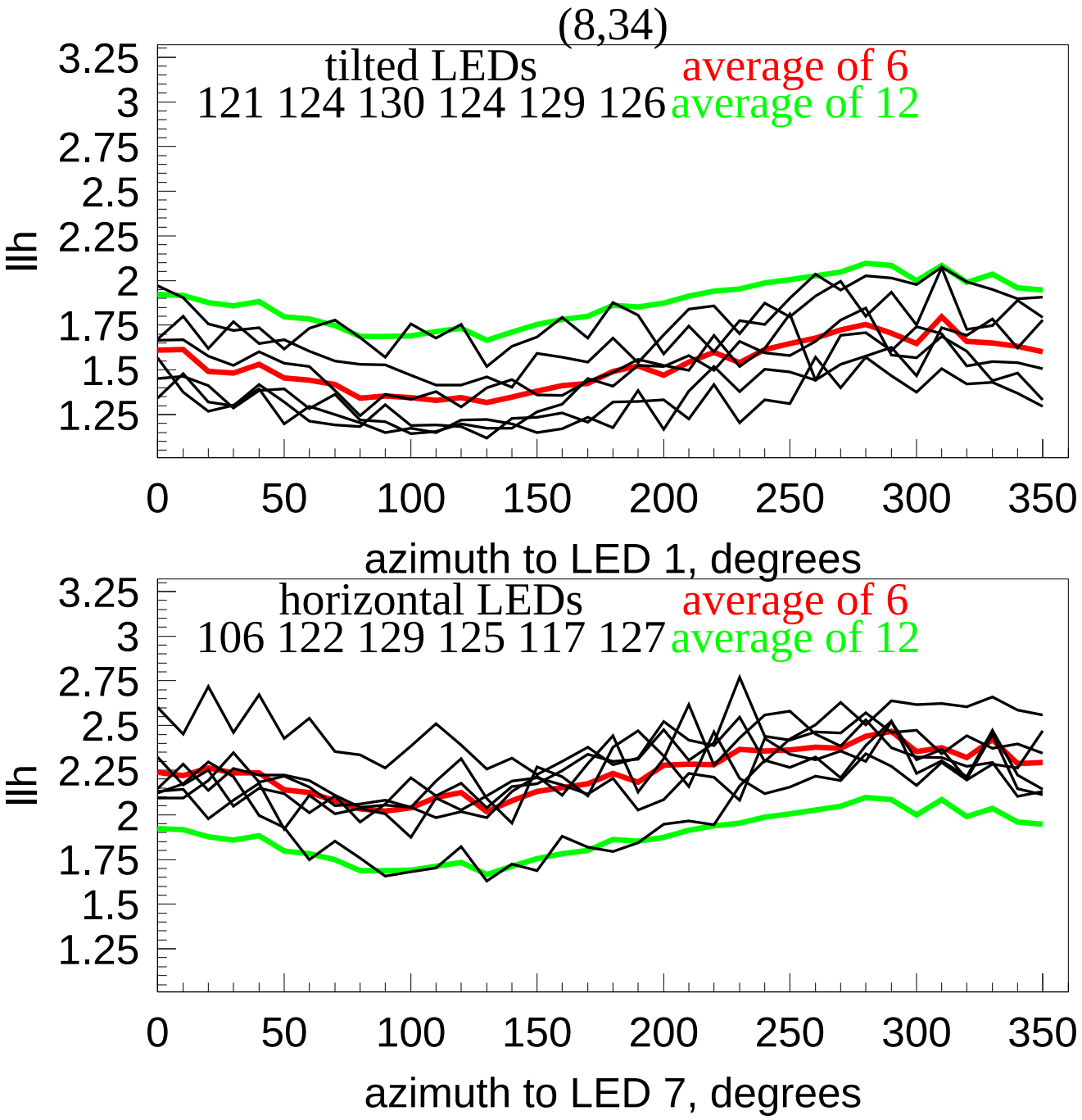

(7,33) 156.68 ± 0.56
2.2
2
1.8
1.6
1.4
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

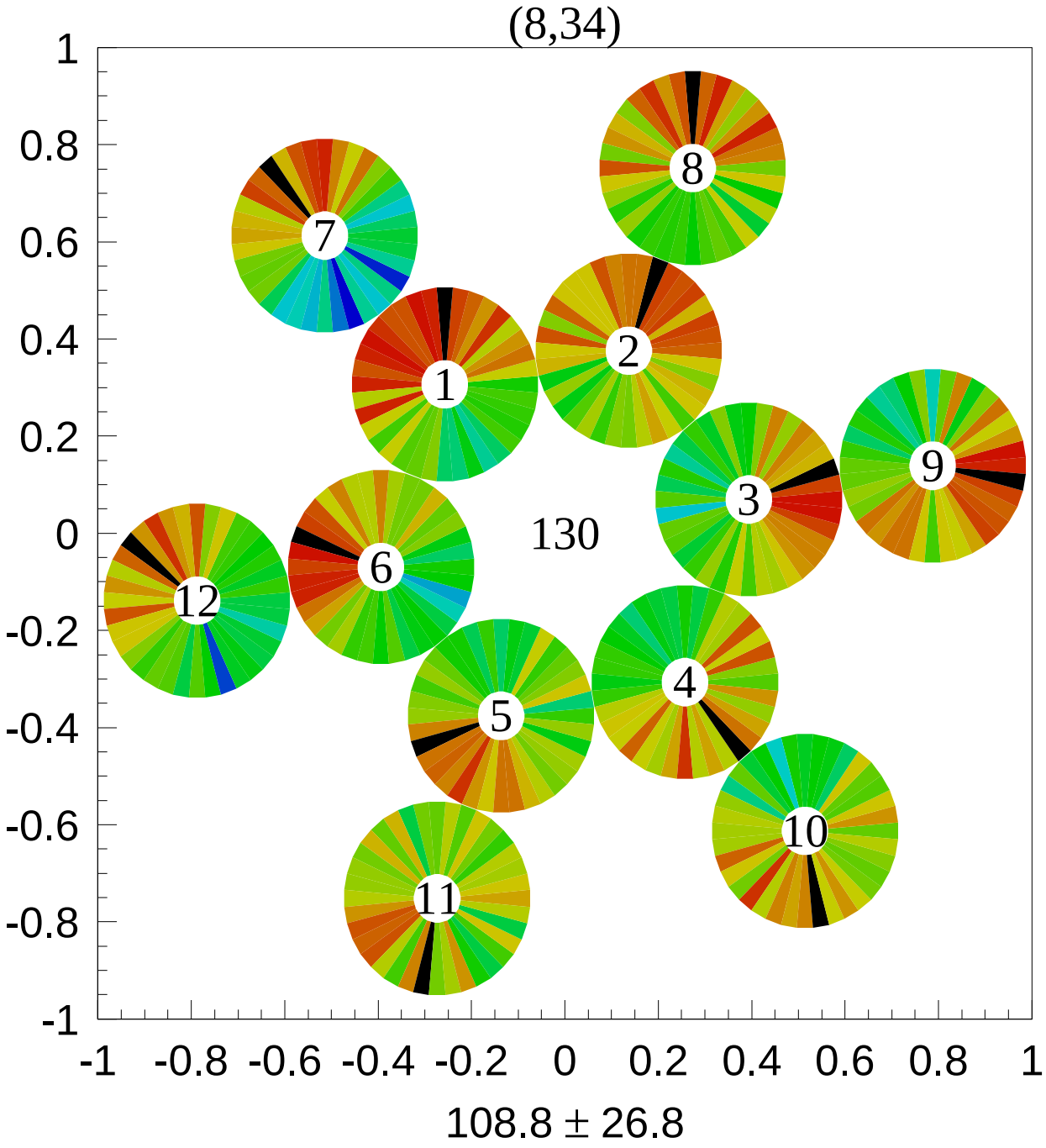

(8,33)
tilted LEDs
123 125 128 125 126 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 132 131 128 121 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

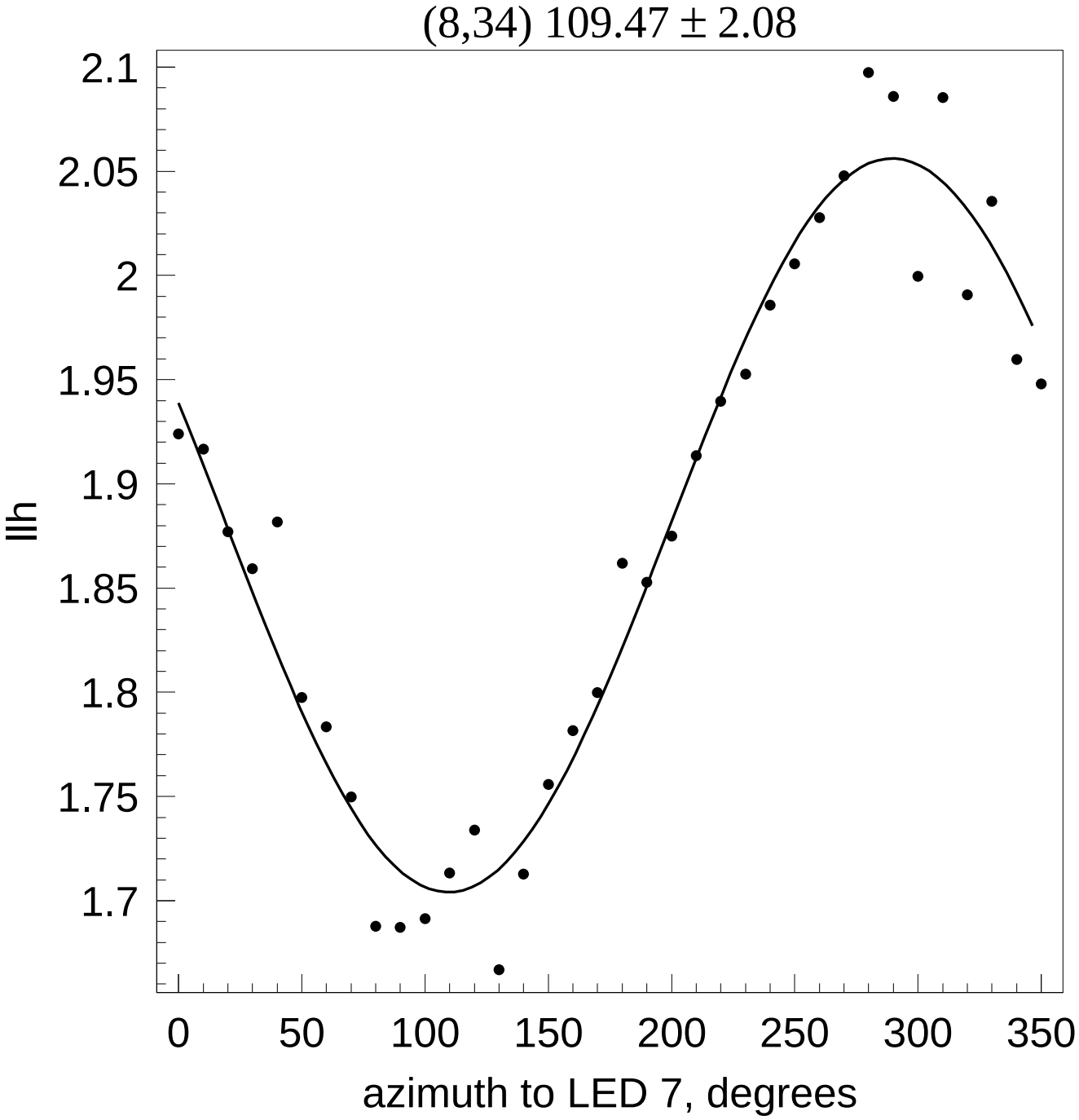

(8,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
306.5 ± 18.2

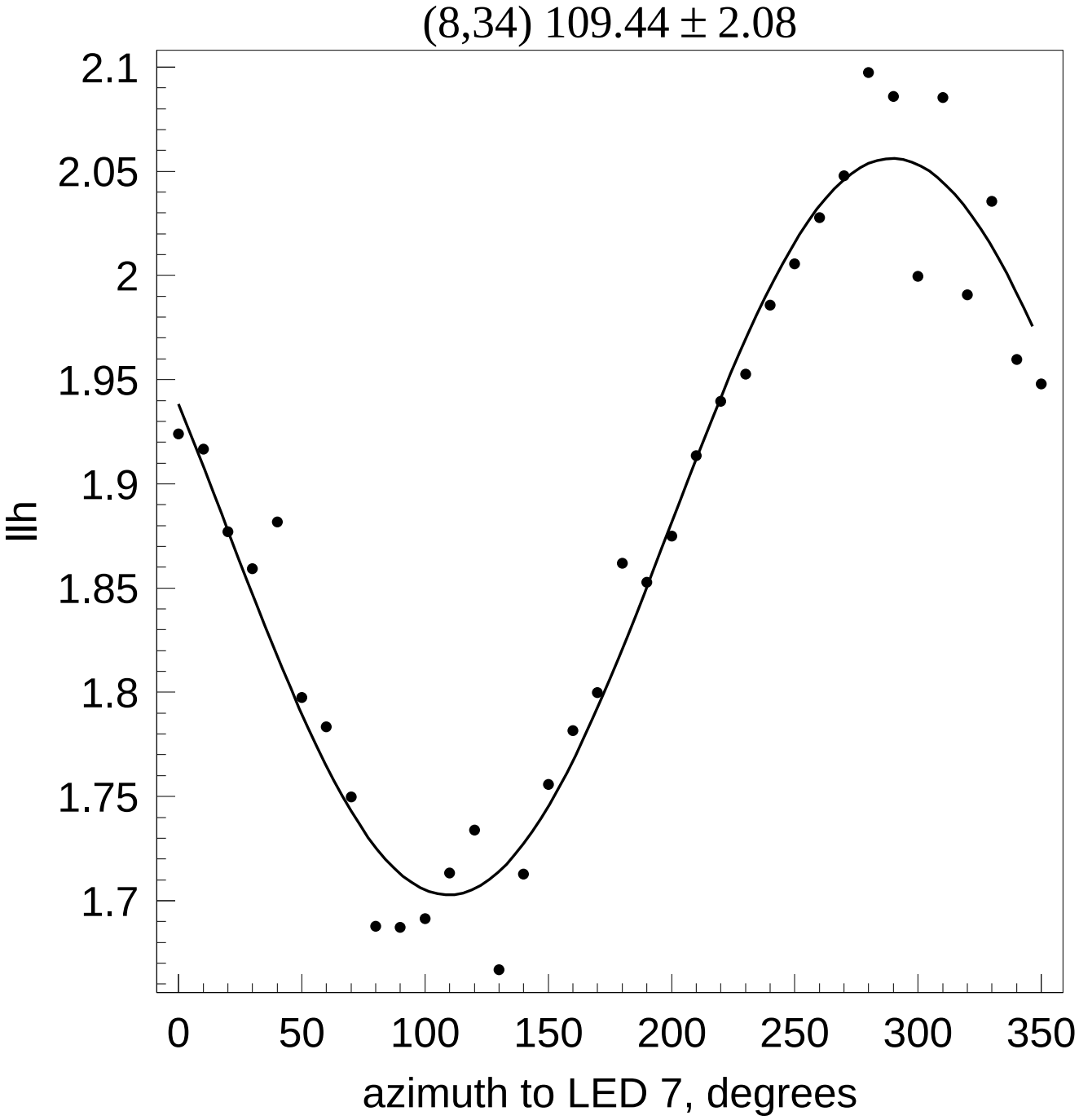

(8,33) 302.45 ± 0.64
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

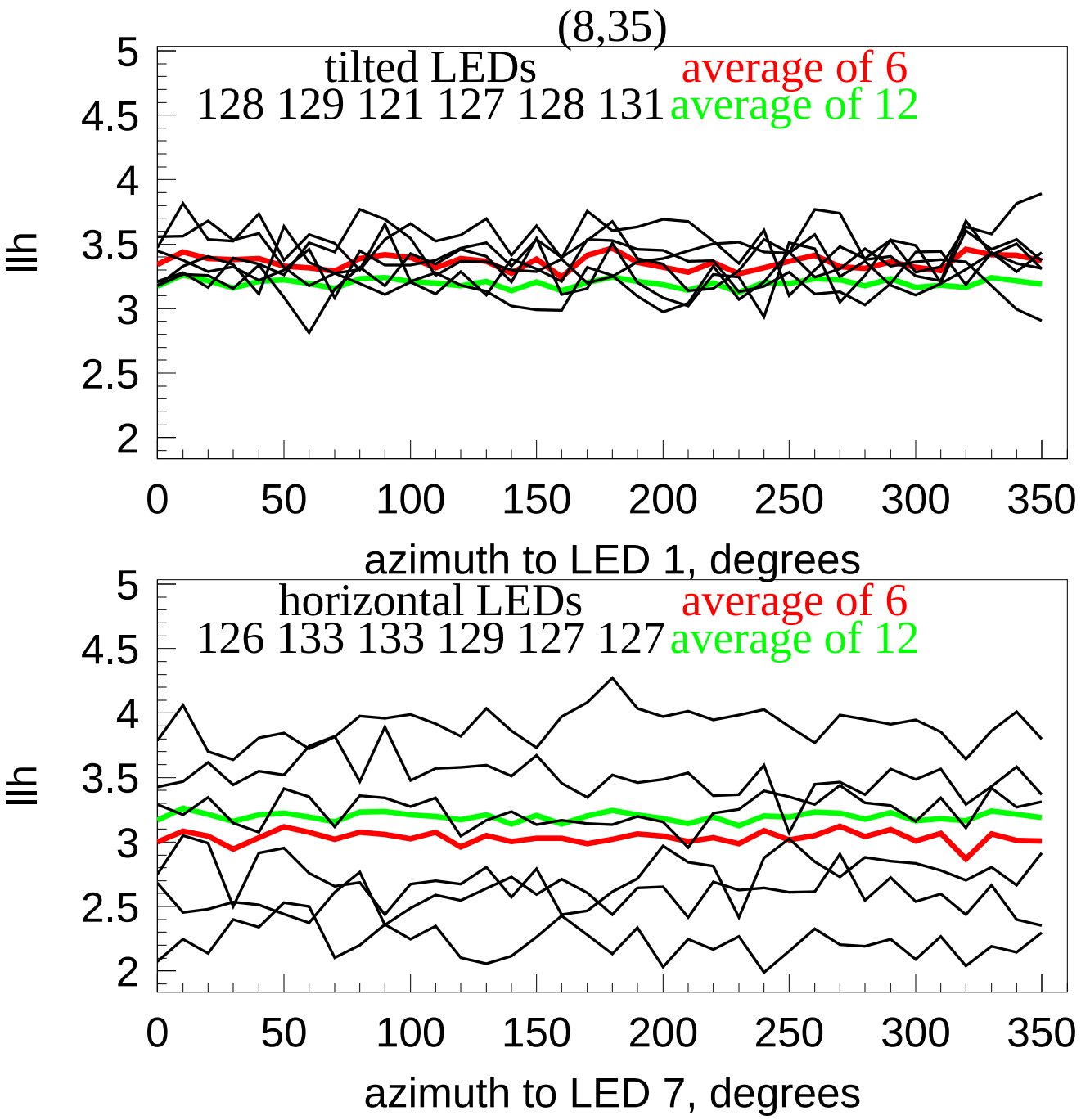

(8,33) 302.81 ± 0.66
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

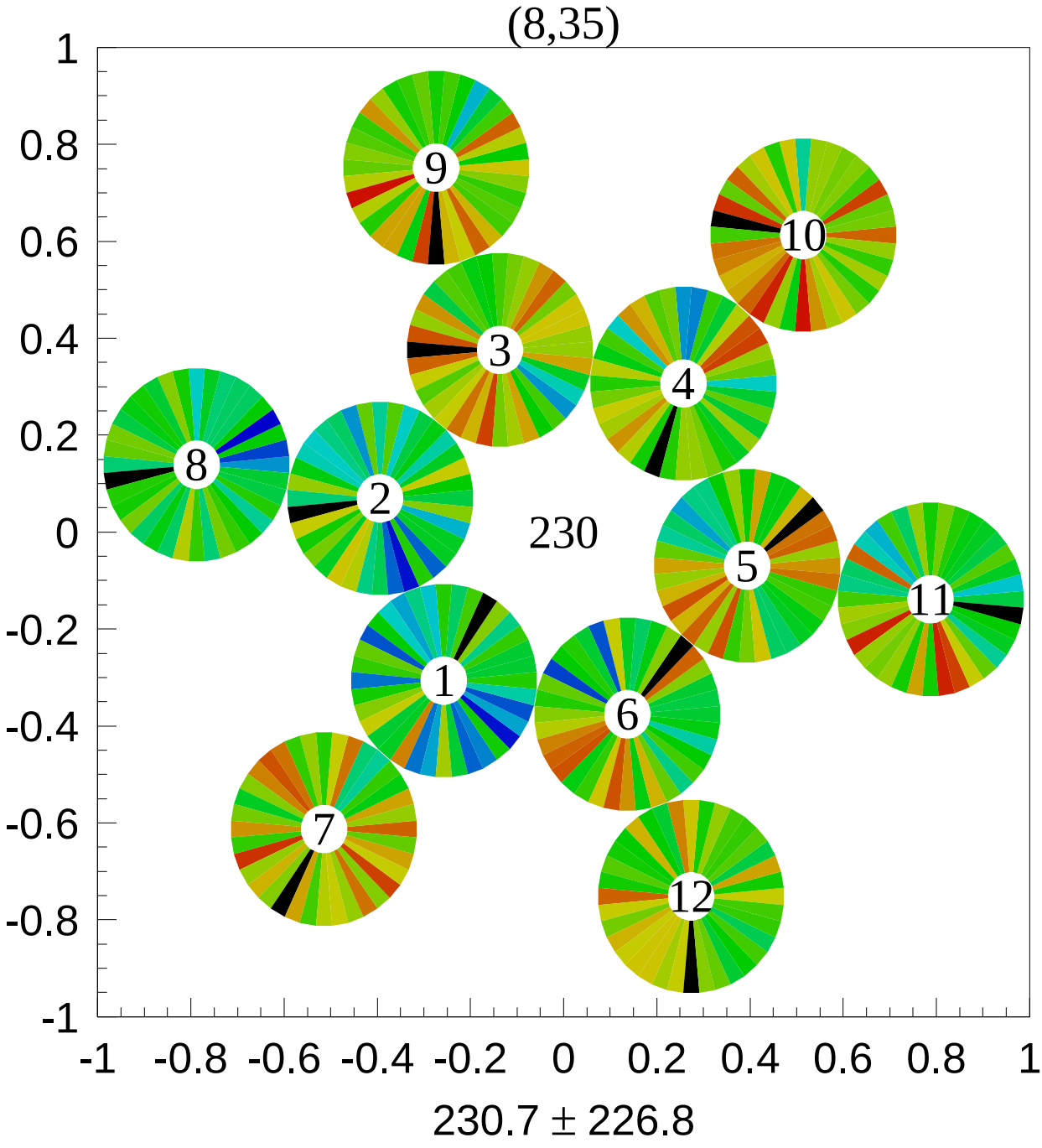

(8,34)
tilted LEDs
121 124 130 124 129 126
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
106 122 129 125 117 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

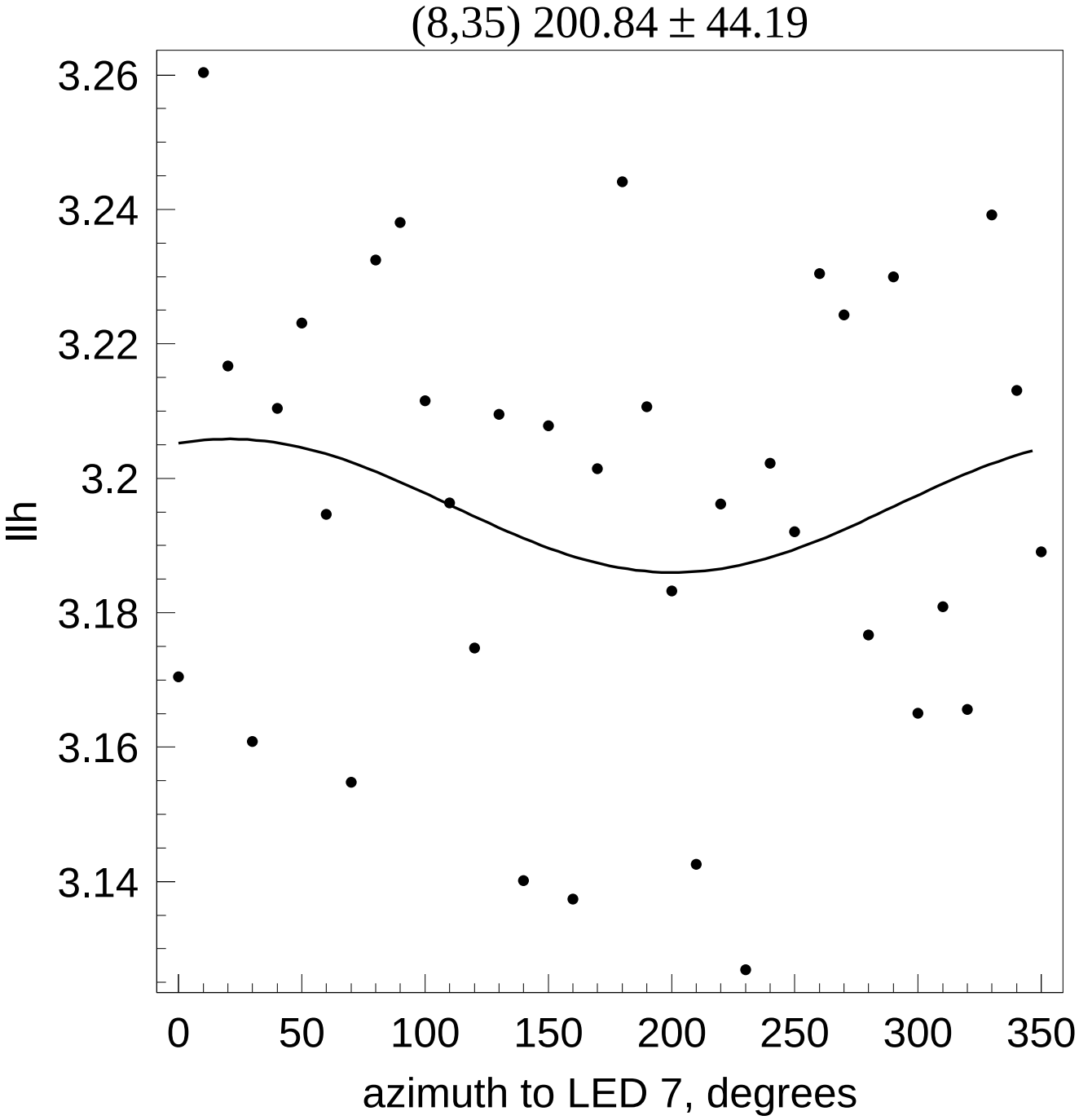

(8,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
108.8 ± 26.8
130
1
2
3
4
5
6
7
8
9
10
11
12

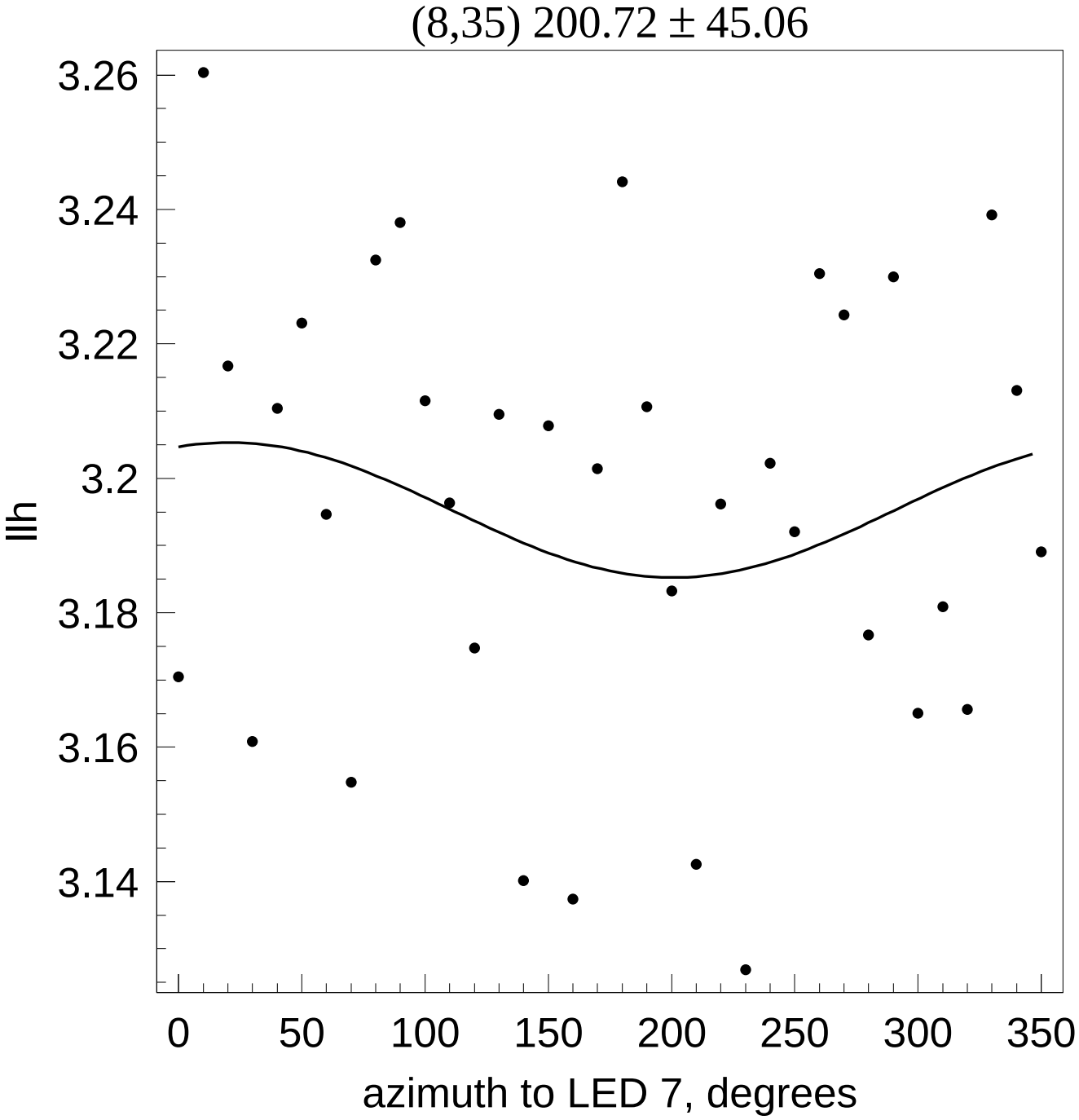

(8,34) 109.47 ± 2.08
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

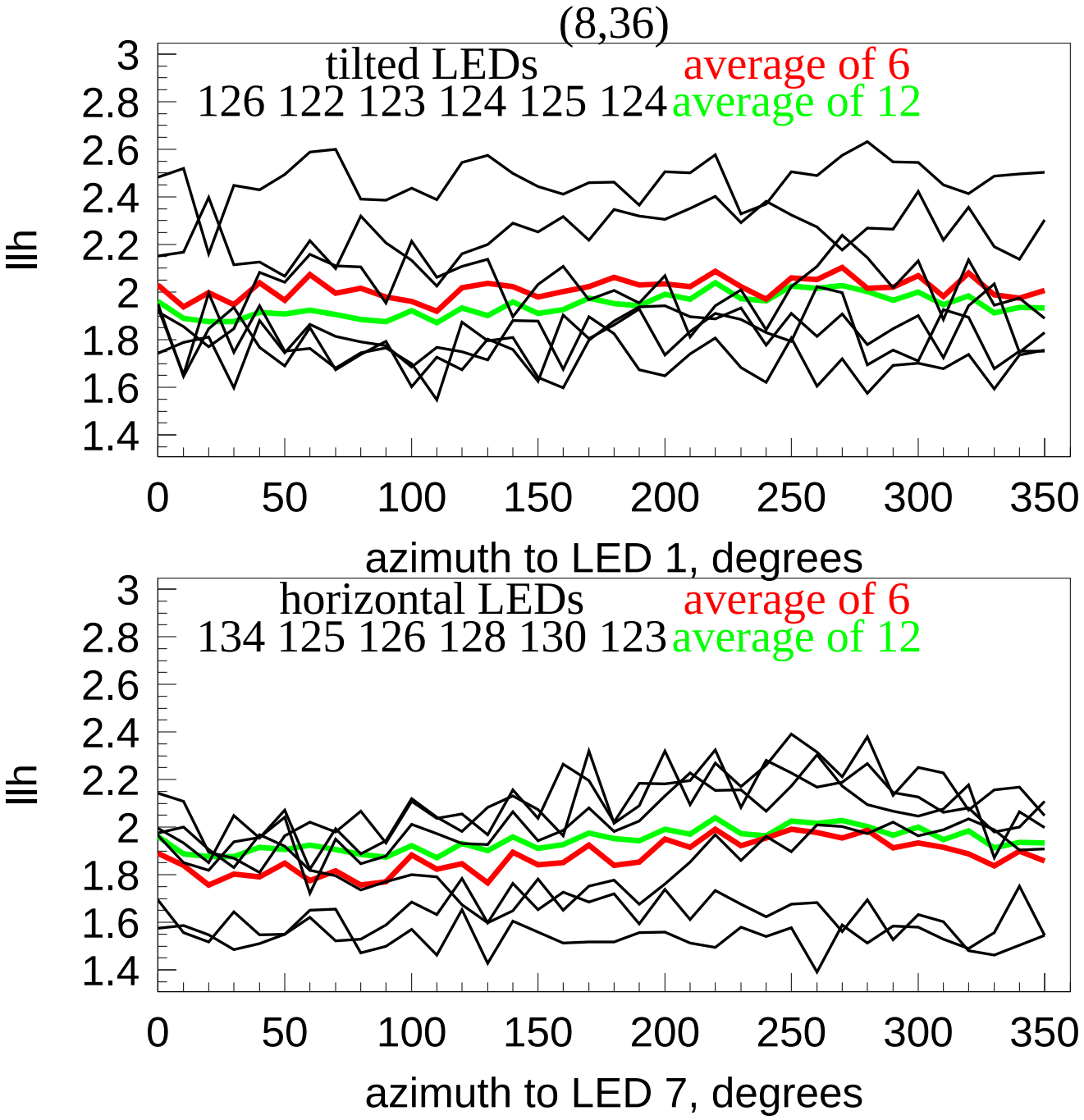

(8,34) 109.44 ± 2.08
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

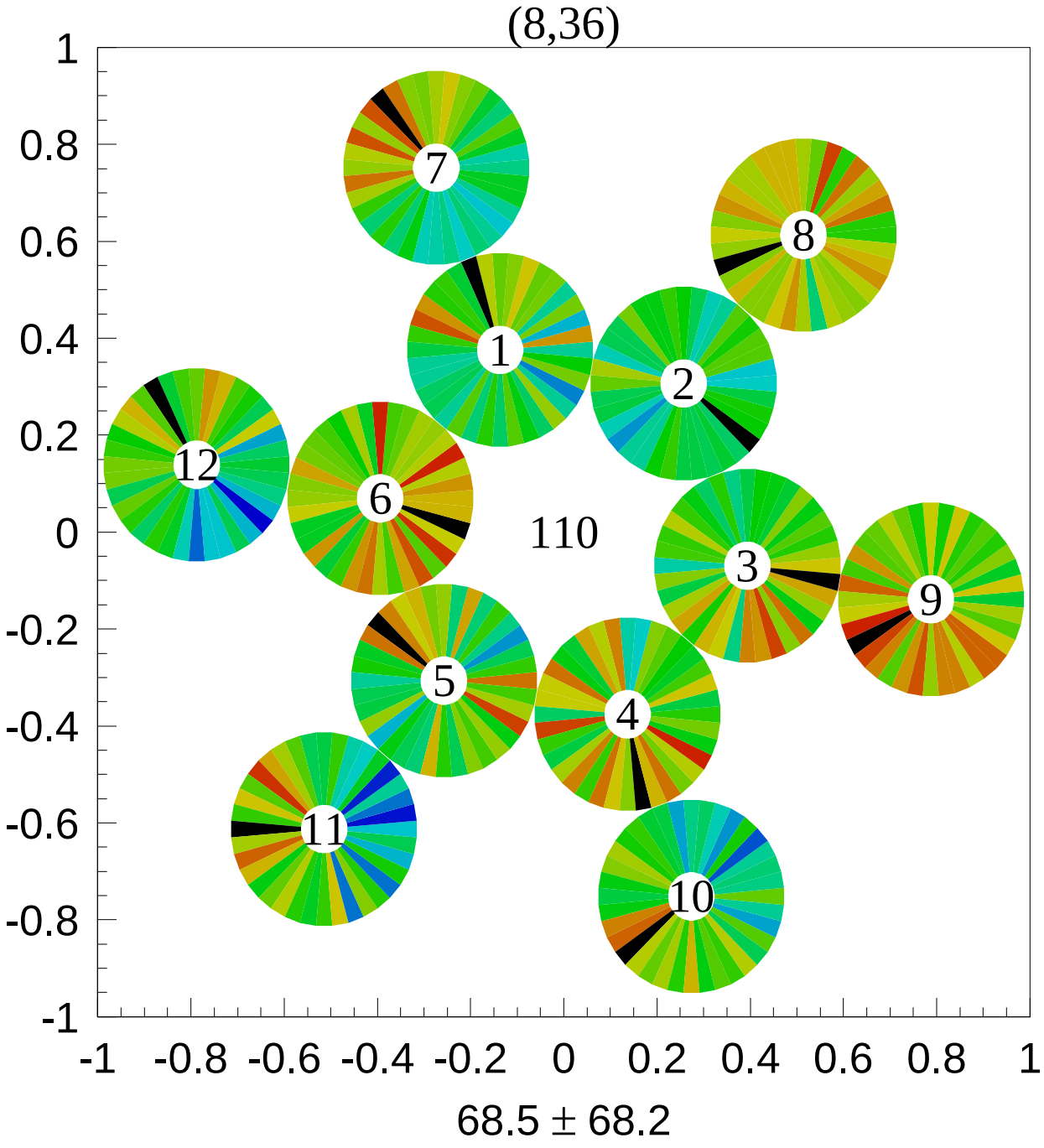

(8,35)
tilted LEDs
128 129 121 127 128 131
average of 6
average of 12
IIh
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 133 133 129 127 127
average of 6
average of 12
IIh
azimuth to LED 7, degrees

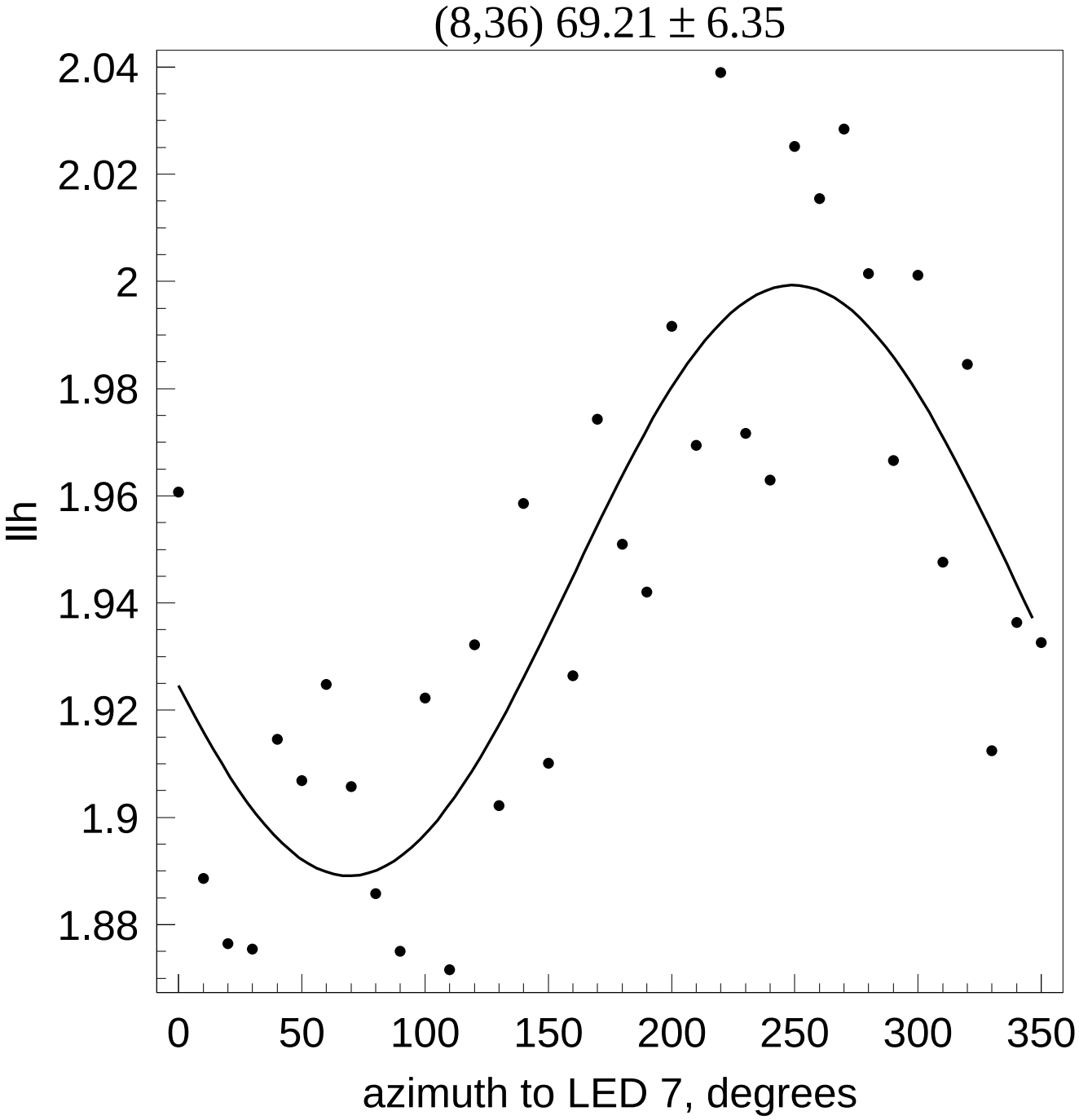

(8,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
230
9
10
3
4
8
2
5
11
1
6
7
12
230.7 ± 226.8

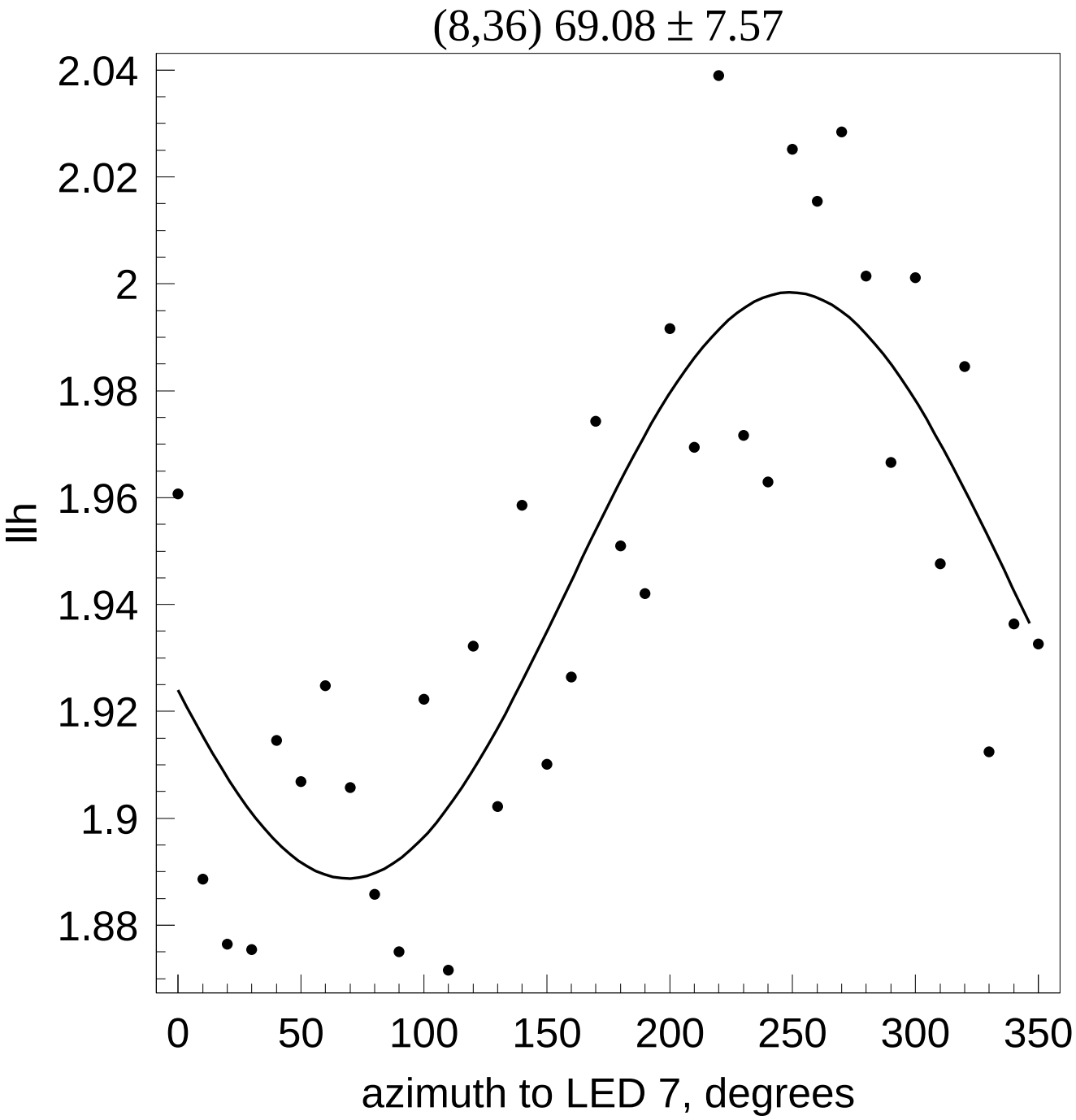

(8,35) 200.84 ± 44.19
3.26
3.24
3.22
3.2
3.18
3.16
3.14
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

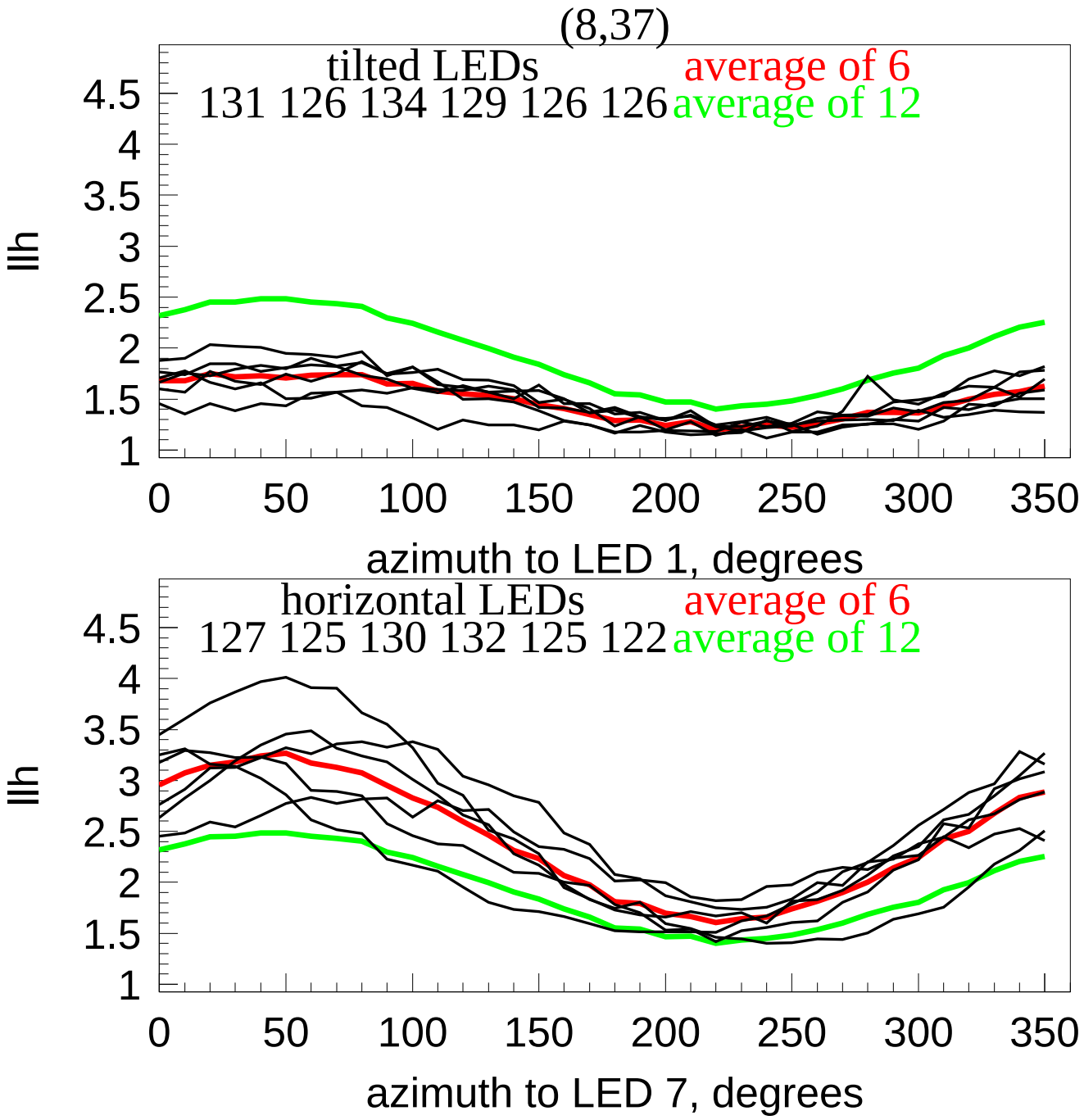

(8,35) 200.72 ± 45.06
3.26
3.24
3.22
3.2
3.18
3.16
3.14
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

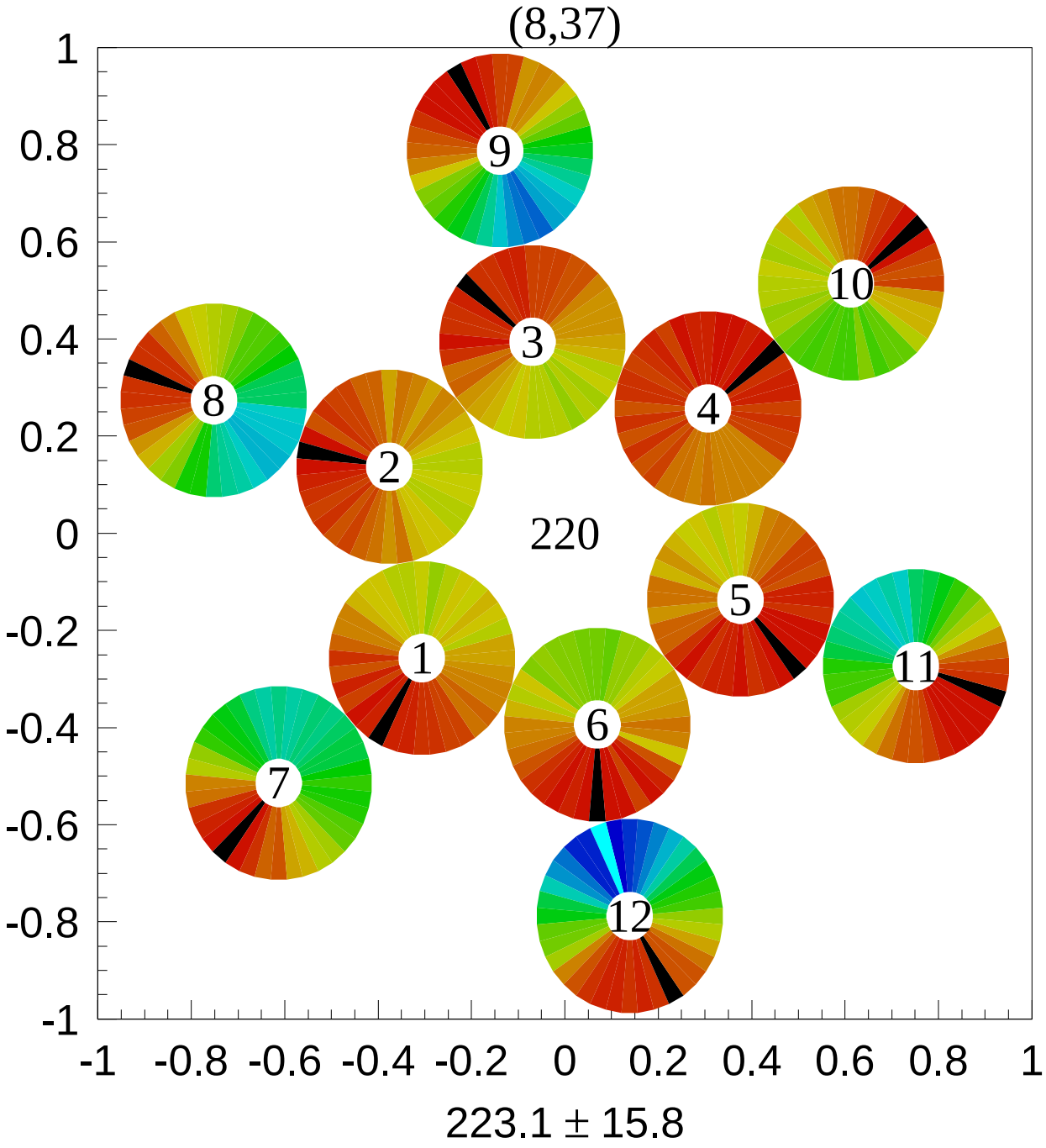

(8,36)
tilted LEDs
126 122 123 124 125 124
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
134 125 126 128 130 123
average of 6
average of 12
IIh
azimuth to LED 7, degrees

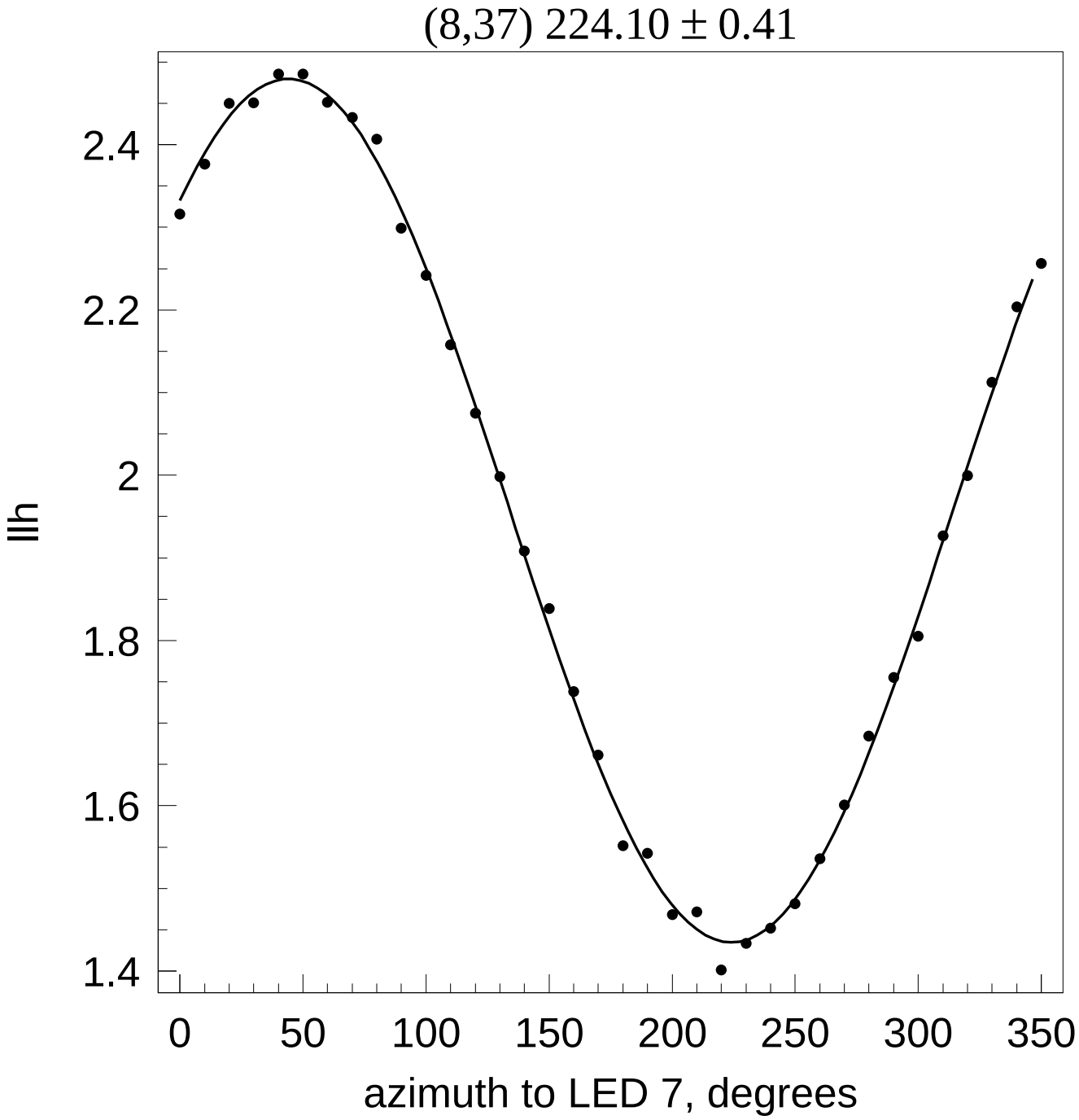

(8,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
68.5 ± 68.2

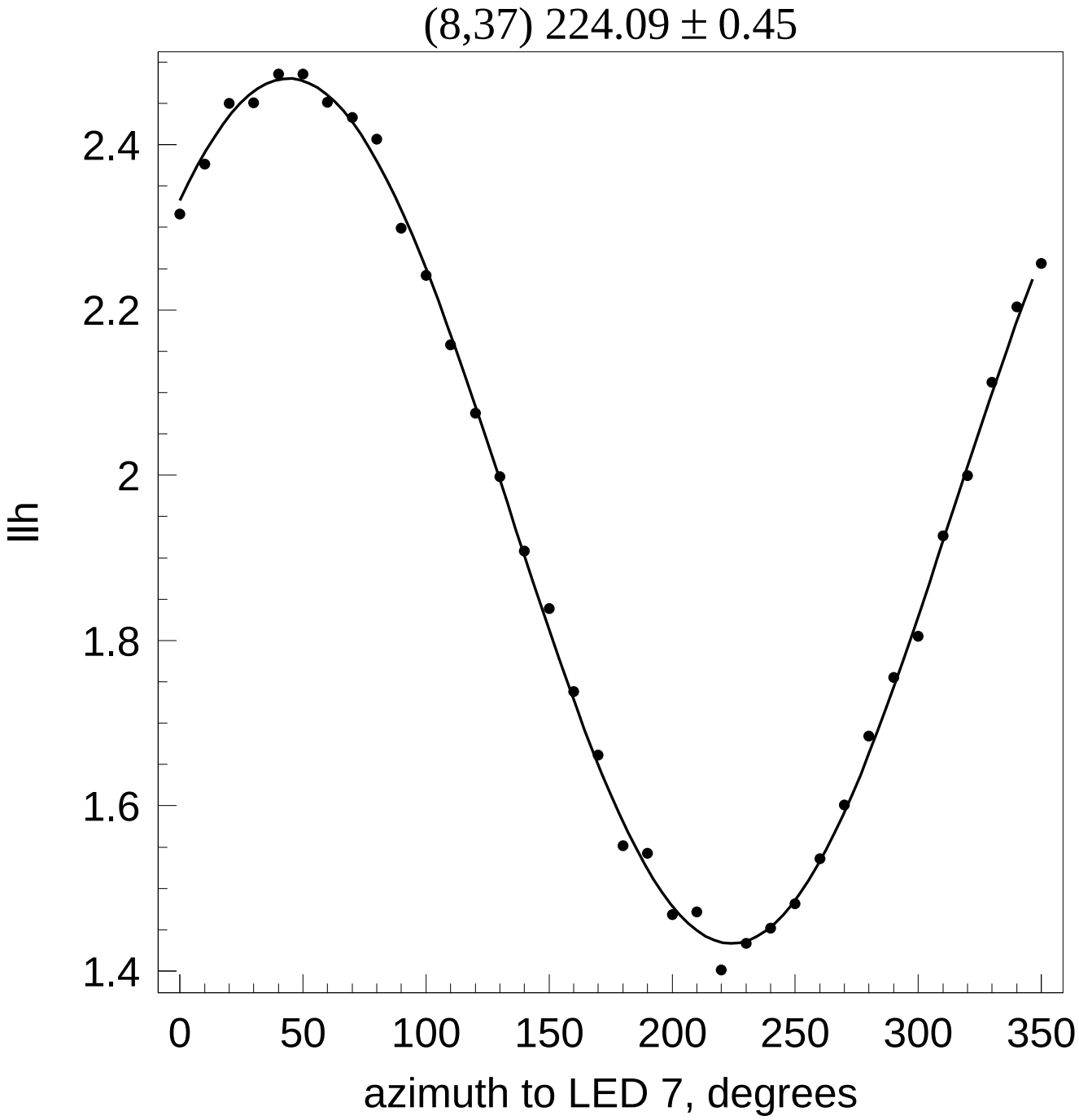

(8,36) 69.21 ± 6.35
2.04
2.02
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

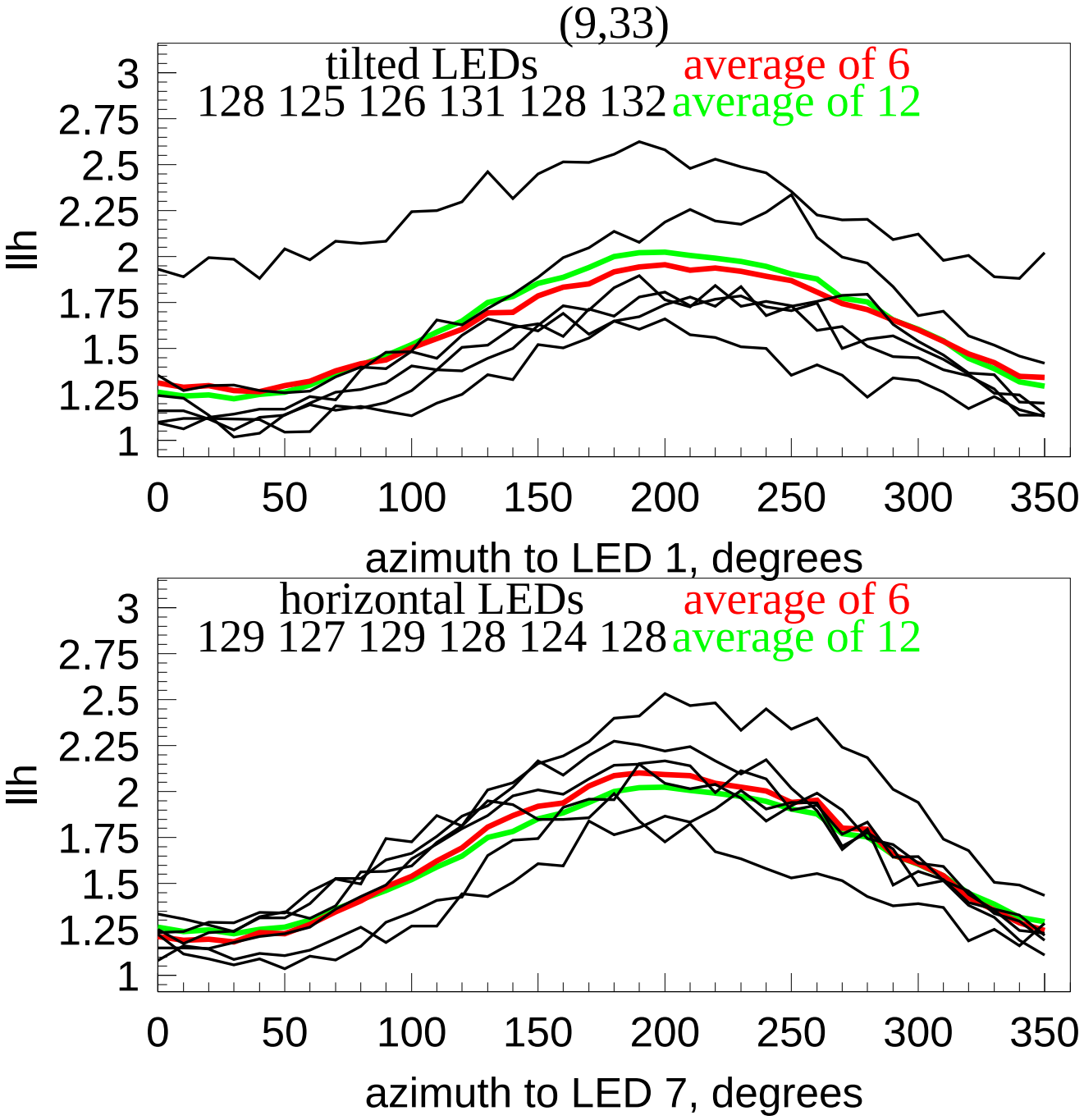

(8,36) 69.08 ± 7.57
2.04
2.02
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

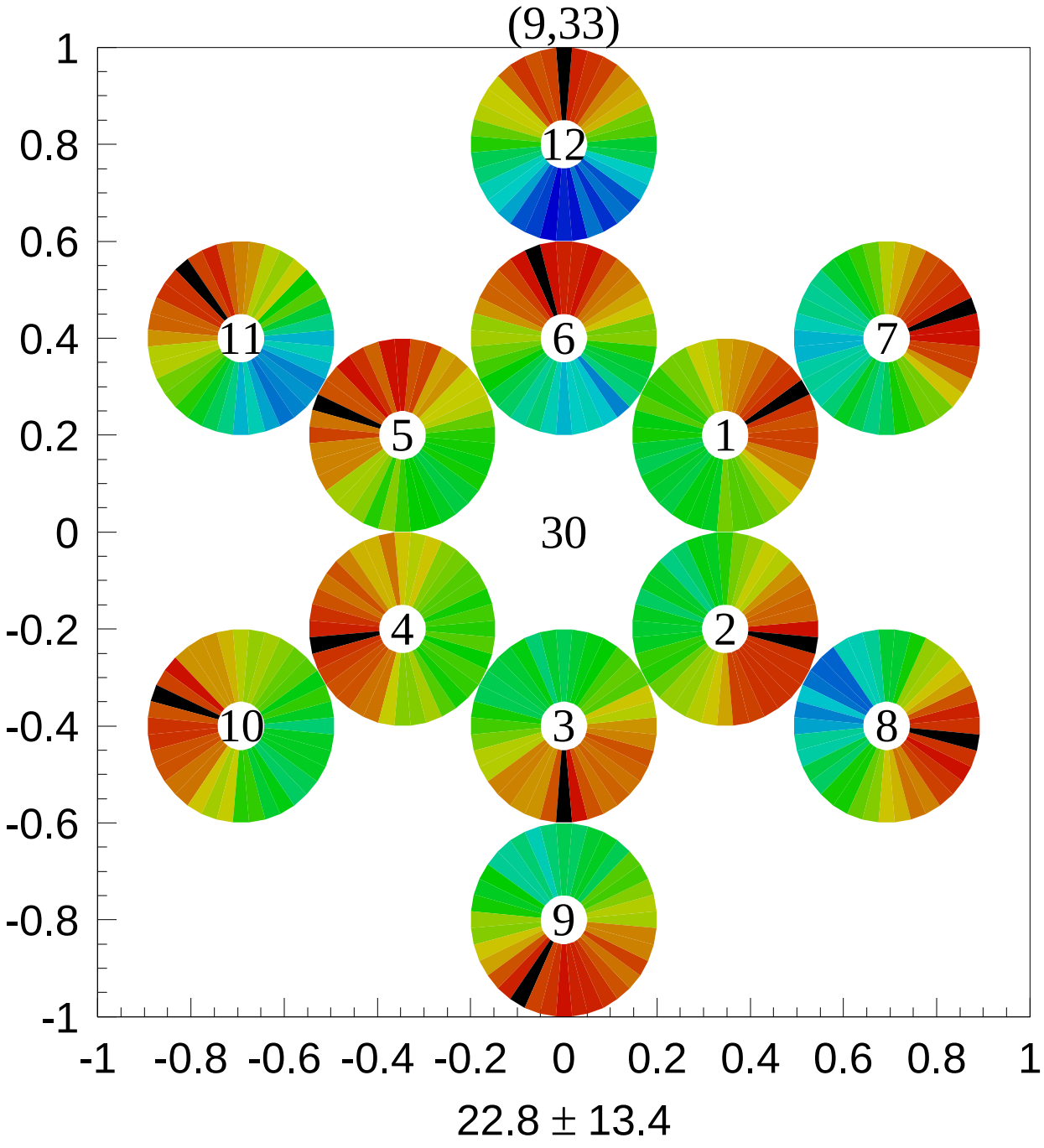

(8,37)
tilted LEDs
131 126 134 129 126 126
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 125 130 132 125 122
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

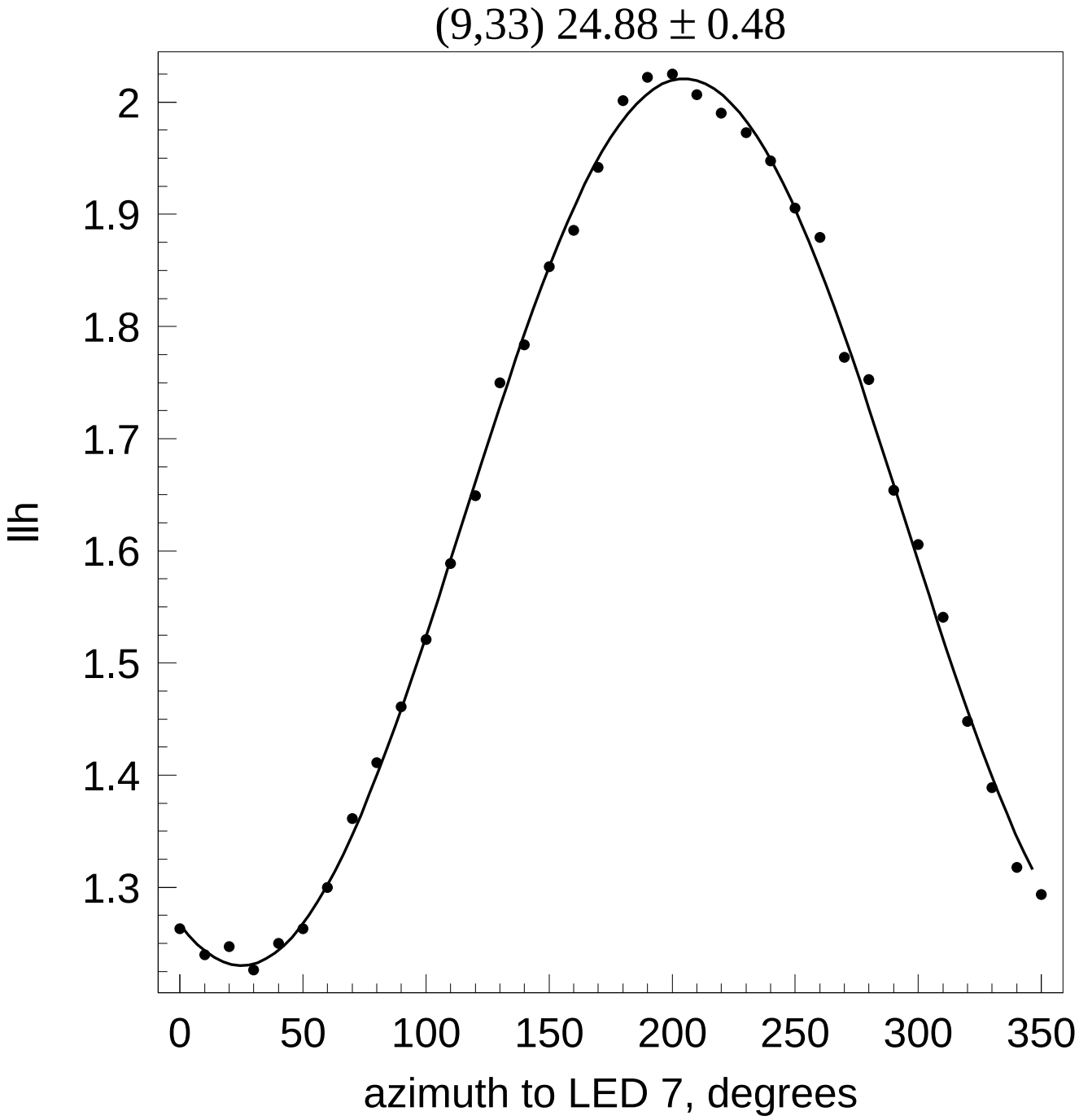

(8,37)
9
10
3
8
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
223.1 ± 15.8

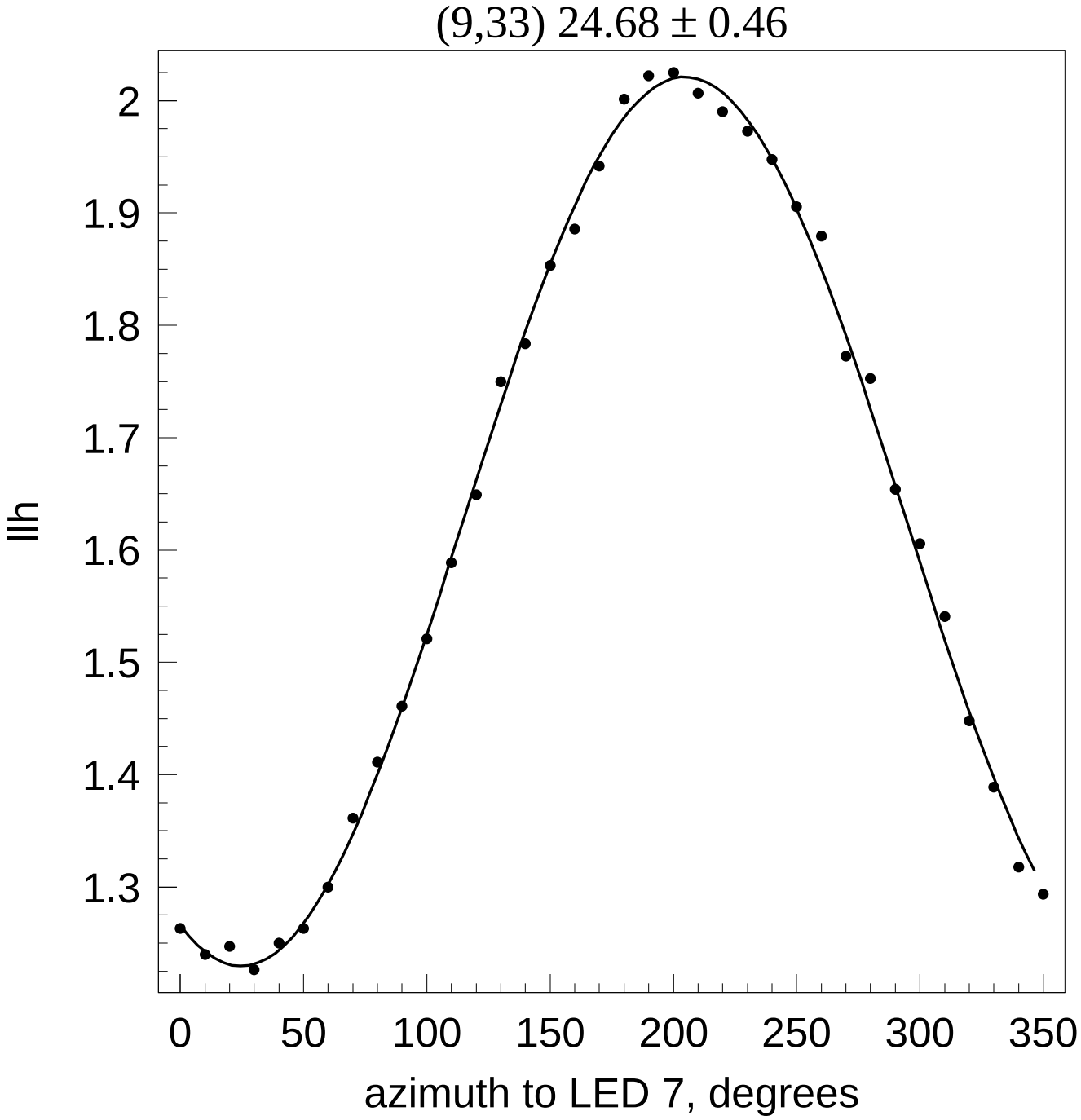

(8,37) 224.10 ± 0.41
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

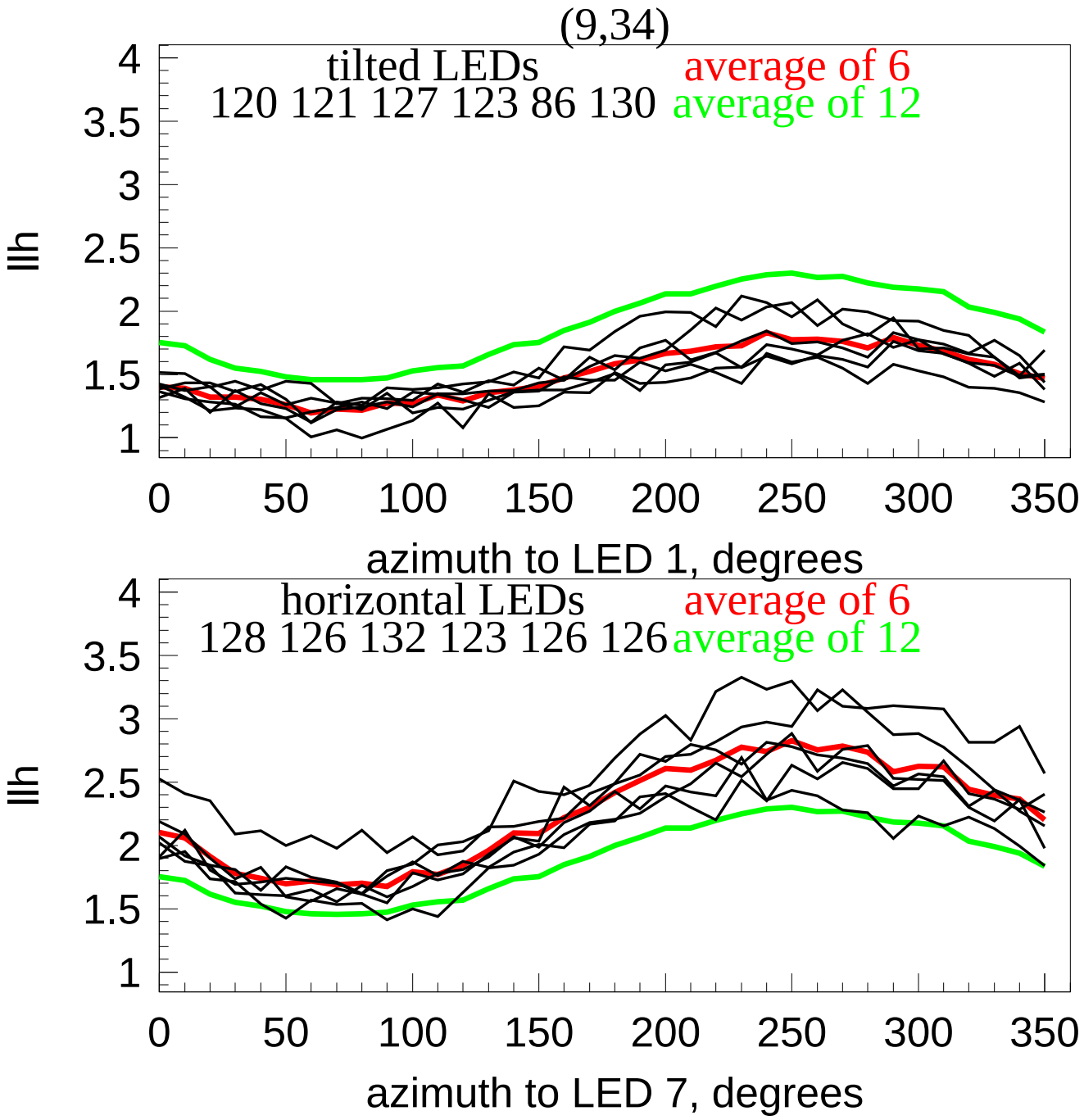

(8,37) 224.09 ± 0.45
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

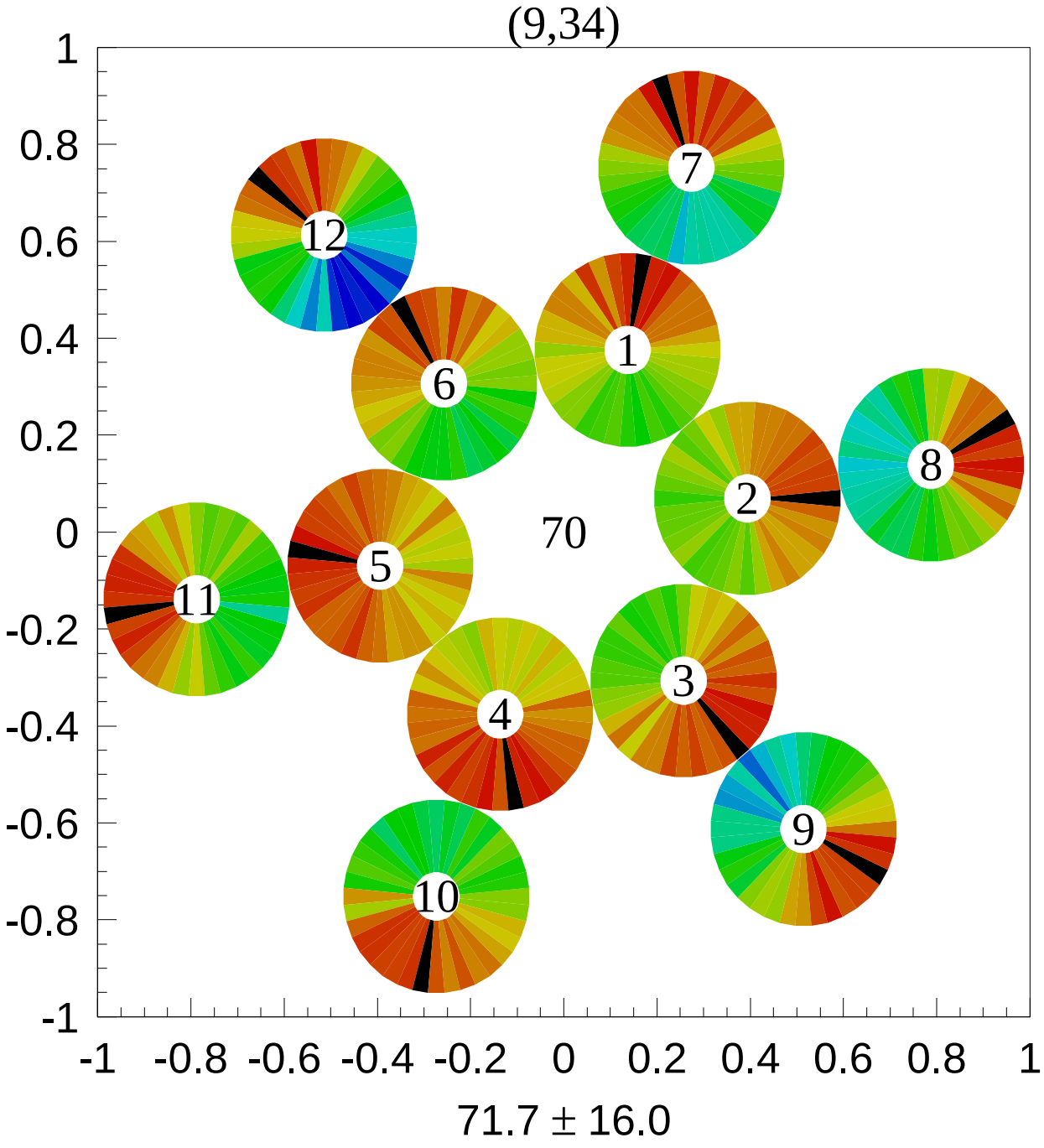

(9,33)
tilted LEDs
128 125 126 131 128 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 127 129 128 124 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

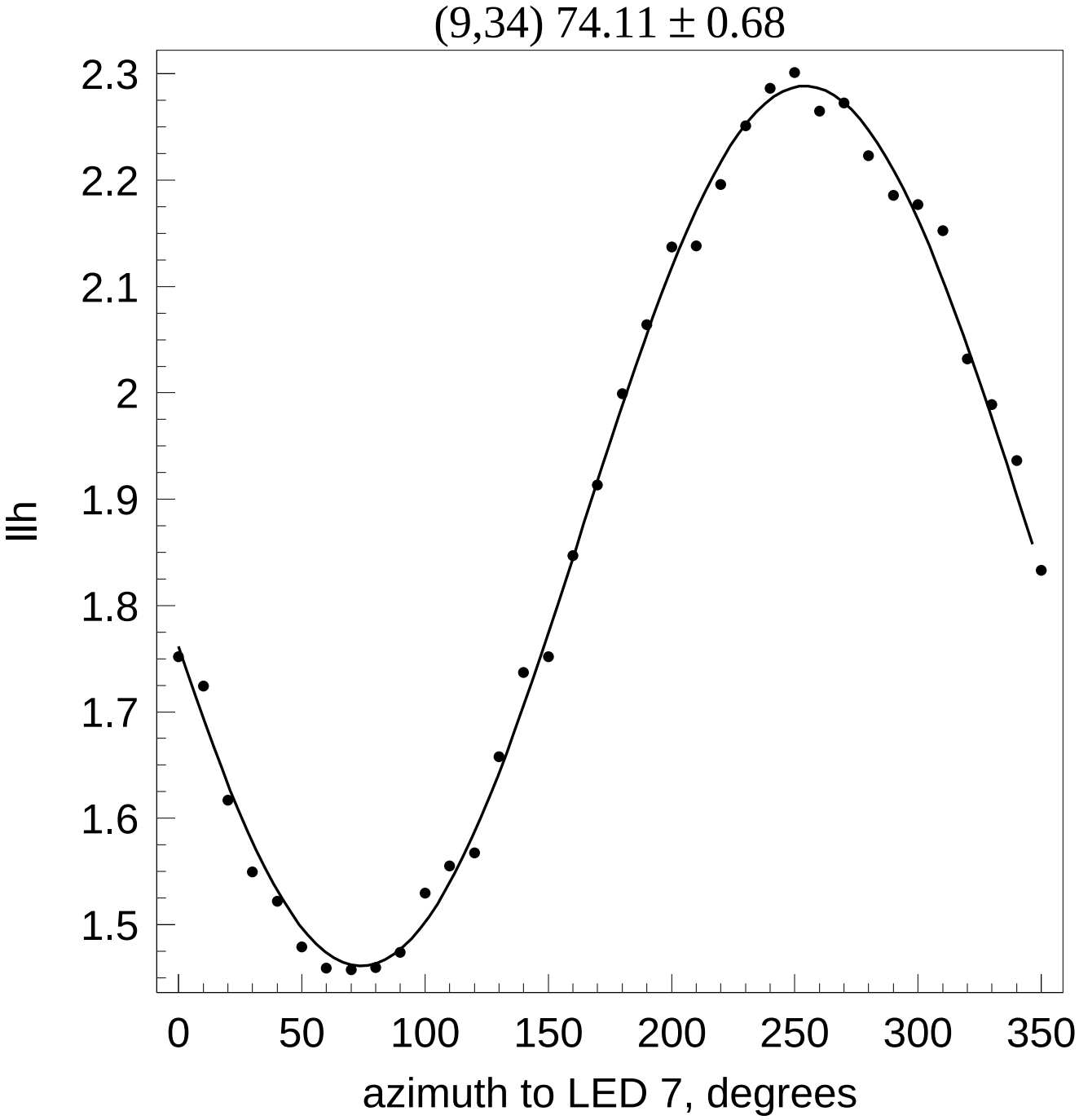

(9,33)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
22.8 ± 13.4

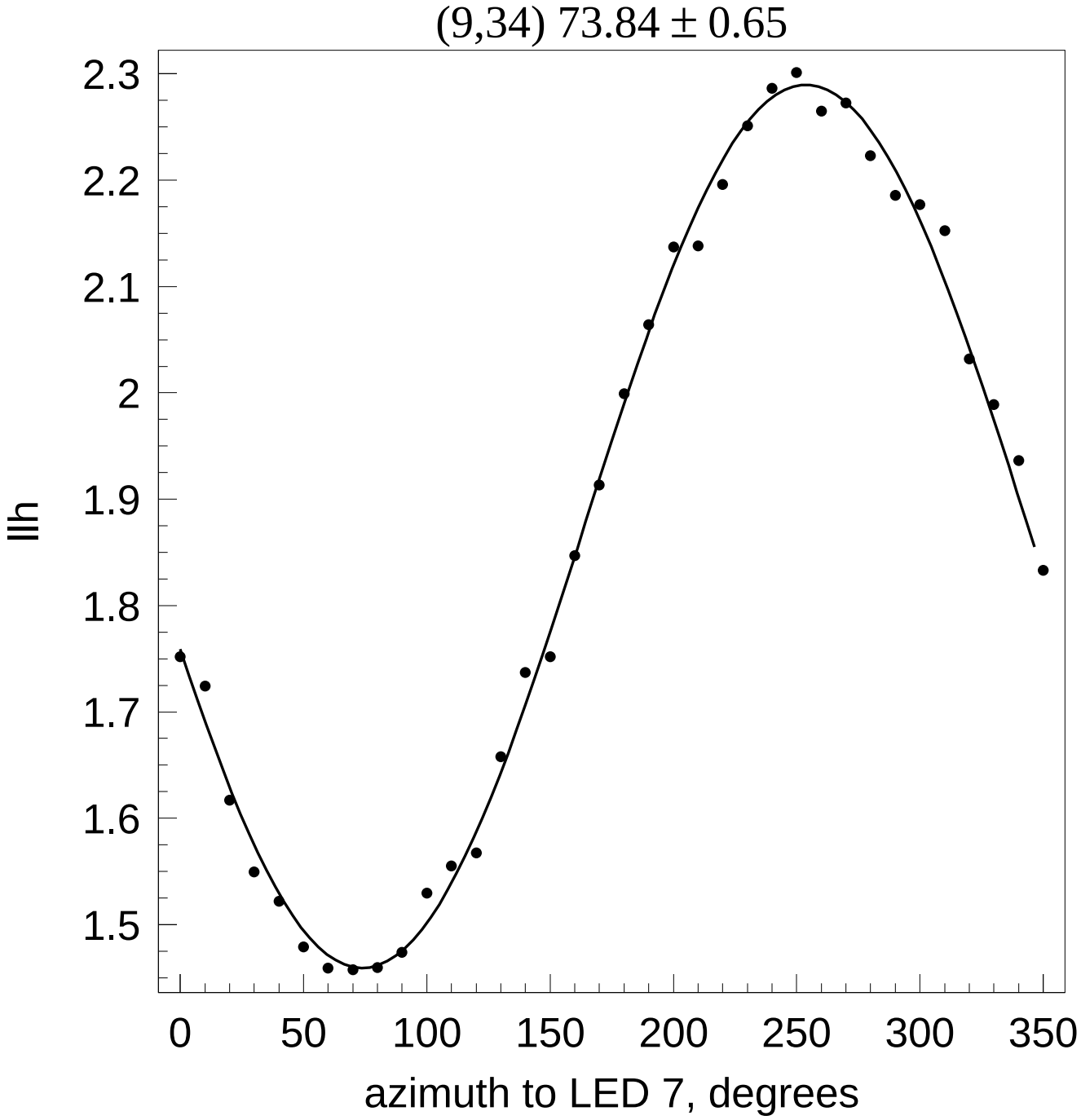

(9,33) 24.88 ± 0.48
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

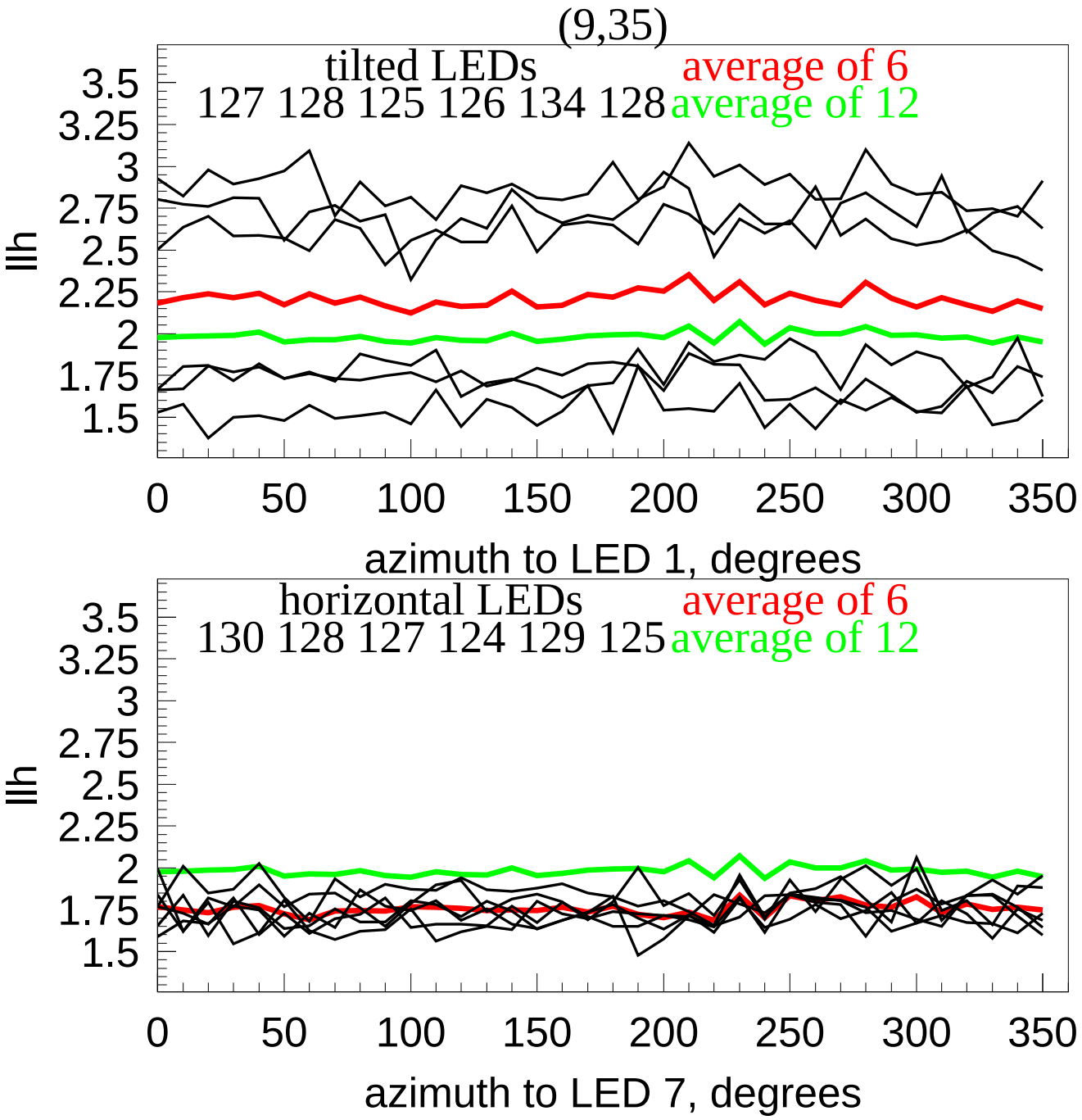

(9,33) 24.68 ± 0.46
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

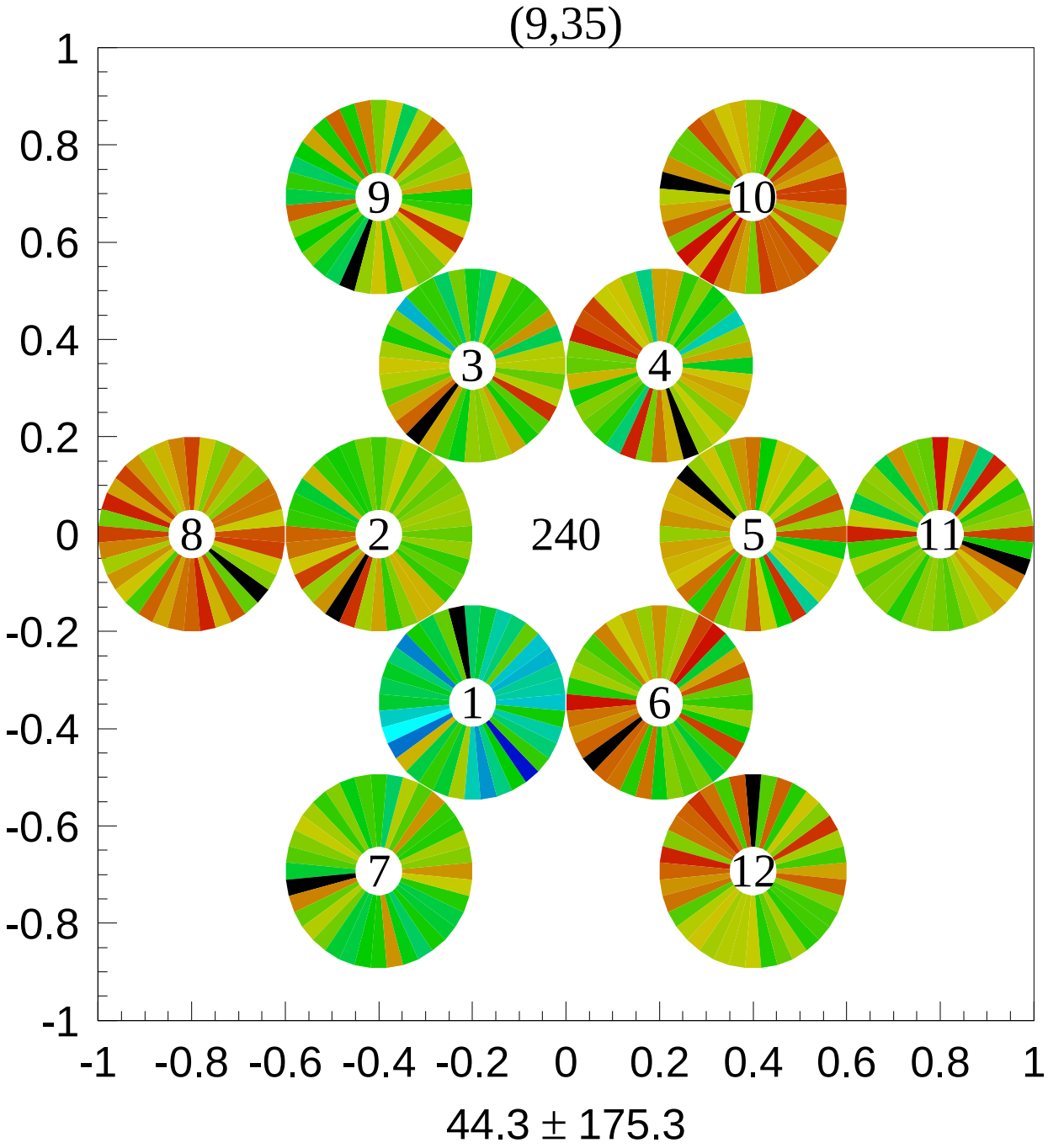

(9,34)
tilted LEDs
120 121 127 123 86 130
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
128 126 132 123 126 126
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

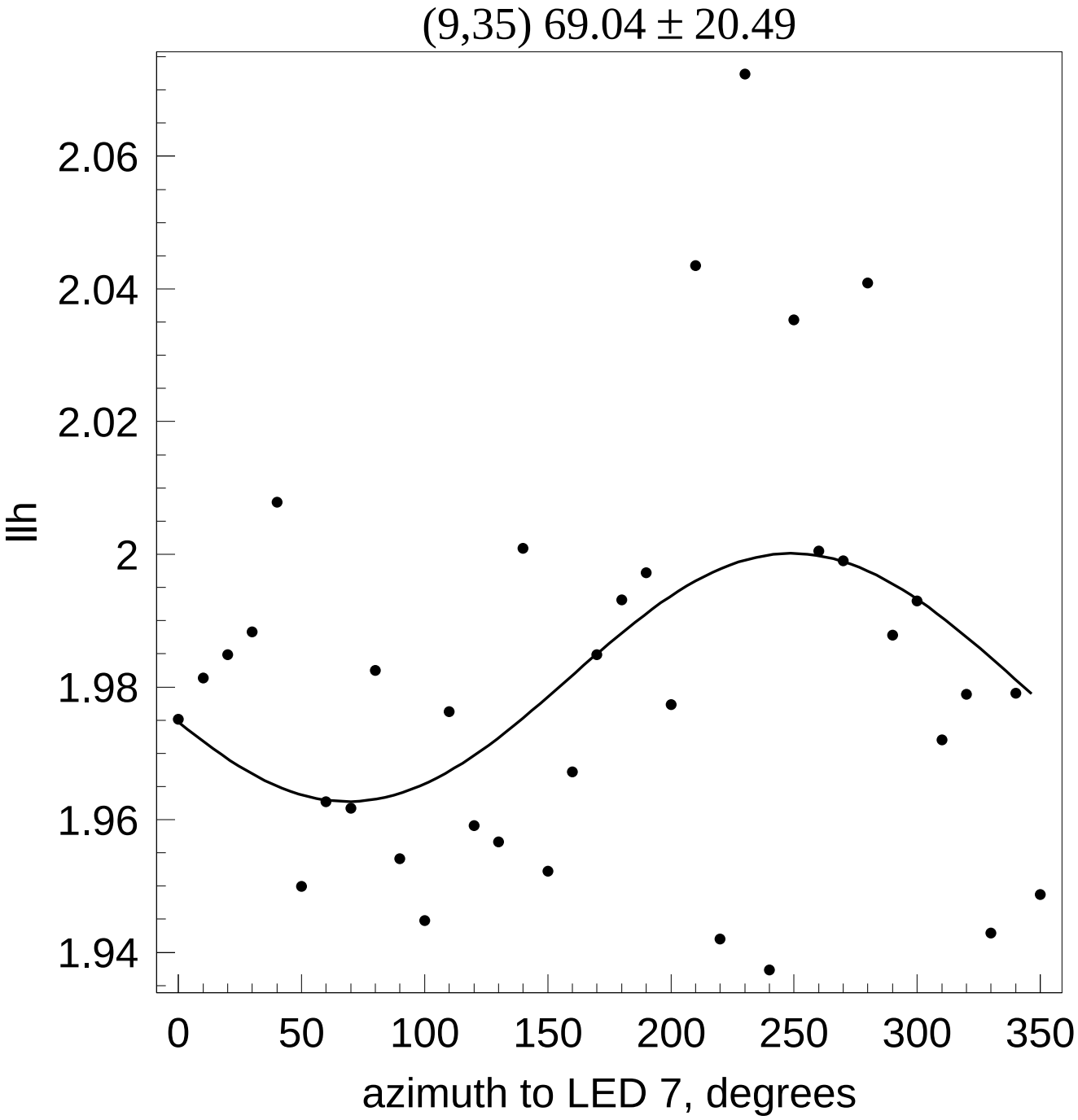

(9,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
5
70
11
4
3
9
10
71.7 ± 16.0

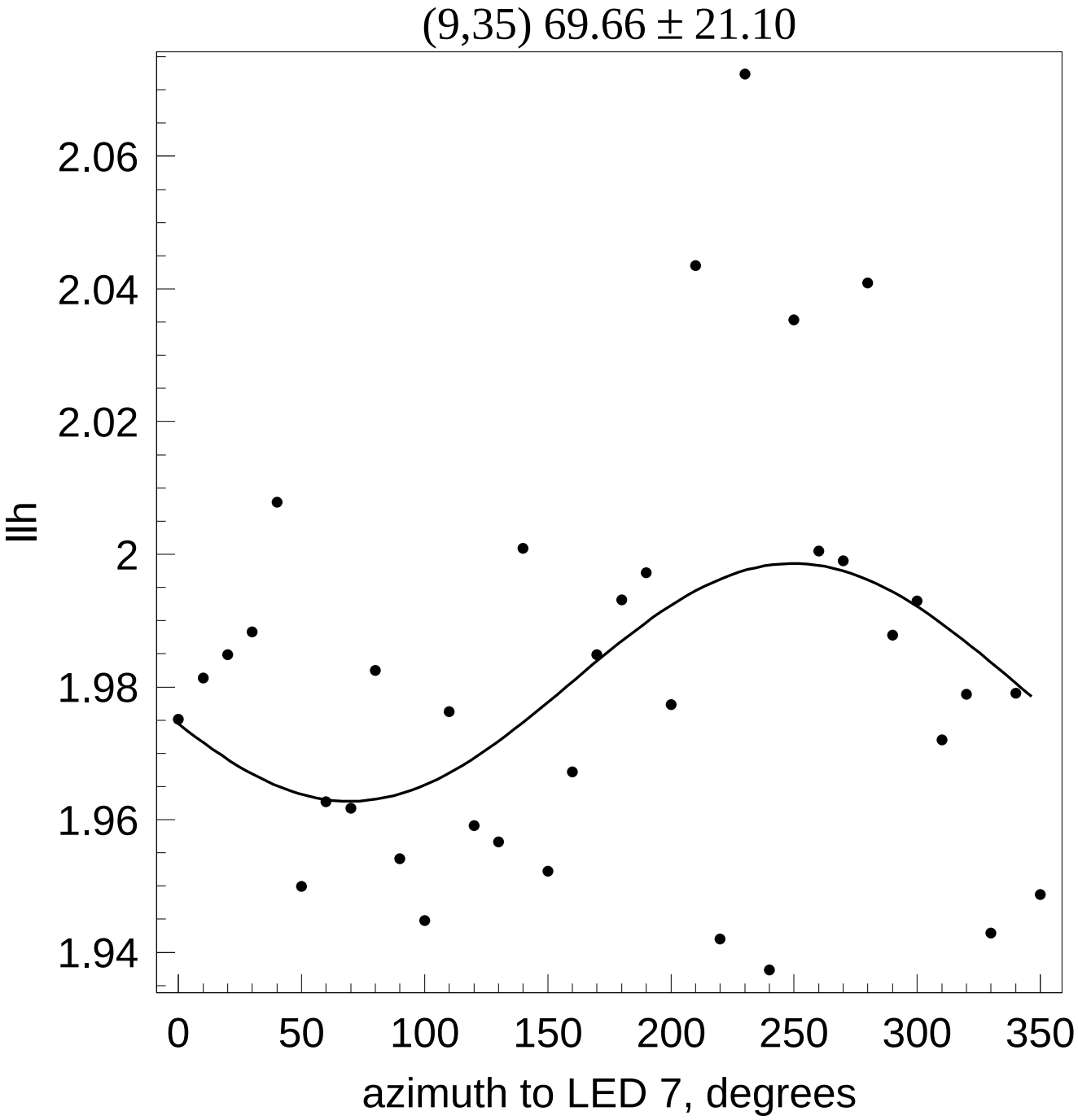

(9,34) 74.11 ± 0.68
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

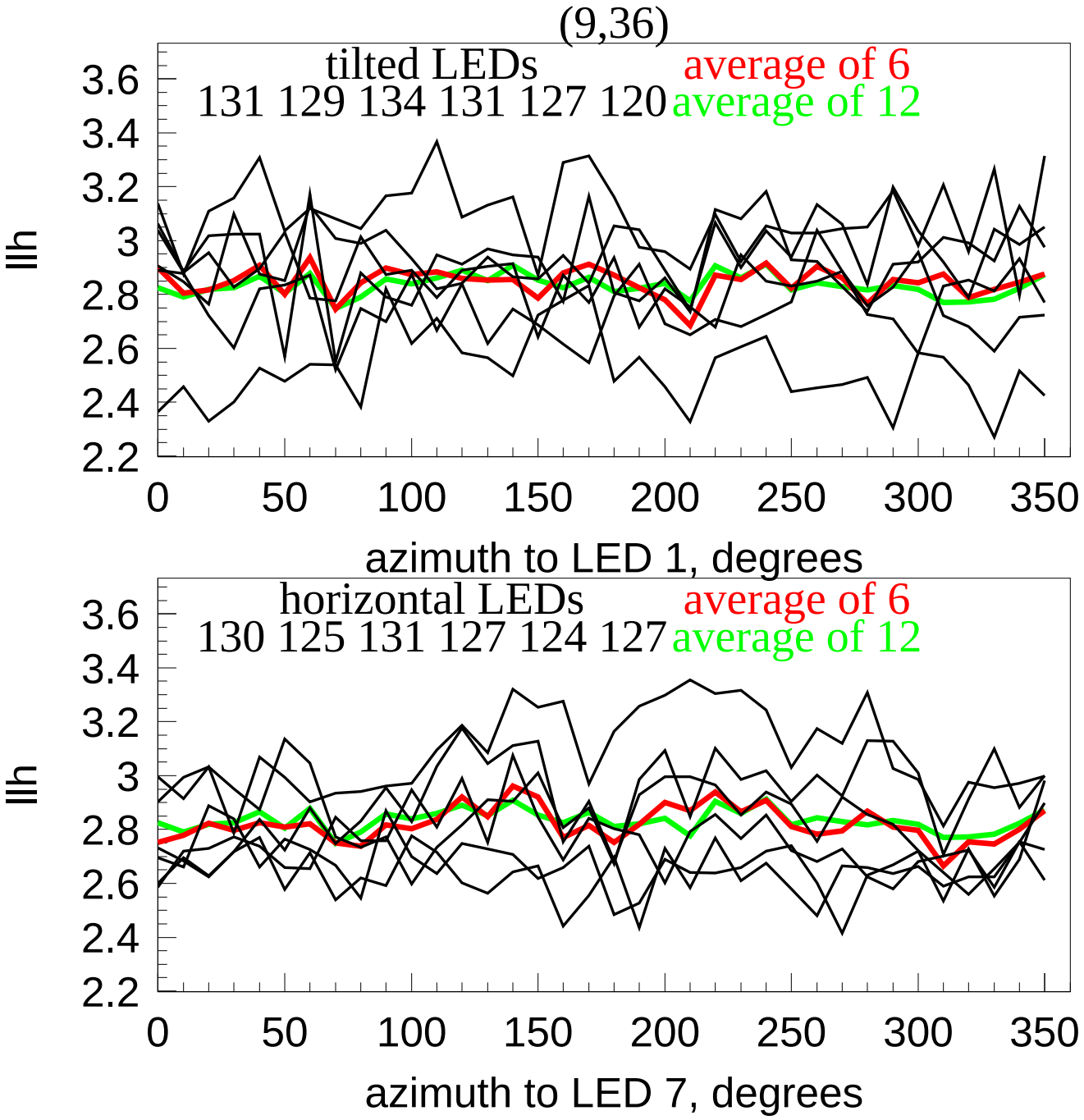

(9,34) 73.84 ± 0.65
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

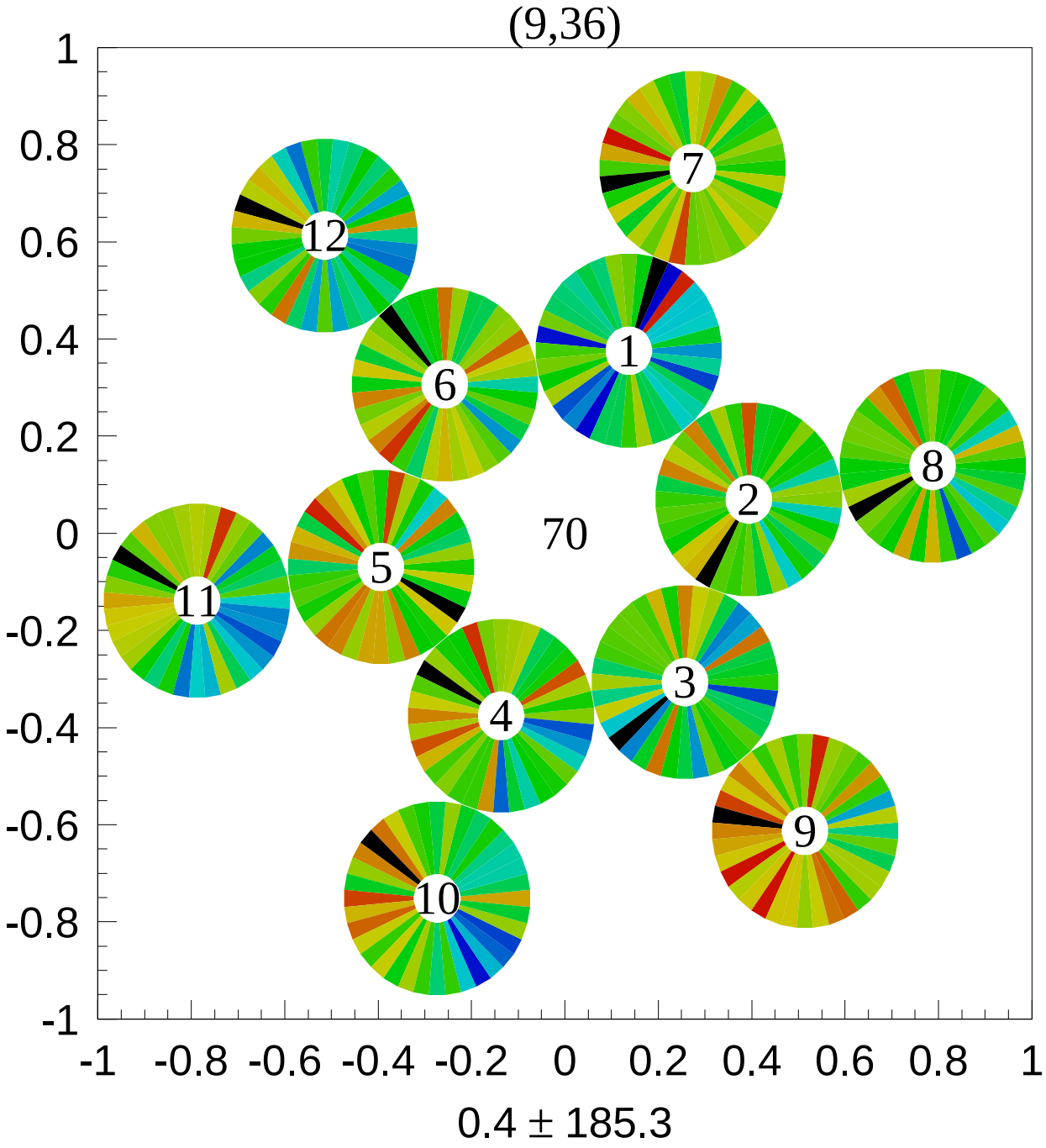

(9,35)
tilted LEDs
127 128 125 126 134 128
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 128 127 124 129 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

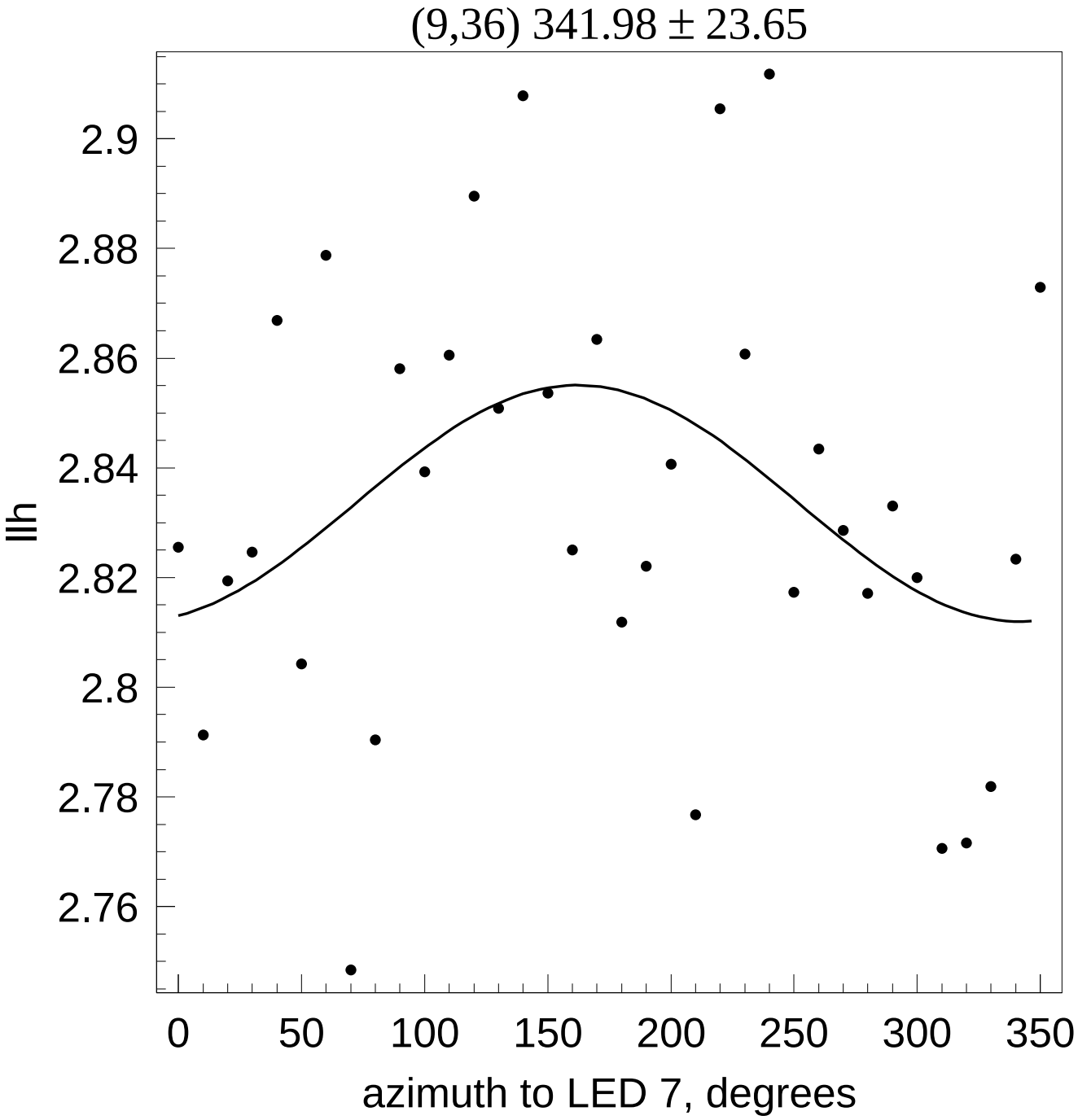

(9,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
44.3 ± 175.3

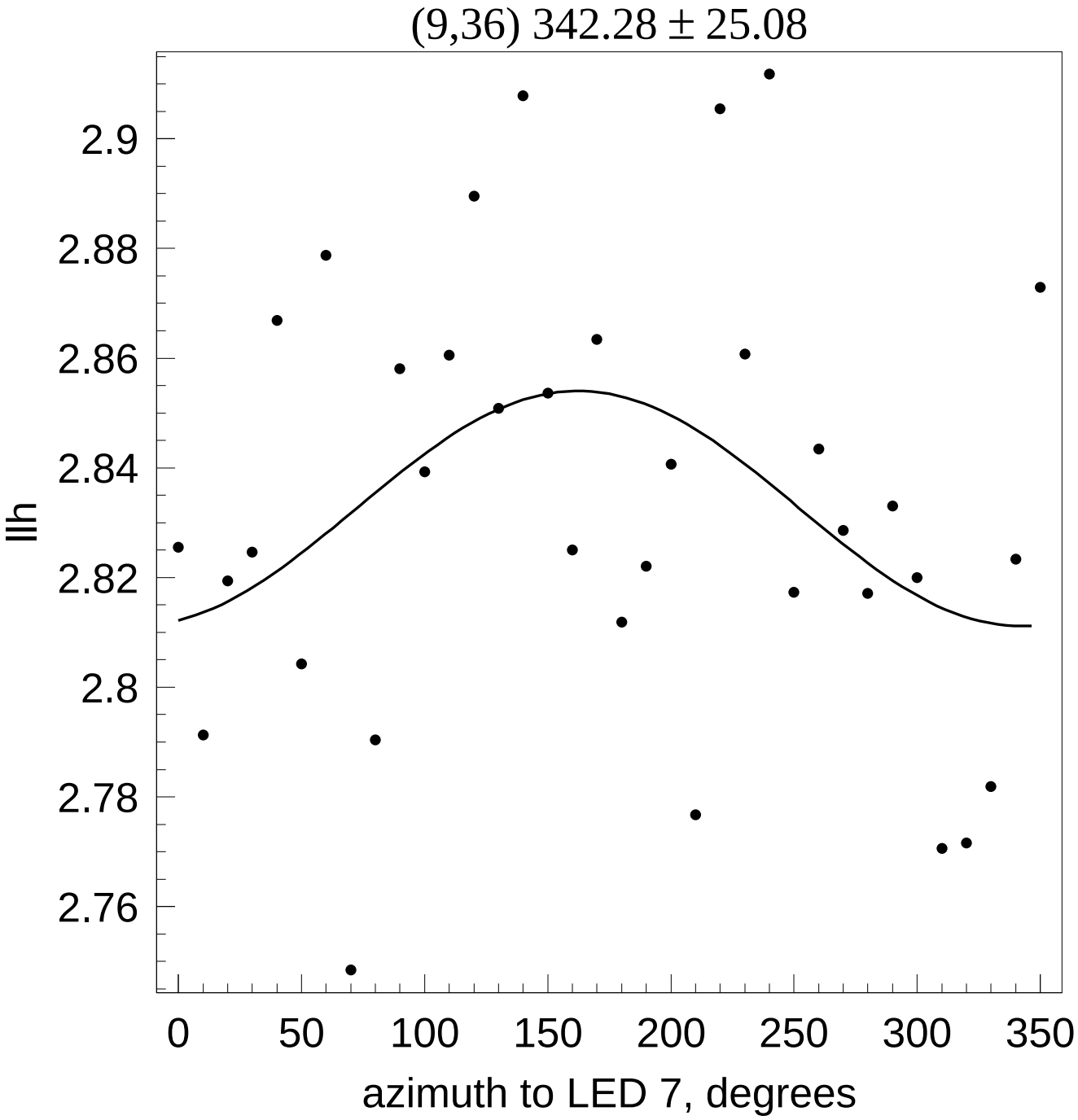

(9,35) 69.04 ± 20.49
2.06
2.04
2.02
2
1.98
1.96
1.94
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

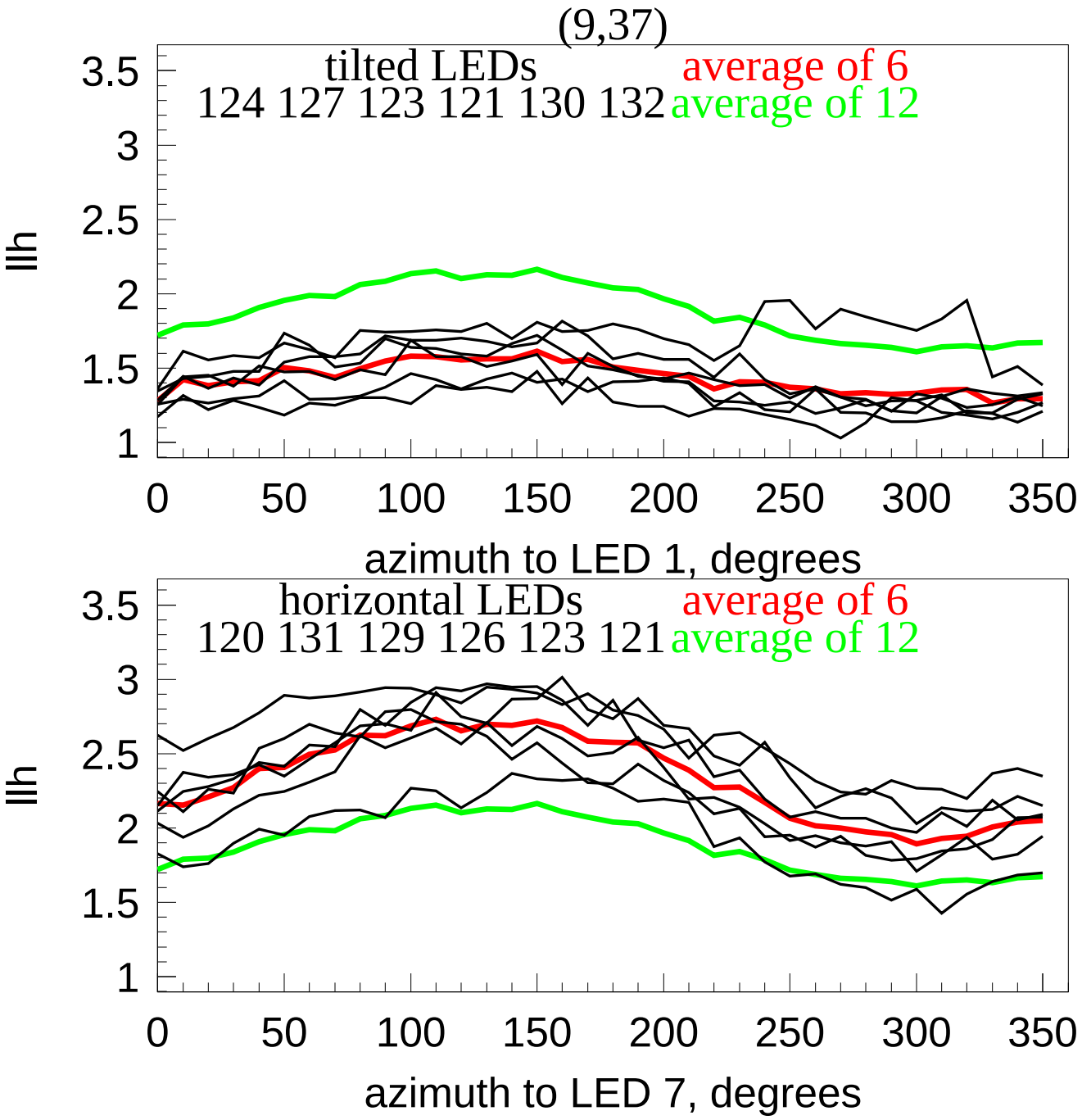

(9,35) 69.66 ± 21.10
2.06
2.04
2.02
2
1.98
1.96
1.94
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

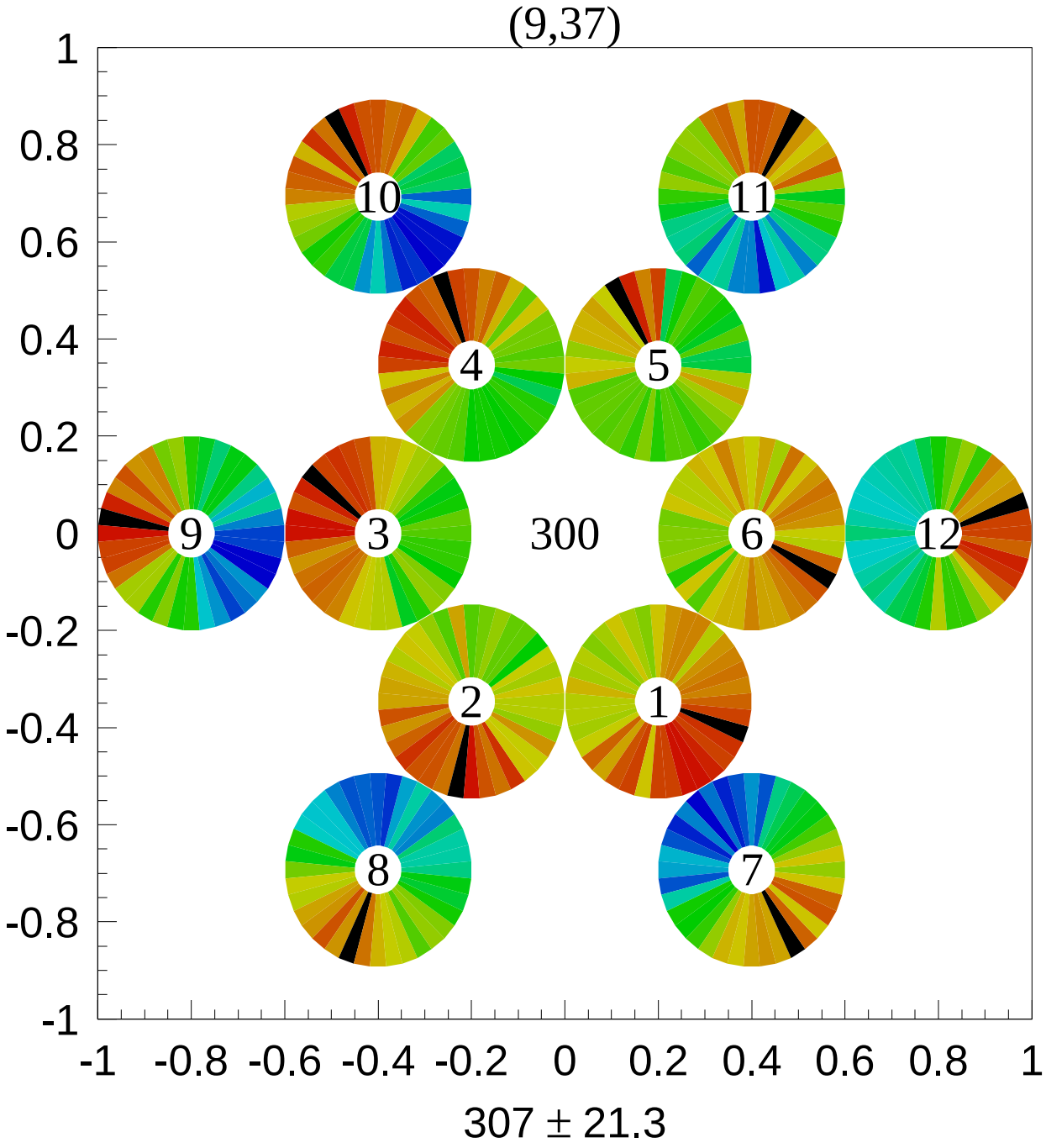

(9,36)
tilted LEDs
131 129 134 131 127 120
average of 6
average of 12
IIh
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 125 131 127 124 127
average of 6
average of 12
IIh
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

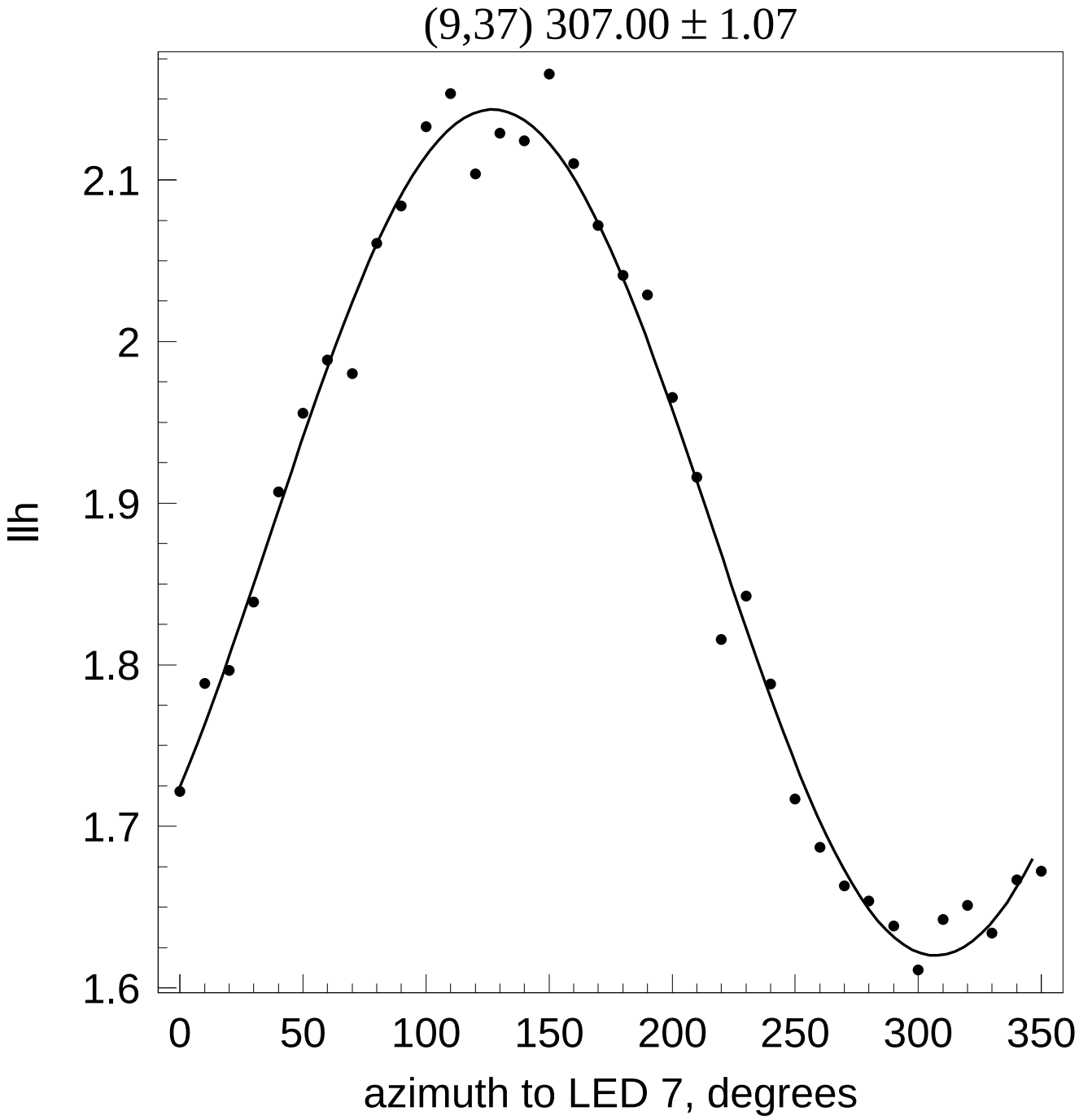

(9,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
0.4 ± 185.3
70
1
2
3
4
5
6
7
8
9
10
11
12

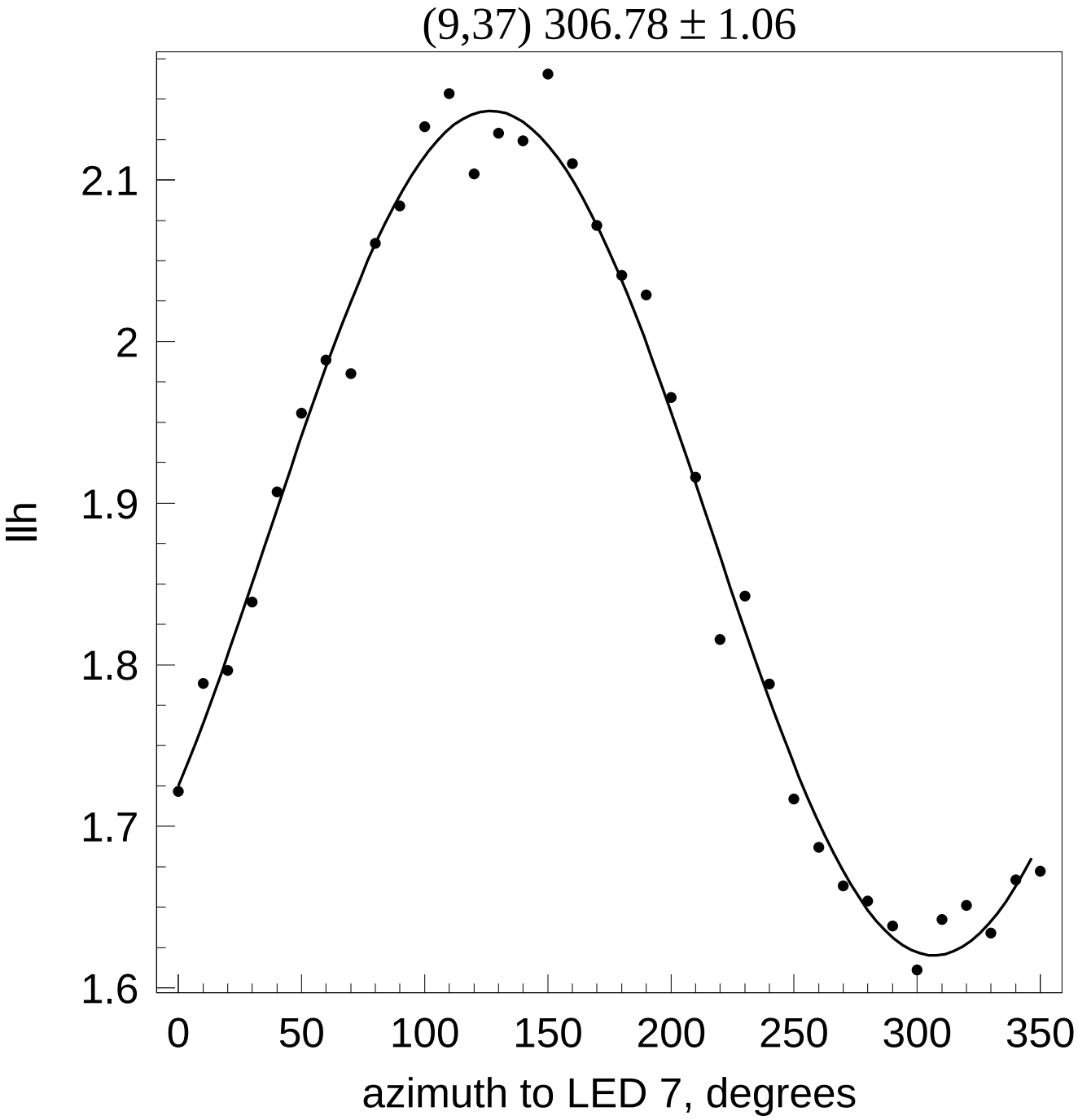

(9,36) 341.98 ± 23.65
llh
2.9
2.88
2.86
2.84
2.82
2.8
2.78
2.76
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

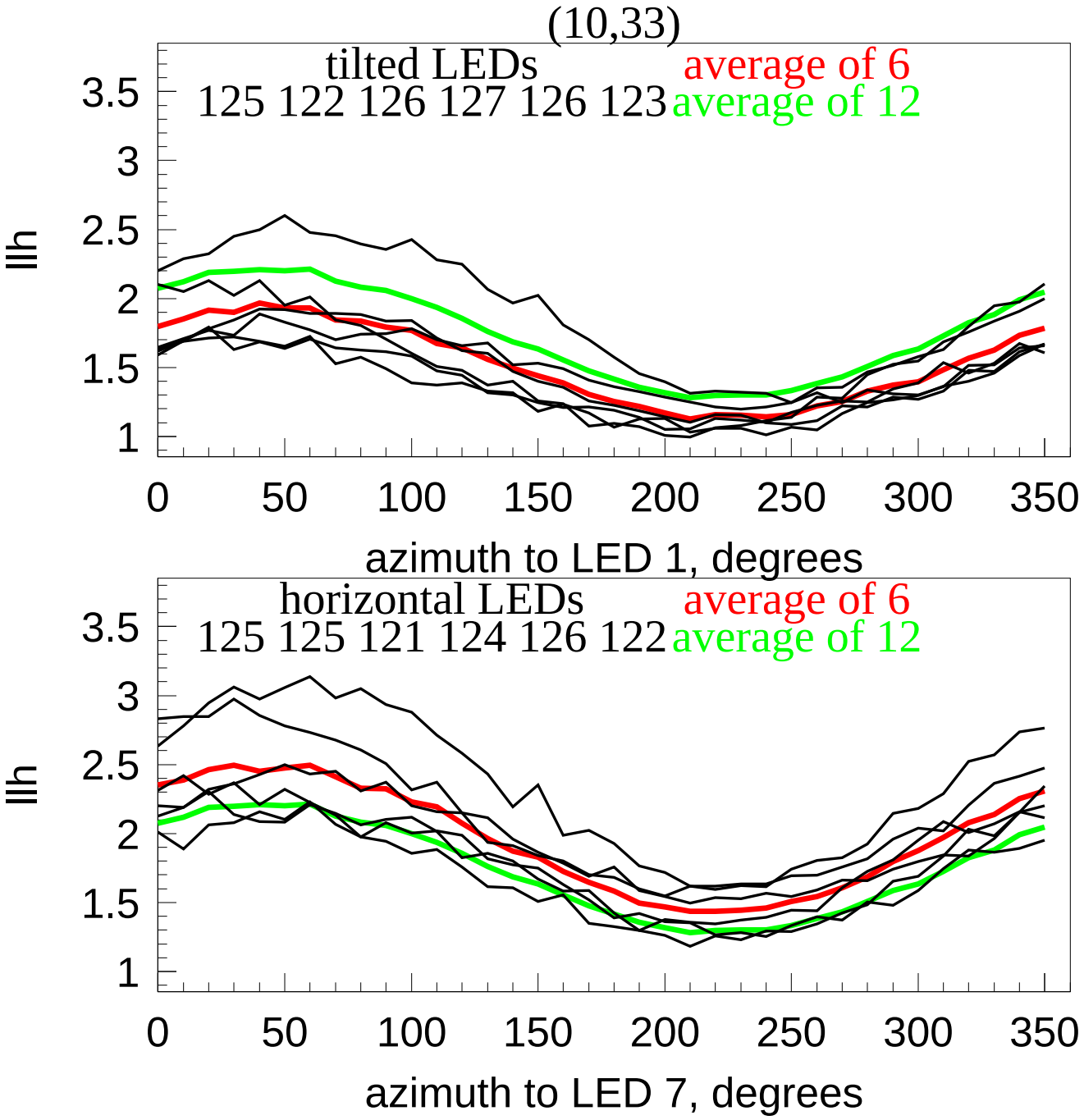

(9,36) 342.28 ± 25.08
llh
2.9
2.88
2.86
2.84
2.82
2.8
2.78
2.76
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

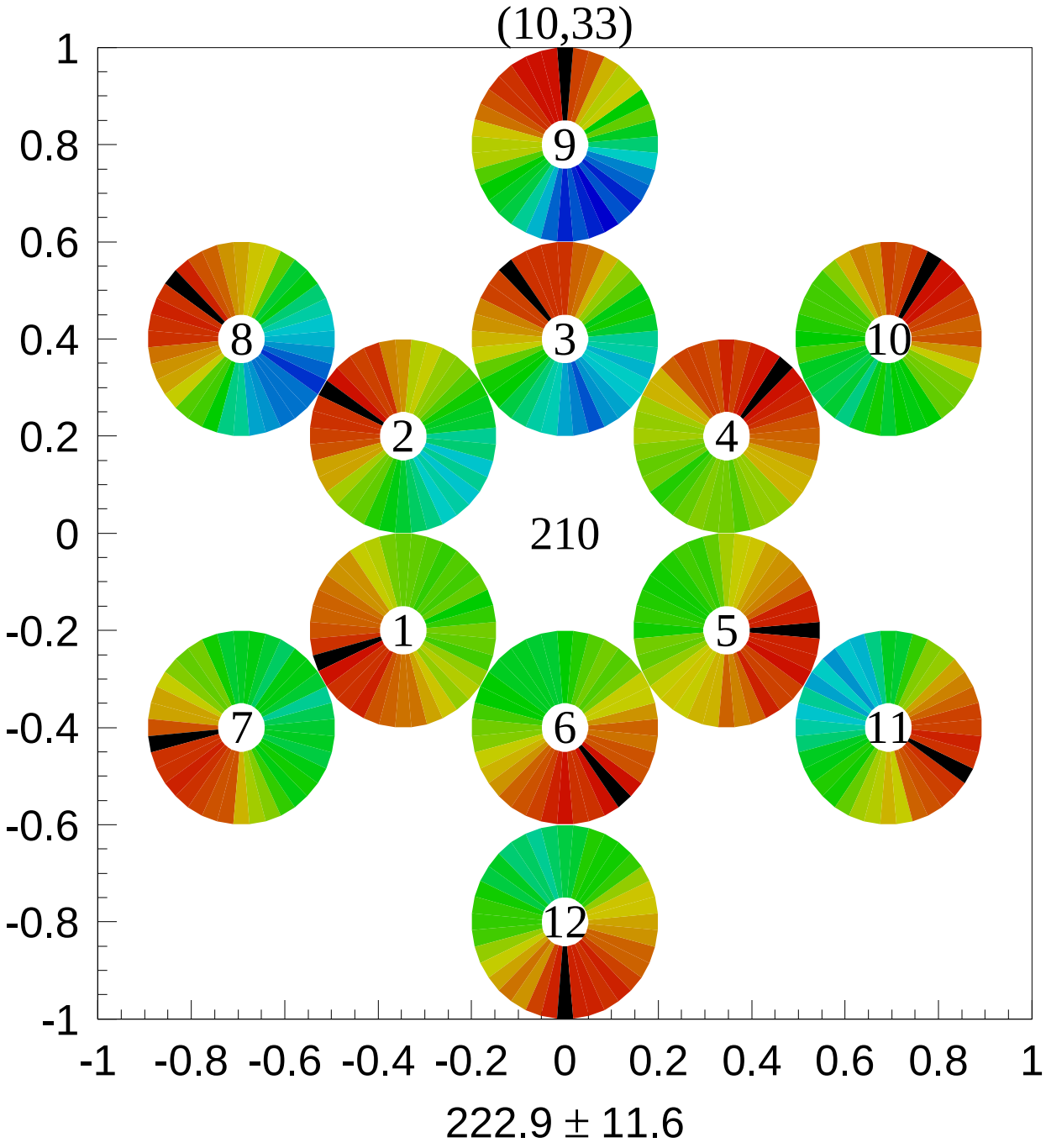

(9,37)
tilted LEDs
124 127 123 121 130 132
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
120 131 129 126 123 121
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

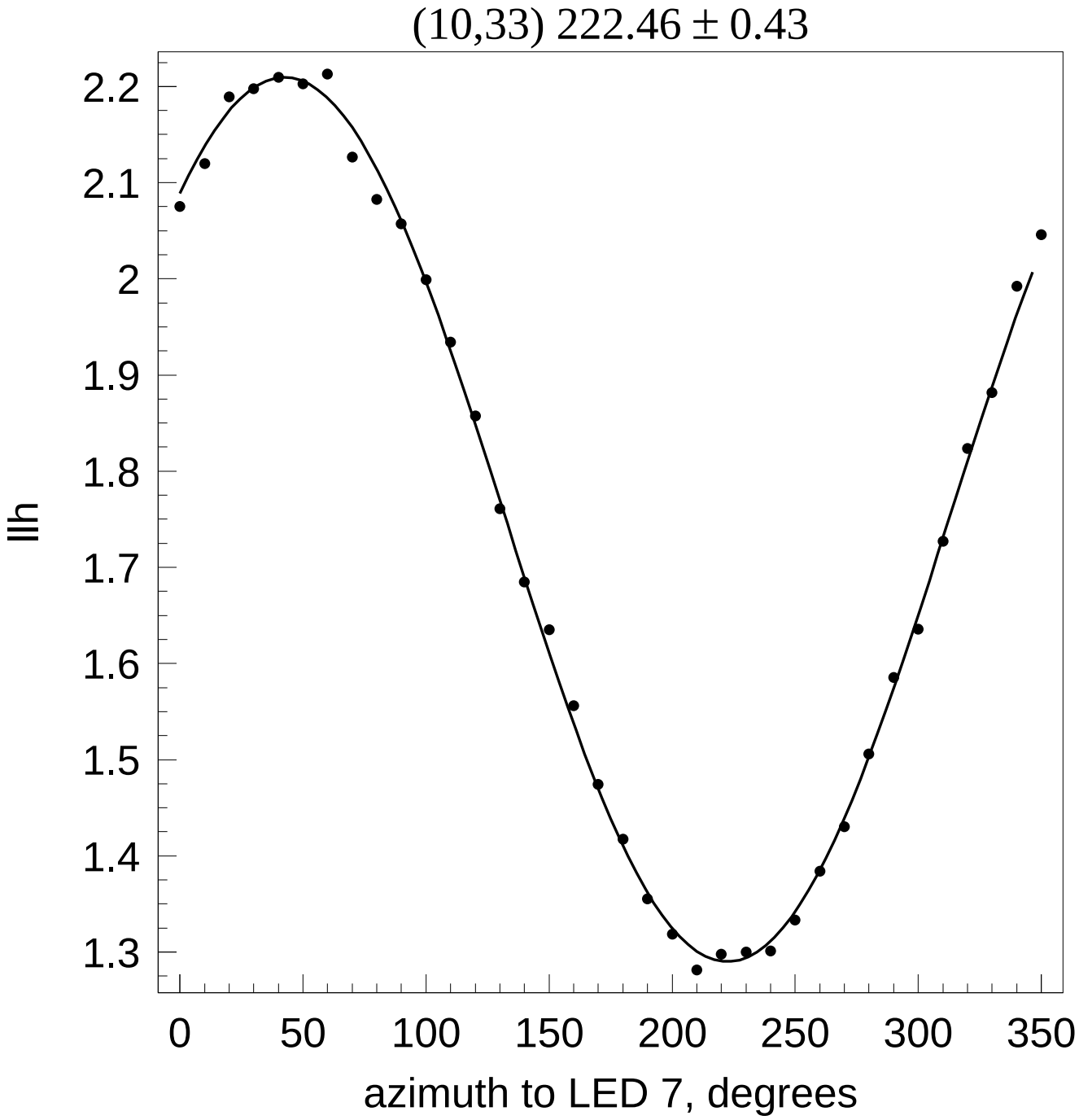

(9,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
307 ± 21.3

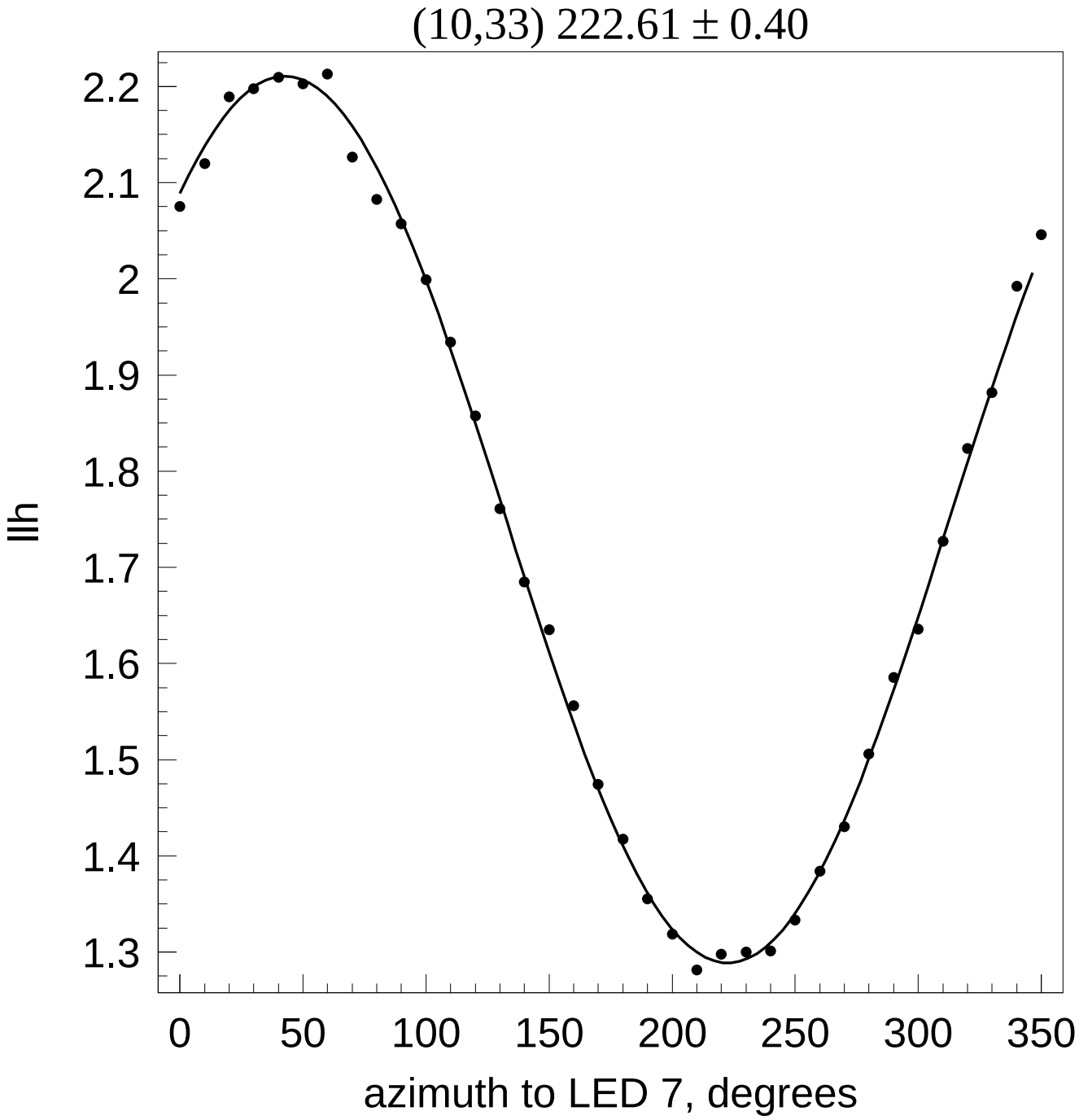

(9,37) 307.00 ± 1.07
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

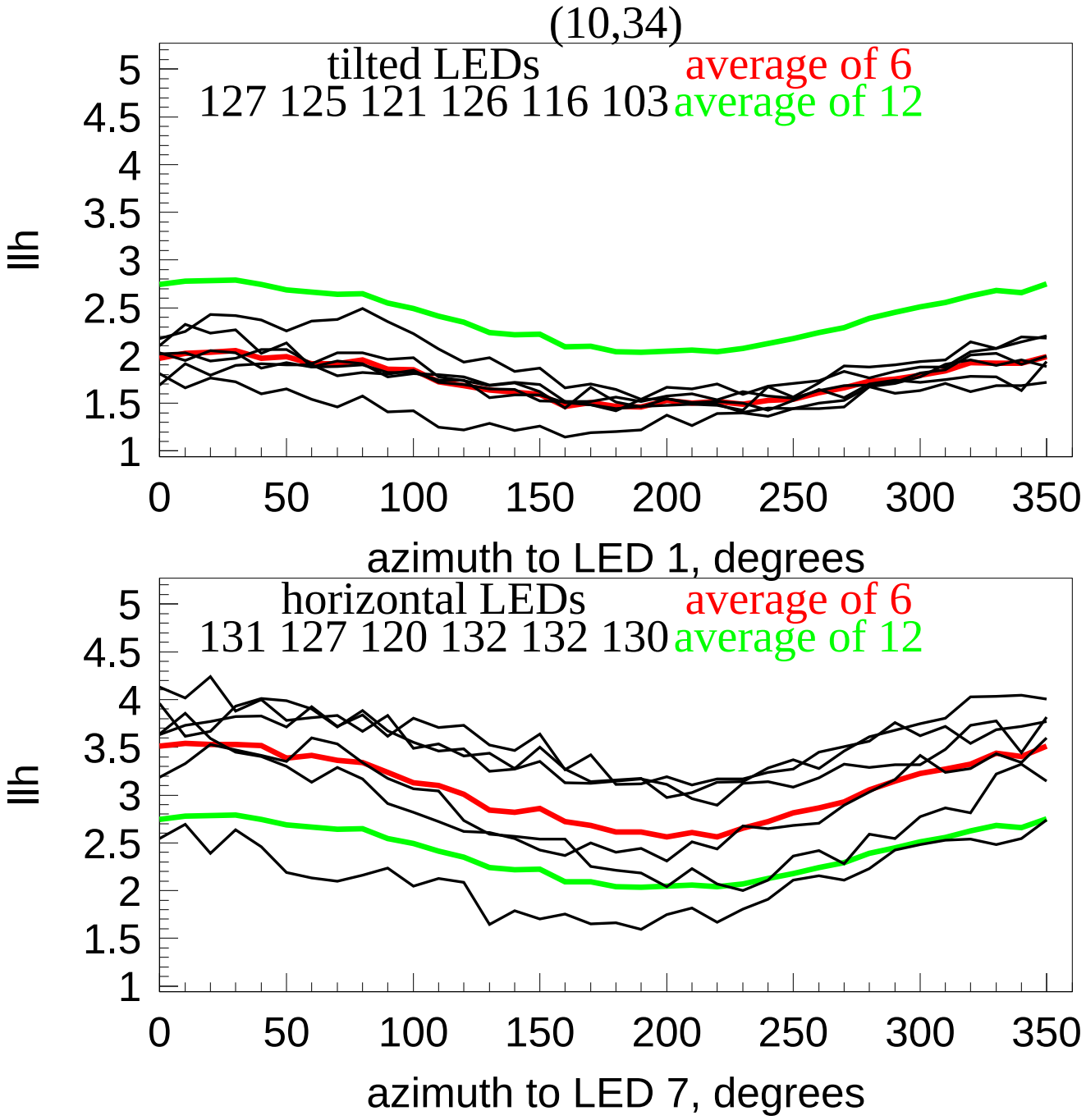

(9,37) 306.78 ± 1.06
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

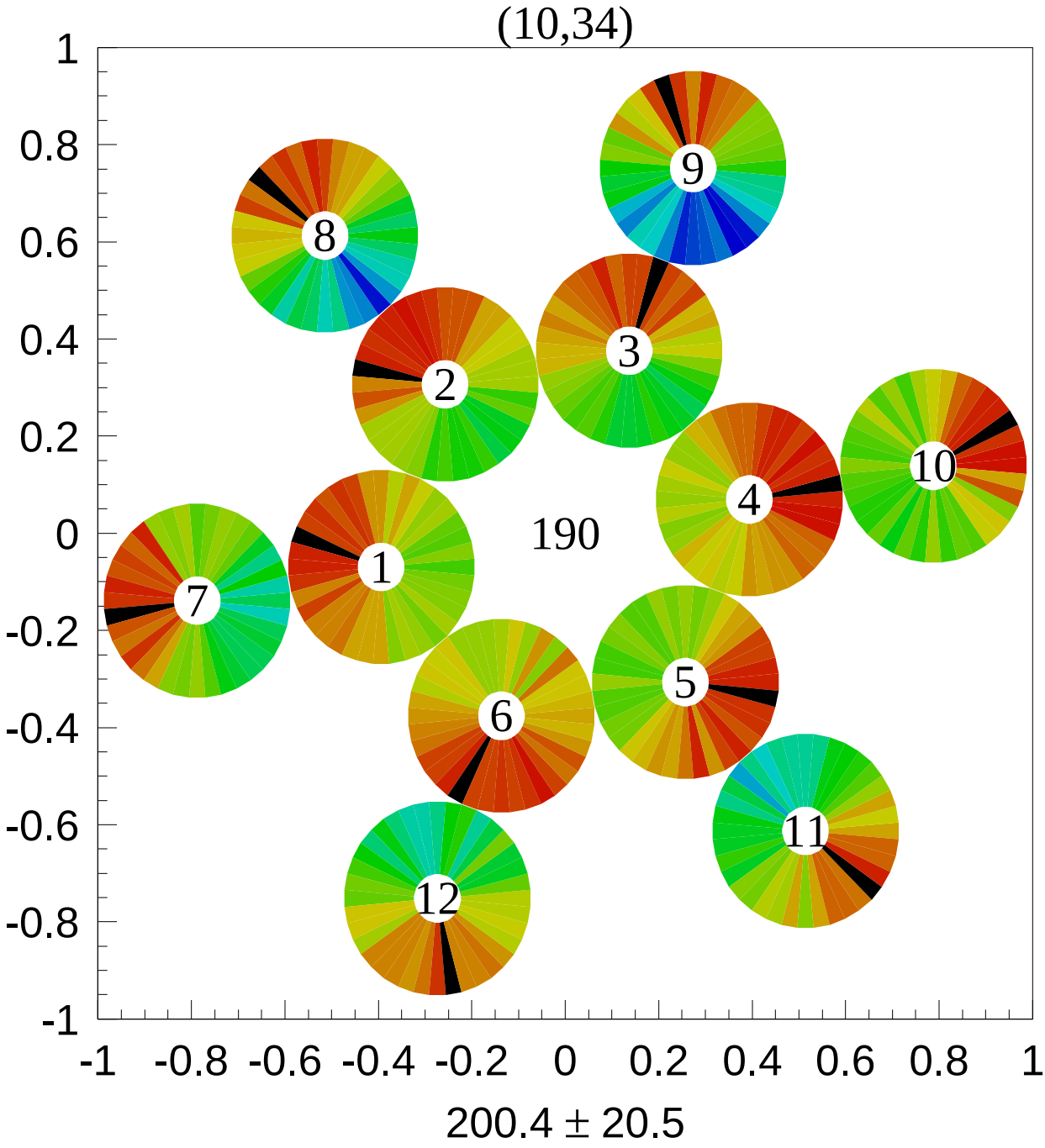

(10,33)
tilted LEDs
125 122 126 127 126 123
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 125 121 124 126 122
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

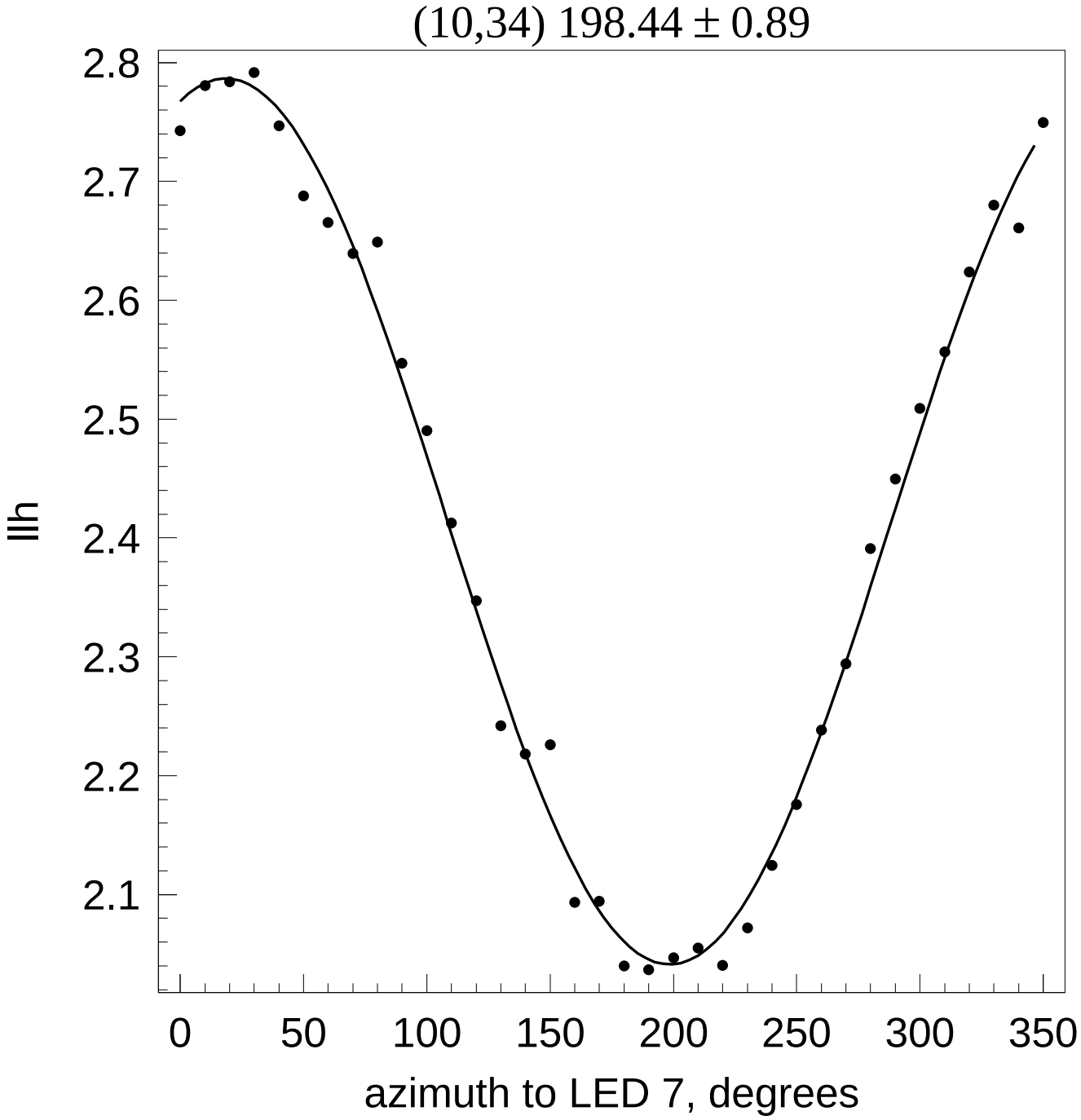

(10,33)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
222.9 ± 11.6

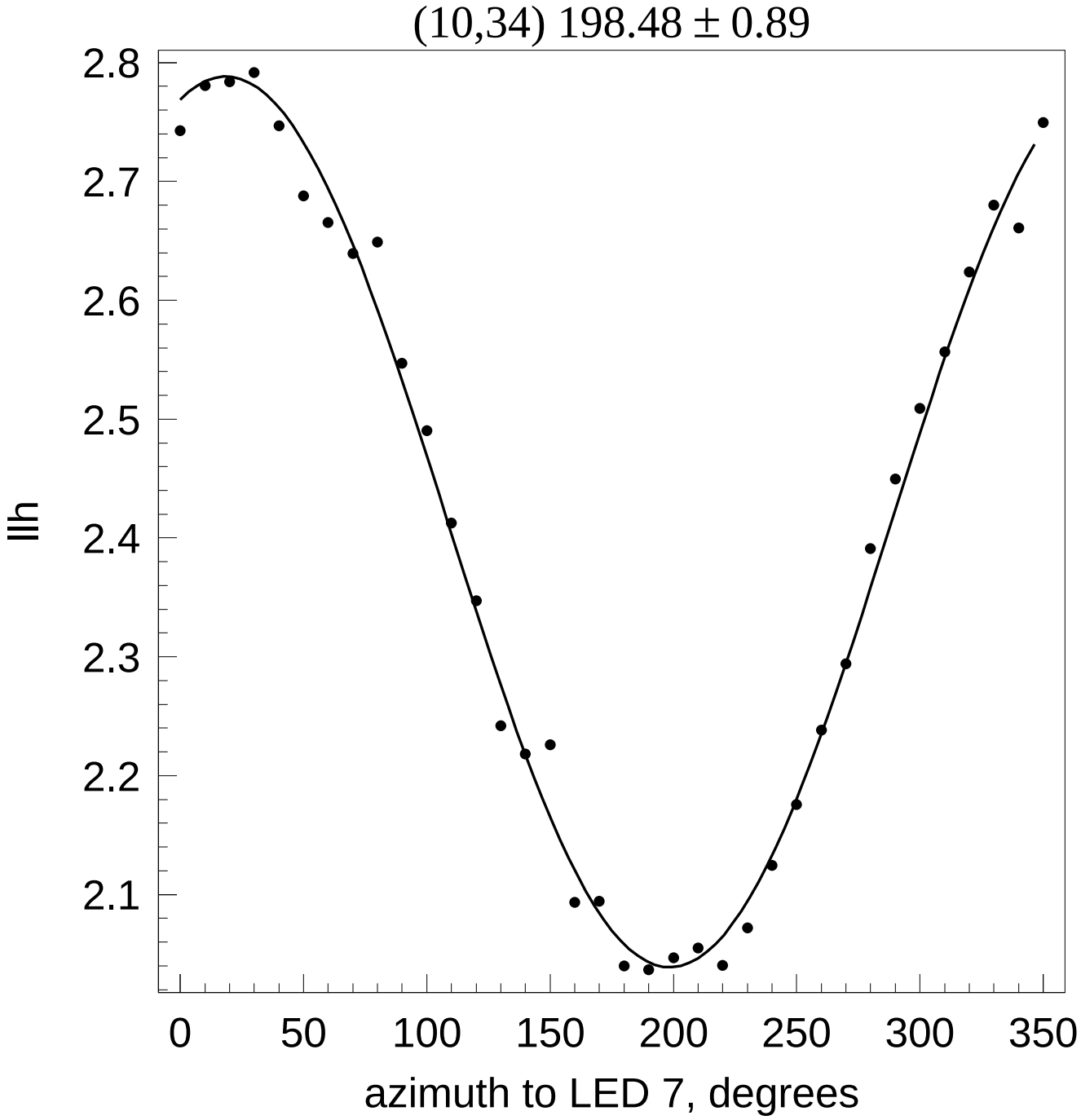

(10,33) 222.46 ± 0.43
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
lih
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

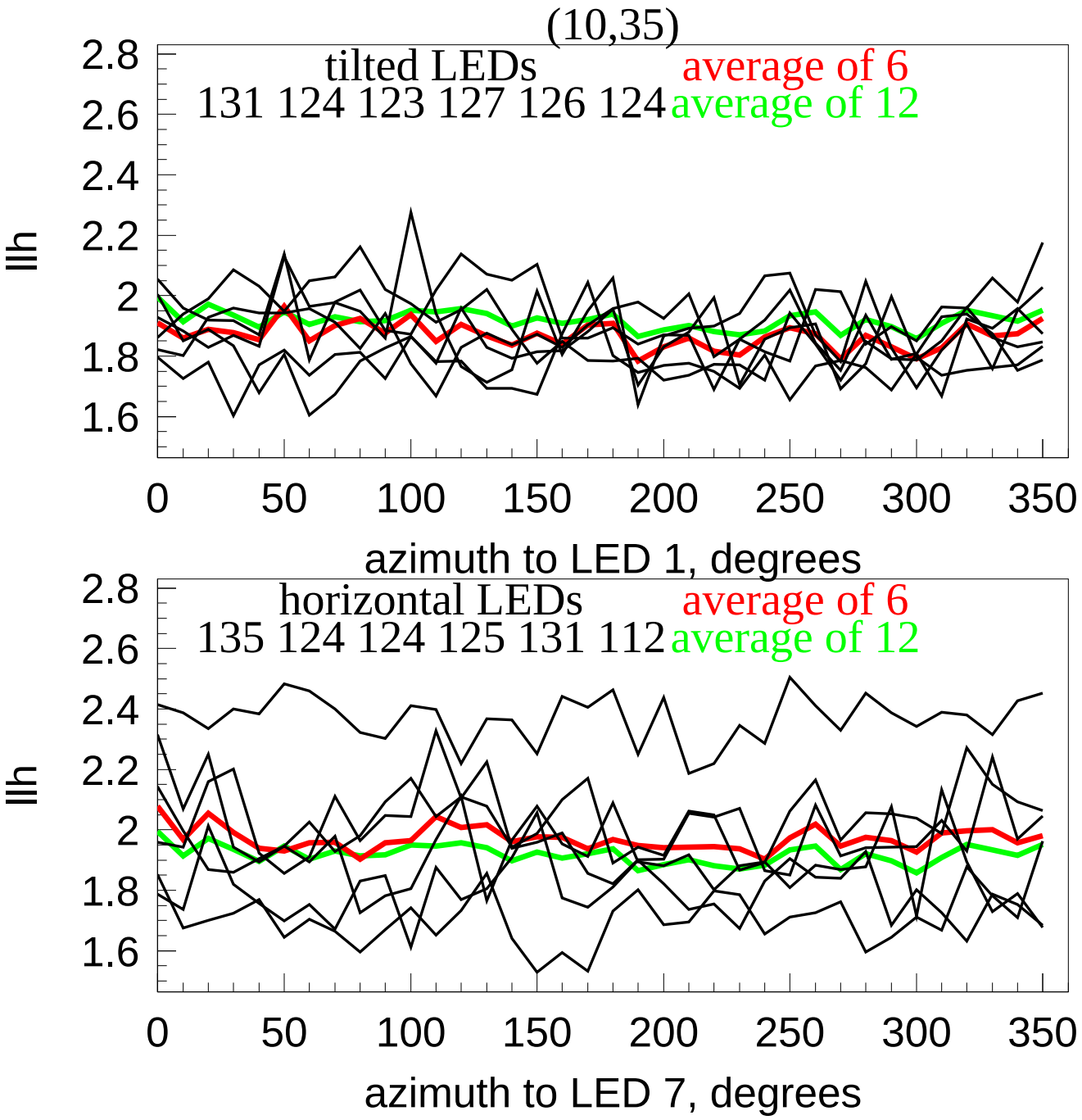

(10,33) 222.61 ± 0.40
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

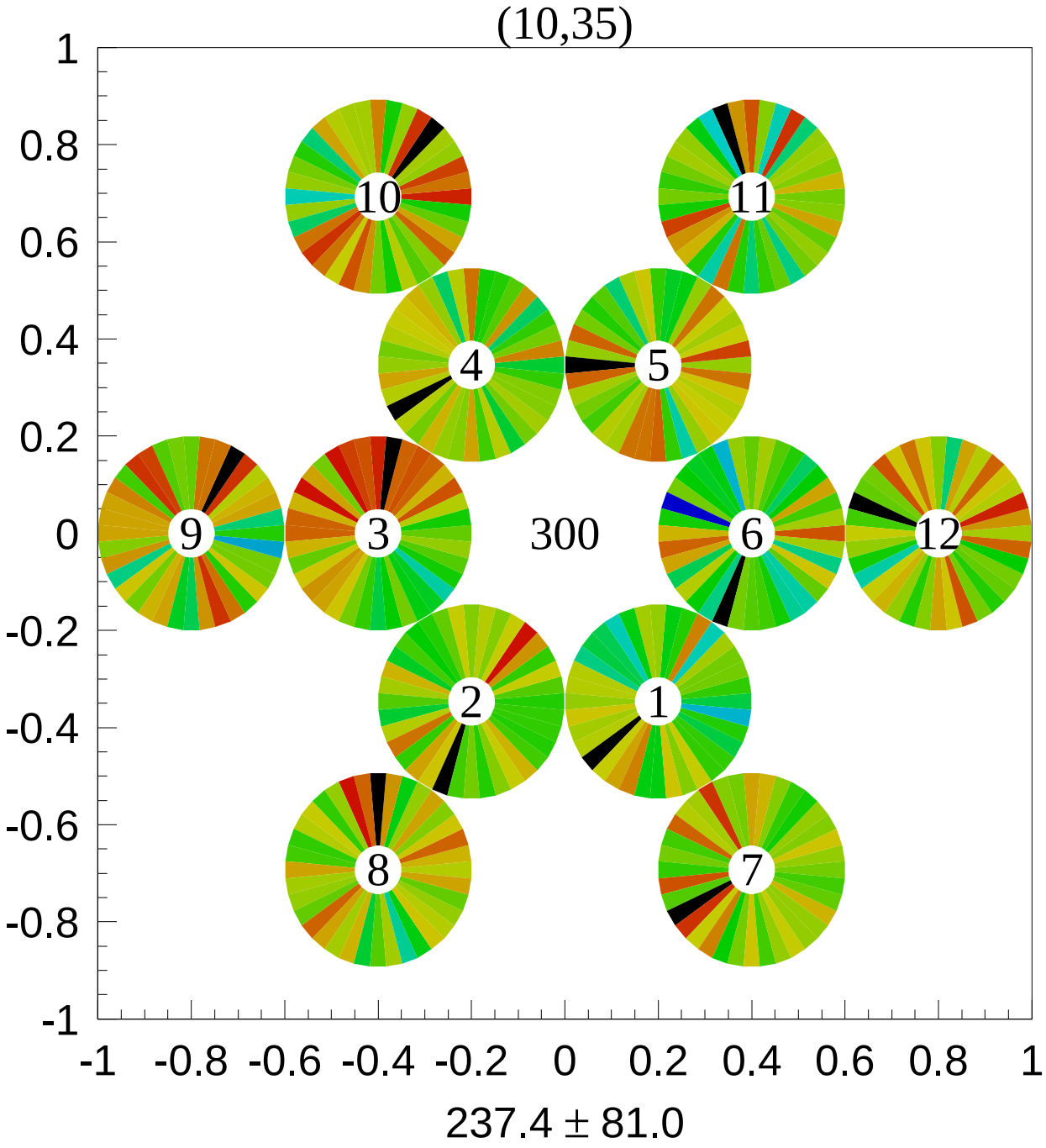

(10,34)
tilted LEDs
127 125 121 126 116 103
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 127 120 132 132 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

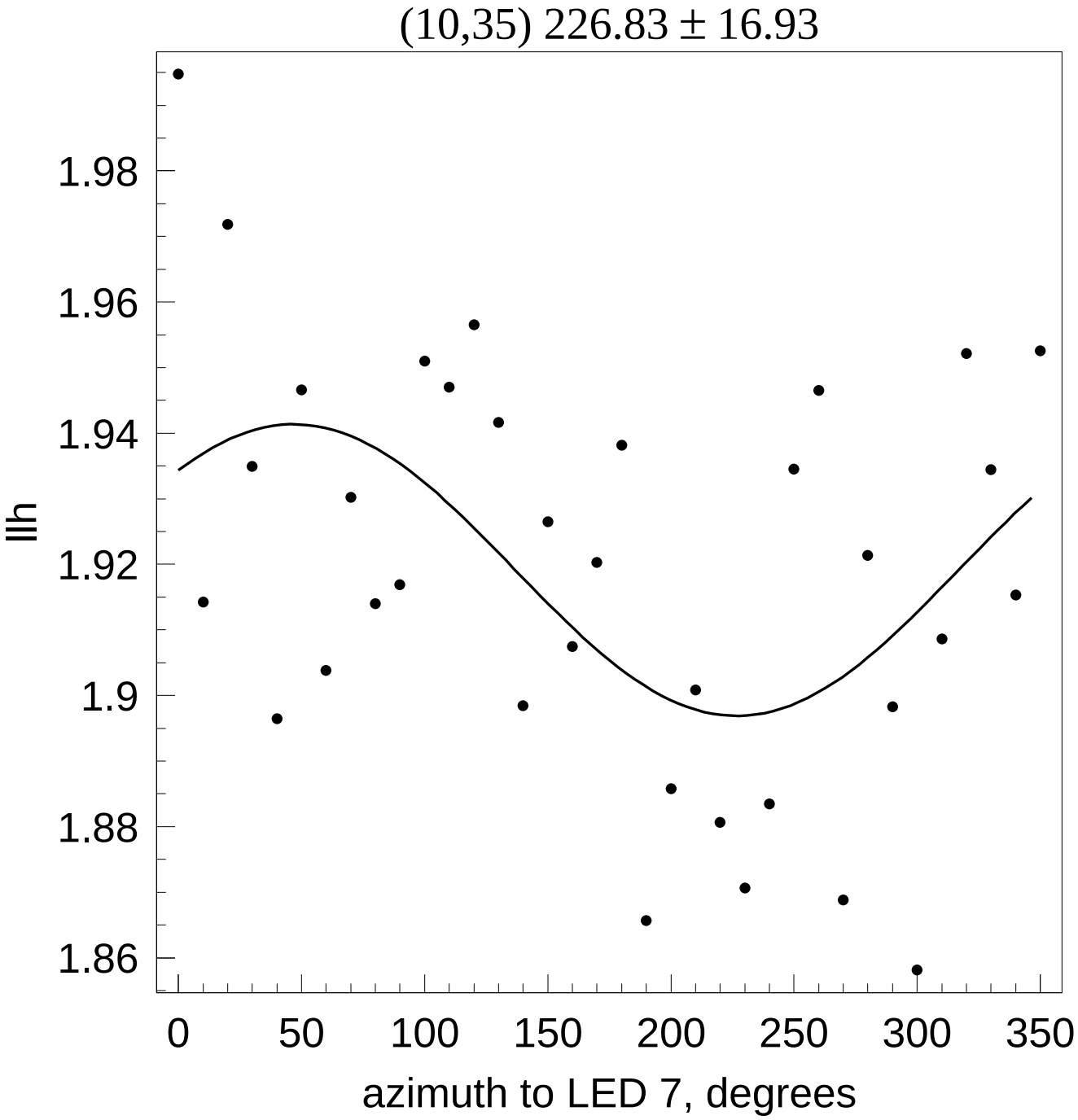

(10,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
200.4 ± 20.5
190
1
2
3
4
5
6
7
8
9
10
11
12

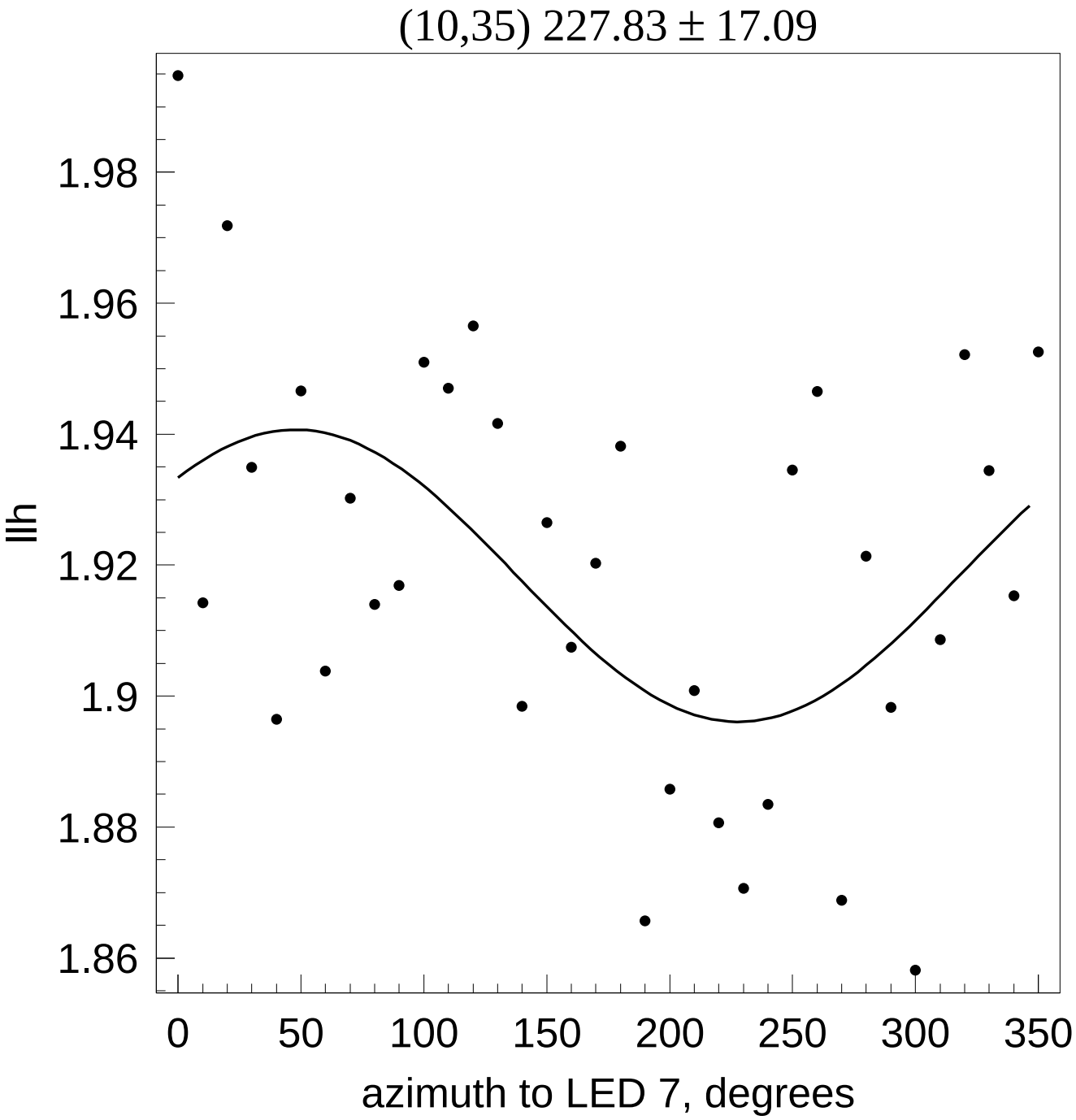

(10,34) 198.44 ± 0.89
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

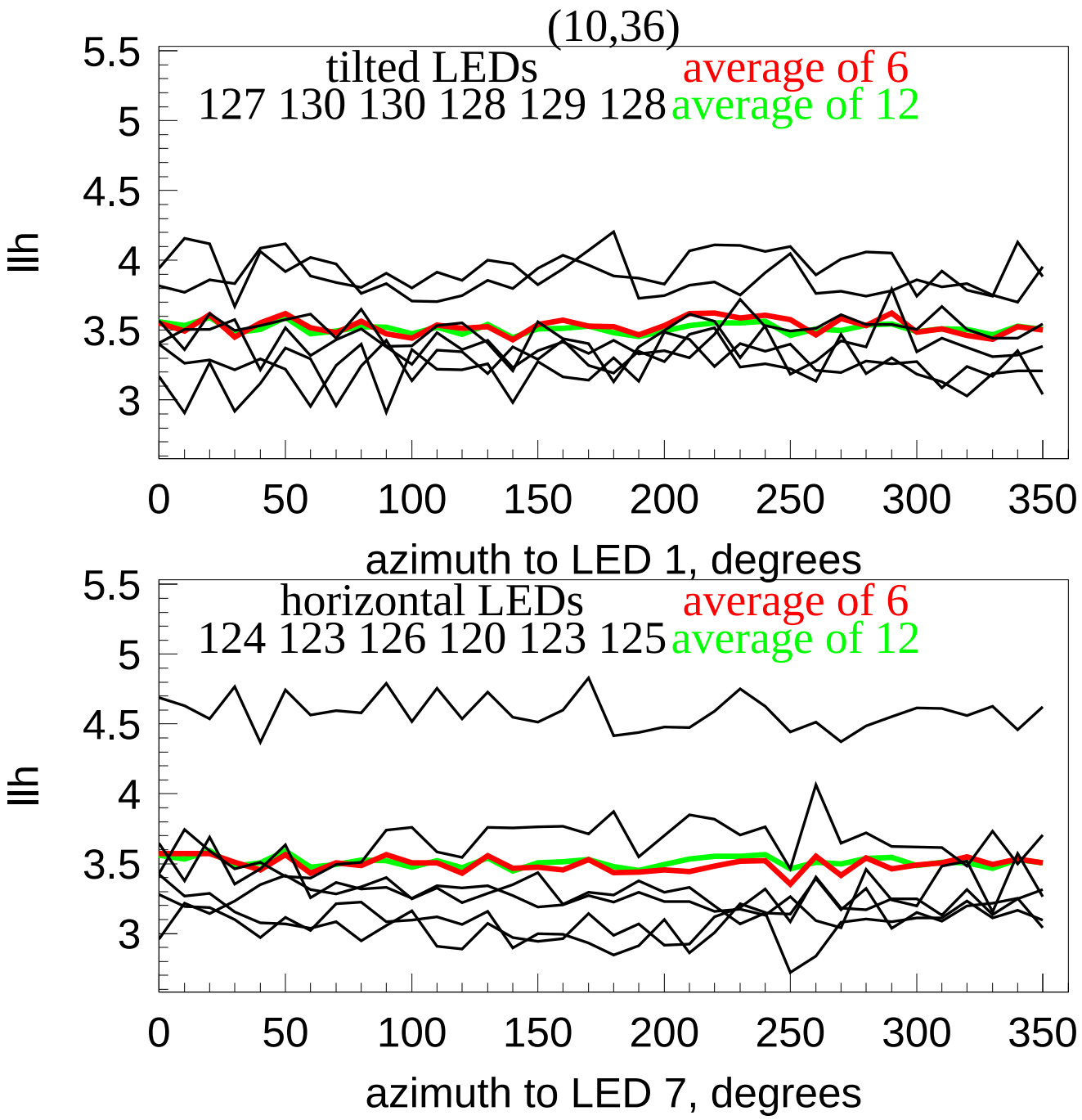

(10,34) 198.48 ± 0.89
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

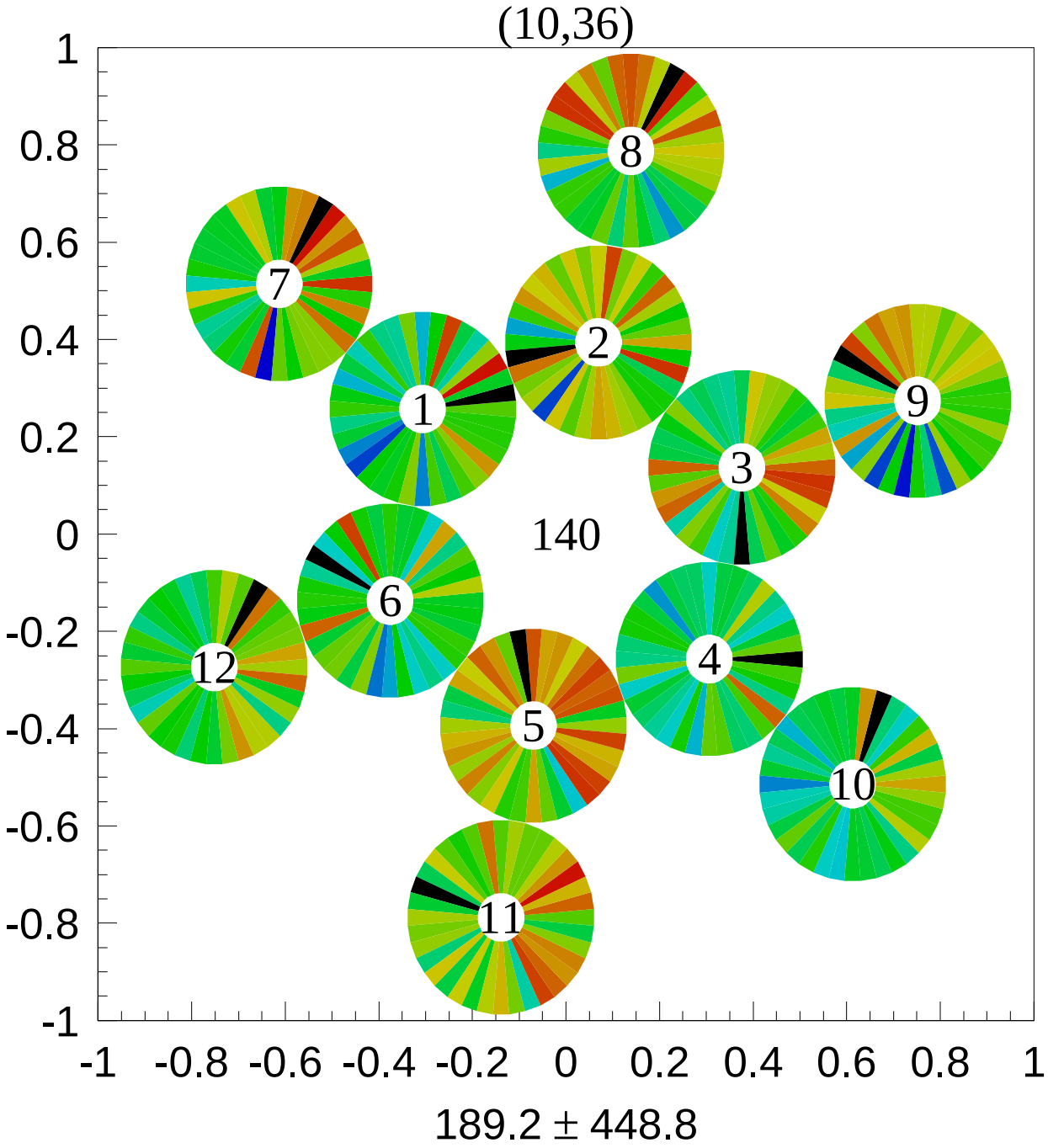

(10,35)
tilted LEDs
131 124 123 127 126 124
average of 6
average of 12
Ilh
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
135 124 124 125 131 112
average of 6
average of 12
Ilh
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

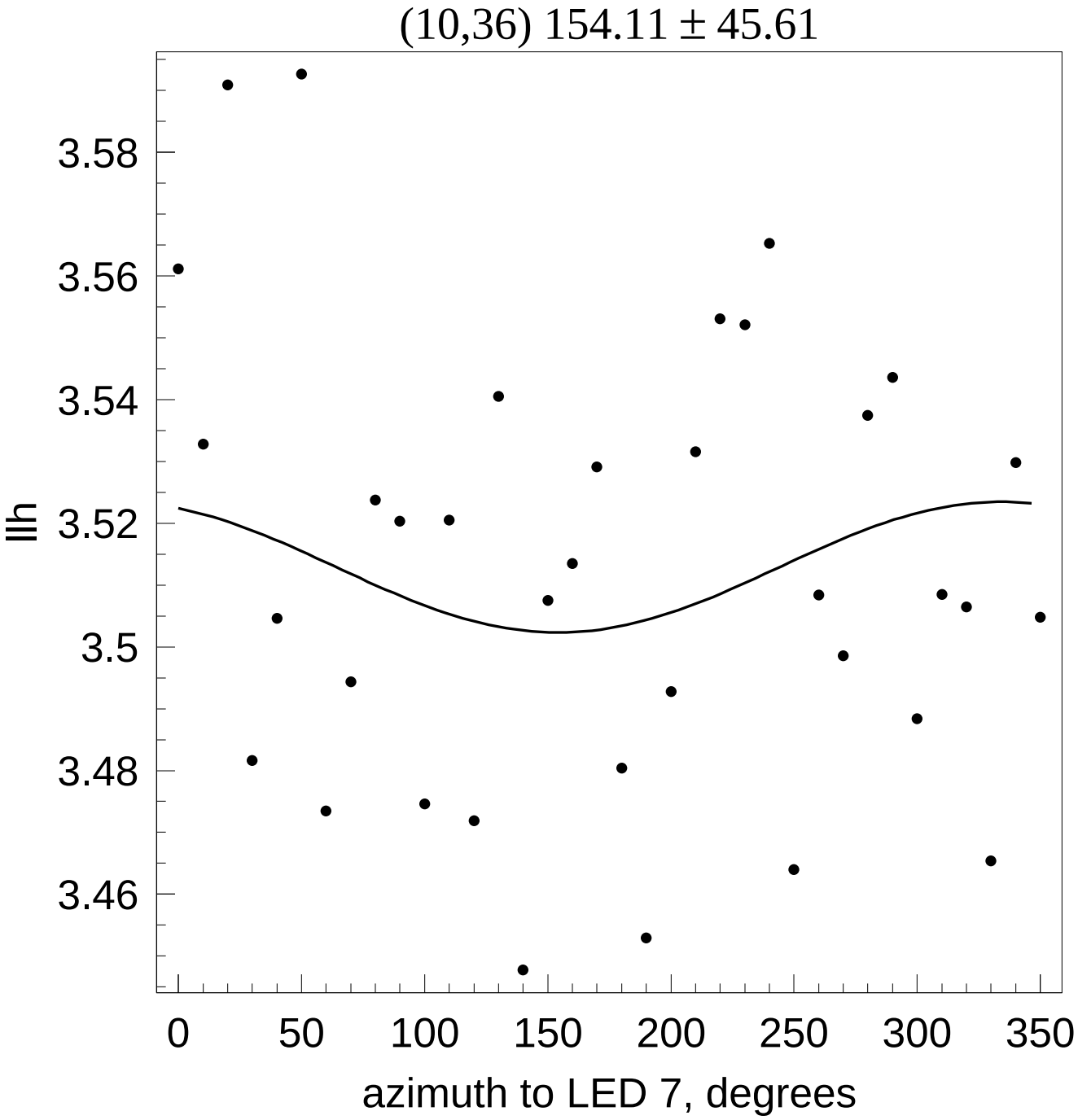

(10,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
237.4 ± 81.0

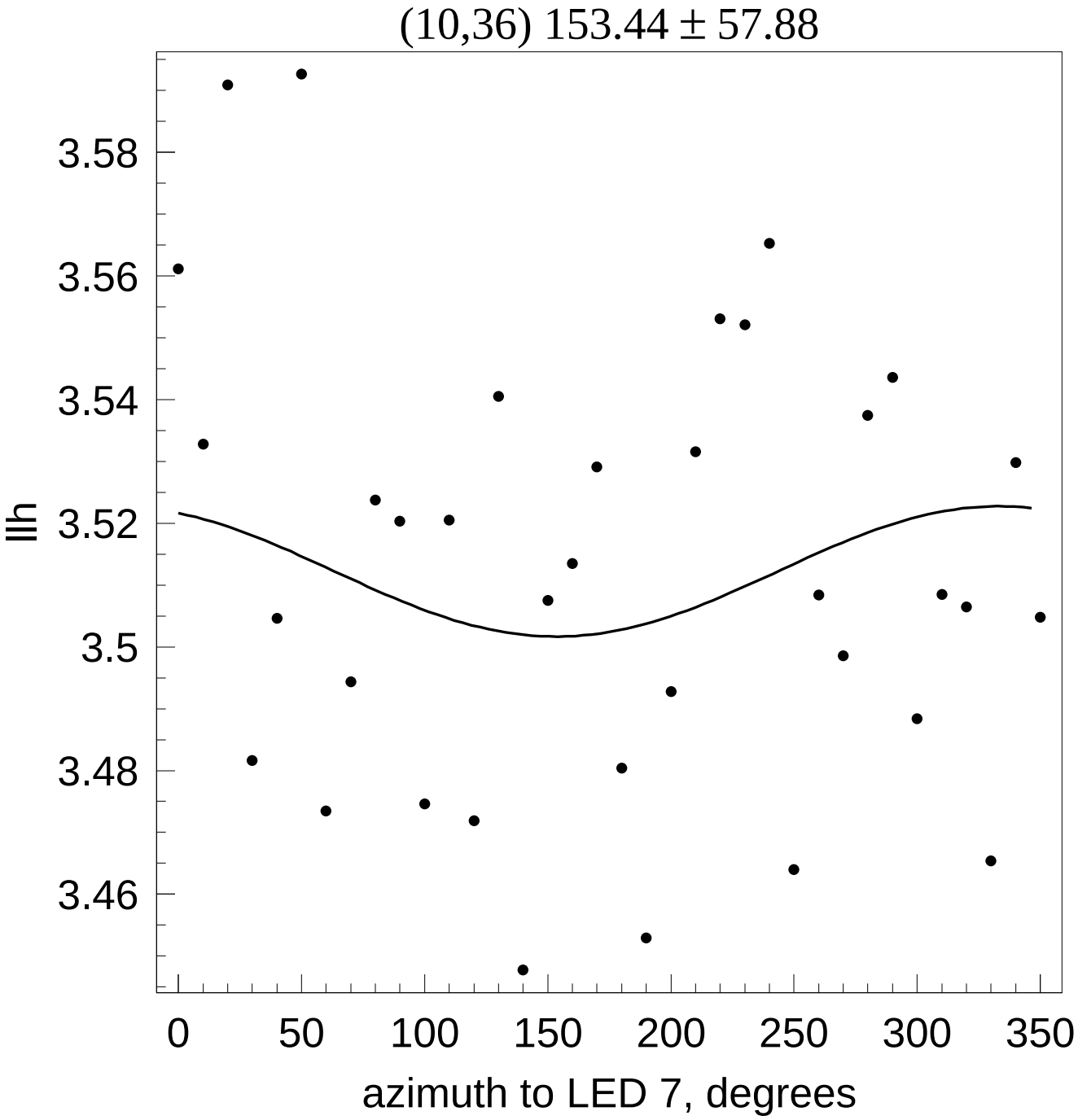

(10,35) 226.83 ± 16.93
1.98
1.96
1.94
1.92
1.9
1.88
1.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

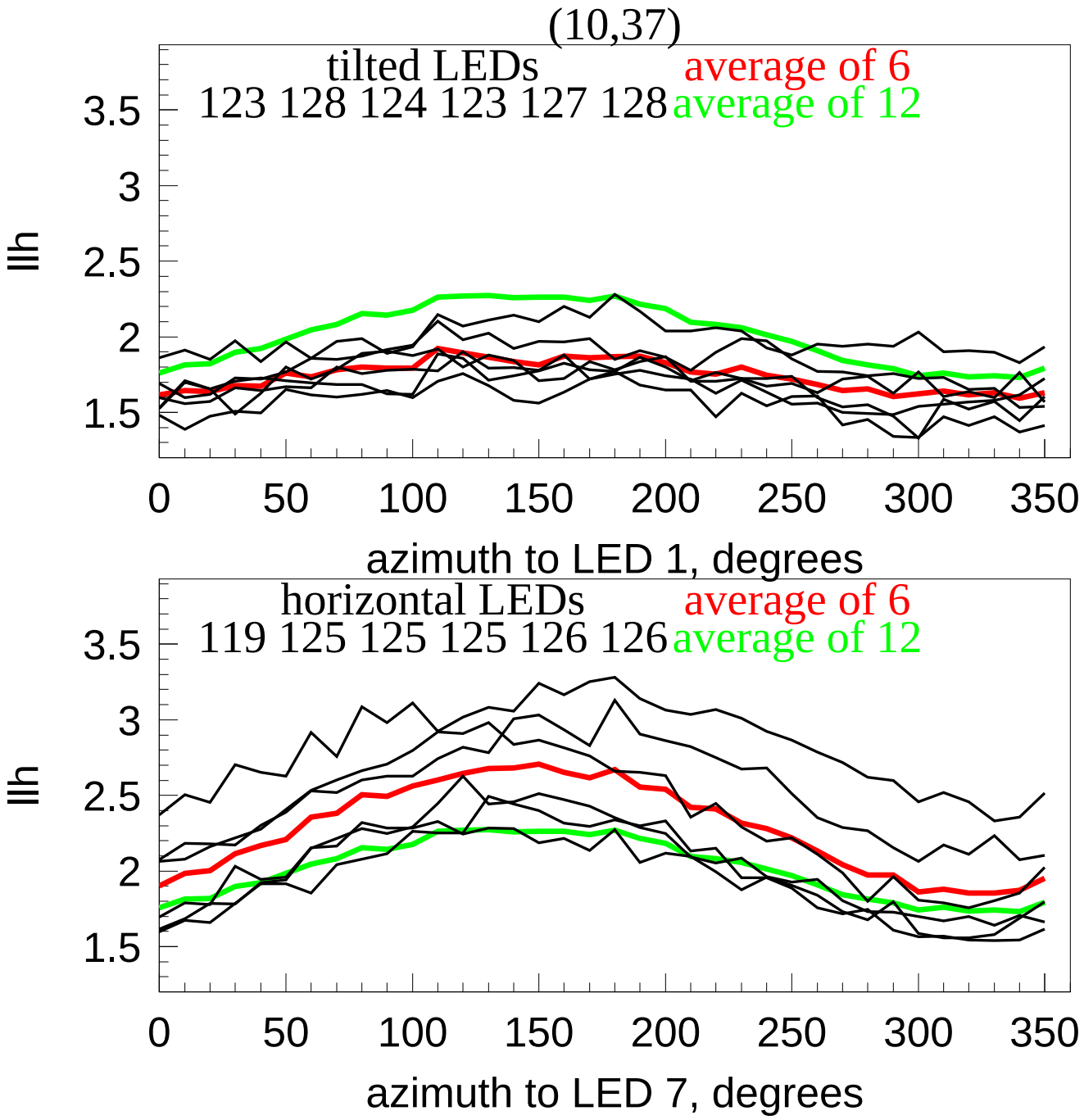

(10,35) 227.83 ± 17.09
1.98
1.96
1.94
1.92
1.9
1.88
1.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

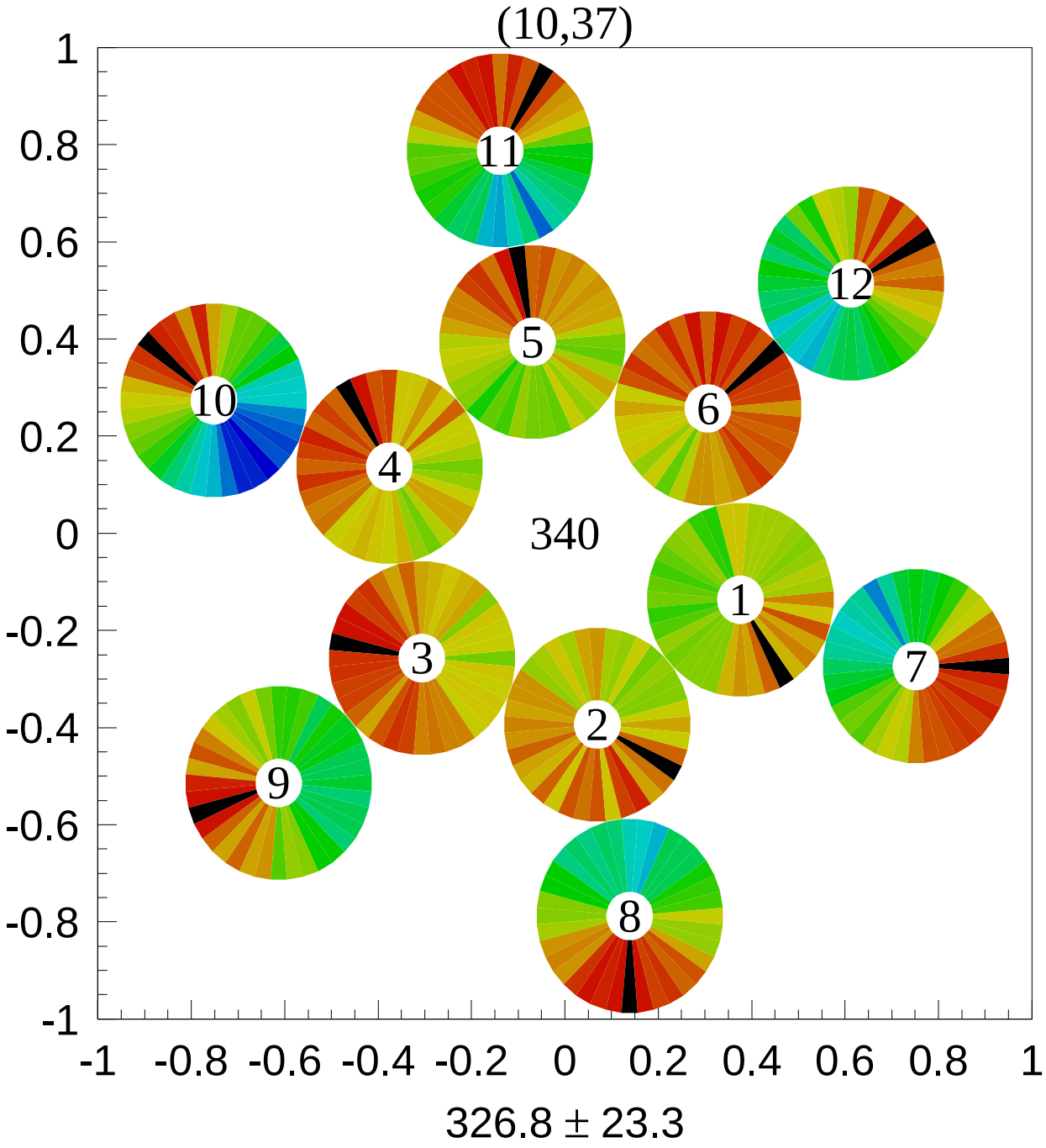

(10,36)
tilted LEDs
127 130 130 128 129 128
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 123 126 120 123 125
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

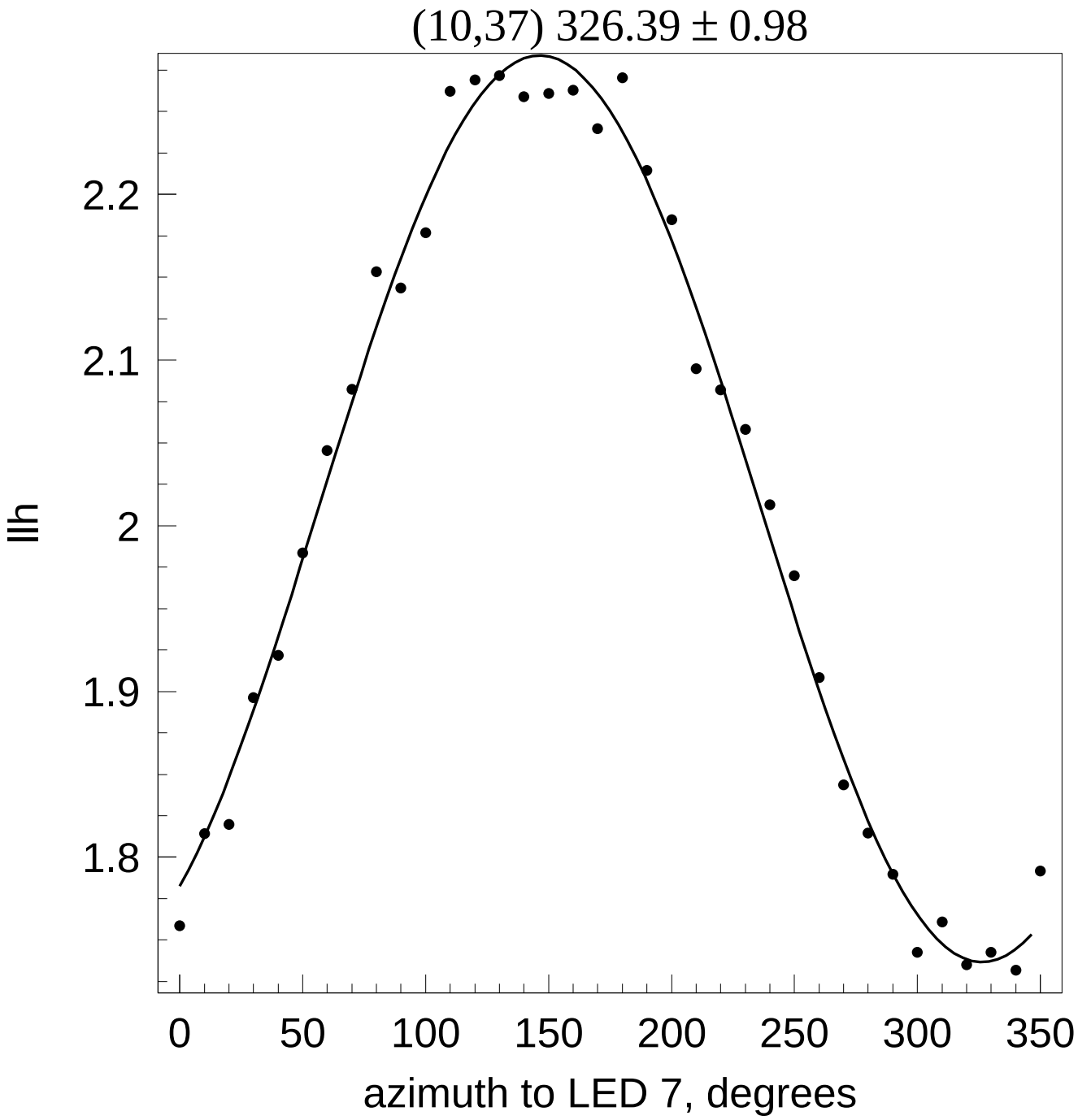

(10,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
8
7
2
1
9
3
140
6
12
4
5
10
11
189.2 ± 448.8

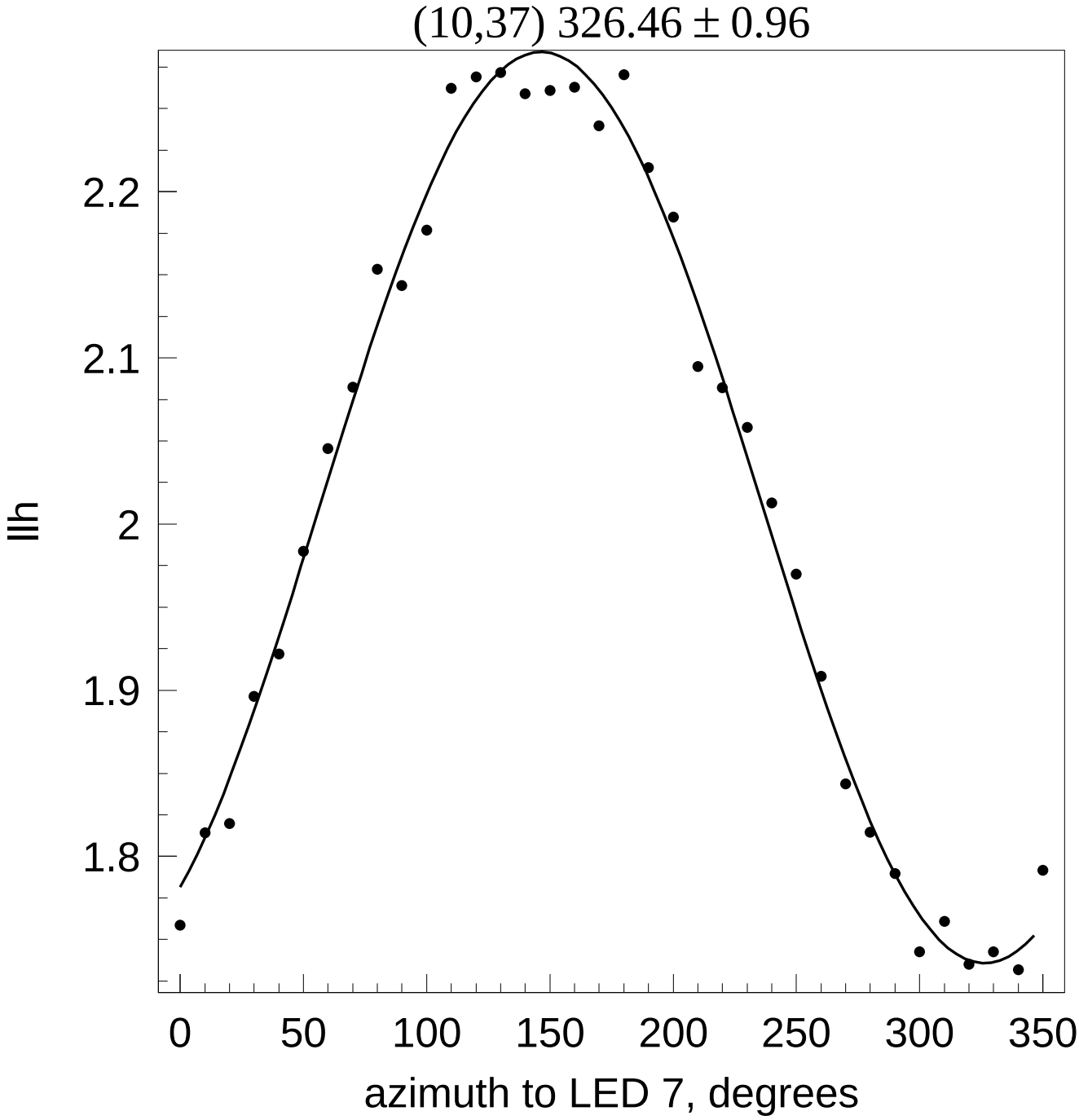

(10,36) 154.11 ± 45.61
3.58
3.56
3.54
3.52
3.5
3.48
3.46
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

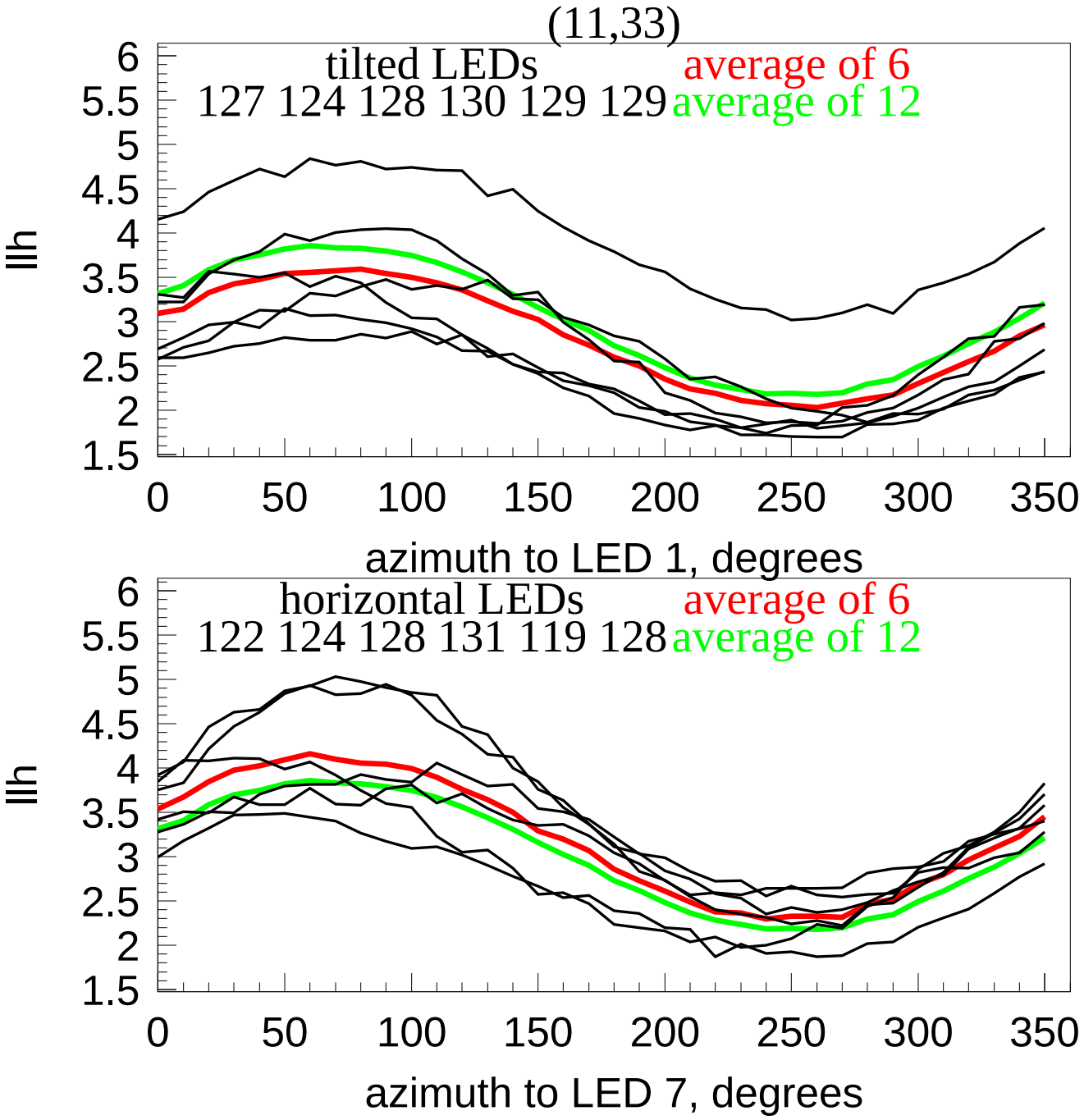

(10,36) 153.44 ± 57.88
3.58
3.56
3.54
3.52
3.5
3.48
3.46
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

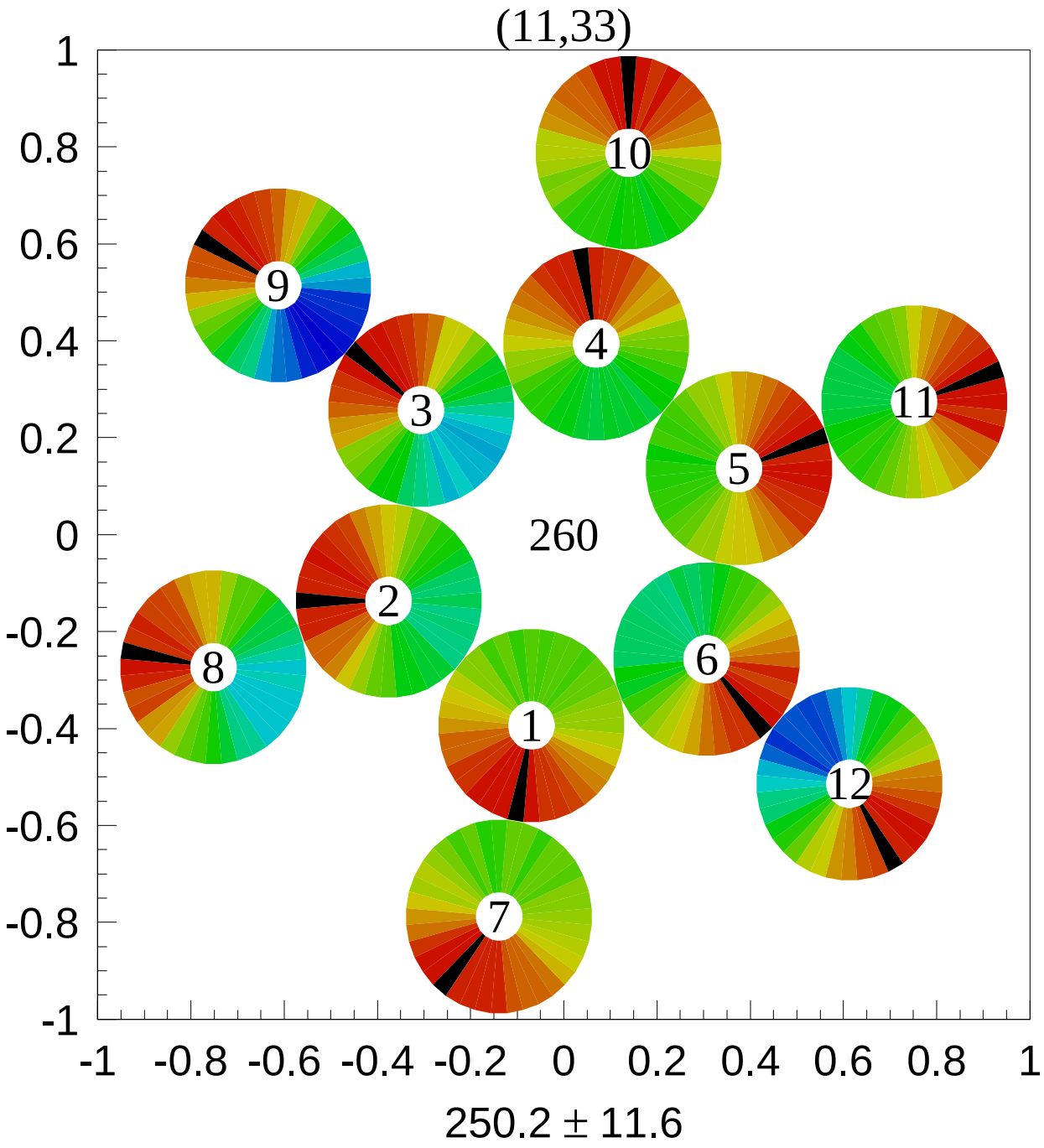

(10,37)
tilted LEDs
123 128 124 123 127 128
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 125 125 125 126 126
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

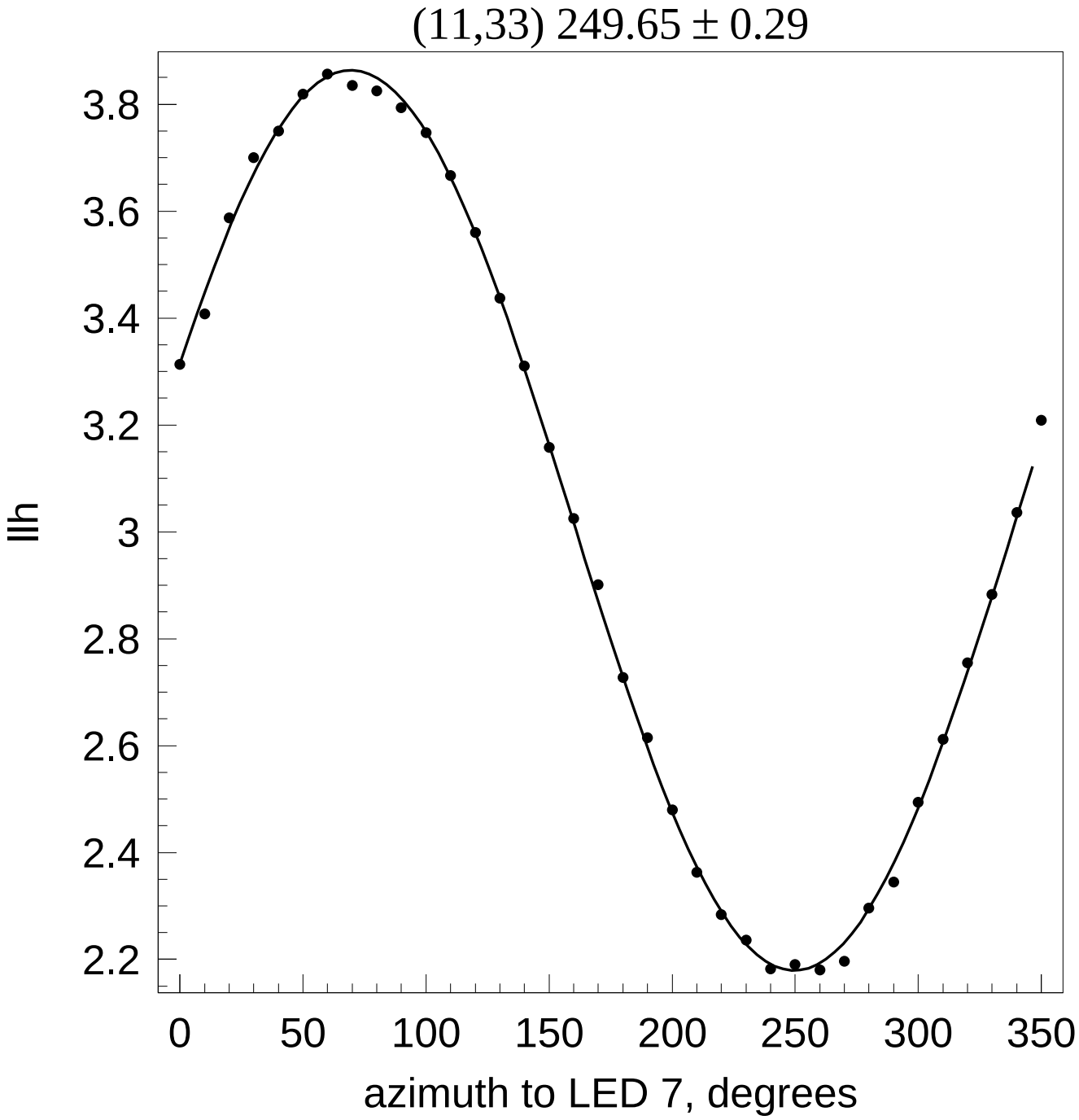

(10,37)
11
12
5
10
6
4
340
1
3
7
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
326.8 ± 23.3

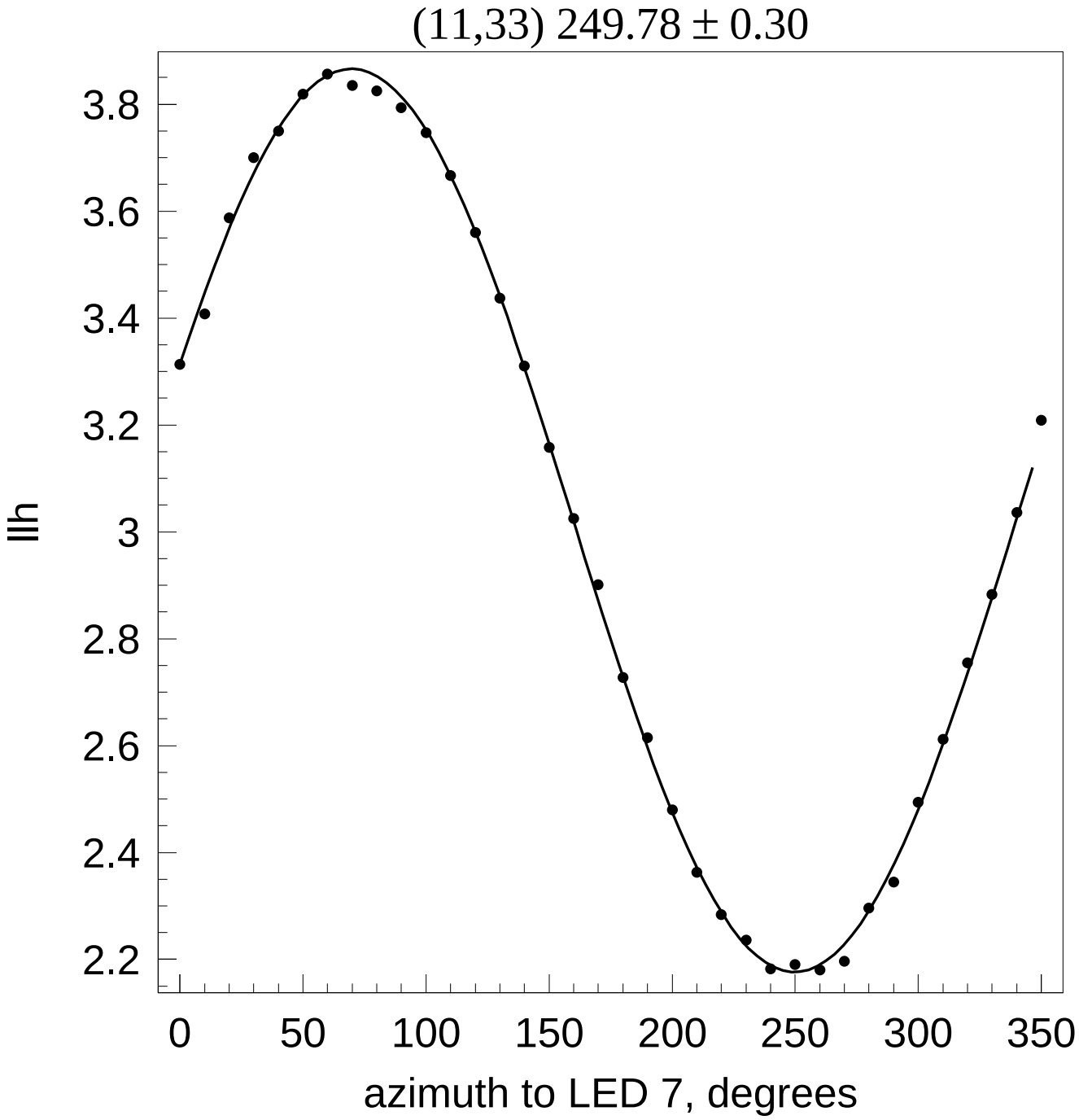

(10,37) 326.39 ± 0.98
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

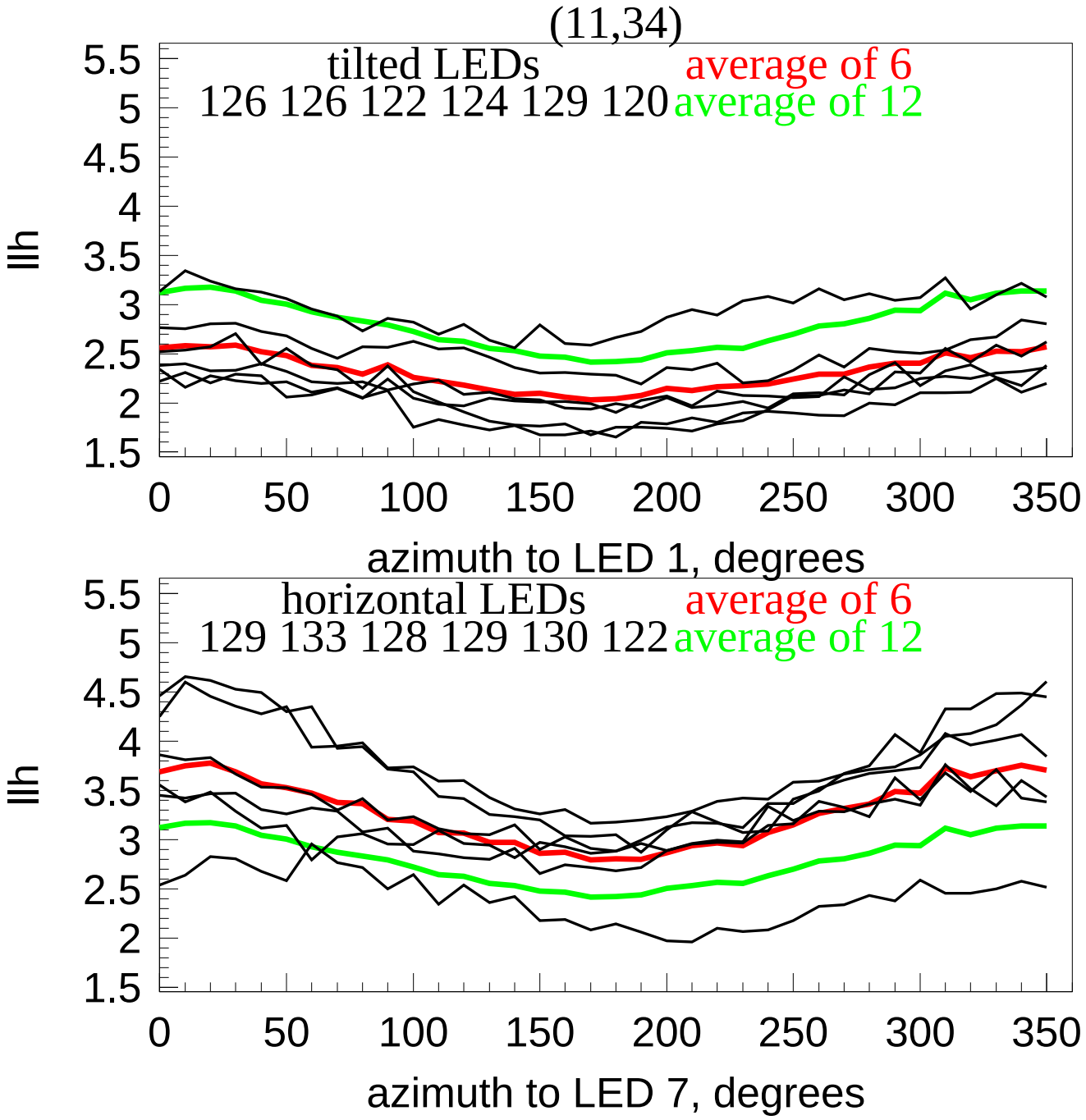

(10,37) 326.46 ± 0.96
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

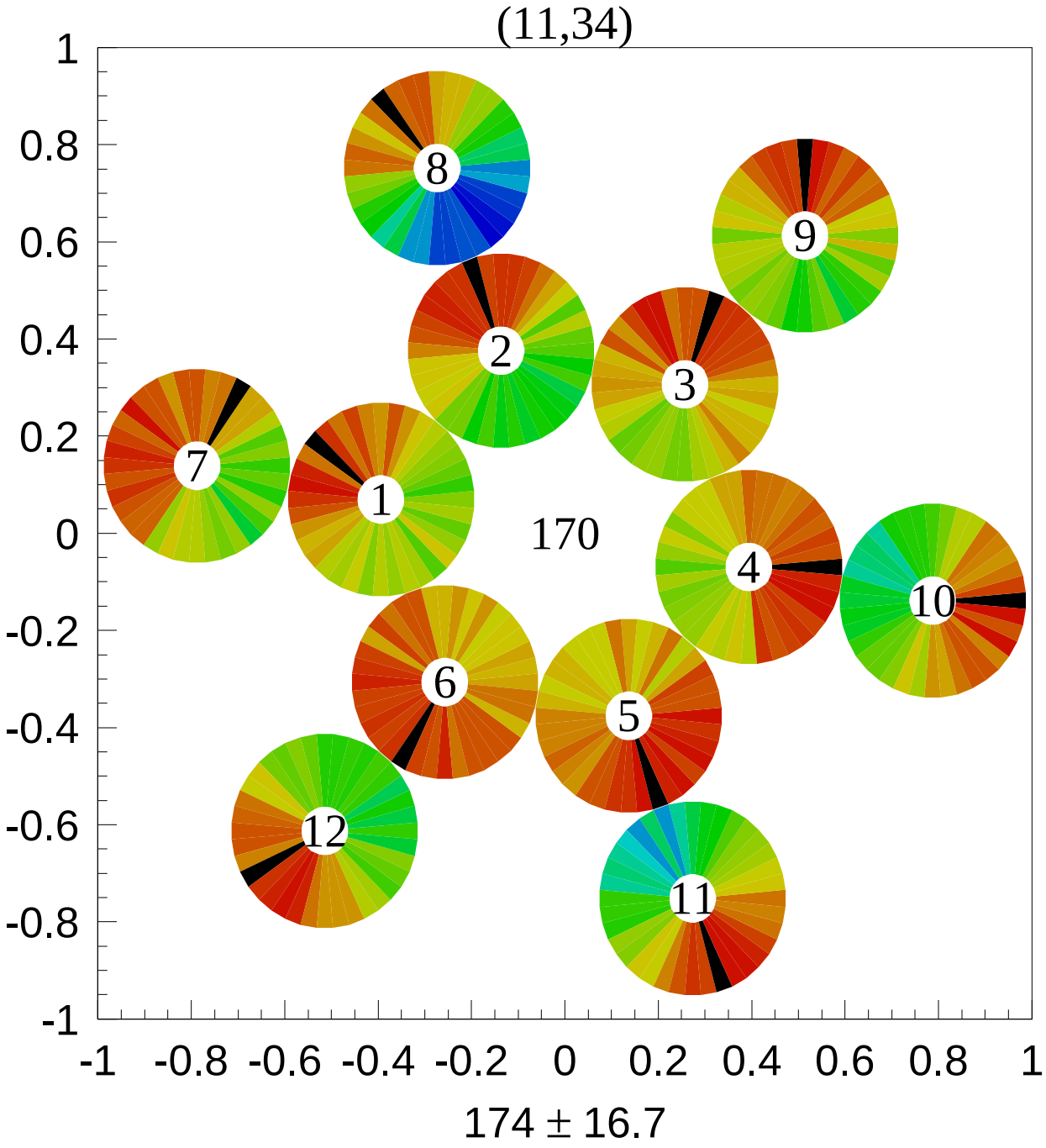

(11,33)
tilted LEDs
127 124 128 130 129 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 124 128 131 119 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

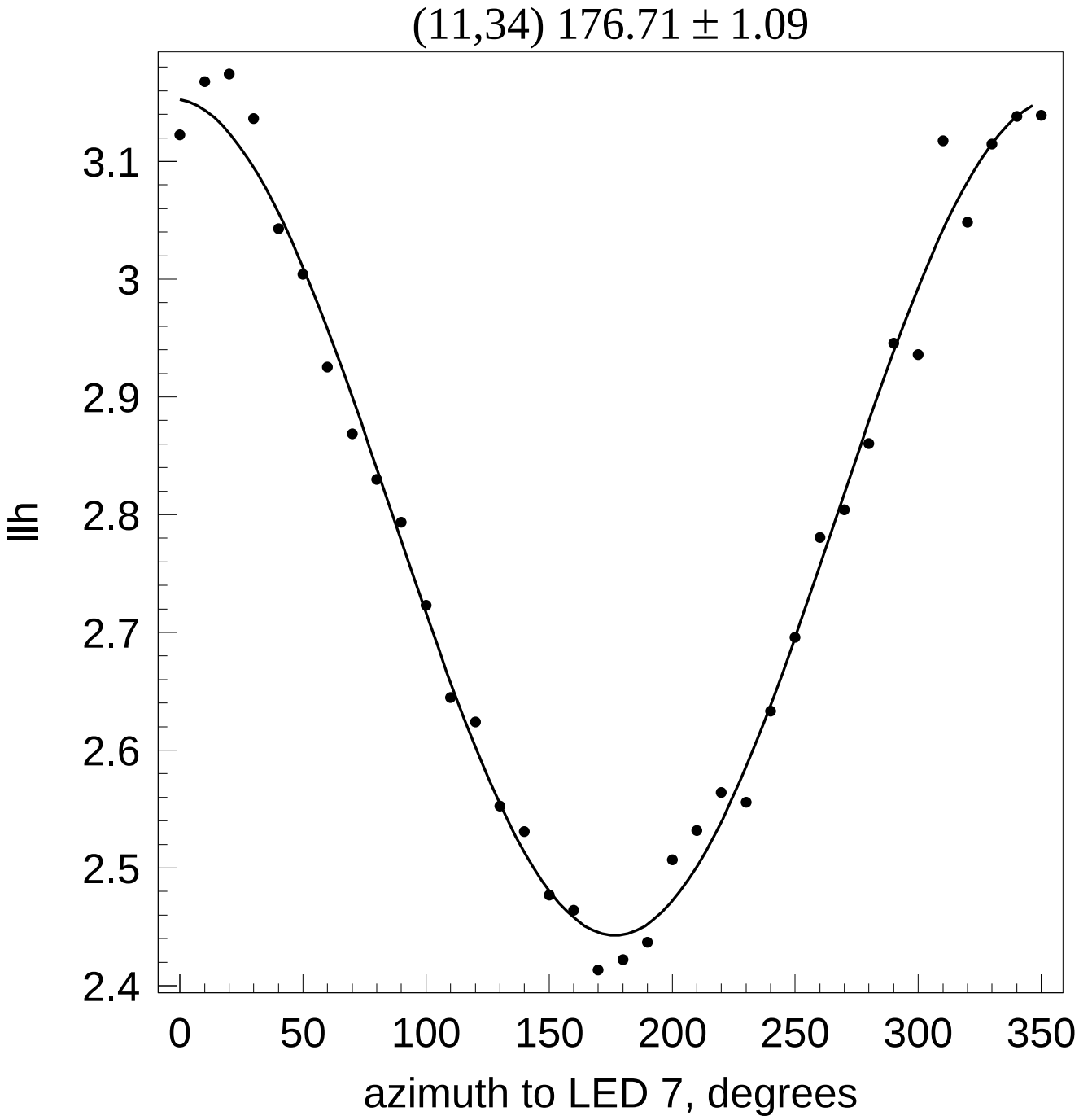

(11,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
250.2 ± 11.6
260
1
2
3
4
5
6
7
8
9
10
11
12

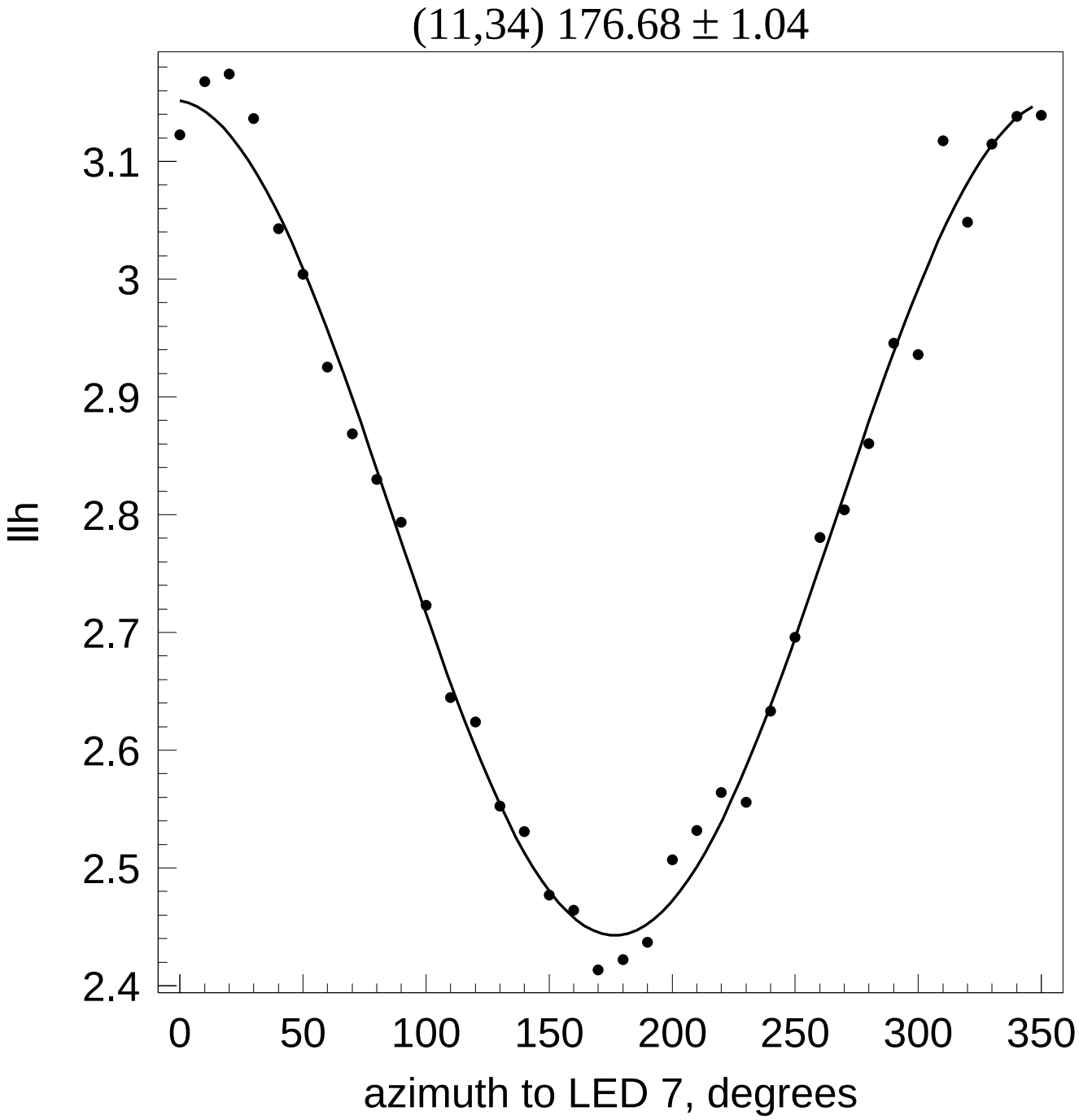

(11,33) 249.65 ± 0.29
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

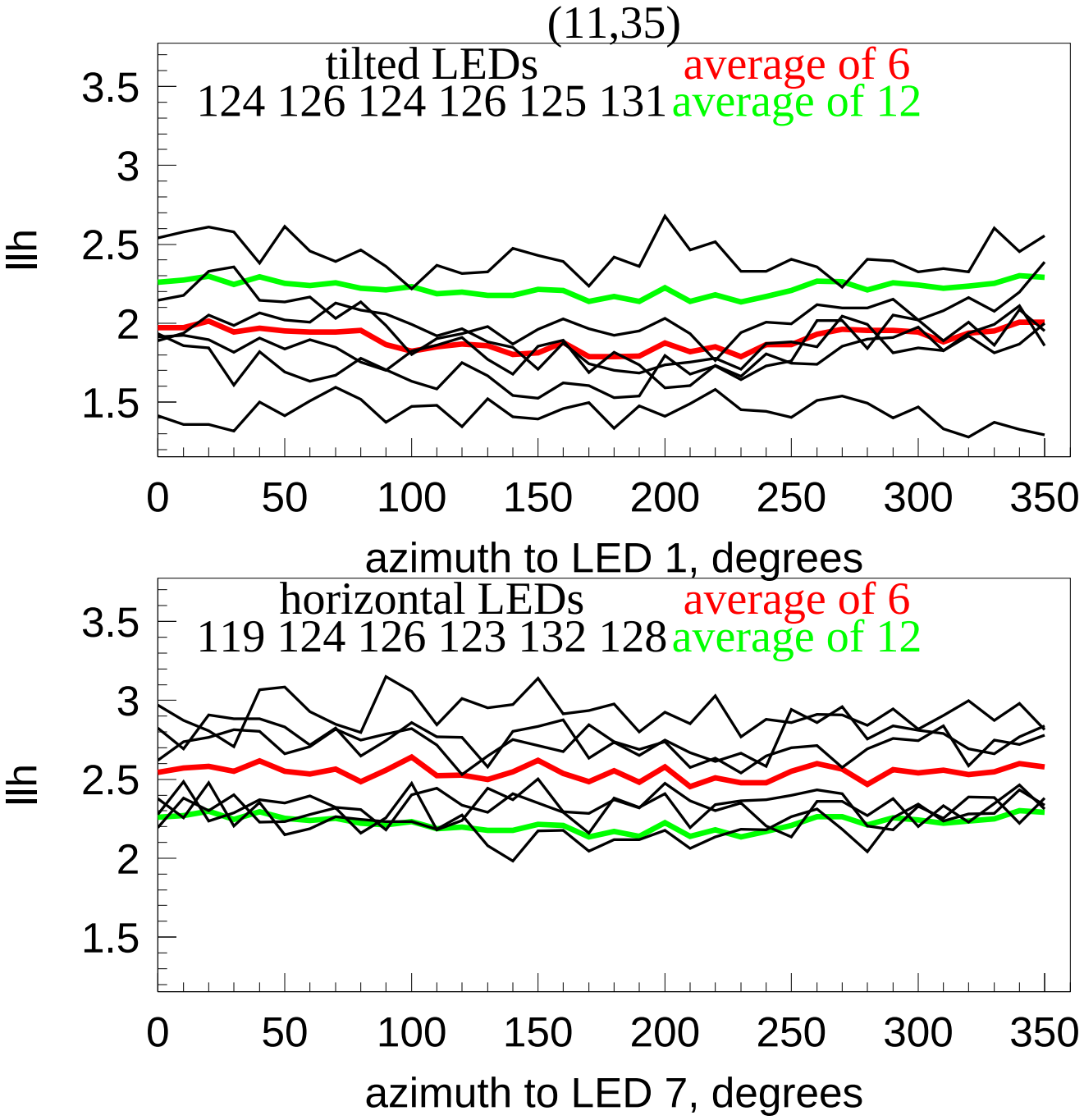

(11,33) 249.78 ± 0.30
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

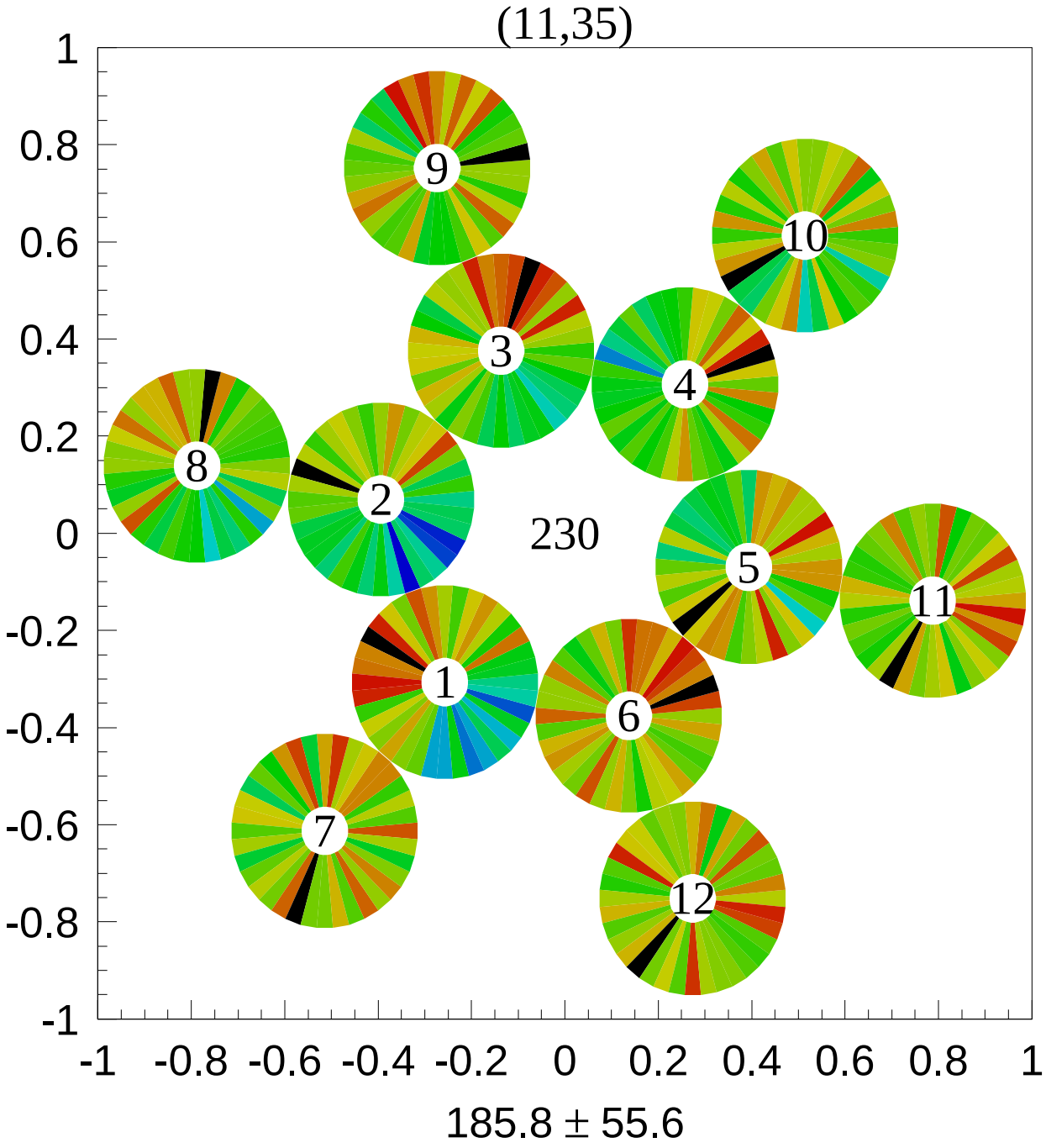

(11,34)
tilted LEDs
126 126 122 124 129 120
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
129 133 128 129 130 122
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

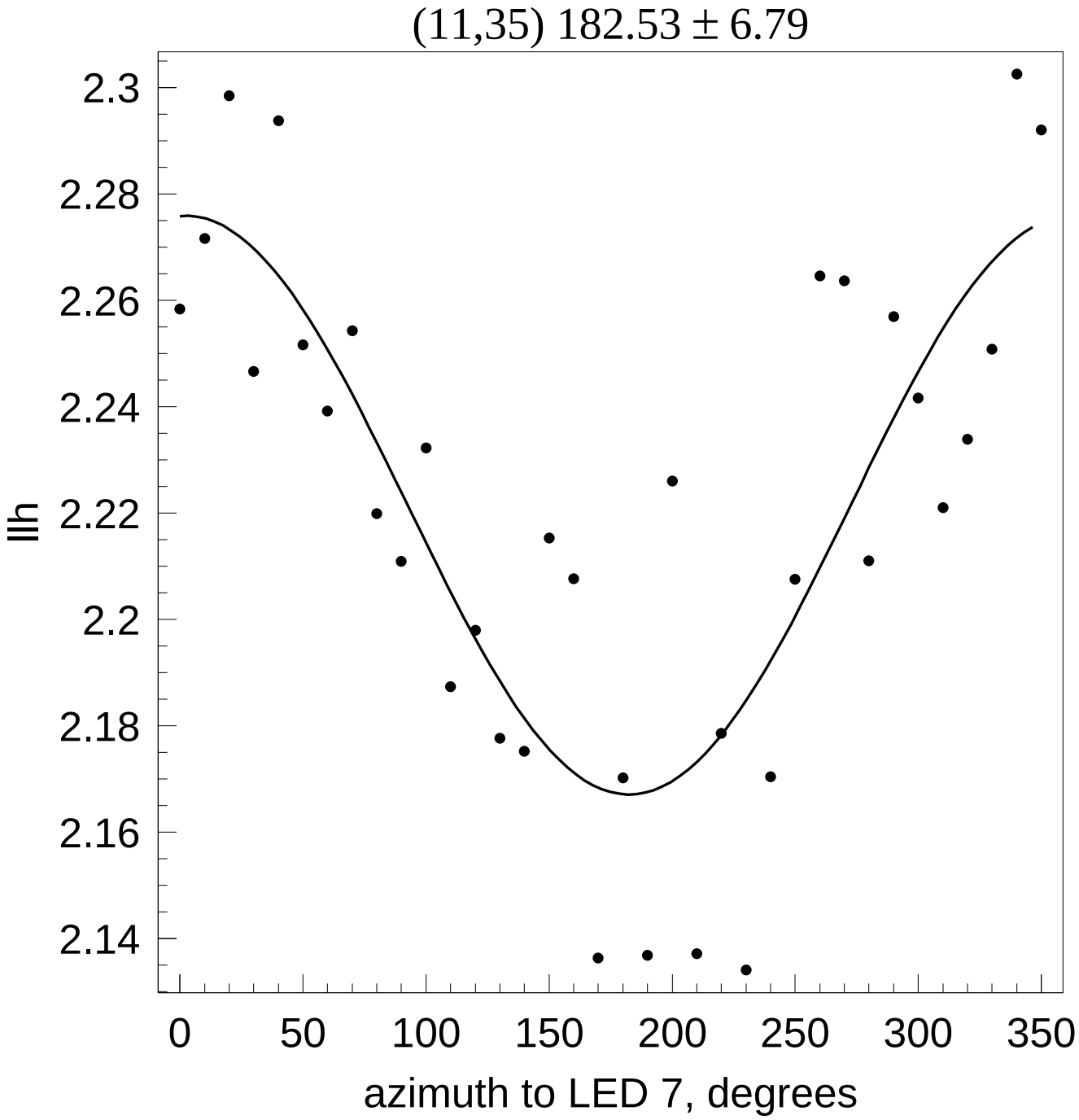

(11,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
174 ± 16.7

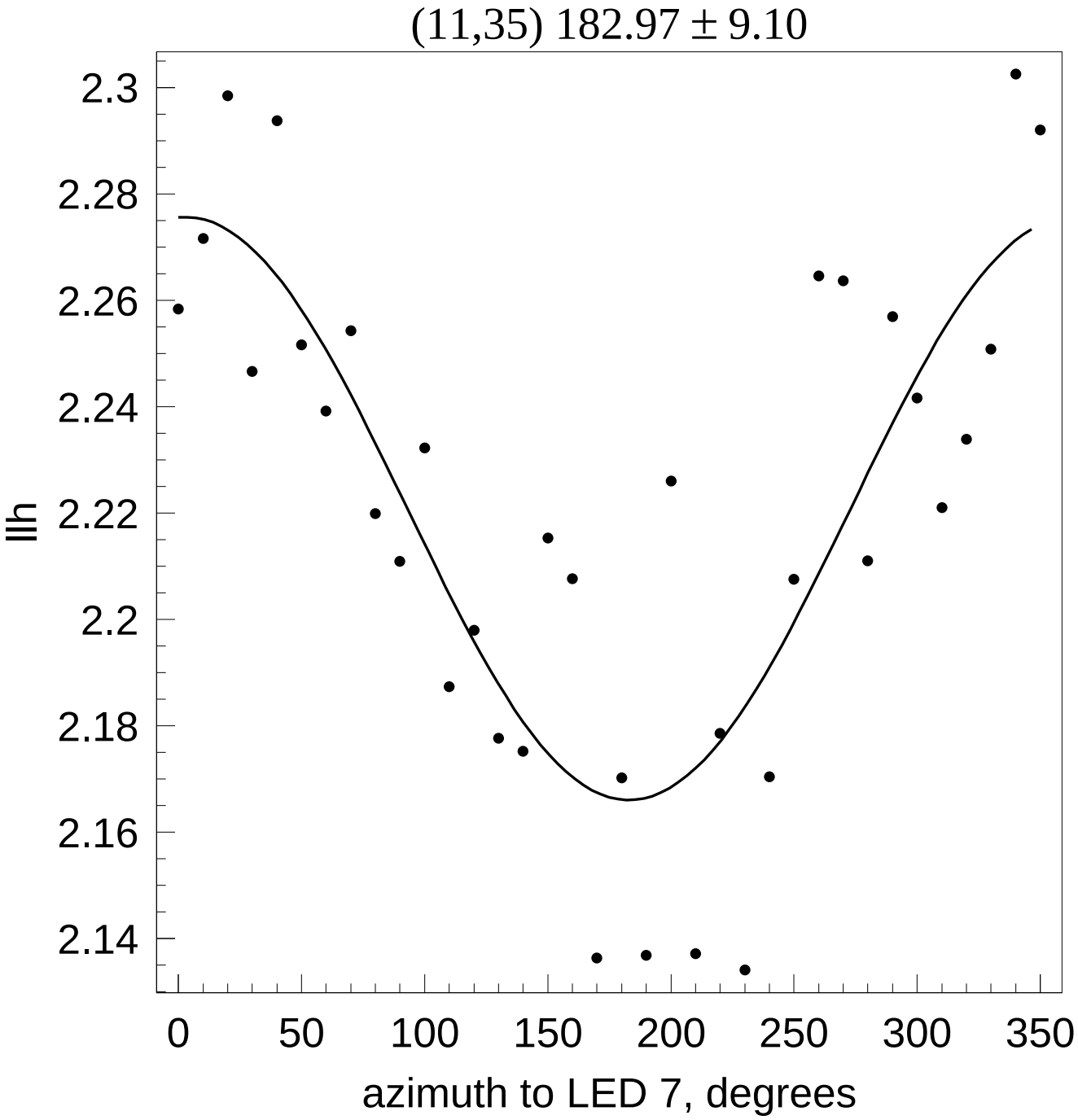

(11,34) 176.71 ± 1.09
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

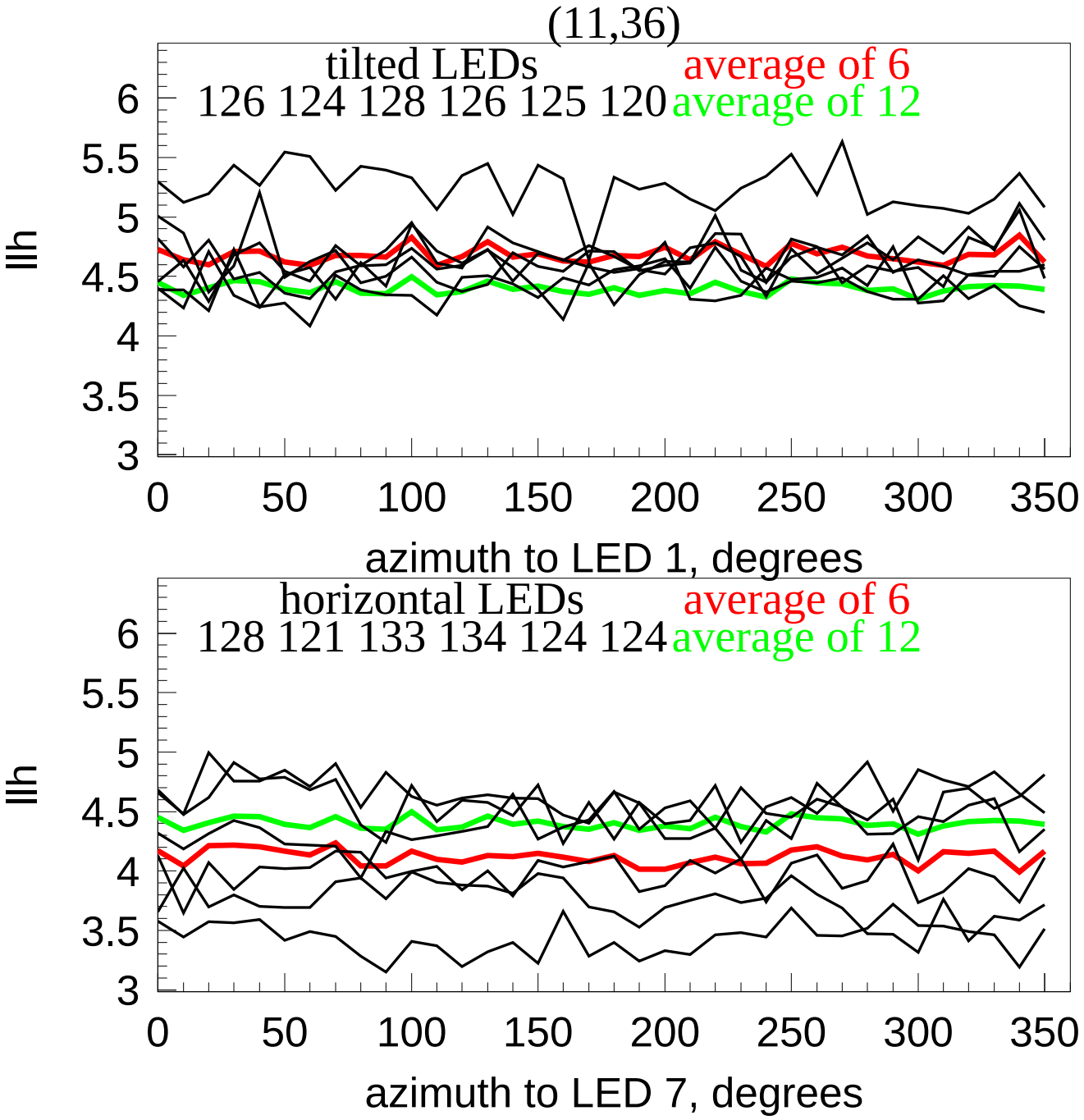

(11,34) 176.68 ± 1.04
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

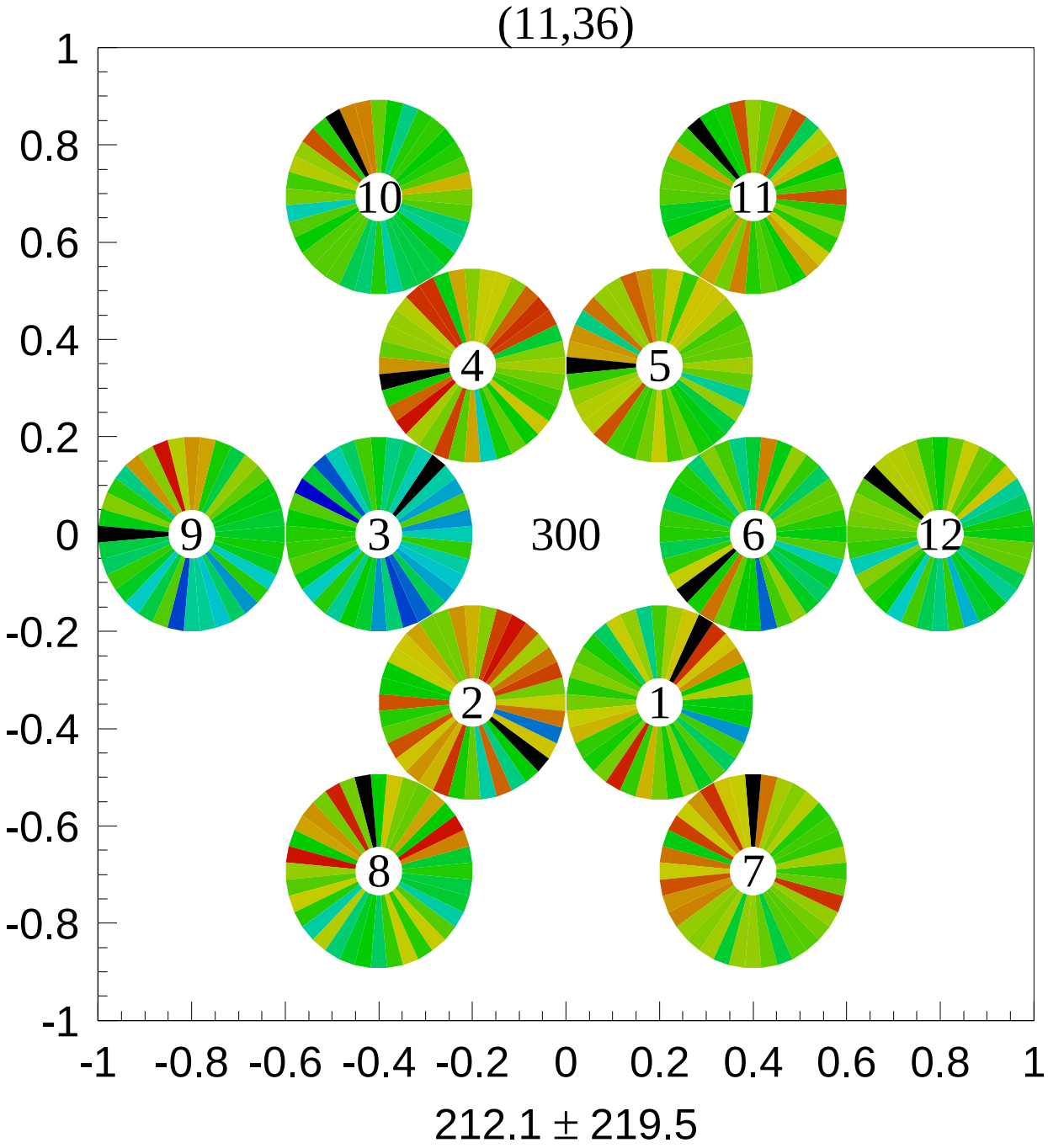

(11,35)
tilted LEDs
124 126 124 126 125 131
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 124 126 123 132 128
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

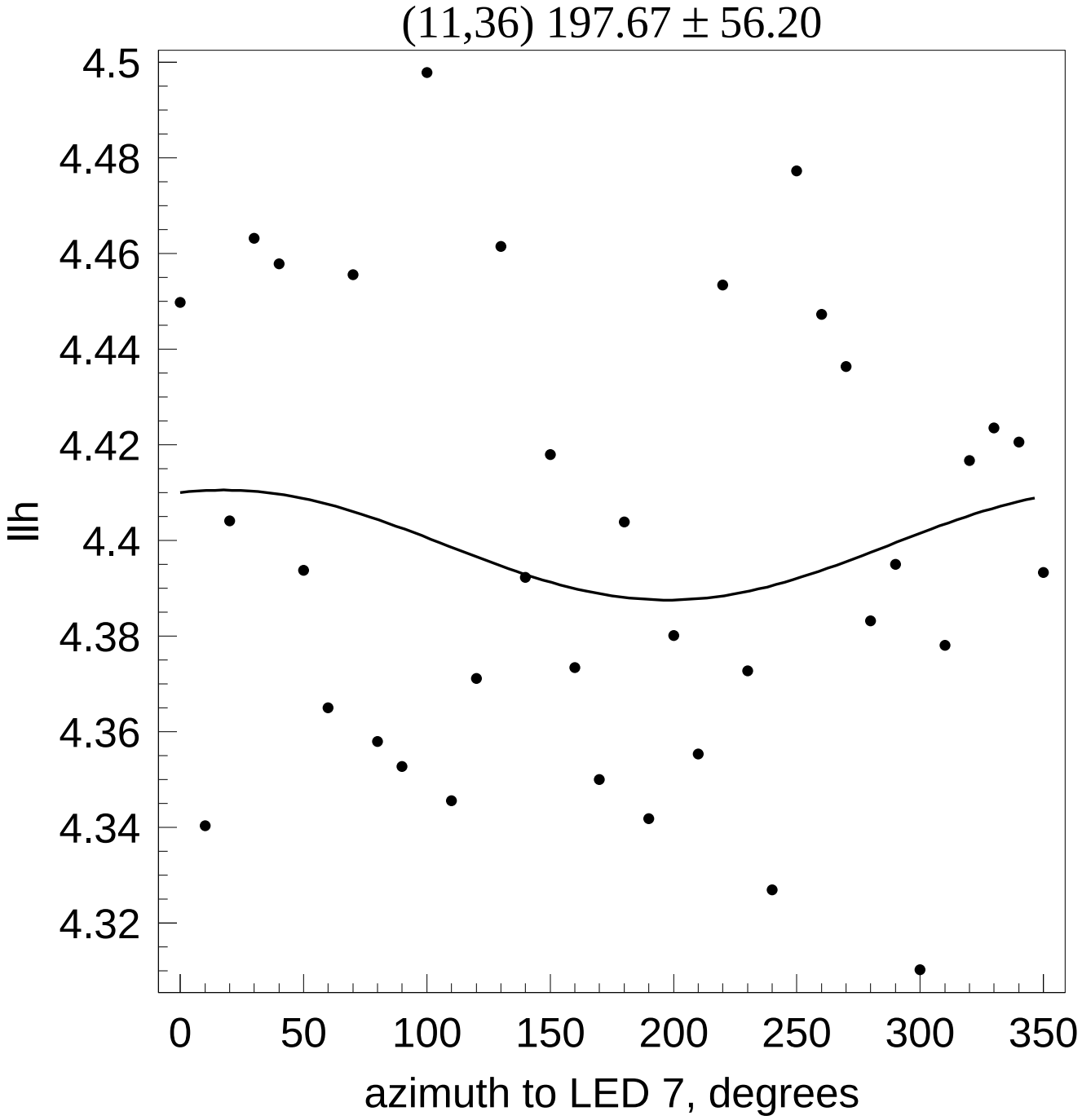

(11,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
185.8 ± 55.6

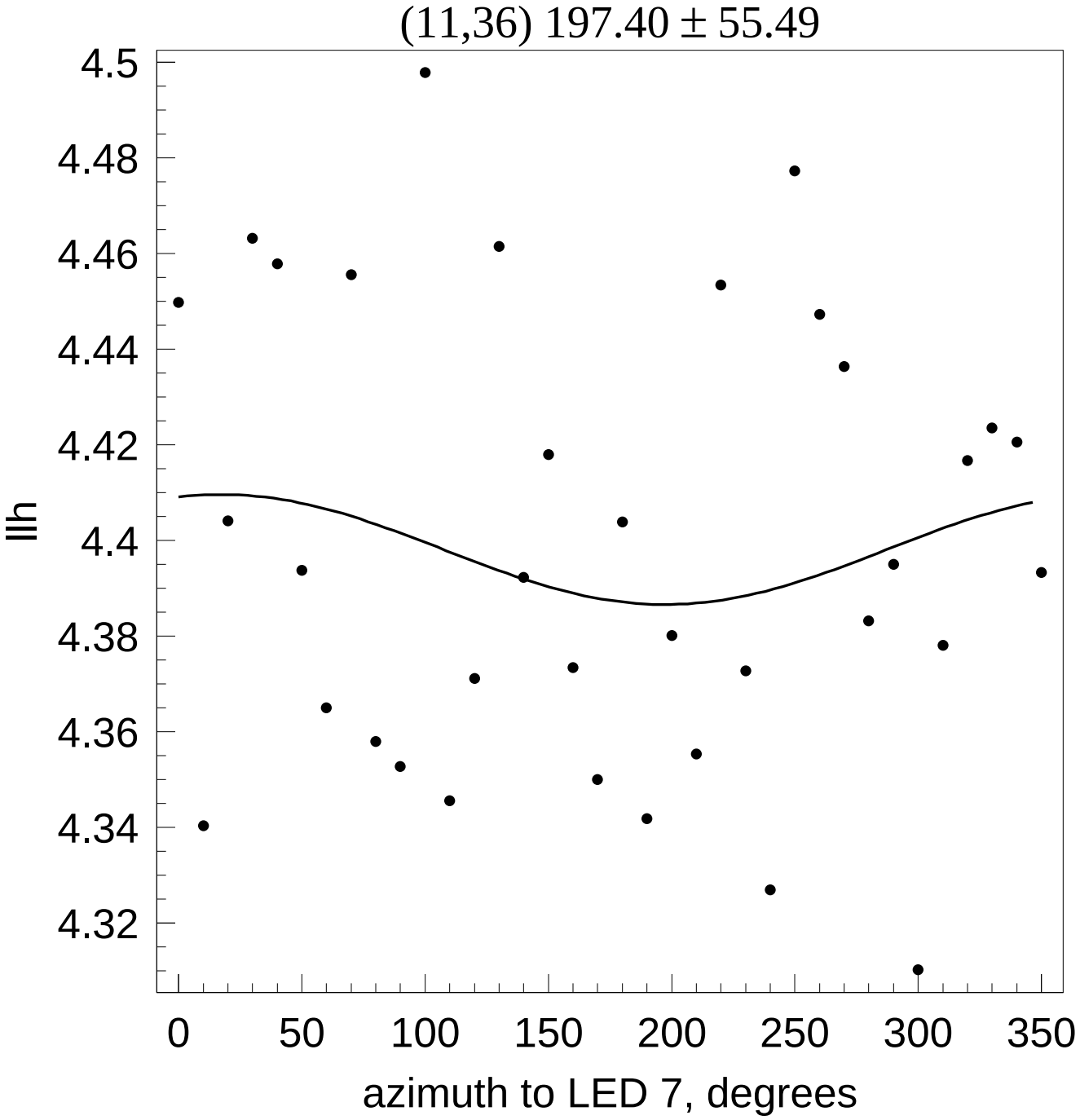

(11,35) 182.53 ± 6.79
2.3
2.28
2.26
2.24
2.22
2.2
2.18
2.16
2.14
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

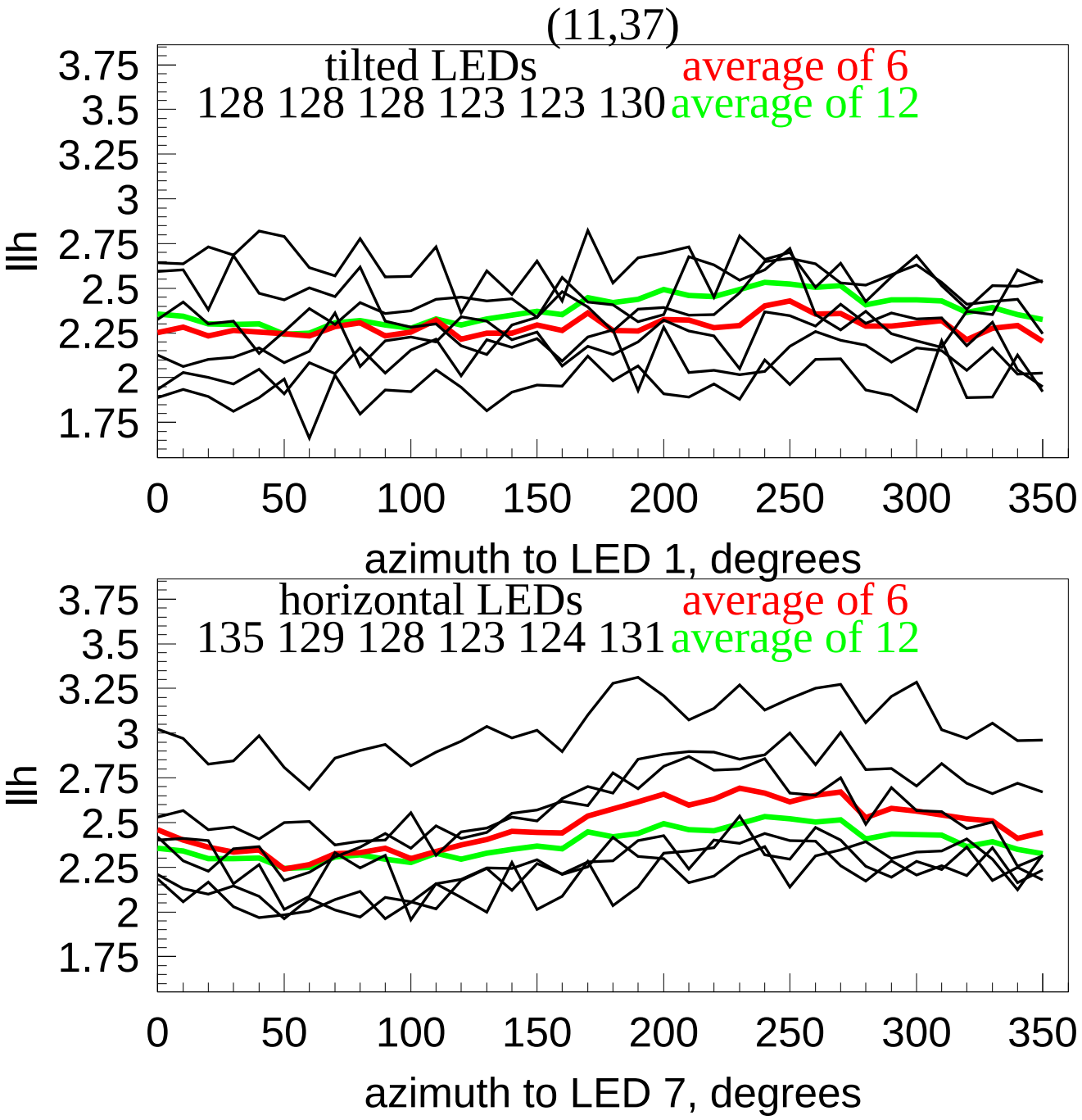

(11,35) 182.97 ± 9.10
2.3
2.28
2.26
2.24
2.22
2.2
2.18
2.16
2.14
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

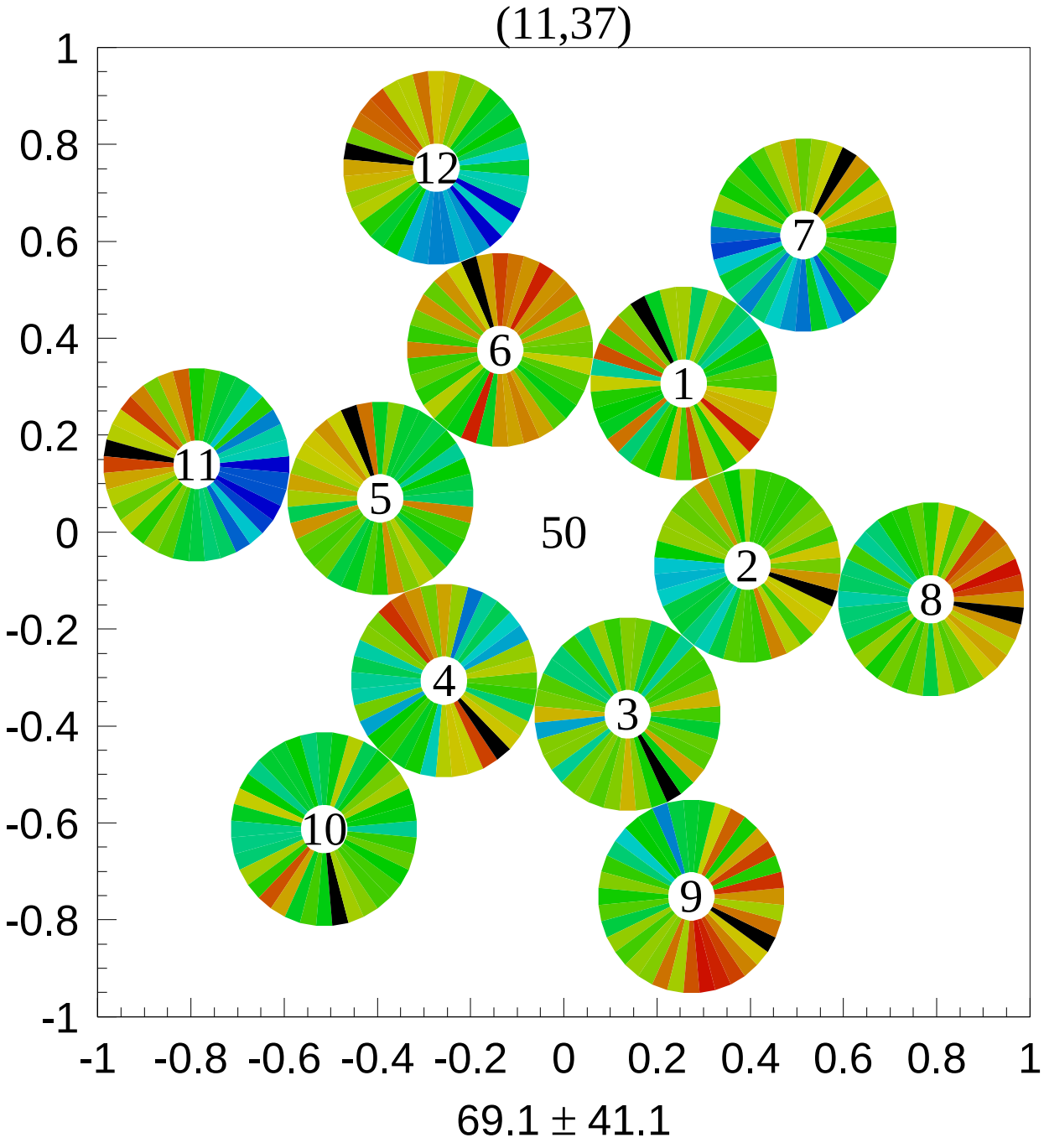

(11,36)
tilted LEDs
126 124 128 126 125 120
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 121 133 134 124 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

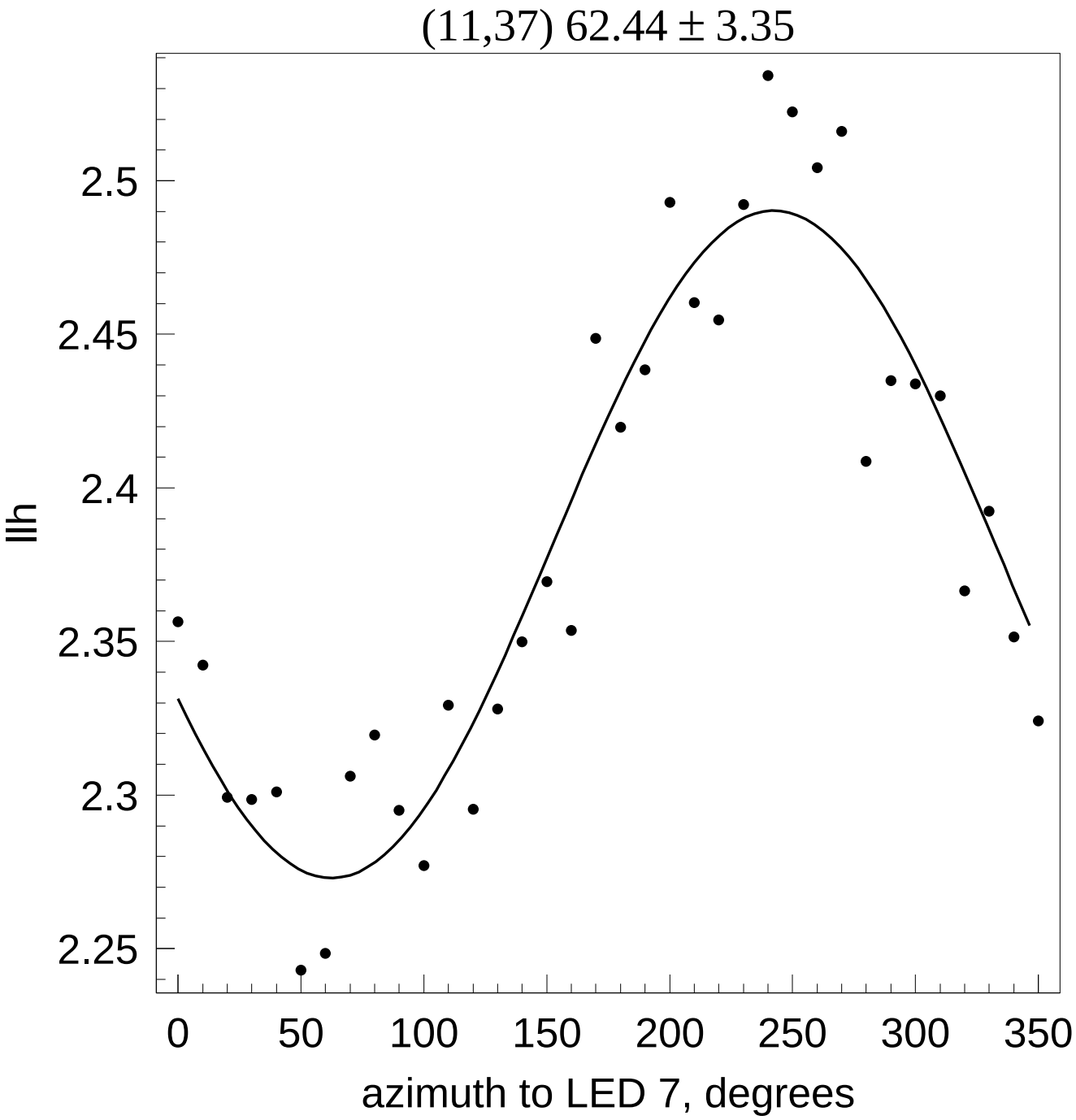

(11,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
212.1 ± 219.5

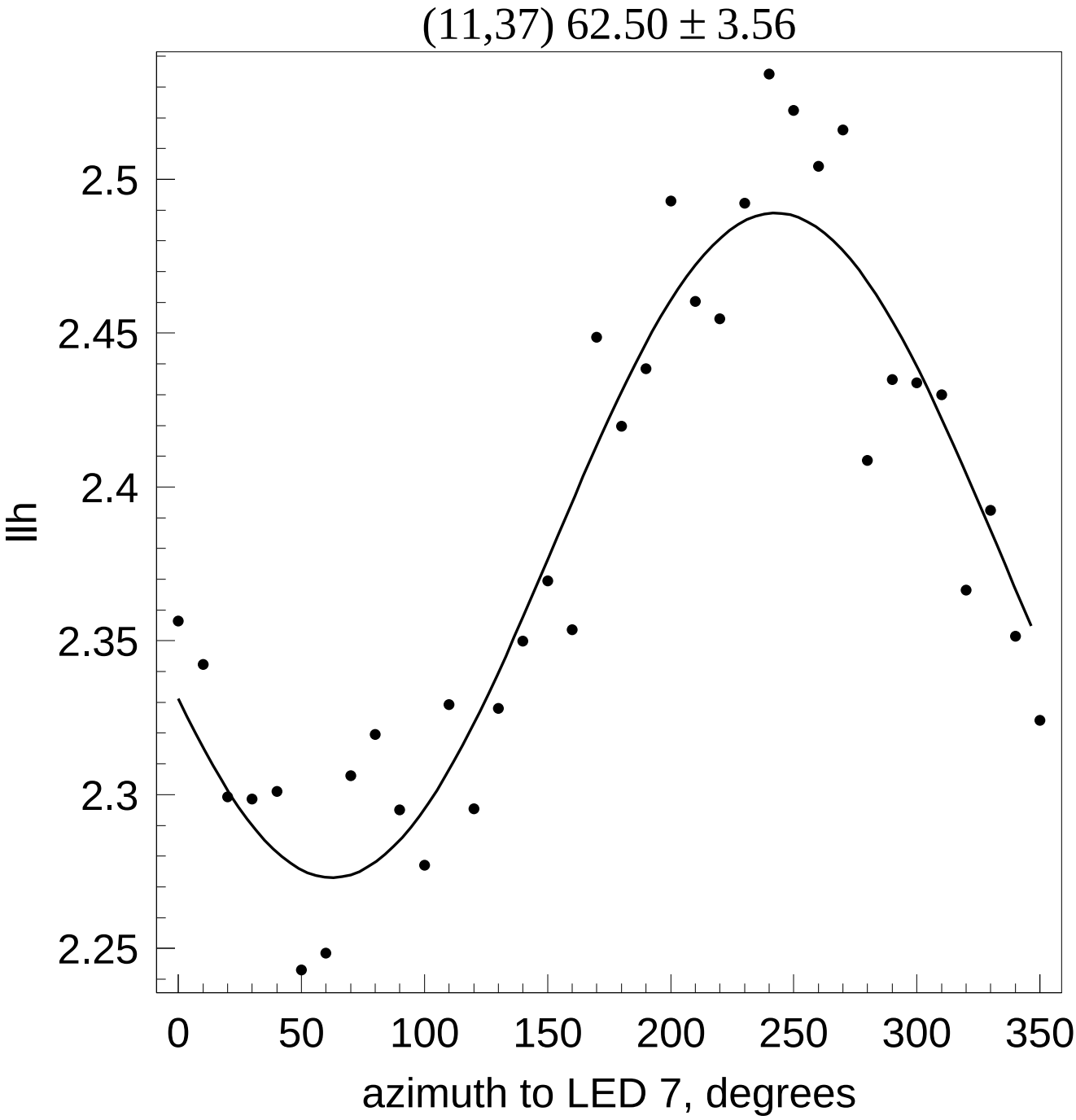

(11,36) 197.67 ± 56.20
4.5
4.48
4.46
4.44
4.42
4.4
4.38
4.36
4.34
4.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

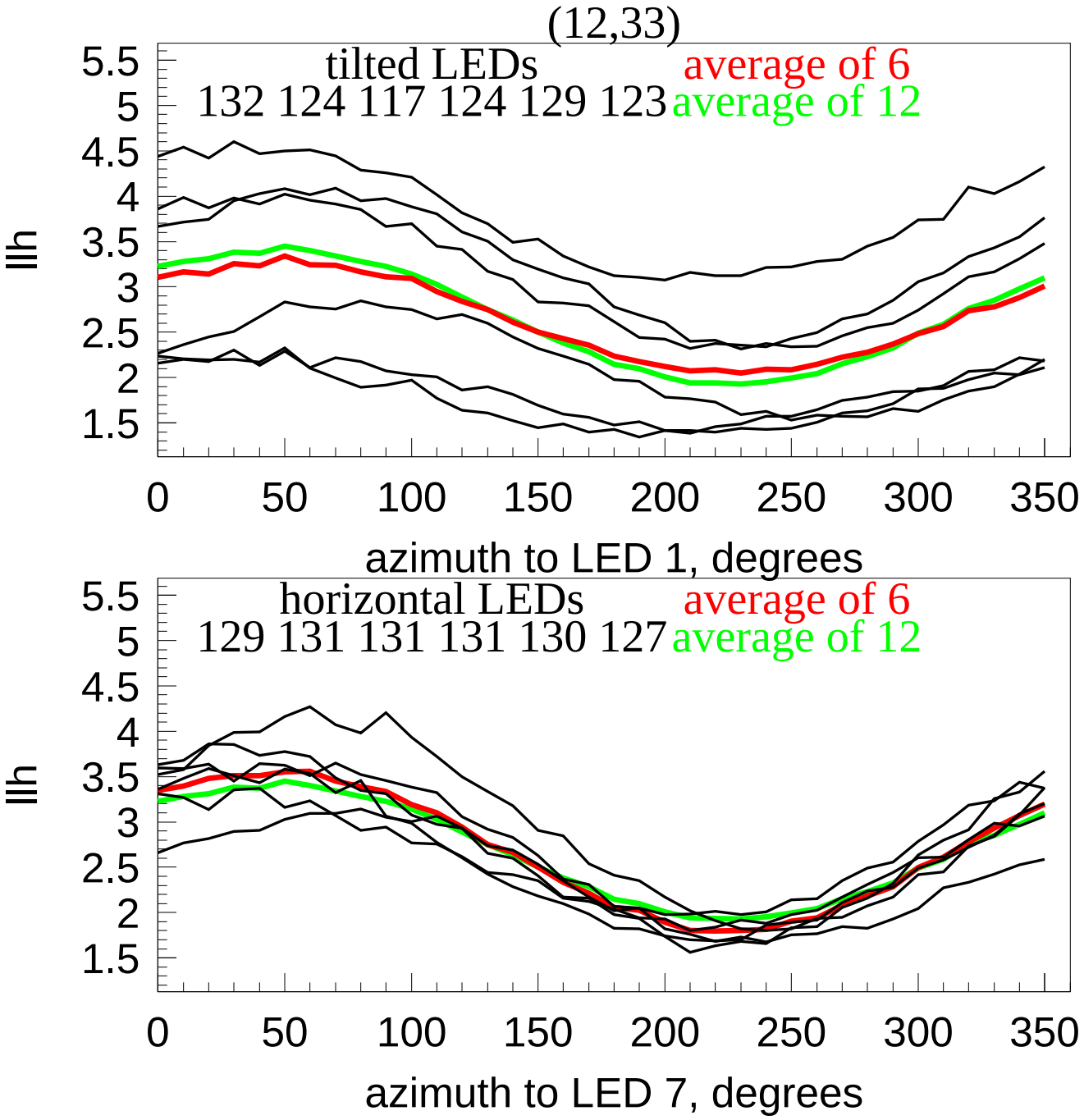

(11,36) 197.40 ± 55.49
4.5
4.48
4.46
4.44
4.42
4.4
4.38
4.36
4.34
4.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

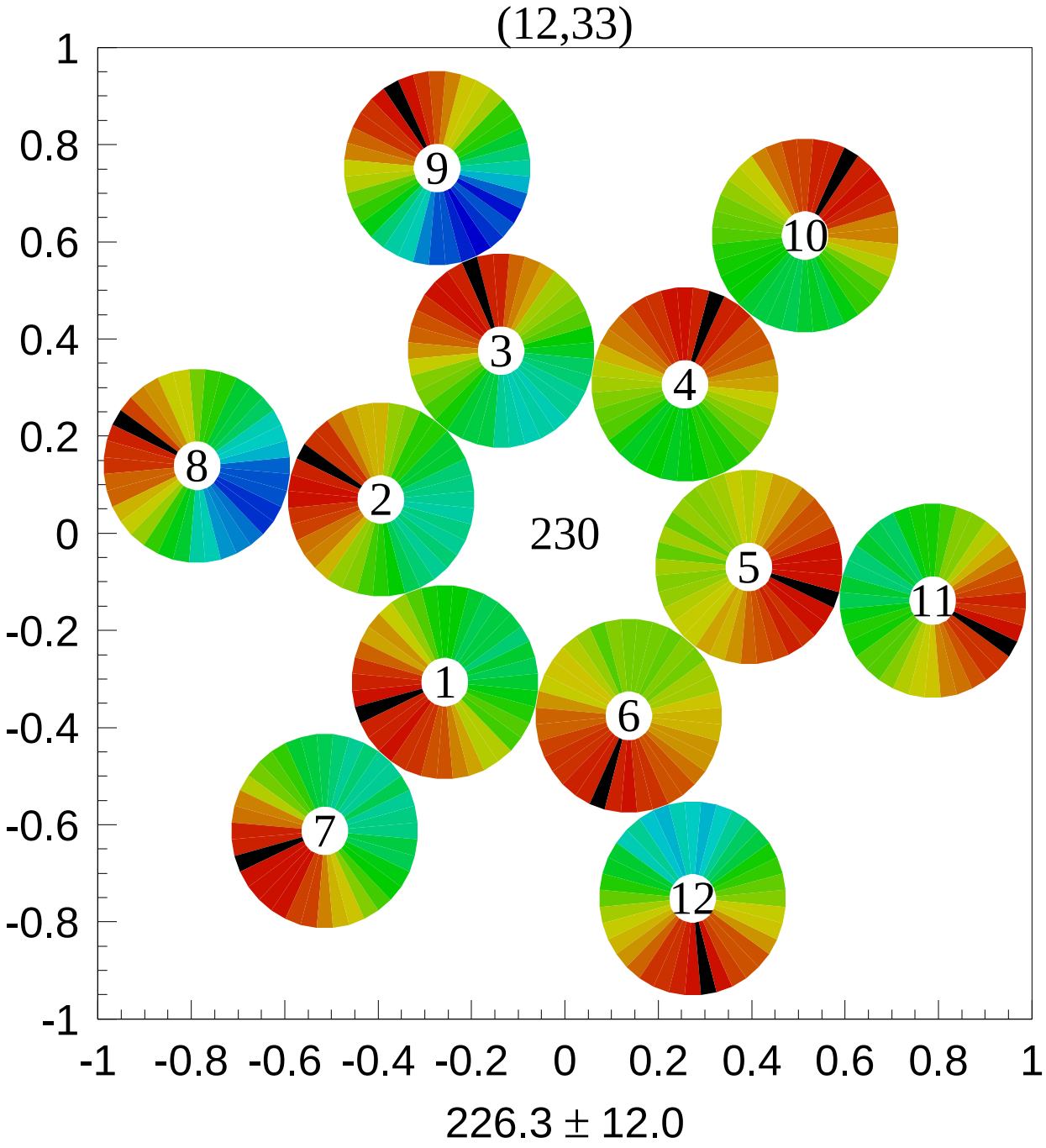

(11,37)
tilted LEDs
128 128 128 123 123 130
average of 6
average of 12
llh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
135 129 128 123 124 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

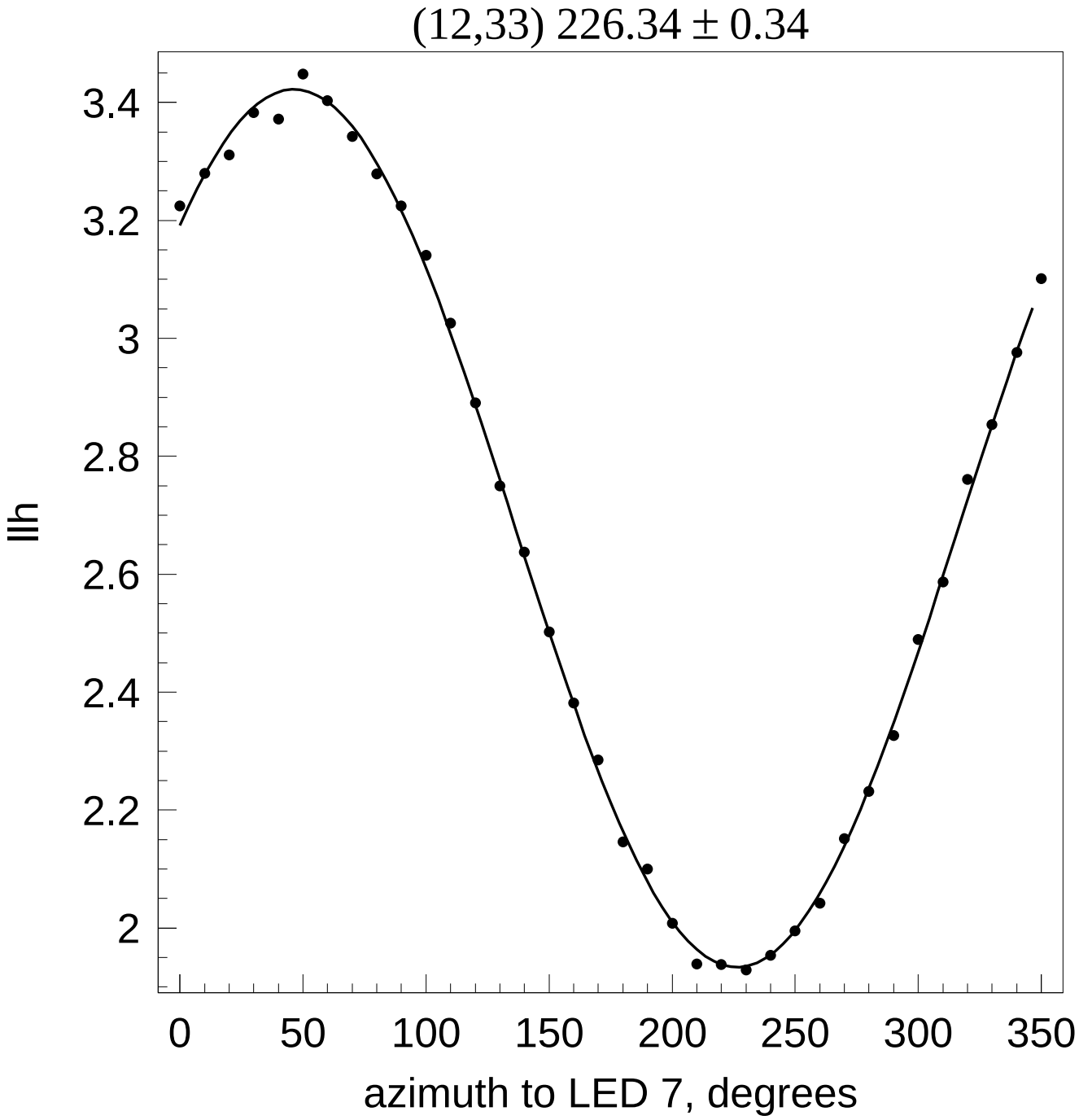

(11,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
69.1 ± 41.1

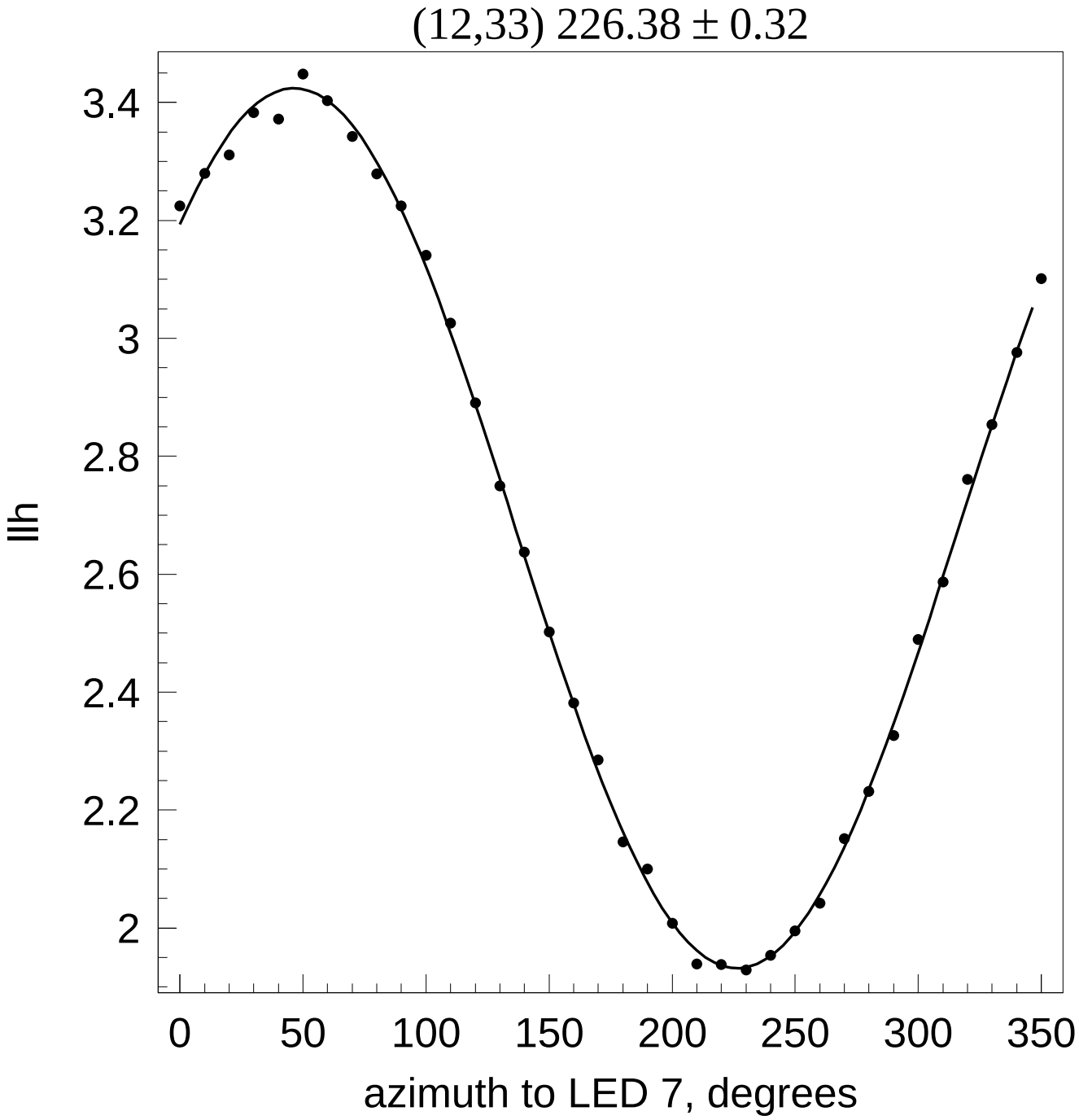

(11,37) 62.44 ± 3.35
2.5
2.45
2.4
2.35
2.3
2.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

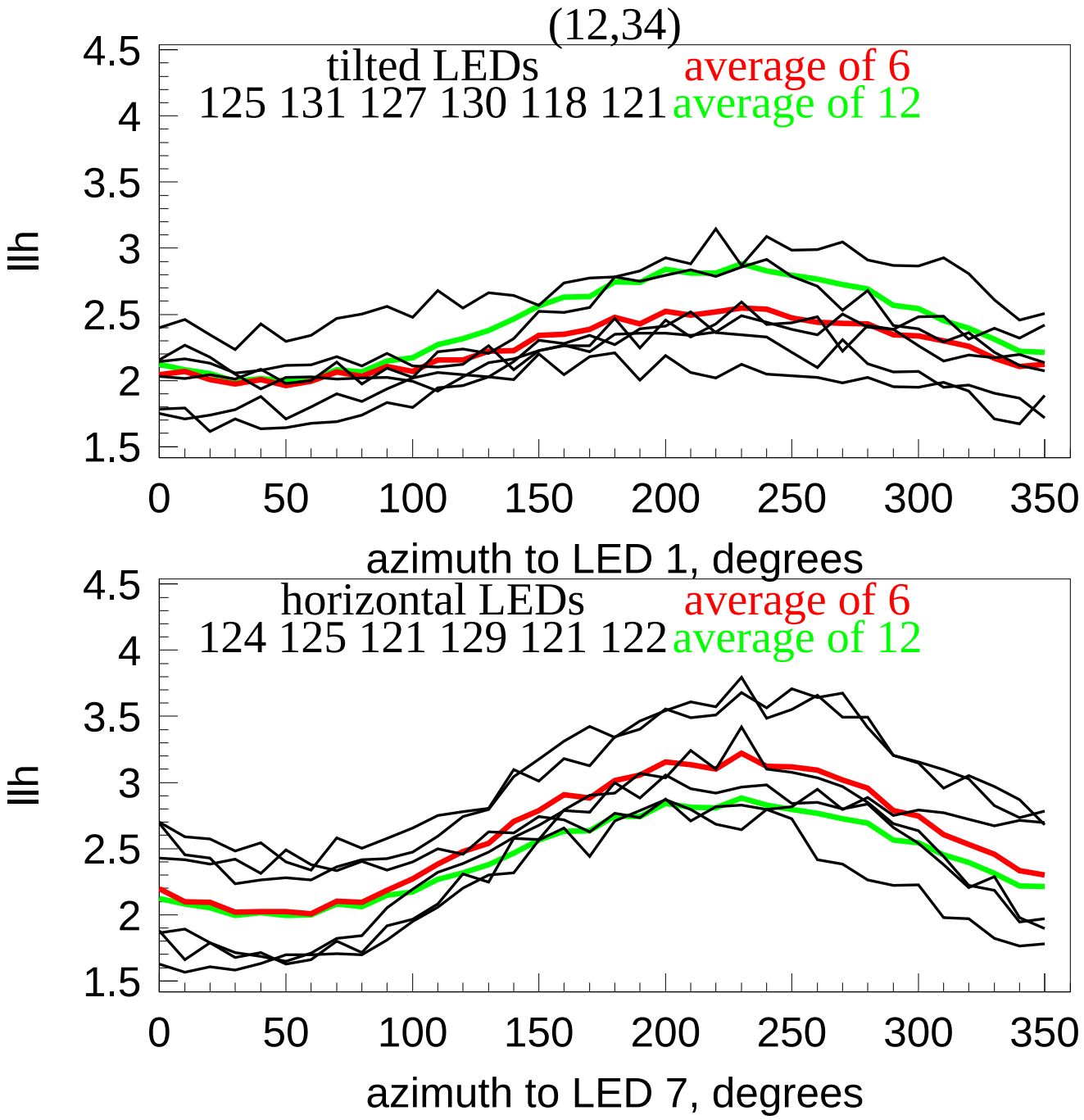

(11,37) 62.50 ± 3.56
2.5
2.45
2.4
2.35
2.3
2.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

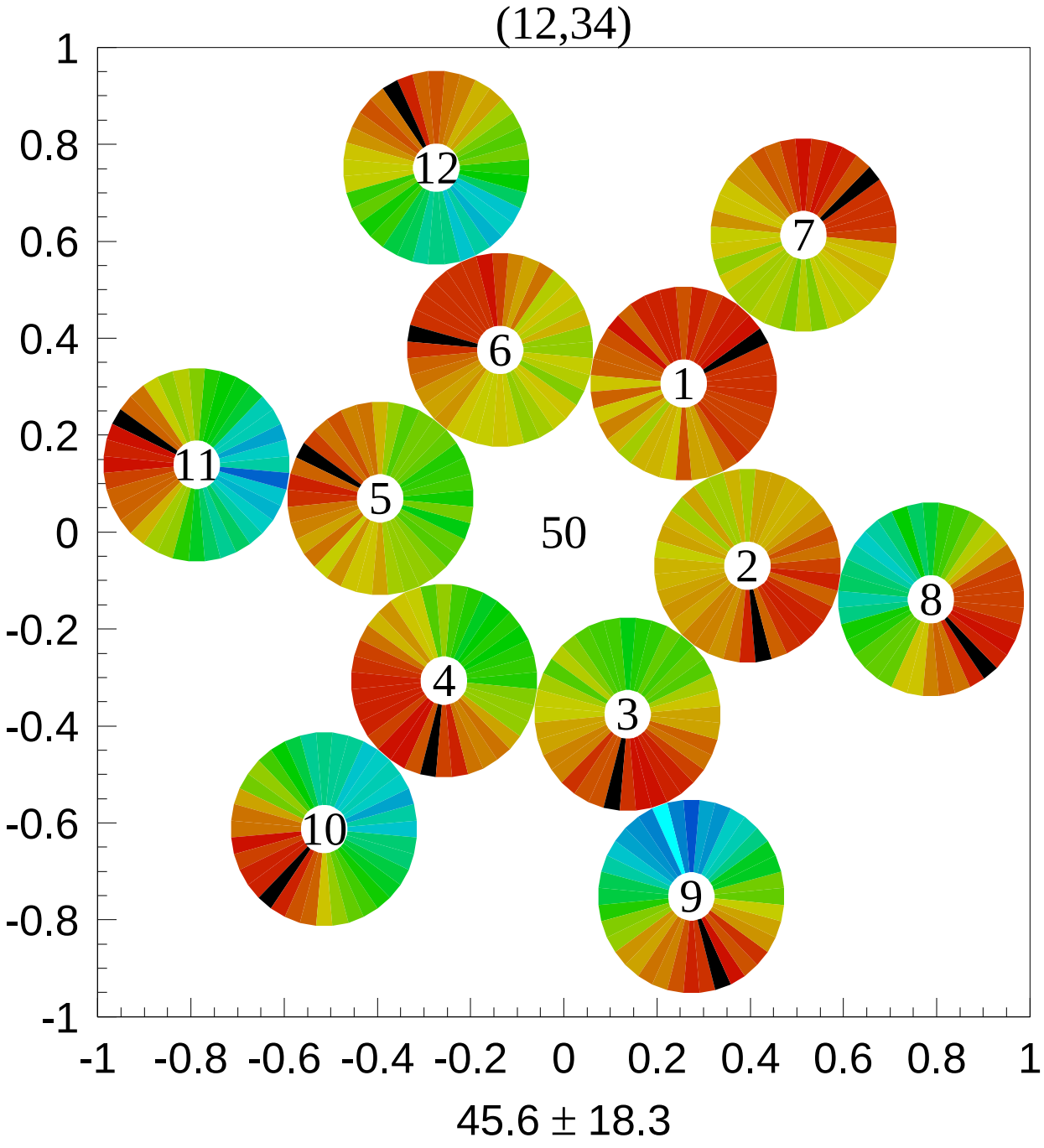

(12,33)
tilted LEDs
132 124 117 124 129 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 131 131 131 130 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

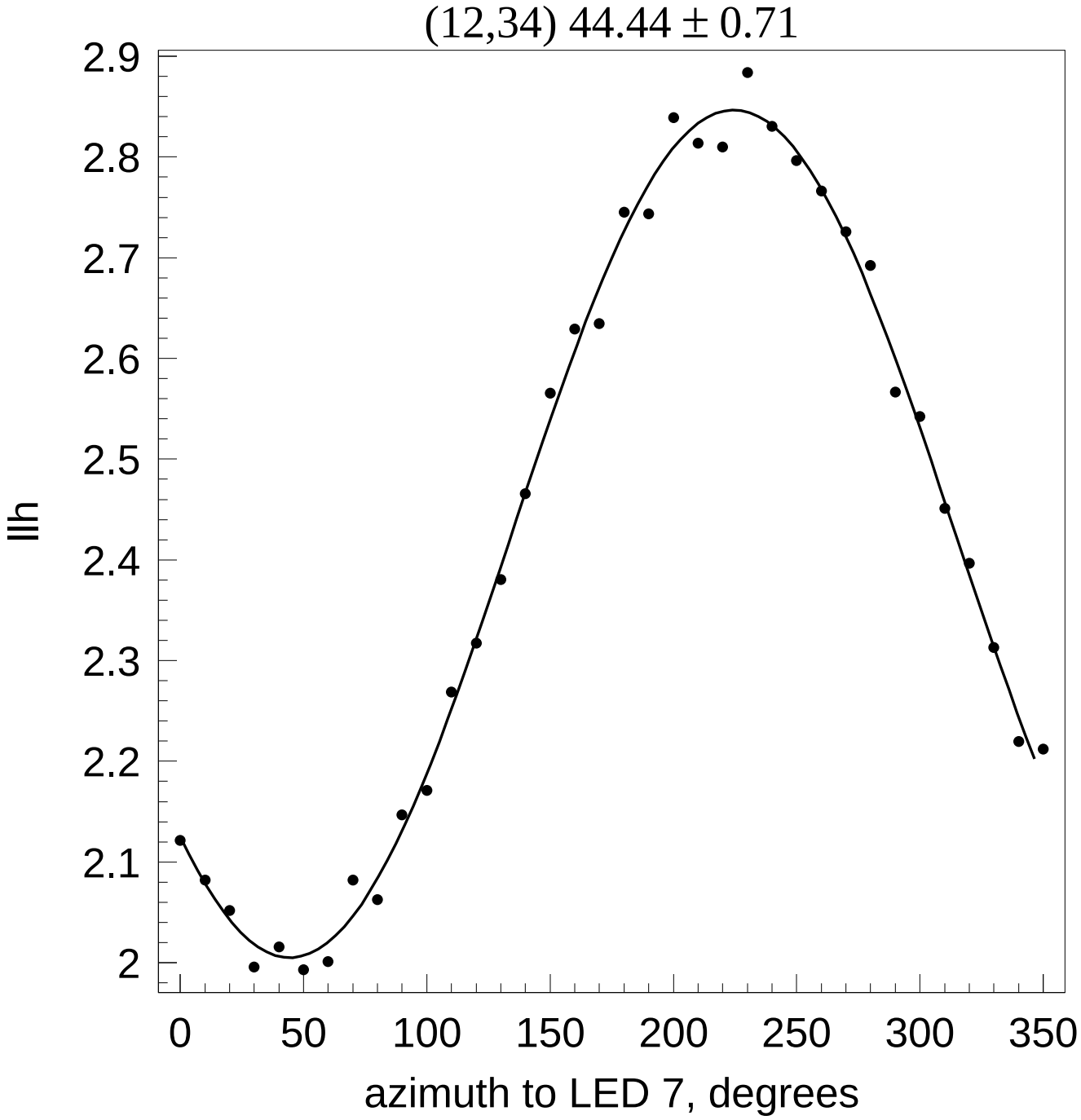

(12,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
226.3 ± 12.0

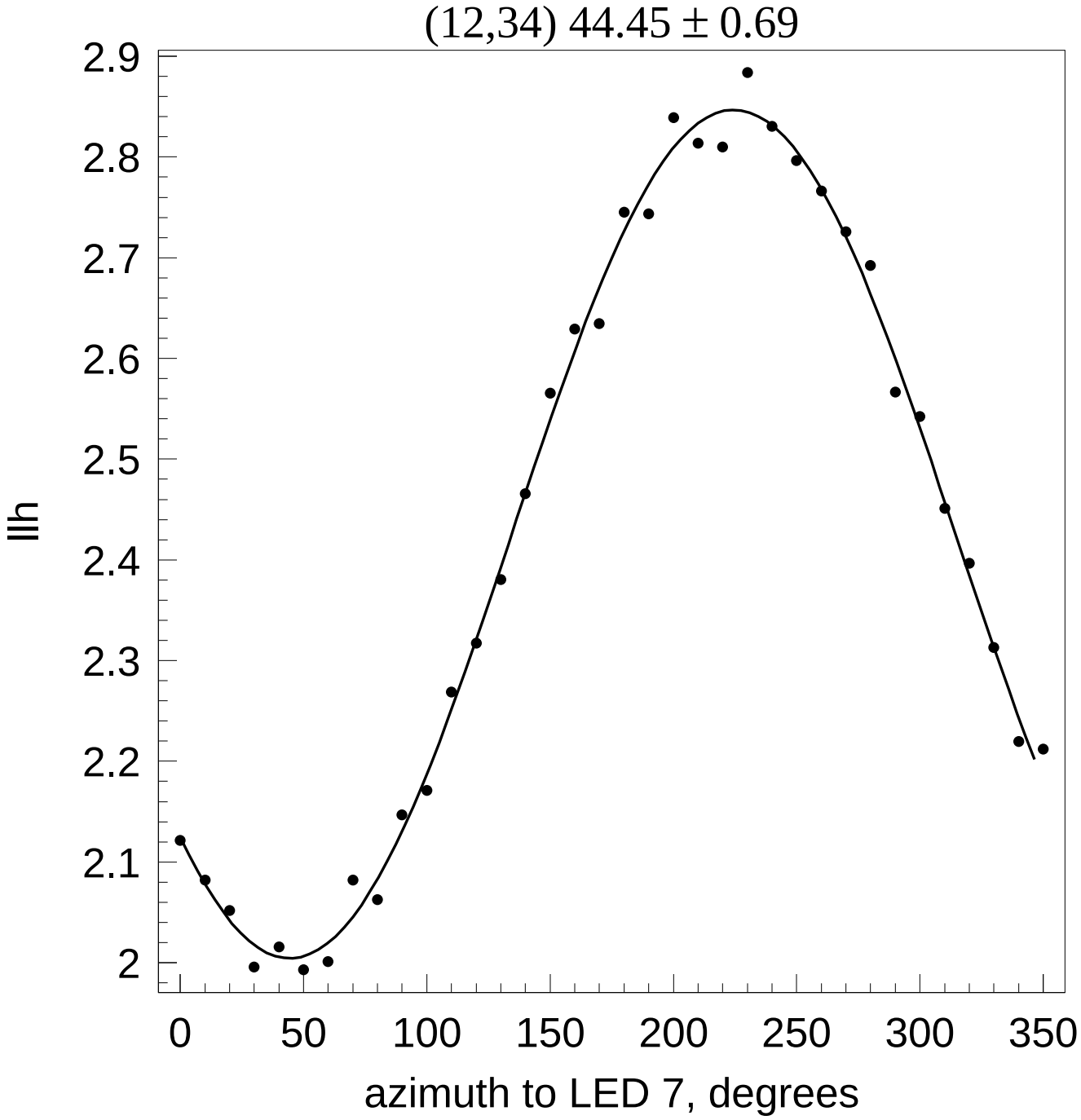

(12,33) 226.34 ± 0.34
3.4
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

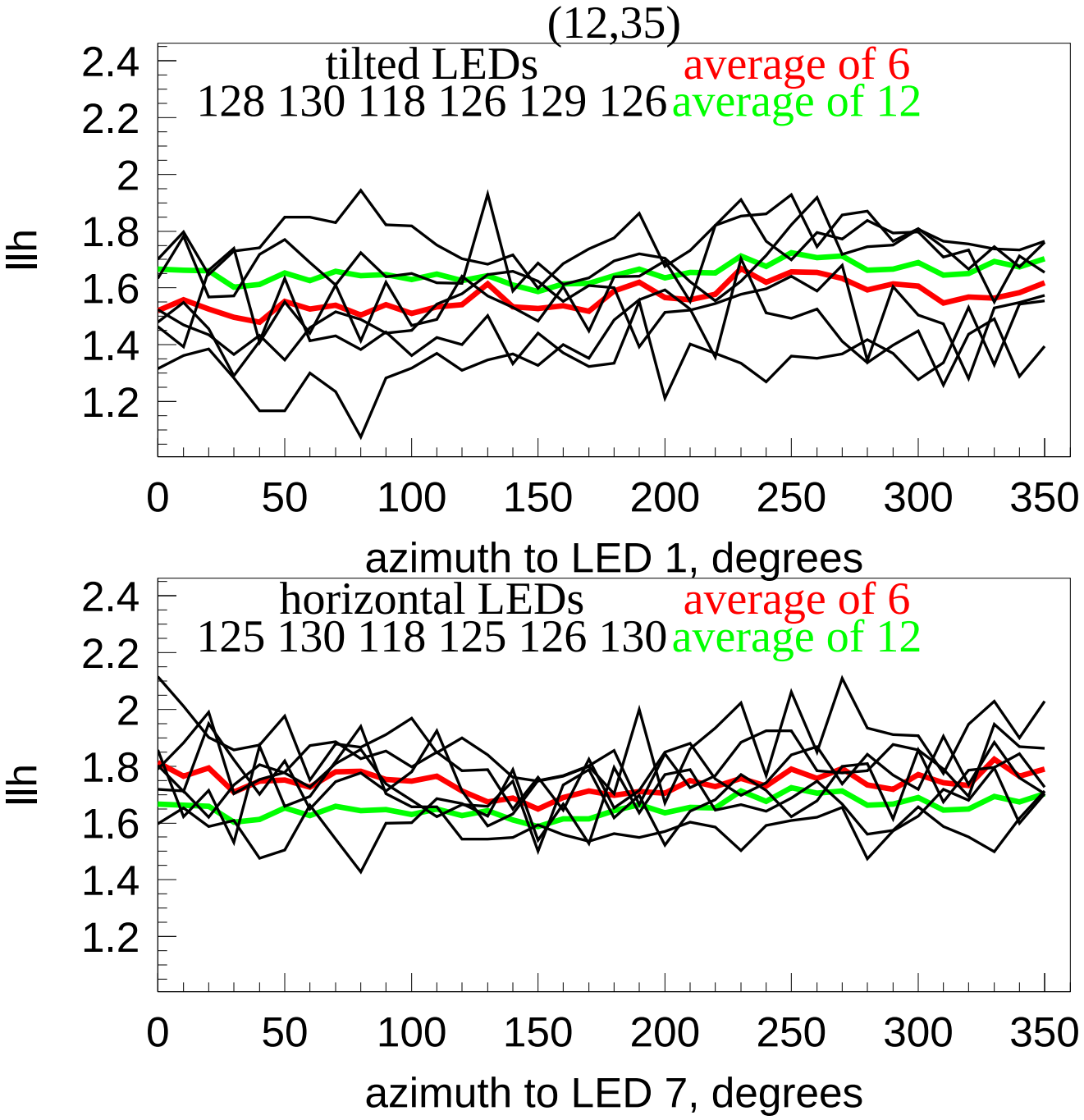

(12,33) 226.38 ± 0.32
3.4
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

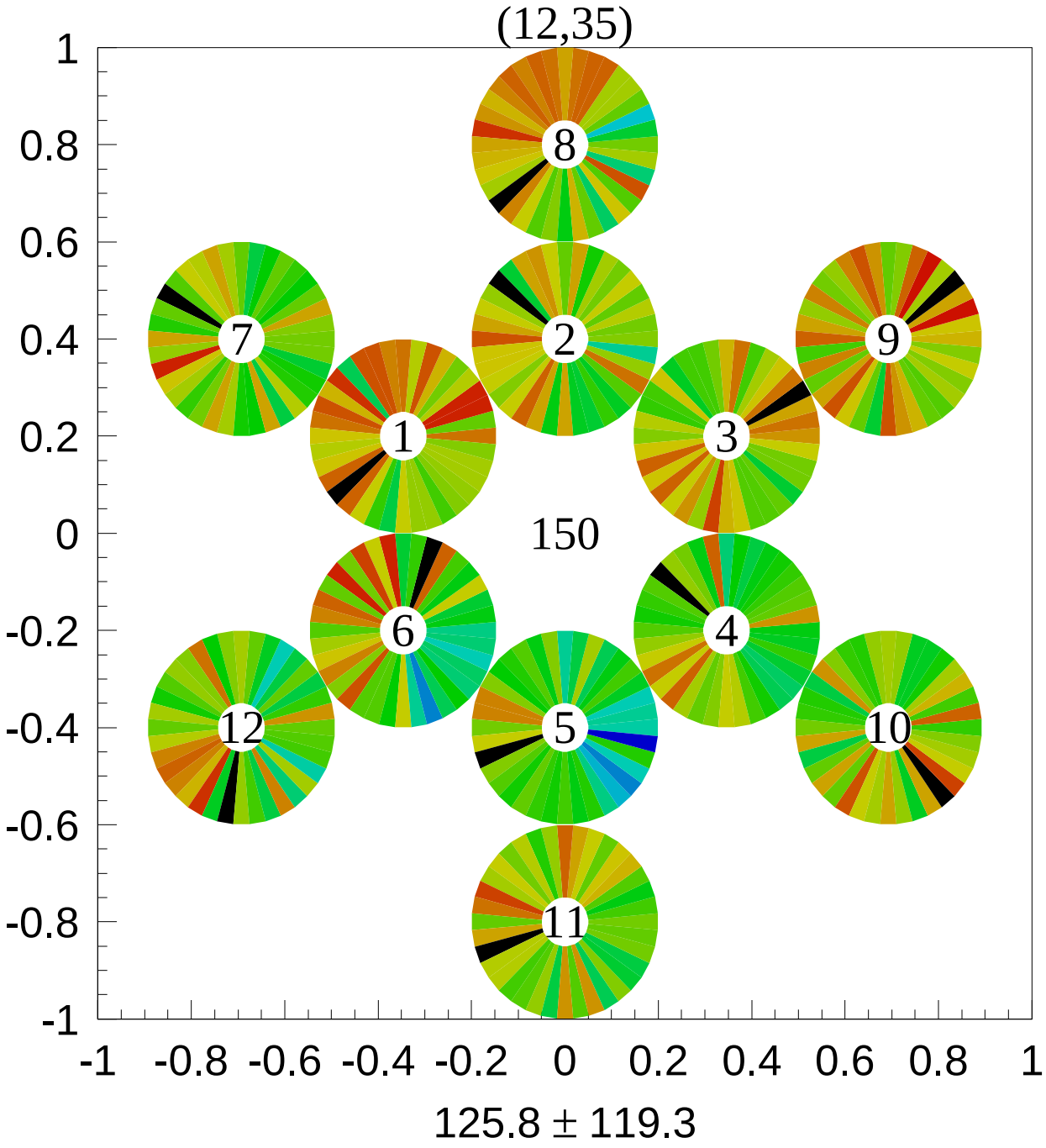

(12,34)
tilted LEDs
125 131 127 130 118 121
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 125 121 129 121 122
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

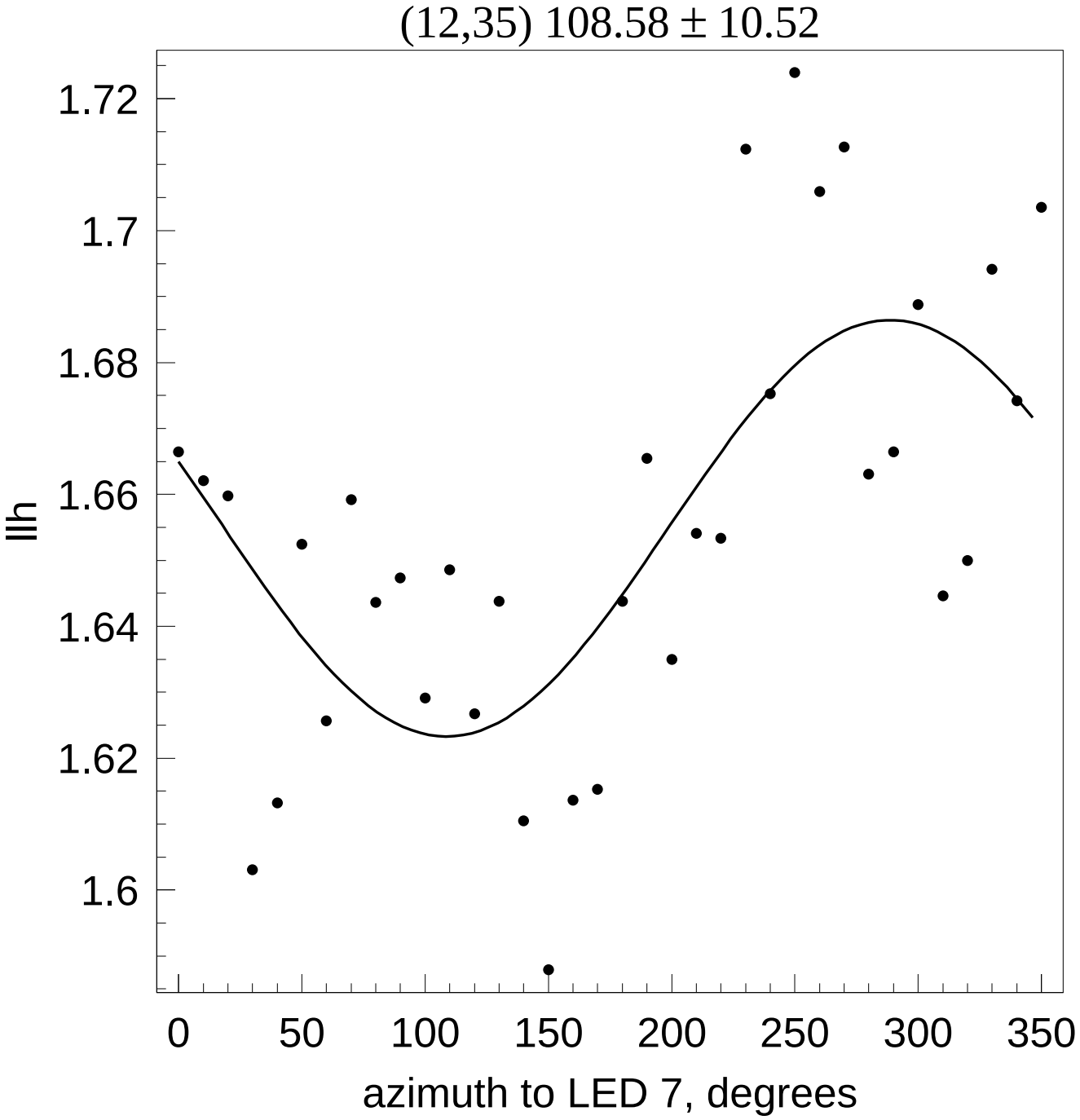

(12,34)
12
7
6
1
11
5
50
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
45.6 ± 18.3

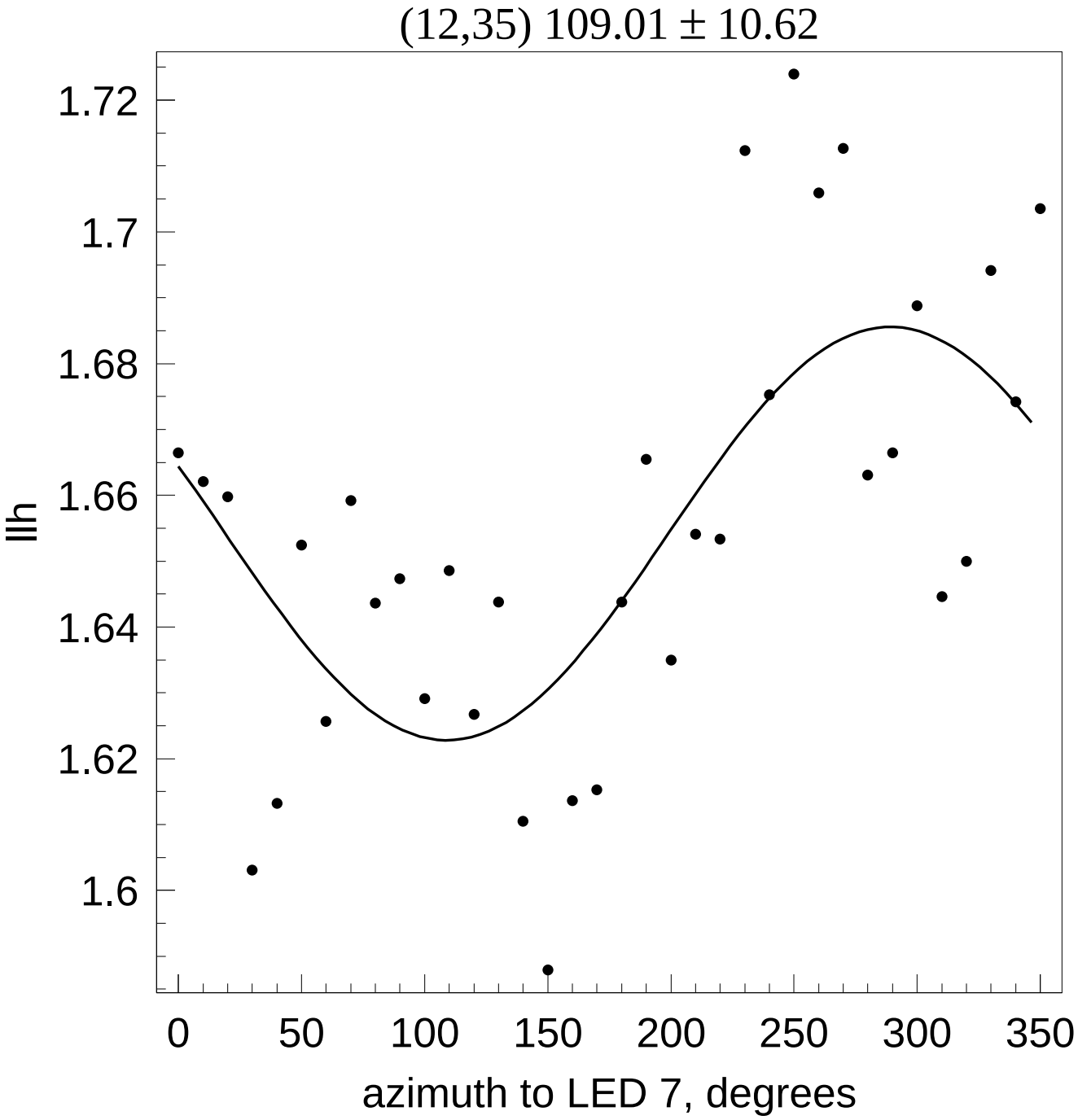

(12,34) 44.44 ± 0.71
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

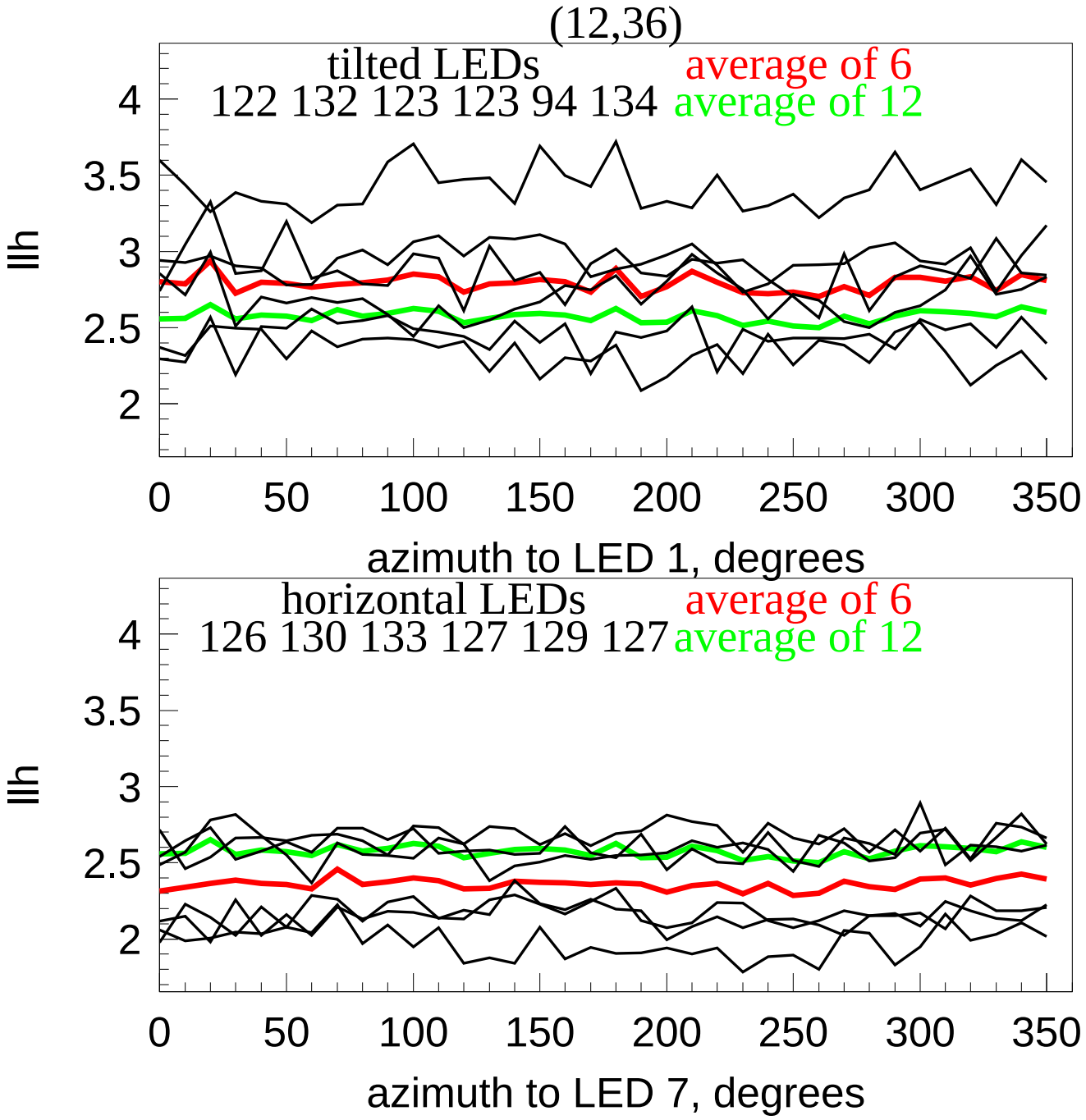

(12,34) 44.45 ± 0.69
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

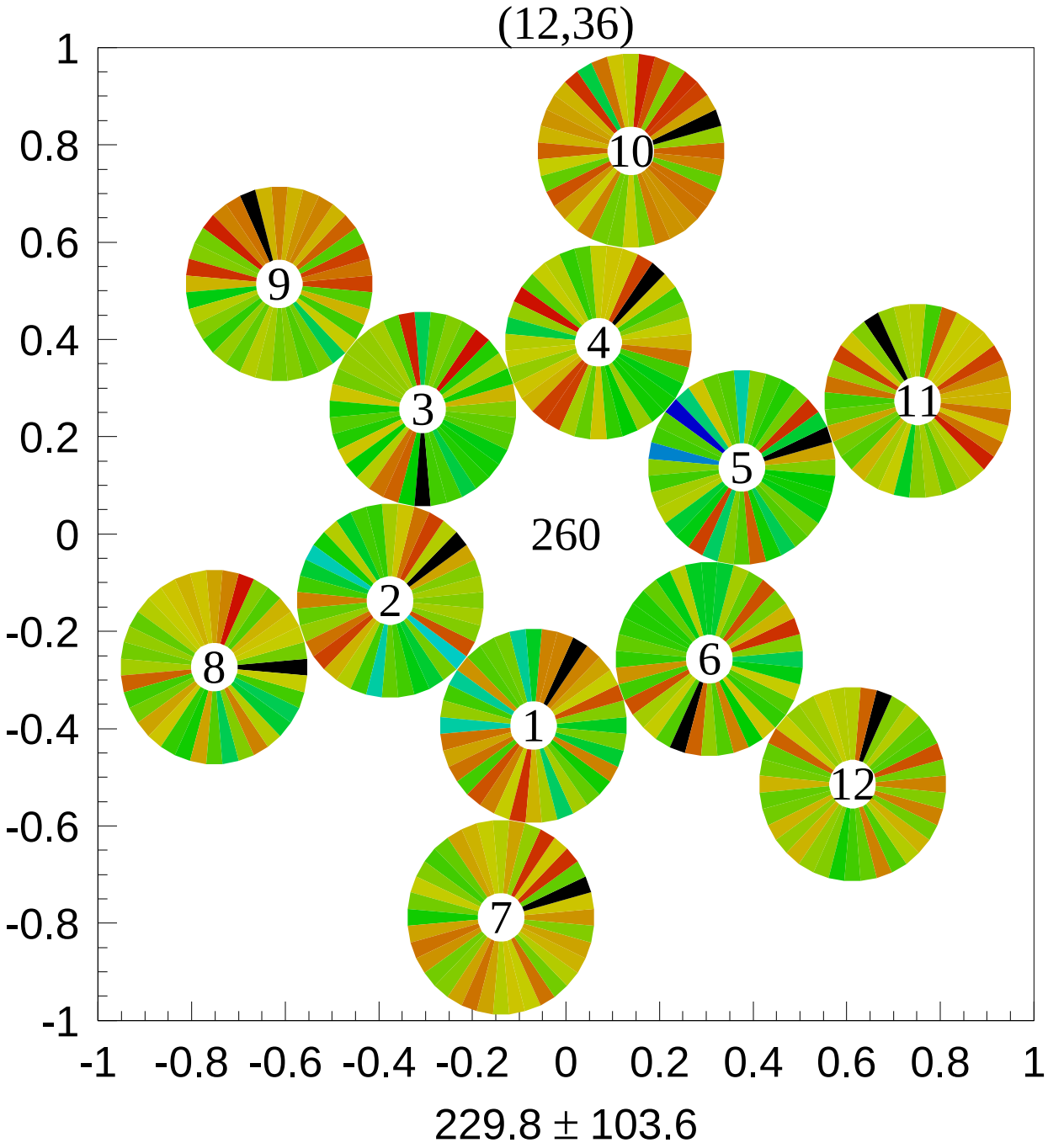

(12,35)
tilted LEDs
128 130 118 126 129 126
average of 6
average of 12
llh
2.4
2.2
2
1.8
1.6
1.4
1.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 130 118 125 126 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

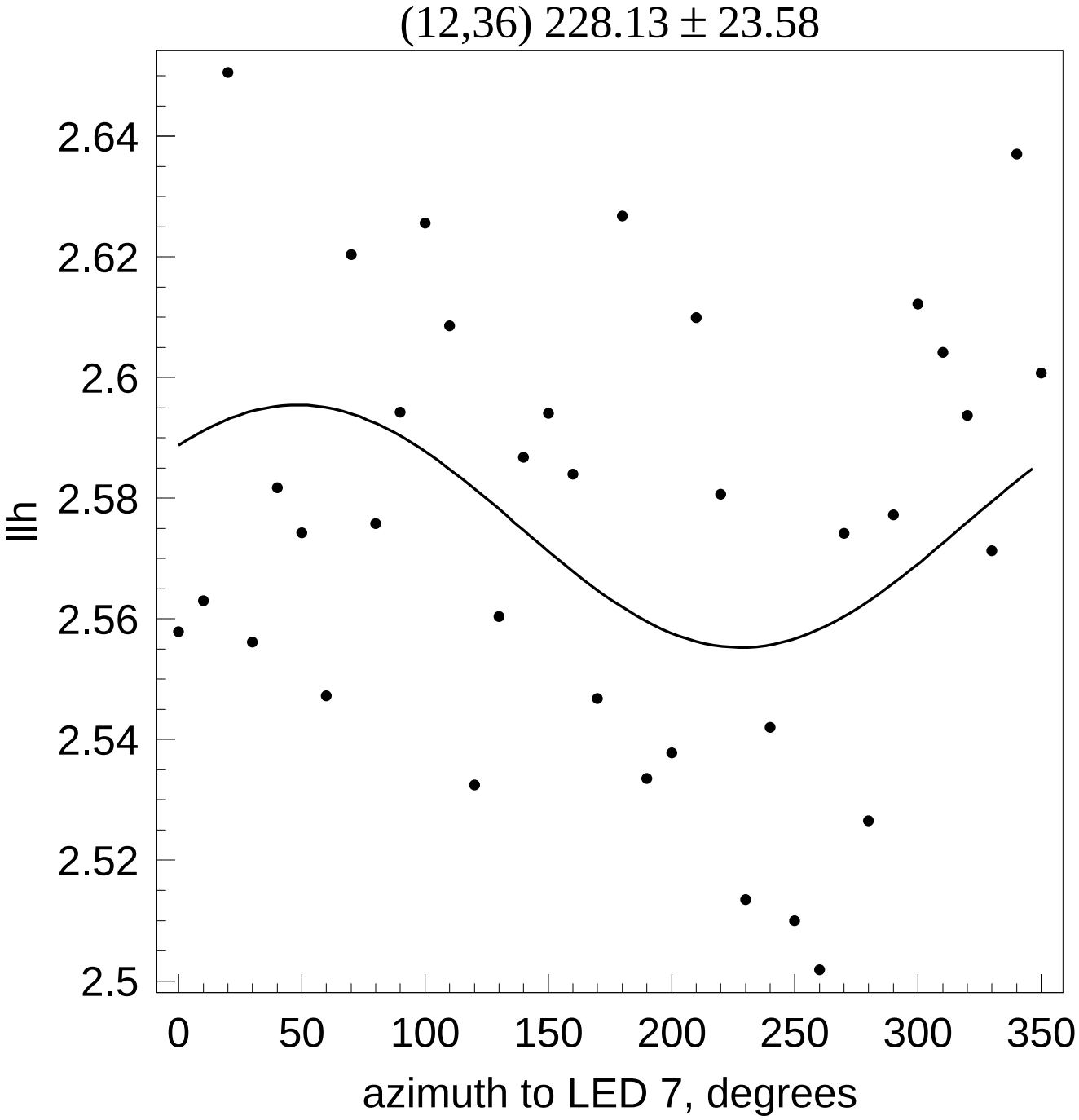

(12,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
7
2
9
1
3
150
6
4
12
5
10
11
125.8 ± 119.3

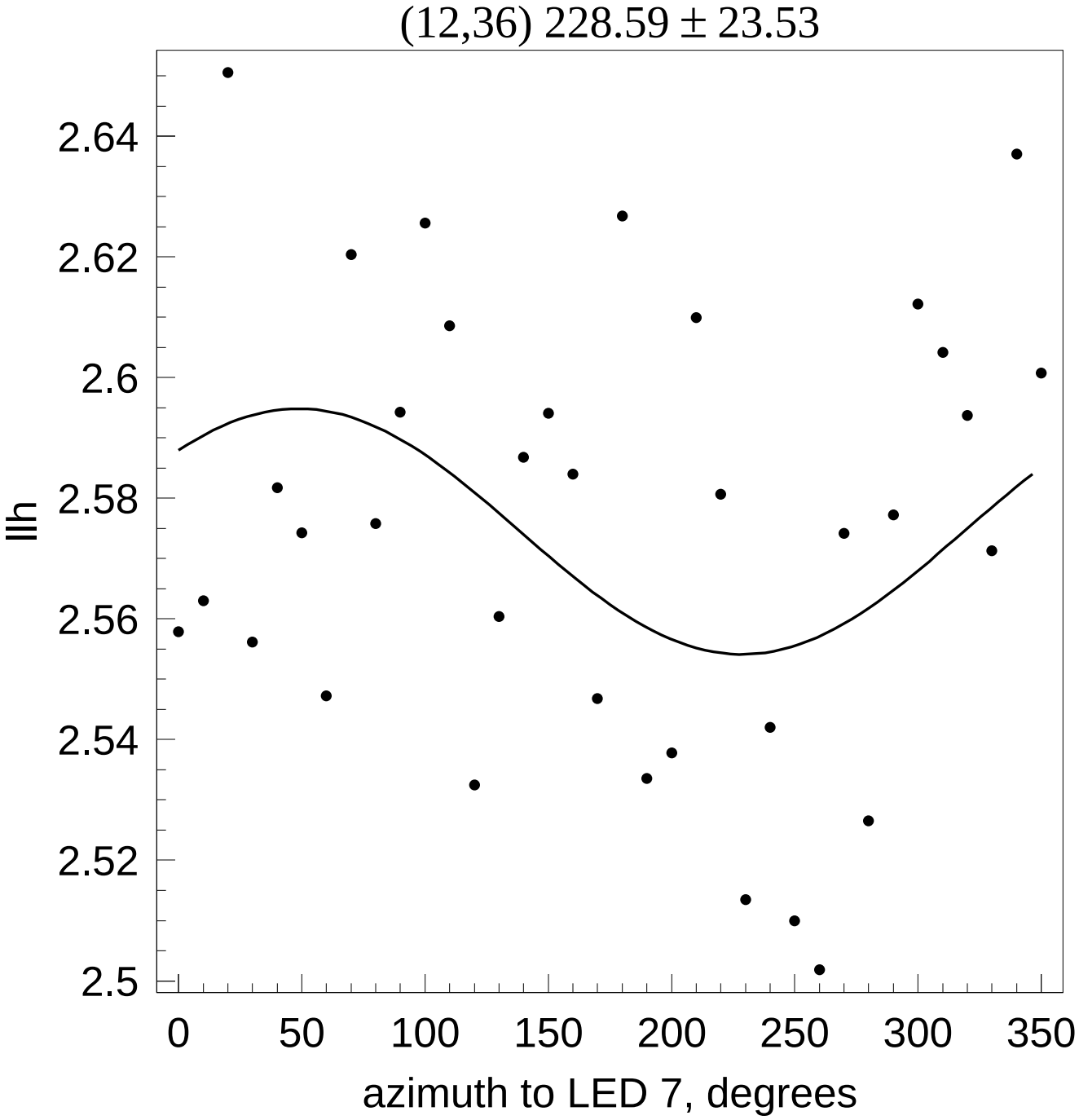

(12,35) 108.58 ± 10.52
1.72
1.7
1.68
1.66
1.64
1.62
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

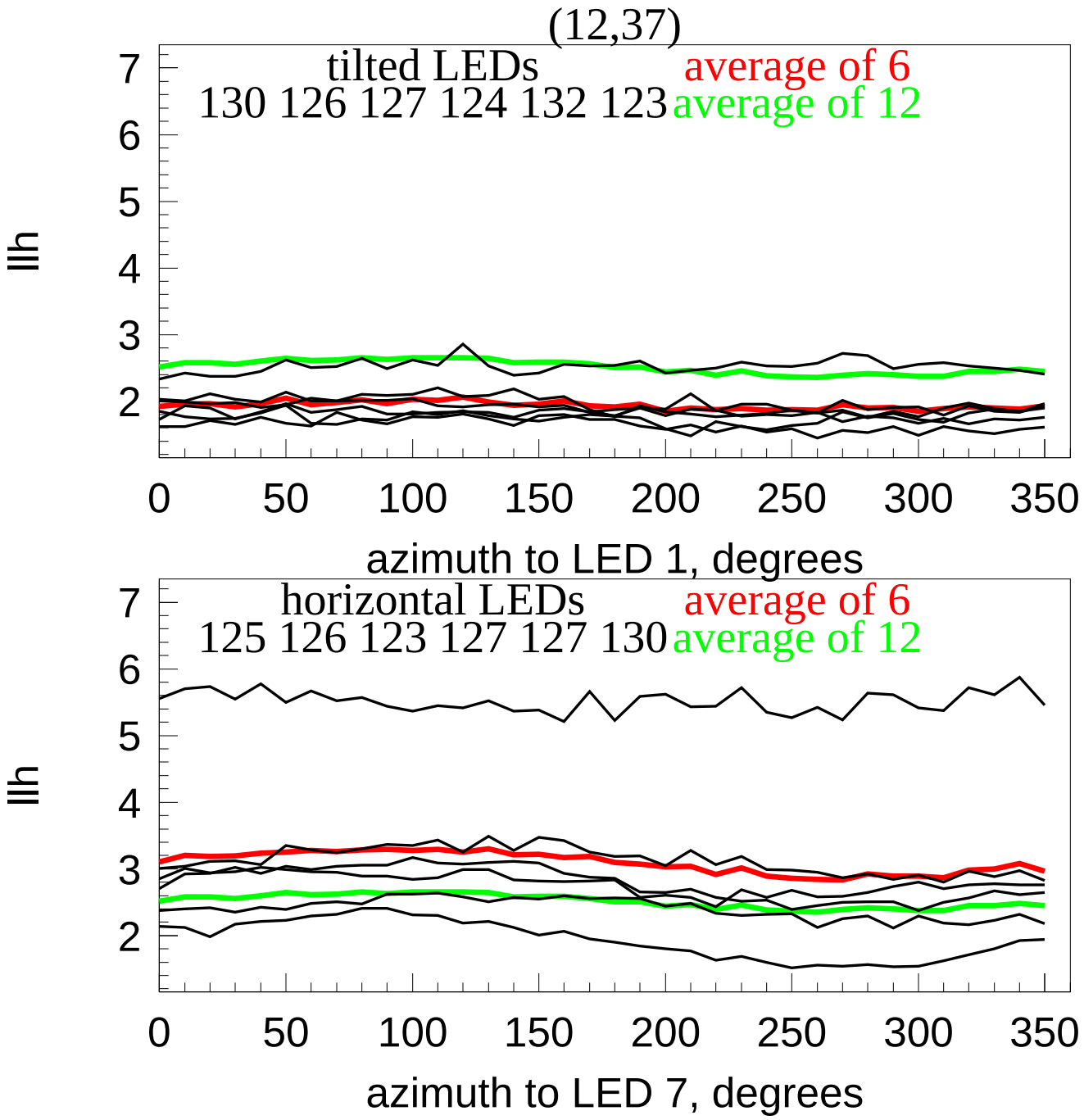

(12,35) 109.01 ± 10.62
1.72
1.7
1.68
1.66
1.64
1.62
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

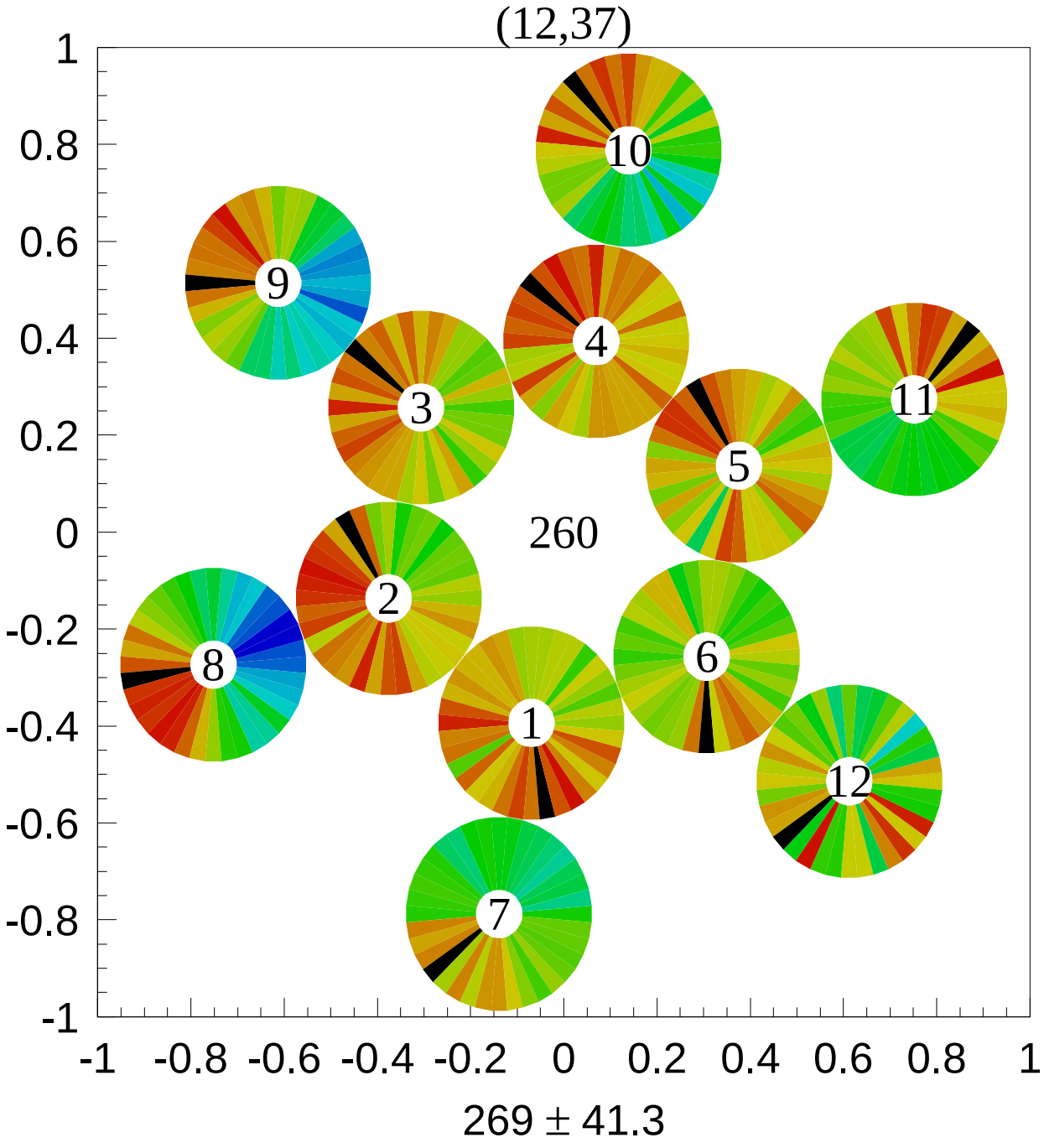

(12,36)
tilted LEDs
122 132 123 123 94 134
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 130 133 127 129 127
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

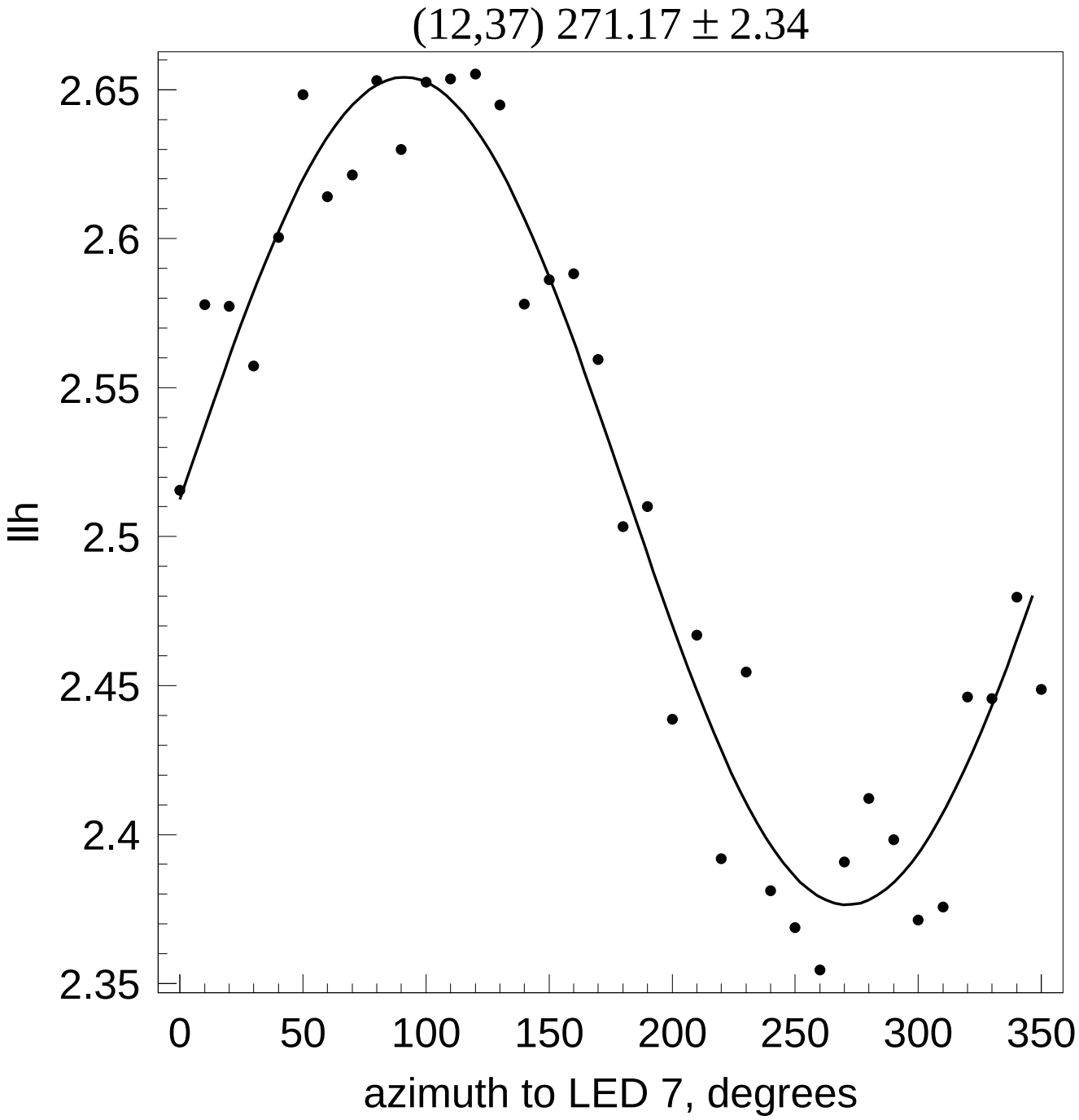

(12,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
229.8 ± 103.6

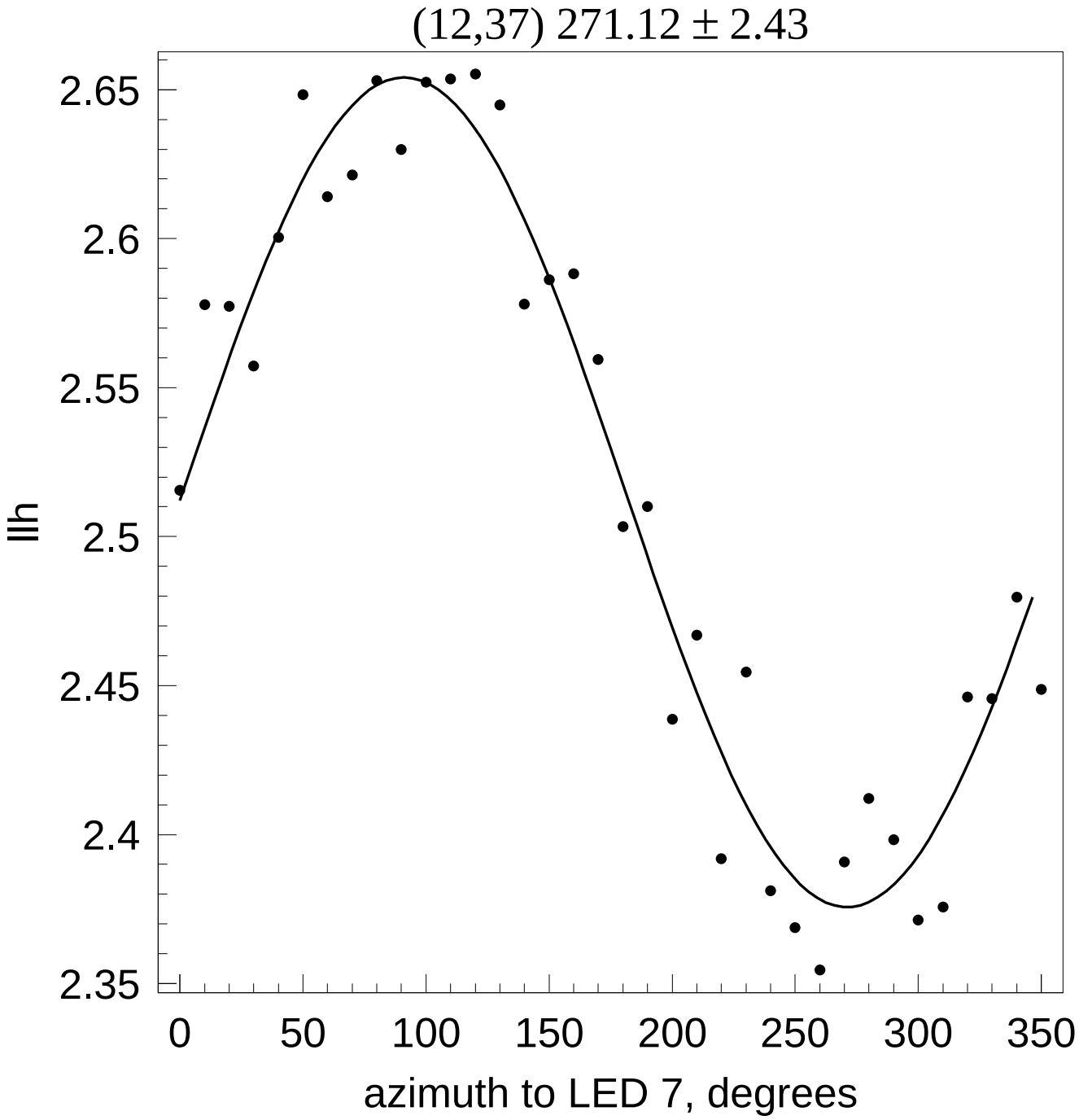

(12,36) 228.13 ± 23.58
2.64
2.62
2.6
2.58
2.56
2.54
2.52
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

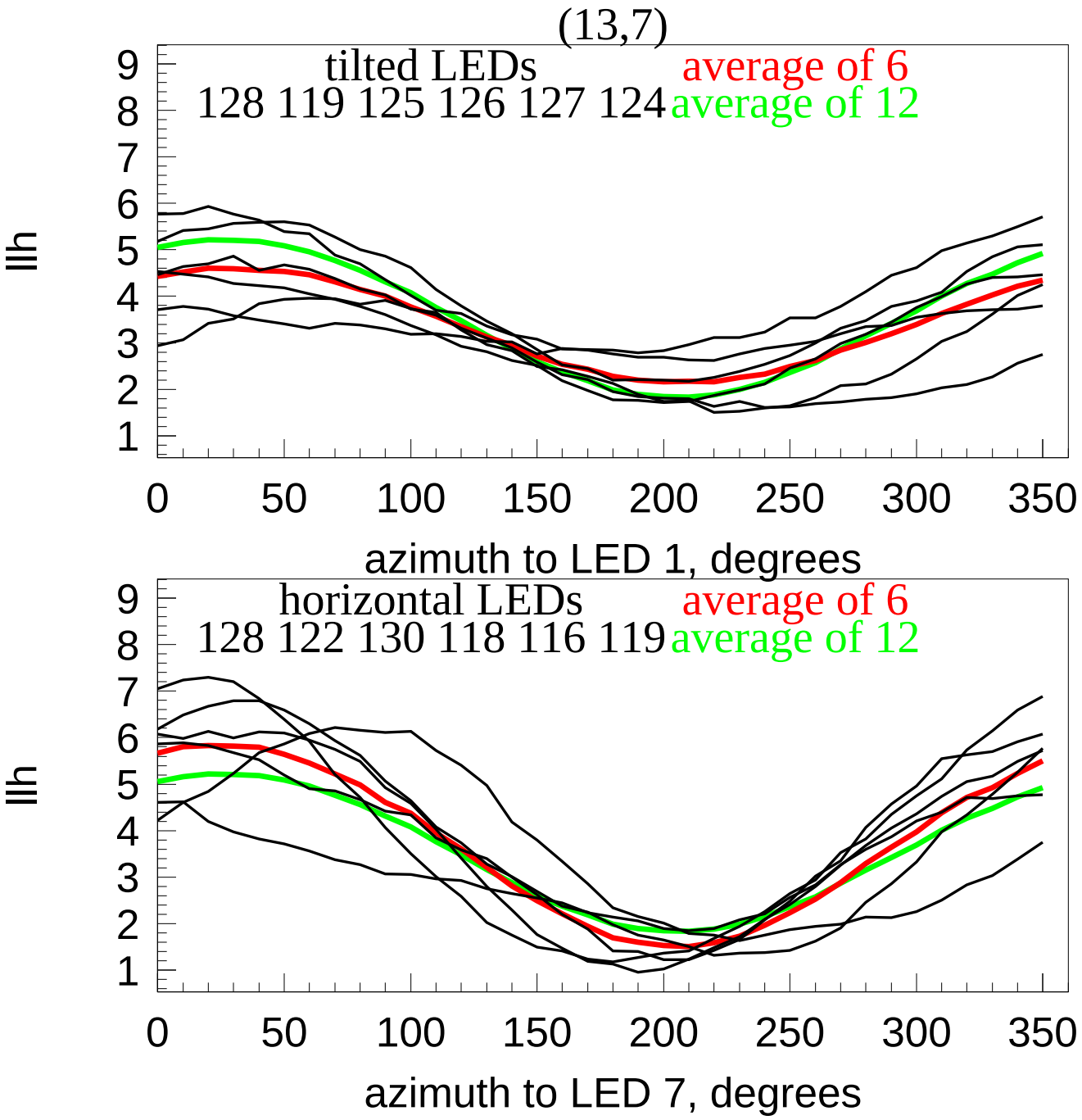

(12,36) 228.59 ± 23.53
2.64
2.62
2.6
2.58
2.56
2.54
2.52
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

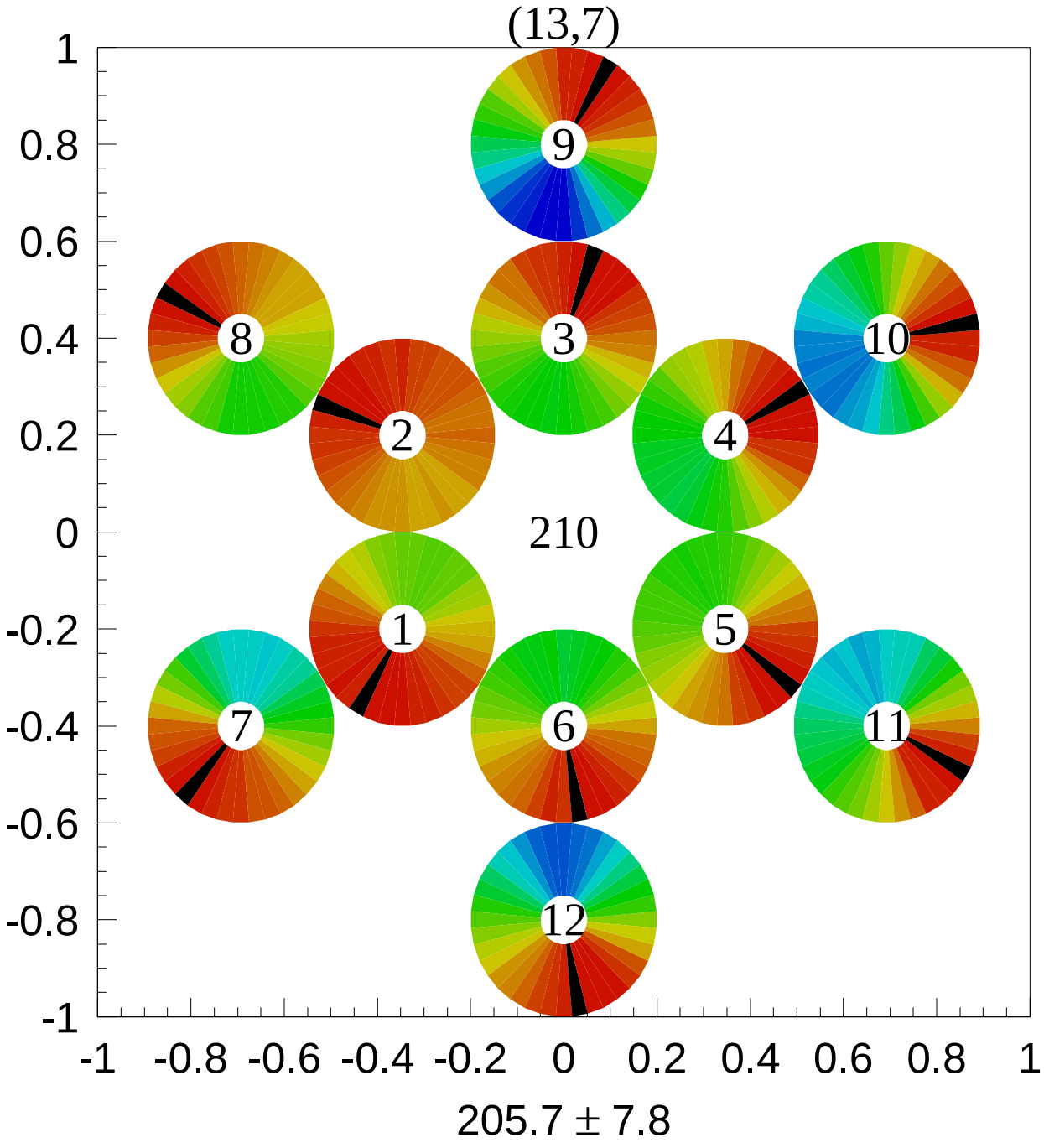

(12,37)
tilted LEDs
130 126 127 124 132 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 126 123 127 127 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

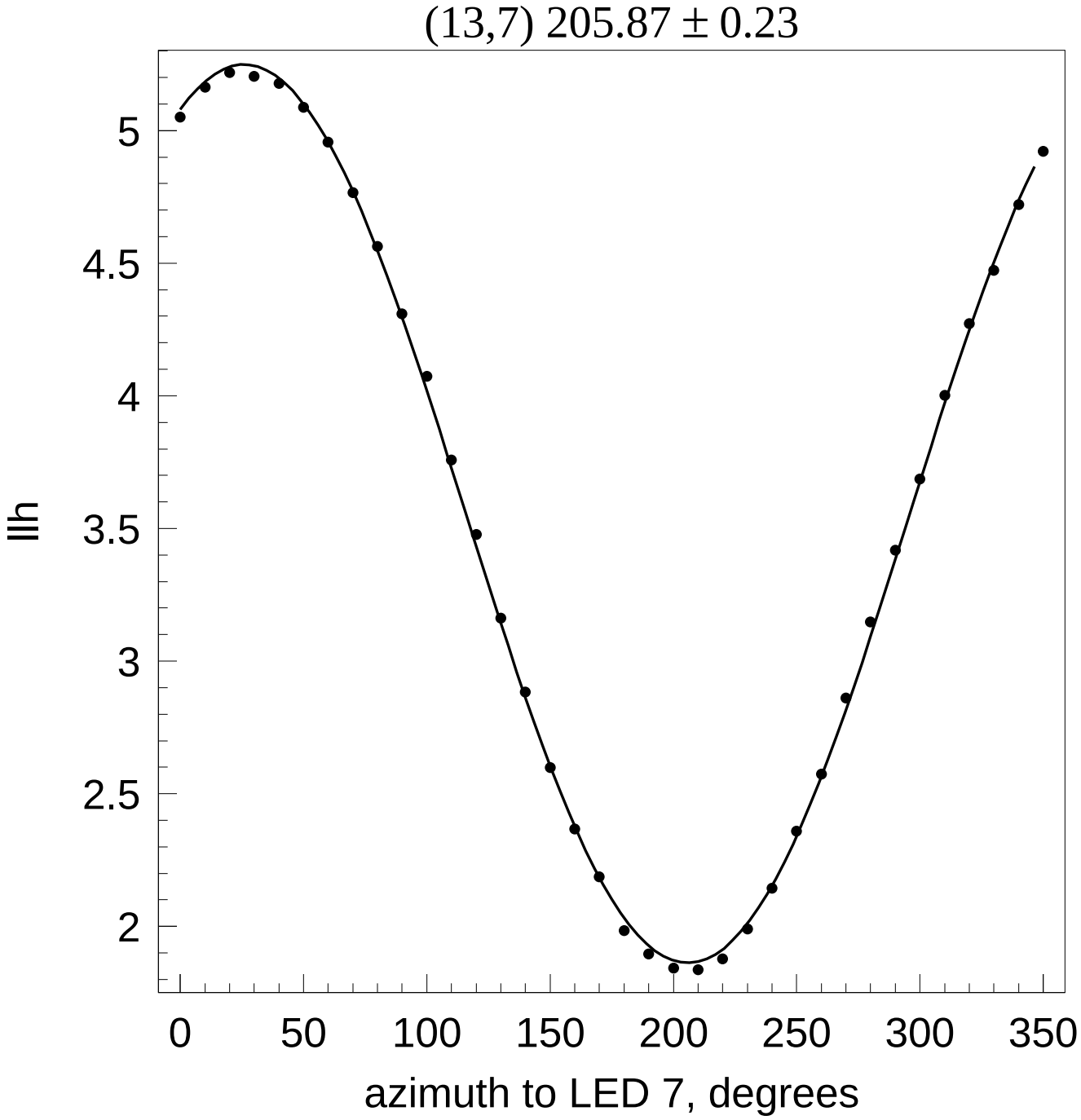

(12,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
269 ± 41.3

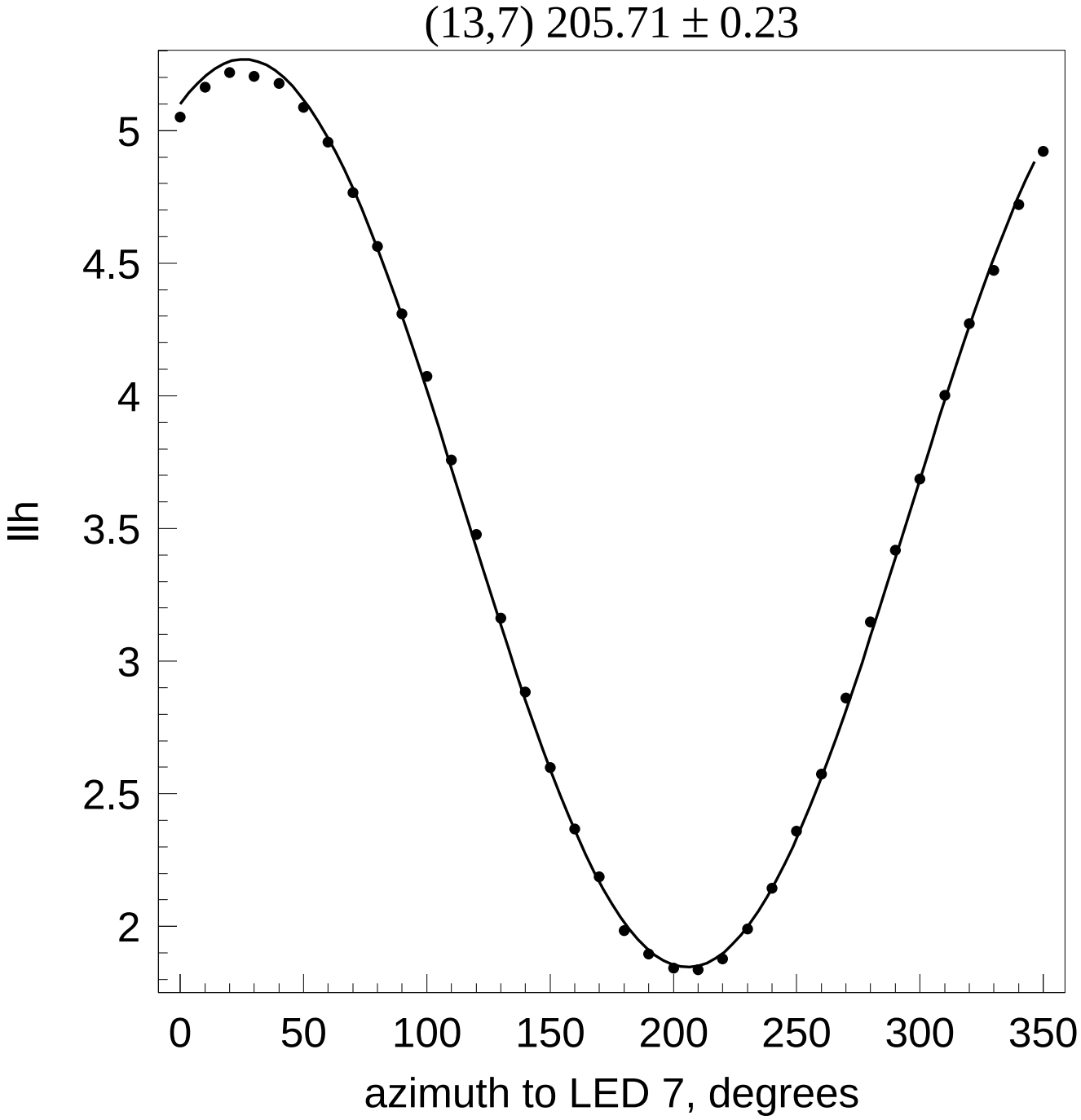

(12,37) 271.17 ± 2.34
2.65
2.6
2.55
2.5
2.45
2.4
2.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

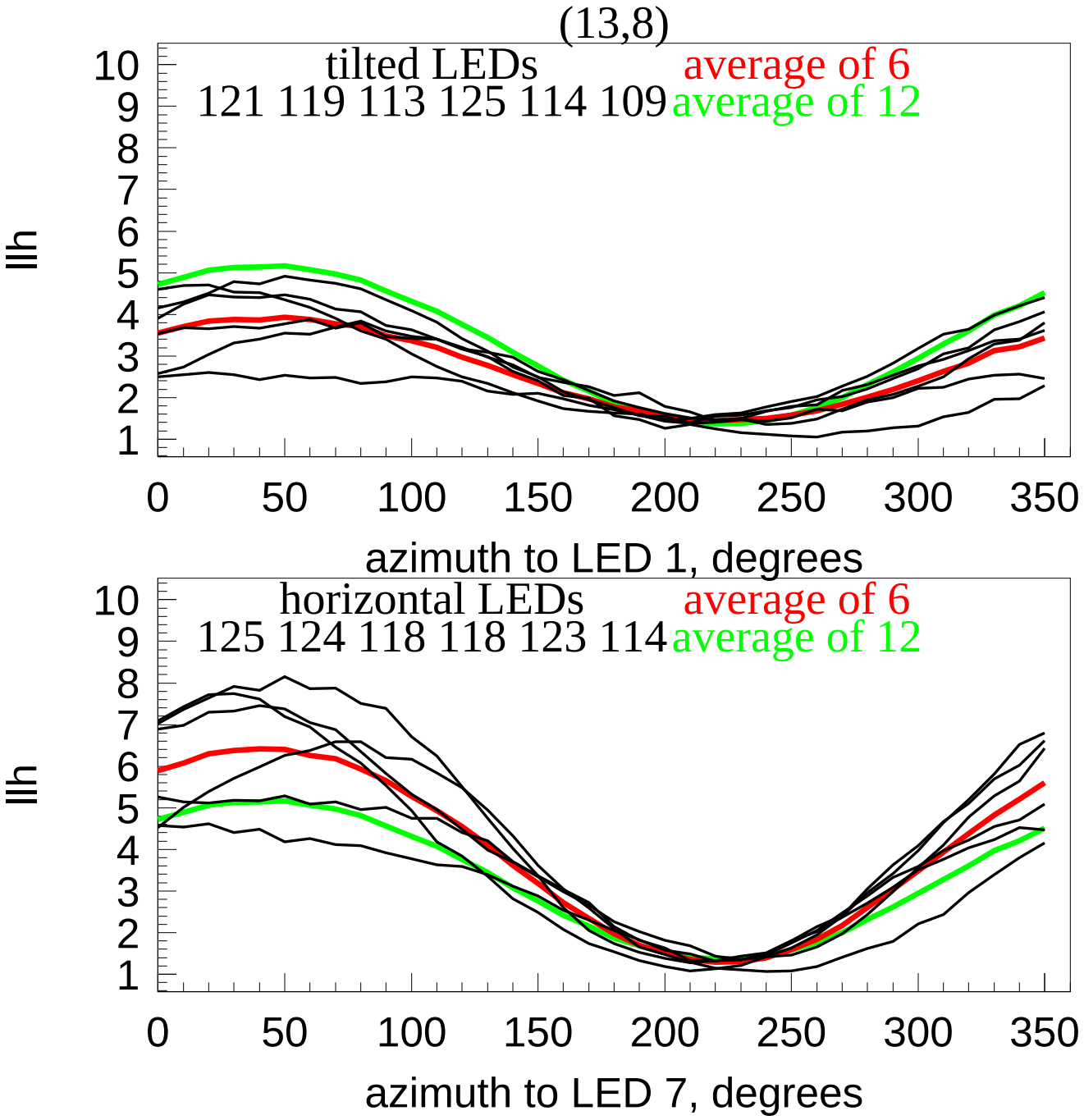

(12,37) 271.12 ± 2.43
2.65
2.6
2.55
2.5
2.45
2.4
2.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

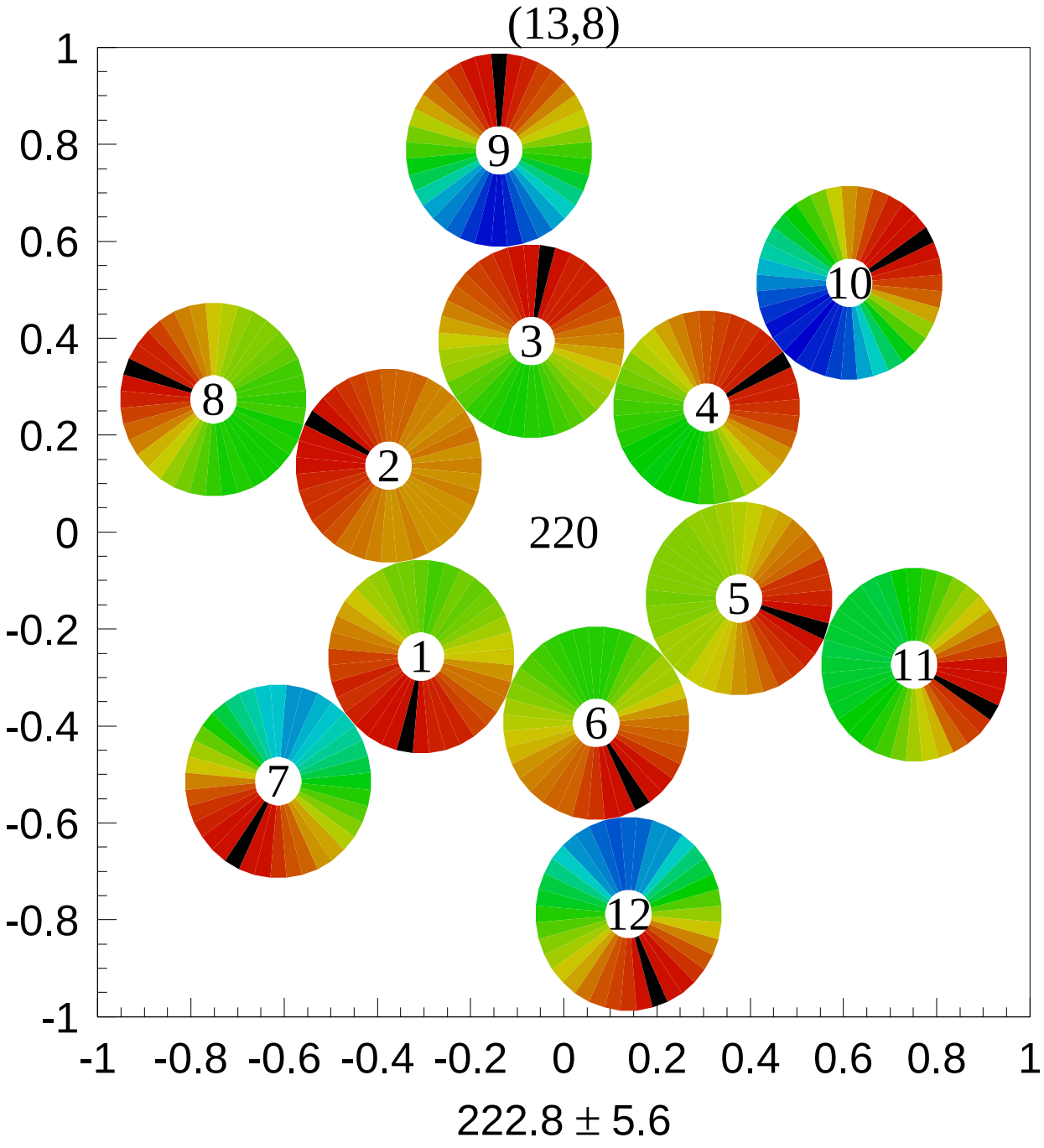

(13,7)
tilted LEDs
128 119 125 126 127 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 122 130 118 116 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

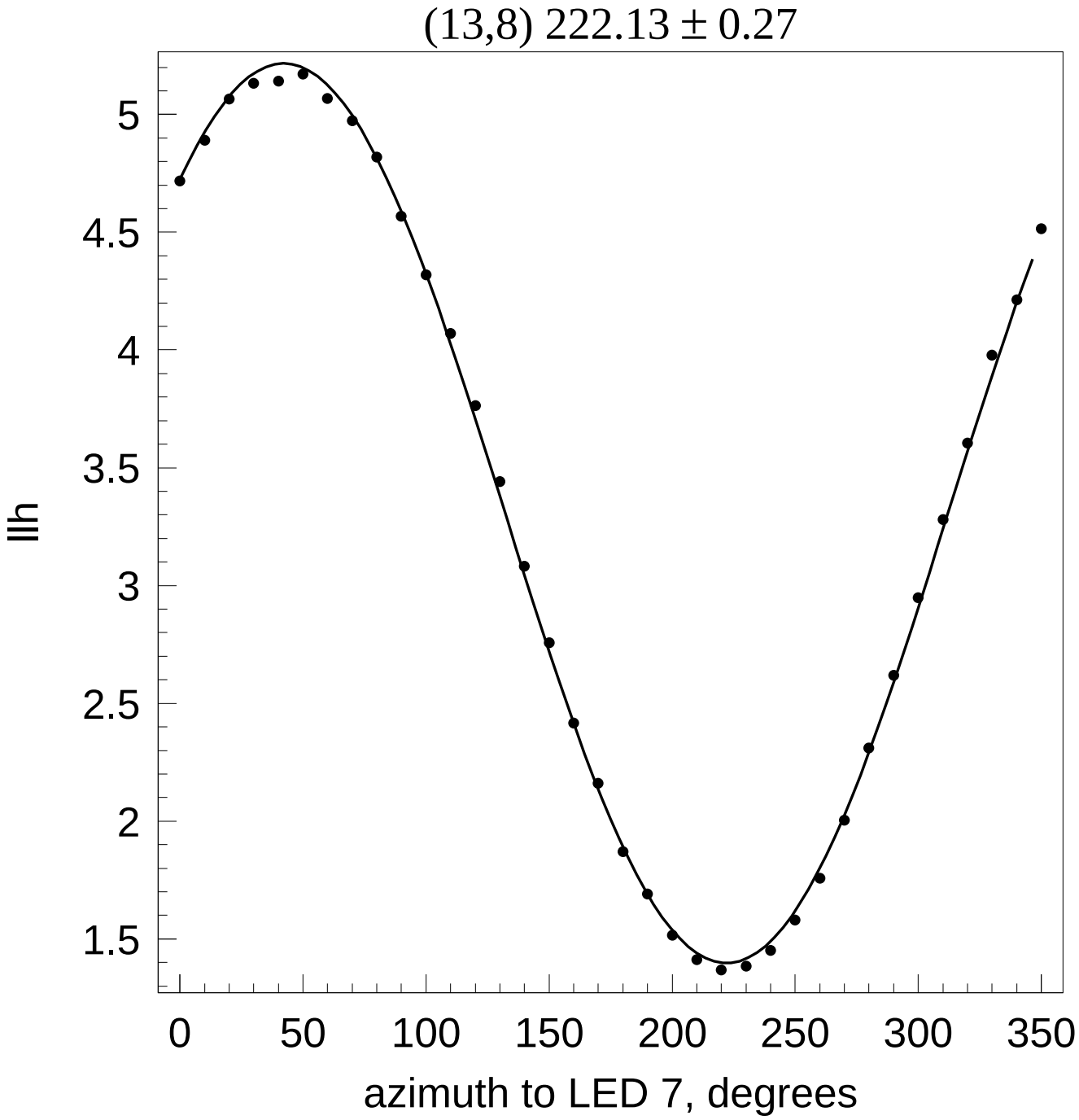

(13,7)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
205.7 ± 7.8

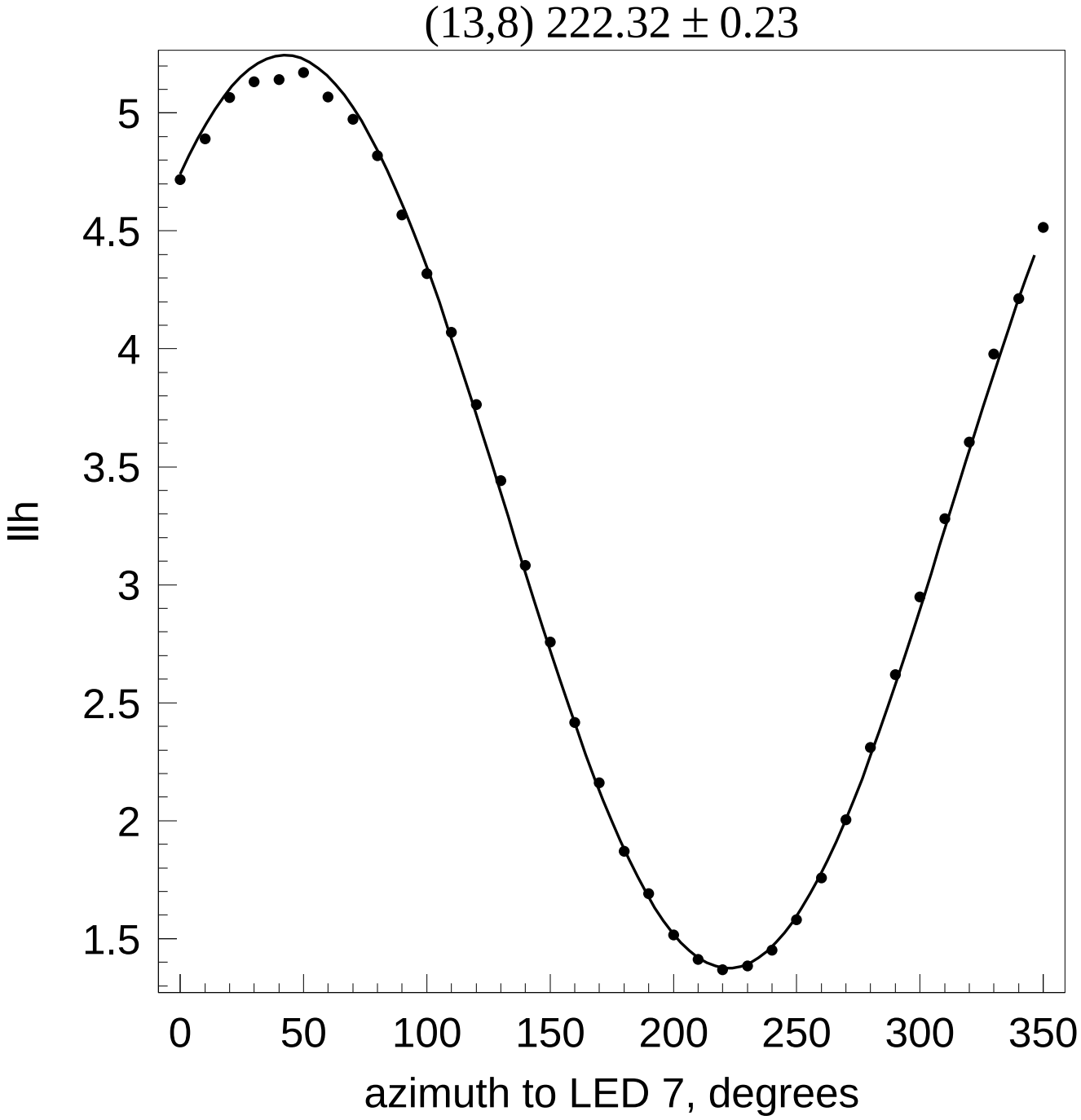

(13,7) 205.87 ± 0.23
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

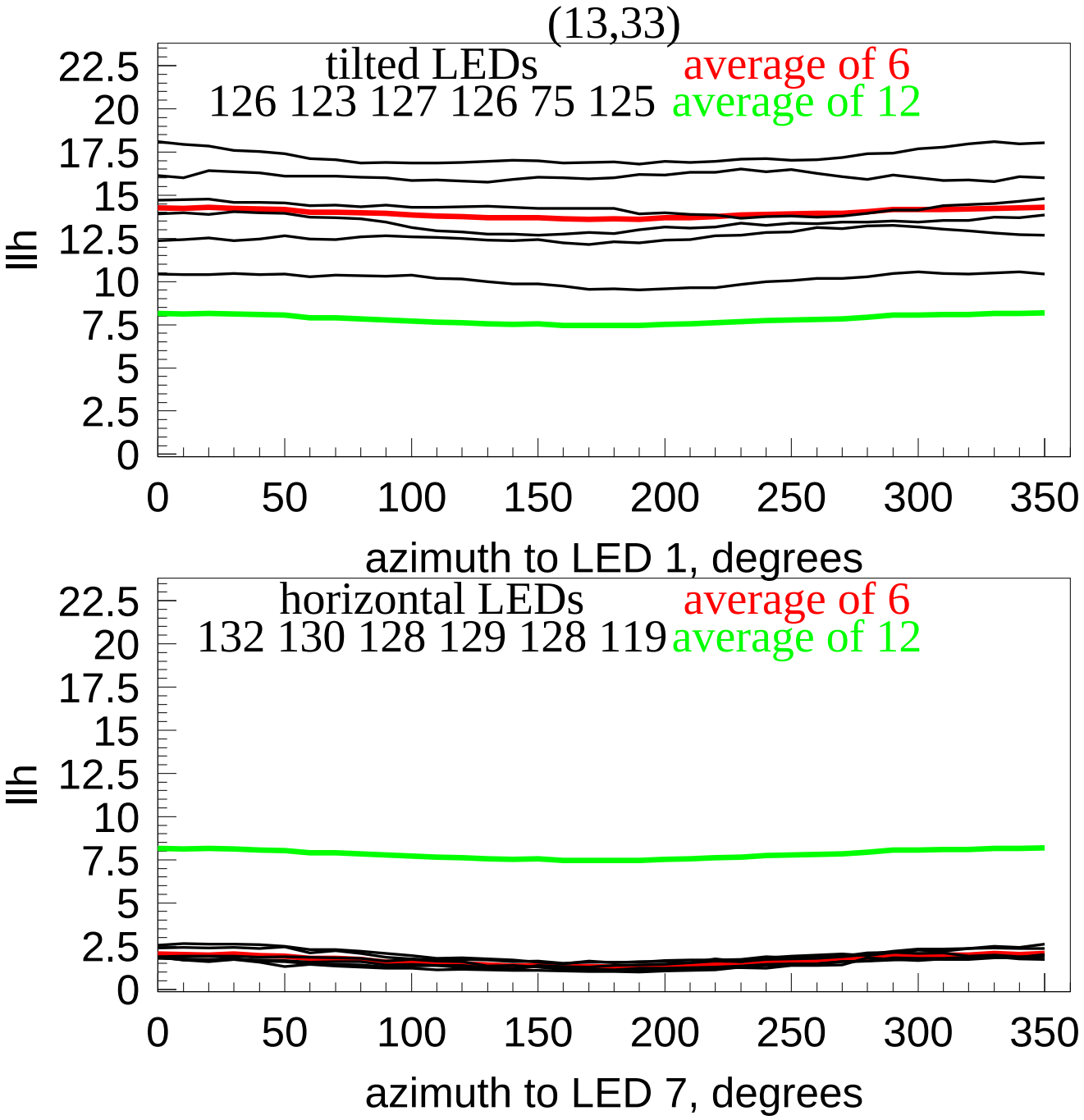

(13,7) 205.71 ± 0.23
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

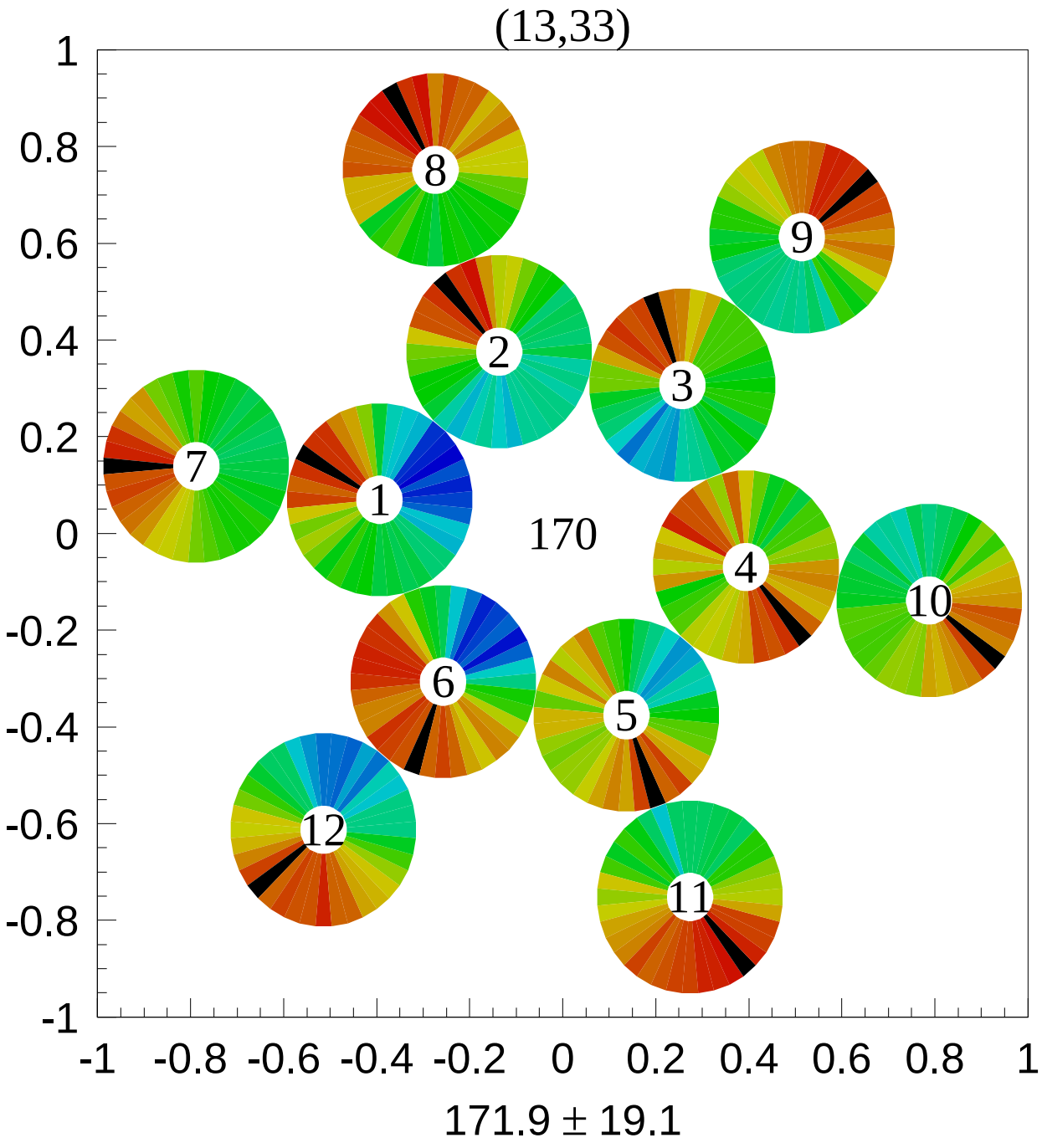

(13,8)
tilted LEDs
121 119 113 125 114 109
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 124 118 118 123 114
average of 6
average of 12
llh
azimuth to LED 7, degrees

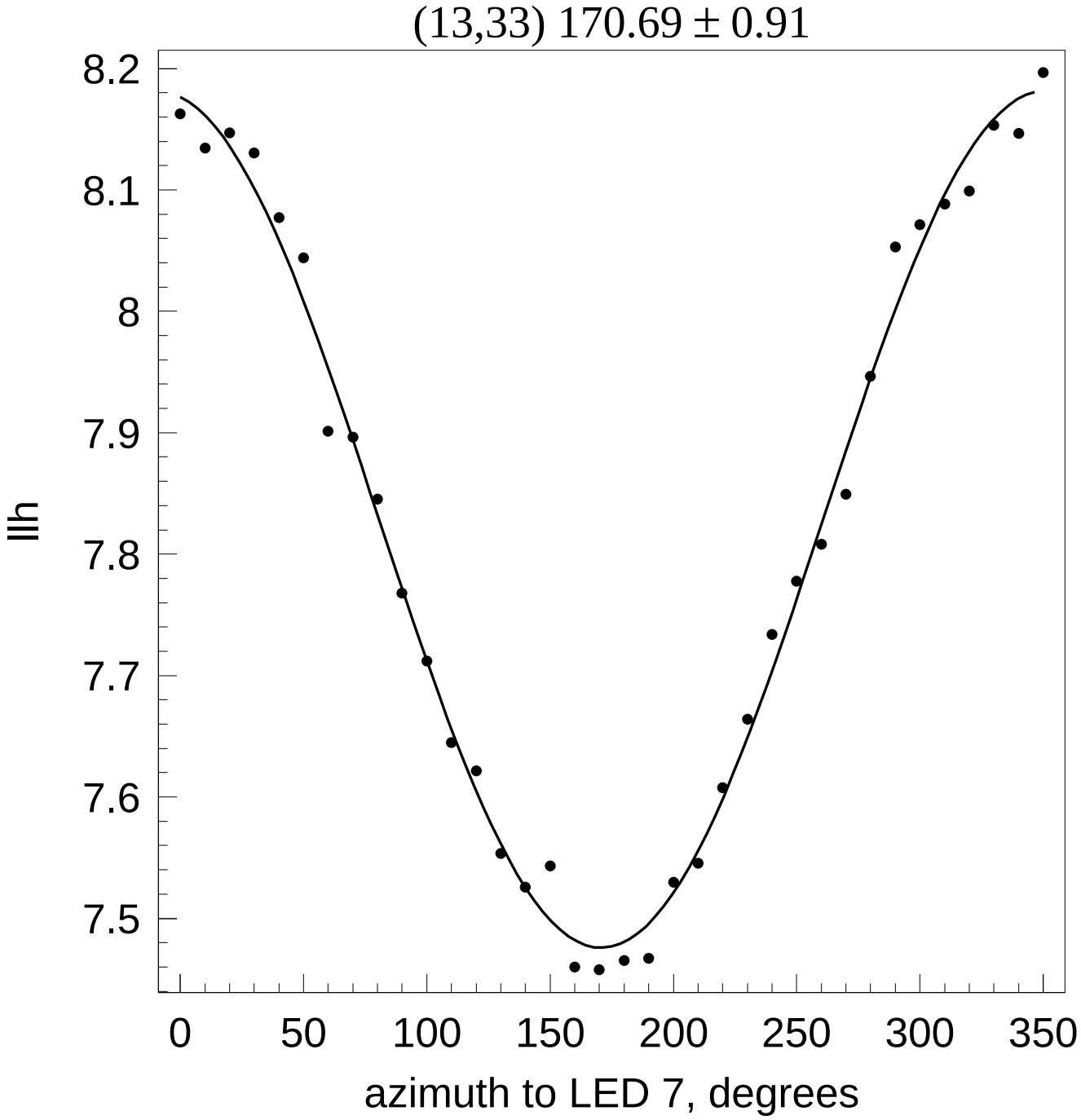

(13,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
8
4
2
220
5
1
11
6
7
12
222.8 ± 5.6

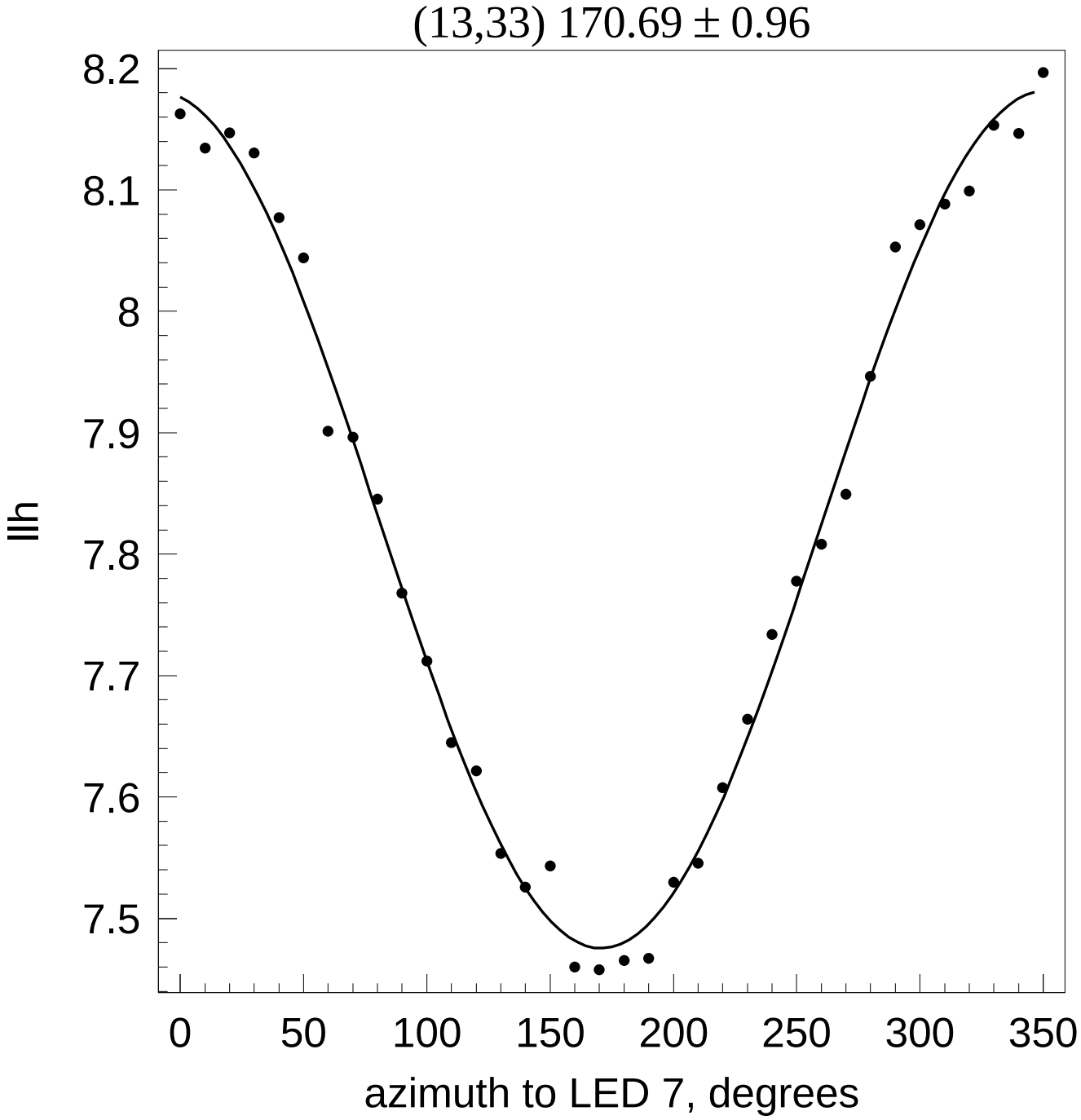

(13,8) 222.13 ± 0.27
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

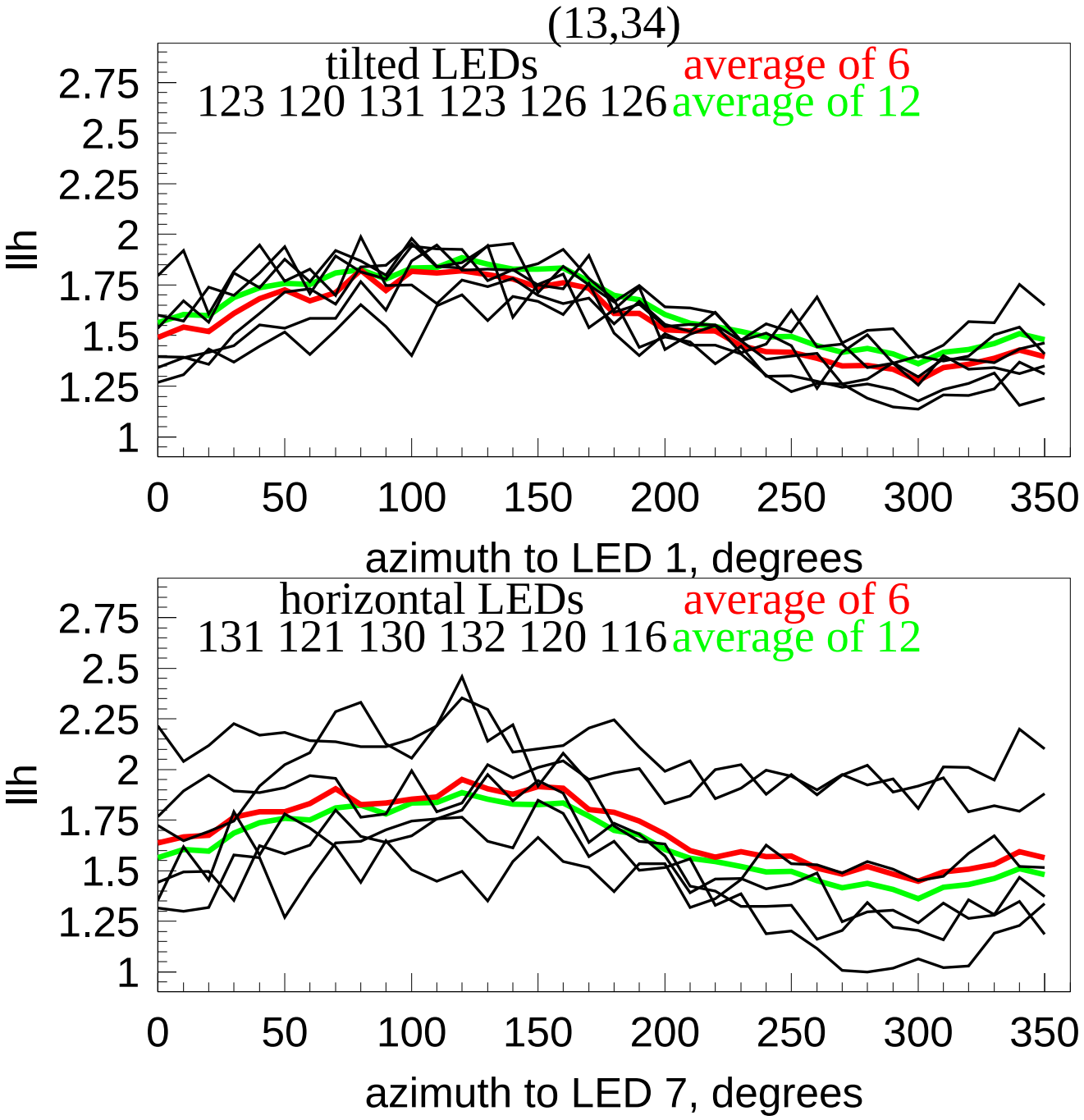

(13,8) 222.32 ± 0.23
5
4.5
4
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

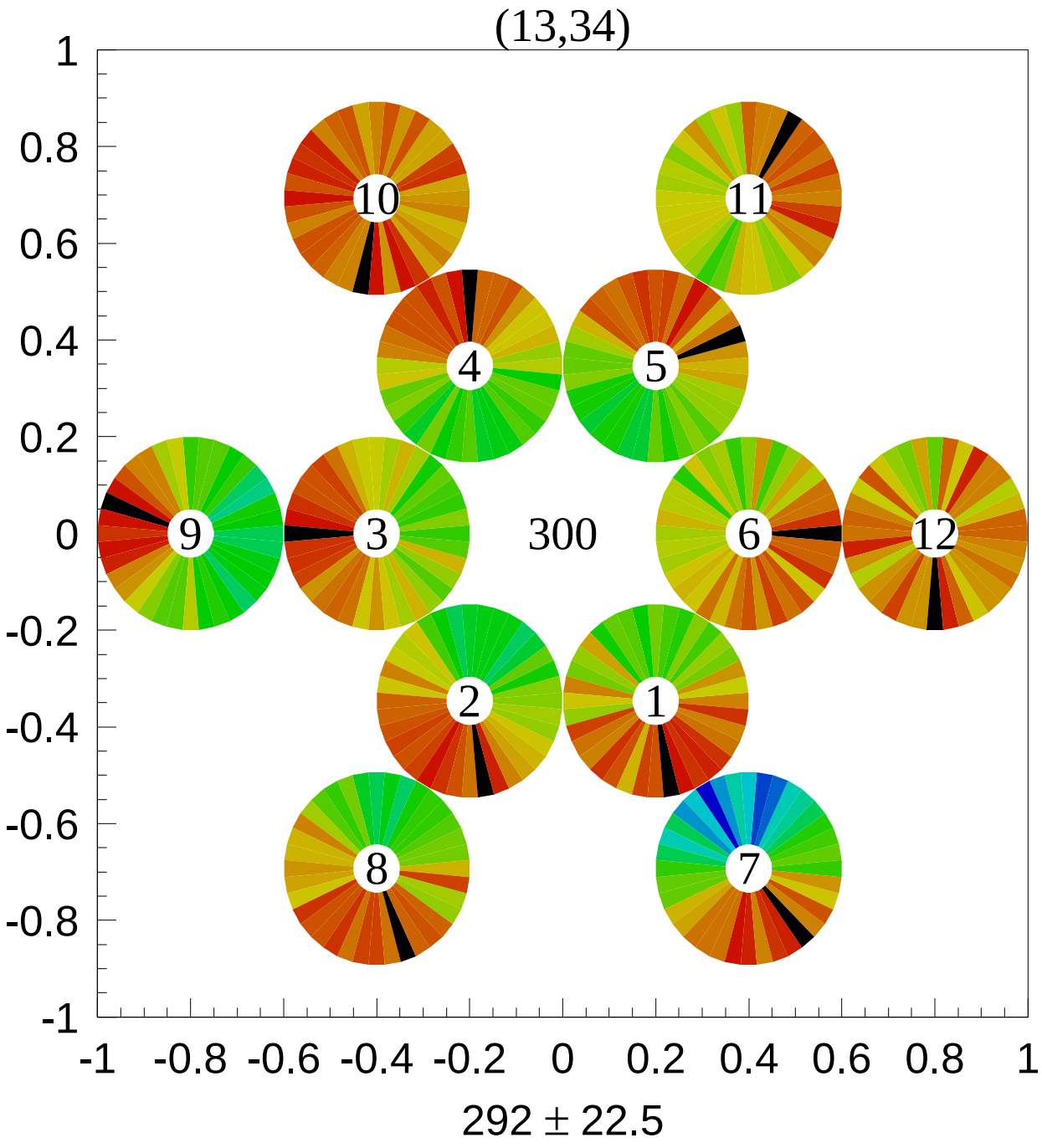

(13,33)
tilted LEDs
126 123 127 126 75 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 130 128 129 128 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

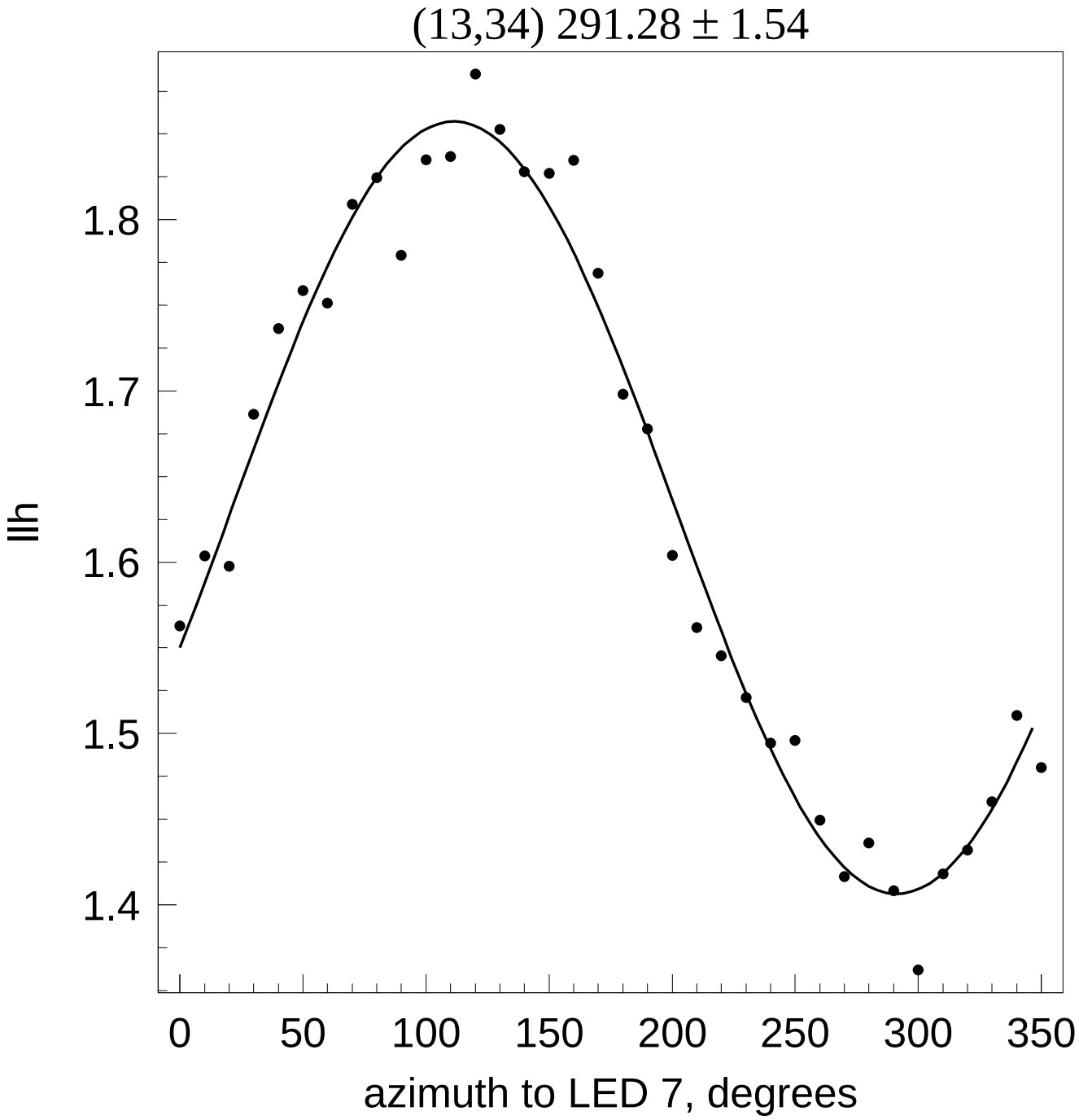

(13,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
171.9 ± 19.1

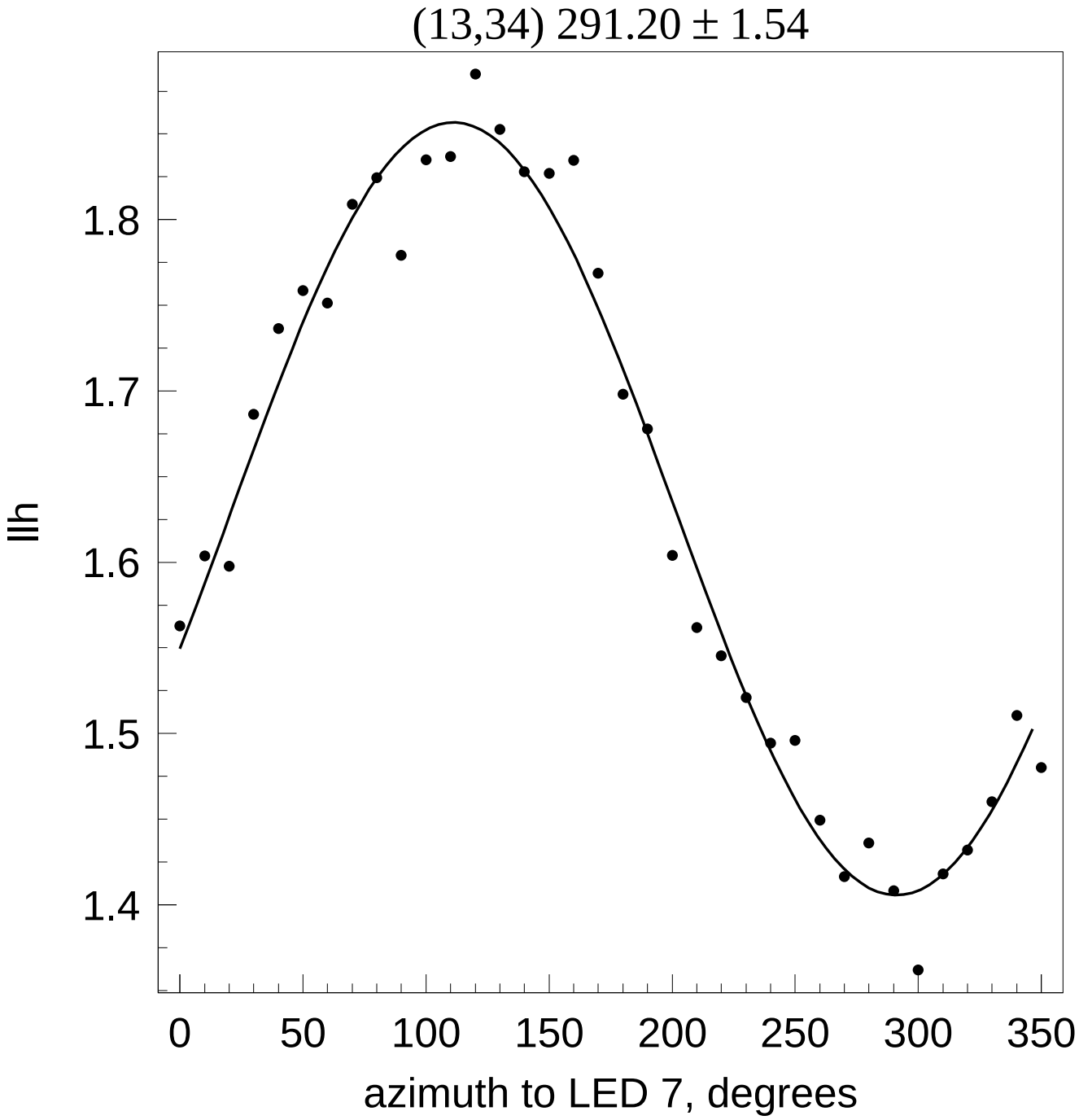

(13,33) 170.69 ± 0.91
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

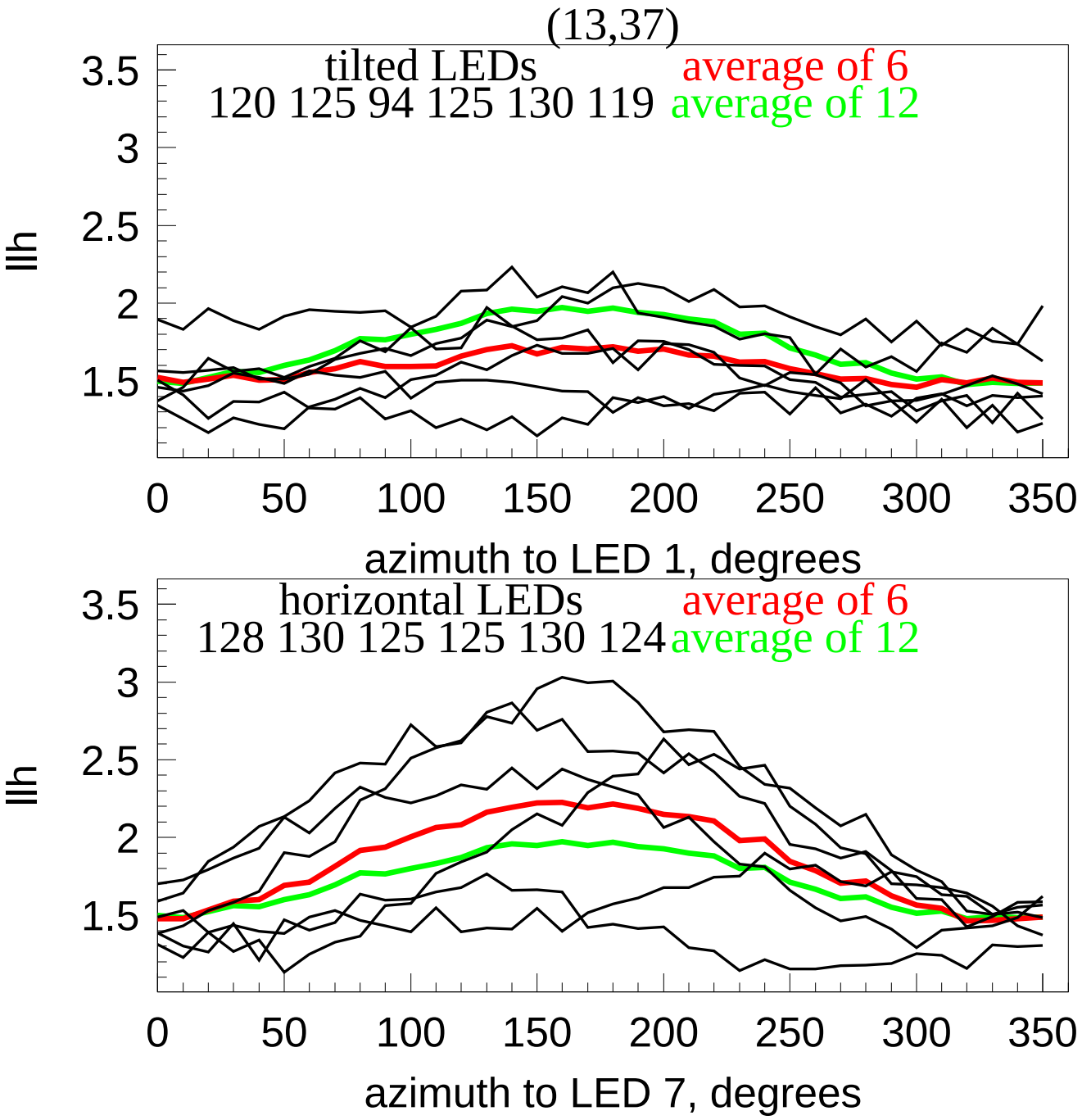

(13,33) 170.69 ± 0.96
8.2
8.1
8
7.9
7.8
7.7
7.6
7.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

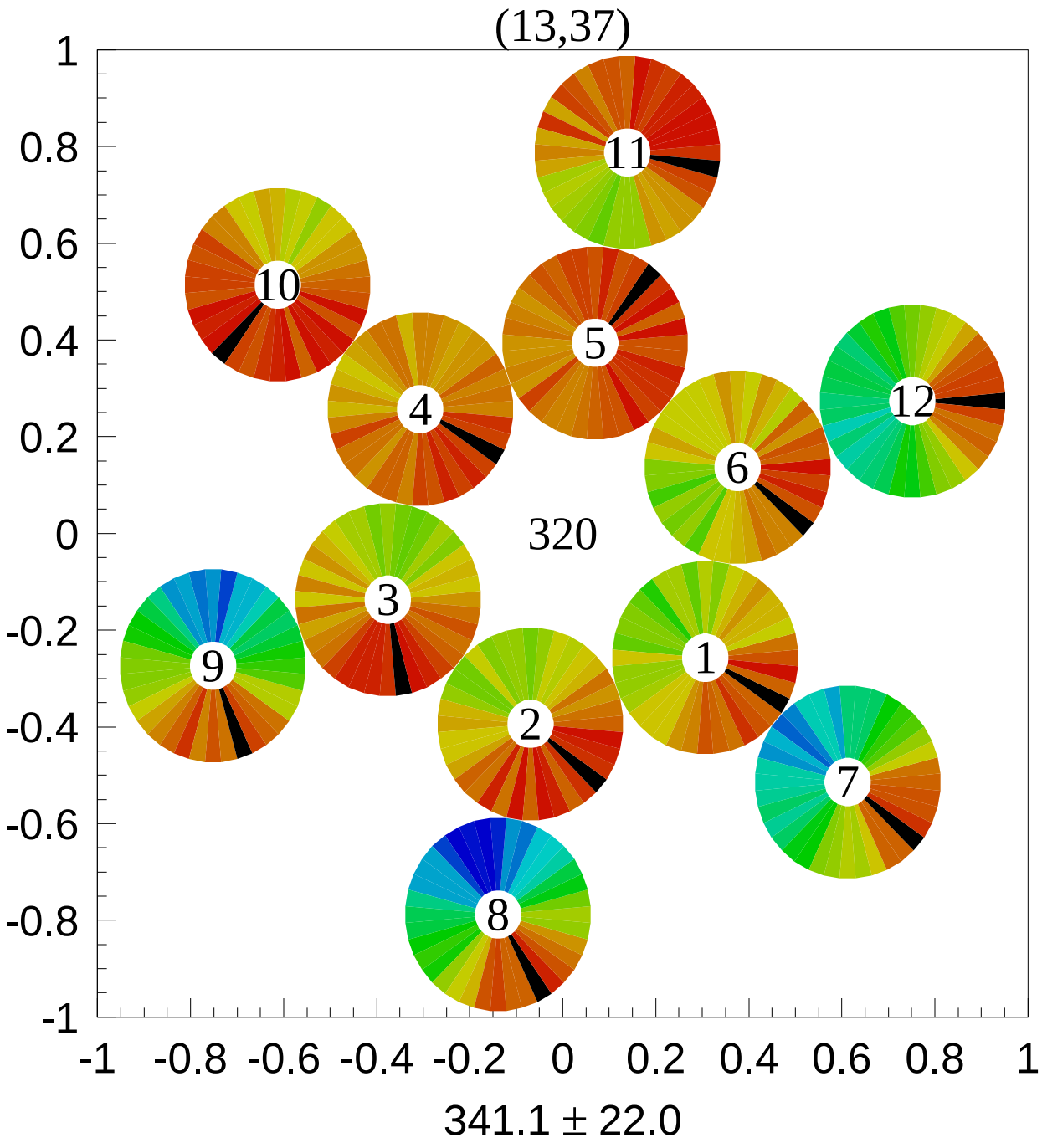

(13,34)
tilted LEDs
123 120 131 123 126 126
average of 6
average of 12
llh
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 121 130 132 120 116
average of 6
average of 12
llh
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

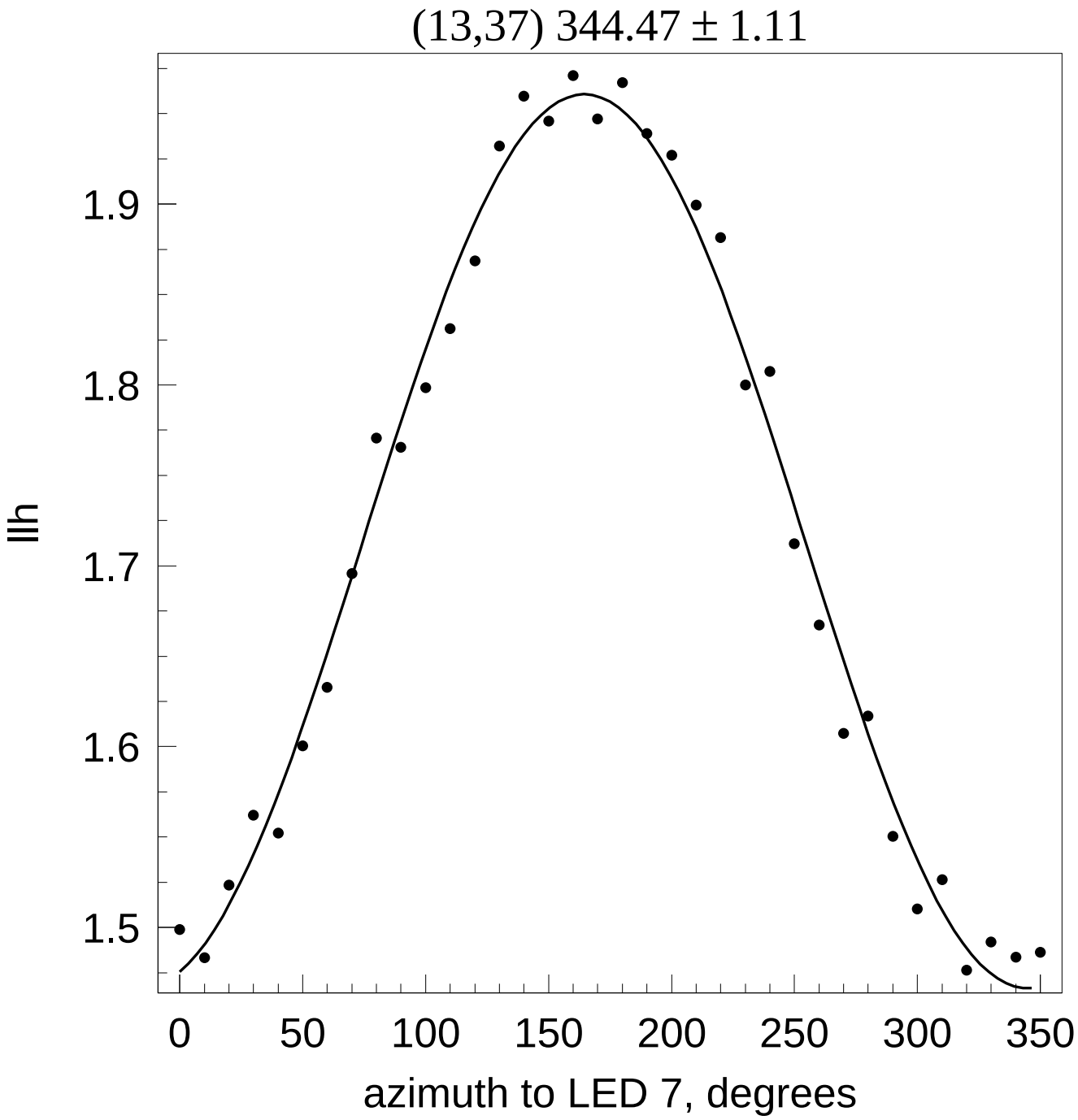

(13,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
292 ± 22.5

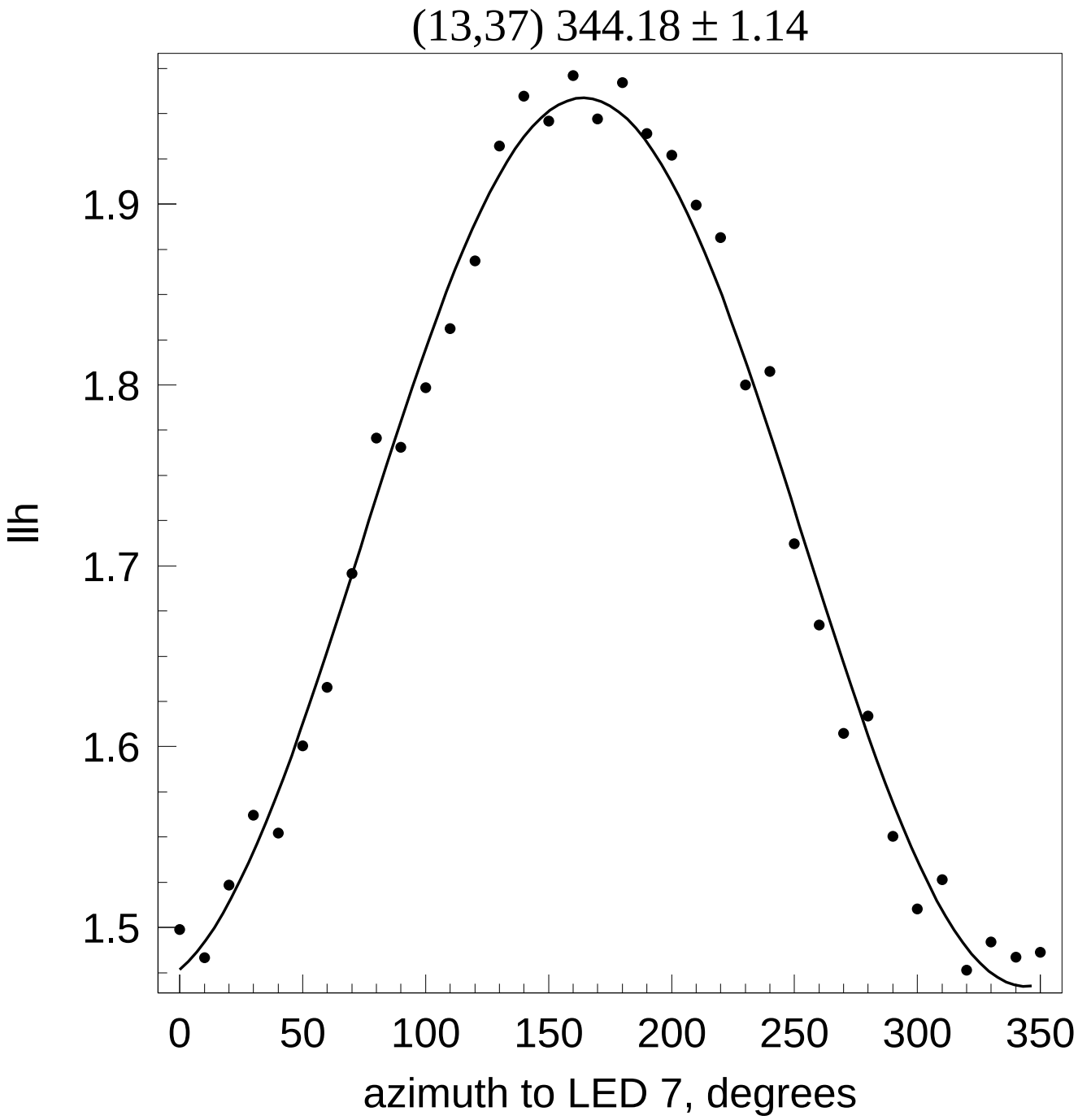

(13,34) 291.28 ± 1.54
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

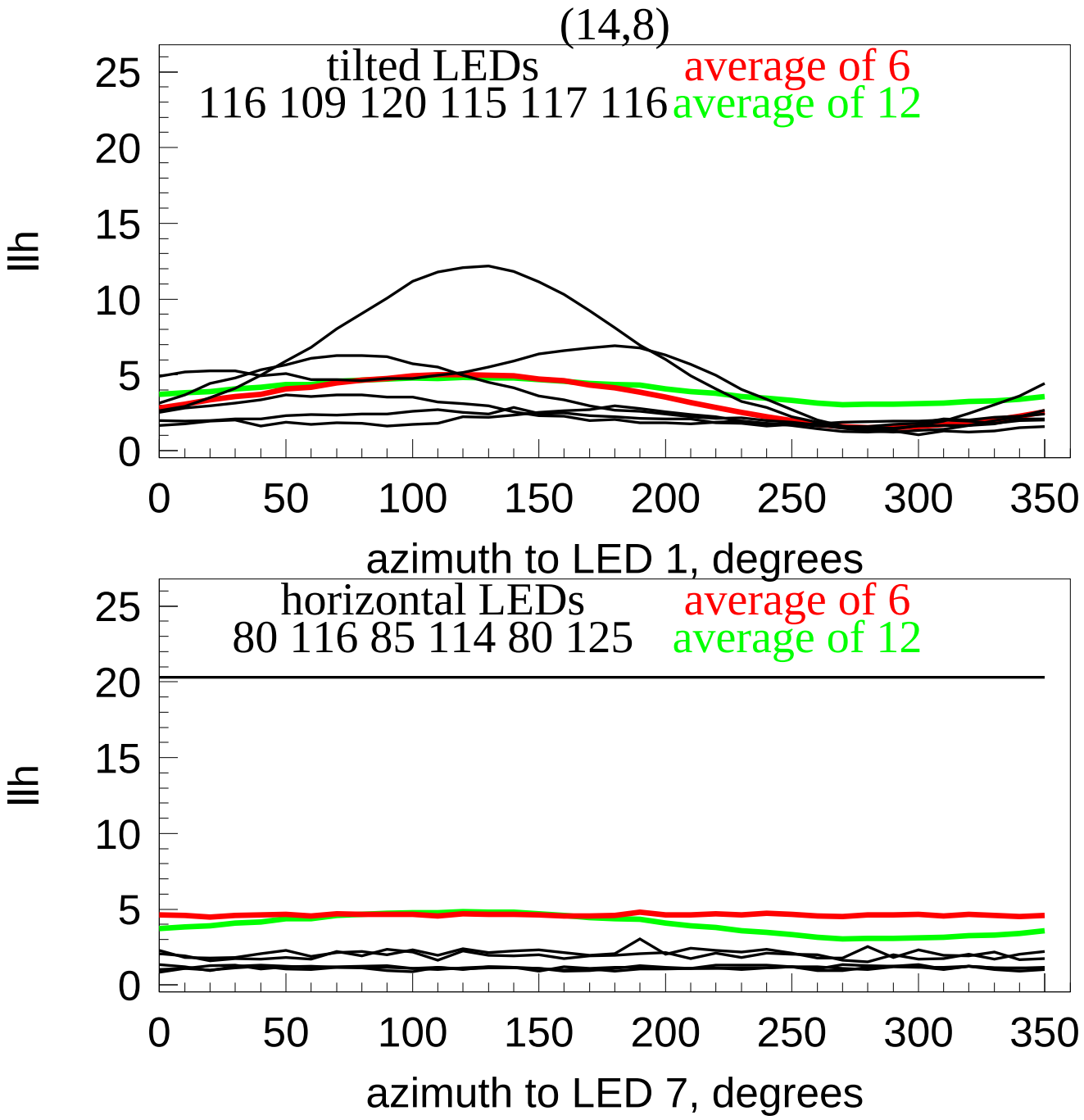

(13,34) 291.20 ± 1.54
1.8
1.7
1.6
1.5
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

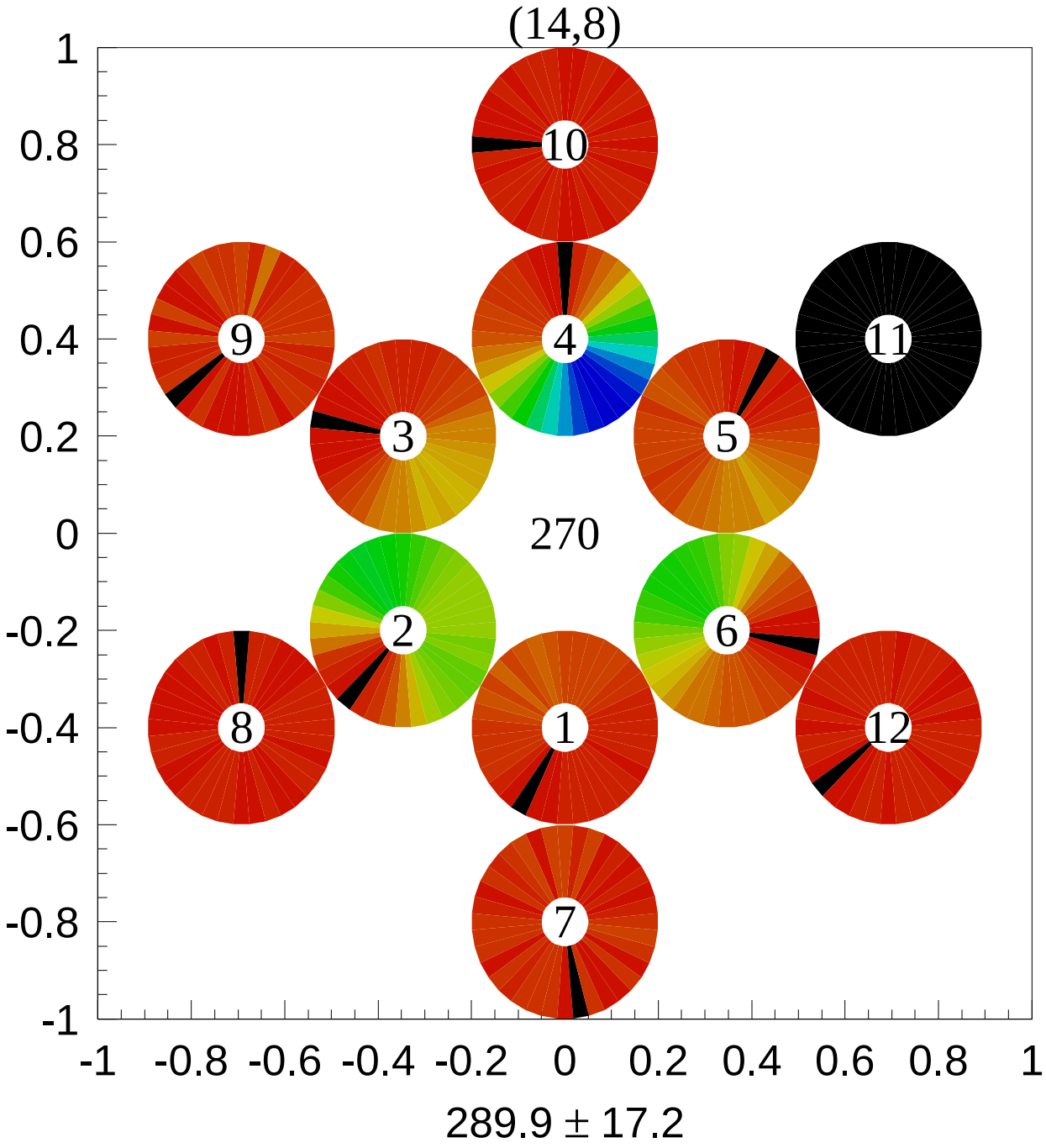

(13,37)
tilted LEDs
120 125 94 125 130 119
average of 6
average of 12
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 130 125 125 130 124
average of 6
average of 12
3.5
3
2.5
2
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

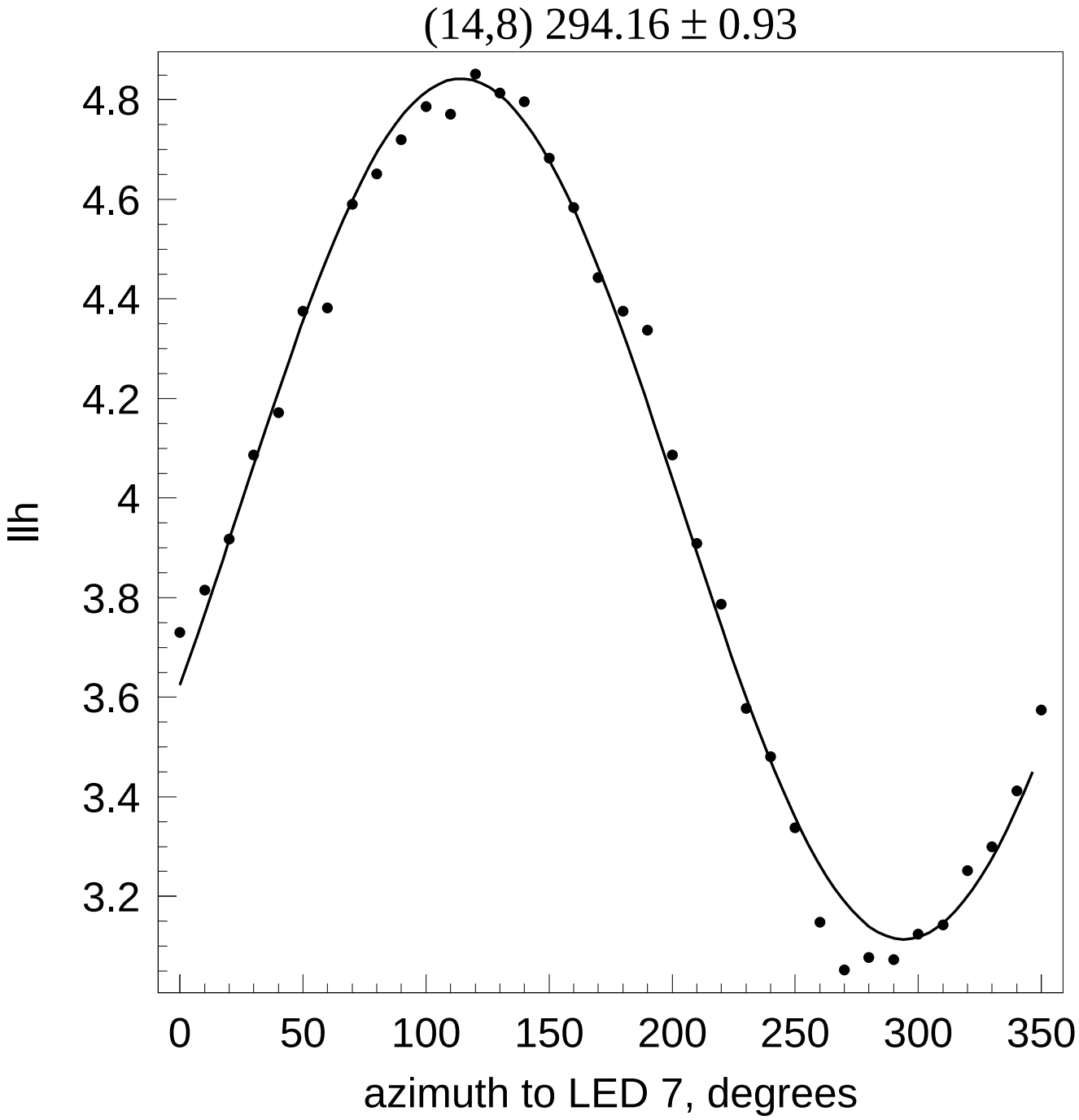

(13,37)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
341.1 ± 22.0

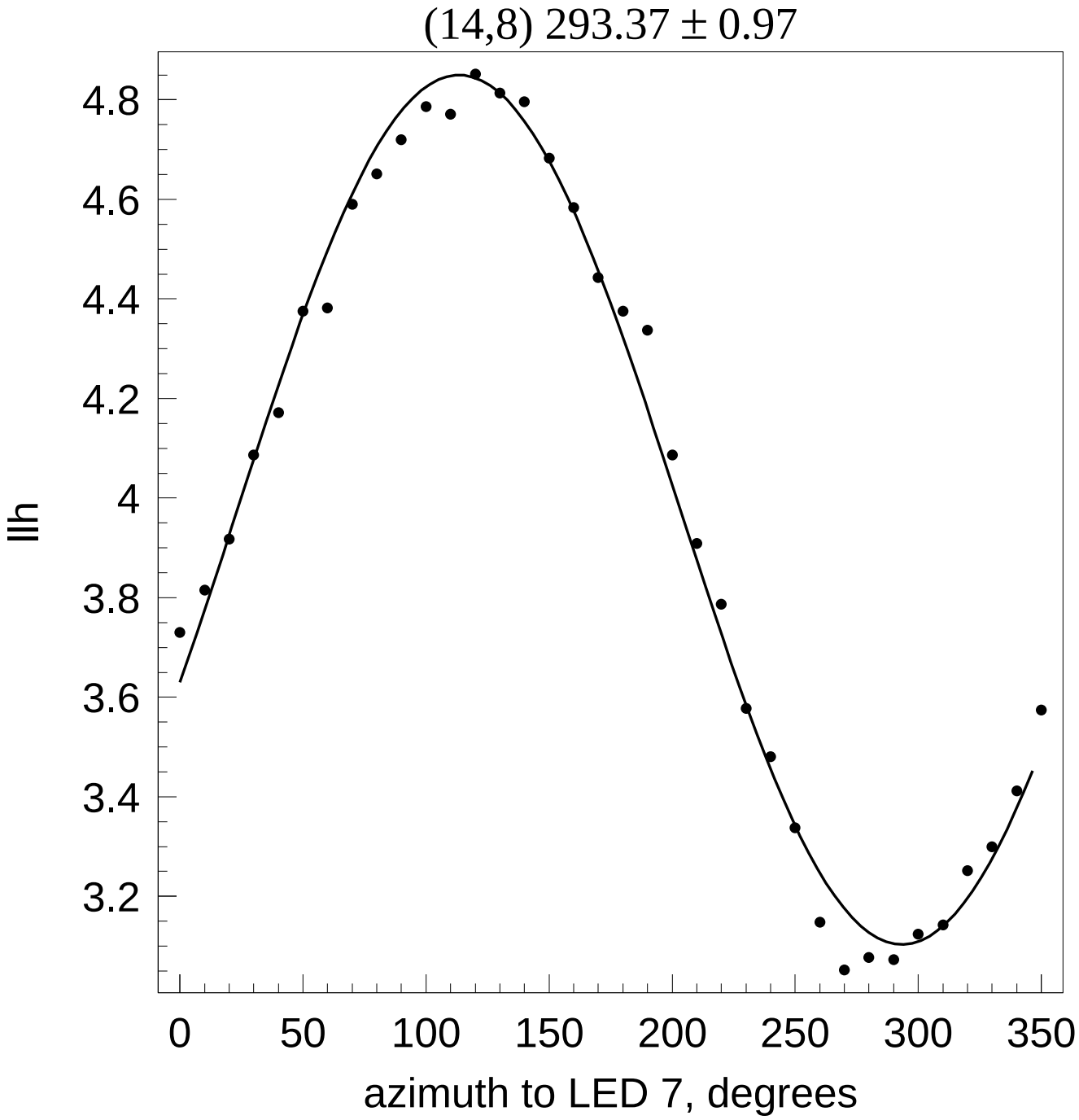

(13,37) 344.47 ± 1.11
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

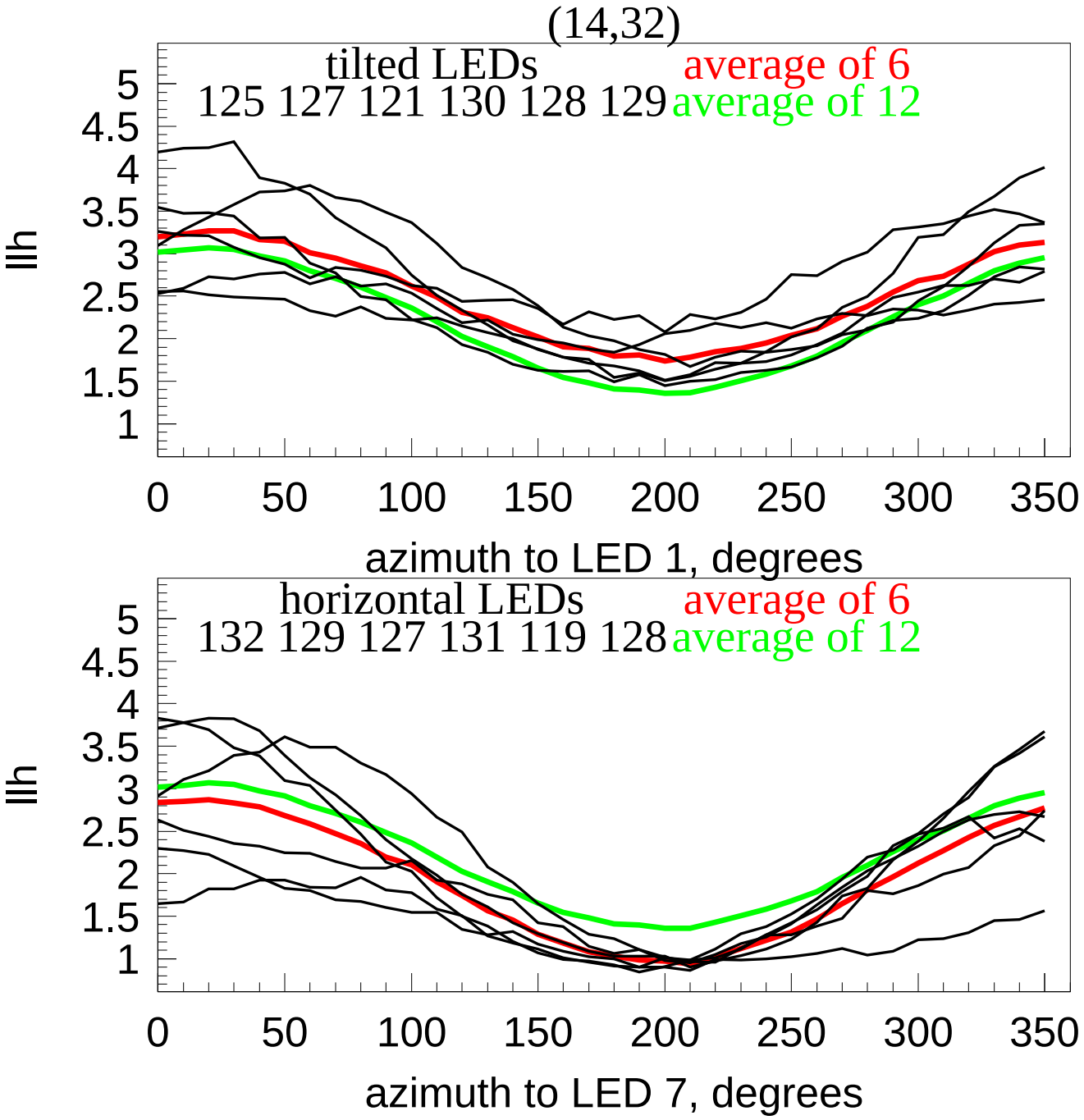

(13,37) 344.18 ± 1.14
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

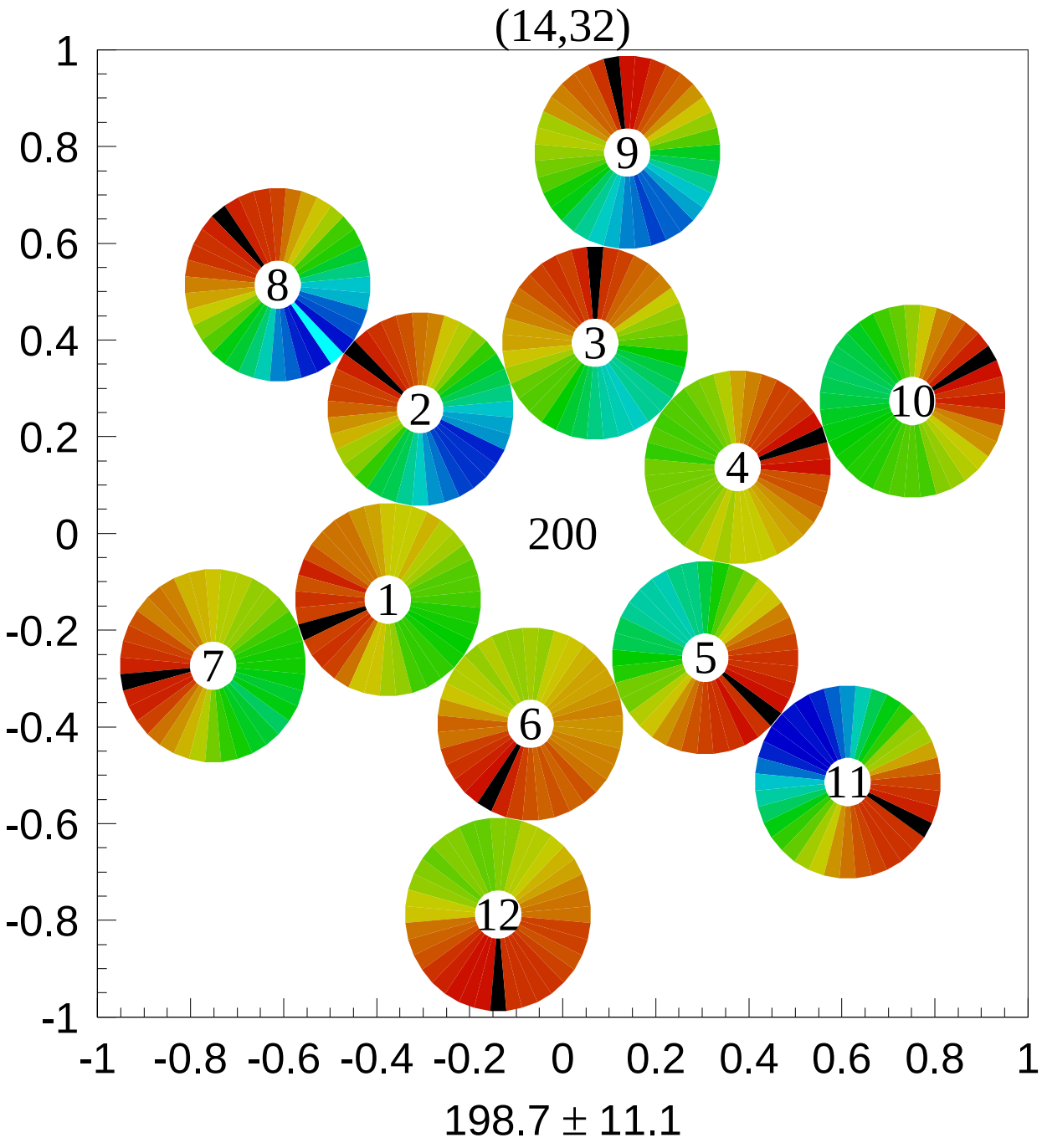

(14,8)
tilted LEDs
116 109 120 115 117 116
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
80 116 85 114 80 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

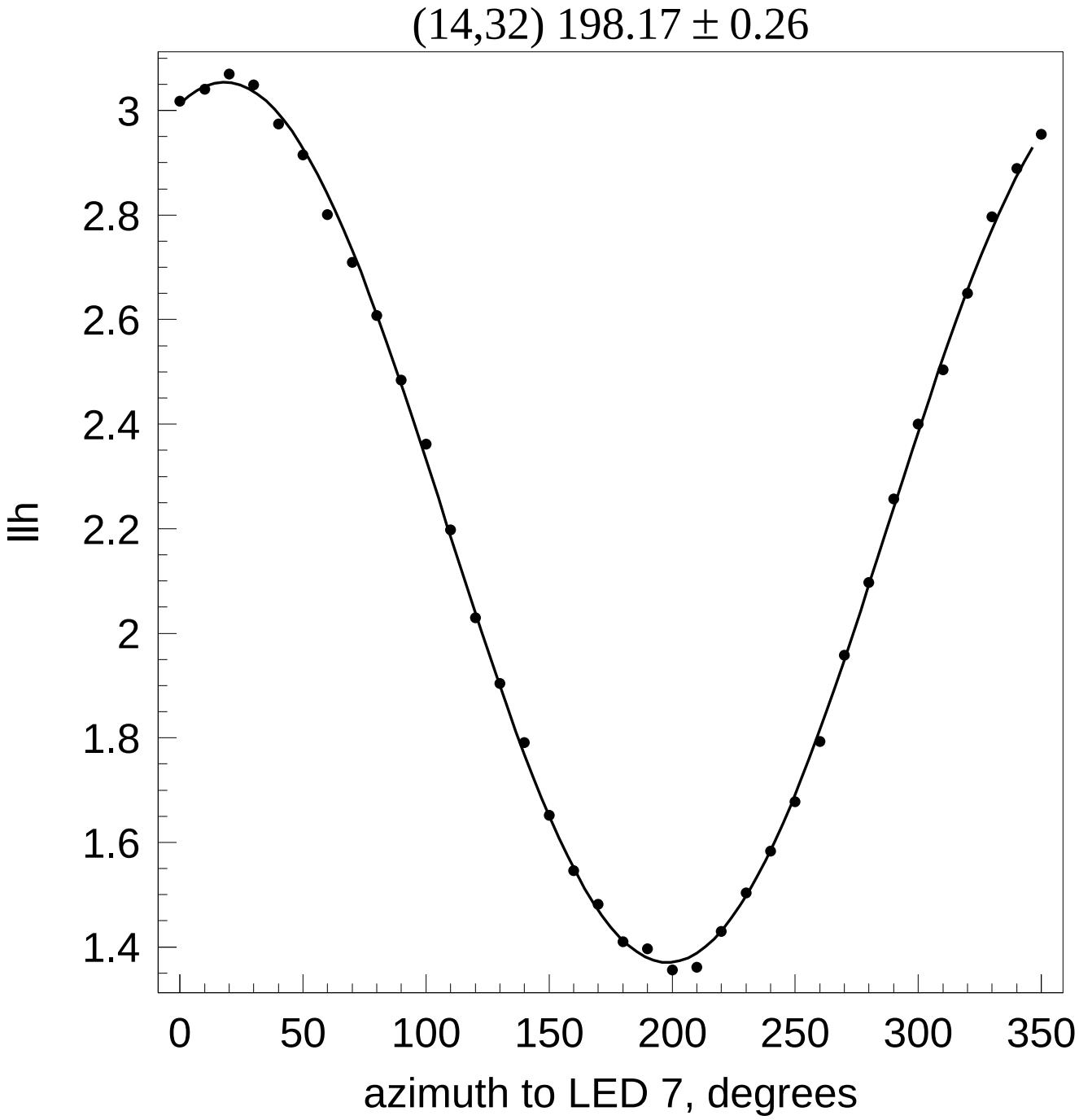

(14,8)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
289.9 ± 17.2

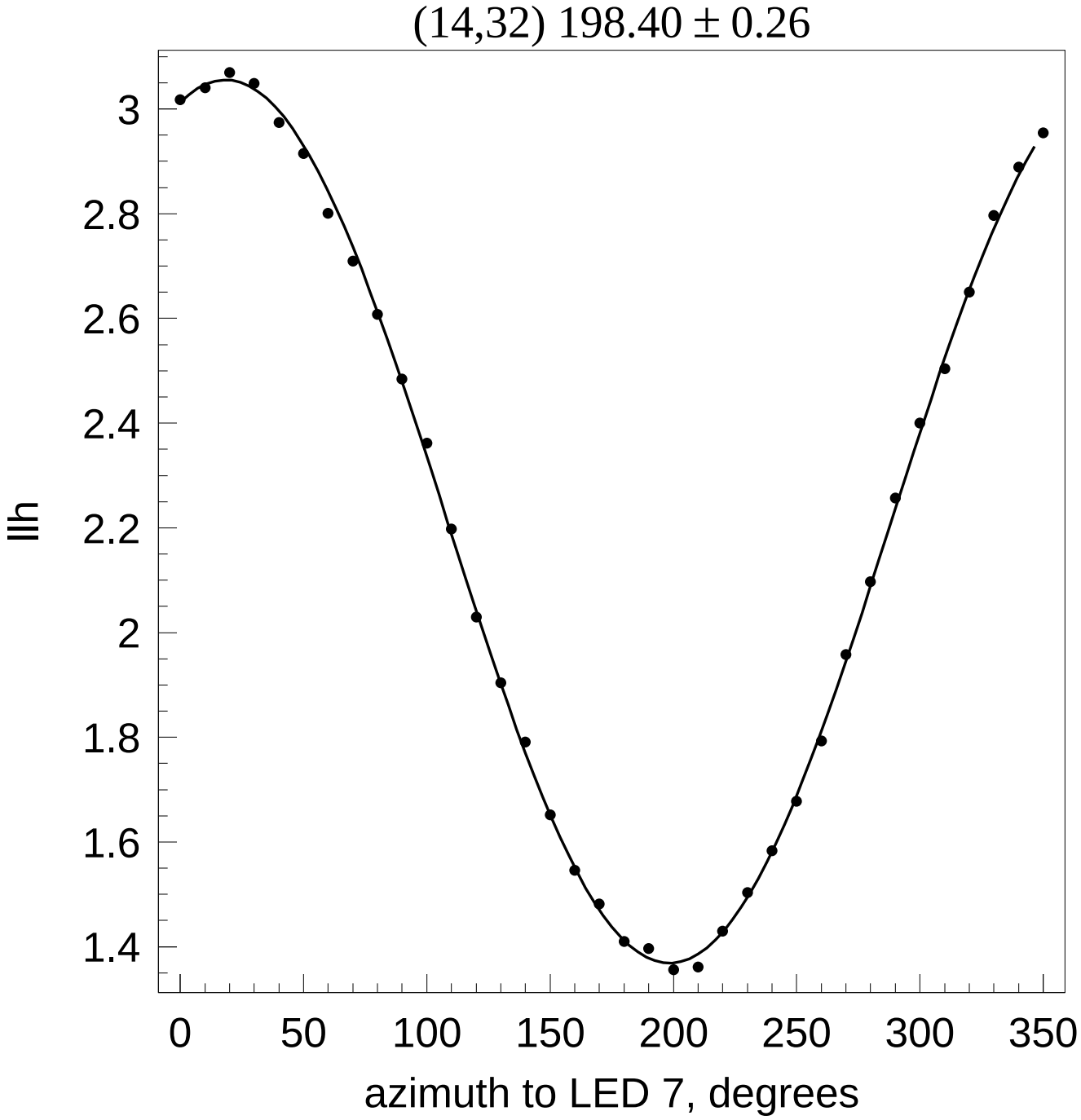

(14,8) 294.16 ± 0.93
llh
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

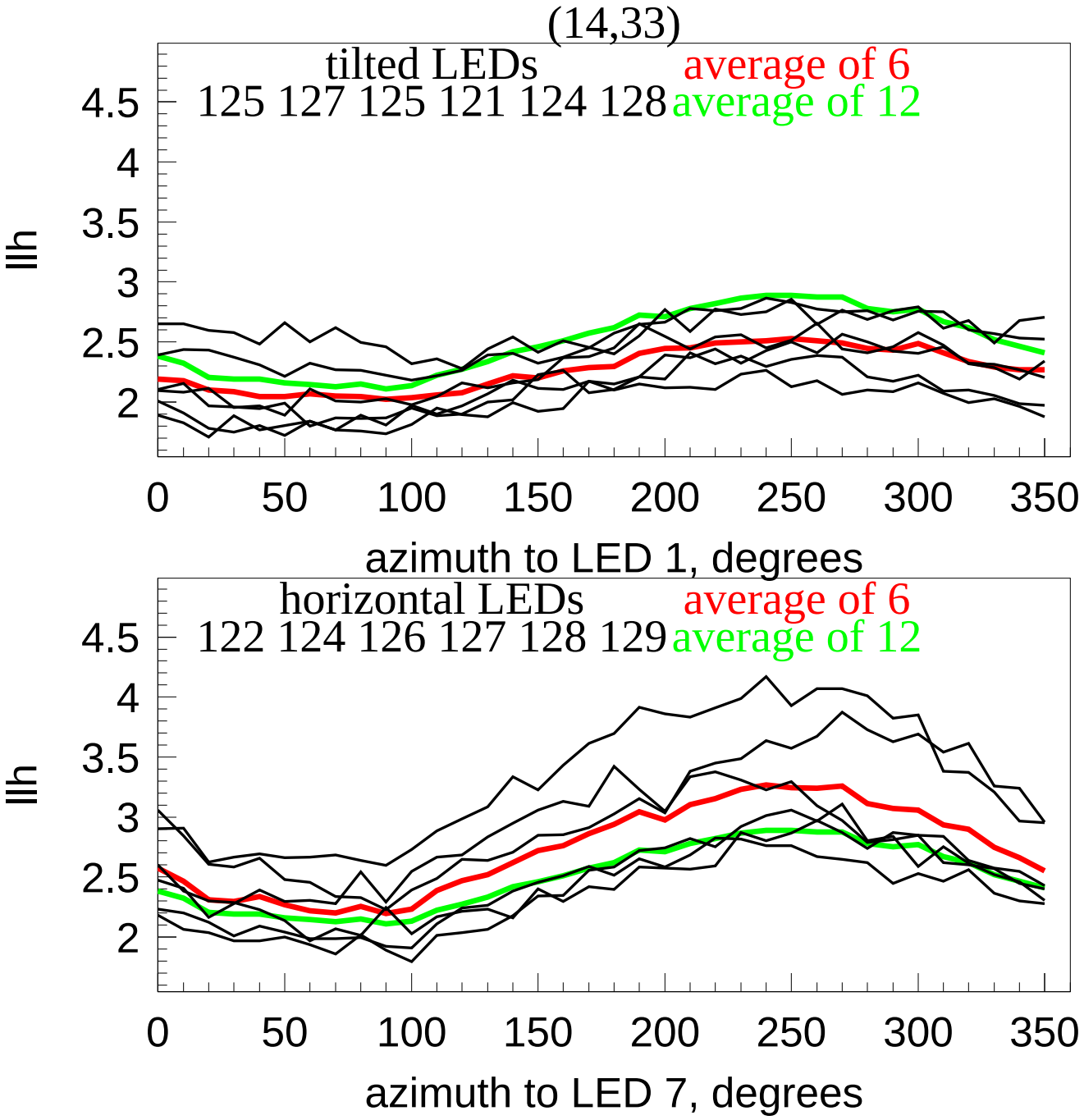

(14,8) 293.37 ± 0.97
llh
4.8
4.6
4.4
4.2
4
3.8
3.6
3.4
3.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

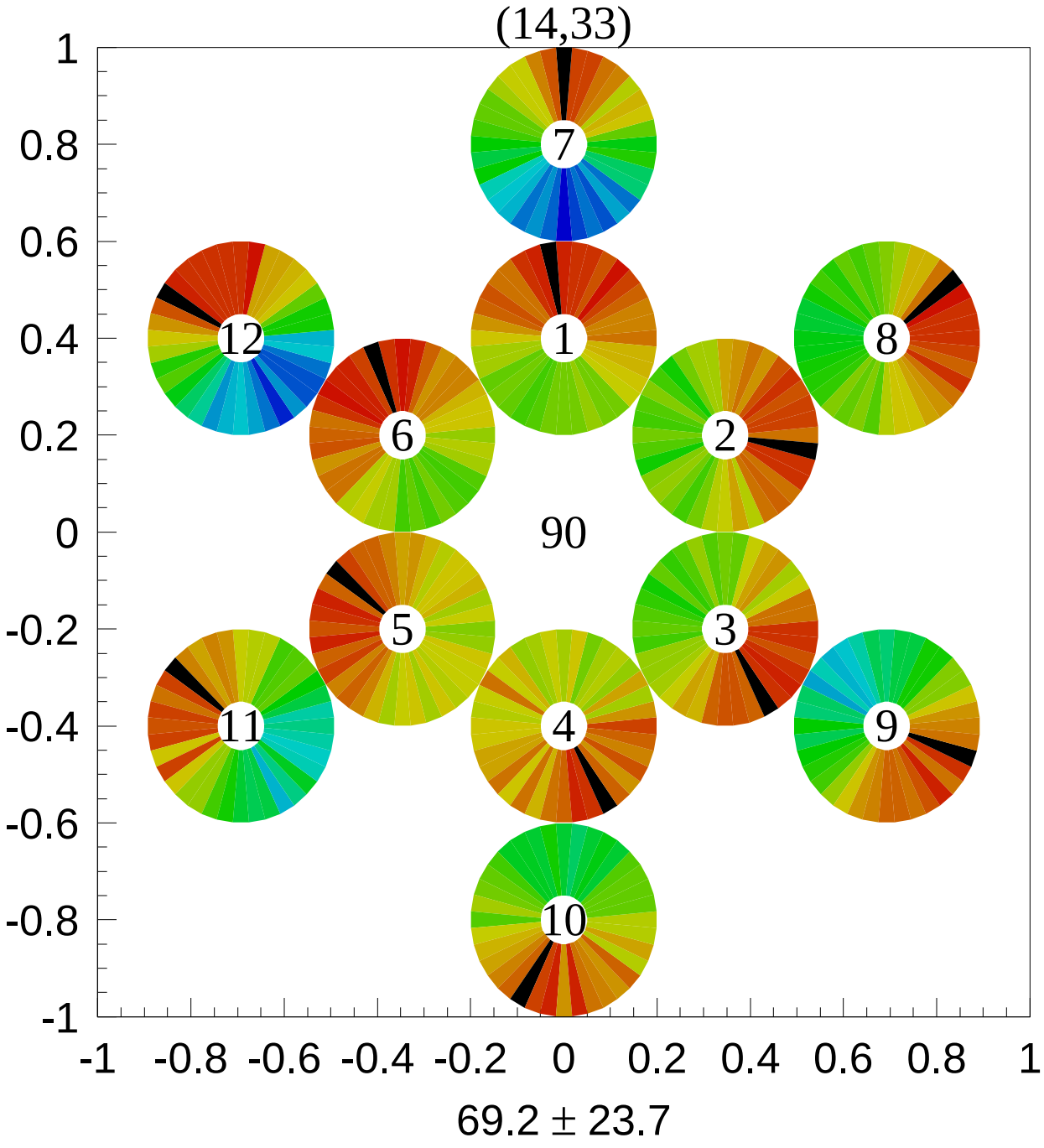

(14,32)
tilted LEDs
125 127 121 130 128 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 129 127 131 119 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

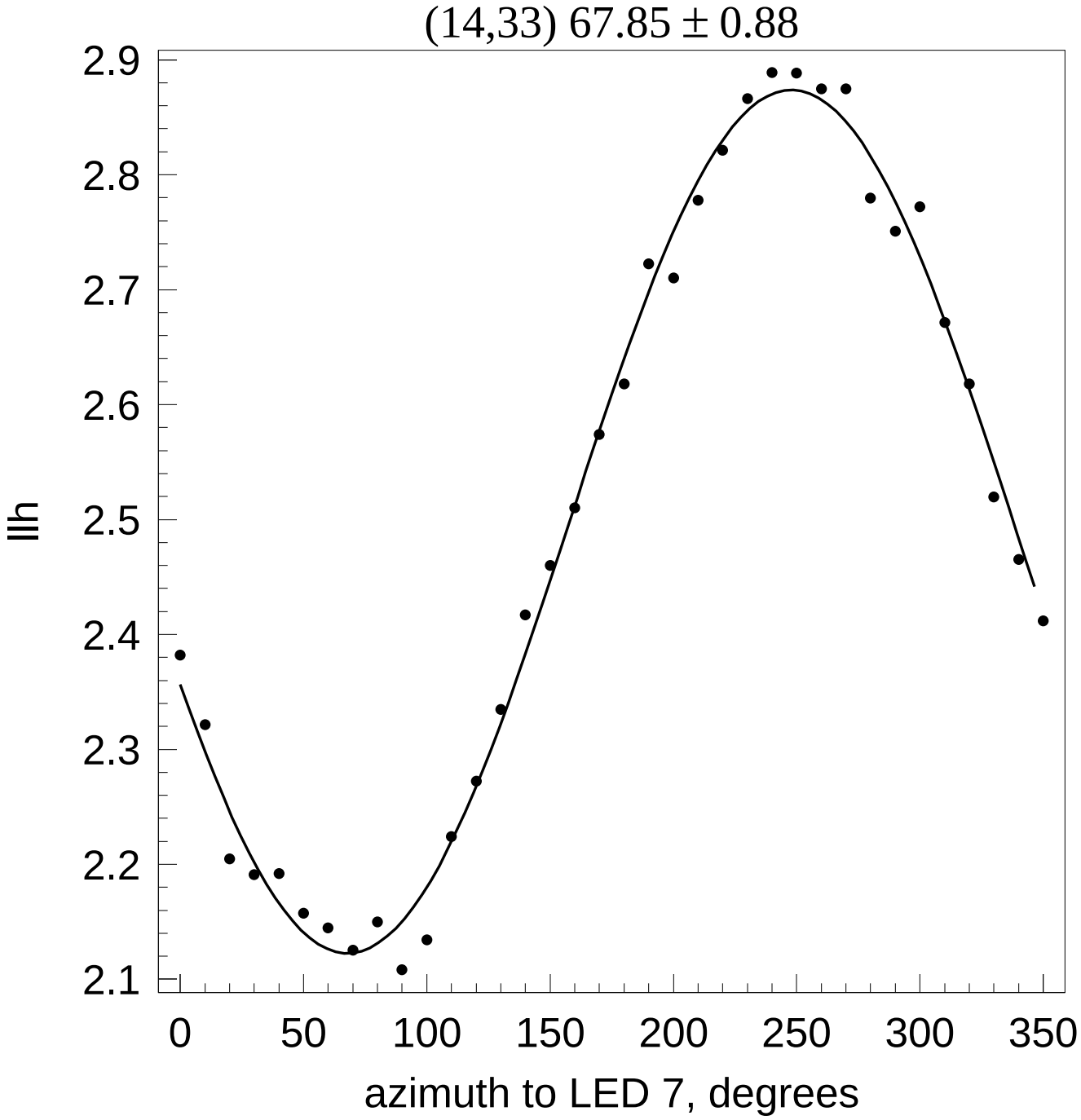

(14,32)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
8
3
2
10
4
200
1
7
5
6
11
12
198.7 ± 11.1

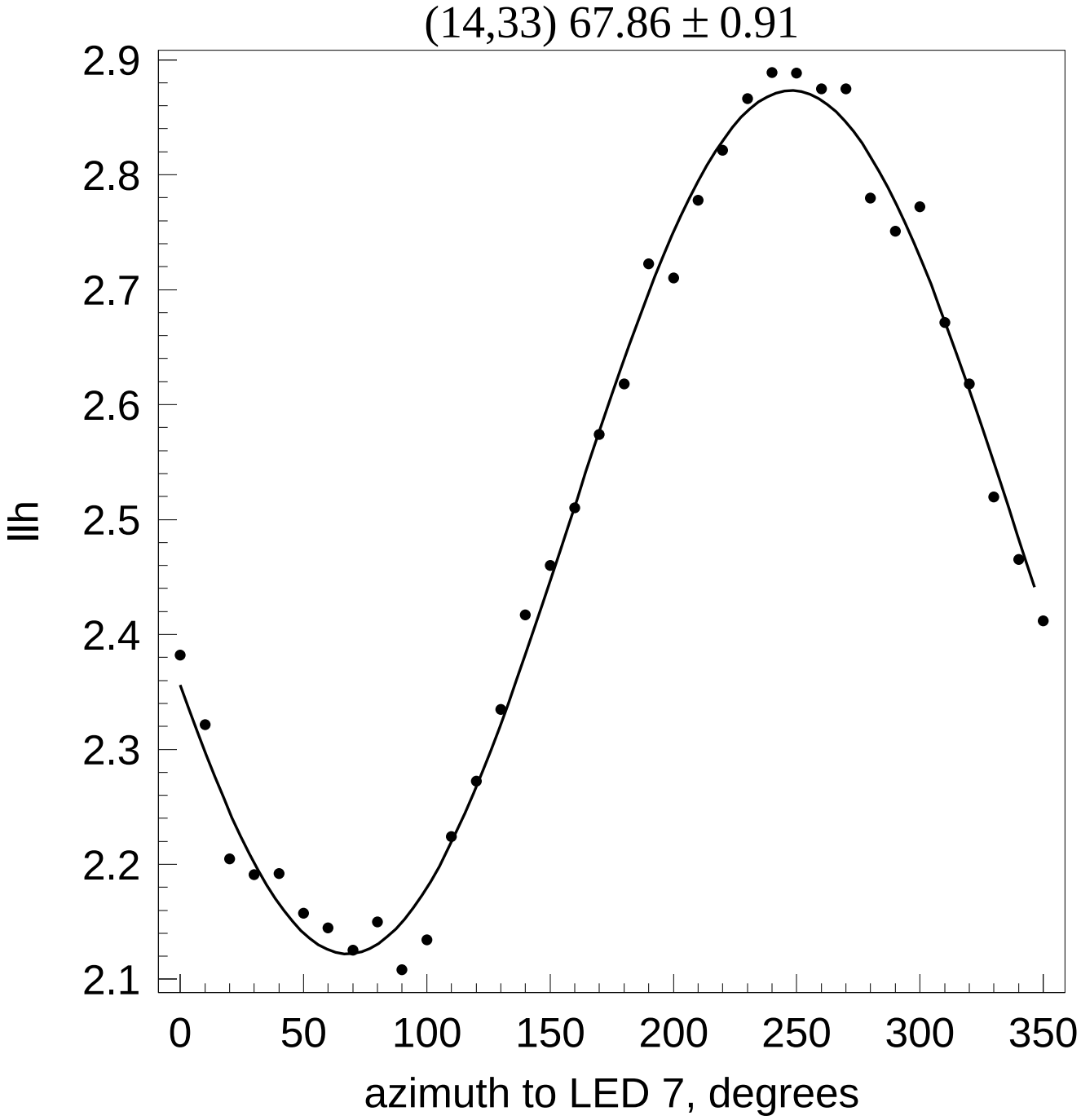

(14,32) 198.17 ± 0.26
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

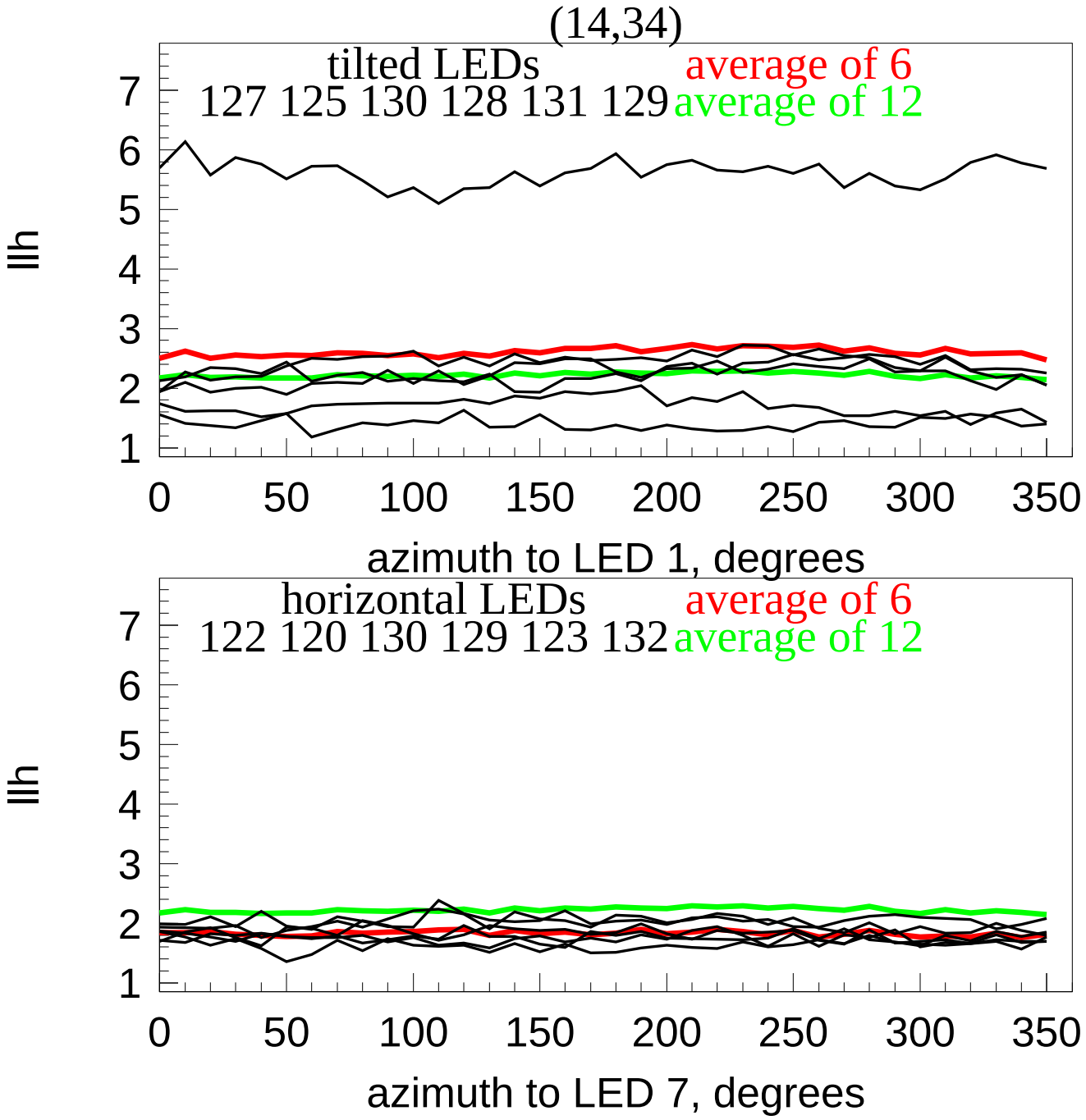

(14,32) 198.40 ± 0.26
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
Ilh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

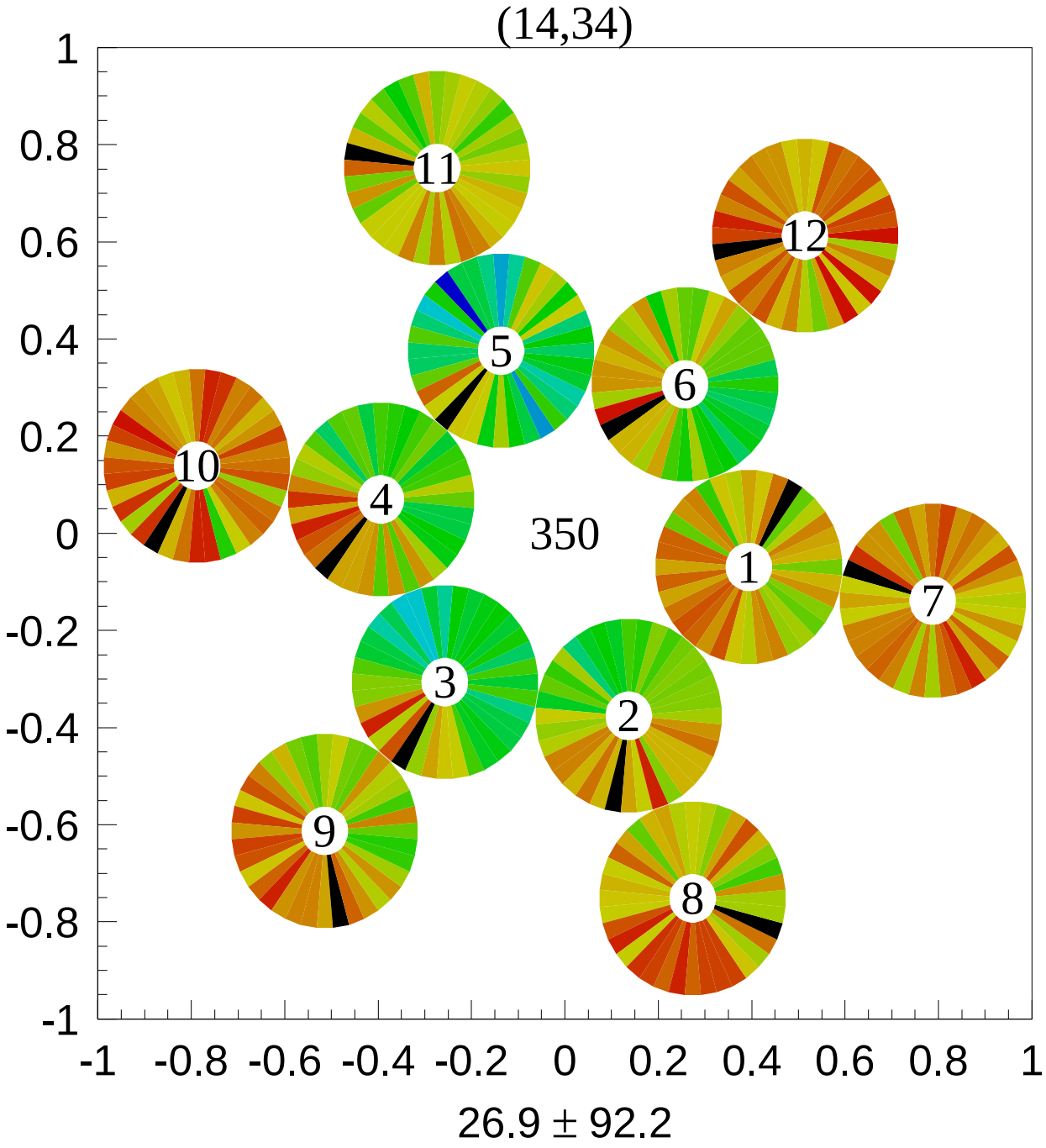

(14,33)
tilted LEDs
125 127 125 121 124 128
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 124 126 127 128 129
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

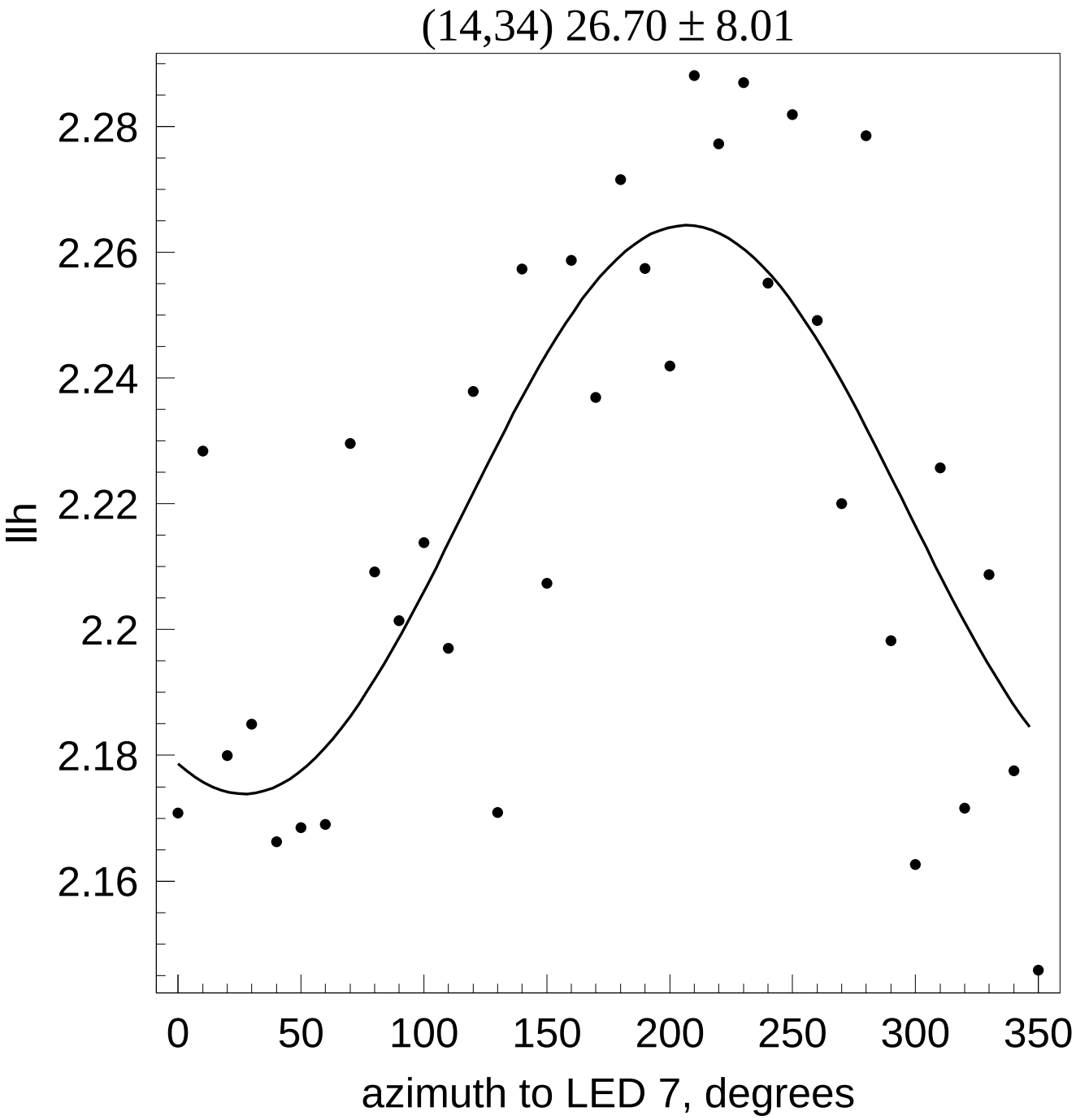

(14,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
7
12
1
8
6
2
90
5
3
11
4
9
10
69.2 ± 23.7

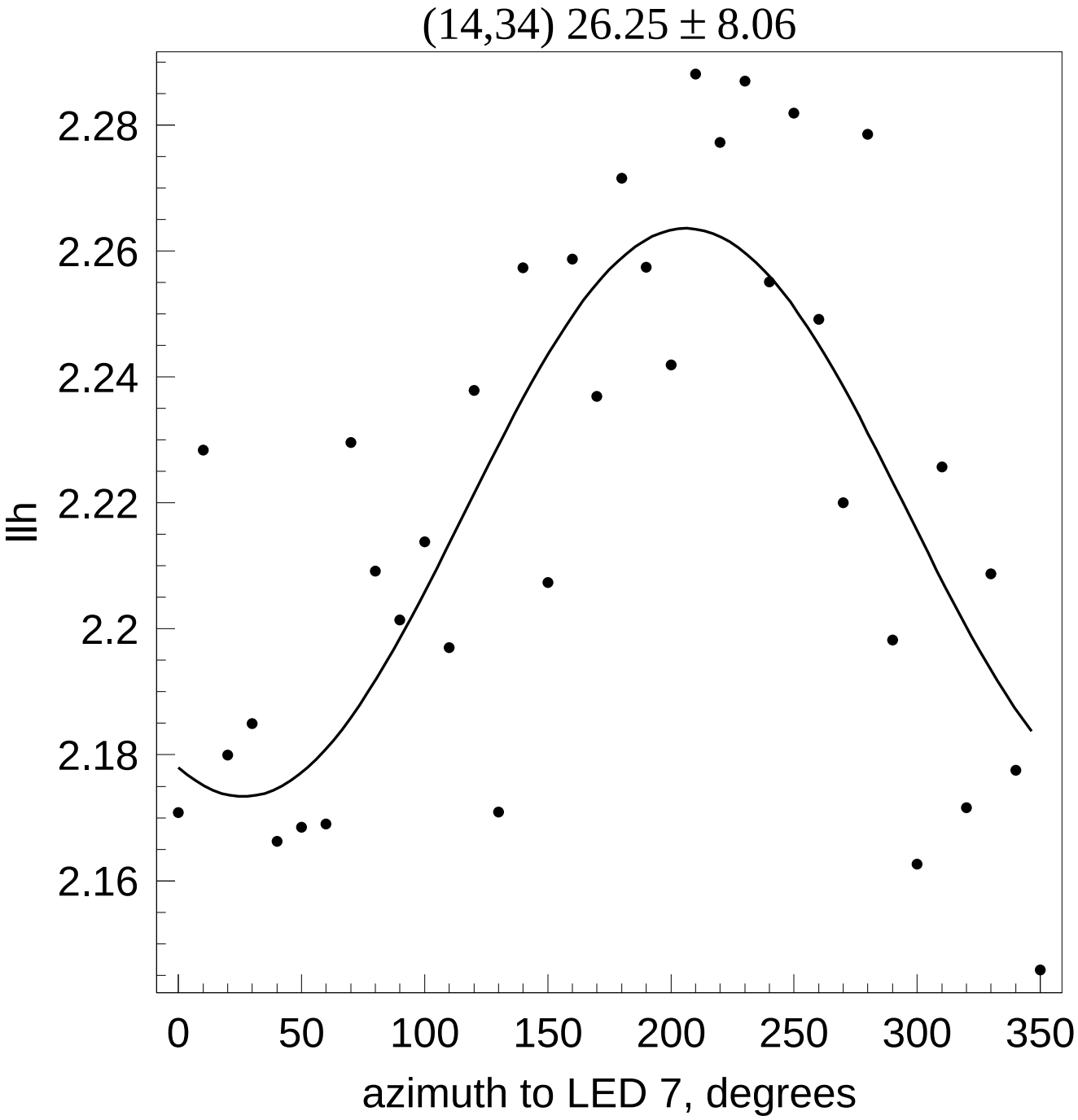

(14,33) 67.85 ± 0.88
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

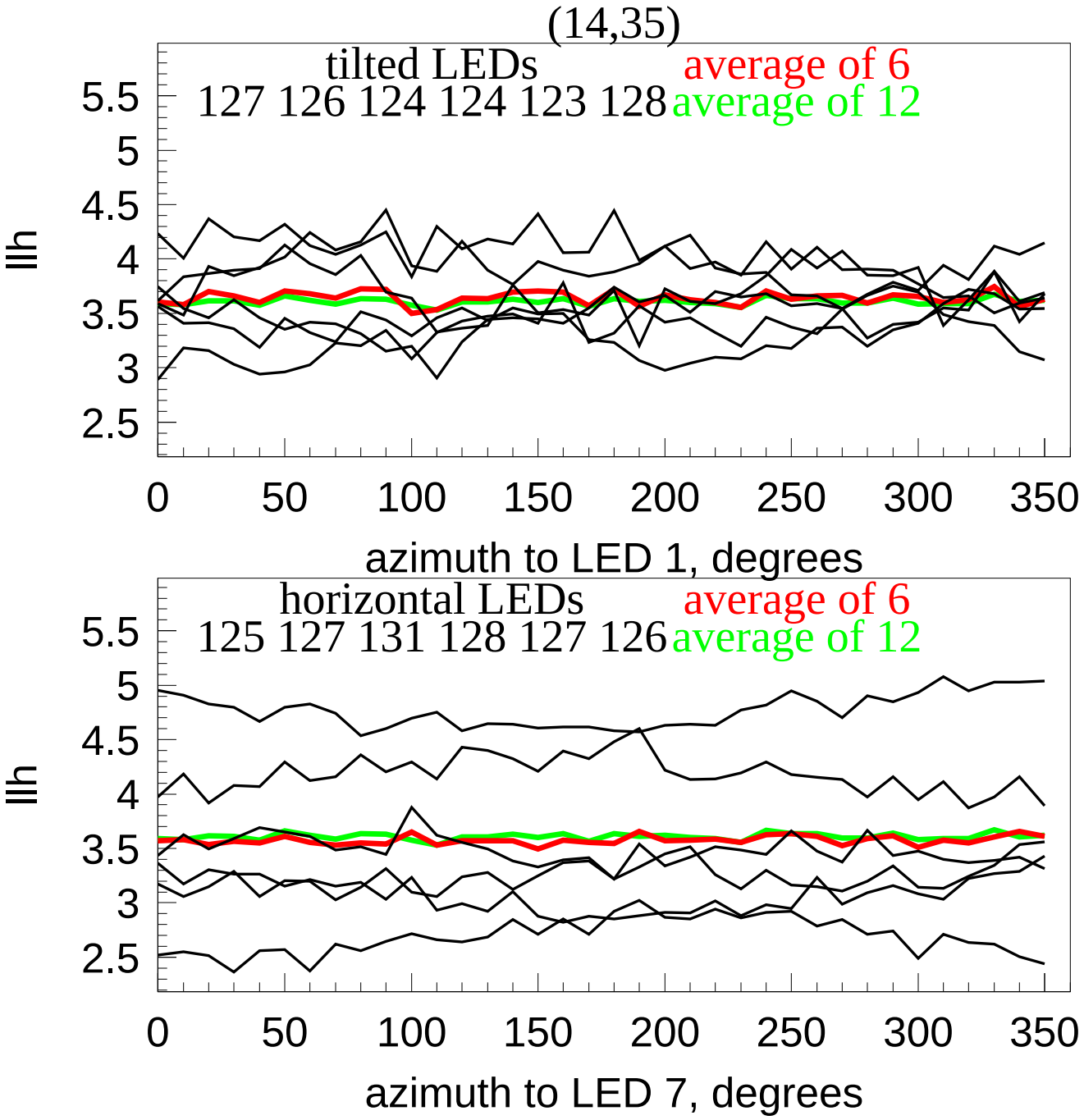

(14,33) 67.86 ± 0.91
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

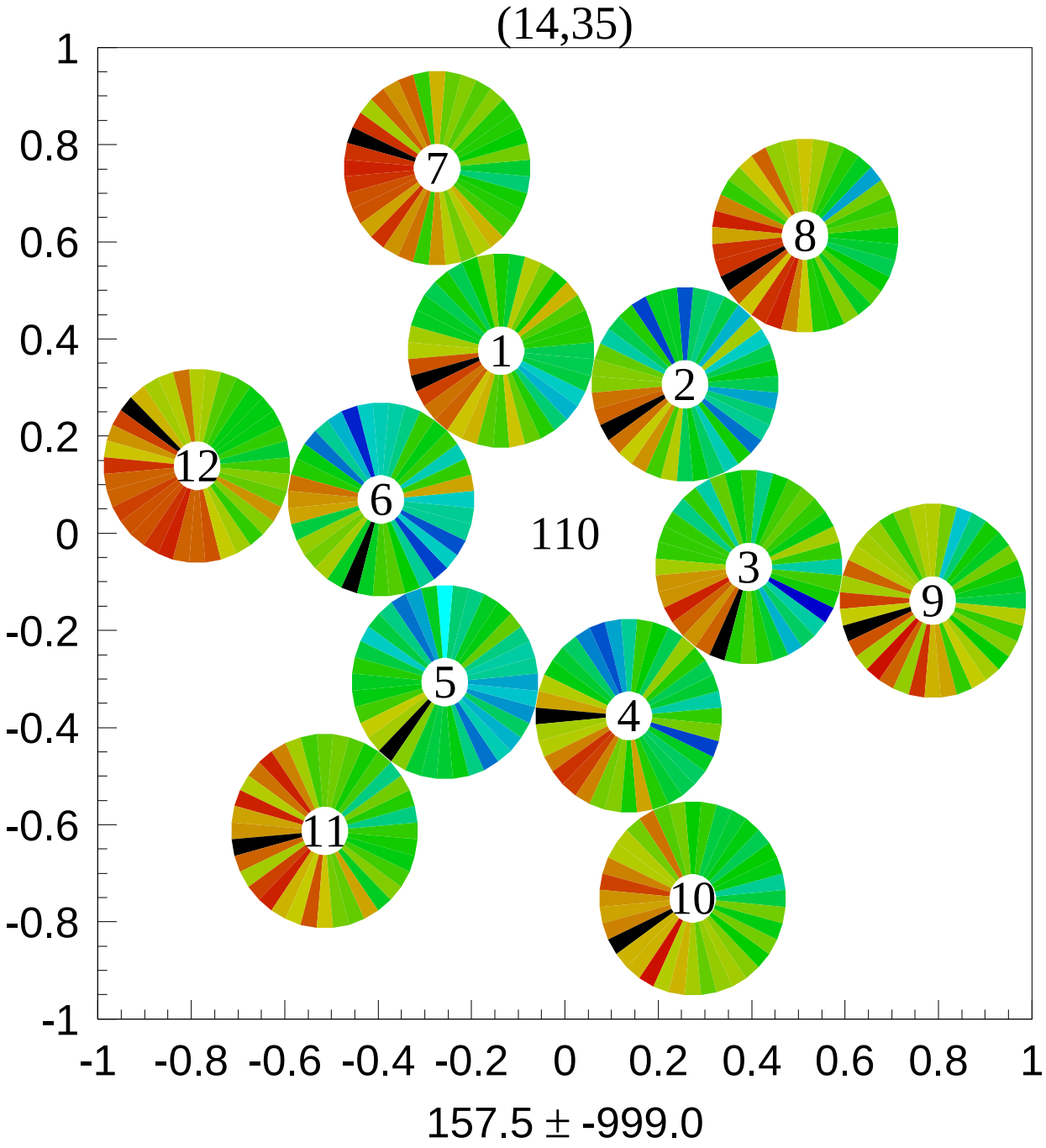

(14,34)
tilted LEDs
127 125 130 128 131 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 120 130 129 123 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

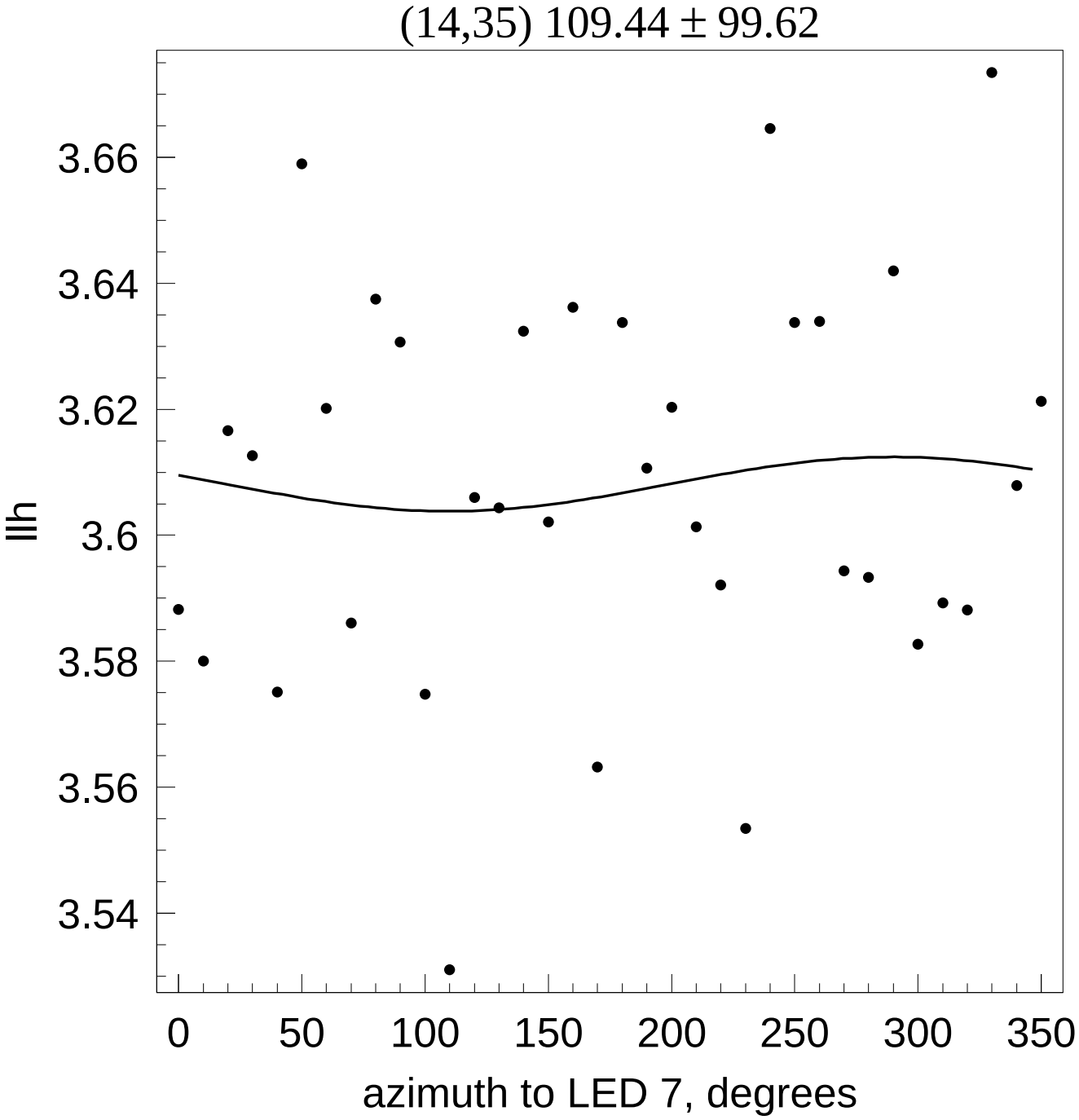

(14,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
26.9 ± 92.2

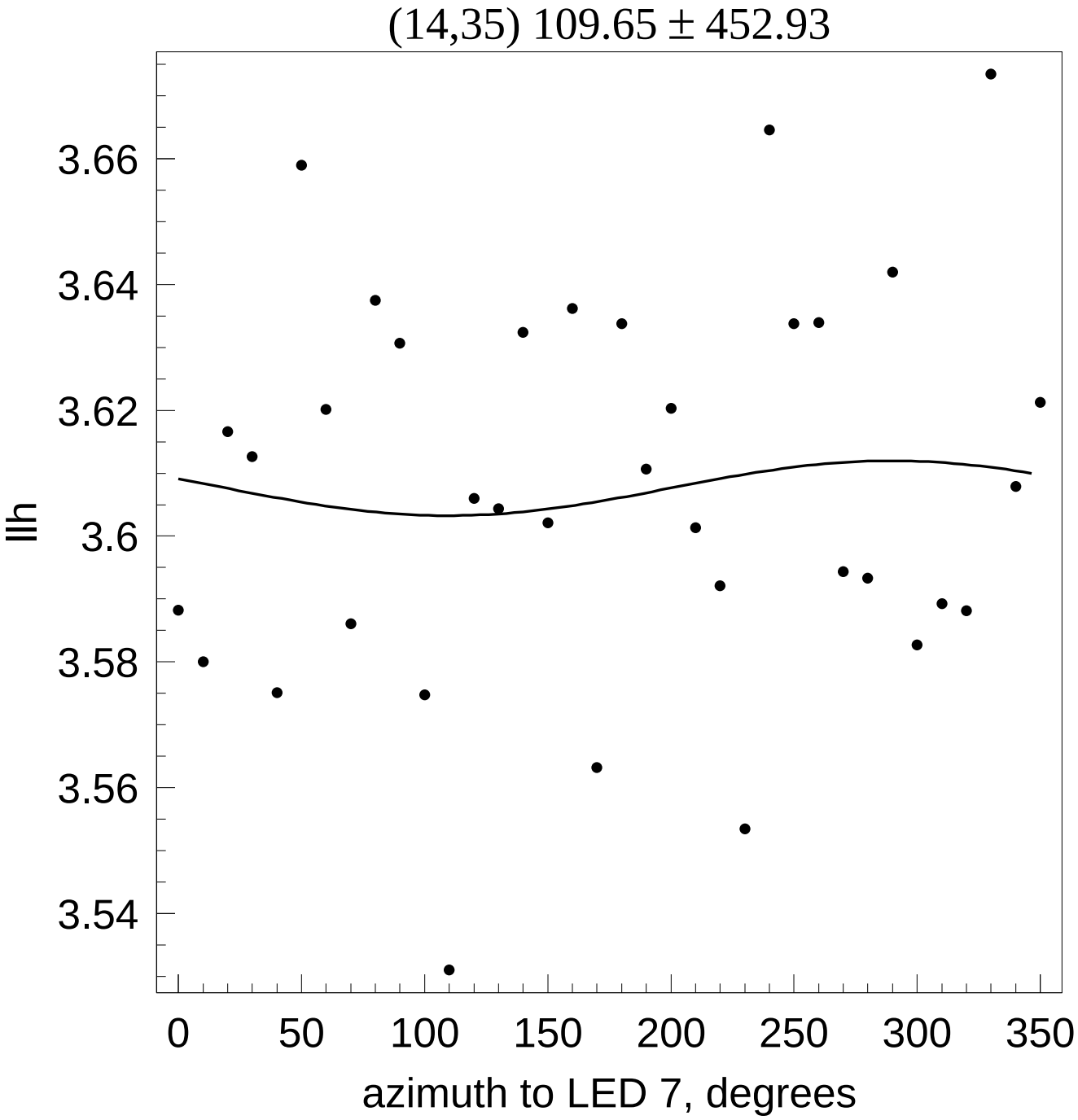

(14,34) 26.70 ± 8.01
2.28
2.26
2.24
2.22
2.2
2.18
2.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

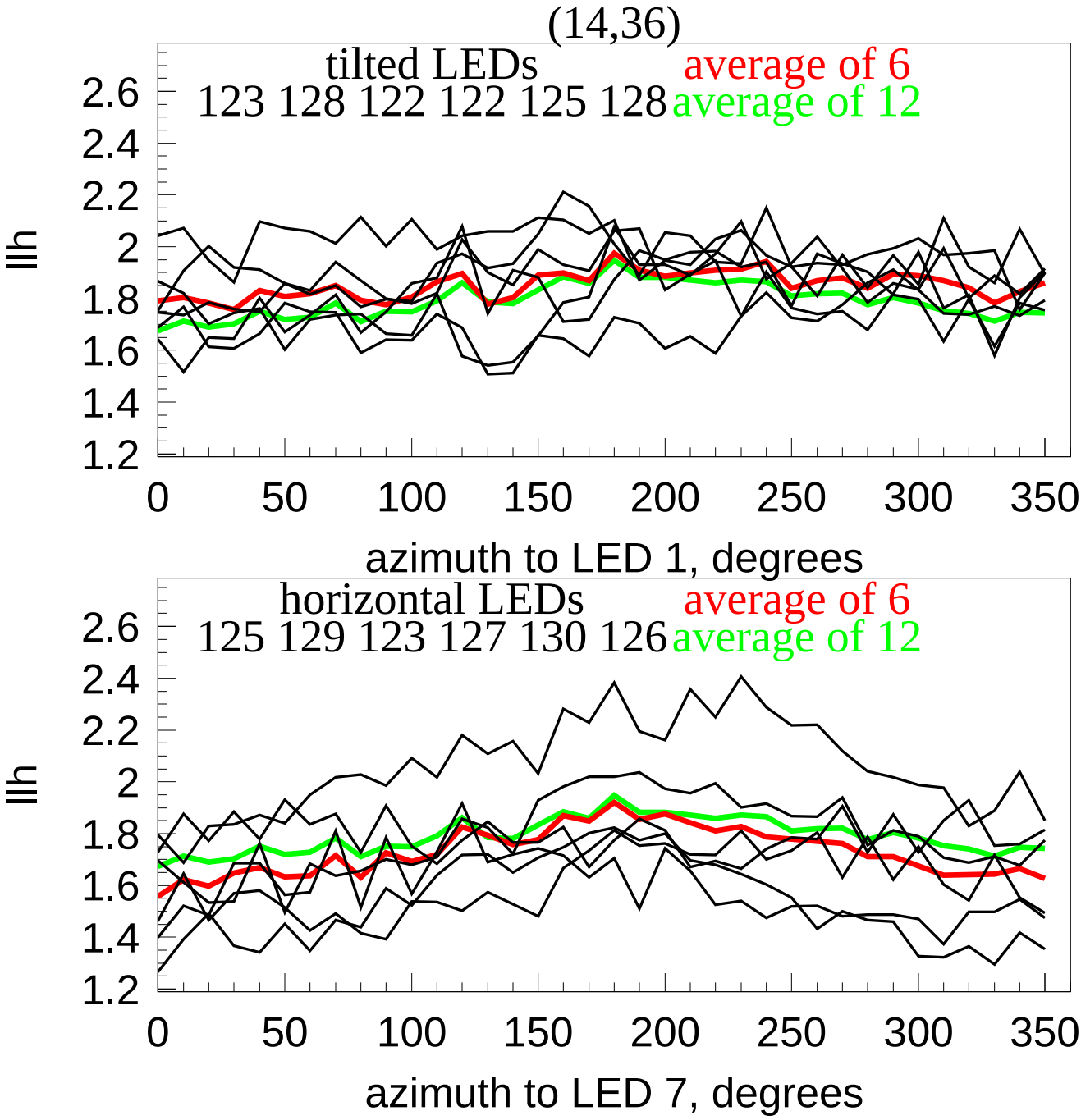

(14,34) 26.25 ± 8.06
2.28
2.26
2.24
2.22
2.2
2.18
2.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

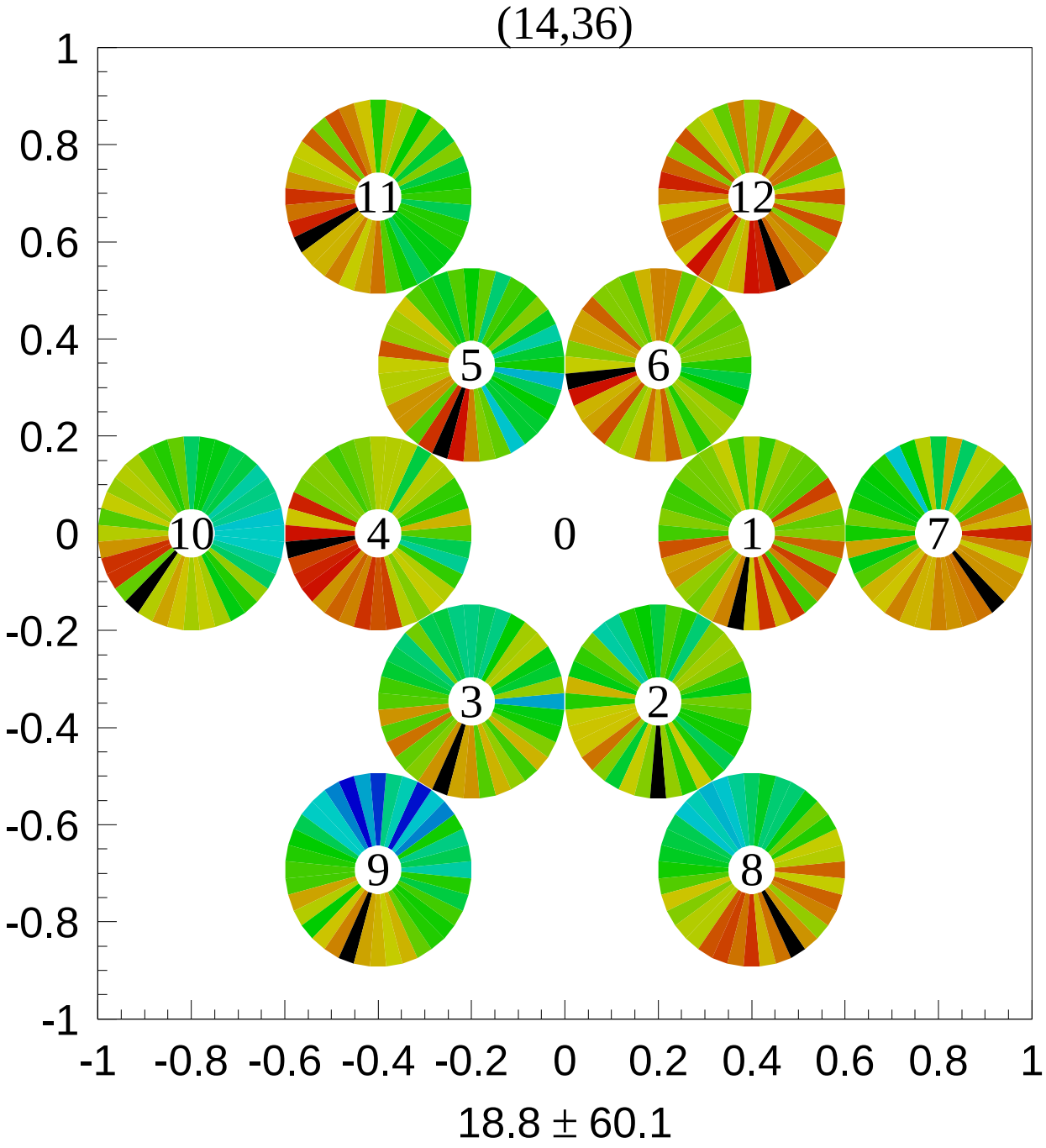

(14,35)
tilted LEDs
127 126 124 124 123 128
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 127 131 128 127 126
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

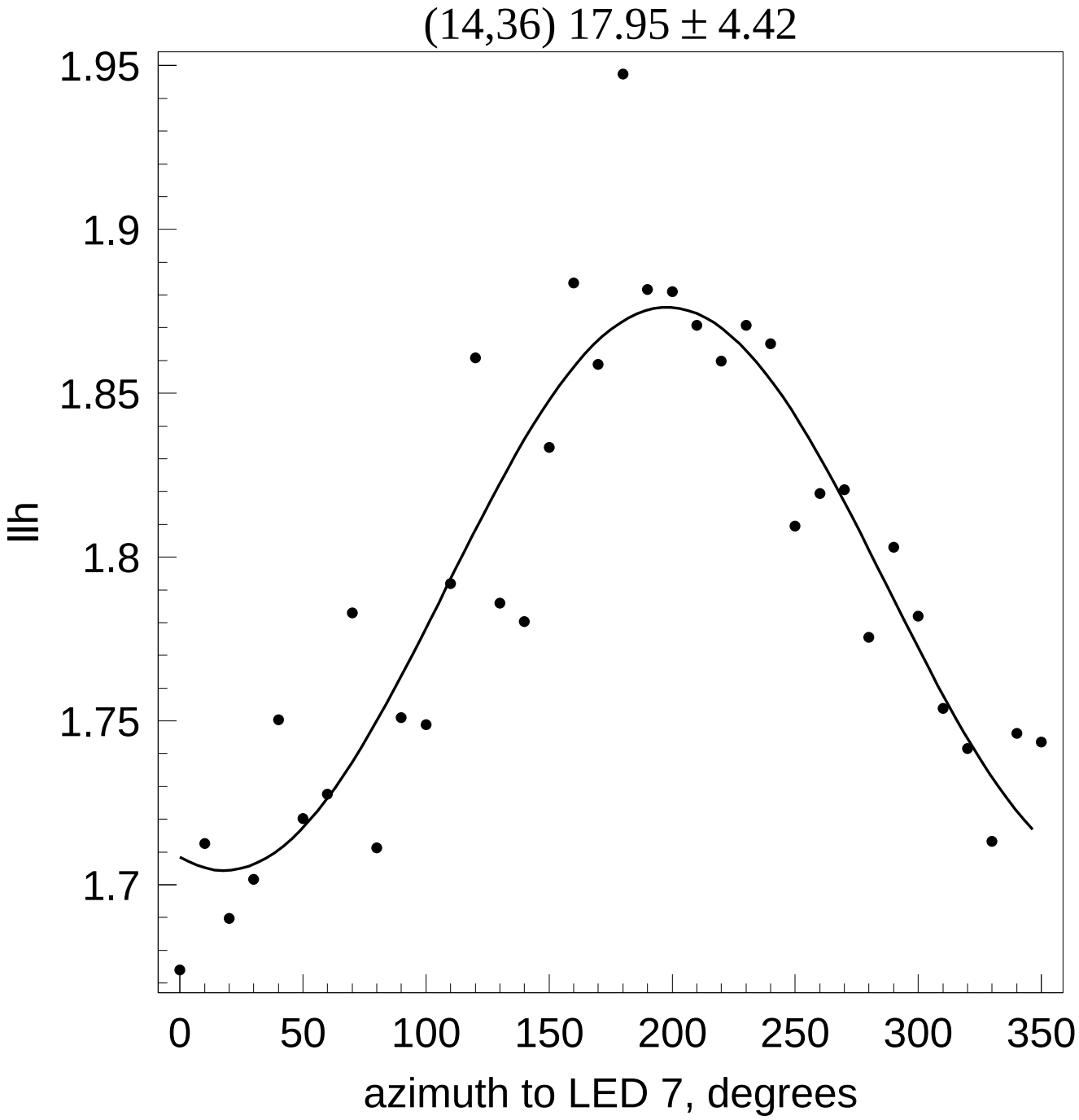

(14,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
157.5 ± -999.0

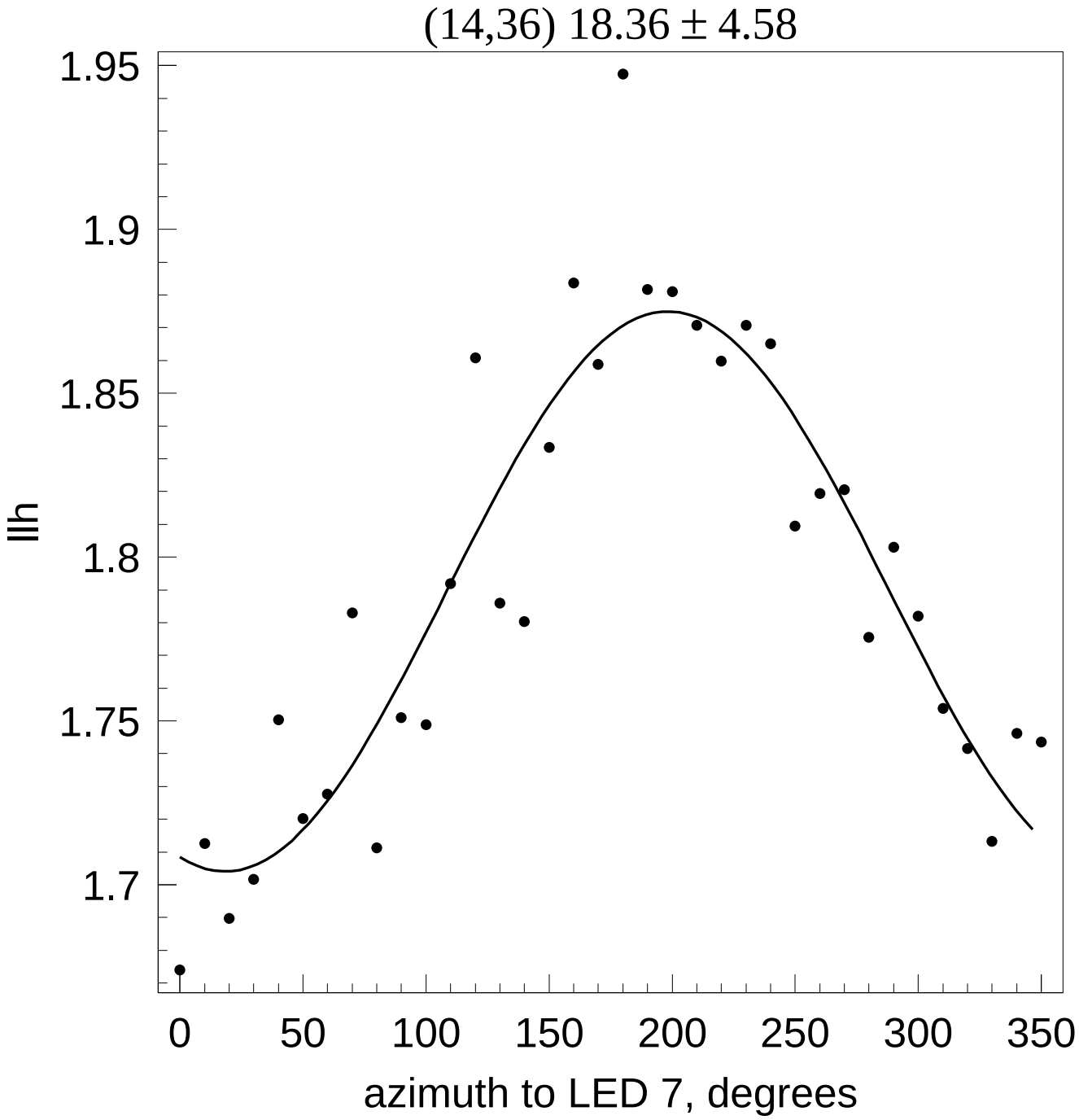

(14,35) 109.44 ± 99.62
3.66
3.64
3.62
3.6
3.58
3.56
3.54
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

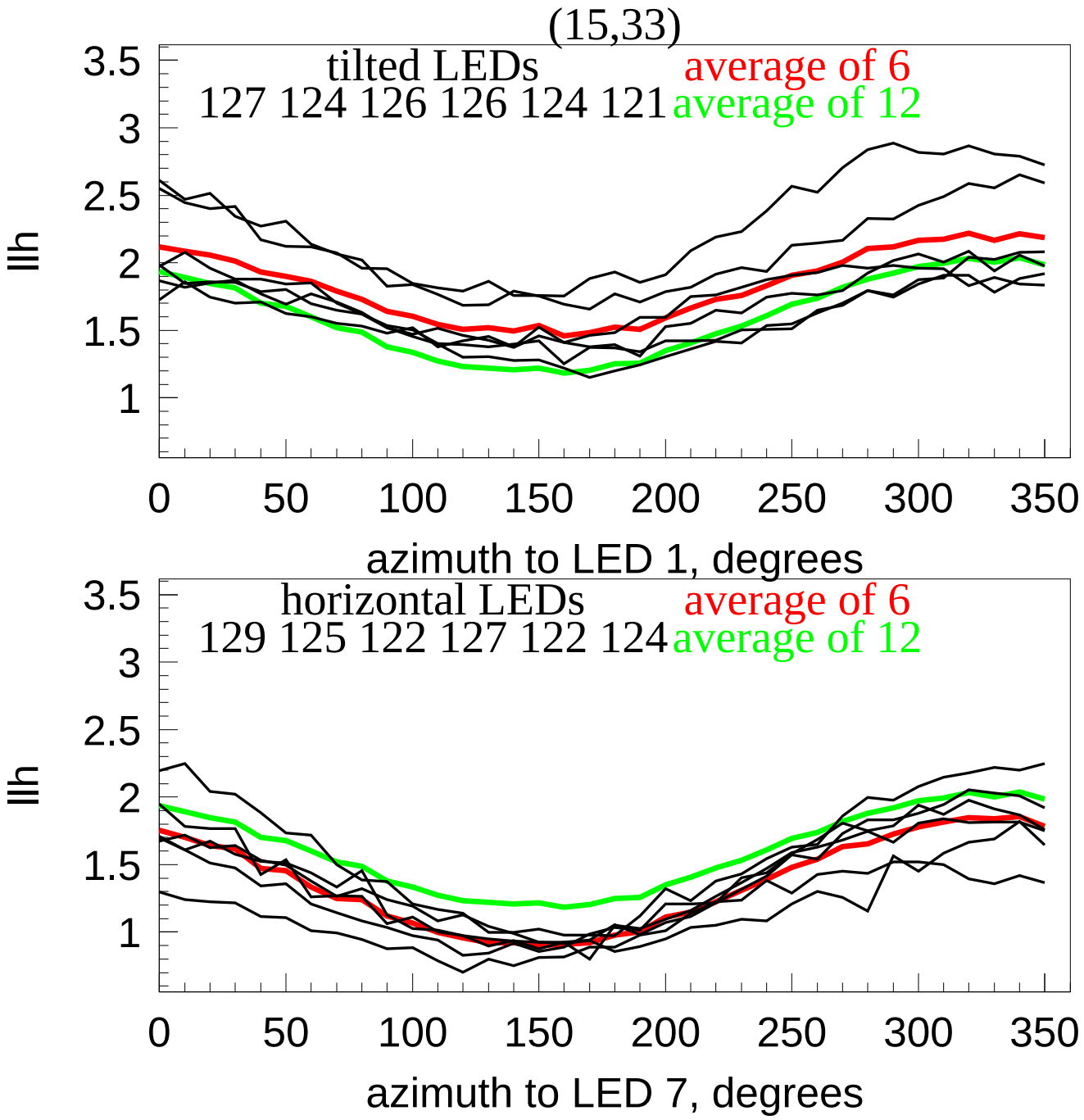

(14,35) 109.65 ± 452.93
llh
3.66
3.64
3.62
3.6
3.58
3.56
3.54
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

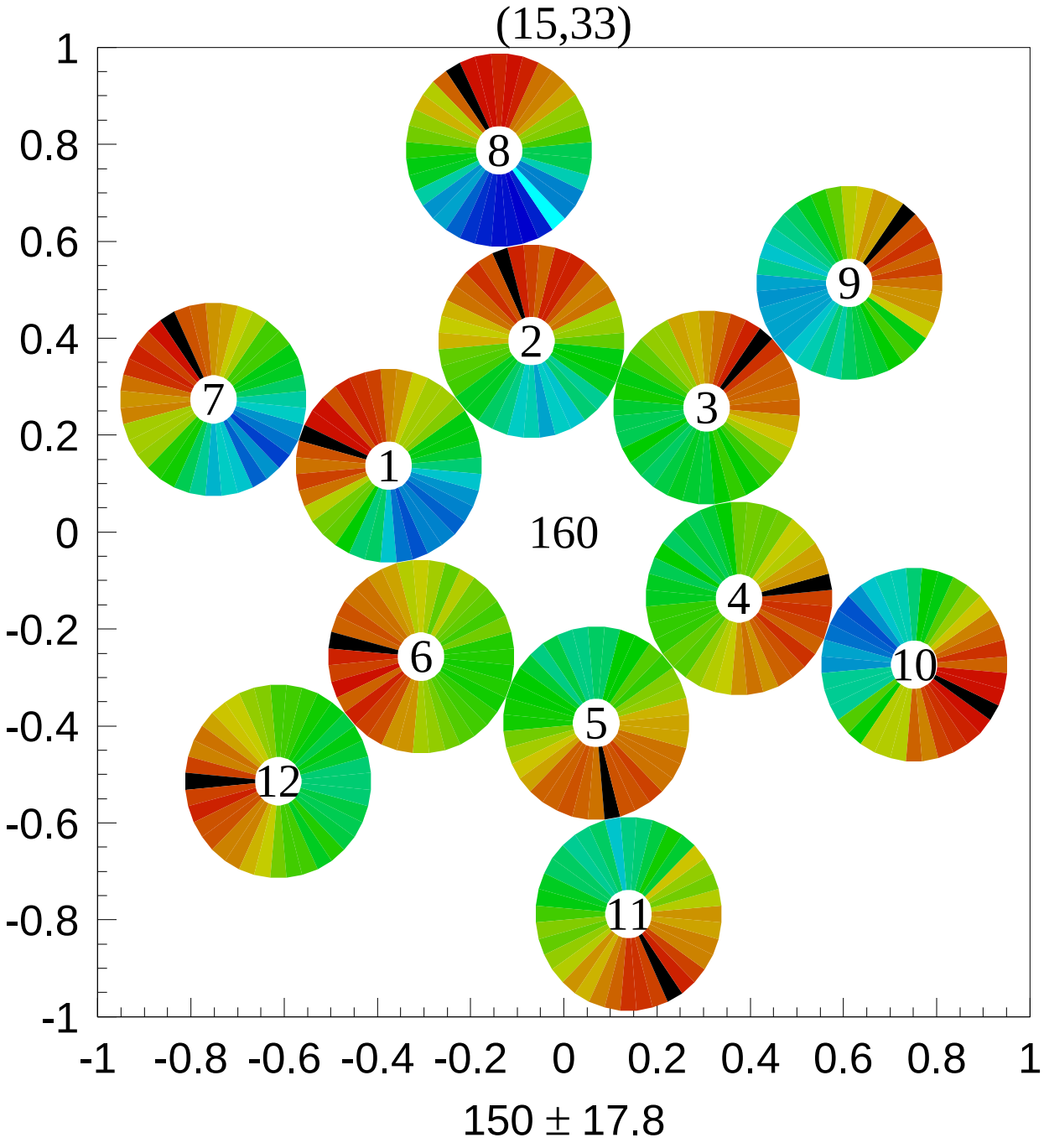

(14,36)
tilted LEDs
123 128 122 122 125 128
average of 6
average of 12
IIh
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 129 123 127 130 126
average of 6
average of 12
IIh
azimuth to LED 7, degrees

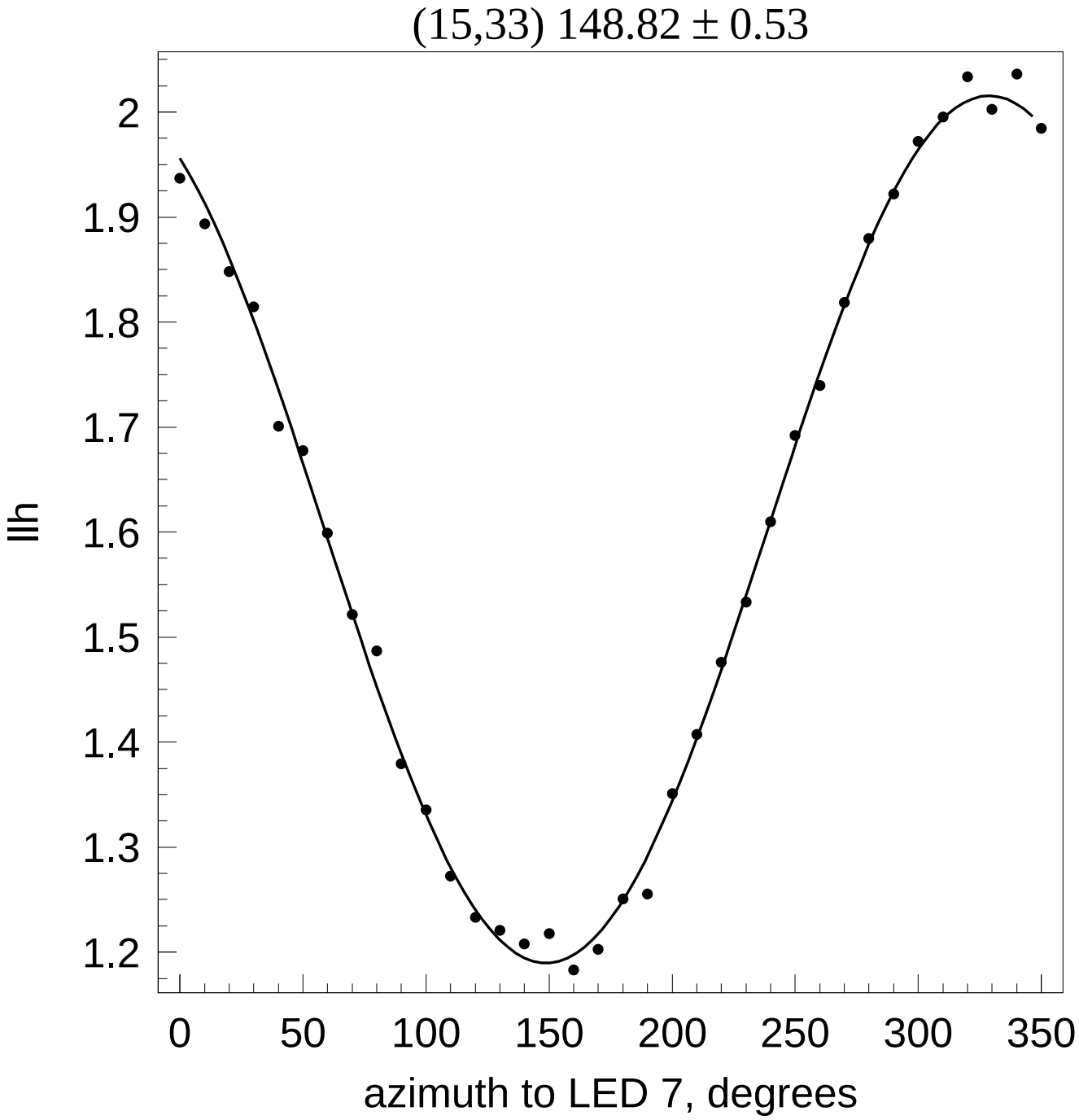

(14,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
18.8 ± 60.1
11
12
5
6
10
4
0
1
7
3
2
9
8

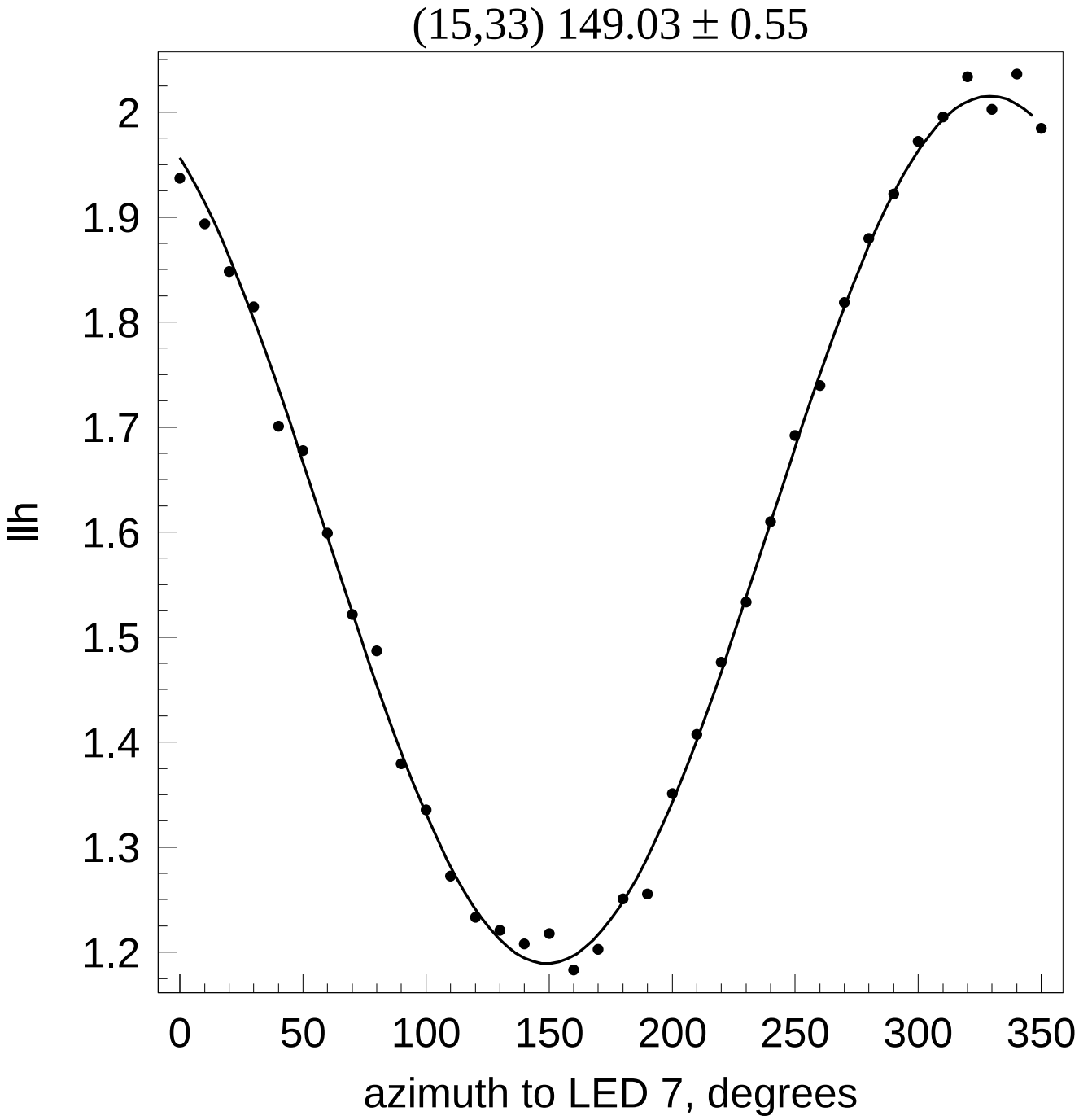

(14,36) 17.95 ± 4.42
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

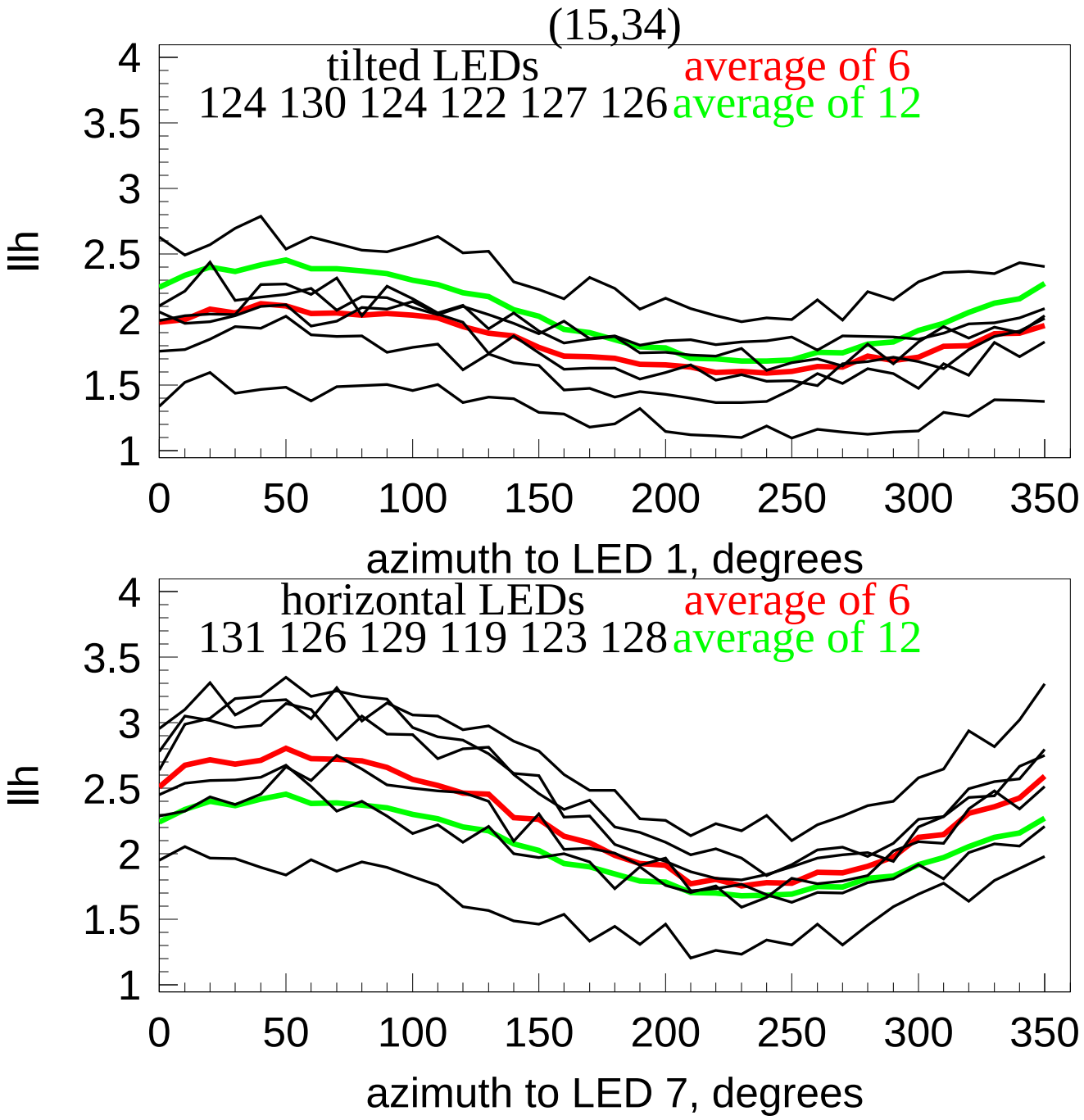

(14,36) 18.36 ± 4.58
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

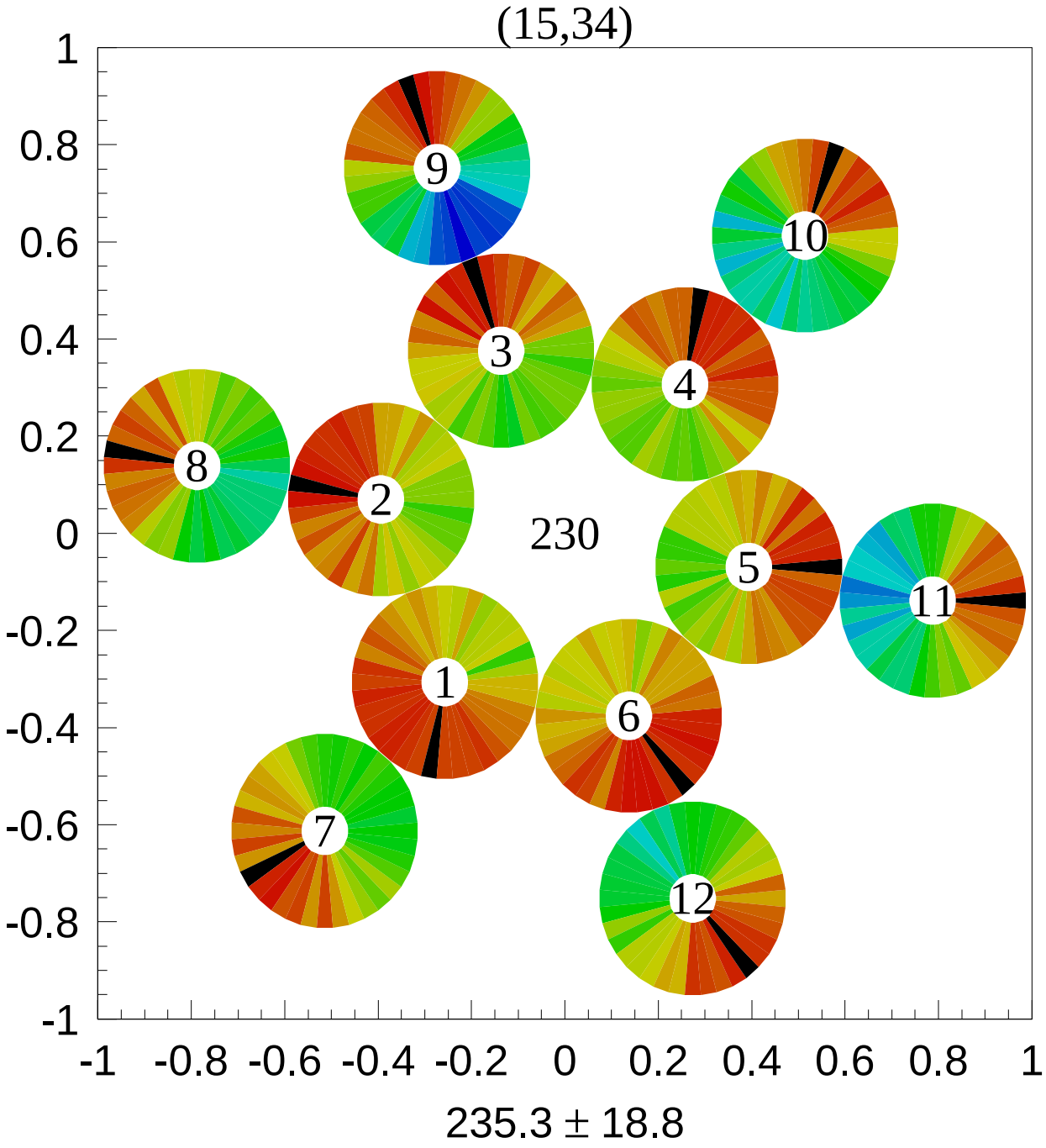

(15,33)
tilted LEDs
127 124 126 126 124 121
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 125 122 127 122 124
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

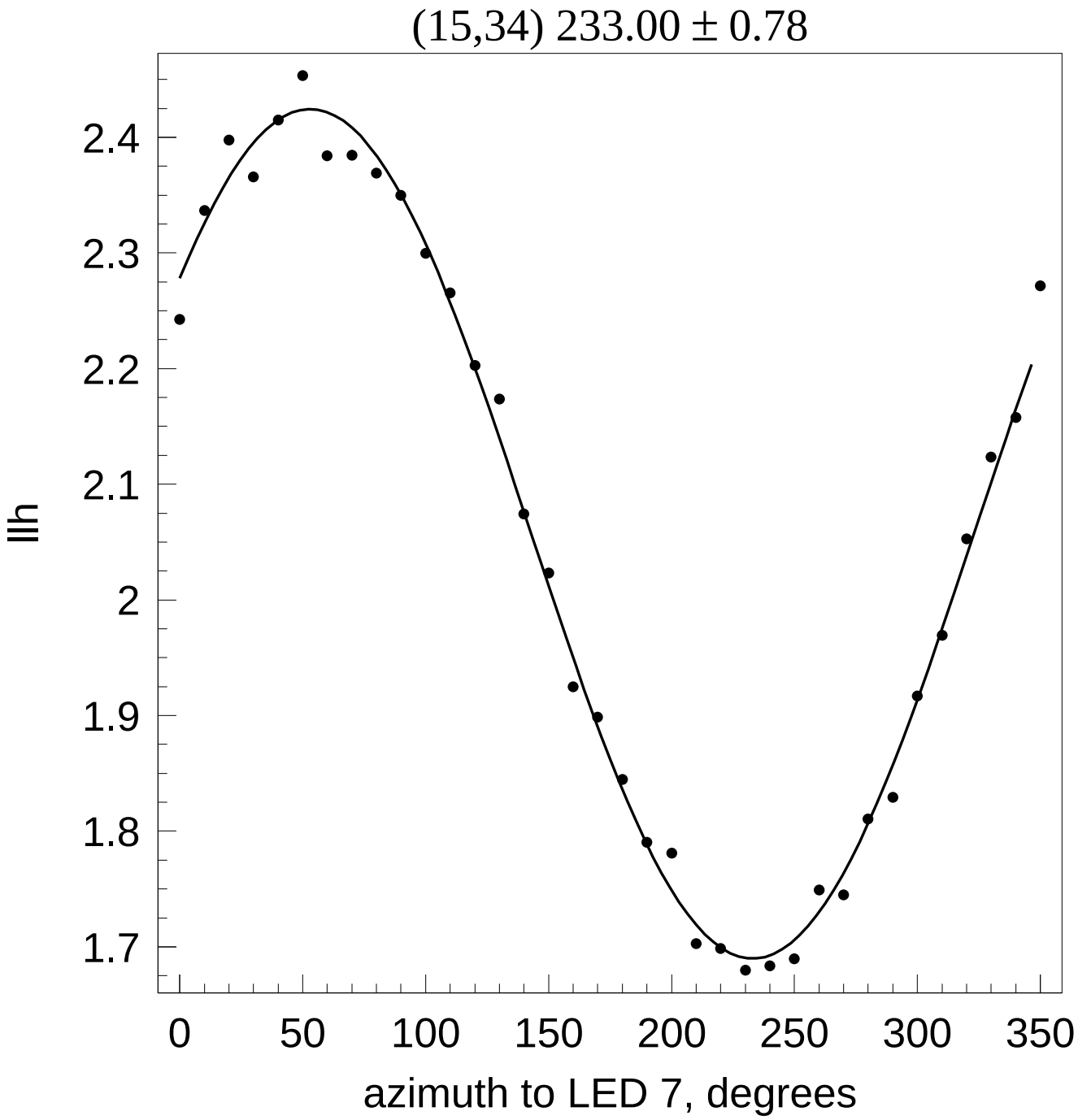

(15,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
7
3
1
160
4
10
6
5
12
11
150 ± 17.8

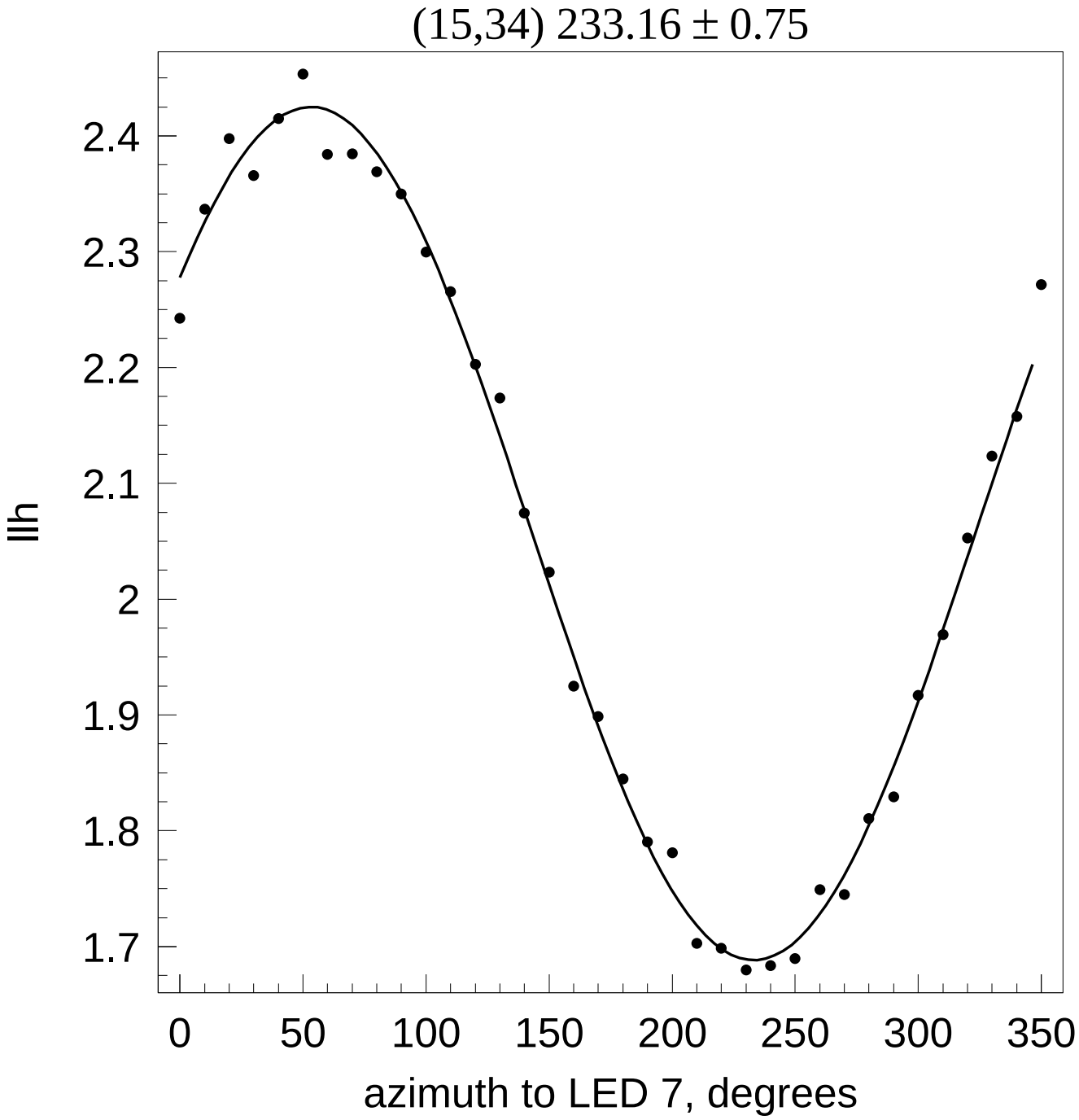

(15,33) 148.82 ± 0.53
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

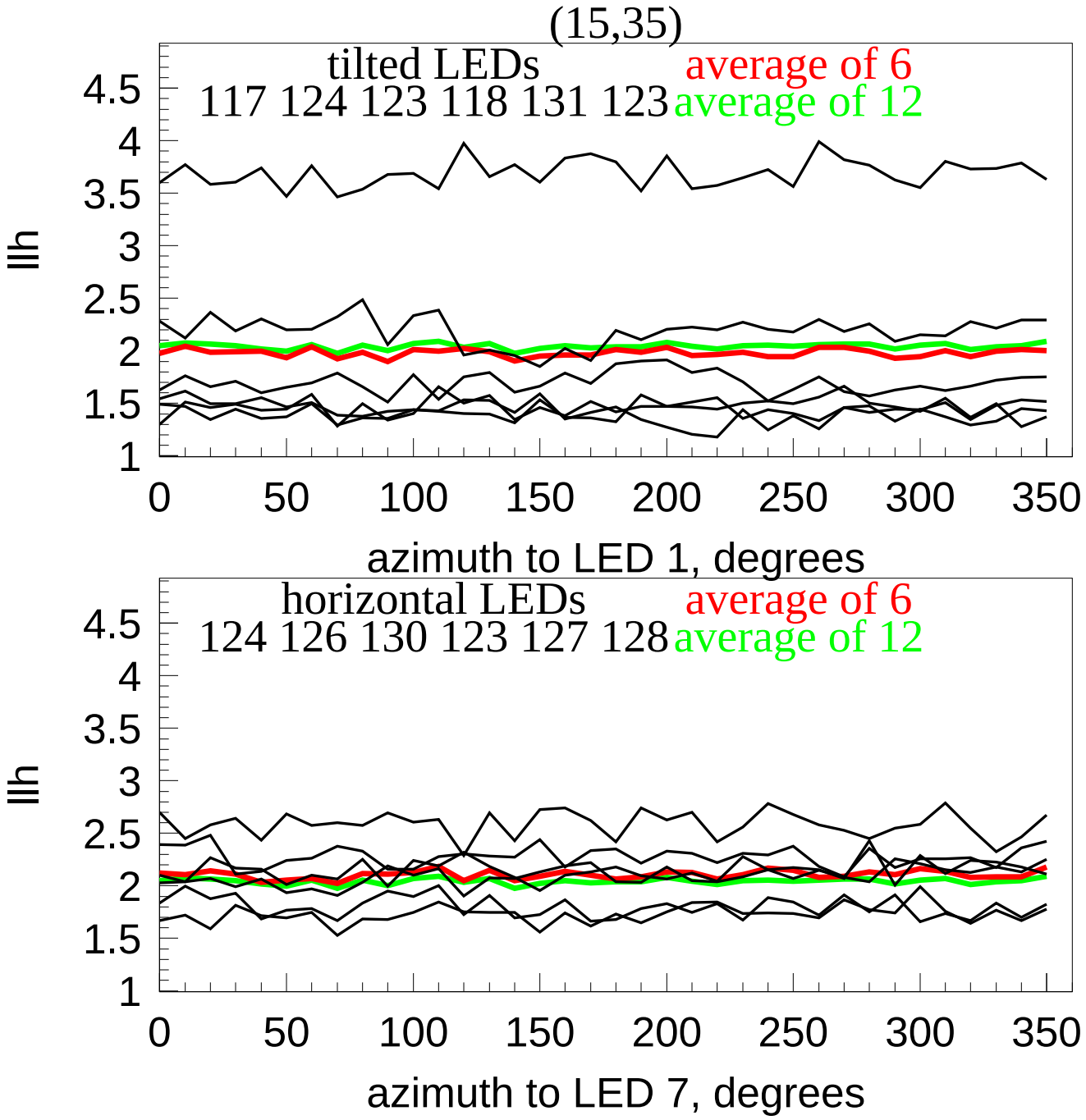

(15,33) 149.03 ± 0.55
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

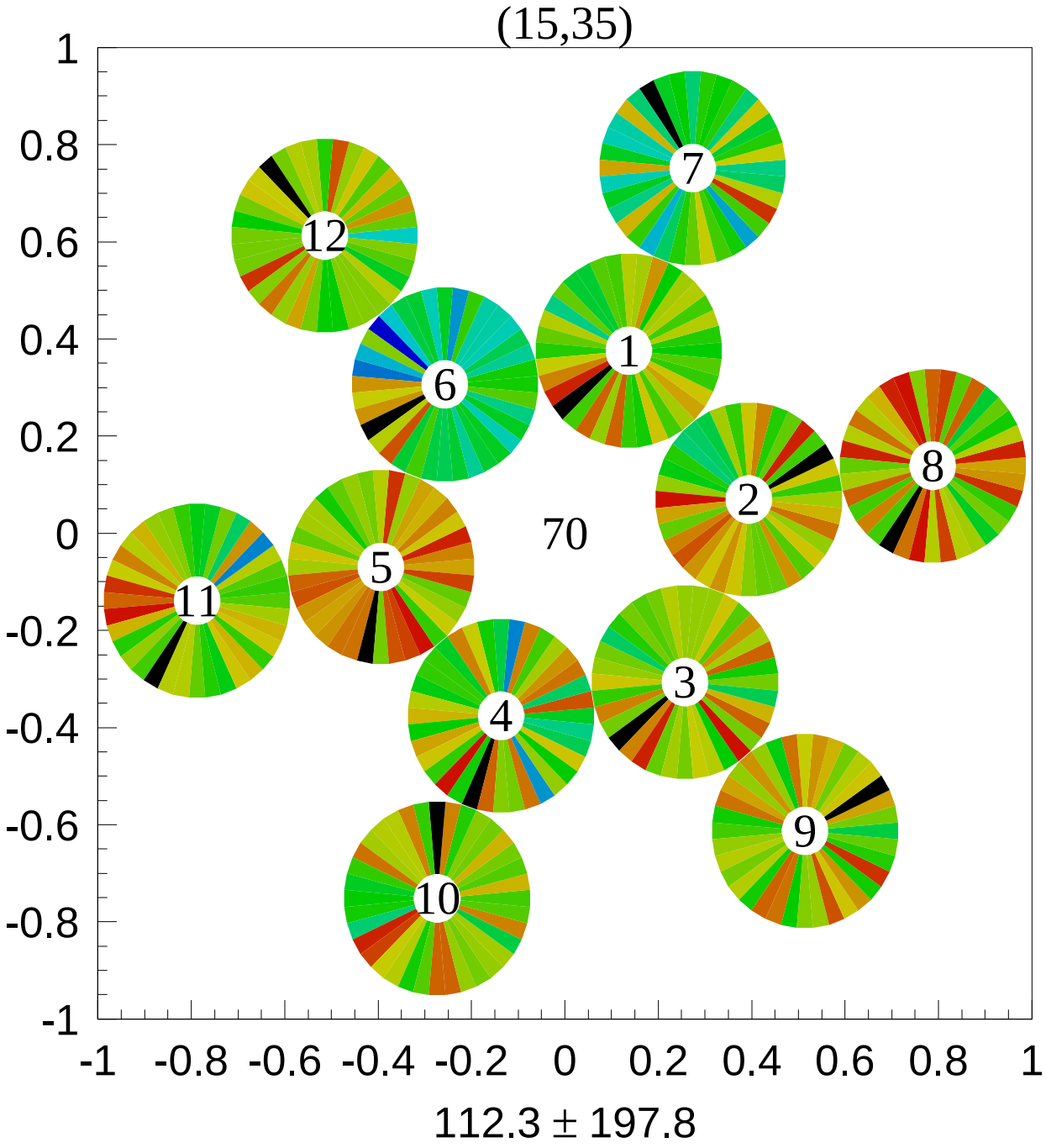

(15,34)
tilted LEDs
124 130 124 122 127 126
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
131 126 129 119 123 128
average of 6
average of 12
IIh
azimuth to LED 7, degrees

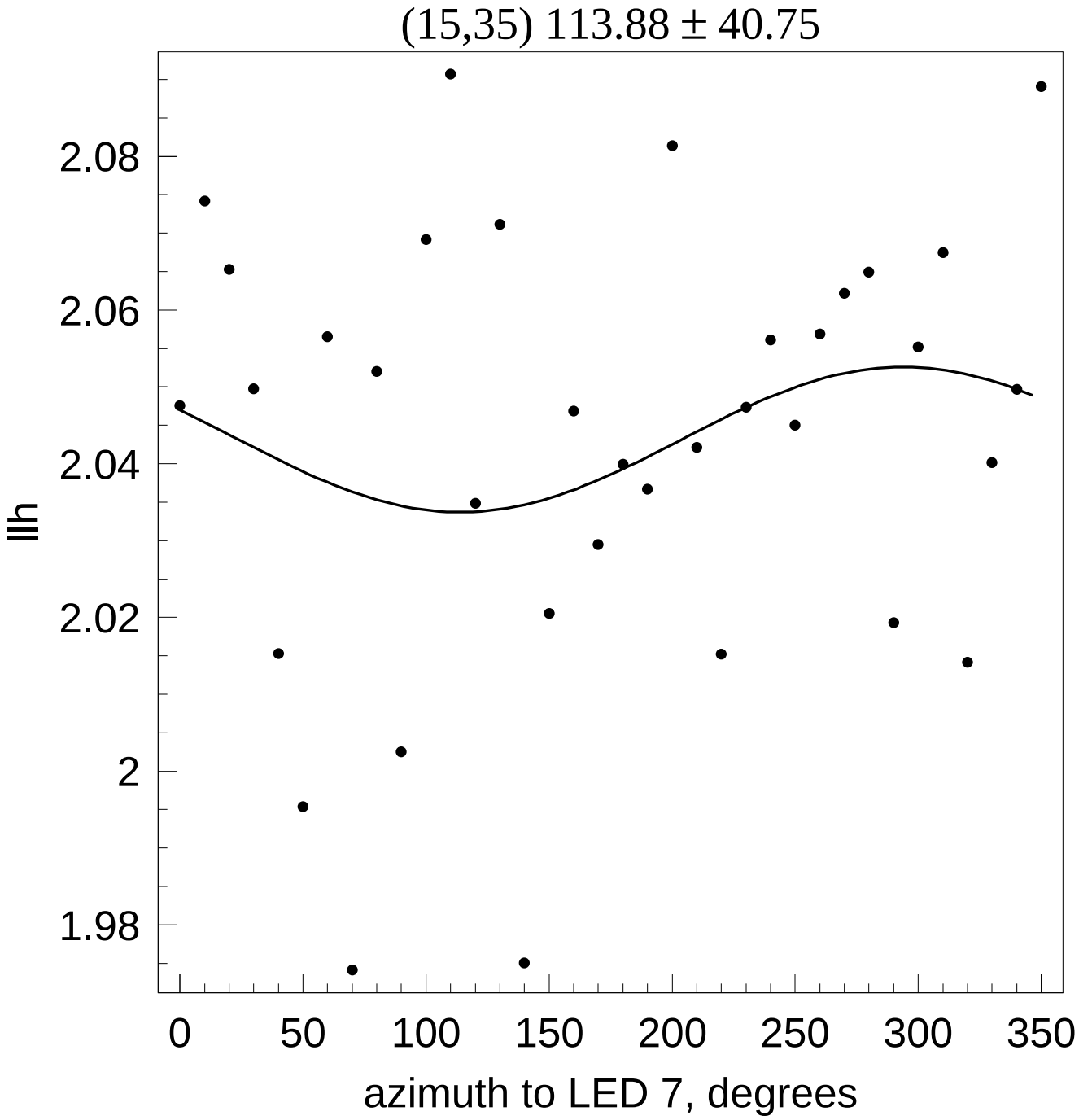

(15,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
235.3 ± 18.8

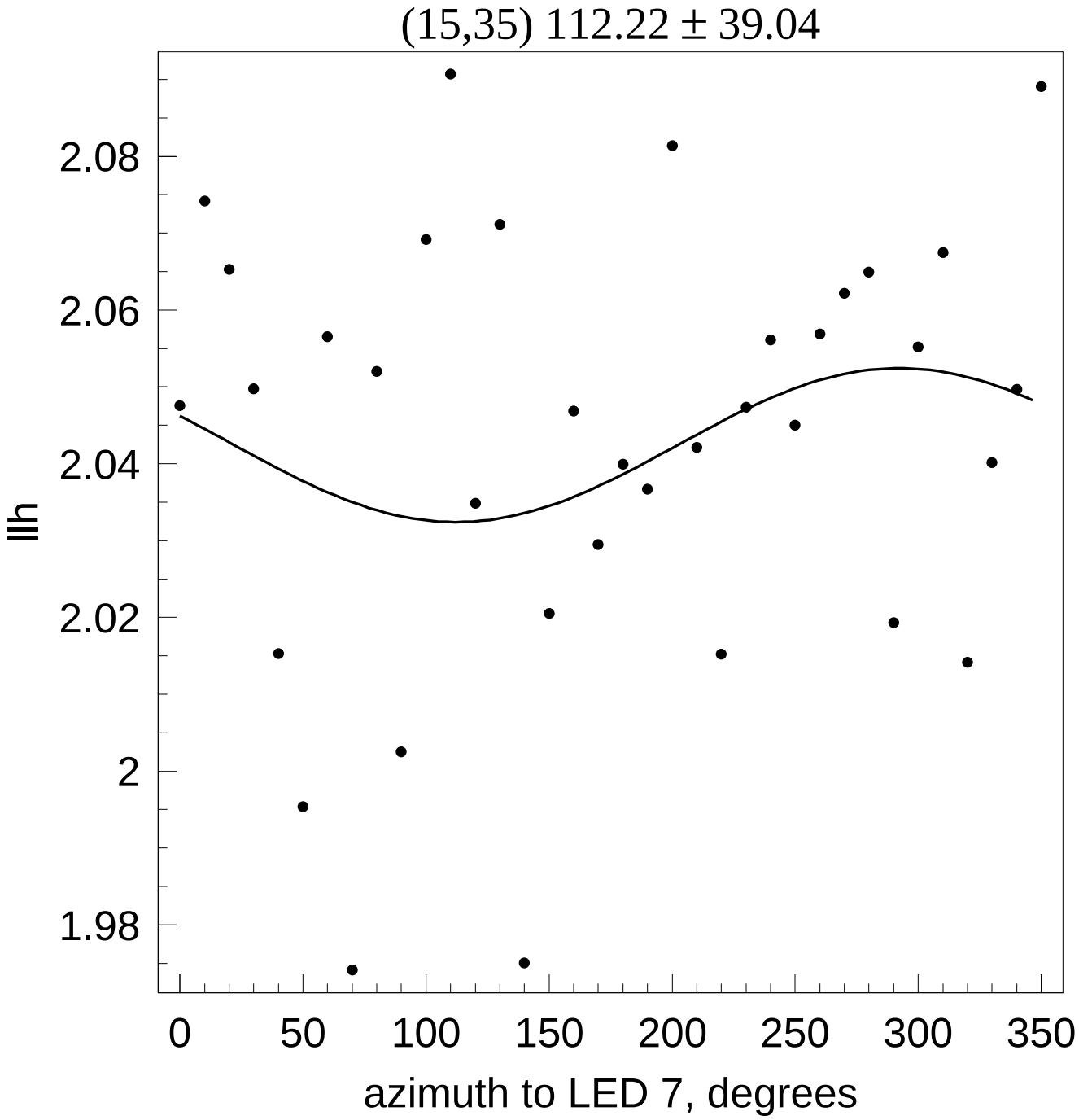

(15,34) 233.00 ± 0.78
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

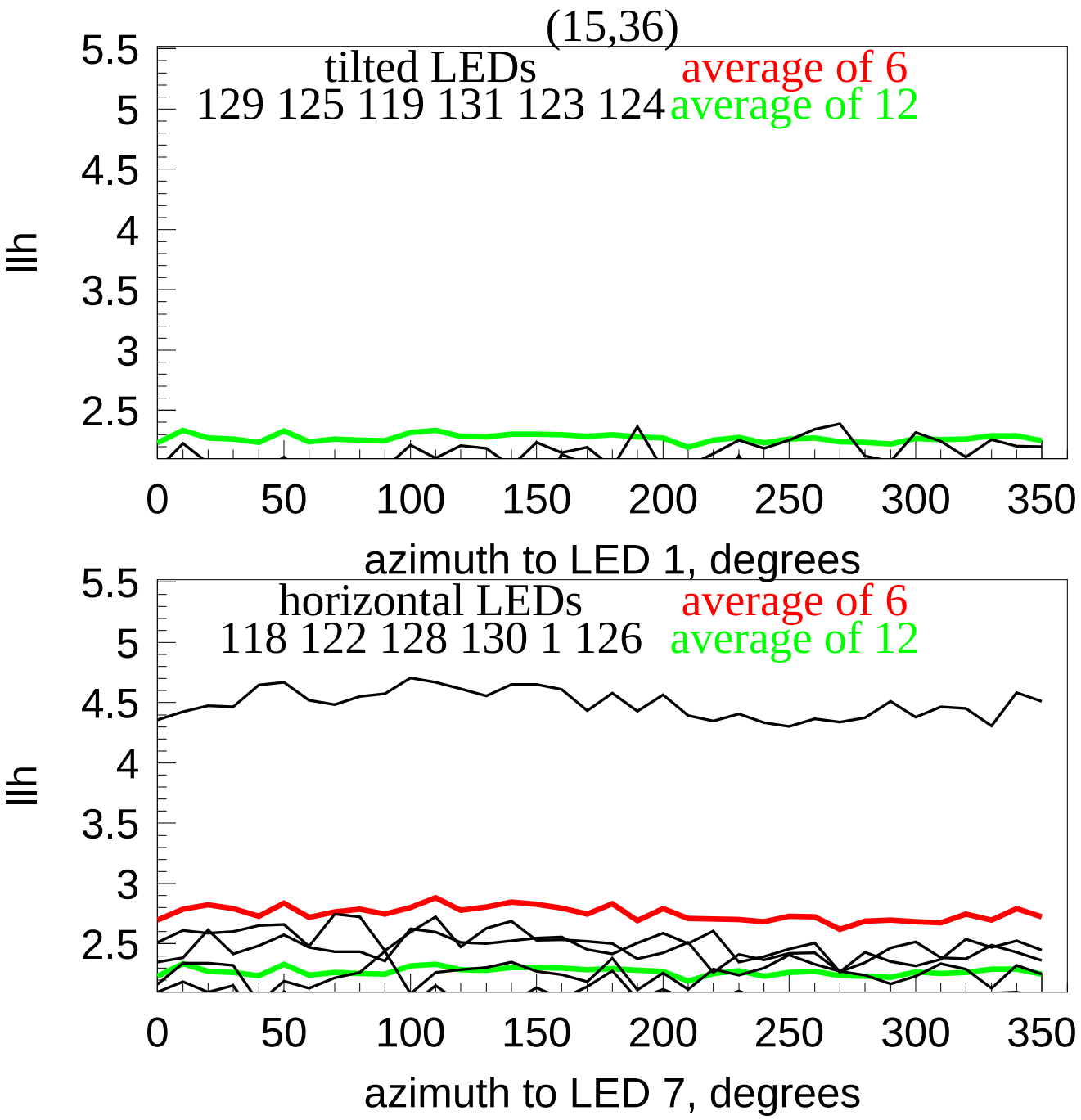

(15,34) 233.16 ± 0.75
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

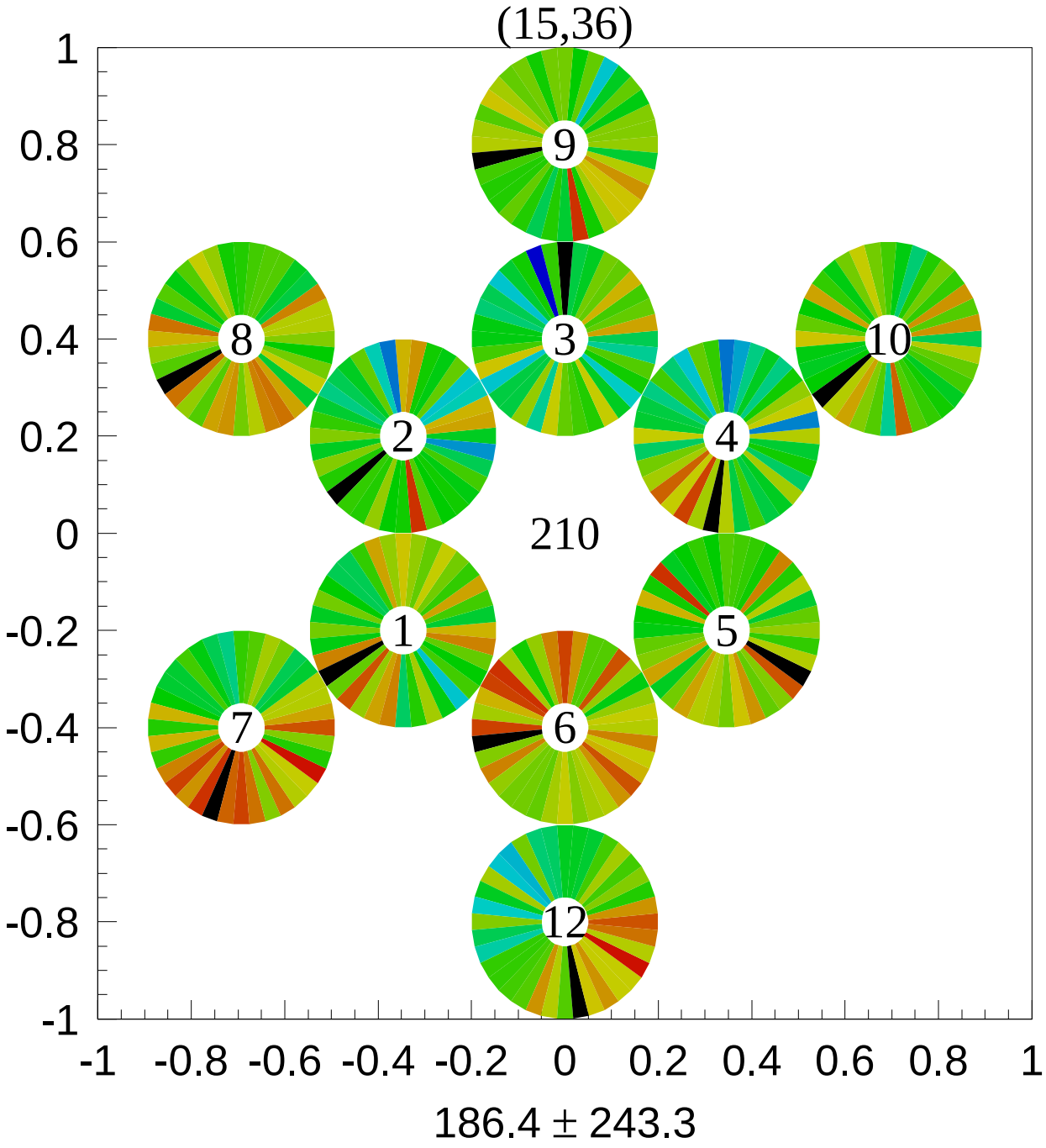

(15,35)
tilted LEDs
117 124 123 118 131 123
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 126 130 123 127 128
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

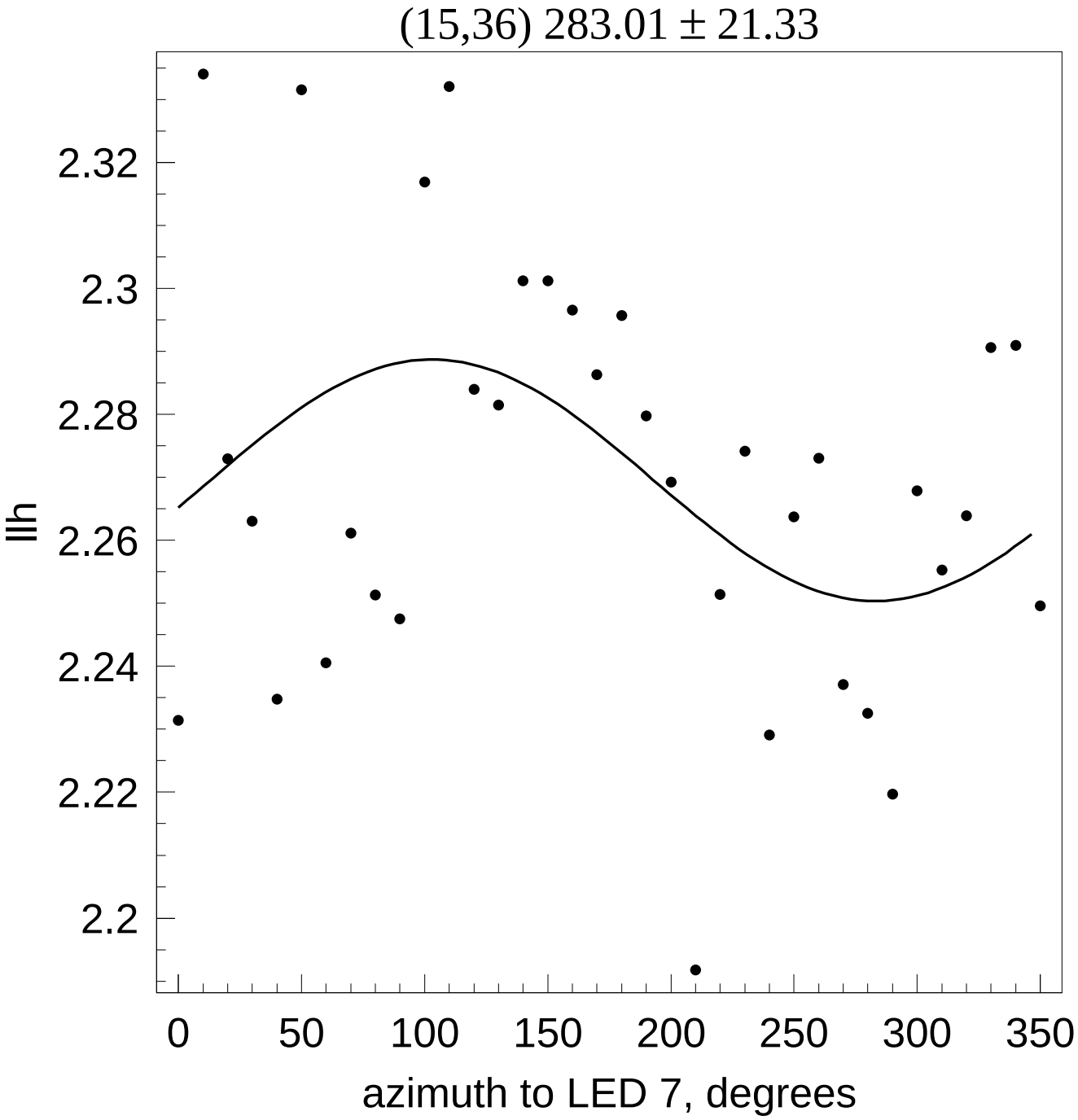

(15,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
112.3 ± 197.8
70
1
2
3
4
5
6
7
8
9
10
11
12

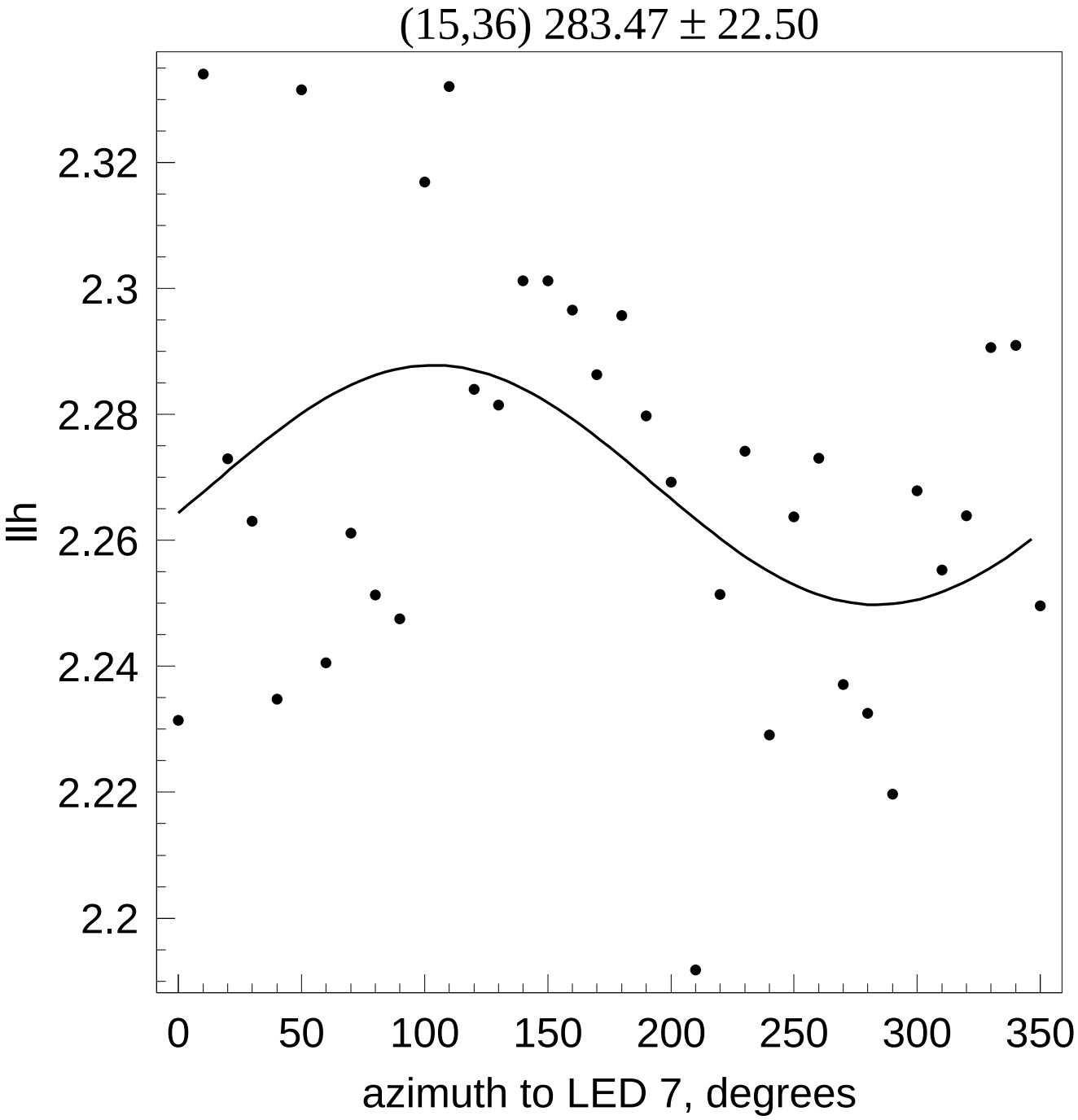

(15,35) 113.88 ± 40.75
2.08
2.06
2.04
2.02
2
1.98
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

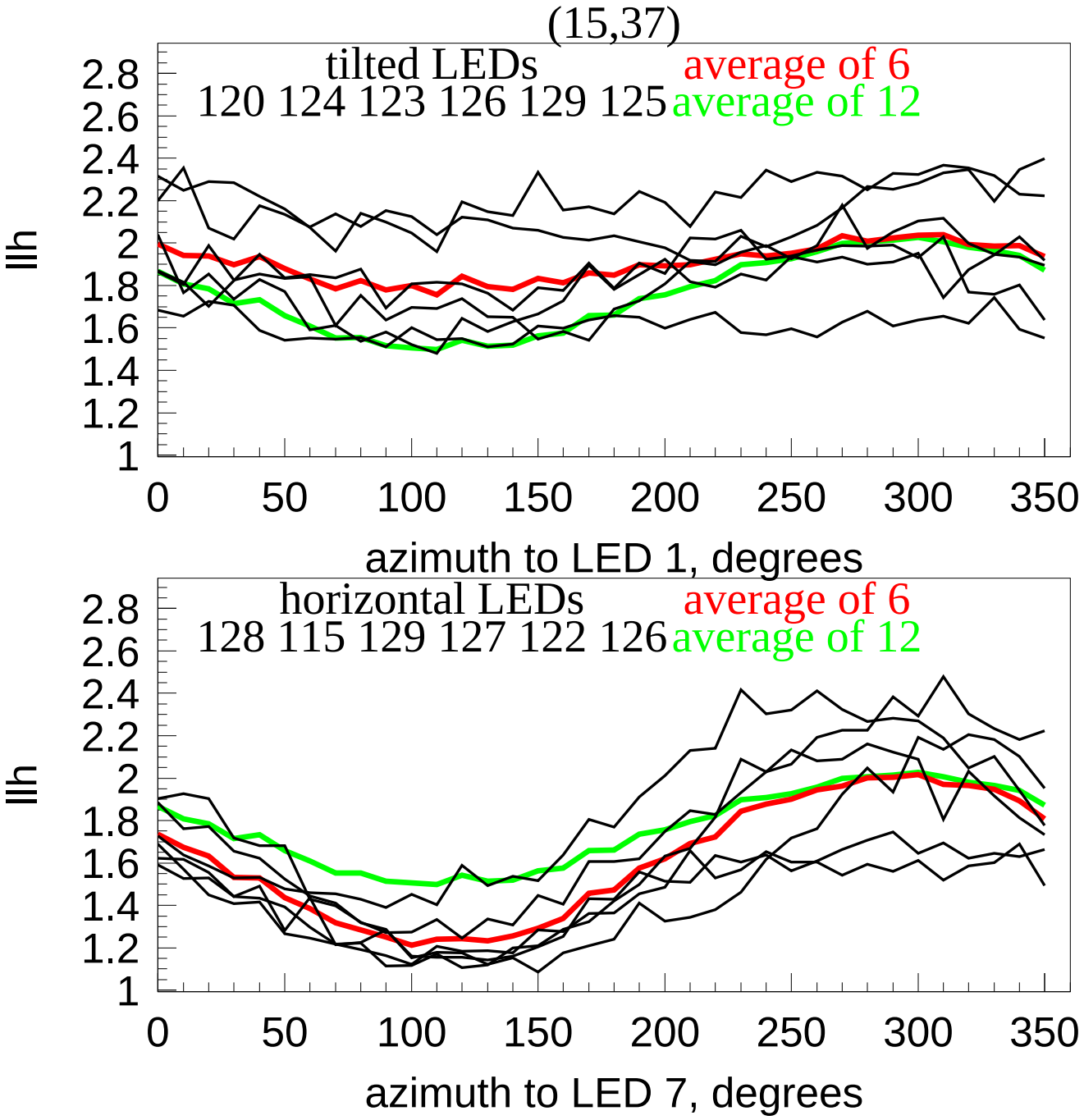

(15,35) 112.22 ± 39.04
2.08
2.06
2.04
2.02
2
1.98
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

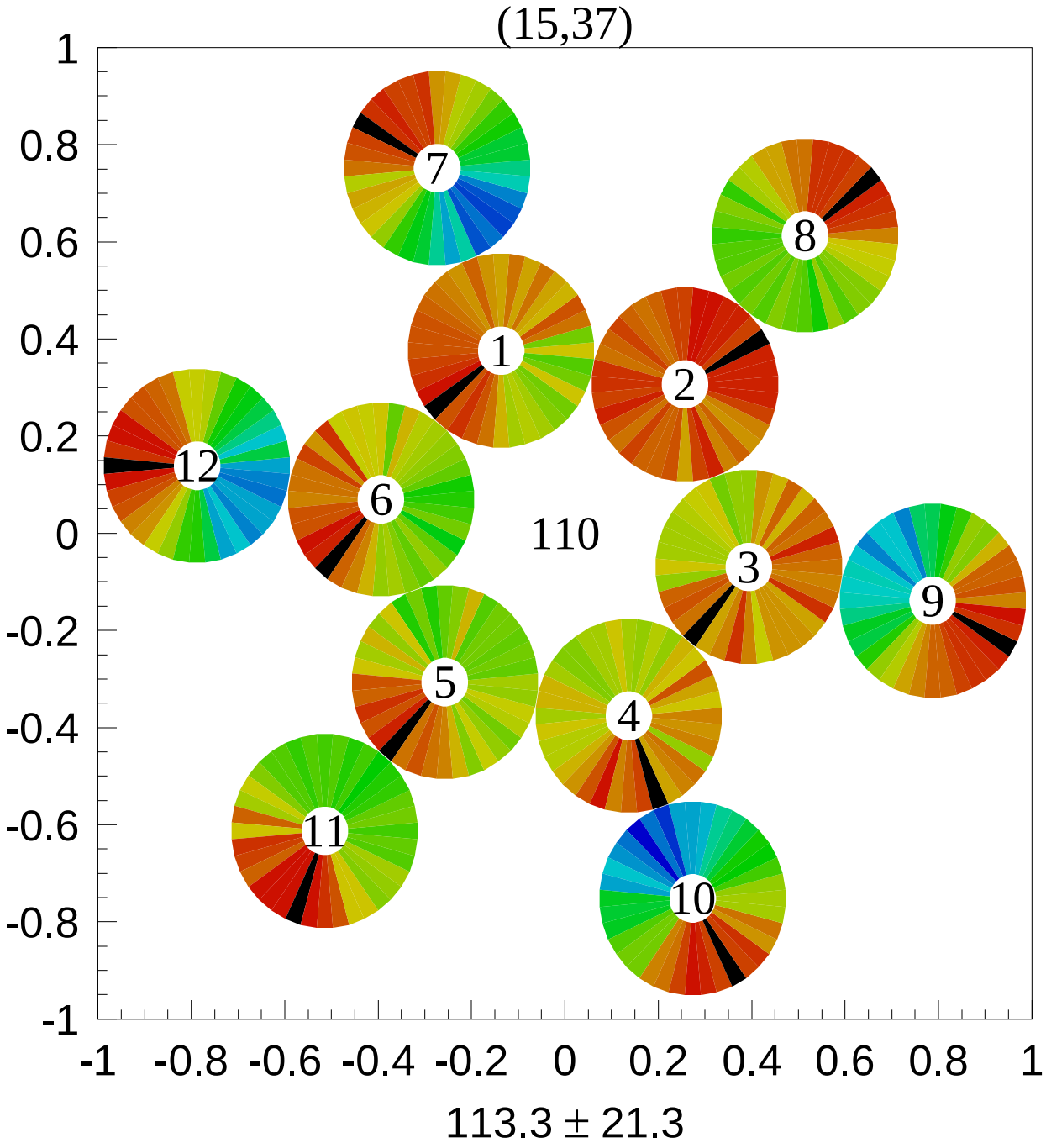

(15,36)
tilted LEDs
129 125 119 131 123 124
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
118 122 128 130 1 126
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

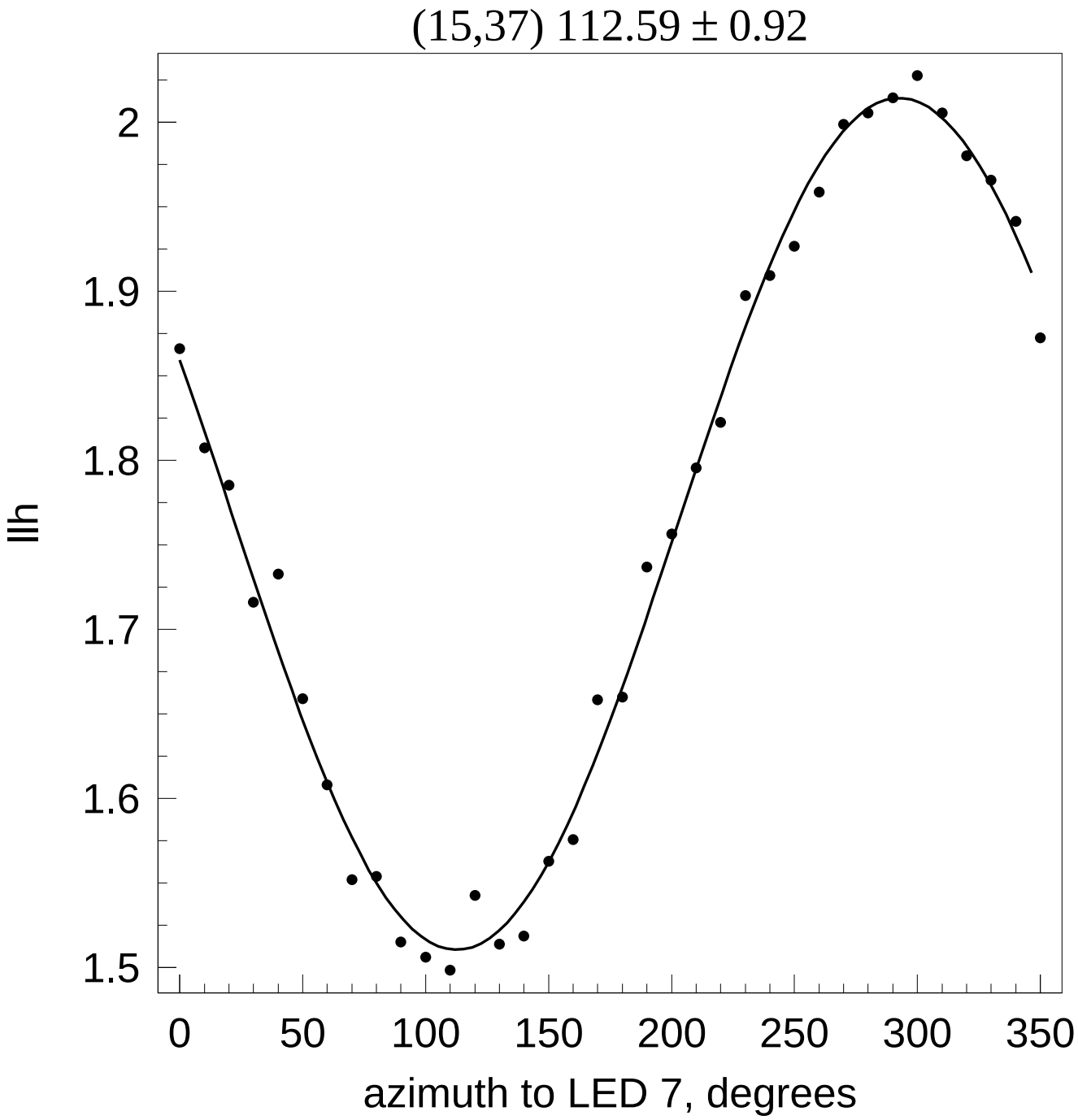

(15,36)
9
8
3
10
2
4
210
1
5
7
6
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
186.4 ± 243.3

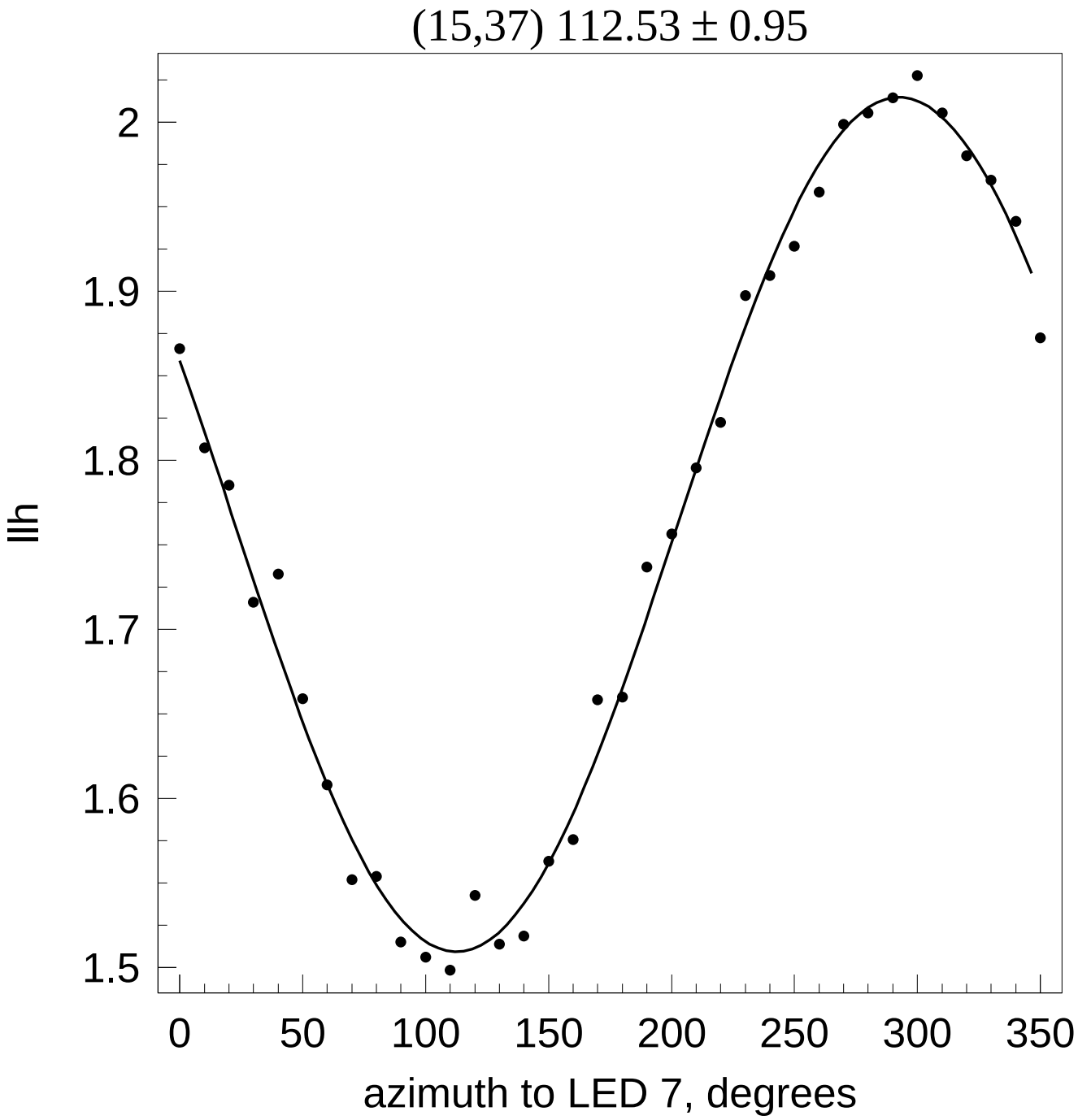

(15,36) 283.01 ± 21.33
2.32
2.3
2.28
2.26
2.24
2.22
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

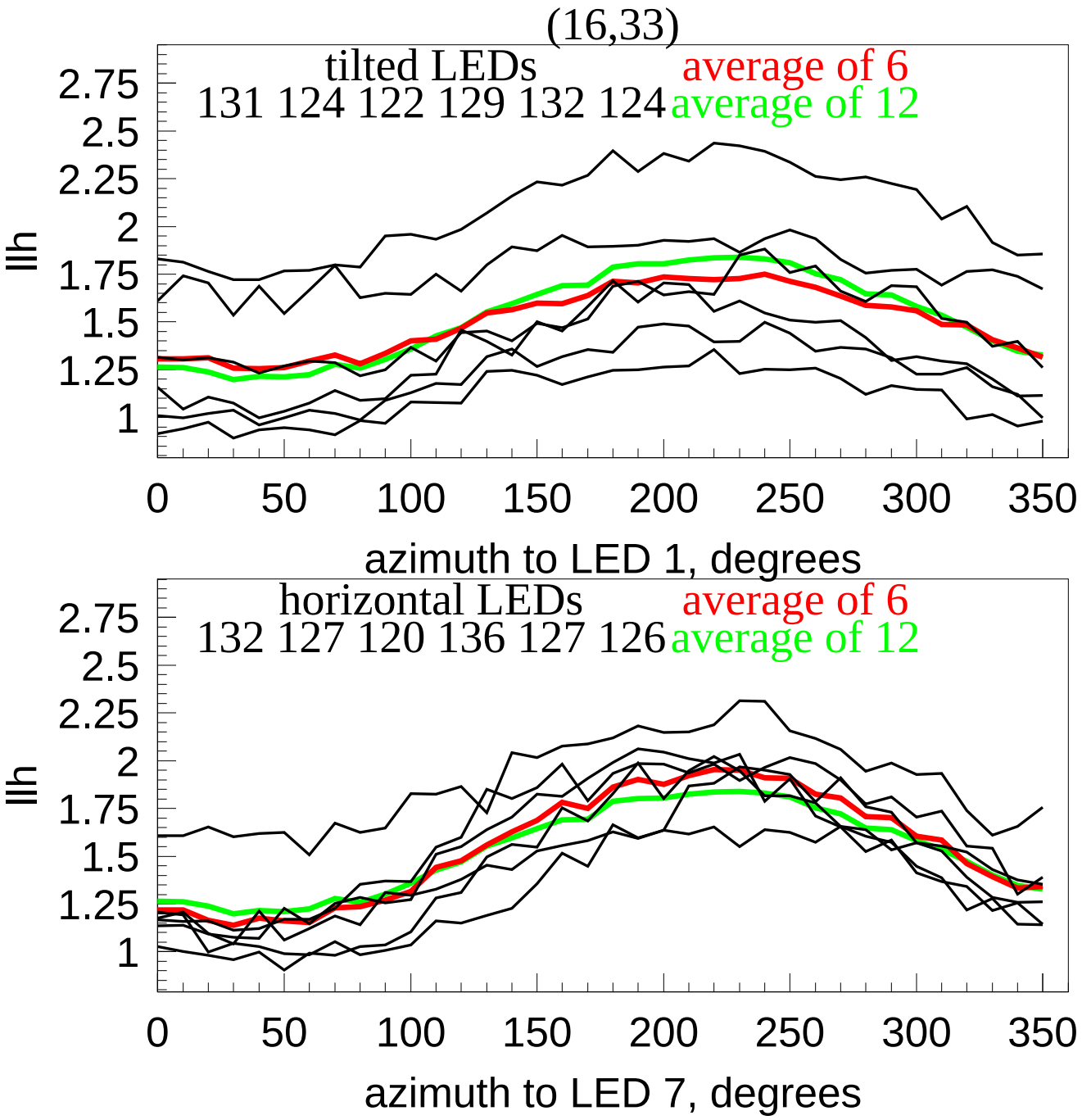

(15,36) 283.47 ± 22.50
2.32
2.3
2.28
2.26
2.24
2.22
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

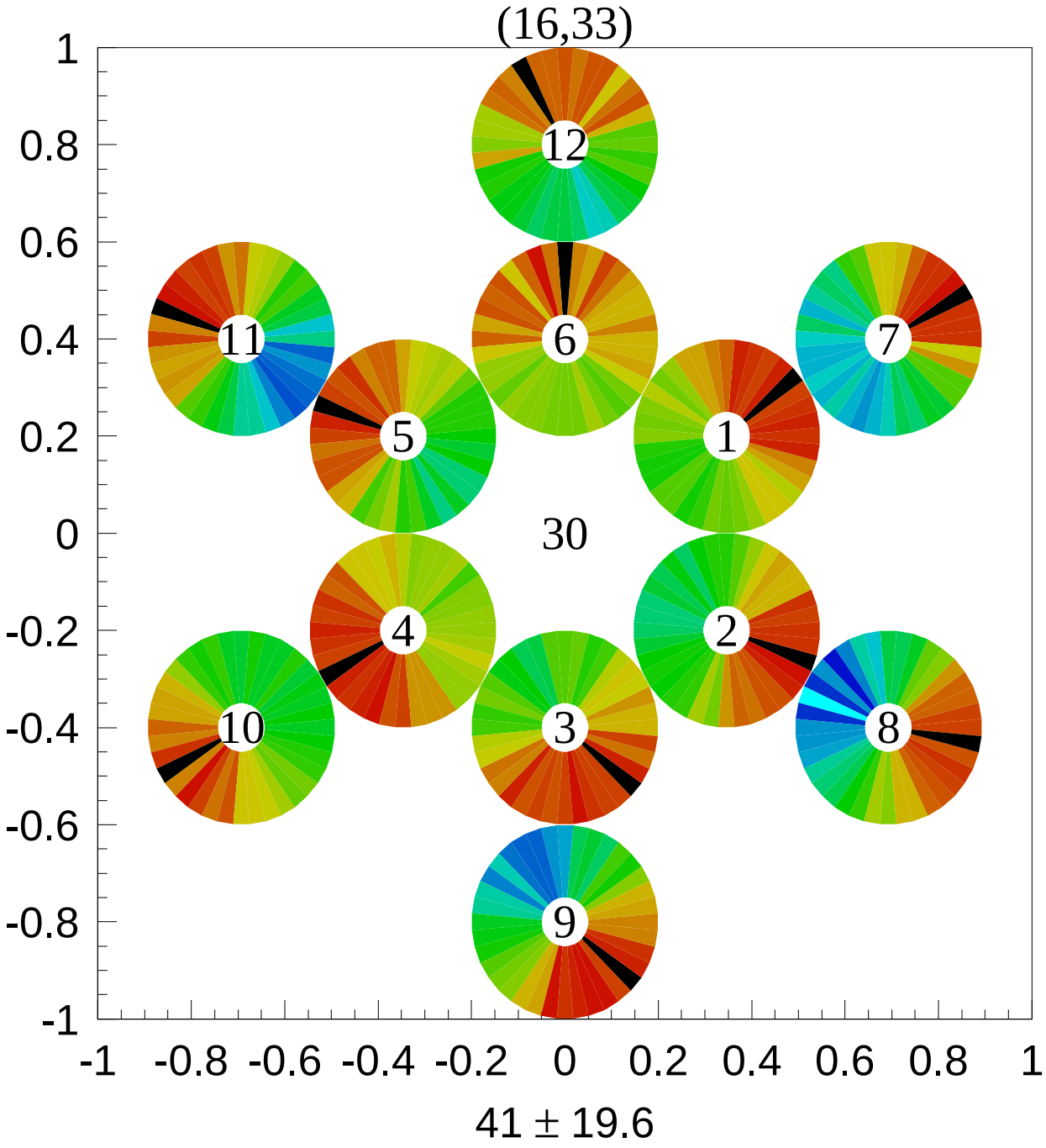

(15,37)
tilted LEDs
120 124 123 126 129 125
average of 6
average of 12
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 115 129 127 122 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

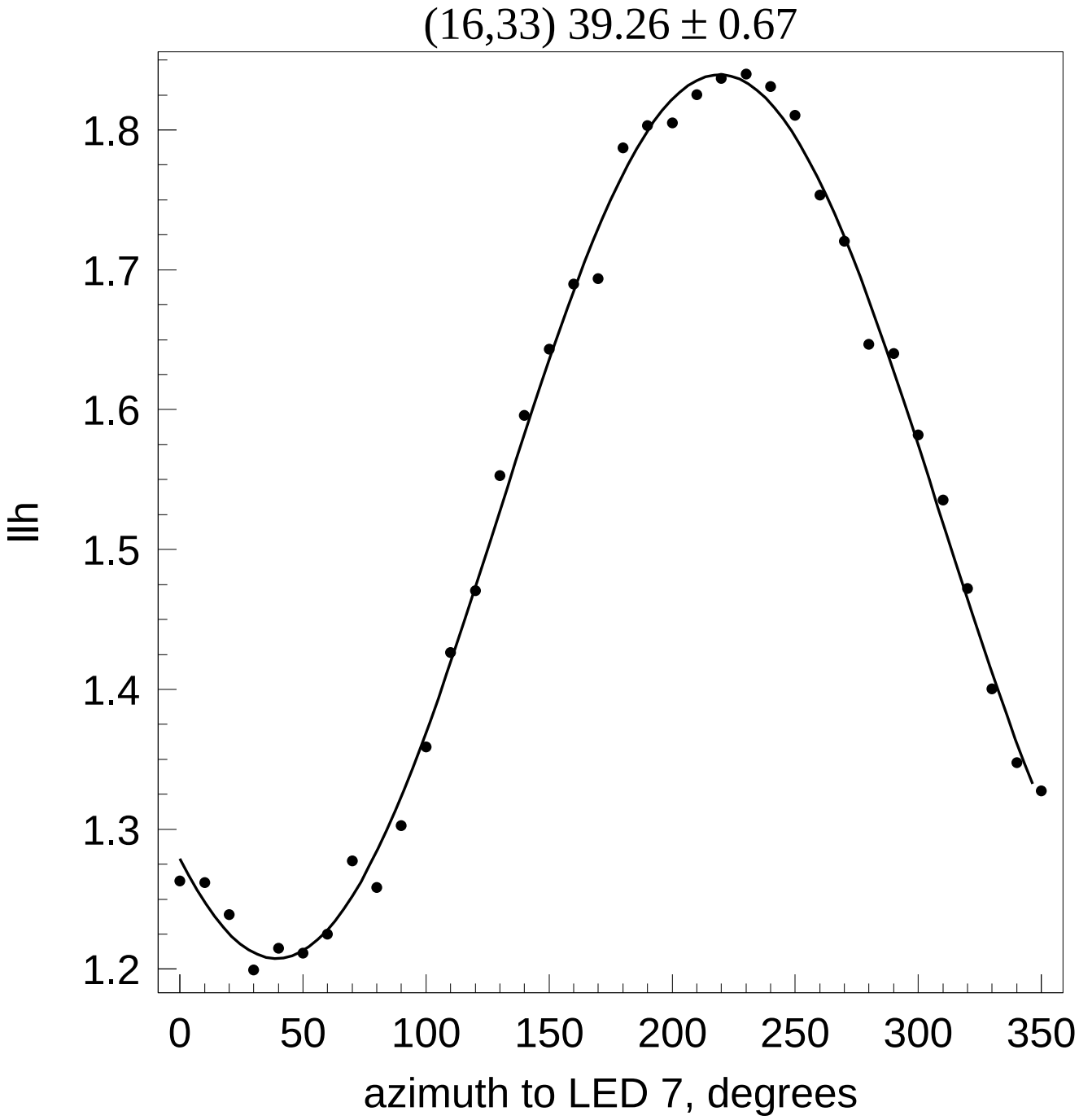

(15,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
113.3 ± 21.3

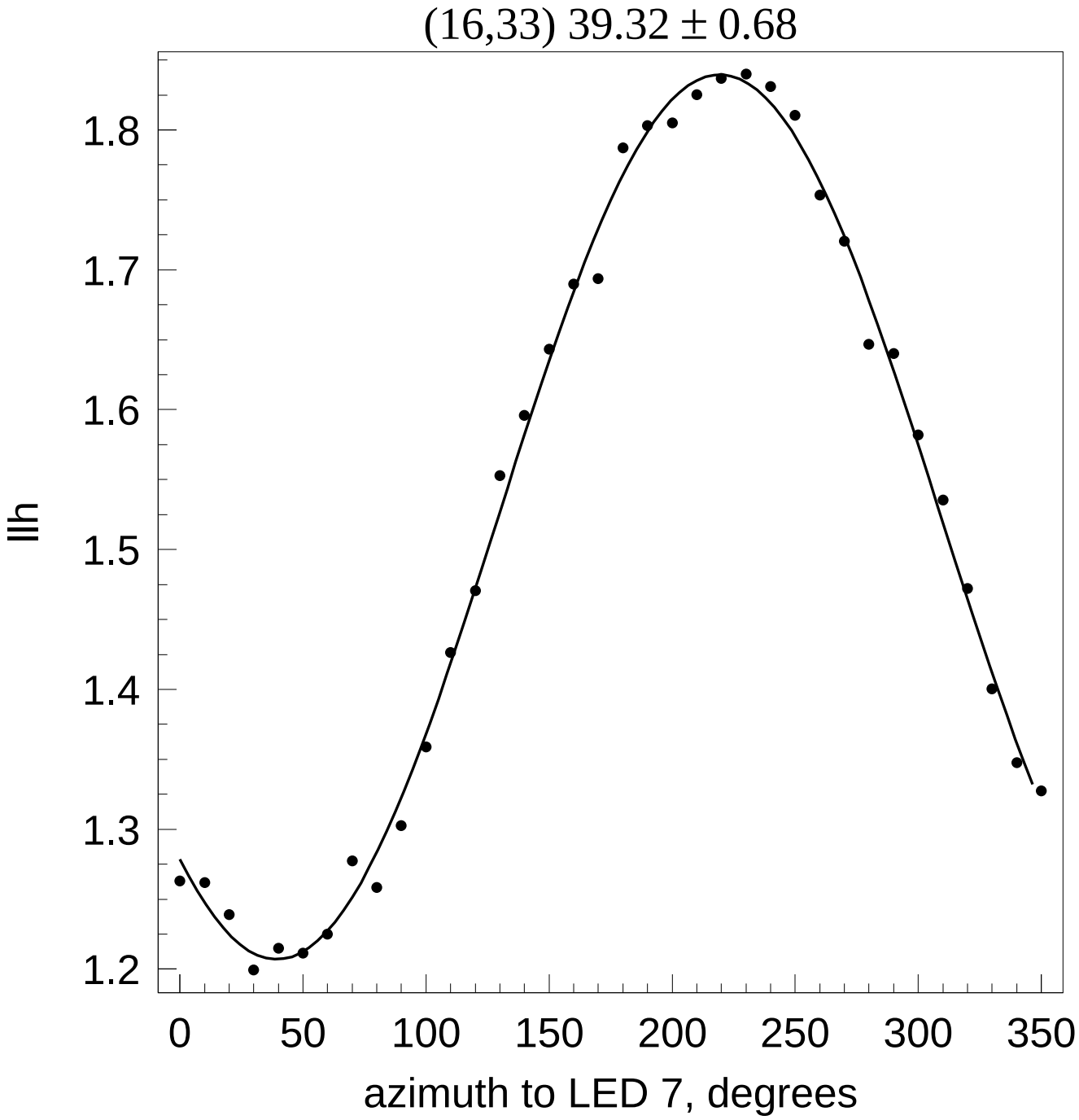

(15,37) 112.59 ± 0.92
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

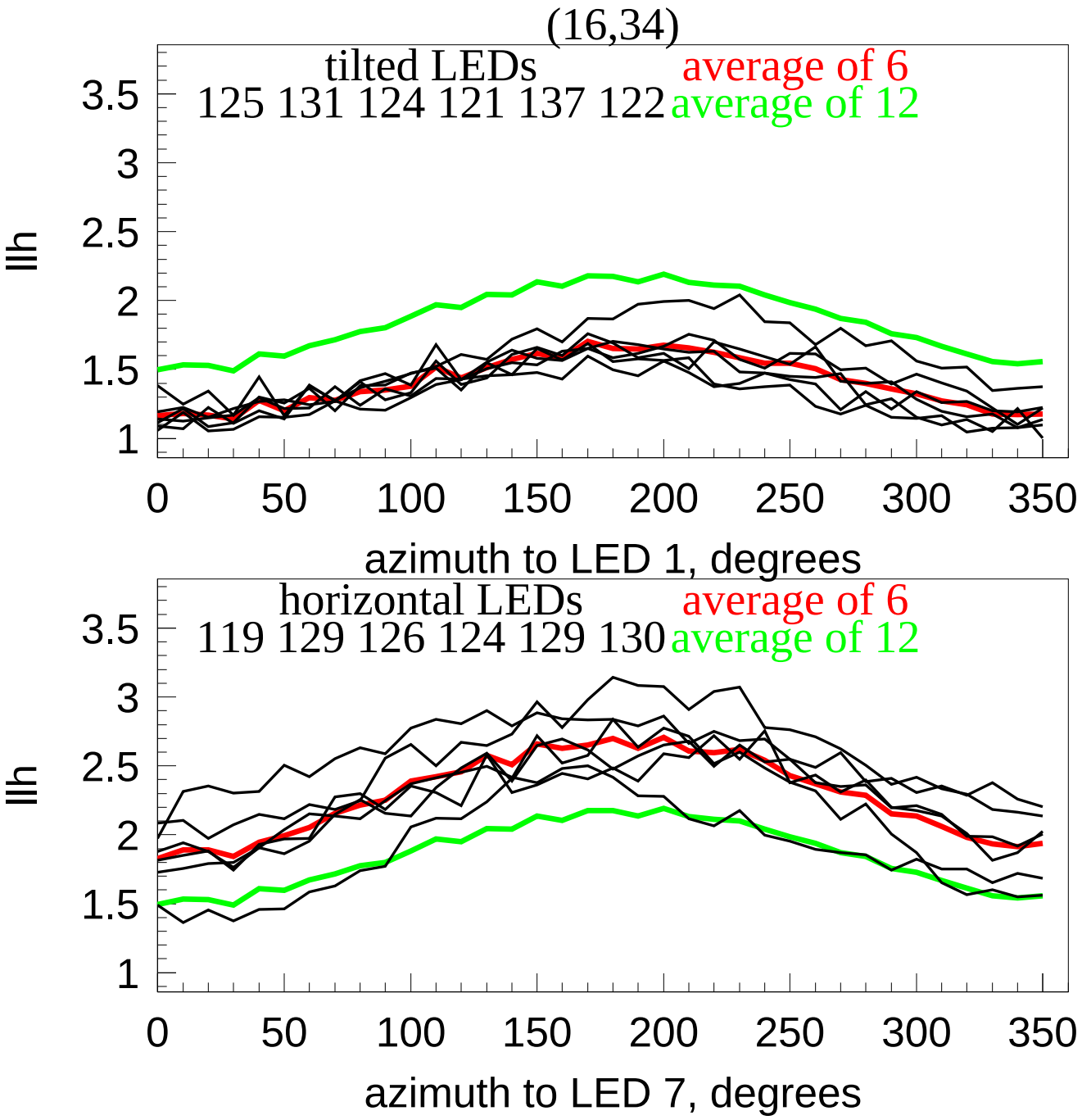

(15,37) 112.53 ± 0.95
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

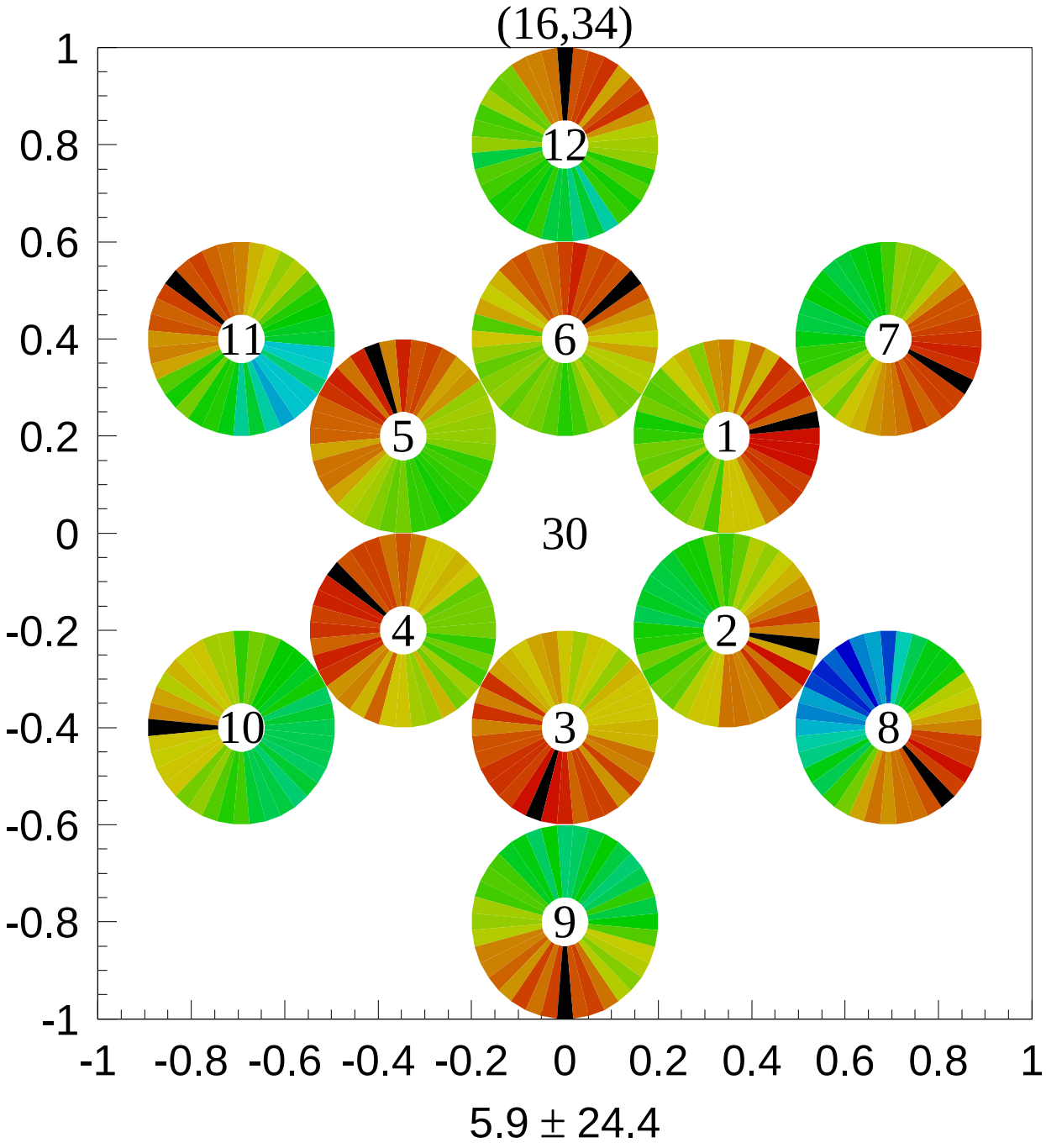

(16,33)
tilted LEDs
131 124 122 129 132 124
average of 6
average of 12
llh
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 127 120 136 127 126
average of 6
average of 12
llh
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

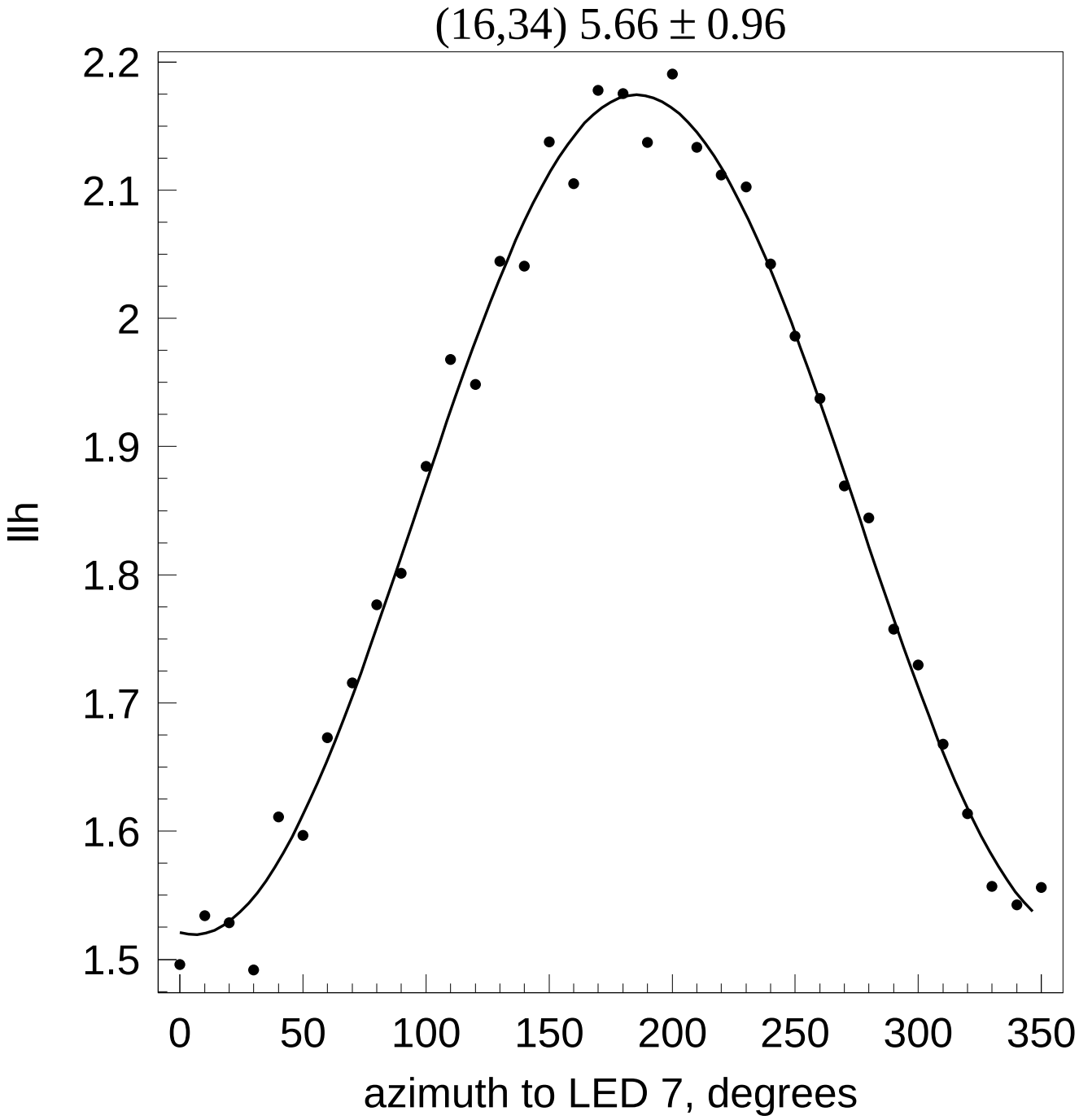

(16,33)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
41 ± 19.6

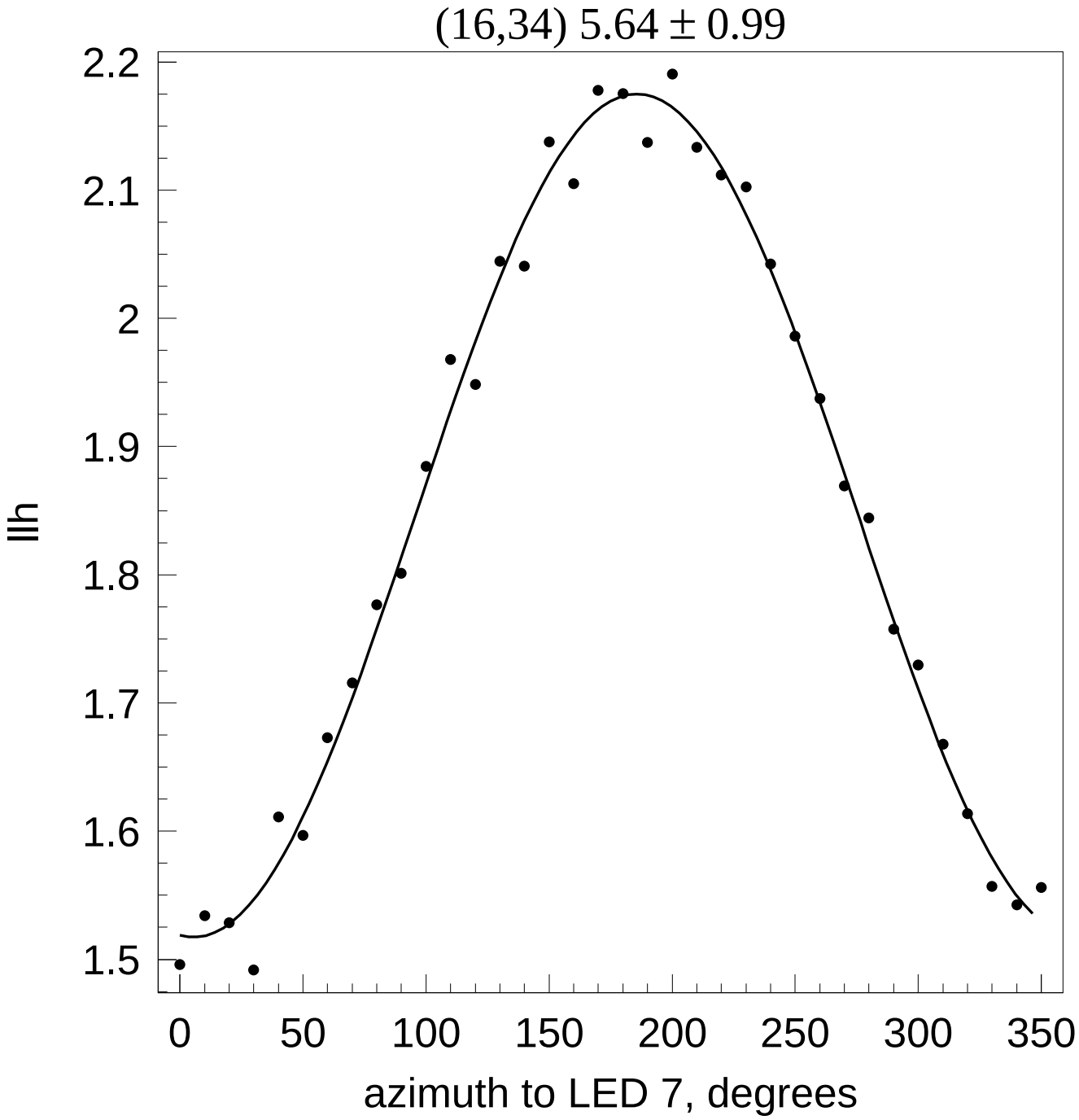

(16,33) 39.26 ± 0.67
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

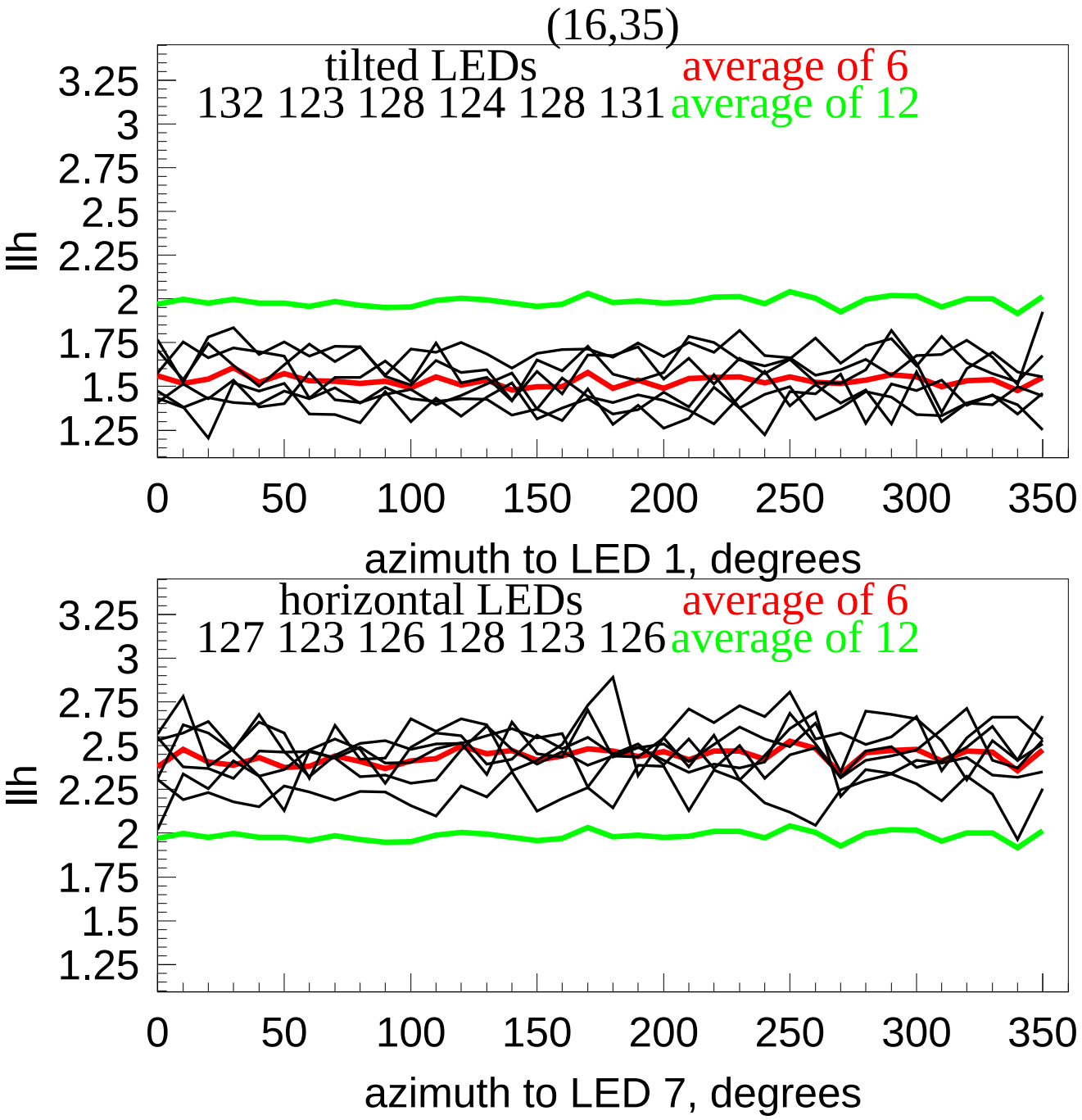

(16,33) 39.32 ± 0.68
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

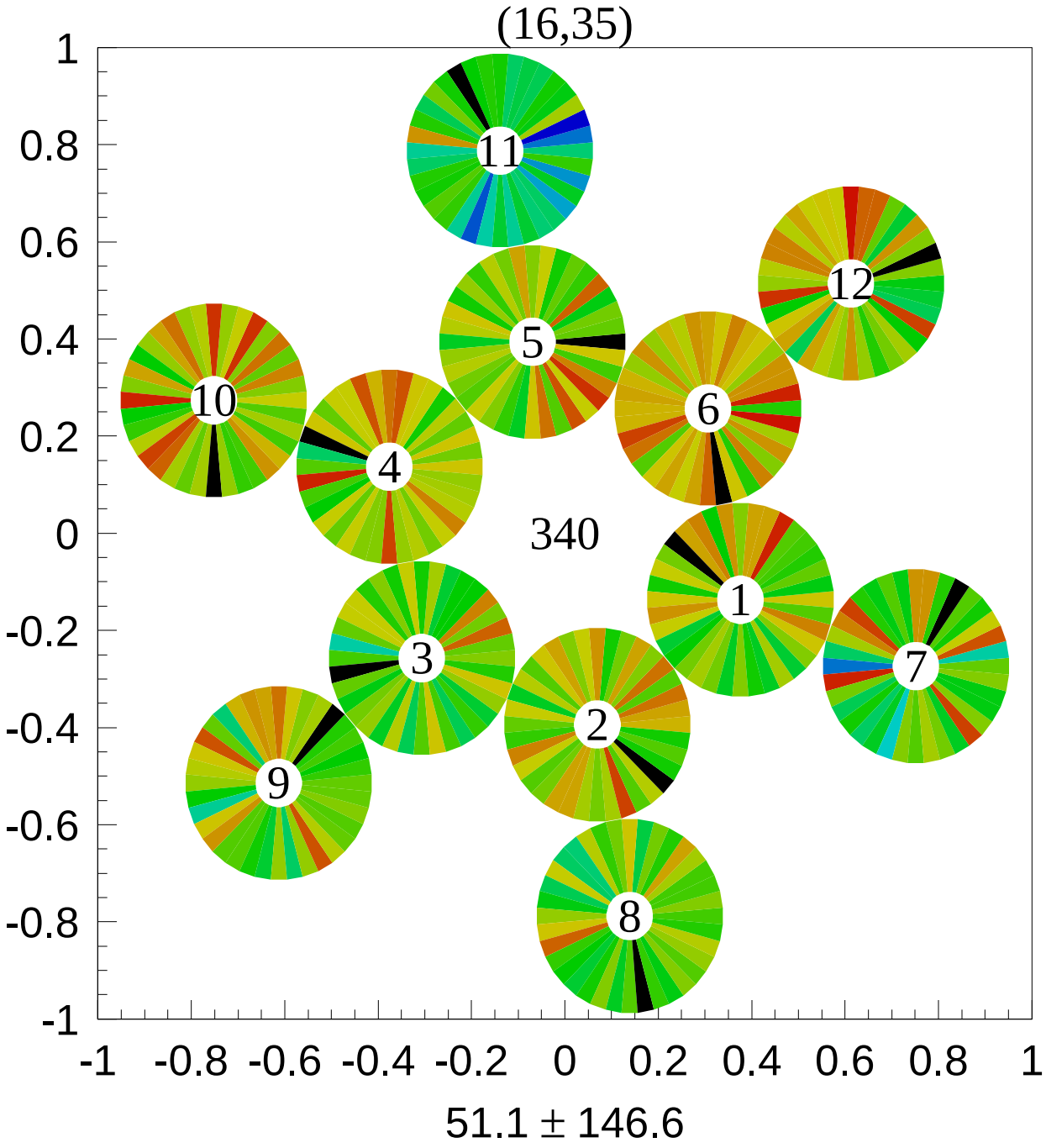

(16,34)
tilted LEDs
125 131 124 121 137 122
average of 6
average of 12
Ilh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 129 126 124 129 130
average of 6
average of 12
Ilh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

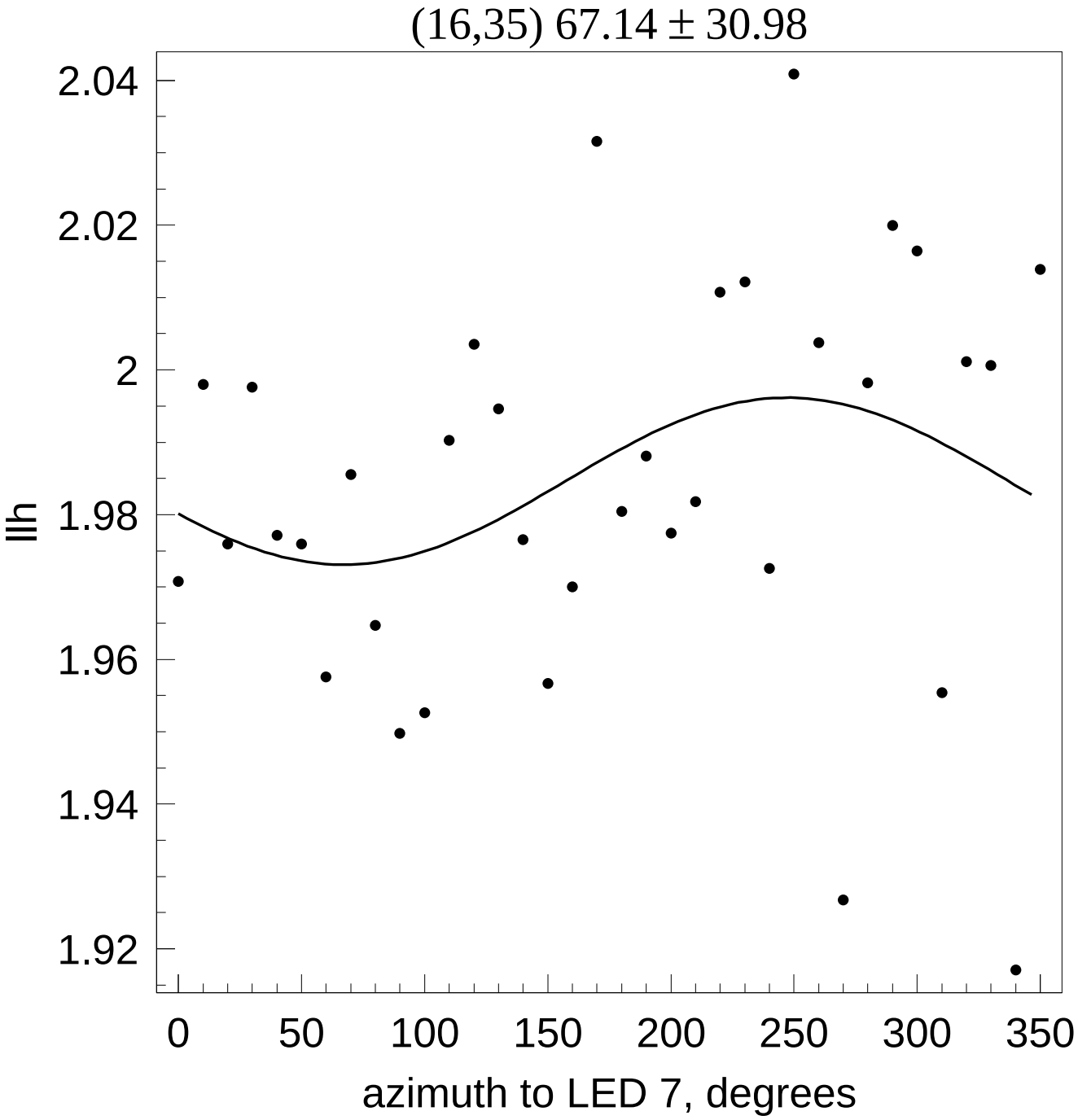

(16,34)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
5.9 ± 24.4

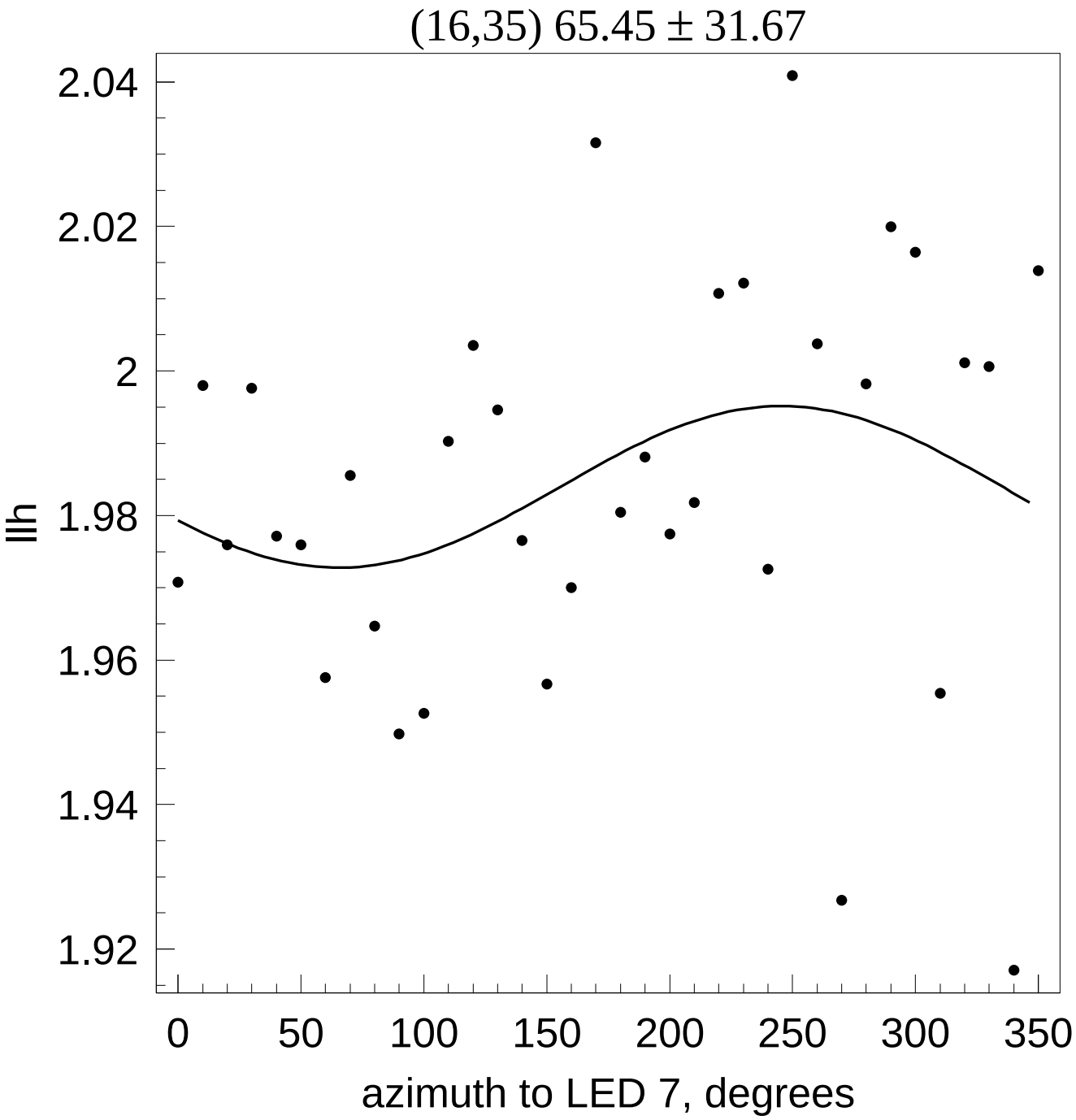

(16,34) 5.66 ± 0.96
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

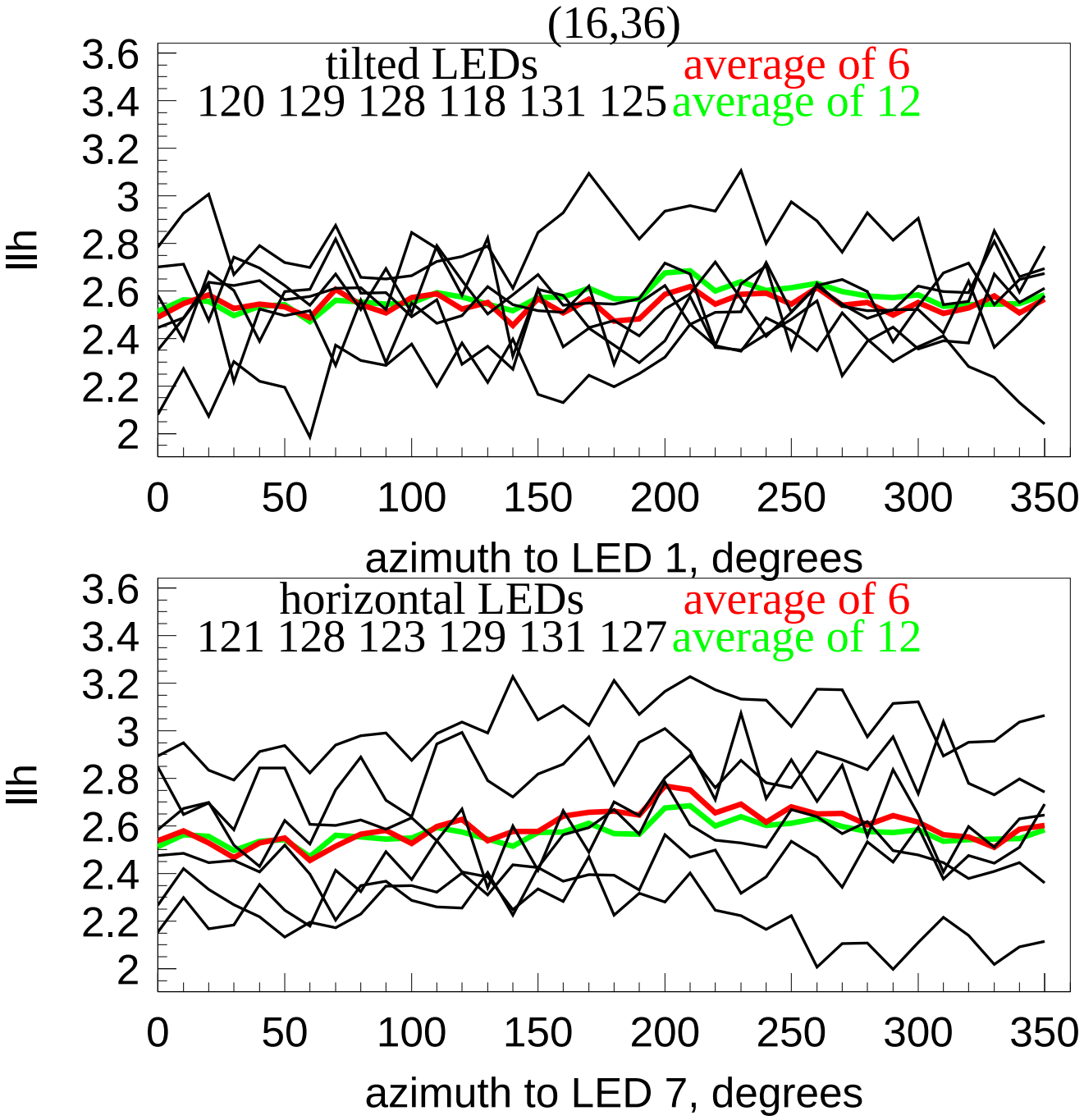

(16,34) 5.64 ± 0.99
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

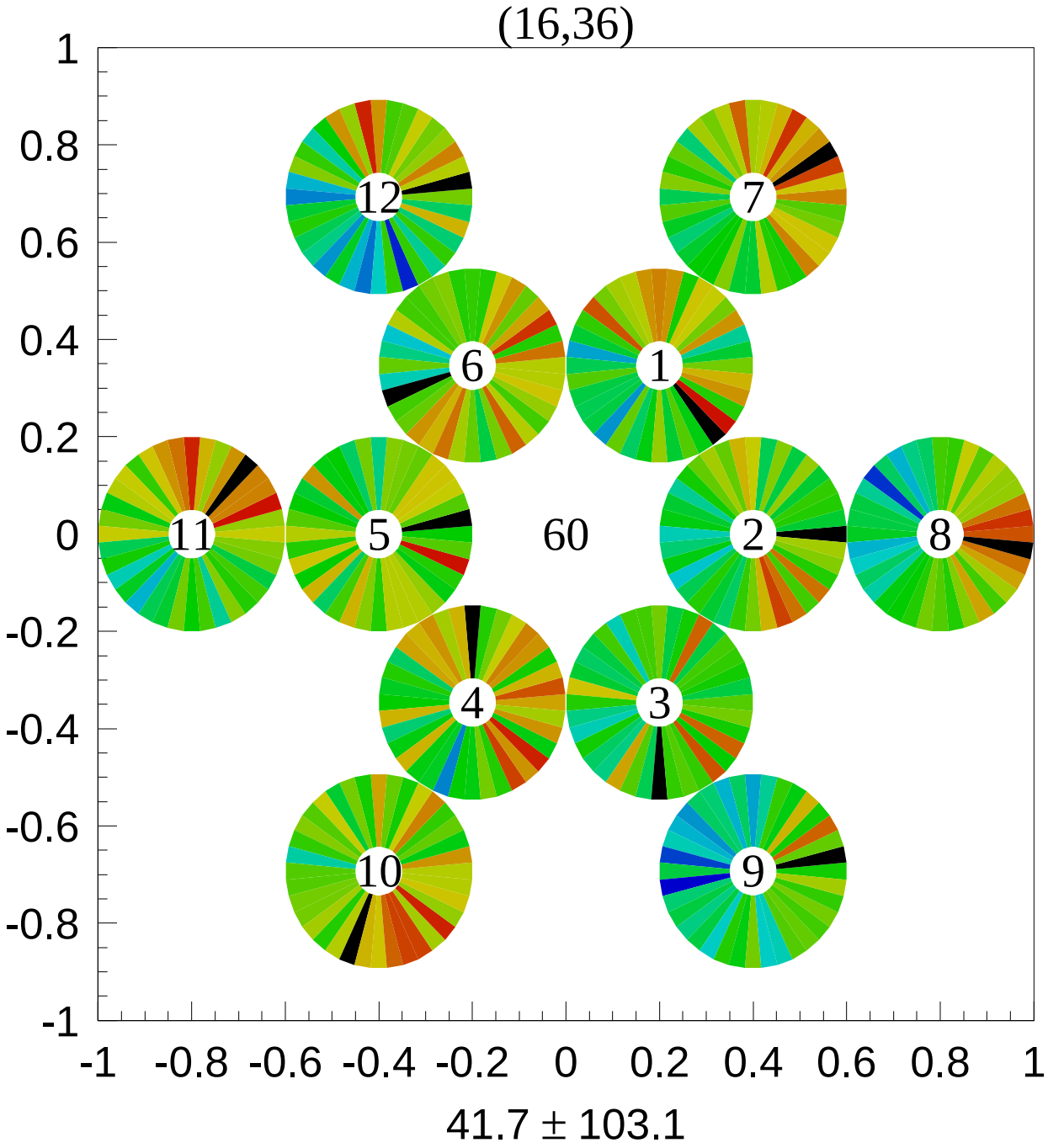

(16,35)
tilted LEDs
132 123 128 124 128 131
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 123 126 128 123 126
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

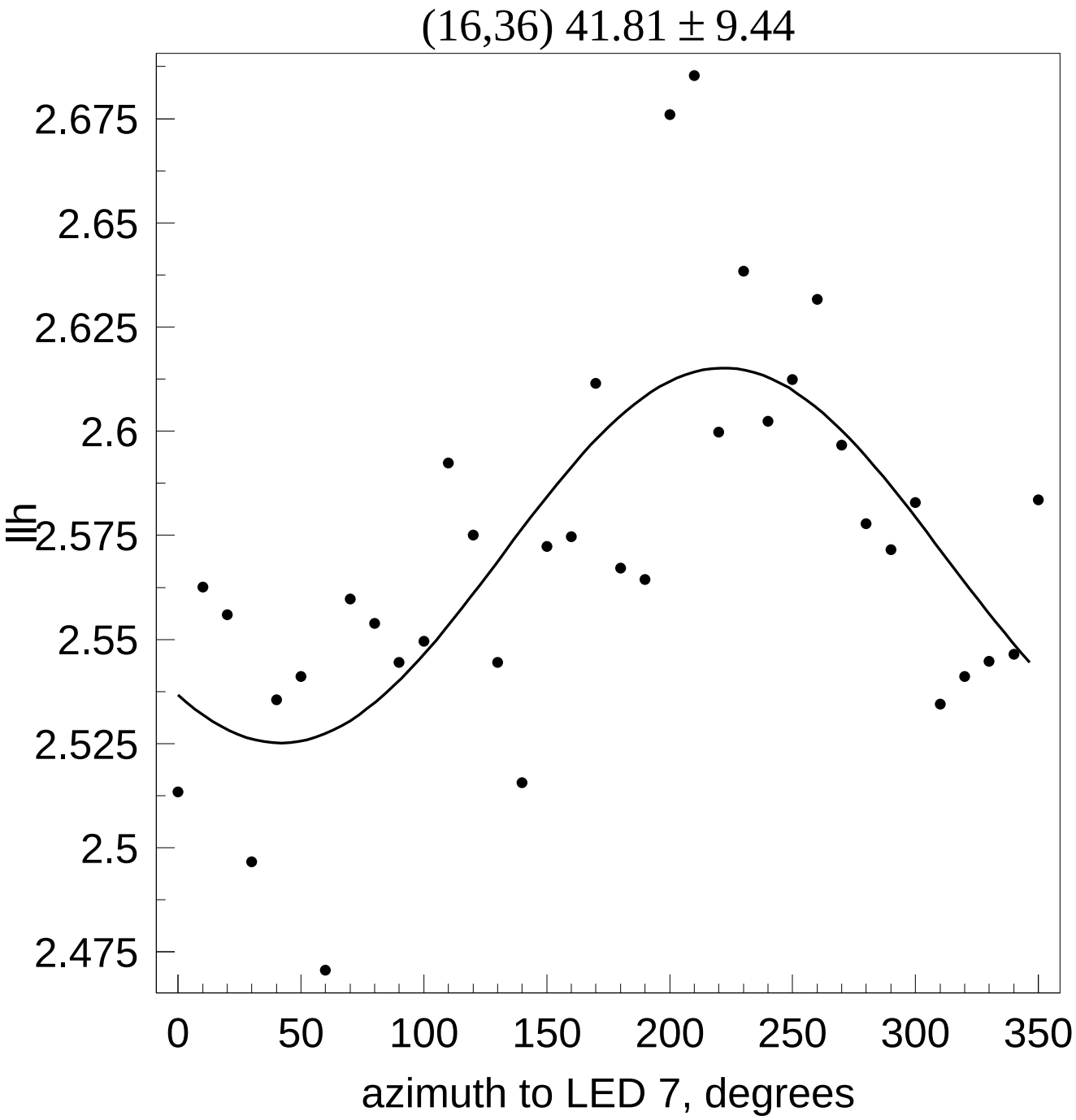

(16,35)
11
12
5
10
6
4
340
1
3
7
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
51.1 ± 146.6

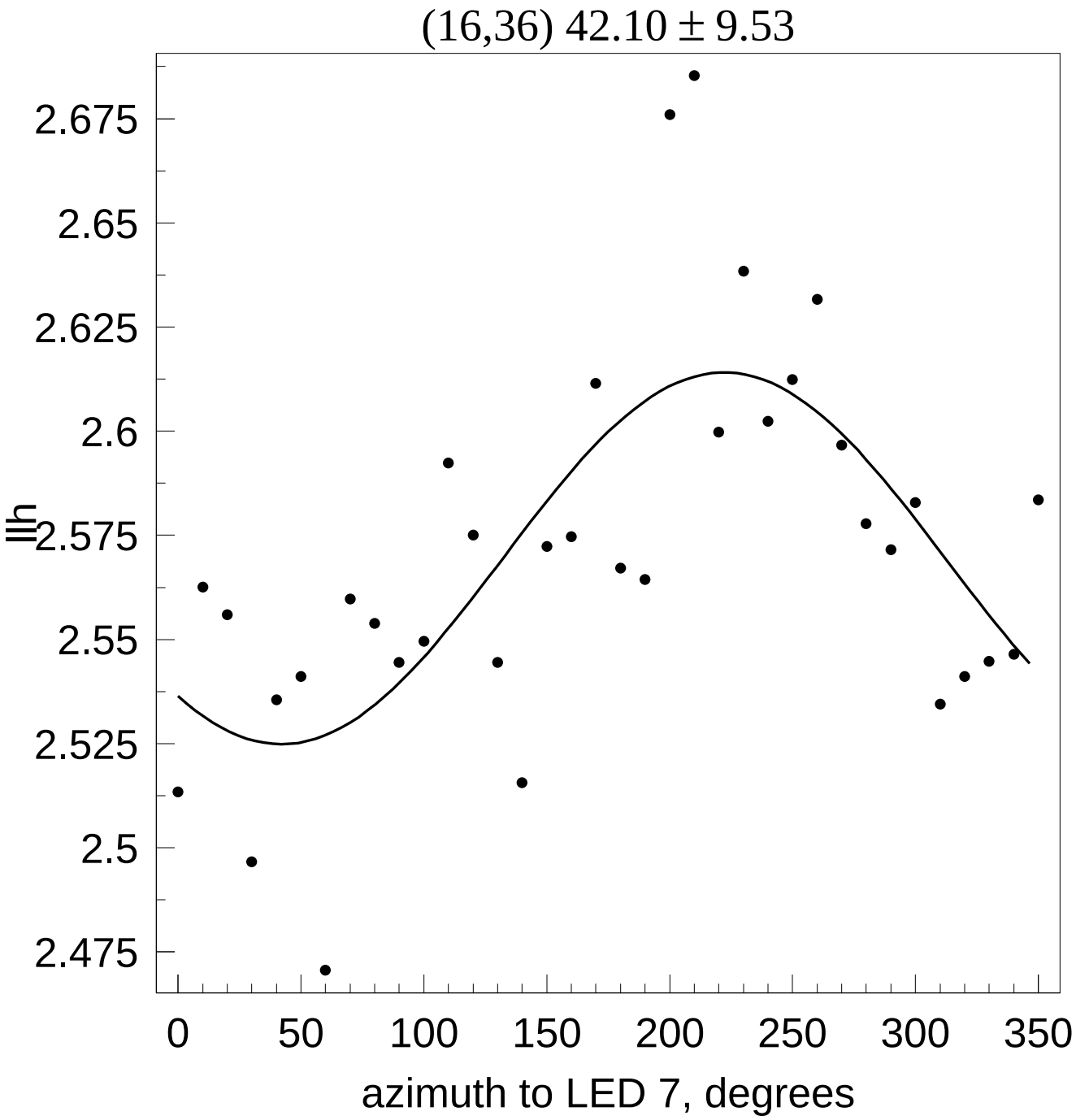

(16,35) 67.14 ± 30.98
2.04
2.02
2
1.98
1.96
1.94
1.92
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

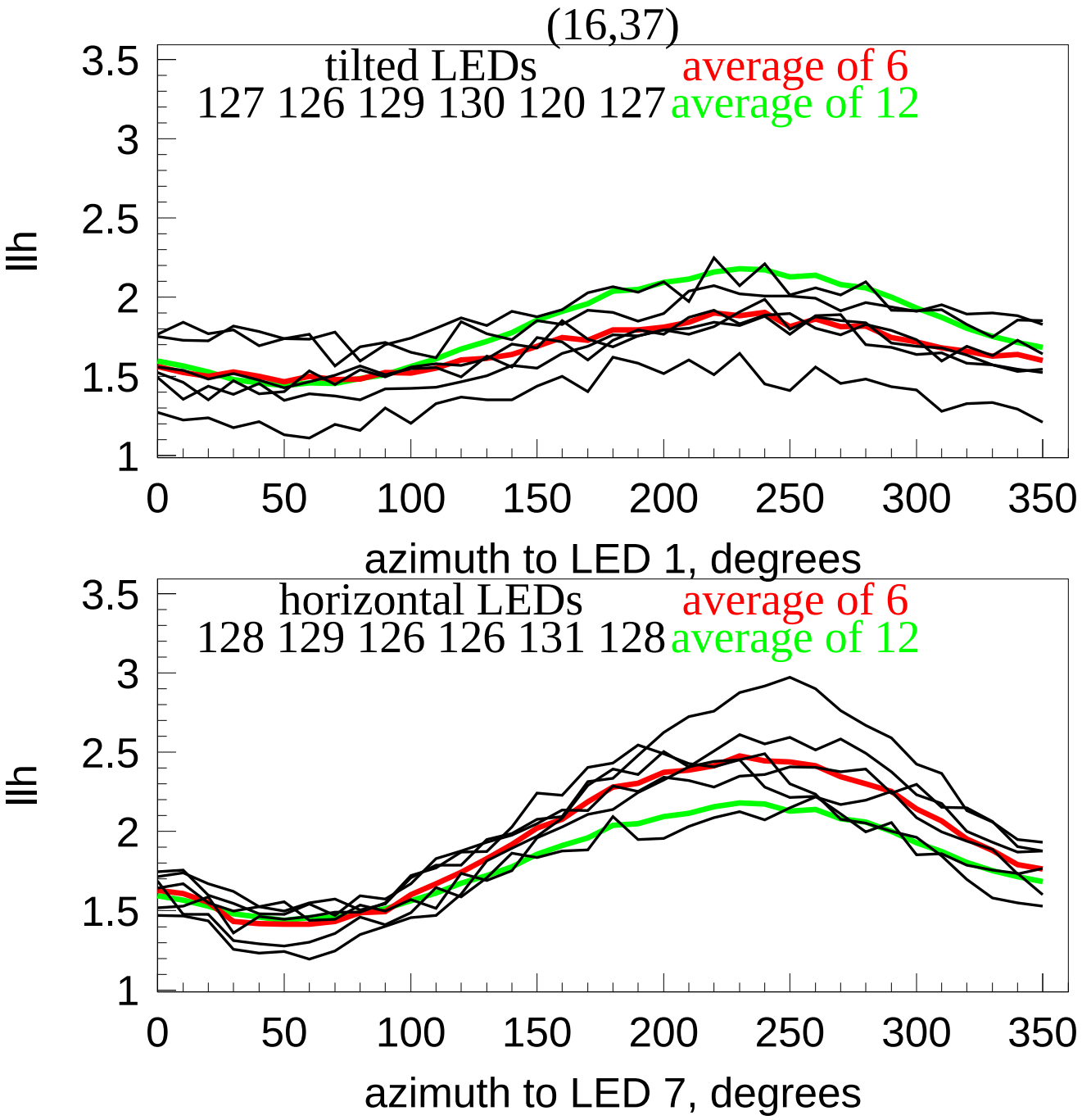

(16,35) 65.45 ± 31.67
2.04
2.02
2
1.98
1.96
1.94
1.92
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

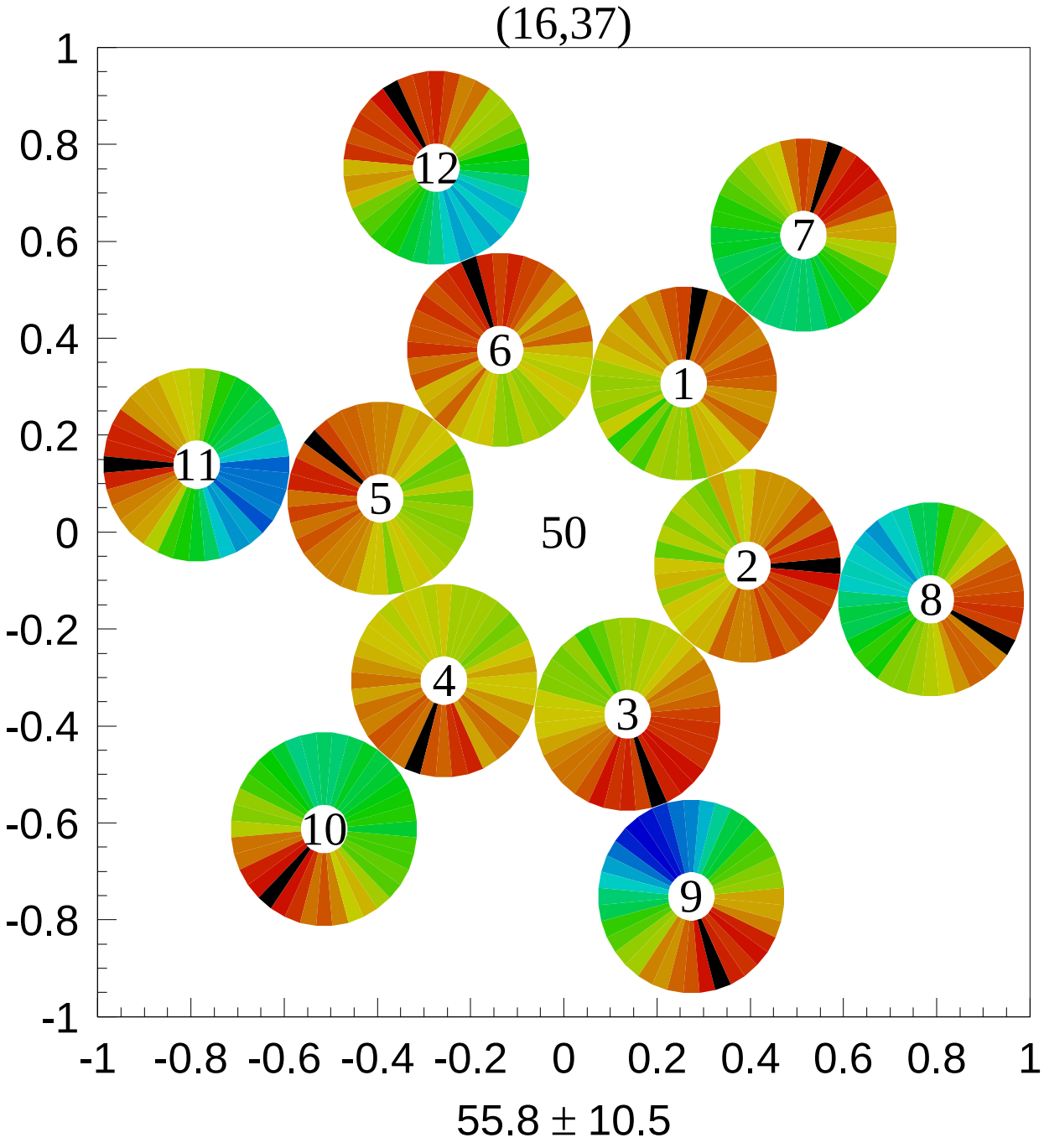

(16,36)
tilted LEDs
120 129 128 118 131 125
average of 6
average of 12
Ilh
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
121 128 123 129 131 127
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

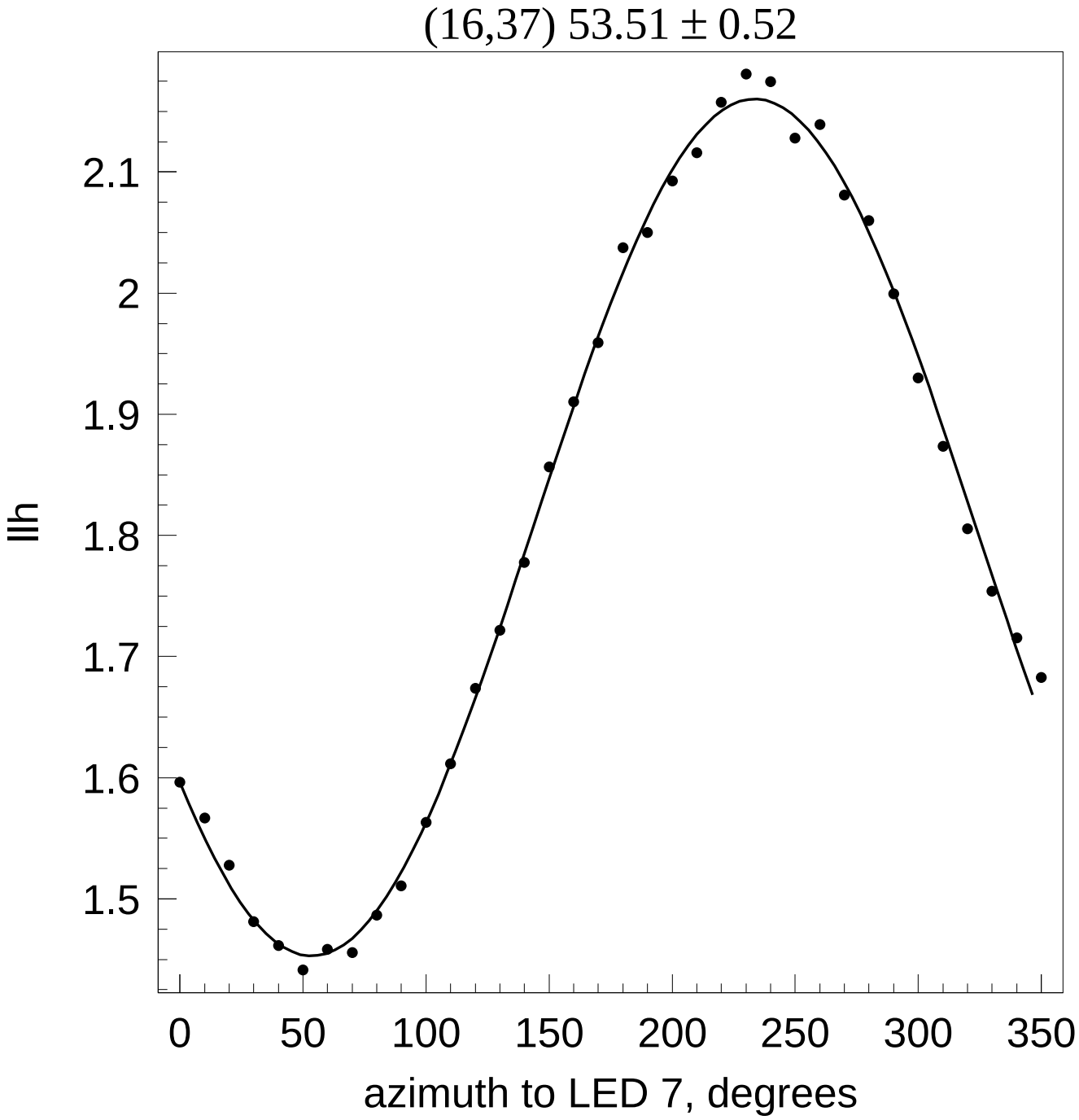

(16,36)
12
7
6
1
11
5
60
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
41.7 ± 103.1

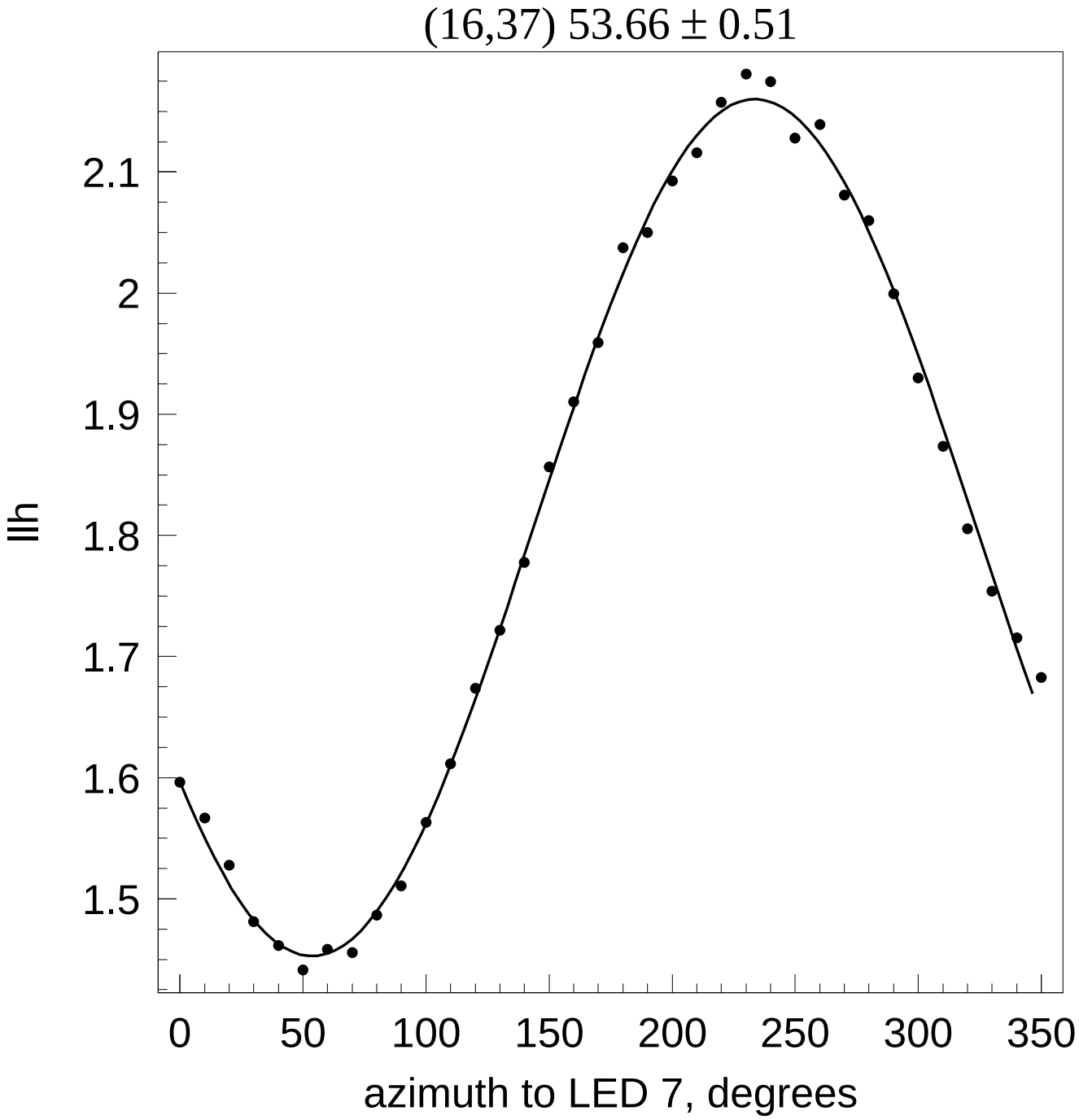

(16,36) 41.81 ± 9.44
2.675
2.65
2.625
2.6
2.575
2.55
2.525
2.5
2.475
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

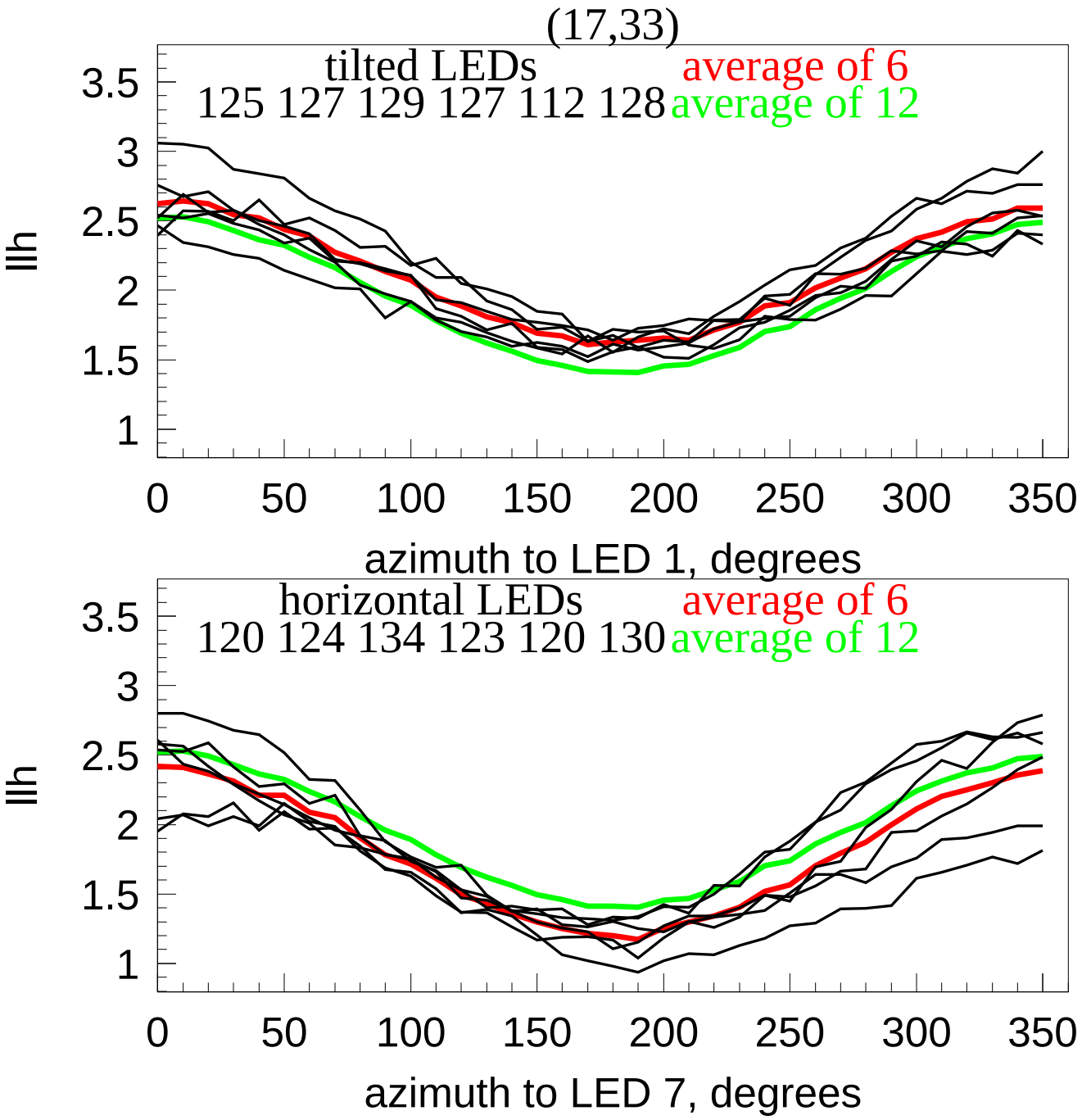

(16,36) 42.10 ± 9.53
2.675
2.65
2.625
2.6
2.575
2.55
2.525
2.5
2.475
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

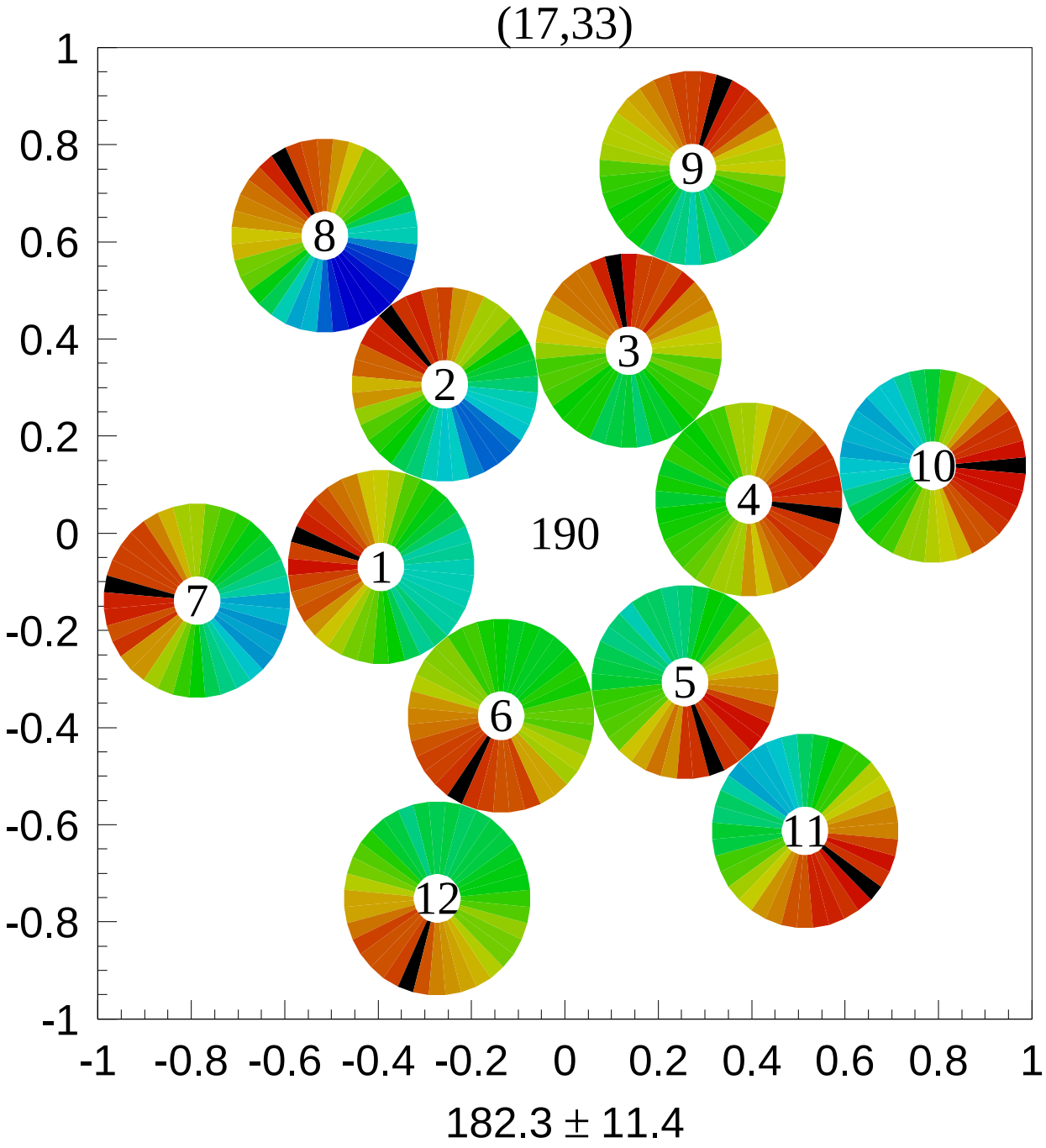

(16,37)
tilted LEDs
127 126 129 130 120 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 129 126 126 131 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

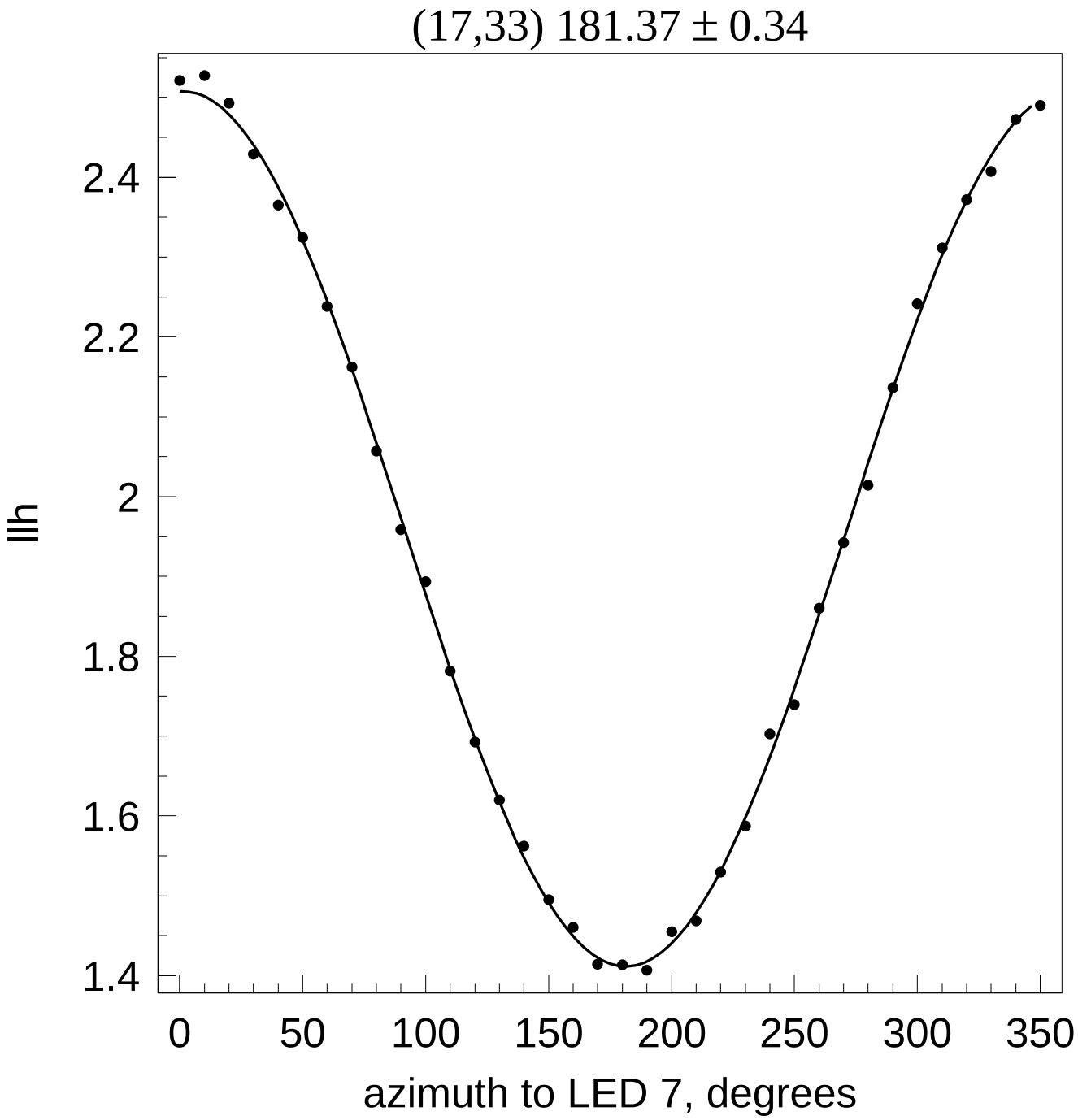

(16,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
55.8 ± 10.5

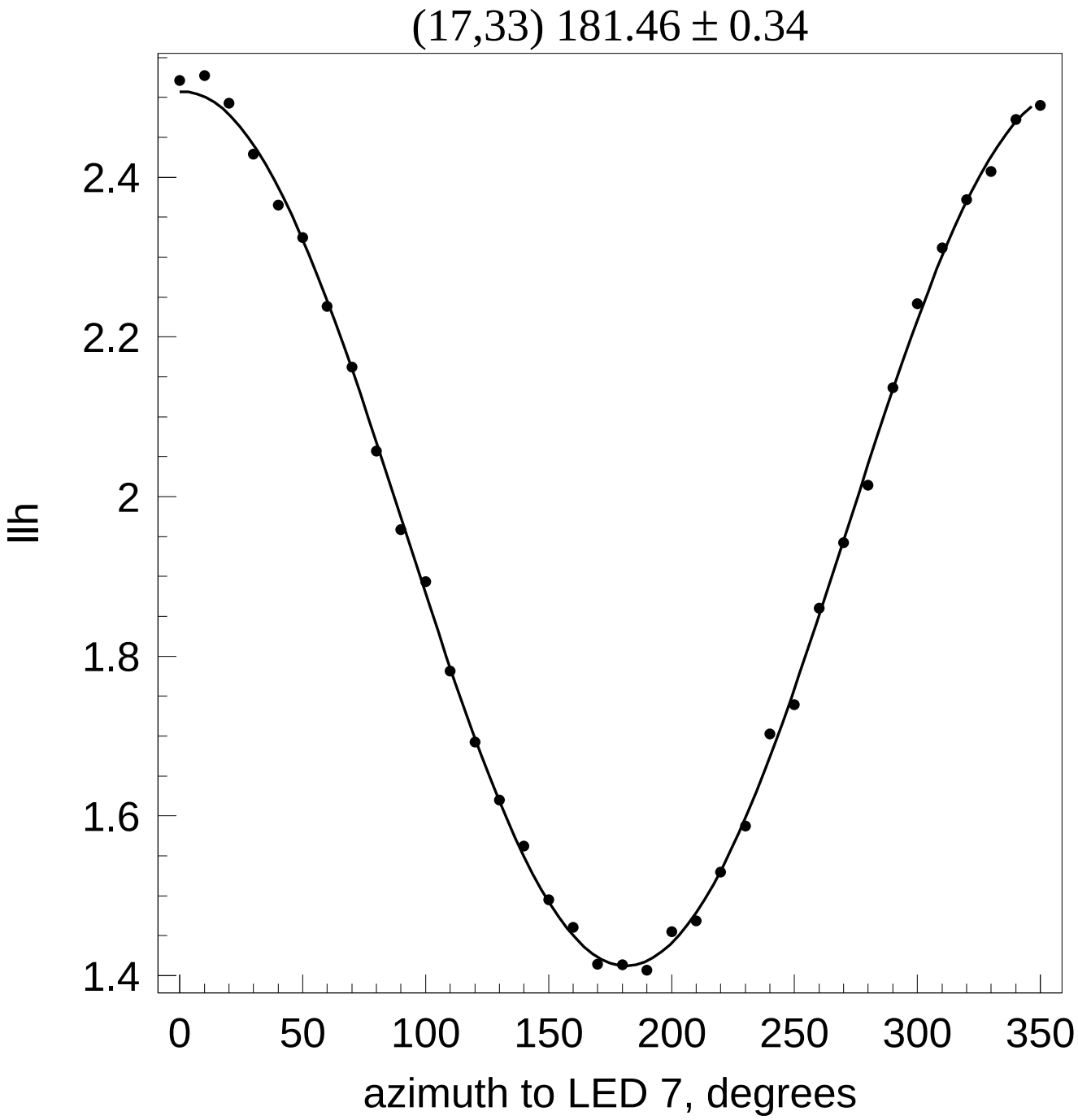

(16,37) 53.51 ± 0.52
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

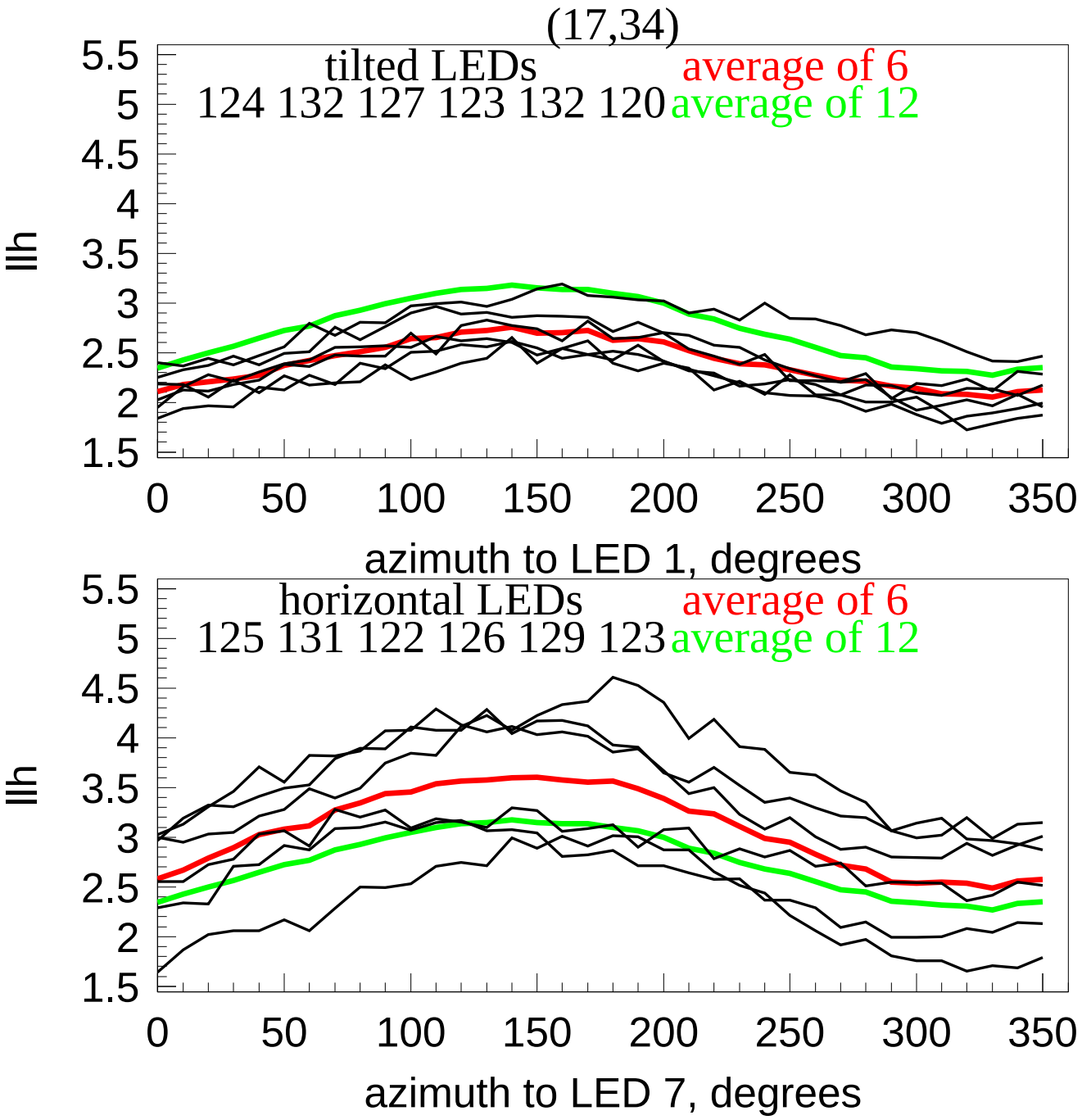

(16,37) 53.66 ± 0.51
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

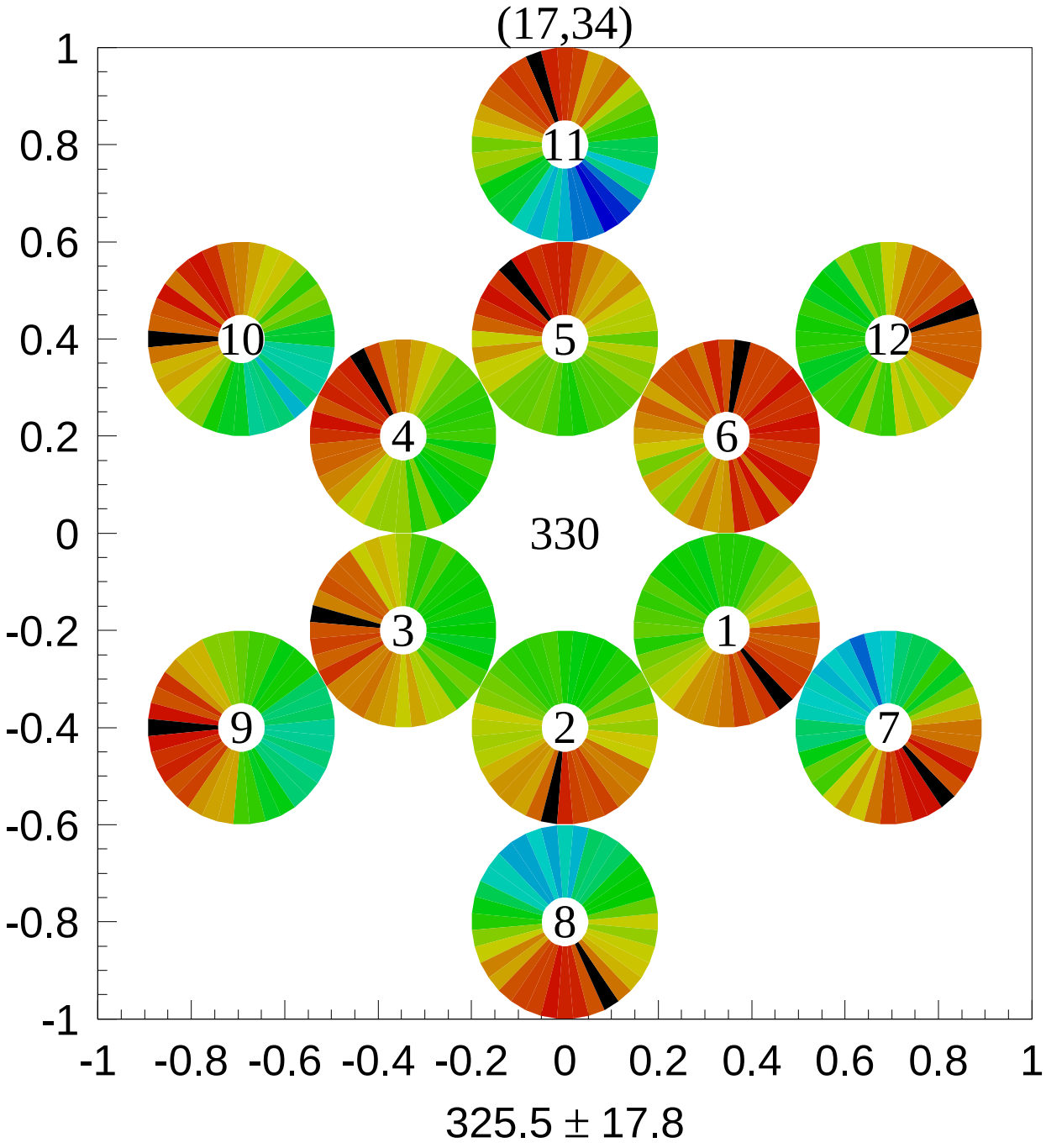

(17,33)
tilted LEDs
125 127 129 127 112 128
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
120 124 134 123 120 130
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

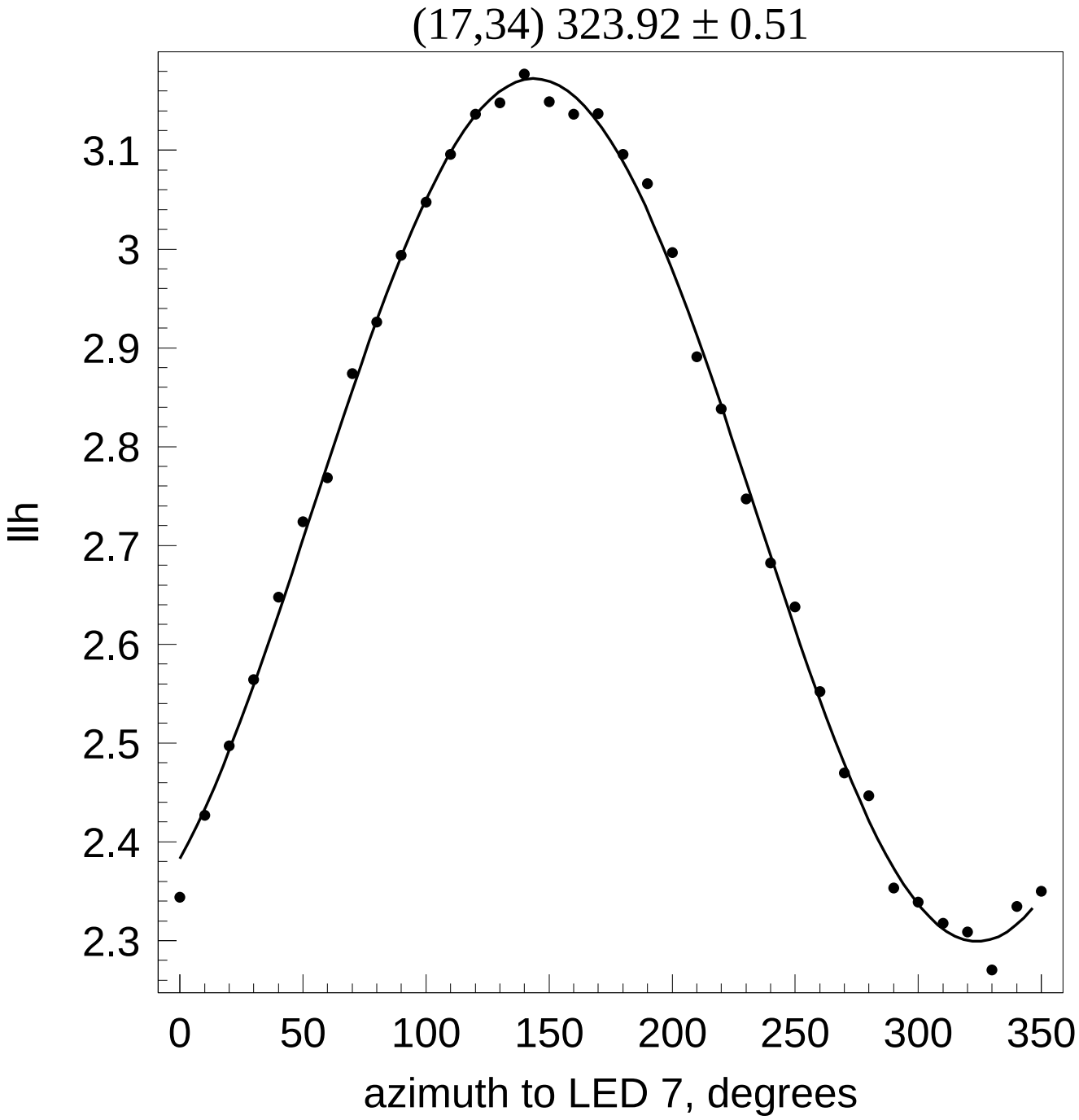

(17,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
182.3 ± 11.4
190
1
2
3
4
5
6
7
8
9
10
11
12

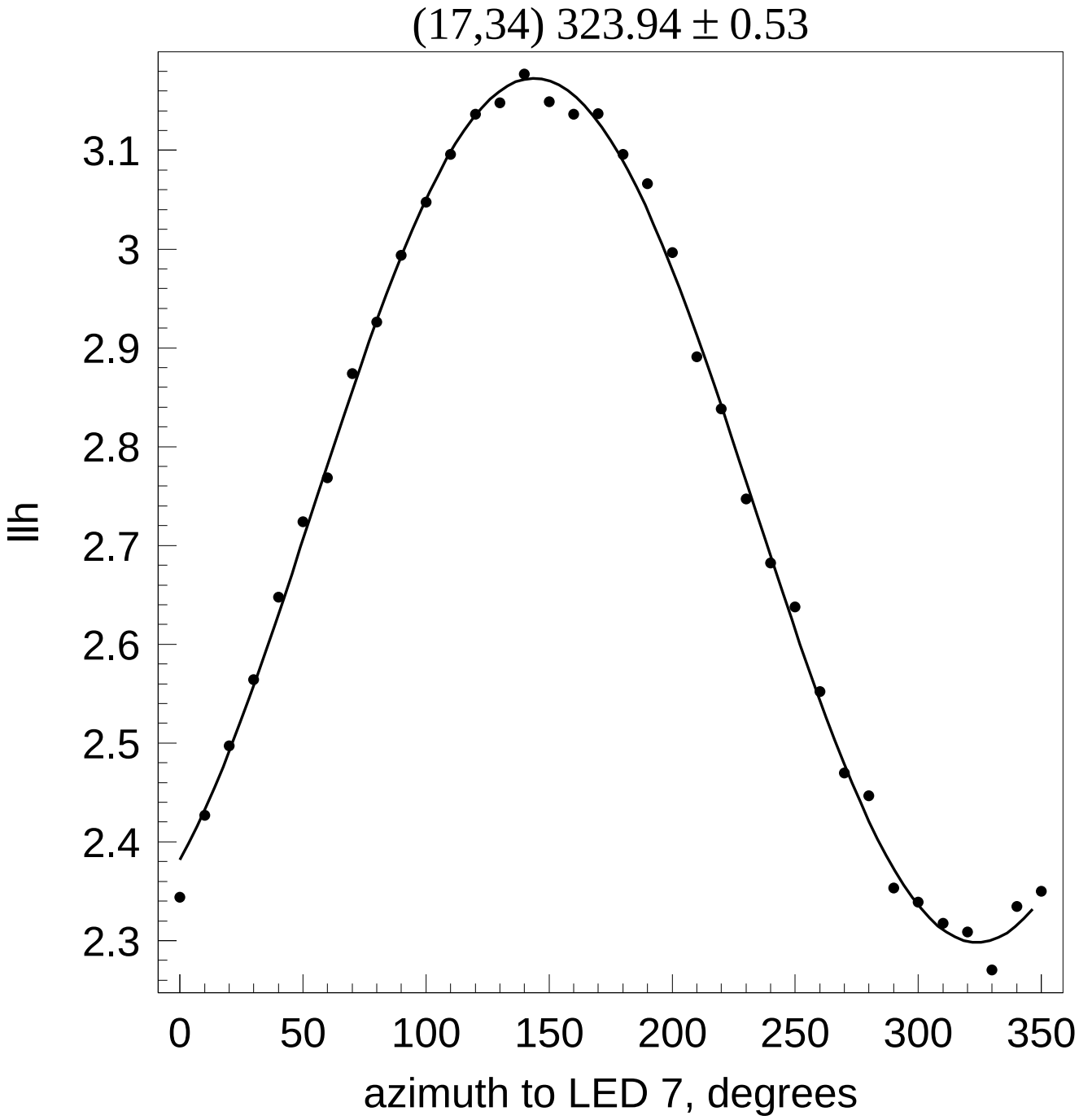

(17,33) 181.37 ± 0.34
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

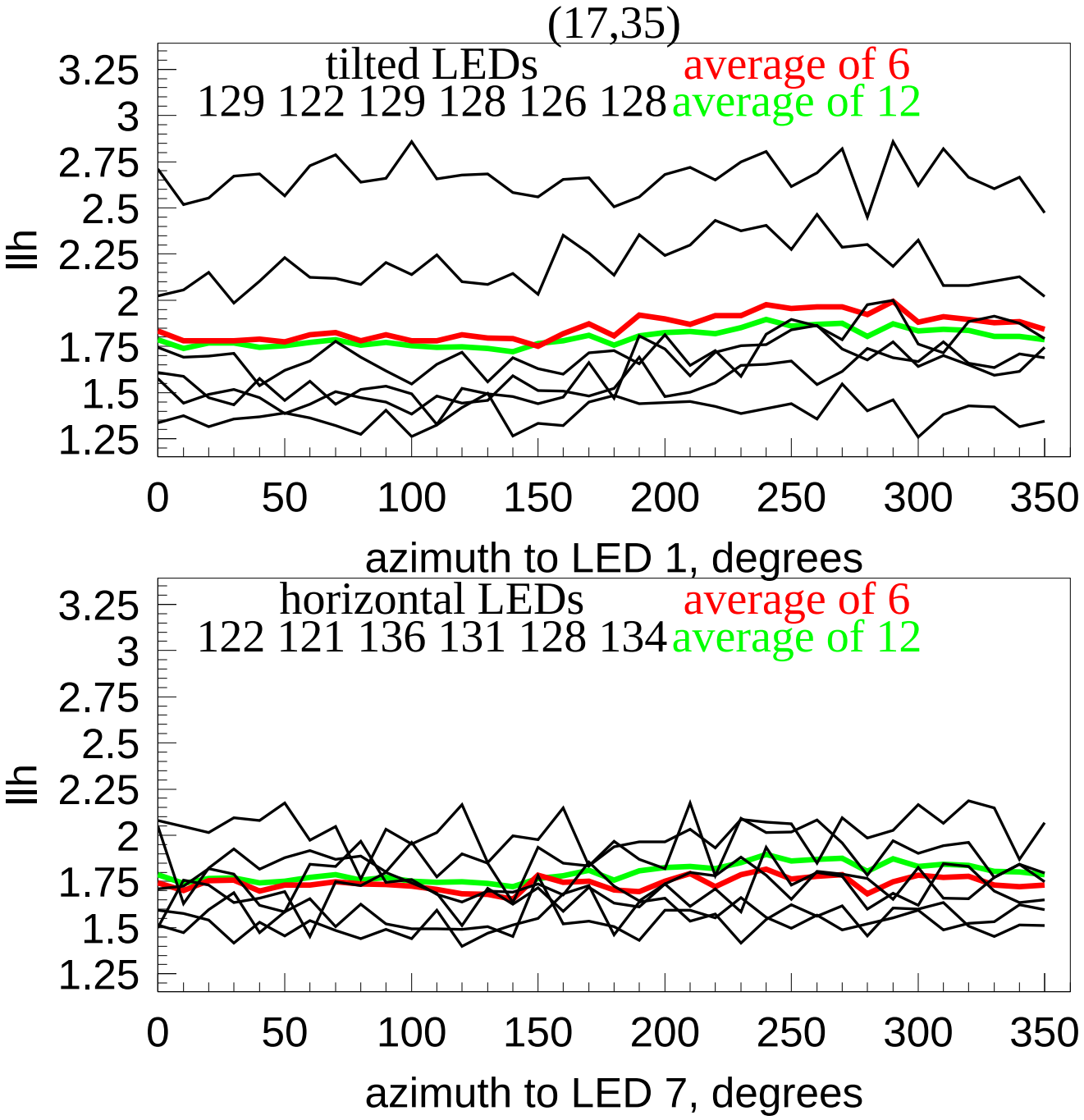

(17,33) 181.46 ± 0.34
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

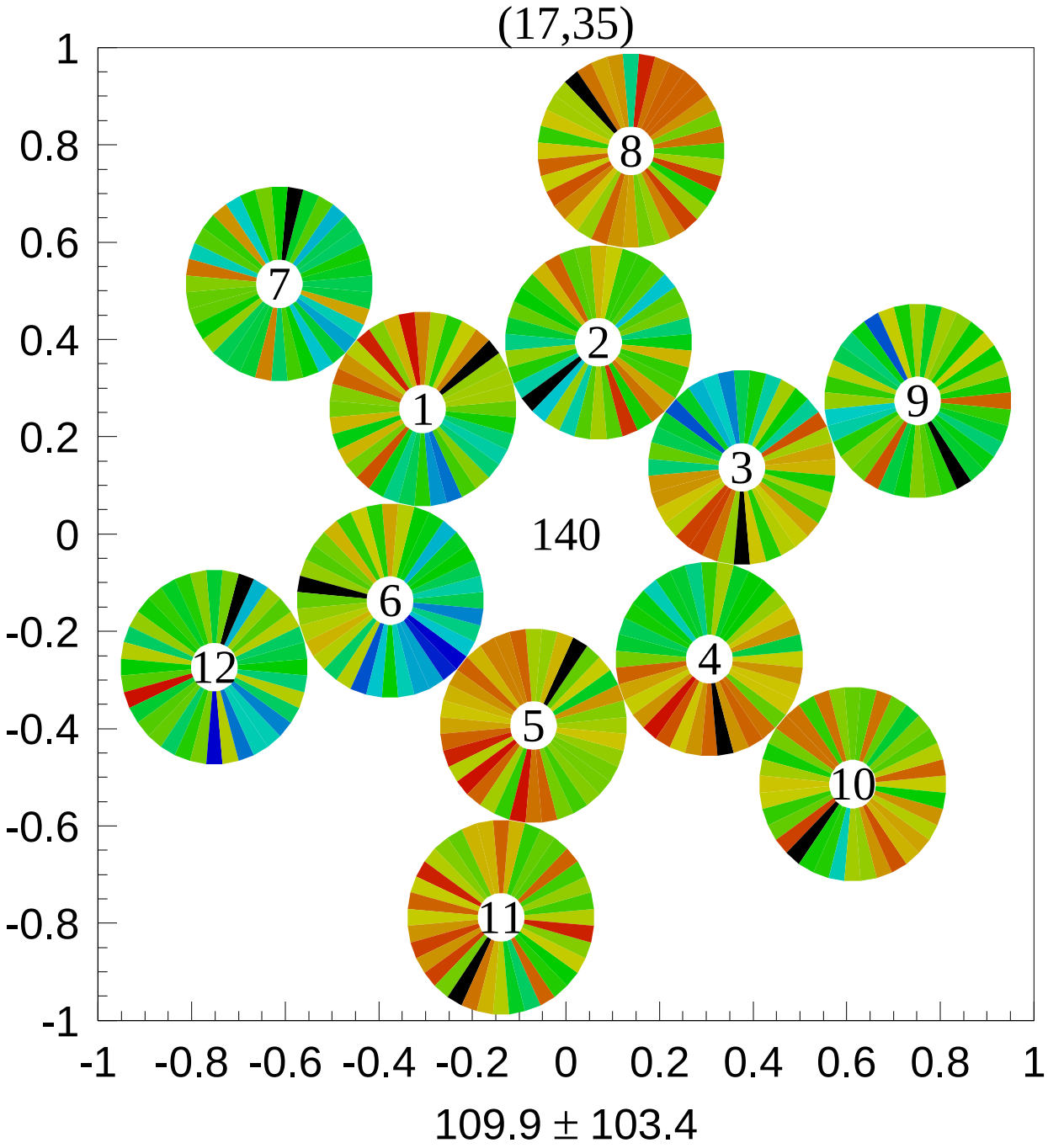

(17,34)
tilted LEDs
124 132 127 123 132 120
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 131 122 126 129 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

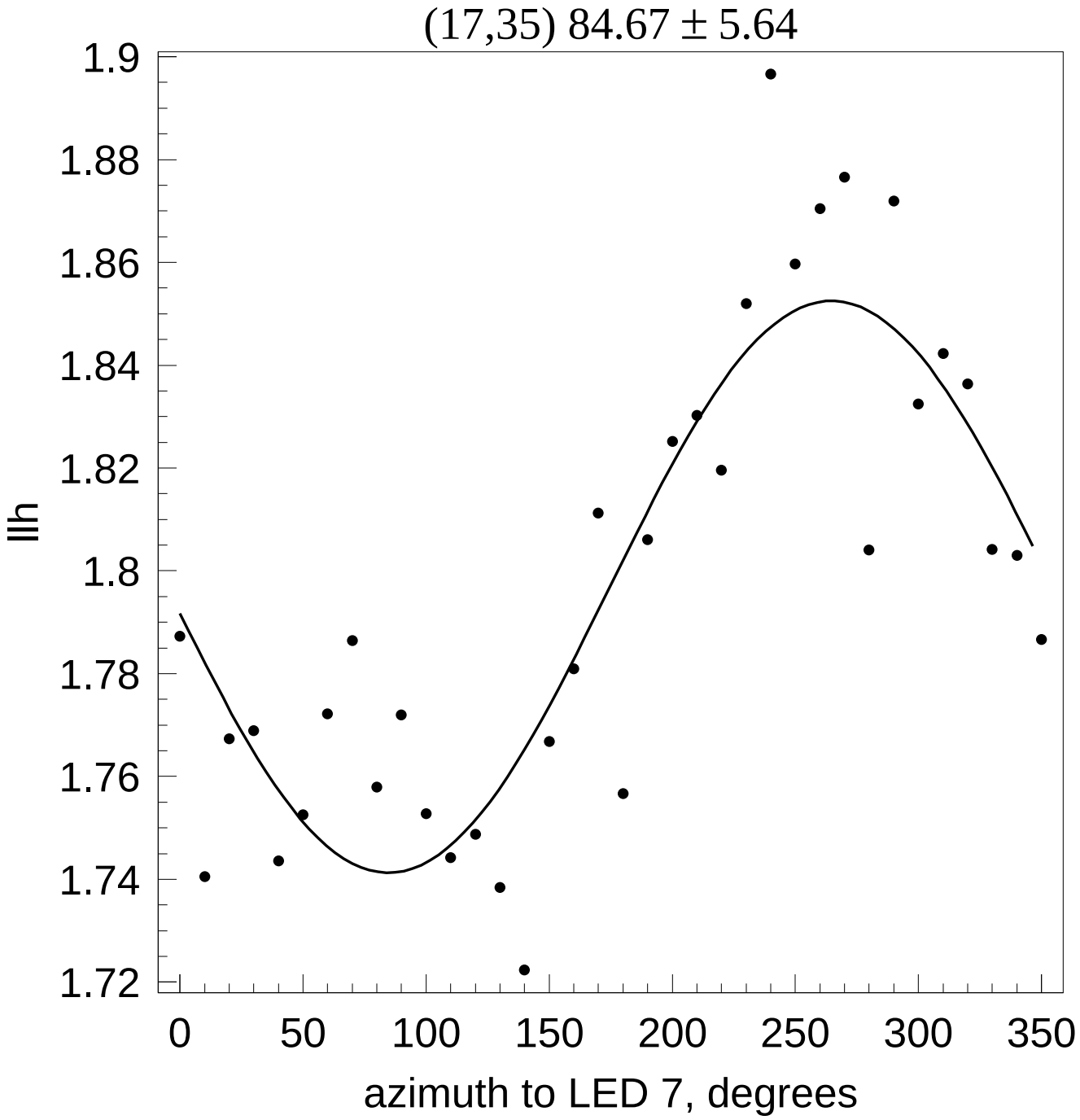

(17,34)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
325.5 ± 17.8

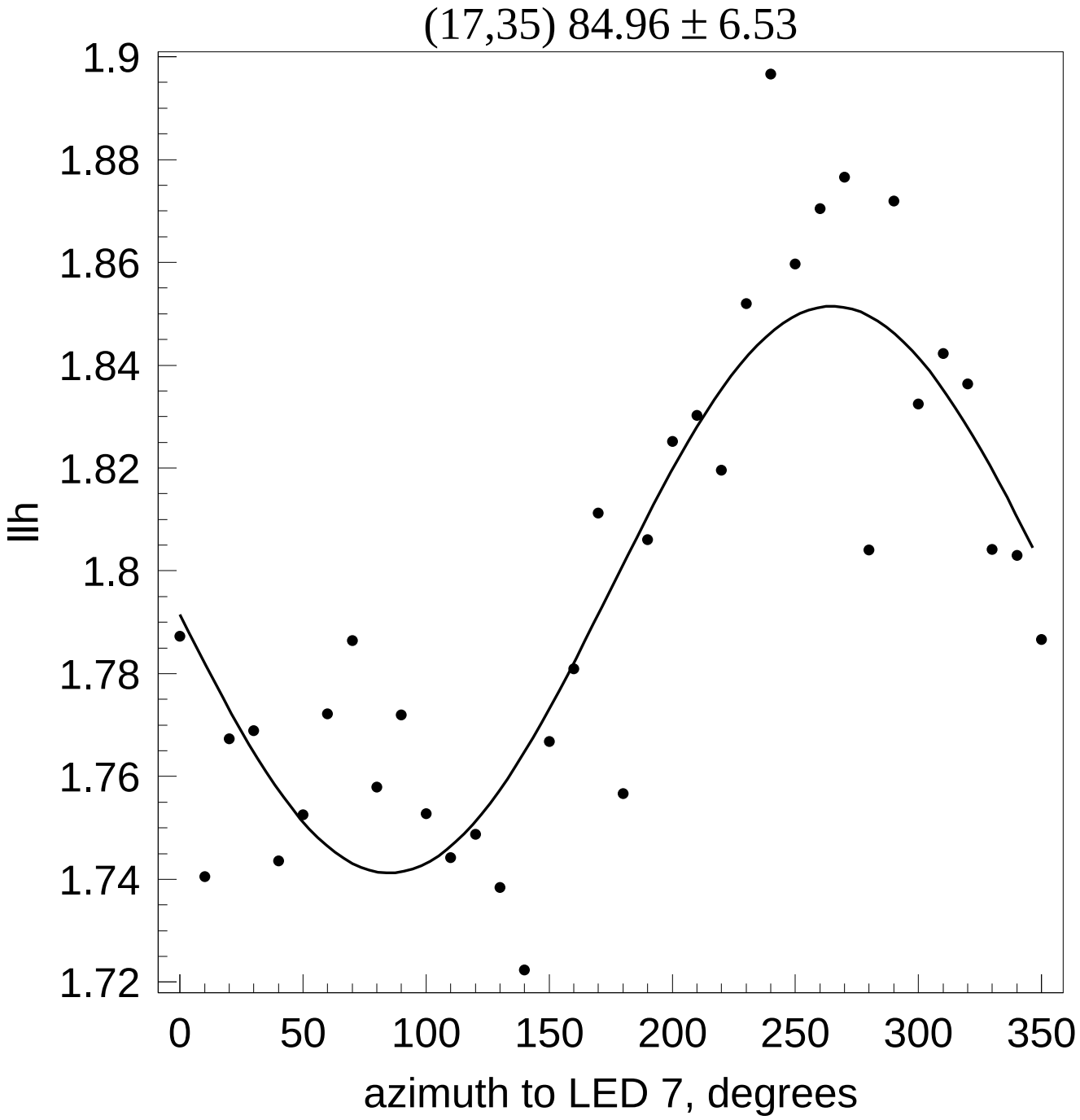

(17,34) 323.92 ± 0.51
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

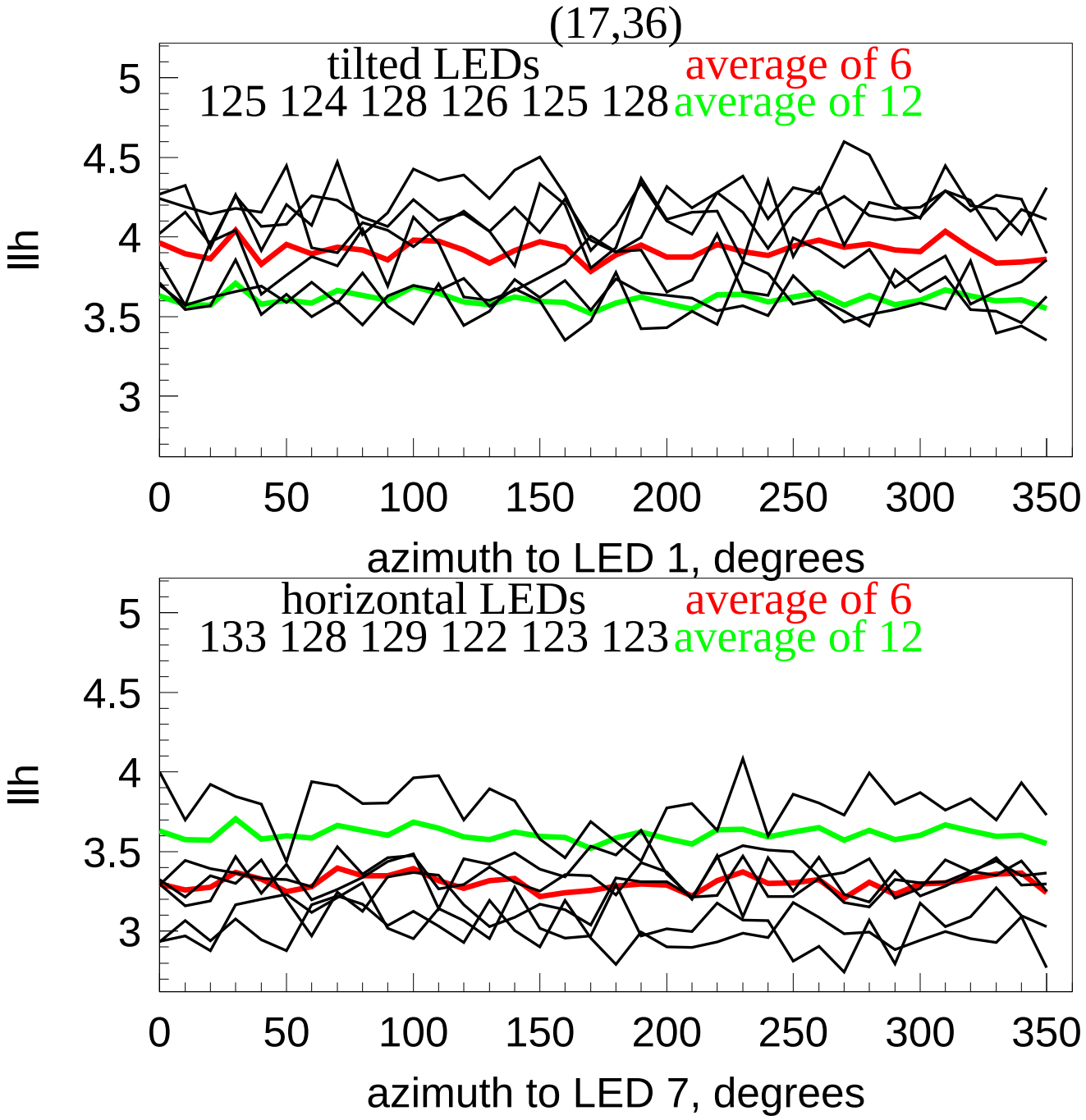

(17,34) 323.94 ± 0.53
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

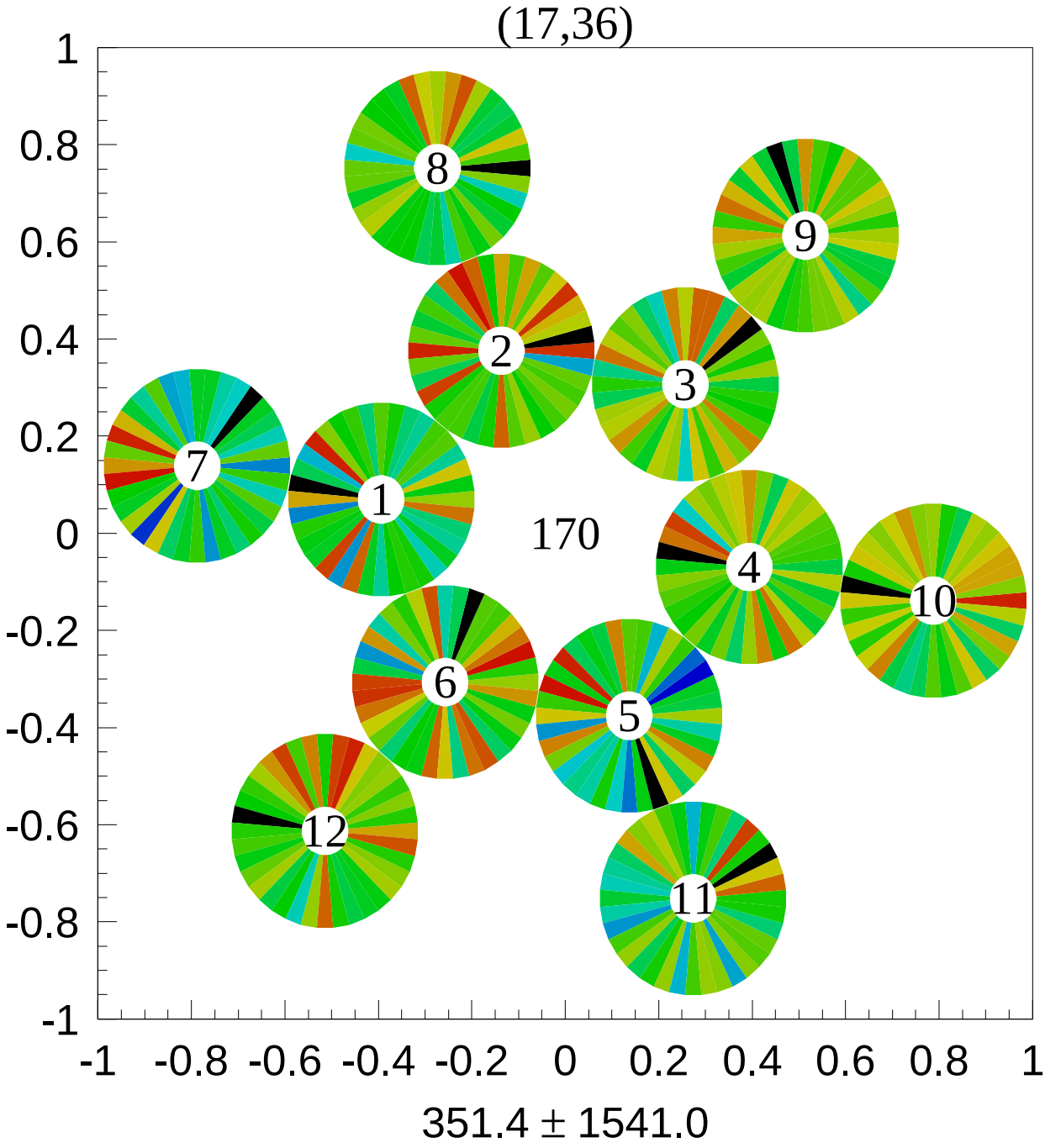

(17,35)
tilted LEDs
129 122 129 128 126 128
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 121 136 131 128 134
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

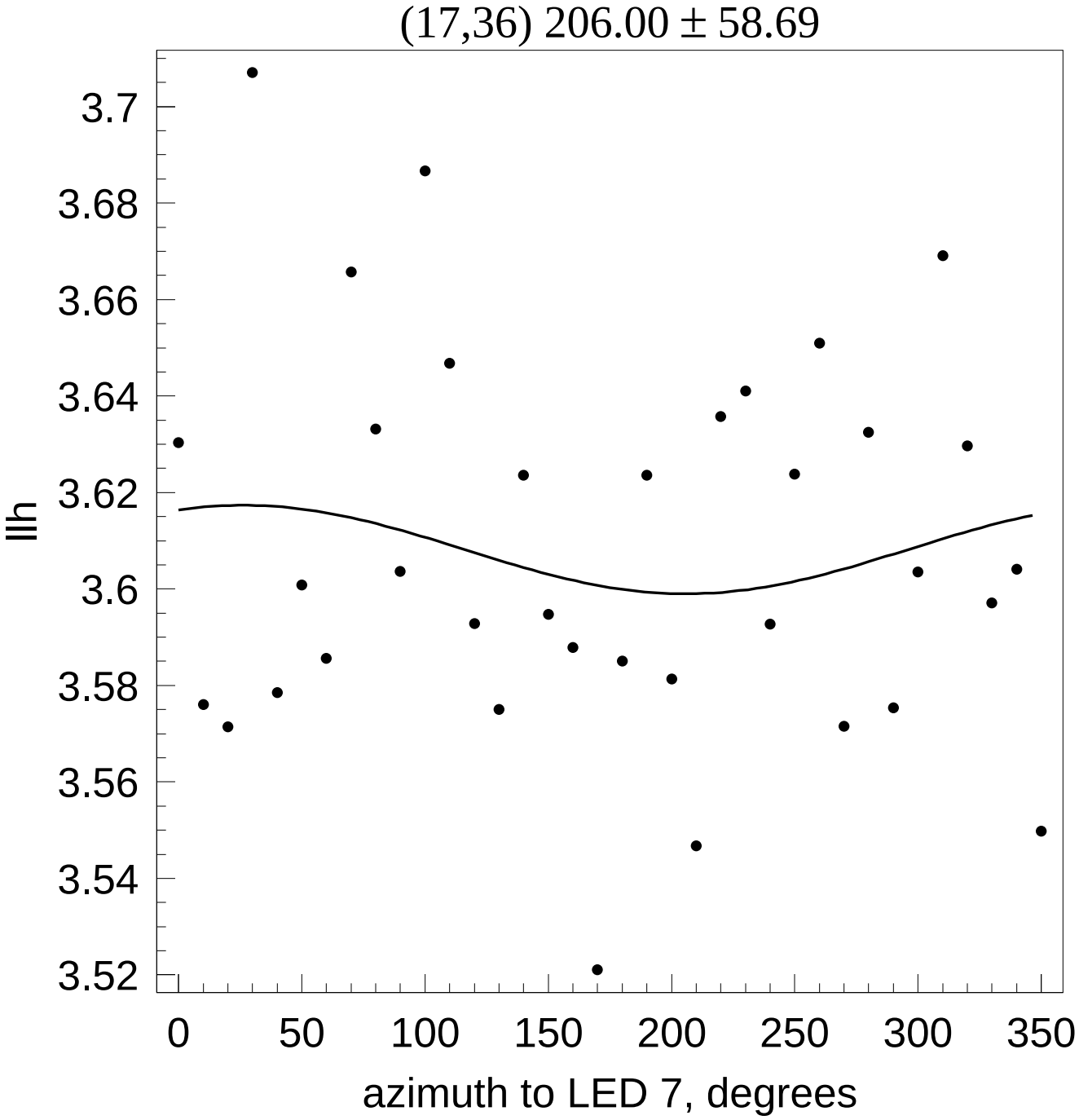

(17,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
109.9 ± 103.4
140
1
2
3
4
5
6
7
8
9
10
11
12

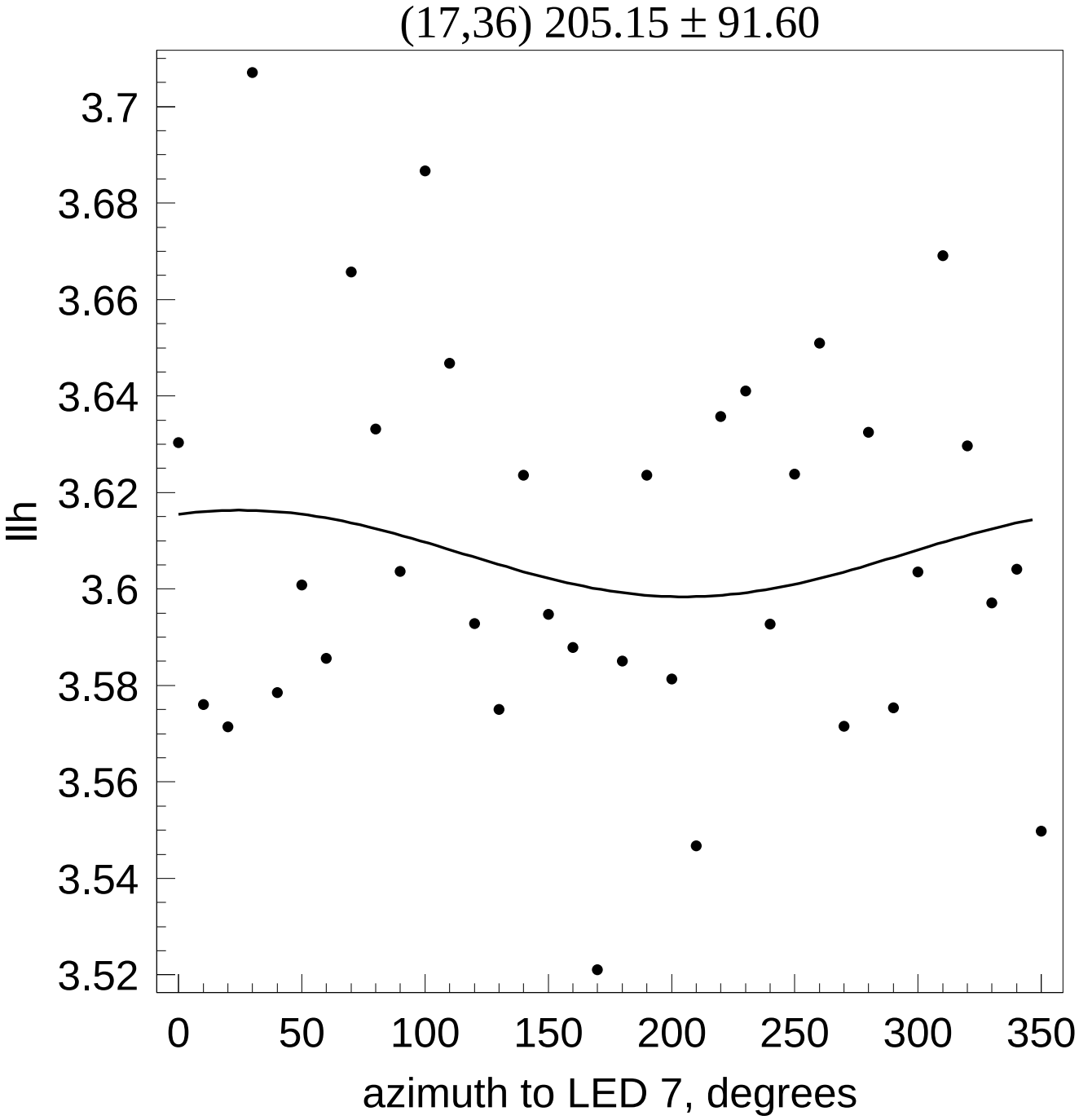

(17,35) 84.67 ± 5.64
1.9
1.88
1.86
1.84
1.82
1.8
1.78
1.76
1.74
1.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

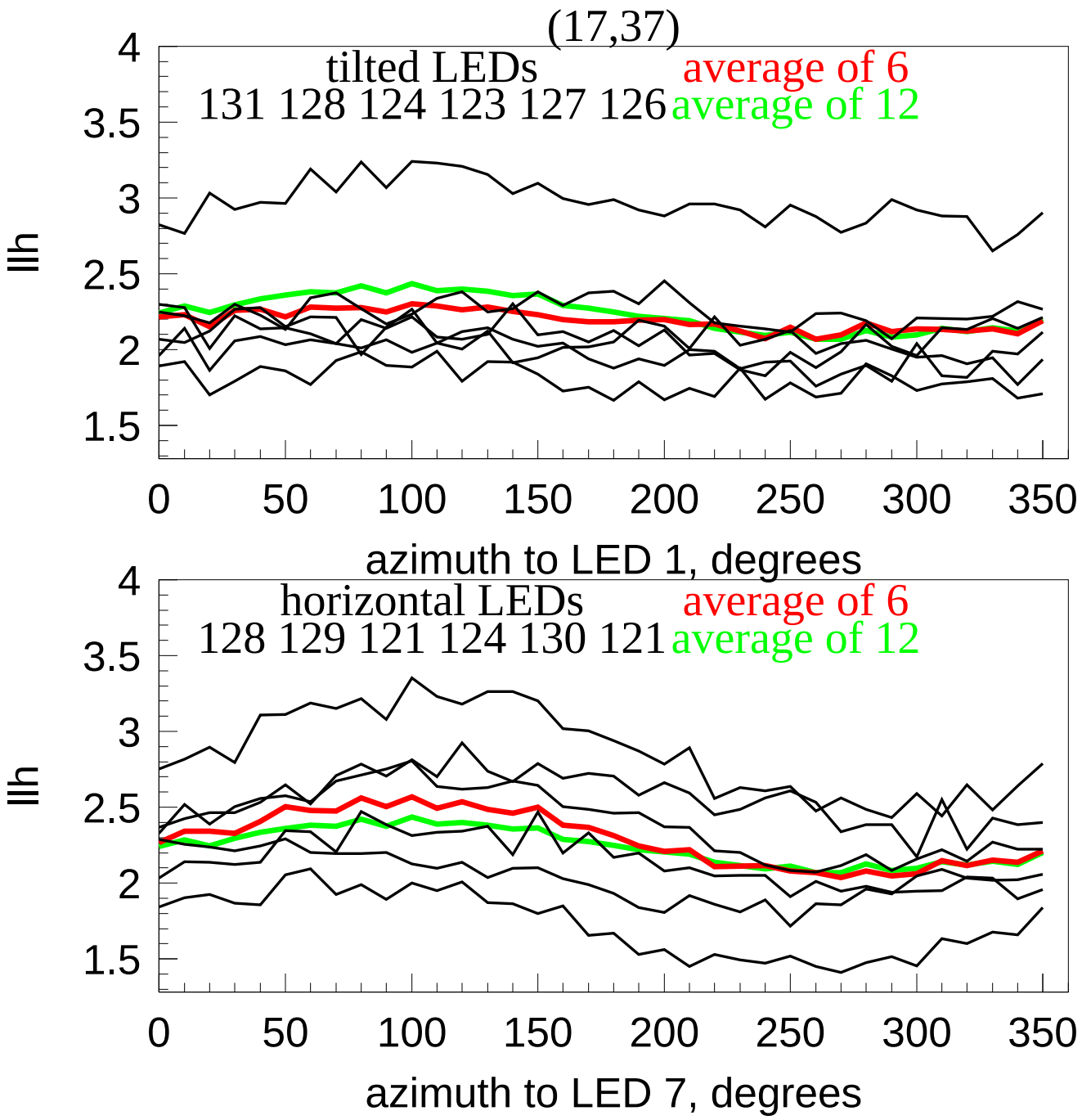

(17,35) 84.96 ± 6.53
1.9
1.88
1.86
1.84
1.82
1.8
1.78
1.76
1.74
1.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

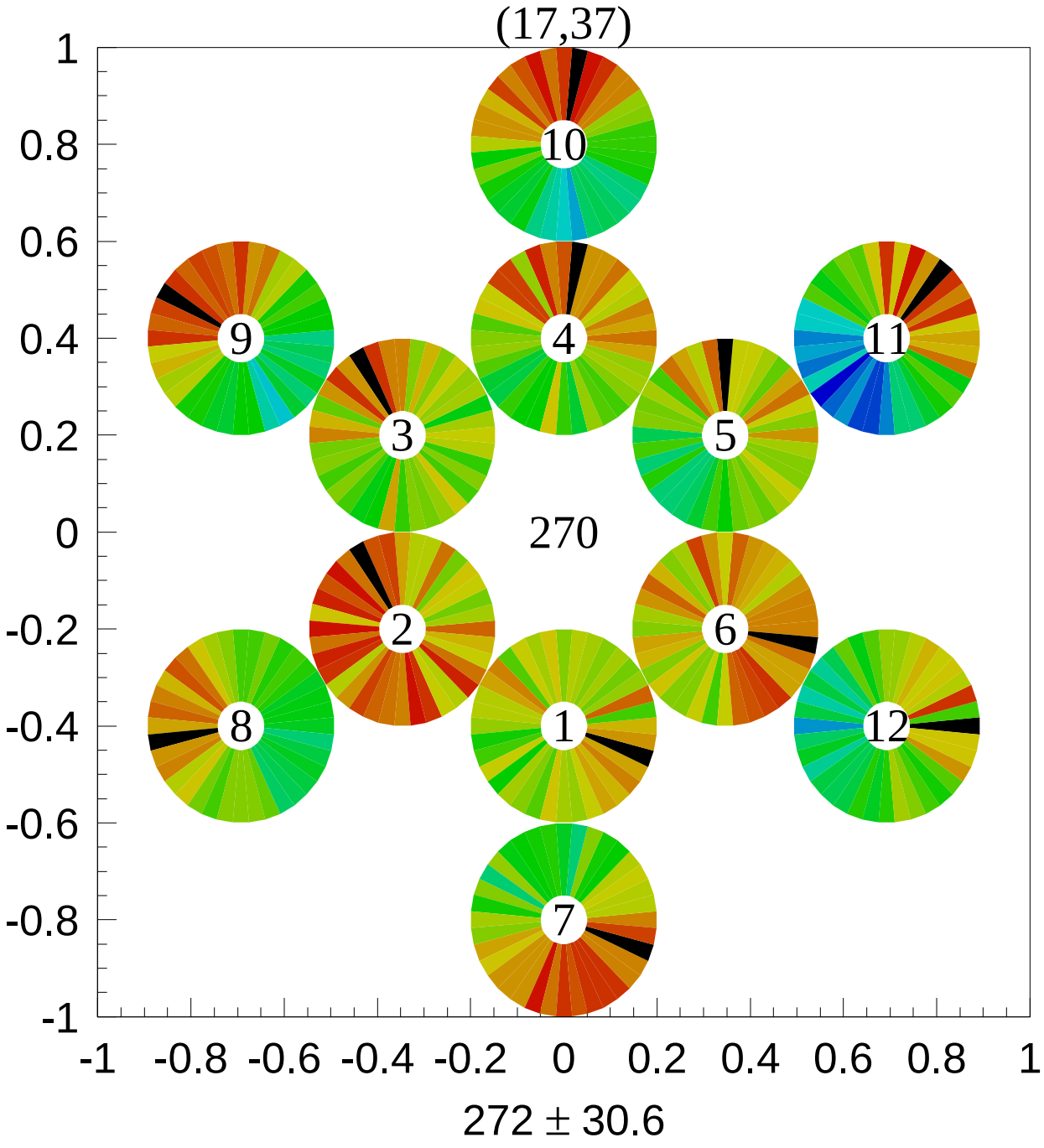

(17,36)
tilted LEDs
125 124 128 126 125 128
average of 6
average of 12
llh
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
133 128 129 122 123 123
average of 6
average of 12
llh
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

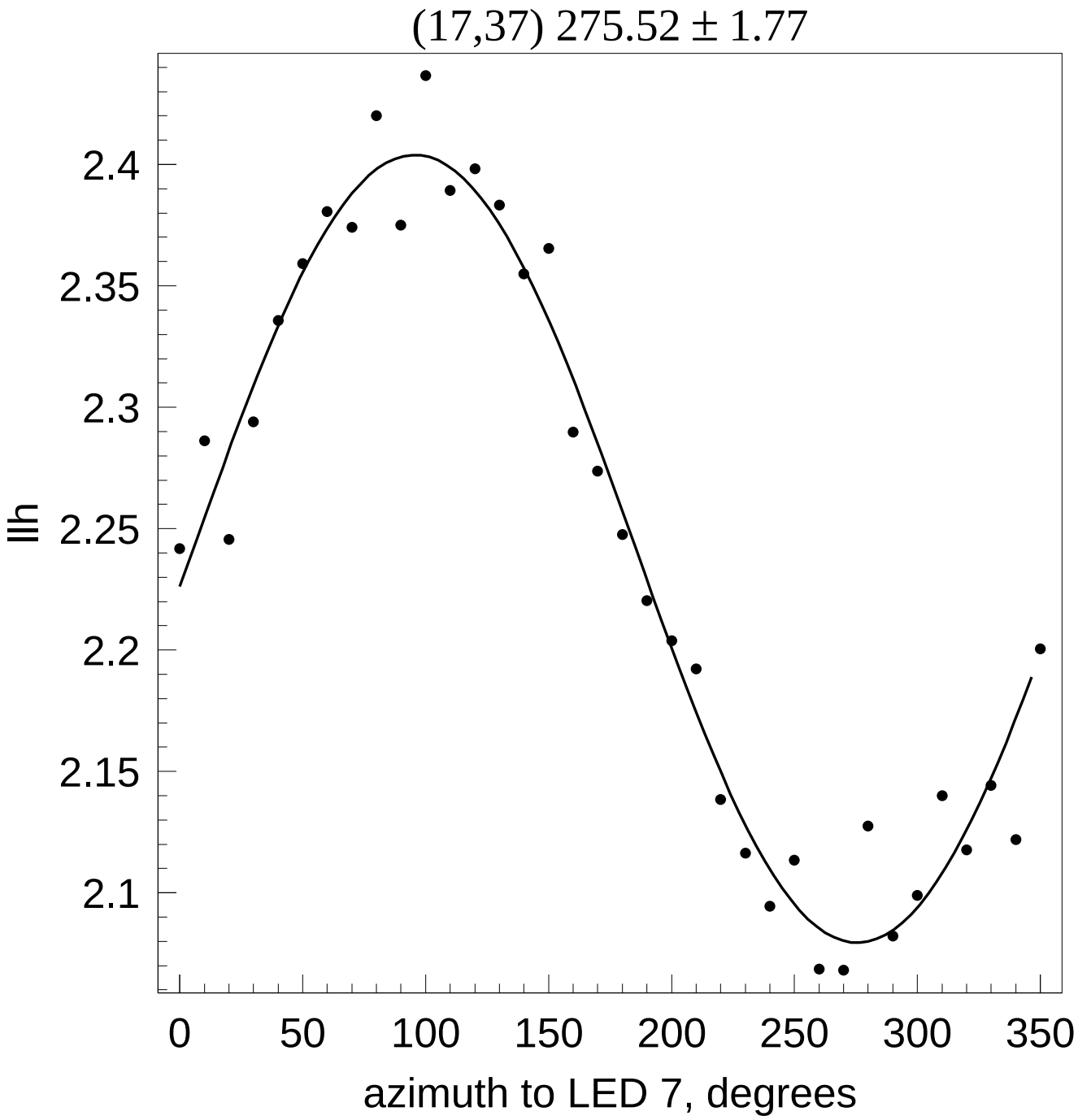

(17,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
351.4 ± 1541.0
8
9
2
3
7
1
170
4
10
6
5
12
11

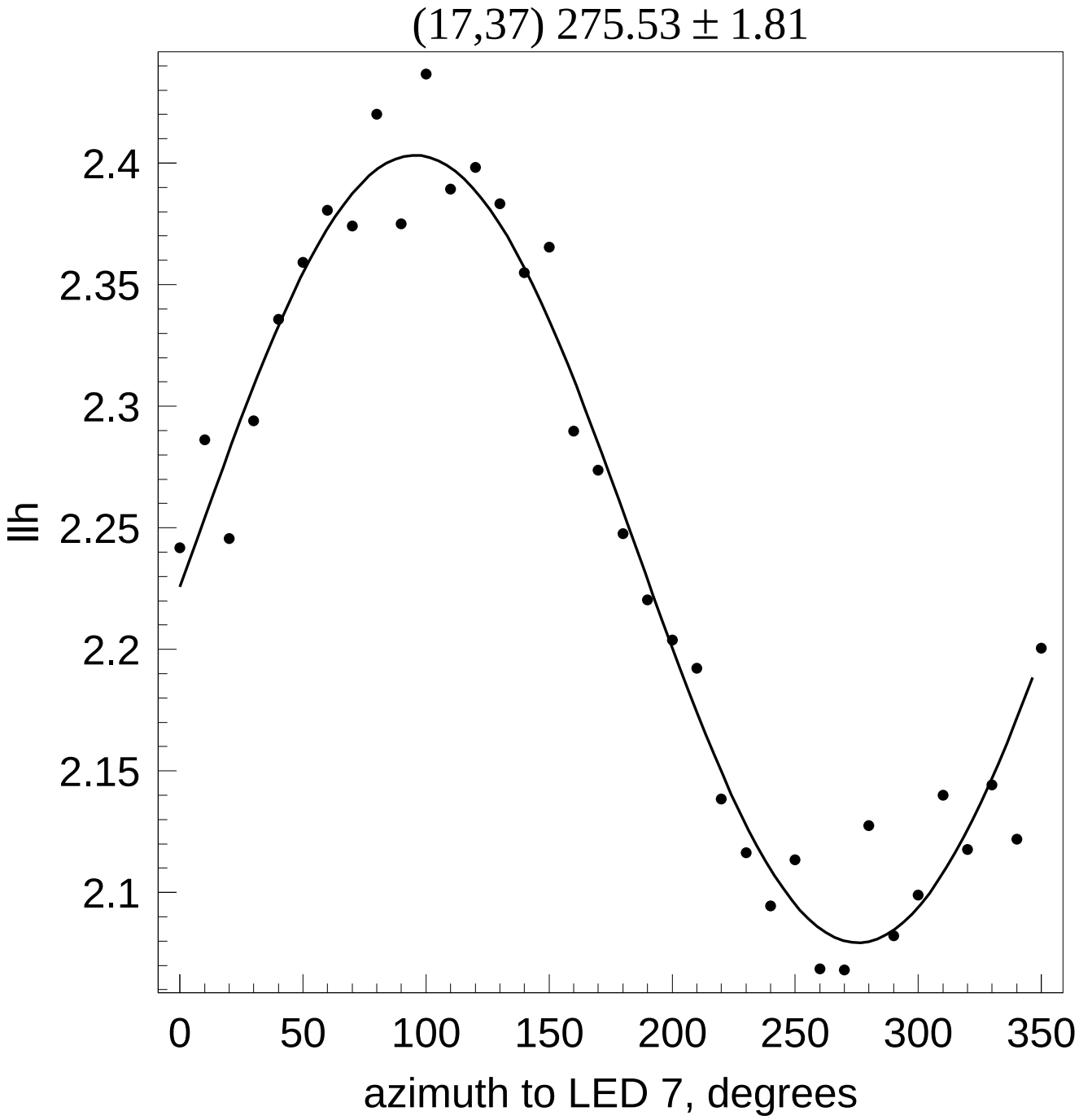

(17,36) 206.00 ± 58.69
3.7
3.68
3.66
3.64
3.62
3.6
3.58
3.56
3.54
3.52
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

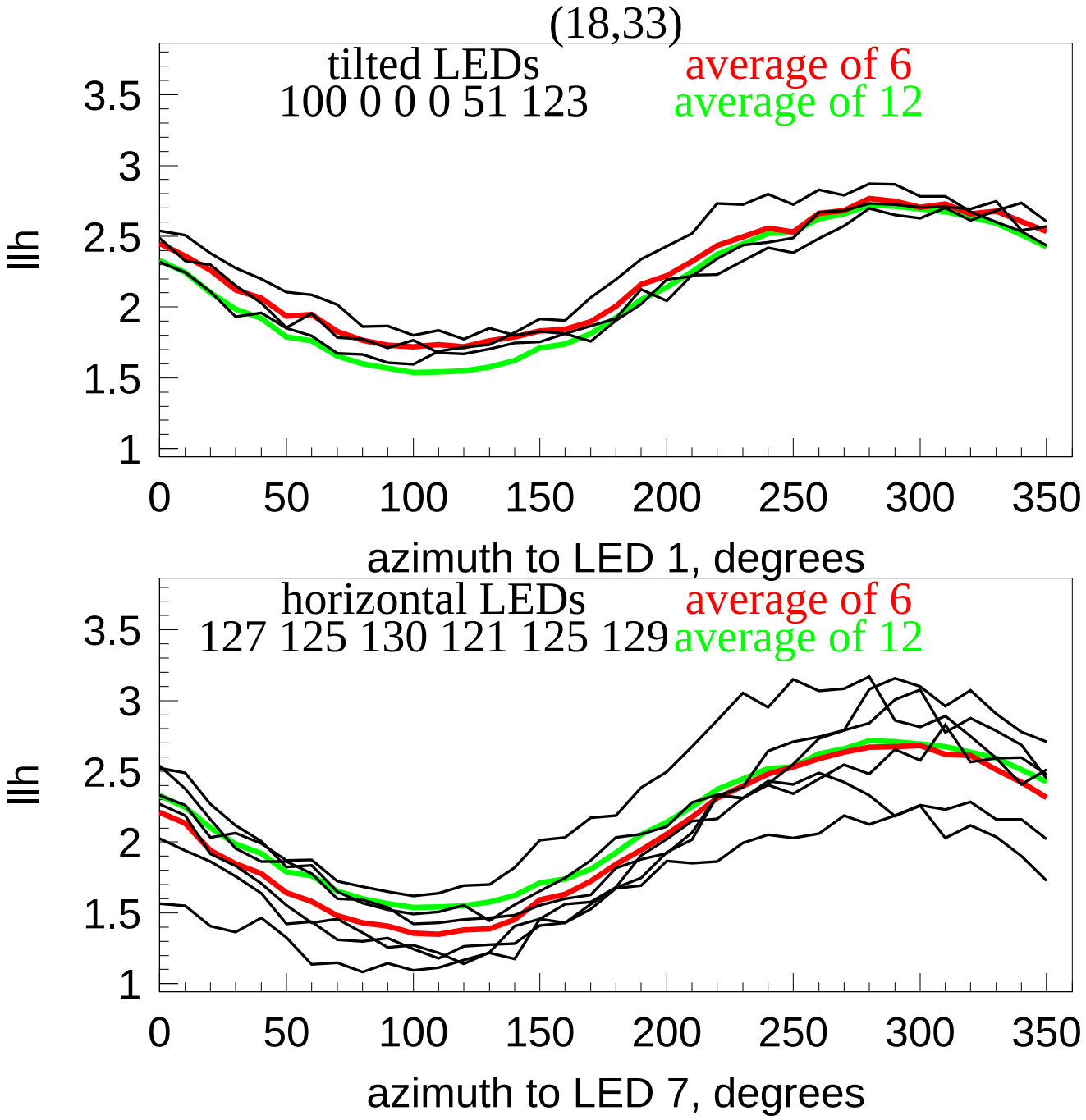

(17,36) 205.15 ± 91.60
3.7
3.68
3.66
3.64
3.62
3.6
3.58
3.56
3.54
3.52
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

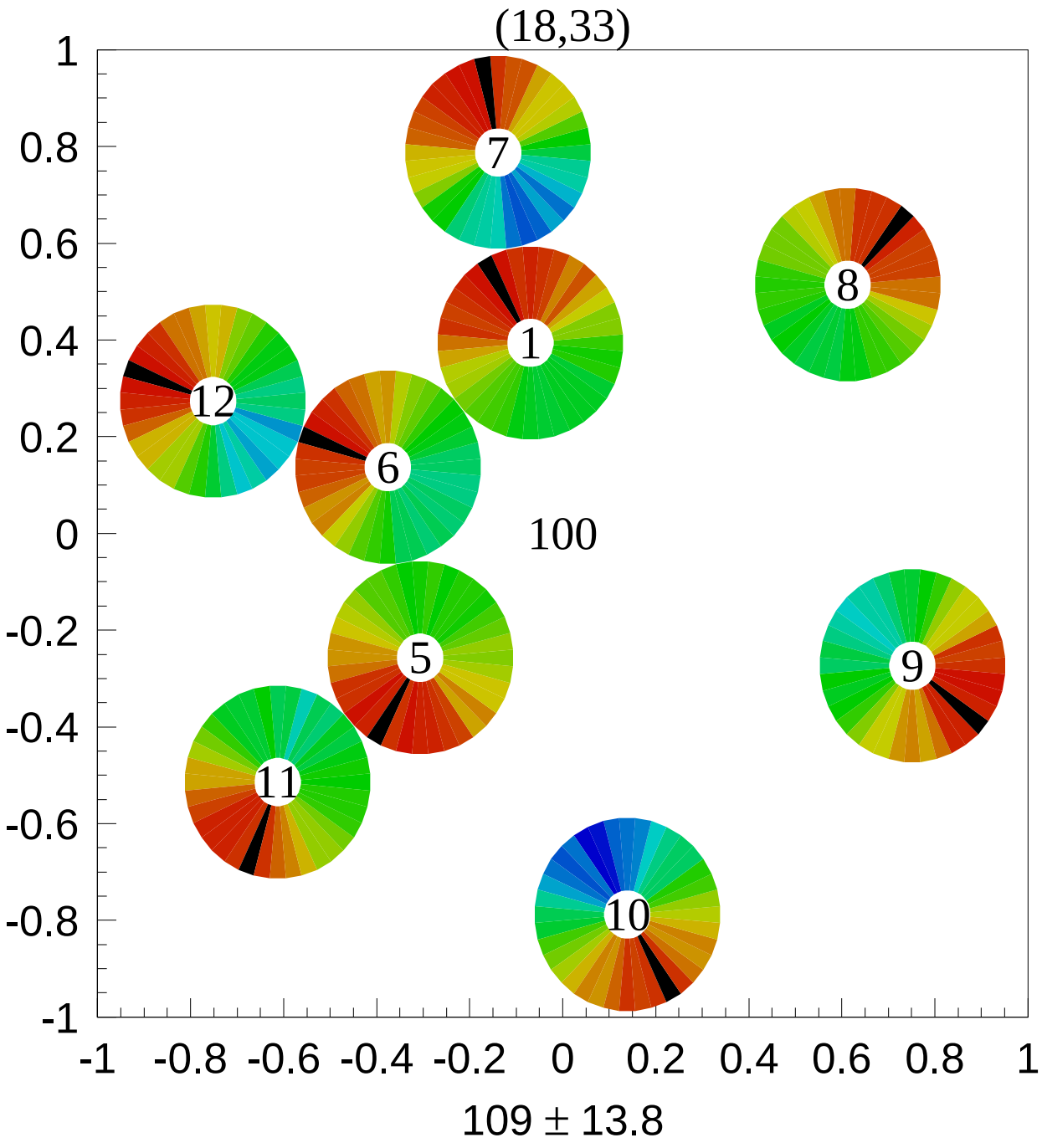

(17,37)
tilted LEDs
131 128 124 123 127 126
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 129 121 124 130 121
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

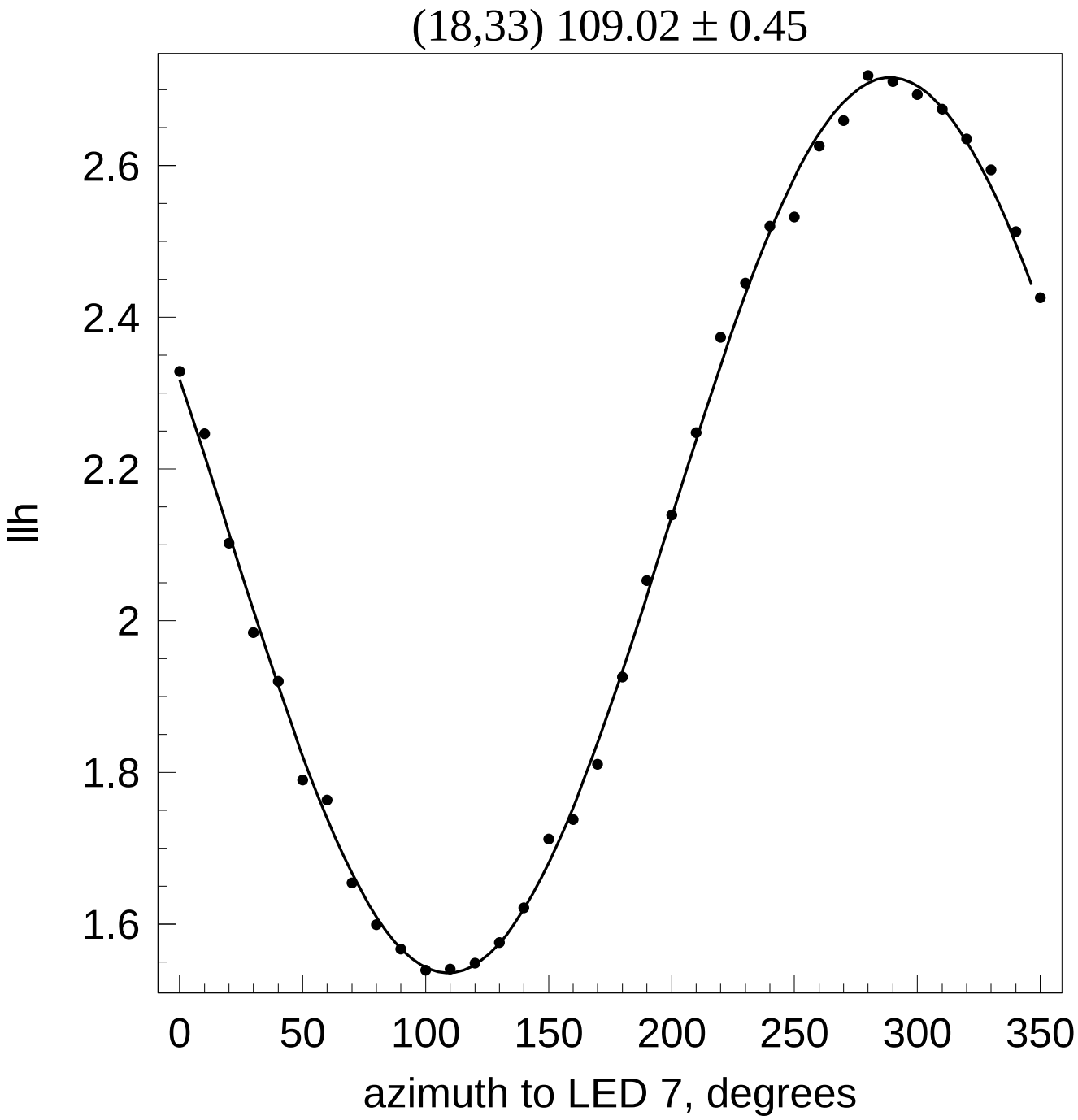

(17,37)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
272 ± 30.6

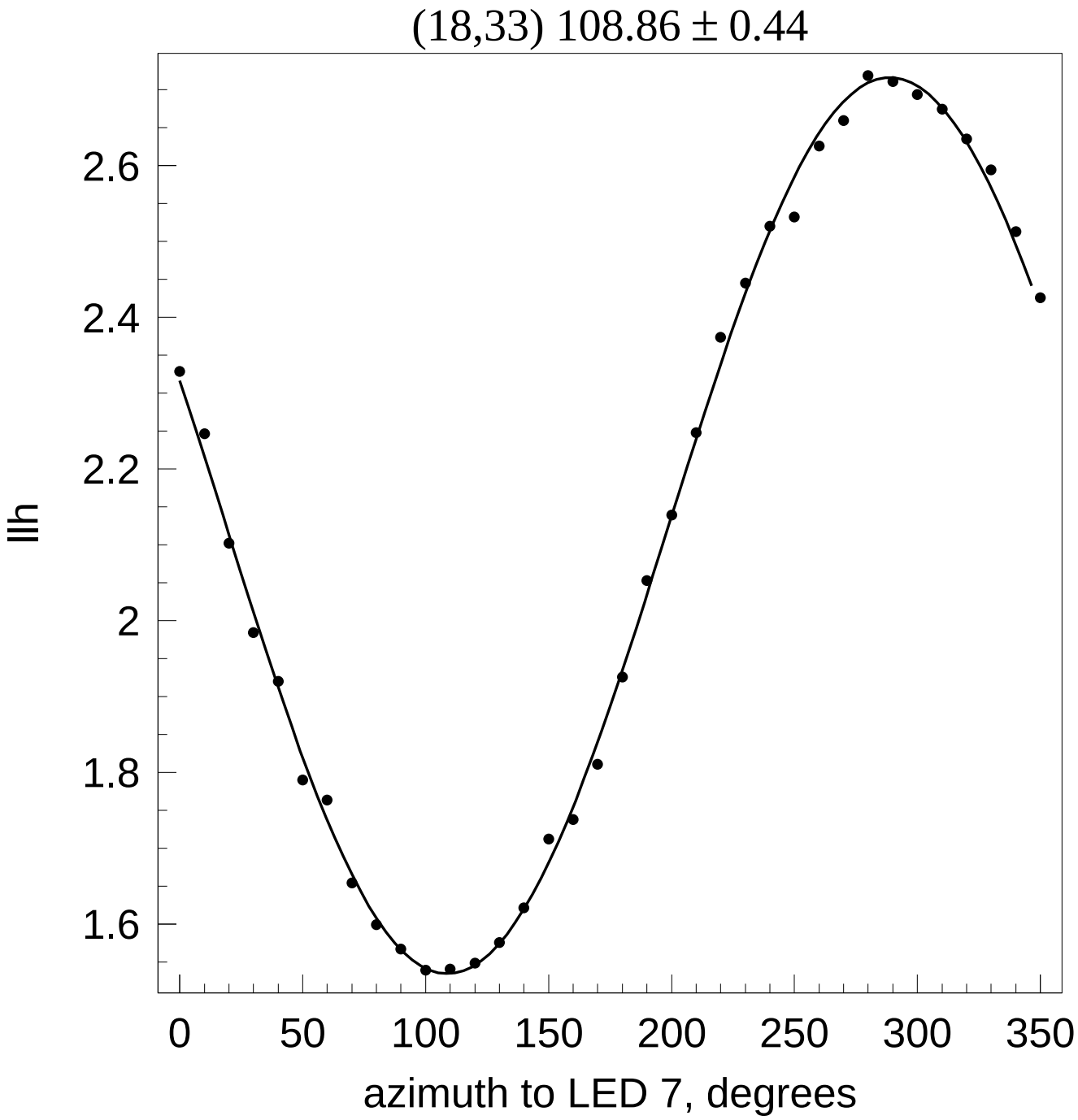

(17,37) 275.52 ± 1.77
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

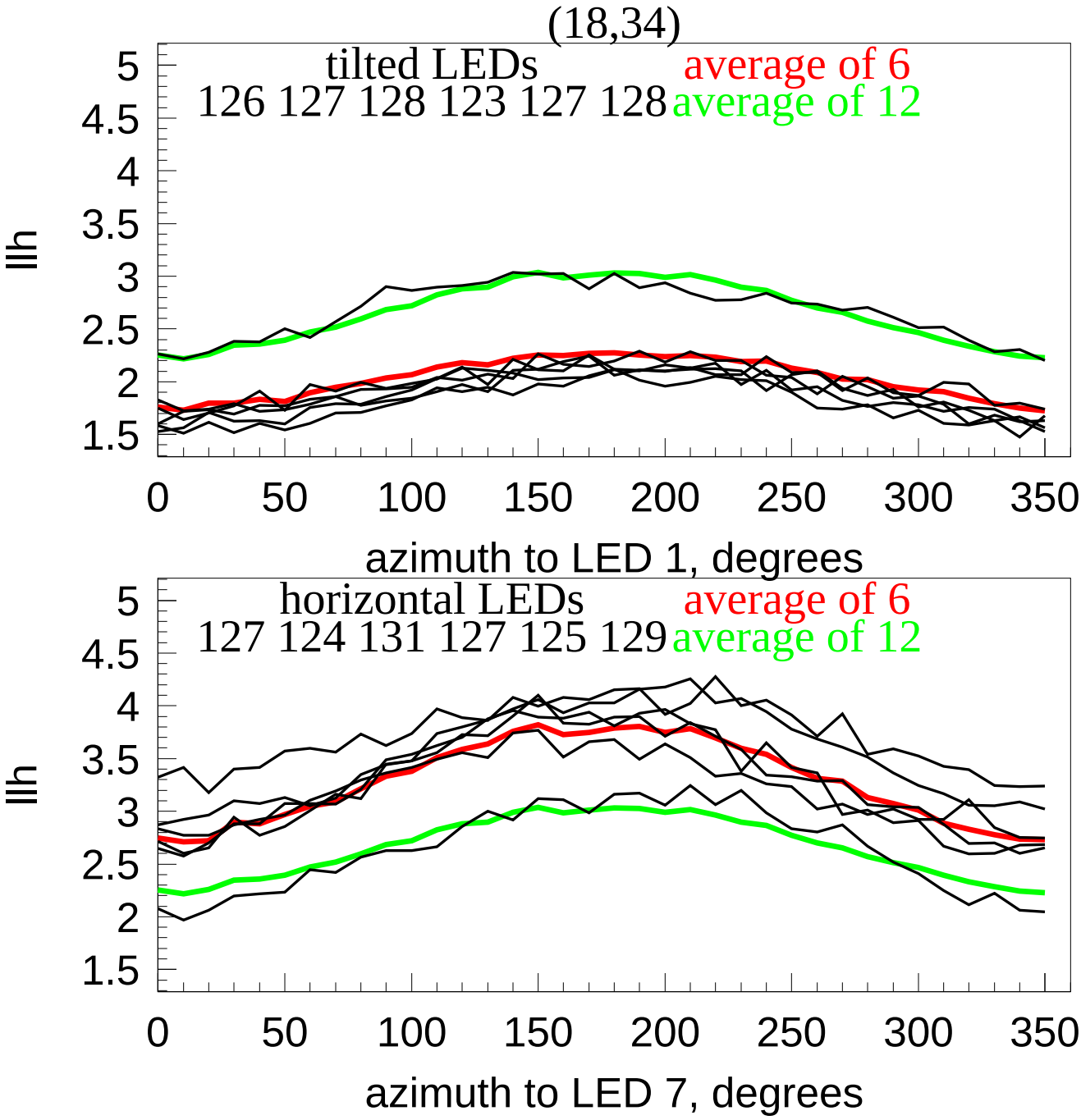

(17,37) 275.53 ± 1.81
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

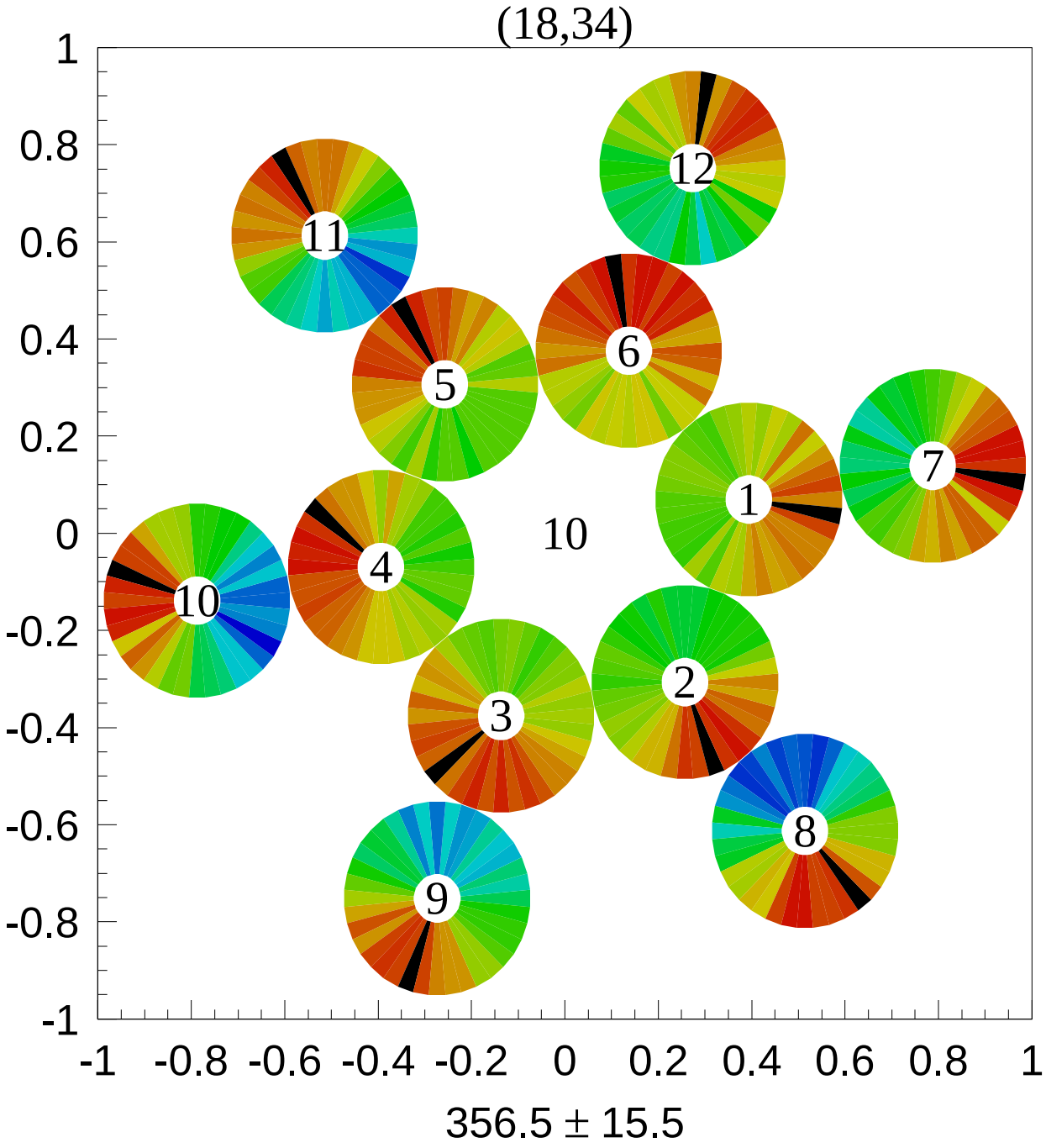

(18,33)
tilted LEDs
100 0 0 0 51 123
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 125 130 121 125 129
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

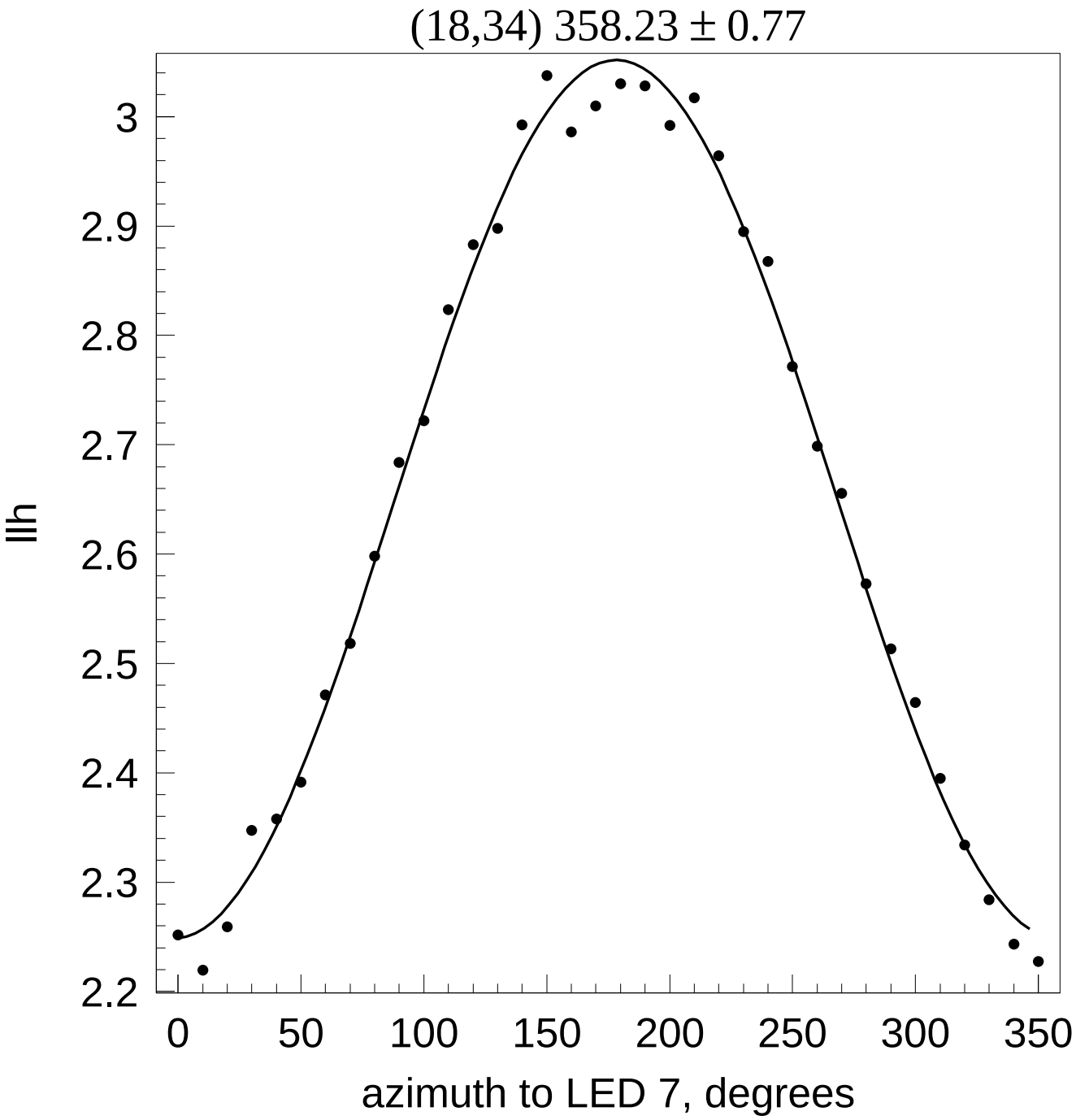

(18,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
12
6
100
5
9
11
10
109 ± 13.8

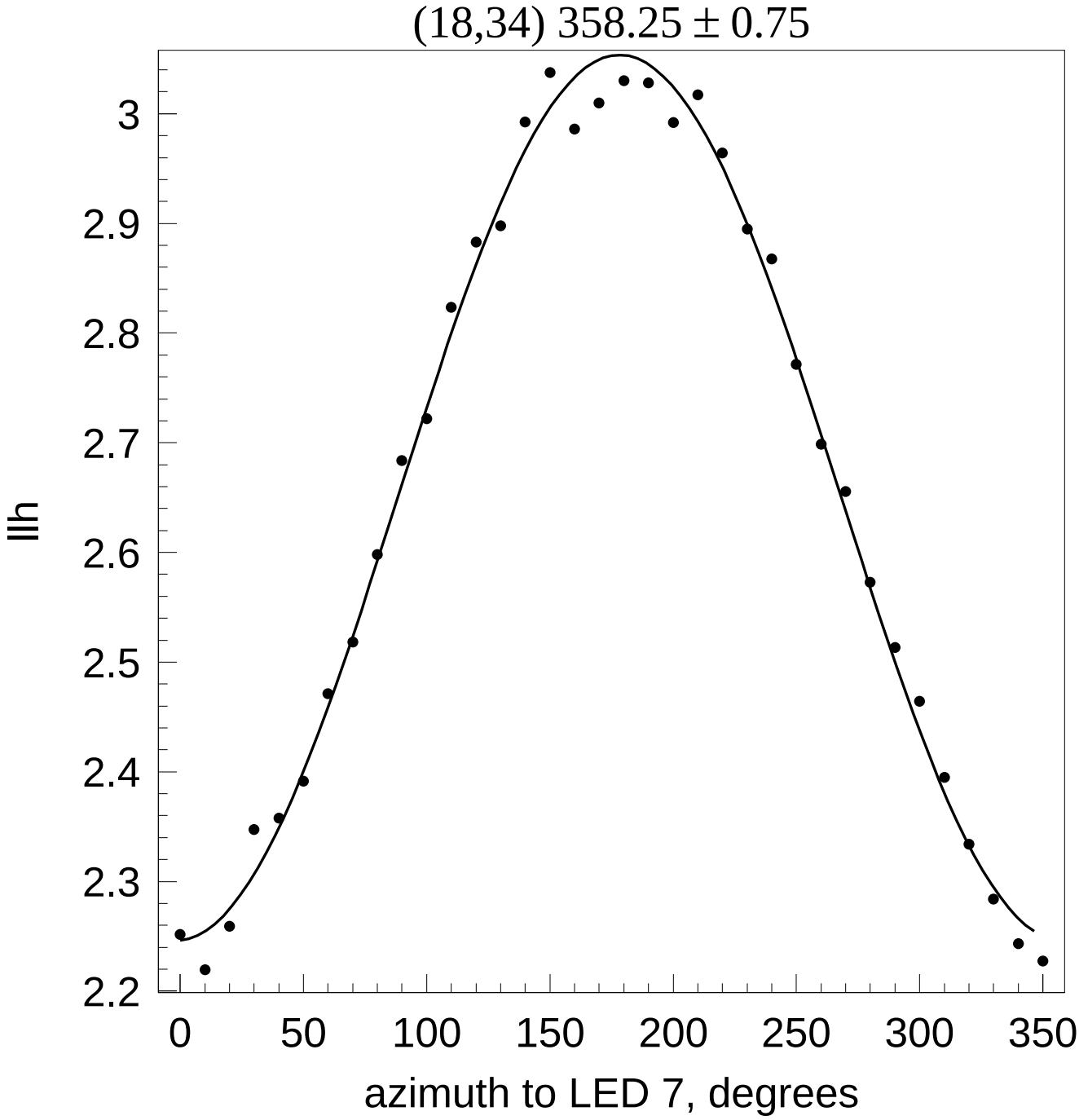

(18,33) 109.02 ± 0.45
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

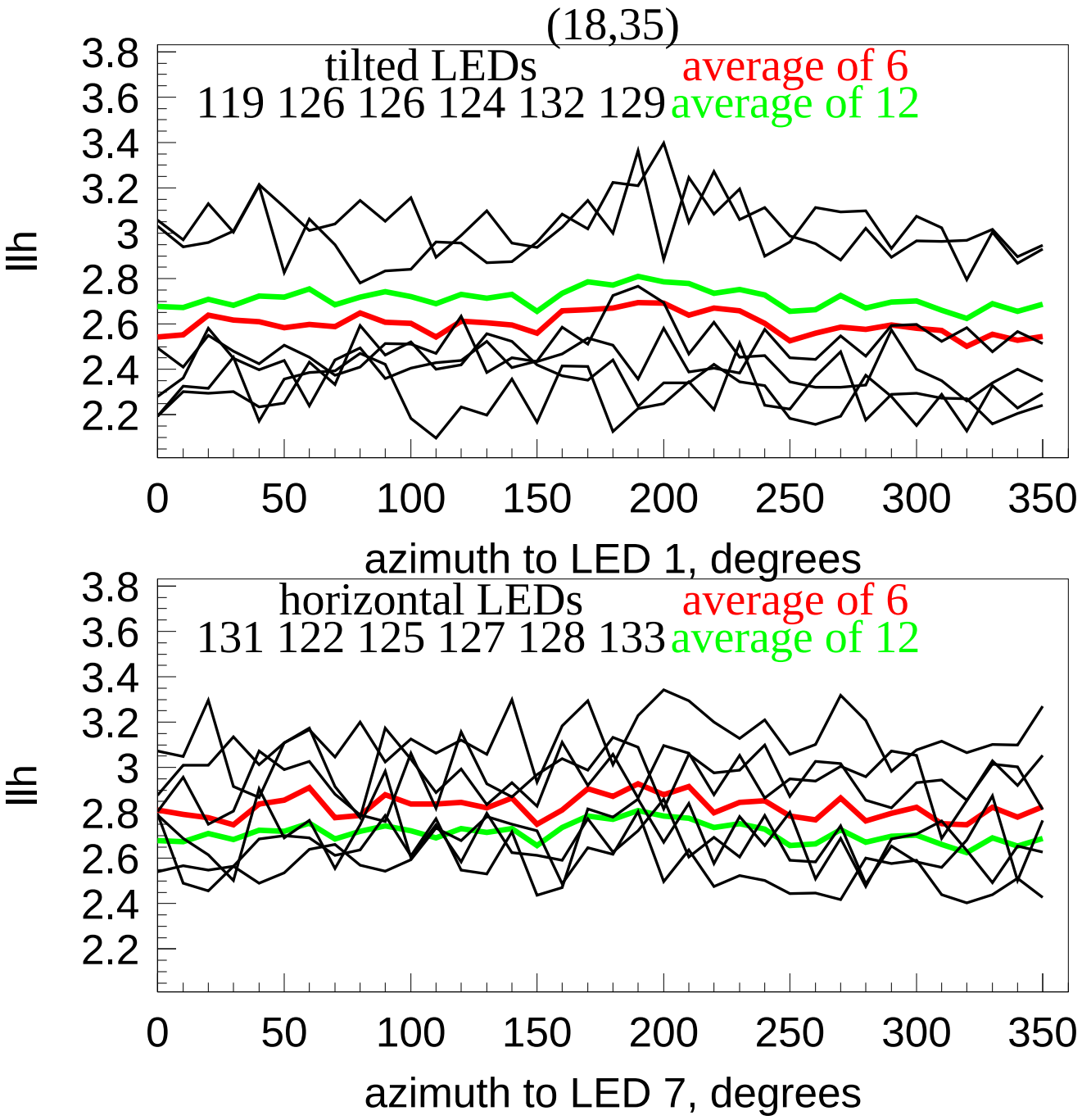

(18,33) 108.86 ± 0.44
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

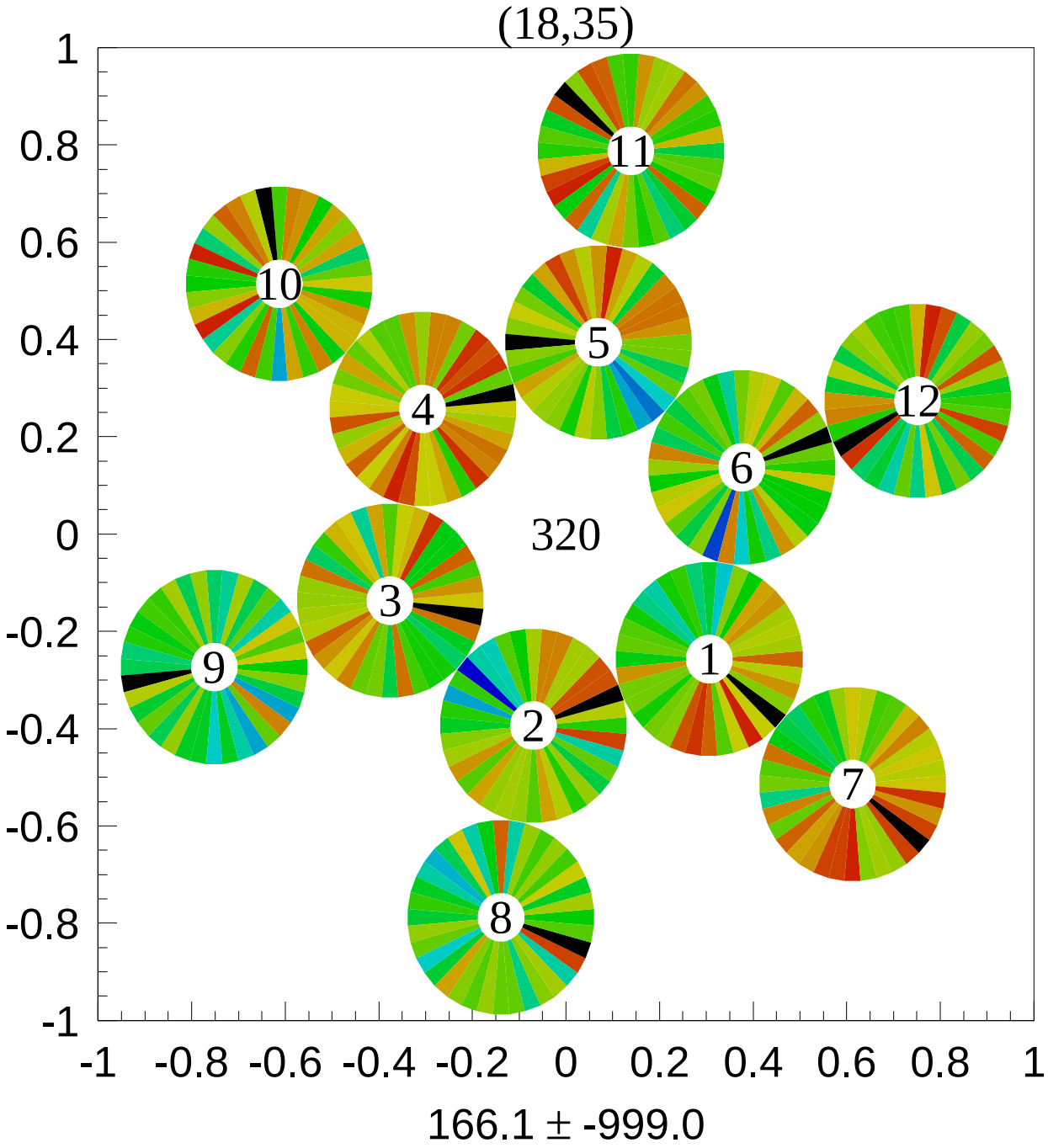

(18,34)
tilted LEDs
126 127 128 123 127 128
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 124 131 127 125 129
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

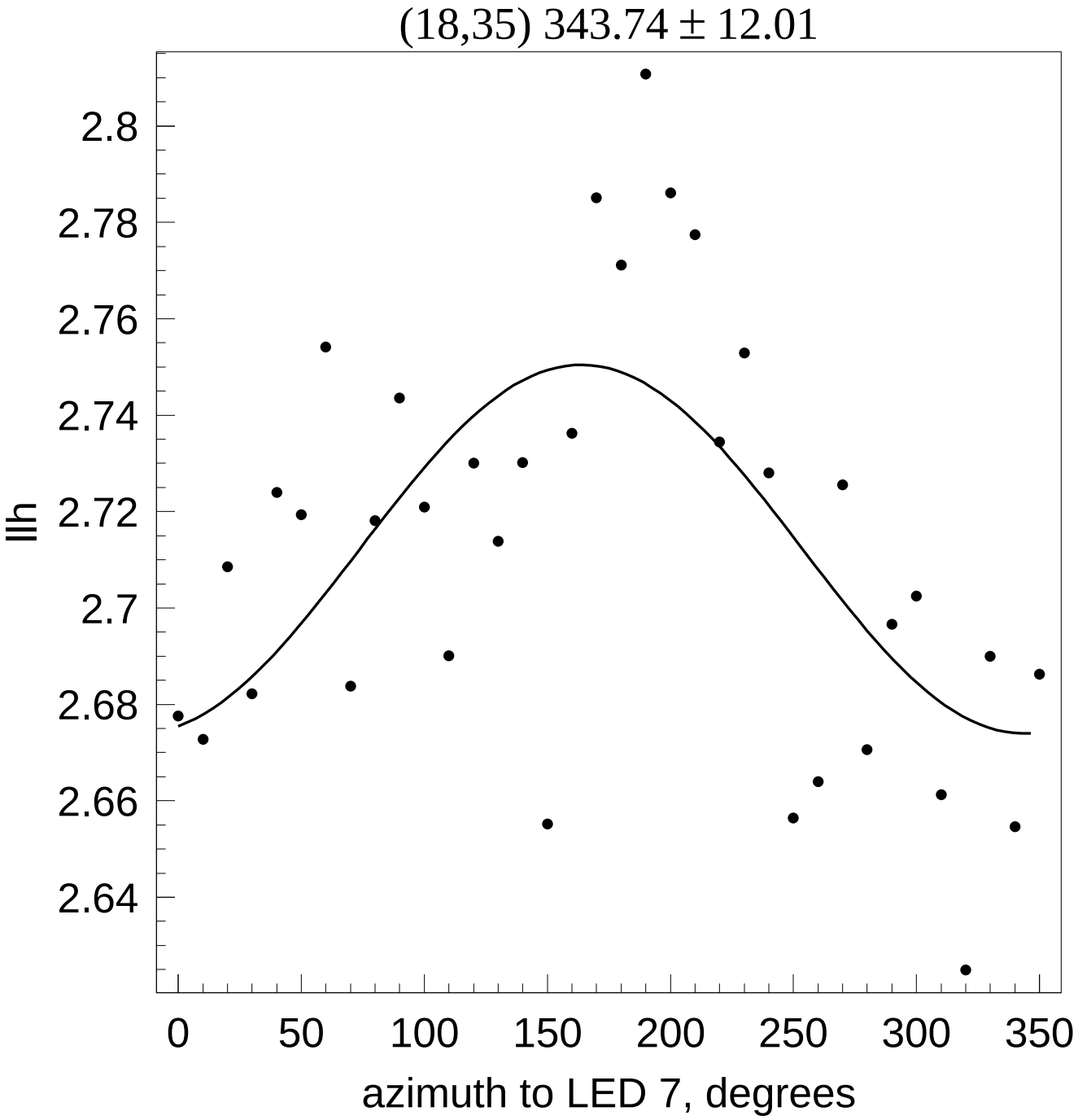

(18,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
356.5 ± 15.5
12
11
6
5
7
1
10
4
10
2
3
8
9

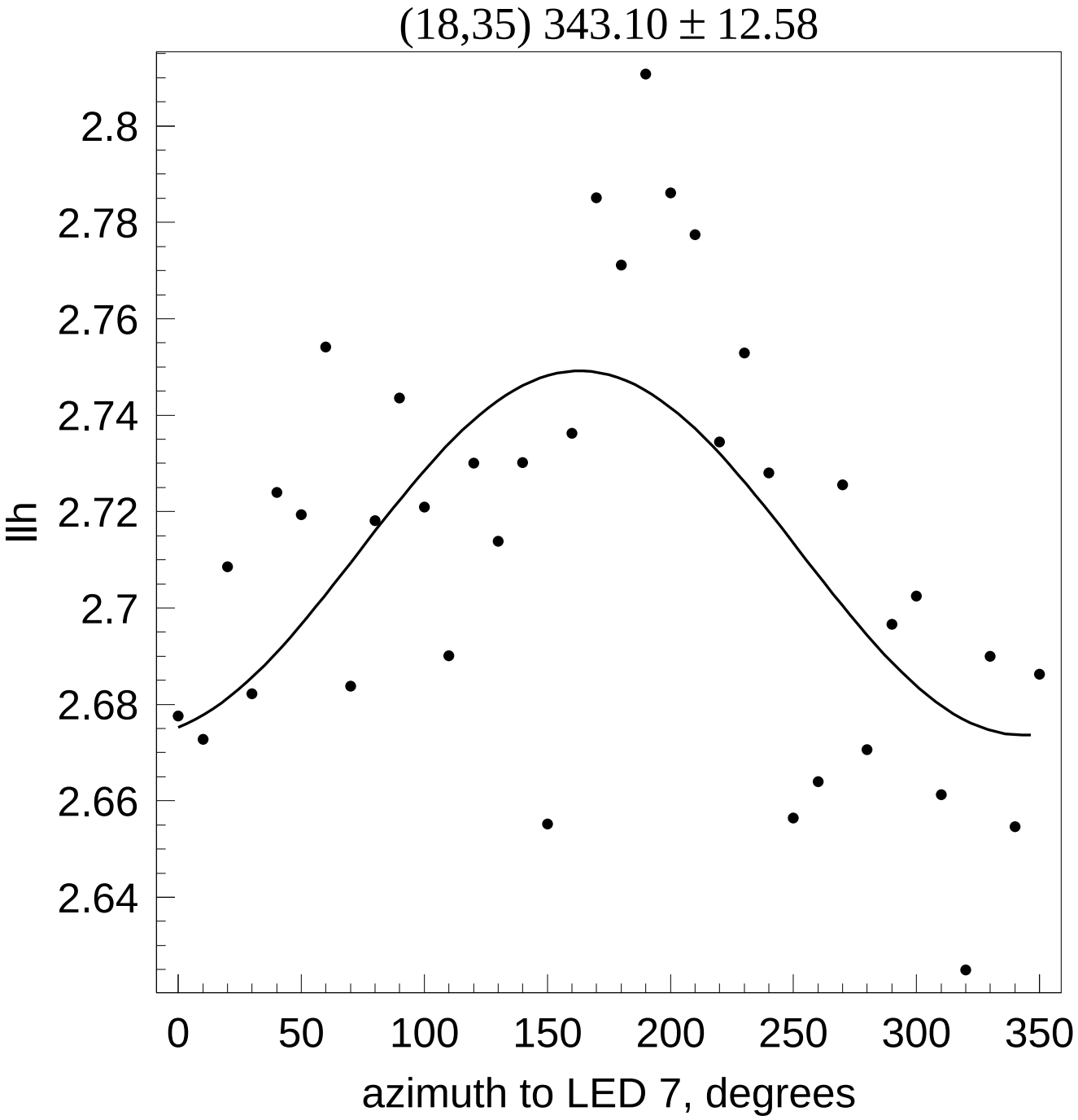

(18,34) 358.23 ± 0.77
llh
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

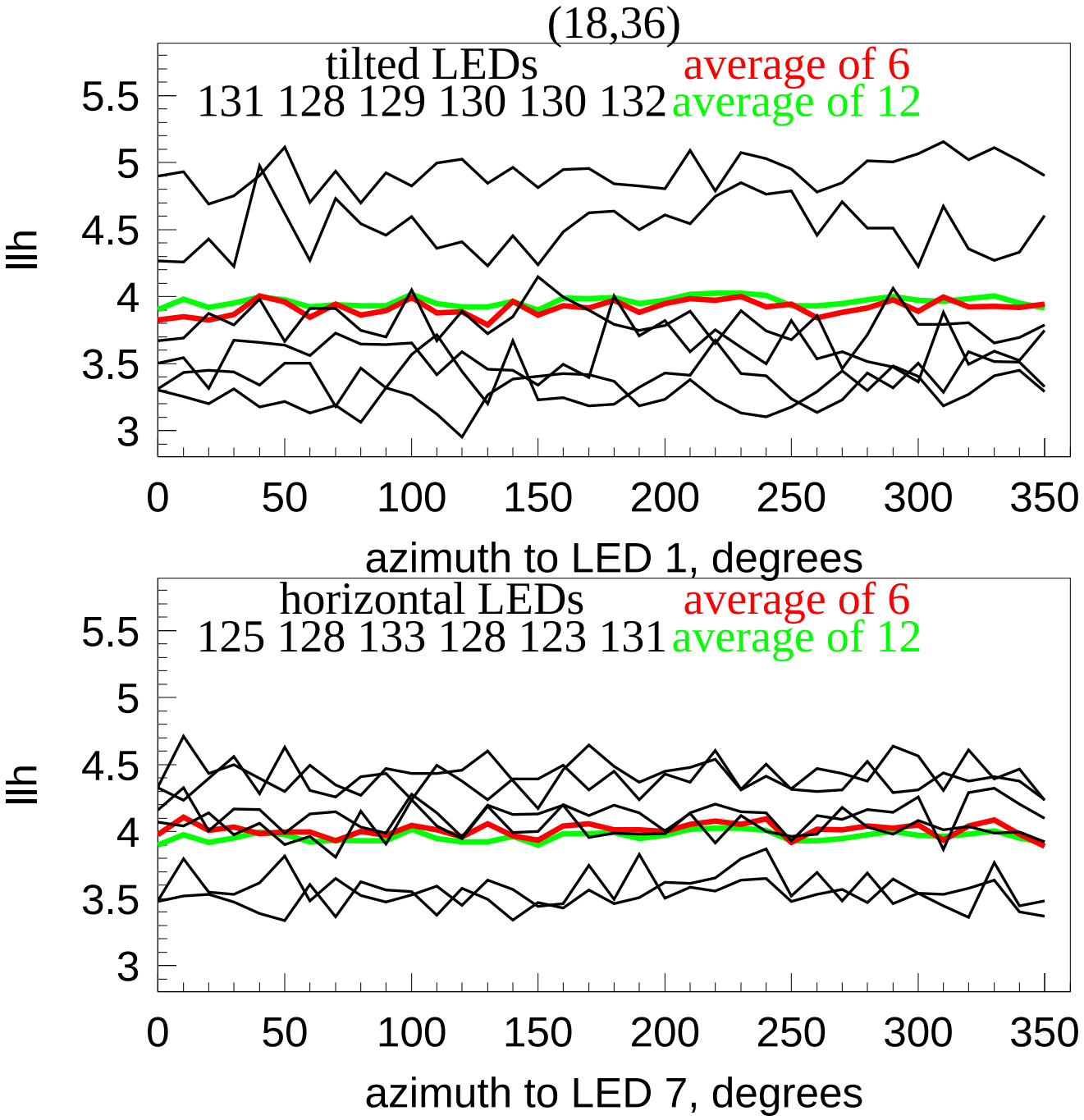

(18,34) 358.25 ± 0.75
llh
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

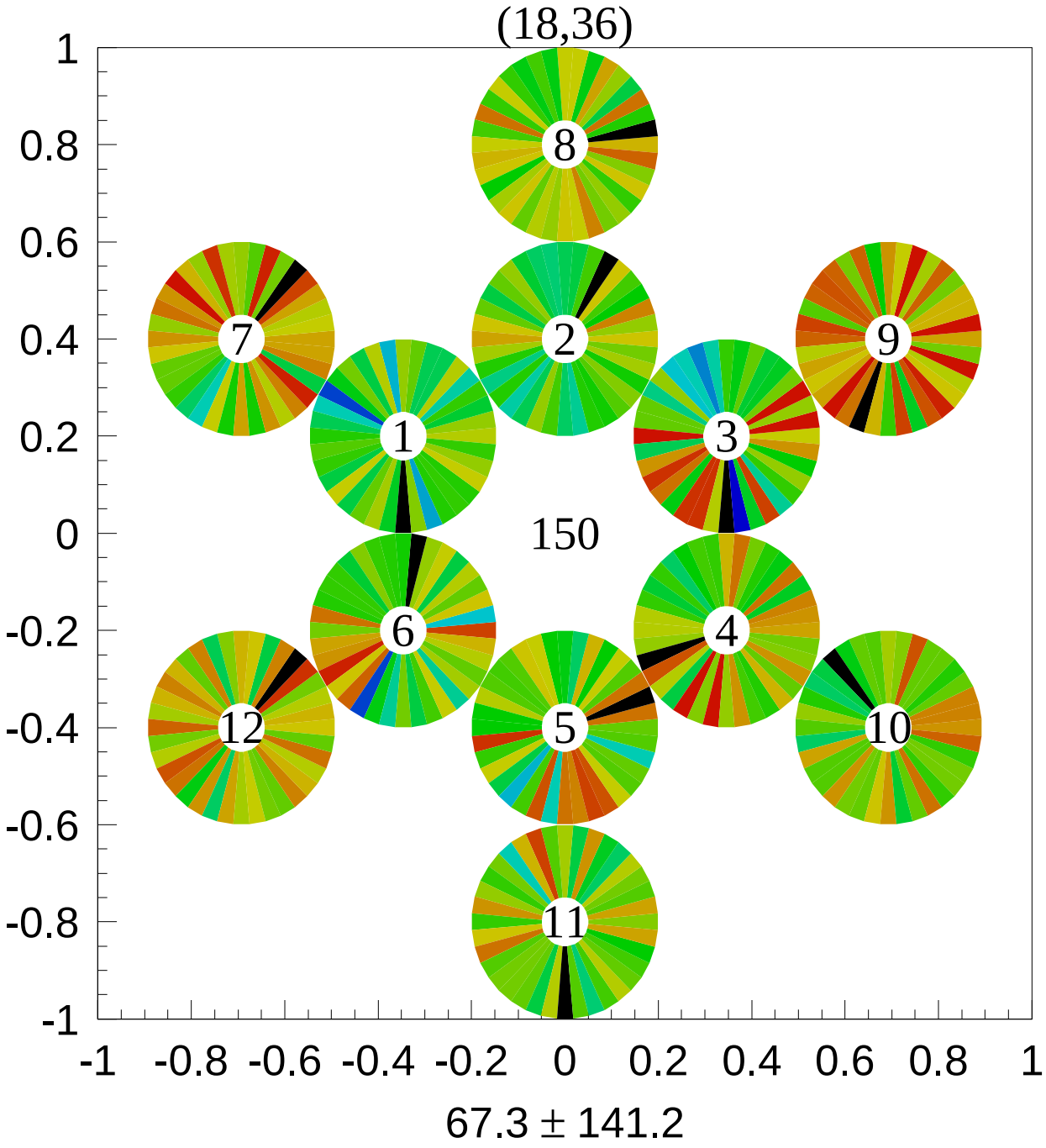

(18,35)
tilted LEDs
119 126 126 124 132 129
average of 6
average of 12
llh
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 122 125 127 128 133
average of 6
average of 12
llh
azimuth to LED 7, degrees

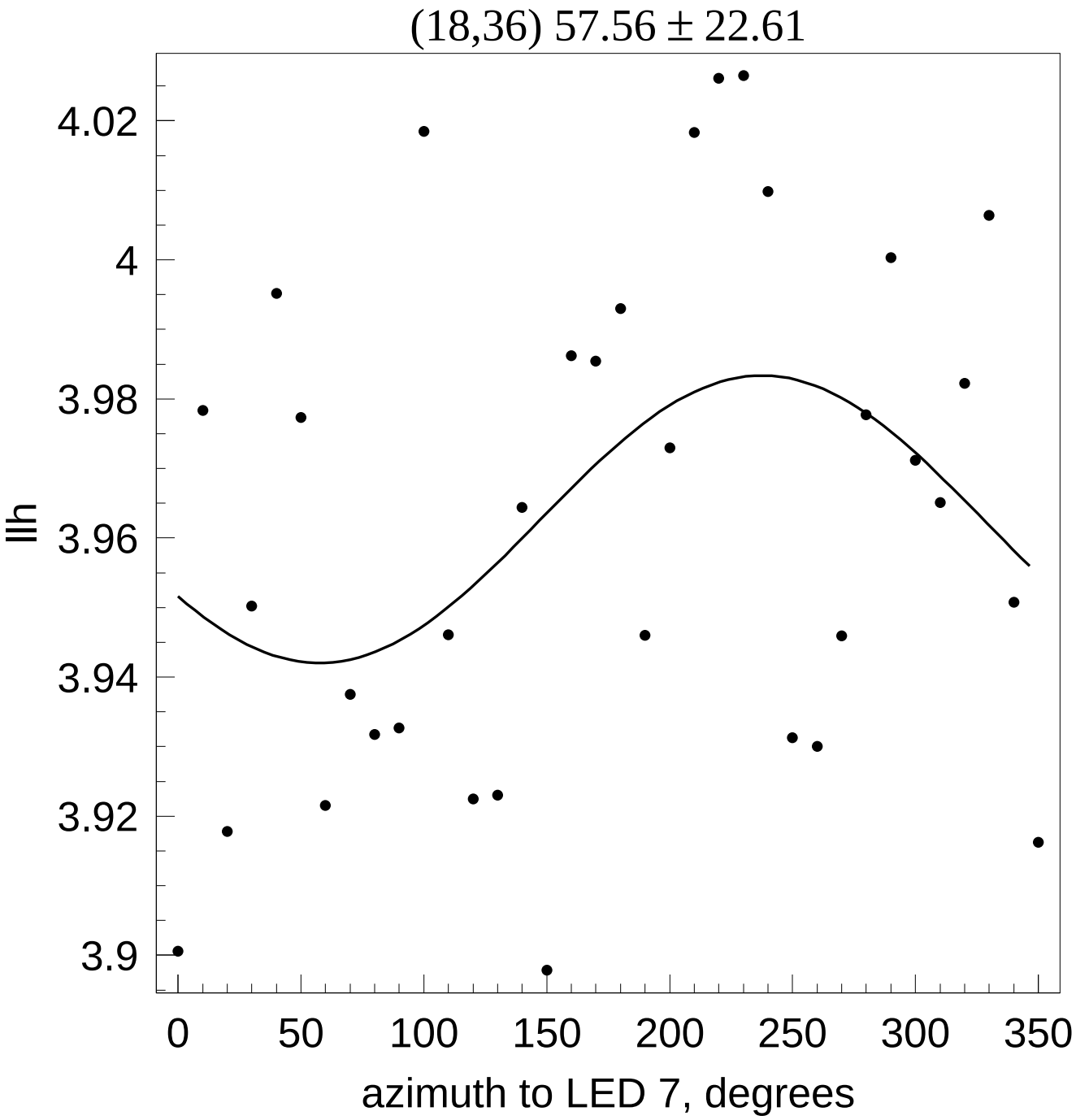

(18,35)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
166.1 ± -999.0

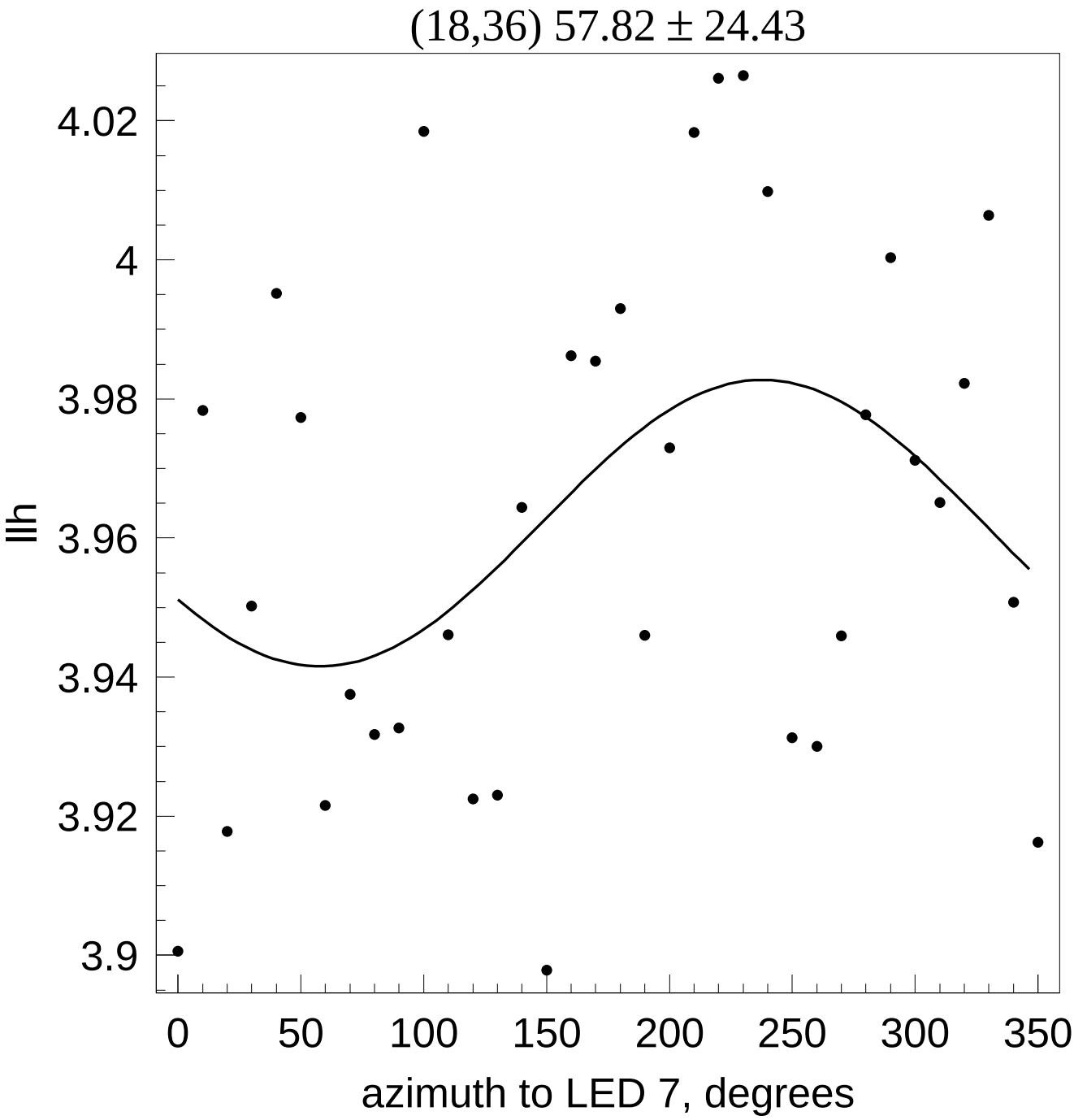

(18,35) 343.74 ± 12.01
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

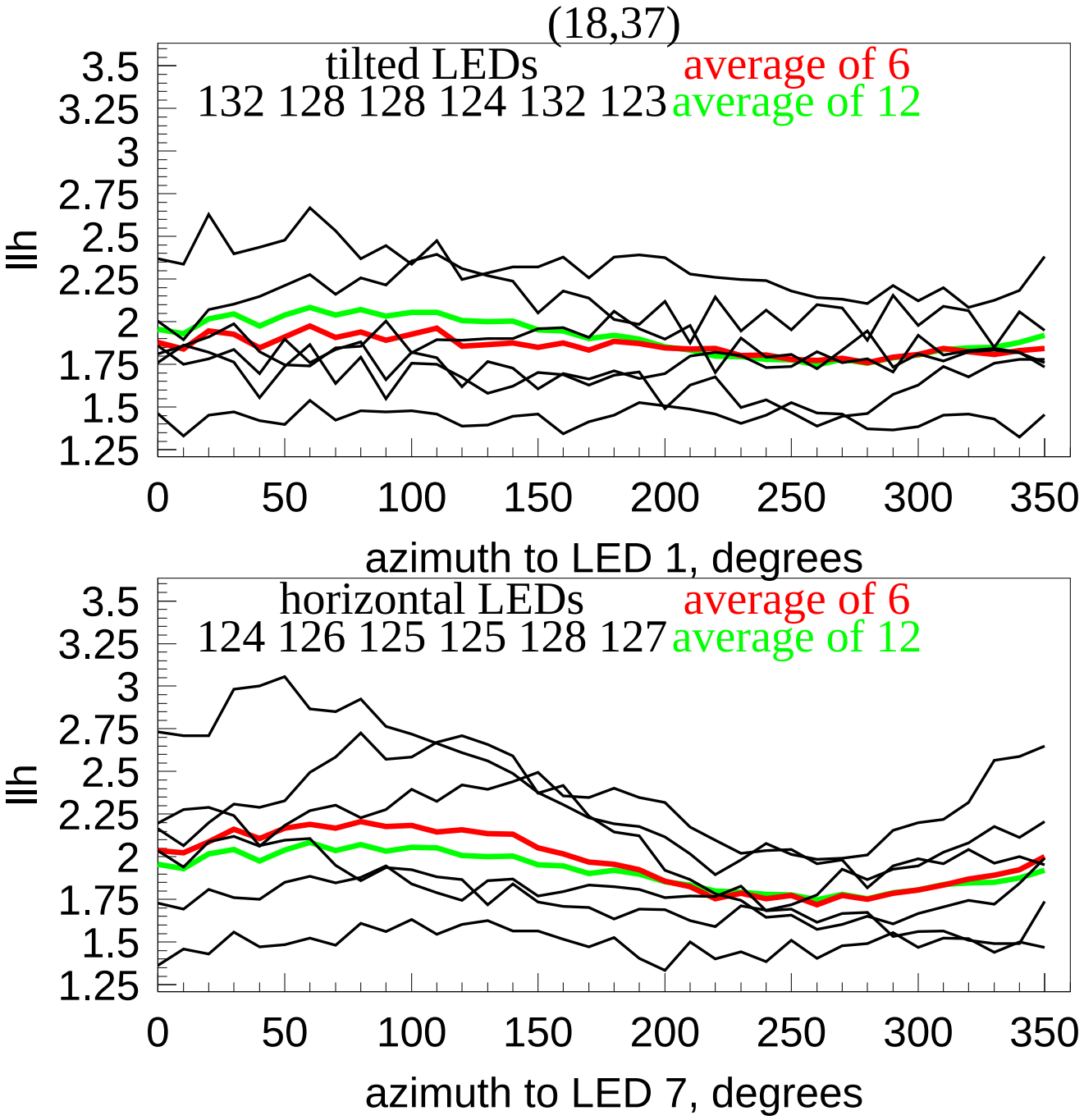

(18,35) 343.10 ± 12.58
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

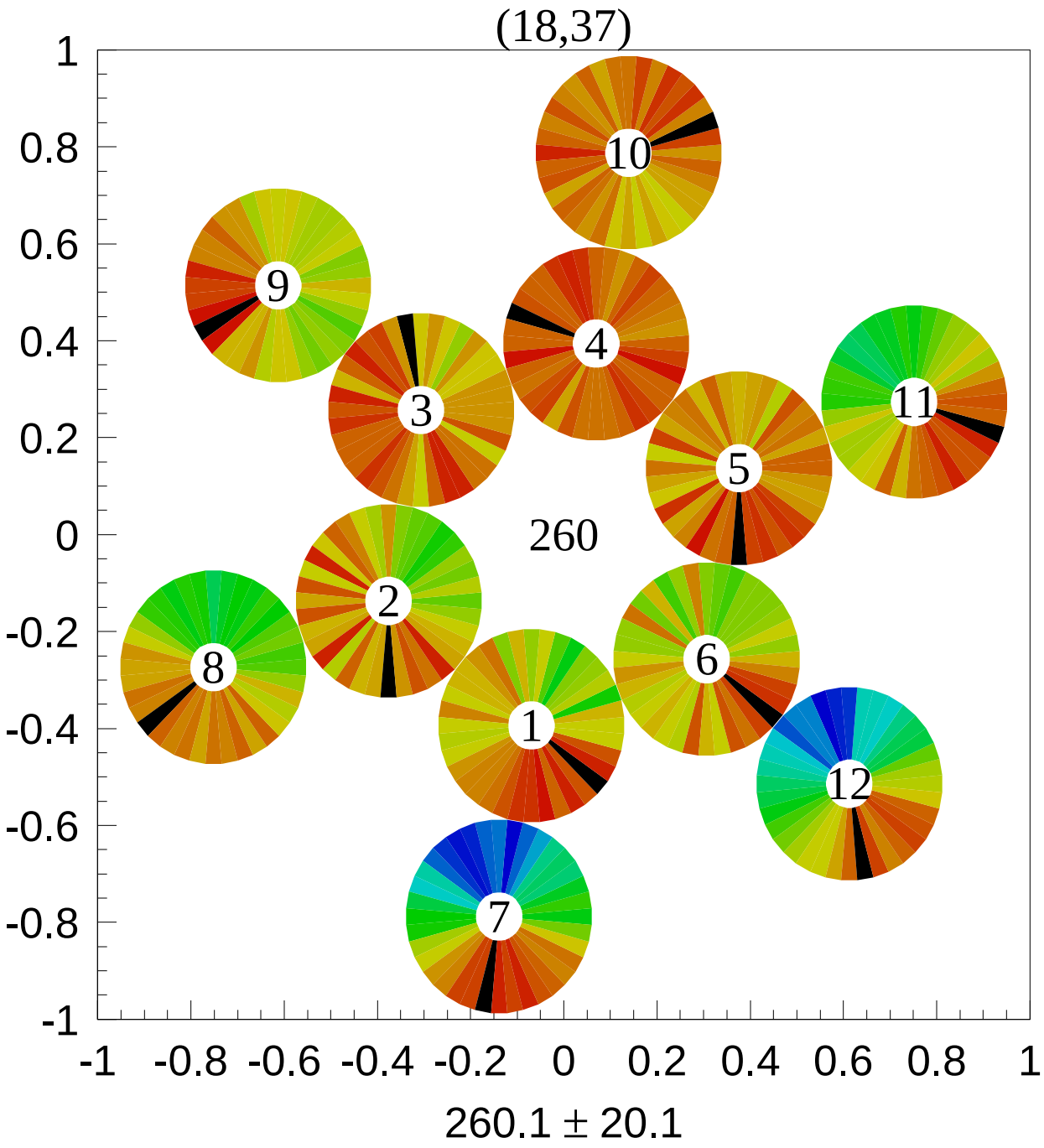

(18,36)
tilted LEDs
131 128 129 130 130 132
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 128 133 128 123 131
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

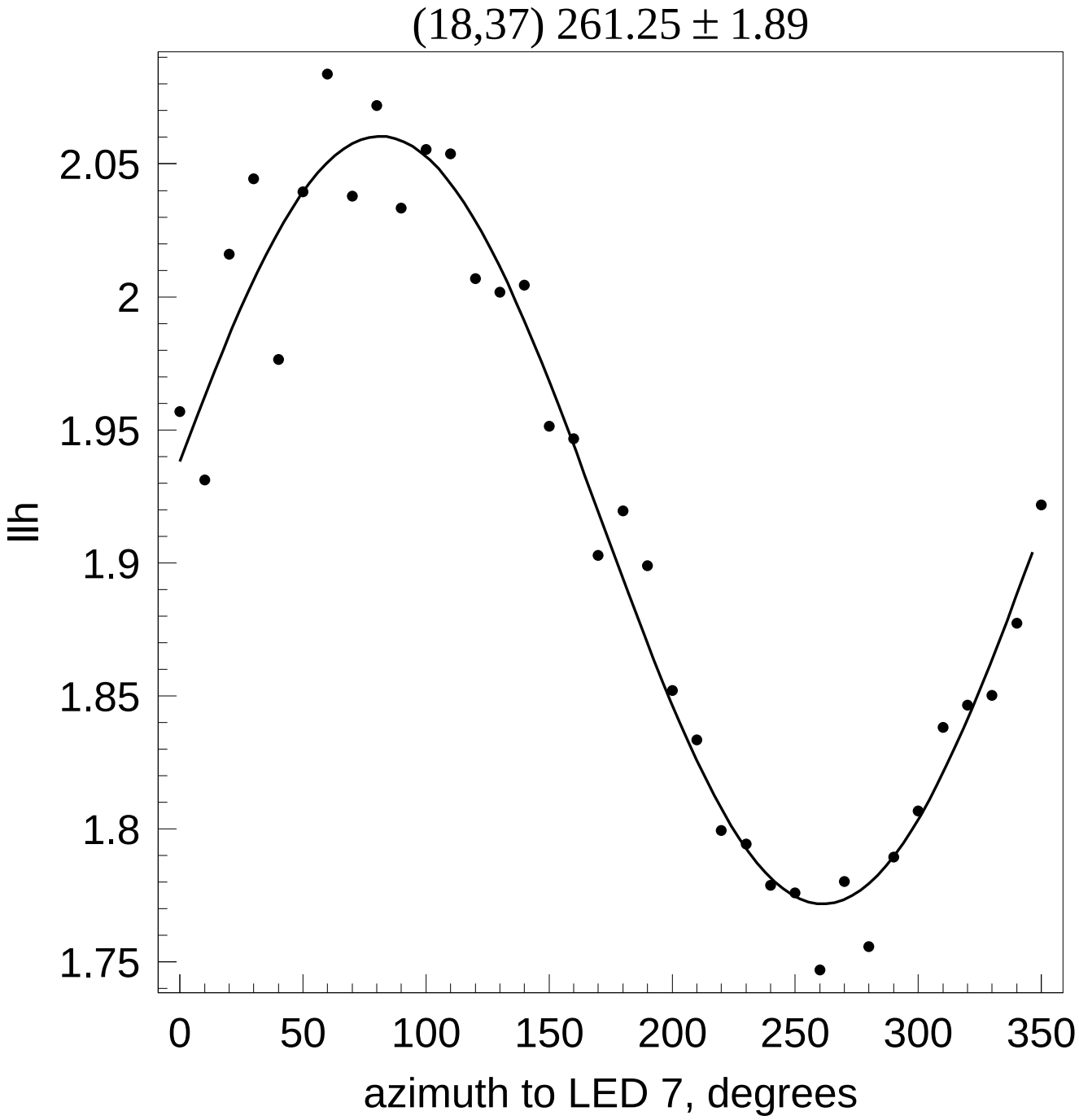

(18,36)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
67.3 ± 141.2

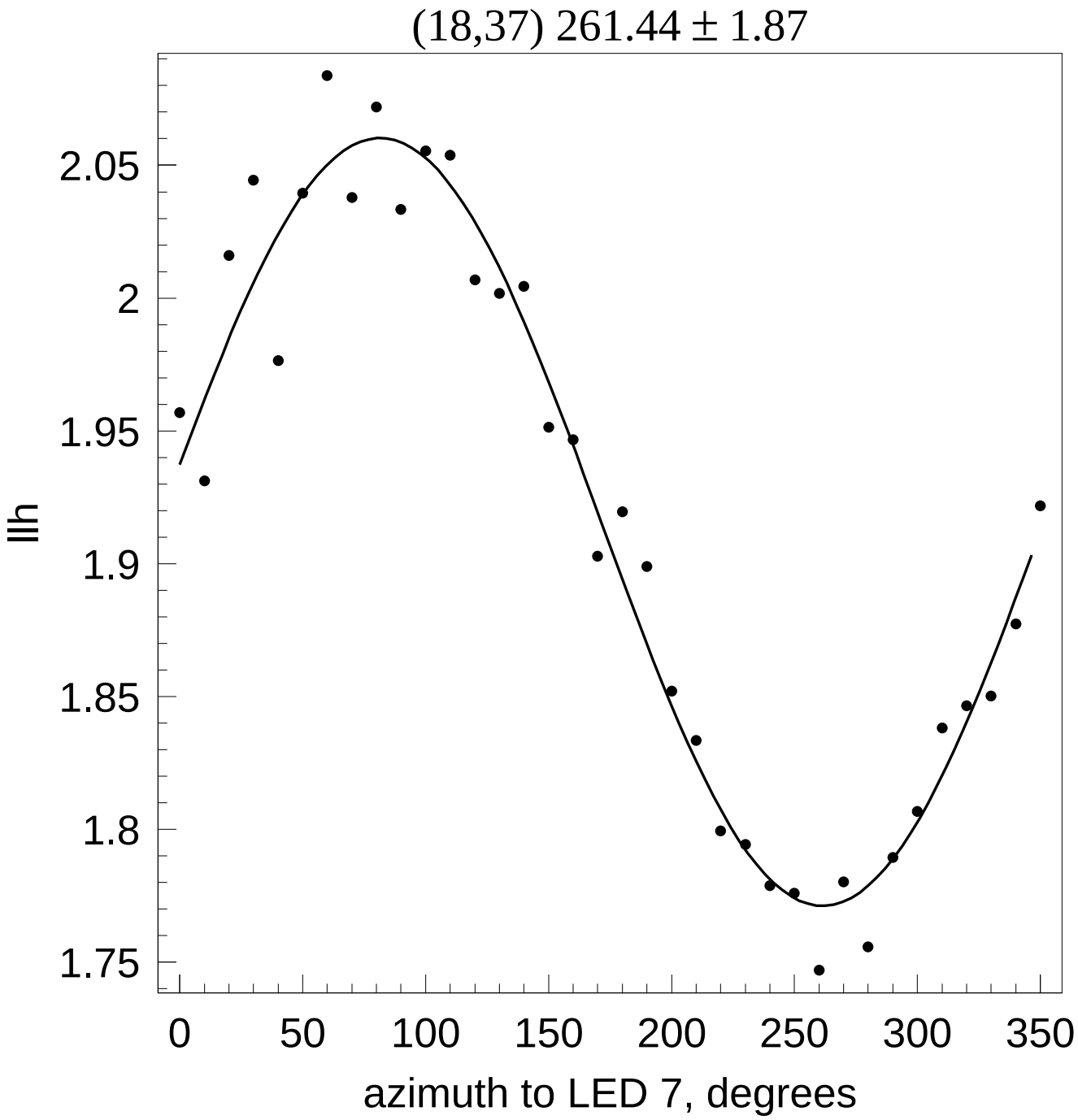

(18,36) 57.56 ± 22.61
4.02
4
3.98
3.96
3.94
3.92
3.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

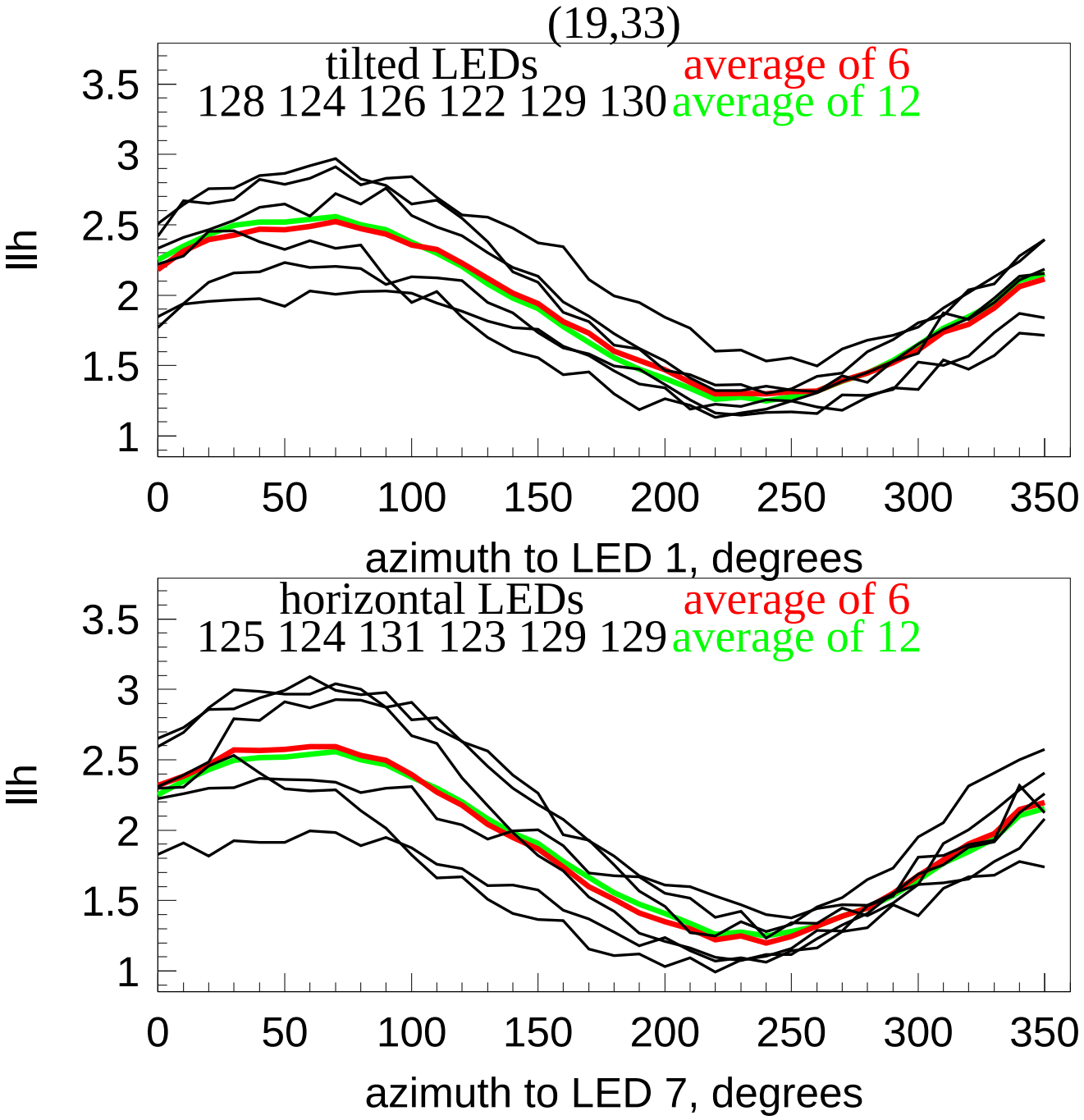

(18,36) 57.82 ± 24.43
4.02
4
3.98
3.96
3.94
3.92
3.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

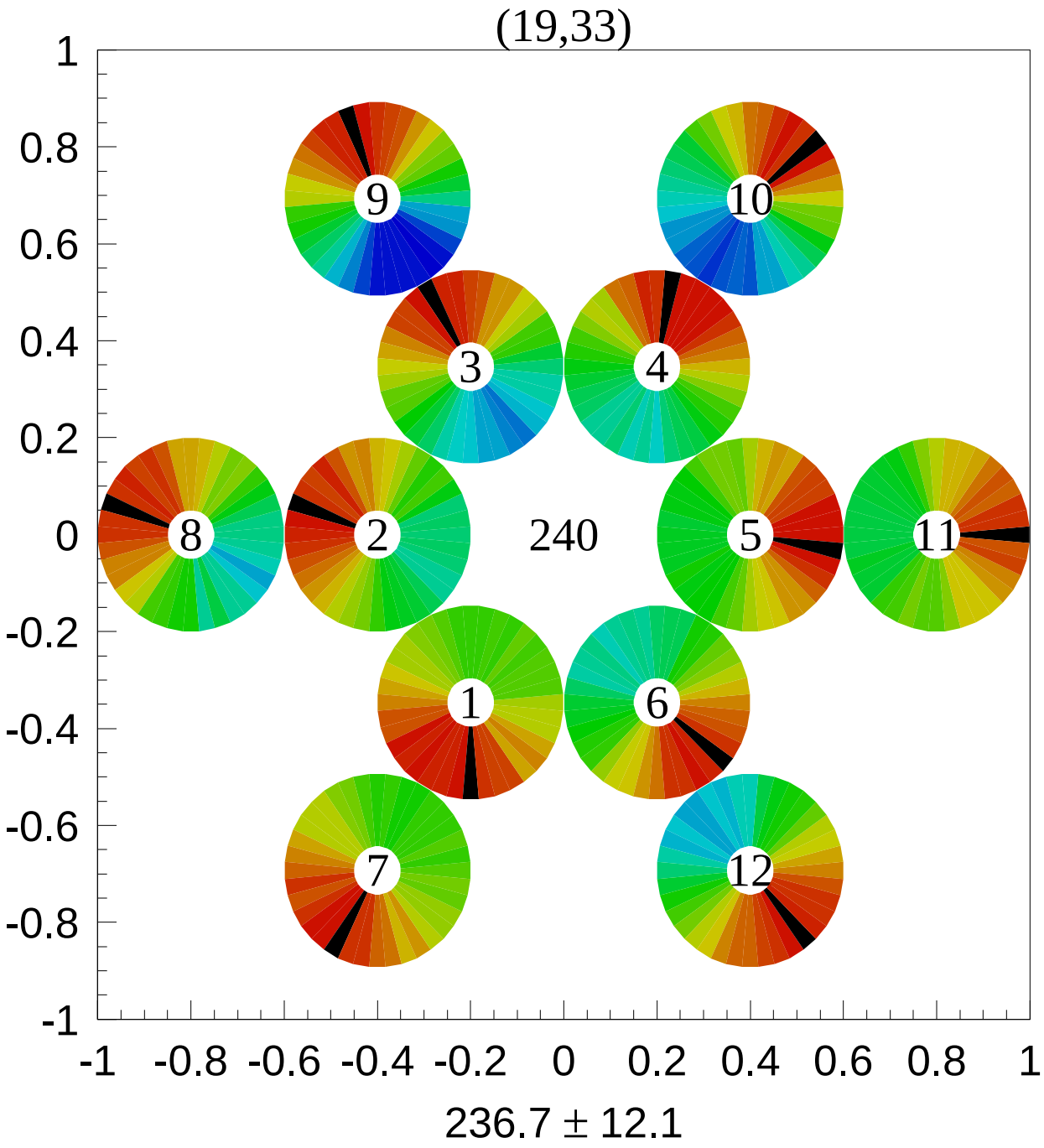

(18,37)
tilted LEDs
132 128 128 124 132 123
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 126 125 125 128 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

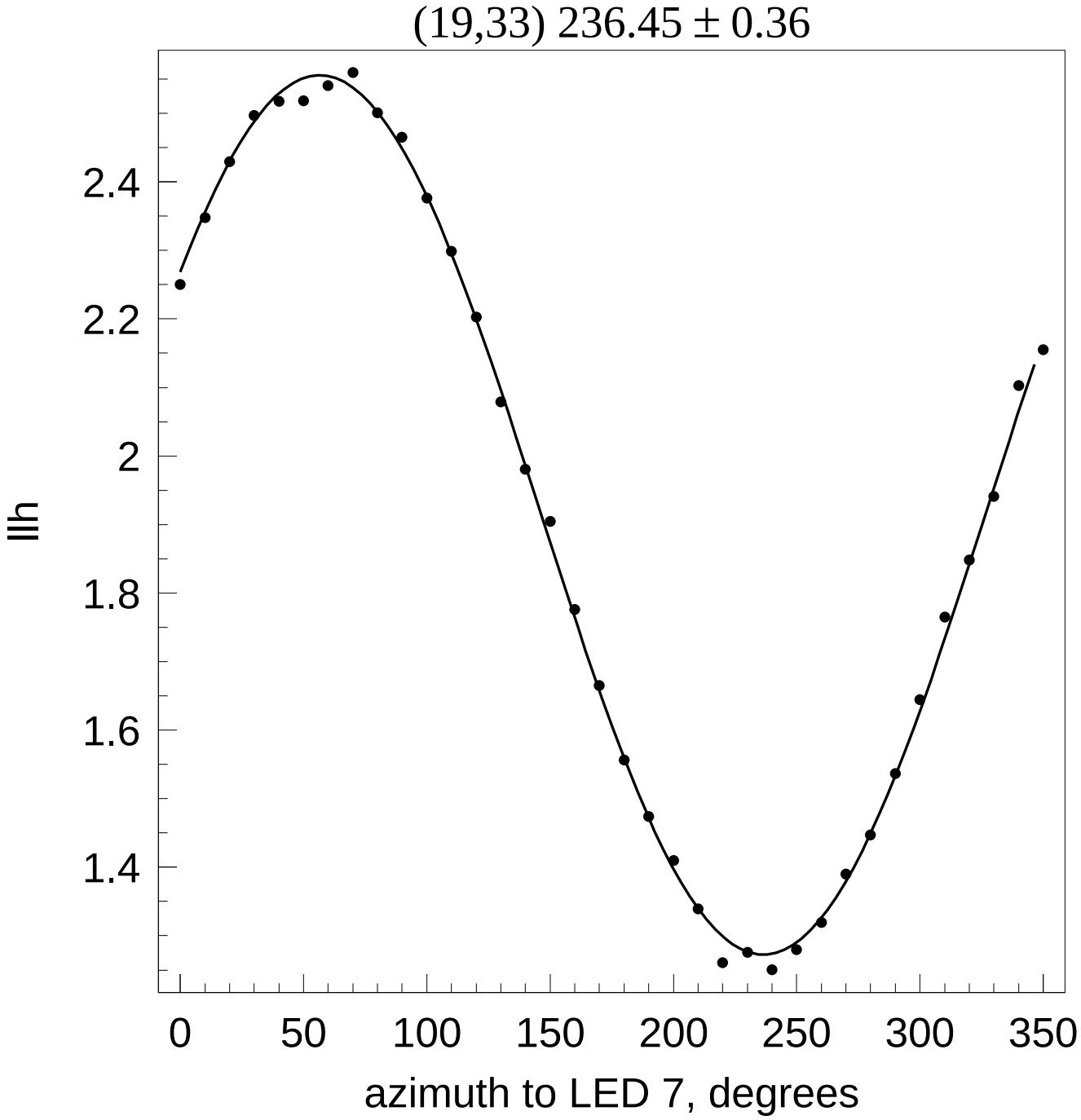

(18,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
260
10
9
4
3
11
5
2
8
6
1
12
7
260.1 ± 20.1

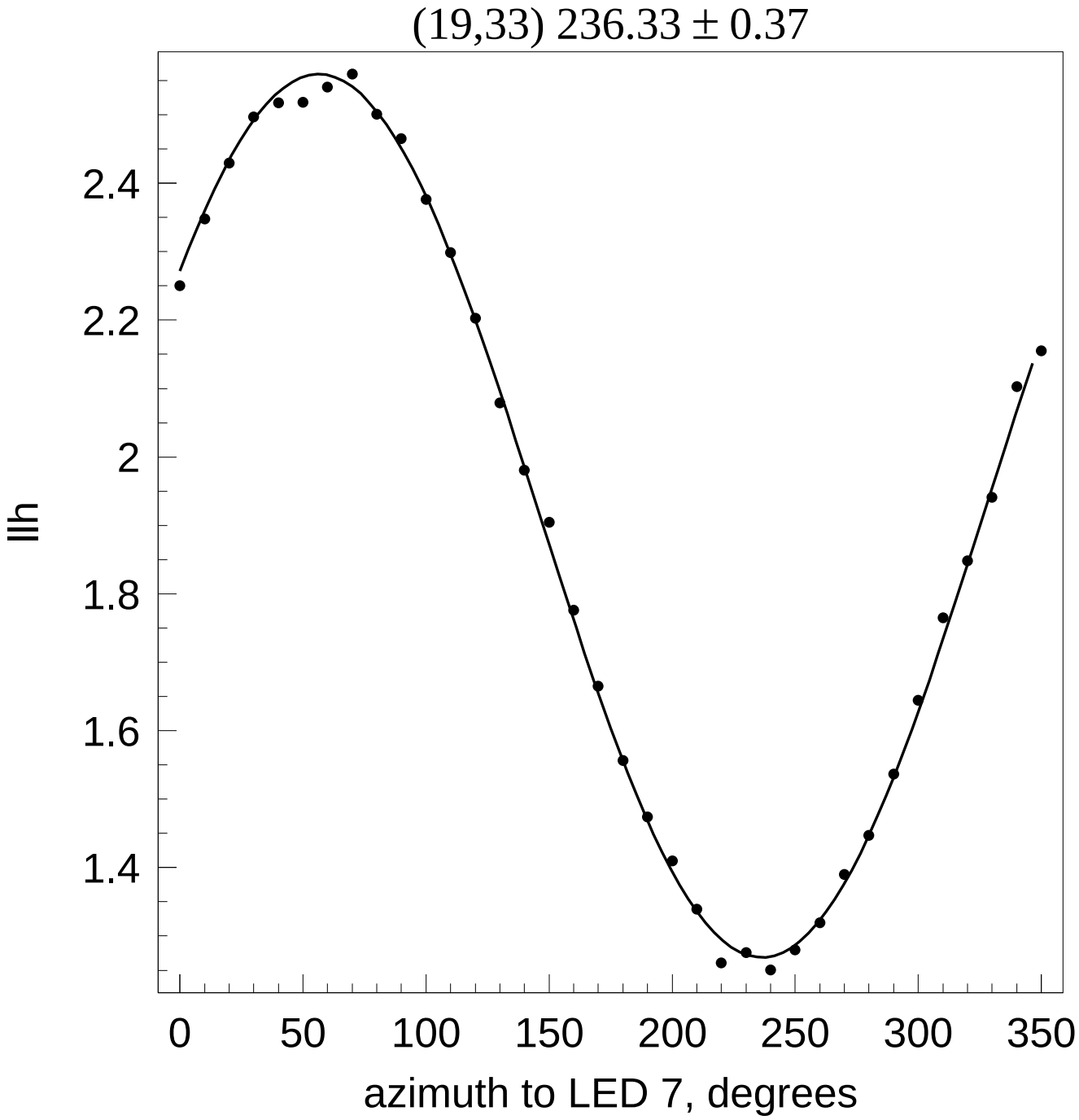

(18,37) 261.25 ± 1.89
2.05
2
1.95
1.9
1.85
1.8
1.75
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

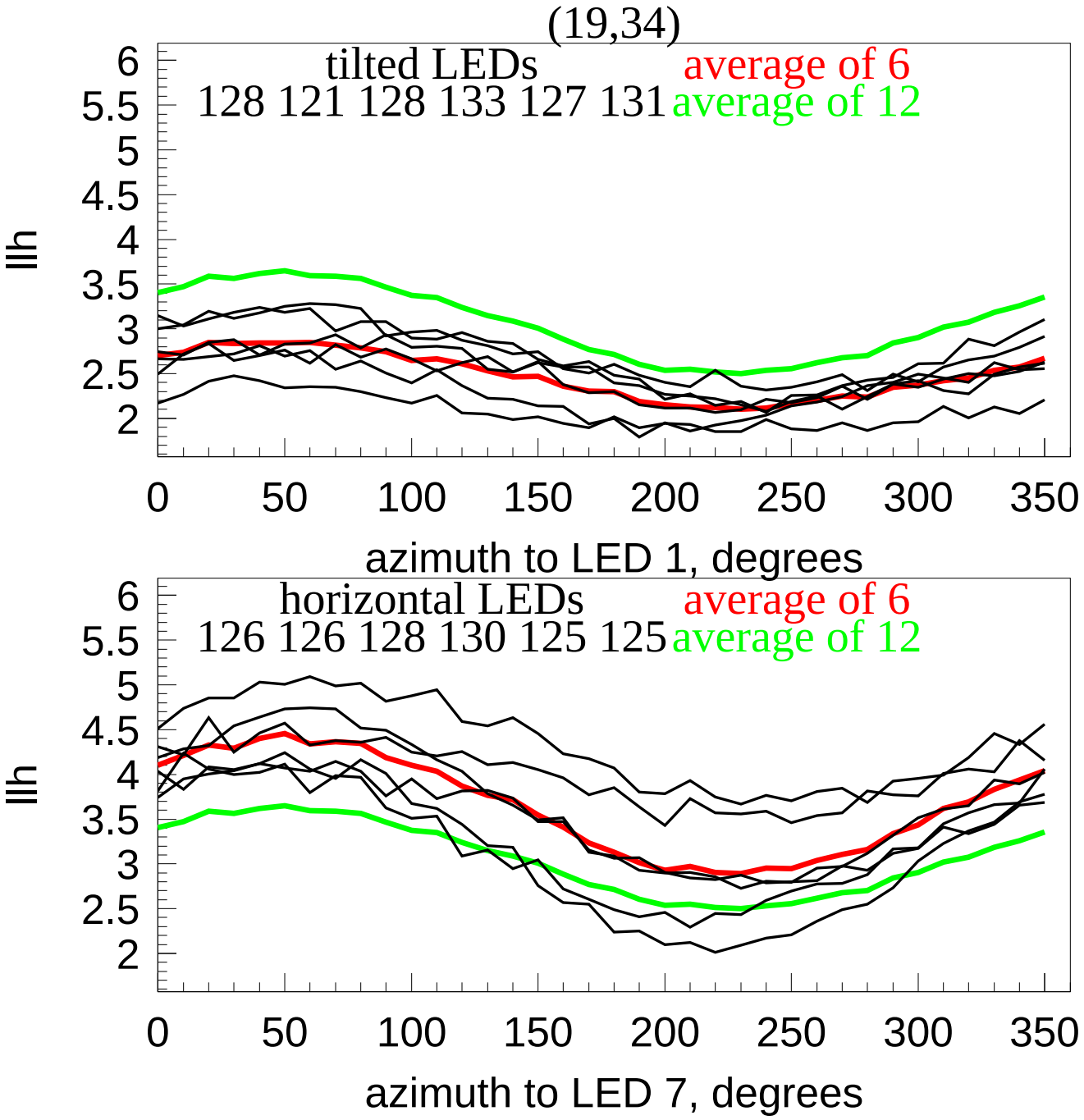

(18,37) 261.44 ± 1.87
2.05
2
1.95
1.9
1.85
1.8
1.75
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

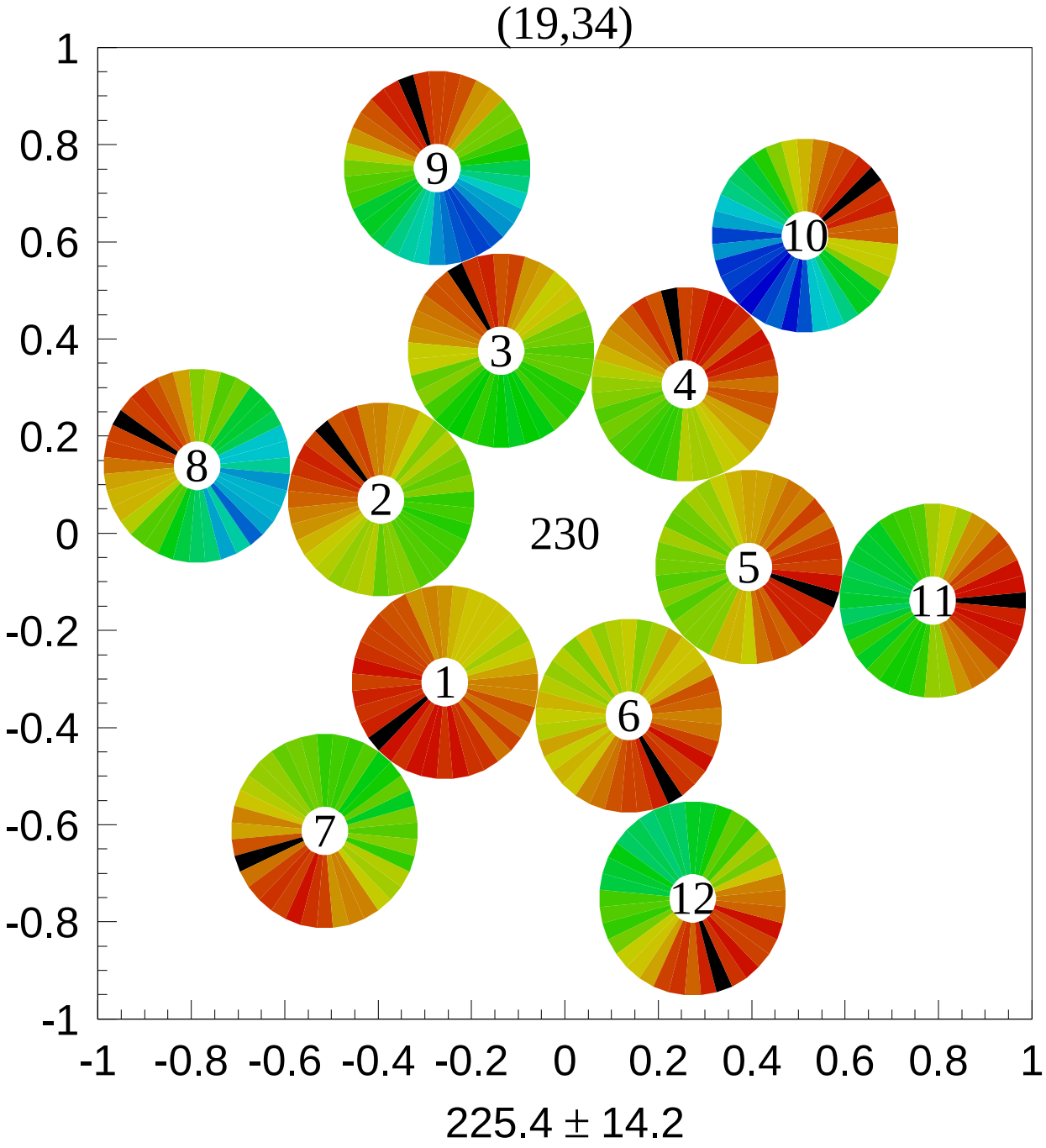

(19,33)
tilted LEDs
128 124 126 122 129 130
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 124 131 123 129 129
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

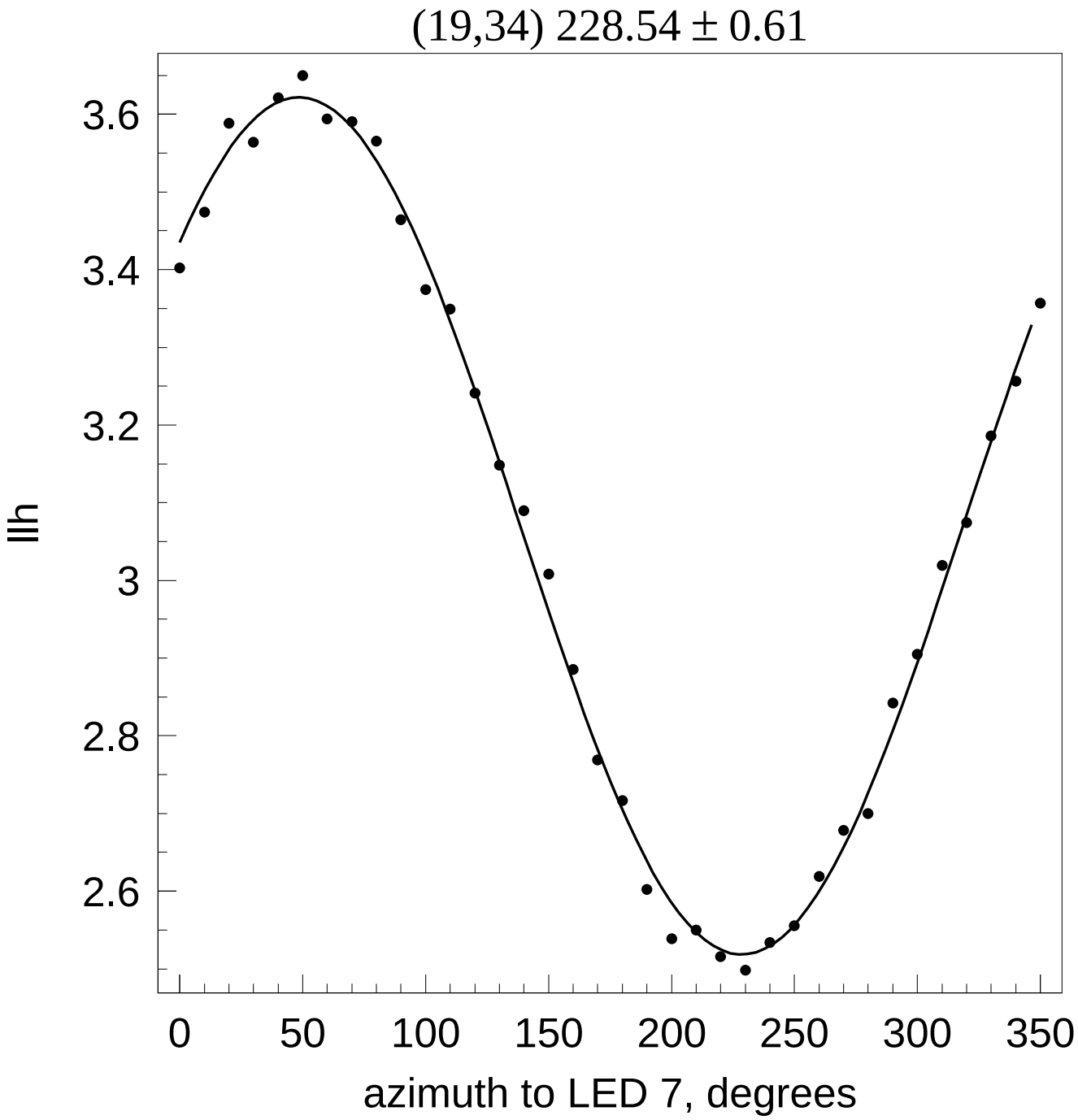

(19,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
236.7 ± 12.1

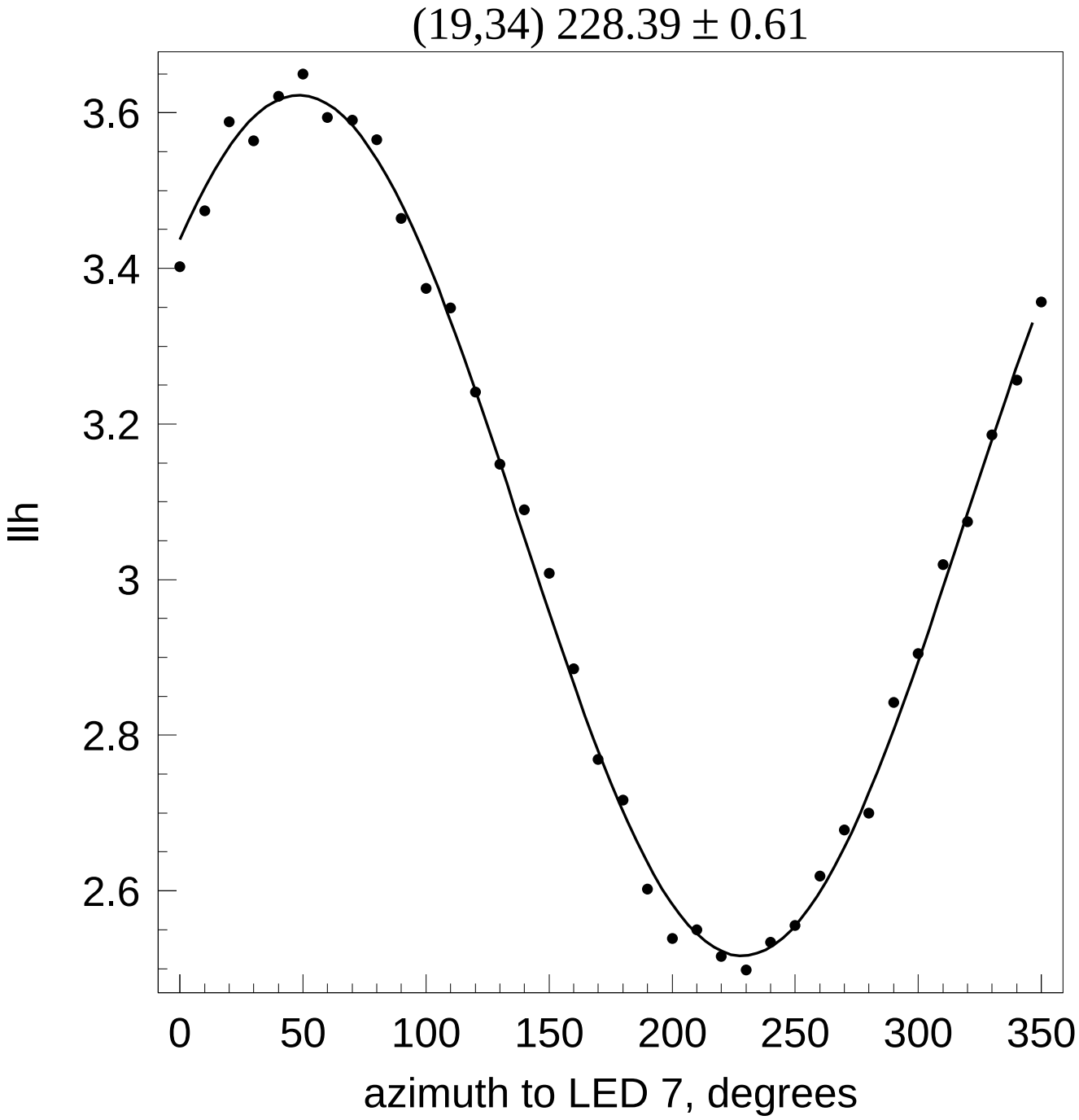

(19,33) 236.45 ± 0.36
2.4
2.2
2
1.8
1.6
1.4
Ilh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

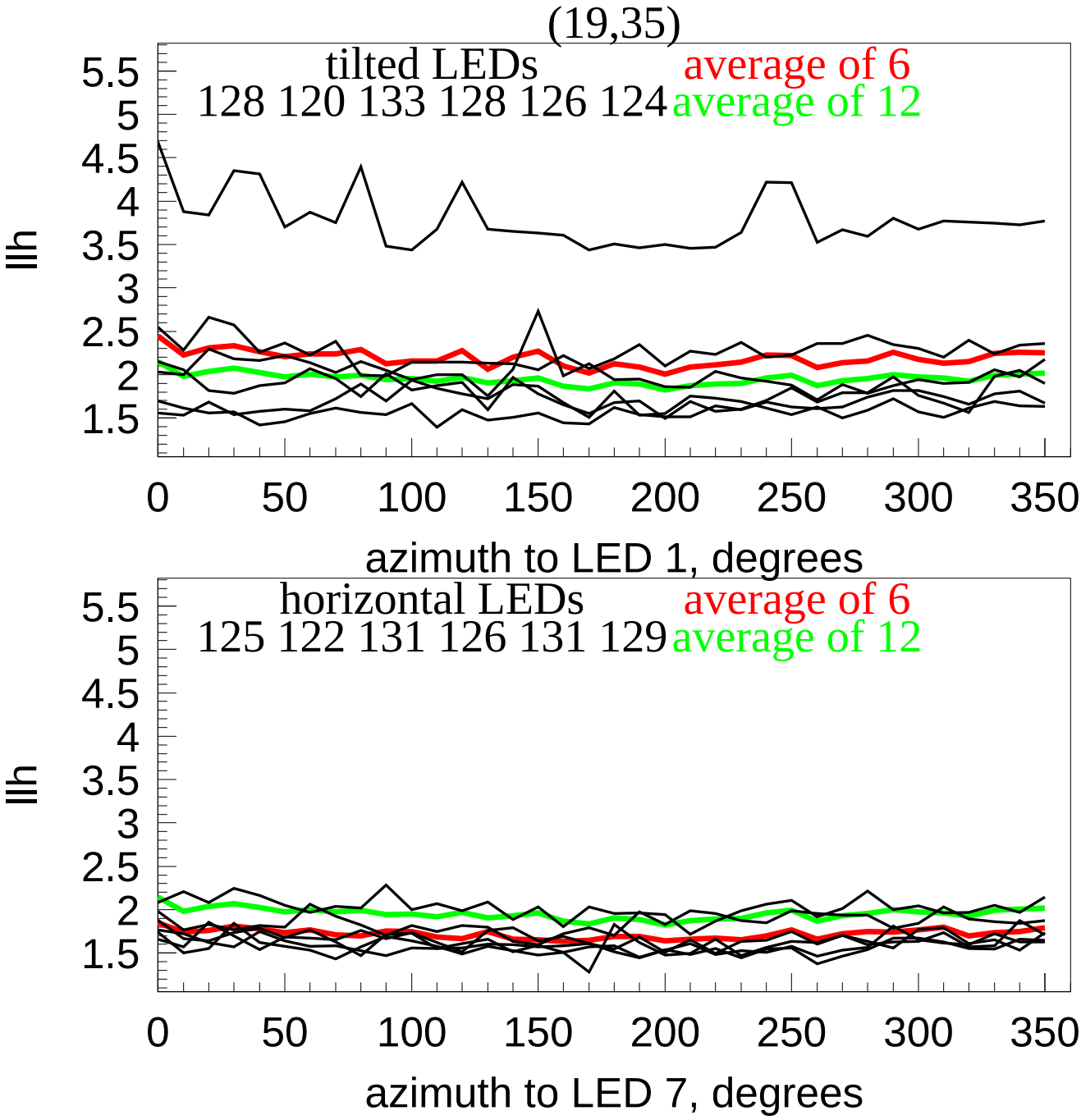

(19,33) 236.33 ± 0.37
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

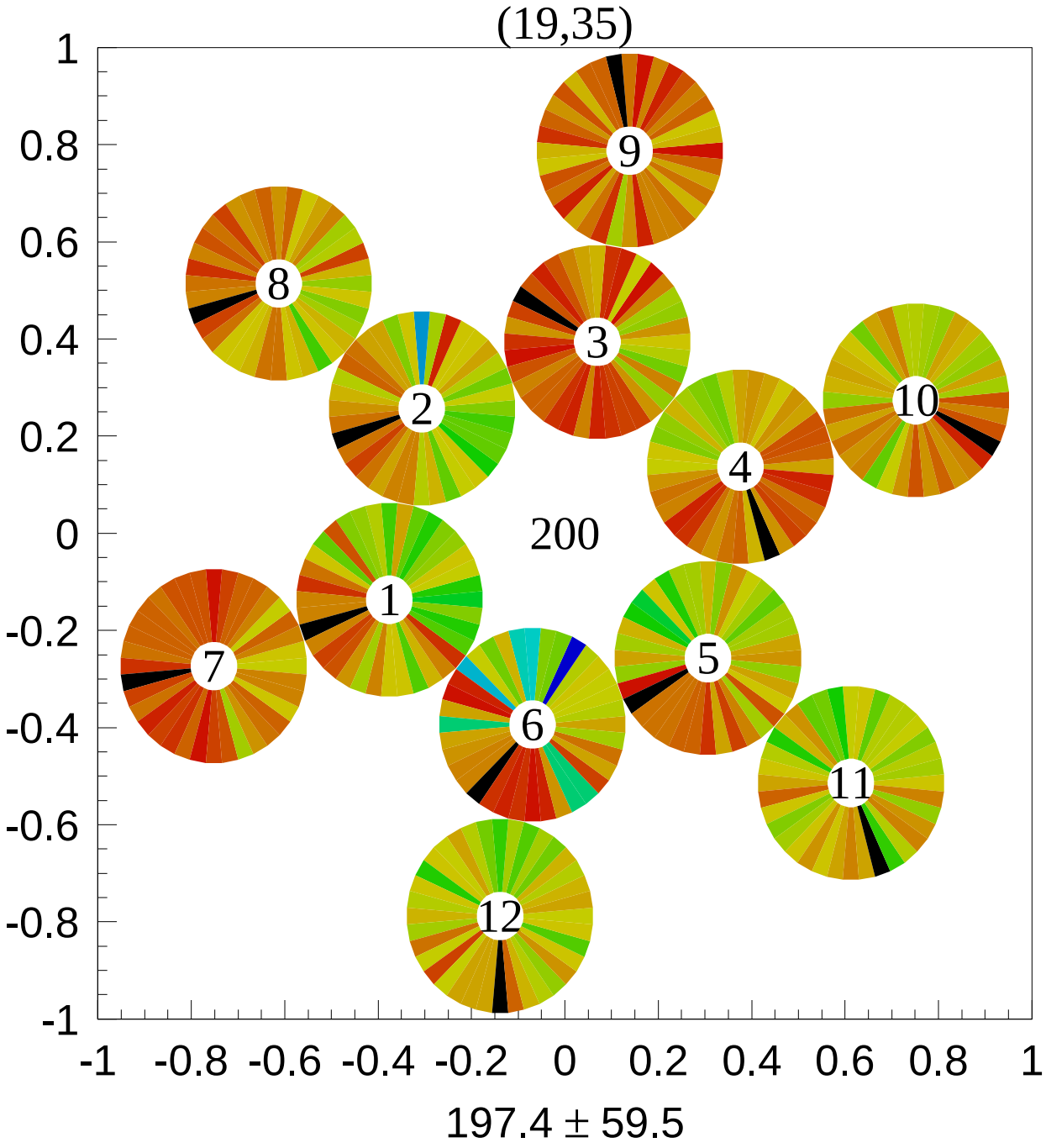

(19,34)
tilted LEDs
128 121 128 133 127 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 126 128 130 125 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

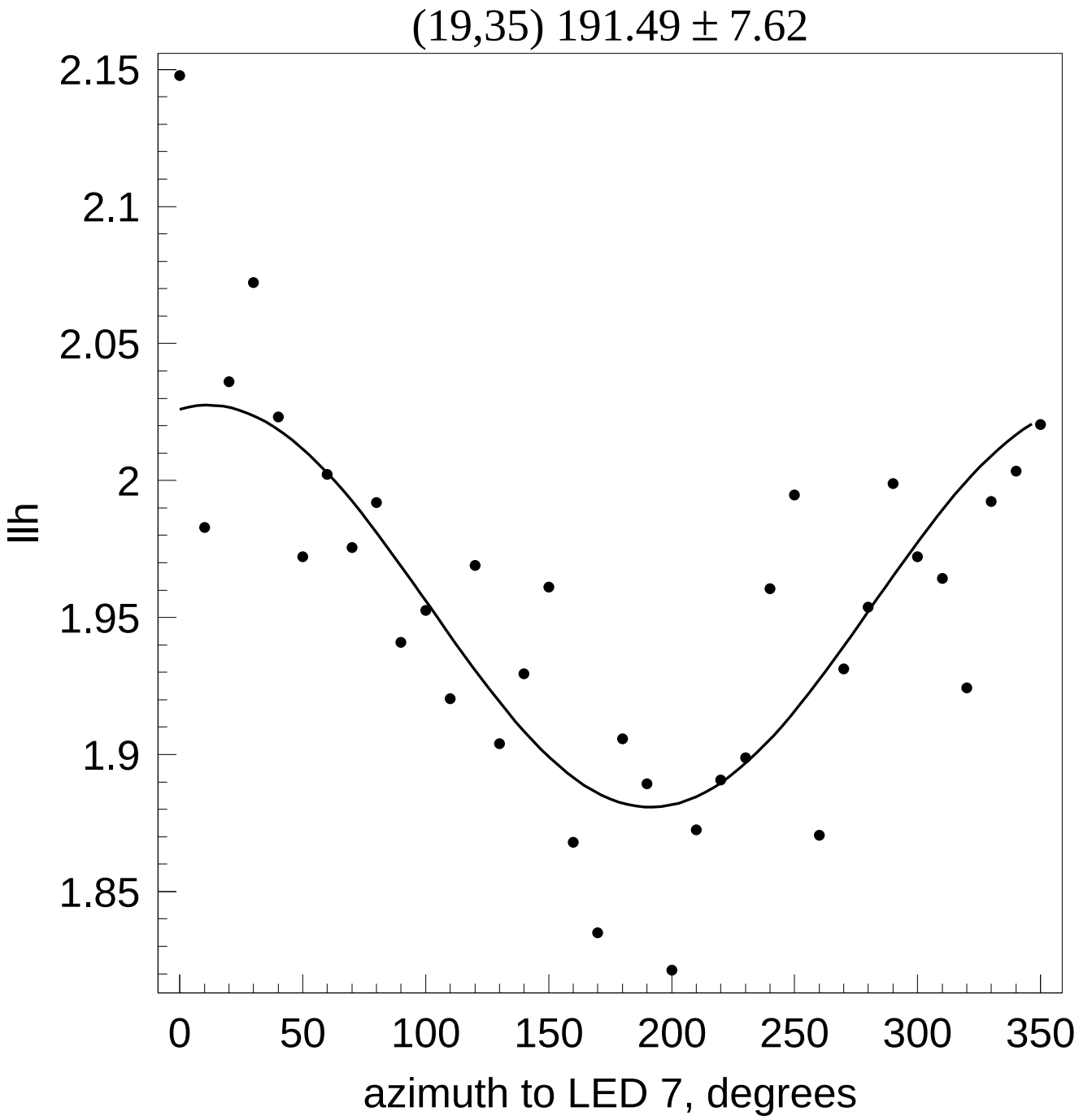

(19,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
225.4 ± 14.2
9
10
3
4
8
2
230
5
11
1
6
7
12

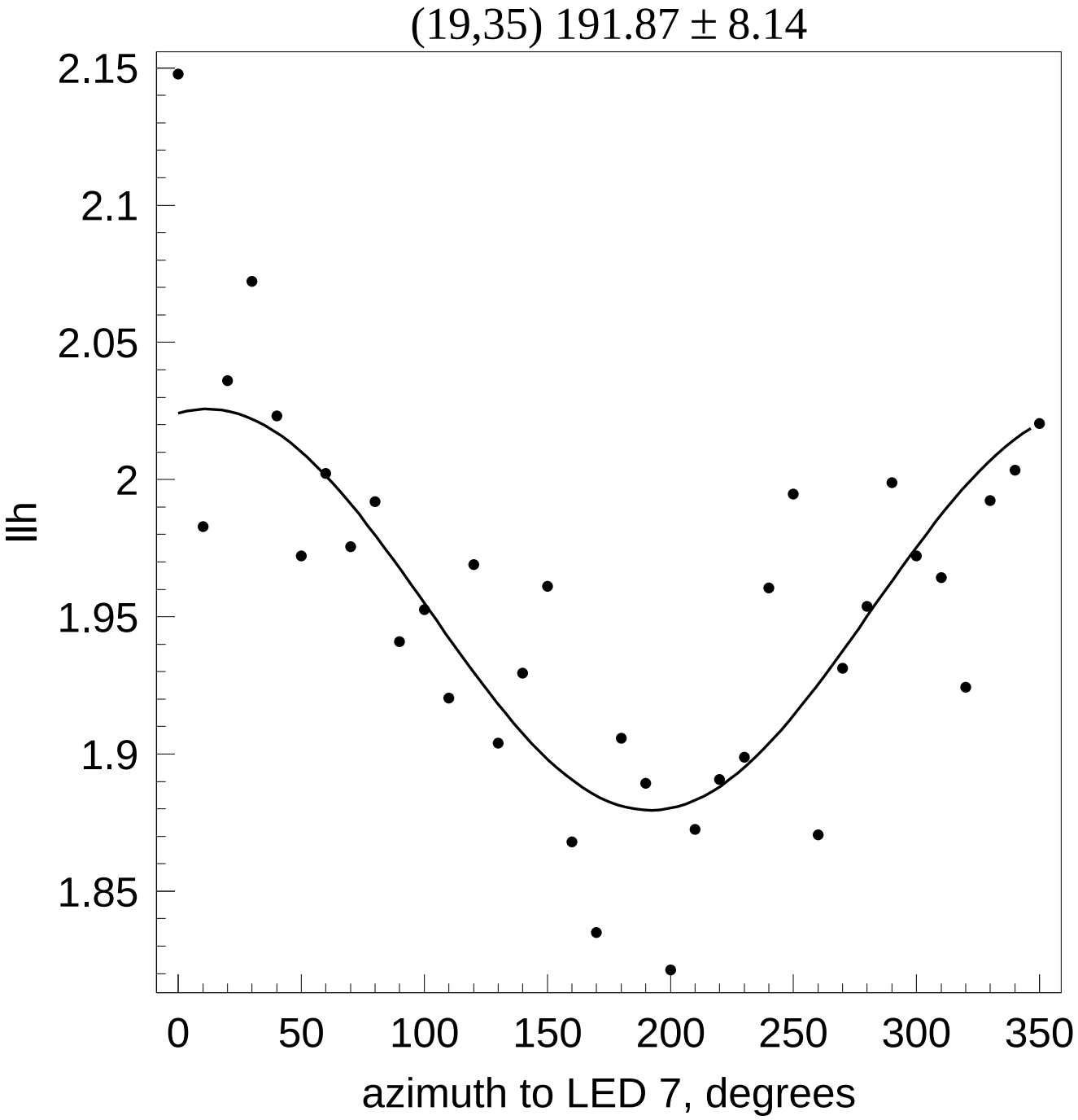

(19,34) 228.54 ± 0.61
3.6
3.4
3.2
3
2.8
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

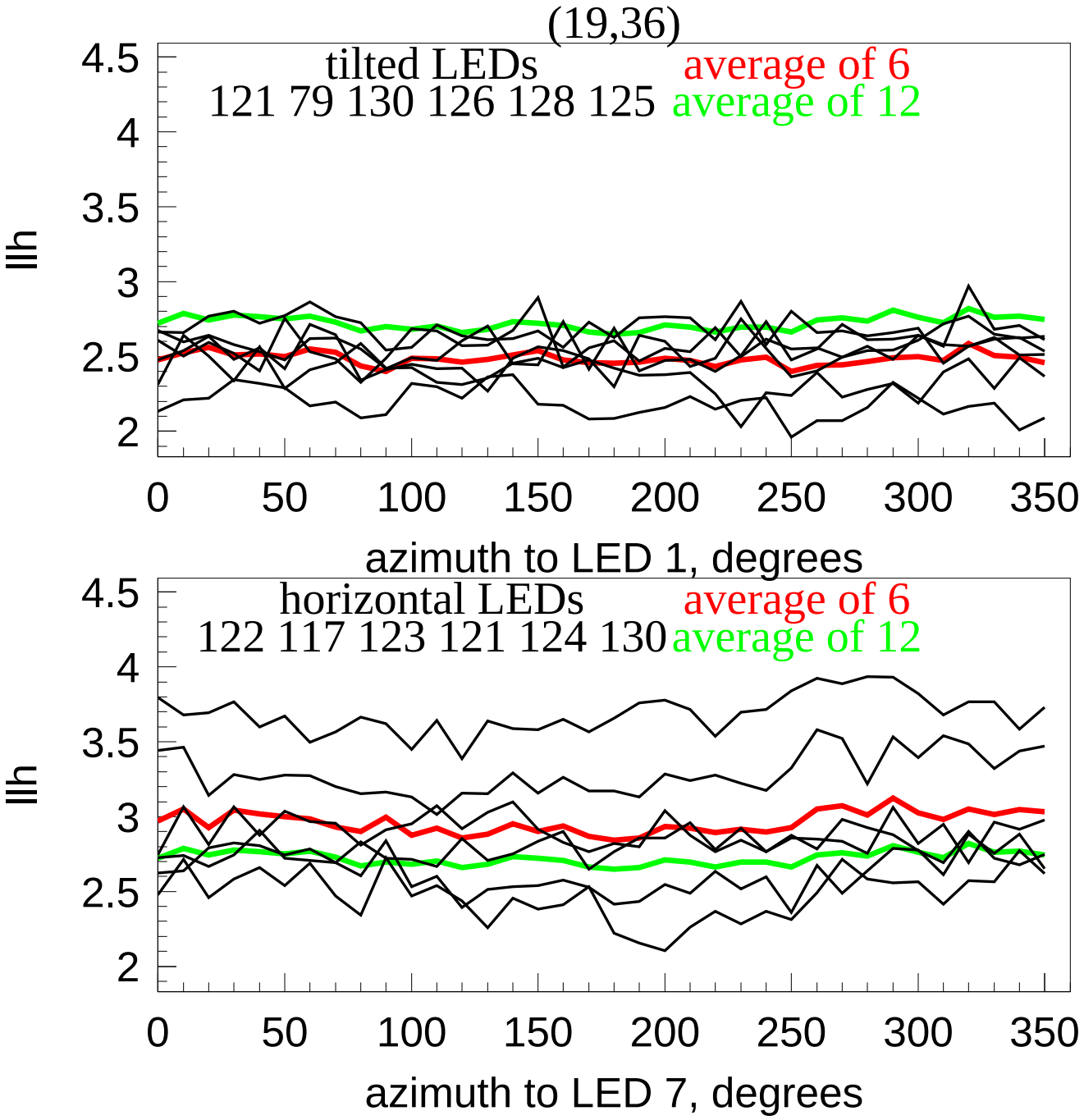

(19,34) 228.39 ± 0.61
3.6
3.4
3.2
3
2.8
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

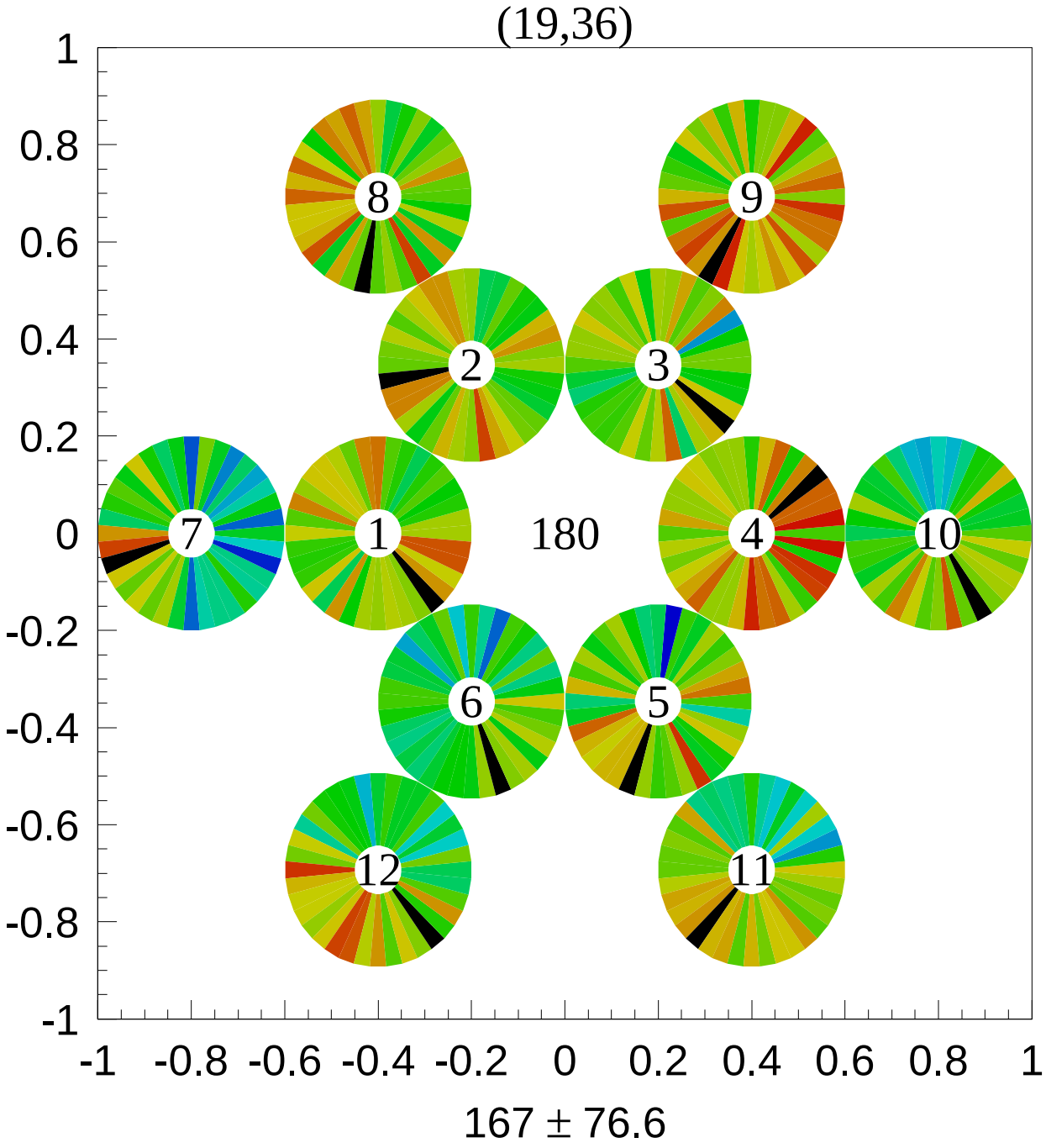

(19,35)
tilted LEDs
128 120 133 128 126 124
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 122 131 126 131 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

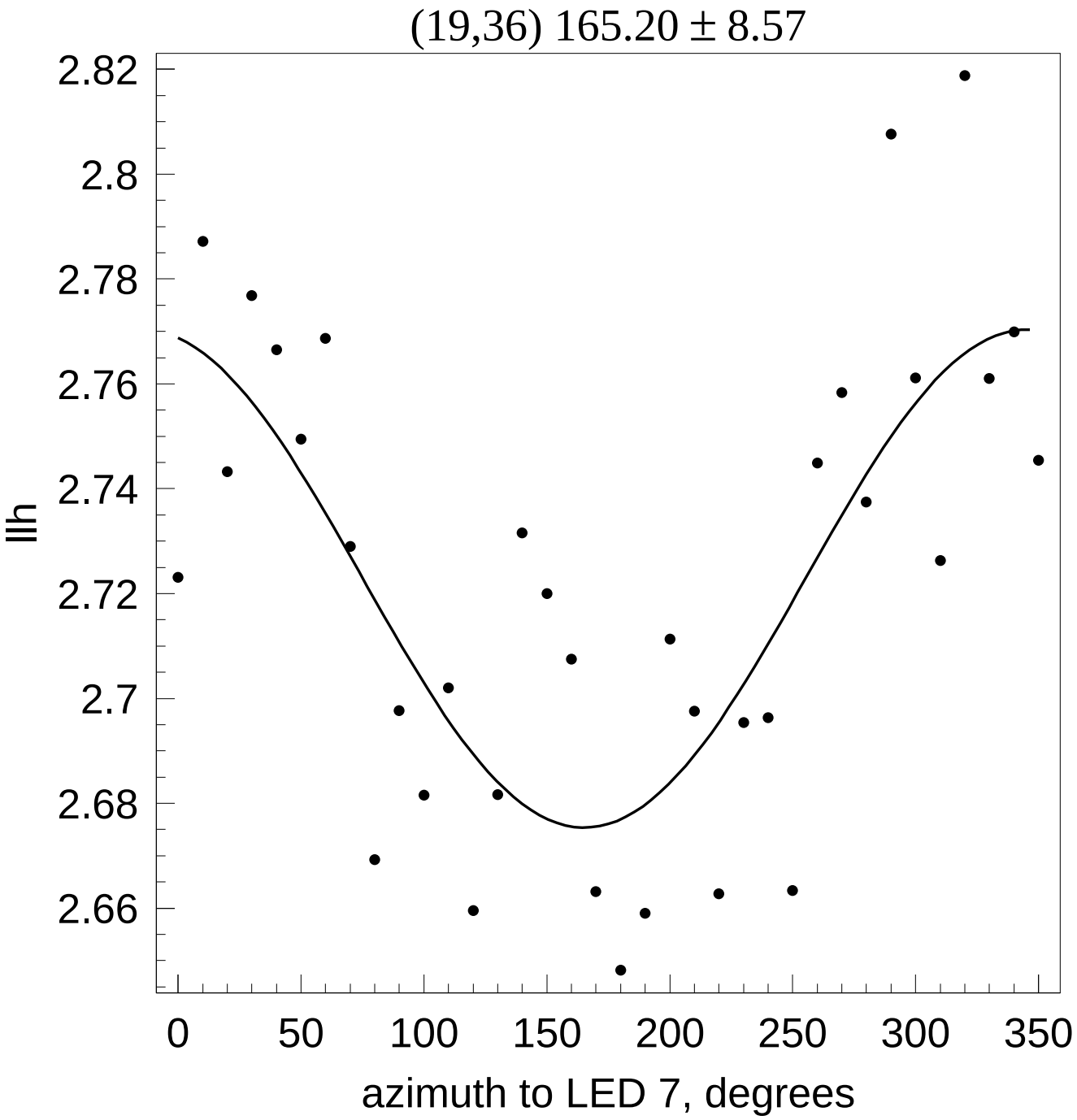

(19,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
8
3
2
10
4
200
1
7
5
6
11
12
197.4 ± 59.5

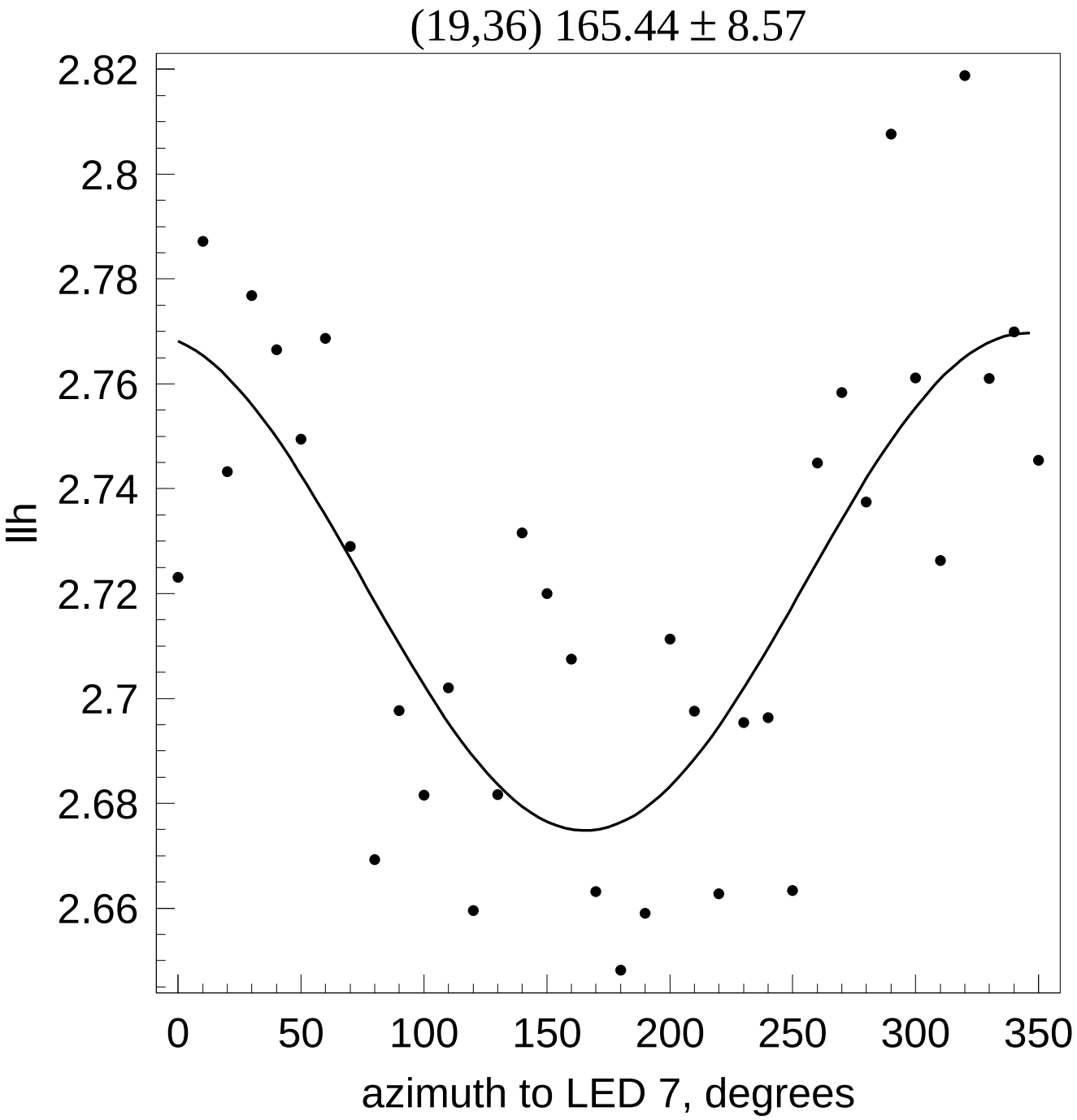

(19,35) 191.49 ± 7.62
2.15
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

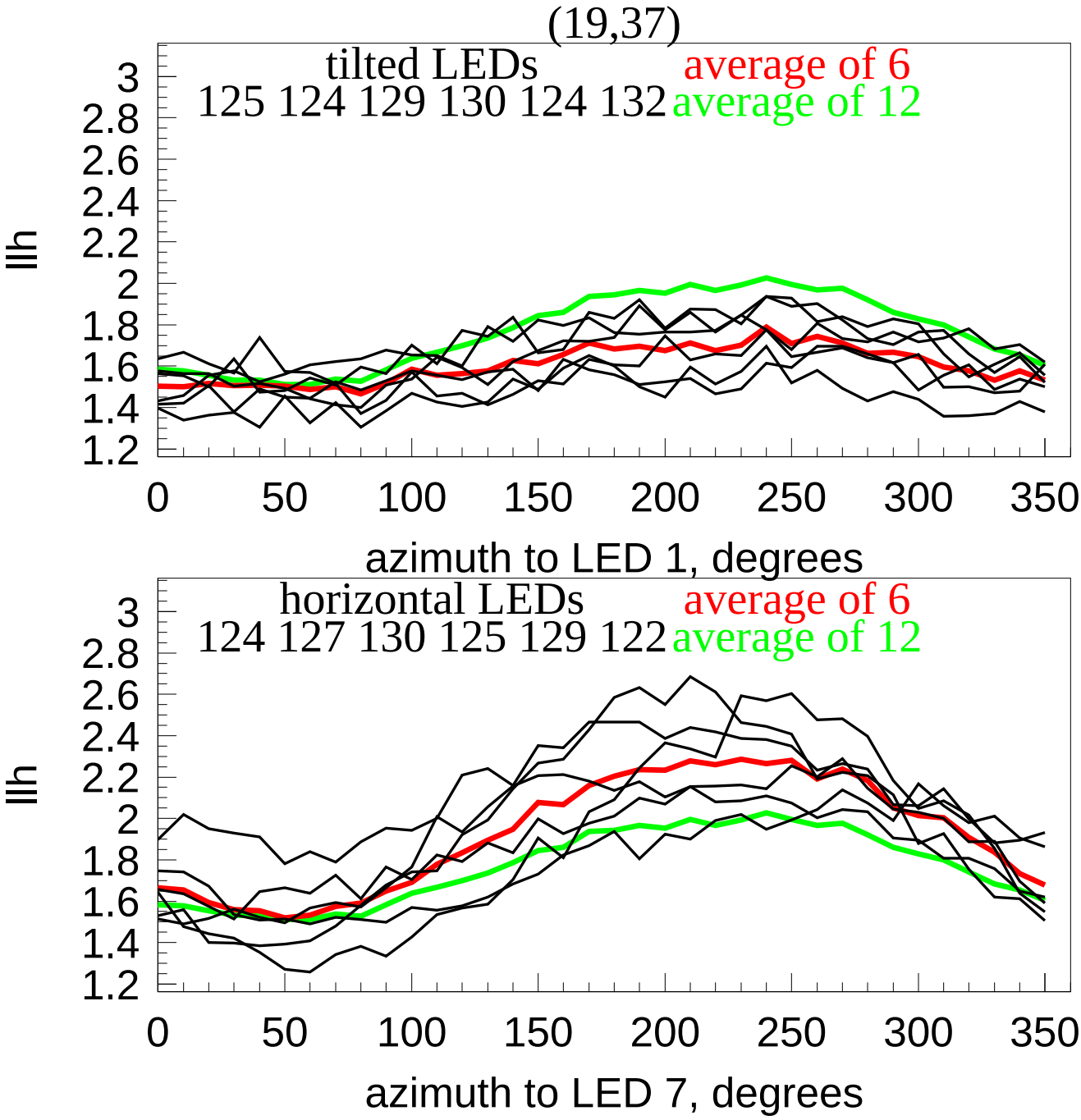

(19,35) 191.87 ± 8.14
2.15
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

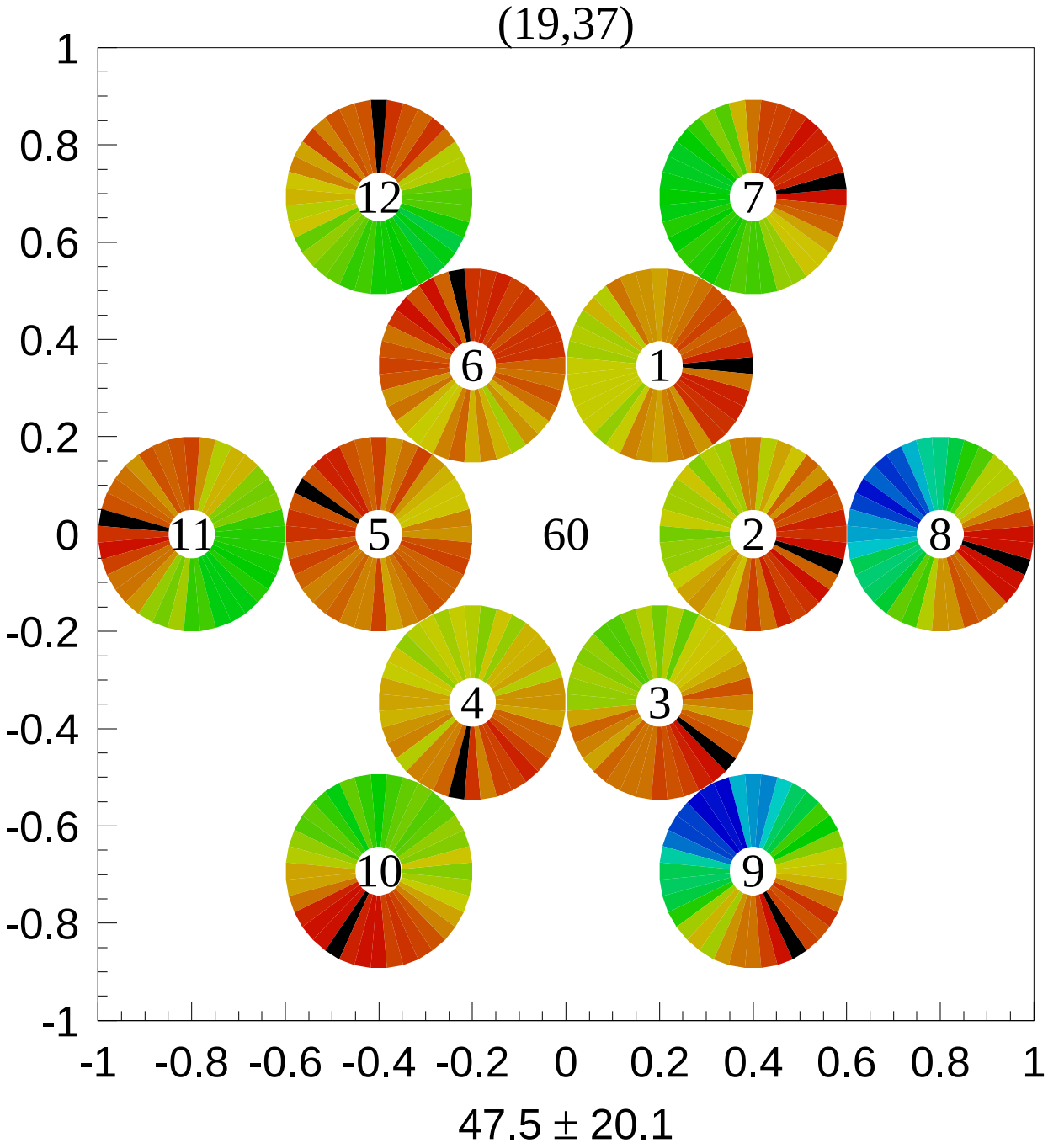

(19,36)
tilted LEDs
121 79 130 126 128 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 117 123 121 124 130
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

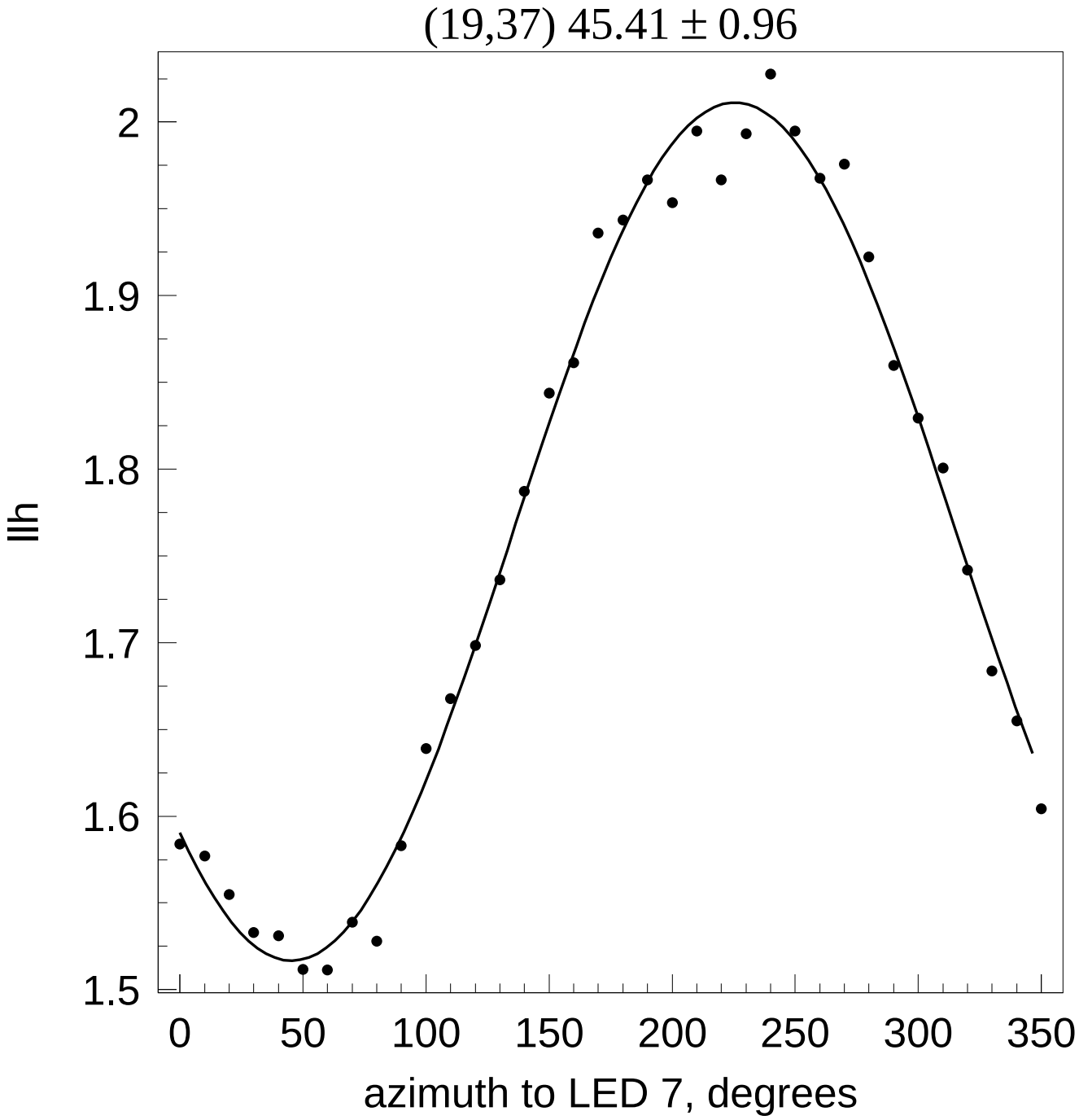

(19,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
167 ± 76.6

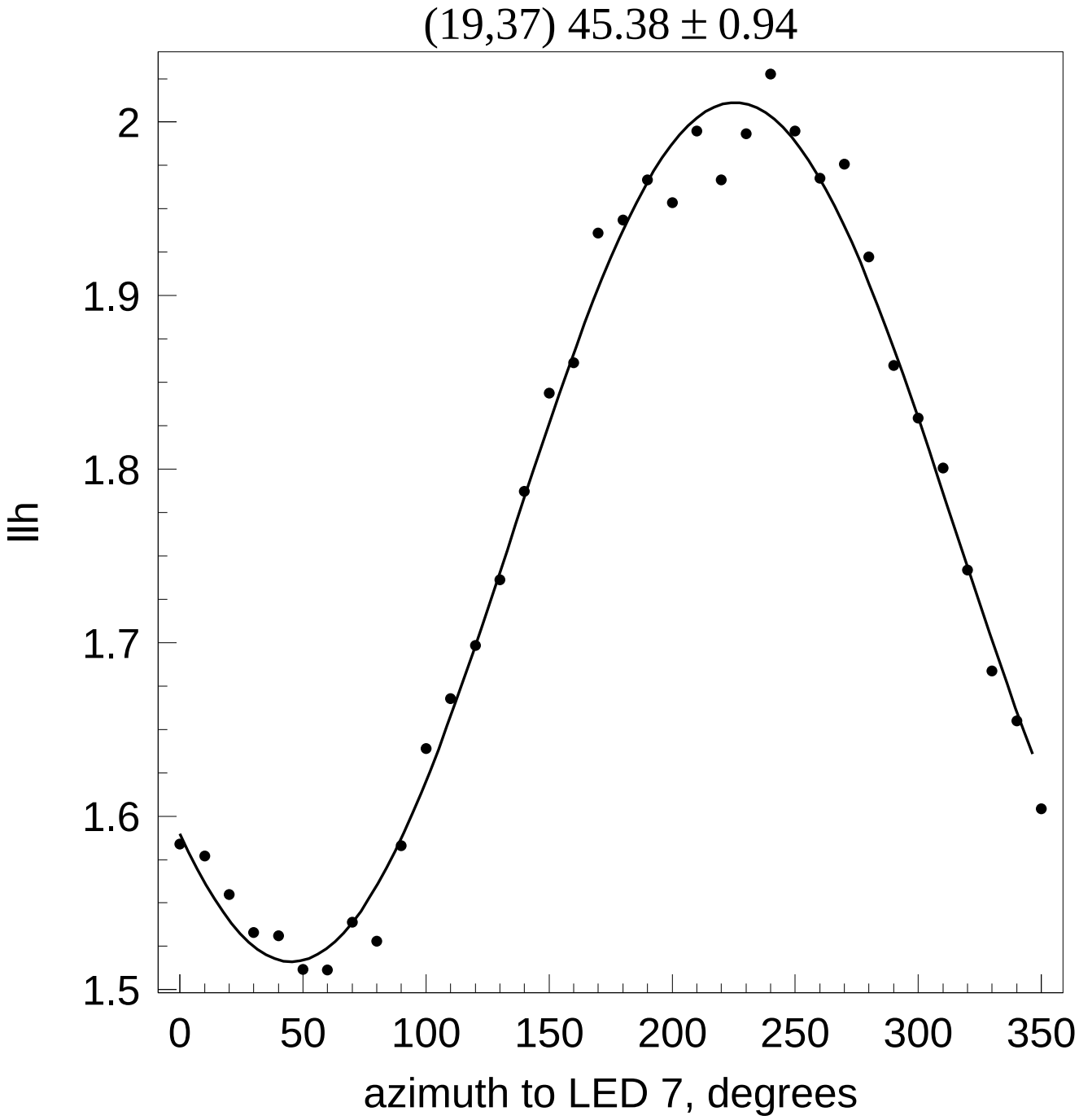

(19,36) 165.20 ± 8.57
2.82
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

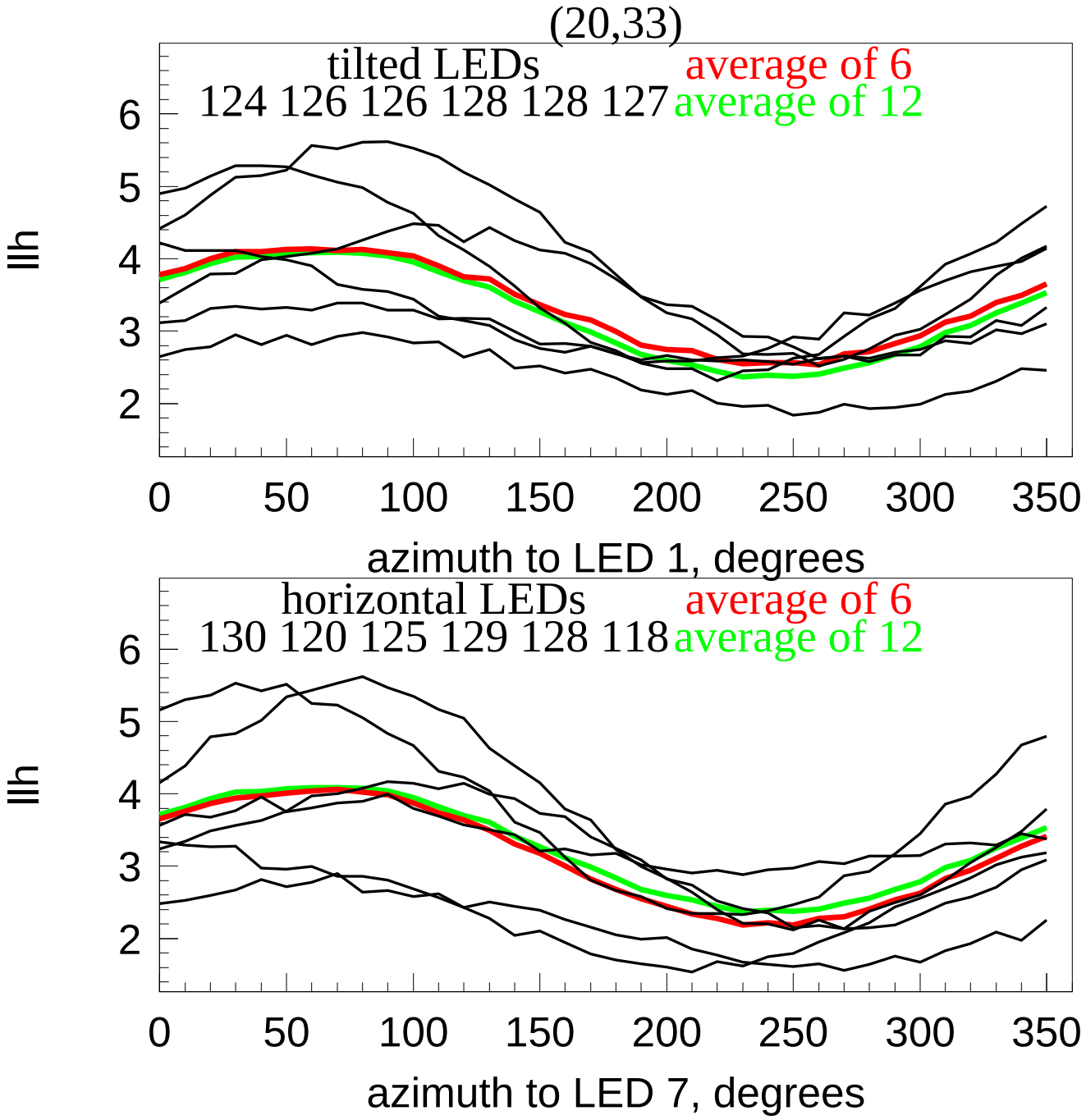

(19,36) 165.44 ± 8.57
2.82
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

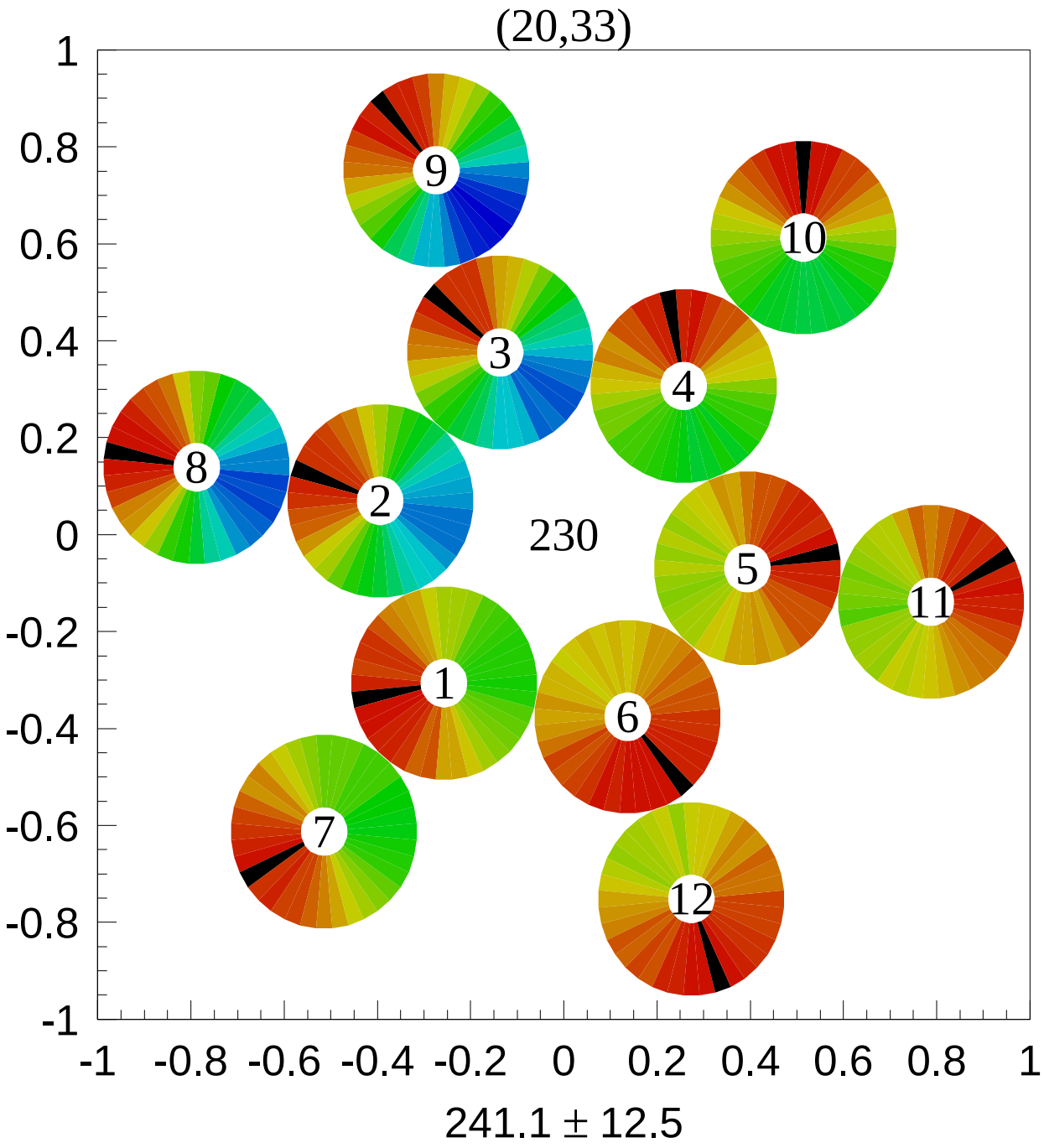

(19,37)
tilted LEDs
125 124 129 130 124 132
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
124 127 130 125 129 122
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

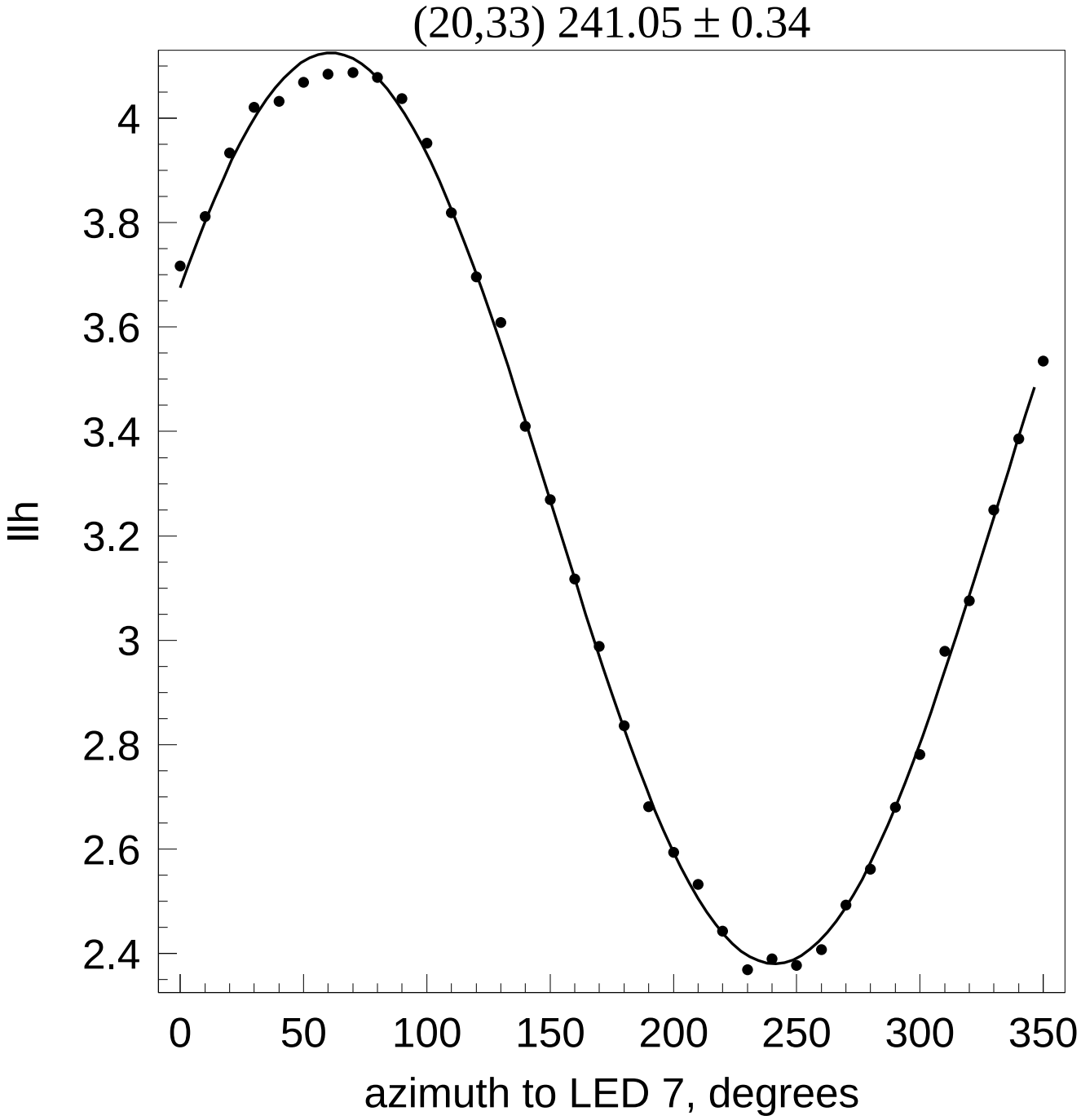

(19,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
47.5 ± 20.1

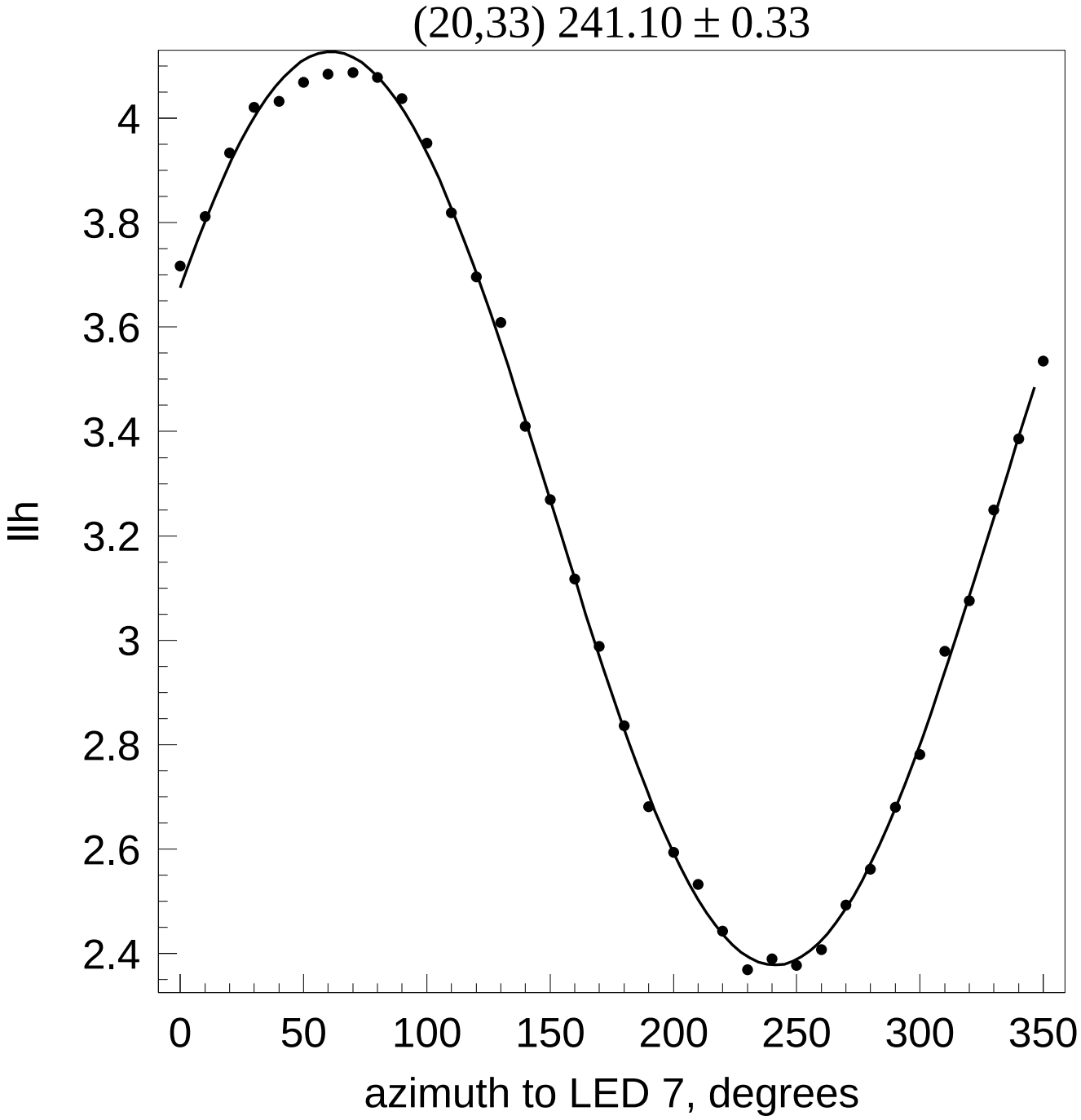

(19,37) 45.41 ± 0.96
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

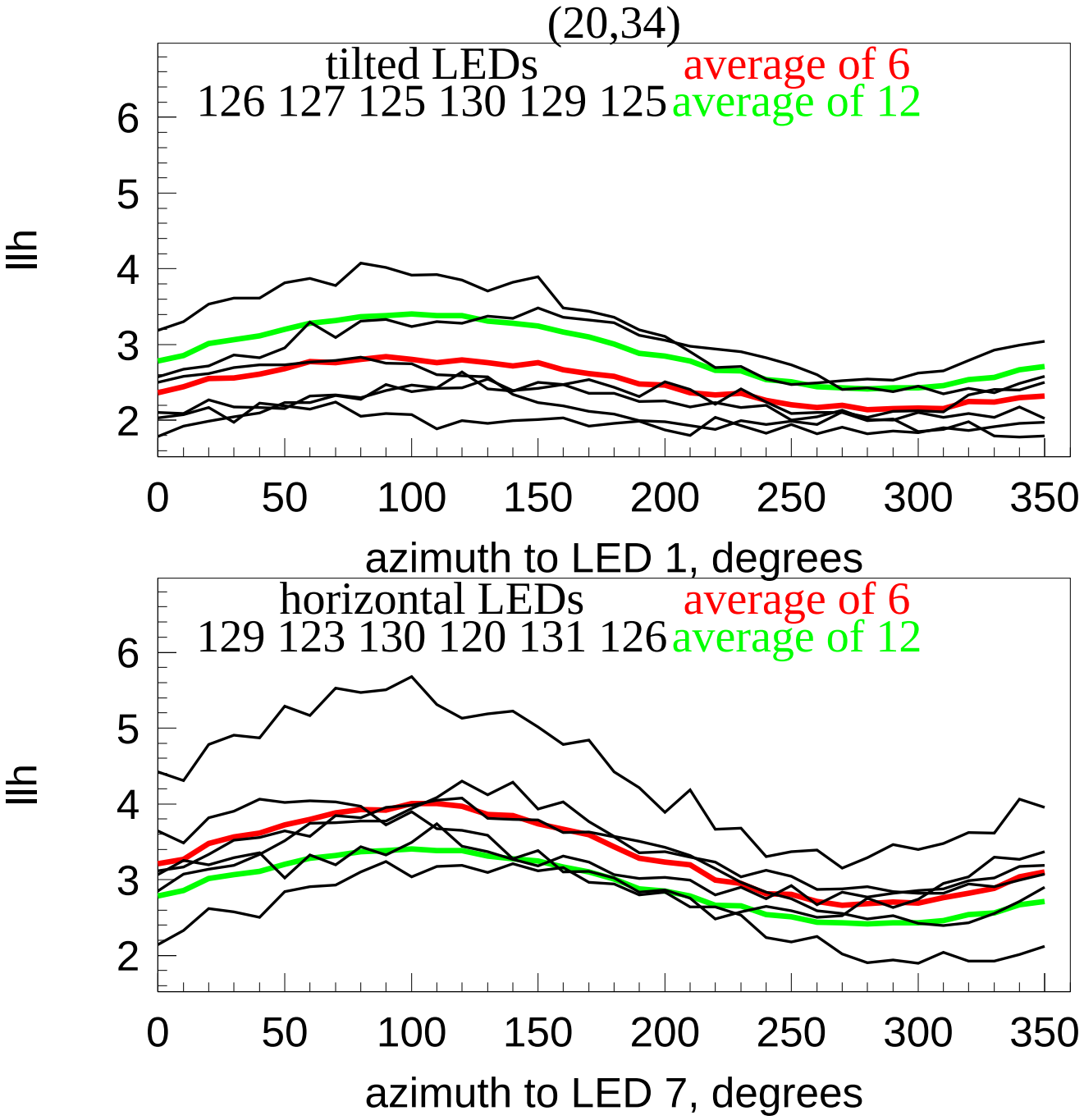

(19,37) 45.38 ± 0.94
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

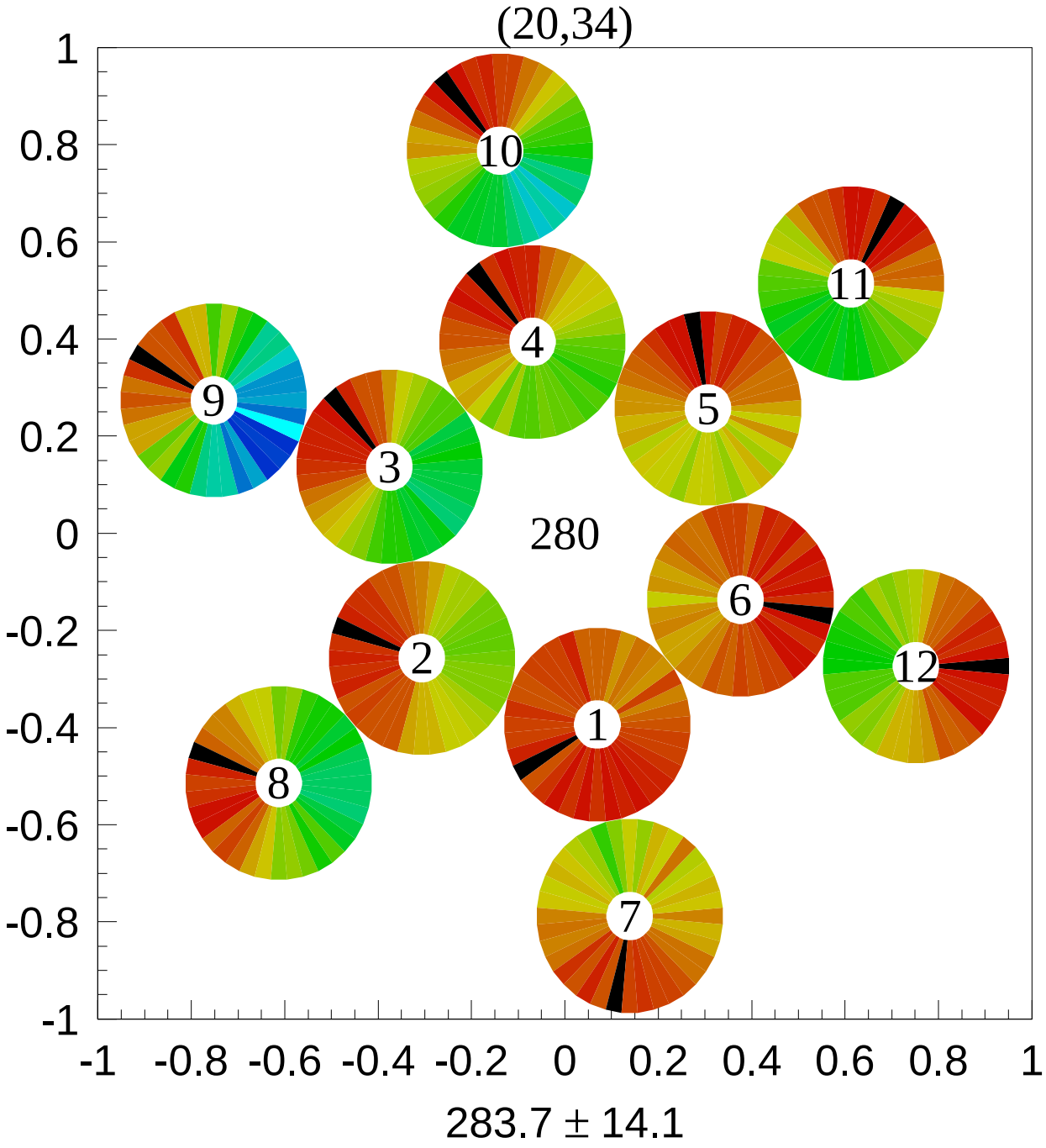

(20,33)
tilted LEDs
124 126 126 128 128 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 120 125 129 128 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

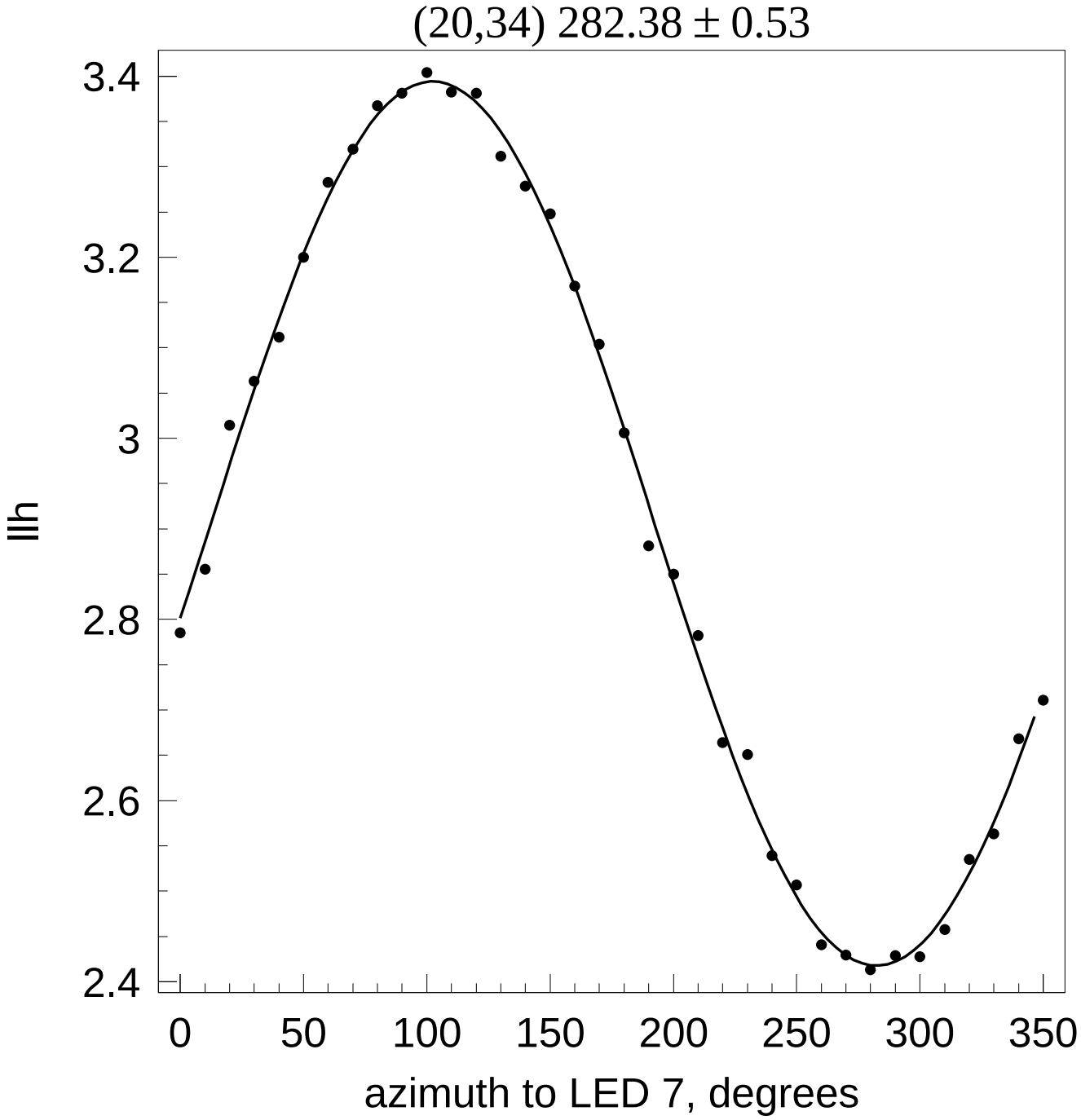

(20,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
241.1 ± 12.5

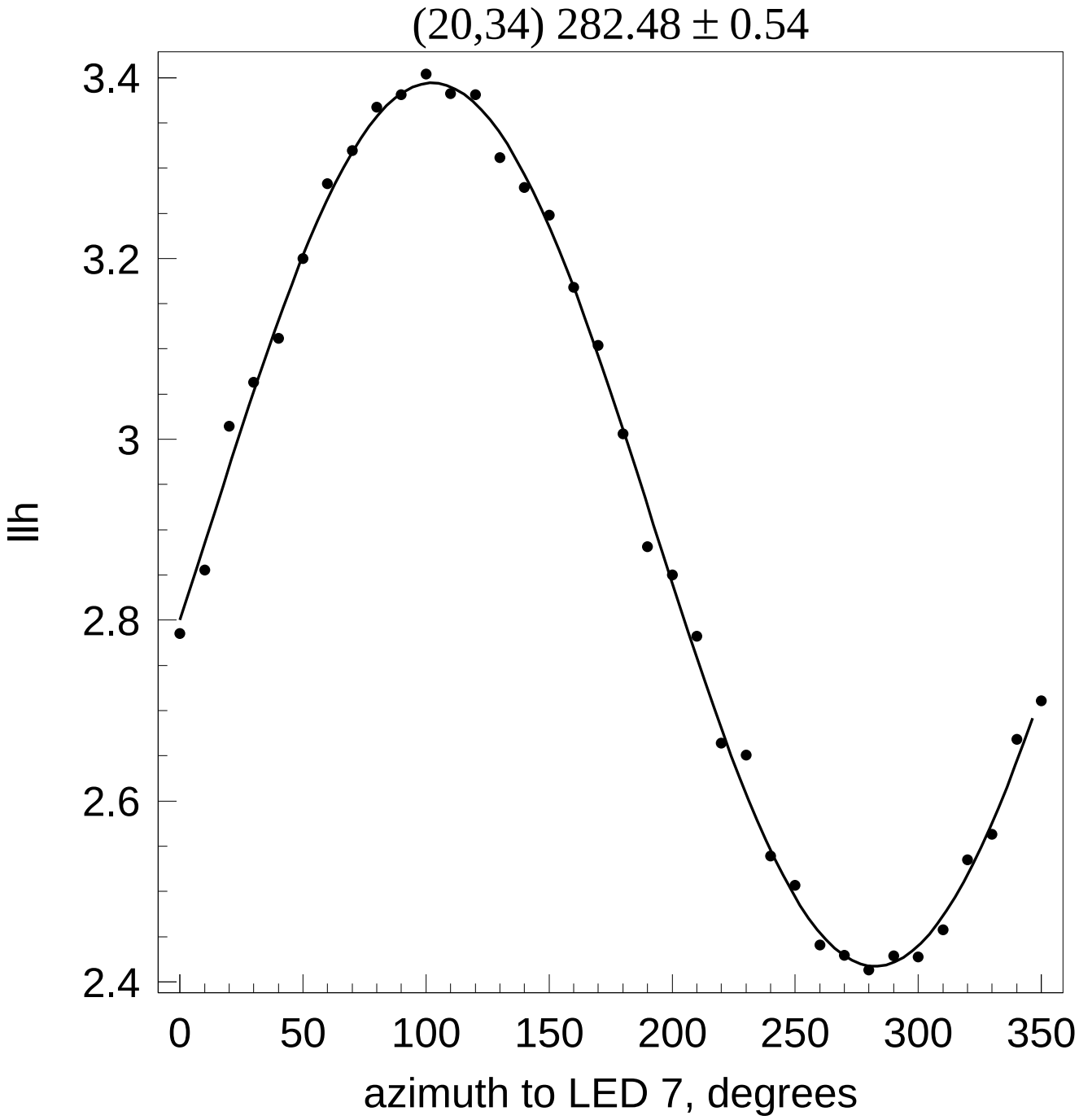

(20,33) 241.05 ± 0.34
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

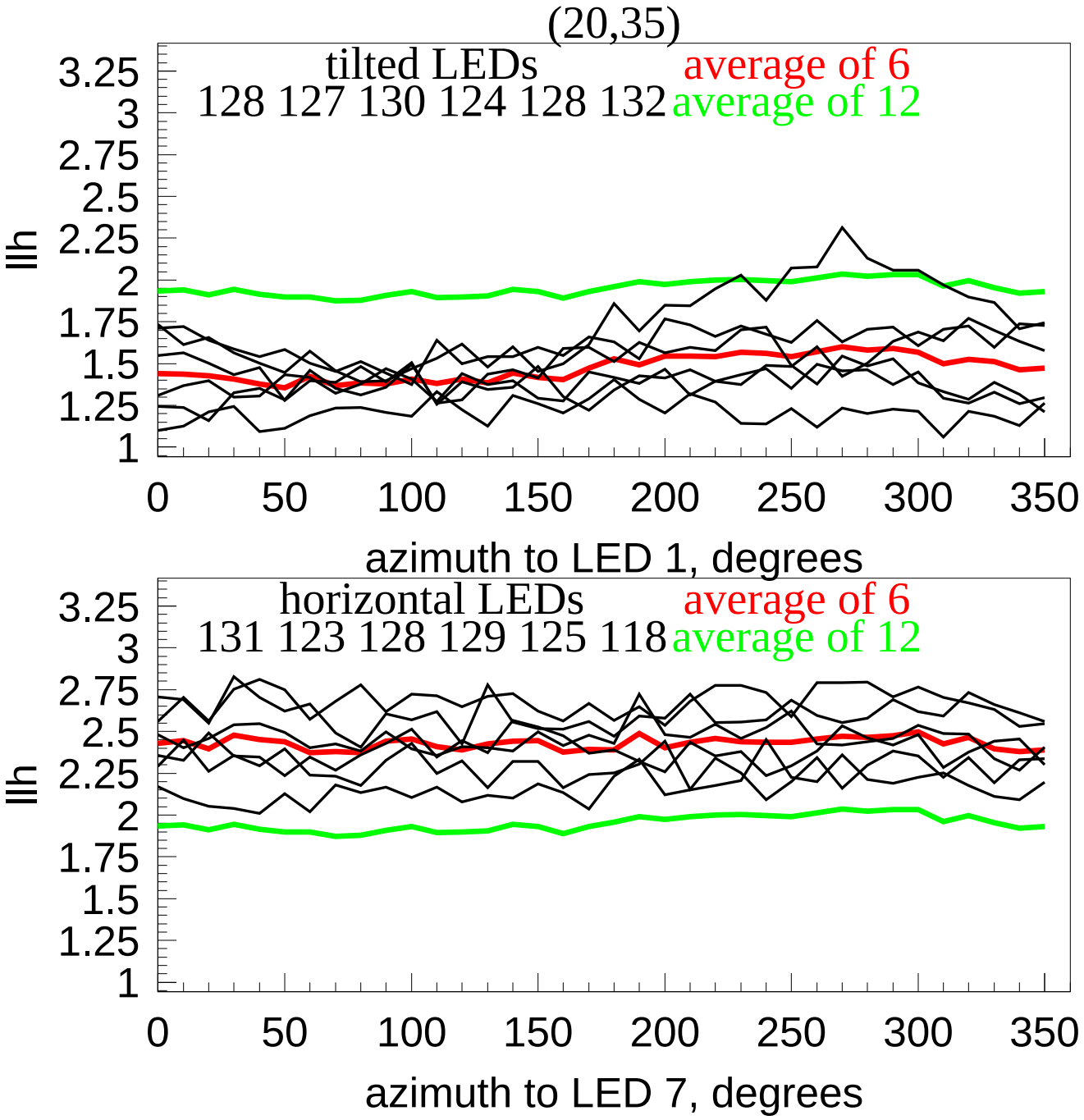

(20,33) 241.10 ± 0.33
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

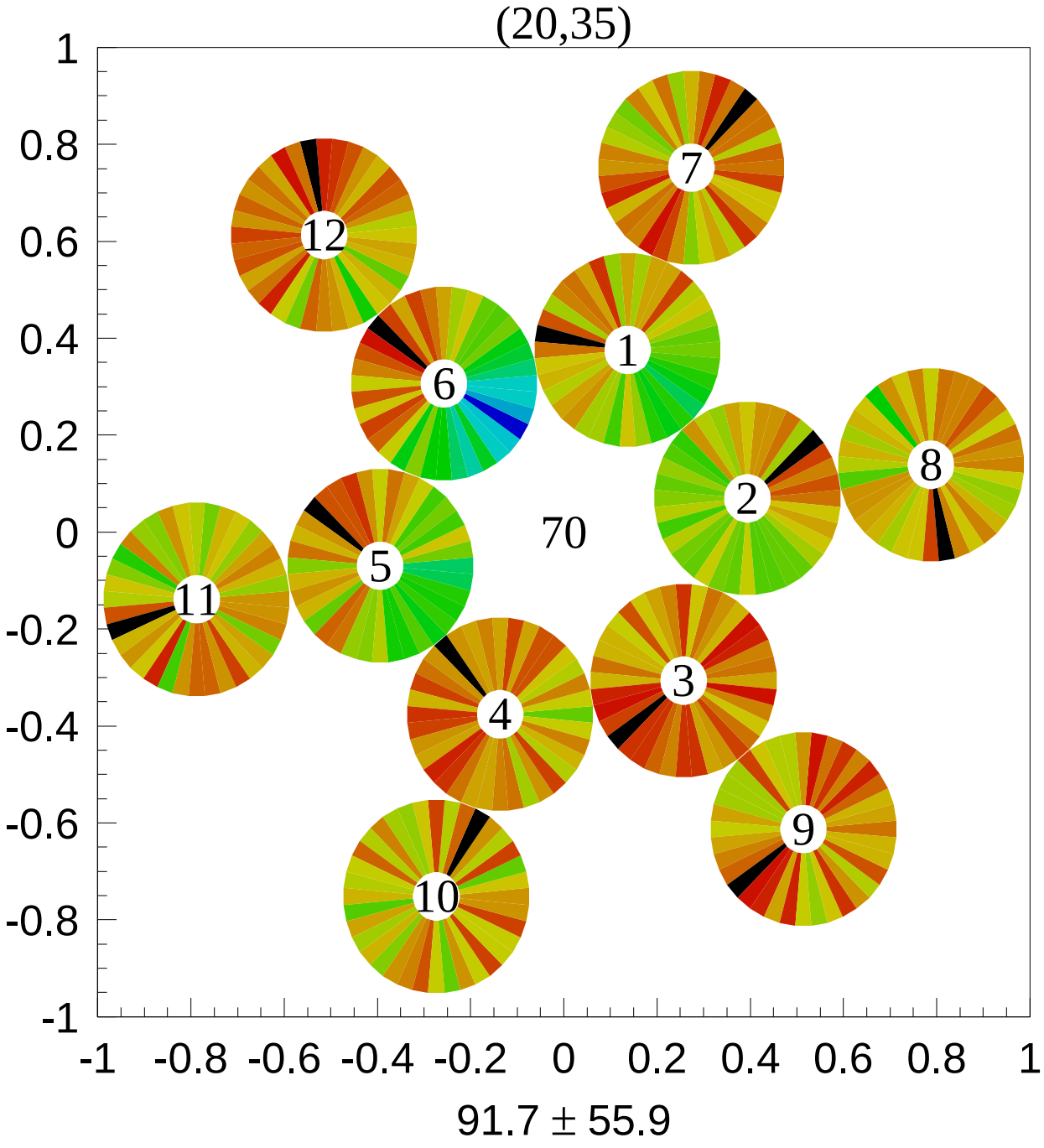

(20,34)
tilted LEDs
126 127 125 130 129 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 123 130 120 131 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

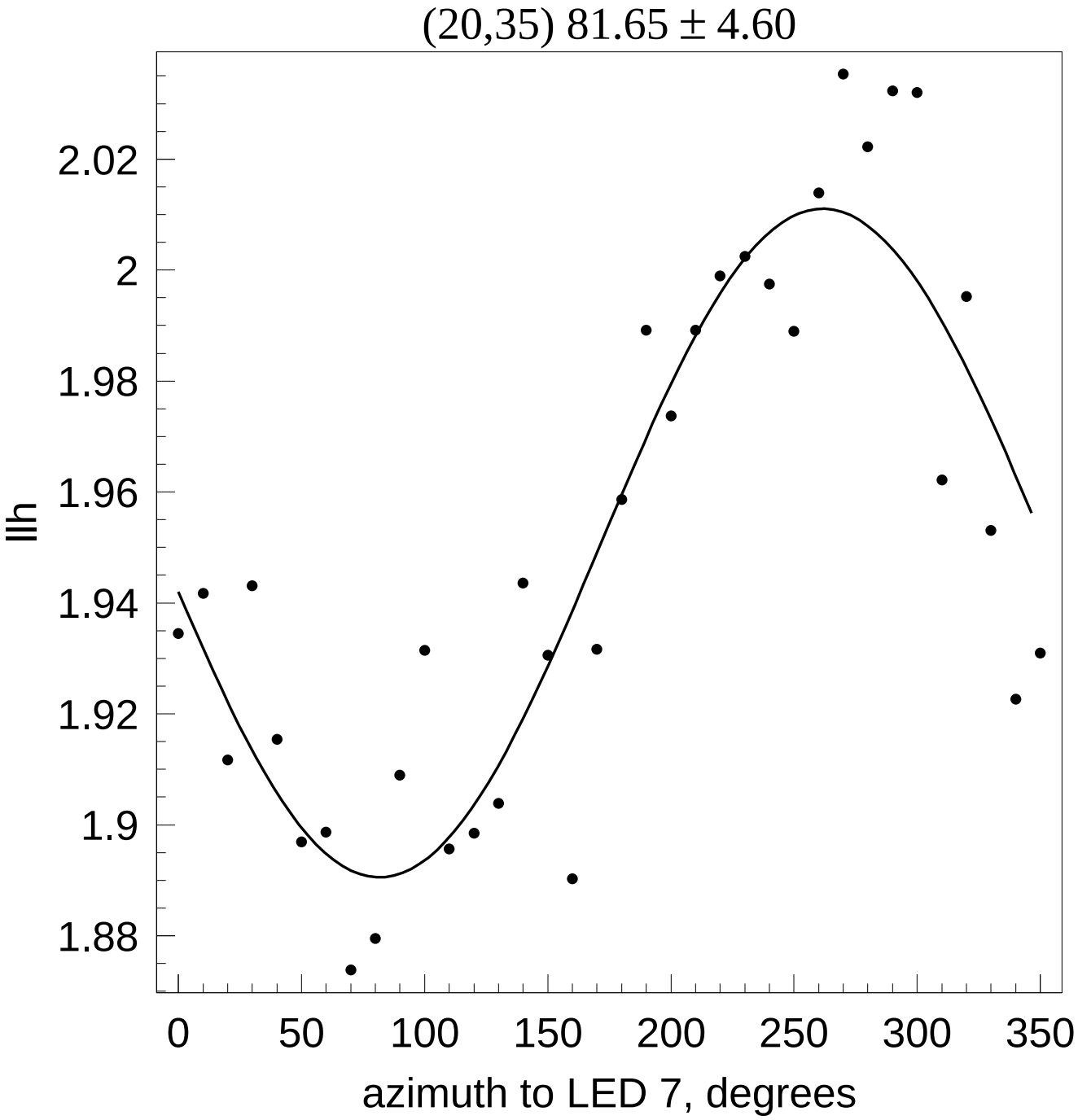

(20,34)
10
11
4
9
5
3
280
6
12
2
1
8
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
283.7 ± 14.1

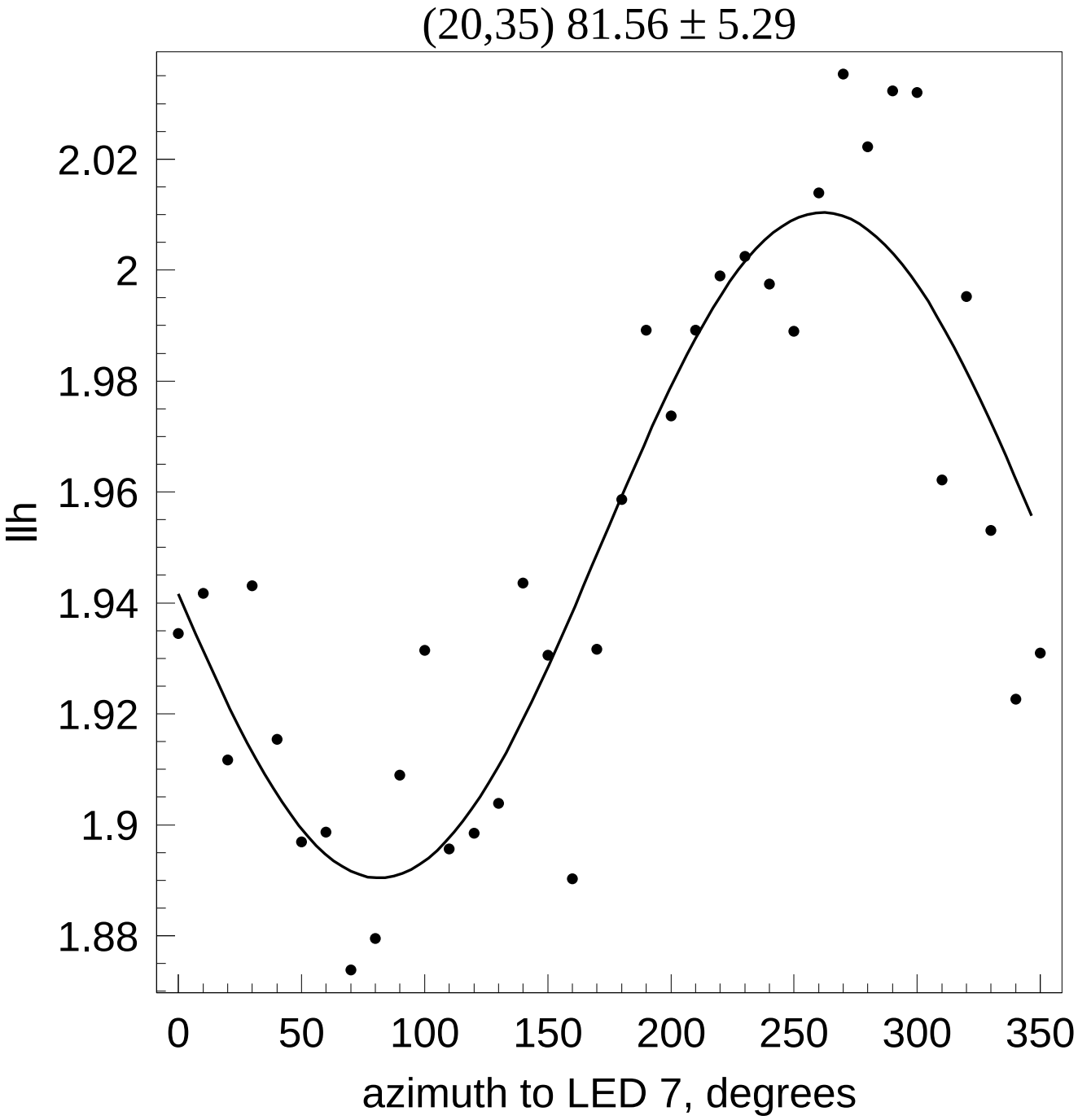

(20,34) 282.38 ± 0.53
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

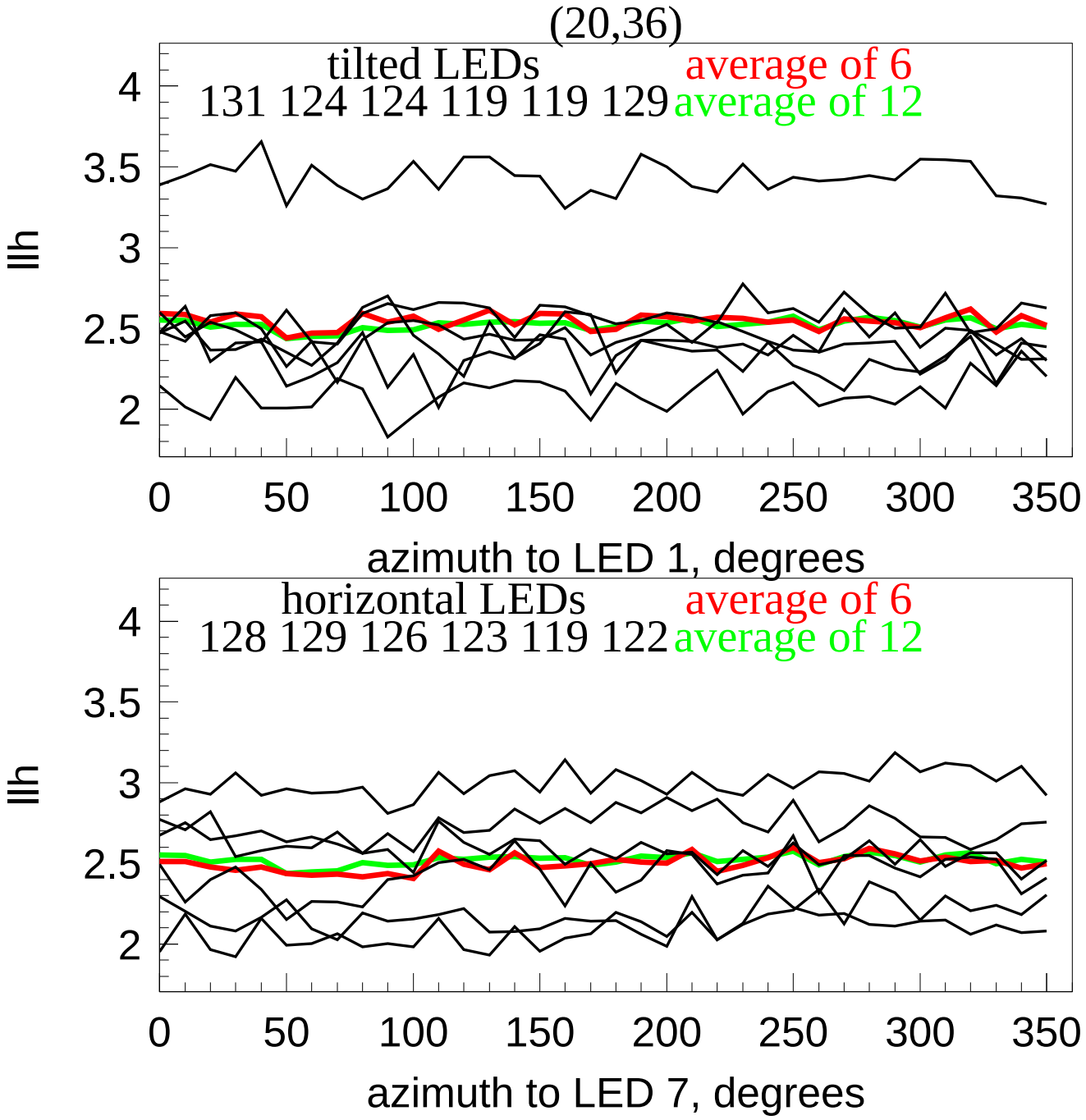

(20,34) 282.48 ± 0.54
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

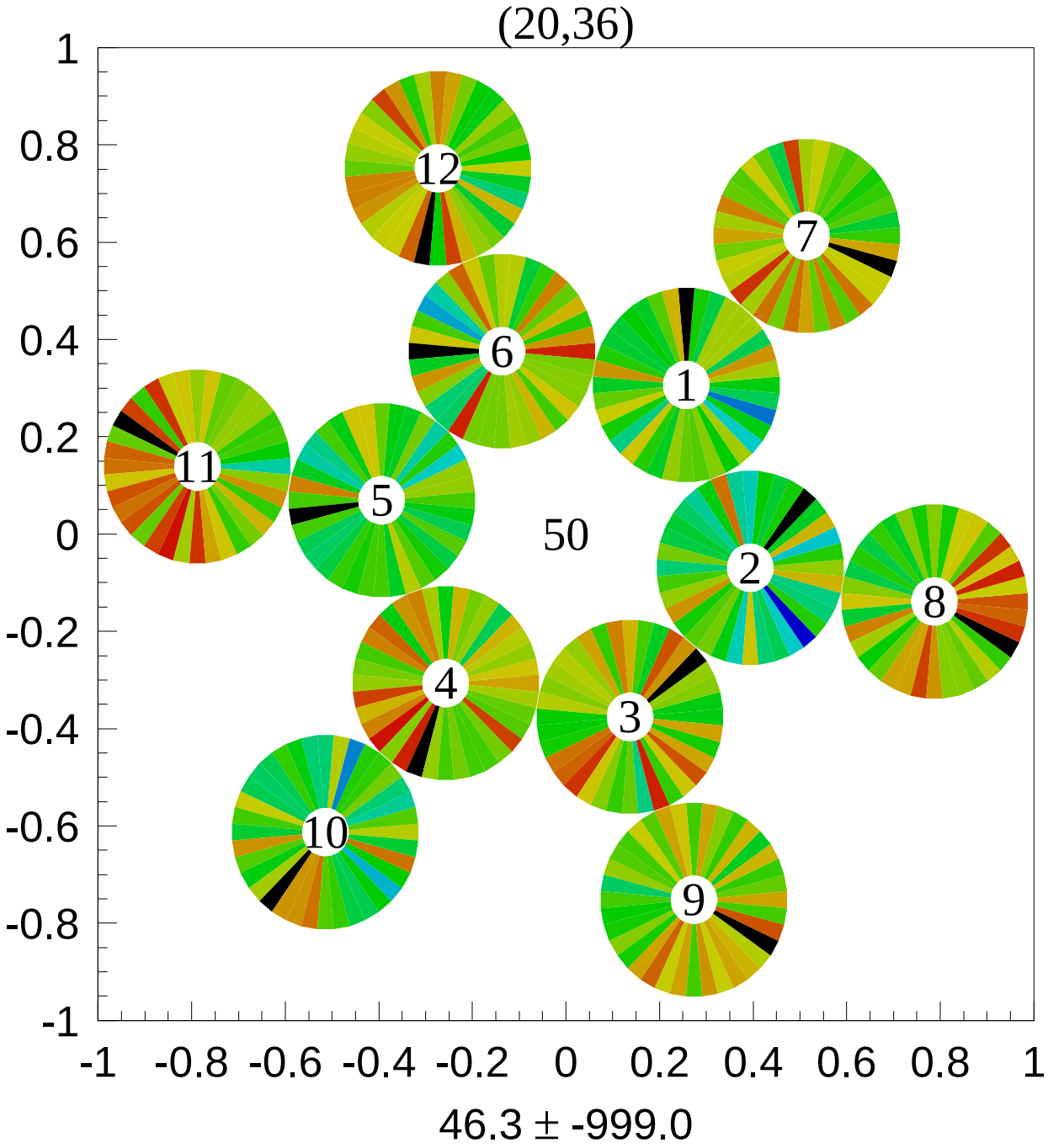

(20,35)
tilted LEDs
128 127 130 124 128 132
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 123 128 129 125 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

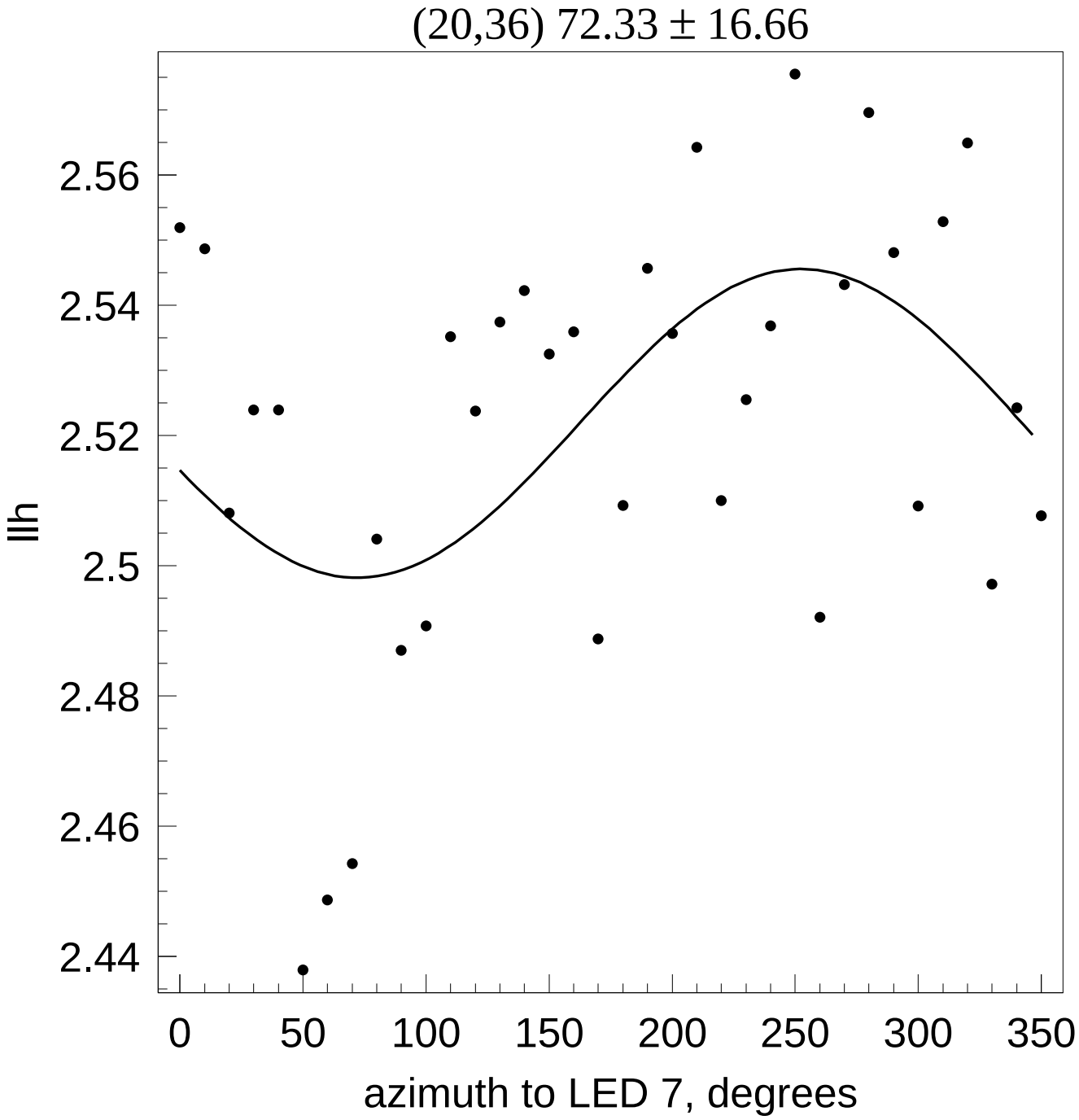

(20,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
70
5
11
3
4
9
10
91.7 ± 55.9

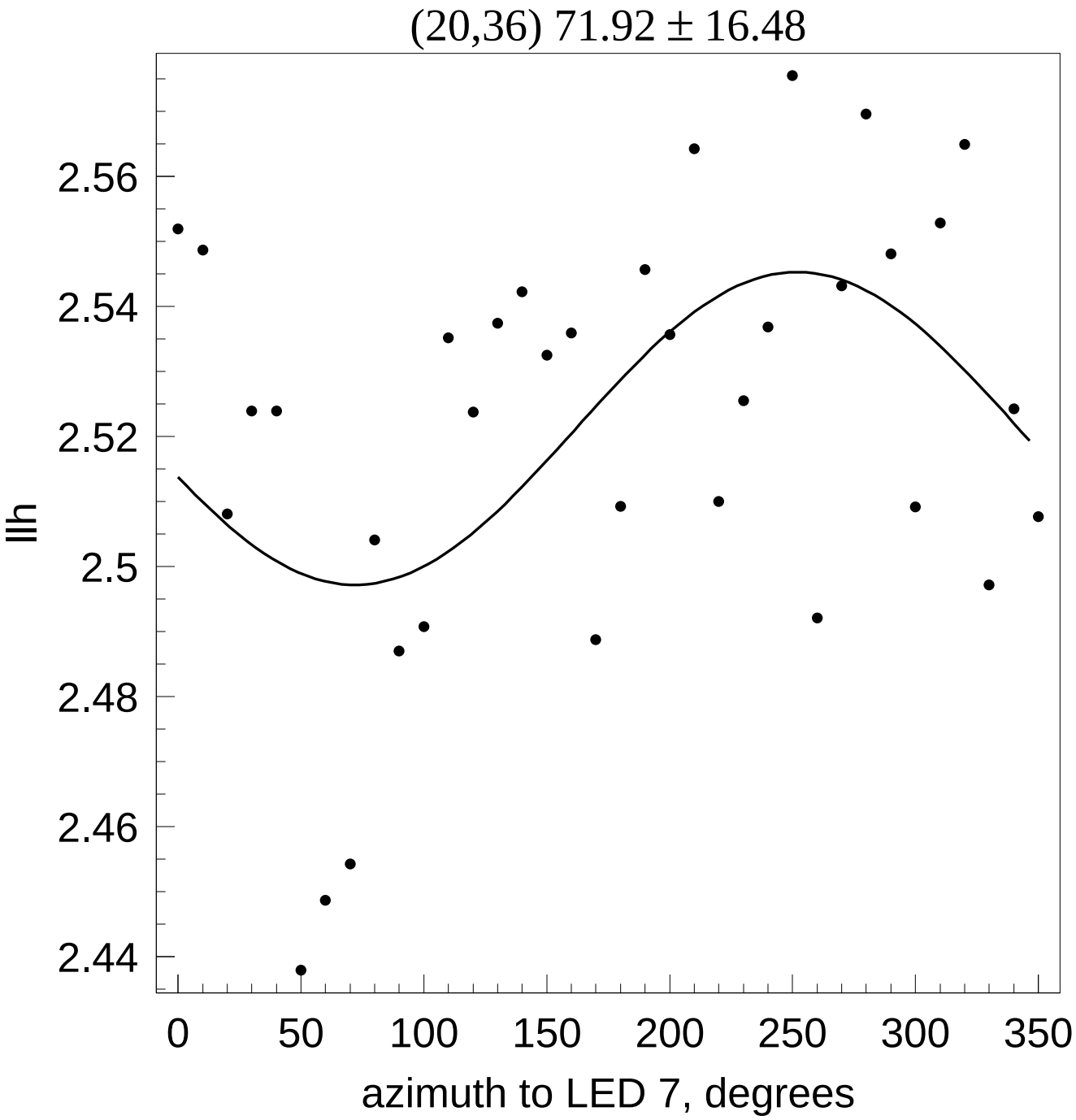

(20,35) 81.65 ± 4.60
2.02
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

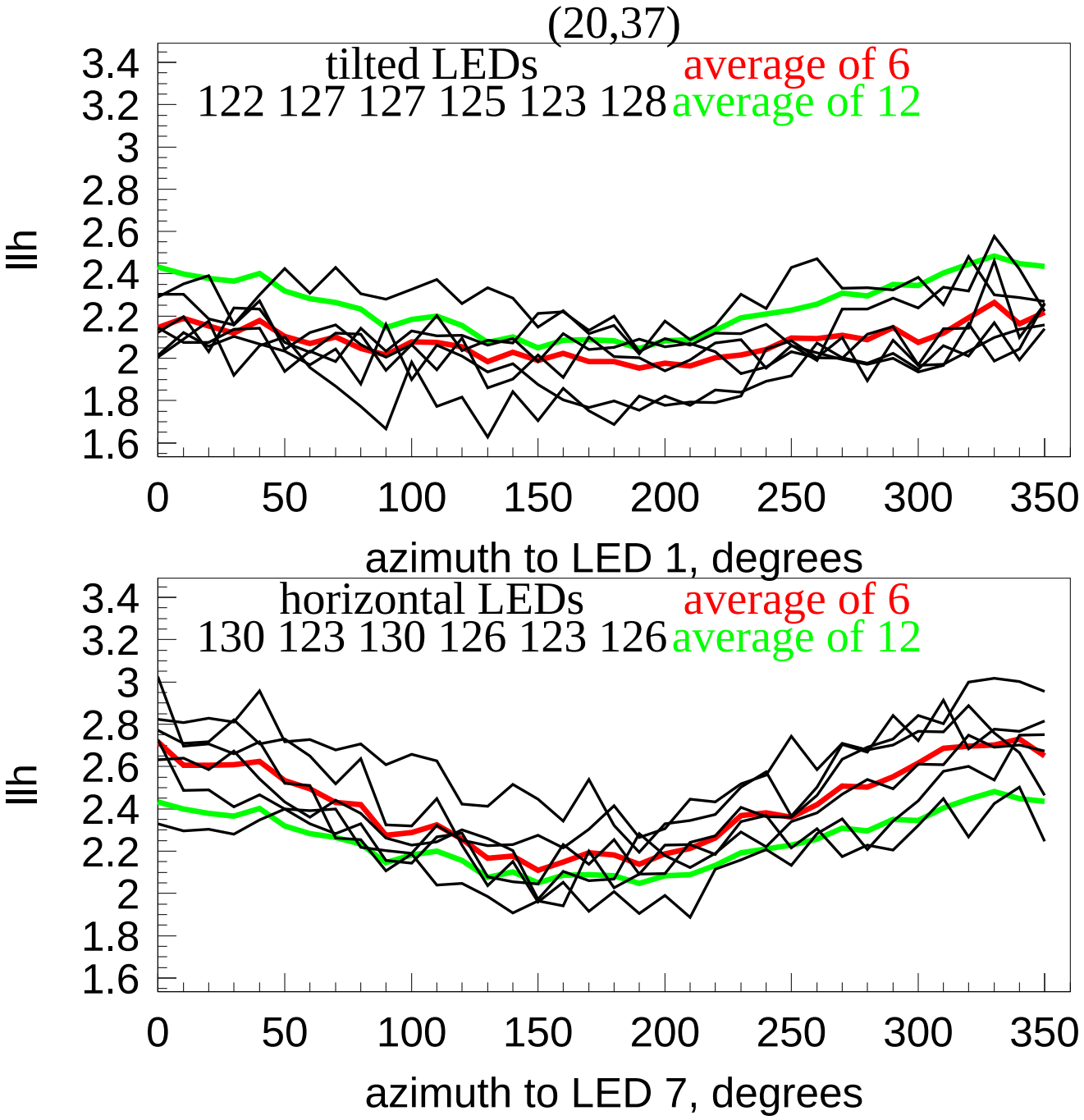

(20,35) 81.56 ± 5.29
2.02
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

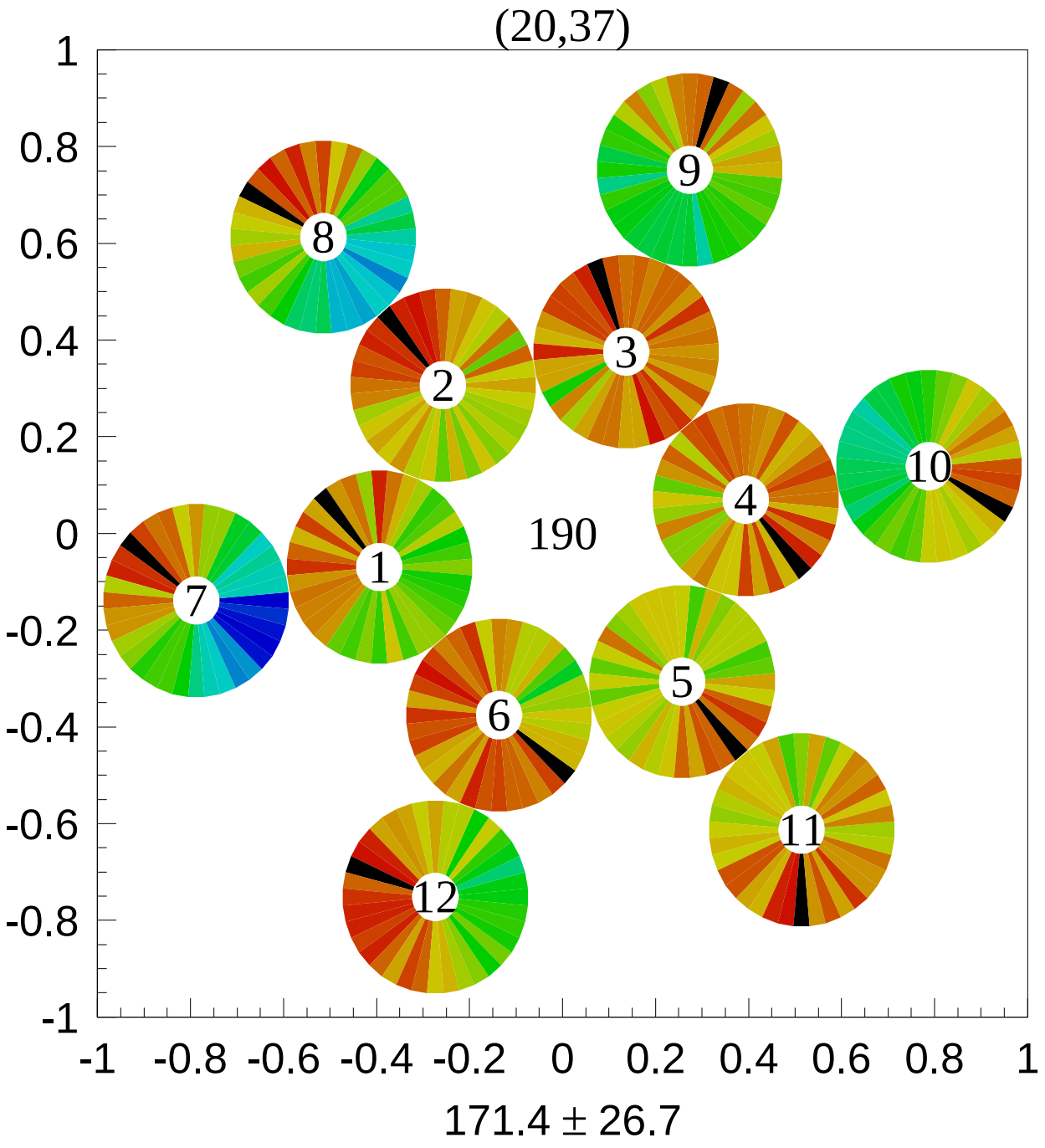

(20,36)
tilted LEDs
131 124 124 119 119 129
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
128 129 126 123 119 122
average of 6
average of 12
IIh
azimuth to LED 7, degrees

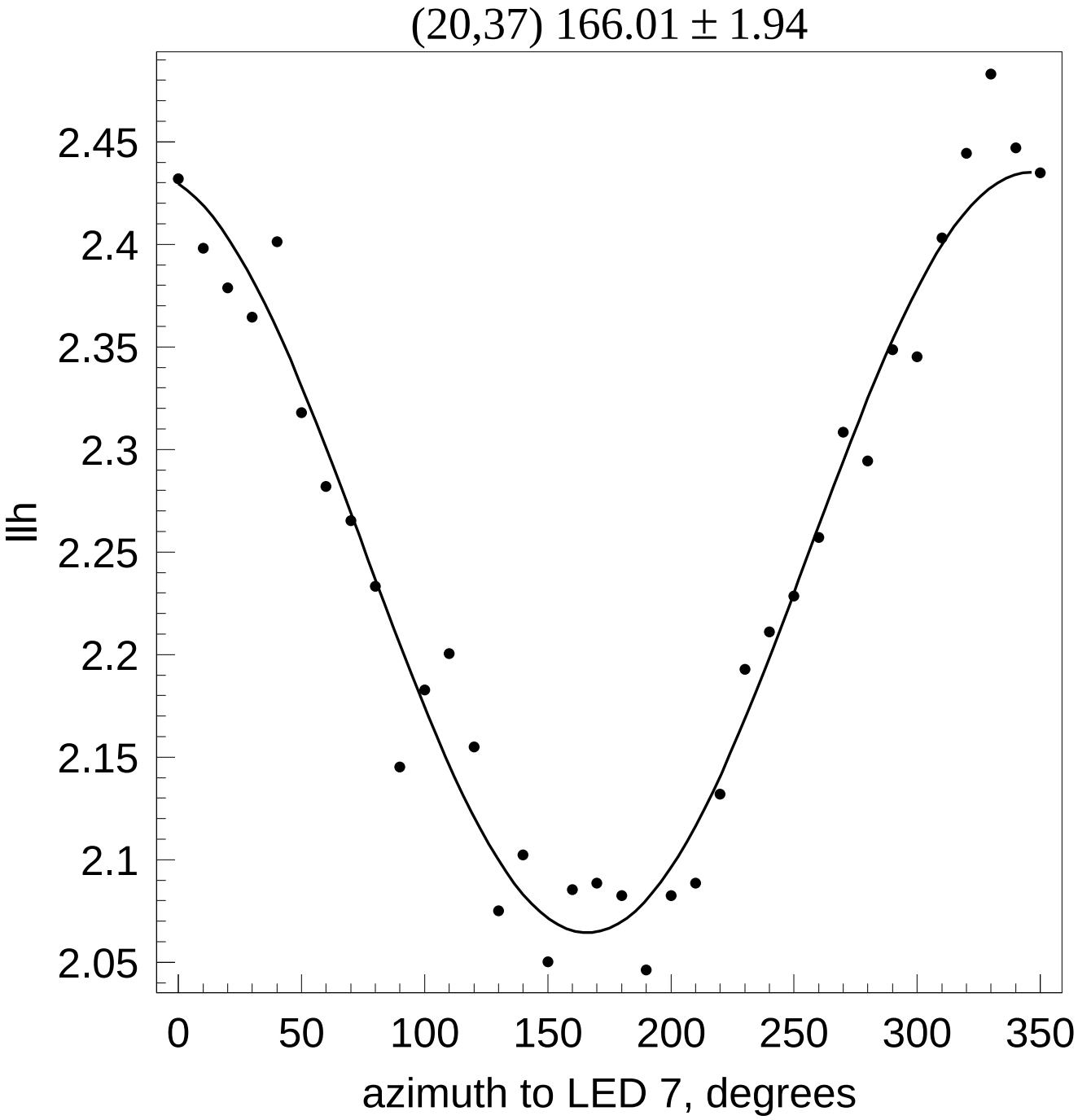

(20,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
46.3 ± -999.0

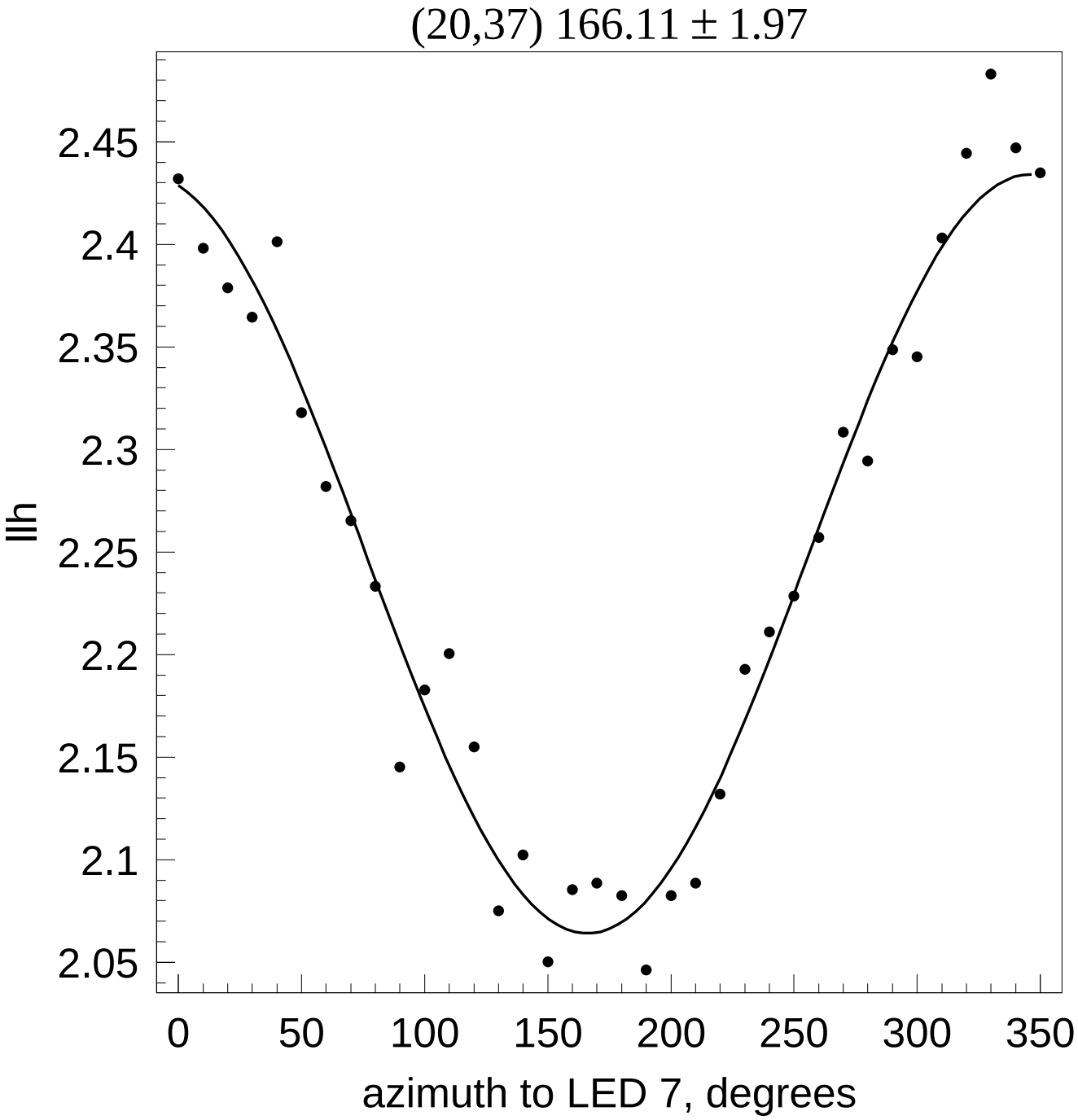

(20,36) 72.33 ± 16.66
2.56
2.54
2.52
2.5
2.48
2.46
2.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

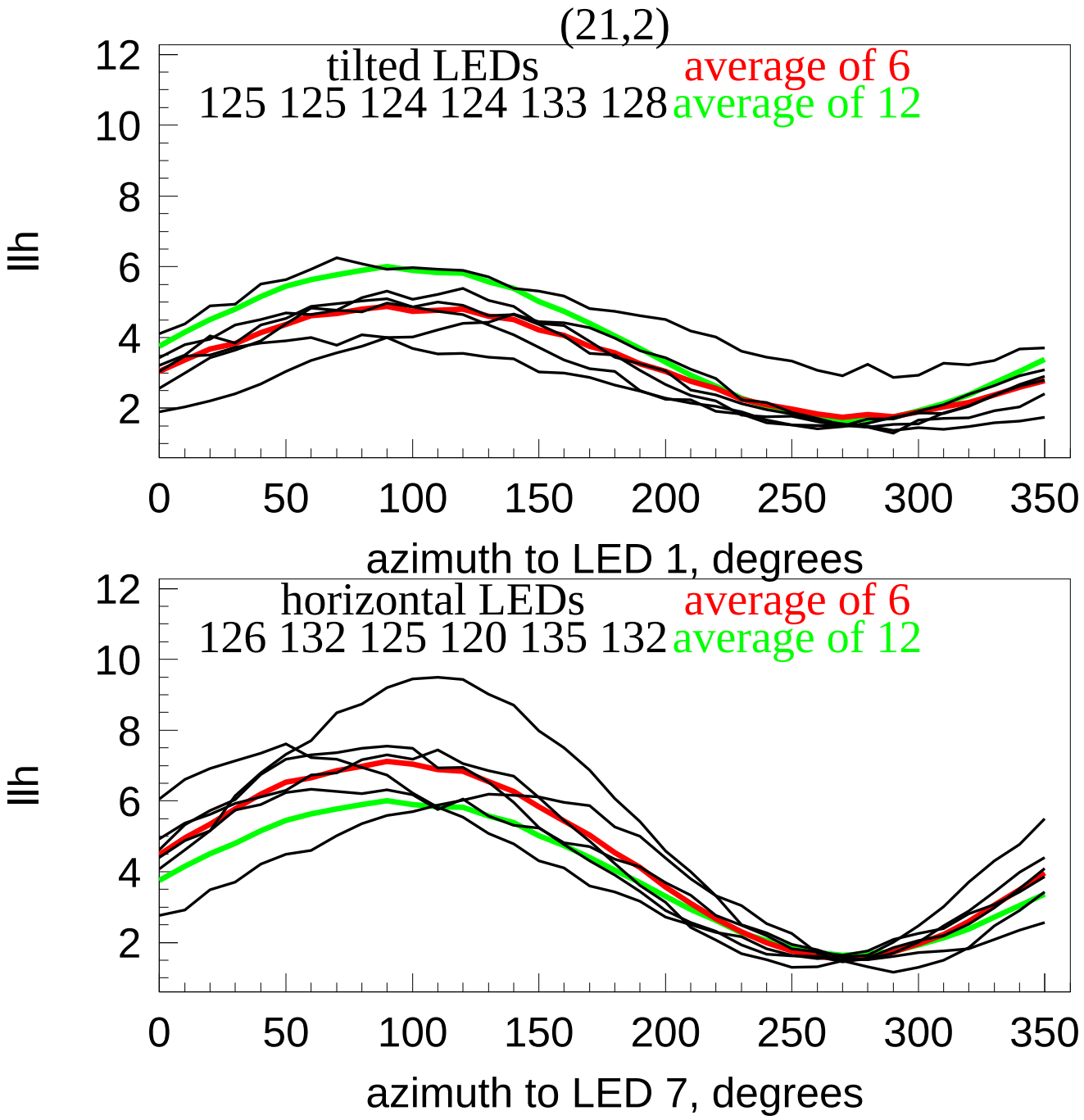

(20,36) 71.92 ± 16.48
2.56
2.54
2.52
2.5
2.48
2.46
2.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

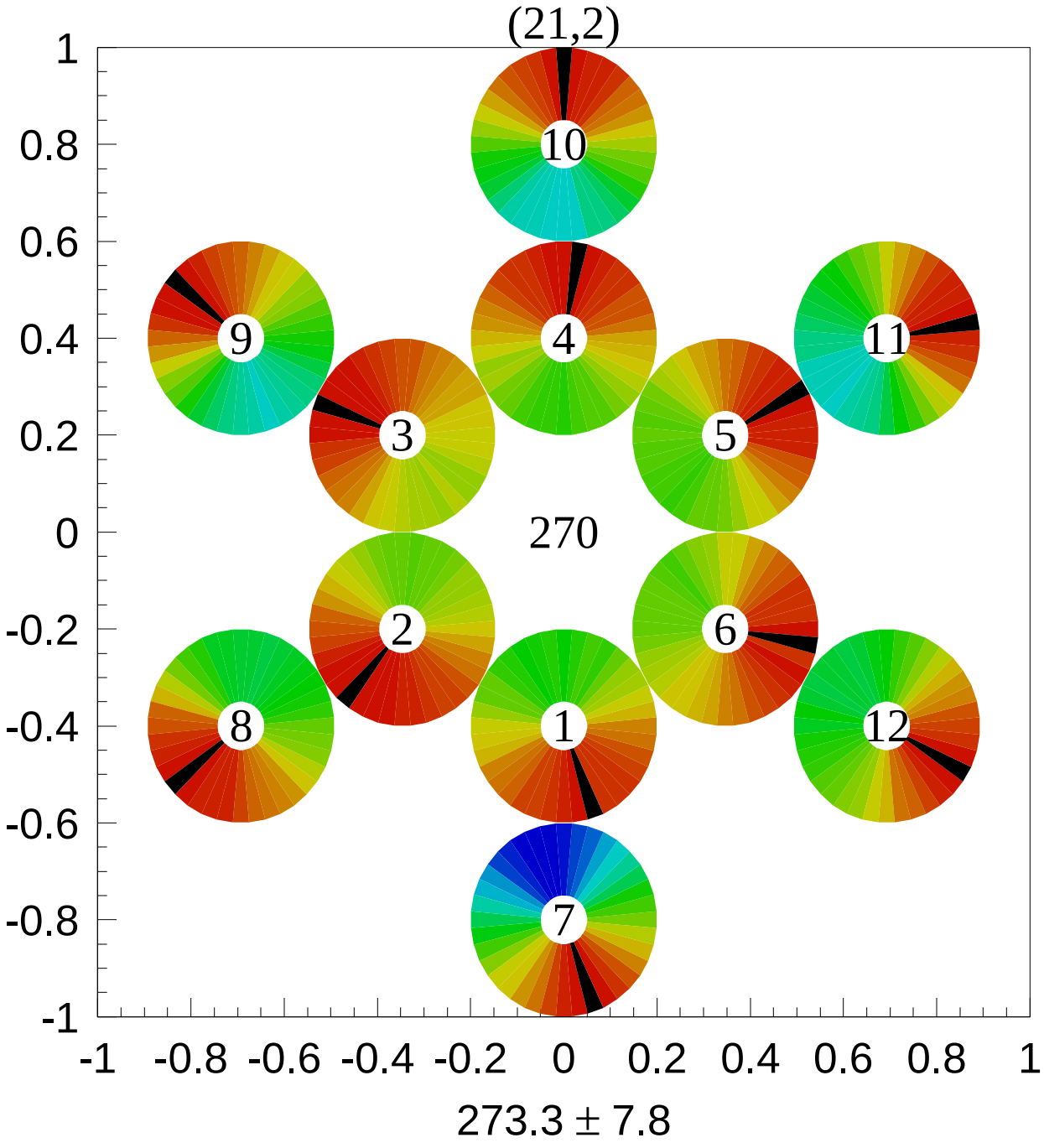

(20,37)
tilted LEDs
122 127 127 125 123 128
average of 6
average of 12
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 123 130 126 123 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

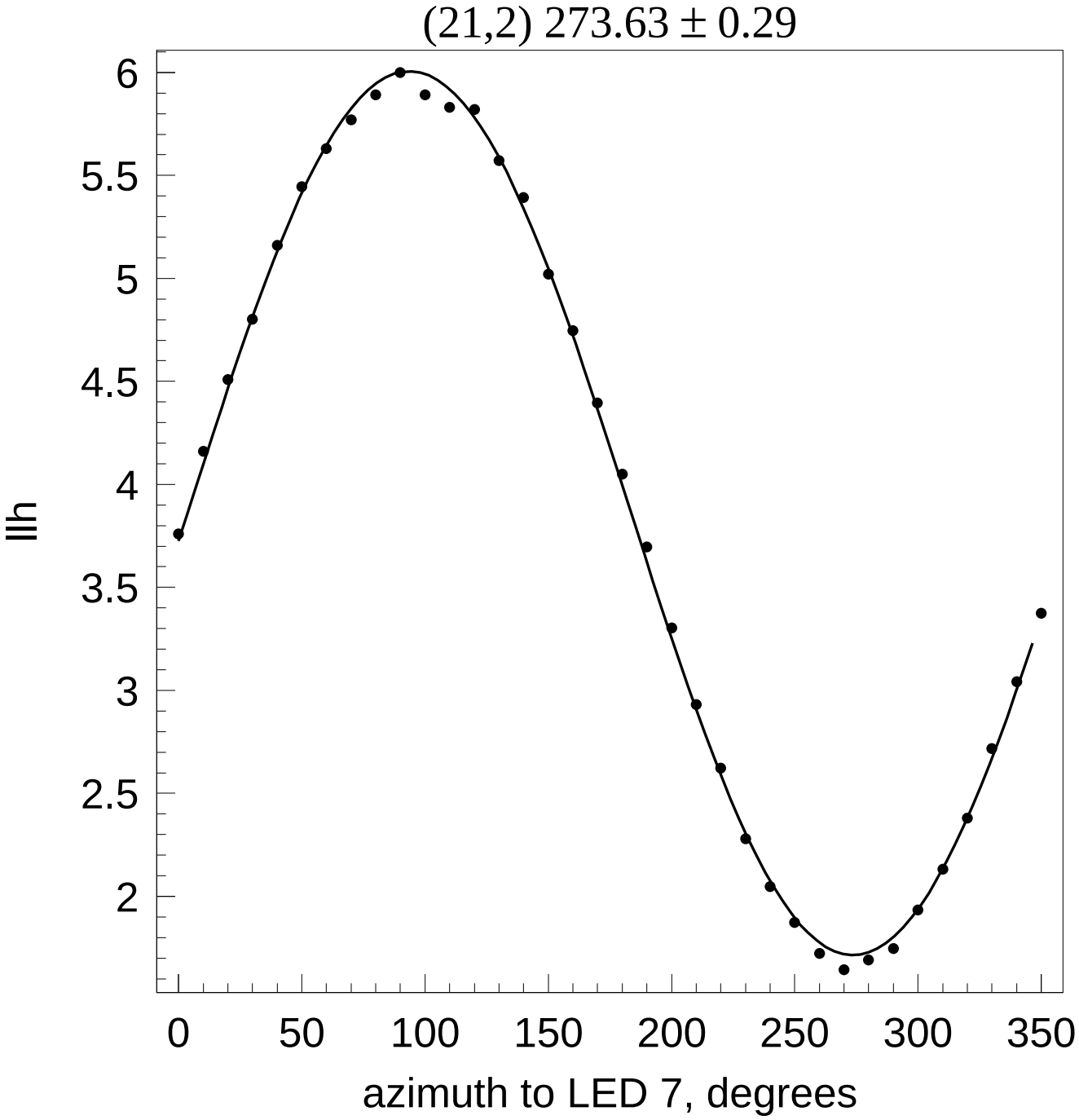

(20,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
171.4 ± 26.7
190
1
2
3
4
5
6
7
8
9
10
11
12

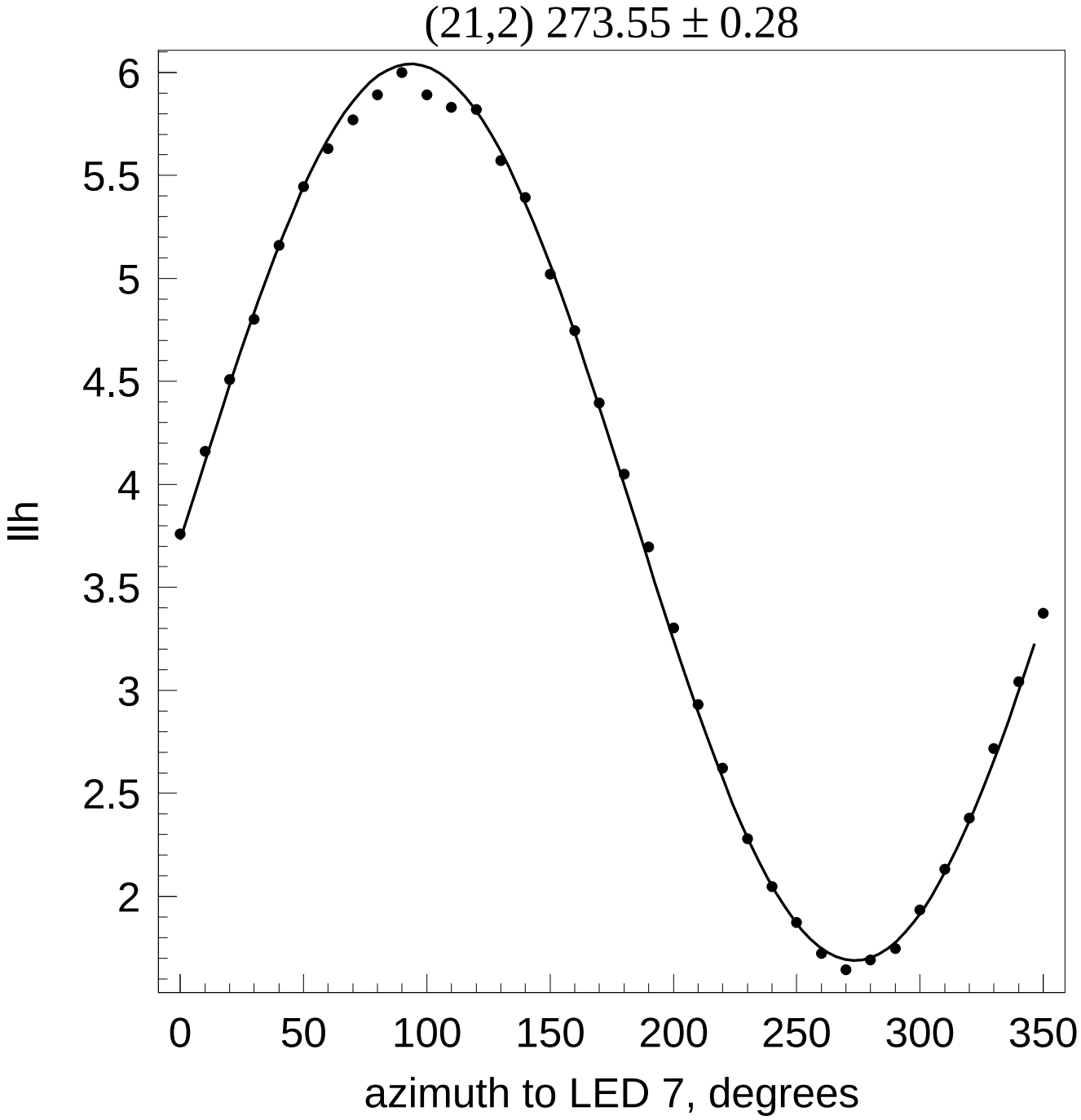

(20,37) 166.01 ± 1.94
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
2.05
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

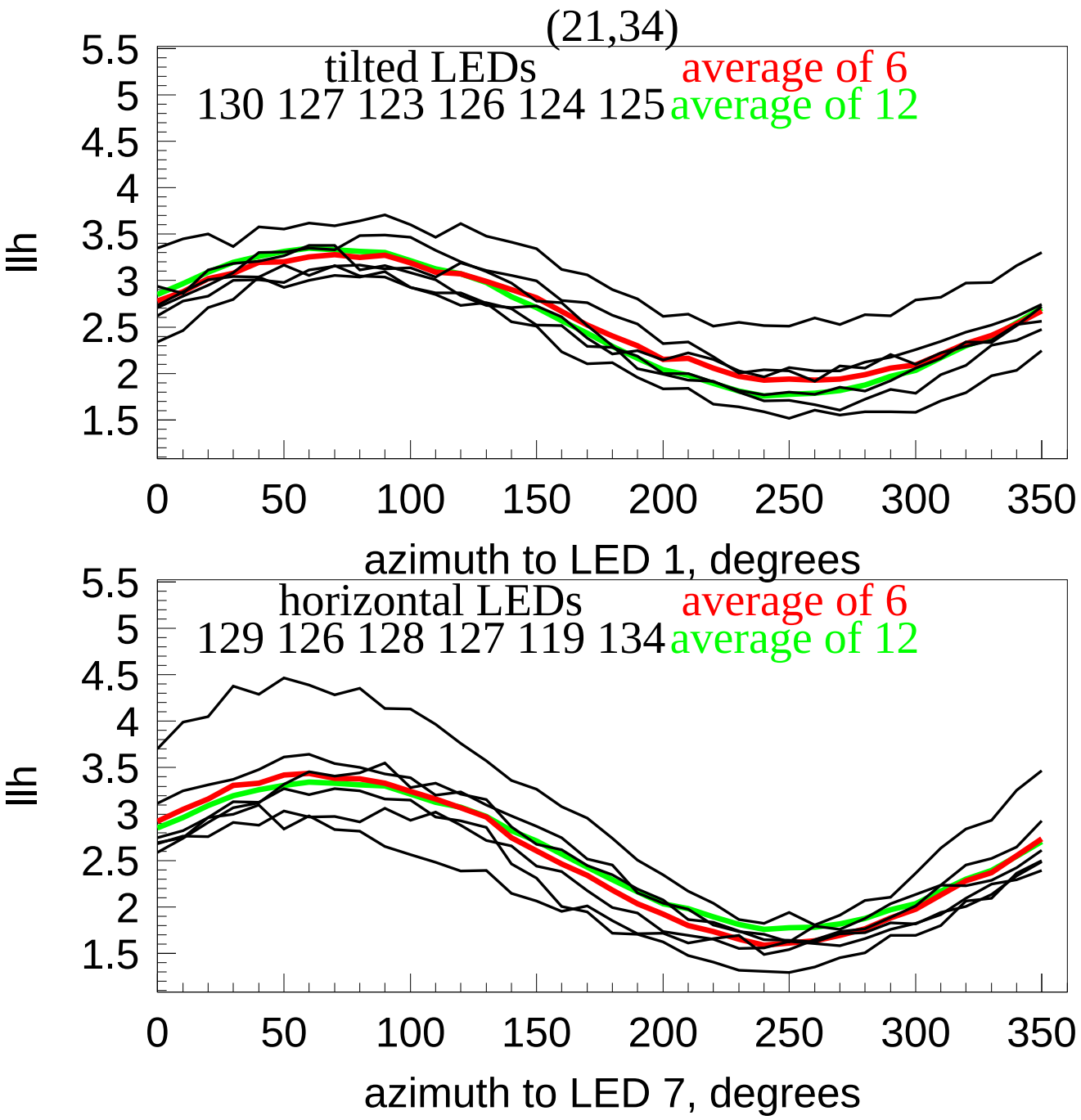

(20,37) 166.11 ± 1.97
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
2.05
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

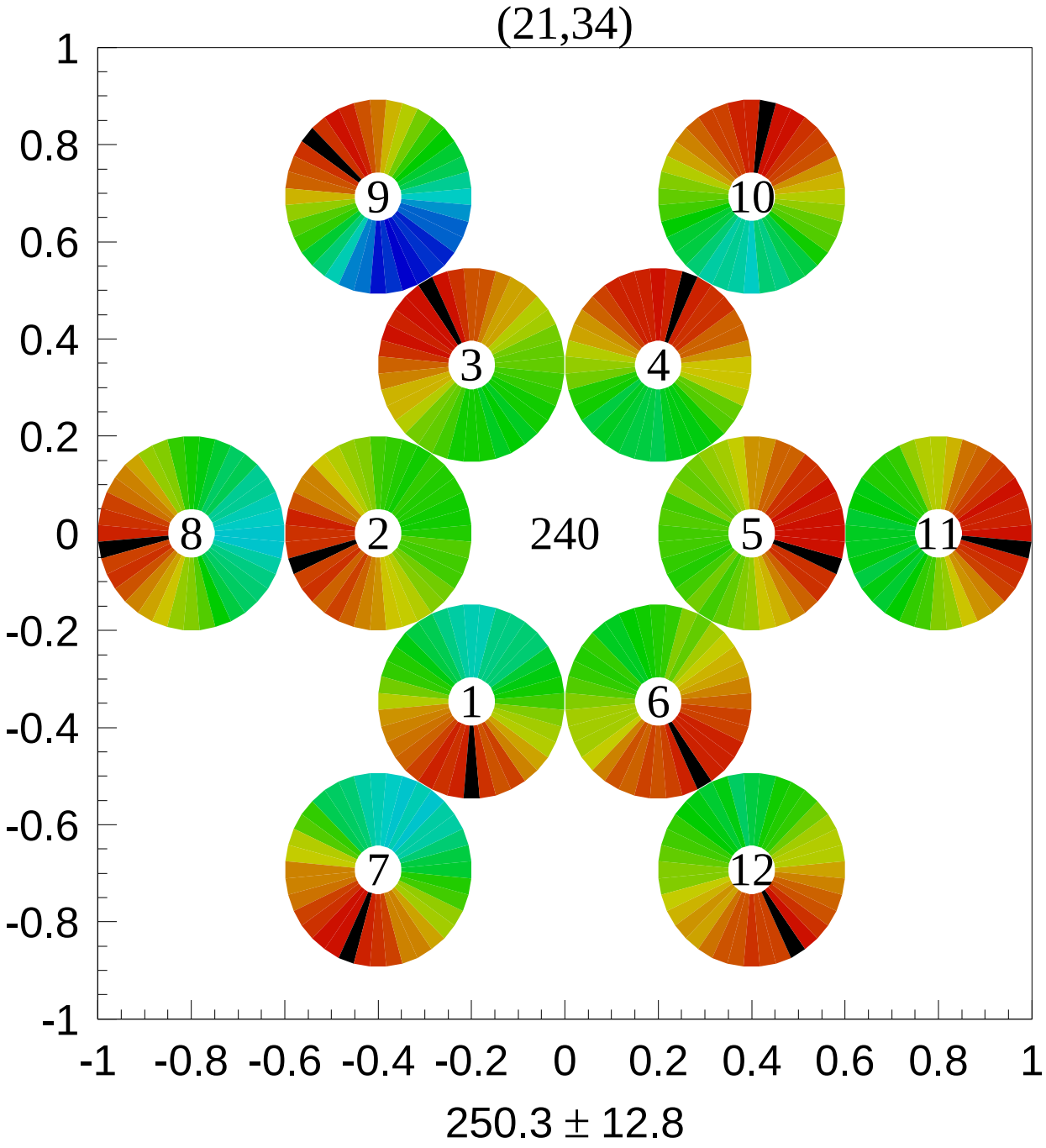

(21,2)
tilted LEDs
125 125 124 124 133 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 132 125 120 135 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

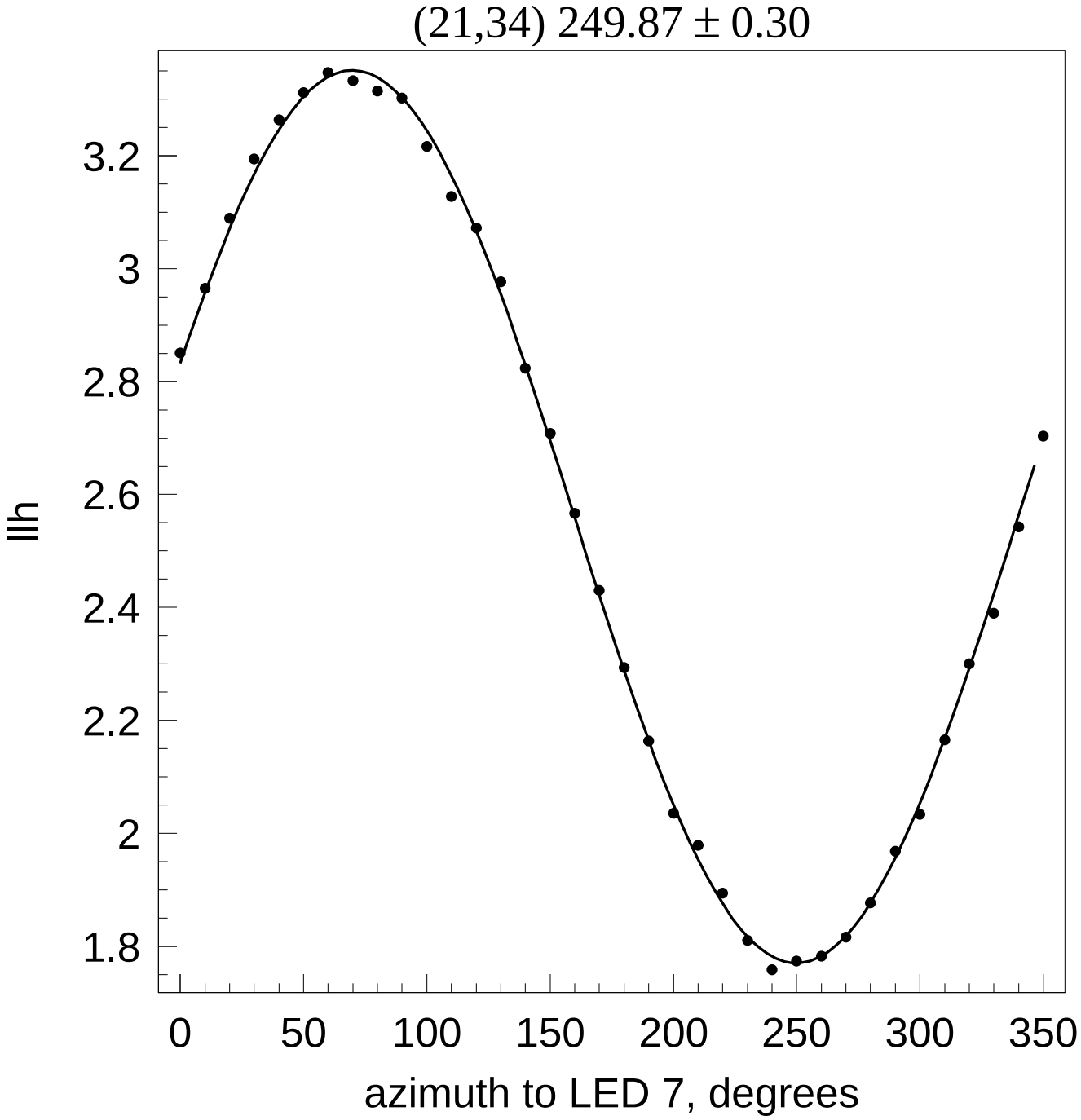

(21,2)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
273.3 ± 7.8

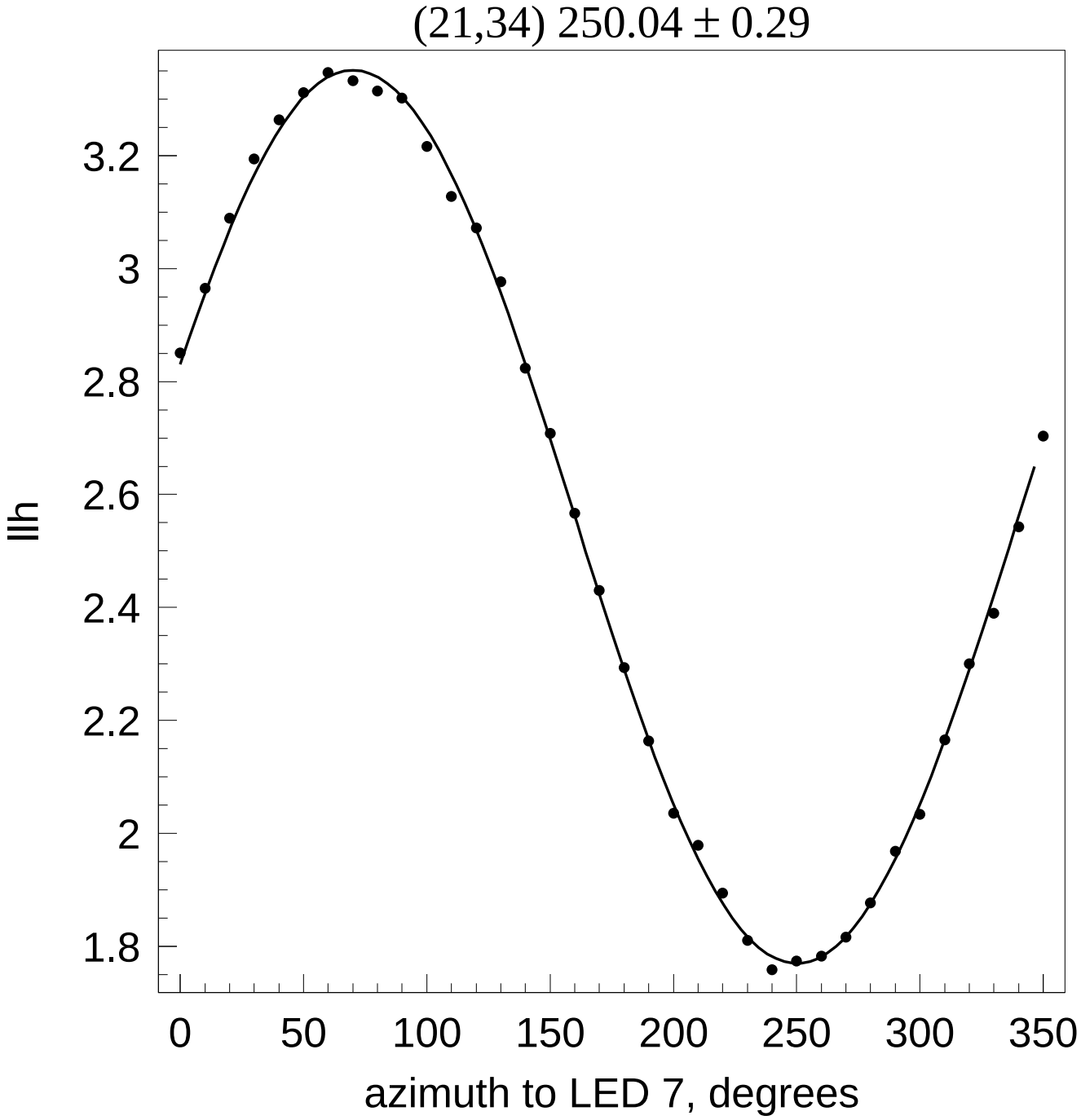

(21,2) 273.63 ± 0.29
6
5.5
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

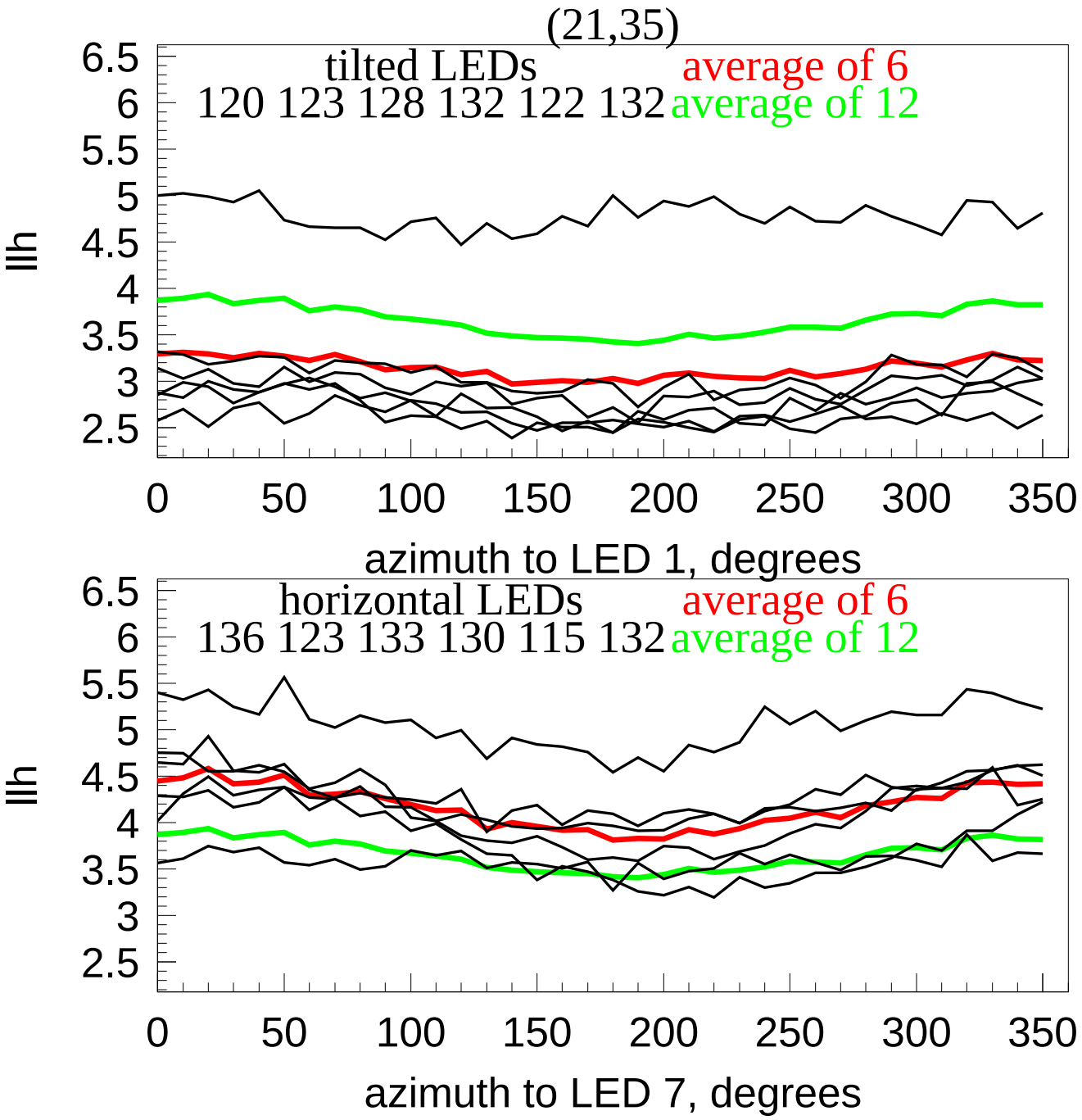

(21,2) 273.55 ± 0.28
6
5.5
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

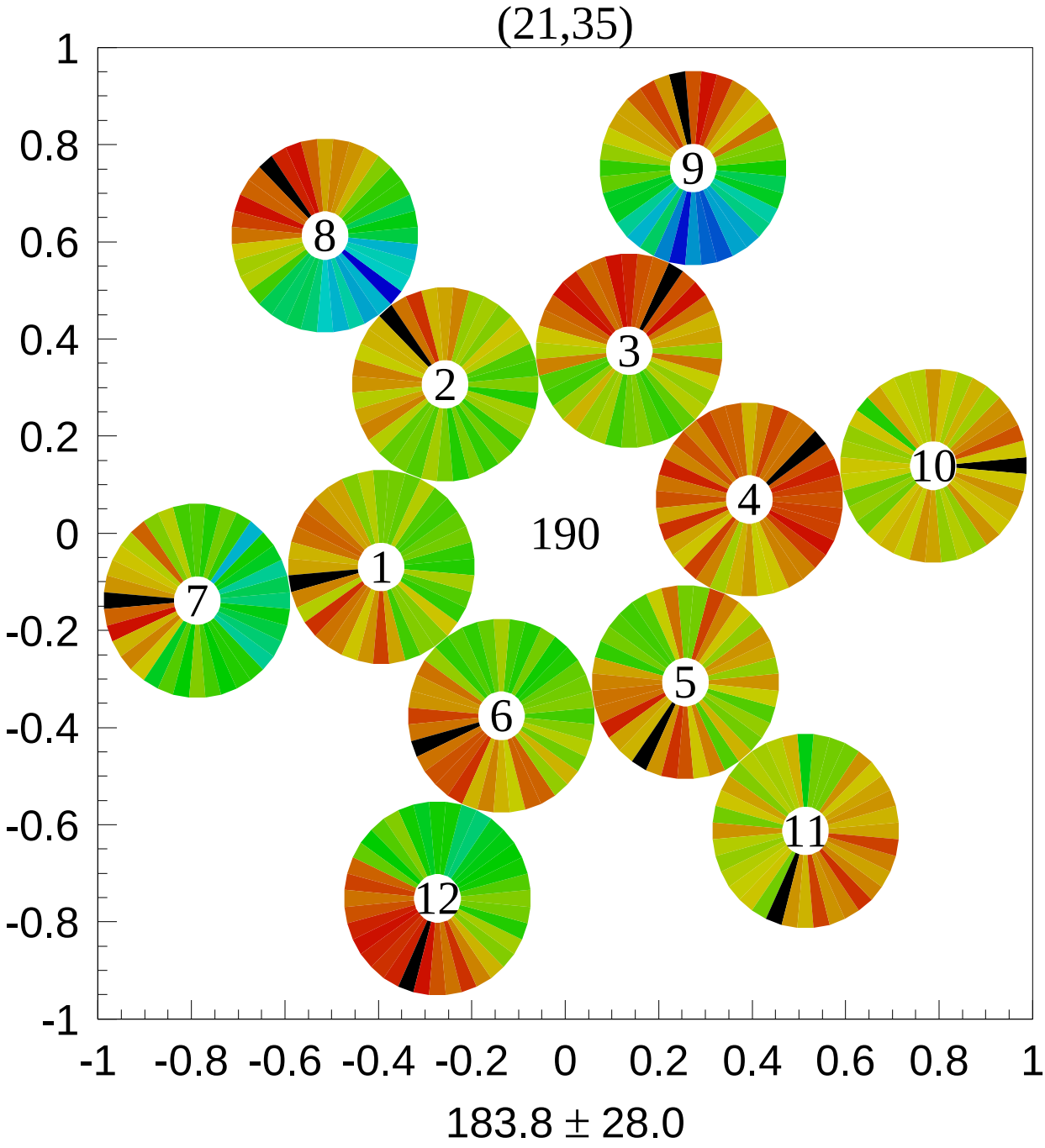

(21,34)
tilted LEDs
130 127 123 126 124 125
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 126 128 127 119 134
average of 6
average of 12
llh
azimuth to LED 7, degrees

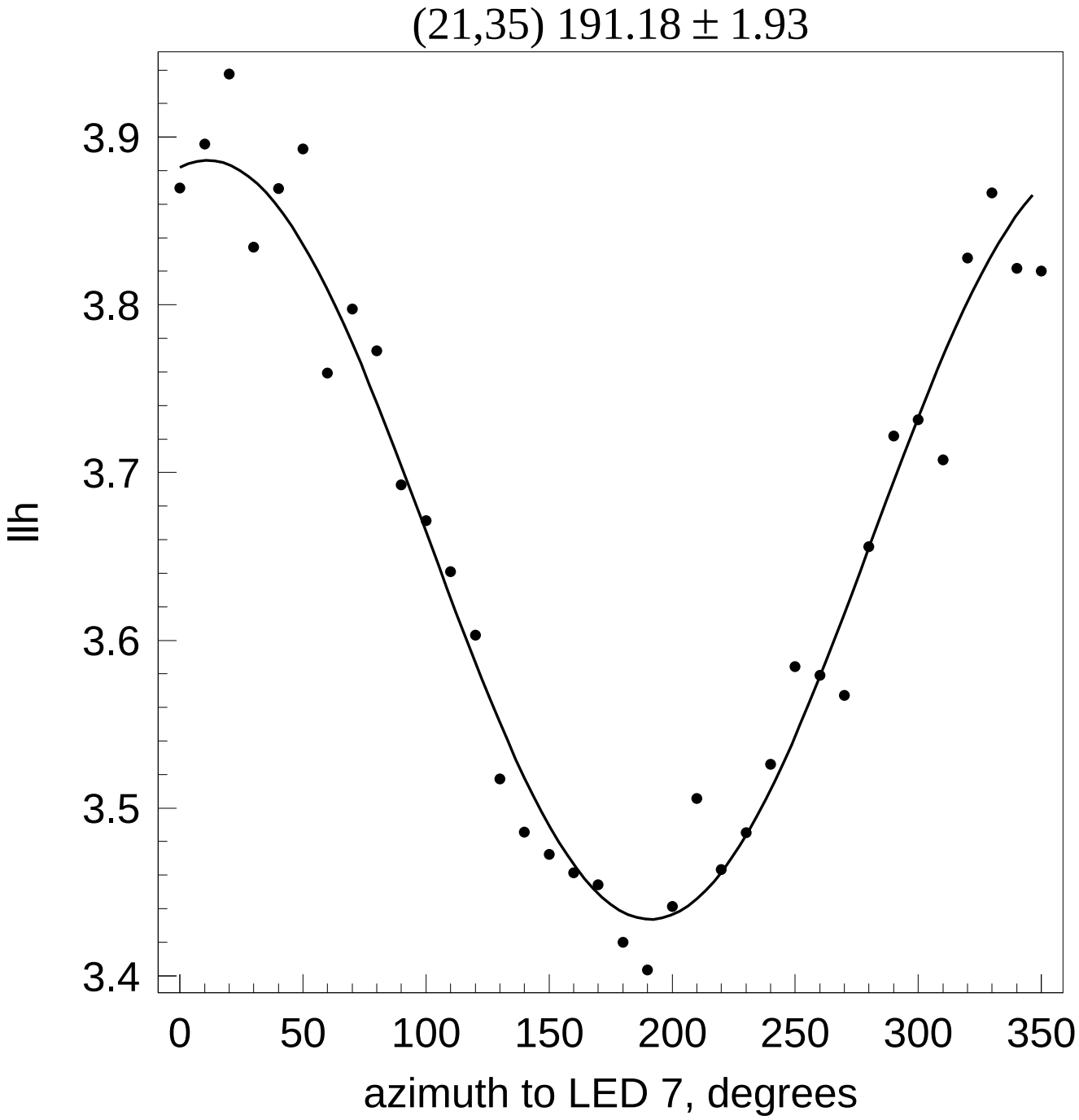

(21,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
250.3 ± 12.8

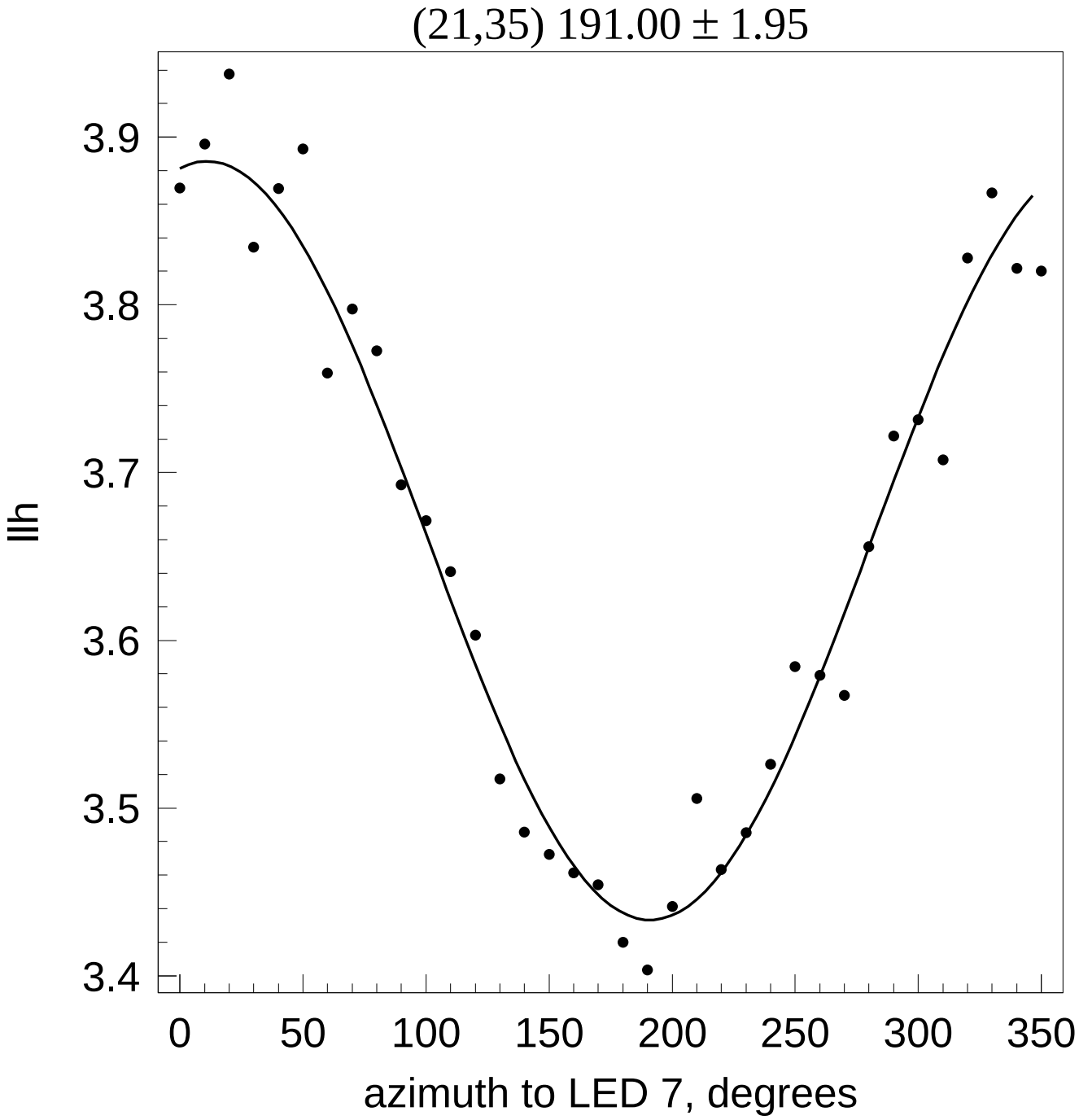

(21,34) 249.87 ± 0.30
llh
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

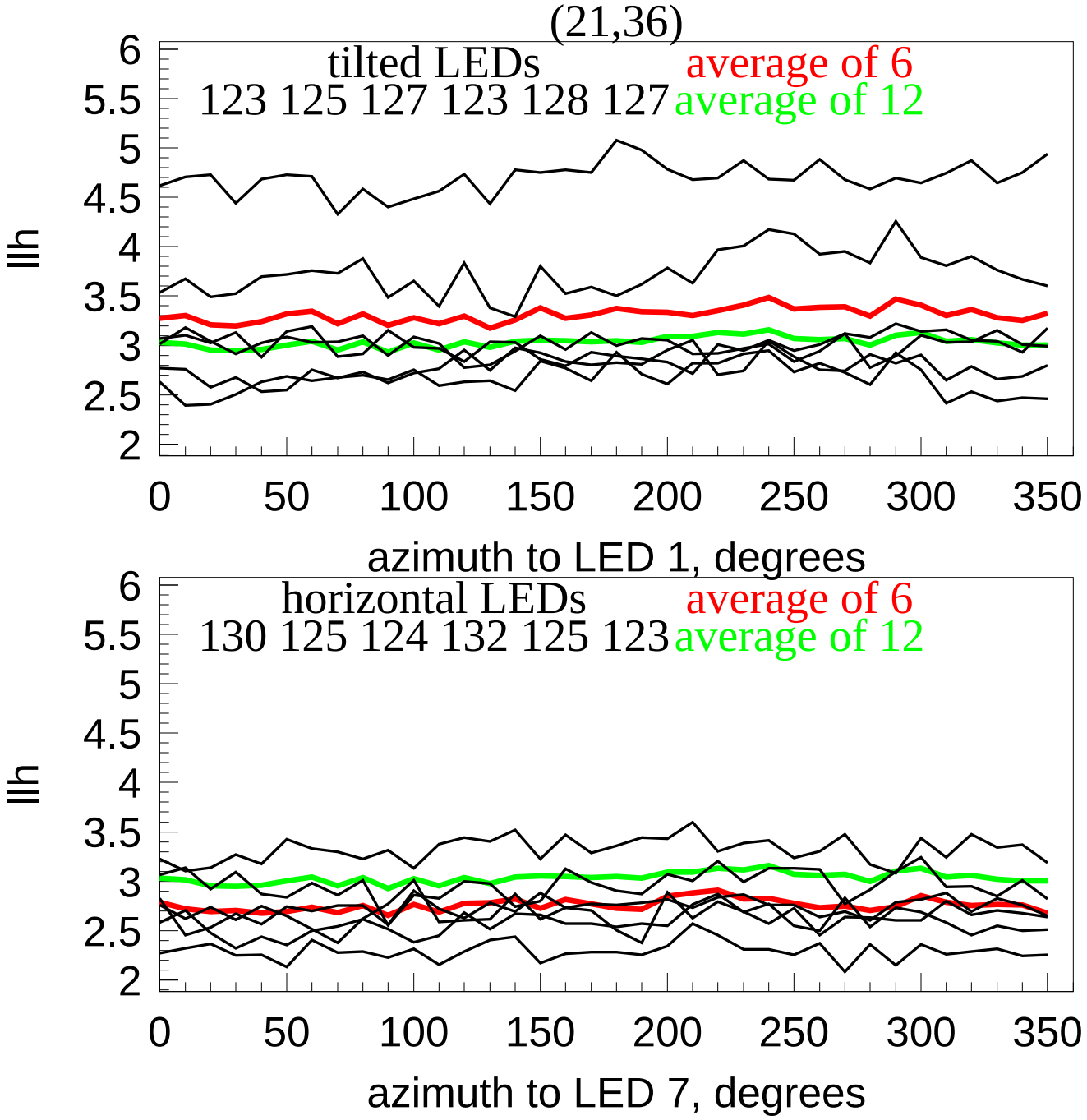

(21,34) 250.04 ± 0.29
llh
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

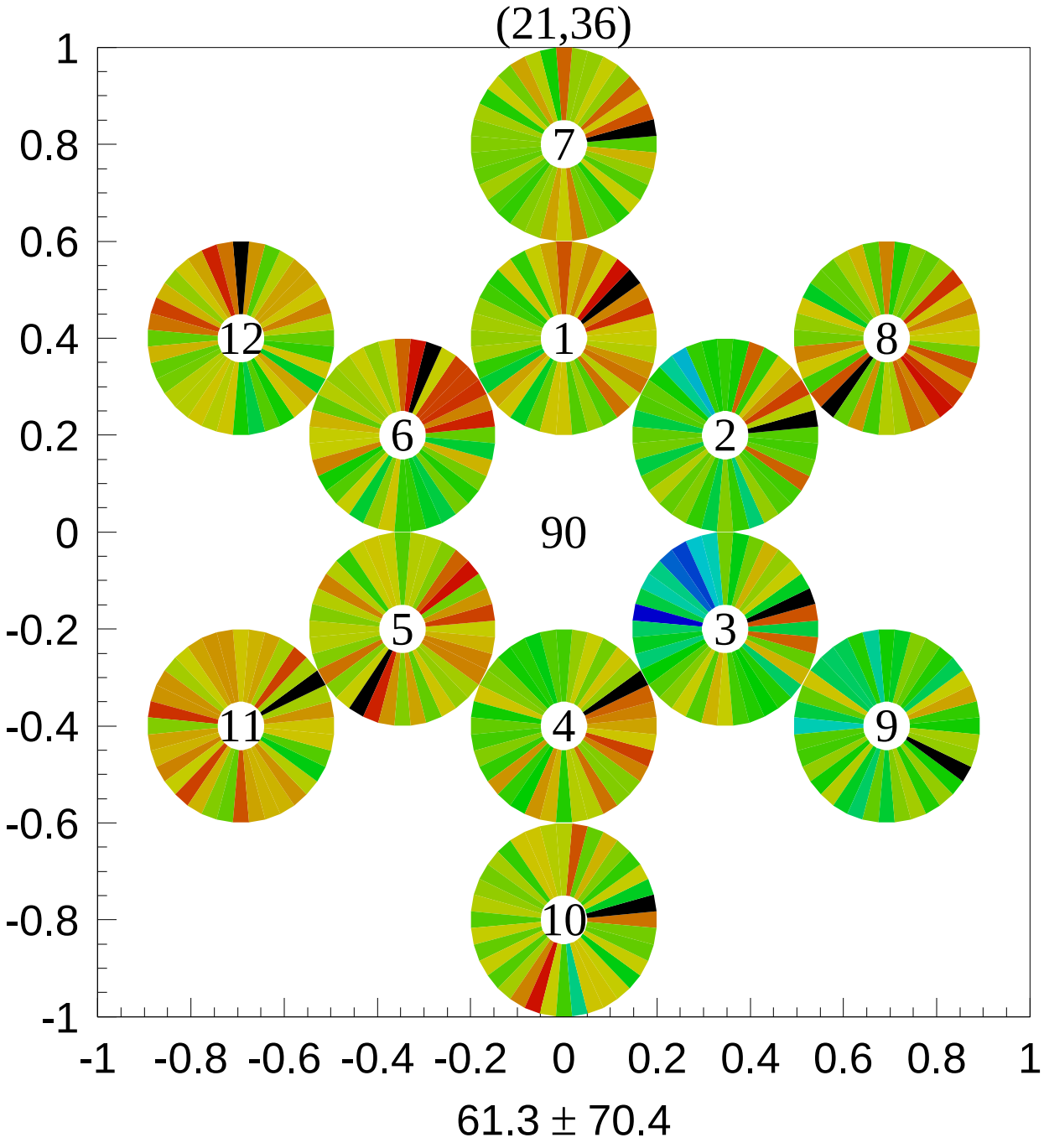

(21,35)
tilted LEDs
120 123 128 132 122 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
136 123 133 130 115 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

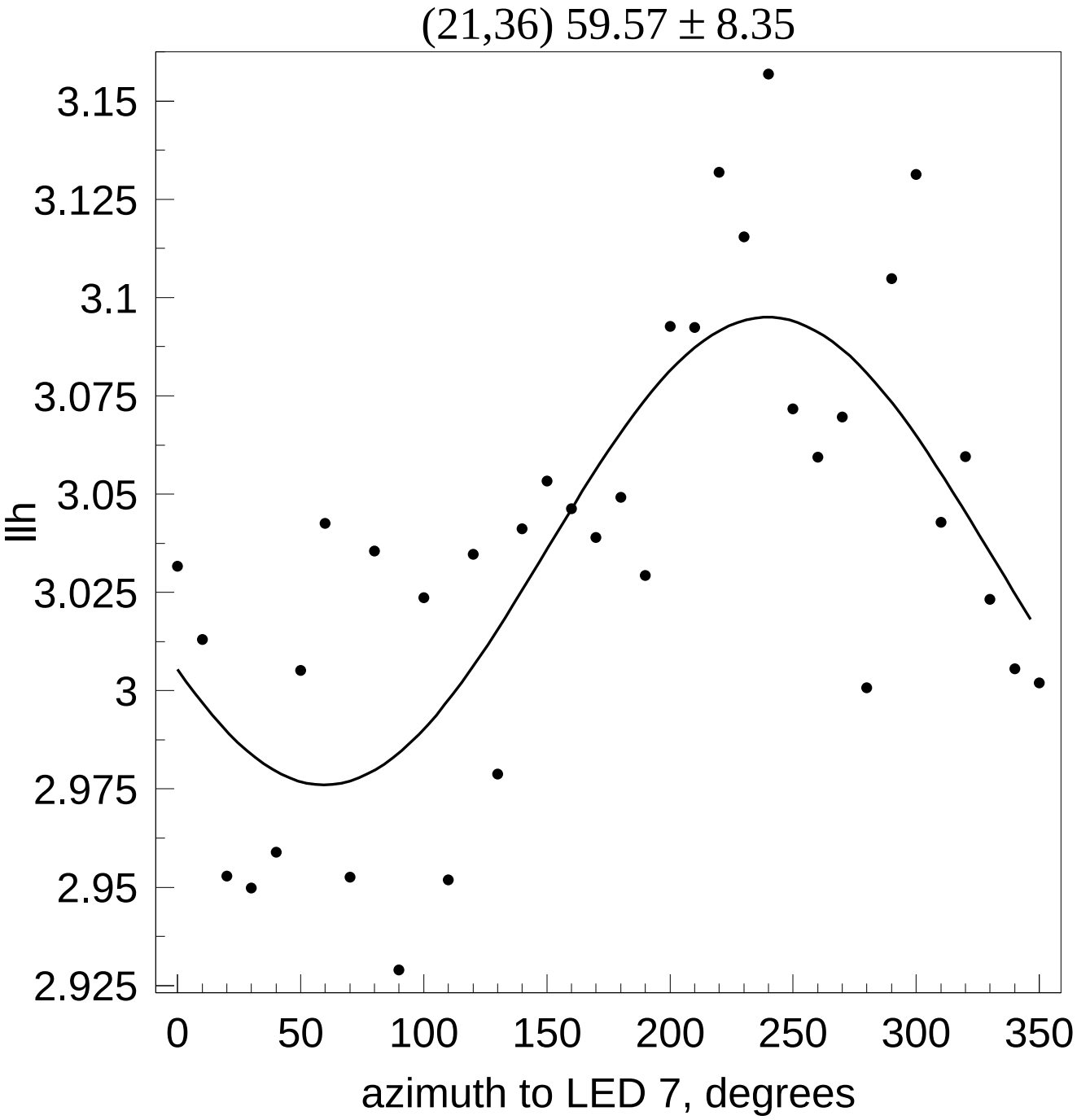

(21,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
183.8 ± 28.0
190
1
2
3
4
5
6
7
8
9
10
11
12

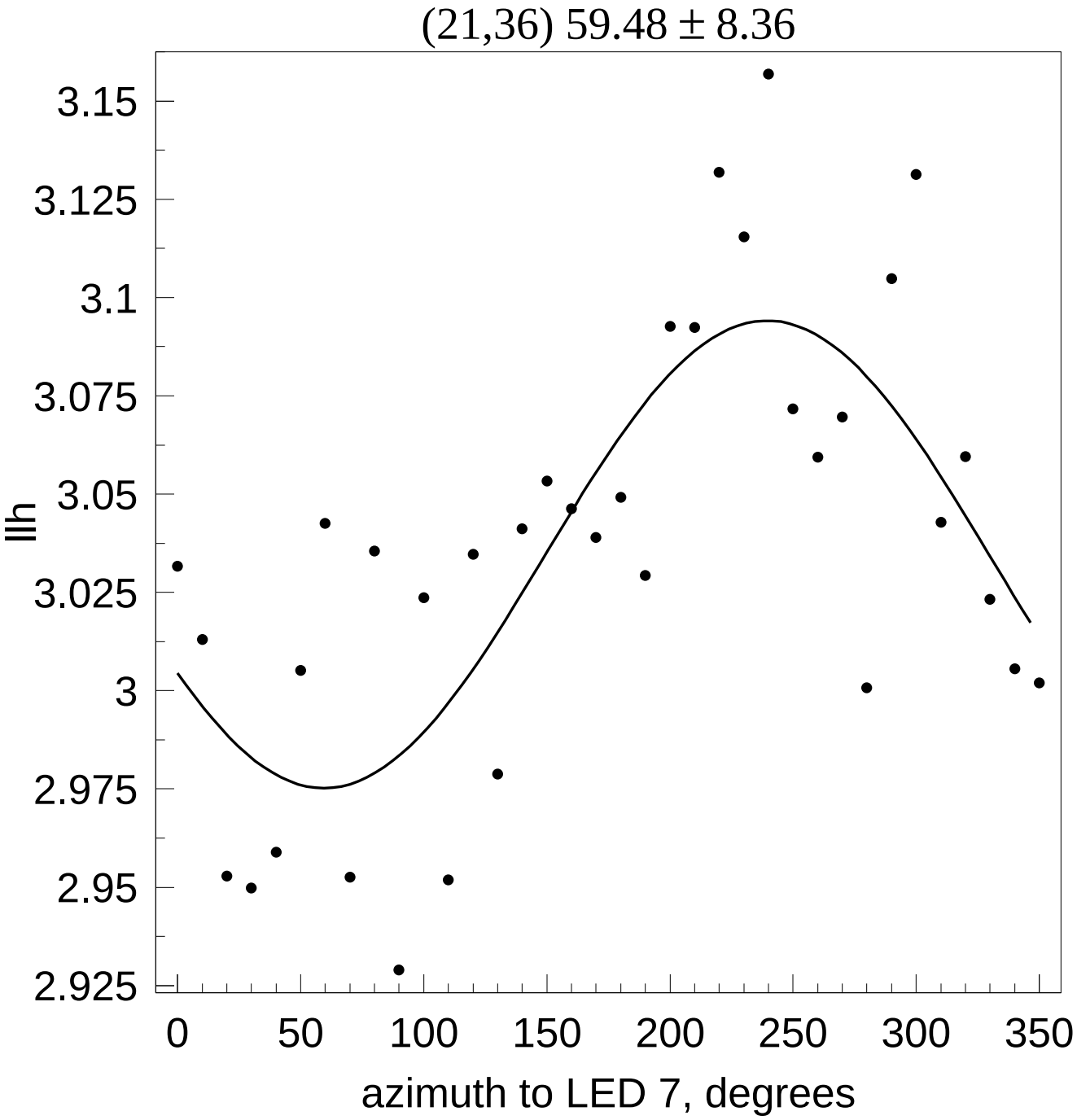

(21,35) 191.18 ± 1.93
3.9
3.8
3.7
3.6
3.5
3.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

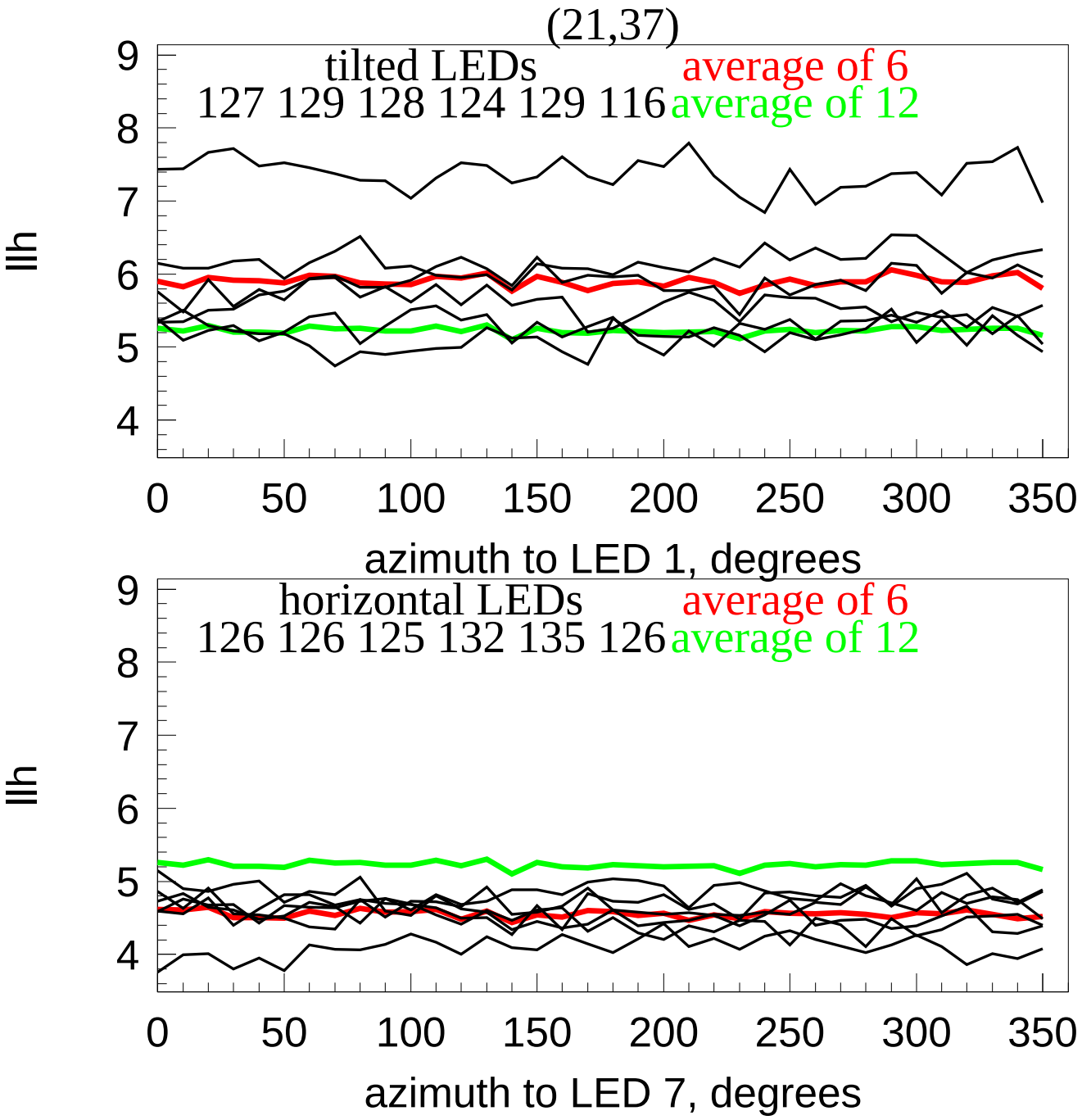

(21,35) 191.00 ± 1.95
3.9
3.8
3.7
3.6
3.5
3.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

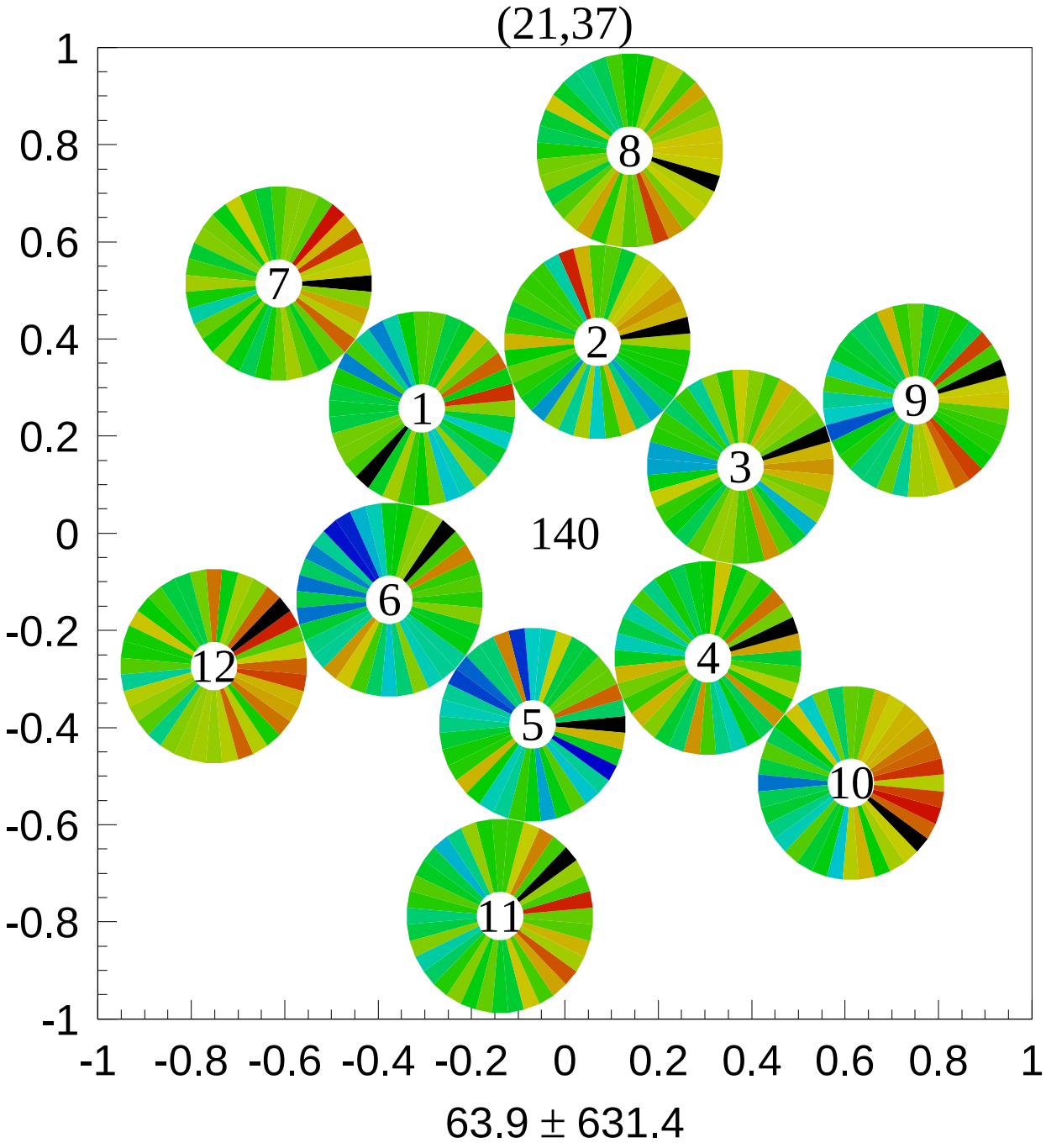

(21,36)
tilted LEDs
123 125 127 123 128 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 125 124 132 125 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

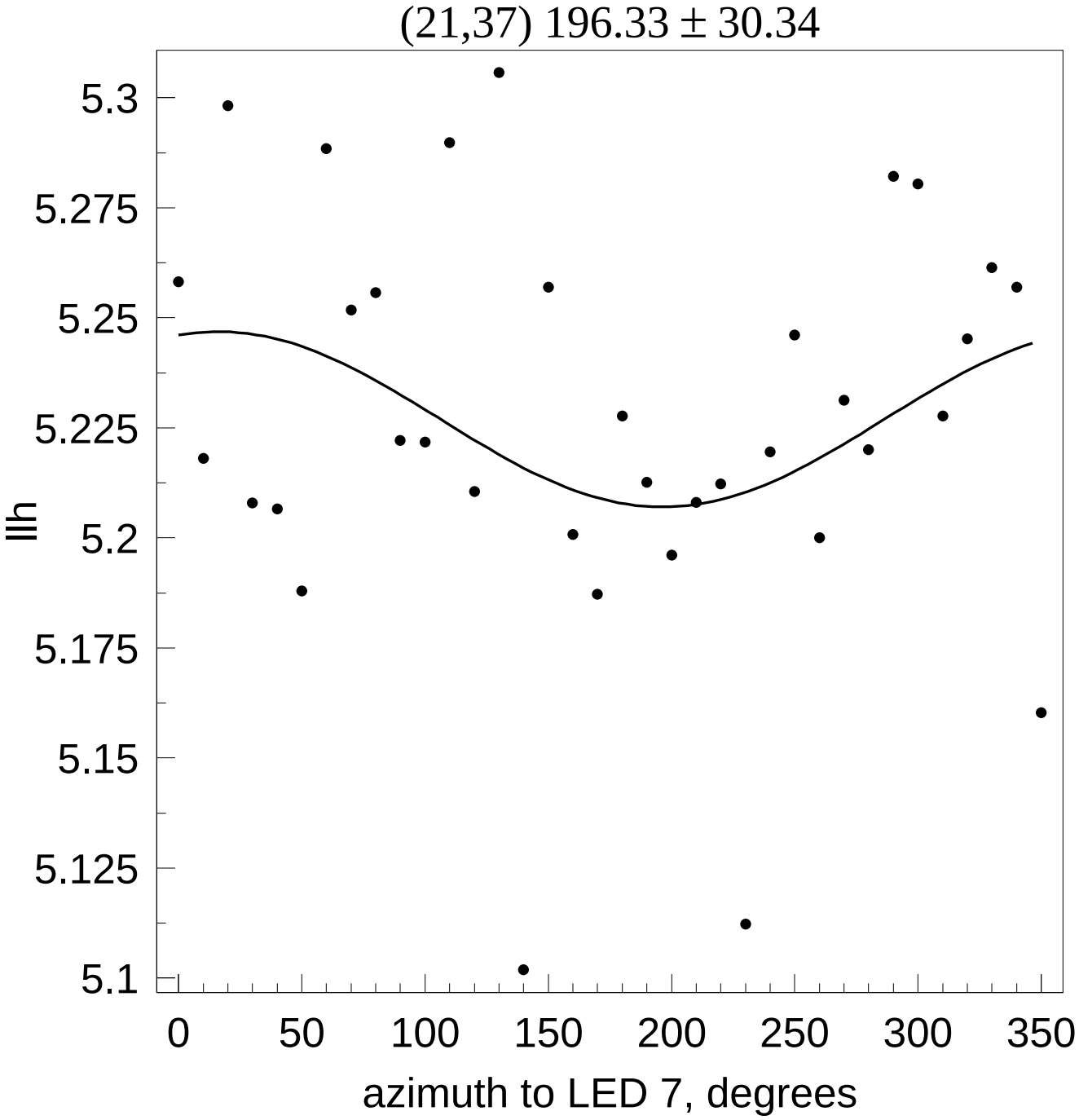

(21,36)
7
12
1
8
6
2
90
5
3
11
4
9
10
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
61.3 ± 70.4

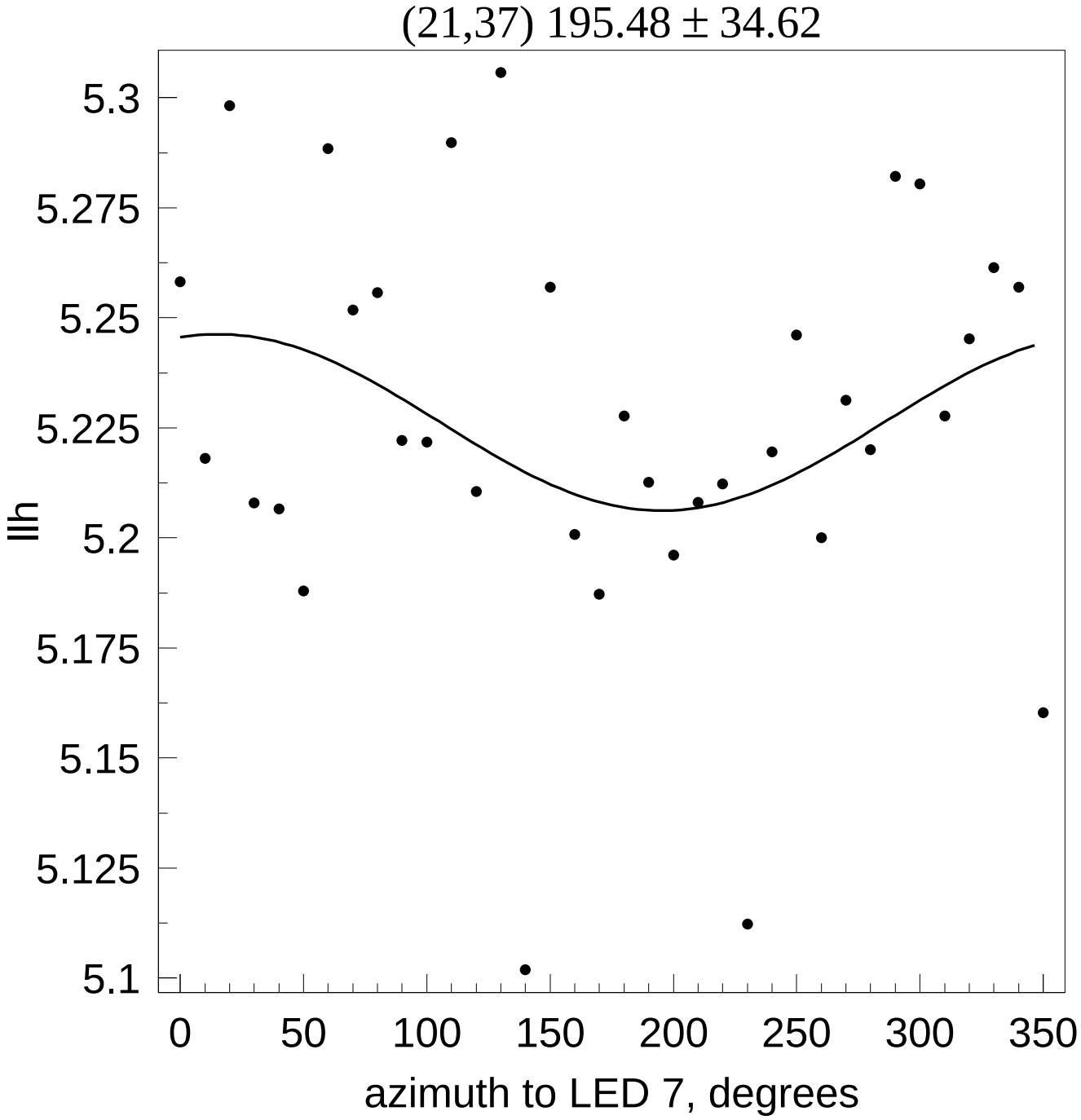

(21,36) 59.57 ± 8.35
3.15
3.125
3.1
3.075
3.05
3.025
3
2.975
2.95
2.925
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

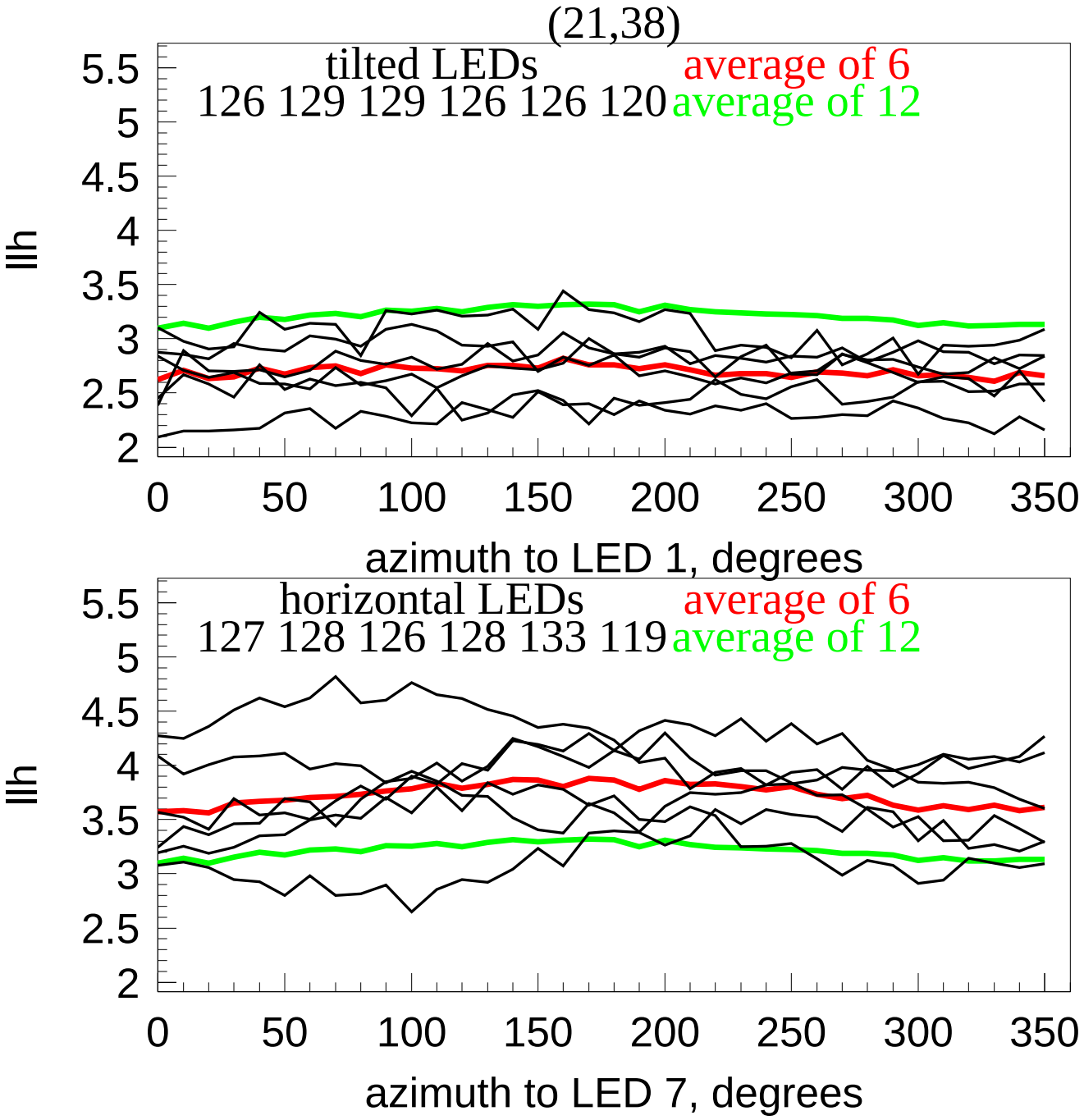

(21,36) 59.48 ± 8.36
3.15
3.125
3.1
3.075
3.05
3.025
3
2.975
2.95
2.925
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

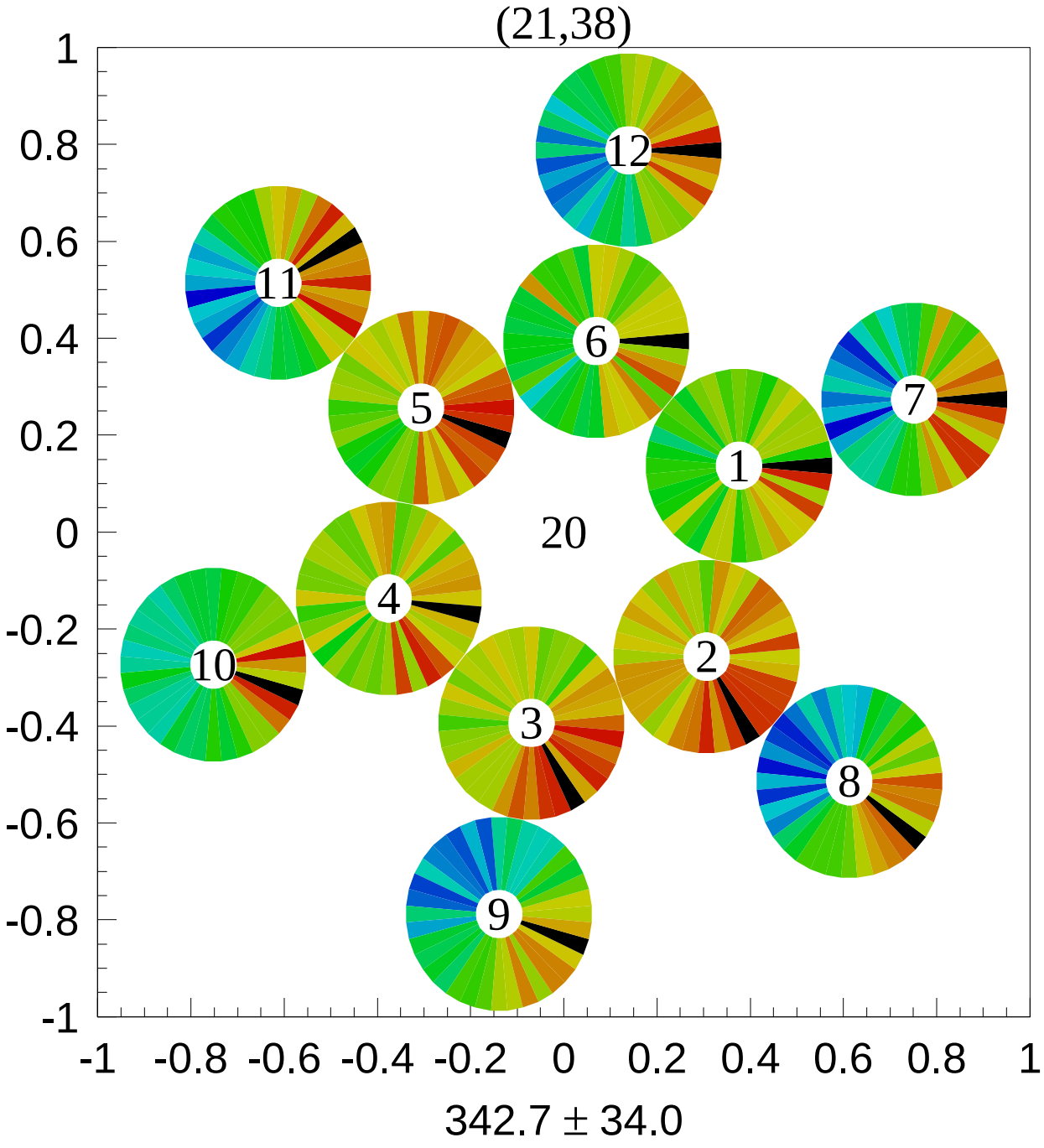

(21,37)
tilted LEDs
127 129 128 124 129 116
average of 6
average of 12
llh
9
8
7
6
5
4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 126 125 132 135 126
average of 6
average of 12
llh
9
8
7
6
5
4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

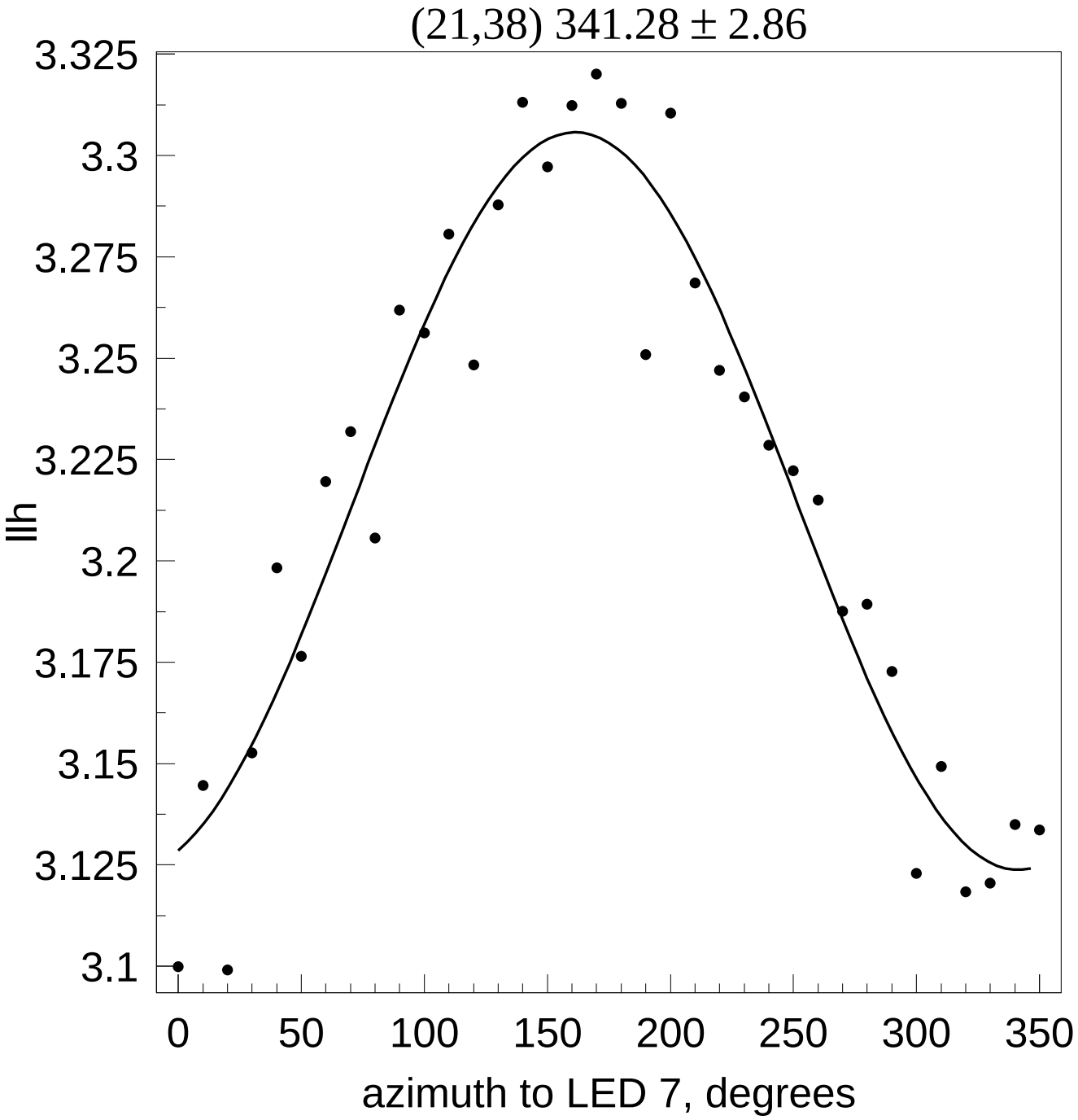

(21,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
63.9 ± 631.4
140
1
2
3
4
5
6
7
8
9
10
11
12

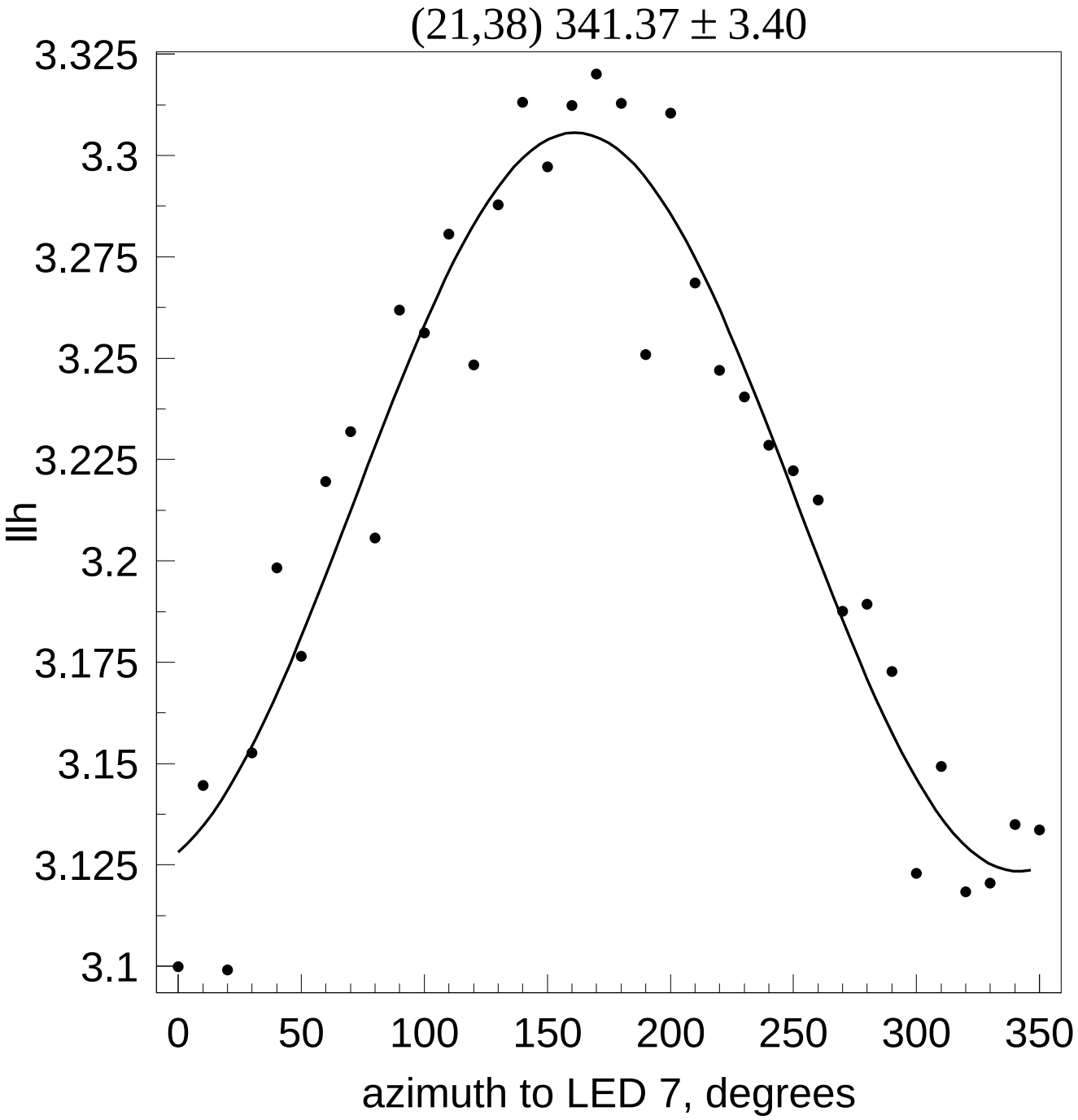

(21,37) 196.33 ± 30.34
5.3
5.275
5.25
5.225
5.2
5.175
5.15
5.125
5.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

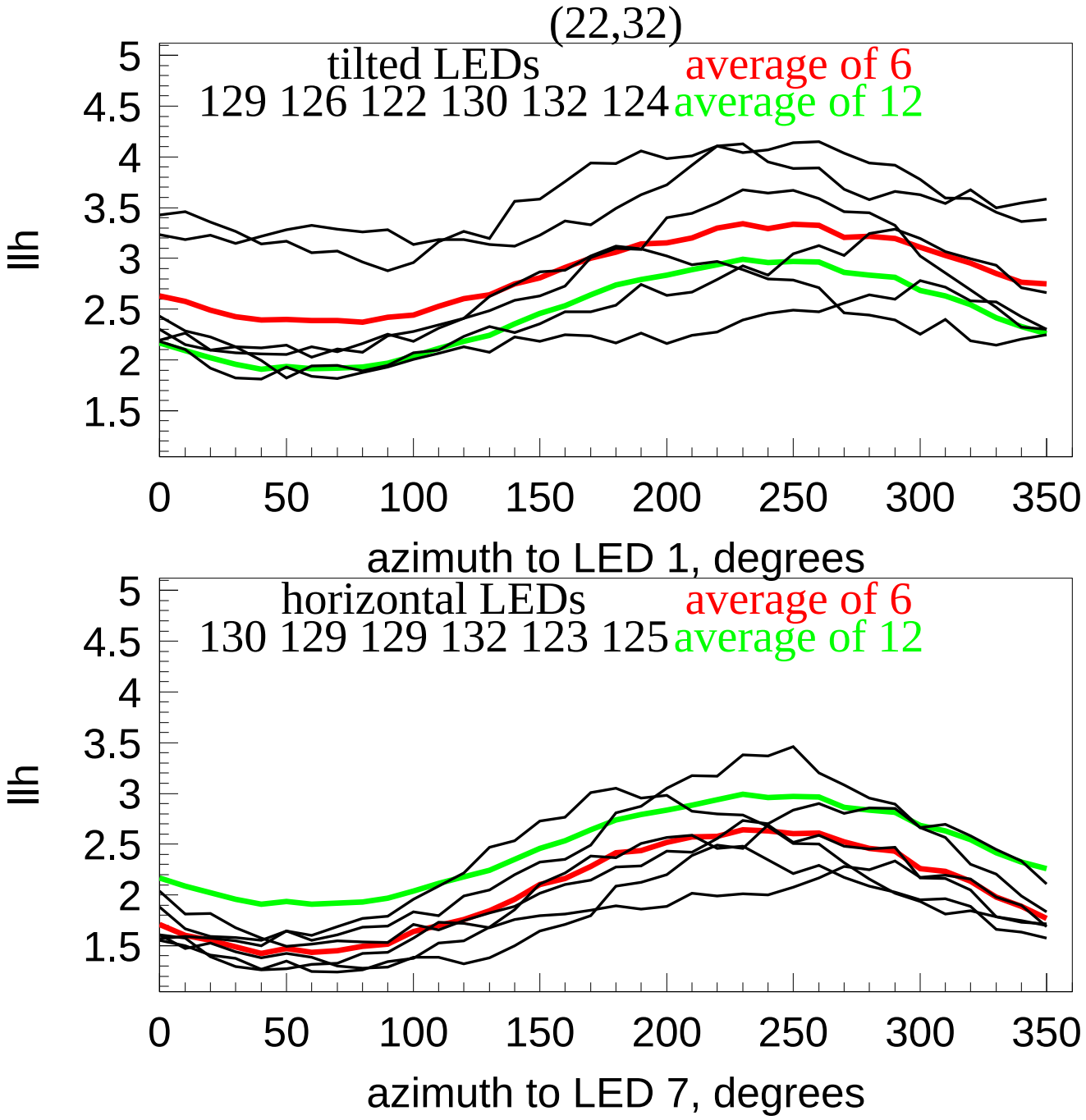

(21,37) 195.48 ± 34.62
5.3
5.275
5.25
5.225
5.2
5.175
5.15
5.125
5.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

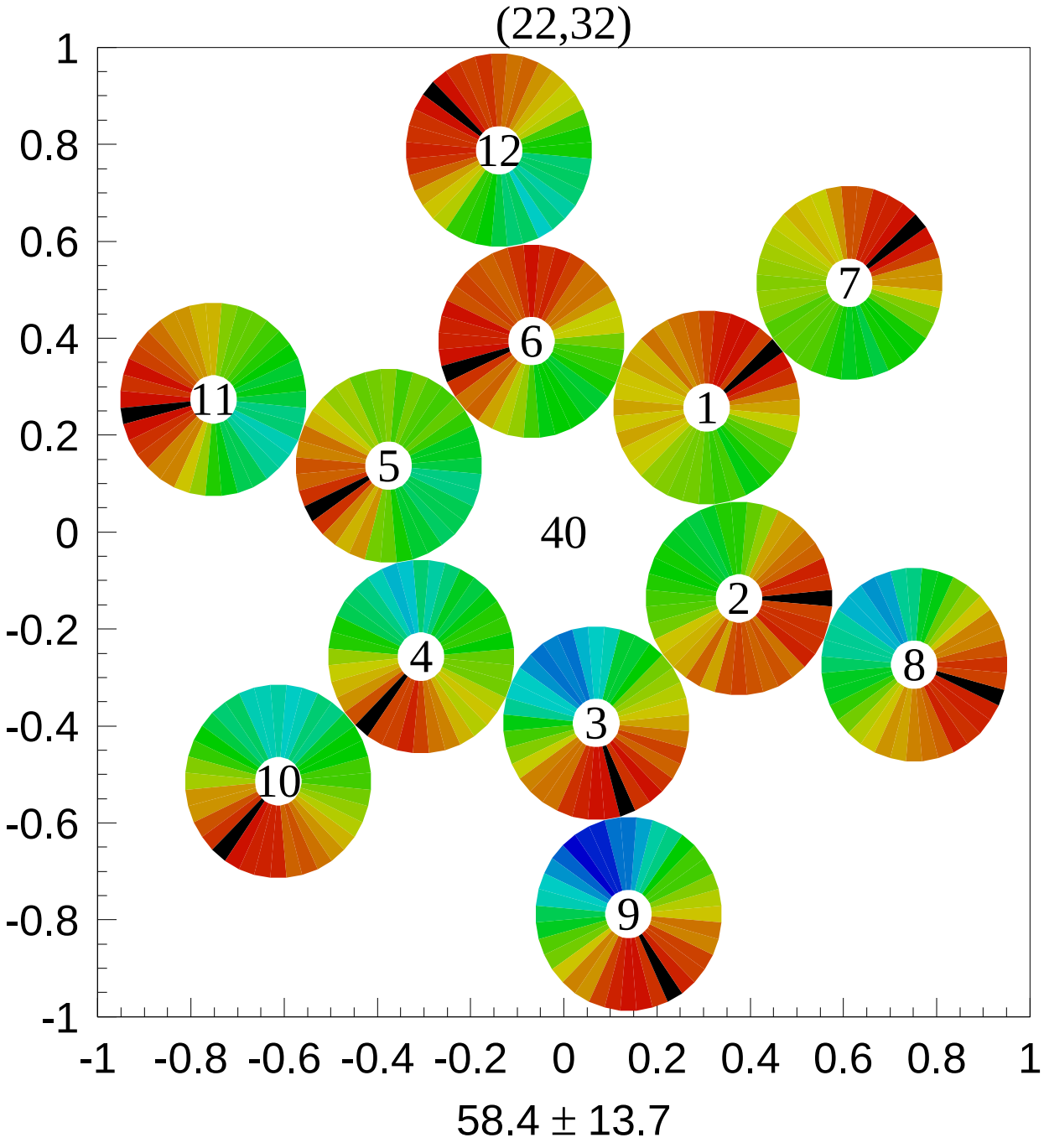

(21,38)
tilted LEDs
126 129 129 126 126 120
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 128 126 128 133 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

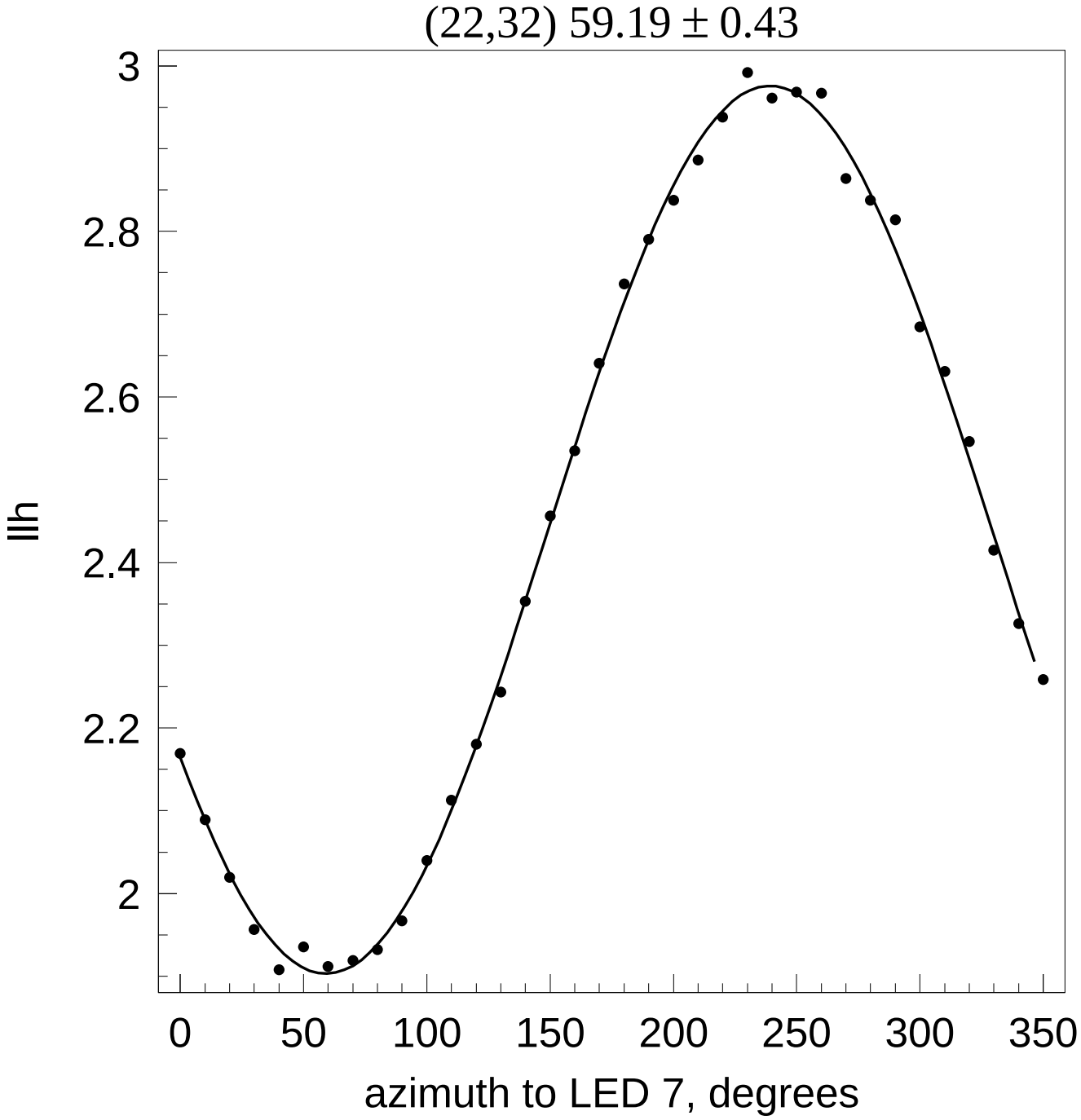

(21,38)
12
11
6
5
7
1
20
4
10
2
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
342.7 ± 34.0

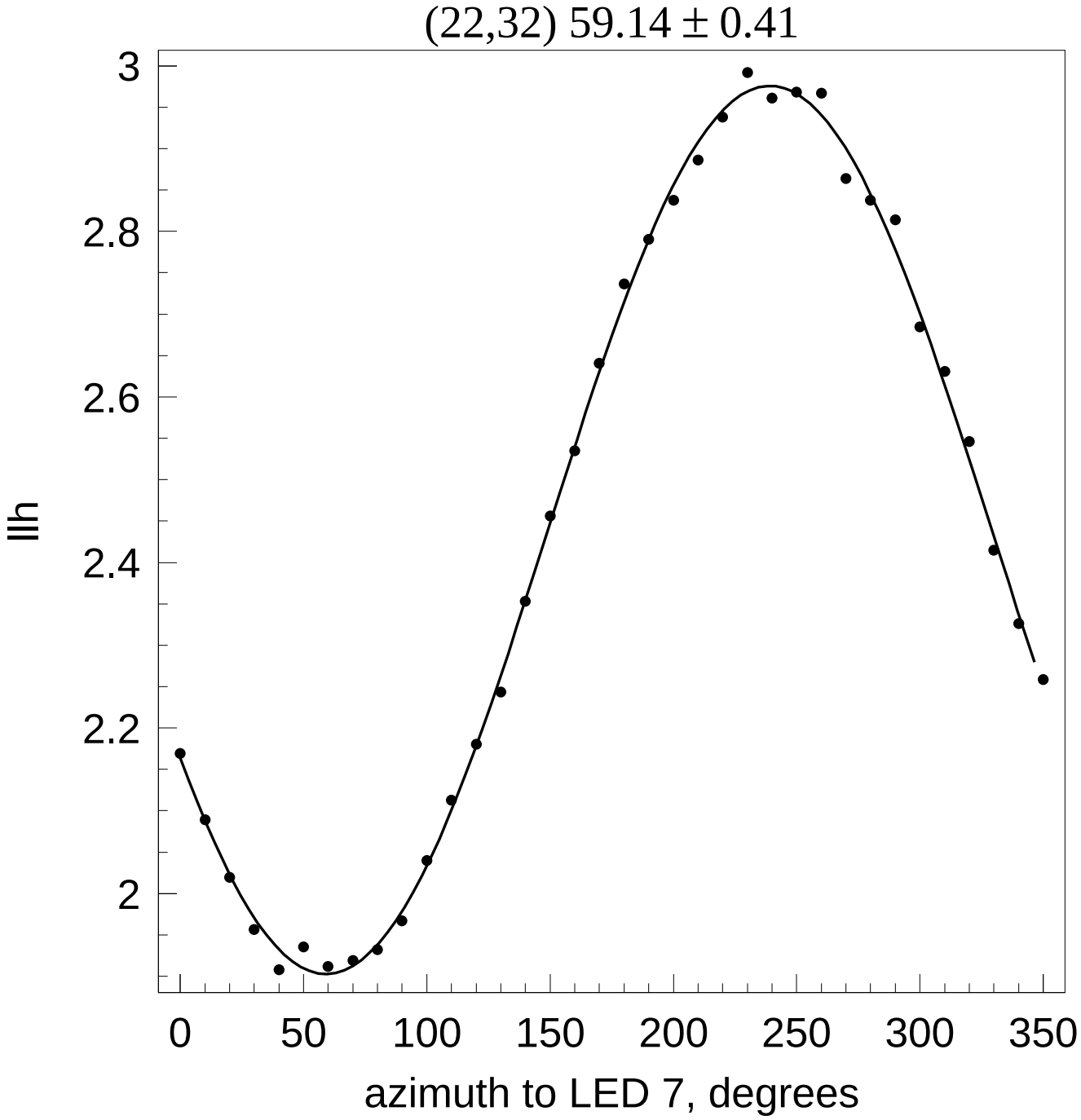

(21,38) 341.28 ± 2.86
3.325
3.3
3.275
3.25
3.225
3.2
3.175
3.15
3.125
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

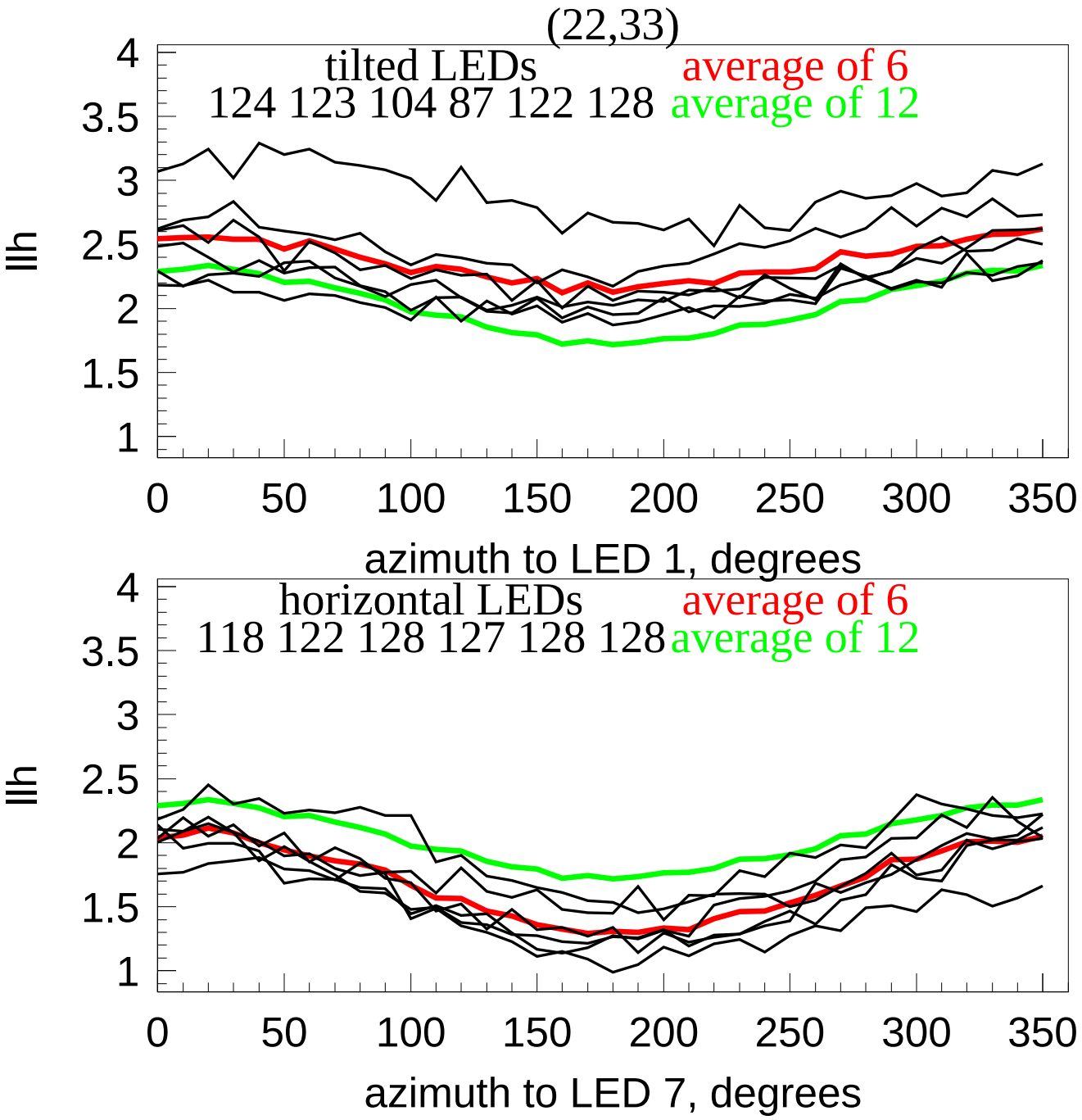

(21,38) 341.37 ± 3.40
3.325
3.3
3.275
3.25
3.225
3.2
3.175
3.15
3.125
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

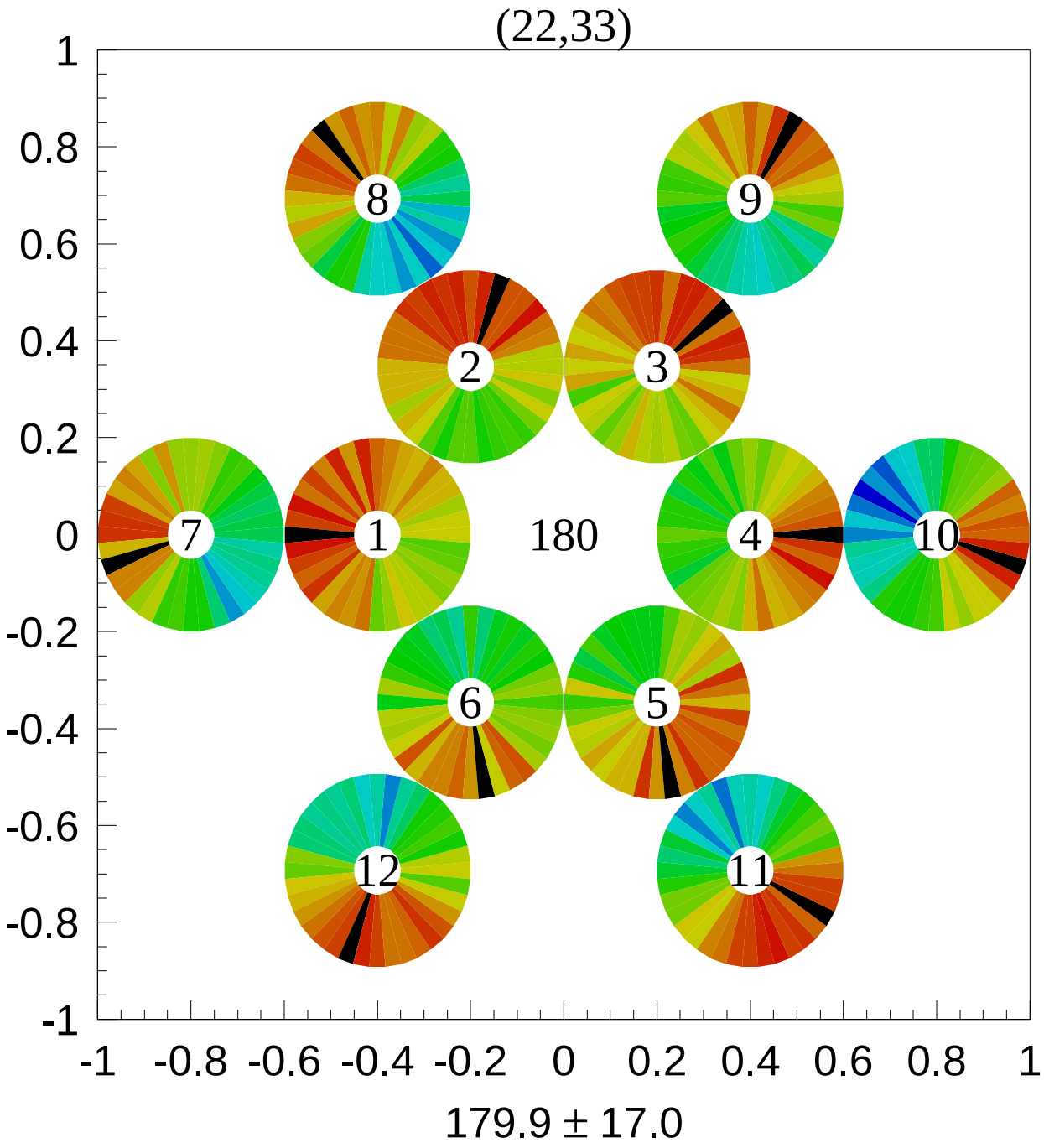

(22,32)
tilted LEDs
129 126 122 130 132 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 129 129 132 123 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

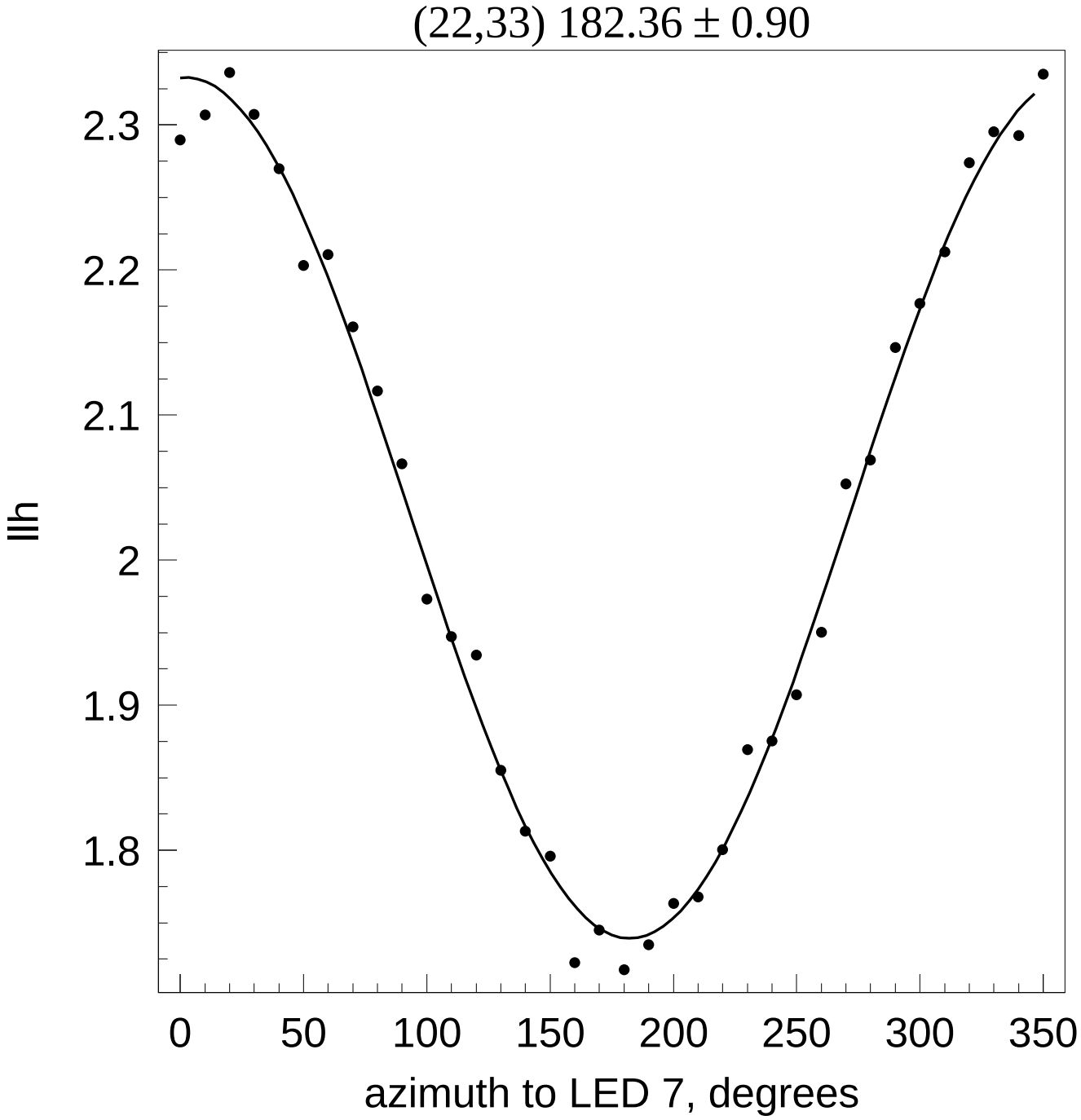

(22,32)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
58.4 ± 13.7

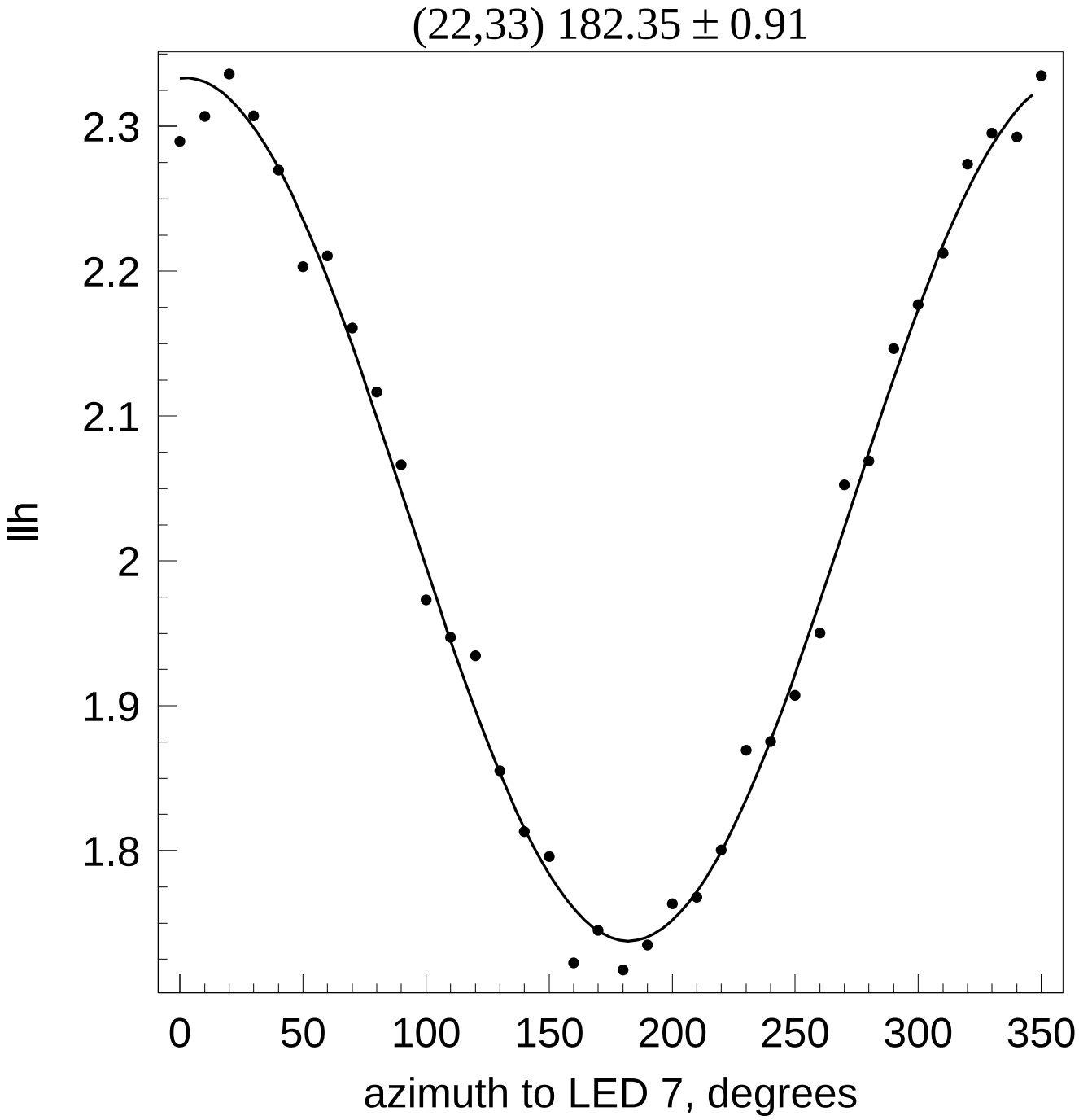

(22,32) 59.19 ± 0.43
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

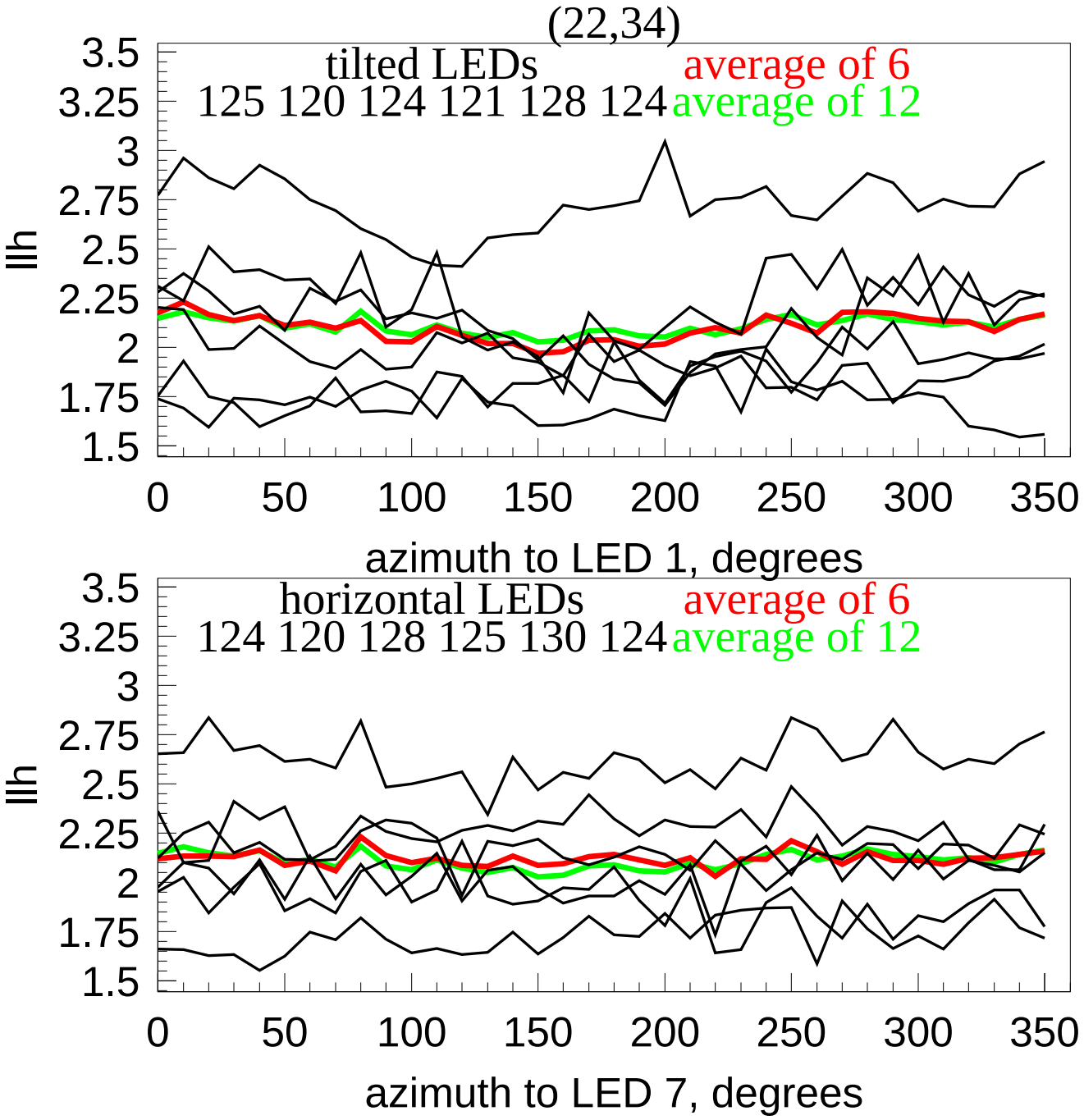

(22,32) 59.14 ± 0.41
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

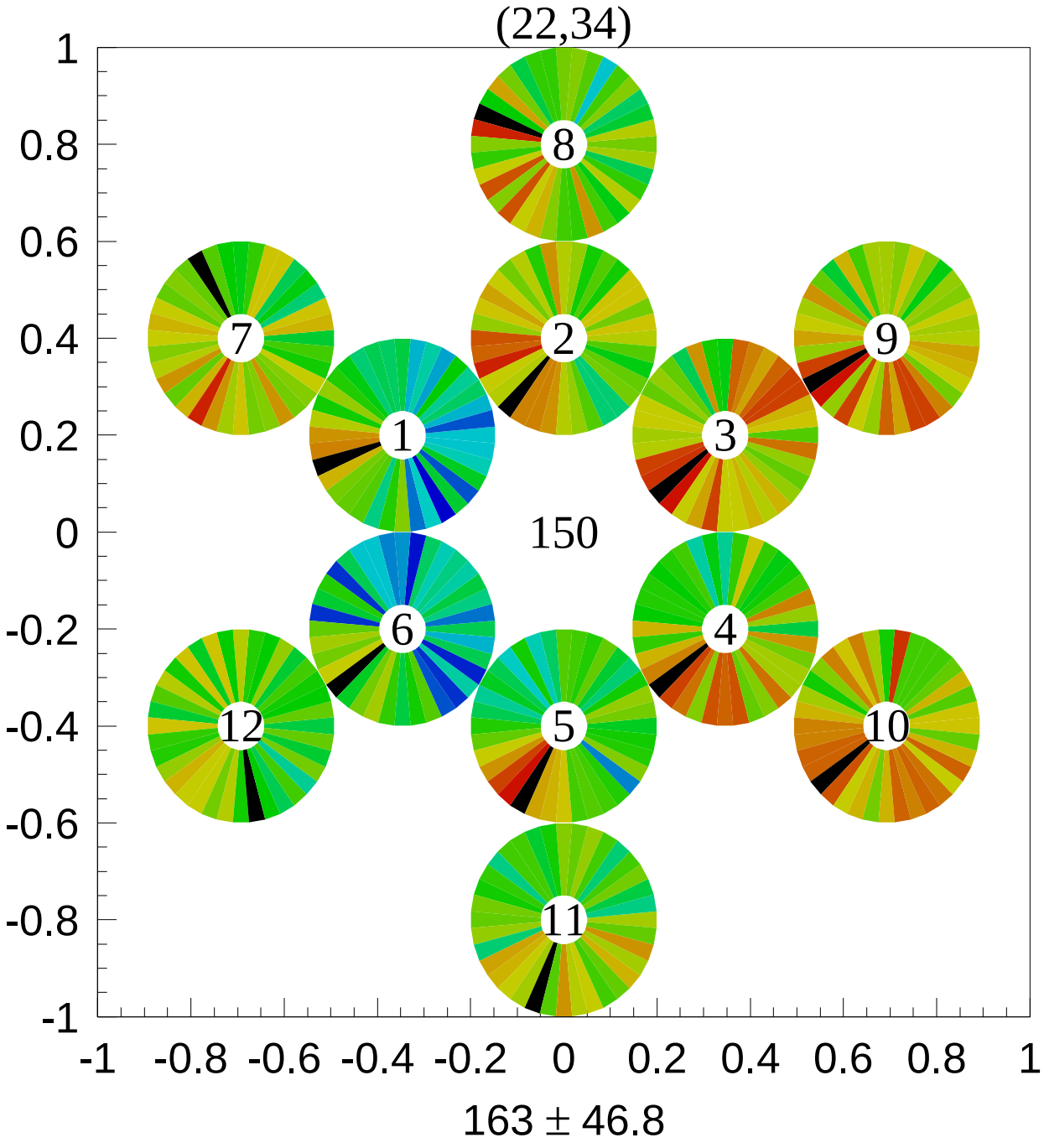

(22,33)
tilted LEDs
124 123 104 87 122 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
118 122 128 127 128 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

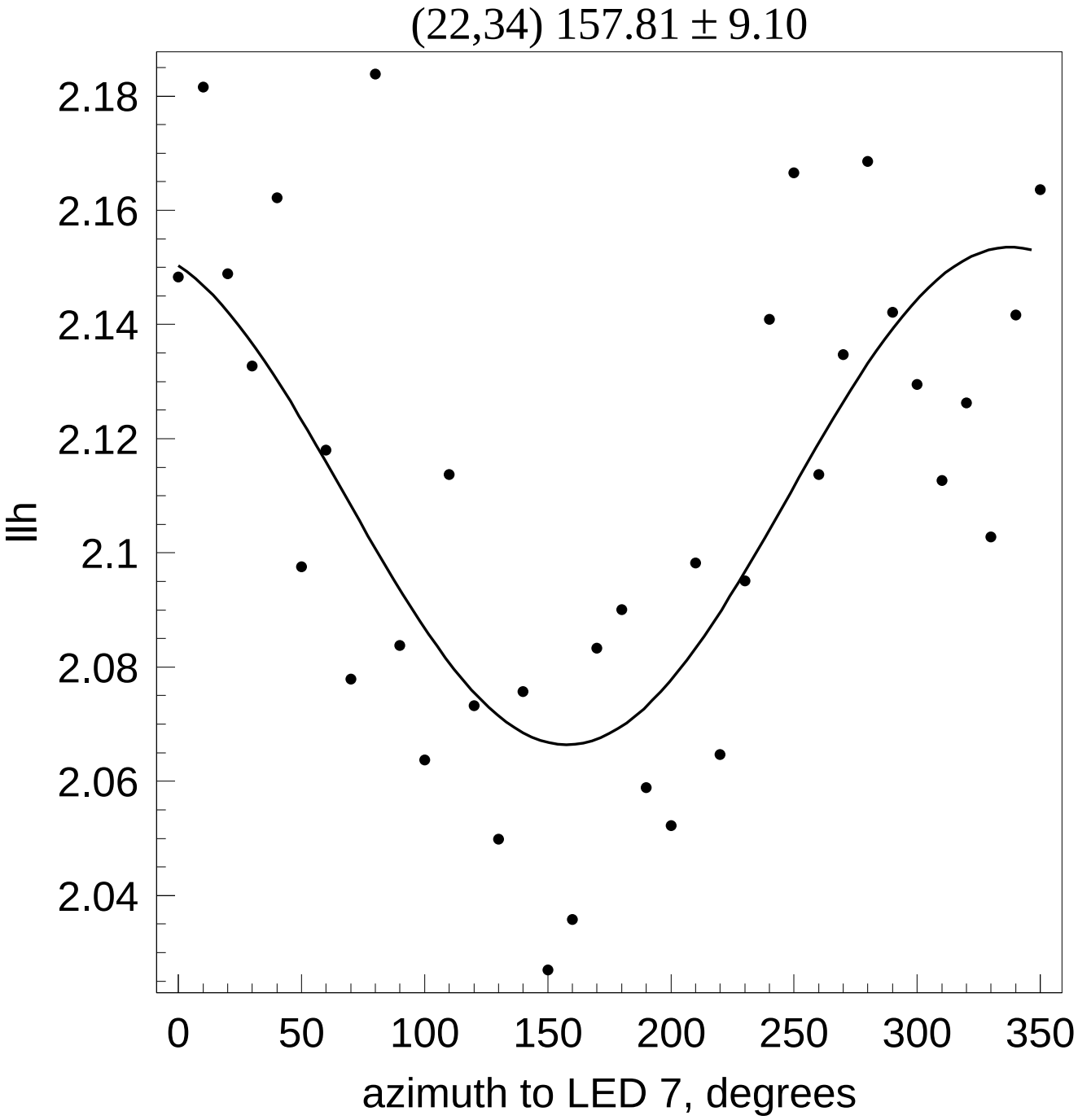

(22,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
179.9 ± 17.0
8
9
2
3
7
1
180
4
10
6
5
12
11

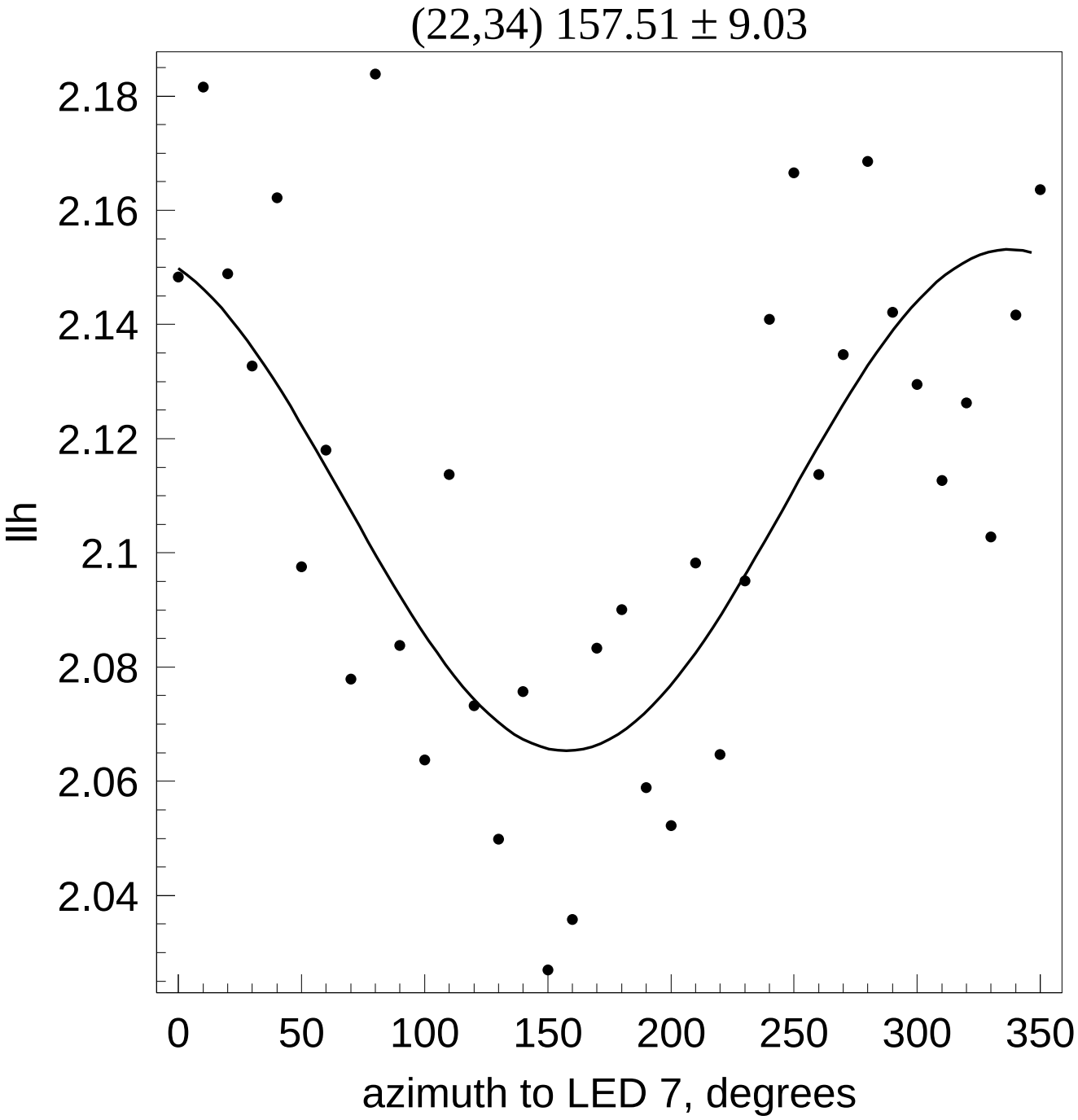

(22,33) 182.36 ± 0.90
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

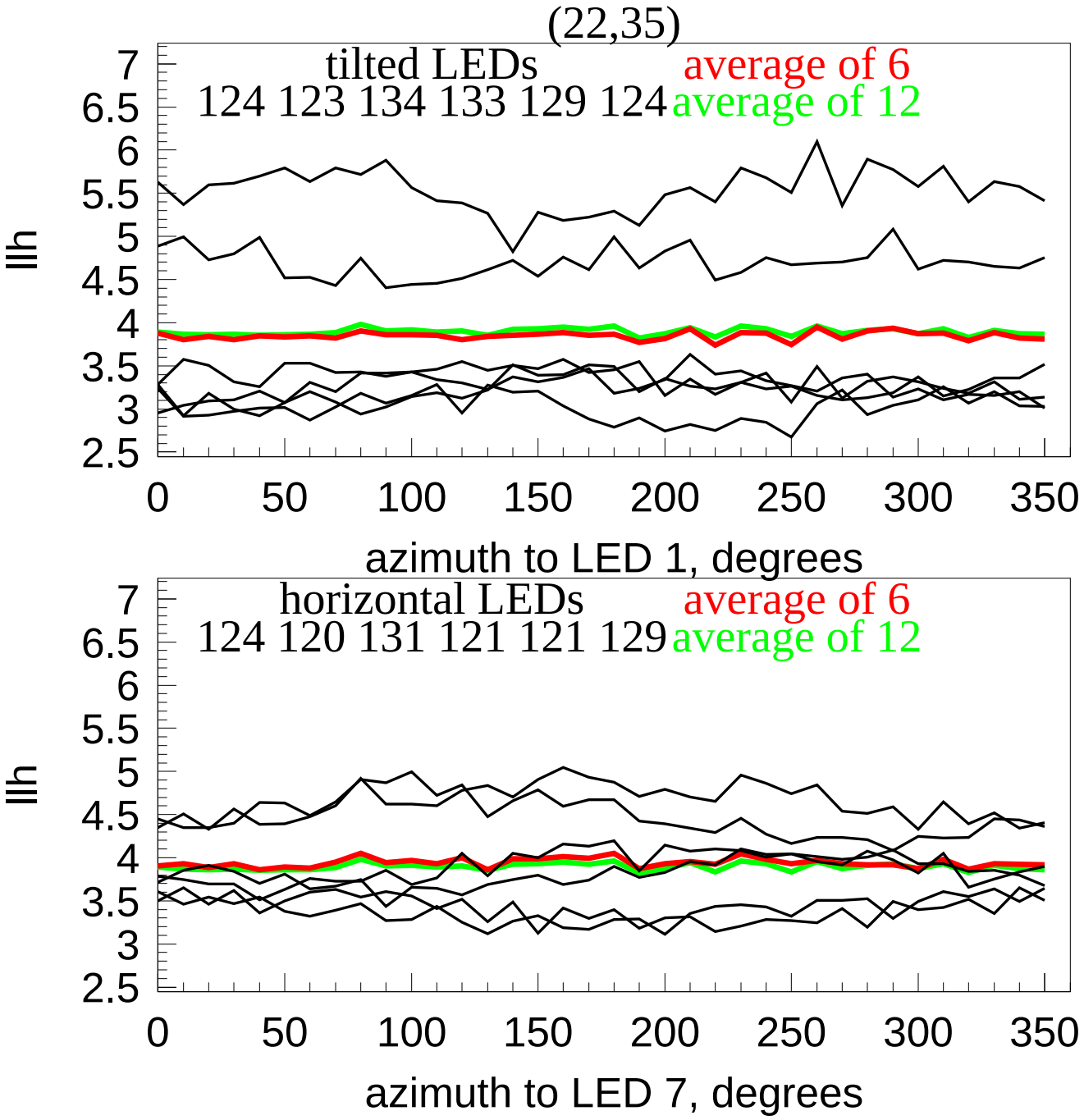

(22,33) 182.35 ± 0.91
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

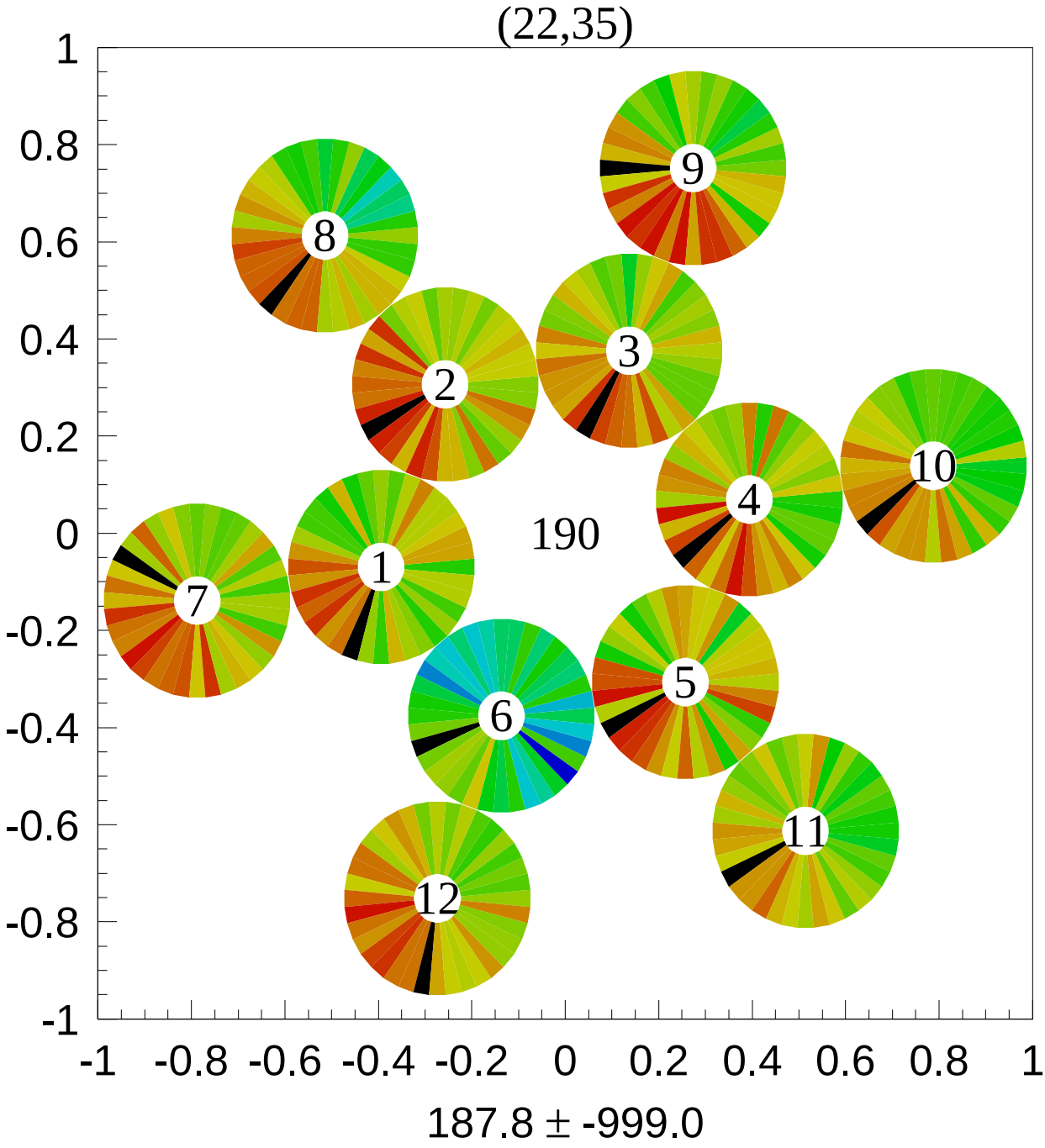

(22,34)
tilted LEDs
125 120 124 121 128 124
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 120 128 125 130 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

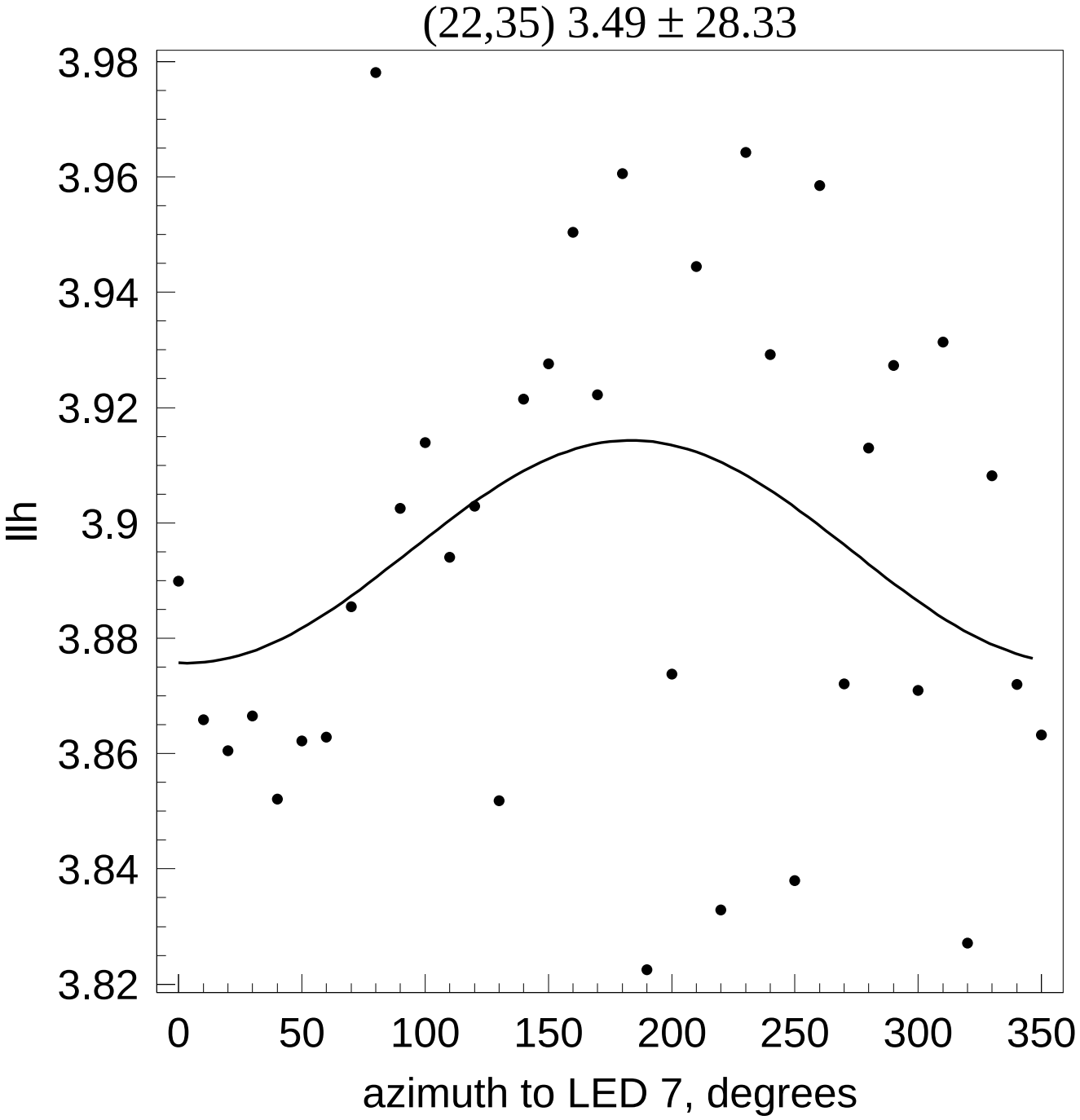

(22,34)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
163 ± 46.8

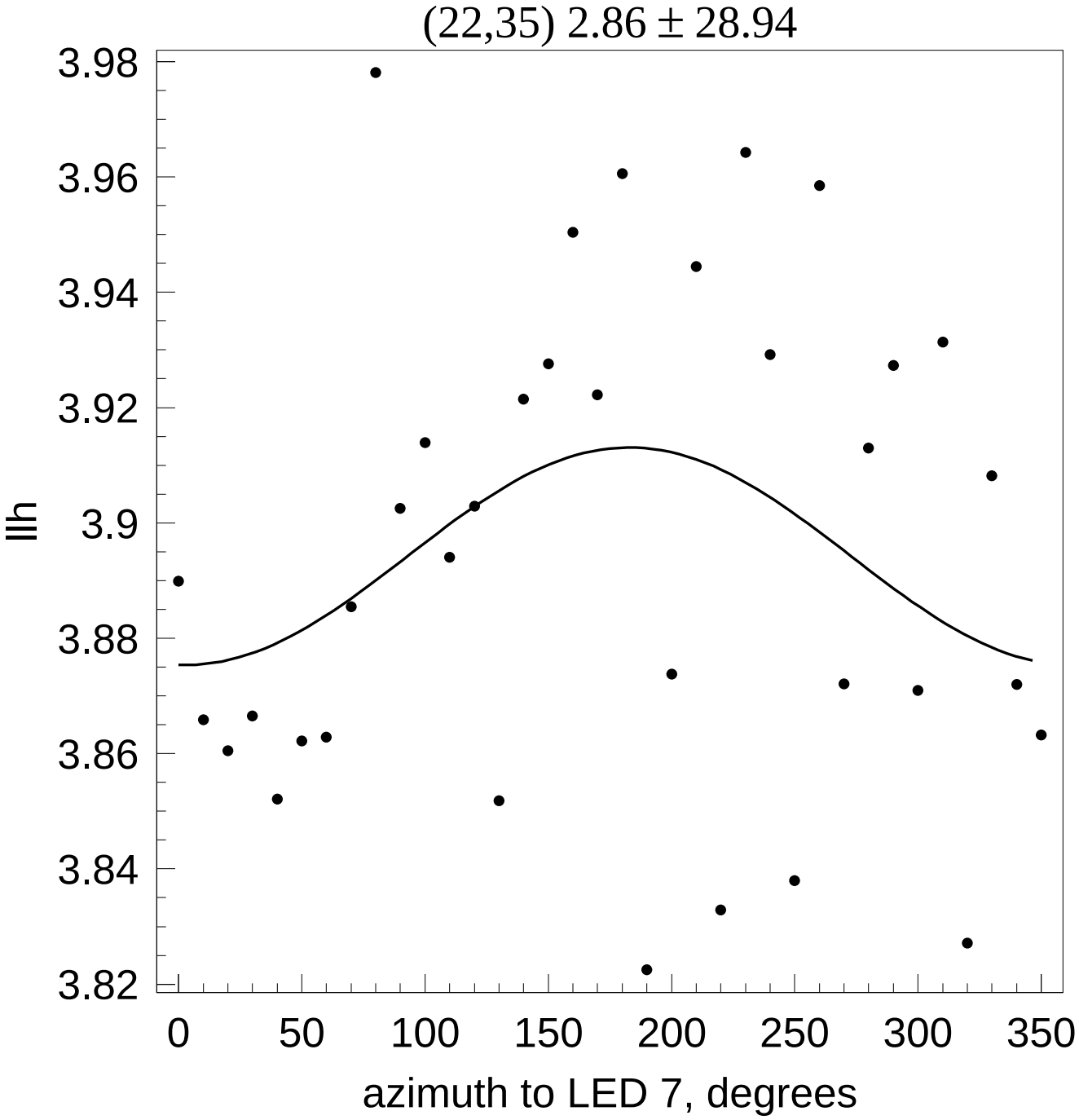

(22,34) 157.81 ± 9.10
2.18
2.16
2.14
2.12
2.1
2.08
2.06
2.04
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

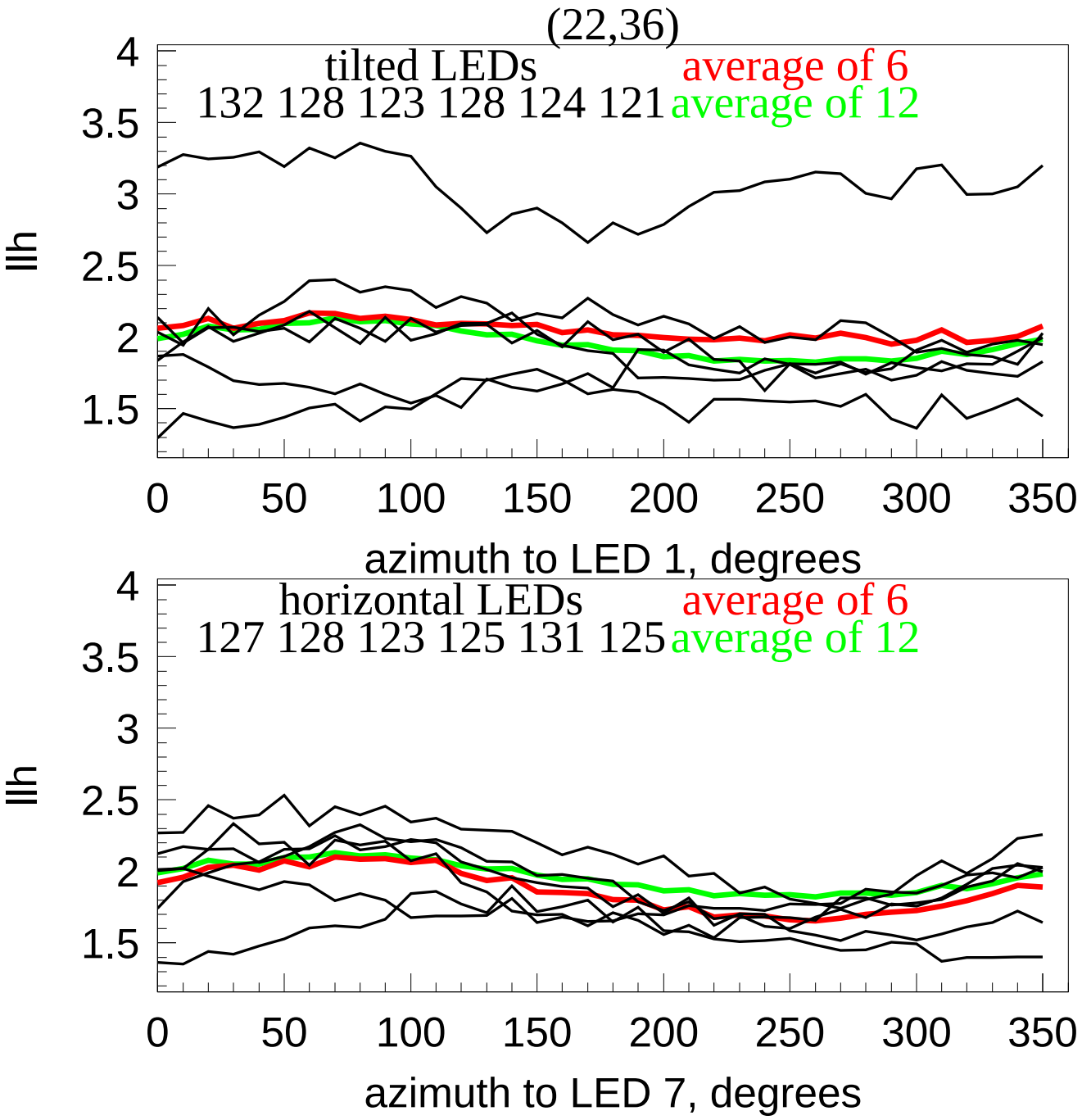

(22,34) 157.51 ± 9.03
2.18
2.16
2.14
2.12
2.1
2.08
2.06
2.04
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

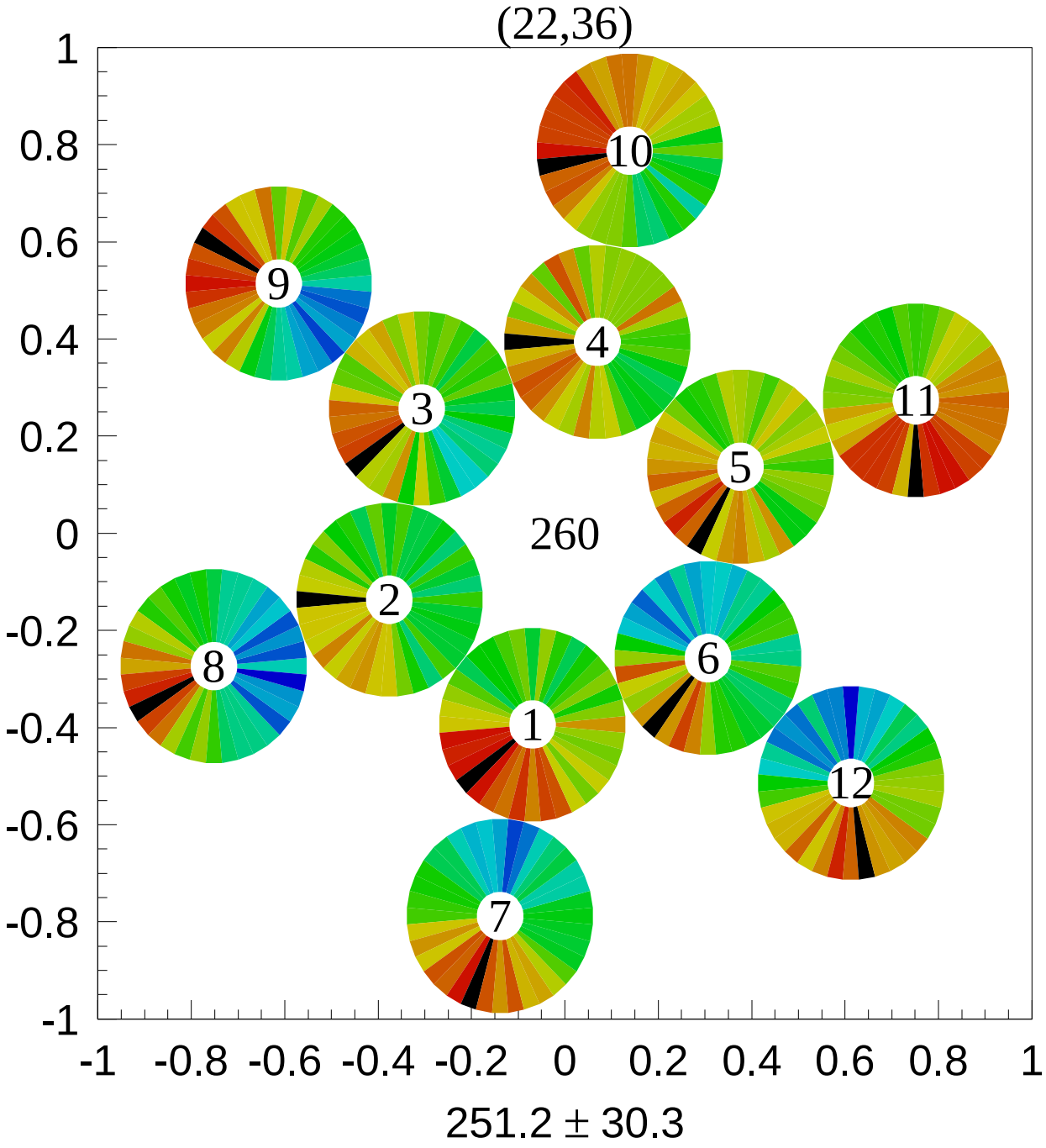

(22,35)
tilted LEDs
124 123 134 133 129 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 120 131 121 121 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

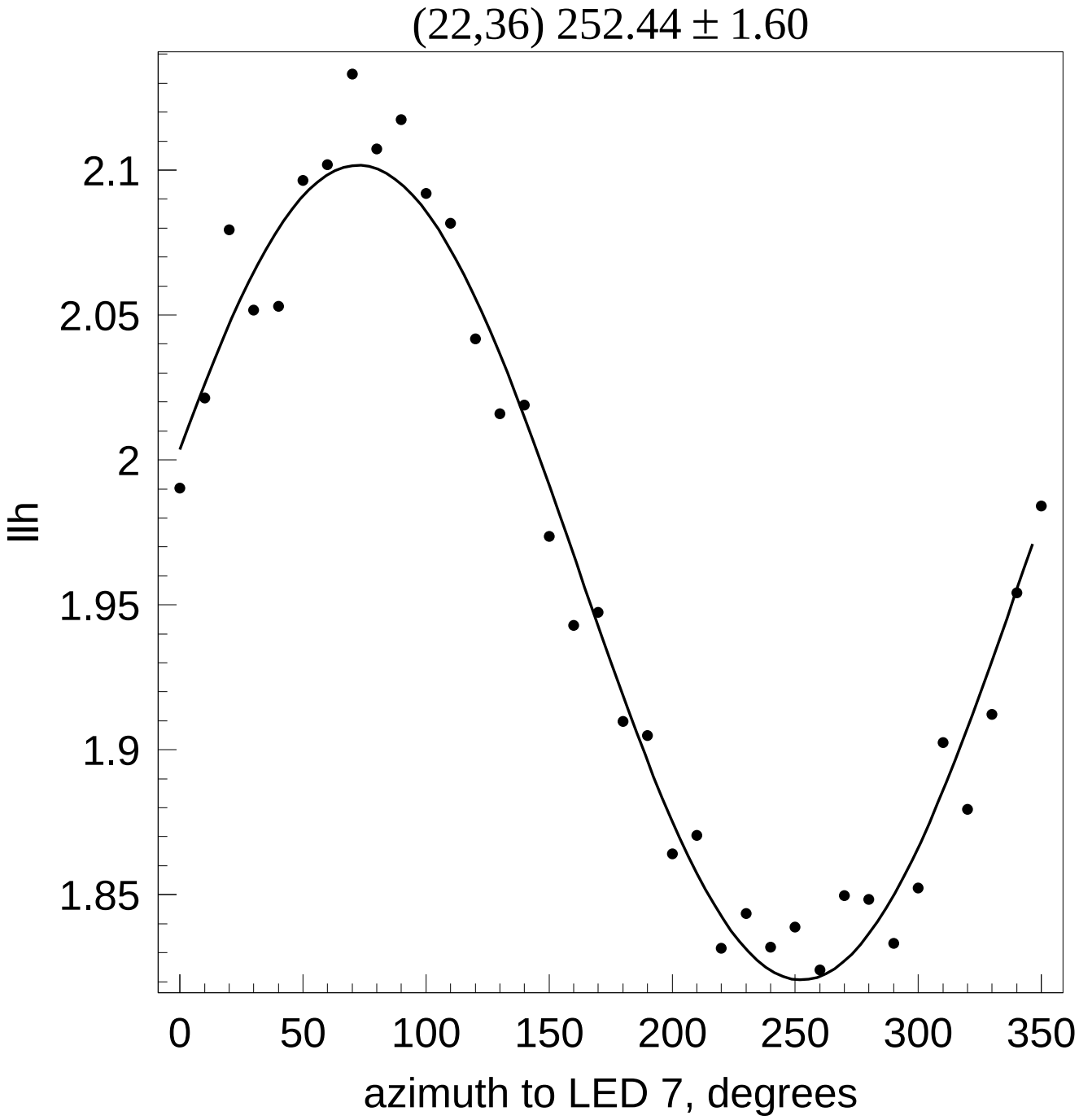

(22,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
187.8 ± -999.0
190
1
2
3
4
5
6
7
8
9
10
11
12

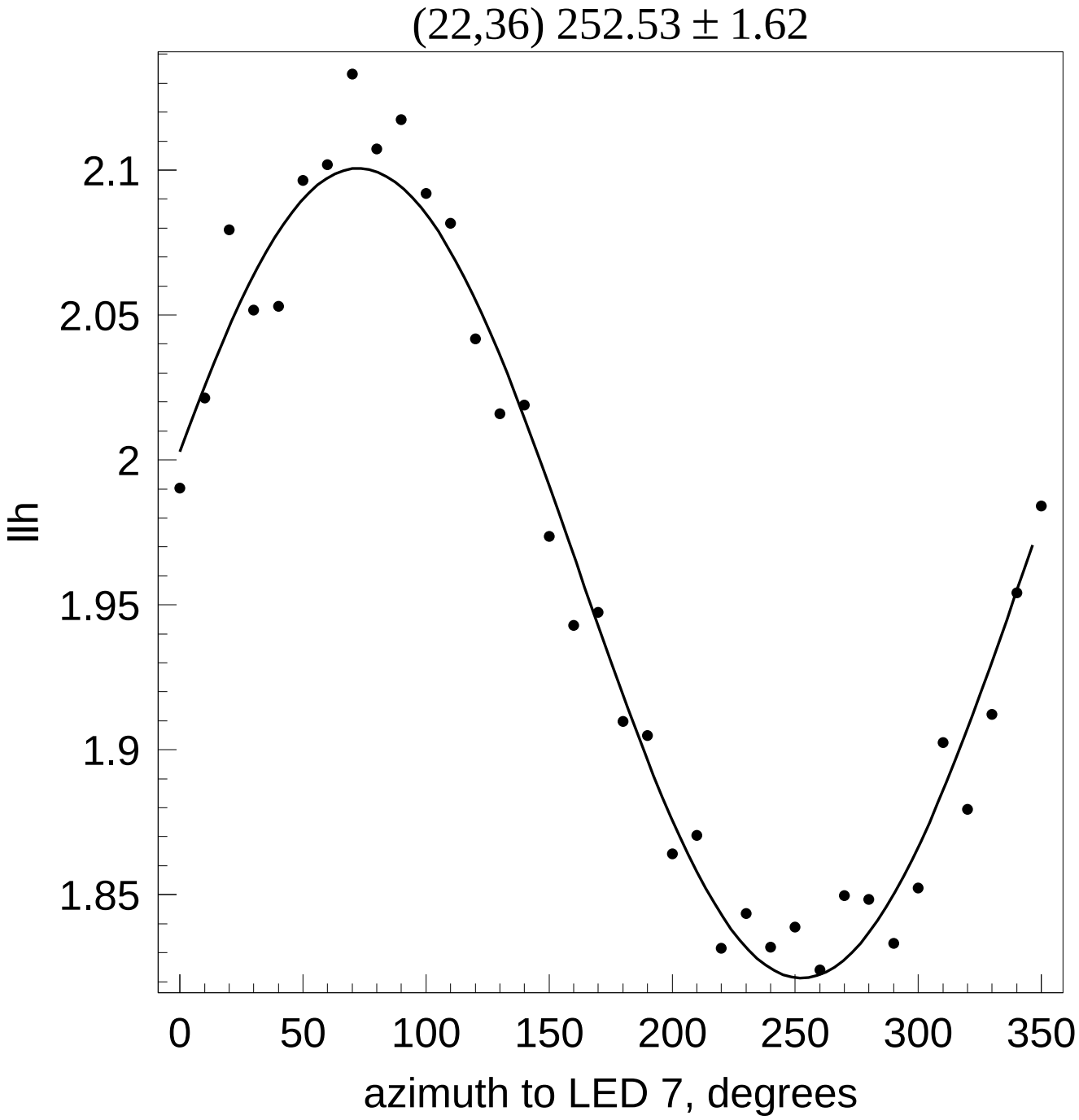

(22,35) 3.49 ± 28.33
3.98
3.96
3.94
3.92
3.9
3.88
3.86
3.84
3.82
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

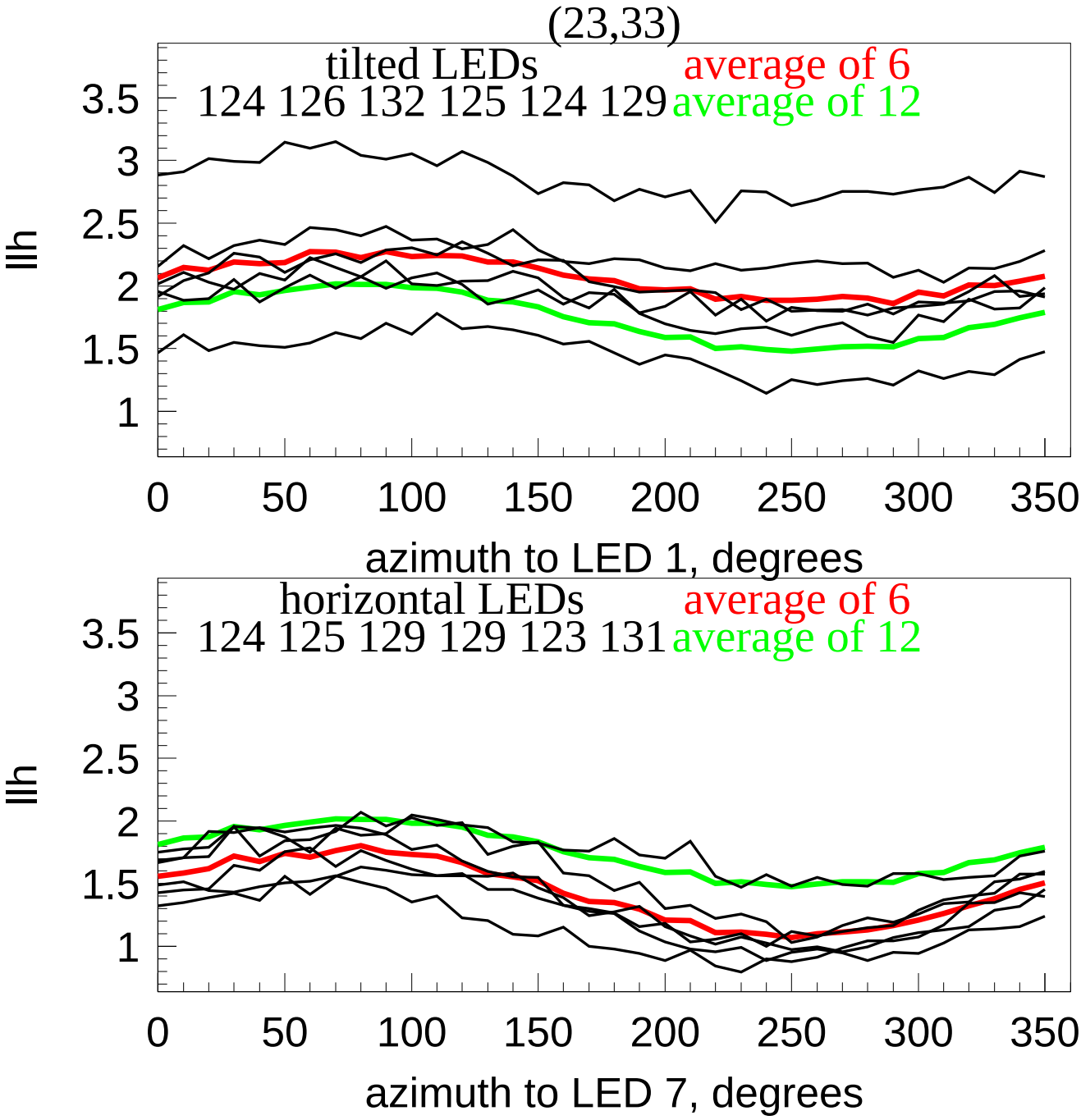

(22,35) 2.86 ± 28.94
3.98
3.96
3.94
3.92
3.9
3.88
3.86
3.84
3.82
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

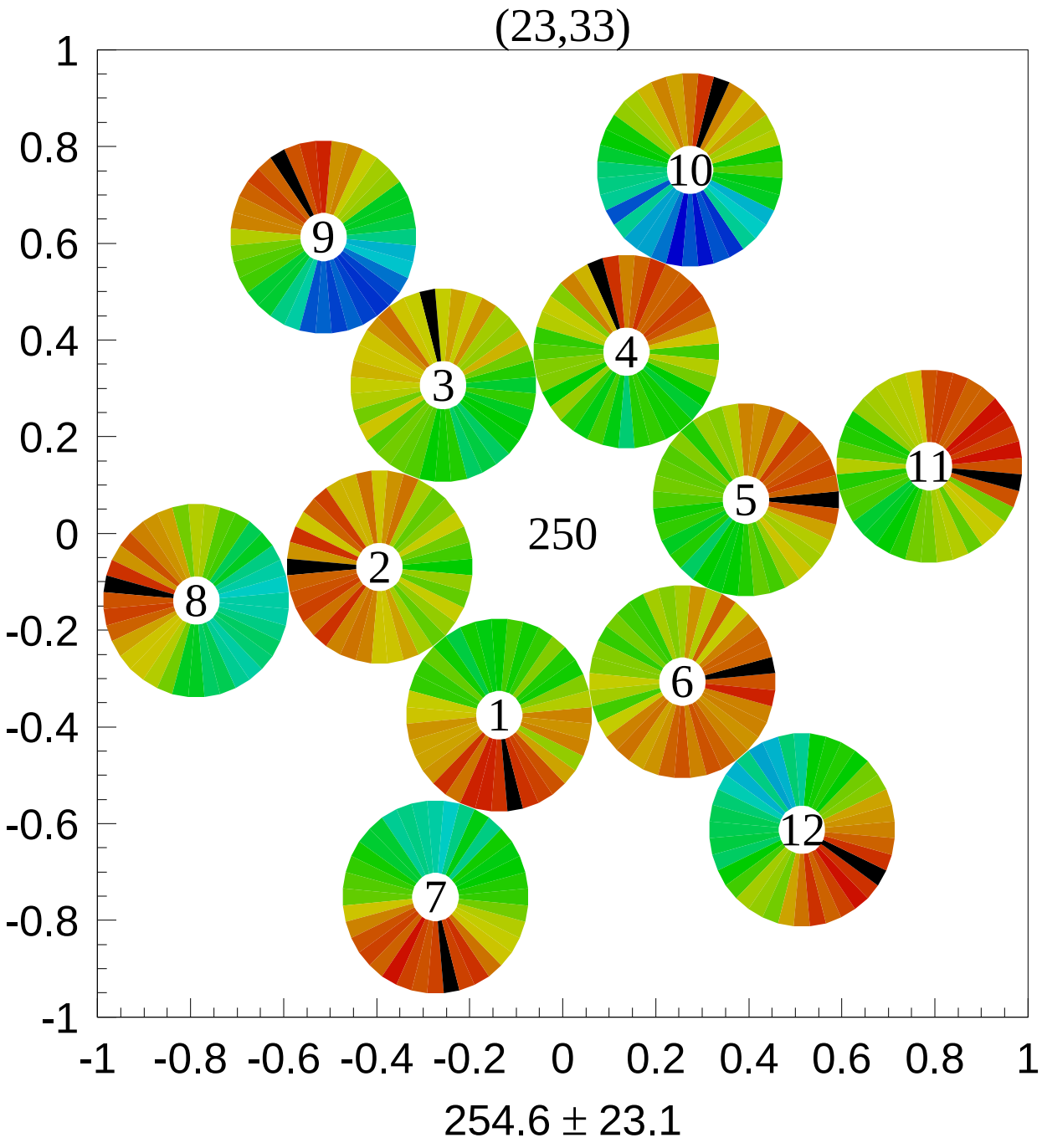

(22,36)
tilted LEDs
132 128 123 128 124 121
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 128 123 125 131 125
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

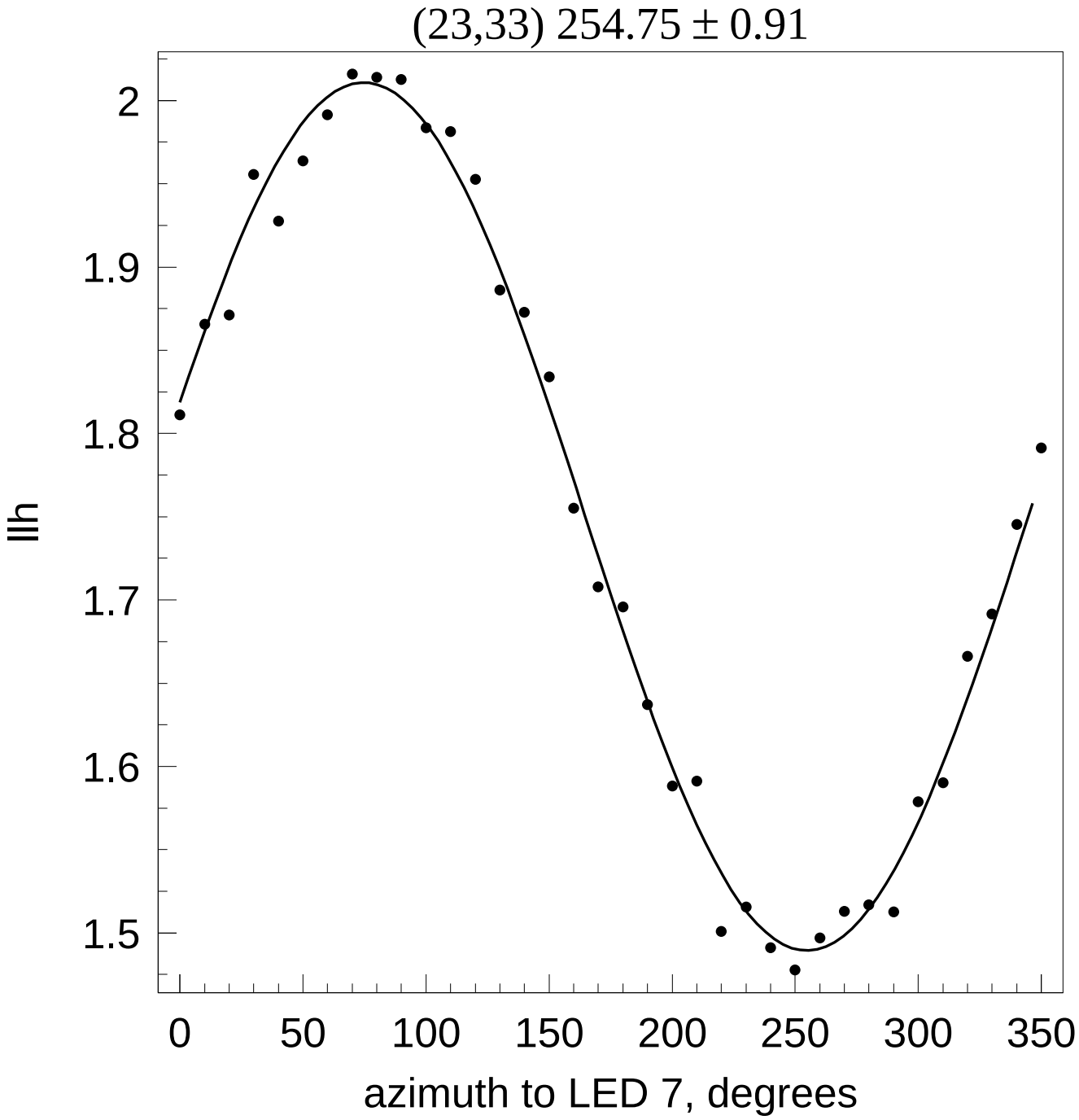

(22,36)
10
9
4
3
11
5
260
2
8
6
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
251.2 ± 30.3

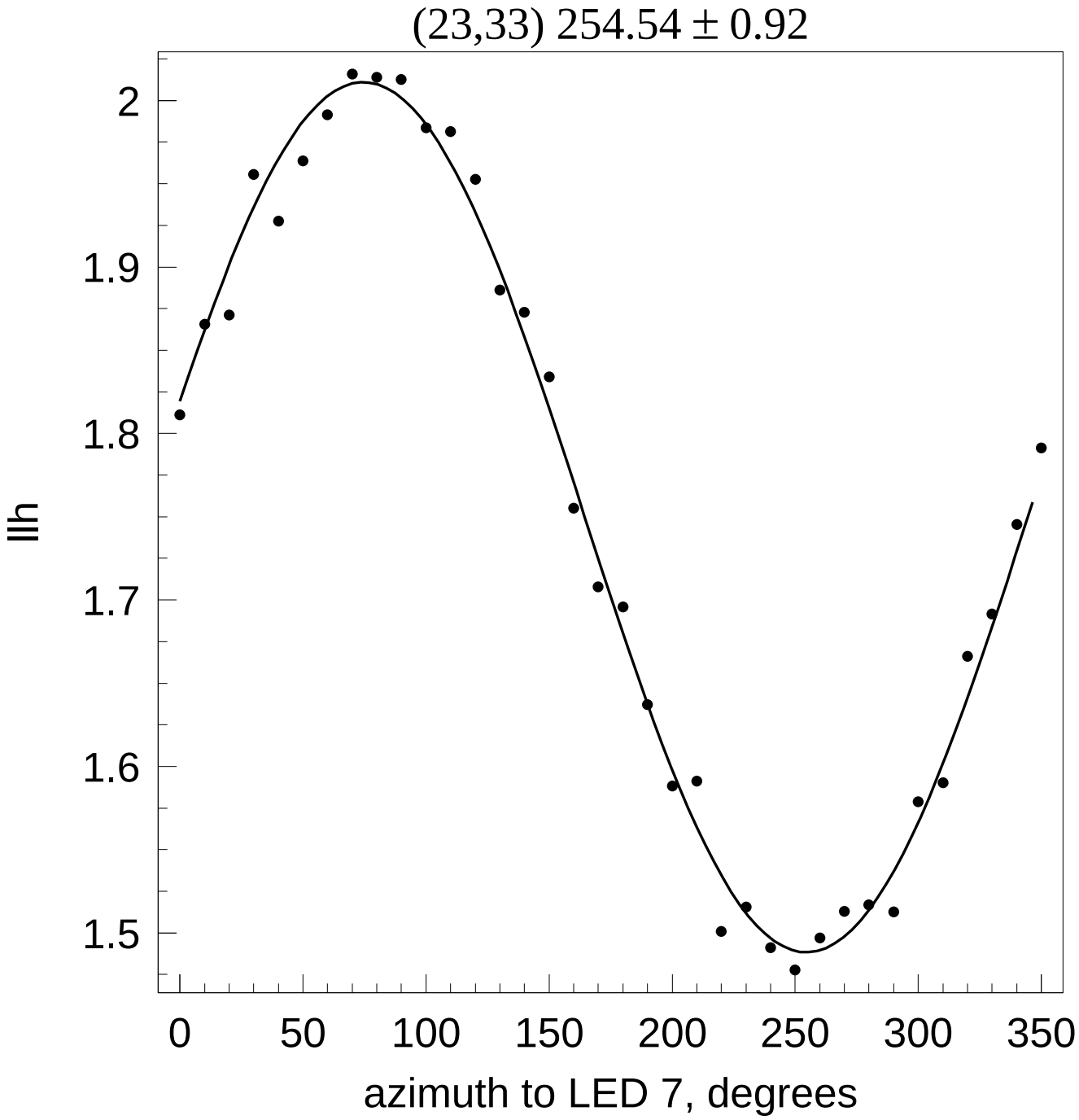

(22,36) 252.44 ± 1.60
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

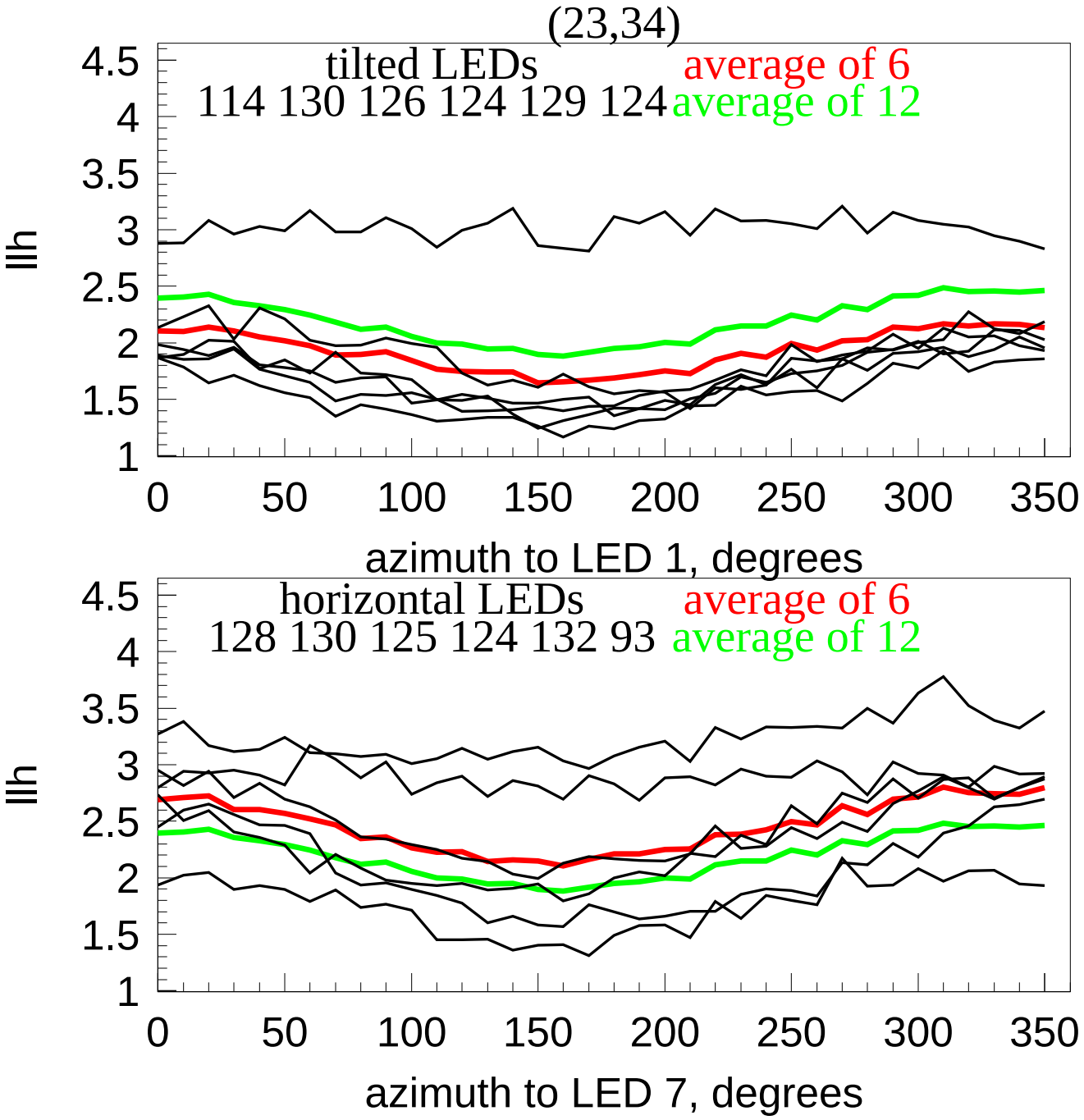

(22,36) 252.53 ± 1.62
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

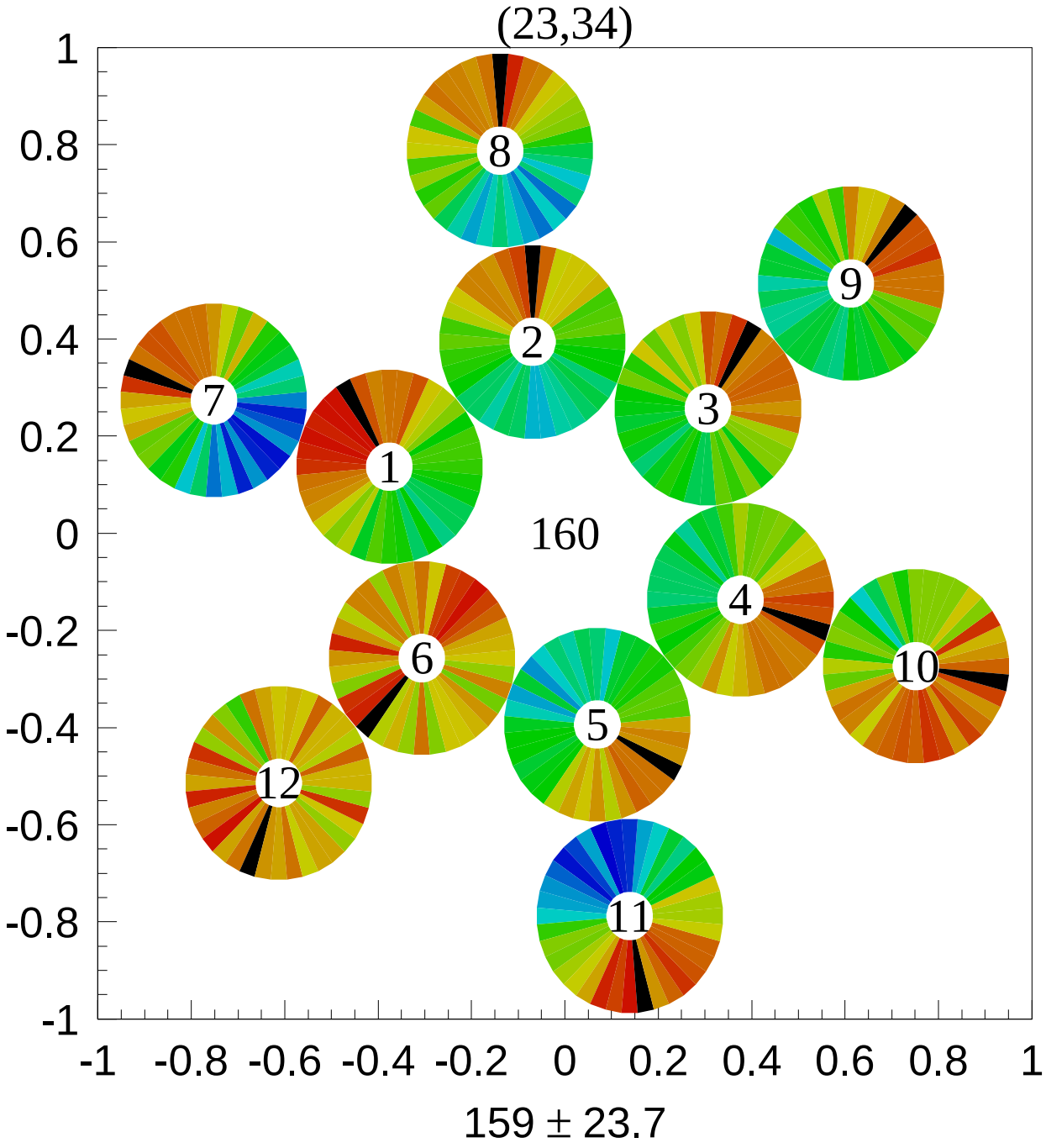

(23,33)
tilted LEDs
124 126 132 125 124 129
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 125 129 129 123 131
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

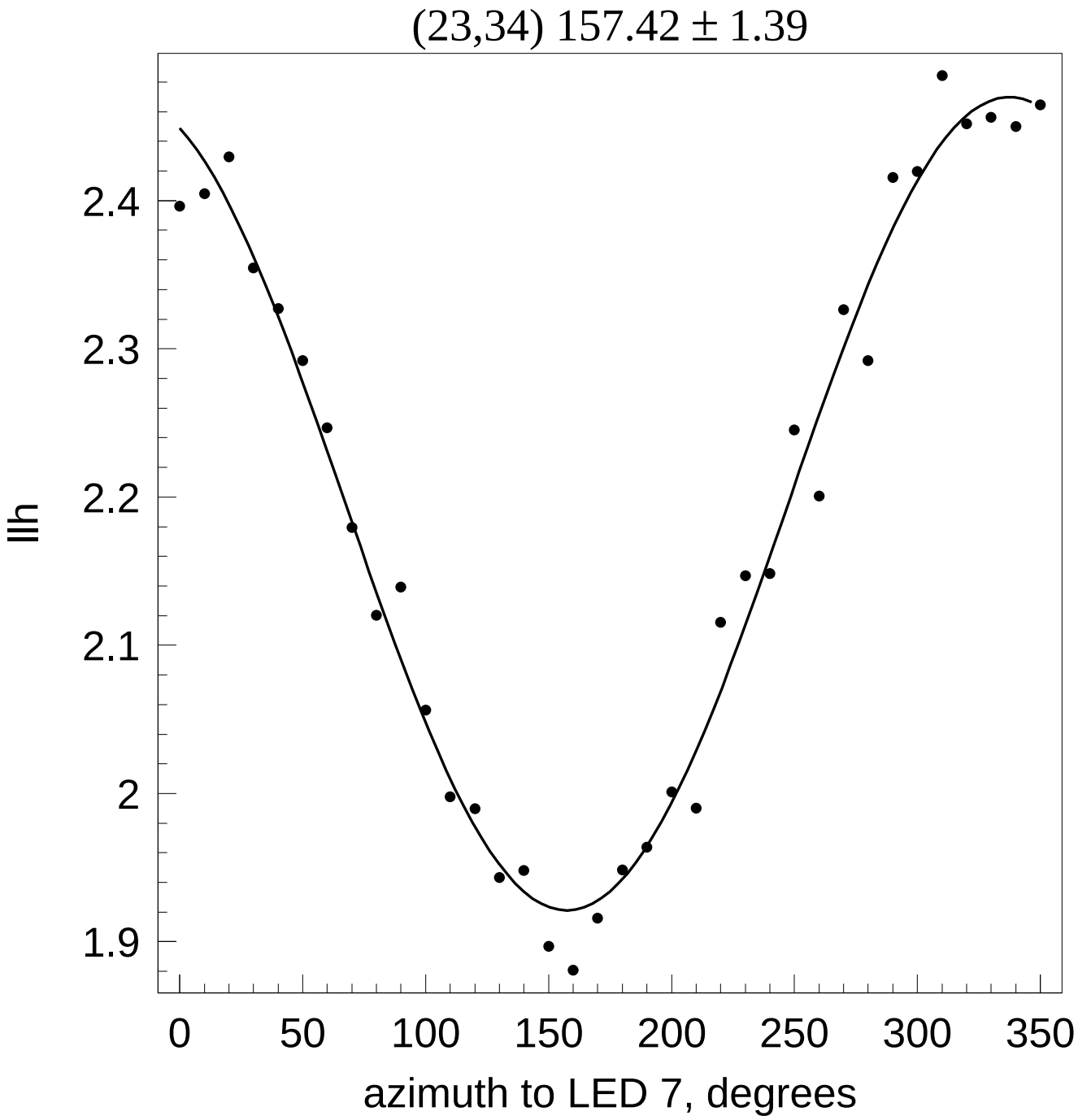

(23,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
254.6 ± 23.1
250
1
2
3
4
5
6
7
8
9
10
11
12

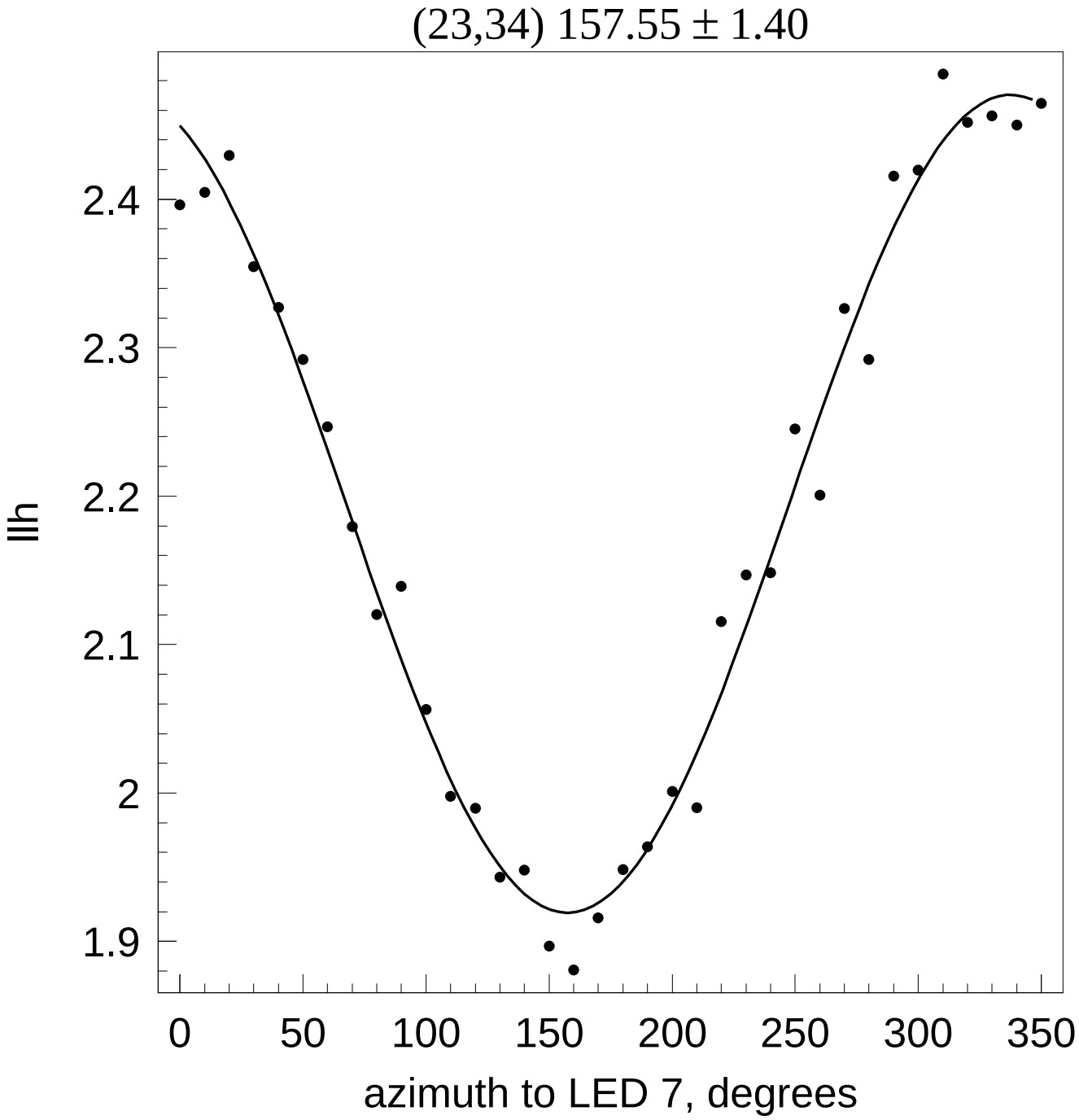

(23,33) 254.75 ± 0.91
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

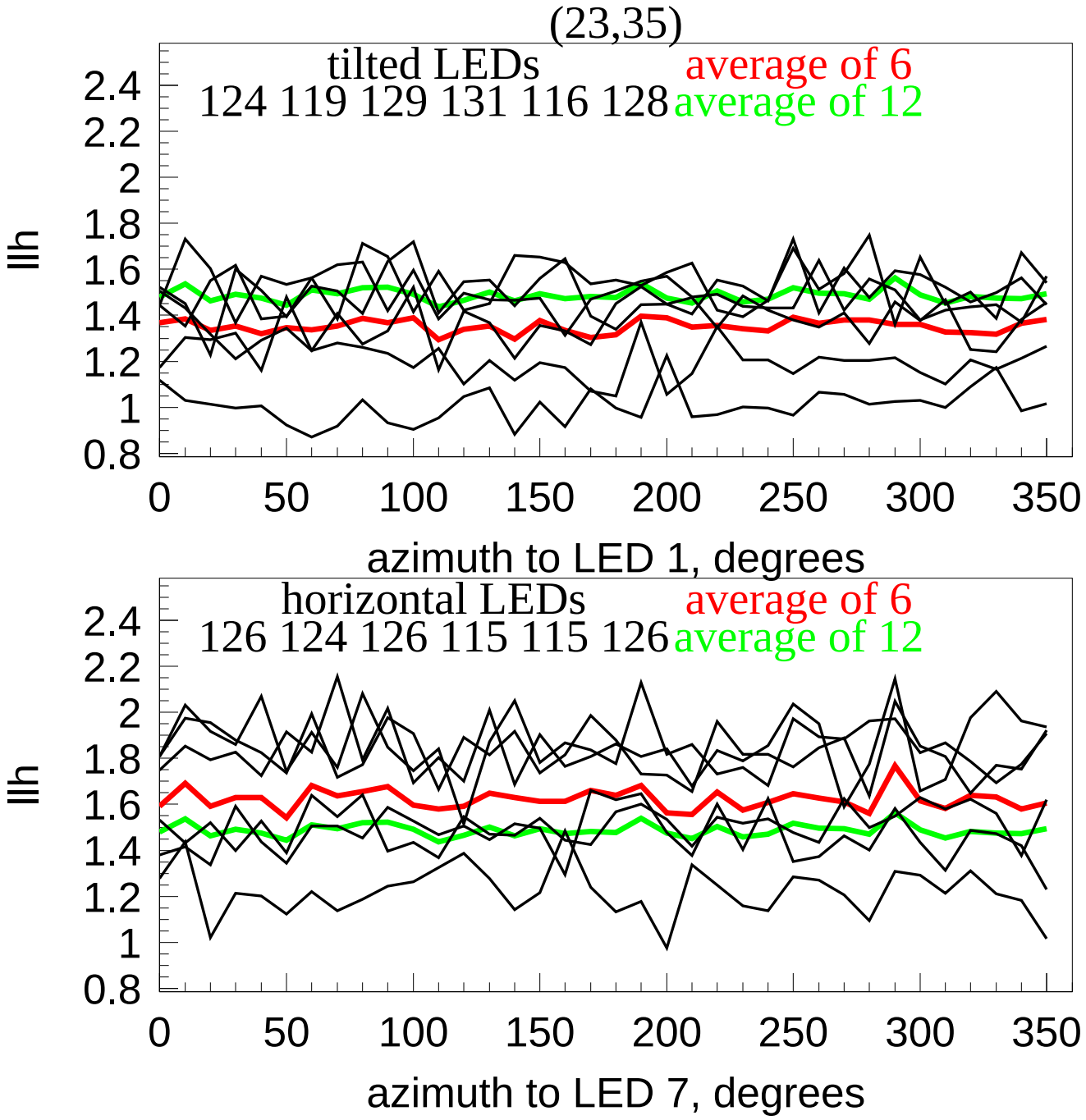

(23,33) 254.54 ± 0.92
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

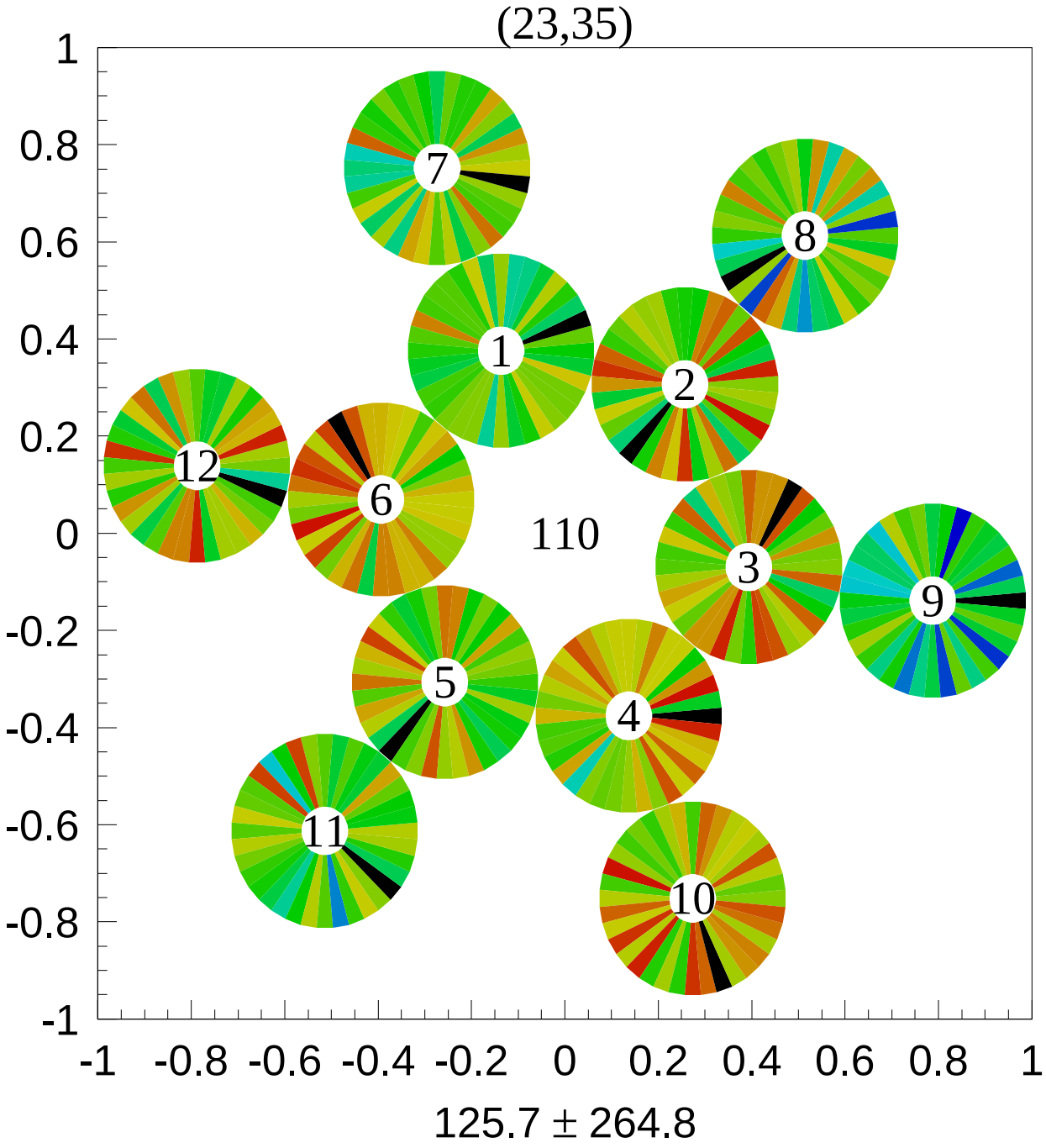

(23,34)
tilted LEDs
114 130 126 124 129 124
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 130 125 124 132 93
average of 6
average of 12
llh
azimuth to LED 7, degrees

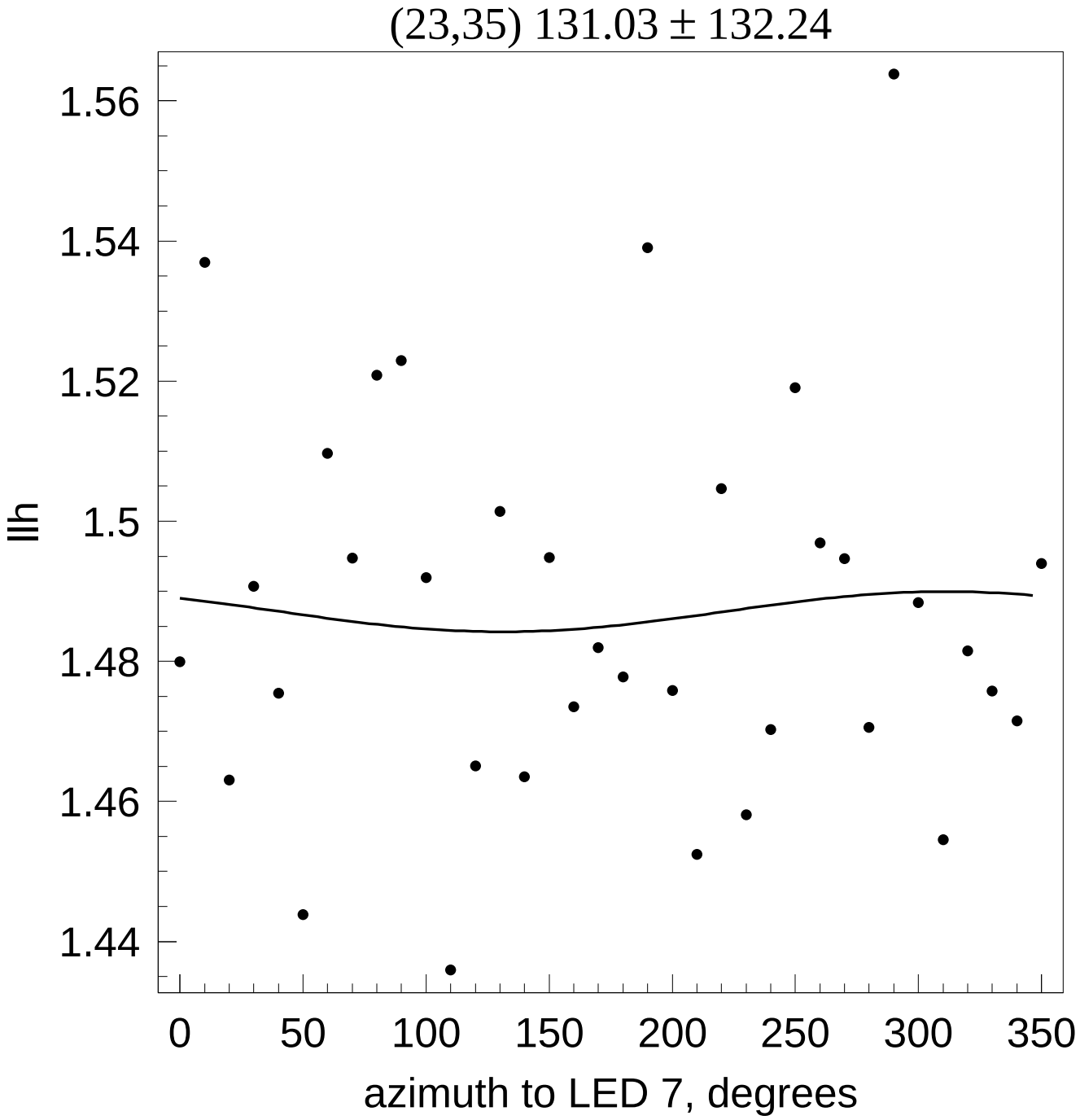

(23,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
7
3
1
160
4
10
6
5
12
11
159 ± 23.7

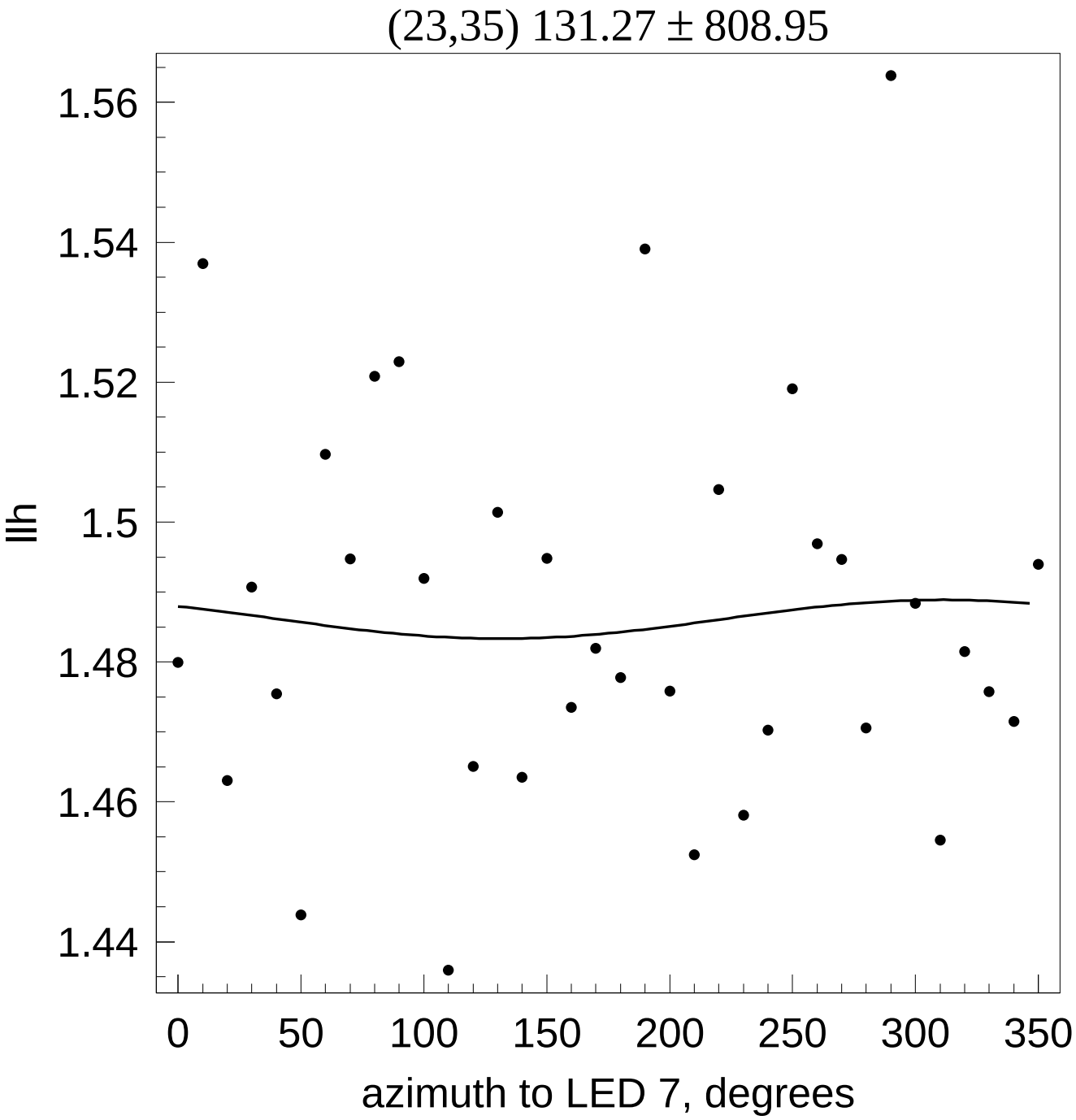

(23,34) 157.42 ± 1.39
2.4
2.3
2.2
2.1
2
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

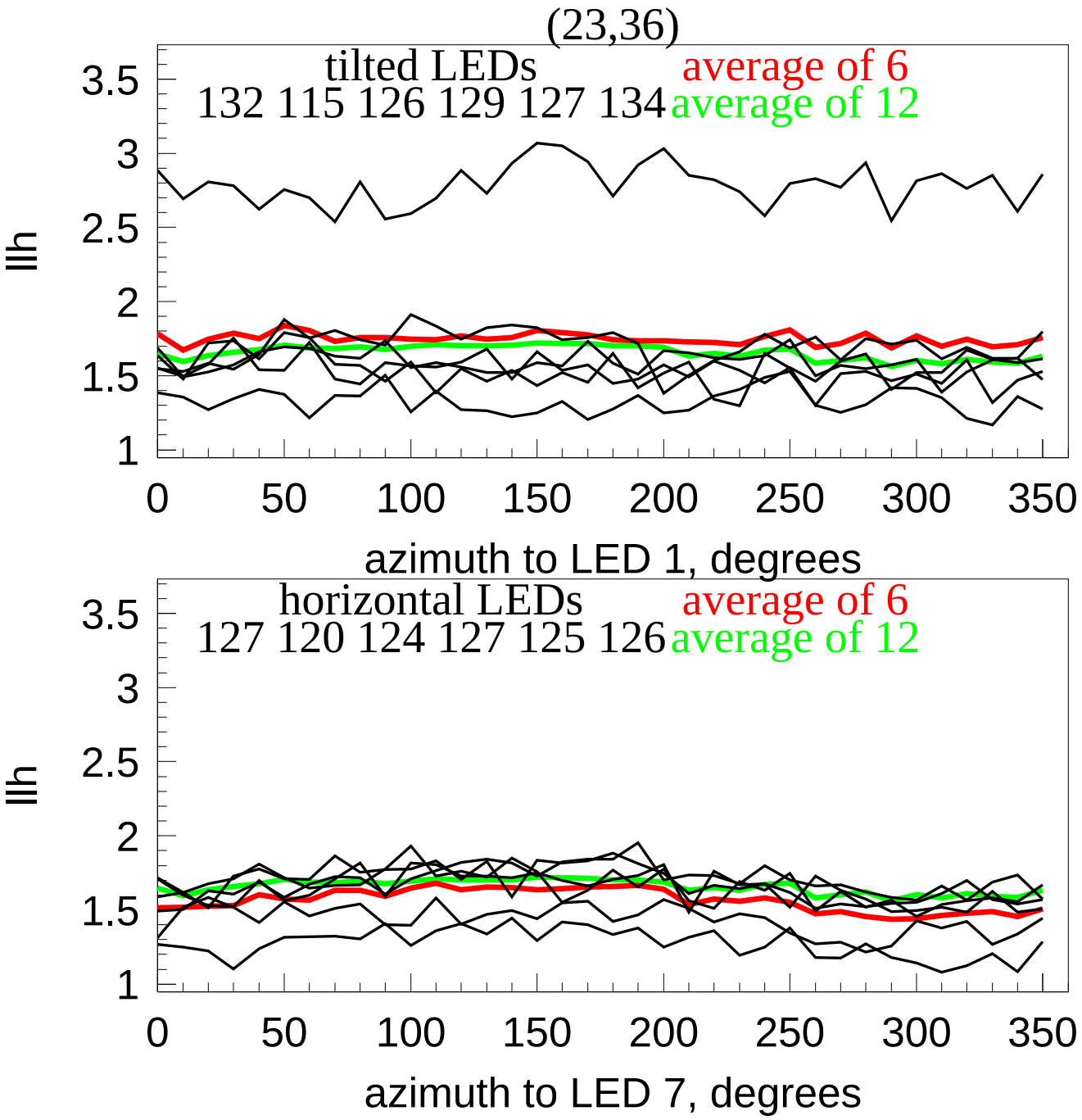

(23,34) 157.55 ± 1.40
2.4
2.3
2.2
2.1
2
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

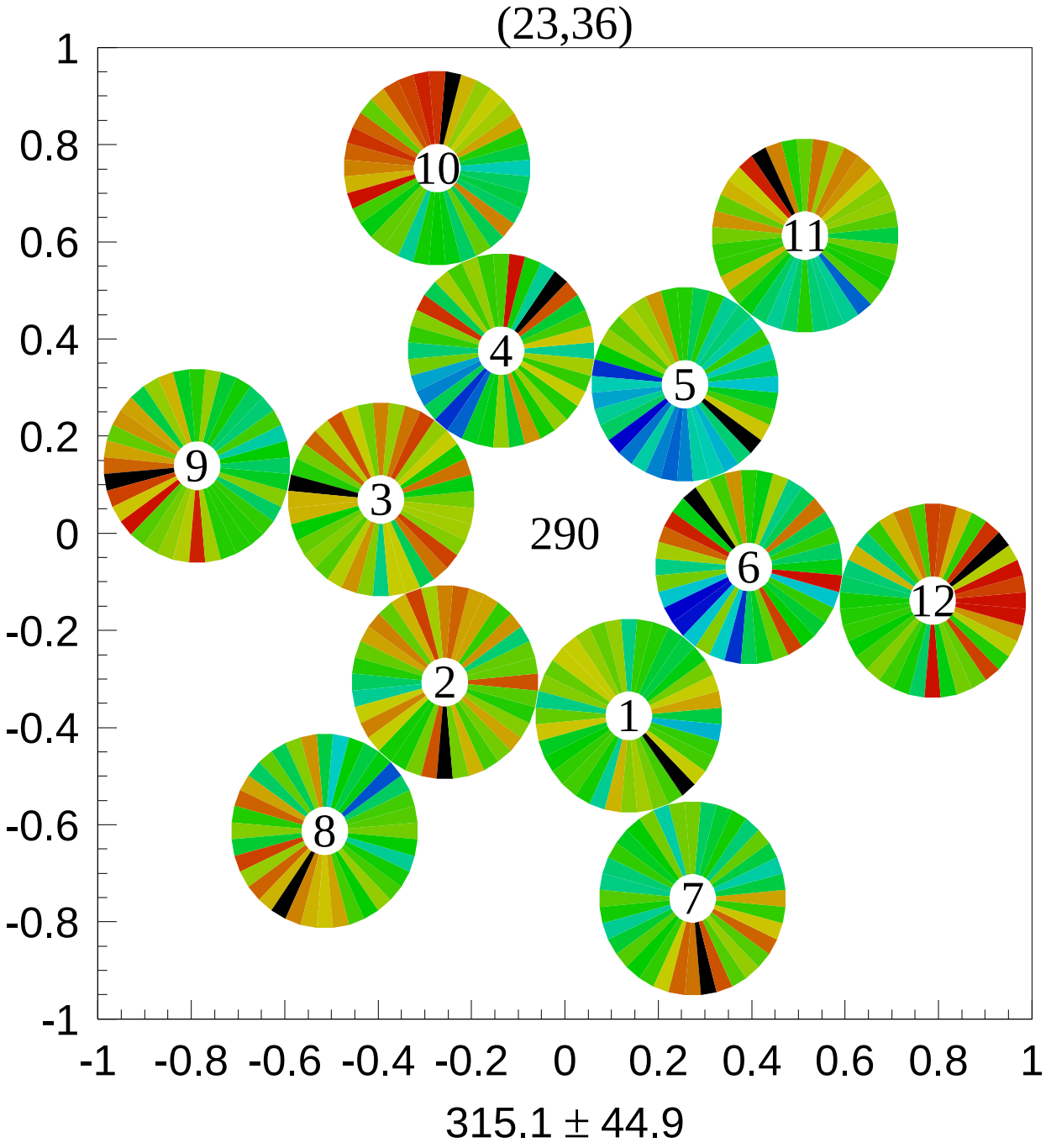

(23,35)
tilted LEDs
124 119 129 131 116 128
average of 6
average of 12
llh
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 124 126 115 115 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

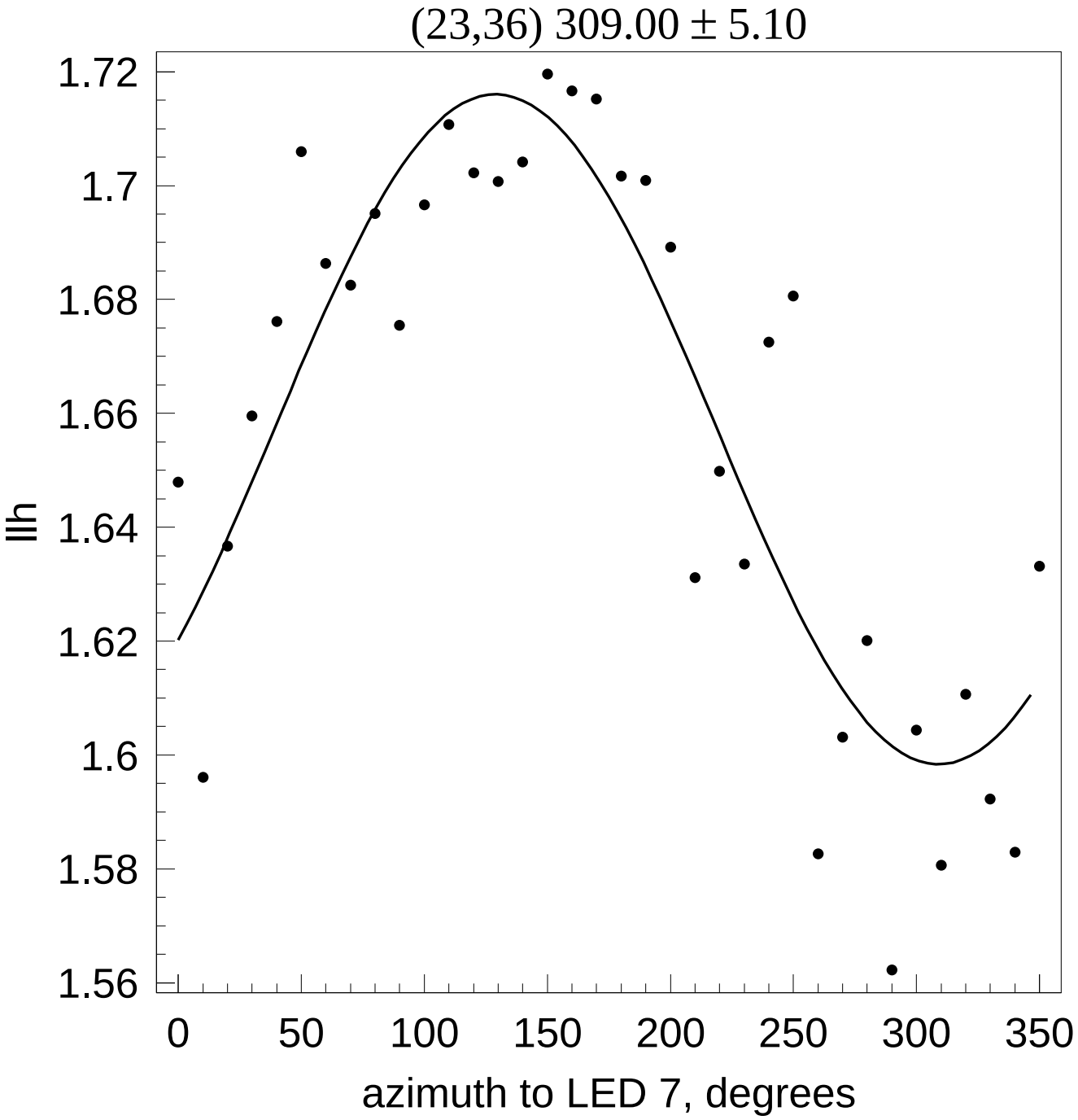

(23,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
125.7 ± 264.8
7
8
1
2
12
6
110
3
9
5
4
11
10

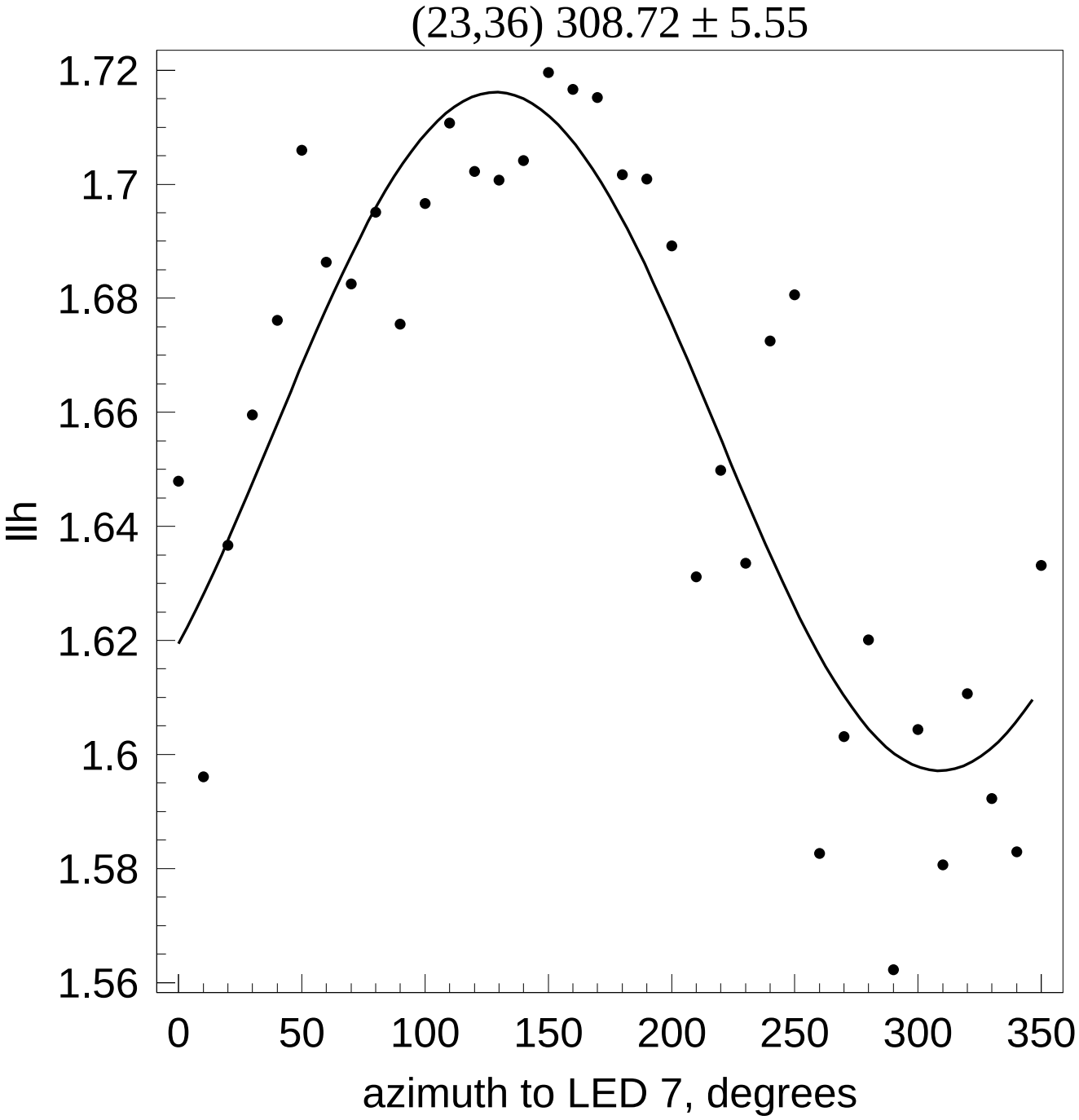

(23,35) 131.03 ± 132.24
1.56
1.54
1.52
1.5
1.48
1.46
1.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

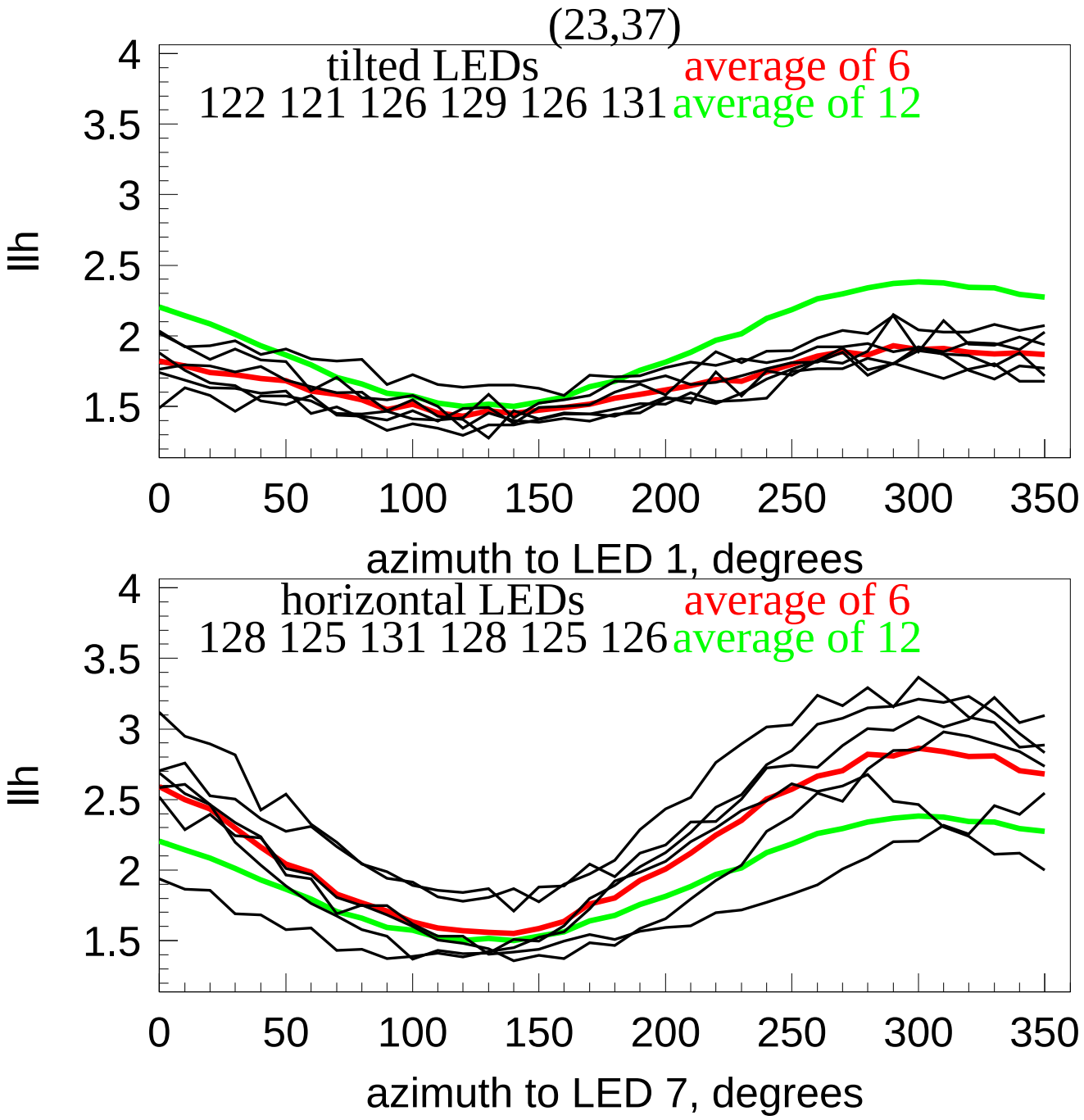

(23,35) 131.27 ± 808.95
1.56
1.54
1.52
1.5
1.48
1.46
1.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

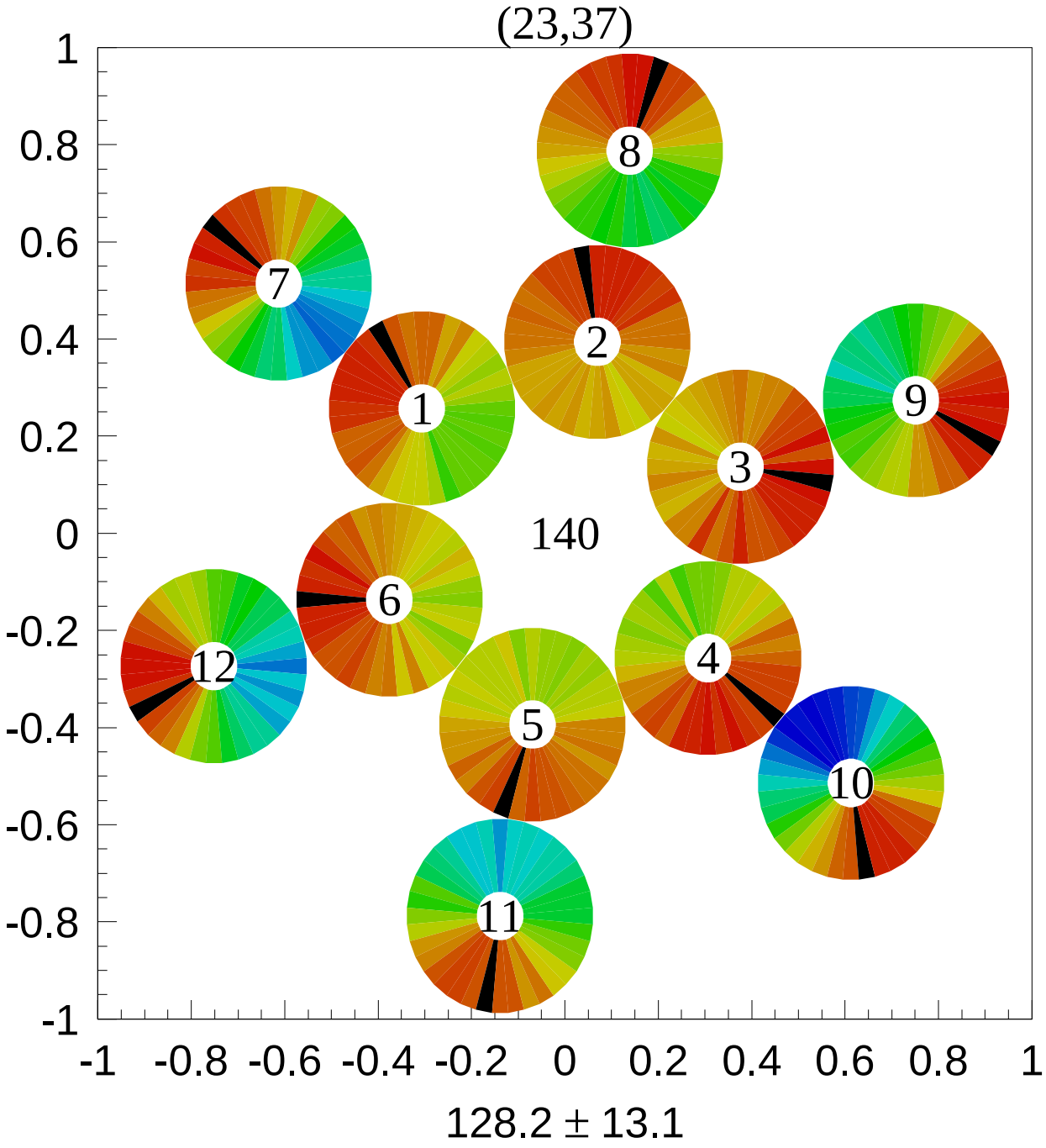

(23,36)
tilted LEDs
132 115 126 129 127 134
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 120 124 127 125 126
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

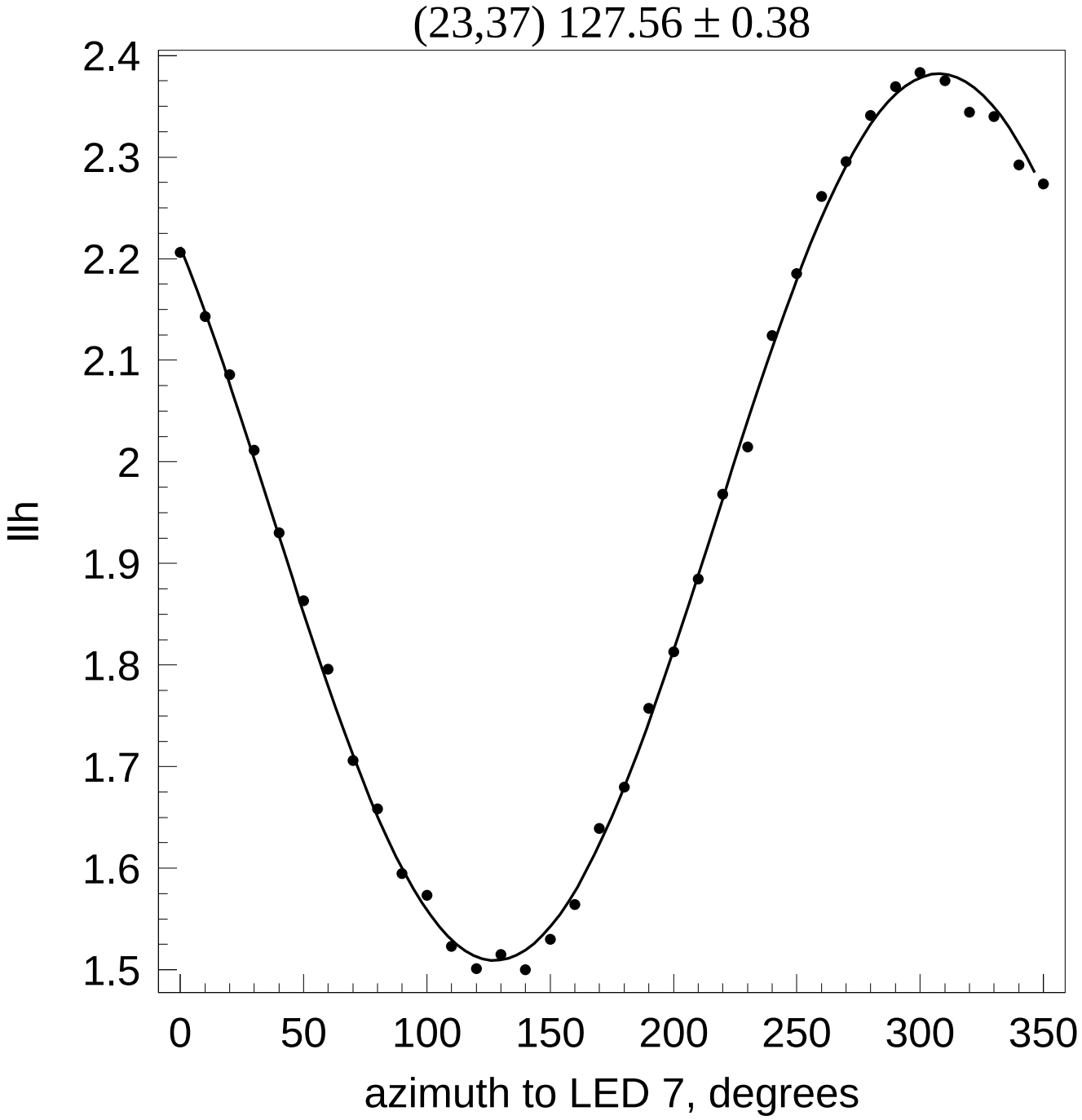

(23,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
290
6
12
2
1
8
7
315.1 ± 44.9

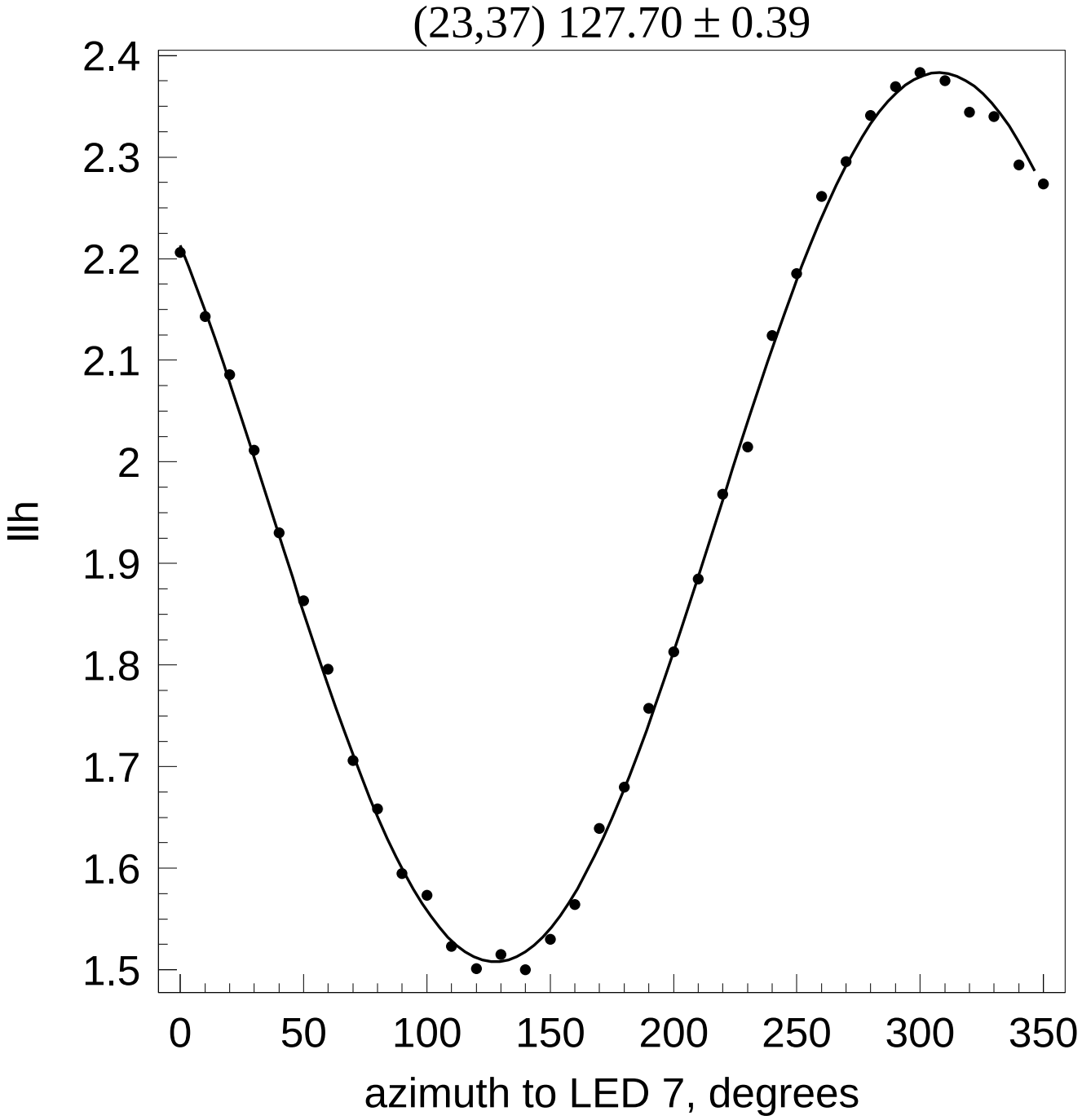

(23,36) 309.00 ± 5.10
1.72
1.7
1.68
1.66
1.64
1.62
1.6
1.58
1.56
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

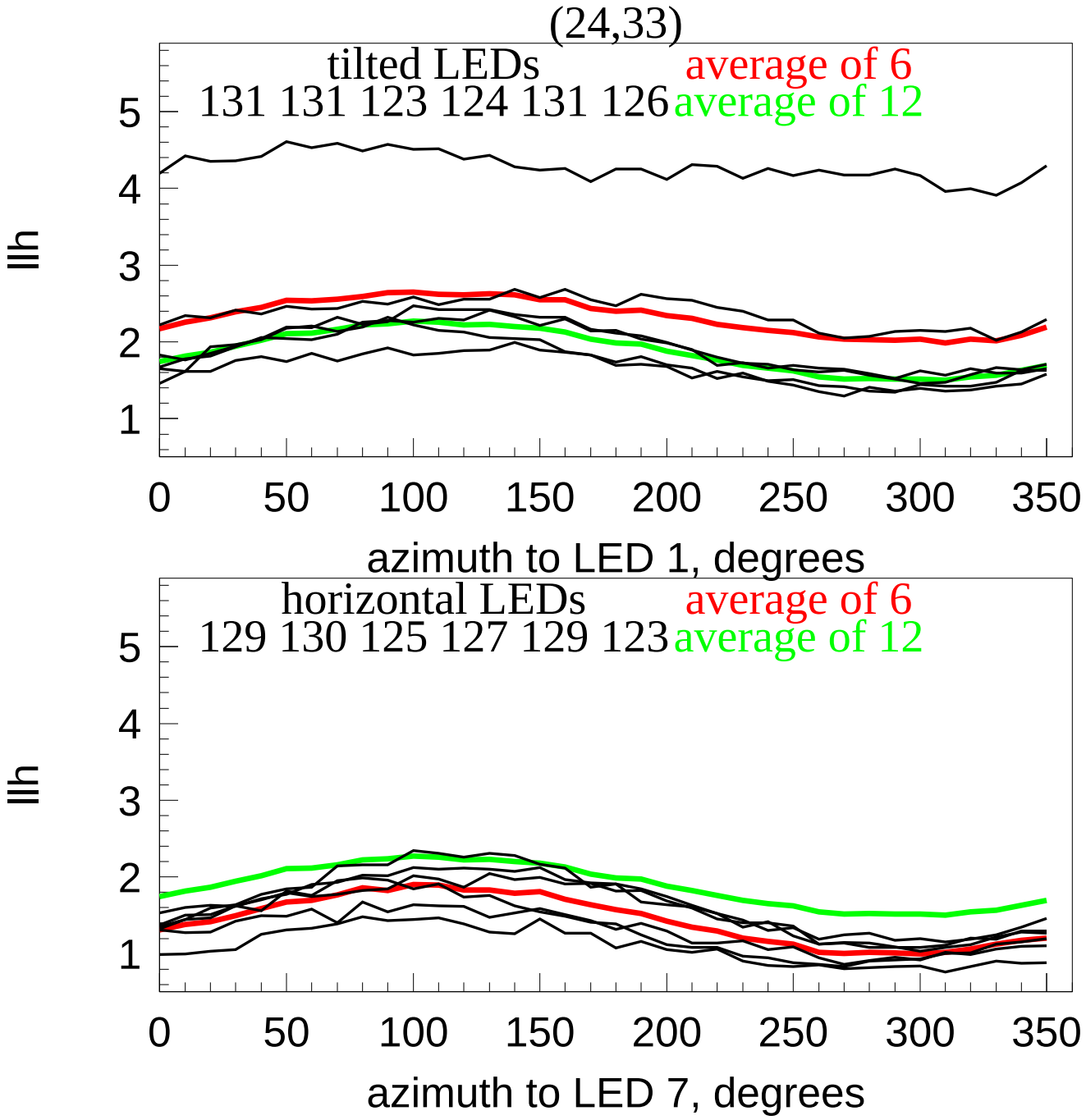

(23,36) 308.72 ± 5.55
1.72
1.7
1.68
1.66
1.64
1.62
1.6
1.58
1.56
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

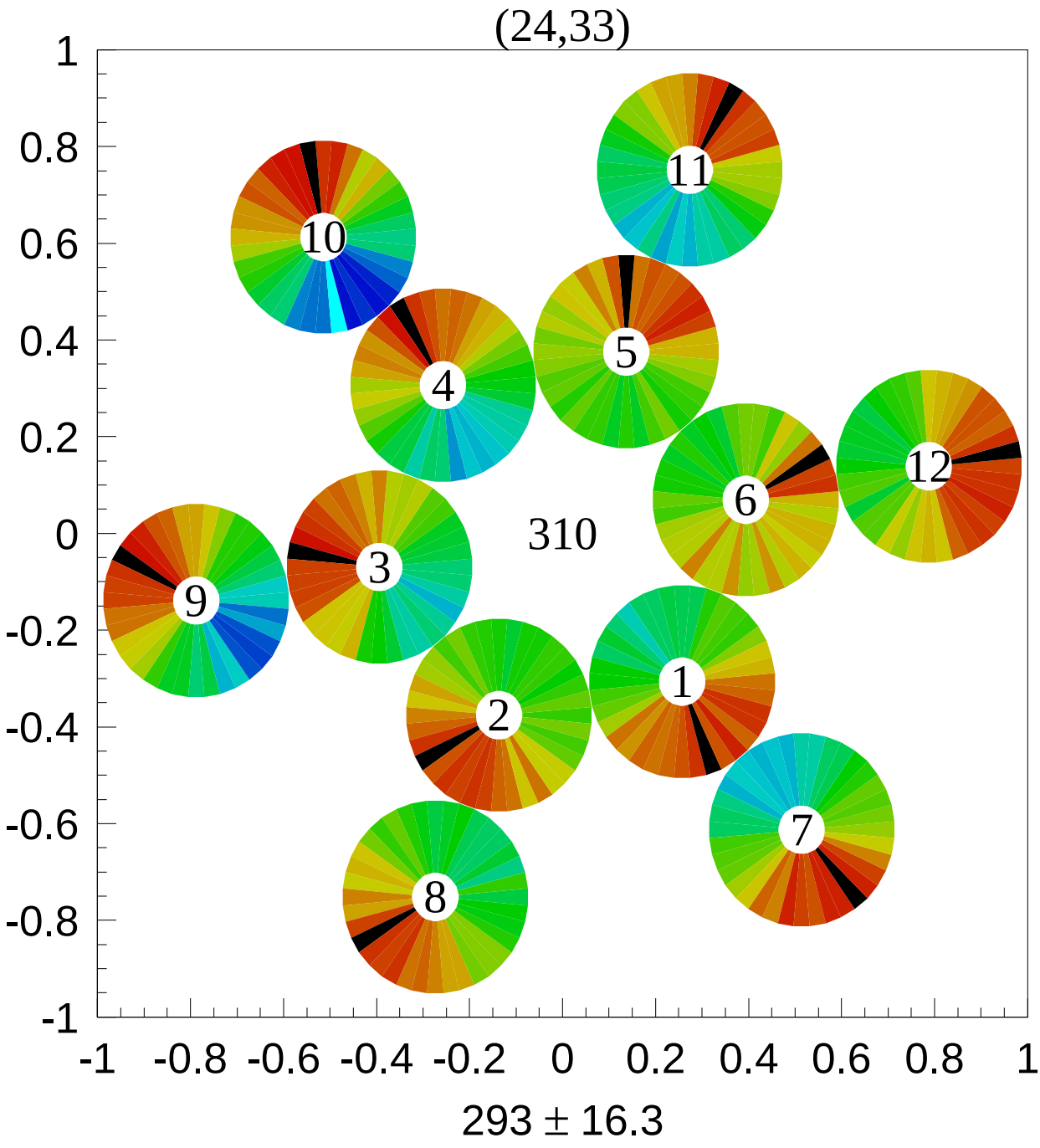

(23,37)
tilted LEDs
122 121 126 129 126 131
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 125 131 128 125 126
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

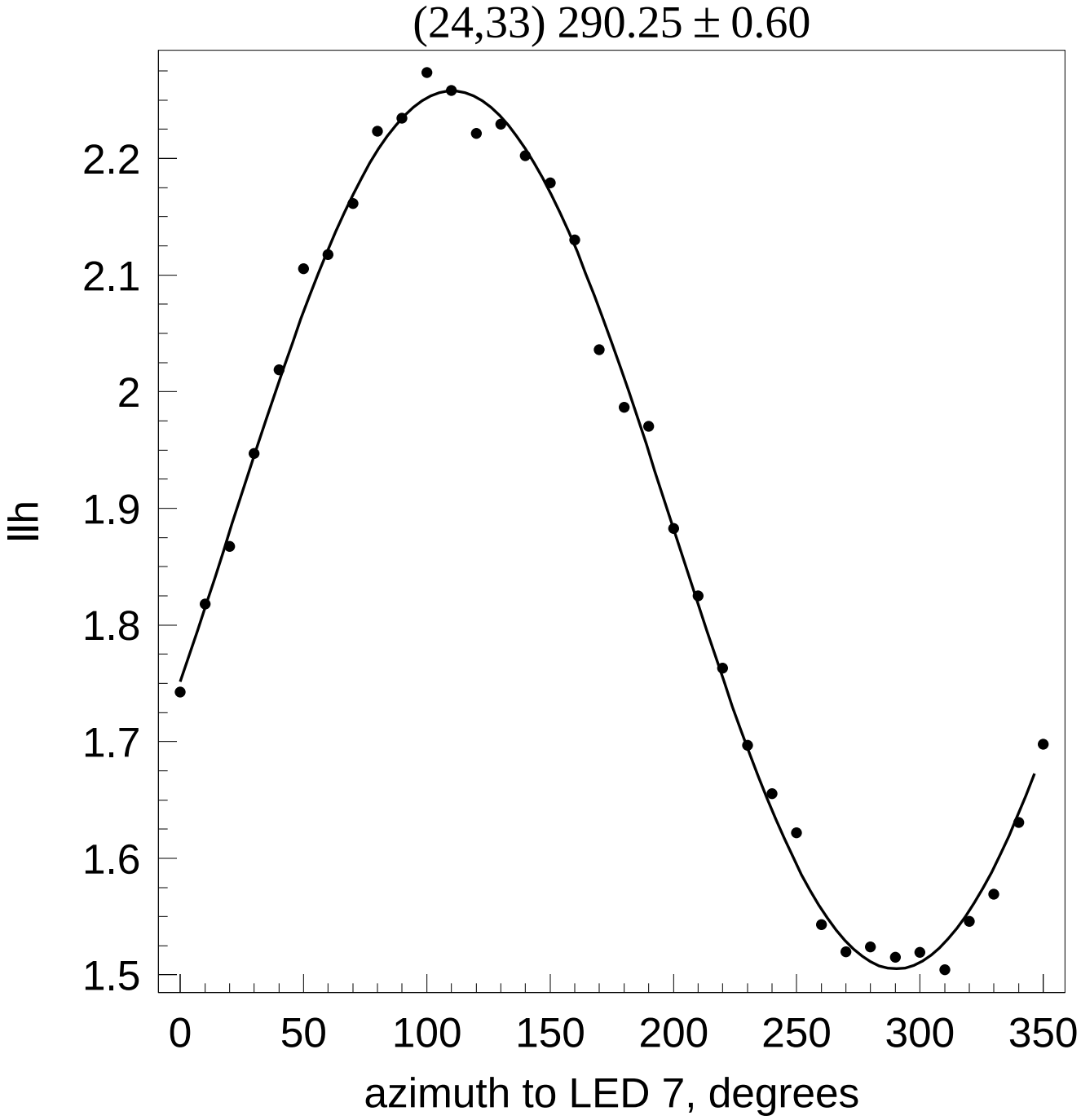

(23,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
128.2 ± 13.1
140
1
2
3
4
5
6
7
8
9
10
11
12

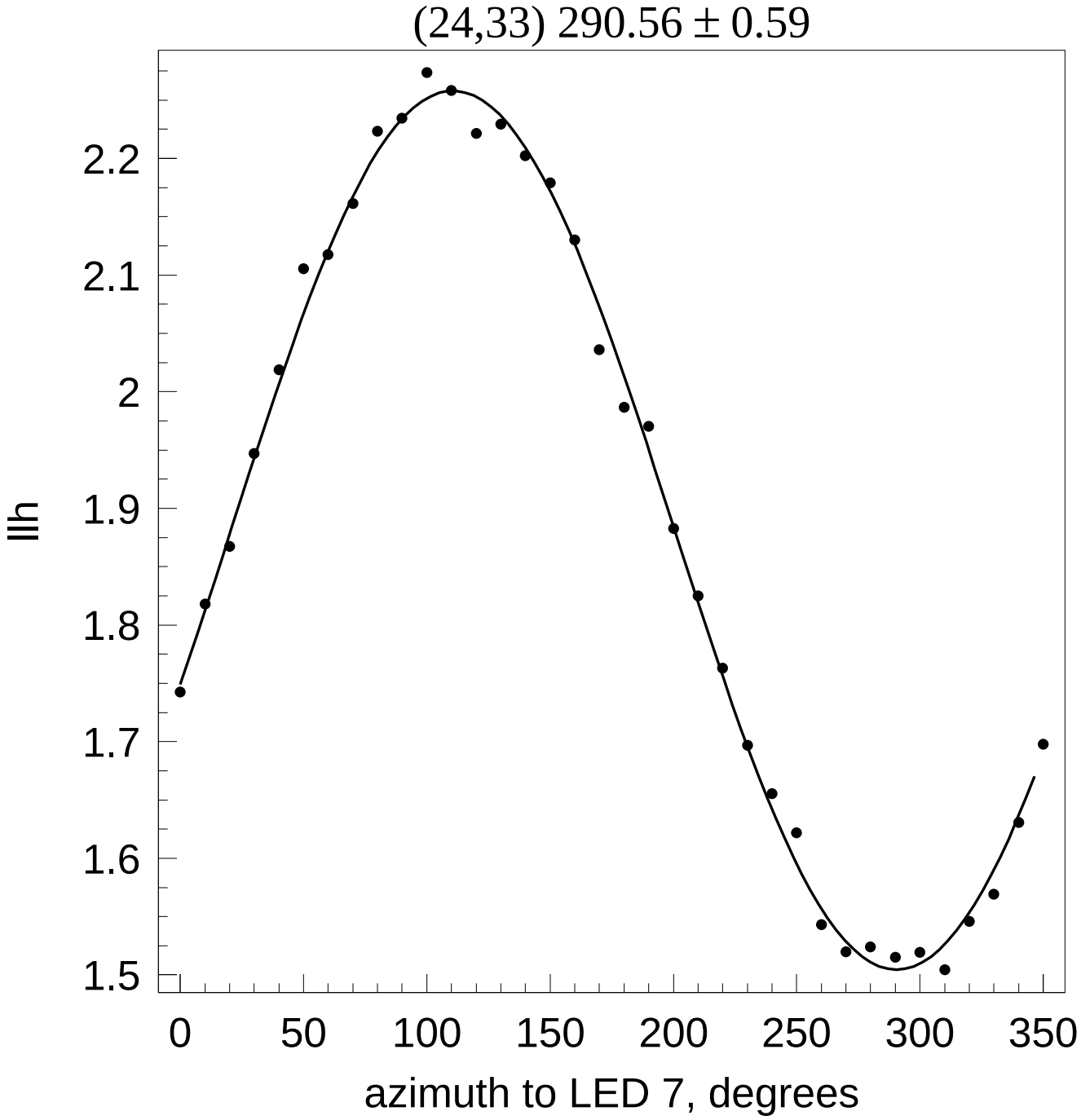

(23,37) 127.56 ± 0.38
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

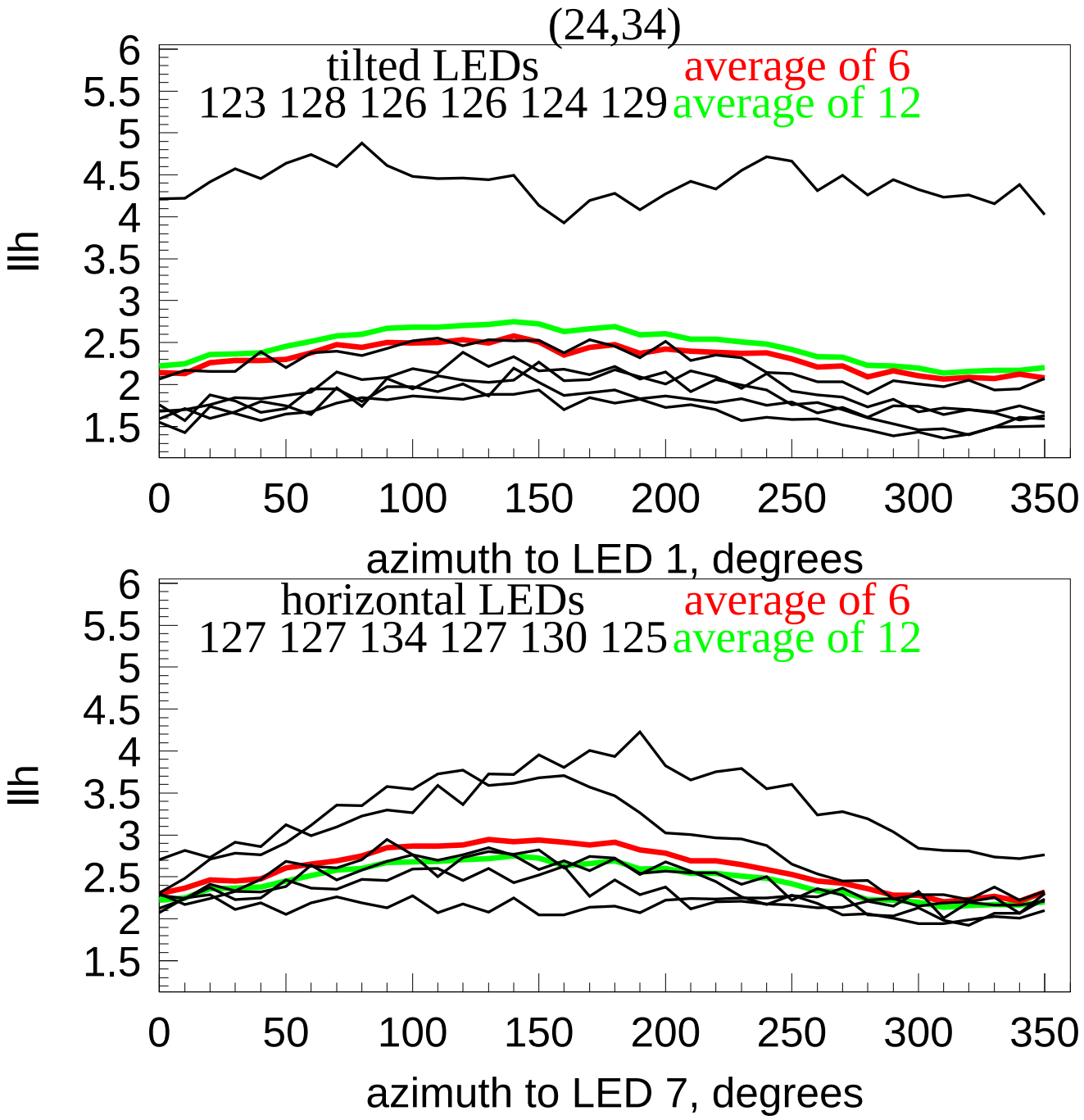

(23,37) 127.70 ± 0.39
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

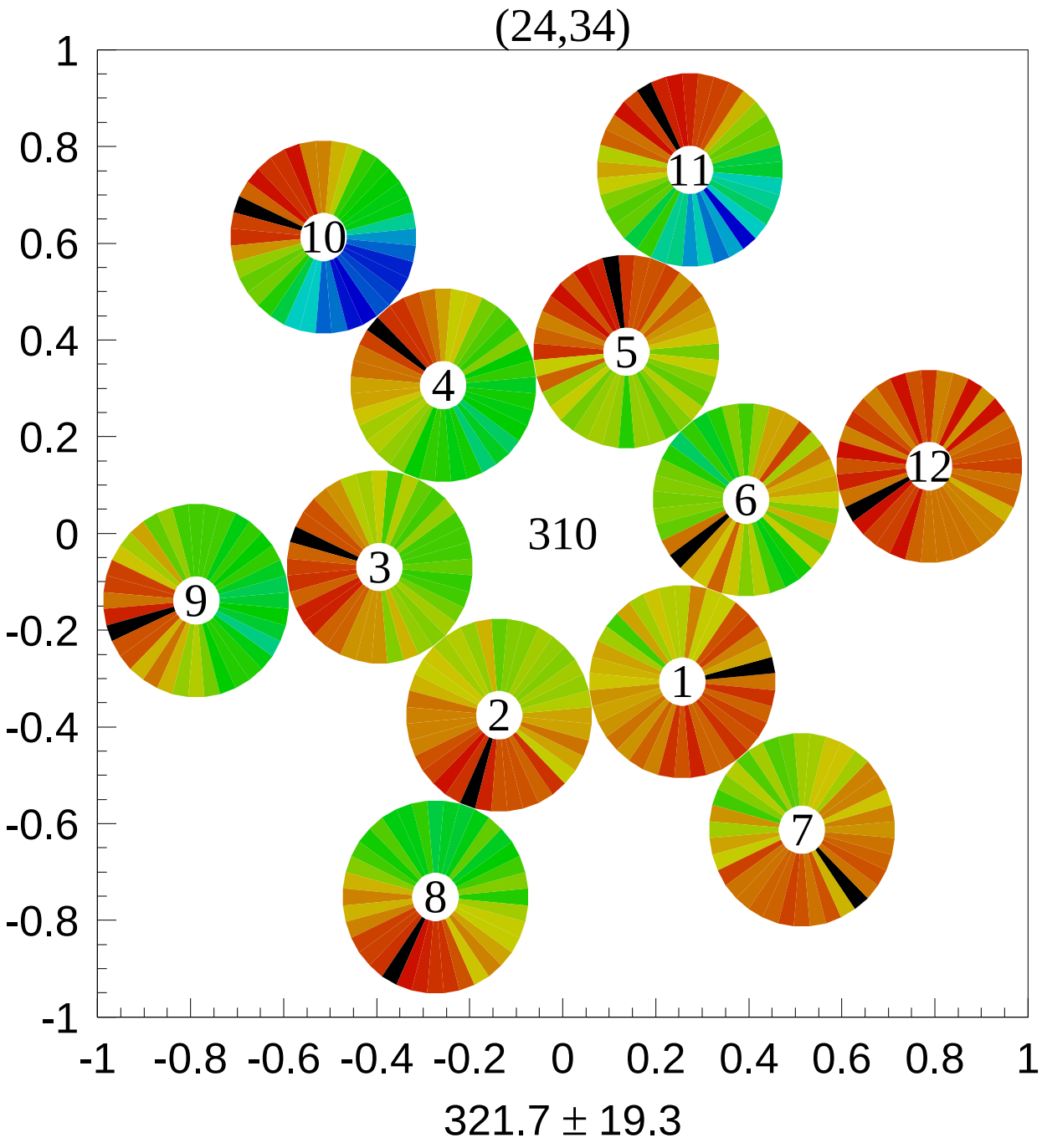

(24,33)
tilted LEDs
131 131 123 124 131 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 130 125 127 129 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

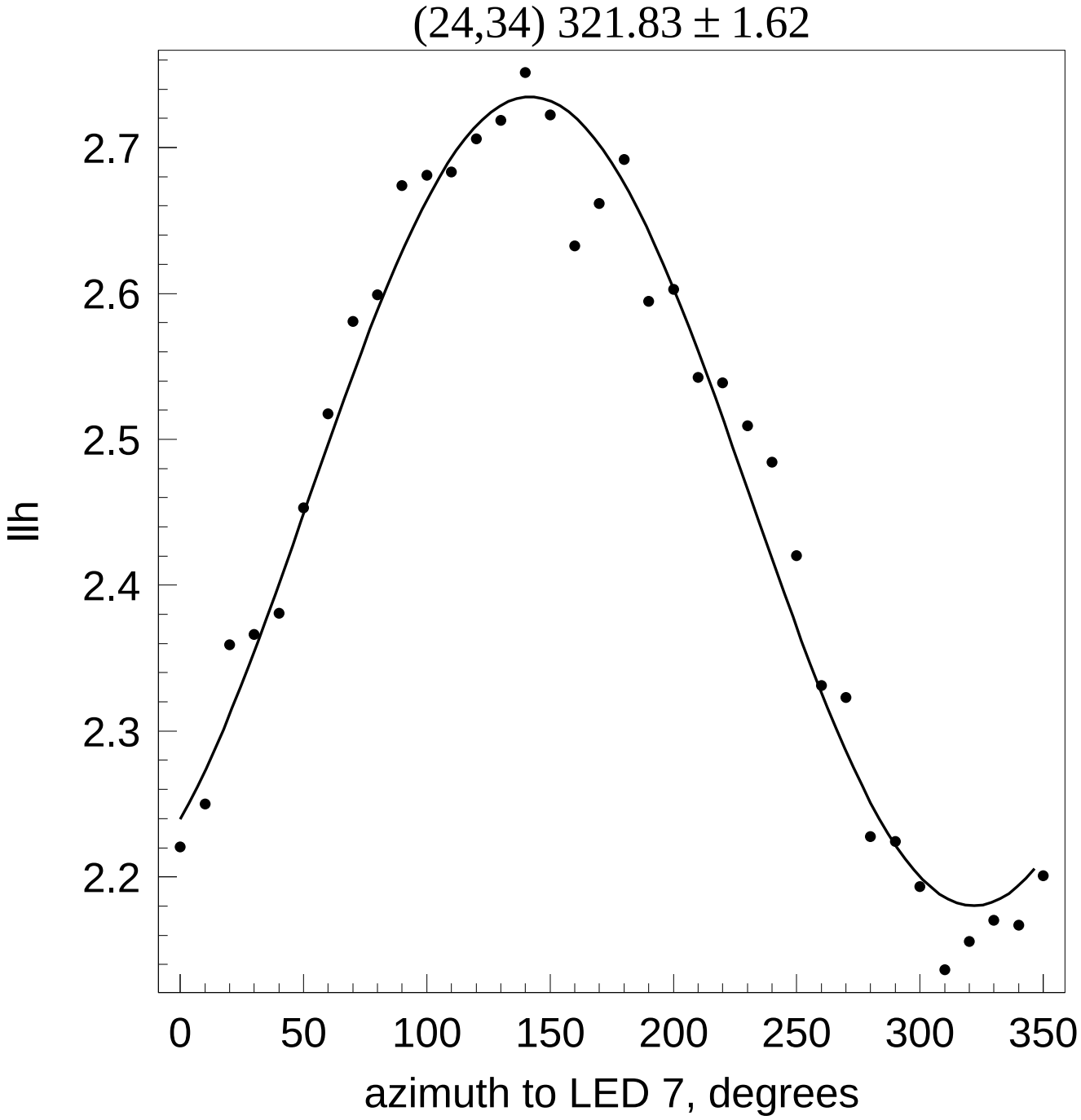

(24,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
9
310
2
1
7
8
293 ± 16.3

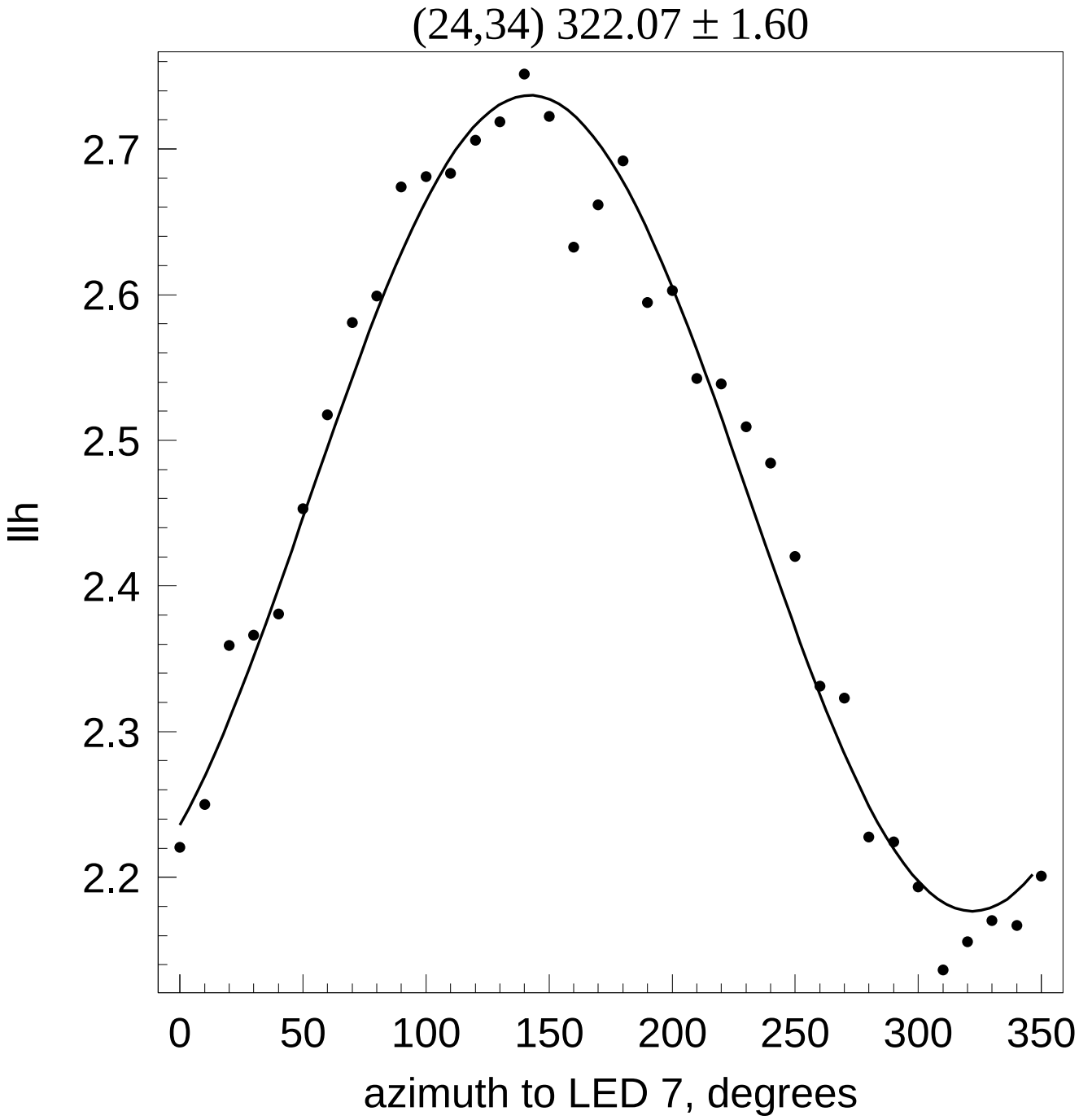

(24,33) 290.25 ± 0.60
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

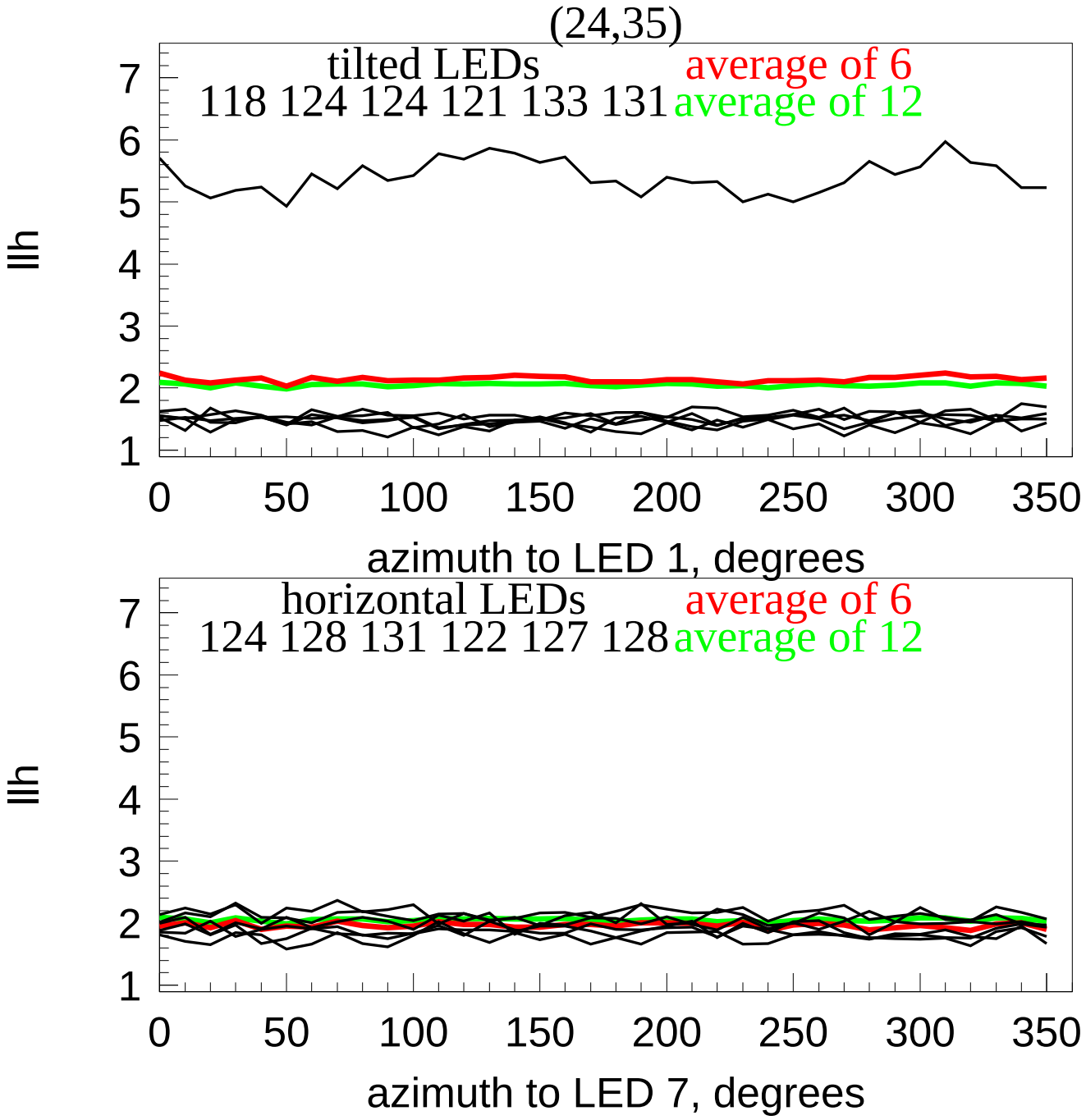

(24,33) 290.56 ± 0.59
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

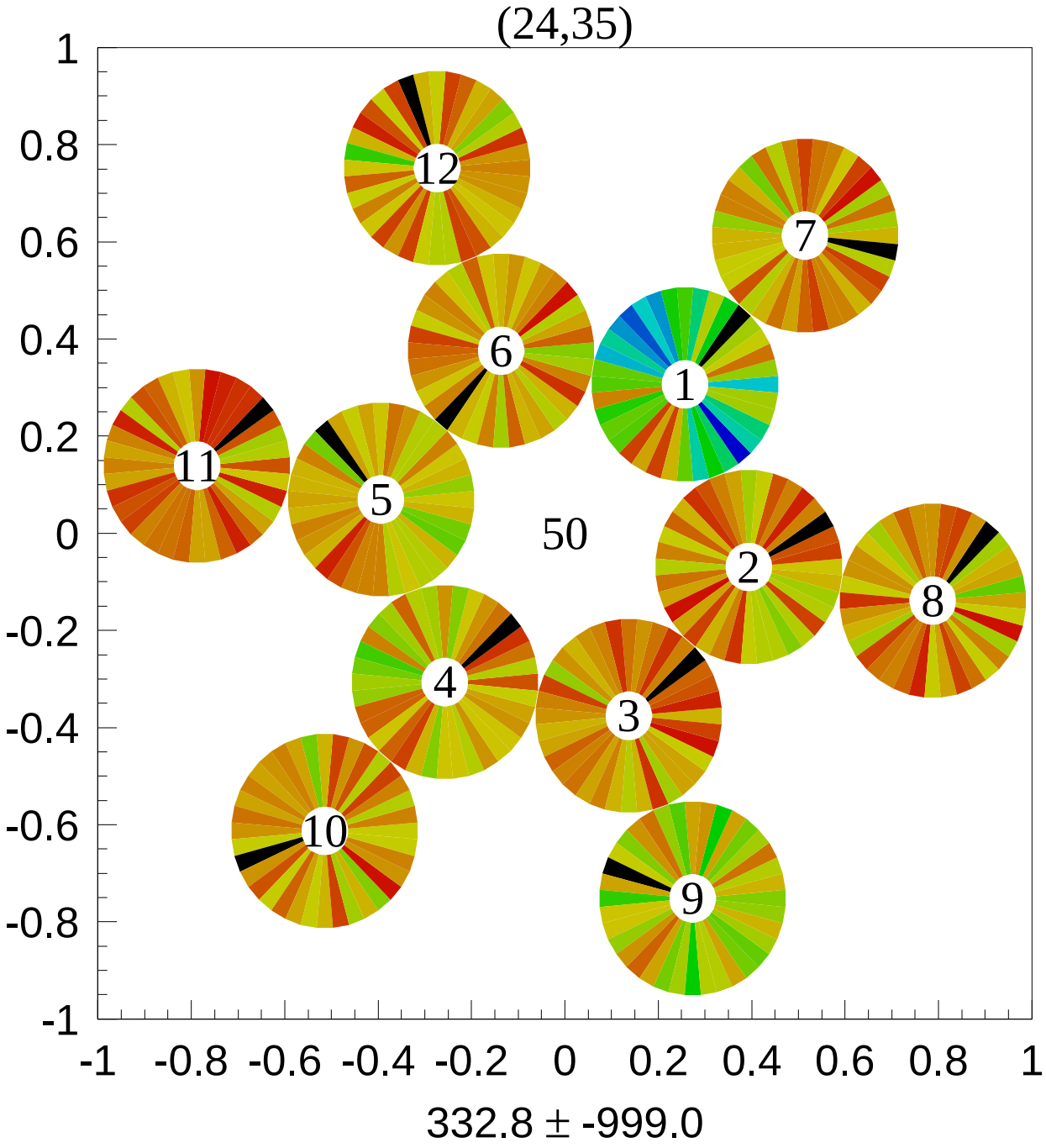

(24,34)
tilted LEDs
123 128 126 126 124 129
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
127 127 134 127 130 125
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

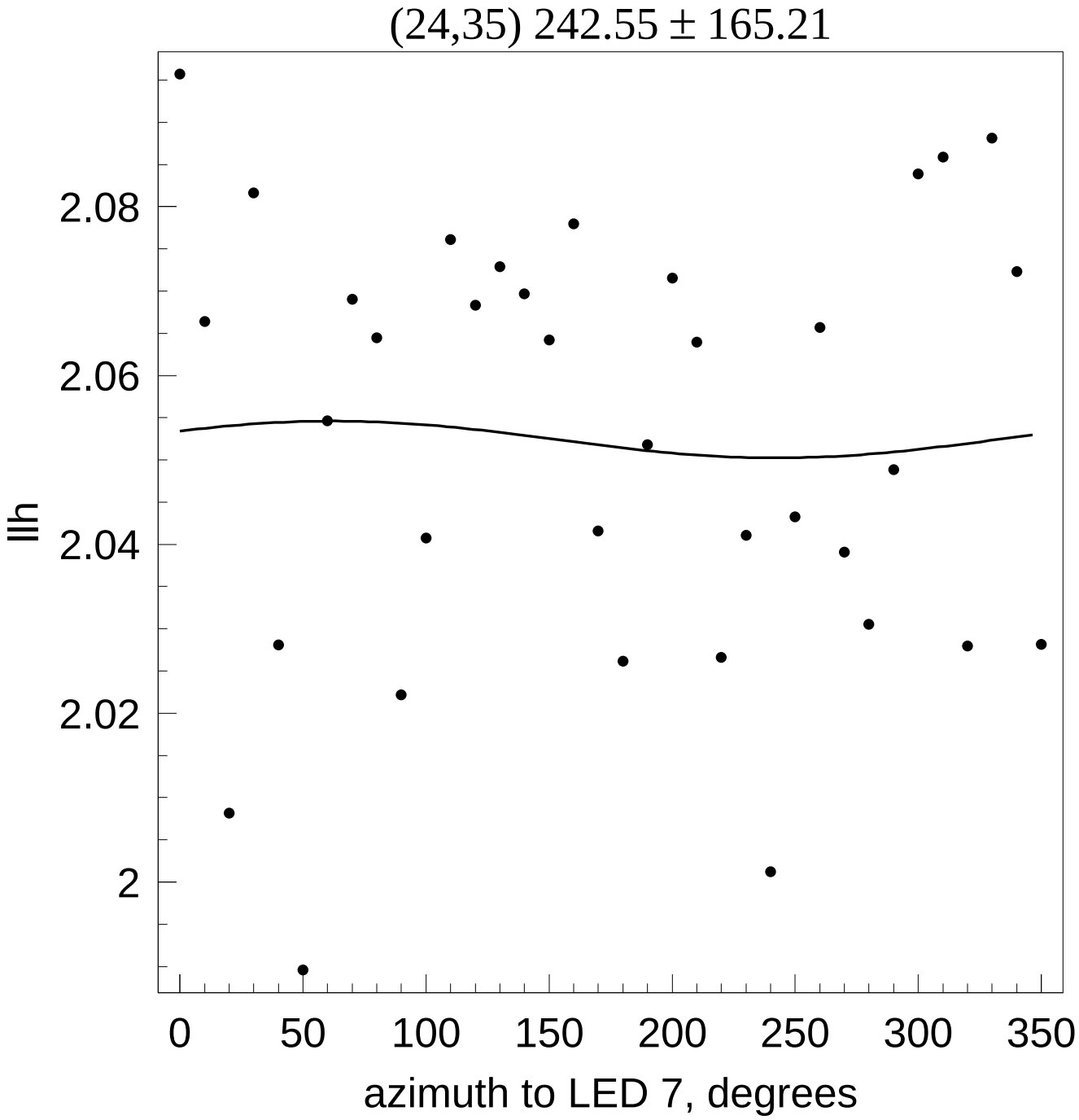

(24,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
9
310
2
1
7
8
321.7 ± 19.3

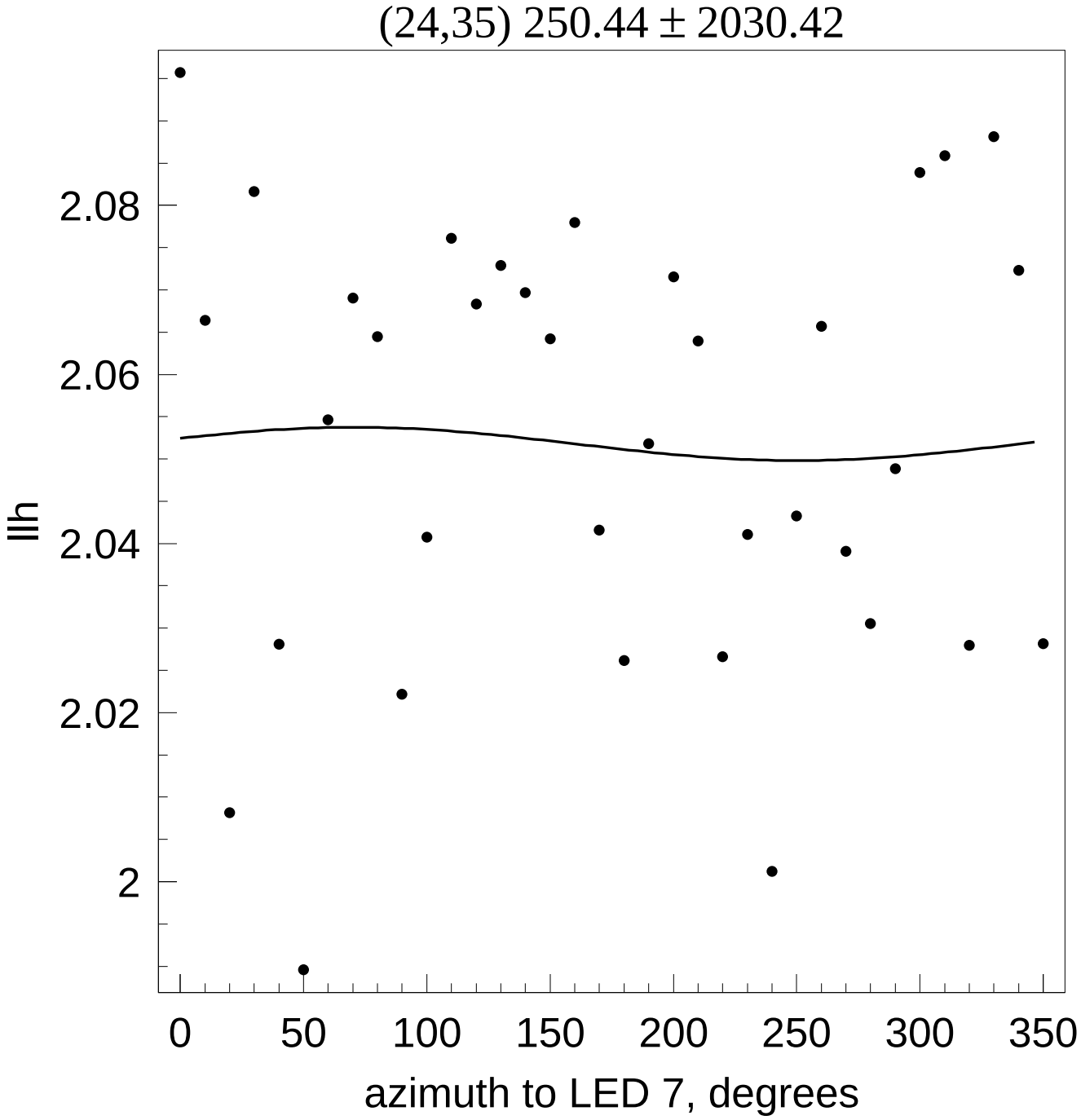

(24,34) 321.83 ± 1.62
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

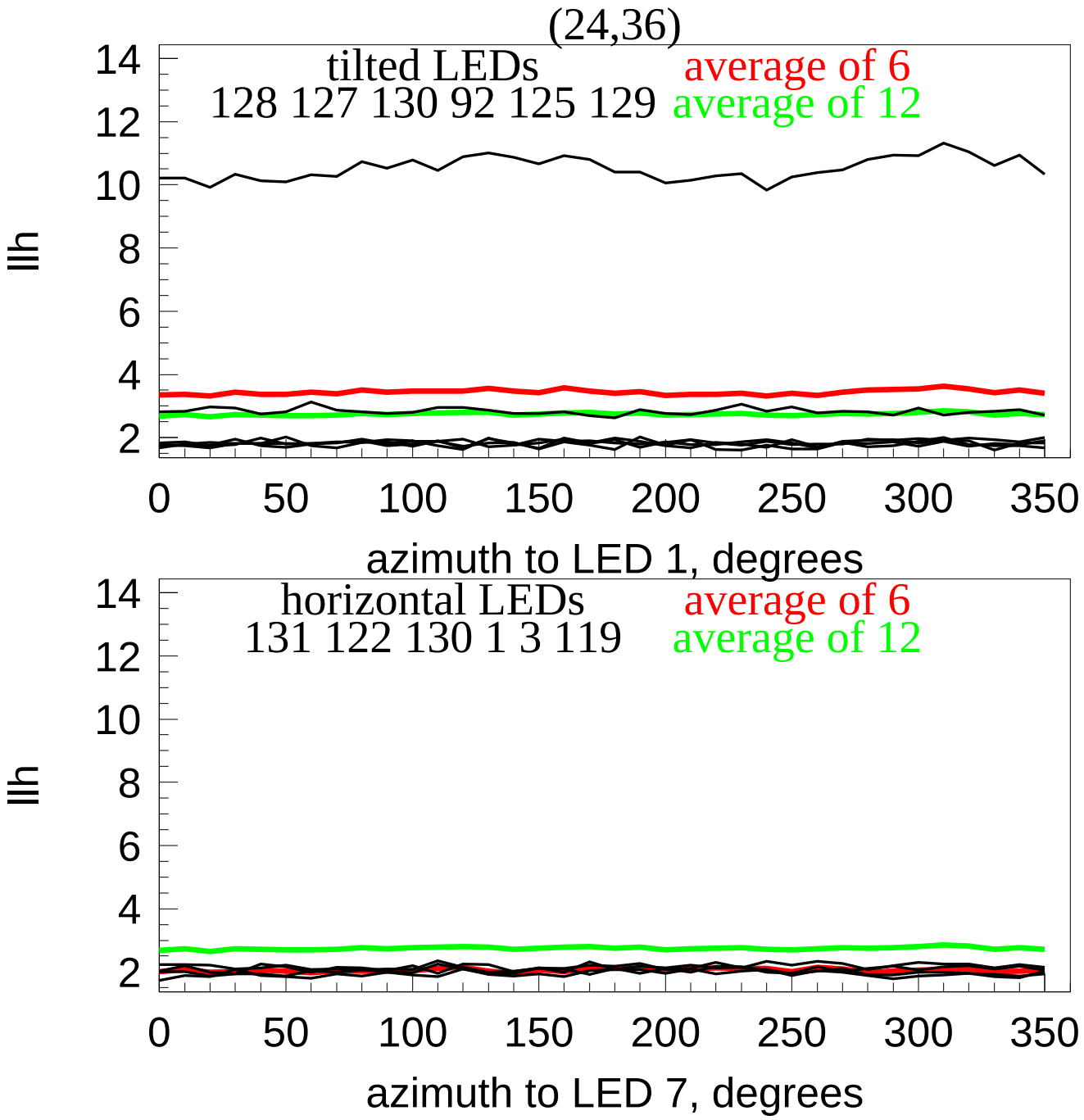

(24,34) 322.07 ± 1.60
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

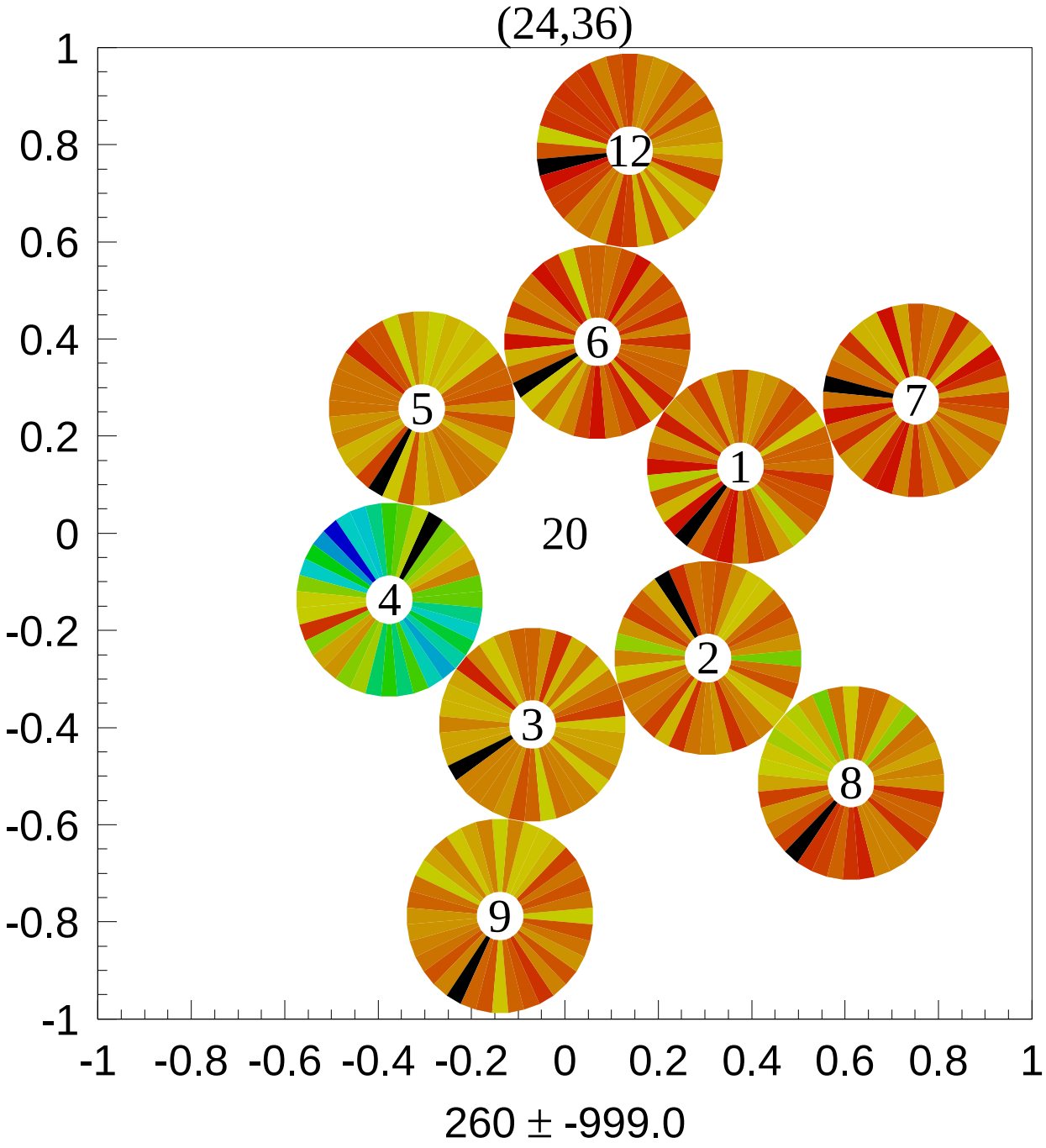

(24,35)
tilted LEDs
118 124 124 121 133 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 128 131 122 127 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

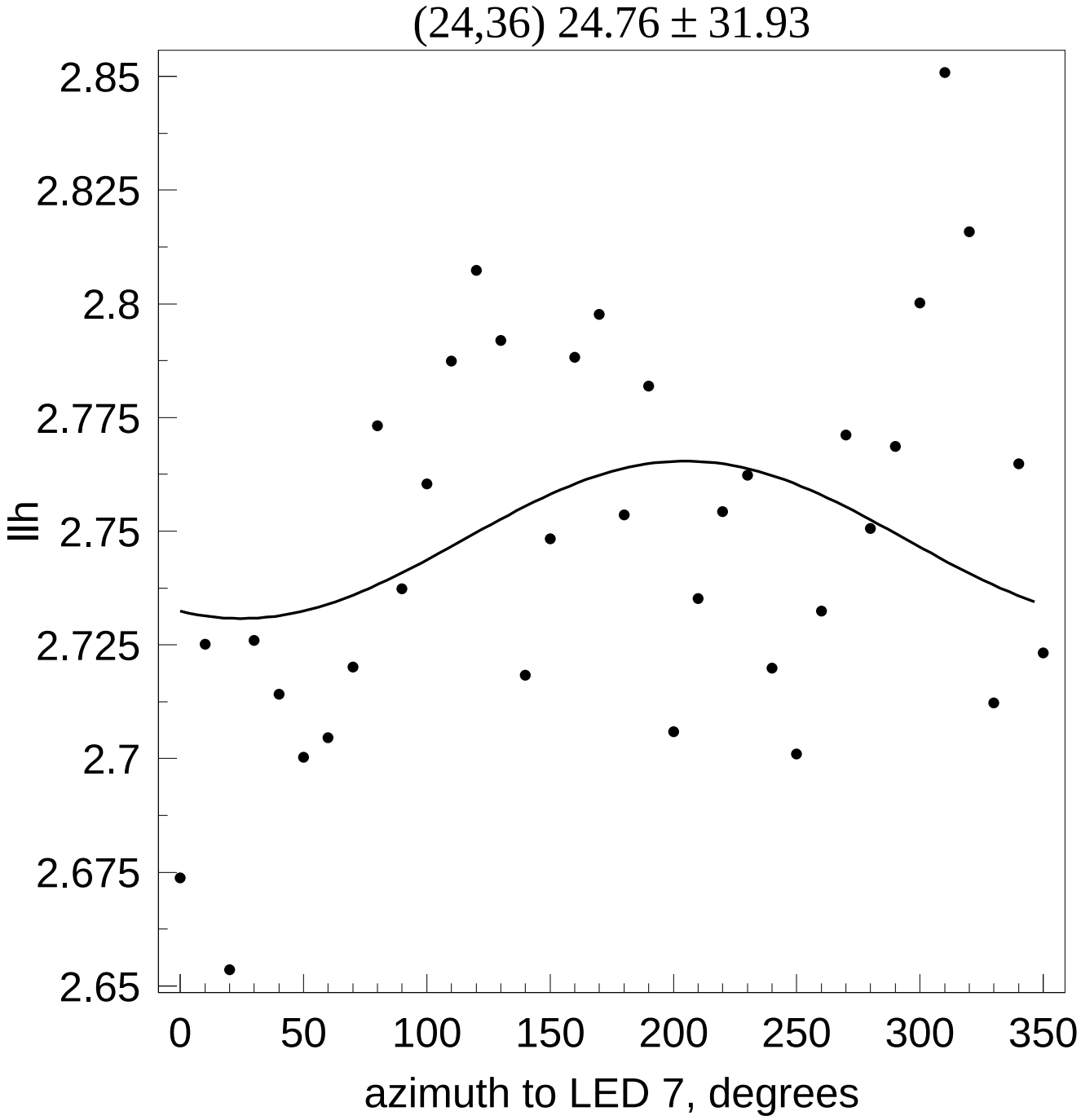

(24,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
332.8 ± -999.0

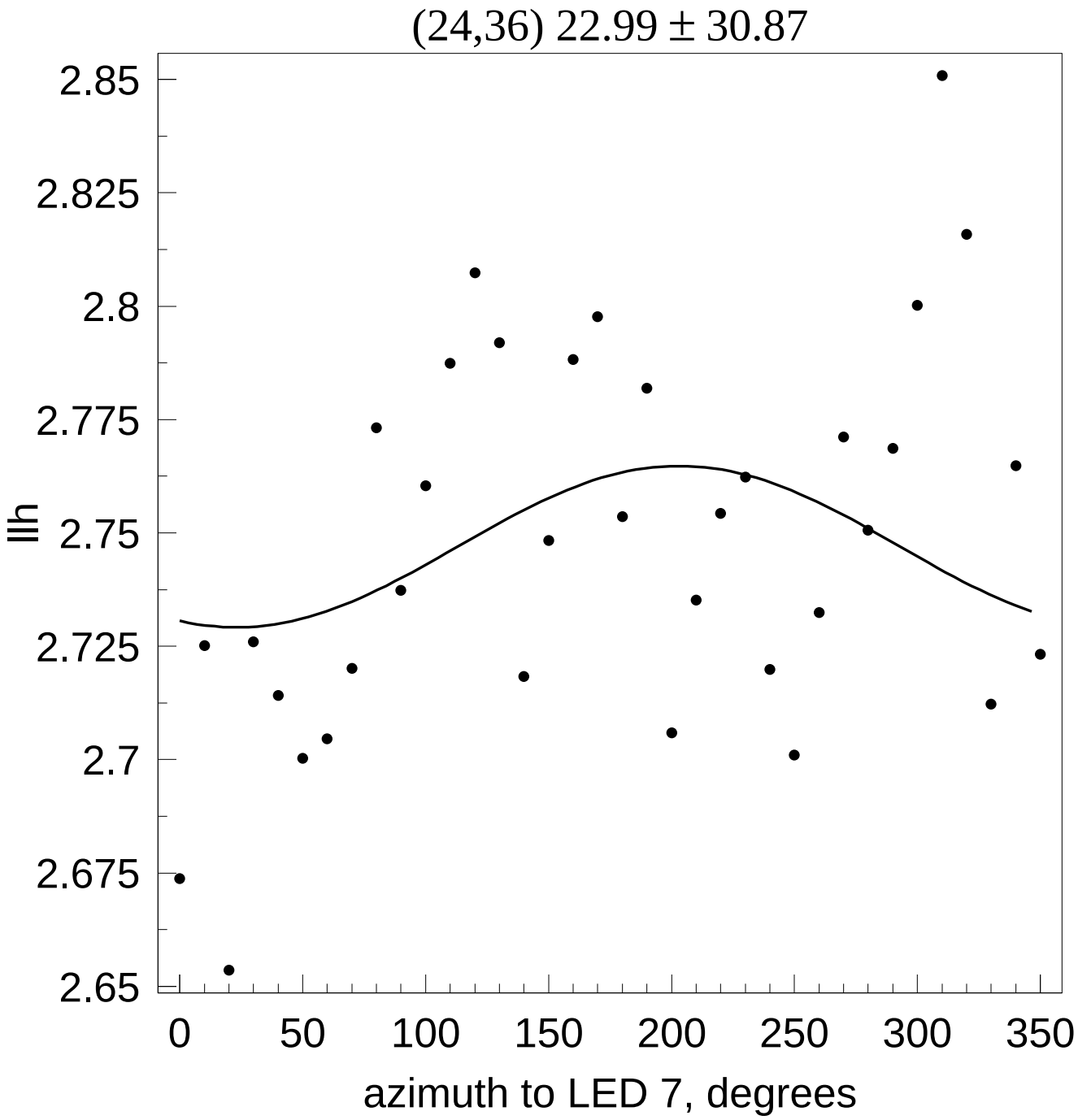

(24,35) 242.55 ± 165.21
2.08
2.06
2.04
2.02
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

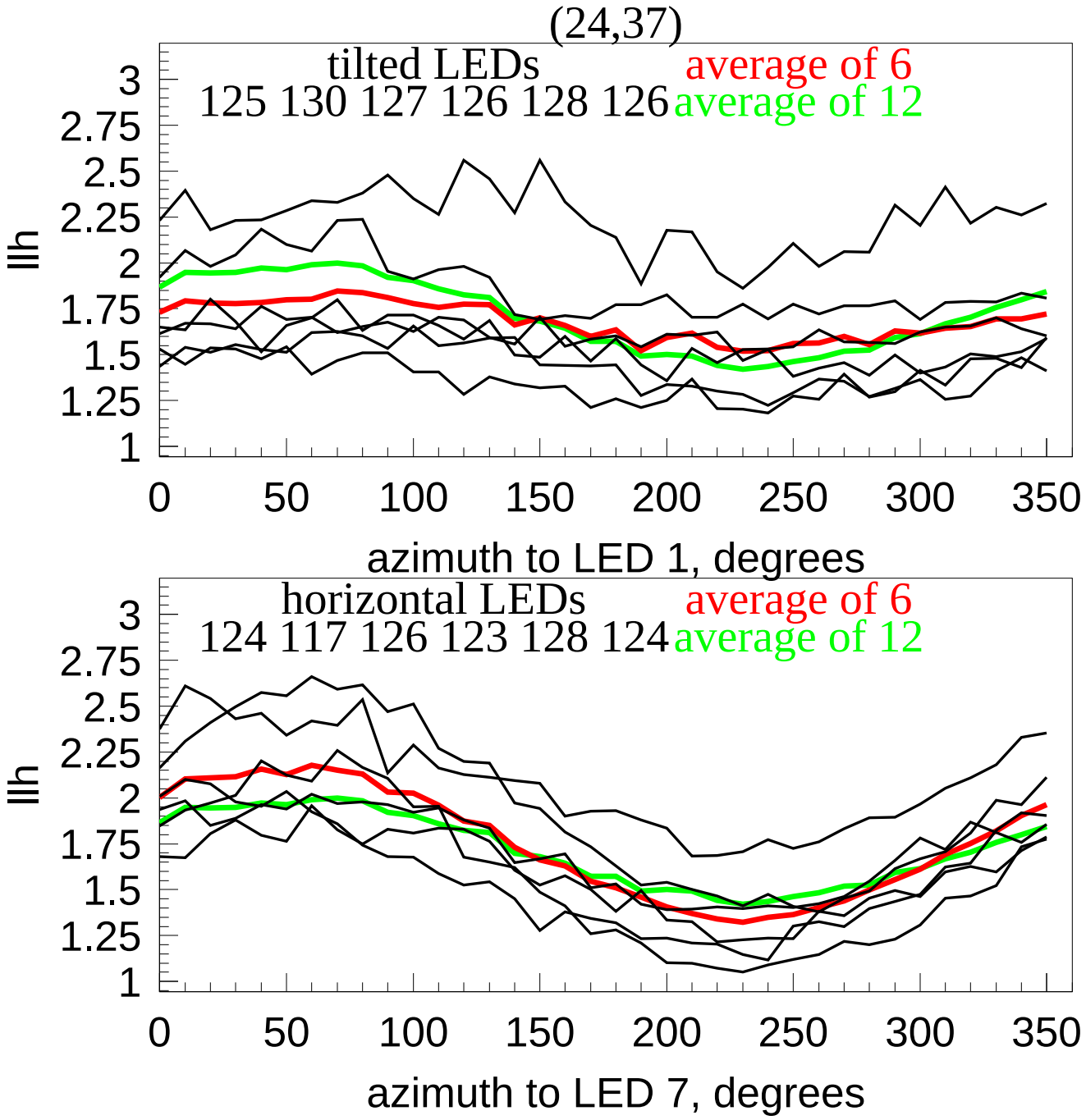

(24,35) 250.44 ± 2030.42
2.08
2.06
2.04
2.02
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

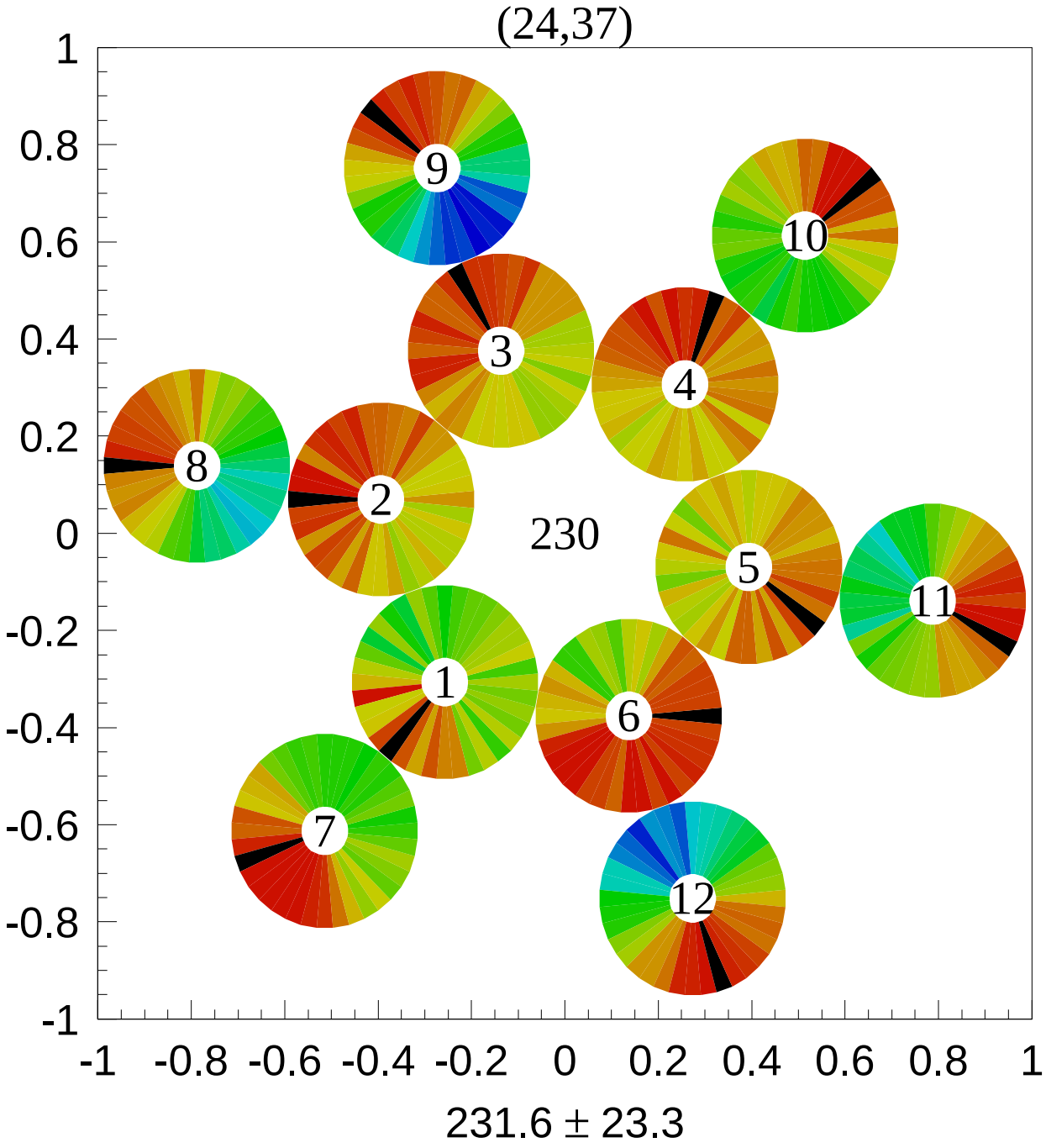

(24,36)
tilted LEDs
128 127 130 92 125 129
average of 6
average of 12
llh
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 122 130 1 3 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

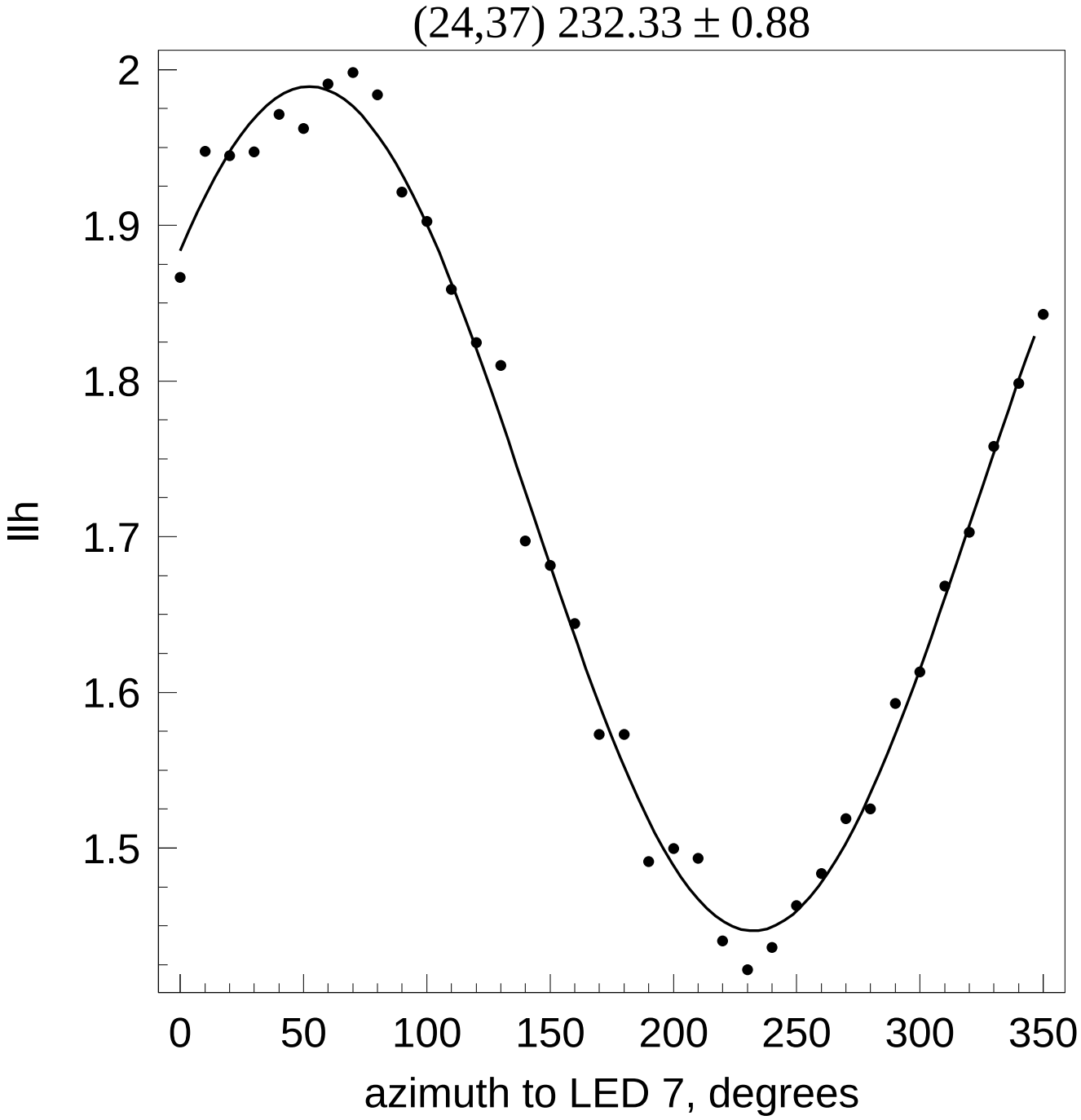

(24,36)
12
6
5
7
1
20
4
2
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
260 ± -999.0

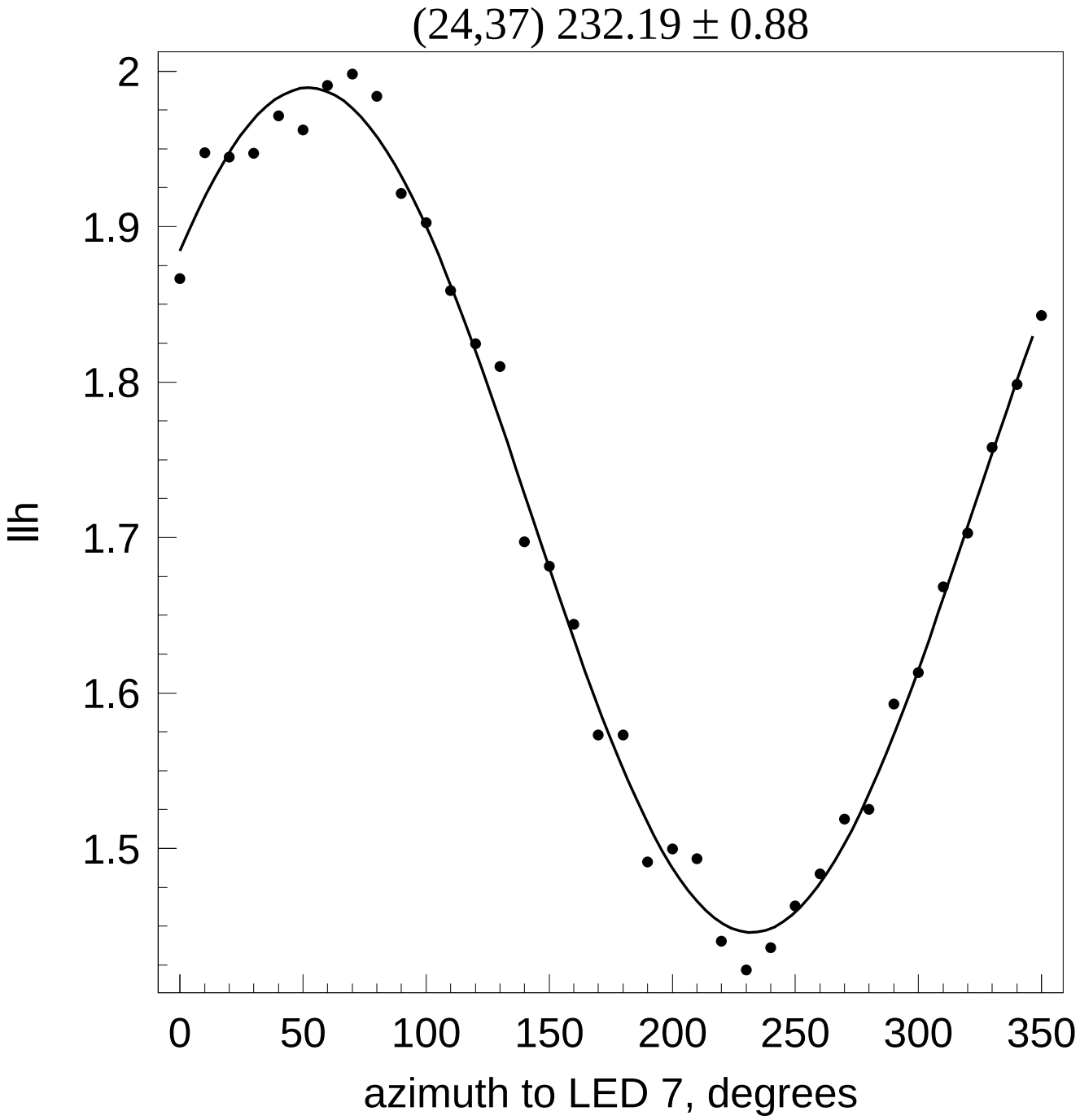

(24,36) 24.76 ± 31.93
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
2.65
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

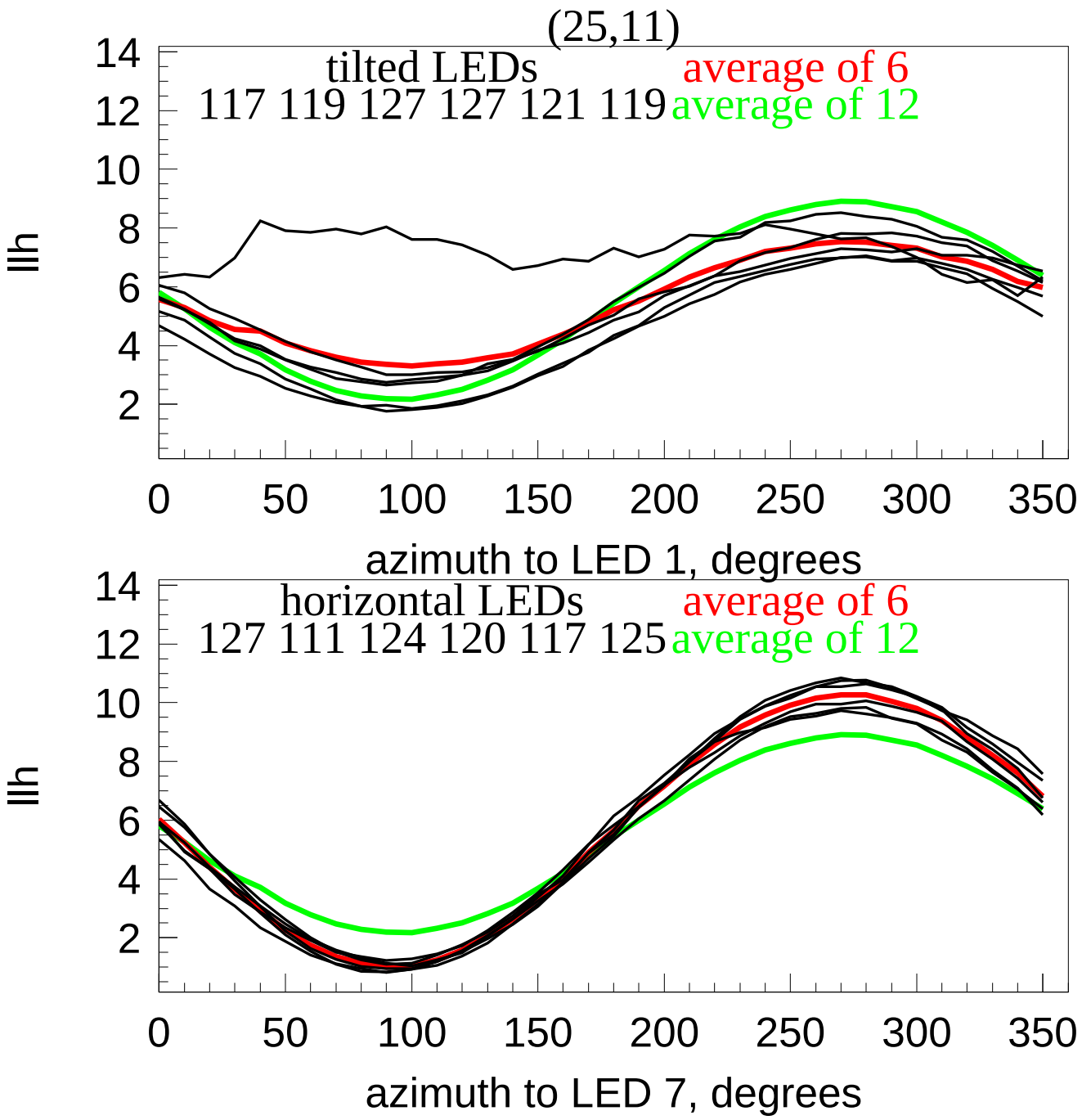

(24,36) 22.99 ± 30.87
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
2.65
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

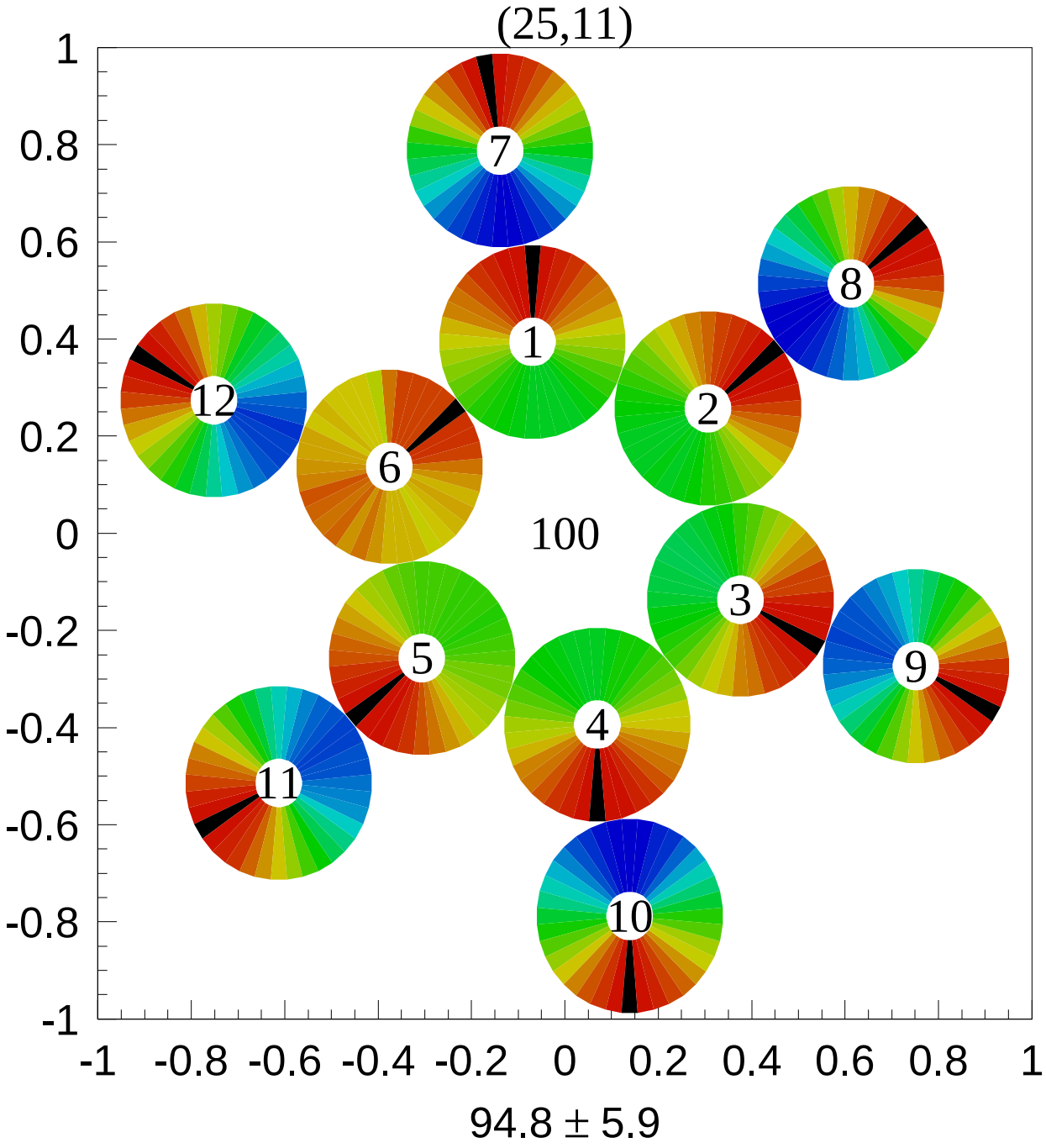

(24,37)
tilted LEDs
125 130 127 126 128 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 117 126 123 128 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

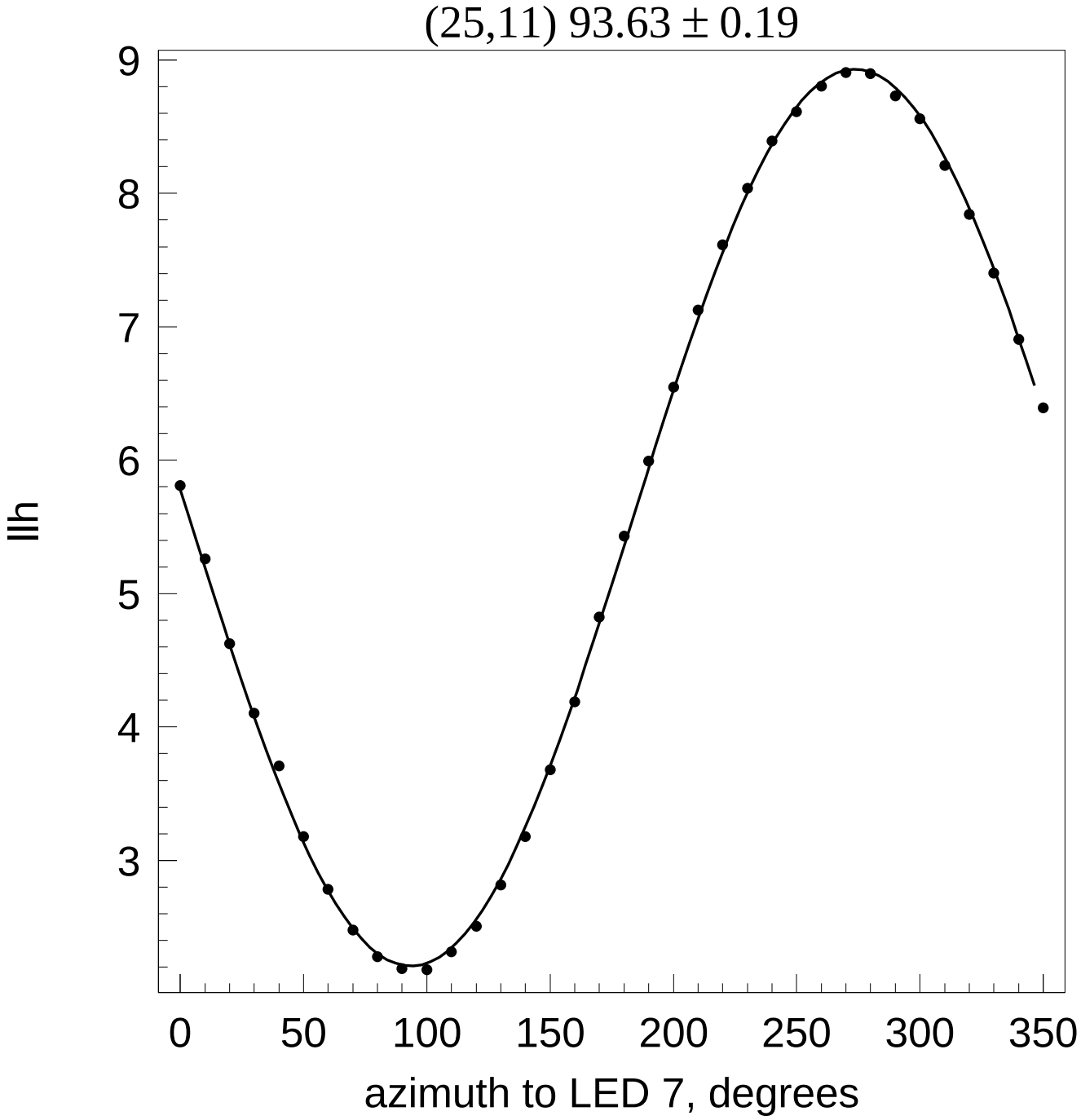

(24,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
231.6 ± 23.3
9
10
3
4
8
2
230
5
11
1
6
7
12

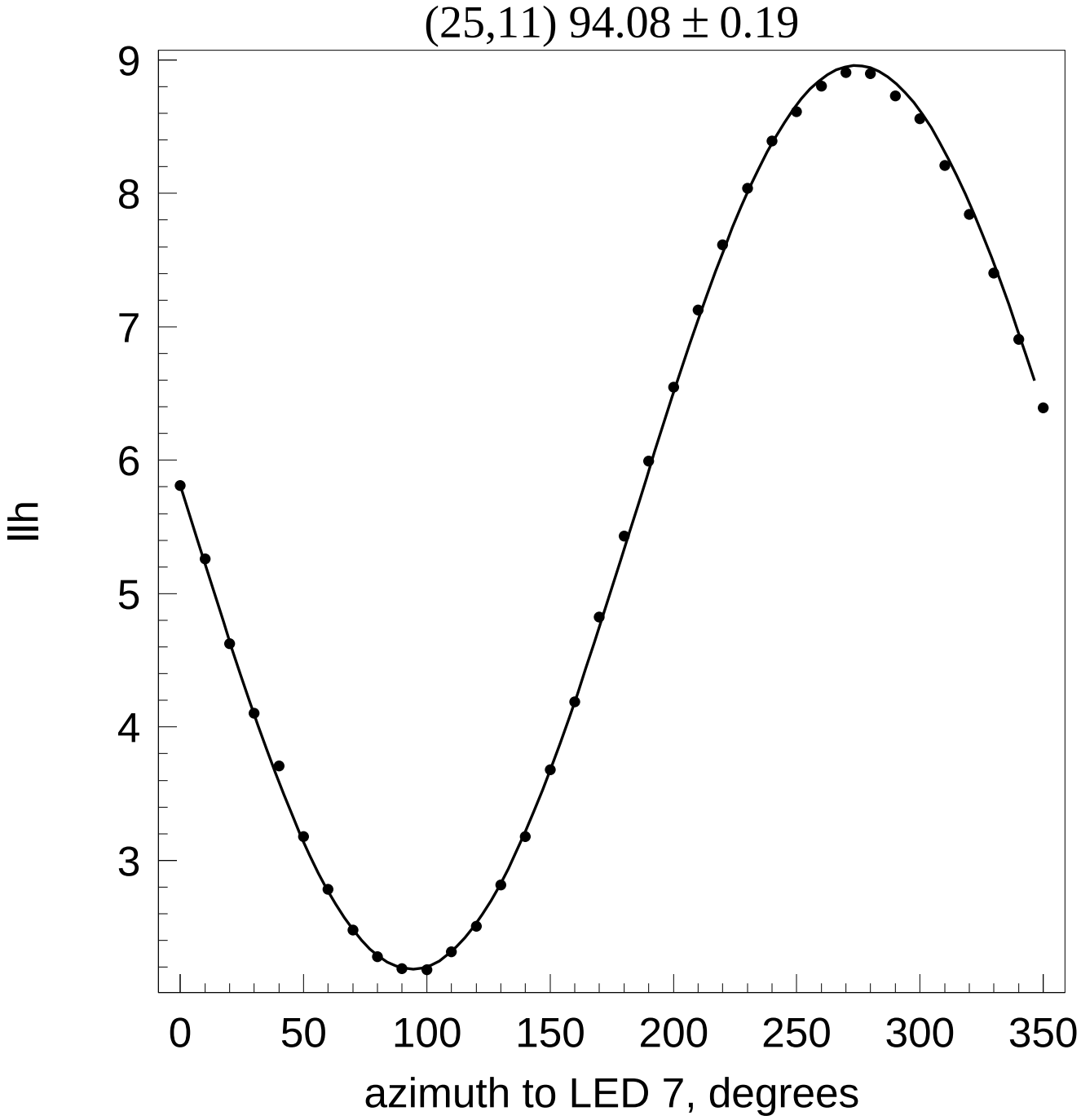

(24,37) 232.33 ± 0.88
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

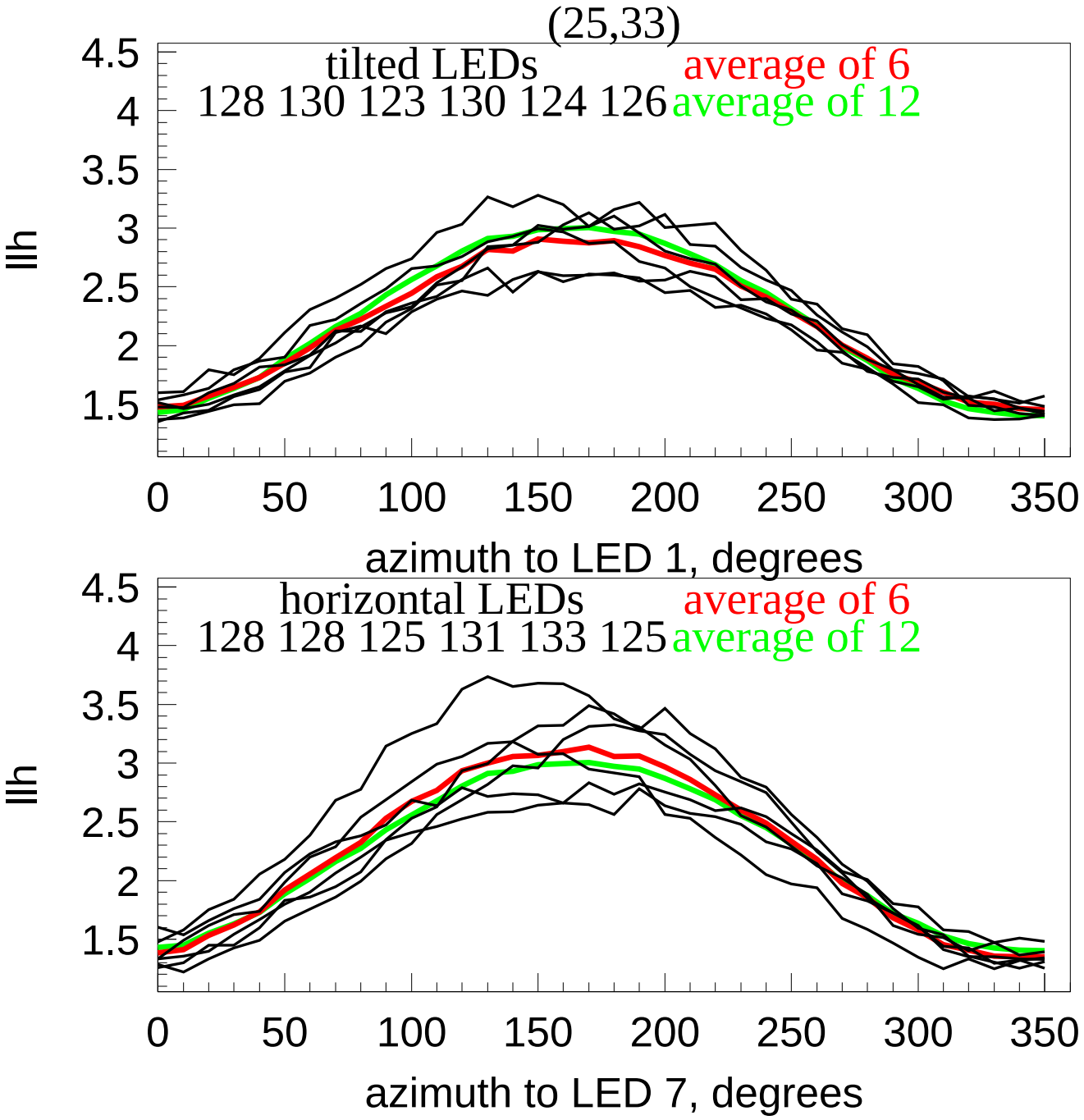

(24,37) 232.19 ± 0.88
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

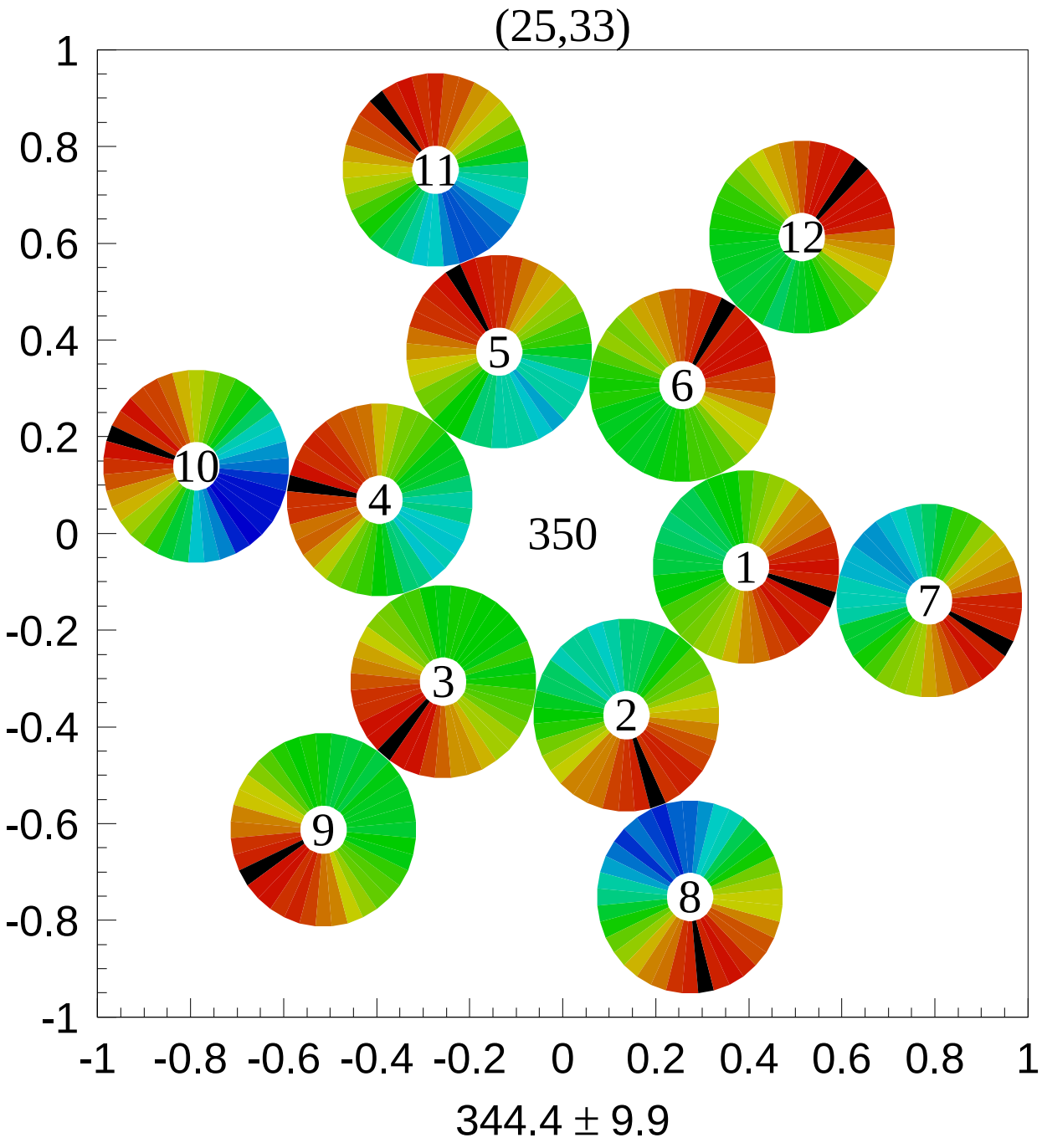

(25,11)
tilted LEDs
117 119 127 127 121 119
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 111 124 120 117 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

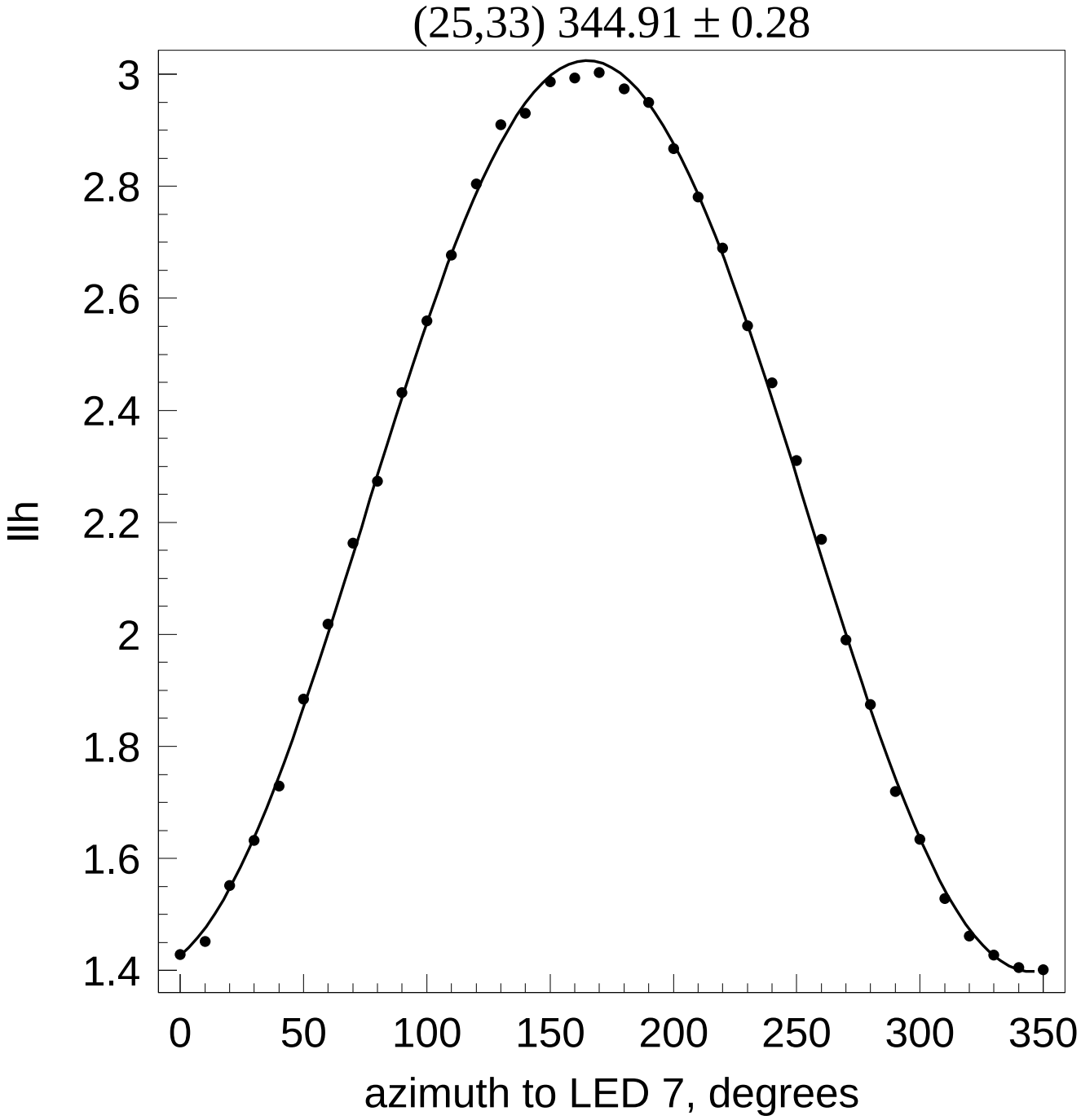

(25,11)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
94.8 ± 5.9

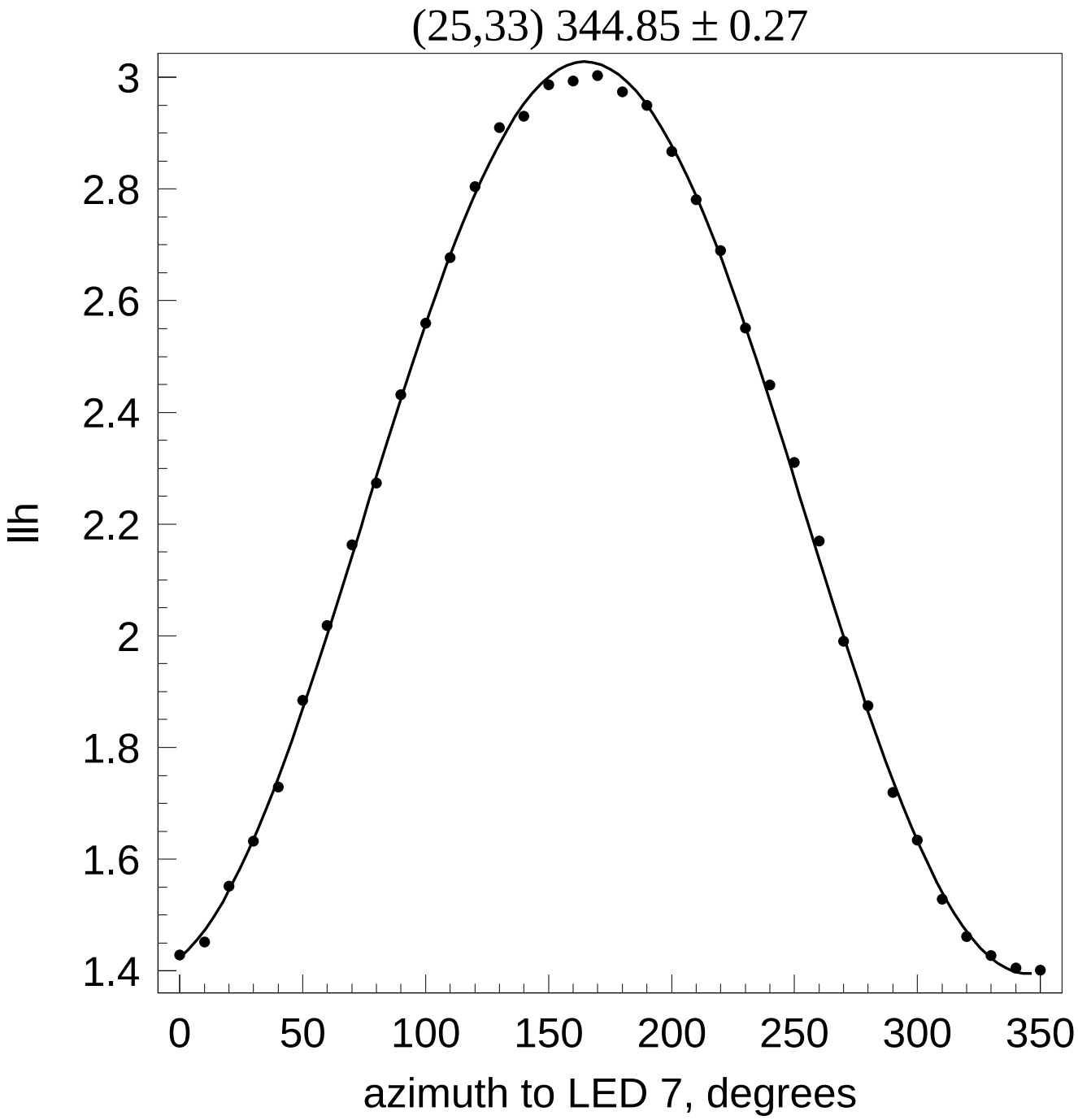

(25,11) 93.63 ± 0.19
9
8
7
6
5
4
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

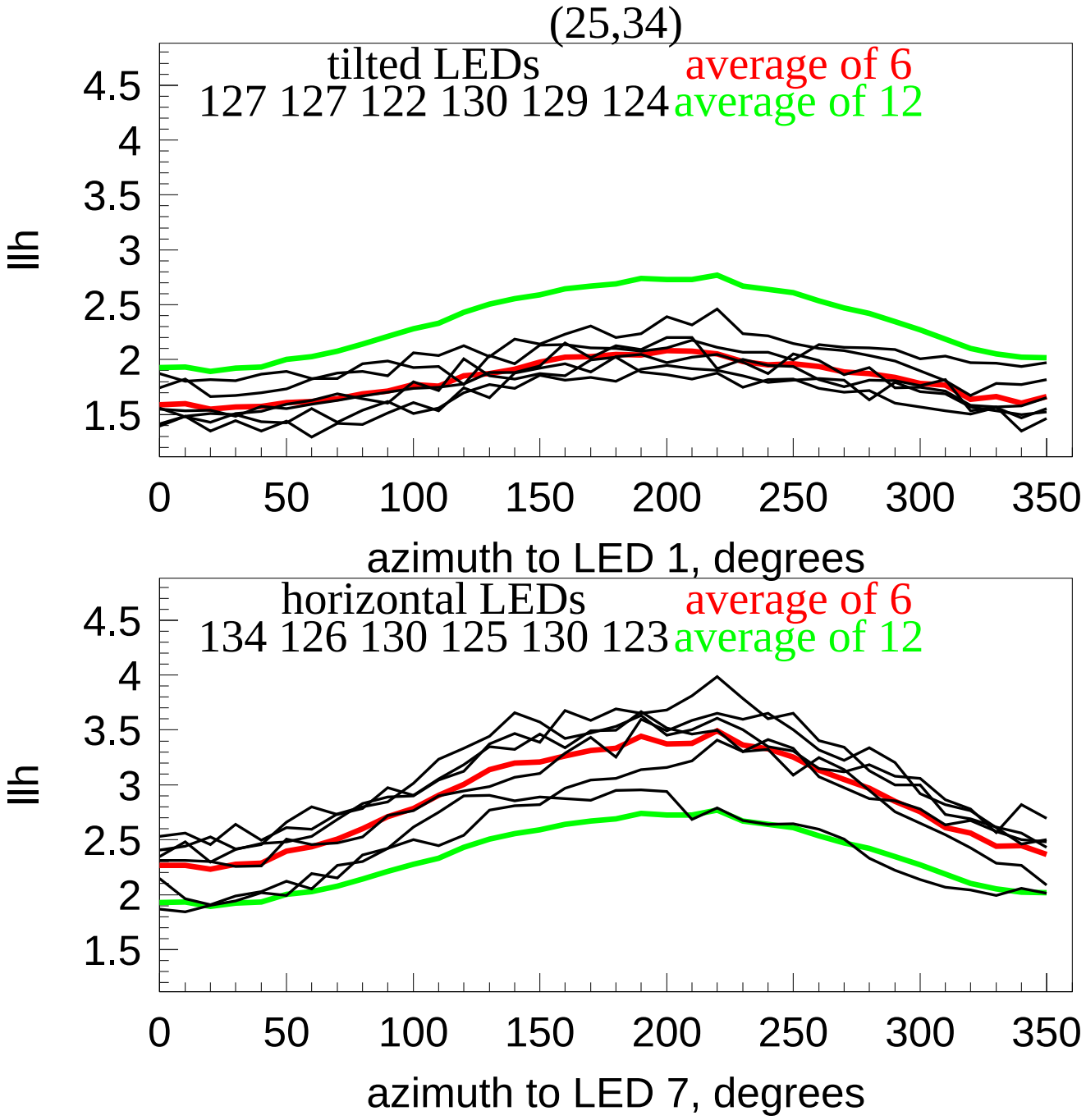

(25,11) 94.08 ± 0.19
9
8
7
6
5
4
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

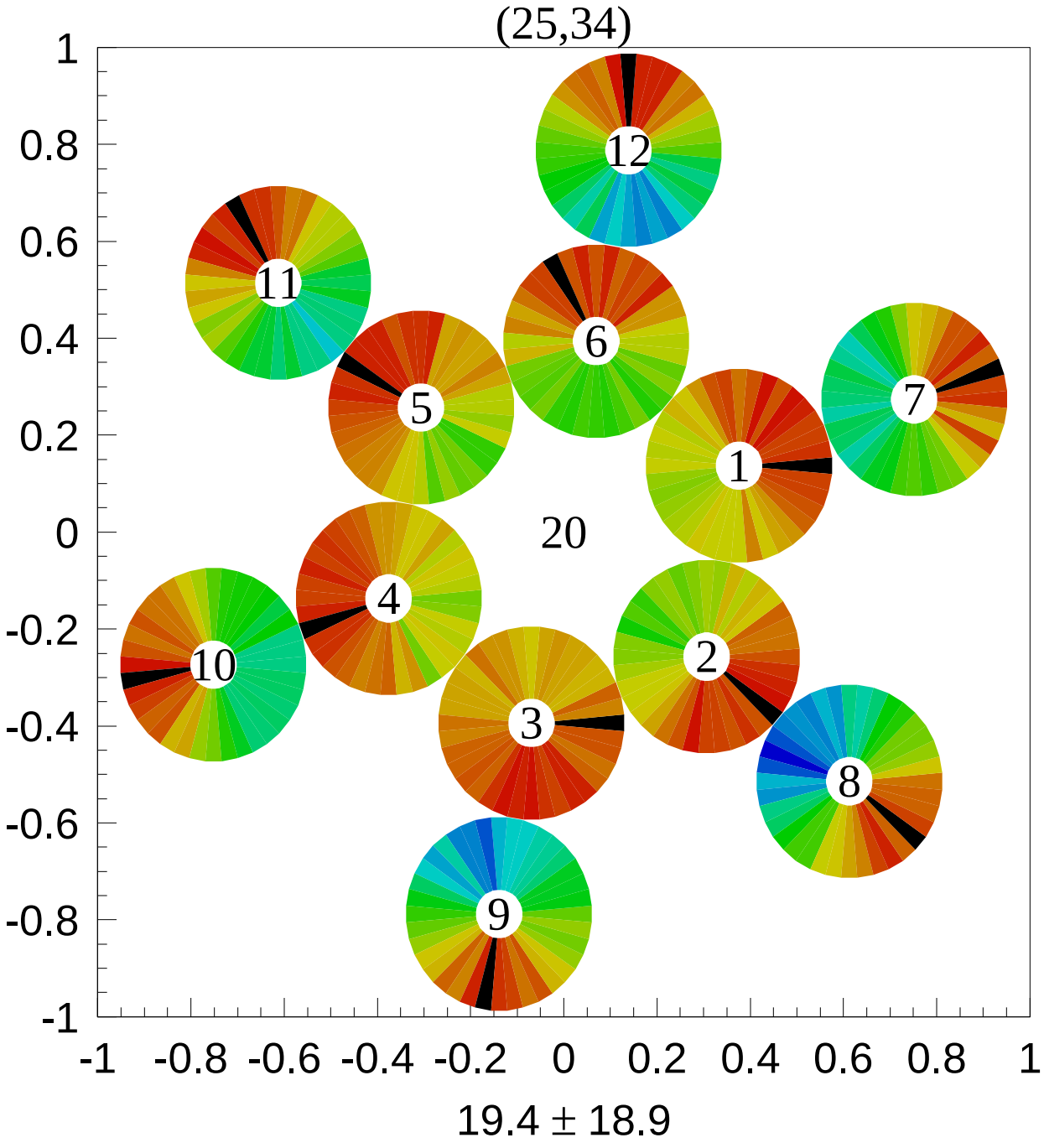

(25,33)
tilted LEDs
128 130 123 130 124 126
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 128 125 131 133 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

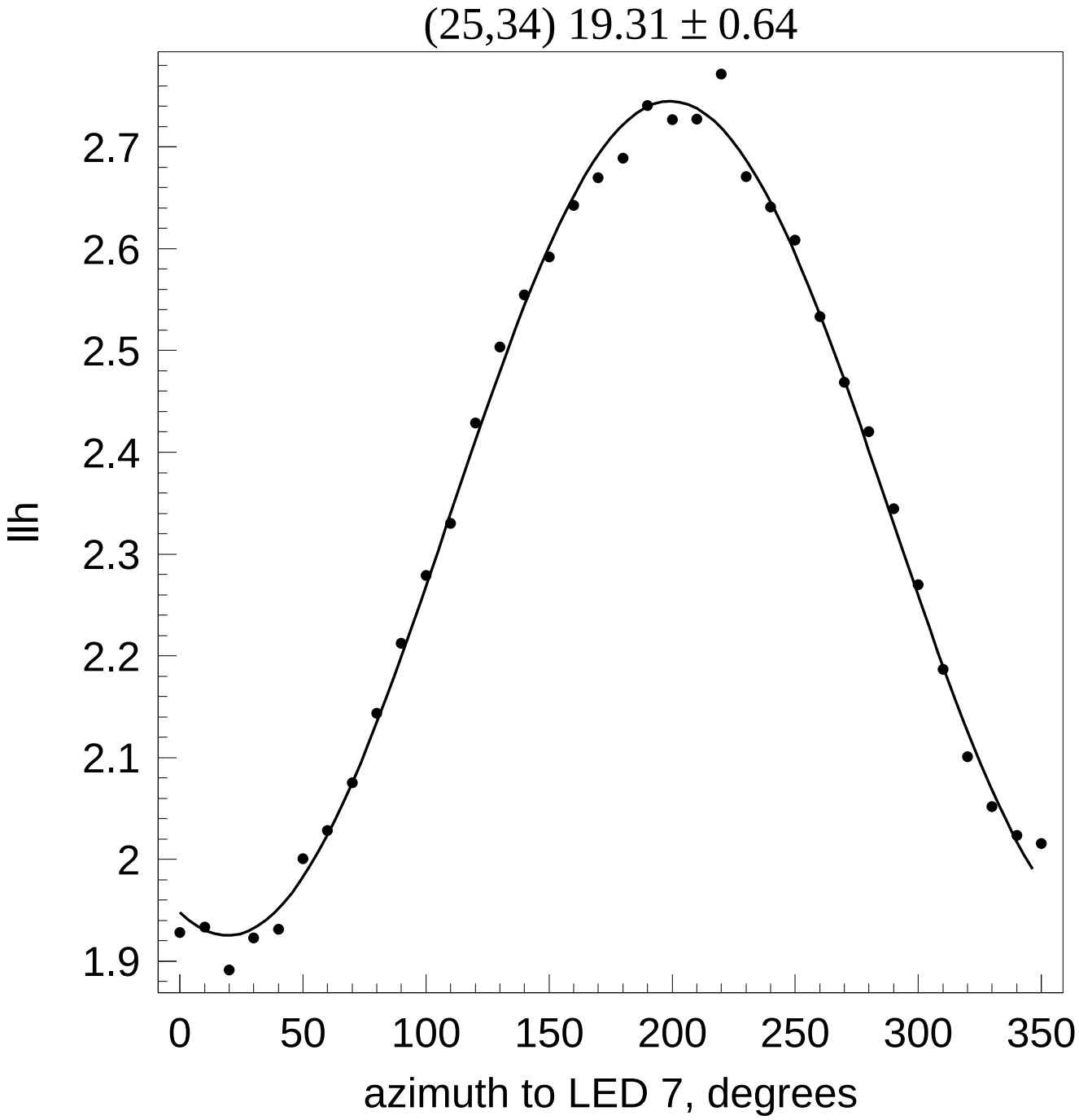

(25,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
344.4 ± 9.9

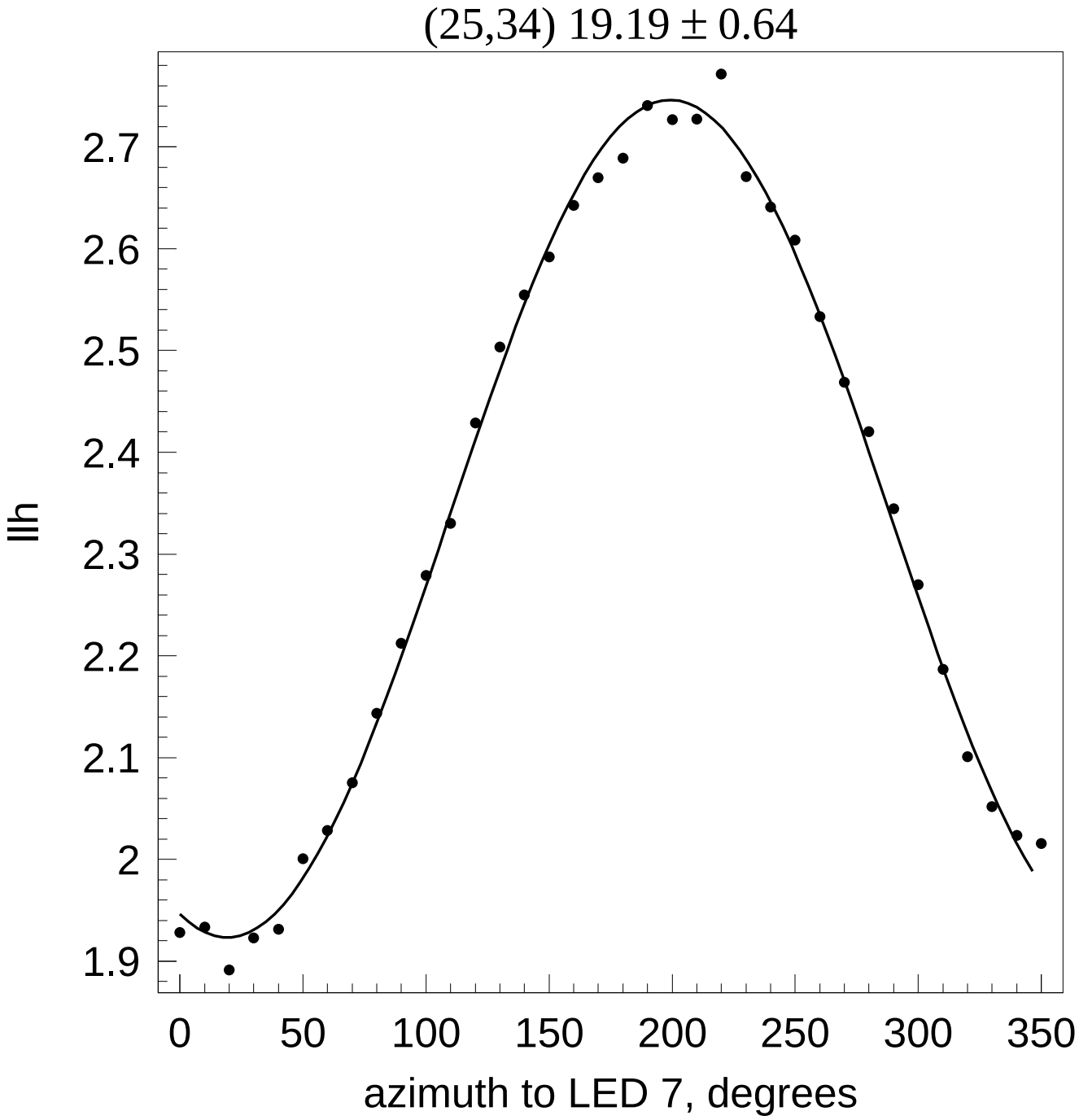

(25,33) 344.91 ± 0.28
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

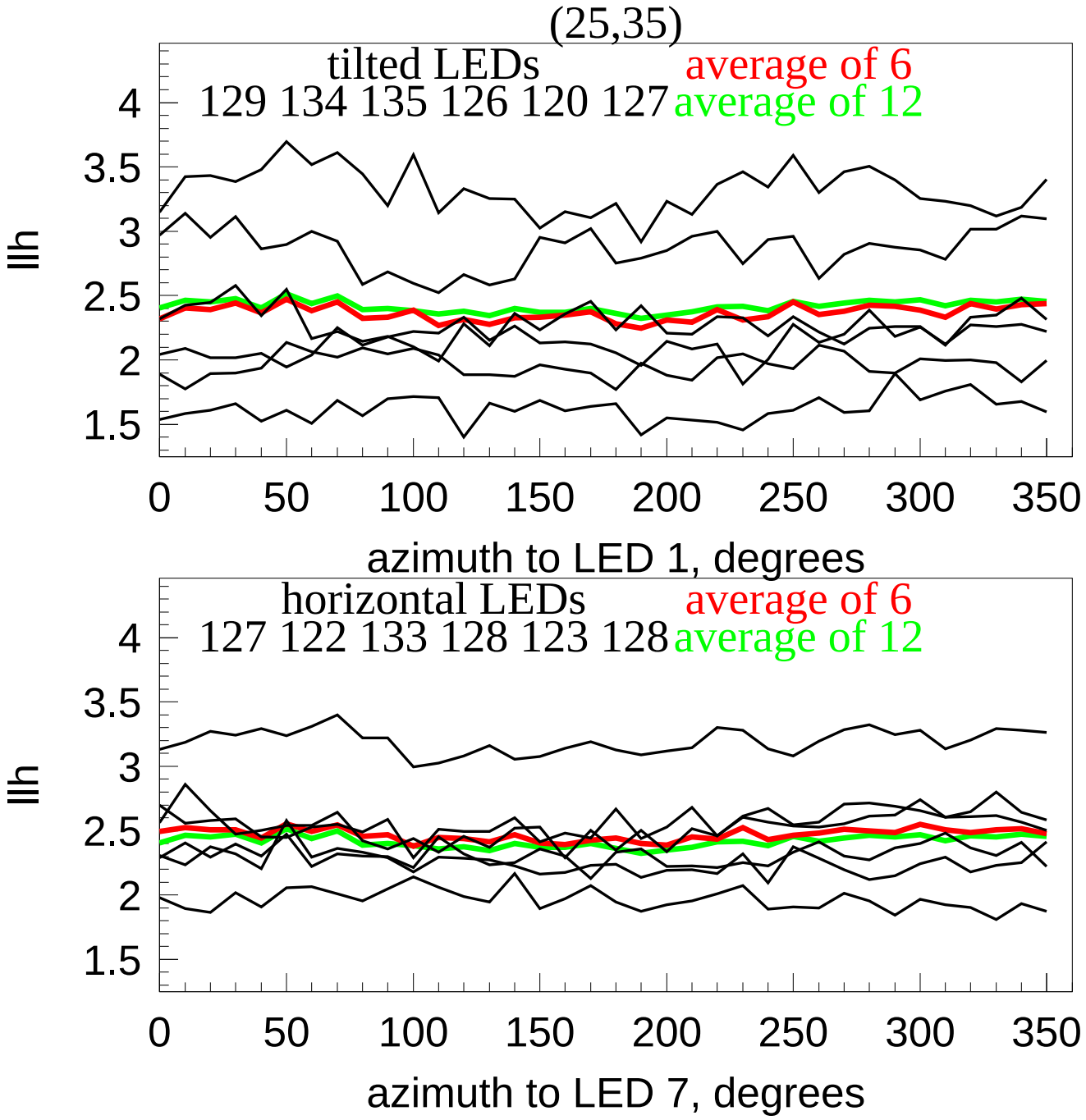

(25,33) 344.85 ± 0.27
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

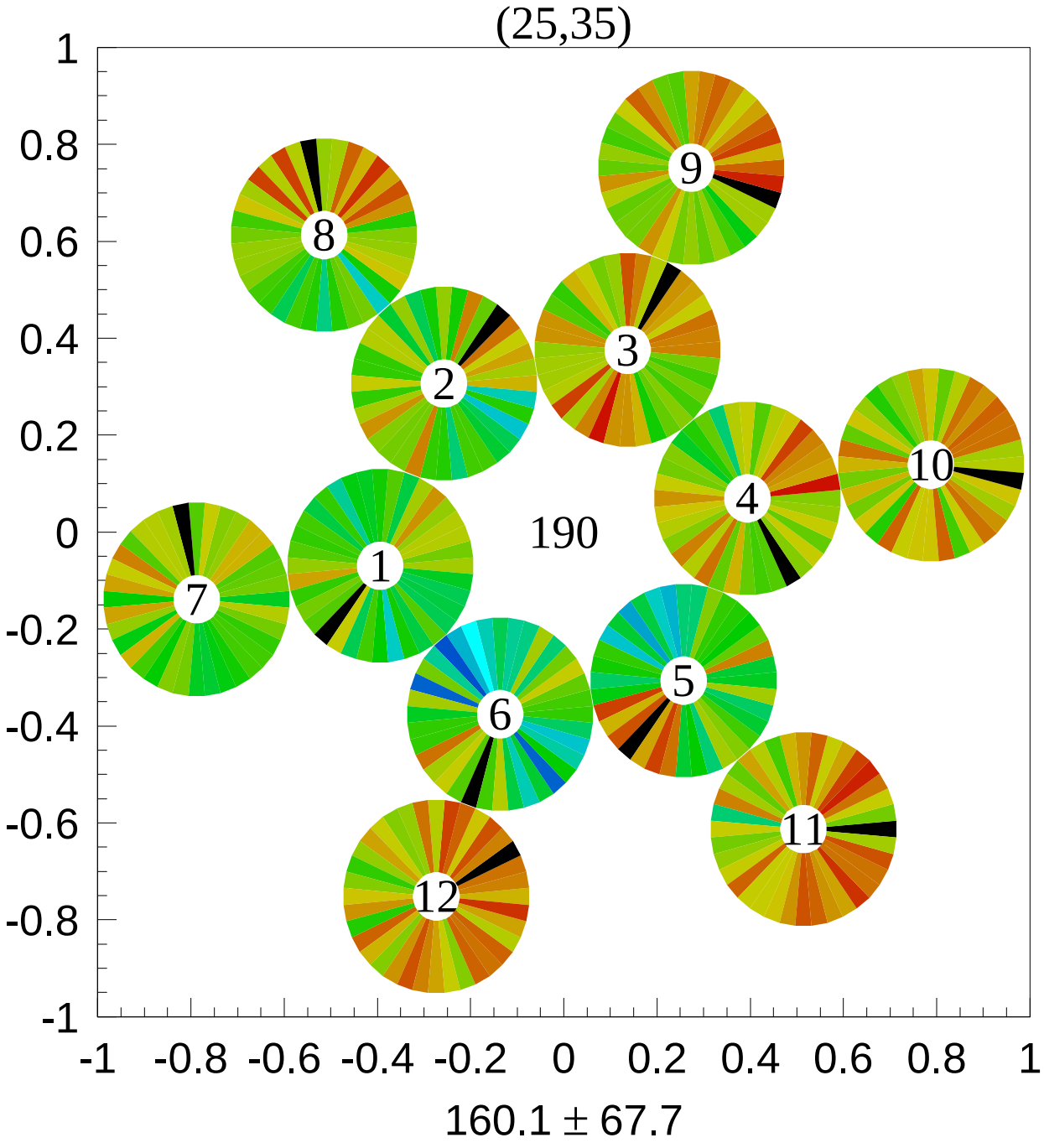

(25,34)
tilted LEDs
127 127 122 130 129 124
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
134 126 130 125 130 123
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

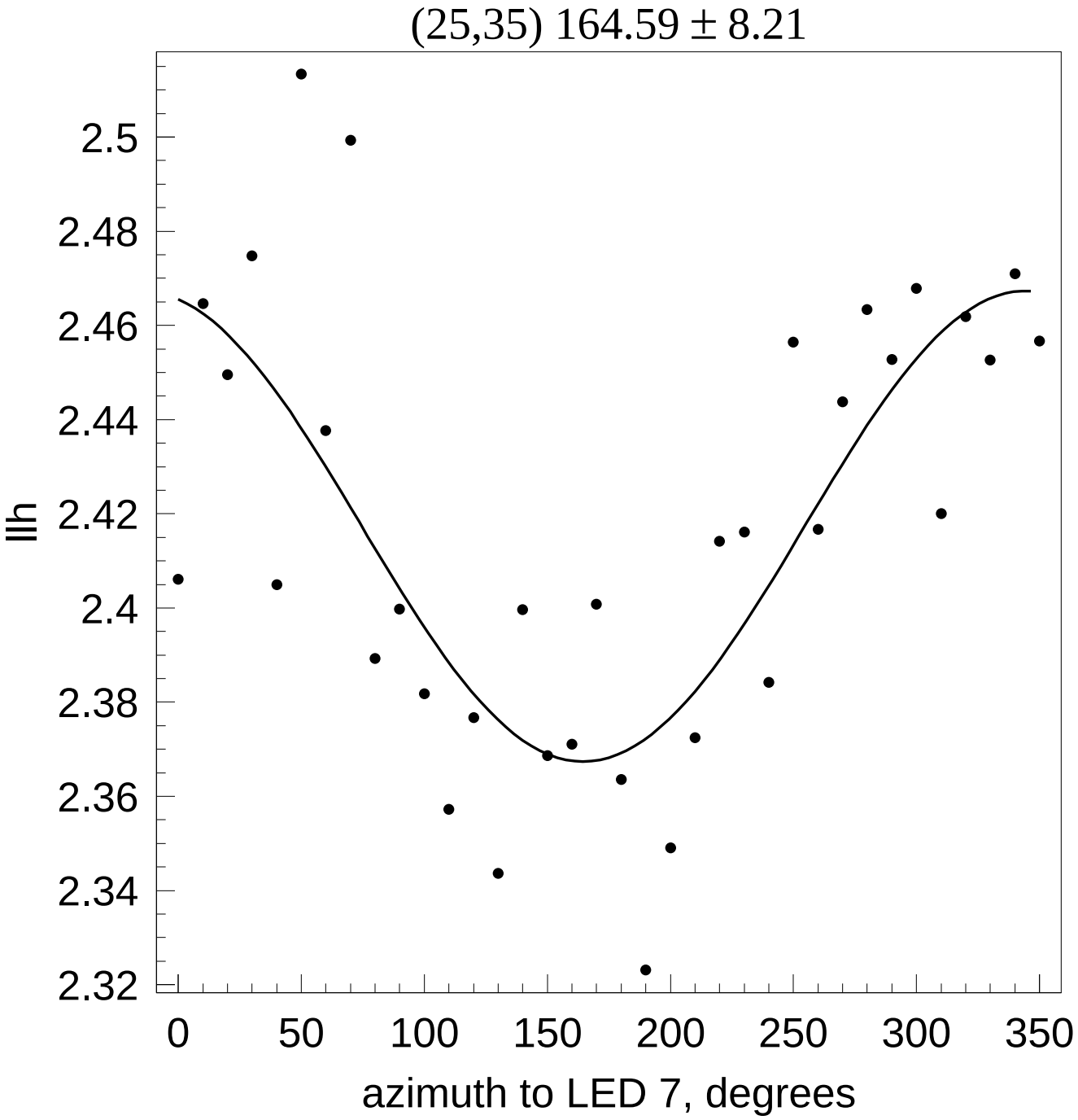

(25,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
20
4
10
2
3
8
9
19.4 ± 18.9

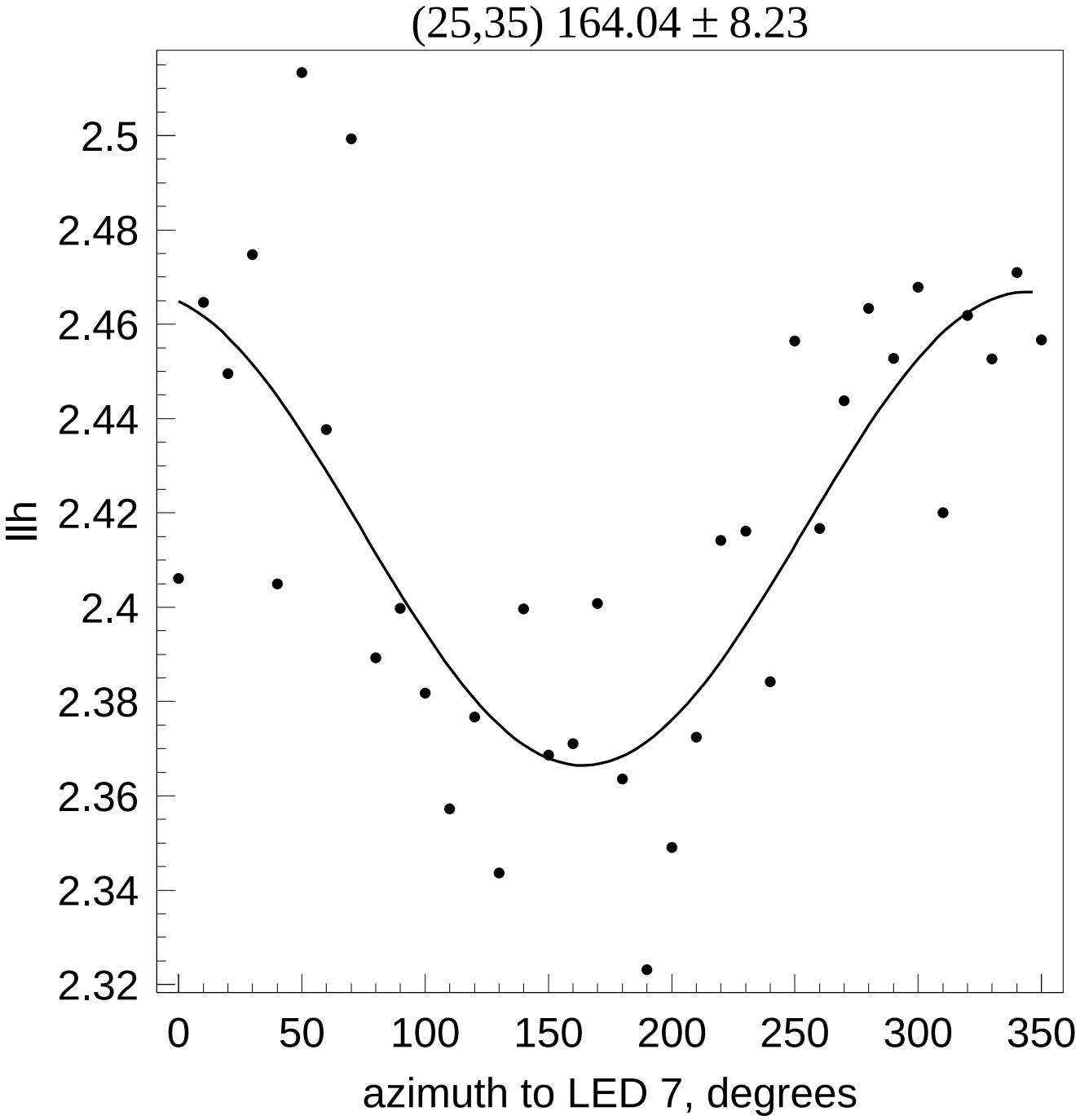

(25,34) 19.31 ± 0.64
llh
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

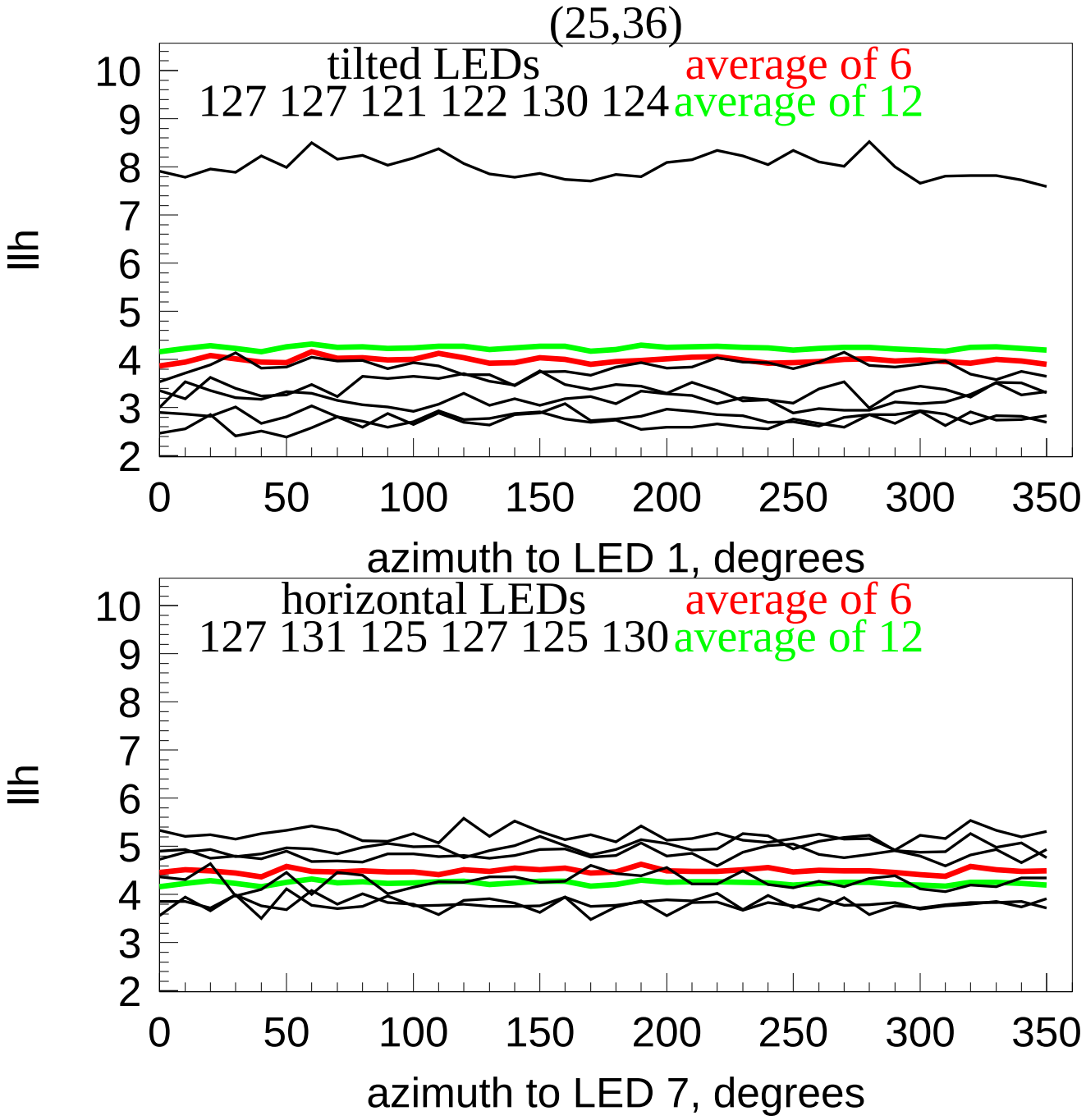

(25,34) 19.19 ± 0.64
llh
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

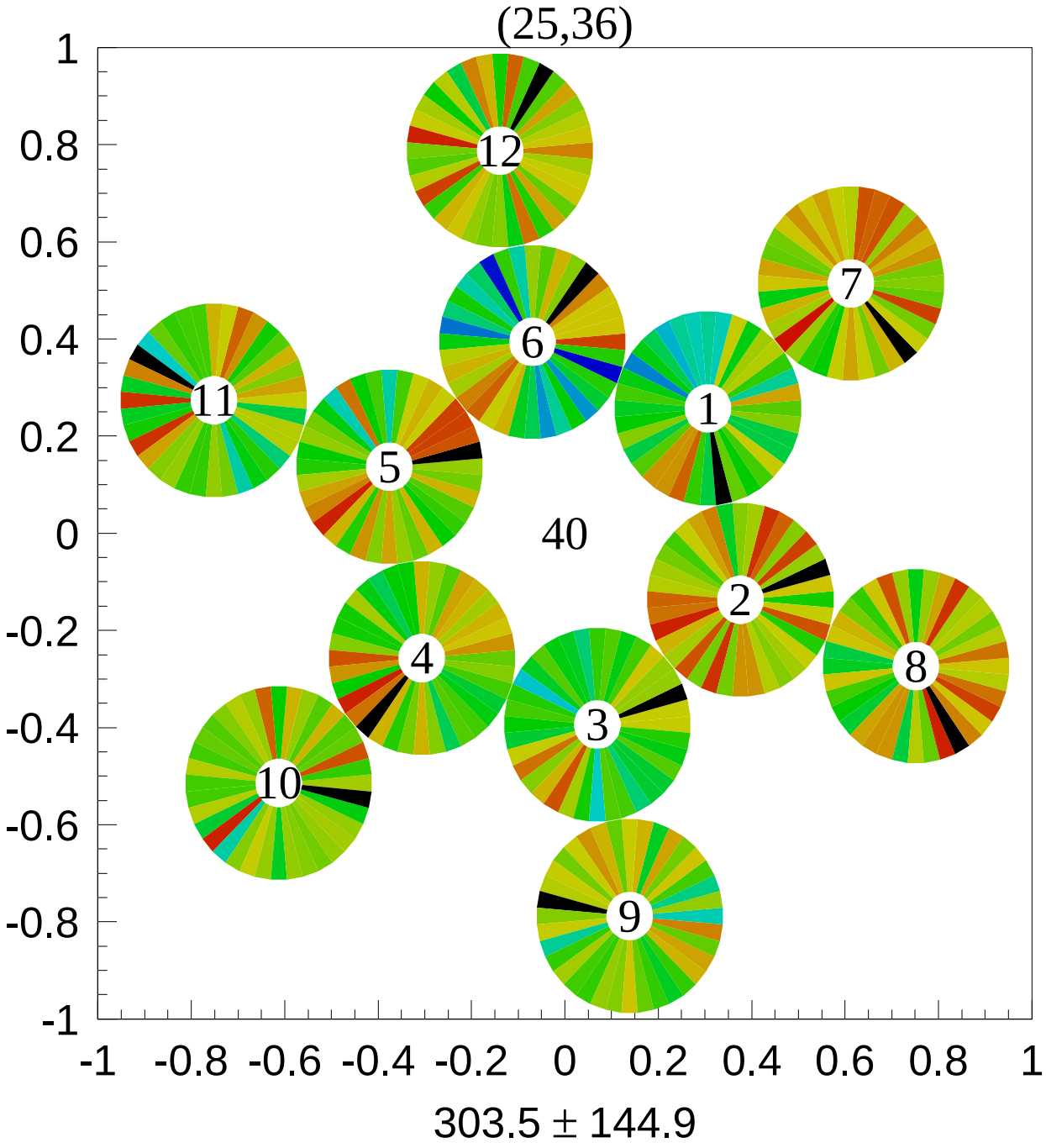

(25,35)
tilted LEDs
129 134 135 126 120 127
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 122 133 128 123 128
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

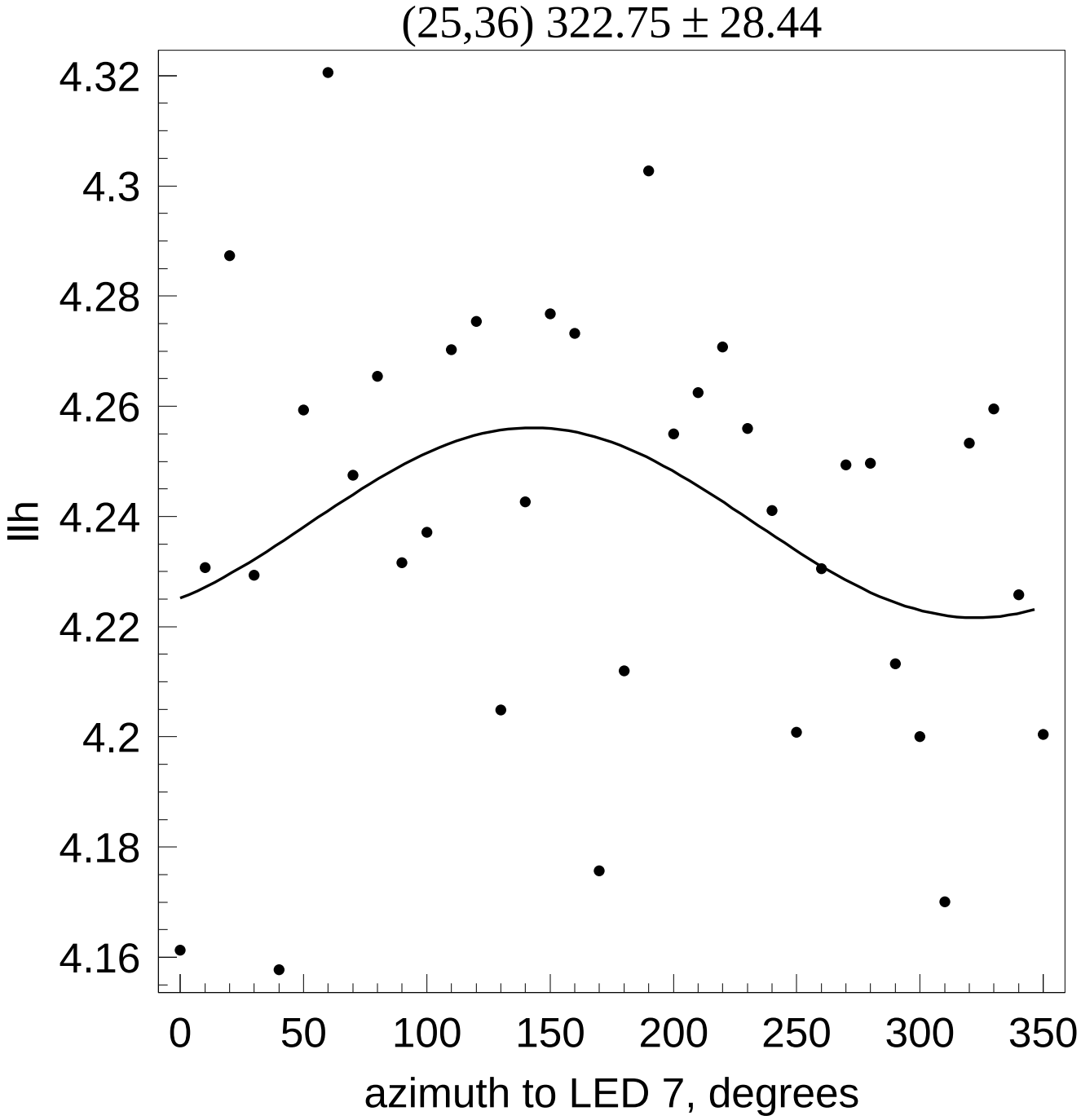

(25,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
160.1 ± 67.7
190
1
2
3
4
5
6
7
8
9
10
11
12

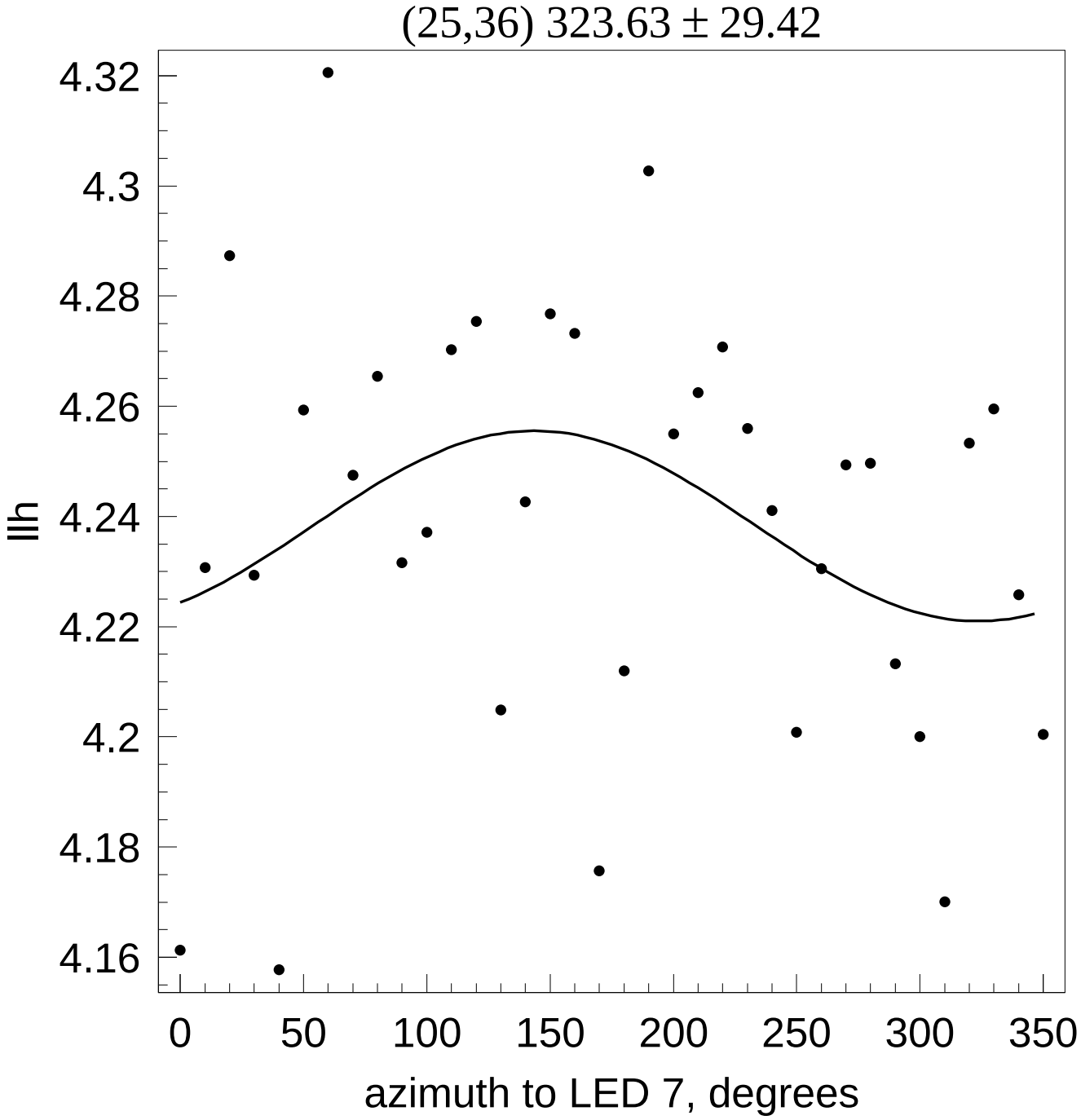

(25,35) 164.59 ± 8.21
2.5
2.48
2.46
2.44
2.42
2.4
2.38
2.36
2.34
2.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

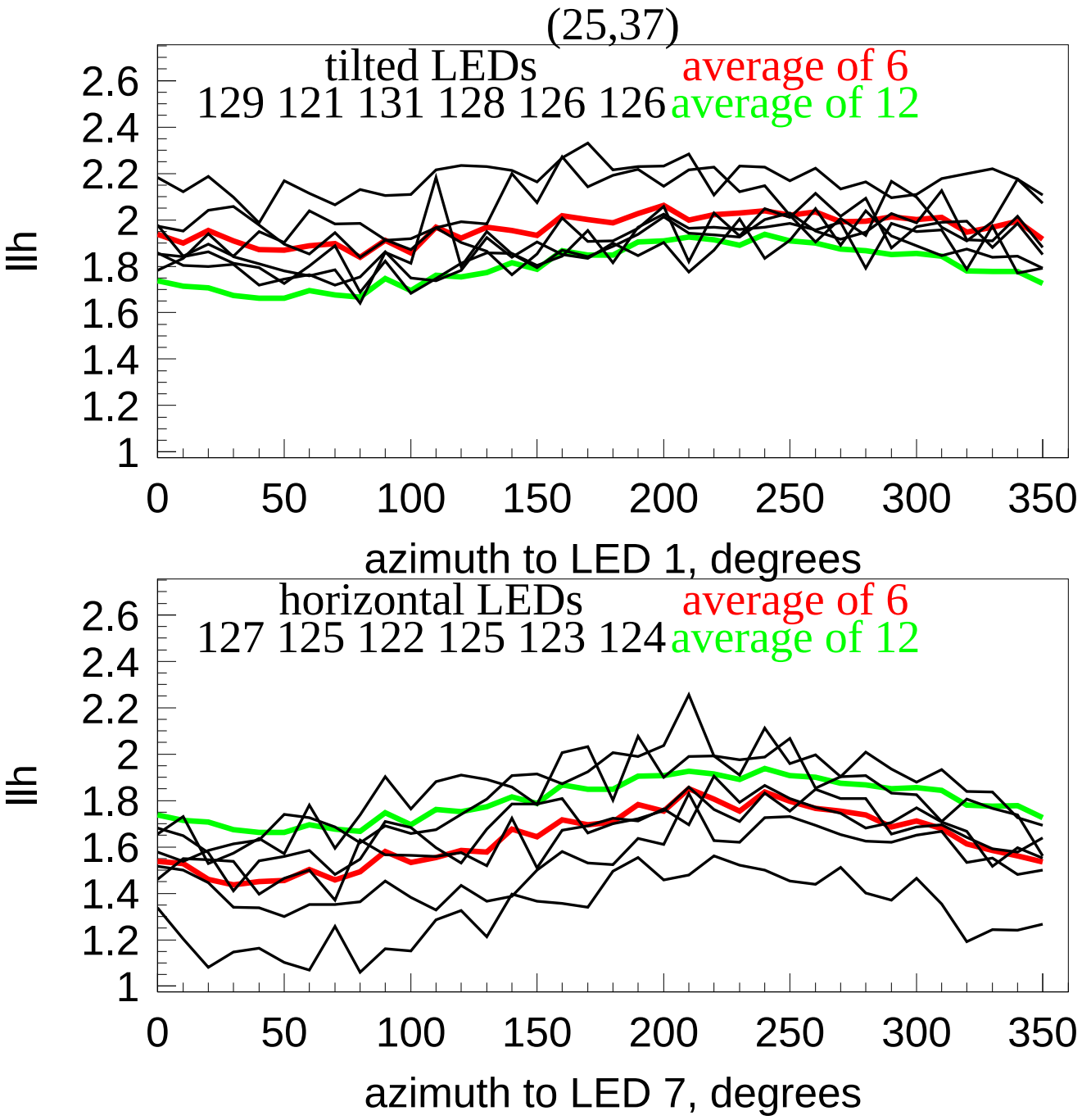

(25,35) 164.04 ± 8.23
2.5
2.48
2.46
2.44
2.42
2.4
2.38
2.36
2.34
2.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

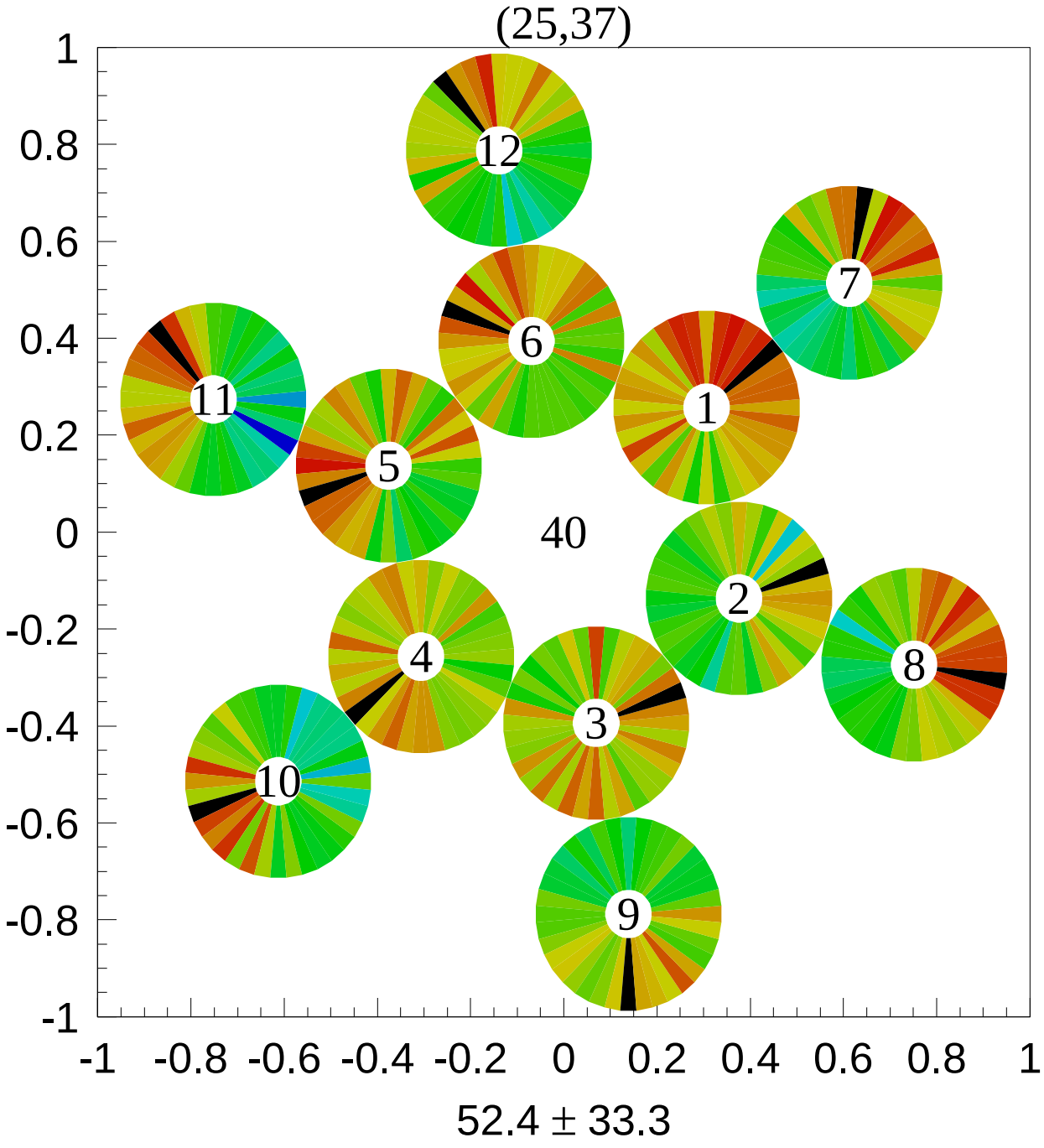

(25,36)
tilted LEDs
127 127 121 122 130 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 131 125 127 125 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

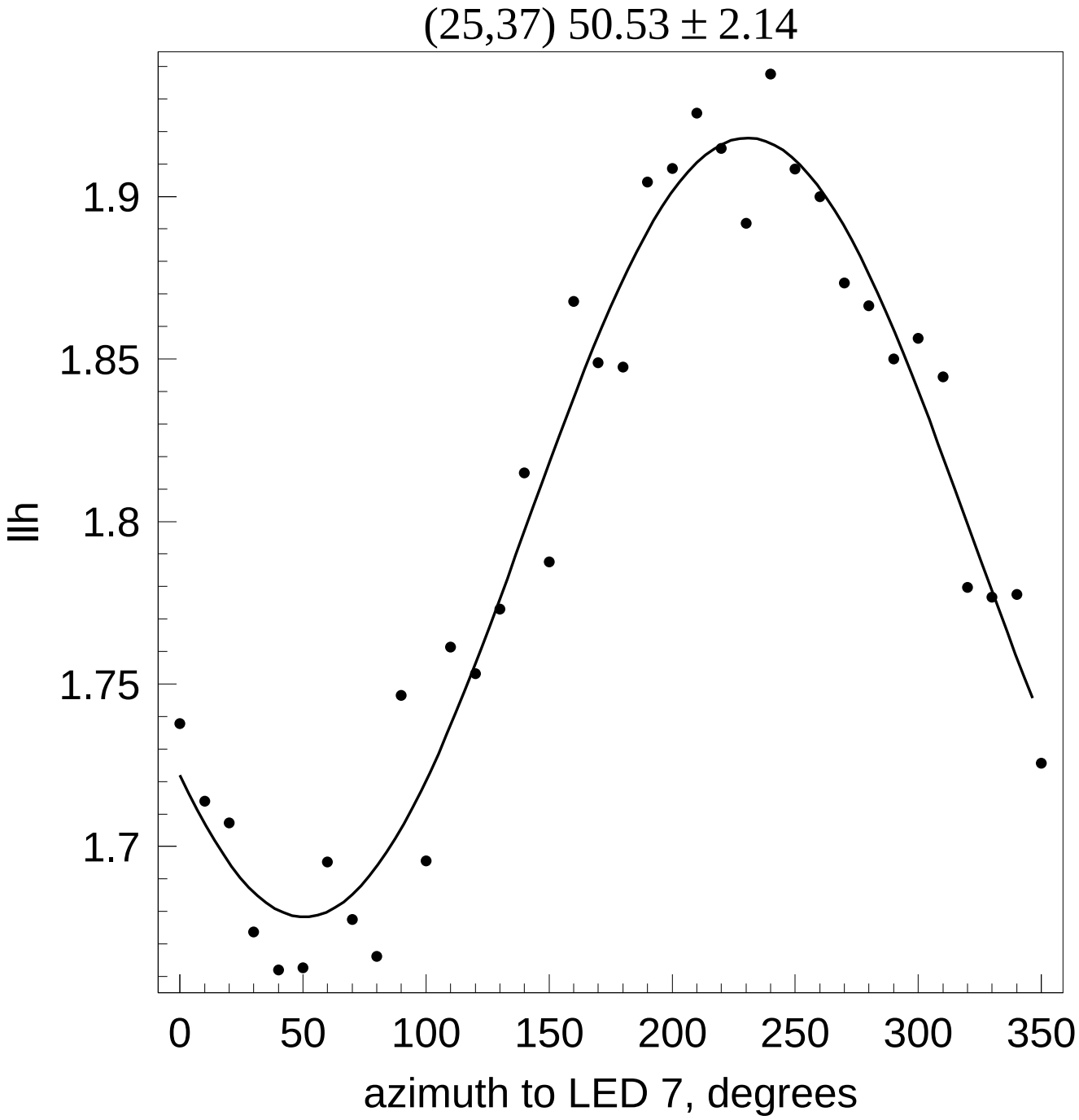

(25,36)
12
7
6
11
1
5
40
2
4
8
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
303.5 ± 144.9

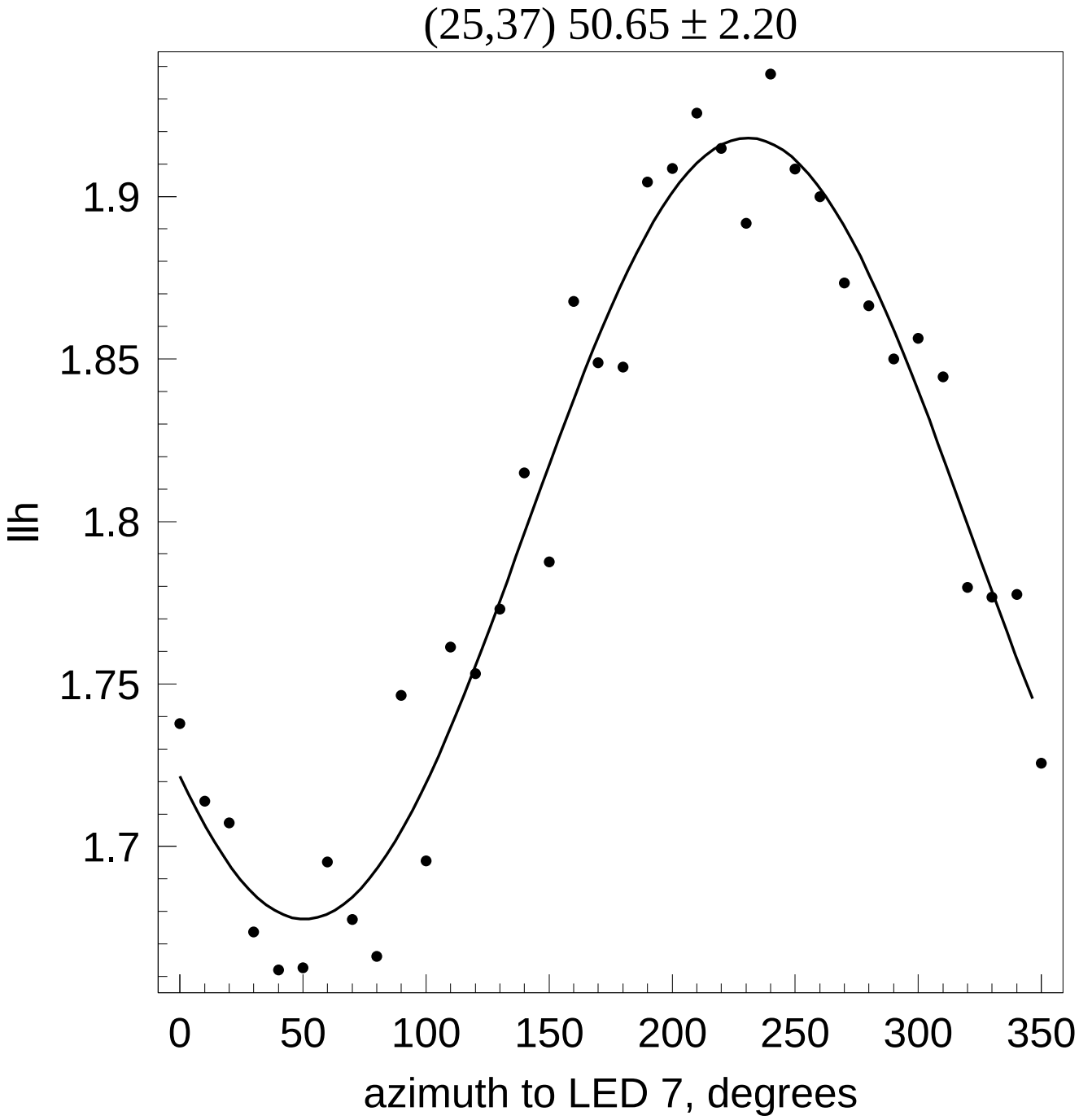

(25,36) 322.75 ± 28.44
4.32
4.3
4.28
4.26
4.24
4.22
4.2
4.18
4.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

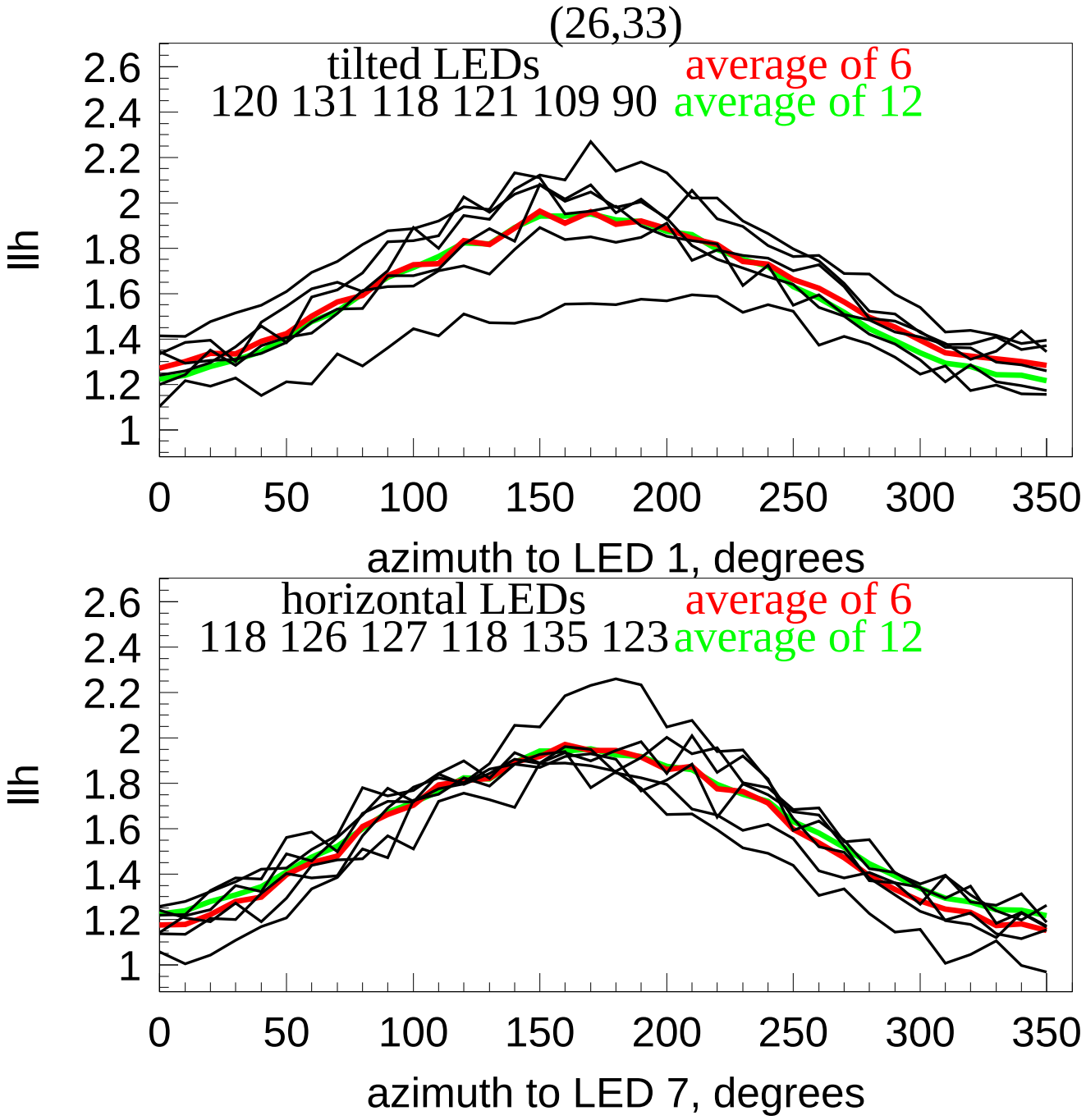

(25,36) 323.63 ± 29.42
4.32
4.3
4.28
4.26
4.24
4.22
4.2
4.18
4.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

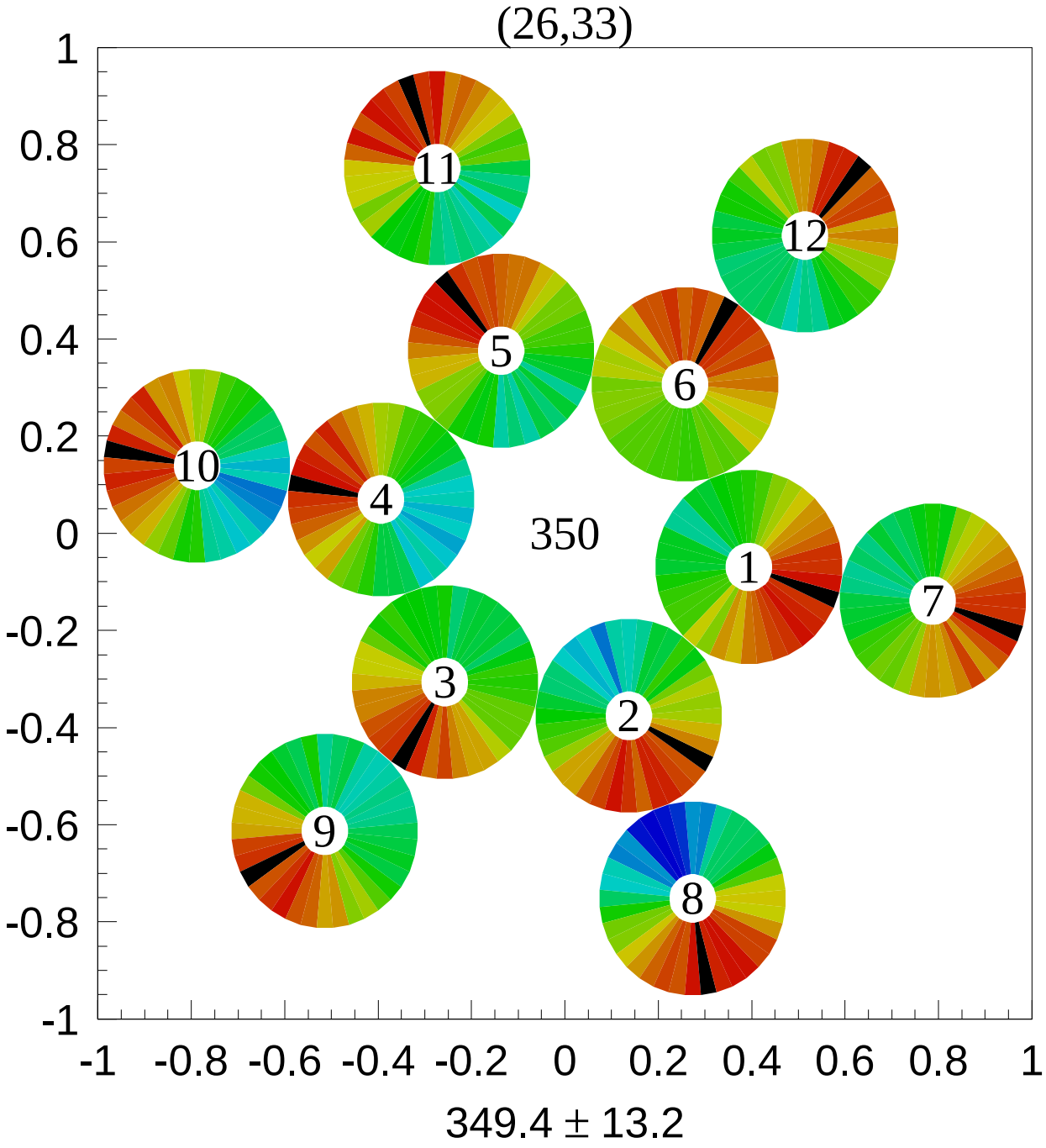

(25,37)
tilted LEDs
129 121 131 128 126 126
average of 6
average of 12
Ilh
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 125 122 125 123 124
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

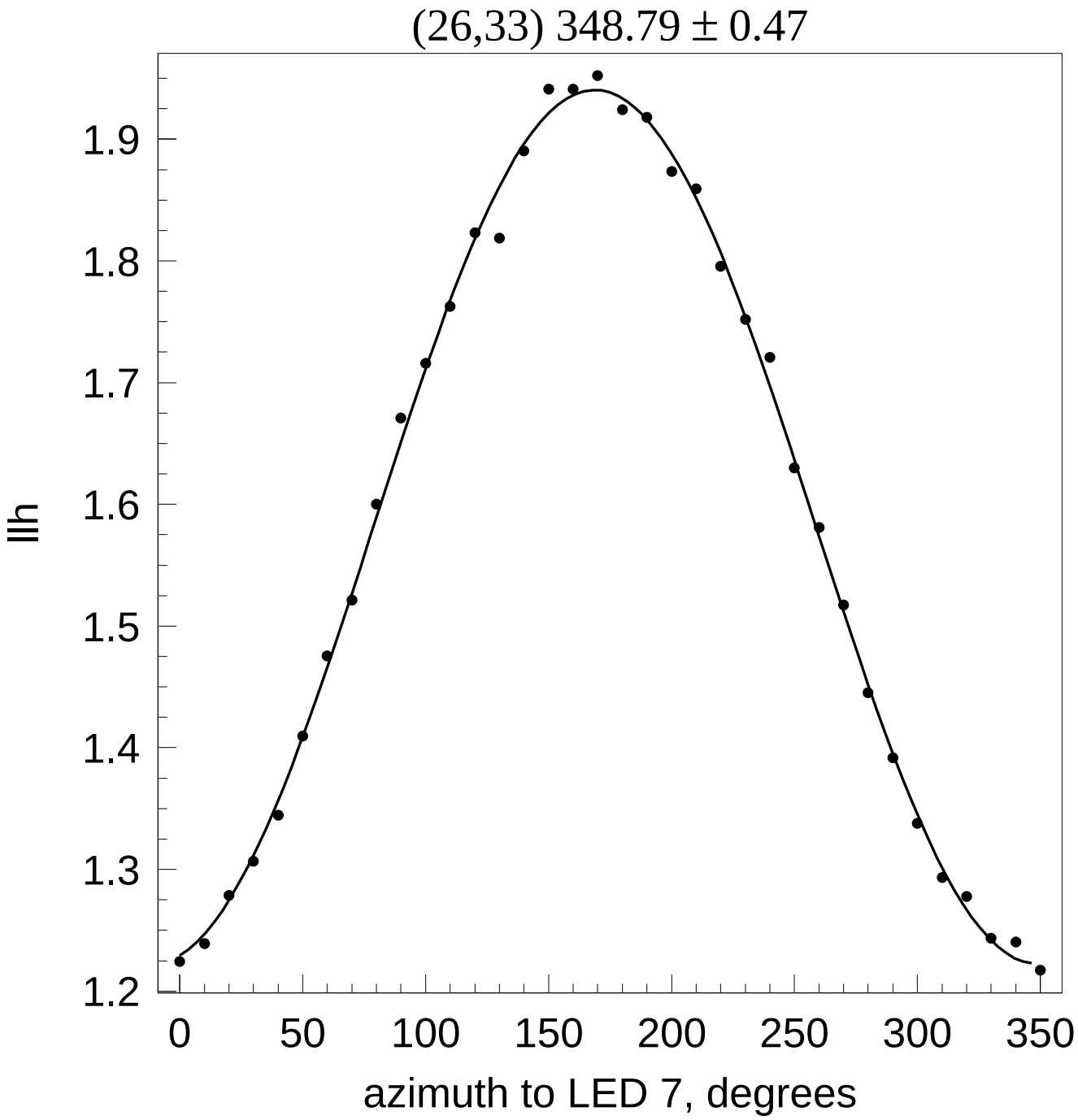

(25,37)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
52.4 ± 33.3

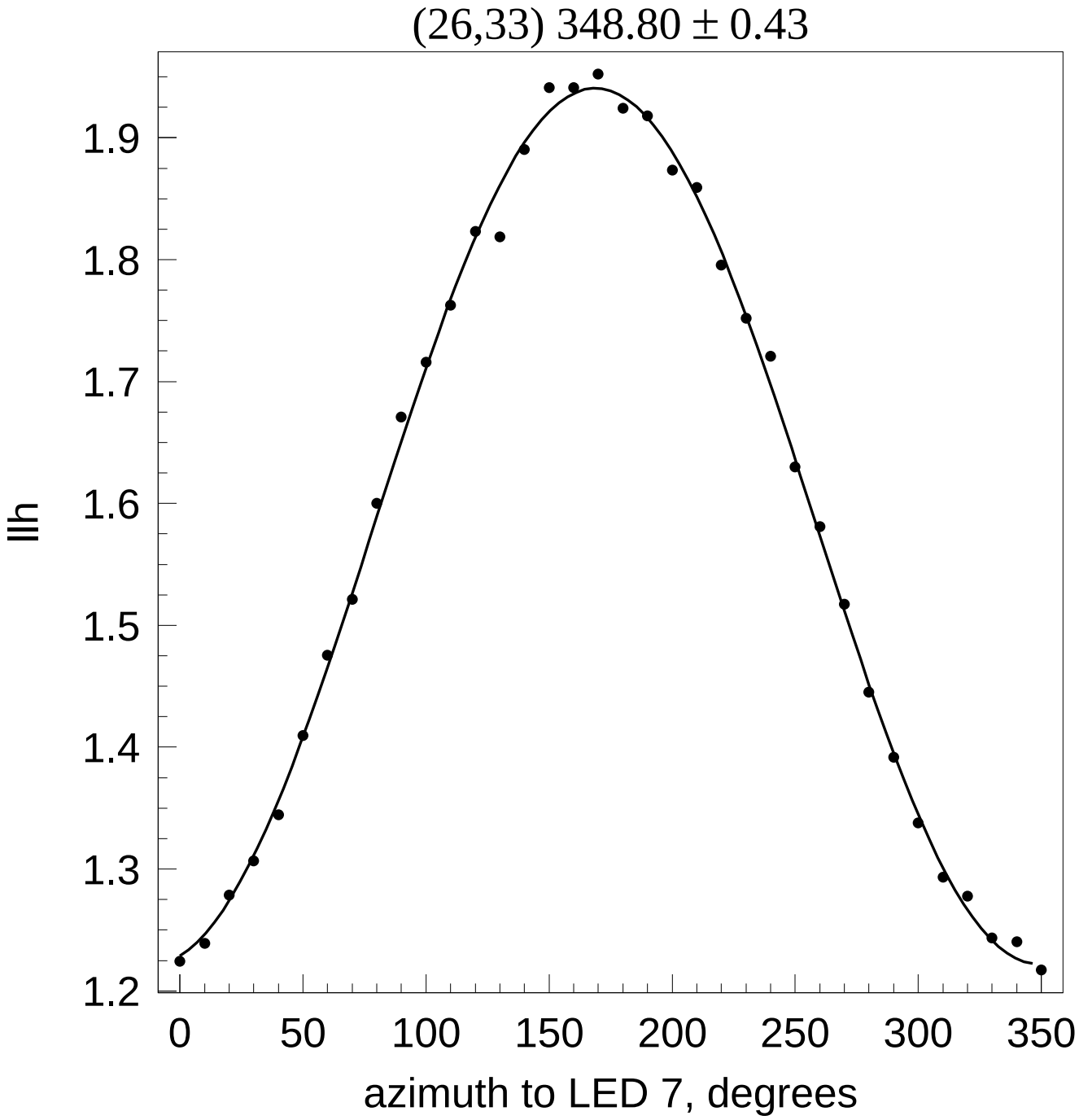

(25,37) 50.53 ± 2.14
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

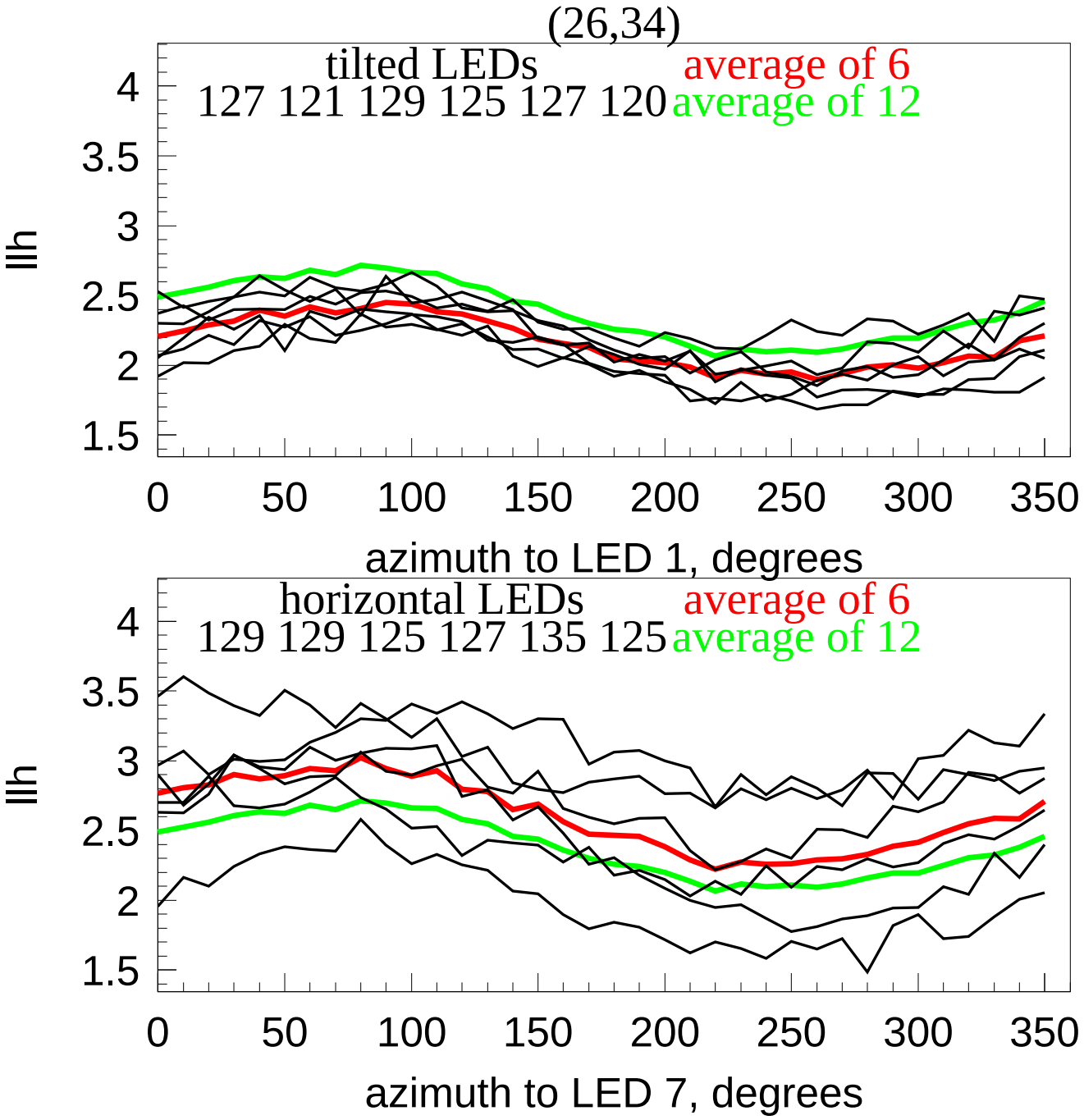

(25,37) 50.65 ± 2.20
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

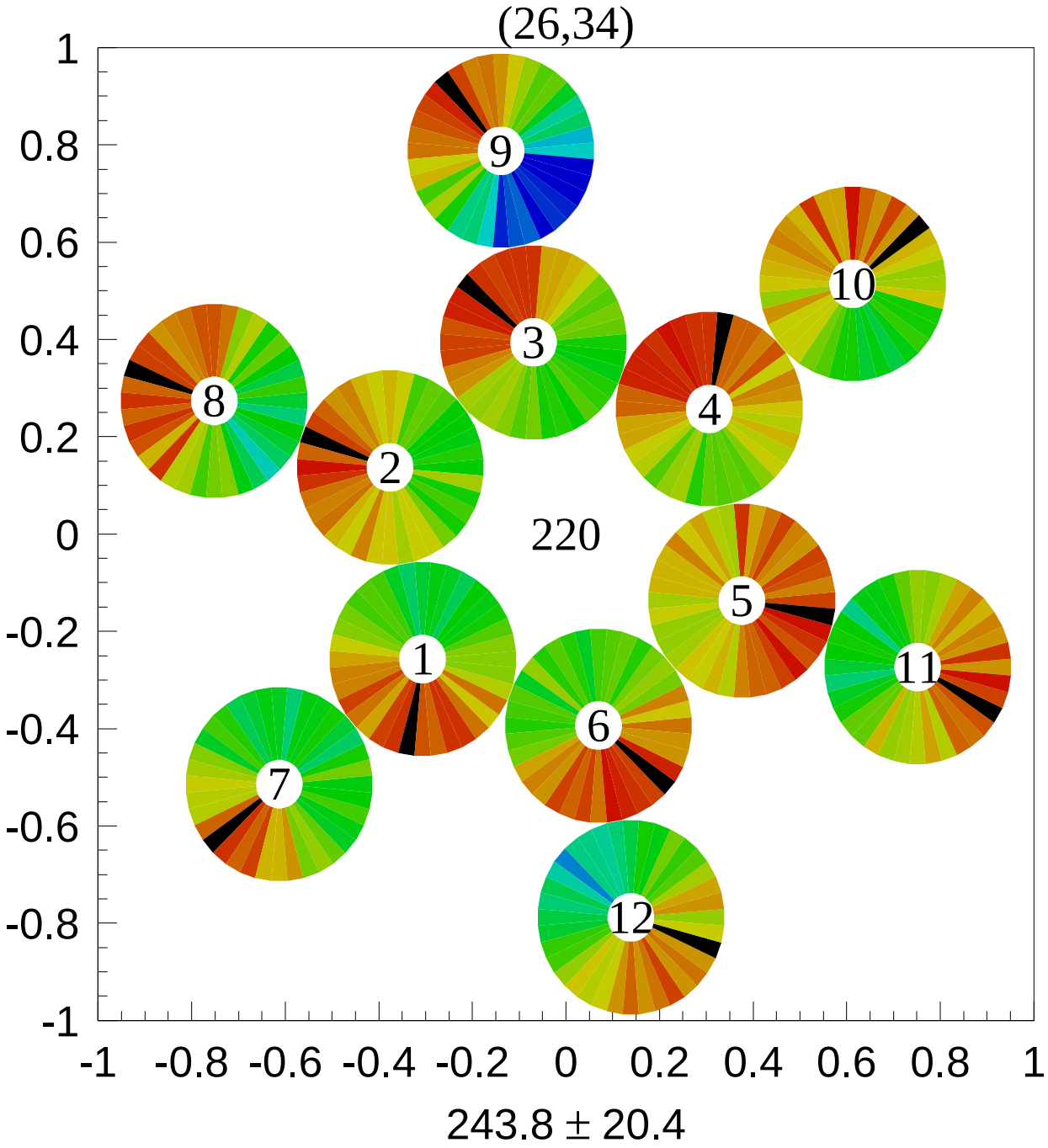

(26,33)
tilted LEDs
120 131 118 121 109 90
average of 6
average of 12
llh
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
118 126 127 118 135 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

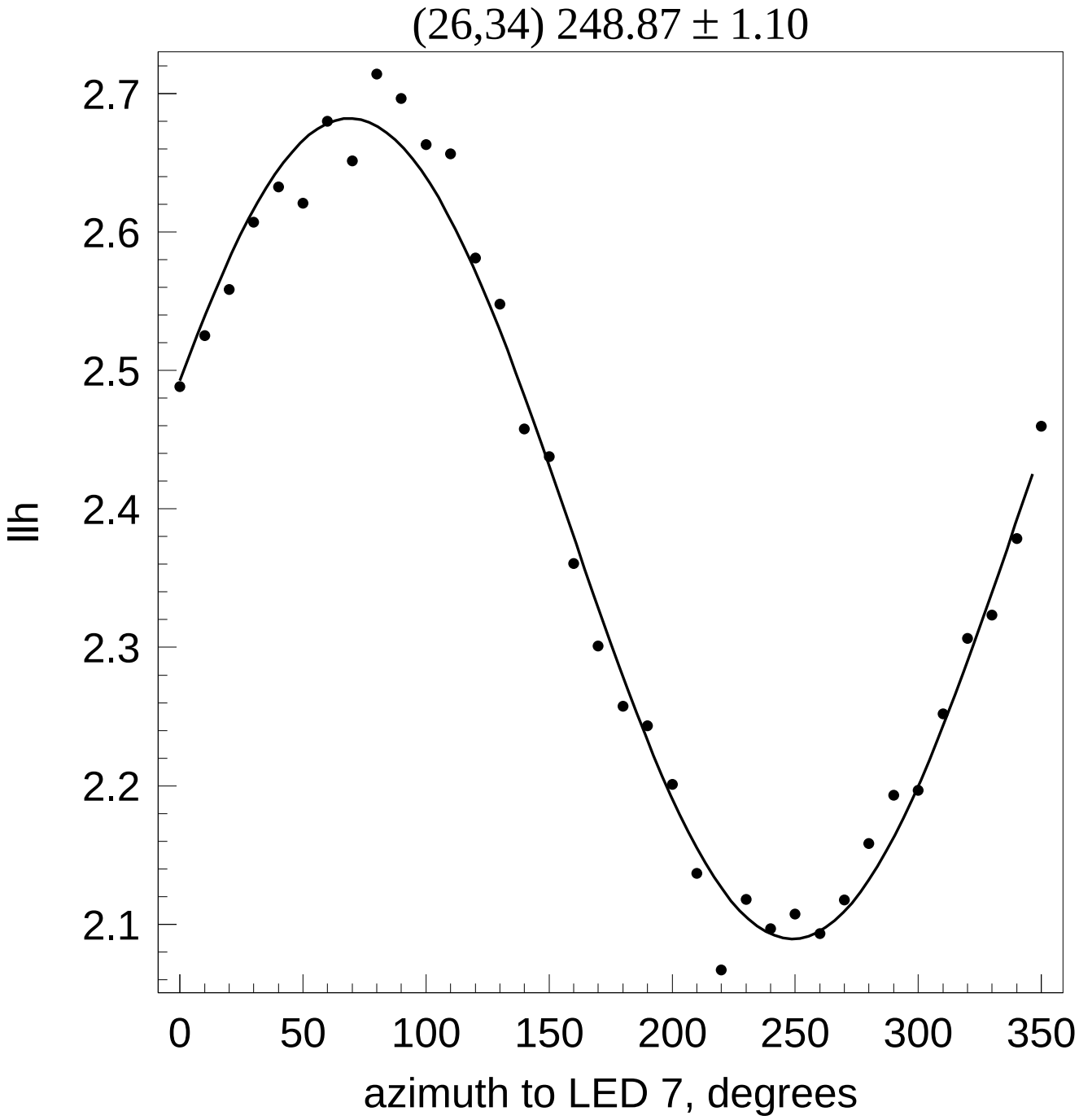

(26,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
349.4 ± 13.2

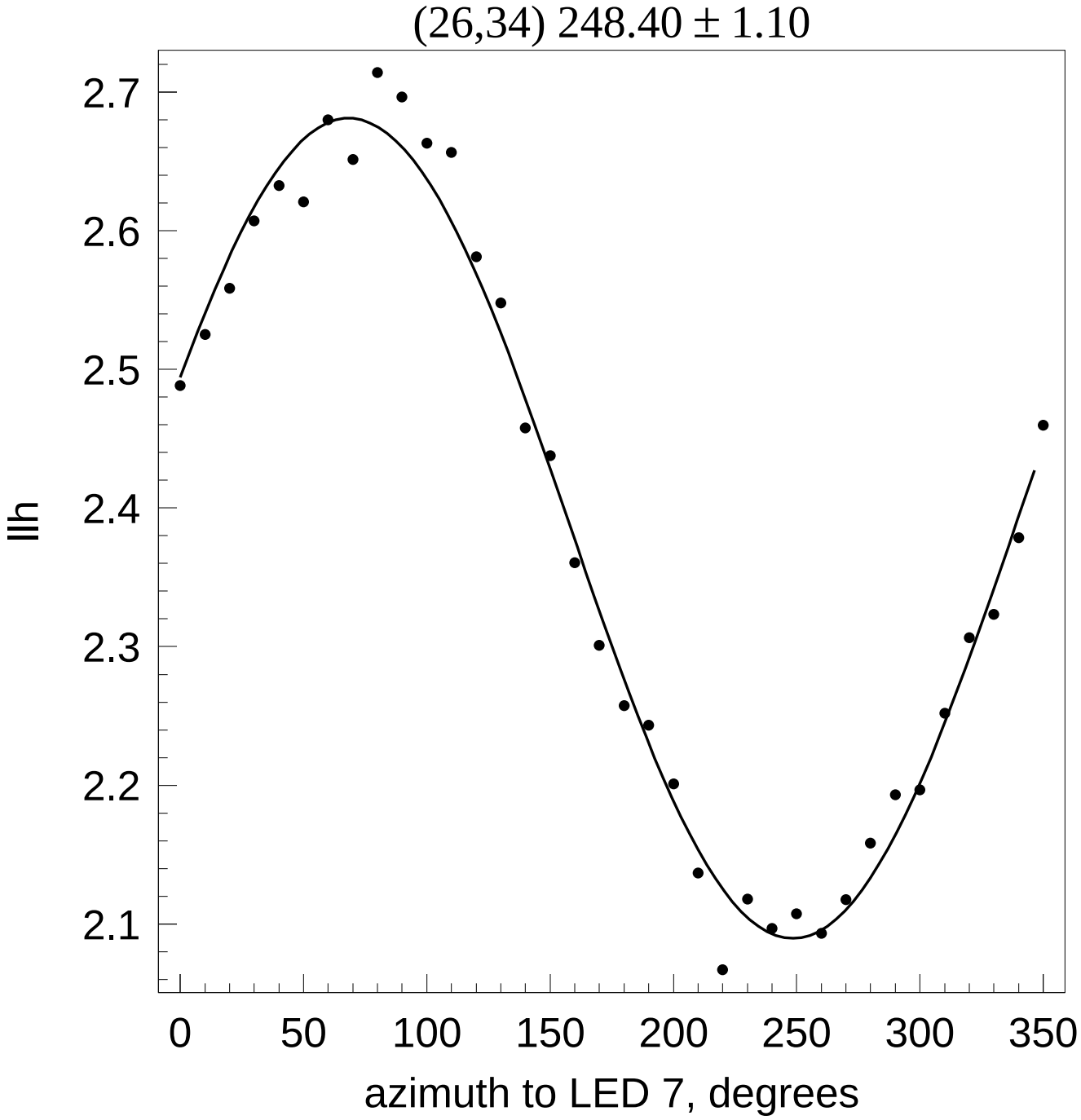

(26,33) 348.79 ± 0.47
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

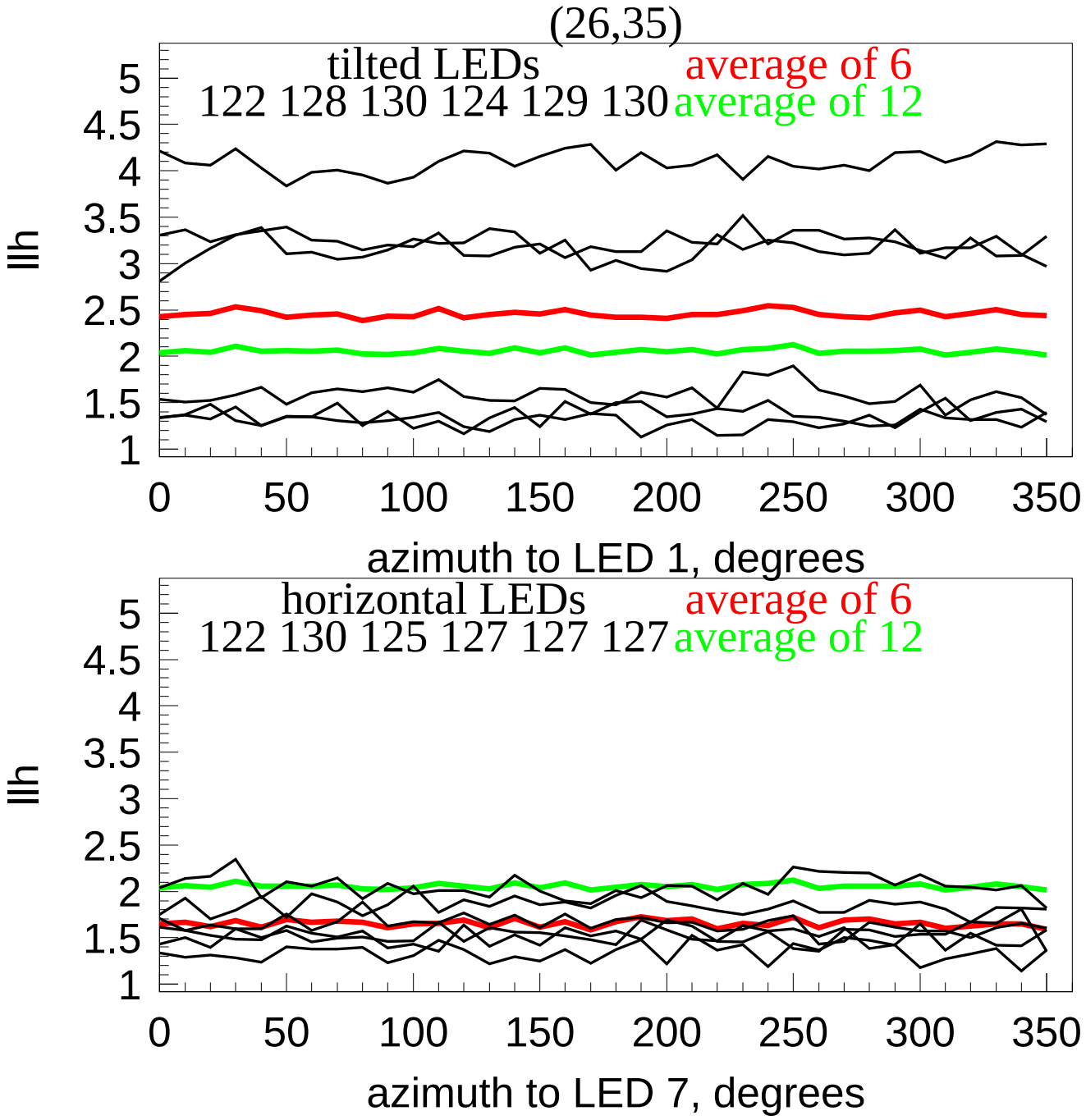

(26,33) 348.80 ± 0.43
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

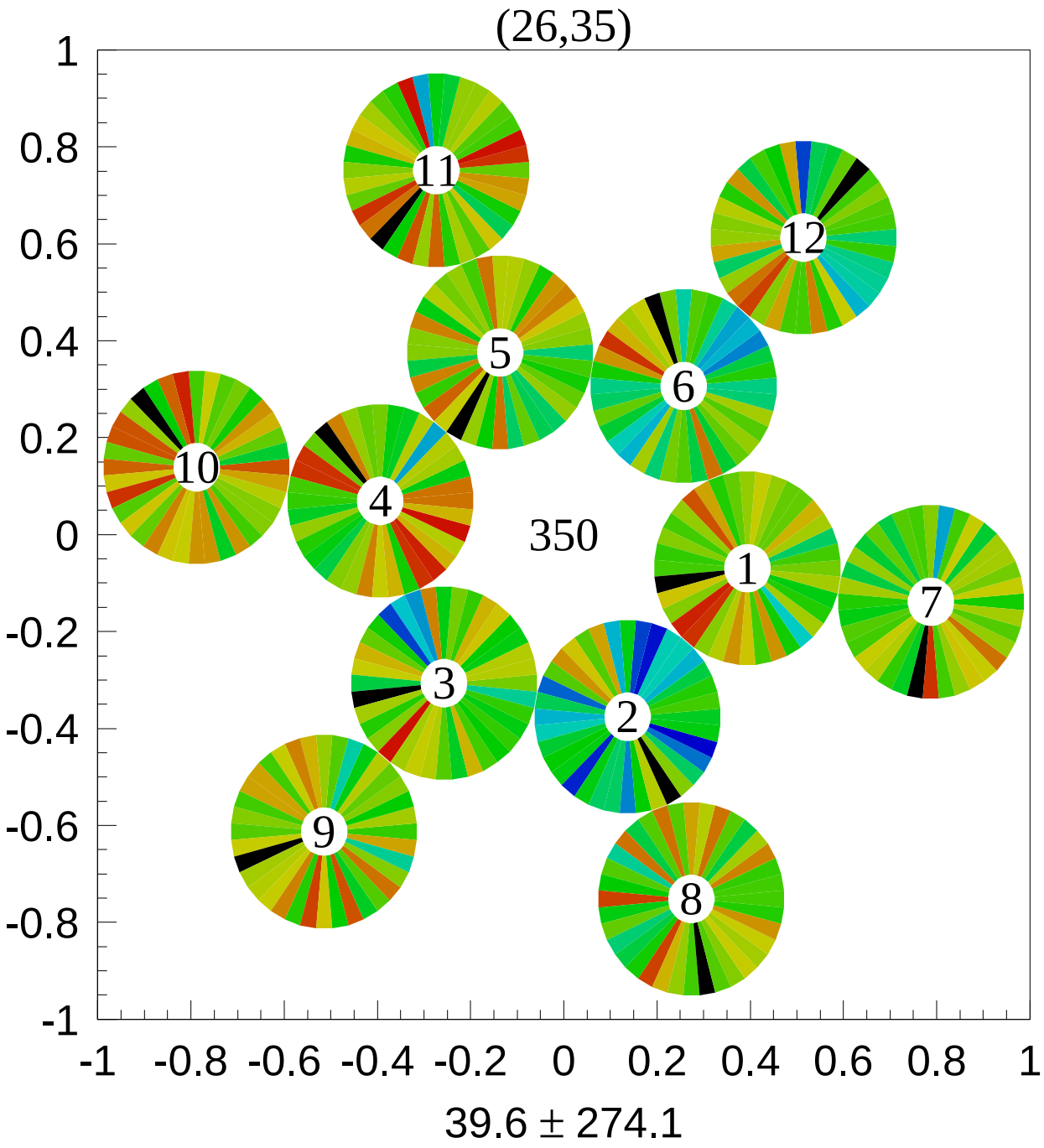

(26,34)
tilted LEDs
127 121 129 125 127 120
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 129 125 127 135 125
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

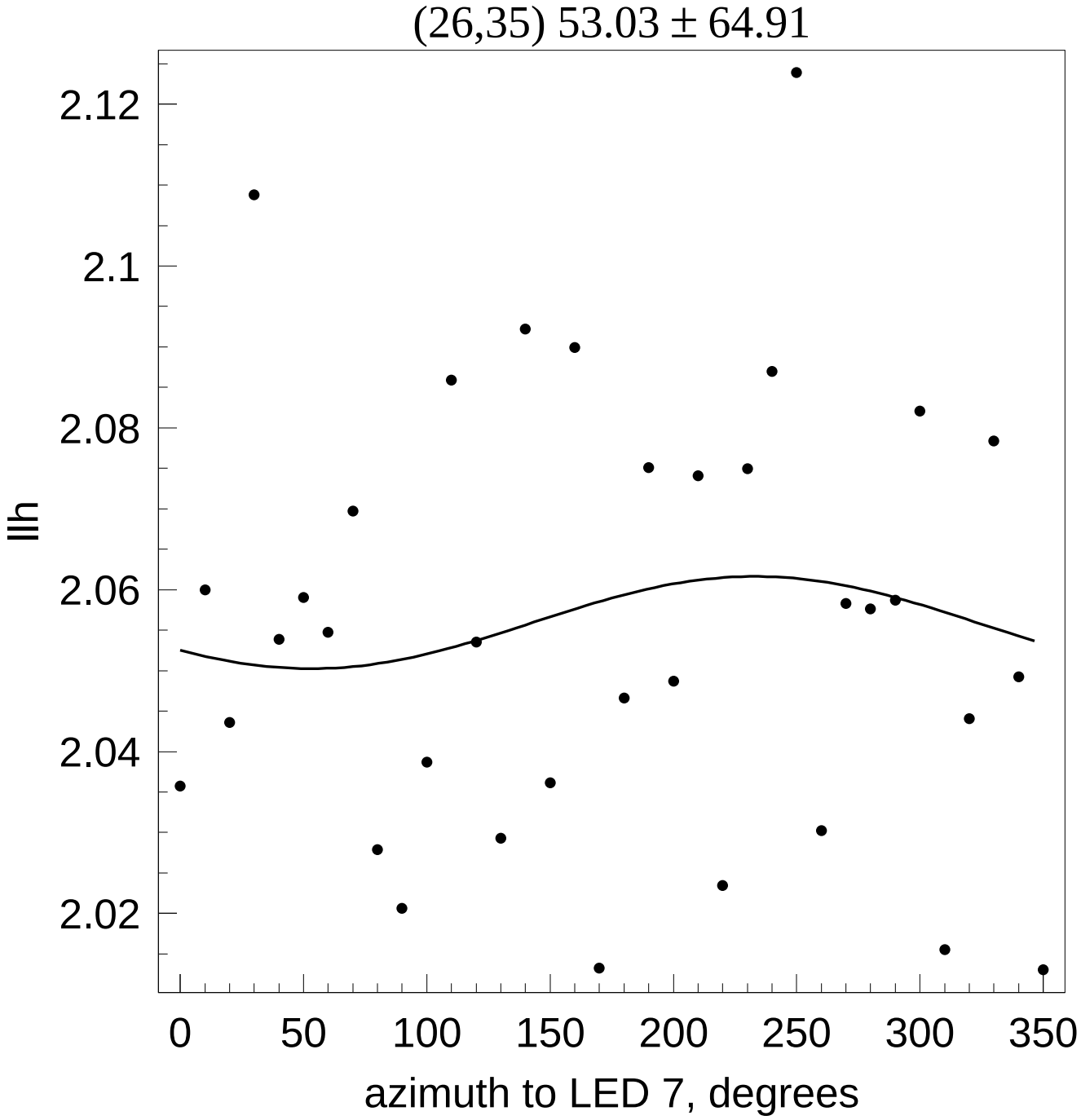

(26,34)
9
10
3
8
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
243.8 ± 20.4

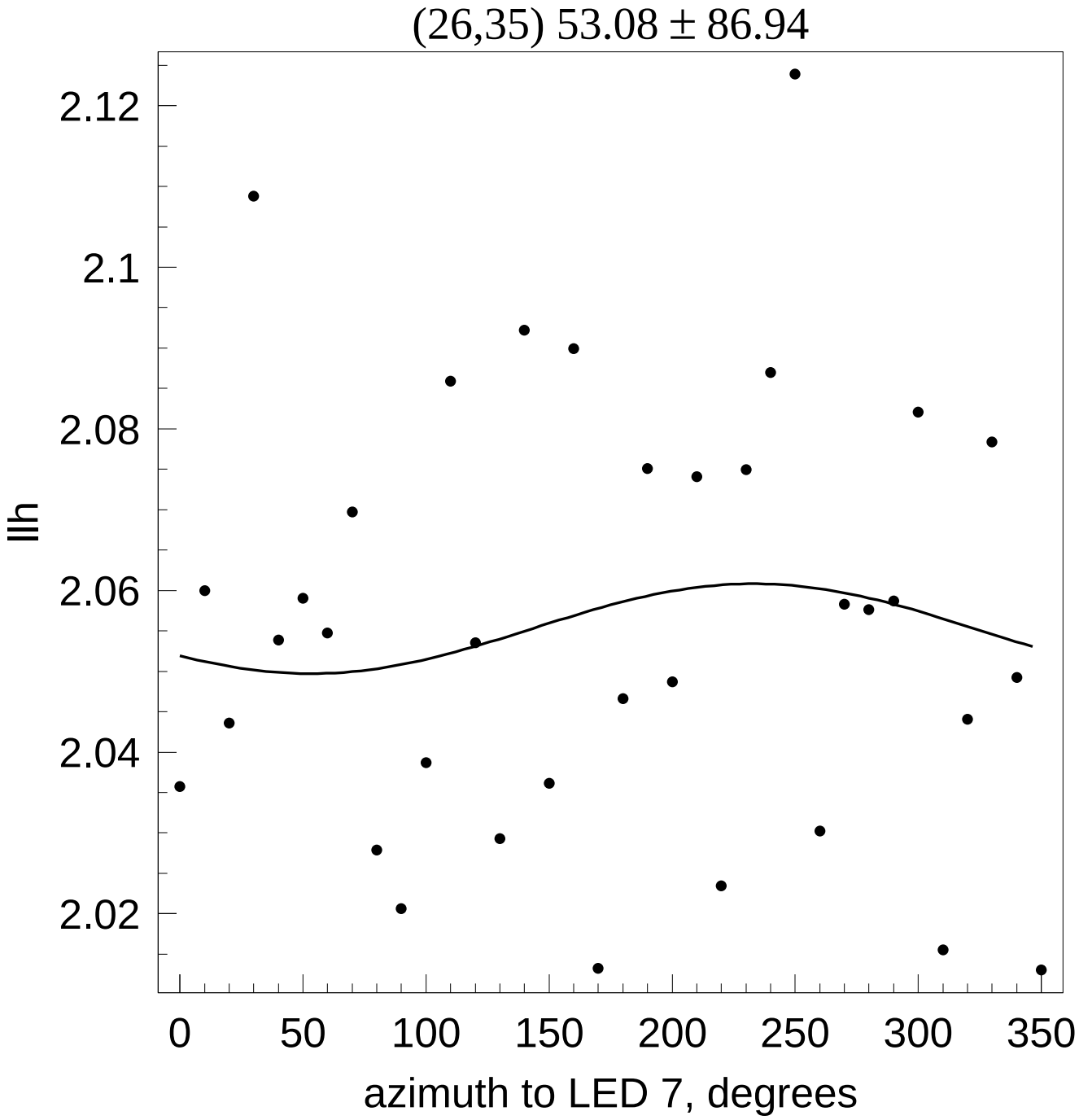

(26,34) 248.87 ± 1.10
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

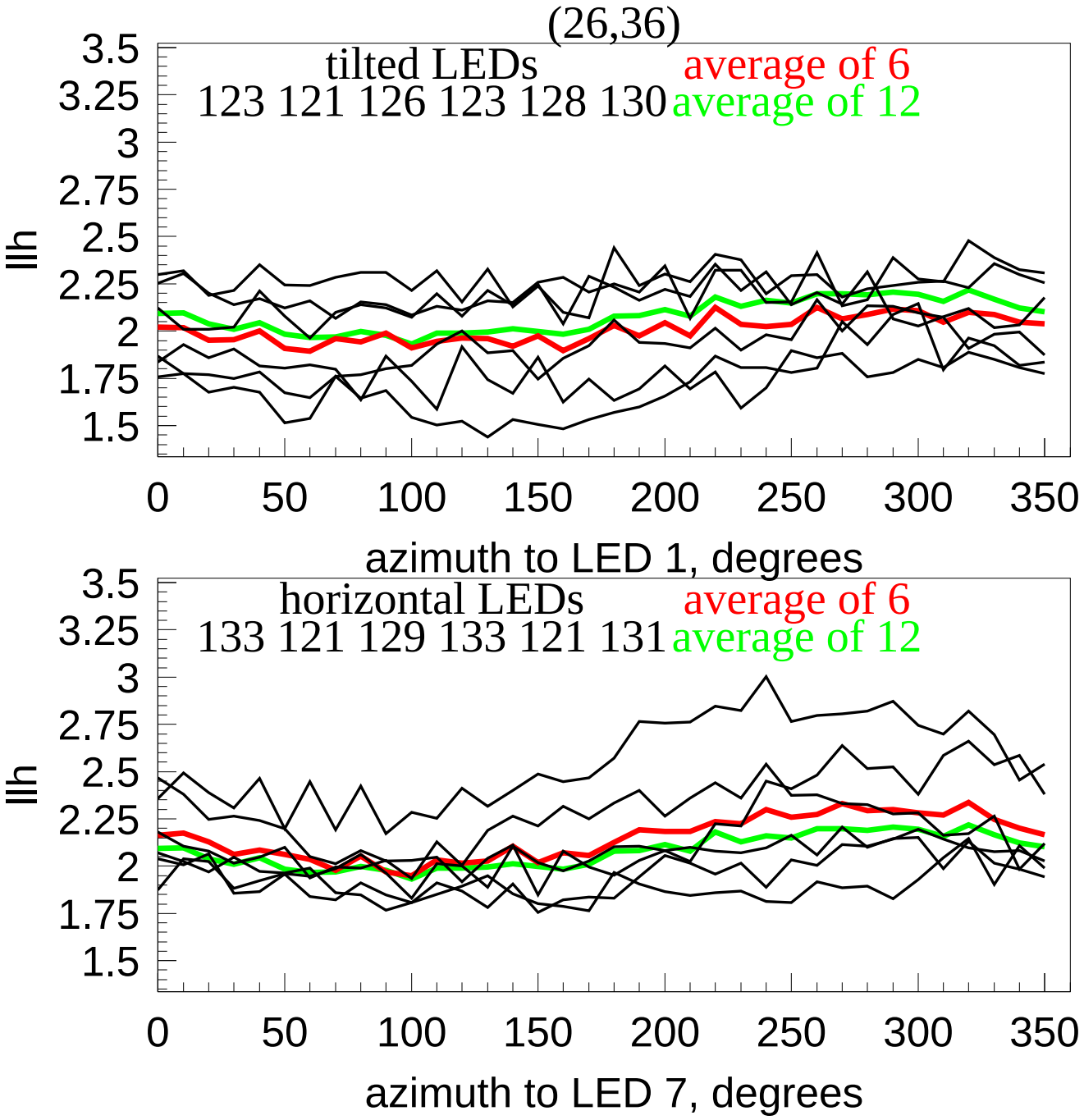

(26,34) 248.40 ± 1.10
2.7
2.6
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

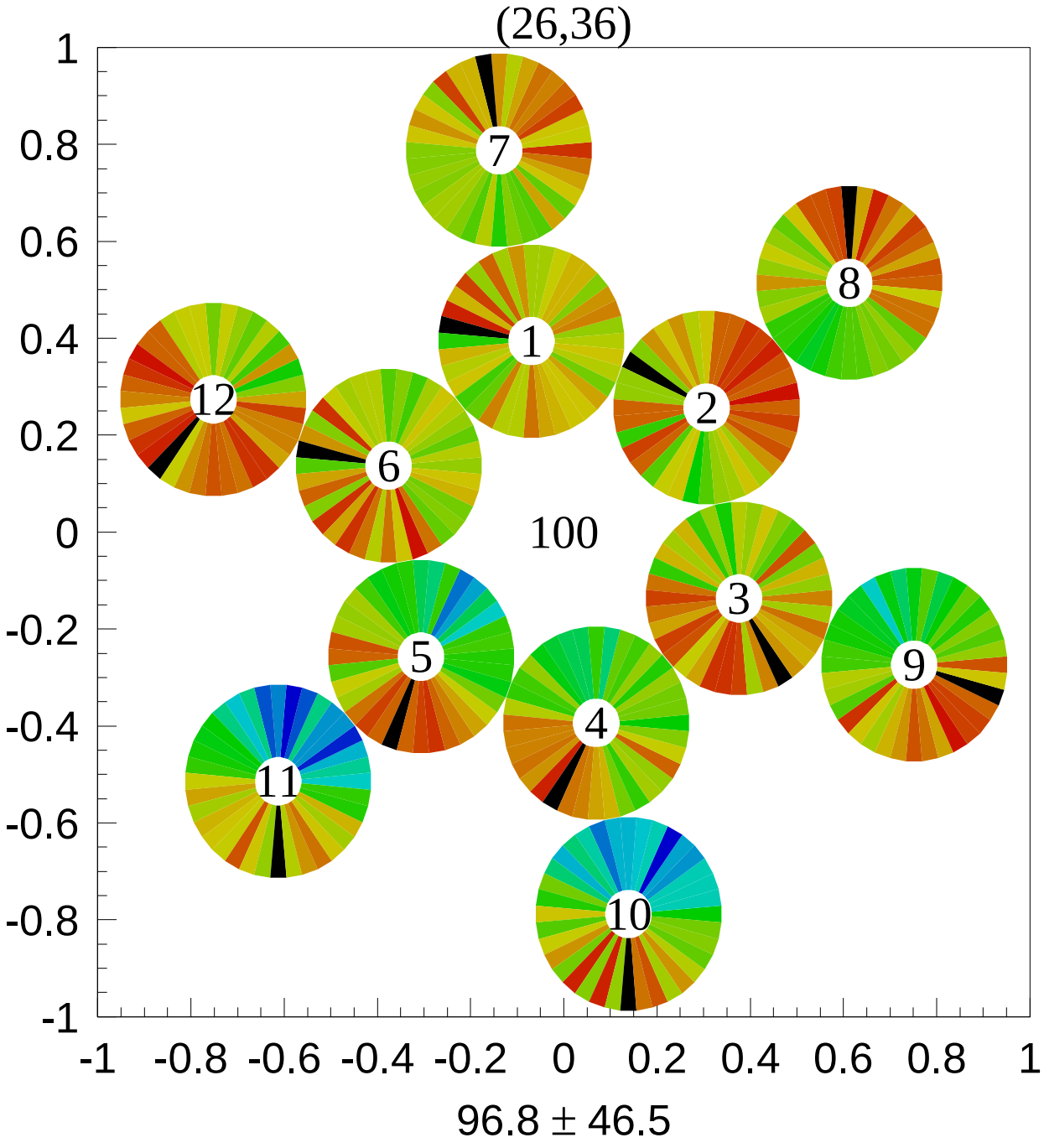

(26,35)
tilted LEDs
122 128 130 124 129 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 130 125 127 127 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

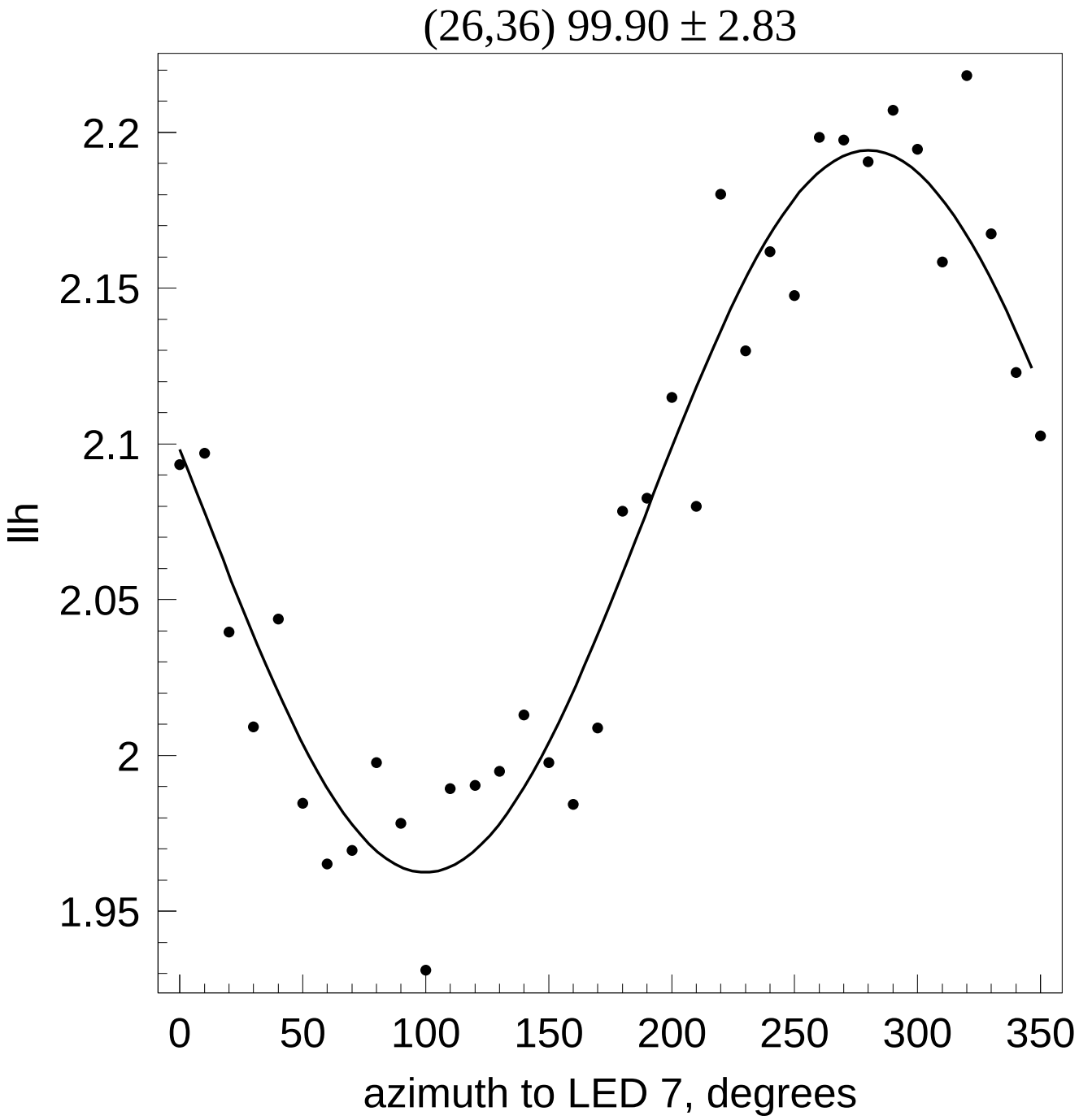

(26,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
39.6 ± 274.1

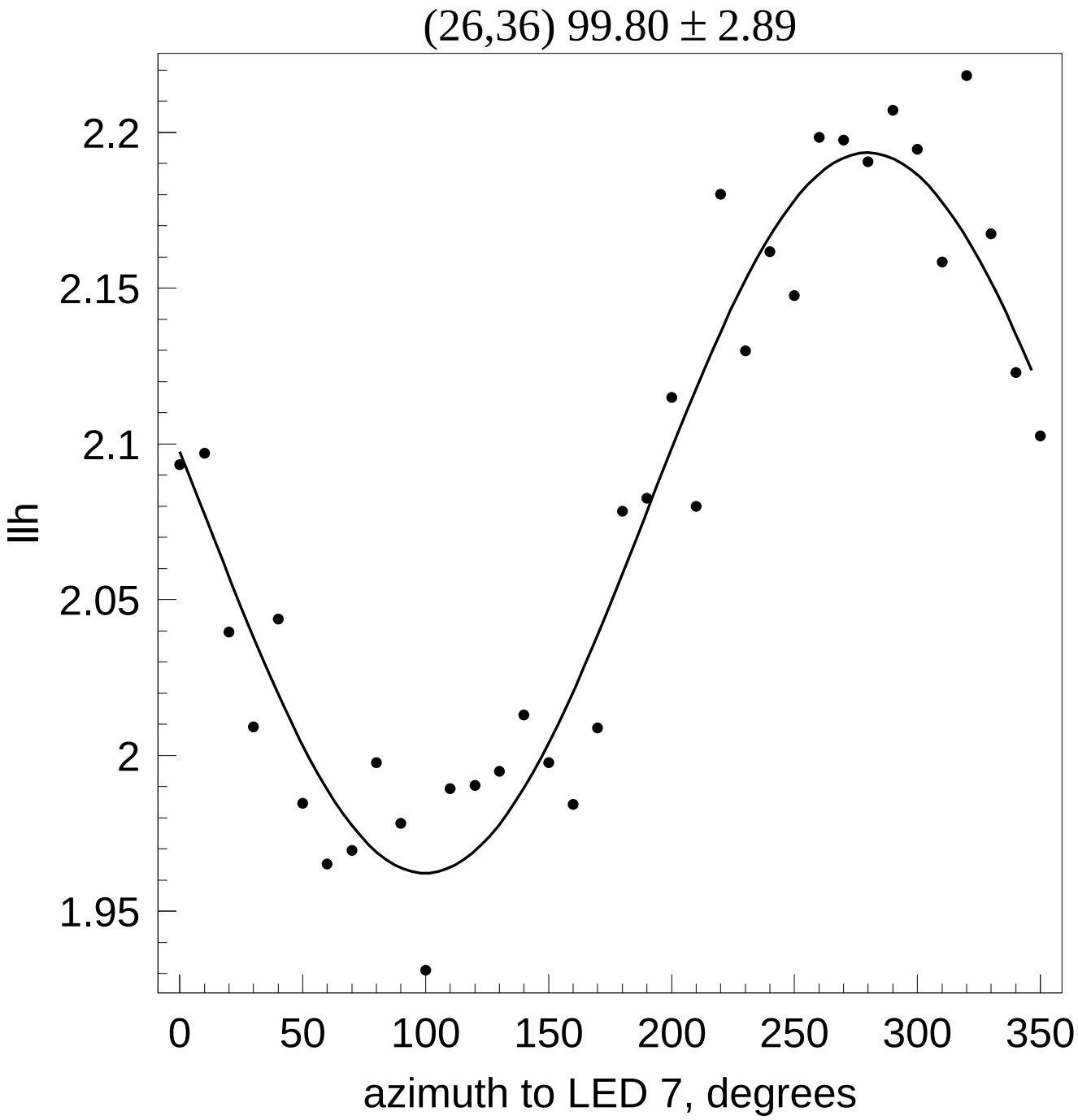

(26,35) 53.03 ± 64.91
2.12
2.1
2.08
2.06
2.04
2.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

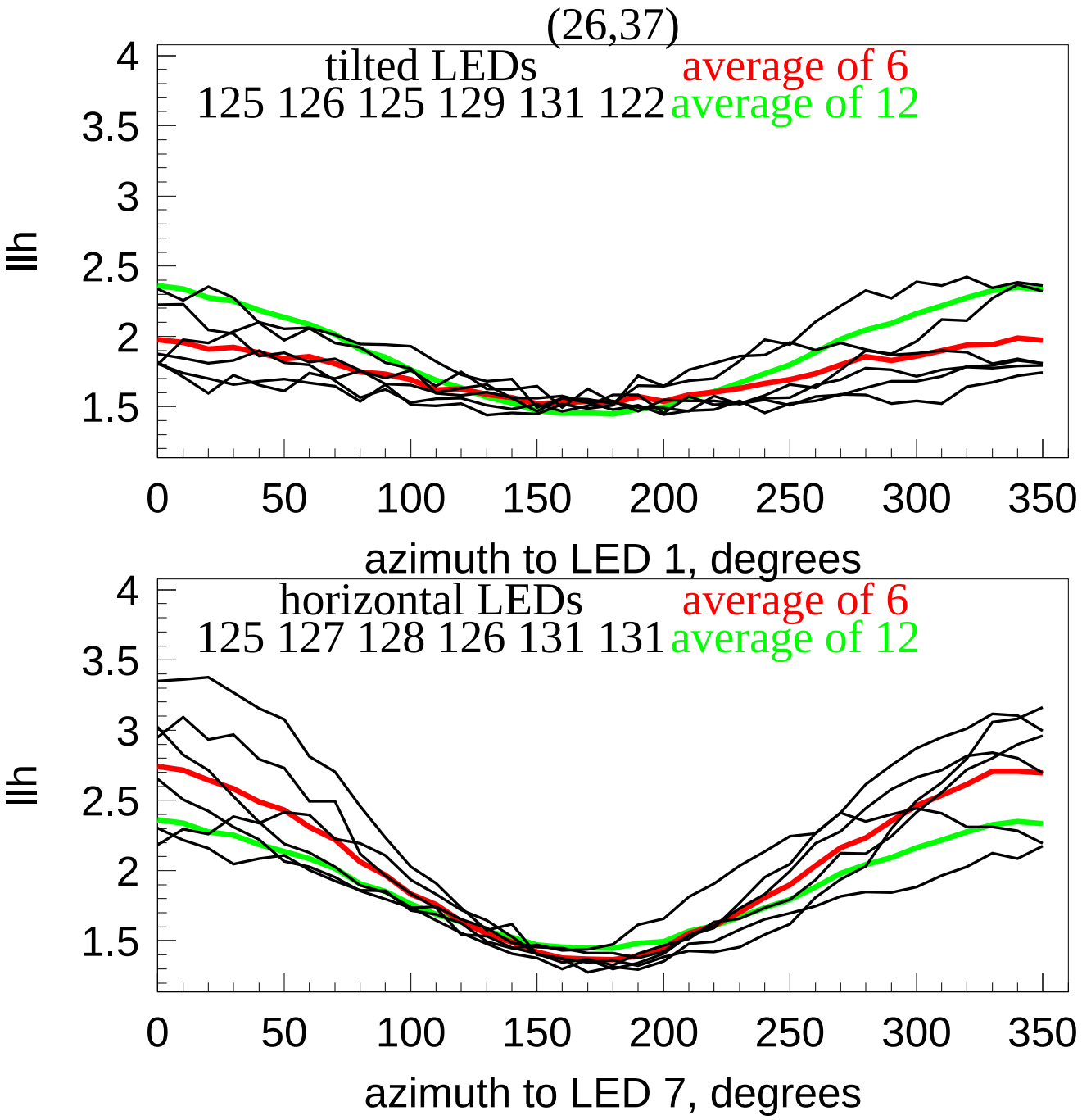

(26,35) 53.08 ± 86.94
2.12
2.1
2.08
2.06
2.04
2.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

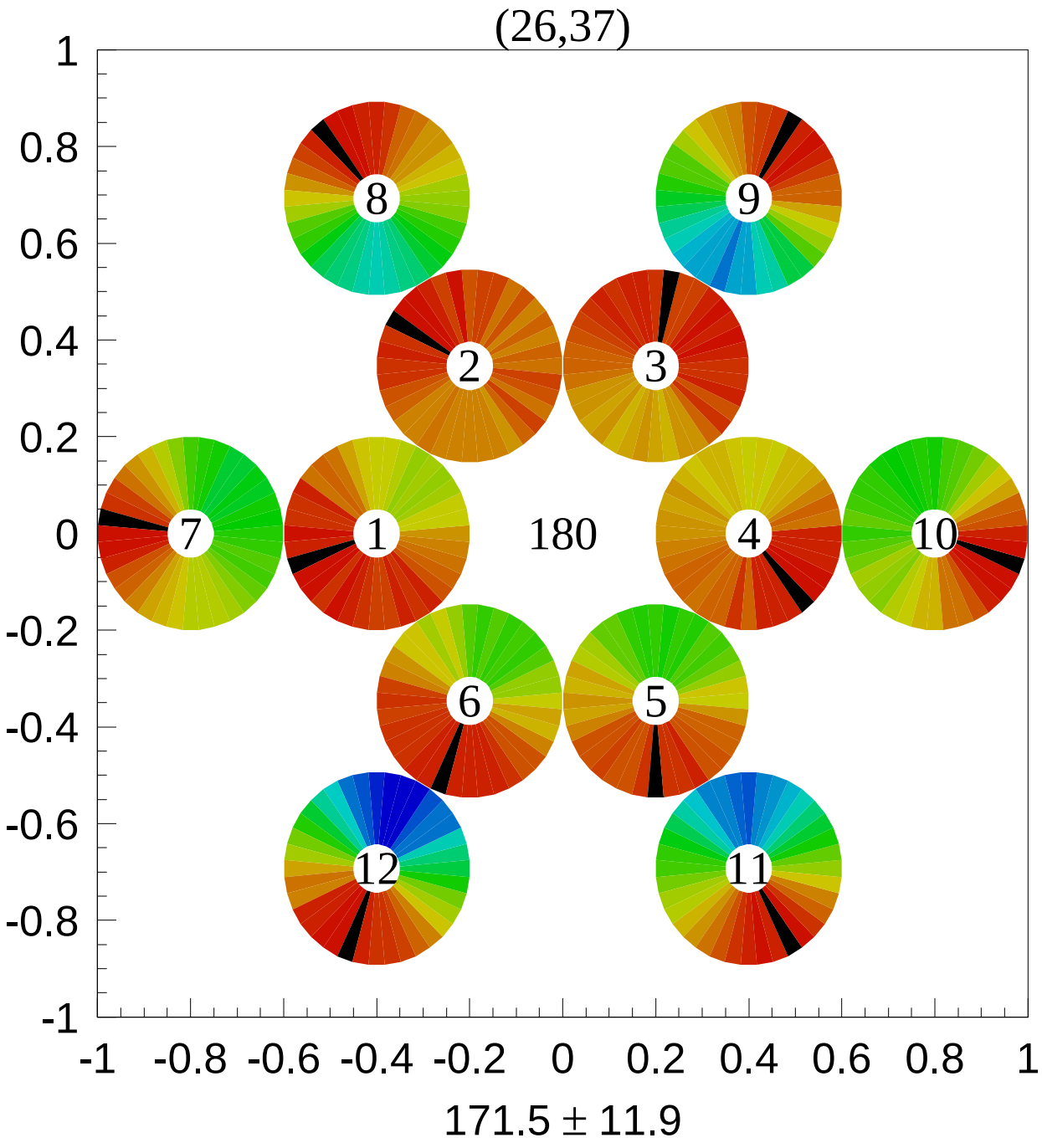

(26,36)
tilted LEDs
123 121 126 123 128 130
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
133 121 129 133 121 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

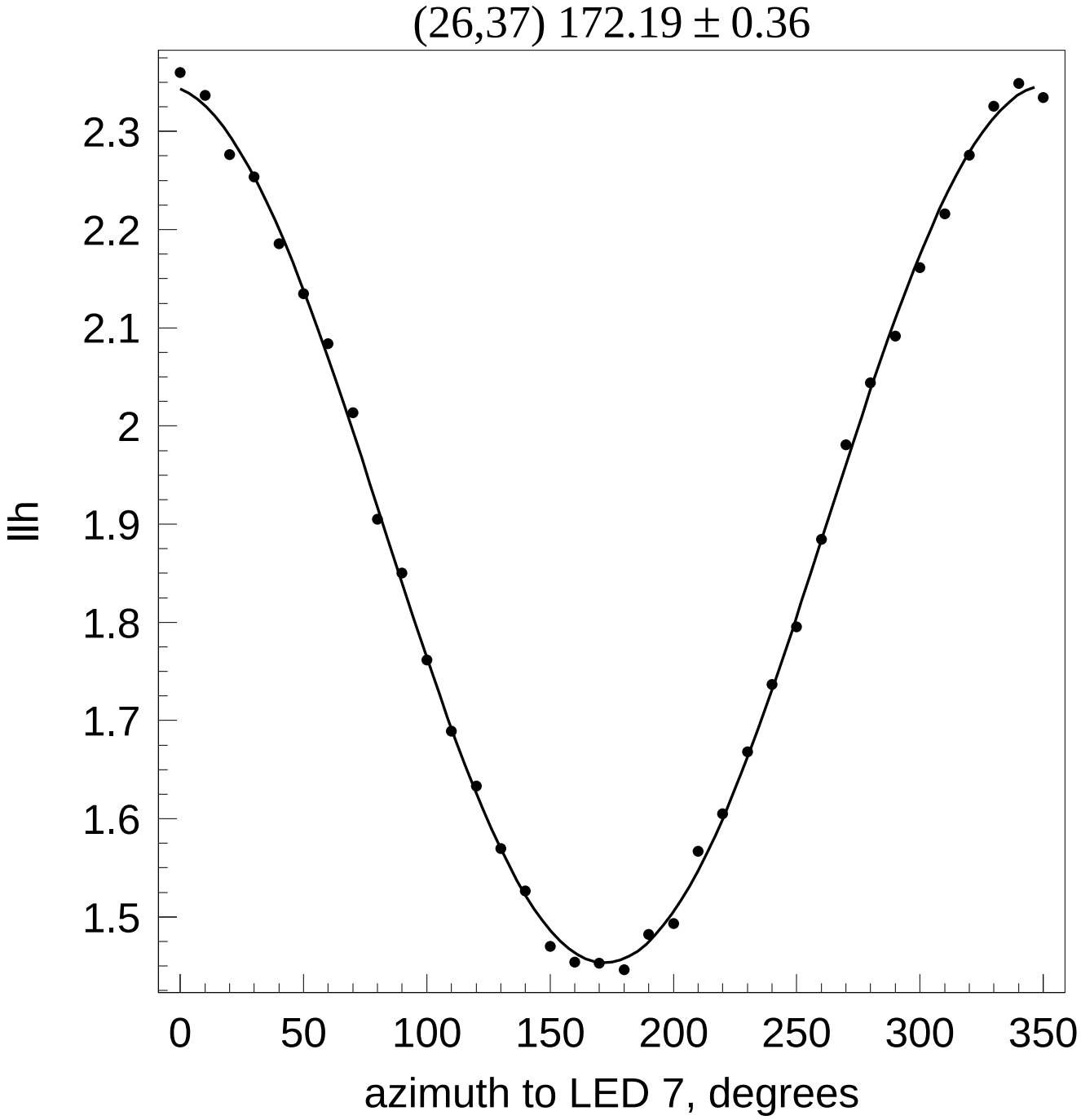

(26,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
96.8 ± 46.5

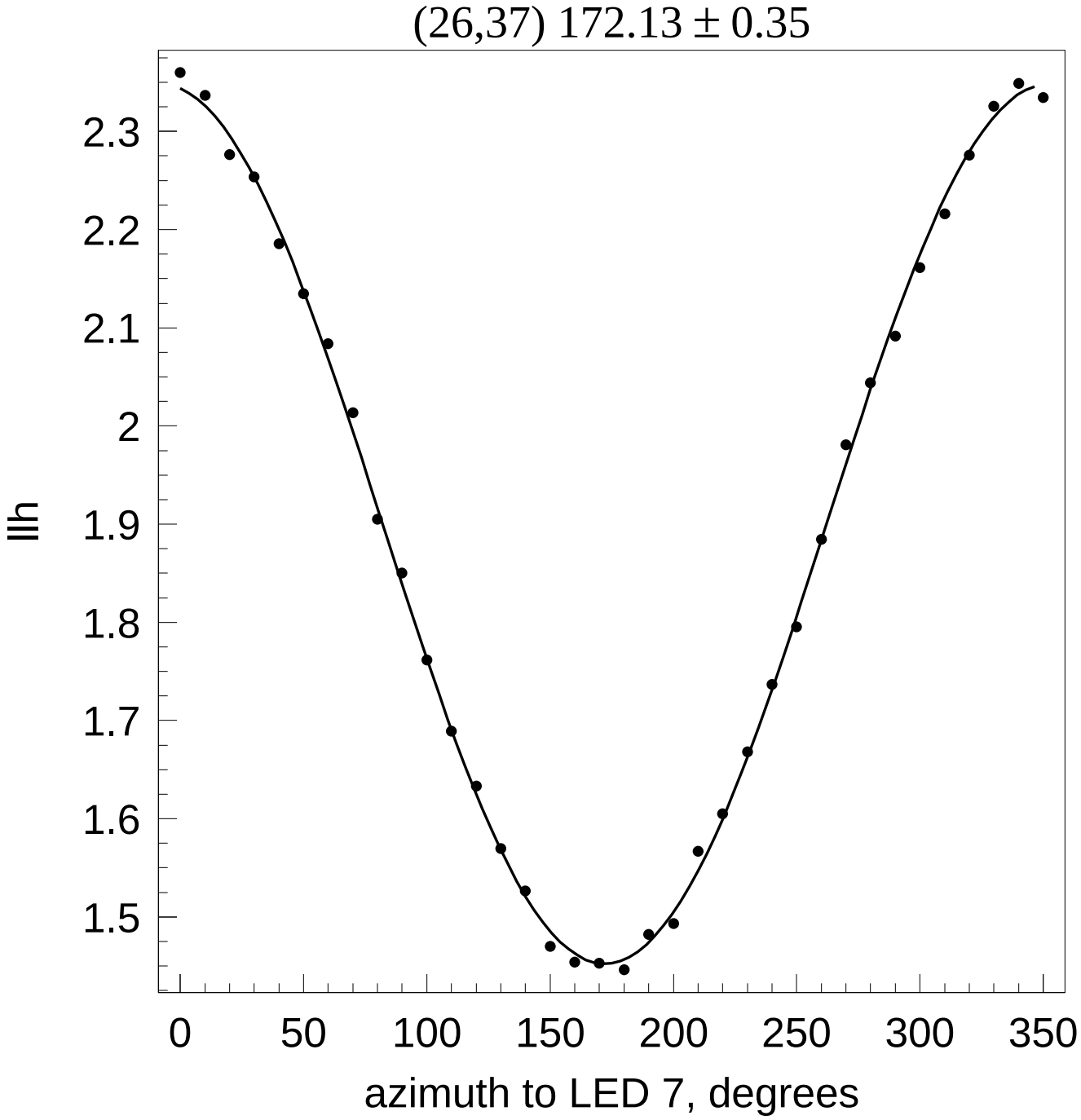

(26,36) 99.90 ± 2.83
2.2
2.15
2.1
2.05
2
1.95
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

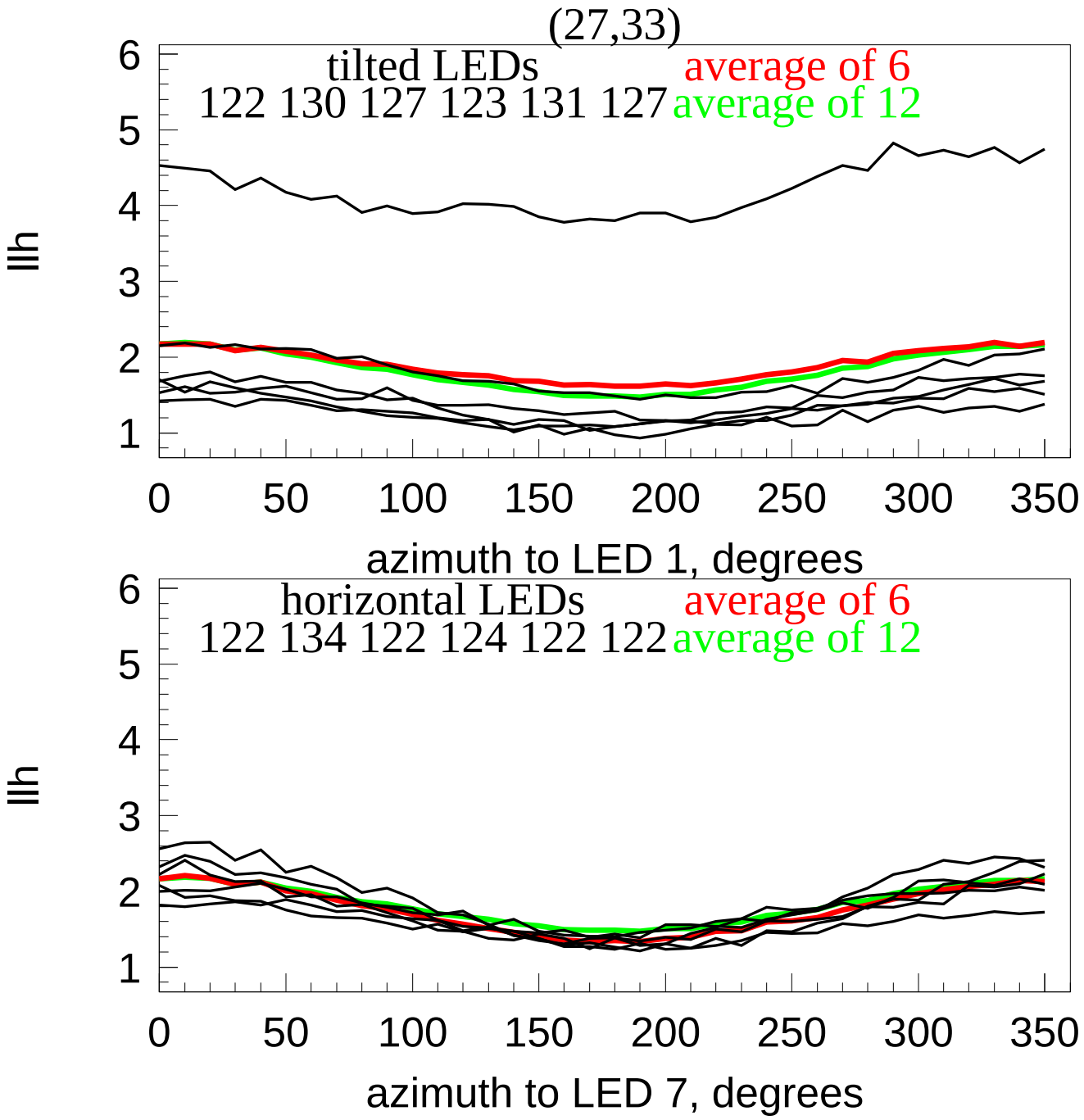

(26,36) 99.80 ± 2.89
2.2
2.15
2.1
2.05
2
1.95
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

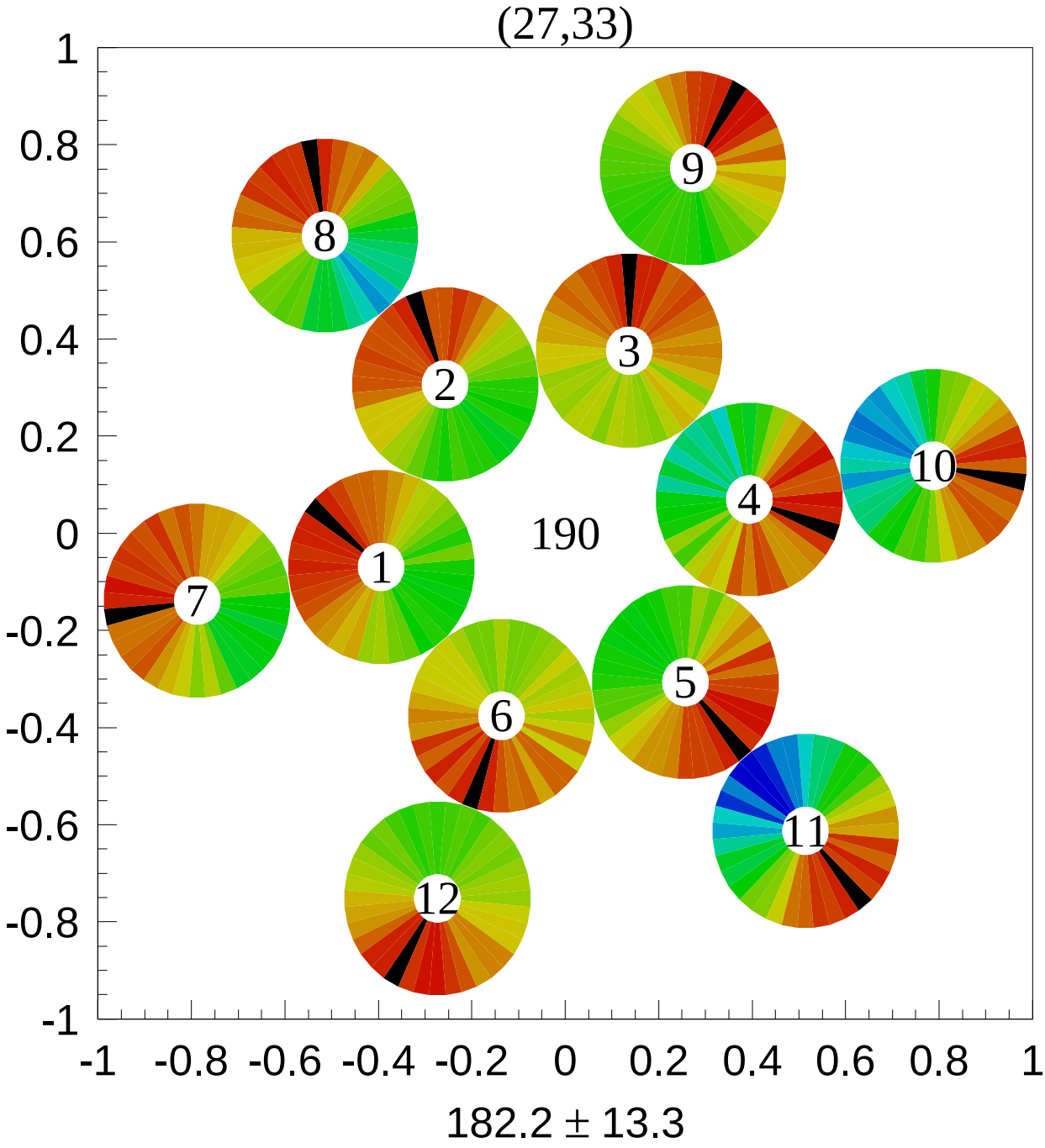

(26,37)
tilted LEDs
125 126 125 129 131 122
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 127 128 126 131 131
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

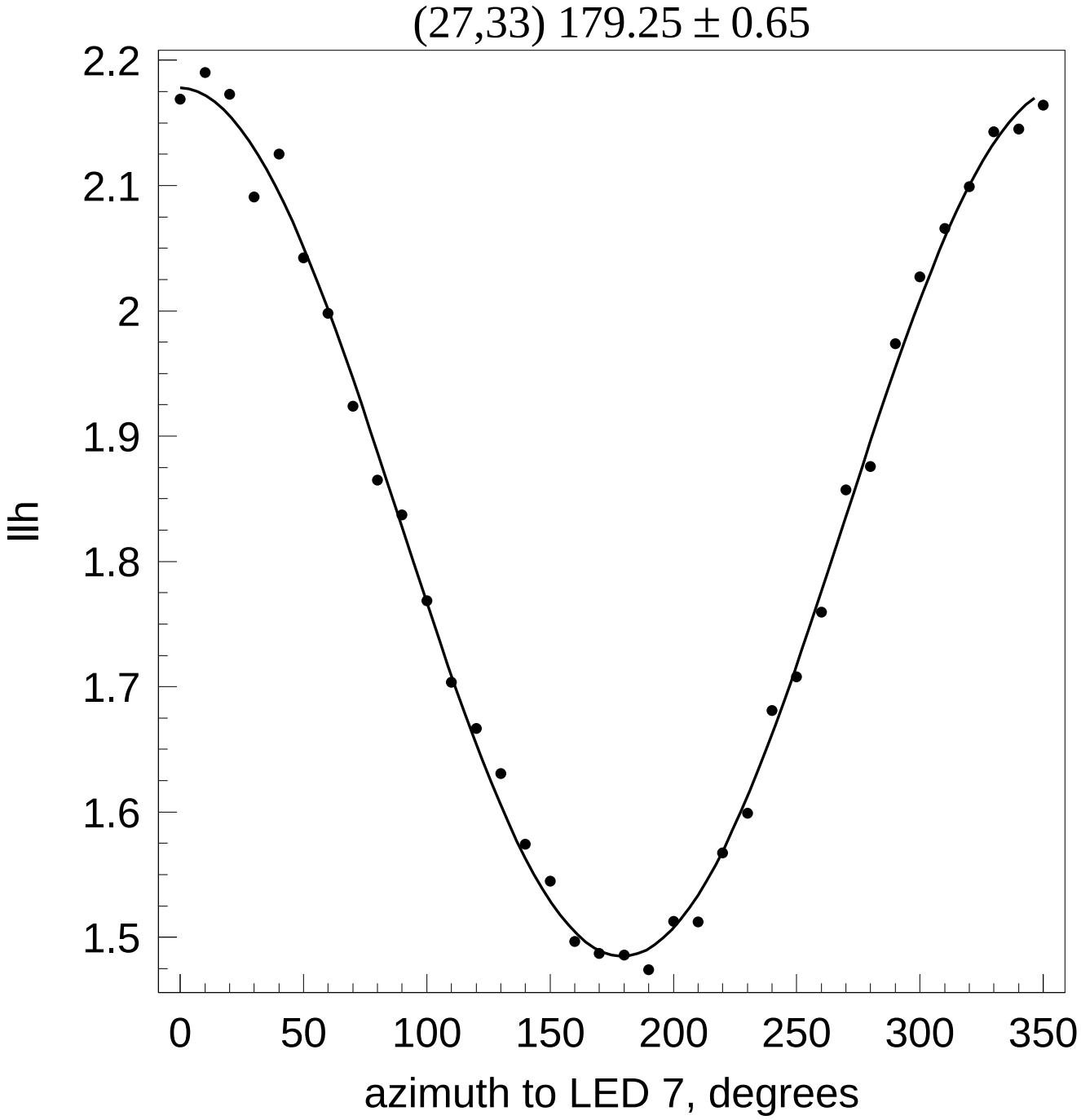

(26,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
171.5 ± 11.9

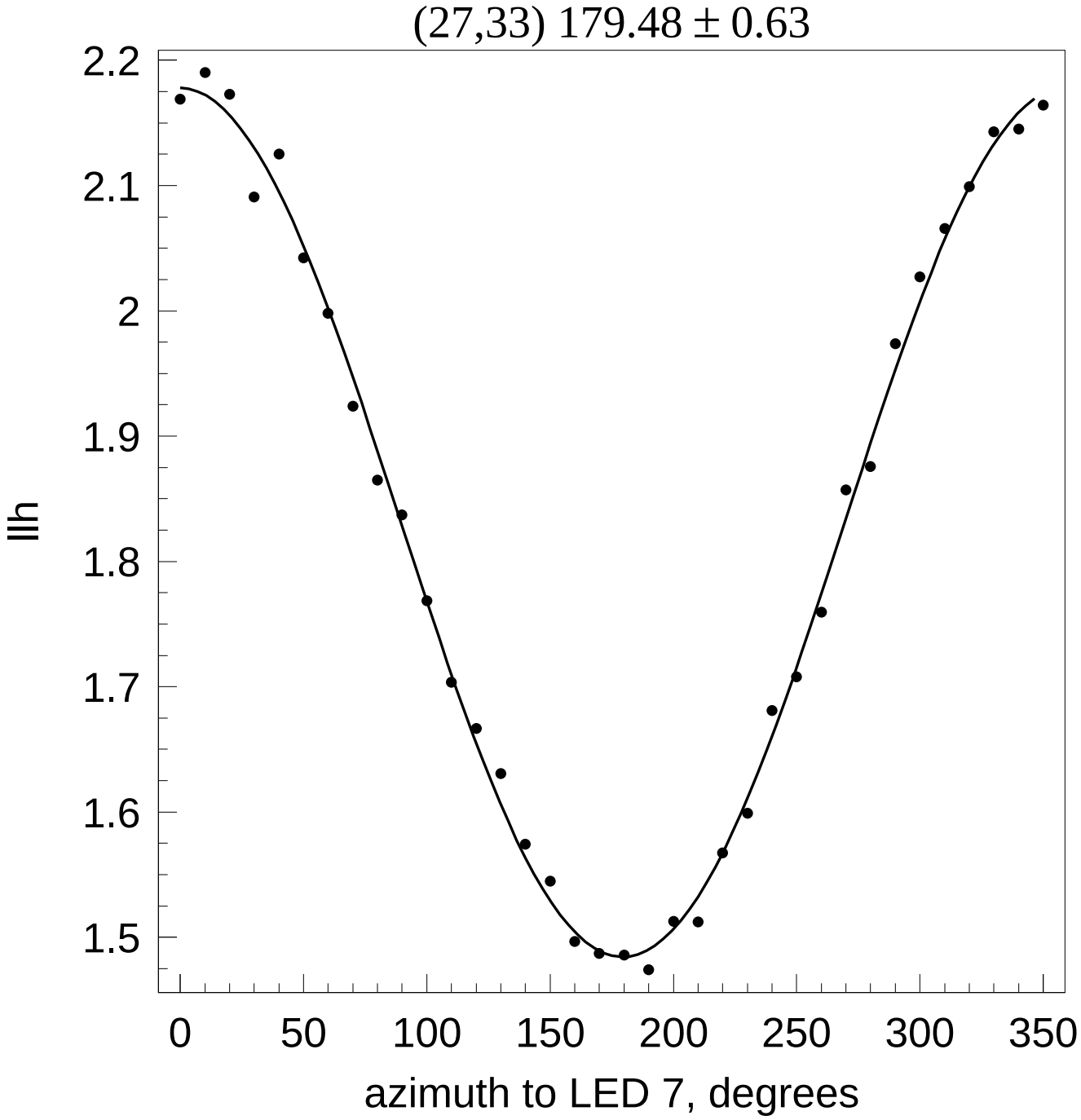

(26,37) 172.19 ± 0.36
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

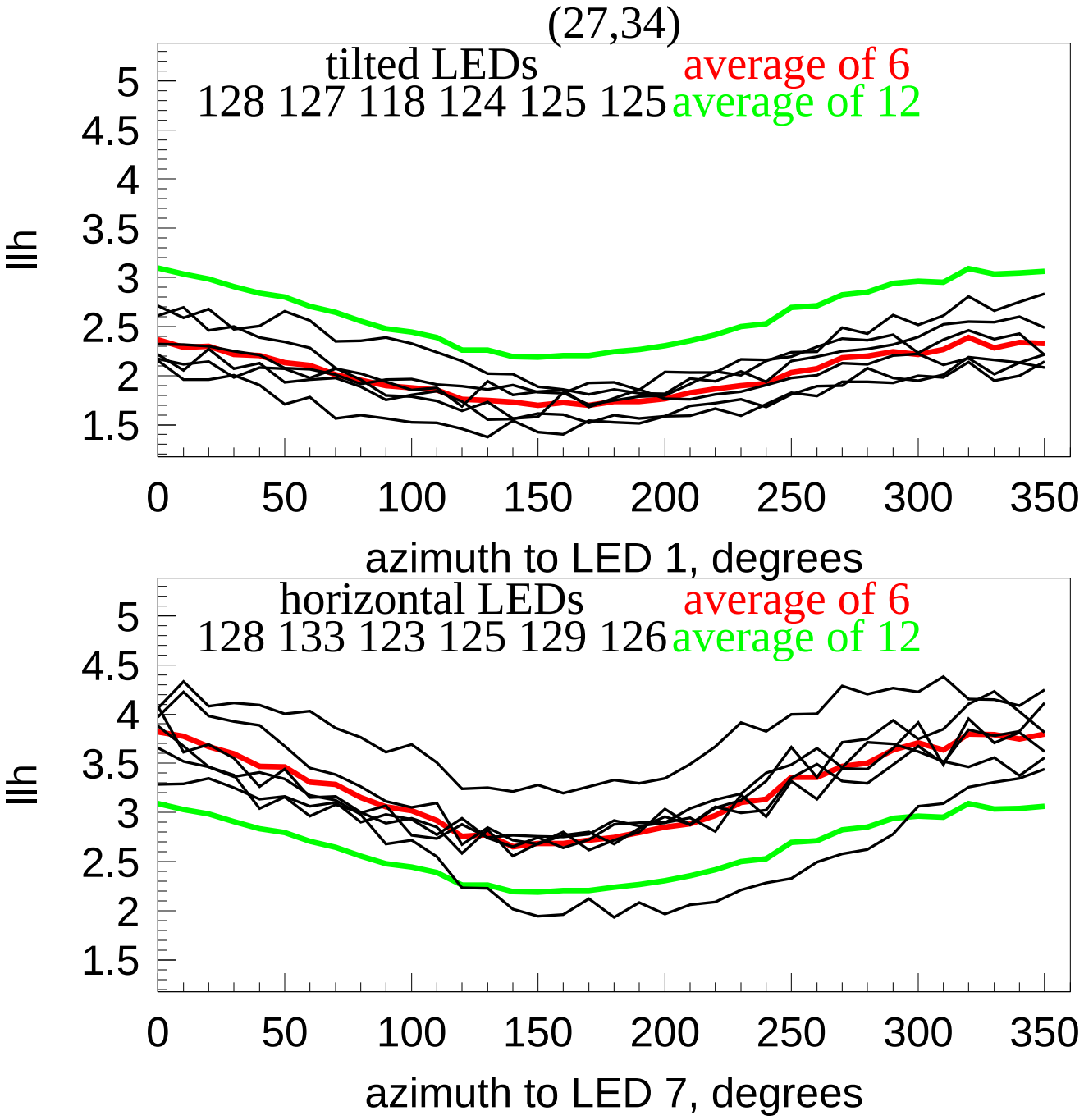

(26,37) 172.13 ± 0.35
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

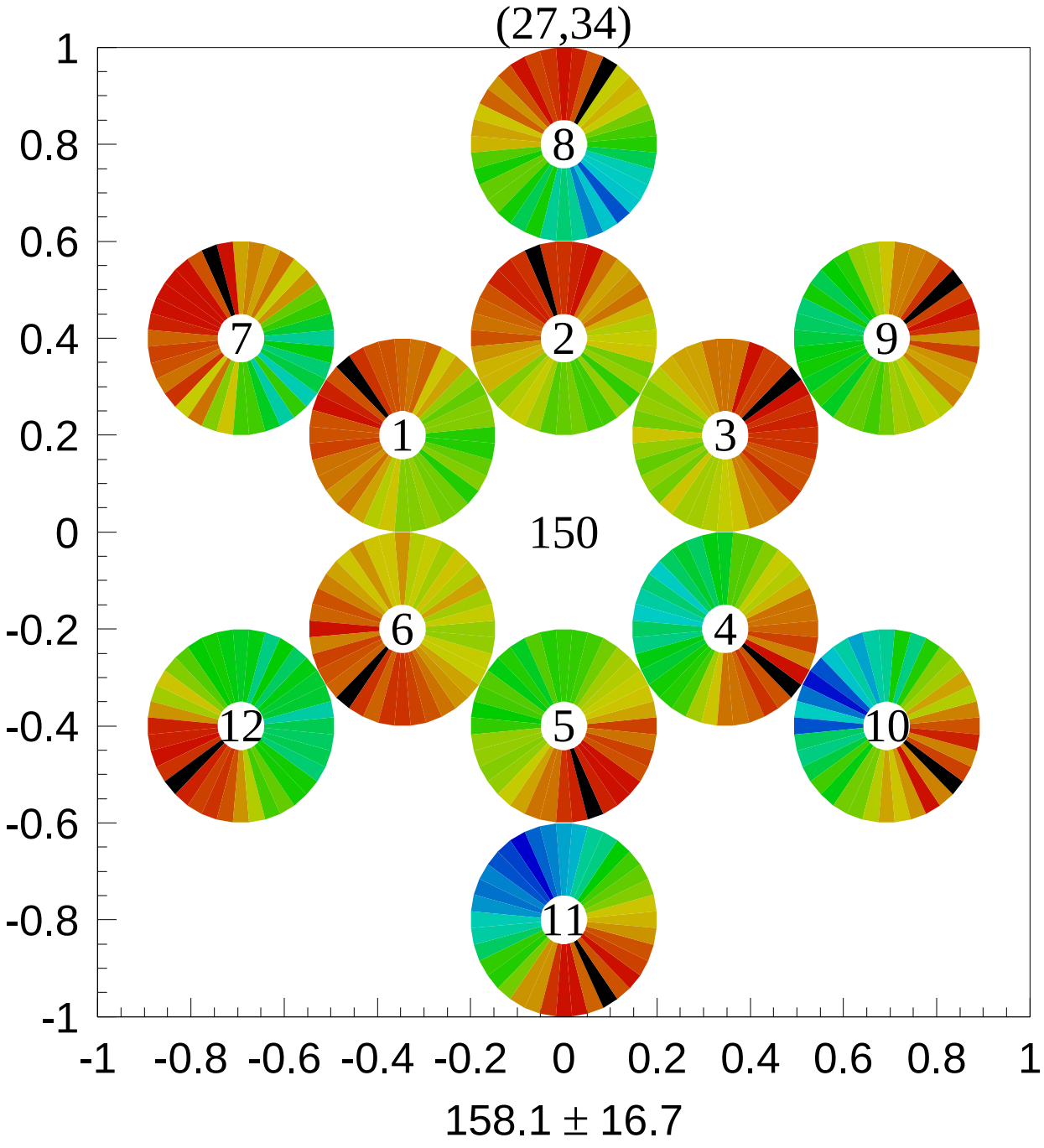

(27,33)
tilted LEDs
122 130 127 123 131 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 134 122 124 122 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

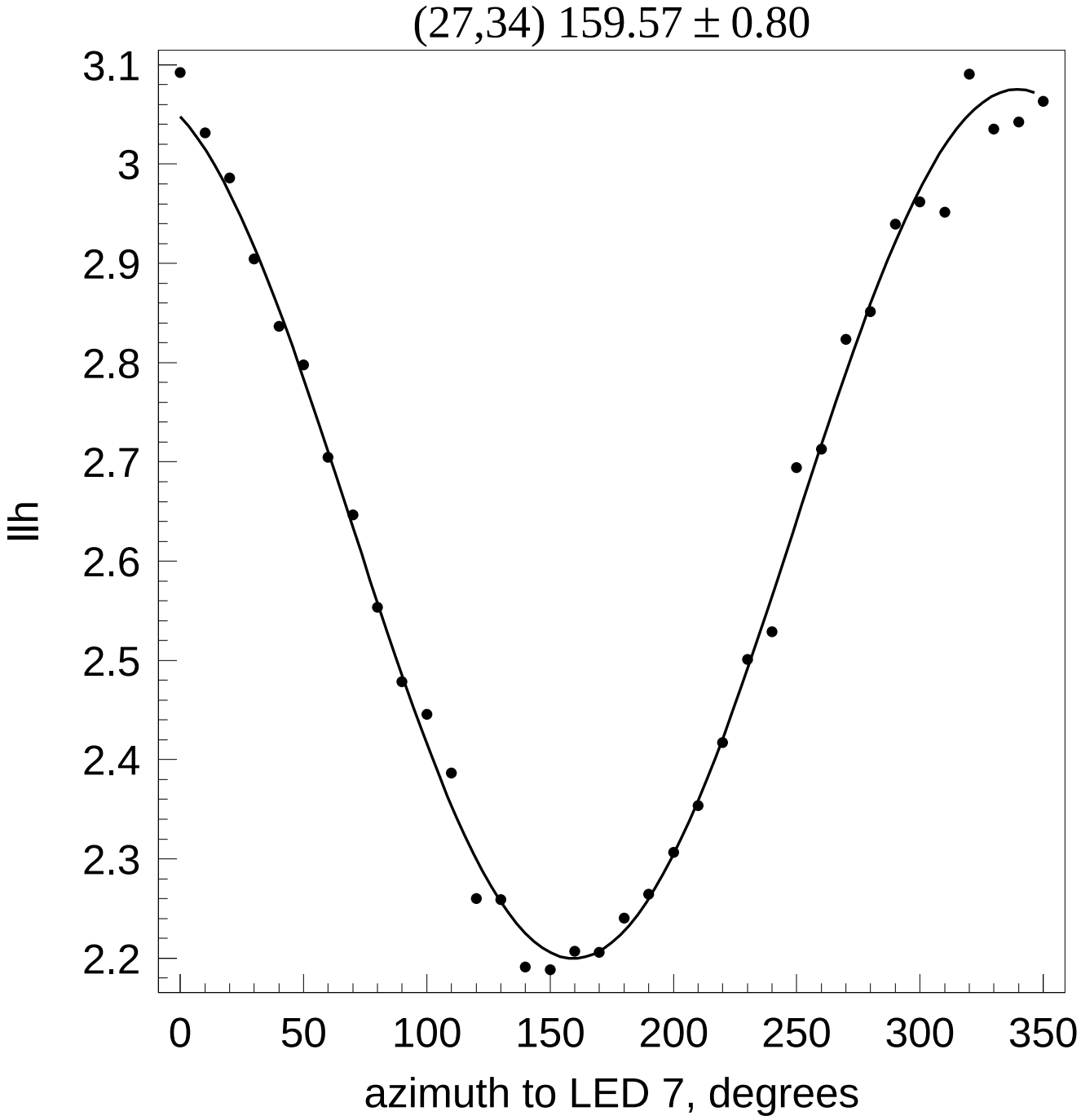

(27,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
182.2 ± 13.3
190
1
2
3
4
5
6
7
8
9
10
11
12

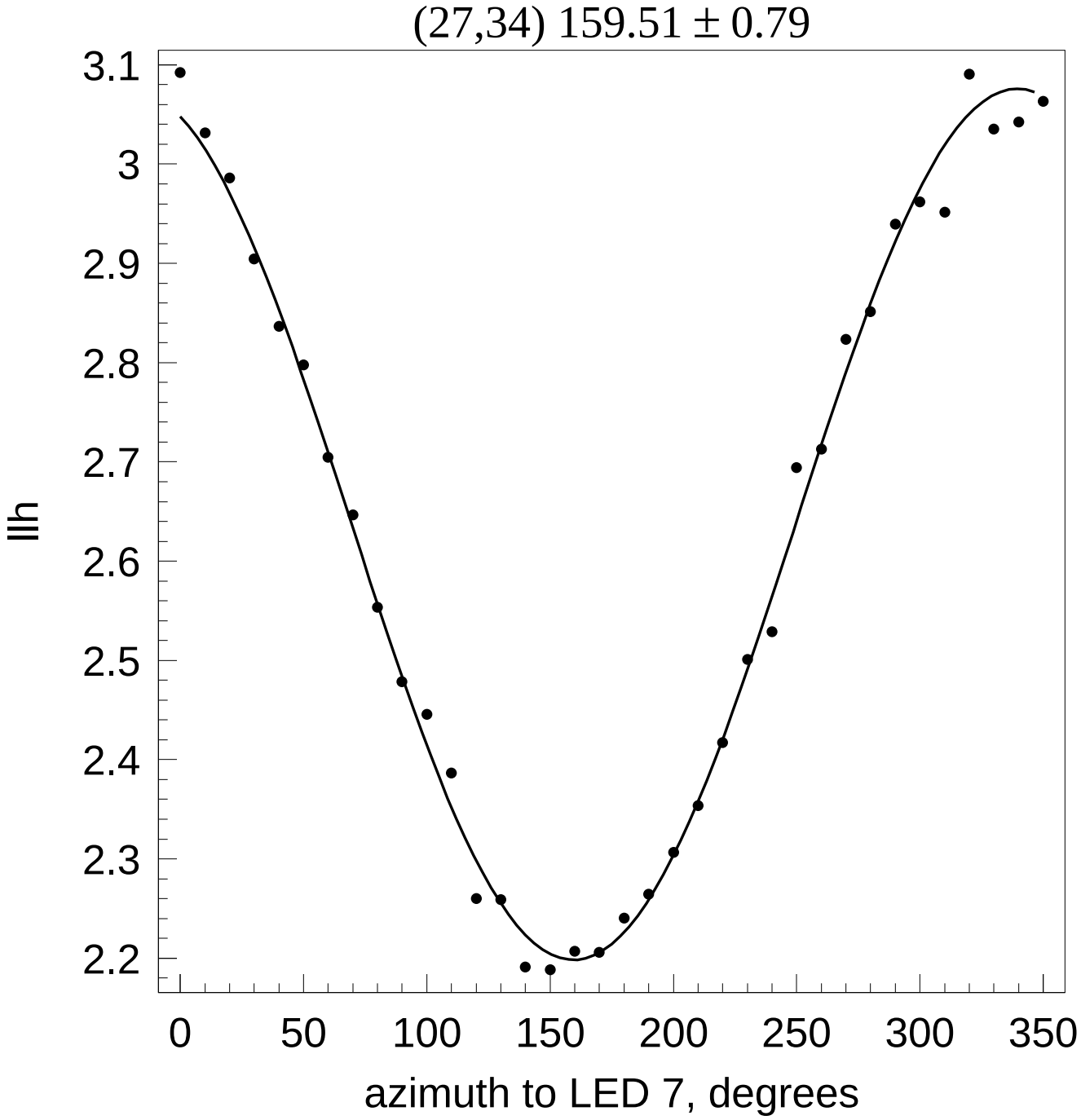

(27,33) 179.25 ± 0.65
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

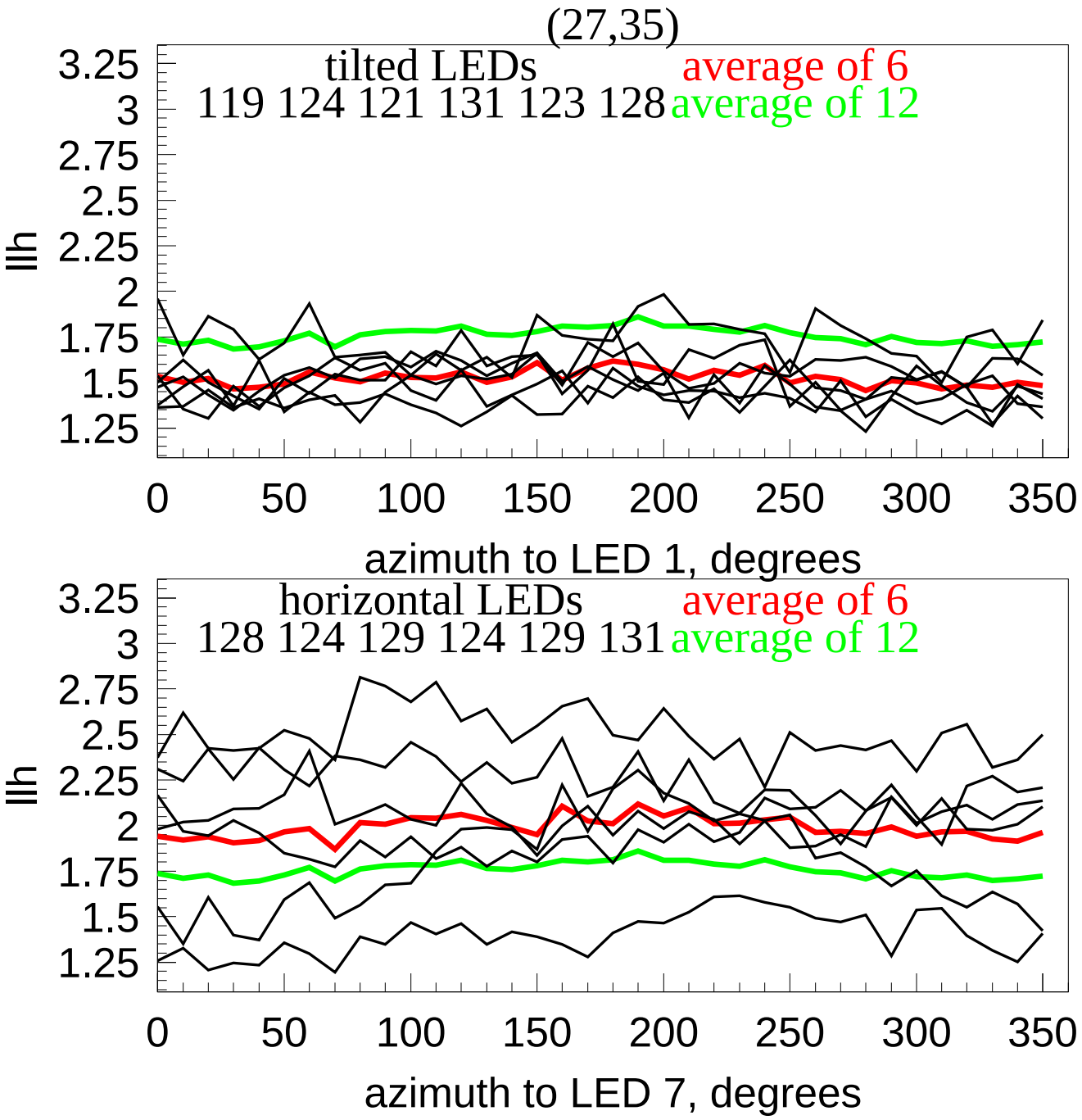

(27,33) 179.48 ± 0.63
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

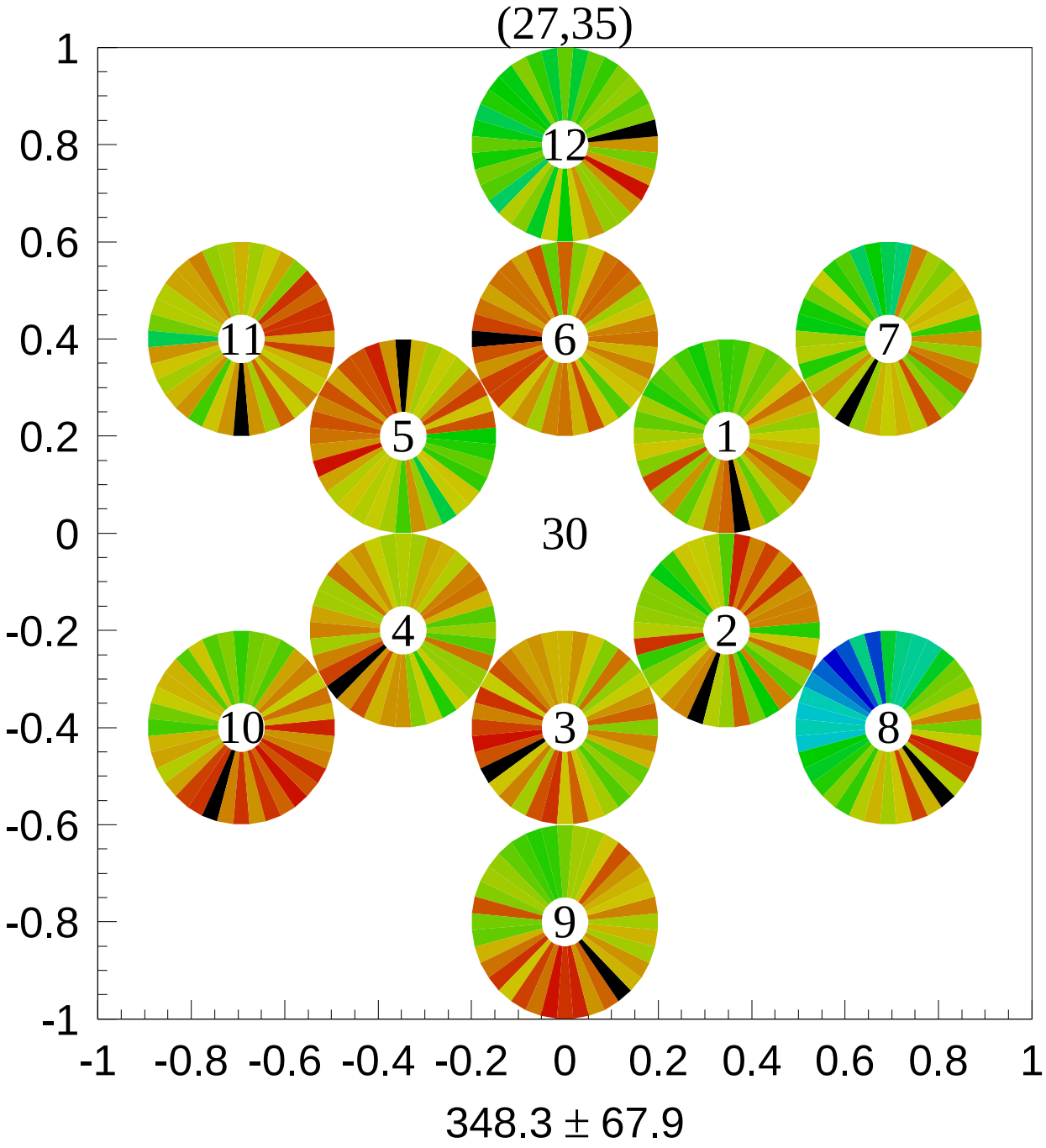

(27,34)
tilted LEDs
128 127 118 124 125 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 133 123 125 129 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

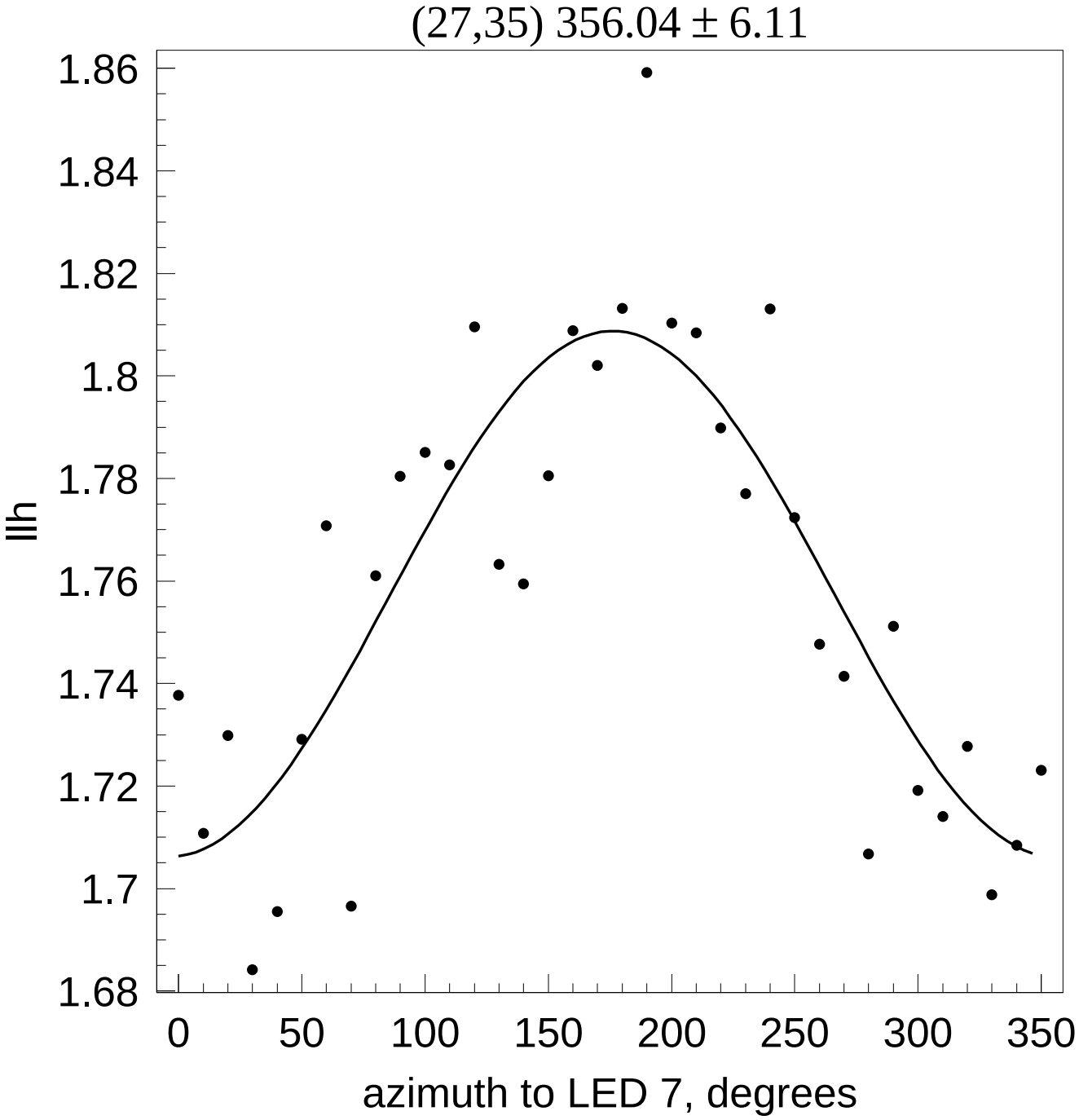

(27,34)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
158.1 ± 16.7

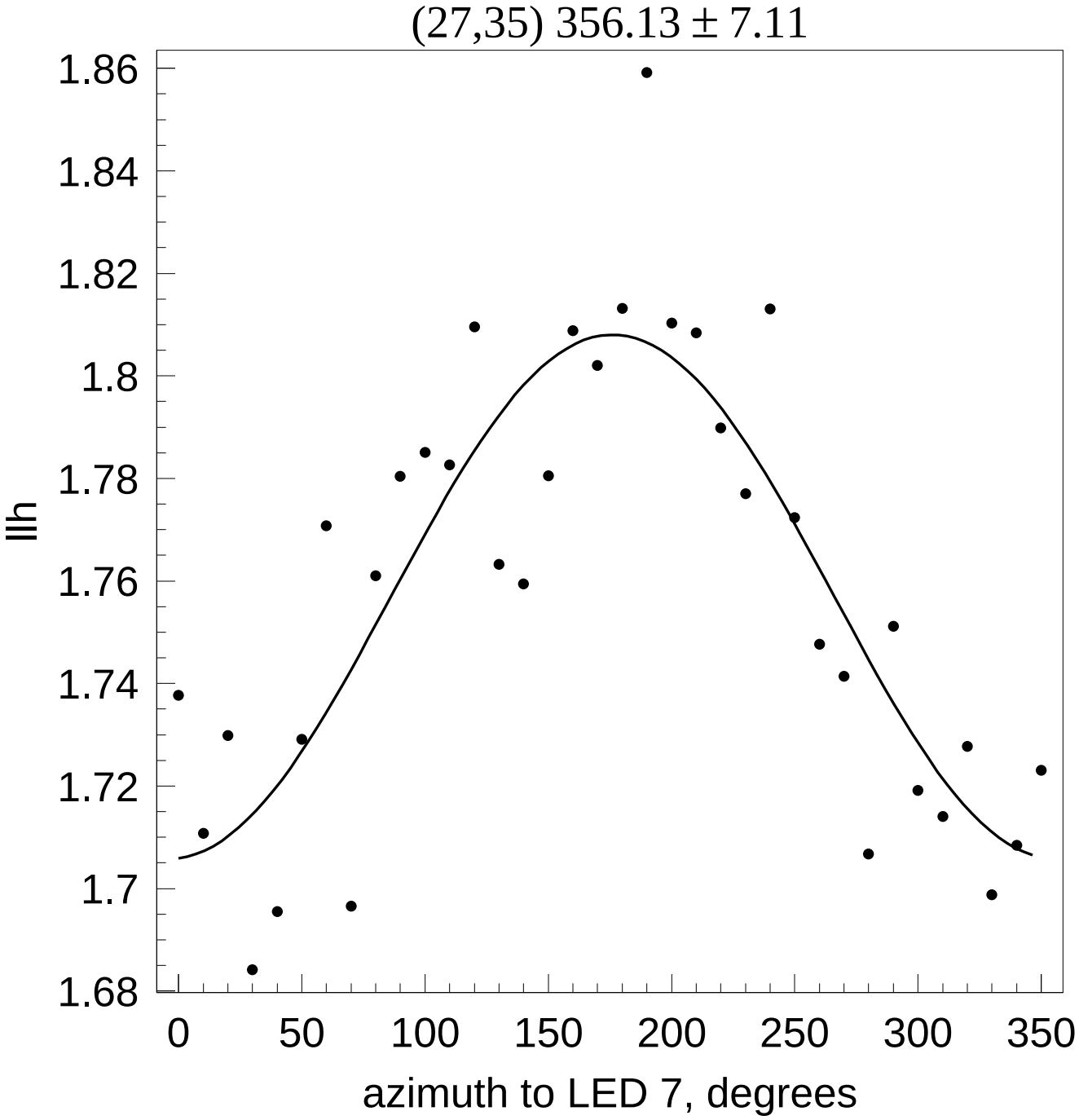

(27,34) 159.57 ± 0.80
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

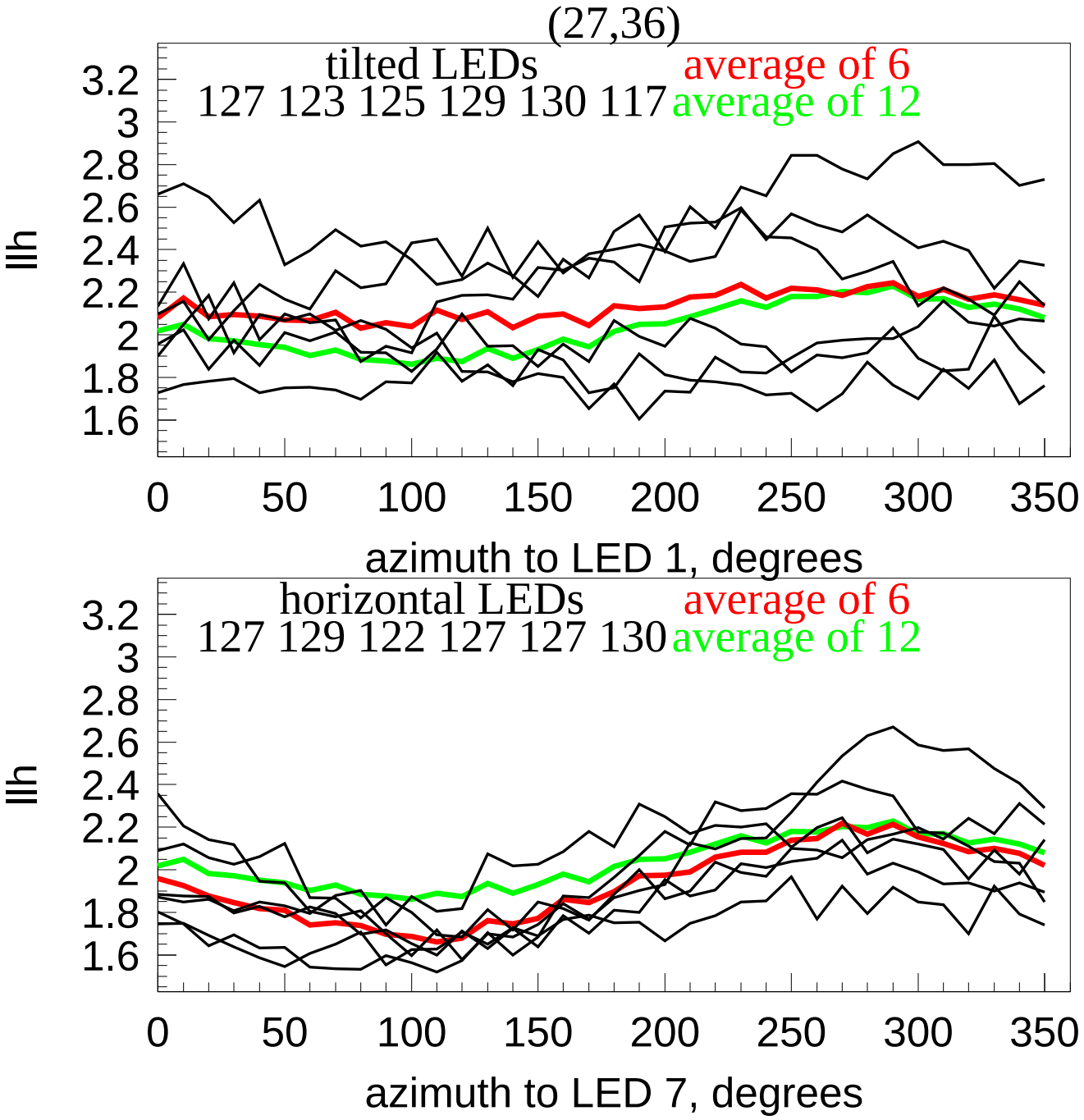

(27,34) 159.51 ± 0.79
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

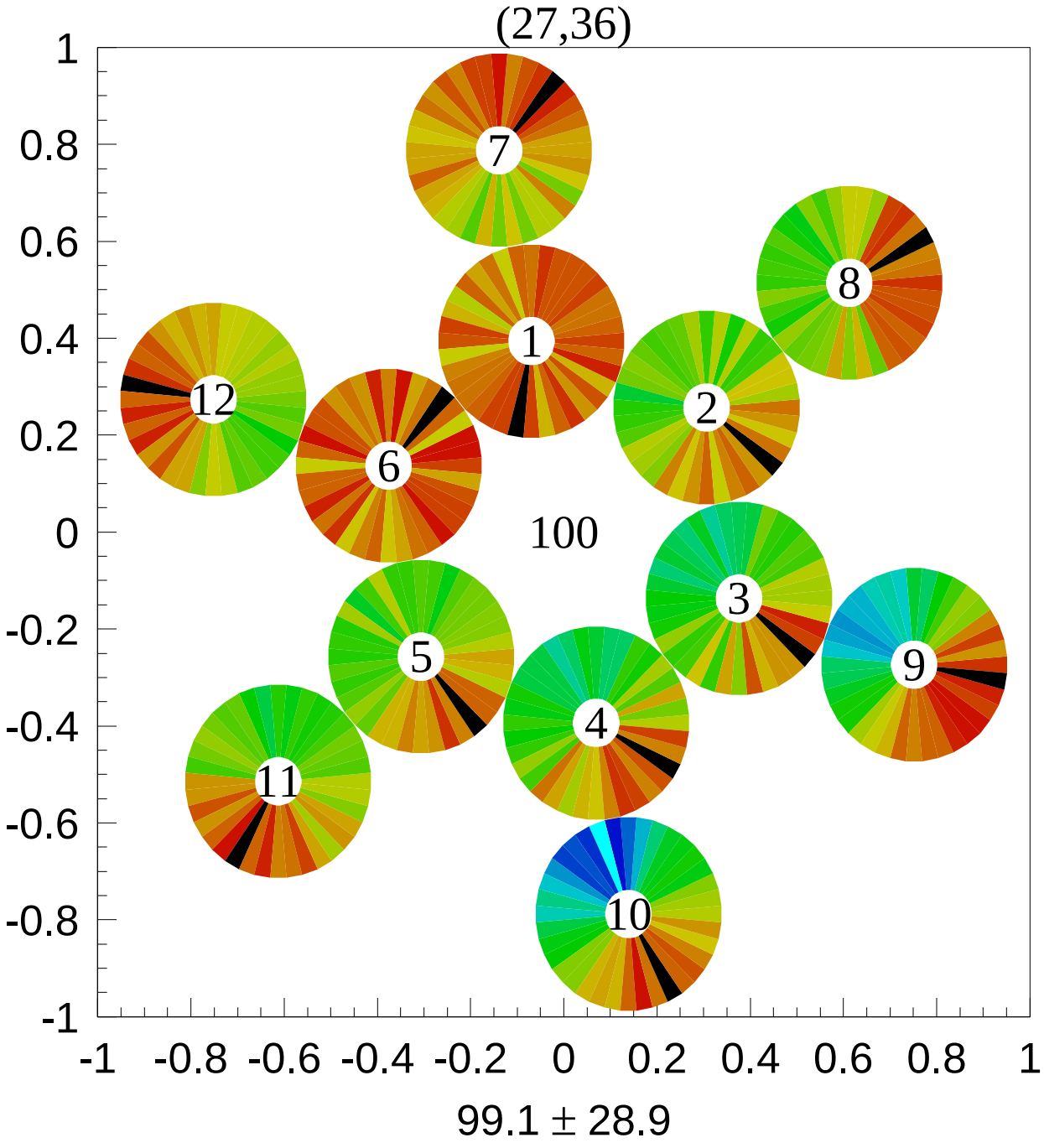

(27,35)
tilted LEDs
119 124 121 131 123 128
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 124 129 124 129 131
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

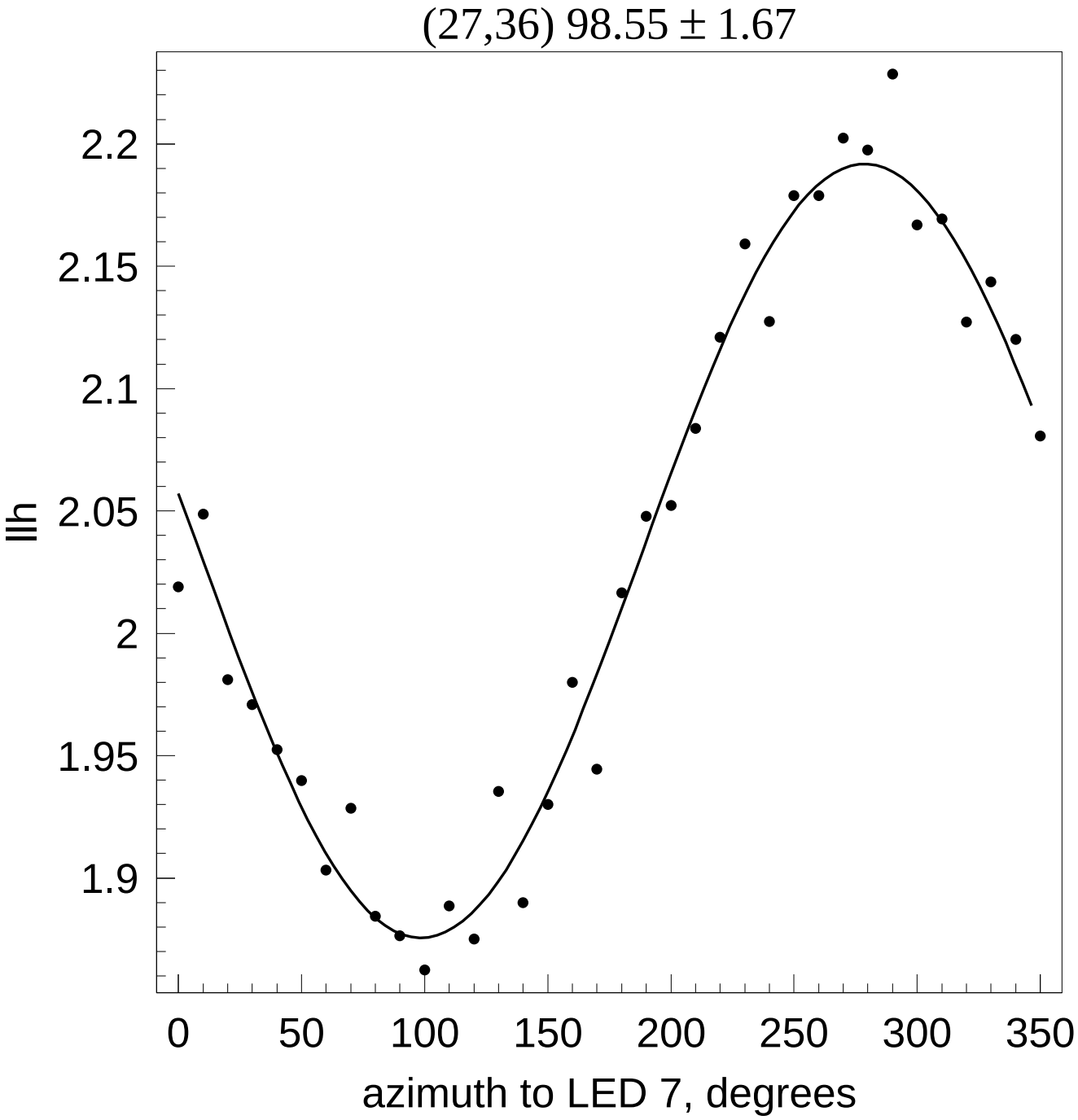

(27,35)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
348.3 ± 67.9

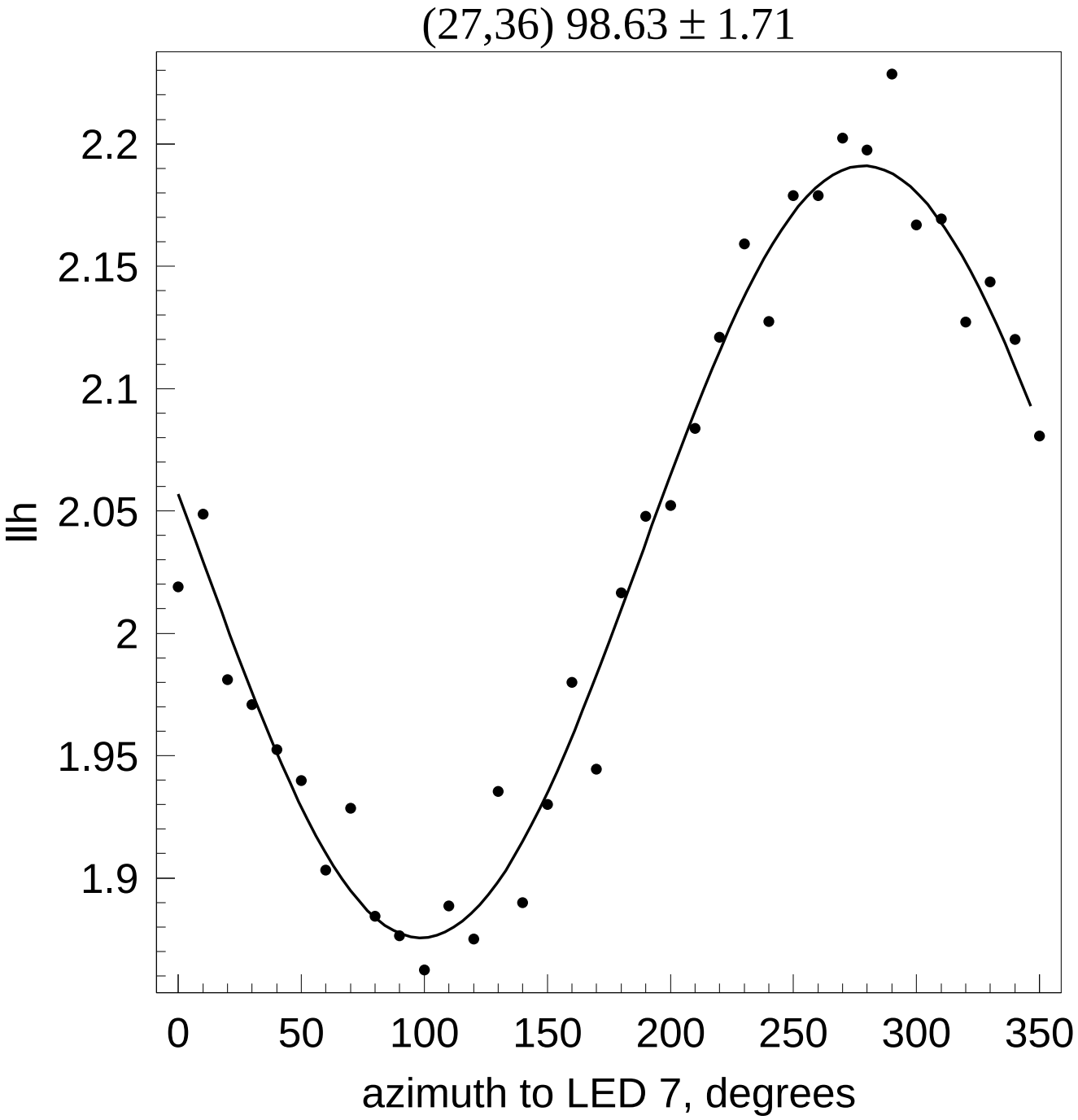

(27,35) 356.04 ± 6.11
1.86
1.84
1.82
1.8
1.78
1.76
1.74
1.72
1.7
1.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

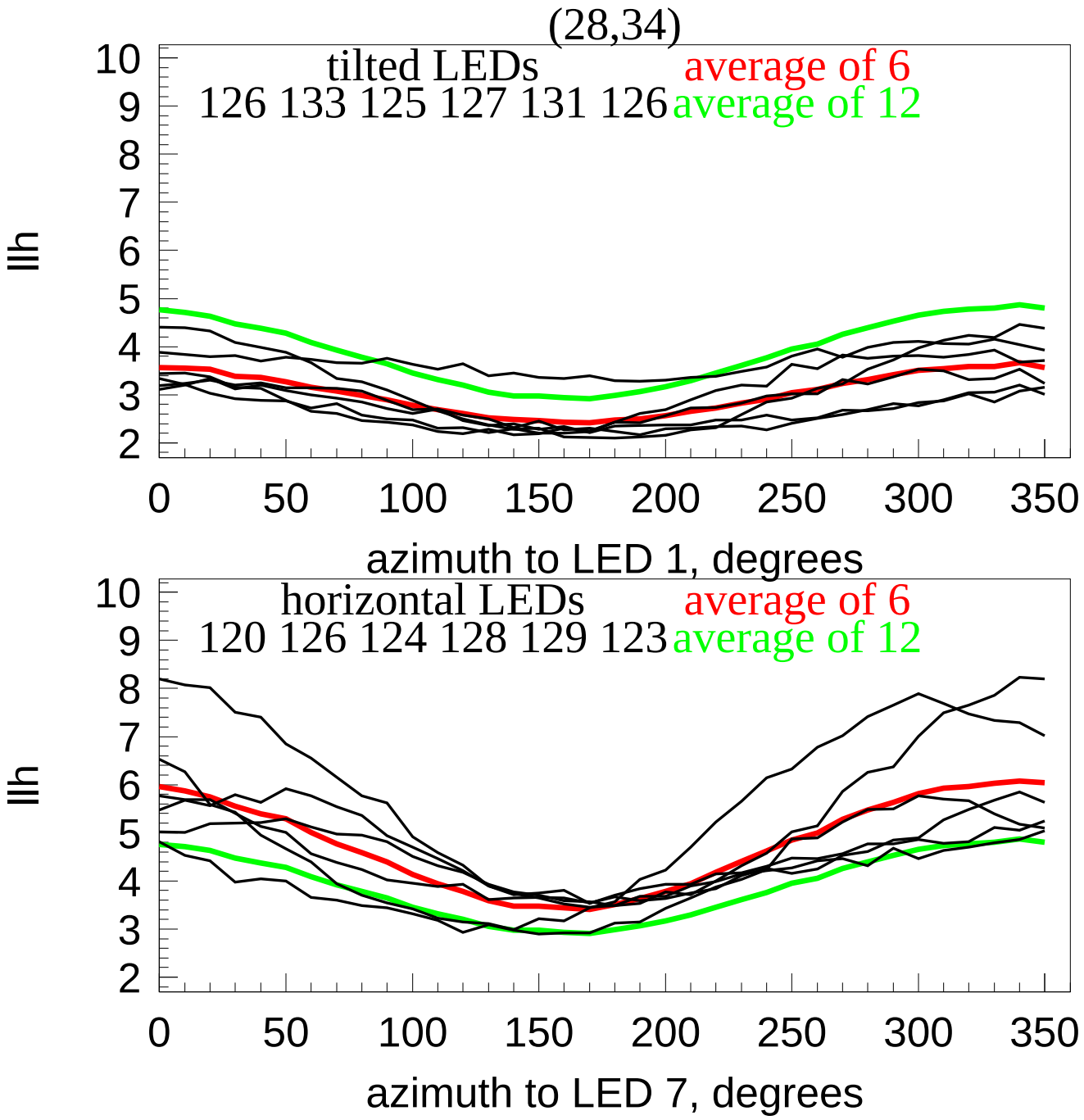

(27,35) 356.13 ± 7.11
1.86
1.84
1.82
1.8
1.78
1.76
1.74
1.72
1.7
1.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

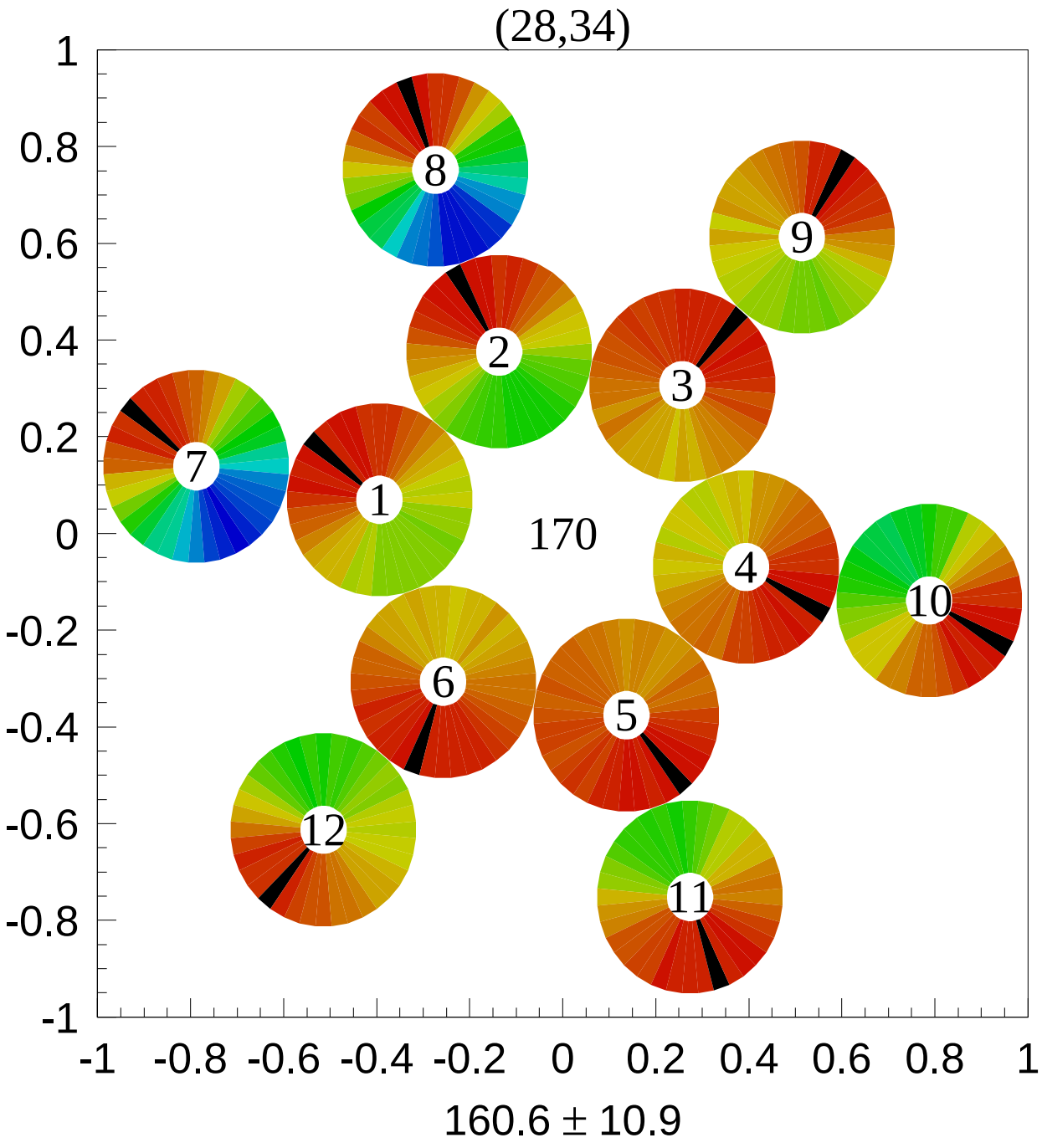

(27,36)
tilted LEDs
127 123 125 129 130 117
average of 6
average of 12
Ilh
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 129 122 127 127 130
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

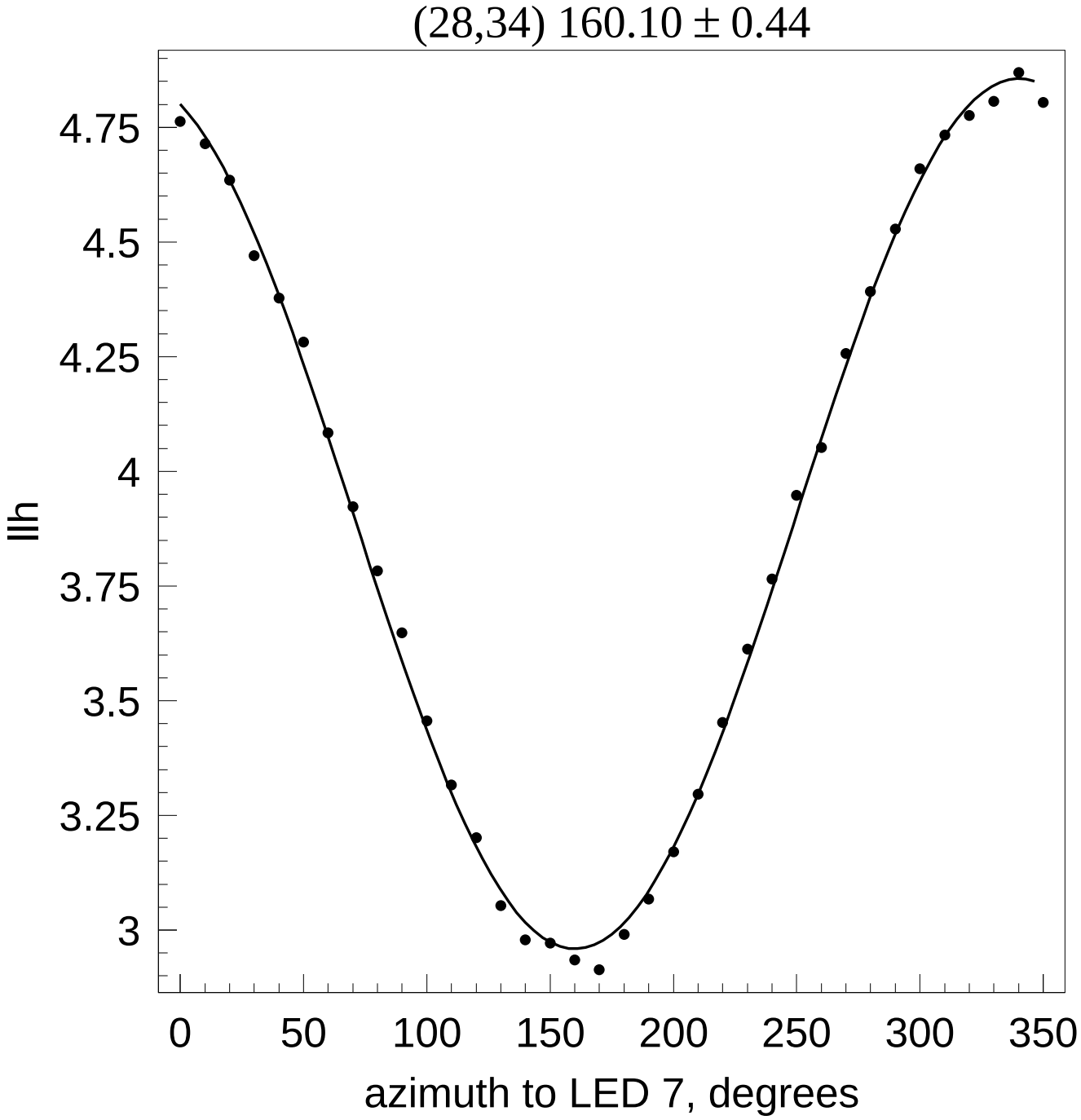

(27,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
99.1 ± 28.9

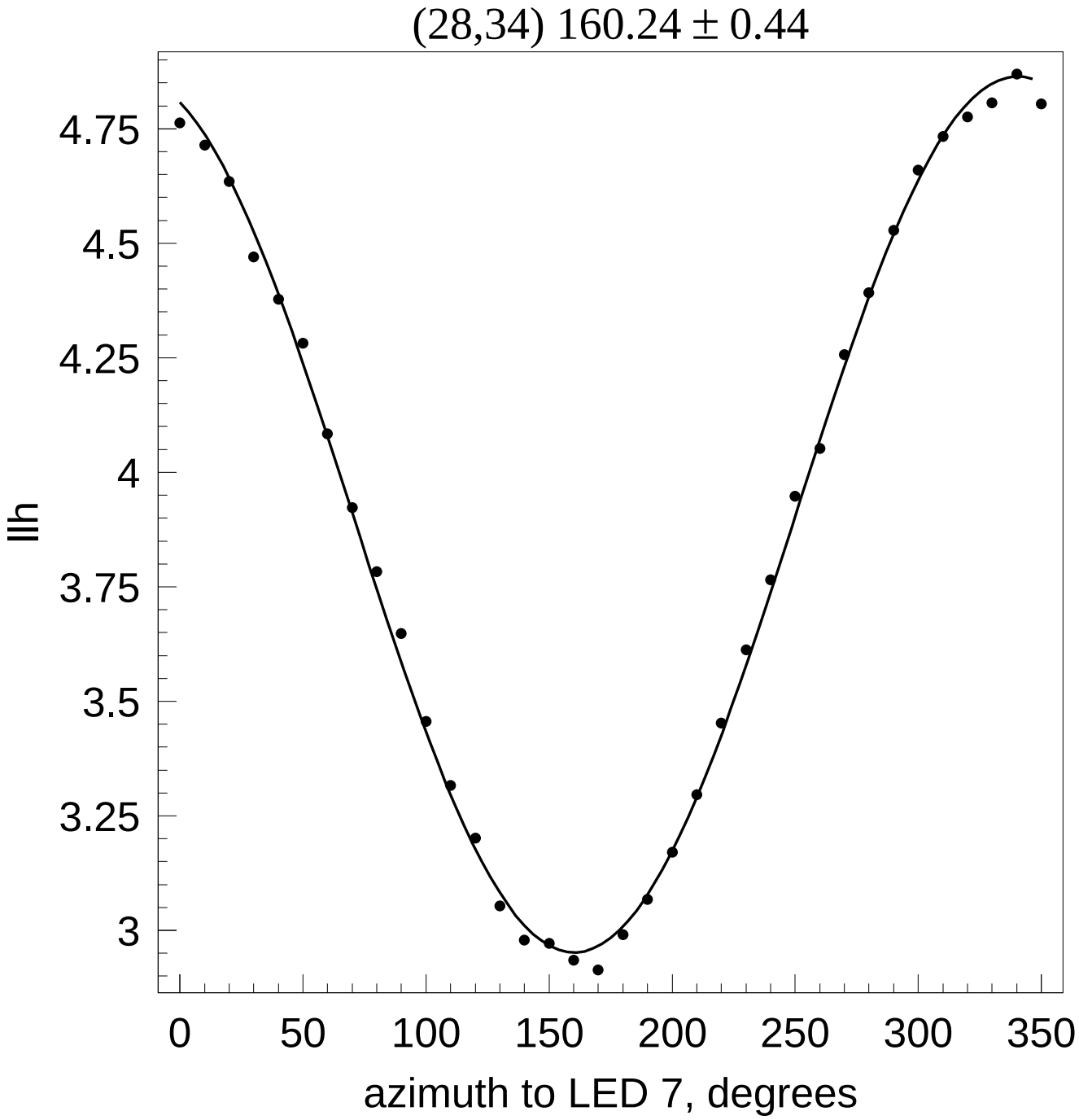

(27,36) 98.55 ± 1.67
2.2
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

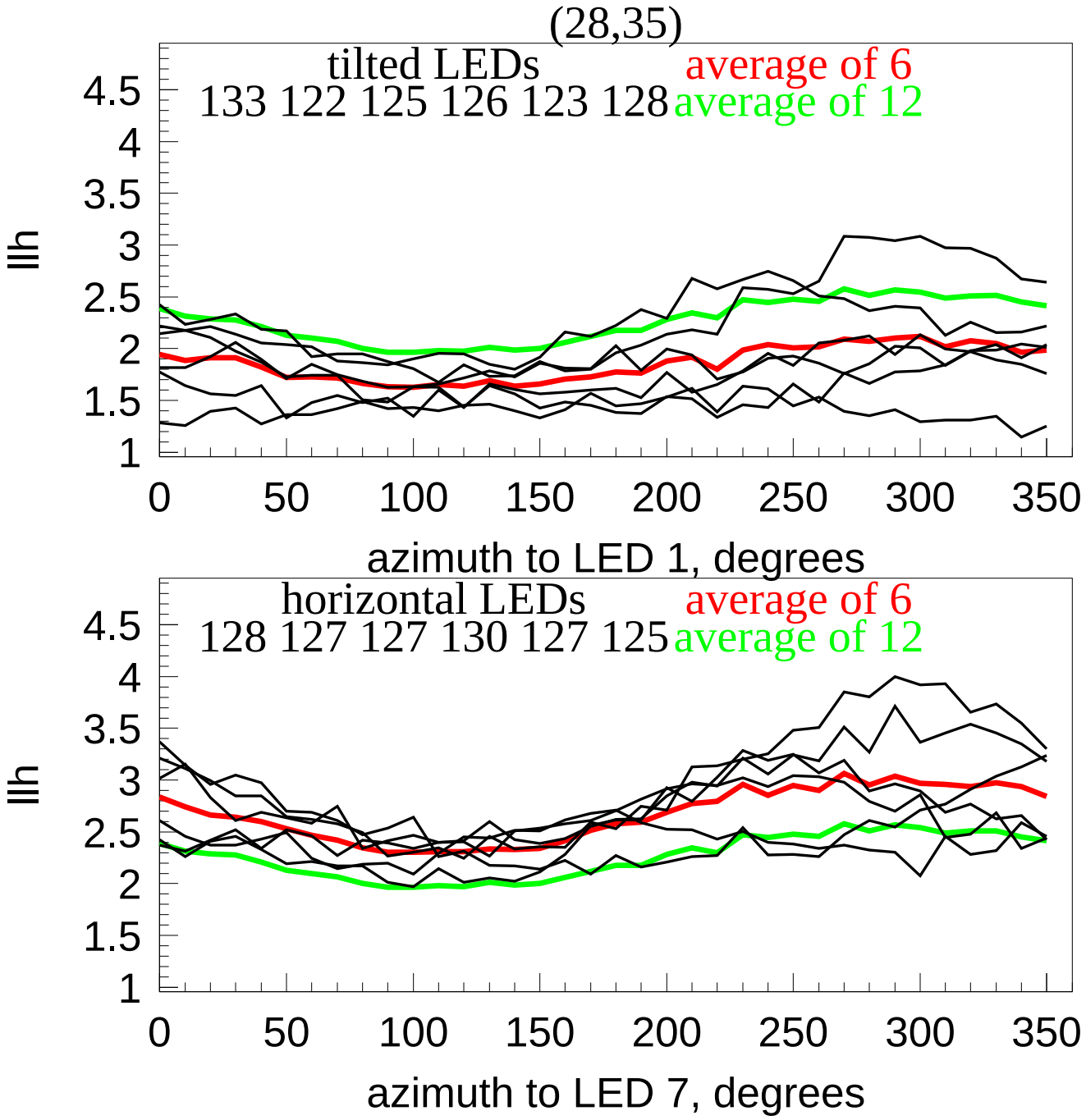

(27,36) 98.63 ± 1.71
2.2
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

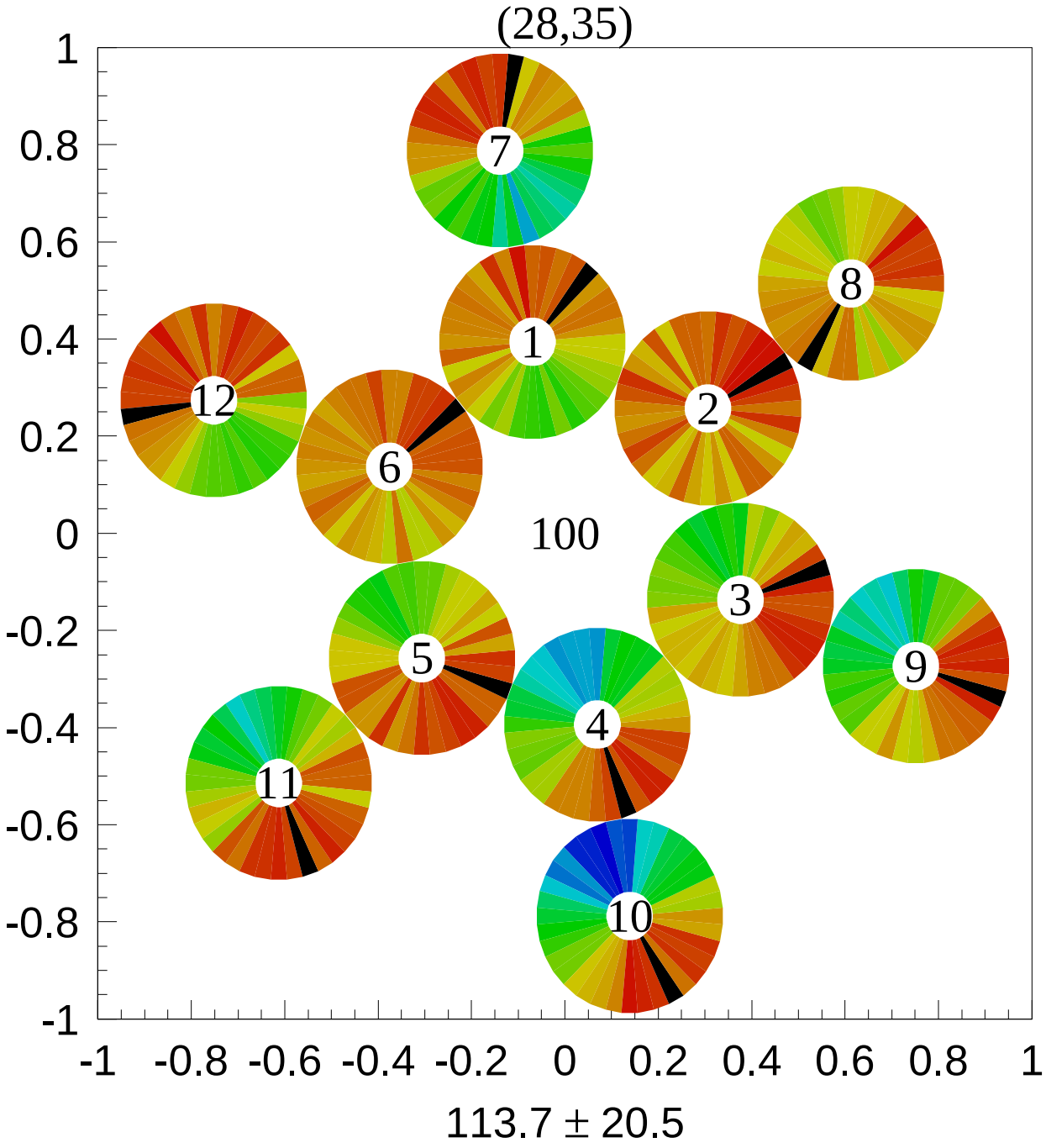

(28,34)
tilted LEDs
126 133 125 127 131 126
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
120 126 124 128 129 123
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

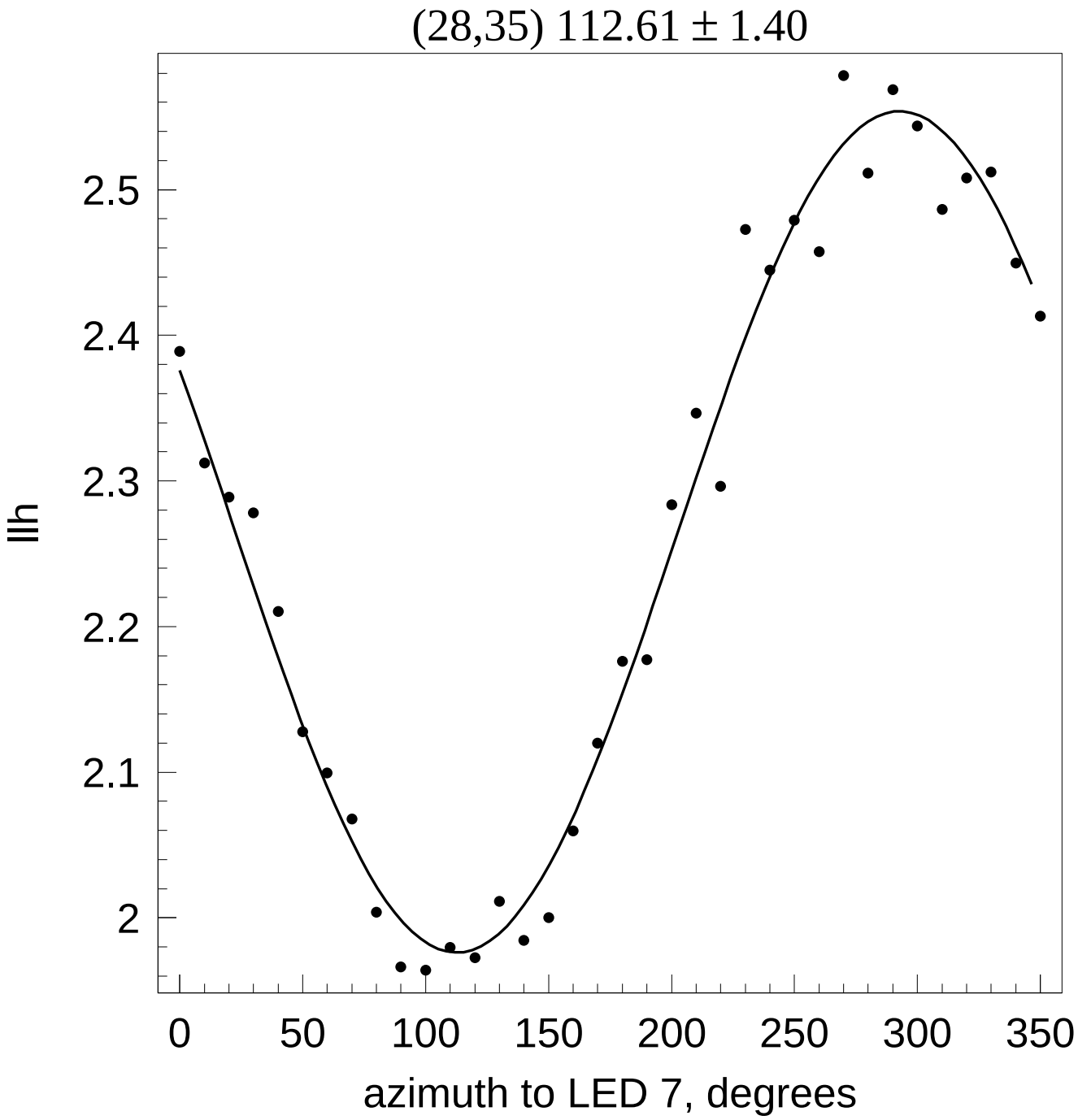

(28,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
160.6 ± 10.9

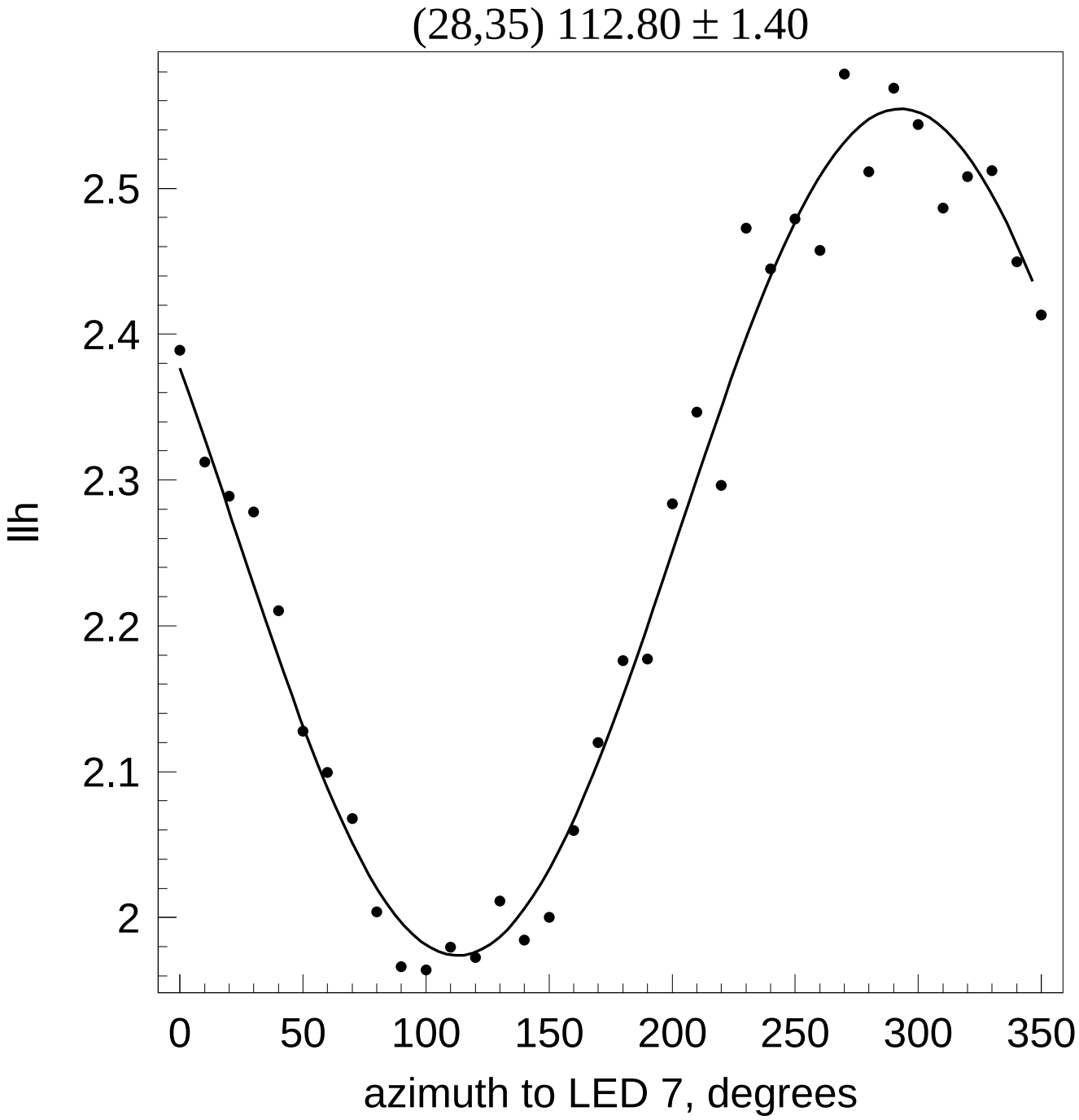

(28,34) 160.10 ± 0.44
4.75
4.5
4.25
4
3.75
3.5
3.25
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

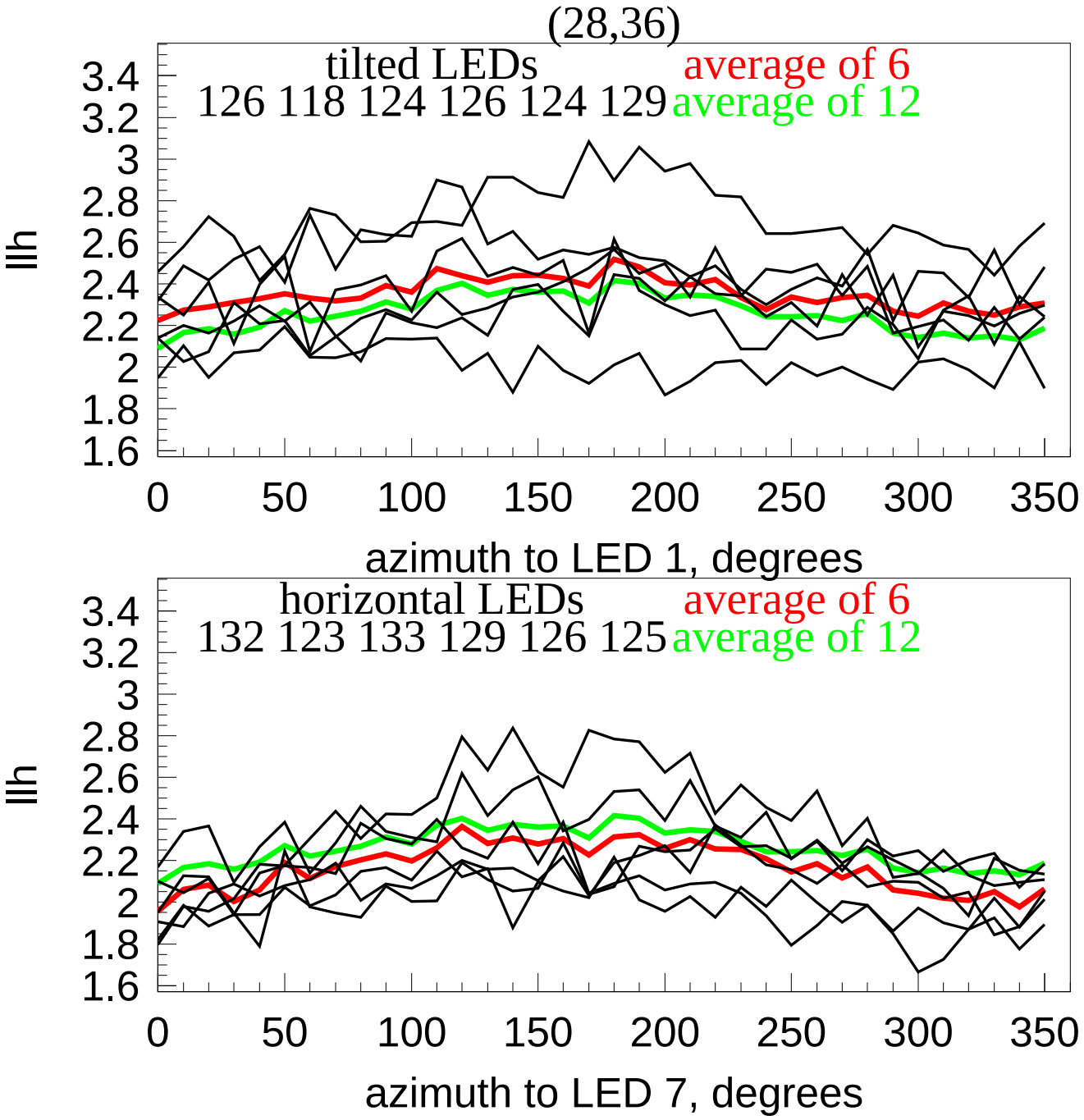

(28,34) 160.24 ± 0.44
4.75
4.5
4.25
4
3.75
3.5
3.25
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

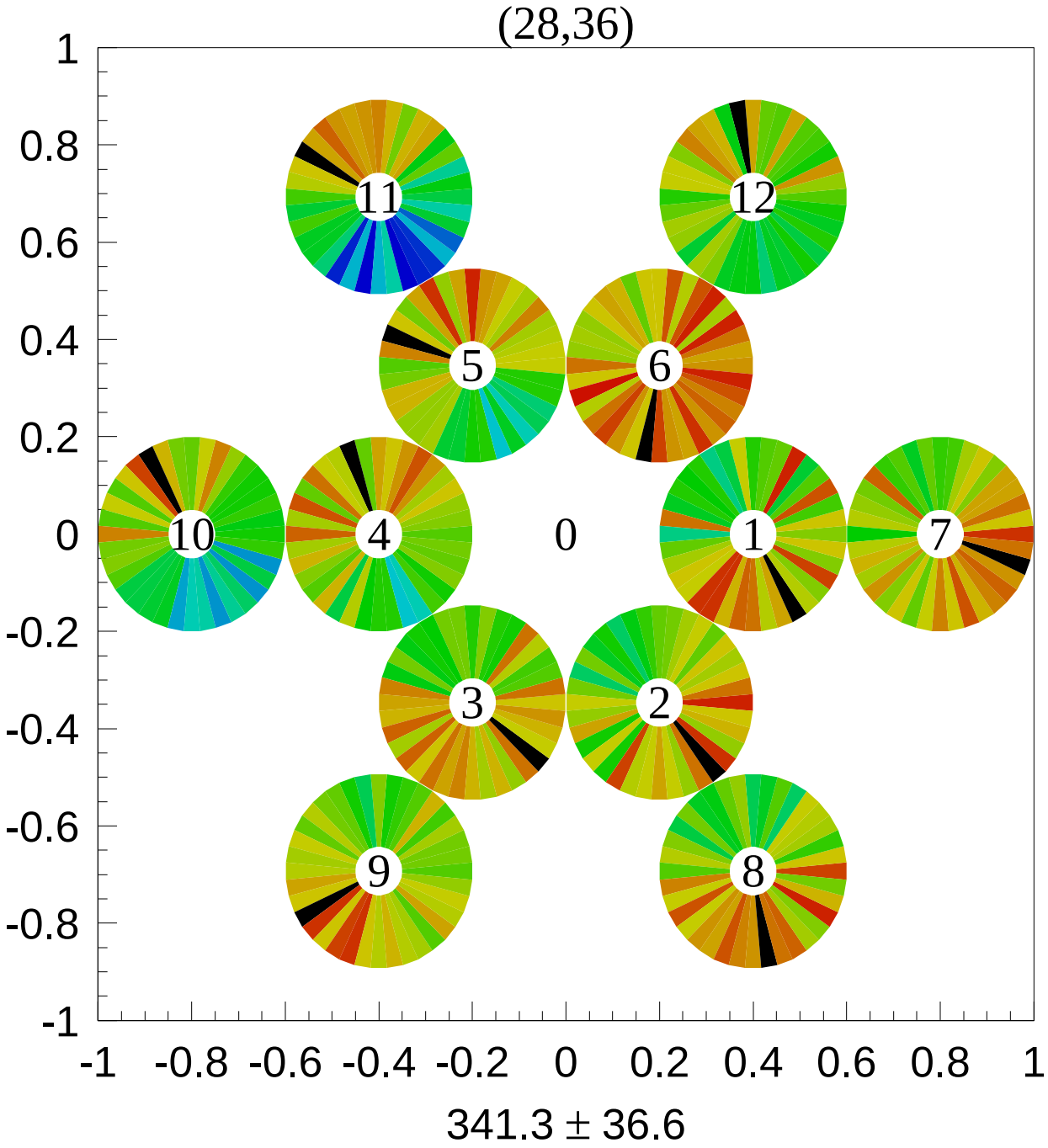

(28,35)
tilted LEDs
133 122 125 126 123 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 127 127 130 127 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

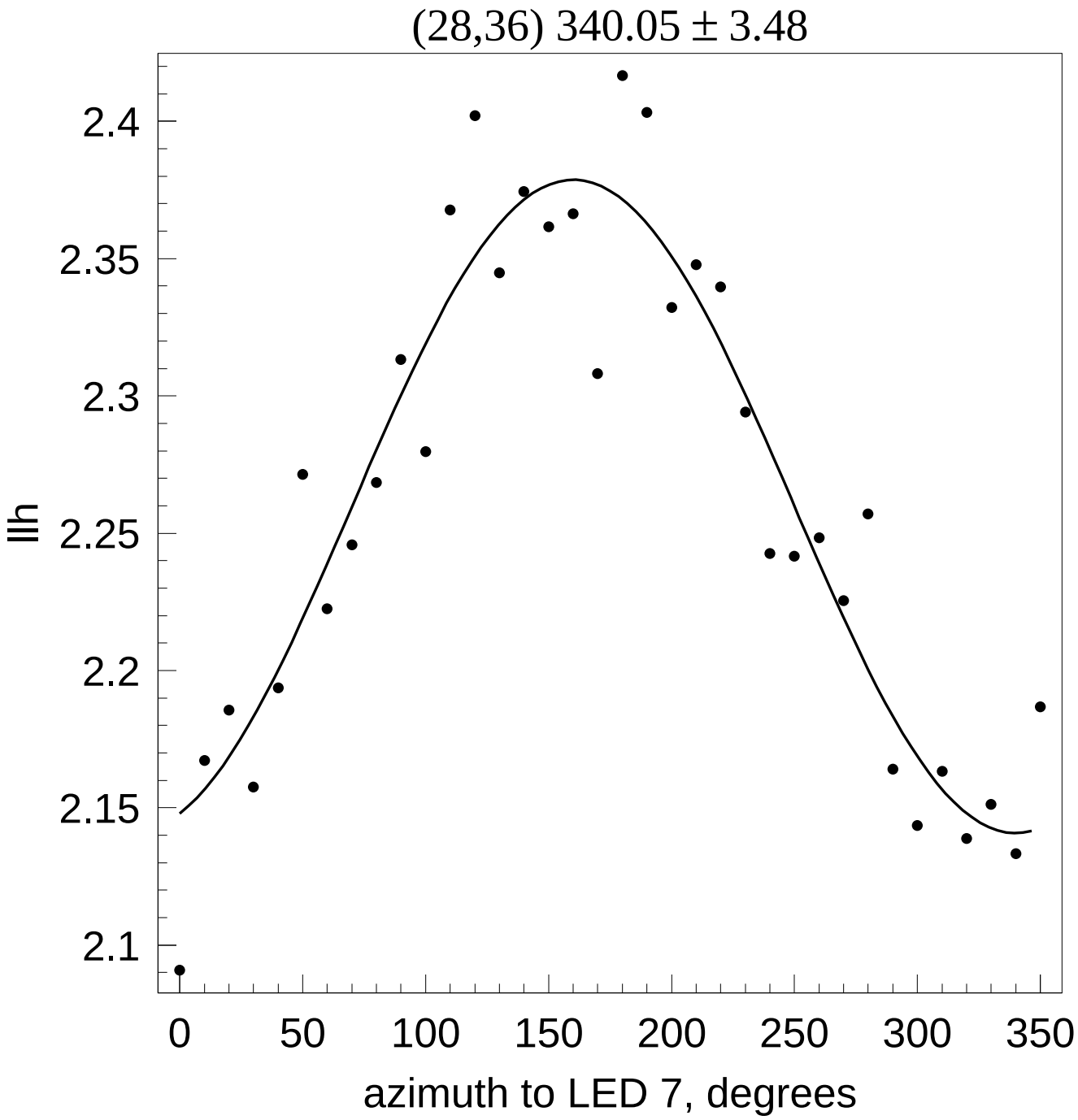

(28,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
113.7 ± 20.5

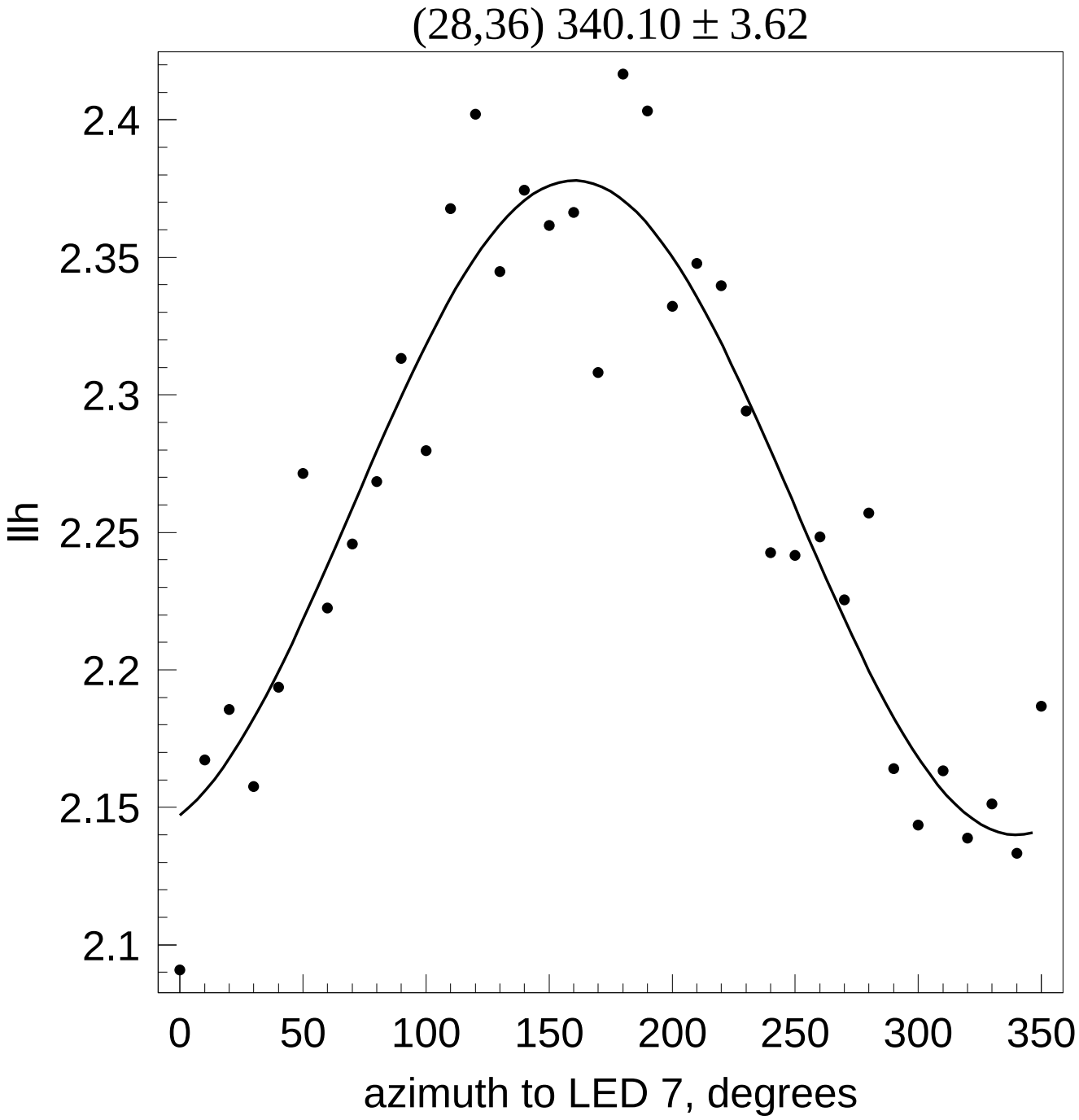

(28,35) 112.61 ± 1.40
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

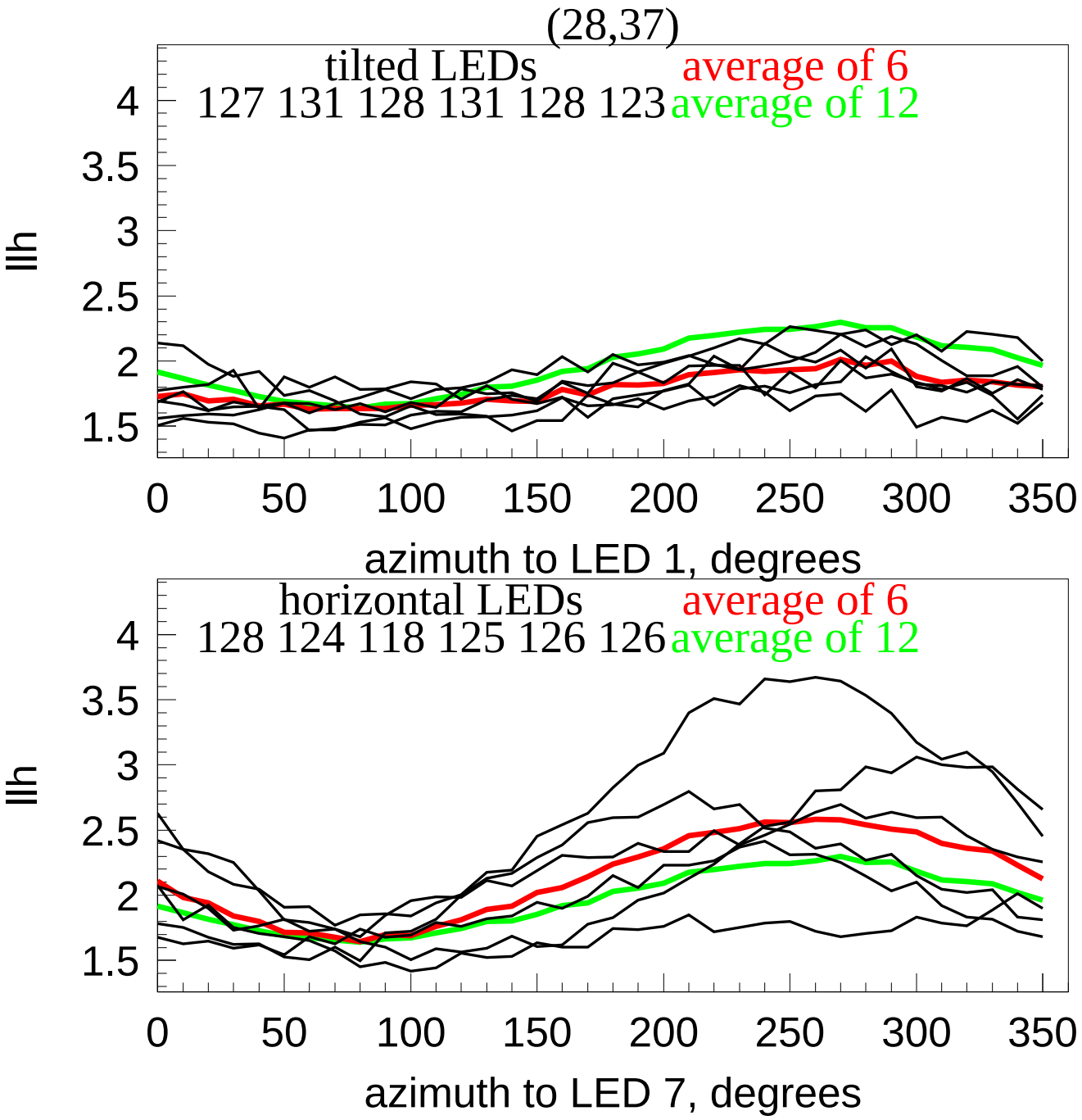

(28,35) 112.80 ± 1.40
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

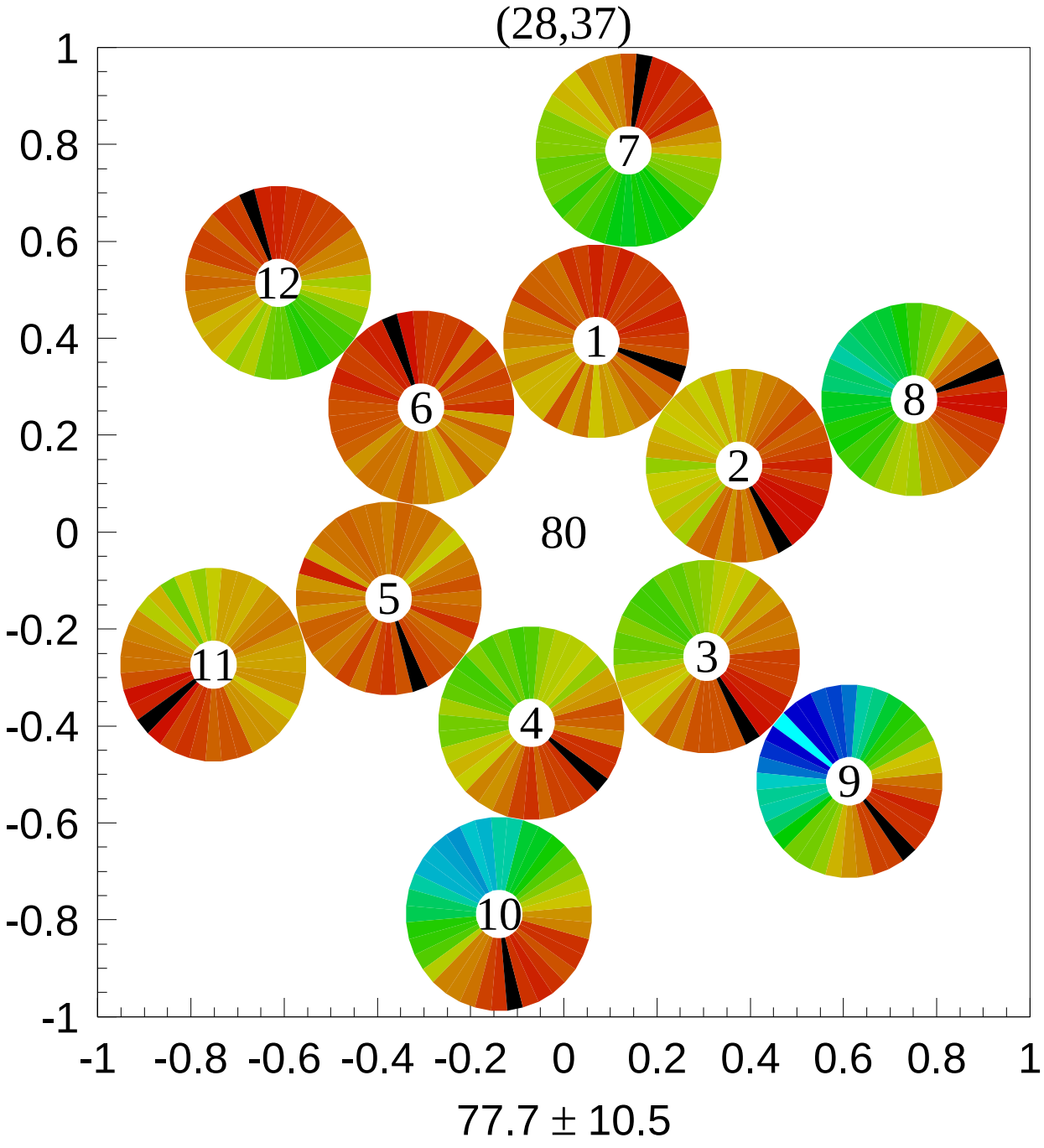

(28,36)
tilted LEDs
126 118 124 126 124 129
average of 6
average of 12
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 123 133 129 126 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

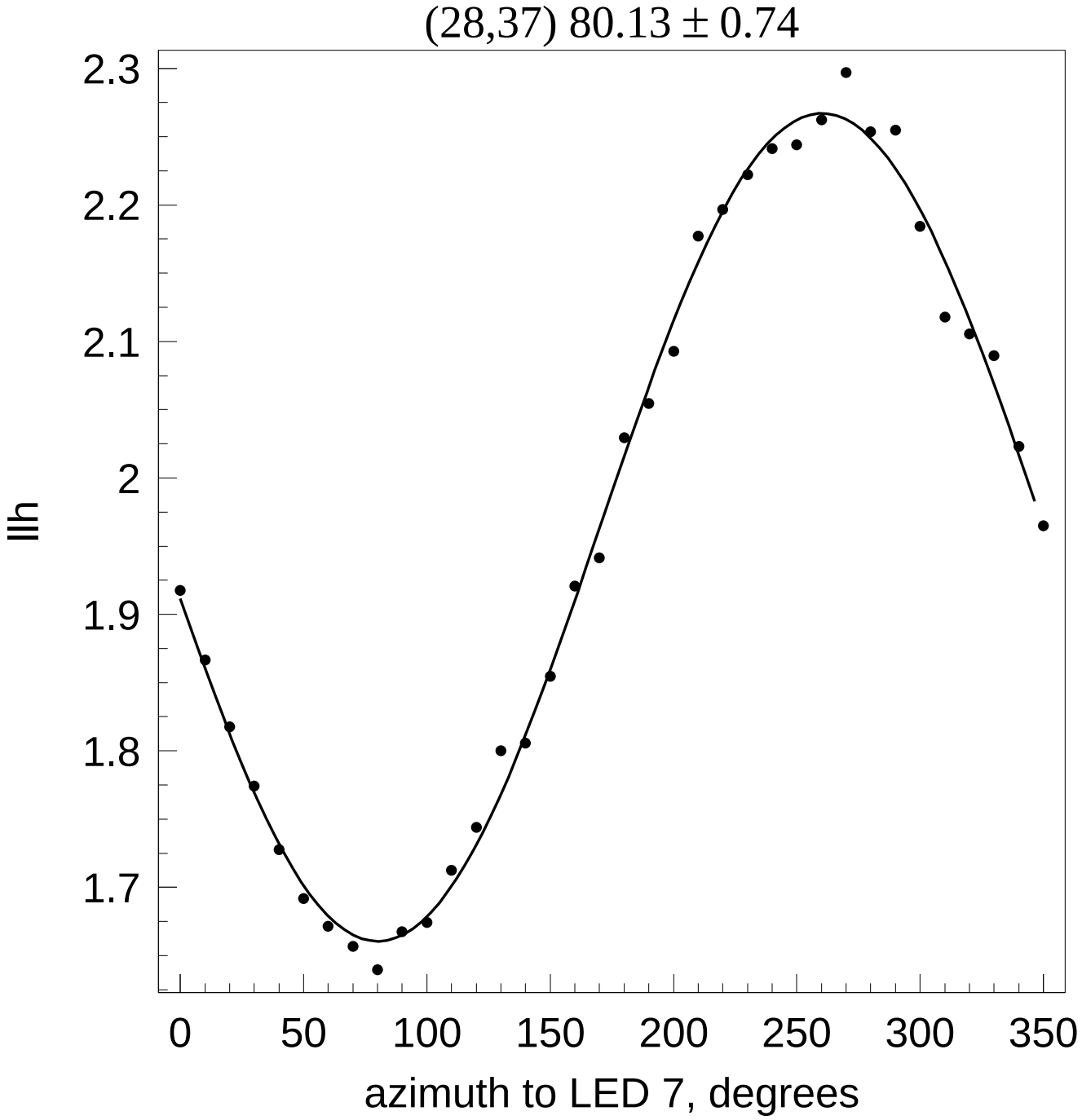

(28,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
341.3 ± 36.6

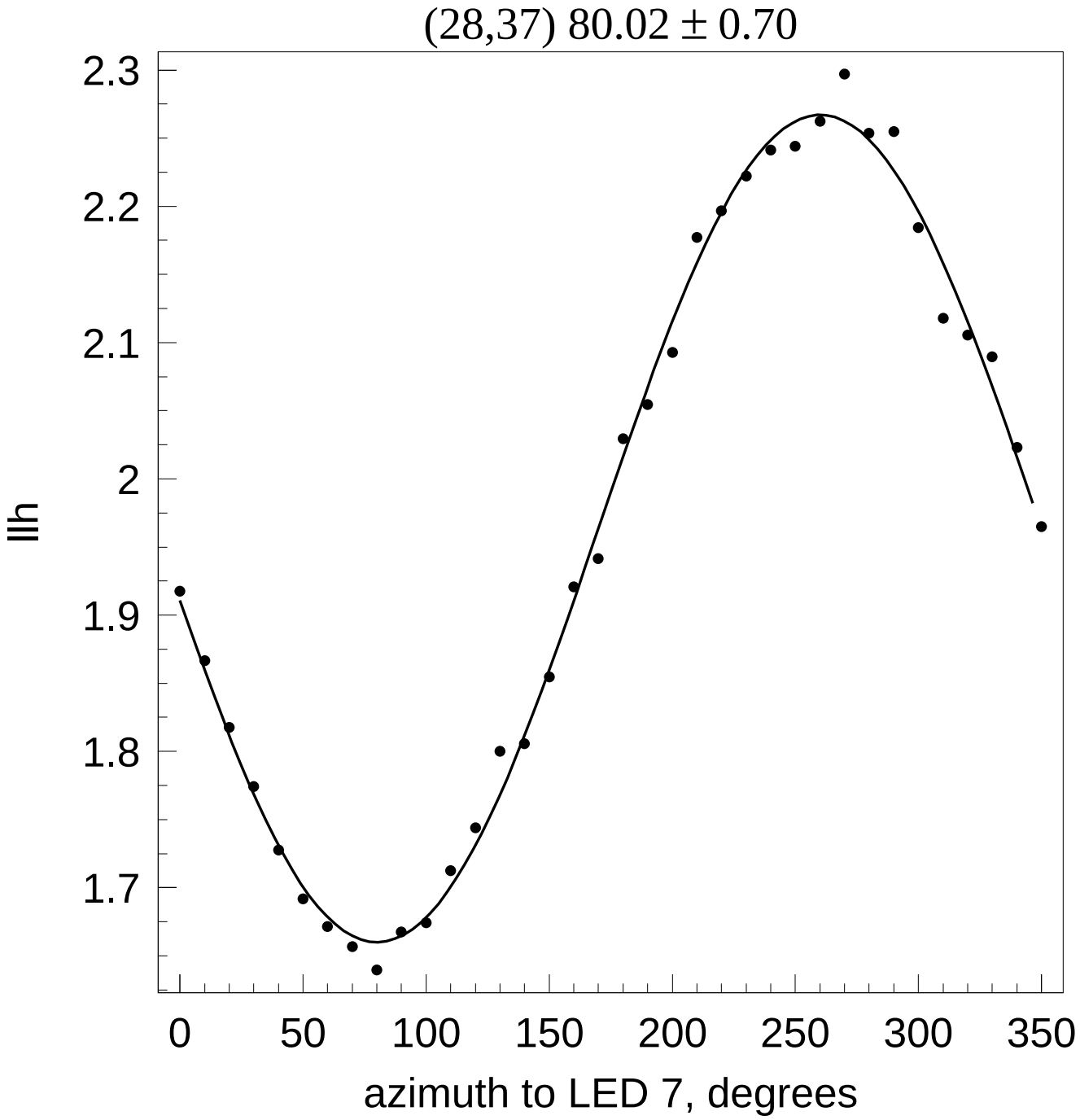

(28,36) 340.05 ± 3.48
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

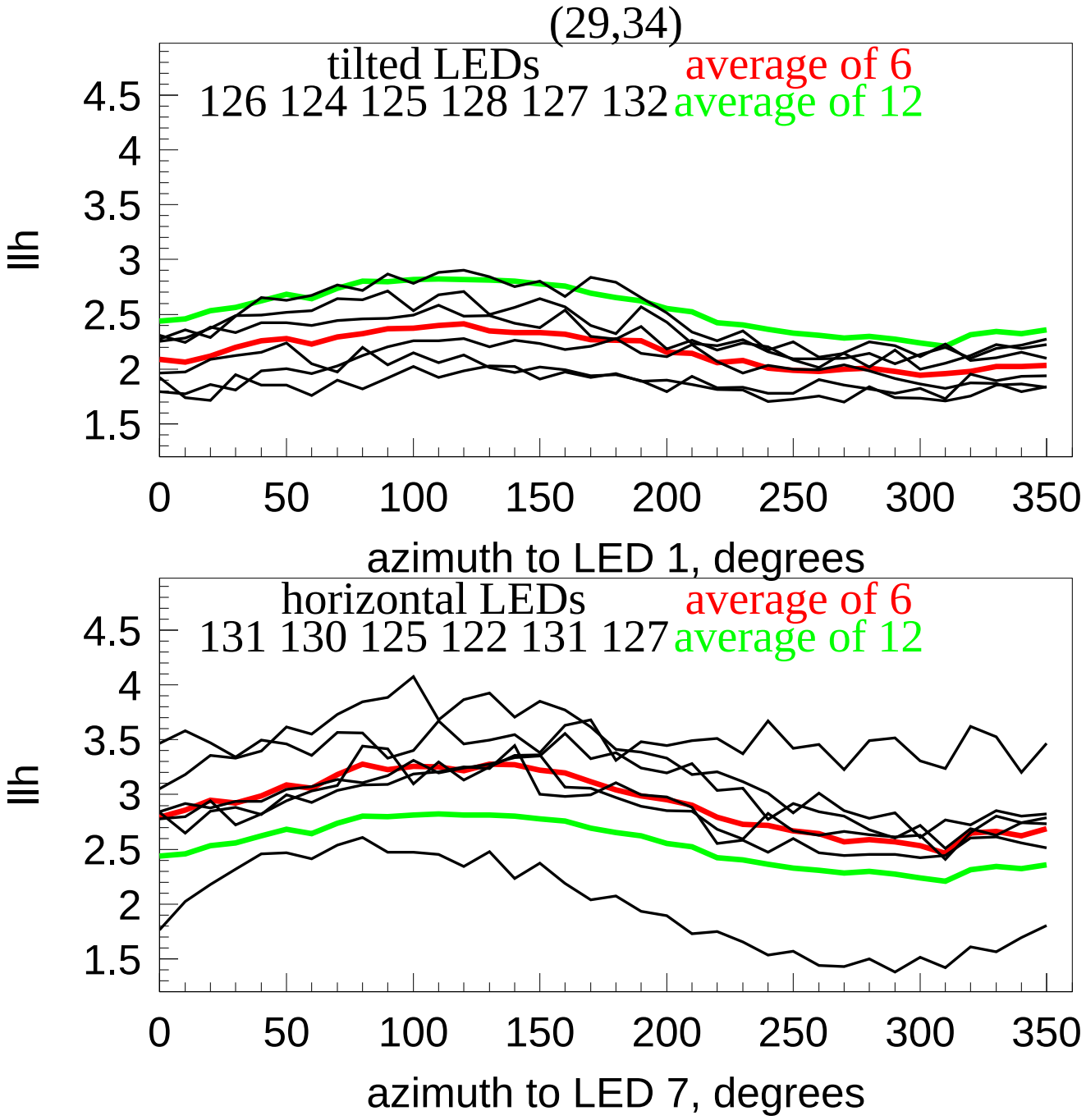

(28,36) 340.10 ± 3.62
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

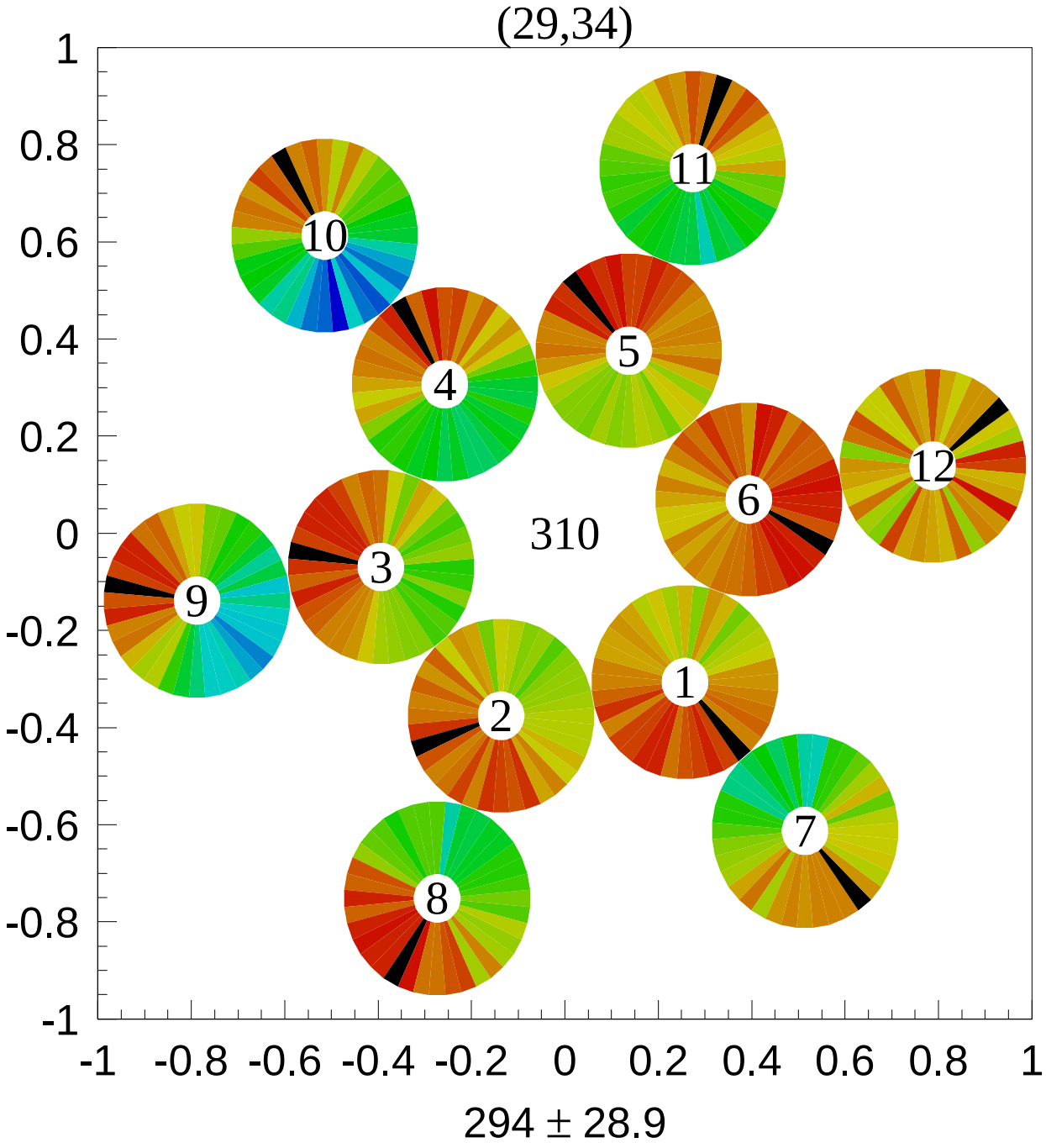

(28,37)
tilted LEDs
127 131 128 131 128 123
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 124 118 125 126 126
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

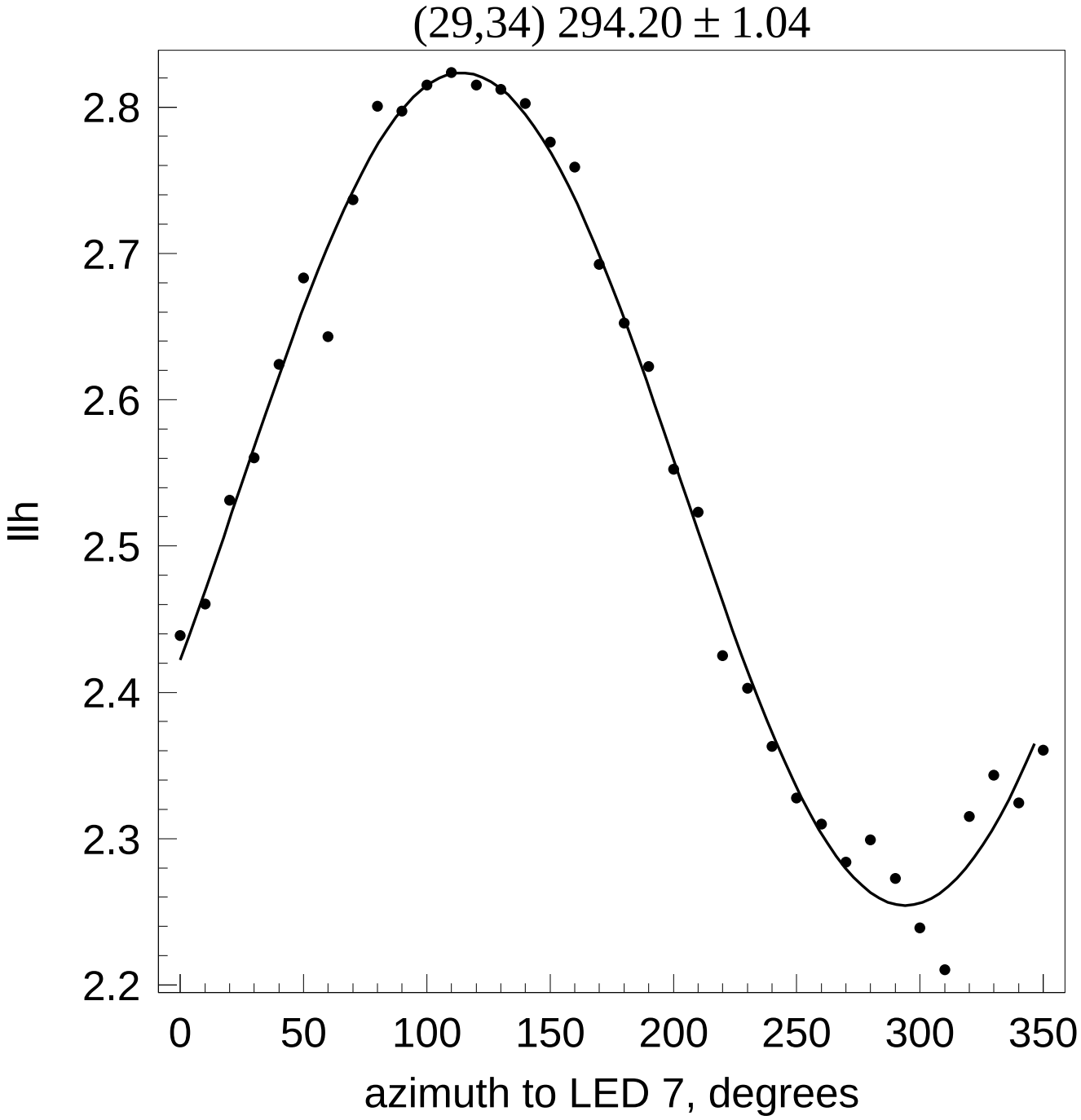

(28,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
77.7 ± 10.5
7
12
1
6
8
2
80
5
11
3
4
9
10

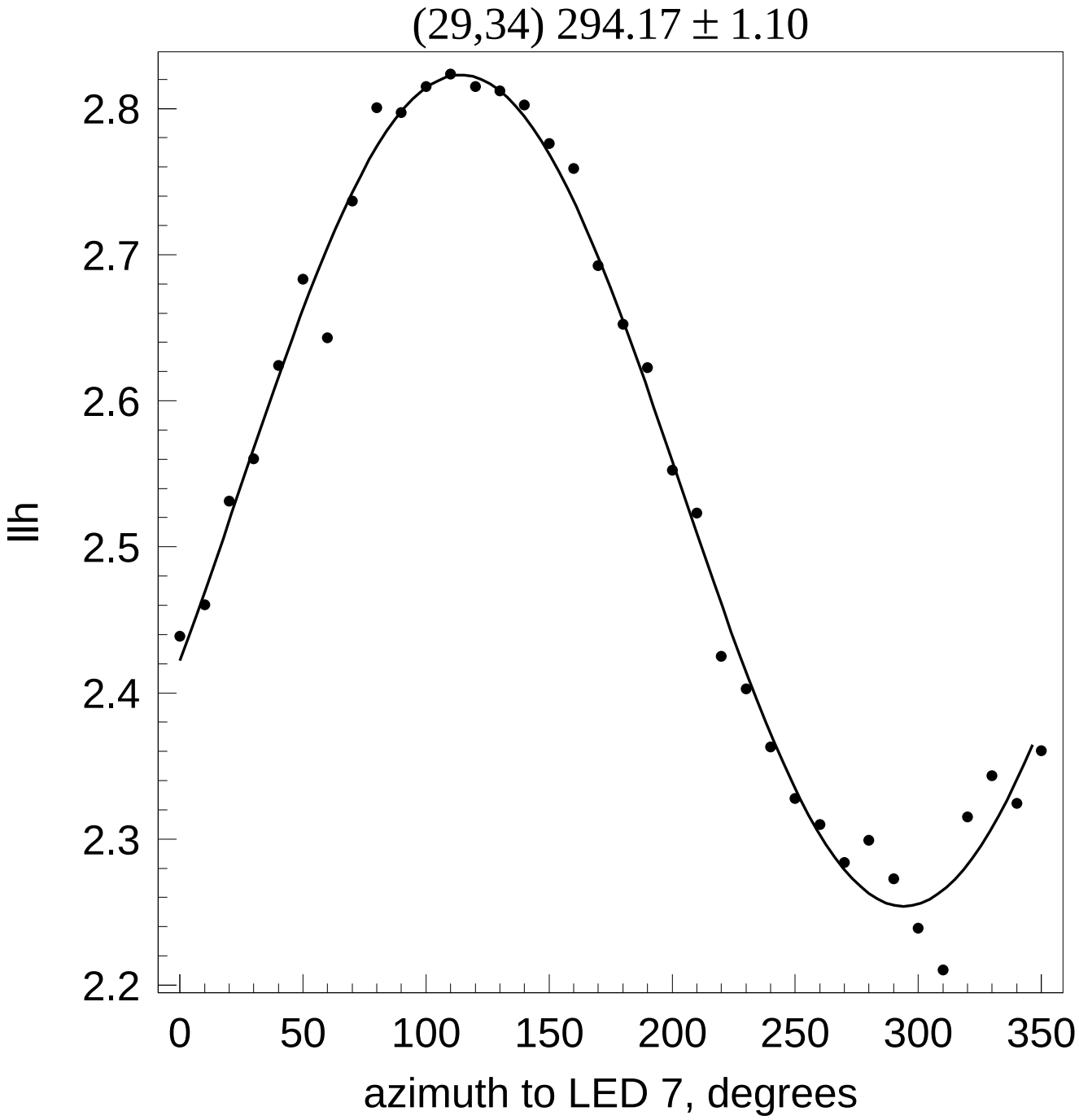

(28,37) 80.13 ± 0.74
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

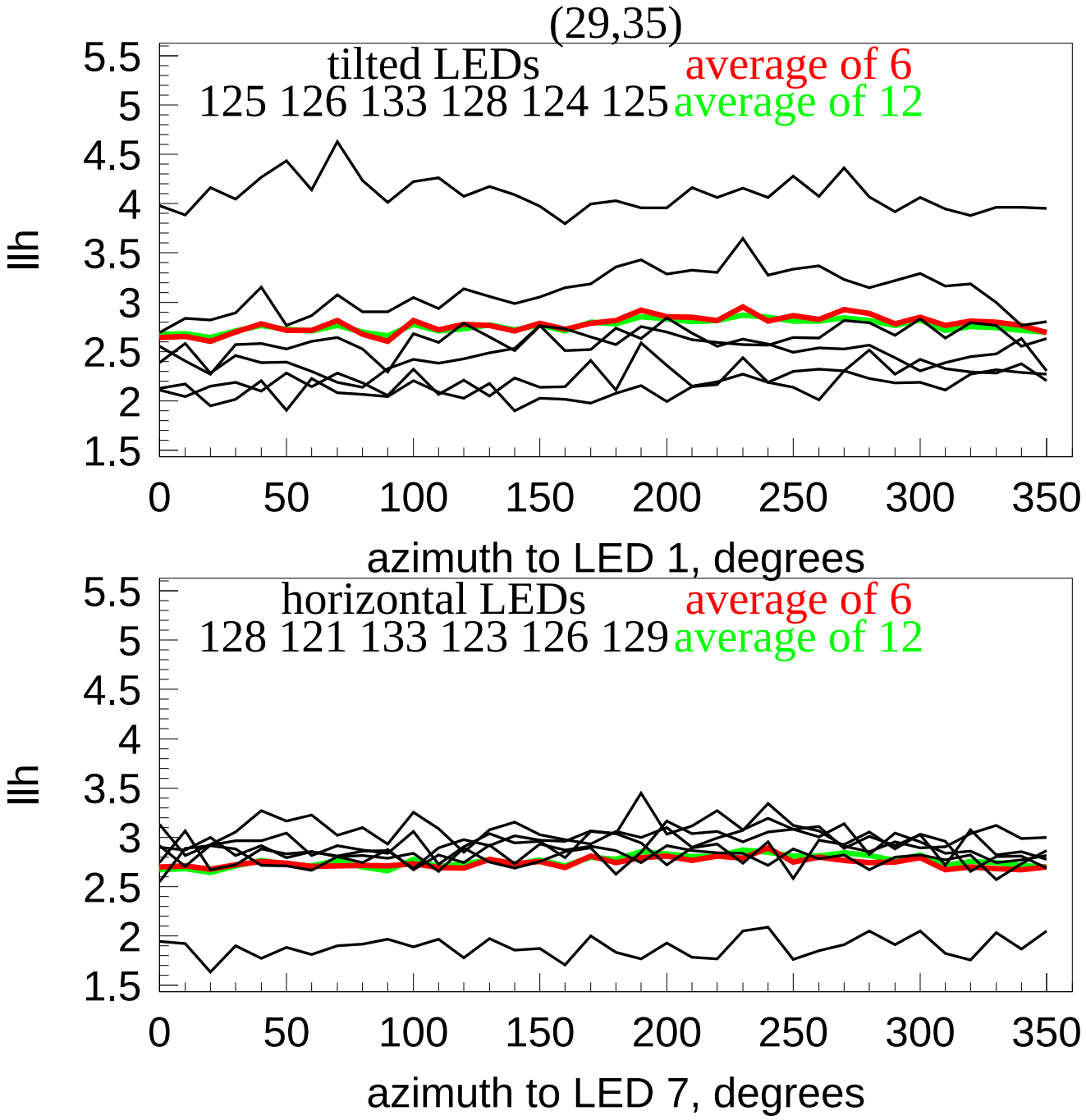

(28,37) 80.02 ± 0.70
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

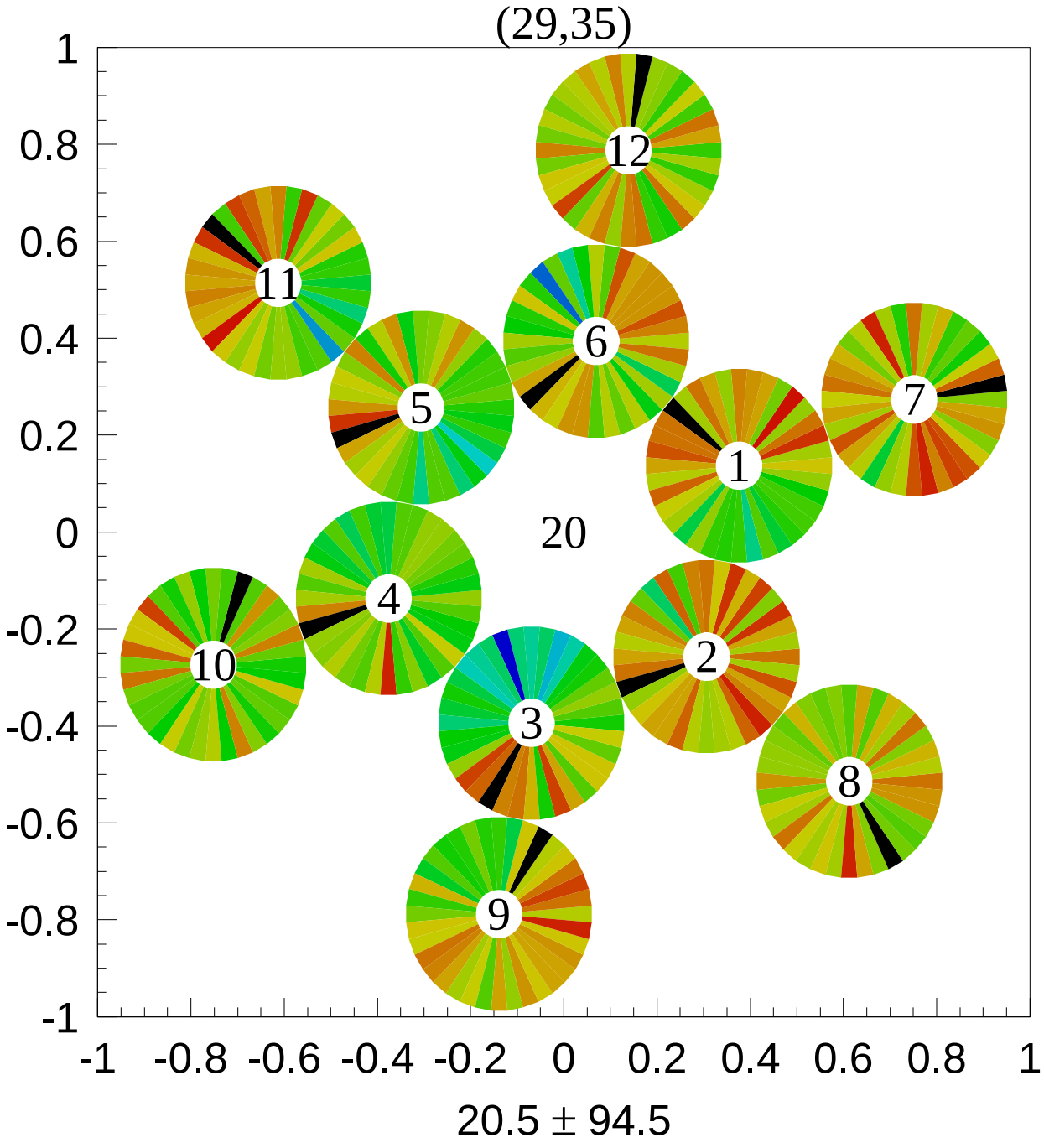

(29,34)
tilted LEDs
126 124 125 128 127 132
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 130 125 122 131 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

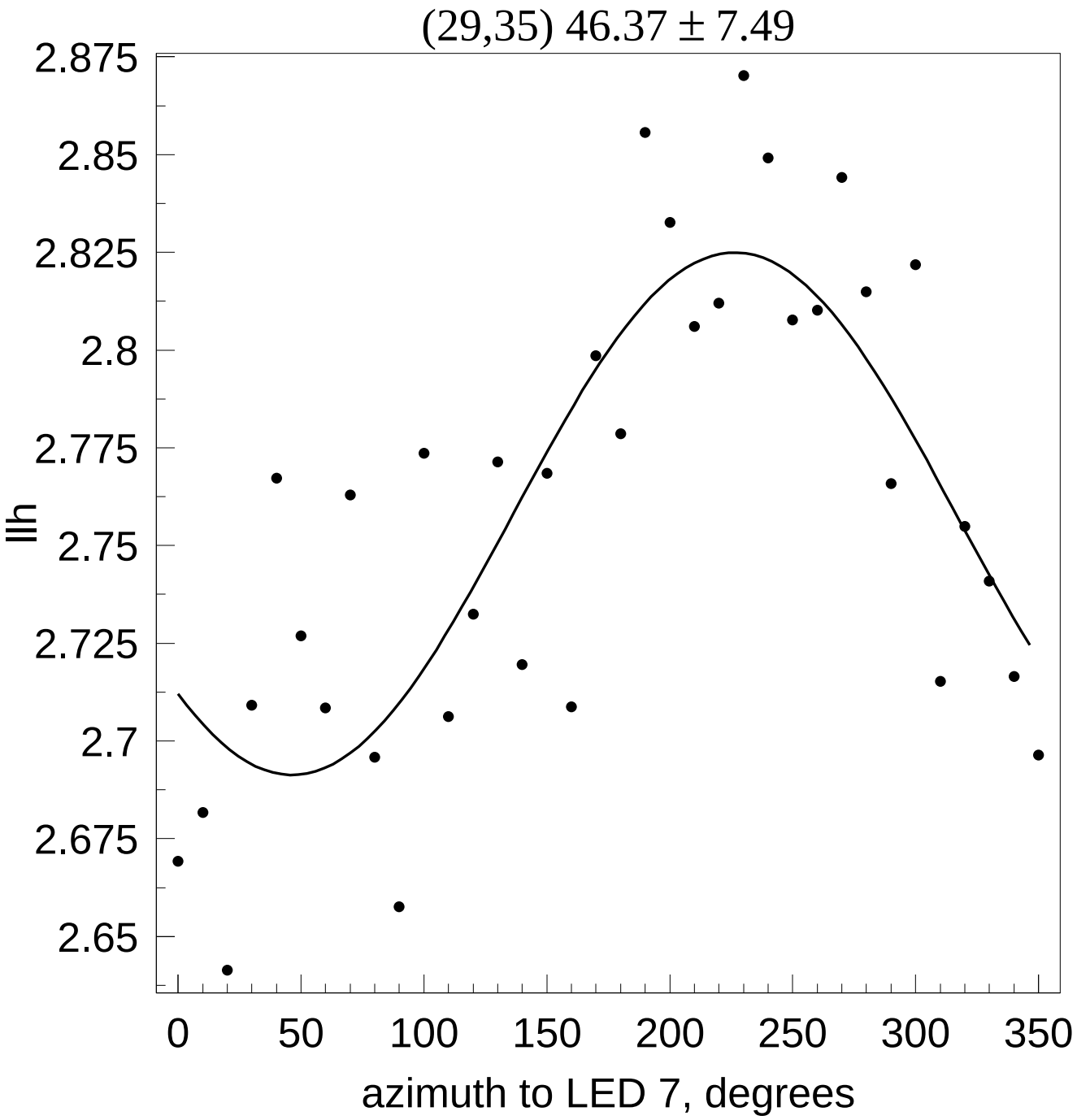

(29,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
294 ± 28.9
310
1
2
3
4
5
6
7
8
9
10
11
12

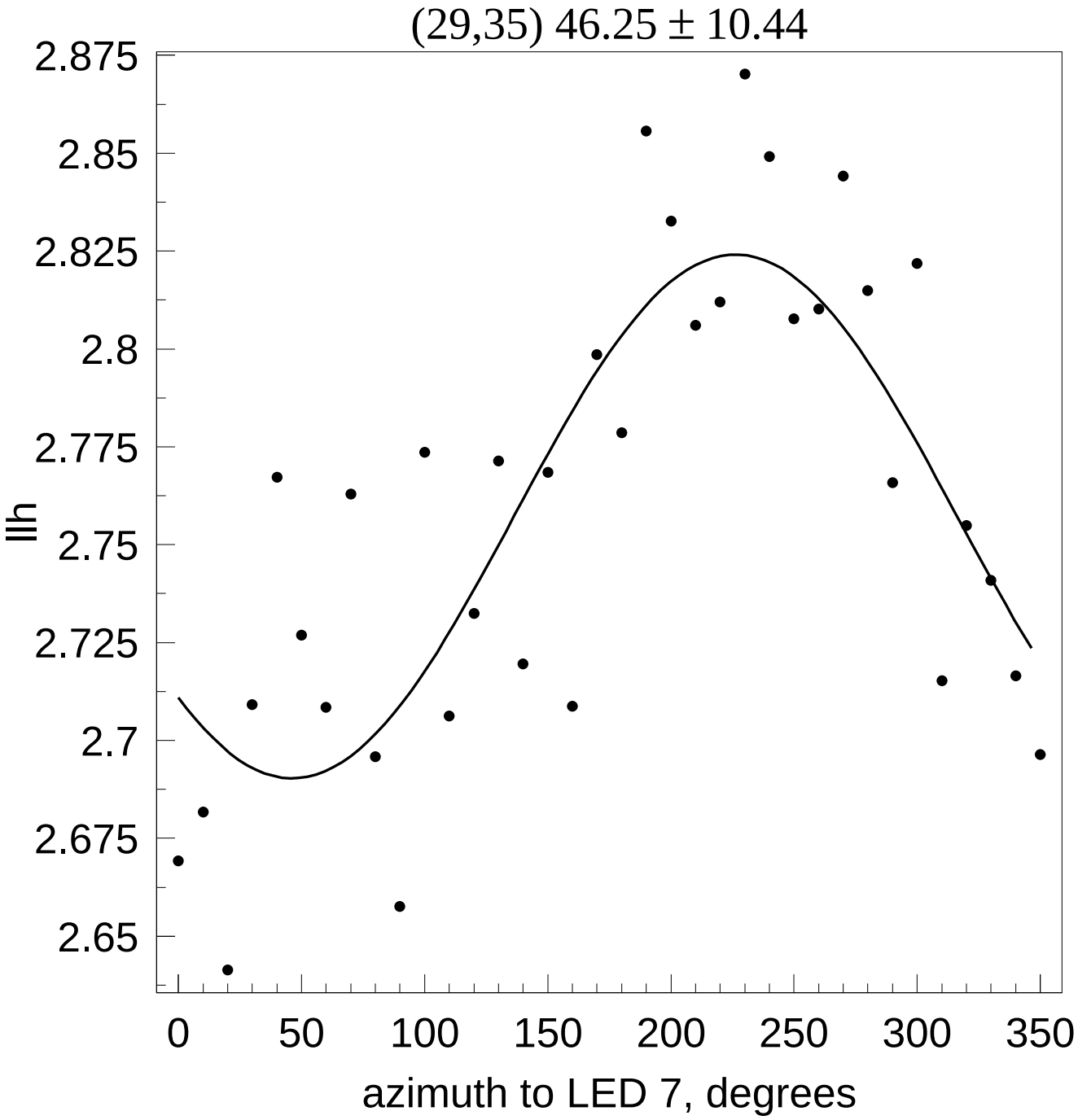

(29,34) 294.20 ± 1.04
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

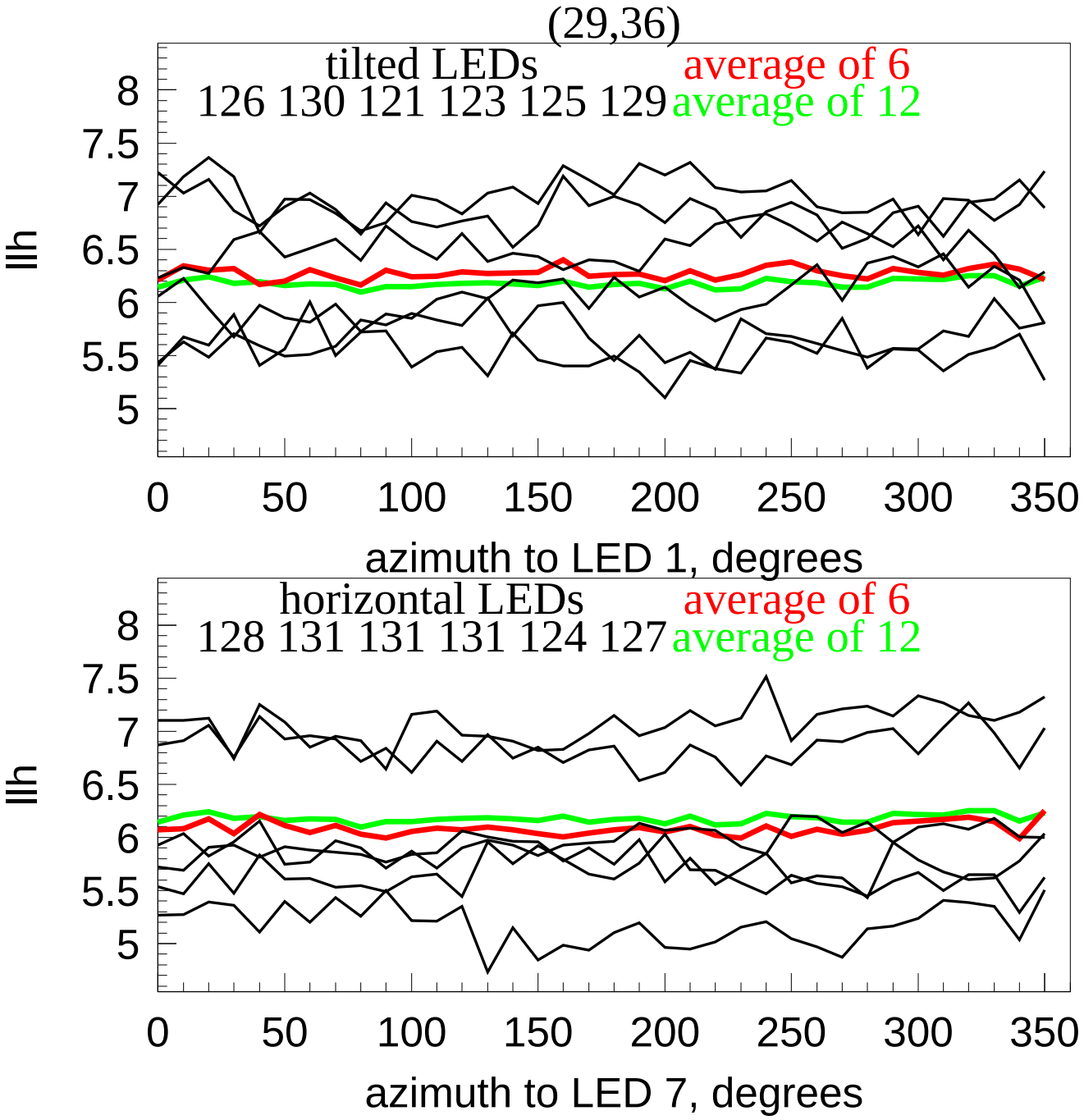

(29,34) 294.17 ± 1.10
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

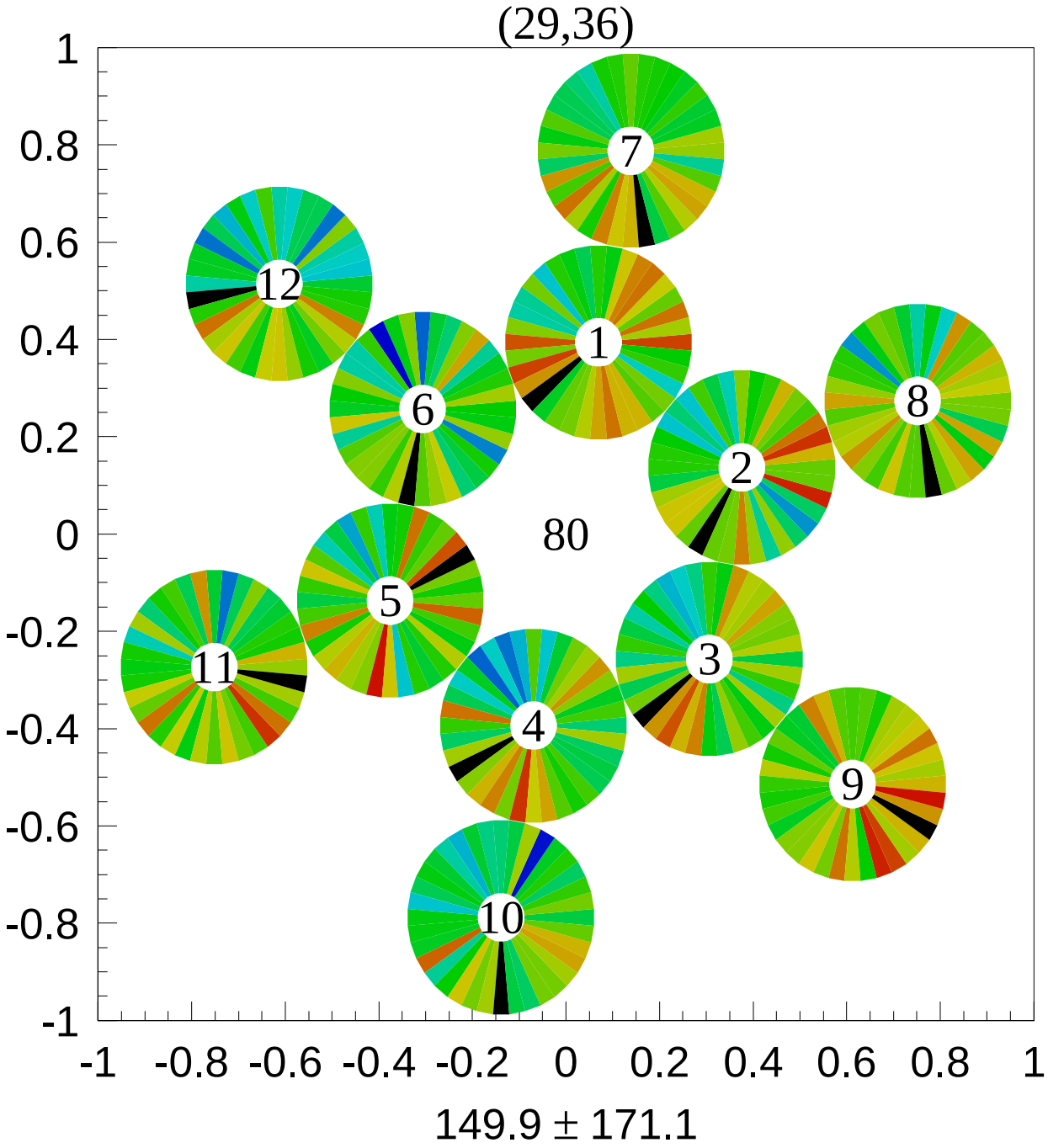

(29,35)
tilted LEDs
125 126 133 128 124 125
average of 6
average of 12
IIh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 121 133 123 126 129
average of 6
average of 12
IIh
azimuth to LED 7, degrees

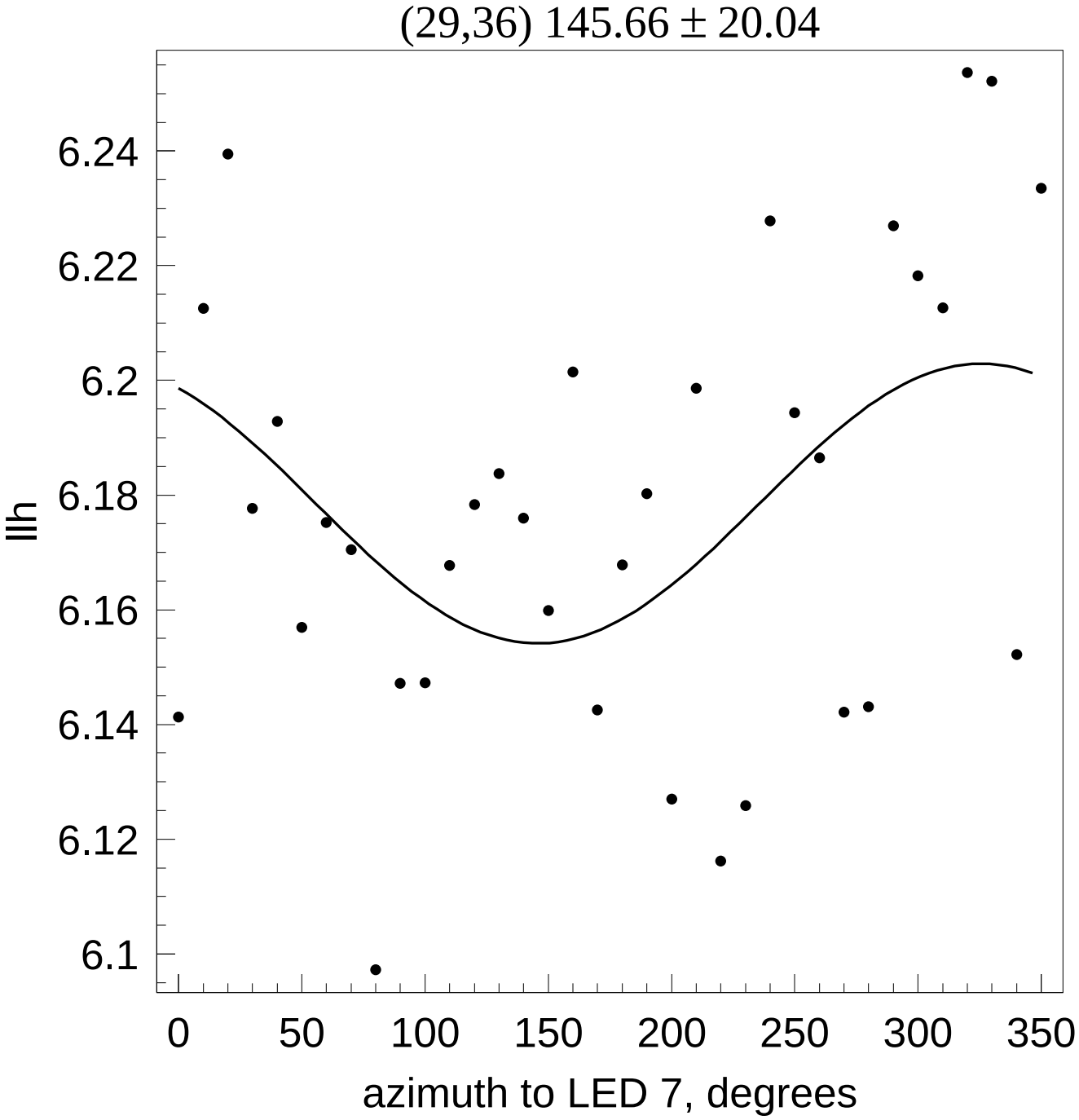

(29,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
20.5 ± 94.5
12
11
6
5
7
1
20
4
10
2
3
8
9

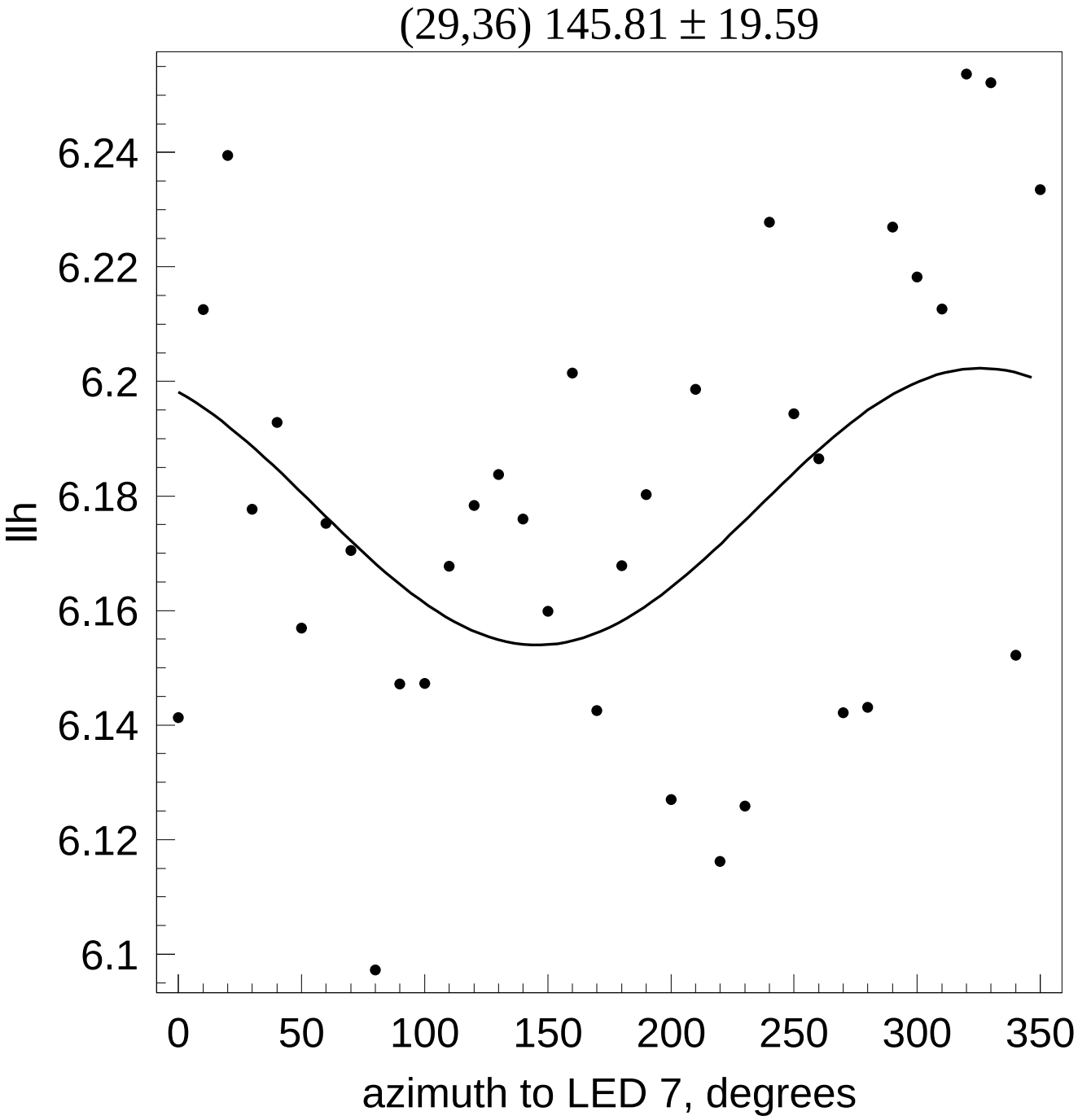

(29,35) 46.37 ± 7.49
2.875
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
2.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

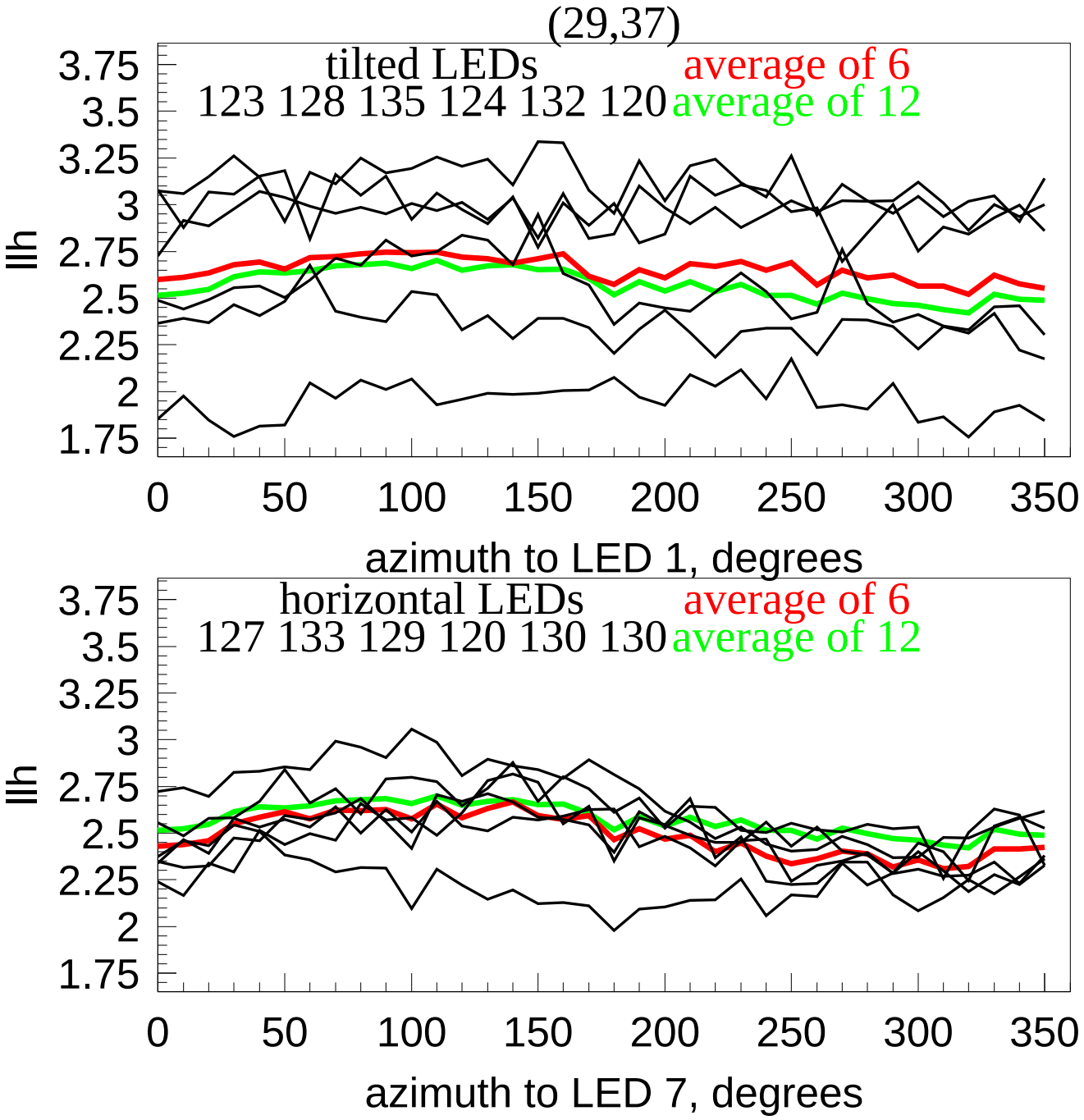

(29,35) 46.25 ± 10.44
2.875
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
2.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

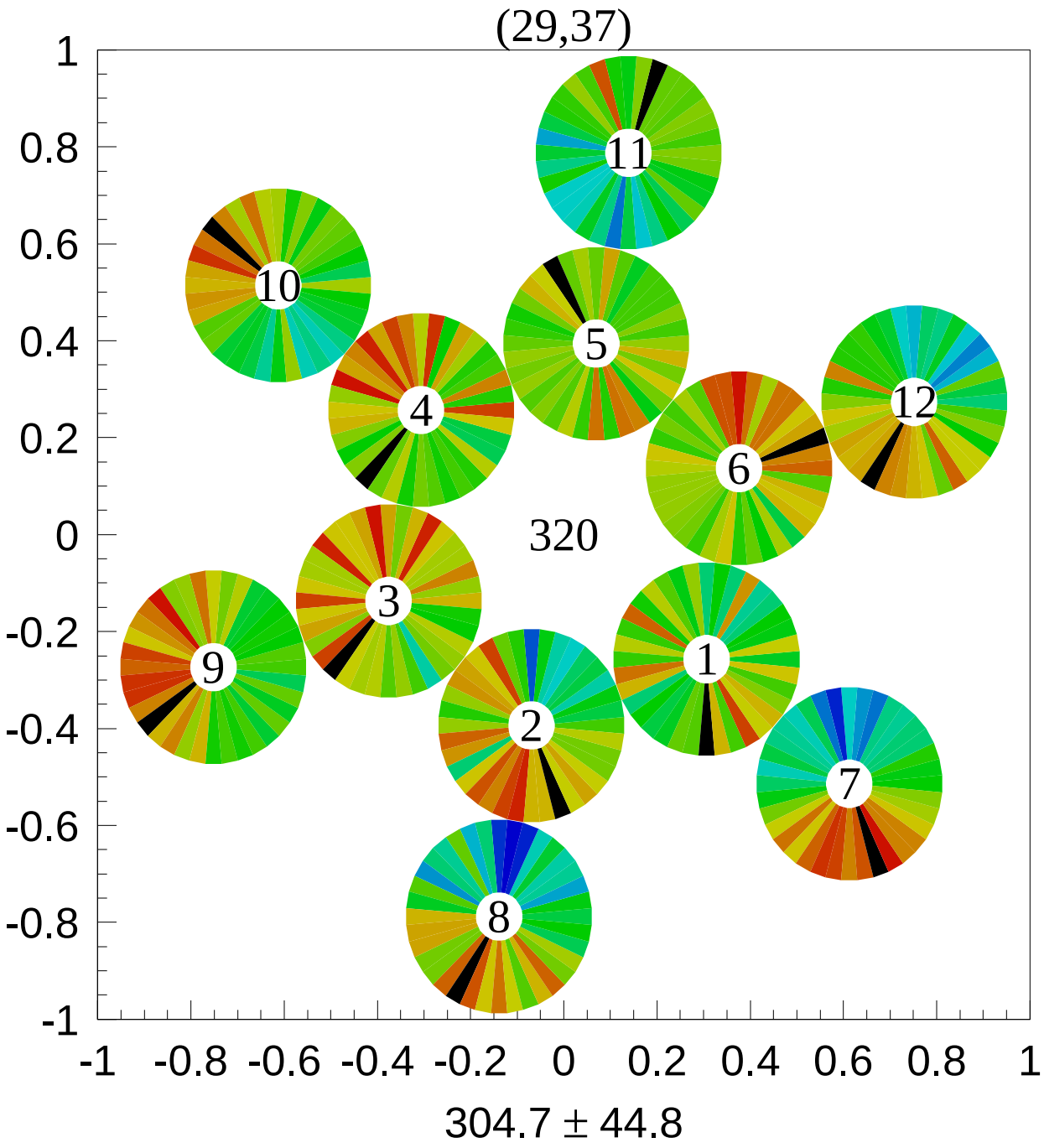

(29,36)
tilted LEDs
126 130 121 123 125 129
average of 6
average of 12
llh
8
7.5
7
6.5
6
5.5
5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 131 131 131 124 127
average of 6
average of 12
llh
8
7.5
7
6.5
6
5.5
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

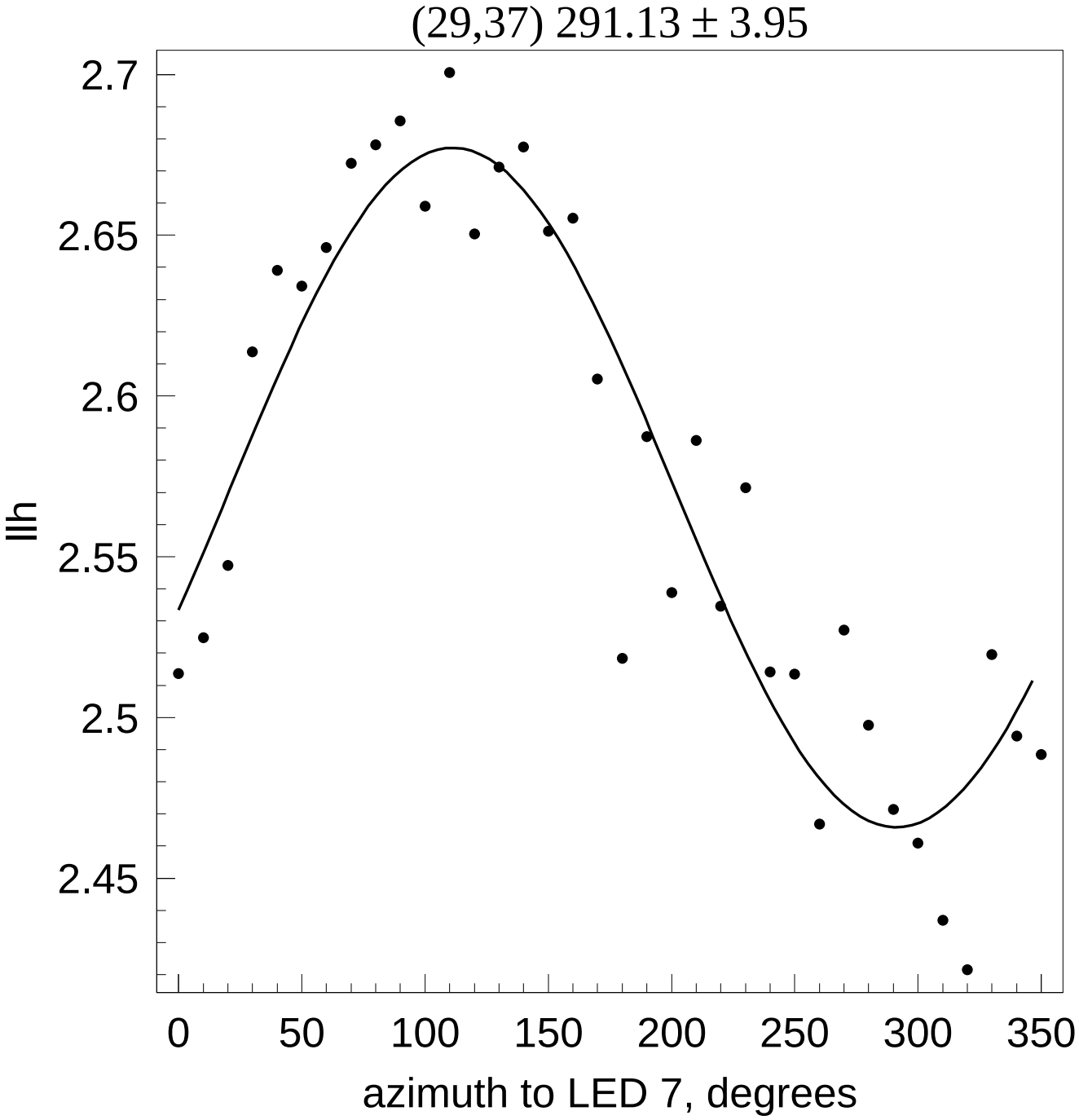

(29,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
80
5
11
3
4
9
10
149.9 ± 171.1

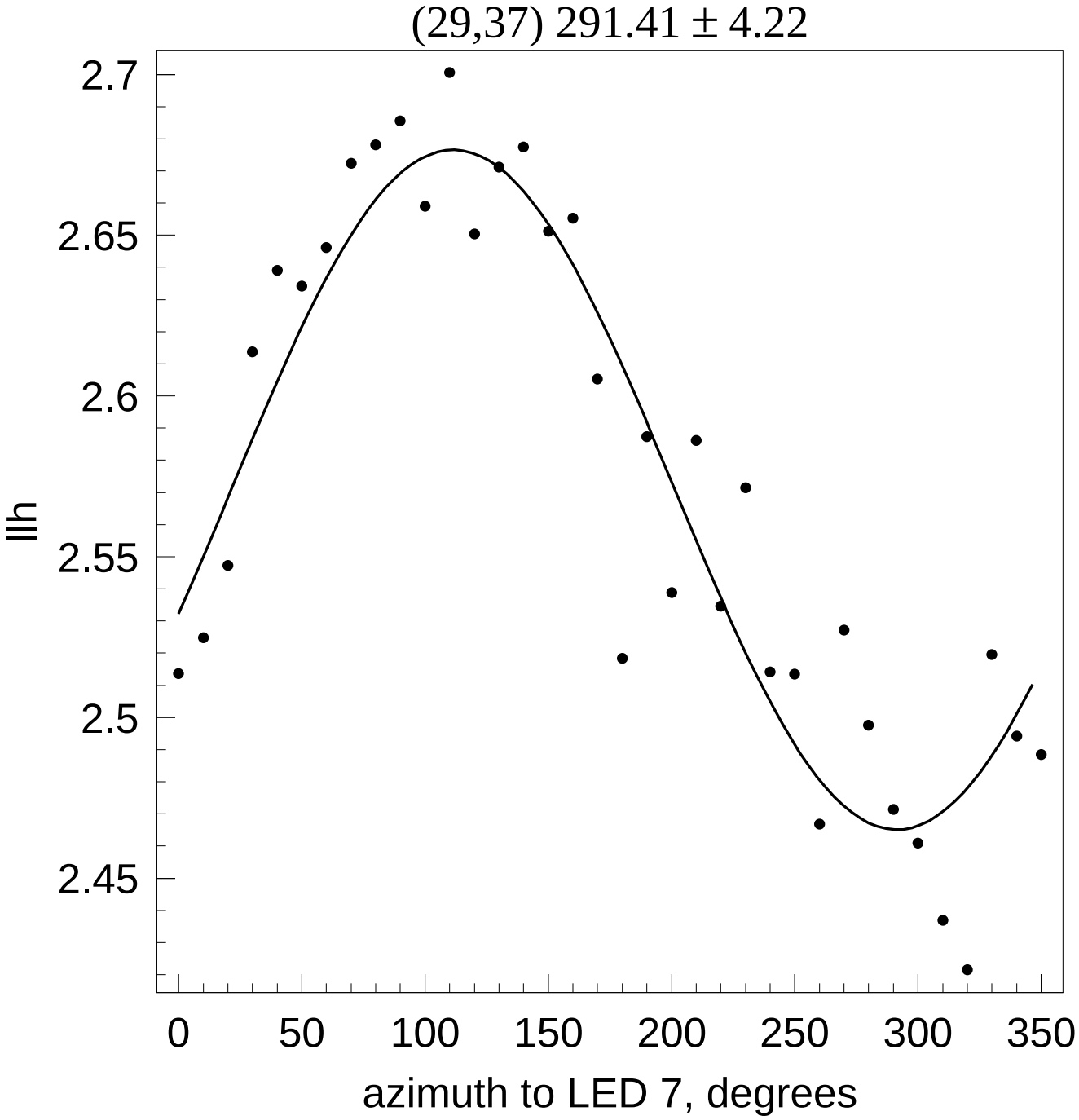

(29,36) 145.66 ± 20.04
6.24
6.22
6.2
6.18
6.16
6.14
6.12
6.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

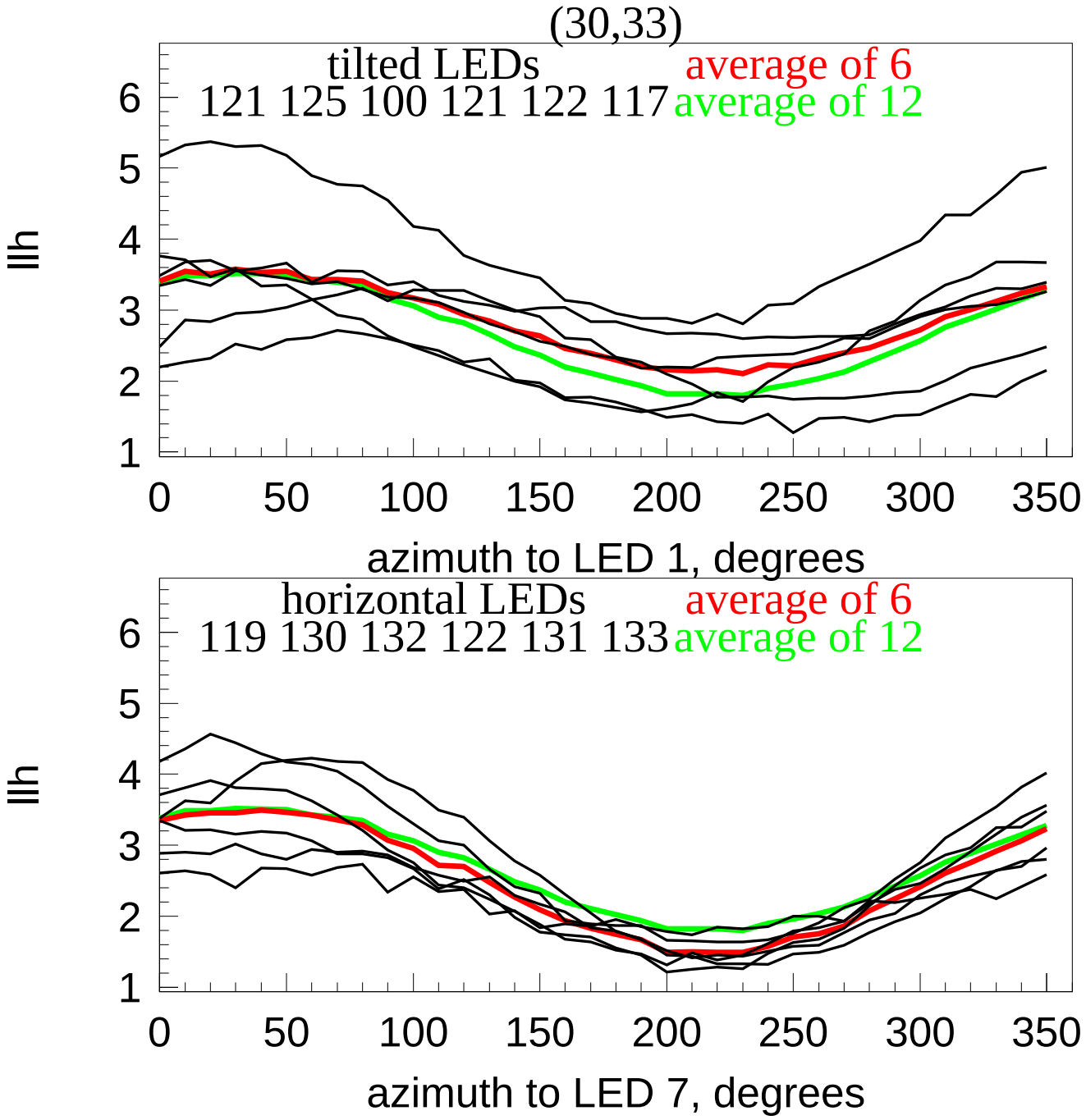

(29,36) 145.81 ± 19.59
6.24
6.22
6.2
6.18
6.16
6.14
6.12
6.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

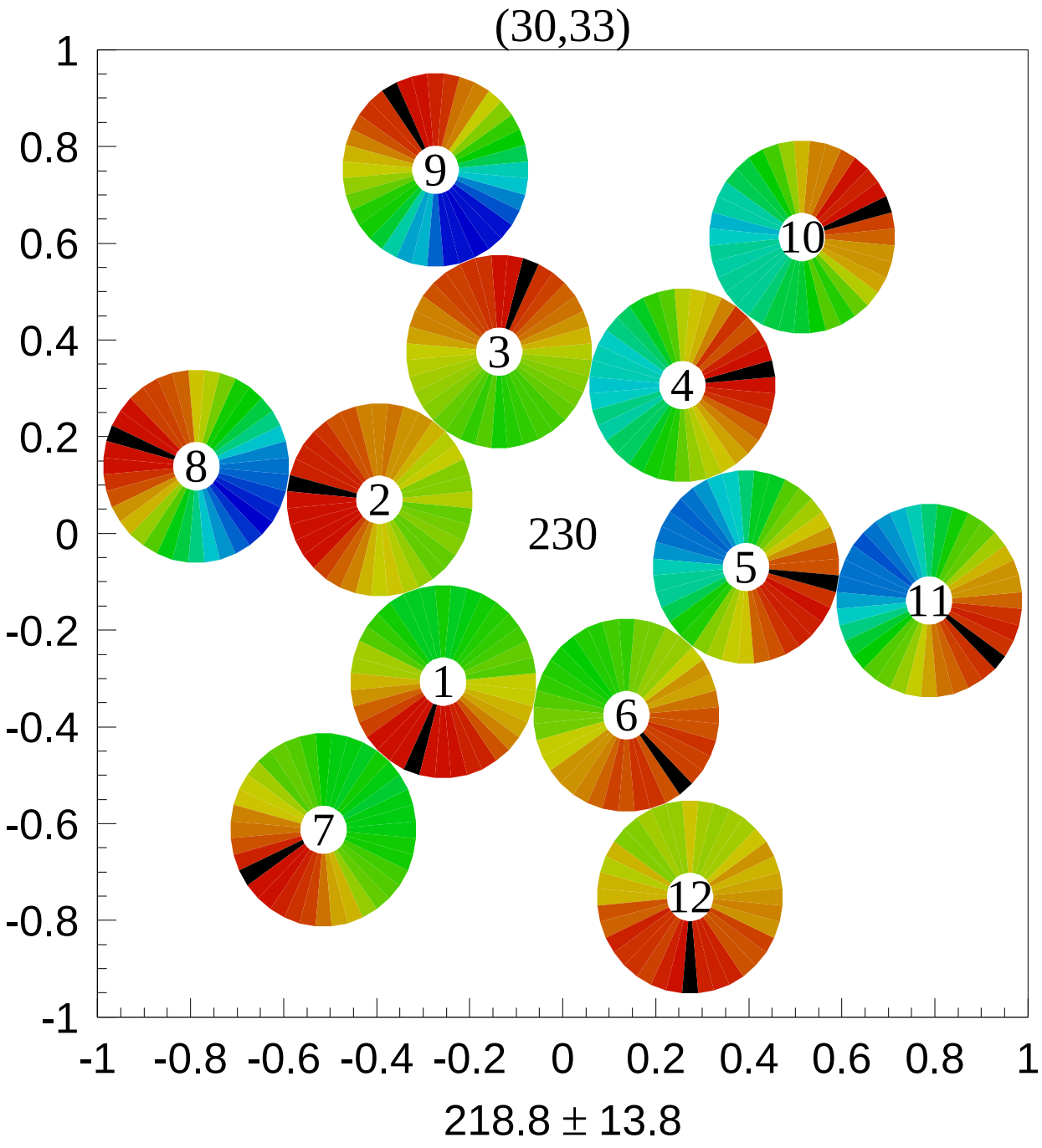

(29,37)
tilted LEDs
123 128 135 124 132 120
average of 6
average of 12
IIh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 133 129 120 130 130
average of 6
average of 12
IIh
azimuth to LED 7, degrees

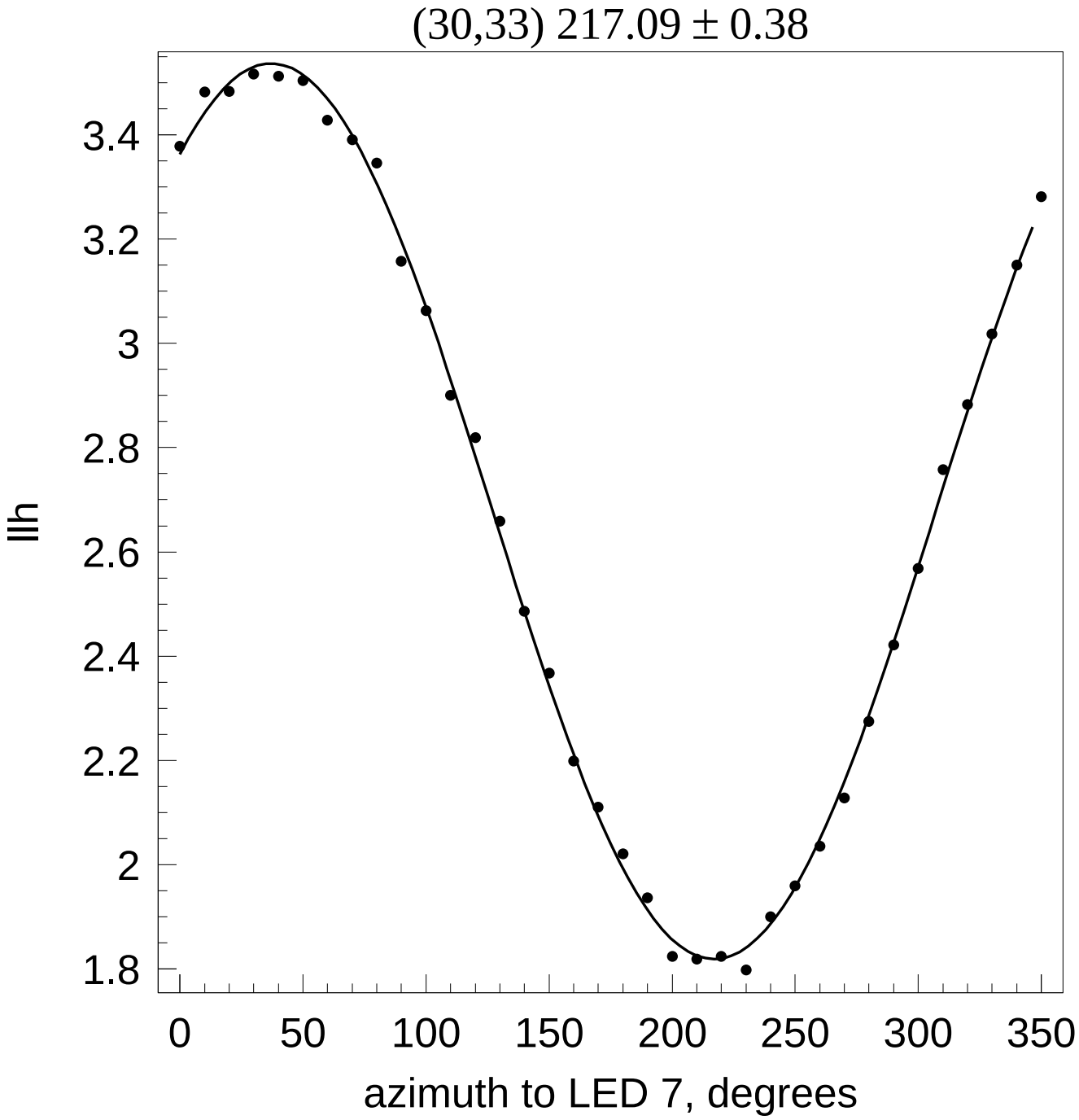

(29,37)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
304.7 ± 44.8

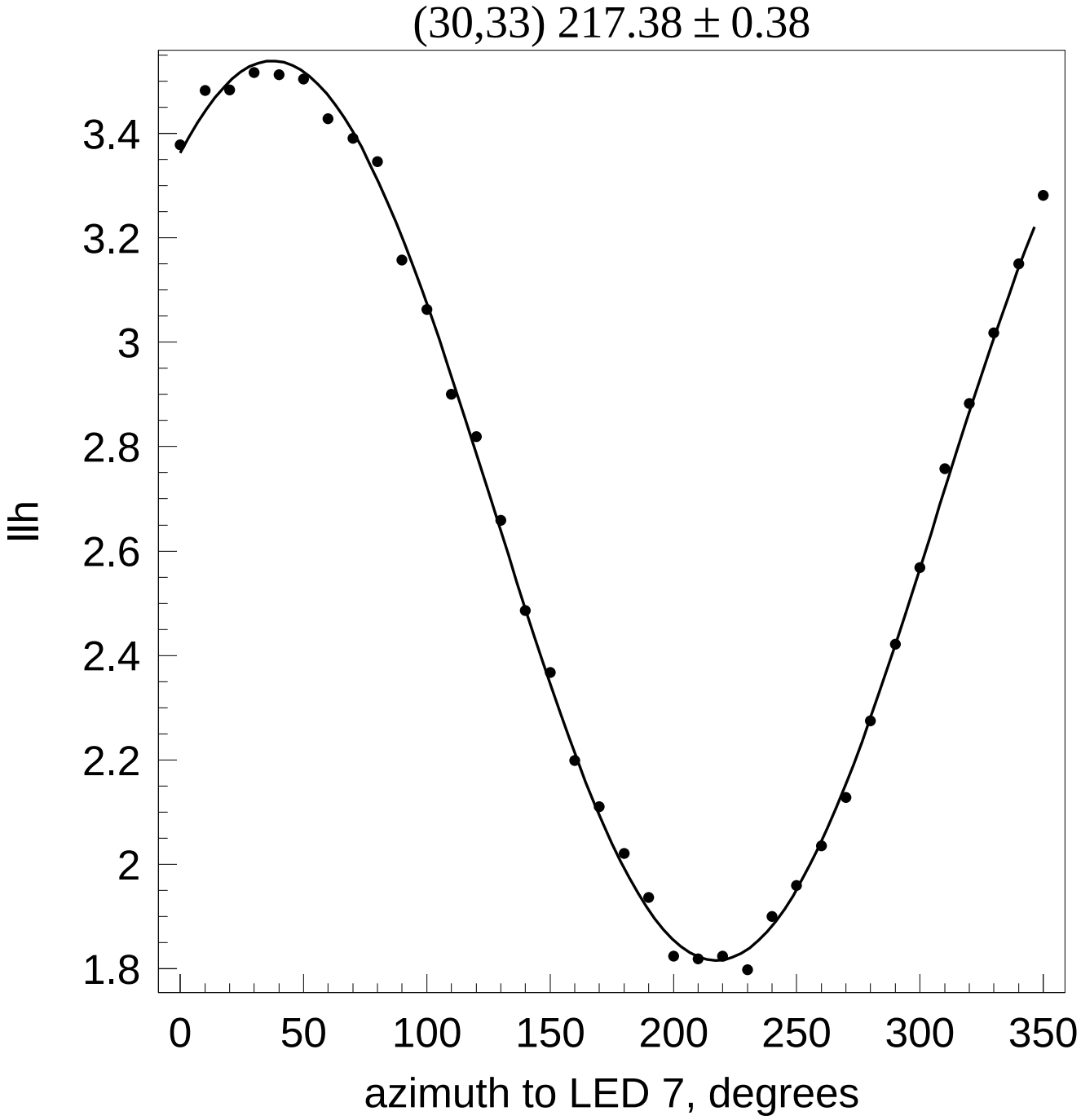

(29,37) 291.13 ± 3.95
2.7
2.65
2.6
2.55
2.5
2.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

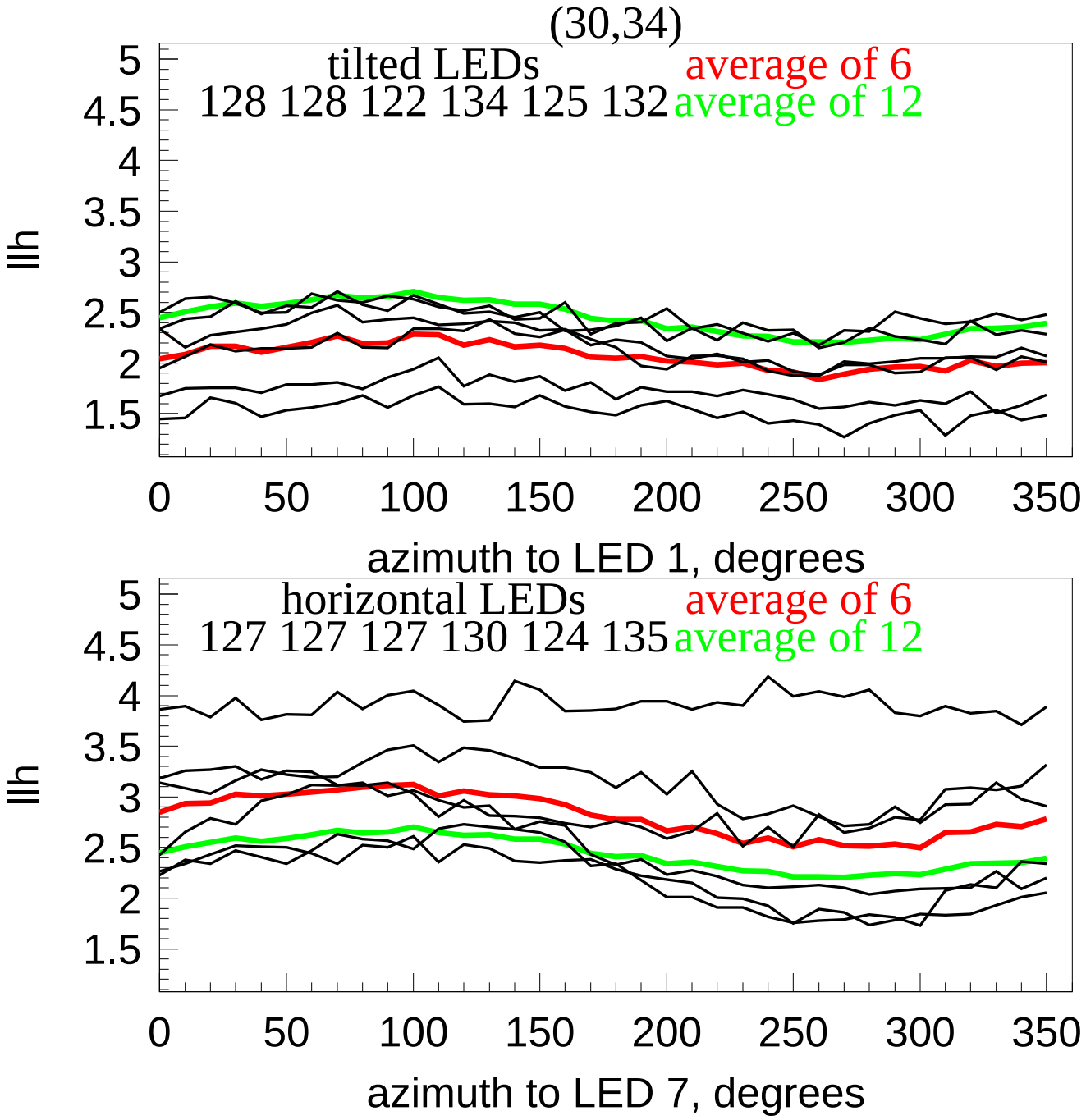

(29,37) 291.41 ± 4.22
2.7
2.65
2.6
2.55
2.5
2.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

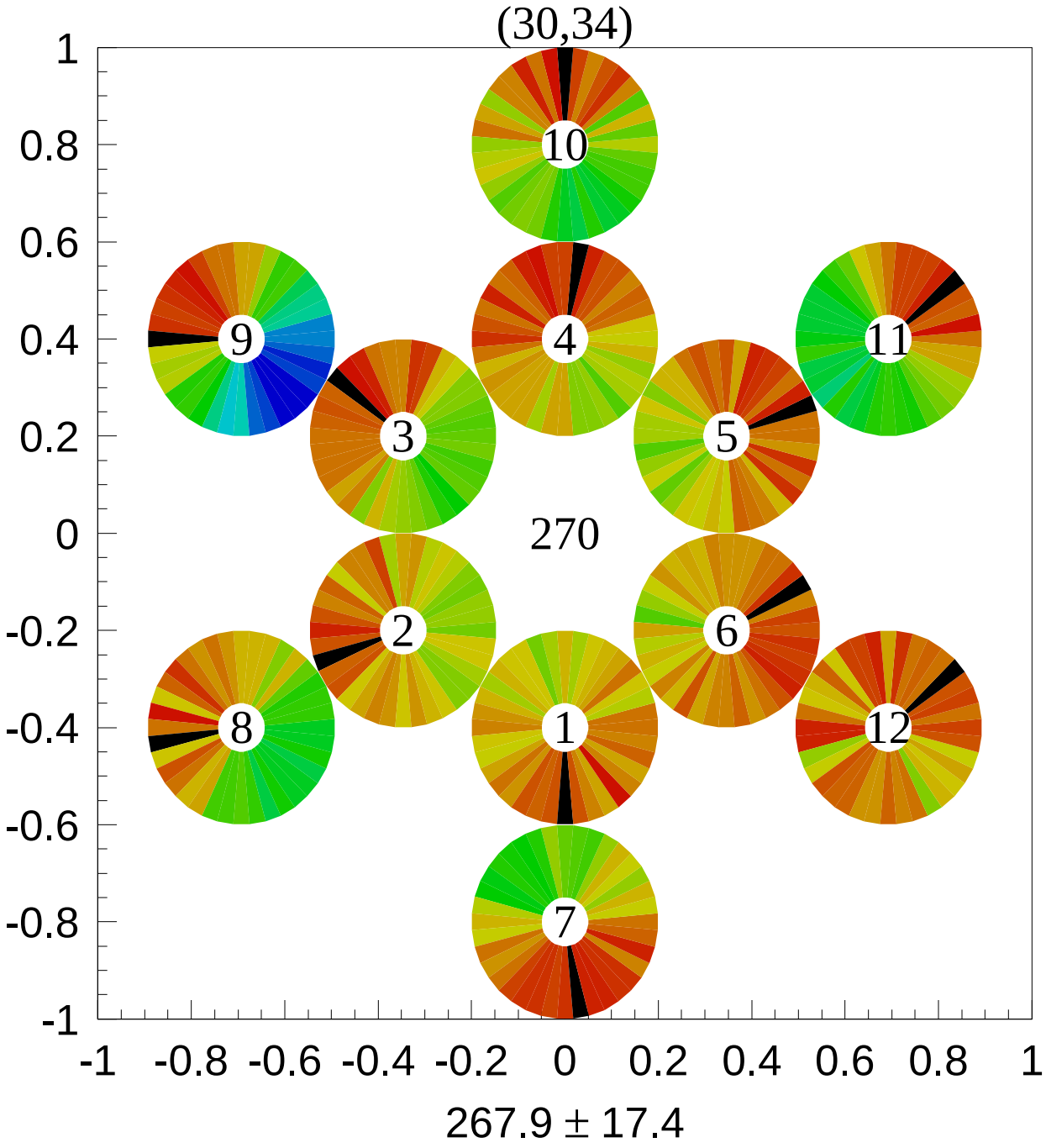

(30,33)
tilted LEDs
121 125 100 121 122 117
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
119 130 132 122 131 133
average of 6
average of 12
llh
azimuth to LED 7, degrees

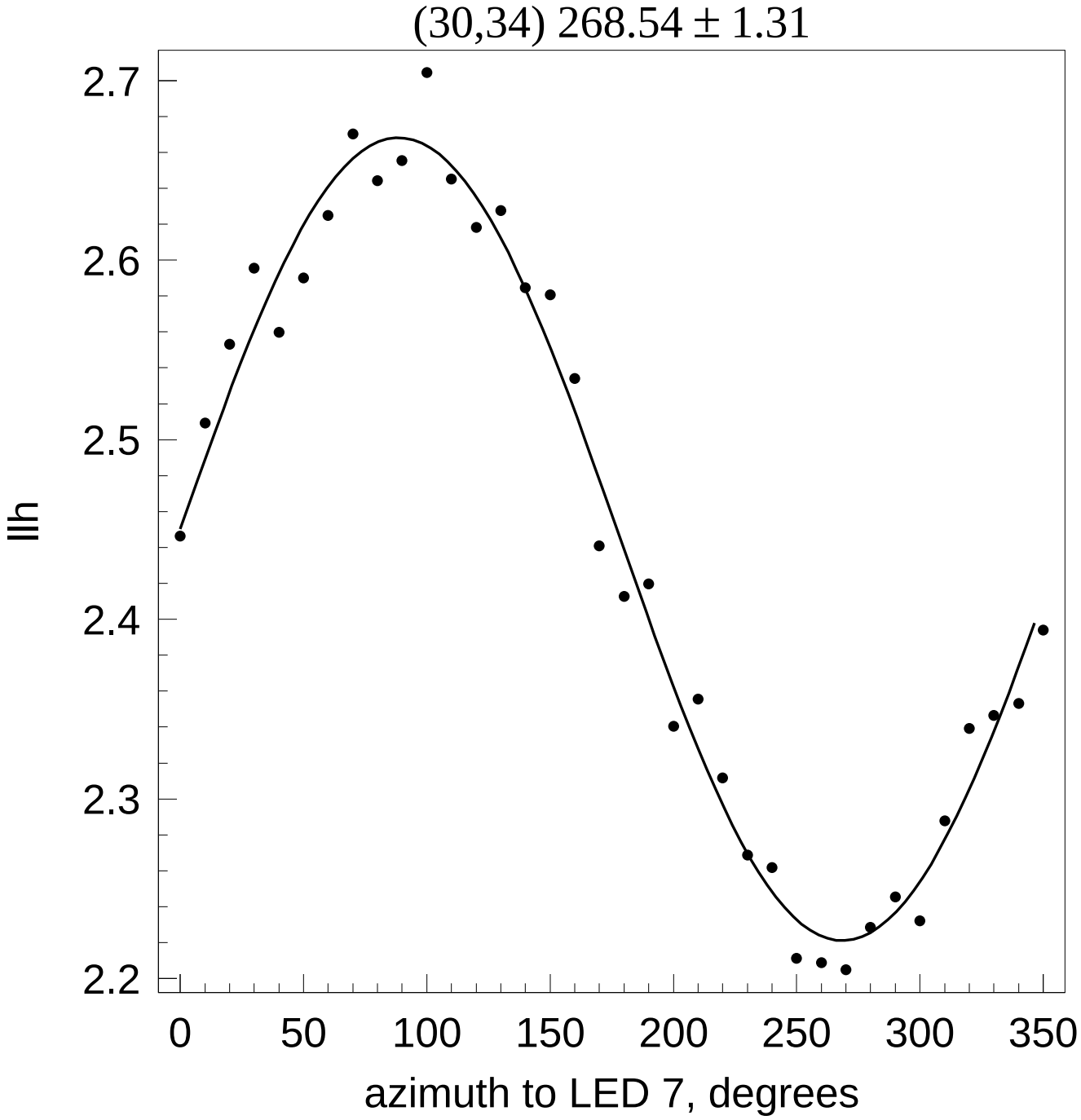

(30,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
218.8 ± 13.8

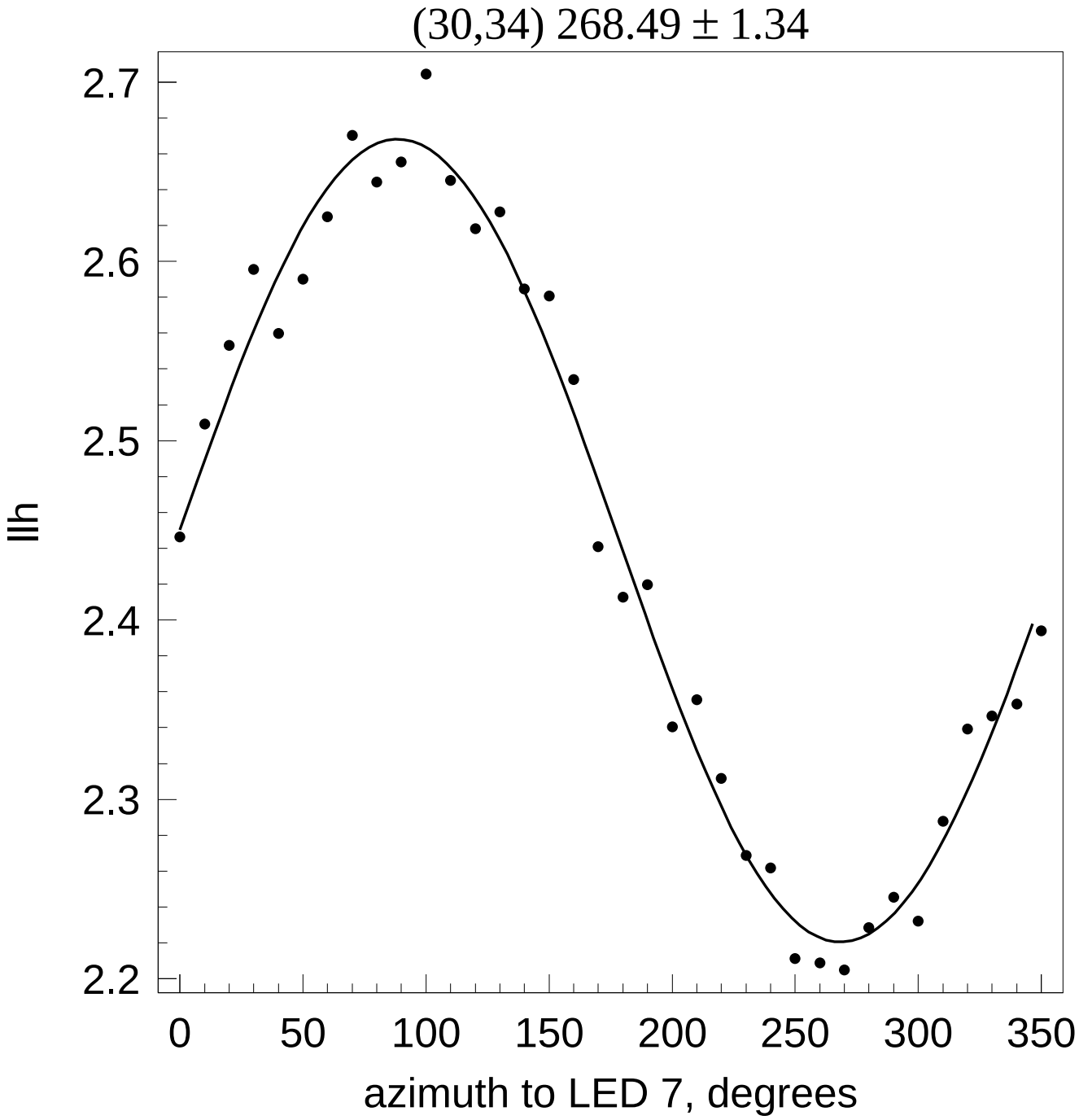

(30,33) 217.09 ± 0.38
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

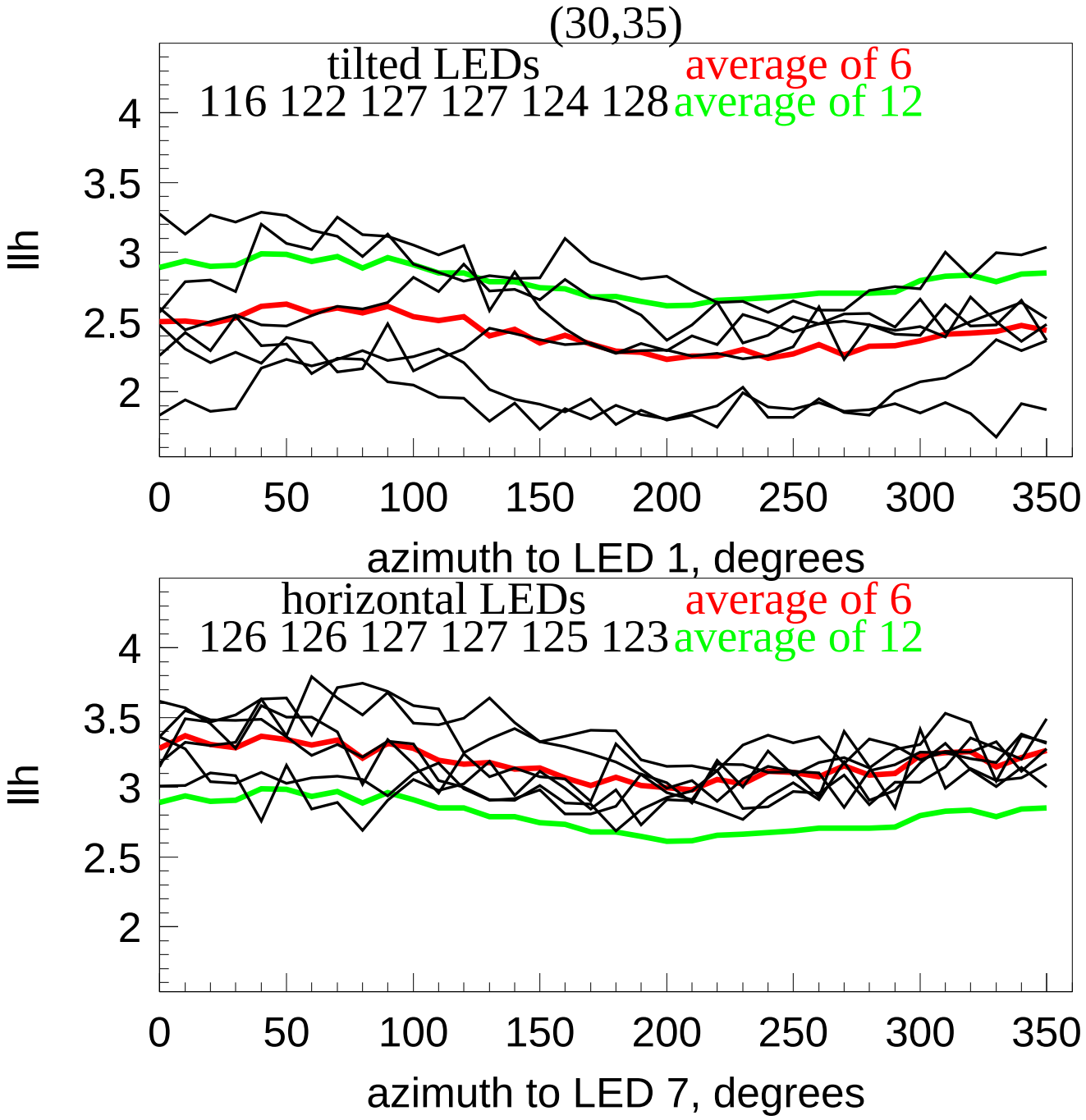

(30,33) 217.38 ± 0.38
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

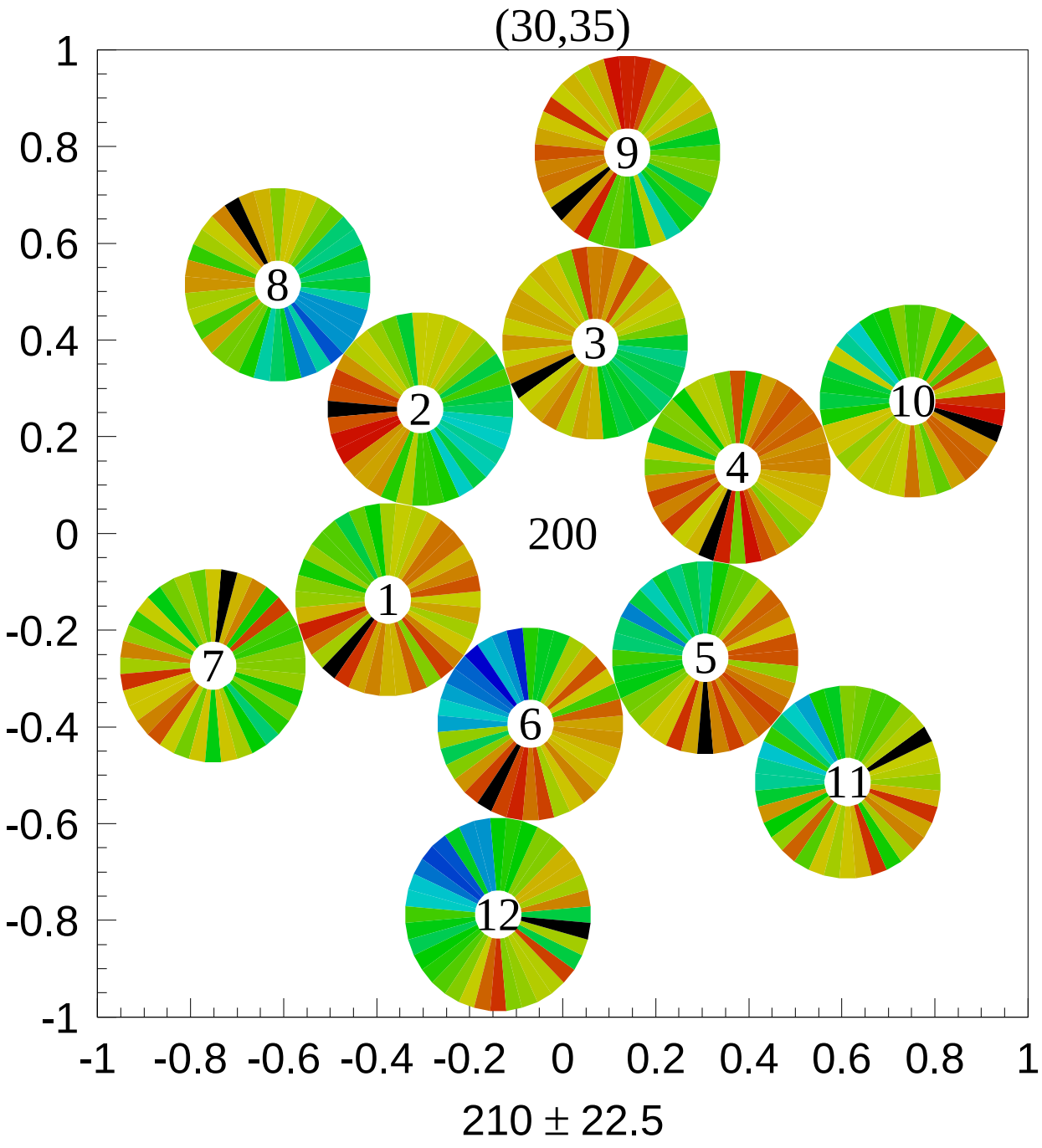

(30,34)
tilted LEDs
128 128 122 134 125 132
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 127 127 130 124 135
average of 6
average of 12
llh
azimuth to LED 7, degrees

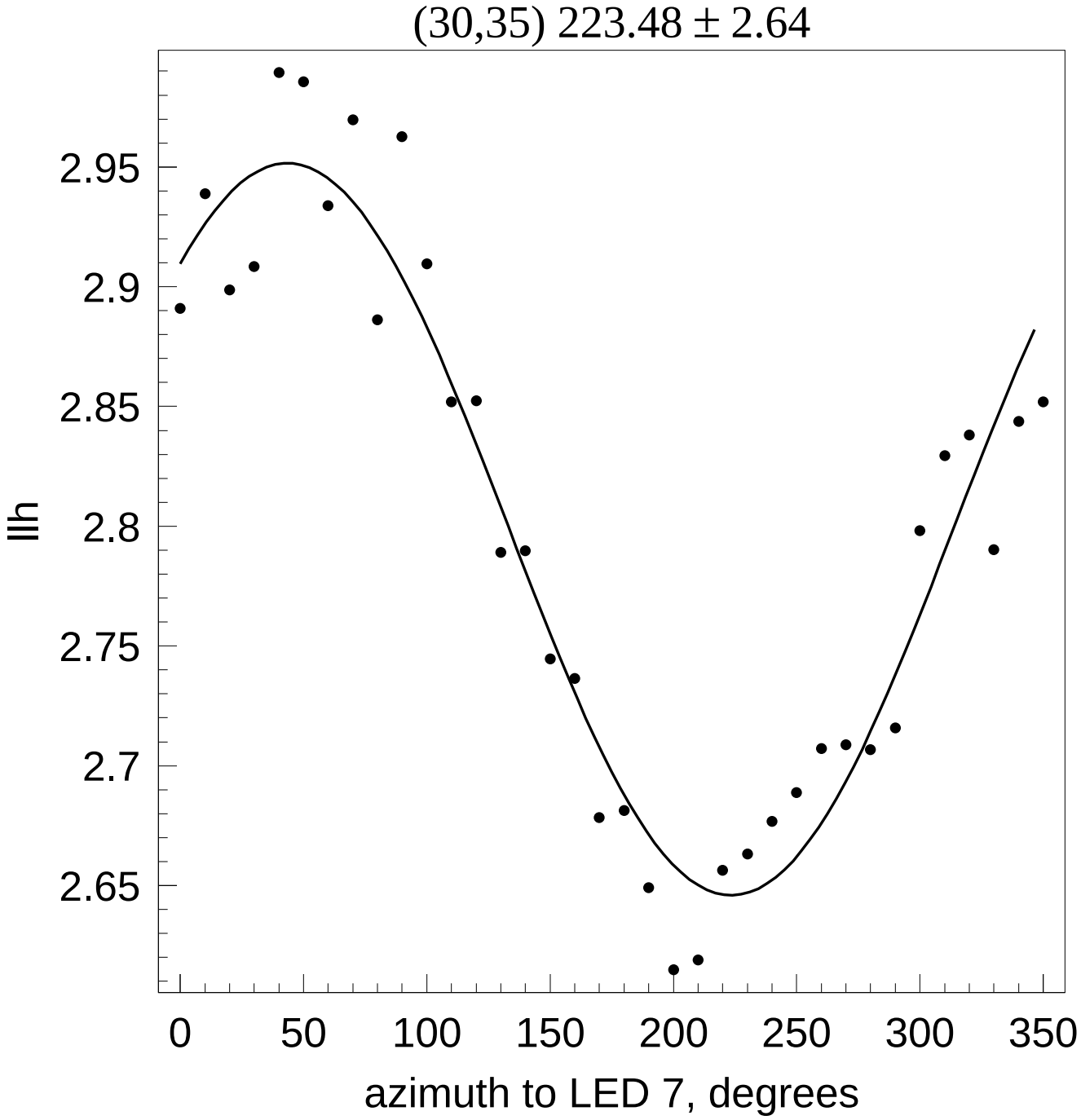

(30,34)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
267.9 ± 17.4

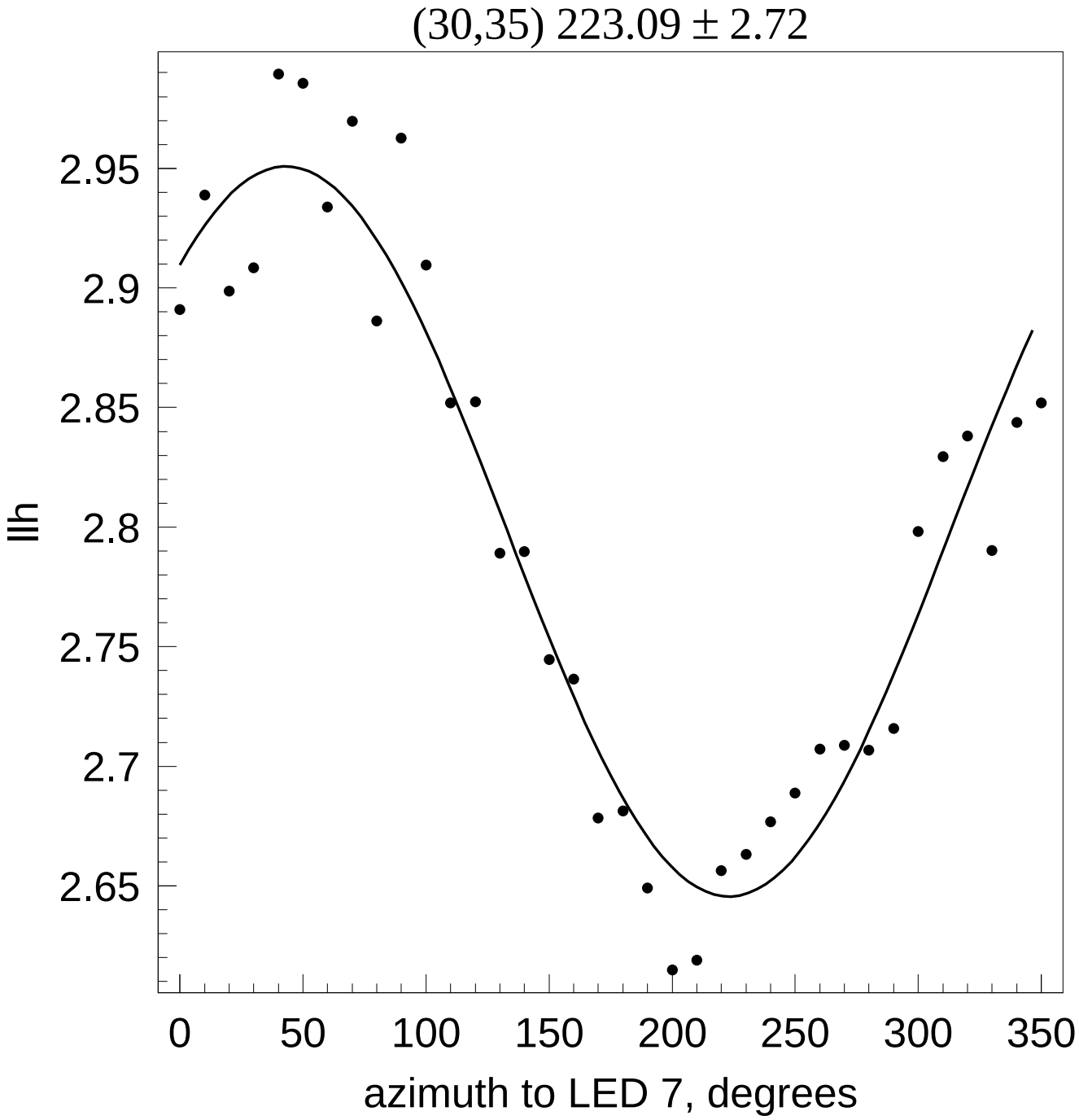

(30,34) 268.54 ± 1.31
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

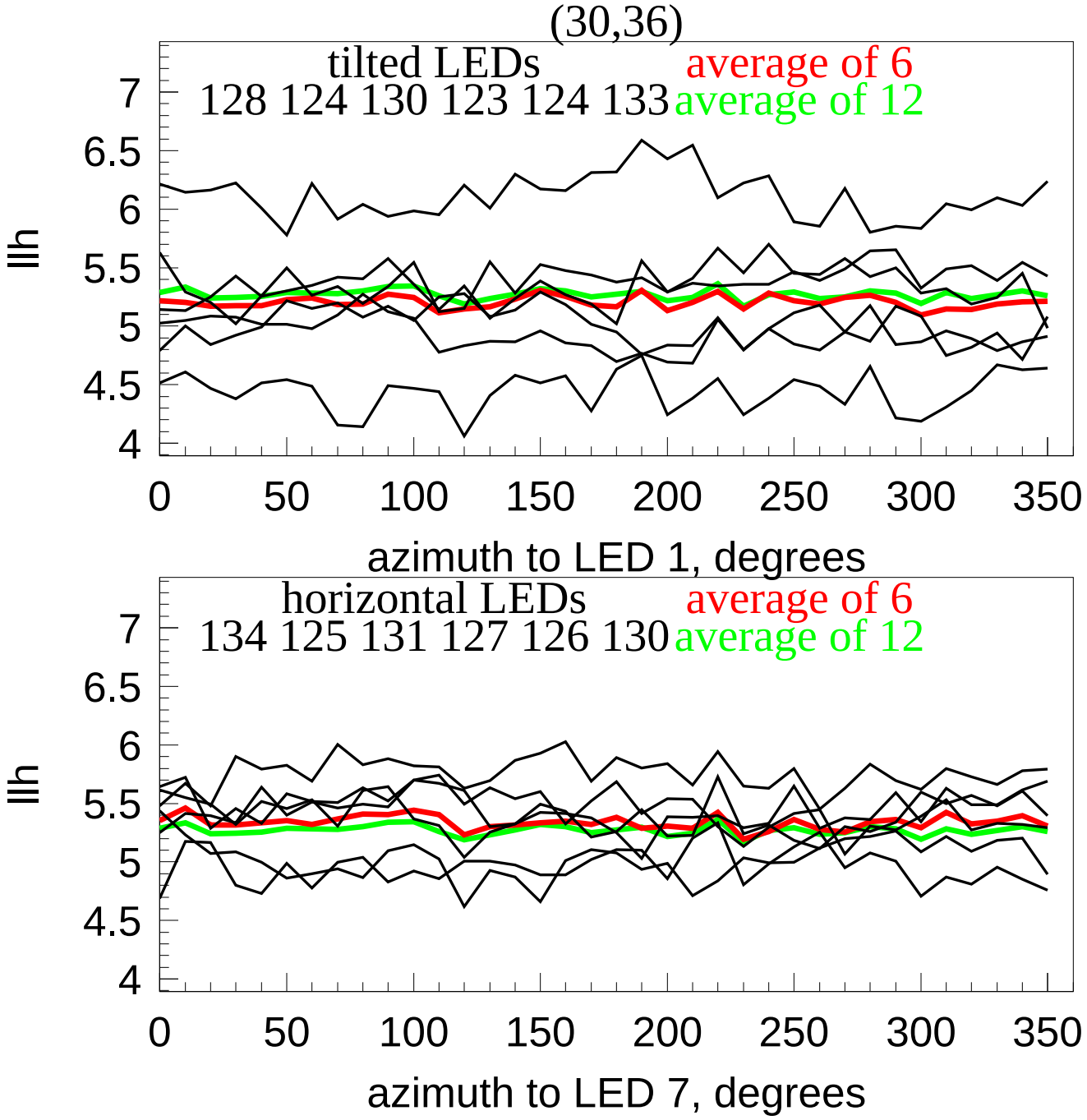

(30,34) 268.49 ± 1.34
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

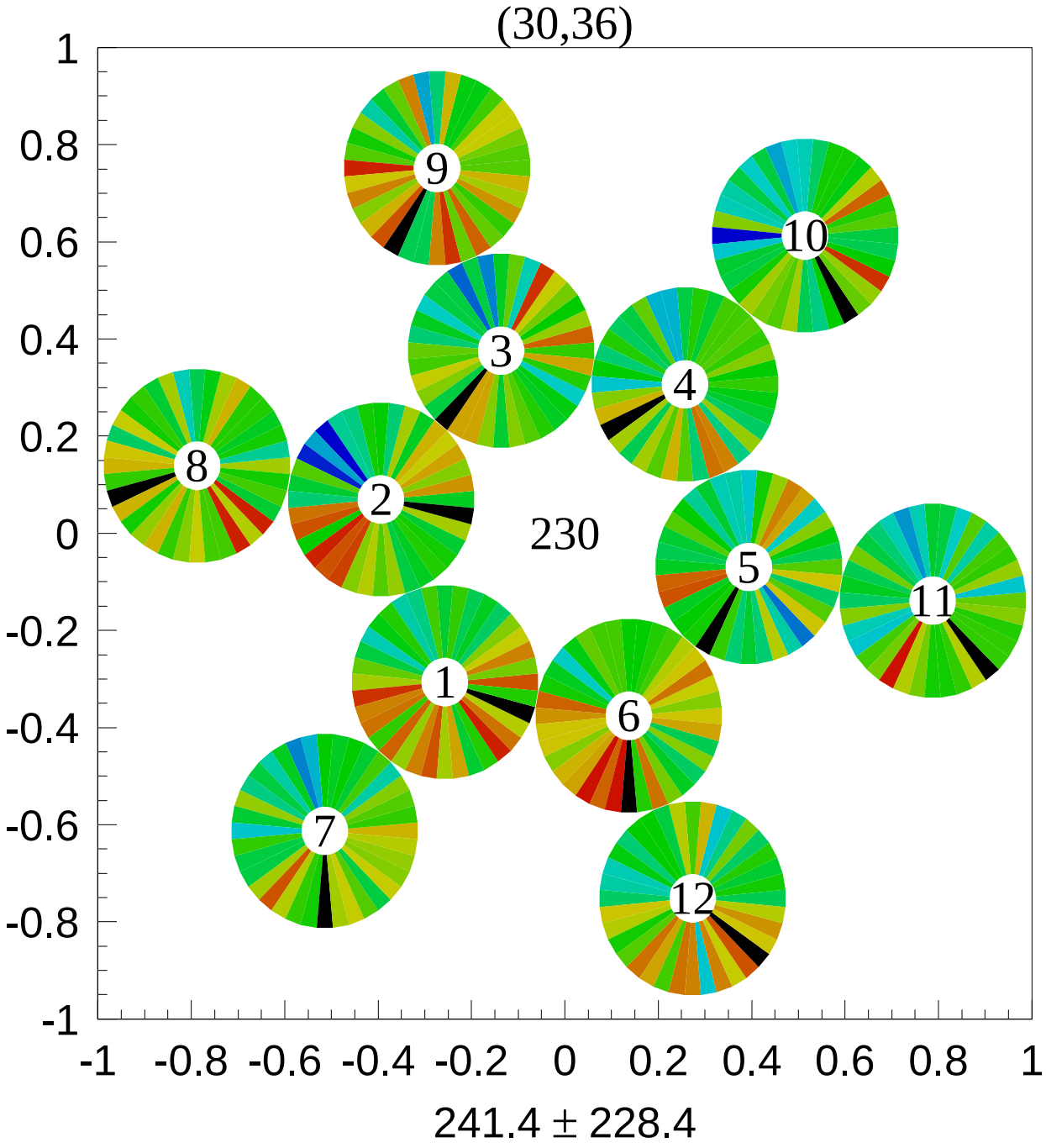

(30,35)
tilted LEDs
116 122 127 127 124 128
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 126 127 127 125 123
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

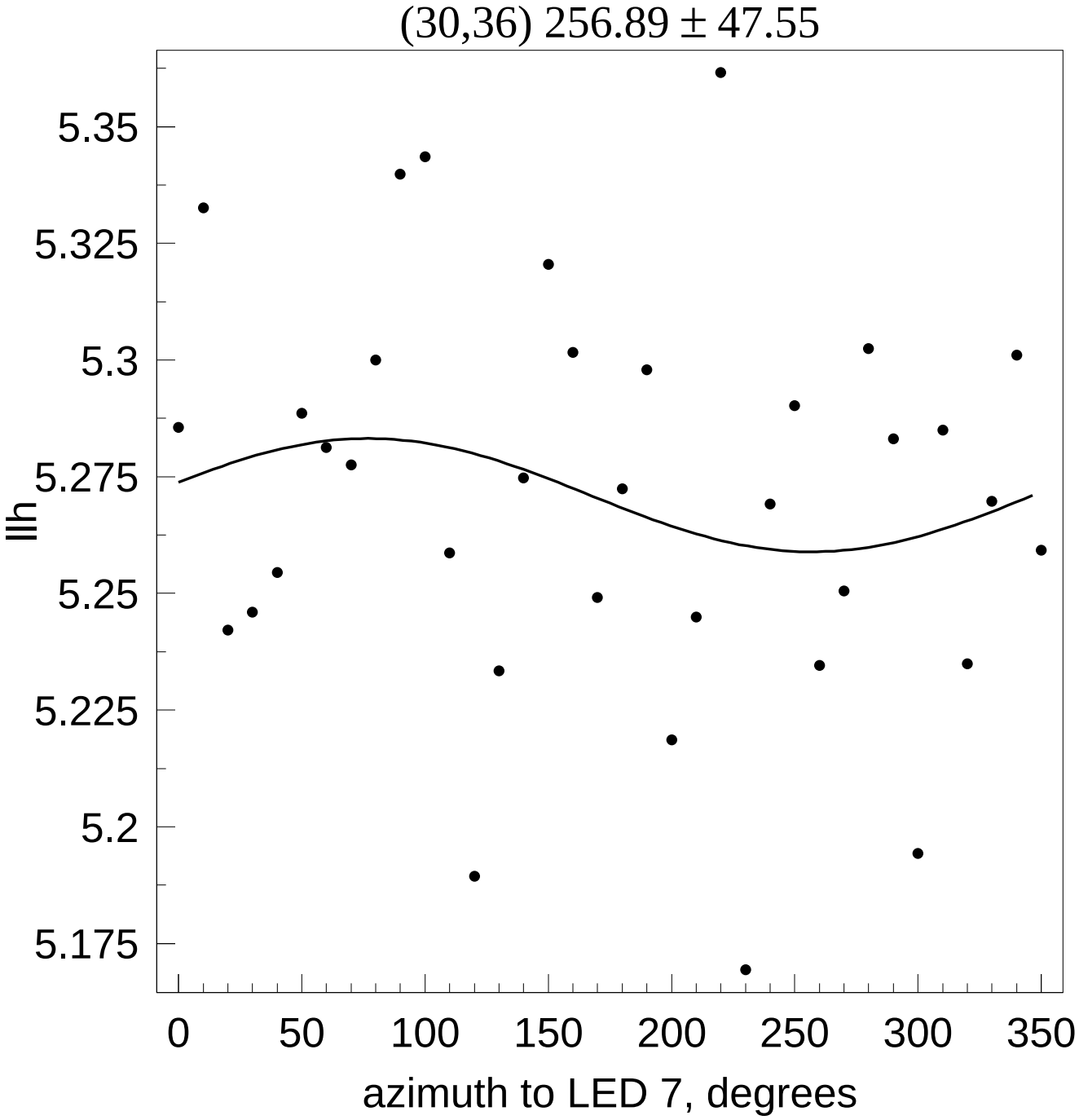

(30,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
210 ± 22.5
200
1
2
3
4
5
6
7
8
9
10
11
12

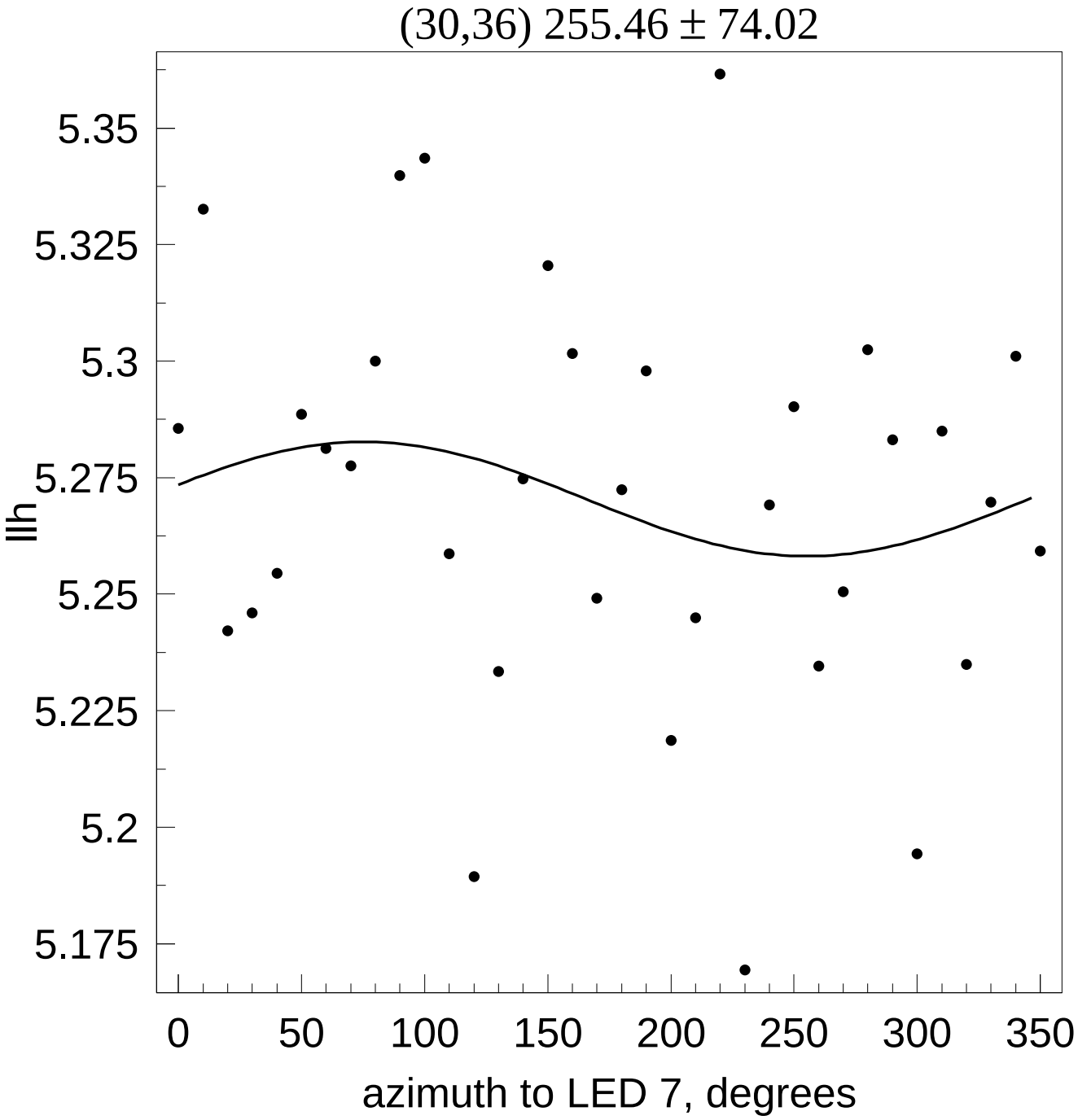

(30,35) 223.48 ± 2.64
2.95
2.9
2.85
2.8
2.75
2.7
2.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

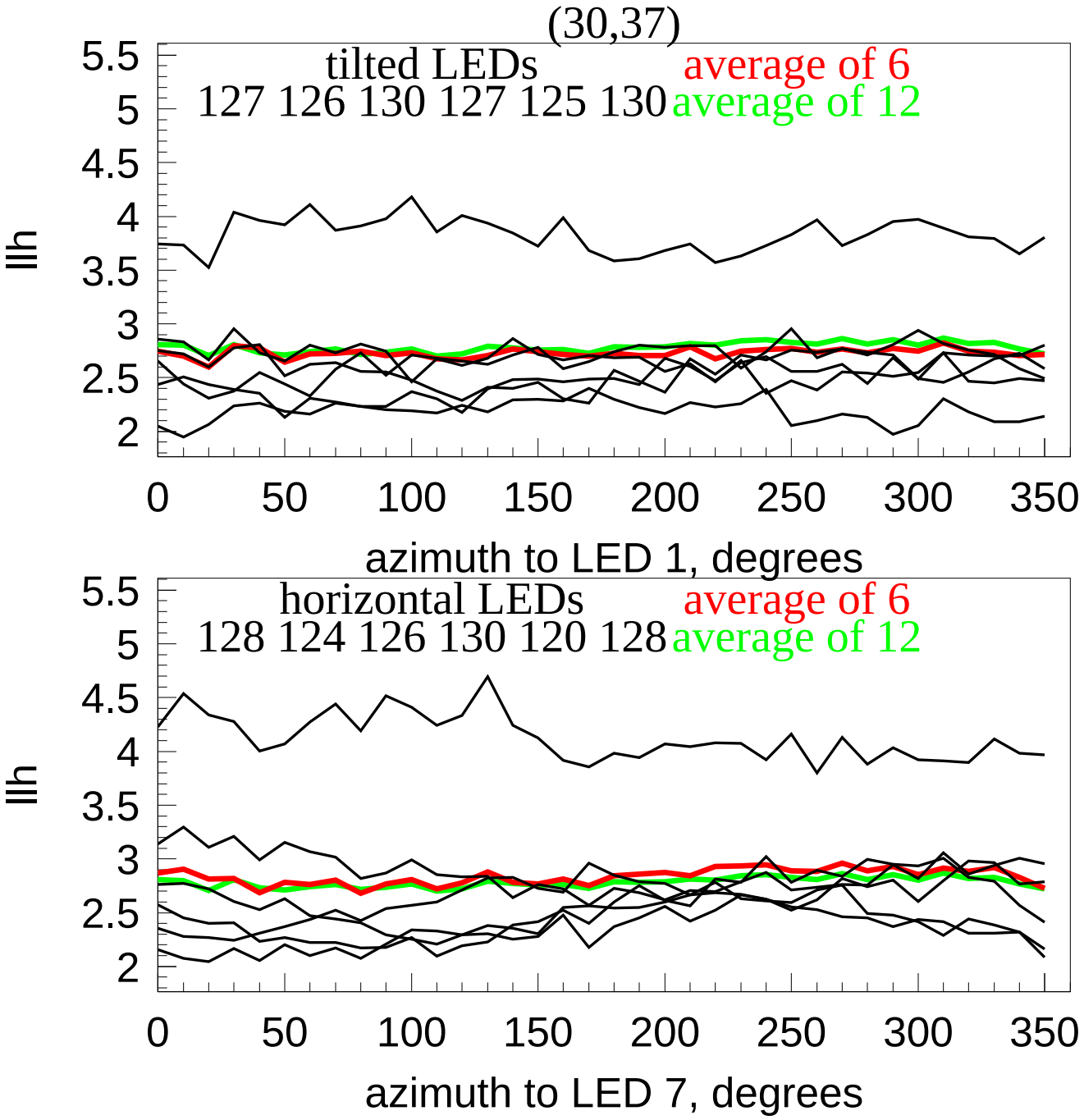

(30,35) 223.09 ± 2.72
2.95
2.9
2.85
2.8
2.75
2.7
2.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

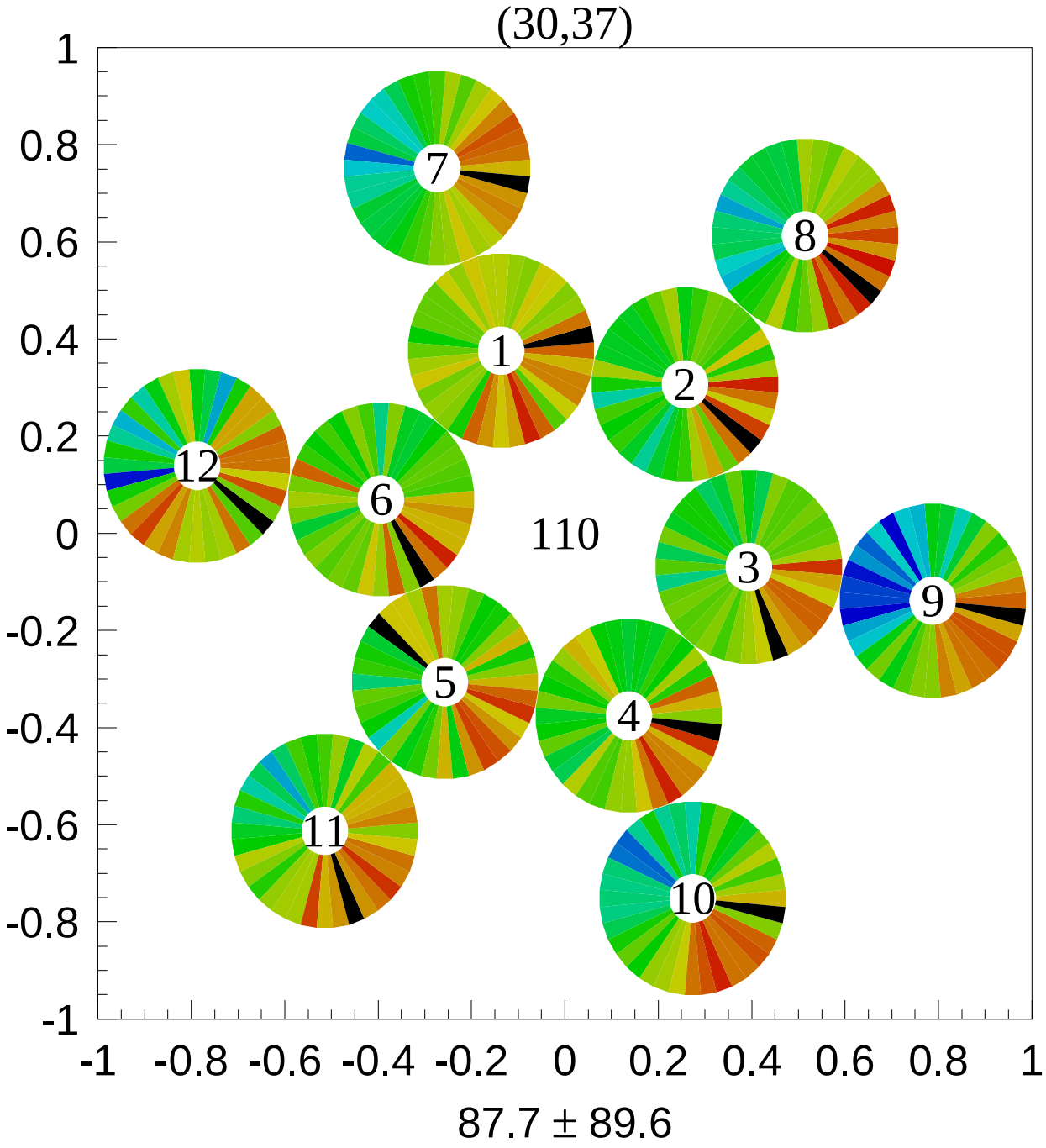

(30,36)
tilted LEDs
128 124 130 123 124 133
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
134 125 131 127 126 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

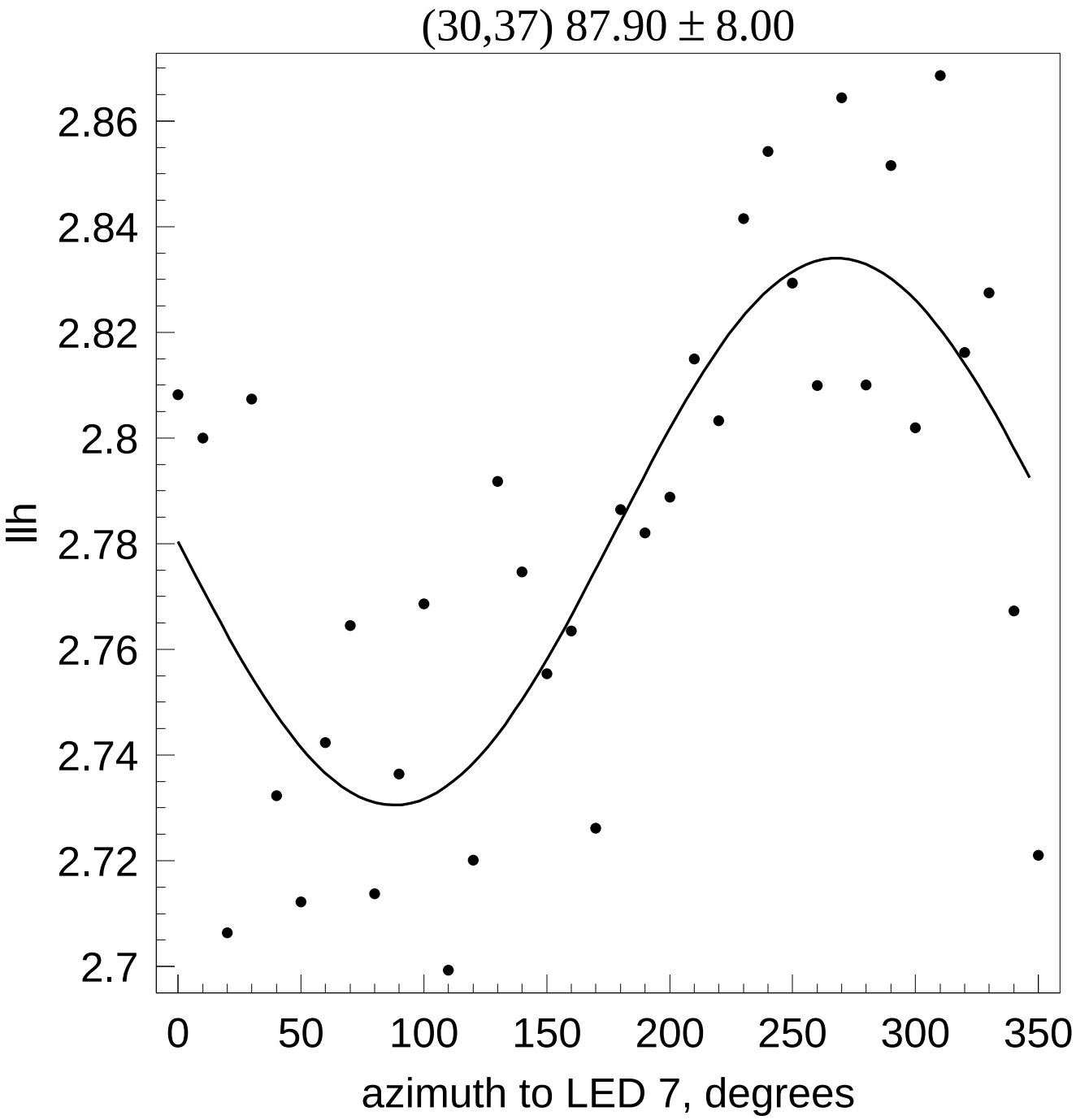

(30,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
241.4 ± 228.4
9
10
3
4
8
2
230
5
11
1
6
7
12

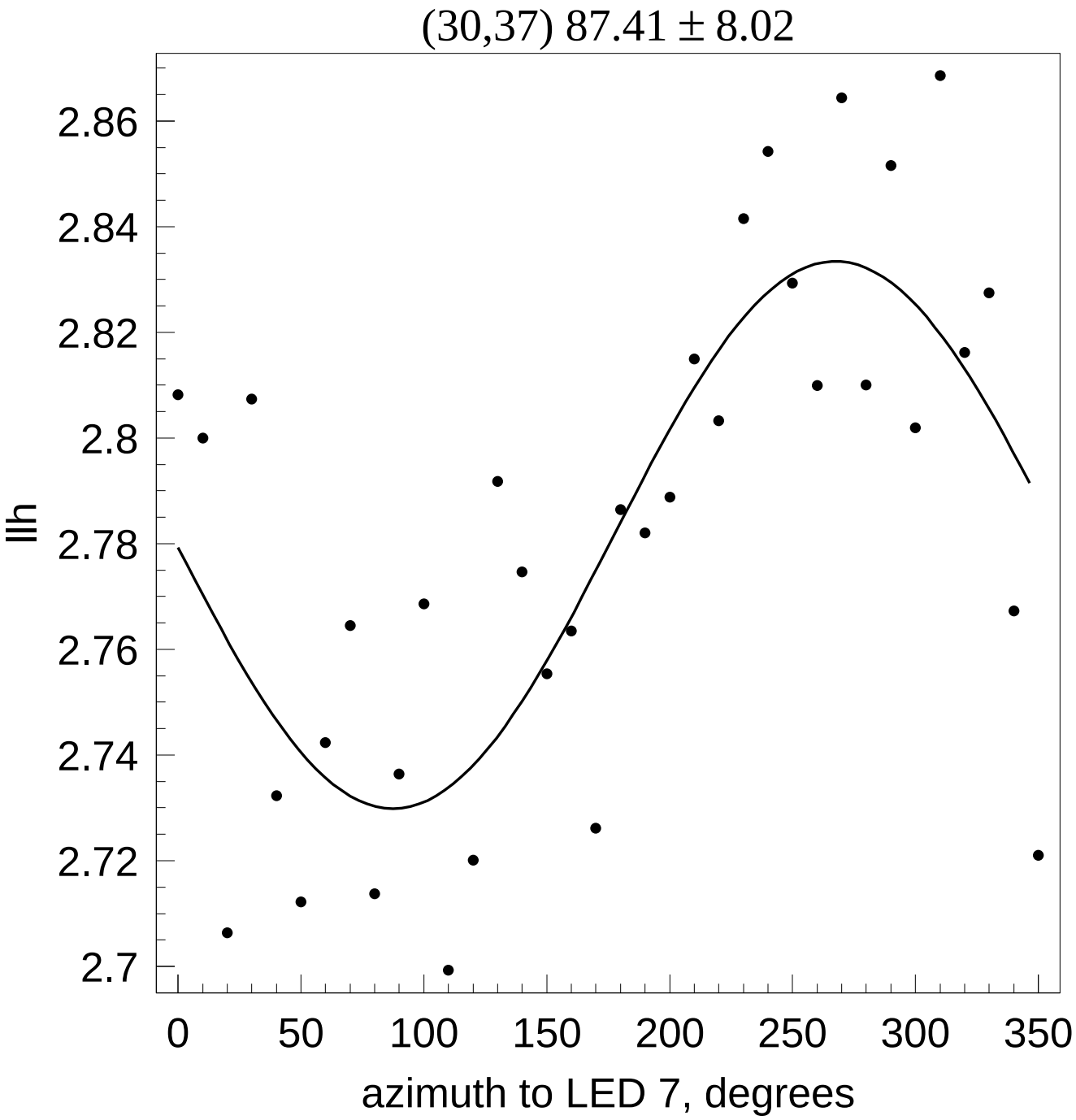

(30,36) 256.89 ± 47.55
5.35
5.325
5.3
5.275
5.25
5.225
5.2
5.175
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

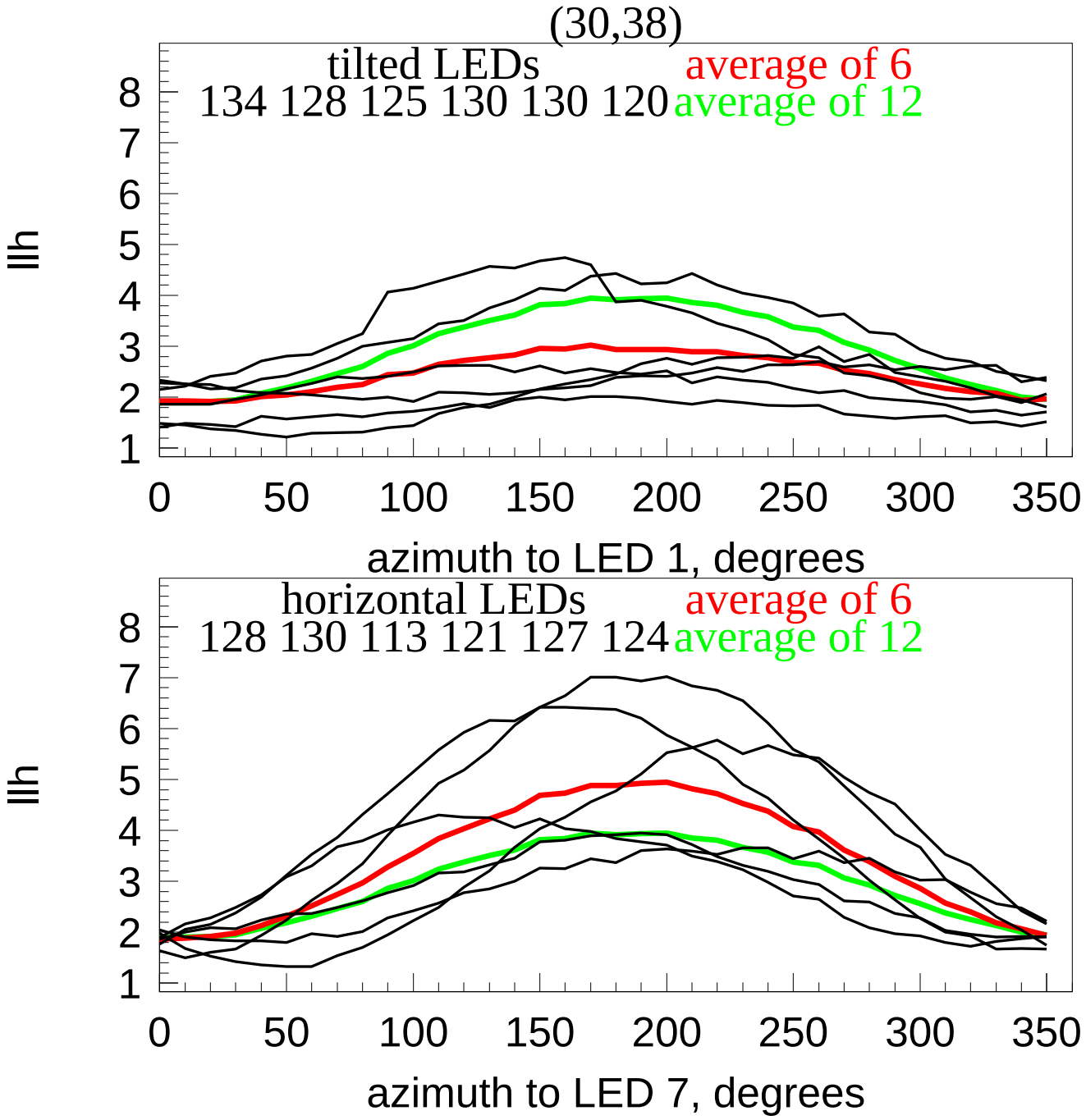

(30,36) 255.46 ± 74.02
5.35
5.325
5.3
5.275
5.25
5.225
5.2
5.175
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

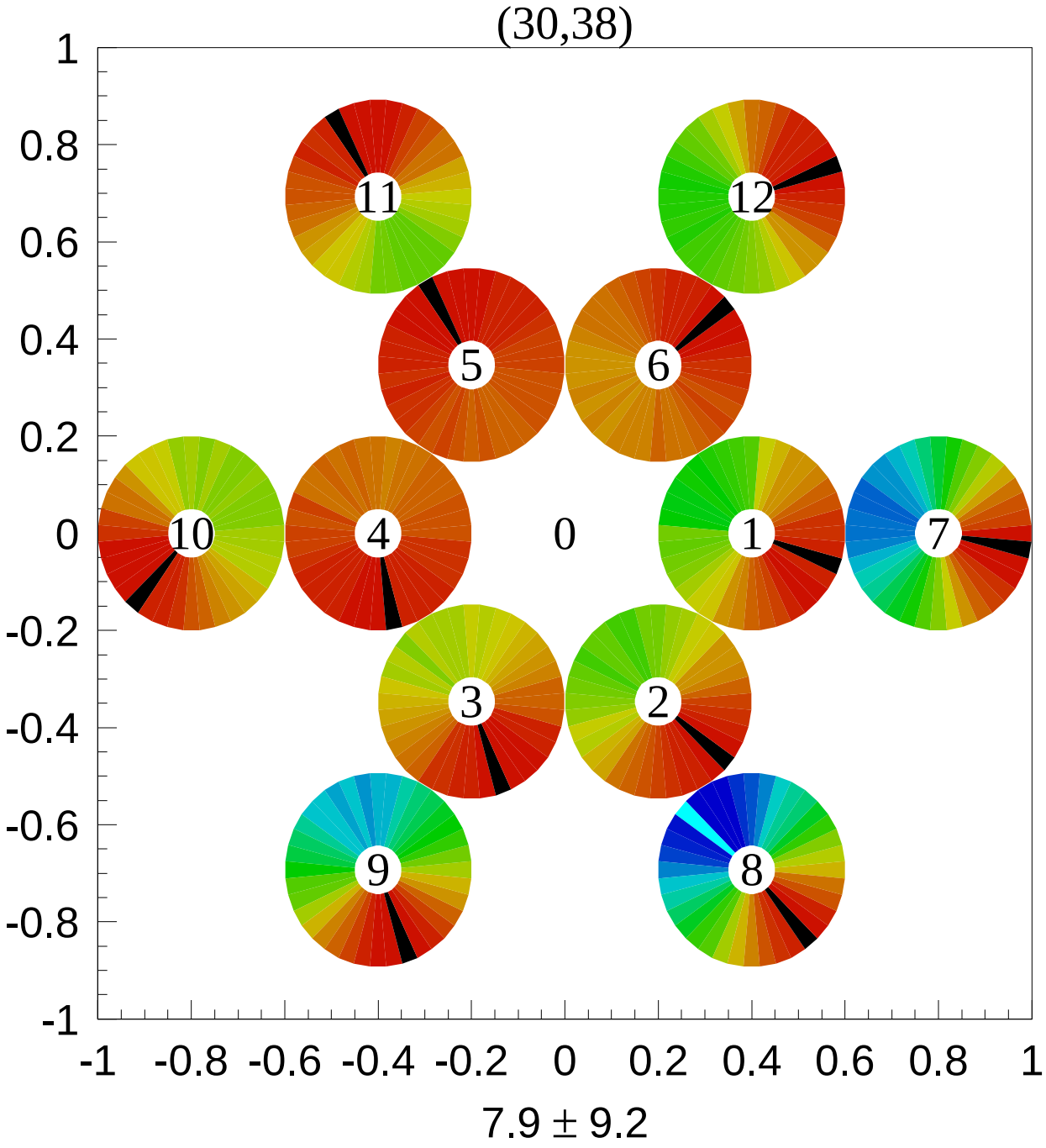

(30,37)
tilted LEDs
127 126 130 127 125 130
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 124 126 130 120 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

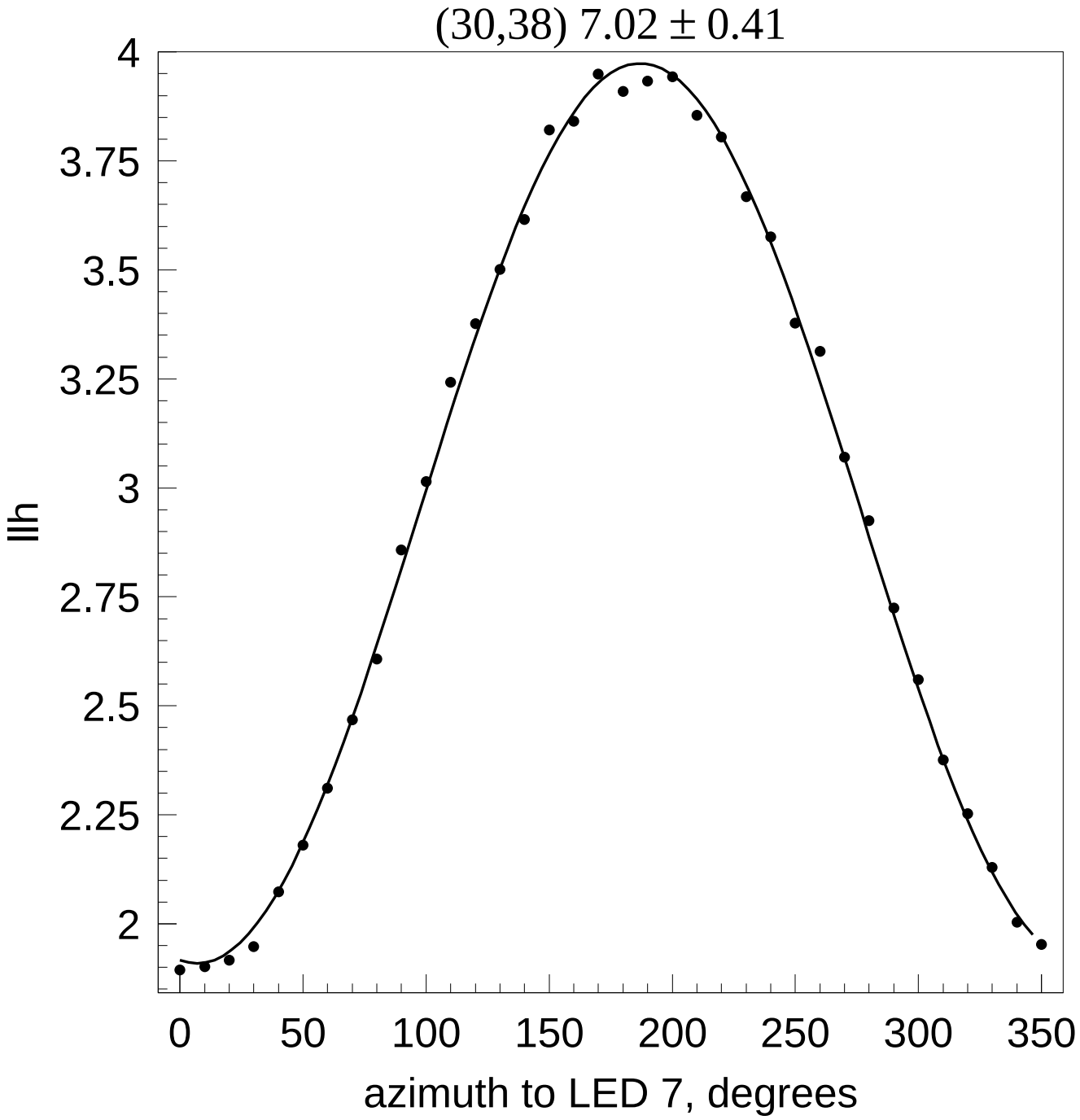

(30,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
87.7 ± 89.6

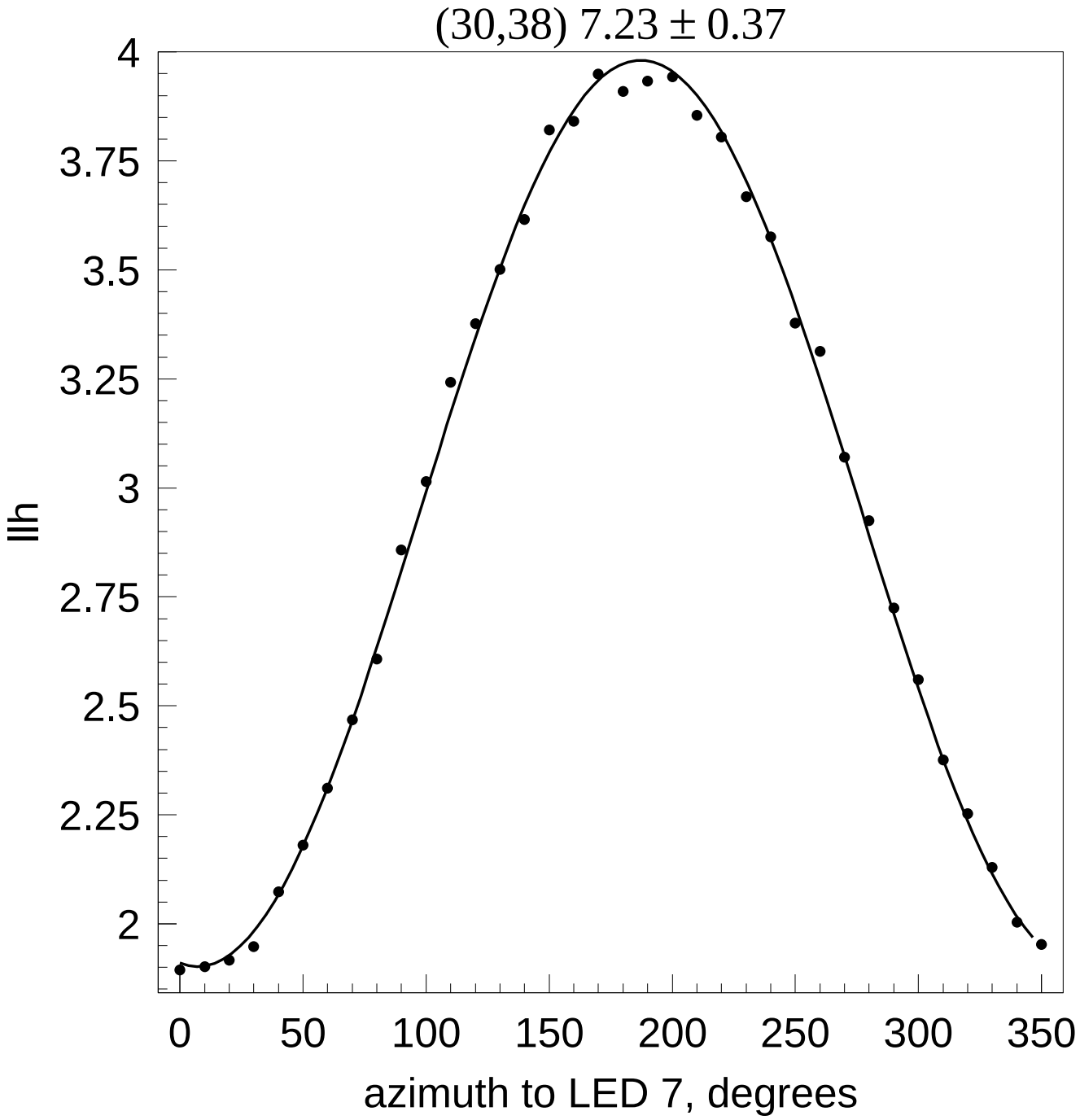

(30,37) 87.90 ± 8.00
2.86
2.84
2.82
2.8
2.78
2.76
2.74
2.72
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

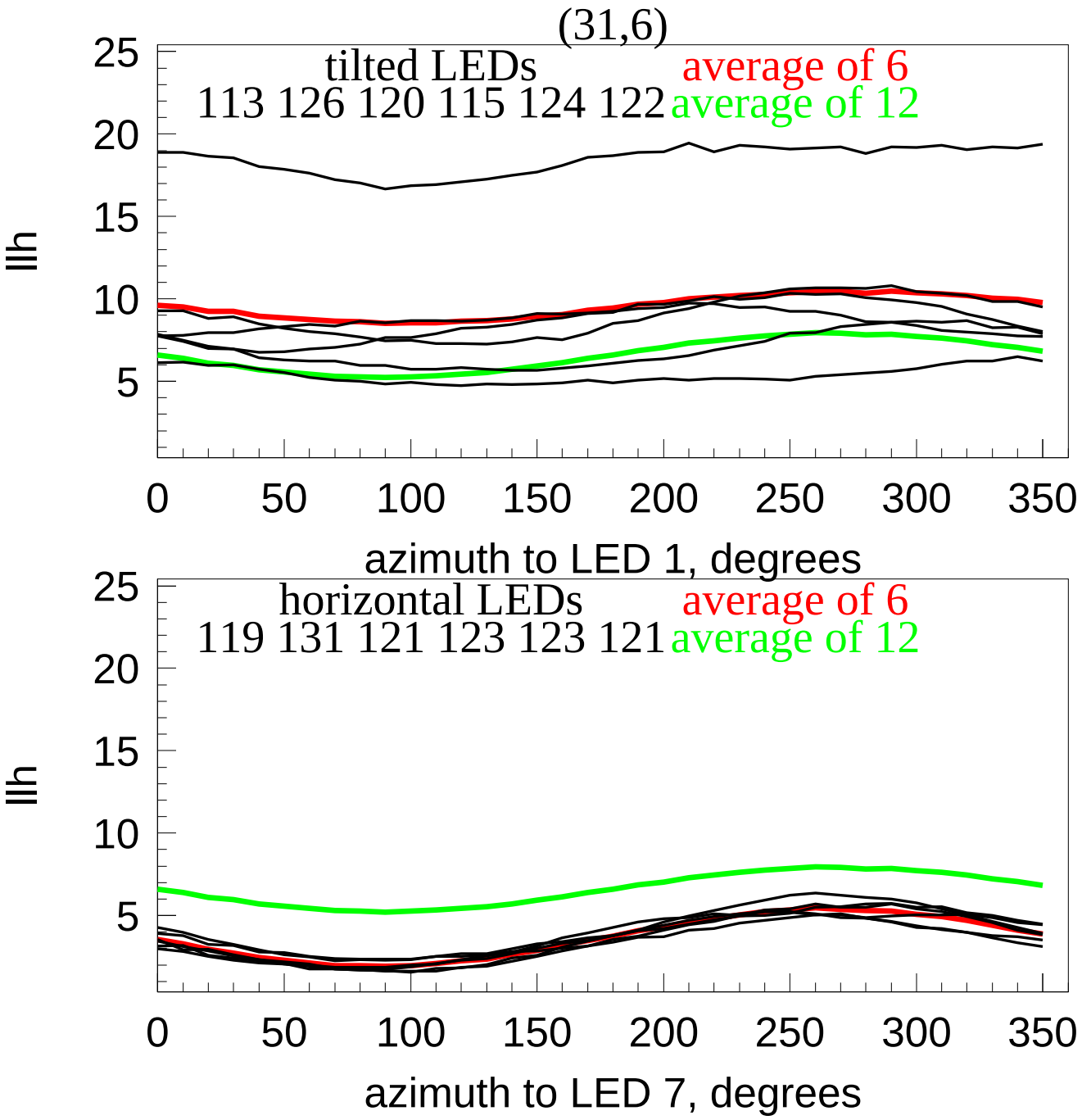

(30,37) 87.41 ± 8.02
2.86
2.84
2.82
2.8
2.78
2.76
2.74
2.72
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

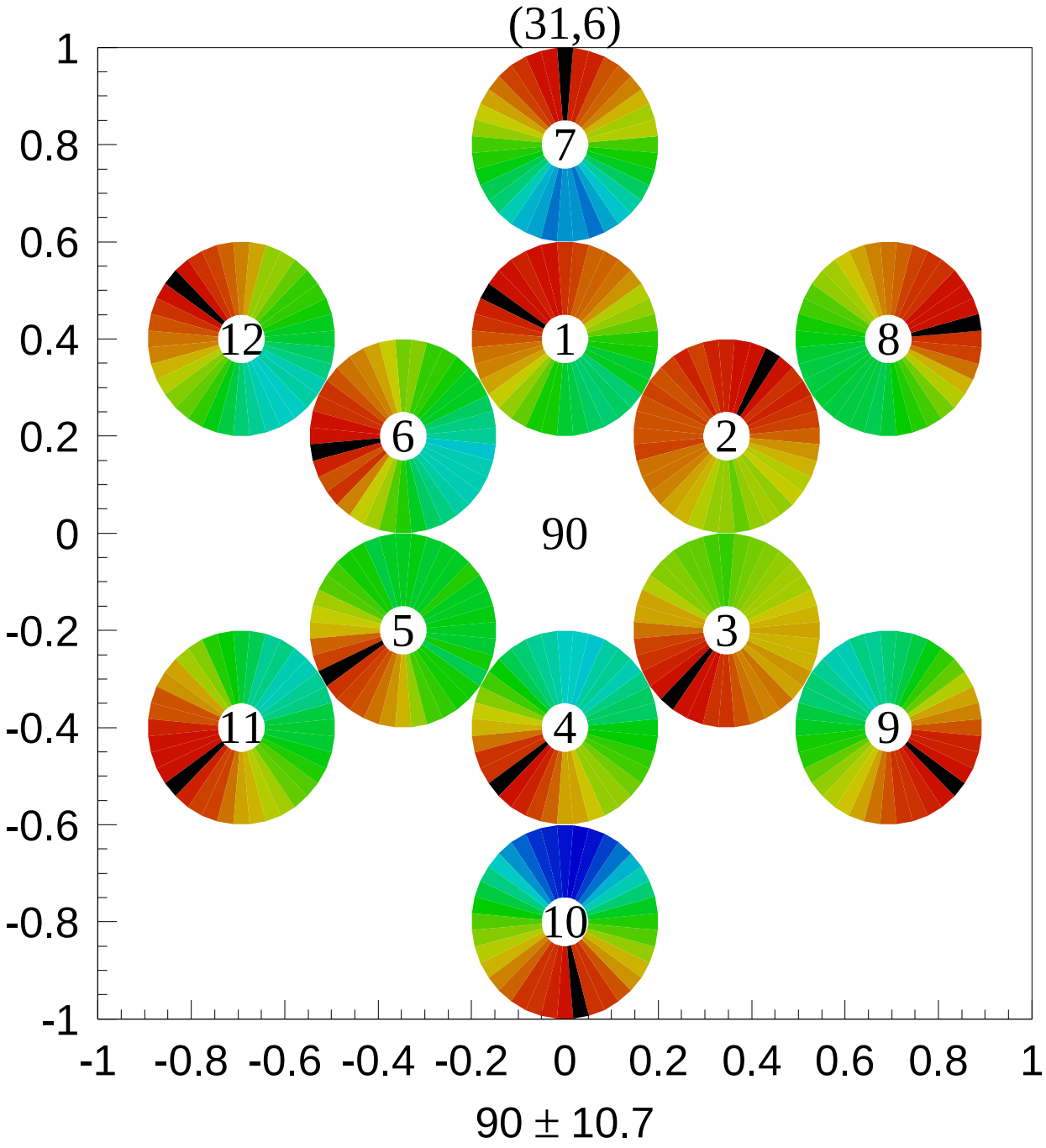

(30,38)
tilted LEDs
134 128 125 130 130 120
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 130 113 121 127 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

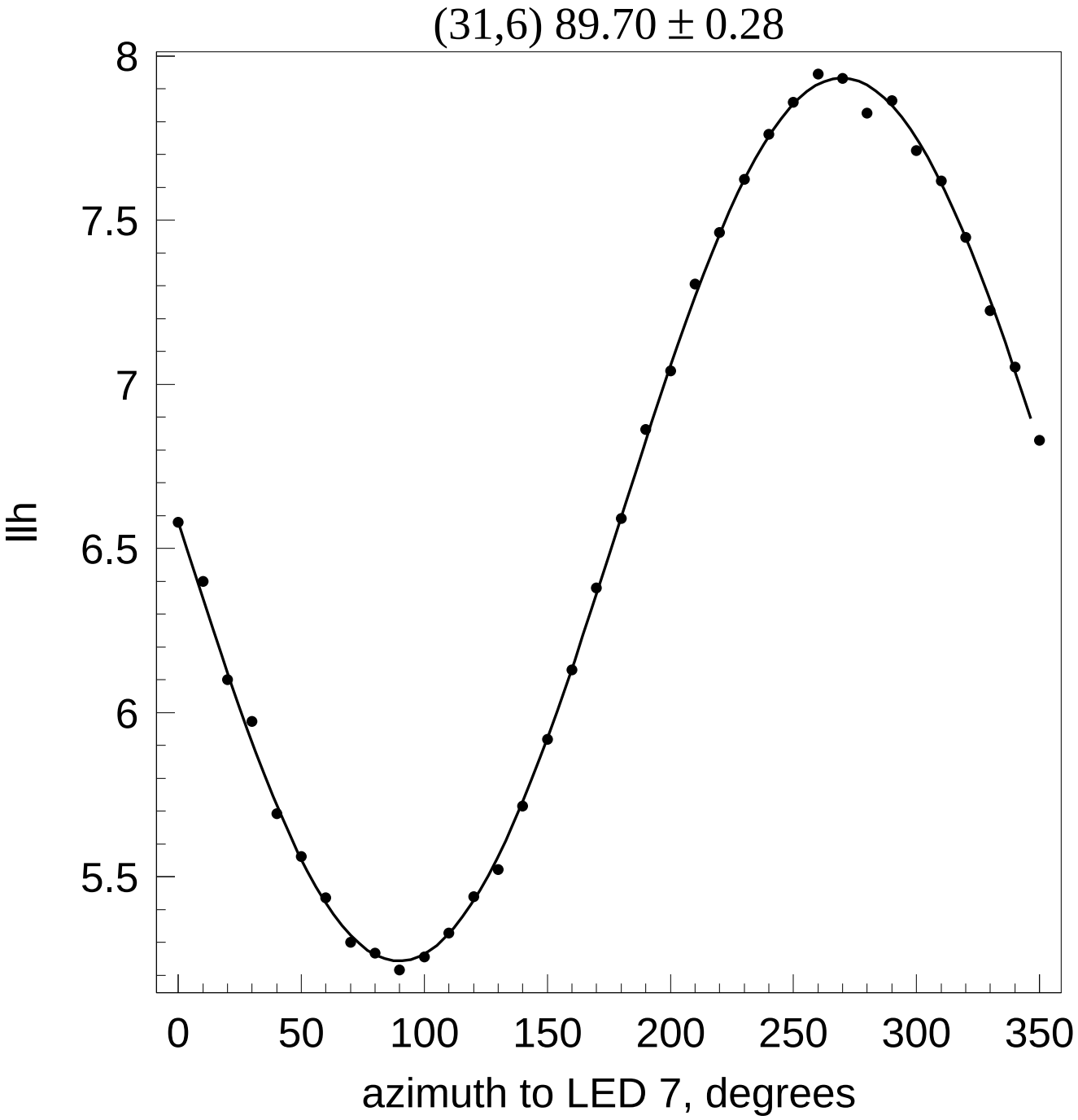

(30,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
7.9 ± 9.2

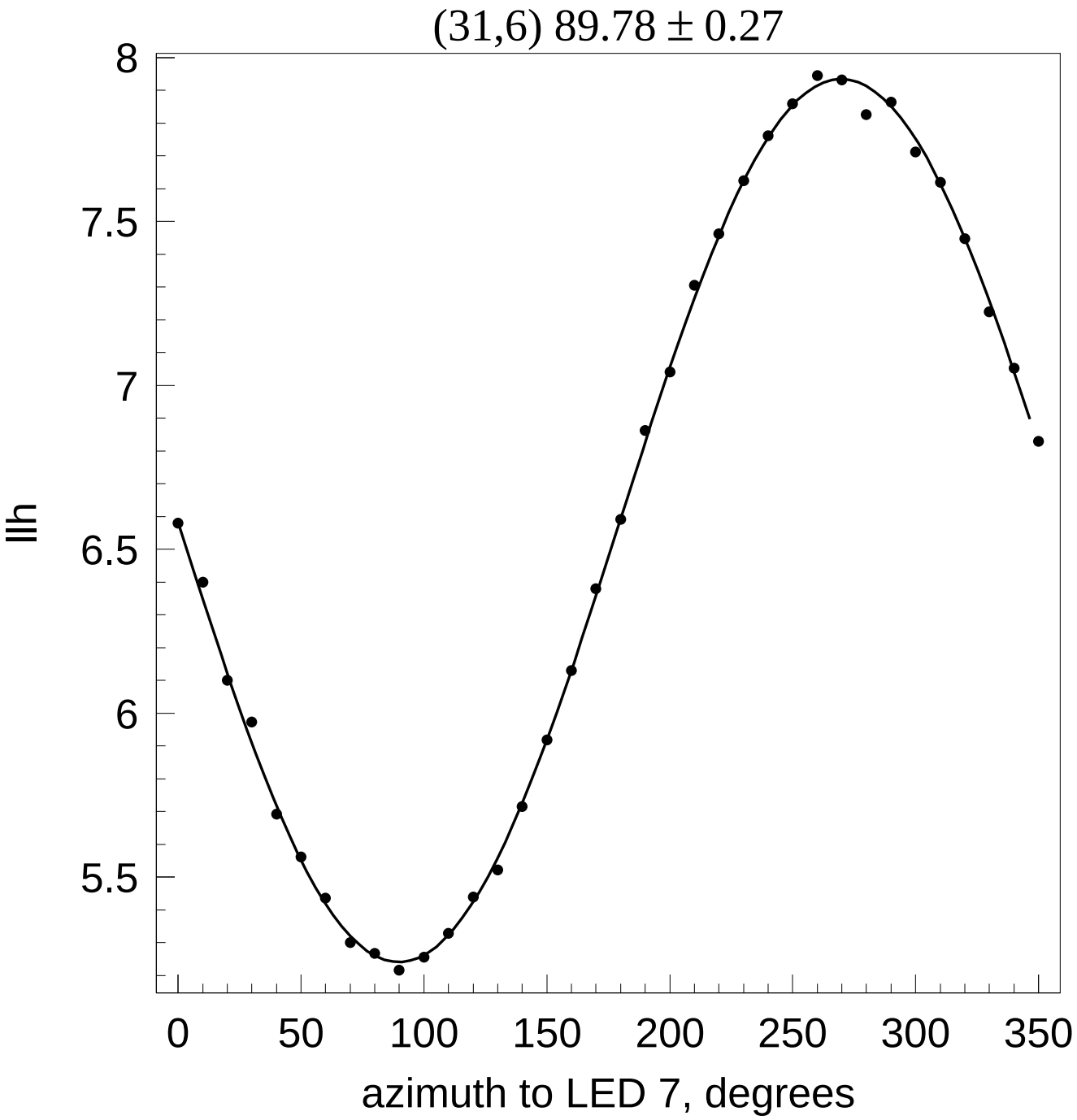

(30,38) 7.02 ± 0.41
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

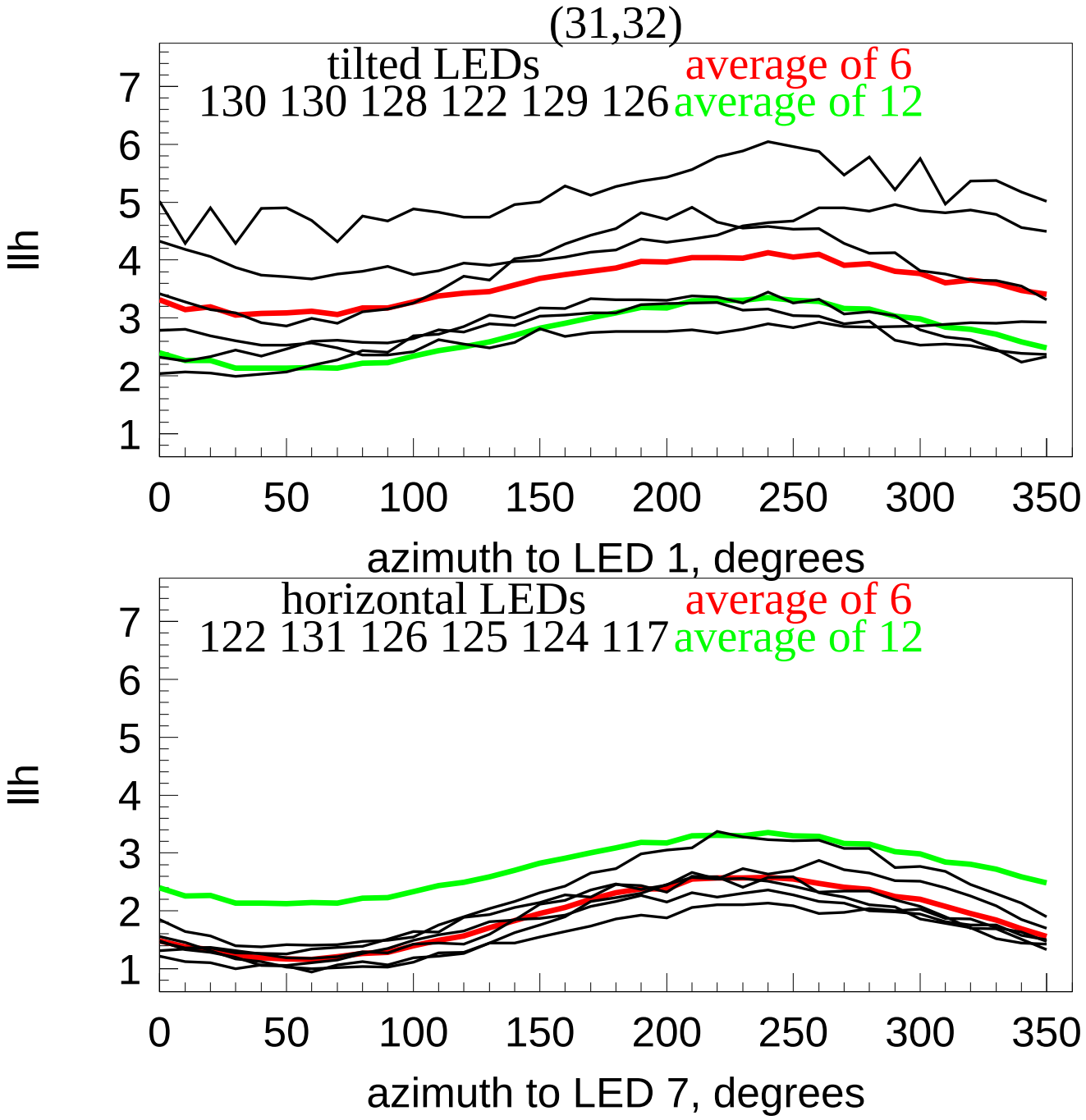

(30,38) 7.23 ± 0.37
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

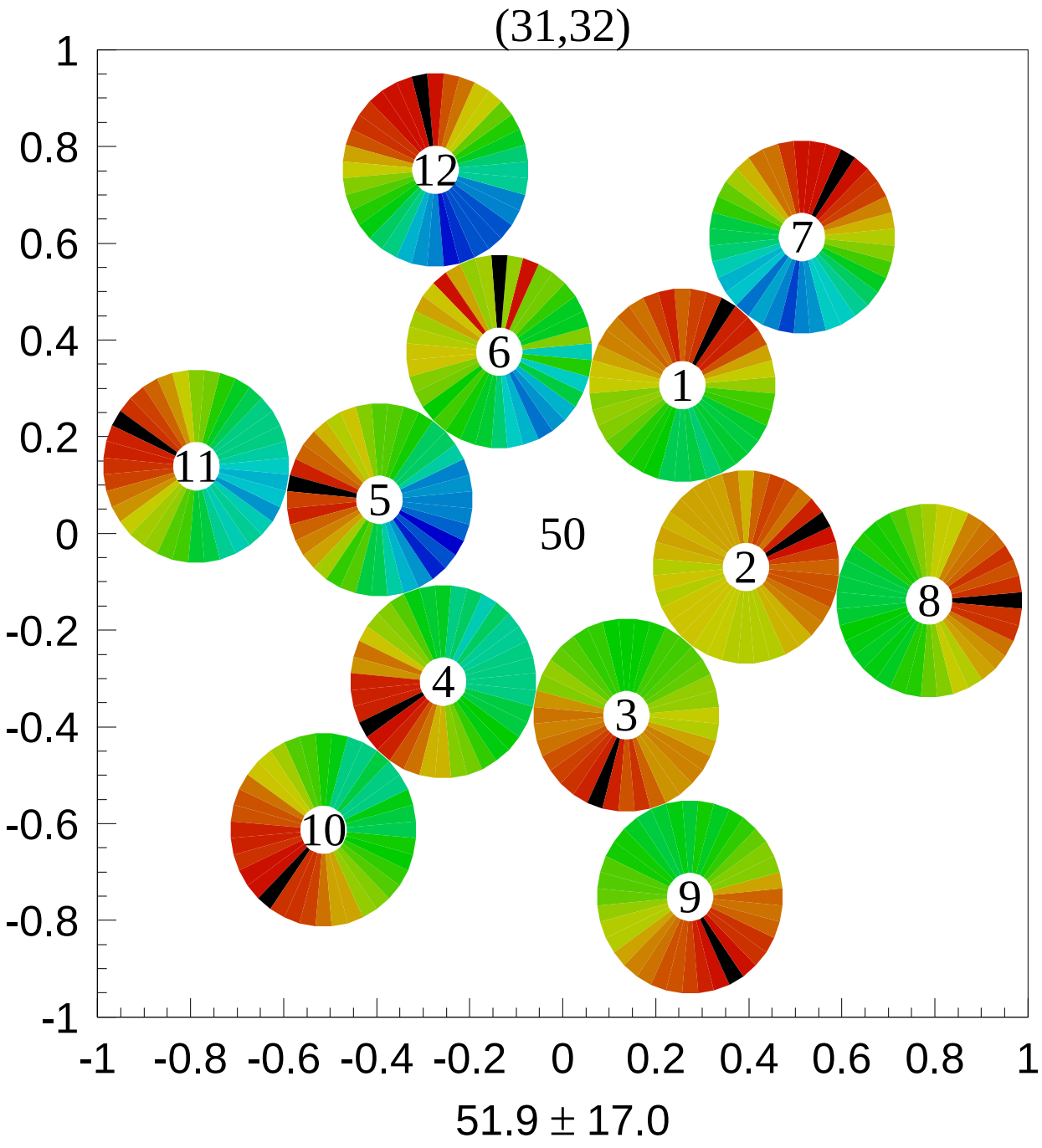

(31,6)
tilted LEDs
113 126 120 115 124 122
average of 6
average of 12
llh
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 131 121 123 123 121
average of 6
average of 12
llh
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

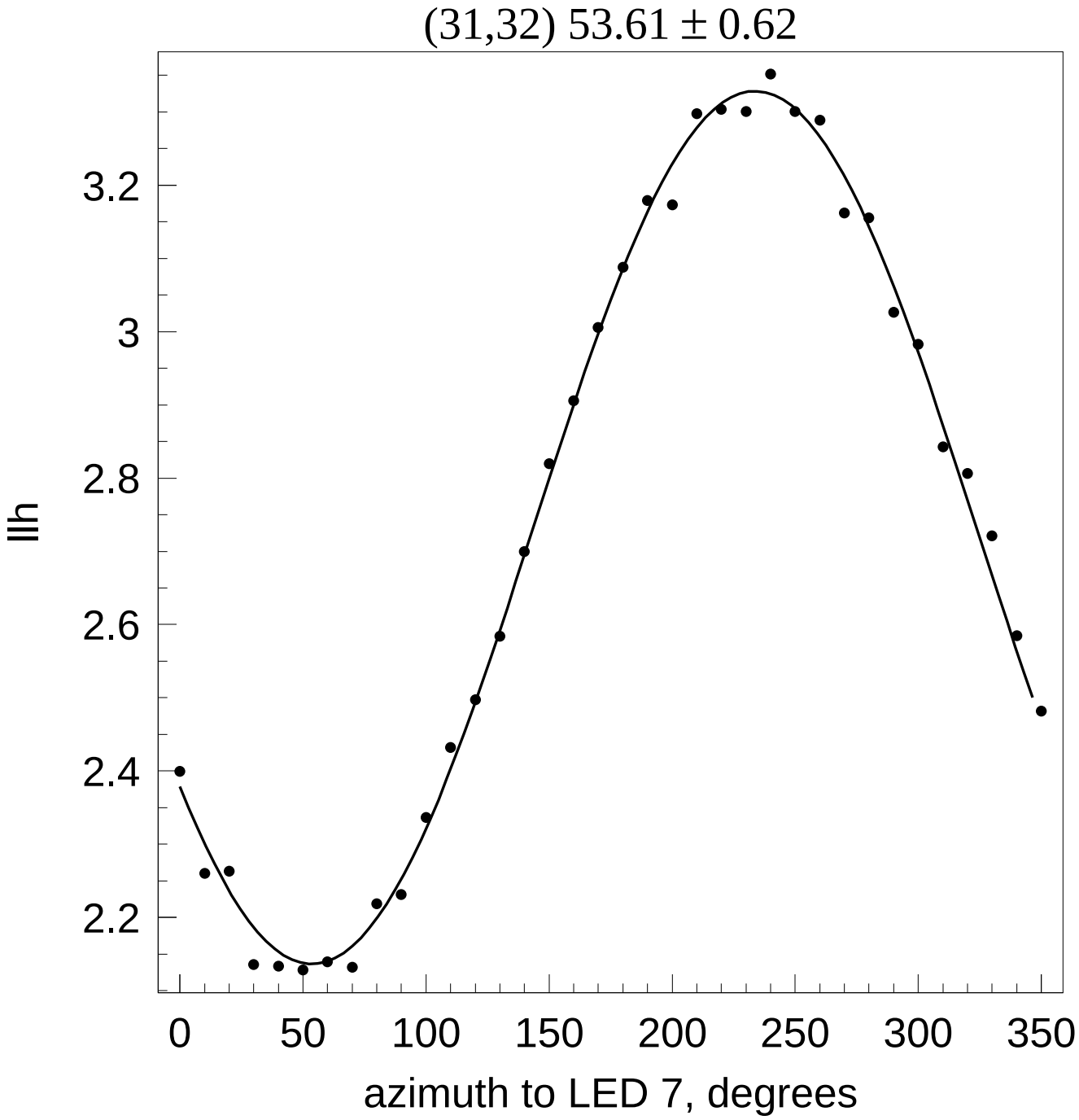

(31,6)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
90 ± 10.7
7
12
1
8
6
2
90
5
3
11
4
9
10

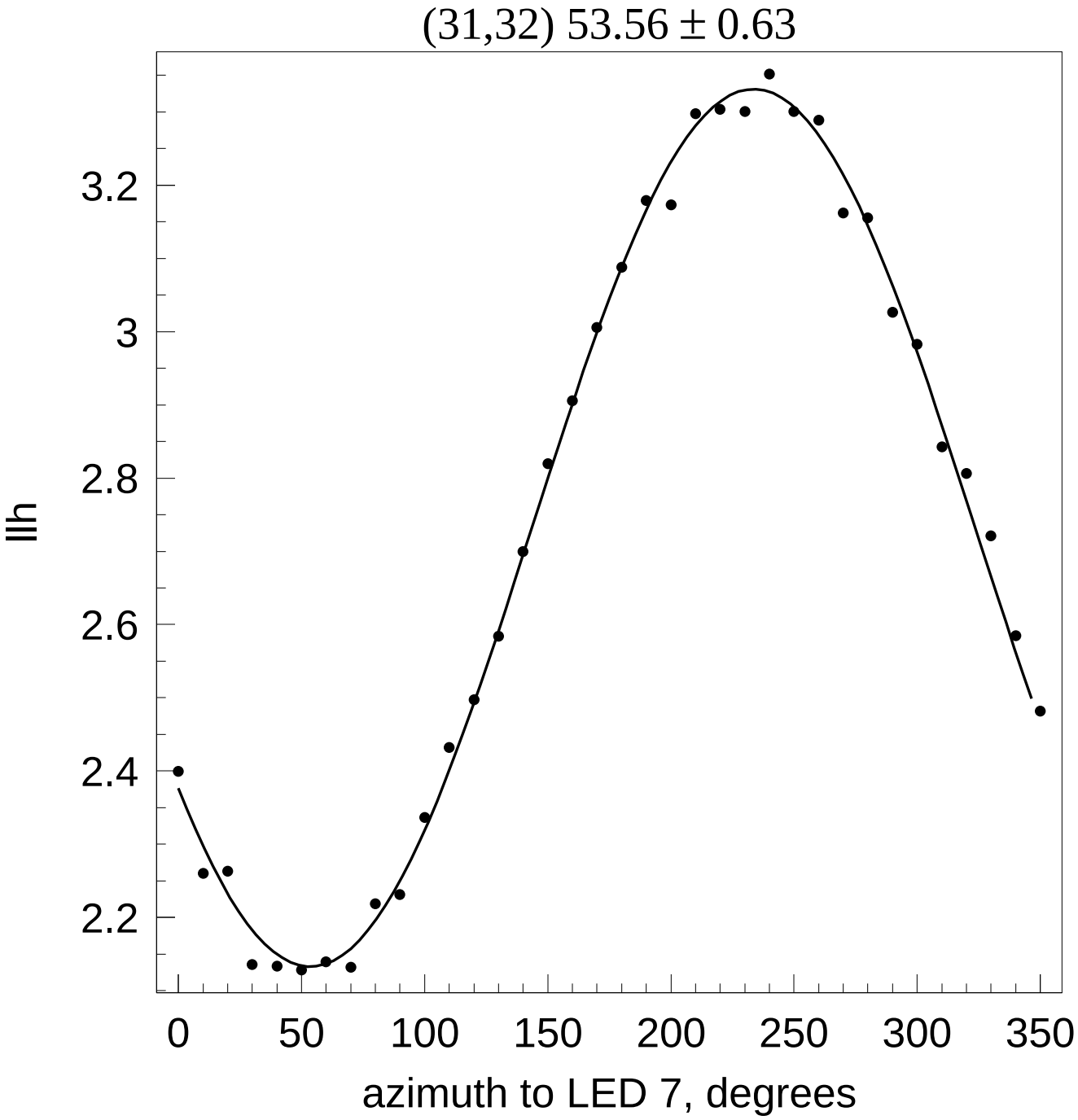

(31,6) 89.70 ± 0.28
8
7.5
7
6.5
6
5.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

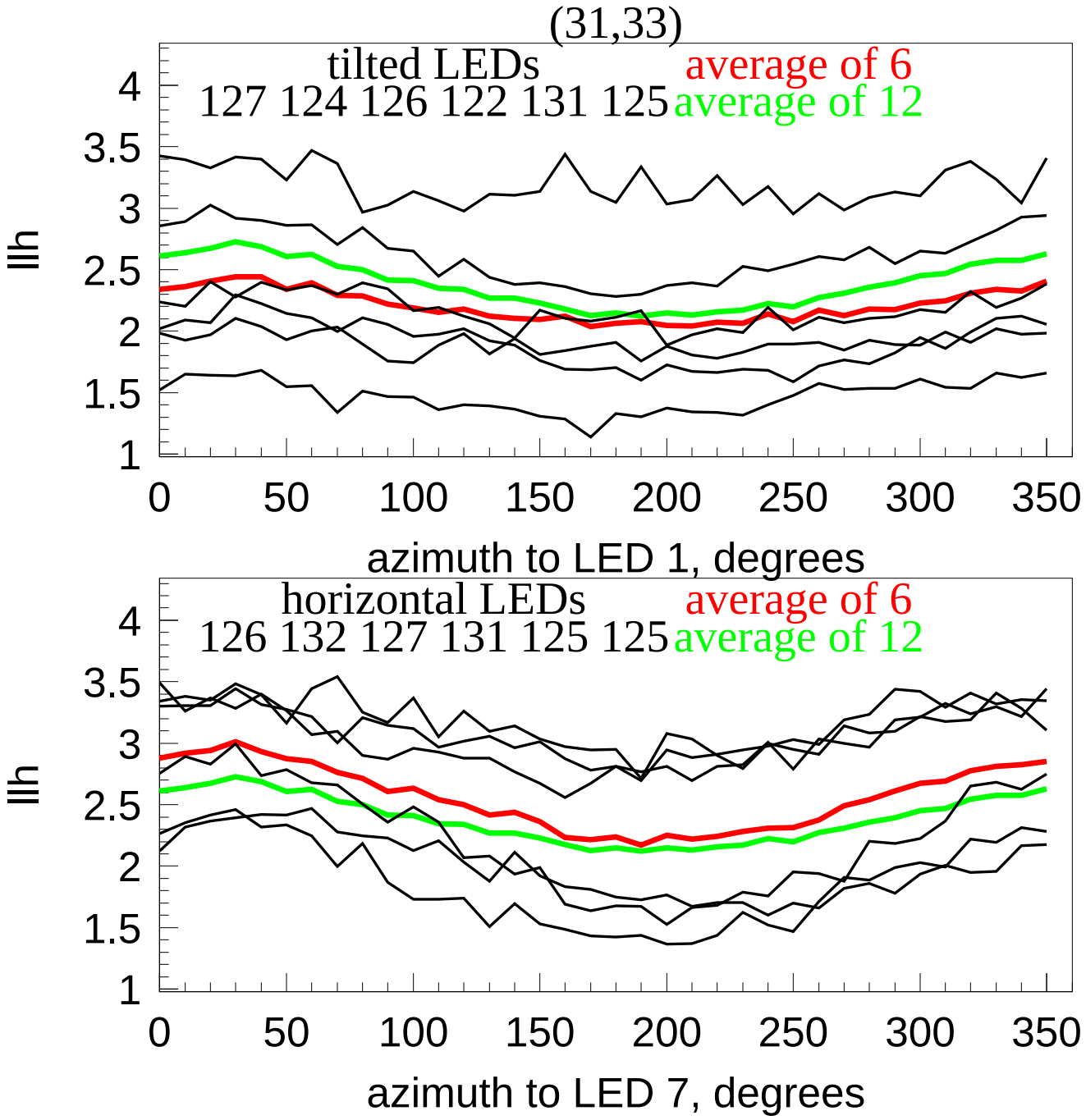

(31,6) 89.78 ± 0.27
8
7.5
7
6.5
6
5.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

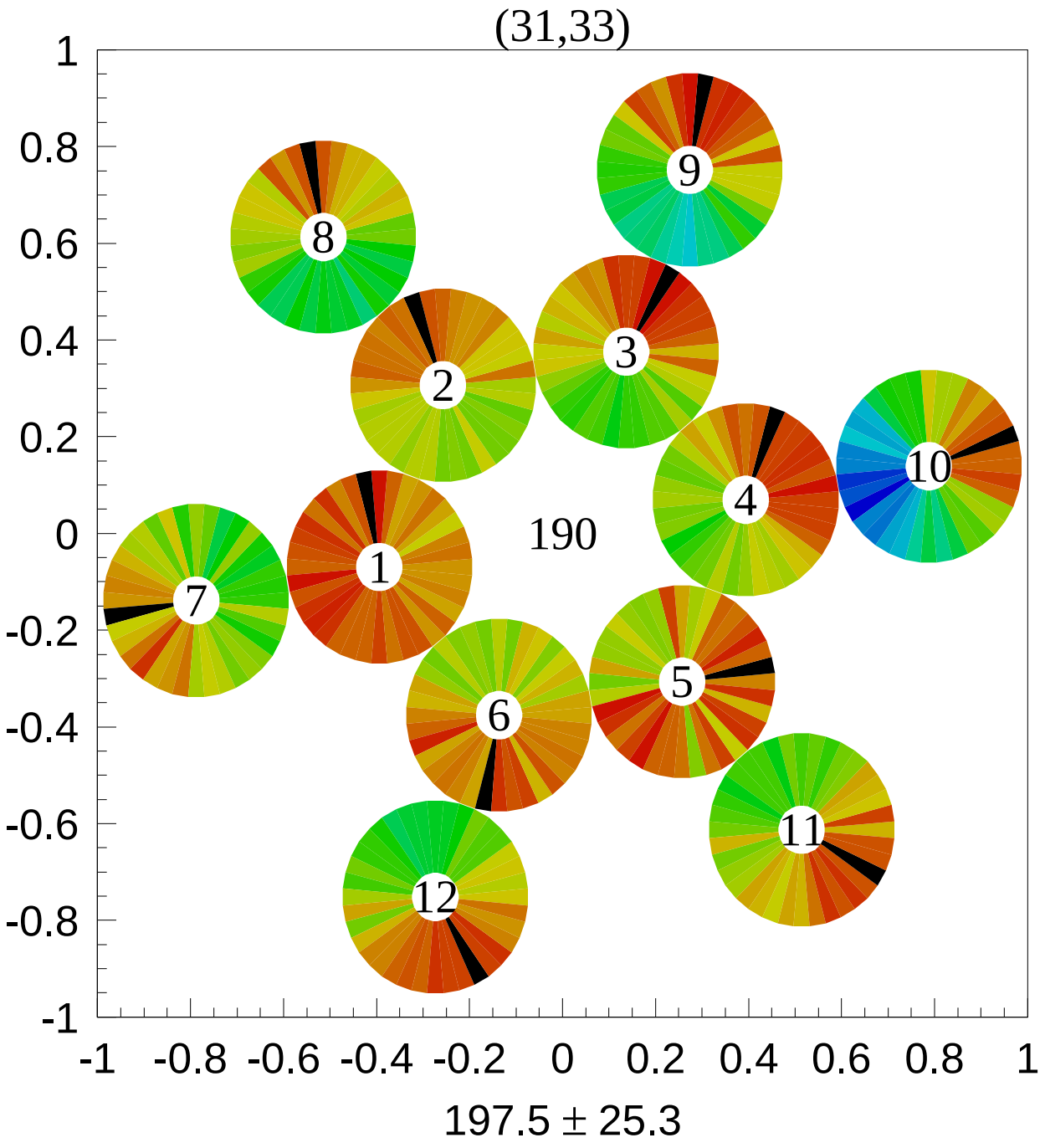

(31,32)
tilted LEDs
130 130 128 122 129 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 131 126 125 124 117
average of 6
average of 12
llh
azimuth to LED 7, degrees

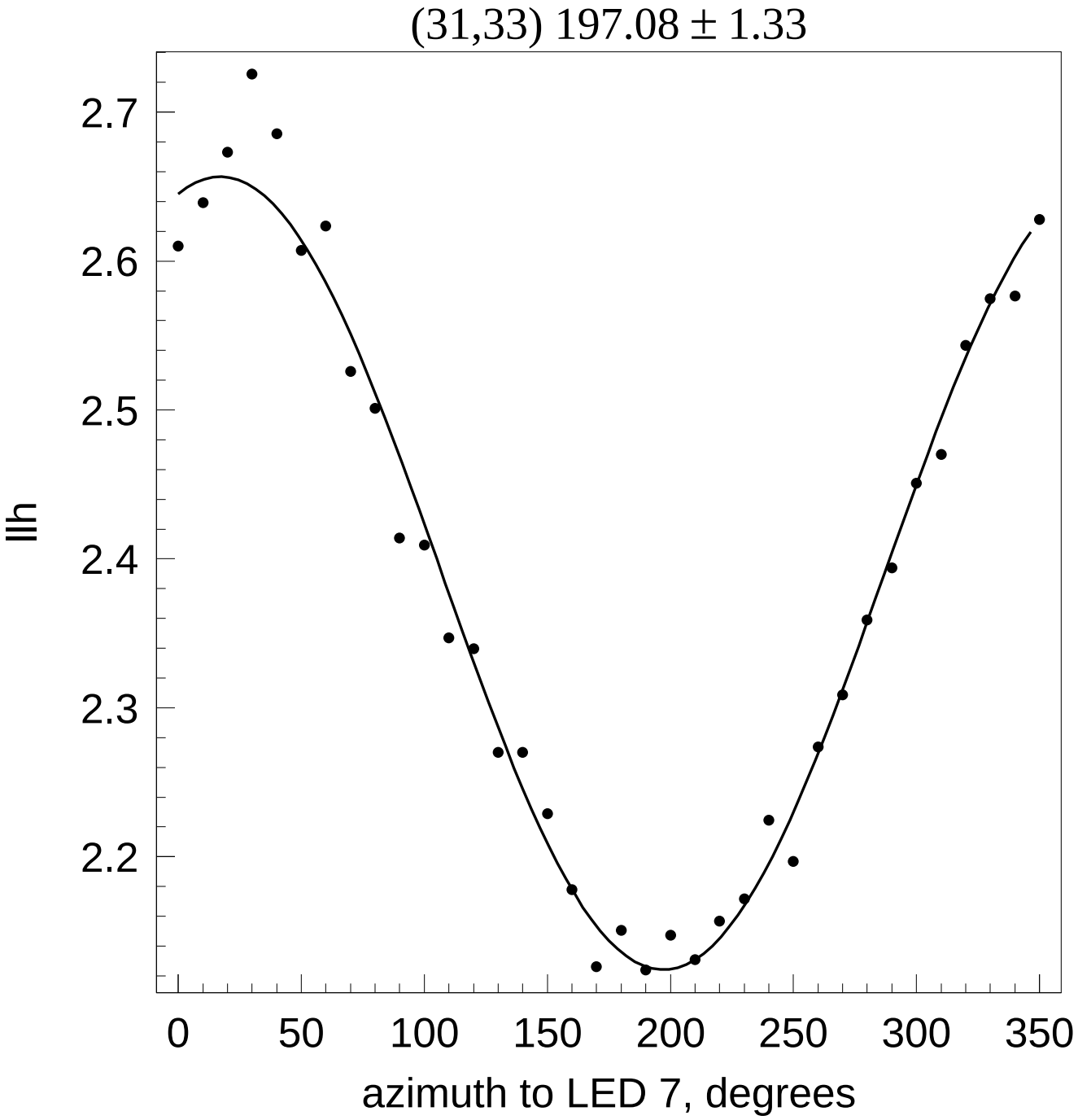

(31,32)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
51.9 ± 17.0

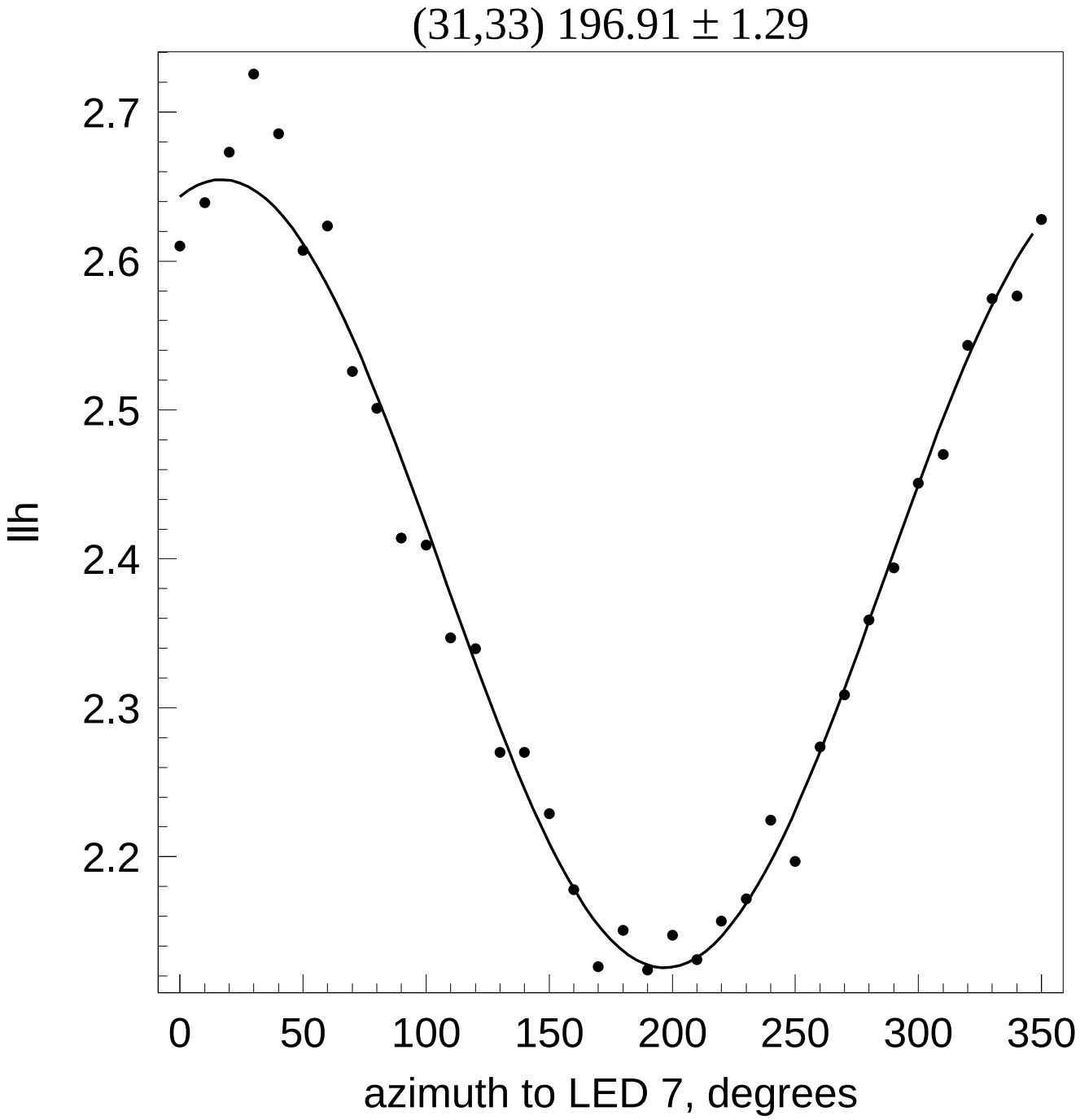

(31,32) 53.61 ± 0.62
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

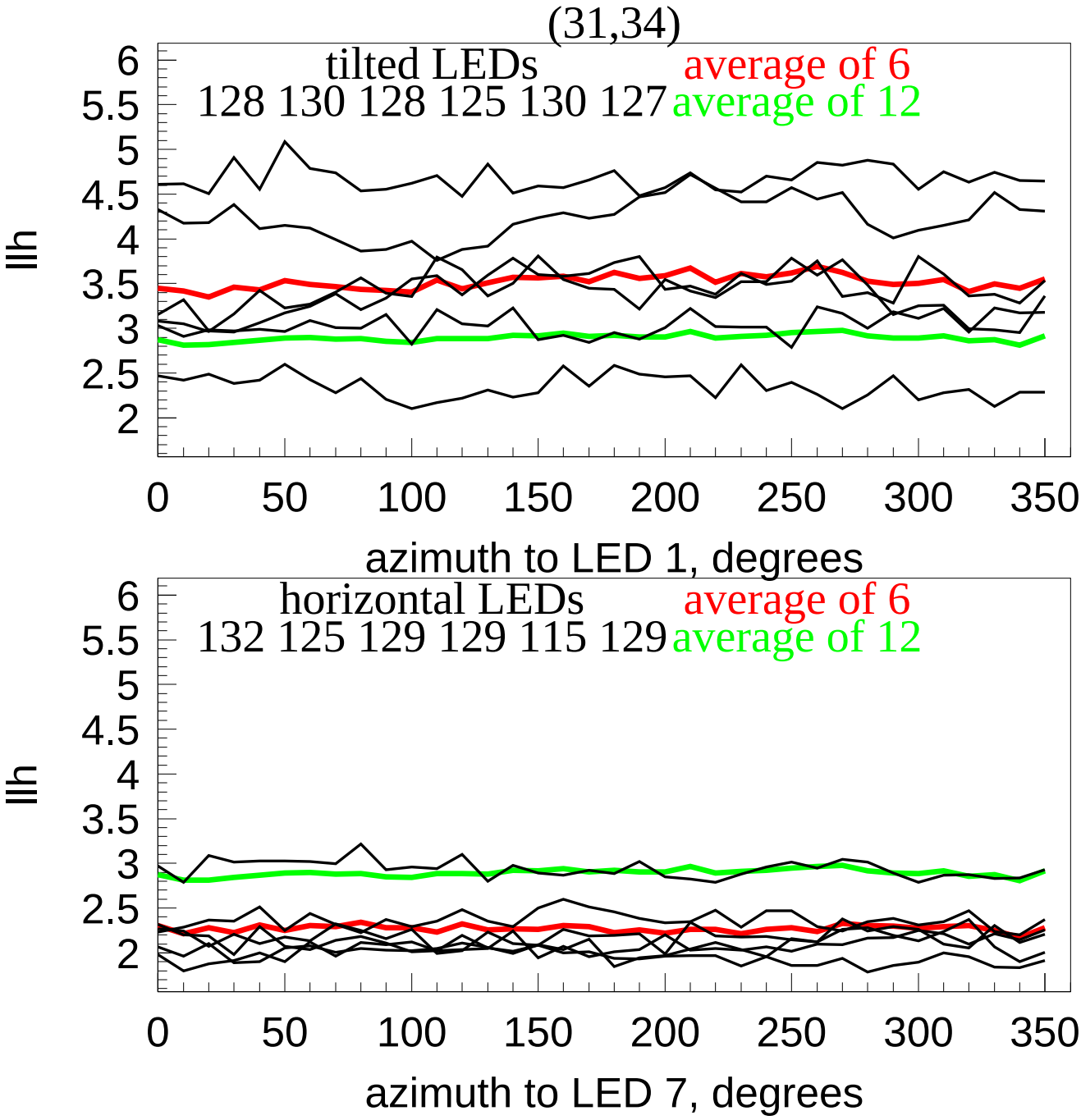

(31,32) 53.56 ± 0.63
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

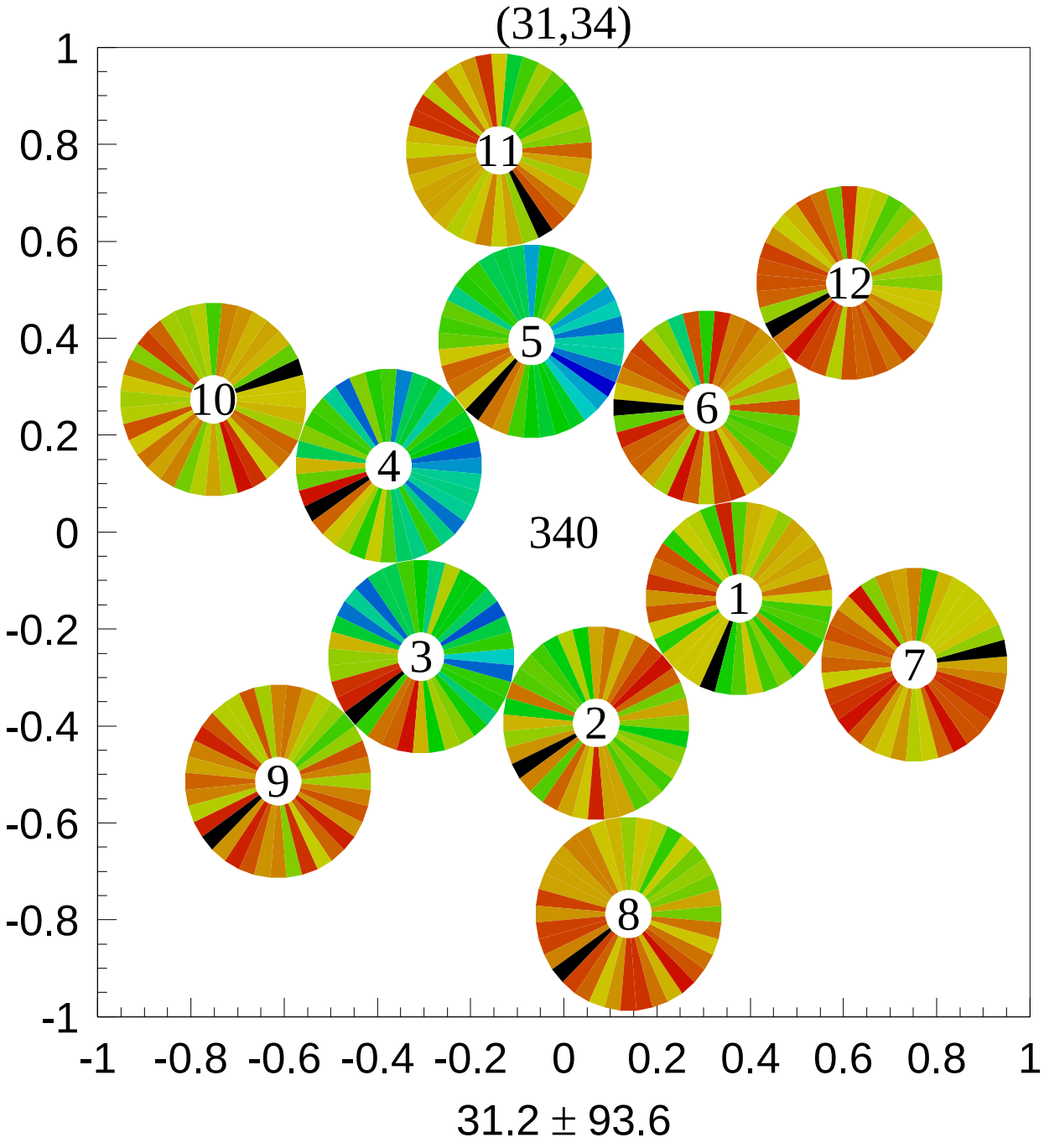

(31,33)
tilted LEDs
127 124 126 122 131 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 132 127 131 125 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

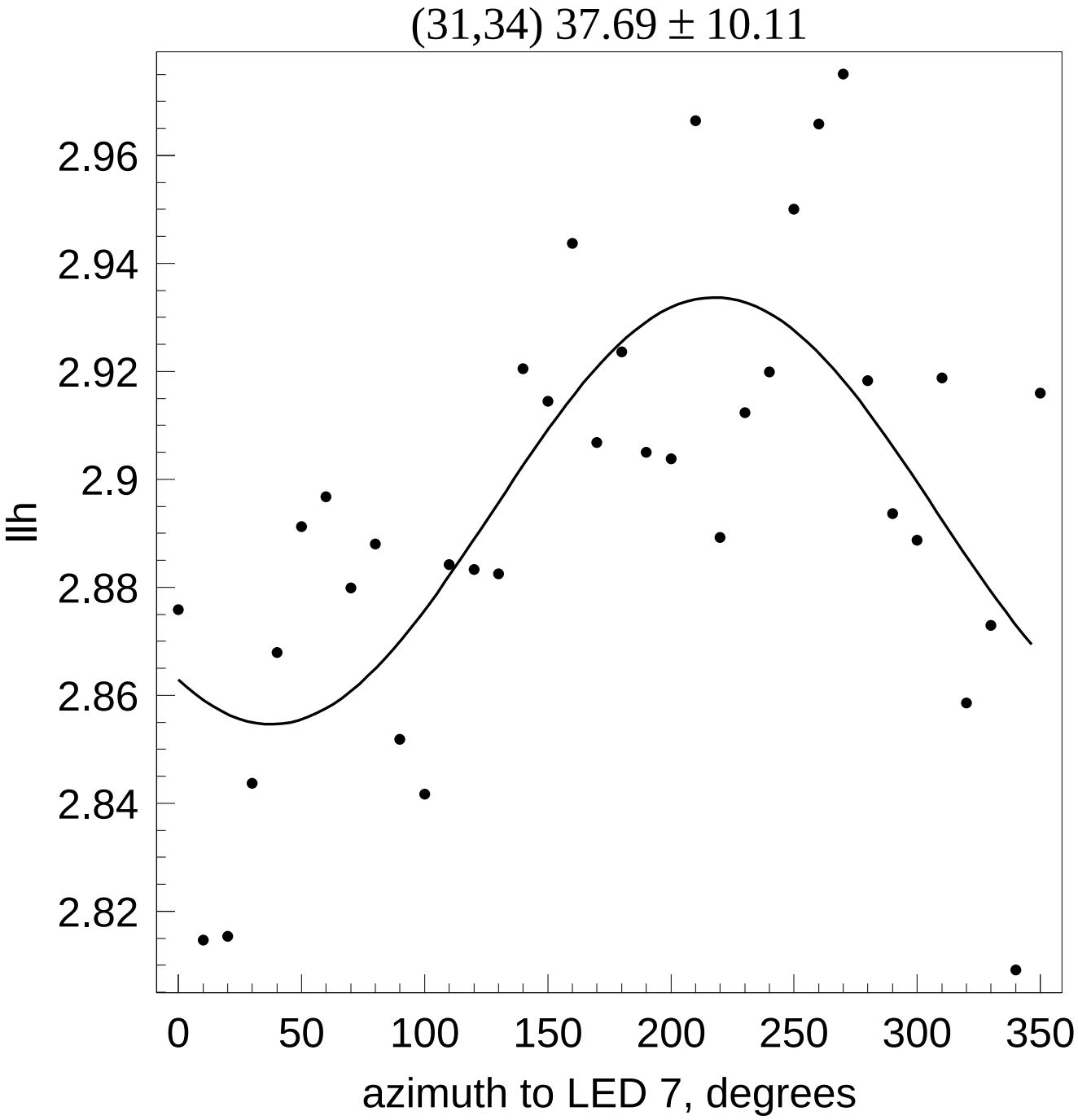

(31,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
197.5 ± 25.3
190
1
2
3
4
5
6
7
8
9
10
11
12

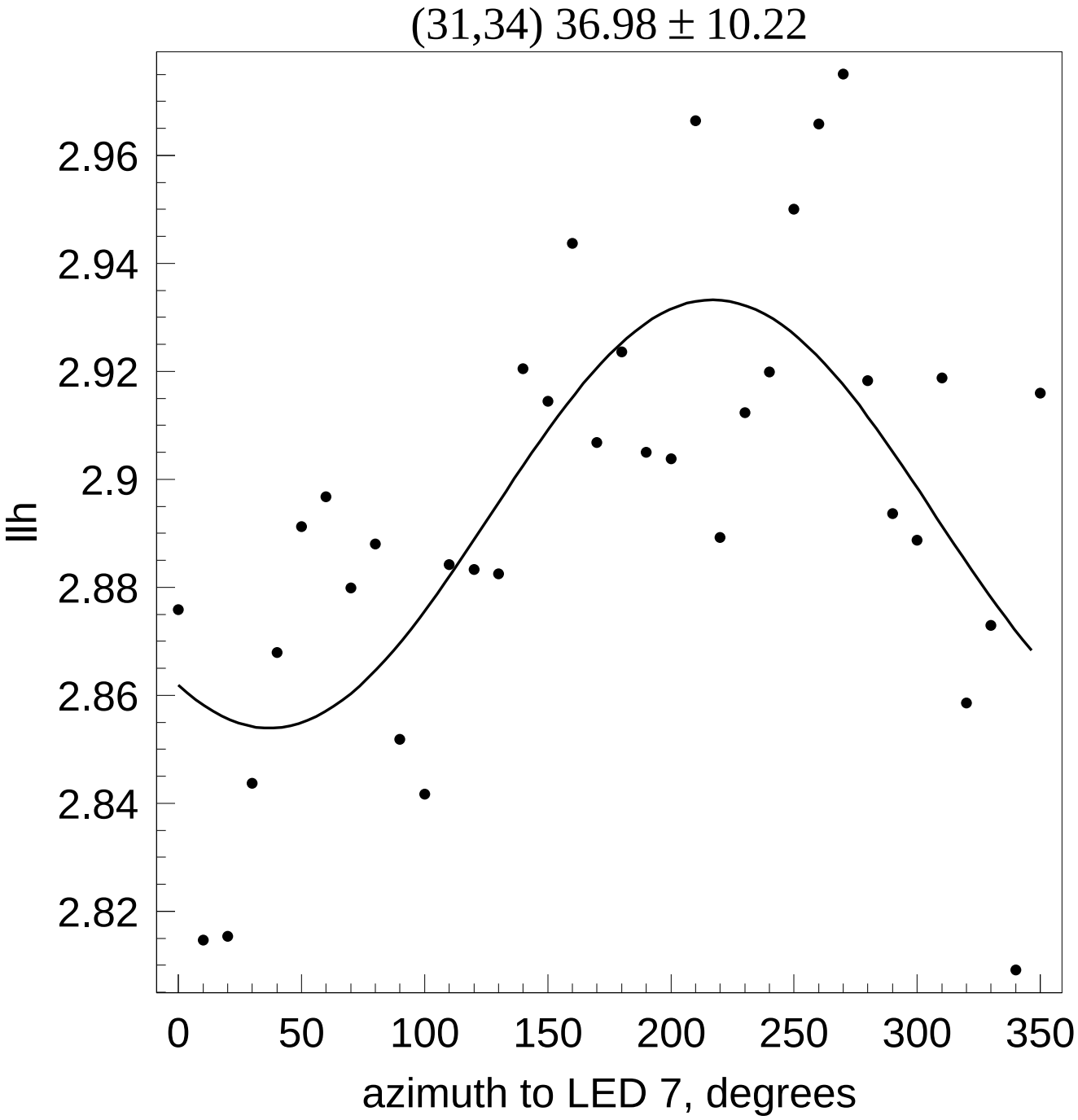

(31,33) 197.08 ± 1.33
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

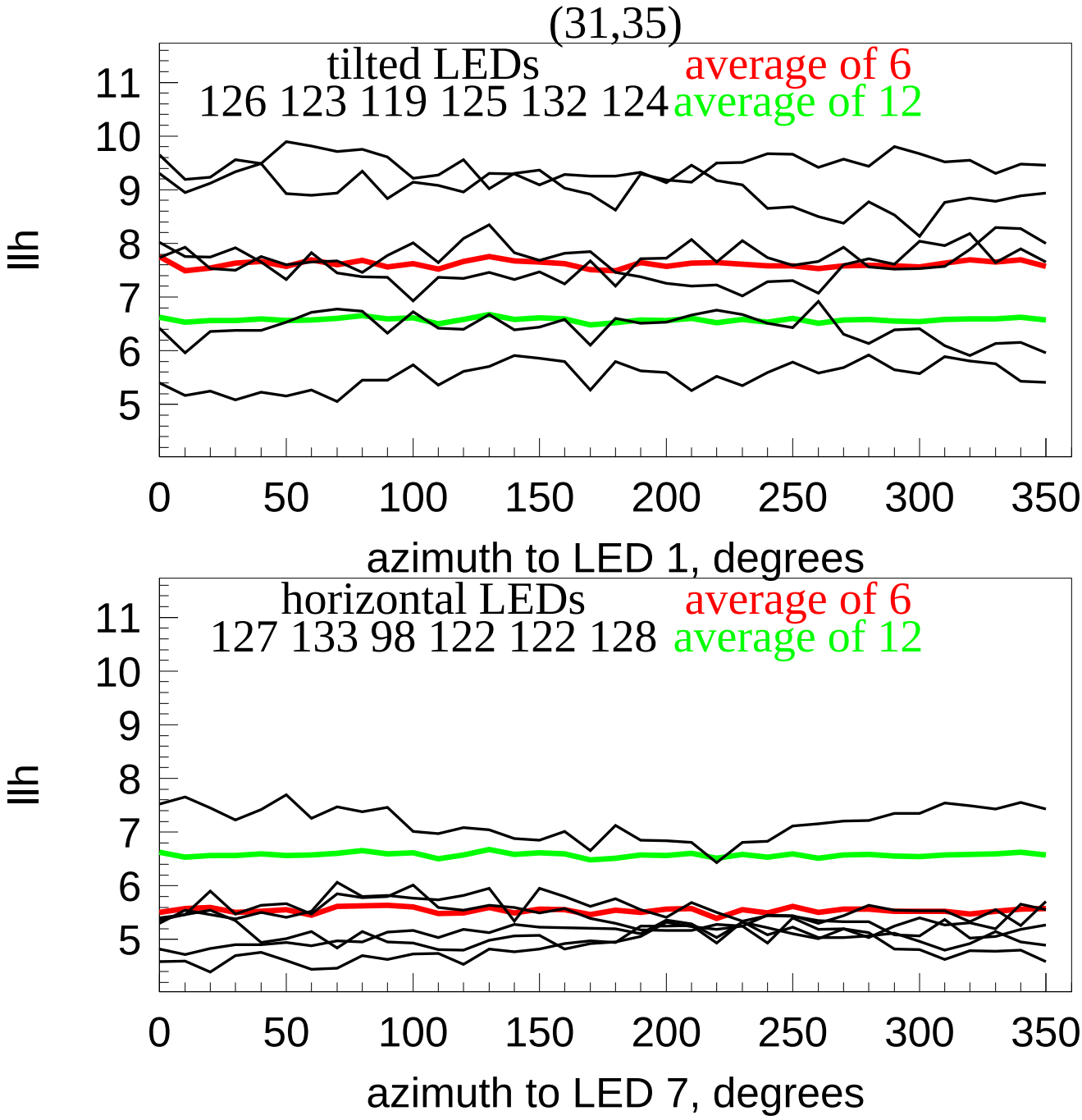

(31,33) 196.91 ± 1.29
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

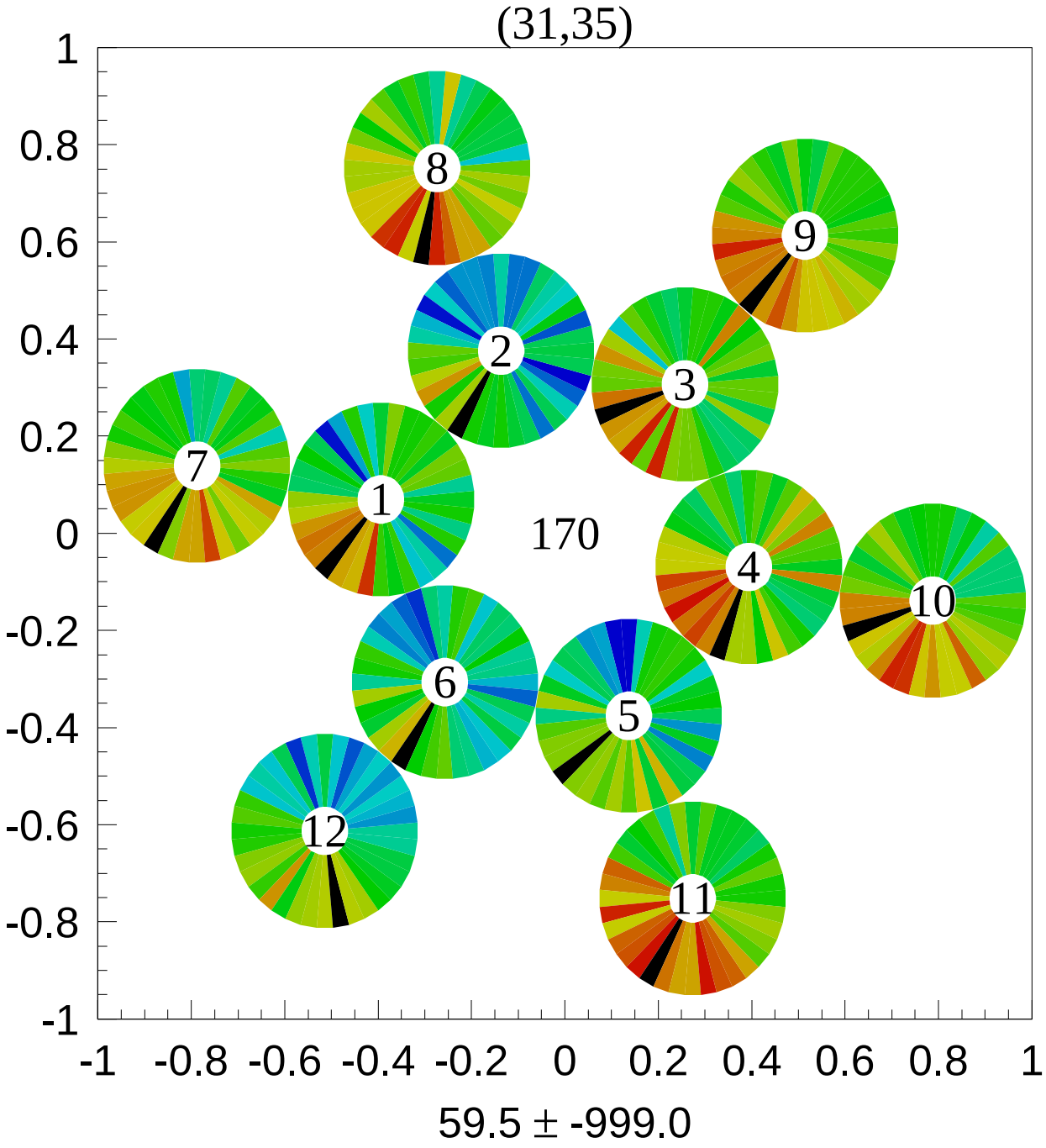

(31,34)
tilted LEDs
128 130 128 125 130 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 125 129 129 115 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

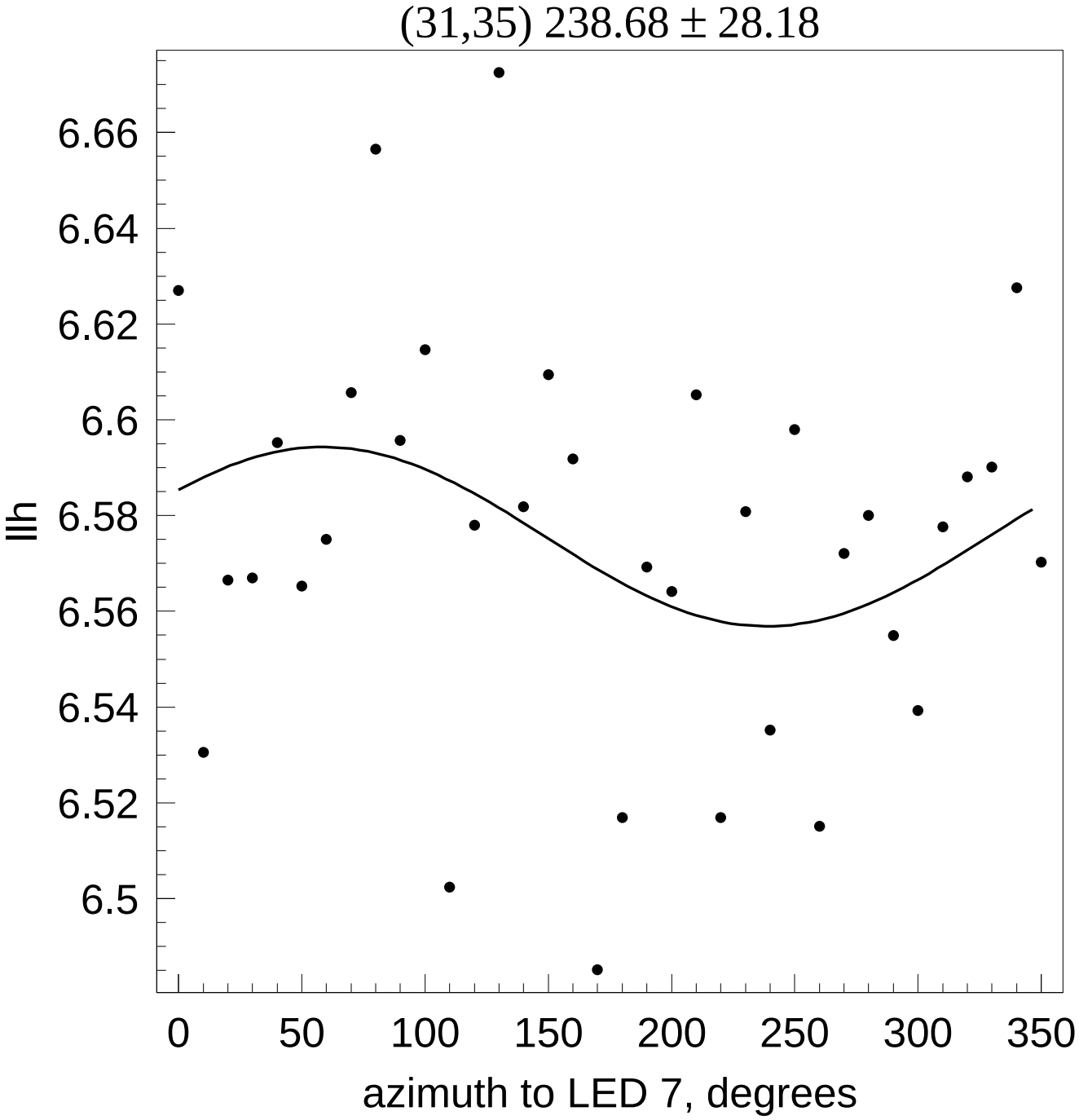

(31,34)
11
12
5
10
6
4
340
1
3
7
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
31.2 ± 93.6

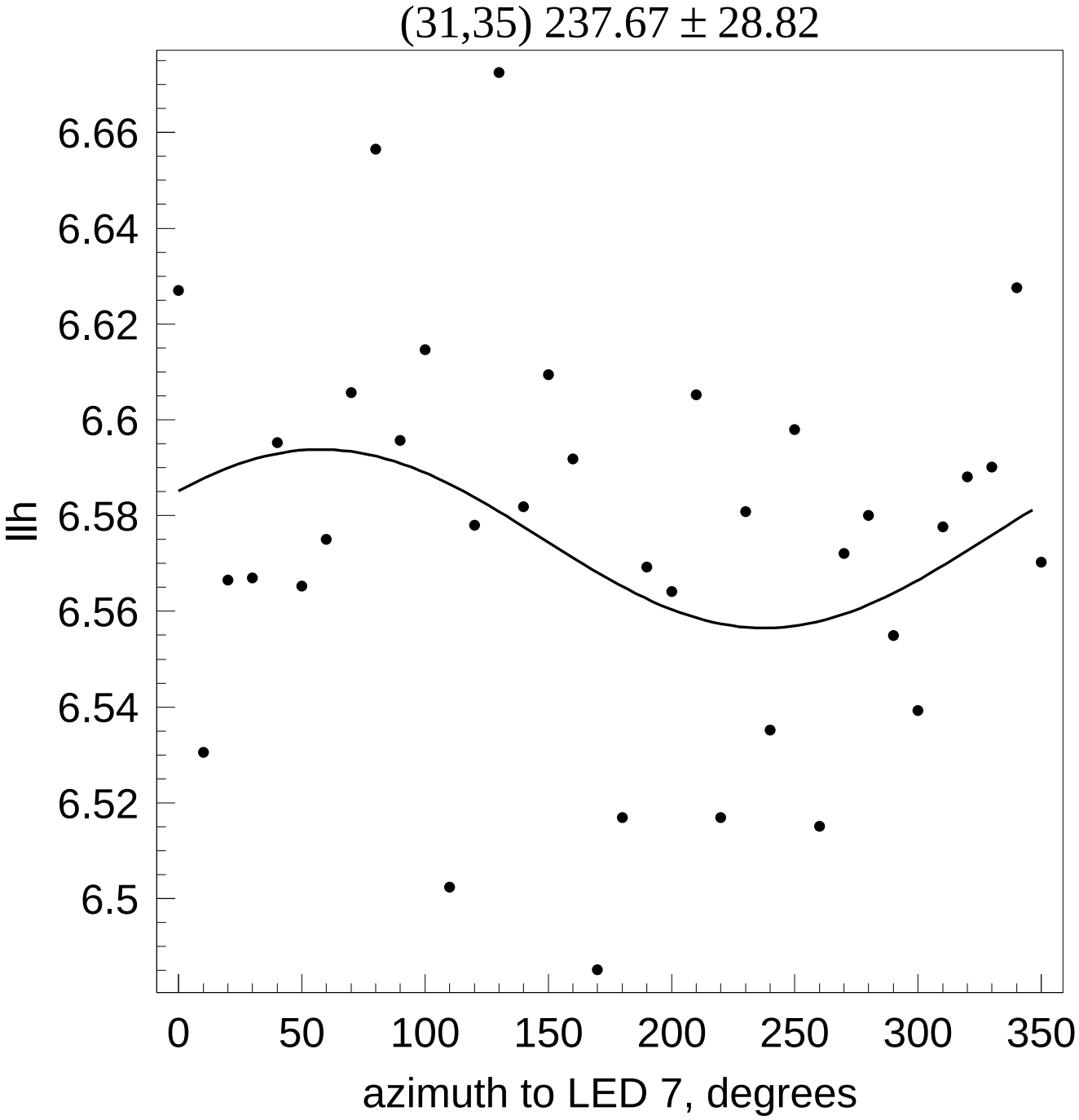

(31,34) 37.69 ± 10.11
2.96
2.94
2.92
2.9
2.88
2.86
2.84
2.82
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

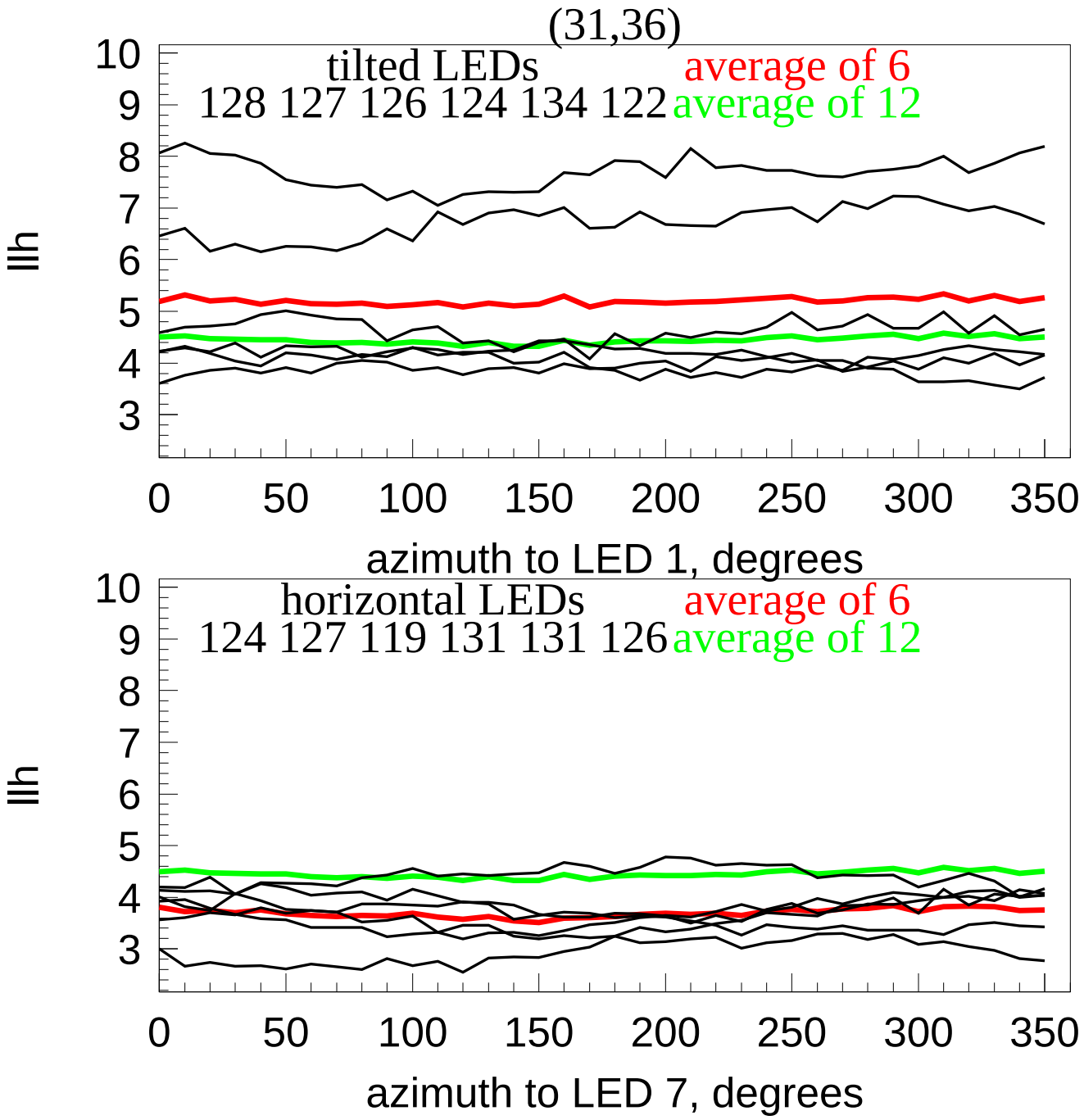

(31,34) 36.98 ± 10.22
2.96
2.94
2.92
2.9
2.88
2.86
2.84
2.82
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

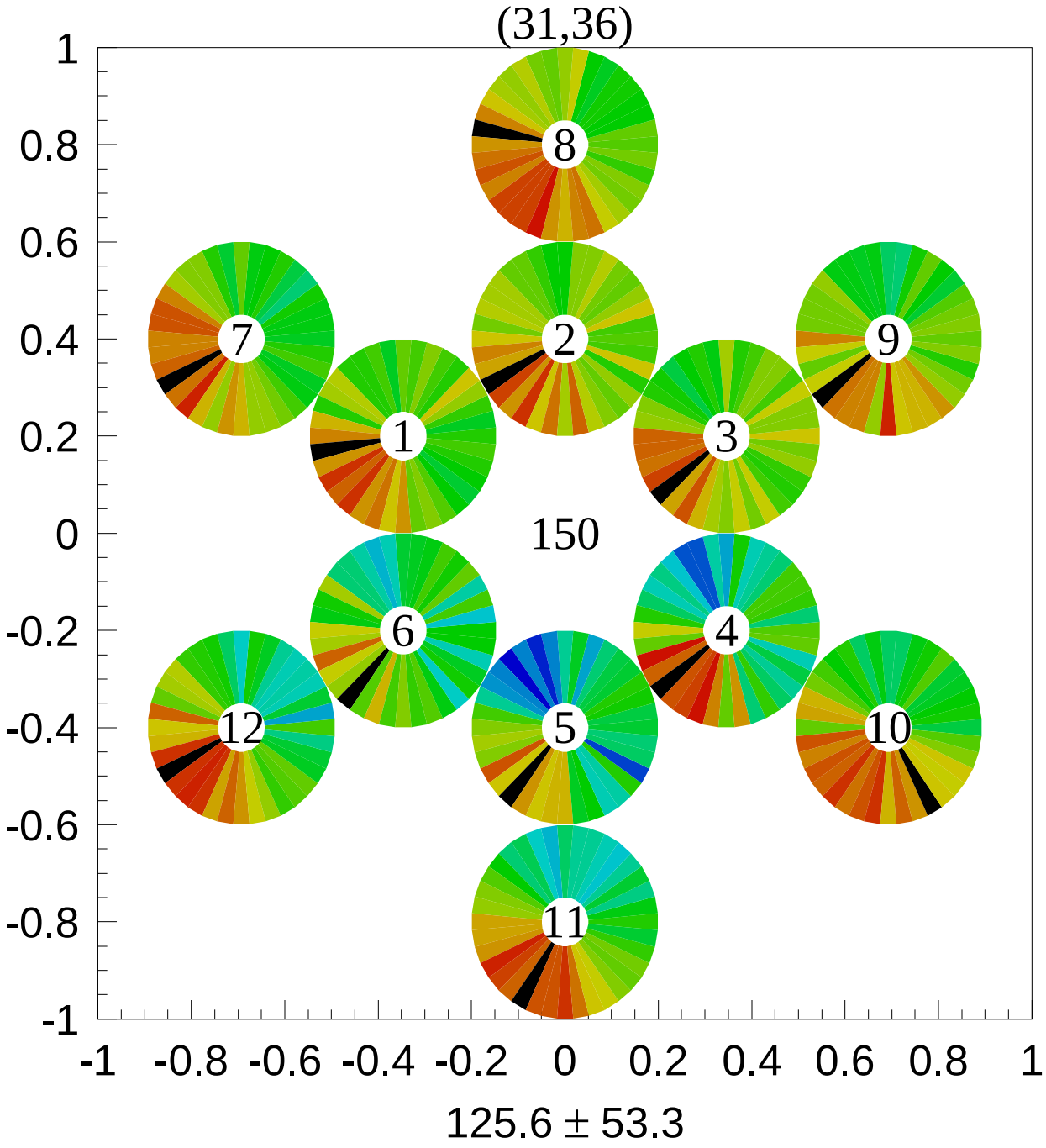

(31,35)
tilted LEDs
126 123 119 125 132 124
average of 6
average of 12
llh
11
10
9
8
7
6
5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 133 98 122 122 128
average of 6
average of 12
llh
11
10
9
8
7
6
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

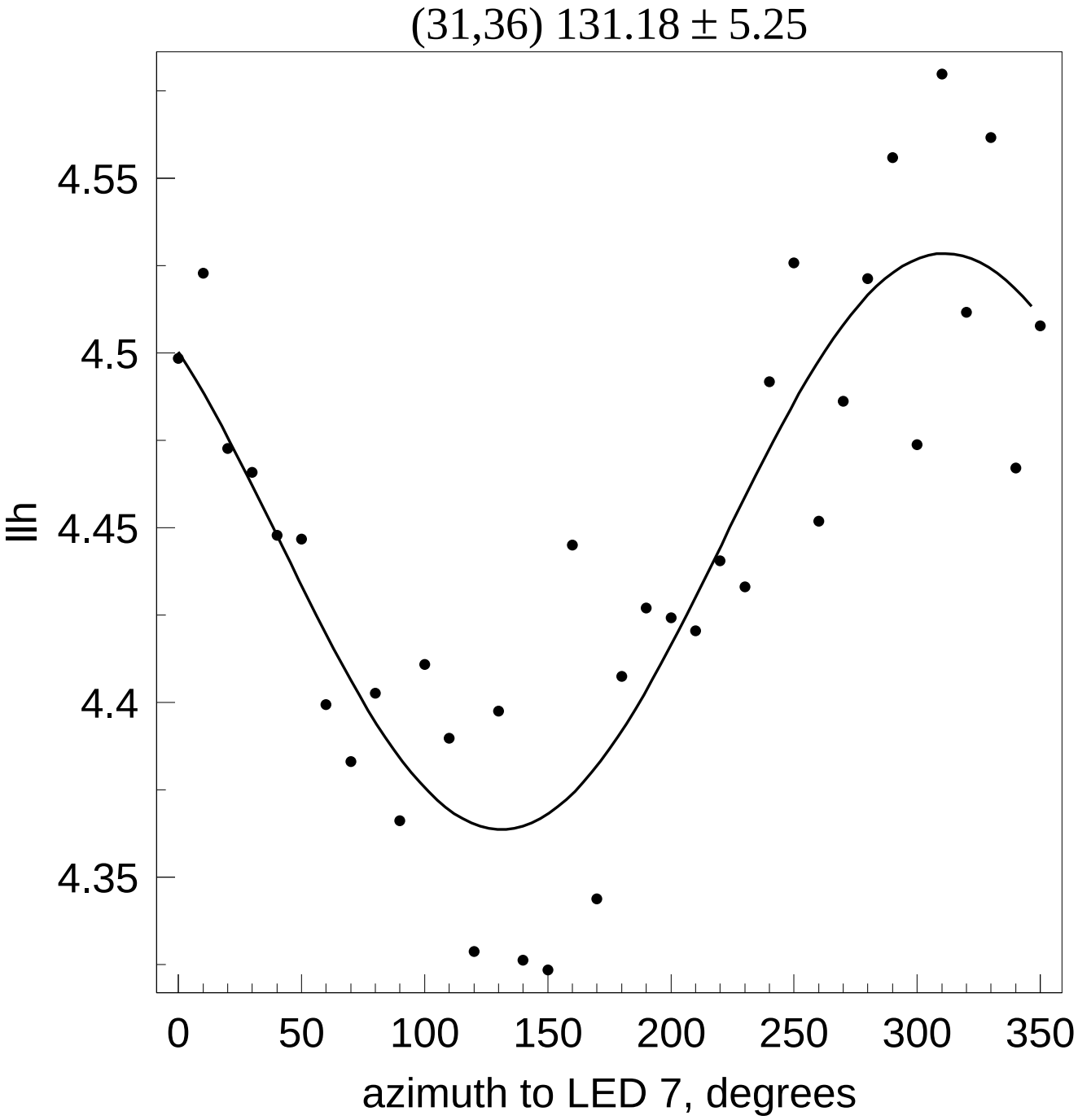

(31,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
59.5 ± -999.0

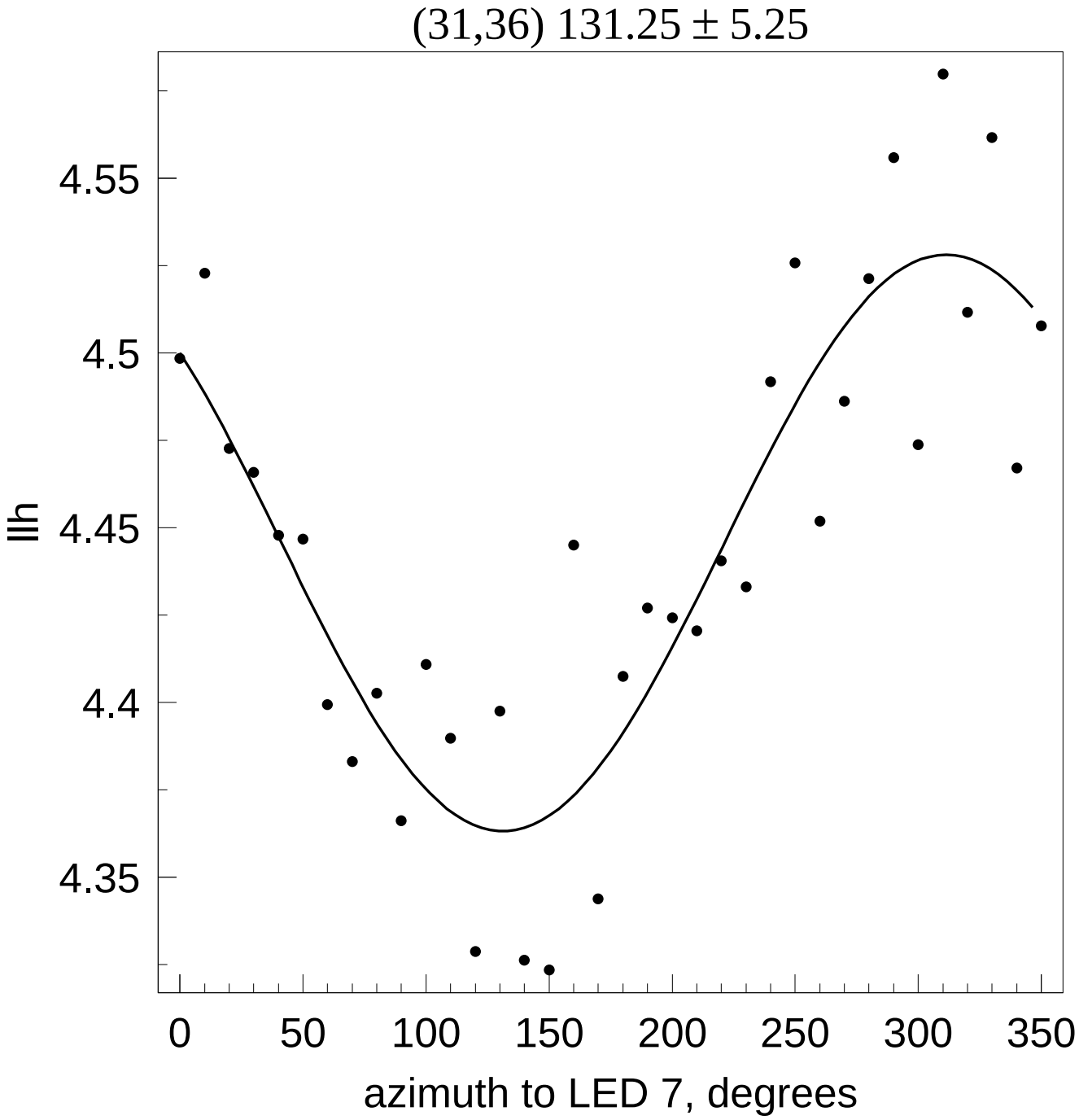

(31,35) 238.68 ± 28.18
6.66
6.64
6.62
6.6
6.58
6.56
6.54
6.52
6.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

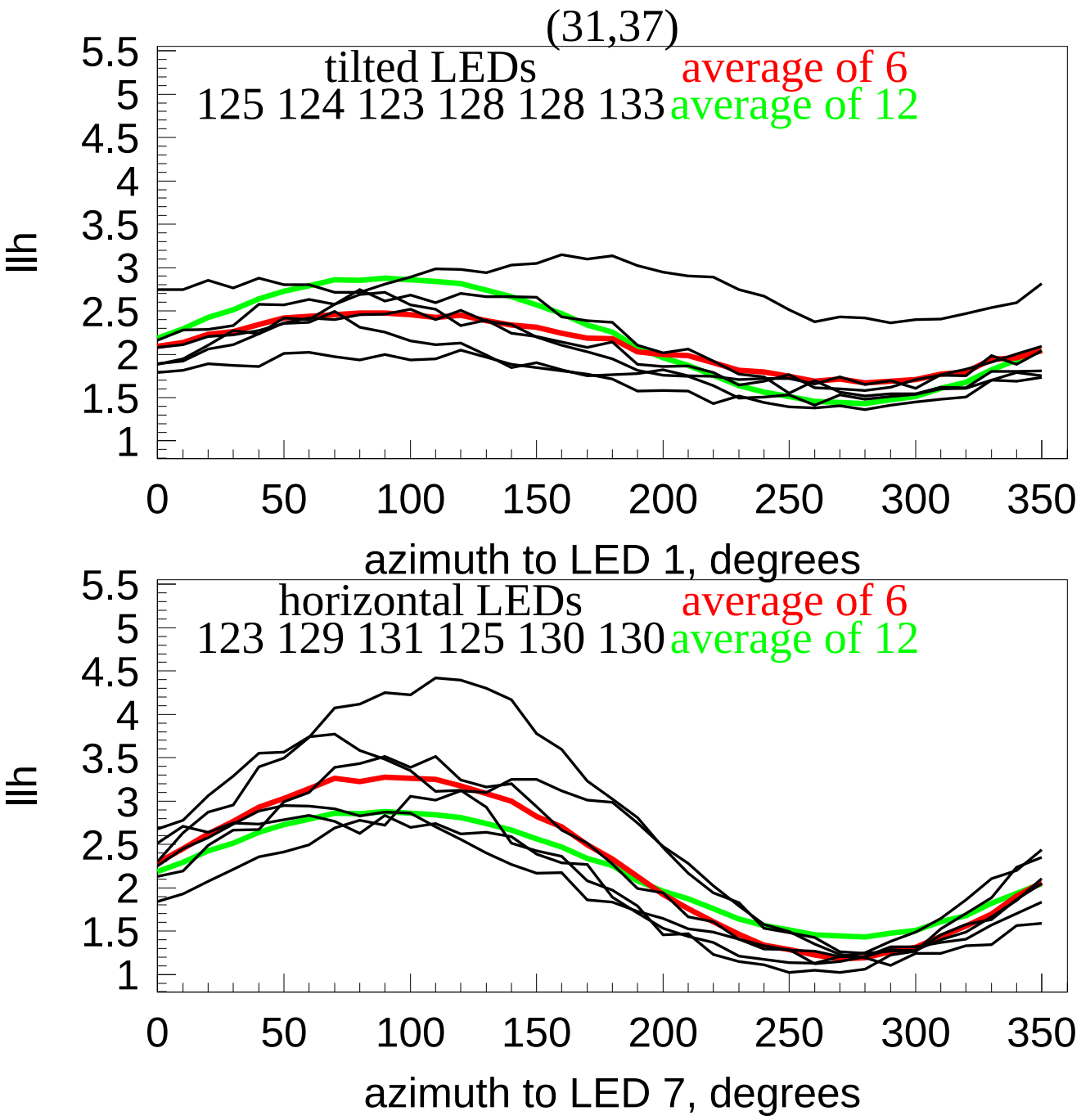

(31,35) 237.67 ± 28.82
6.66
6.64
6.62
6.6
6.58
6.56
6.54
6.52
6.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

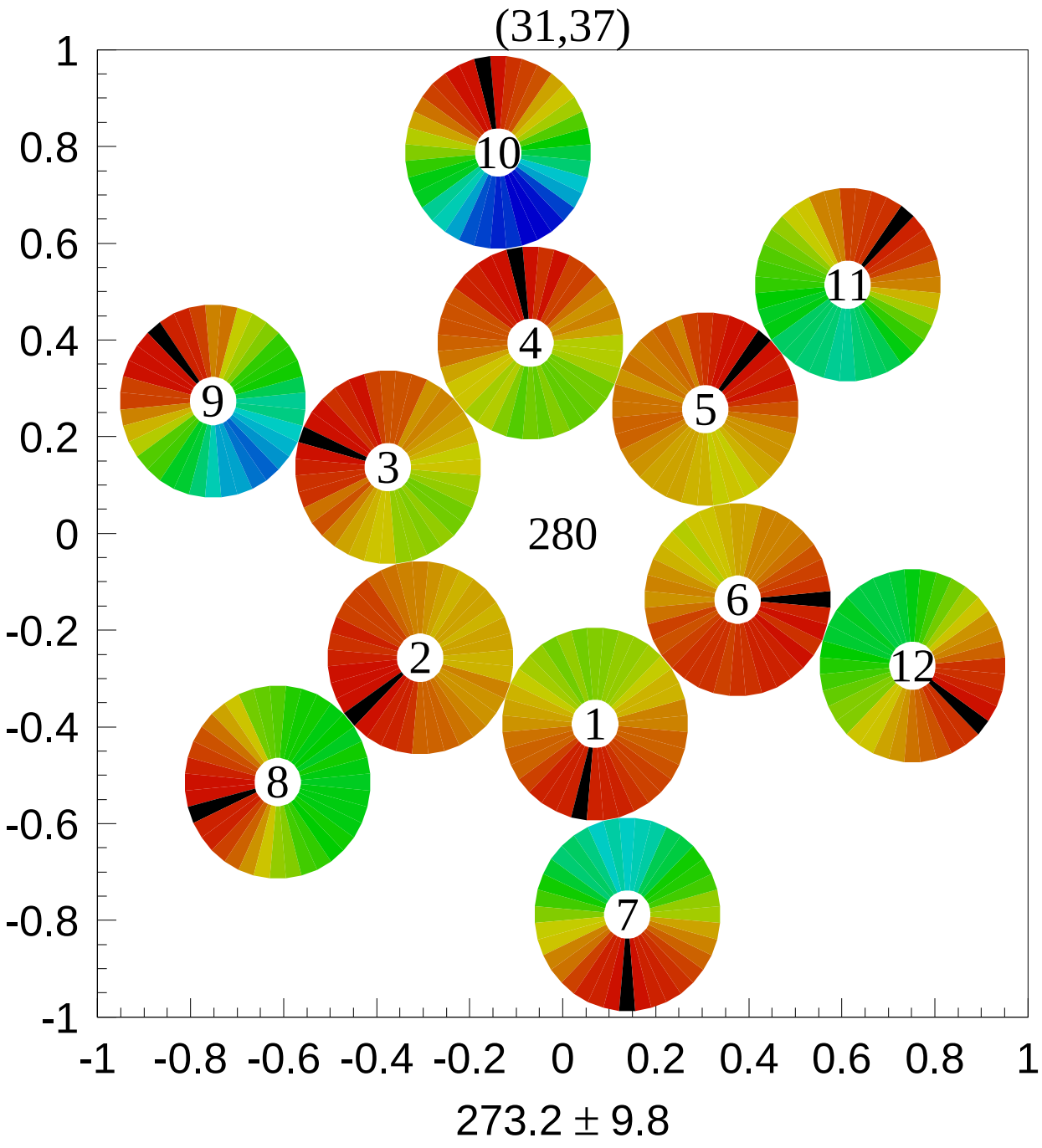

(31,36)
tilted LEDs
128 127 126 124 134 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 127 119 131 131 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

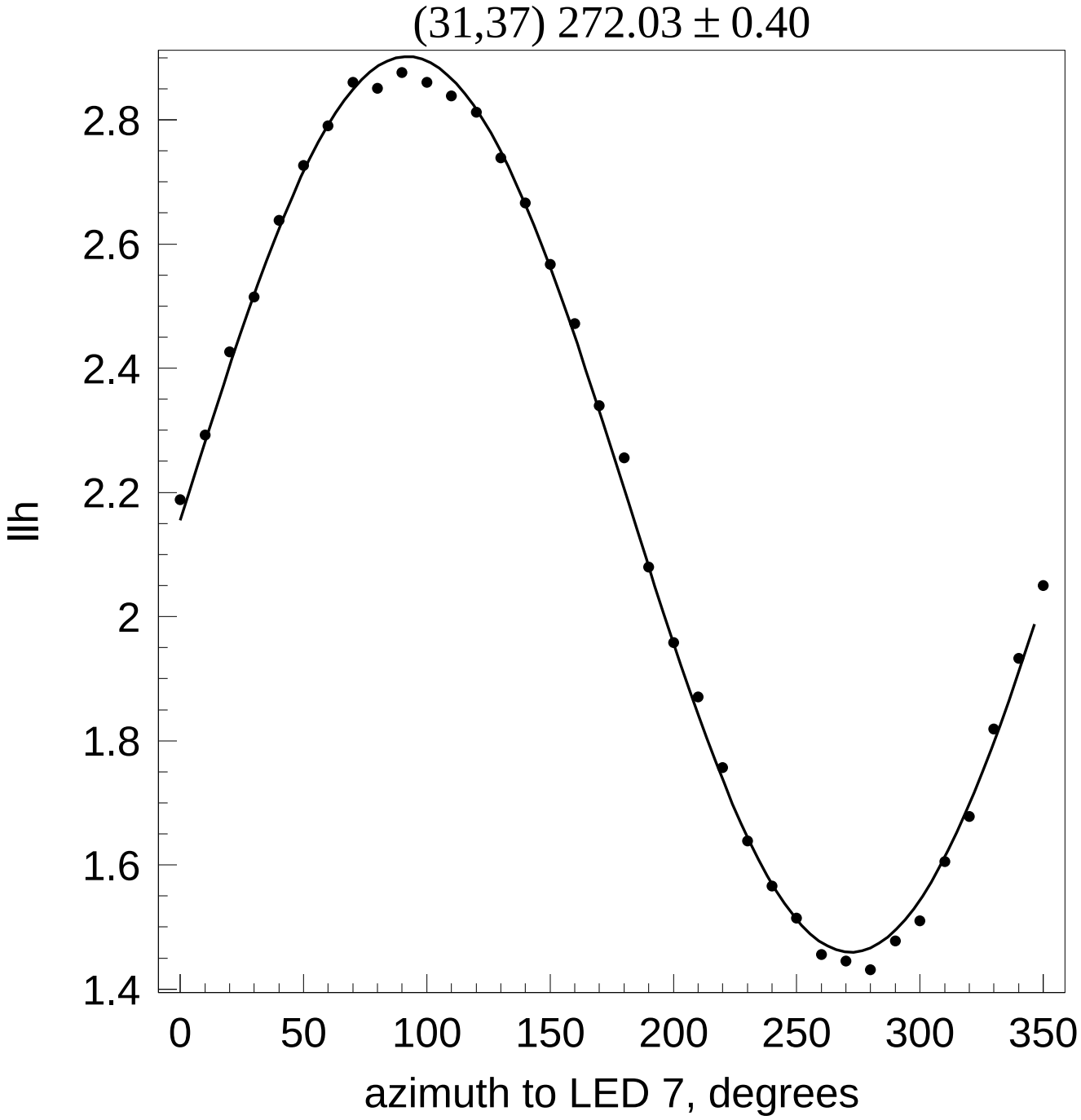

(31,36)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
125.6 ± 53.3

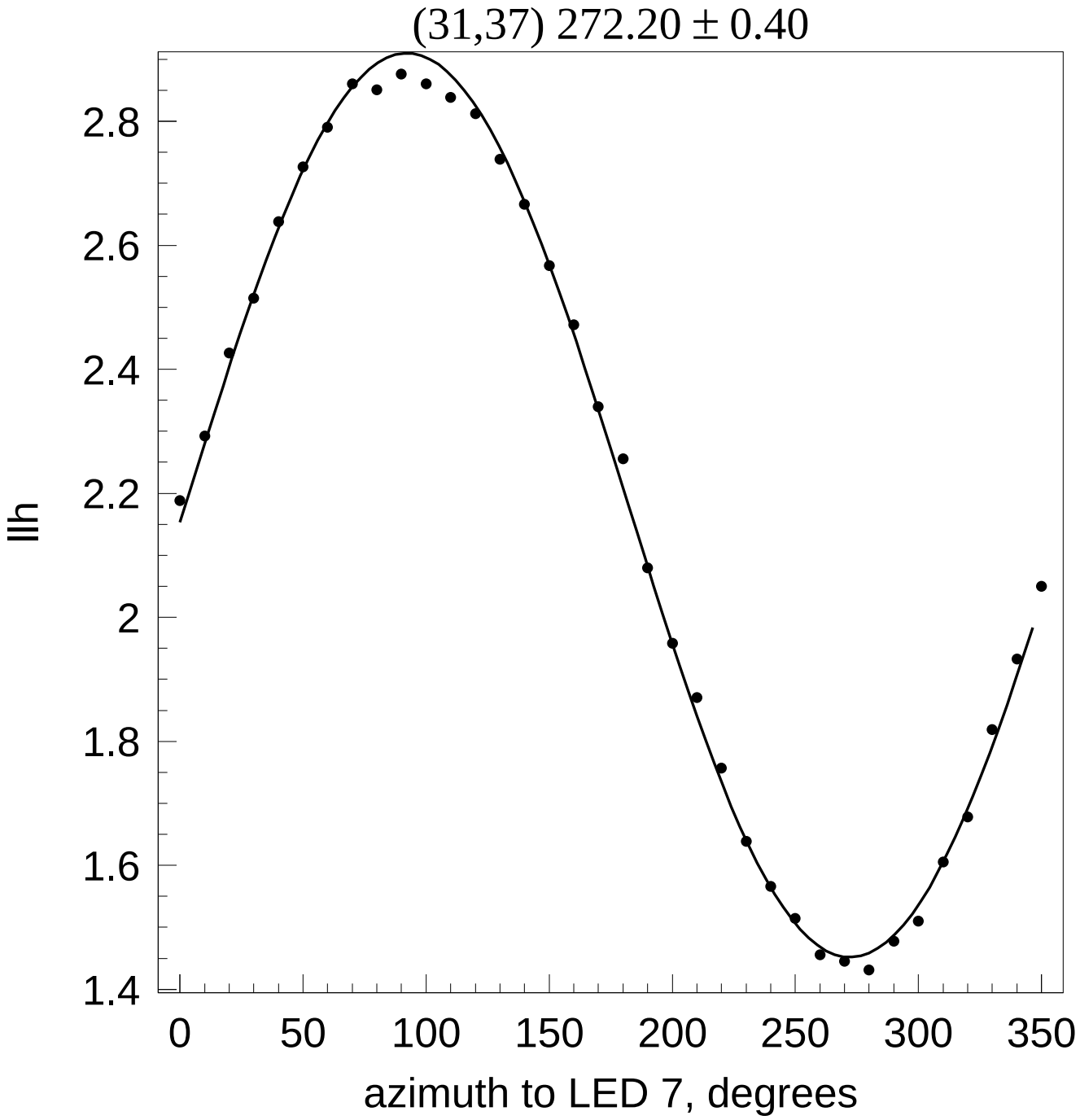

(31,36) 131.18 ± 5.25
4.55
4.5
4.45
4.4
4.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

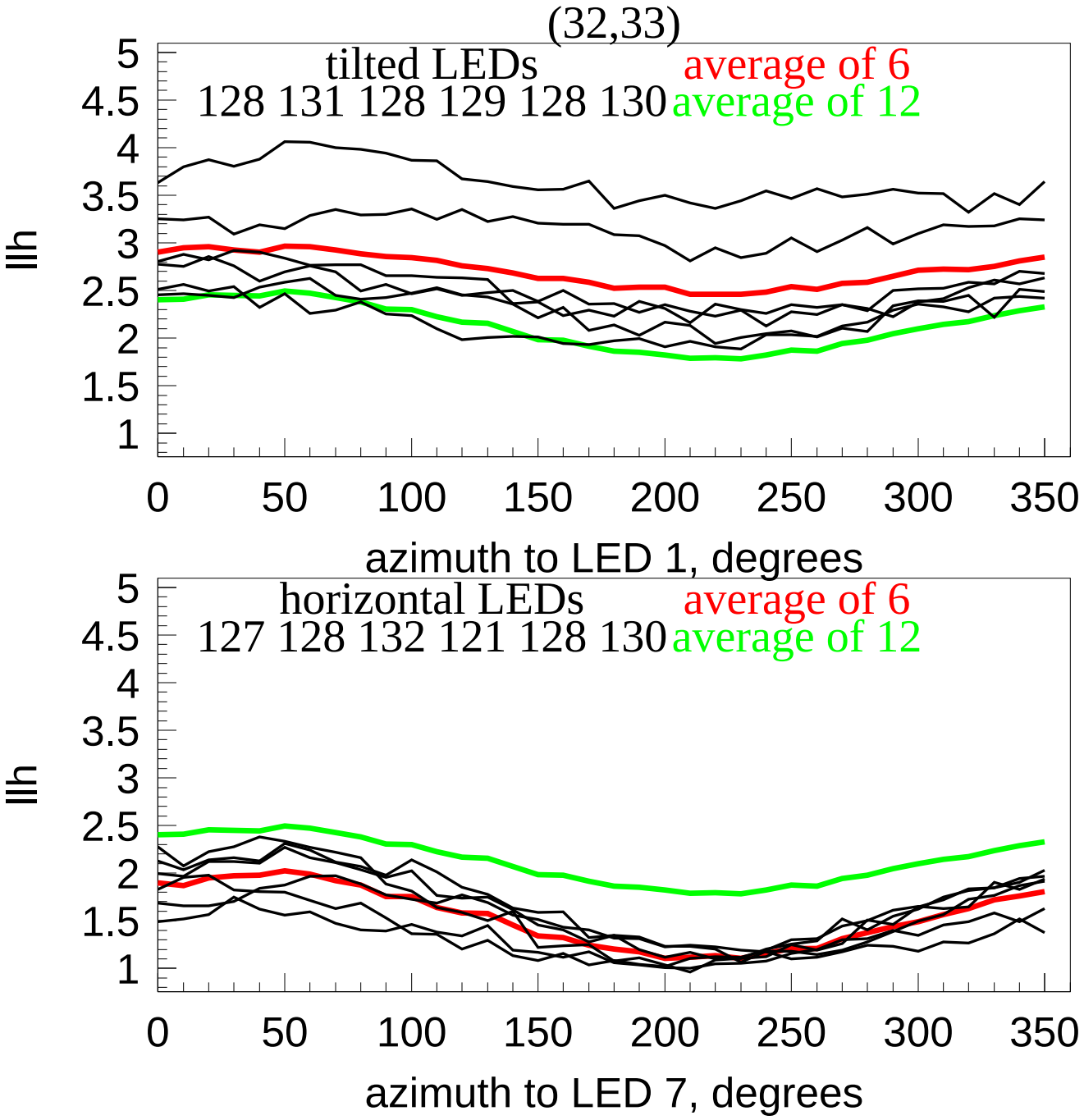

(31,36) 131.25 ± 5.25
4.55
4.5
4.45
4.4
4.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

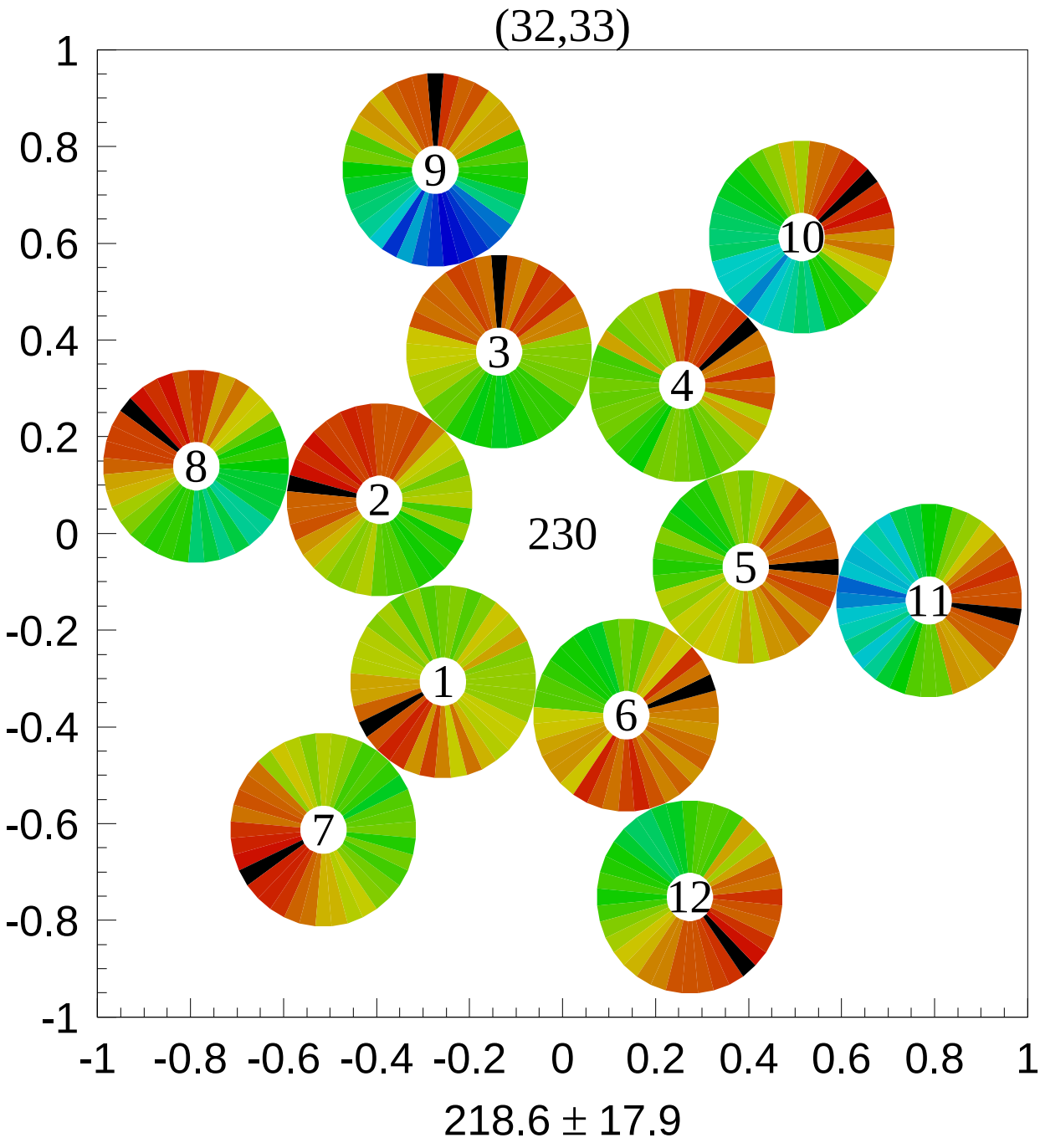

(31,37)
tilted LEDs
125 124 123 128 128 133
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 129 131 125 130 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

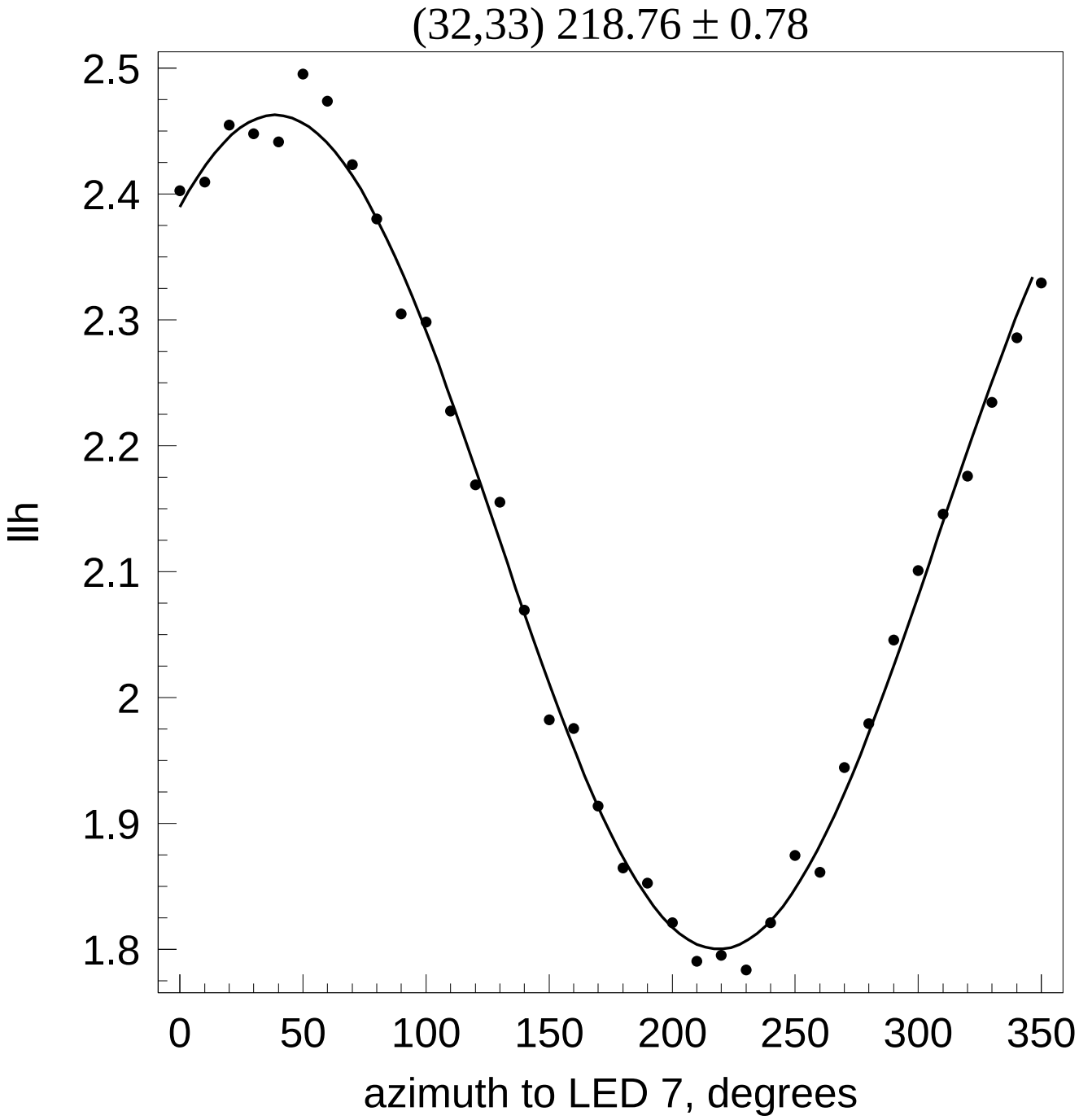

(31,37)
10
11
4
9
5
3
280
6
12
2
1
8
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
273.2 ± 9.8

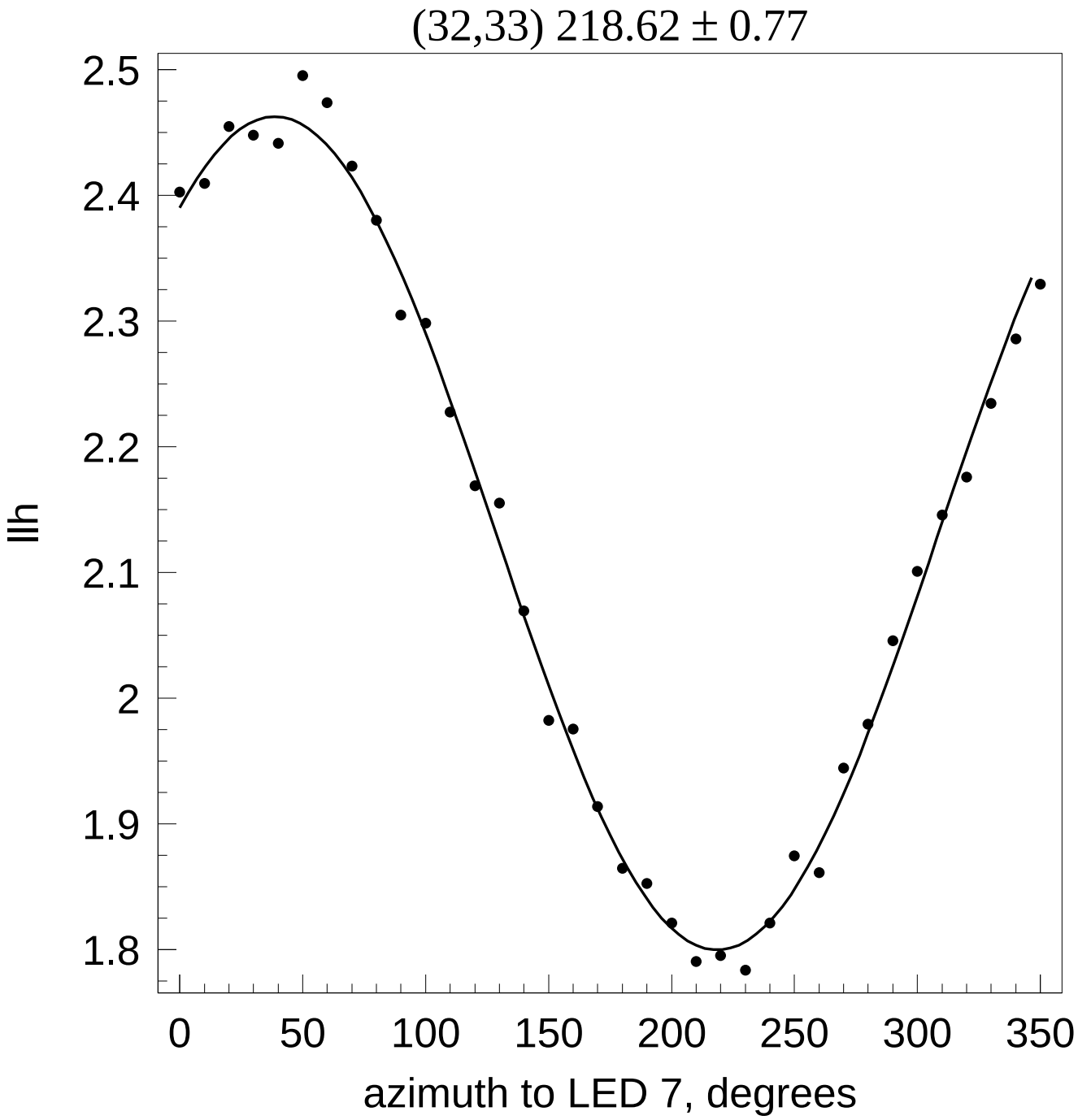

(31,37) 272.03 ± 0.40
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

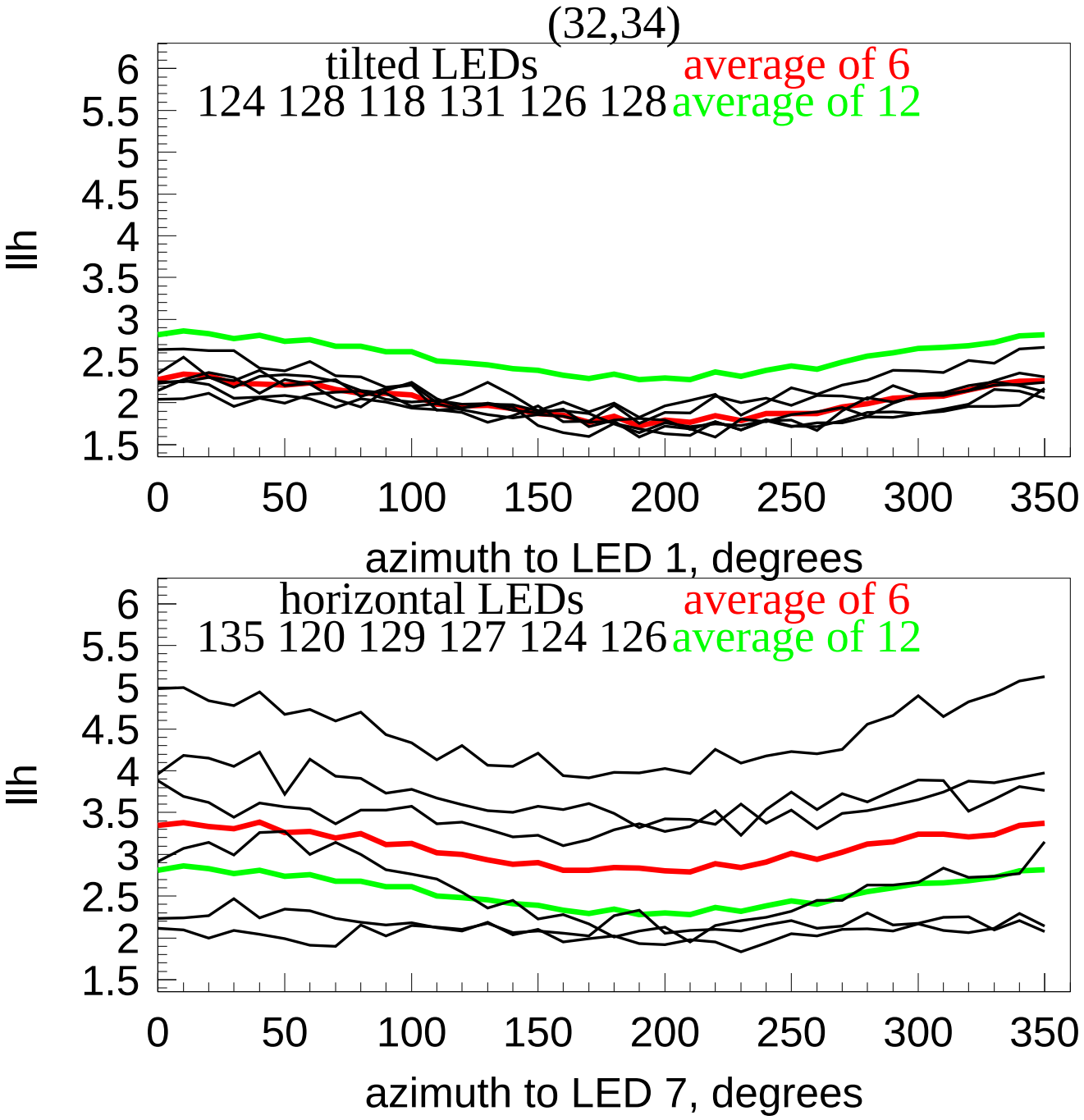

(31,37) 272.20 ± 0.40
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

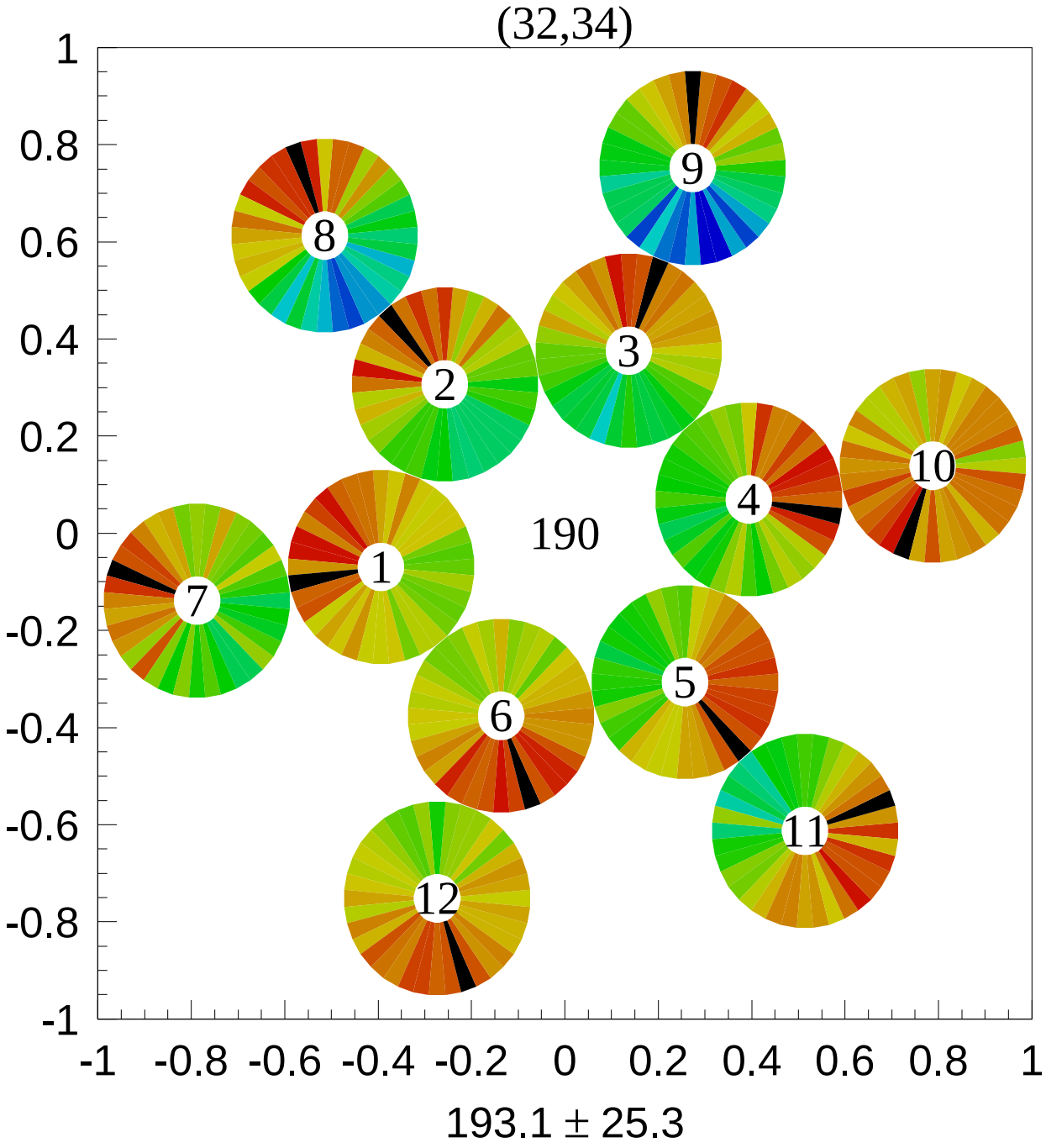

(32,33)
tilted LEDs
128 131 128 129 128 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 128 132 121 128 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

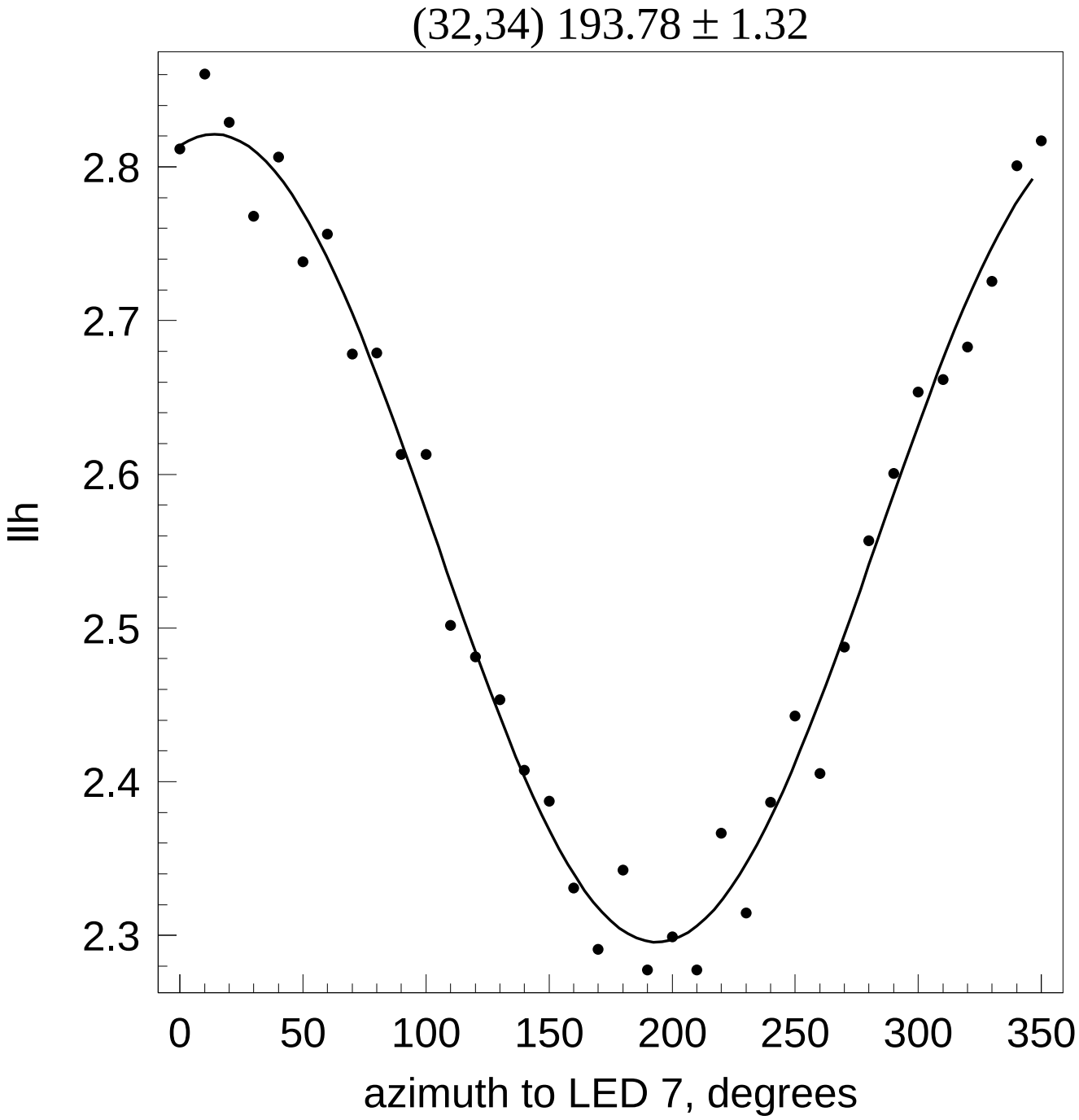

(32,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
218.6 ± 17.9

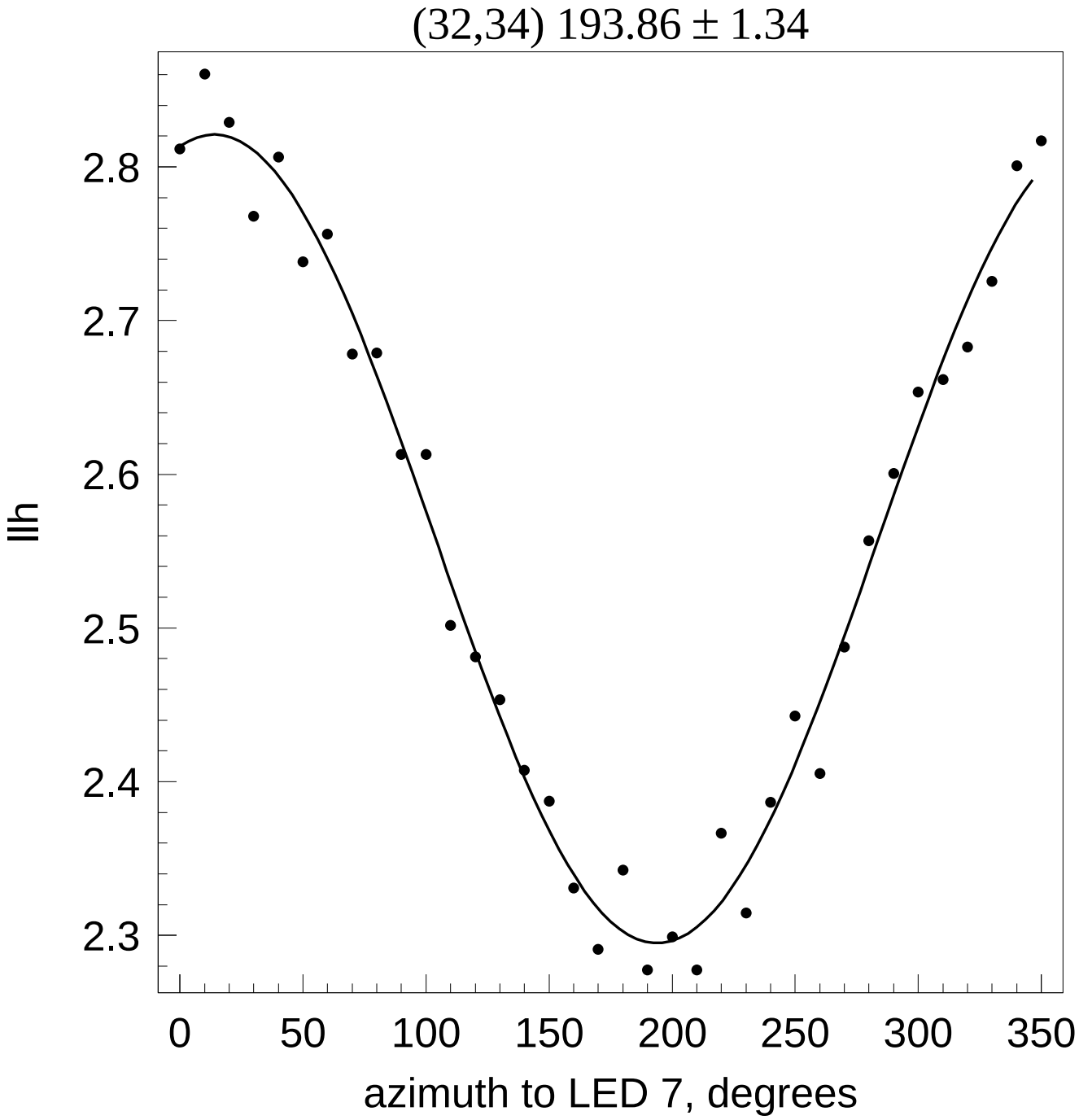

(32,33) 218.76 ± 0.78
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

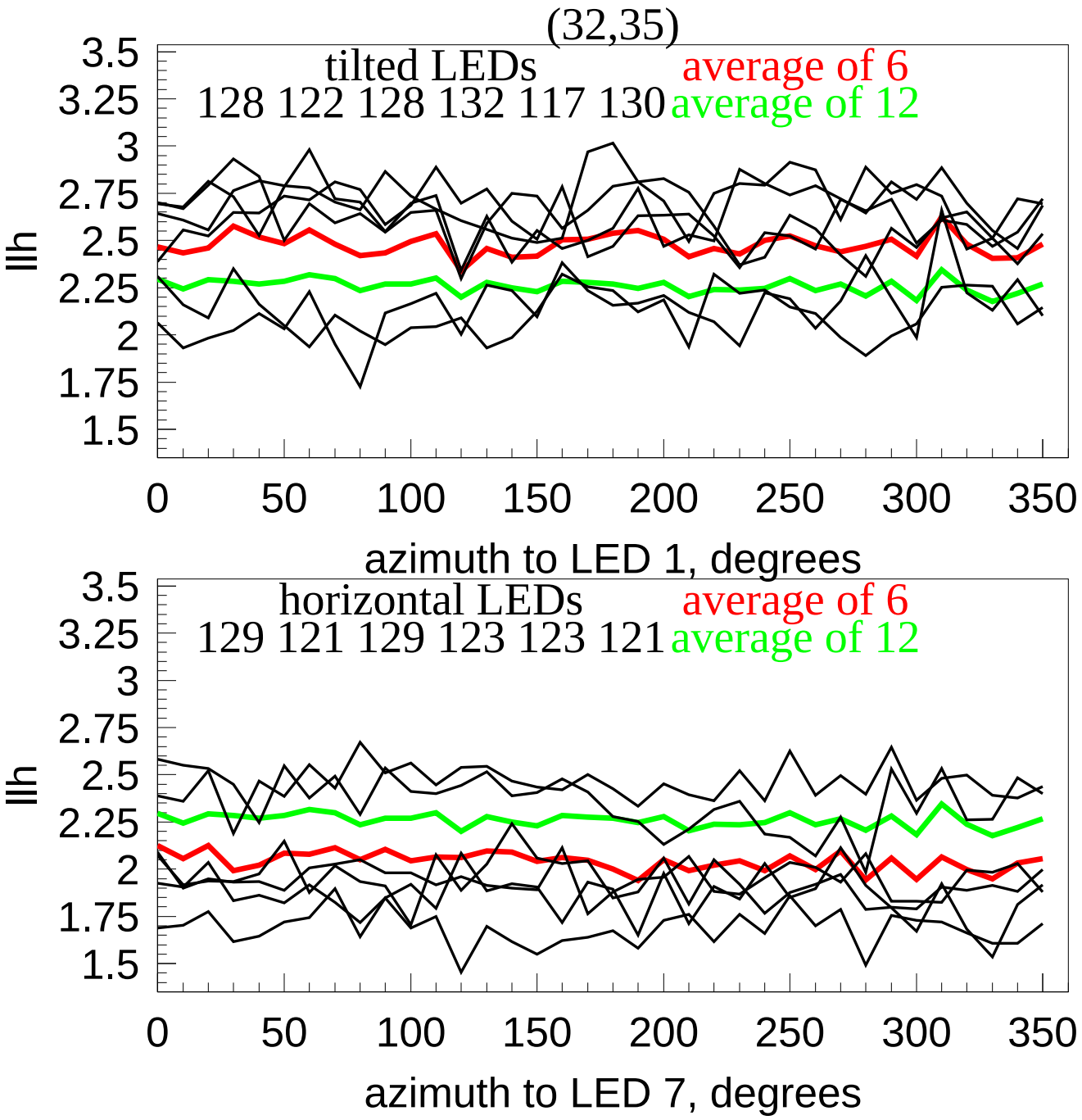

(32,33) 218.62 ± 0.77
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

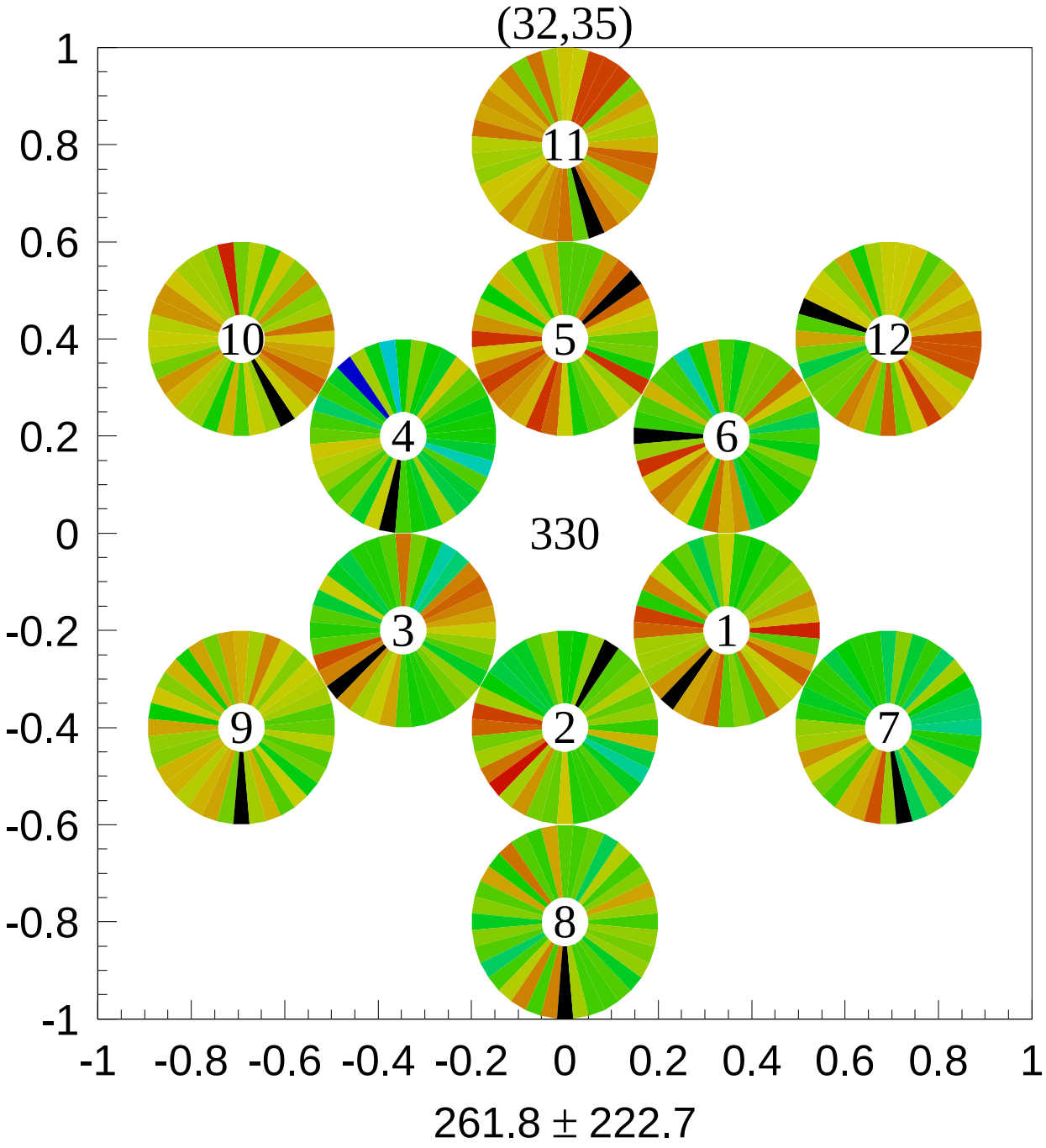

(32,34)
tilted LEDs
124 128 118 131 126 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
135 120 129 127 124 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

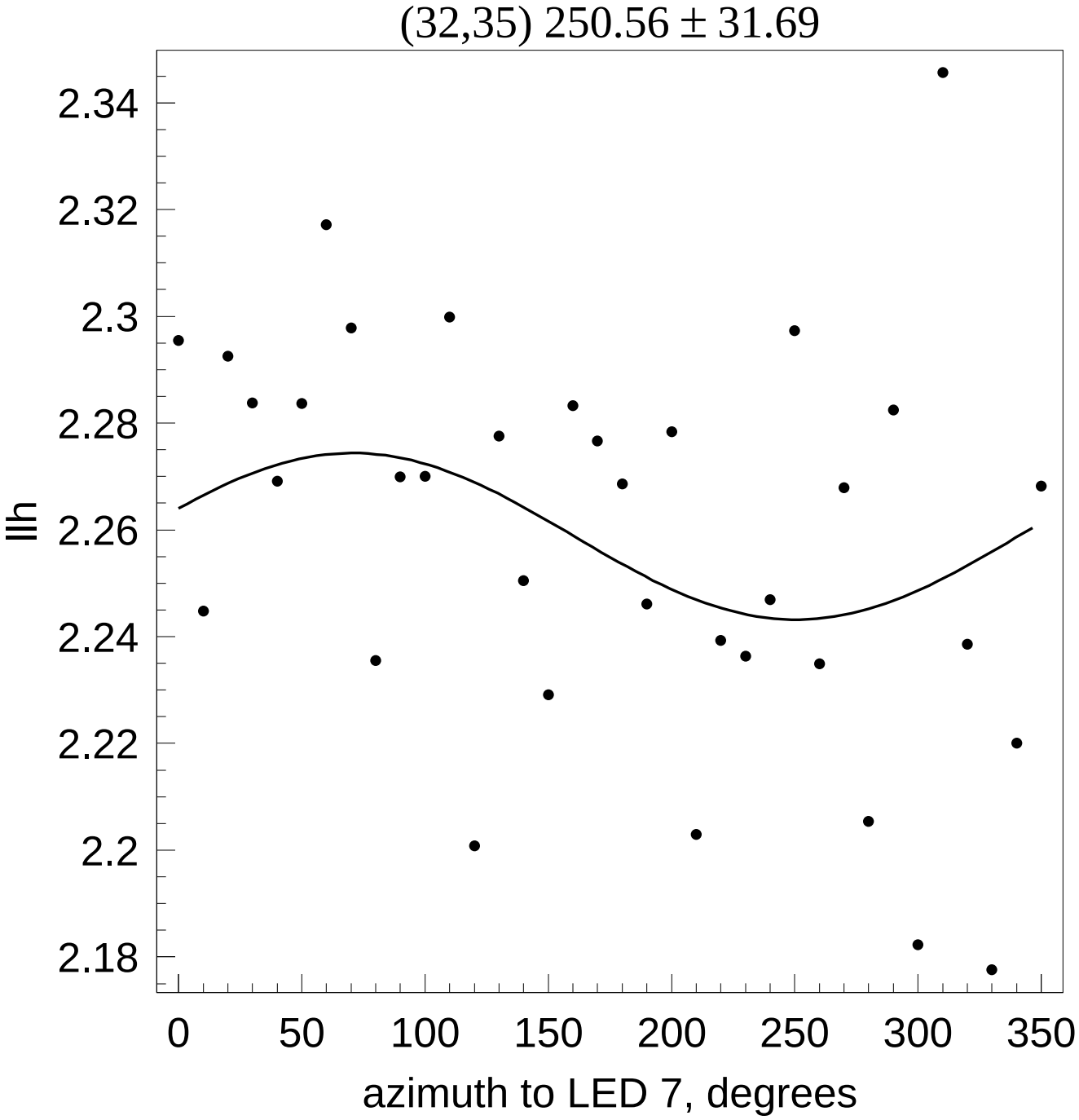

(32,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
193.1 ± 25.3
190
1
2
3
4
5
6
7
8
9
10
11
12

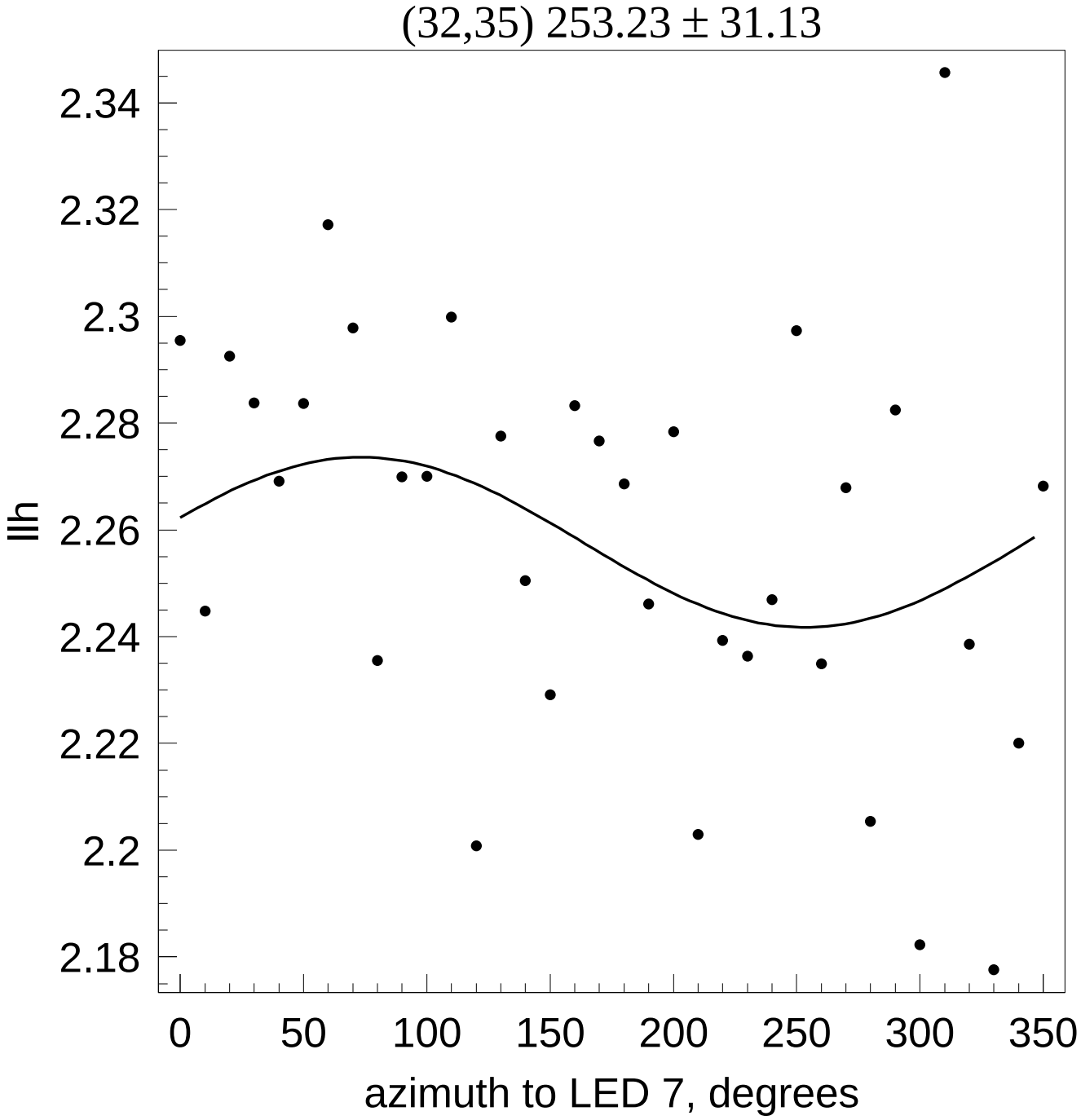

(32,34) 193.78 ± 1.32
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

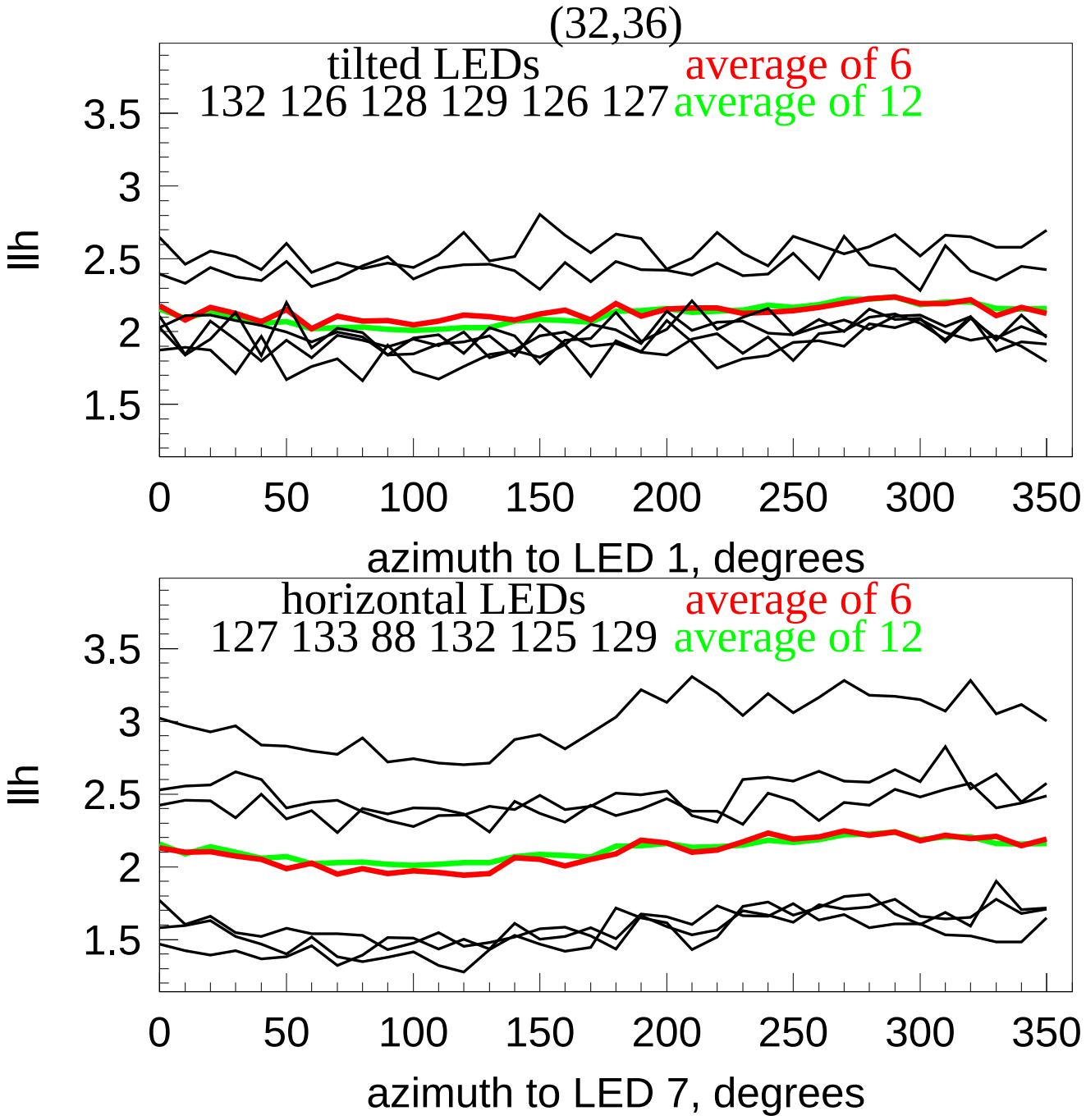

(32,34) 193.86 ± 1.34
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

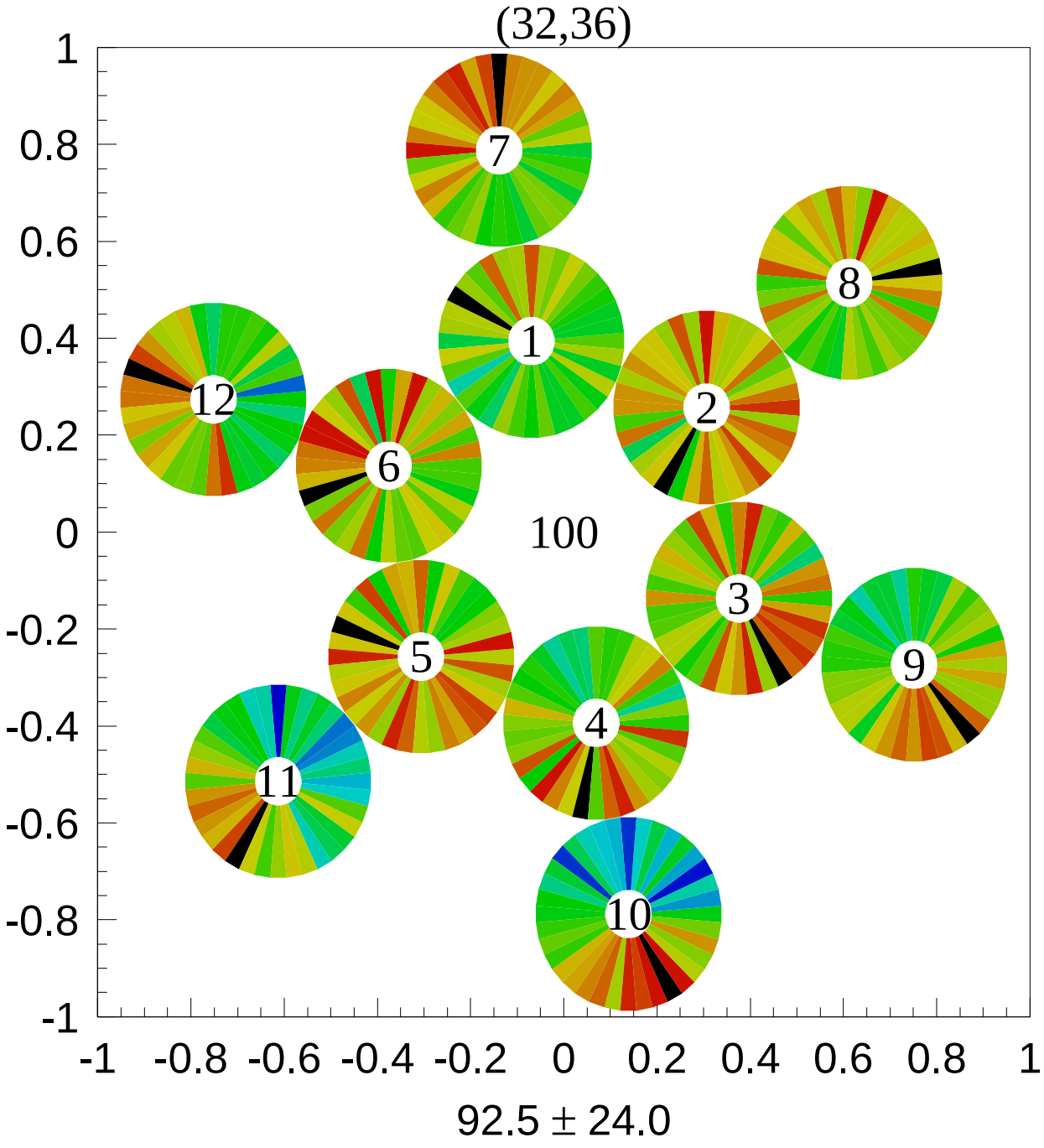

(32,35)
tilted LEDs
128 122 128 132 117 130
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 121 129 123 123 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

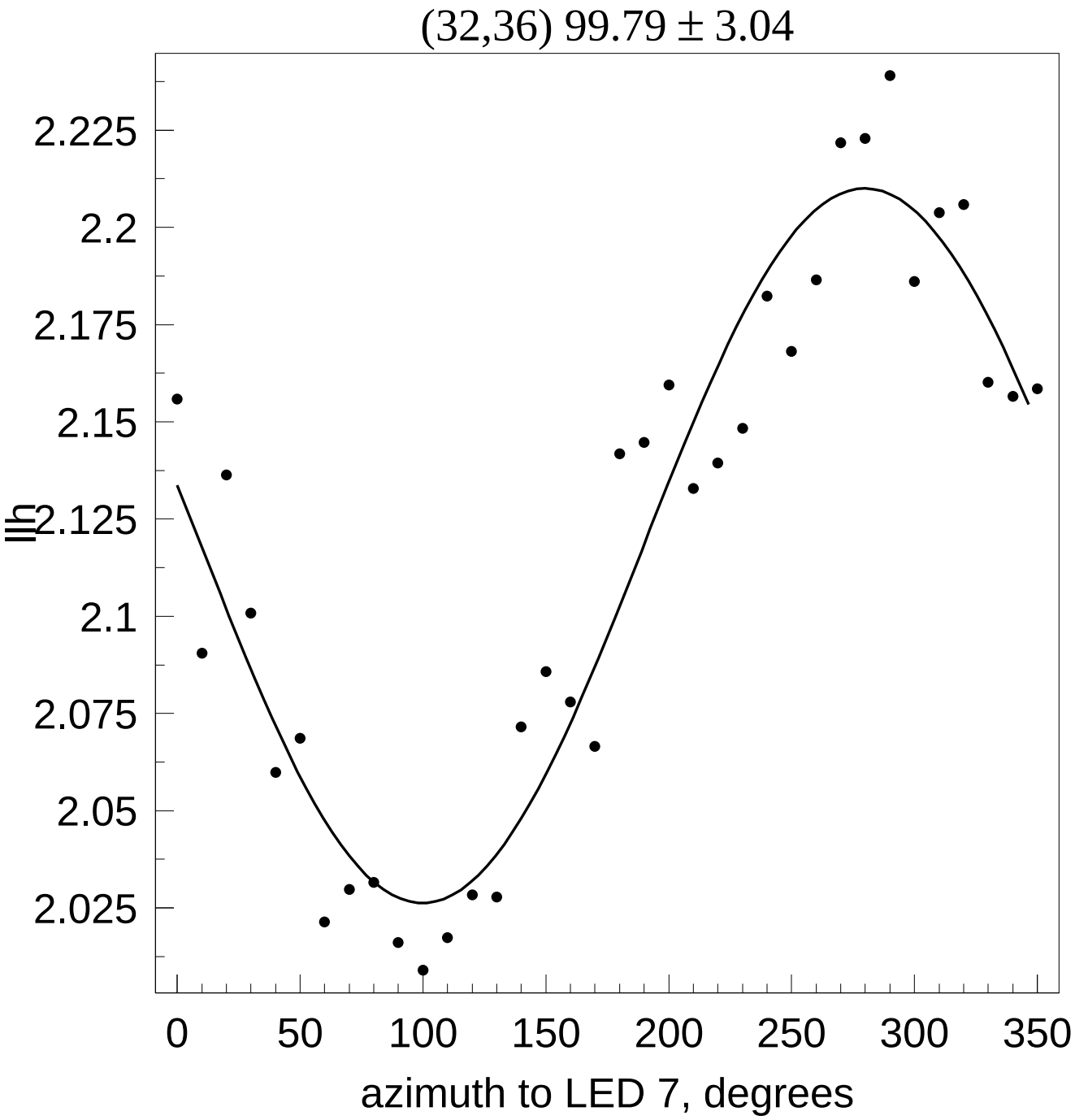

(32,35)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
261.8 ± 222.7

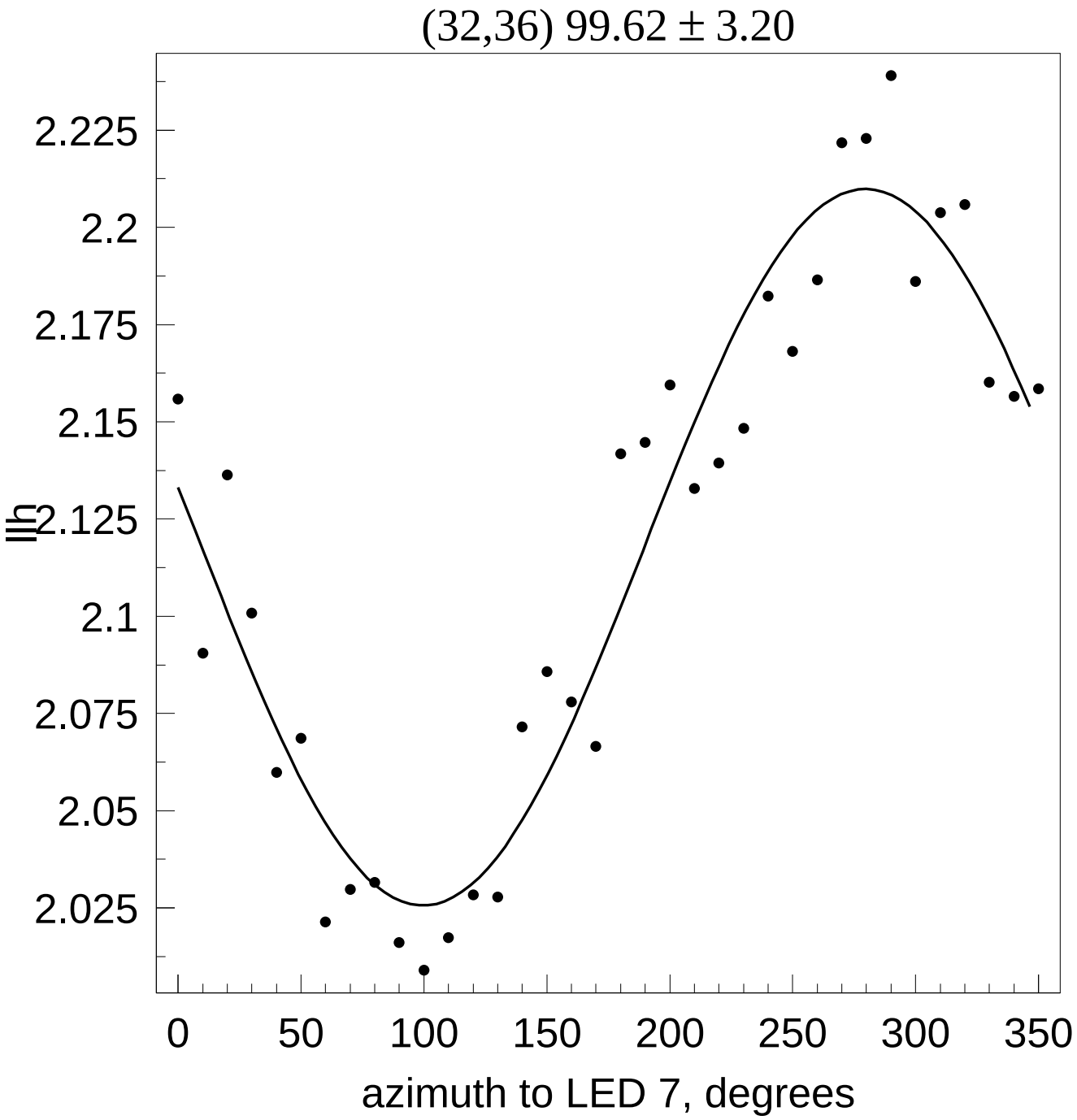

(32,35) 250.56 ± 31.69
2.34
2.32
2.3
2.28
2.26
2.24
2.22
2.2
2.18
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

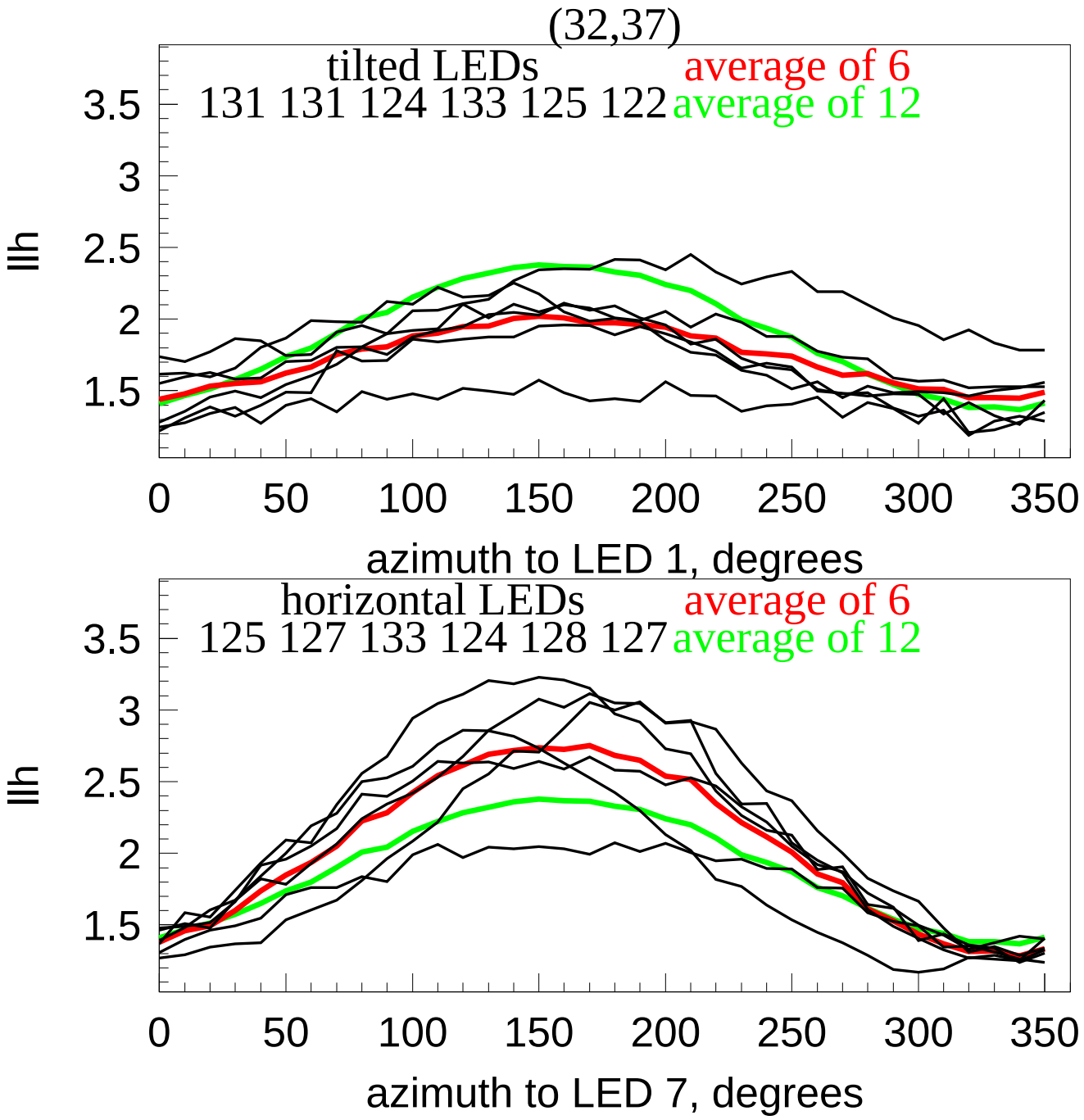

(32,35) 253.23 ± 31.13
2.34
2.32
2.3
2.28
2.26
2.24
2.22
2.2
2.18
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

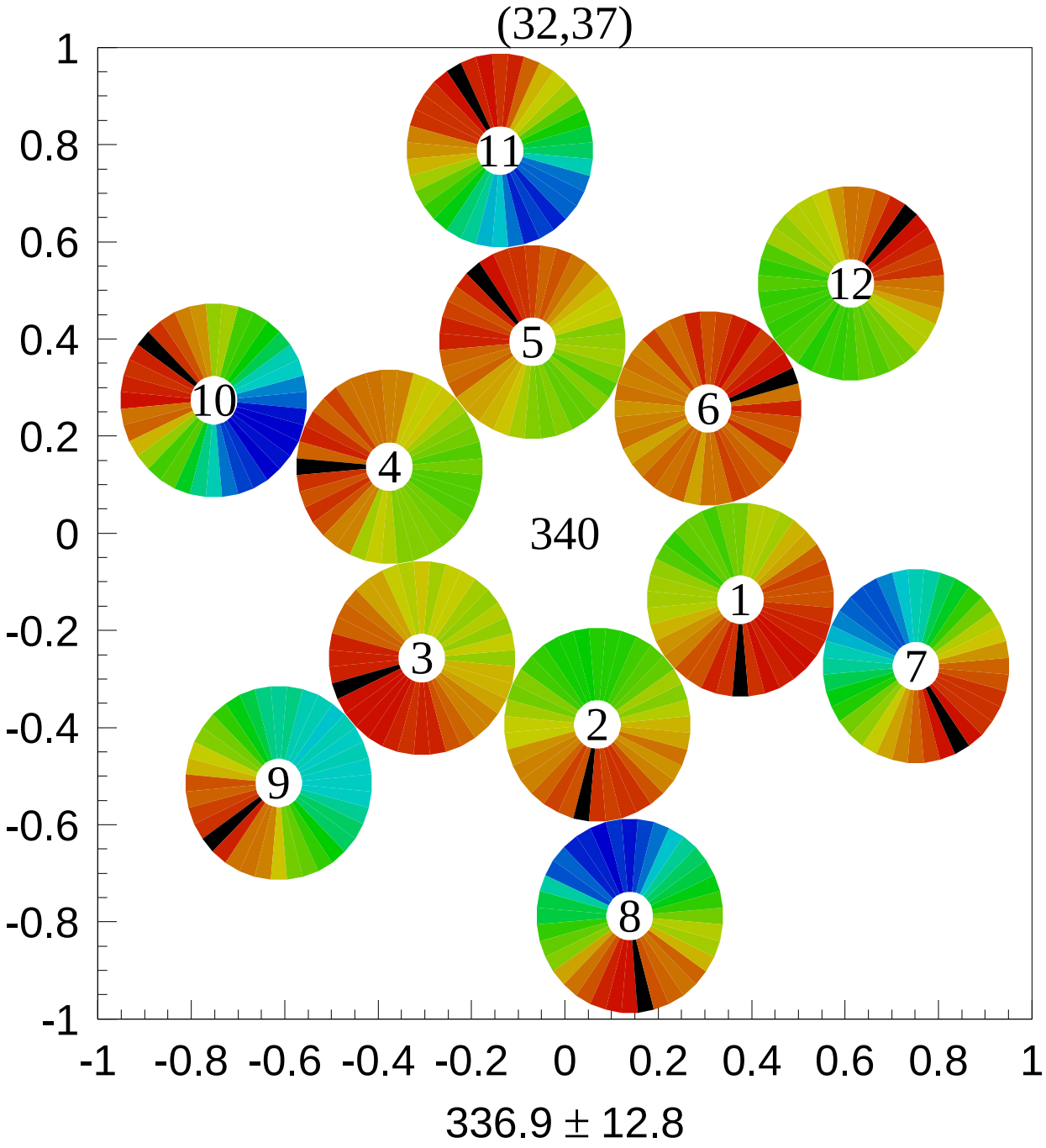

(32,36)
tilted LEDs
132 126 128 129 126 127
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 133 88 132 125 129
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

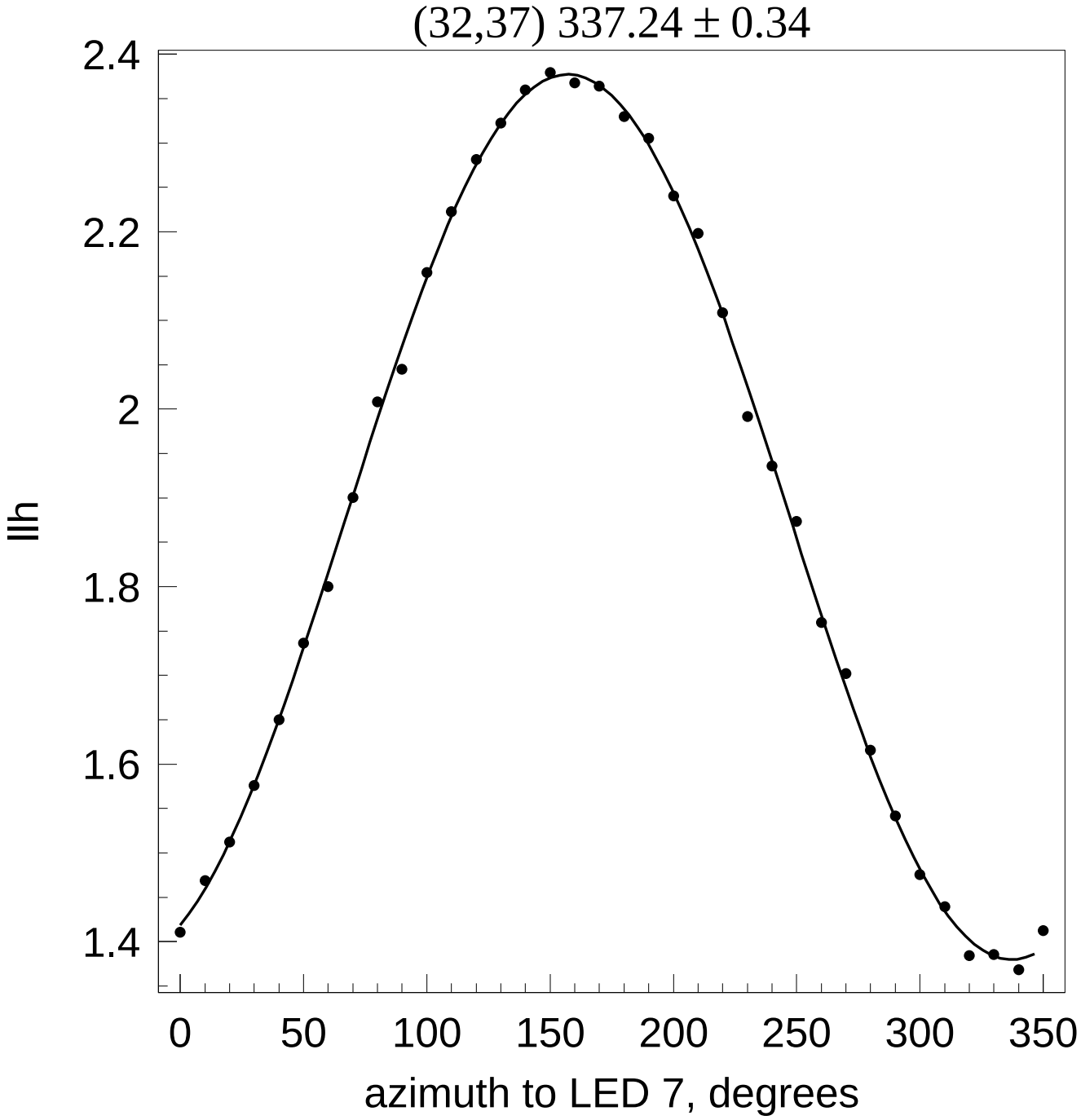

(32,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
92.5 ± 24.0
7
1
8
12
2
6
100
3
5
9
4
11
10

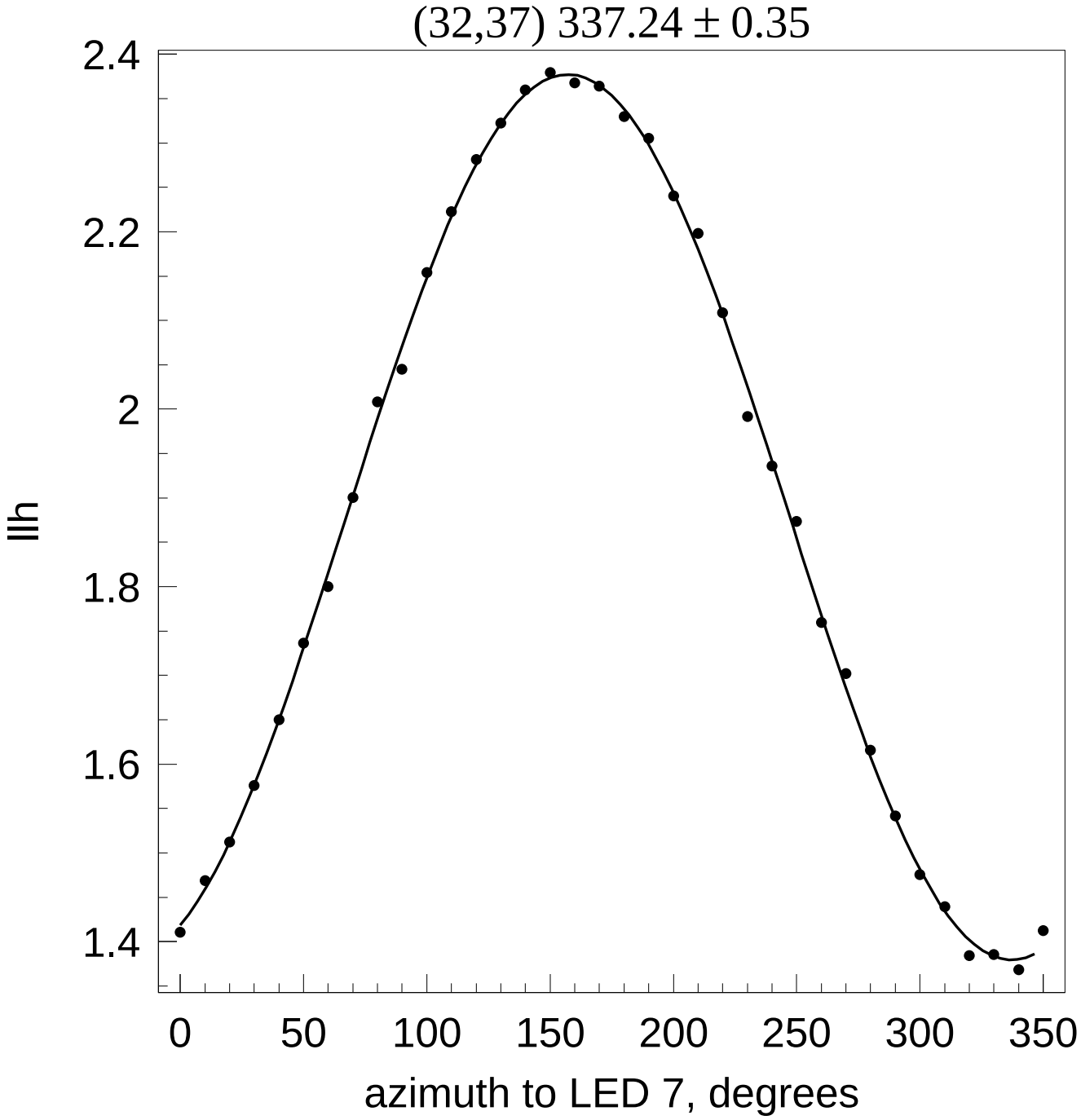

(32,36) 99.79 ± 3.04
2.225
2.2
2.175
2.15
2.125
2.1
2.075
2.05
2.025
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

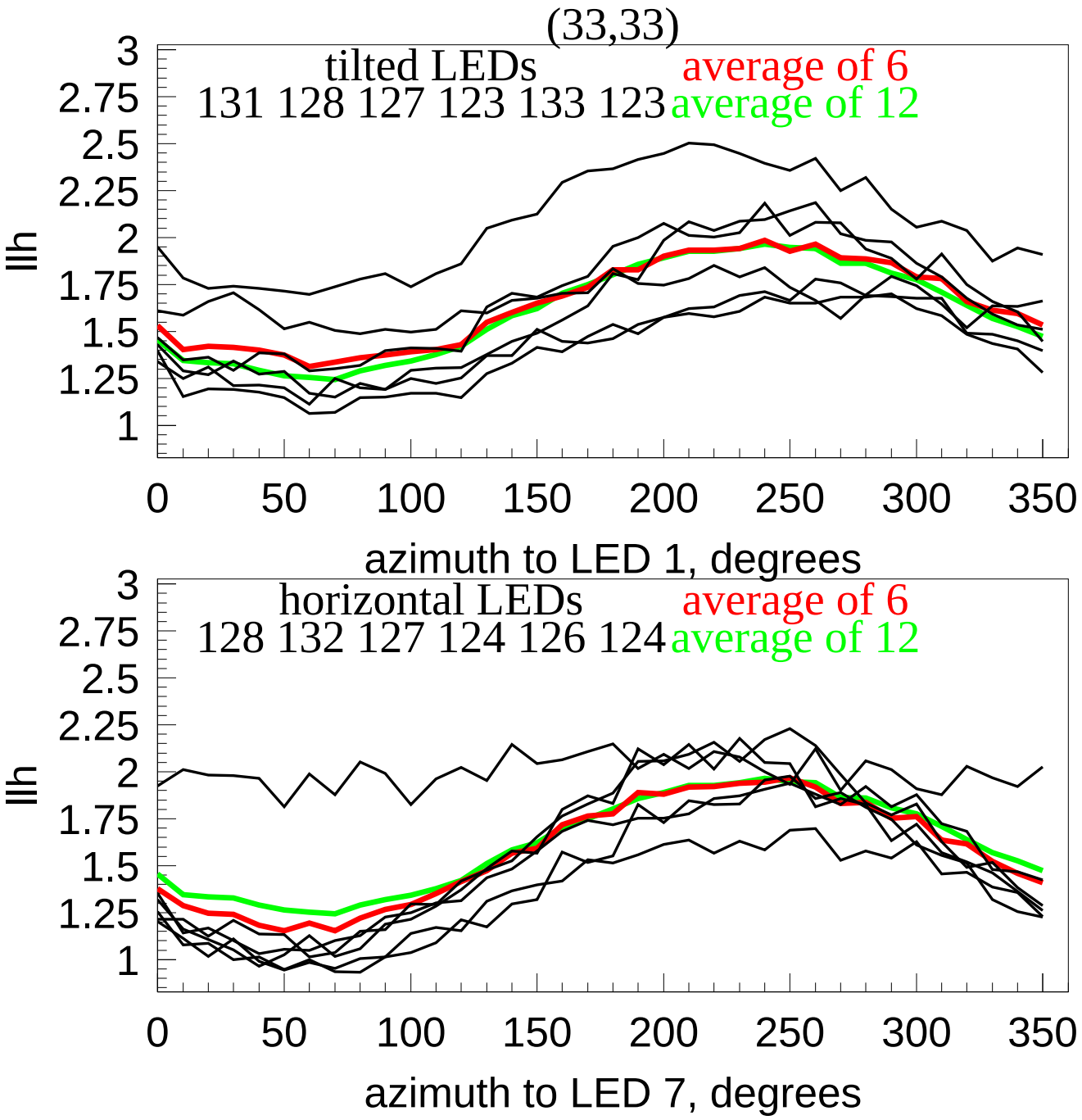

(32,36) 99.62 ± 3.20
2.225
2.2
2.175
2.15
2.125
2.1
2.075
2.05
2.025
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

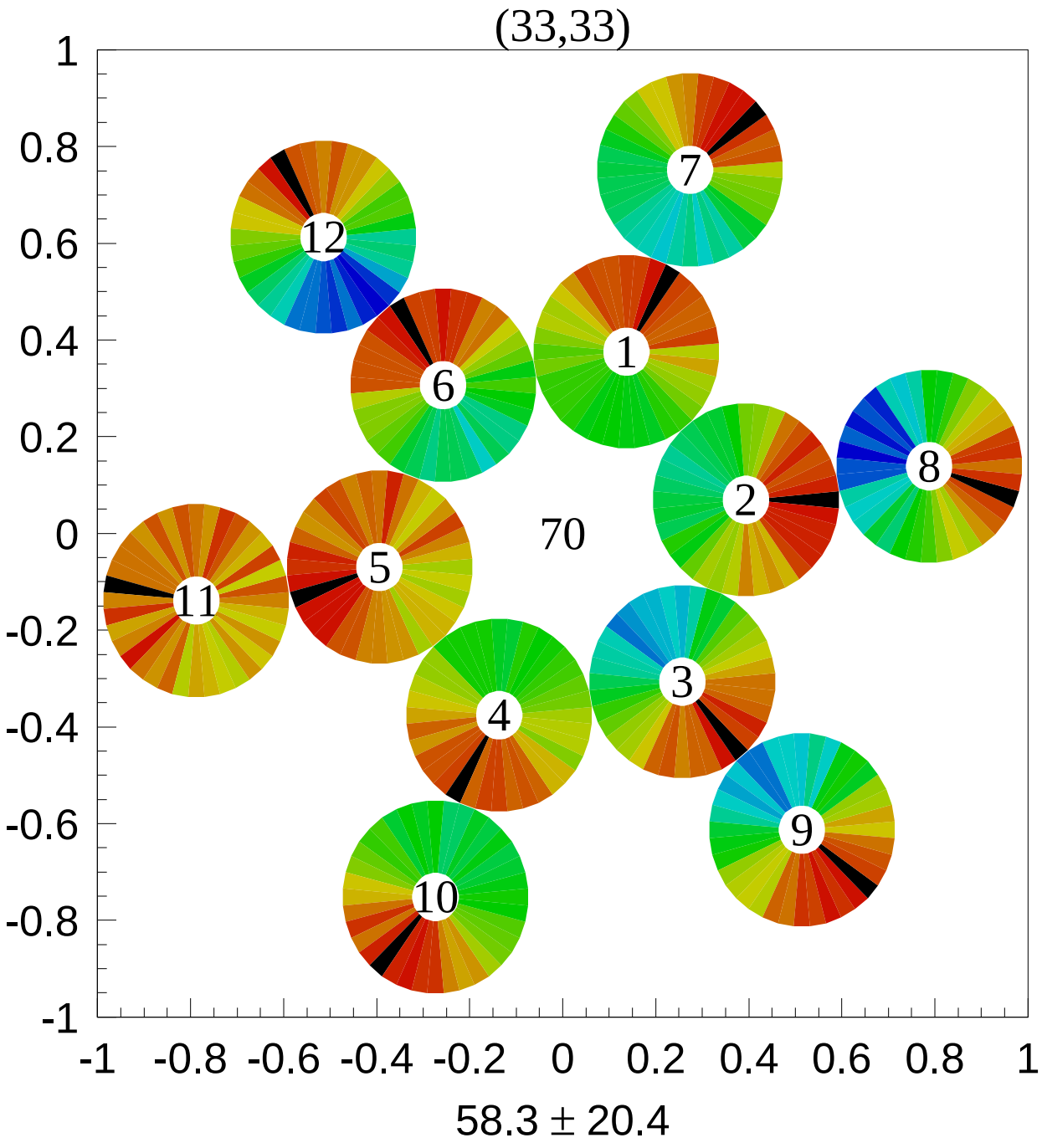

(32,37)
tilted LEDs
131 131 124 133 125 122
average of 6
average of 12
Ilh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 127 133 124 128 127
average of 6
average of 12
Ilh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

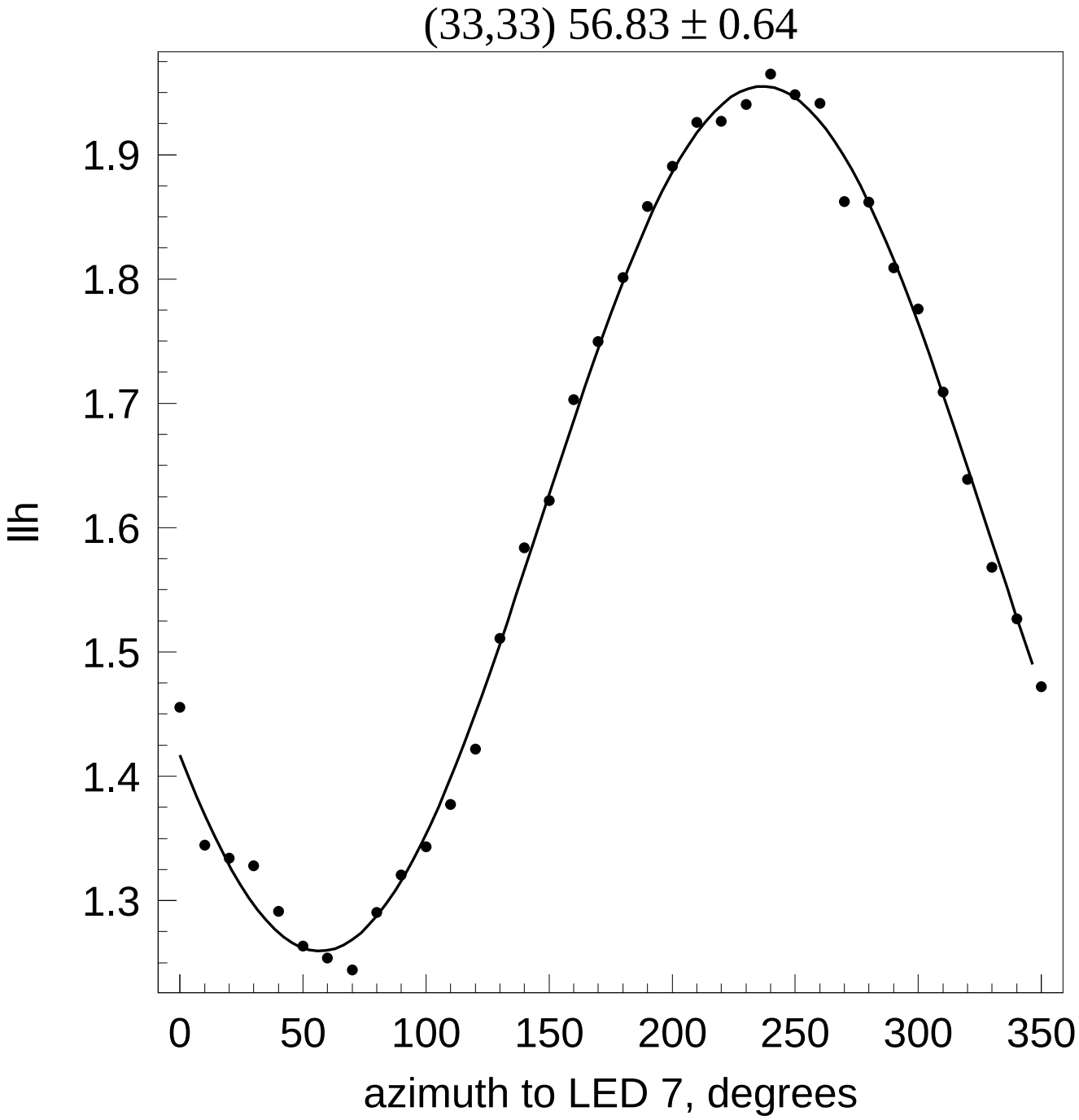

(32,37)
11
12
5
6
10
4
340
1
7
3
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
336.9 ± 12.8

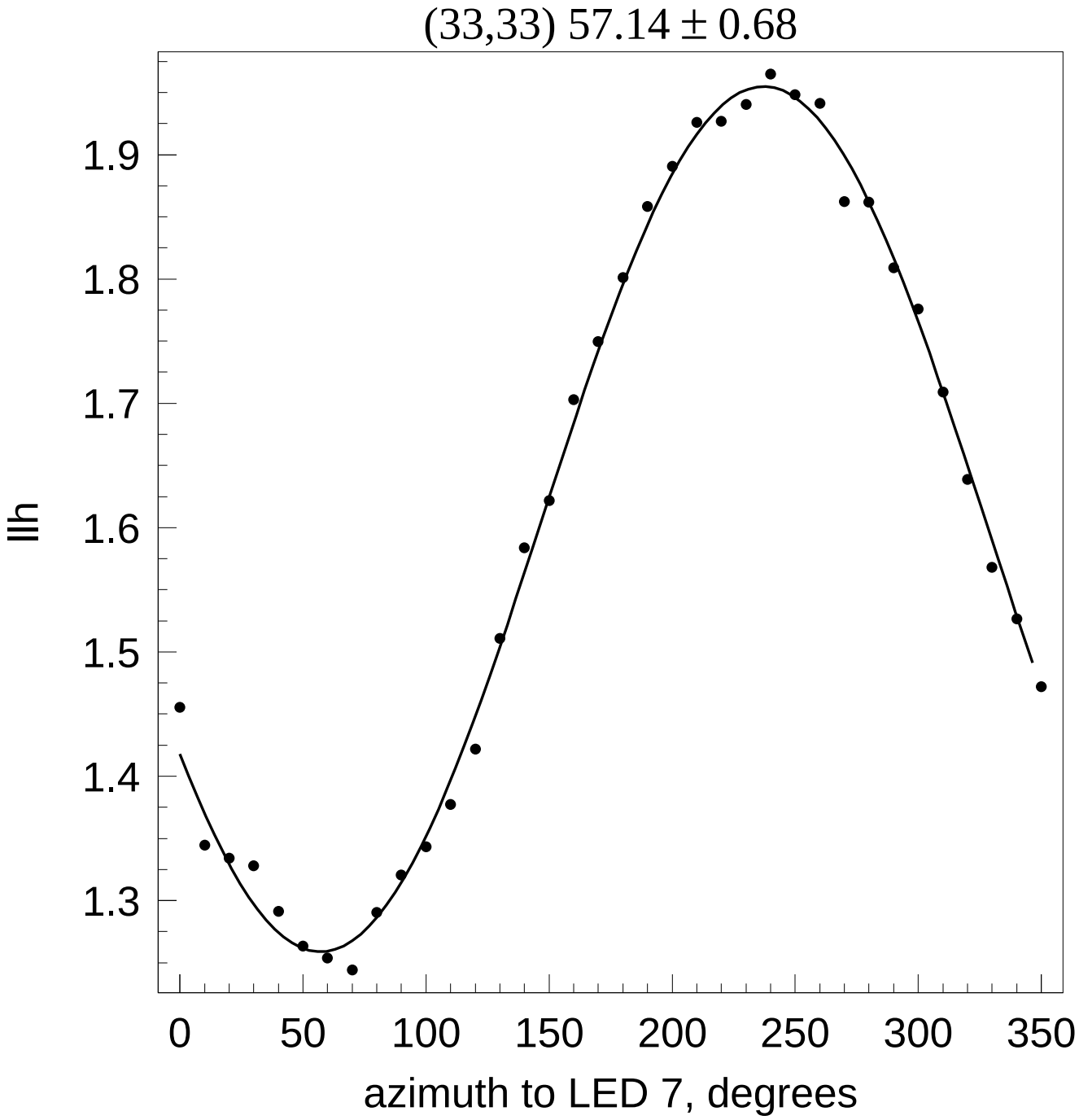

(32,37) 337.24 ± 0.34
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

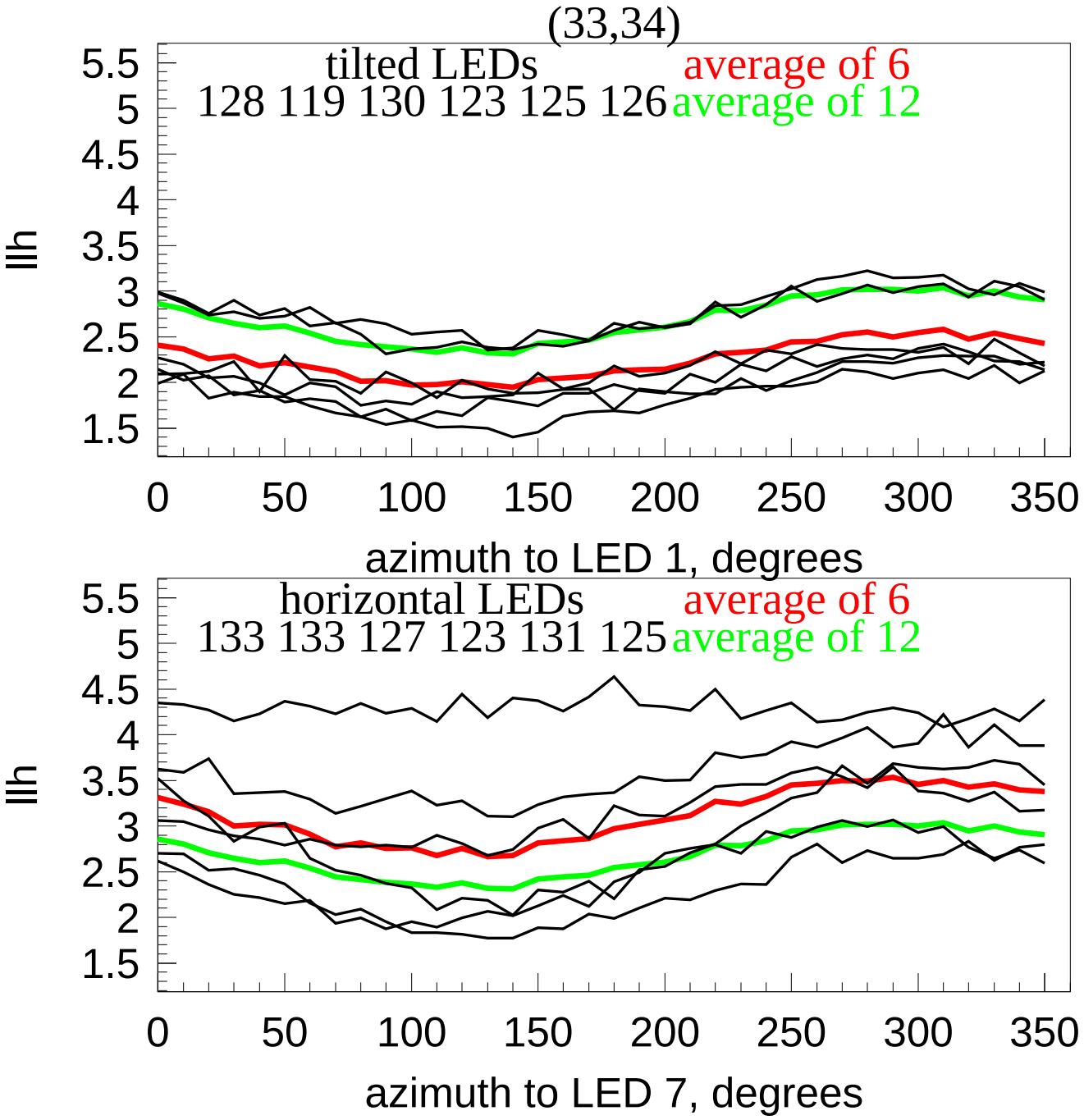

(32,37) 337.24 ± 0.35
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

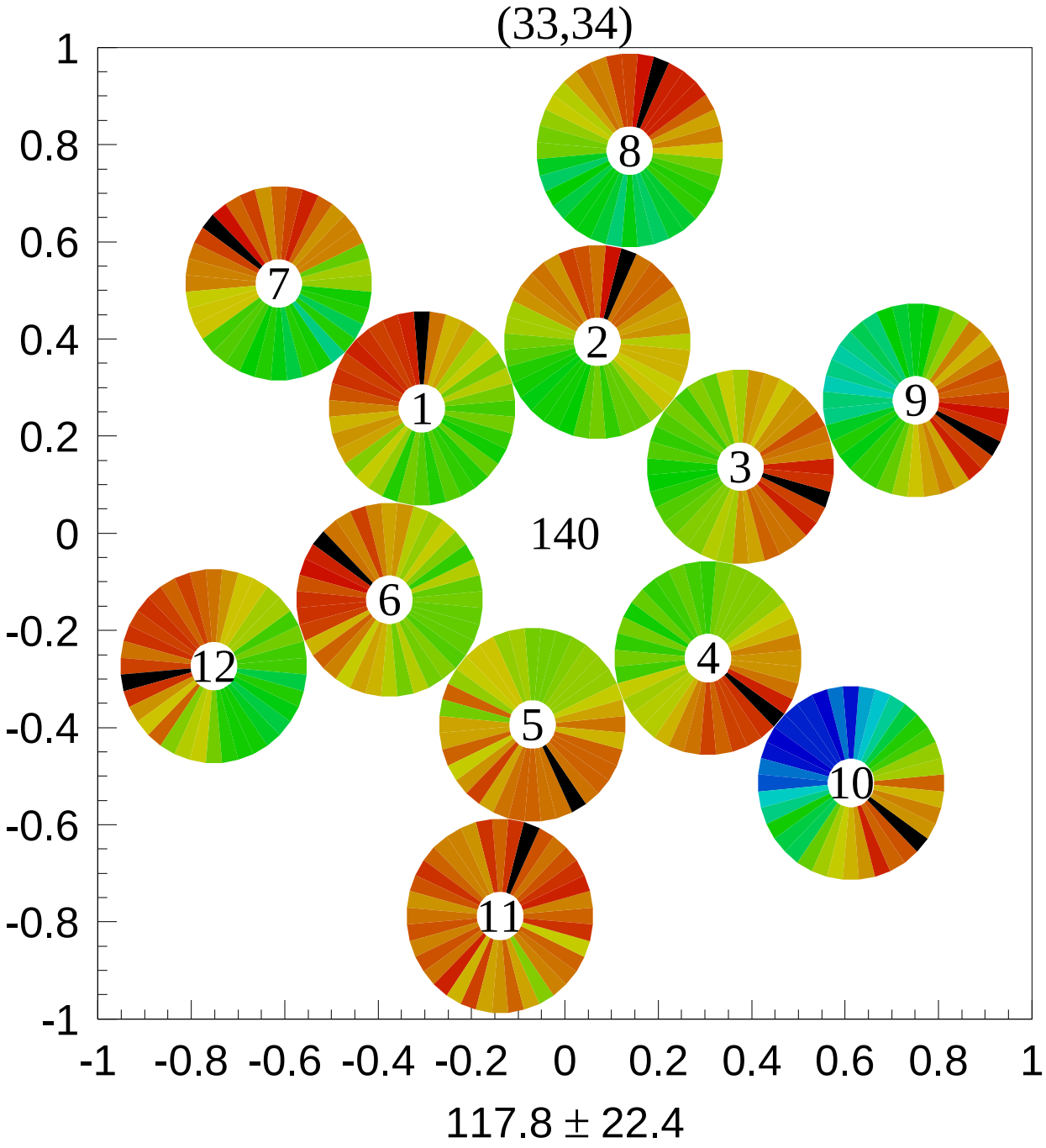

(33,33)
tilted LEDs
131 128 127 123 133 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 132 127 124 126 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

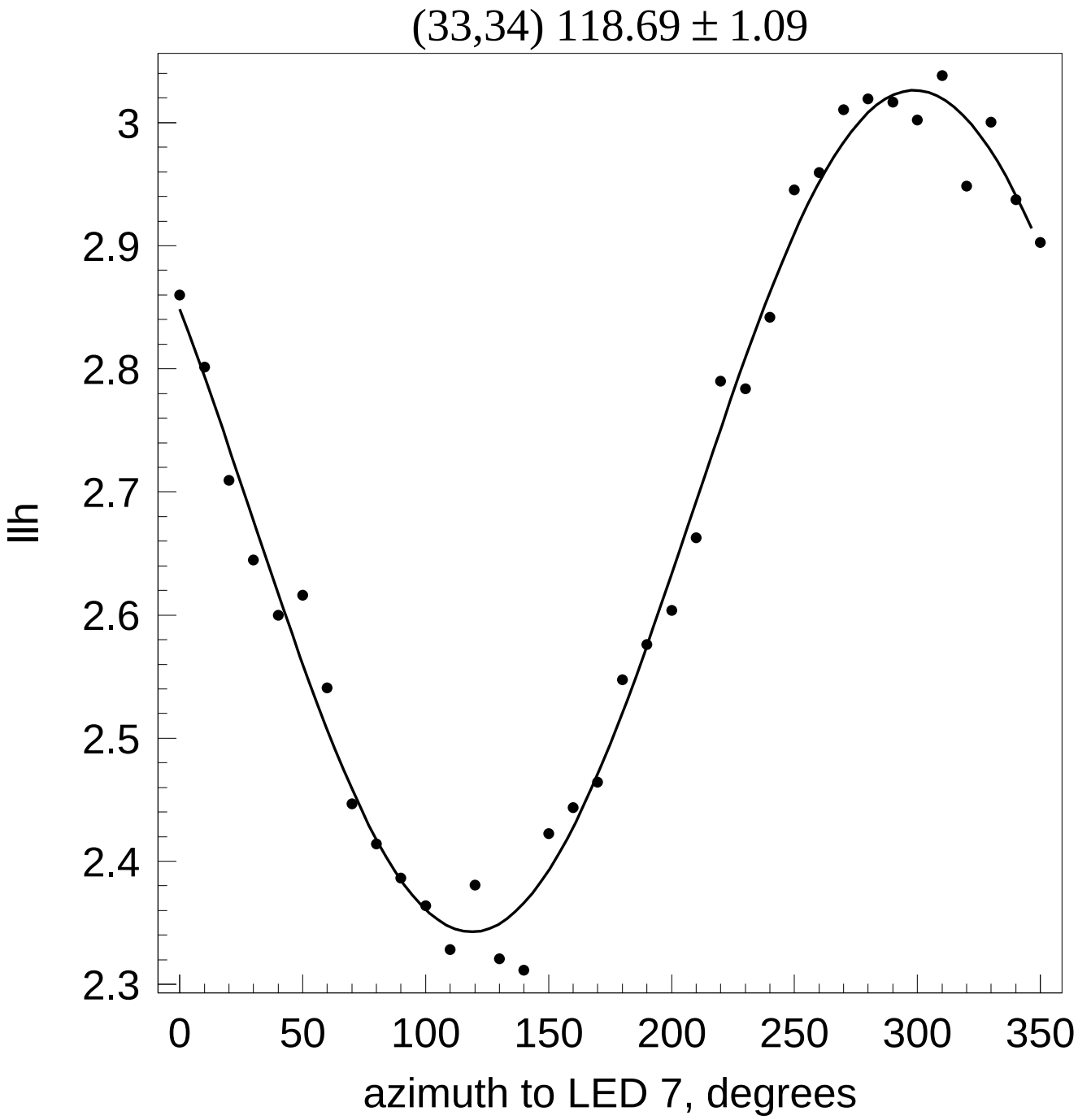

(33,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
70
1
2
3
4
5
6
7
8
9
10
11
12
58.3 ± 20.4

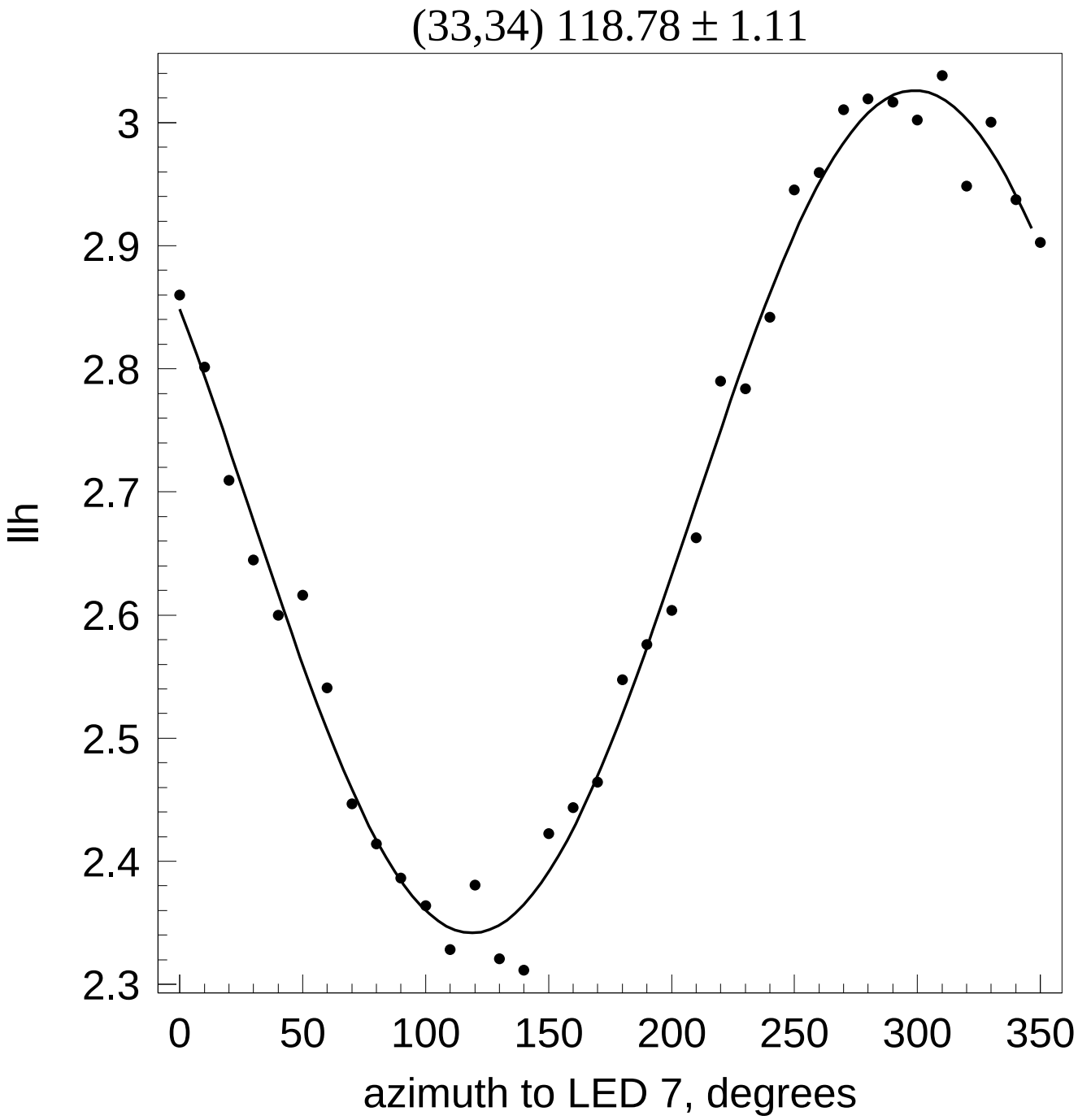

(33,33) 56.83 ± 0.64
1.9
1.8
1.7
1.6
1.5
1.4
1.3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

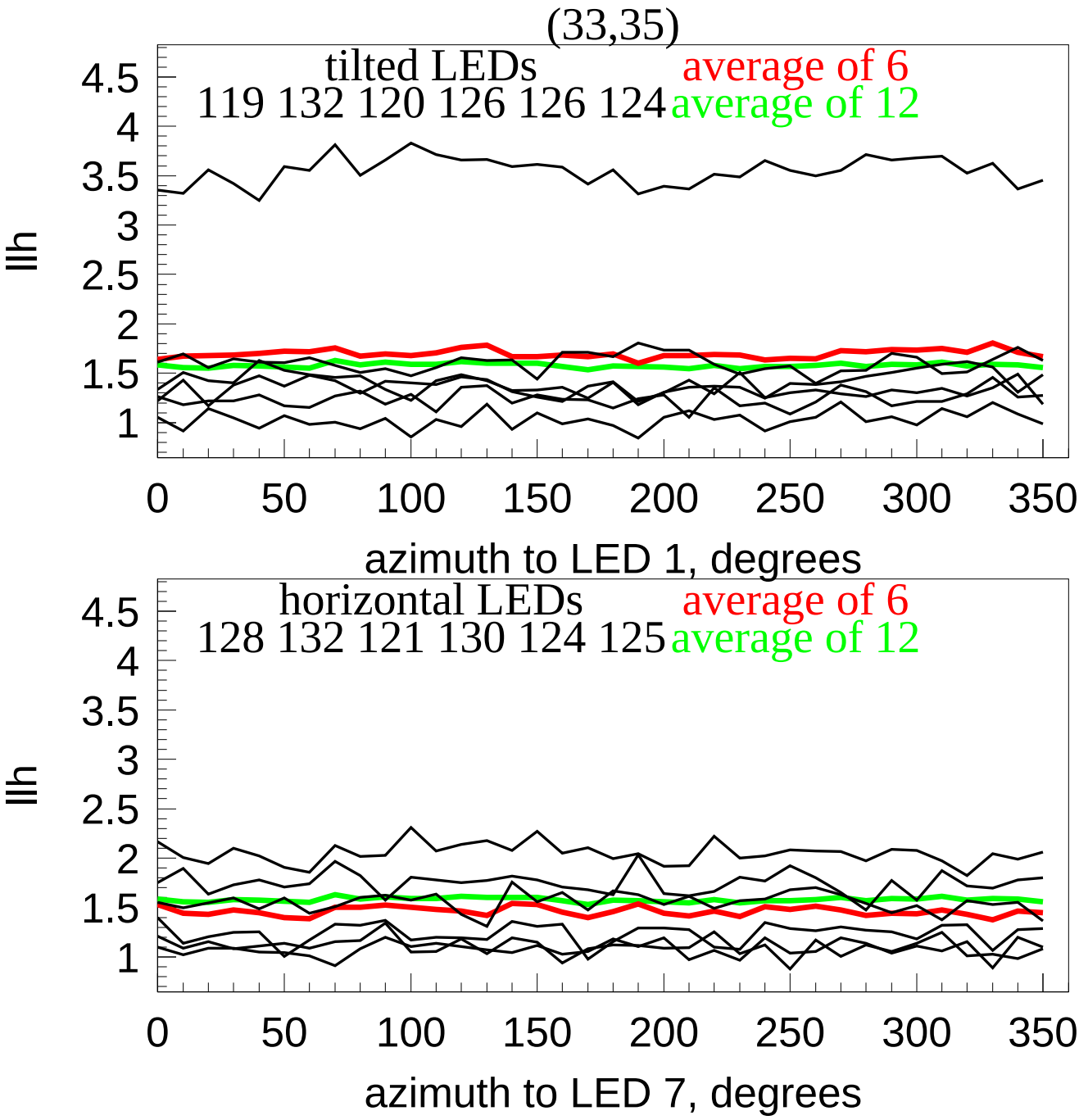

(33,33) 57.14 ± 0.68
1.9
1.8
1.7
1.6
1.5
1.4
1.3
lllh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

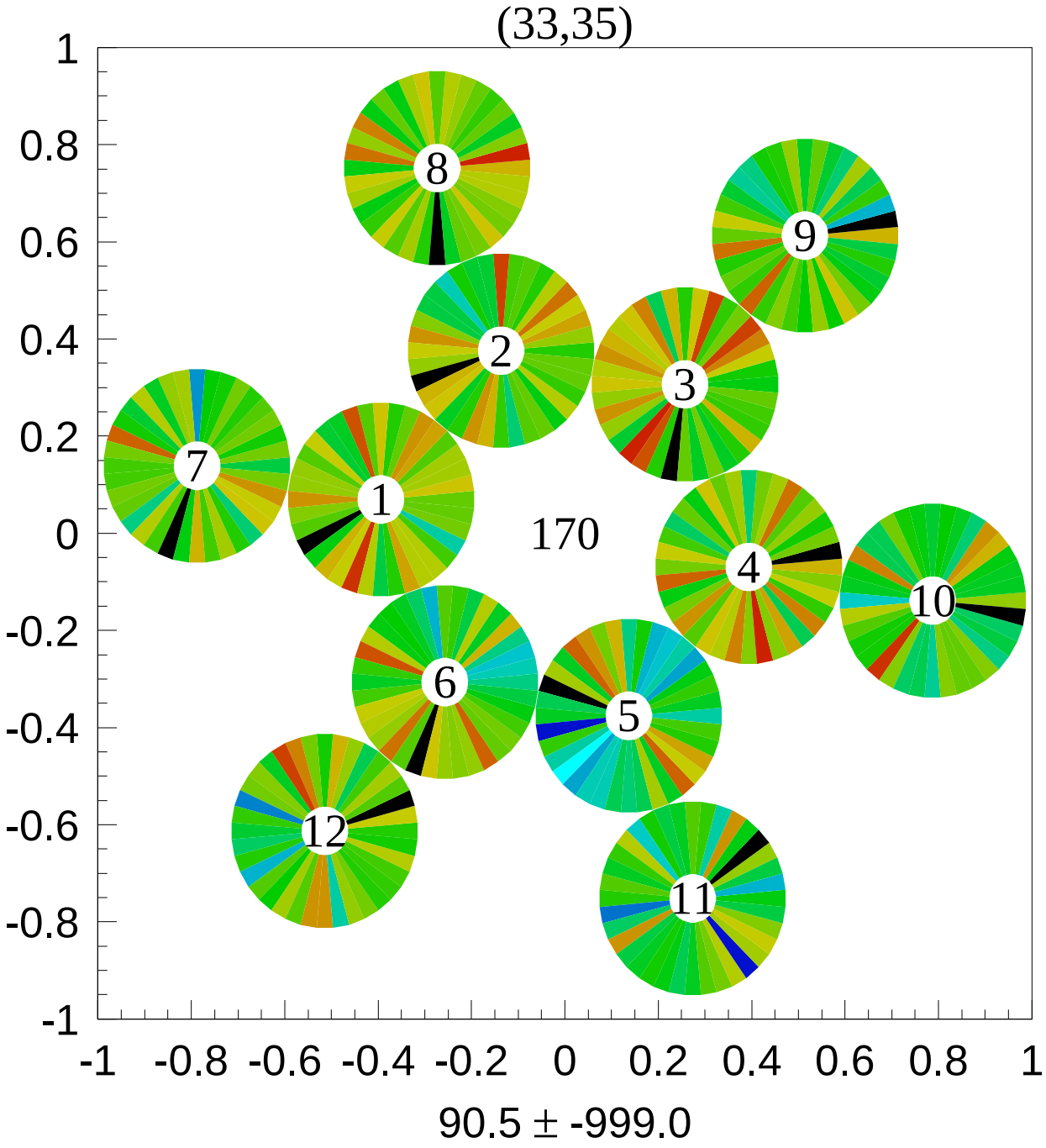

(33,34)
tilted LEDs
128 119 130 123 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
133 133 127 123 131 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

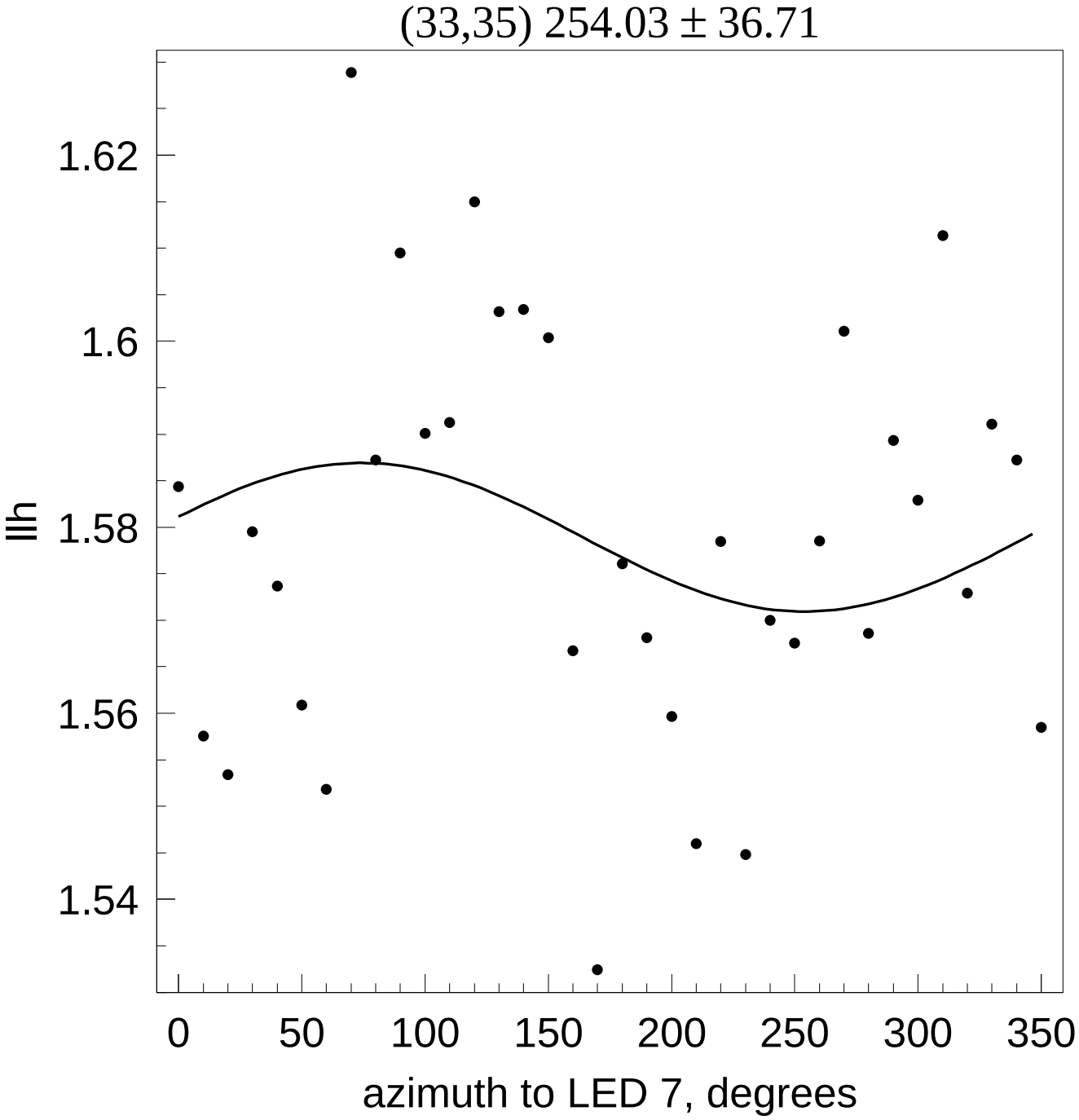

(33,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
117.8 ± 22.4
140
1
2
3
4
5
6
7
8
9
10
11
12

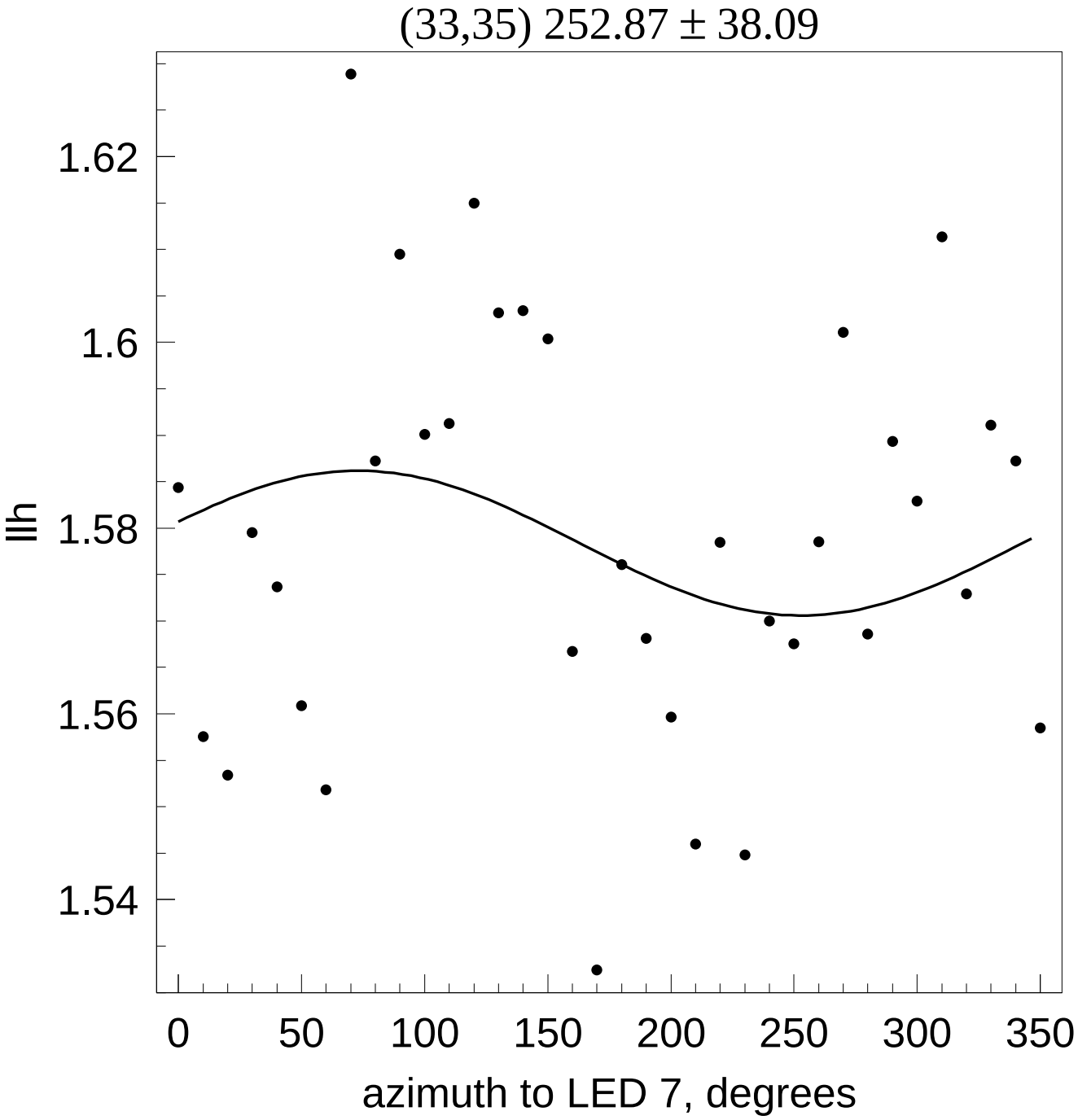

(33,34) 118.69 ± 1.09
llh
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

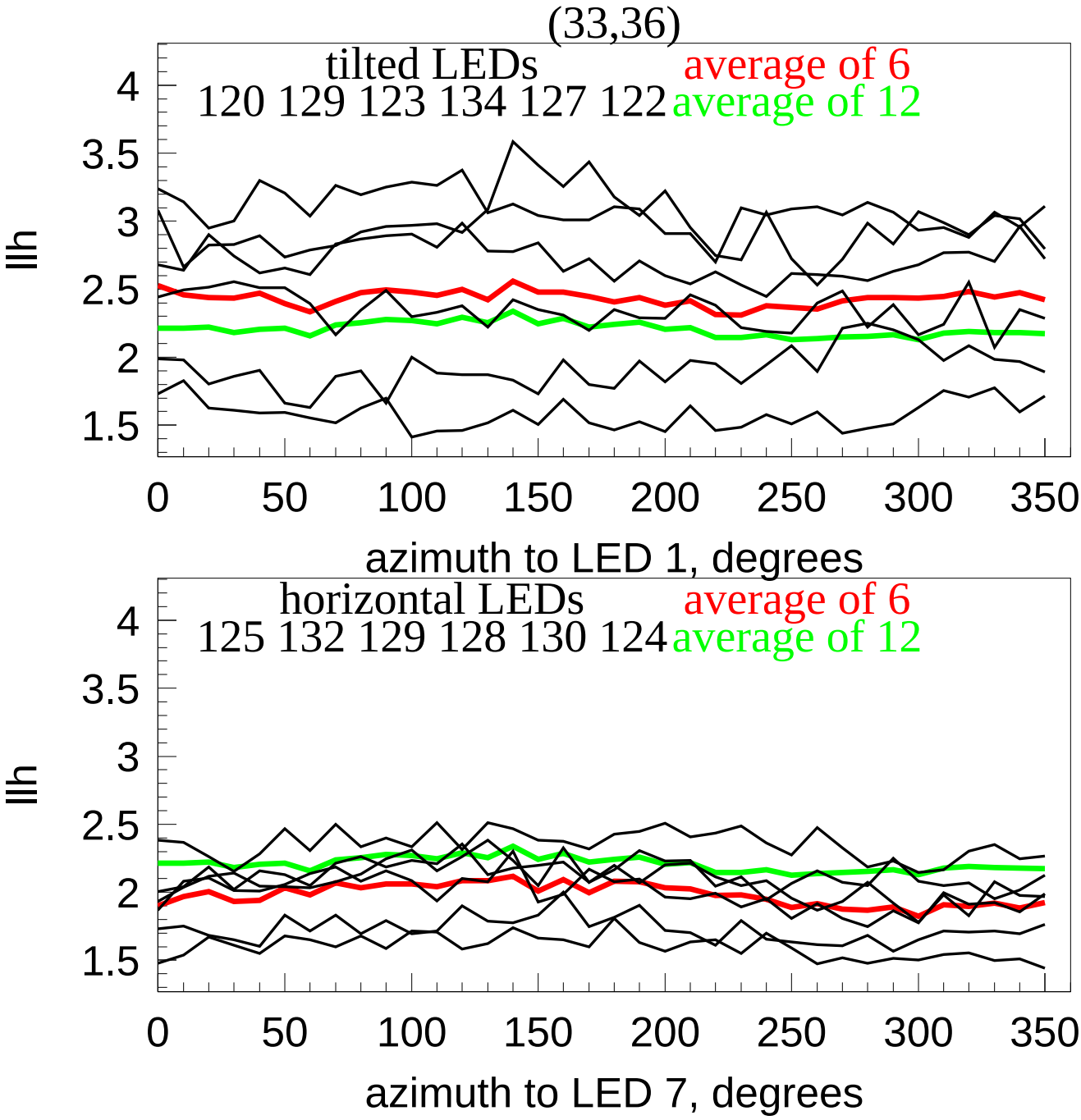

(33,34) 118.78 ± 1.11
llh
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

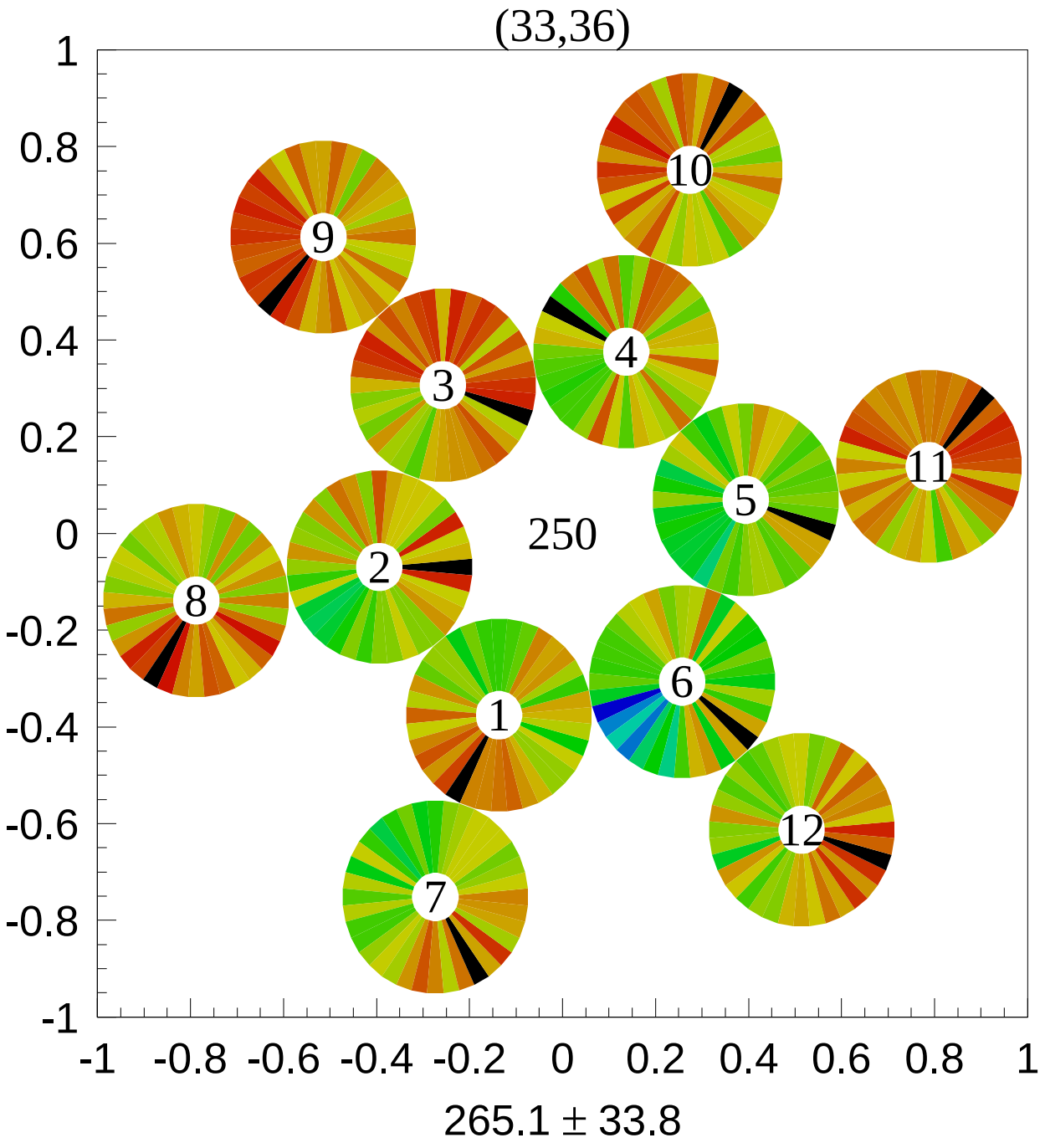

(33,35)
tilted LEDs
119 132 120 126 126 124
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 132 121 130 124 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

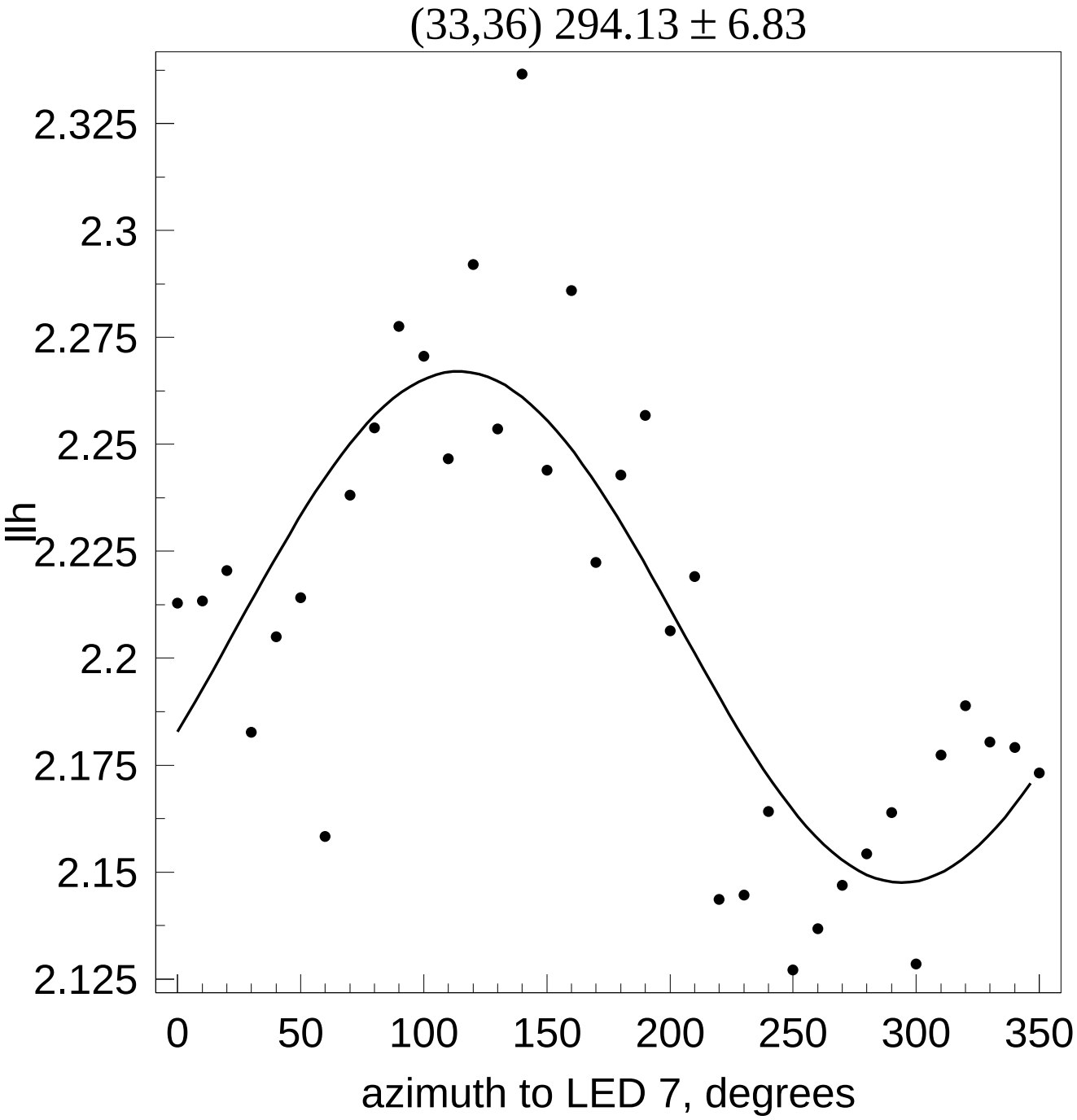

(33,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
90.5 ± -999.0
170
1
2
3
4
5
6
7
8
9
10
11
12

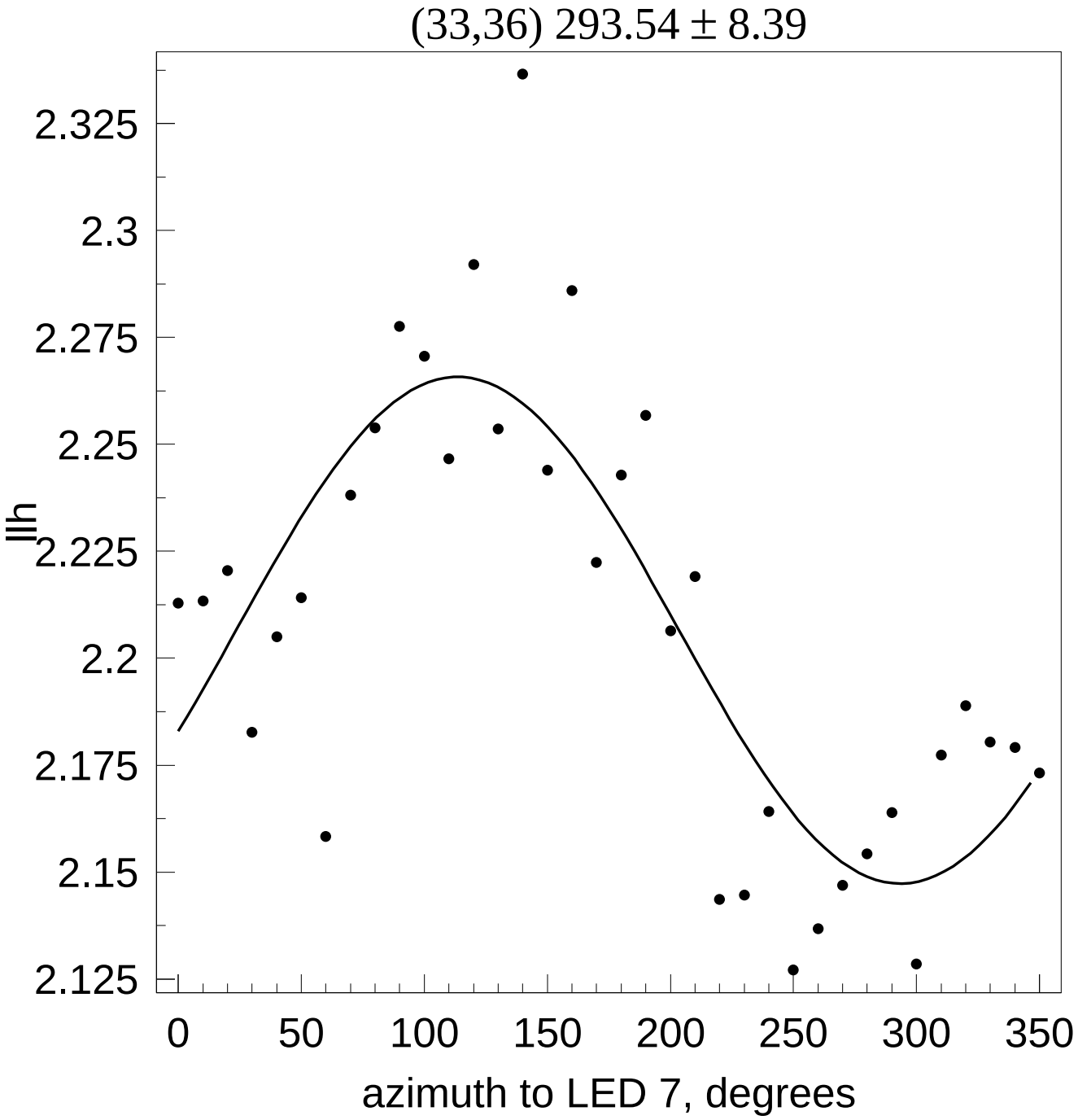

(33,35) 254.03 ± 36.71
1.62
1.6
1.58
1.56
1.54
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

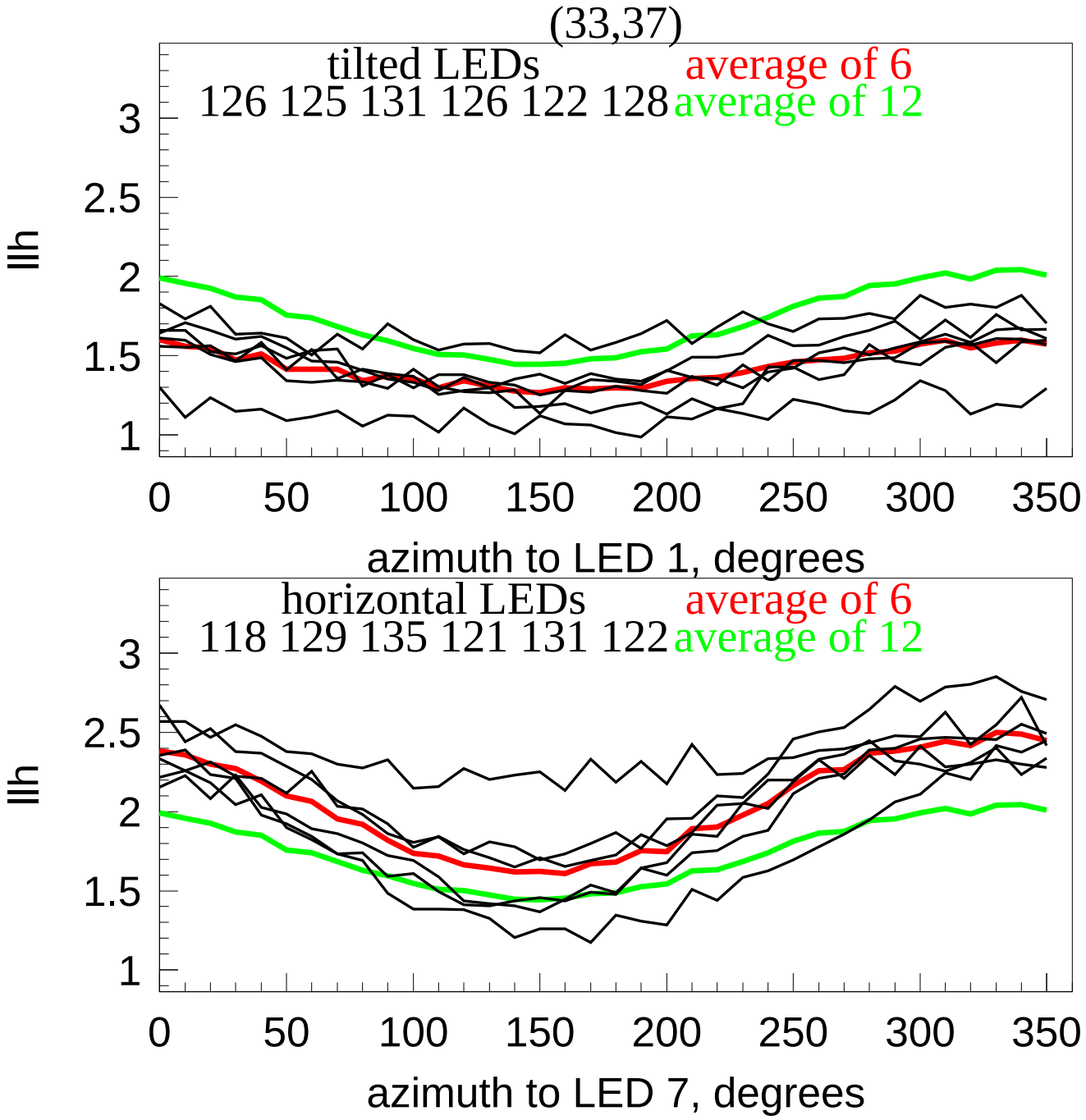

(33,35) 252.87 ± 38.09
1.62
1.6
1.58
1.56
1.54
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

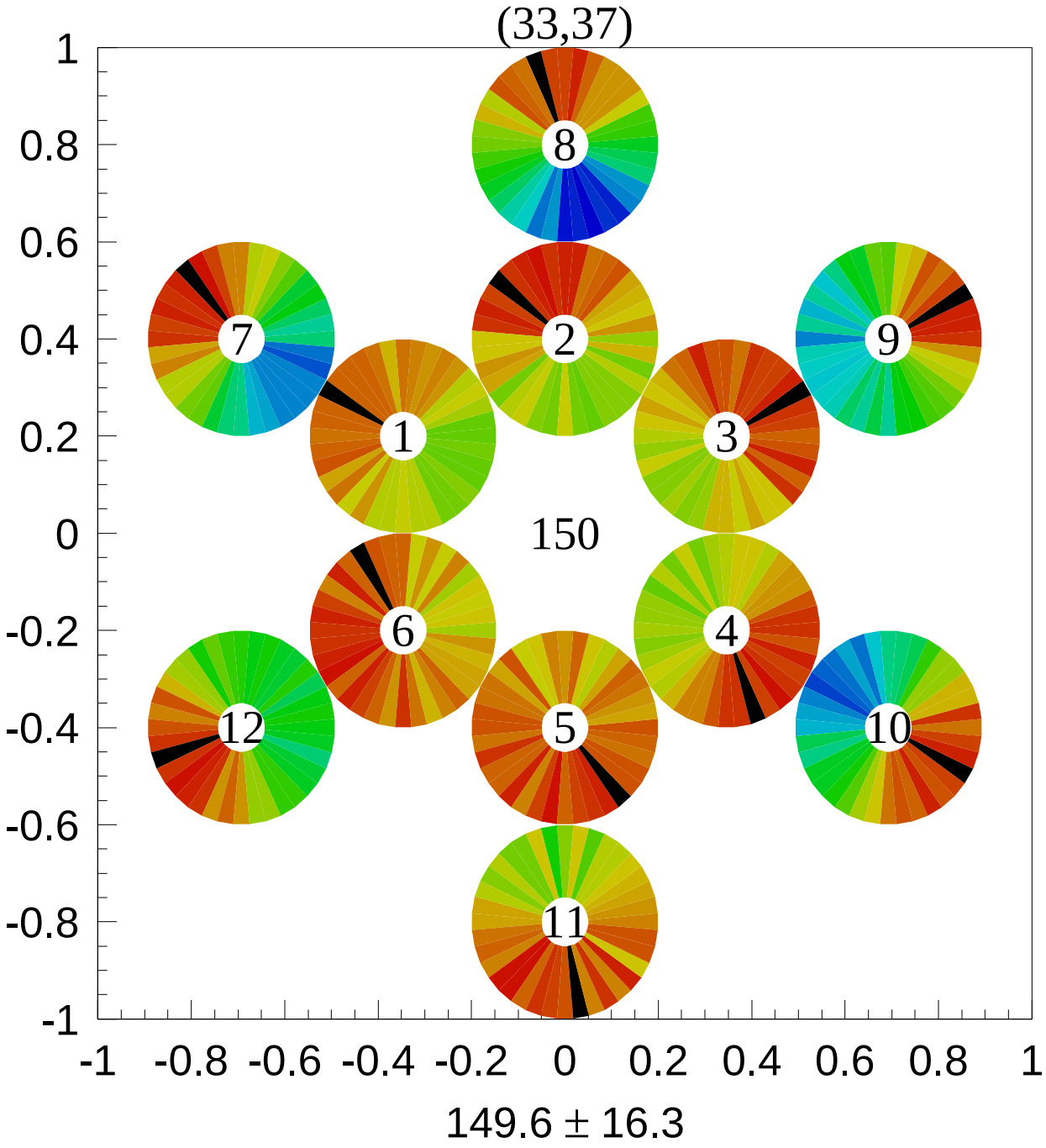

(33,36)
tilted LEDs
120 129 123 134 127 122
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 132 129 128 130 124
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

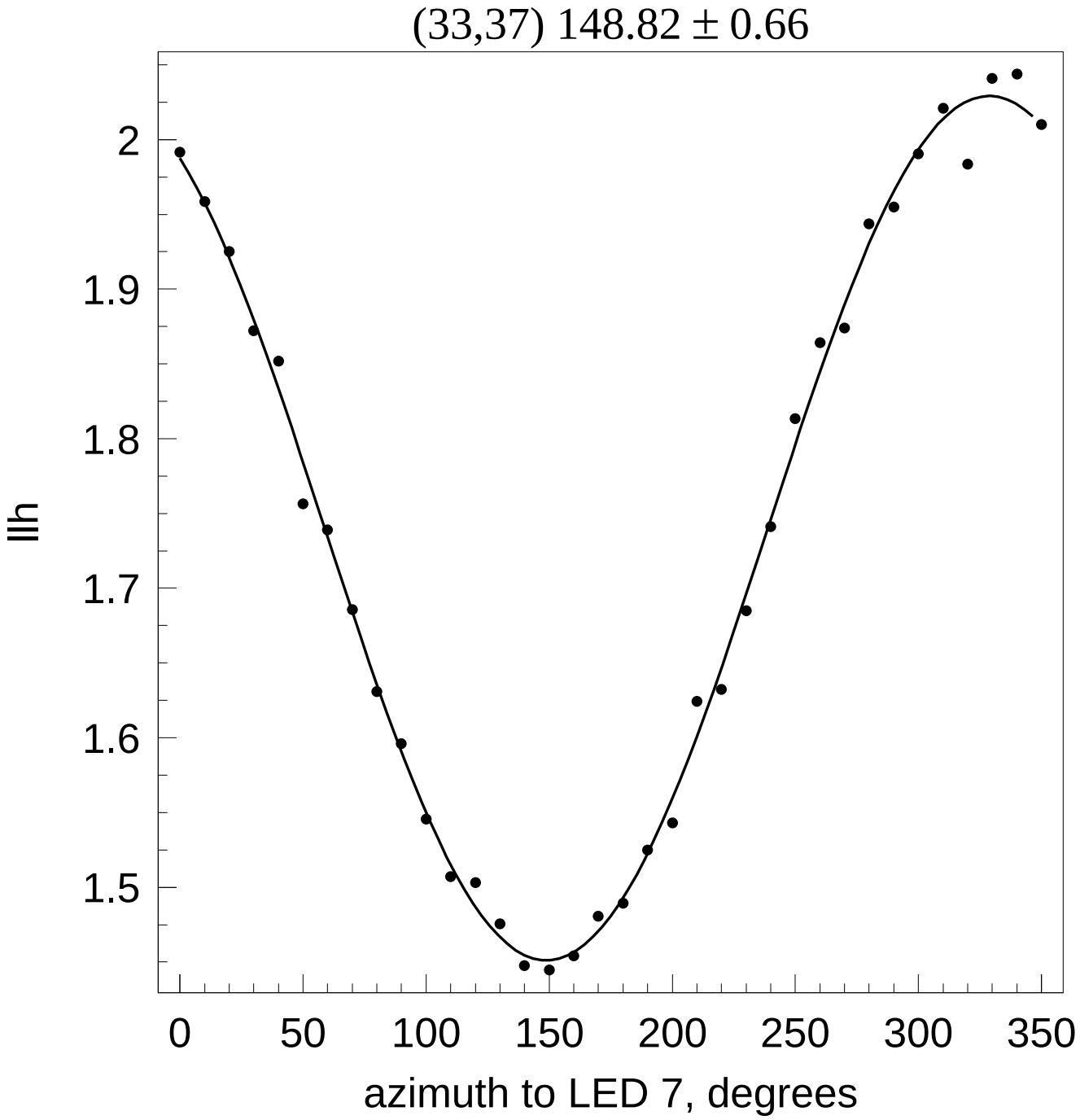

(33,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
265.1 ± 33.8
250
1
2
3
4
5
6
7
8
9
10
11
12

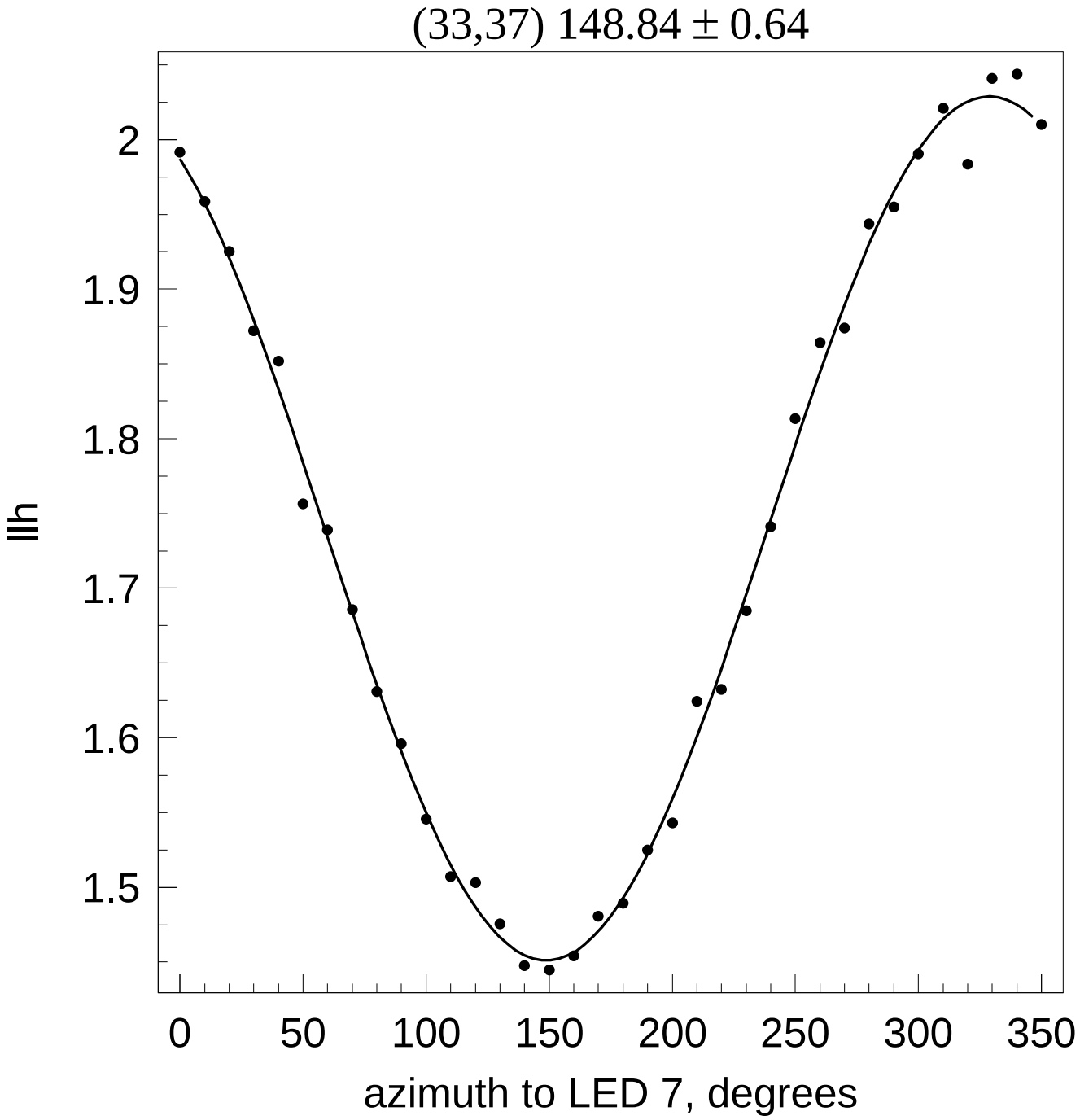

(33,36) 294.13 ± 6.83
2.325
2.3
2.275
2.25
2.225
2.2
2.175
2.15
2.125
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

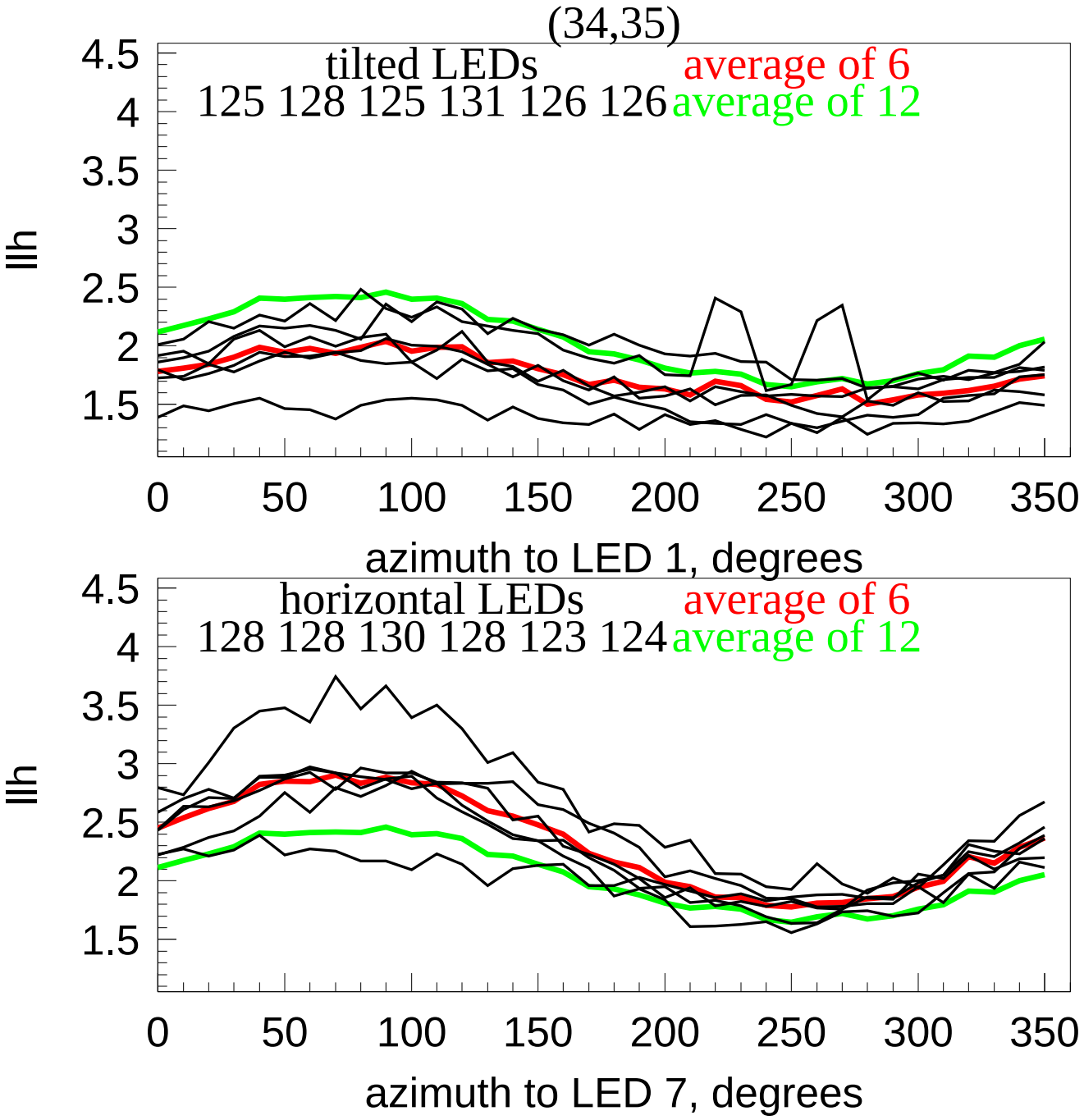

(33,36) 293.54 ± 8.39
2.325
2.3
2.275
2.25
2.225
2.2
2.175
2.15
2.125
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

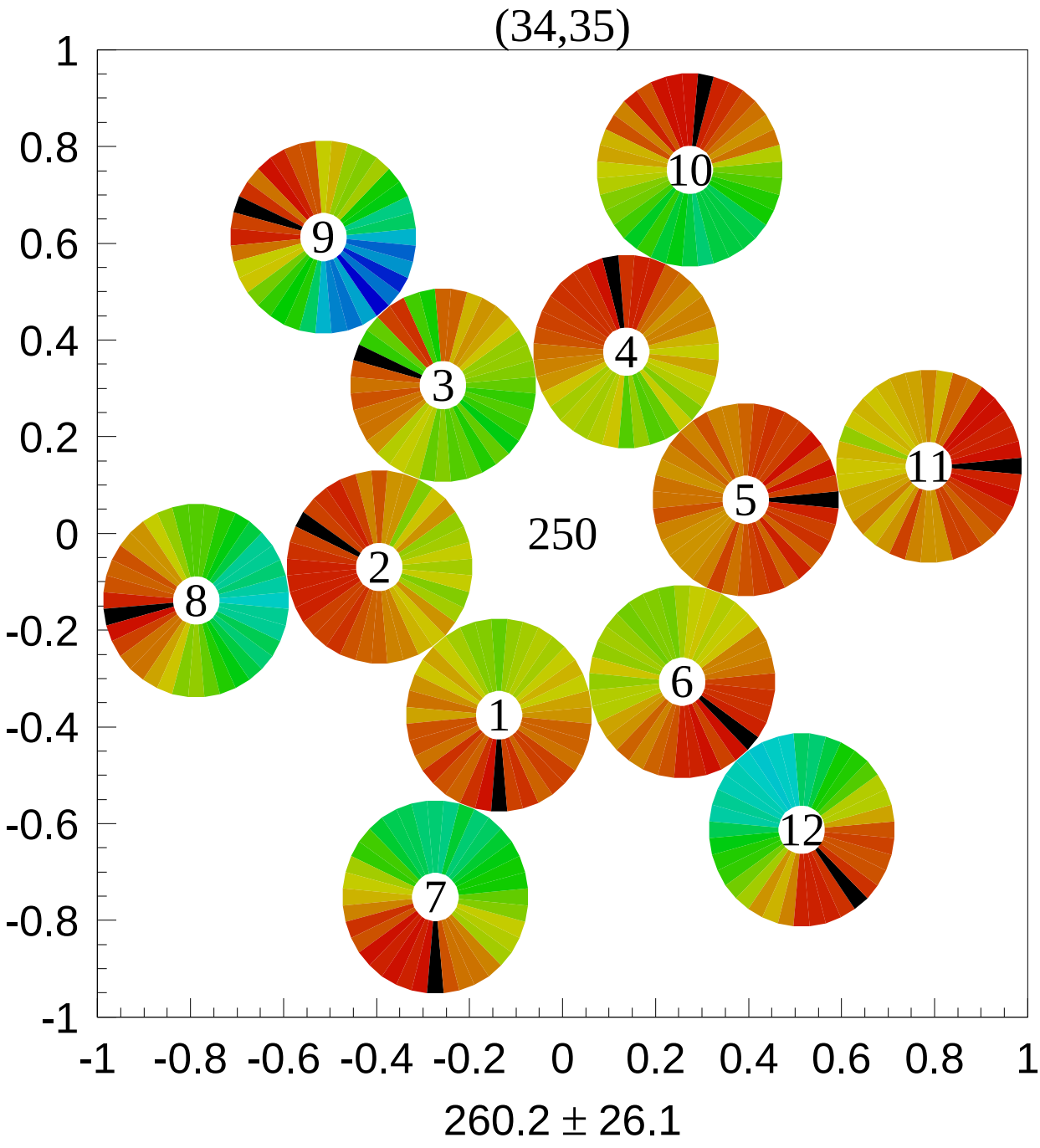

(33,37)
tilted LEDs
126 125 131 126 122 128
average of 6
average of 12
llh
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
118 129 135 121 131 122
average of 6
average of 12
llh
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

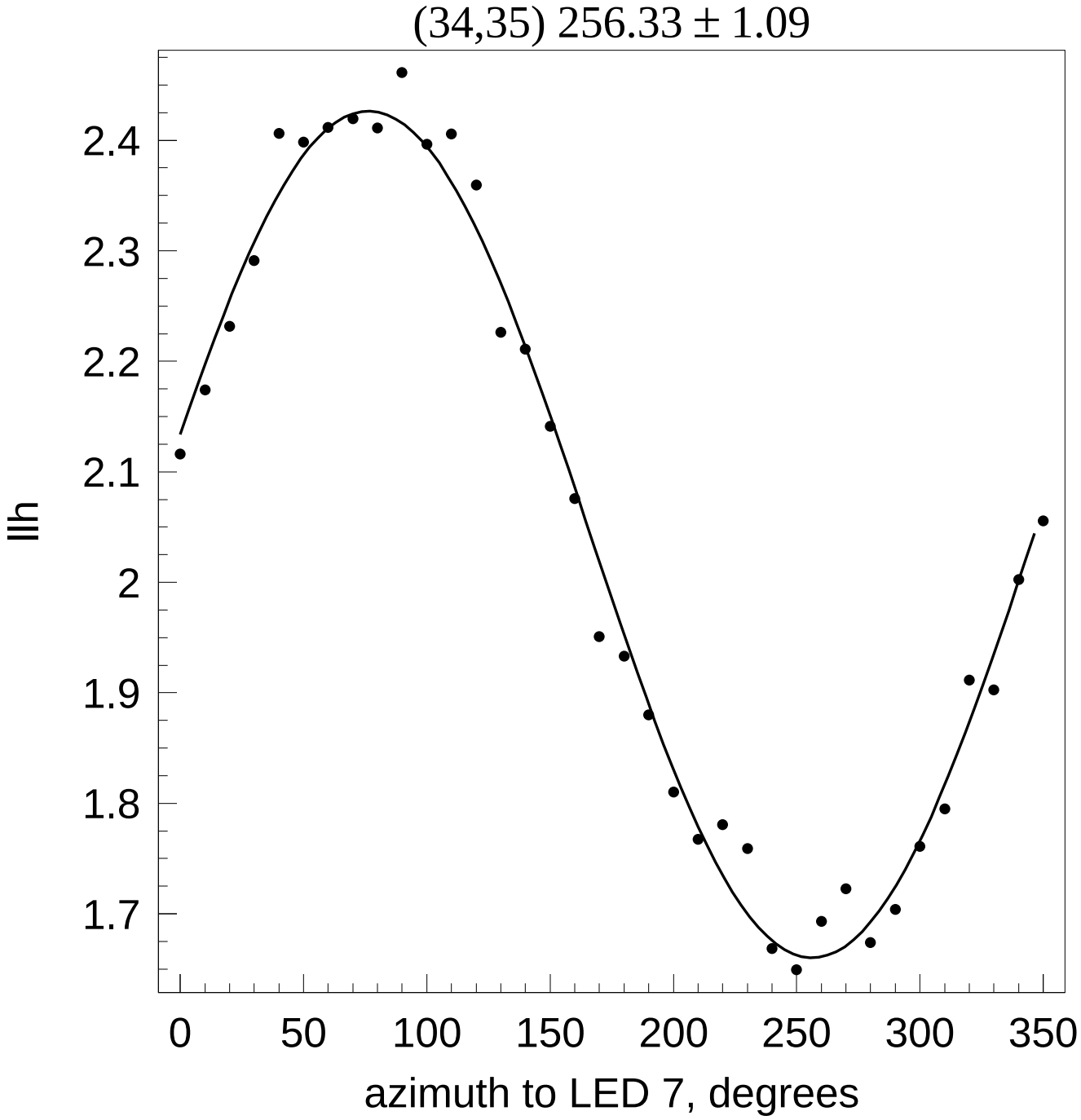

(33,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
8
7
2
9
1
3
150
6
4
12
5
10
11
149.6 ± 16.3

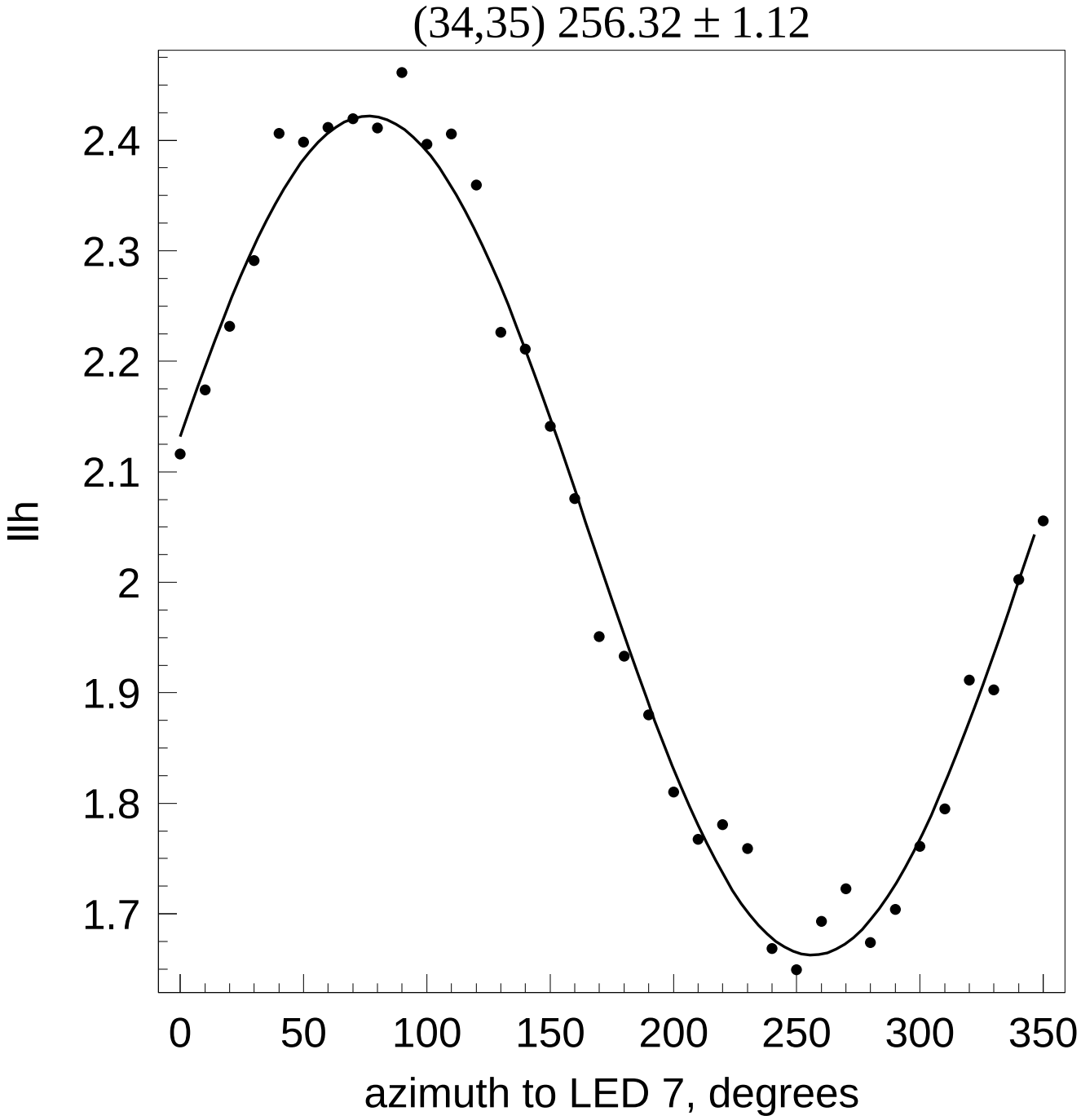

(33,37) 148.82 ± 0.66
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

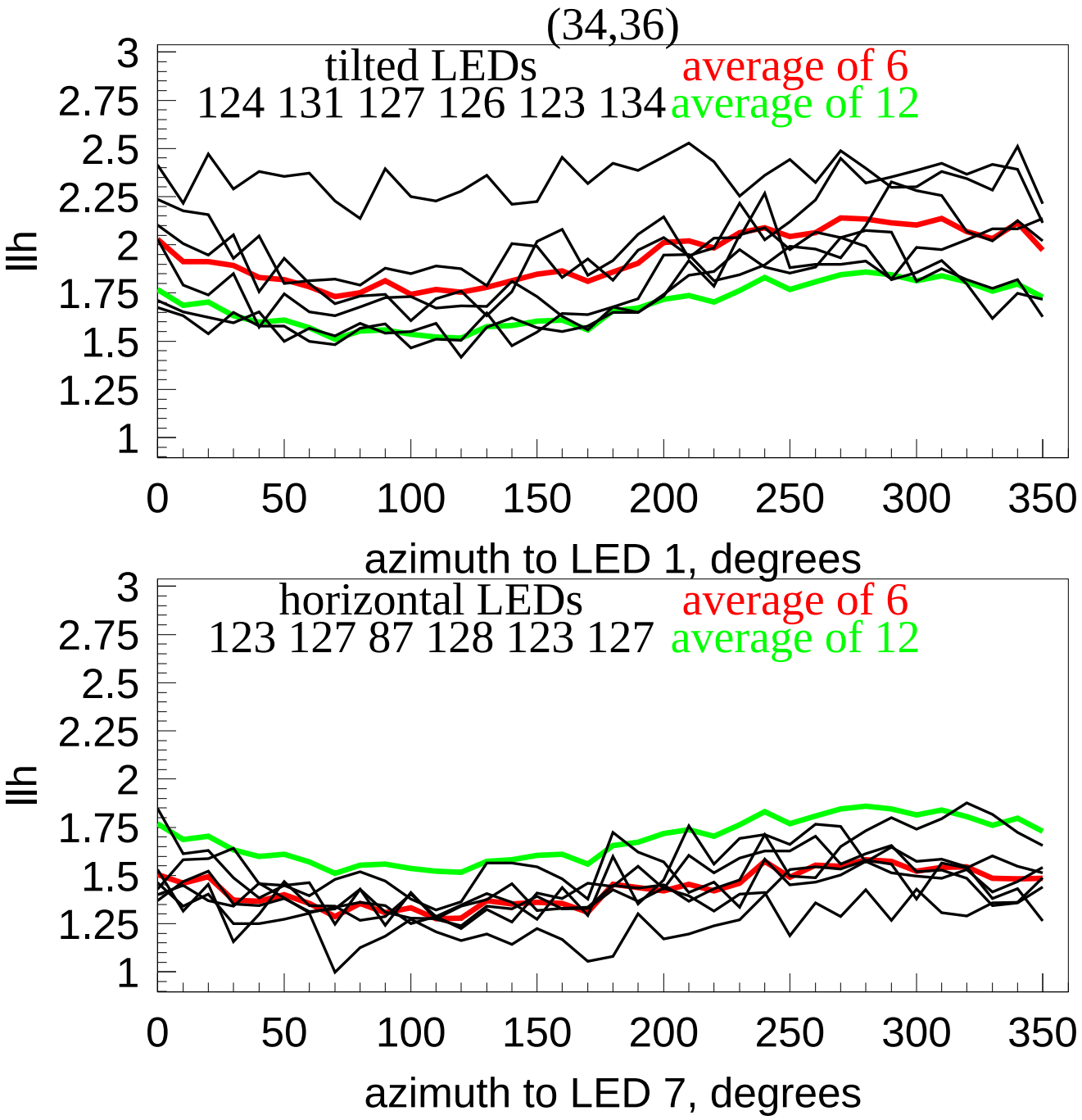

(33,37) 148.84 ± 0.64
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

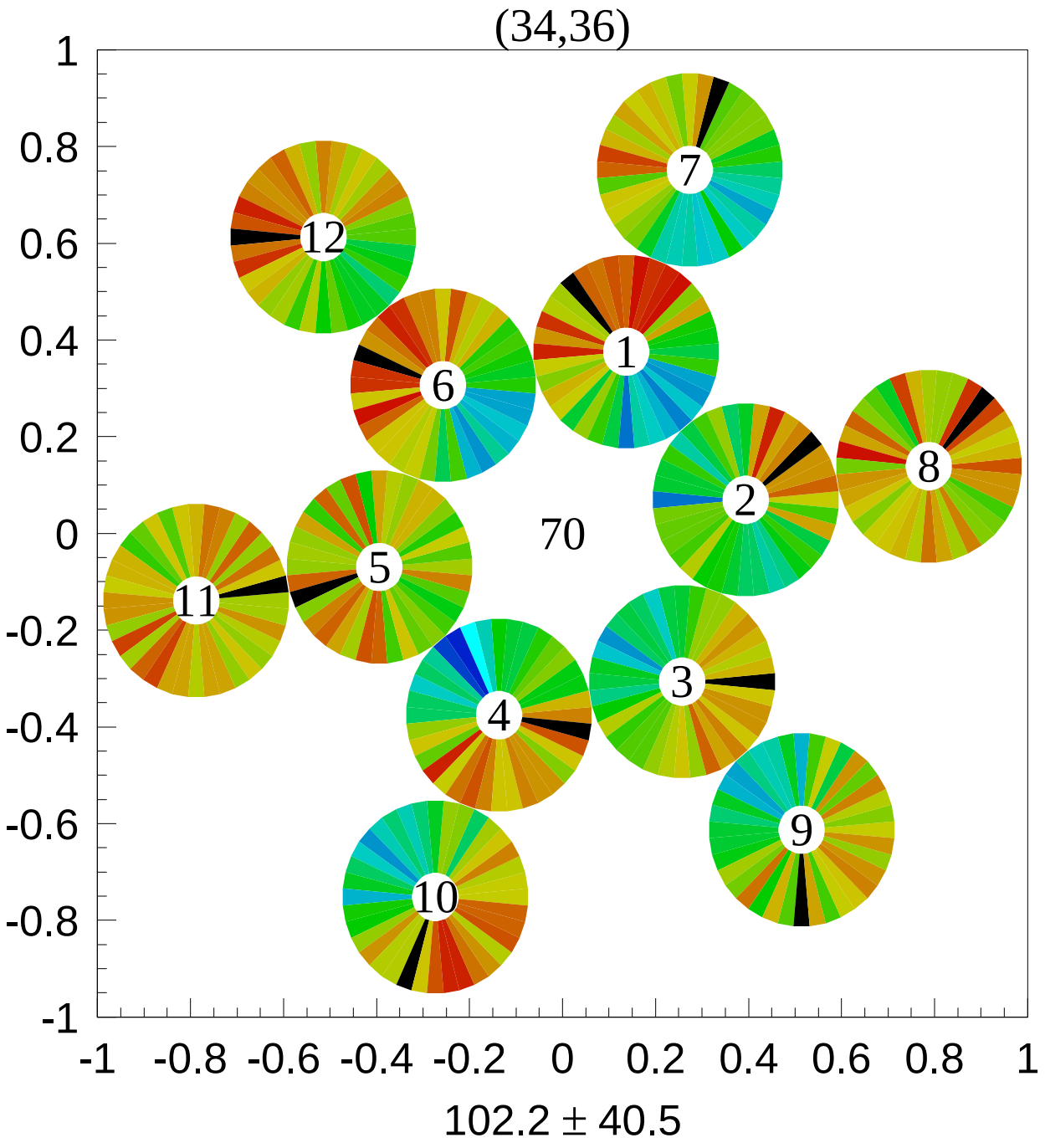

(34,35)
tilted LEDs
125 128 125 131 126 126
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 128 130 128 123 124
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

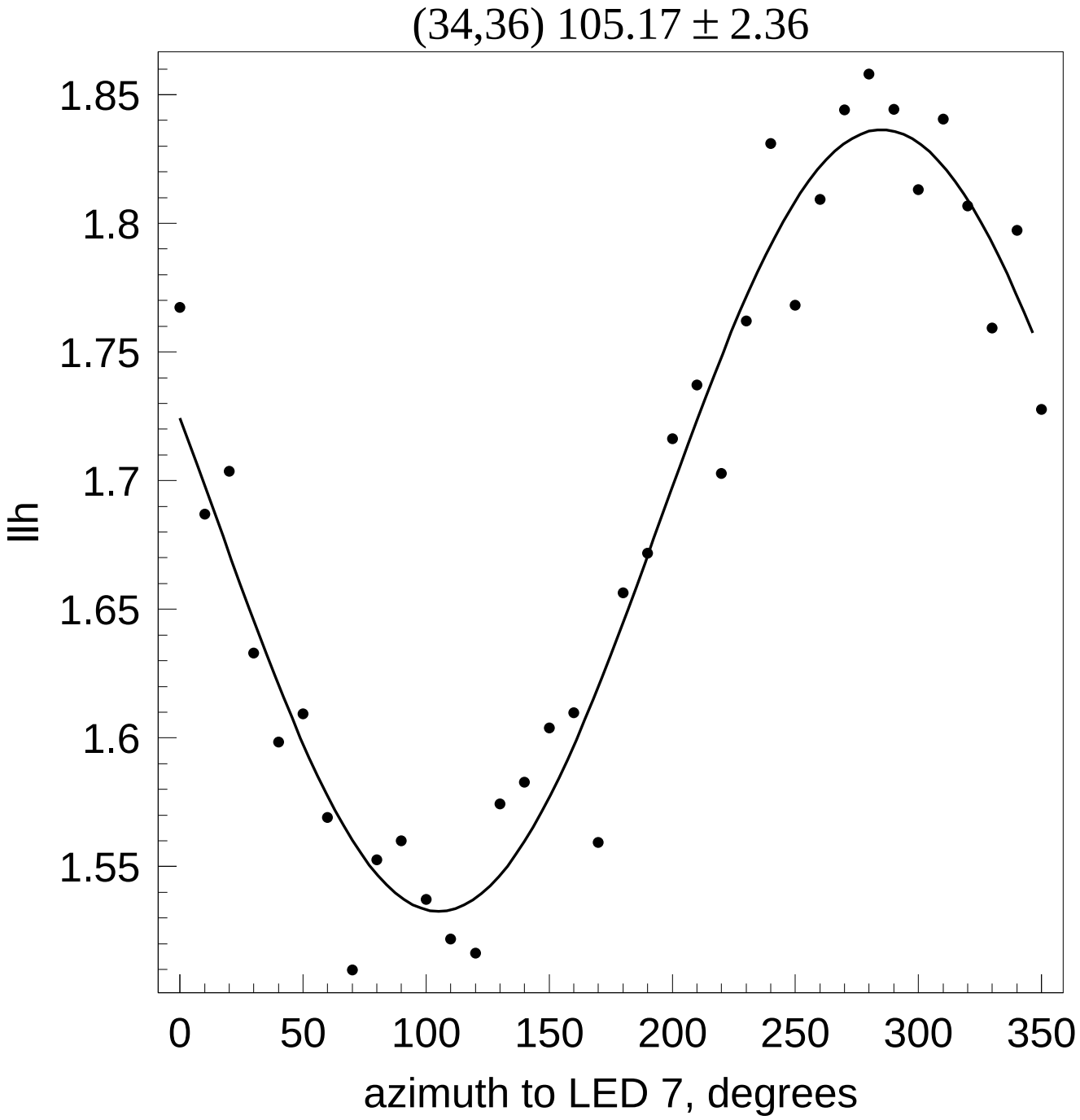

(34,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
11
5
2
250
8
1
6
12
7
260.2 ± 26.1

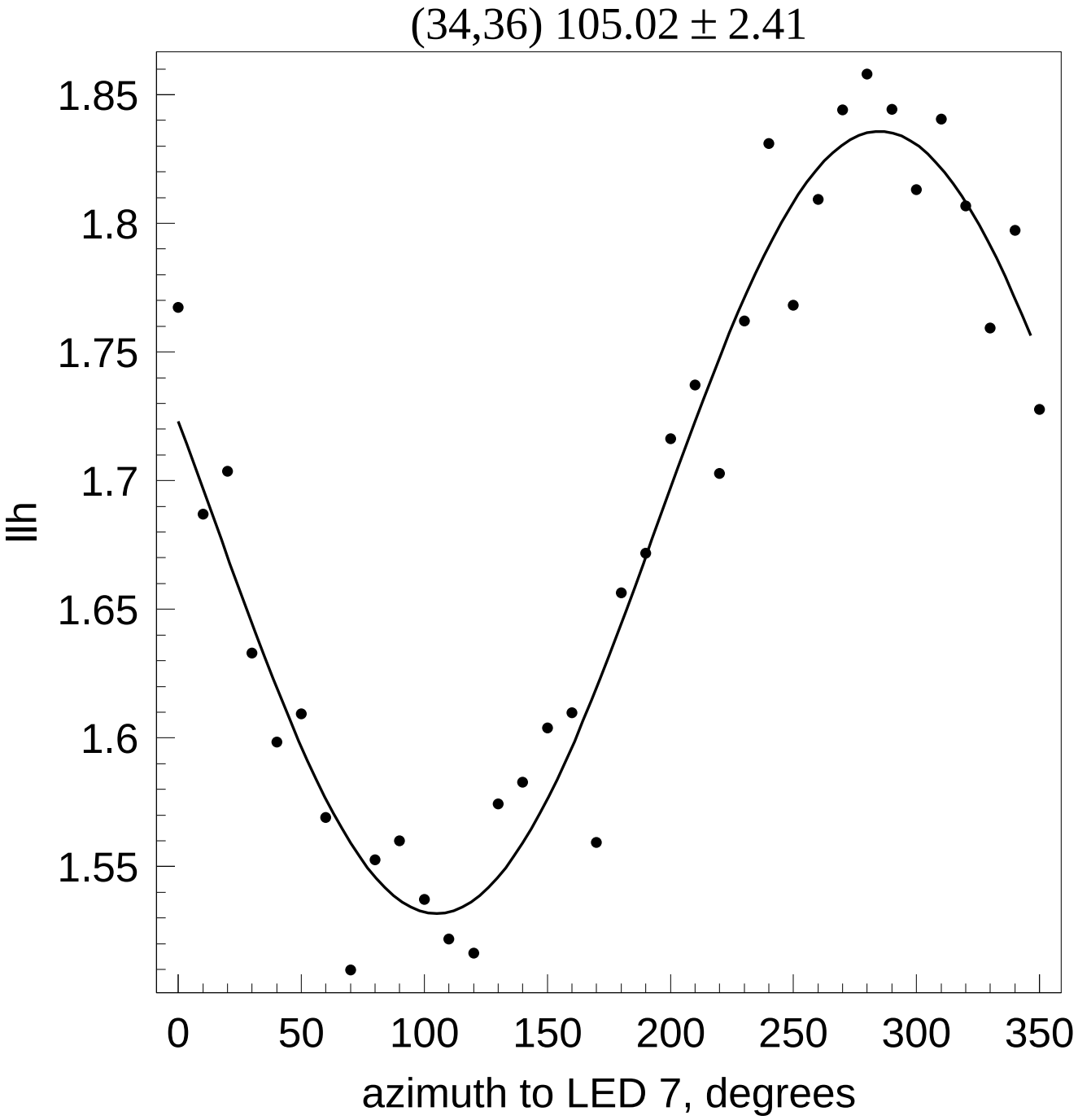

(34,35) 256.33 ± 1.09
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
lllh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

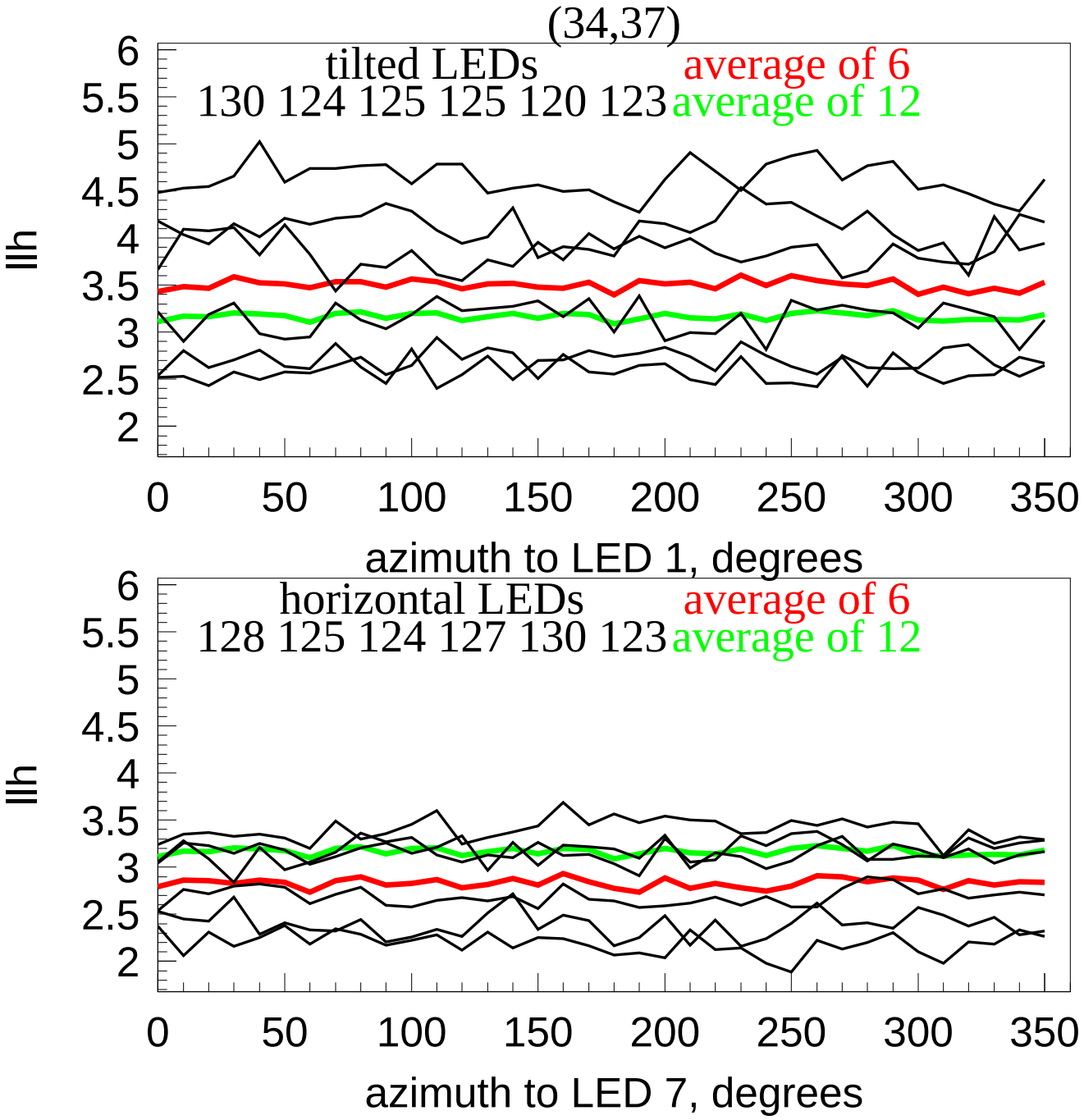

(34,35) 256.32 ± 1.12
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

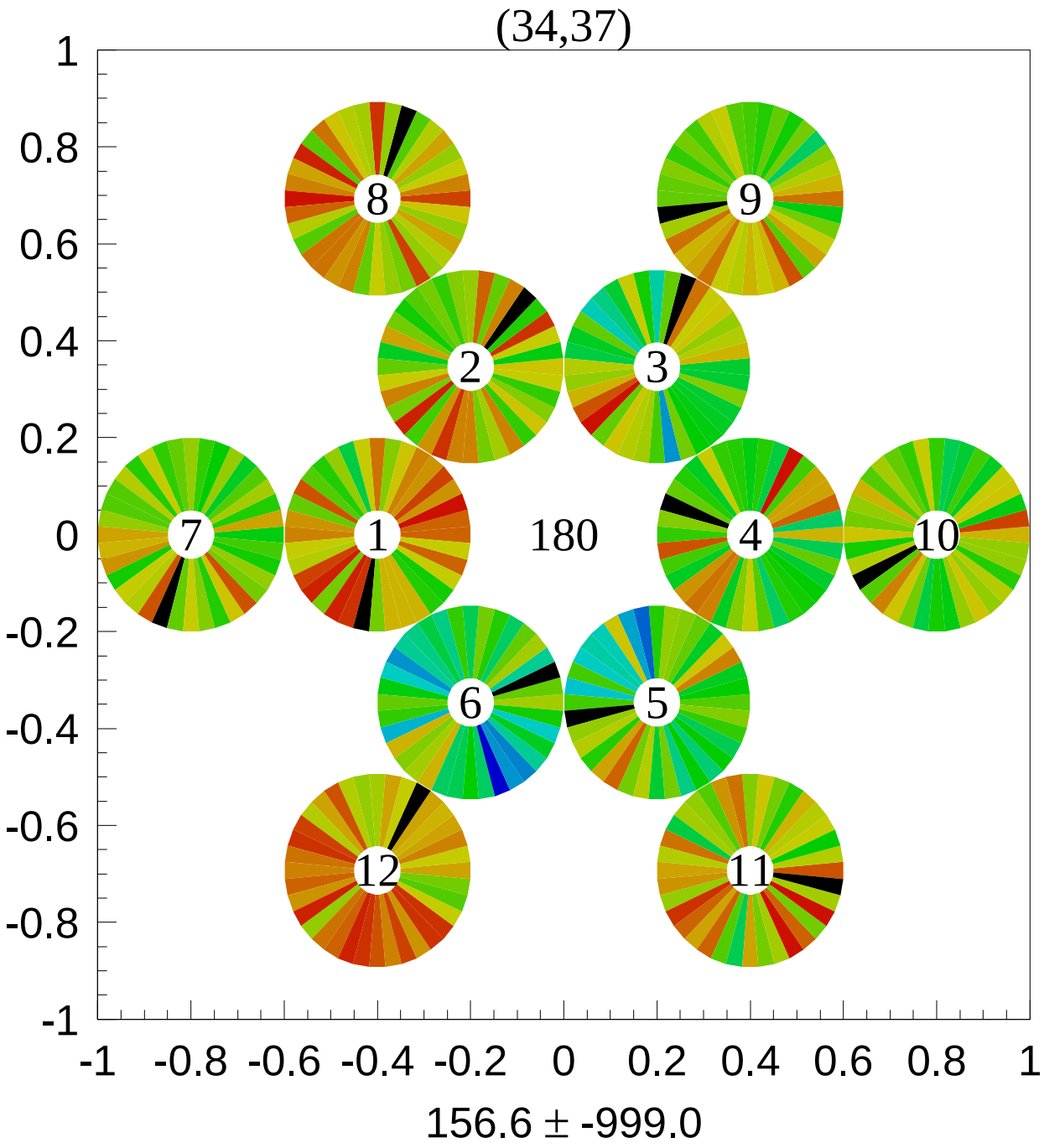

(34,36)
tilted LEDs
124 131 127 126 123 134
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 127 87 128 123 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

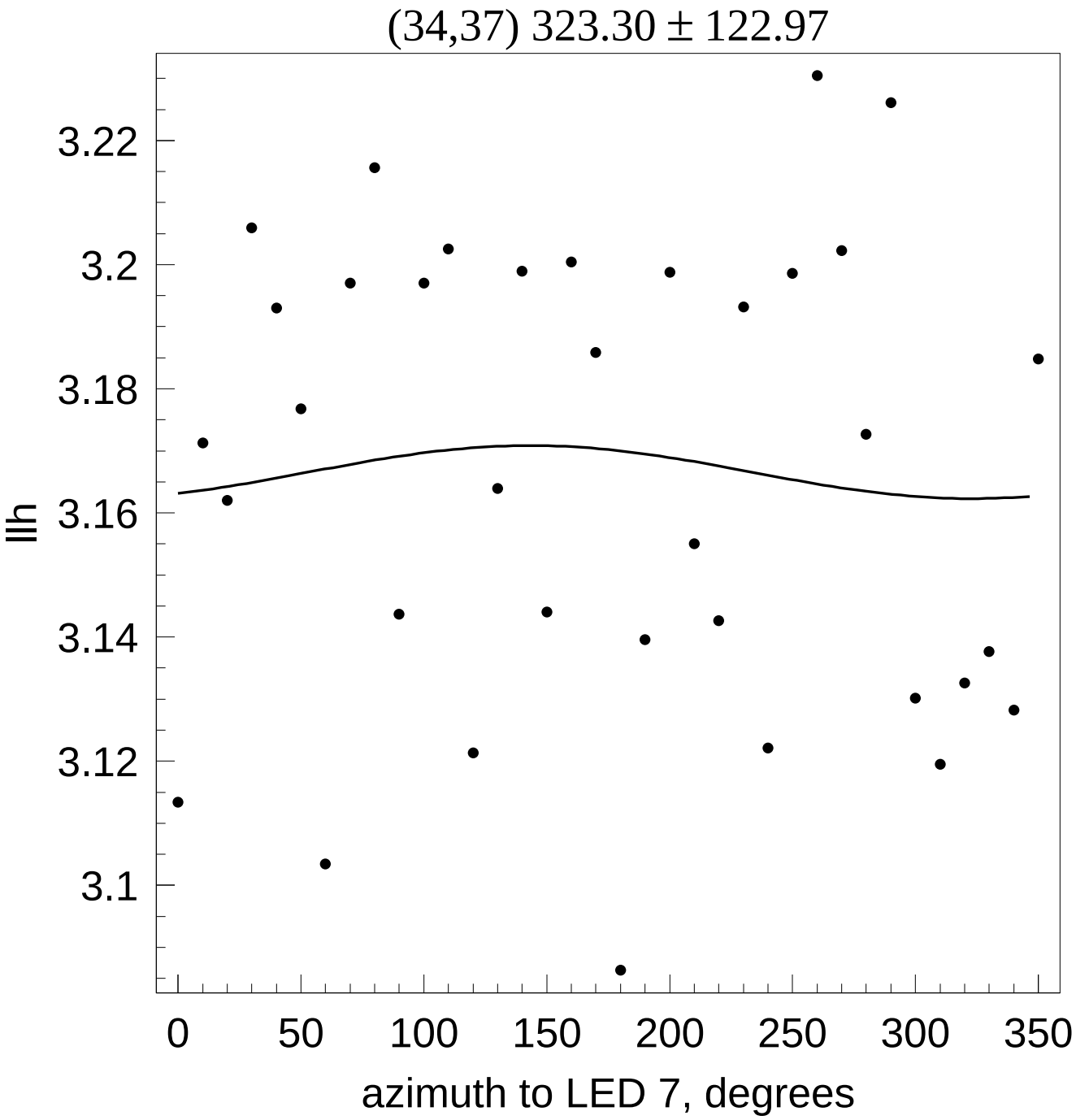

(34,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
70
5
11
4
3
9
10
102.2 ± 40.5

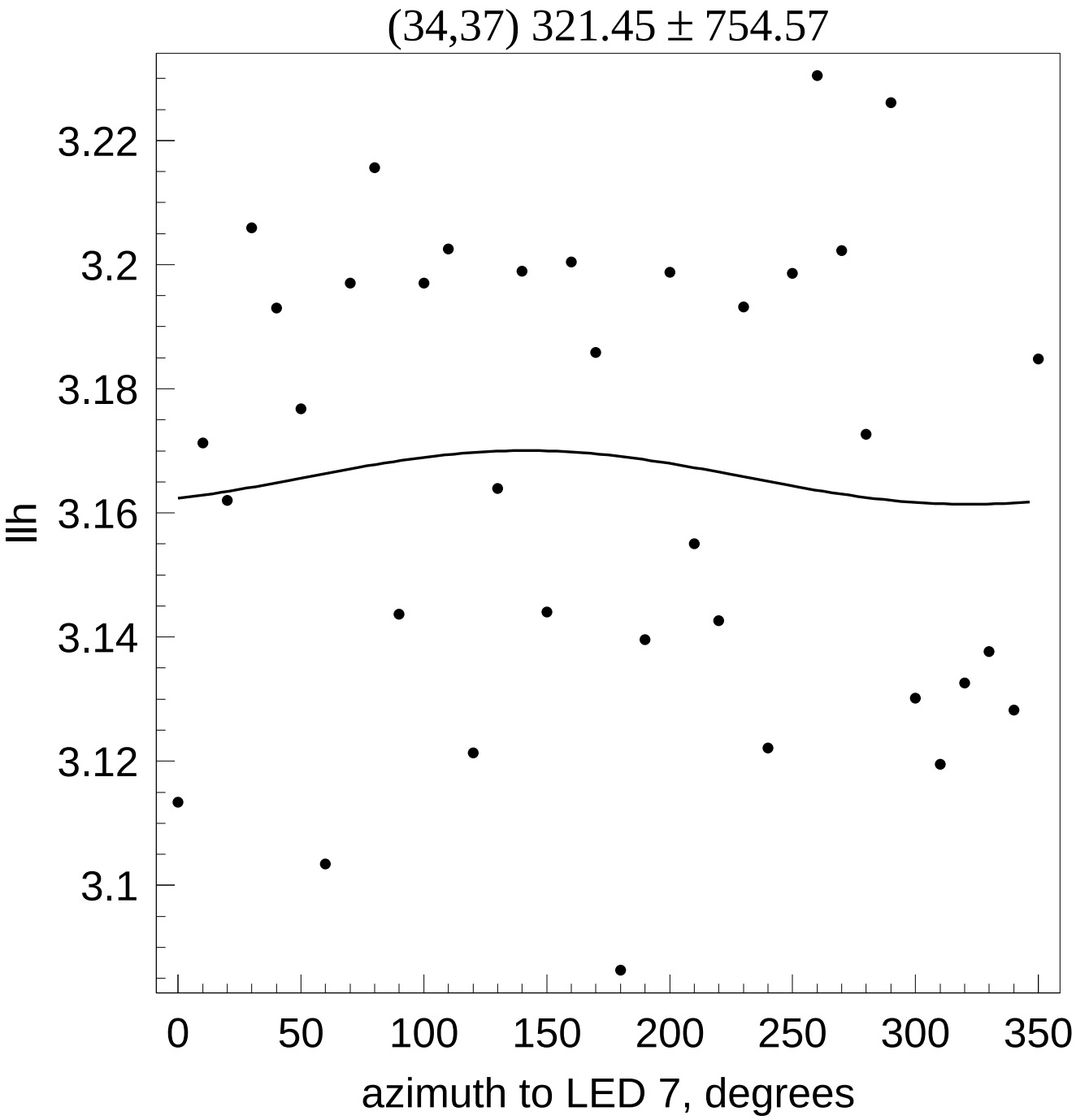

(34,36) 105.17 ± 2.36
1.85
1.8
1.75
1.7
1.65
1.6
1.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

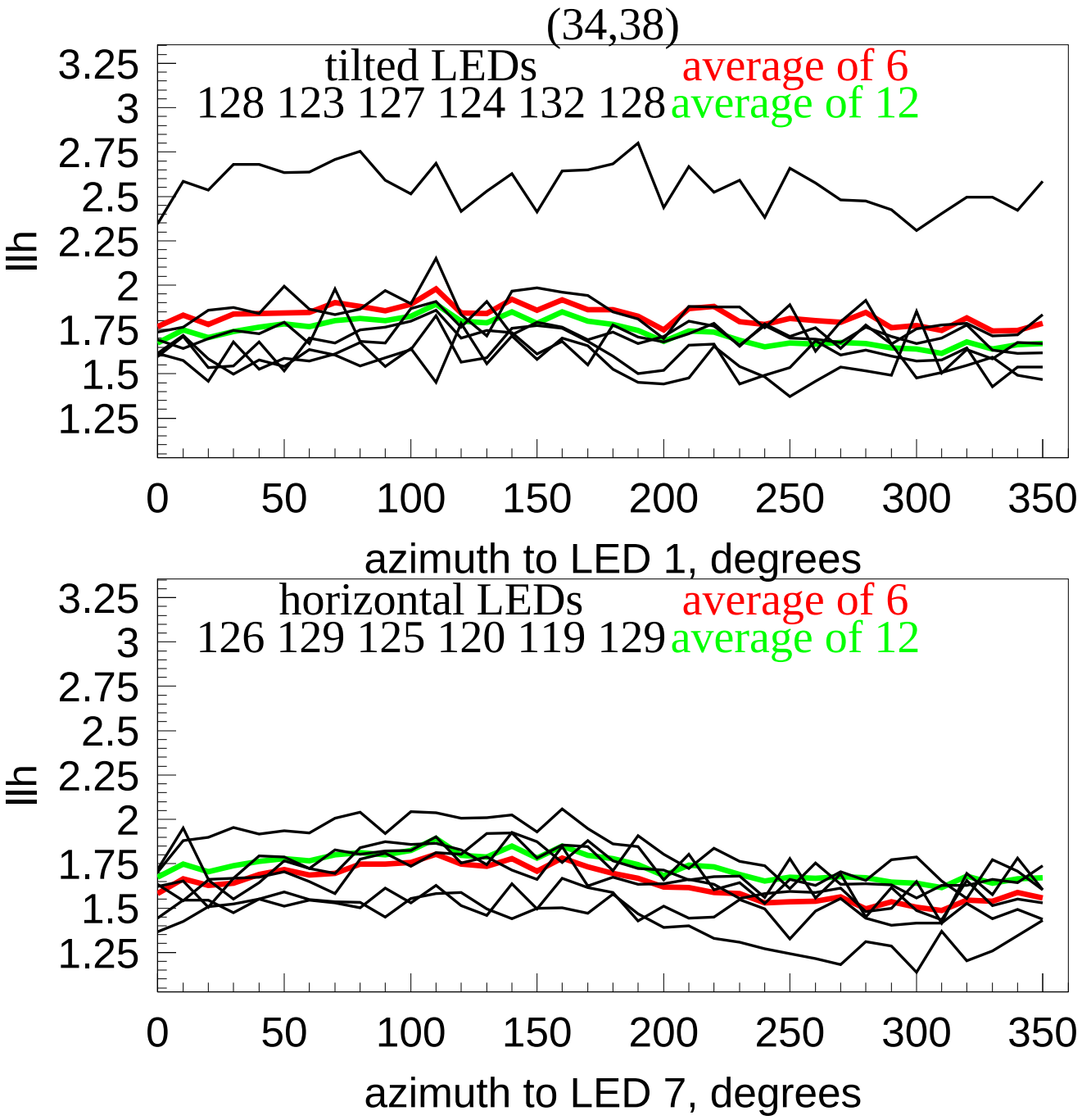

(34,36) 105.02 ± 2.41
1.85
1.8
1.75
1.7
1.65
1.6
1.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

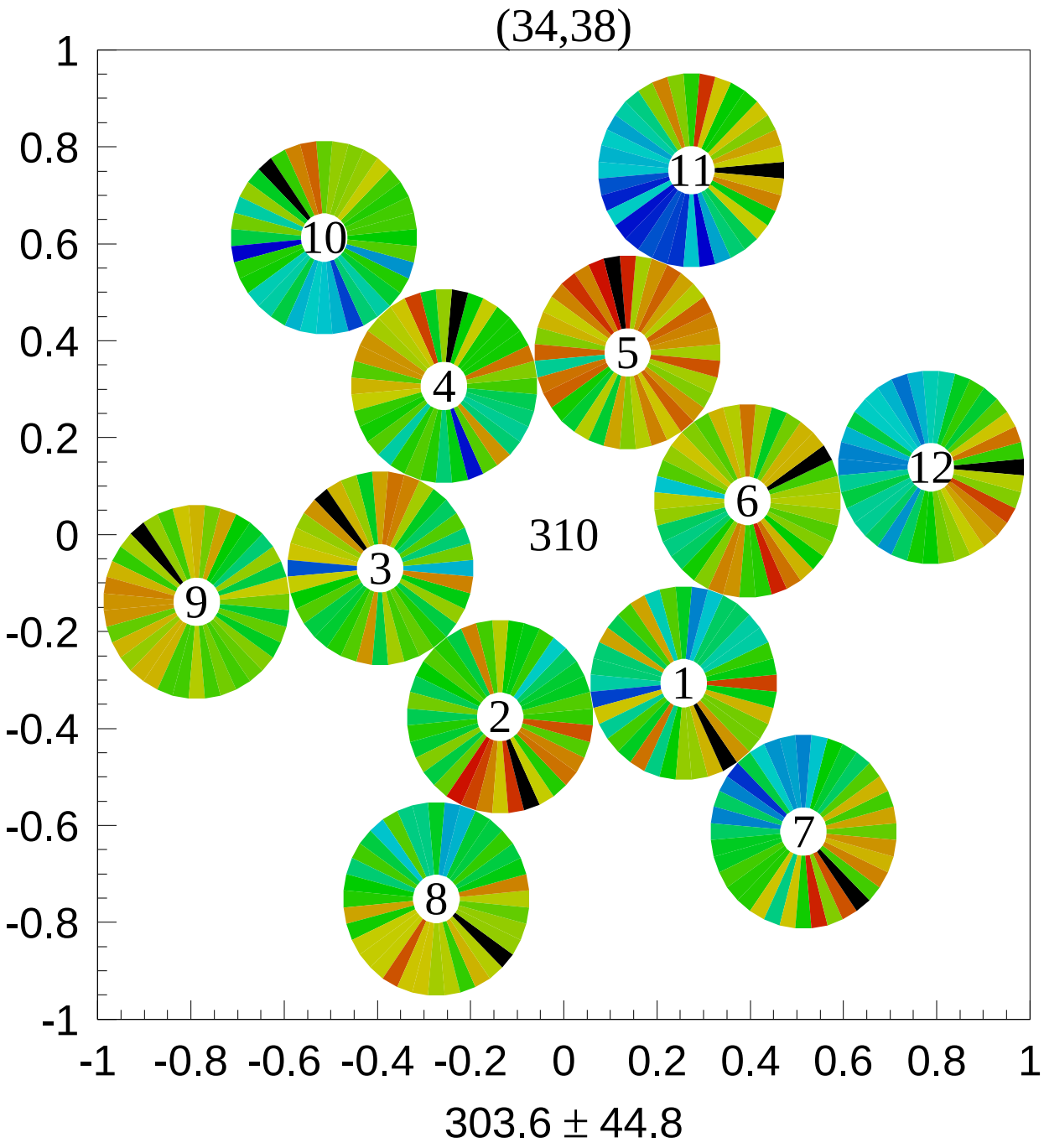

(34,37)
tilted LEDs
130 124 125 125 120 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 125 124 127 130 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

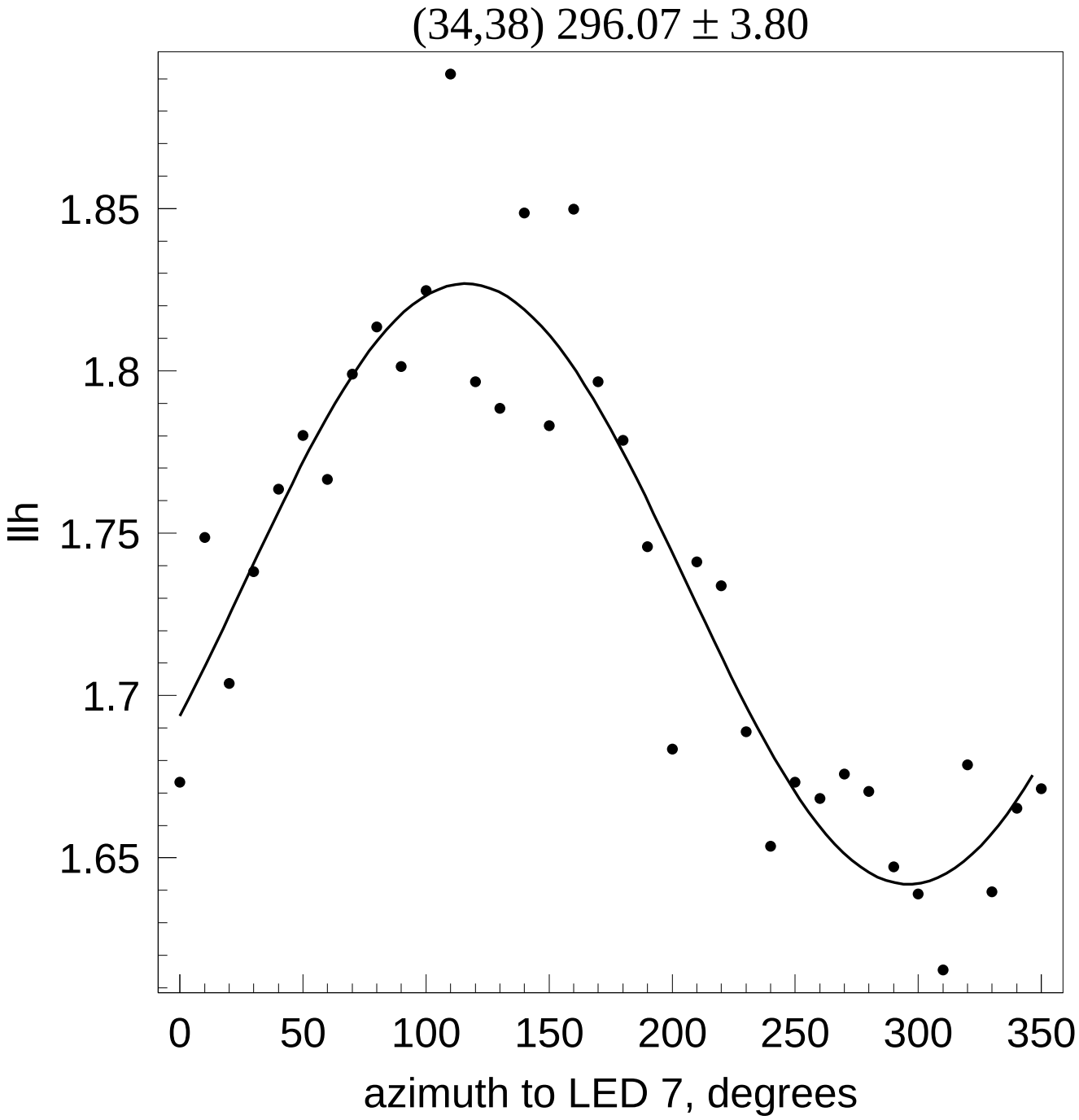

(34,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
156.6 ± -999.0
8
9
2
3
7
1
180
4
10
6
5
12
11

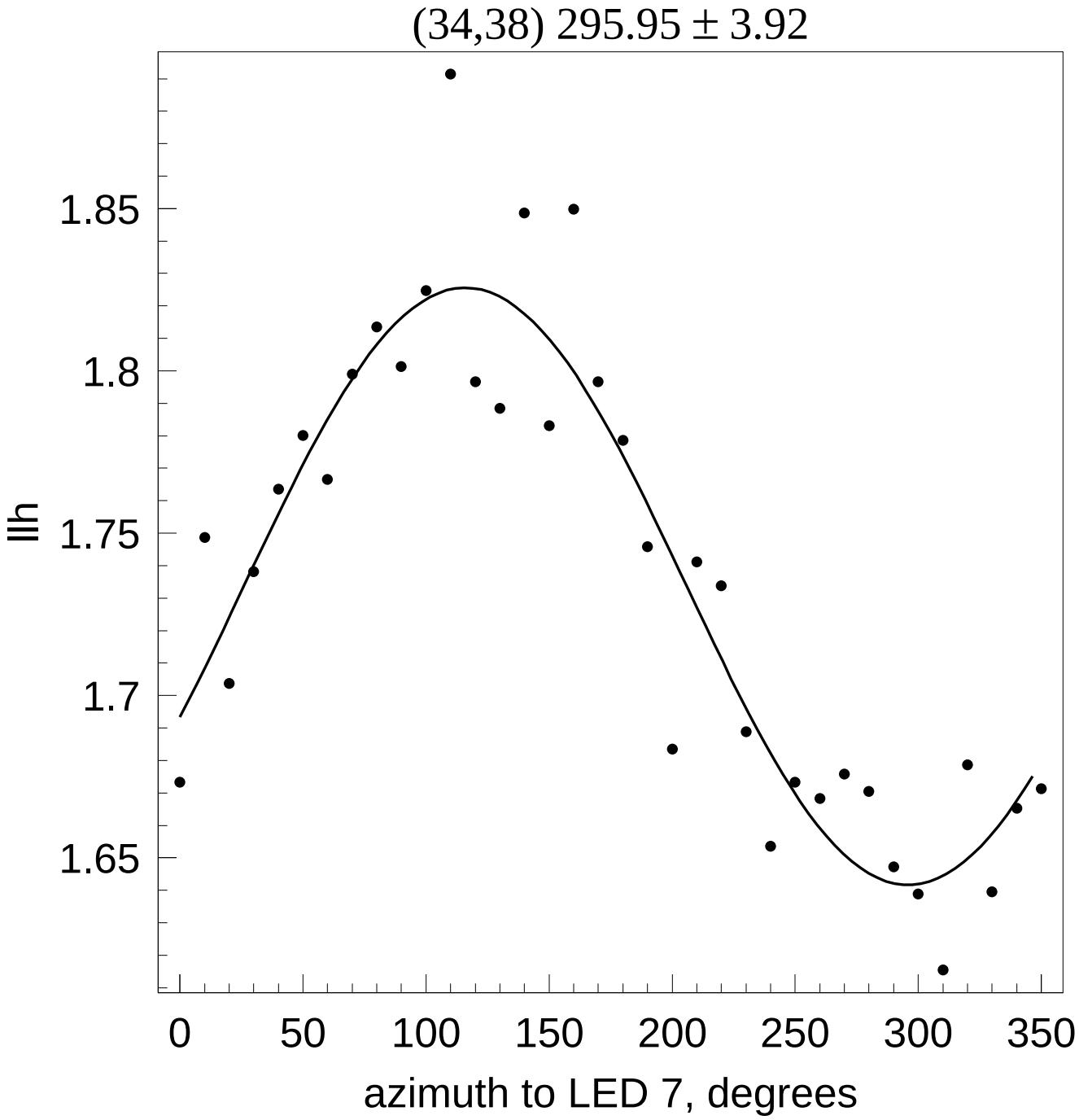

(34,37) 323.30 ± 122.97
3.22
3.2
3.18
3.16
3.14
3.12
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

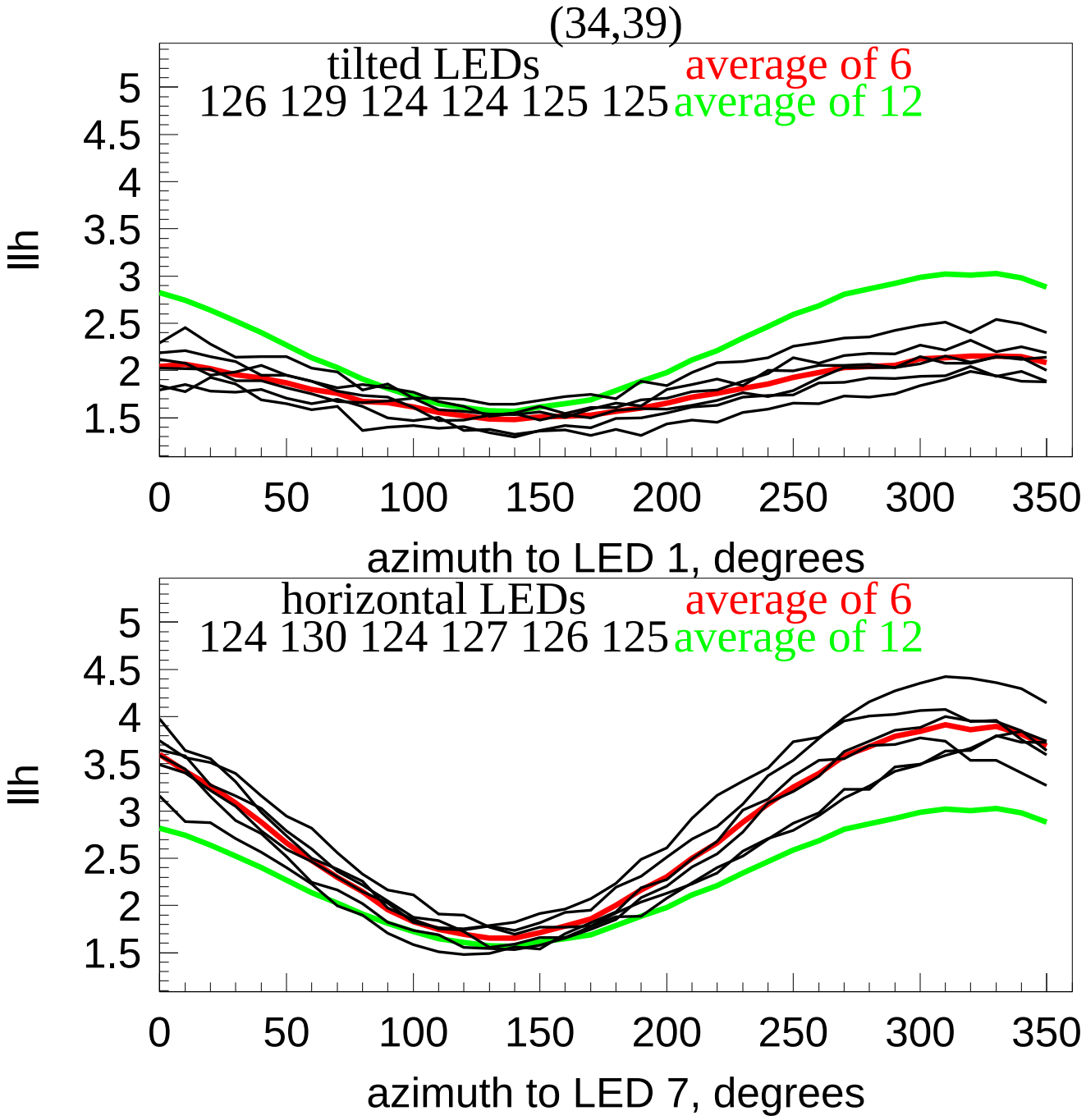

(34,37) 321.45 ± 754.57
3.22
3.2
3.18
3.16
3.14
3.12
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

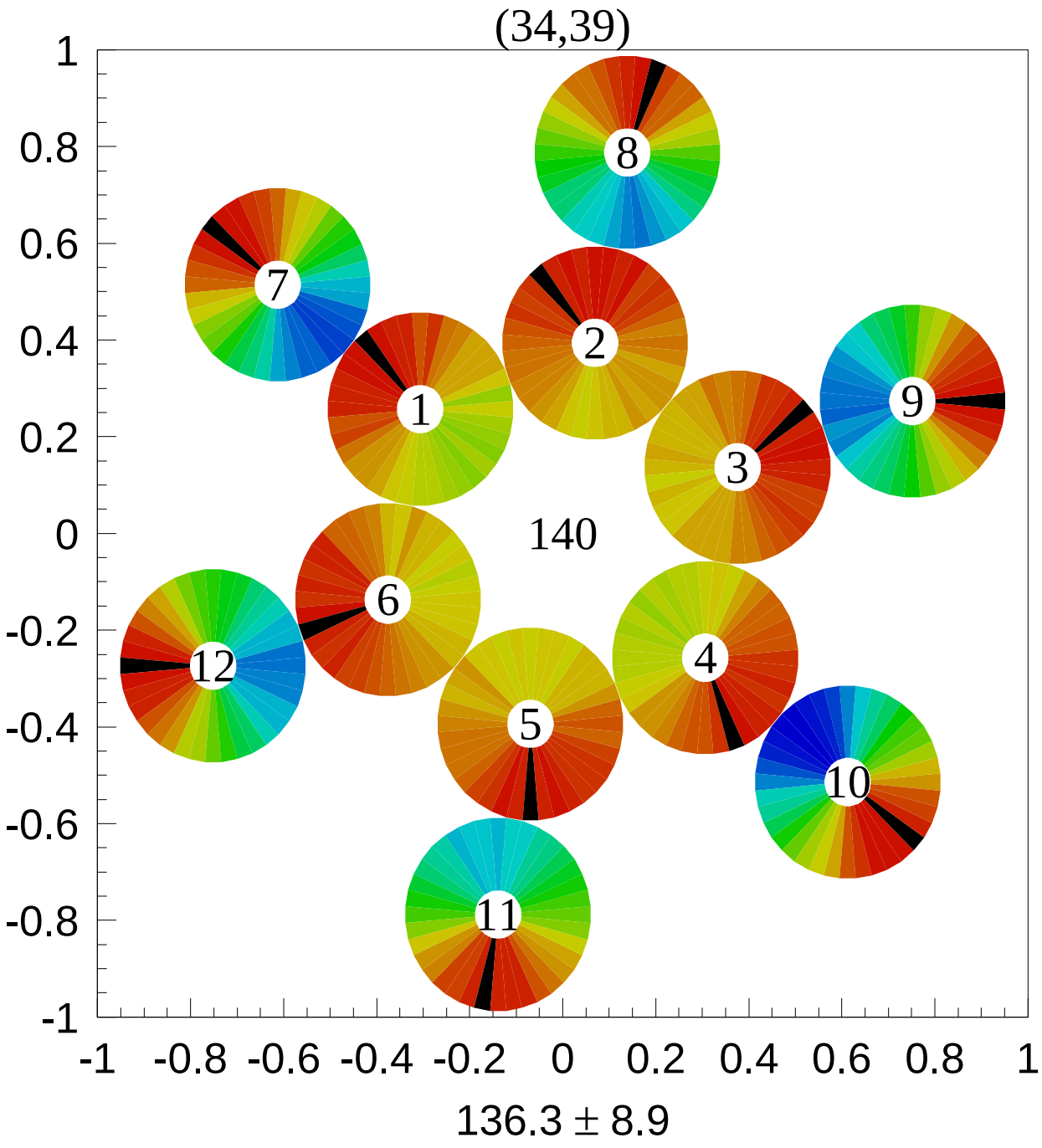

(34,38)
tilted LEDs
128 123 127 124 132 128
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 129 125 120 119 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

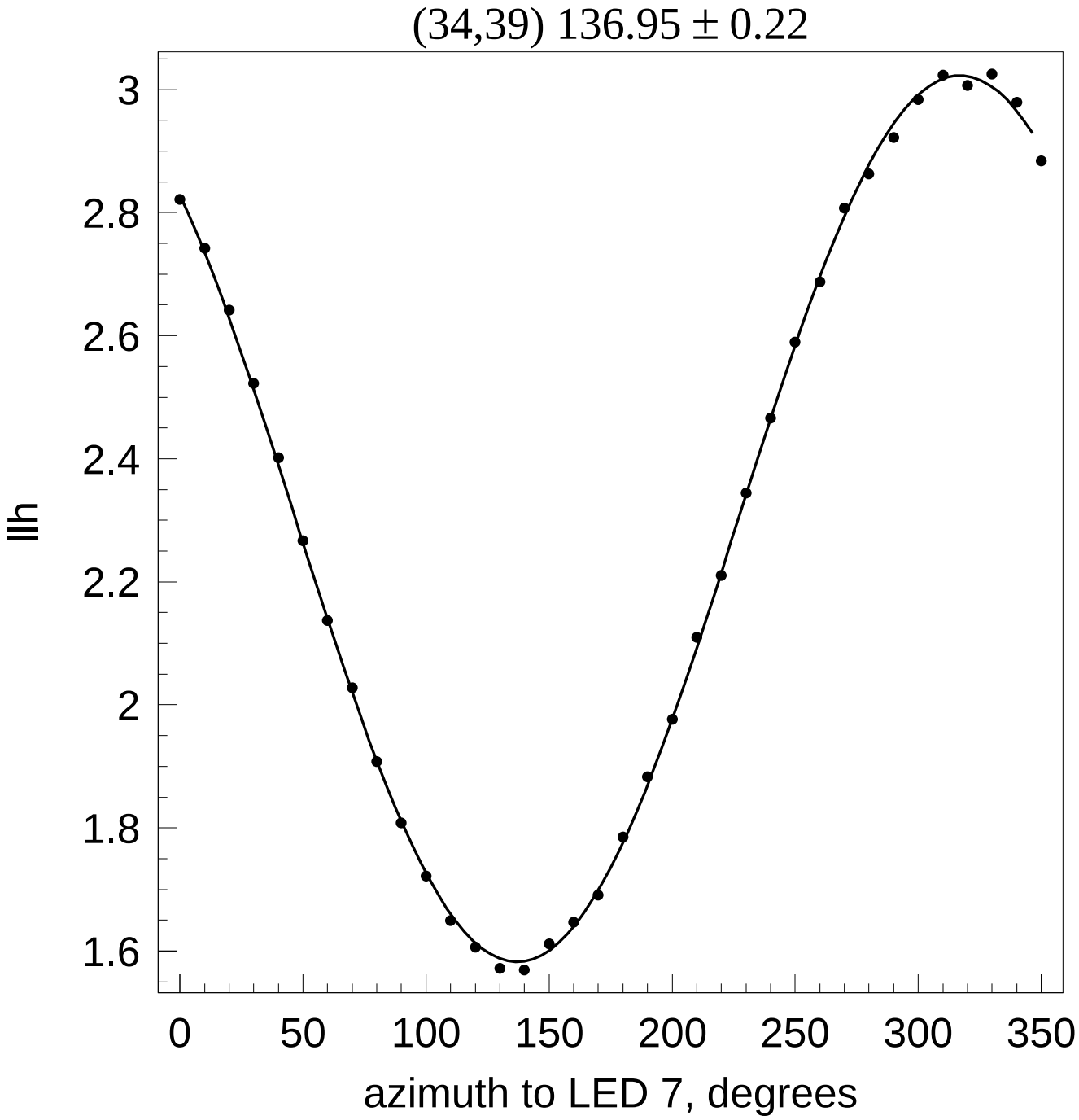

(34,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
303.6 ± 44.8
310
1
2
3
4
5
6
7
8
9
10
11
12

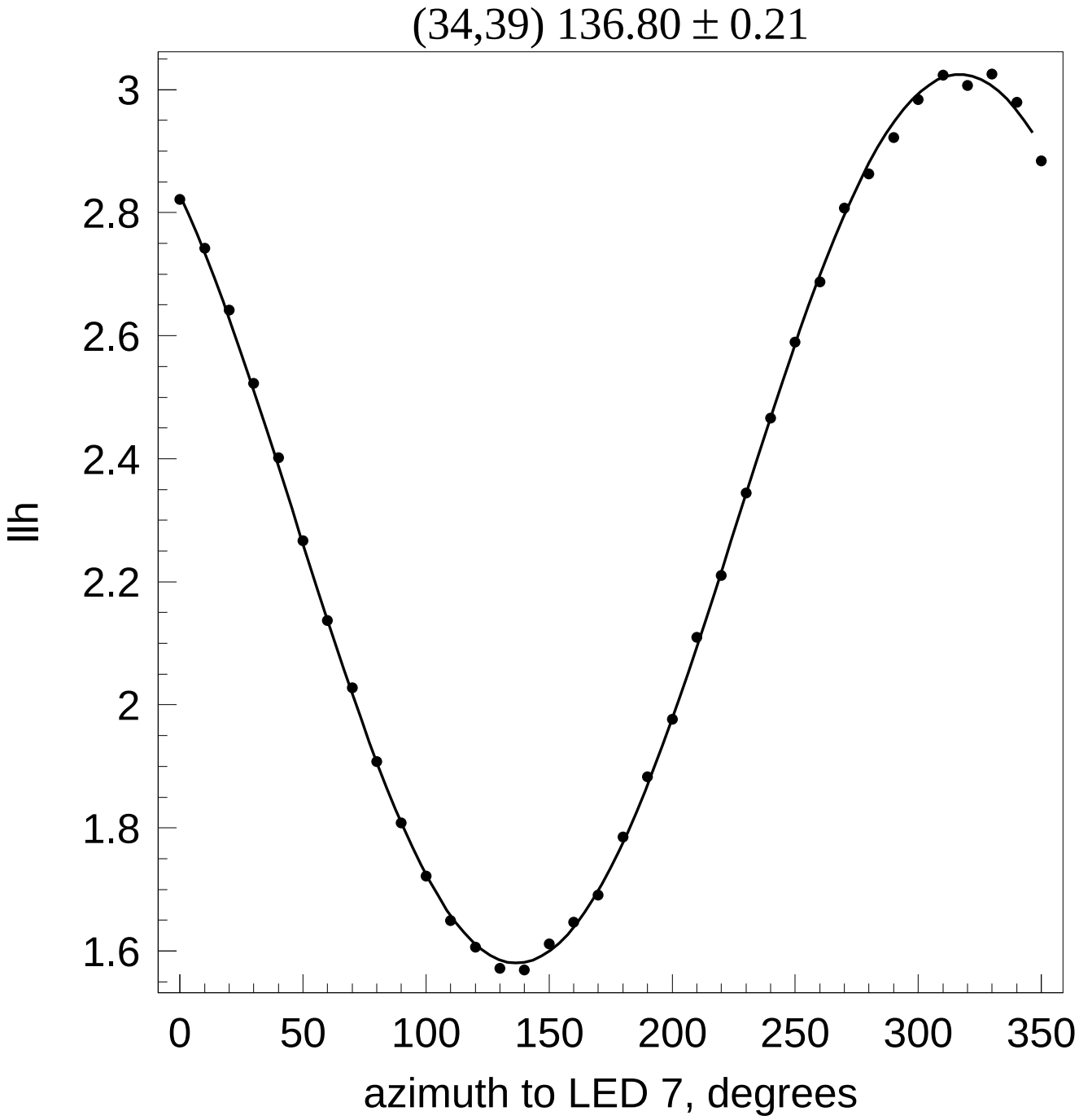

(34,38) 296.07 ± 3.80
1.85
1.8
1.75
1.7
1.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

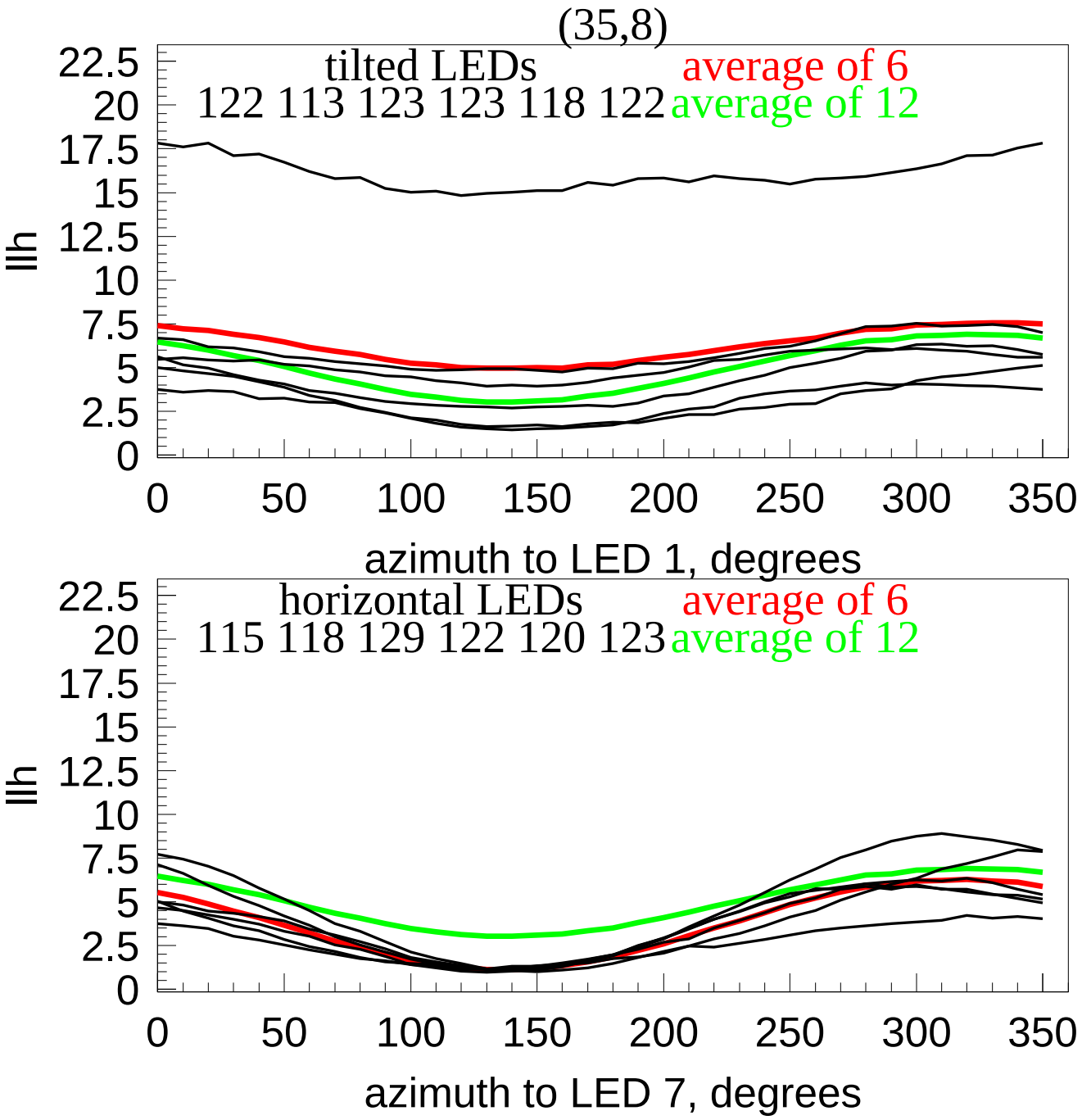

(34,38) 295.95 ± 3.92
1.85
1.8
1.75
1.7
1.65
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

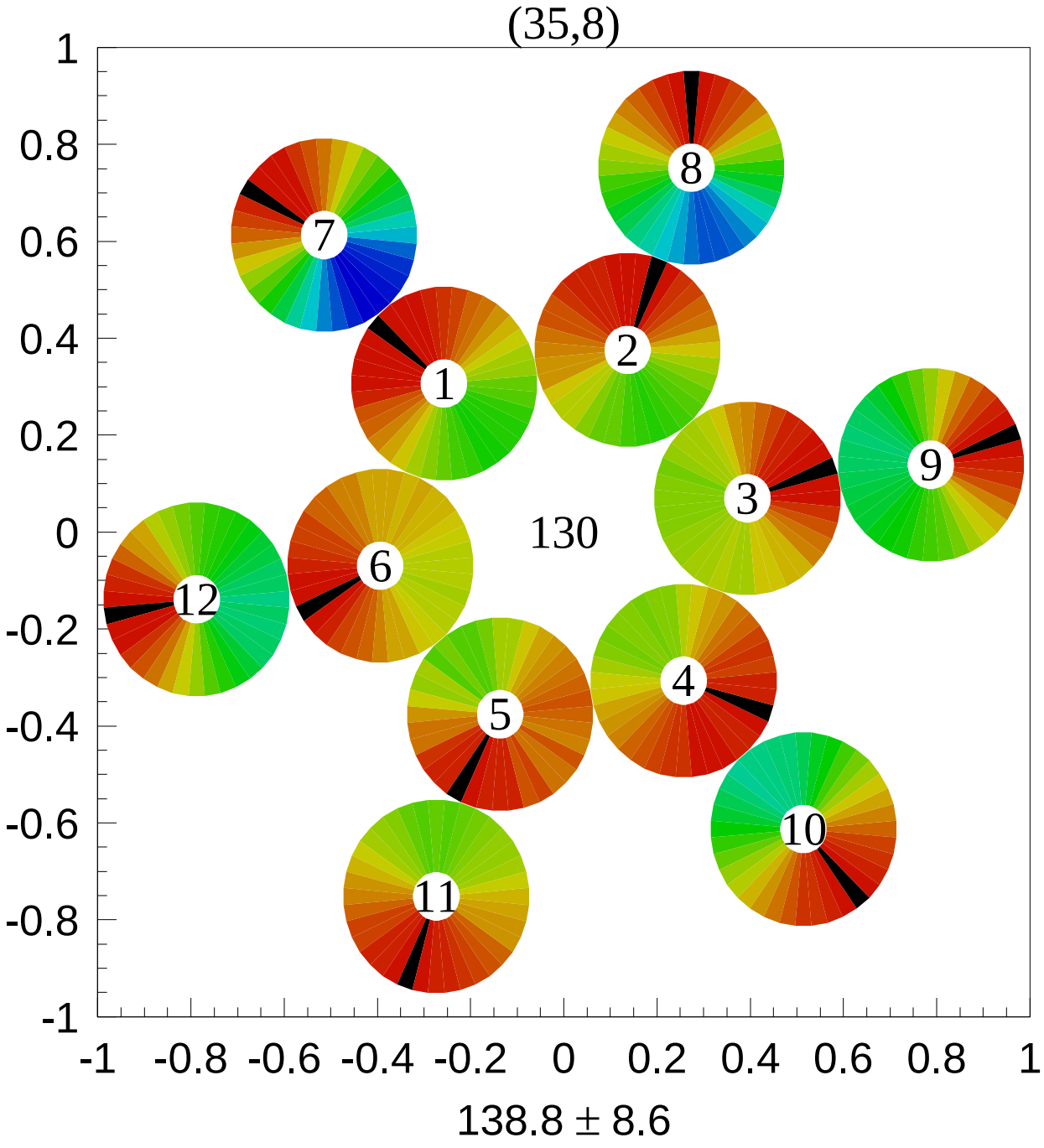

(34,39)
tilted LEDs
126 129 124 124 125 125
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 130 124 127 126 125
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

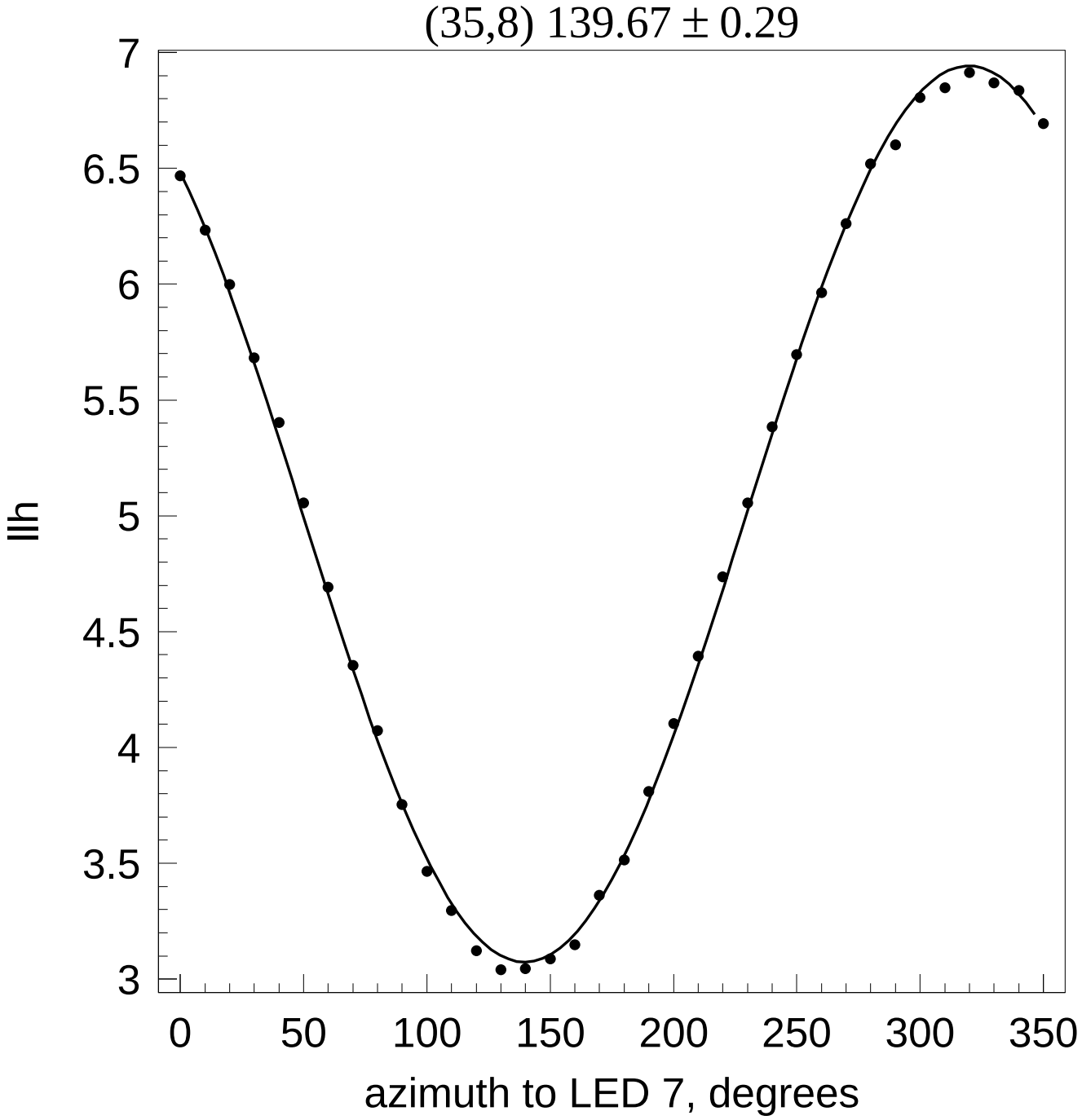

(34,39)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
136.3 ± 8.9
140
1
2
3
4
5
6
7
8
9
10
11
12

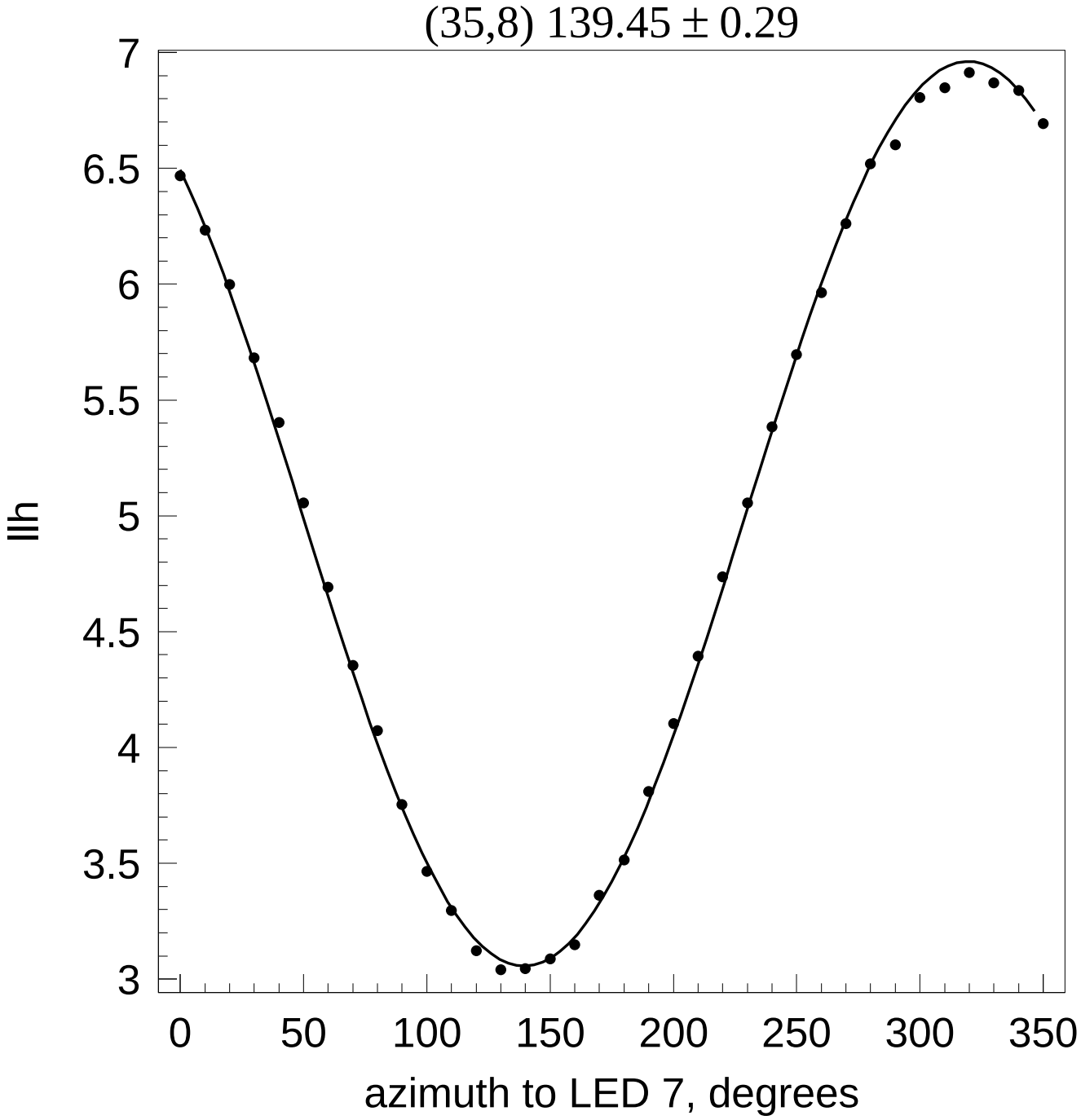

(34,39) 136.95 ± 0.22
3
2.8
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

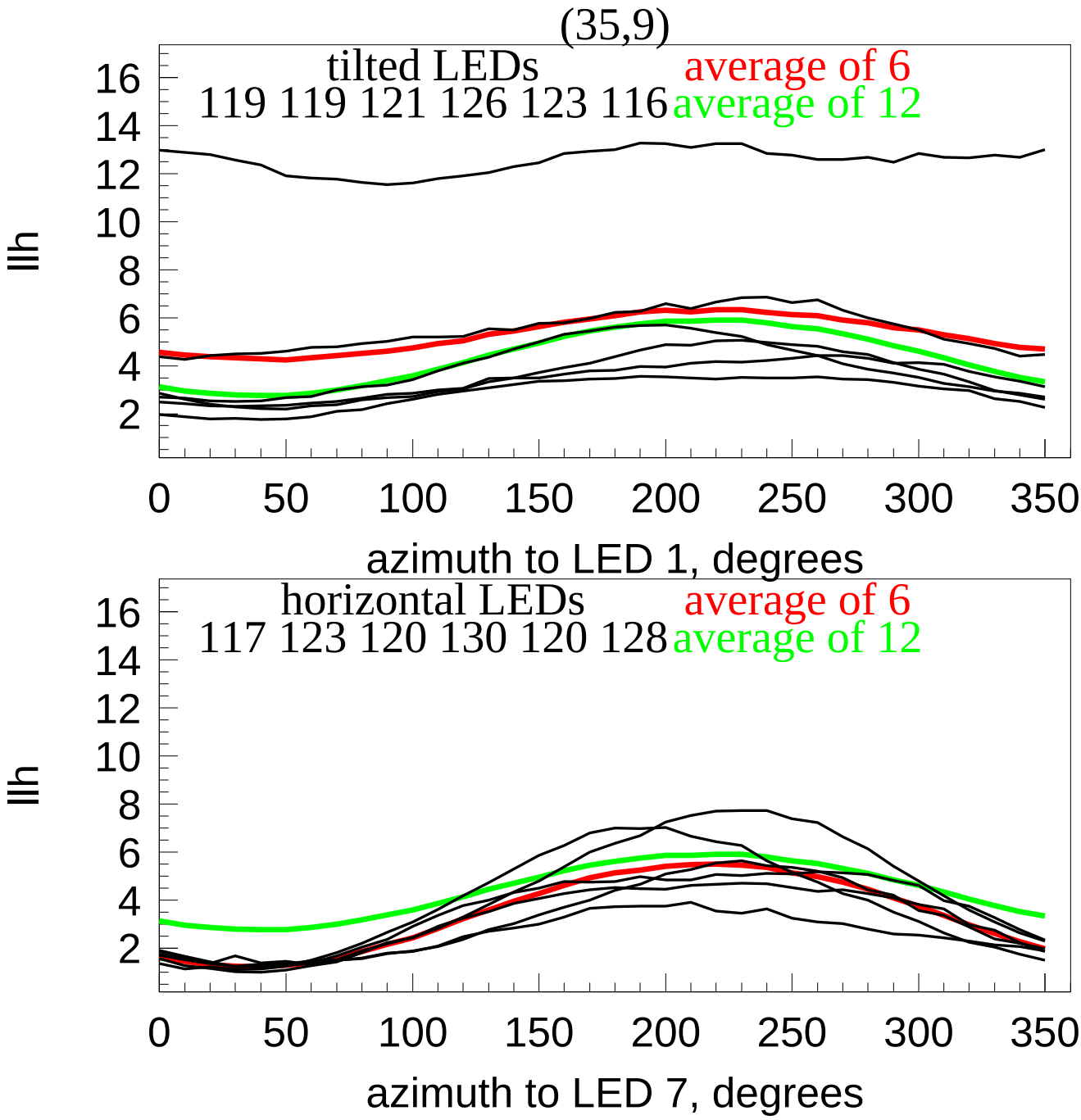

(34,39) 136.80 ± 0.21
3
2.8
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

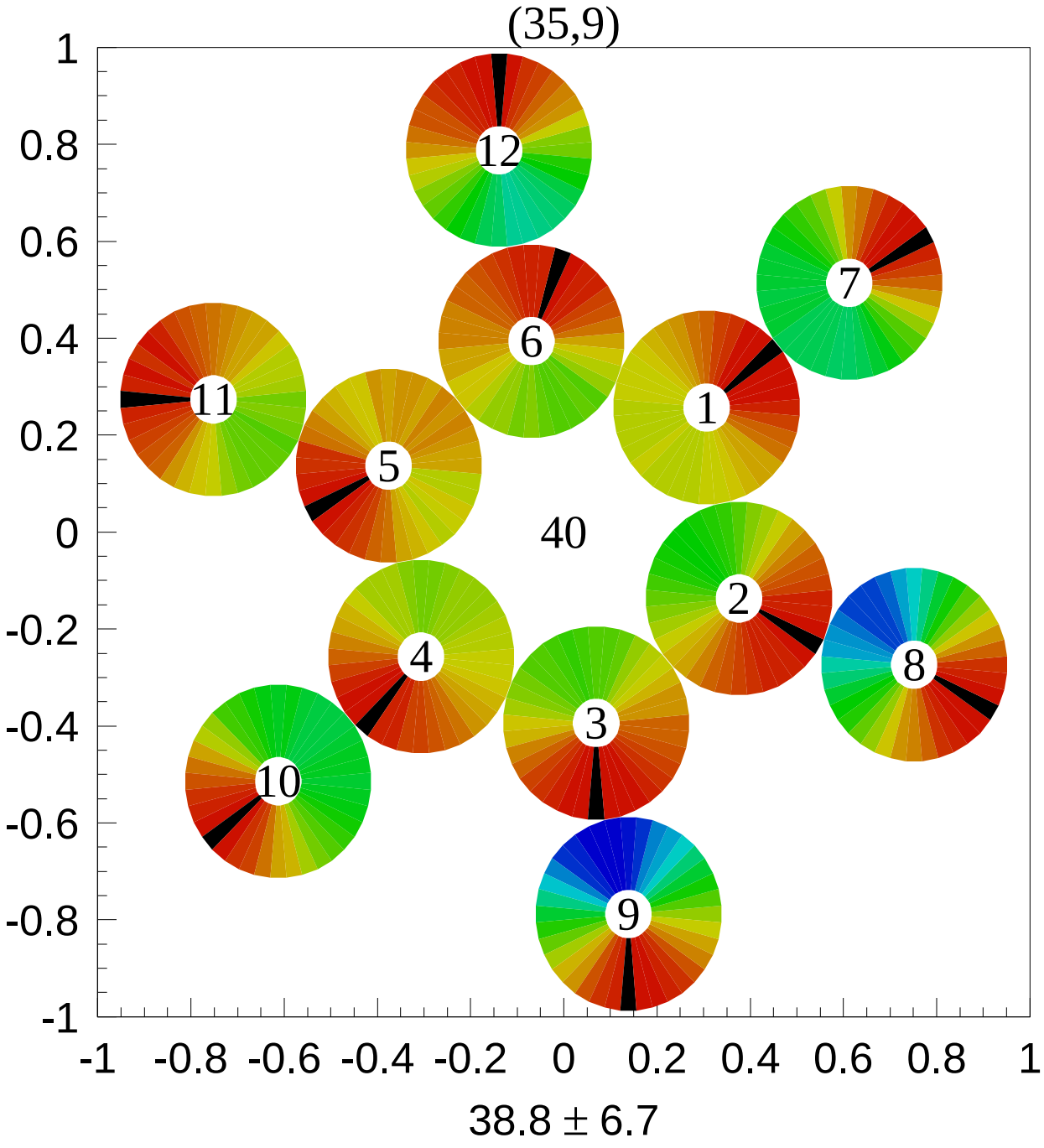

(35,8)
tilted LEDs
122 113 123 123 118 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
115 118 129 122 120 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

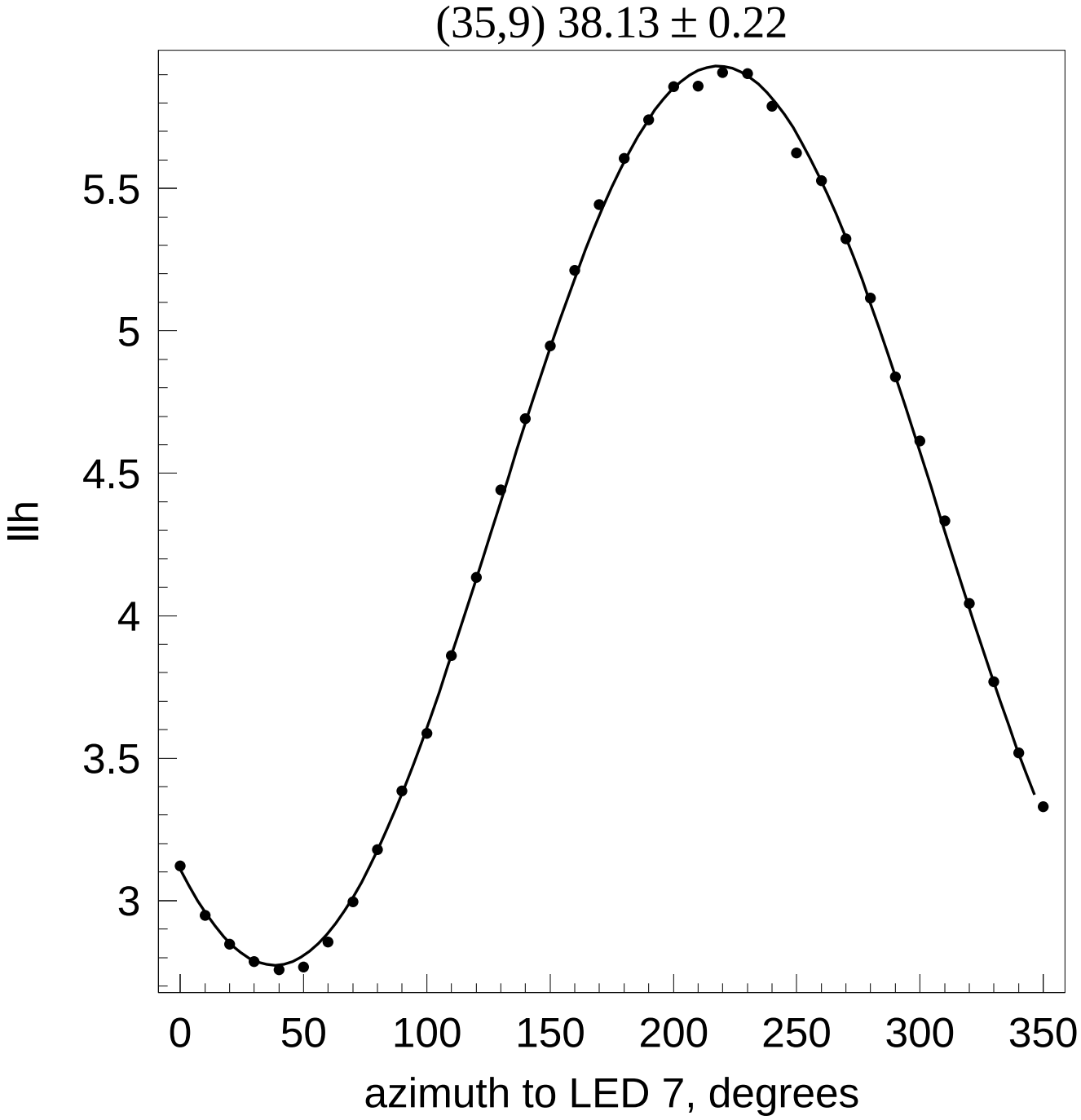

(35,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
138.8 ± 8.6
130
1
2
3
4
5
6
7
8
9
10
11
12

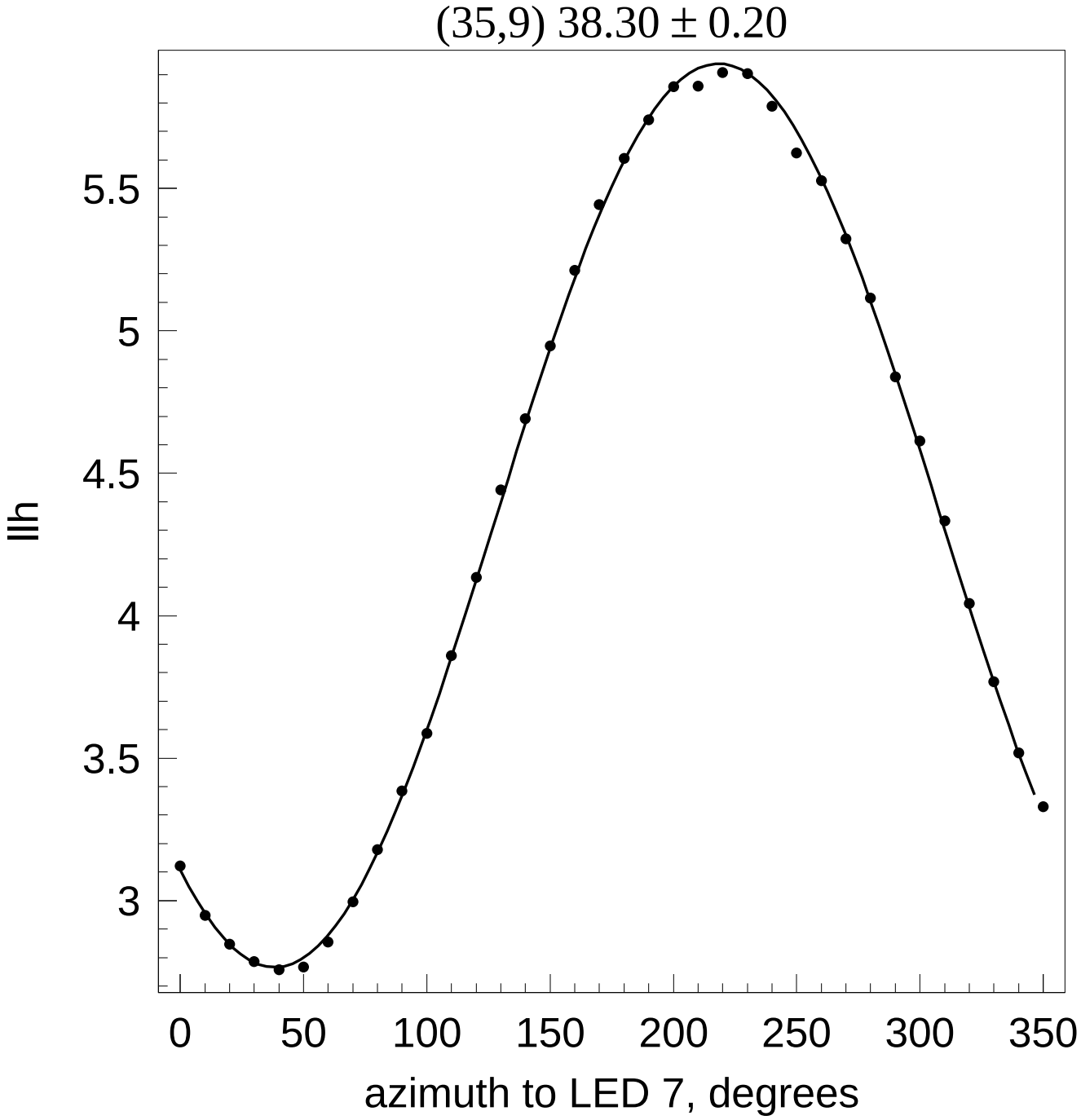

(35,8) 139.67 ± 0.29
7
6.5
6
5.5
5
4.5
4
3.5
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

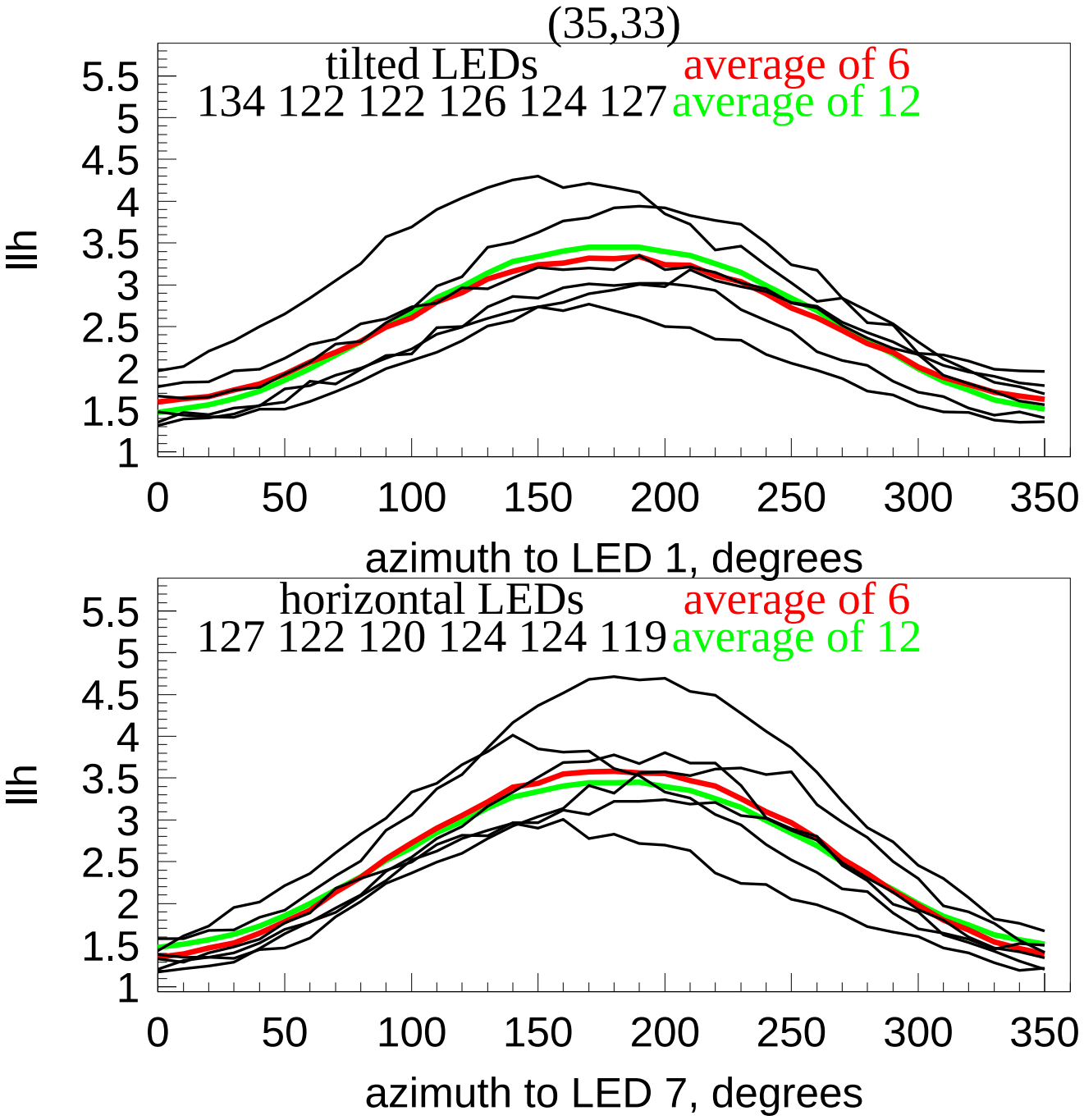

(35,8) 139.45 ± 0.29
7
6.5
6
5.5
5
4.5
4
3.5
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

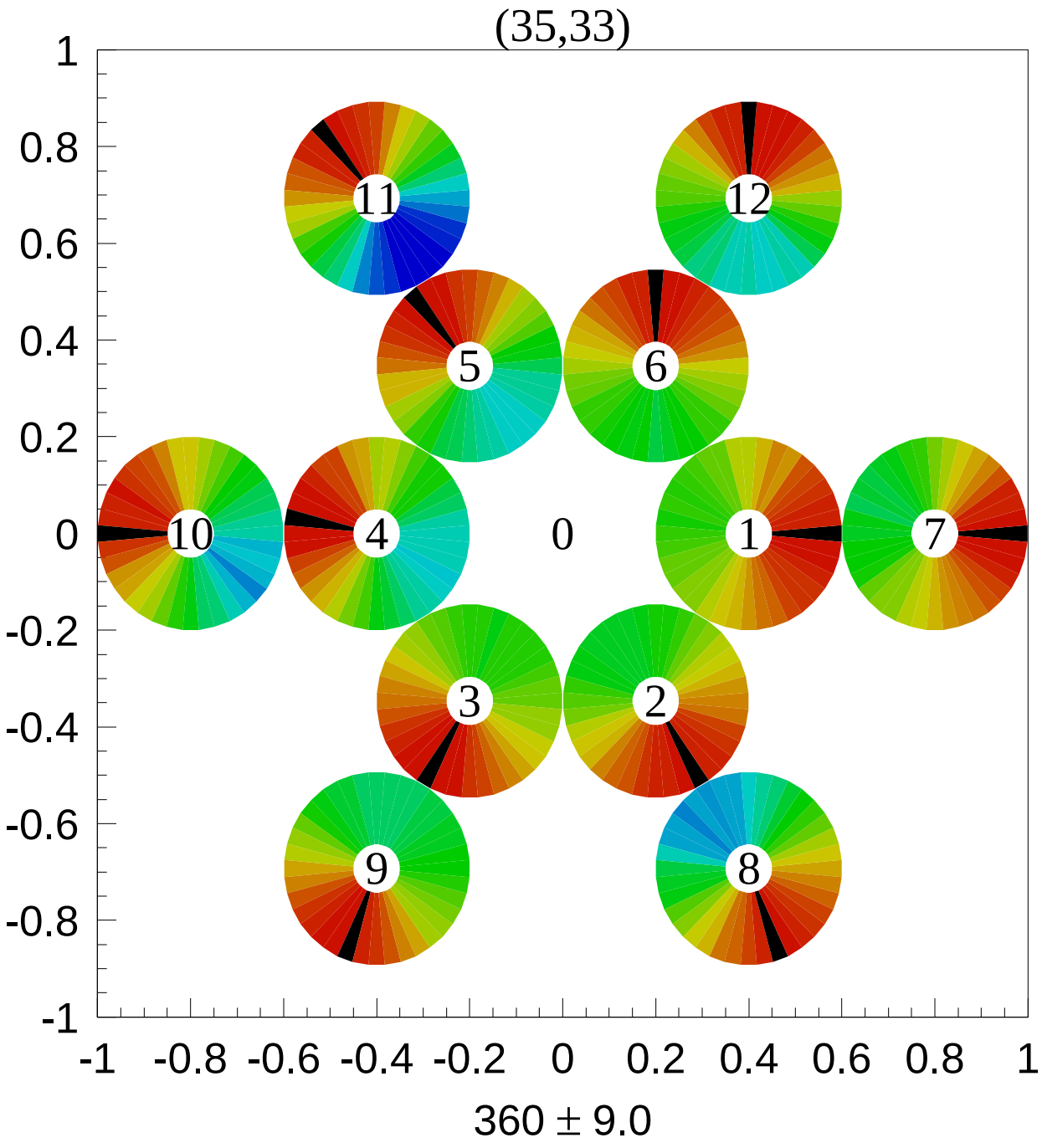

(35,9)
tilted LEDs
119 119 121 126 123 116
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
117 123 120 130 120 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

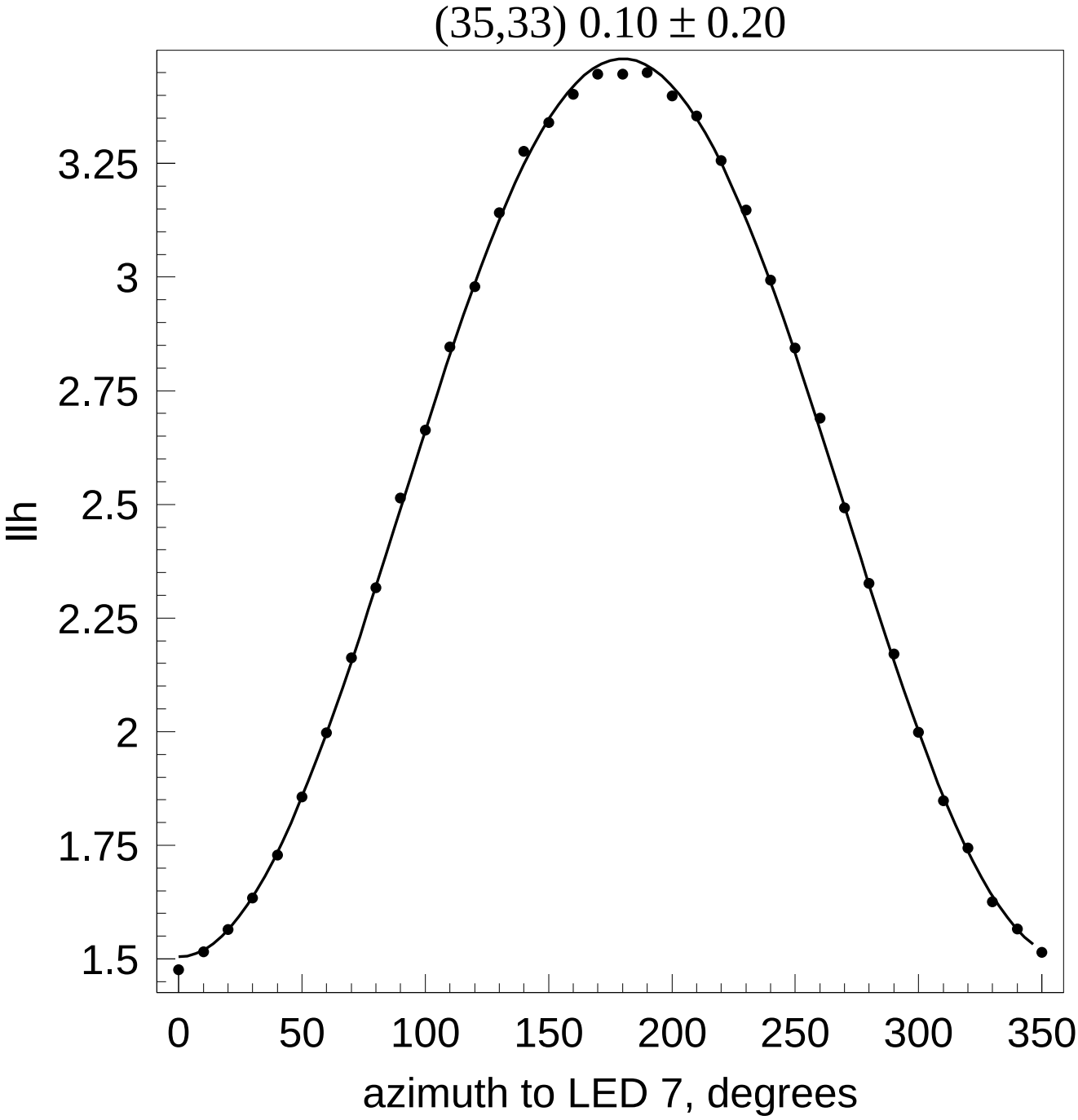

(35,9)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
38.8 ± 6.7

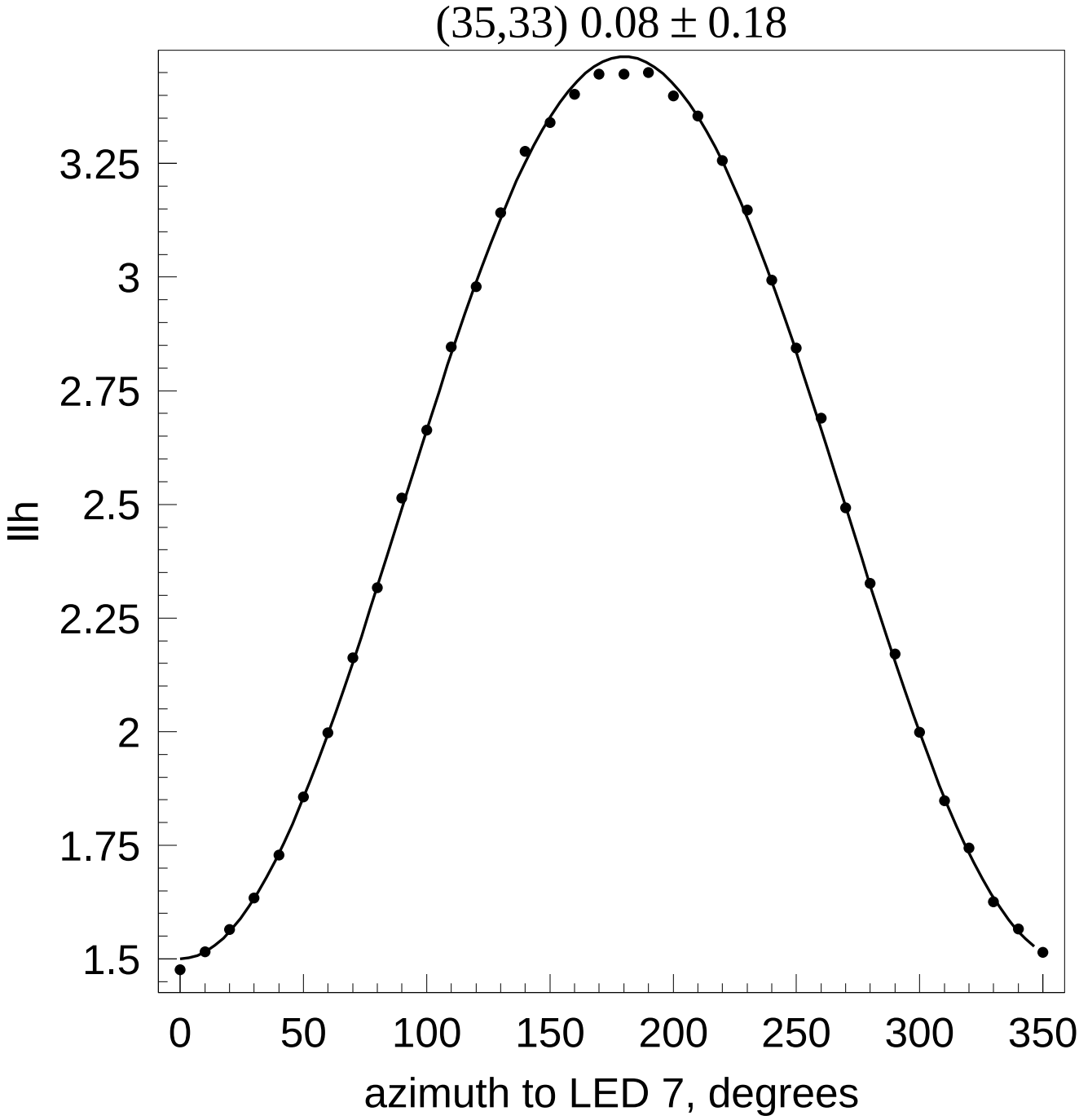

(35,9) 38.13 ± 0.22
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

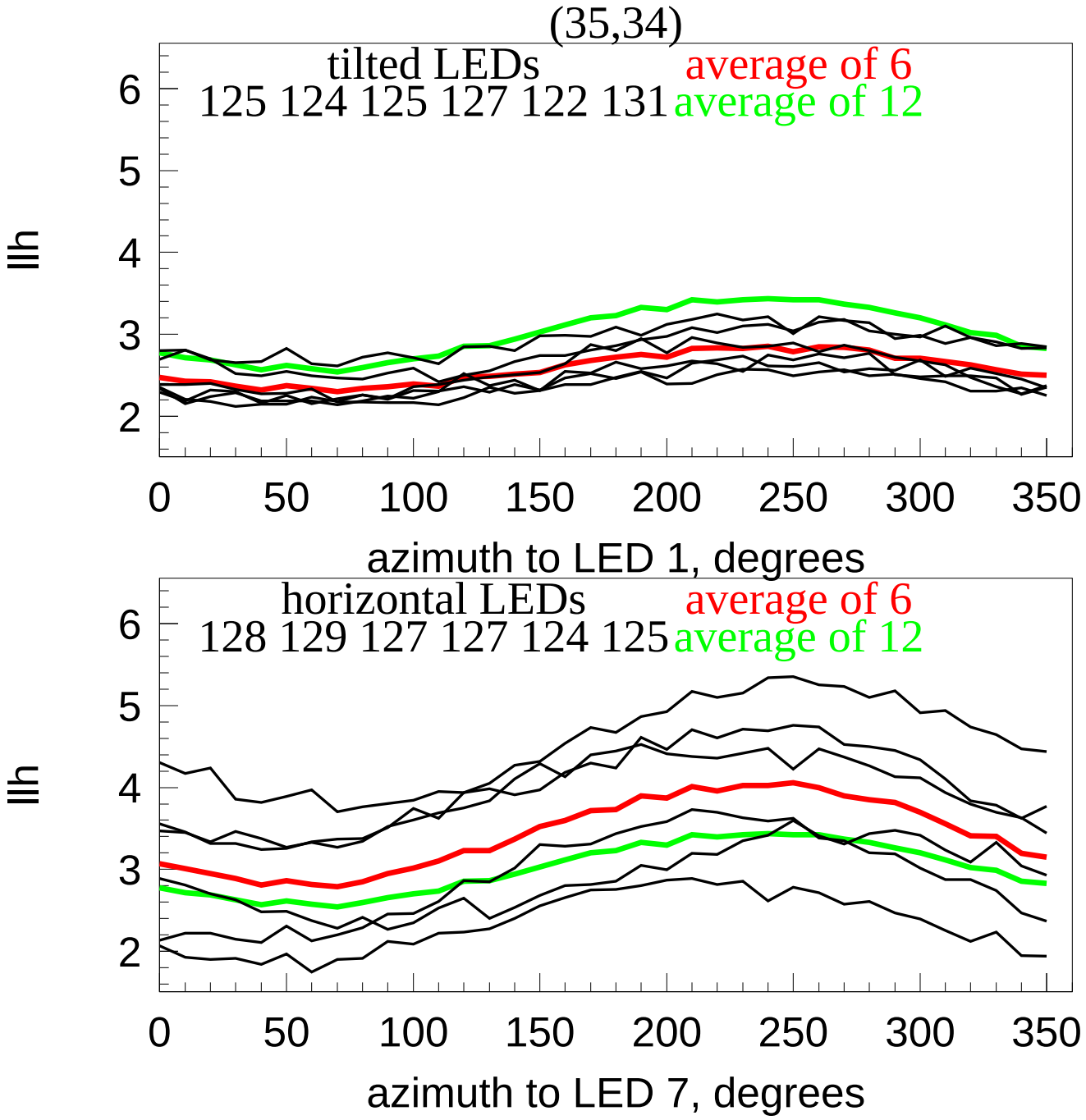

(35,9) 38.30 ± 0.20
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

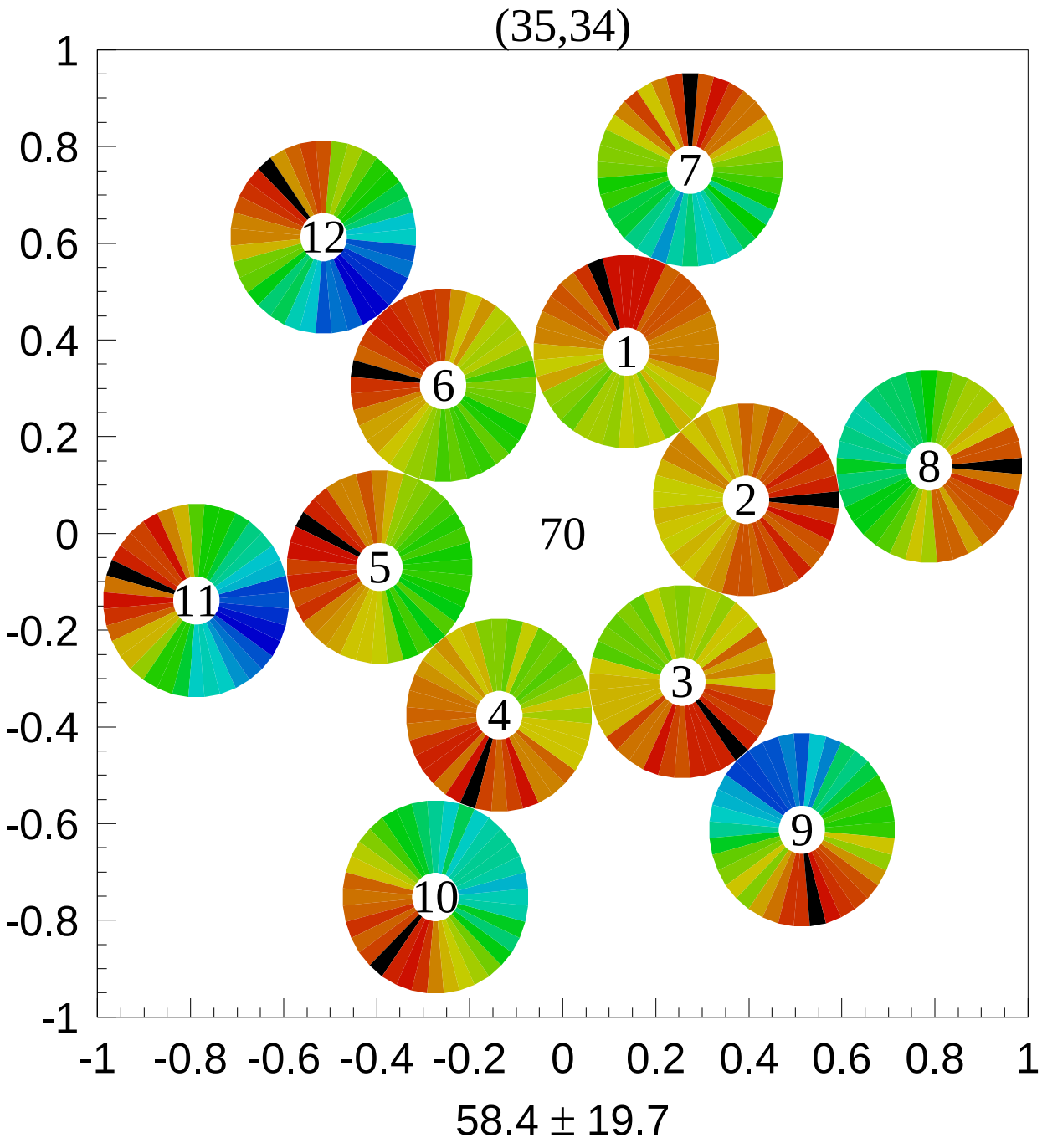

(35,33)
tilted LEDs
134 122 122 126 124 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 122 120 124 124 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

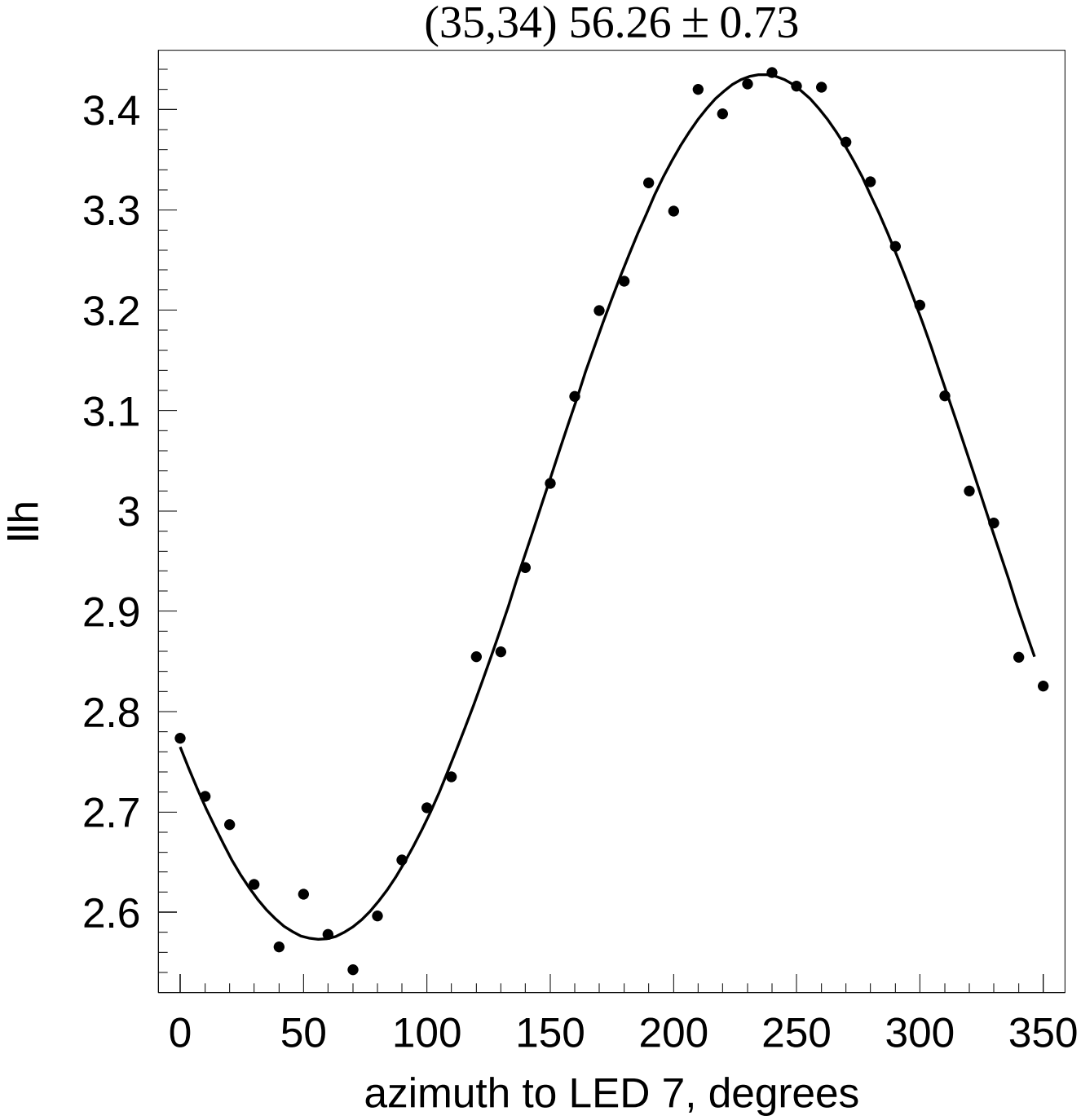

(35,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
360 ± 9.0
11
12
5
6
10
4
0
1
7
3
2
9
8

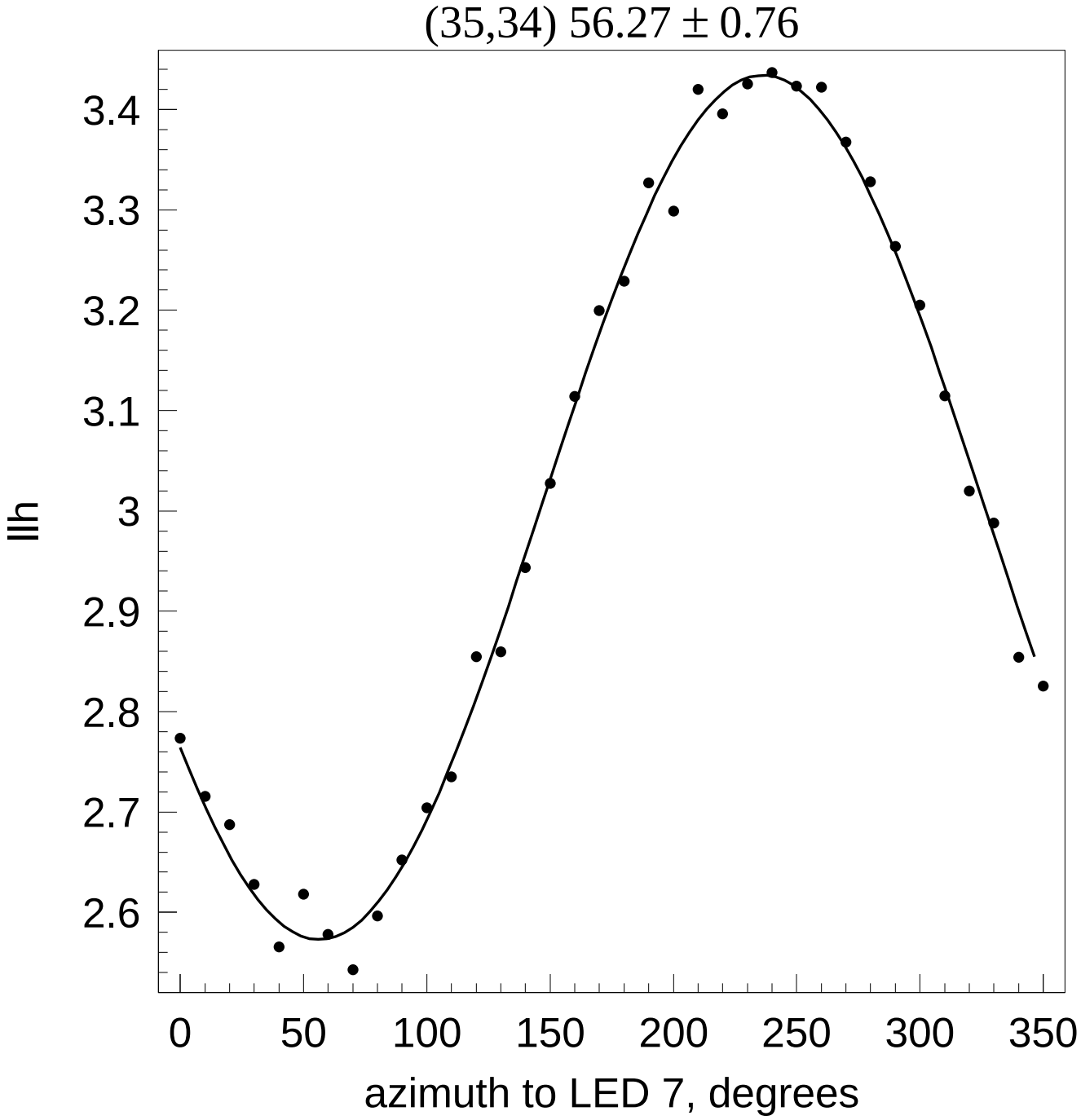

(35,33) 0.10 ± 0.20
3.25
3
2.75
2.5
2.25
2
1.75
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

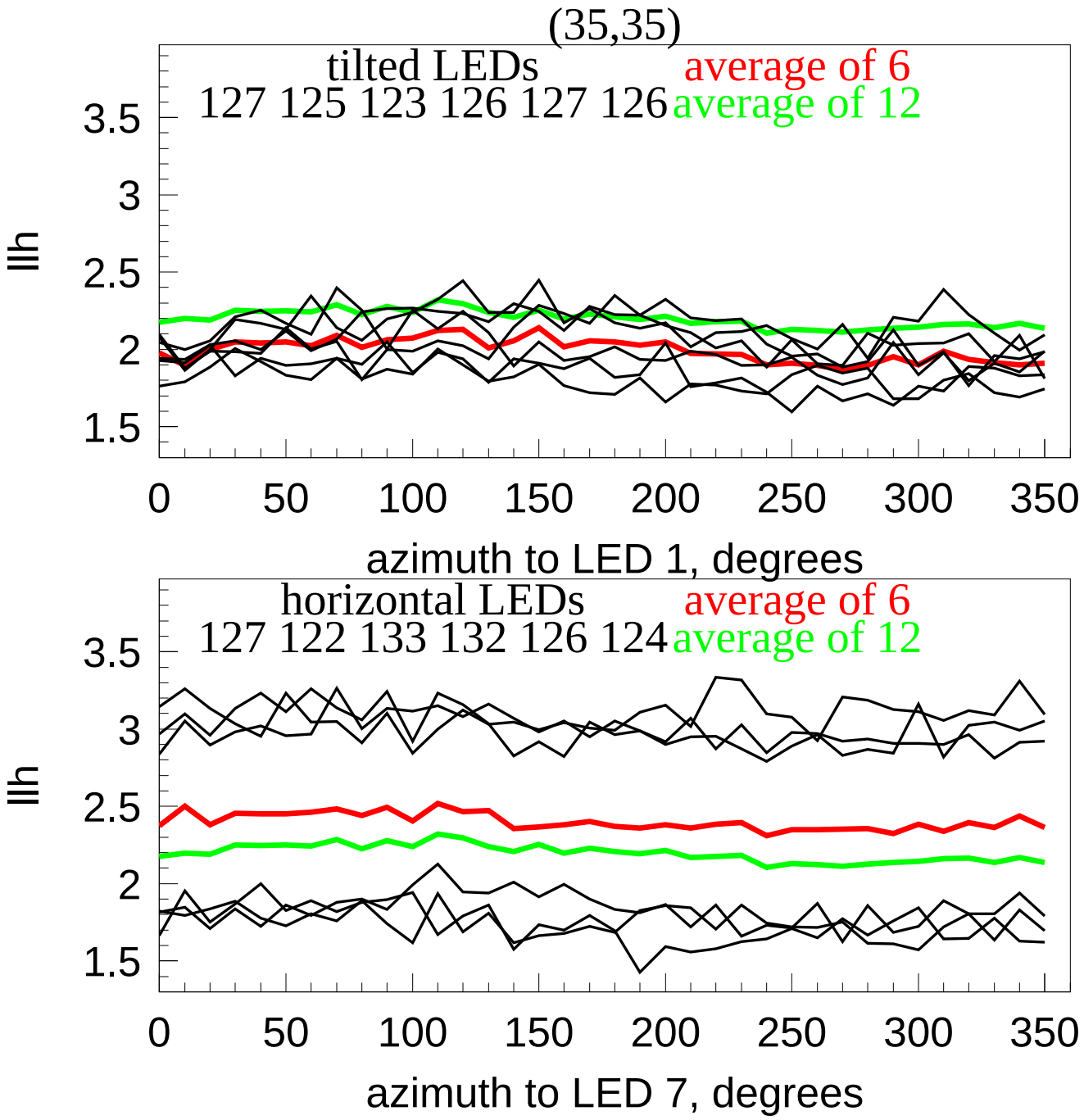

(35,33) 0.08 ± 0.18
3.25
3
2.75
2.5
2.25
2
1.75
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

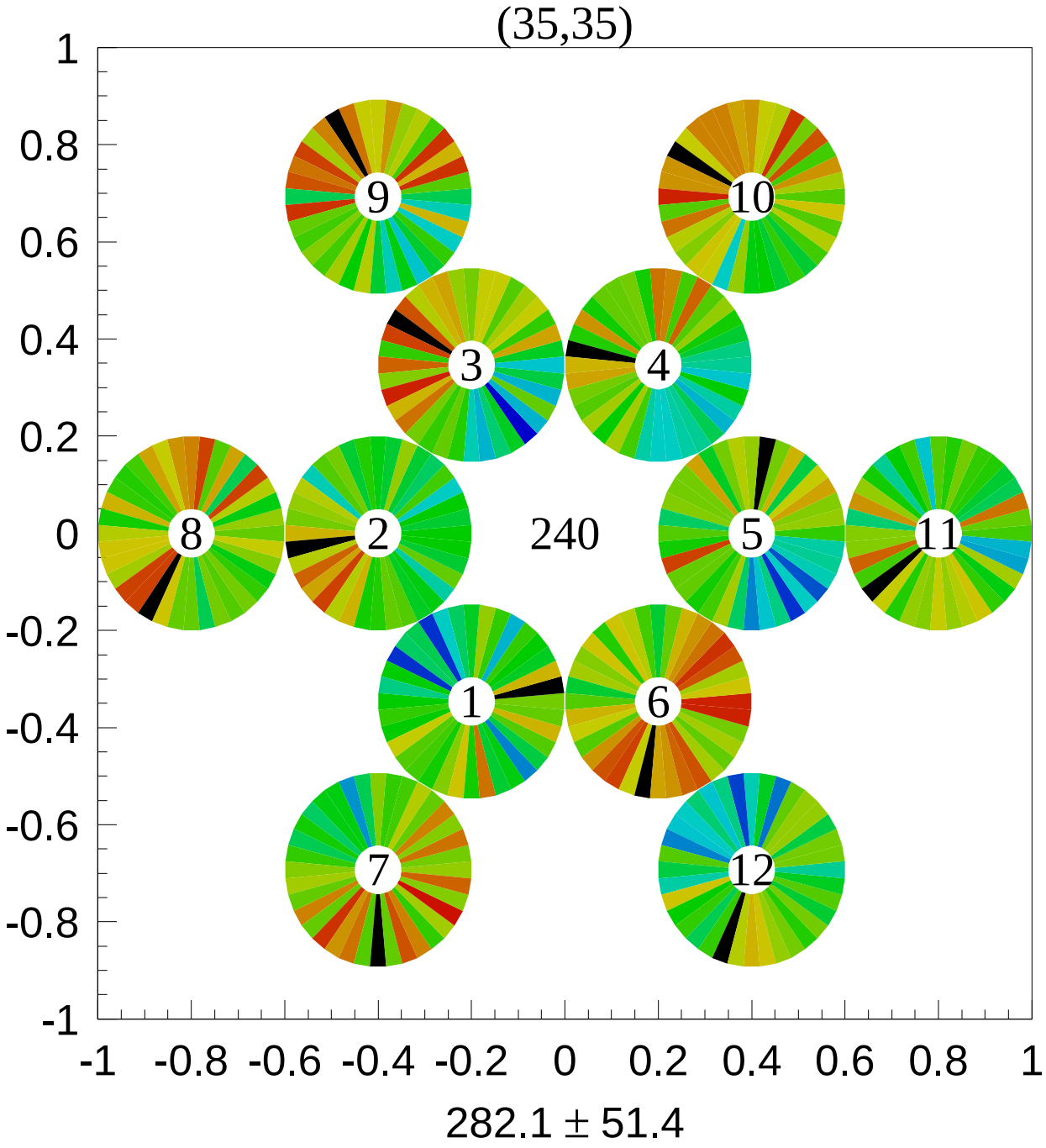

(35,34)
tilted LEDs
125 124 125 127 122 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 129 127 127 124 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

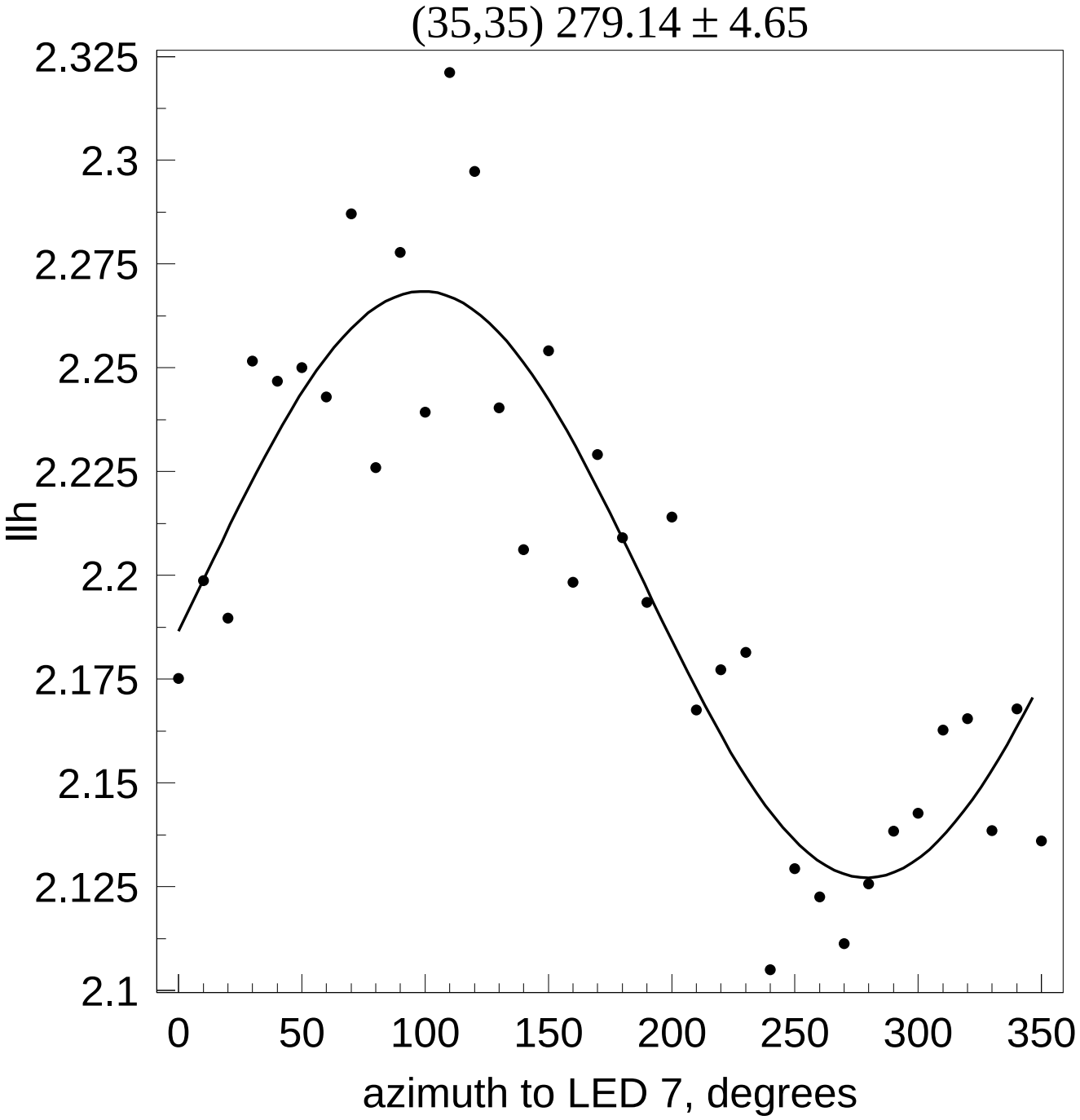

(35,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
70
1
2
3
4
5
6
7
8
9
10
11
12
58.4 ± 19.7

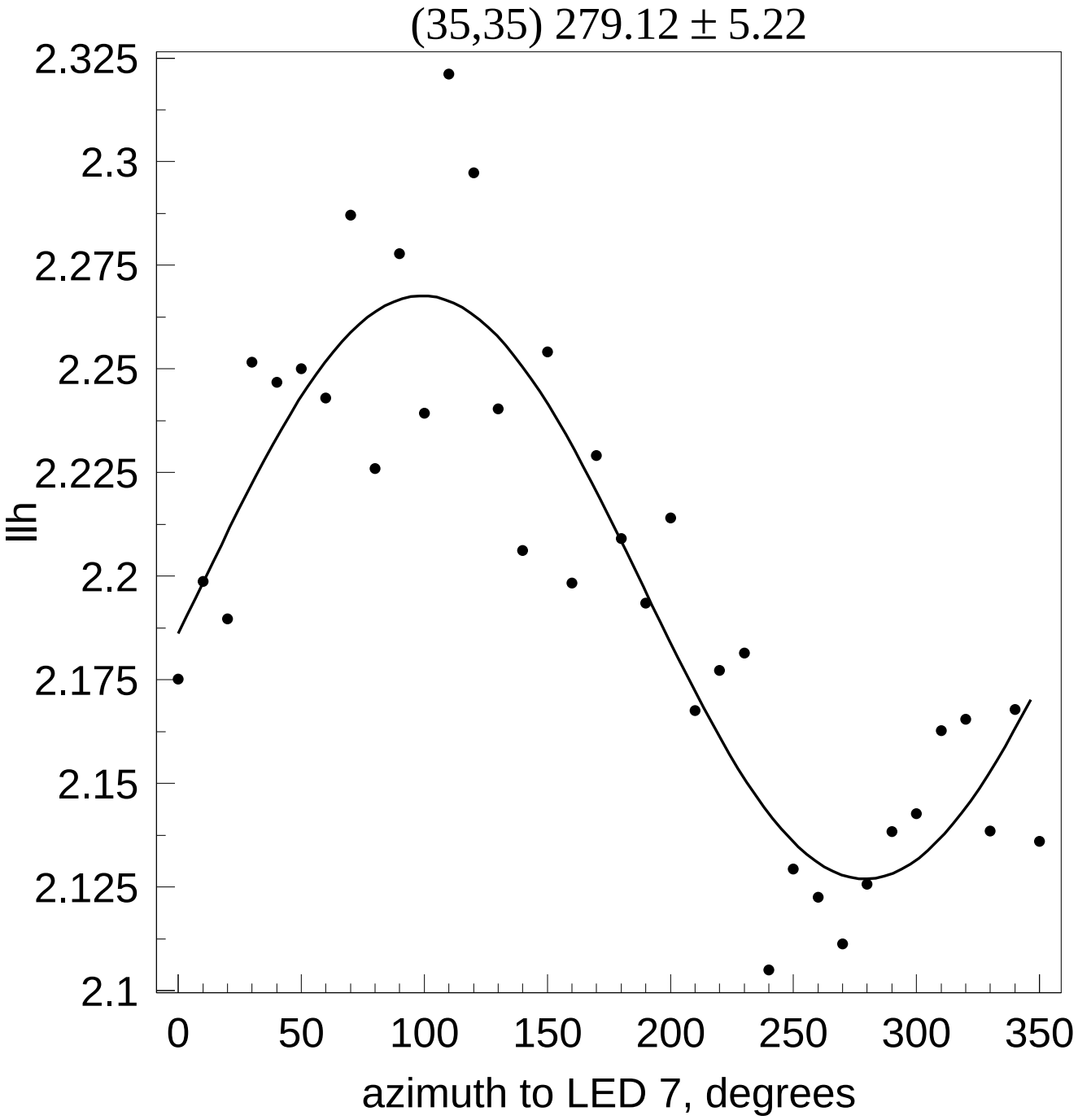

(35,34) 56.26 ± 0.73
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

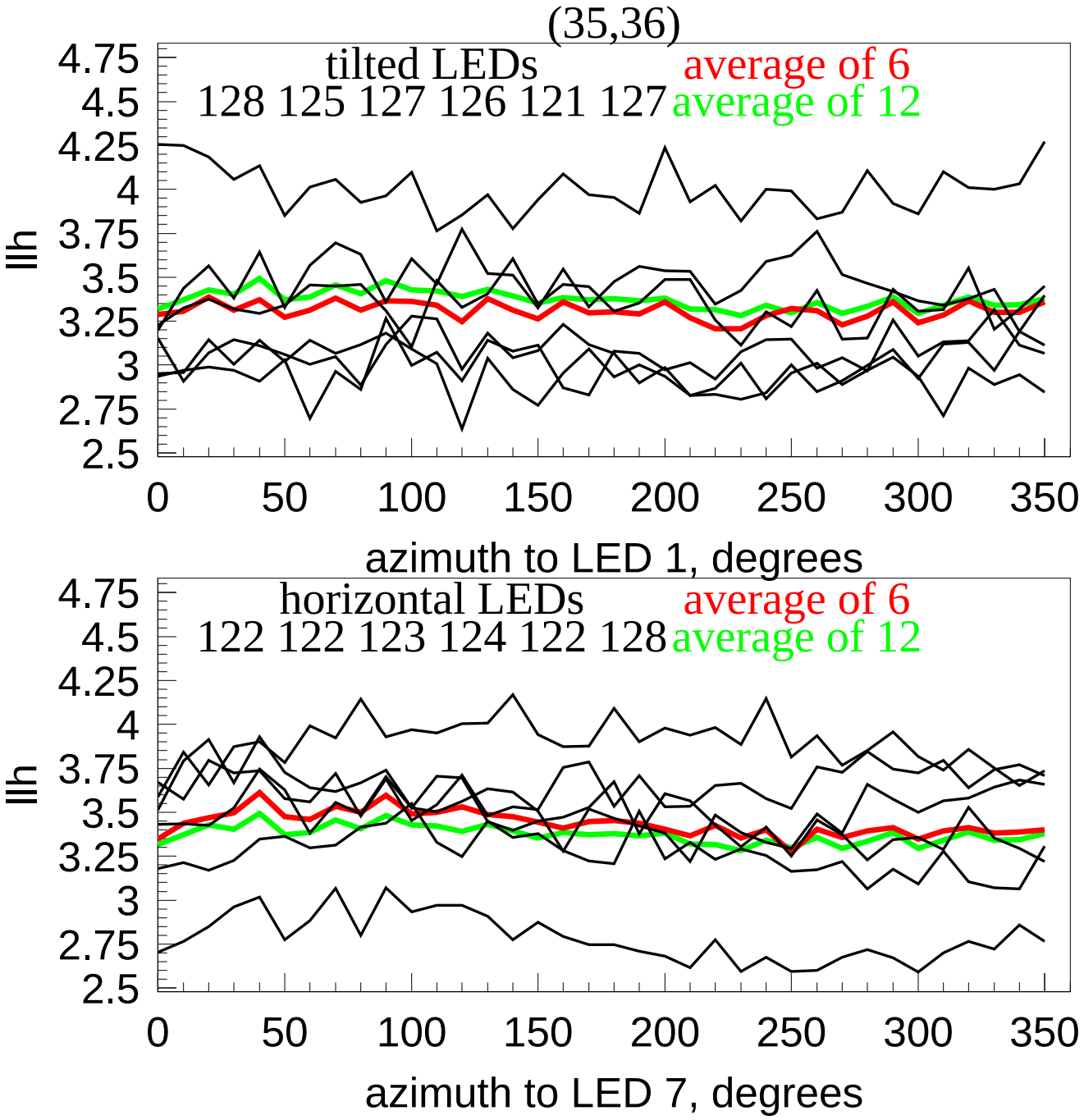

(35,34) 56.27 ± 0.76
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

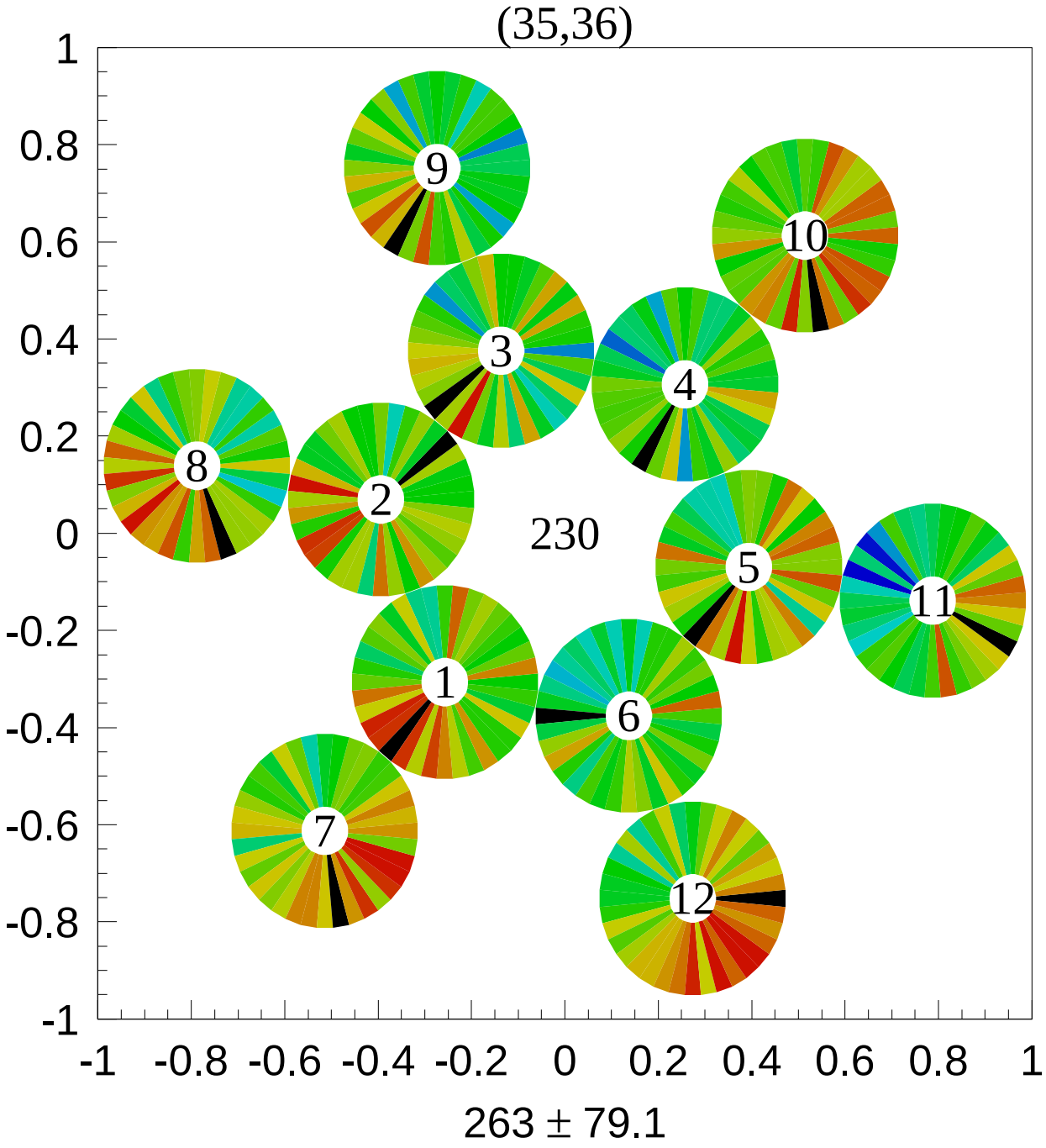

(35,35)
tilted LEDs
127 125 123 126 127 126
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 122 133 132 126 124
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

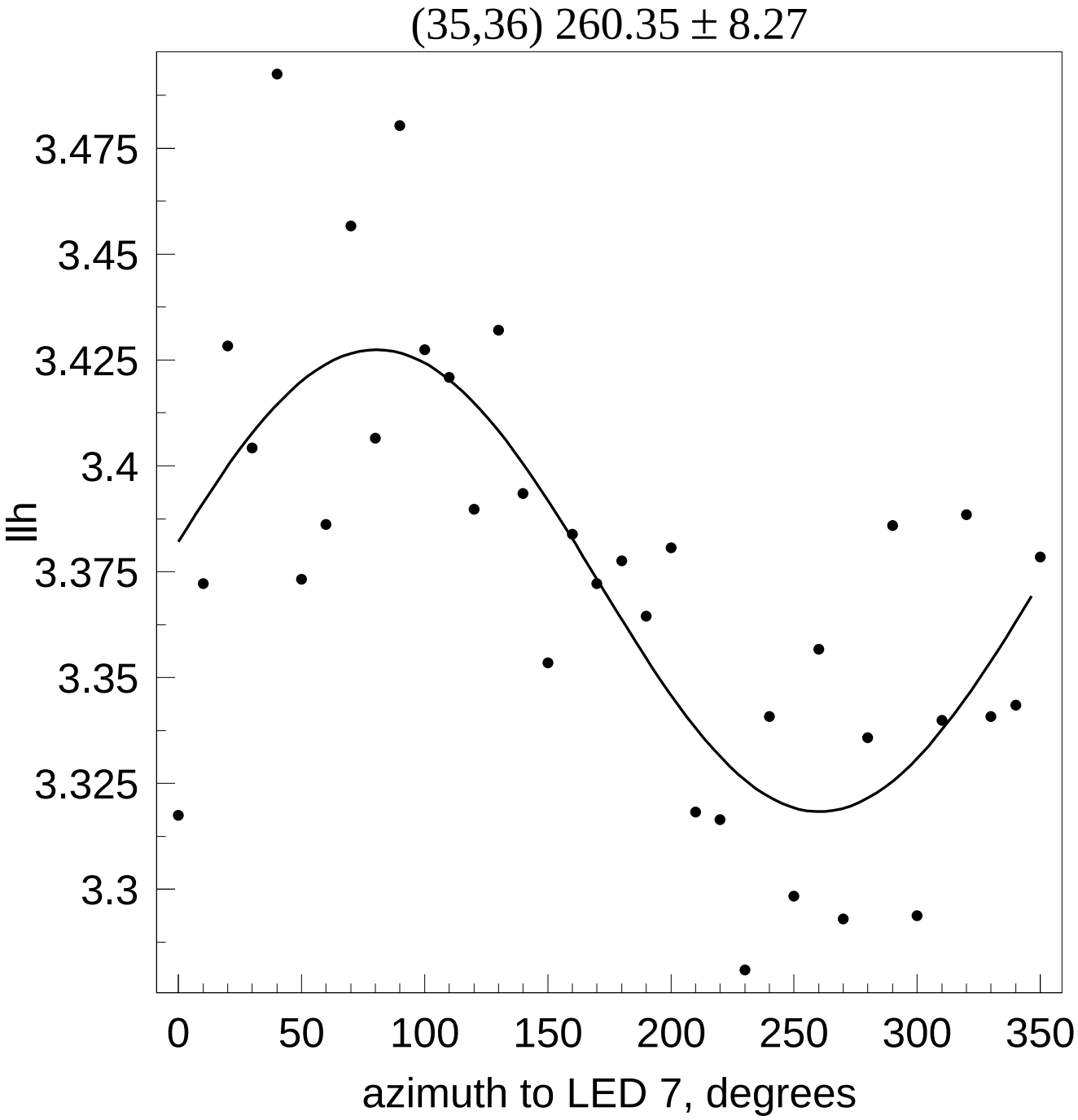

(35,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
282.1 ± 51.4

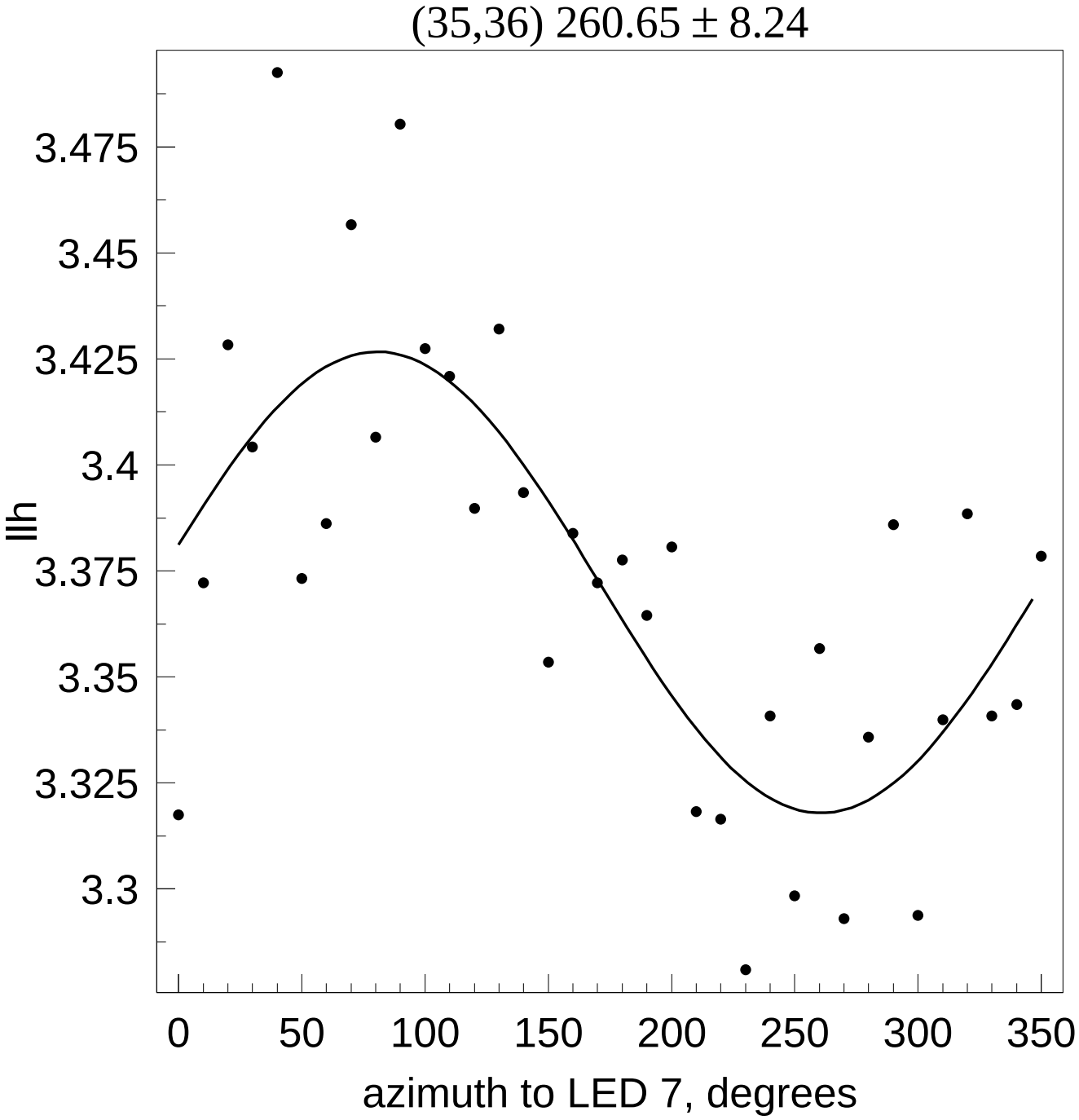

(35,35) 279.14 ± 4.65
2.325
2.3
2.275
2.25
2.225
2.2
2.175
2.15
2.125
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

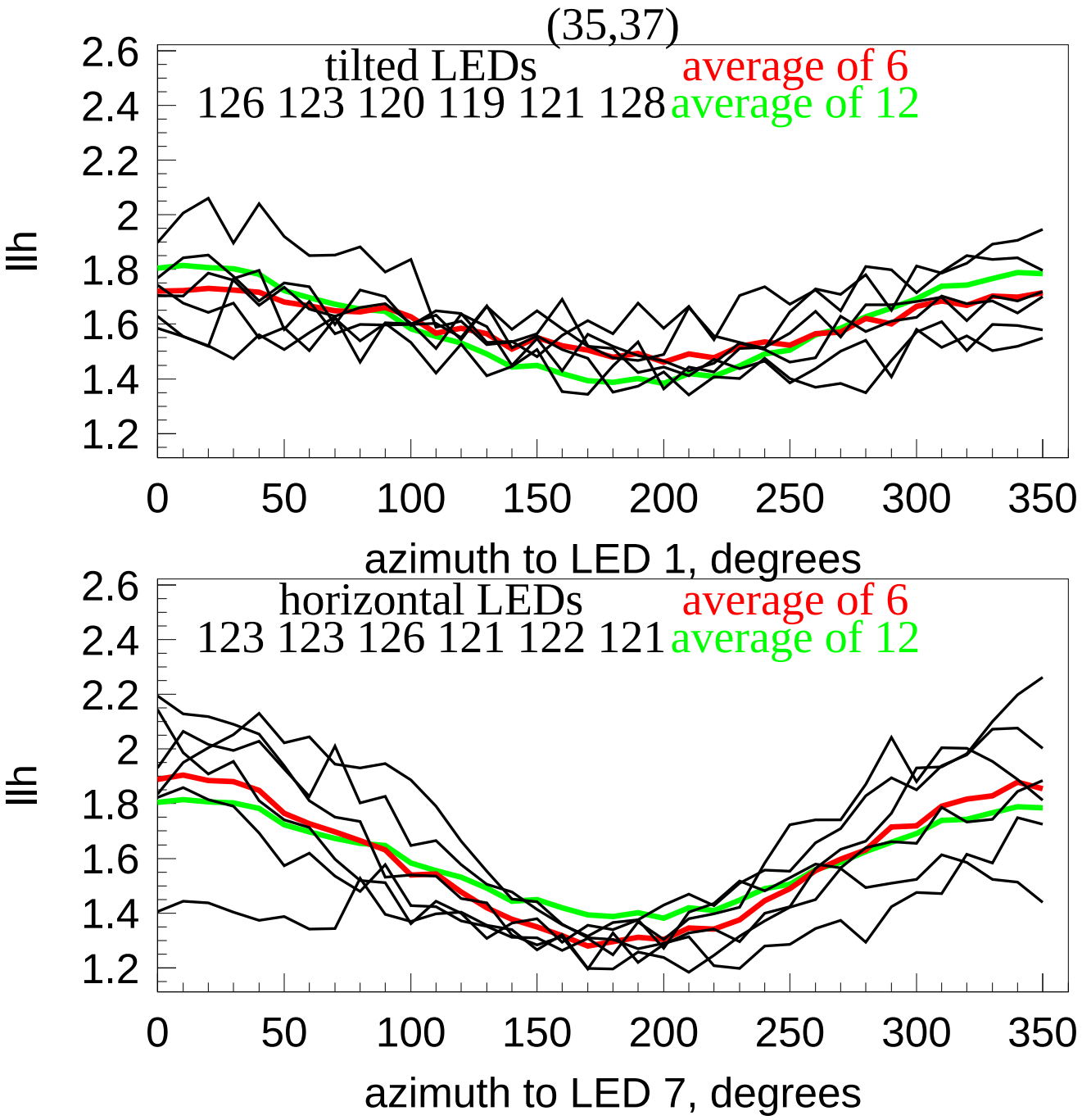

(35,35) 279.12 ± 5.22
2.325
2.3
2.275
2.25
2.225
2.2
2.175
2.15
2.125
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

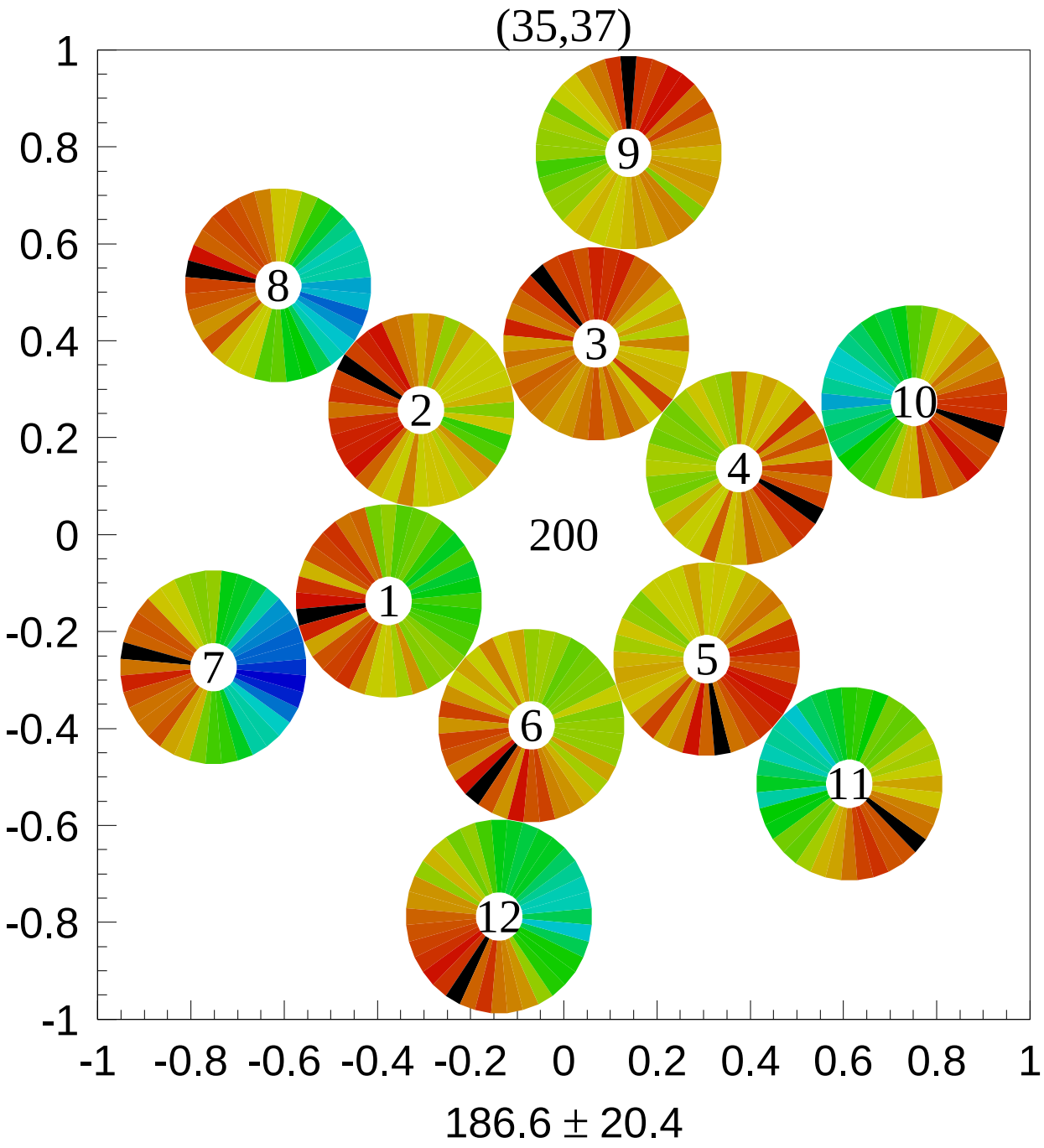

(35,36)
tilted LEDs
128 125 127 126 121 127
average of 6
average of 12
llh
4.75
4.5
4.25
4
3.75
3.5
3.25
3
2.75
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 122 123 124 122 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

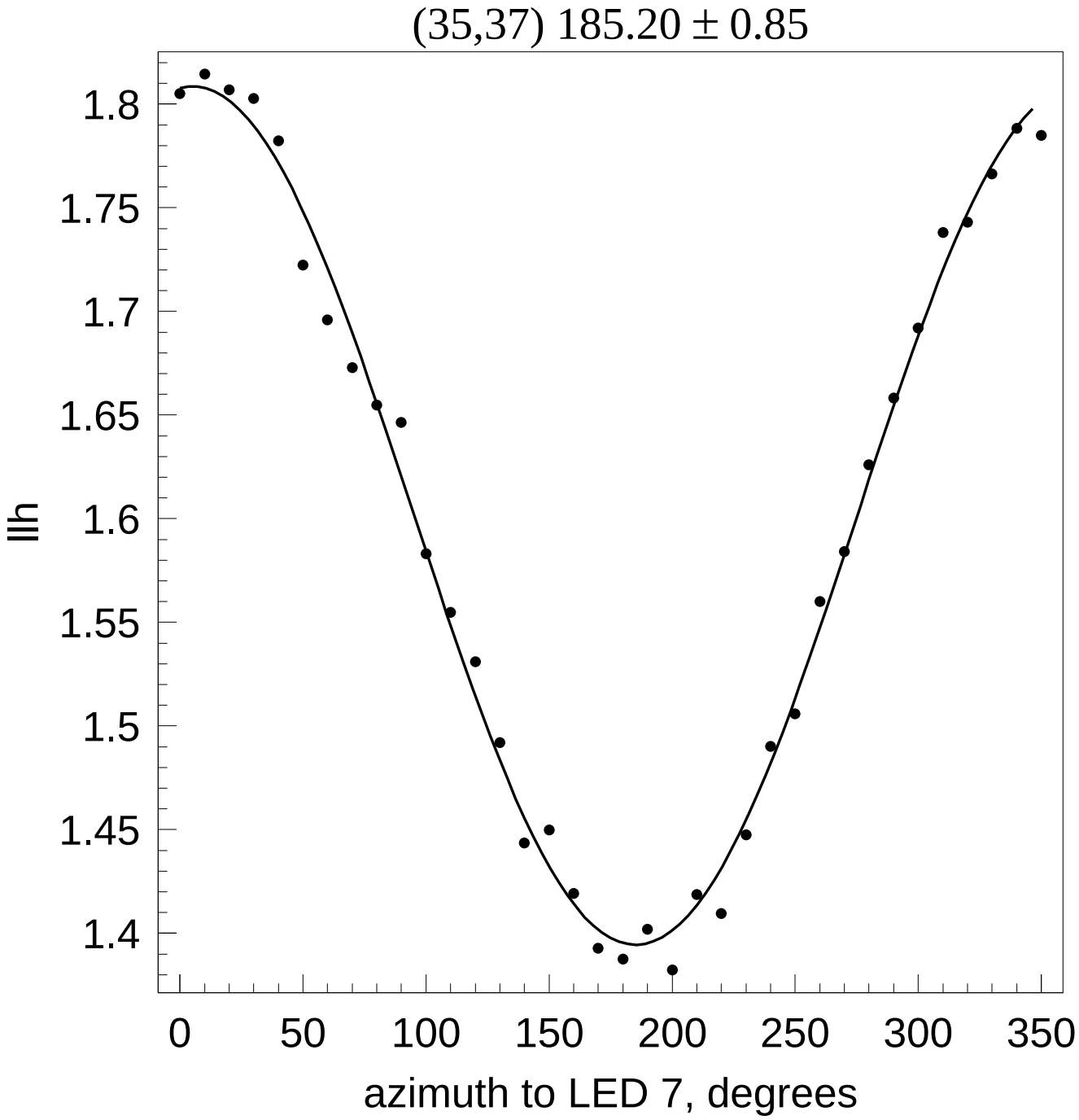

(35,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
263 ± 79.1

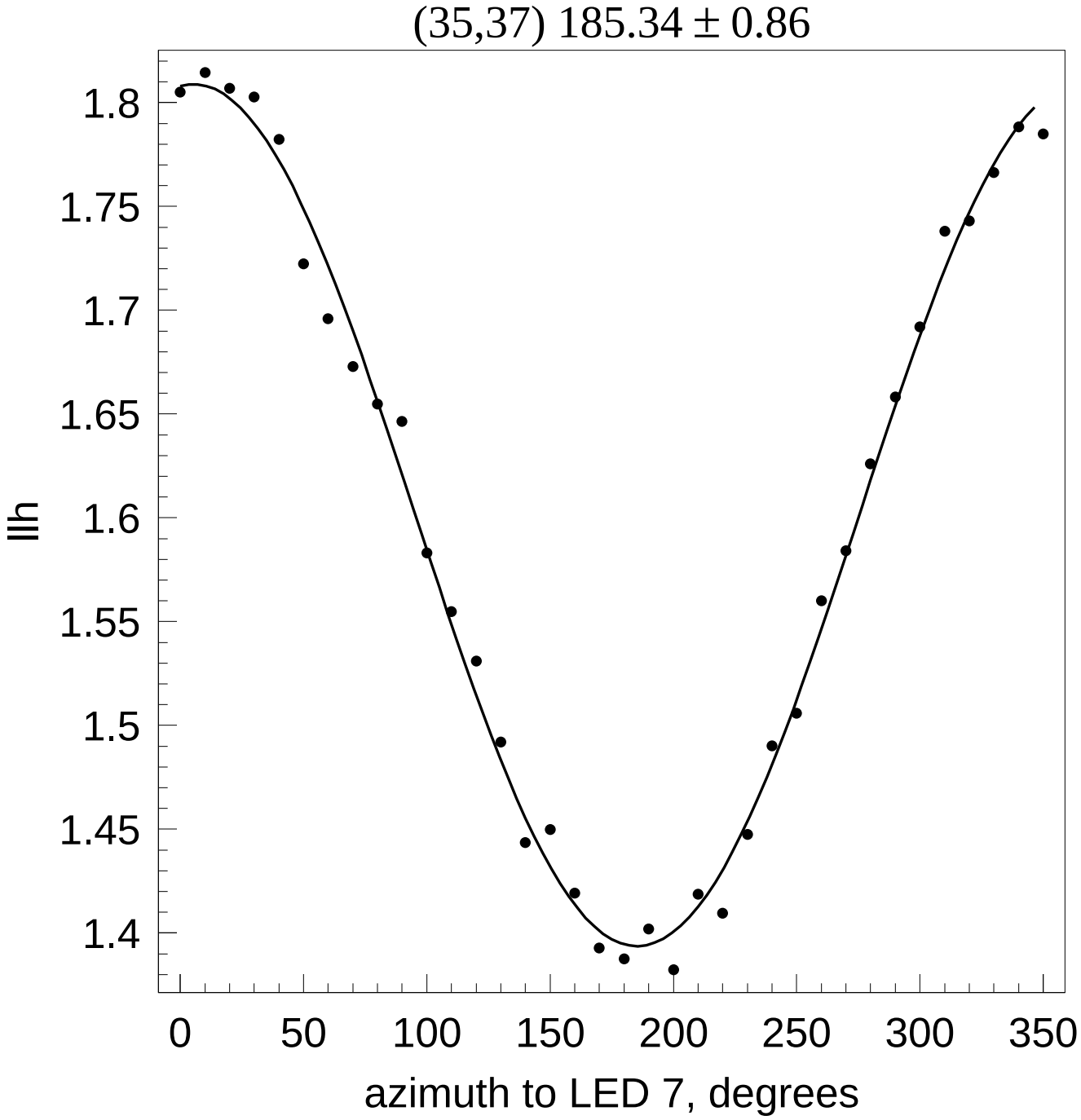

(35,36) 260.35 ± 8.27
3.475
3.45
3.425
3.4
3.375
3.35
3.325
3.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

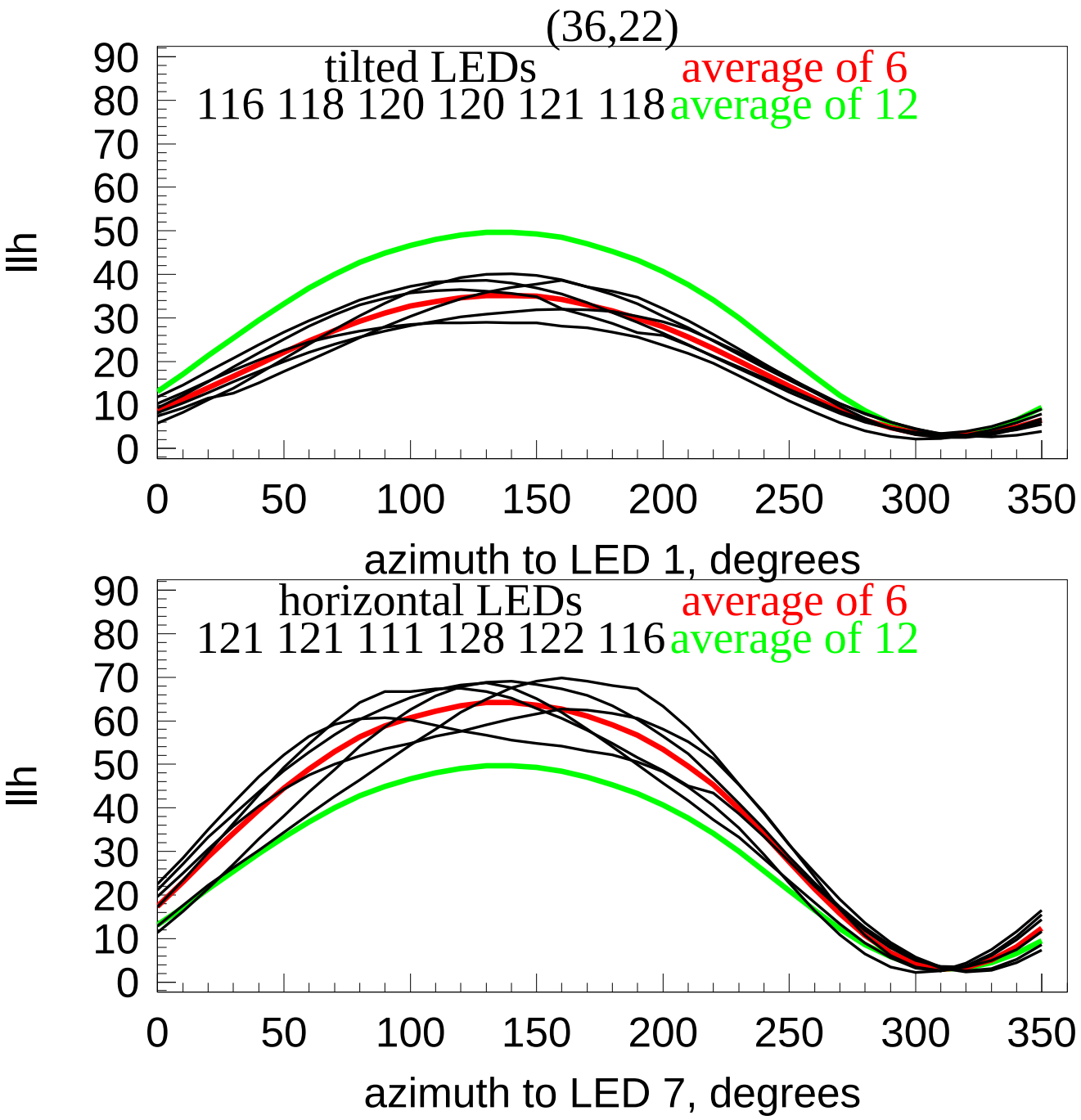

(35,36) 260.65 ± 8.24
3.475
3.45
3.425
3.4
3.375
3.35
3.325
3.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

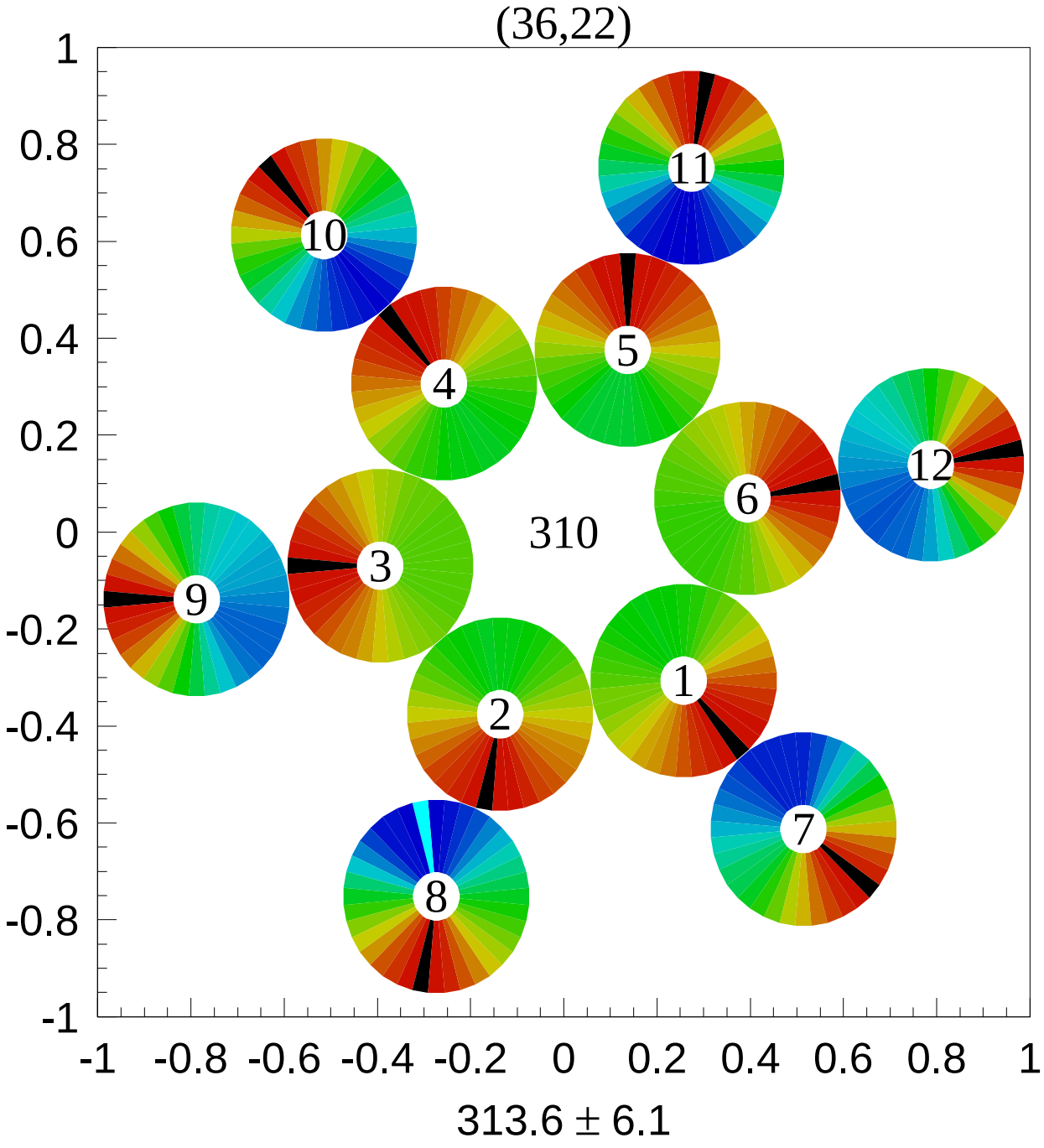

(35,37)
tilted LEDs
126 123 120 119 121 128
average of 6
average of 12
llh
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 123 126 121 122 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

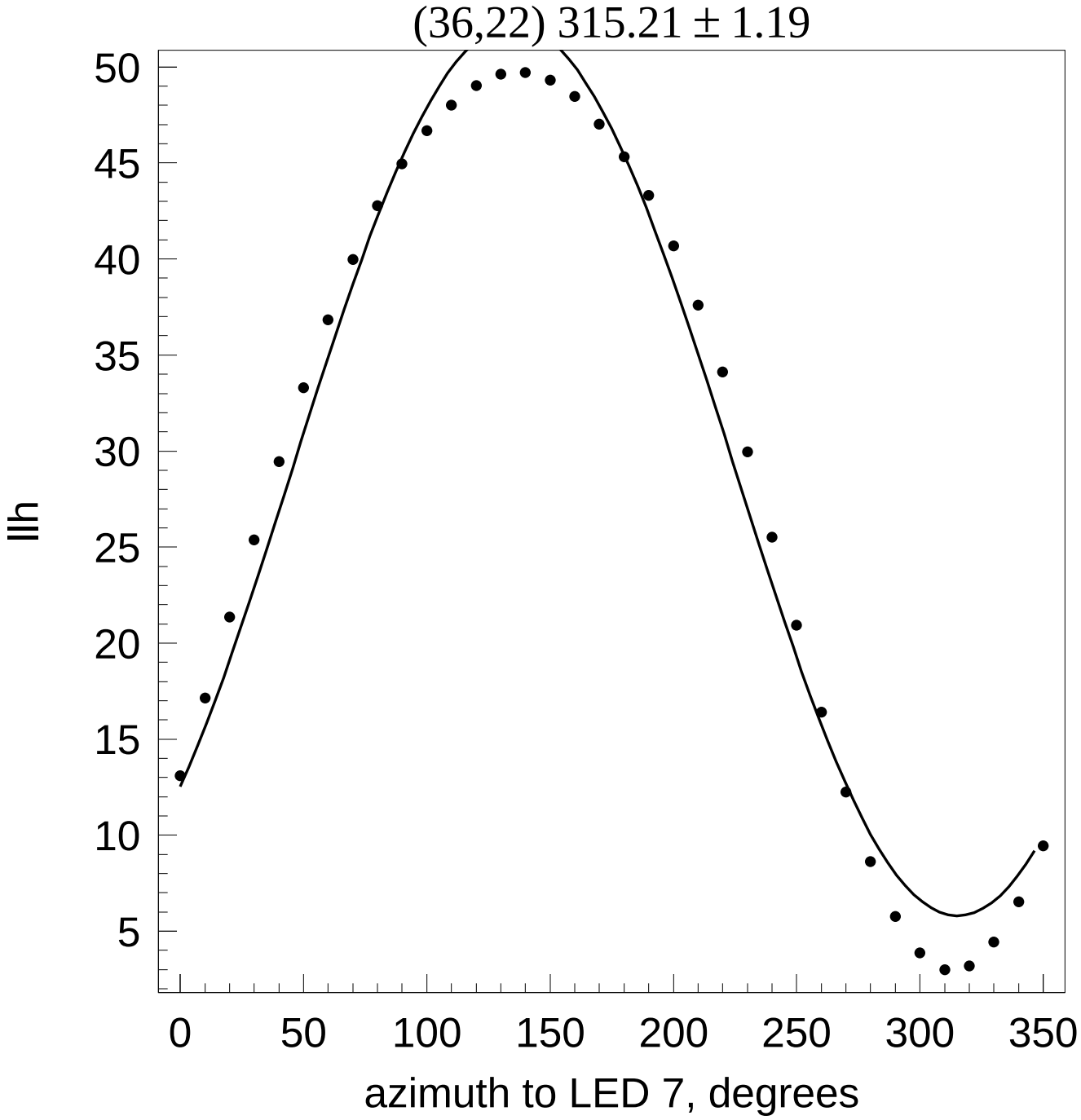

(35,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
186.6 ± 20.4
200
1
2
3
4
5
6
7
8
9
10
11
12

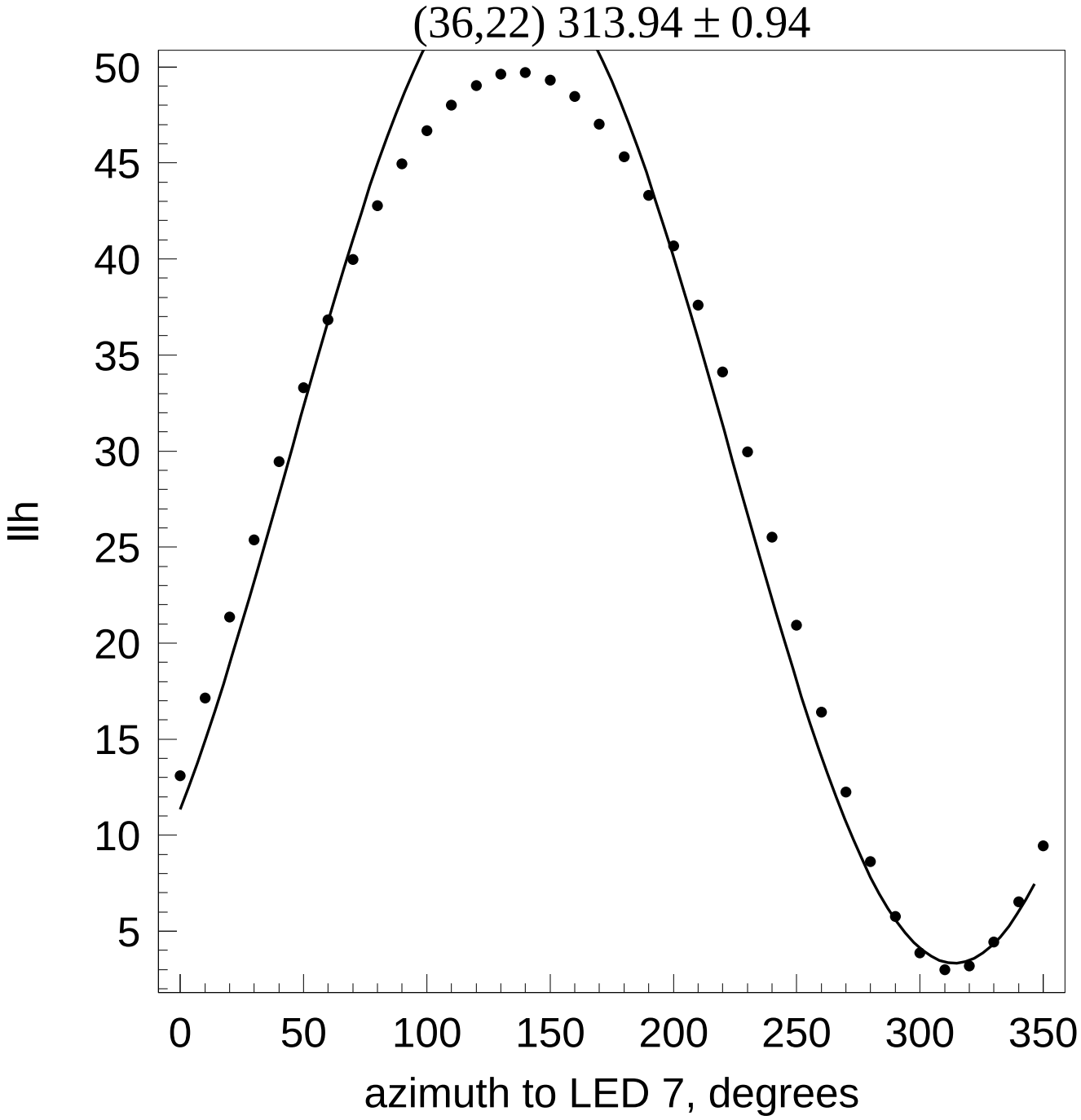

(35,37) 185.20 ± 0.85
1.8
1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

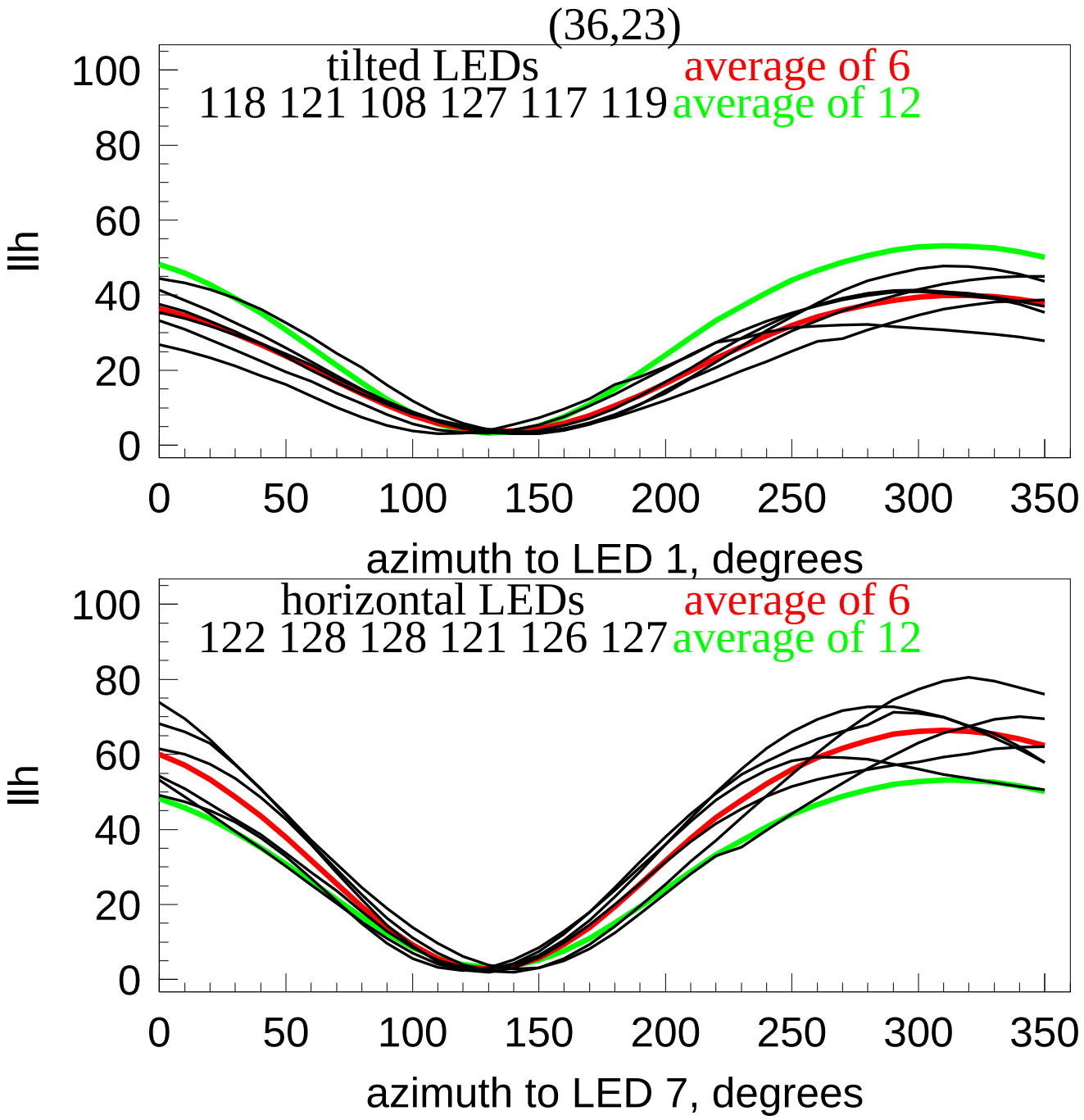

(35,37) 185.34 ± 0.86
1.8
1.75
1.7
1.65
1.6
1.55
1.5
1.45
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

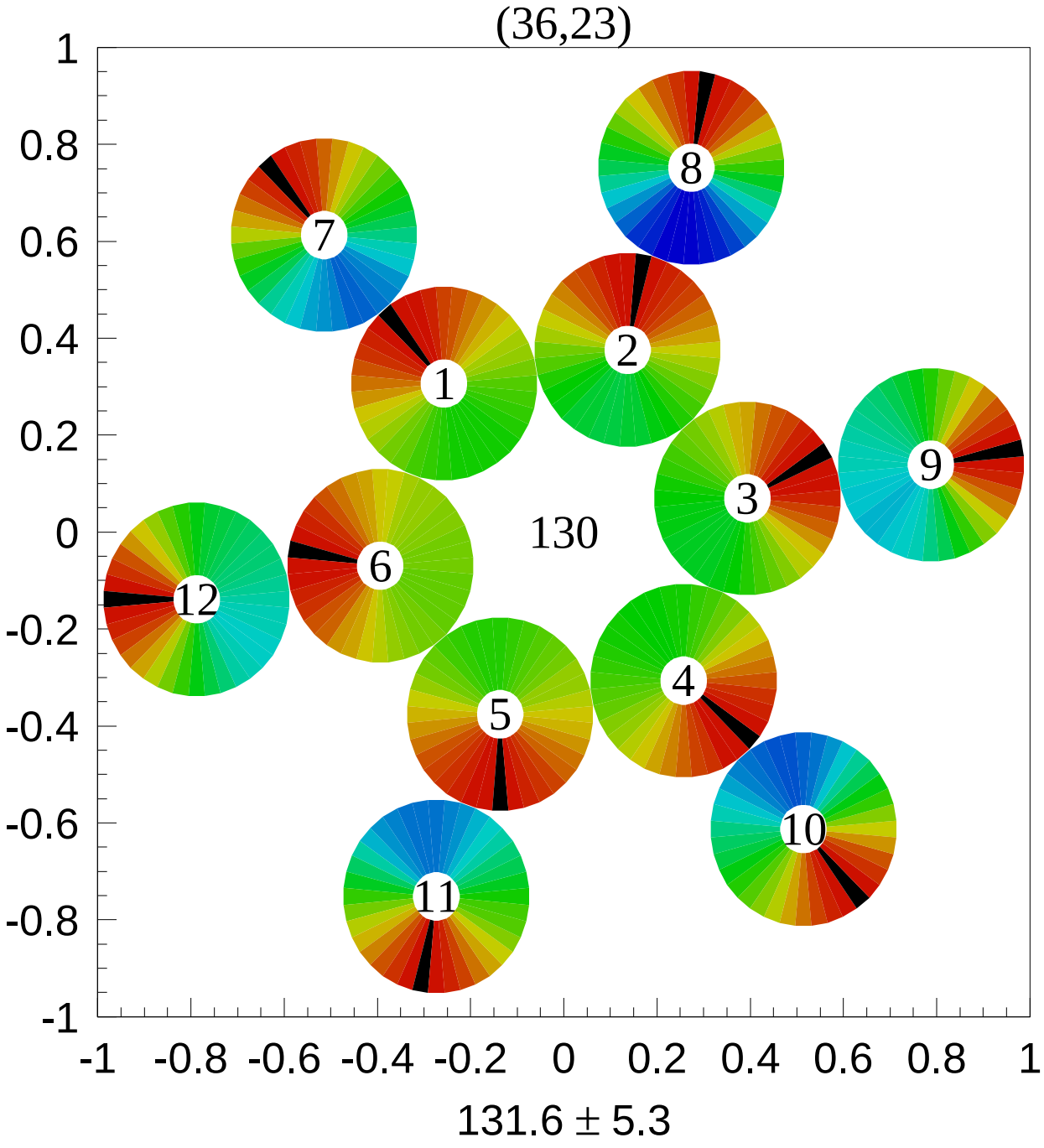

(36,22)
tilted LEDs
116 118 120 120 121 118
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
121 121 111 128 122 116
average of 6
average of 12
llh
azimuth to LED 7, degrees

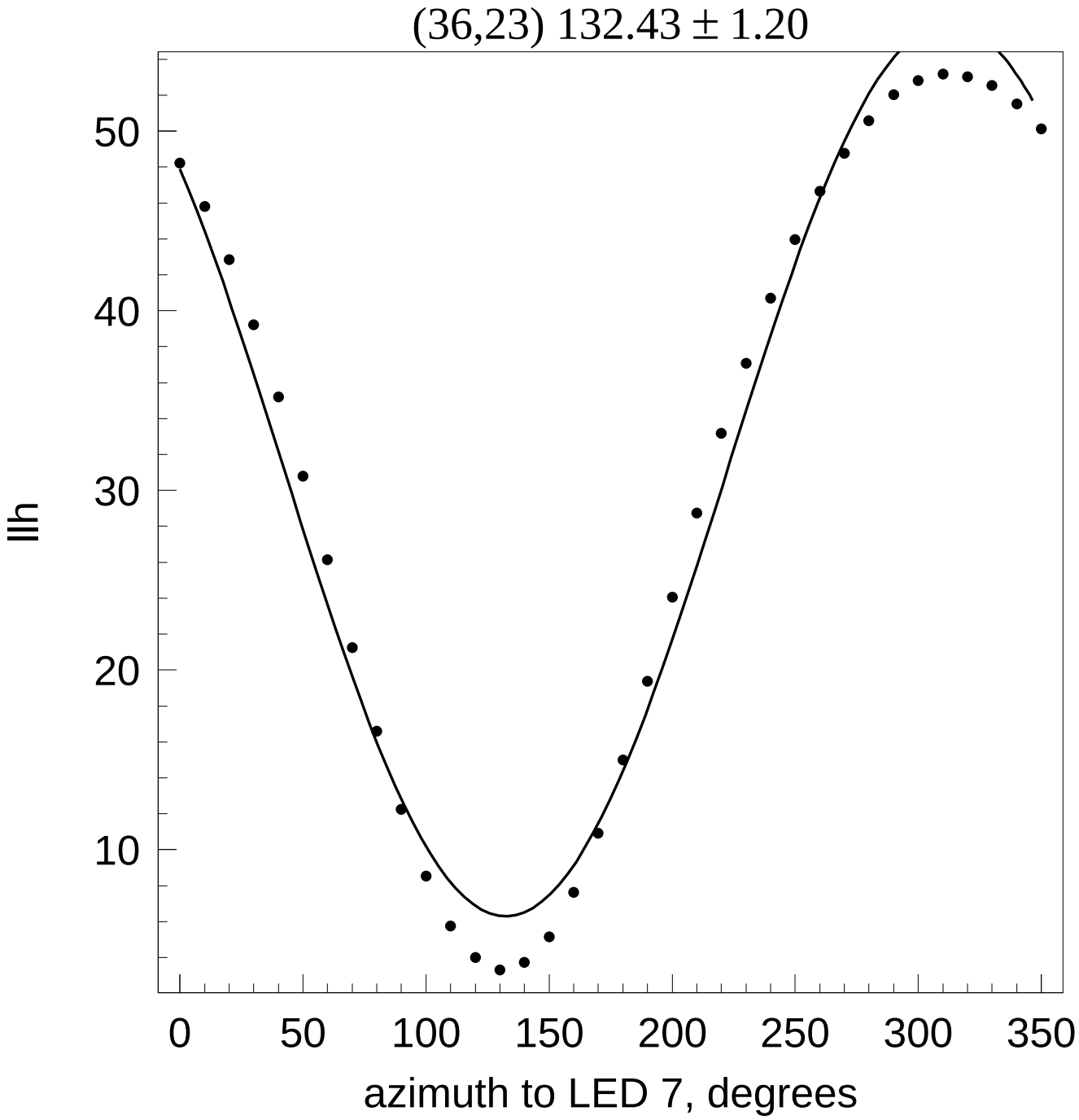

(36,22)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
9
310
2
1
7
8
313.6 ± 6.1

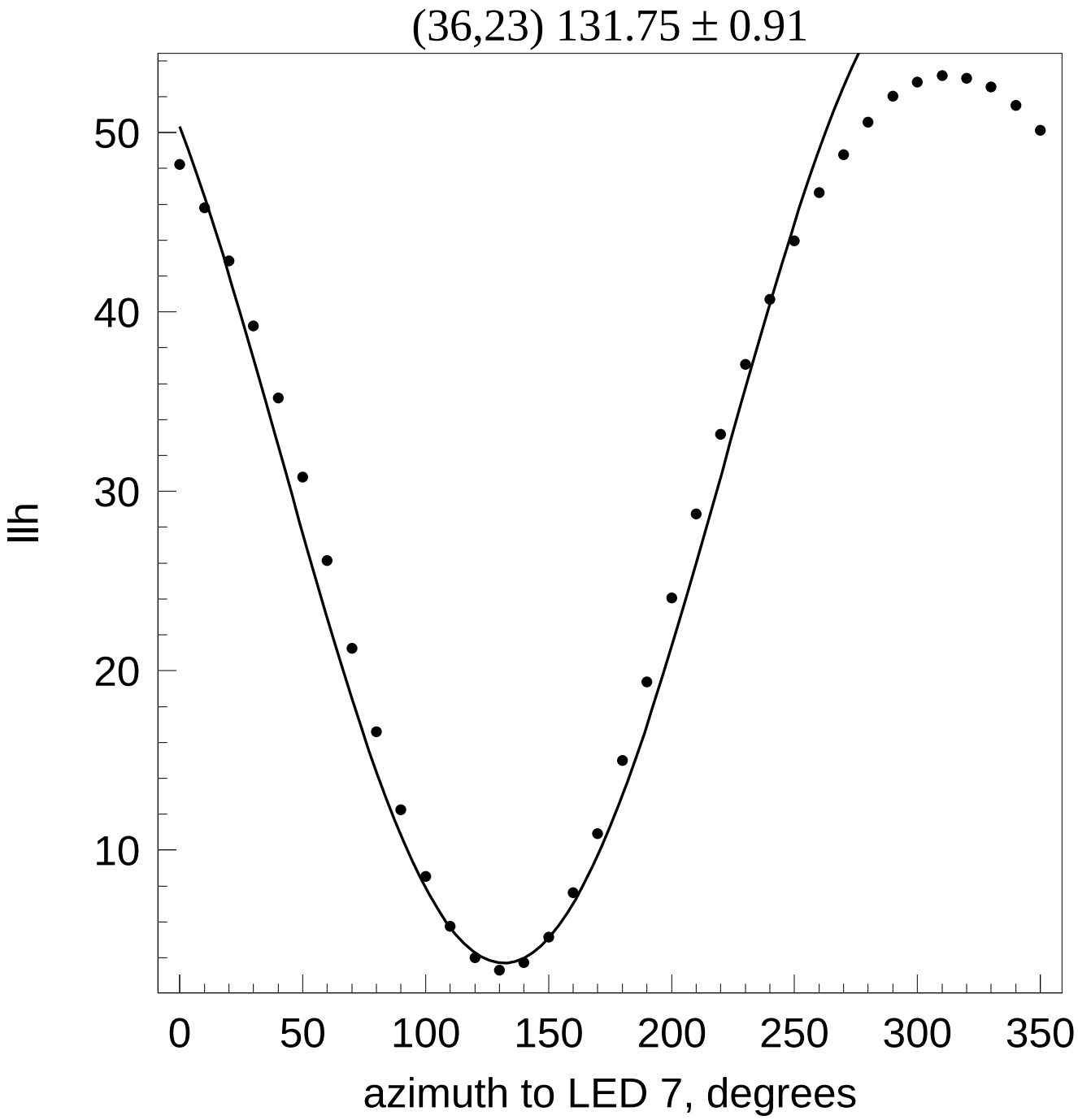

(36,22) 315.21 ± 1.19
50
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

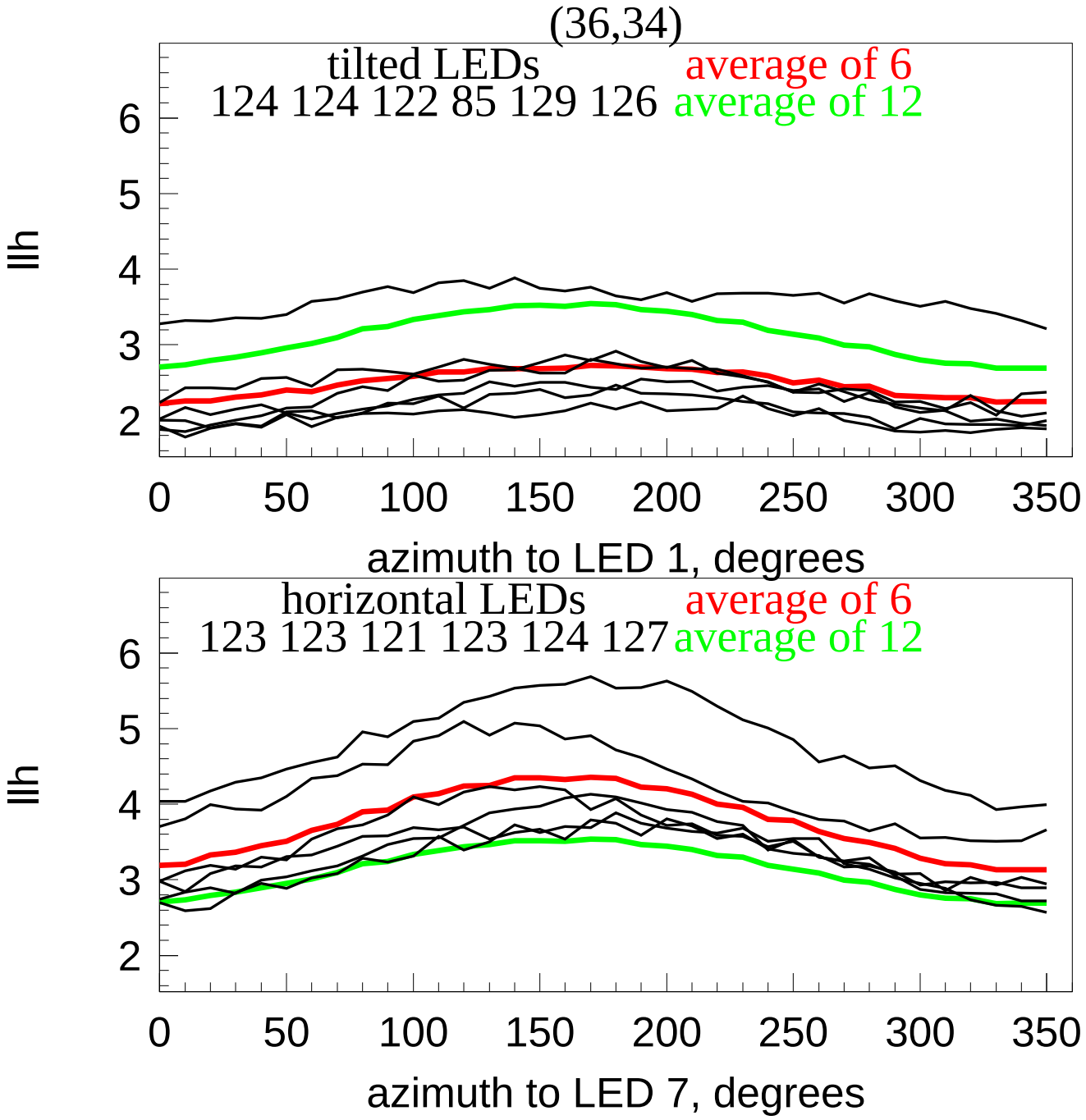

(36,22) 313.94 ± 0.94
50
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

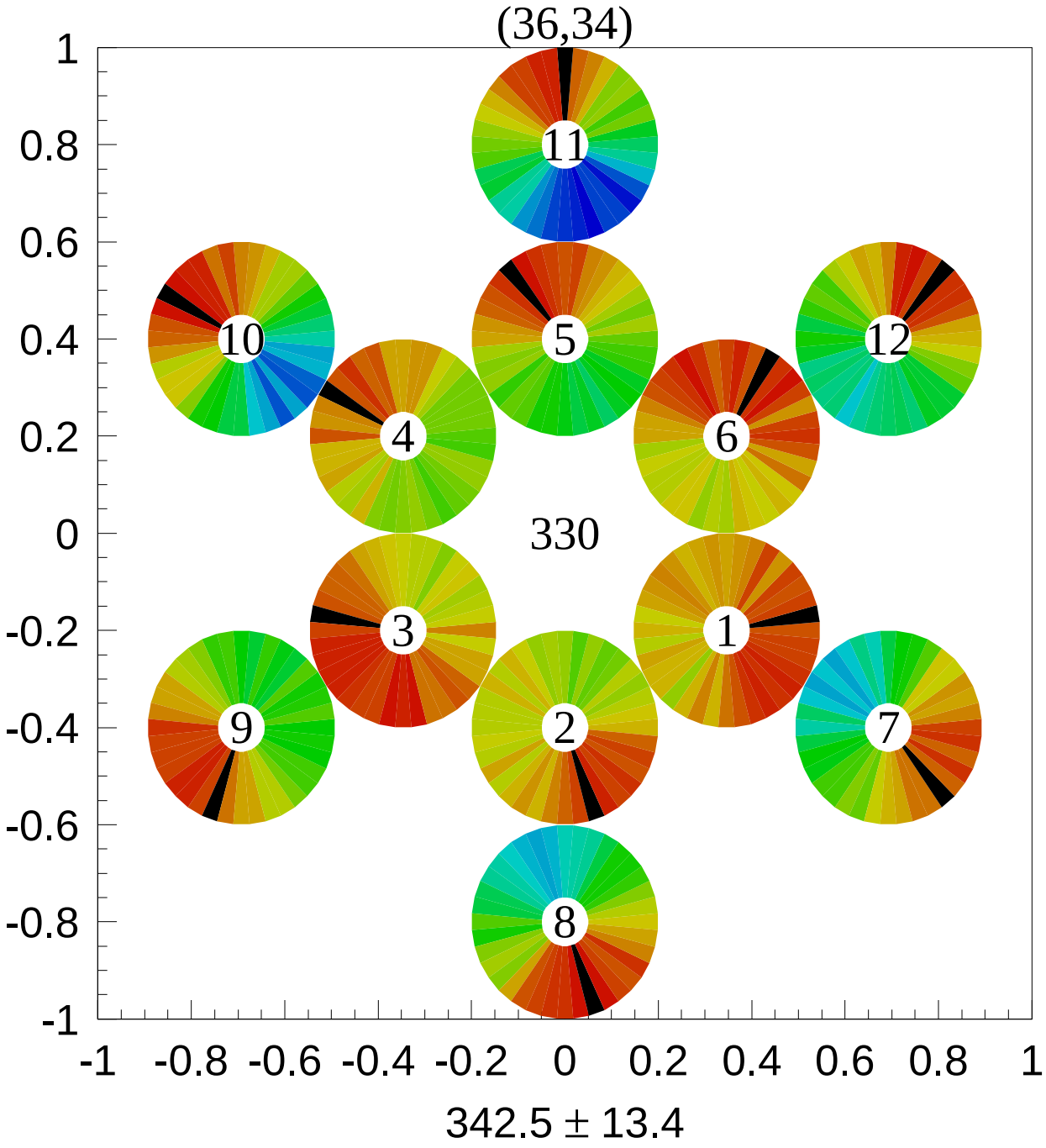

(36,23)
tilted LEDs
118 121 108 127 117 119
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 128 128 121 126 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

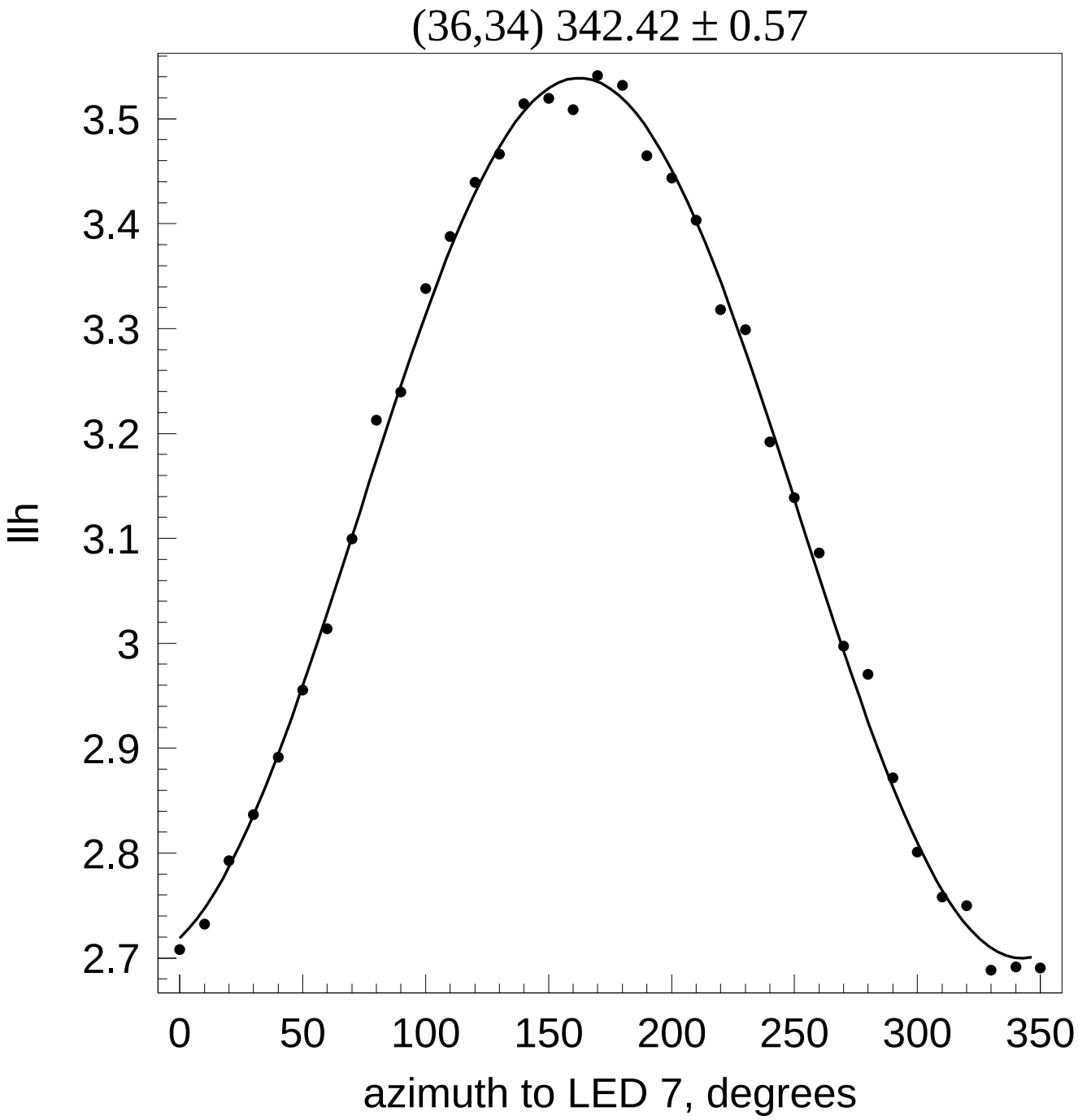

(36,23)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
9
3
6
12
130
5
4
10
11
131.6 ± 5.3

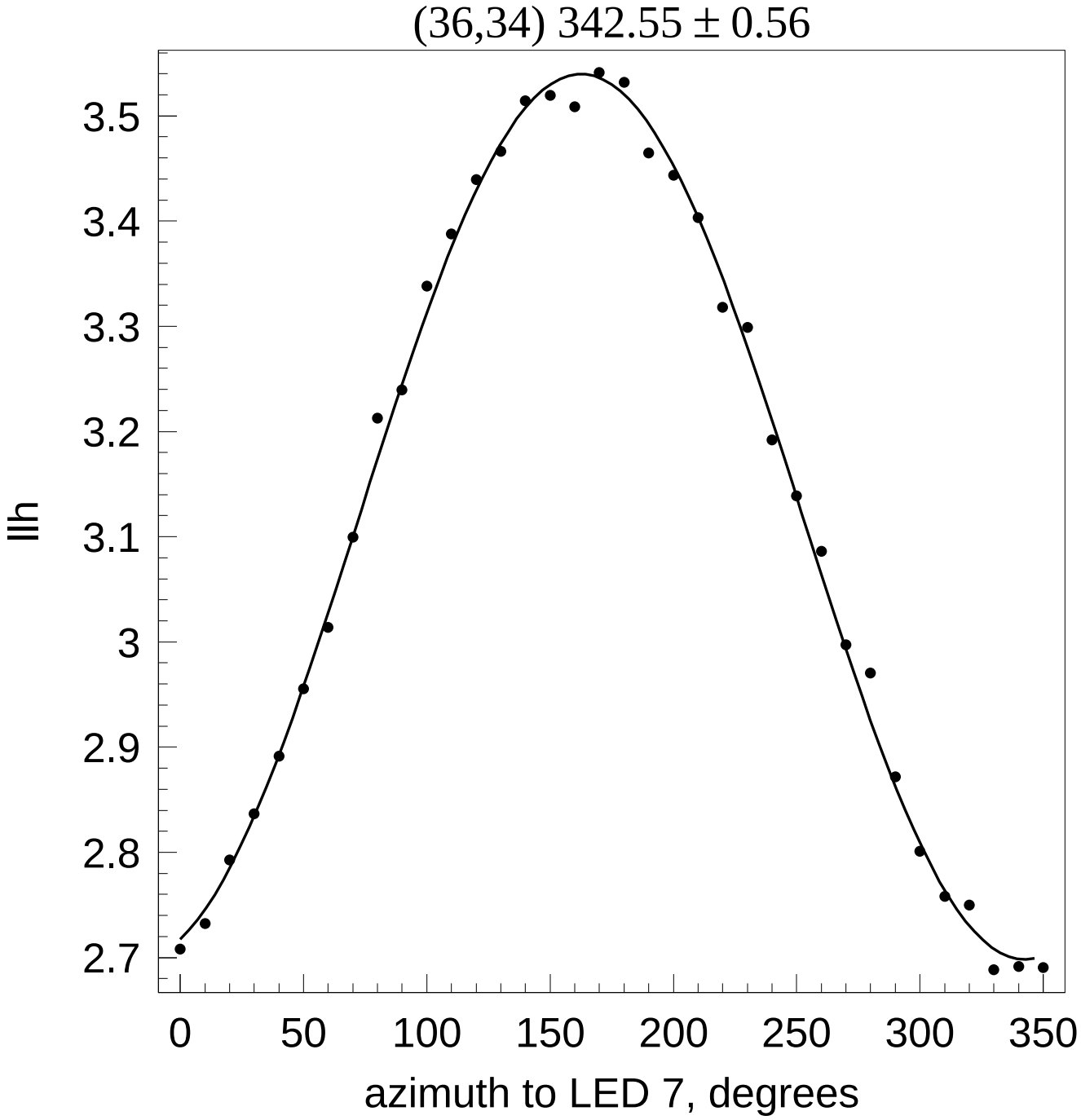

(36,23) 132.43 ± 1.20
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

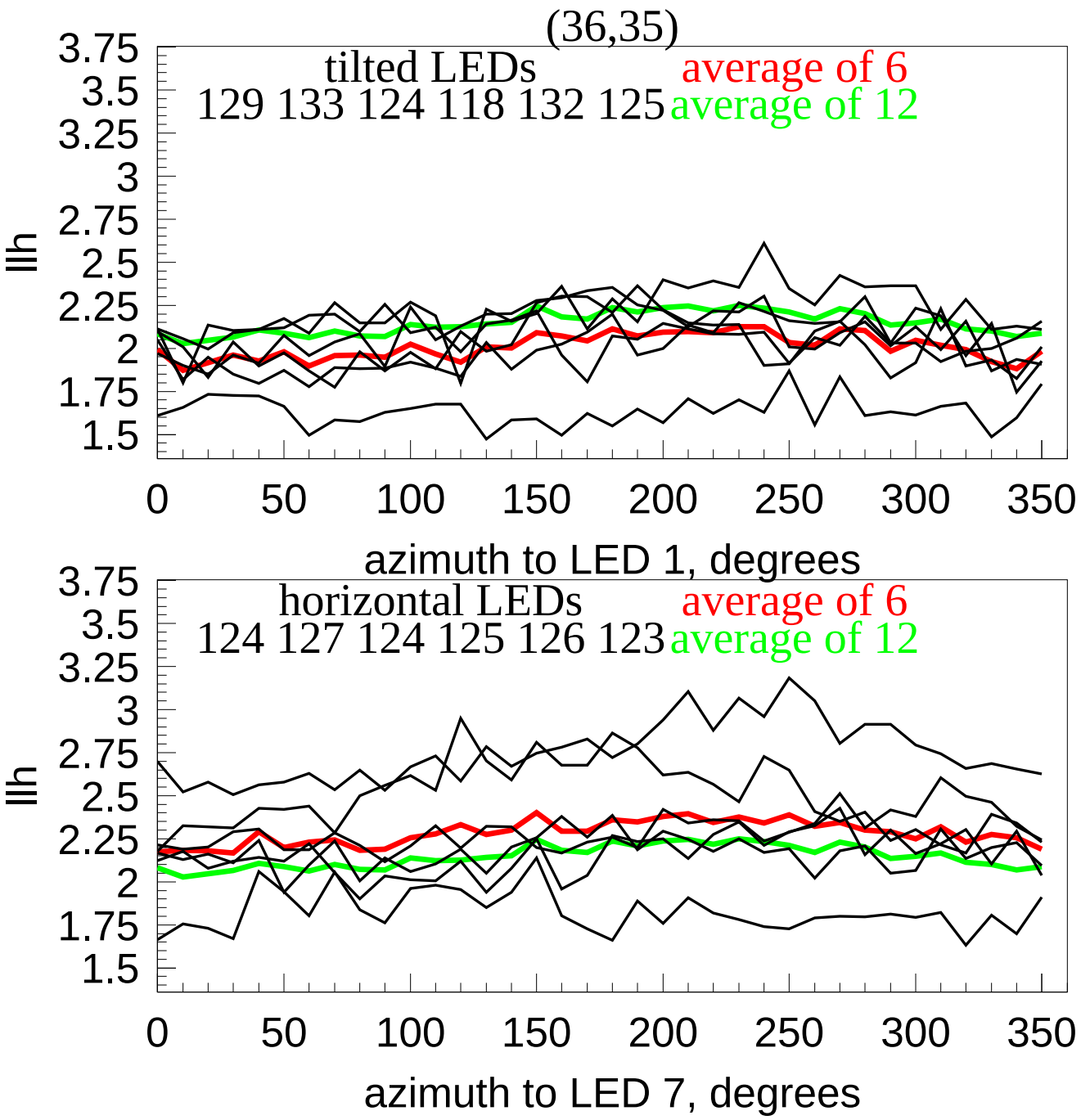

(36,23) 131.75 ± 0.91
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

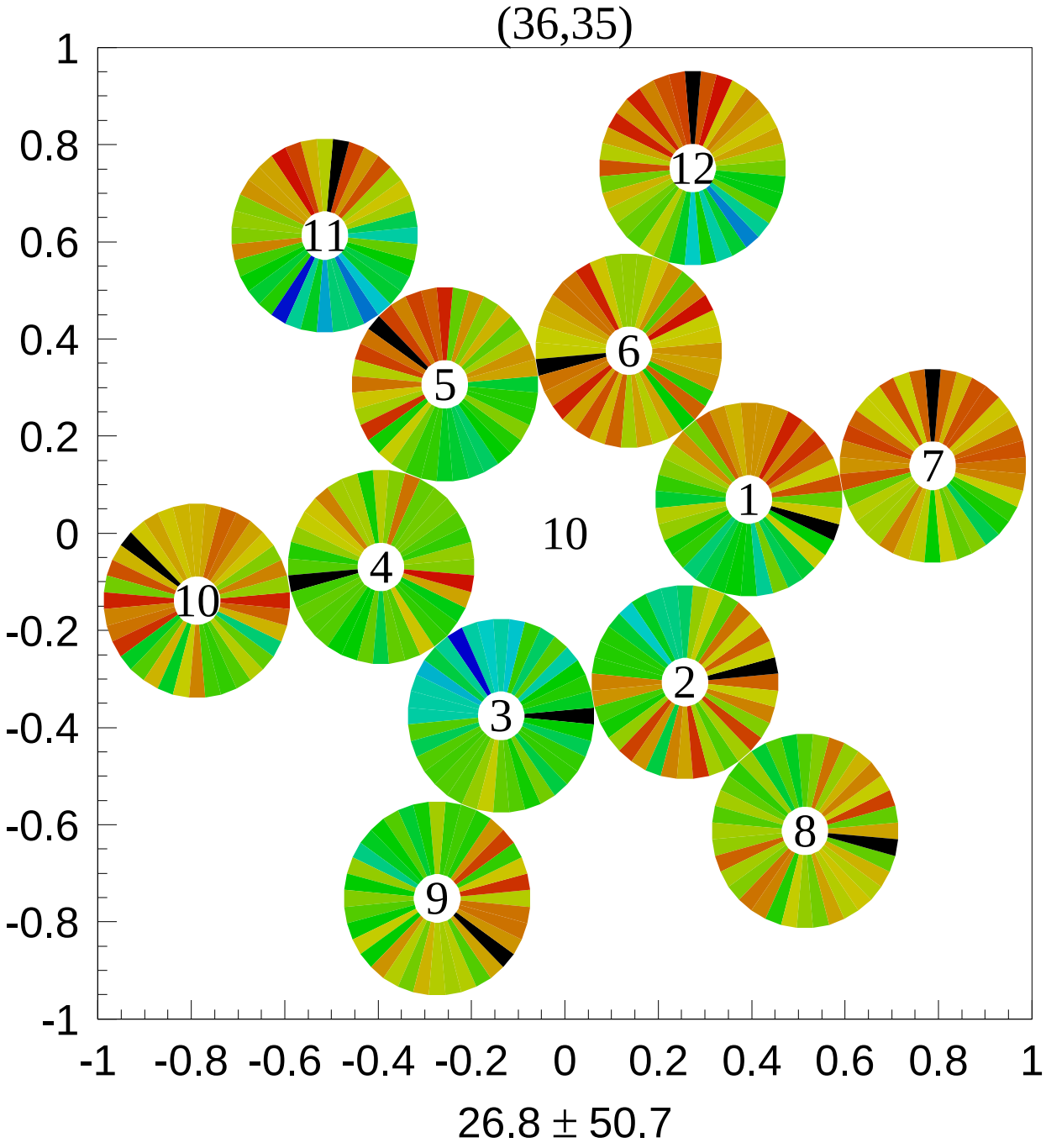

(36,34)
tilted LEDs
124 124 122 85 129 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 123 121 123 124 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

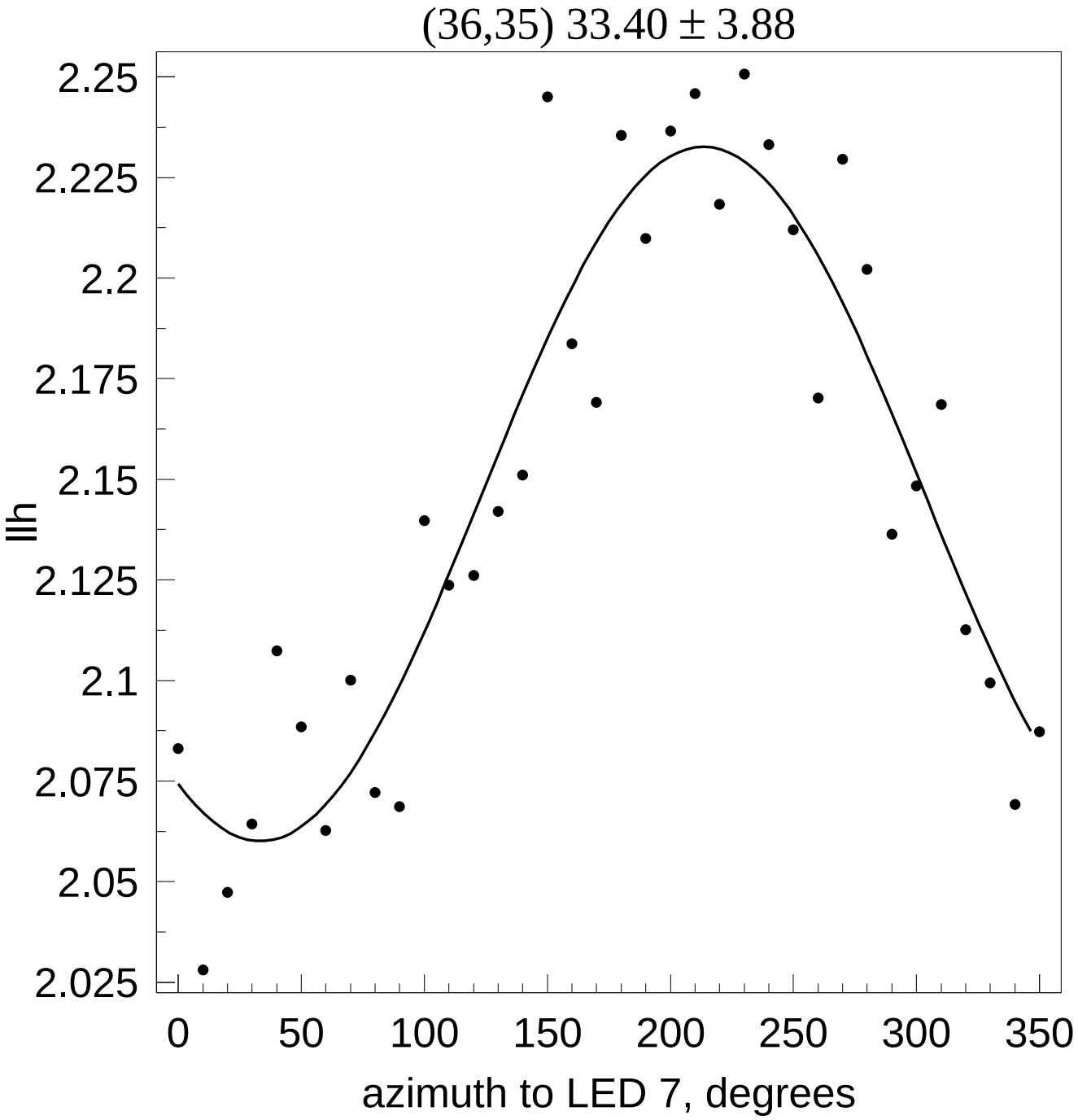

(36,34)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
342.5 ± 13.4

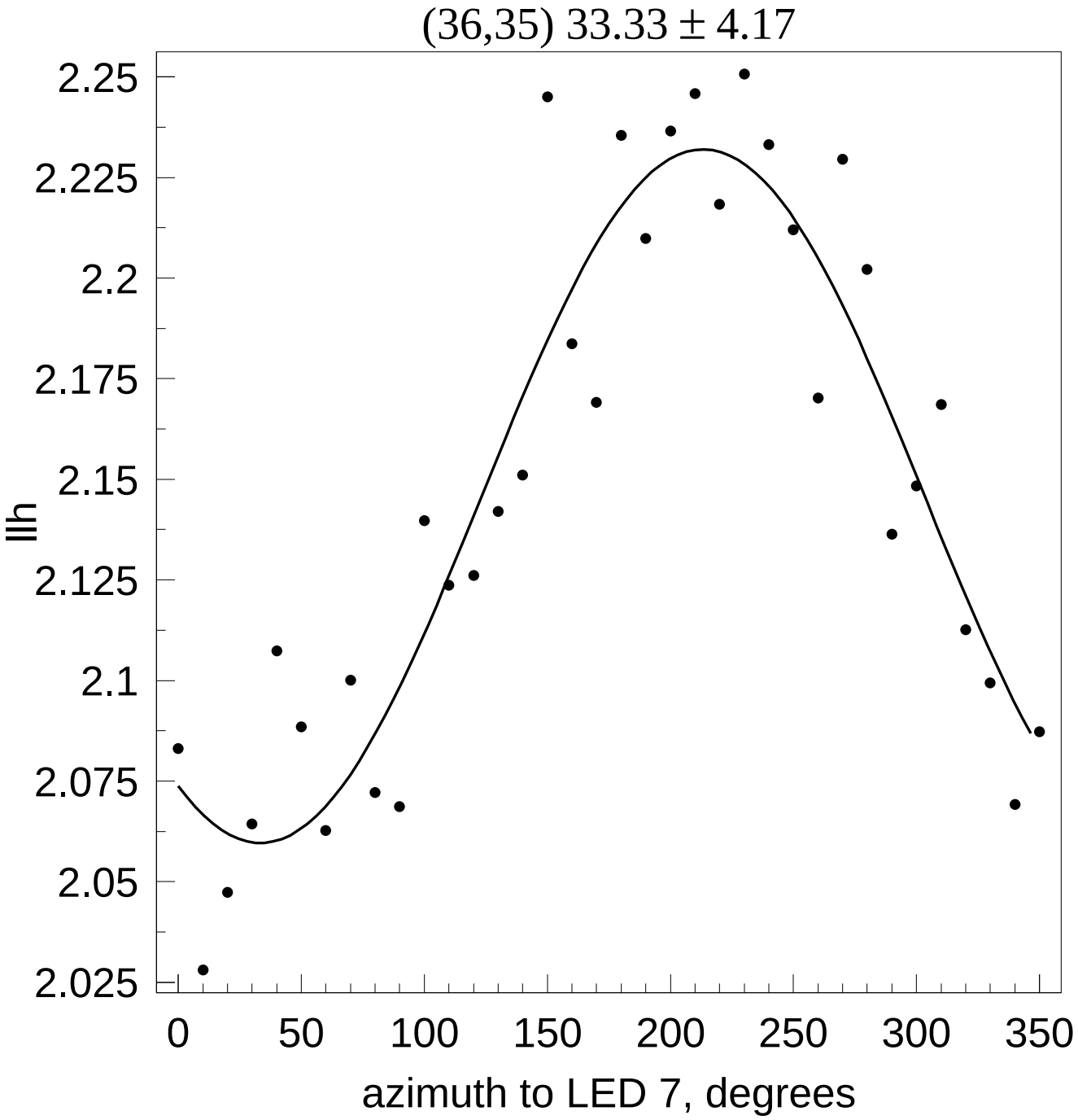

(36,34) 342.42 ± 0.57
3.5
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

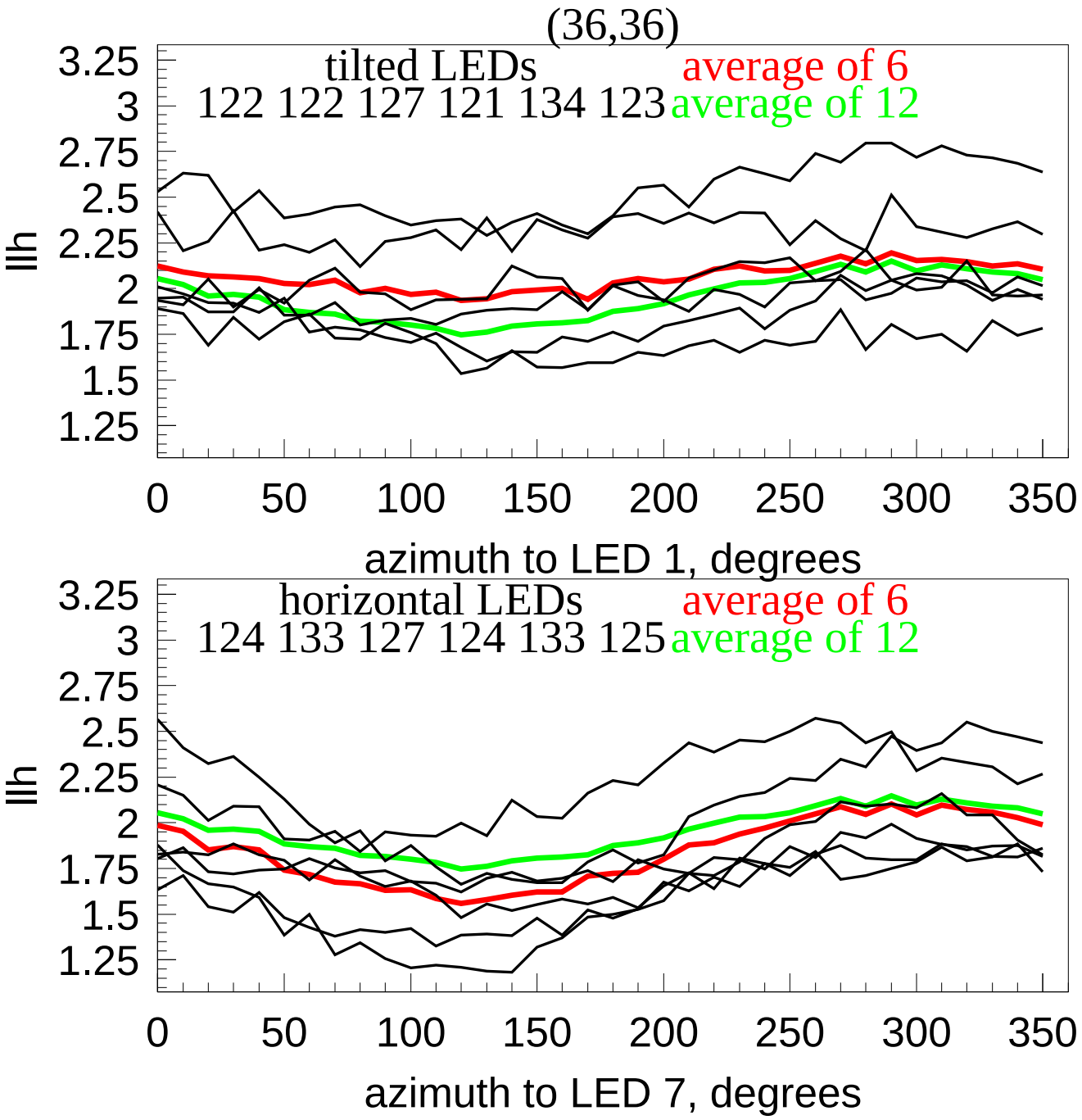

(36,34) 342.55 ± 0.56
3.5
3.4
3.3
3.2
3.1
3
2.9
2.8
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

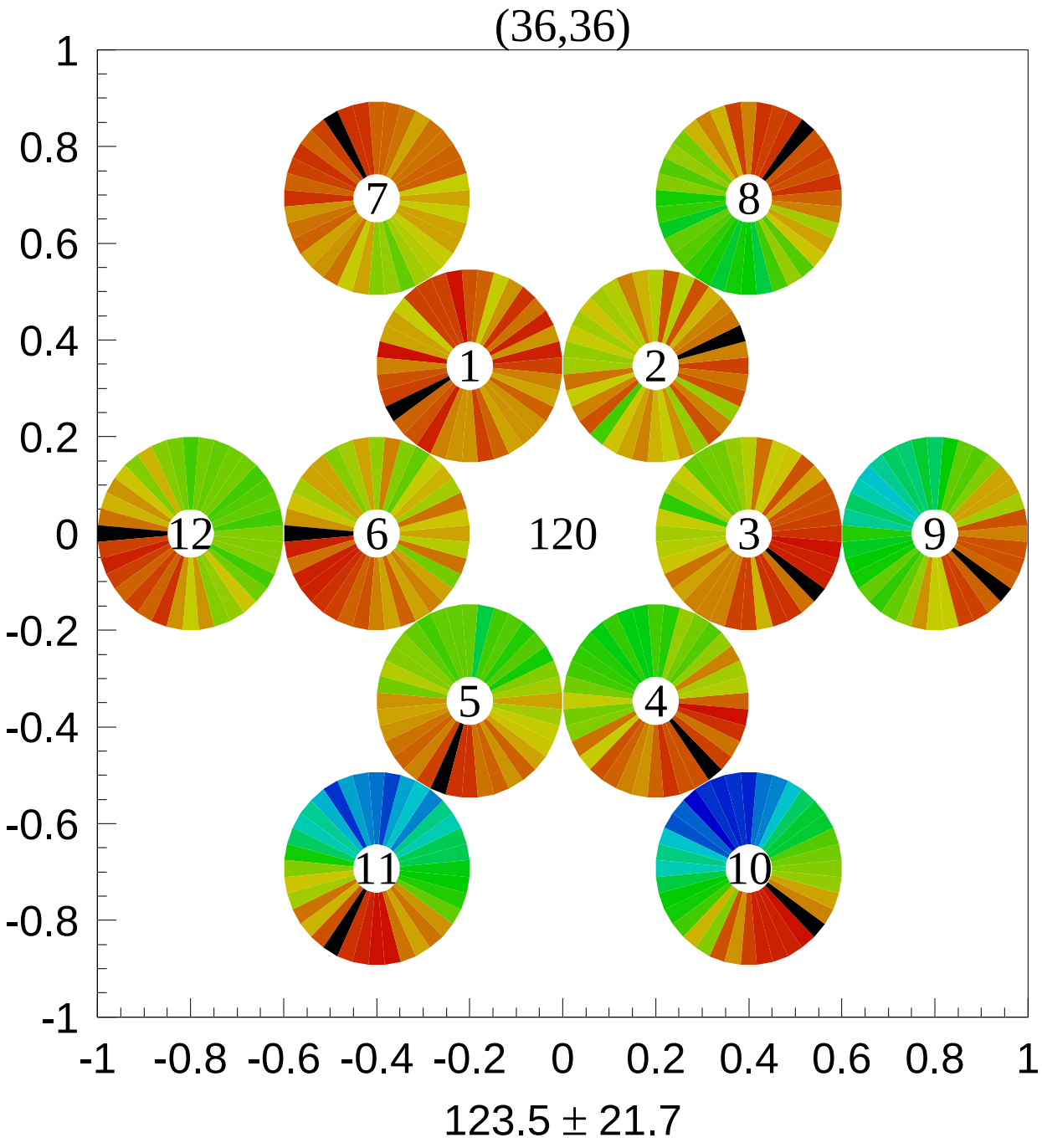

(36,35)
tilted LEDs
129 133 124 118 132 125
average of 6
average of 12
Ilh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 127 124 125 126 123
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

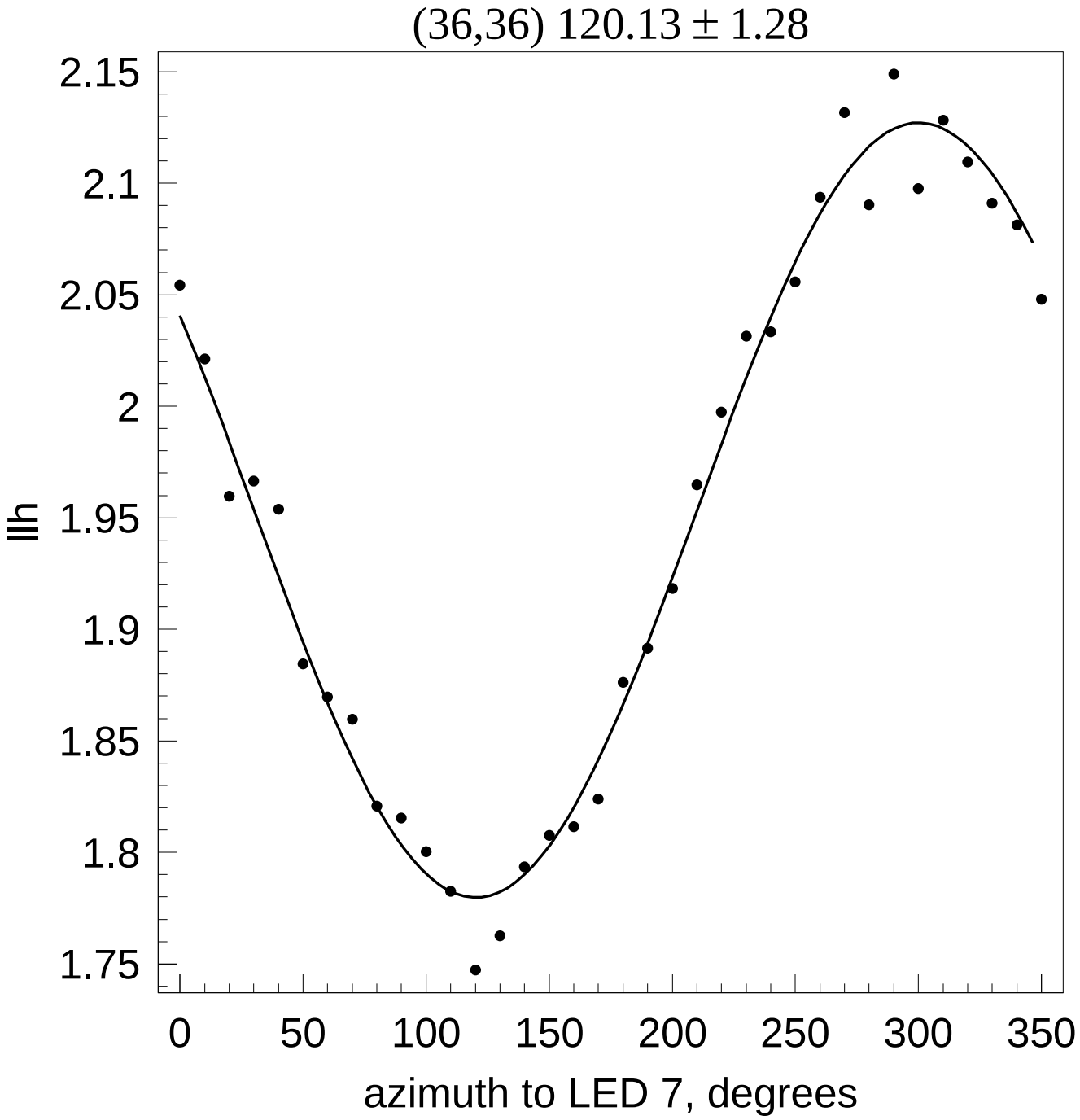

(36,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
26.8 ± 50.7
12
11
6
5
7
1
10
4
10
2
3
8
9

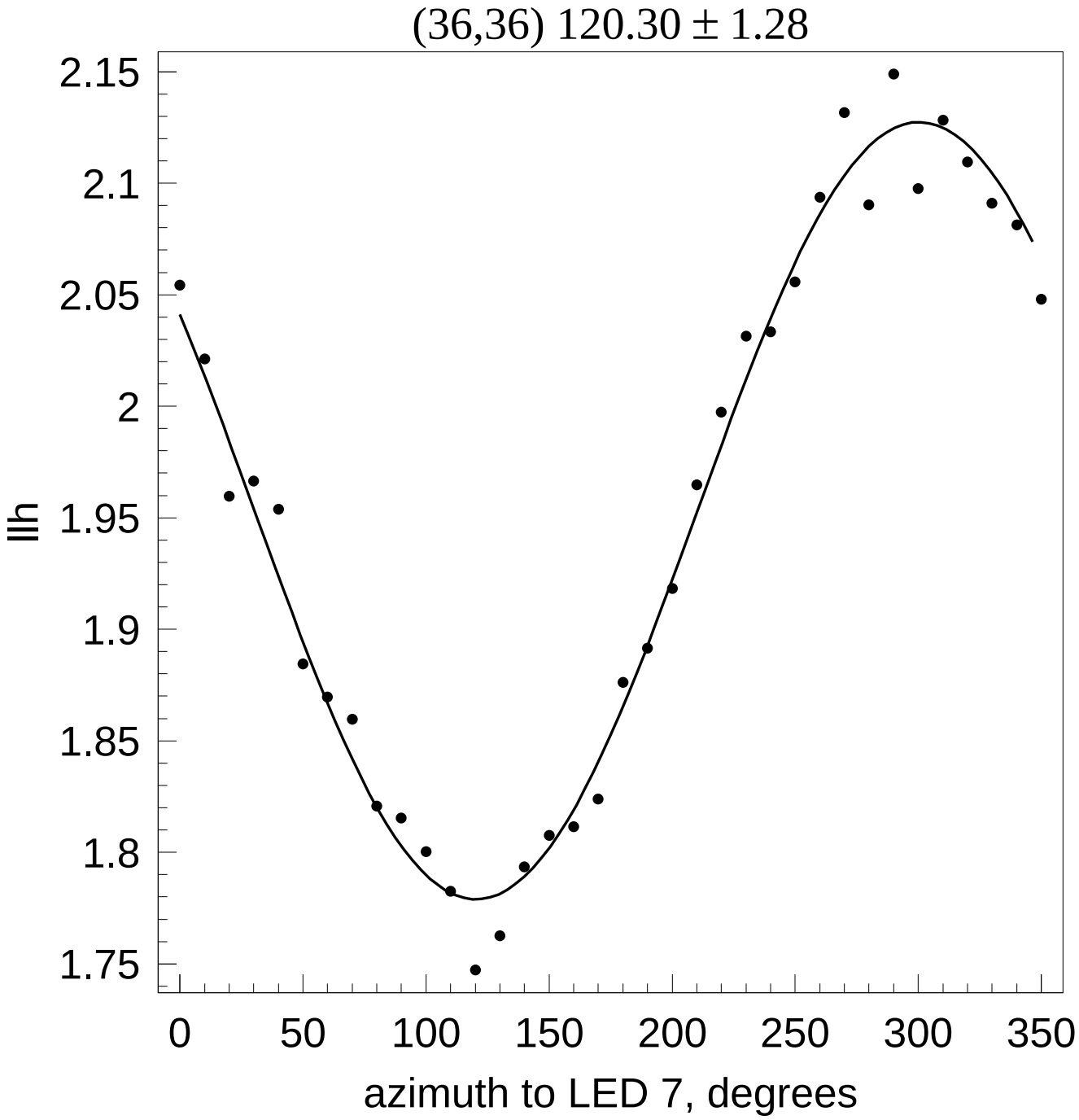

(36,35) 33.40 ± 3.88
2.25
2.225
2.2
2.175
2.15
2.125
2.1
2.075
2.05
2.025
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

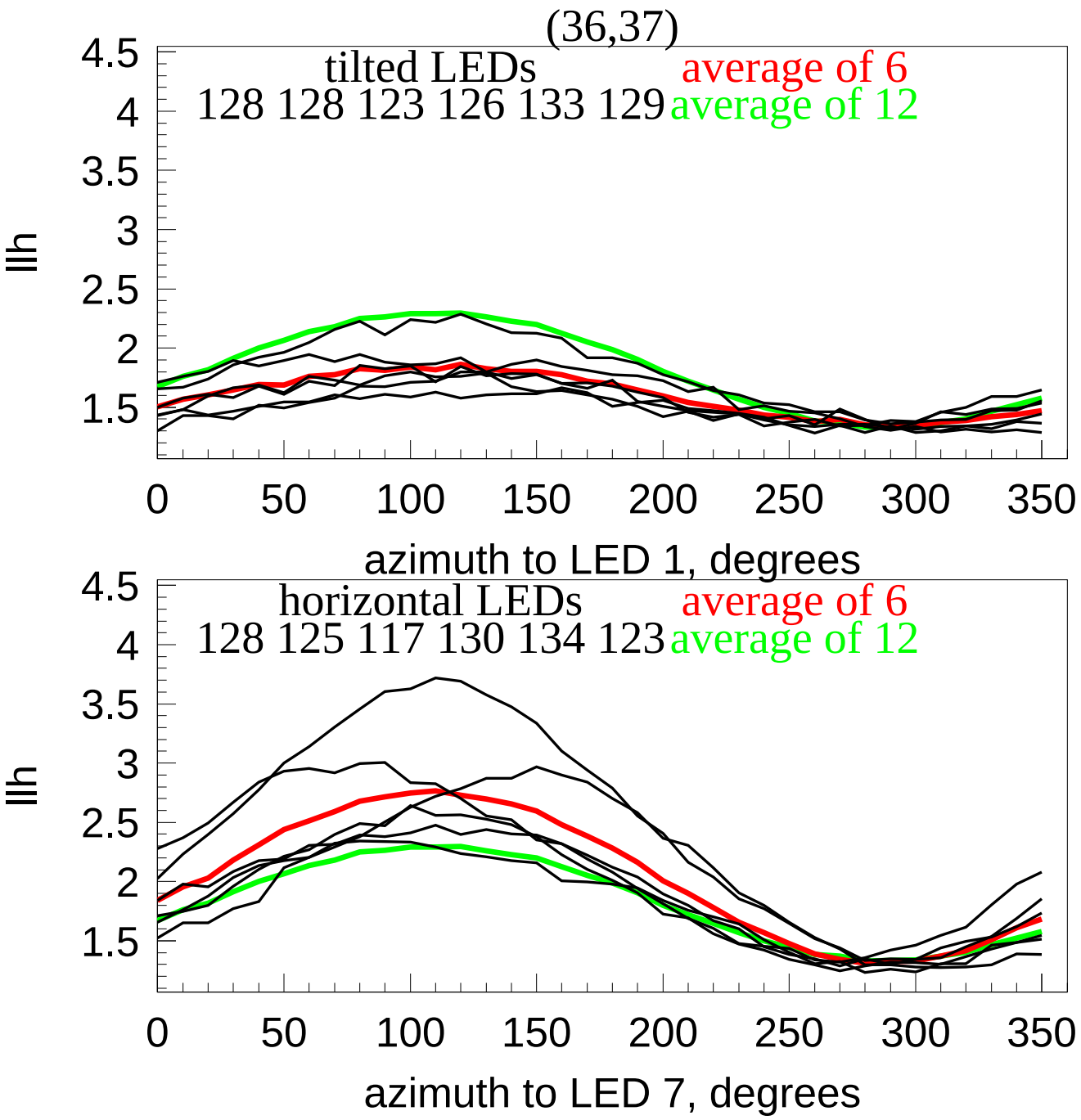

(36,35) 33.33 ± 4.17
2.25
2.225
2.2
2.175
2.15
2.125
2.1
2.075
2.05
2.025
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

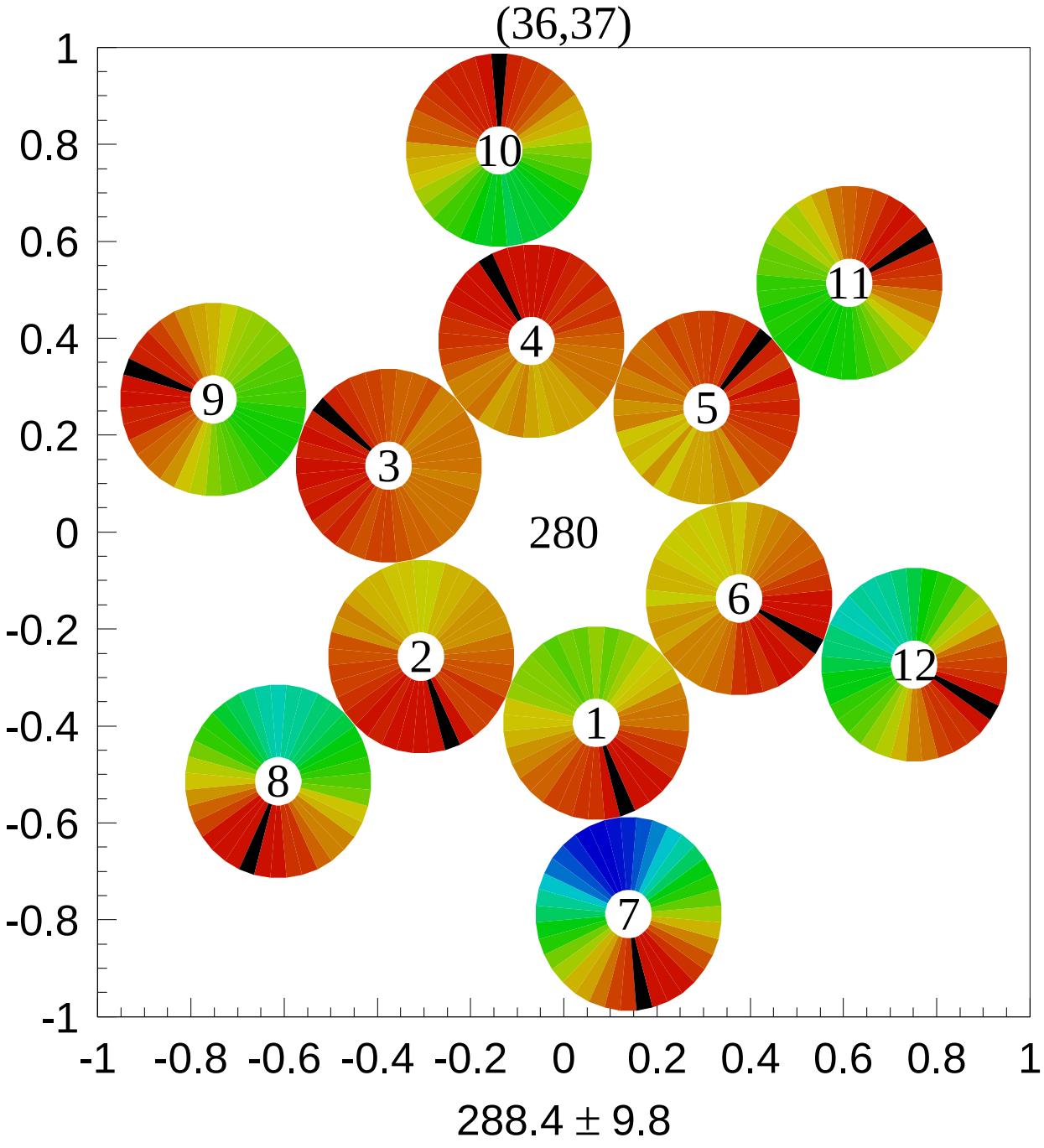

(36,36)
tilted LEDs
122 122 127 121 134 123
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 133 127 124 133 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

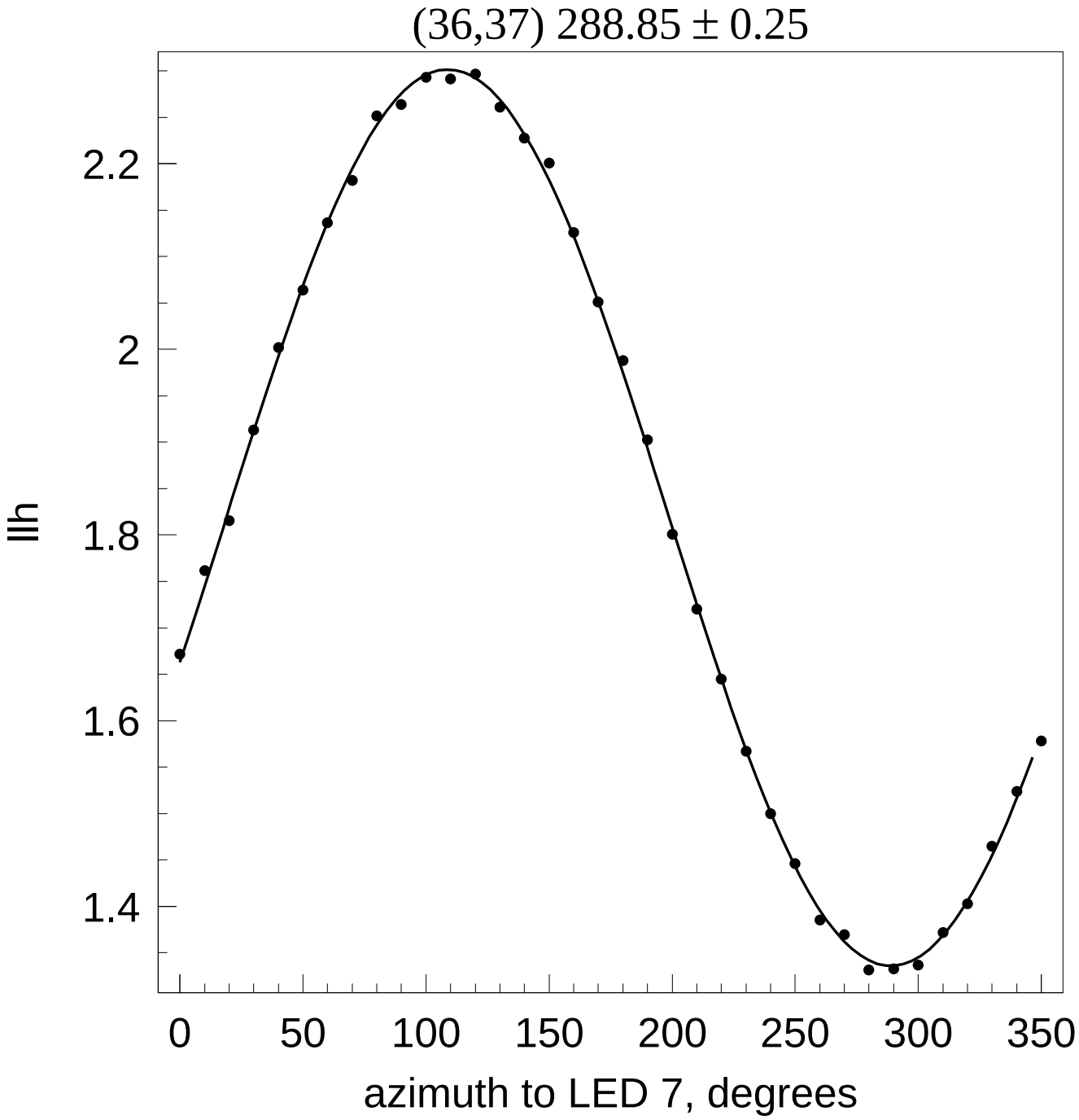

(36,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
123.5 ± 21.7

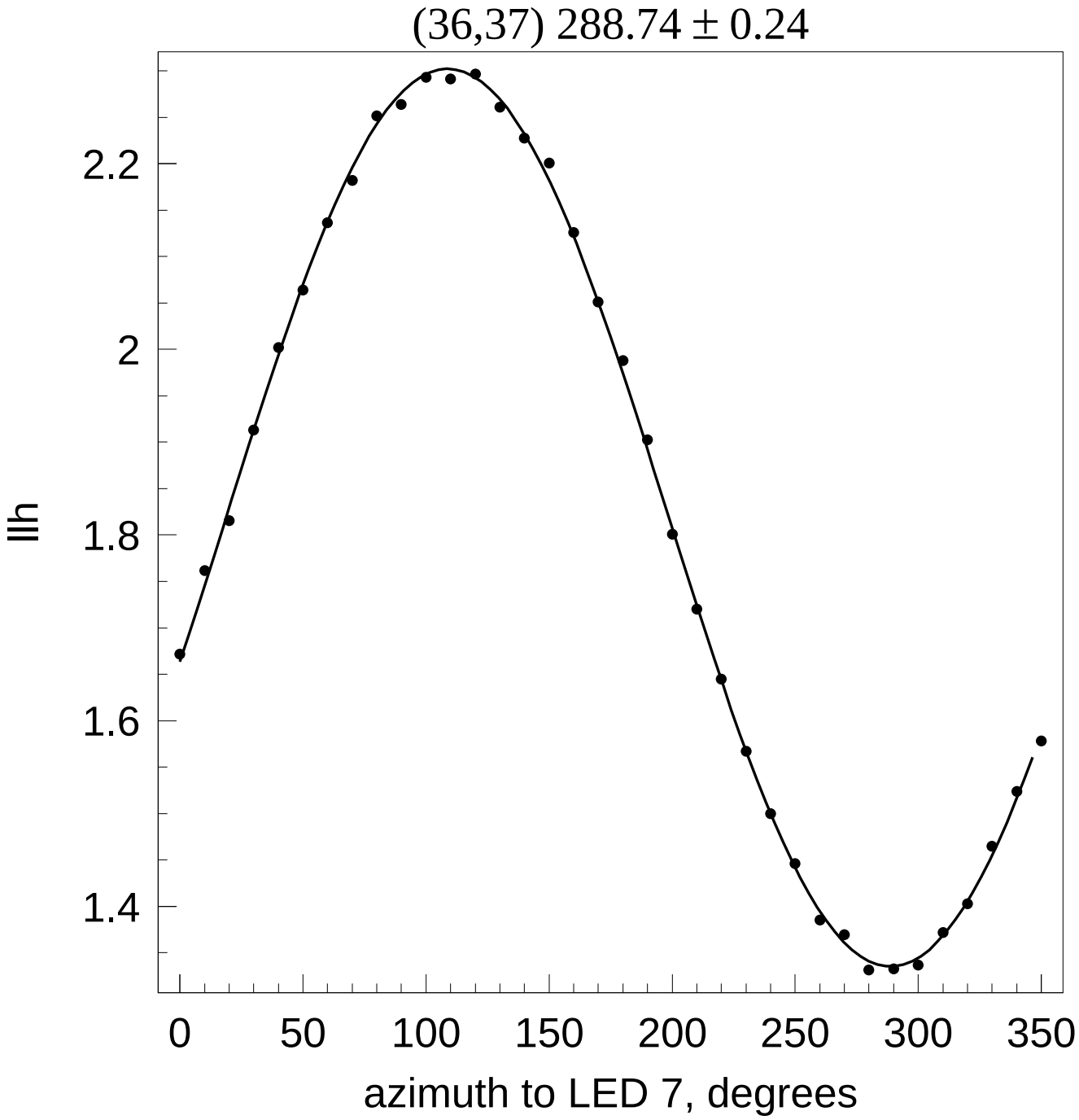

(36,36) 120.13 ± 1.28
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

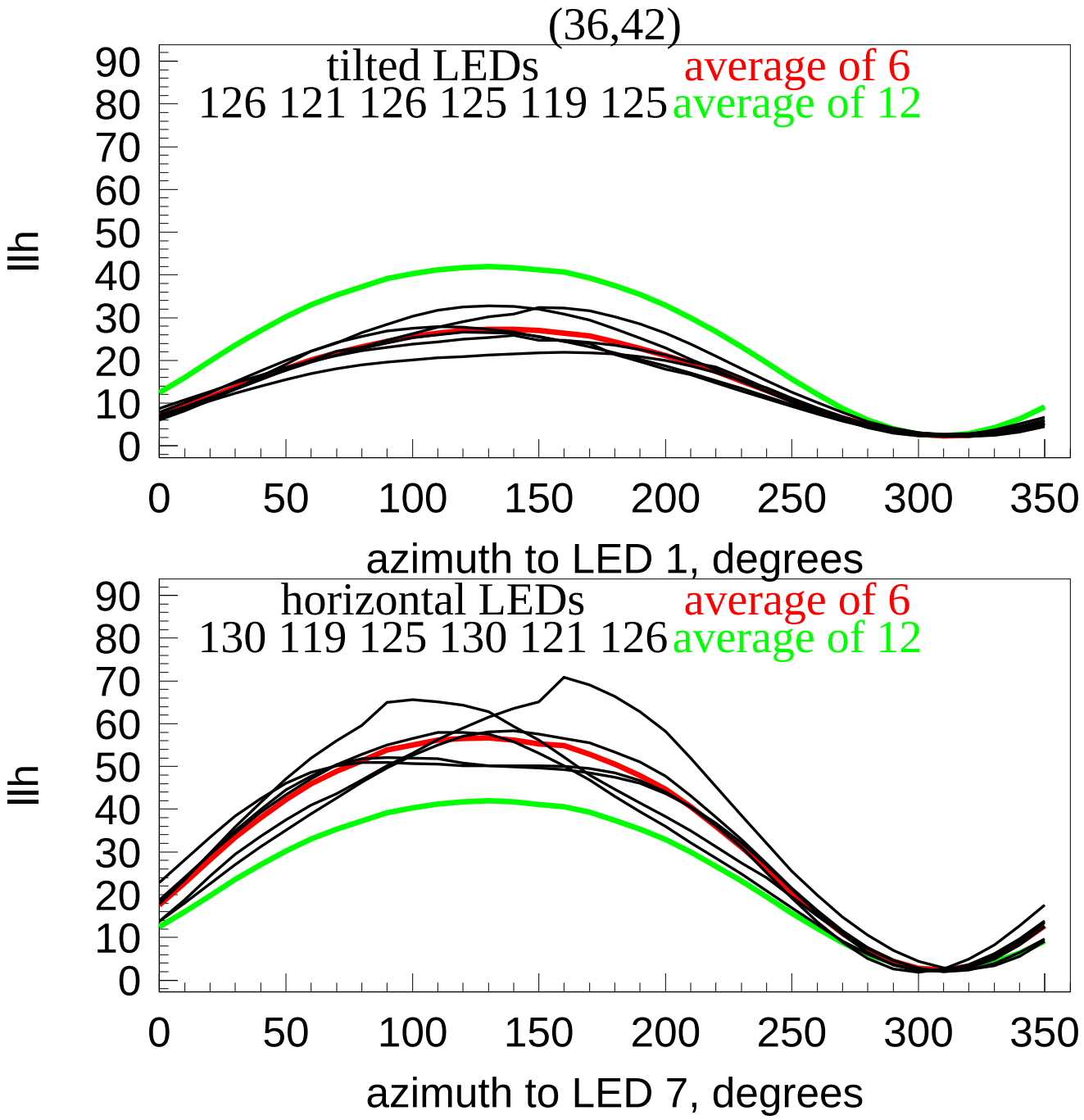

(36,36) 120.30 ± 1.28
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

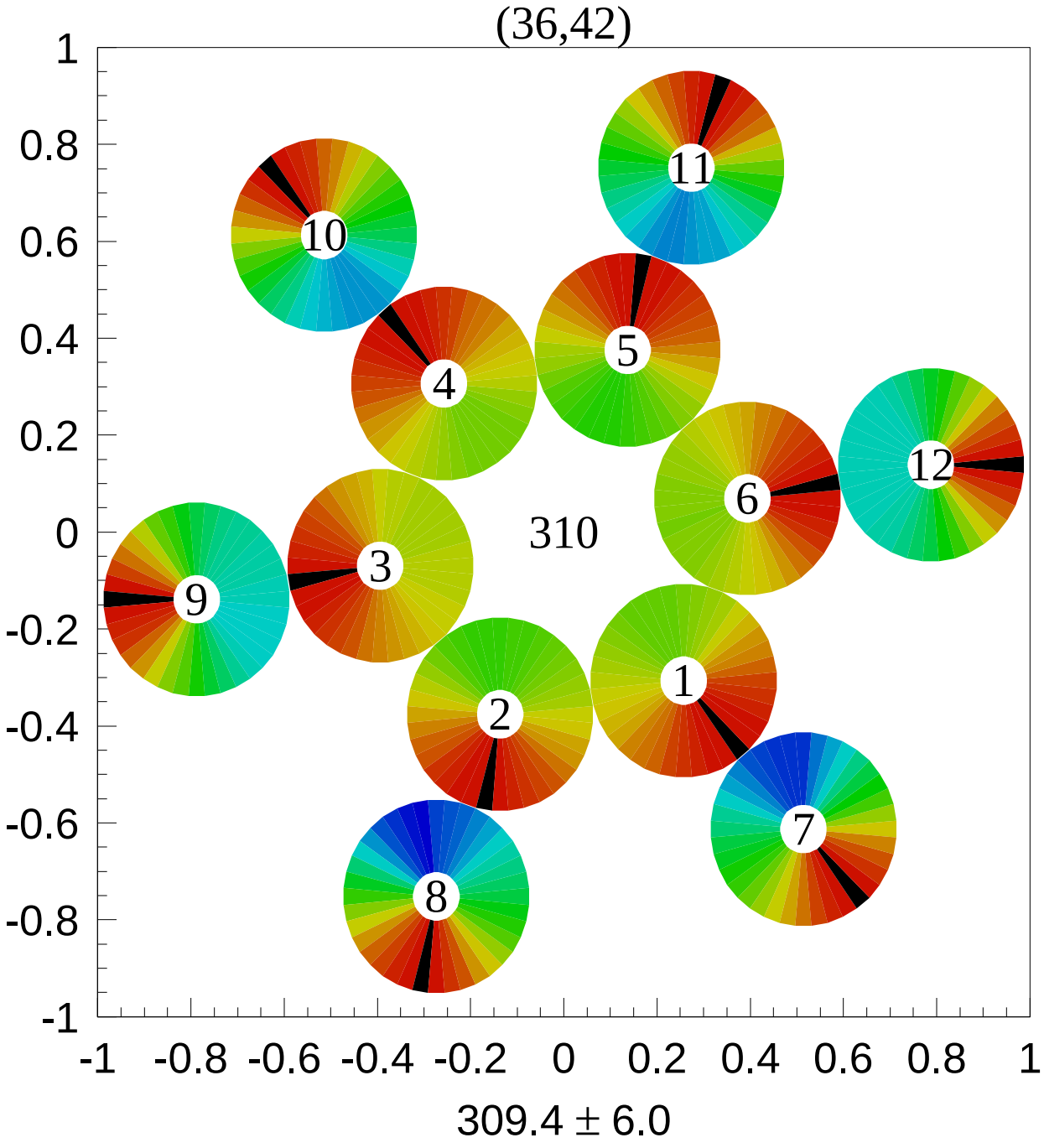

(36,37)
tilted LEDs
128 128 123 126 133 129
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 125 117 130 134 123
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

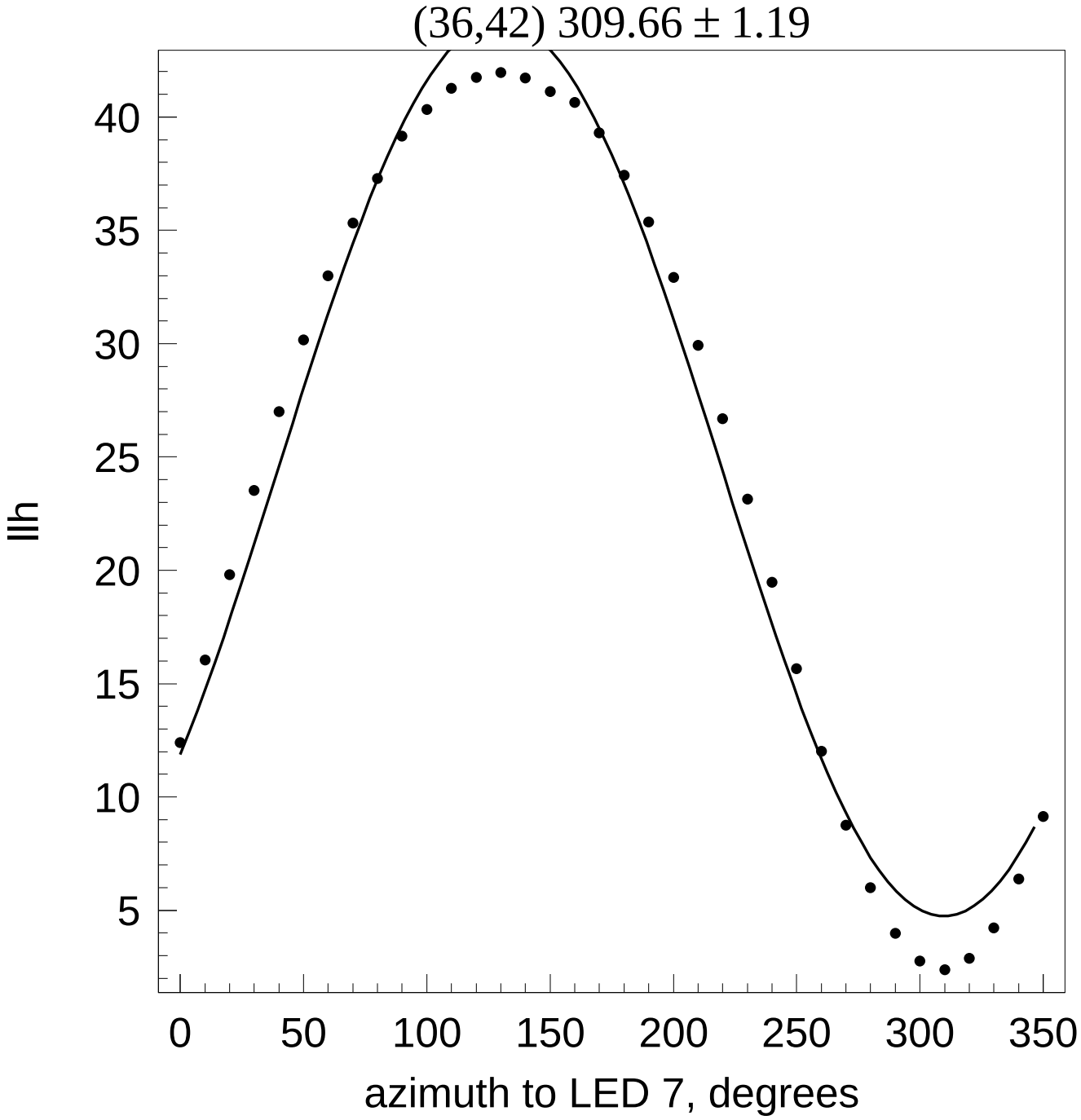

(36,37)
10
11
4
9
5
3
280
6
12
2
1
8
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
288.4 ± 9.8

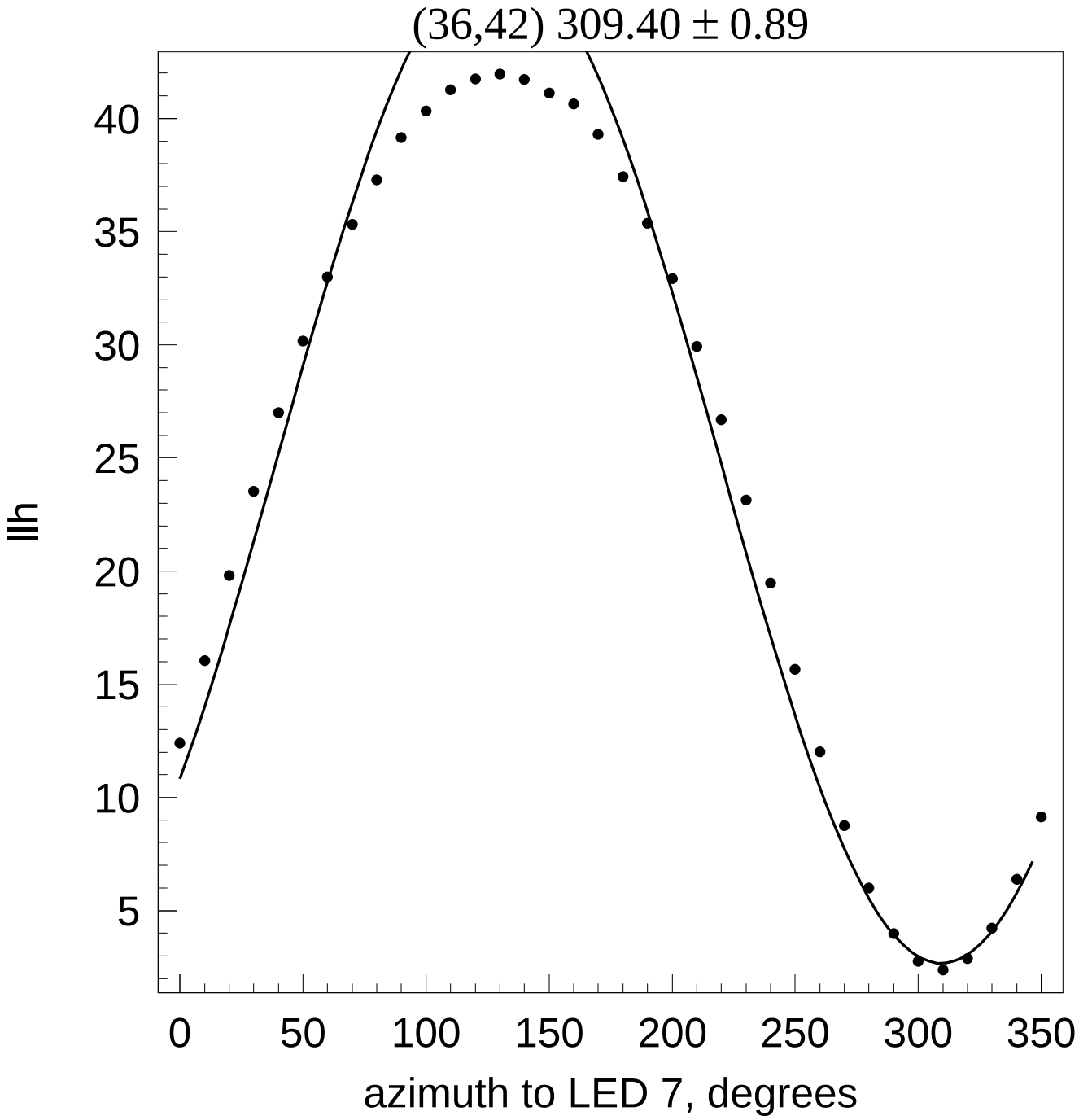

(36,37) 288.85 ± 0.25
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

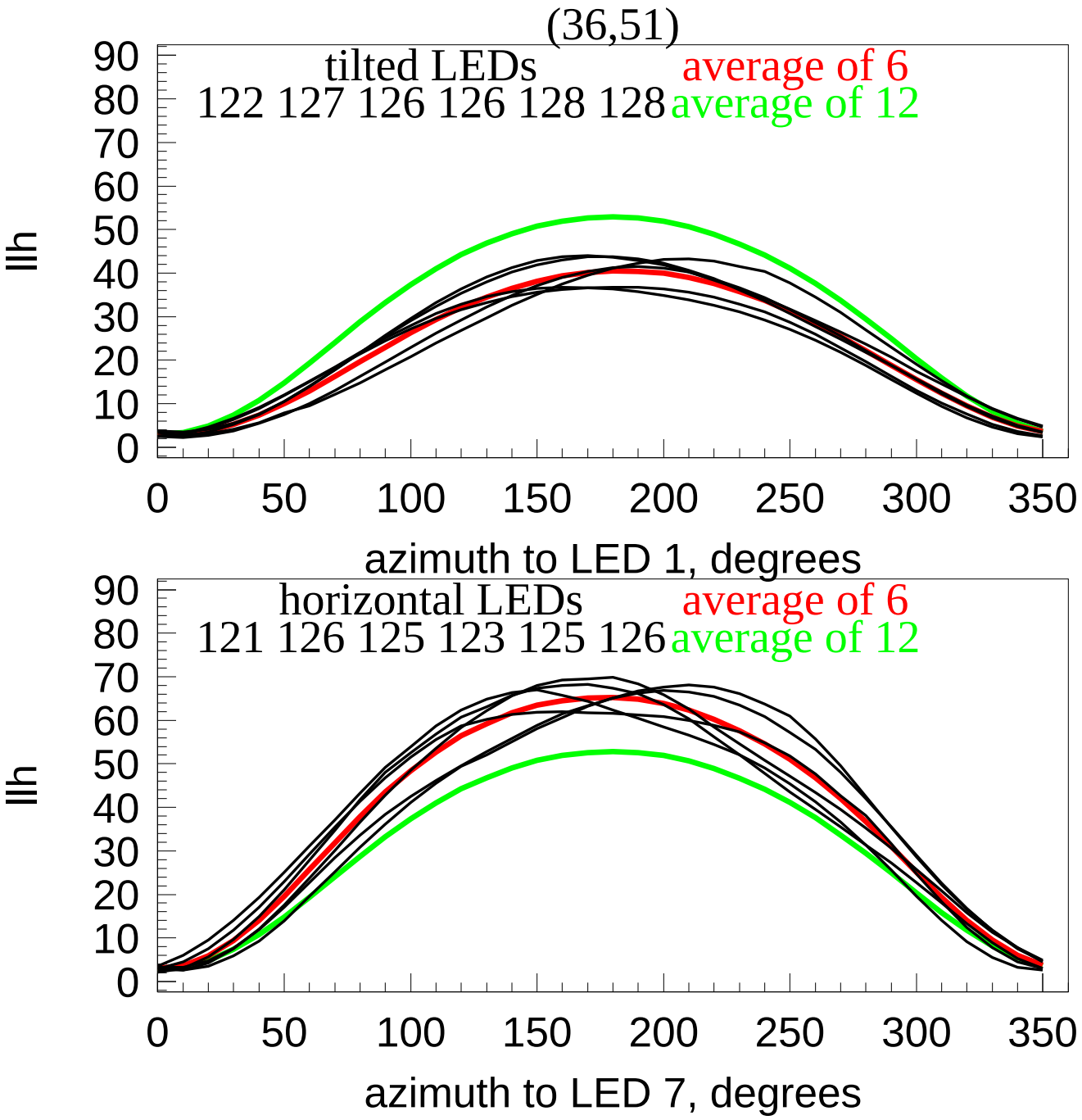

(36,37) 288.74 ± 0.24
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

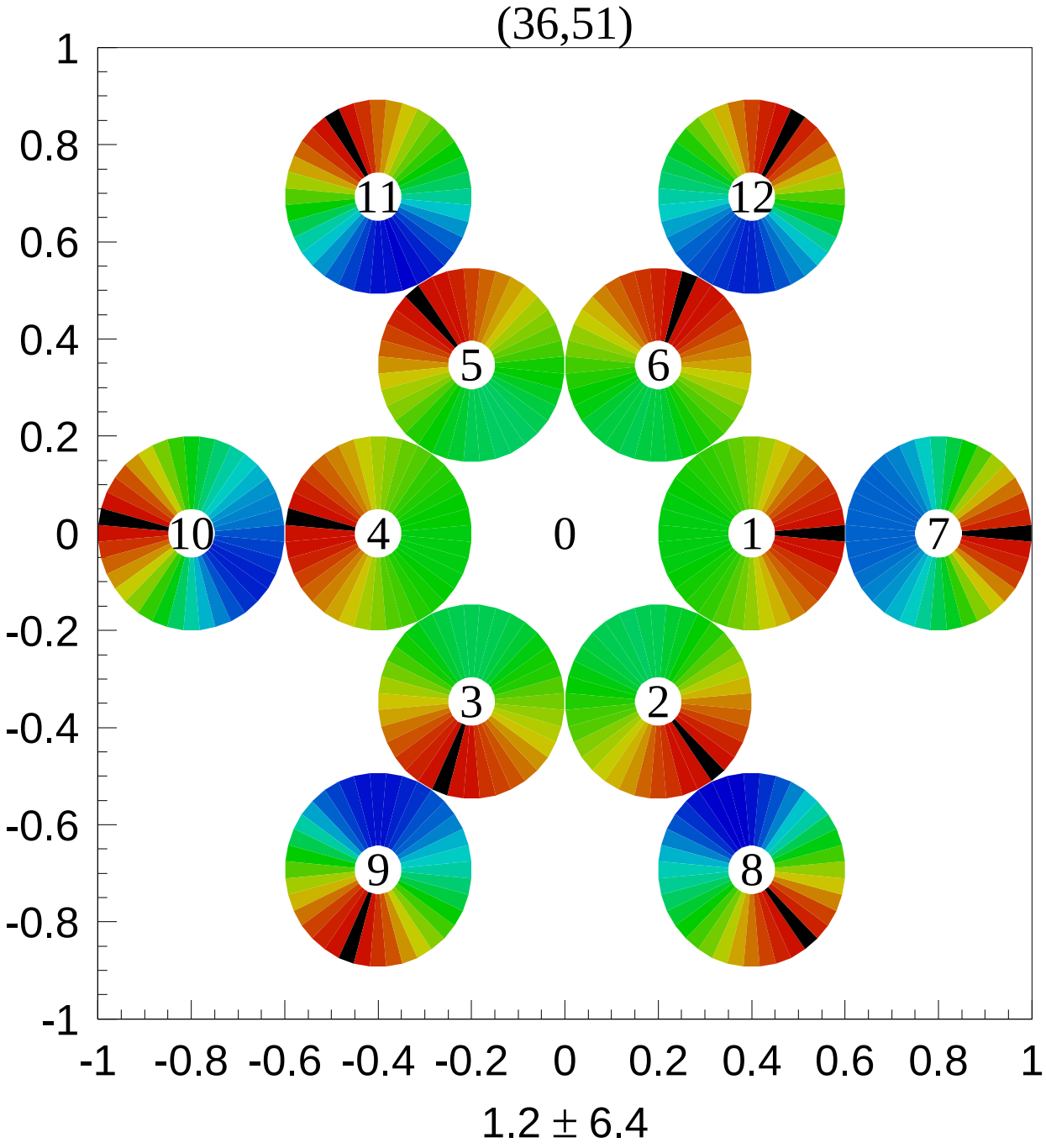

(36,42)
tilted LEDs
126 121 126 125 119 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 119 125 130 121 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

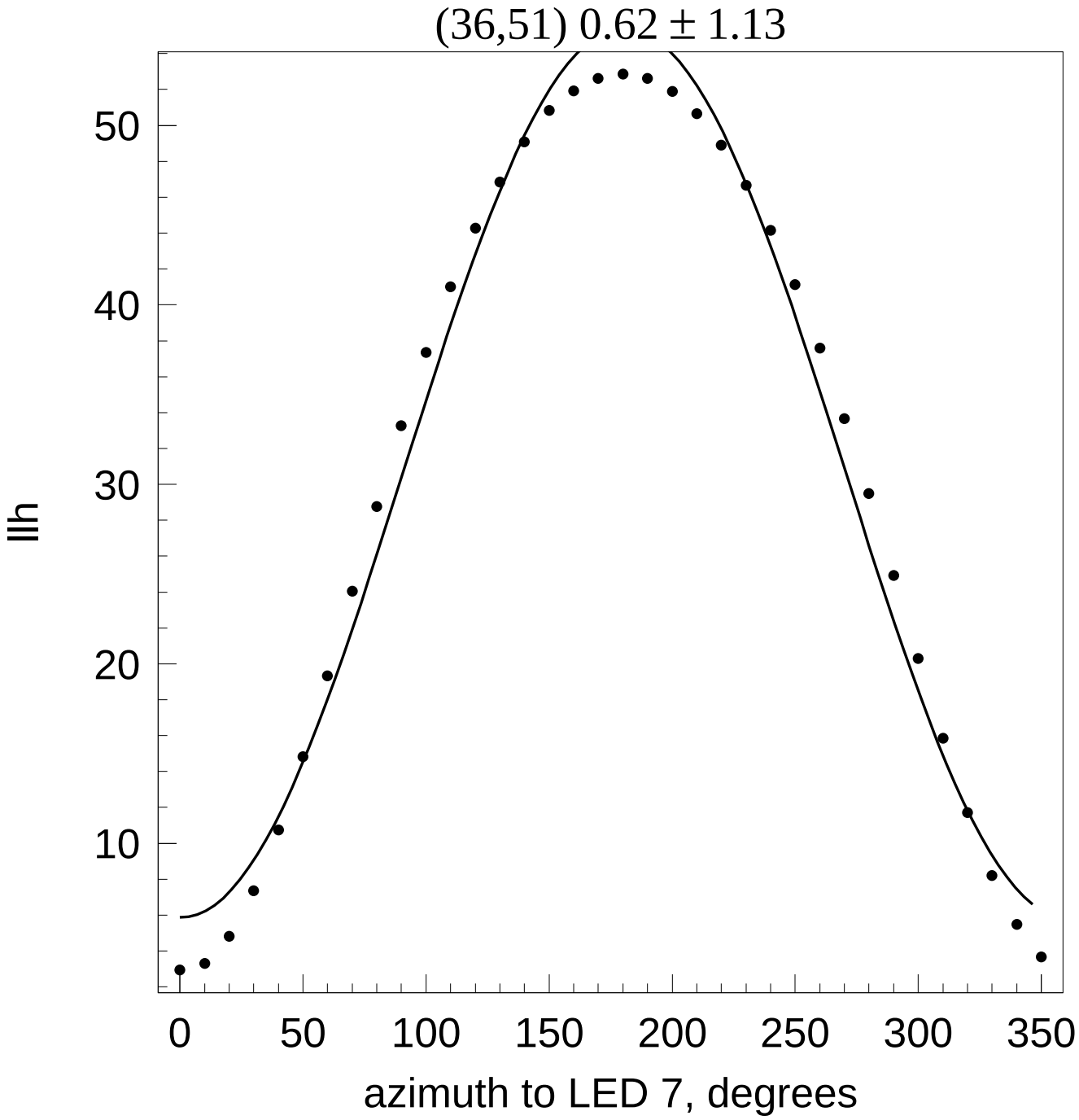

(36,42)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
9
310
2
1
7
8
309.4 ± 6.0

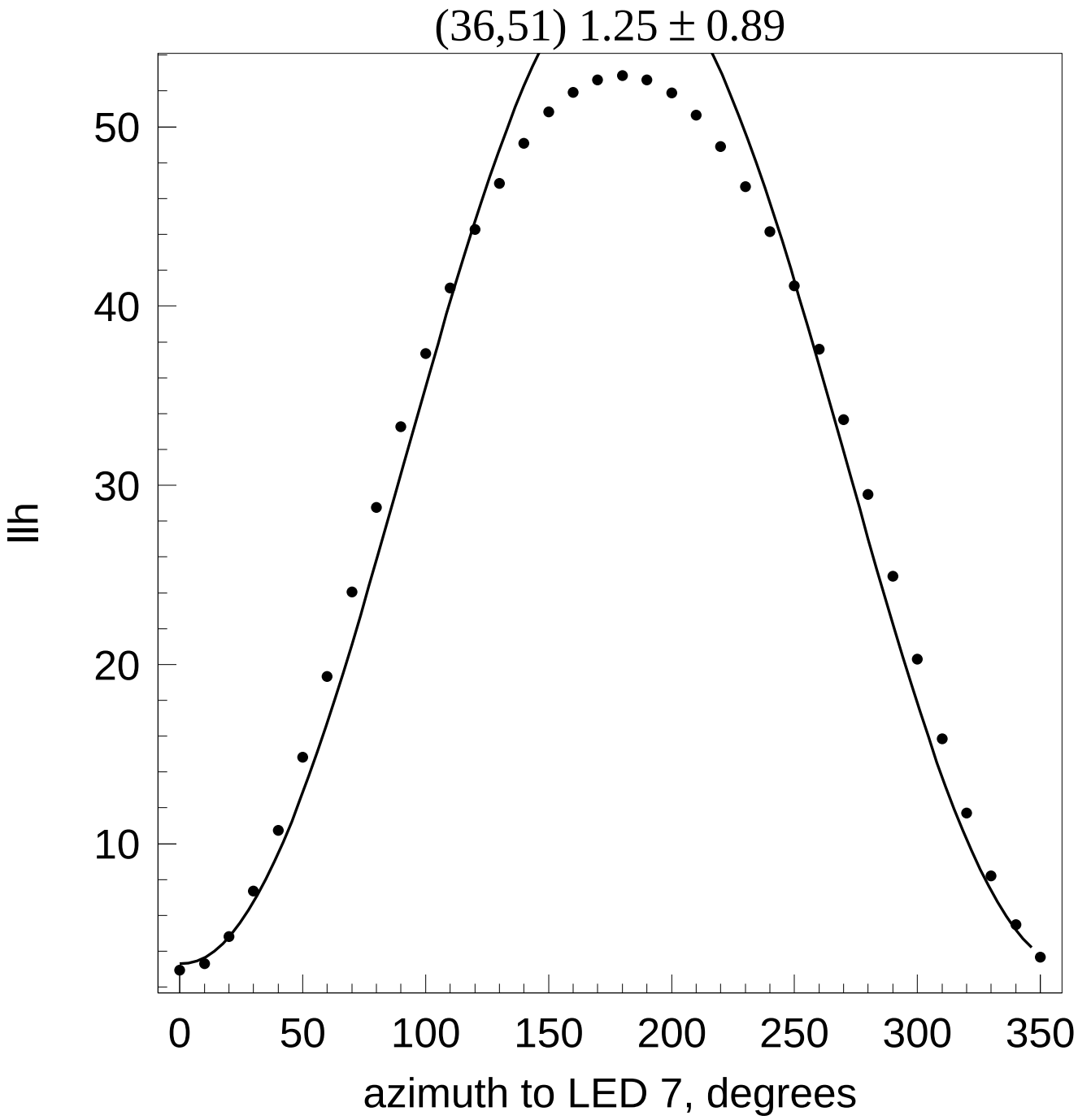

(36,42) 309.66 ± 1.19
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

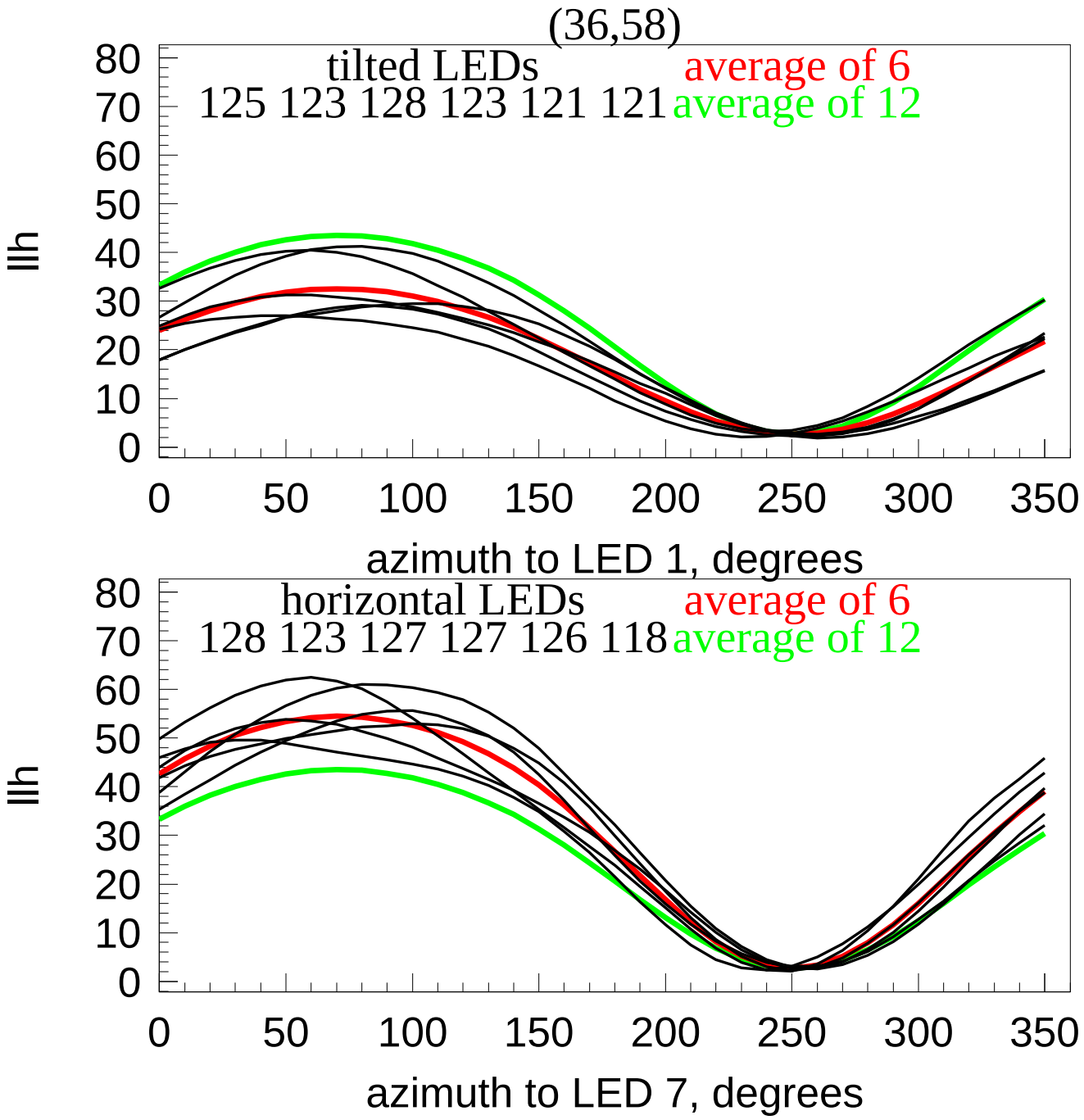

(36,42) 309.40 ± 0.89
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

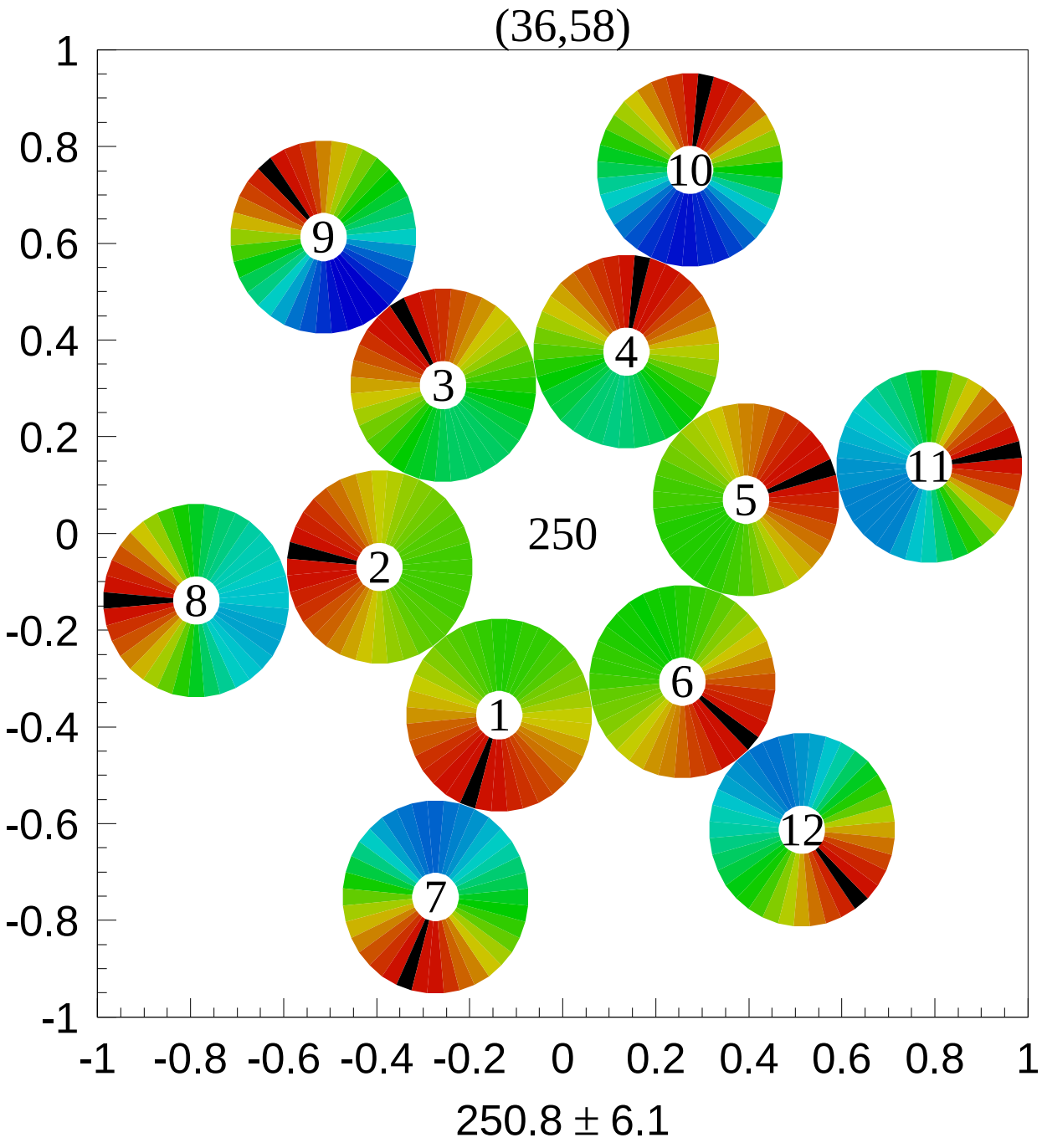

(36,51)
tilted LEDs
122 127 126 126 128 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
121 126 125 123 125 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

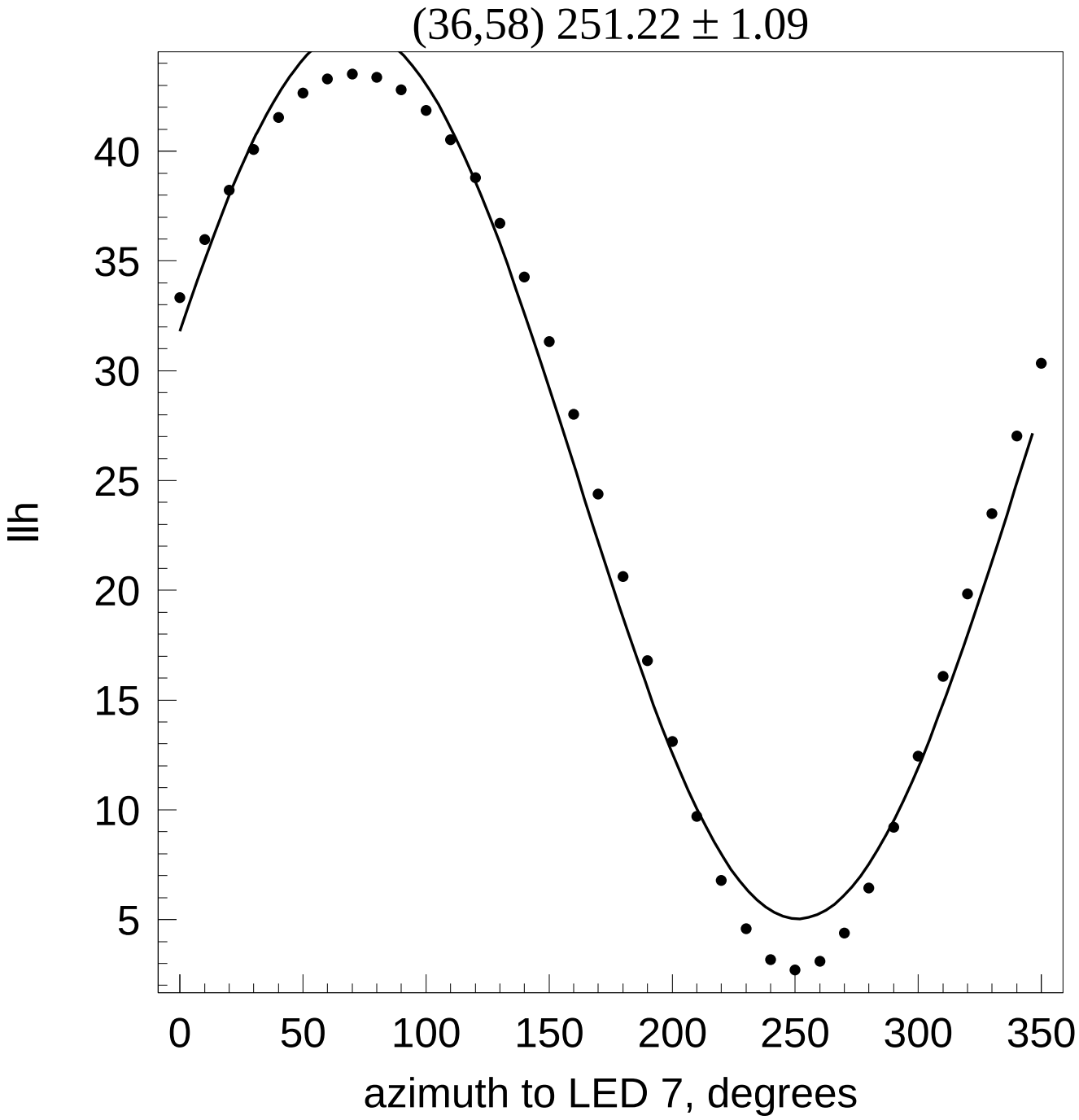

(36,51)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
1.2 ± 6.4
11
12
5
6
10
4
0
1
7
3
2
9
8

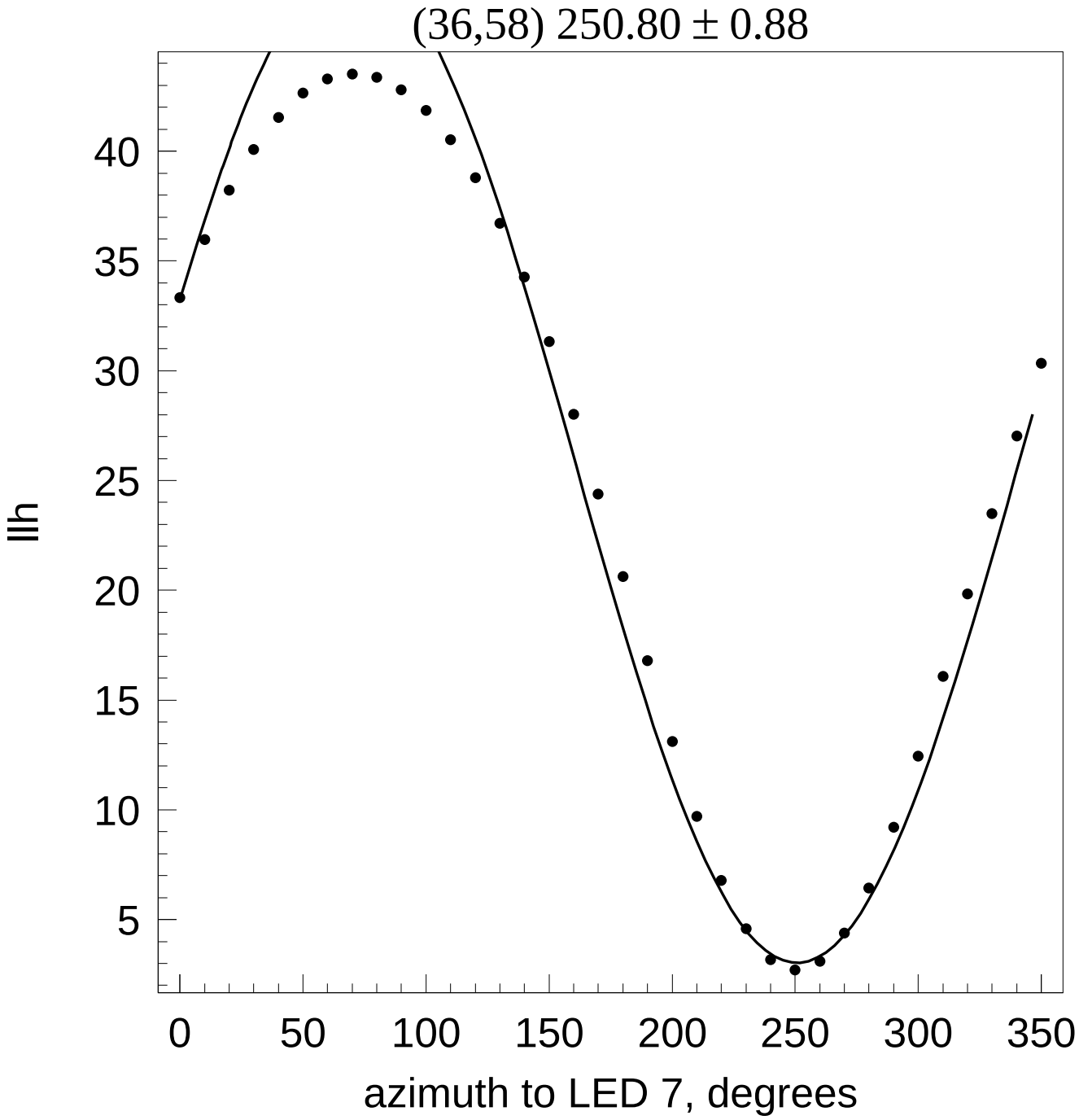

(36,51) 0.62 ± 1.13
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

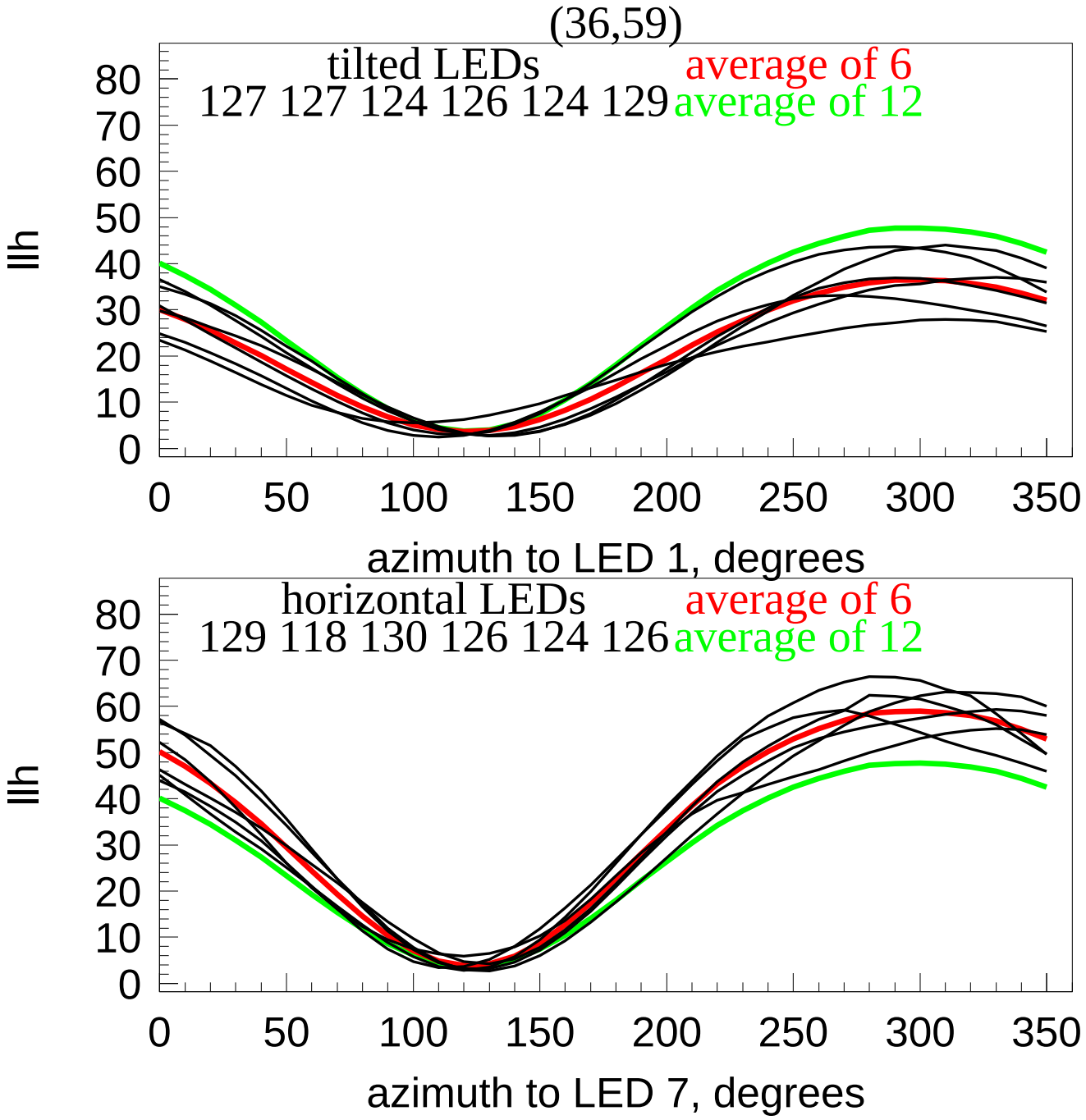

(36,51) 1.25 ± 0.89
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

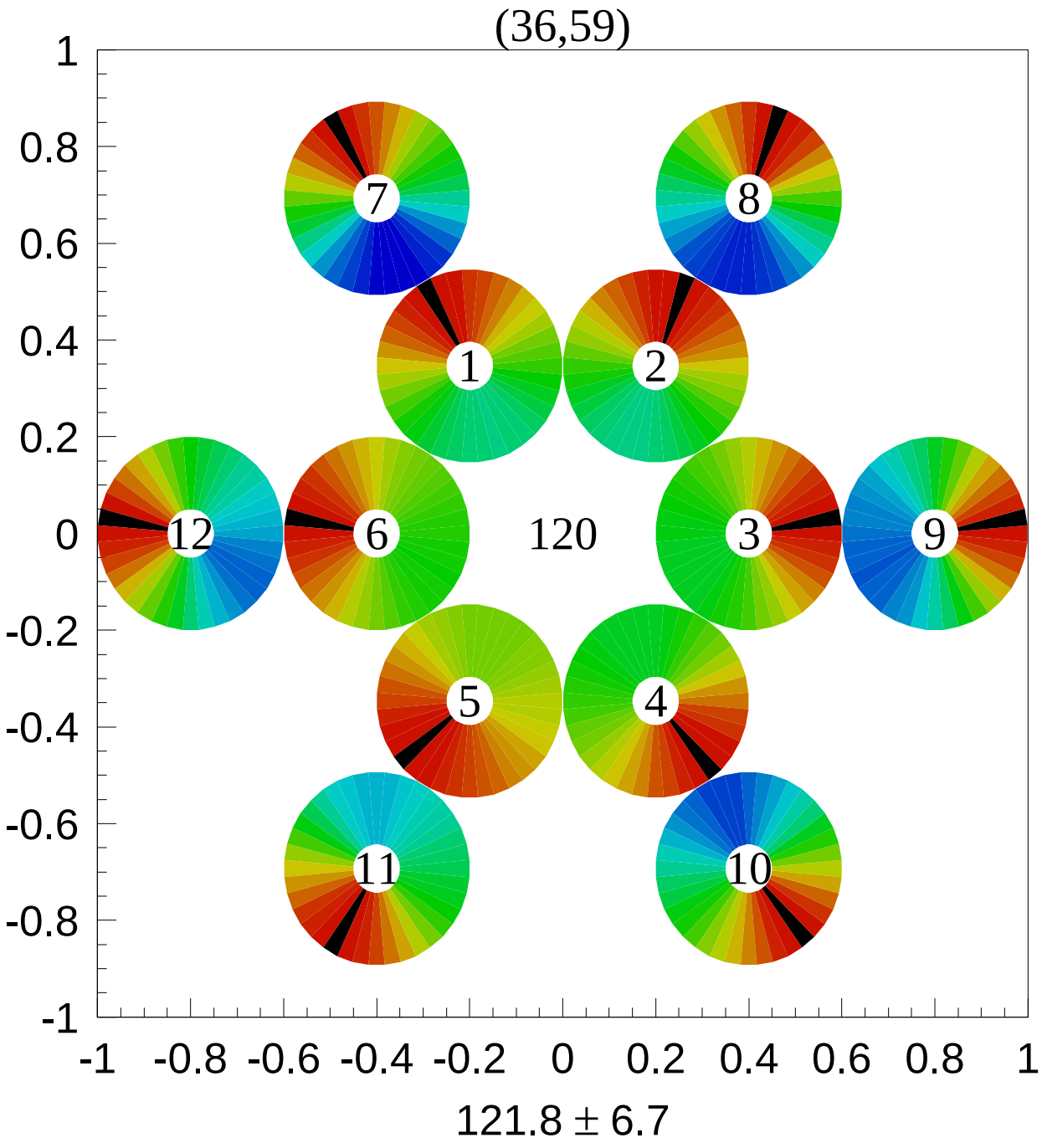

(36,58)
tilted LEDs
125 123 128 123 121 121
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 123 127 127 126 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

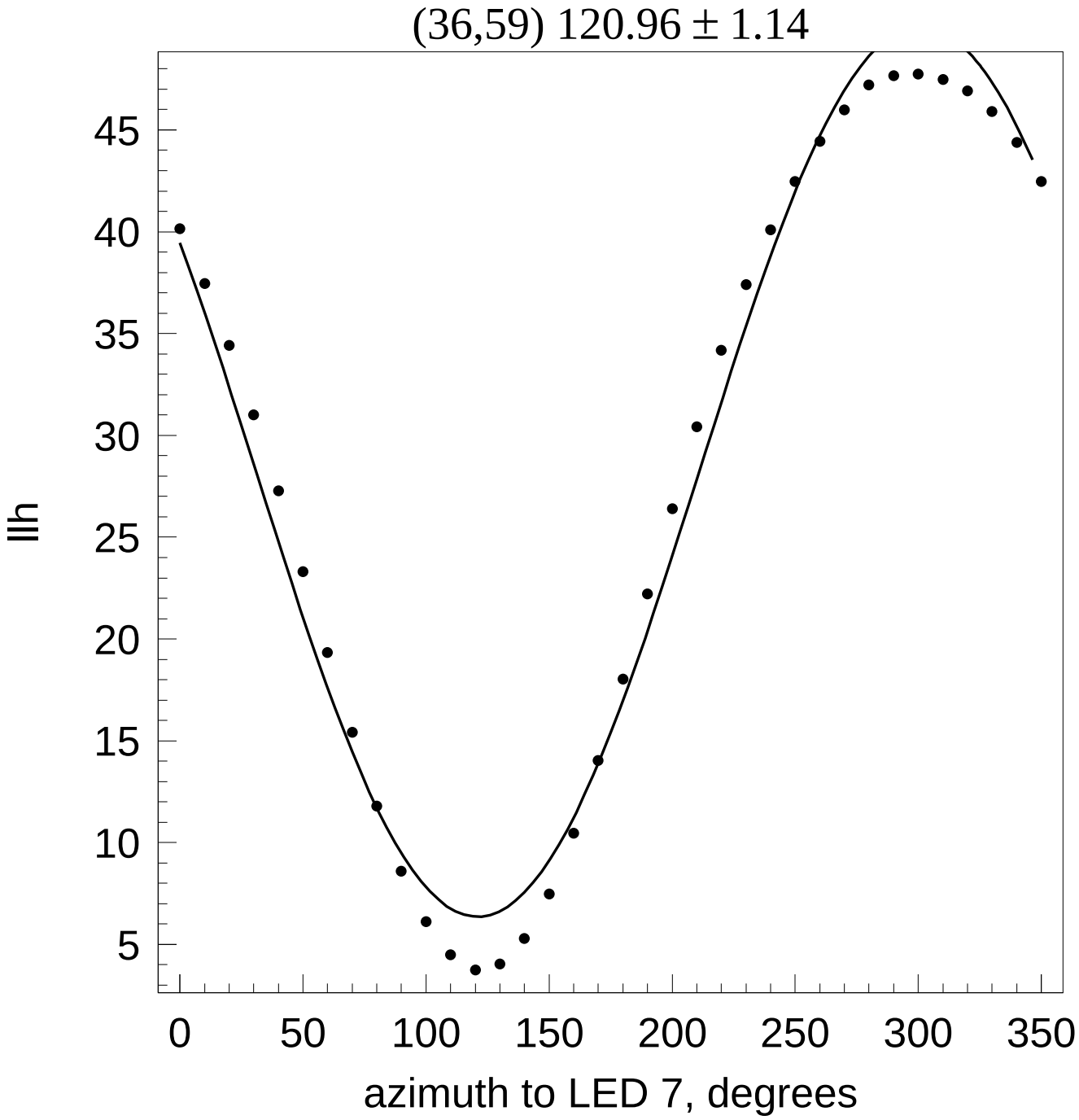

(36,58)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
250
250.8 ± 6.1
1
2
3
4
5
6
7
8
9
10
11
12

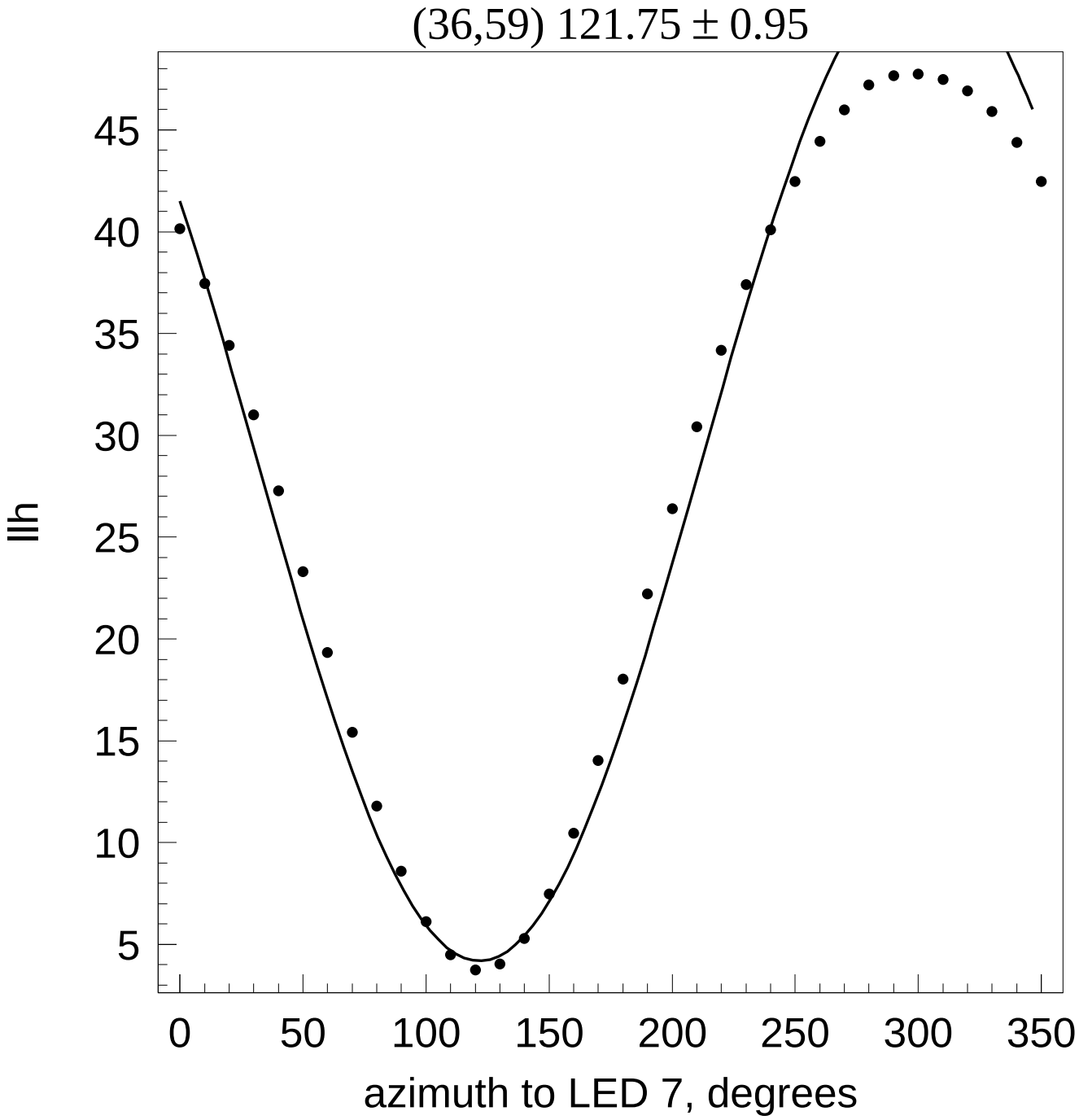

(36,58) 251.22 ± 1.09
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

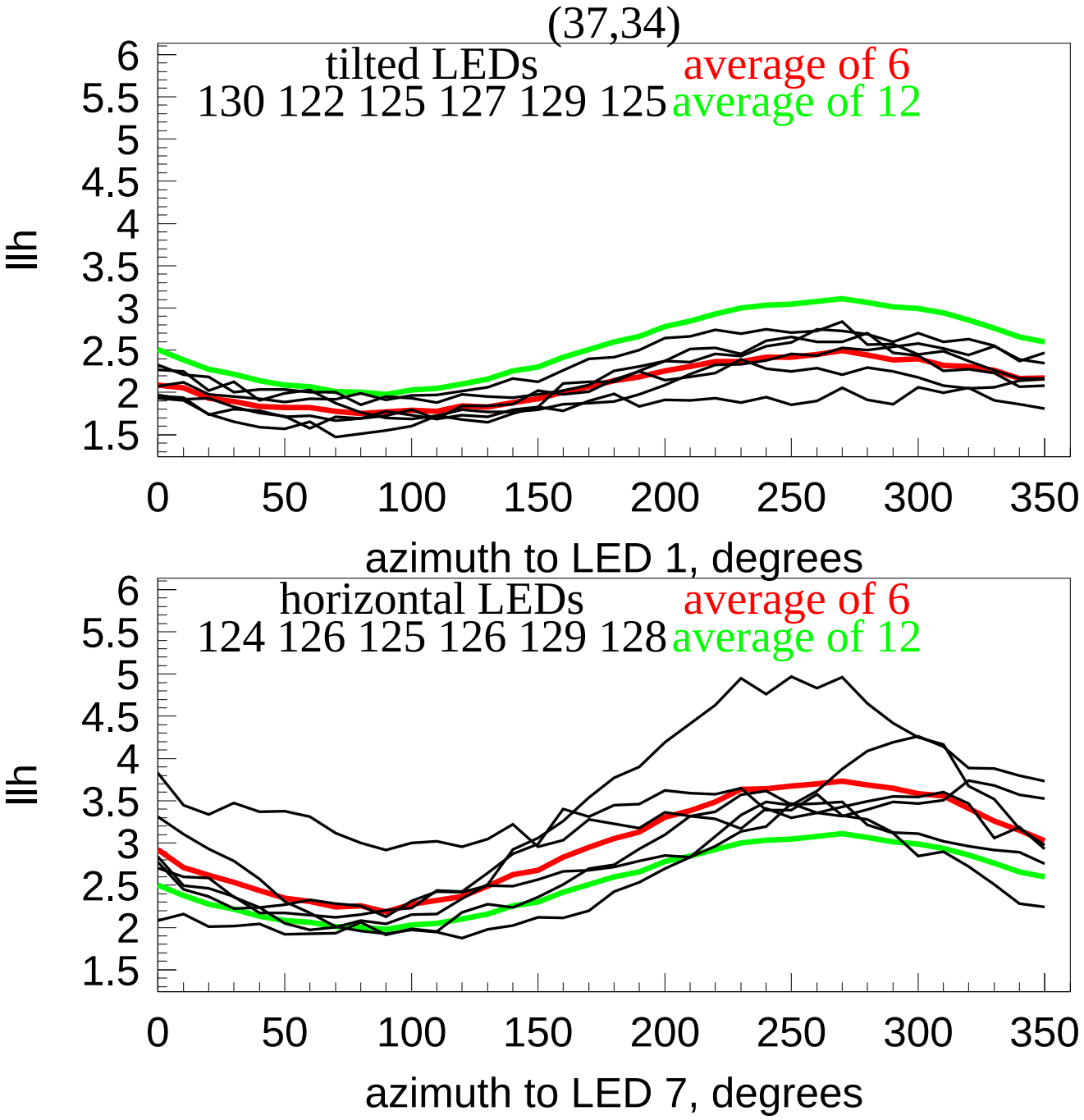

(36,58) 250.80 ± 0.88
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

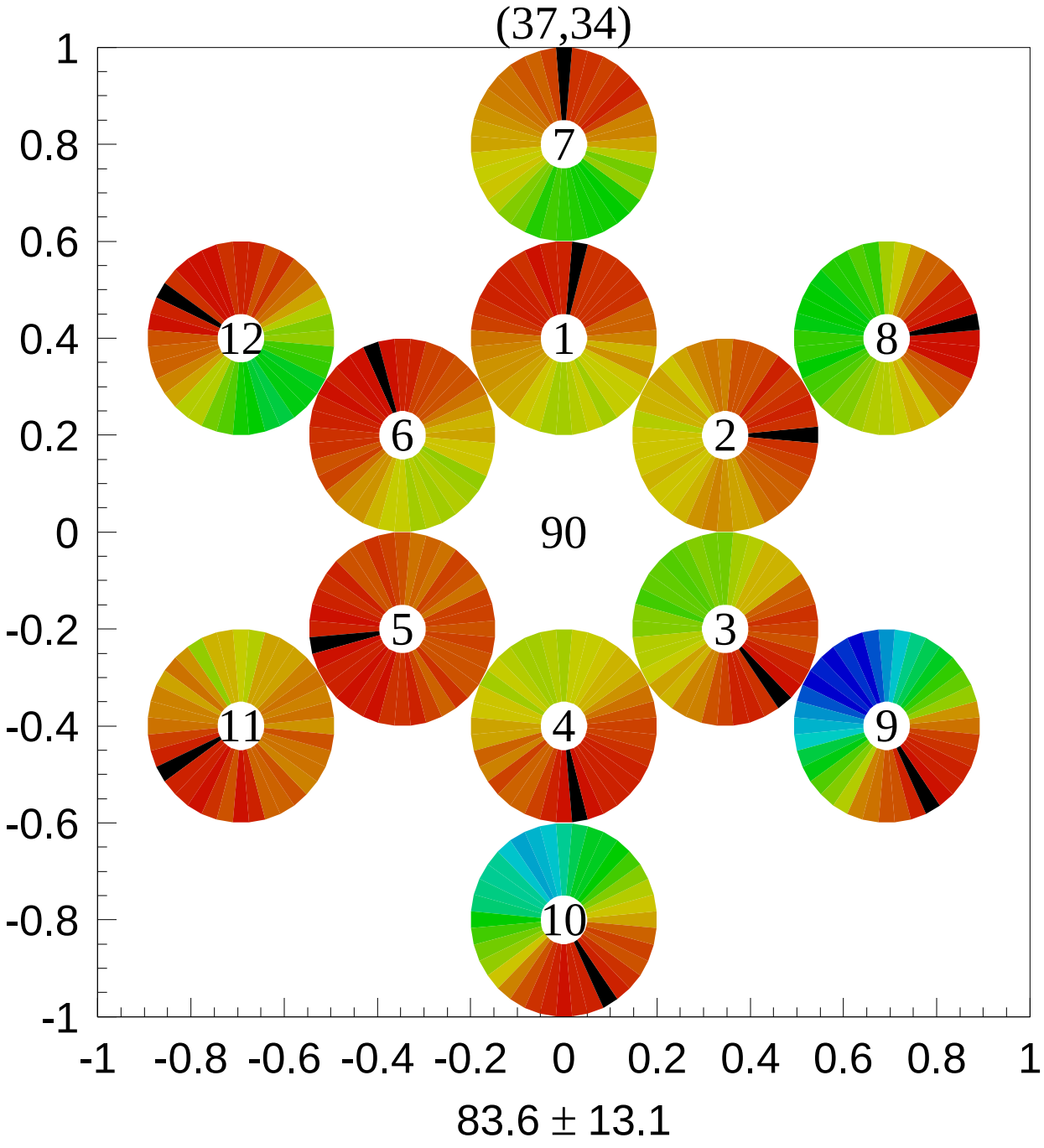

(36,59)
tilted LEDs
127 127 124 126 124 129
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
129 118 130 126 124 126
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

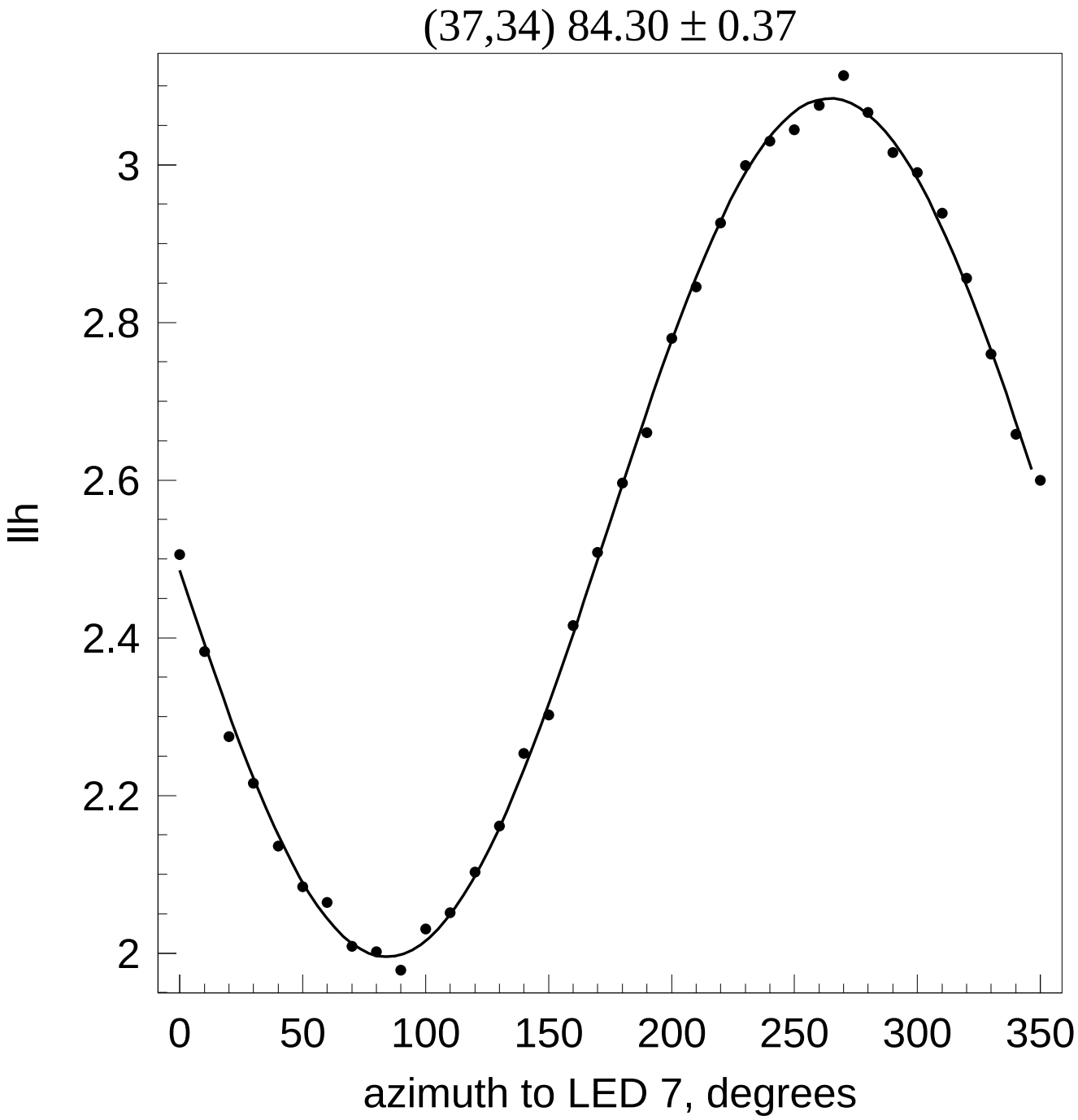

(36,59)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
121.8 ± 6.7

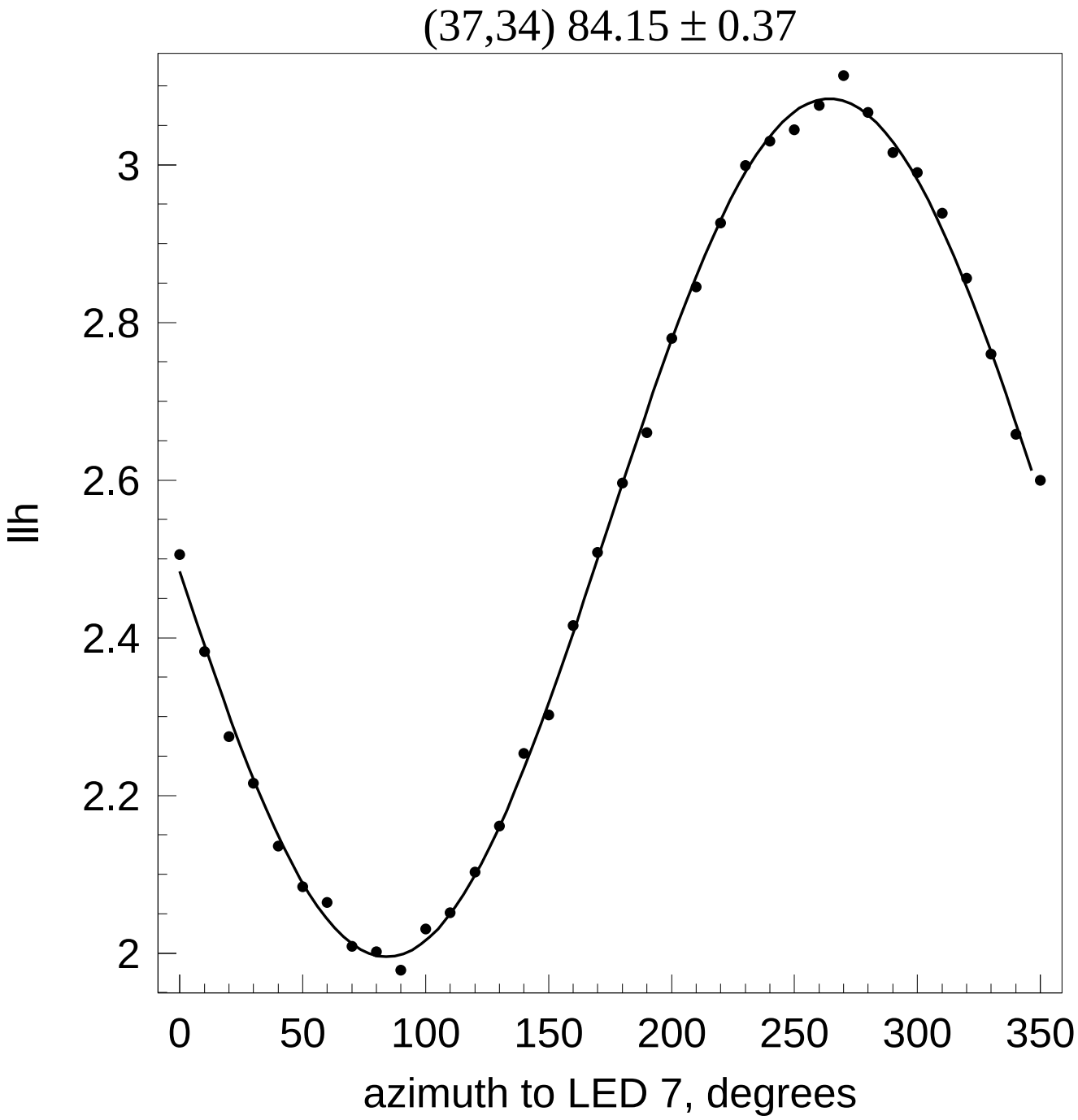

(36,59) 120.96 ± 1.14
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

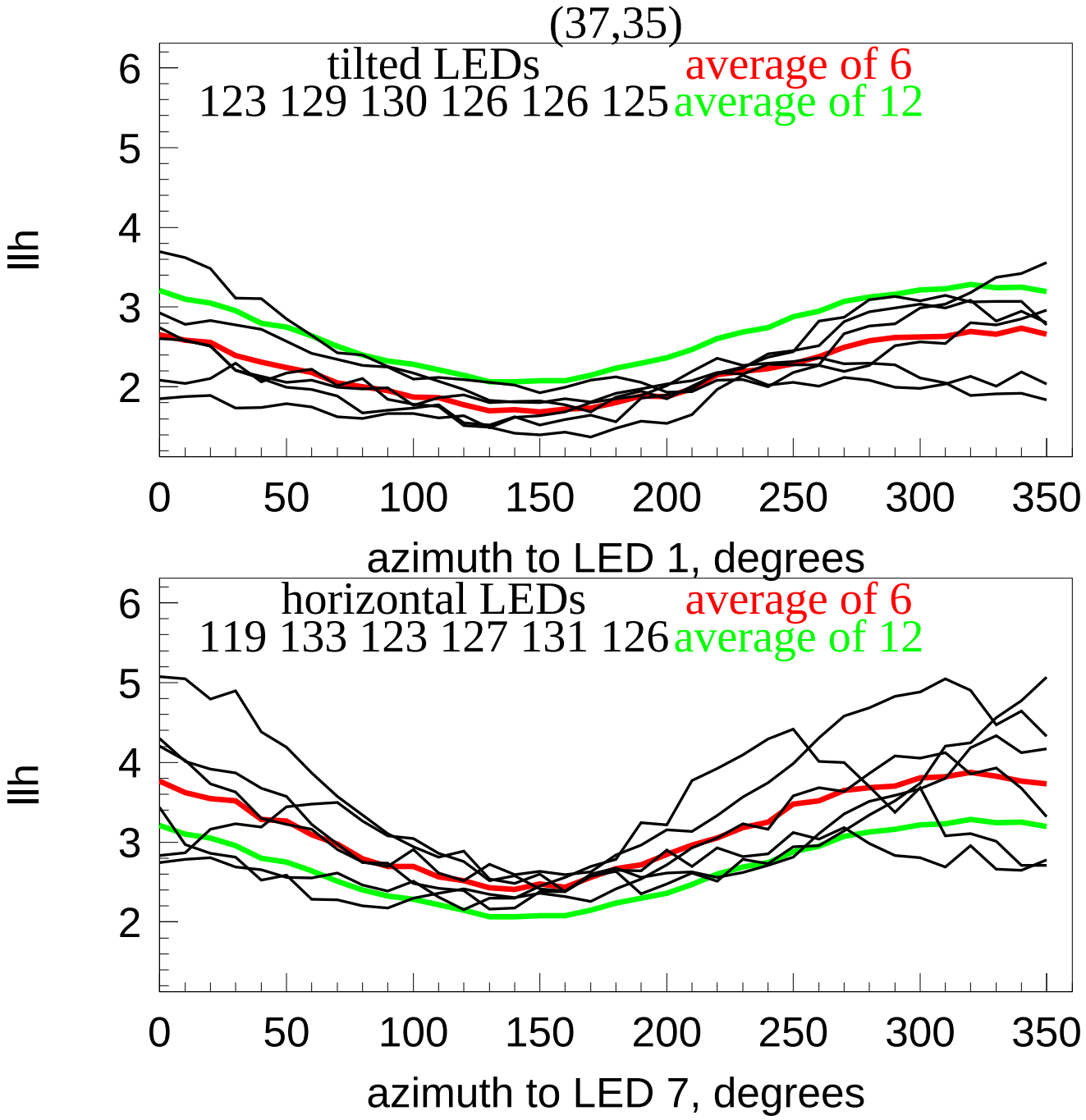

(36,59) 121.75 ± 0.95
llh
45
40
35
30
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

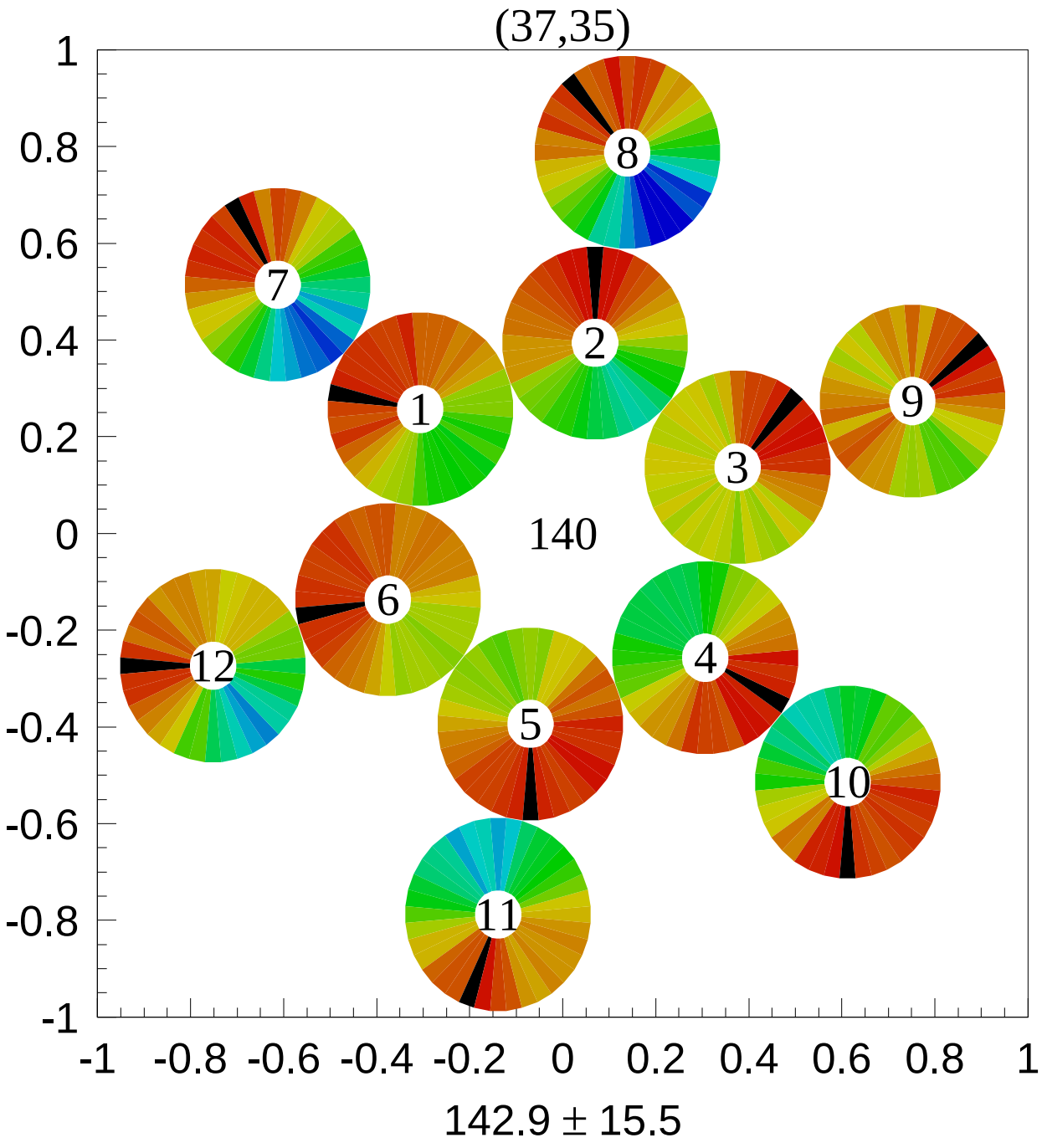

(37,34)
tilted LEDs
130 122 125 127 129 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 126 125 126 129 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

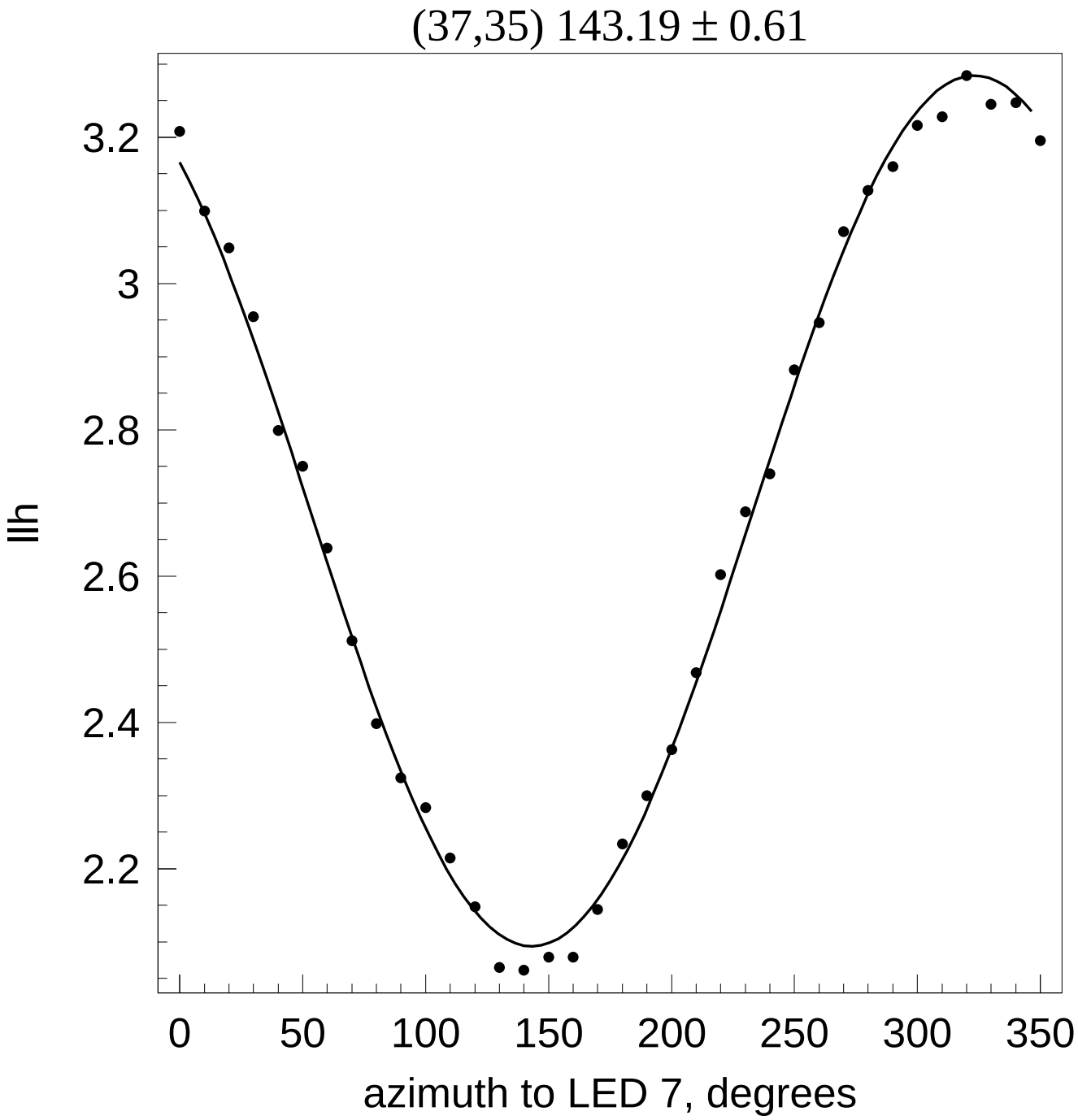

(37,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
8
6
2
90
5
3
11
4
9
10
83.6 ± 13.1

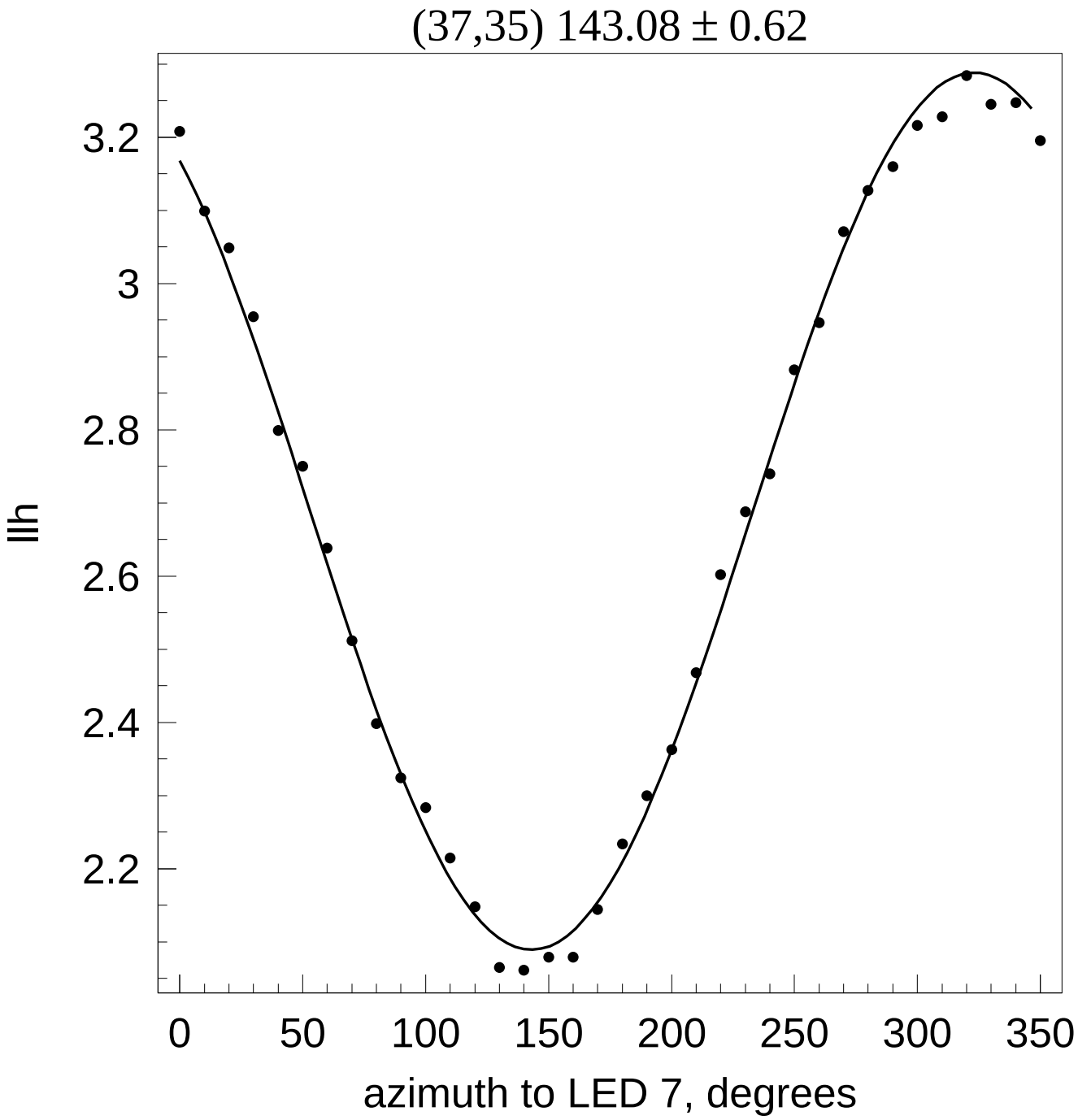

(37,34) 84.30 ± 0.37
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

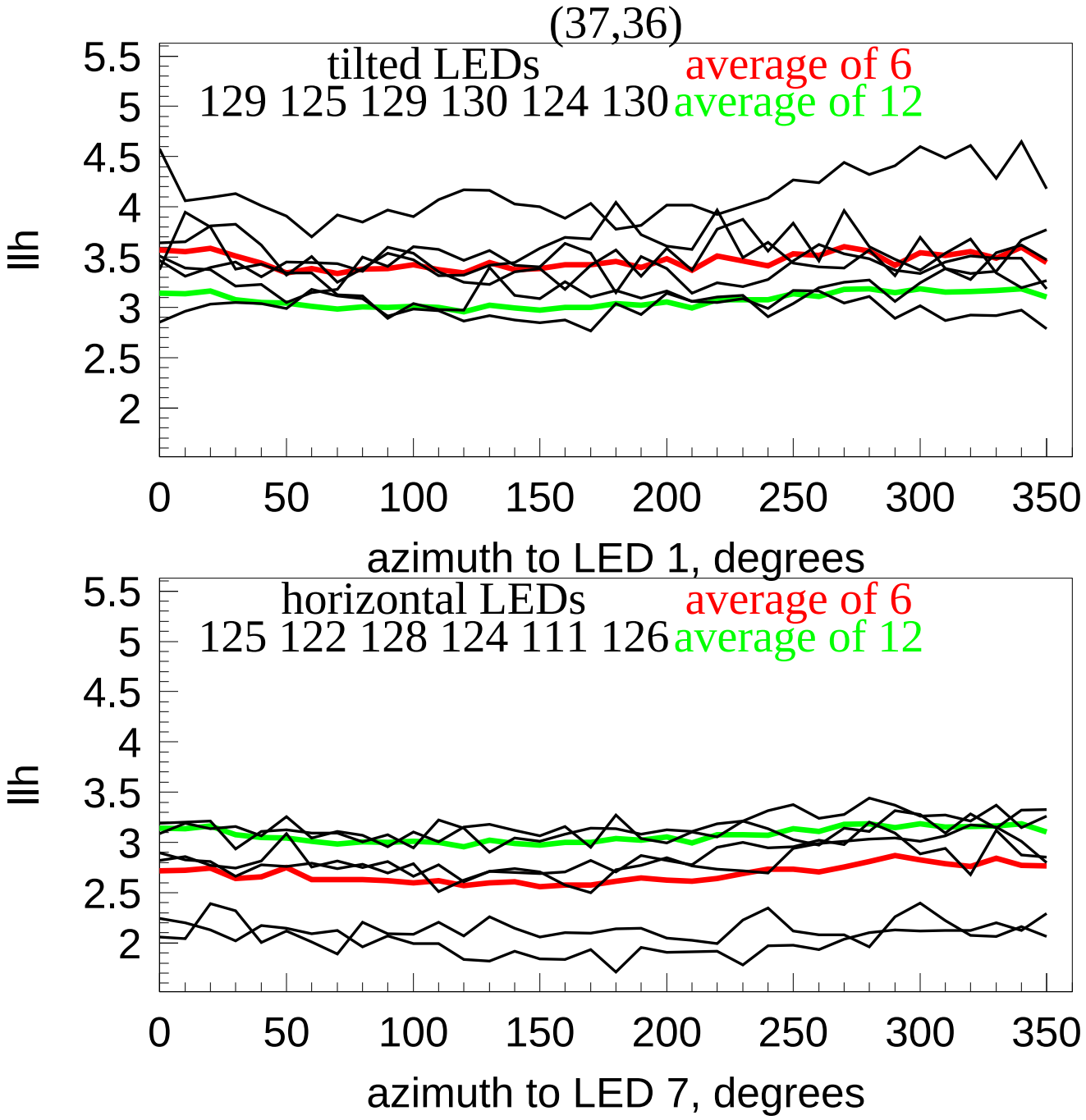

(37,34) 84.15 ± 0.37
llh
3
2.8
2.6
2.4
2.2
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

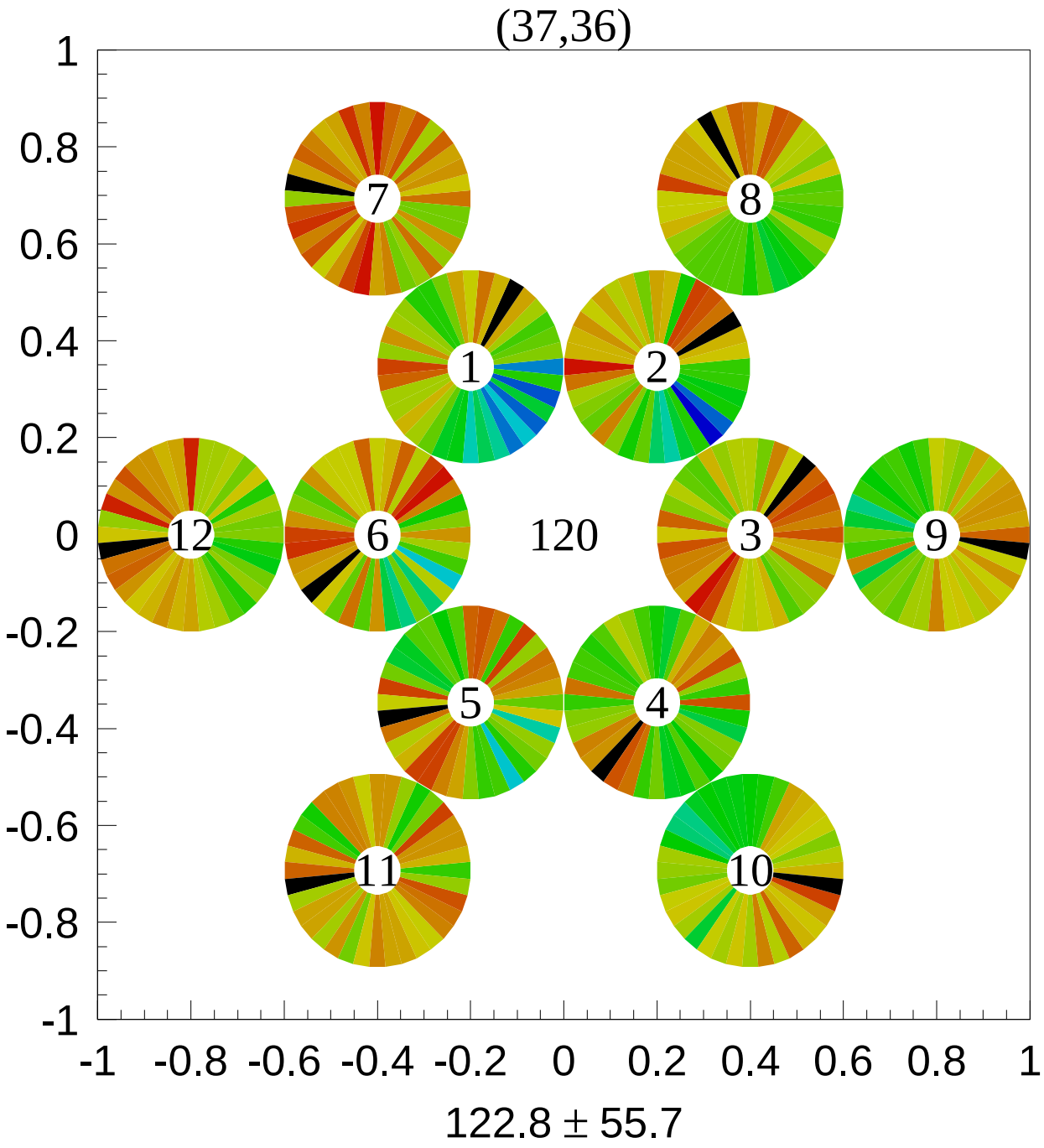

(37,35)
tilted LEDs
123 129 130 126 126 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
119 133 123 127 131 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

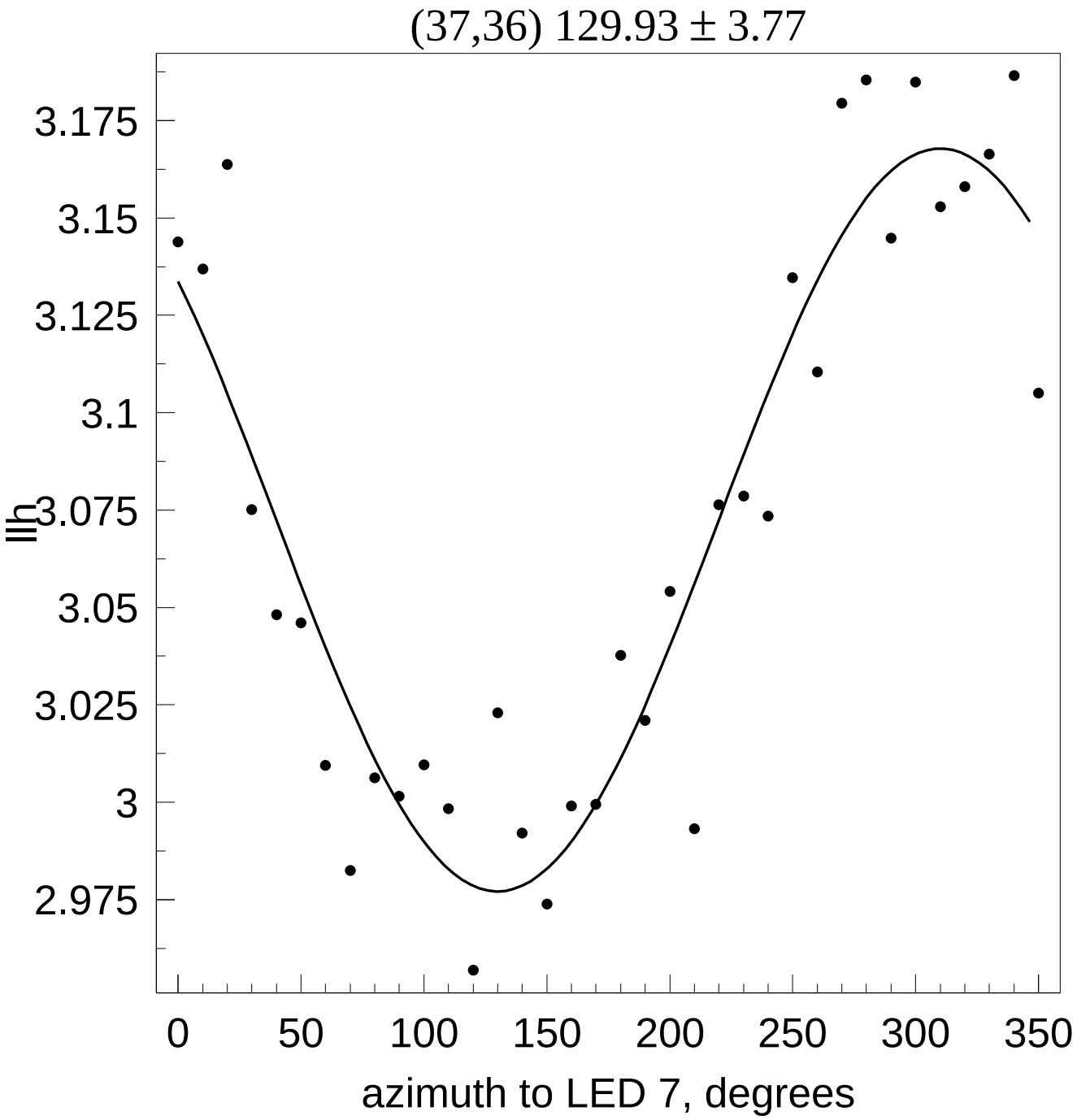

(37,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
142.9 ± 15.5
140
1
2
3
4
5
6
7
8
9
10
11
12

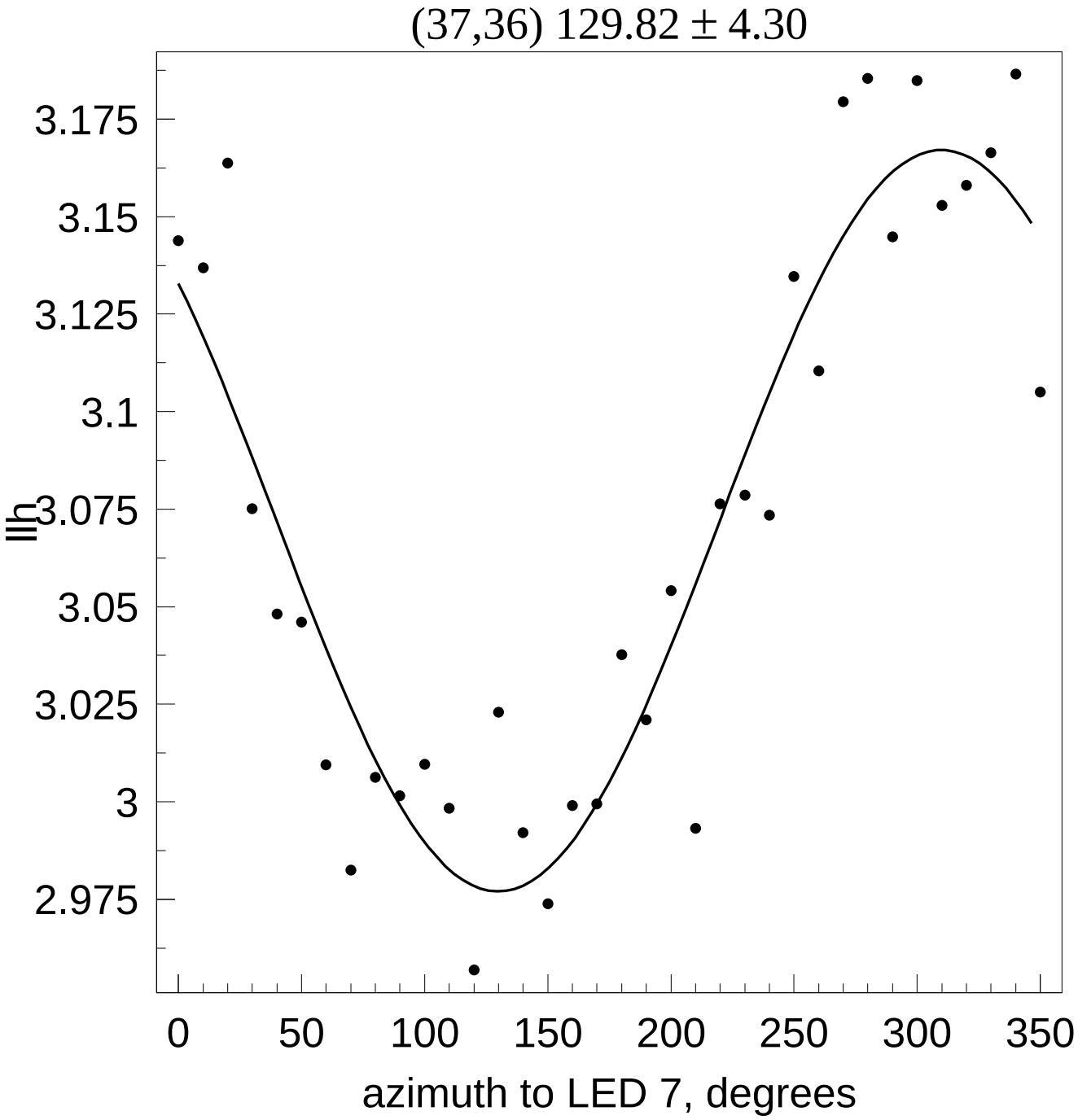

(37,35) 143.19 ± 0.61
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

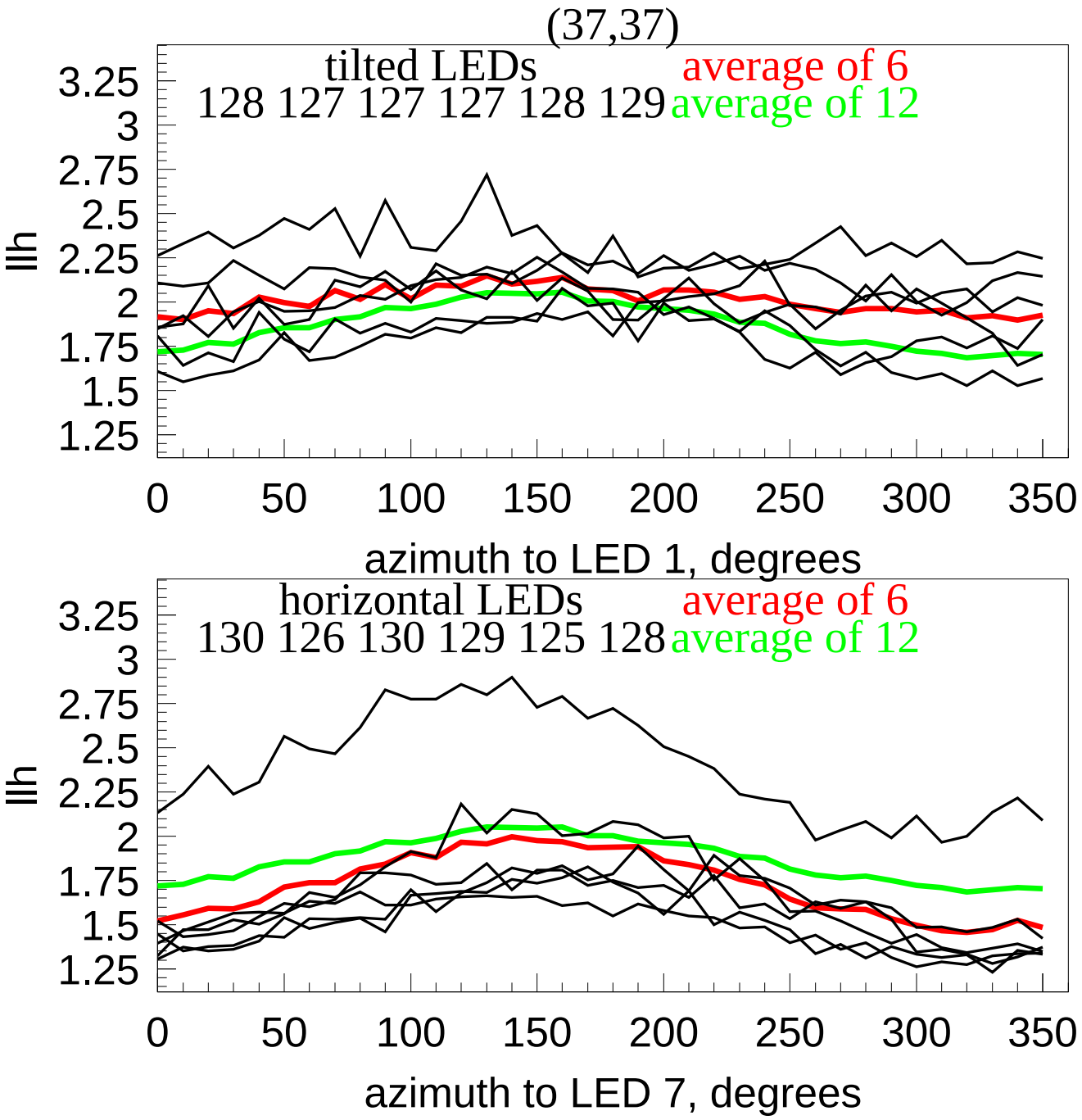

(37,35) 143.08 ± 0.62
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

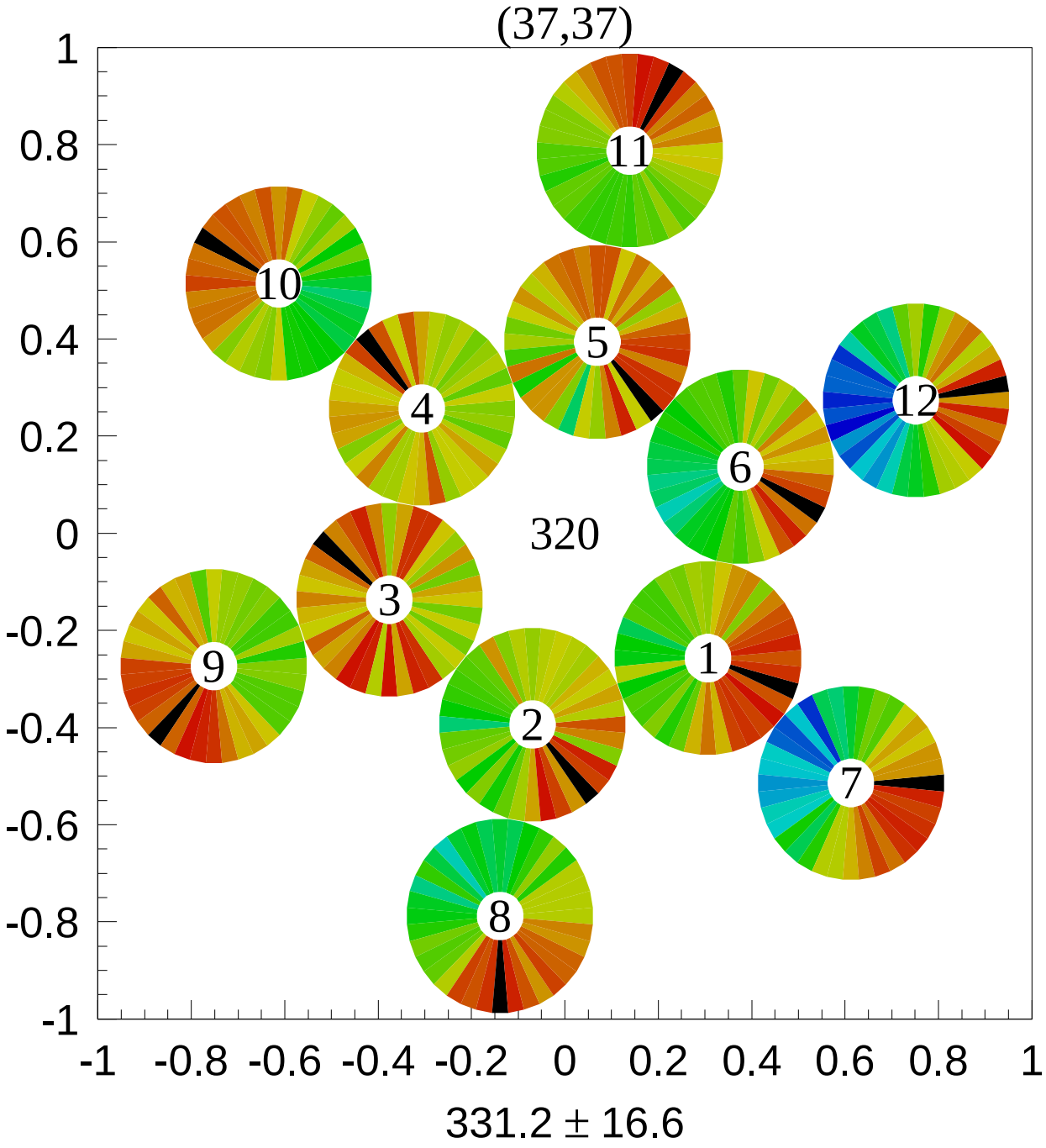

(37,36)
tilted LEDs
129 125 129 130 124 130
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 122 128 124 111 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

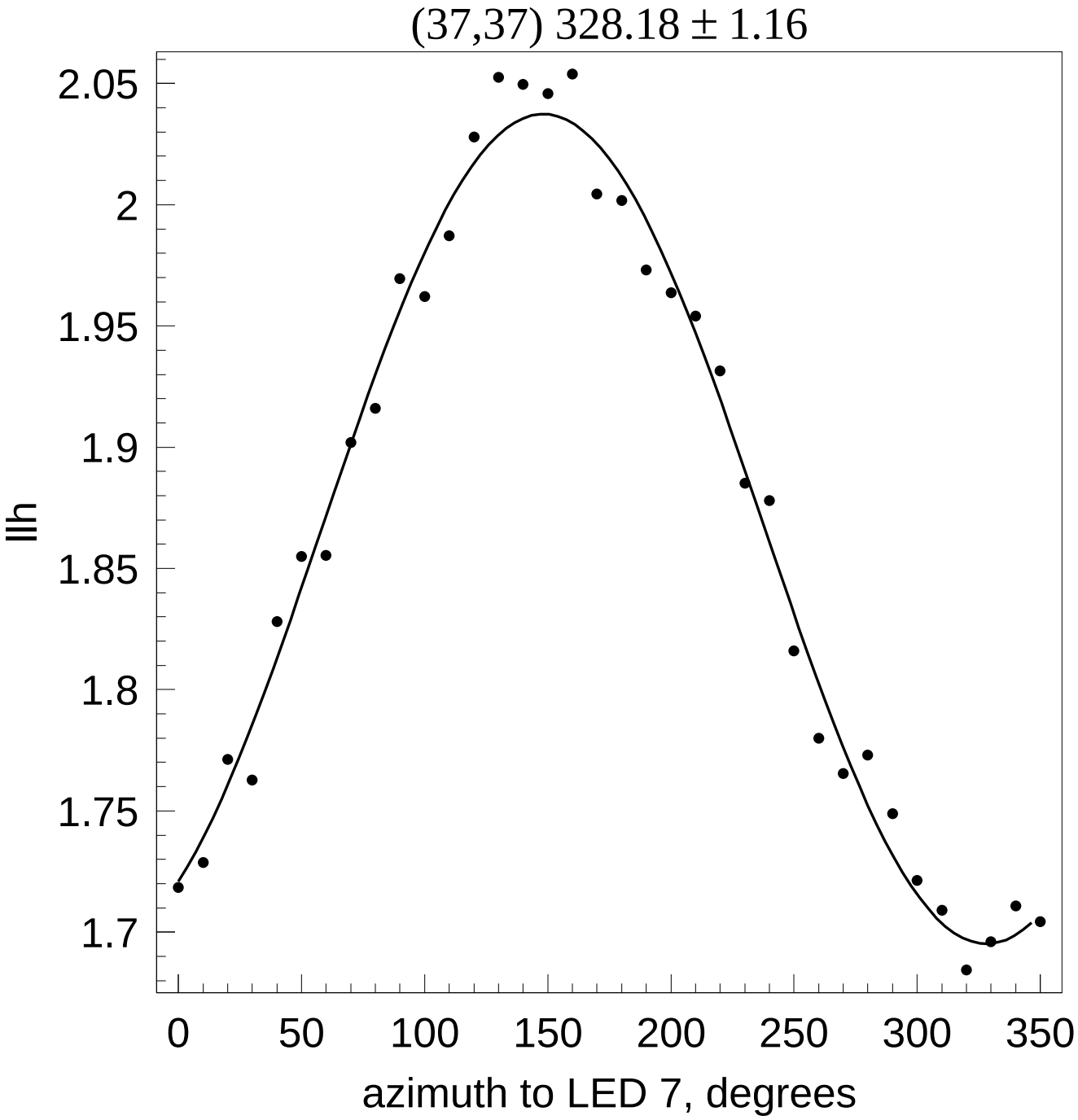

(37,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
122.8 ± 55.7

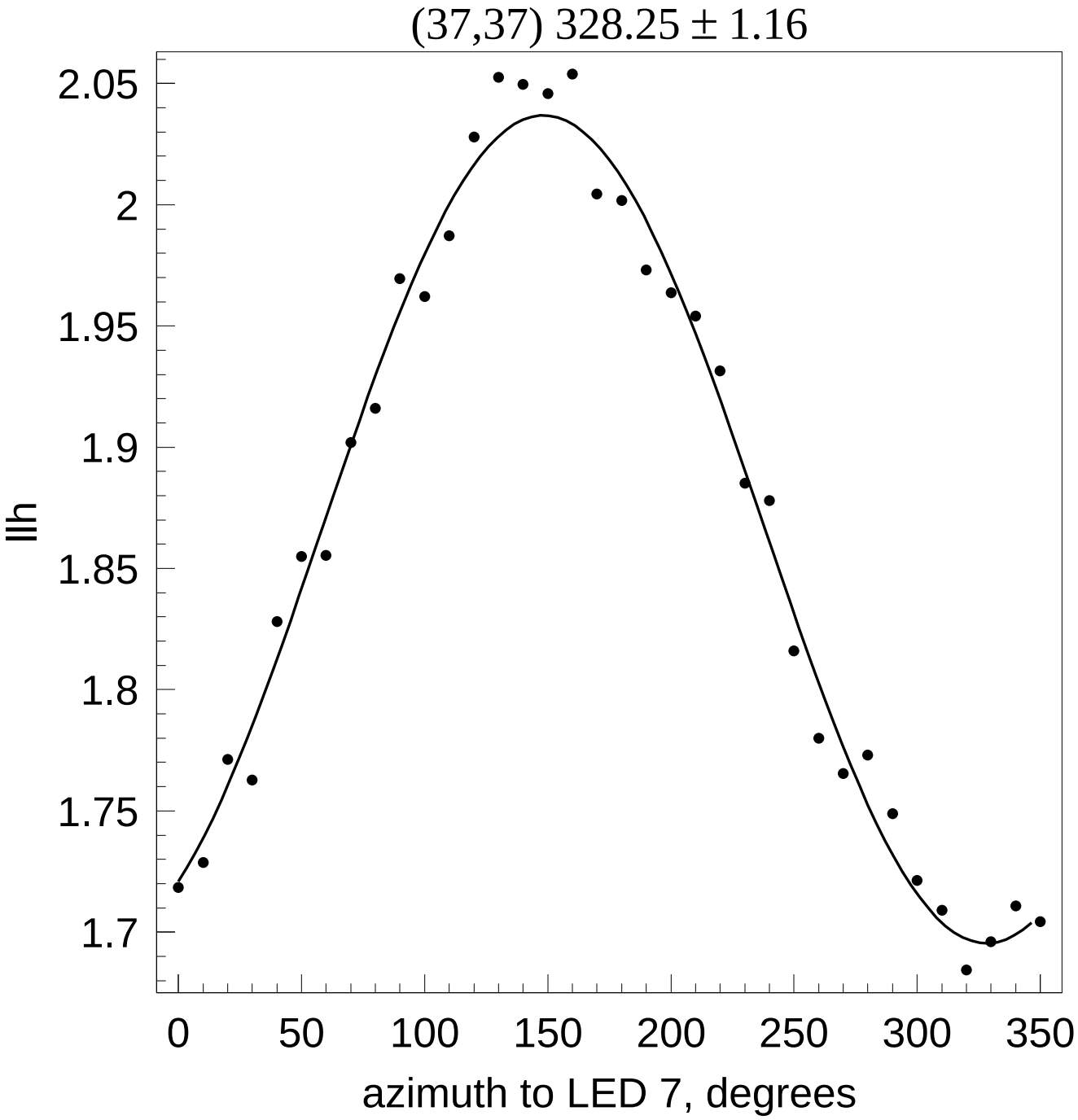

(37,36) 129.93 ± 3.77
3.175
3.15
3.125
3.1
3.075
3.05
3.025
3
2.975
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

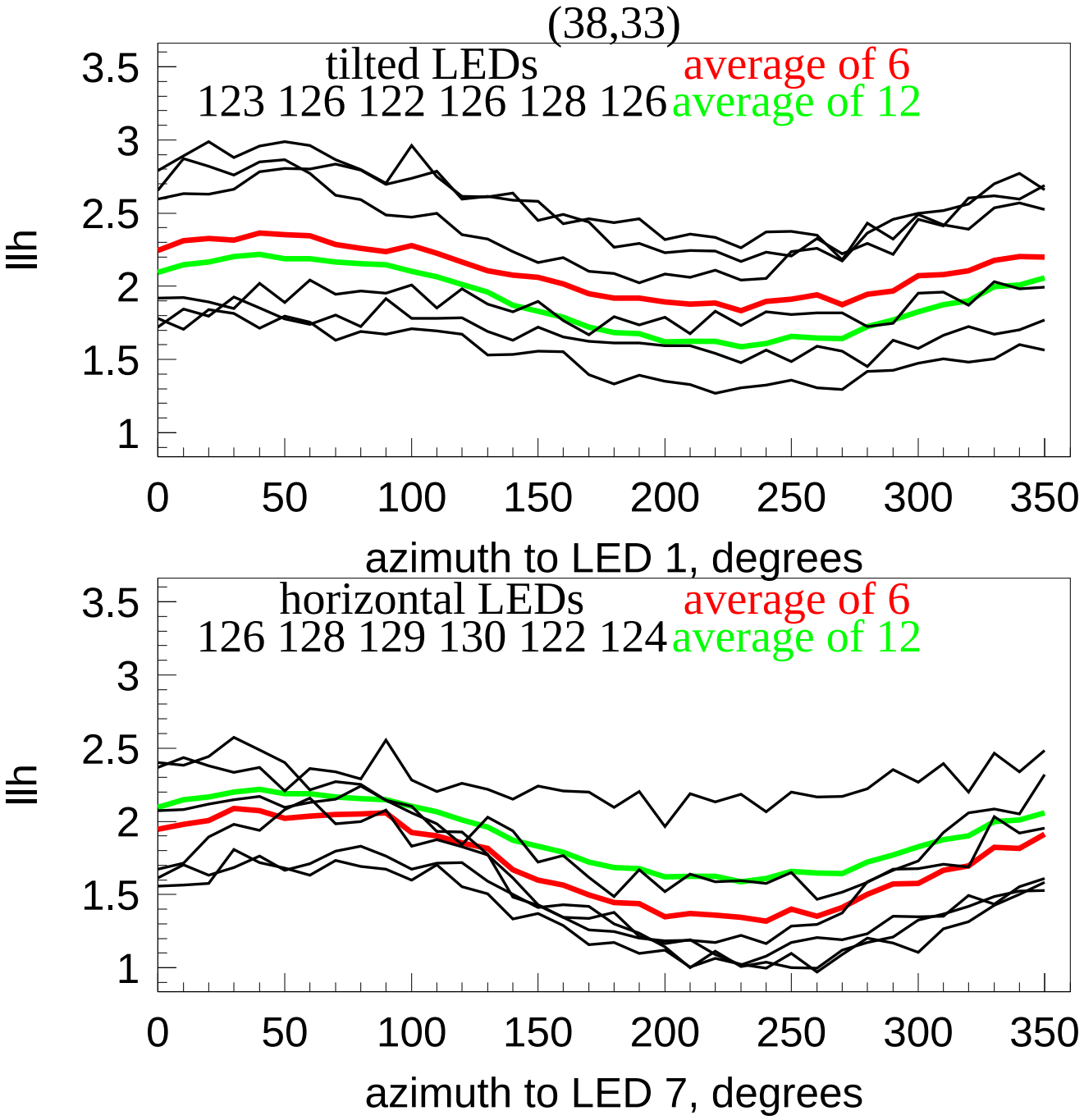

(37,36) 129.82 ± 4.30
3.175
3.15
3.125
3.1
3.075
3.05
3.025
3
2.975
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

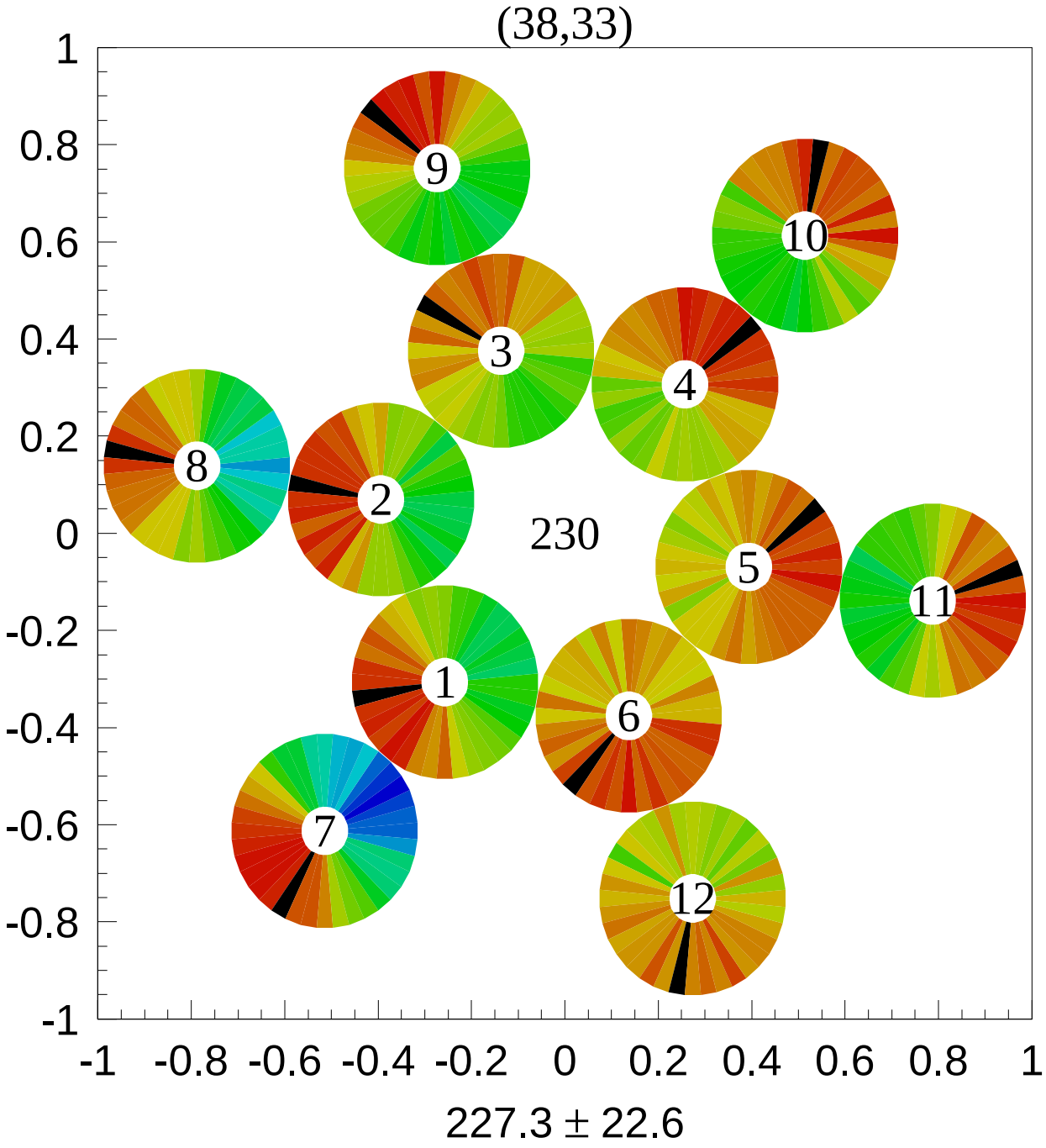

(37,37)
tilted LEDs
128 127 127 127 128 129
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 126 130 129 125 128
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

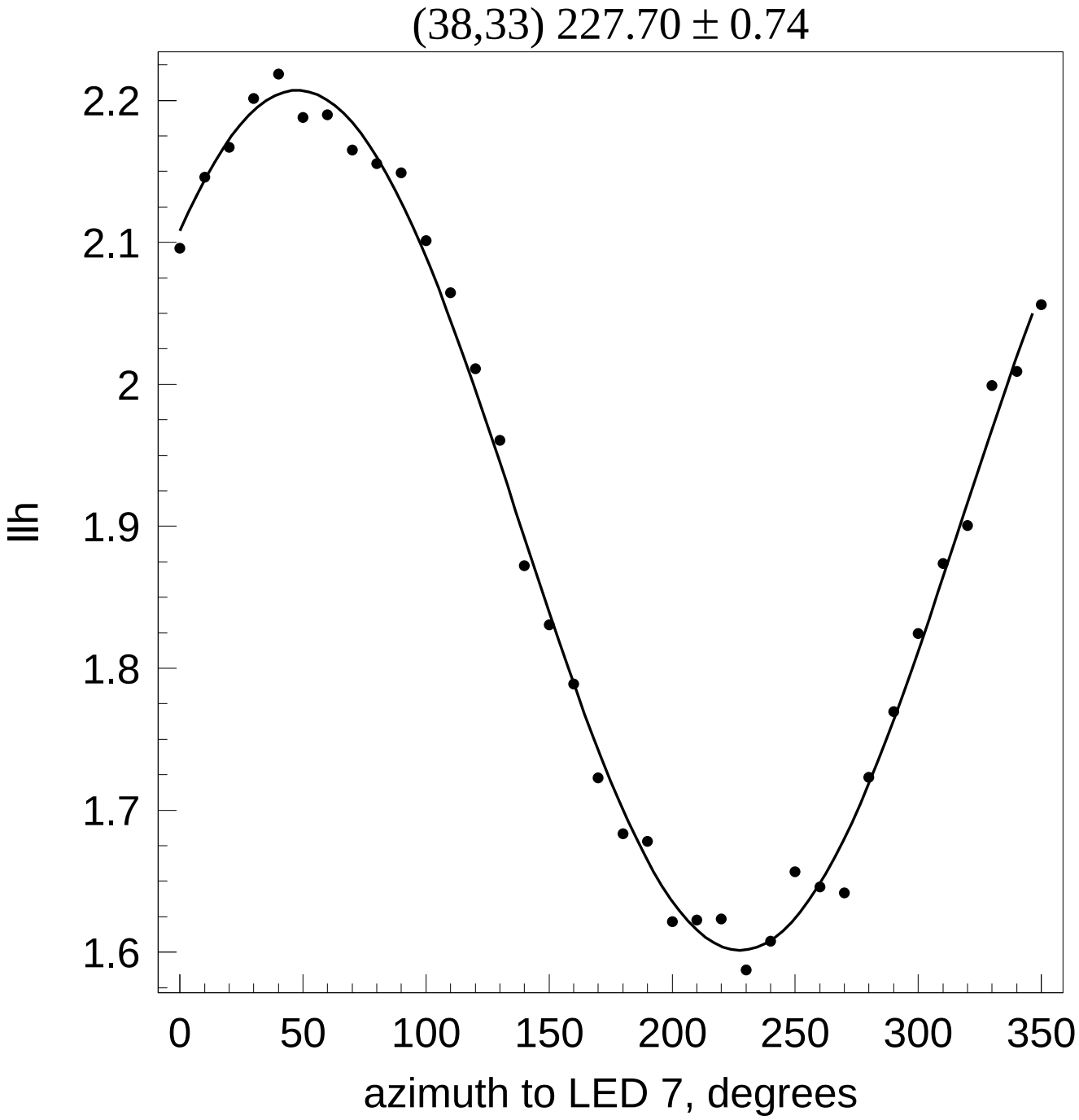

(37,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
10
5
4
12
6
320
3
9
1
2
7
8
331.2 ± 16.6

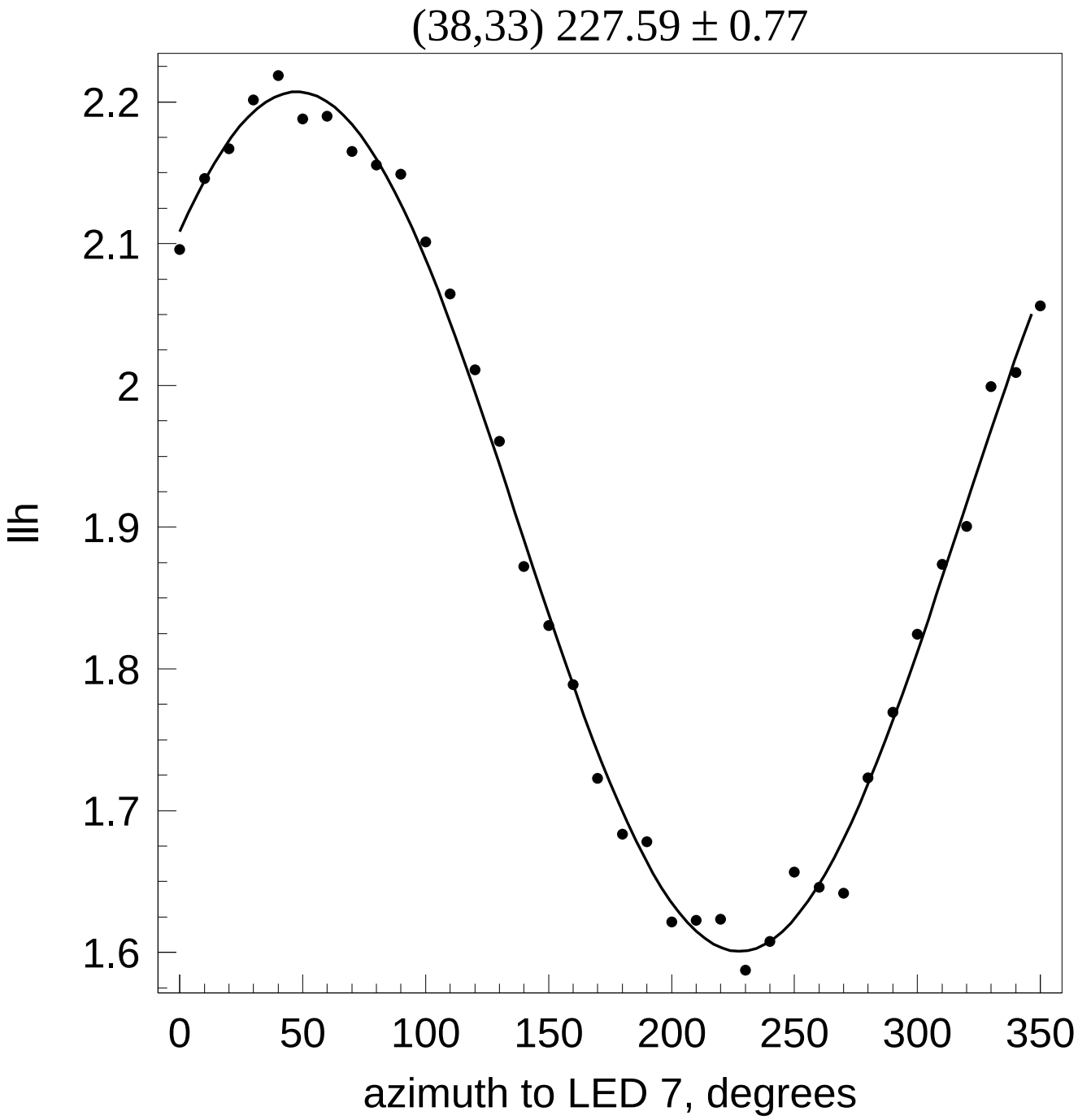

(37,37) 328.18 ± 1.16
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

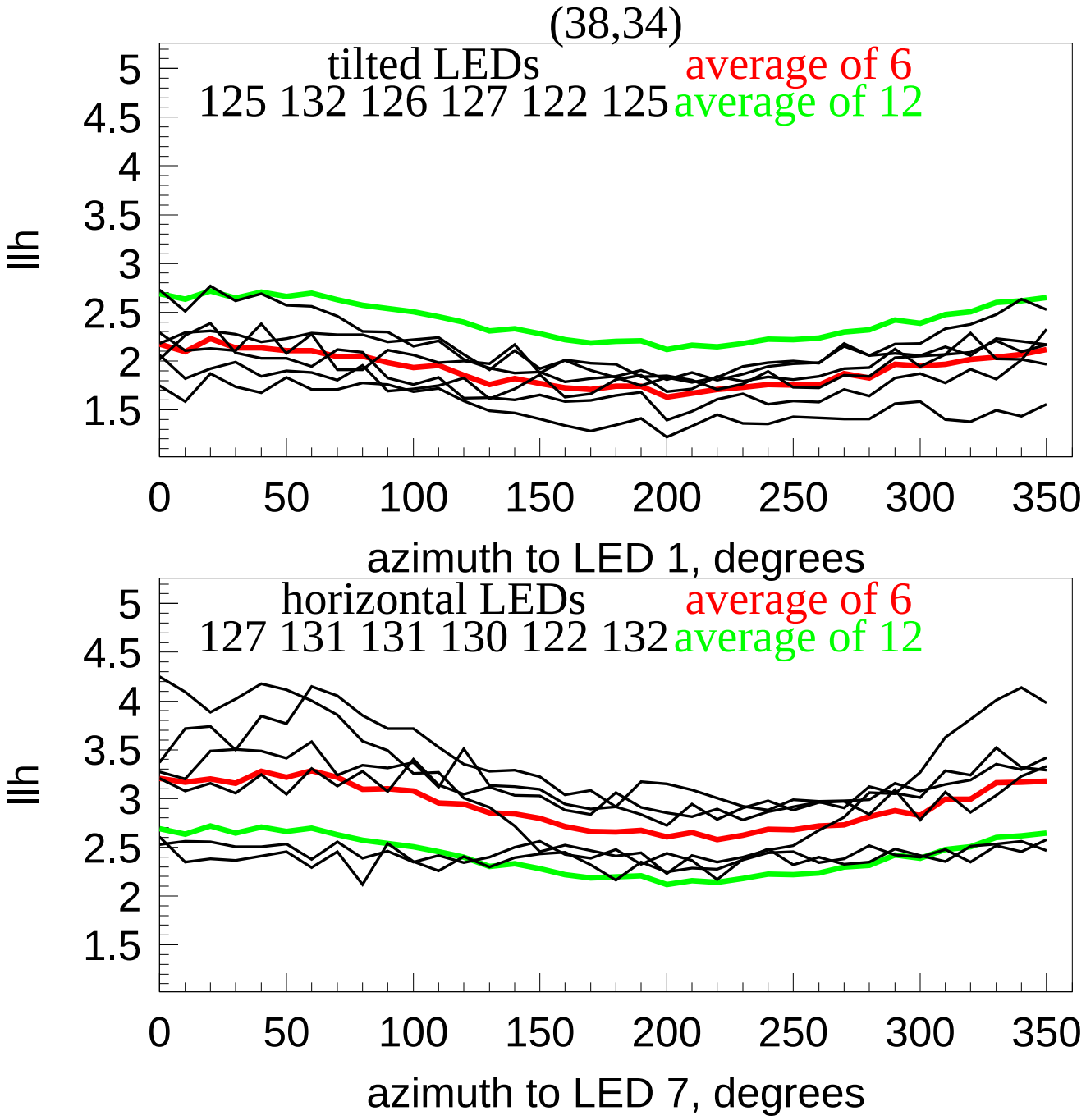

(37,37) 328.25 ± 1.16
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

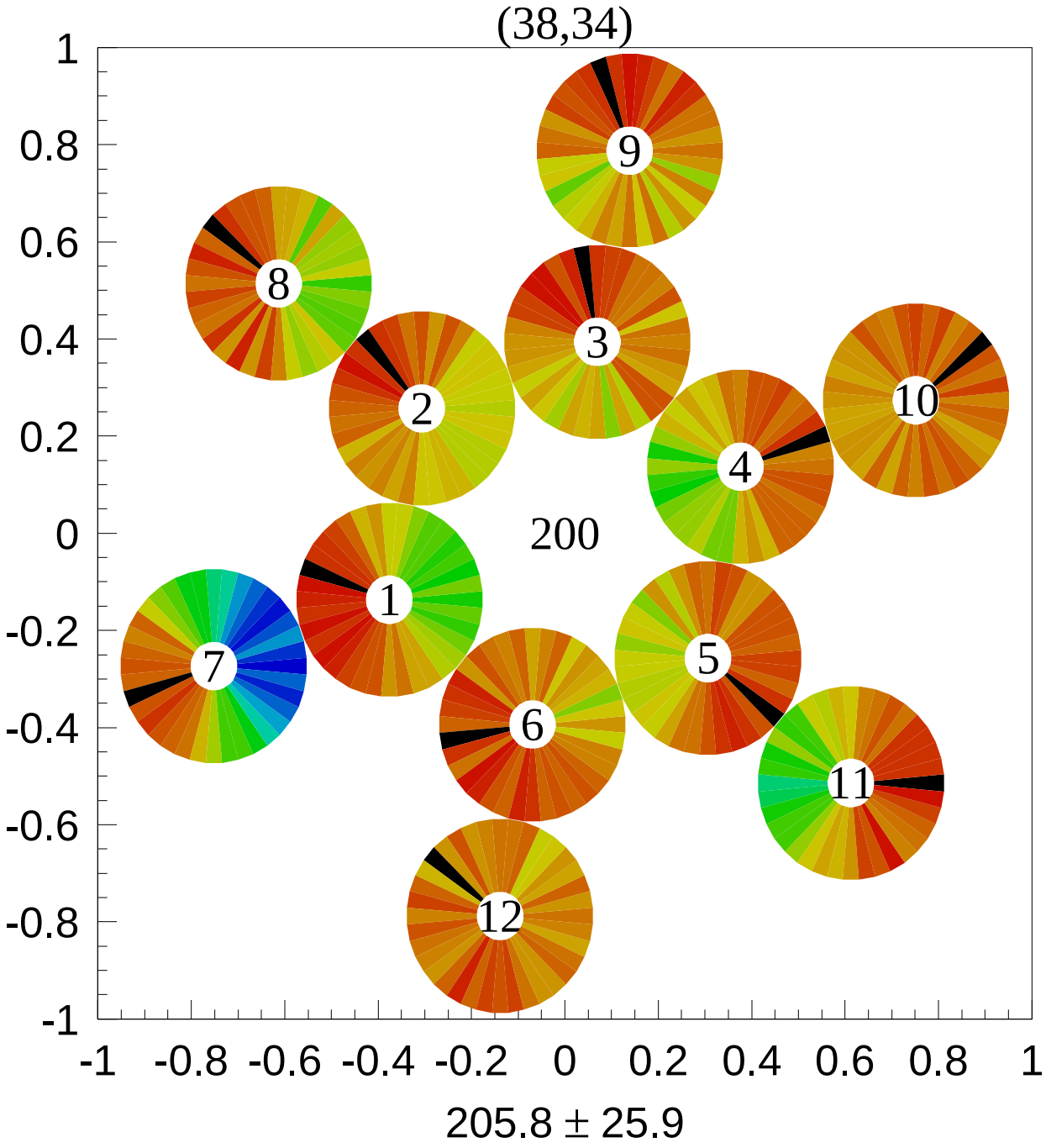

(38,33)
tilted LEDs
123 126 122 126 128 126
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 128 129 130 122 124
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

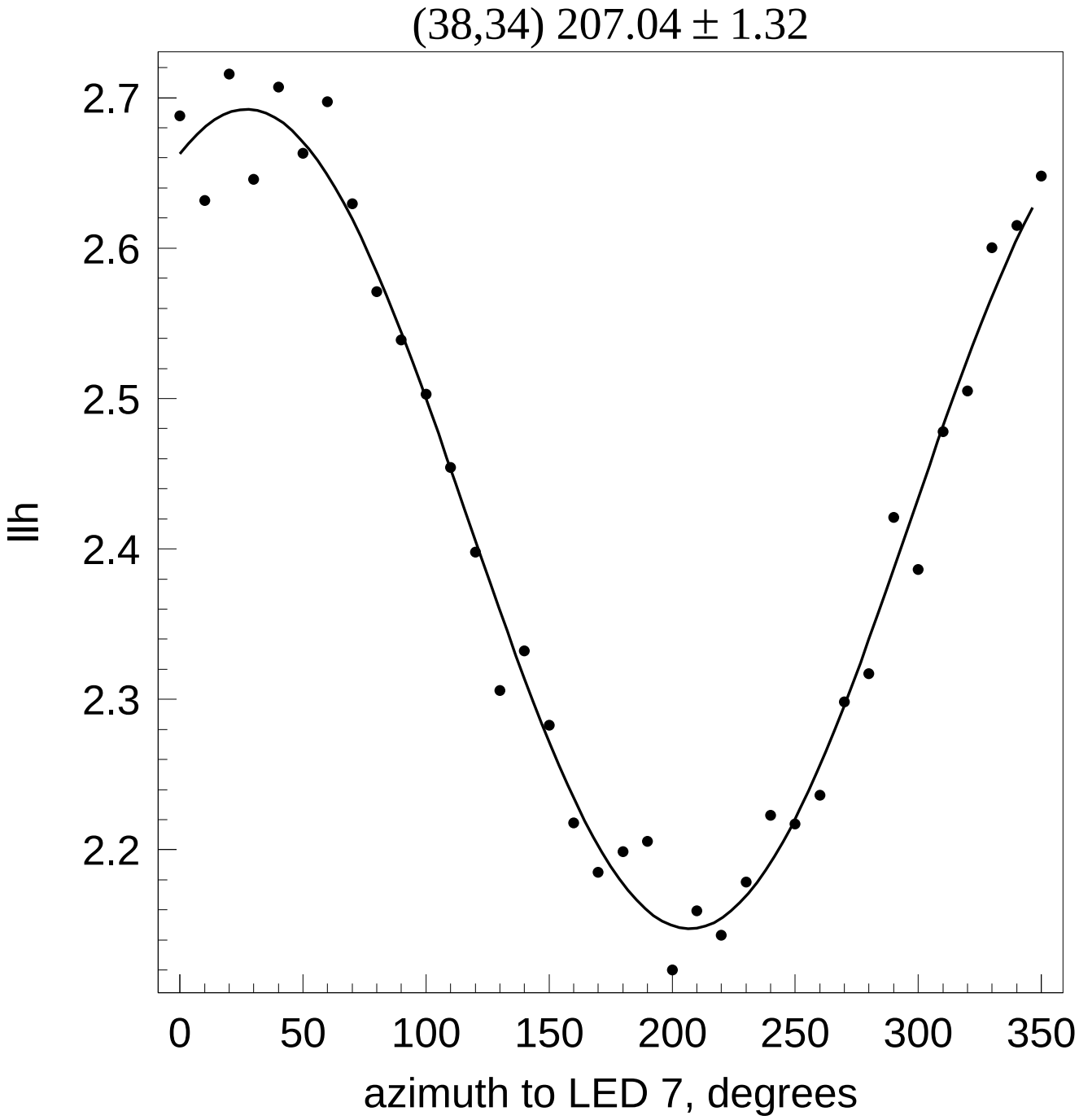

(38,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
227.3 ± 22.6

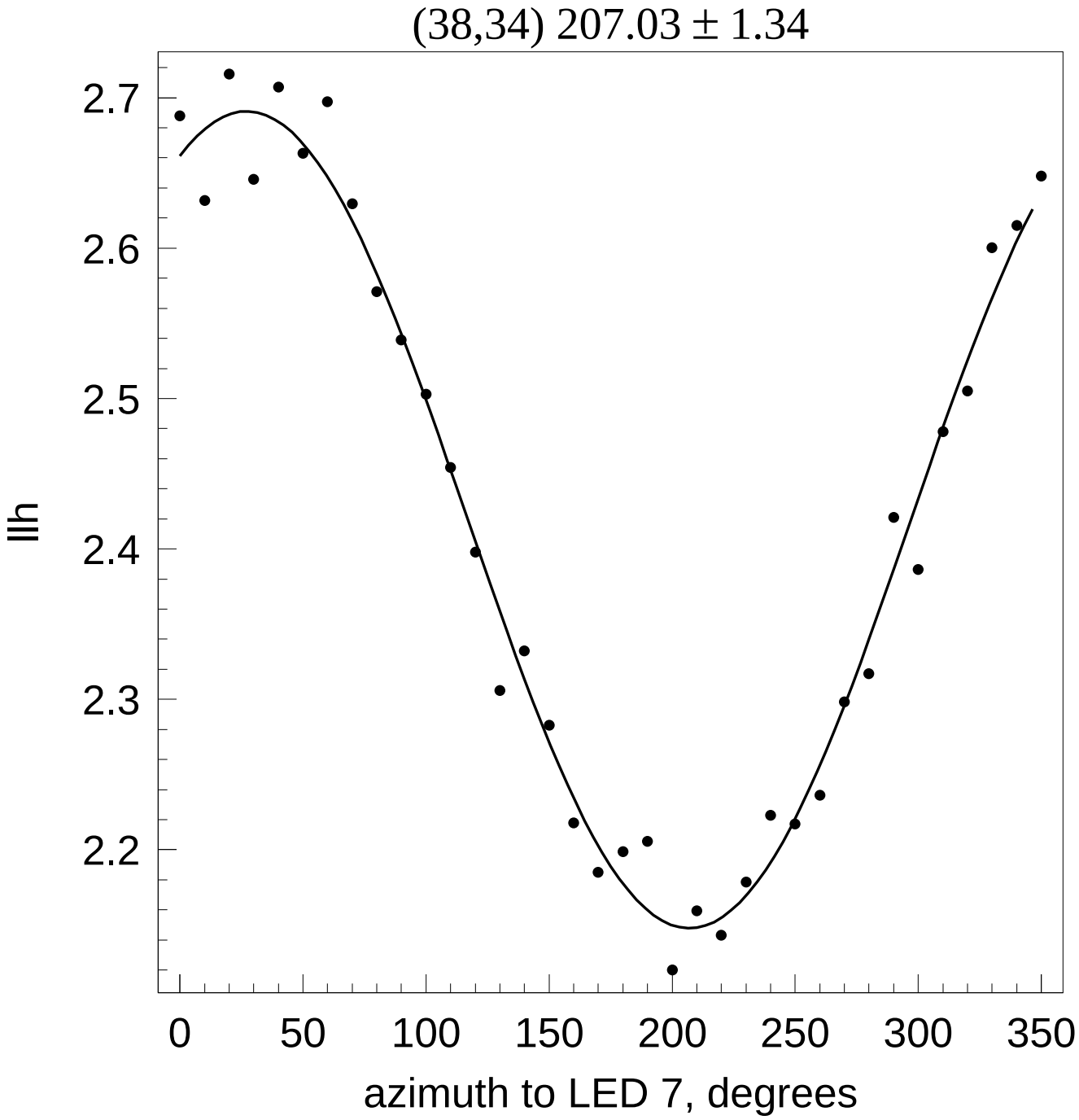

(38,33) 227.70 ± 0.74
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

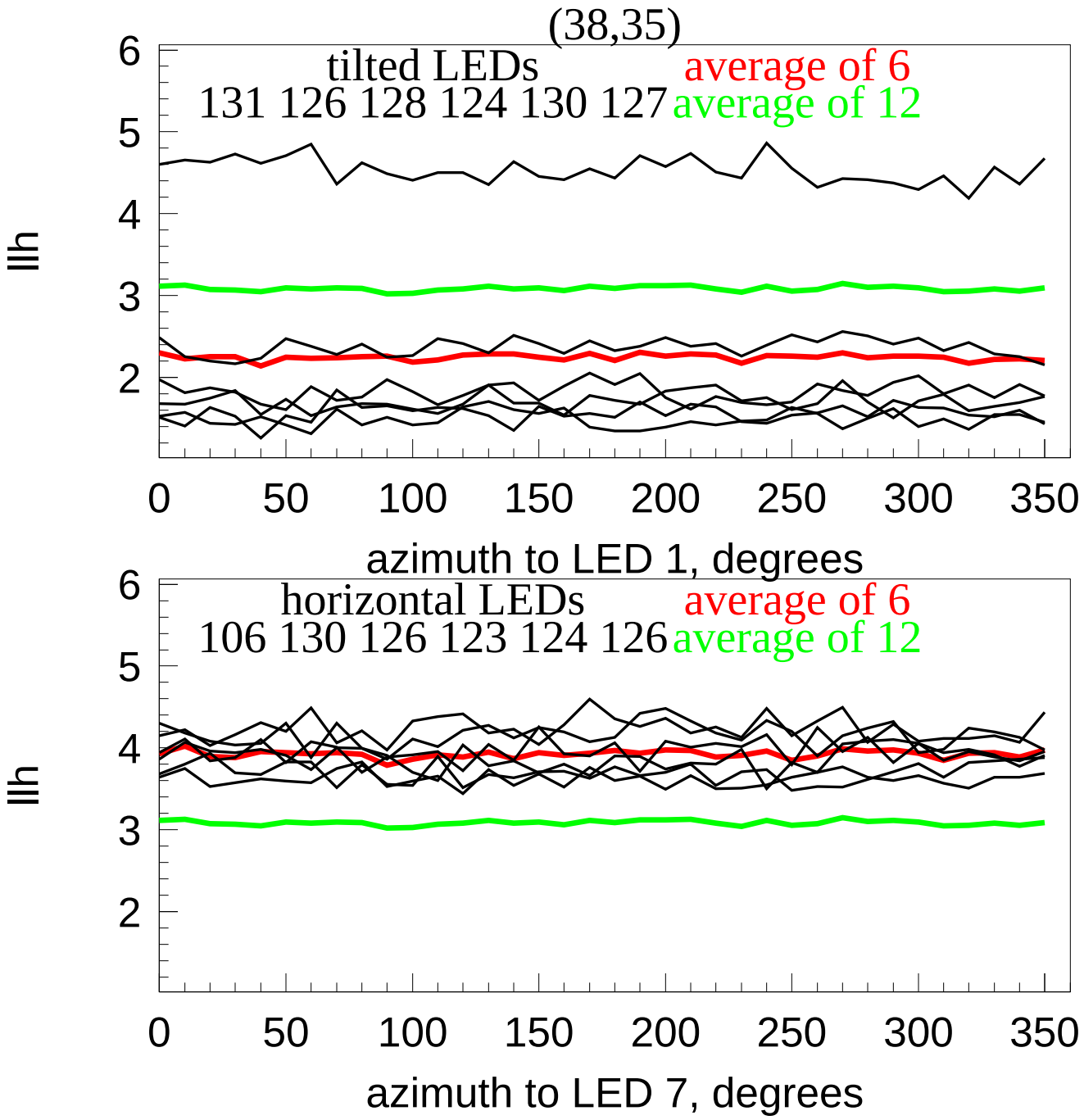

(38,33) 227.59 ± 0.77
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

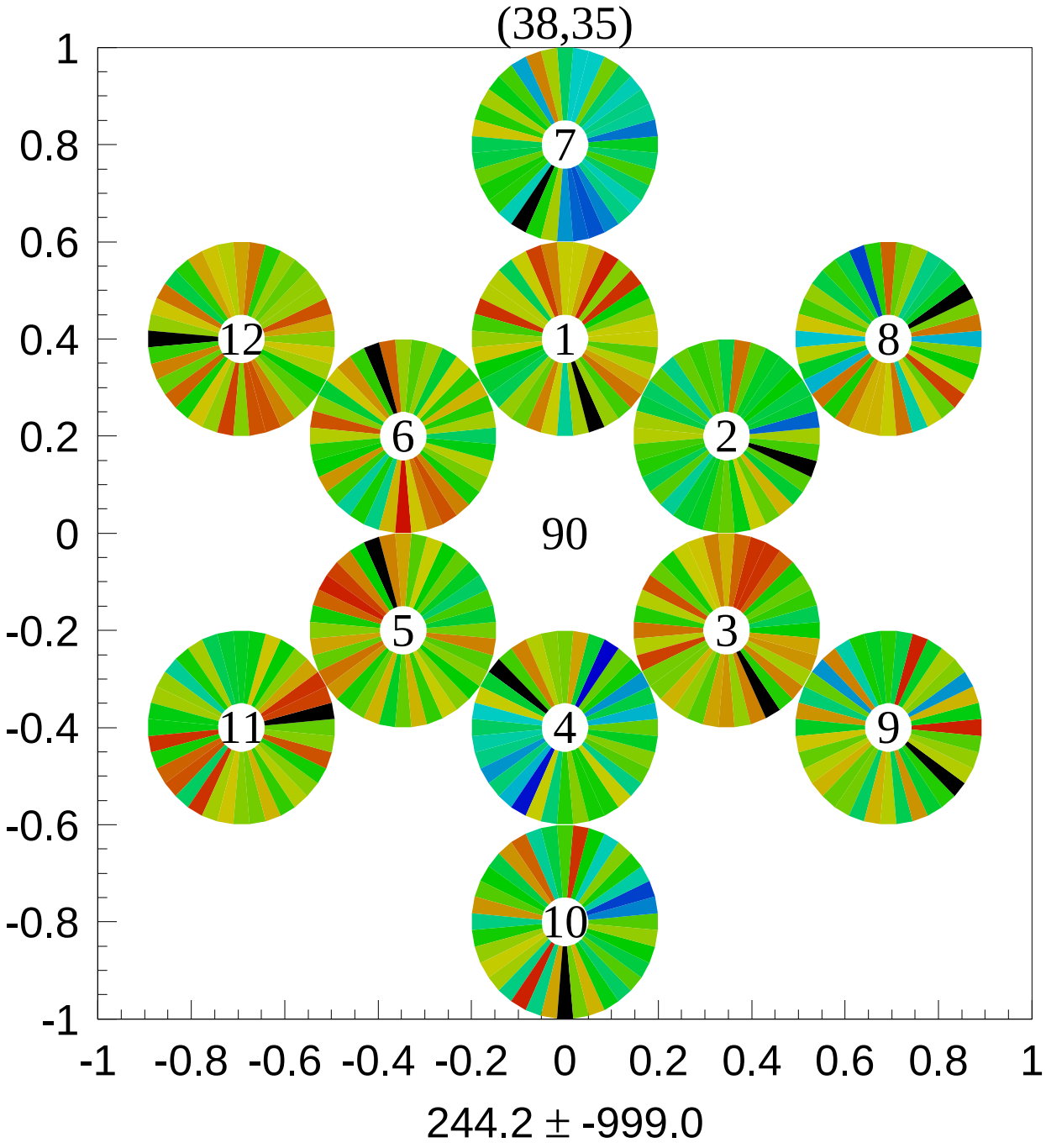

(38,34)
tilted LEDs
125 132 126 127 122 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 131 131 130 122 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

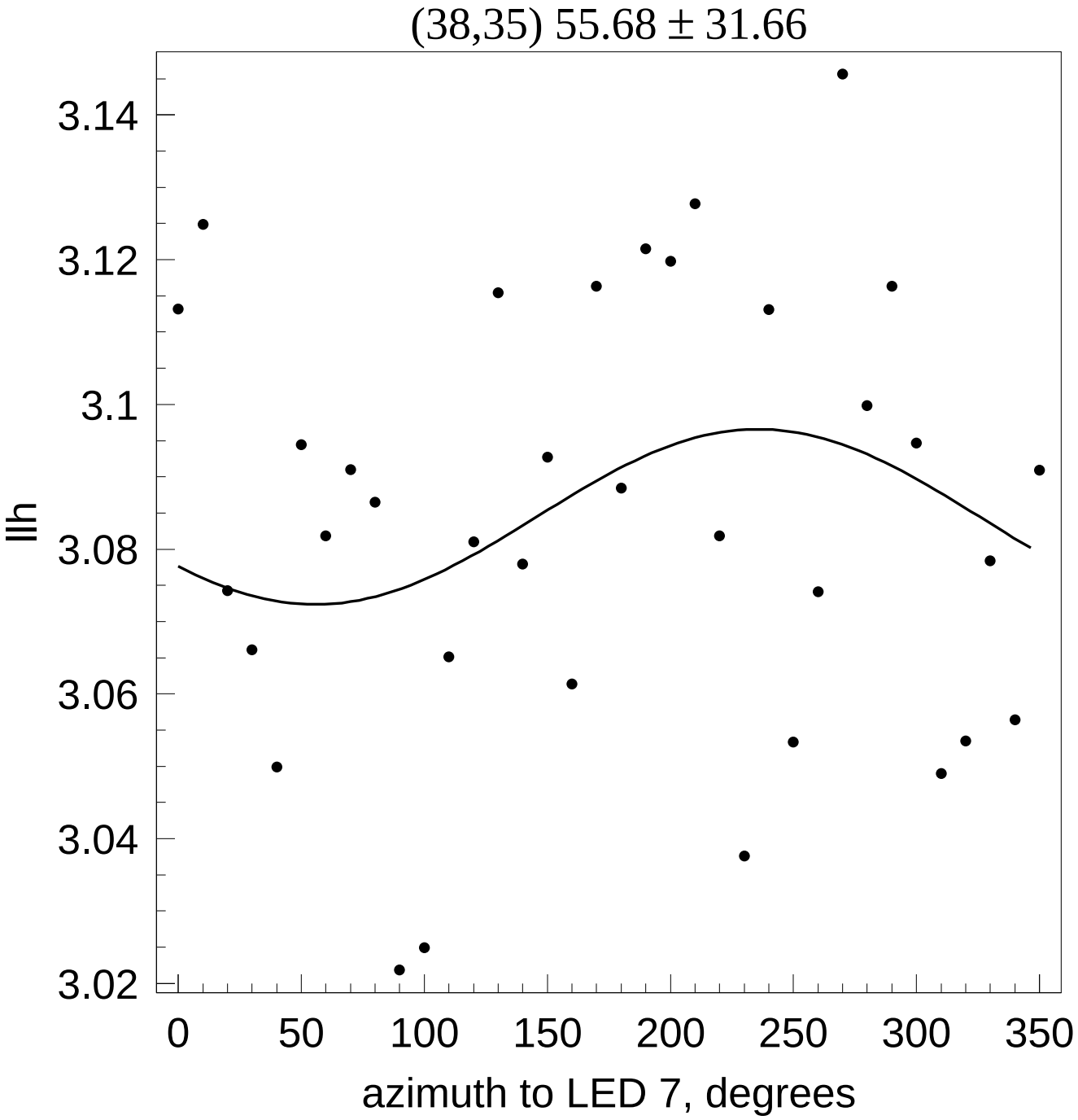

(38,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
205.8 ± 25.9
200
1
2
3
4
5
6
7
8
9
10
11
12

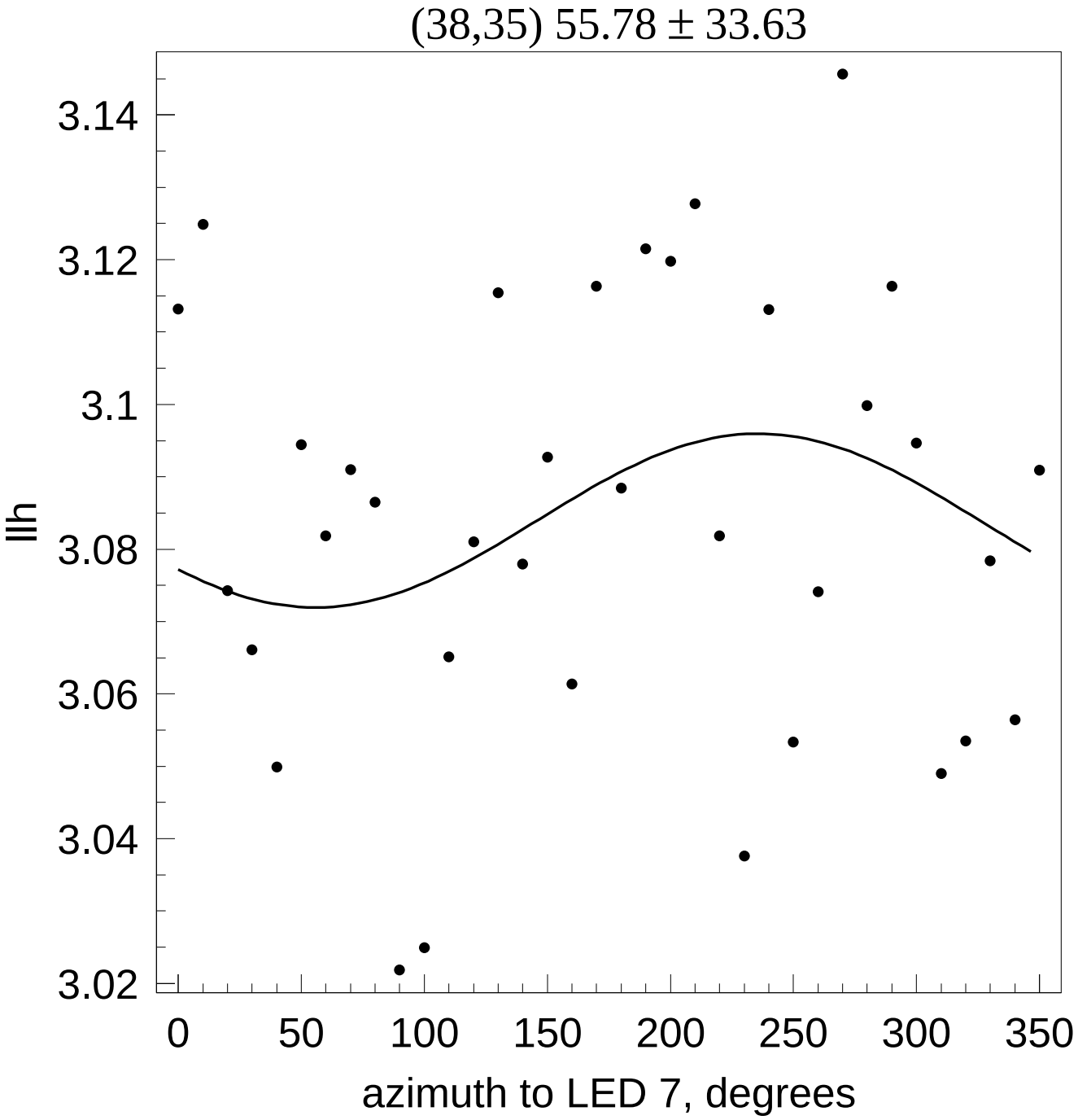

(38,34) 207.04 ± 1.32
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

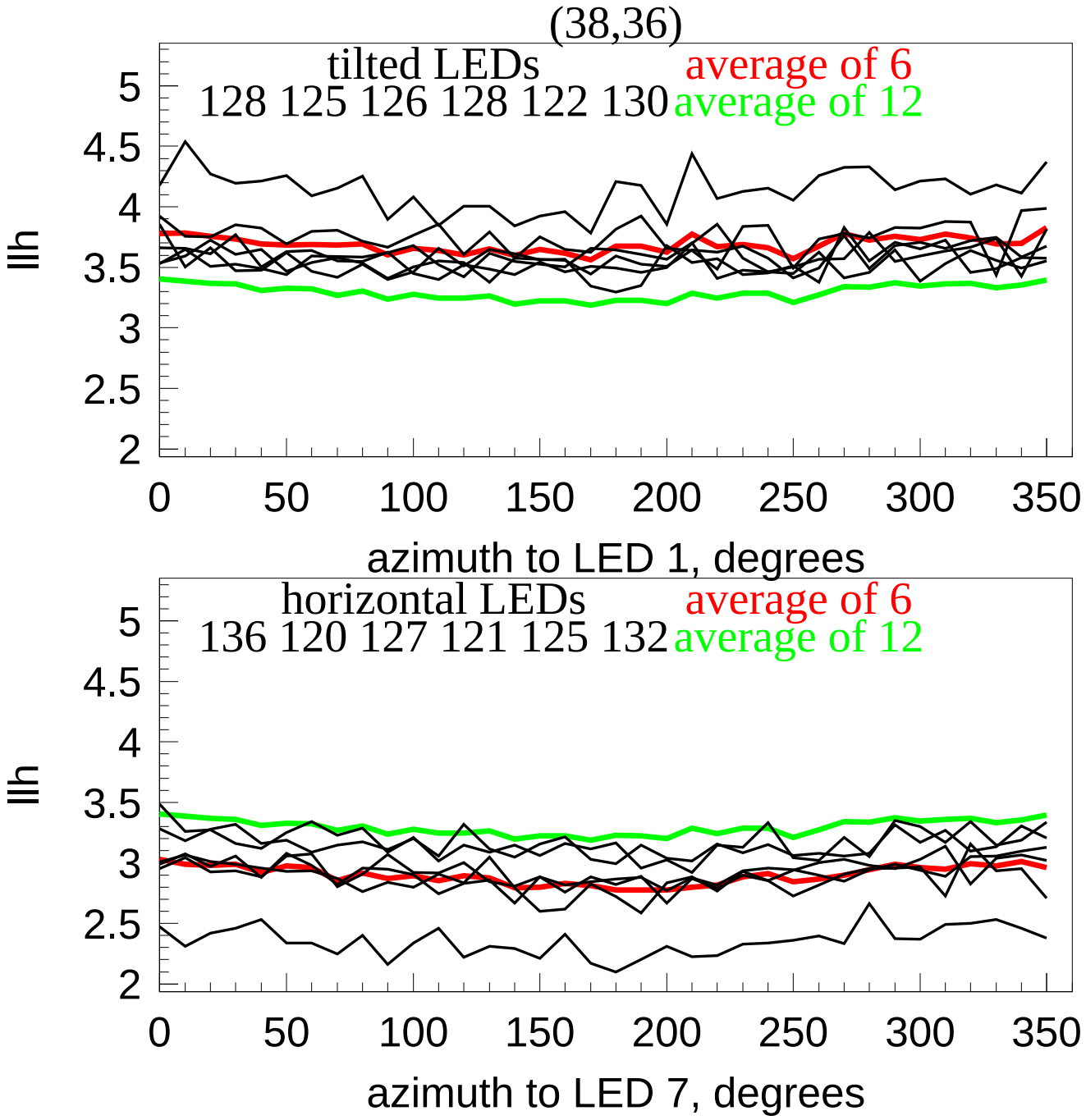

(38,34) 207.03 ± 1.34
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

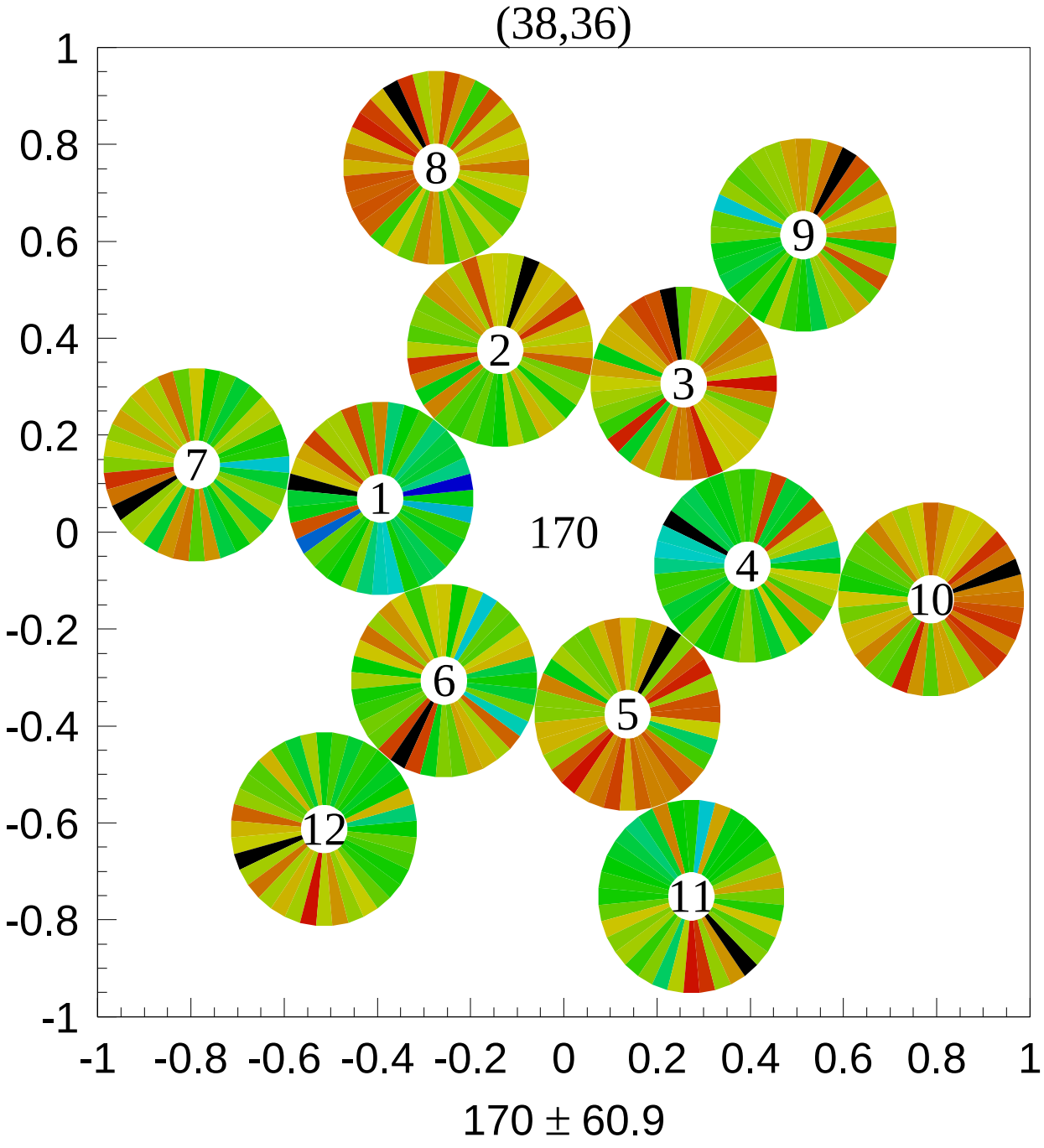

(38,35)
tilted LEDs
131 126 128 124 130 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
106 130 126 123 124 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

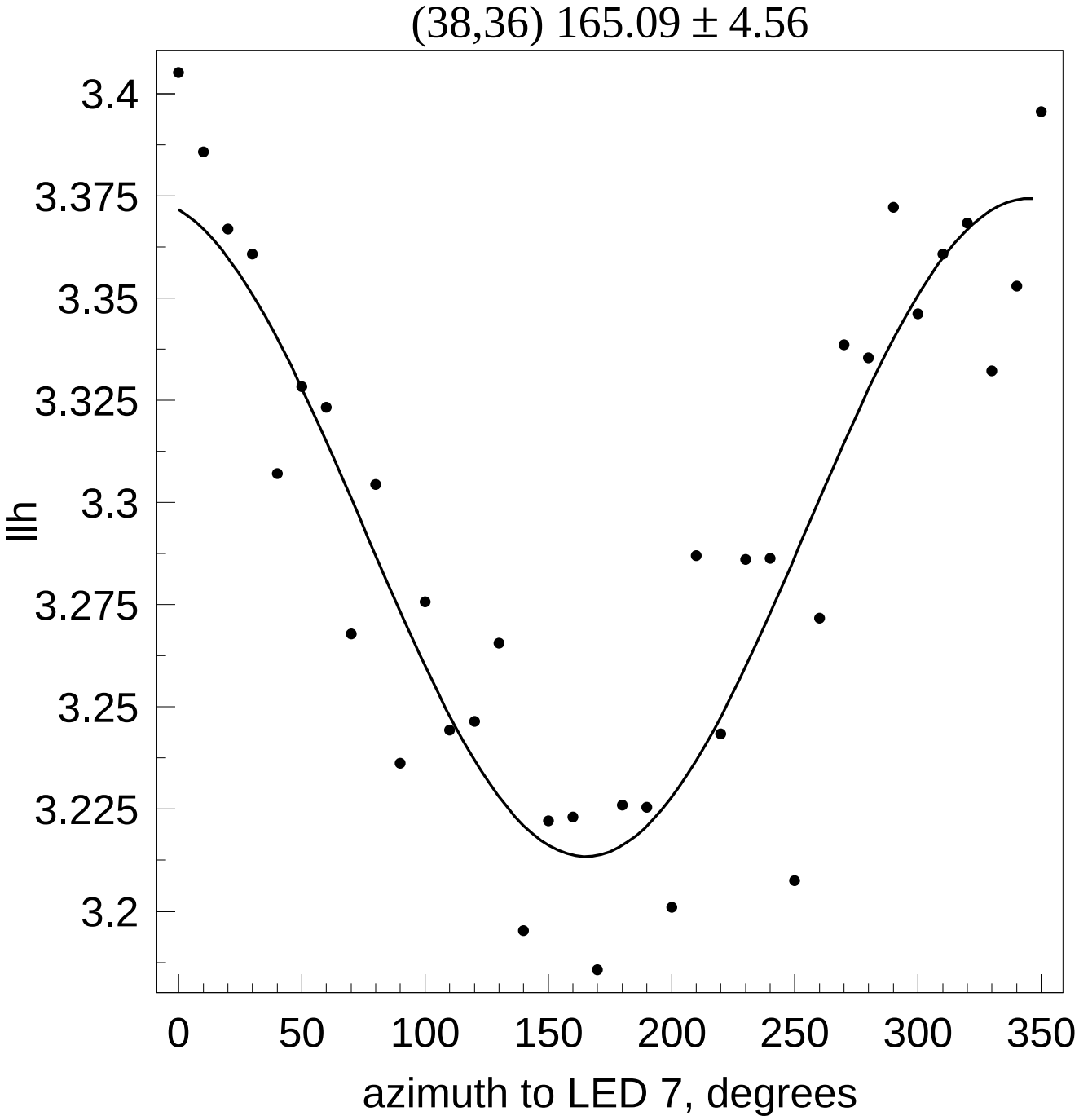

(38,35)
7
12
1
8
6
2
90
5
3
11
4
9
10
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
244.2 ± -999.0

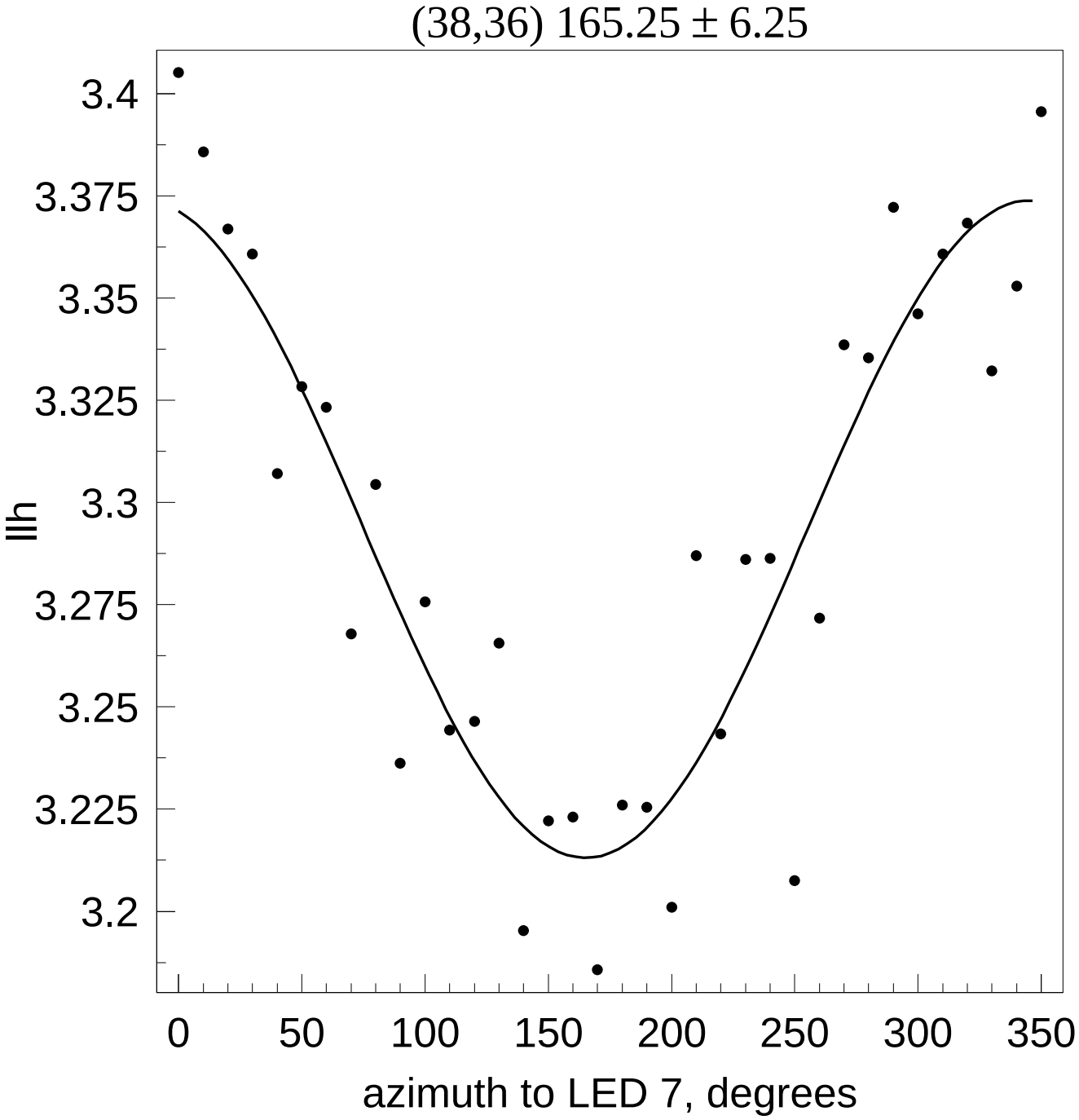

(38,35) 55.68 ± 31.66
3.14
3.12
3.1
3.08
3.06
3.04
3.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

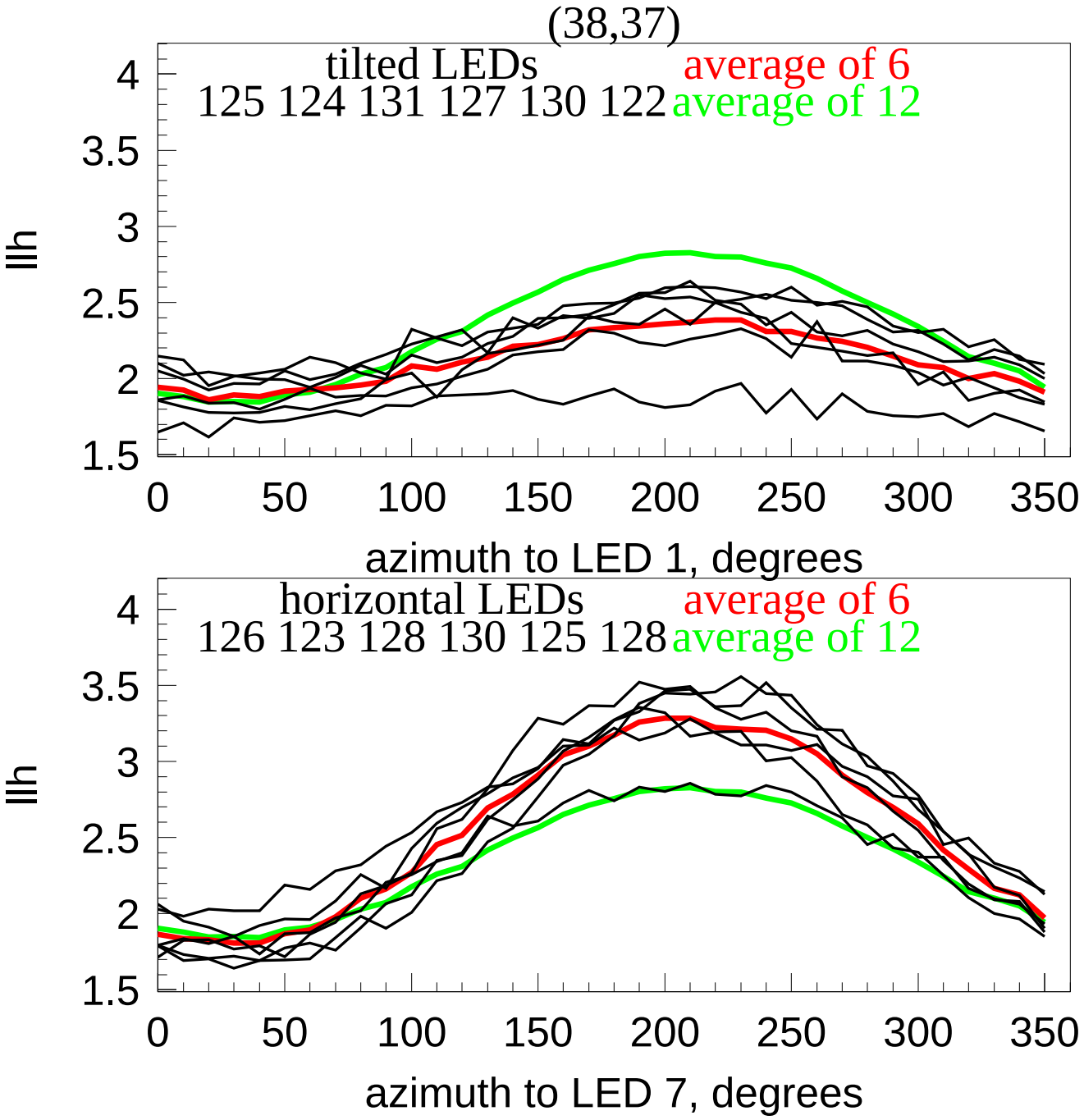

(38,35) 55.78 ± 33.63
3.14
3.12
3.1
3.08
3.06
3.04
3.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

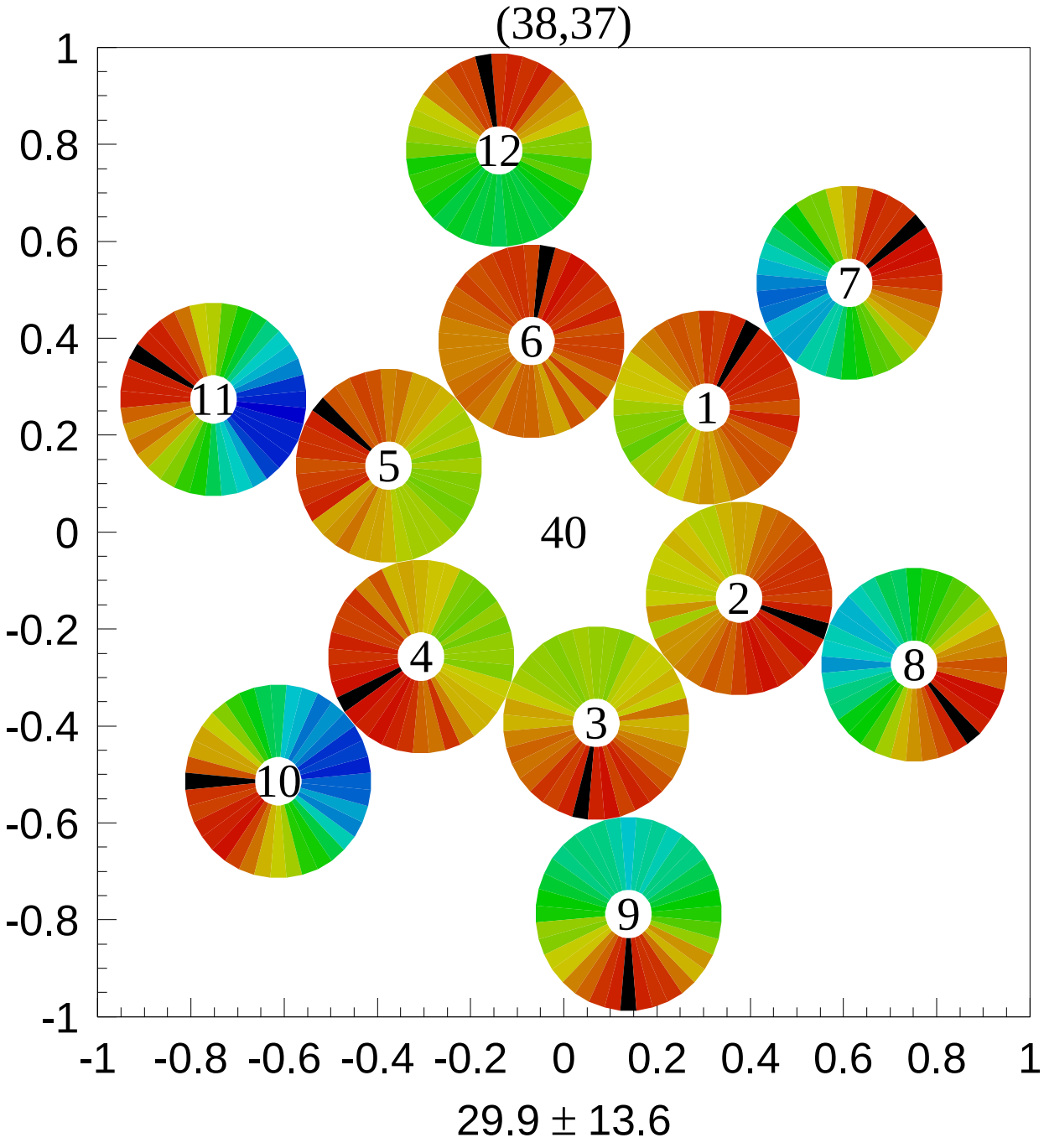

(38,36)
tilted LEDs
128 125 126 128 122 130
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
136 120 127 121 125 132
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

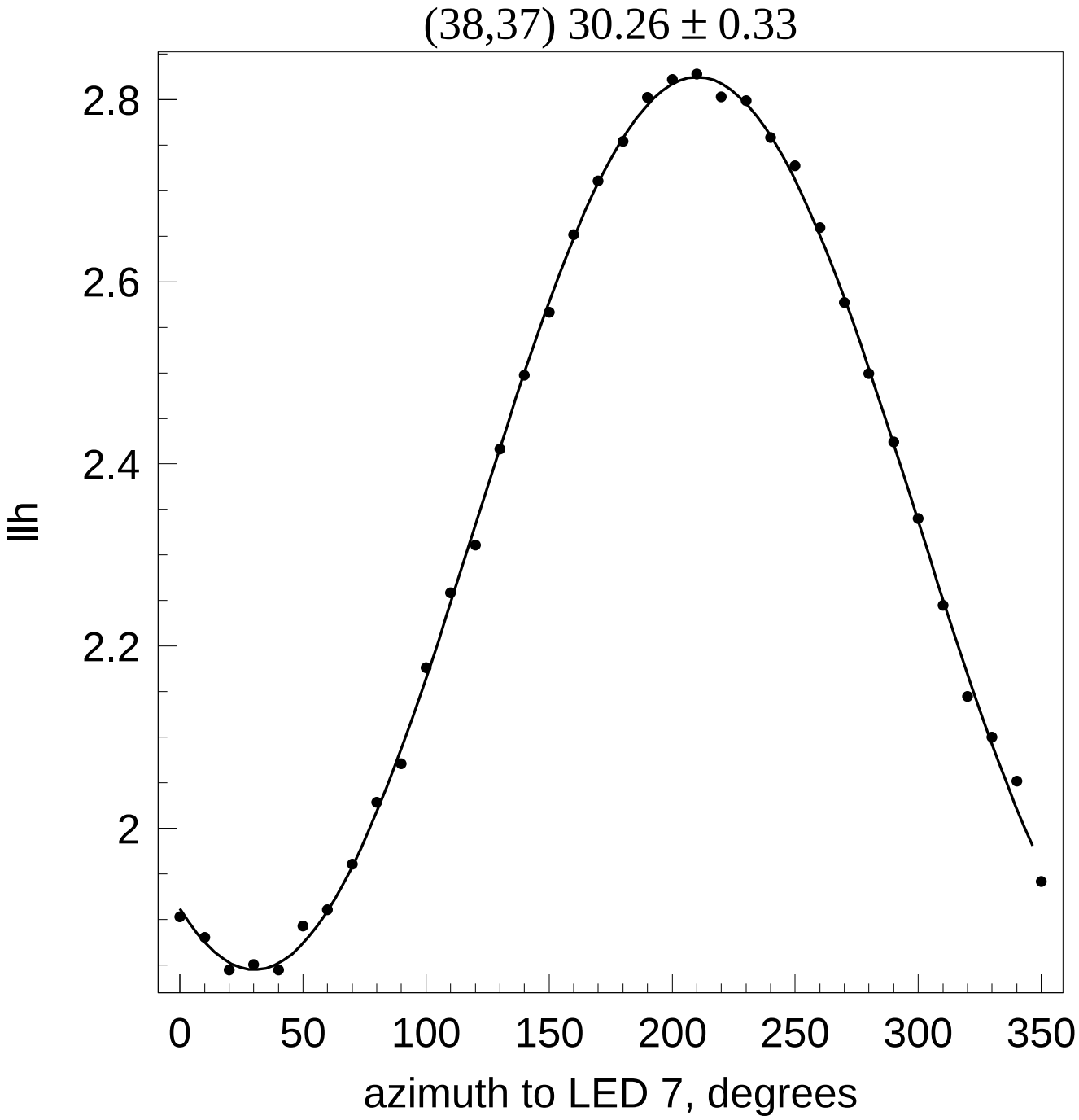

(38,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
170 ± 60.9
8
9
2
3
7
1
170
4
10
6
5
12
11

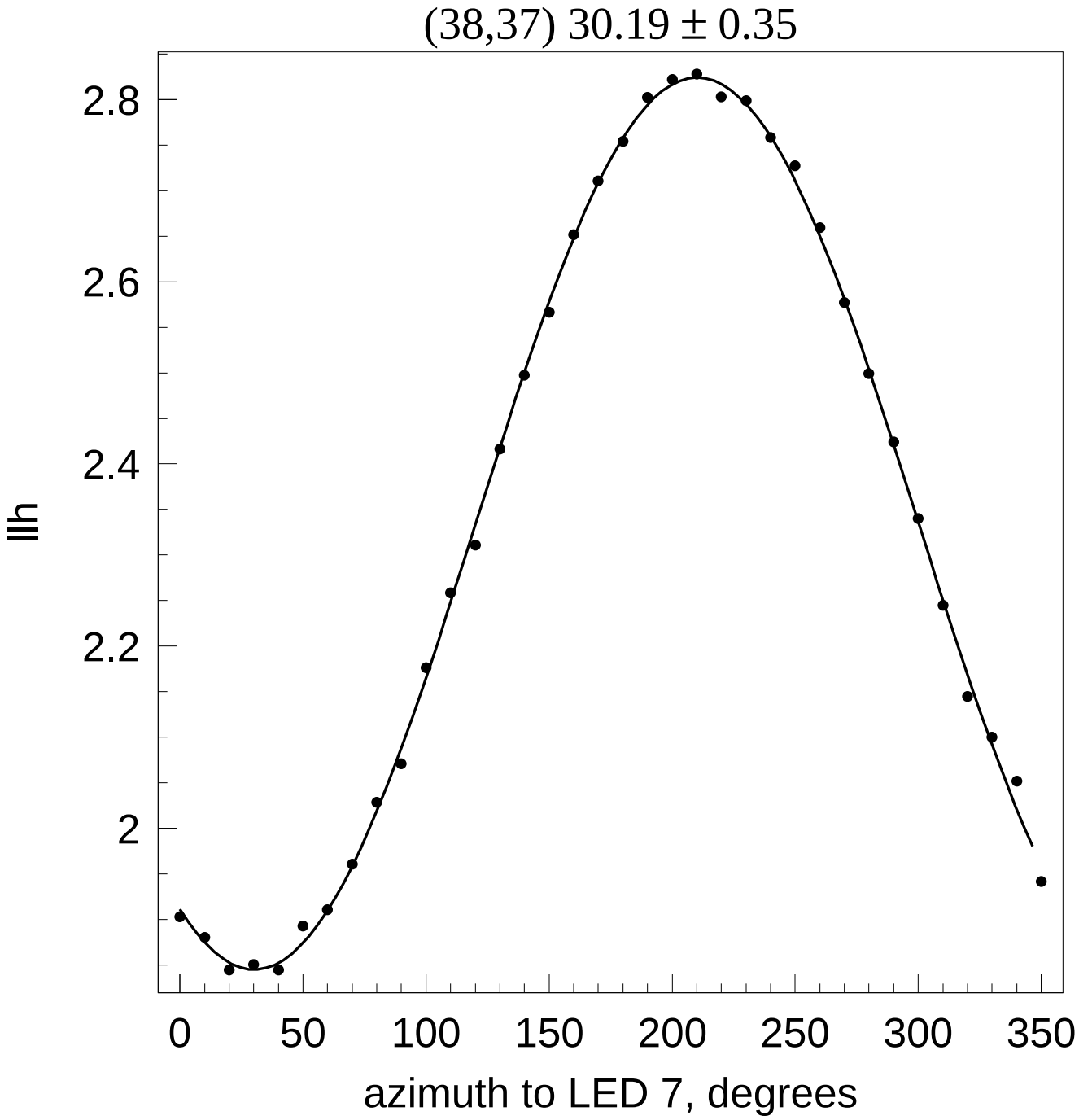

(38,36) 165.09 ± 4.56
3.4
3.375
3.35
3.325
3.3
3.275
3.25
3.225
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

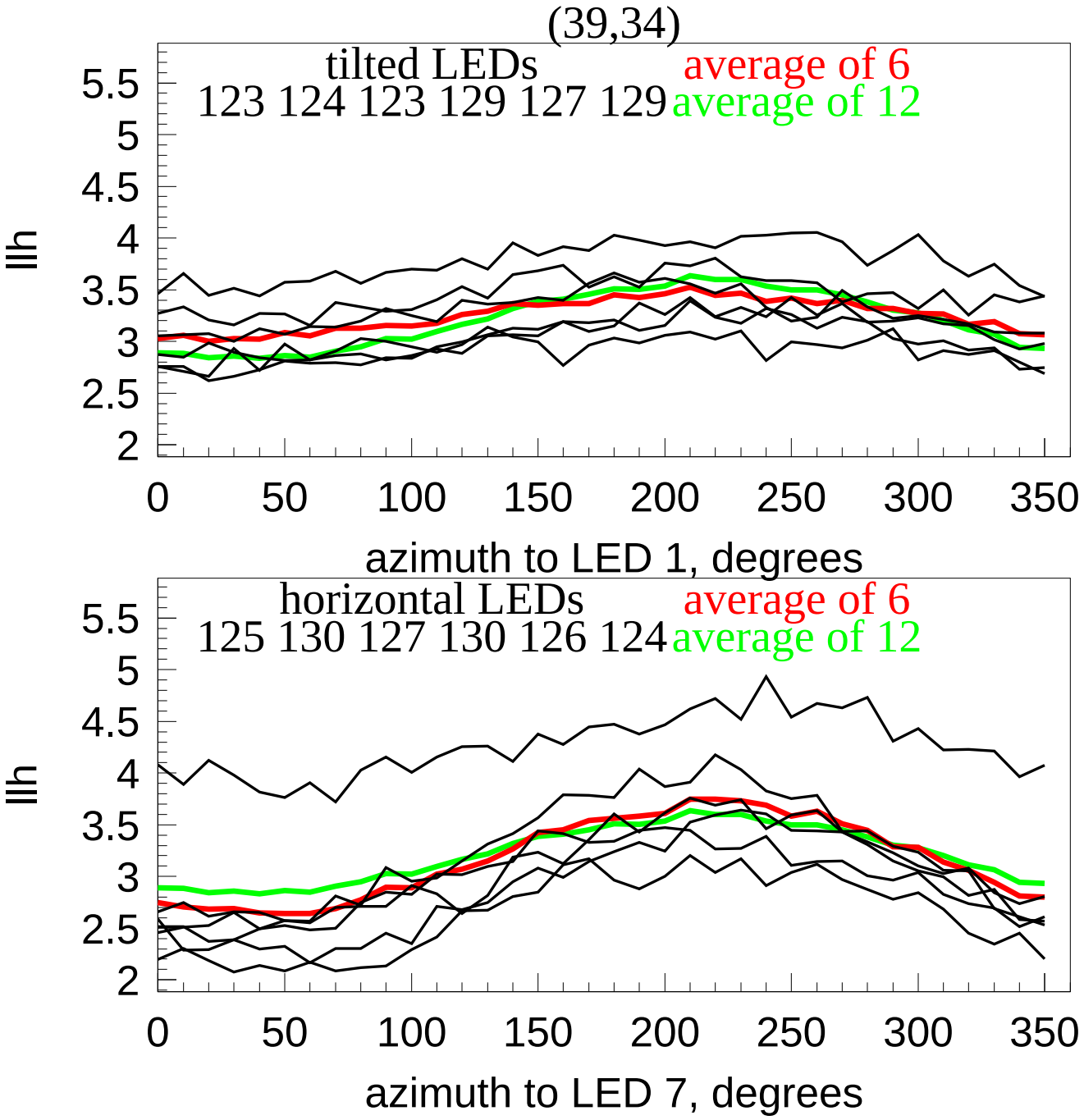

(38,36) 165.25 ± 6.25
3.4
3.375
3.35
3.325
3.3
3.275
3.25
3.225
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

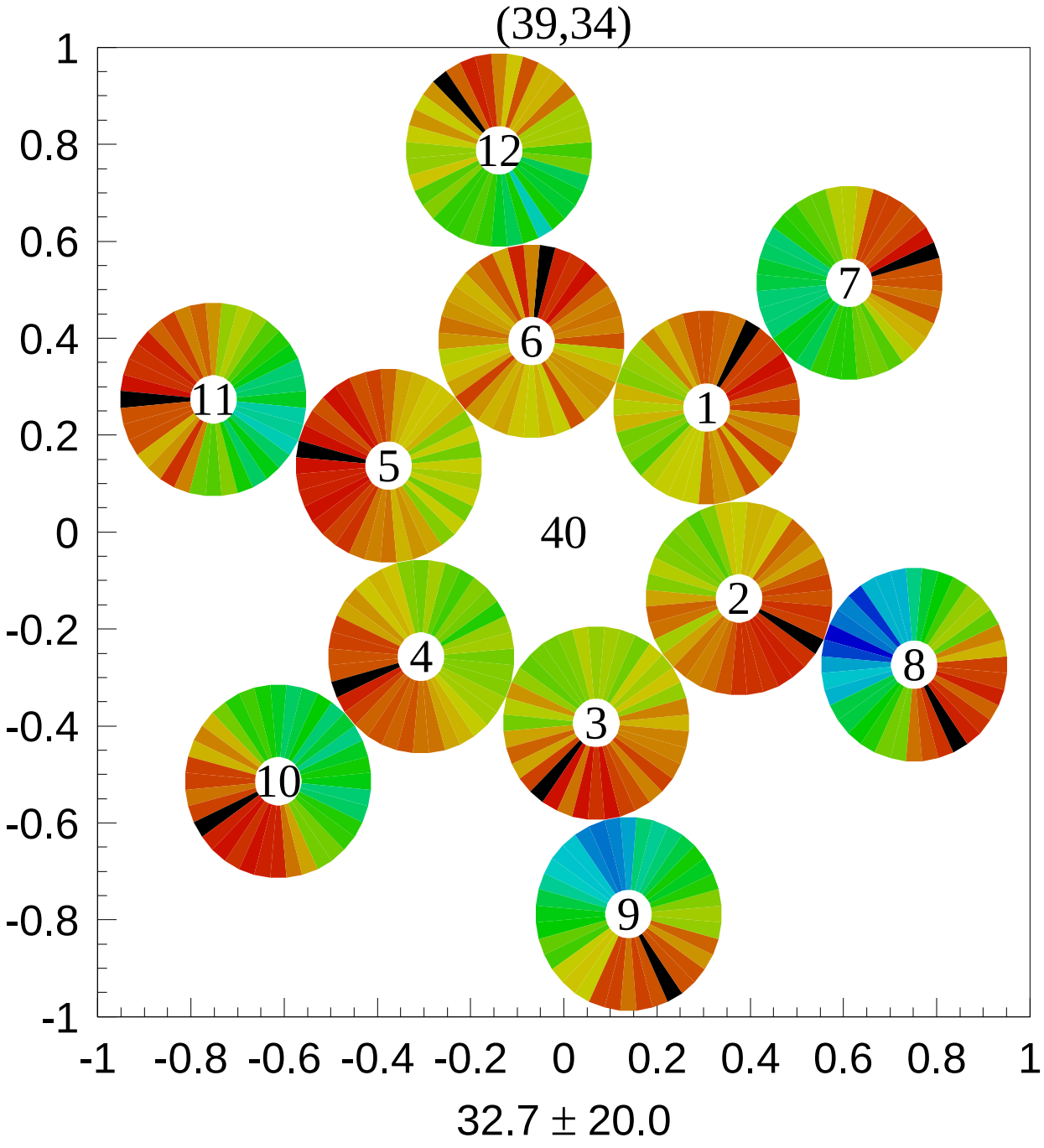

(38,37)
tilted LEDs
125 124 131 127 130 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 123 128 130 125 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

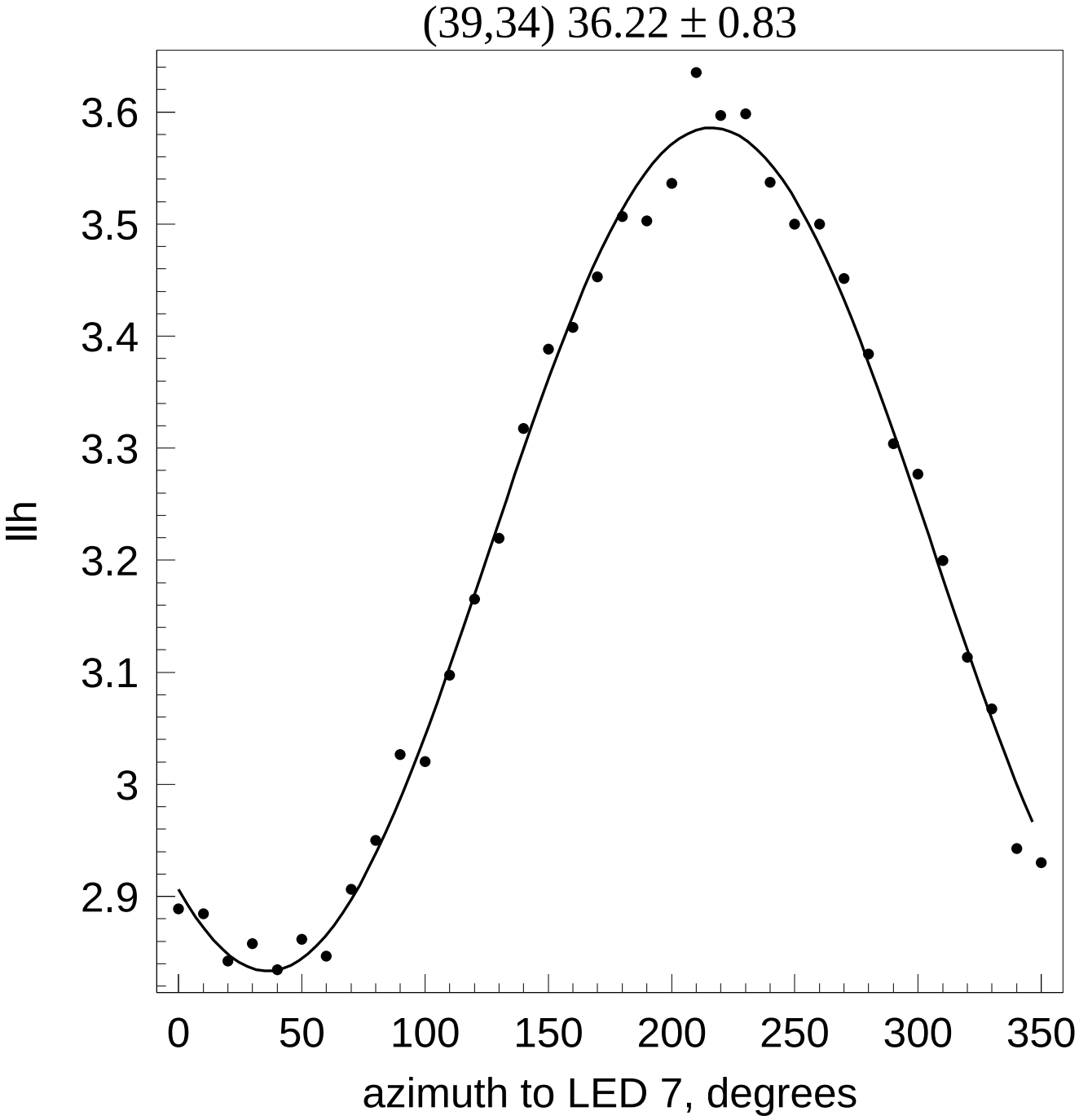

(38,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
11
1
5
40
2
4
8
3
10
9
29.9 ± 13.6

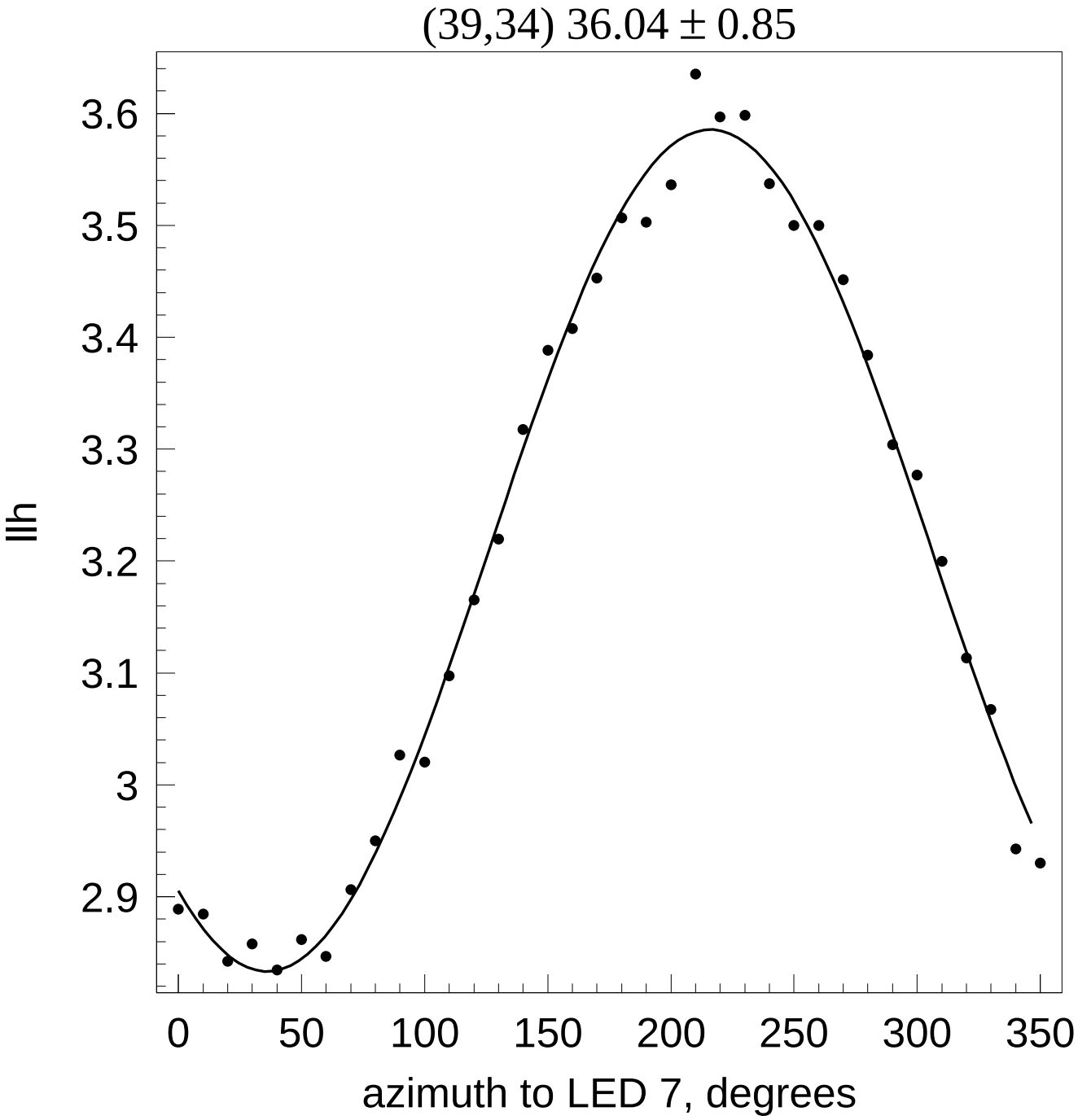

(38,37) 30.26 ± 0.33
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

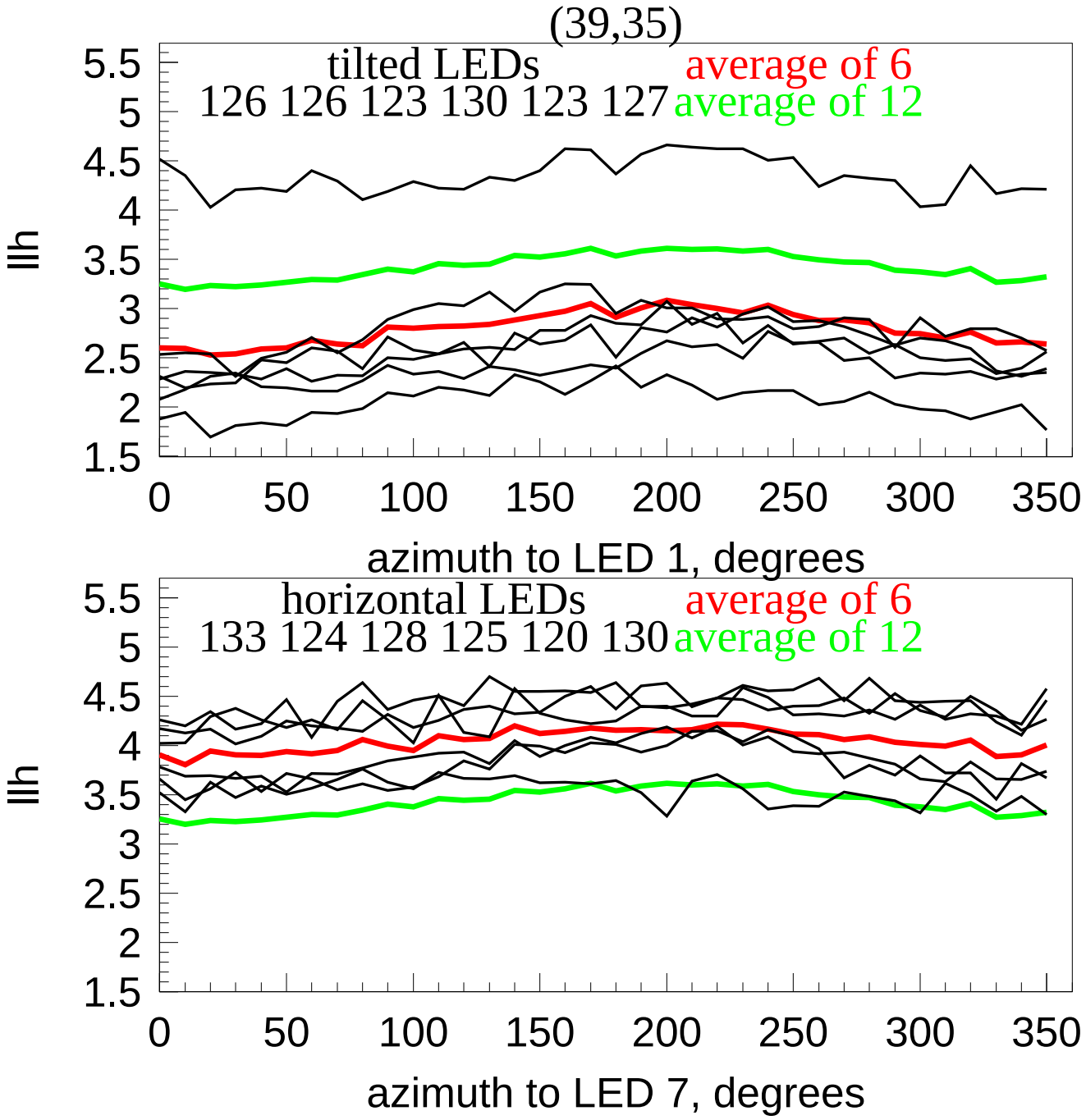

(38,37) 30.19 ± 0.35
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

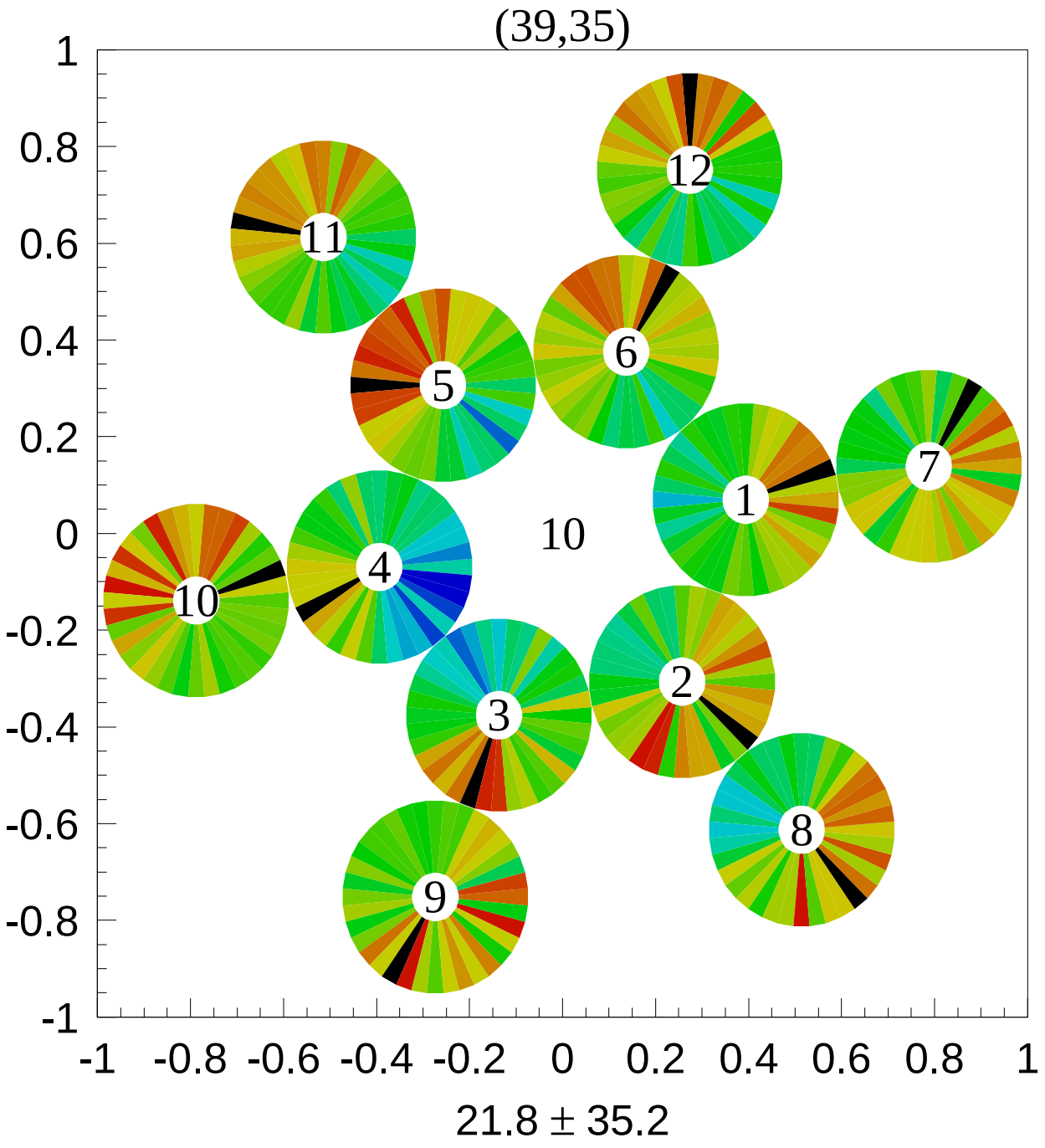

(39,34)
tilted LEDs
123 124 123 129 127 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 130 127 130 126 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

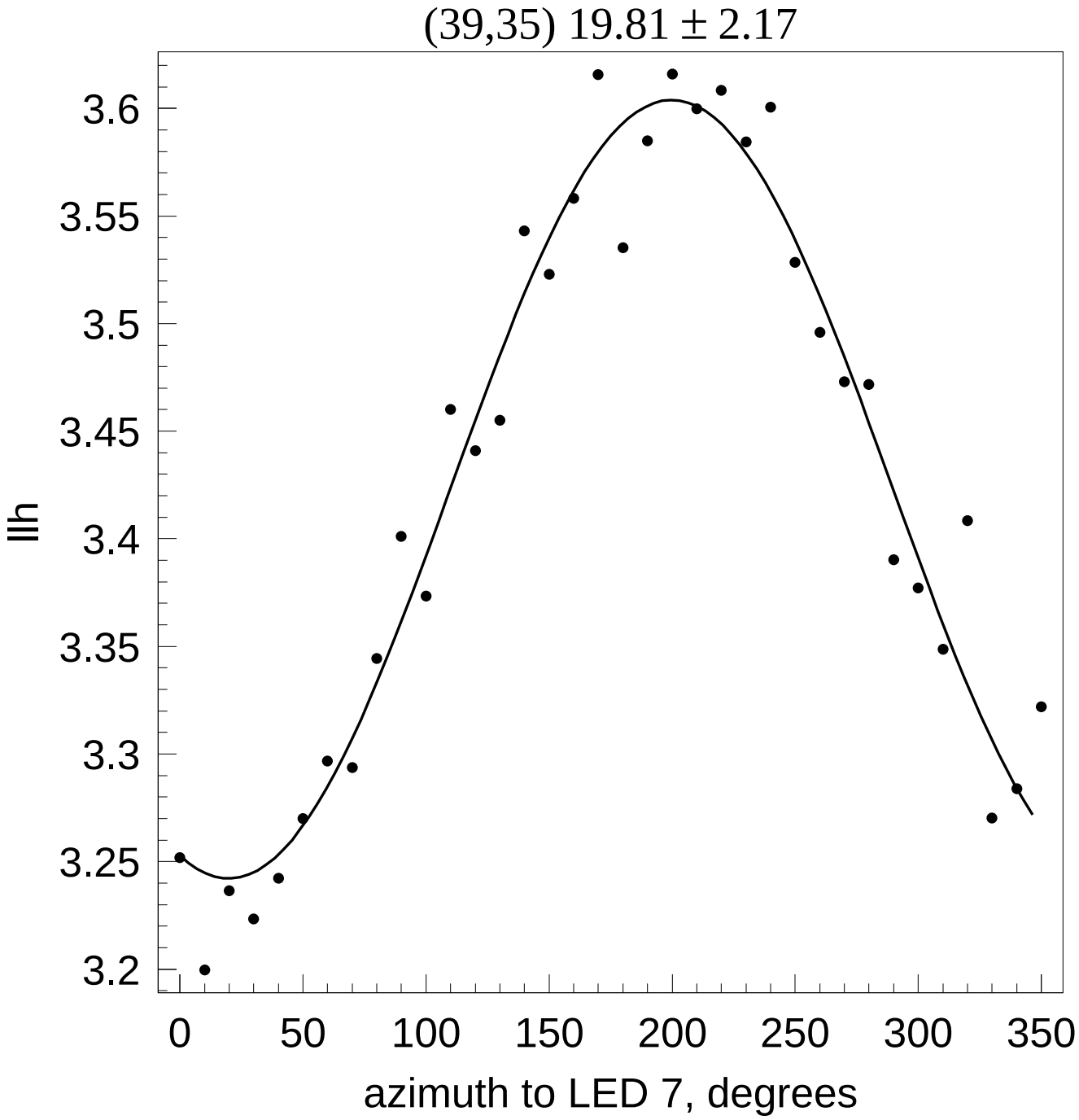

(39,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
11
1
5
40
2
8
4
3
10
9
32.7 ± 20.0

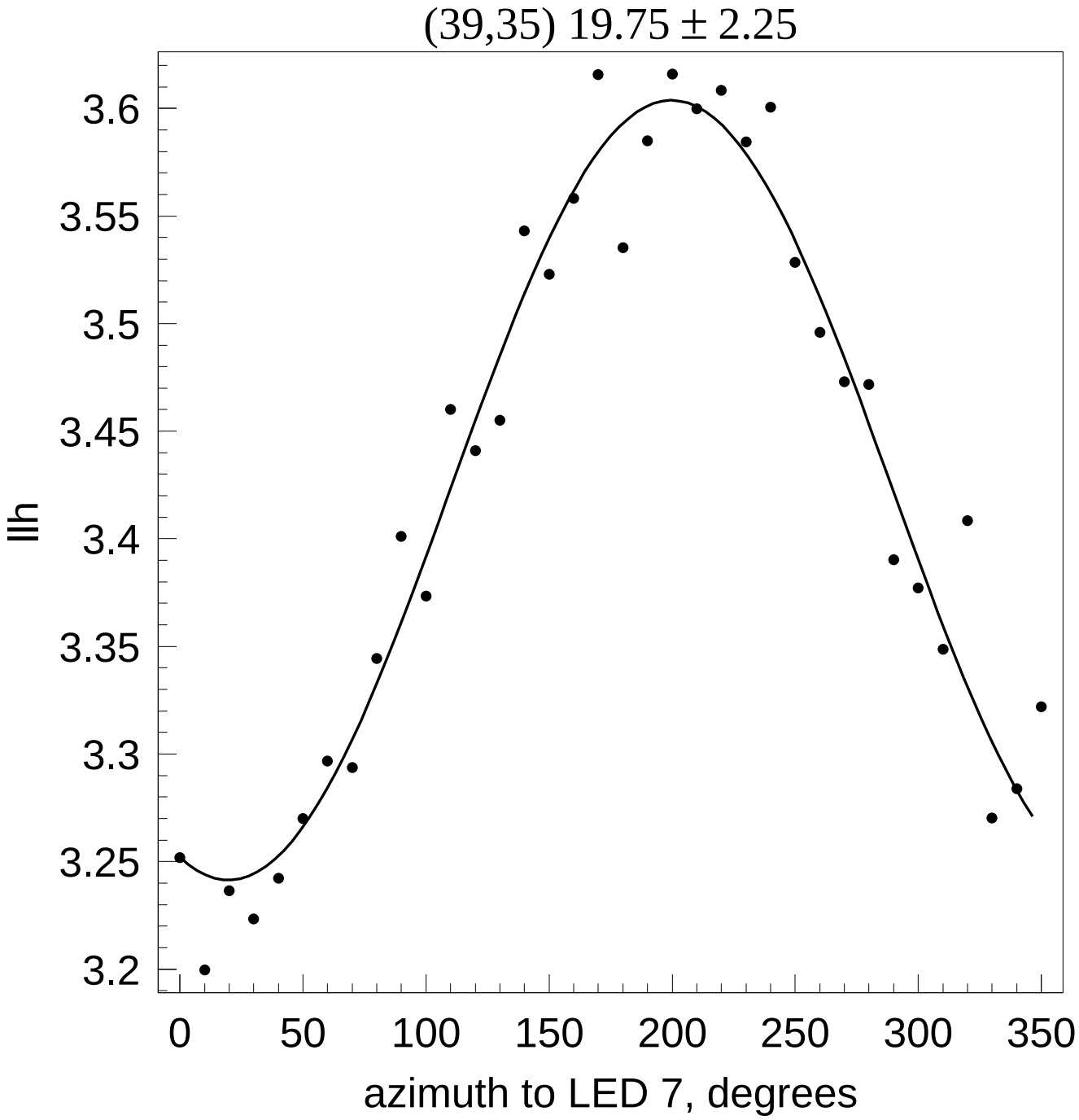

(39,34) 36.22 ± 0.83
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

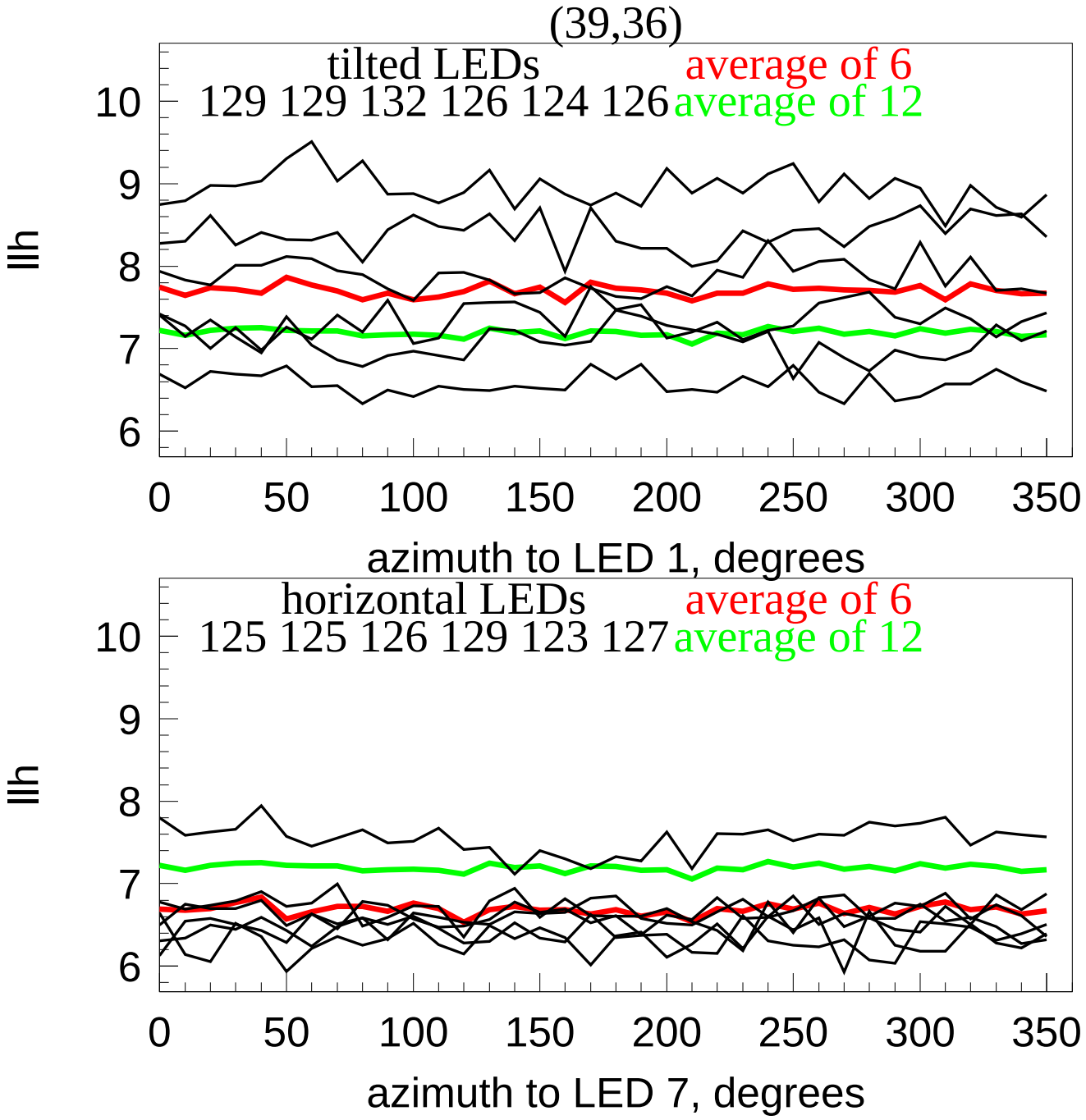

(39,34) 36.04 ± 0.85
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

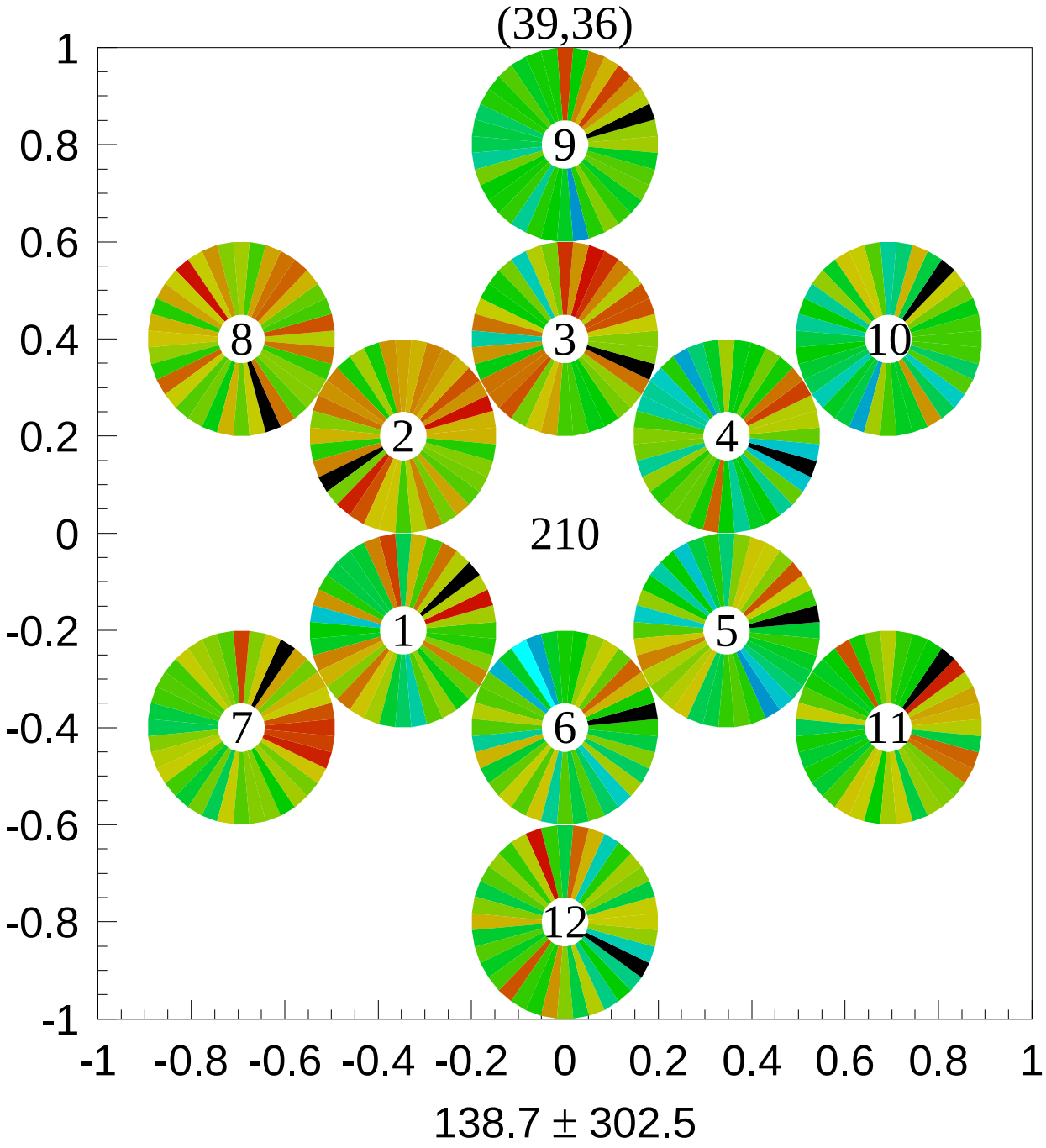

(39,35)
tilted LEDs
126 126 123 130 123 127
average of 6
average of 12
IIh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
133 124 128 125 120 130
average of 6
average of 12
IIh
azimuth to LED 7, degrees

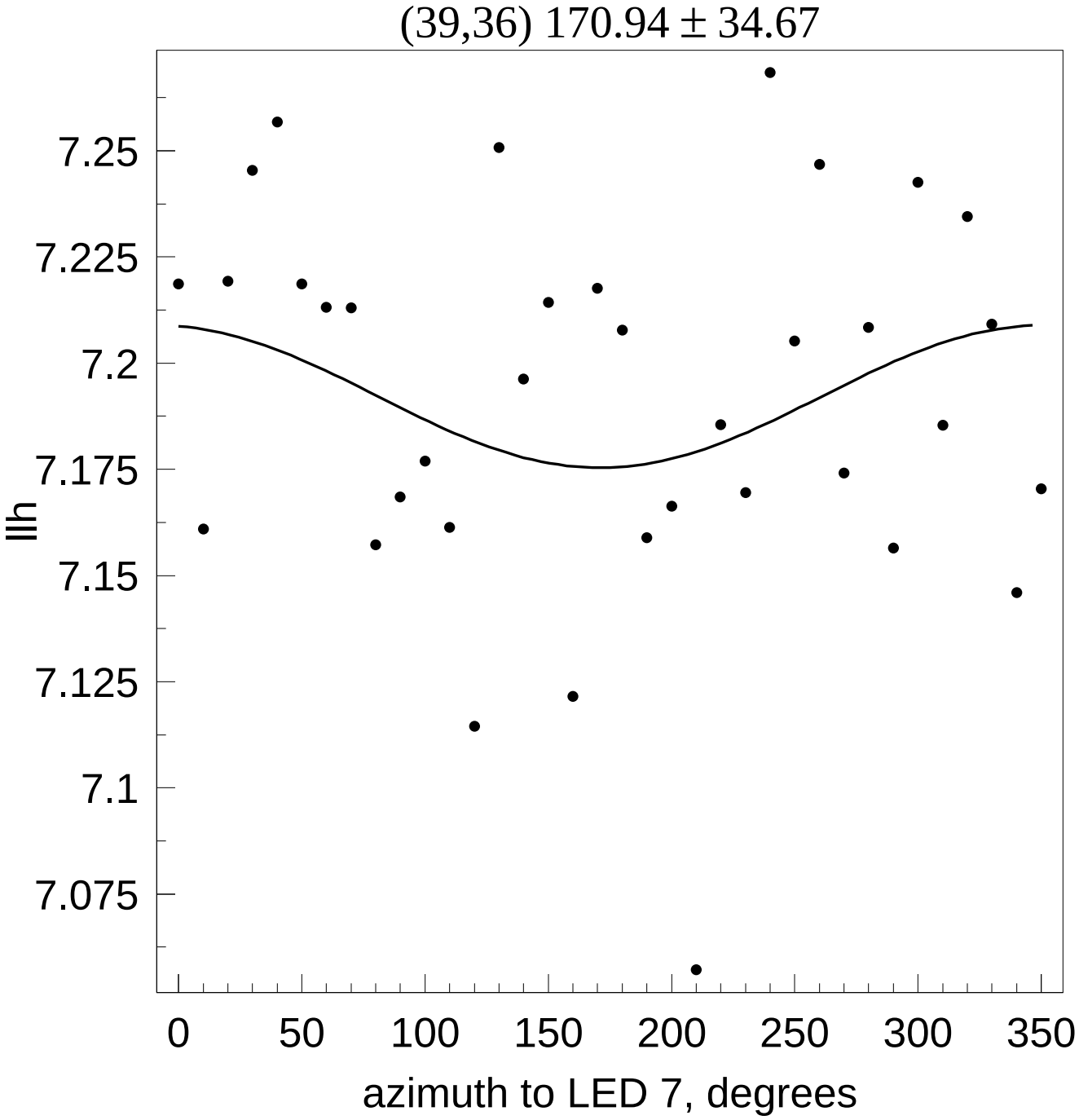

(39,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
10
4
10
2
3
8
9
21.8 ± 35.2

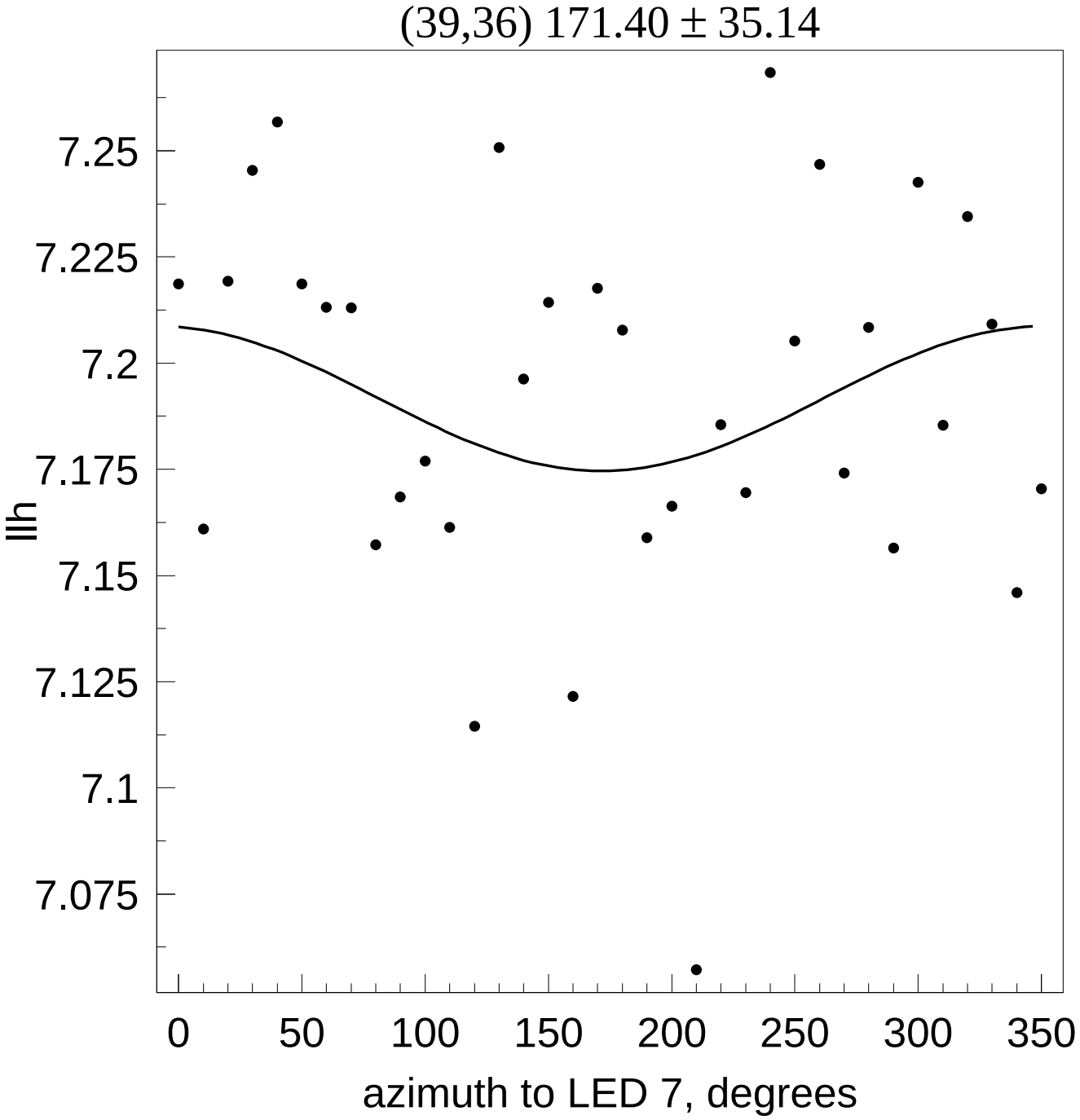

(39,35) 19.81 ± 2.17
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

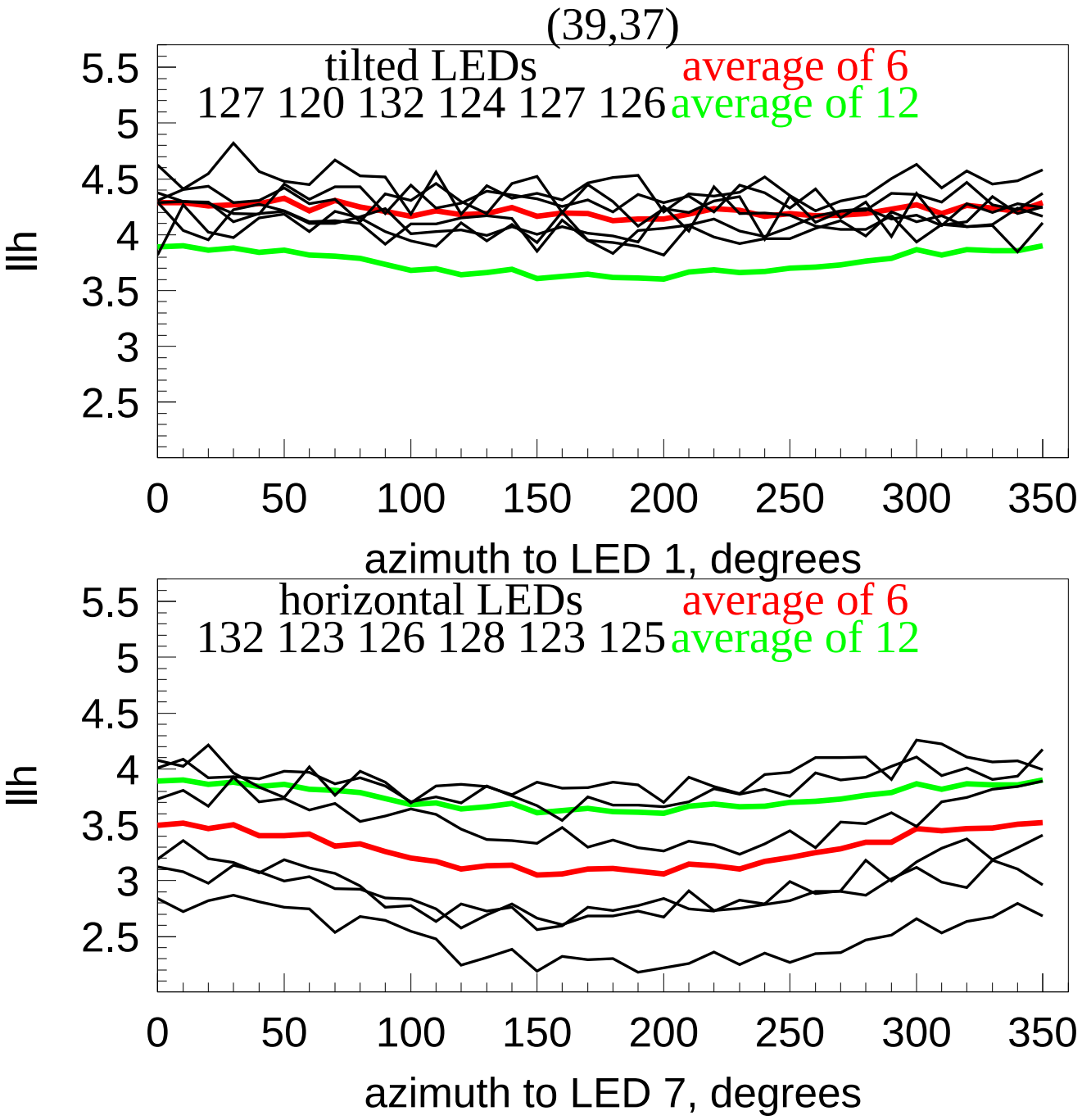

(39,35) 19.75 ± 2.25
3.6
3.55
3.5
3.45
3.4
3.35
3.3
3.25
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

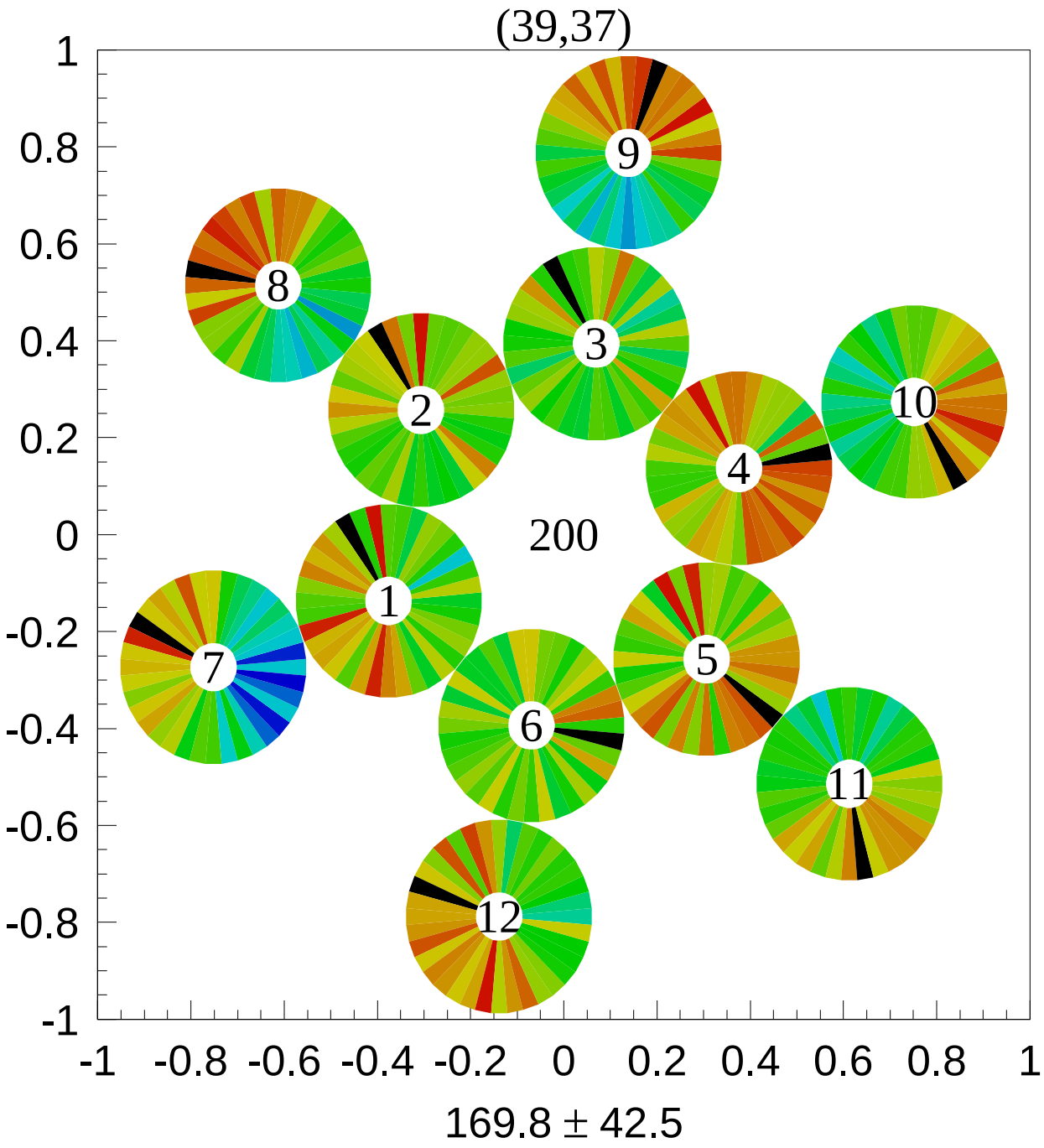

(39,36)
tilted LEDs
129 129 132 126 124 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 125 126 129 123 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

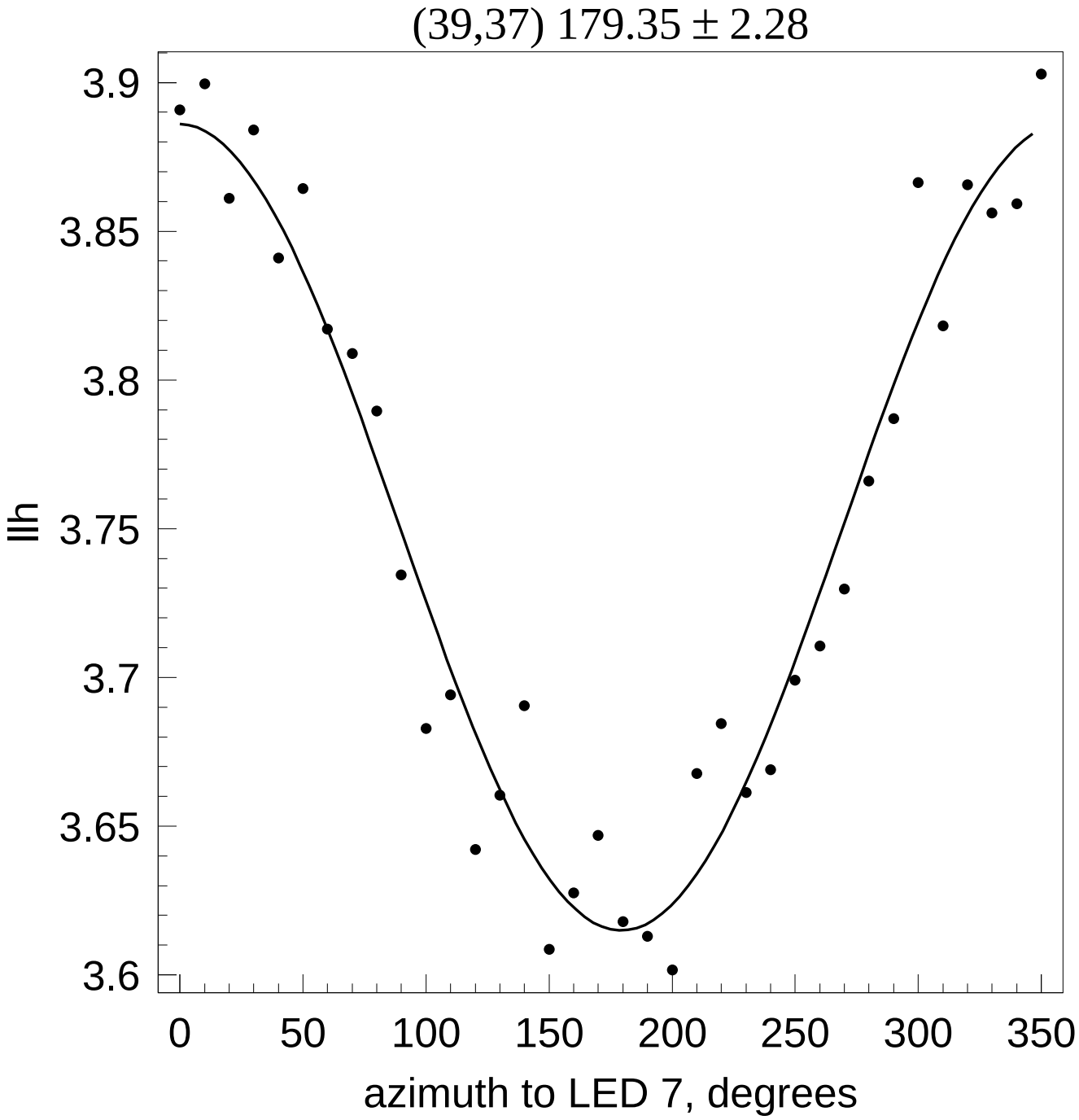

(39,36)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
138.7 ± 302.5

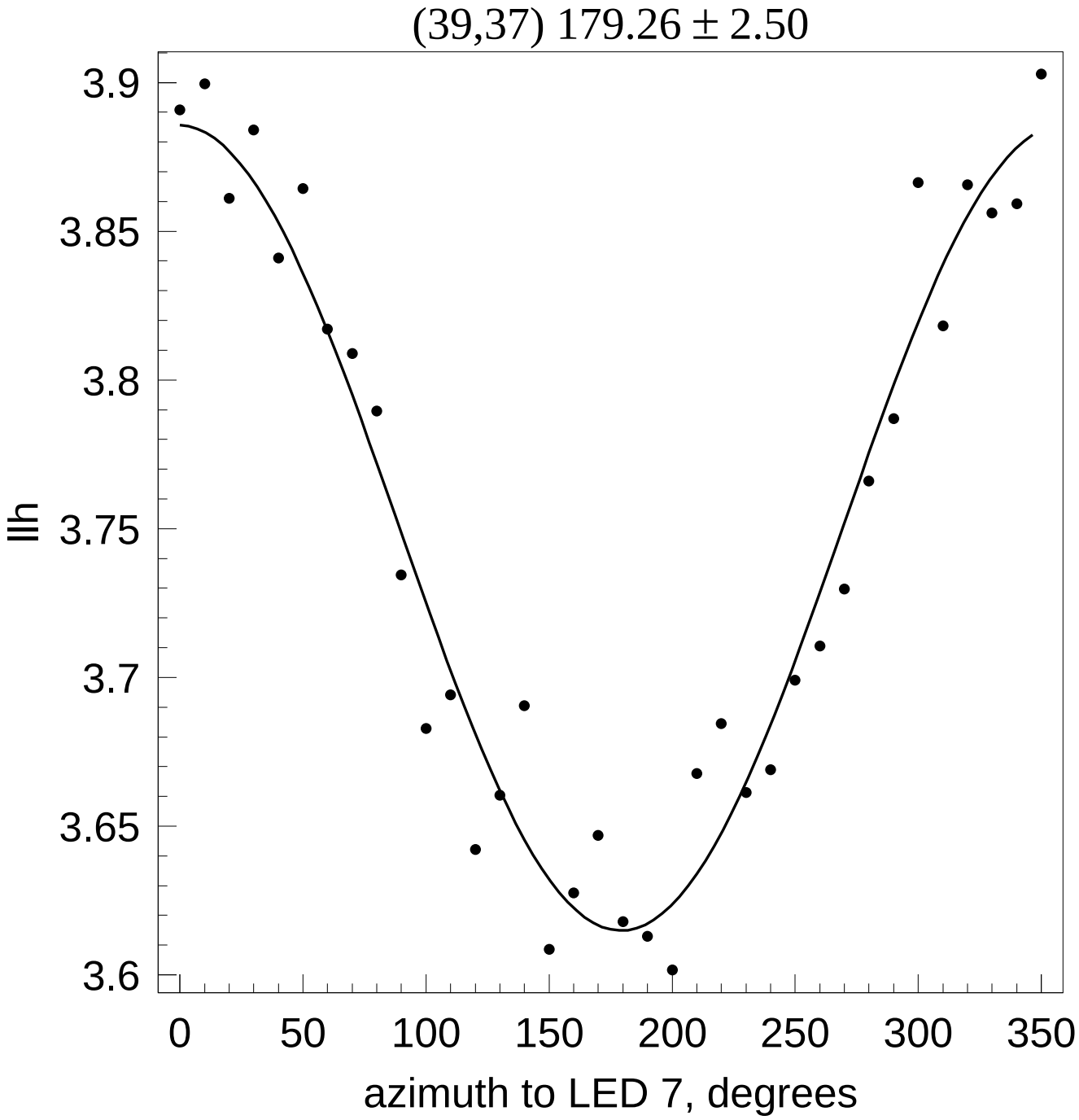

(39,36) 170.94 ± 34.67
7.25
7.225
7.2
7.175
7.15
7.125
7.1
7.075
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

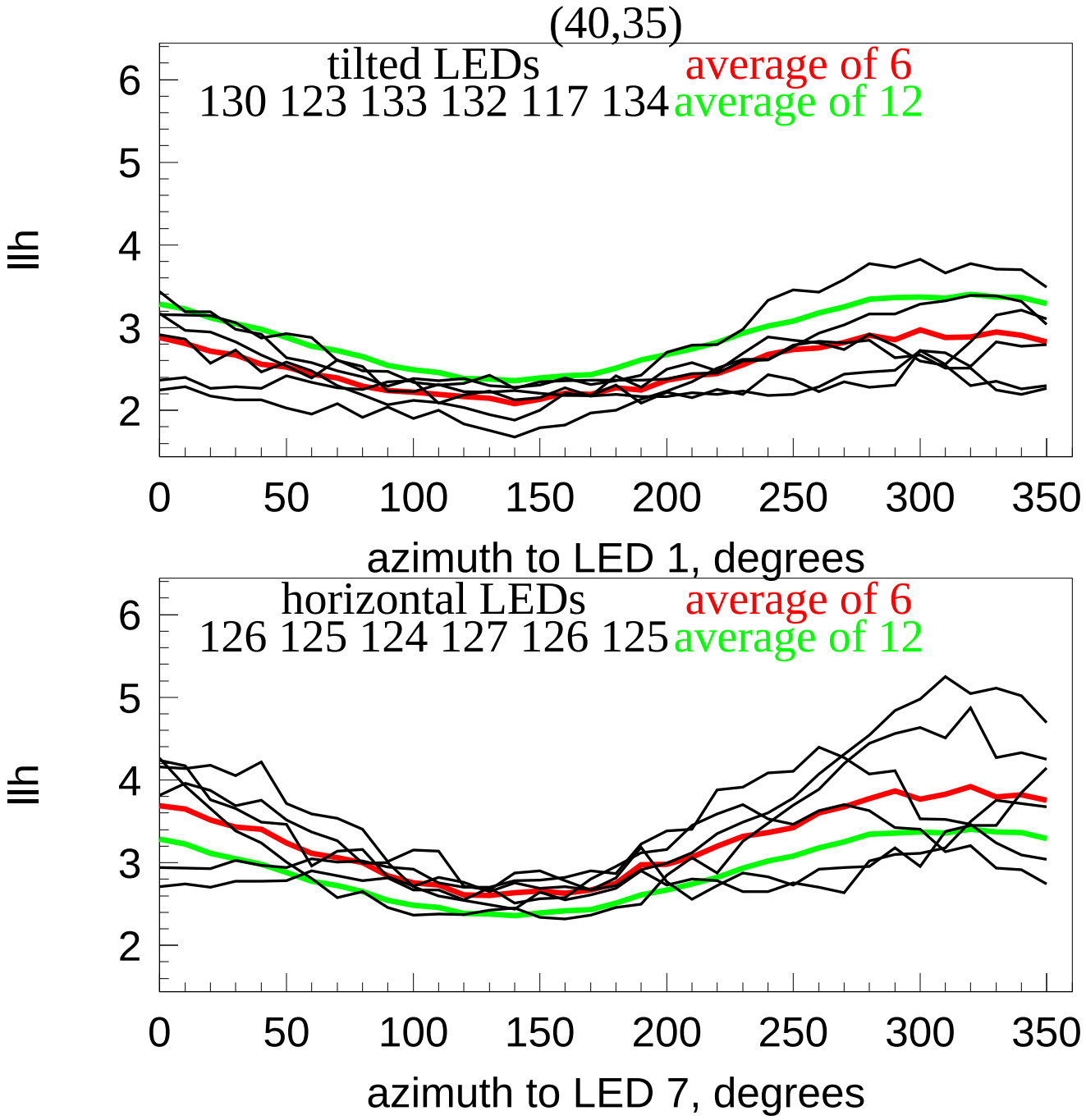

(39,36) 171.40 ± 35.14
7.25
7.225
7.2
7.175
7.15
7.125
7.1
7.075
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

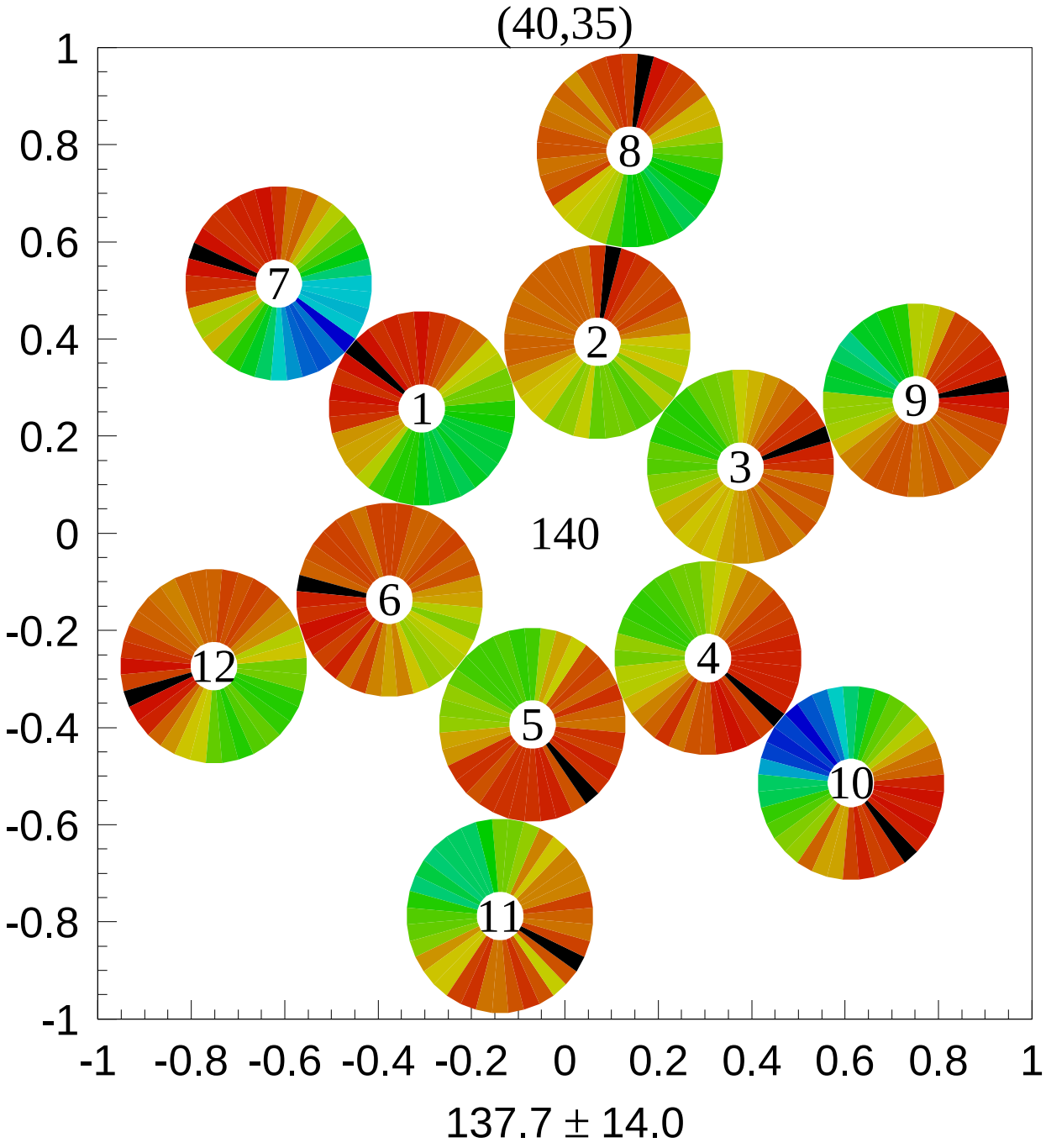

(39,37)
tilted LEDs
127 120 132 124 127 126
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 123 126 128 123 125
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

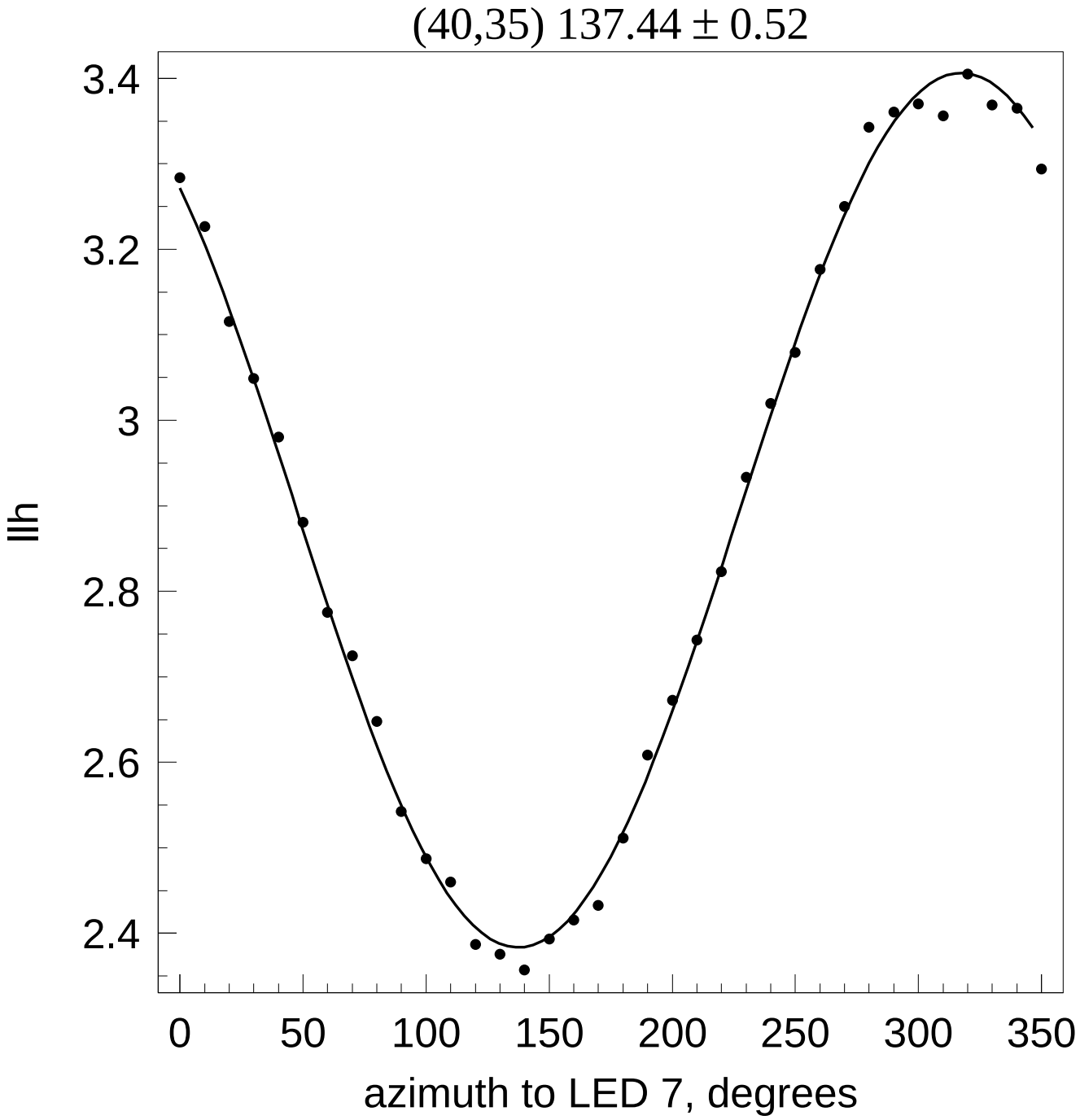

(39,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
8
3
2
10
4
200
1
7
5
6
11
12
169.8 ± 42.5

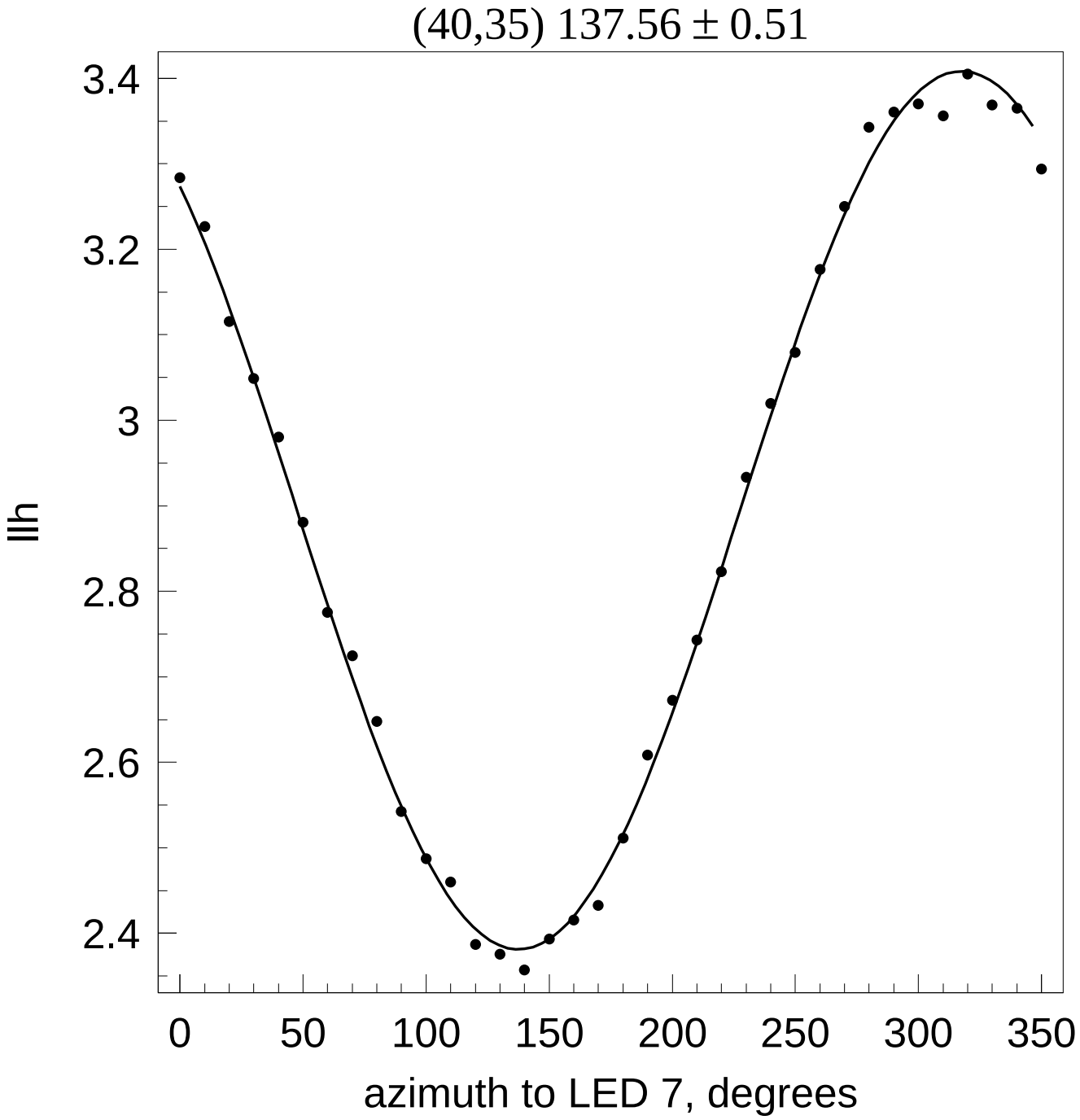

(39,37) 179.35 ± 2.28
3.9
3.85
3.8
3.75
3.7
3.65
3.6
lih
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

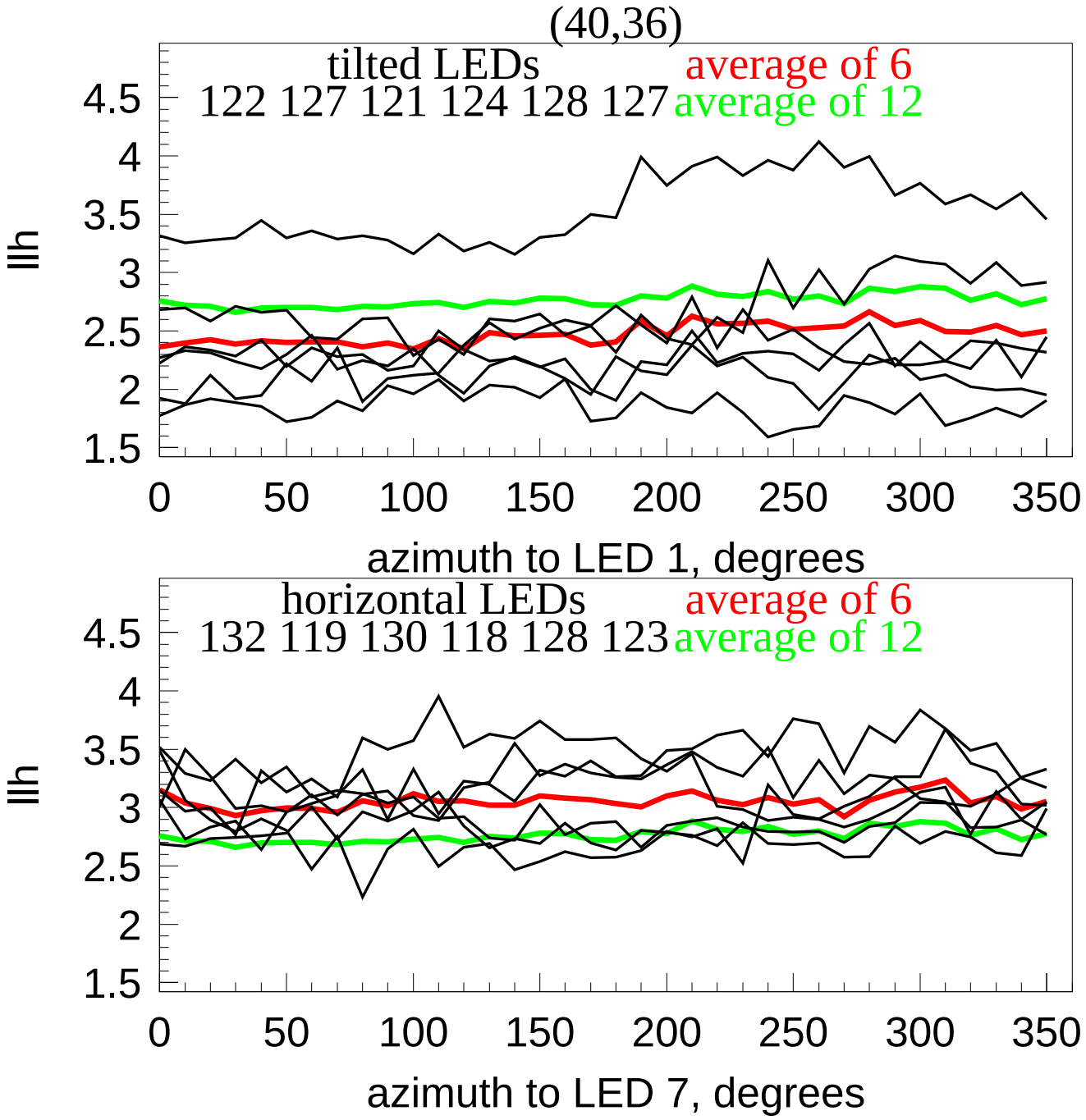

(39,37) 179.26 ± 2.50
3.9
3.85
3.8
3.75
3.7
3.65
3.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

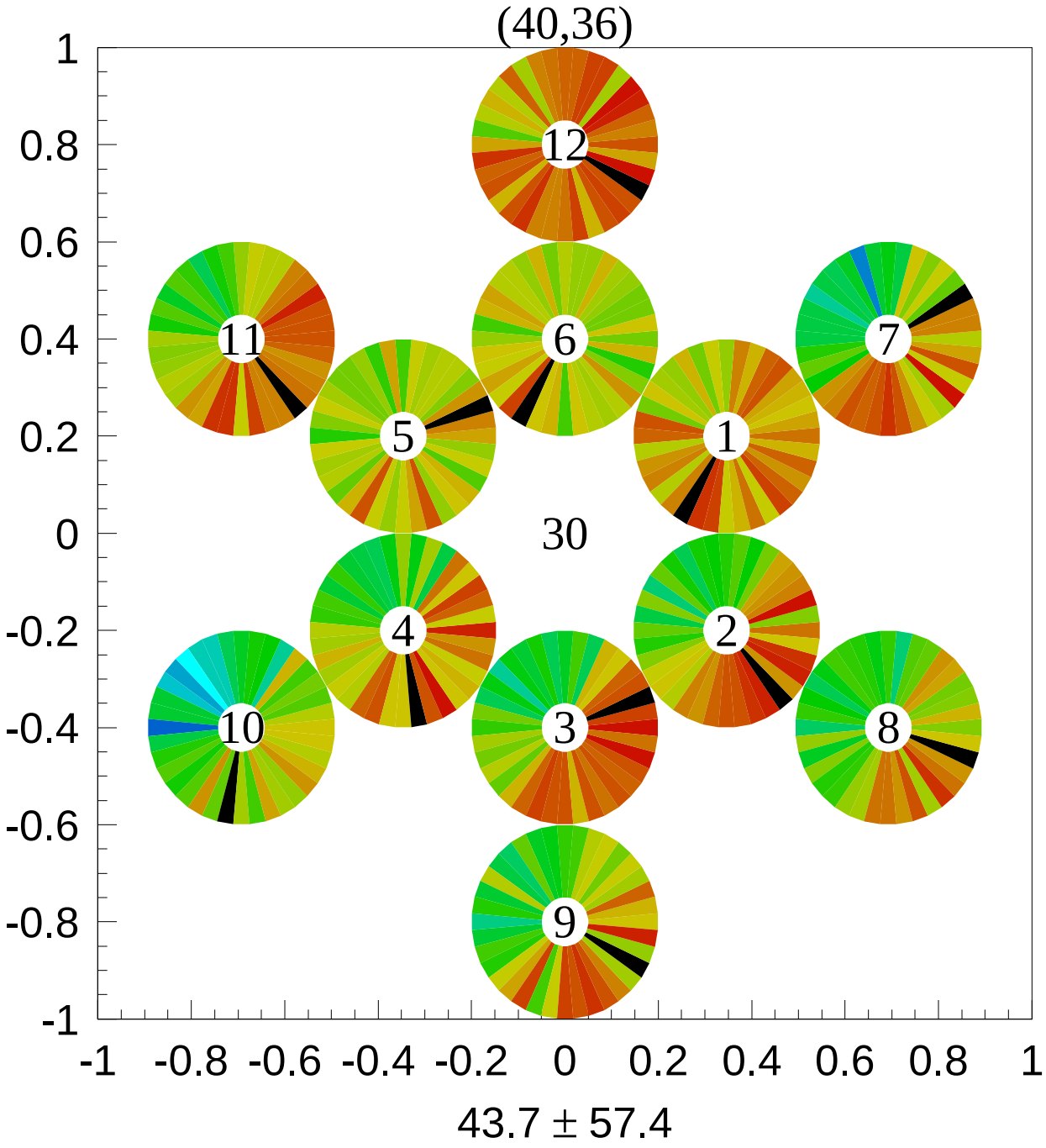

(40,35)
tilted LEDs
130 123 133 132 117 134
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
126 125 124 127 126 125
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

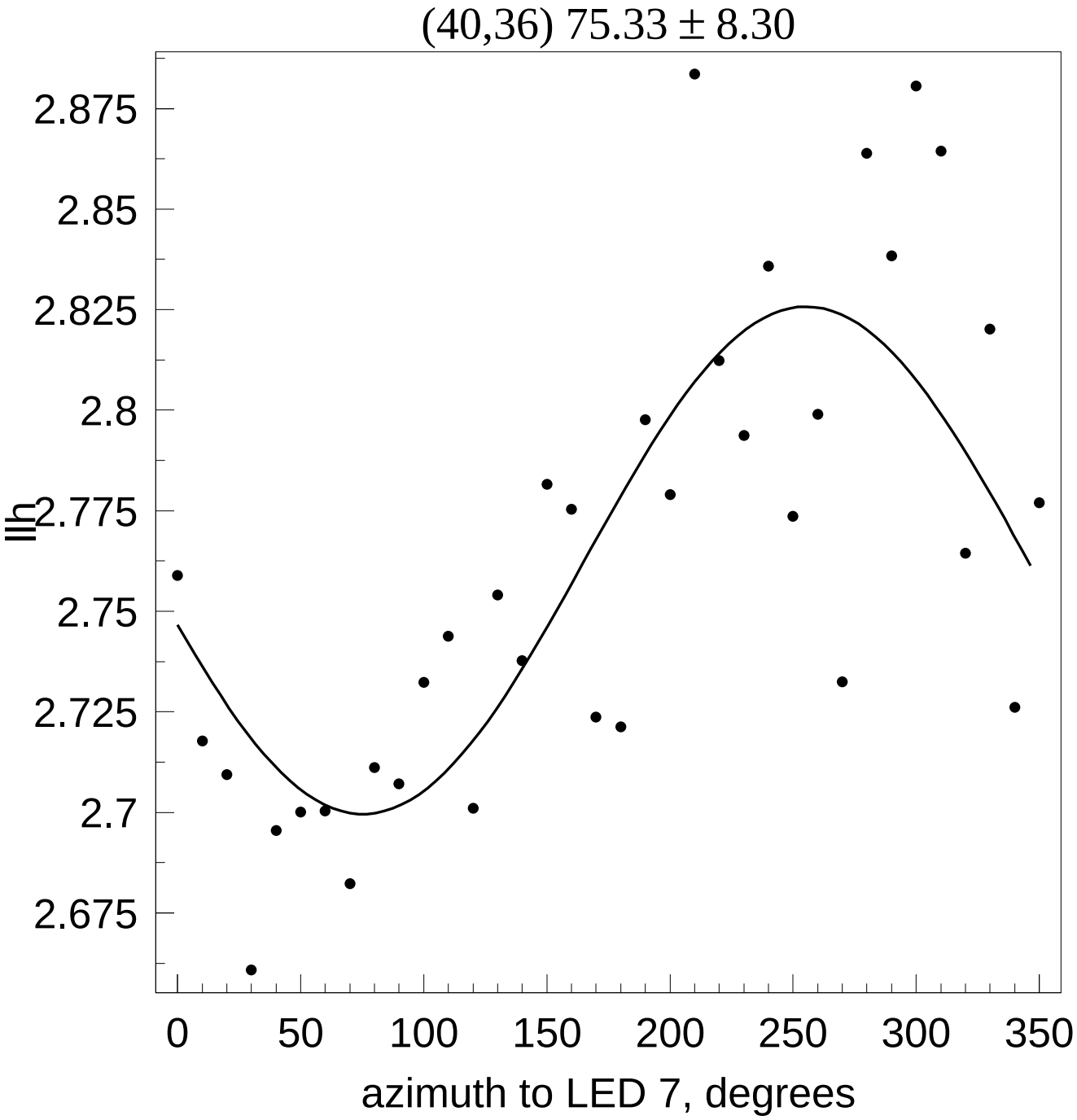

(40,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
137.7 ± 14.0
140
1
2
3
4
5
6
7
8
9
10
11
12

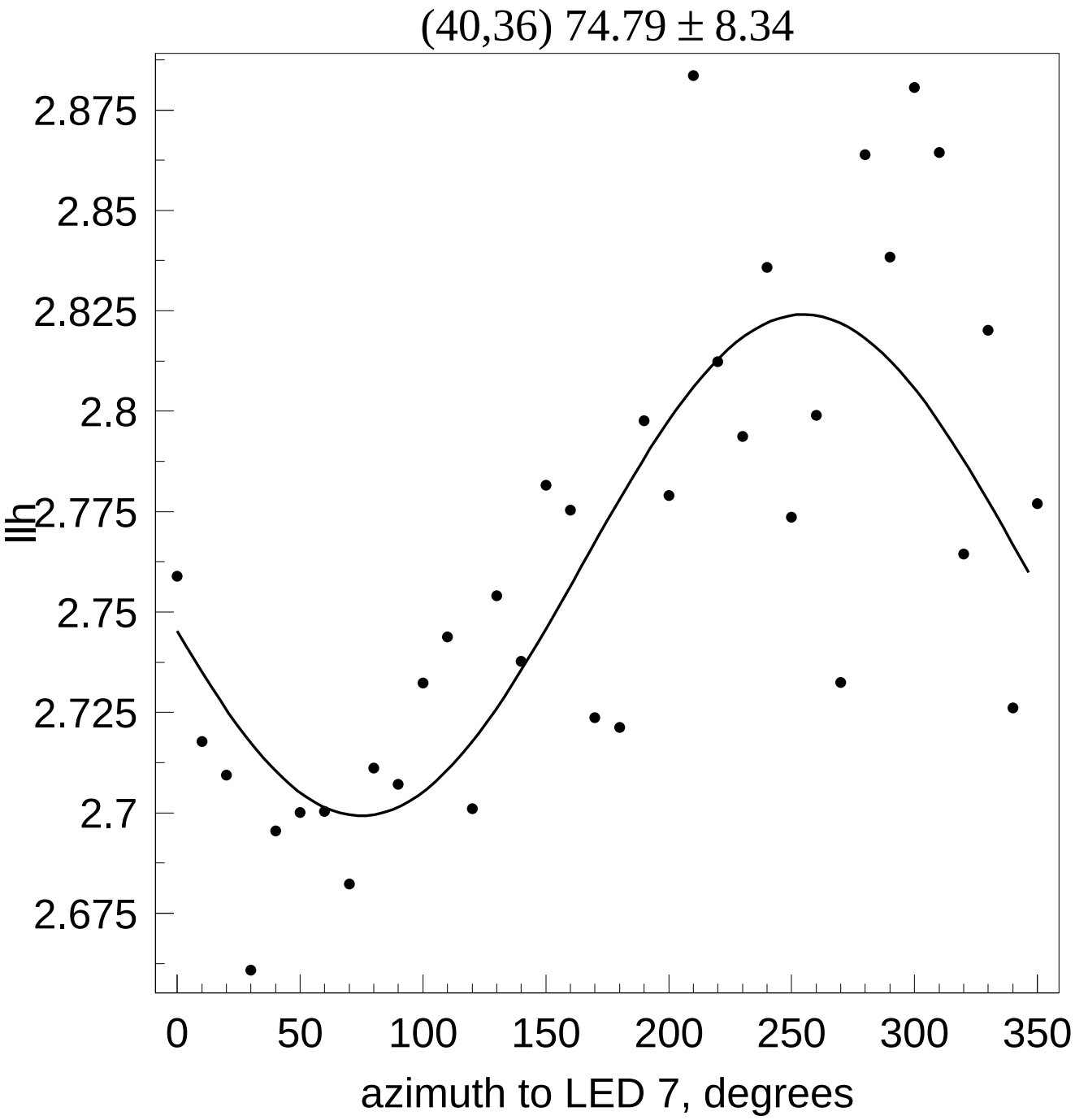

(40,35) 137.44 ± 0.52
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

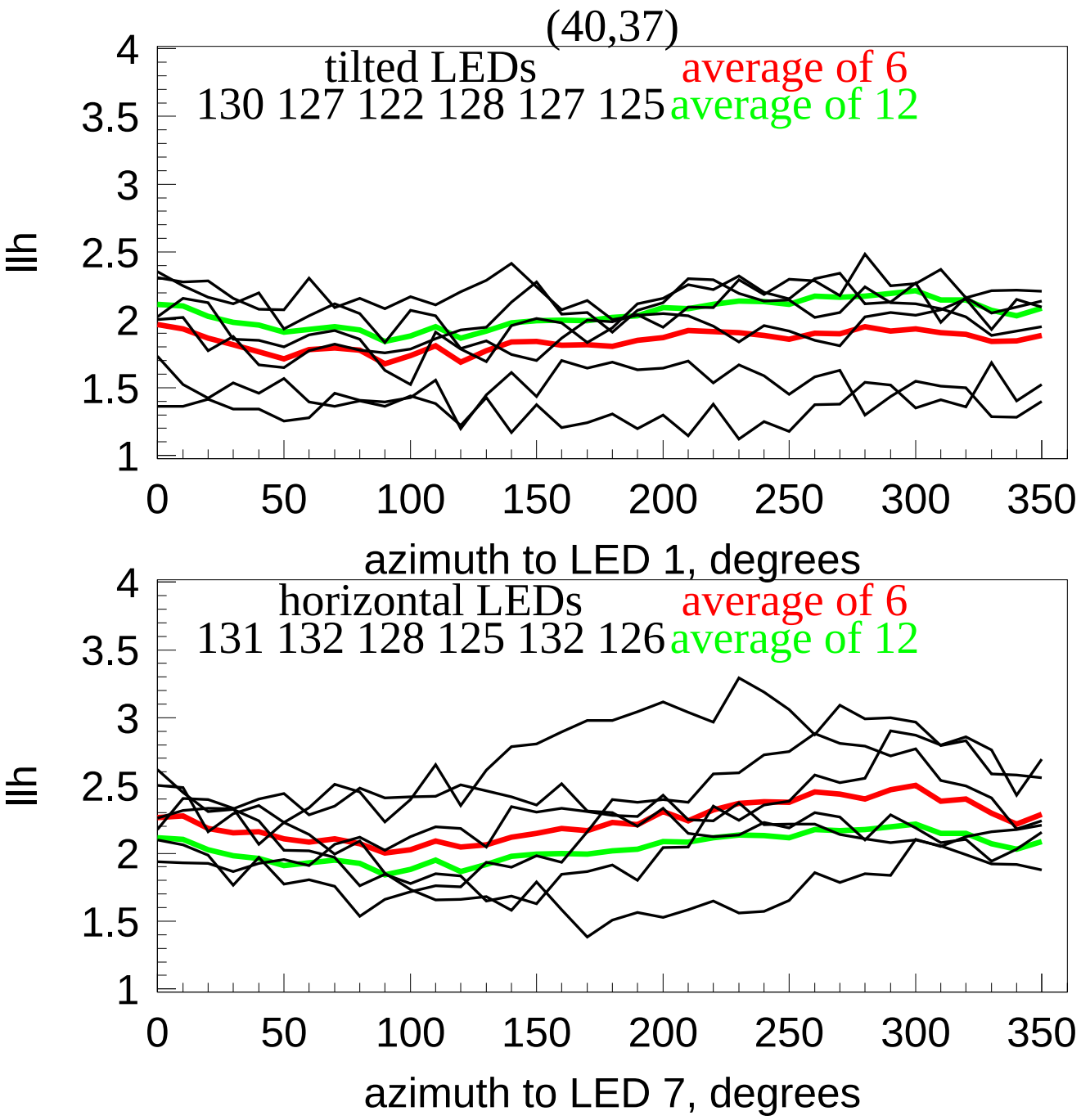

(40,35) 137.56 ± 0.51
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

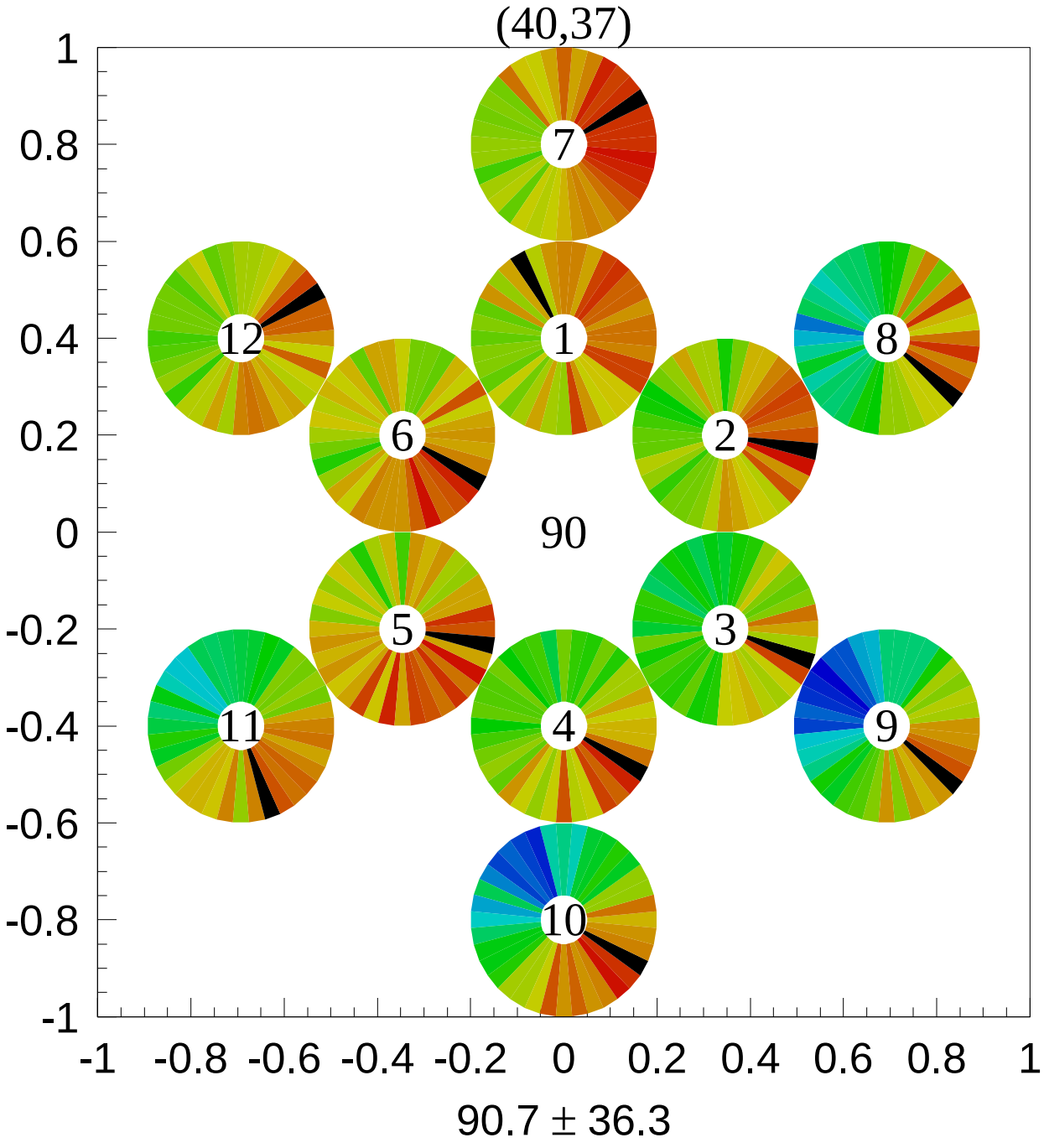

(40,36)
tilted LEDs
122 127 121 124 128 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 119 130 118 128 123
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

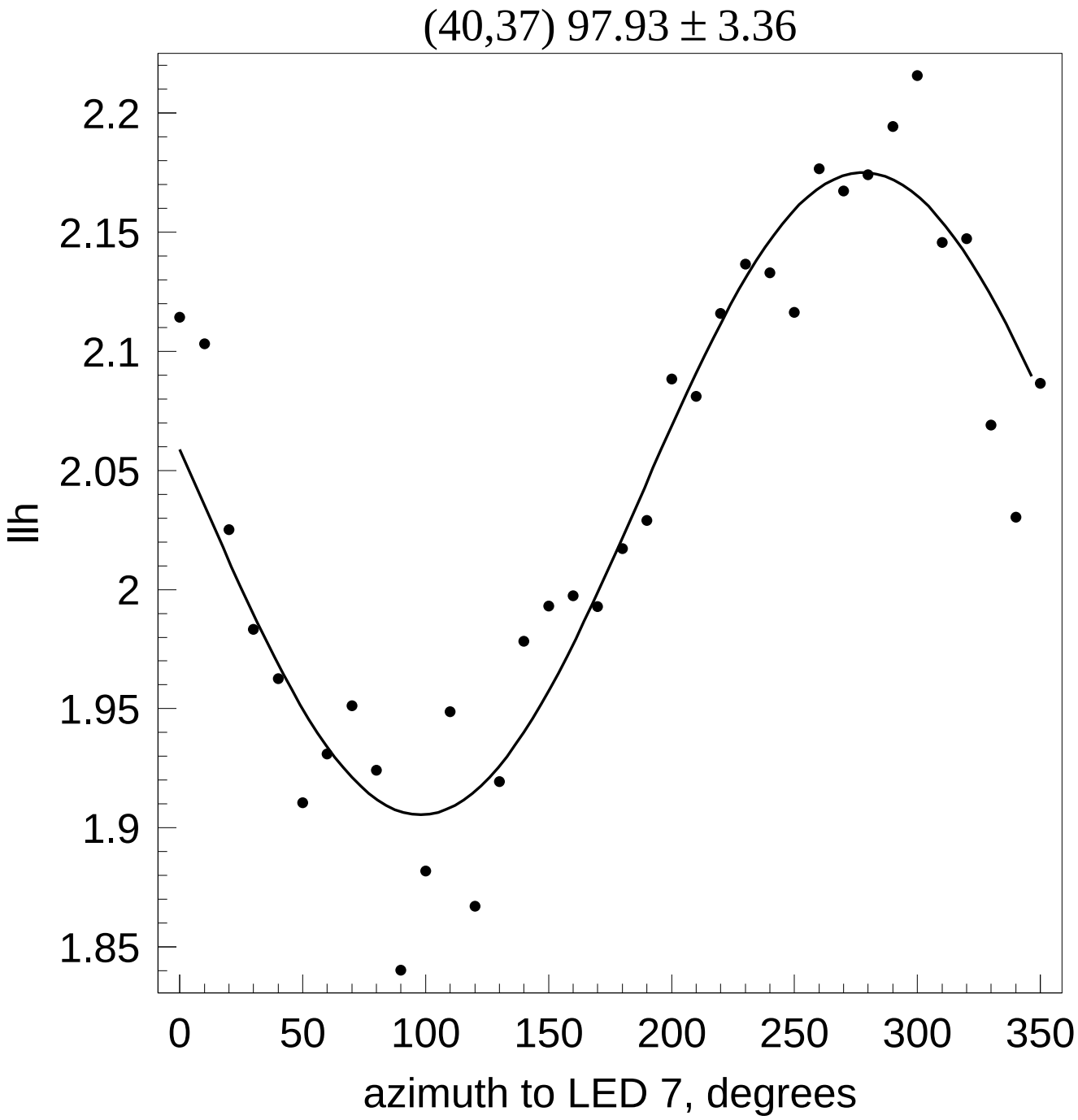

(40,36)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
43.7 ± 57.4

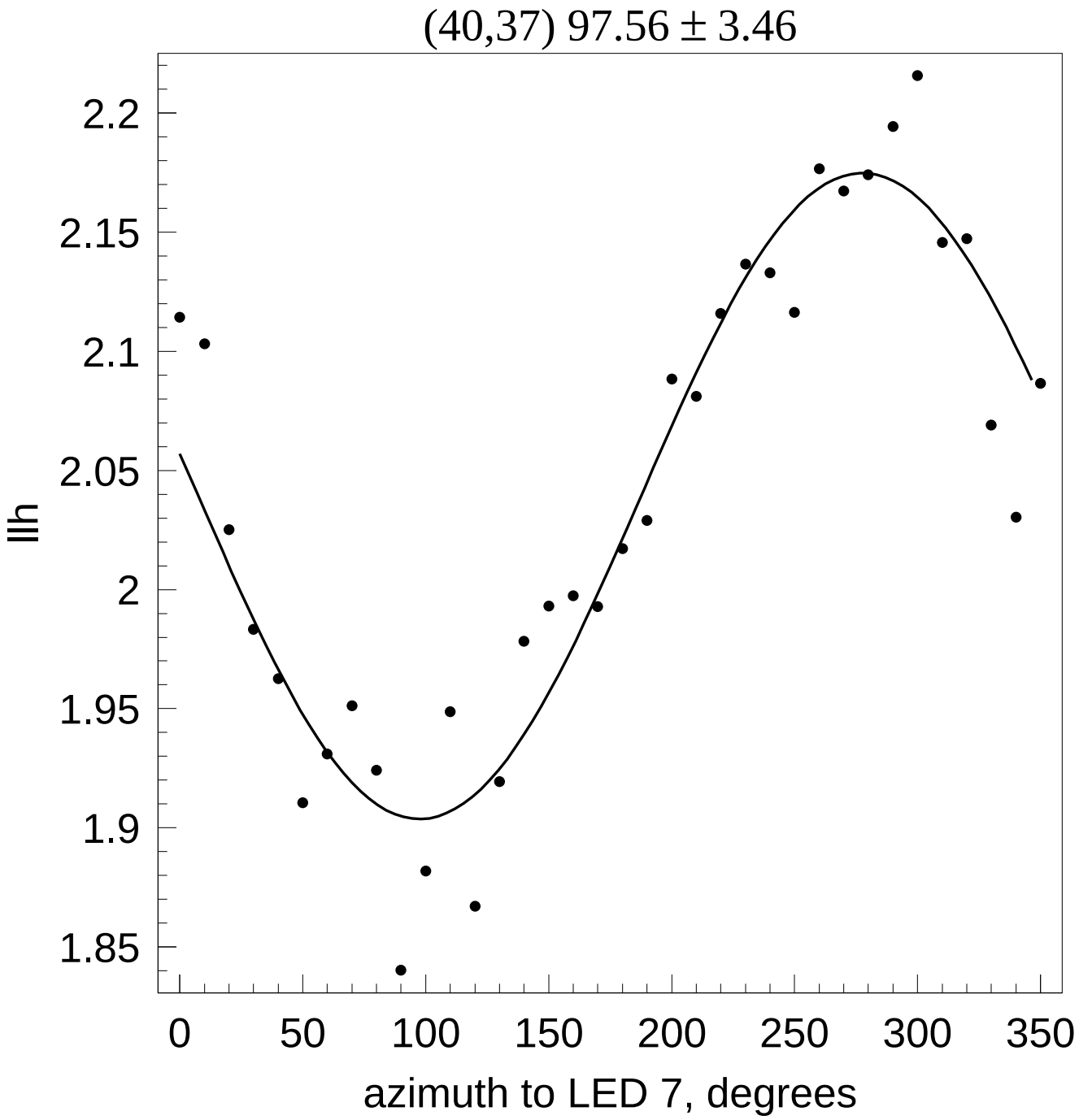

(40,36) 75.33 ± 8.30
2.875
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

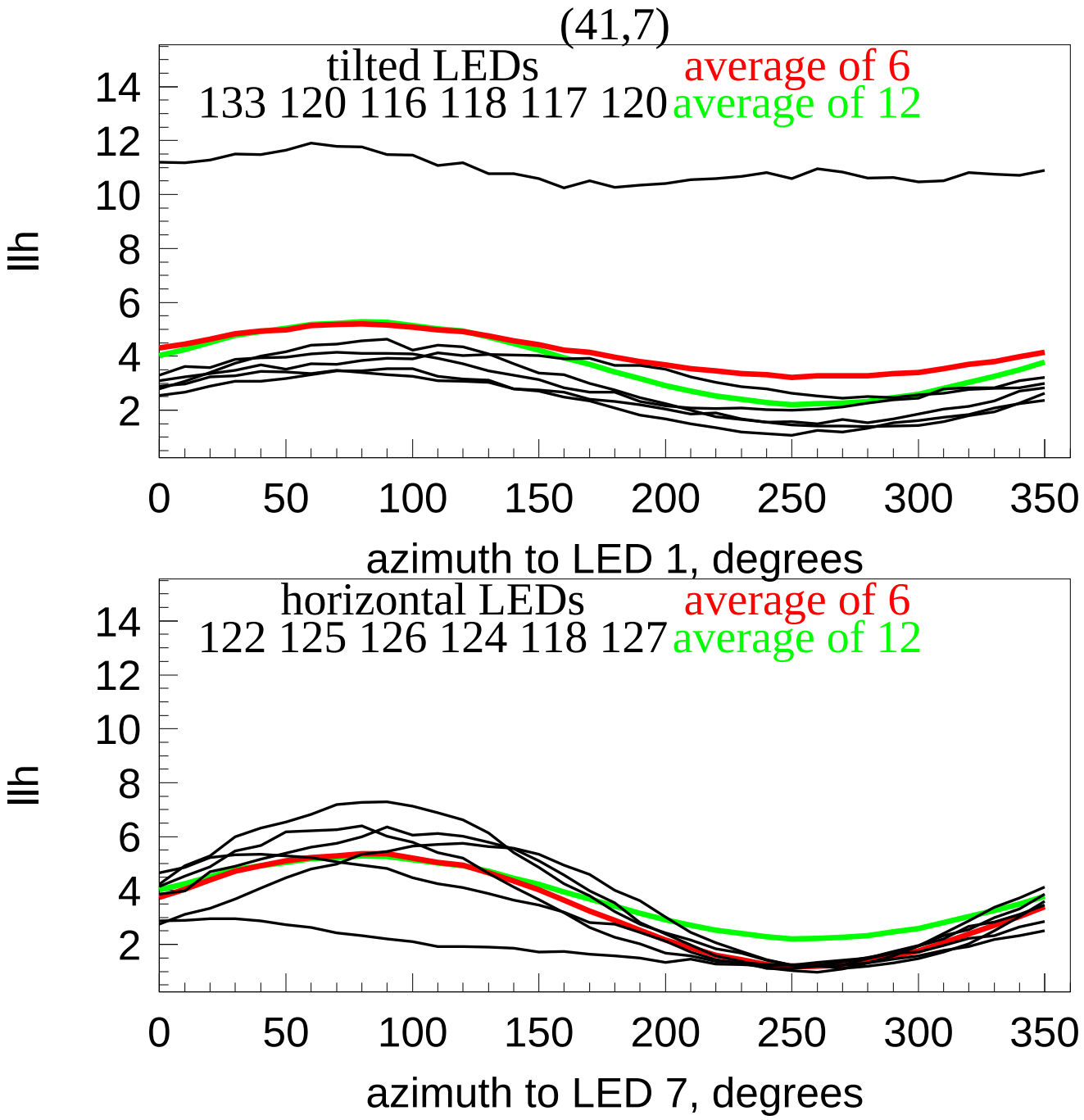

(40,36) 74.79 ± 8.34
2.875
2.85
2.825
2.8
2.775
2.75
2.725
2.7
2.675
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

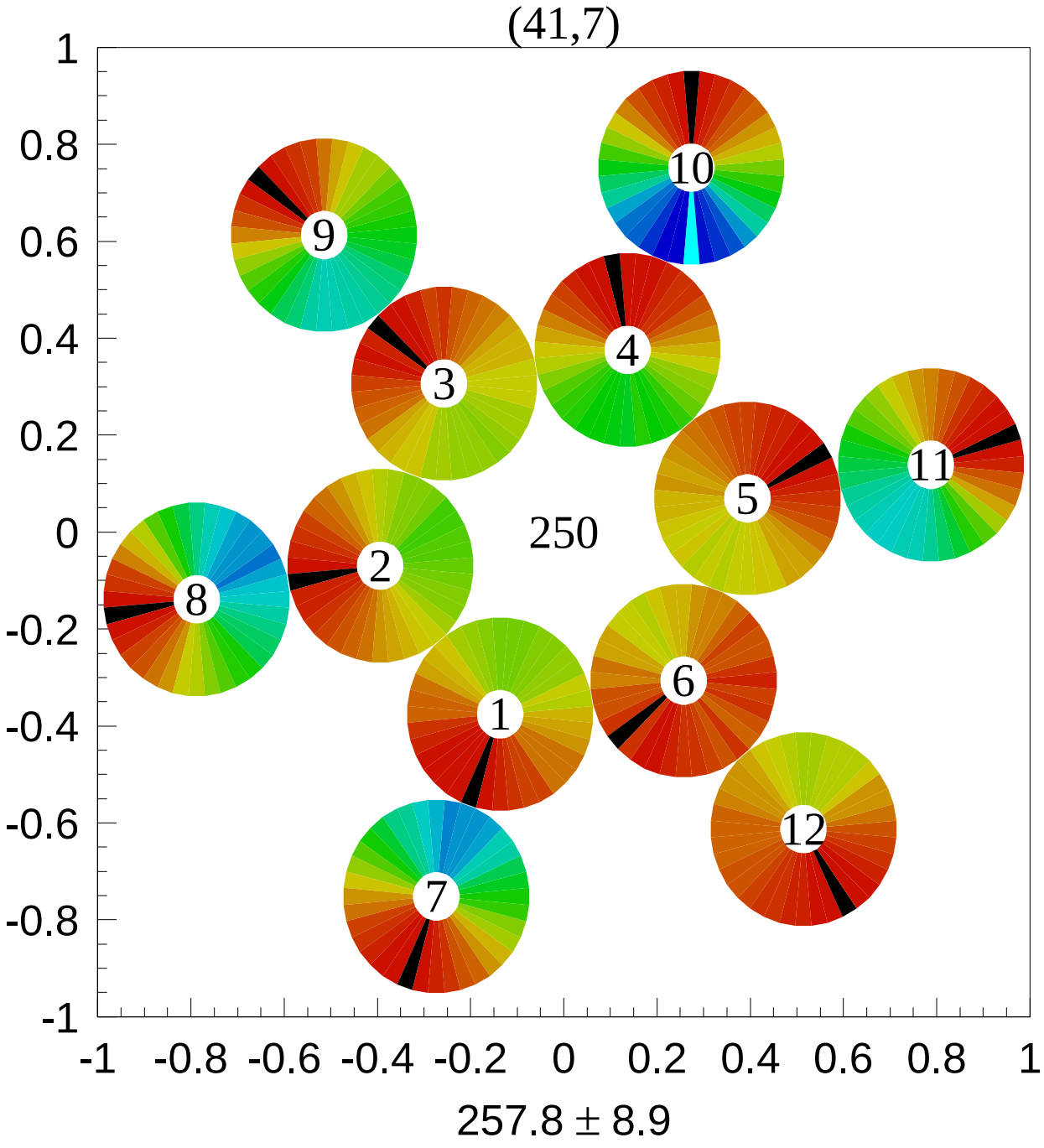

(40,37)
tilted LEDs
130 127 122 128 127 125
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
131 132 128 125 132 126
average of 6
average of 12
Ilh
azimuth to LED 7, degrees
0
50
100
150
200
250
300
350
1
1.5
2
2.5
3
3.5
4

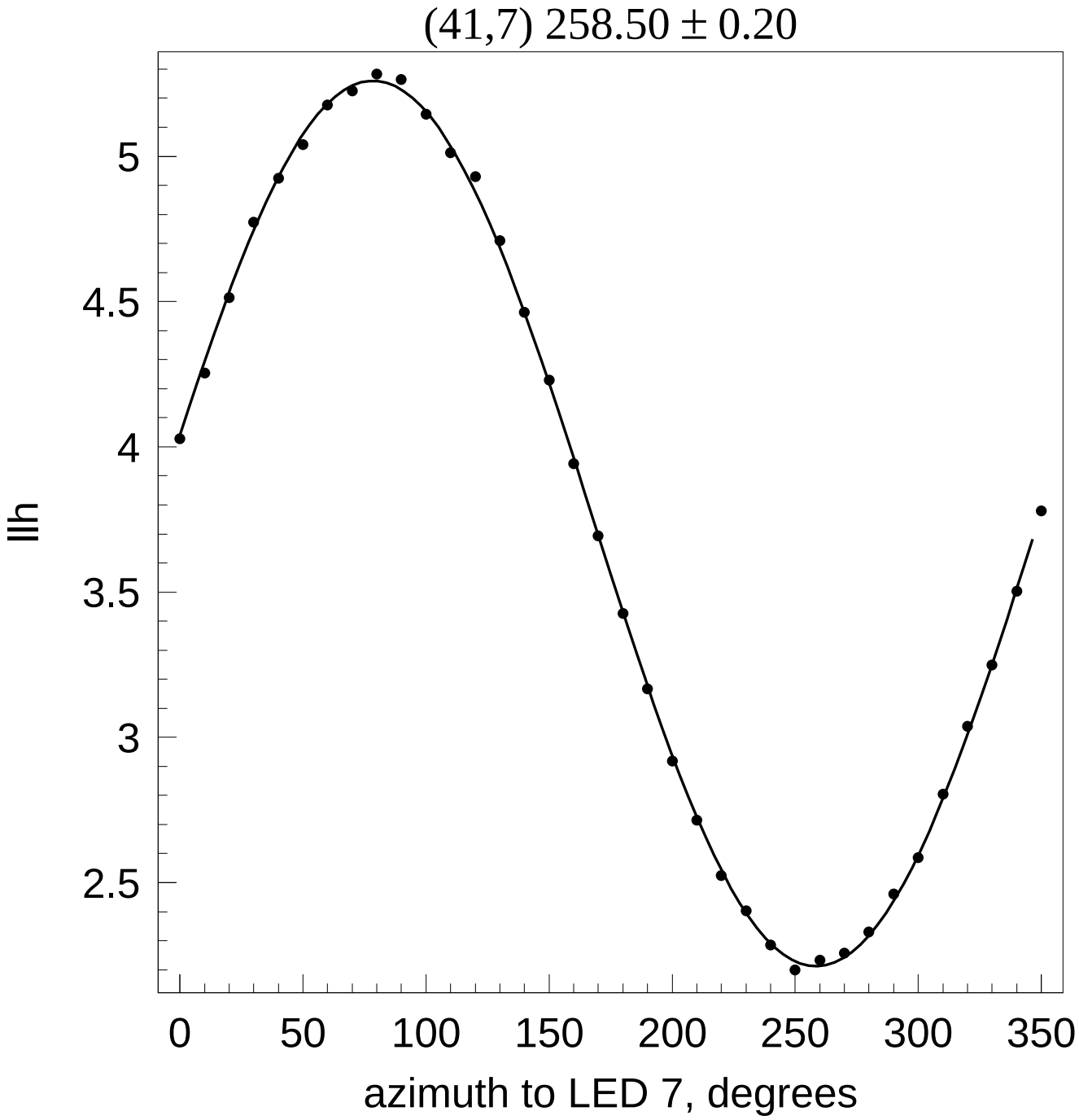

(40,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
90.7 ± 36.3
7
12
1
8
6
2
90
5
3
11
4
9
10

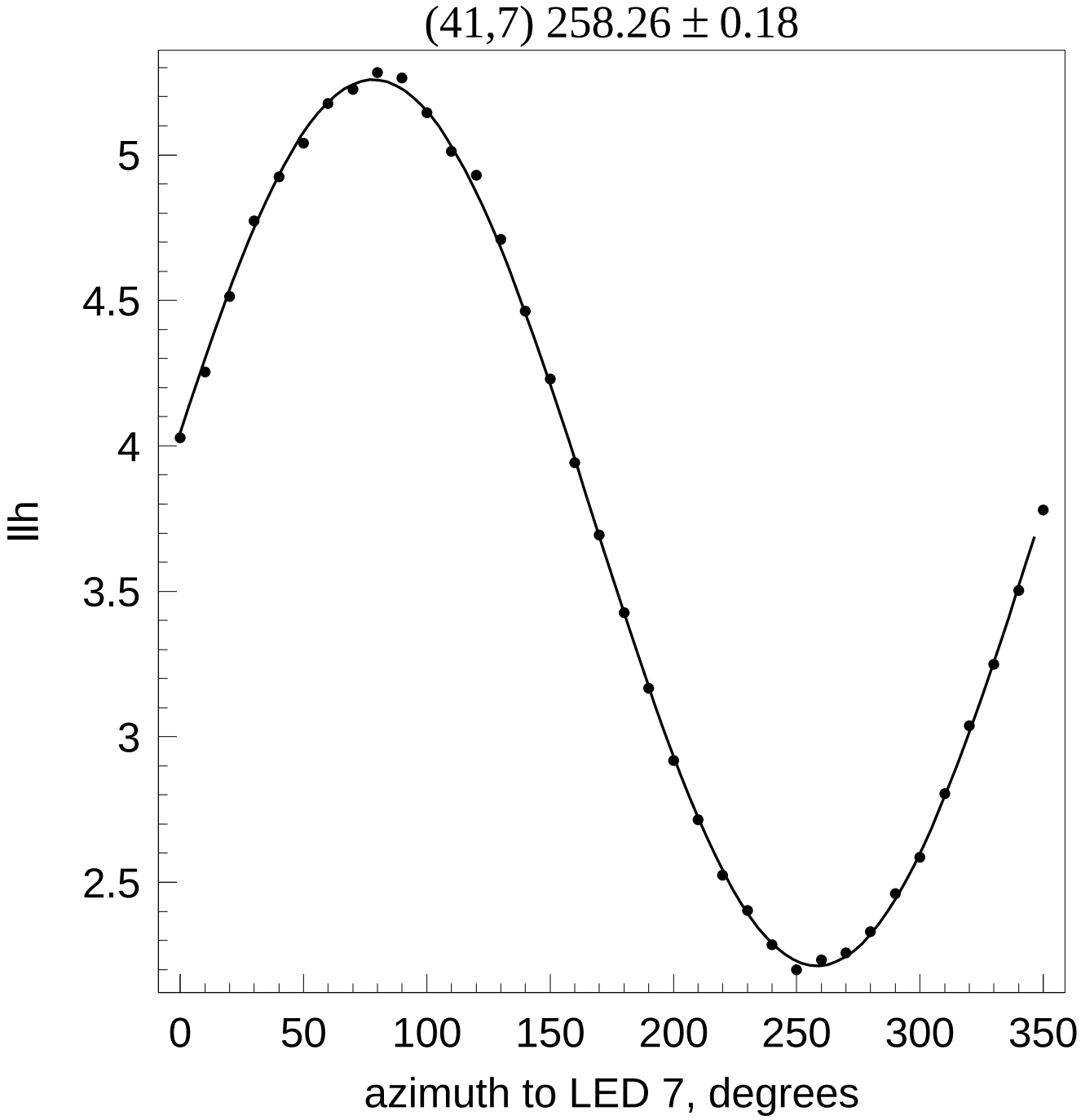

(40,37) 97.93 ± 3.36
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

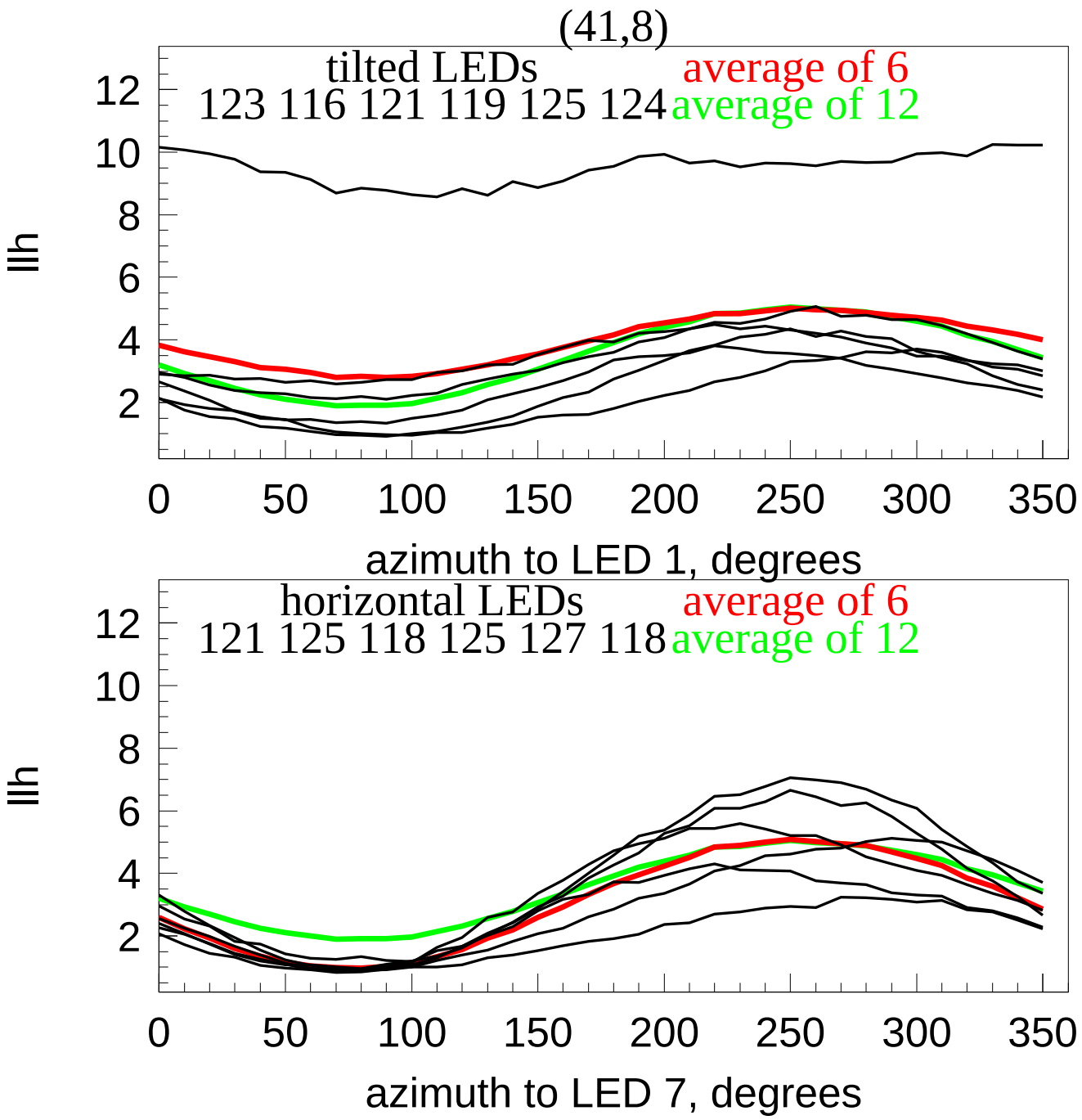

(40,37) 97.56 ± 3.46
2.2
2.15
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

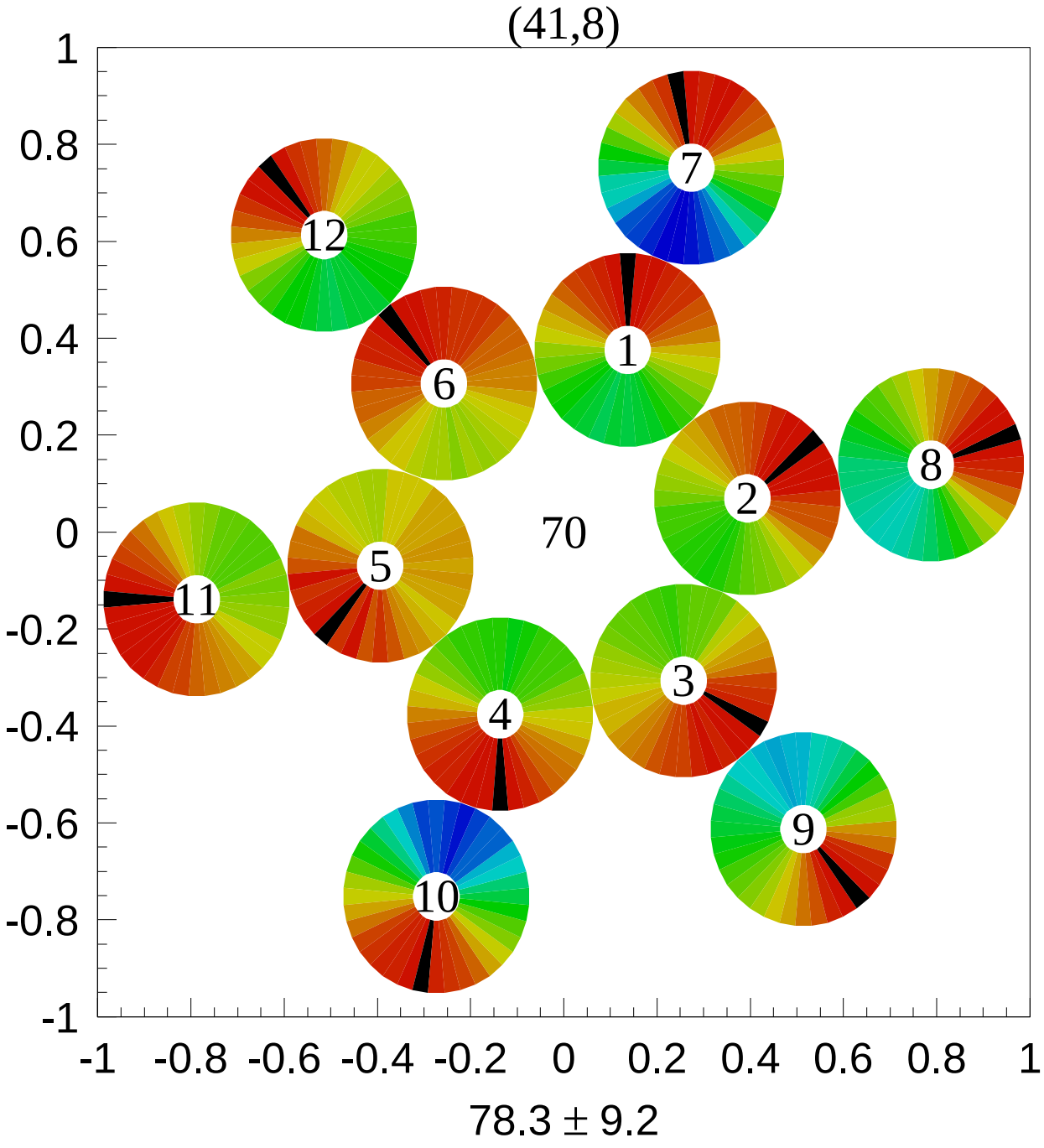

(41,7)
tilted LEDs
133 120 116 118 117 120
average of 6
average of 12
14
12
10
8
6
4
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 125 126 124 118 127
average of 6
average of 12
14
12
10
8
6
4
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

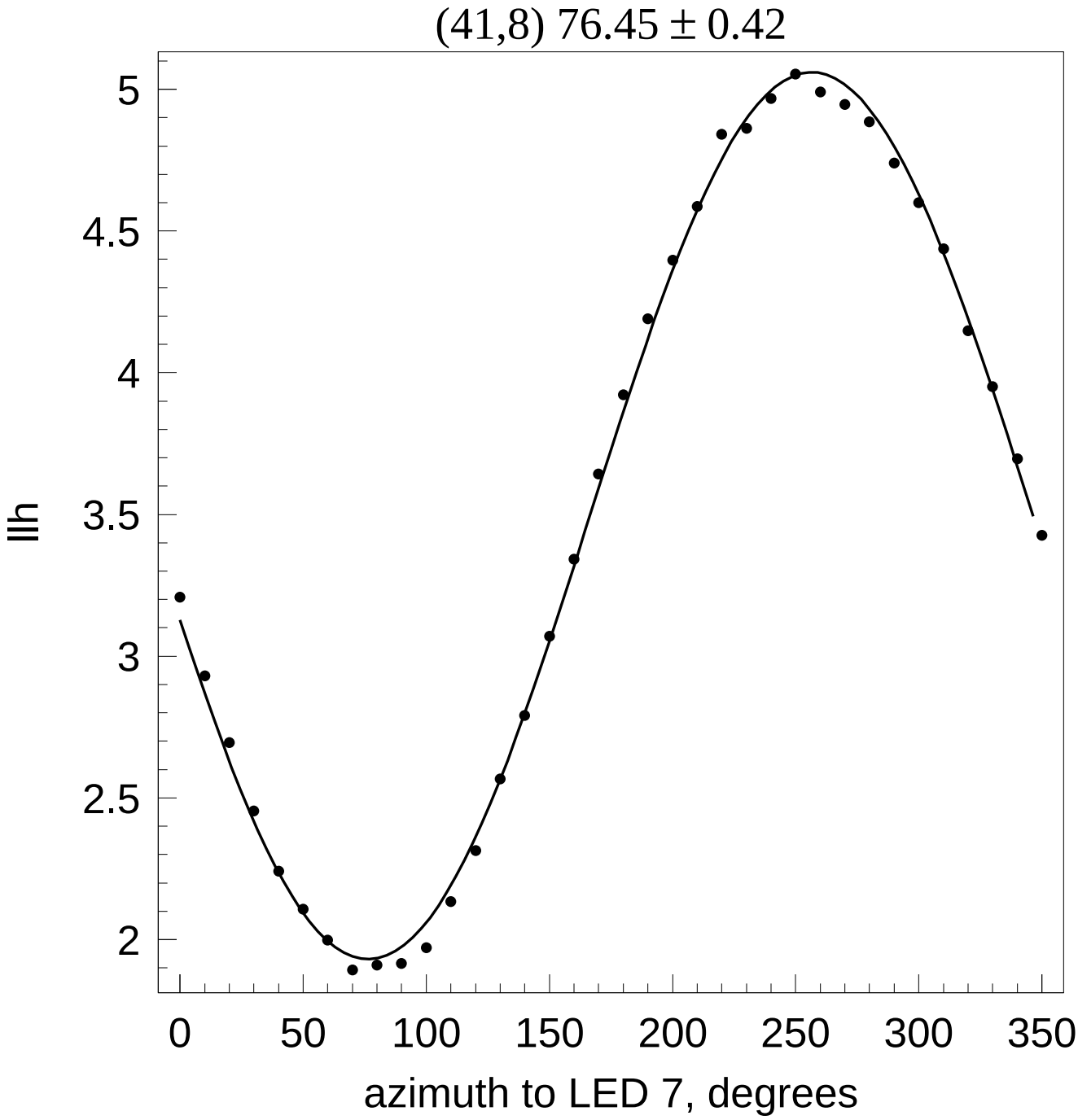

(41,7)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
250
1
2
3
4
5
6
7
8
9
10
11
12
257.8 ± 8.9

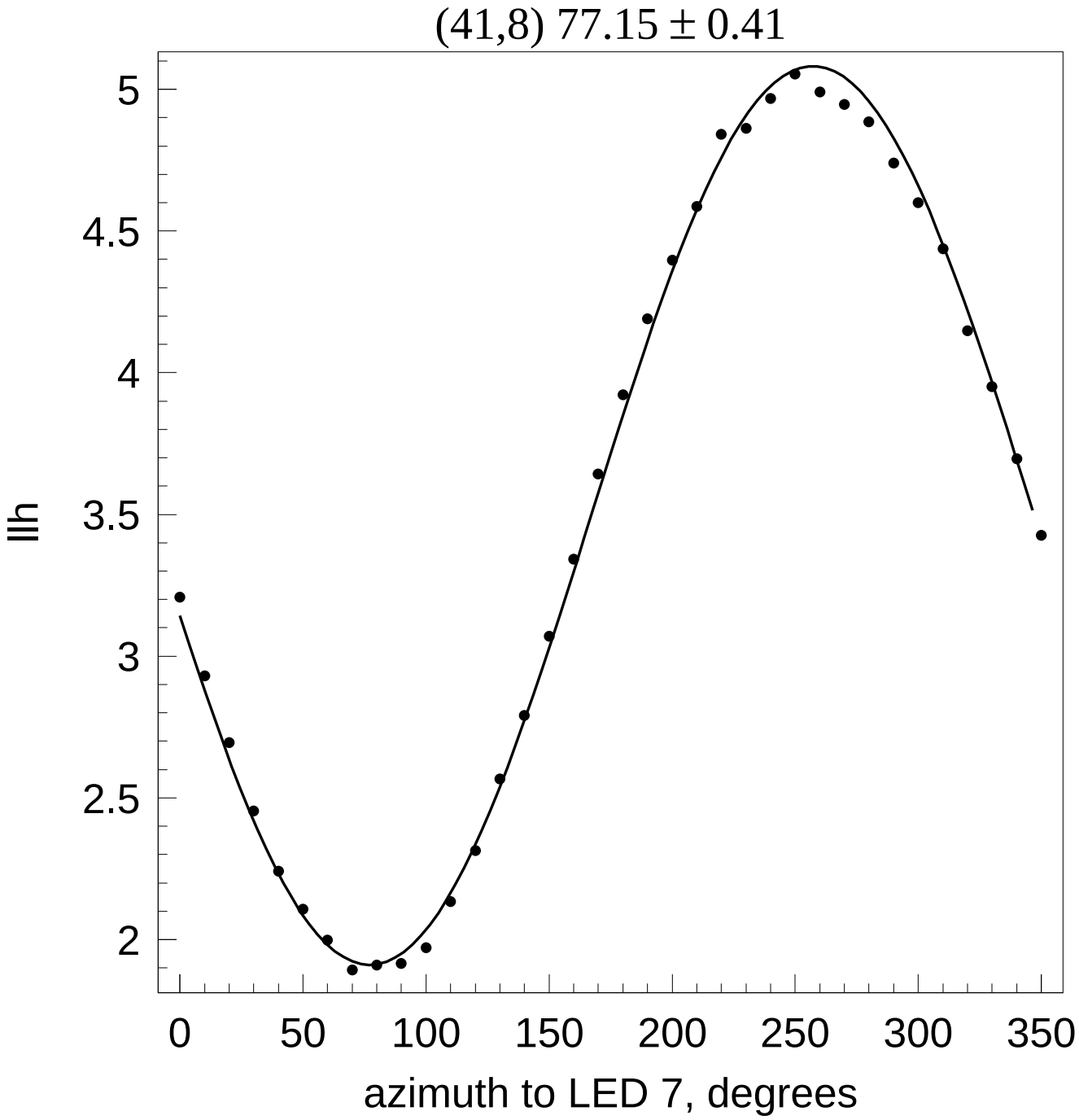

(41,7) 258.50 ± 0.20
5
4.5
4
3.5
3
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

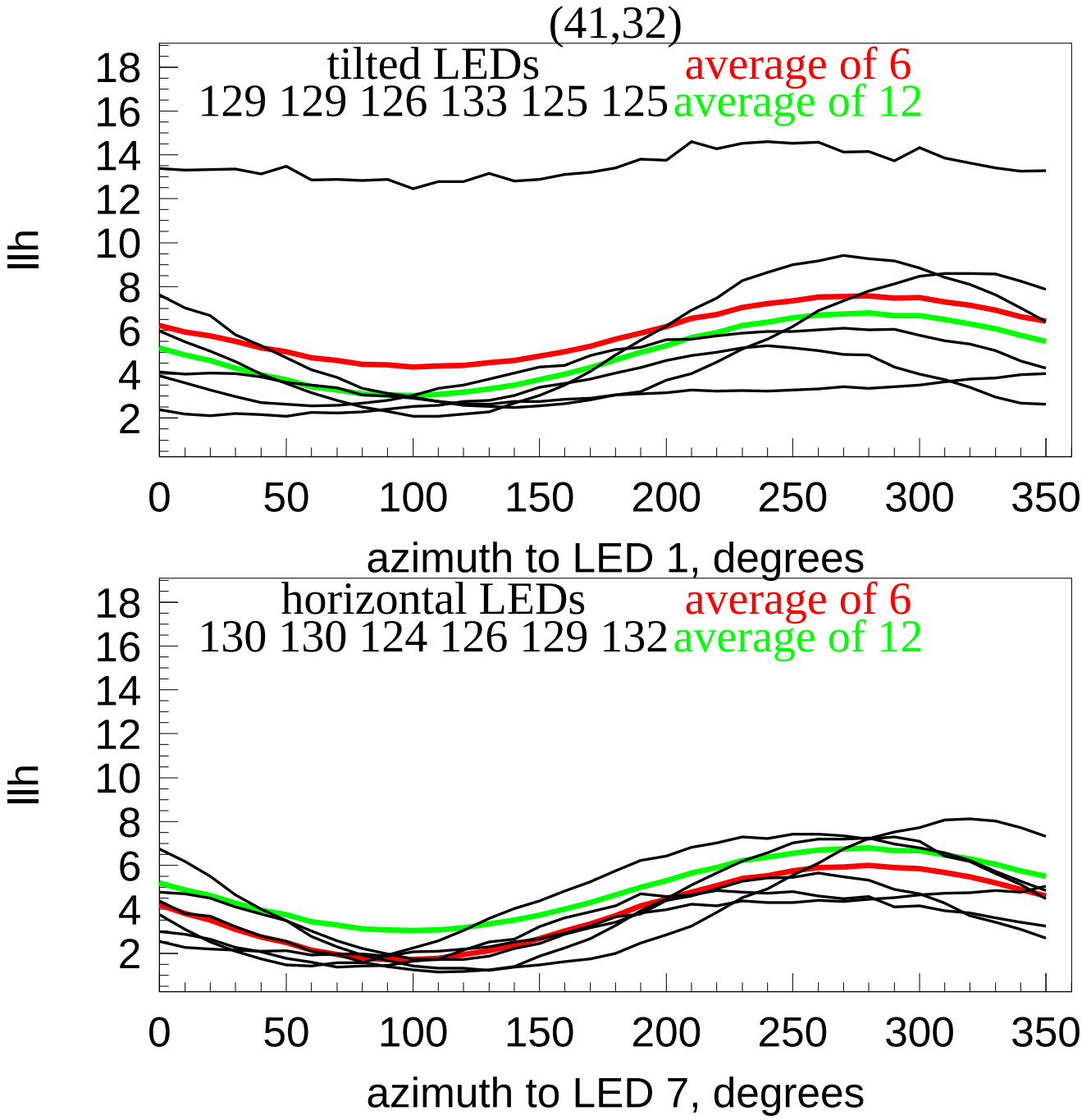

(41,7) 258.26 ± 0.18
llh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

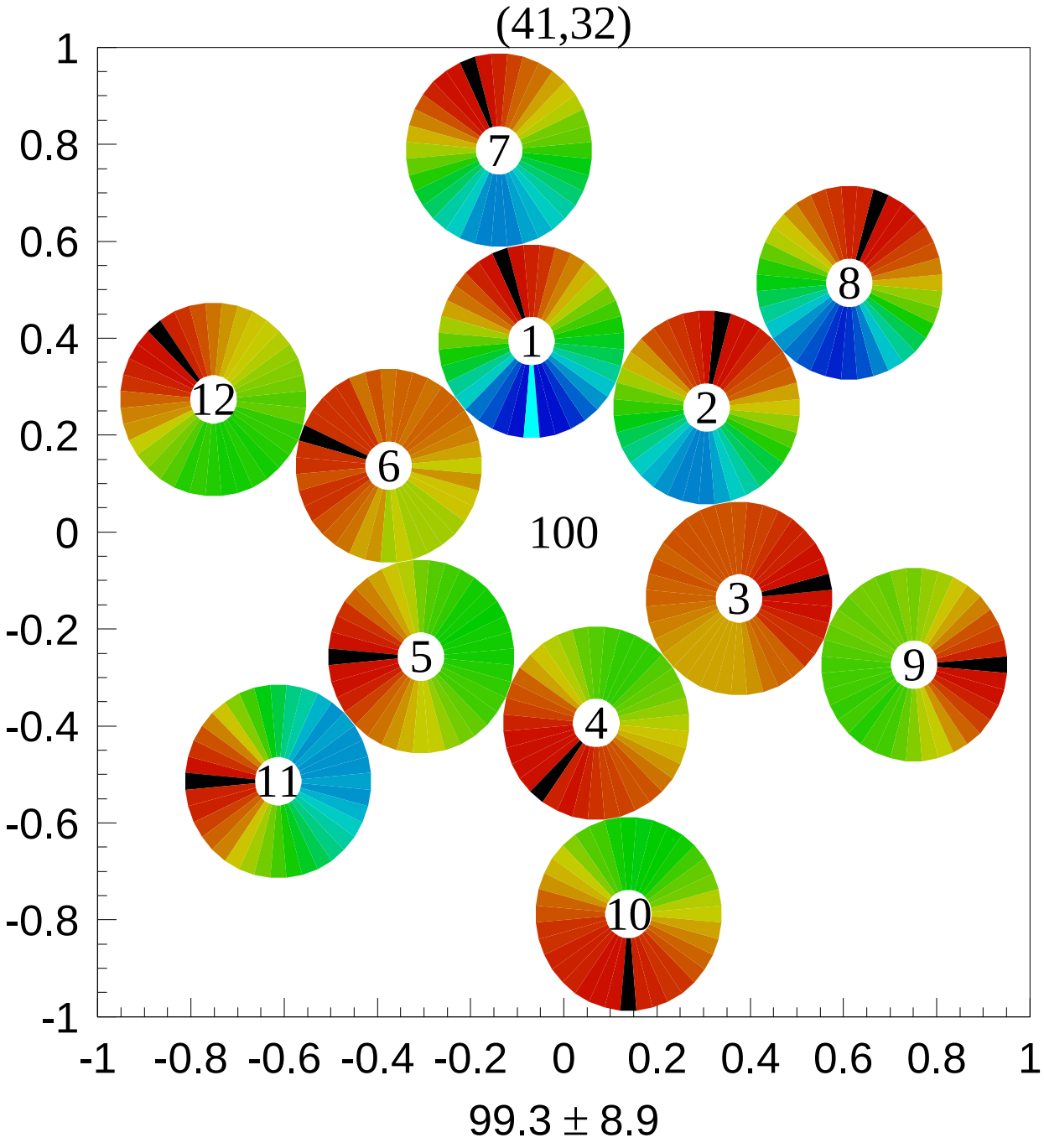

(41,8)
tilted LEDs
123 116 121 119 125 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
121 125 118 125 127 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

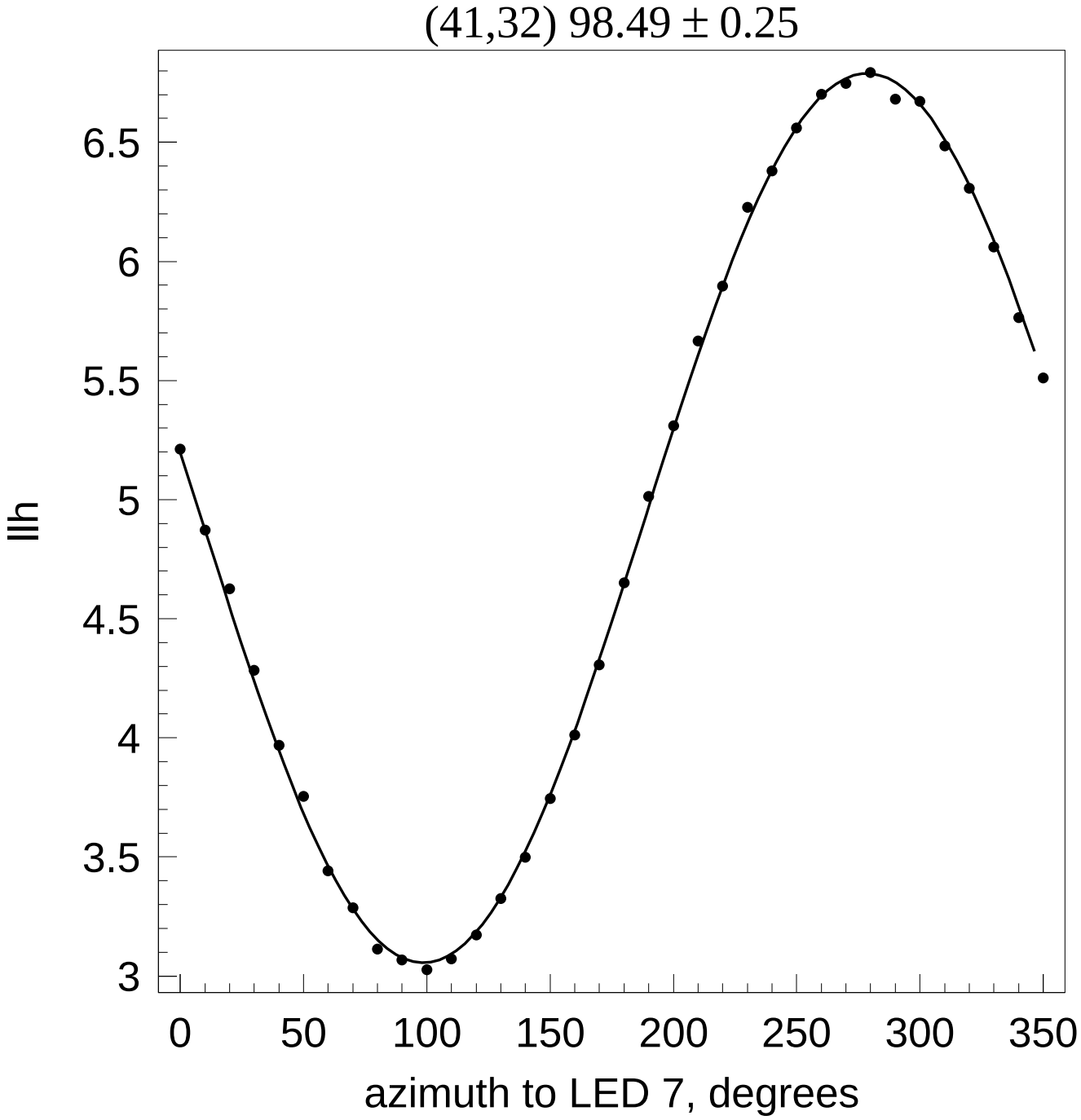

(41,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
5
70
11
4
3
9
10
78.3 ± 9.2

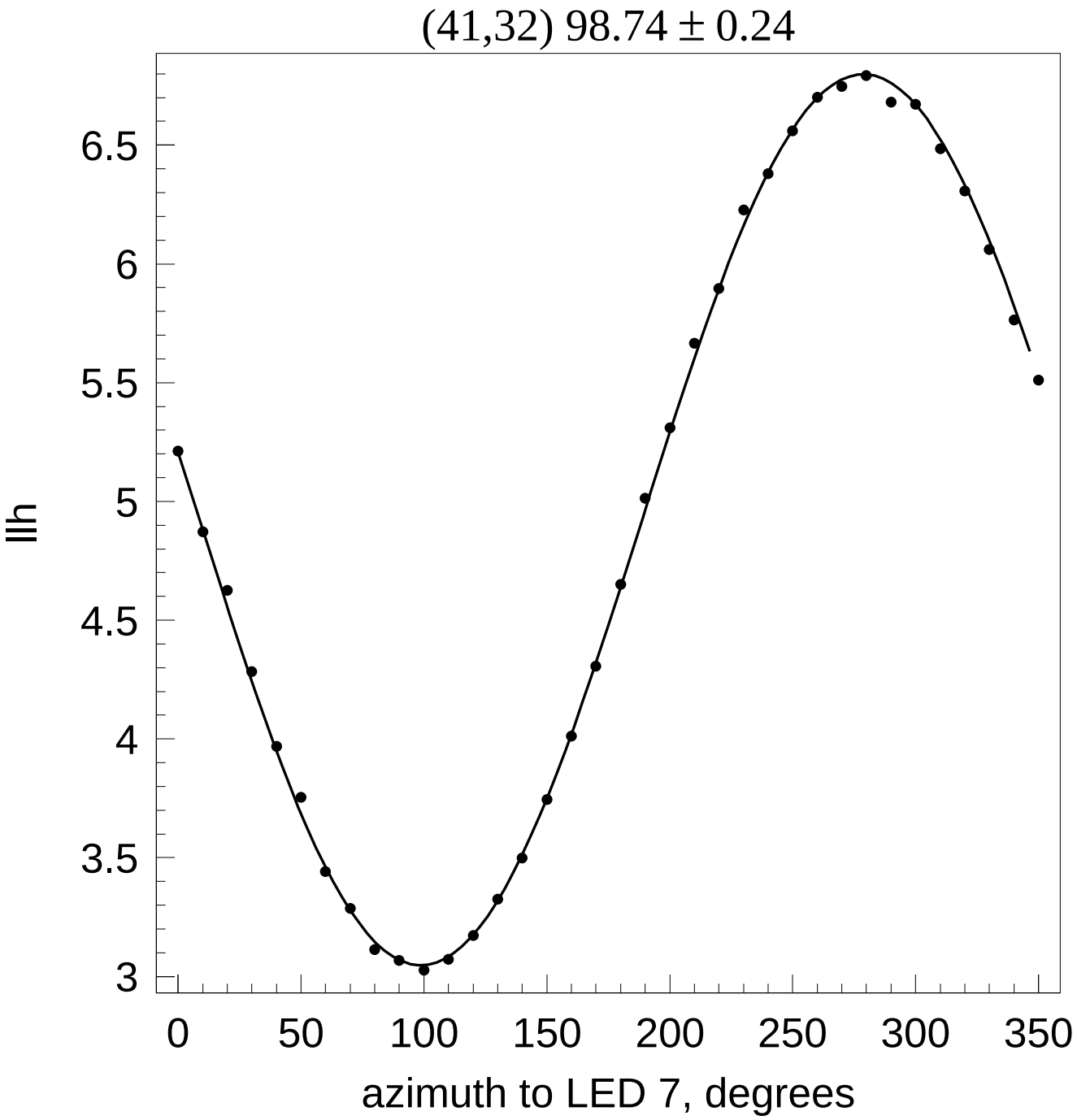

(41,8) 76.45 ± 0.42
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

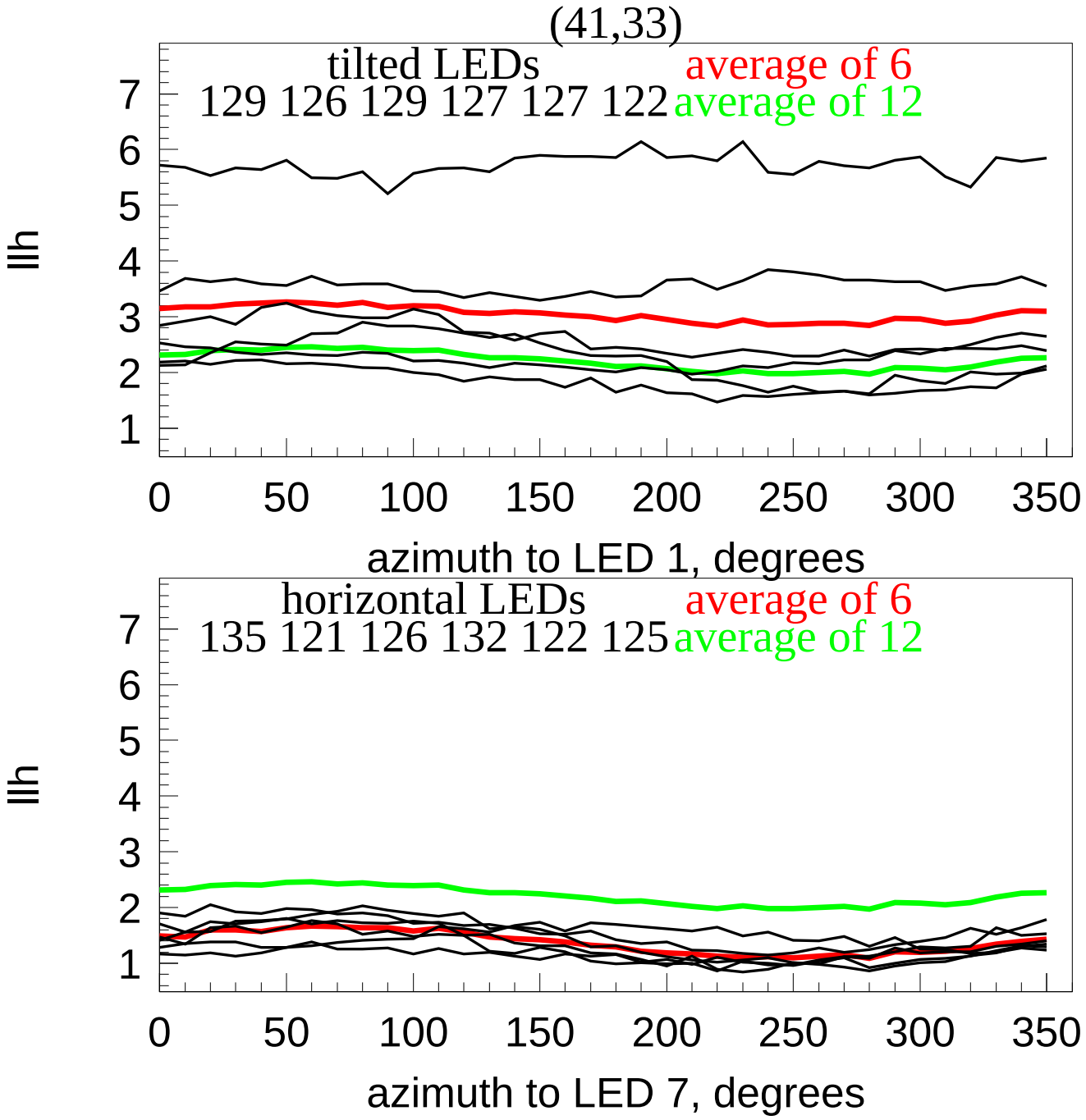

(41,8) 77.15 ± 0.41
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

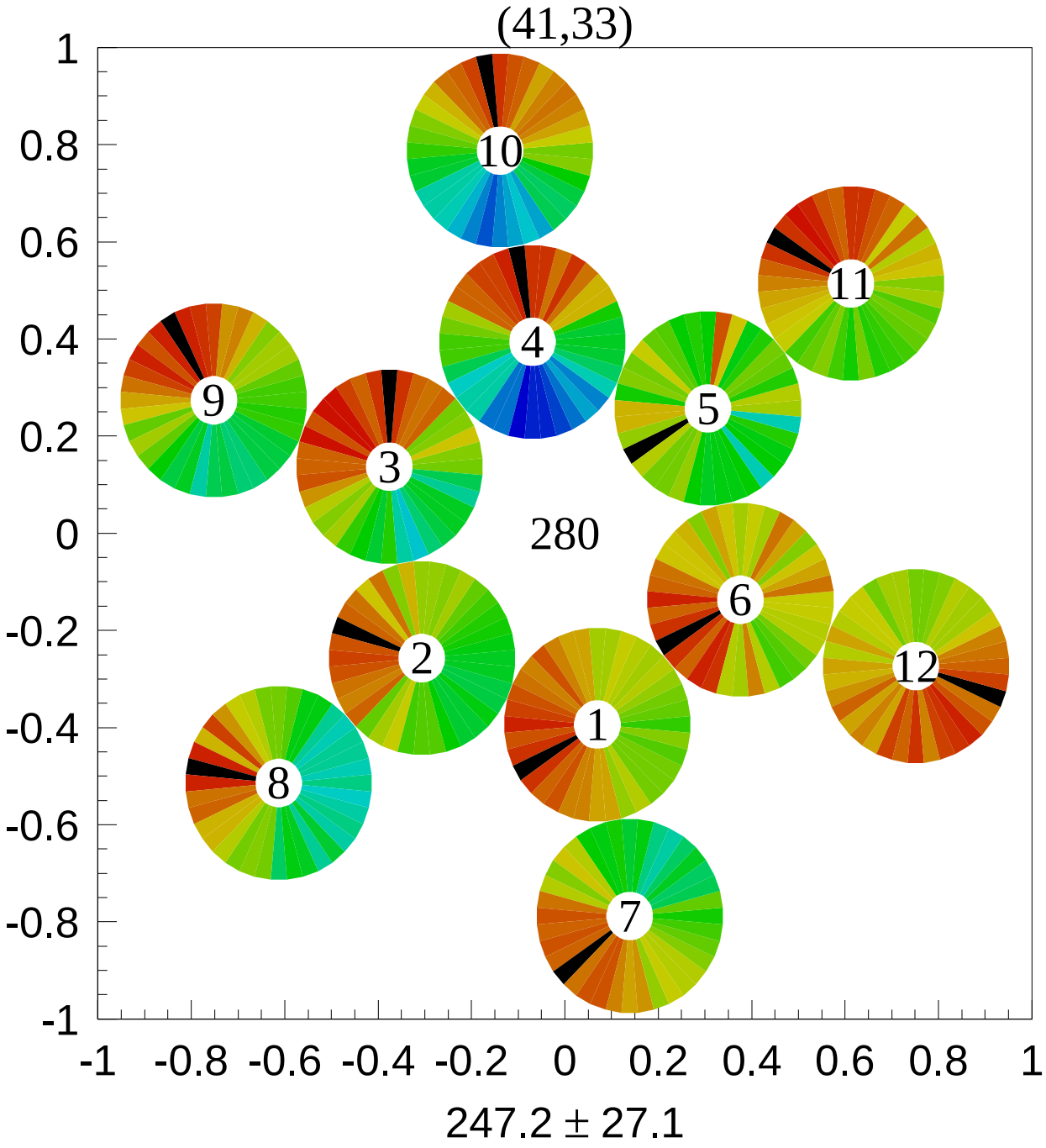

(41,32)
tilted LEDs
129 129 126 133 125 125
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
130 130 124 126 129 132
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

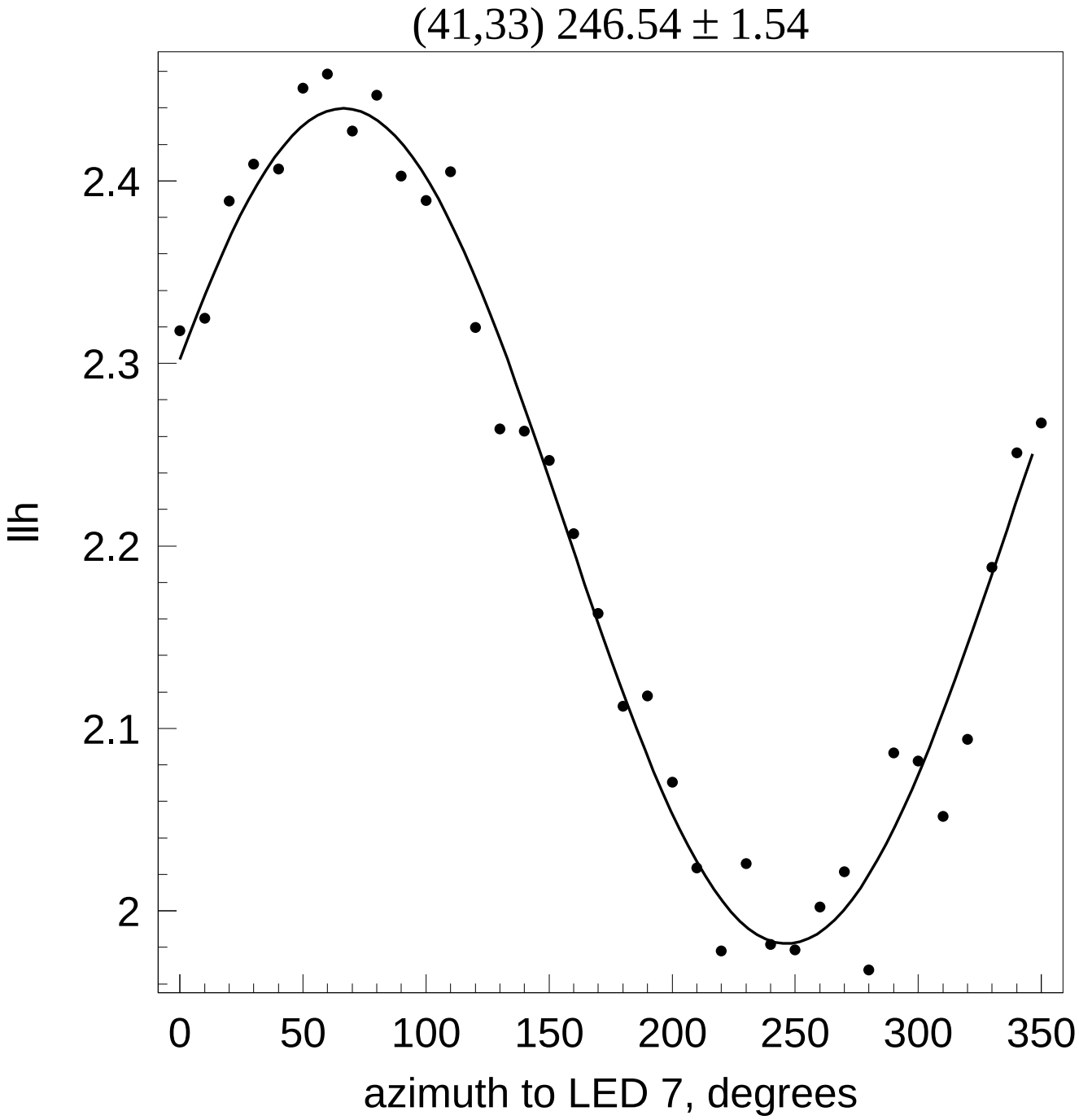

(41,32)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
99.3 ± 8.9

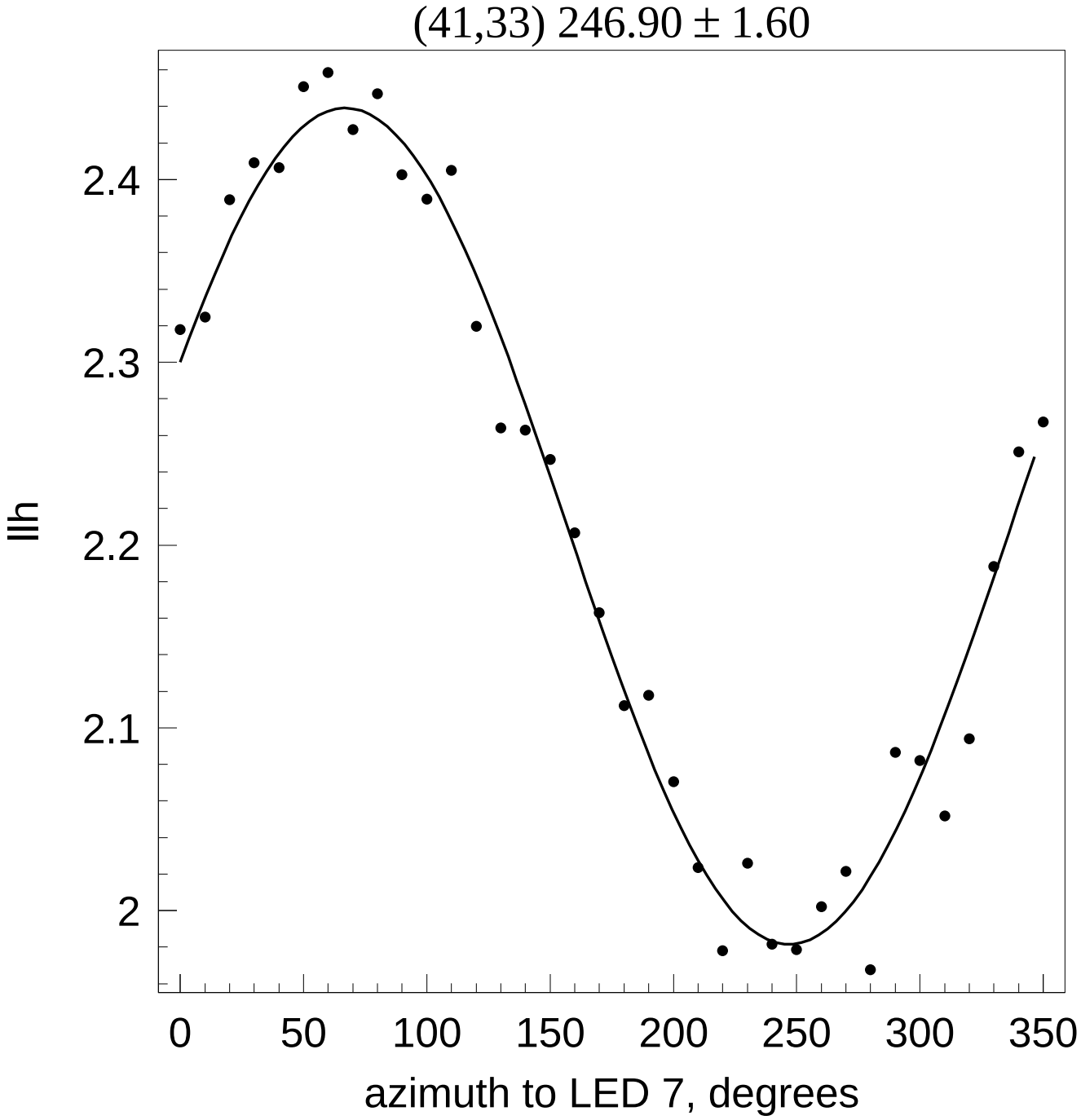

(41,32) 98.49 ± 0.25
llh
6.5
6
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

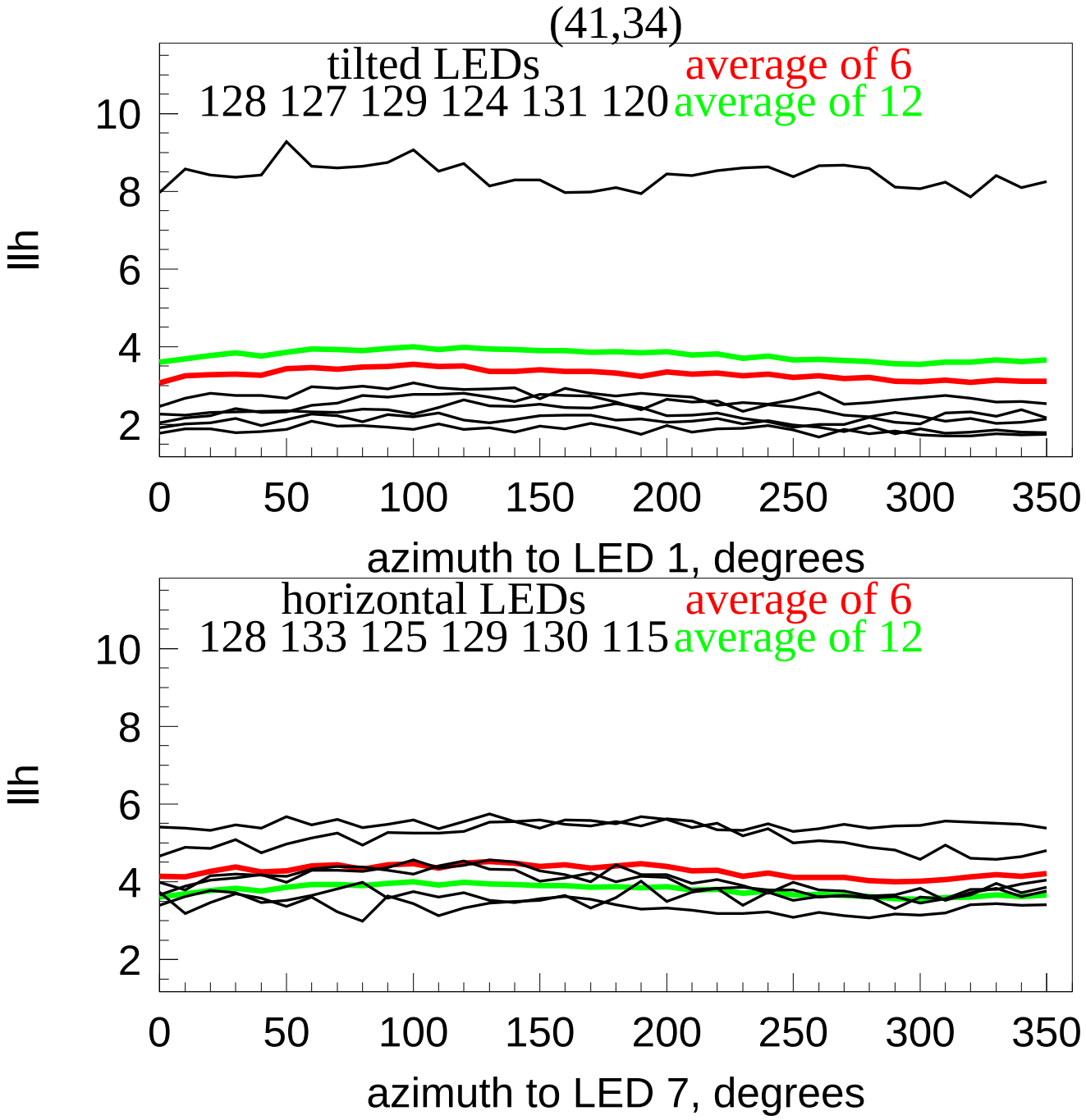

(41,32) 98.74 ± 0.24
6.5
6
5.5
5
4.5
4
3.5
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

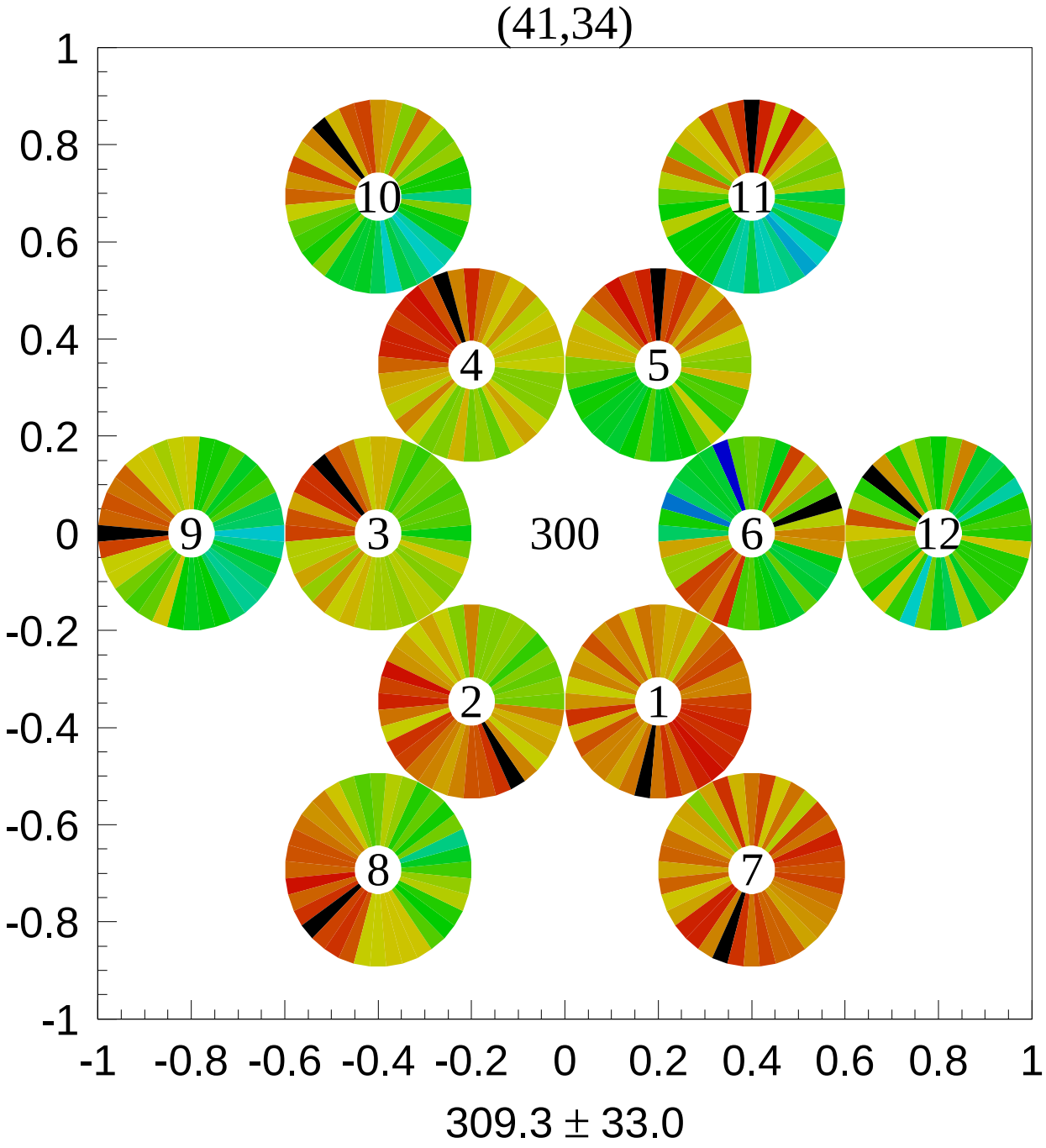

(41,33)
tilted LEDs
129 126 129 127 127 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
135 121 126 132 122 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

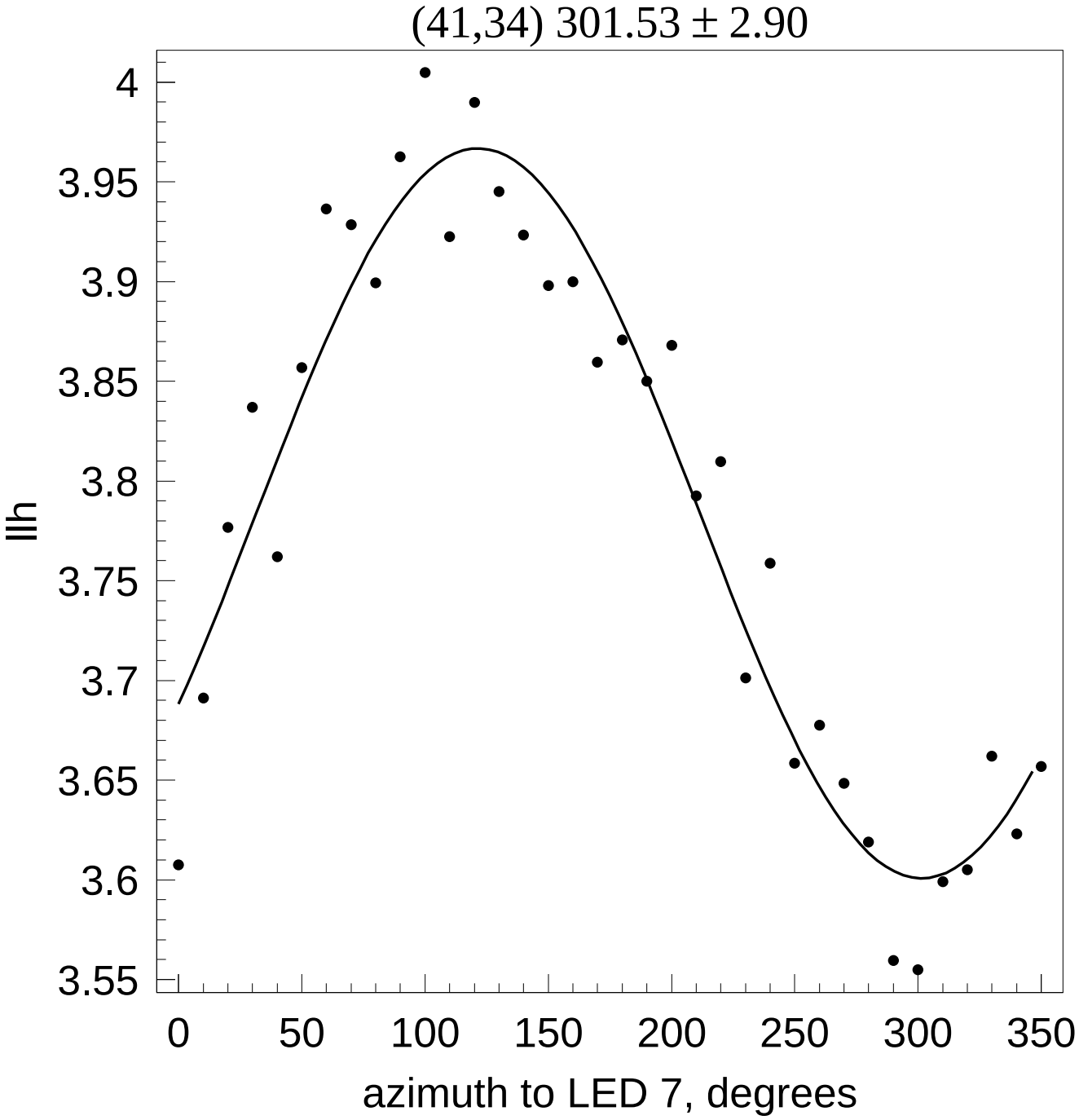

(41,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
9
5
3
280
6
12
2
1
8
7
247.2 ± 27.1

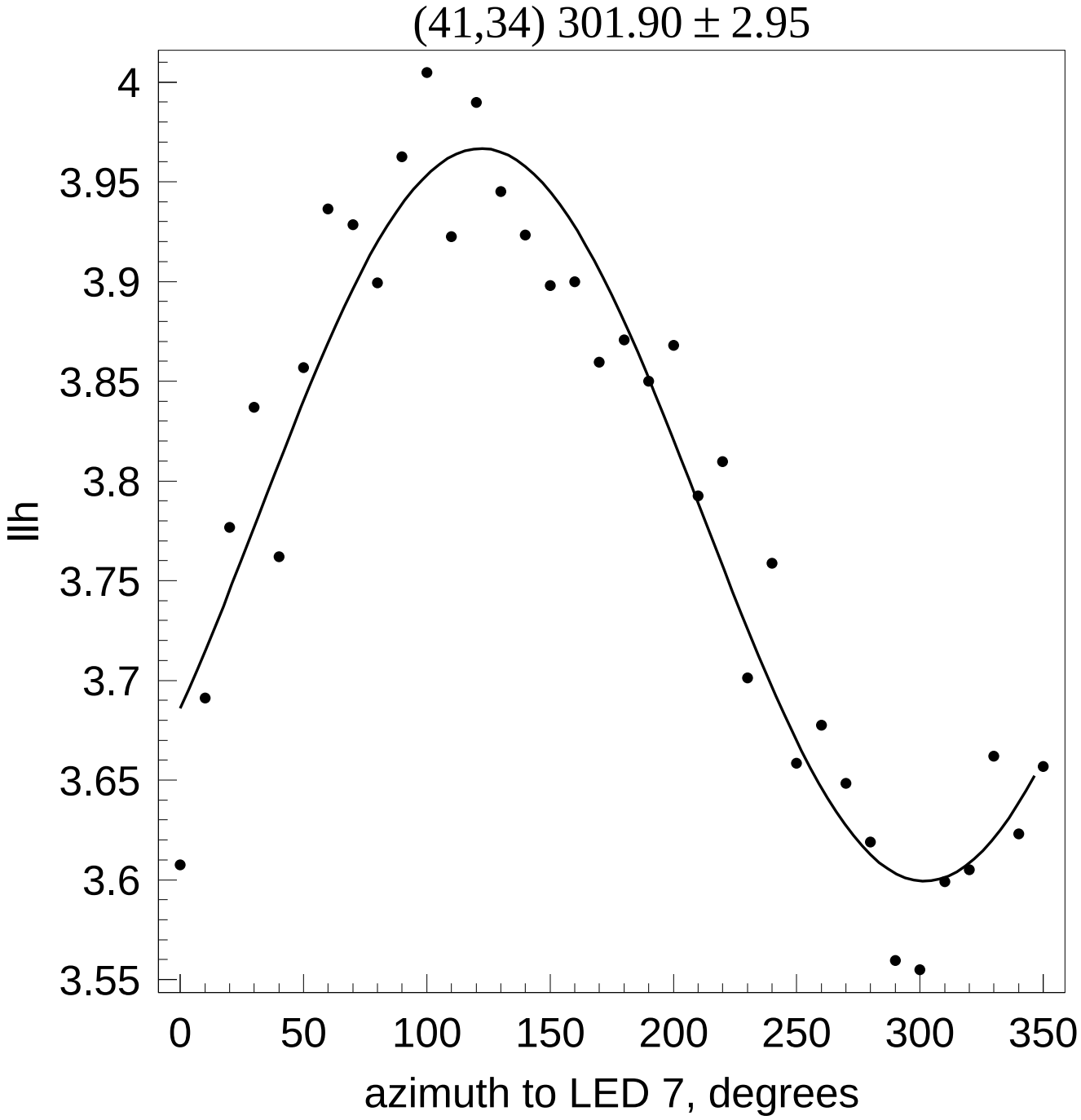

(41,33) 246.54 ± 1.54
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

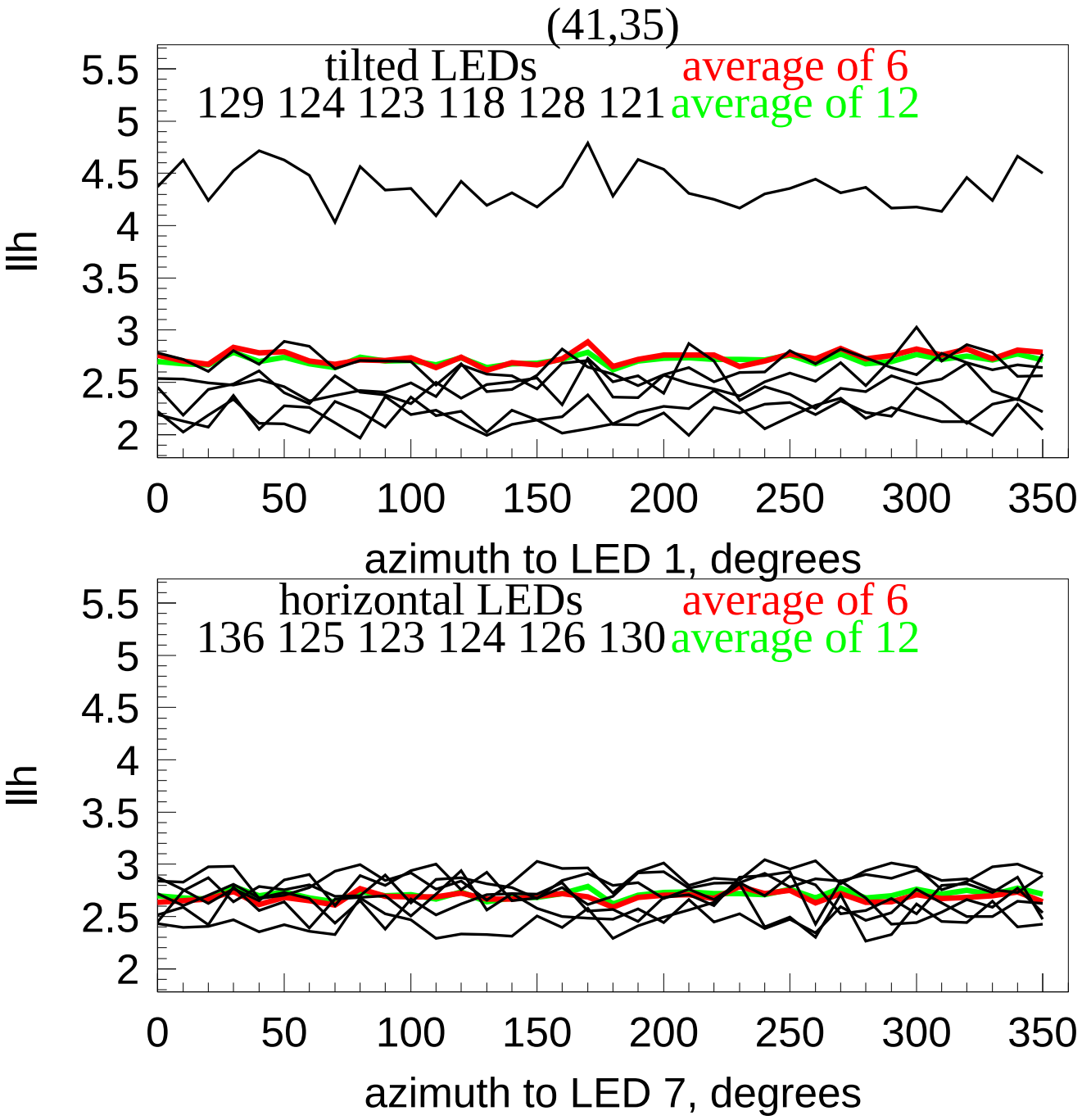

(41,33) 246.90 ± 1.60
llh
2.4
2.3
2.2
2.1
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

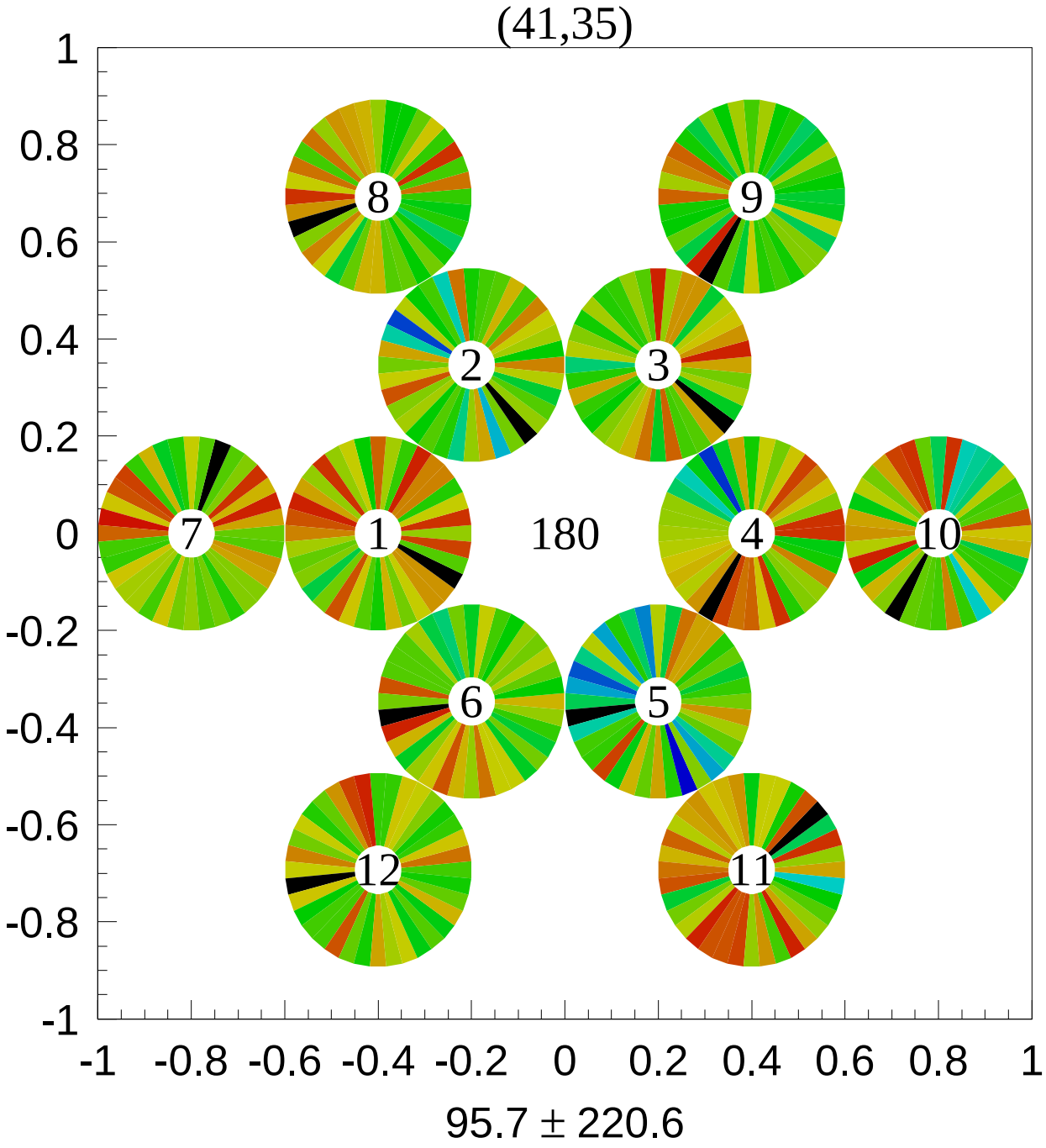

(41,34)
tilted LEDs
128 127 129 124 131 120
average of 6
average of 12
llh
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 133 125 129 130 115
average of 6
average of 12
llh
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

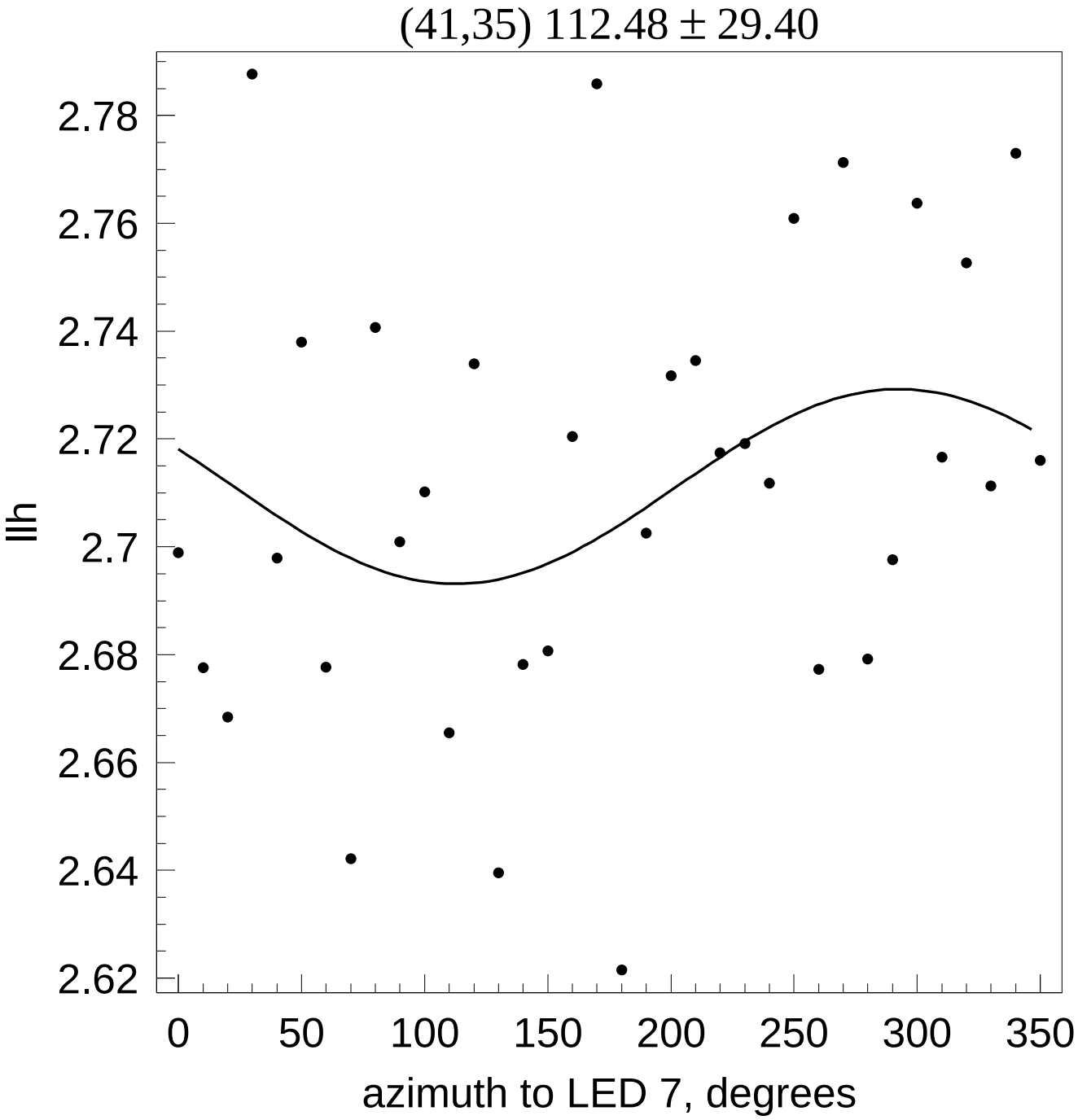

(41,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
309.3 ± 33.0

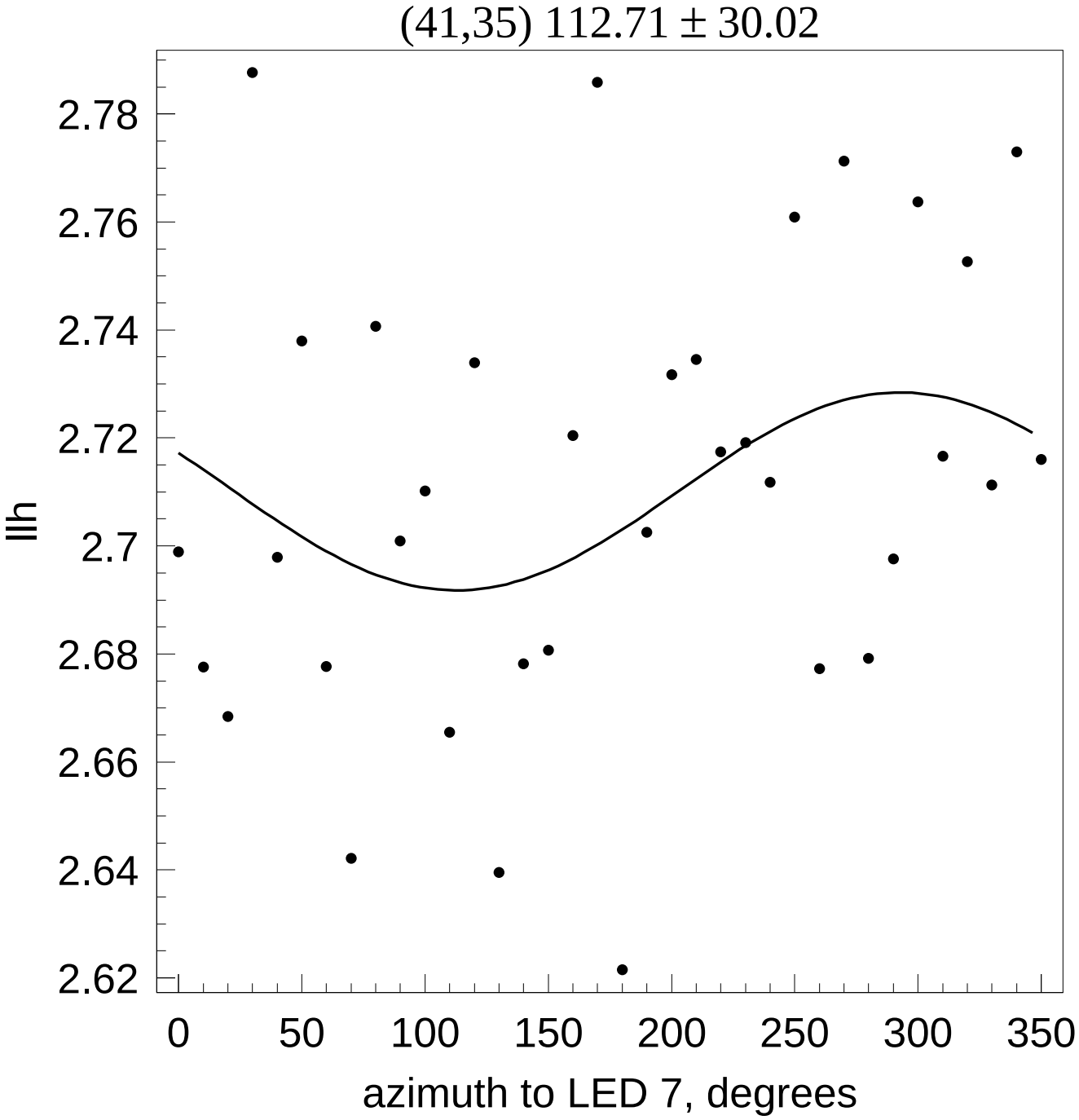

(41,34) 301.53 ± 2.90
4
3.95
3.9
3.85
3.8
3.75
3.7
3.65
3.6
3.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

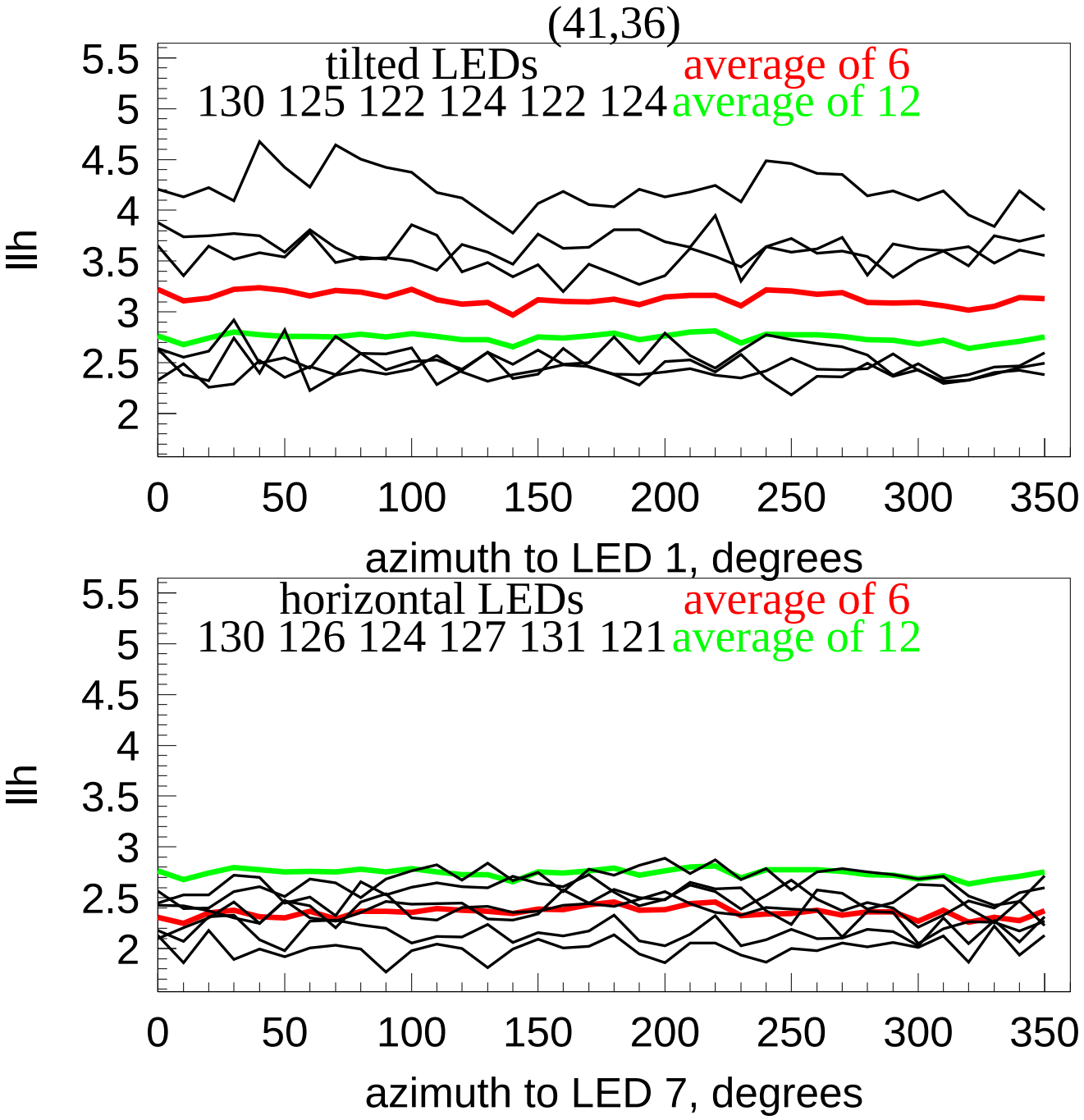

(41,34) 301.90 ± 2.95
4
3.95
3.9
3.85
3.8
3.75
3.7
3.65
3.6
3.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

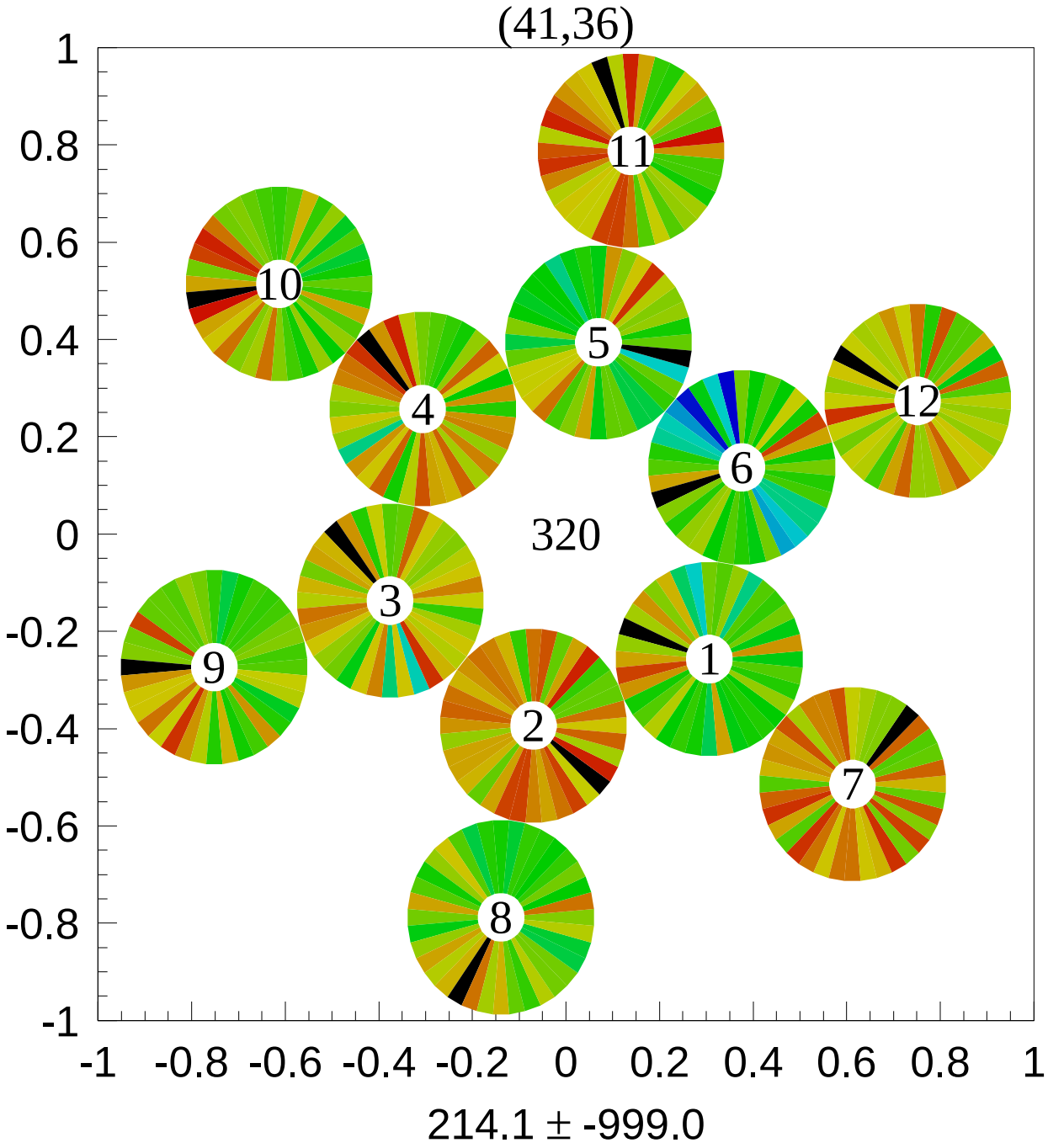

(41,35)
tilted LEDs
129 124 123 118 128 121
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
136 125 123 124 126 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

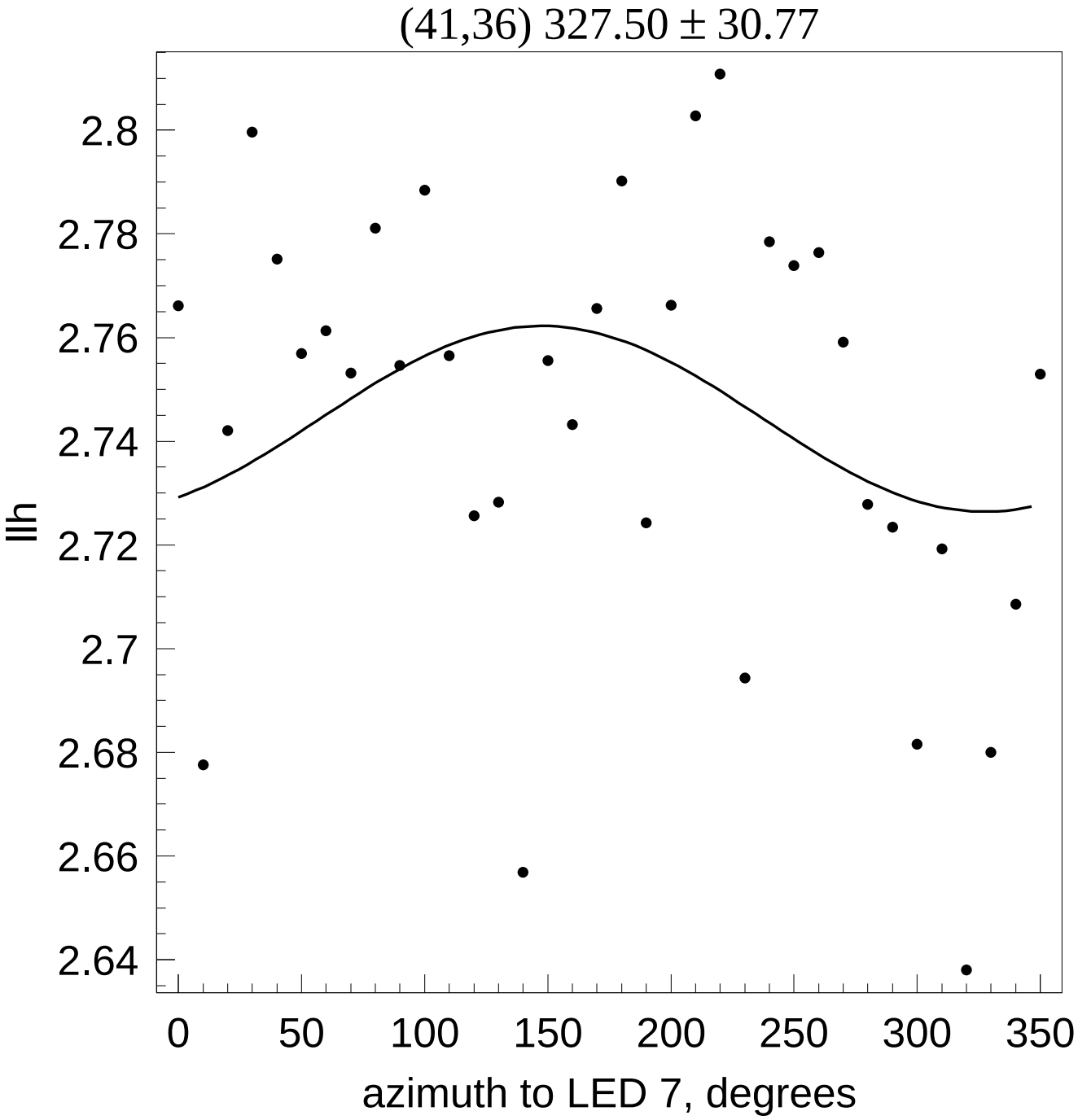

(41,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
95.7 ± 220.6
8
9
2
3
7
1
180
4
10
6
5
12
11

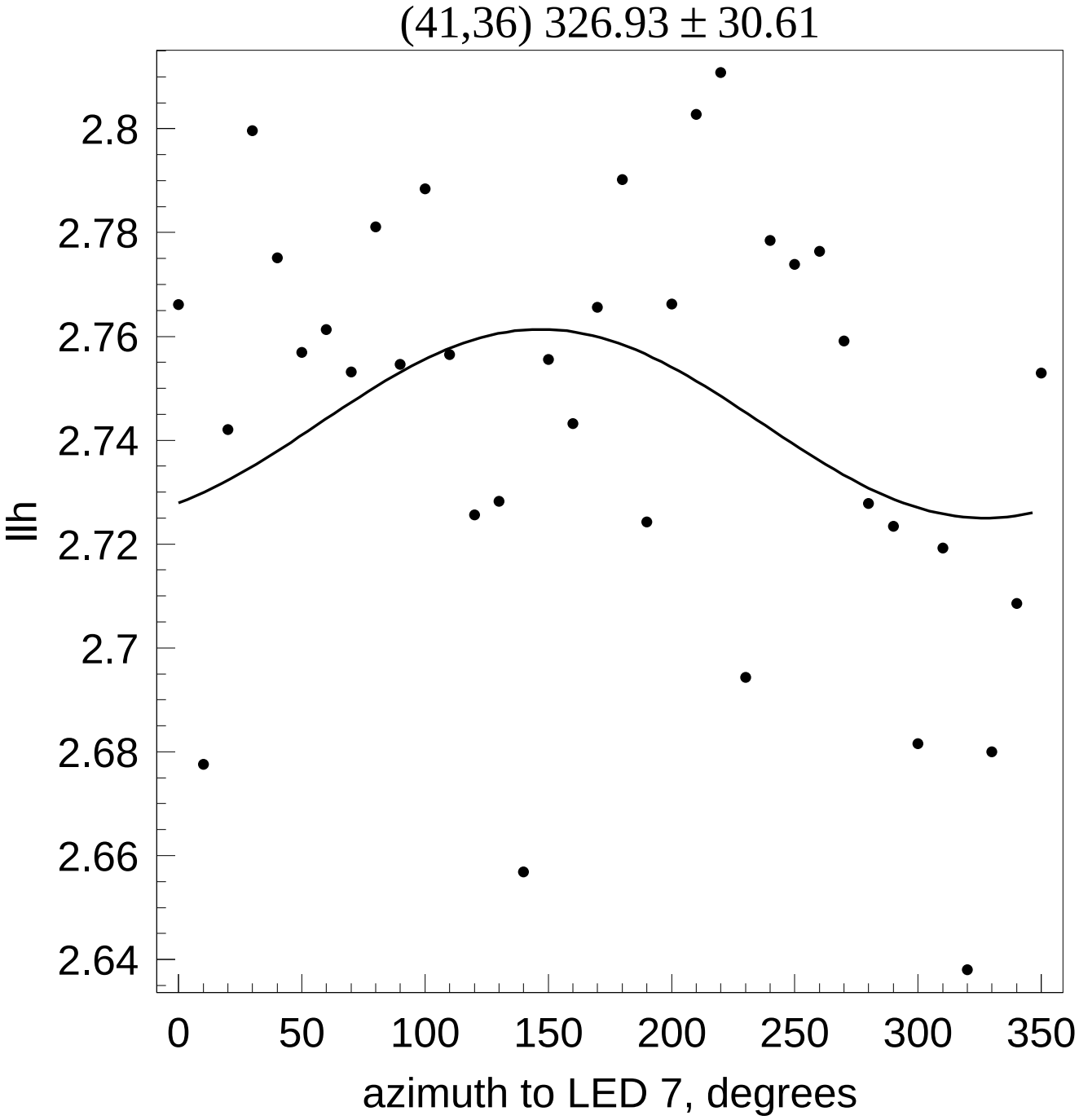

(41,35) 112.48 ± 29.40
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
2.62
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

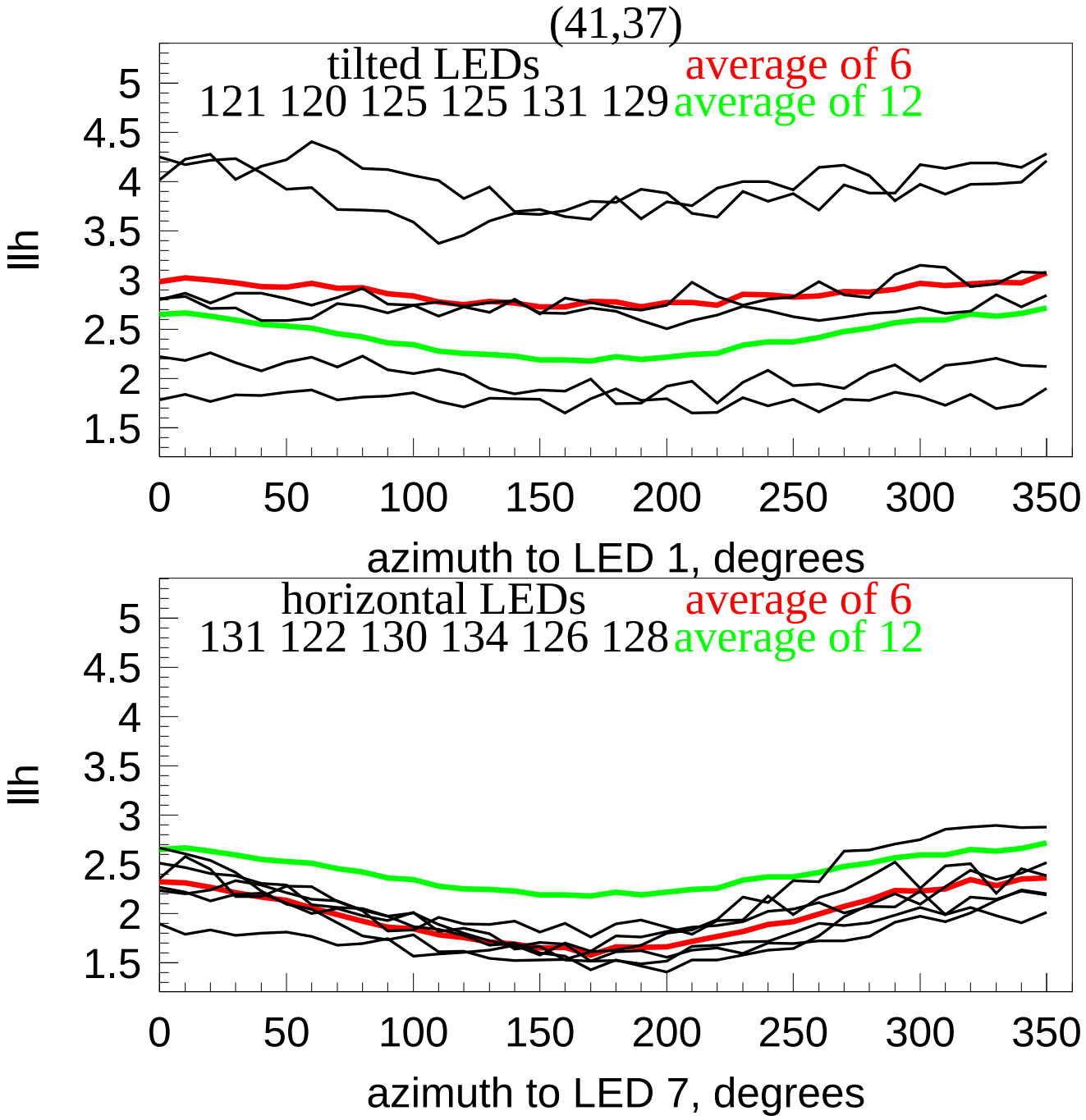

(41,35) 112.71 ± 30.02
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
2.62
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

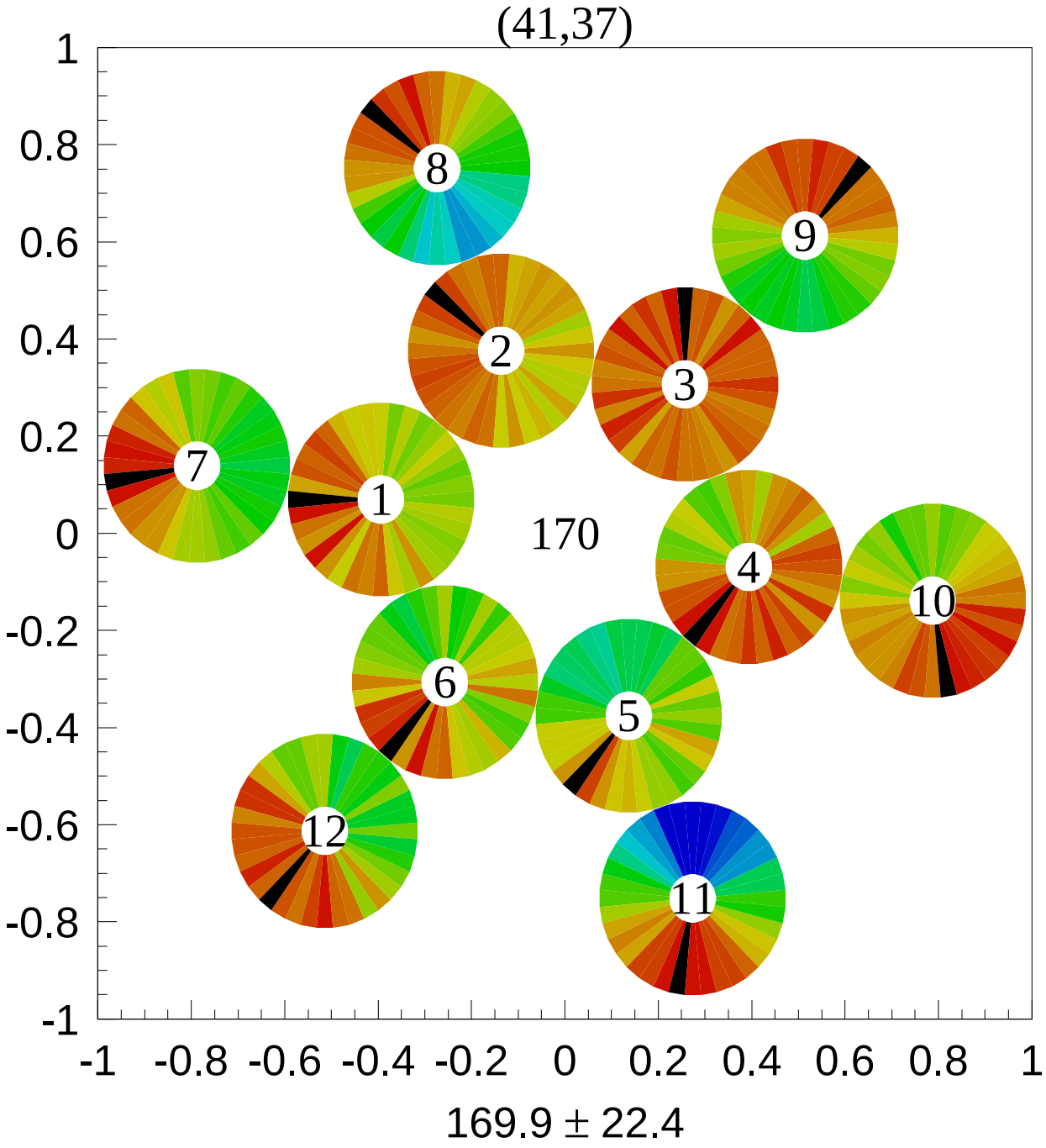

(41,36)
tilted LEDs
130 125 122 124 122 124
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 126 124 127 131 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

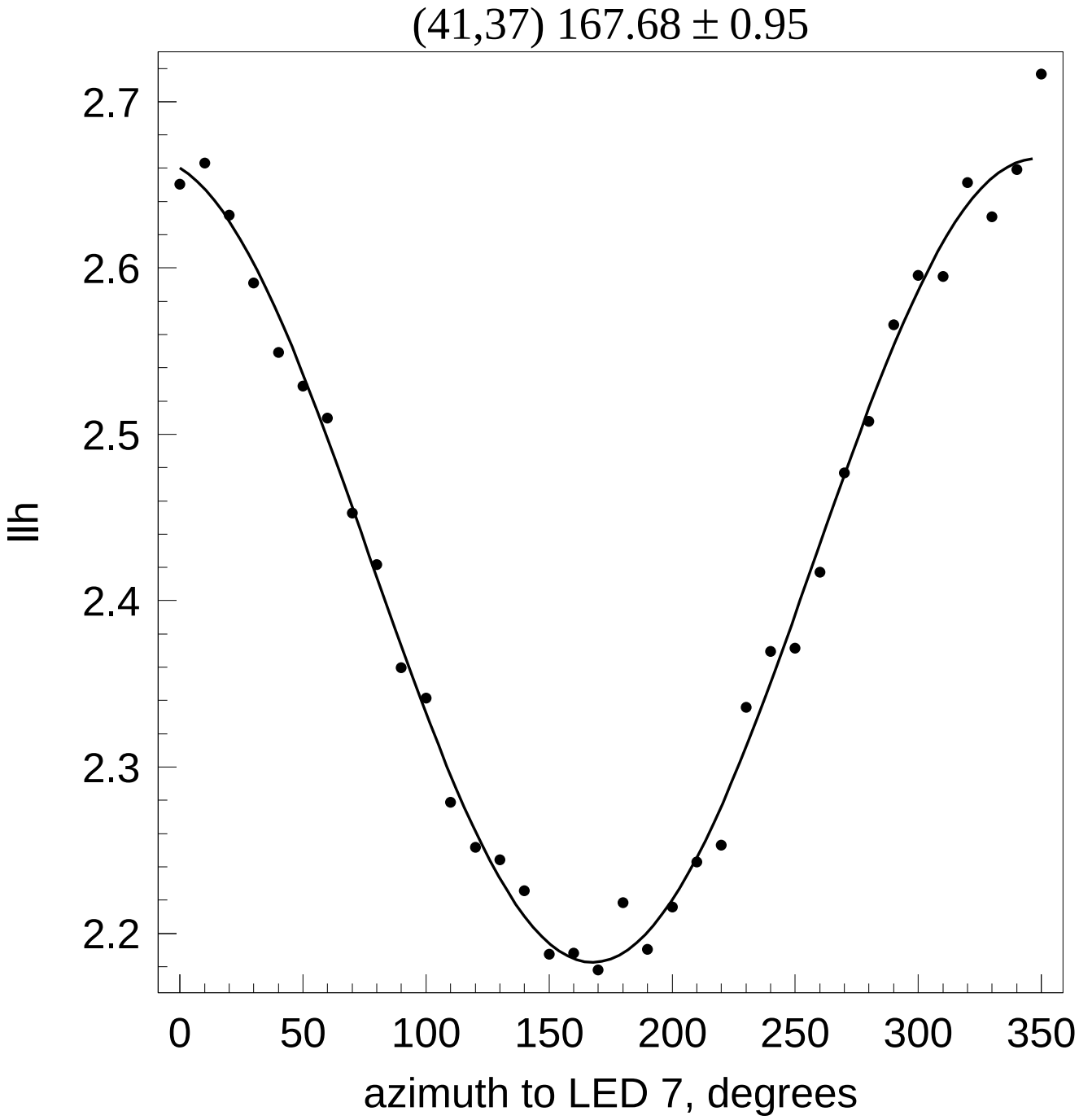

(41,36)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
214.1 ± -999.0

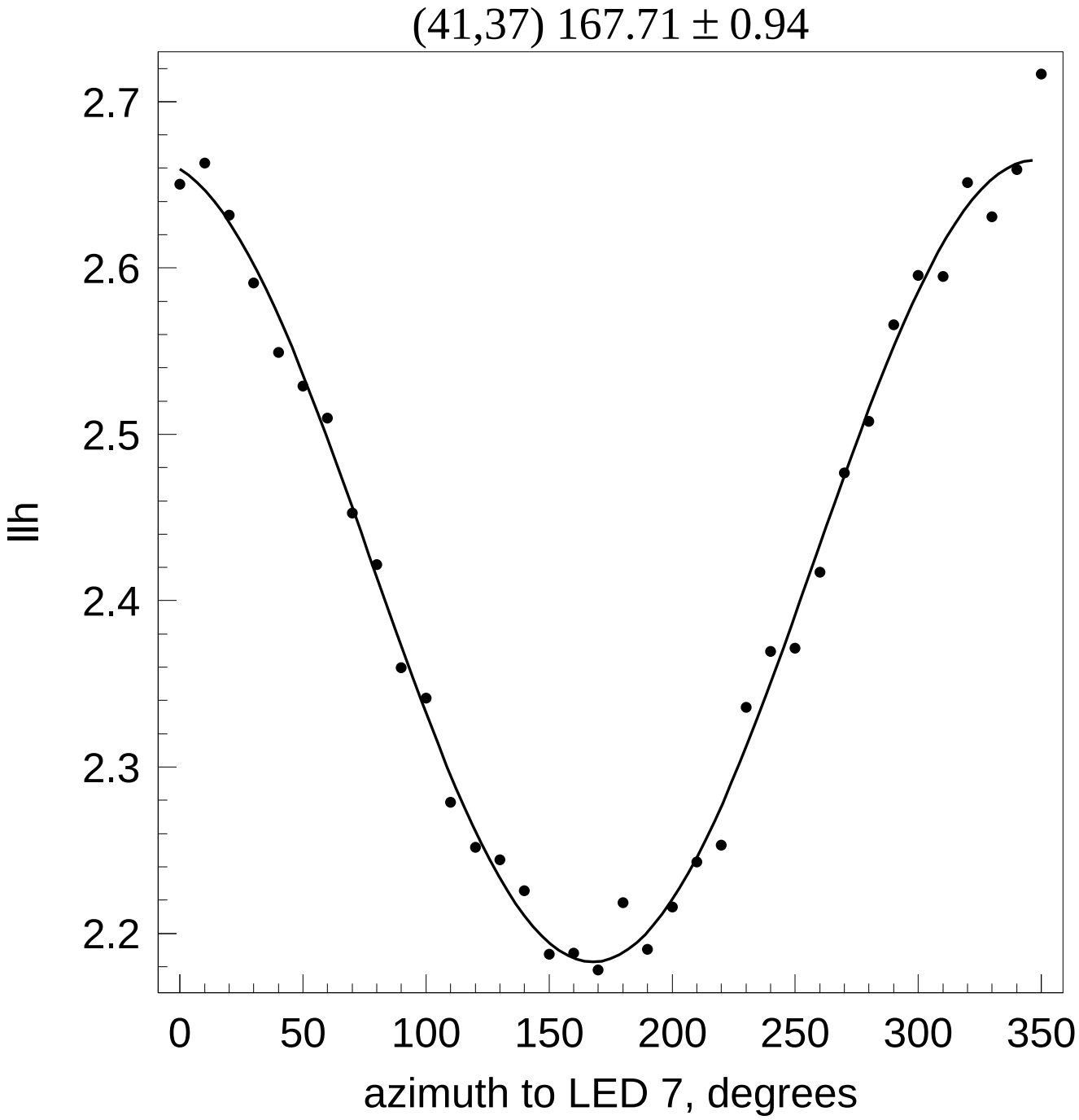

(41,36) 327.50 ± 30.77
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

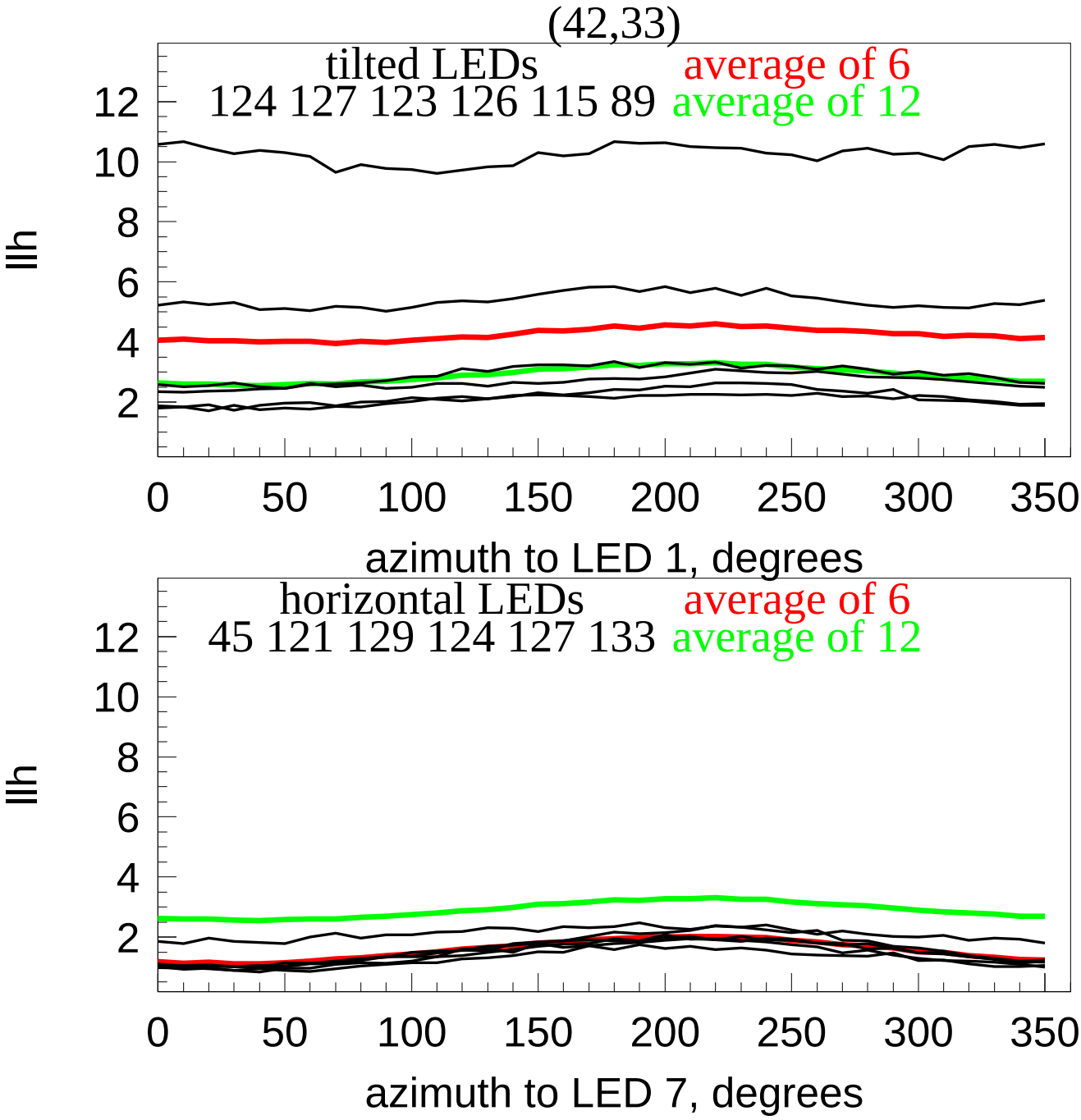

(41,36) 326.93 ± 30.61
2.8
2.78
2.76
2.74
2.72
2.7
2.68
2.66
2.64
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

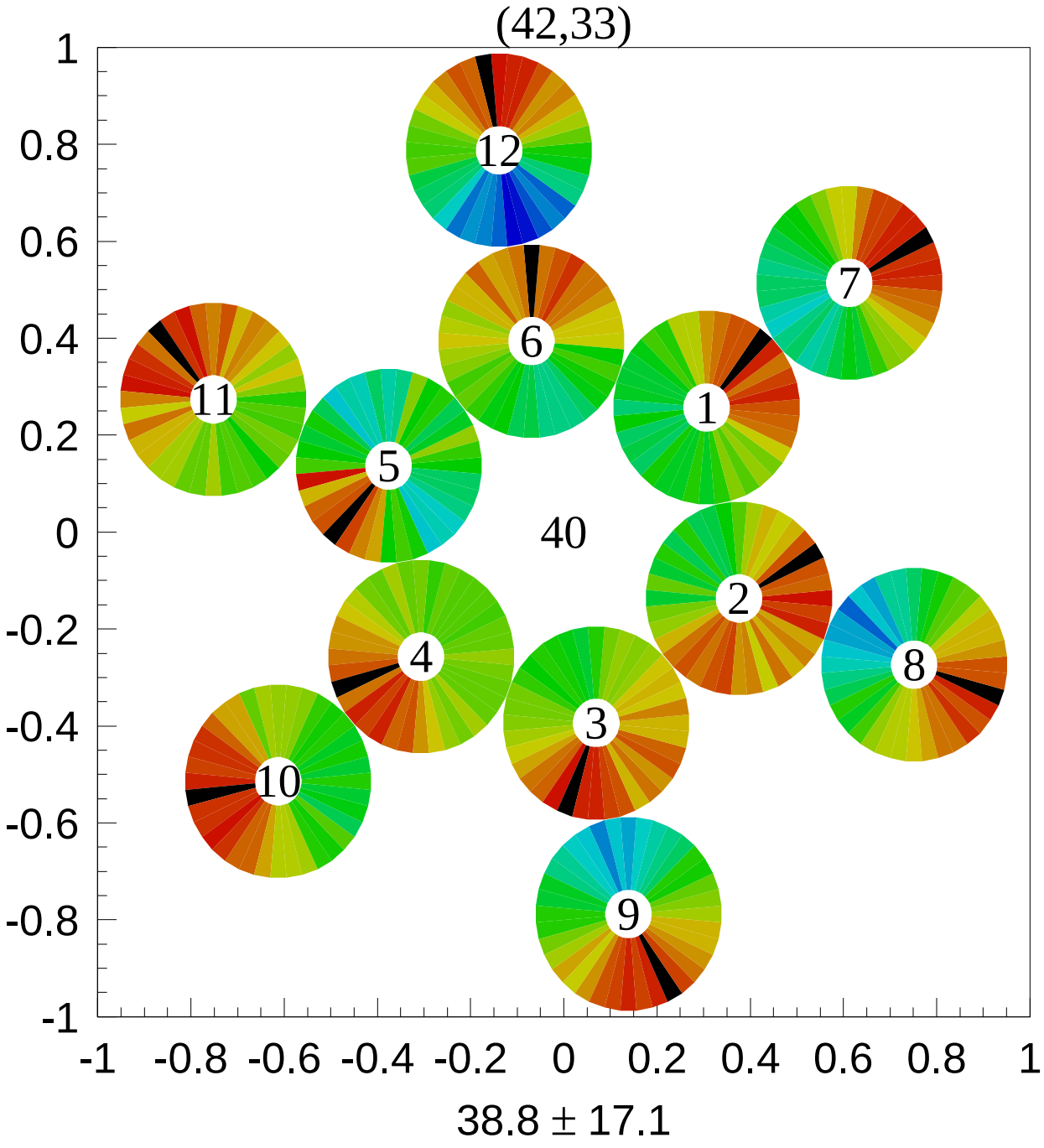

(41,37)
tilted LEDs
121 120 125 125 131 129
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 122 130 134 126 128
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

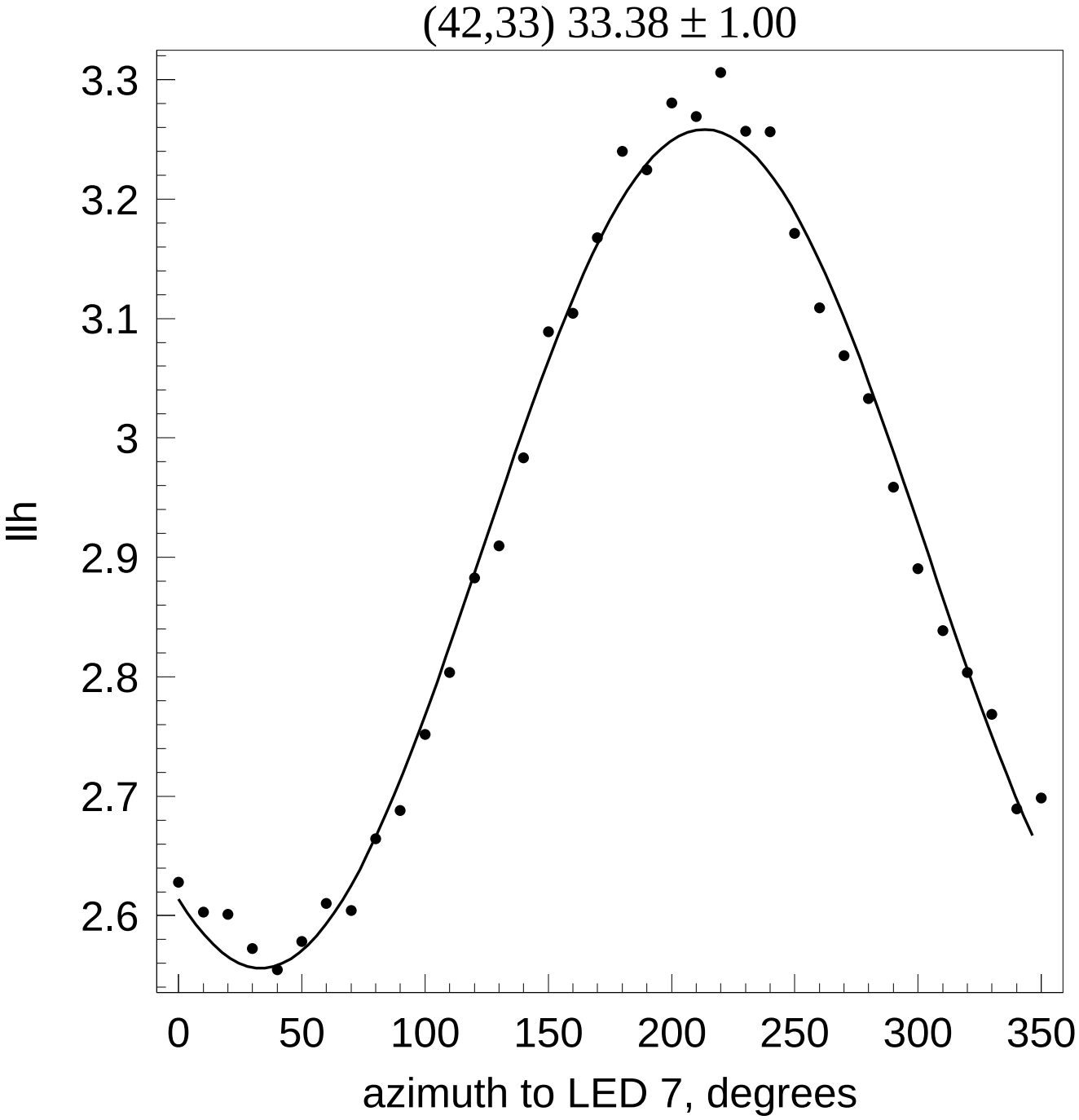

(41,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
169.9 ± 22.4

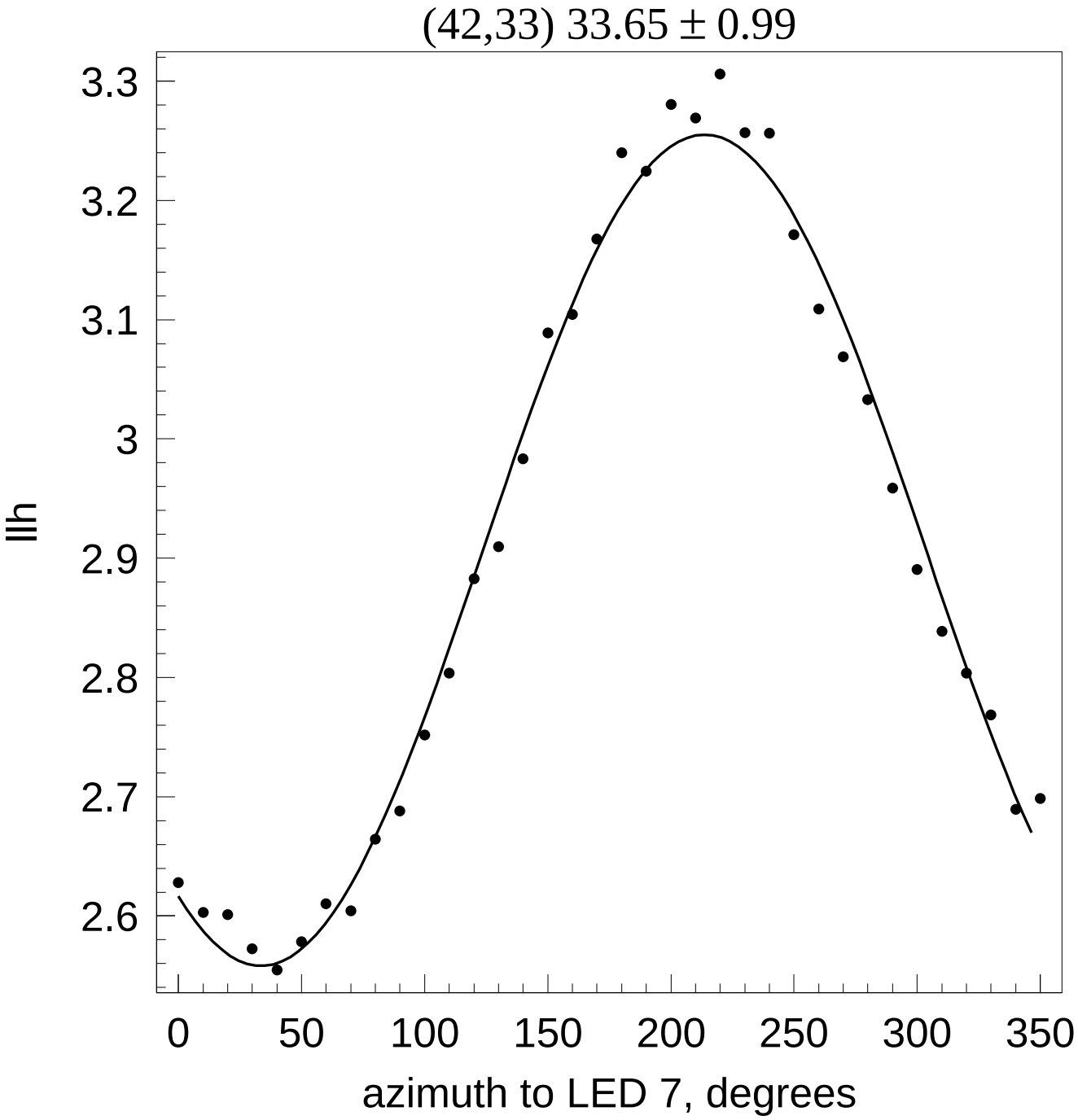

(41,37) 167.68 ± 0.95
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

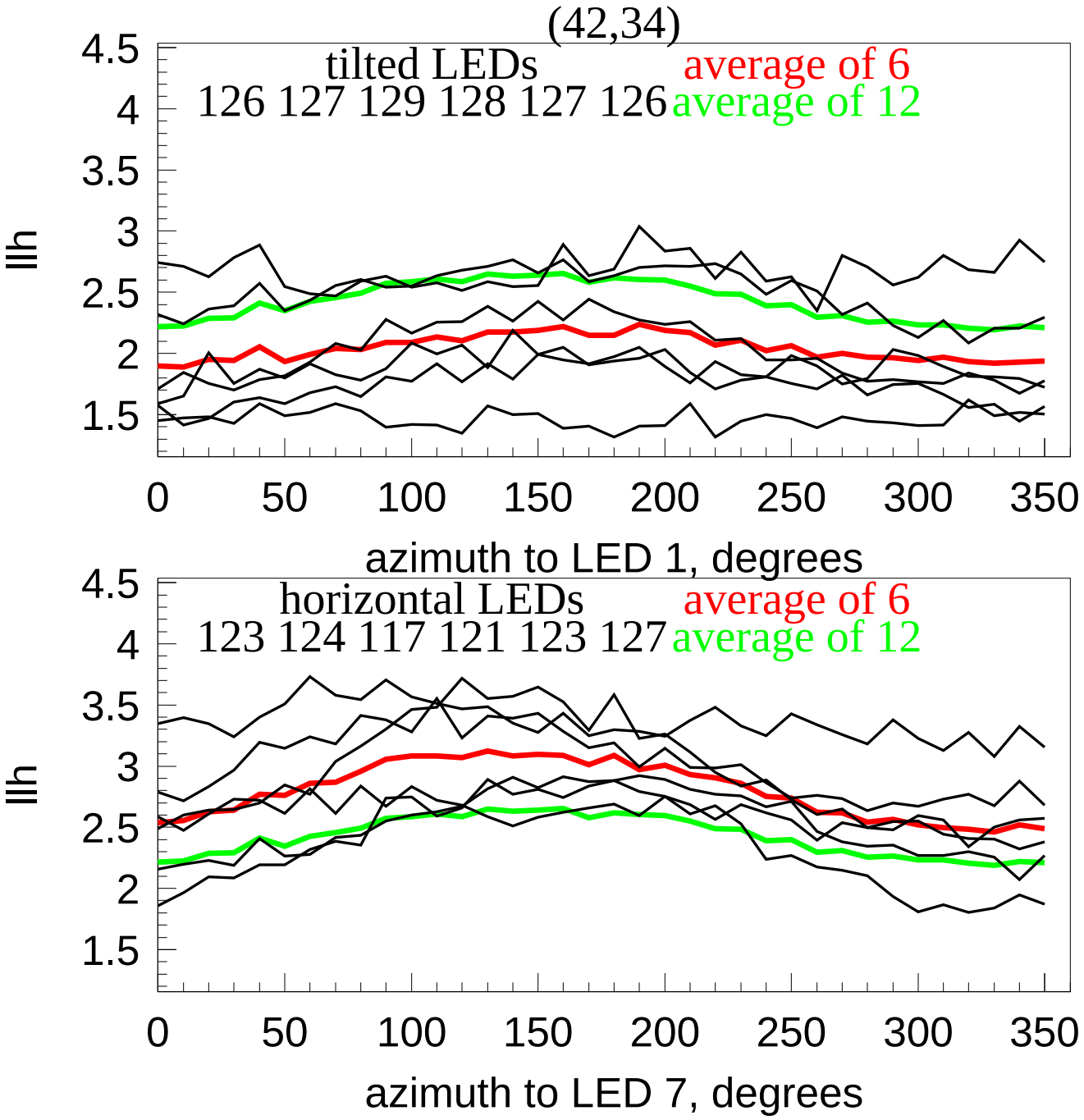

(41,37) 167.71 ± 0.94
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

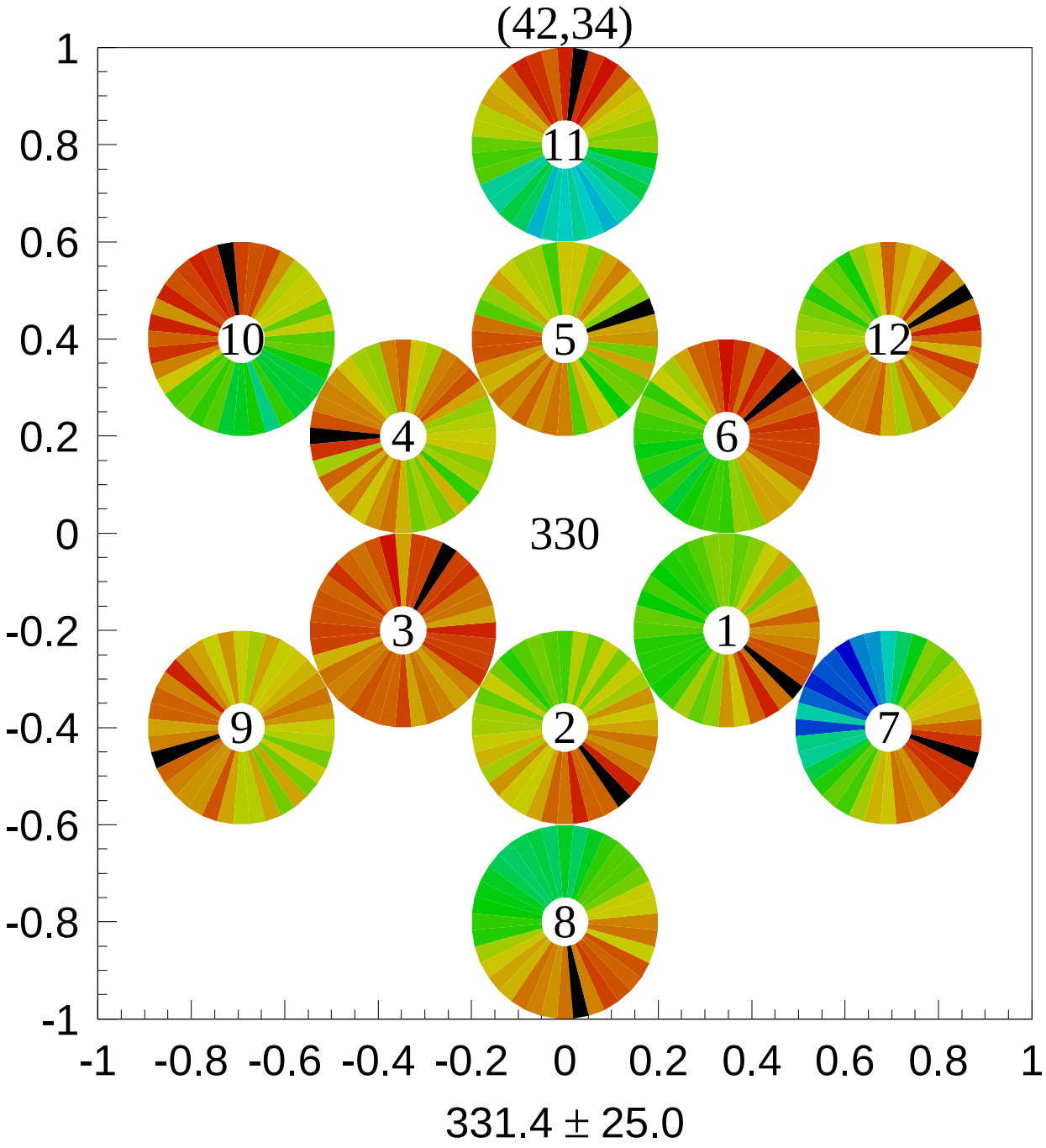

(42,33)
tilted LEDs
124 127 123 126 115 89
average of 6
average of 12
llh
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
45 121 129 124 127 133
average of 6
average of 12
llh
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

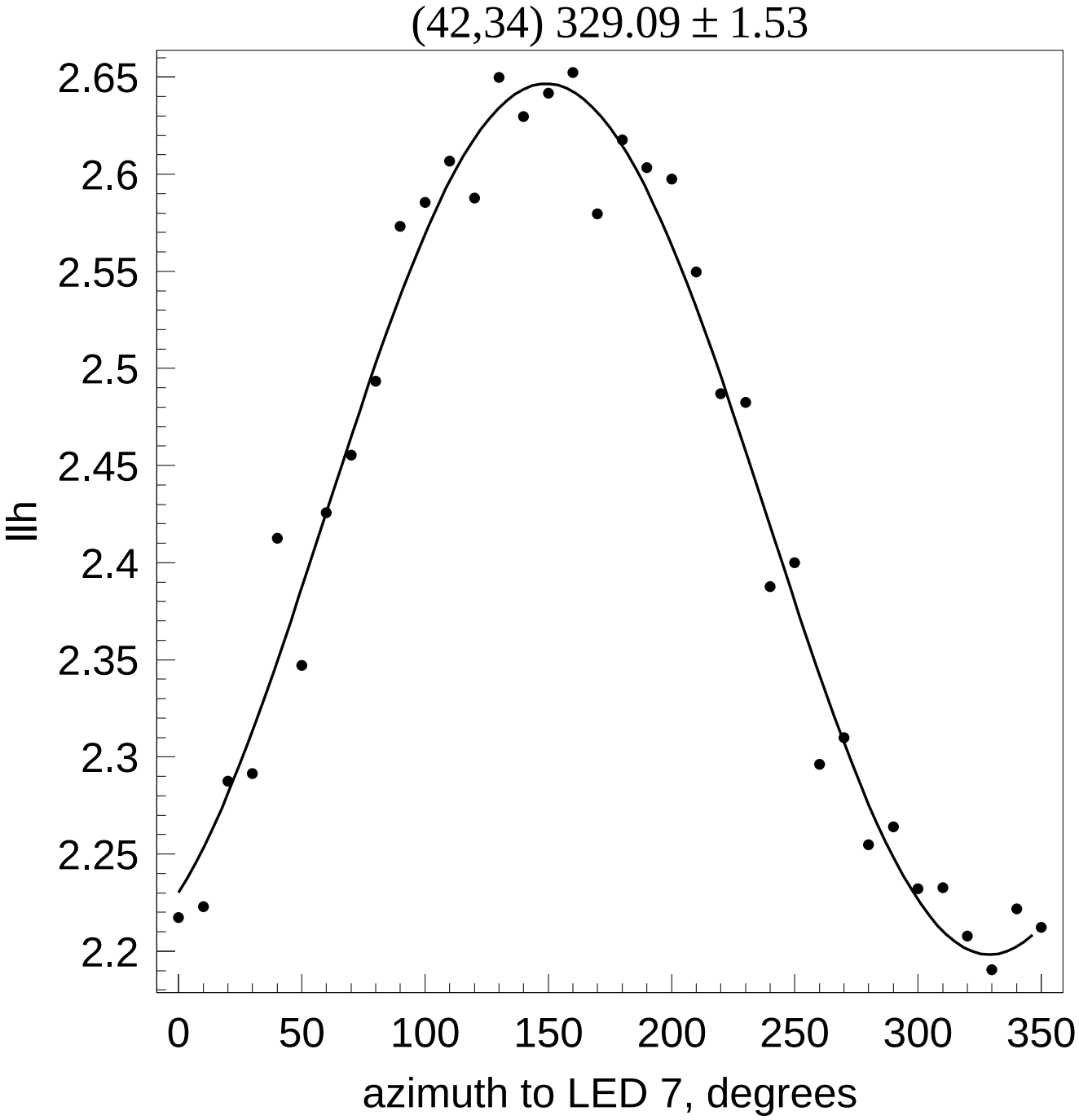

(42,33)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
38.8 ± 17.1

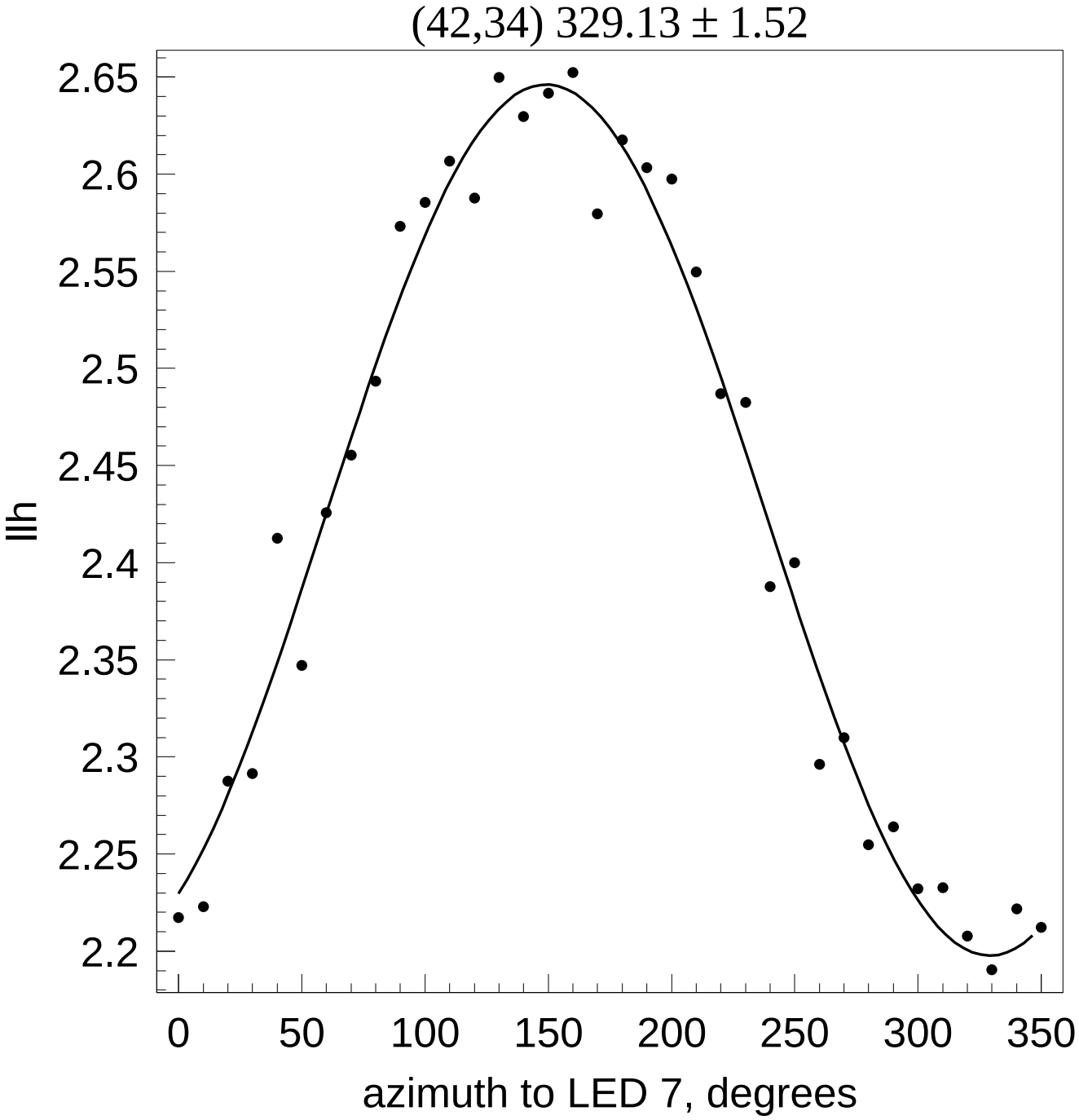

(42,33) 33.38 ± 1.00
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

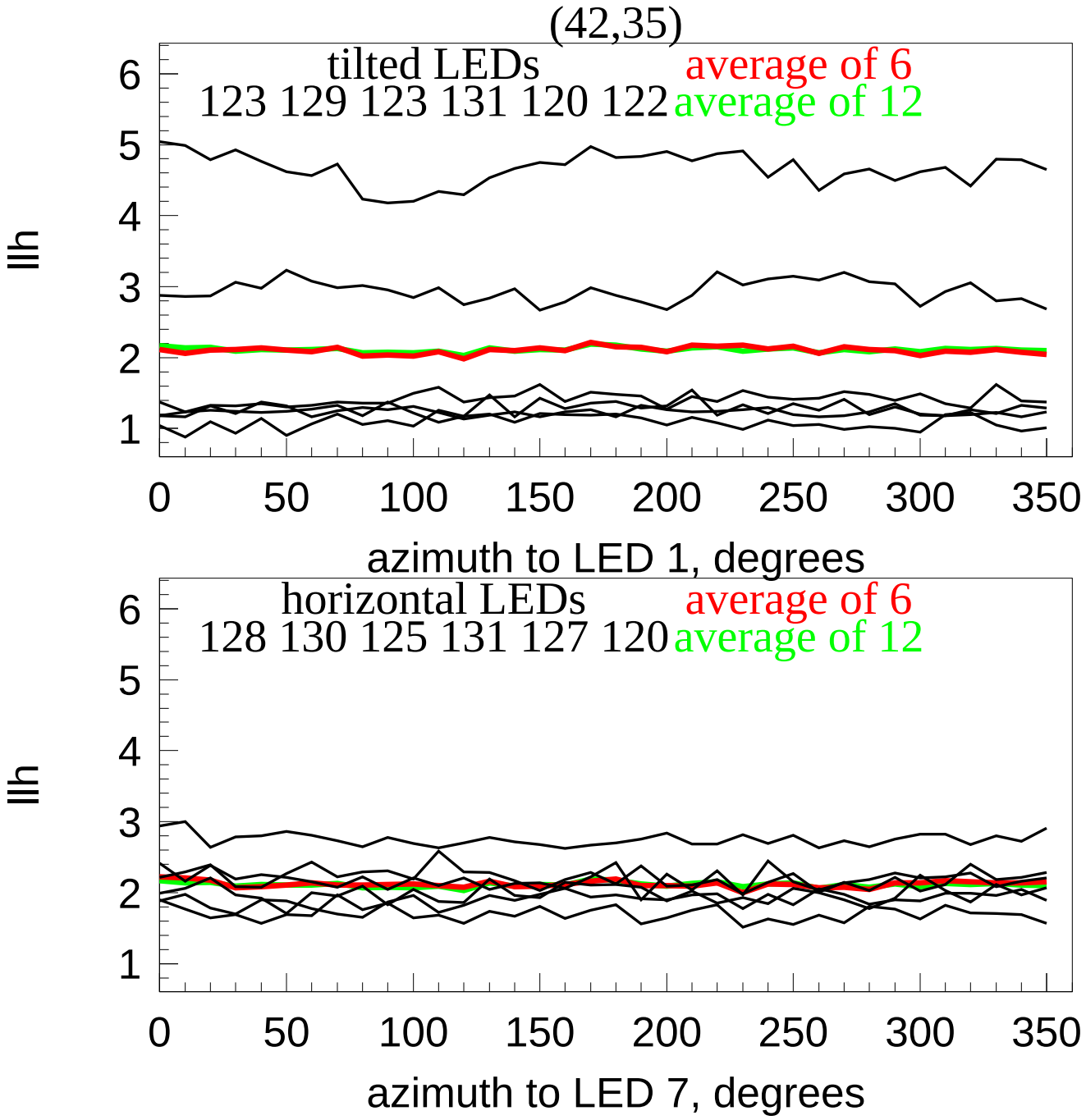

(42,33) 33.65 ± 0.99
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

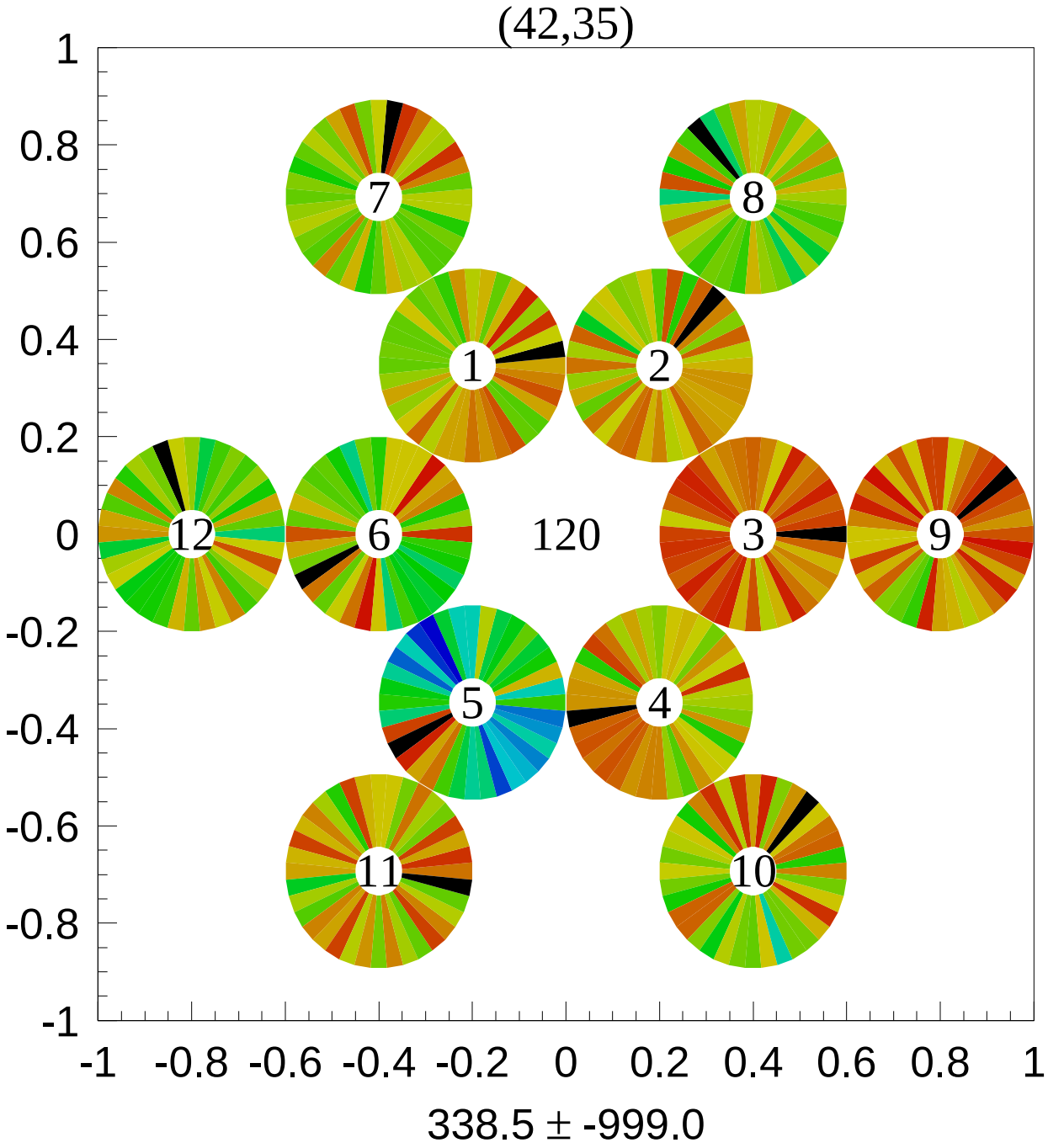

(42,34)
tilted LEDs
126 127 129 128 127 126
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 124 117 121 123 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

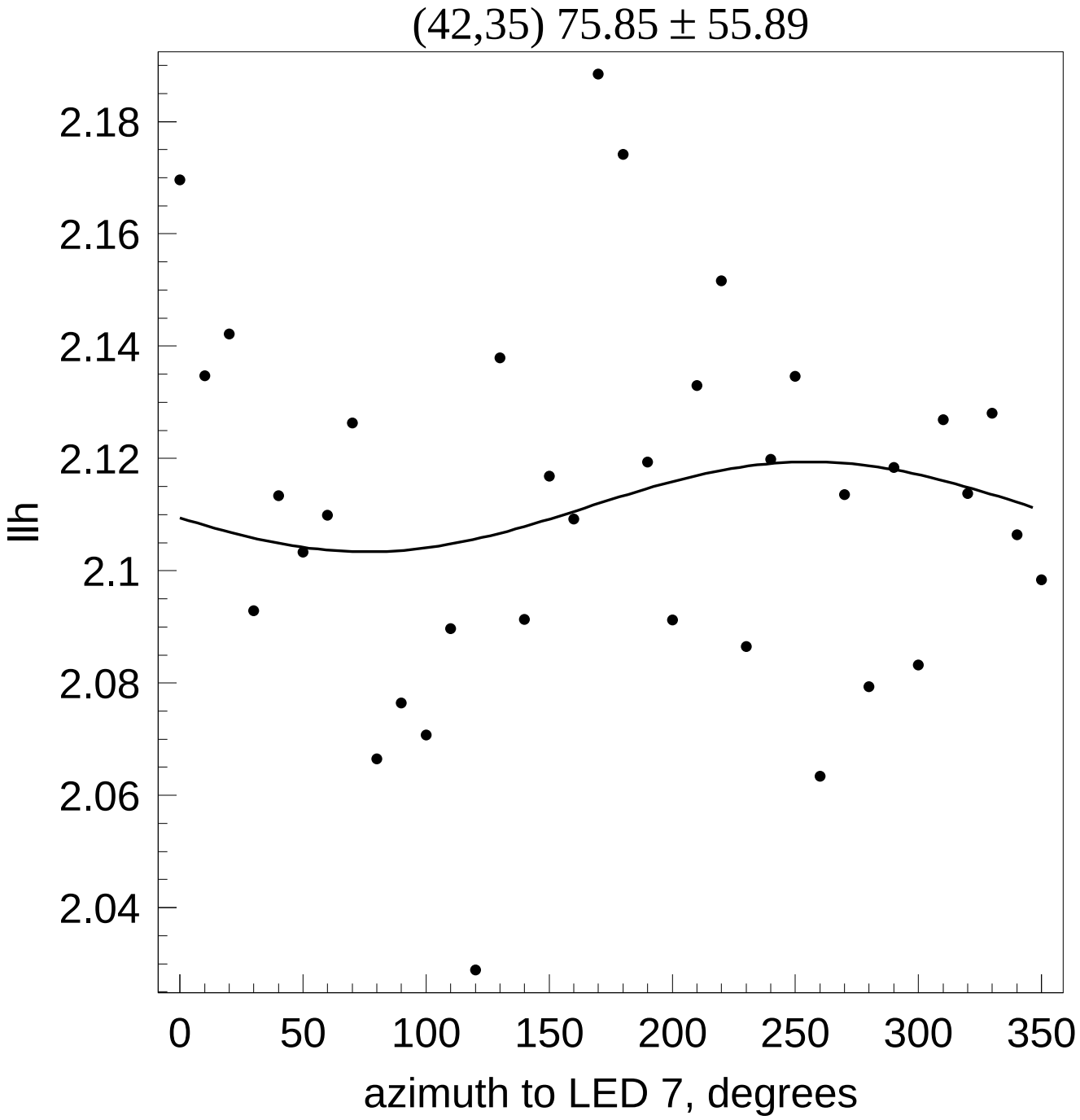

(42,34)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
331.4 ± 25.0

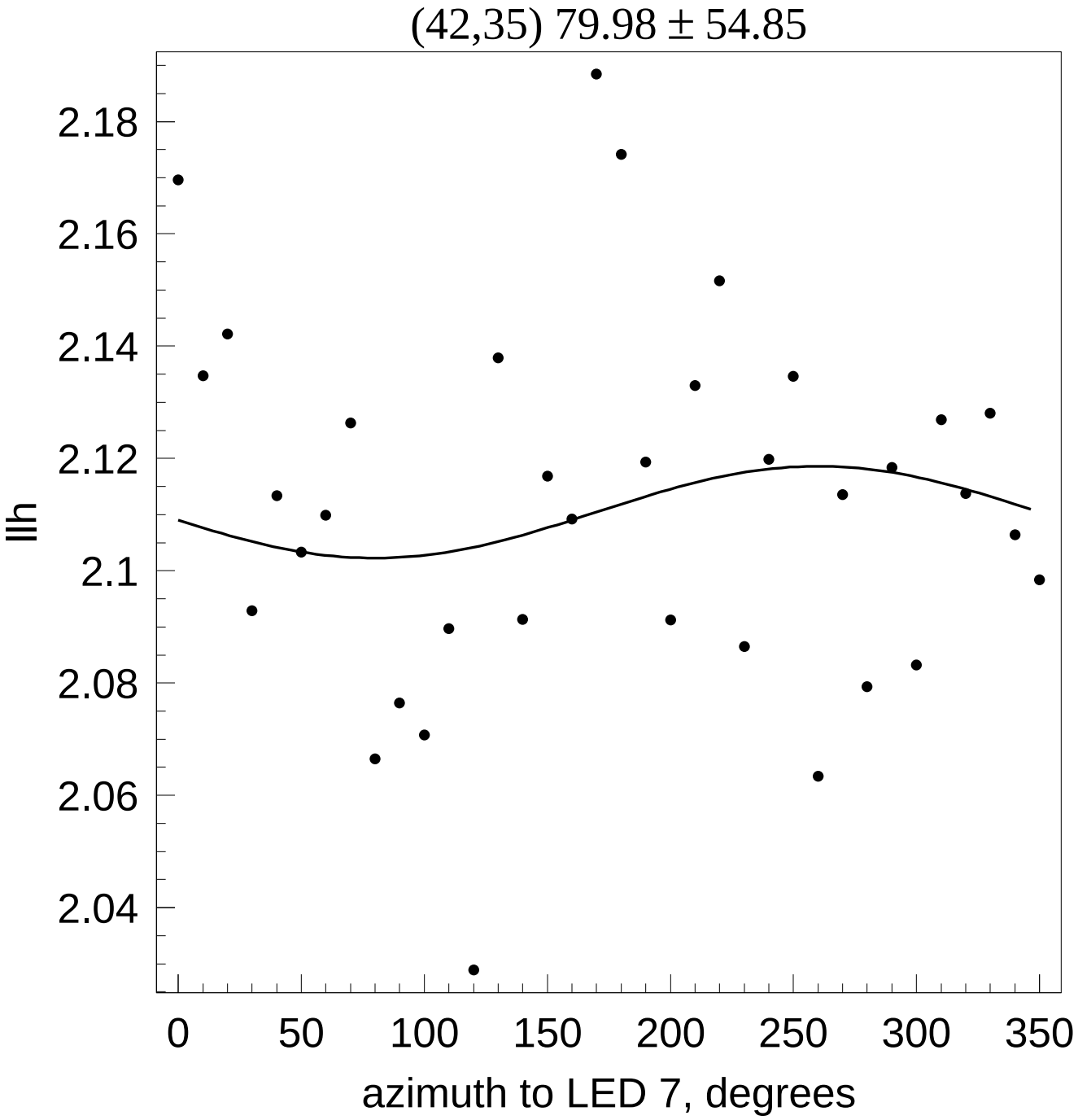

(42,34) 329.09 ± 1.53
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
2.25
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

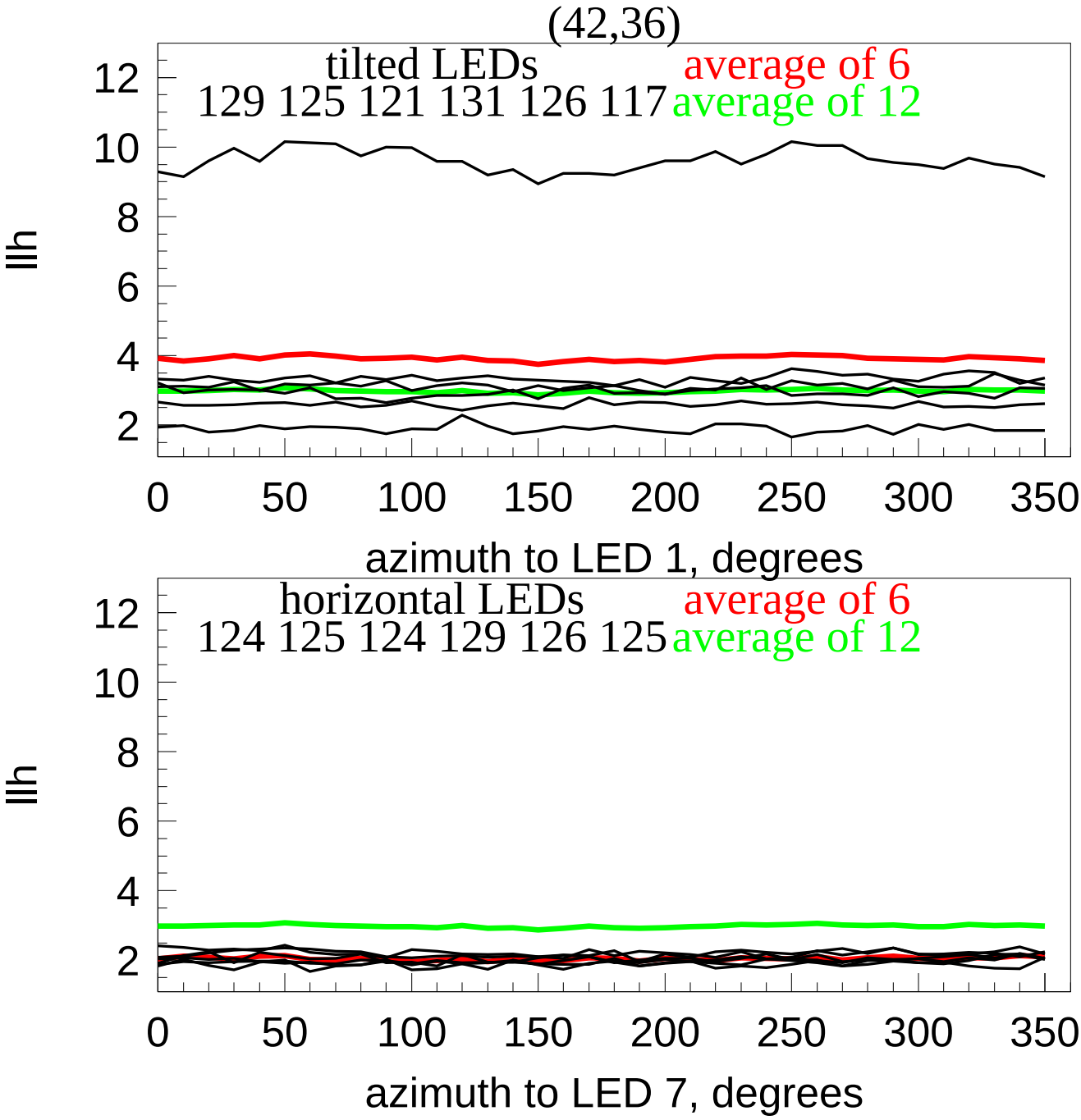

(42,34) 329.13 ± 1.52
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
2.25
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

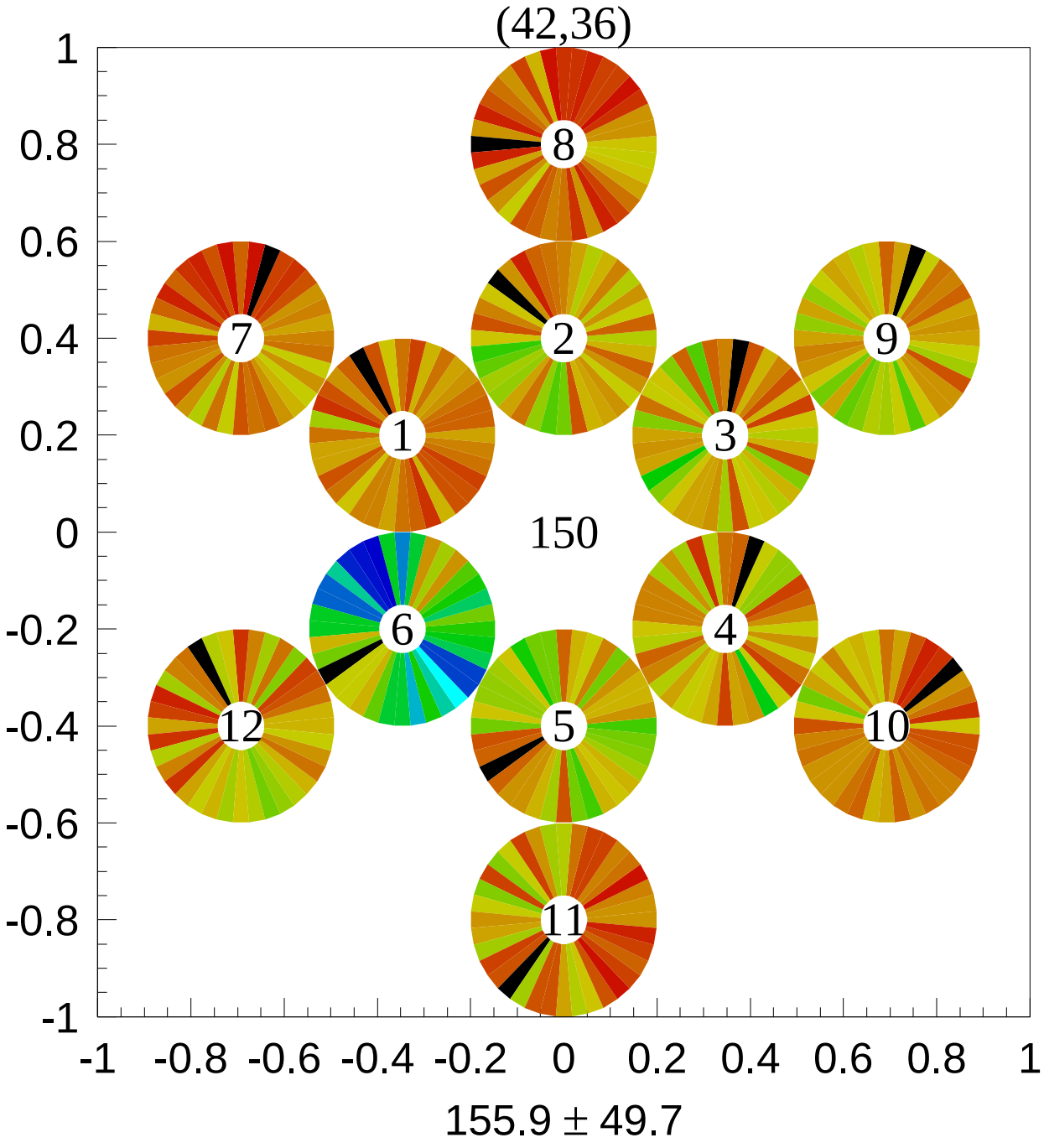

(42,35)
tilted LEDs
123 129 123 131 120 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 130 125 131 127 120
average of 6
average of 12
llh
azimuth to LED 7, degrees

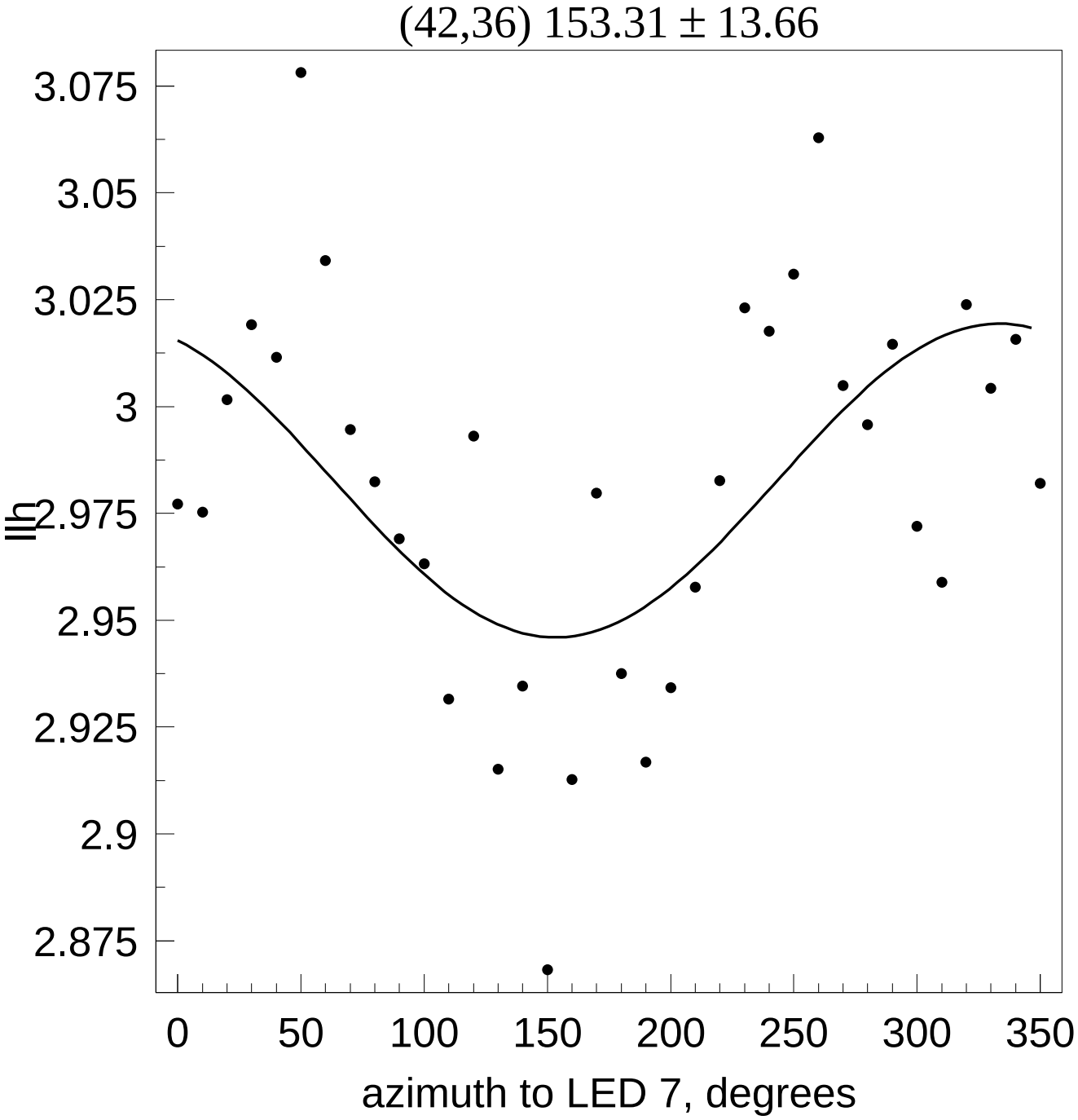

(42,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
338.5 ± -999.0
7
8
1
2
12
6
120
3
9
5
4
11
10

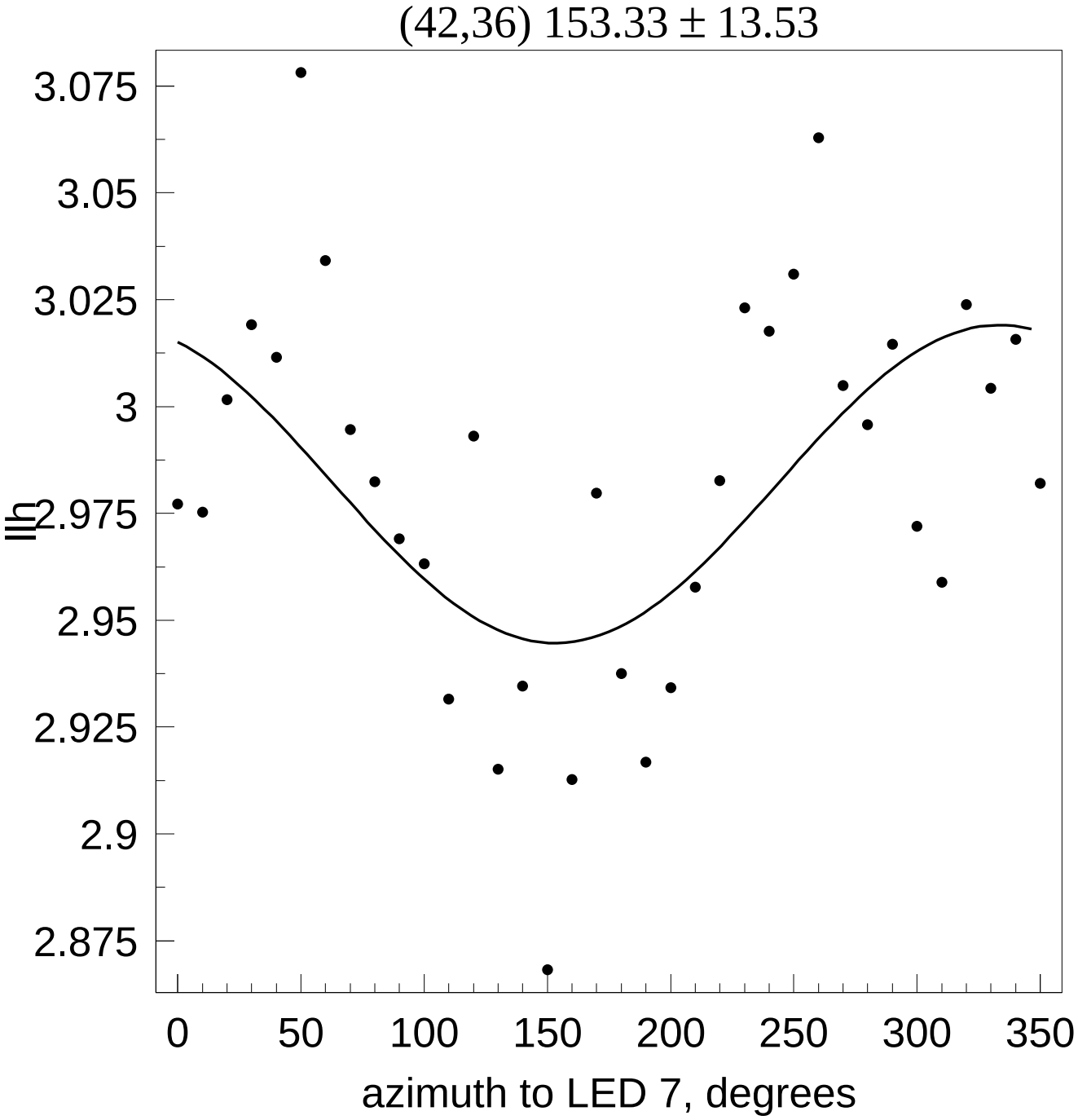

(42,35) 75.85 ± 55.89
2.18
2.16
2.14
2.12
2.1
2.08
2.06
2.04
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

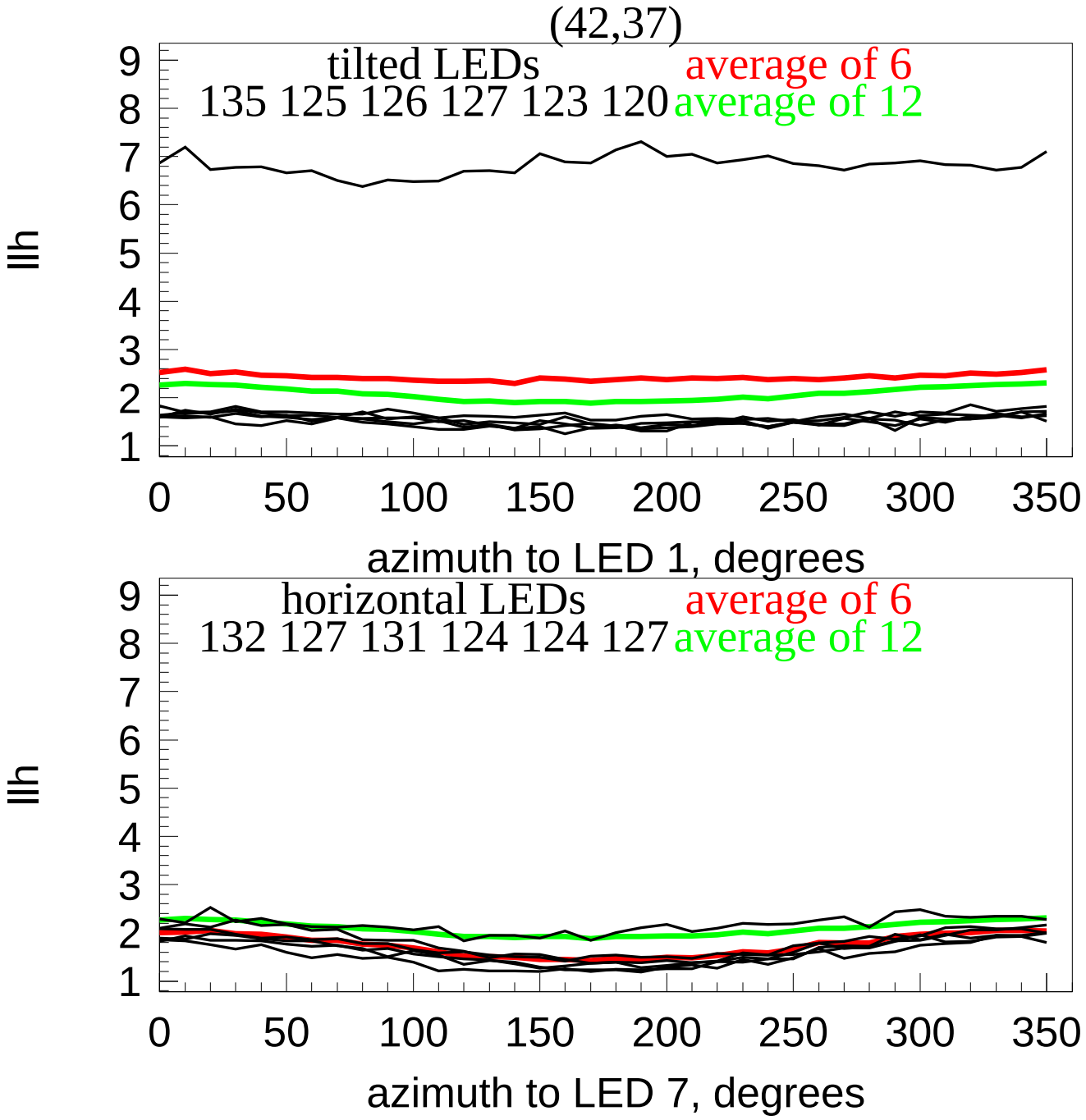

(42,35) 79.98 ± 54.85
2.18
2.16
2.14
2.12
2.1
2.08
2.06
2.04
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

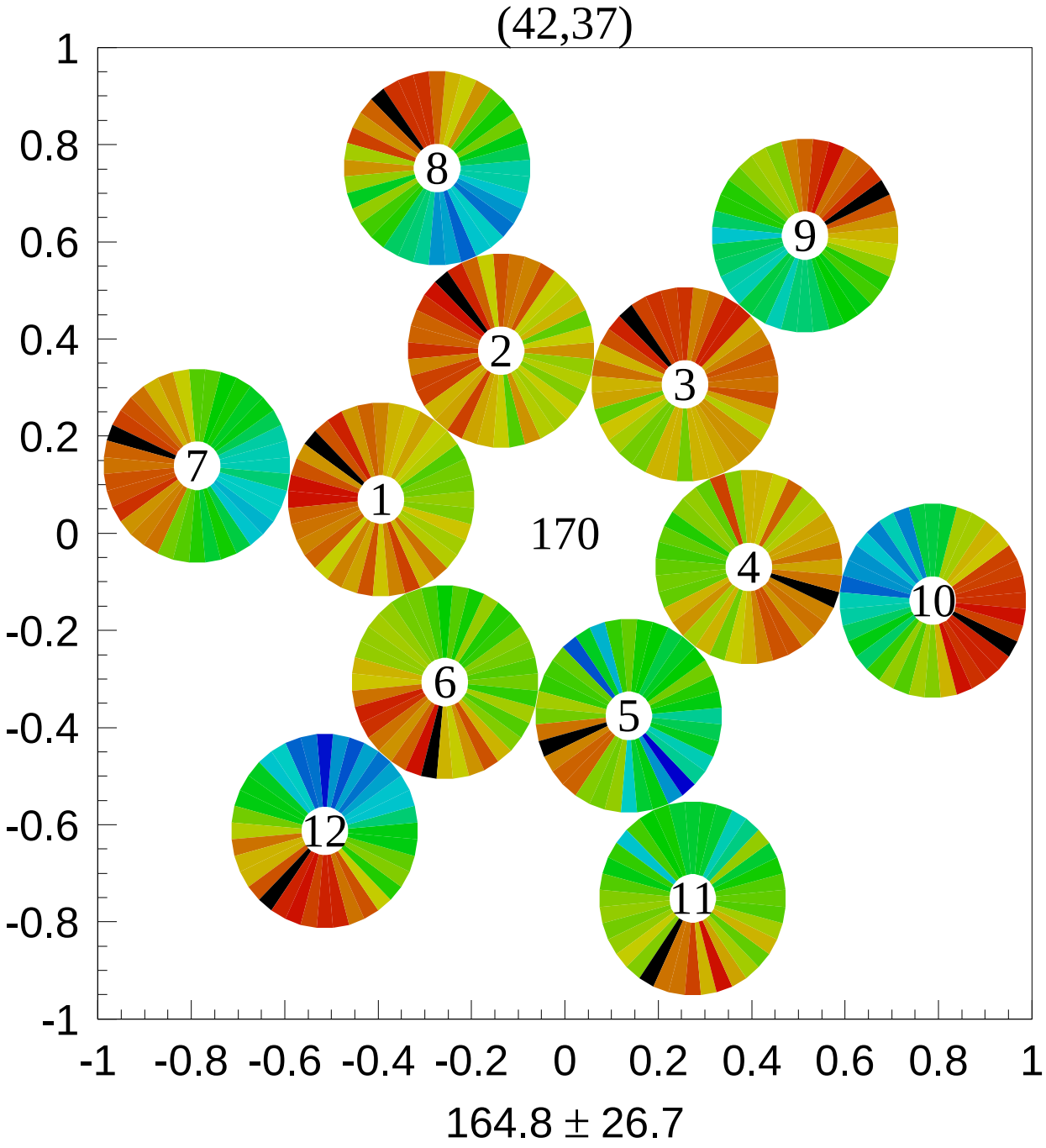

(42,36)
tilted LEDs
129 125 121 131 126 117
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 125 124 129 126 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

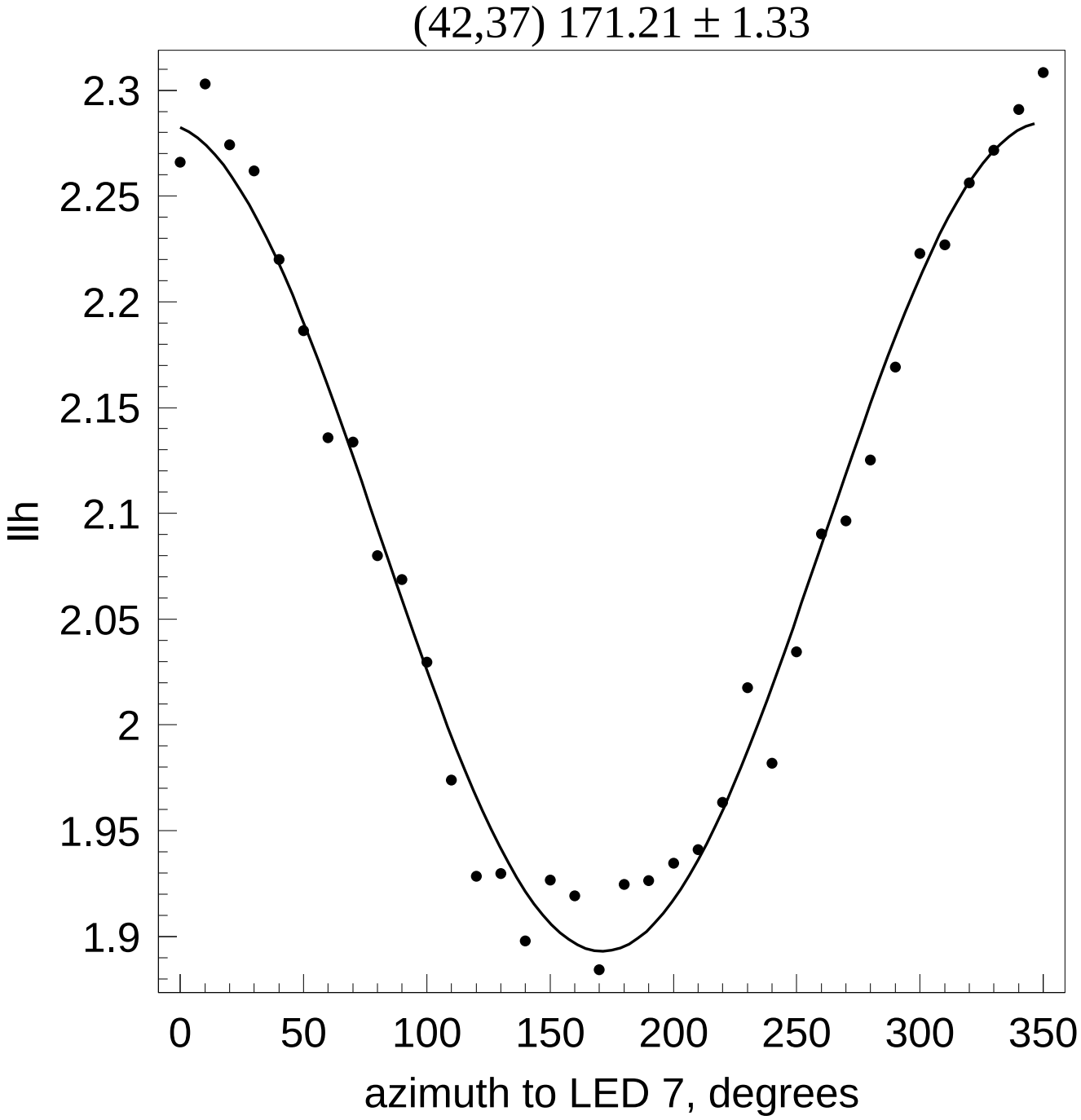

(42,36)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
155.9 ± 49.7

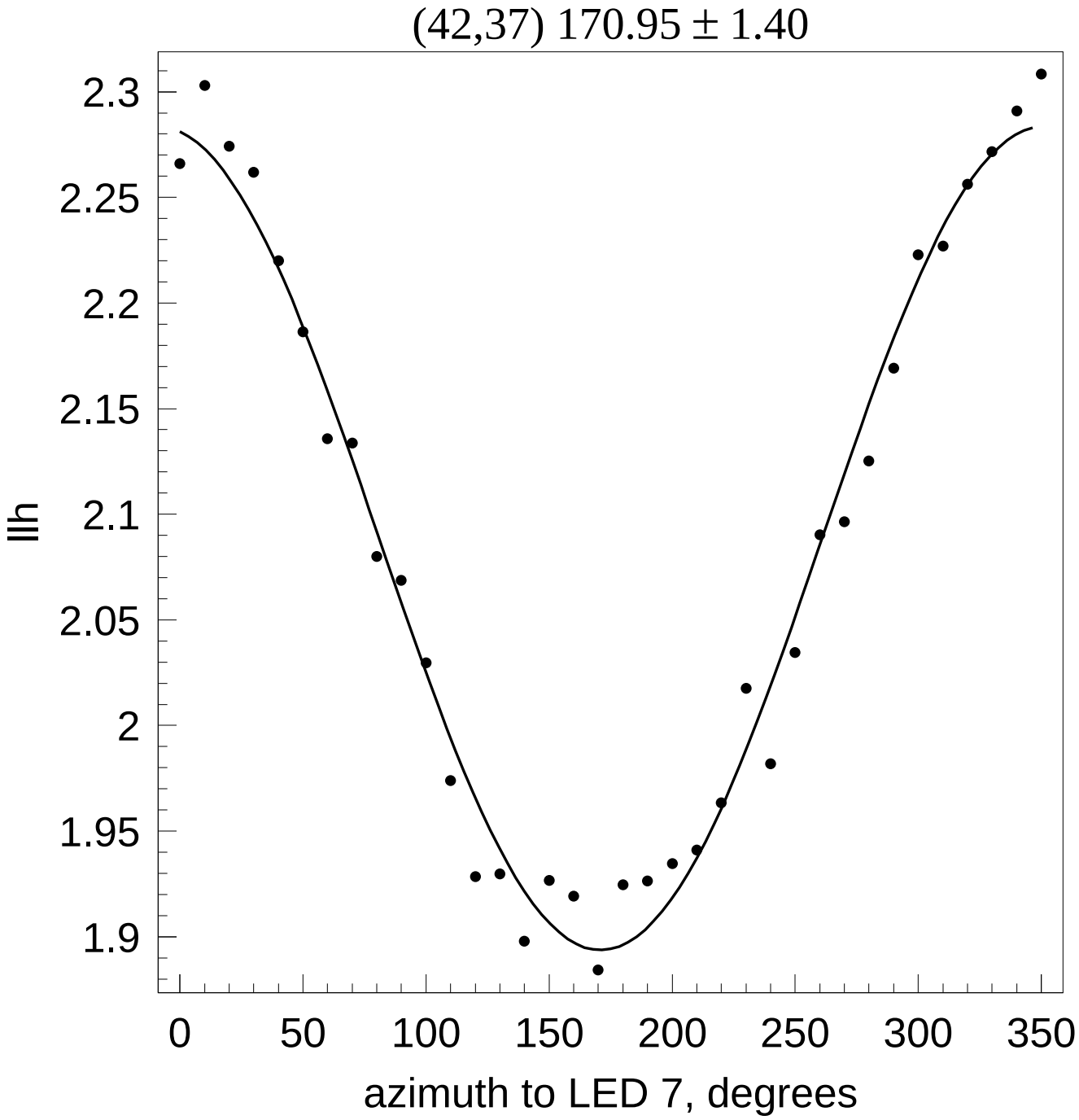

(42,36) 153.31 ± 13.66
3.075
3.05
3.025
3
2.975
2.95
2.925
2.9
2.875
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

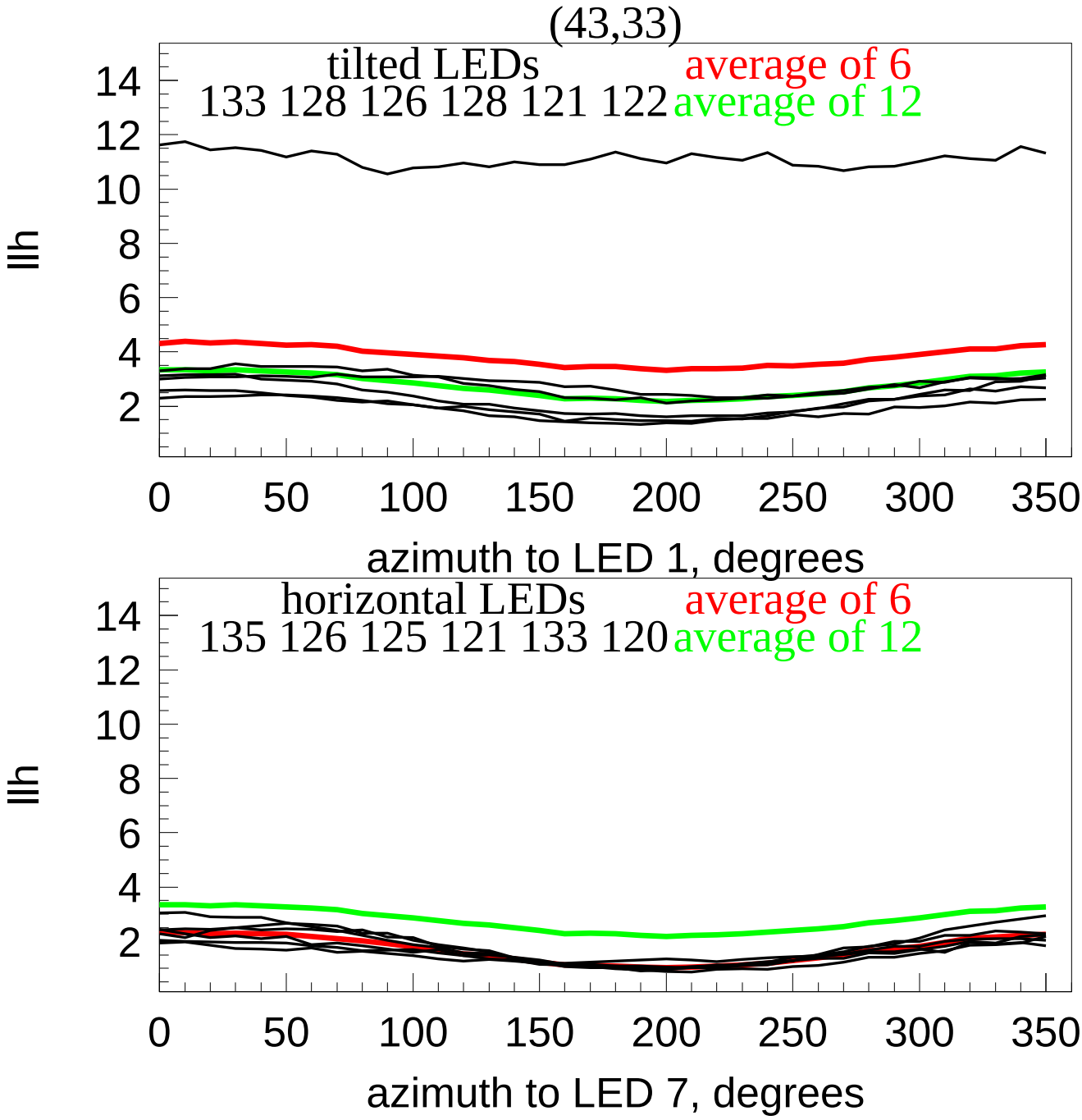

(42,36) 153.33 ± 13.53
3.075
3.05
3.025
3
2.975
2.95
2.925
2.9
2.875
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

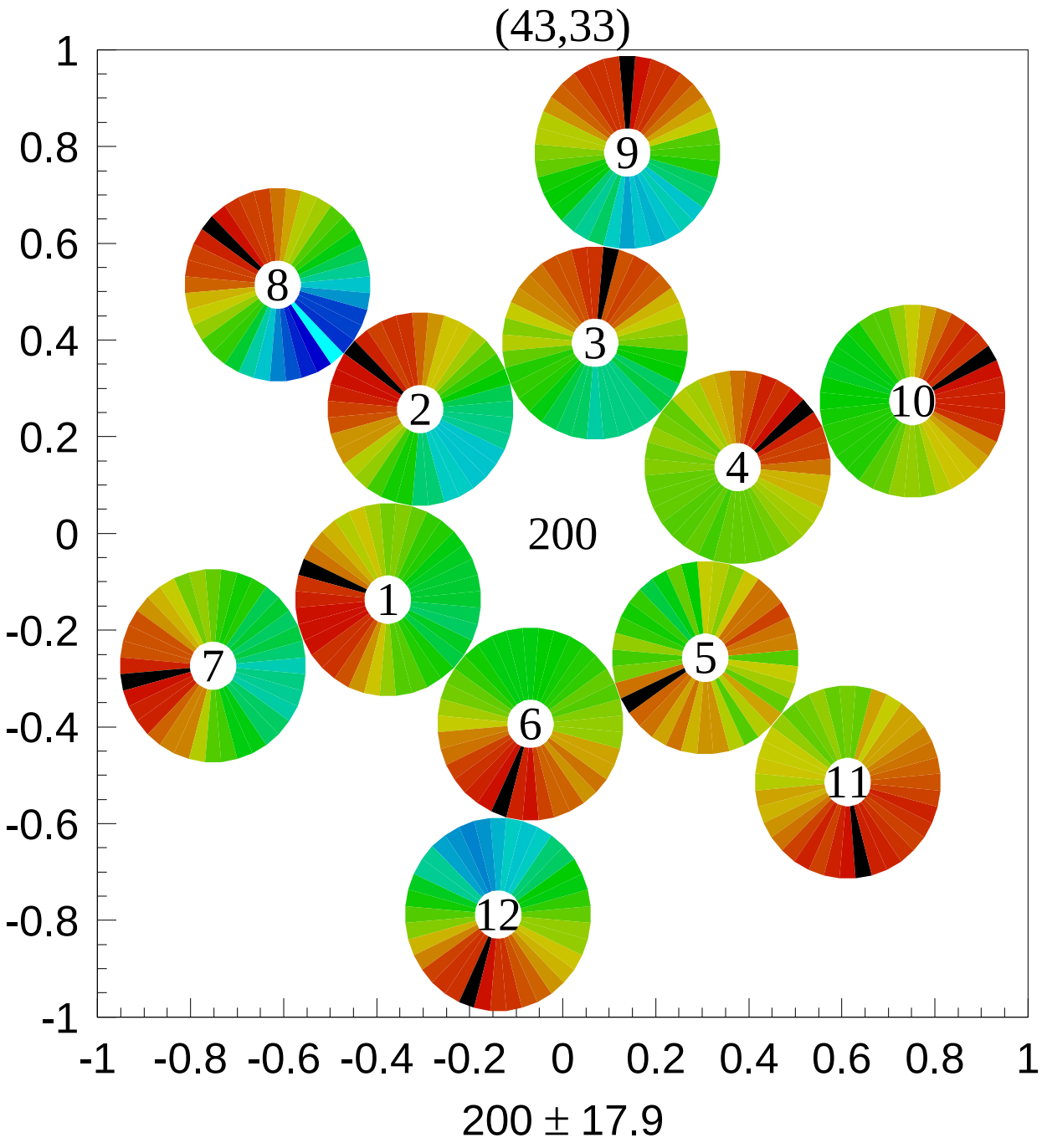

(42,37)
tilted LEDs
135 125 126 127 123 120
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
132 127 131 124 124 127
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

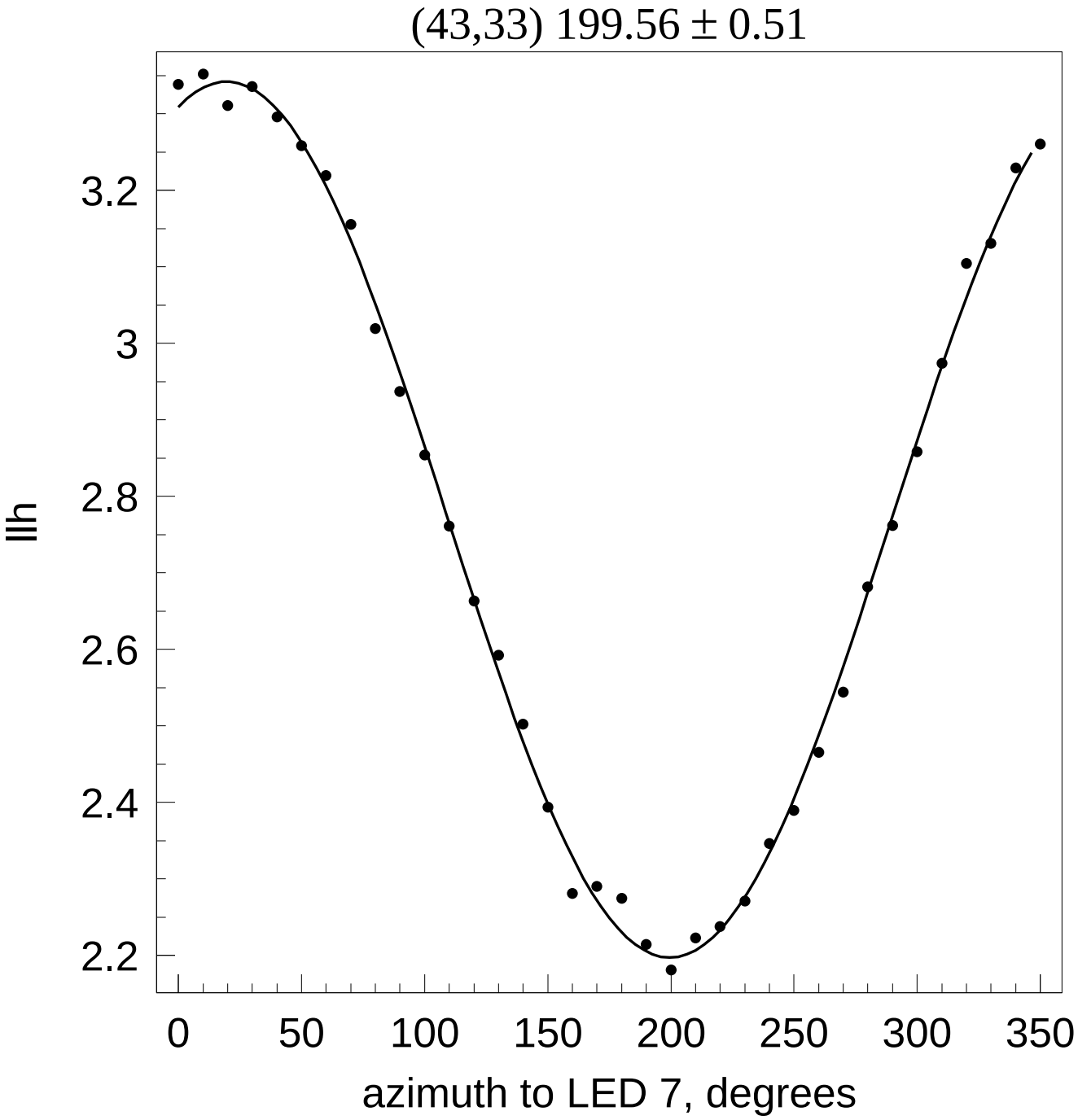

(42,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
164.8 ± 26.7

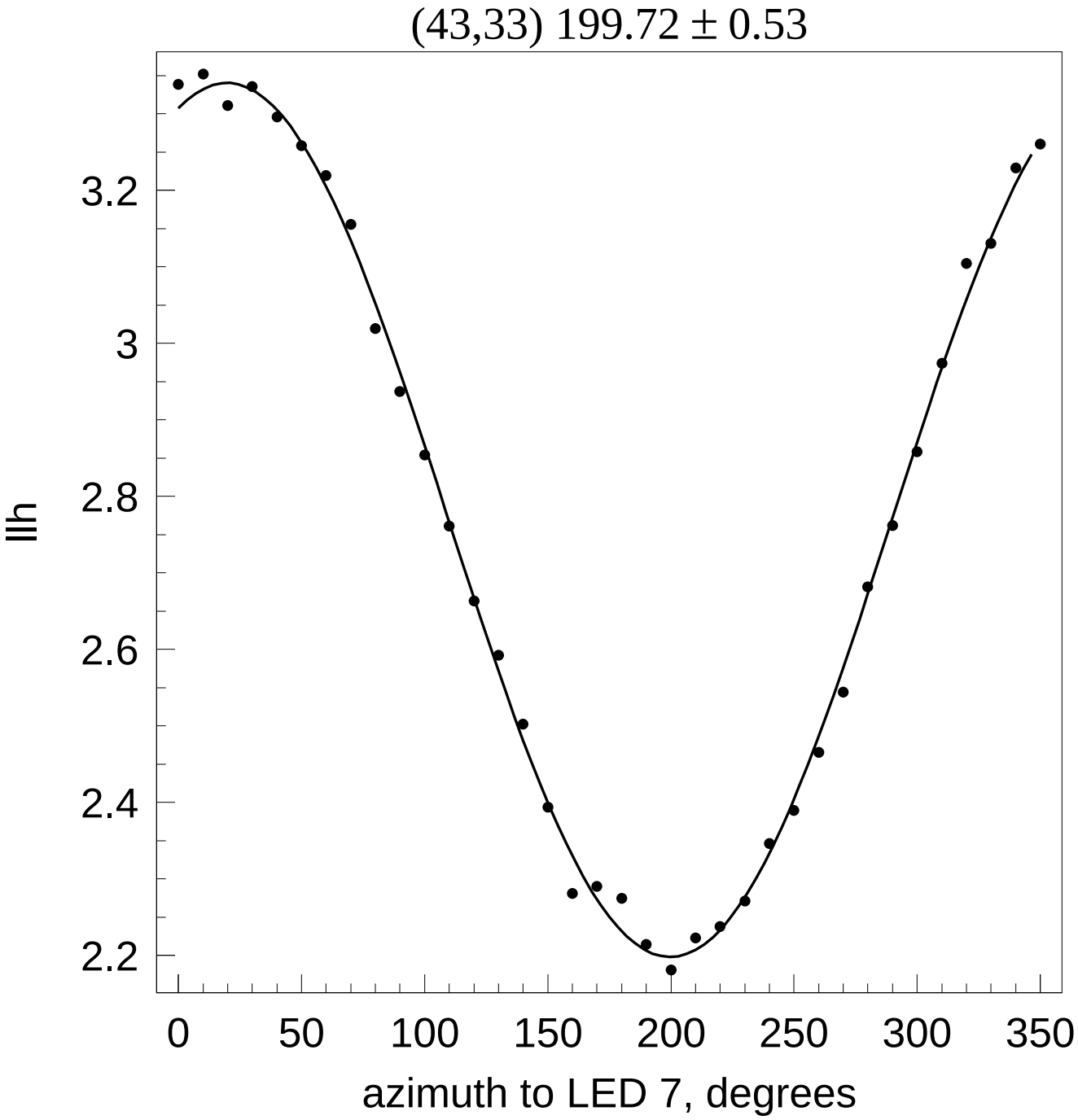

(42,37) 171.21 ± 1.33
2.3
2.25
2.2
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

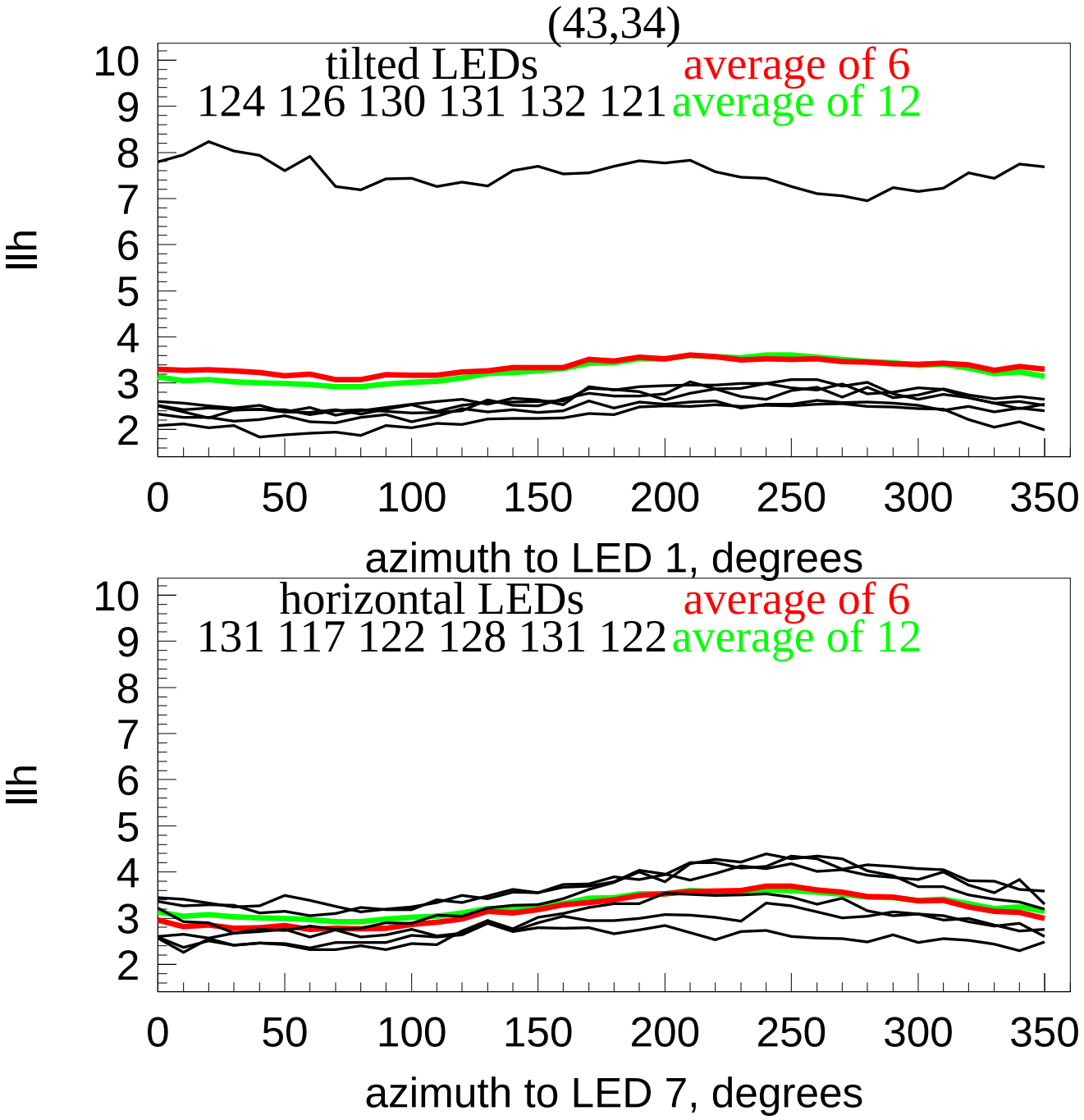

(42,37) 170.95 ± 1.40
2.3
2.25
2.2
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

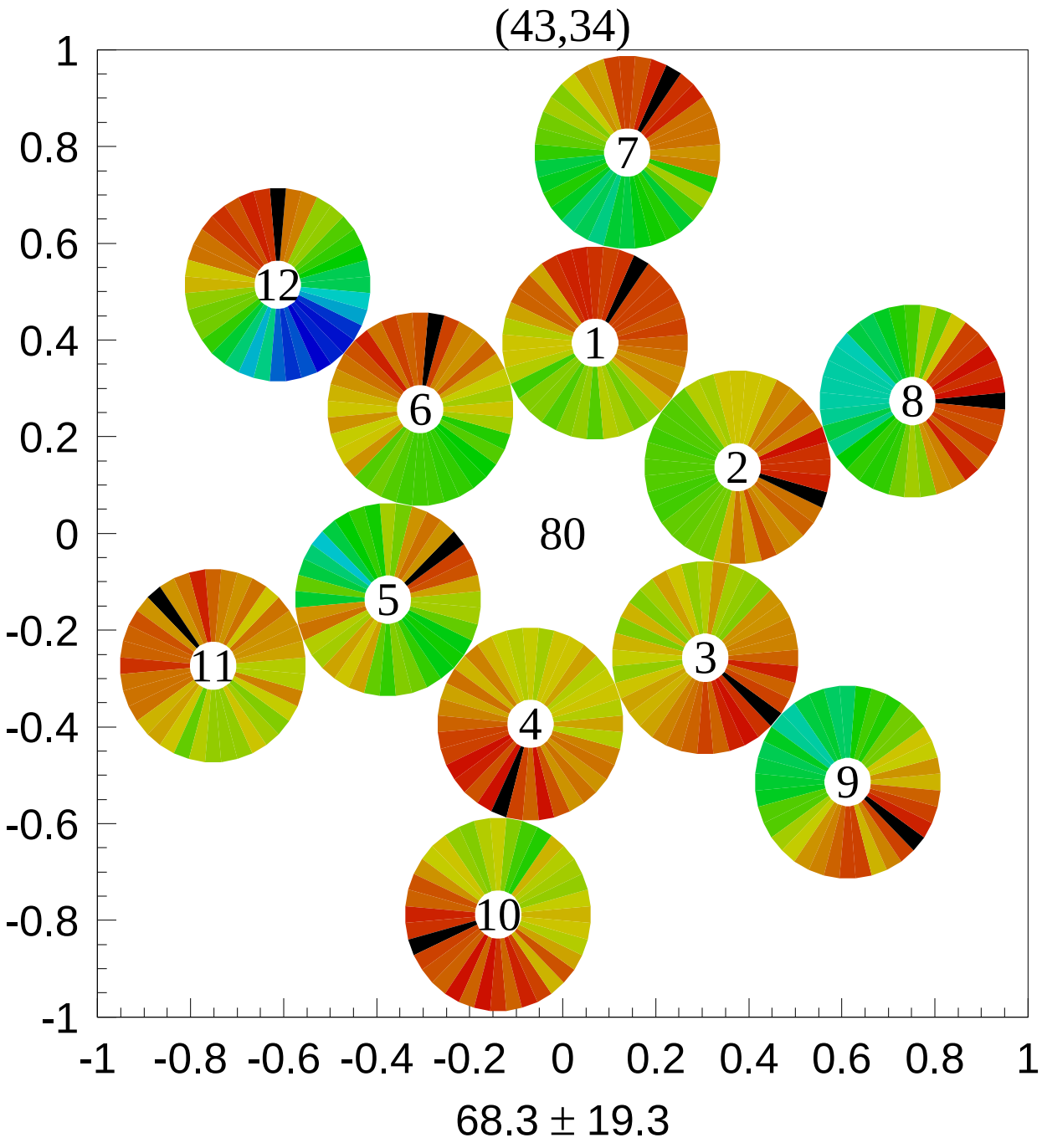

(43,33)
tilted LEDs
133 128 126 128 121 122
average of 6
average of 12
llh
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
135 126 125 121 133 120
average of 6
average of 12
llh
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

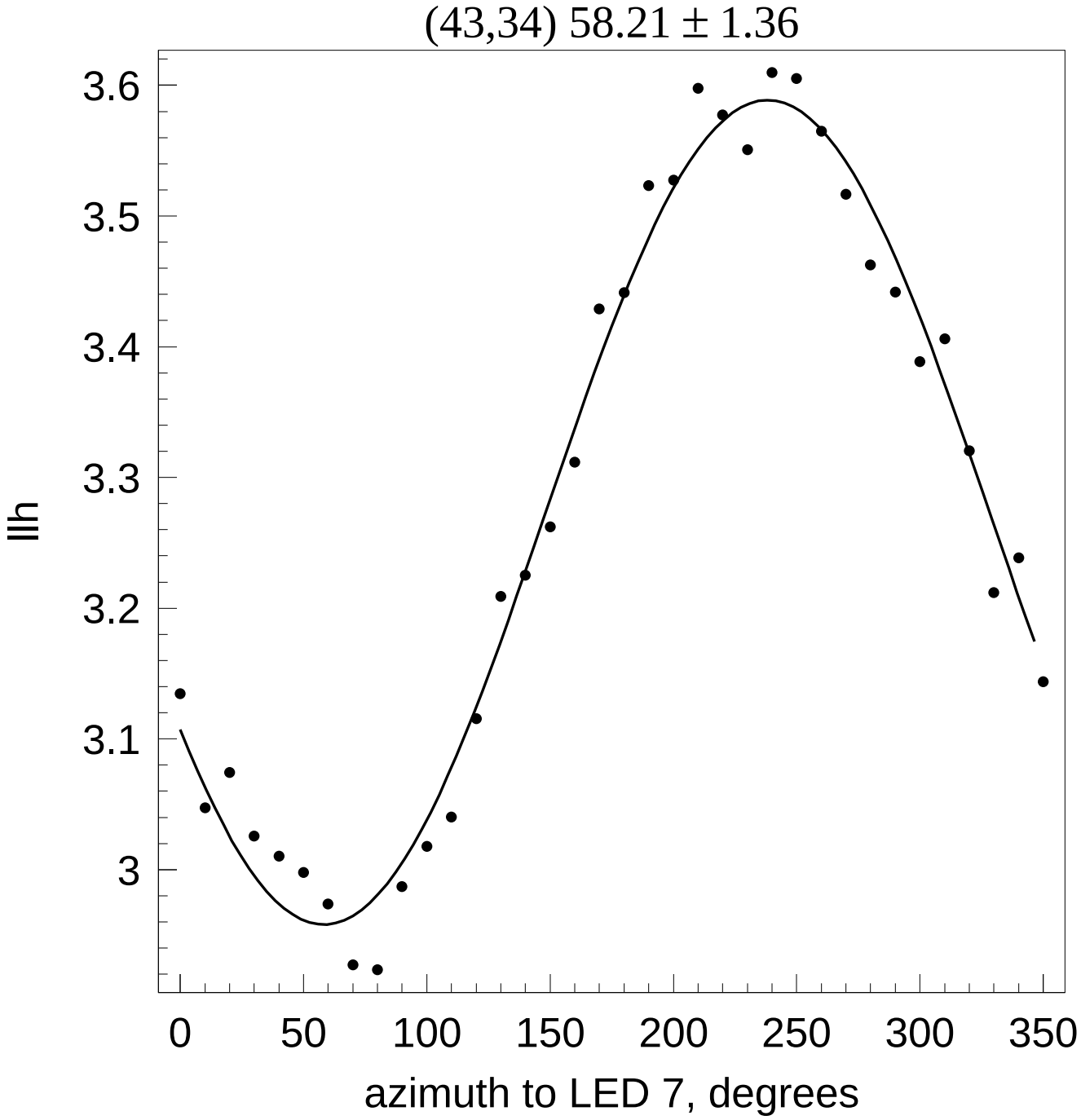

(43,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
200
200 ± 17.9
1
2
3
4
5
6
7
8
9
10
11
12

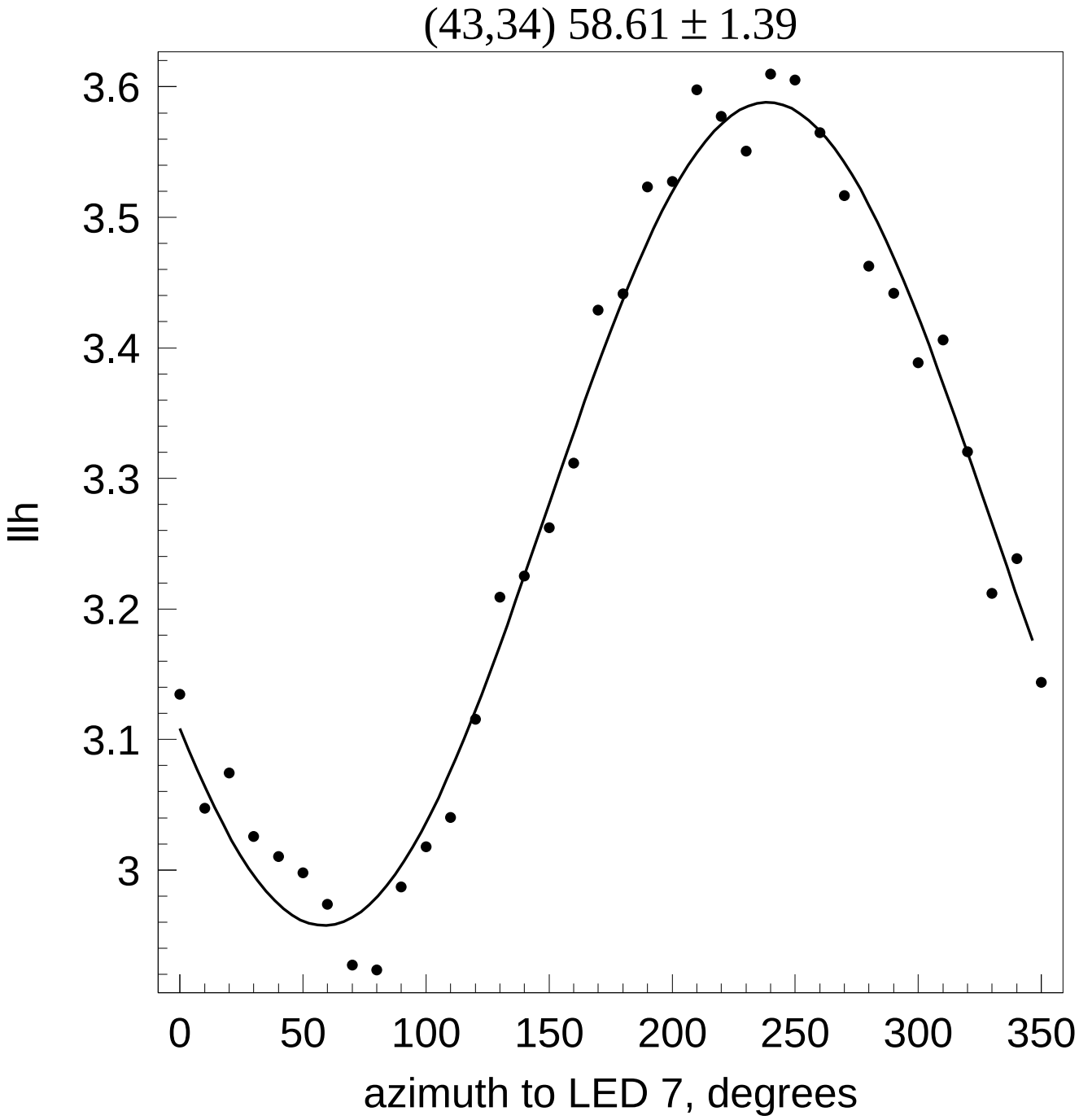

(43,33) 199.56 ± 0.51
llh
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

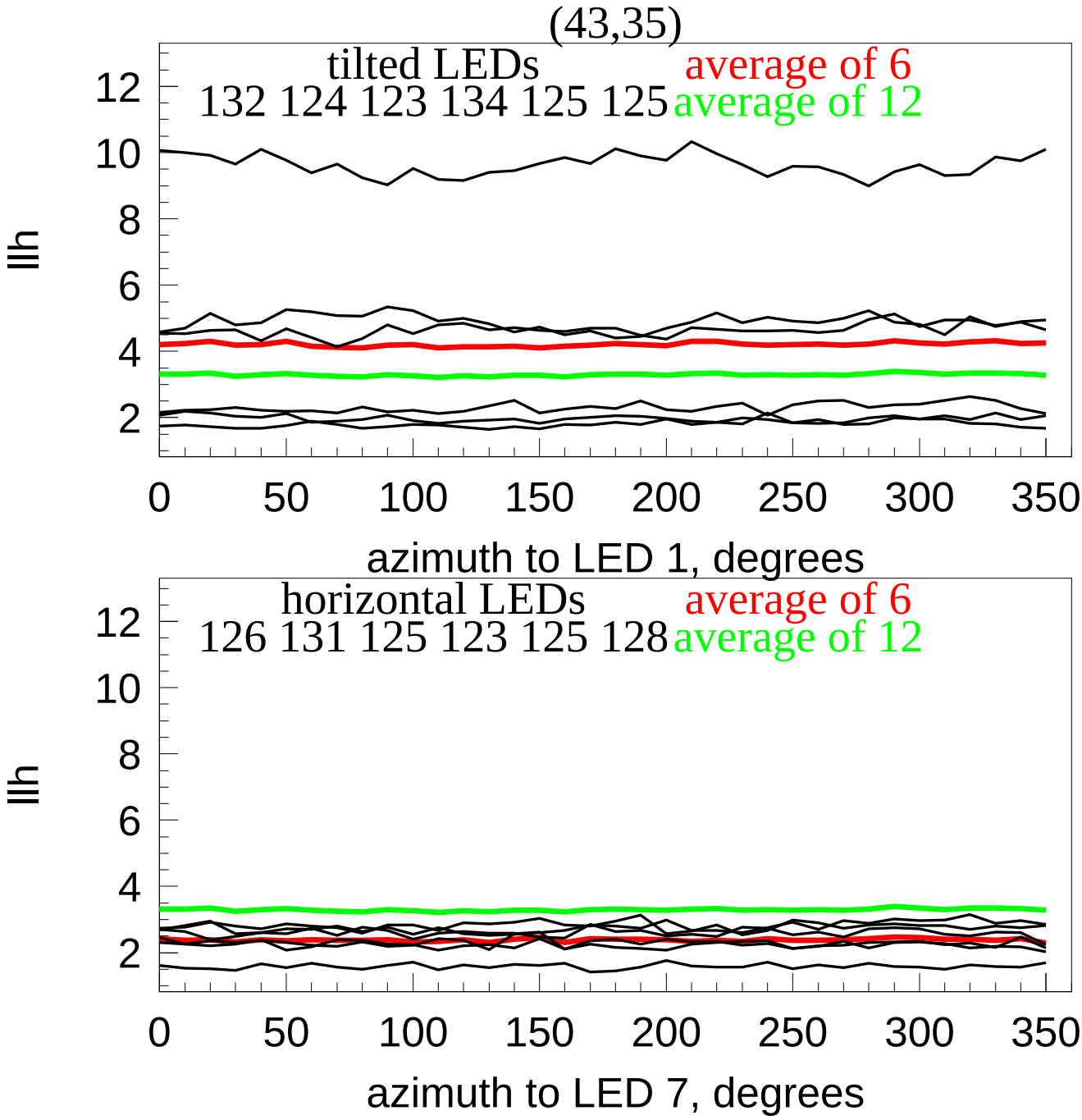

(43,33) 199.72 ± 0.53
llh
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

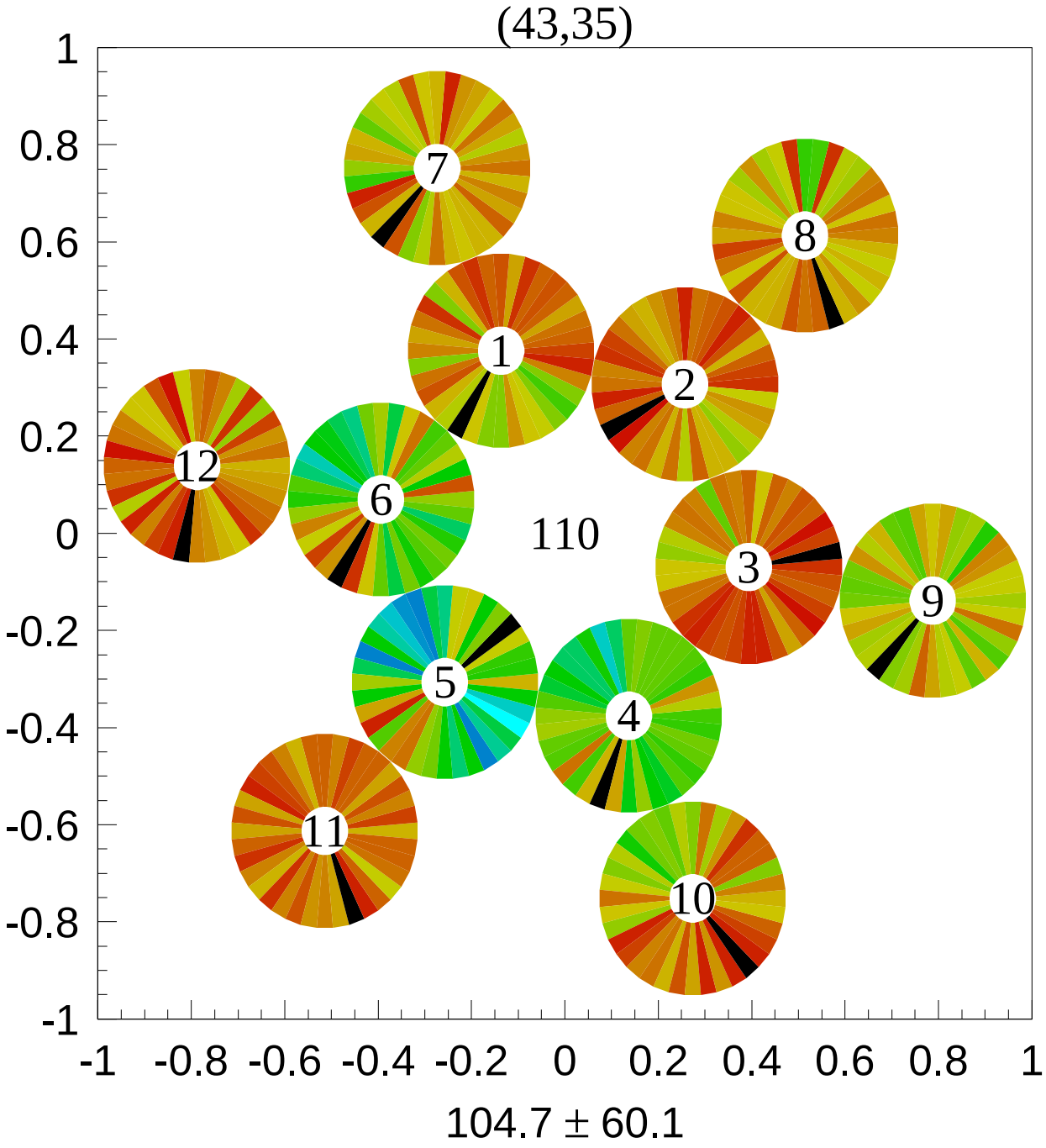

(43,34)
tilted LEDs
124 126 130 131 132 121
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 117 122 128 131 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

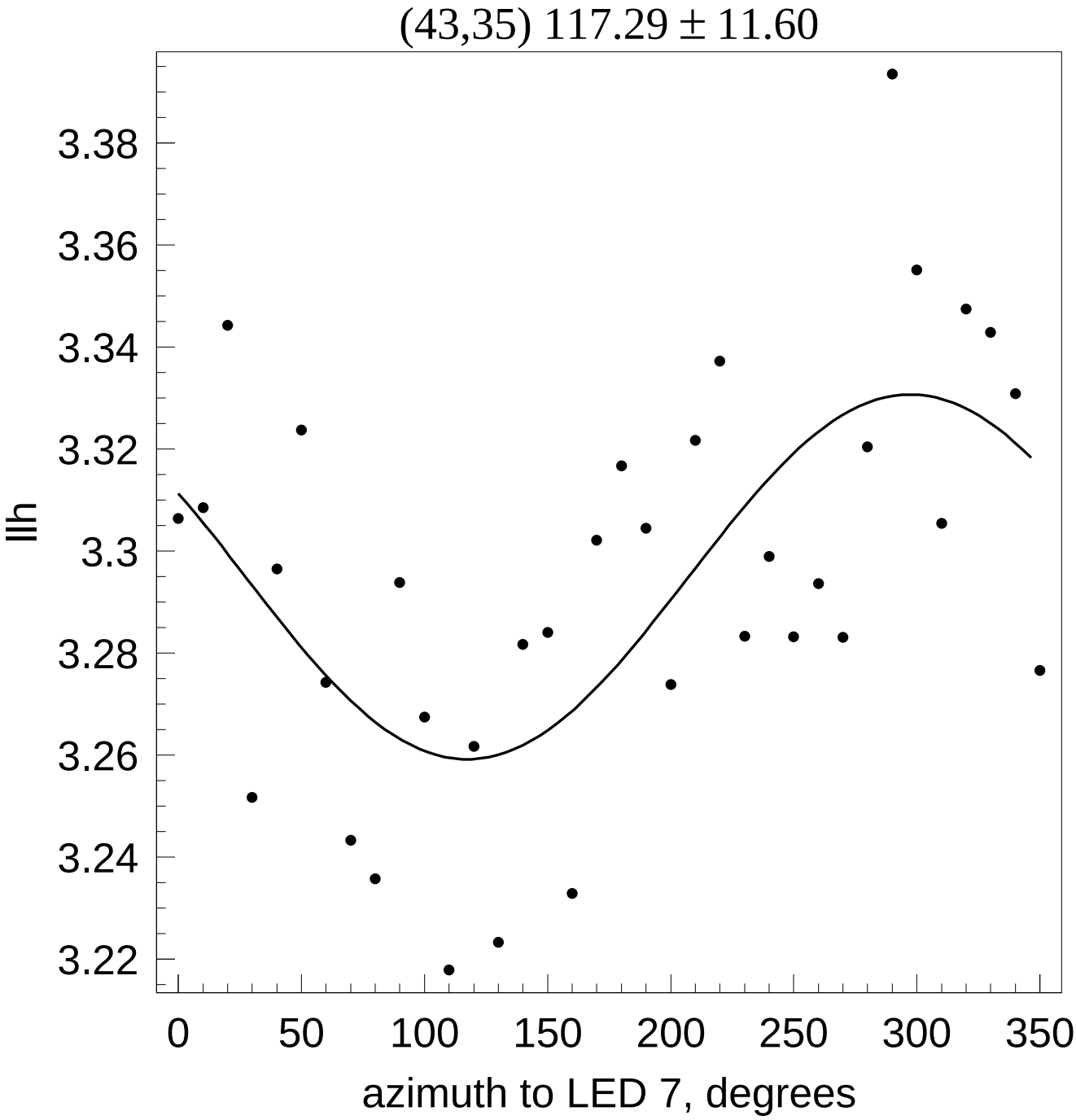

(43,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
68.3 ± 19.3
7
12
1
6
8
2
80
5
11
3
4
9
10

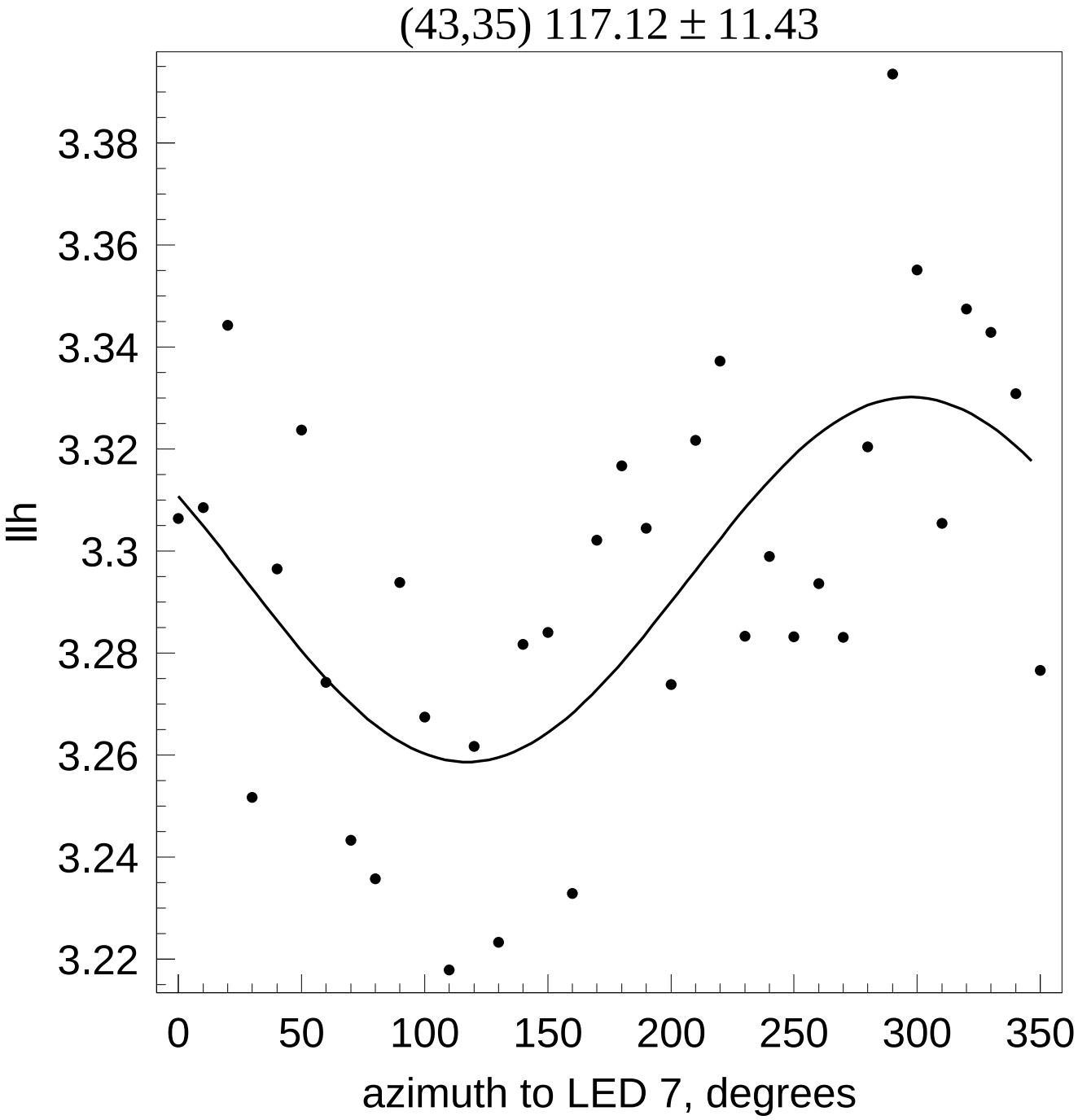

(43,34) 58.21 ± 1.36
3.6
3.5
3.4
3.3
3.2
3.1
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

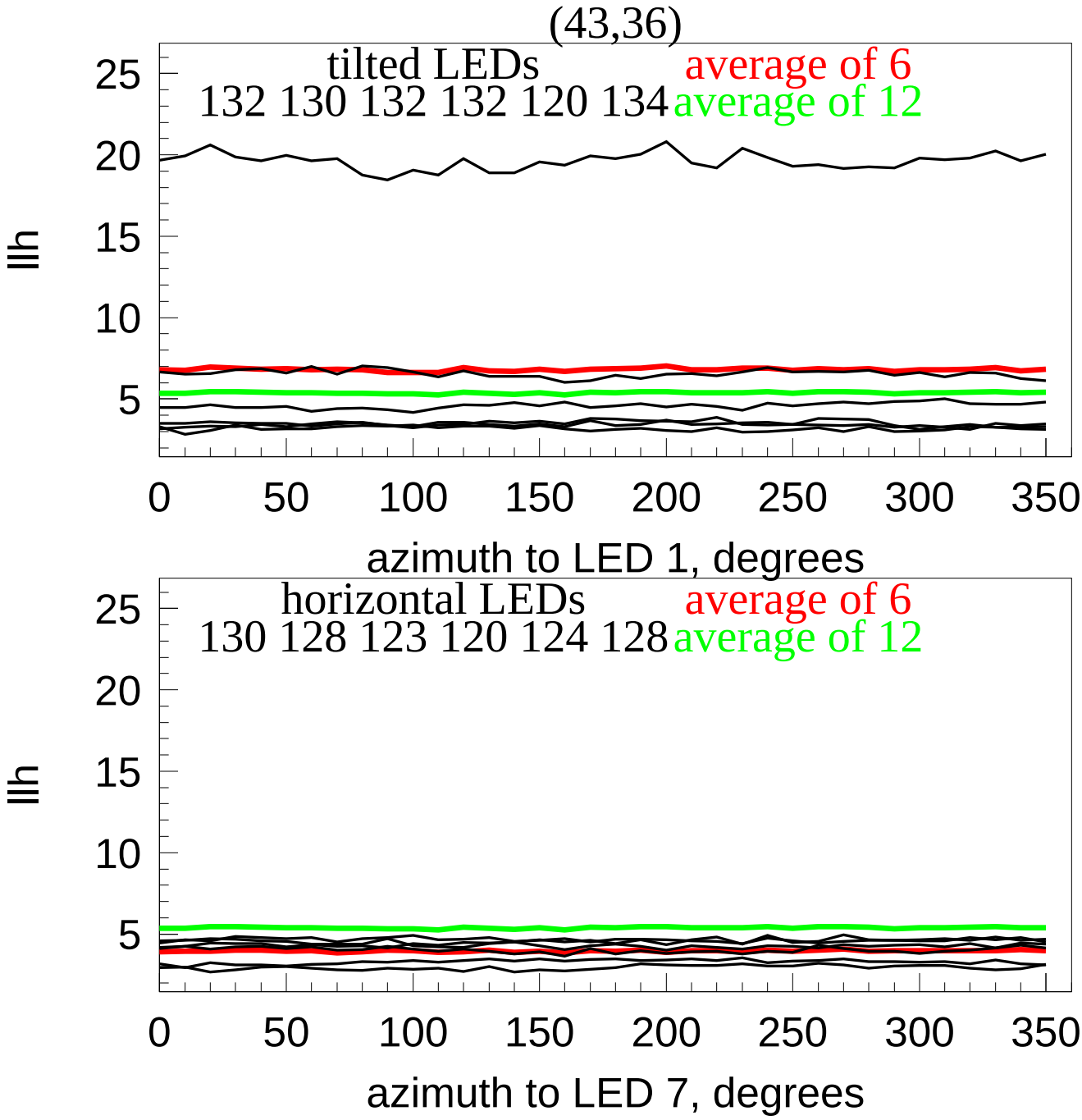

(43,34) 58.61 ± 1.39
3.6
3.5
3.4
3.3
3.2
3.1
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

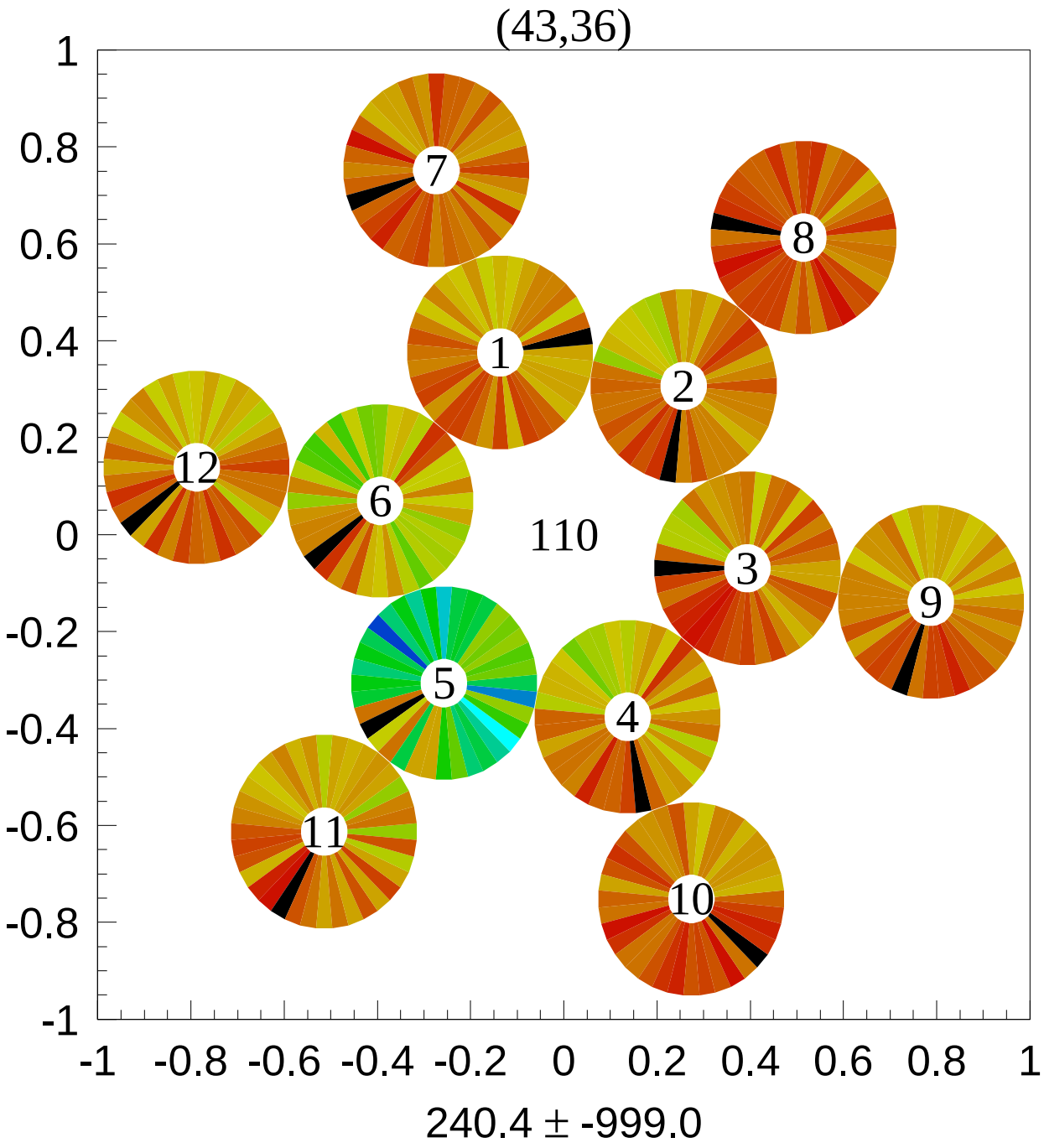

(43,35)
tilted LEDs
132 124 123 134 125 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 131 125 123 125 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

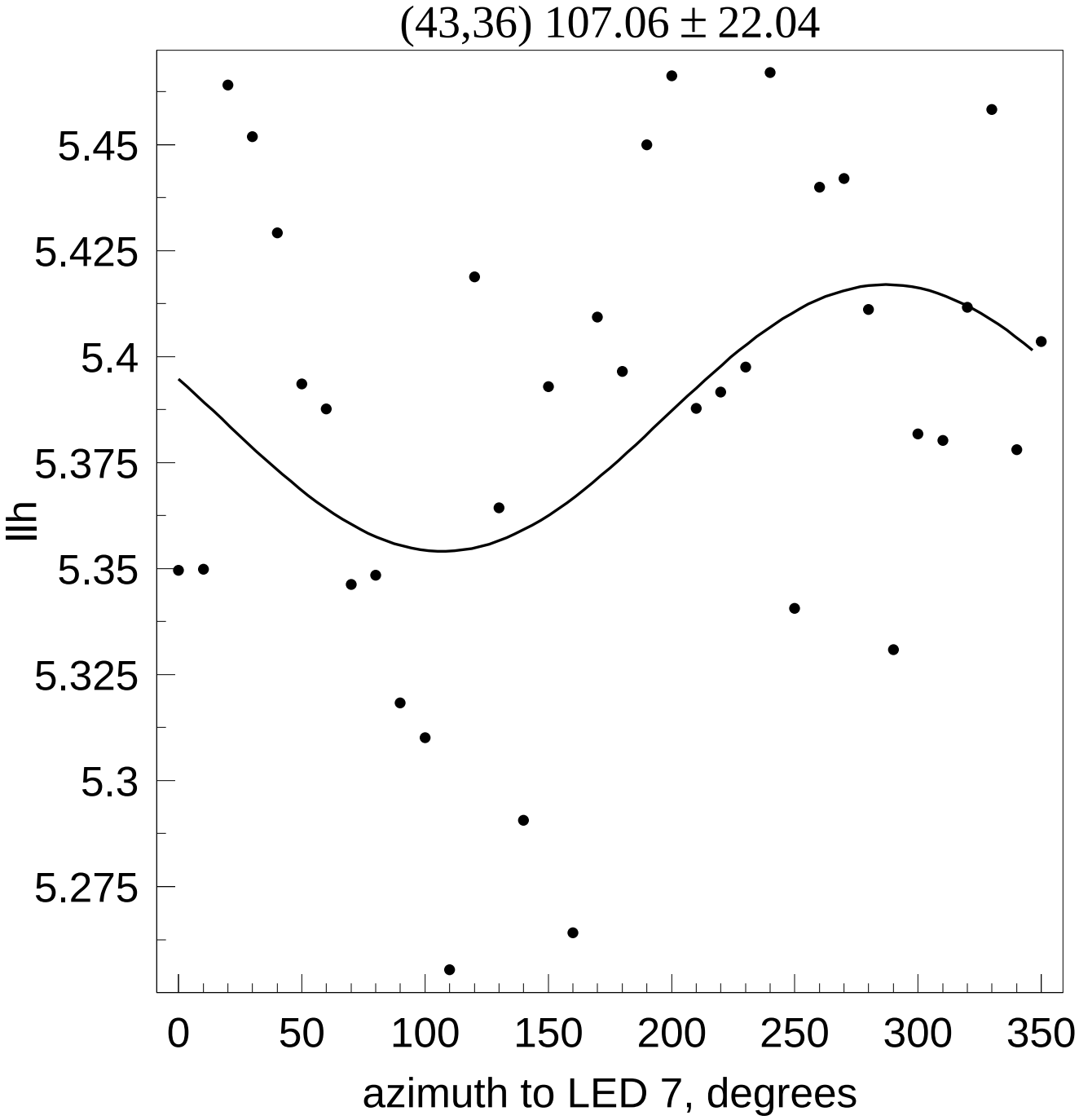

(43,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
104.7 ± 60.1

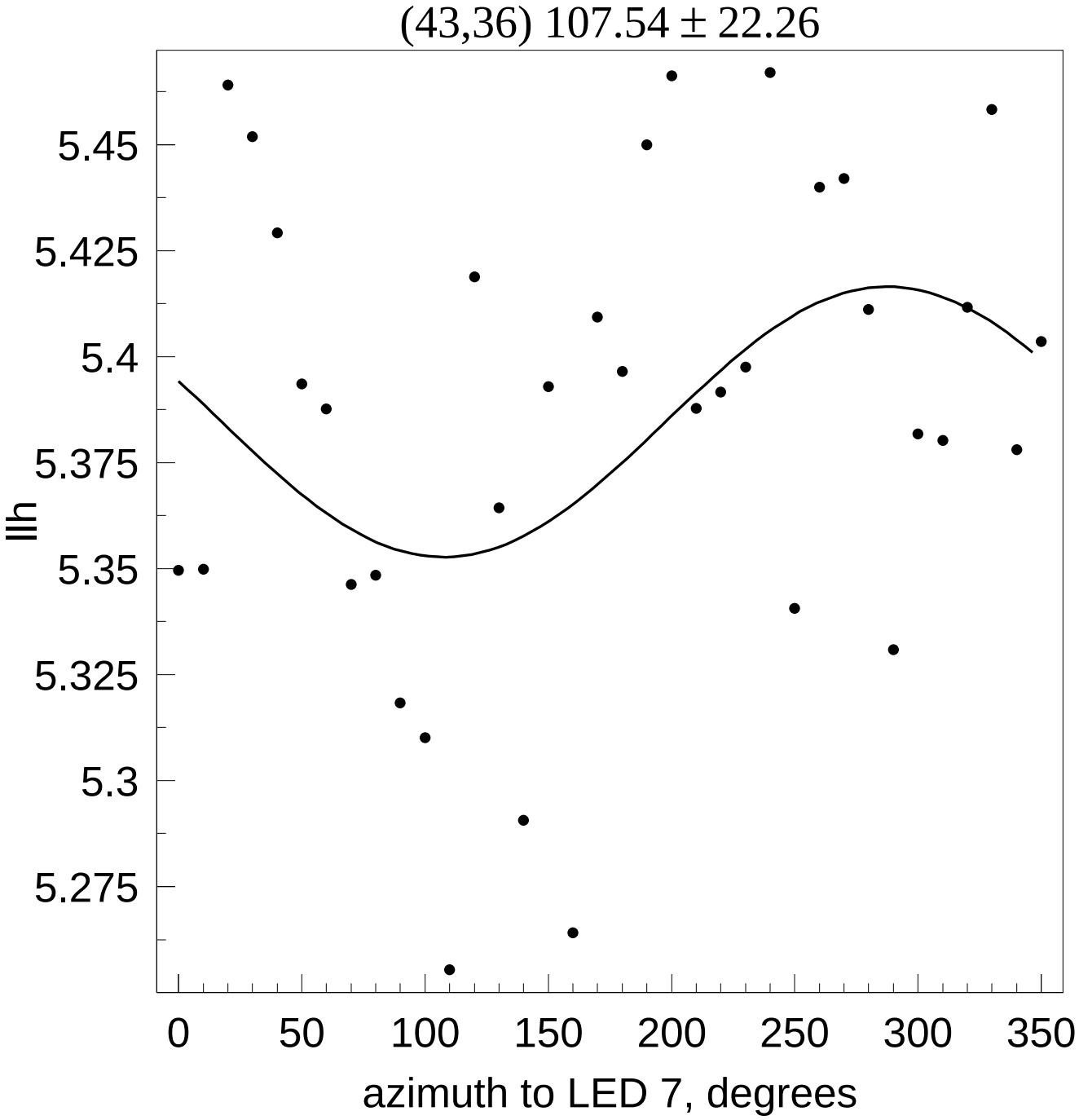

(43,35) 117.29 ± 11.60
3.38
3.36
3.34
3.32
3.3
3.28
3.26
3.24
3.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

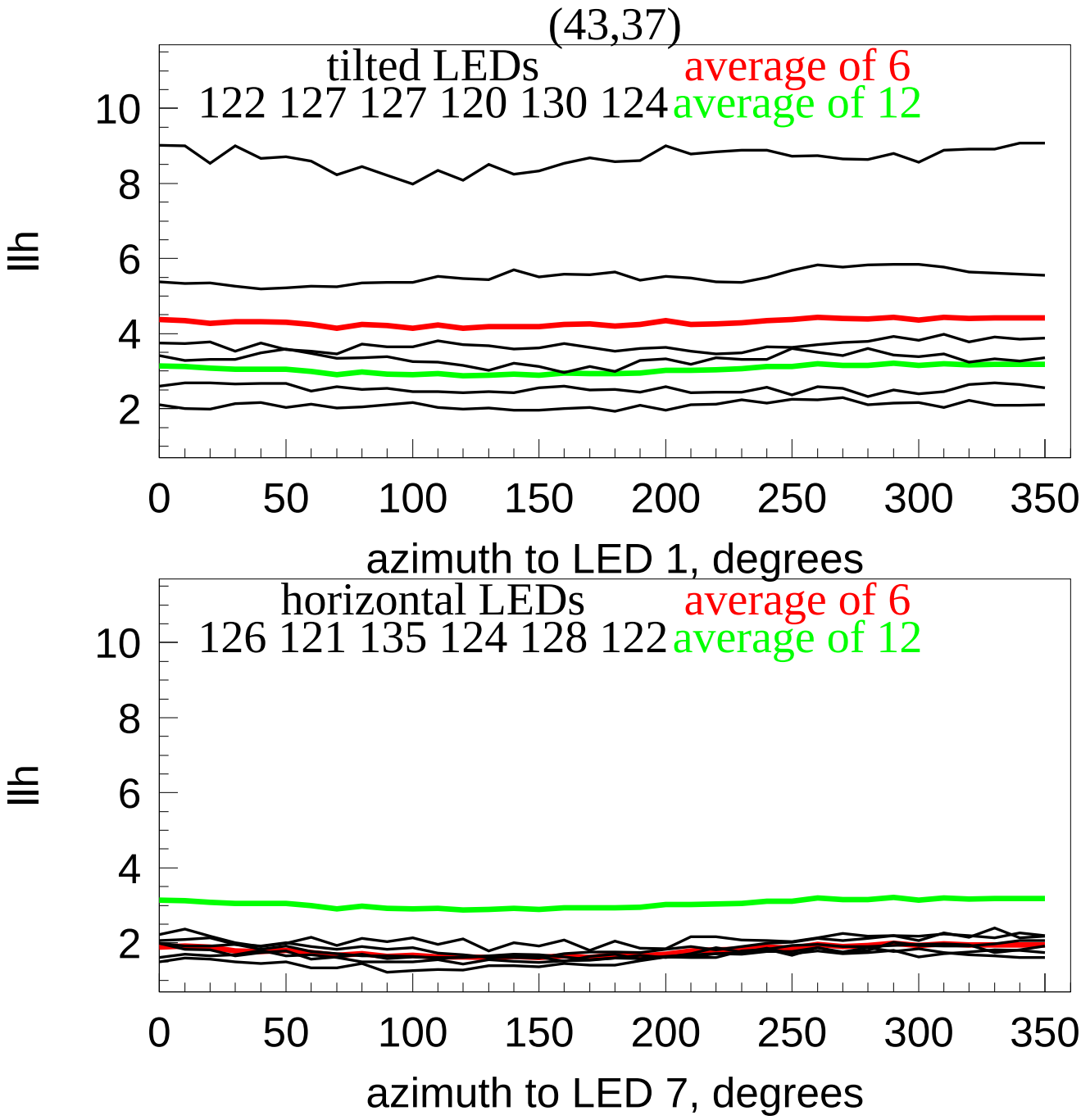

(43,35) 117.12 ± 11.43
3.38
3.36
3.34
3.32
3.3
3.28
3.26
3.24
3.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

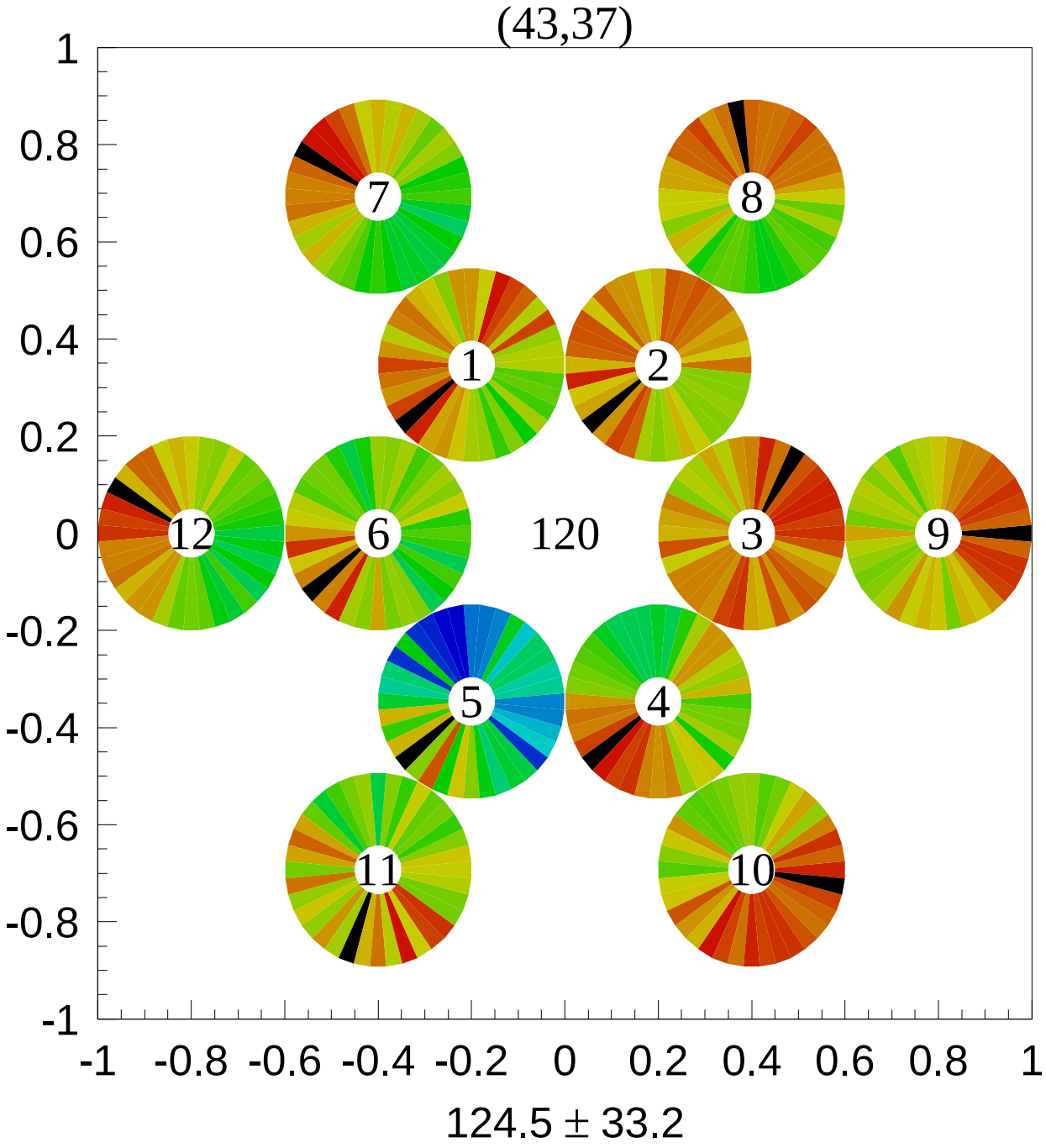

(43,36)
tilted LEDs
132 130 132 132 120 134
average of 6
average of 12
llh
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 128 123 120 124 128
average of 6
average of 12
llh
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

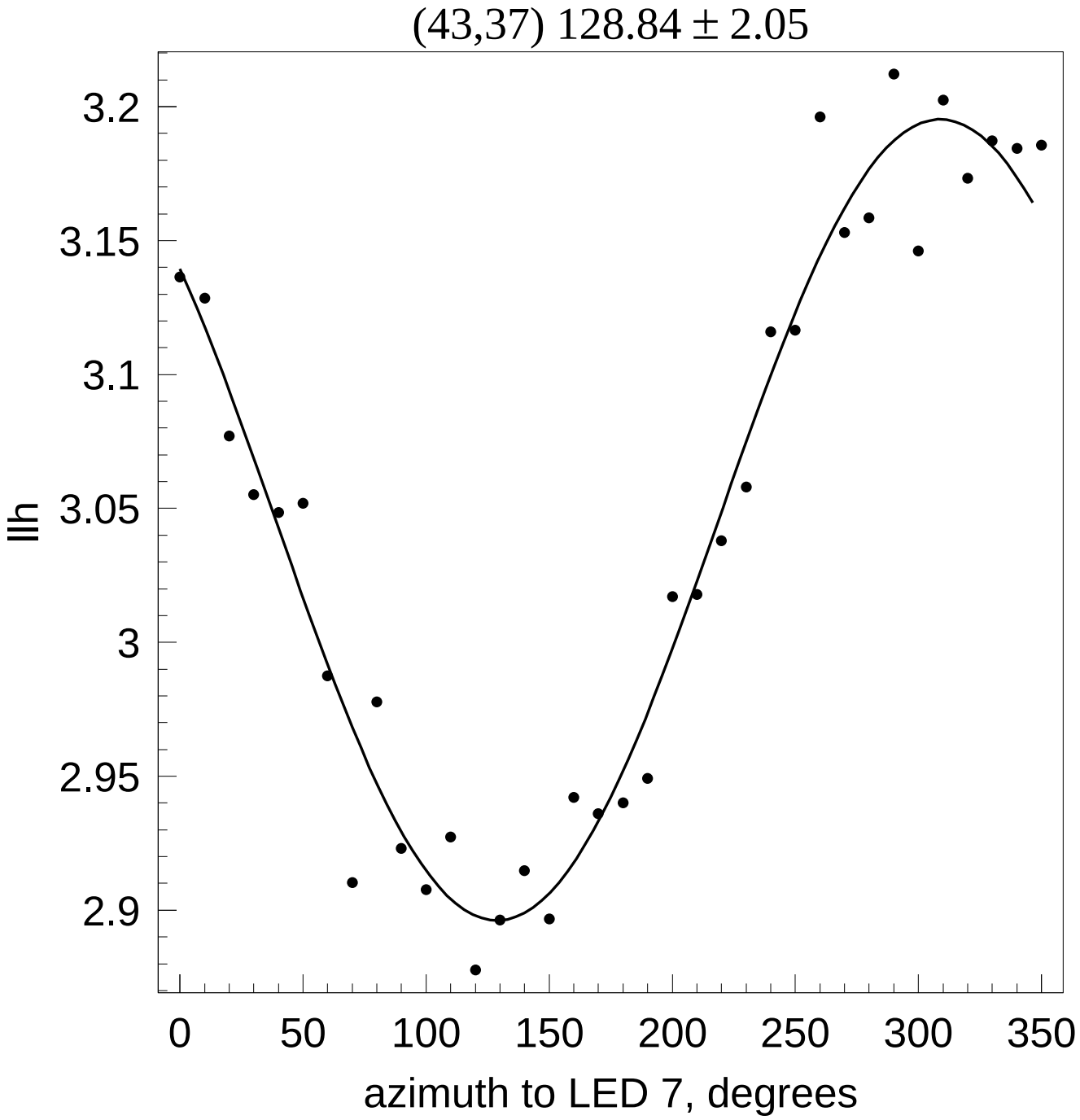

(43,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
240.4 ± -999.0
7
8
1
2
12
6
110
3
9
5
4
11
10

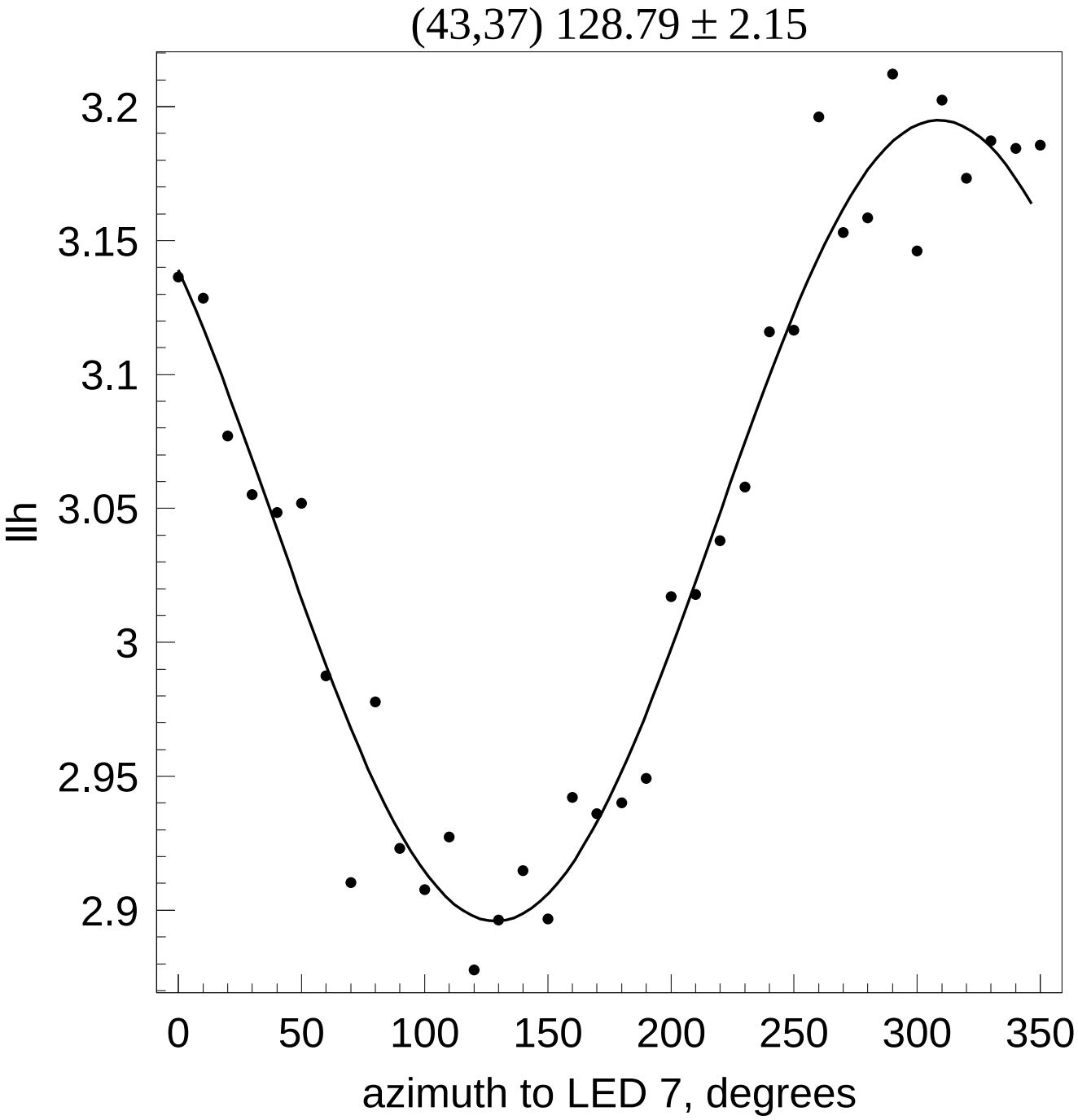

(43,36) 107.06 ± 22.04
5.45
5.425
5.4
5.375
5.35
5.325
5.3
5.275
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

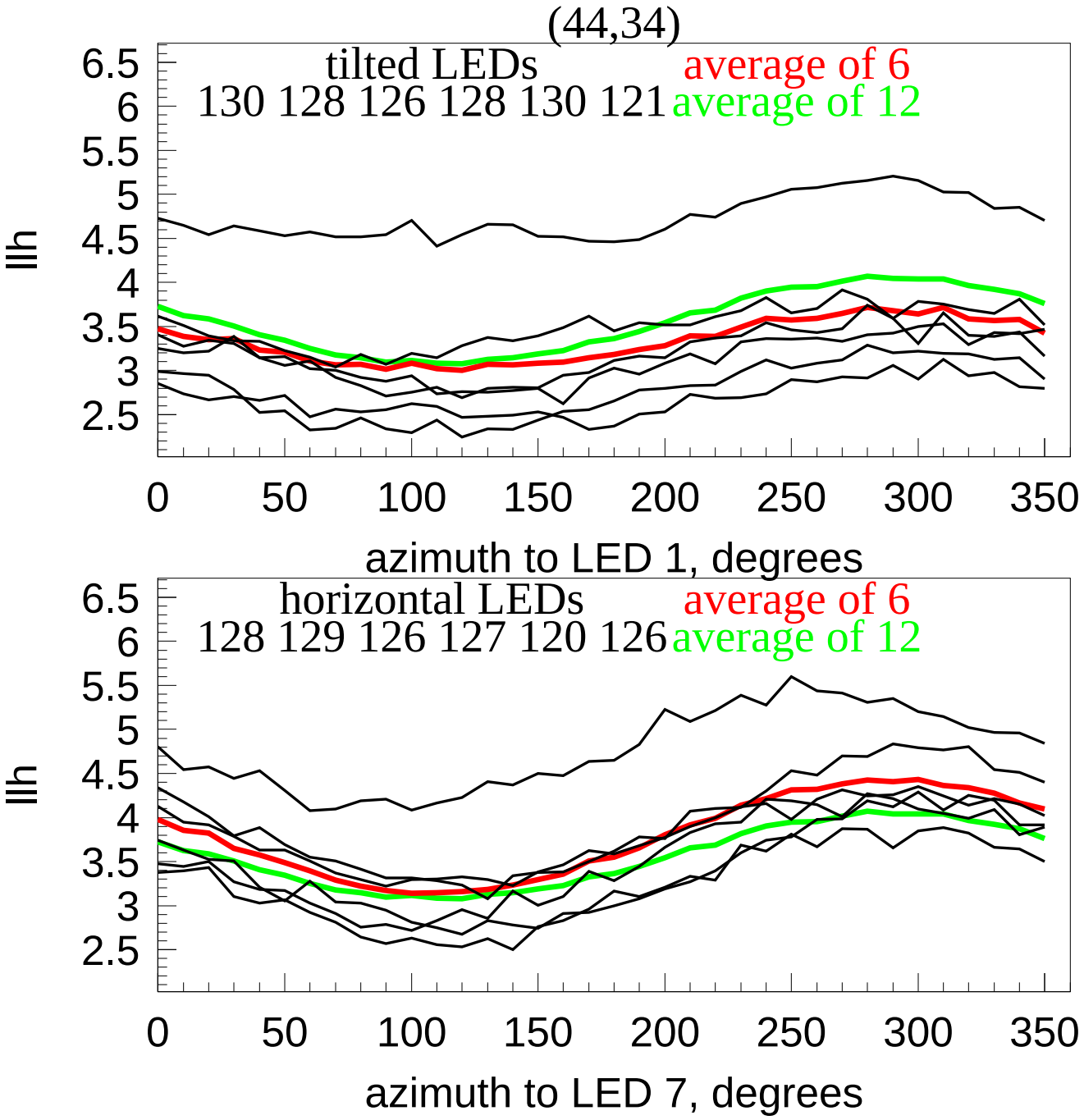

(43,36) 107.54 ± 22.26
5.45
5.425
5.4
5.375
5.35
5.325
5.3
5.275
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

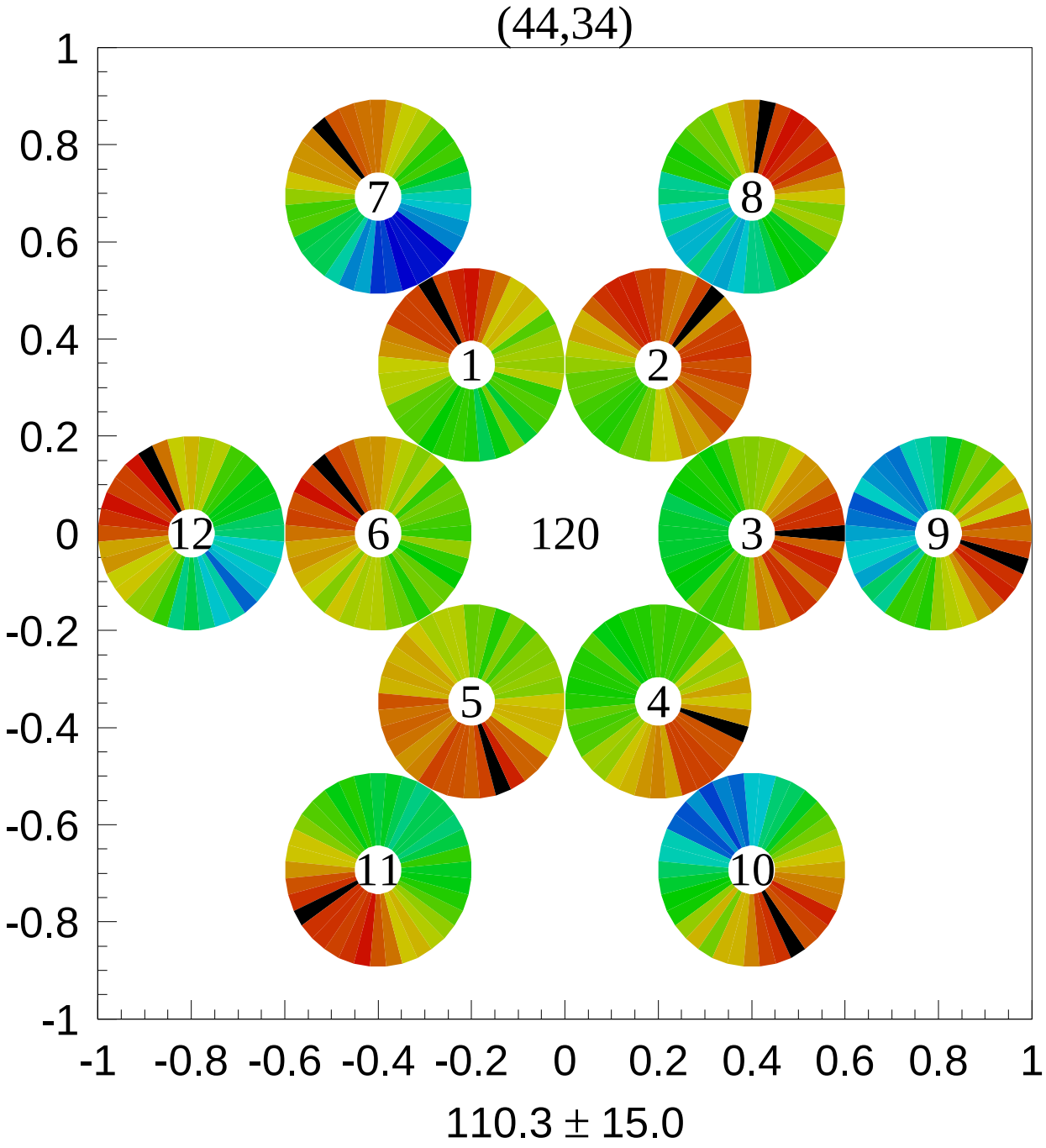

(43,37)
tilted LEDs
122 127 127 120 130 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 121 135 124 128 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

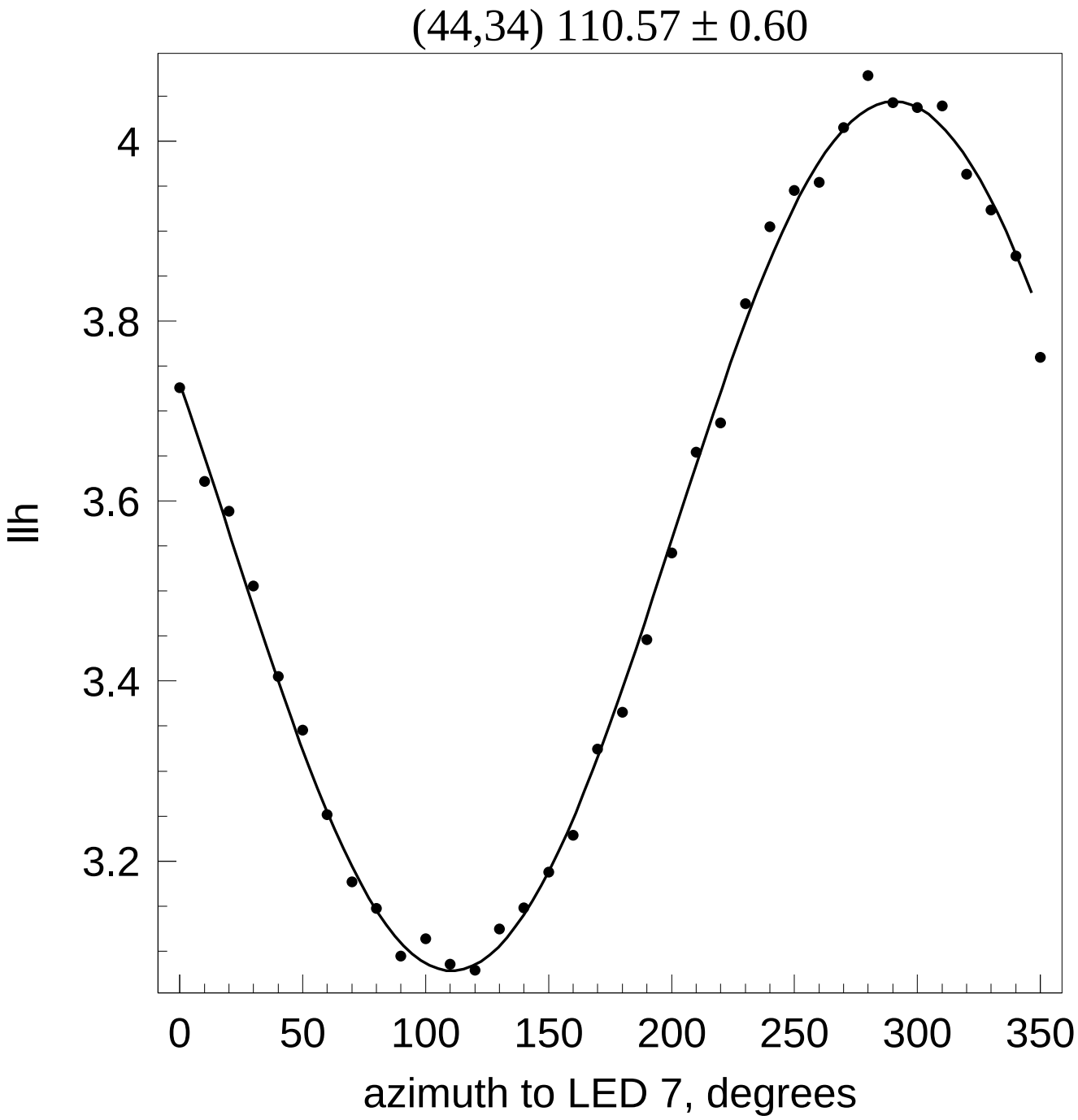

(43,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
124.5 ± 33.2
7
8
1
2
12
6
120
3
9
5
4
11
10

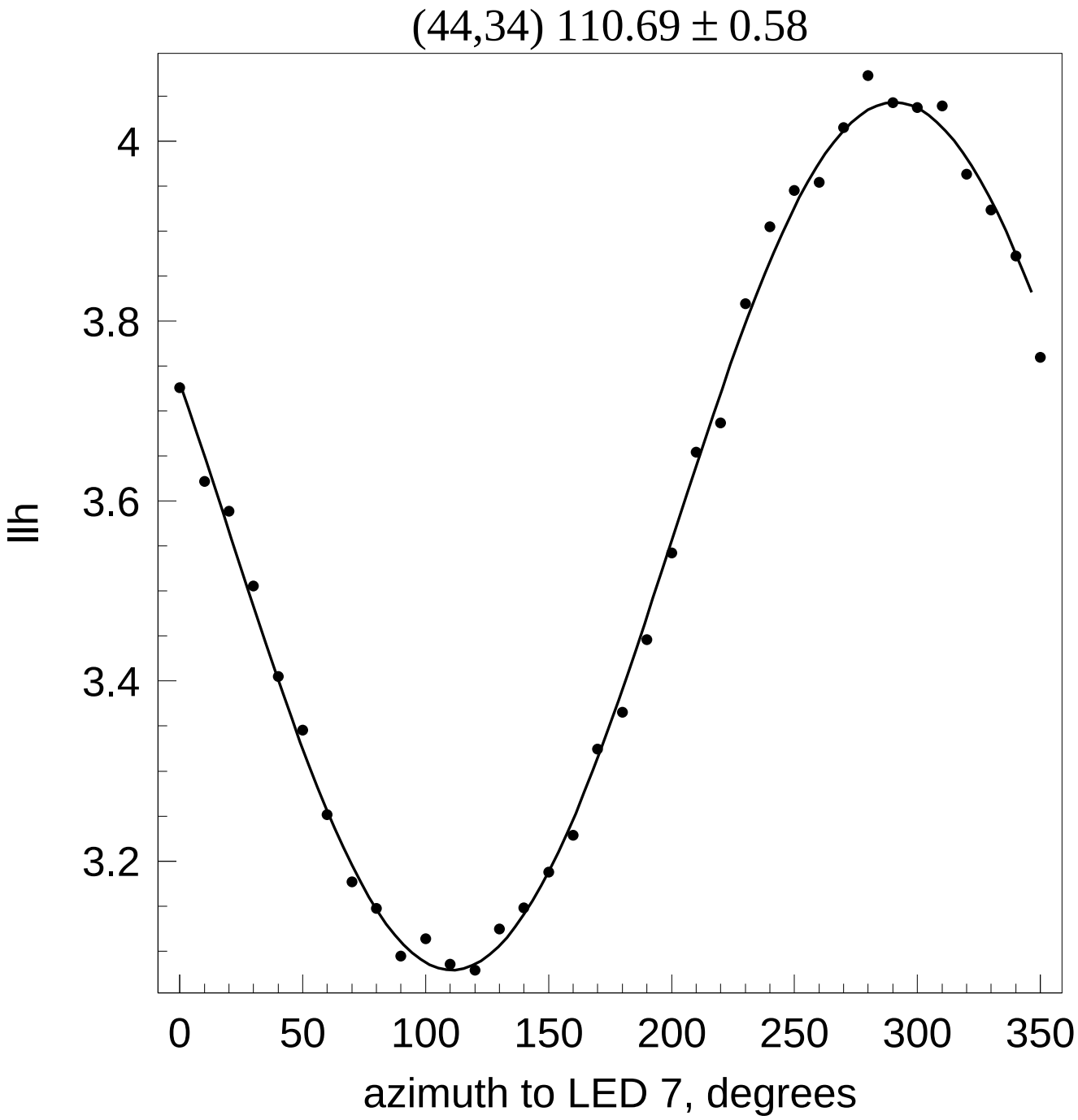

(43,37) 128.84 ± 2.05
3.2
3.15
3.1
3.05
3
2.95
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

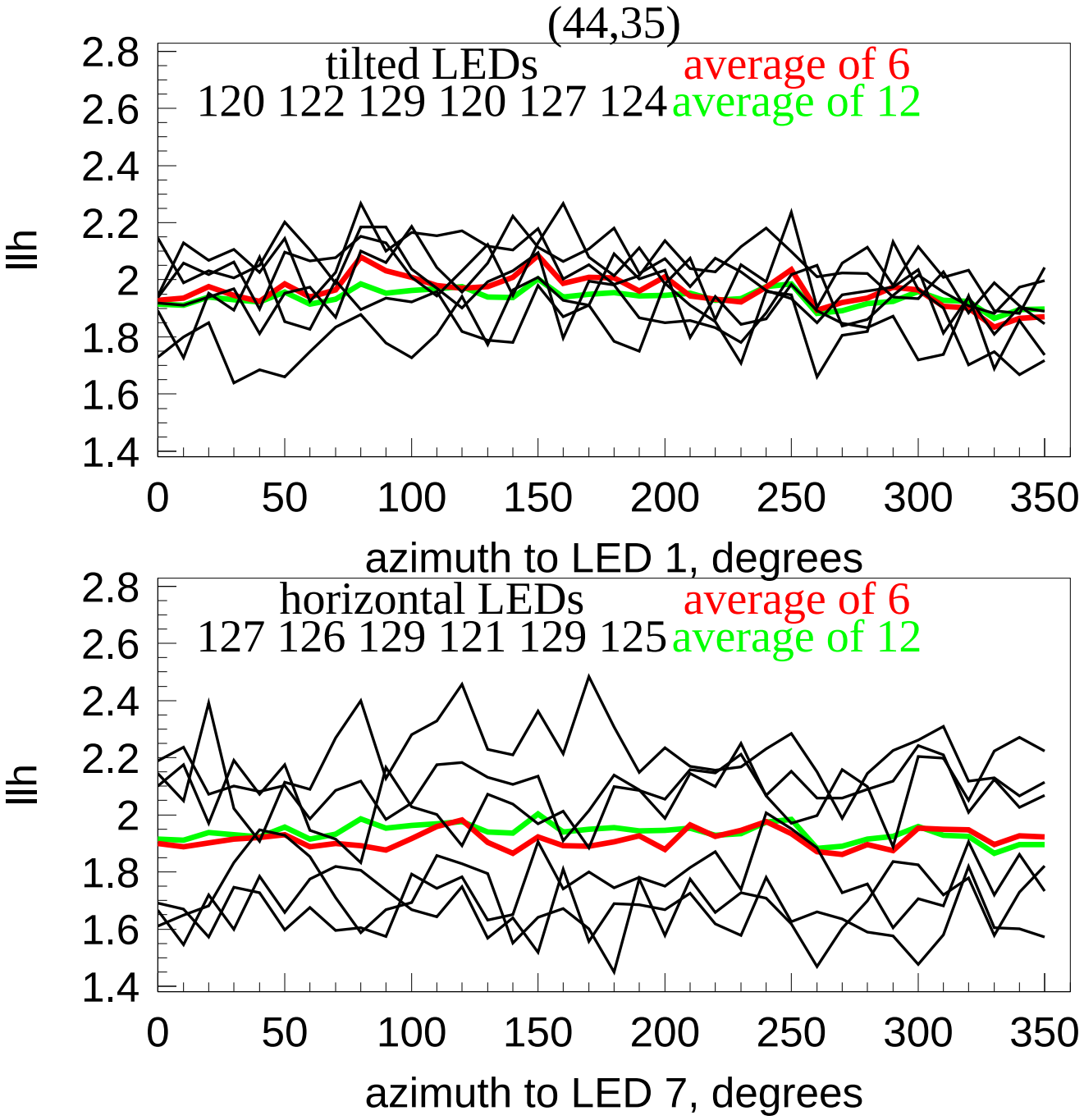

(43,37) 128.79 ± 2.15
3.2
3.15
3.1
3.05
3
2.95
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

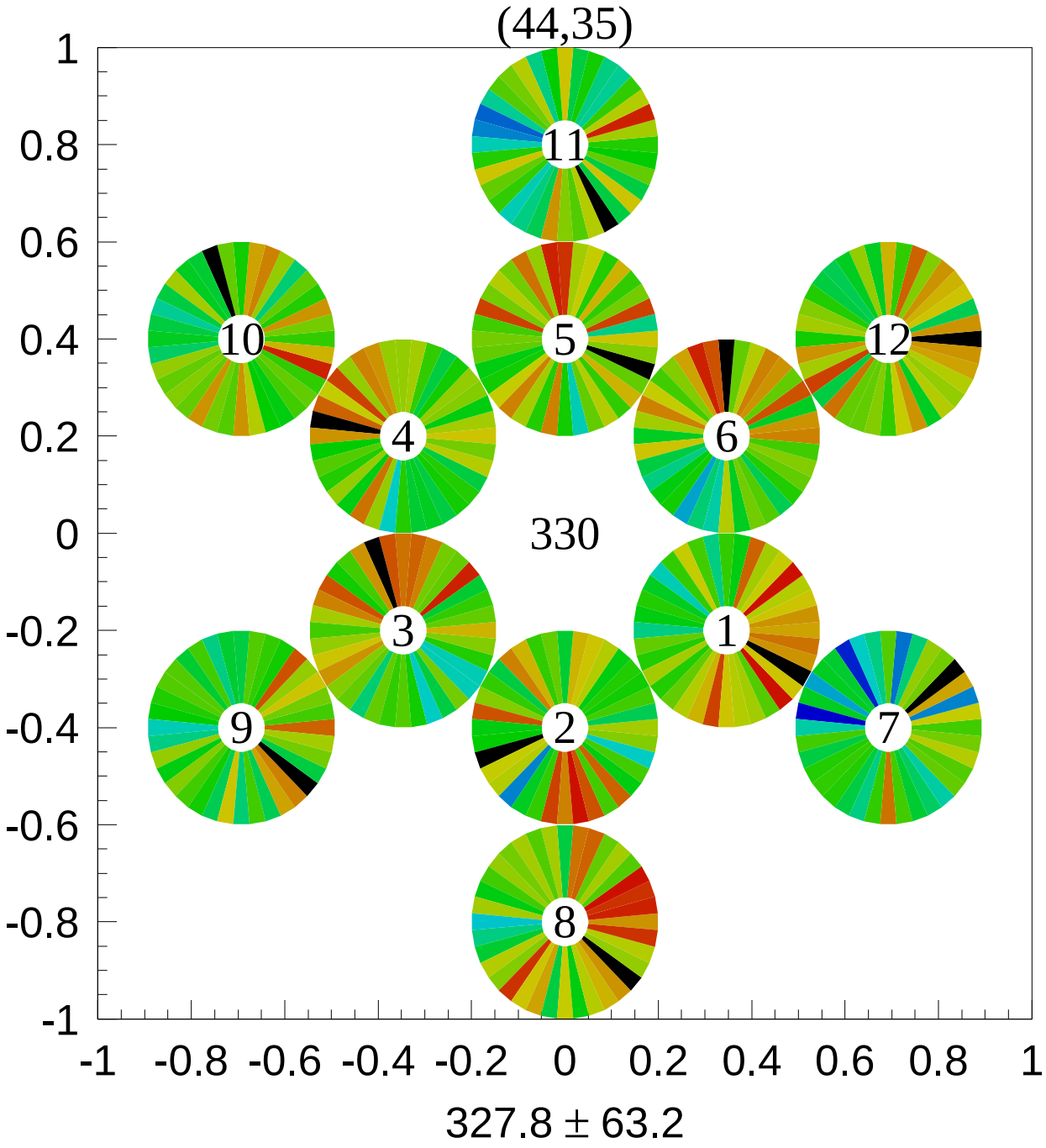

(44,34)
tilted LEDs
130 128 126 128 130 121
average of 6
average of 12
llh
6.5
6
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 129 126 127 120 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

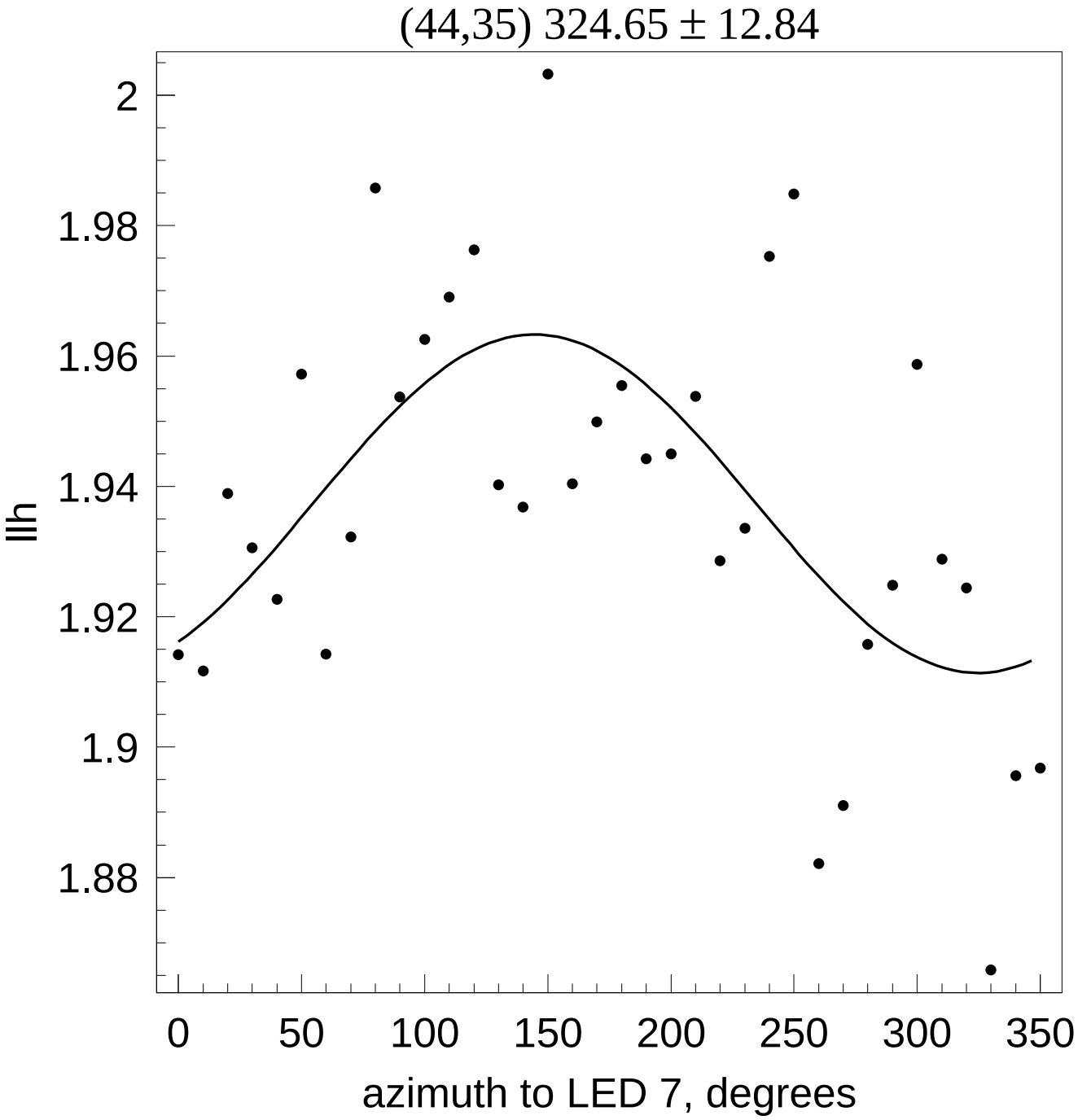

(44,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
110.3 ± 15.0

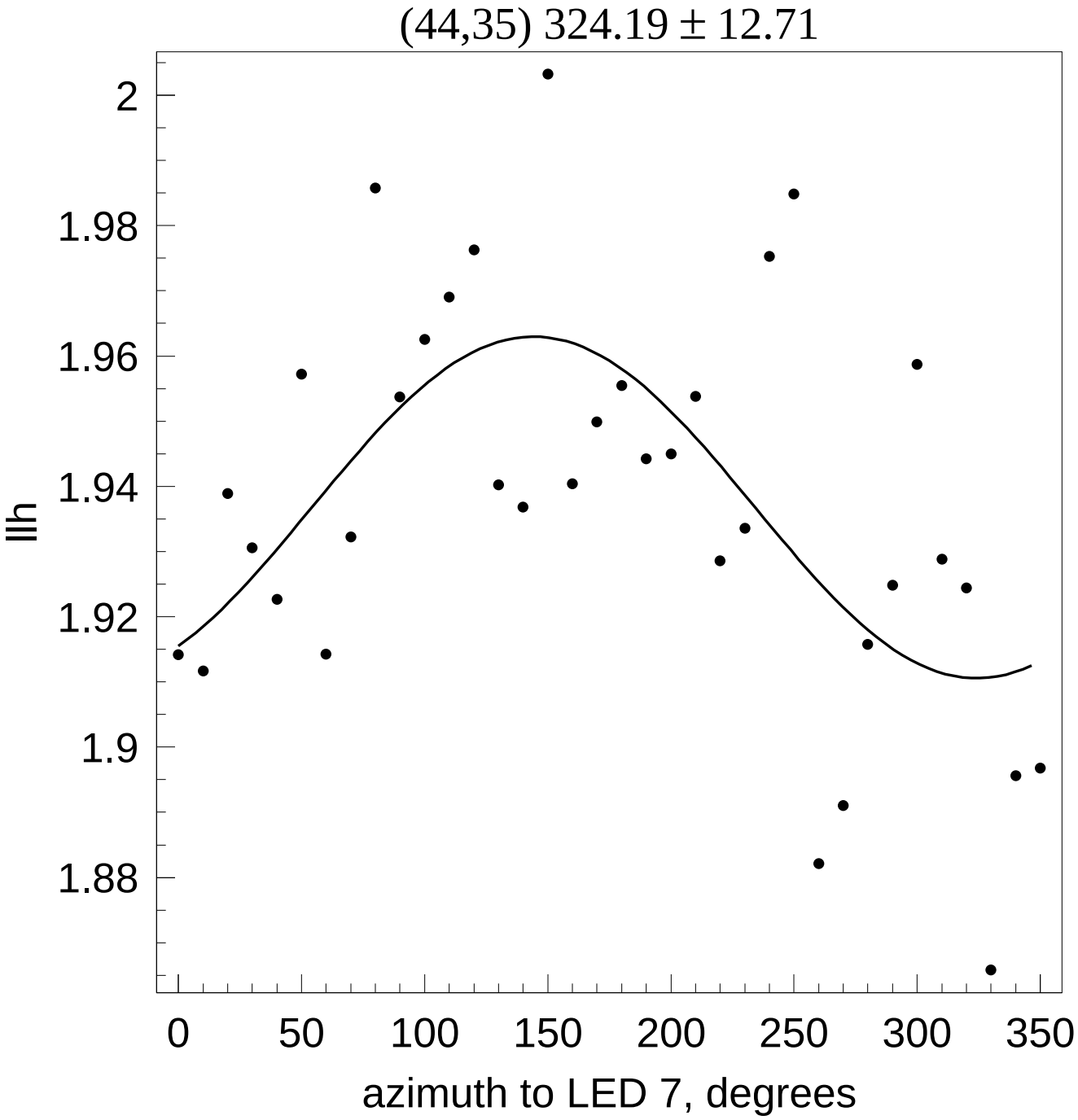

(44,34) 110.57 ± 0.60
4
3.8
3.6
3.4
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

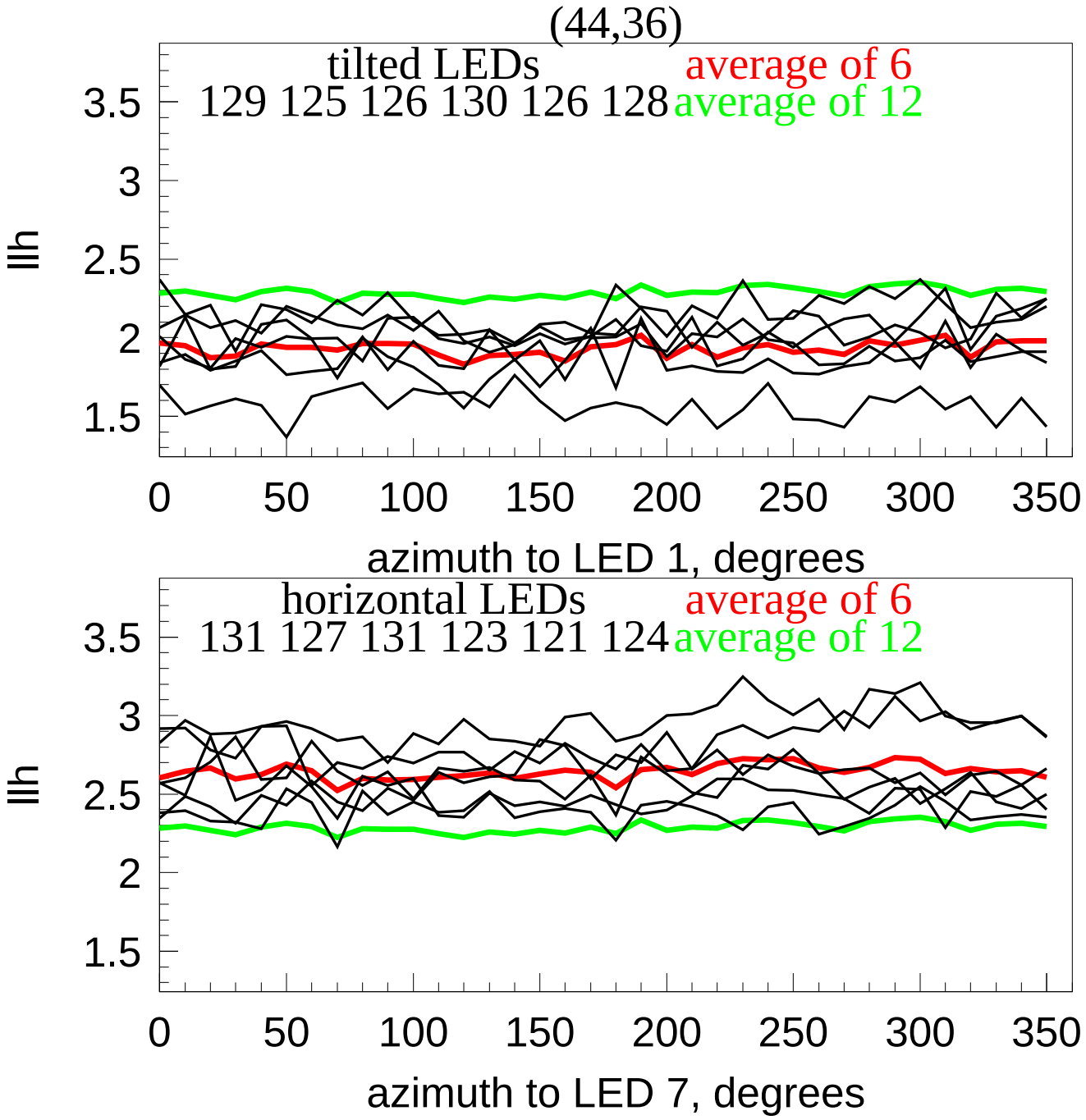

(44,34) 110.69 ± 0.58
4
3.8
3.6
3.4
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

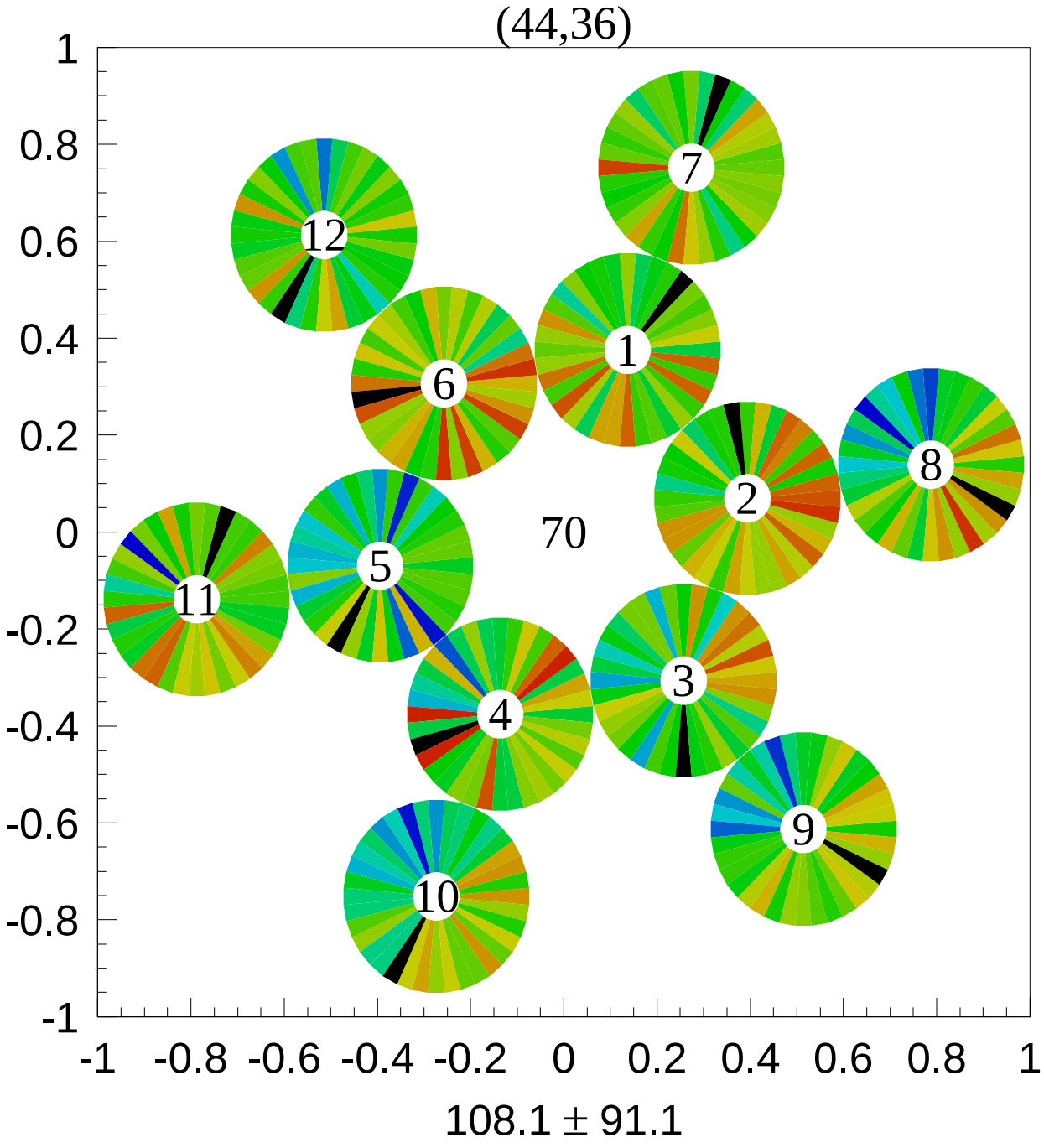

(44,35)
tilted LEDs
120 122 129 120 127 124
average of 6
average of 12
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 126 129 121 129 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

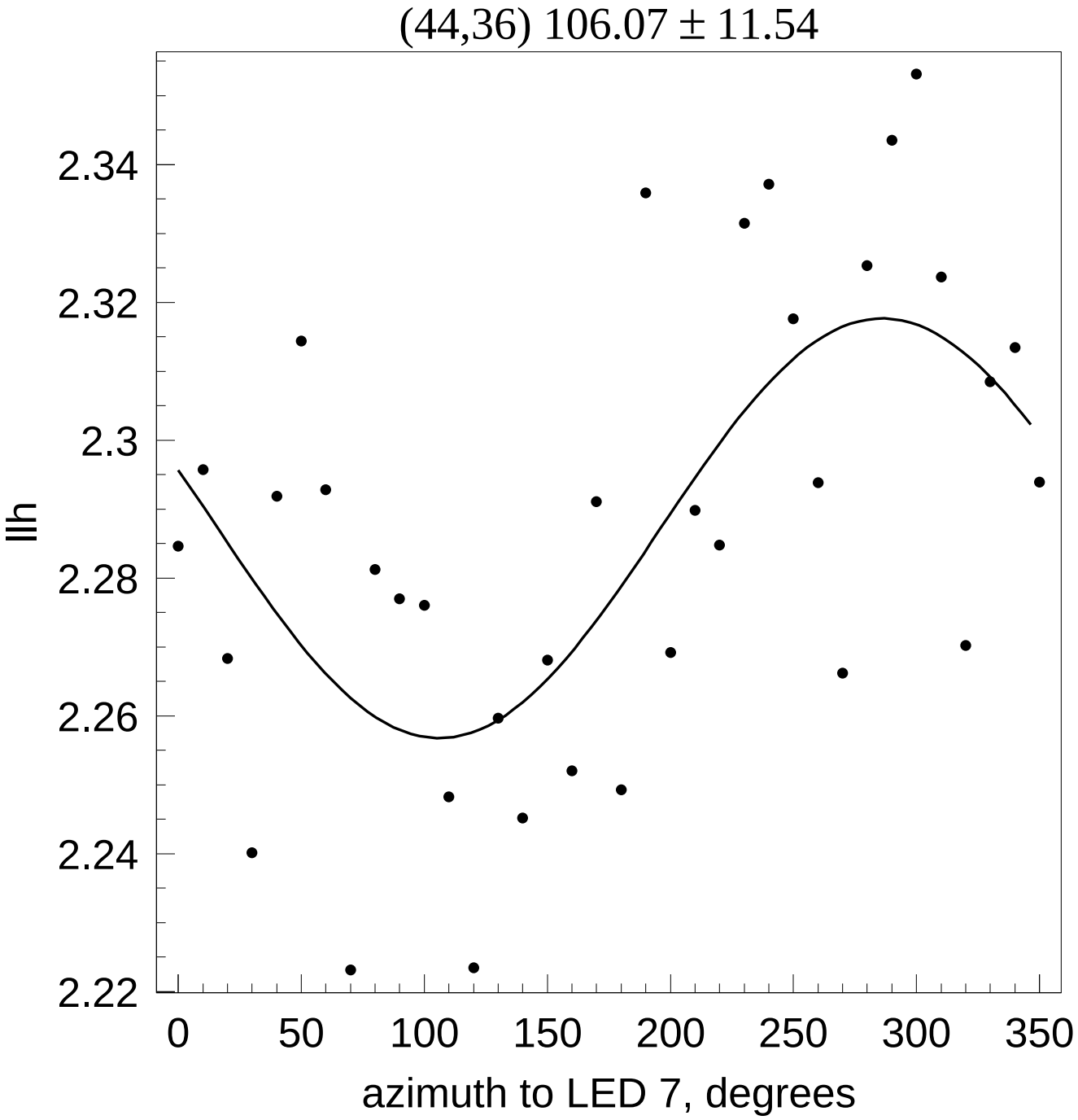

(44,35)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
327.8 ± 63.2

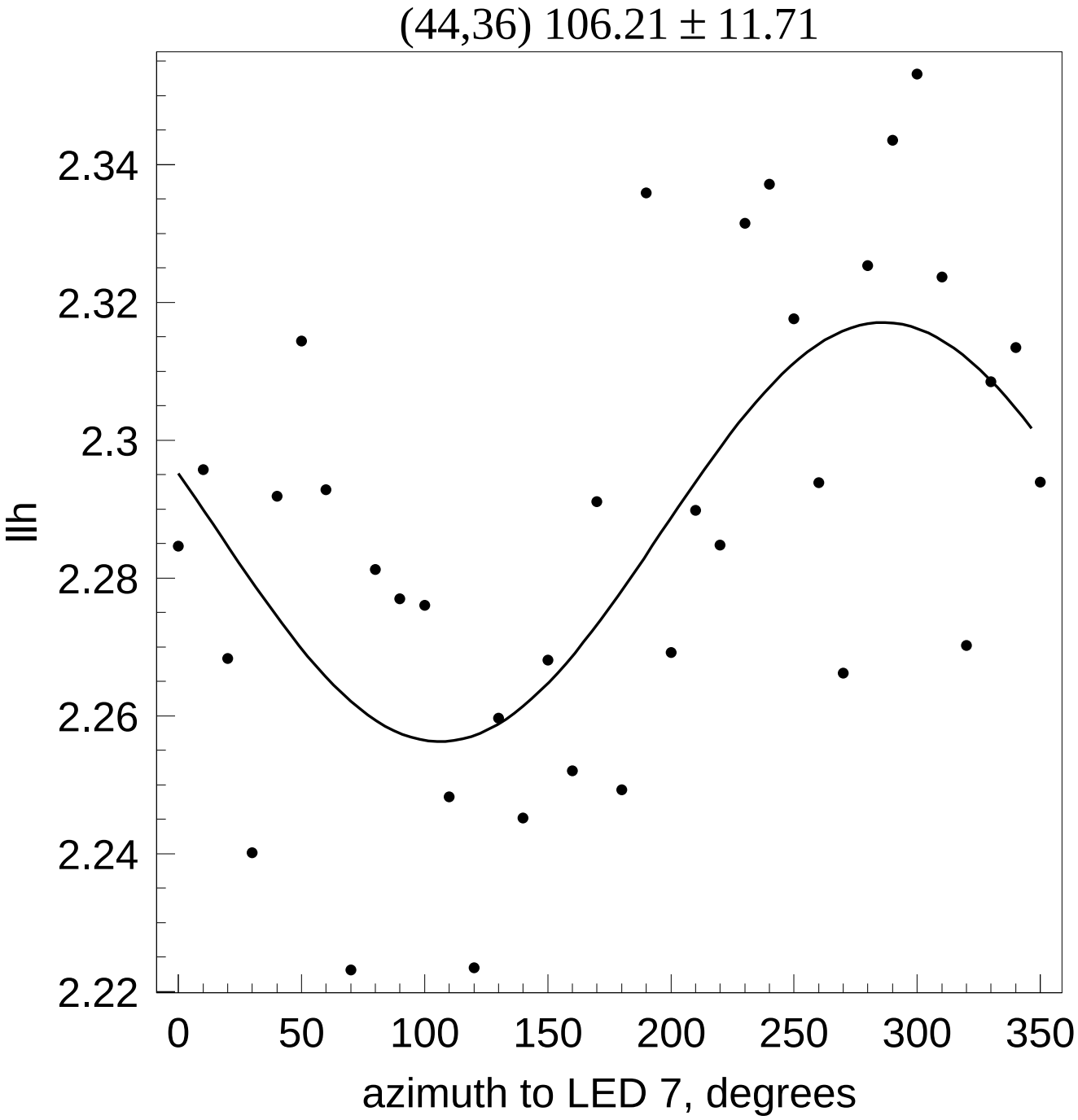

(44,35) 324.65 ± 12.84
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

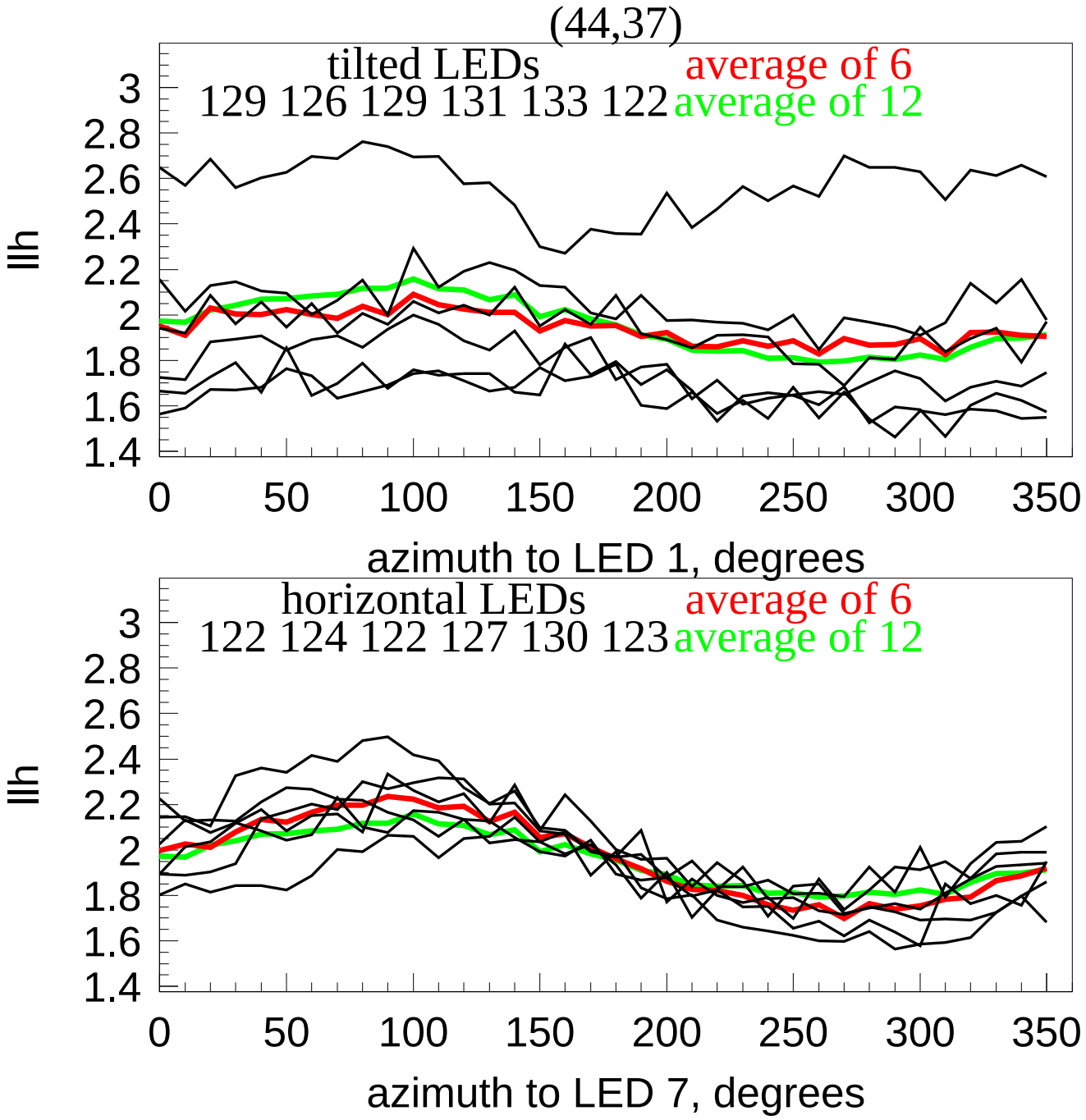

(44,35) 324.19 ± 12.71
2
1.98
1.96
1.94
1.92
1.9
1.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

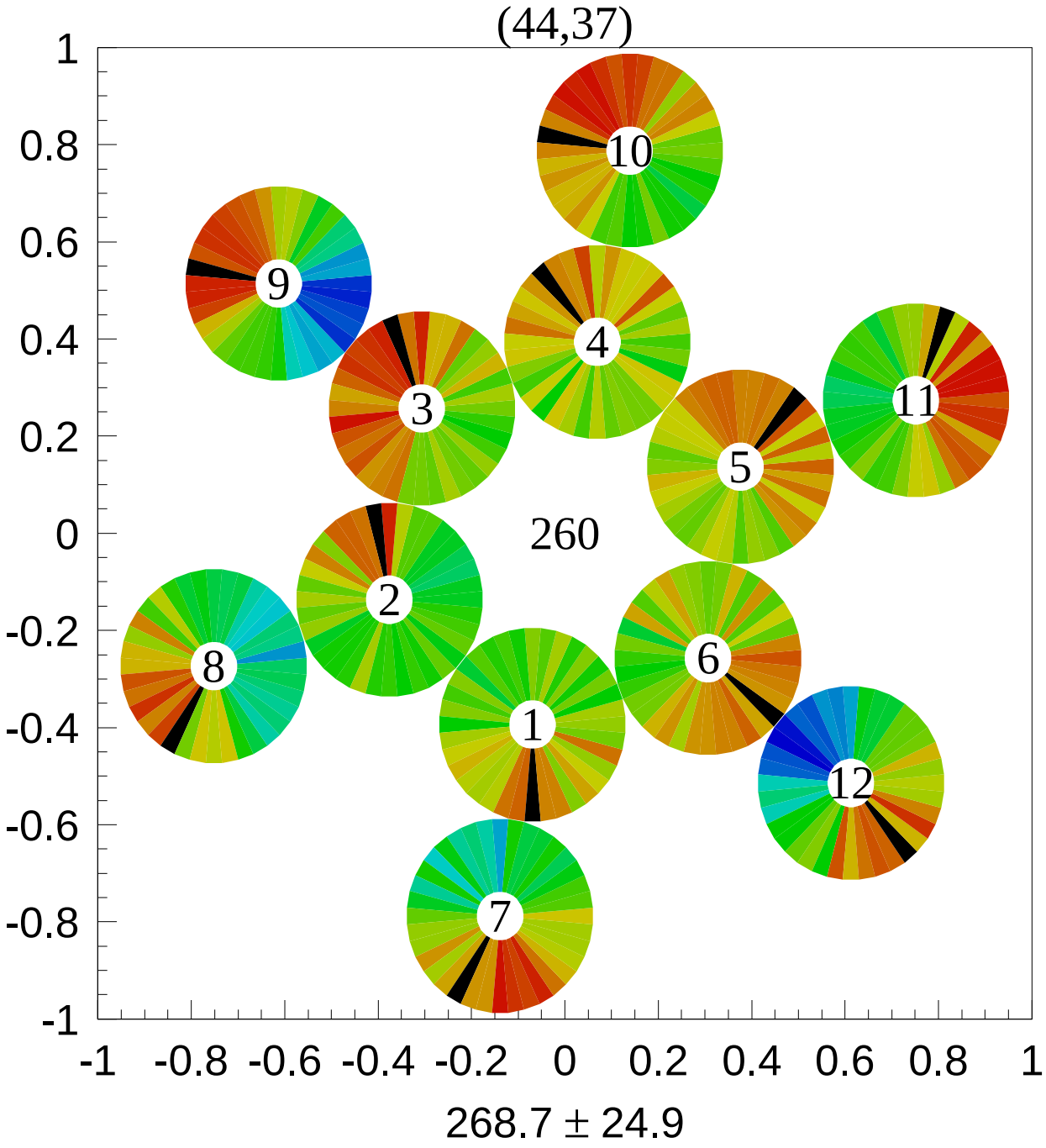

(44,36)
tilted LEDs
129 125 126 130 126 128
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 127 131 123 121 124
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

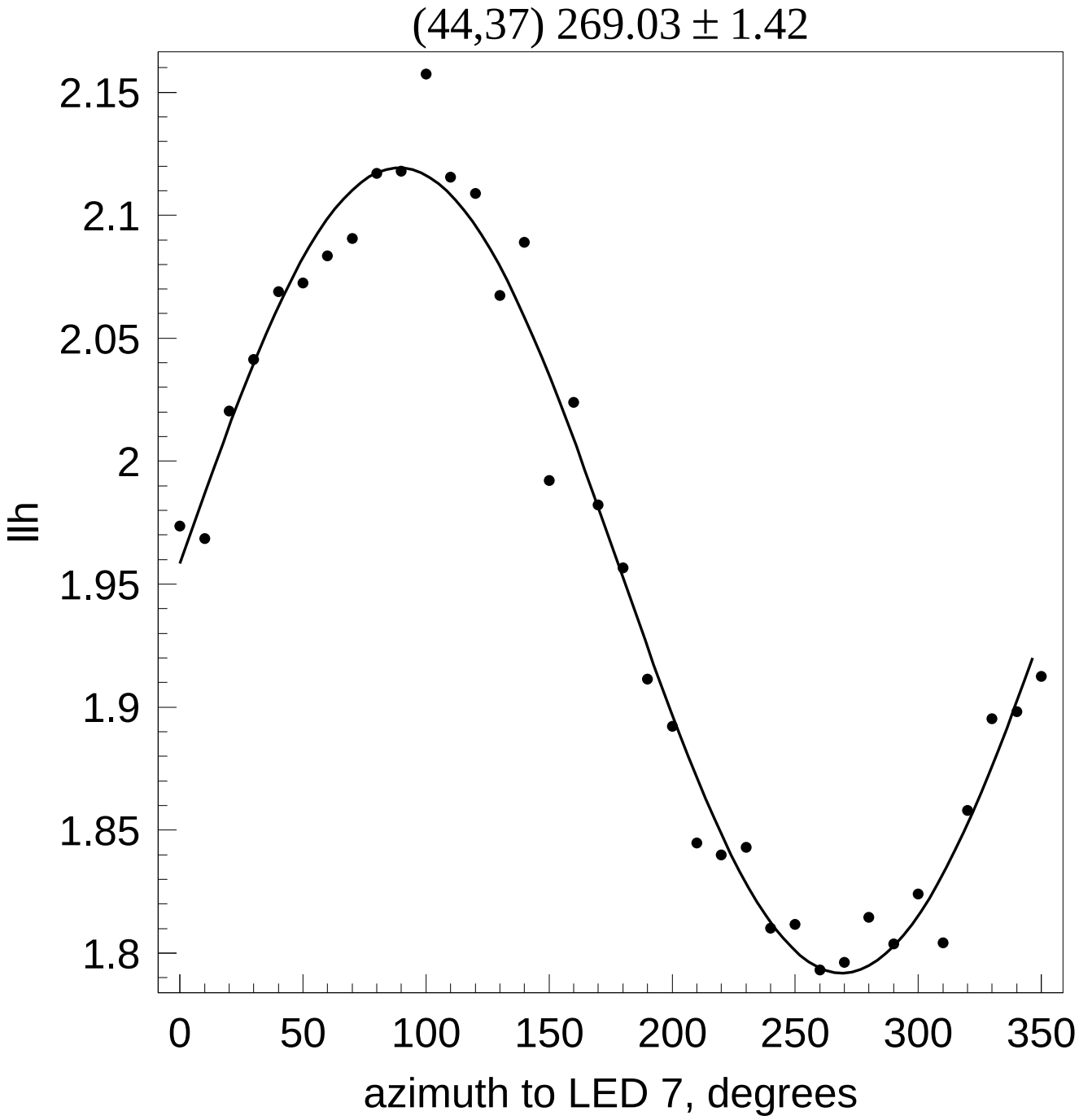

(44,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
108.1 ± 91.1
70
1
2
3
4
5
6
7
8
9
10
11
12

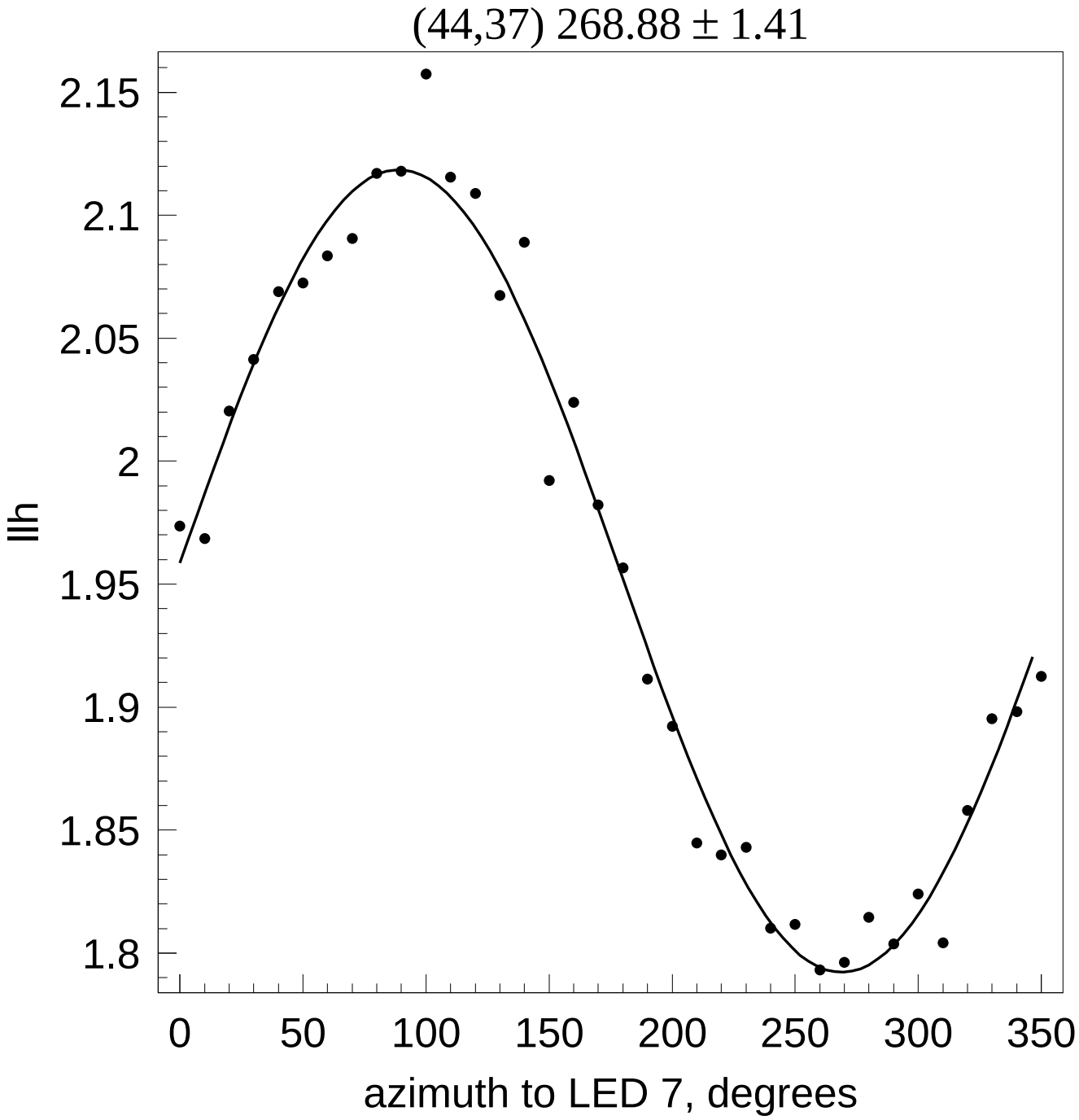

(44,36) 106.07 ± 11.54
2.34
2.32
2.3
2.28
2.26
2.24
2.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

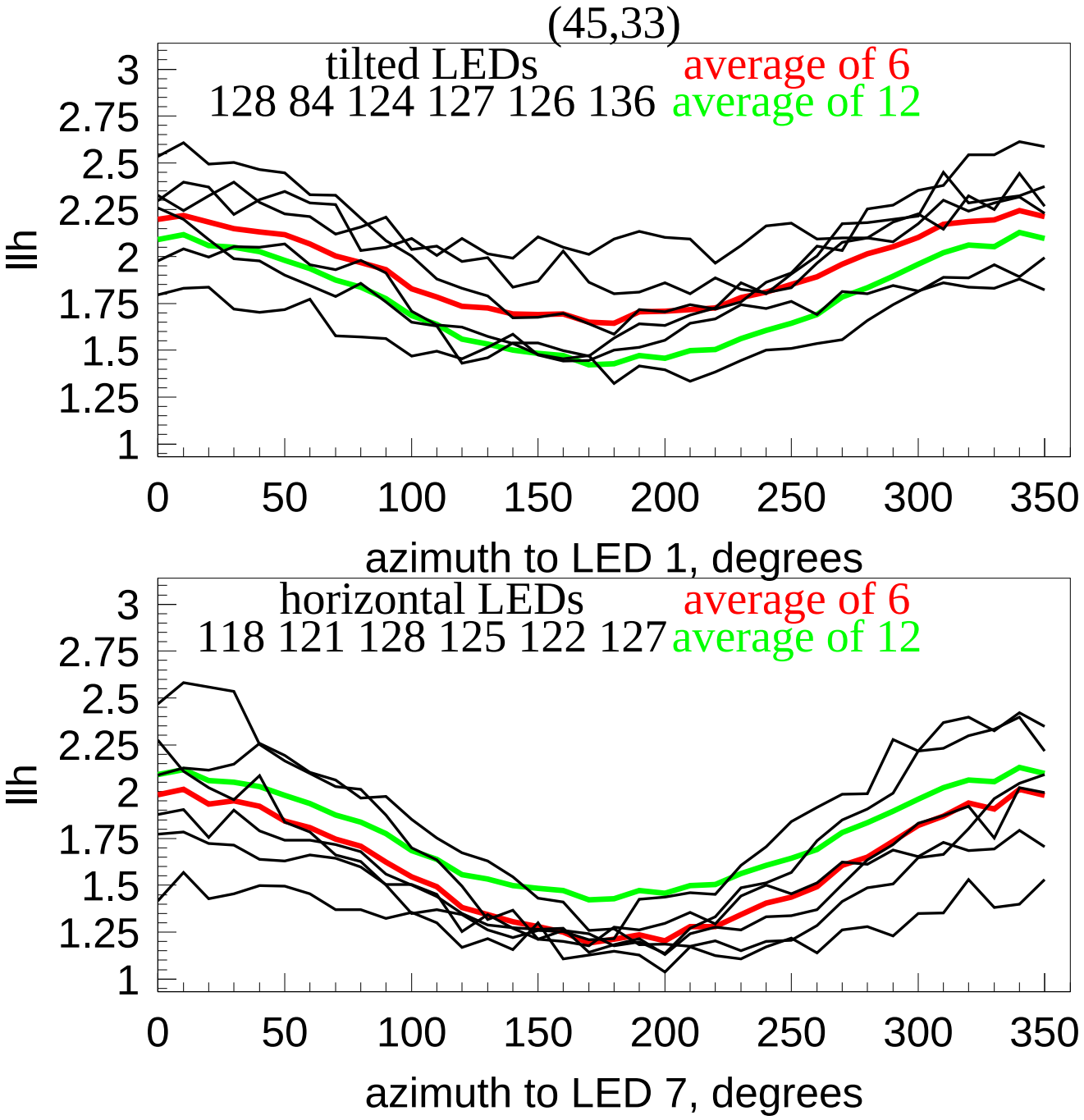

(44,36) 106.21 ± 11.71
2.34
2.32
2.3
2.28
2.26
2.24
2.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

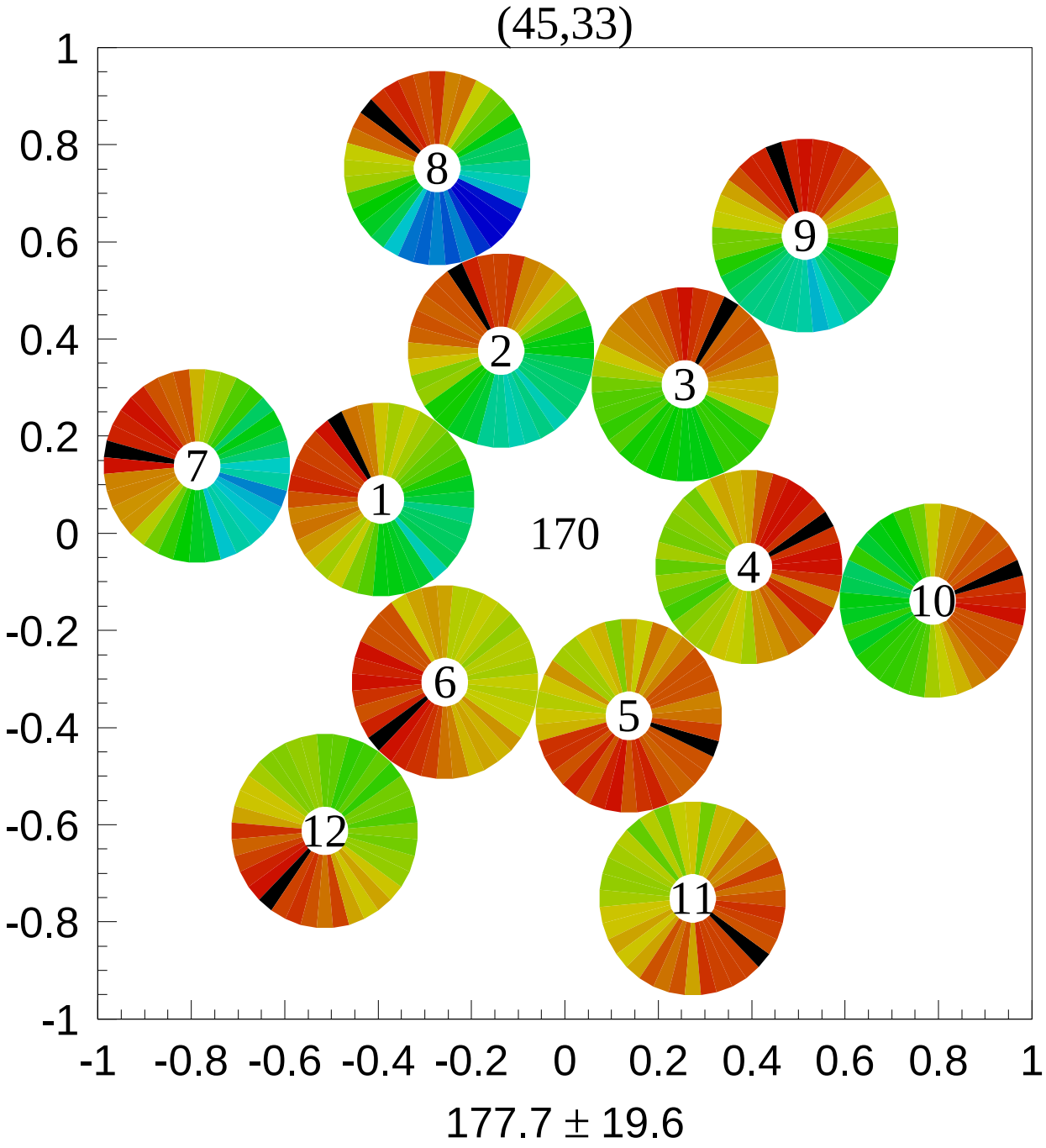

(44,37)
tilted LEDs
129 126 129 131 133 122
average of 6
average of 12
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 124 122 127 130 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

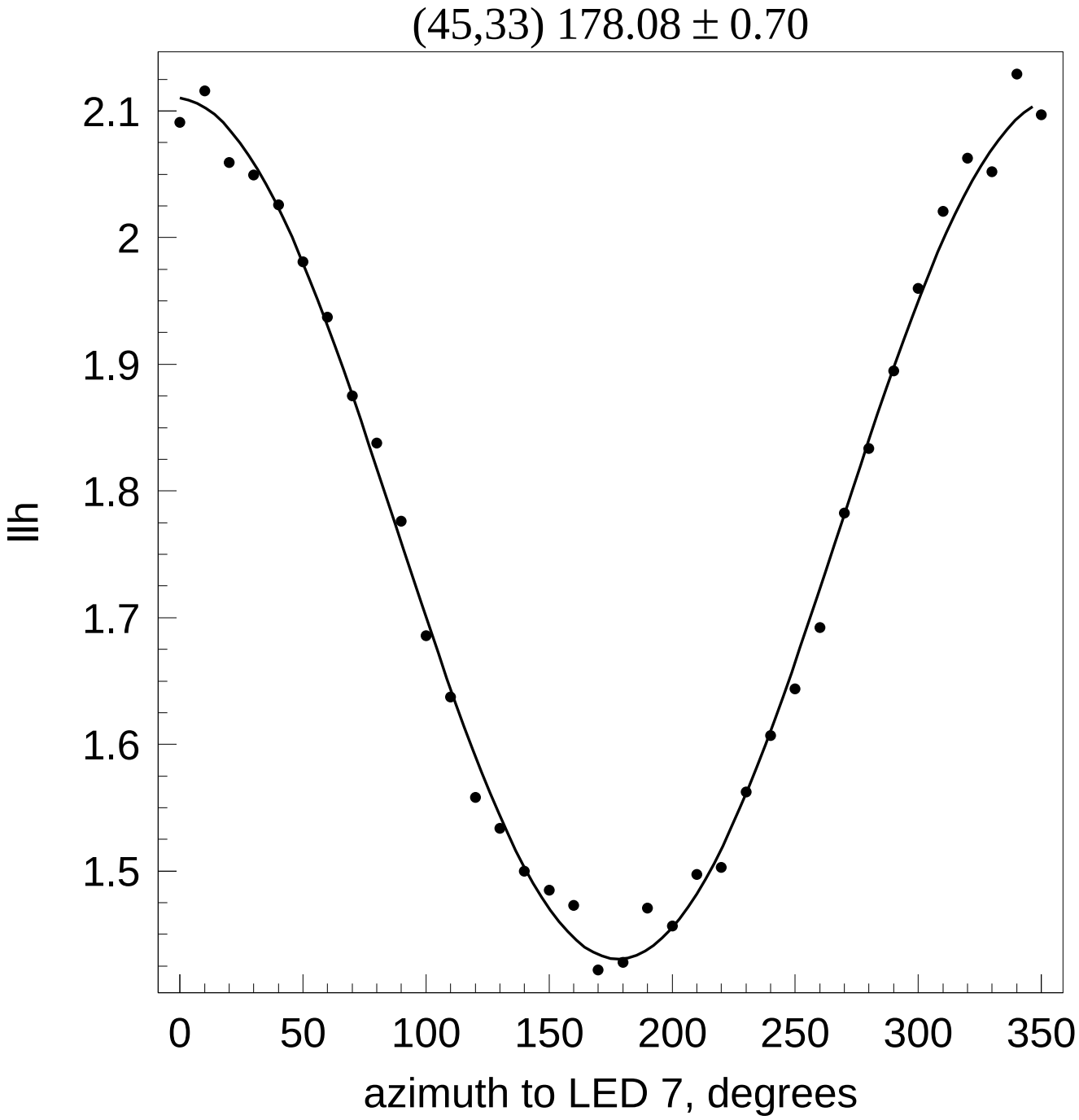

(44,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
268.7 ± 24.9
260
1
2
3
4
5
6
7
8
9
10
11
12

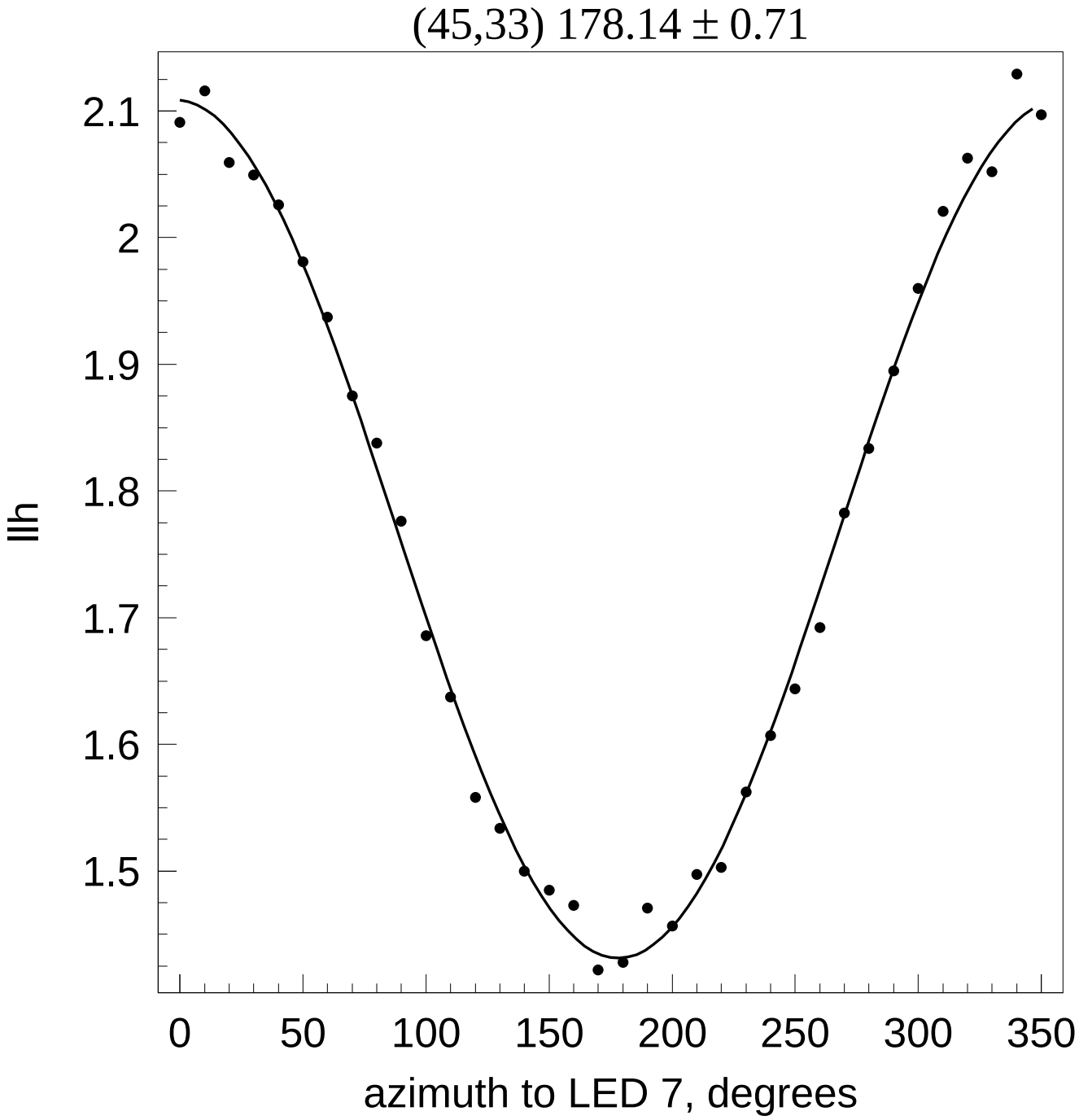

(44,37) 269.03 ± 1.42
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

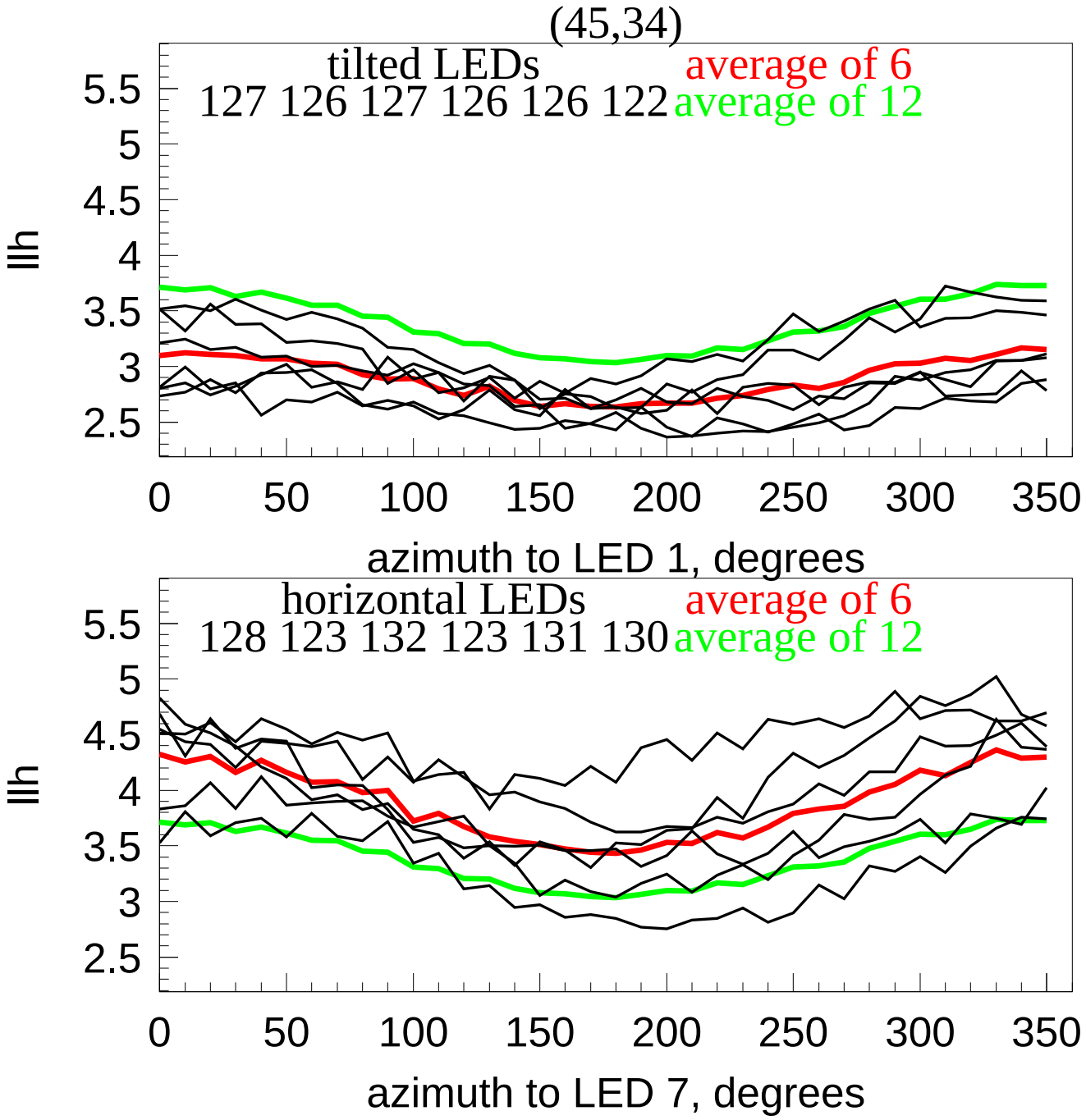

(44,37) 268.88 ± 1.41
2.15
2.1
2.05
2
1.95
1.9
1.85
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

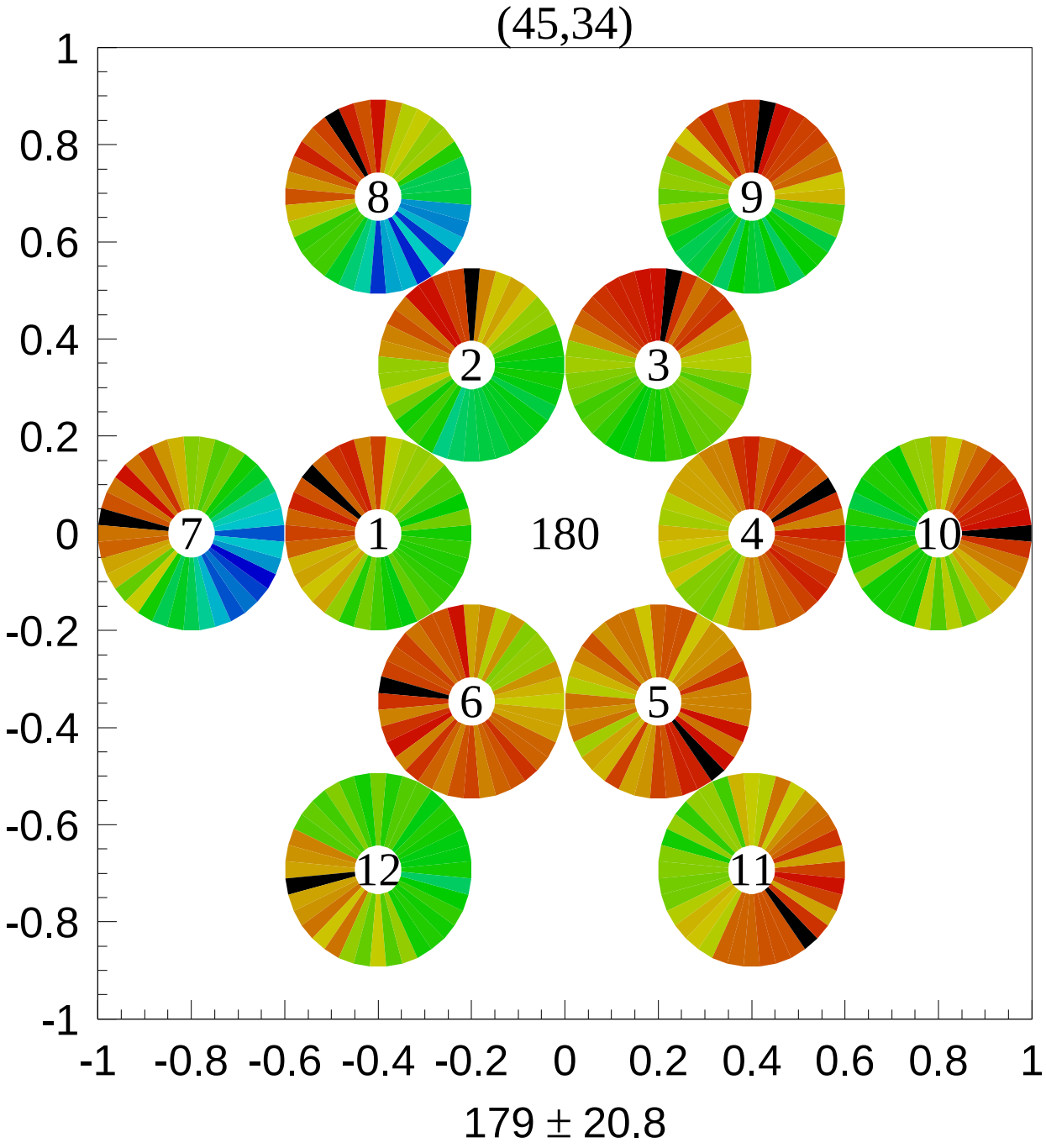

(45,33)
tilted LEDs
128 84 124 127 126 136
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
118 121 128 125 122 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

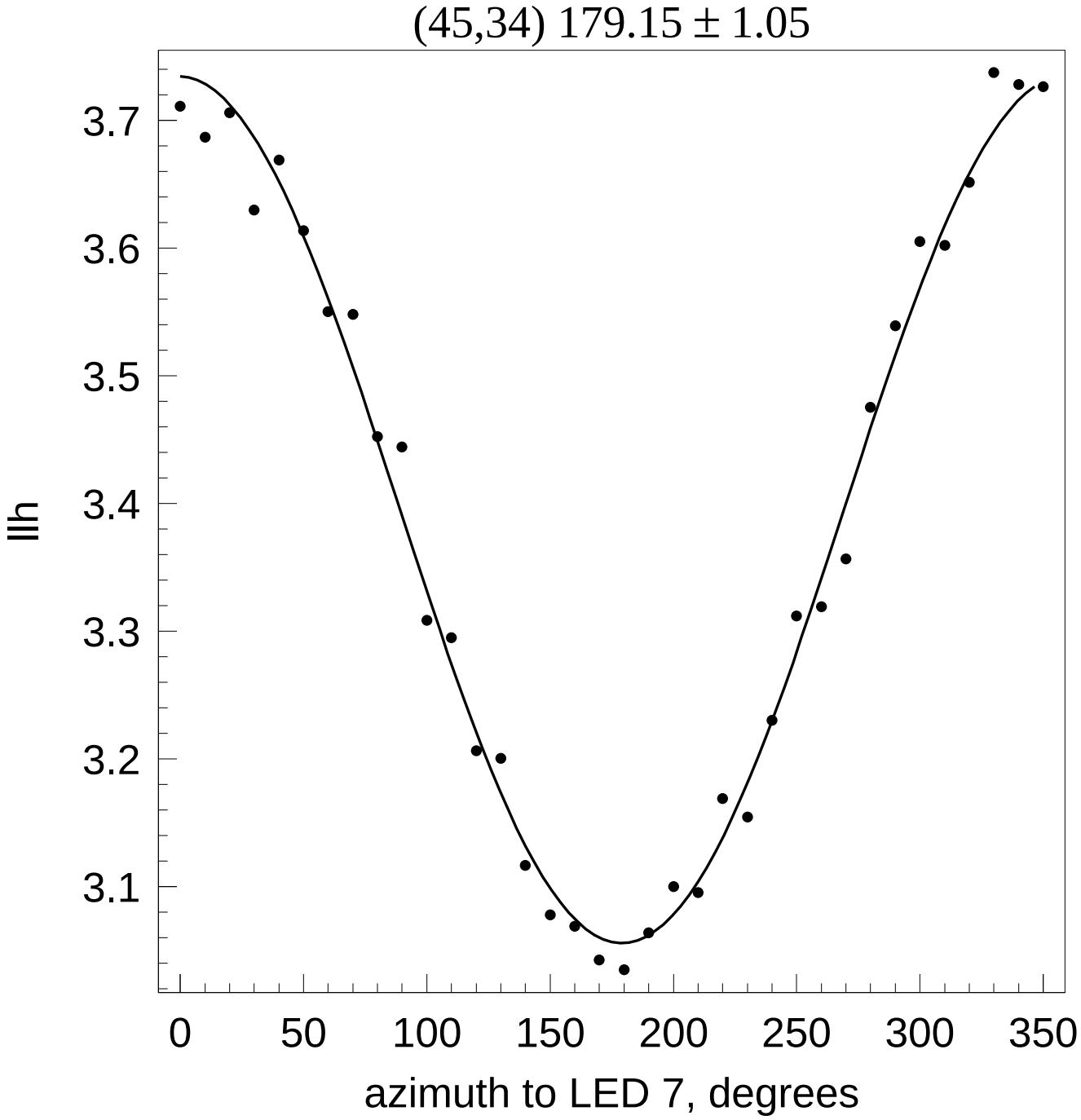

(45,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
177.7 ± 19.6

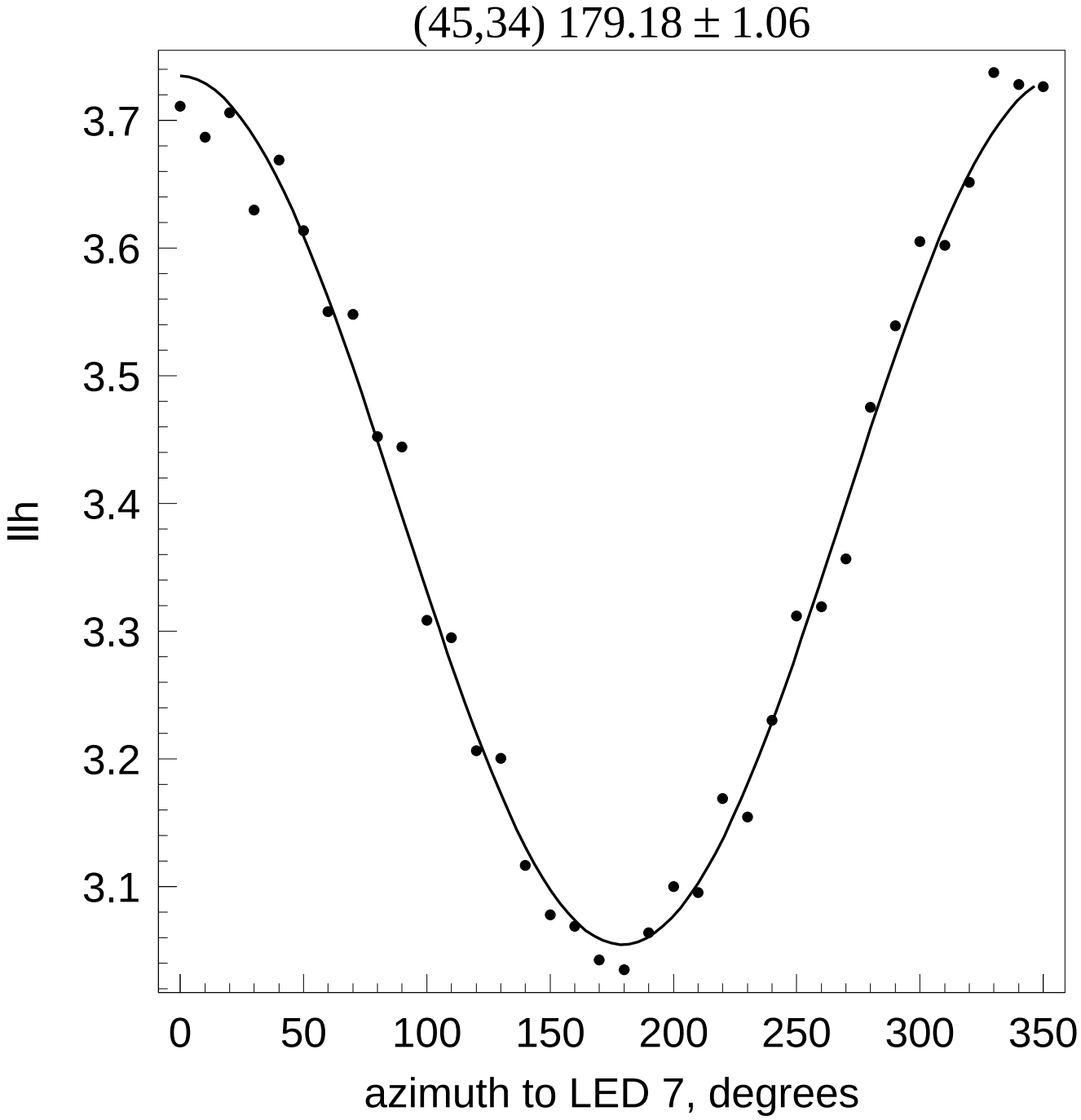

(45,33) 178.08 ± 0.70
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

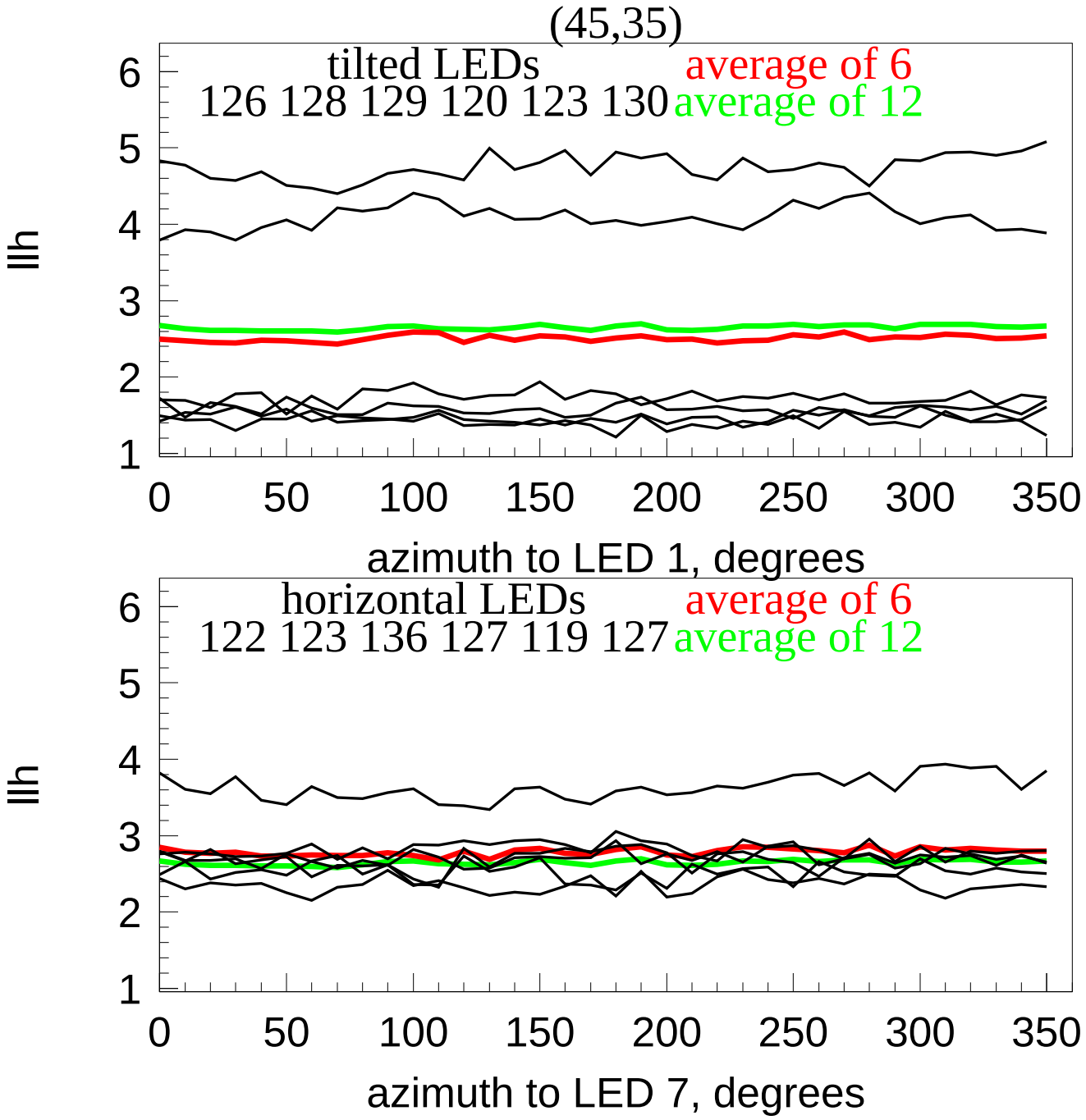

(45,33) 178.14 ± 0.71
2.1
2
1.9
1.8
1.7
1.6
1.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

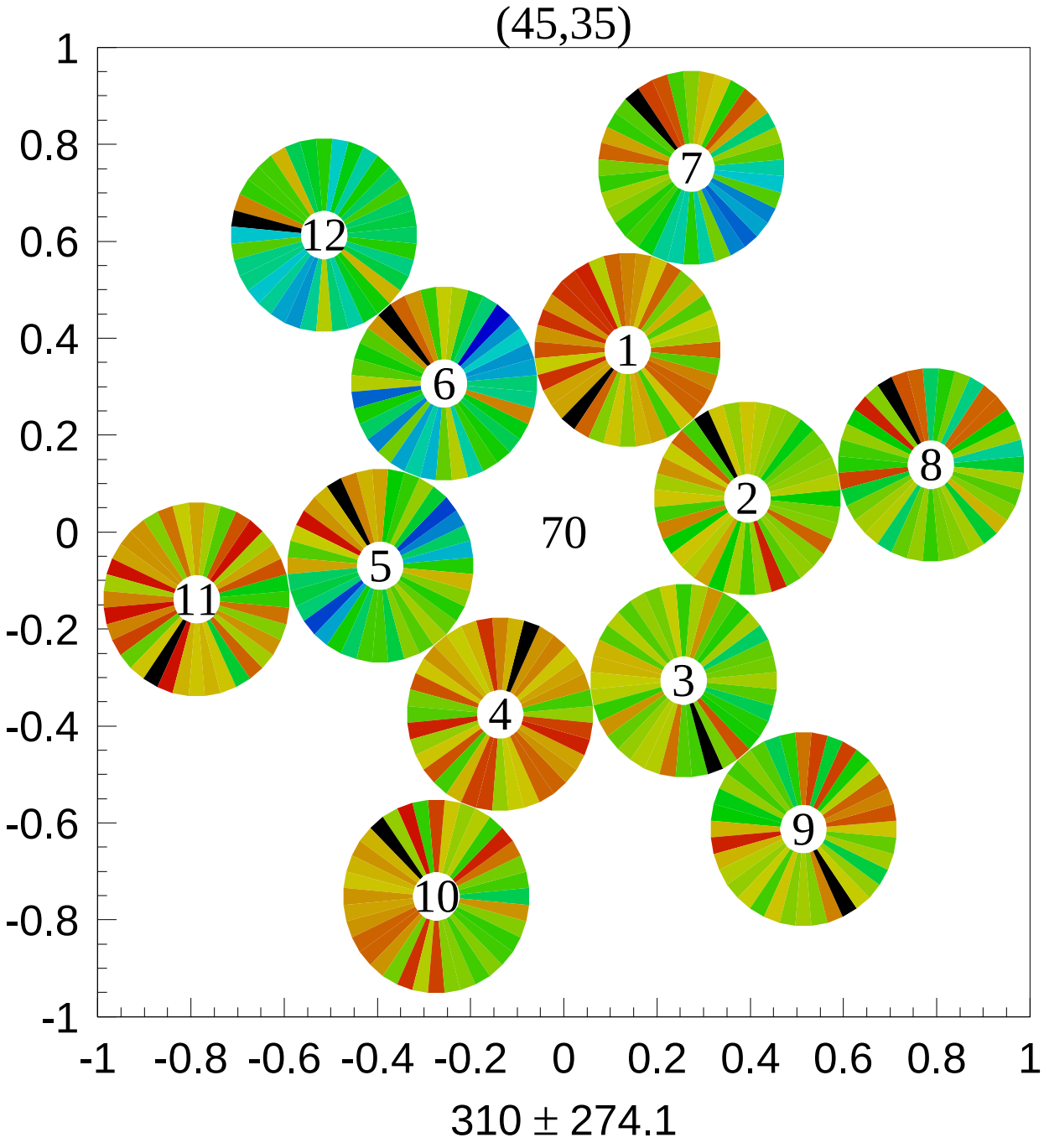

(45,34)
tilted LEDs
127 126 127 126 126 122
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 123 132 123 131 130
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

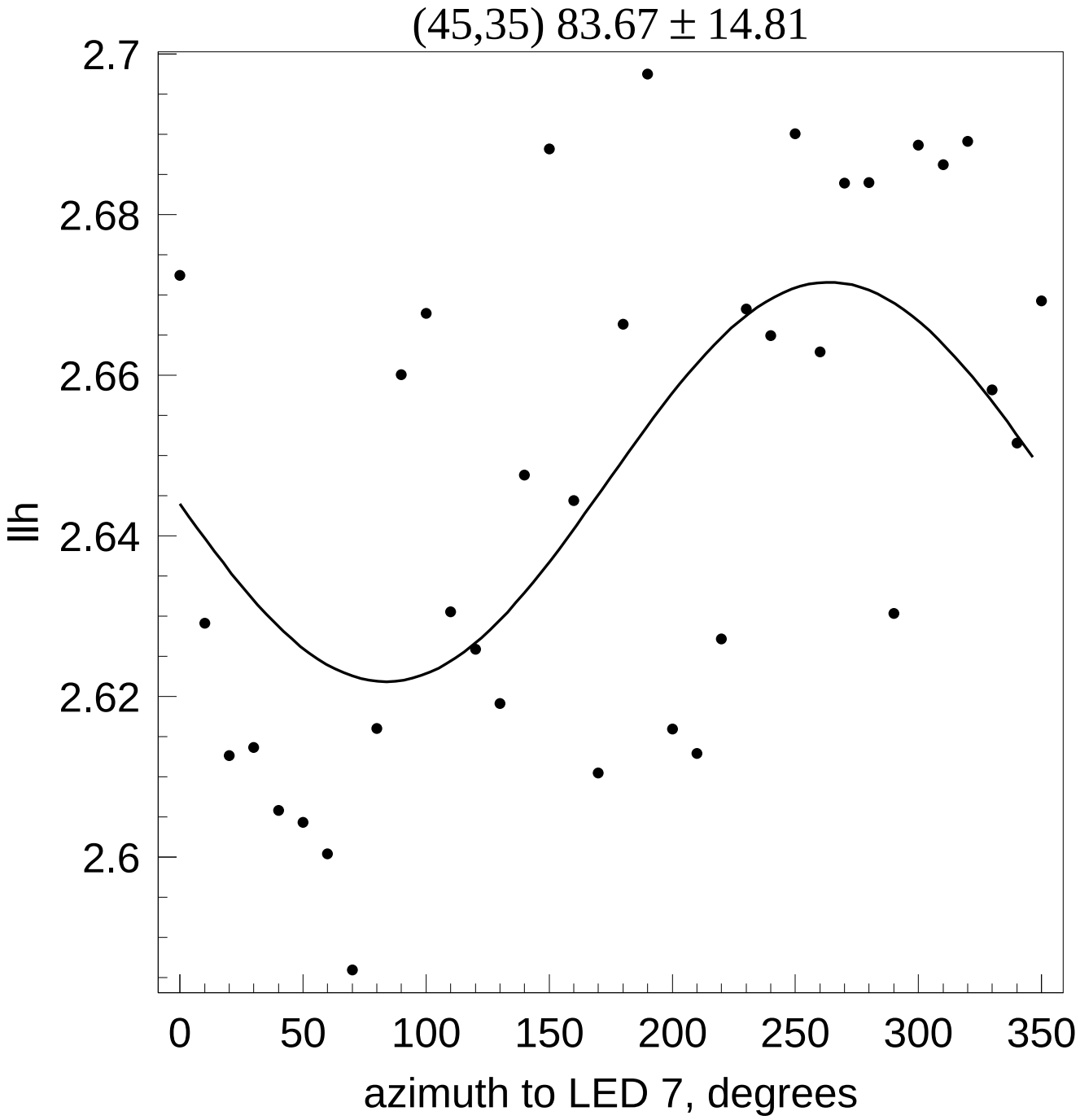

(45,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
179 ± 20.8
8
9
2
3
7
1
180
4
10
6
5
12
11

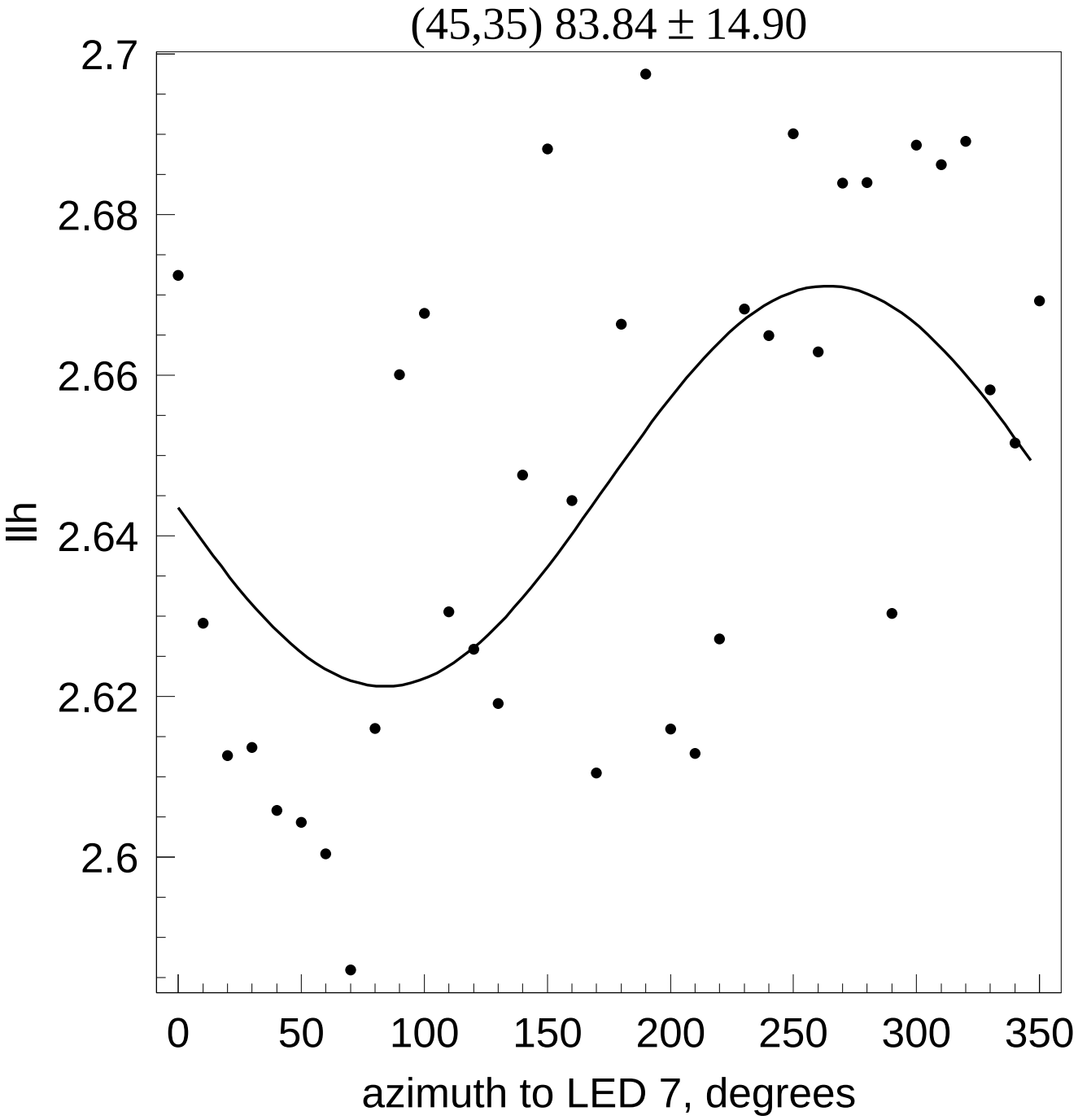

(45,34) 179.15 ± 1.05
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

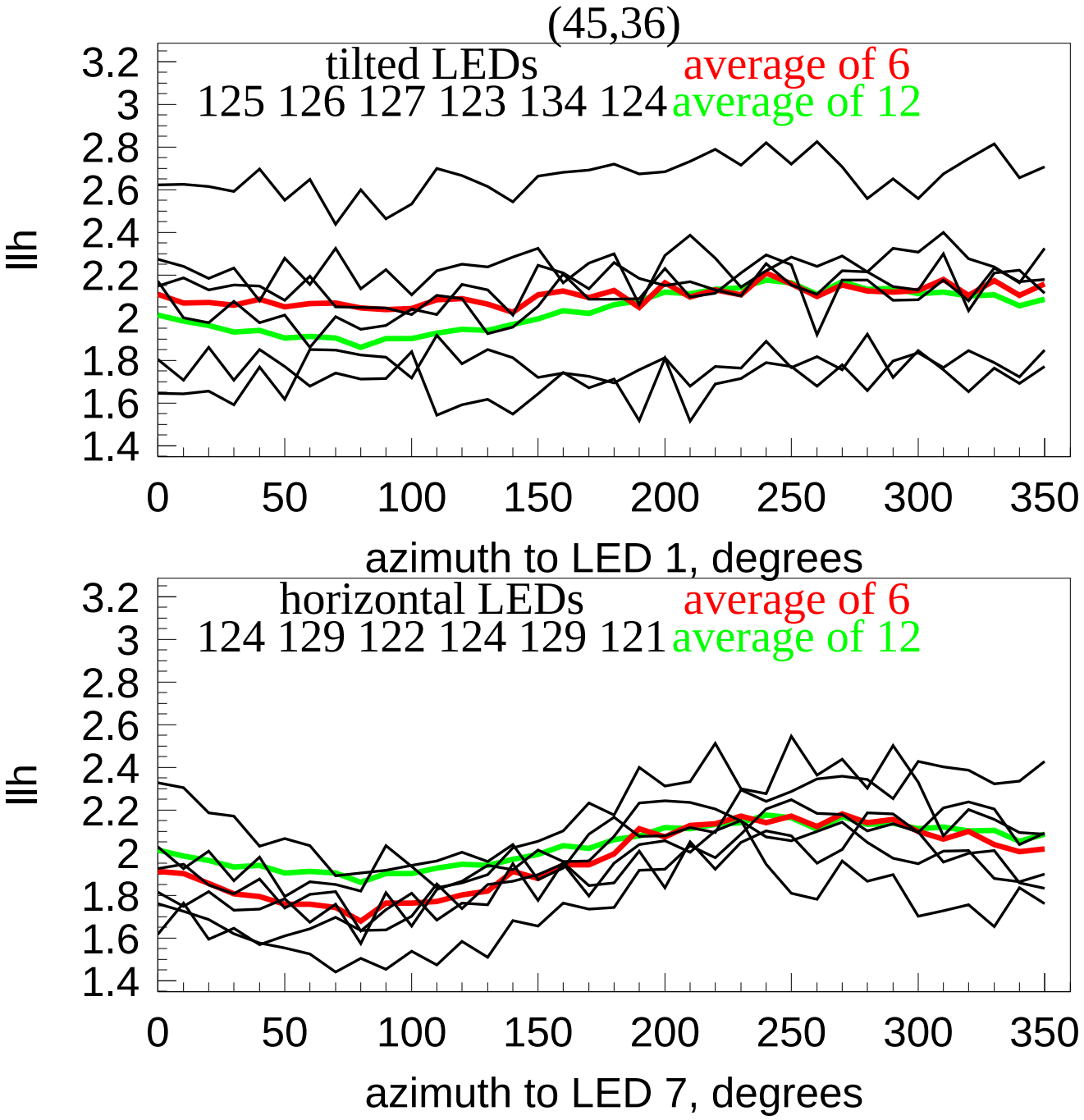

(45,34) 179.18 ± 1.06
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

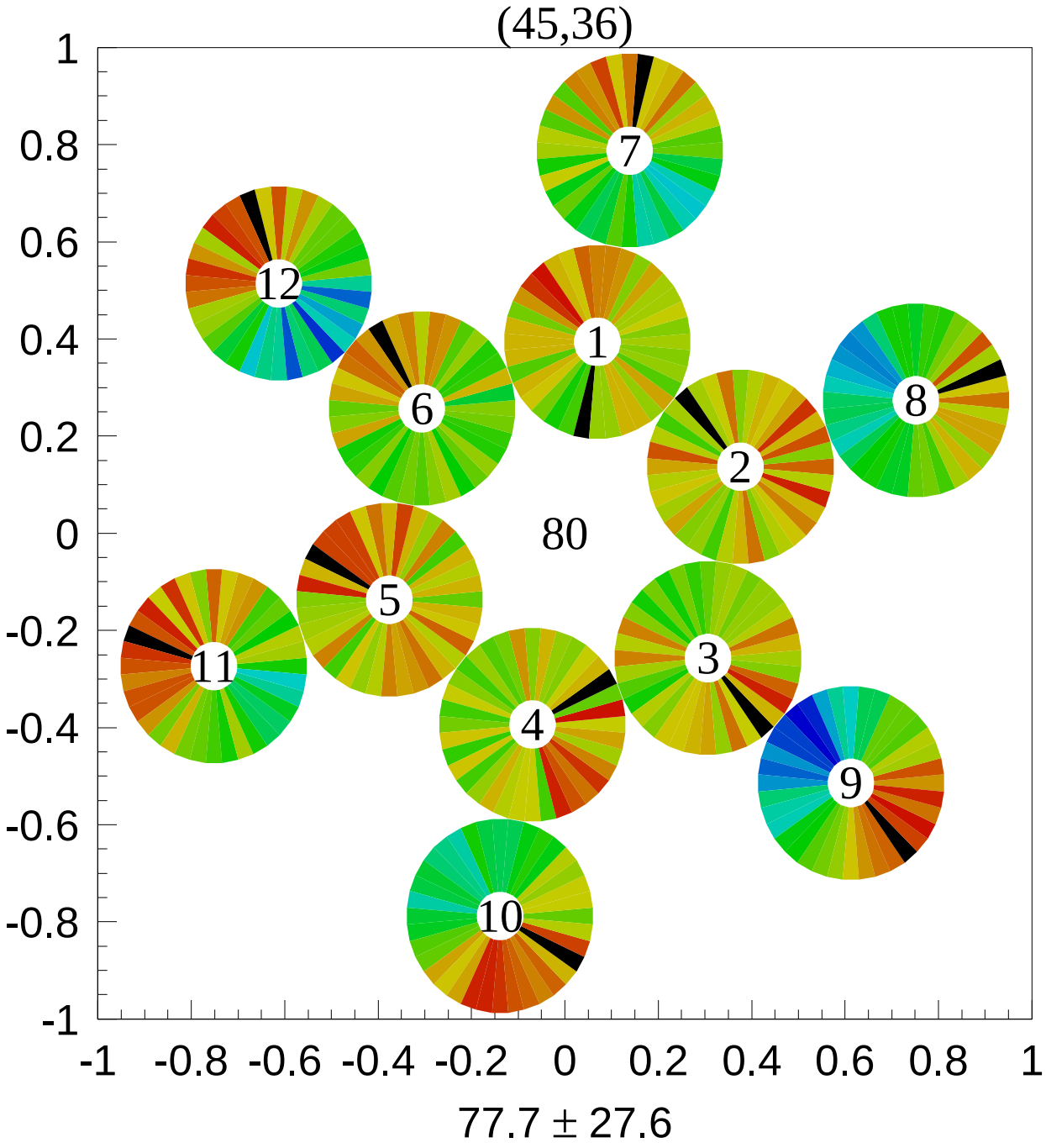

(45,35)
tilted LEDs
126 128 129 120 123 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 123 136 127 119 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

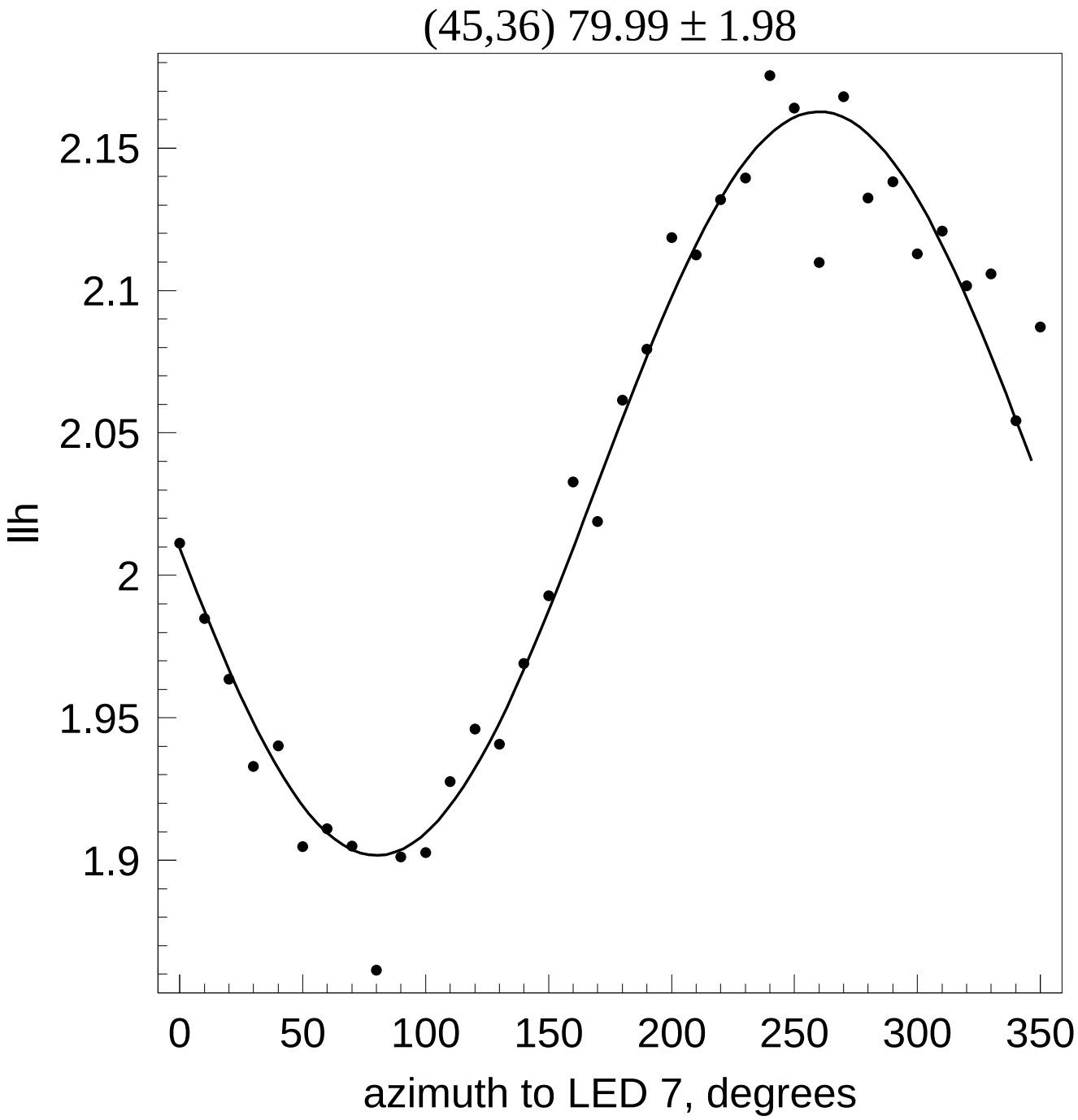

(45,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
5
70
11
4
3
9
10
310 ± 274.1

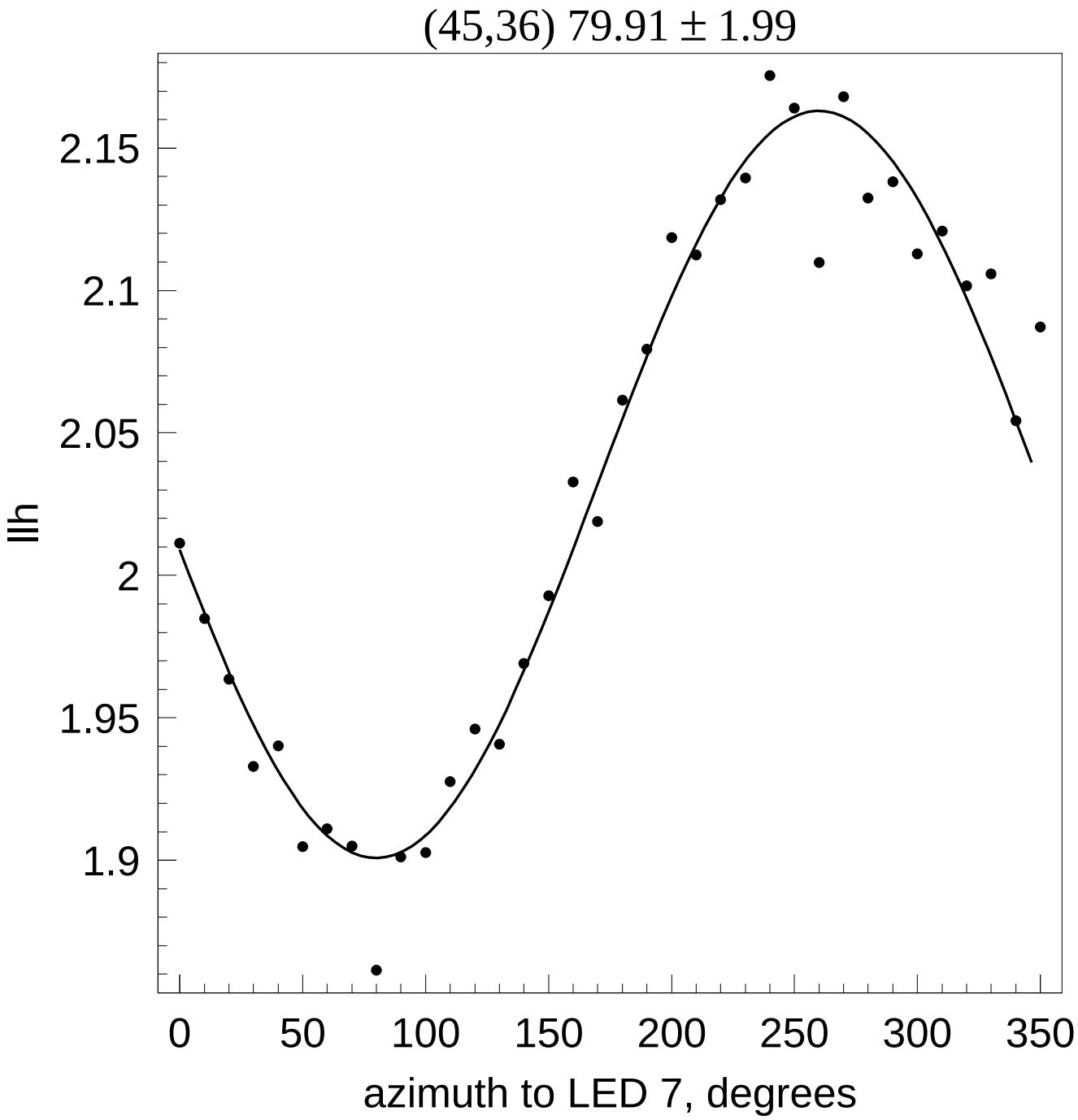

(45,35) 83.67 ± 14.81
2.7
2.68
2.66
2.64
2.62
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

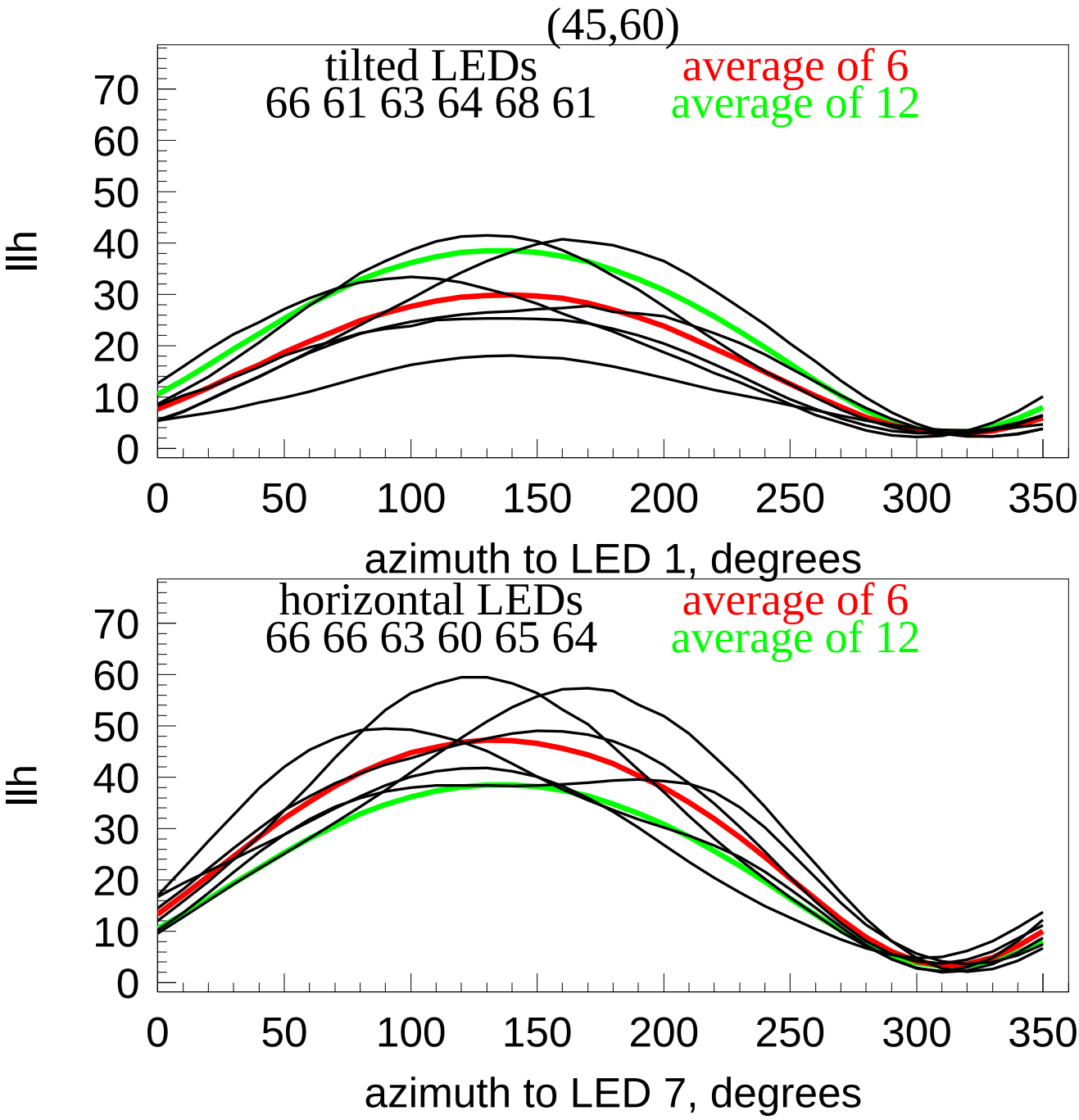

(45,35) 83.84 ± 14.90
2.7
2.68
2.66
2.64
2.62
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

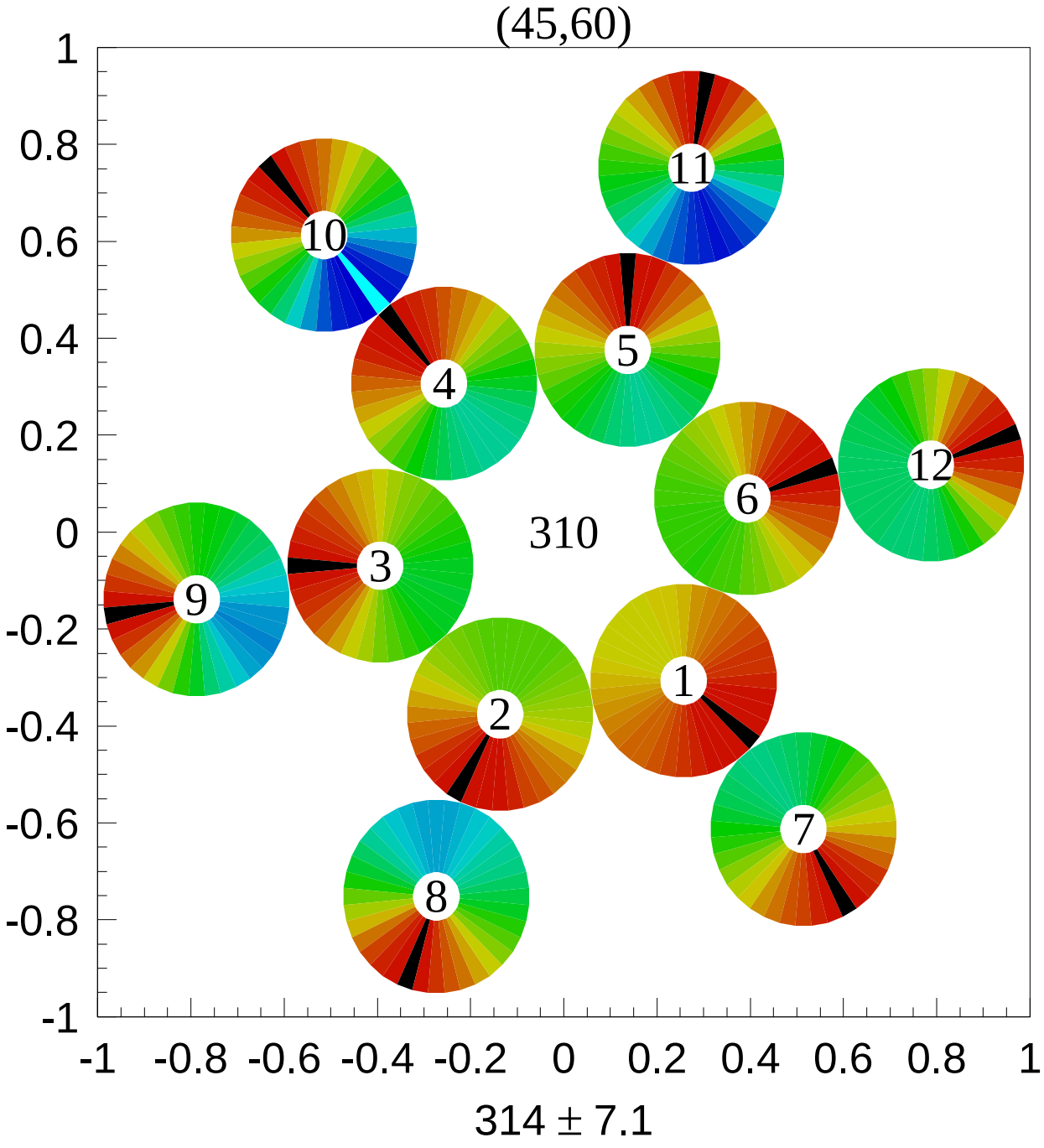

(45,36)
tilted LEDs
125 126 127 123 134 124
average of 6
average of 12
llh
3.2
3
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 129 122 124 129 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

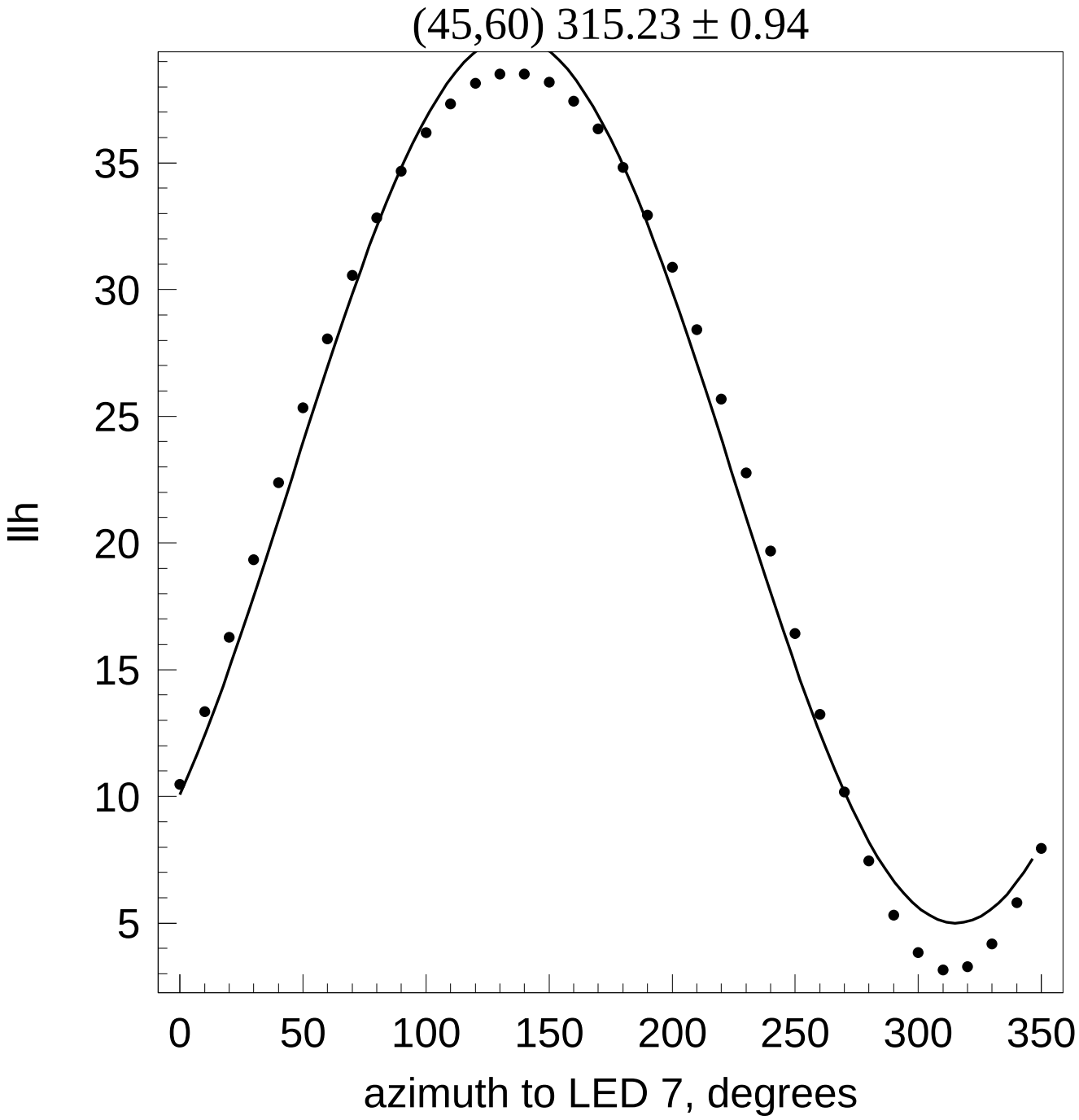

(45,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
77.7 ± 27.6
7
12
1
6
8
2
80
5
11
3
4
9
10

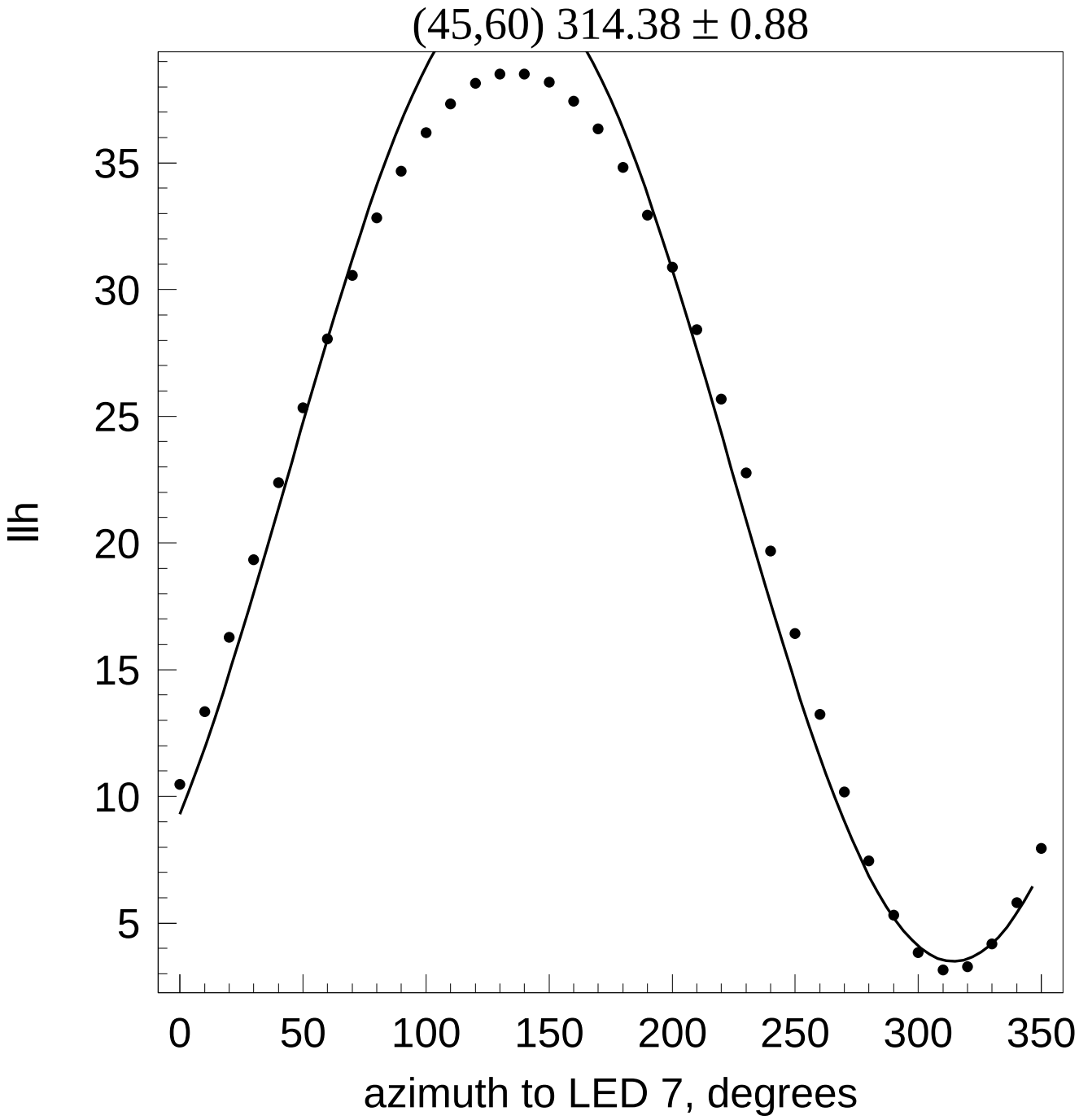

(45,36) 79.99 ± 1.98
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

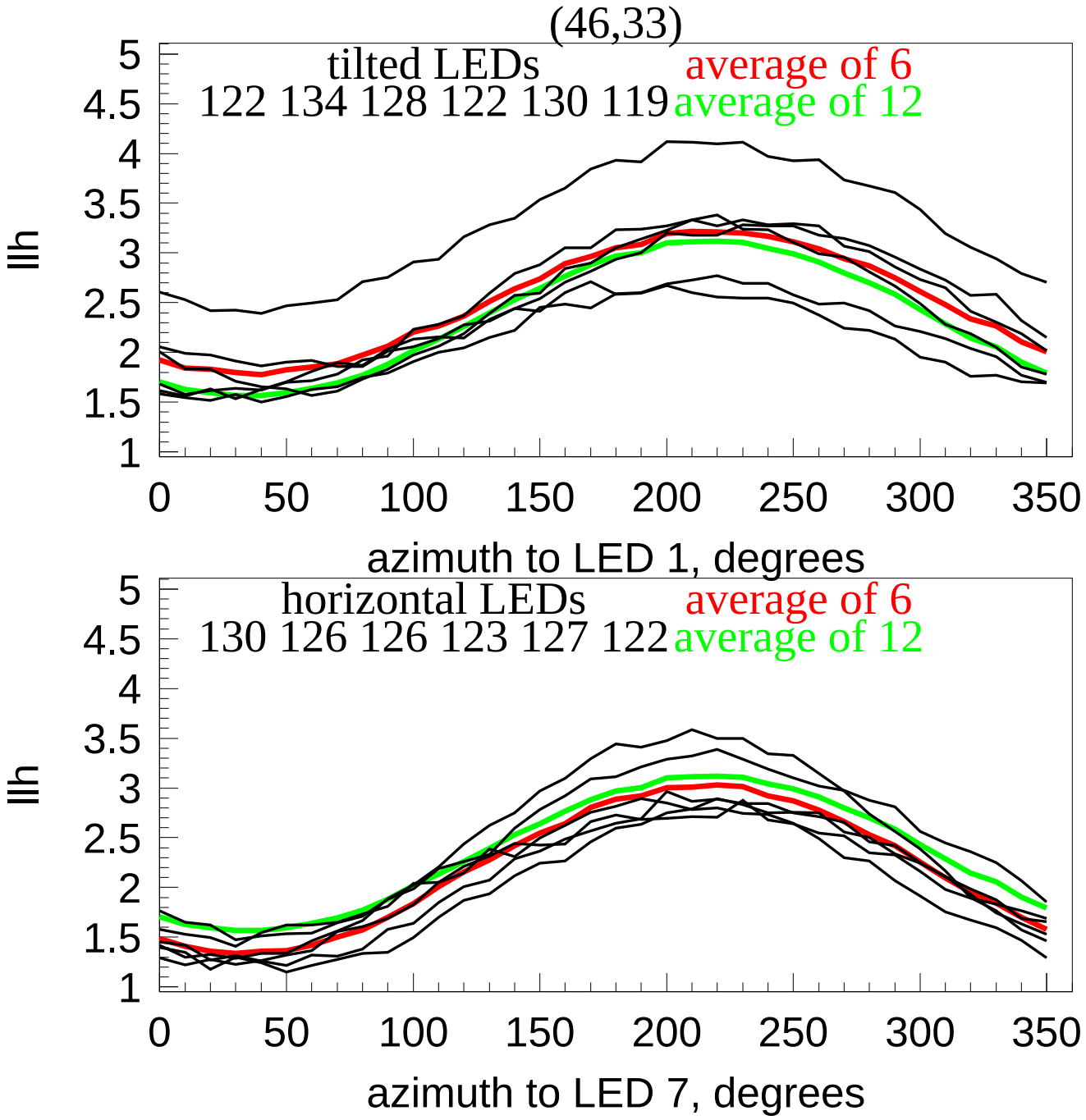

(45,36) 79.91 ± 1.99
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

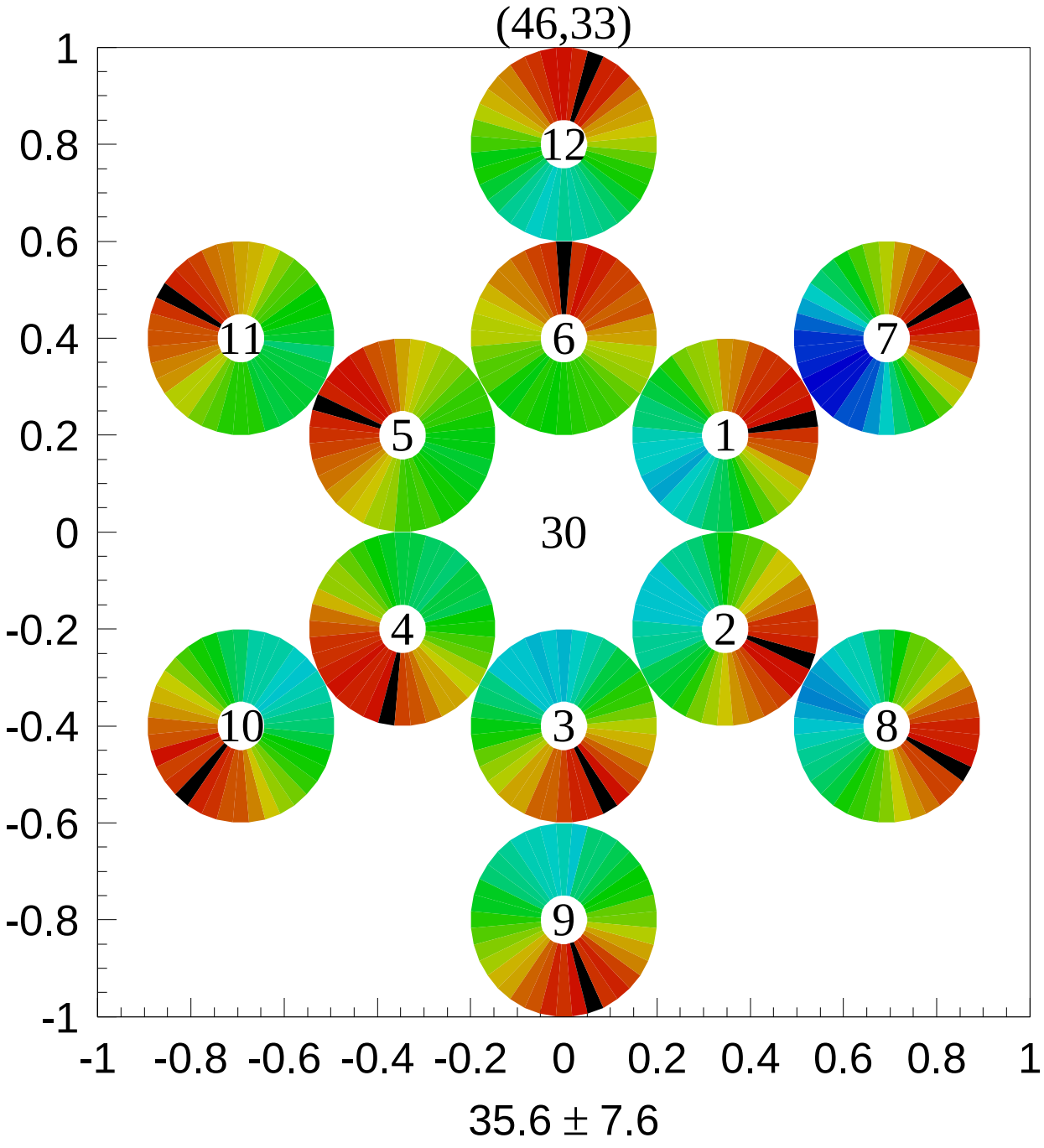

(45,60)
tilted LEDs
66 61 63 64 68 61
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
66 66 63 60 65 64
average of 6
average of 12
llh
azimuth to LED 7, degrees

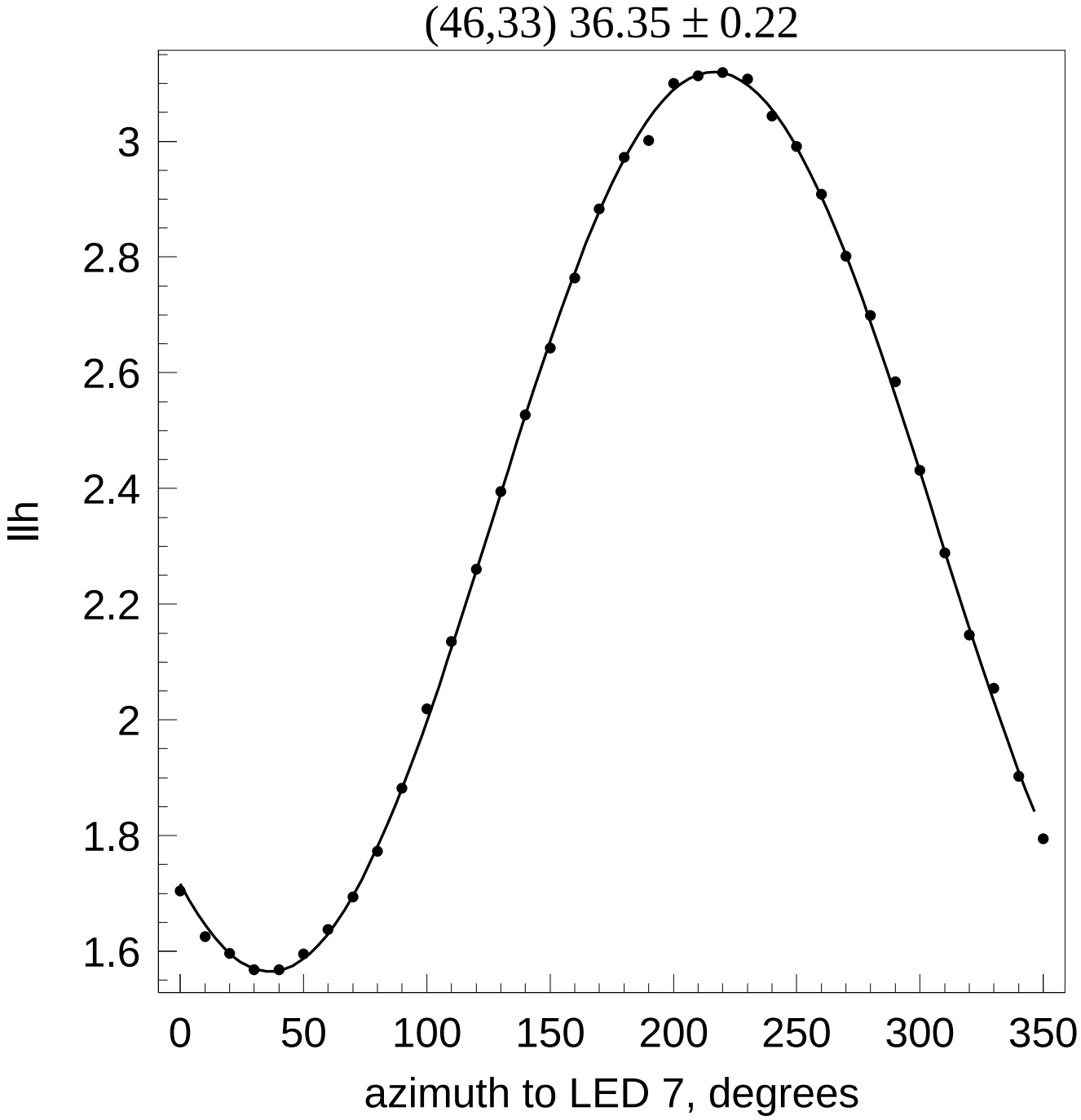

(45,60)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
12
6
3
9
310
2
1
7
8
314 ± 7.1

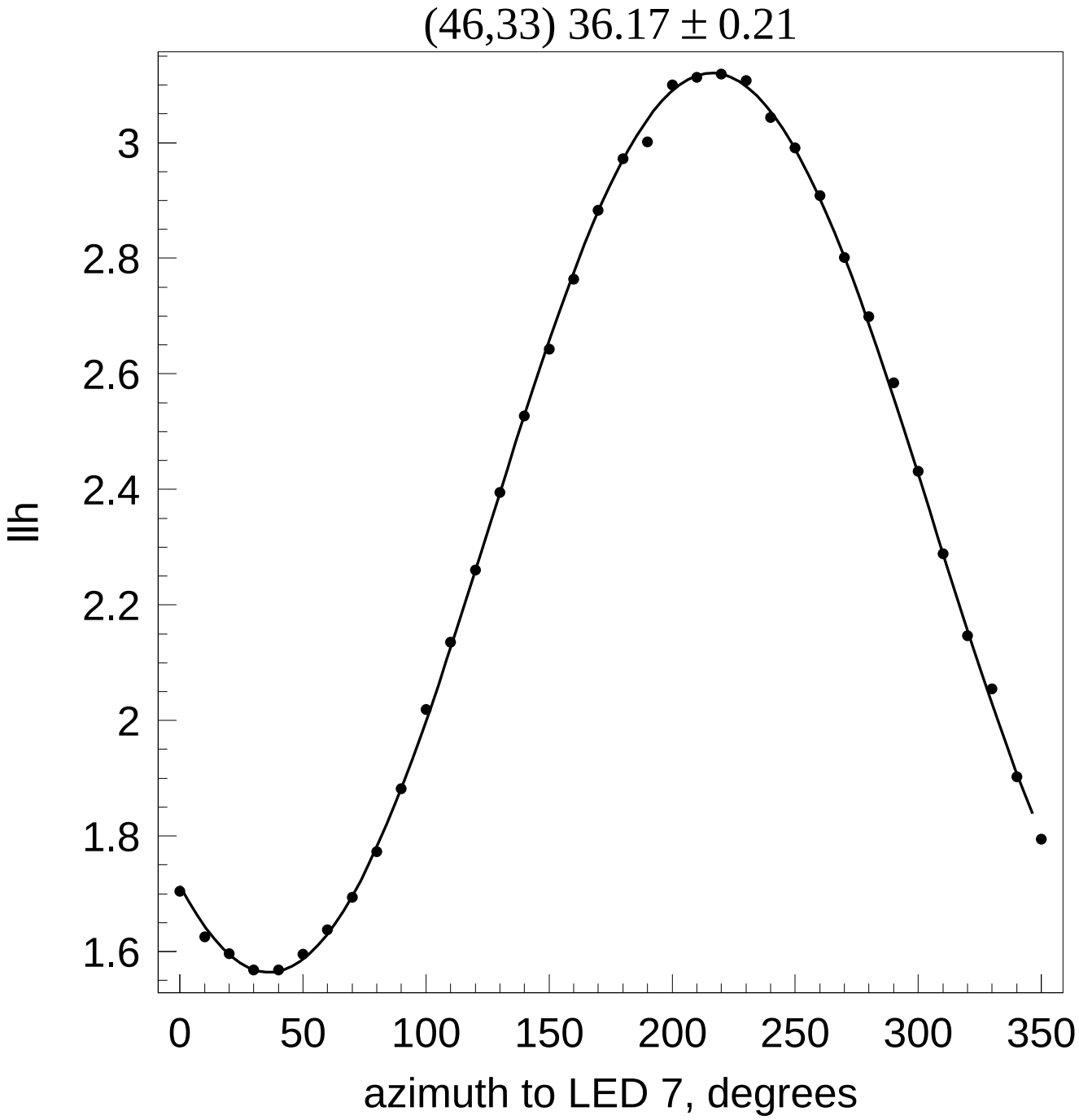

(45,60) 315.23 ± 0.94
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

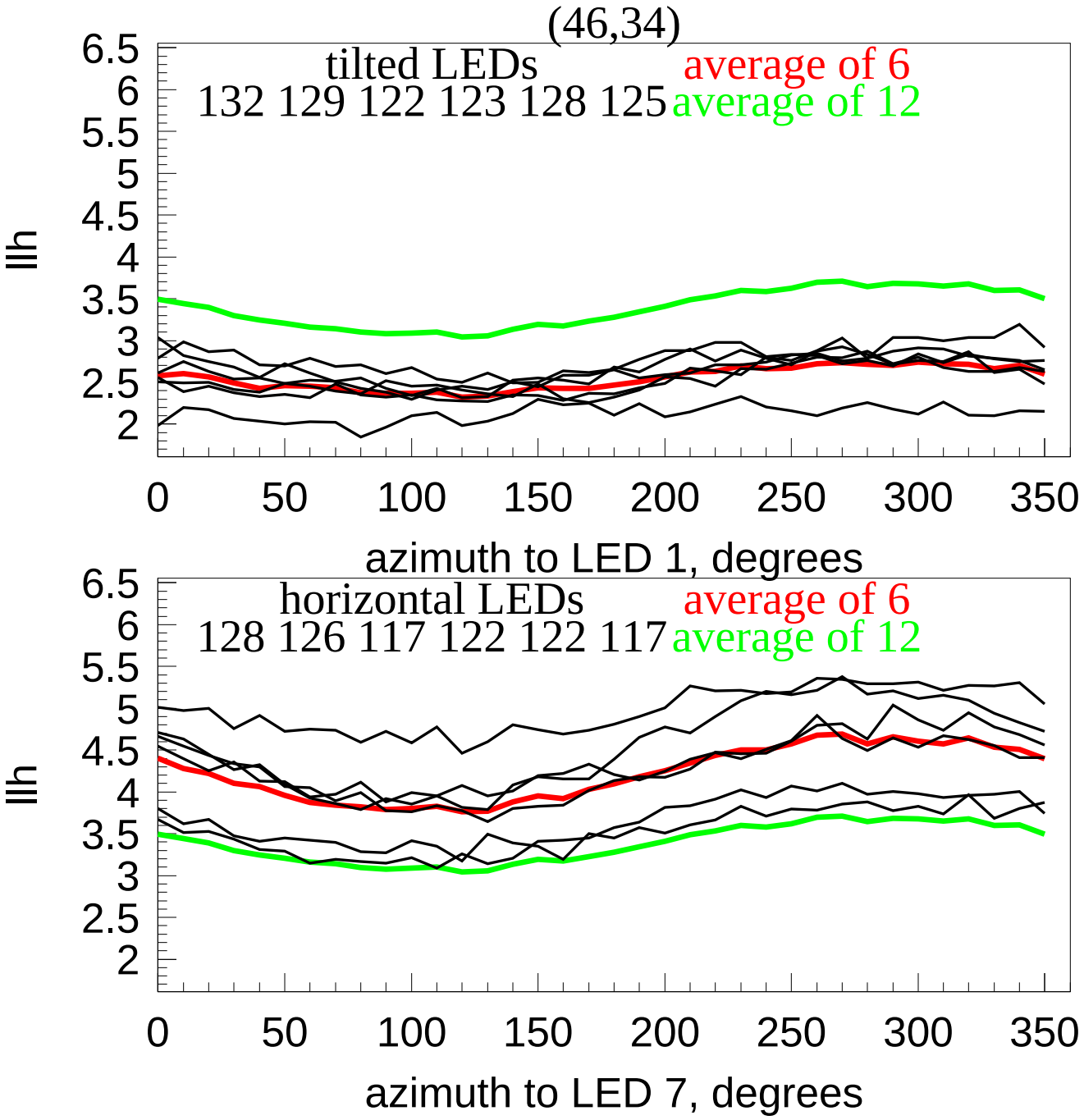

(45,60) 314.38 ± 0.88
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

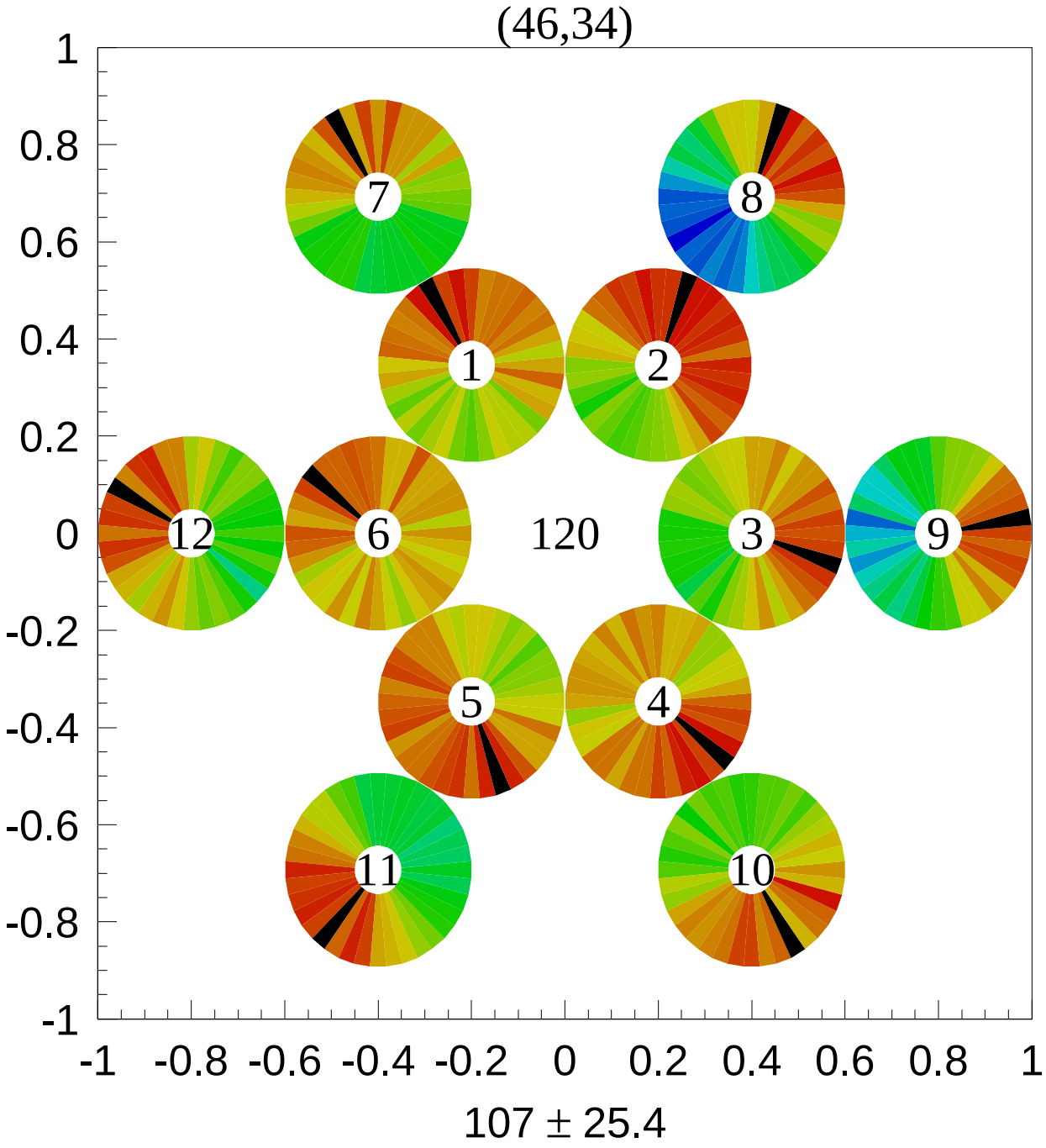

(46,33)
tilted LEDs
122 134 128 122 130 119
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
130 126 126 123 127 122
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

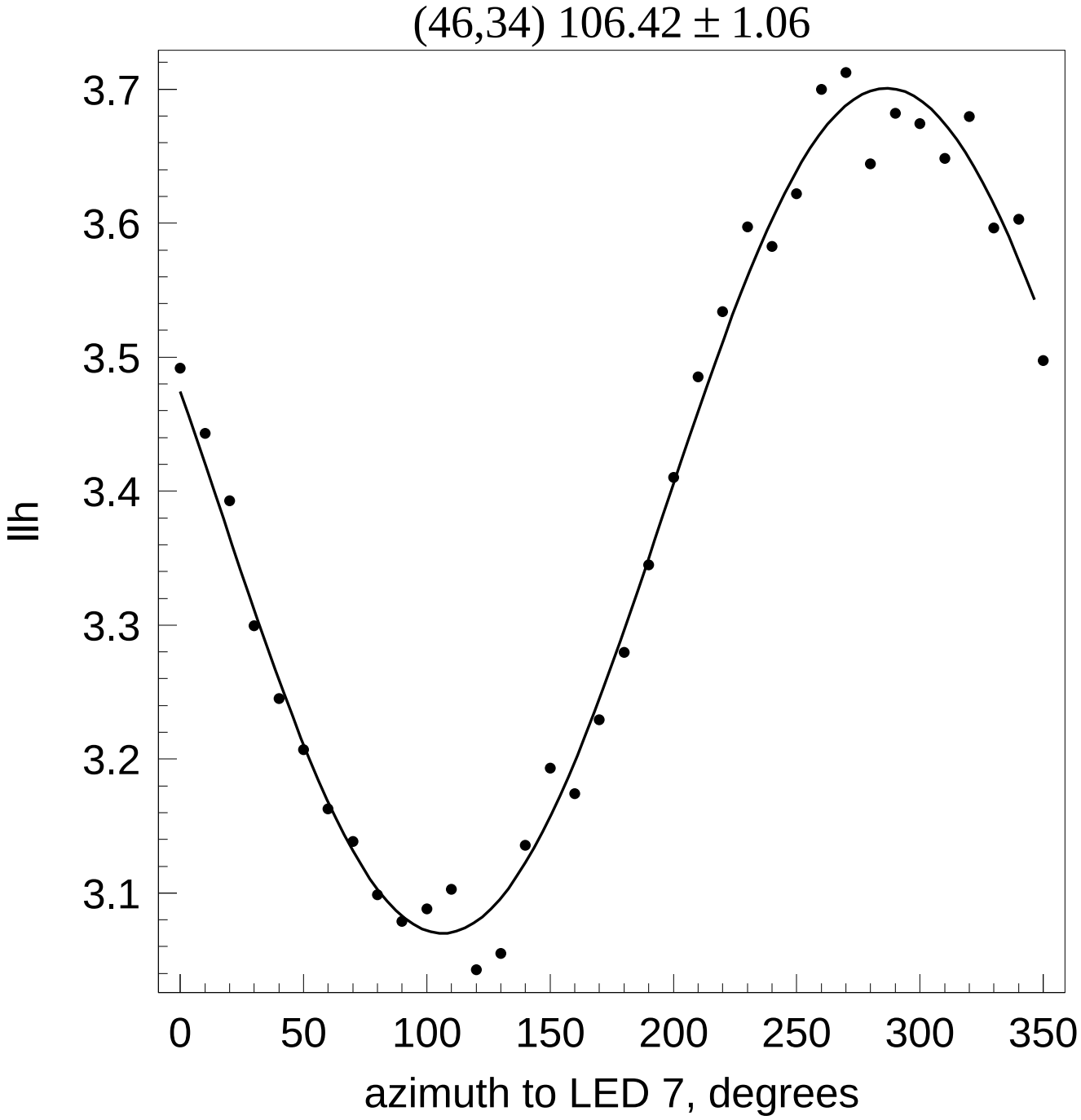

(46,33)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
35.6 ± 7.6

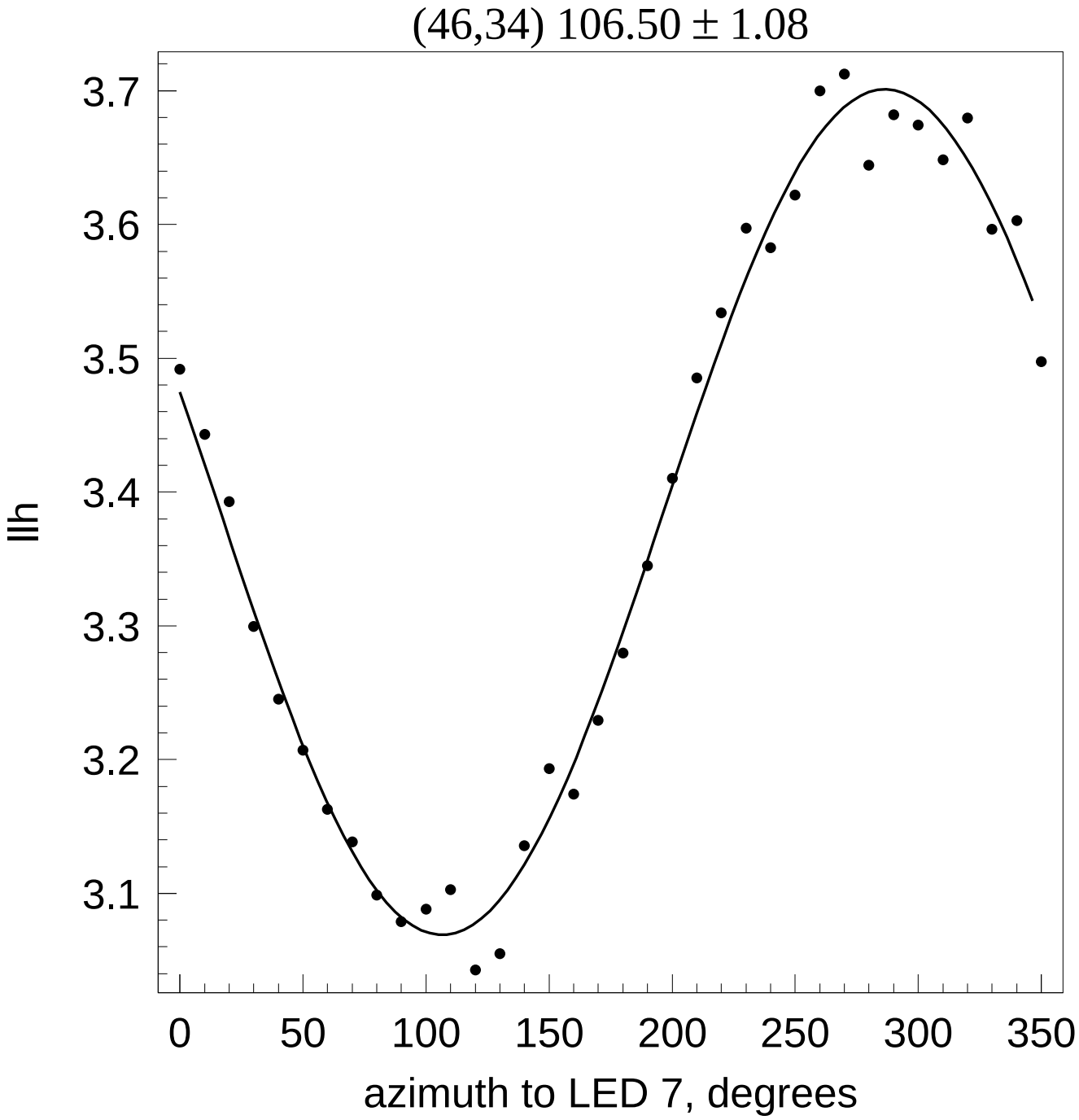

(46,33) 36.35 ± 0.22
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

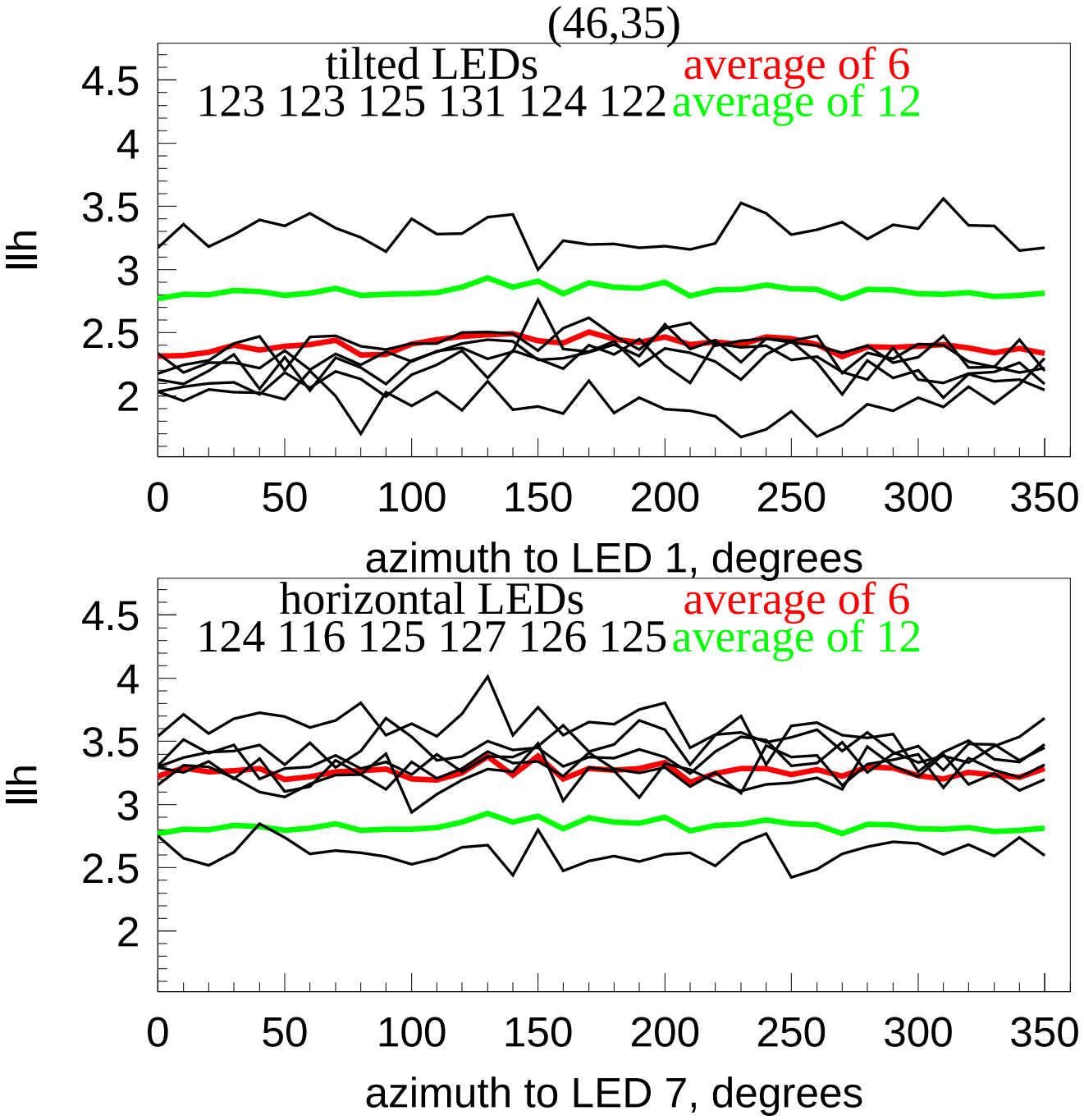

(46,33) 36.17 ± 0.21
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

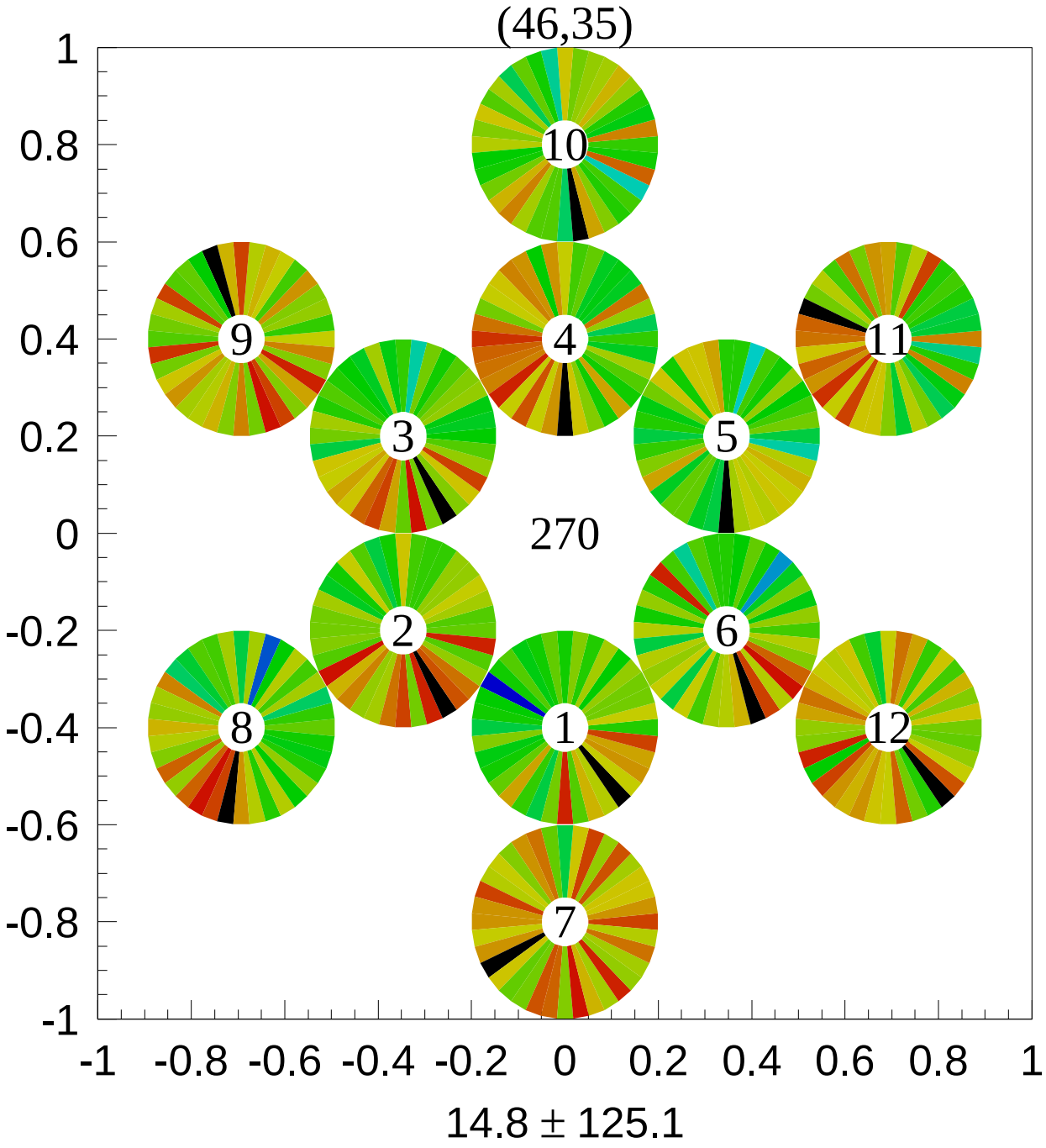

(46,34)
tilted LEDs
132 129 122 123 128 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 126 117 122 122 117
average of 6
average of 12
llh
azimuth to LED 7, degrees

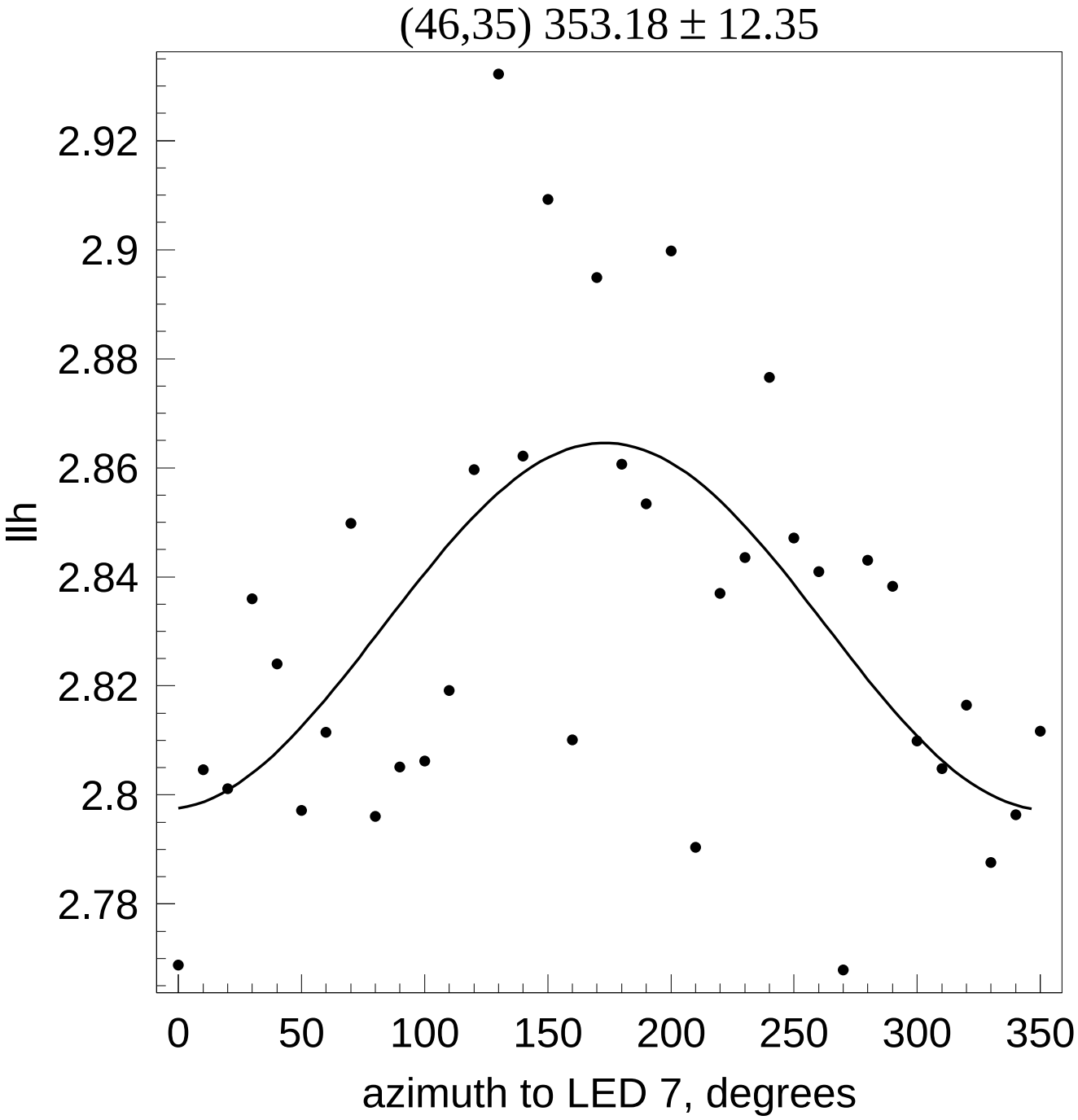

(46,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
107 ± 25.4

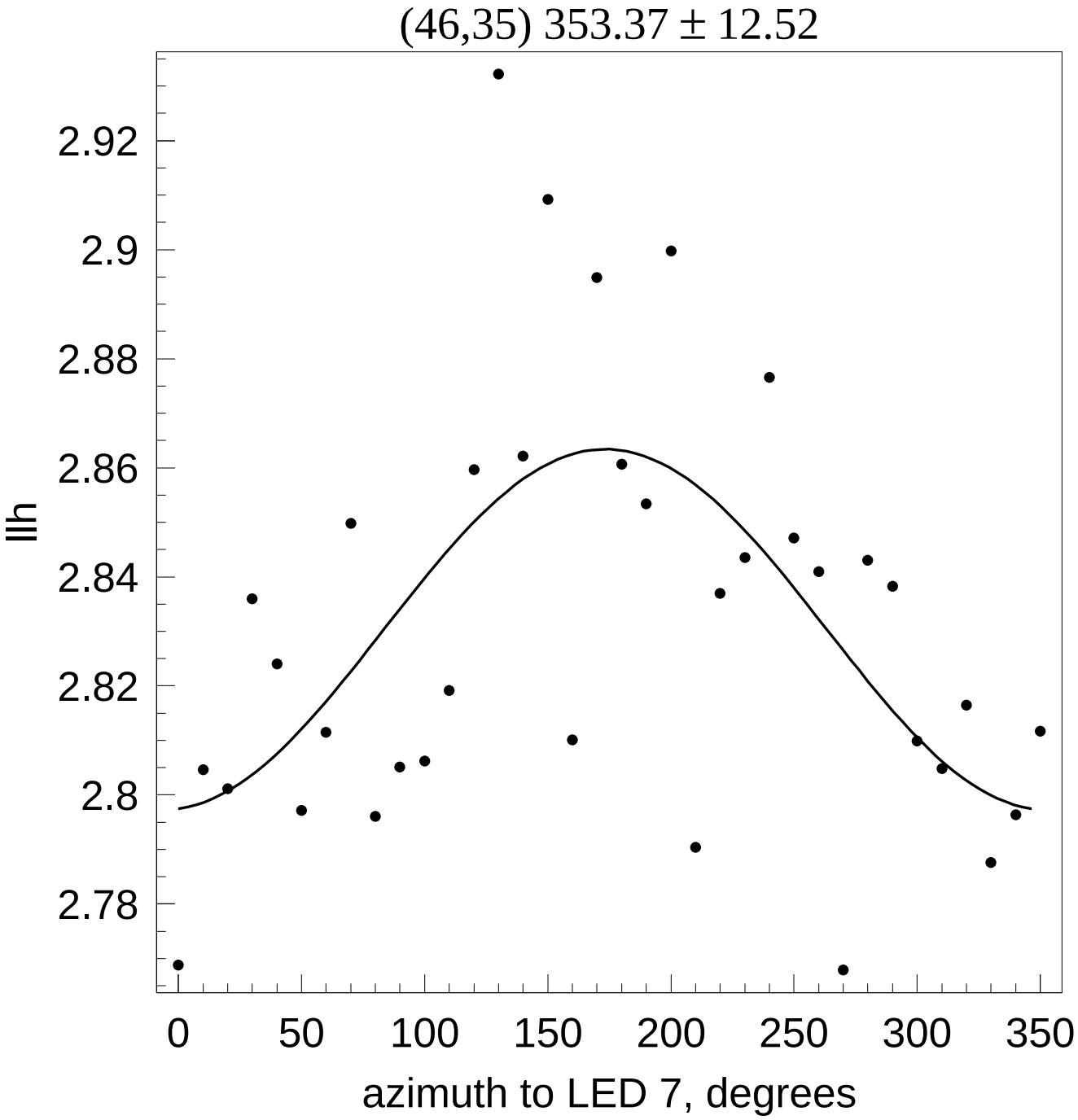

(46,34) 106.42 ± 1.06
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

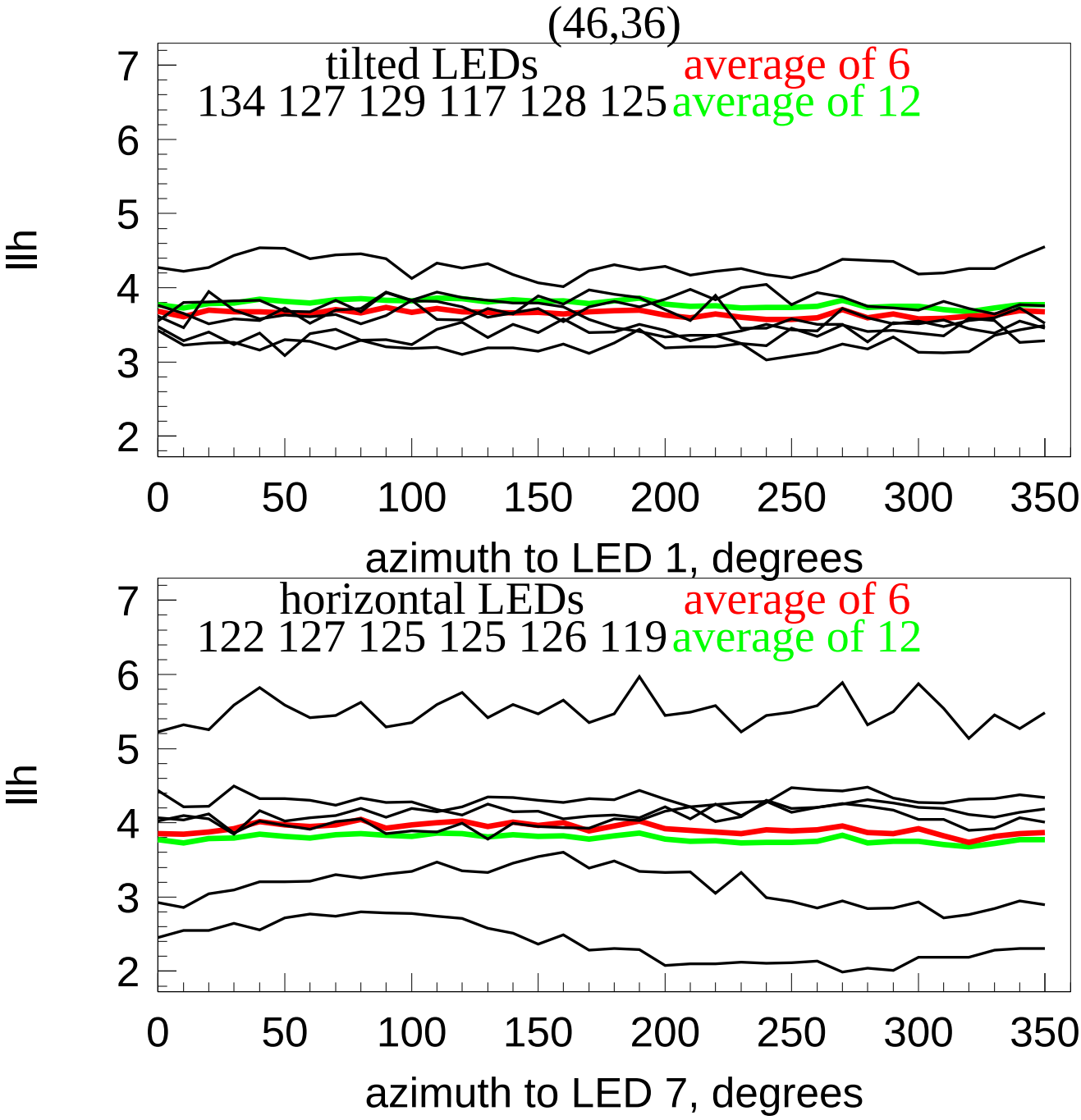

(46,34) 106.50 ± 1.08
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

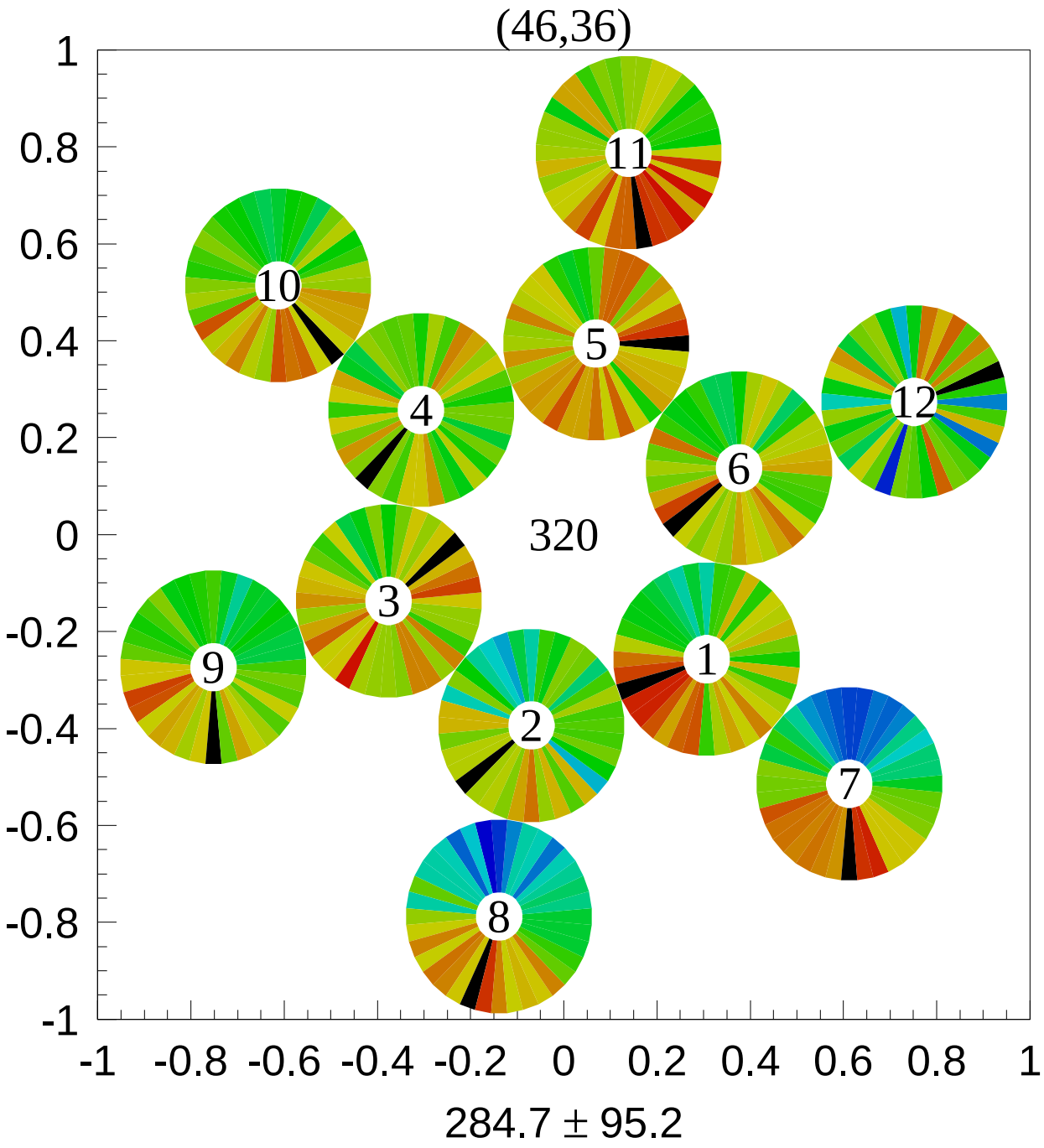

(46,35)
tilted LEDs
123 123 125 131 124 122
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 116 125 127 126 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

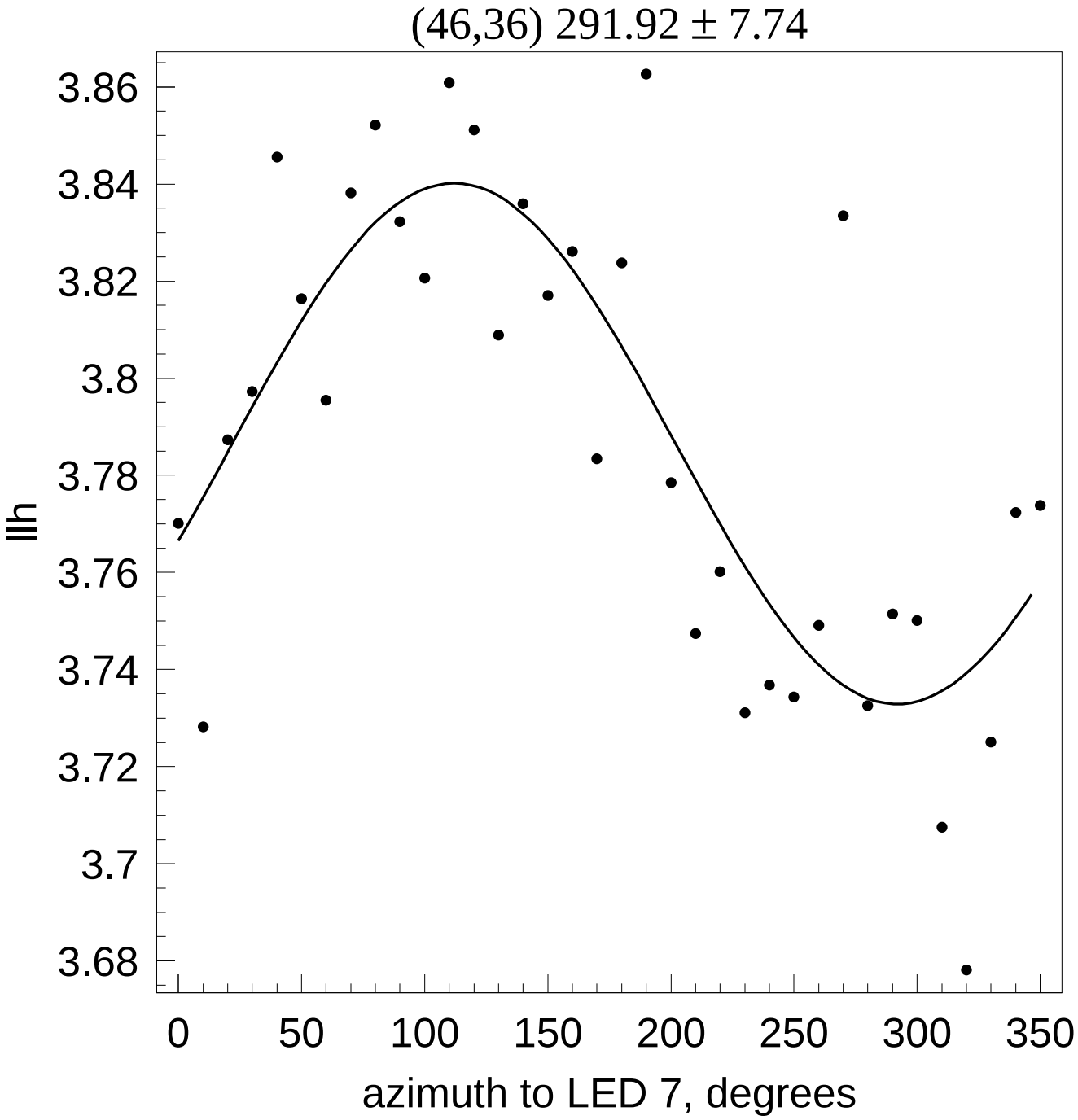

(46,35)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
14.8 ± 125.1

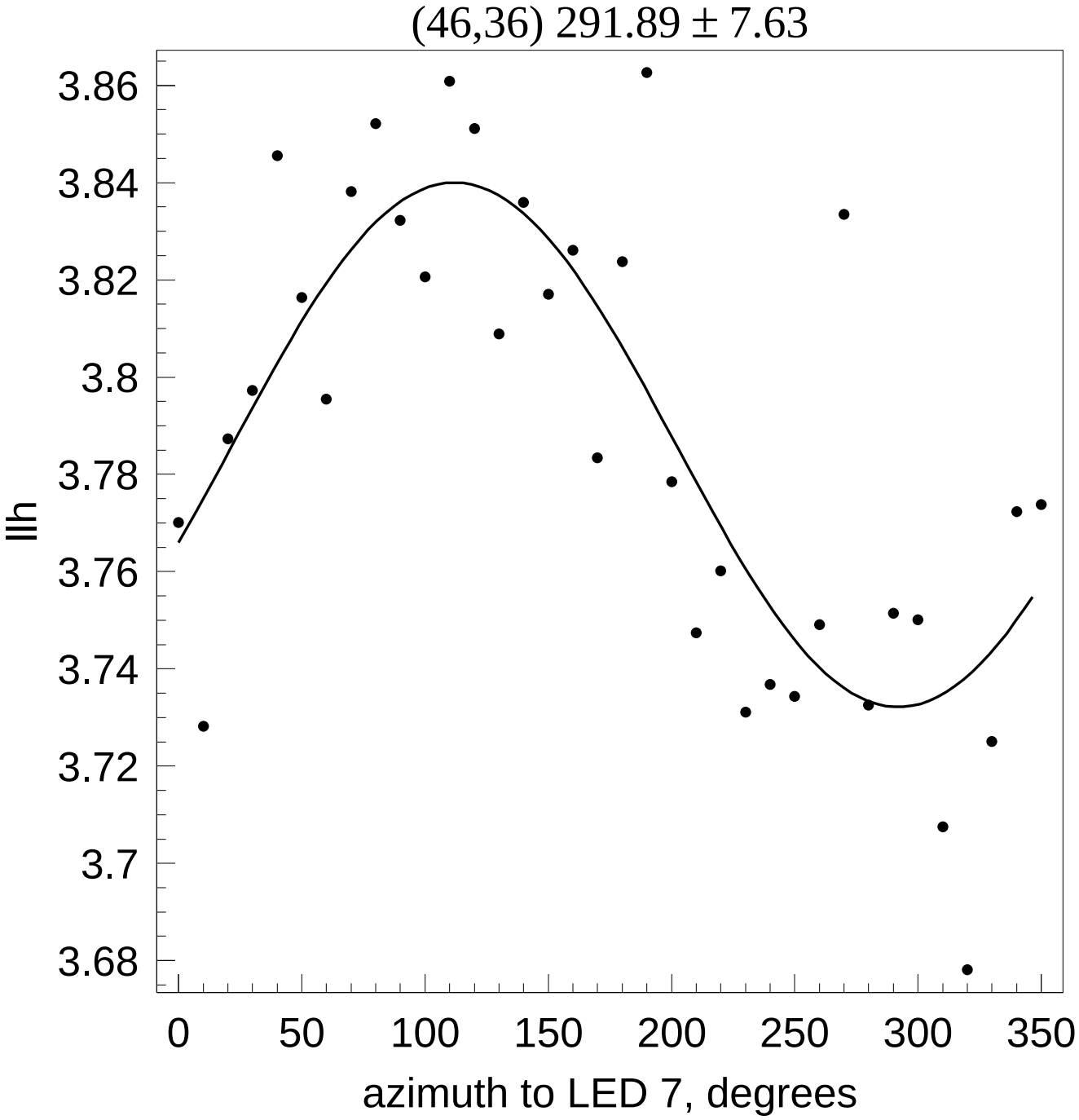

(46,35) 353.18 ± 12.35
llh
2.92
2.9
2.88
2.86
2.84
2.82
2.8
2.78
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

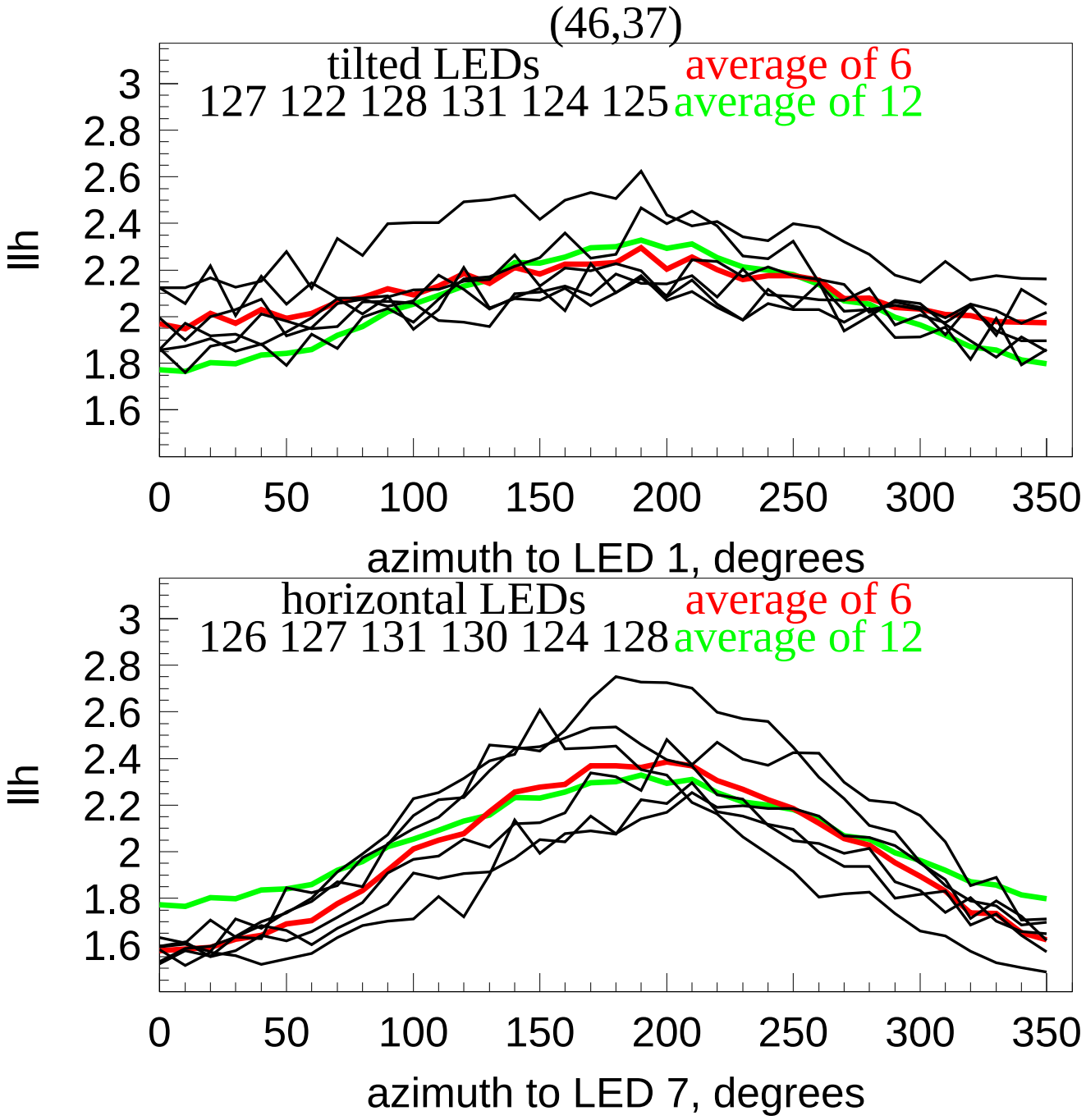

(46,35) 353.37 ± 12.52
2.92
2.9
2.88
2.86
2.84
2.82
2.8
2.78
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

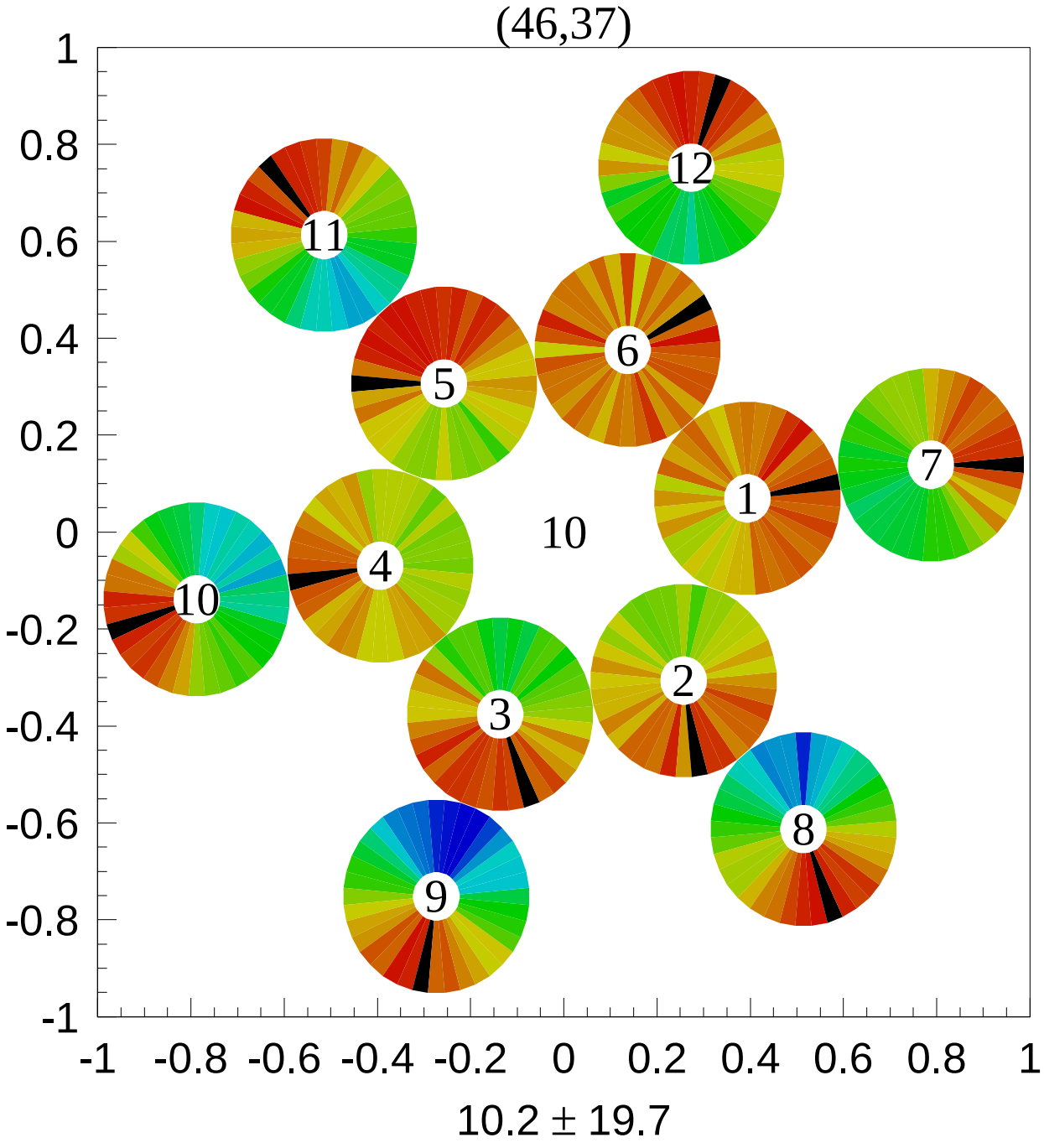

(46,36)
tilted LEDs
134 127 129 117 128 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 127 125 125 126 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

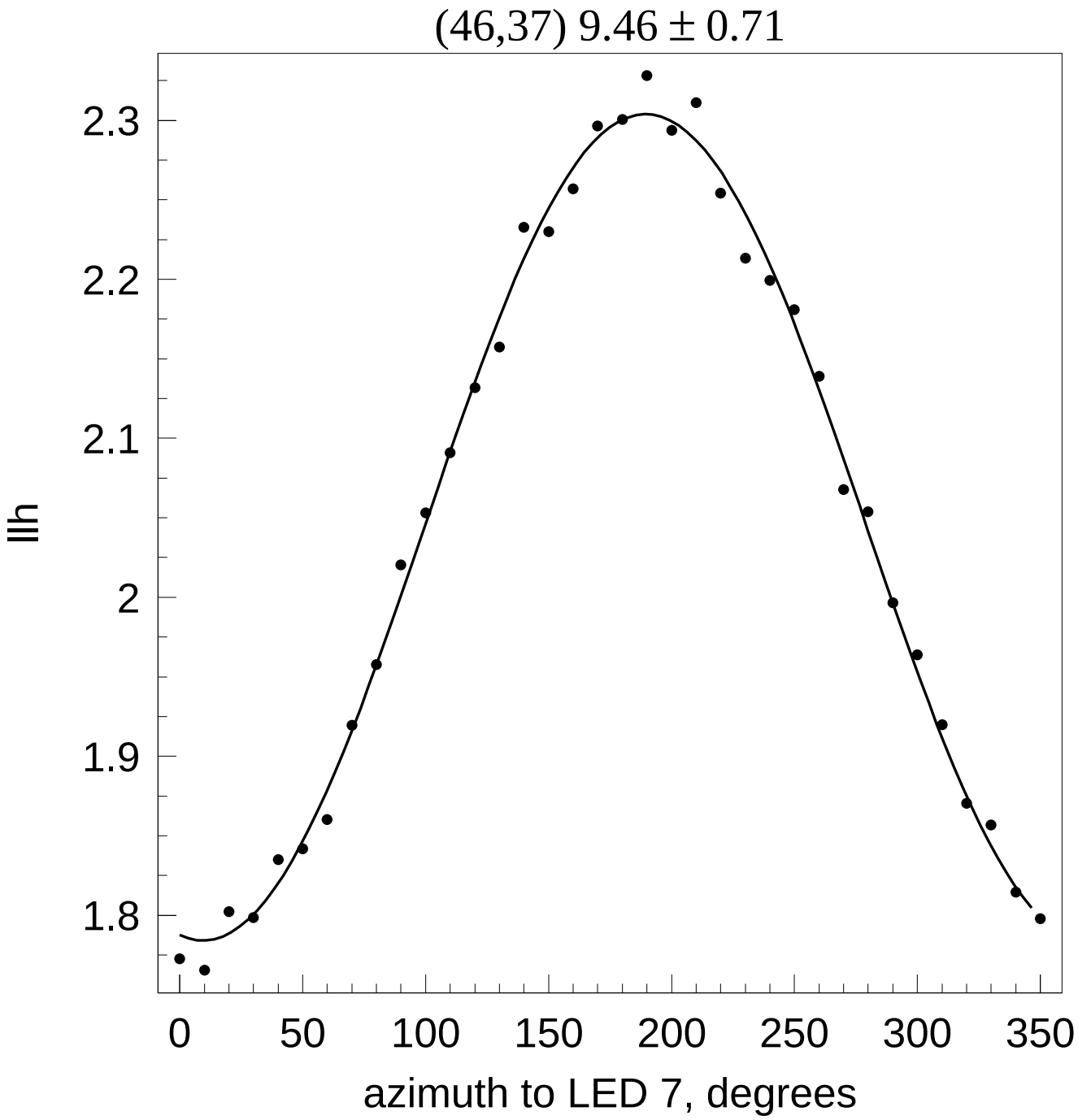

(46,36)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
284.7 ± 95.2

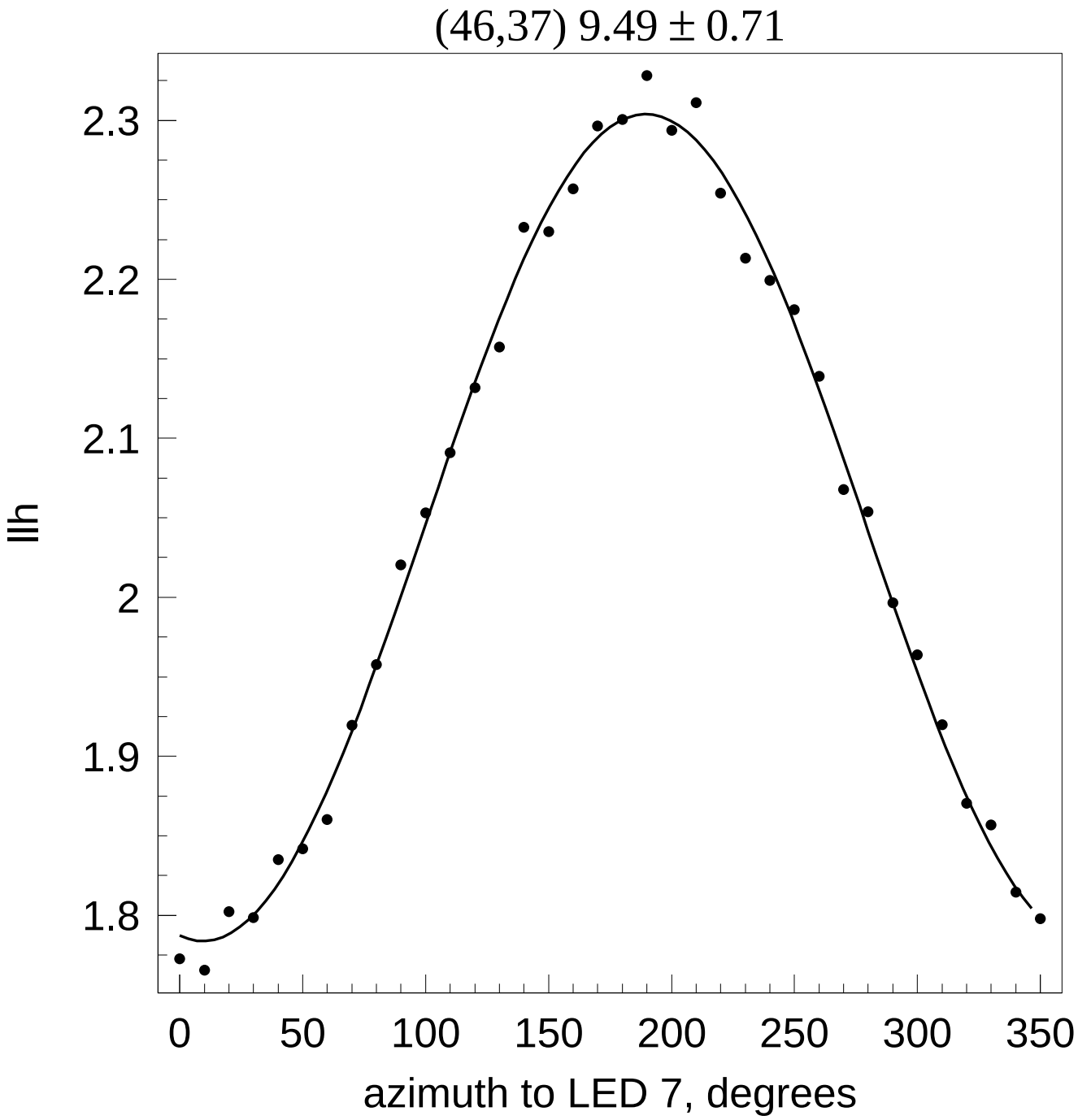

(46,36) 291.92 ± 7.74
3.86
3.84
3.82
3.8
3.78
3.76
3.74
3.72
3.7
3.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

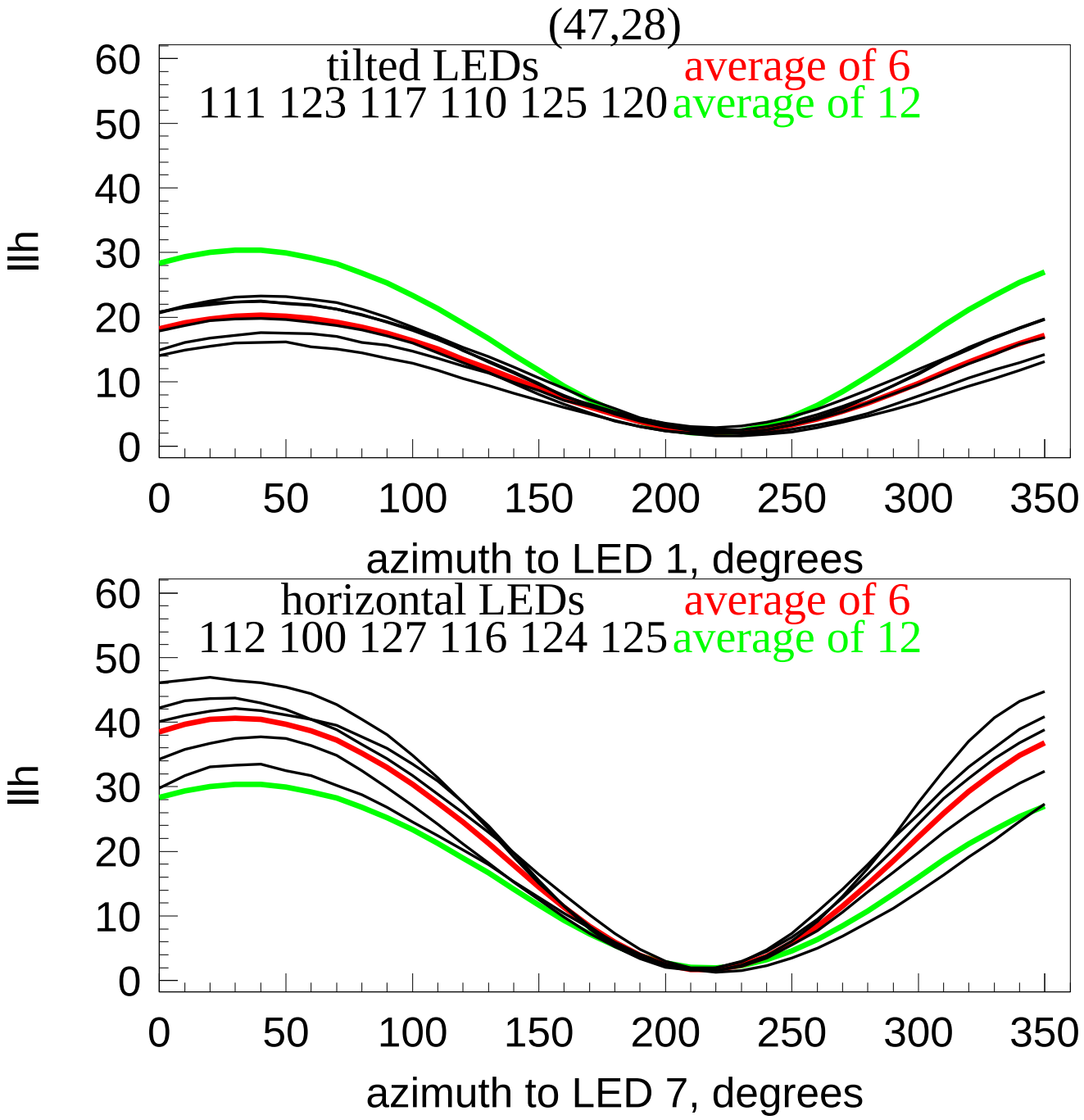

(46,36) 291.89 ± 7.63
3.86
3.84
3.82
3.8
3.78
3.76
3.74
3.72
3.7
3.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

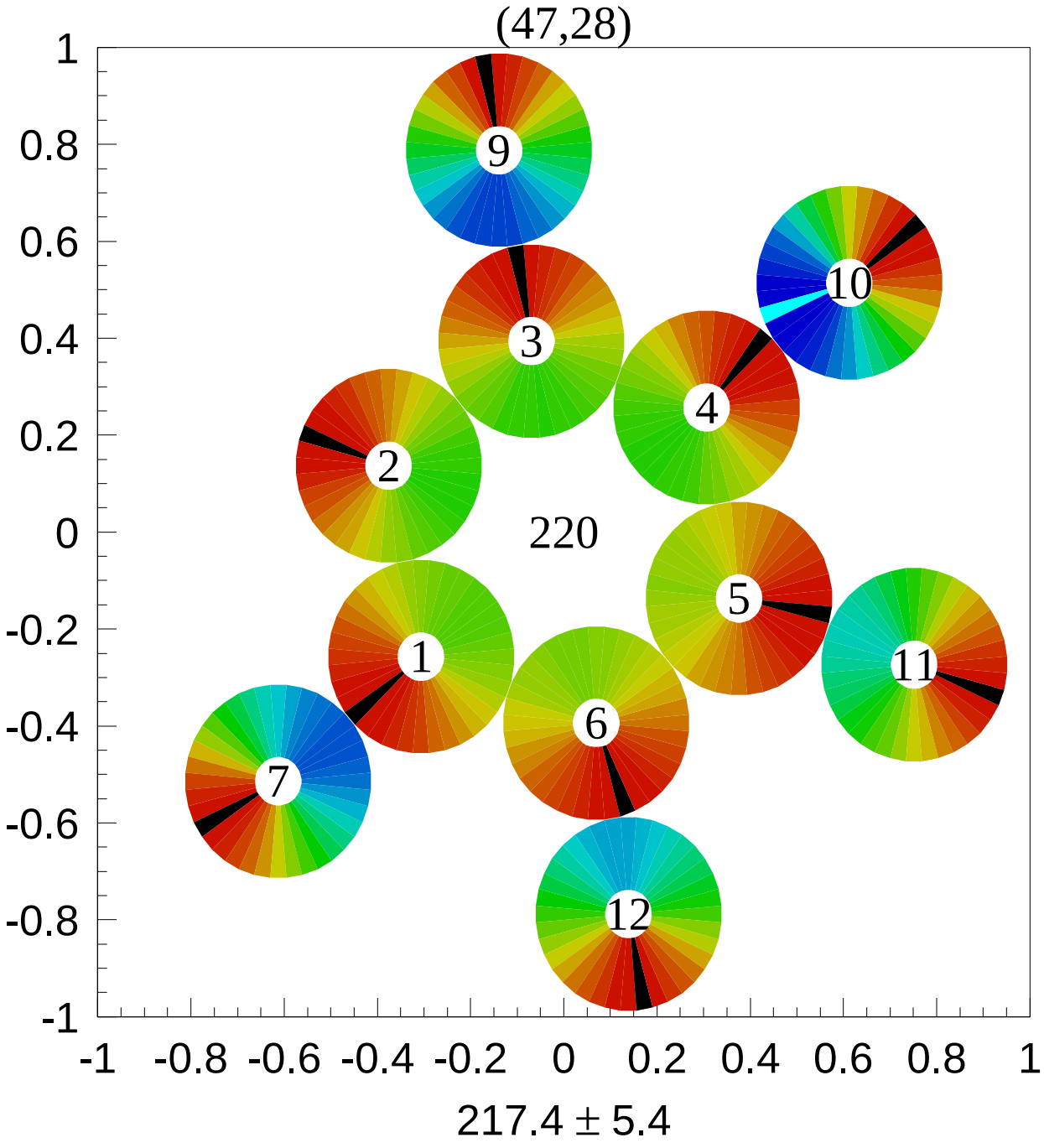

(46,37)
tilted LEDs
127 122 128 131 124 125
average of 6
average of 12
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 127 131 130 124 128
average of 6
average of 12
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

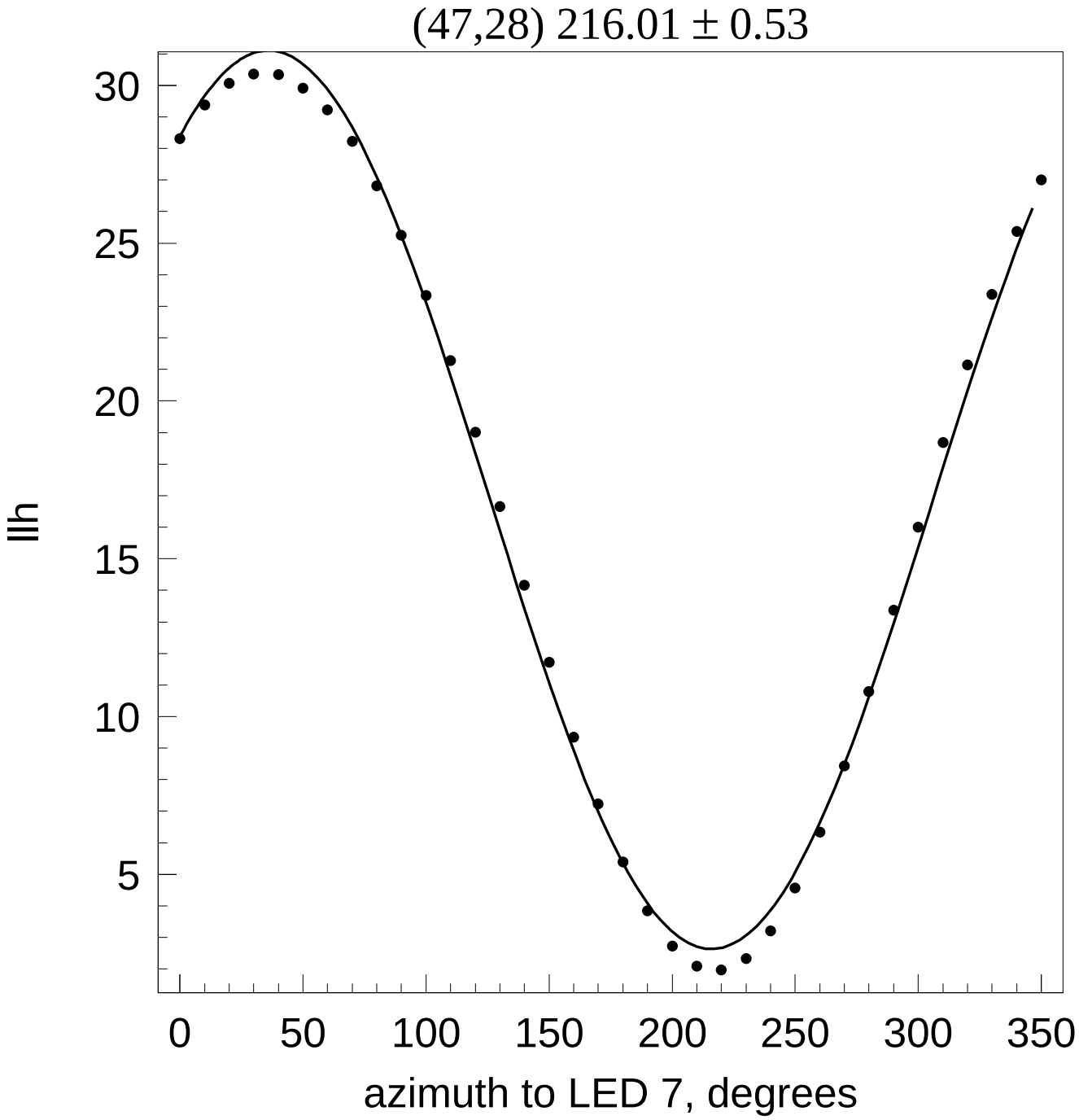

(46,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10.2 ± 19.7
12
11
6
5
7
1
10
4
10
2
3
8
9

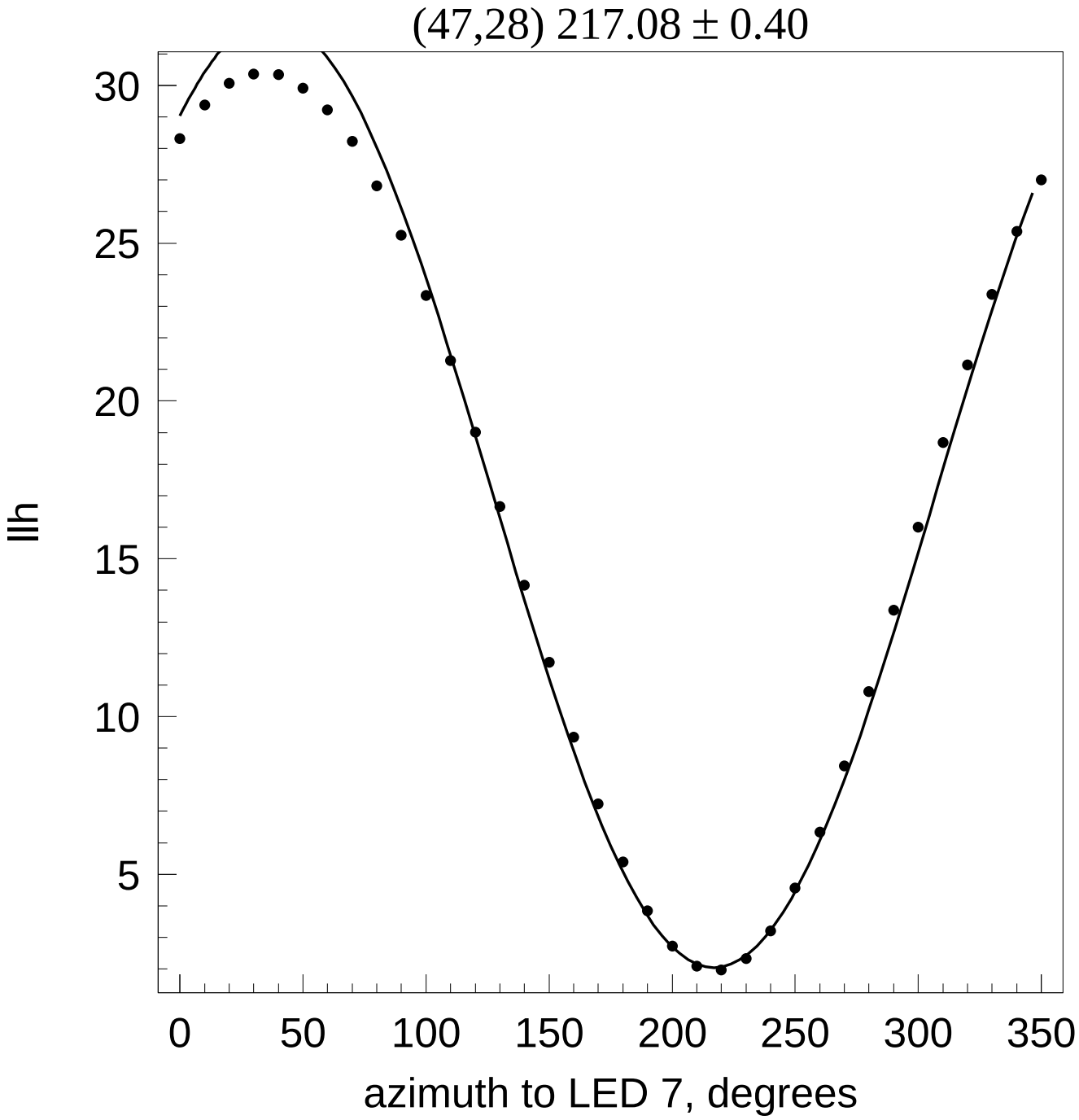

(46,37) 9.46 ± 0.71
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

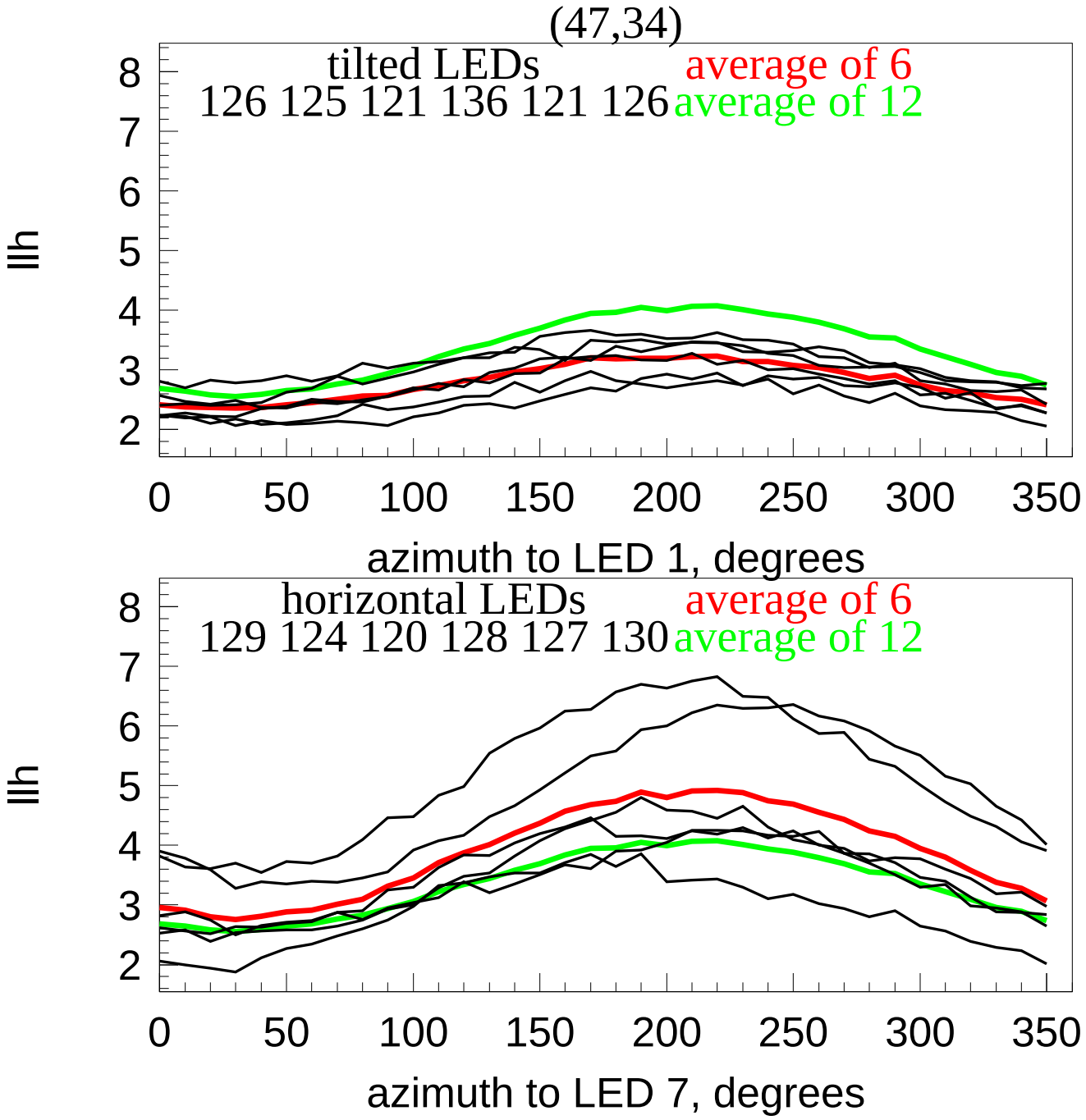

(46,37) 9.49 ± 0.71
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

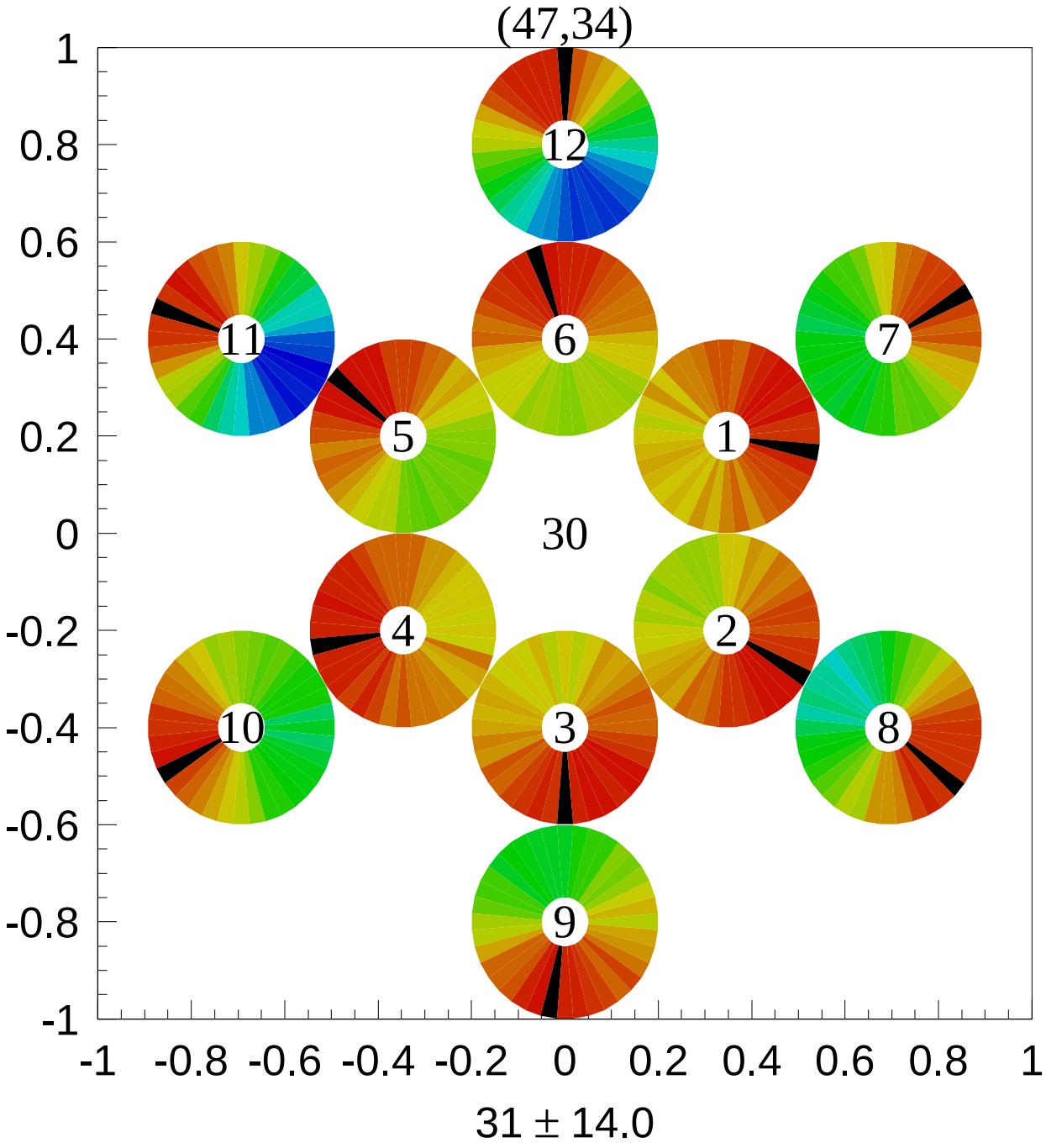

(47,28)
tilted LEDs
111 123 117 110 125 120
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
112 100 127 116 124 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

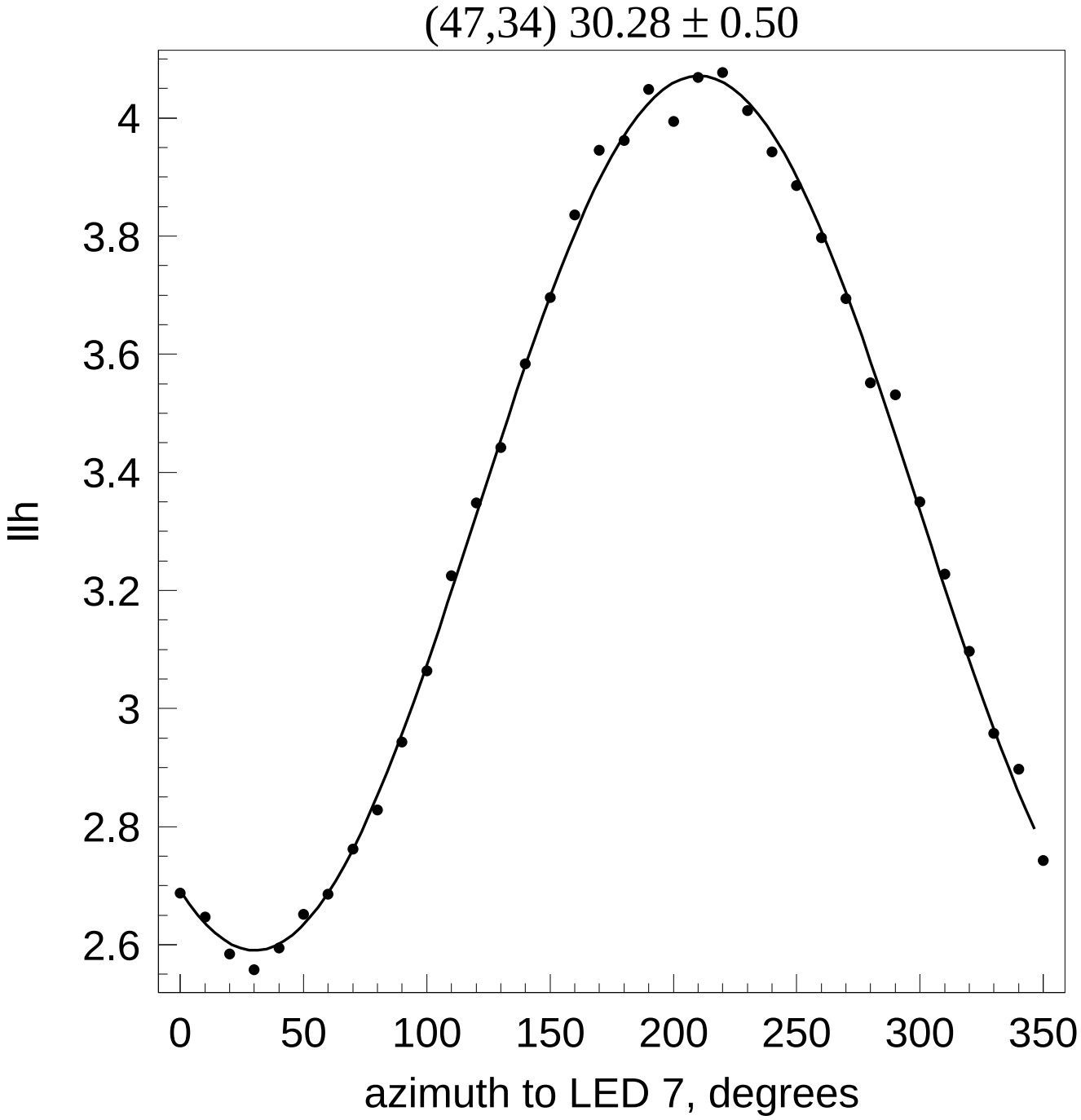

(47,28)
9
10
3
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
217.4 ± 5.4

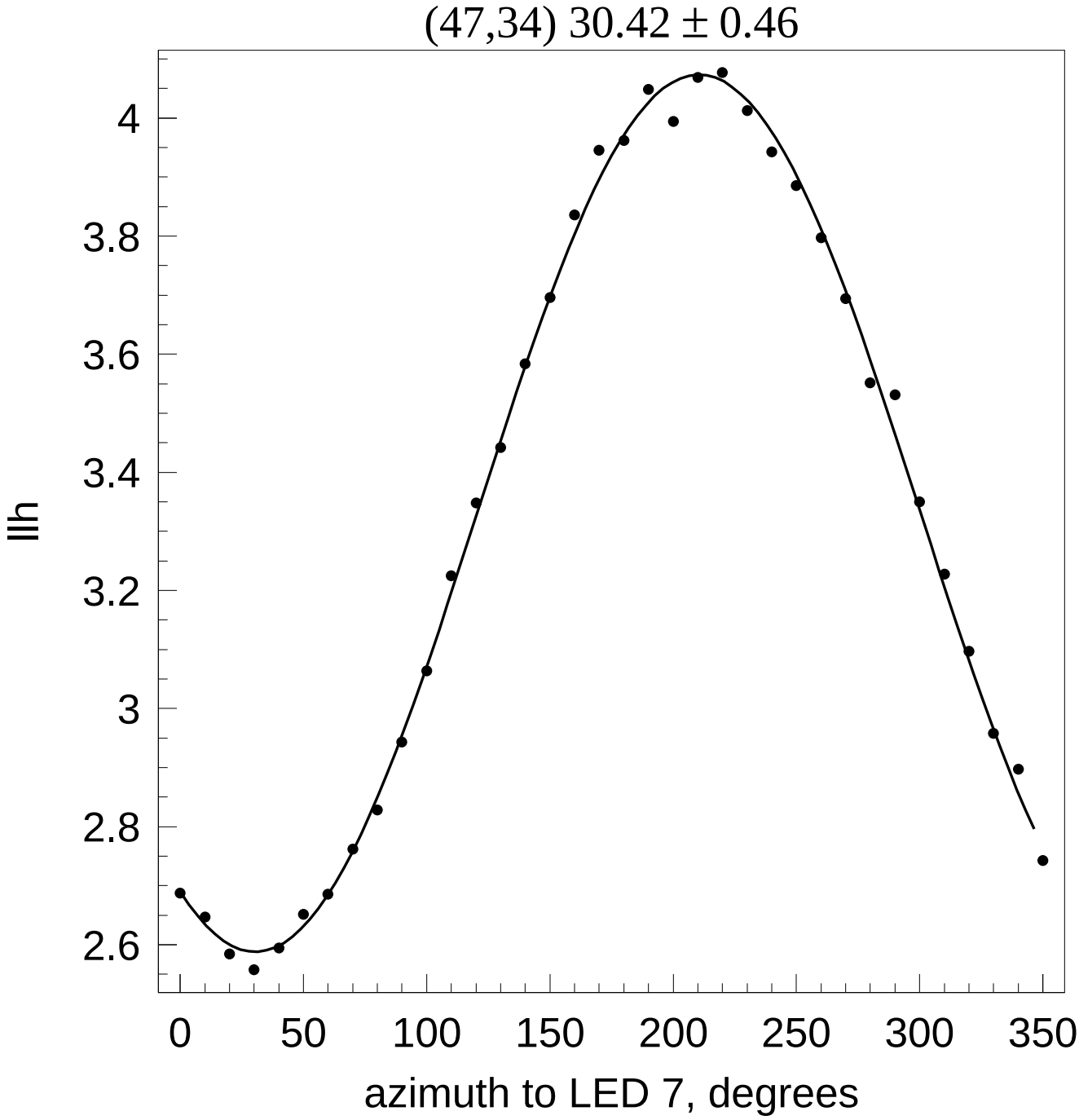

(47,28) 216.01 ± 0.53
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

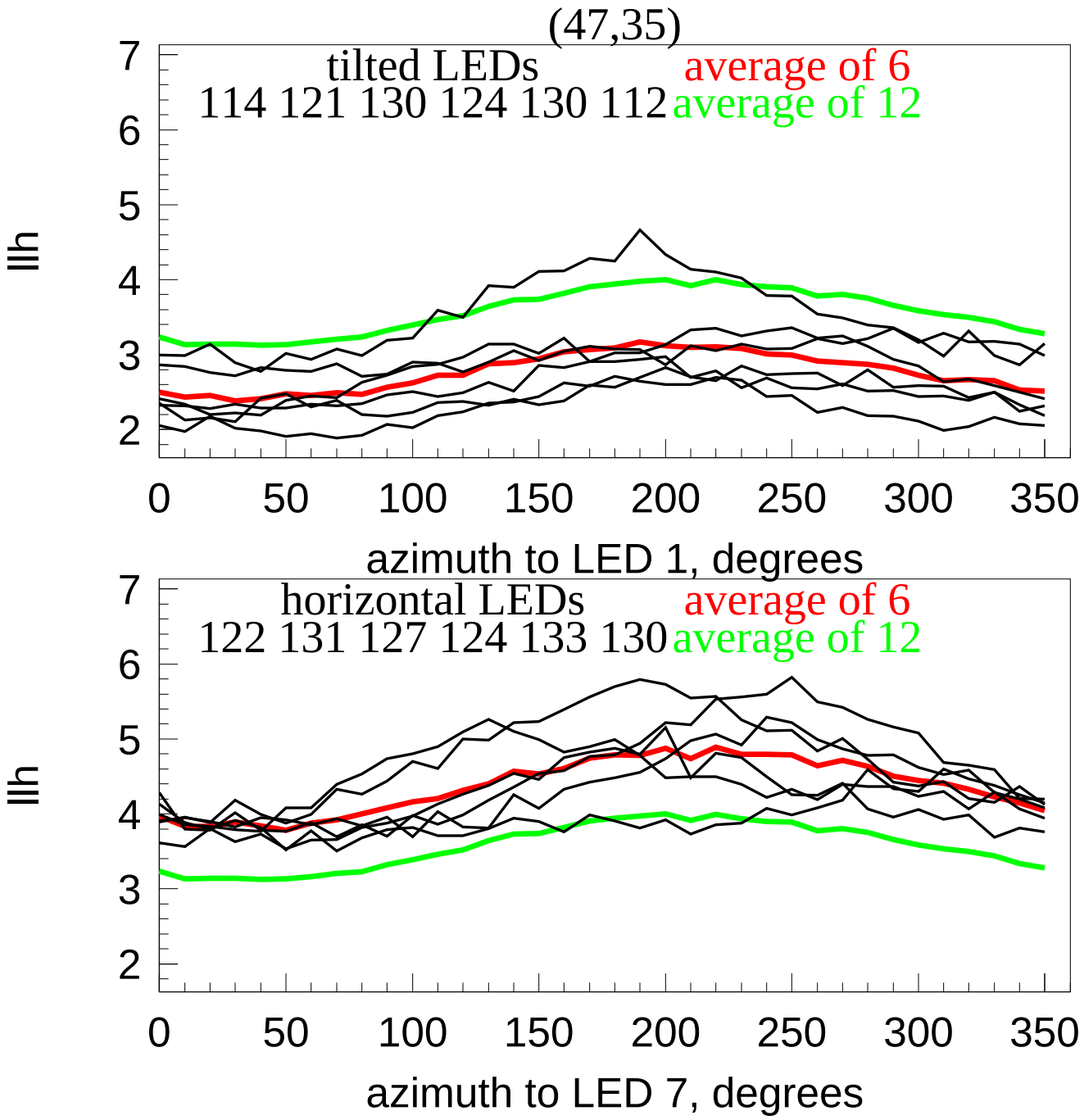

(47,28) 217.08 ± 0.40
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

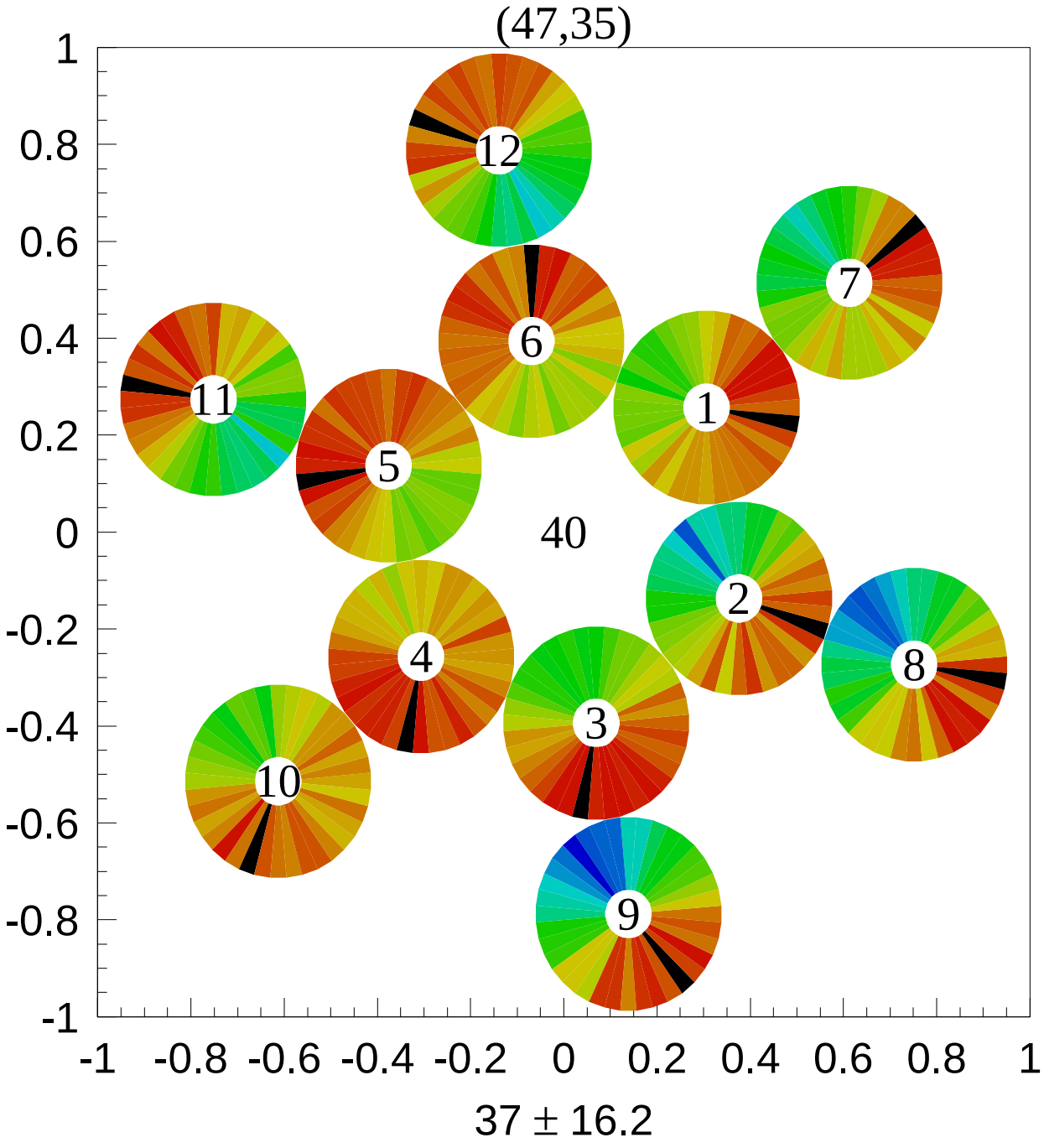

(47,34)
tilted LEDs
126 125 121 136 121 126
average of 6
average of 12
Ilh
8
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 124 120 128 127 130
average of 6
average of 12
Ilh
8
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

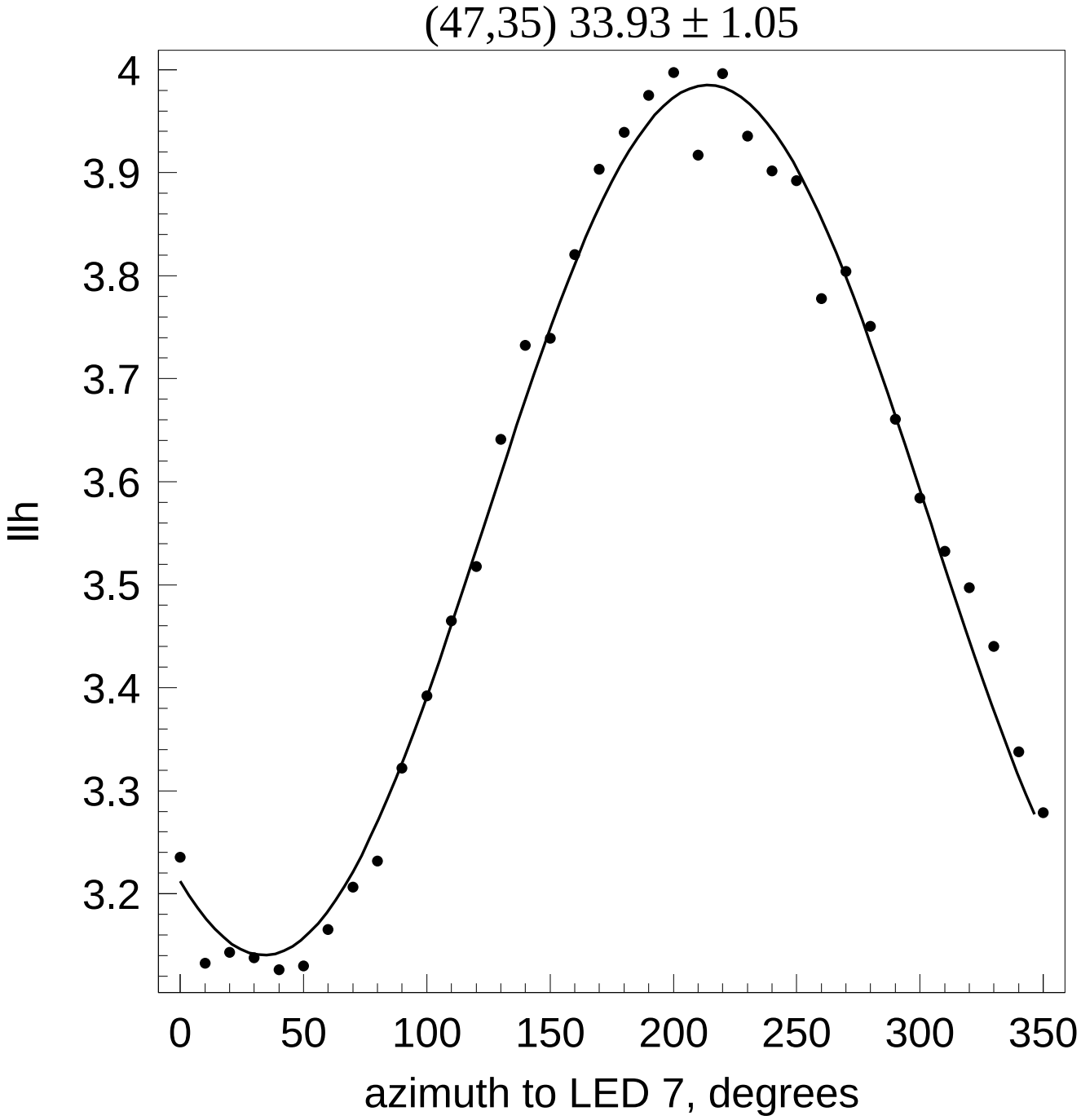

(47,34)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
31 ± 14.0

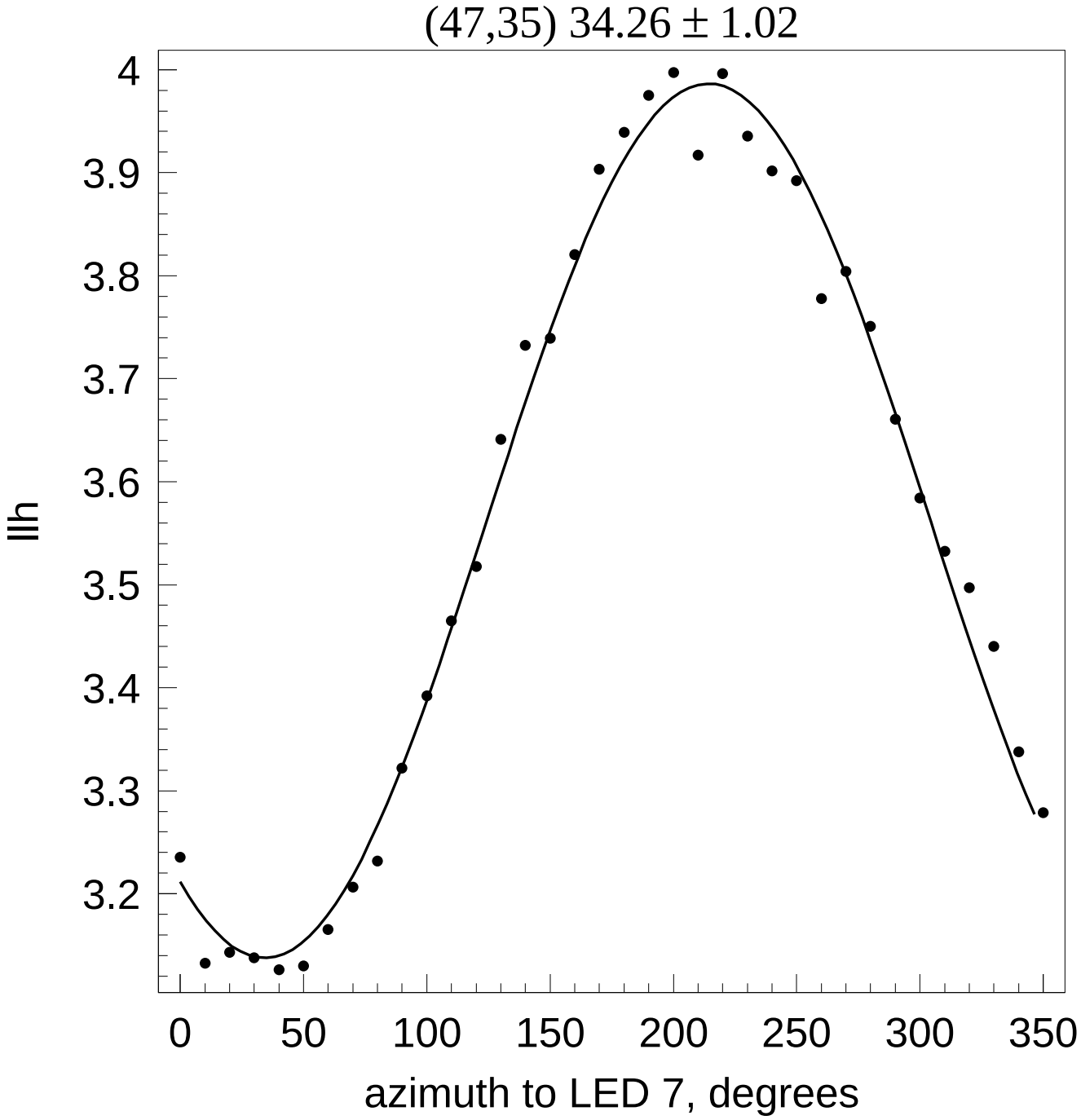

(47,34) 30.28 ± 0.50
llh
4
3.8
3.6
3.4
3.2
3
2.8
2.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

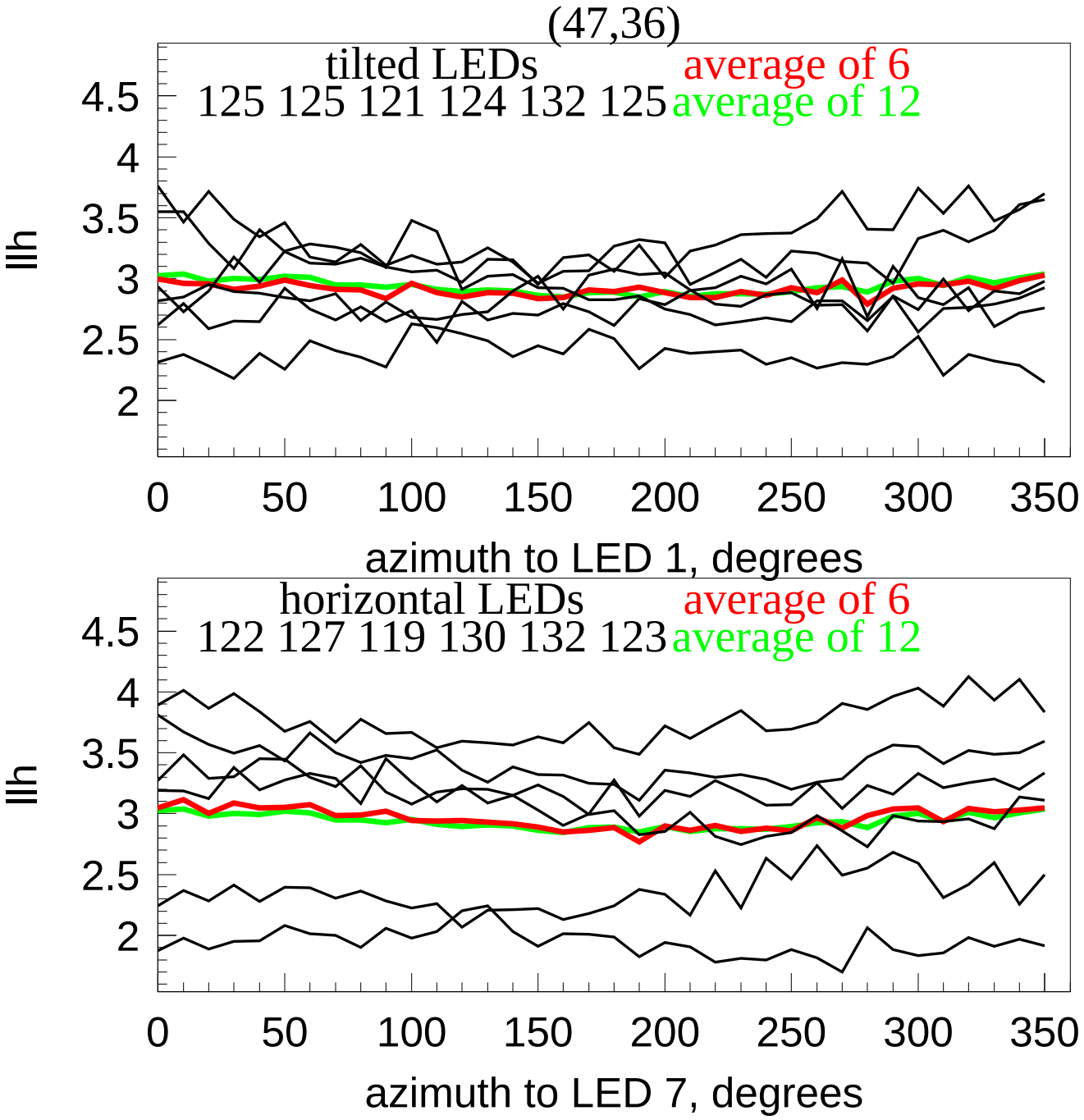

(47,34) 30.42 ± 0.46
llh
4
3.8
3.6
3.4
3.2
3
2.8
2.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

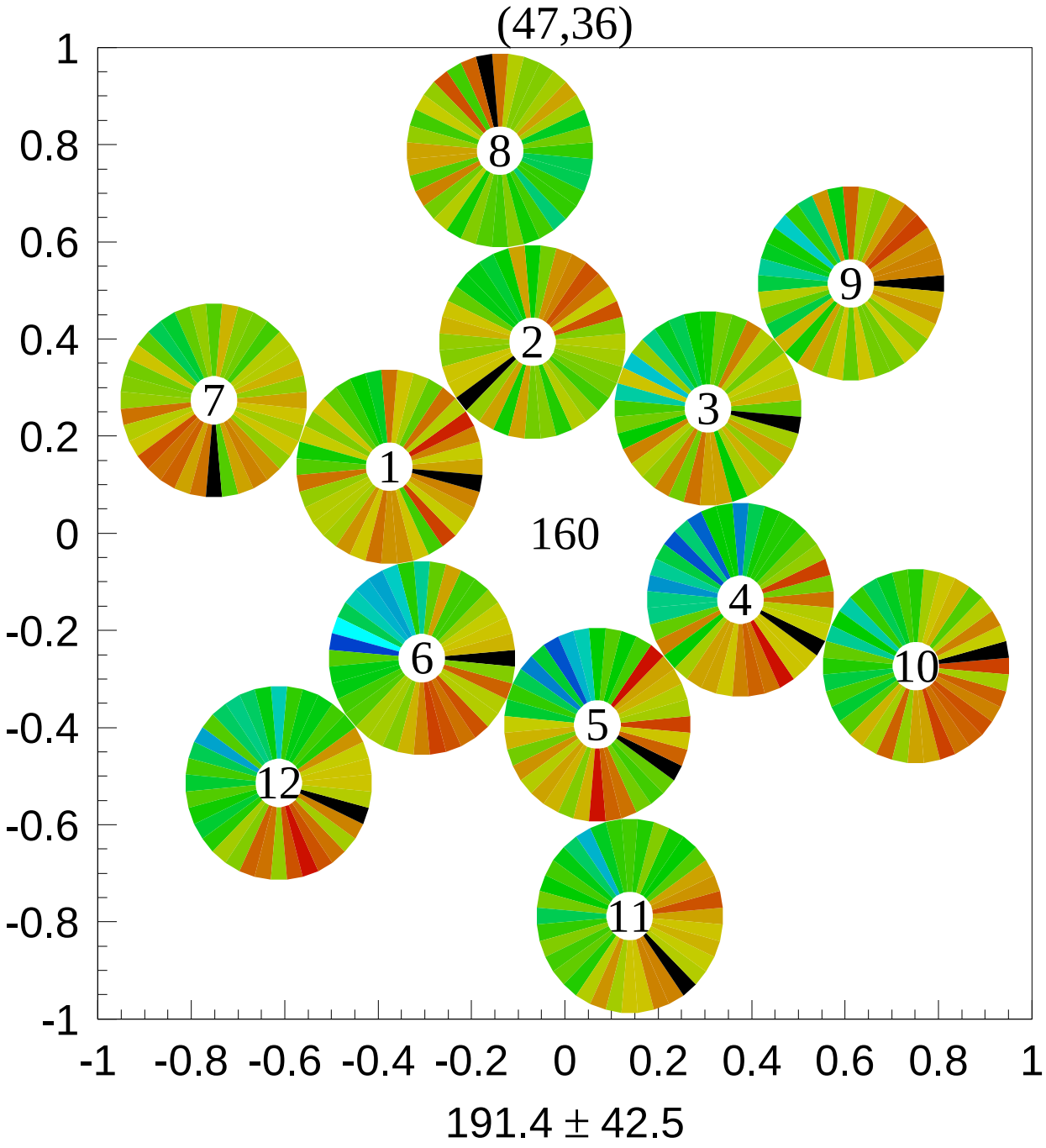

(47,35)
tilted LEDs
114 121 130 124 130 112
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 131 127 124 133 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

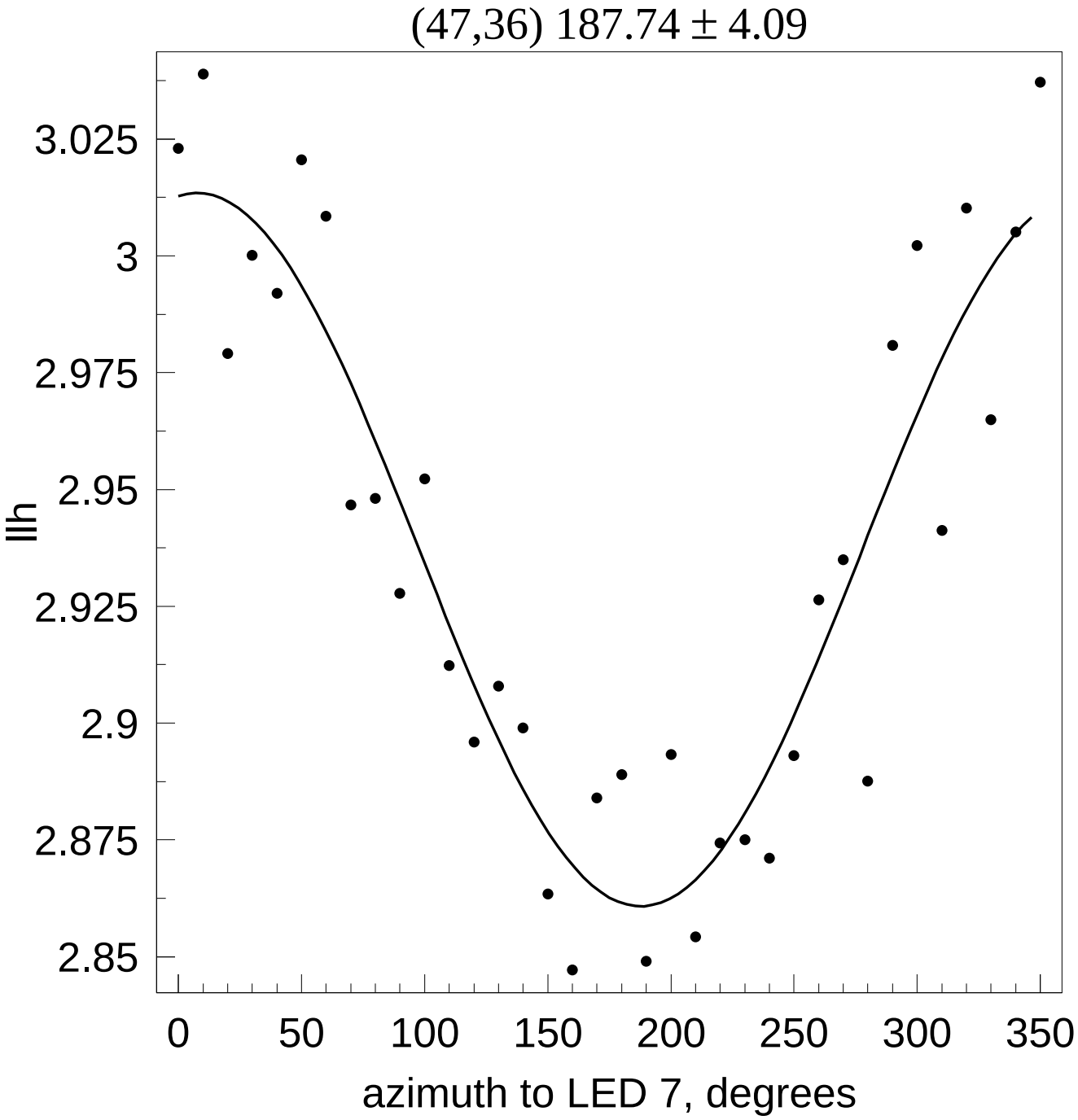

(47,35)
12
7
6
11
1
5
40
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
37 ± 16.2

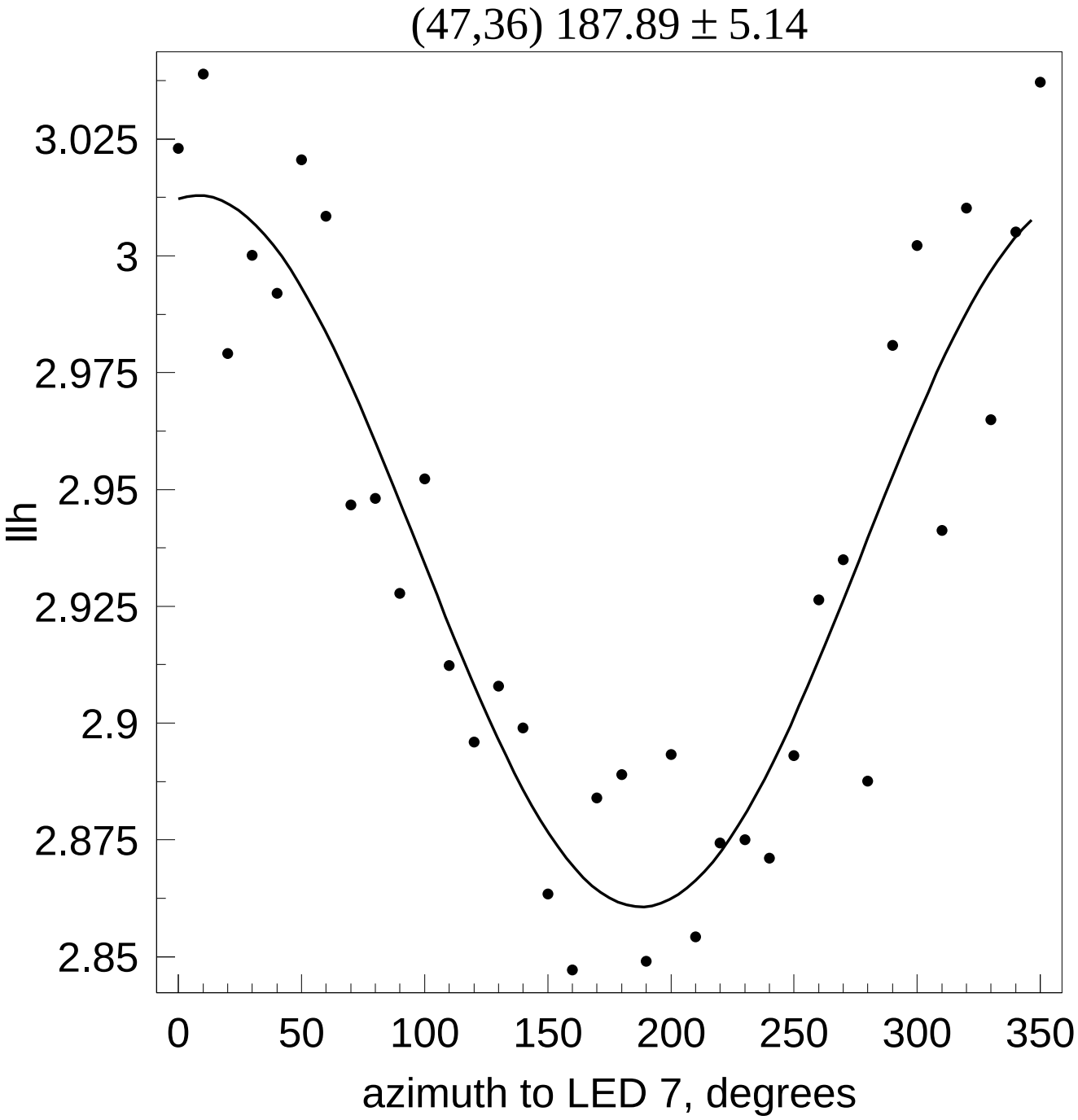

(47,35) 33.93 ± 1.05
llh
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

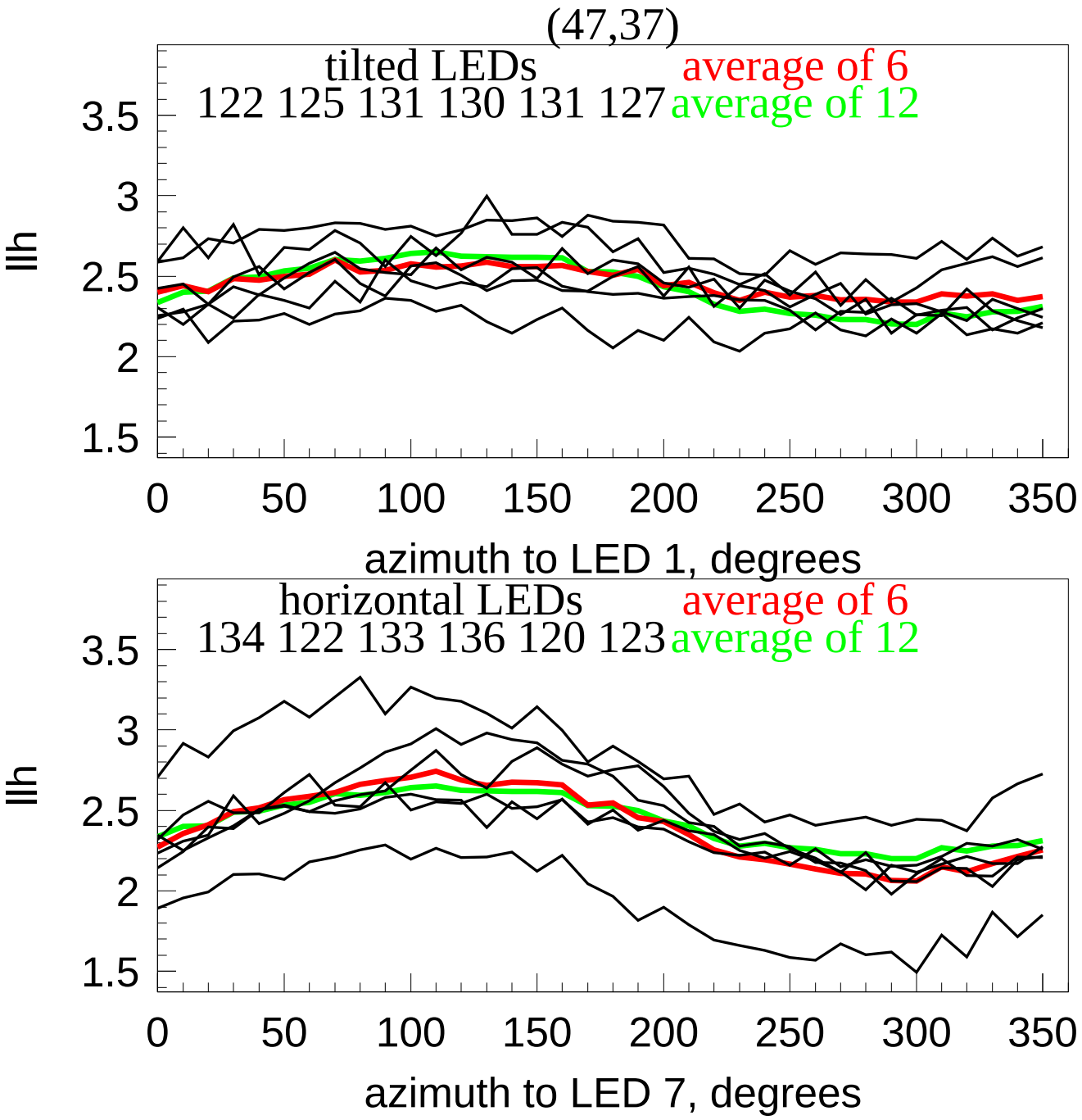

(47,35) 34.26 ± 1.02
llh
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

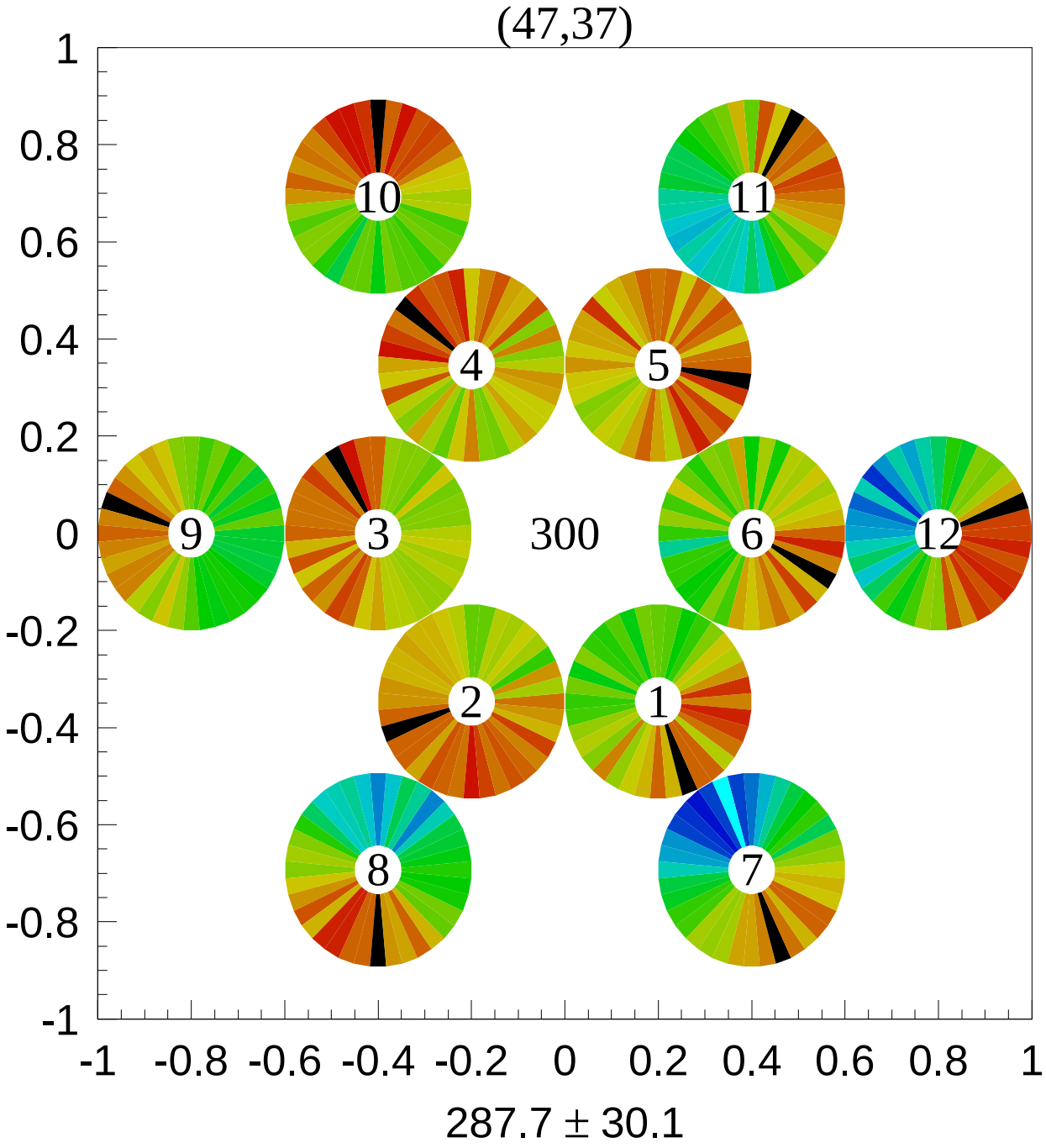

(47,36)
tilted LEDs
125 125 121 124 132 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 127 119 130 132 123
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

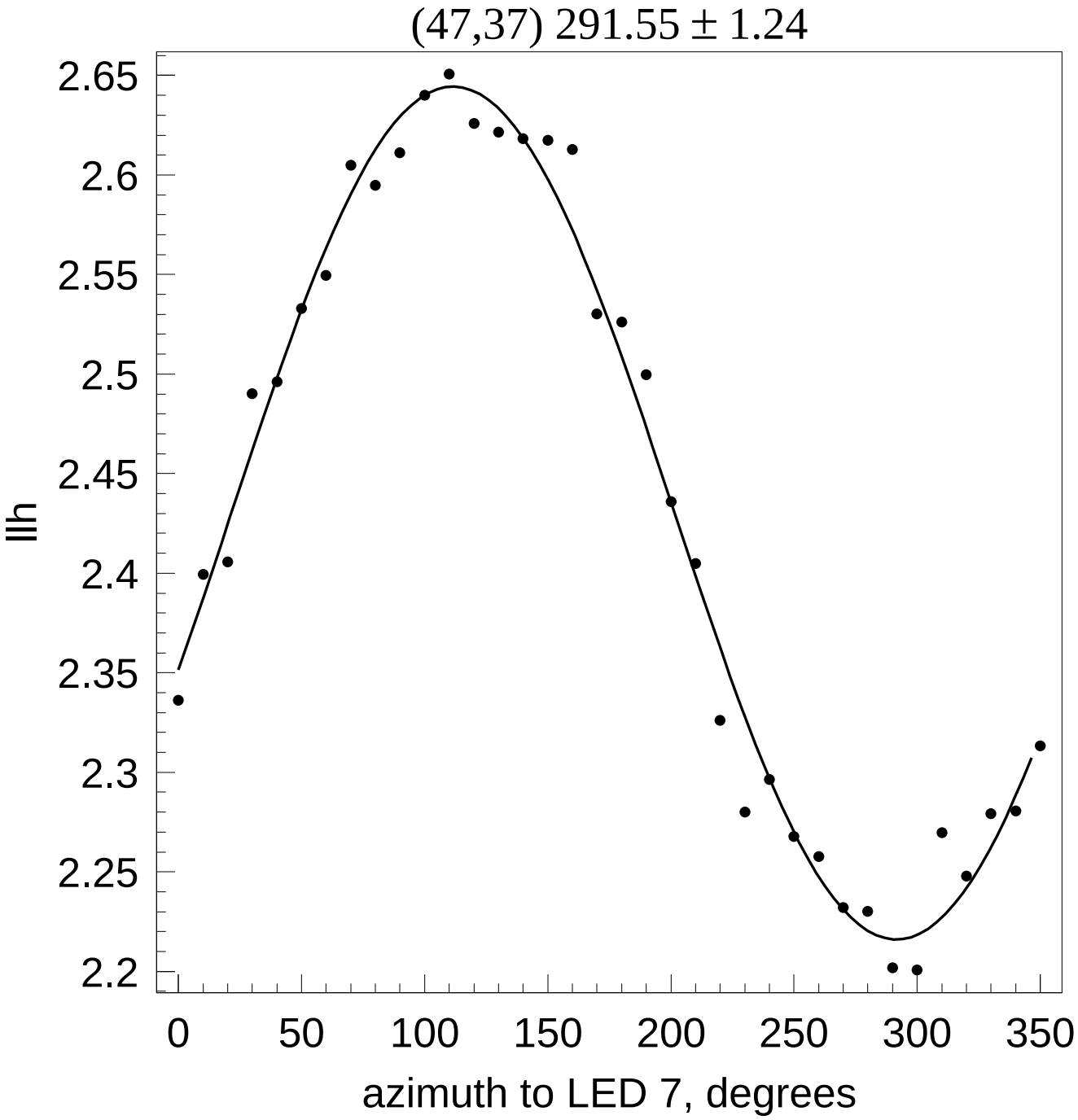

(47,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
7
3
1
160
4
10
6
5
12
11
191.4 ± 42.5

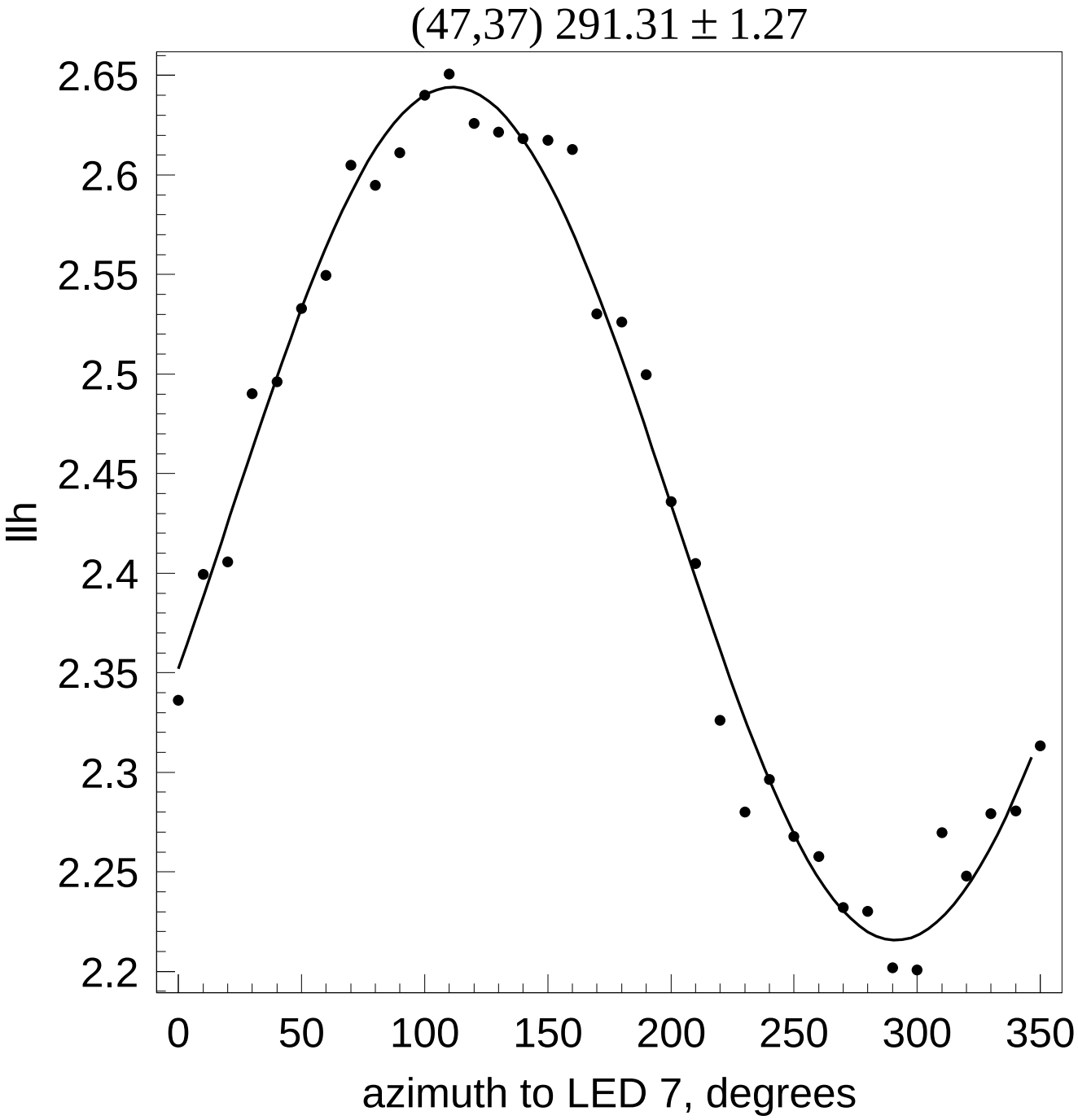

(47,36) 187.74 ± 4.09
3.025
3
2.975
2.95
2.925
2.9
2.875
2.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

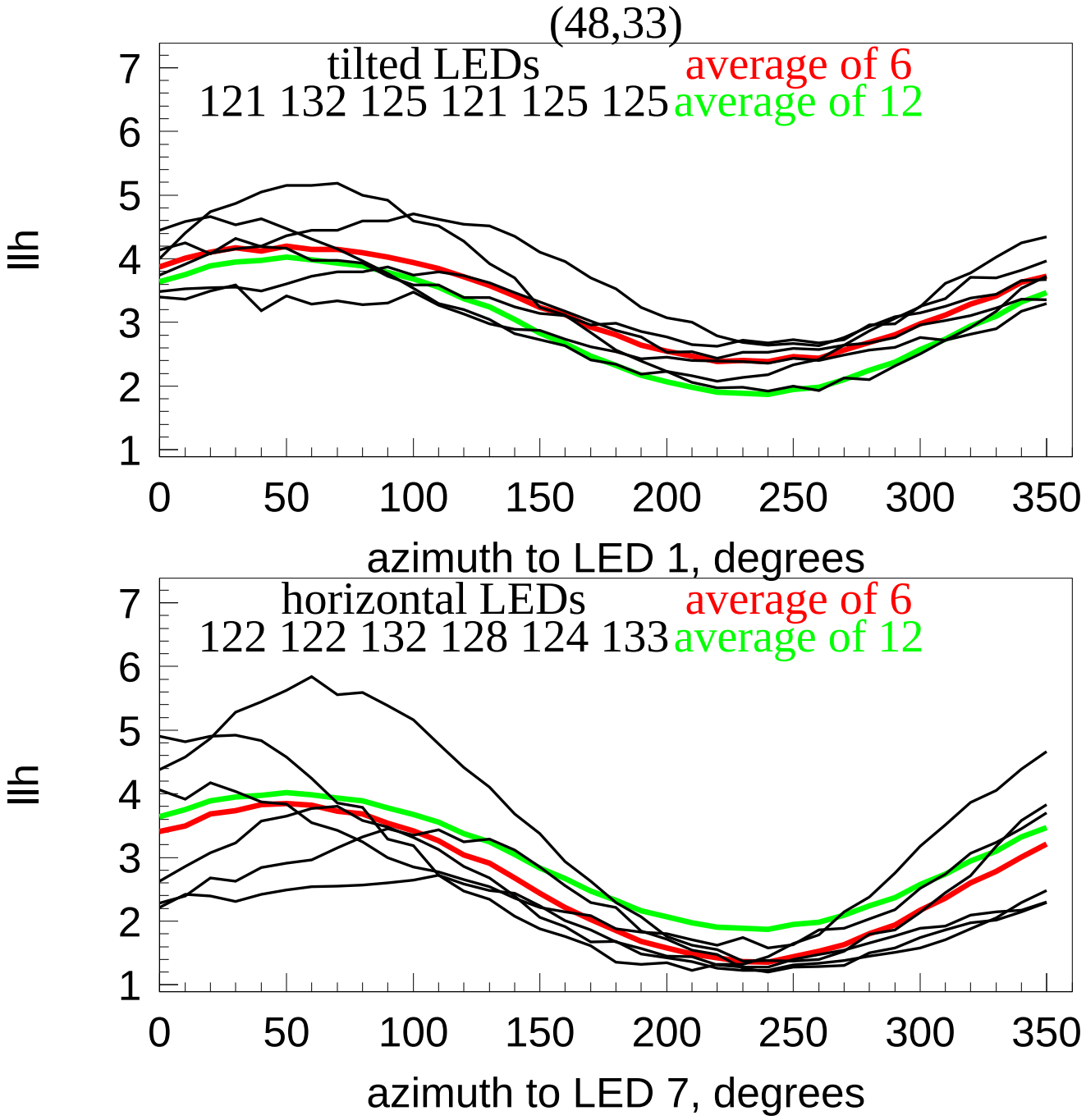

(47,36) 187.89 ± 5.14
3.025
3
2.975
2.95
2.925
2.9
2.875
2.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

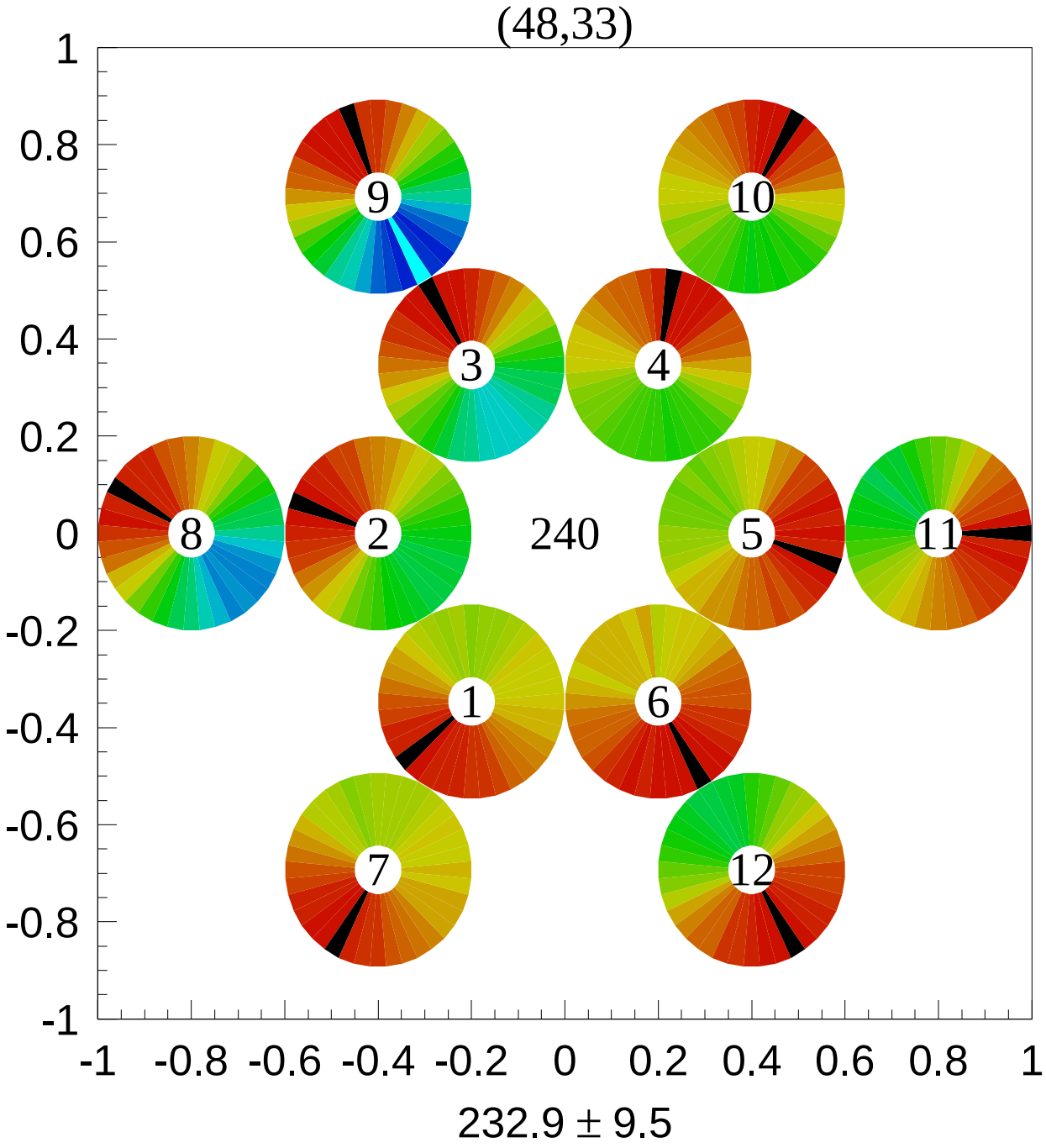

(47,37)
tilted LEDs
122 125 131 130 131 127
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
134 122 133 136 120 123
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

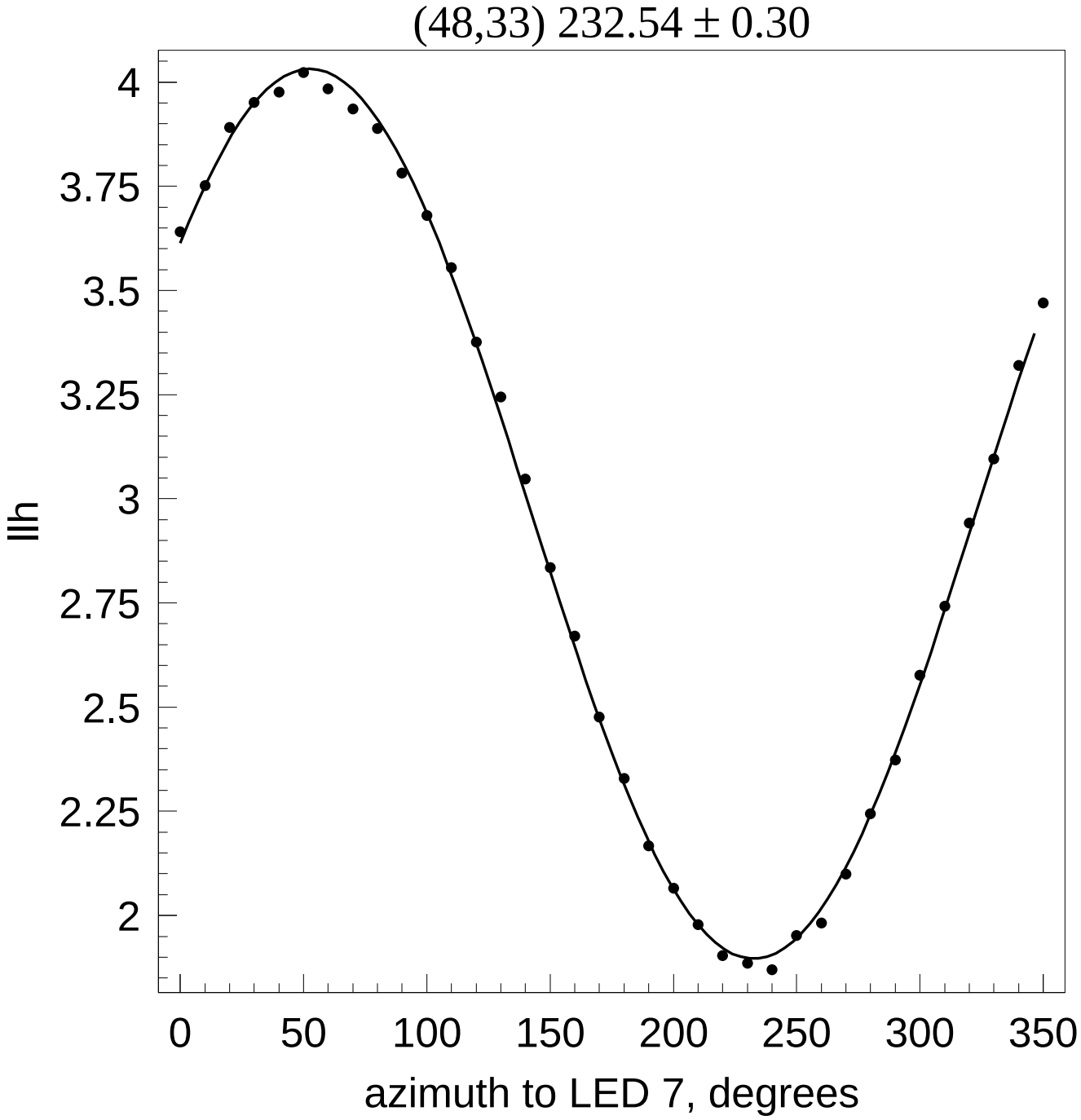

(47,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
287.7 ± 30.1

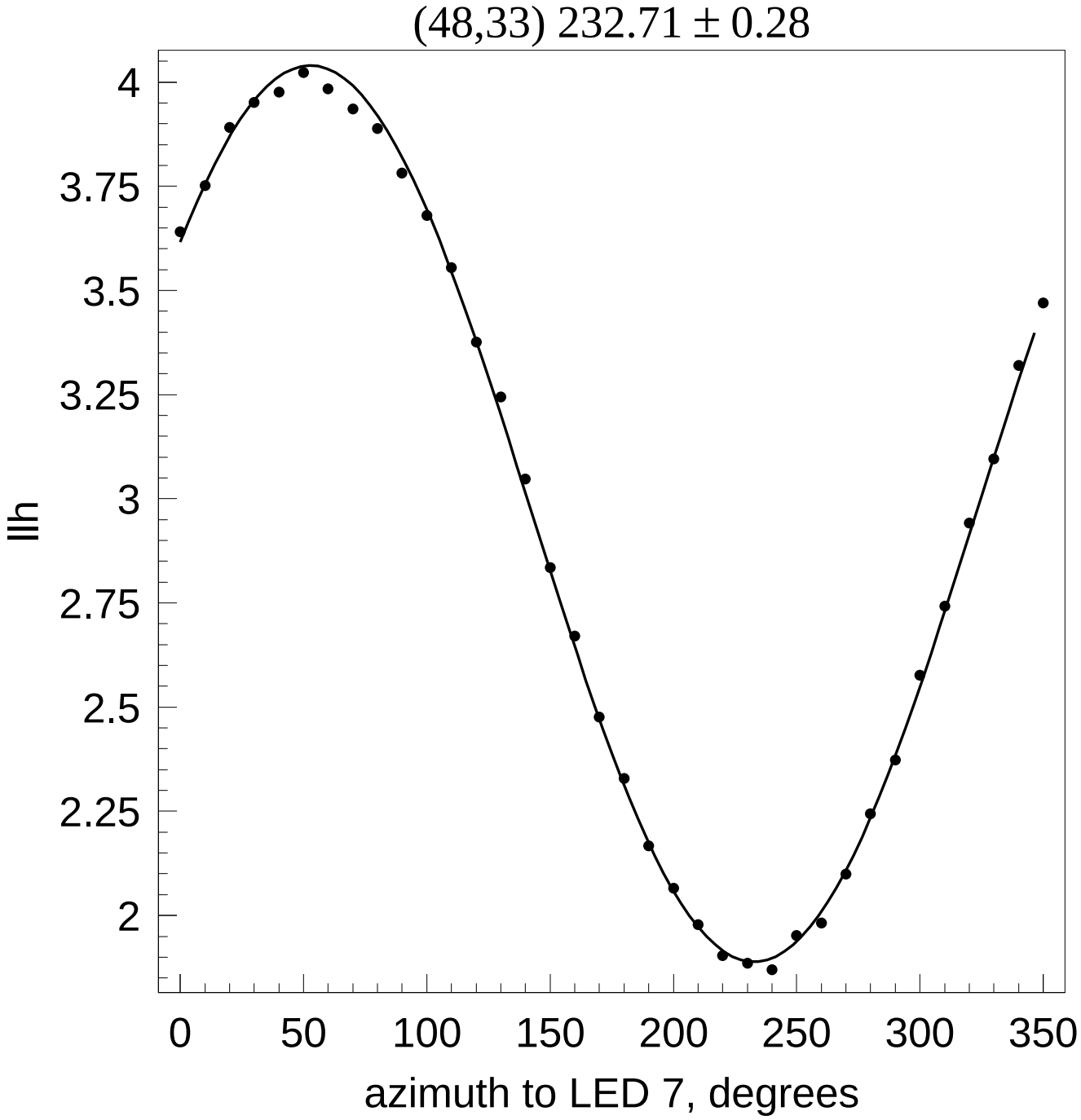

(47,37) 291.55 ± 1.24
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
2.25
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

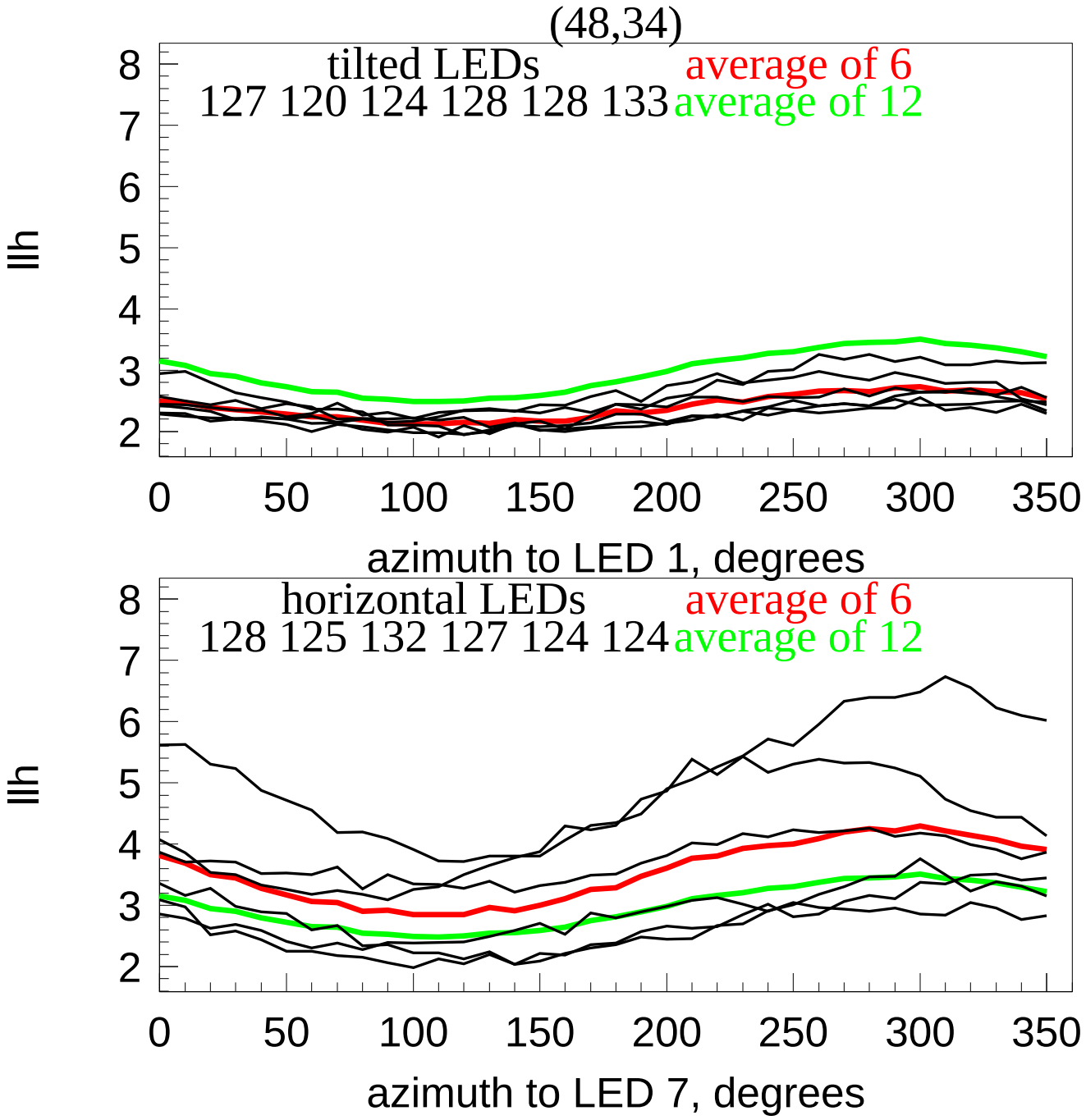

(47,37) 291.31 ± 1.27
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
2.25
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

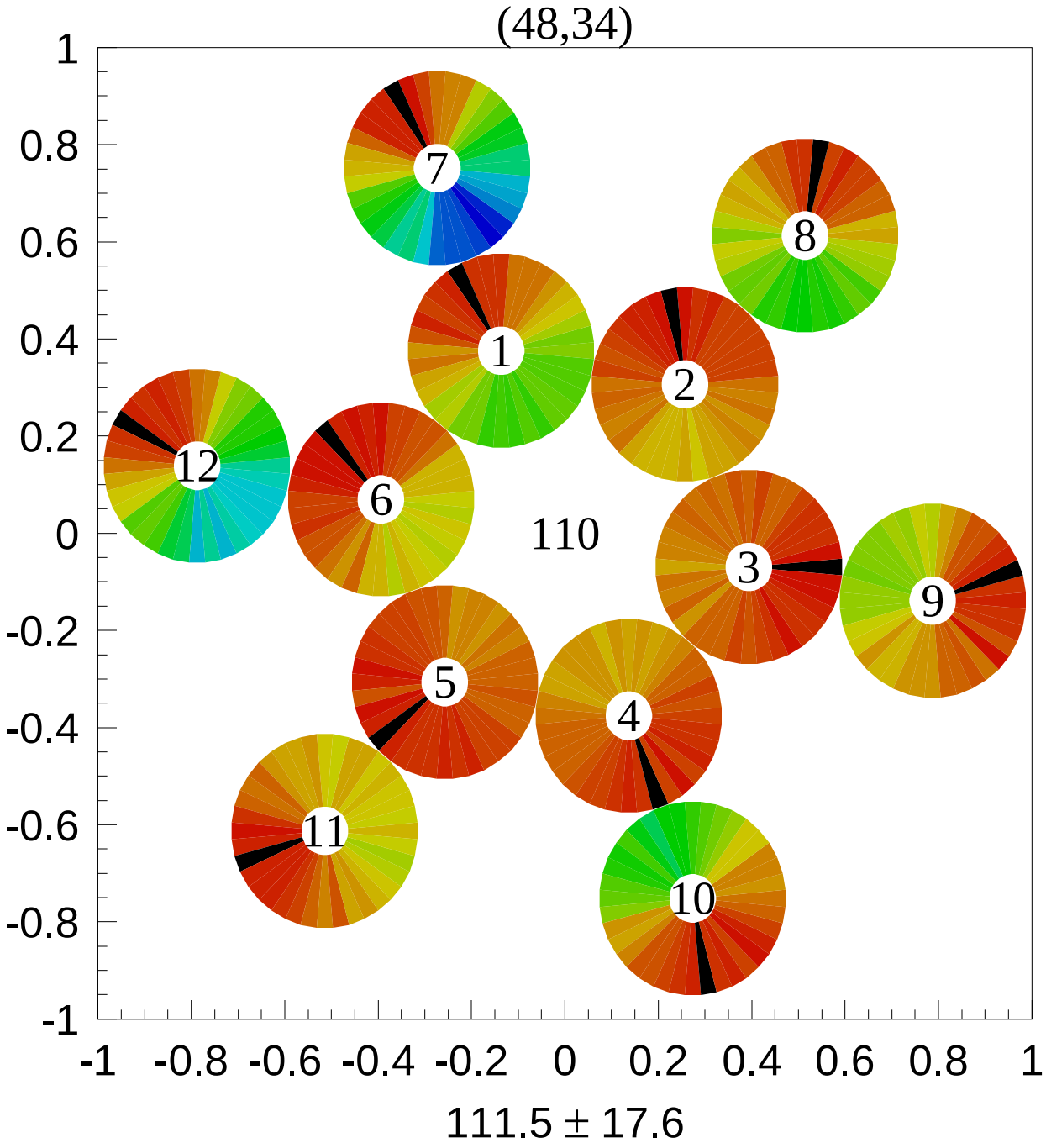

(48,33)
tilted LEDs
121 132 125 121 125 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 122 132 128 124 133
average of 6
average of 12
llh
azimuth to LED 7, degrees

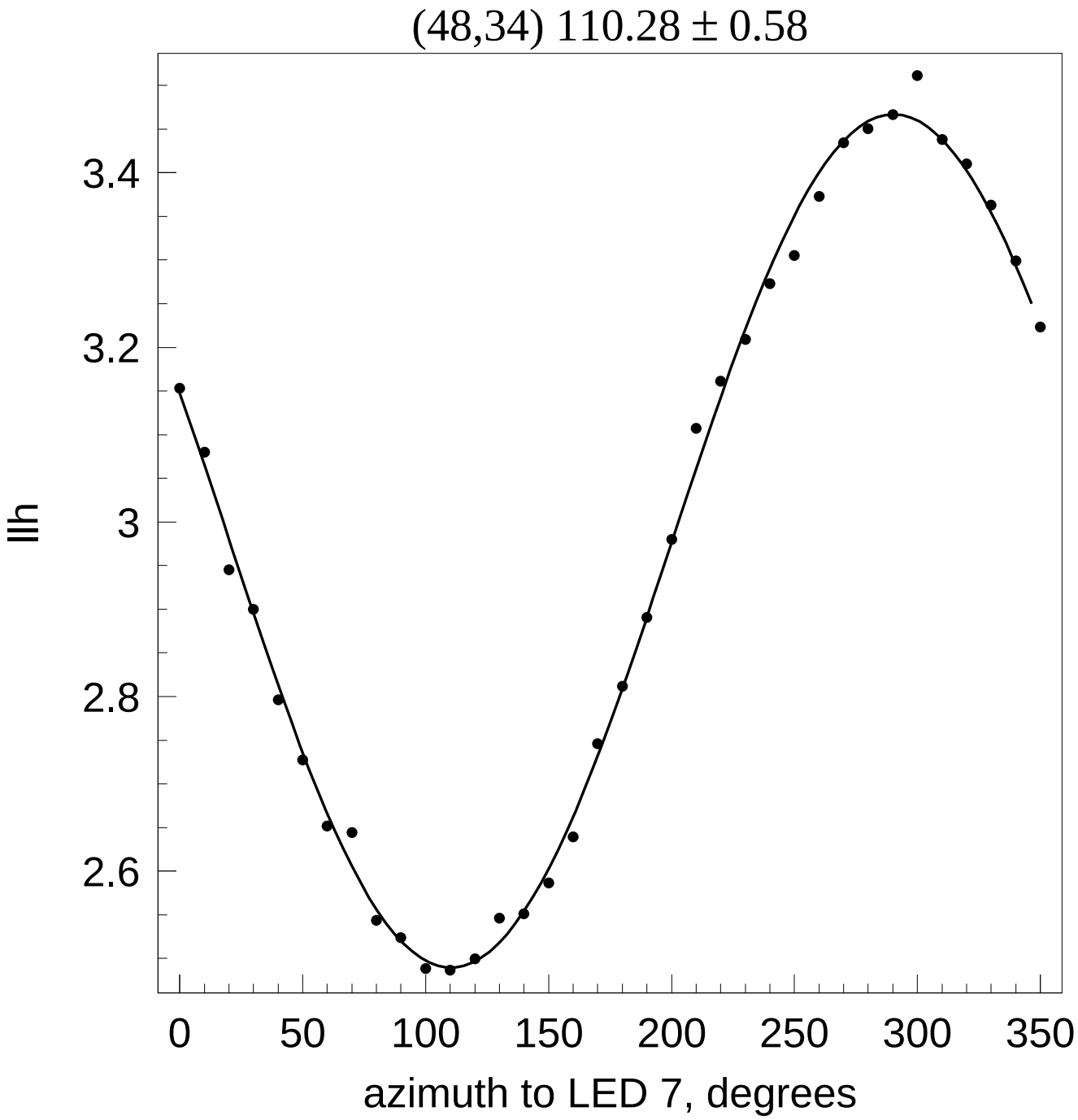

(48,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
232.9 ± 9.5

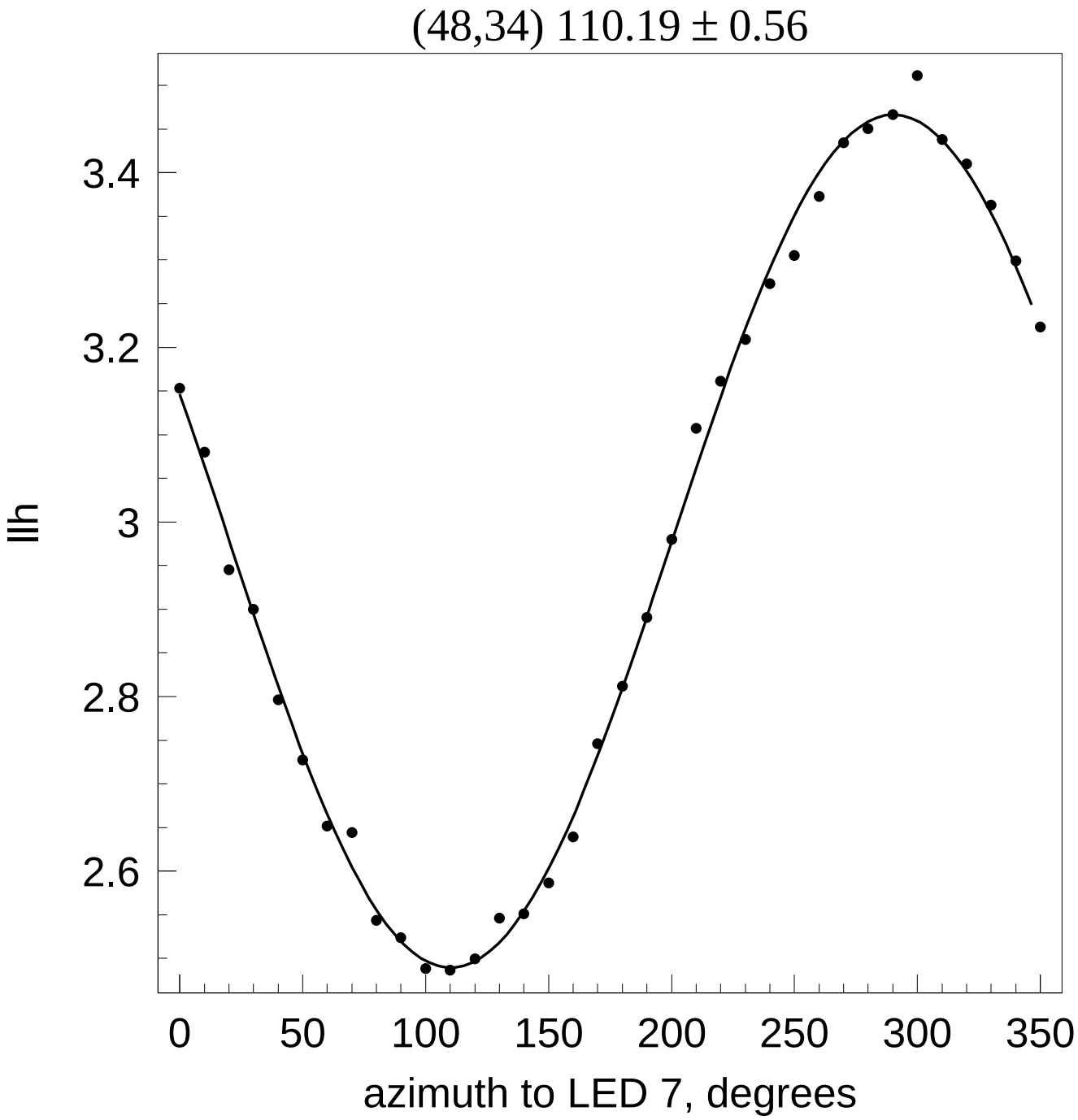

(48,33) 232.54 ± 0.30
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

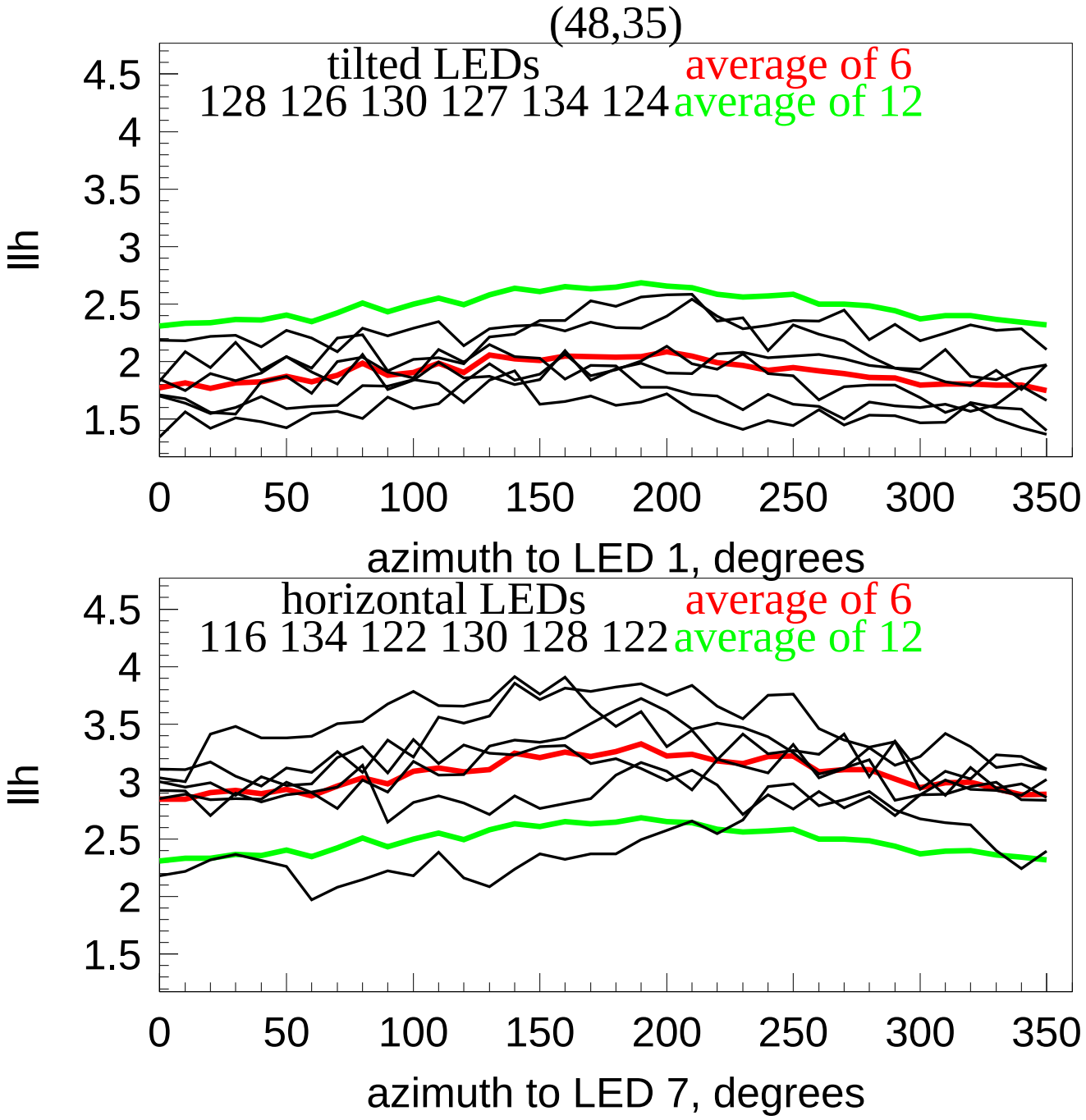

(48,33) 232.71 ± 0.28
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

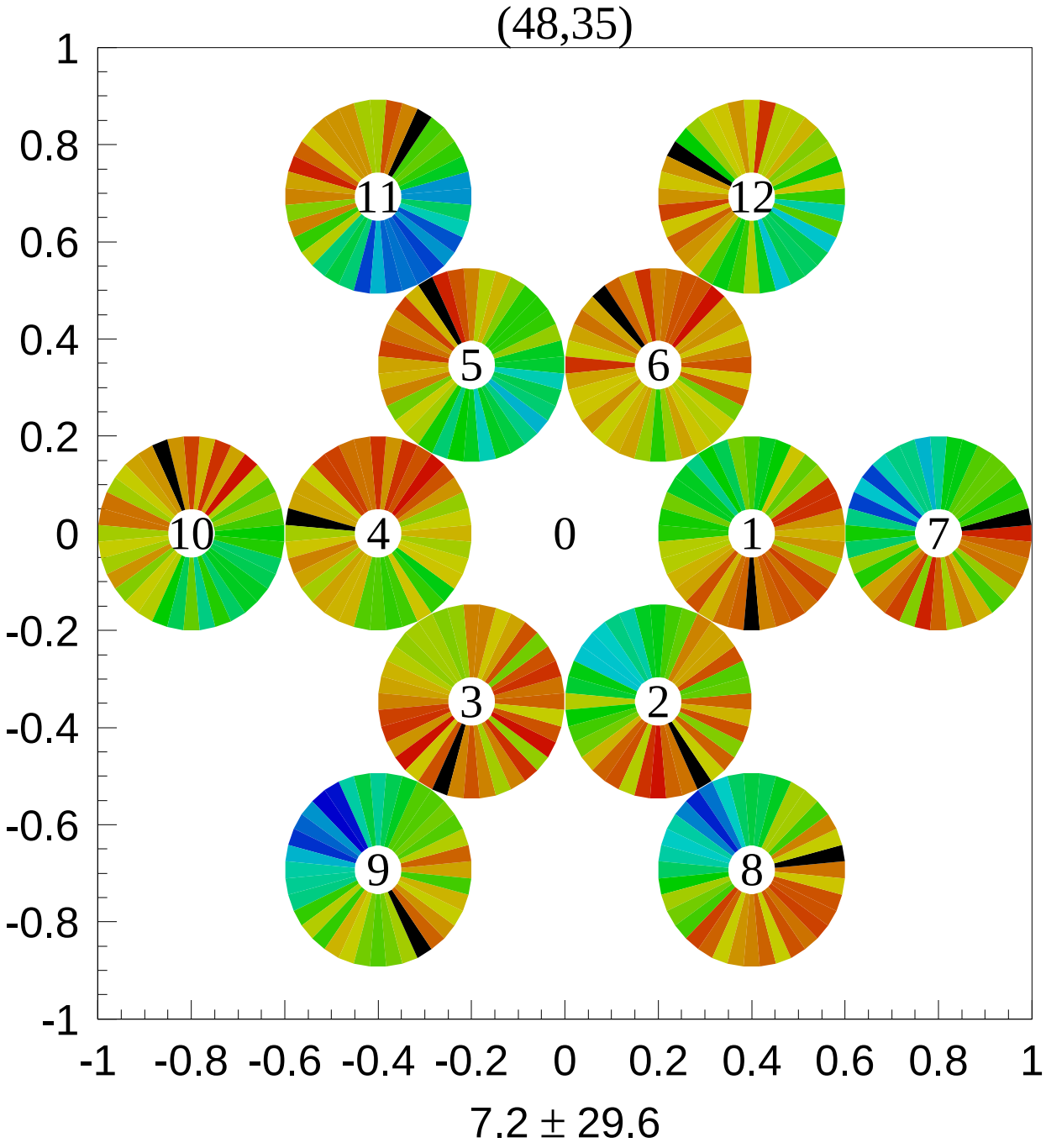

(48,34)
tilted LEDs
127 120 124 128 128 133
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 125 132 127 124 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

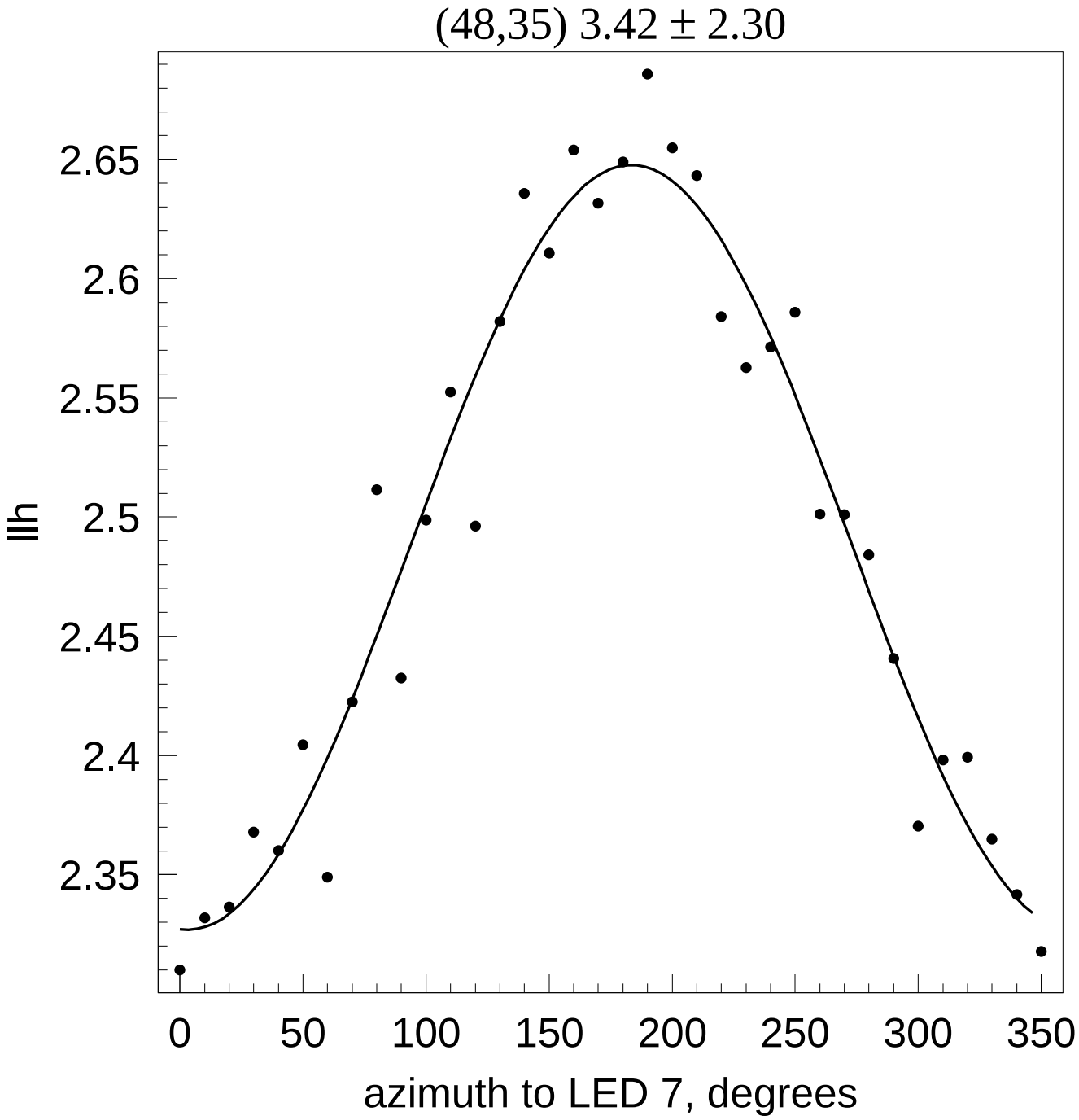

(48,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
111.5 ± 17.6

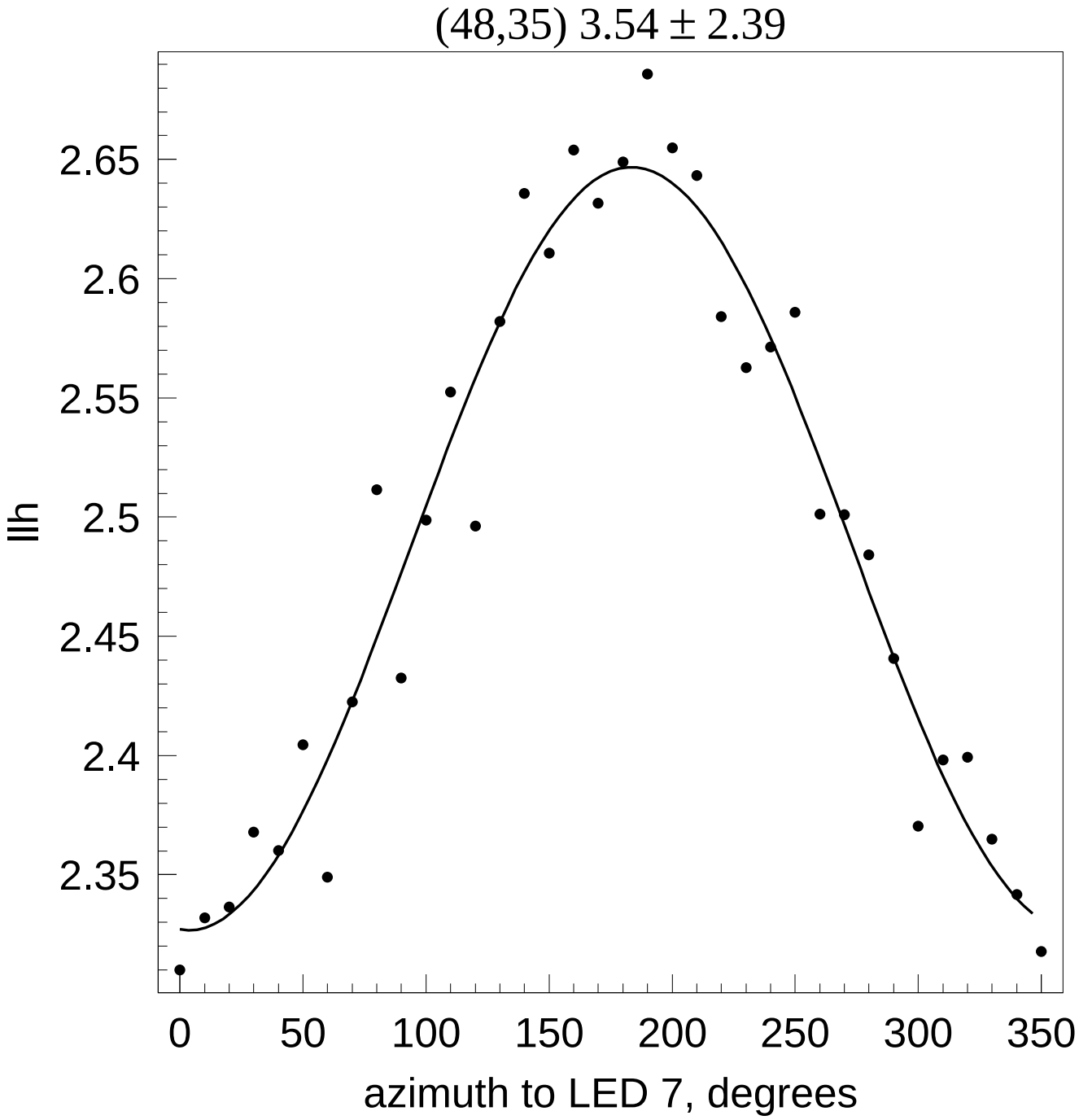

(48,34) 110.28 ± 0.58
3.4
3.2
3
2.8
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

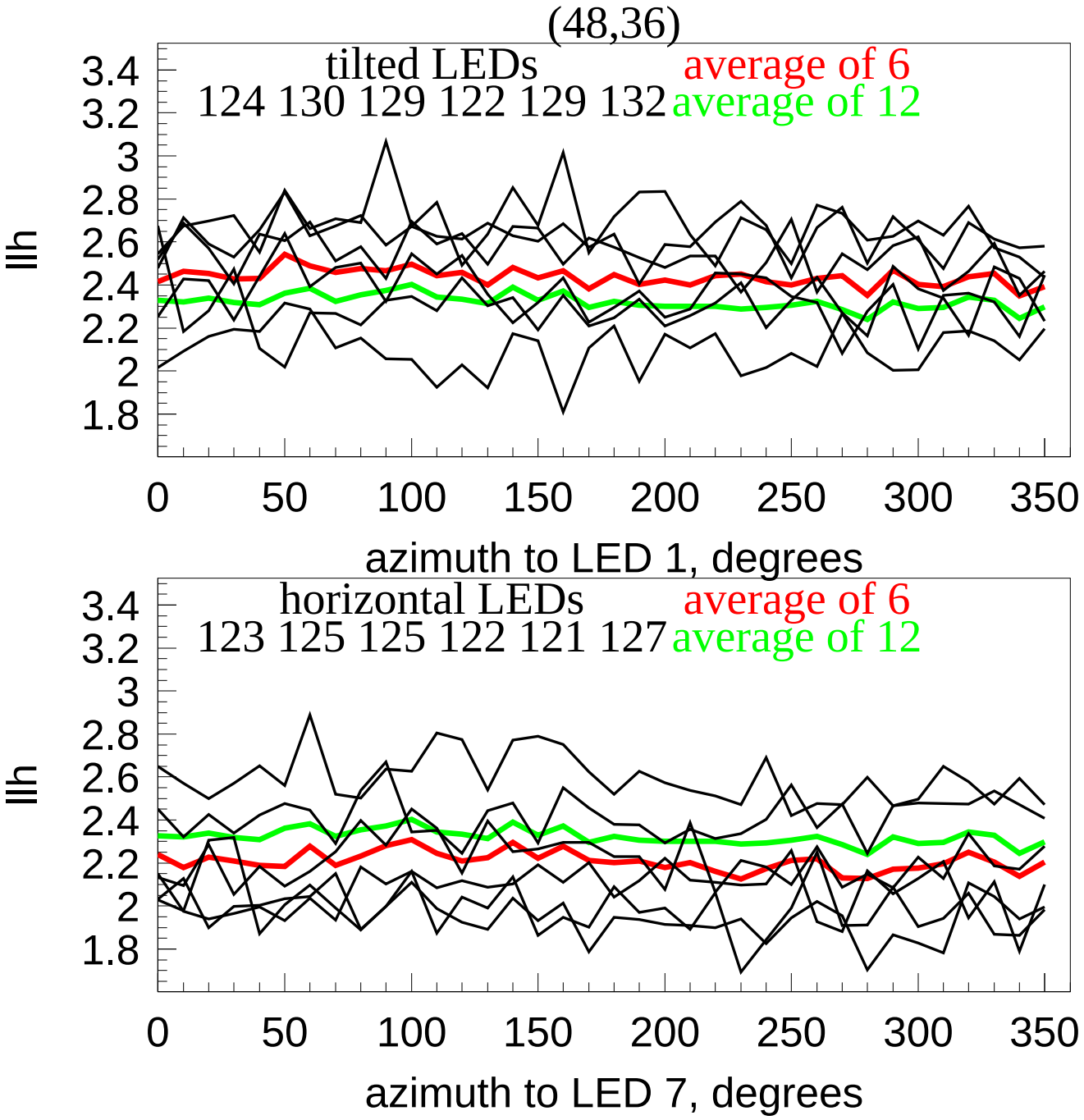

(48,34) 110.19 ± 0.56
3.4
3.2
3
2.8
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

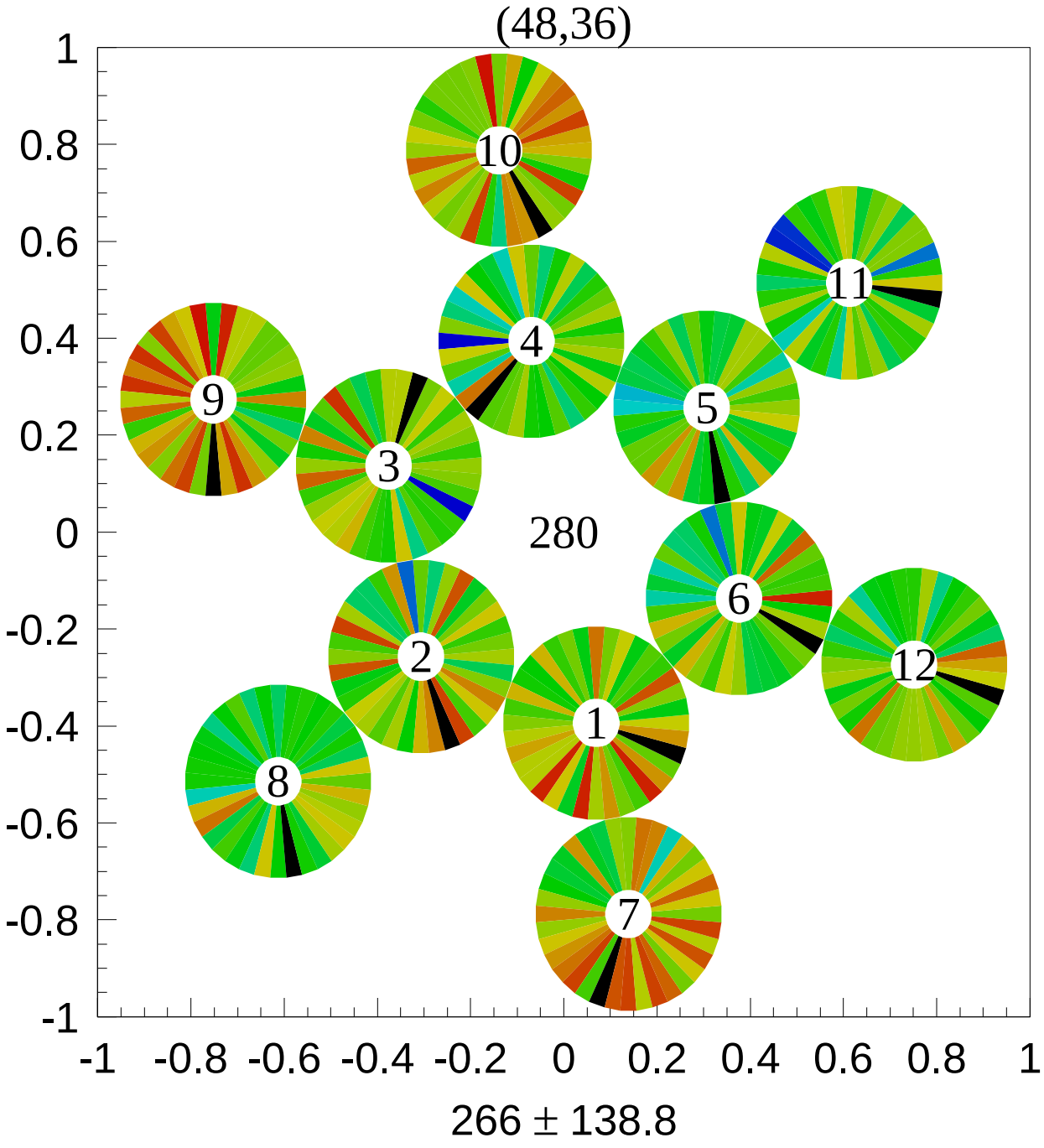

(48,35)
tilted LEDs
128 126 130 127 134 124
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
116 134 122 130 128 122
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

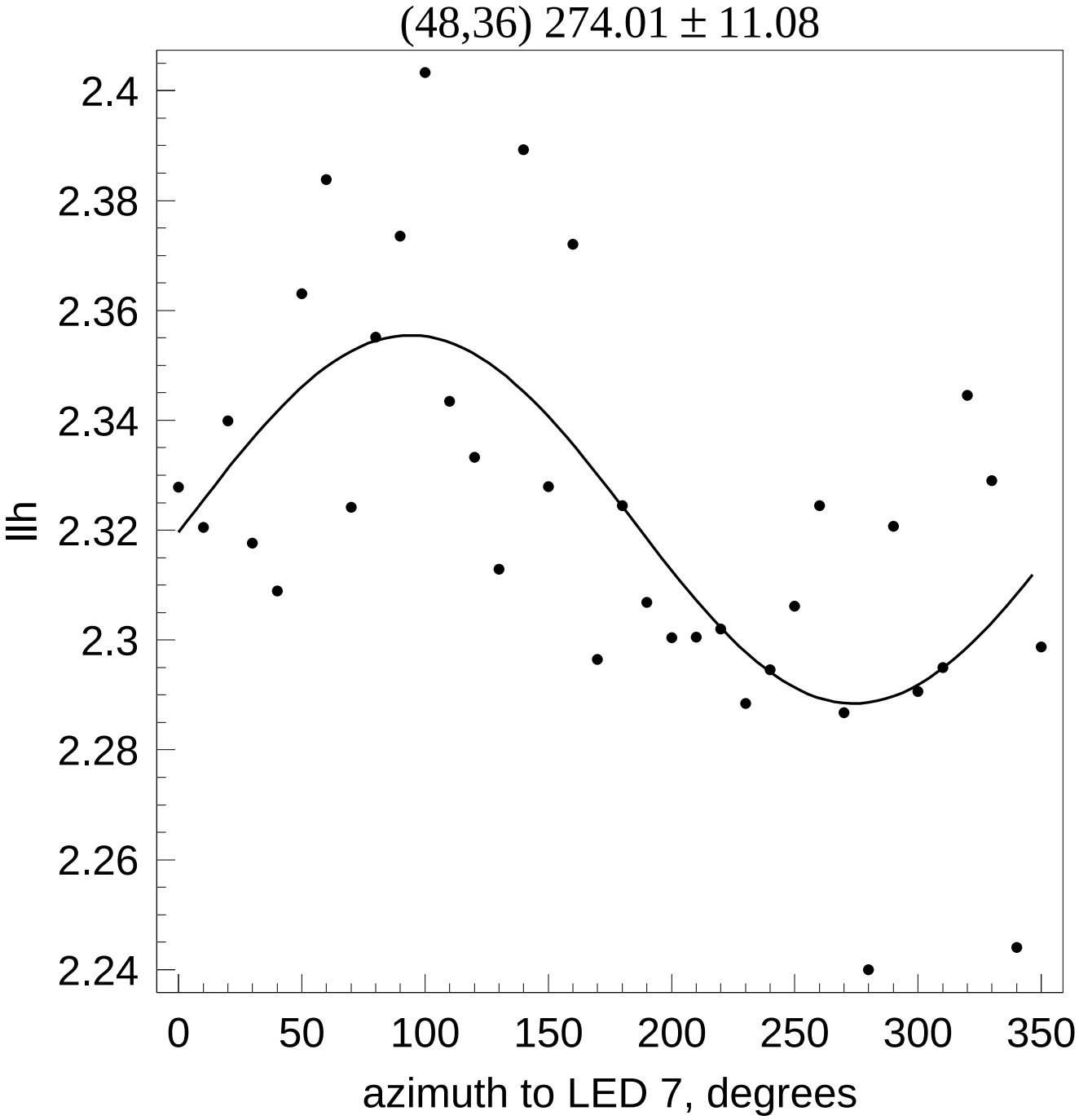

(48,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
7.2 ± 29.6

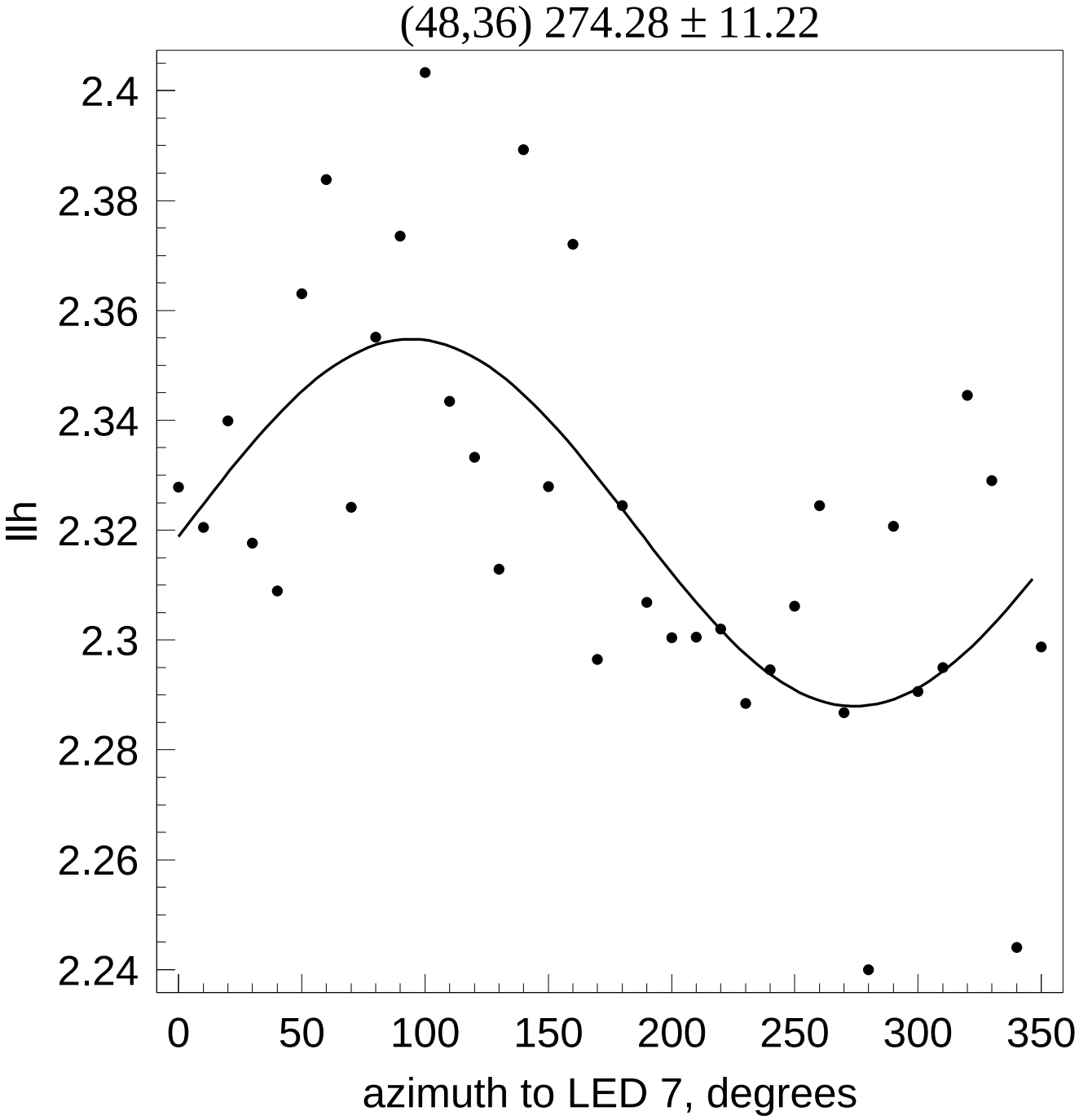

(48,35) 3.42 ± 2.30
2.65
2.6
2.55
2.5
2.45
2.4
2.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

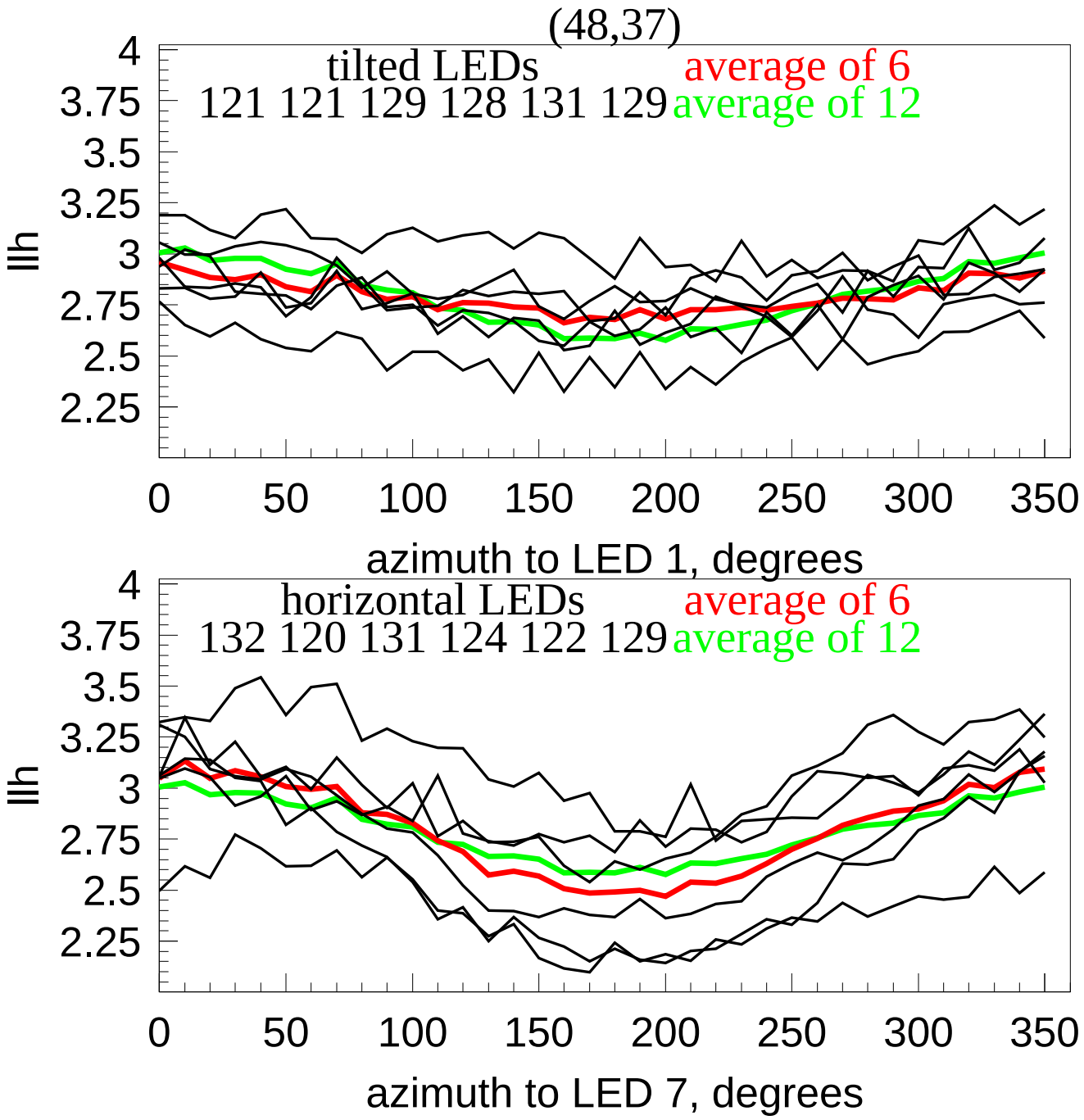

(48,35) 3.54 ± 2.39
2.65
2.6
2.55
2.5
2.45
2.4
2.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

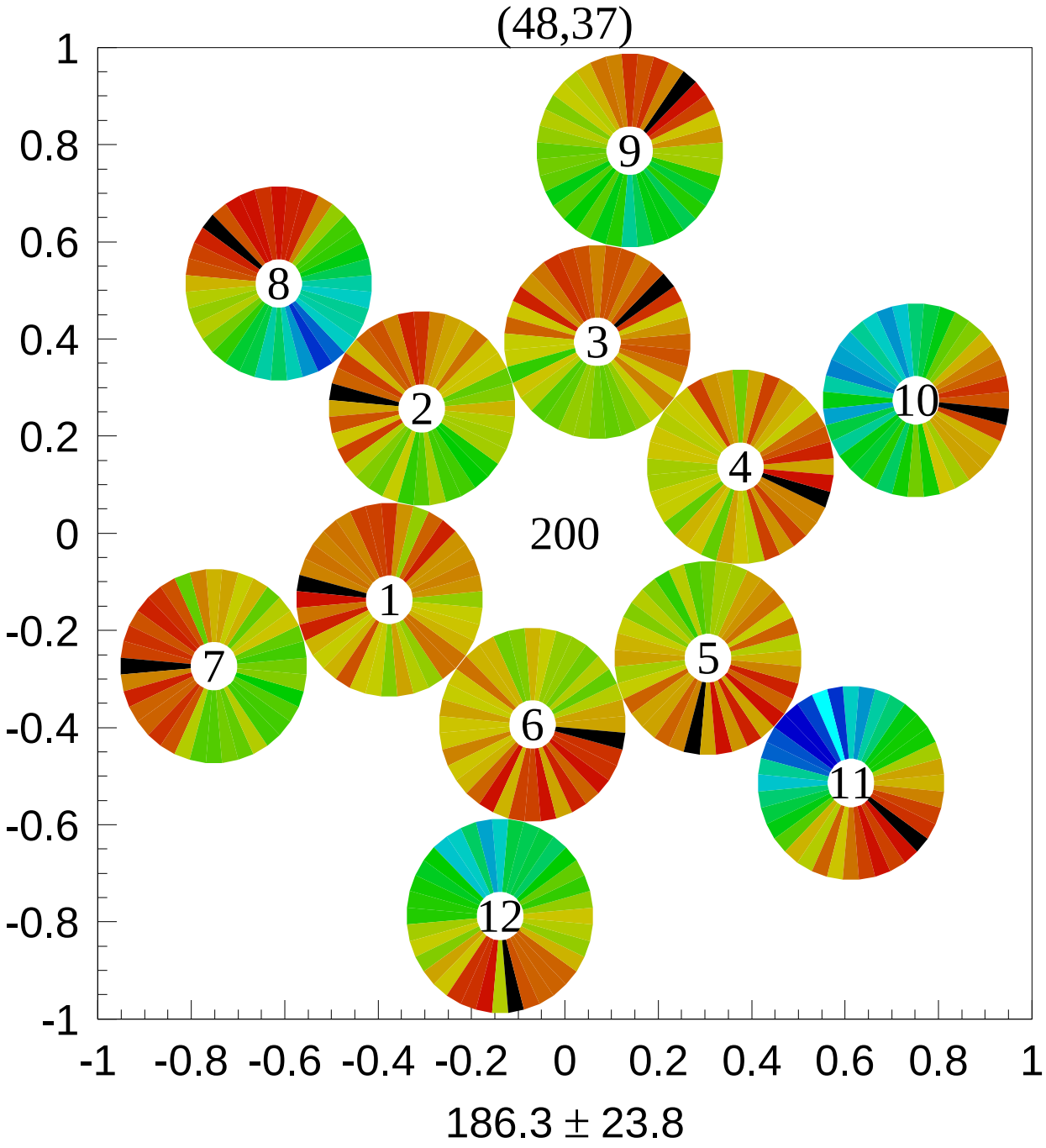

(48,36)
tilted LEDs
124 130 129 122 129 132
average of 6
average of 12
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 125 125 122 121 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

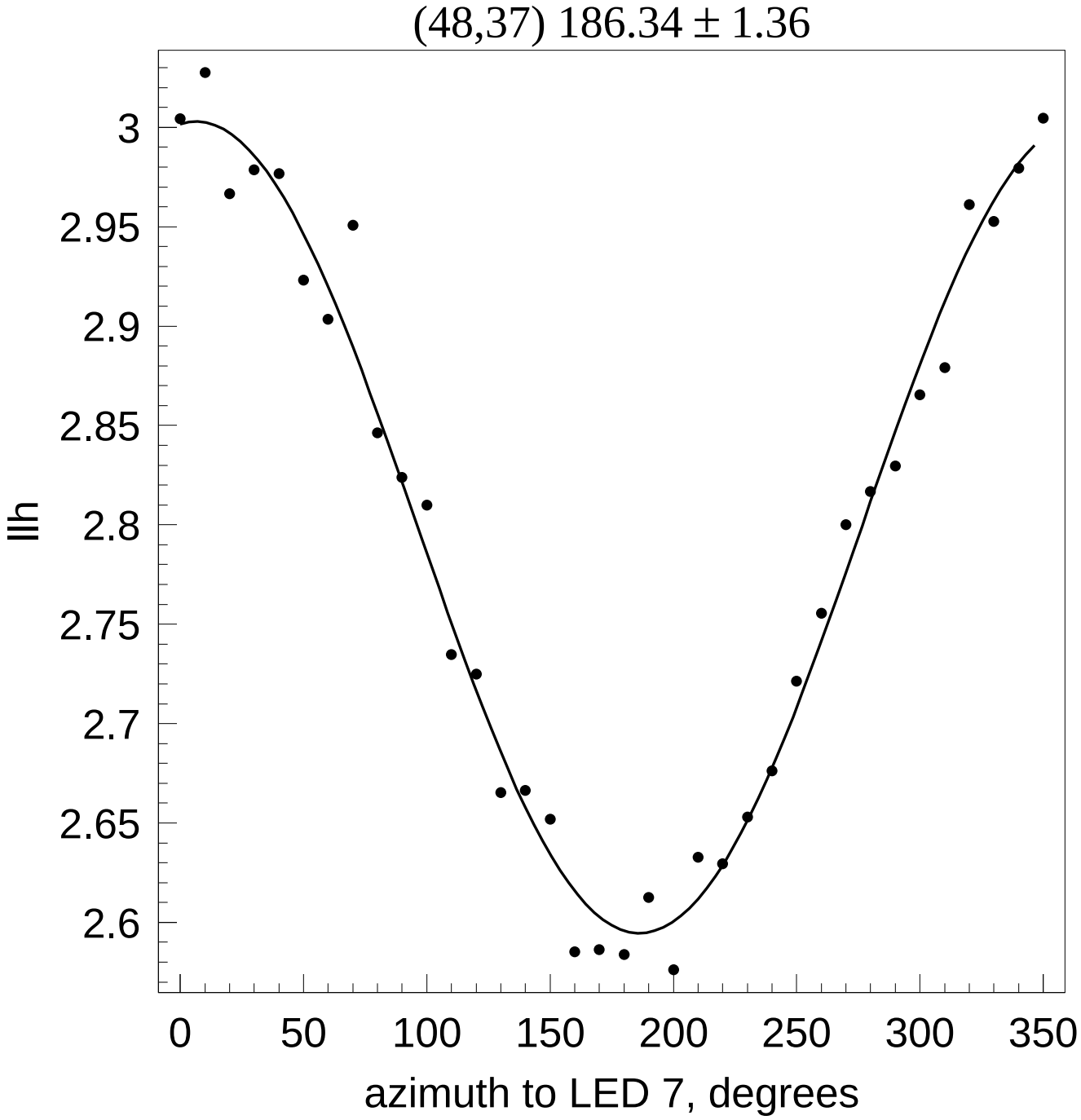

(48,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
9
5
3
280
6
12
2
1
8
7
266 ± 138.8

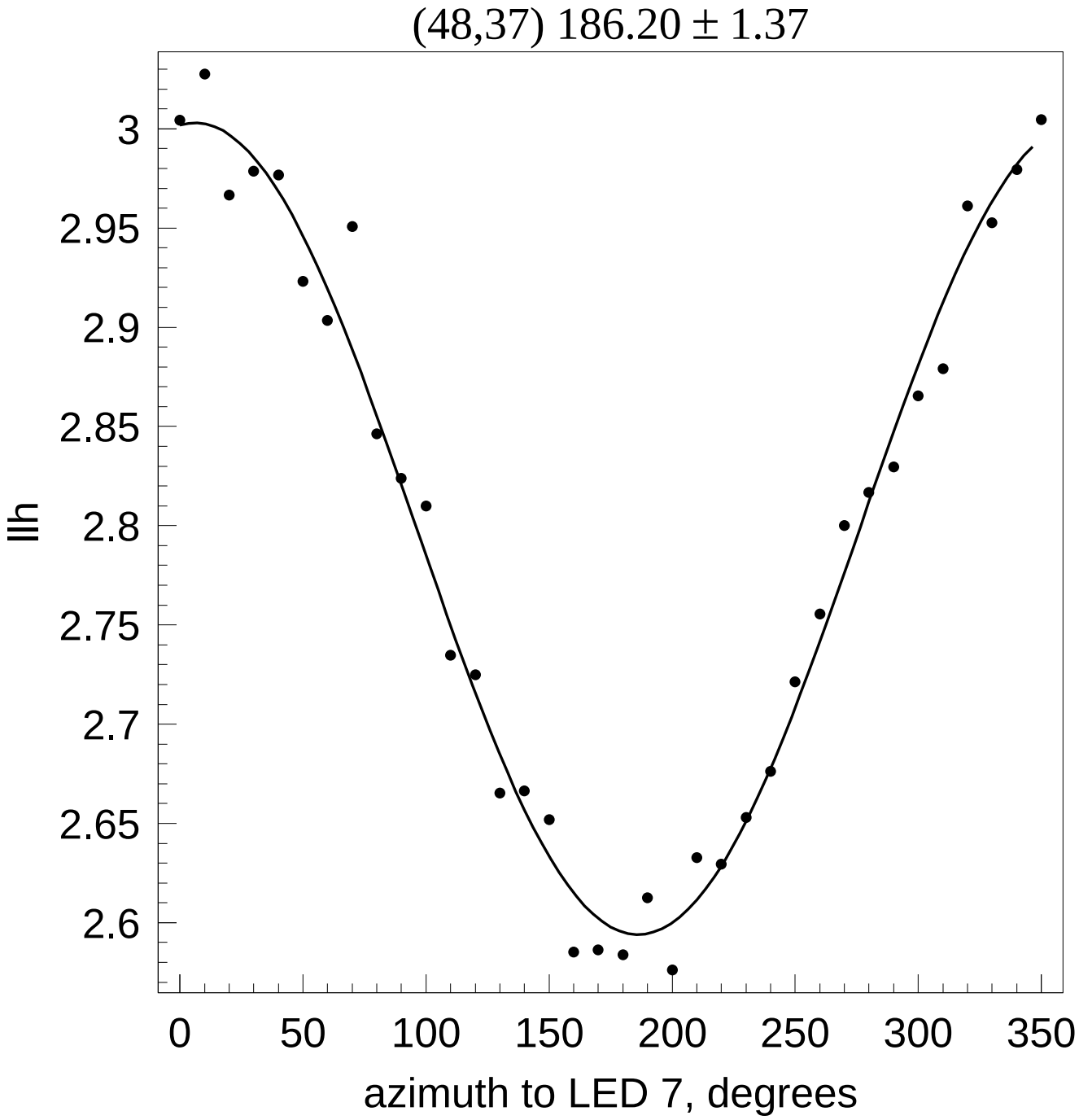

(48,36) 274.01 ± 11.08
2.4
2.38
2.36
2.34
2.32
2.3
2.28
2.26
2.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

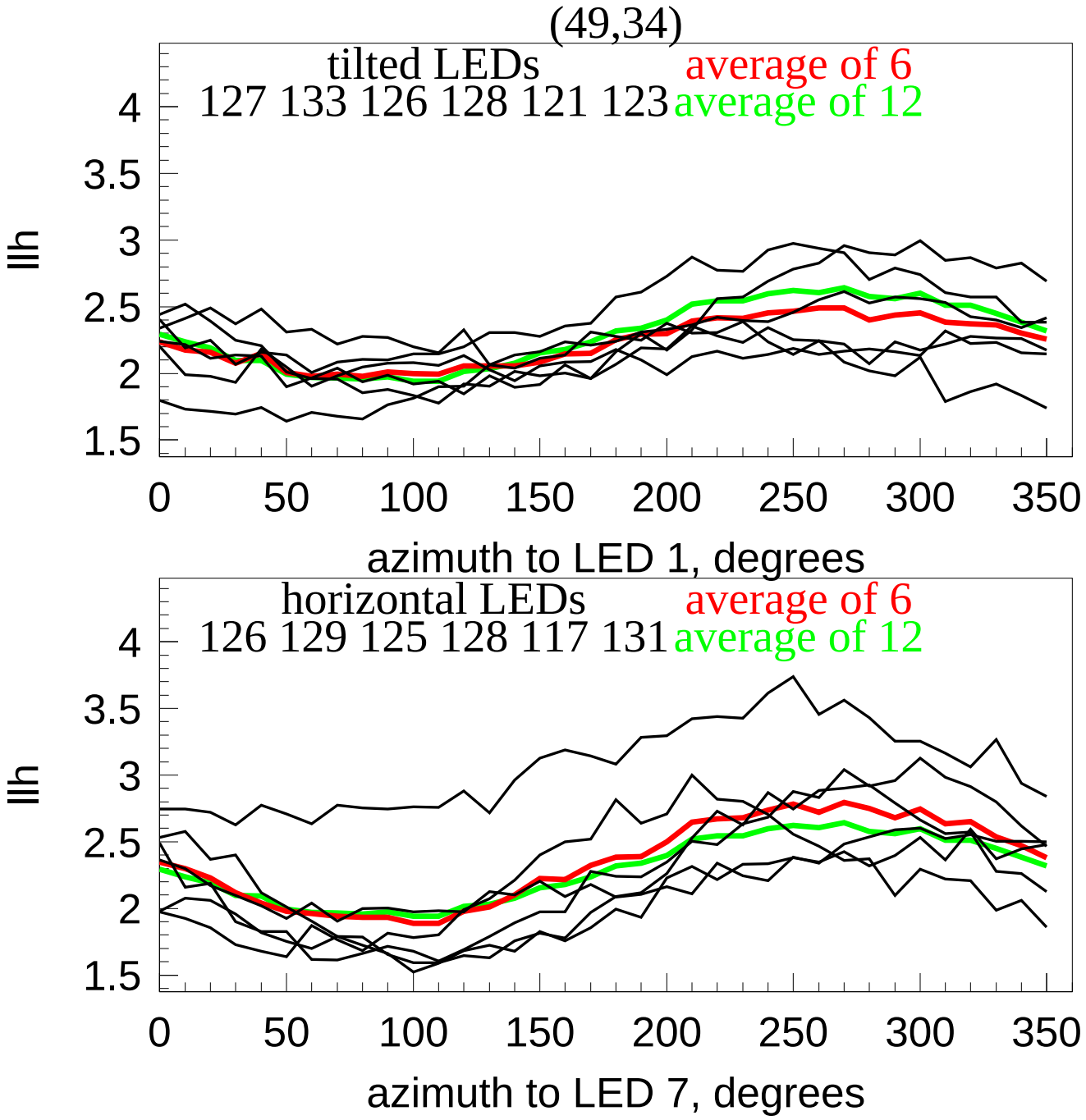

(48,36) 274.28 ± 11.22
2.4
2.38
2.36
2.34
2.32
2.3
2.28
2.26
2.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

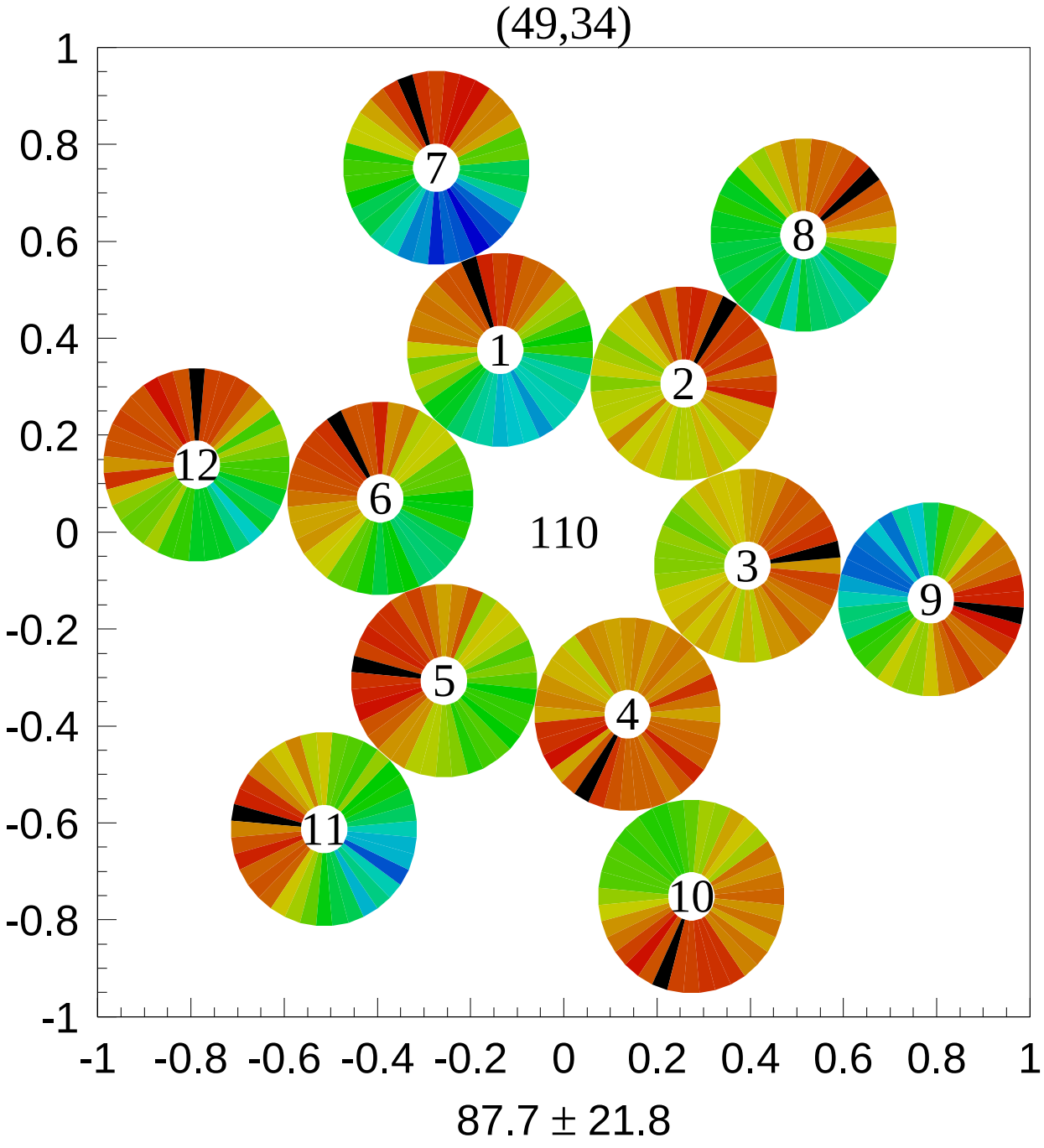

(48,37)
tilted LEDs
121 121 129 128 131 129
average of 6
average of 12
llh
4
3.75
3.5
3.25
3
2.75
2.5
2.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 120 131 124 122 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

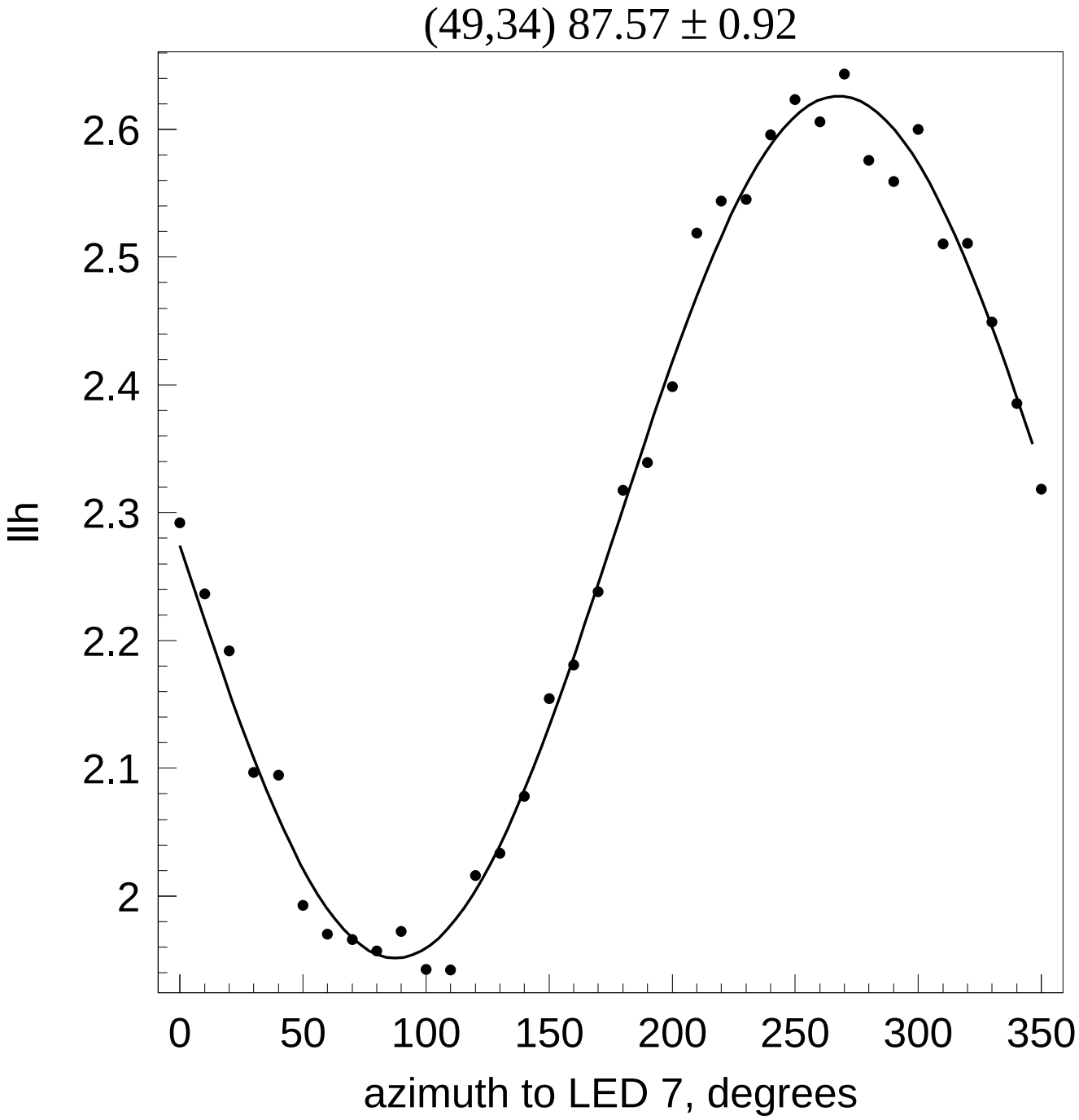

(48,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
186.3 ± 23.8
200
1
2
3
4
5
6
7
8
9
10
11
12

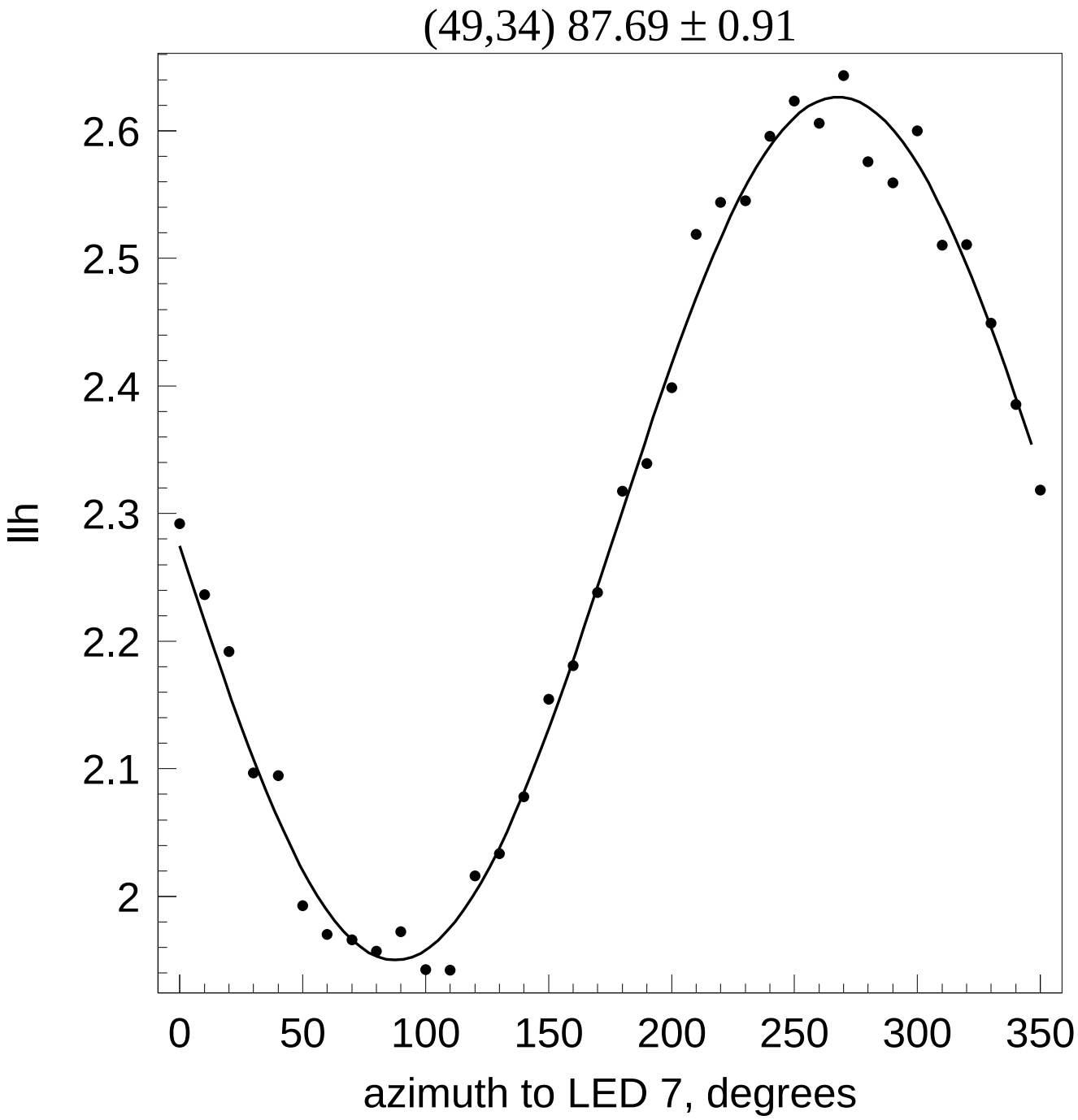

(48,37) 186.34 ± 1.36
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

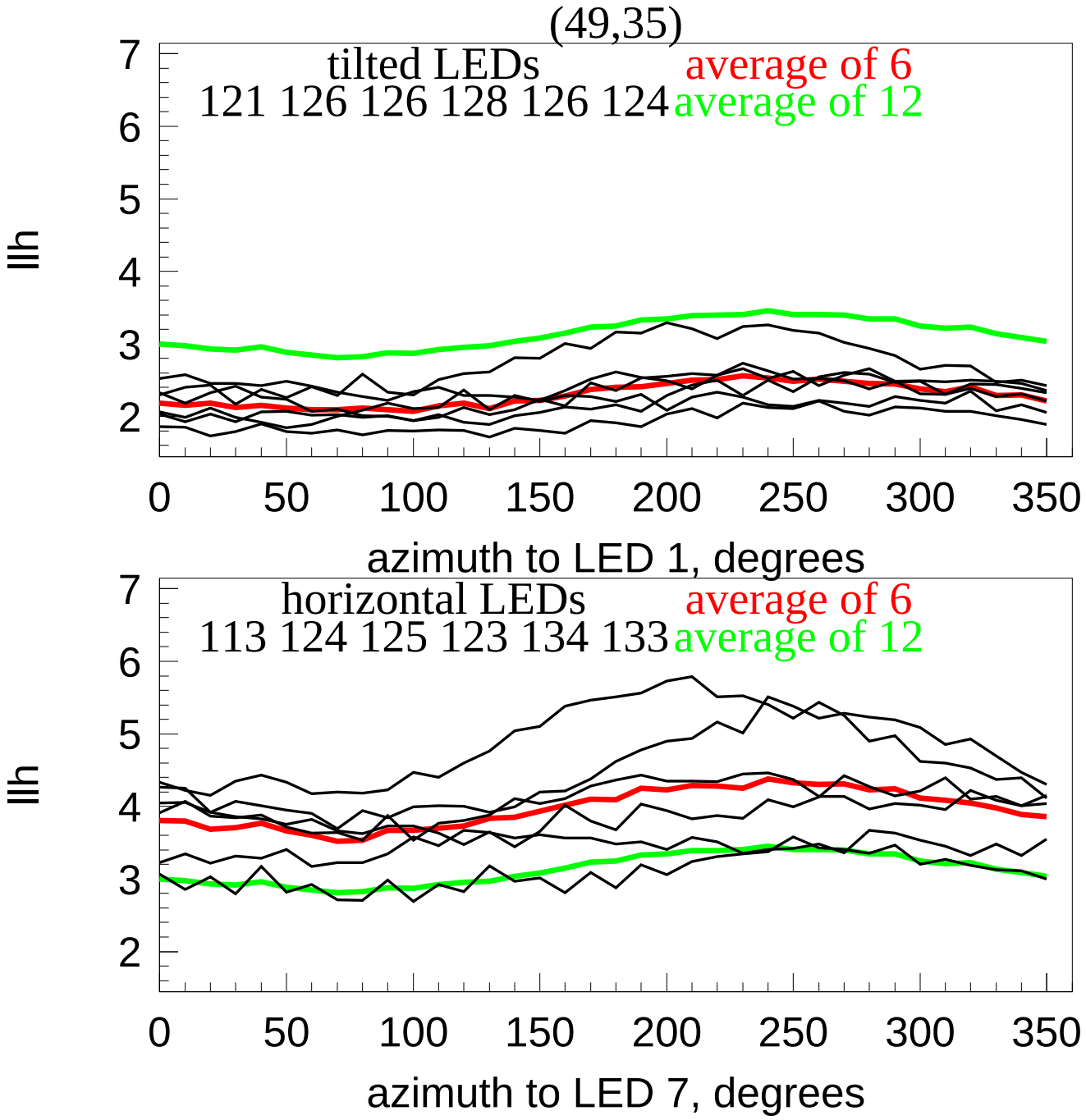

(48,37) 186.20 ± 1.37
llh
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
2.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

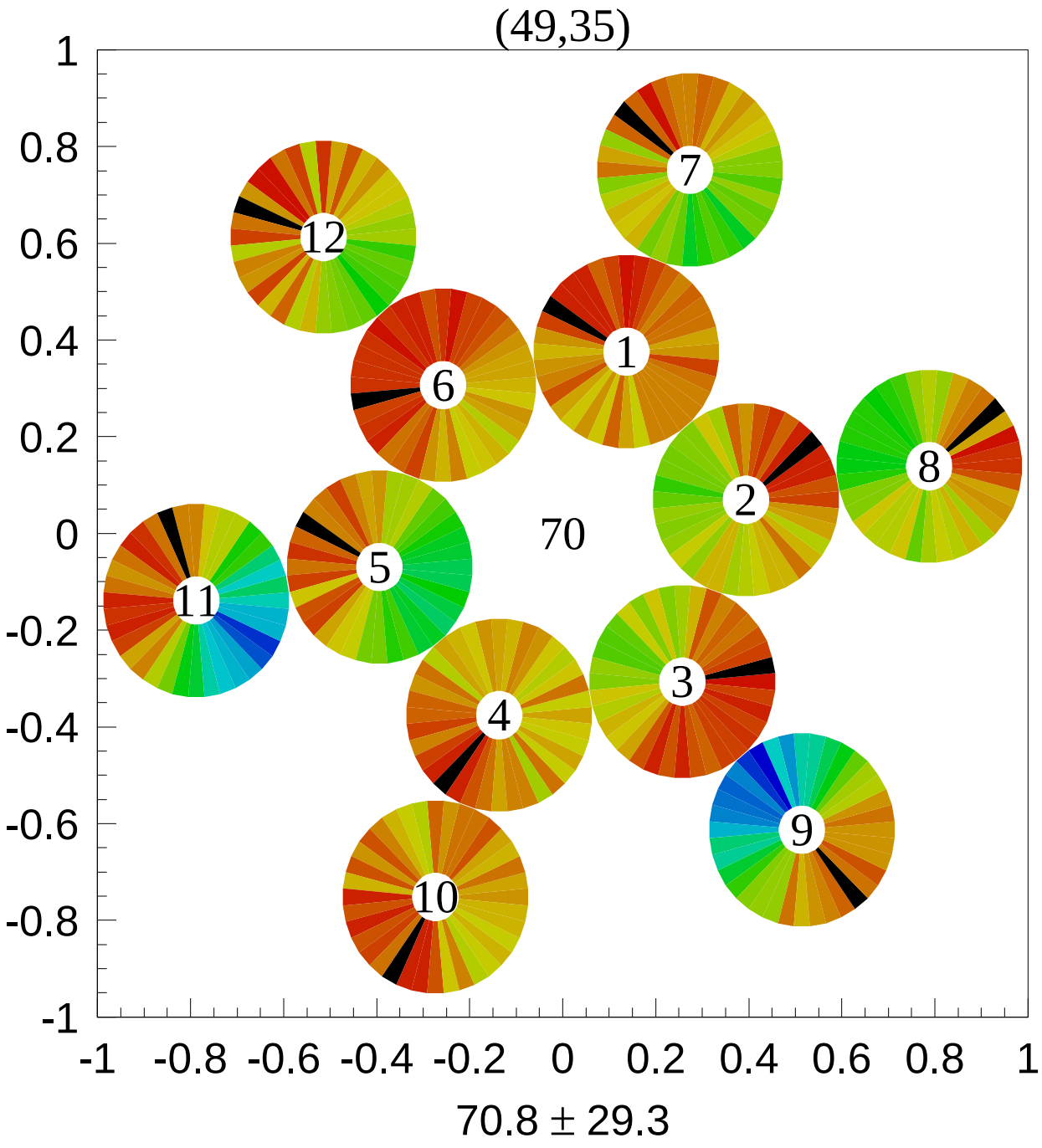

(49,34)
tilted LEDs
127 133 126 128 121 123
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 129 125 128 117 131
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

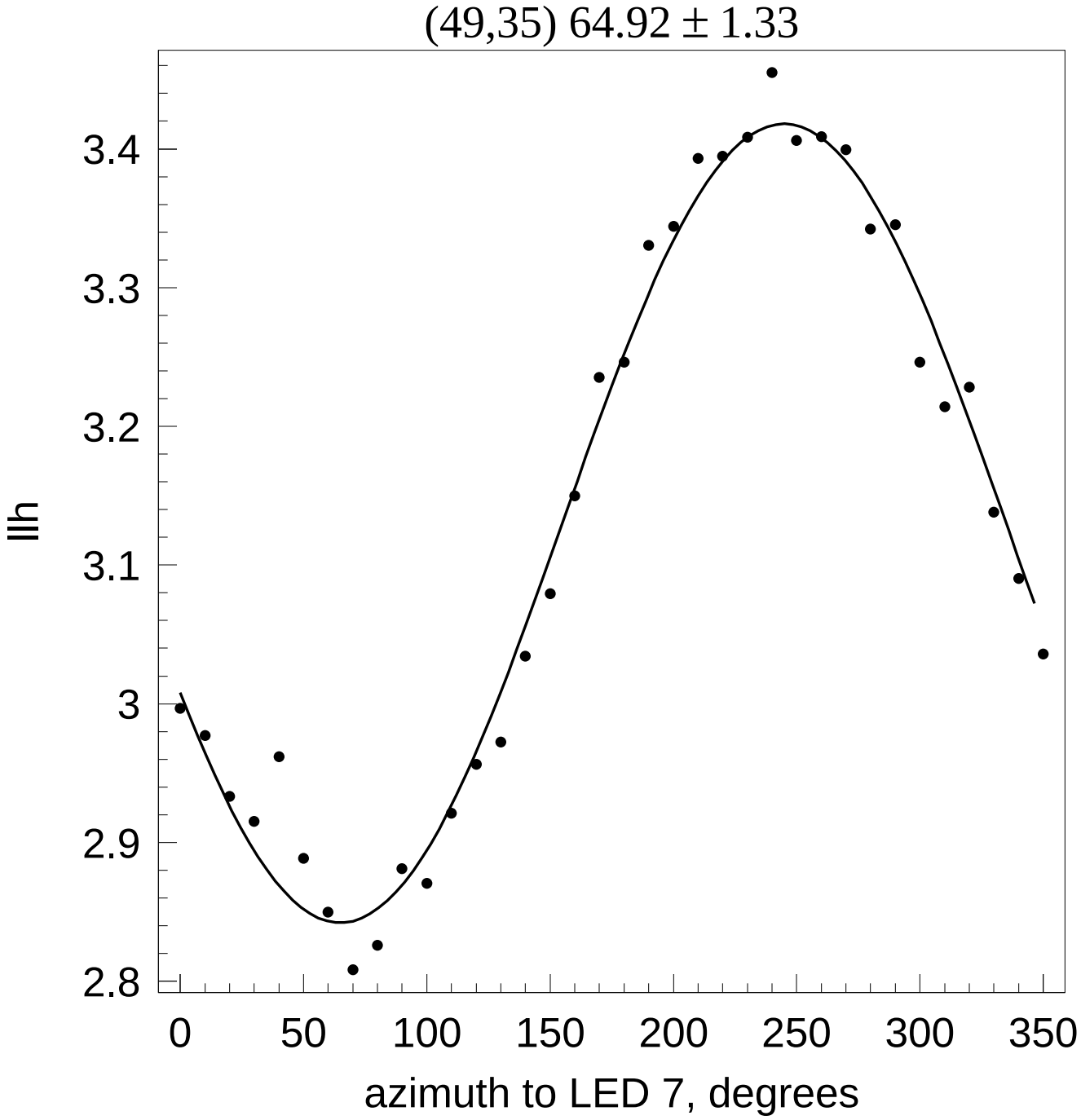

(49,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
110
3
9
5
4
11
10
87.7 ± 21.8

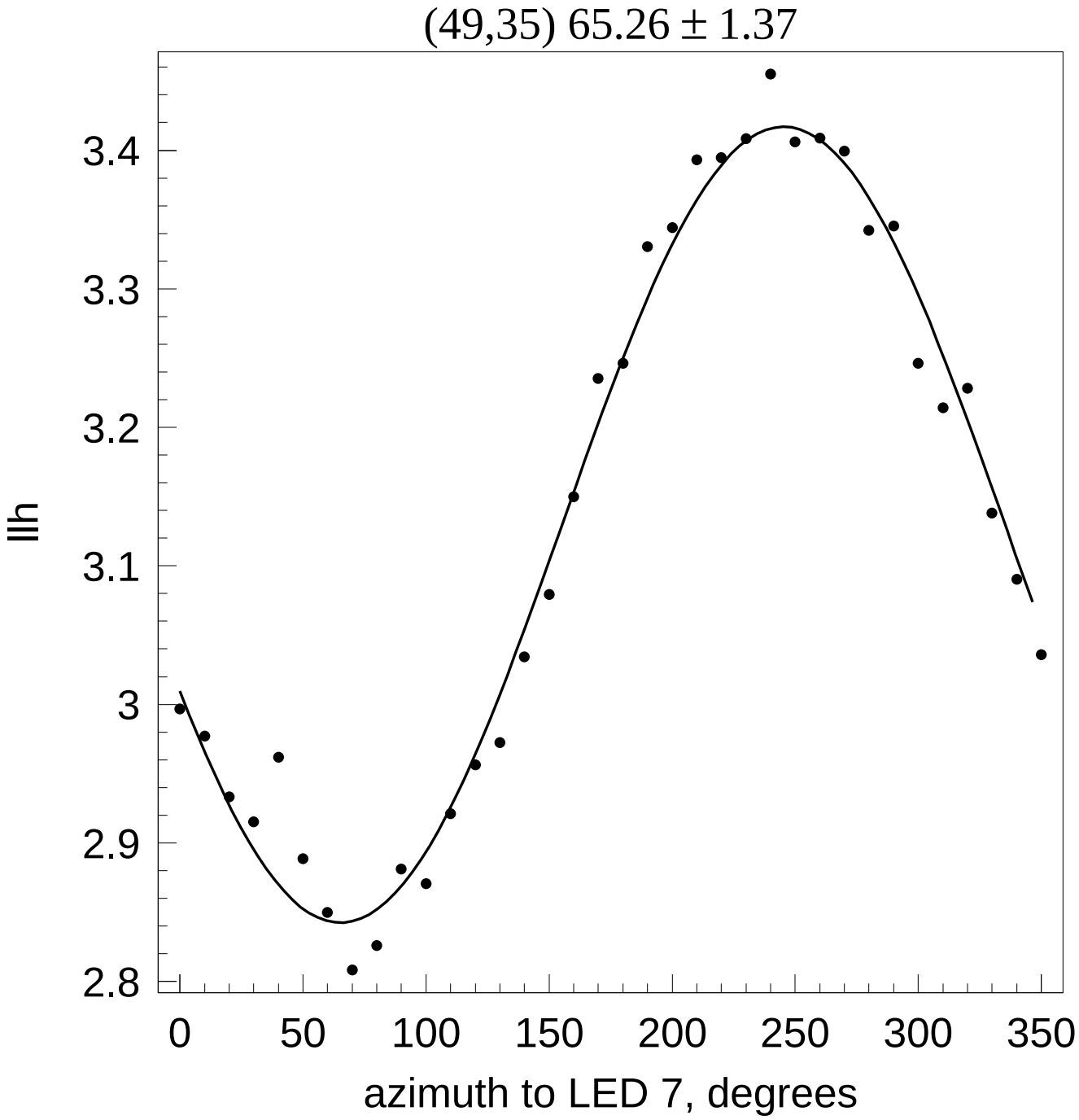

(49,34) 87.57 ± 0.92
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

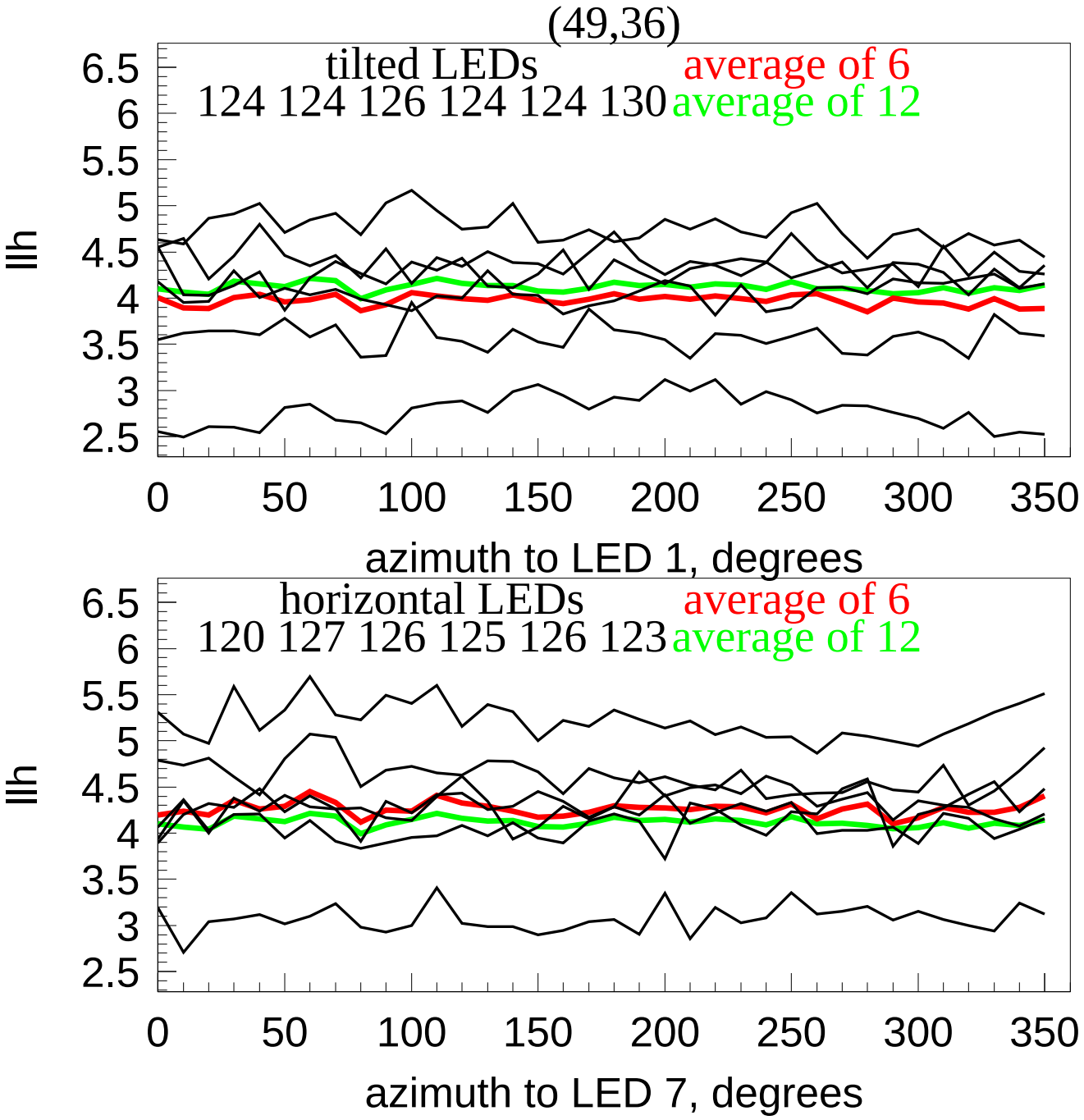

(49,34) 87.69 ± 0.91
2.6
2.5
2.4
2.3
2.2
2.1
2
lllh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

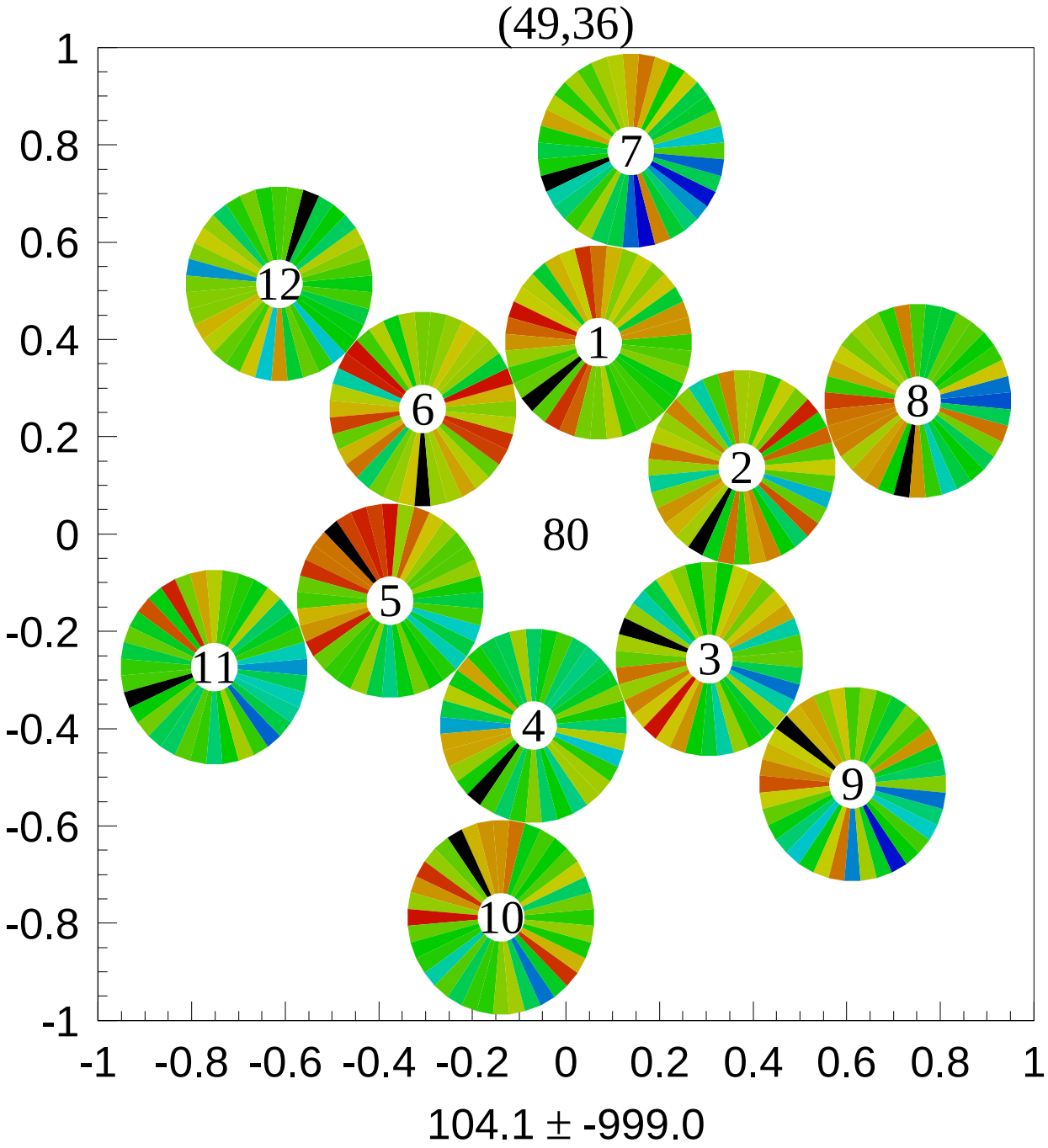

(49,35)
tilted LEDs
121 126 126 128 126 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
113 124 125 123 134 133
average of 6
average of 12
llh
azimuth to LED 7, degrees

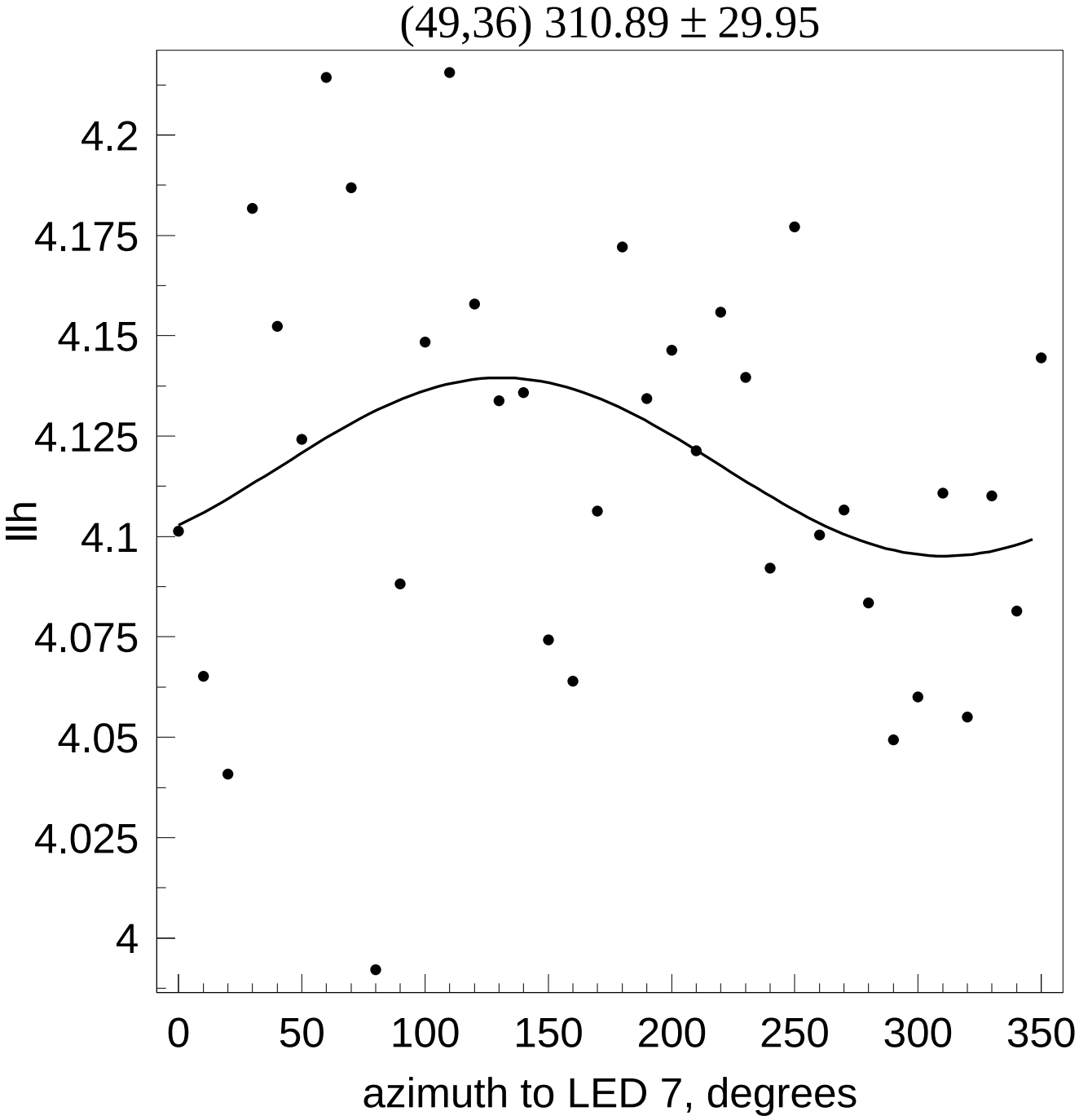

(49,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
70
7
12
1
6
2
8
5
11
3
4
9
10
70.8 ± 29.3

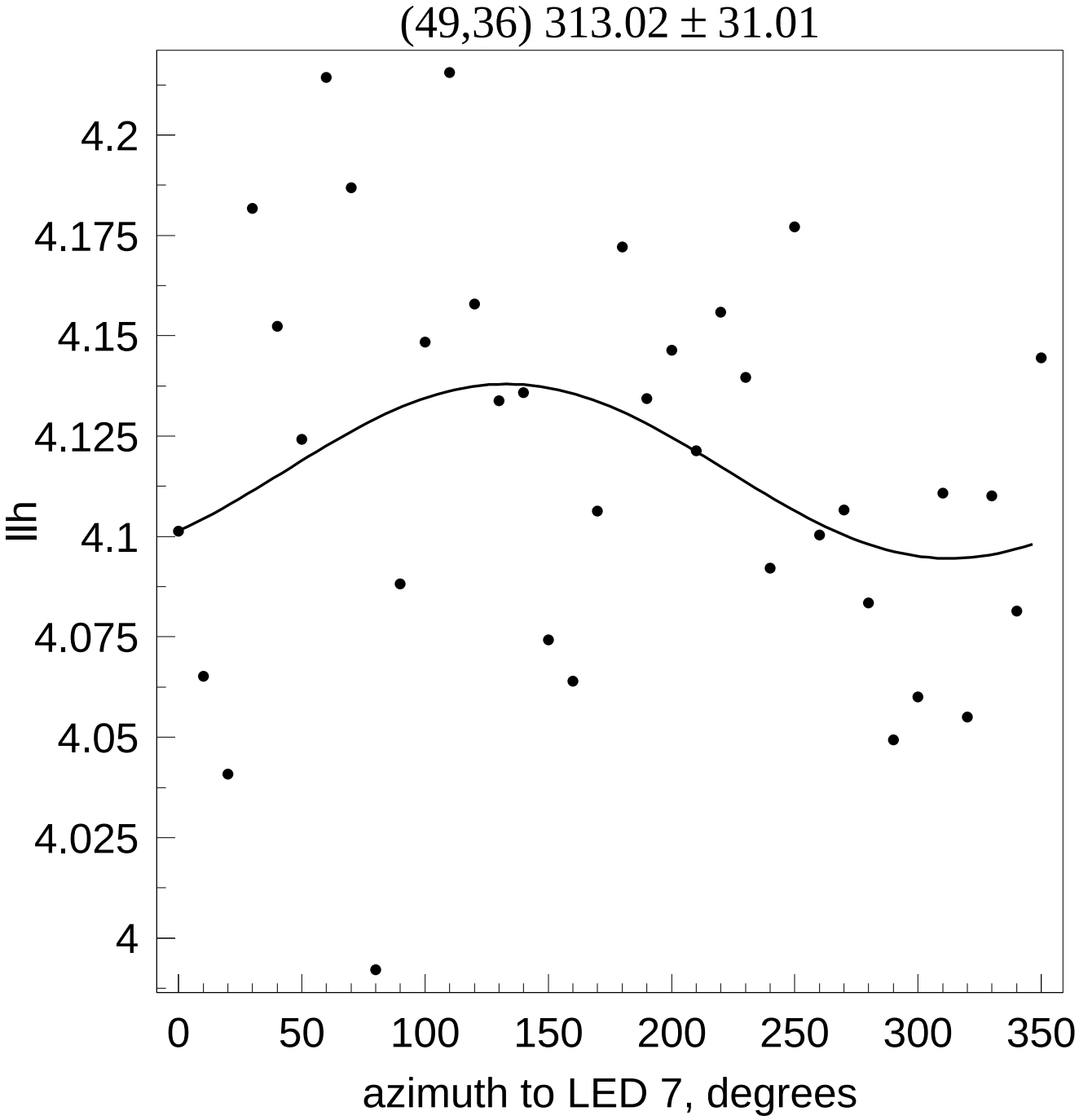

(49,35) 64.92 ± 1.33
llh
3.4
3.3
3.2
3.1
3
2.9
2.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

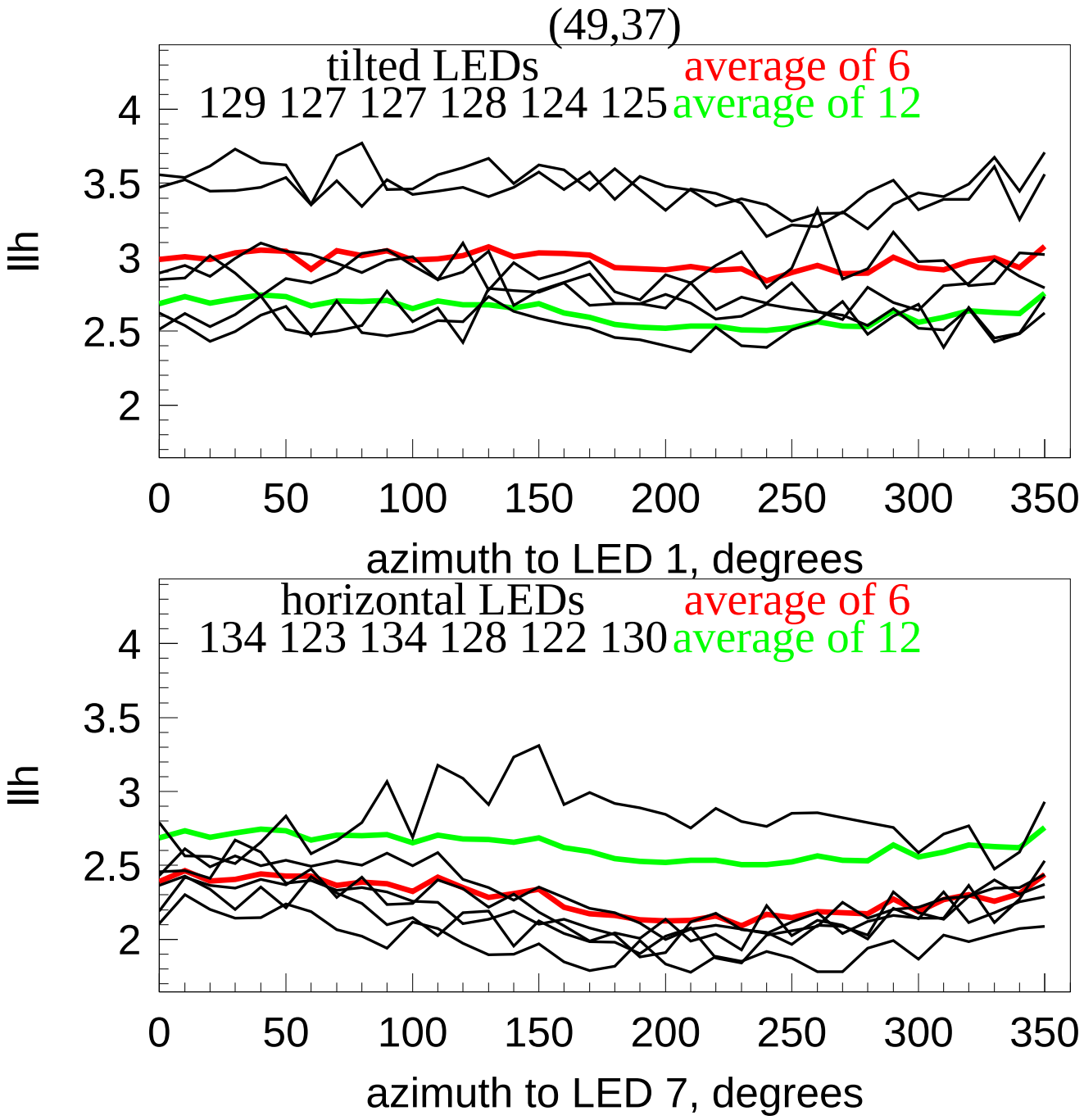

(49,35) 65.26 ± 1.37
llh
3.4
3.3
3.2
3.1
3
2.9
2.8
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

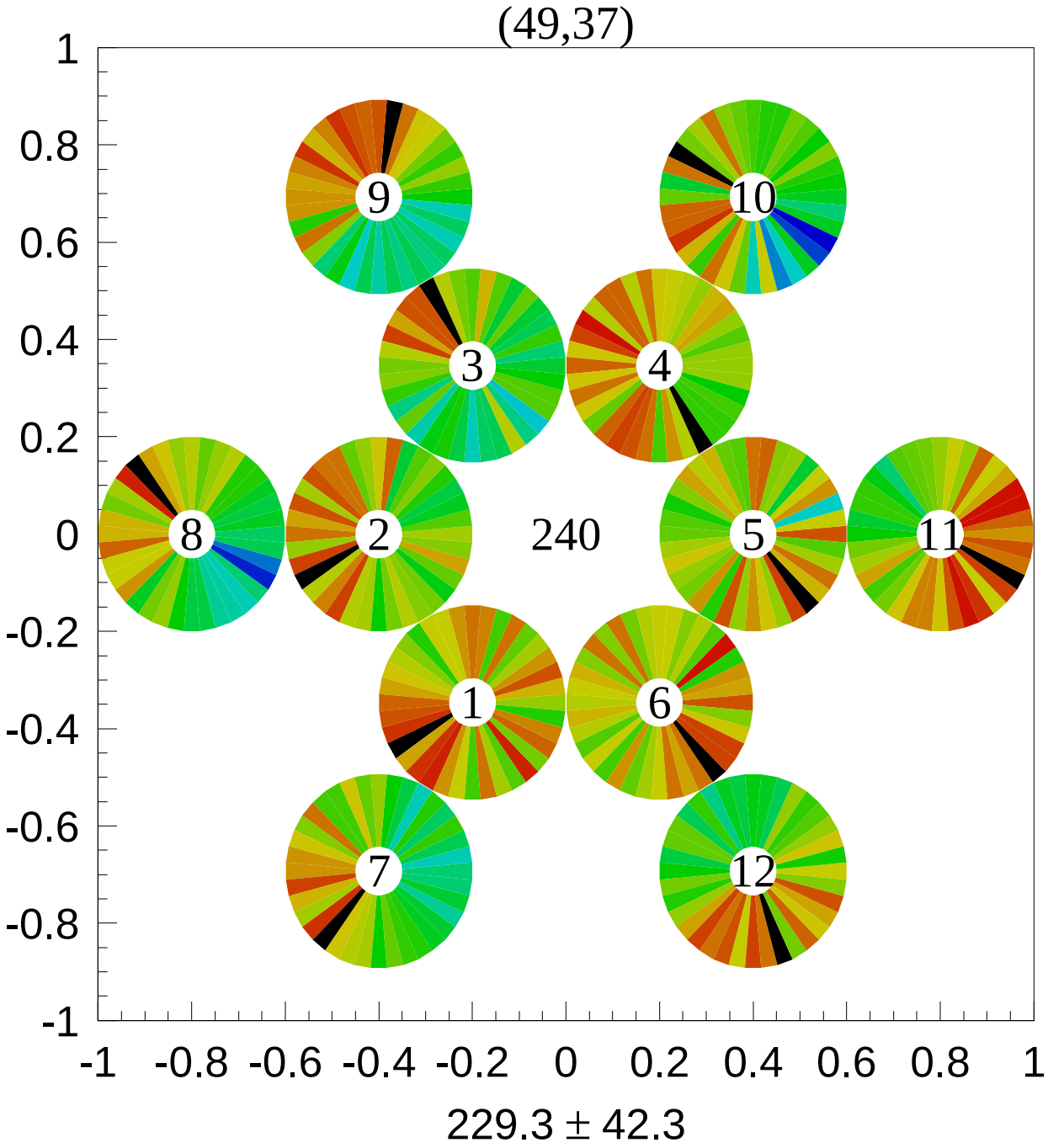

(49,36)
tilted LEDs
124 124 126 124 124 130
average of 6
average of 12
IIh
6.5
6
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
120 127 126 125 126 123
average of 6
average of 12
IIh
azimuth to LED 7, degrees

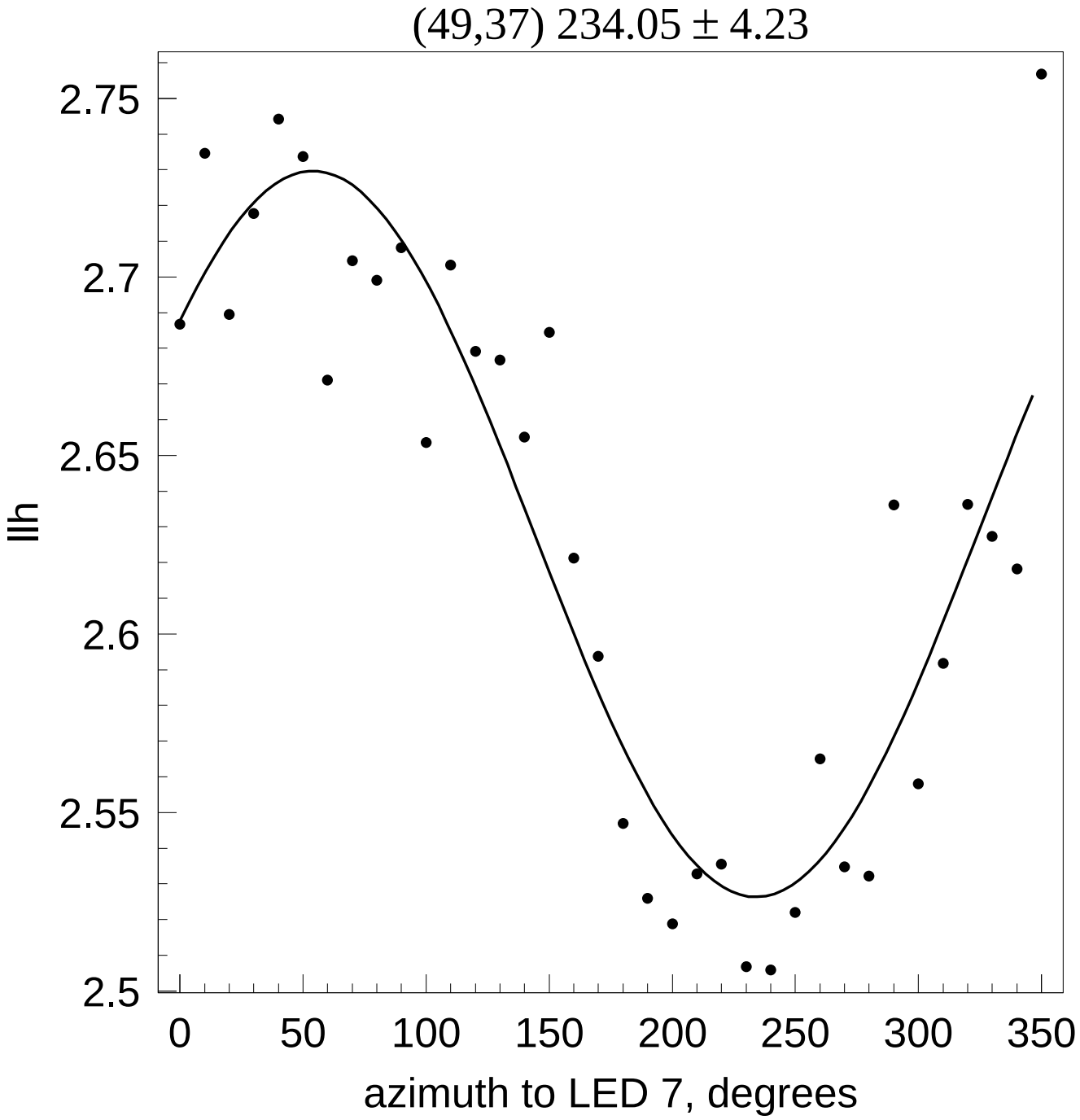

(49,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
104.1 ± -999.0
7
12
1
6
8
2
80
5
11
3
4
9
10

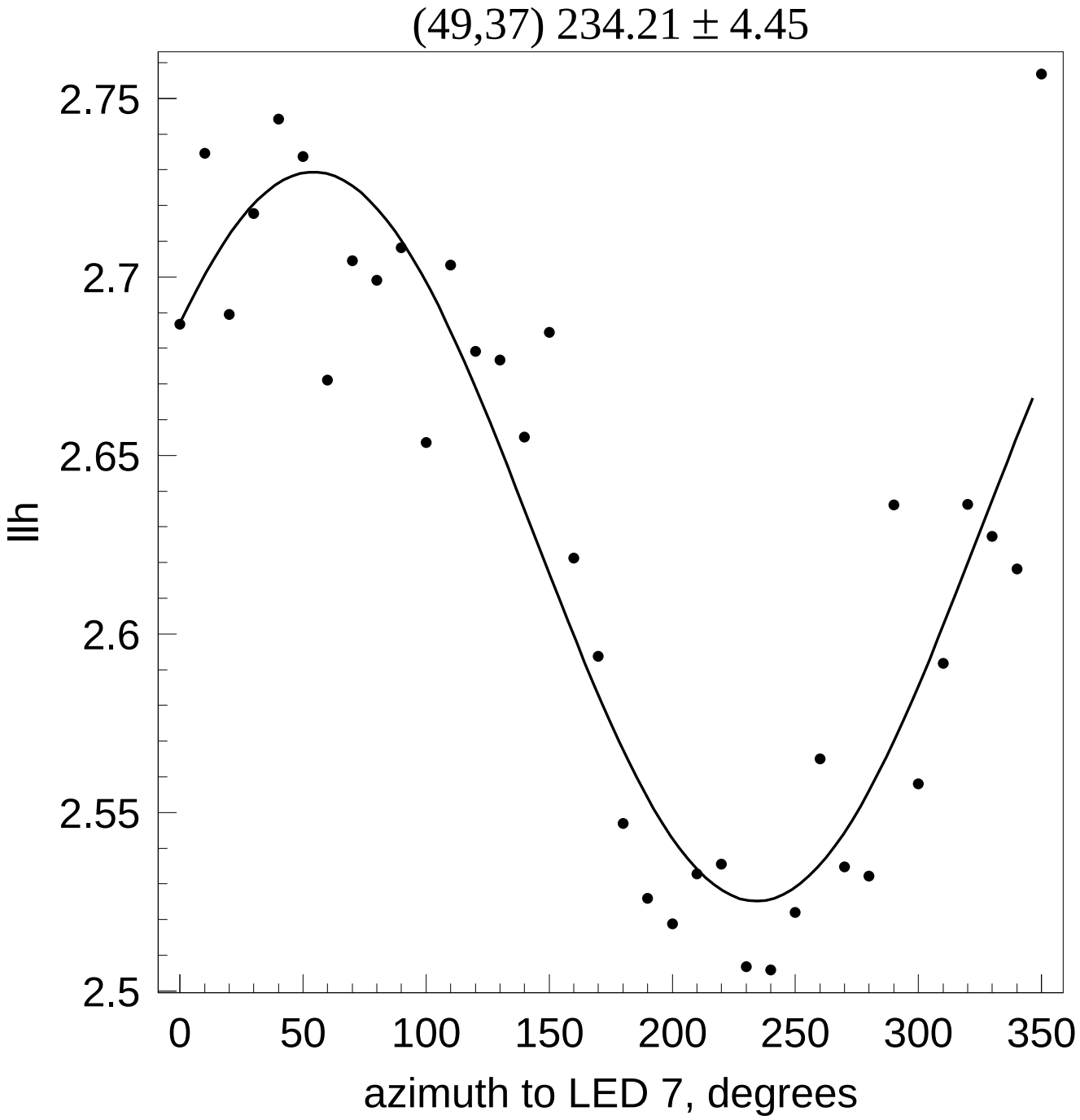

(49,36) 310.89 ± 29.95
4.2
4.175
4.15
4.125
4.1
4.075
4.05
4.025
4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

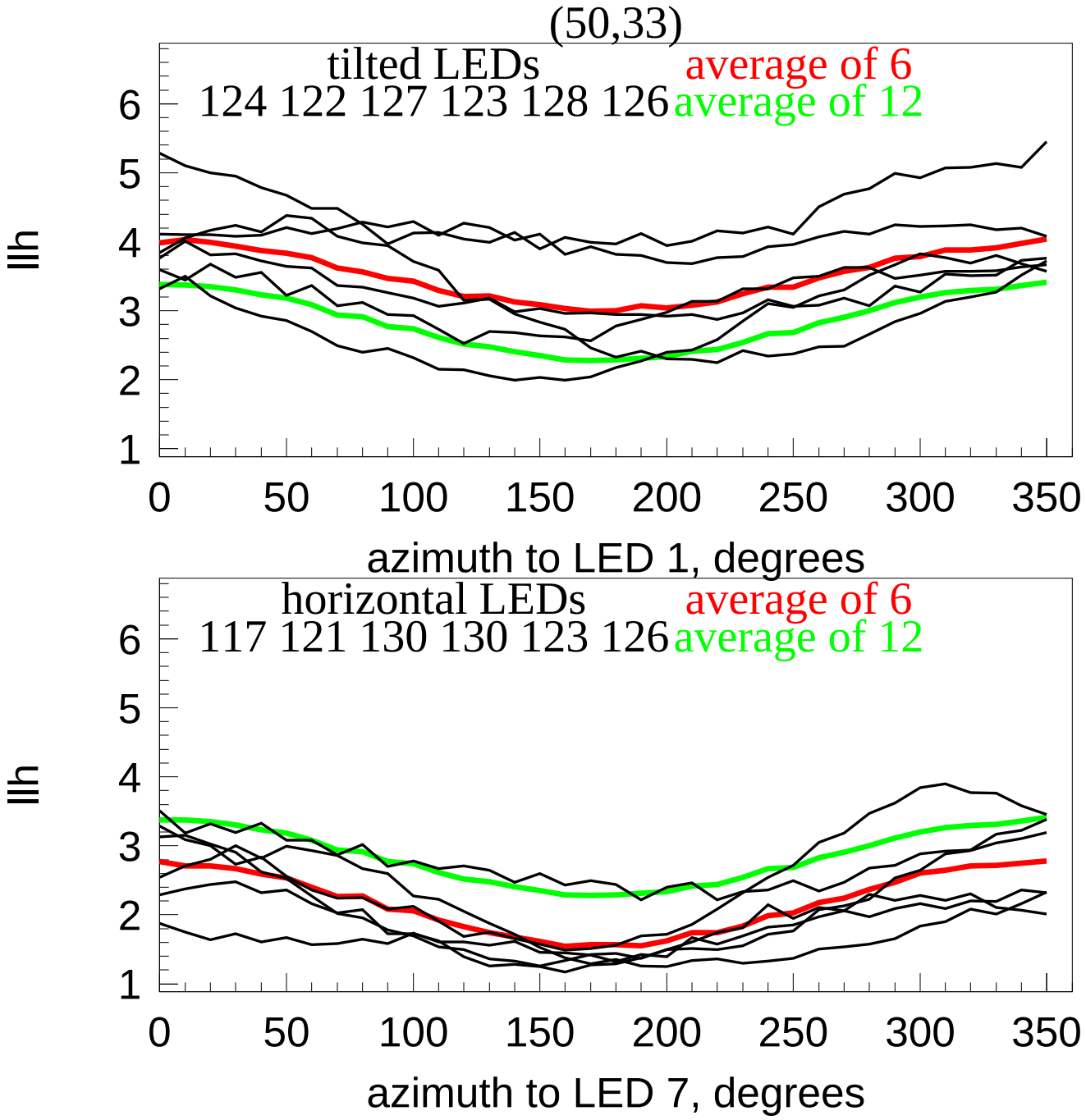

(49,36) 313.02 ± 31.01
4.2
4.175
4.15
4.125
4.1
4.075
4.05
4.025
4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

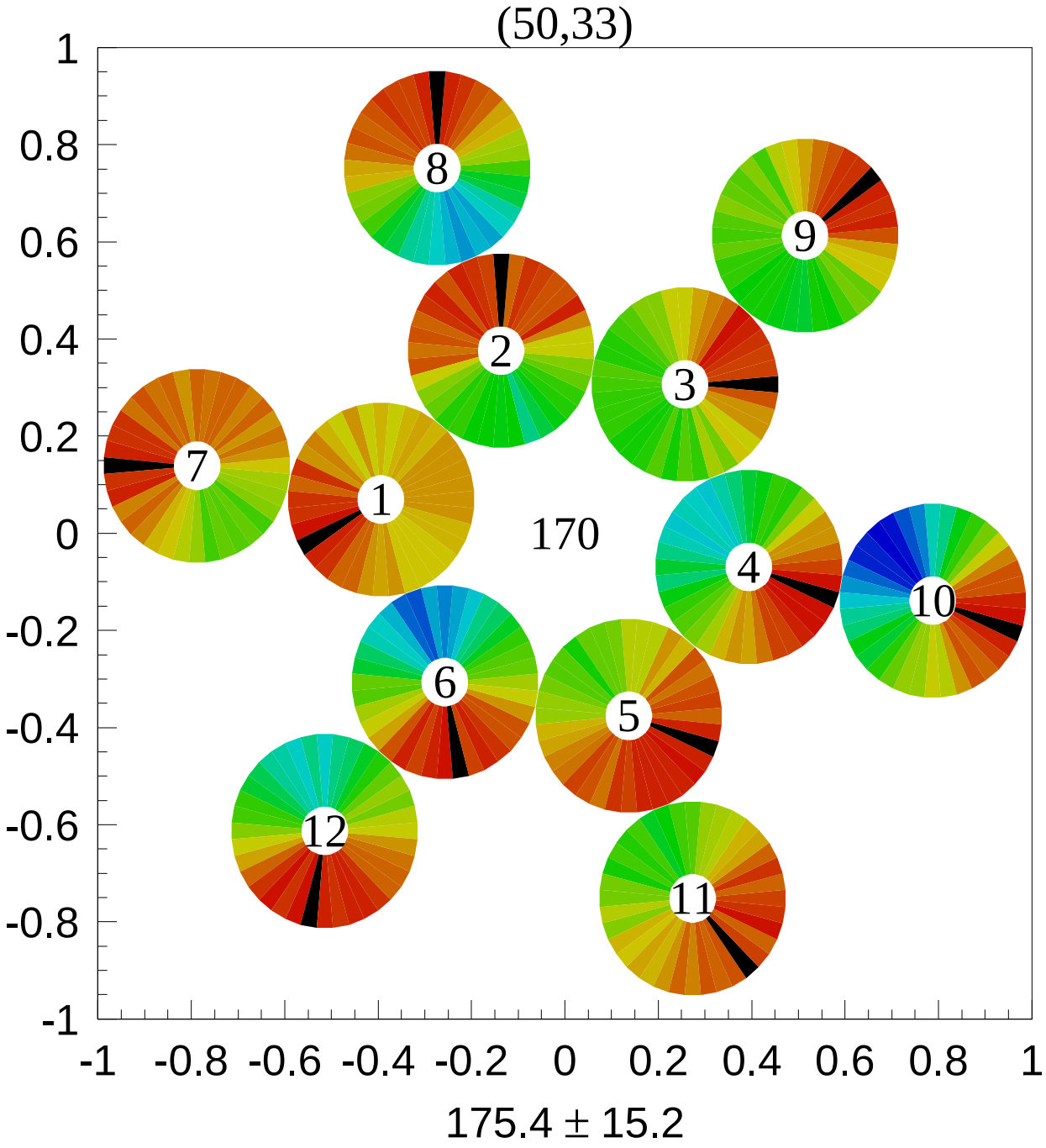

(49,37)
tilted LEDs
129 127 127 128 124 125
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
134 123 134 128 122 130
average of 6
average of 12
IIh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

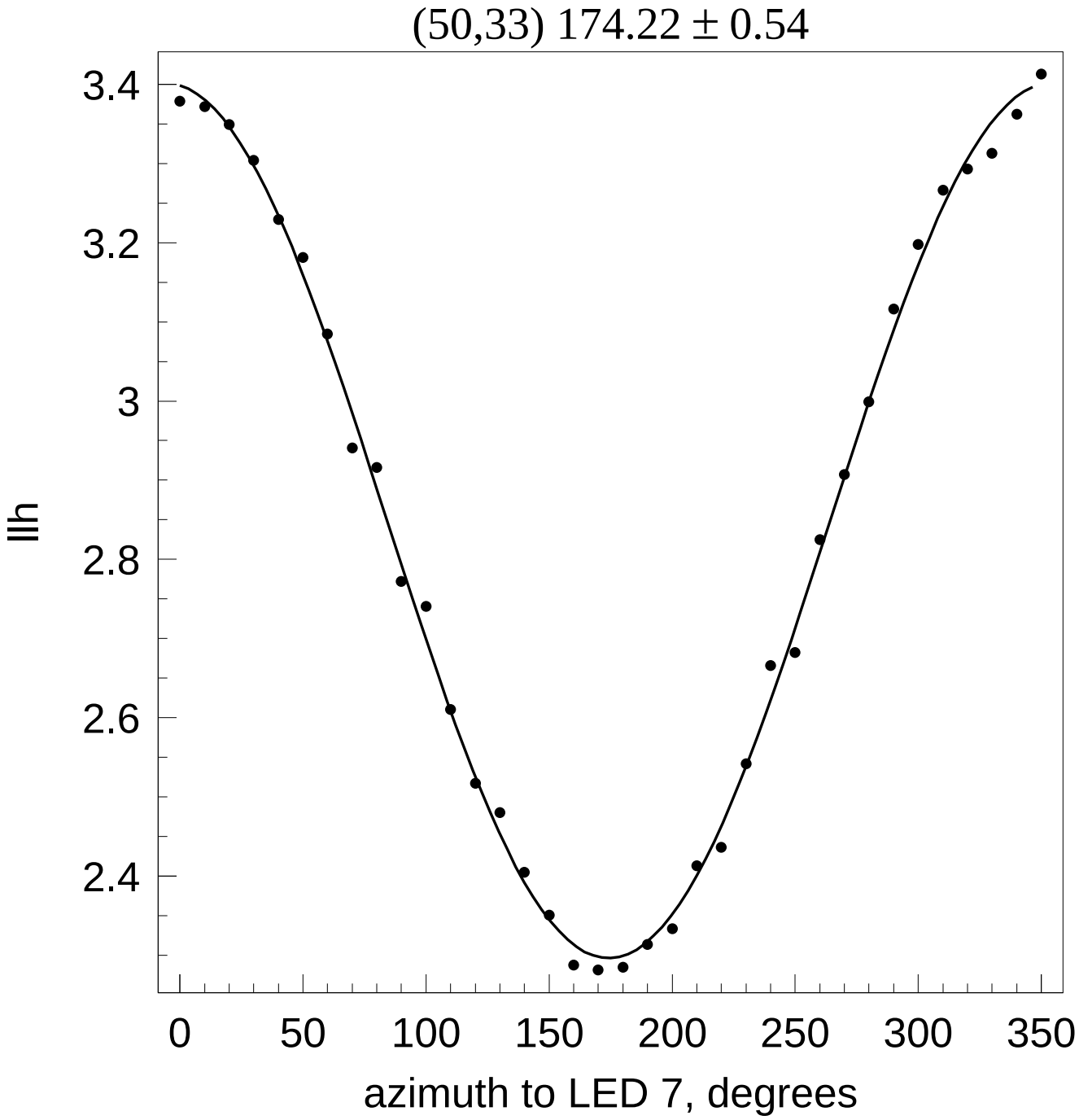

(49,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
229.3 ± 42.3

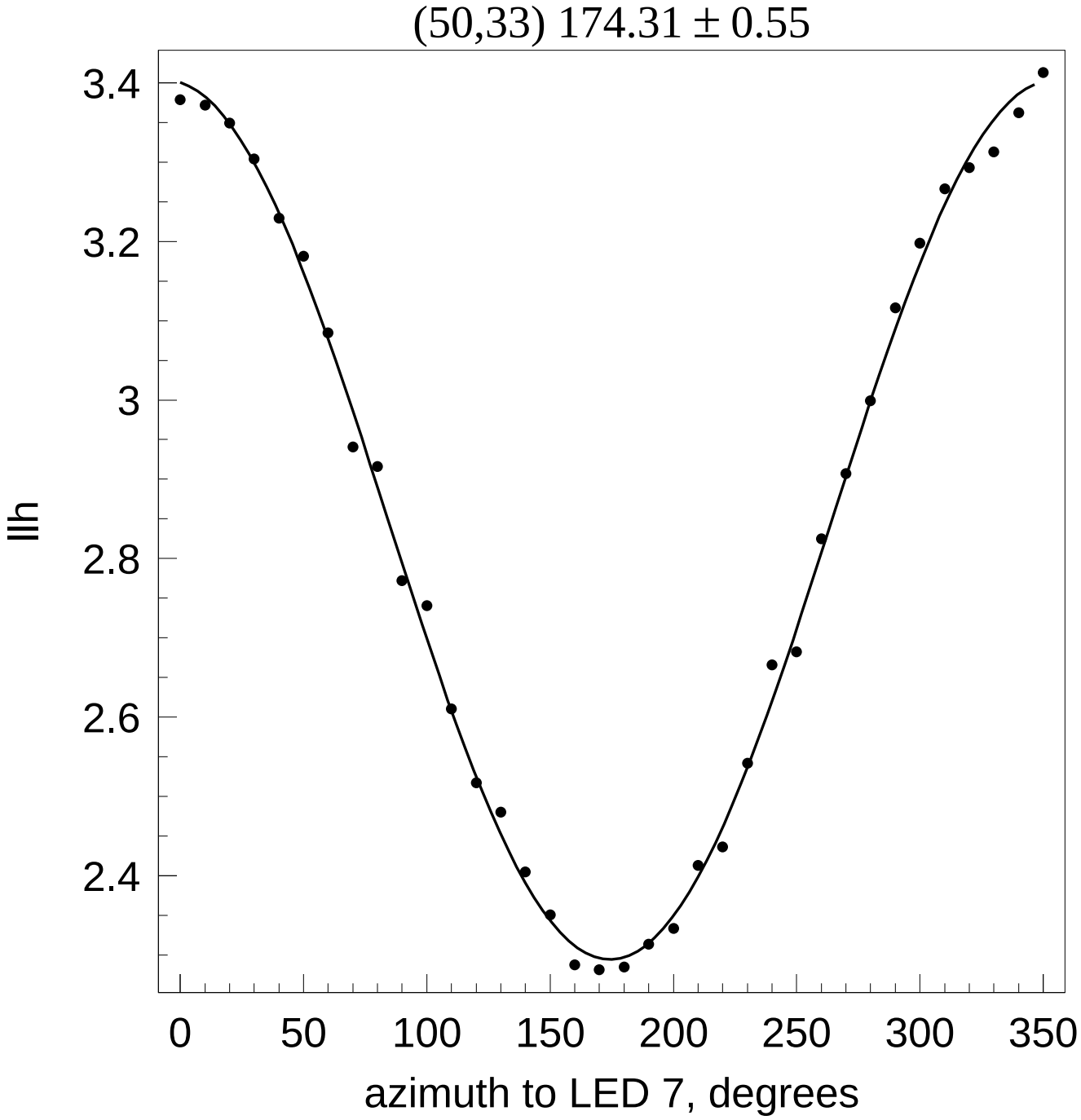

(49,37) 234.05 ± 4.23
2.75
2.7
2.65
2.6
2.55
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

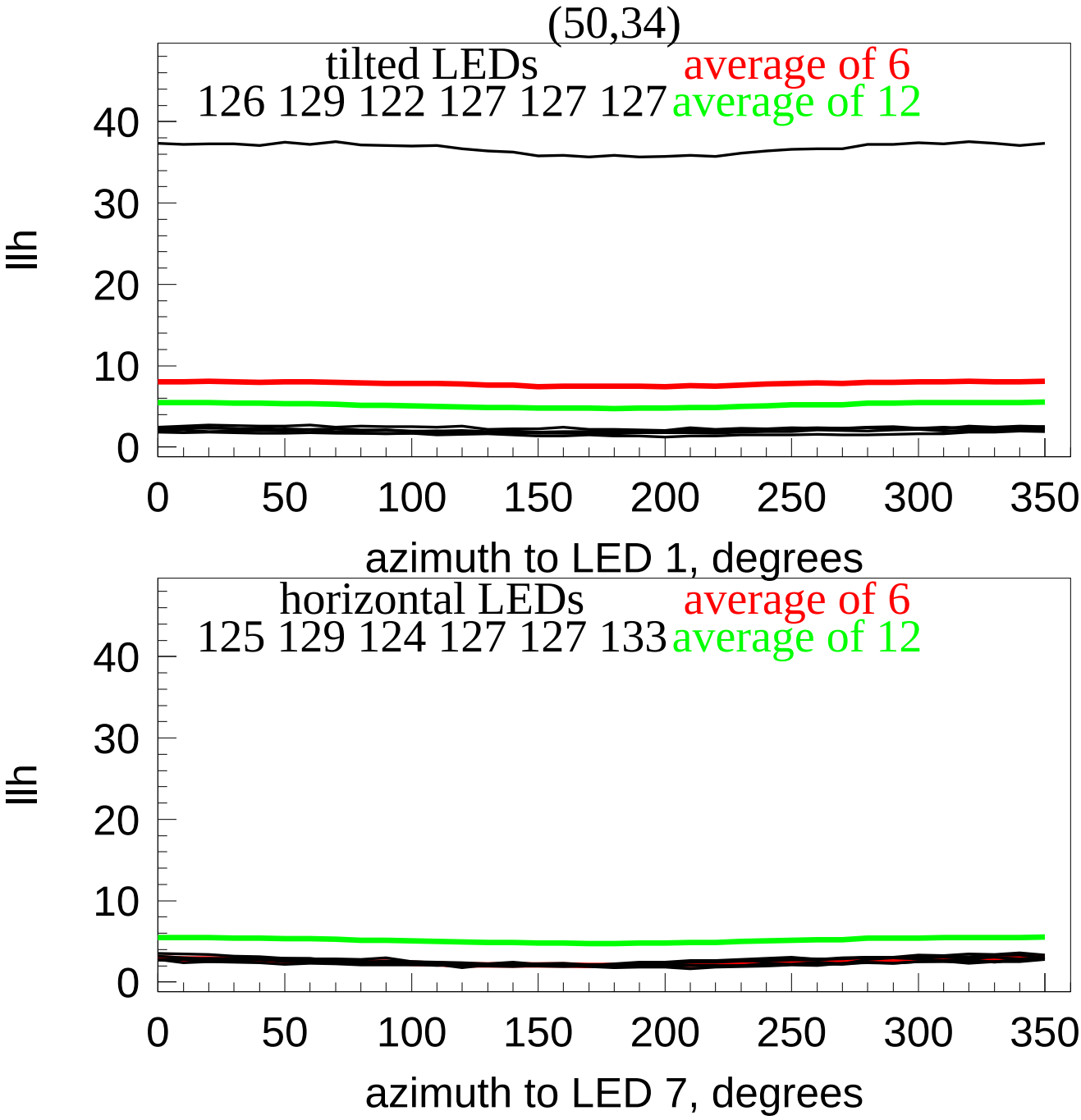

(49,37) 234.21 ± 4.45
2.75
2.7
2.65
2.6
2.55
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

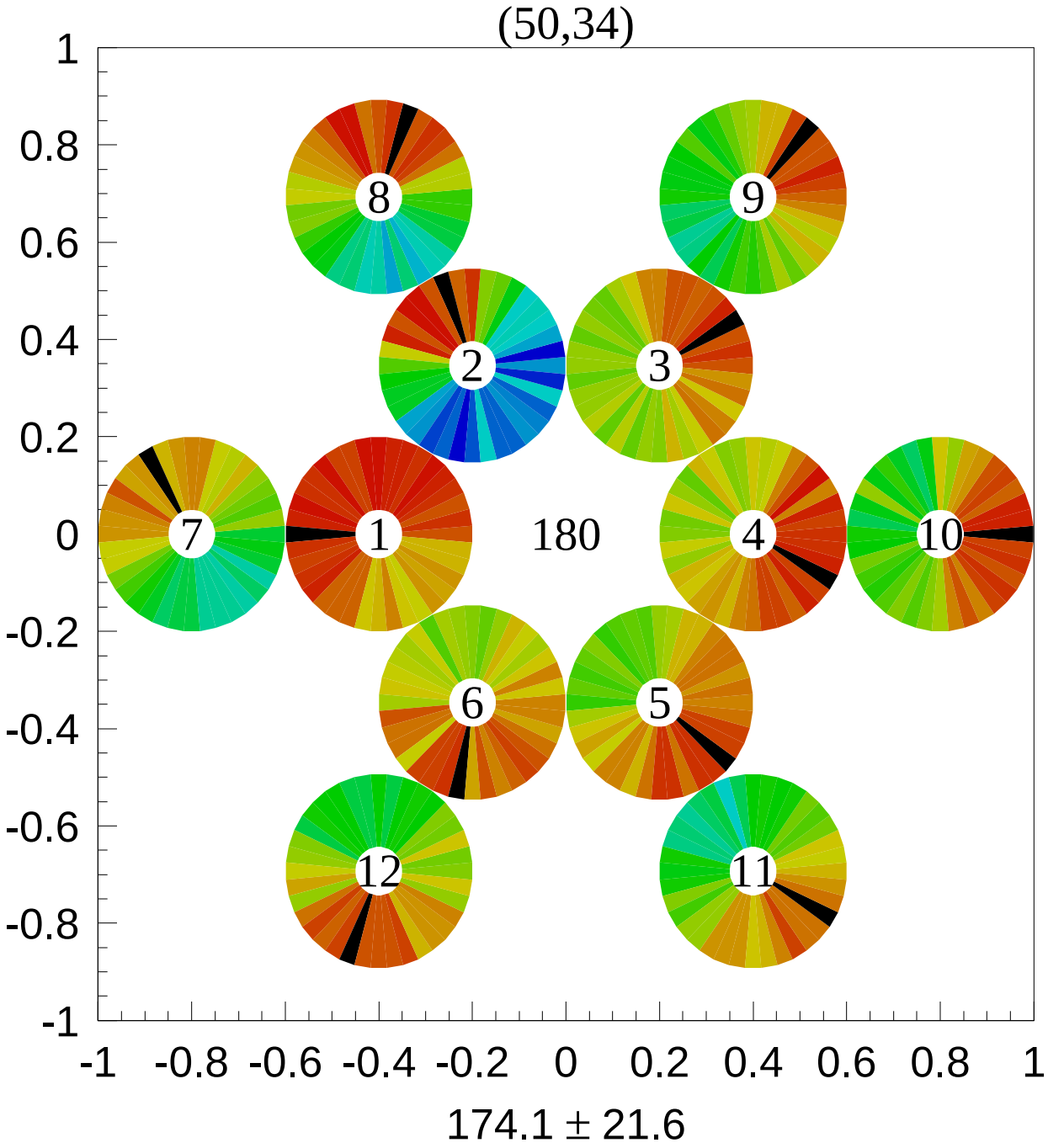

(50,33)
tilted LEDs
124 122 127 123 128 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
117 121 130 130 123 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

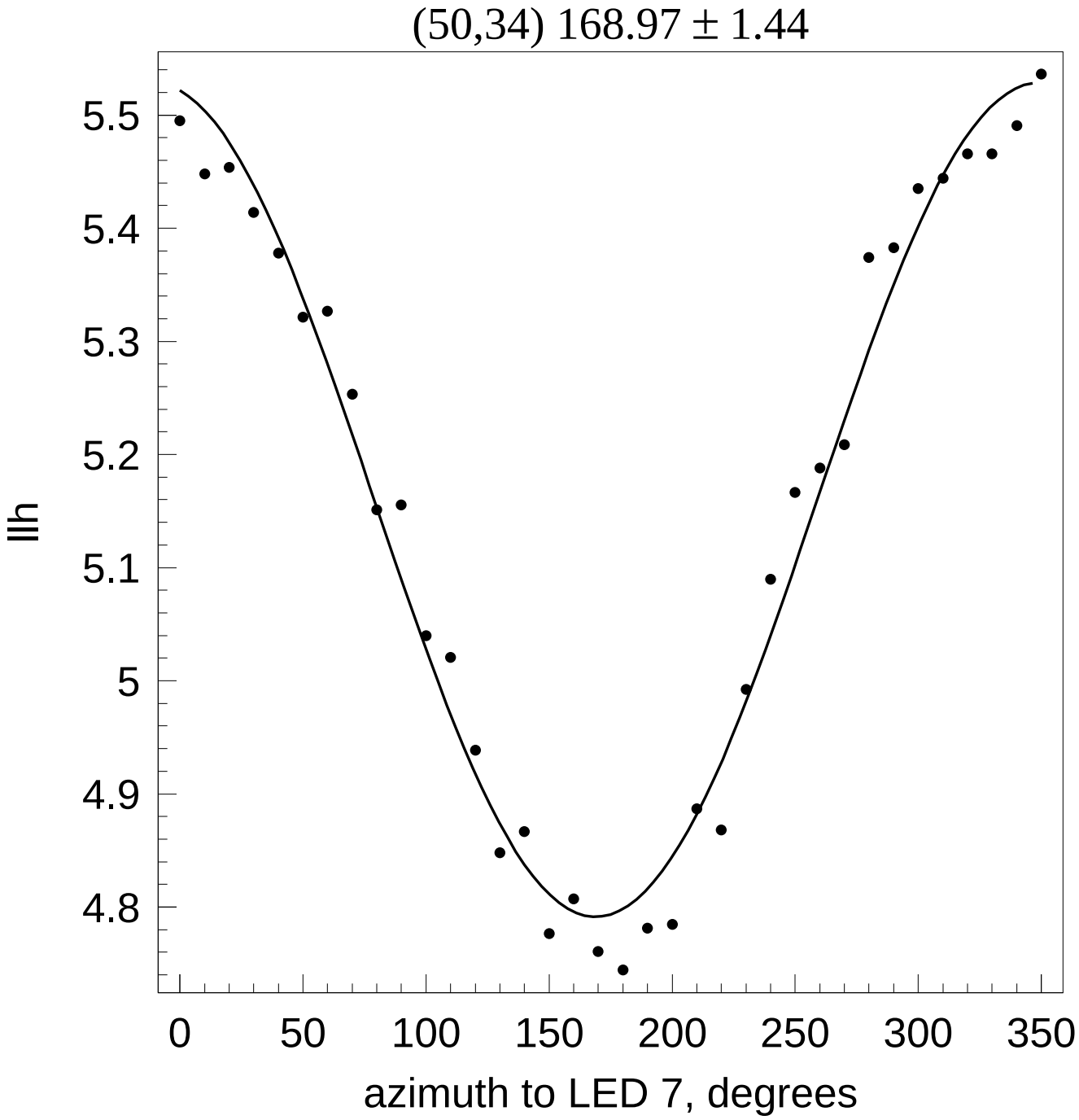

(50,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
175.4 ± 15.2

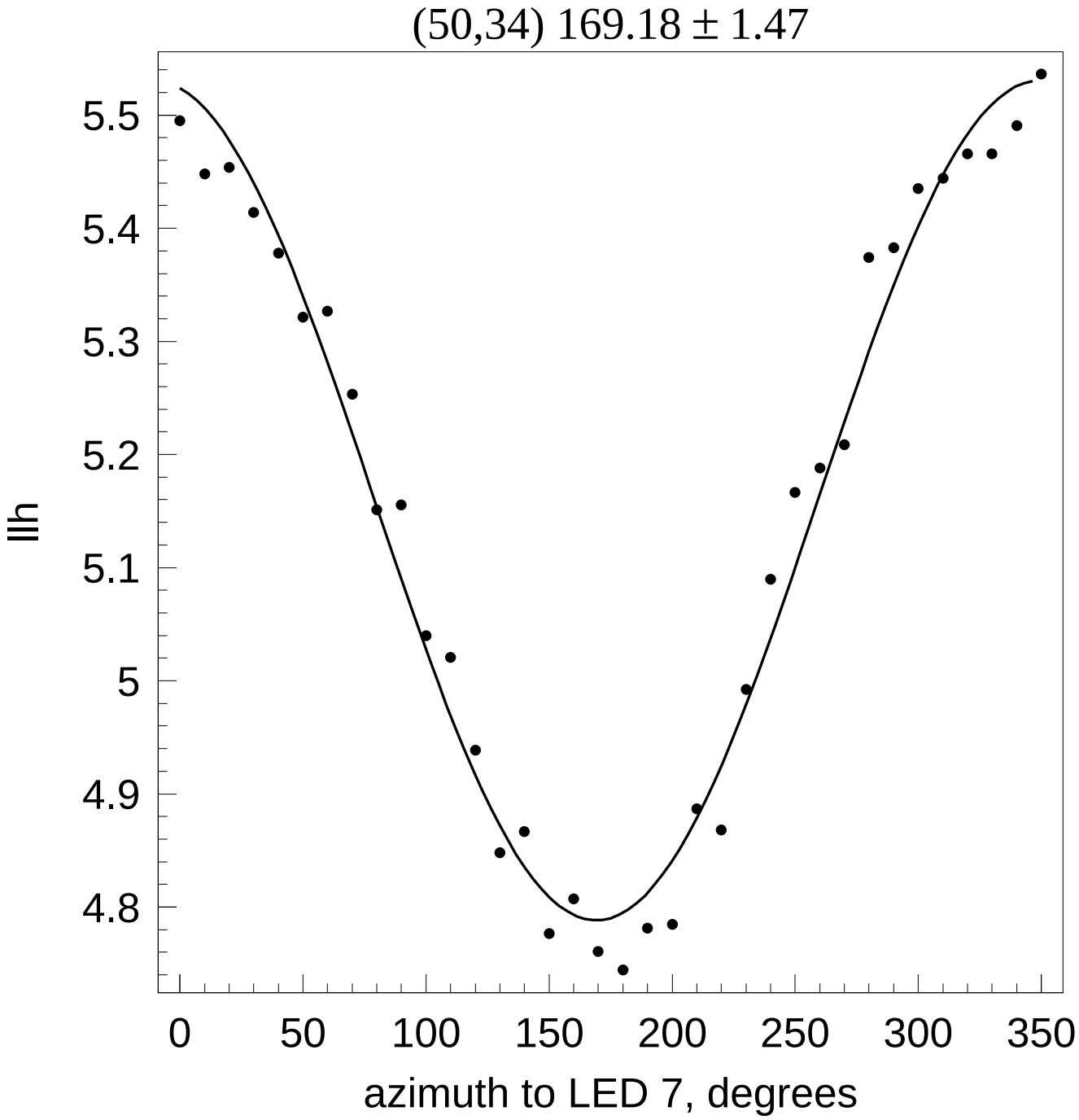

(50,33) 174.22 ± 0.54
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

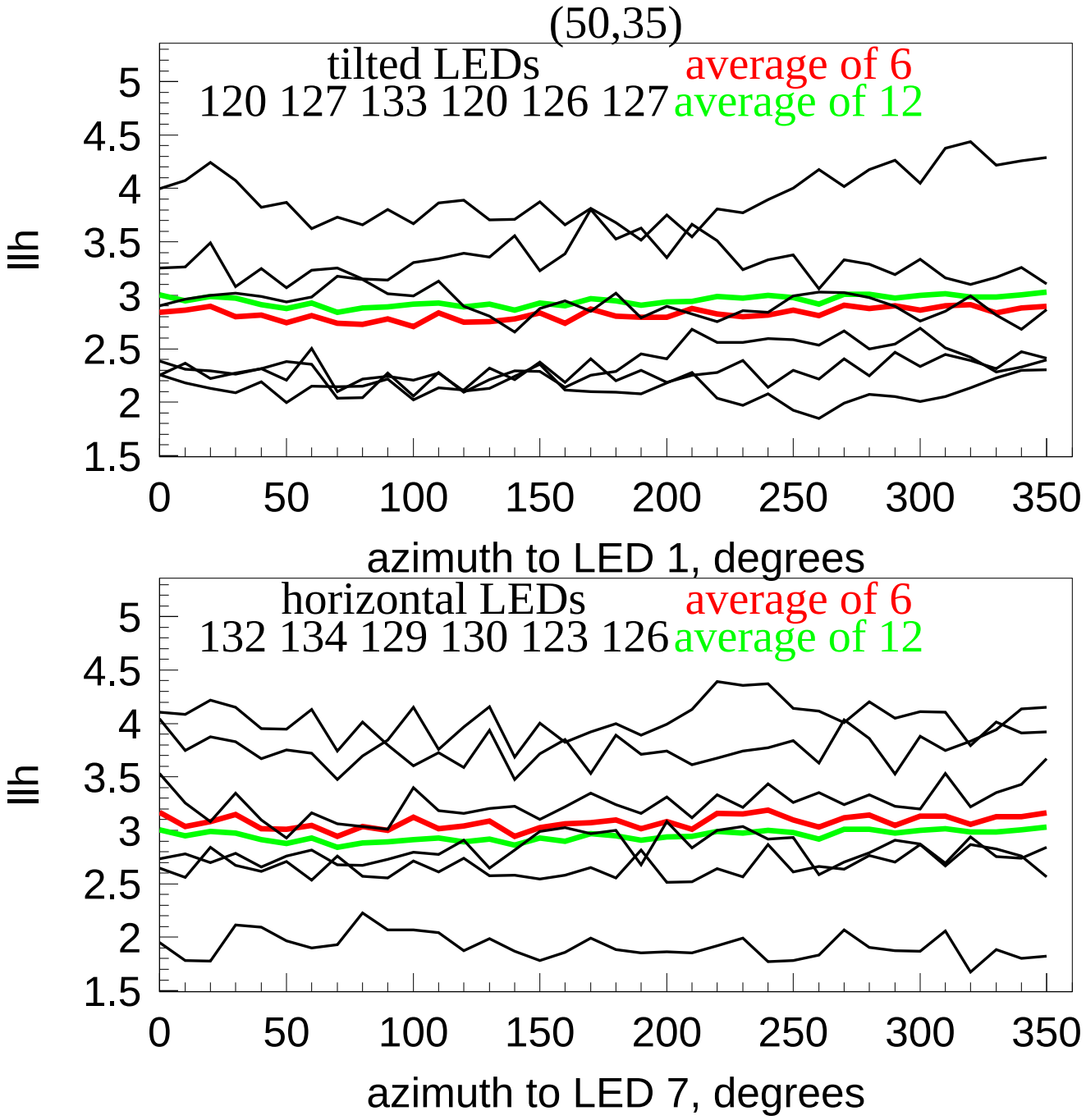

(50,33) 174.31 ± 0.55
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

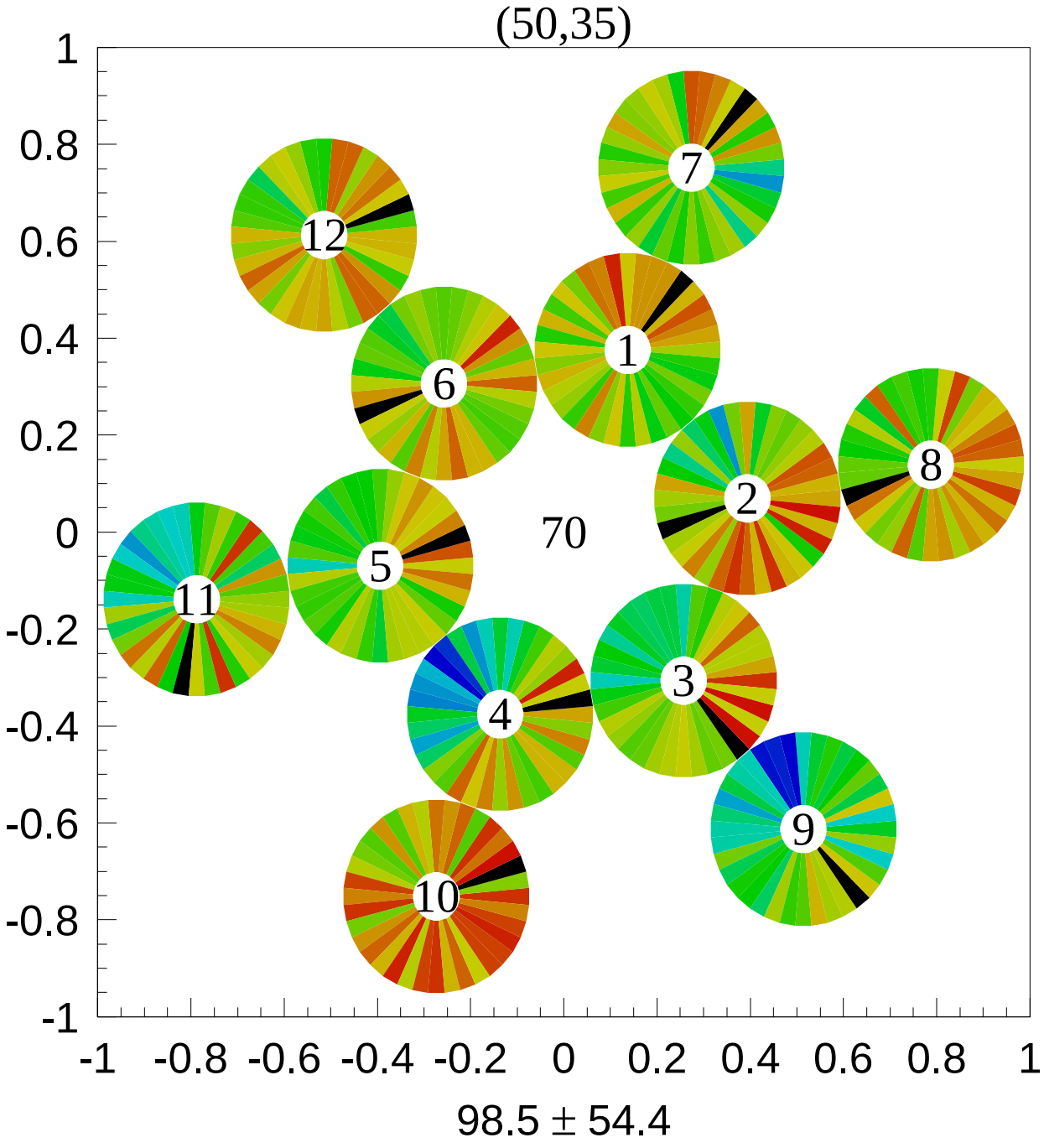

(50,34)
tilted LEDs
126 129 122 127 127 127
average of 6
average of 12
llh
0
10
20
30
40
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 129 124 127 127 133
average of 6
average of 12
llh
0
10
20
30
40
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

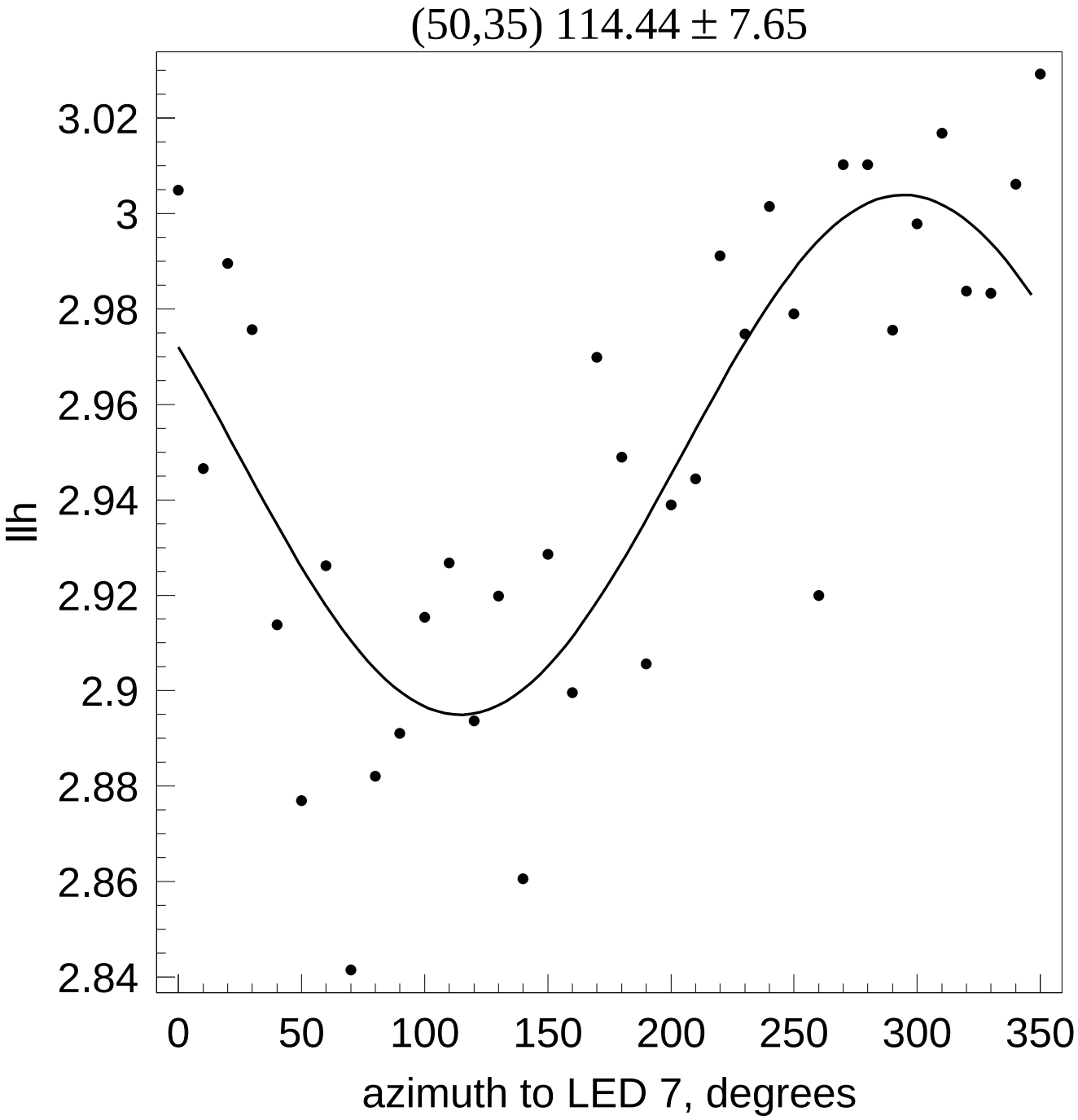

(50,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
174.1 ± 21.6

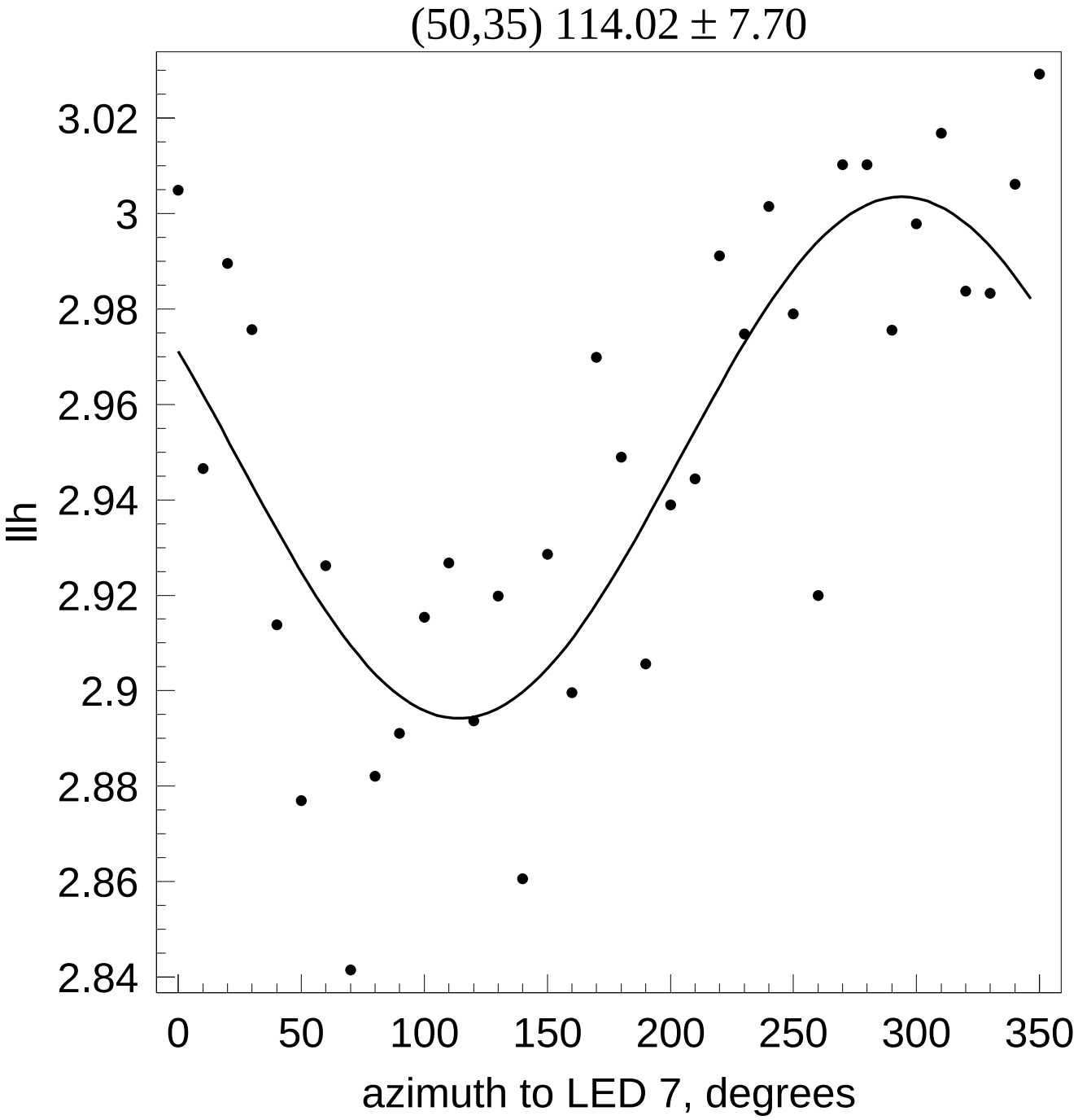

(50,34) 168.97 ± 1.44
5.5
5.4
5.3
5.2
5.1
5
4.9
4.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

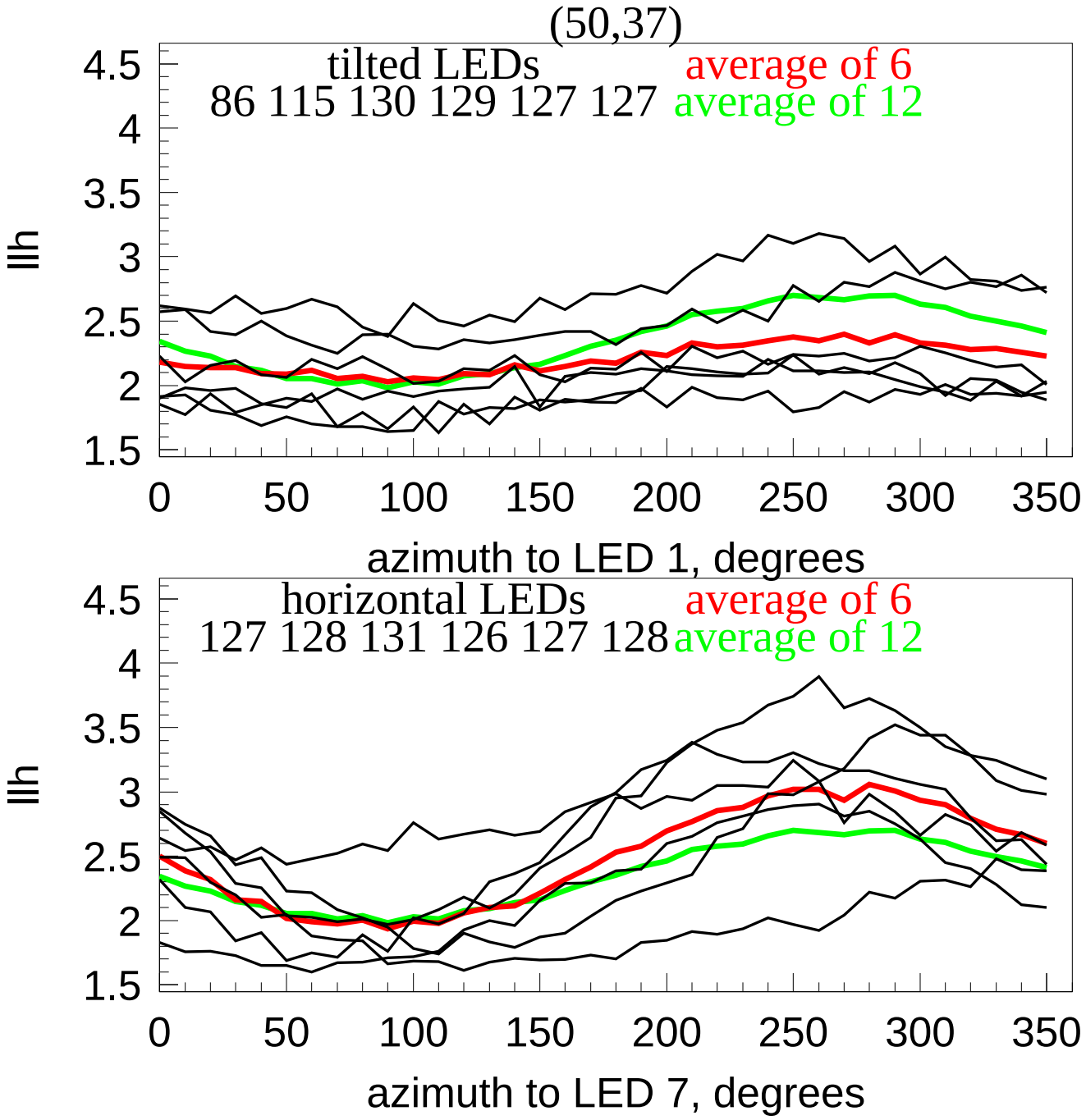

(50,34) 169.18 ± 1.47
5.5
5.4
5.3
5.2
5.1
5
4.9
4.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

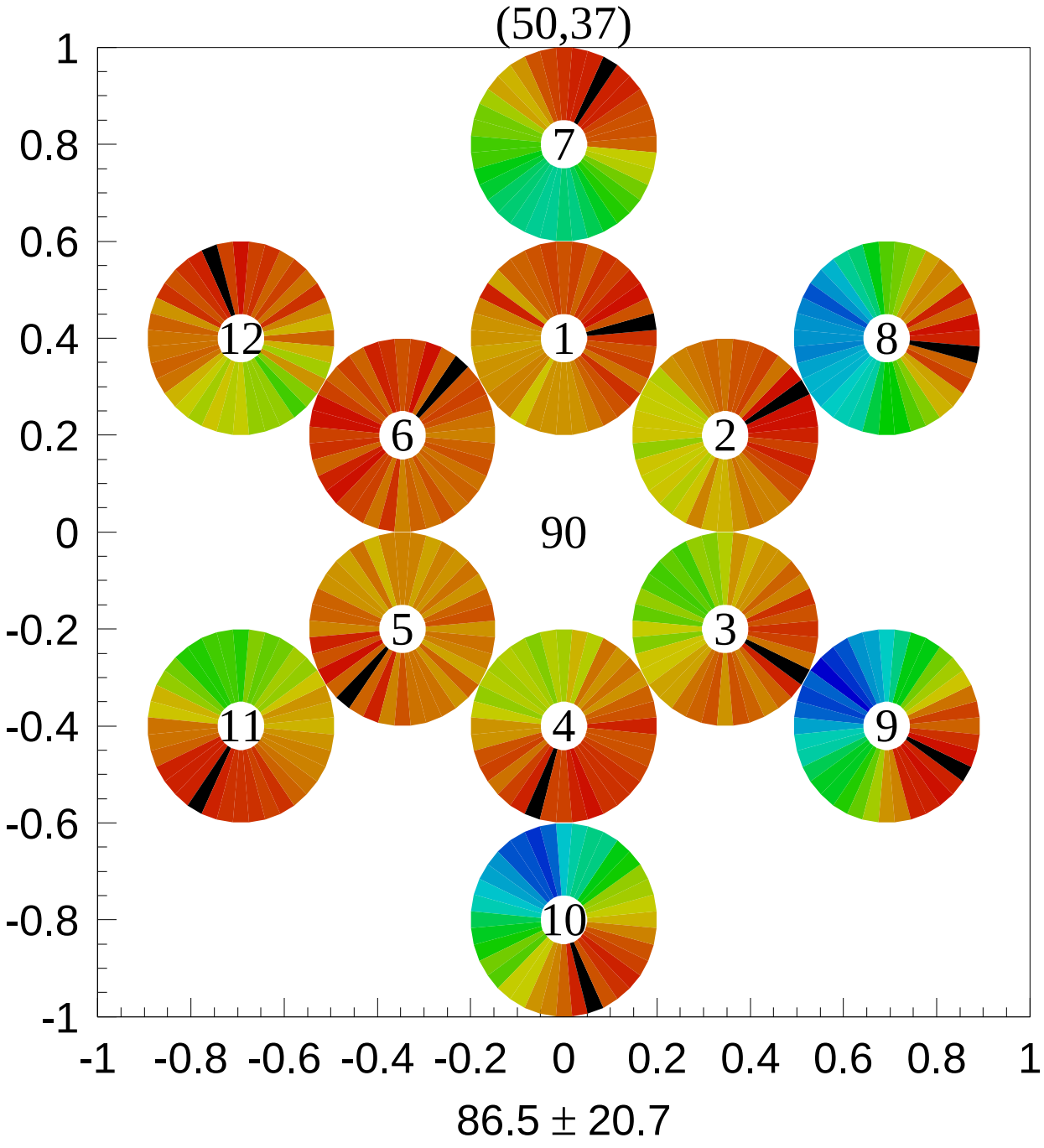

(50,35)
tilted LEDs
120 127 133 120 126 127
average of 6
average of 12
Ilh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 134 129 130 123 126
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

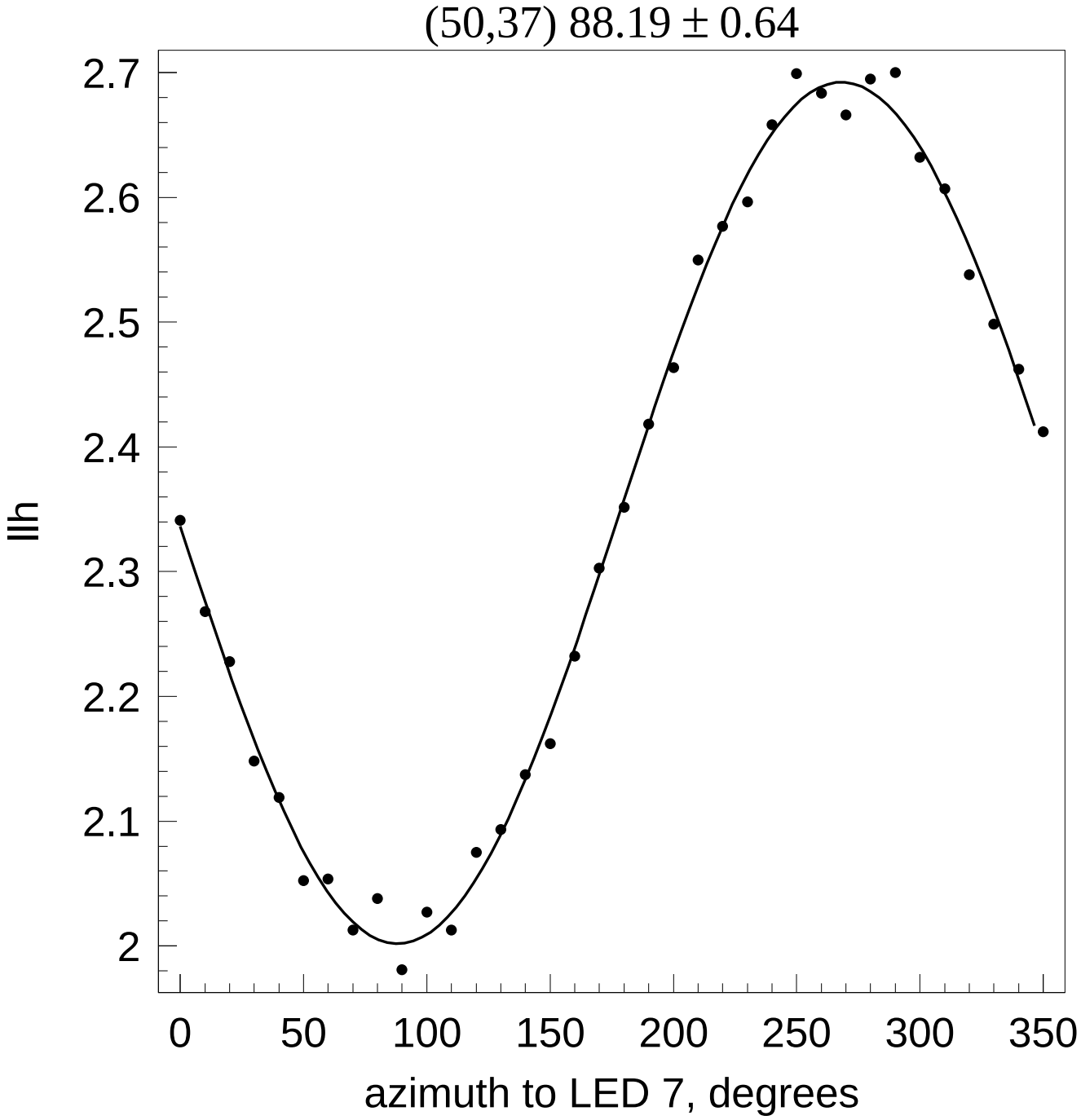

(50,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
2
8
70
5
11
3
4
9
10
98.5 ± 54.4

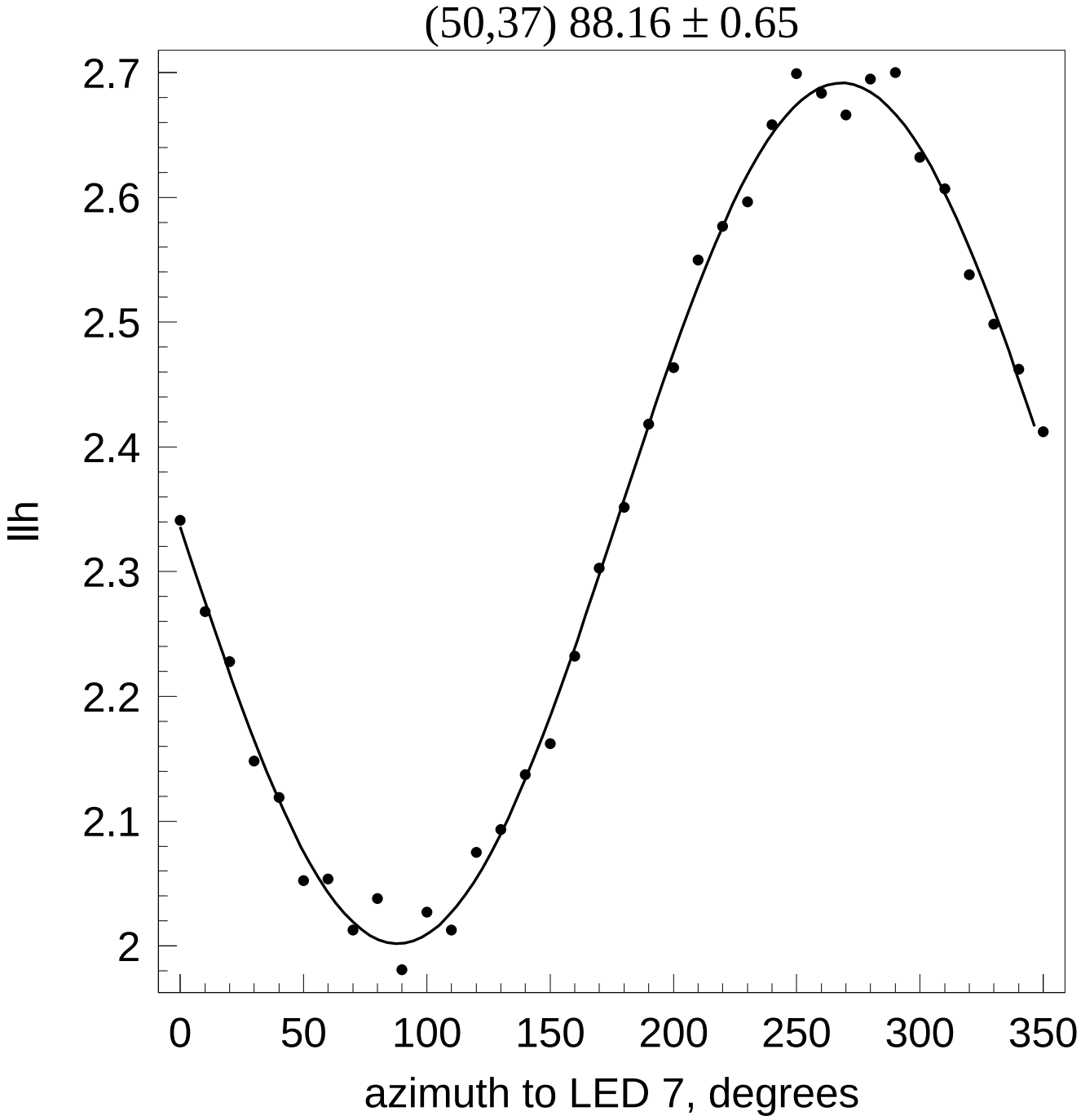

(50,35) 114.44 ± 7.65
3.02
3
2.98
2.96
2.94
2.92
2.9
2.88
2.86
2.84
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

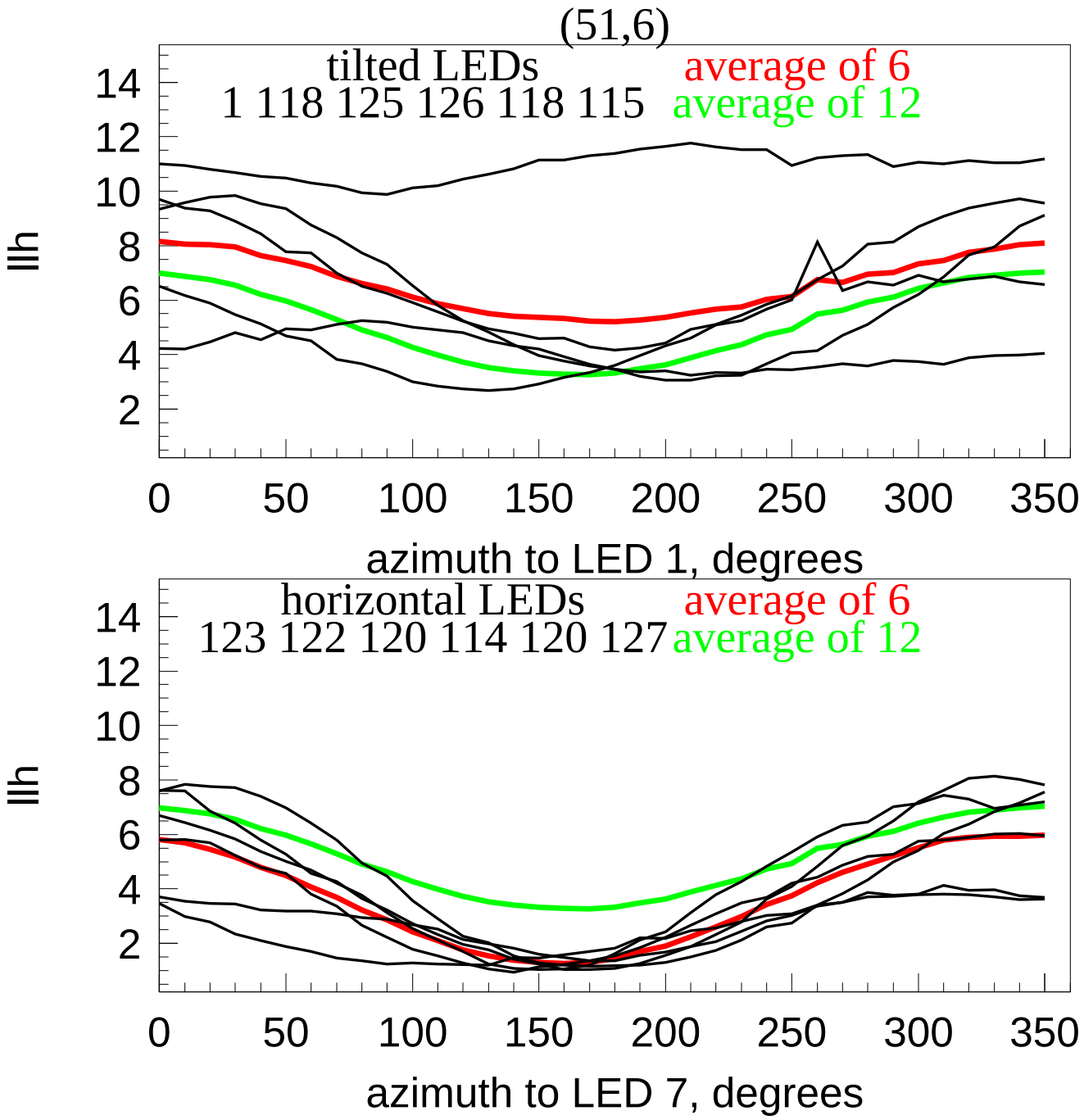

(50,35) 114.02 ± 7.70
3.02
3
2.98
2.96
2.94
2.92
2.9
2.88
2.86
2.84
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

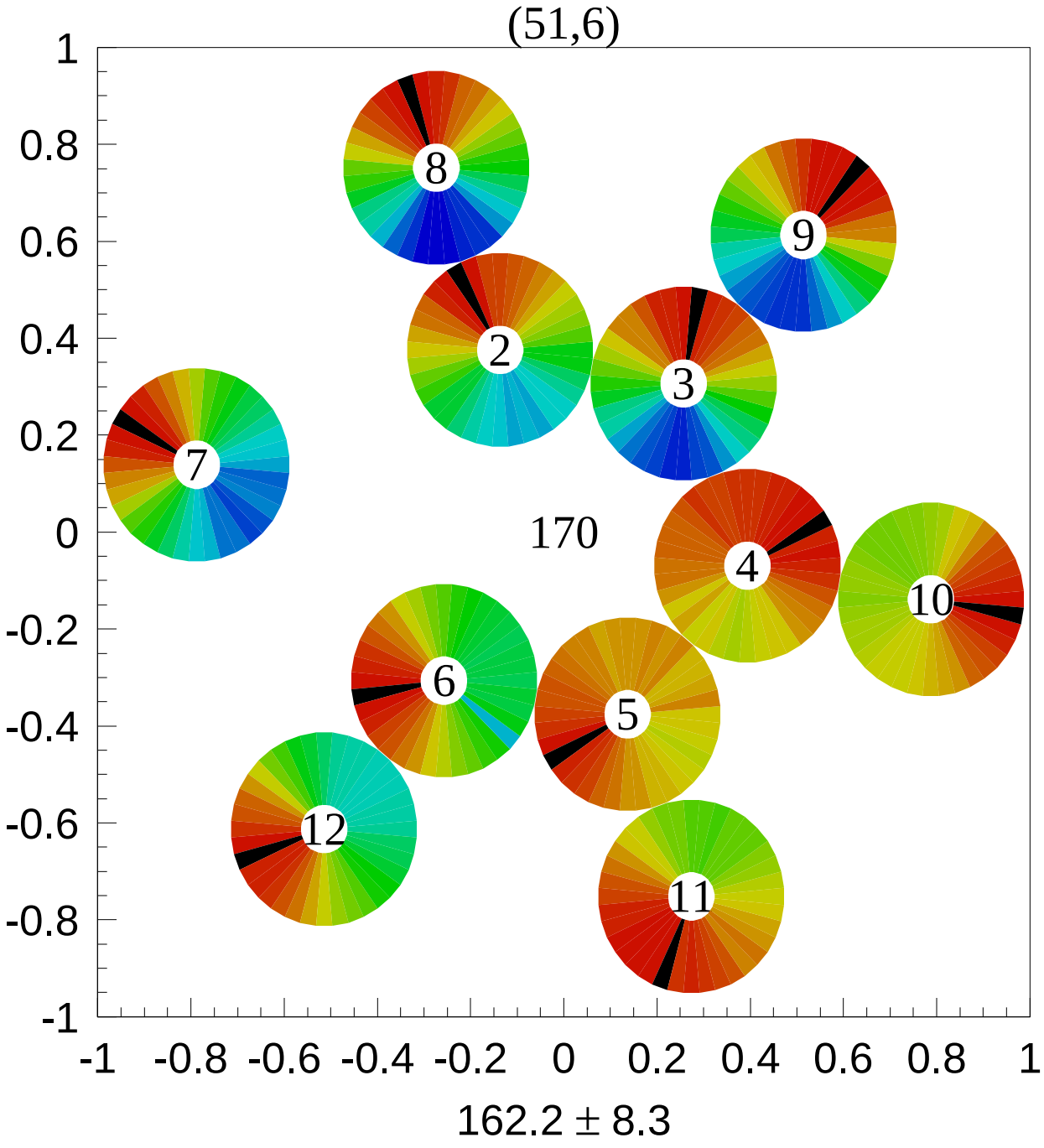

(50,37)
tilted LEDs
86 115 130 129 127 127
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 128 131 126 127 128
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

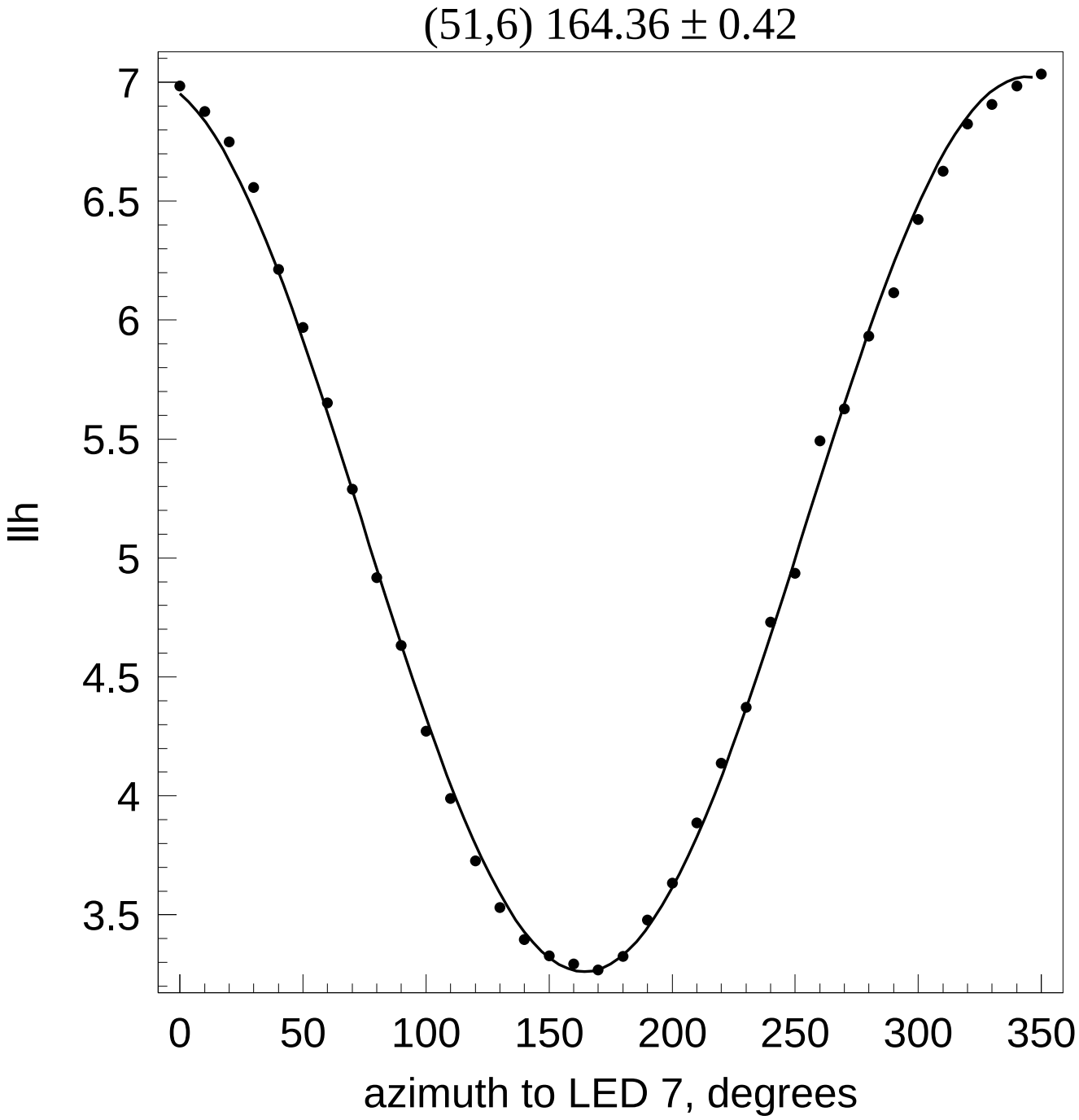

(50,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
8
6
2
90
5
3
11
4
9
10
86.5 ± 20.7

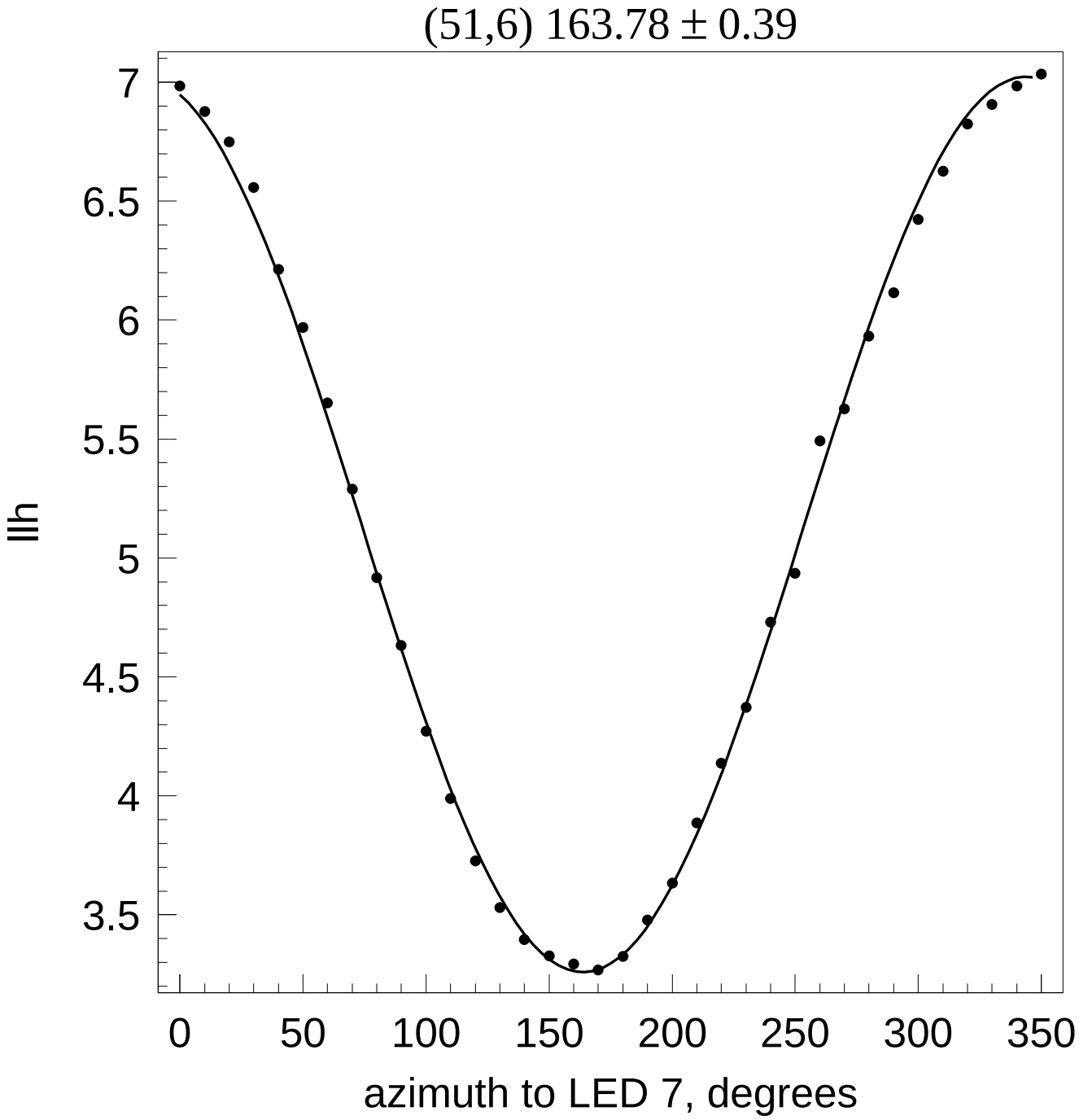

(50,37) 88.19 ± 0.64
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

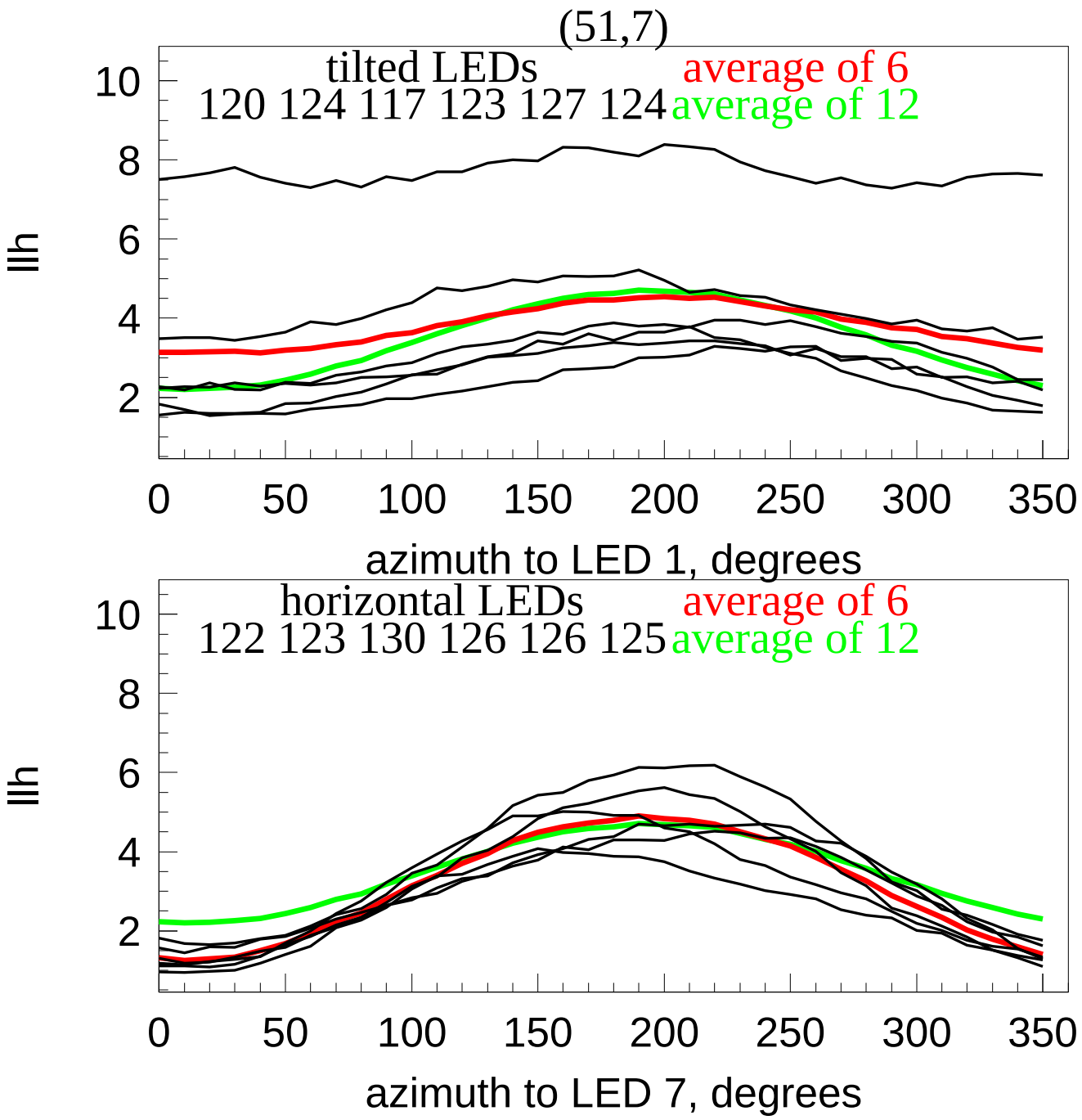

(50,37) 88.16 ± 0.65
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

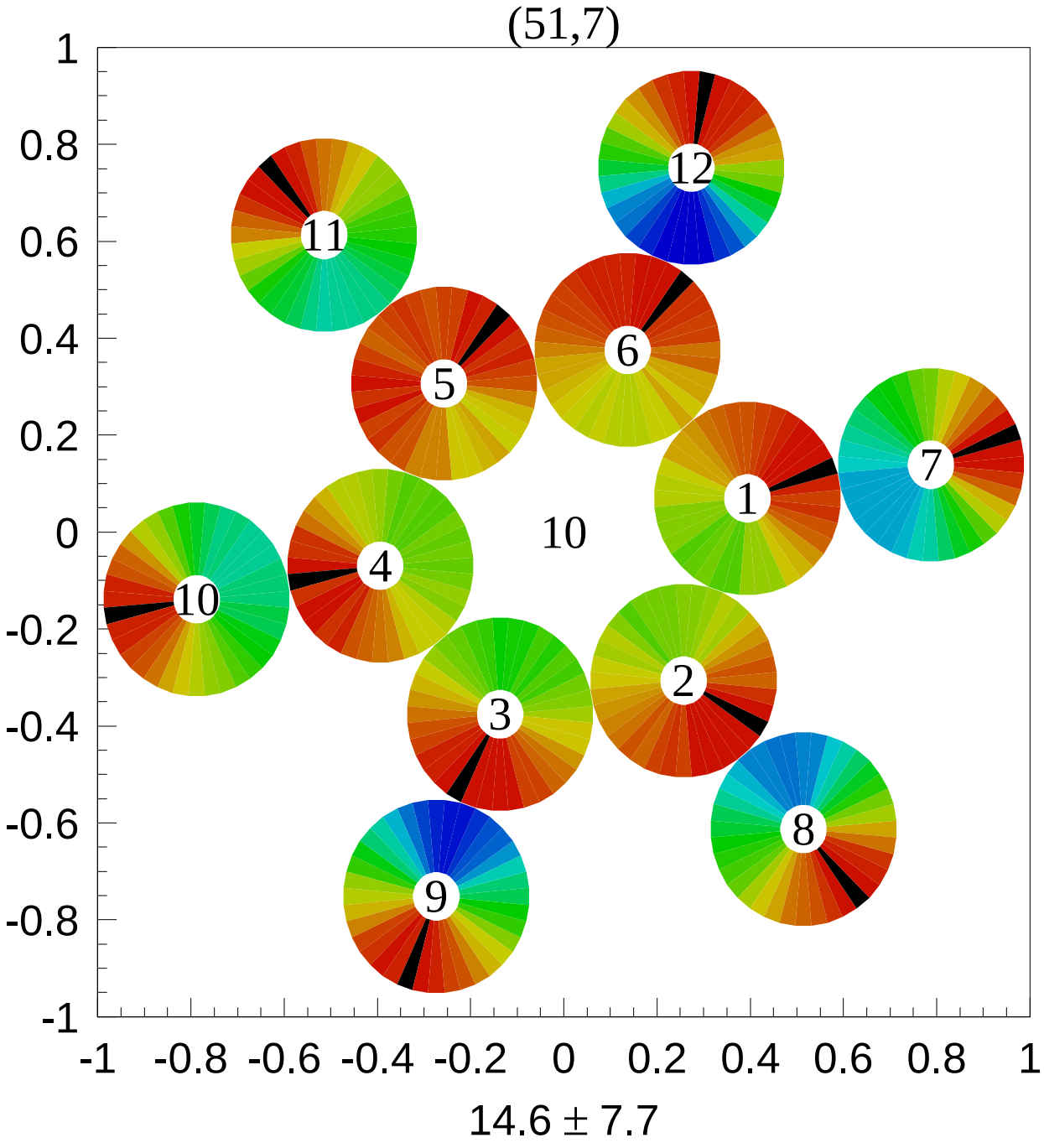

(51,6)
tilted LEDs
1 118 125 126 118 115
average of 6
average of 12
llh
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 122 120 114 120 127
average of 6
average of 12
llh
14
12
10
8
6
4
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

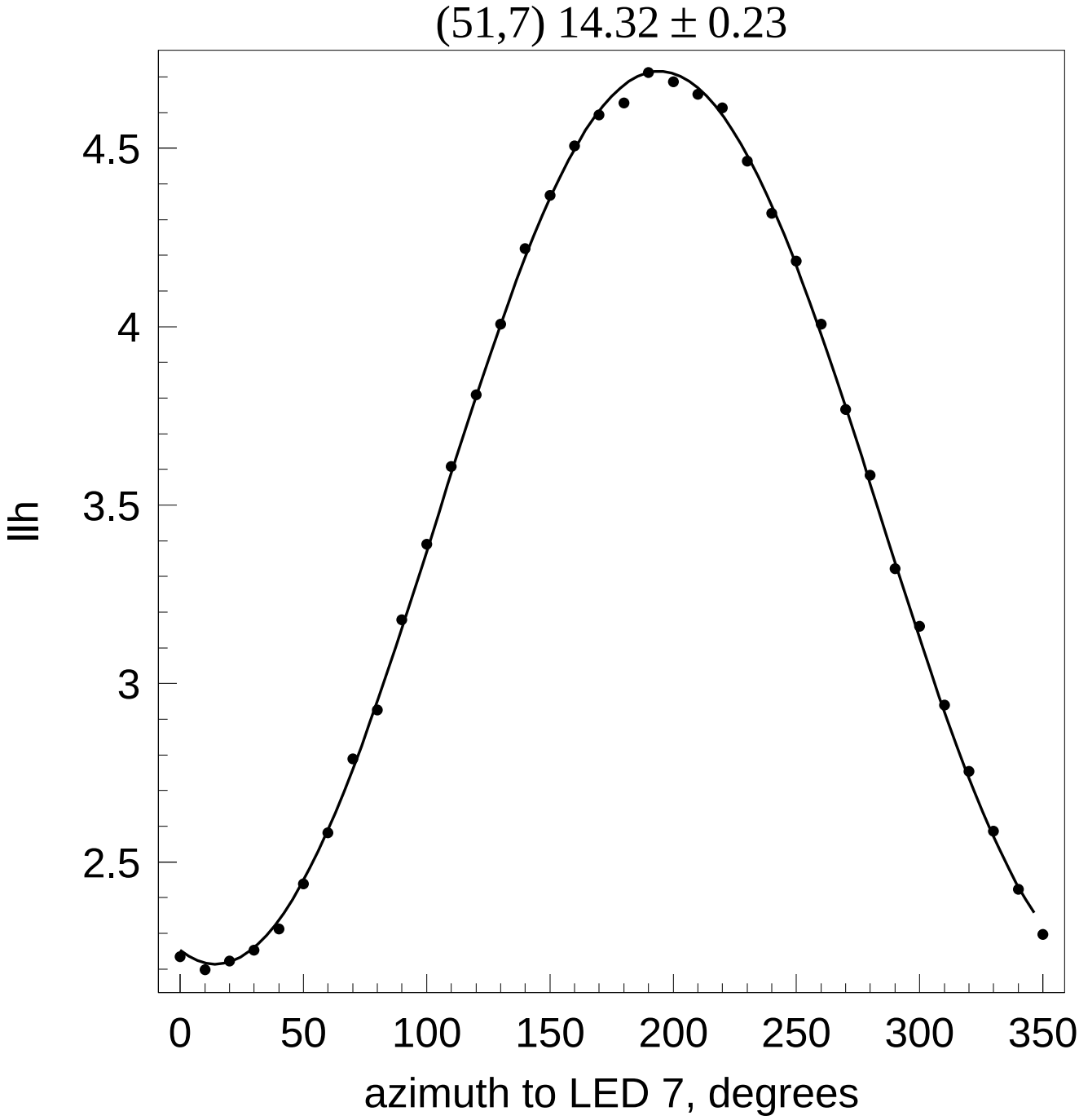

(51,6)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
170
4
10
6
5
12
11
162.2 ± 8.3

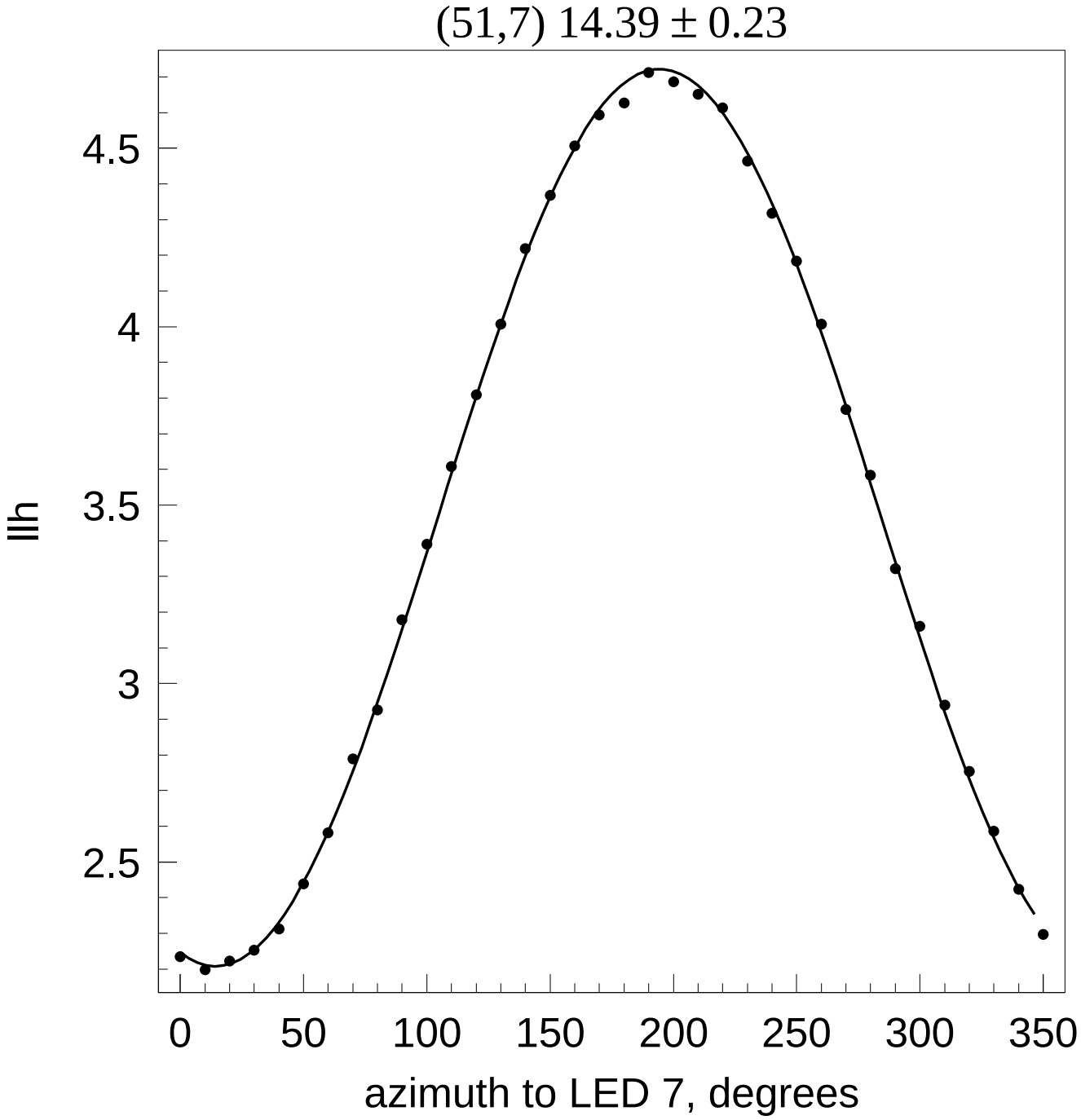

(51,6) 164.36 ± 0.42
7
6.5
6
5.5
5
4.5
4
3.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

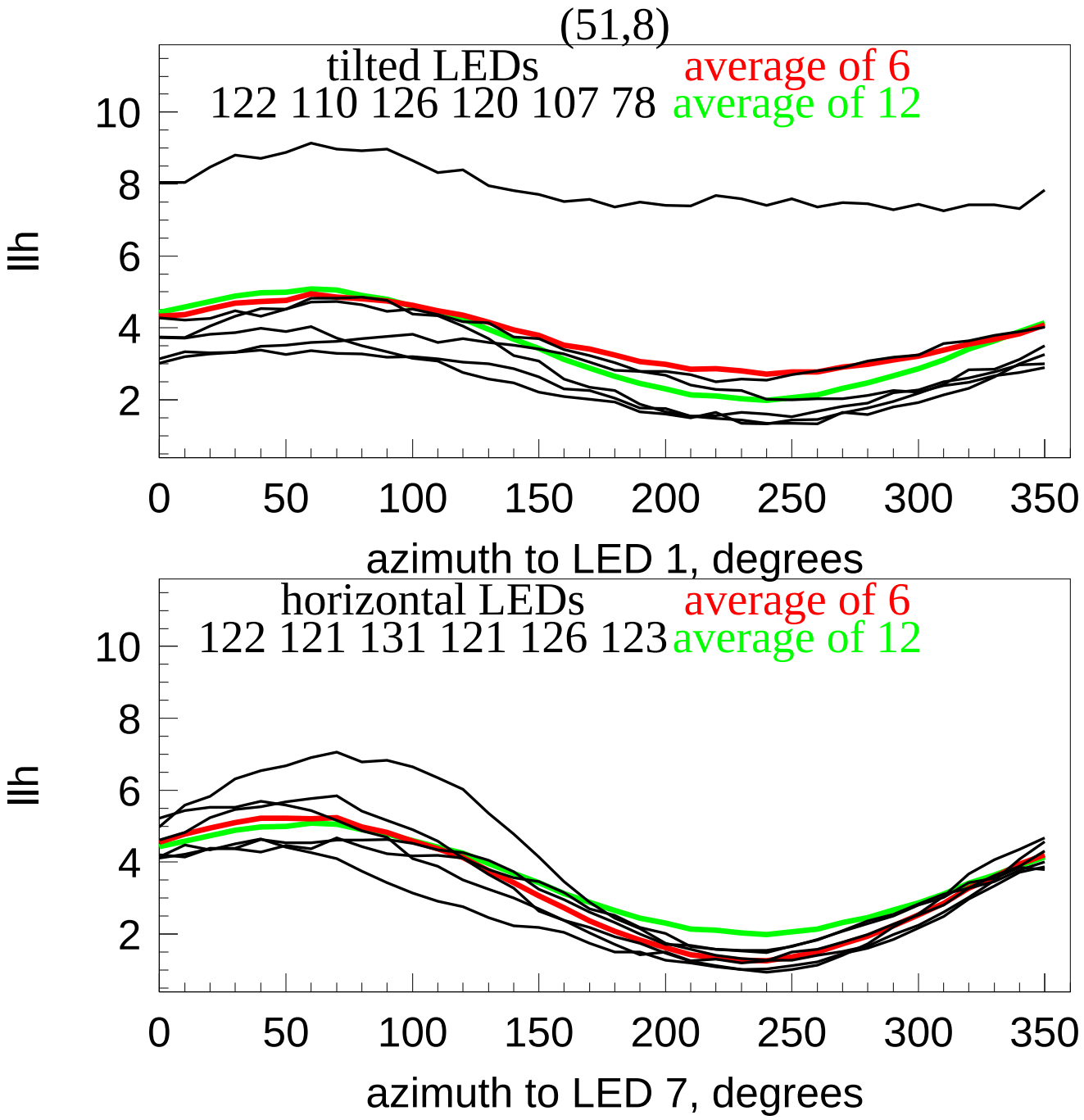

(51,6) 163.78 ± 0.39
7
6.5
6
5.5
5
4.5
4
3.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

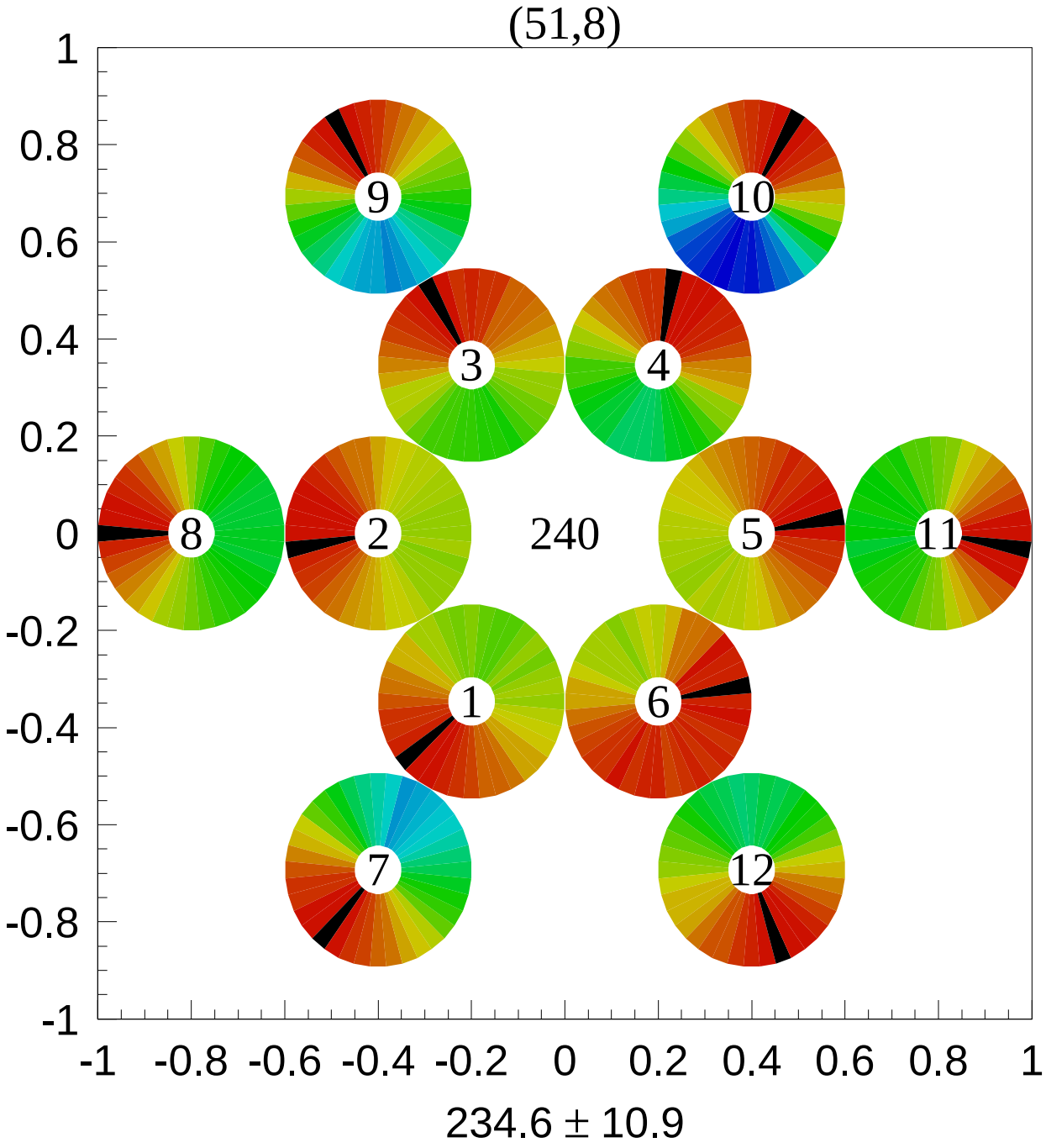

(51,7)
tilted LEDs
120 124 117 123 127 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 123 130 126 126 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

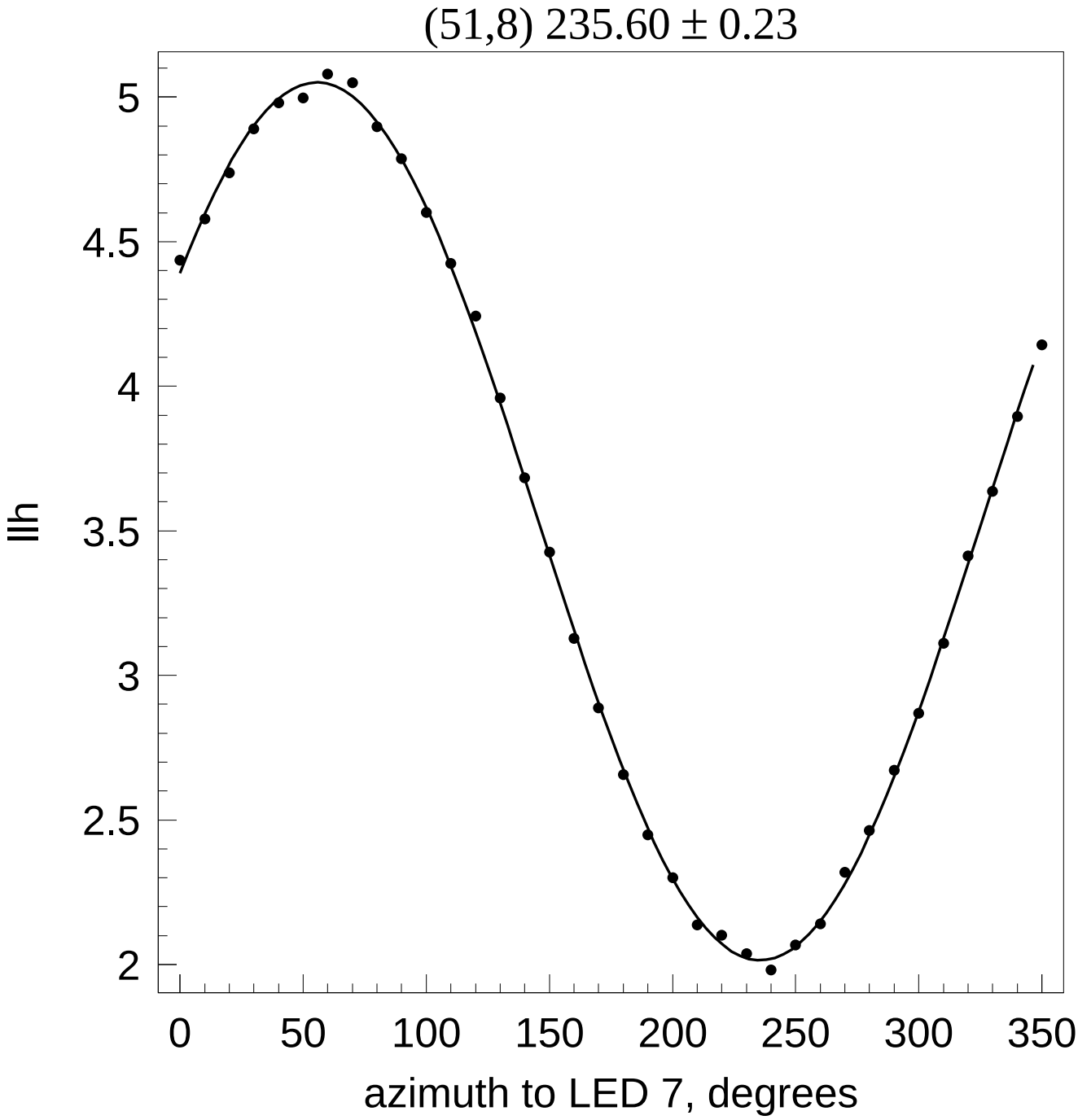

(51,7)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
10
4
10
2
3
8
9
14.6 ± 7.7

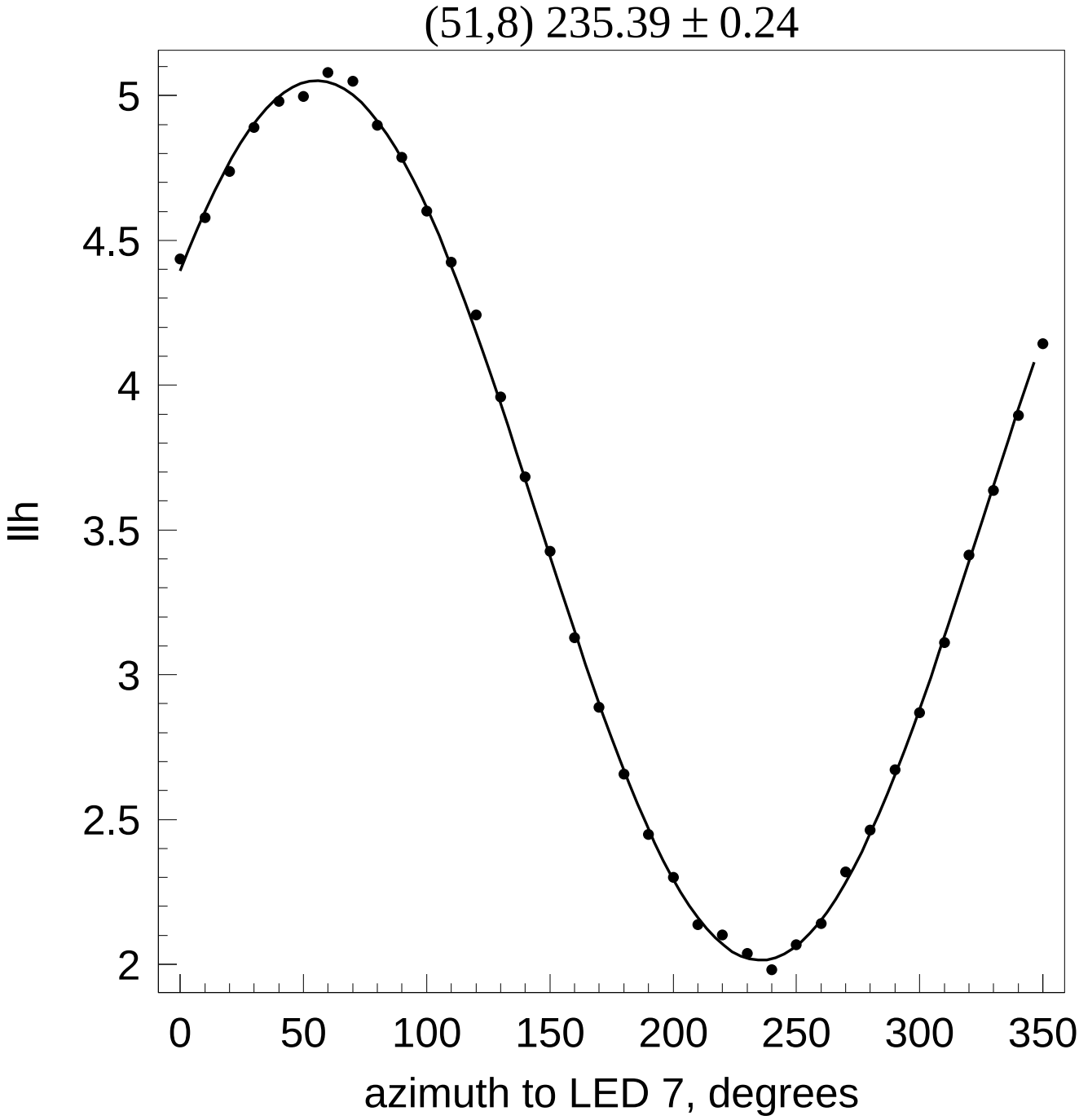

(51,7) 14.32 ± 0.23
llh
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

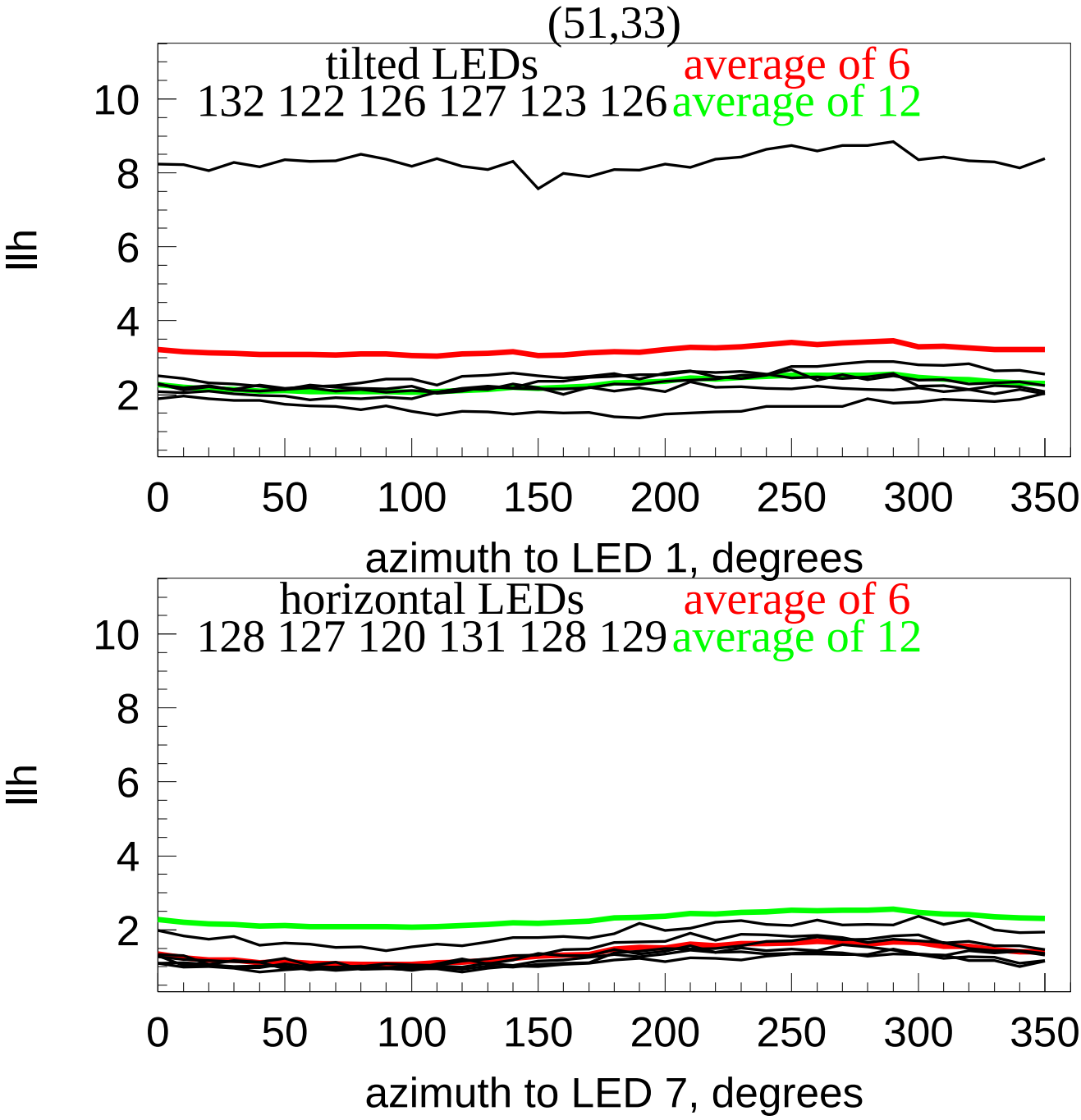

(51,7) 14.39 ± 0.23
4.5
4
3.5
3
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

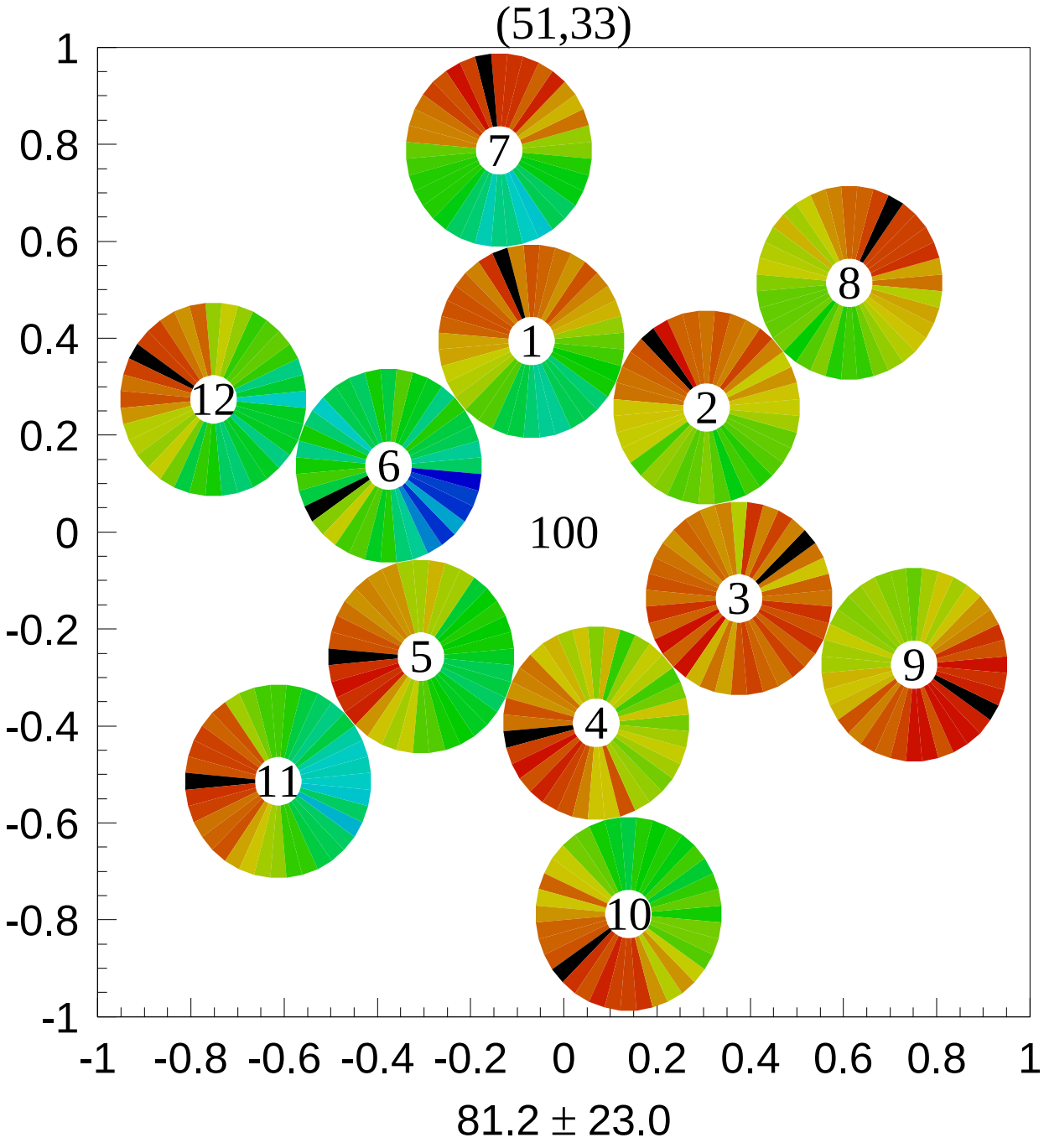

(51,8)
tilted LEDs
122 110 126 120 107 78
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 121 131 121 126 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

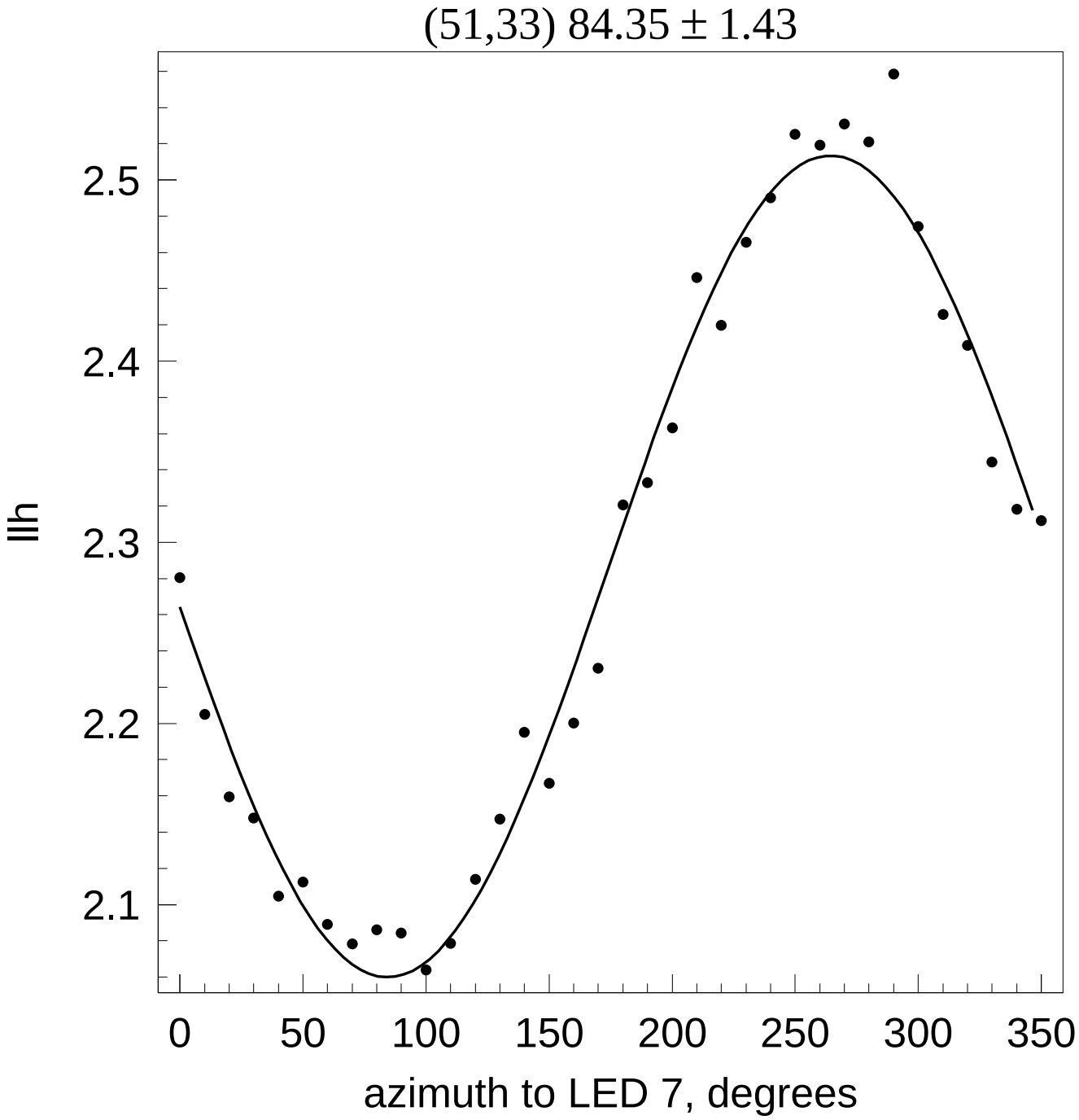

(51,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
234.6 ± 10.9

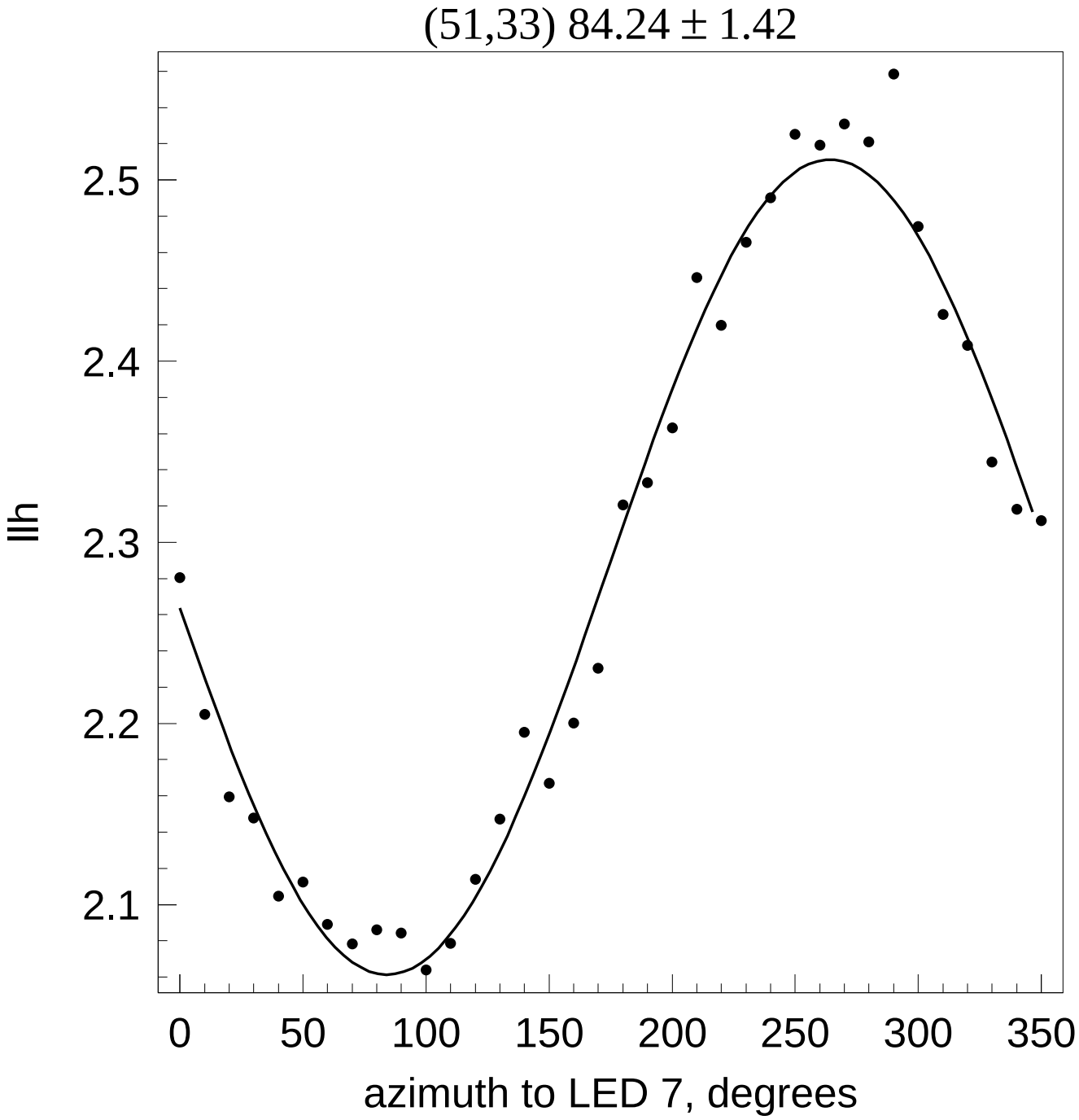

(51,8) 235.60 ± 0.23
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

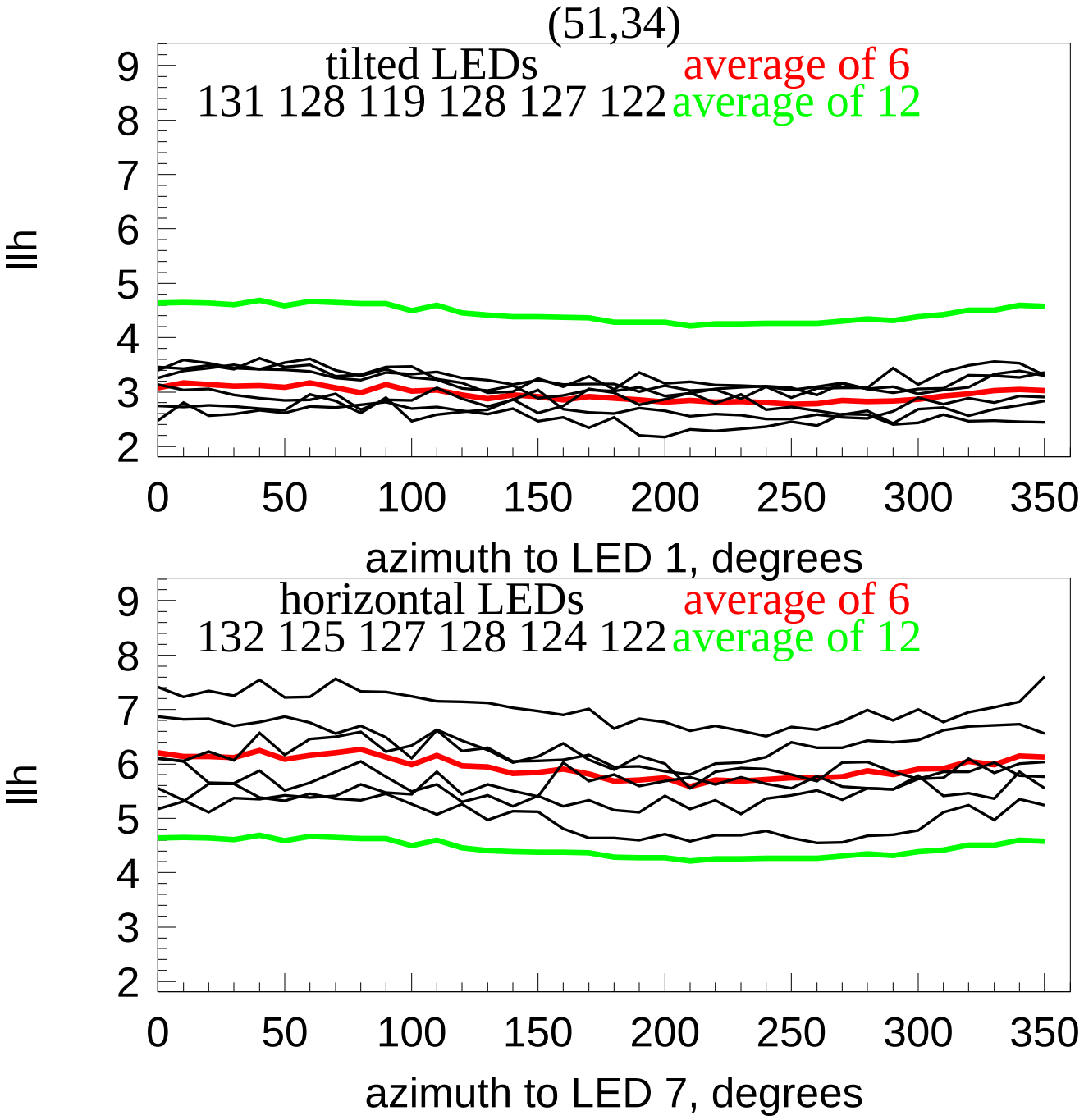

(51,8) 235.39 ± 0.24
5
4.5
4
3.5
3
2.5
2
Ilh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

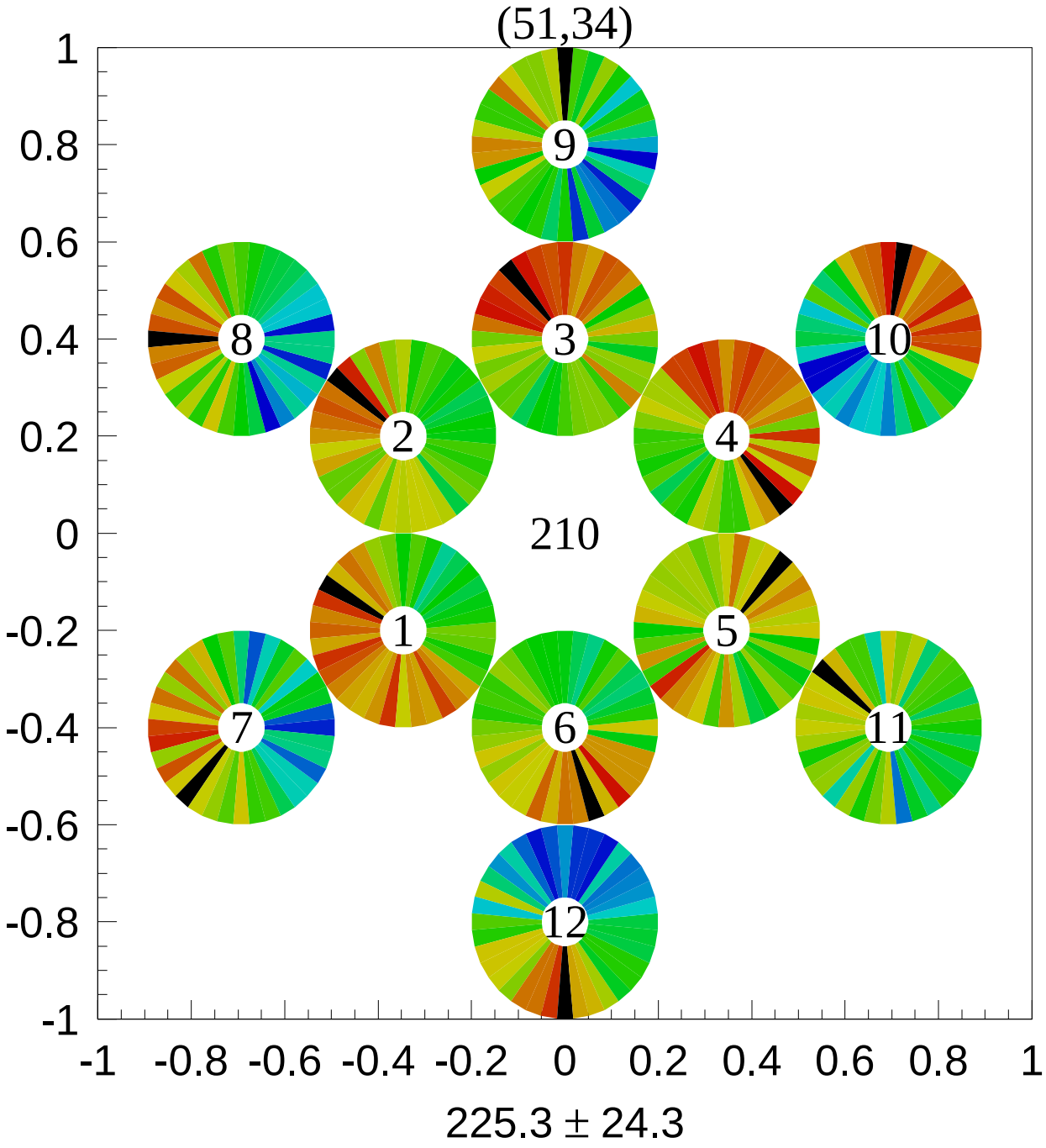

(51,33)
tilted LEDs
132 122 126 127 123 126
average of 6
average of 12
10
8
6
4
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 127 120 131 128 129
average of 6
average of 12
10
8
6
4
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

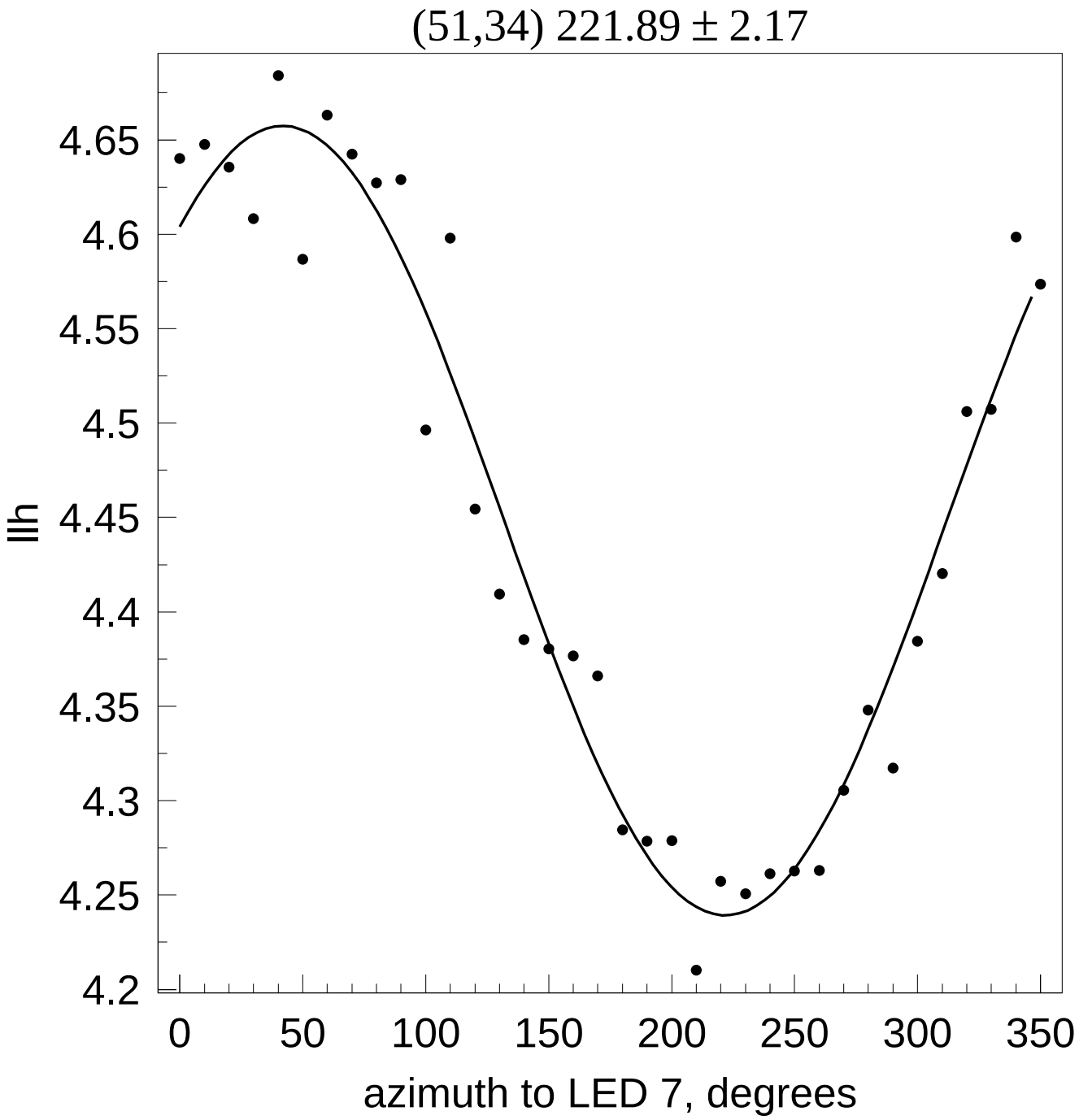

(51,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
81.2 ± 23.0

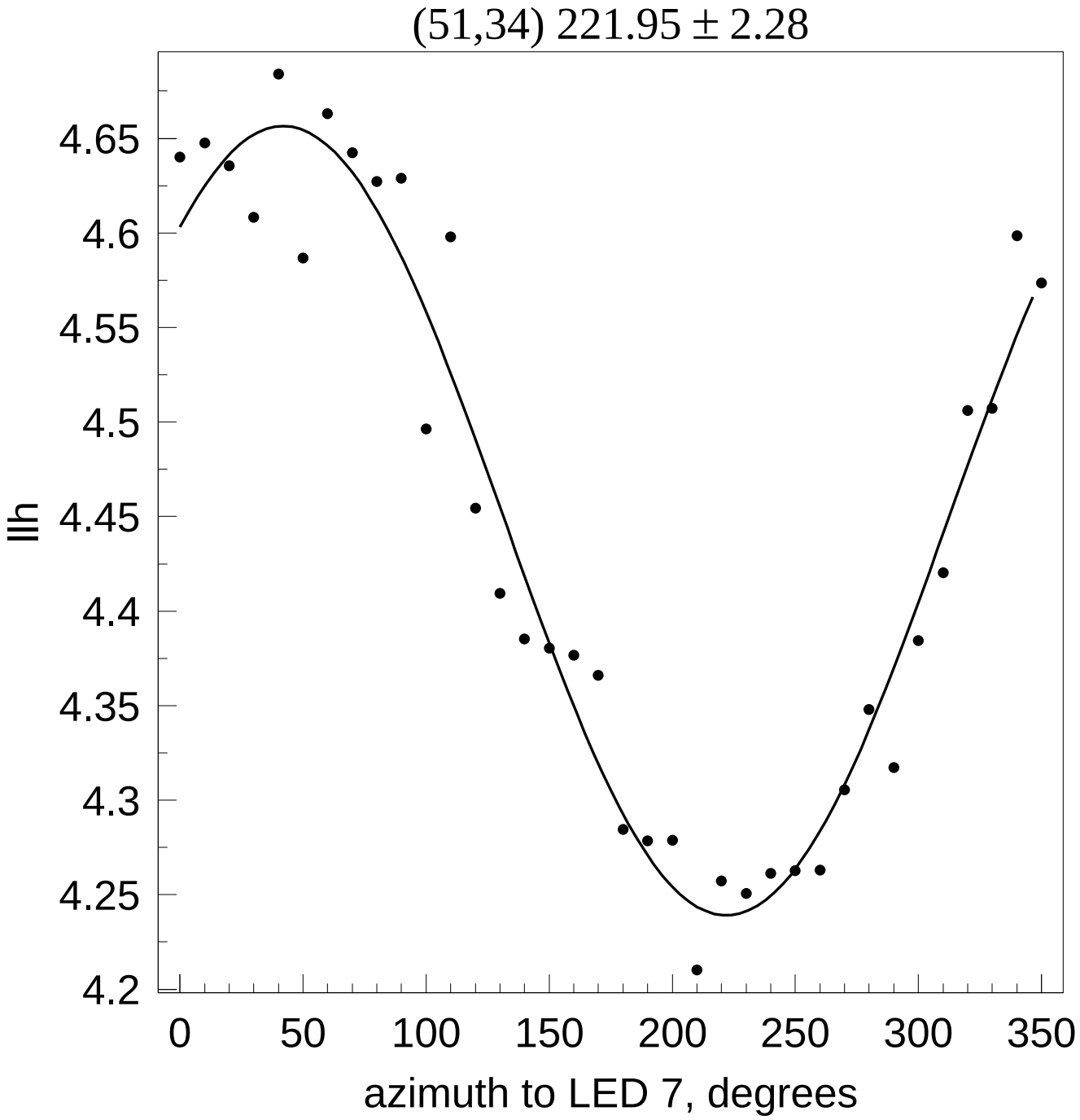

(51,33) 84.35 ± 1.43
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

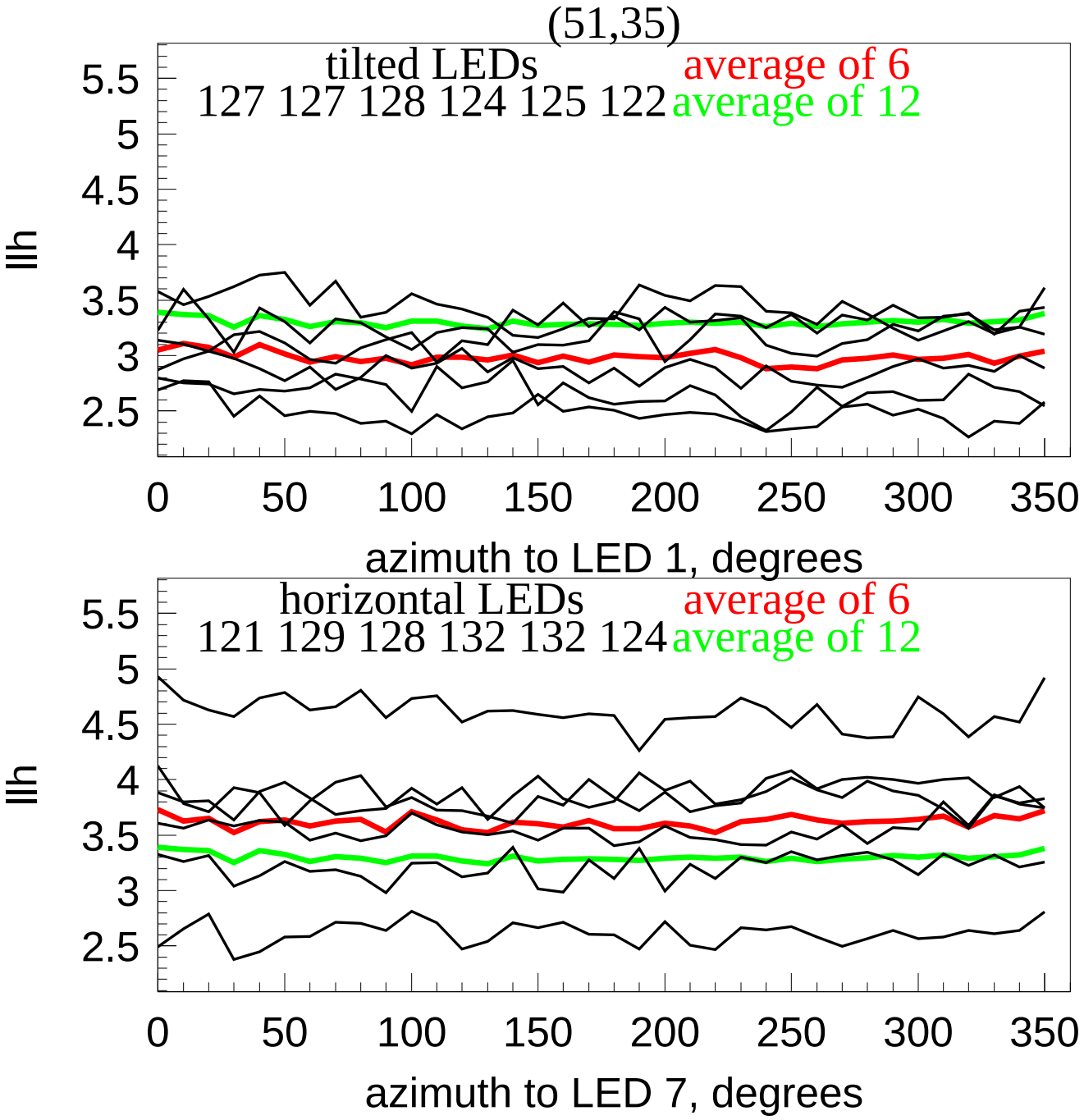

(51,33) 84.24 ± 1.42
2.5
2.4
2.3
2.2
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

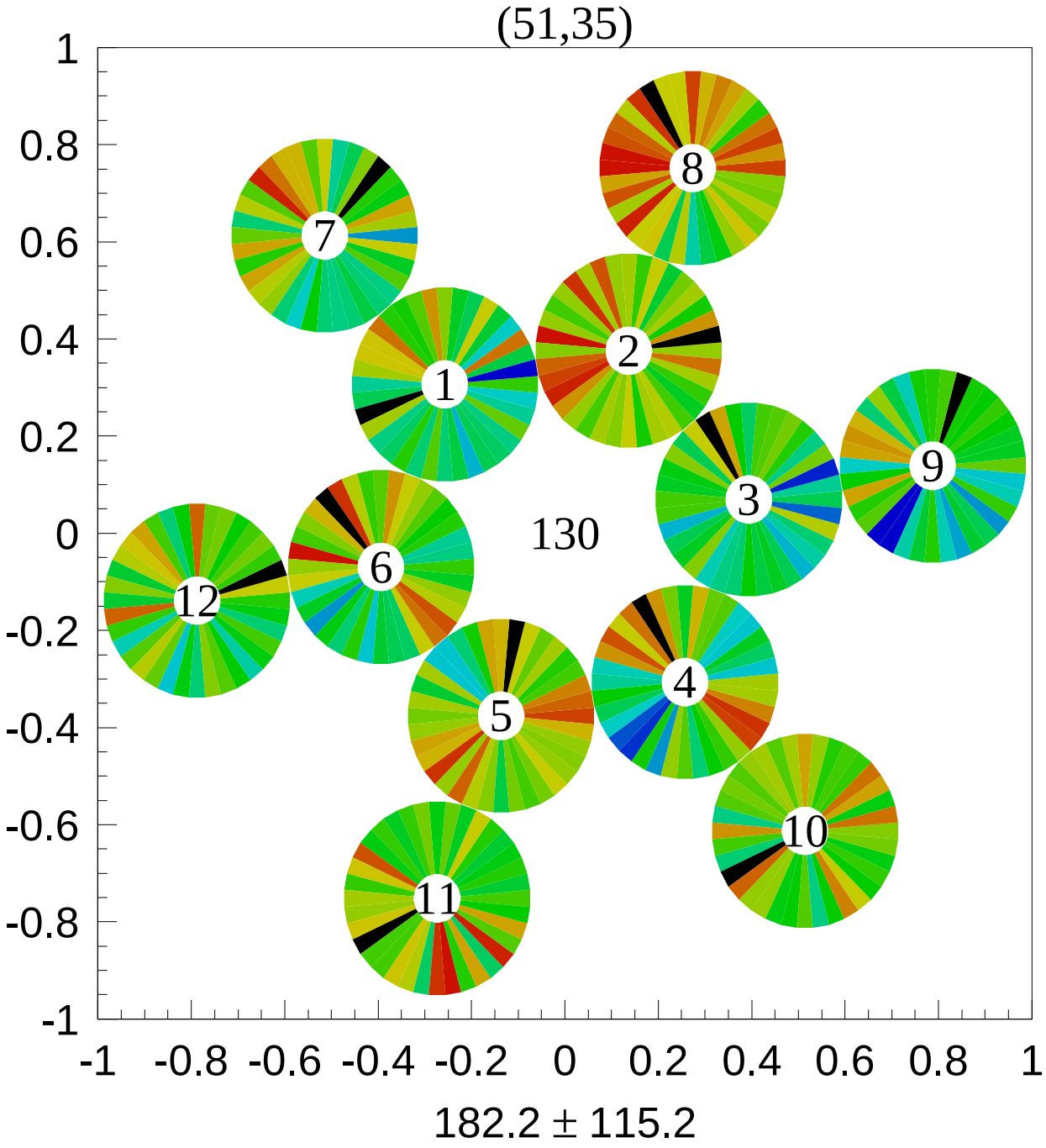

(51,34)
tilted LEDs
131 128 119 128 127 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 125 127 128 124 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

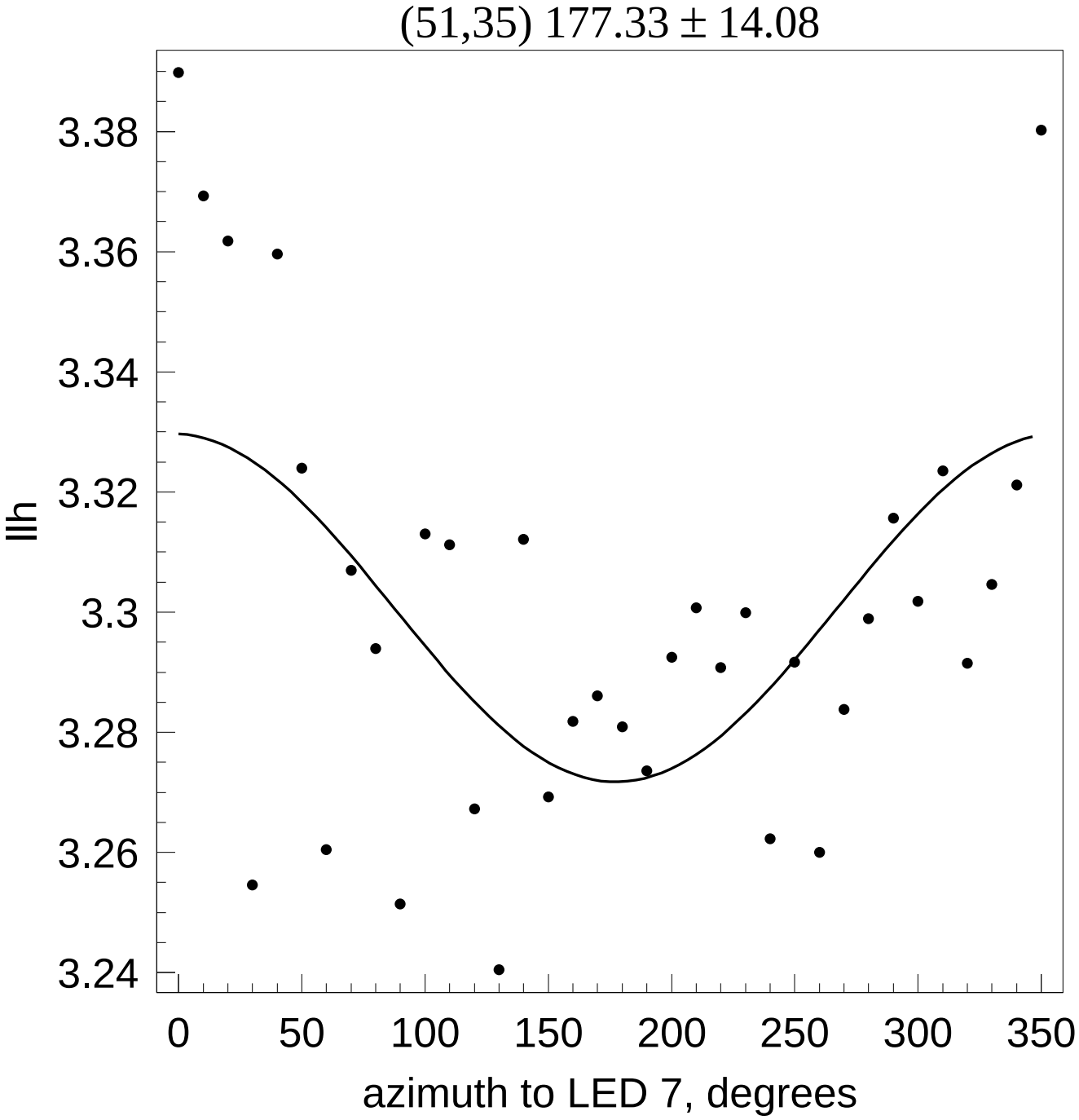

(51,34)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
225.3 ± 24.3

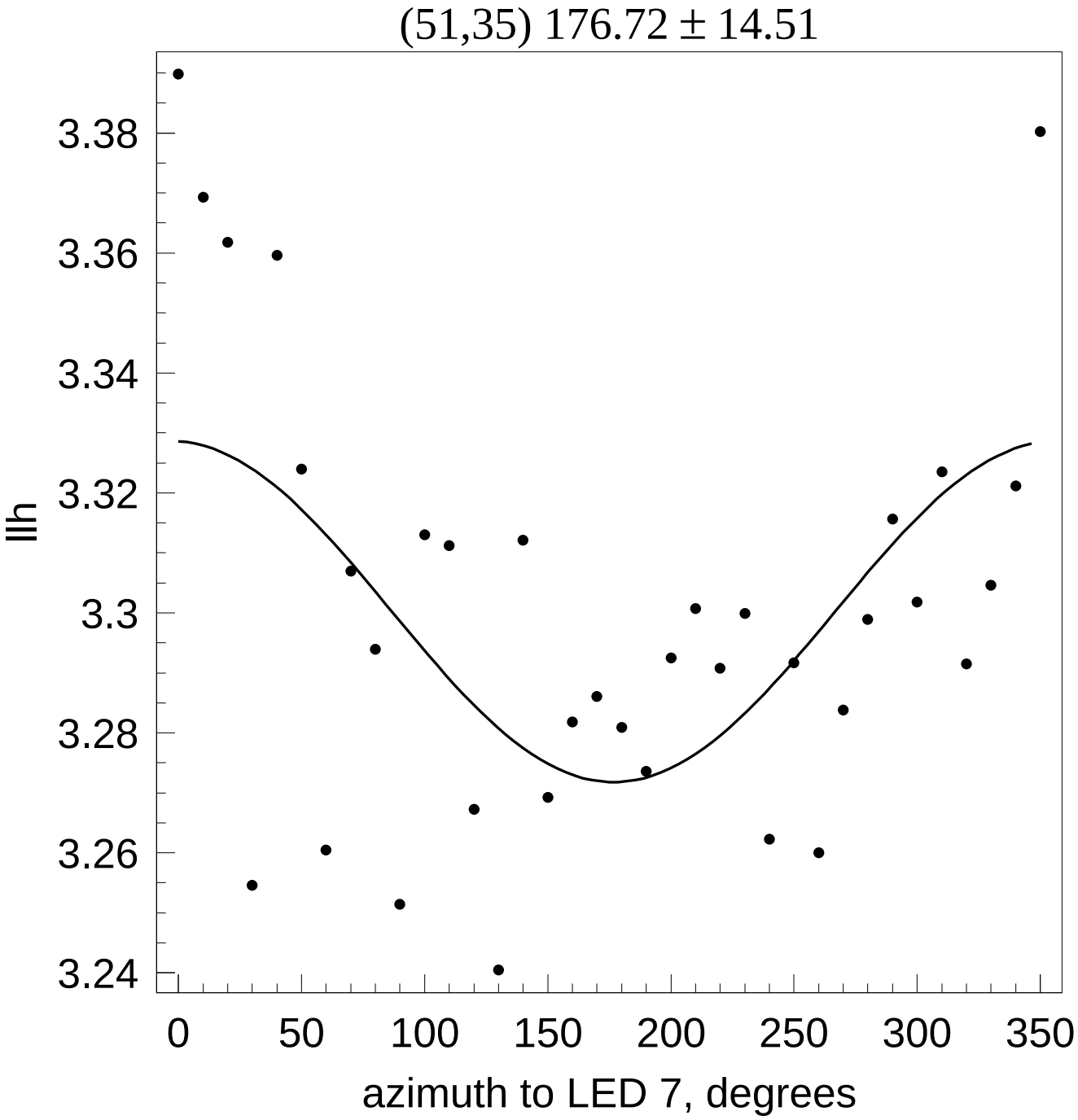

(51,34) 221.89 ± 2.17
4.65
4.6
4.55
4.5
4.45
4.4
4.35
4.3
4.25
4.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

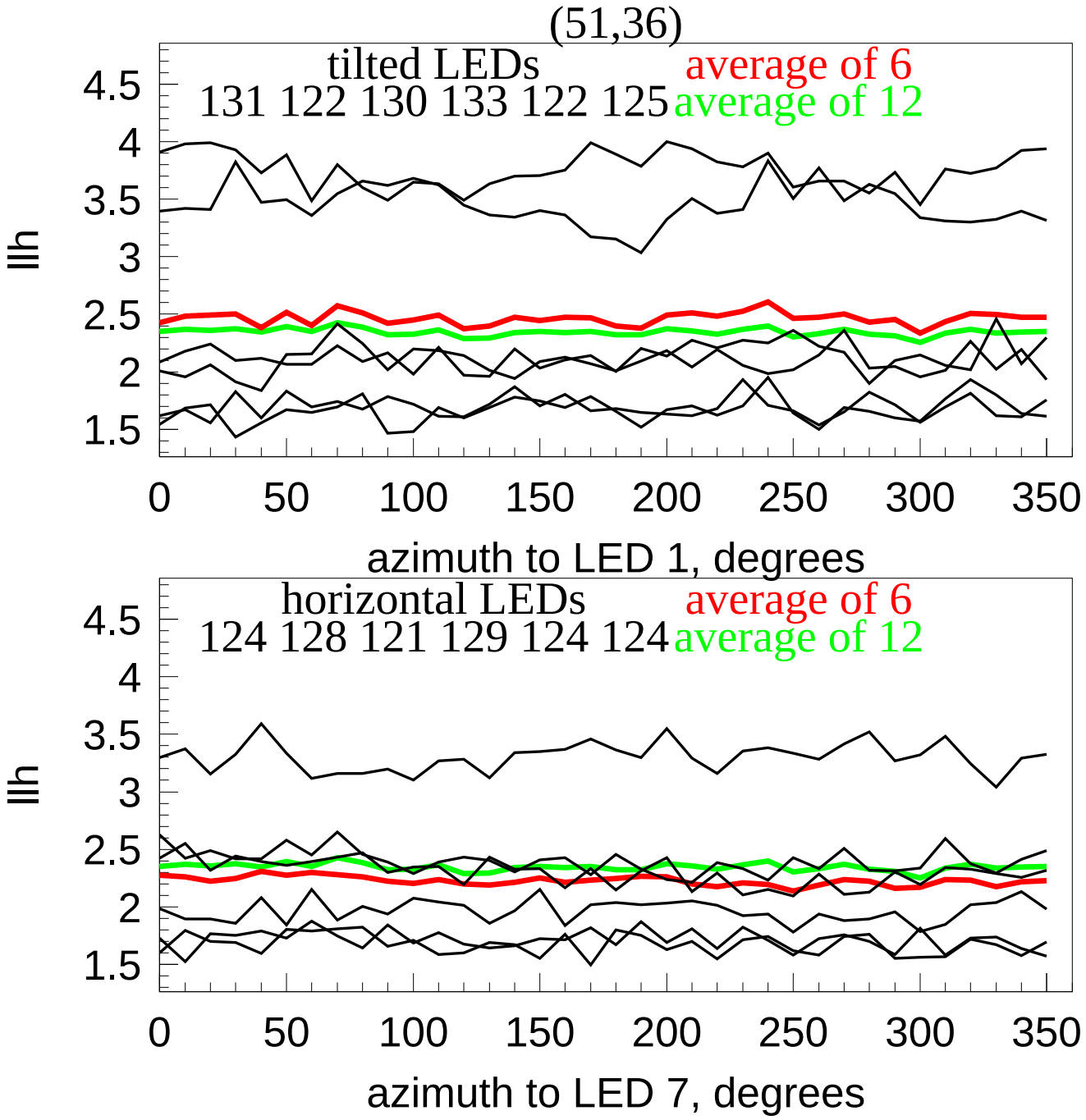

(51,34) 221.95 ± 2.28
4.65
4.6
4.55
4.5
4.45
4.4
4.35
4.3
4.25
4.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

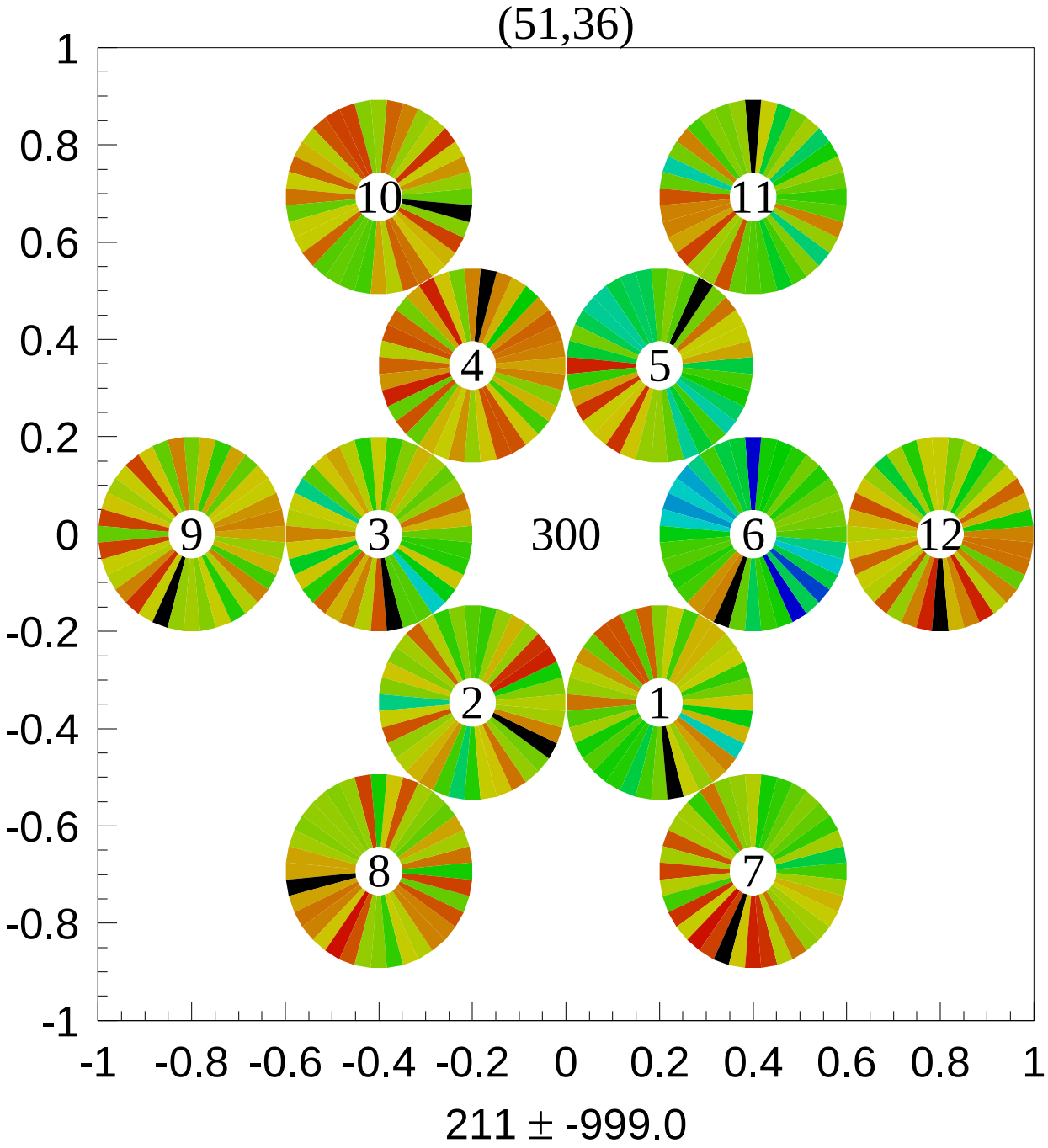

(51,35)
tilted LEDs
127 127 128 124 125 122
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
121 129 128 132 132 124
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

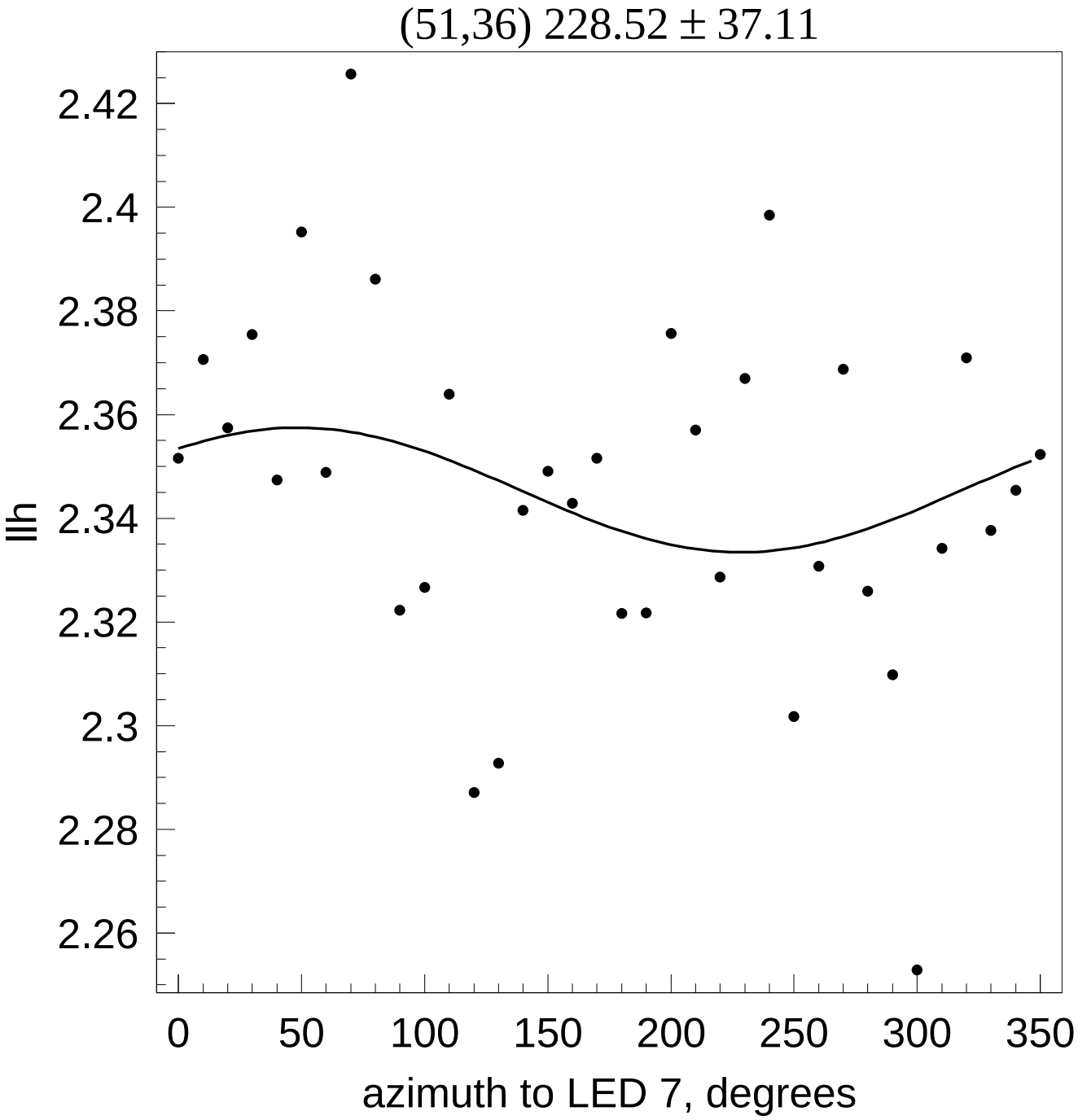

(51,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
182.2 ± 115.2
130
1
2
3
4
5
6
7
8
9
10
11
12

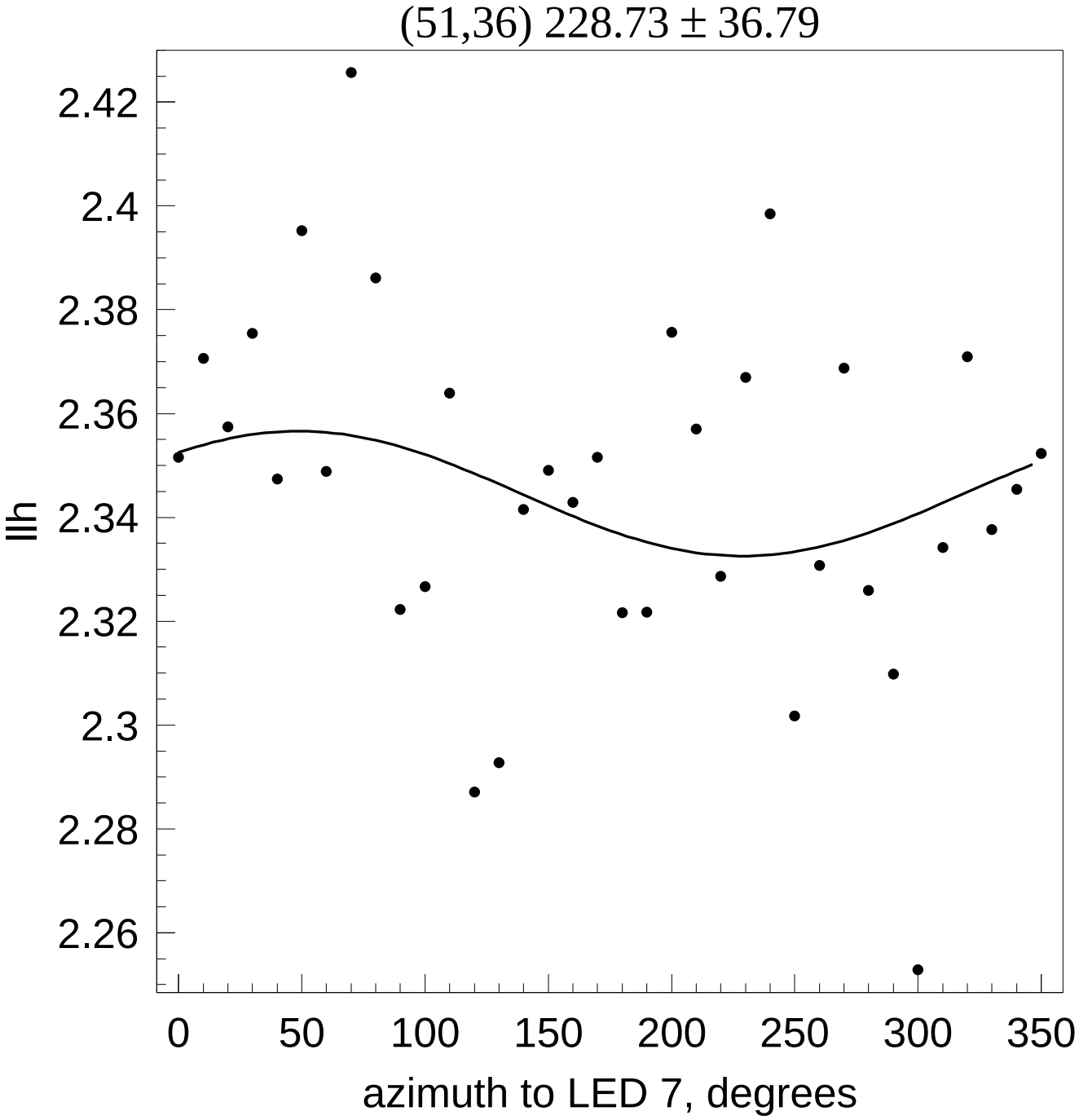

(51,35) 177.33 ± 14.08
3.38
3.36
3.34
3.32
3.3
3.28
3.26
3.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

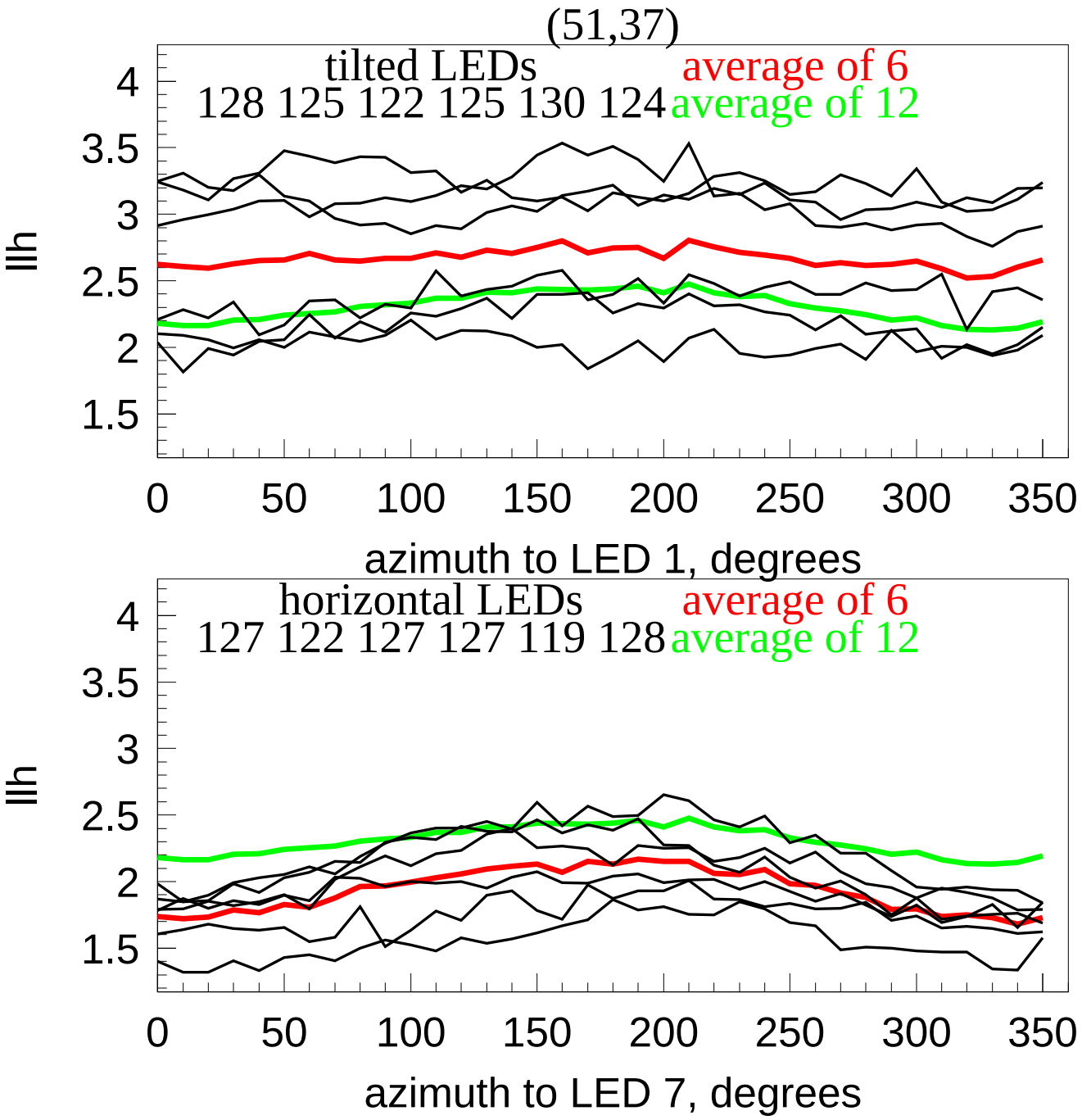

(51,35) 176.72 ± 14.51
3.38
3.36
3.34
3.32
3.3
3.28
3.26
3.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

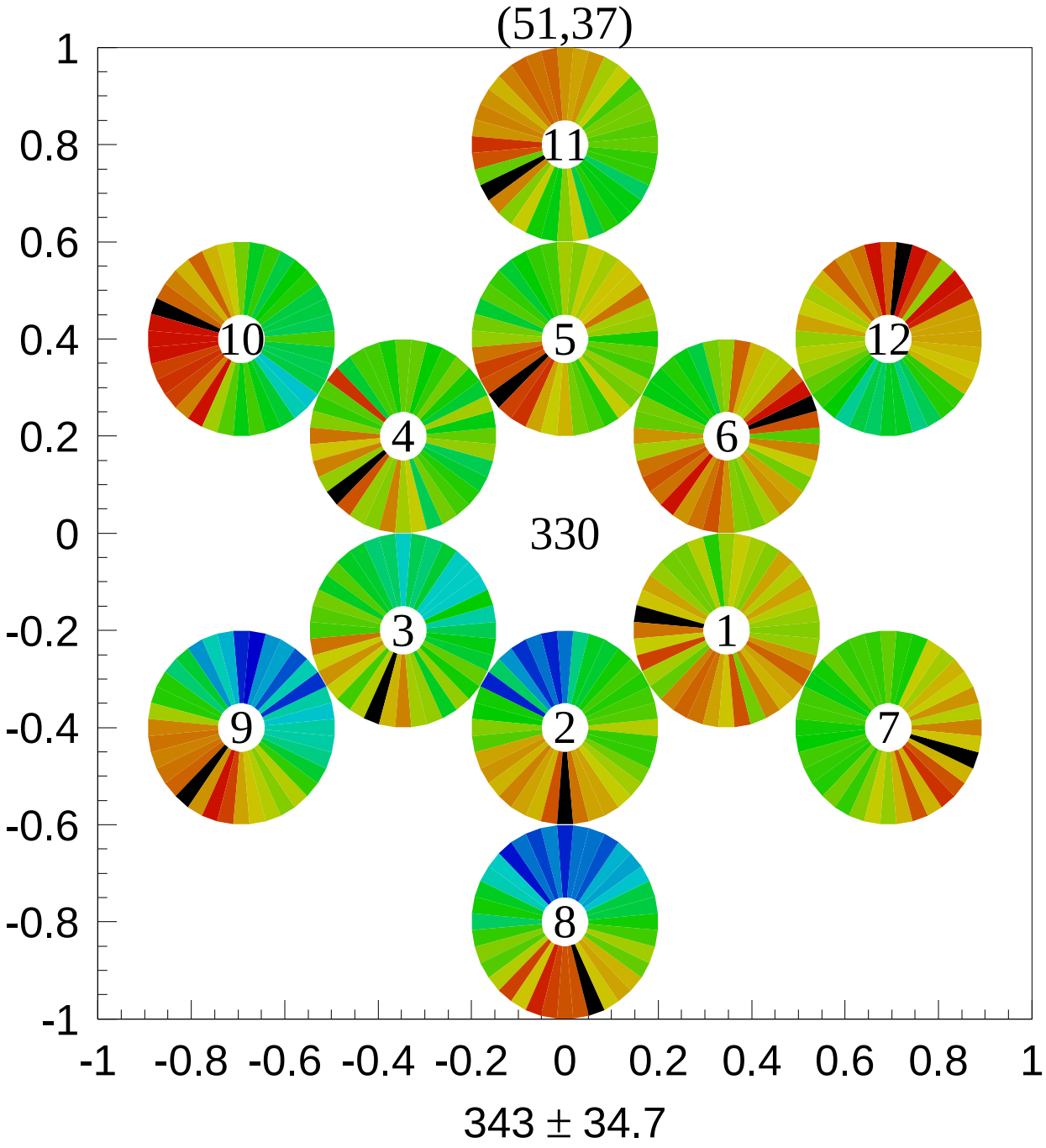

(51,36)
tilted LEDs
131 122 130 133 122 125
average of 6
average of 12
IIh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 128 121 129 124 124
average of 6
average of 12
IIh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

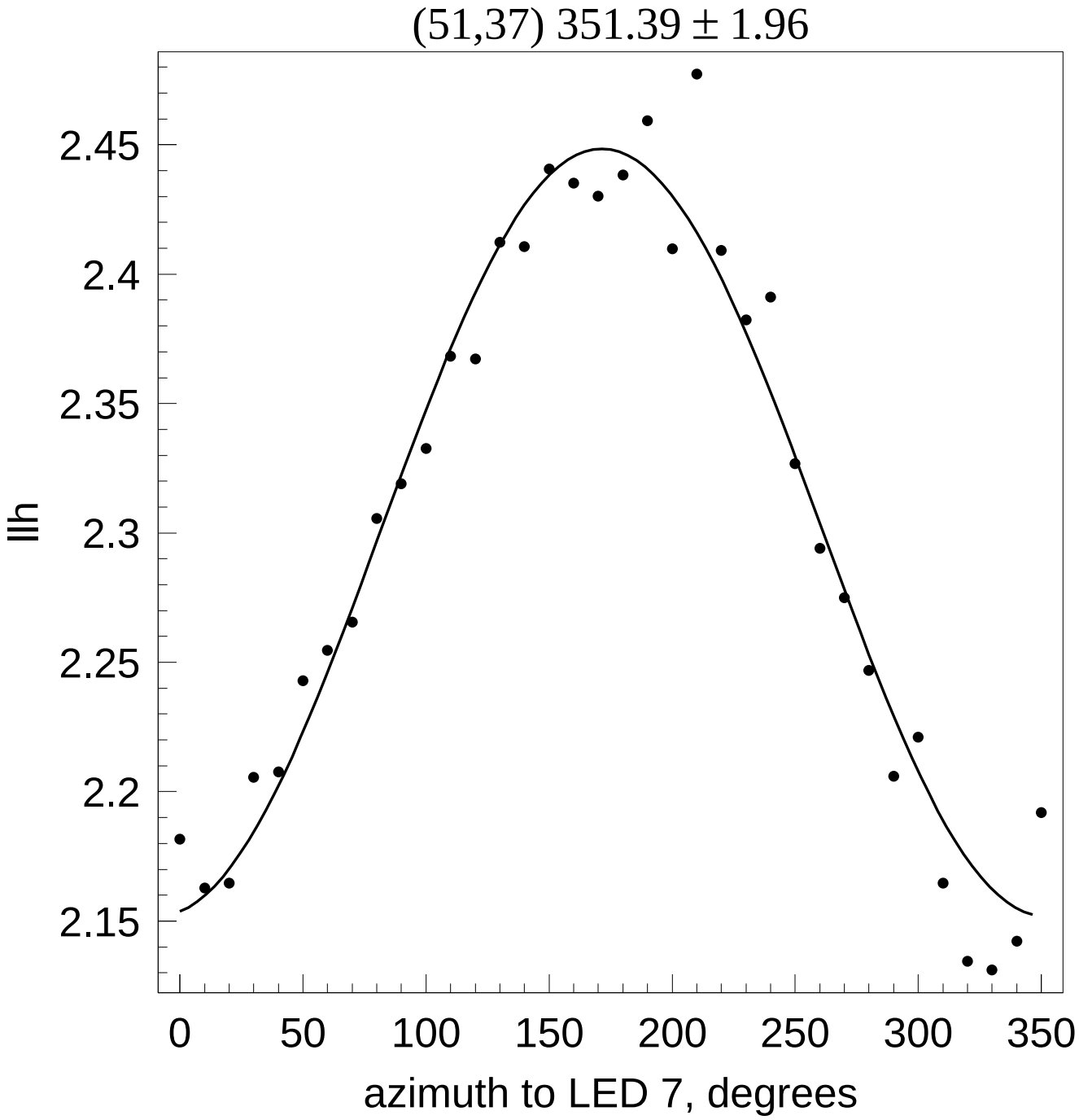

(51,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
211 ± -999.0
10
11
4
5
9
3
300
6
12
2
1
8
7

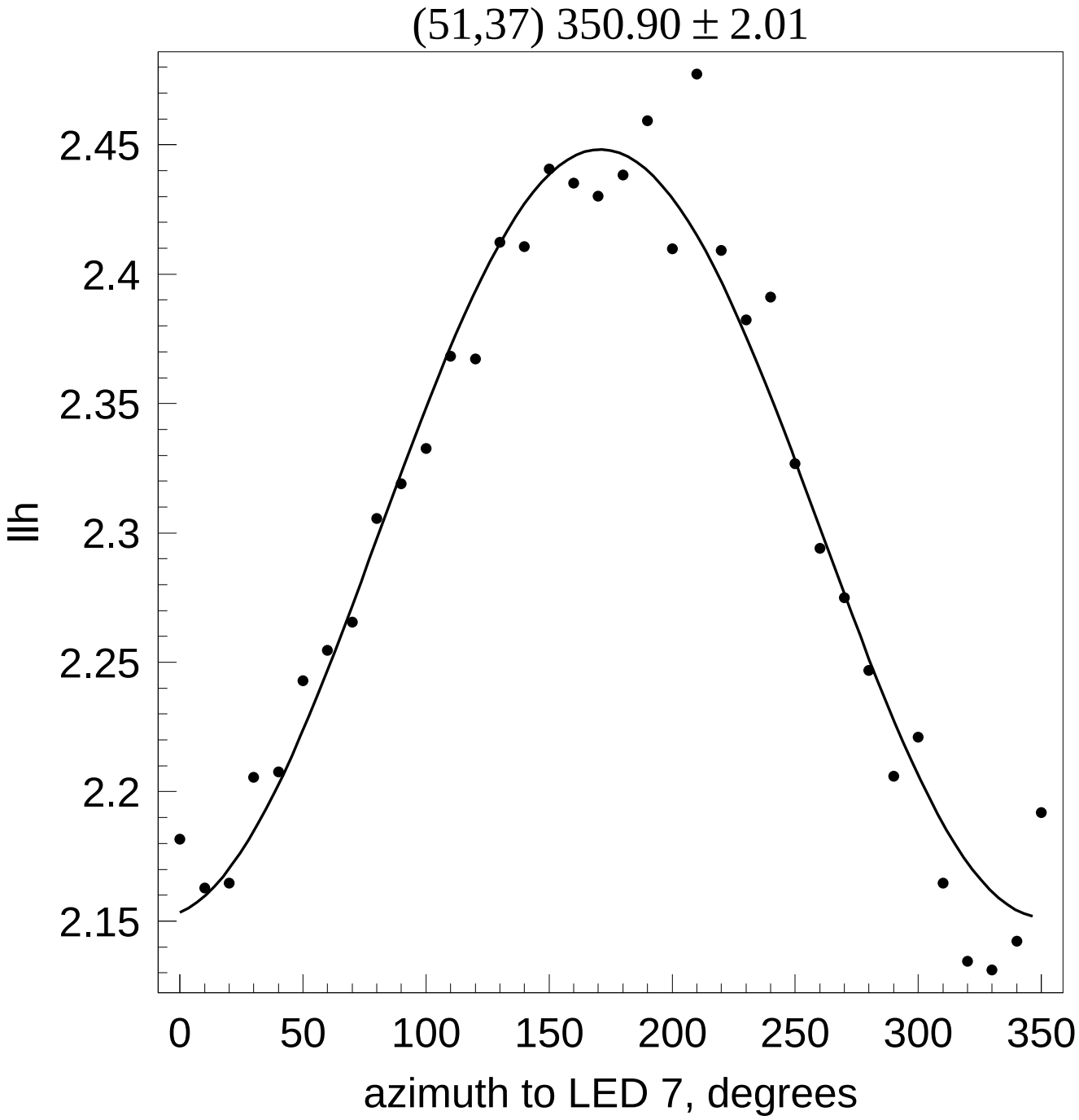

(51,36) 228.52 ± 37.11
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
2.26
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

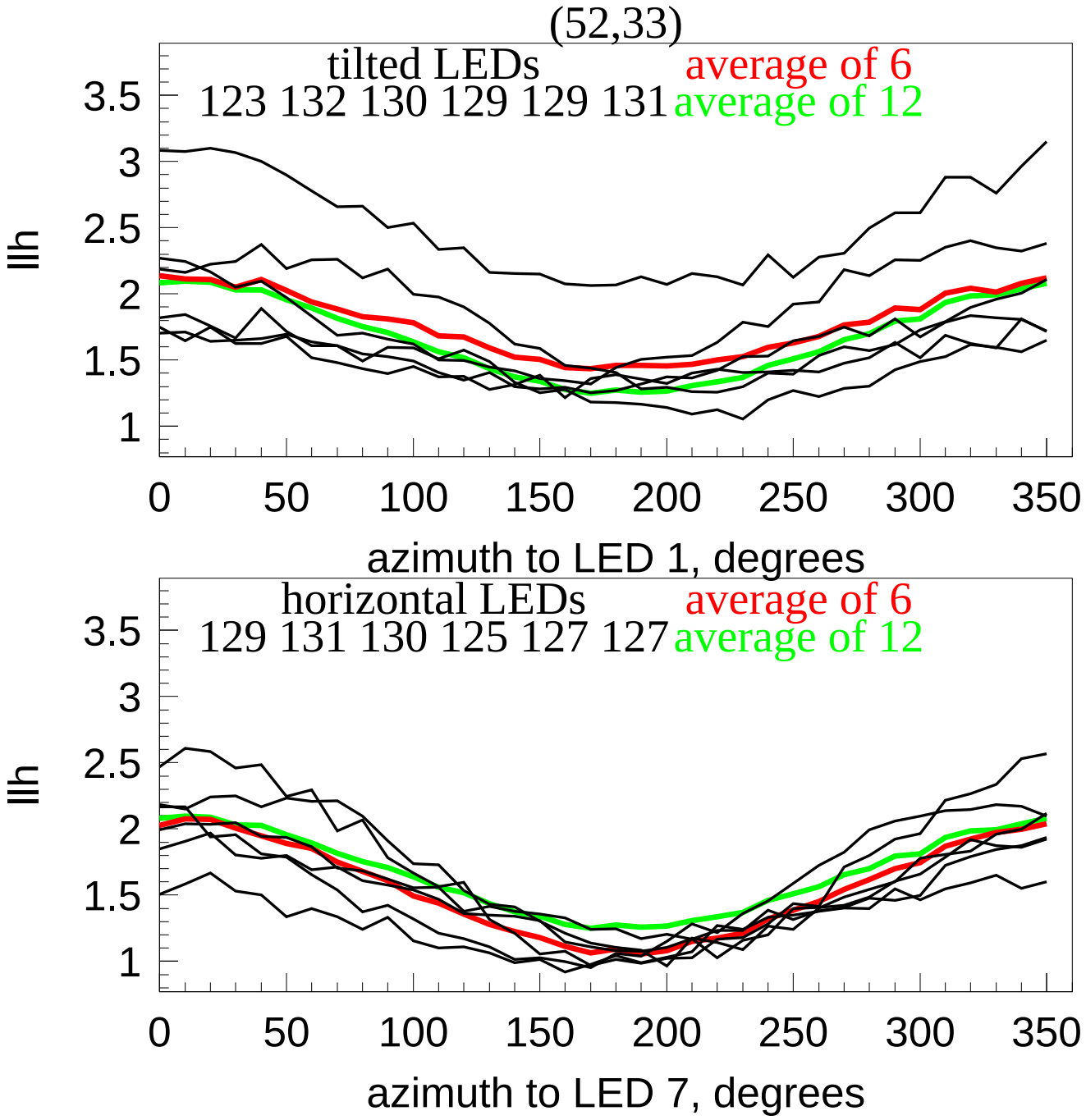

(51,36) 228.73 ± 36.79
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
2.26
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

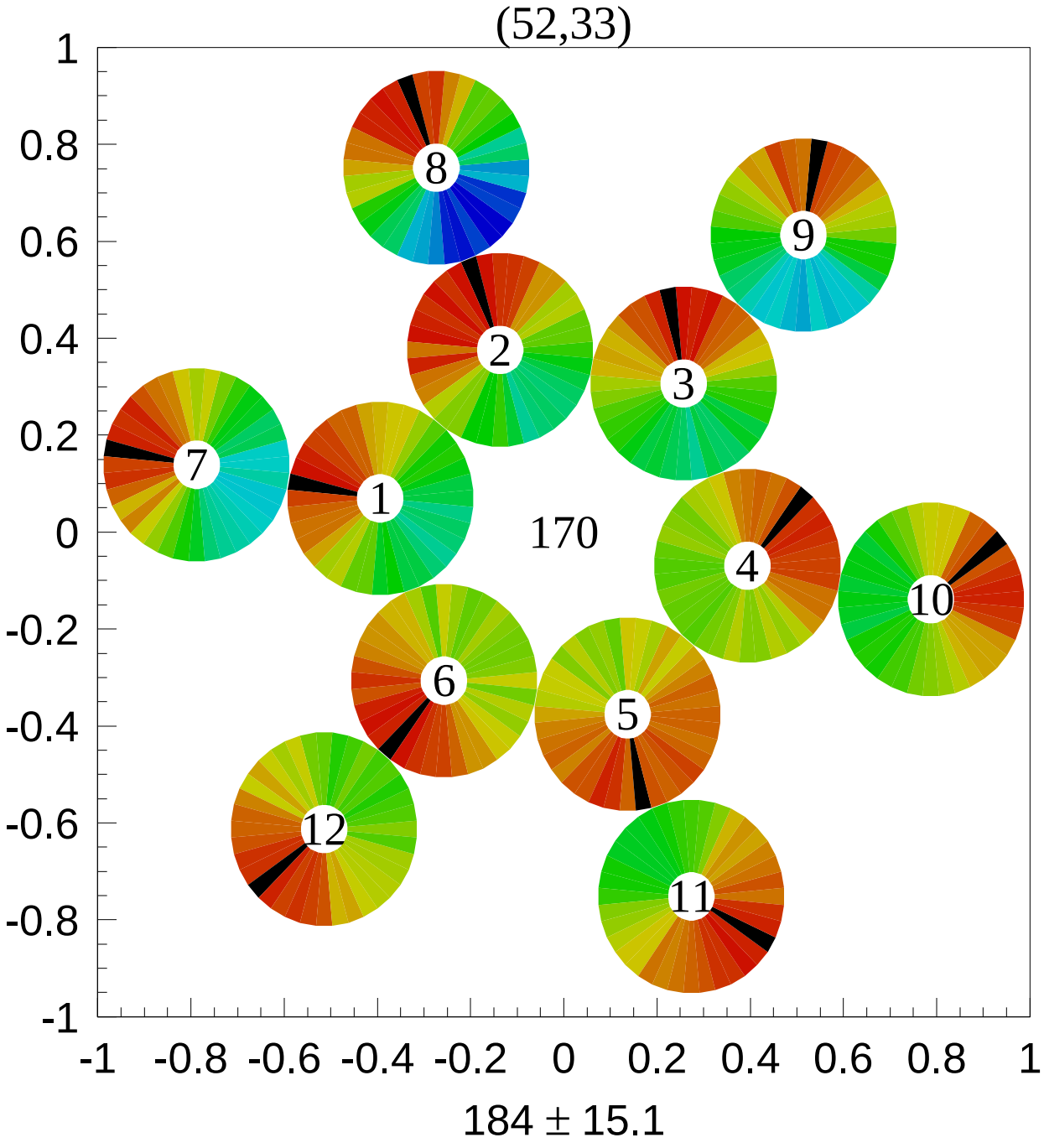

(51,37)
tilted LEDs
128 125 122 125 130 124
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 122 127 127 119 128
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

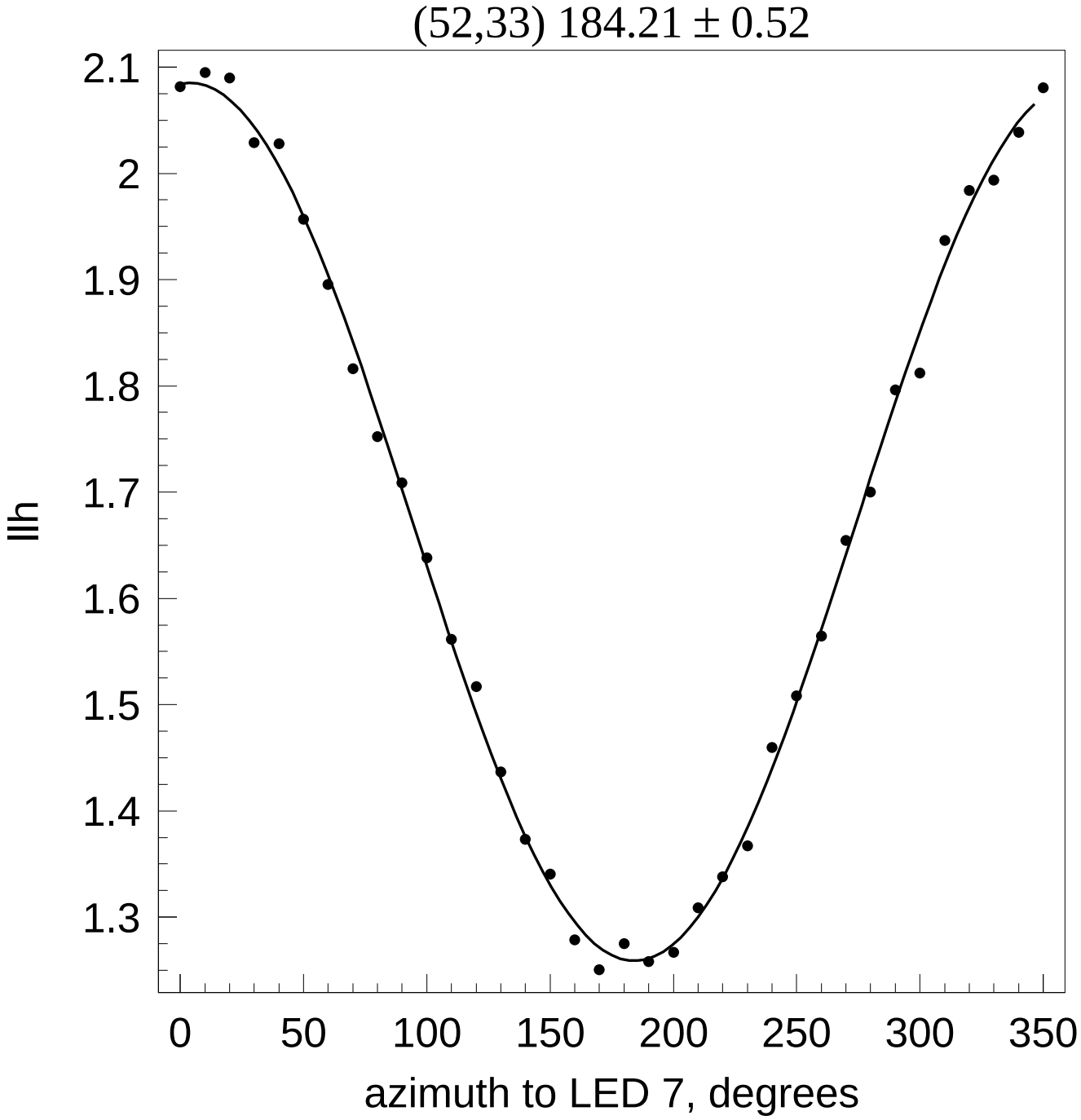

(51,37)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
343 ± 34.7

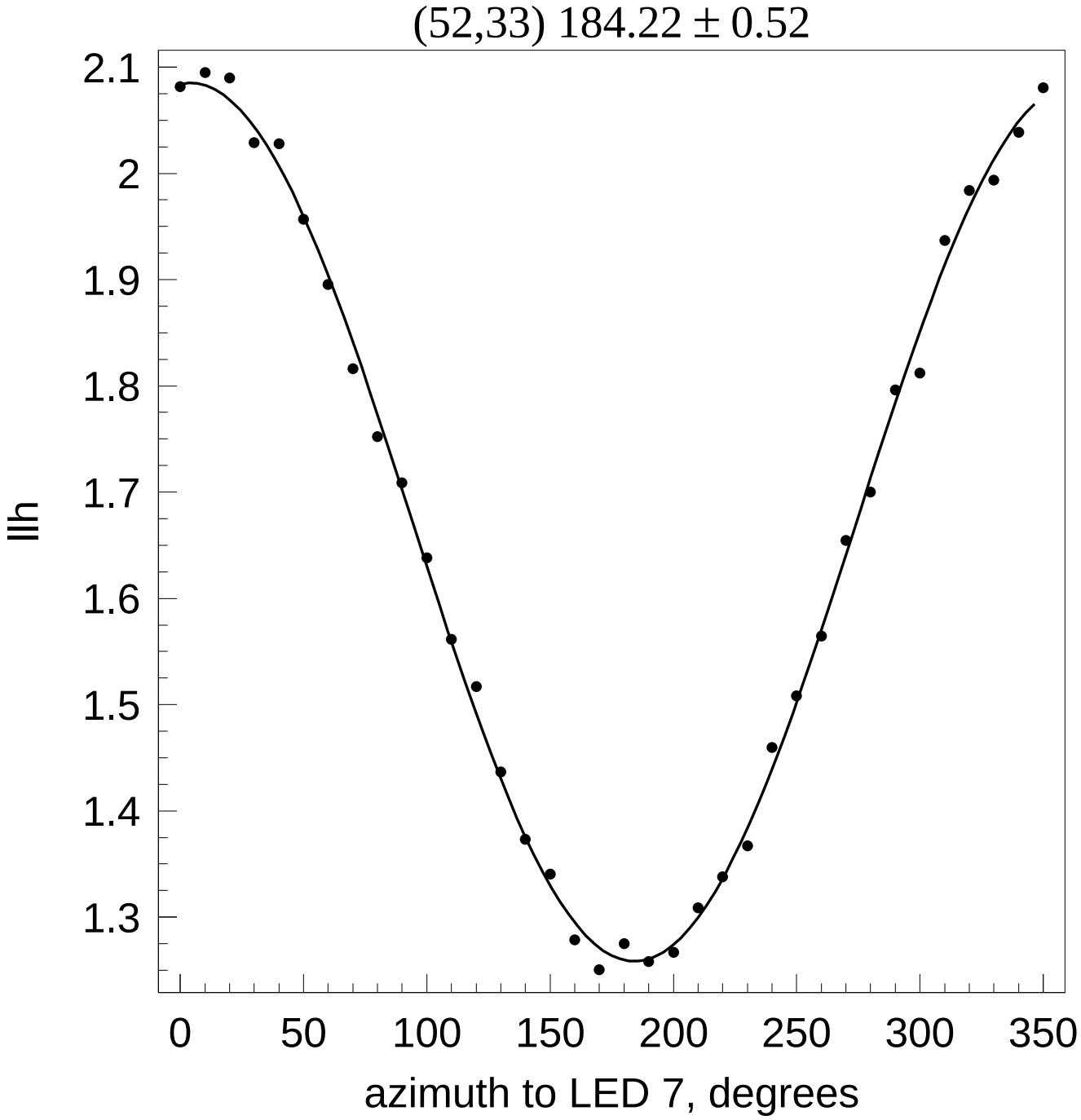

(51,37) 351.39 ± 1.96
2.45
2.4
2.35
2.3
2.25
2.2
2.15
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

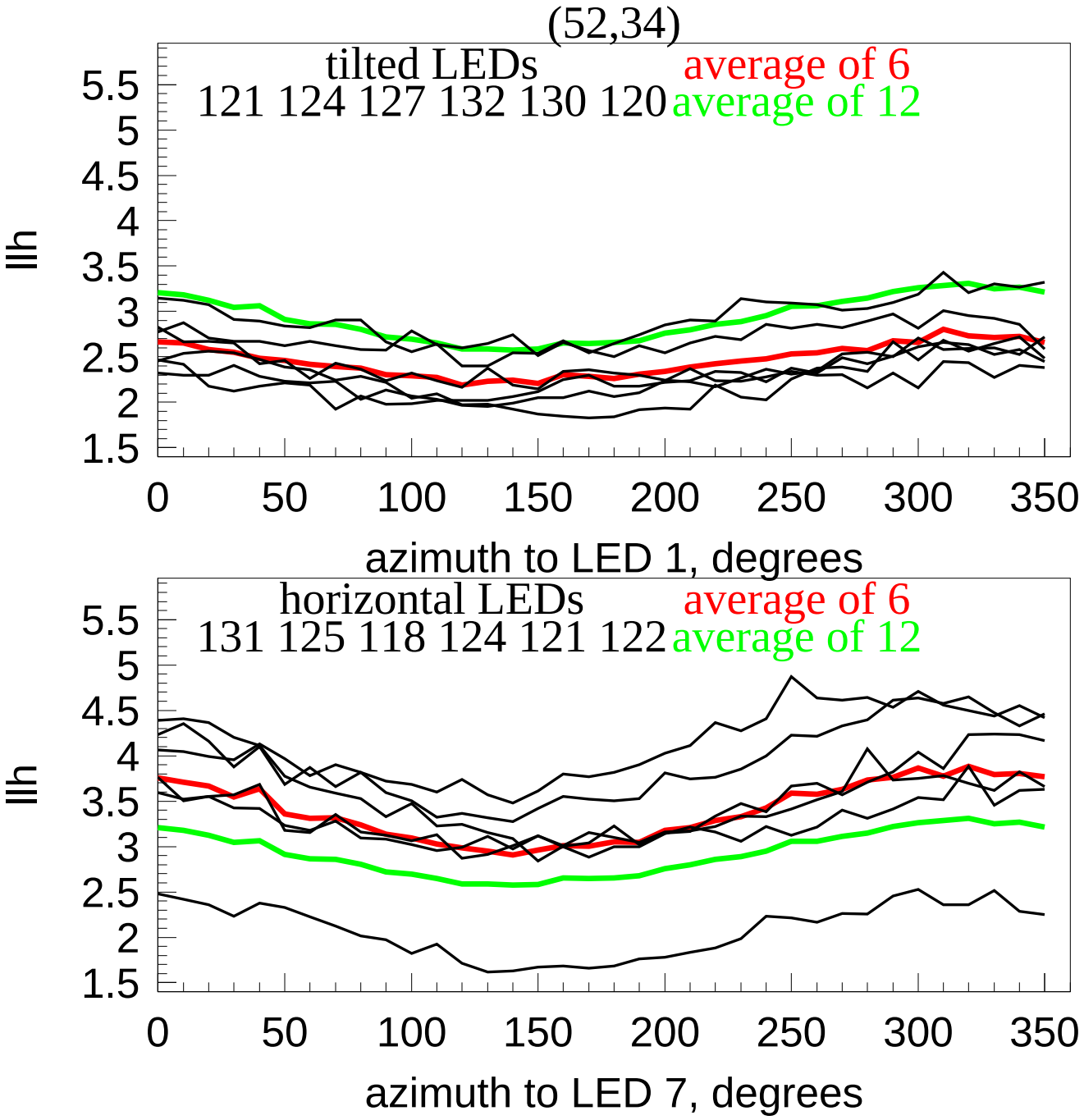

(51,37) 350.90 ± 2.01
2.45
2.4
2.35
2.3
2.25
2.2
2.15
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

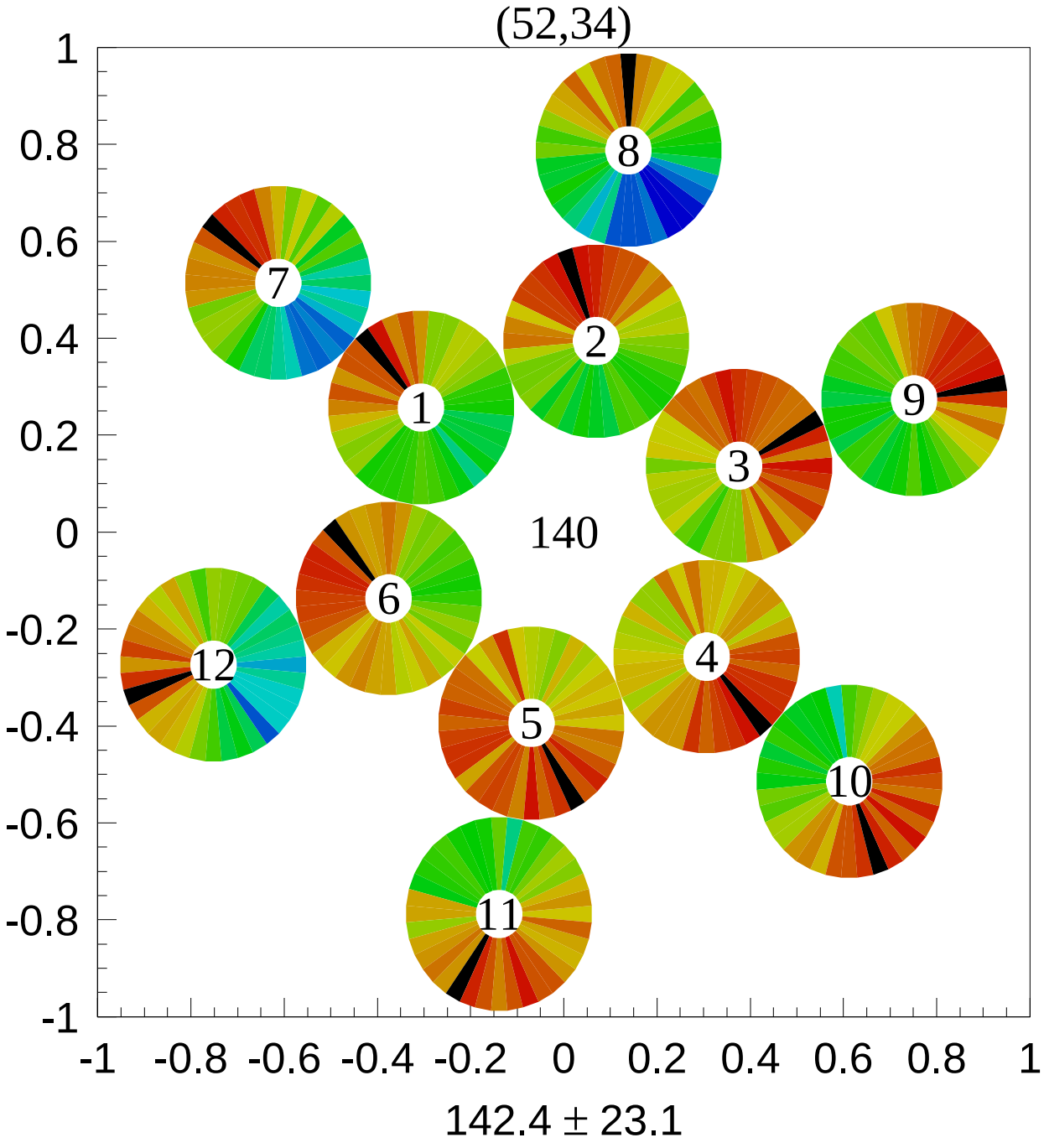

(52,33)
tilted LEDs
123 132 130 129 129 131
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 131 130 125 127 127
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

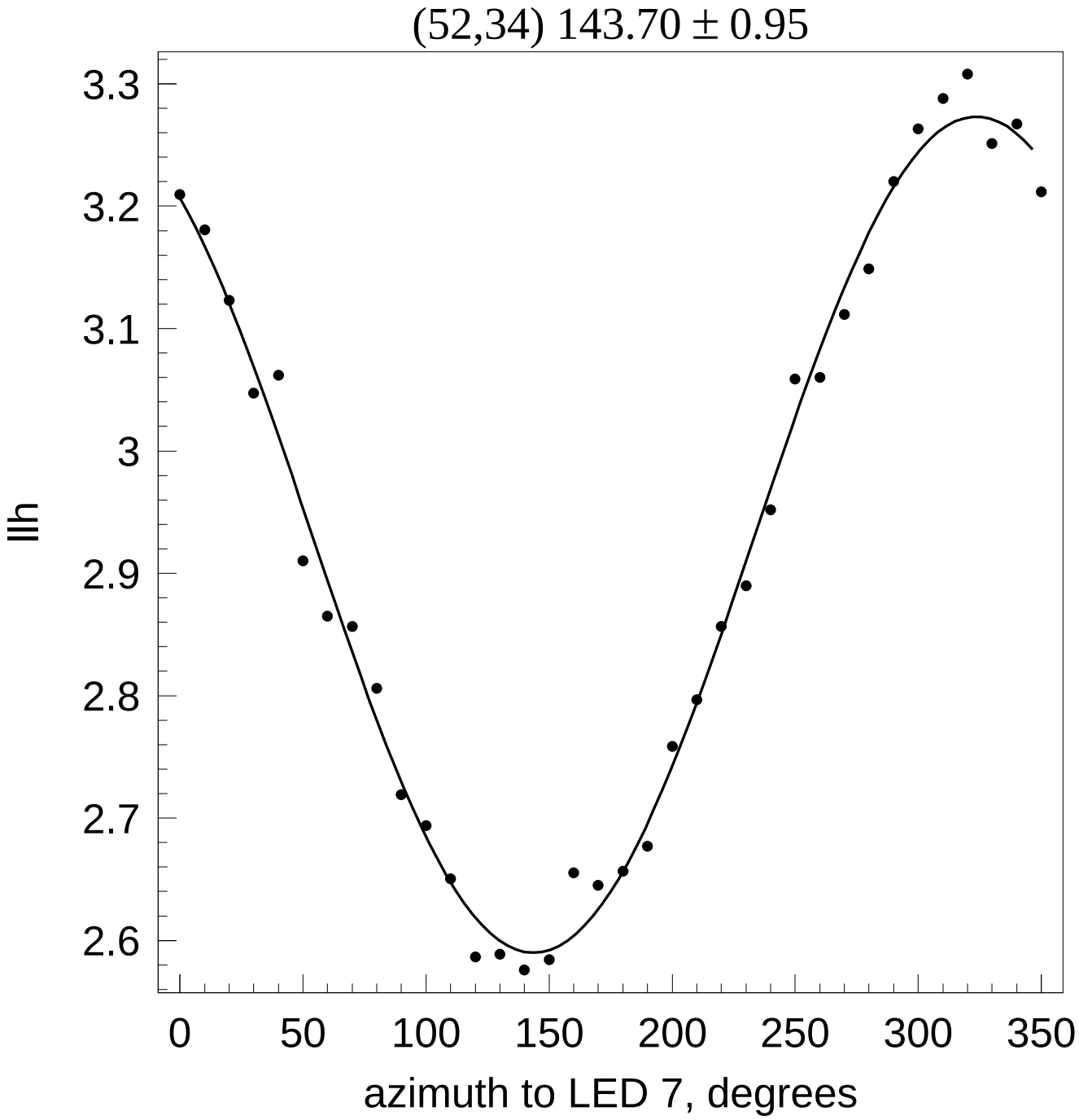

(52,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
184 ± 15.1

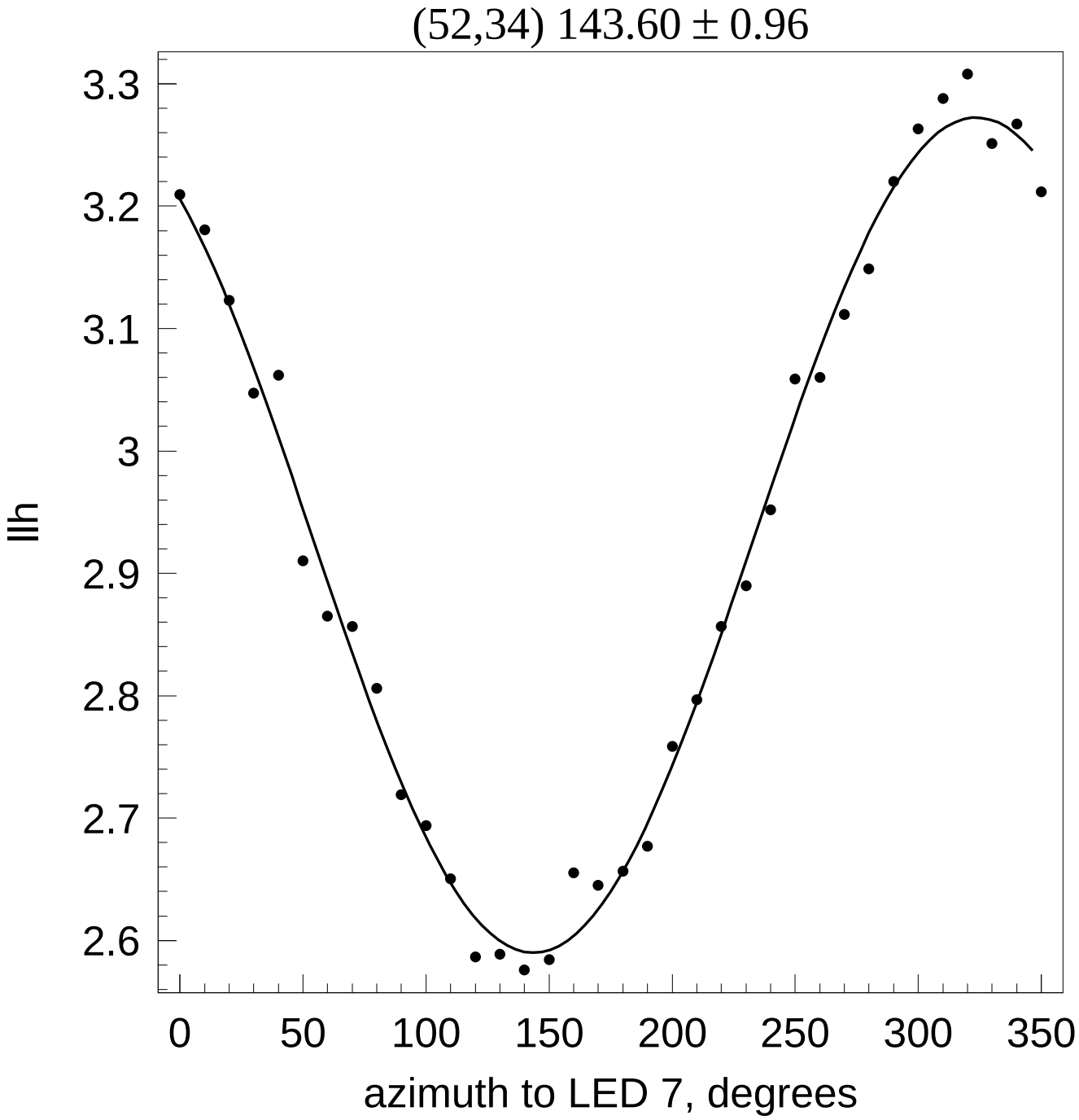

(52,33) 184.21 ± 0.52
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

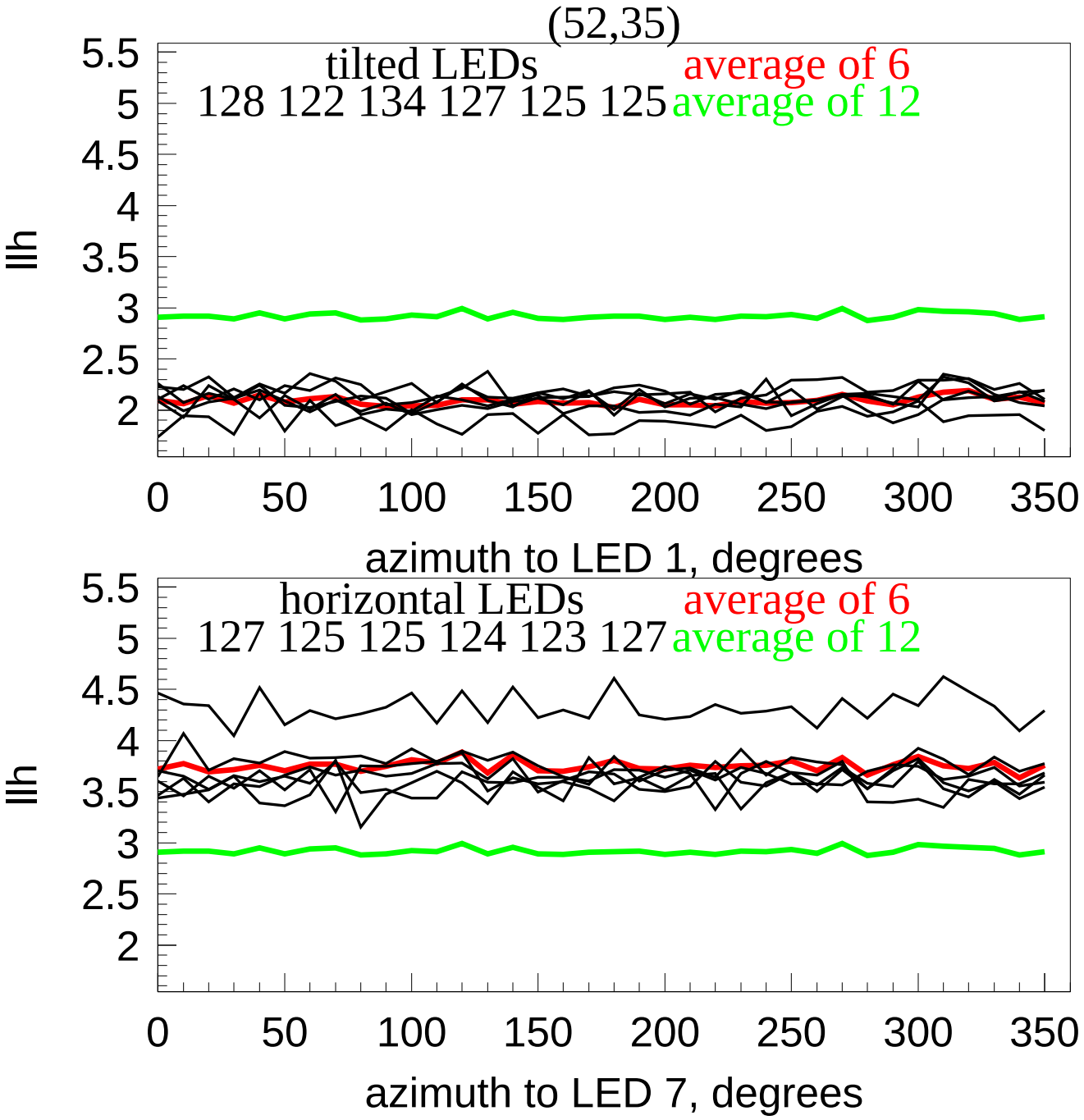

(52,33) 184.22 ± 0.52
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

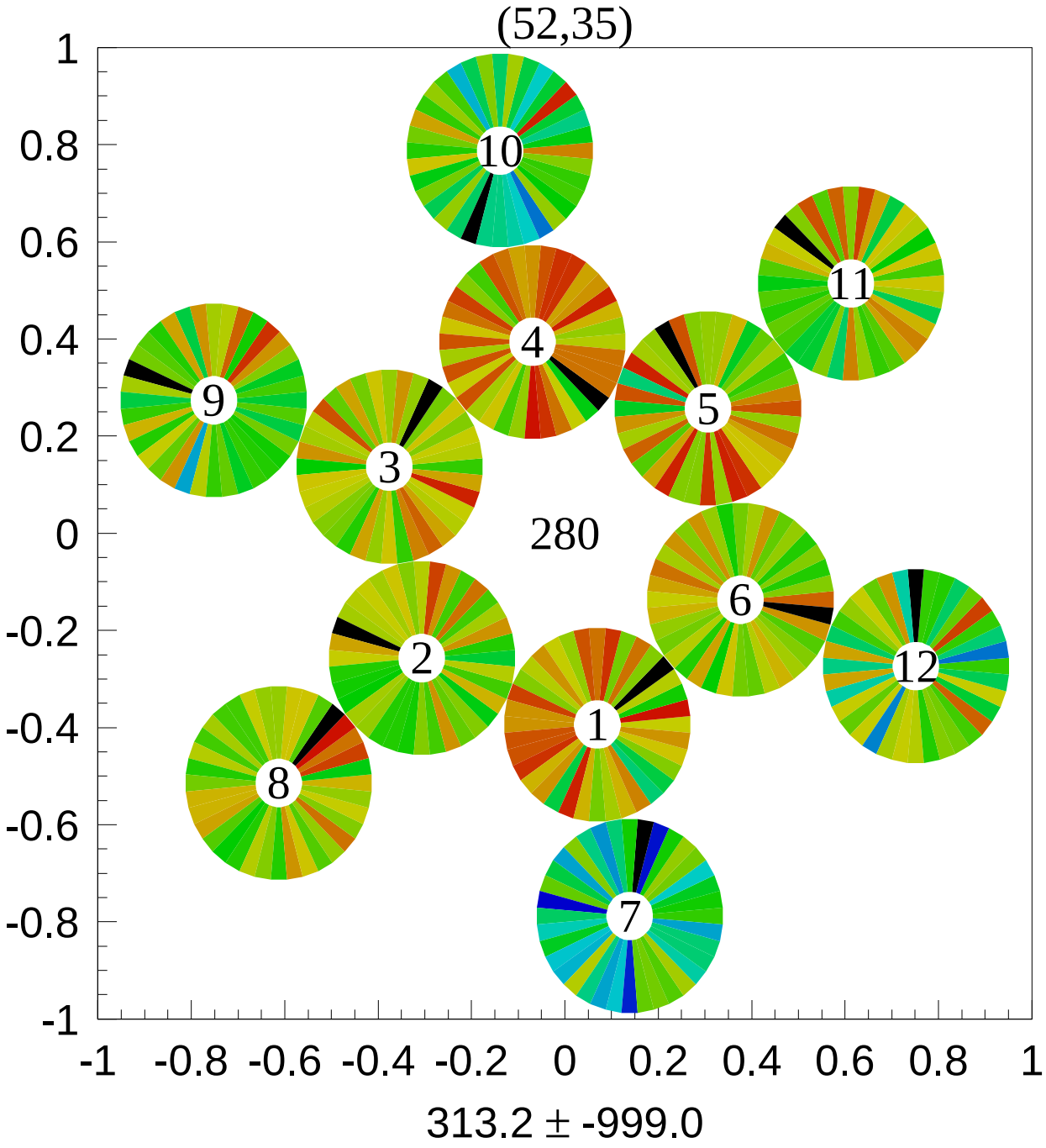

(52,34)
tilted LEDs
121 124 127 132 130 120
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 125 118 124 121 122
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

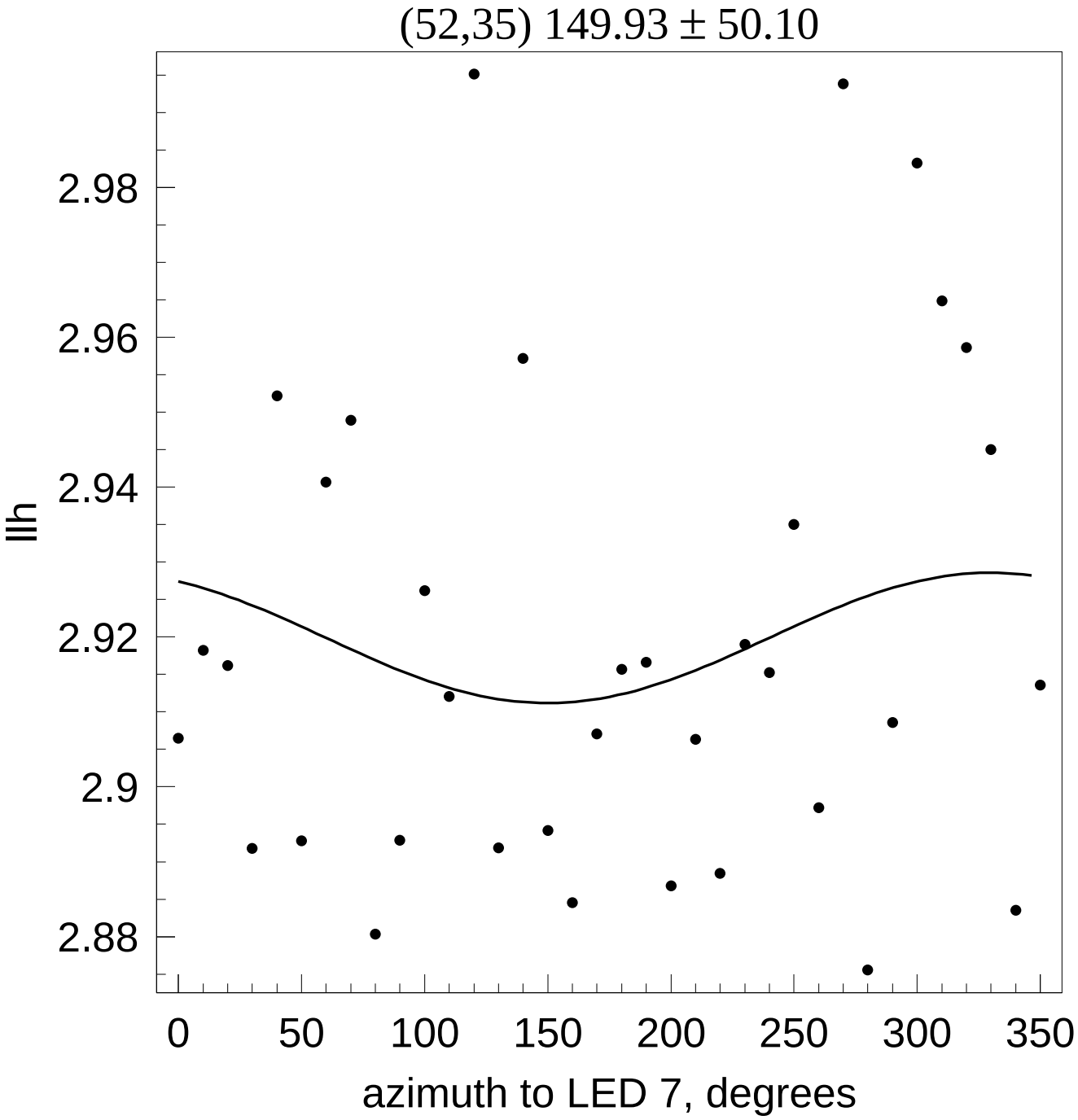

(52,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
142.4 ± 23.1
140
1
2
3
4
5
6
7
8
9
10
11
12

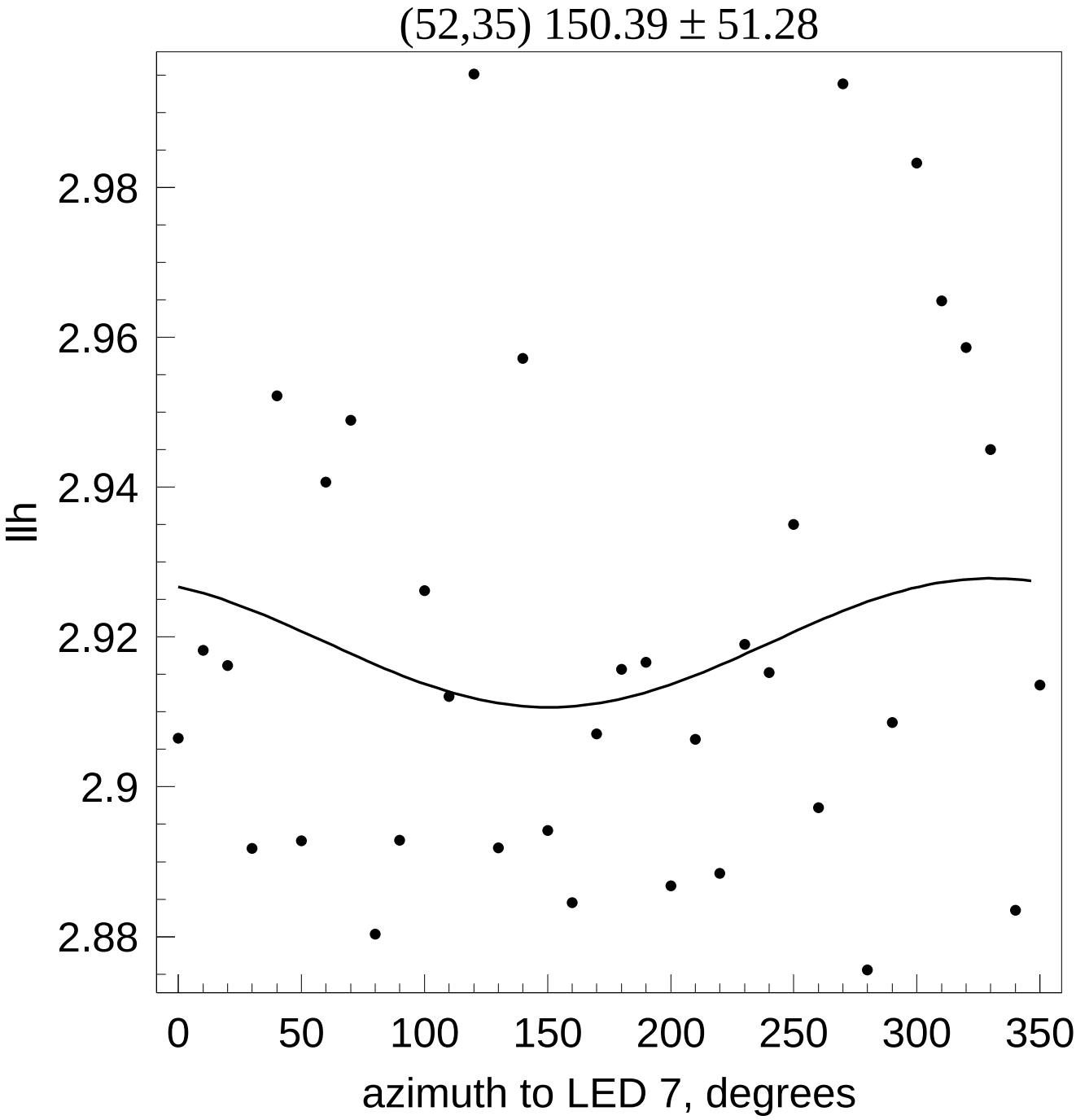

(52,34) 143.70 ± 0.95
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

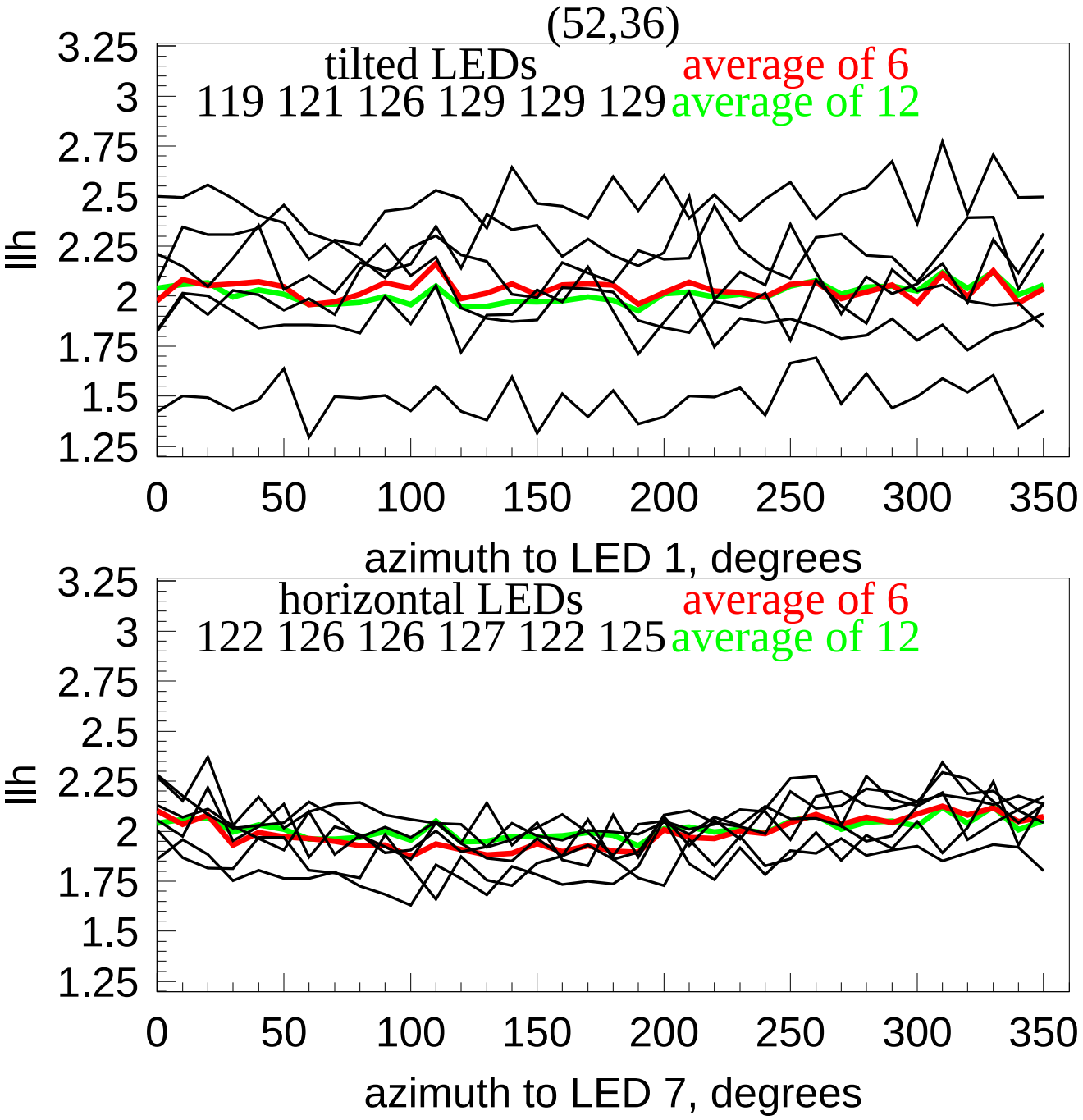

(52,34) 143.60 ± 0.96
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

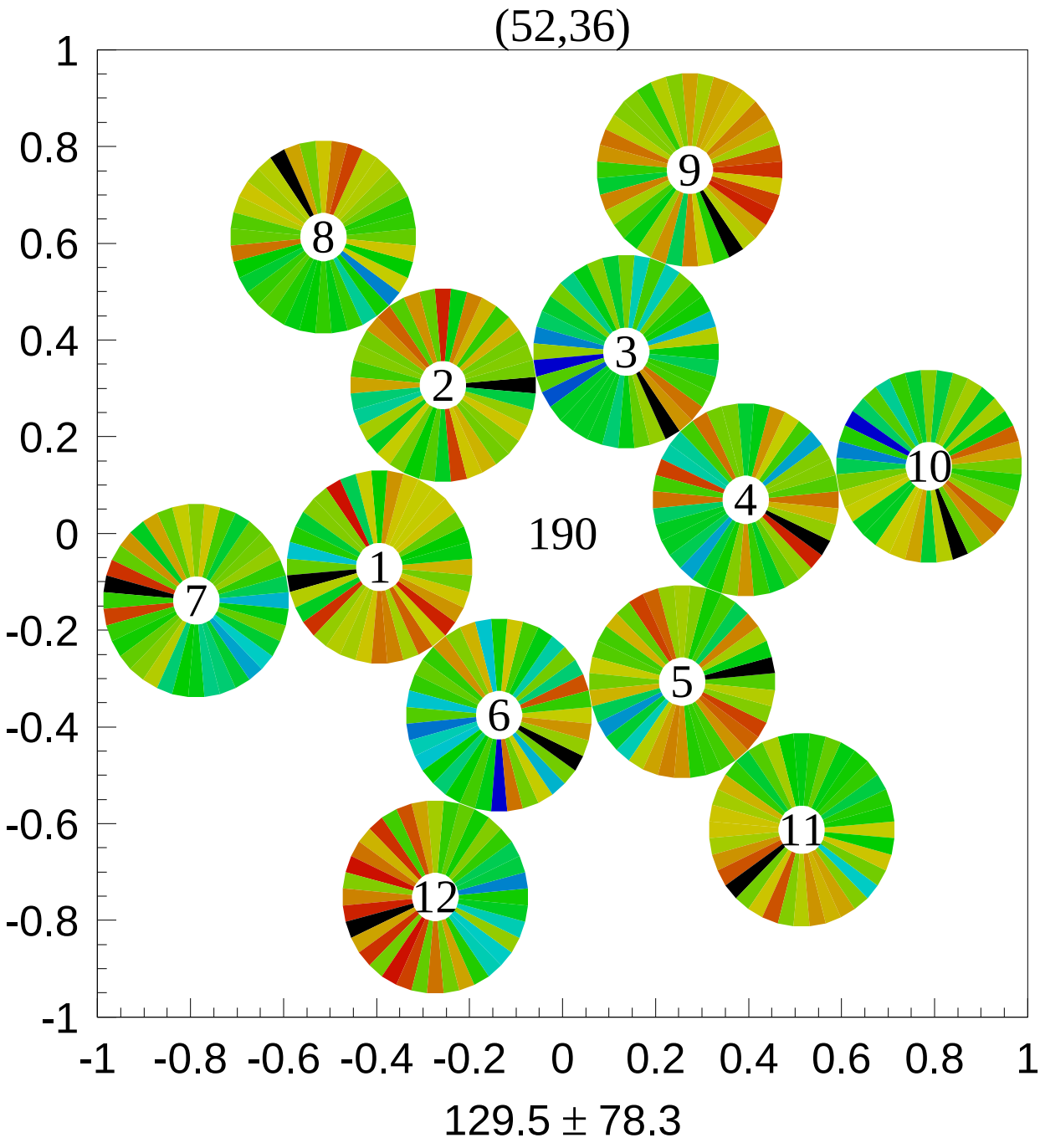

(52,35)
tilted LEDs
128 122 134 127 125 125
average of 6
average of 12
IIh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 125 125 124 123 127
average of 6
average of 12
IIh
azimuth to LED 7, degrees

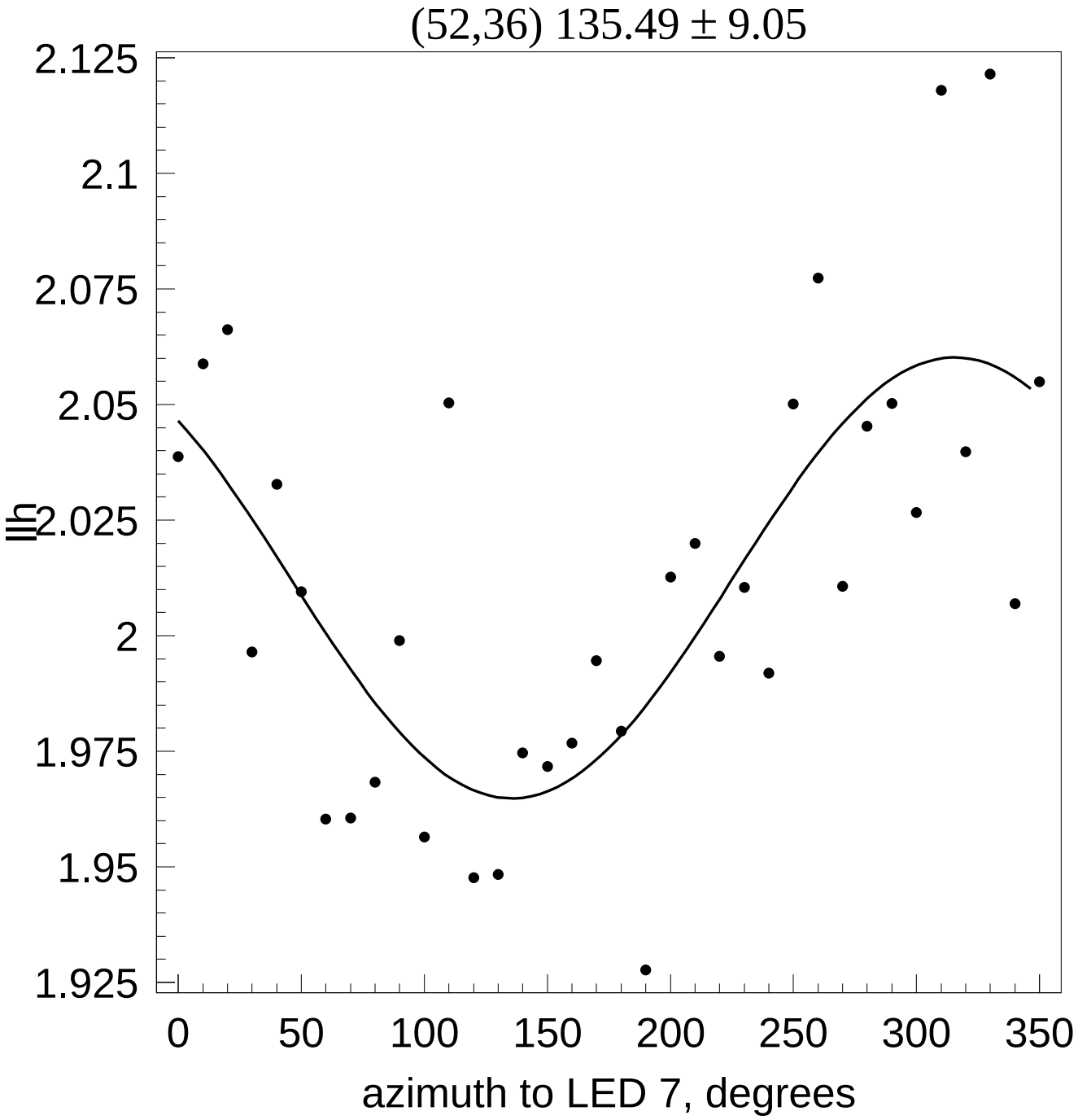

(52,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
313.2 ± -999.0
10
11
4
9
5
3
280
6
12
2
1
8
7

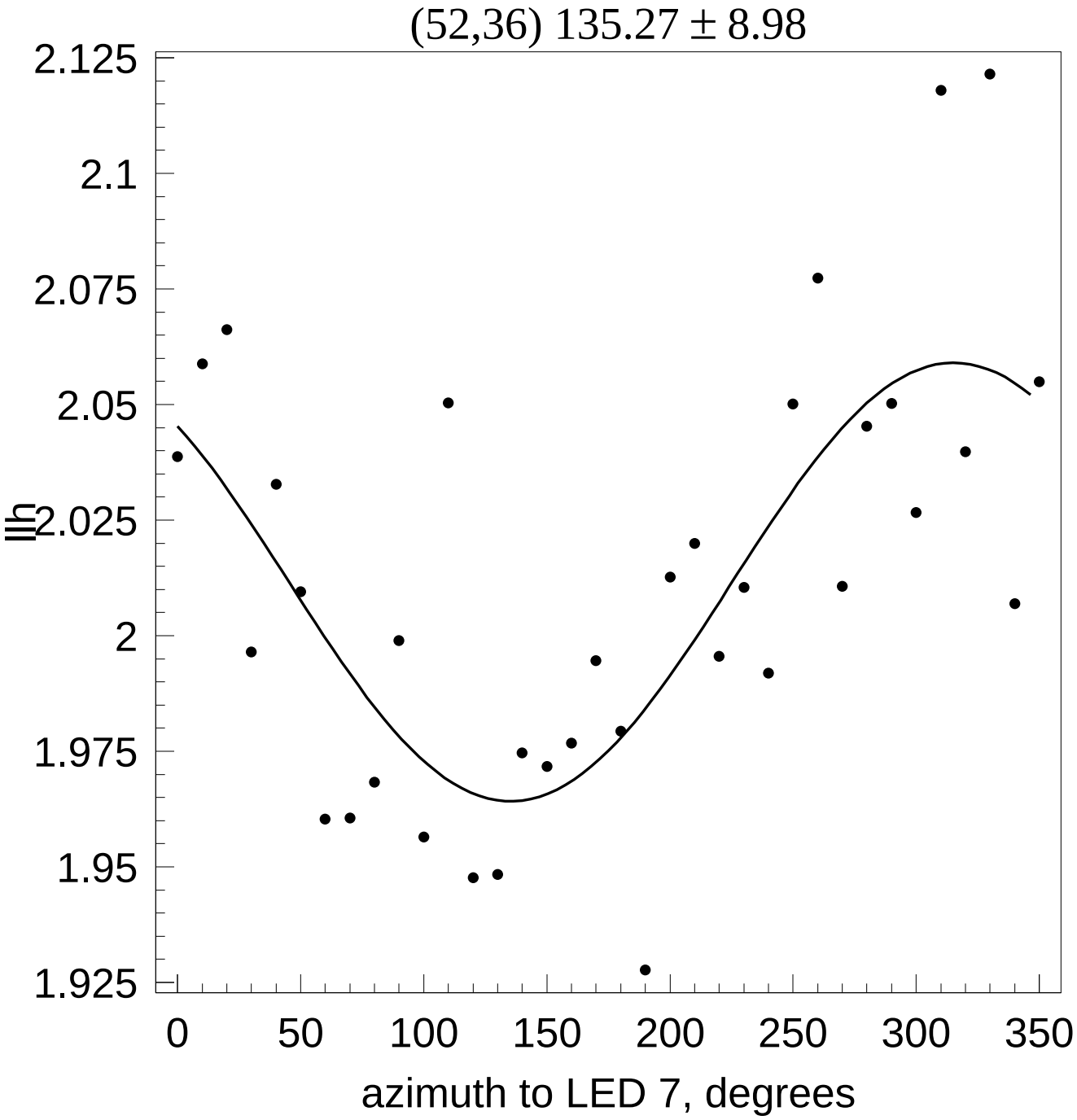

(52,35) 149.93 ± 50.10
2.98
2.96
2.94
2.92
2.9
2.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

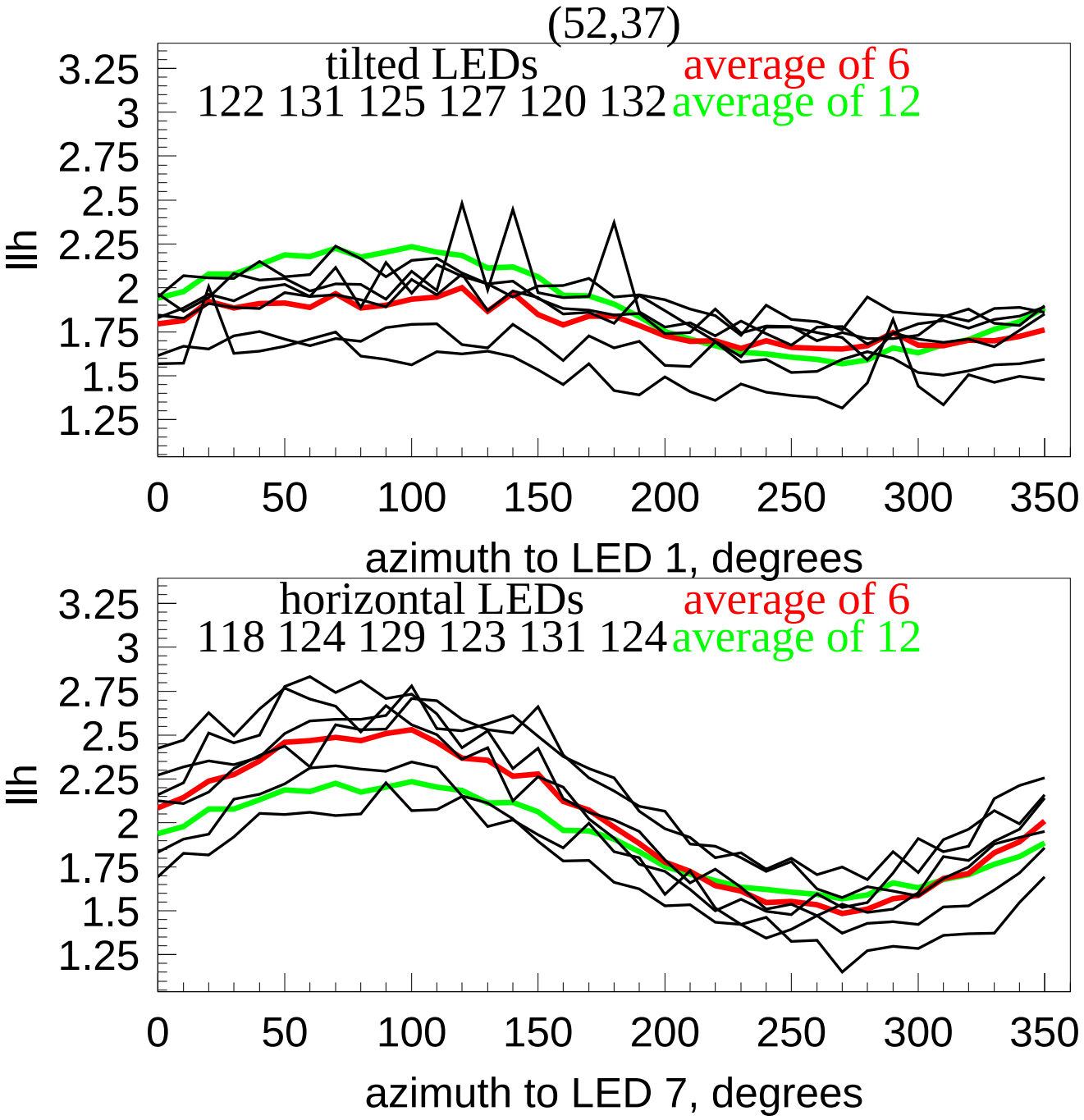

(52,35) 150.39 ± 51.28
2.98
2.96
2.94
2.92
2.9
2.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

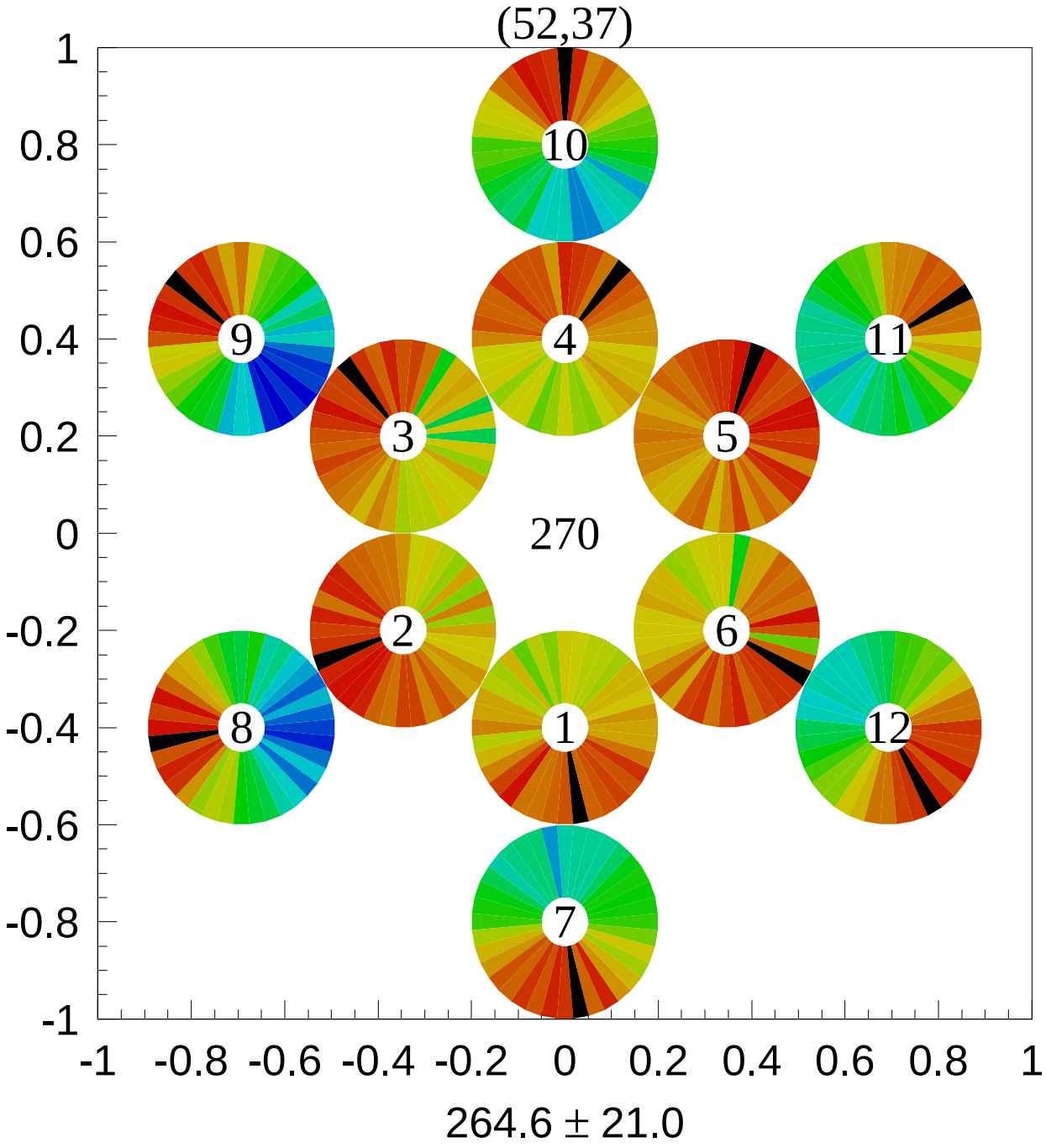

(52,36)
tilted LEDs
119 121 126 129 129 129
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
IIh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 126 126 127 122 125
average of 6
average of 12
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
IIh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

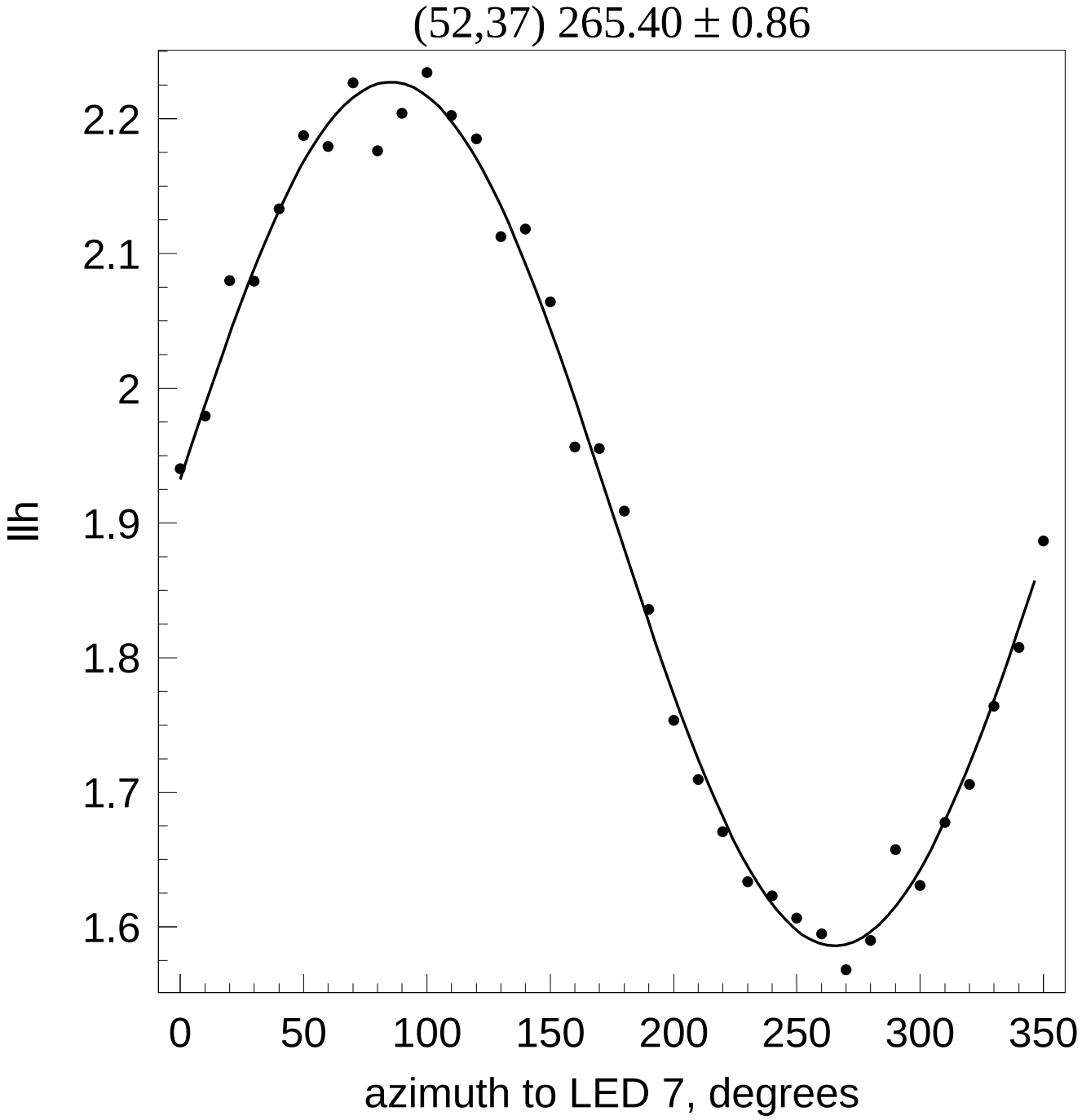

(52,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
129.5 ± 78.3
190
1
2
3
4
5
6
7
8
9
10
11
12

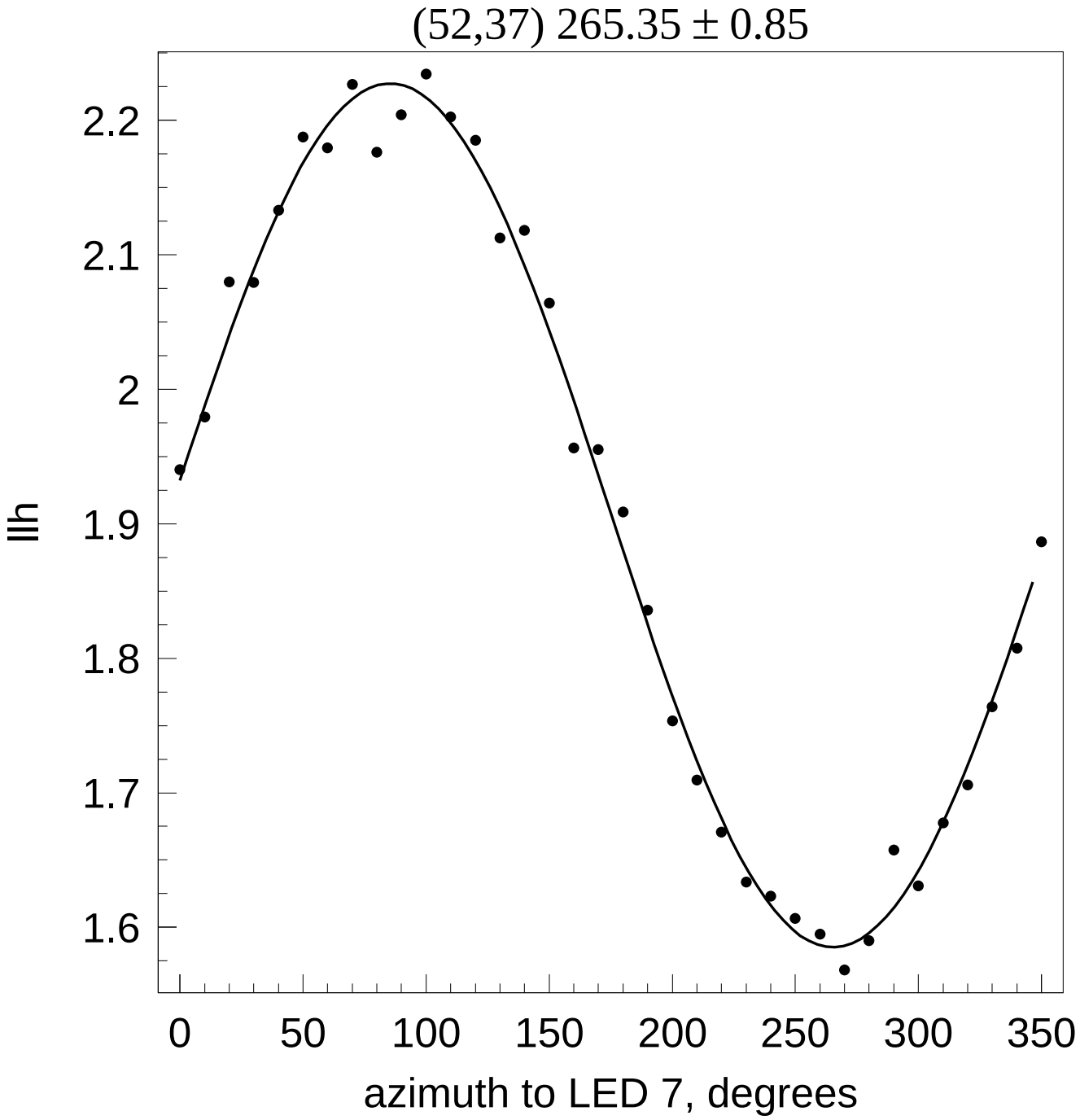

(52,36) 135.49 ± 9.05
2.125
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

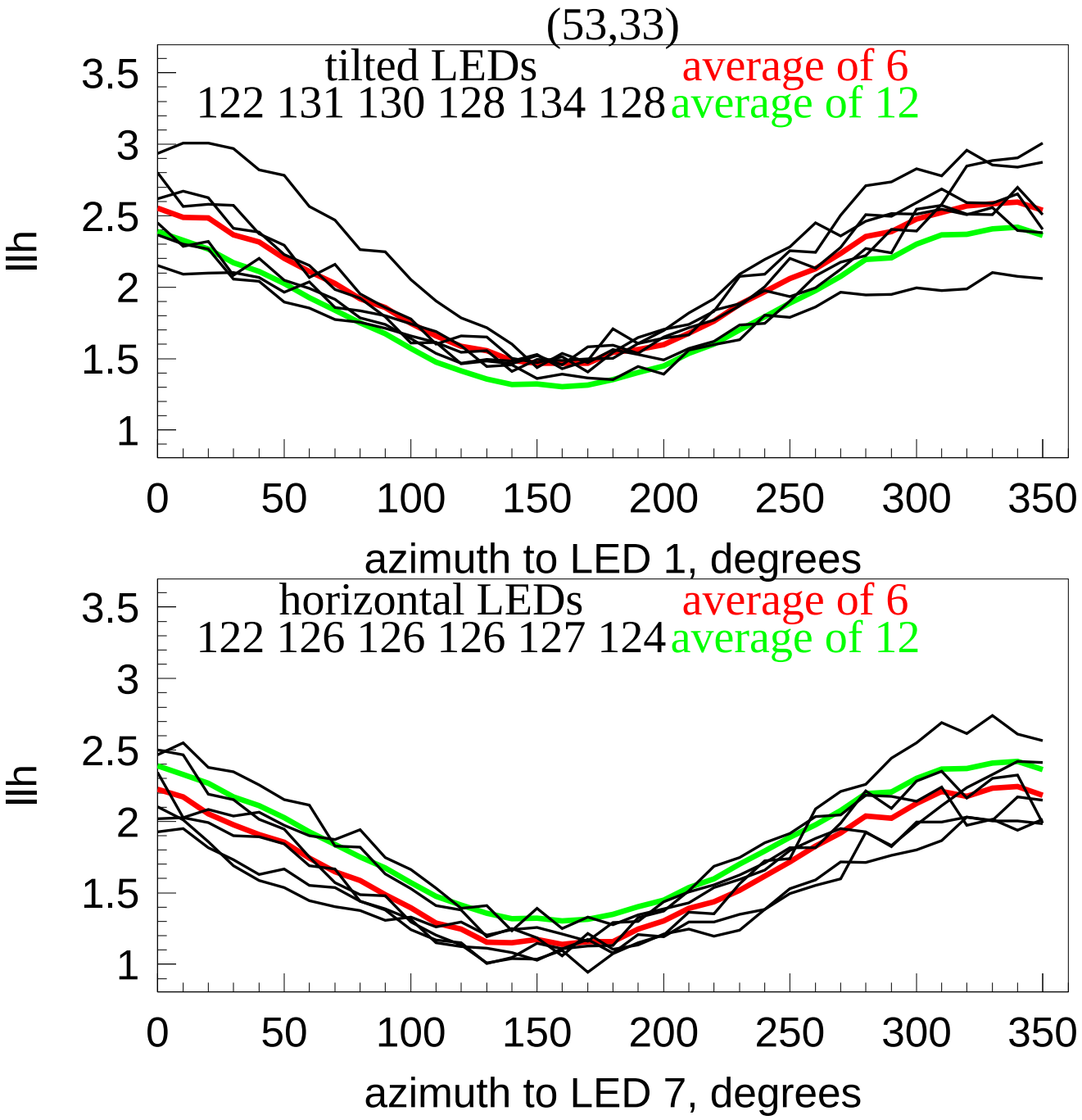

(52,36) 135.27 ± 8.98
2.125
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

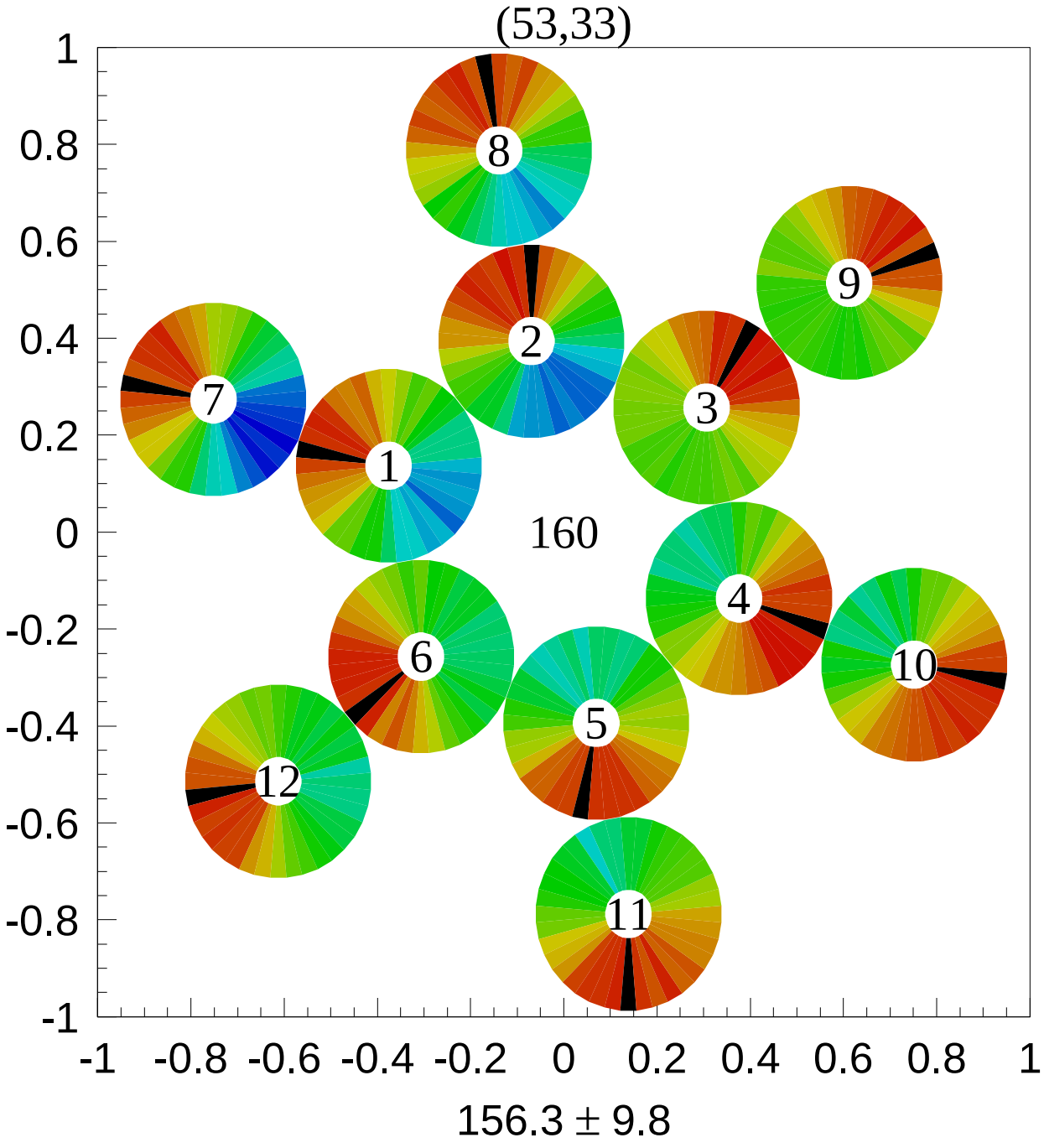

(52,37)
tilted LEDs
122 131 125 127 120 132
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
118 124 129 123 131 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

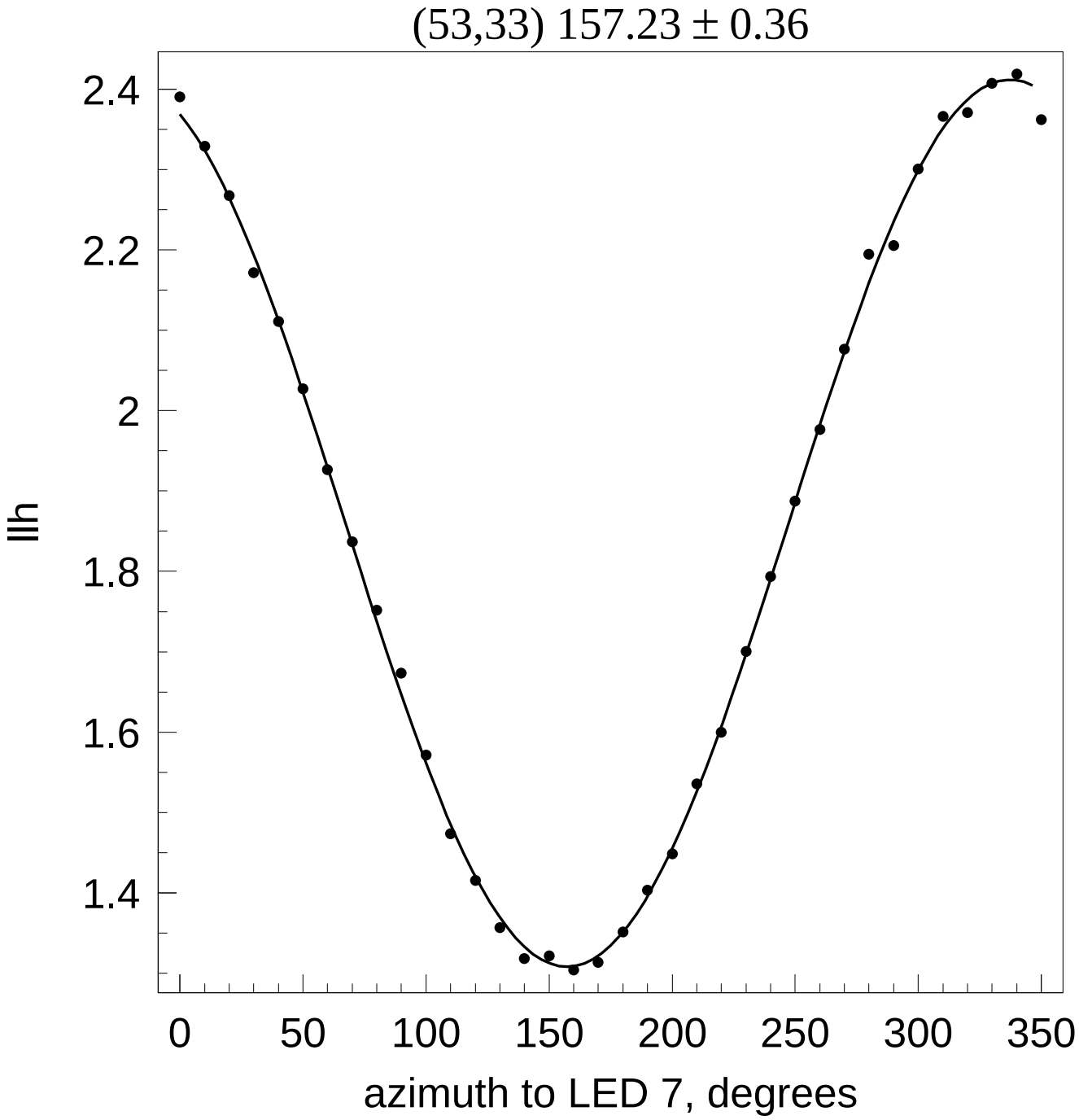

(52,37)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
264.6 ± 21.0

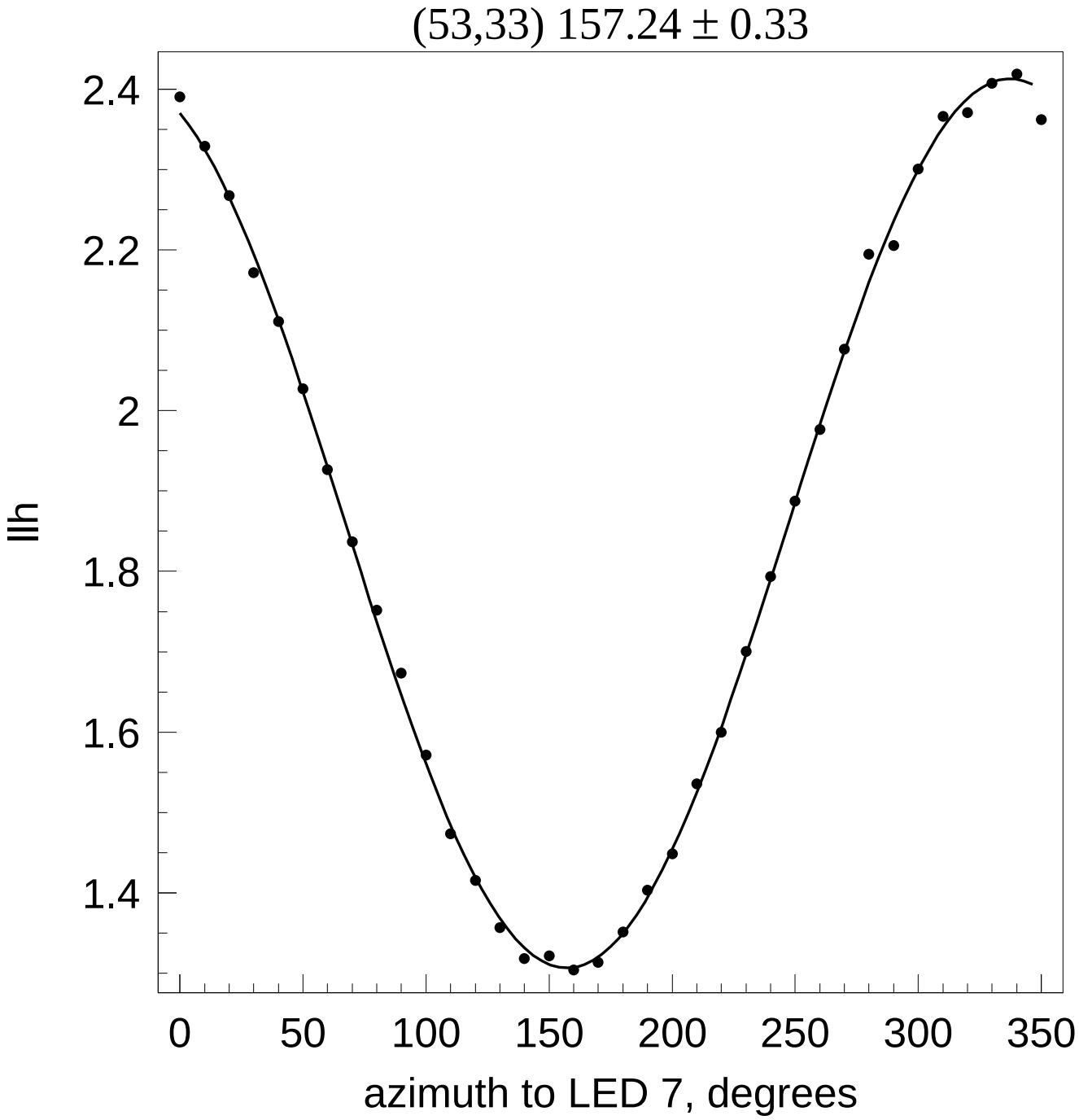

(52,37) 265.40 ± 0.86
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

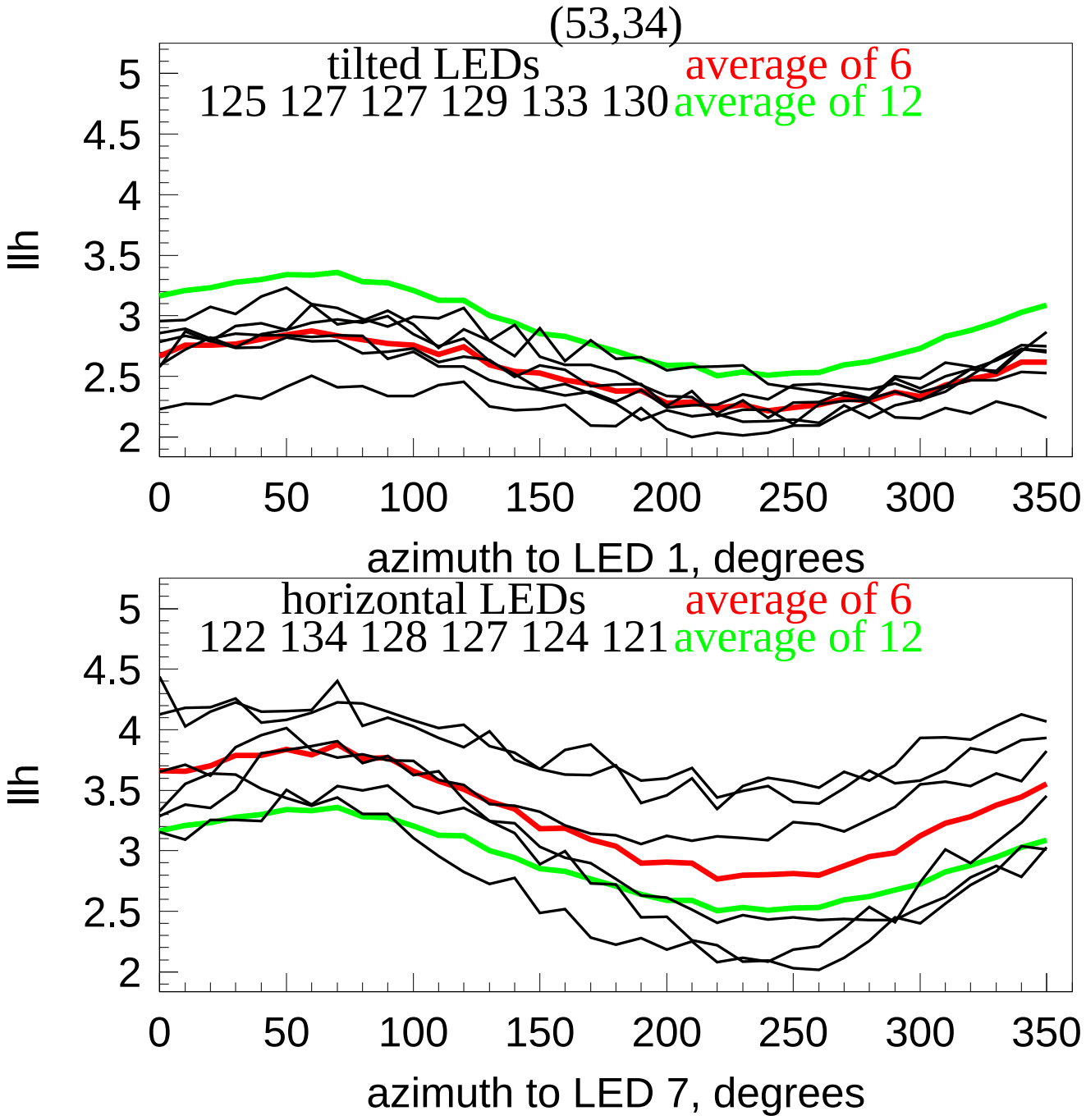

(52,37) 265.35 ± 0.85
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

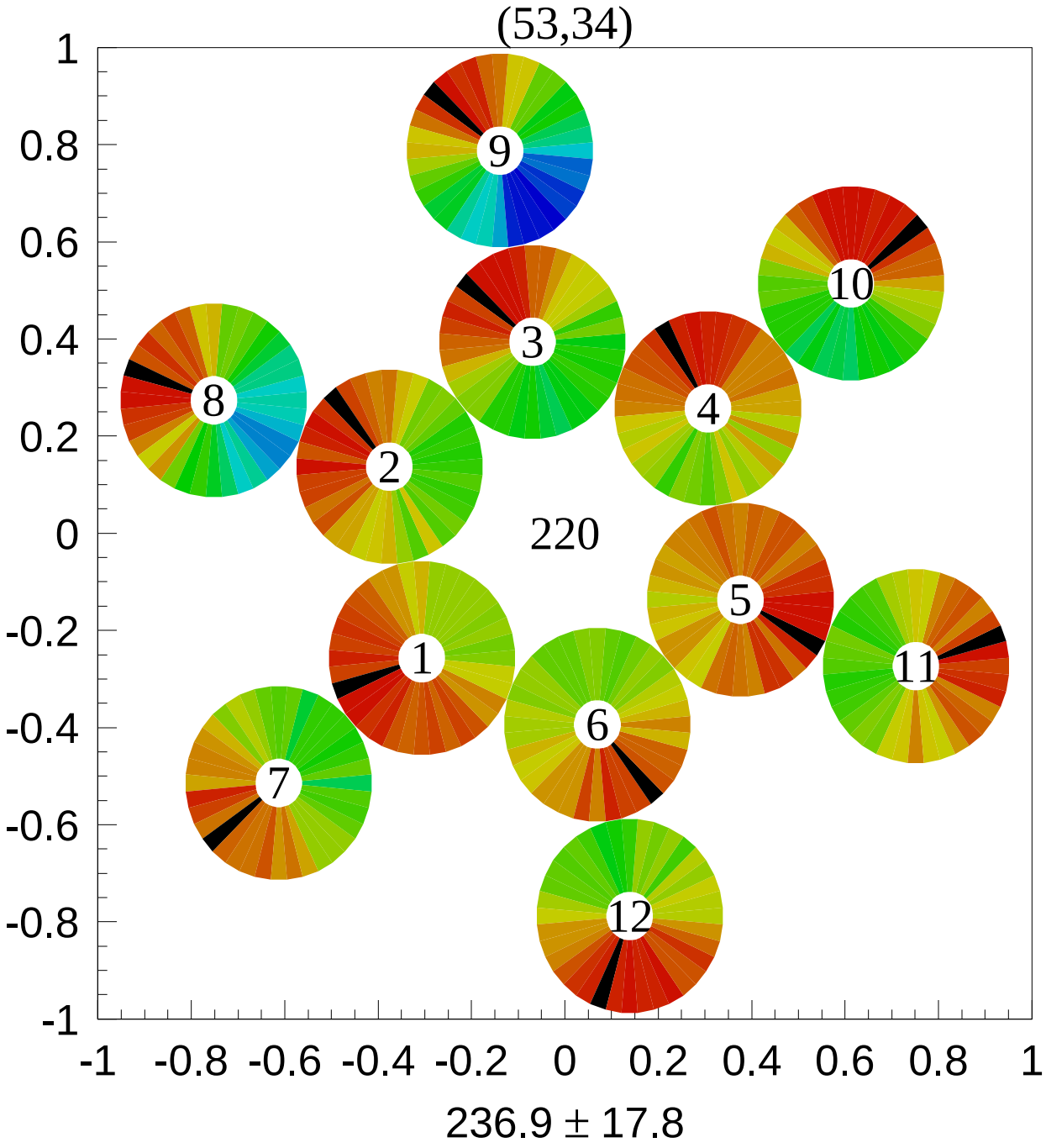

(53,33)
tilted LEDs
122 131 130 128 134 128
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 126 126 126 127 124
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

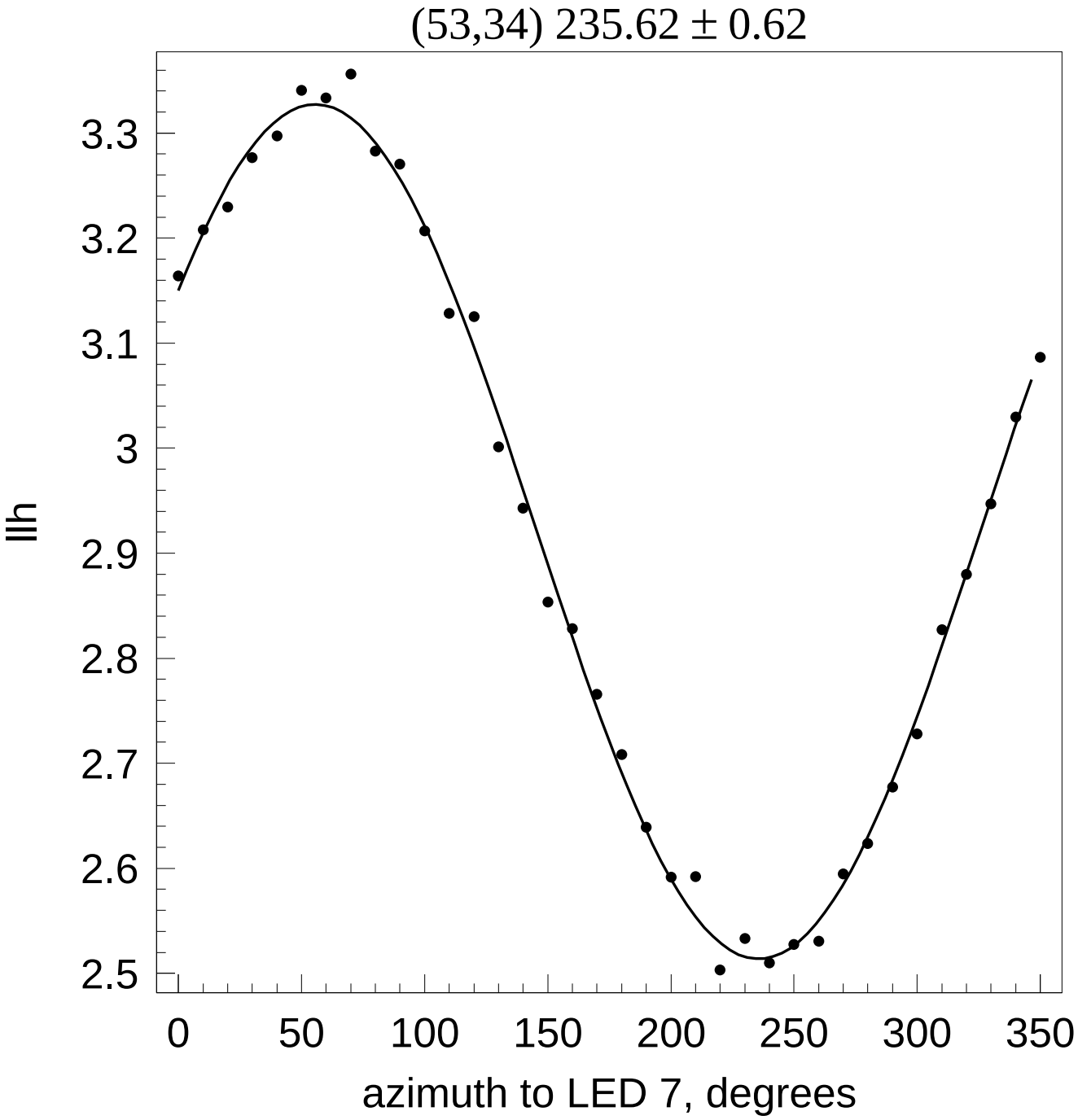

(53,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
8
2
9
7
3
1
160
4
10
6
5
12
11
156.3 ± 9.8

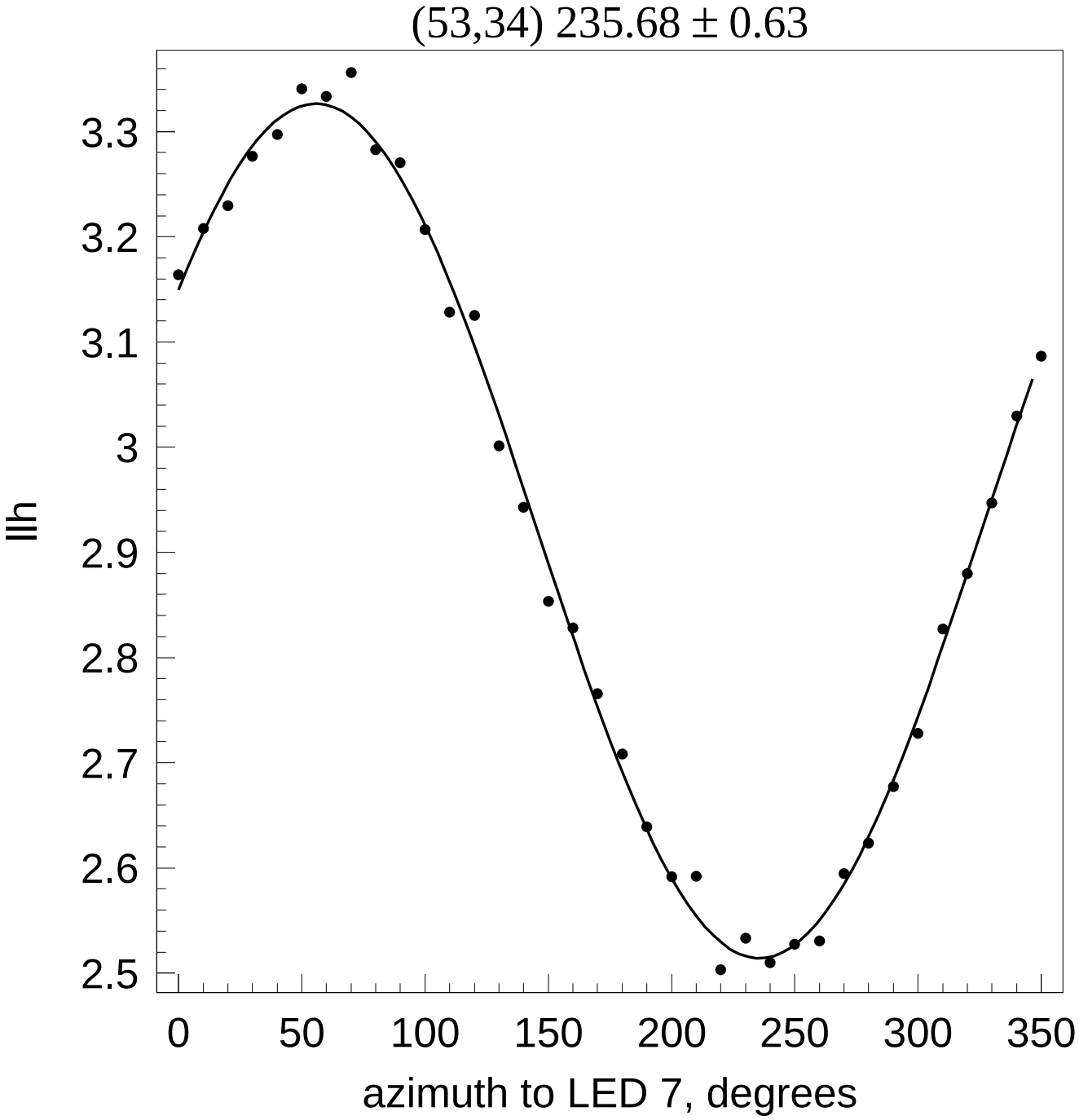

(53,33) 157.23 ± 0.36
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

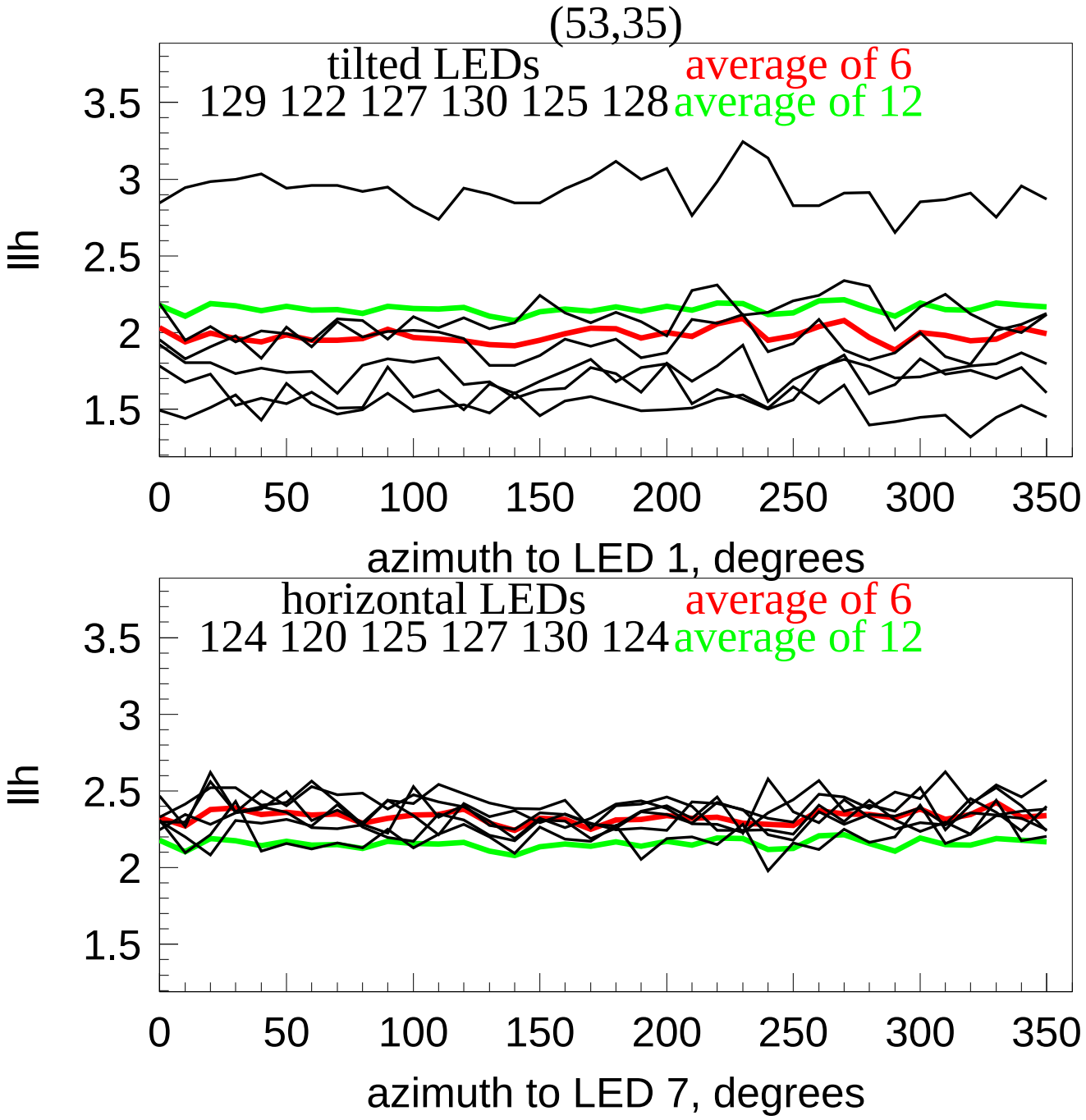

(53,33) 157.24 ± 0.33
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

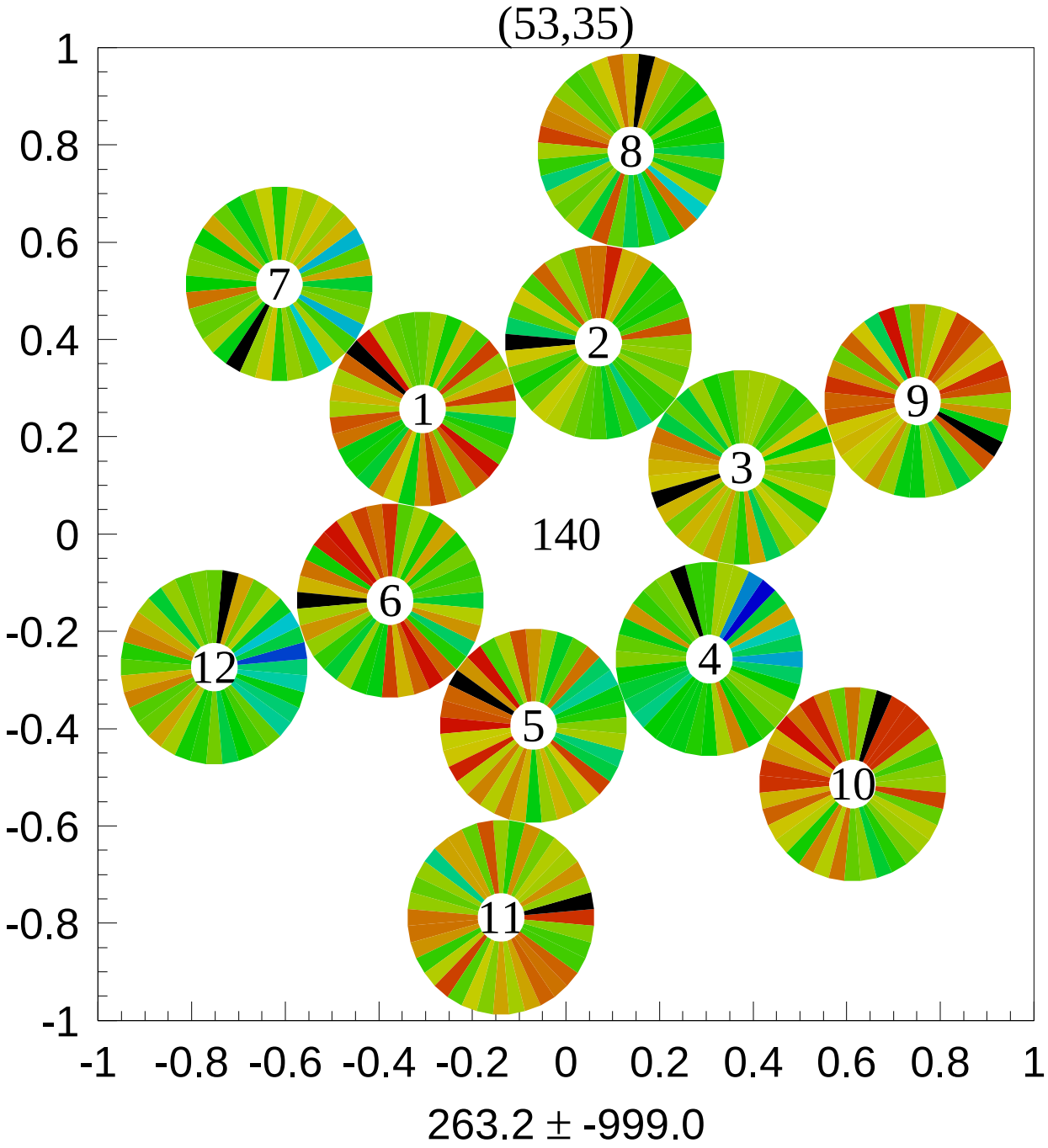

(53,34)
tilted LEDs
125 127 127 129 133 130
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
122 134 128 127 124 121
average of 6
average of 12
IIh
azimuth to LED 7, degrees

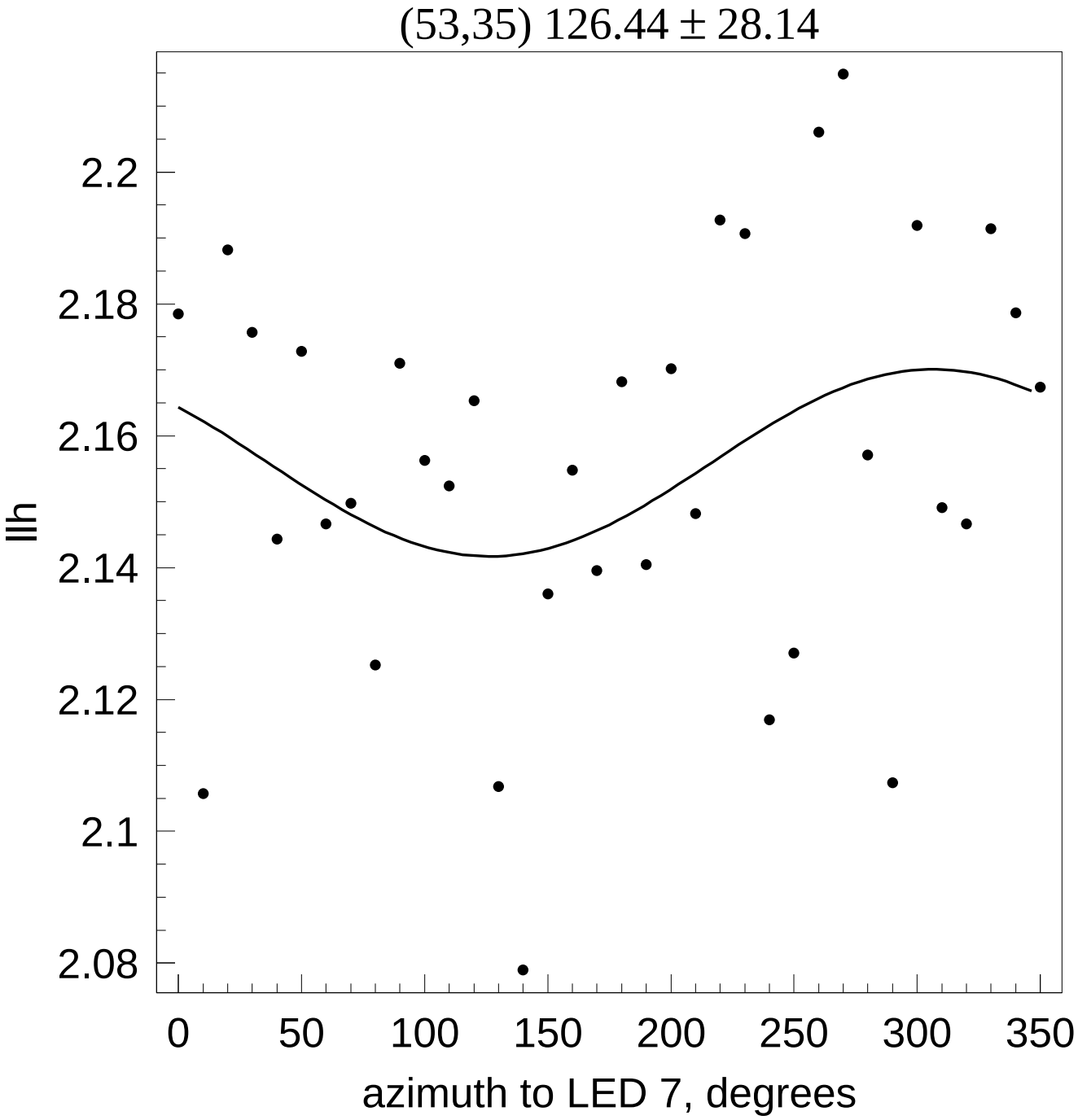

(53,34)
9
10
3
8
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
236.9 ± 17.8

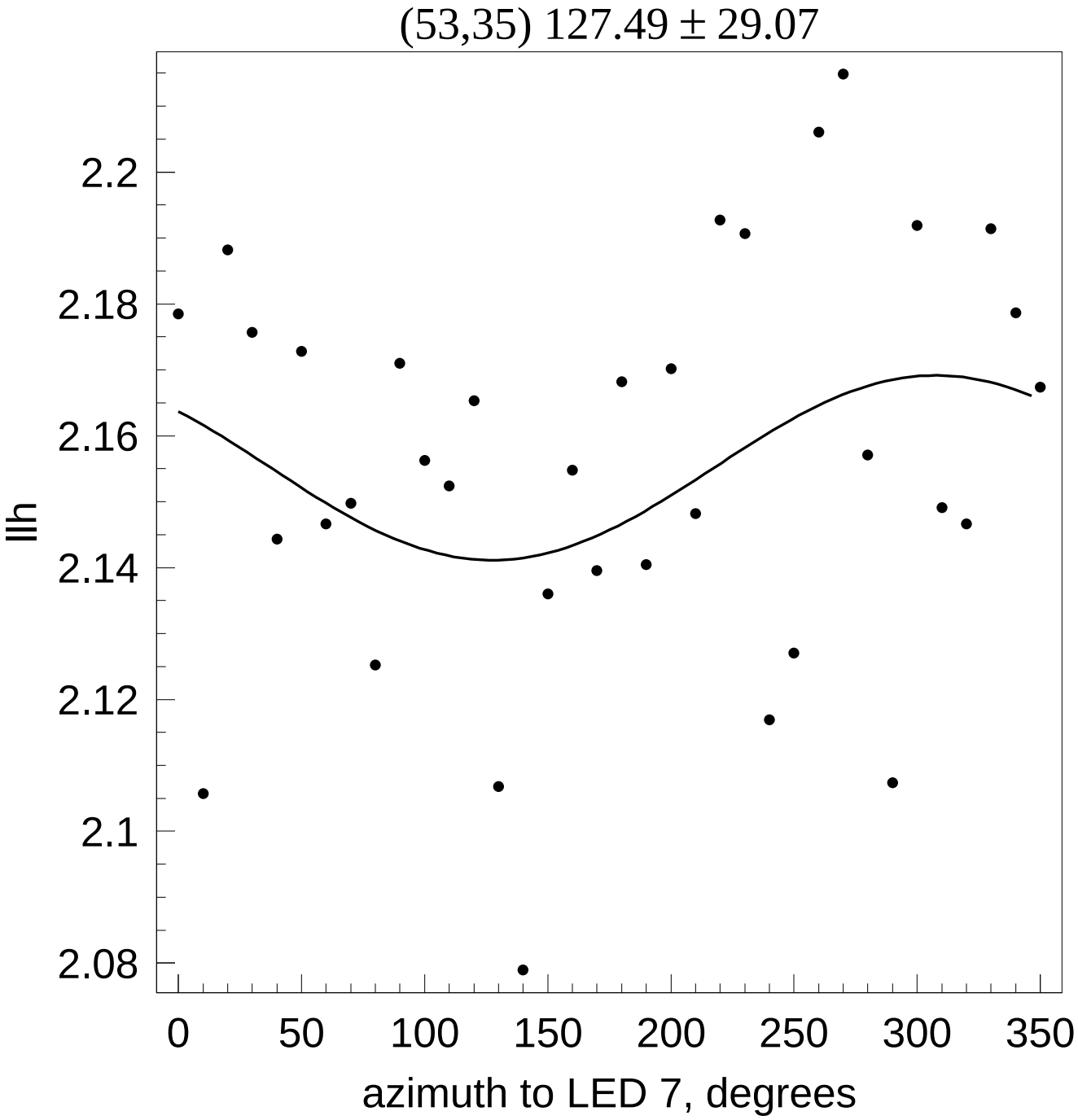

(53,34) 235.62 ± 0.62
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

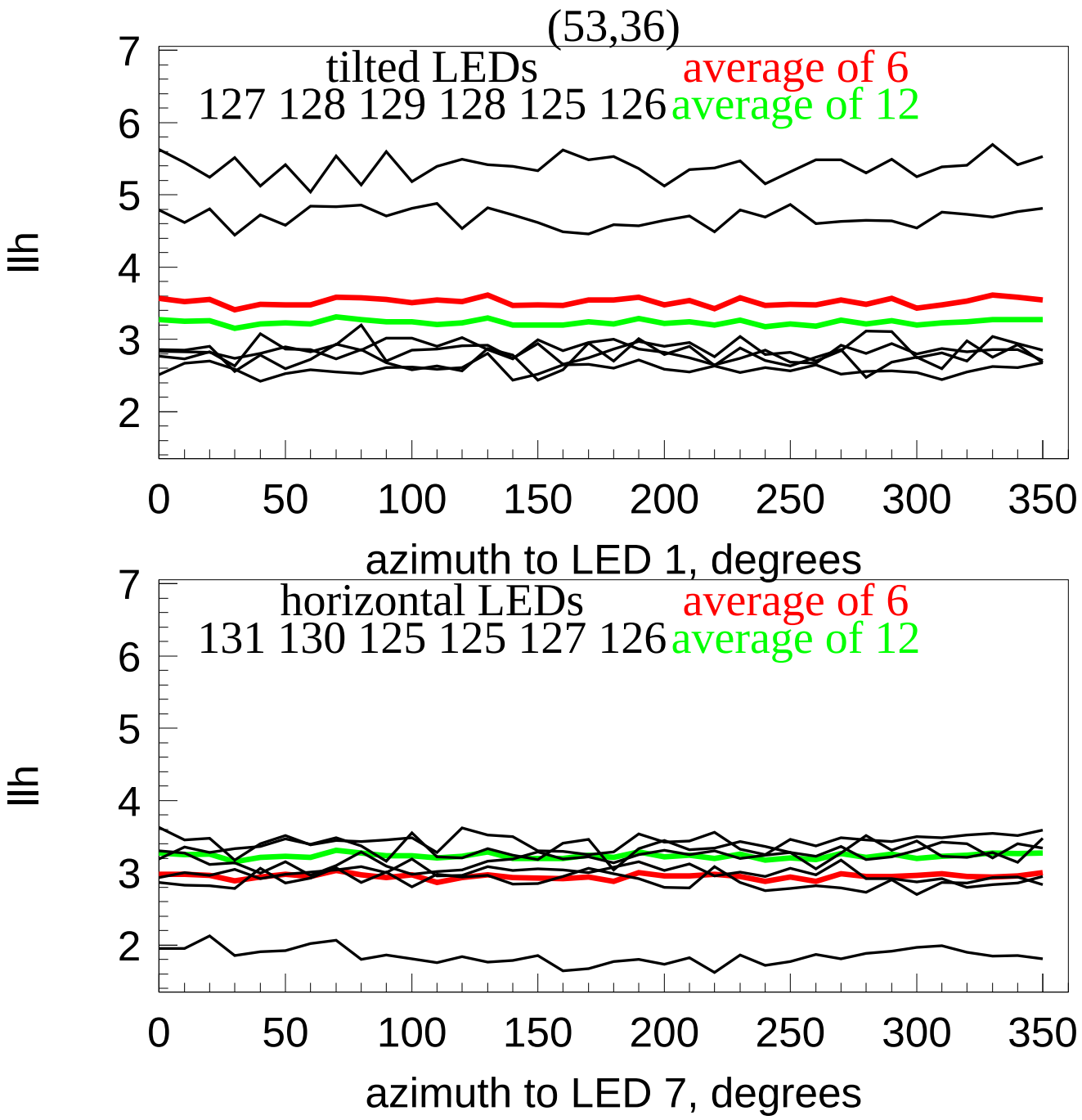

(53,34) 235.68 ± 0.63
3.3
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

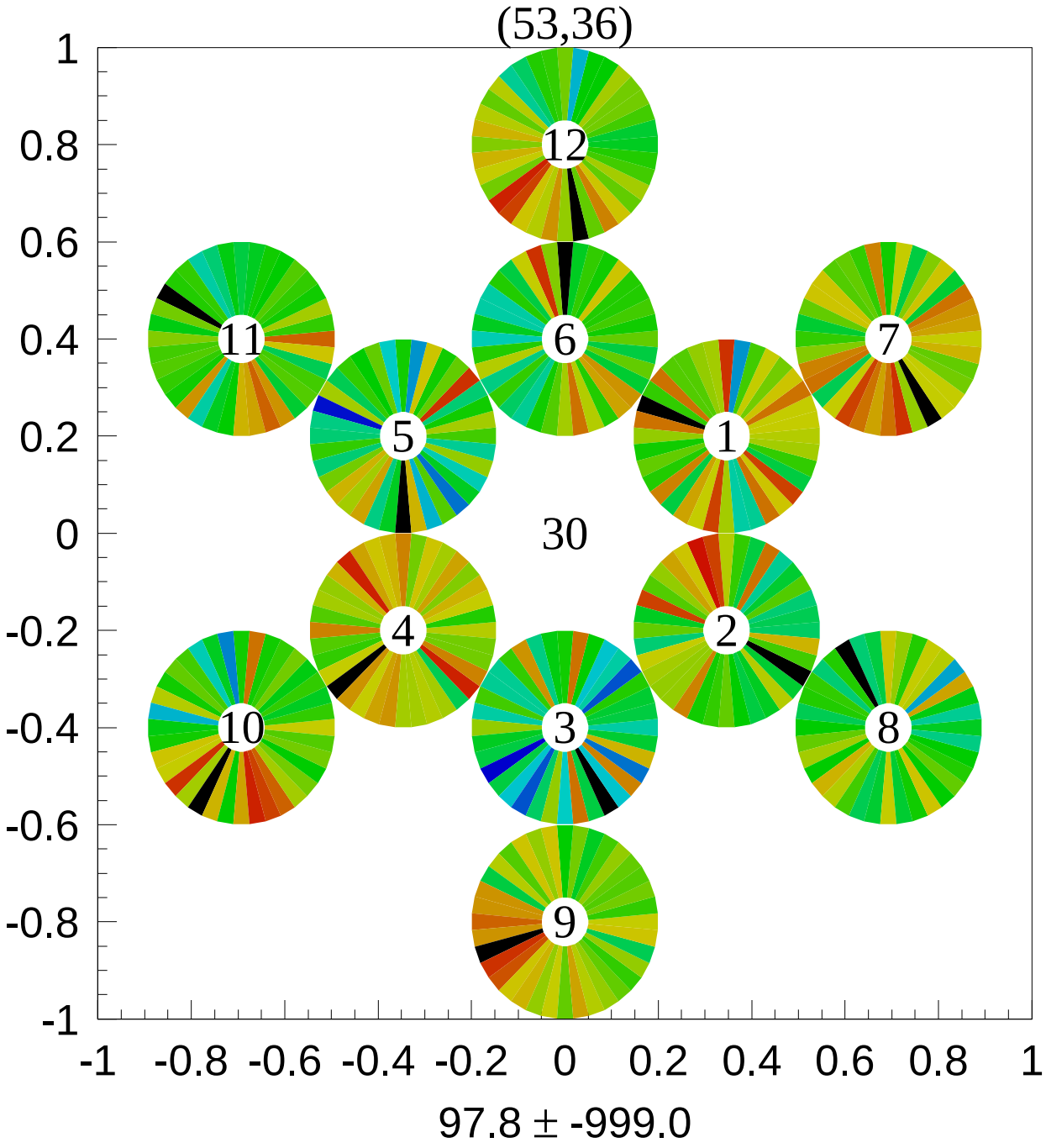

(53,35)
tilted LEDs
129 122 127 130 125 128
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 120 125 127 130 124
average of 6
average of 12
IIh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

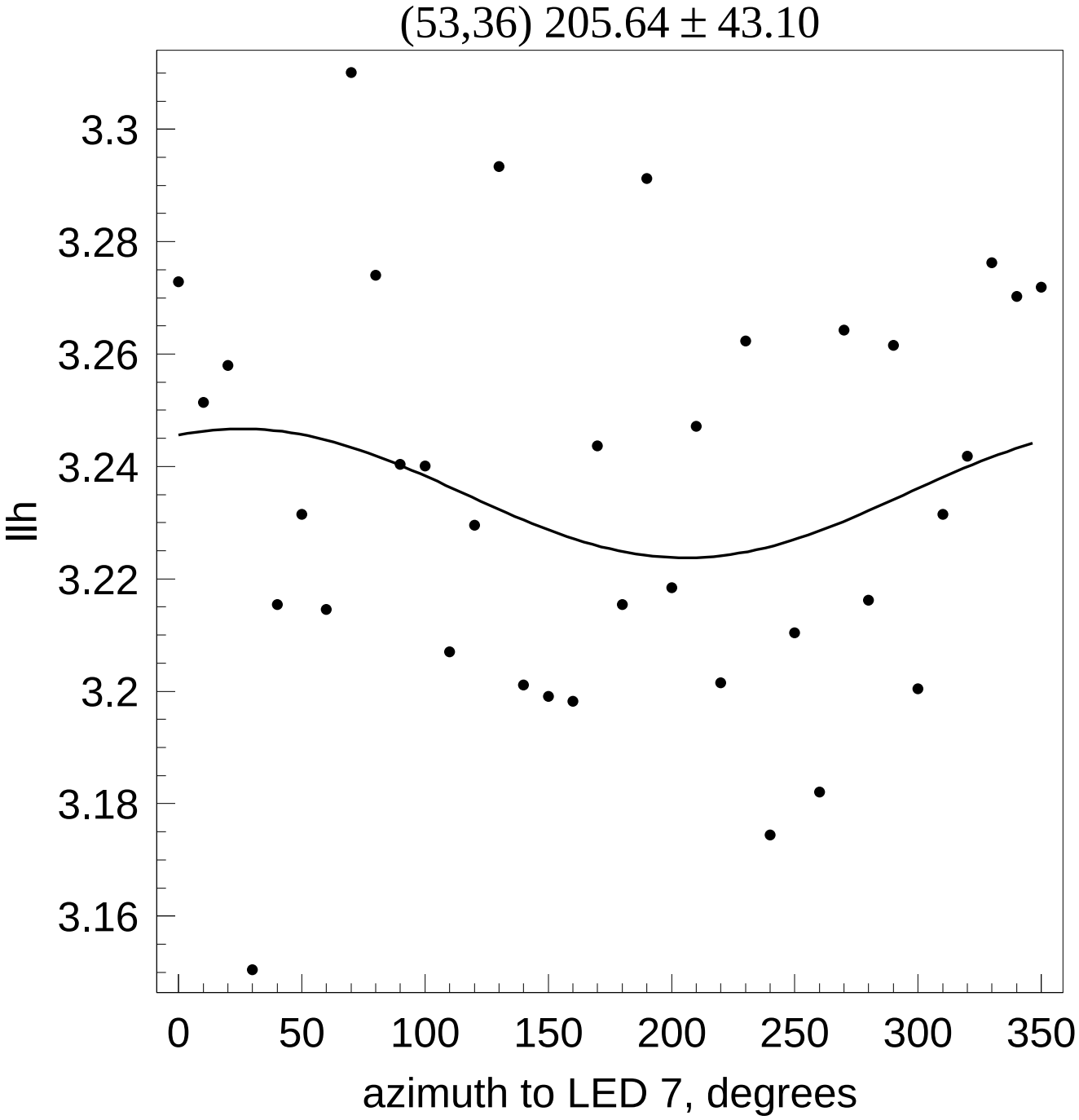

(53,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
263.2 ± -999.0
140
1
2
3
4
5
6
7
8
9
10
11
12

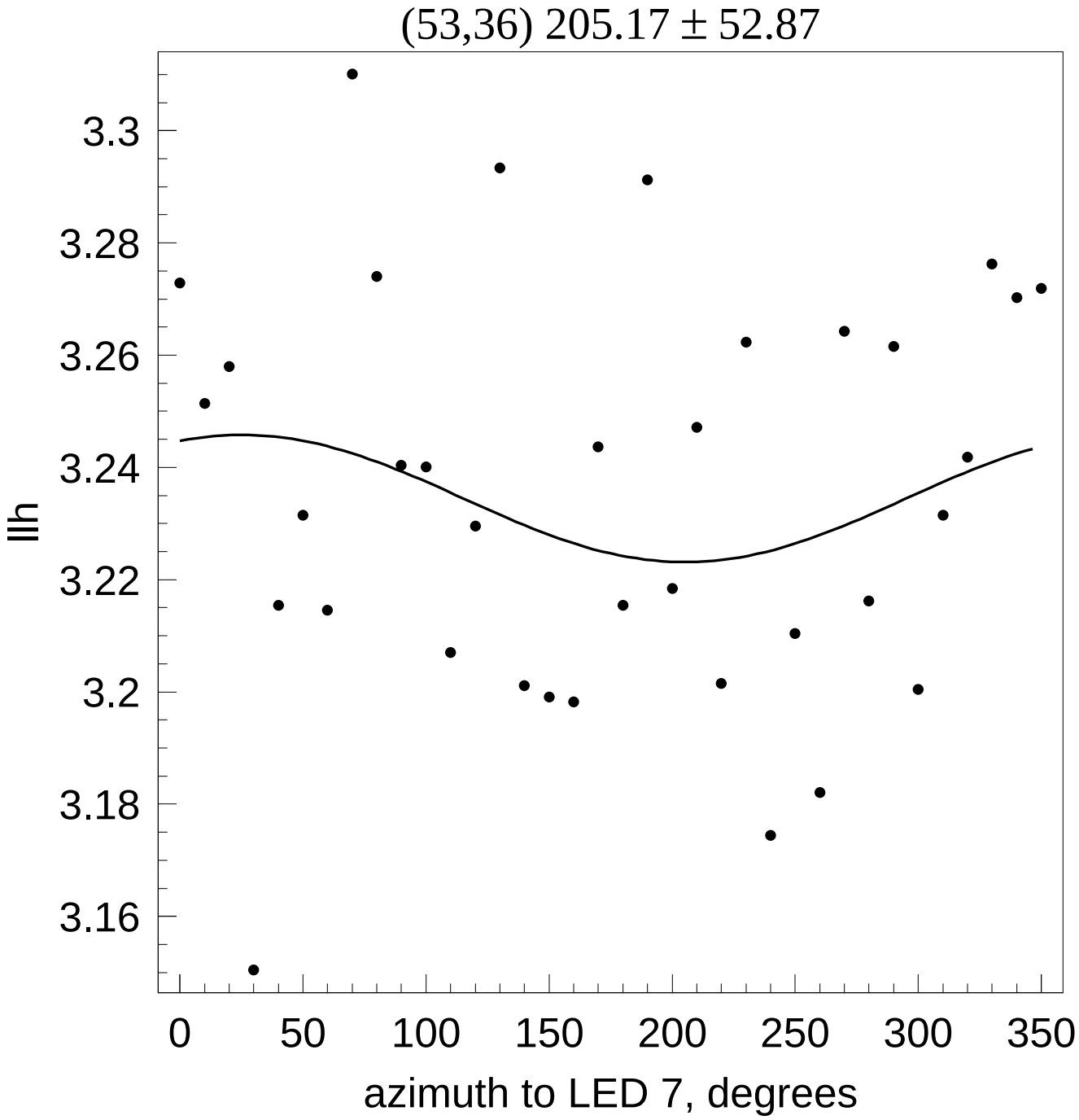

(53,35) 126.44 ± 28.14
2.2
2.18
2.16
2.14
2.12
2.1
2.08
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

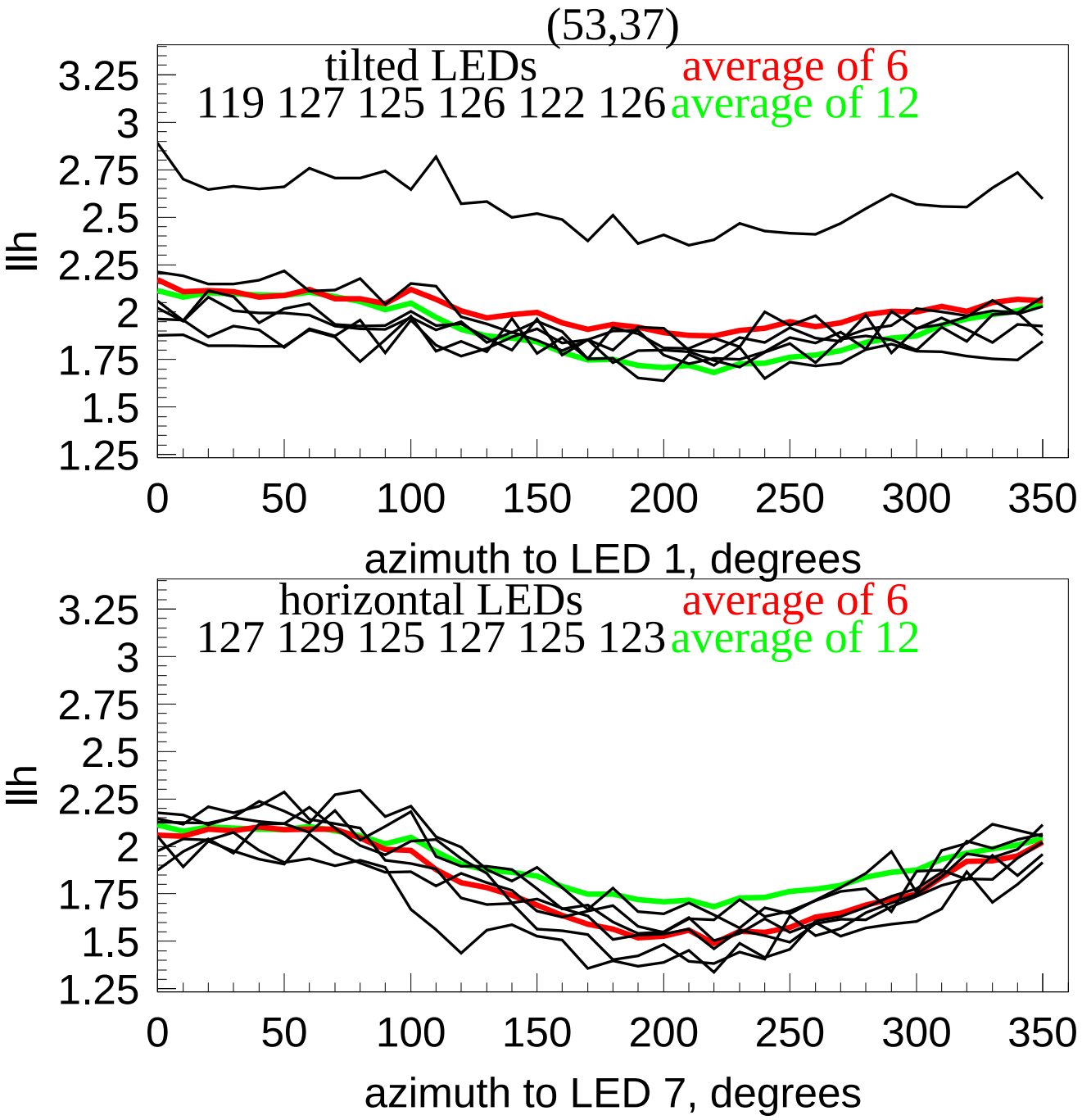

(53,35) 127.49 ± 29.07
2.2
2.18
2.16
2.14
2.12
2.1
2.08
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

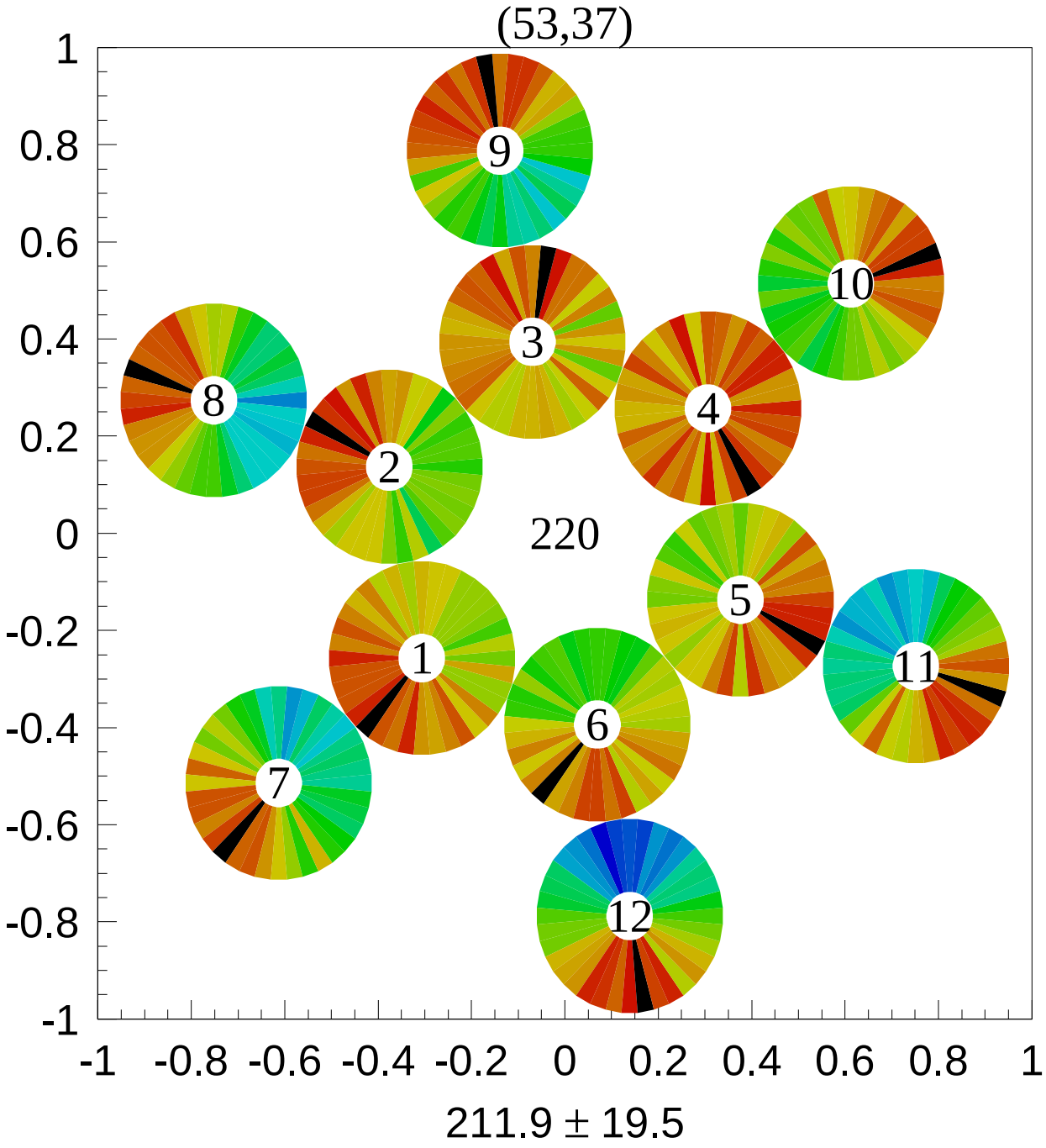

(53,36)
tilted LEDs
127 128 129 128 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 130 125 125 127 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

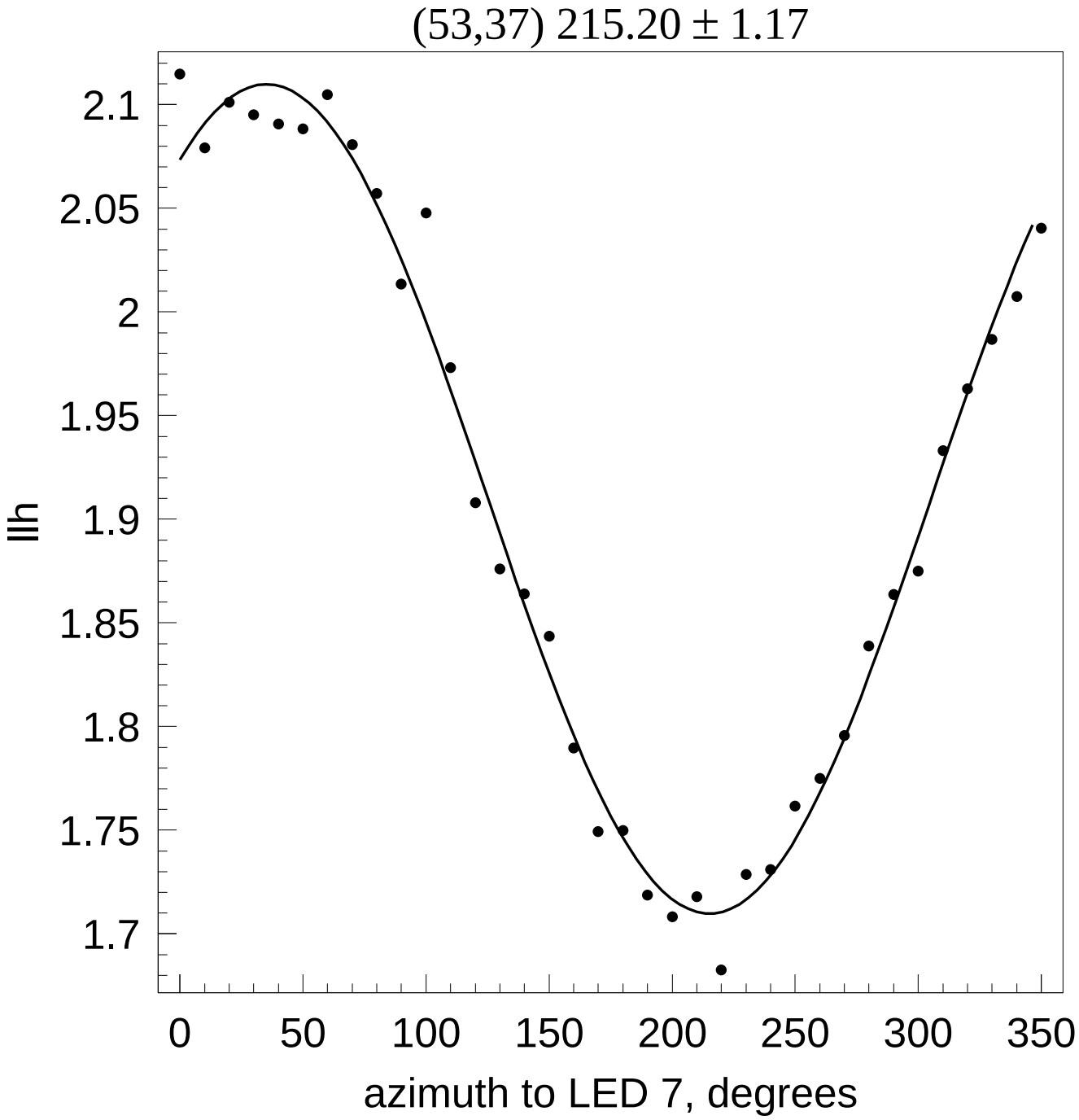

(53,36)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
97.8 ± -999.0

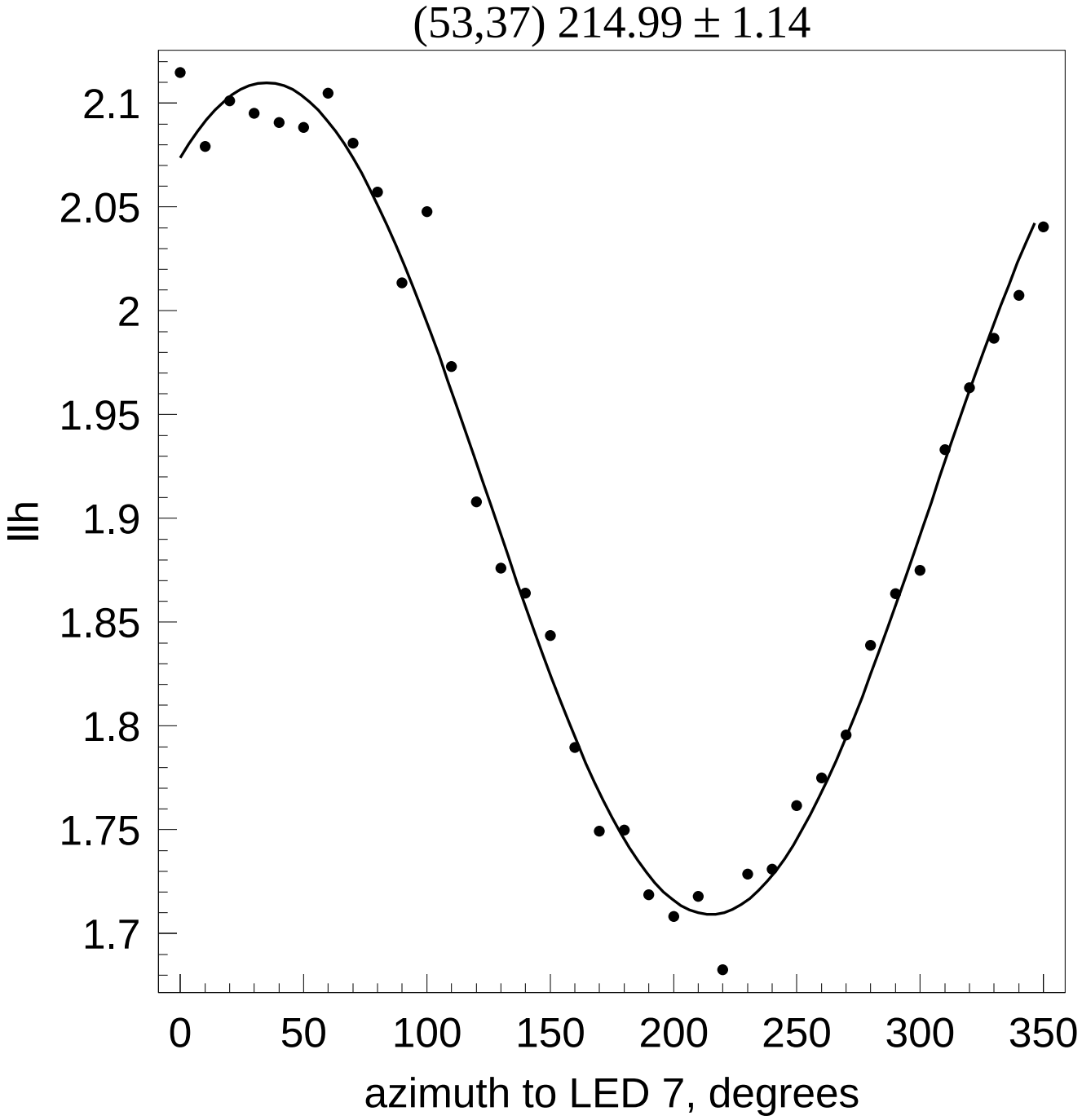

(53,36) 205.64 ± 43.10
3.3
3.28
3.26
3.24
3.22
3.2
3.18
3.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

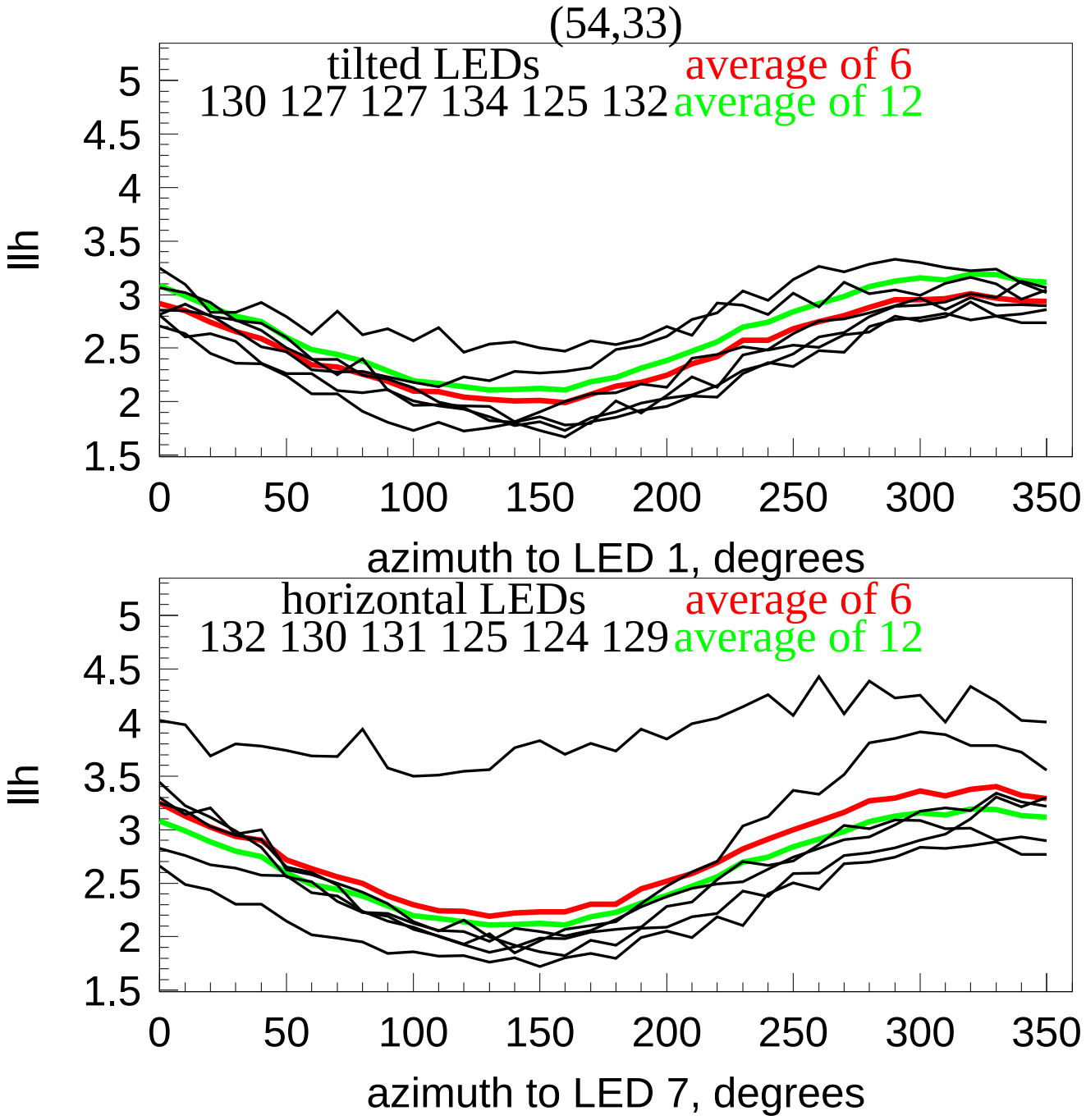

(53,36) 205.17 ± 52.87
3.3
3.28
3.26
3.24
3.22
3.2
3.18
3.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

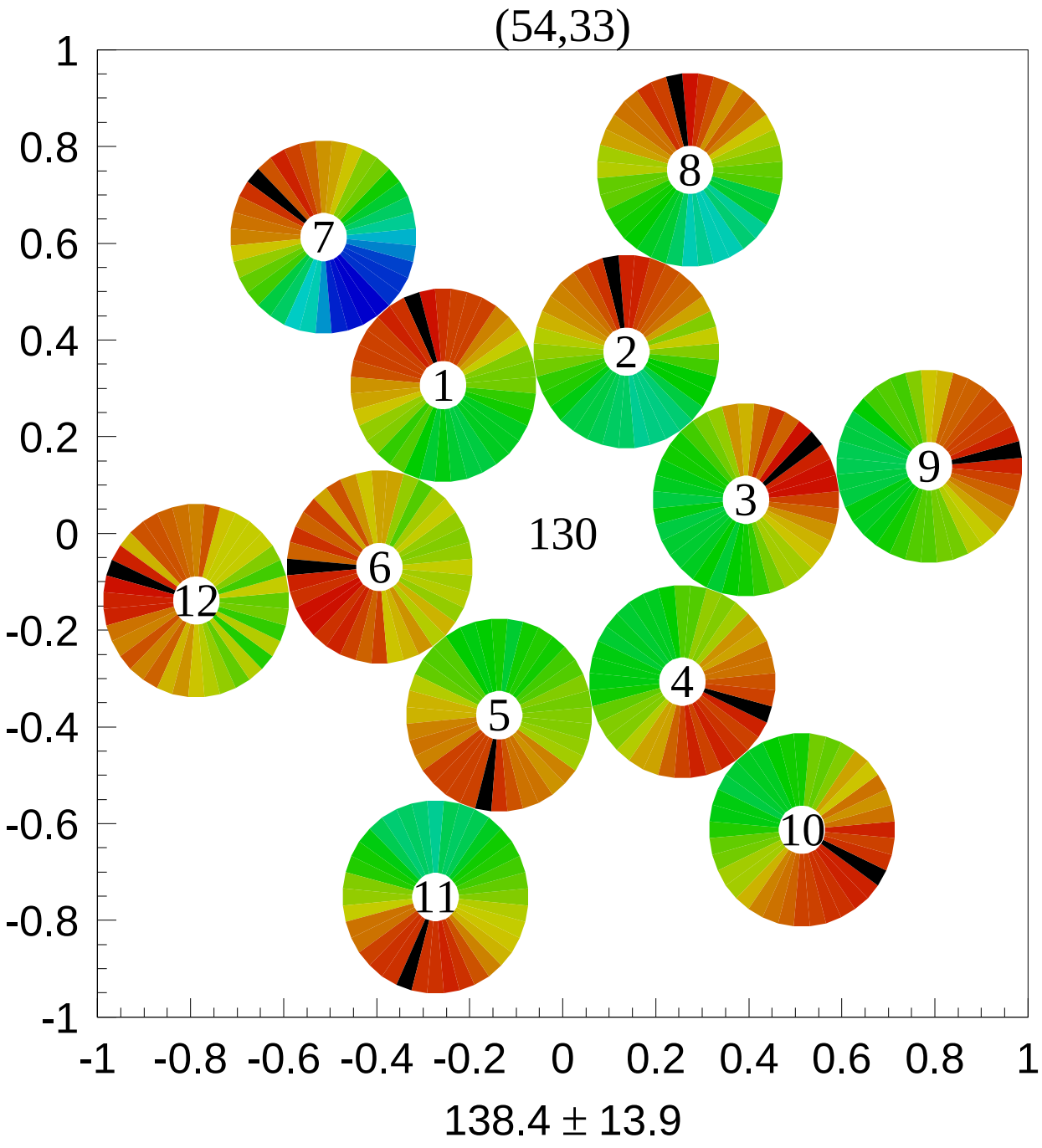

(53,37)
tilted LEDs
119 127 125 126 122 126
average of 6
average of 12
Ilh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 129 125 127 125 123
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

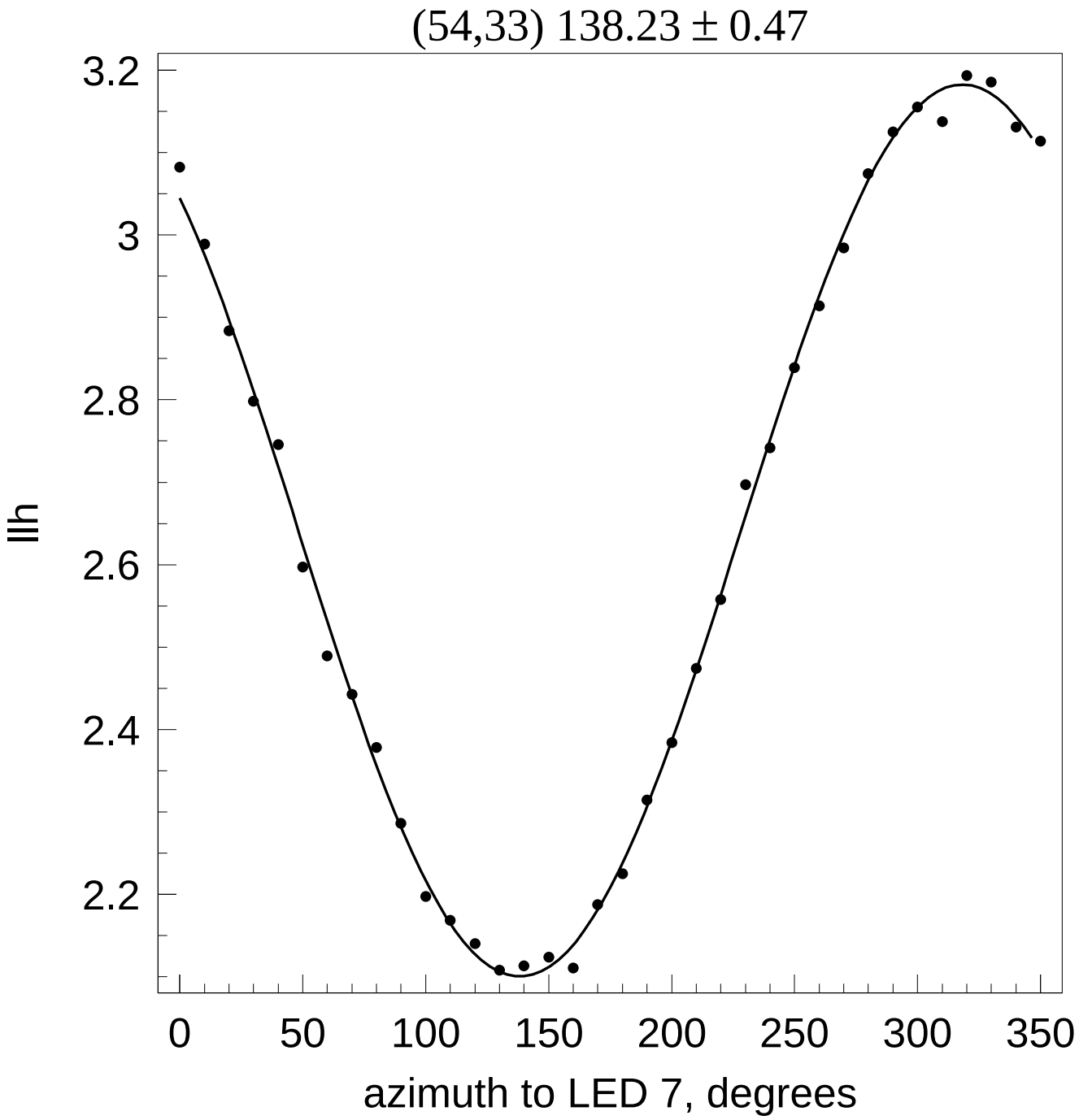

(53,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
8
4
2
220
5
1
11
6
7
12
211.9 ± 19.5

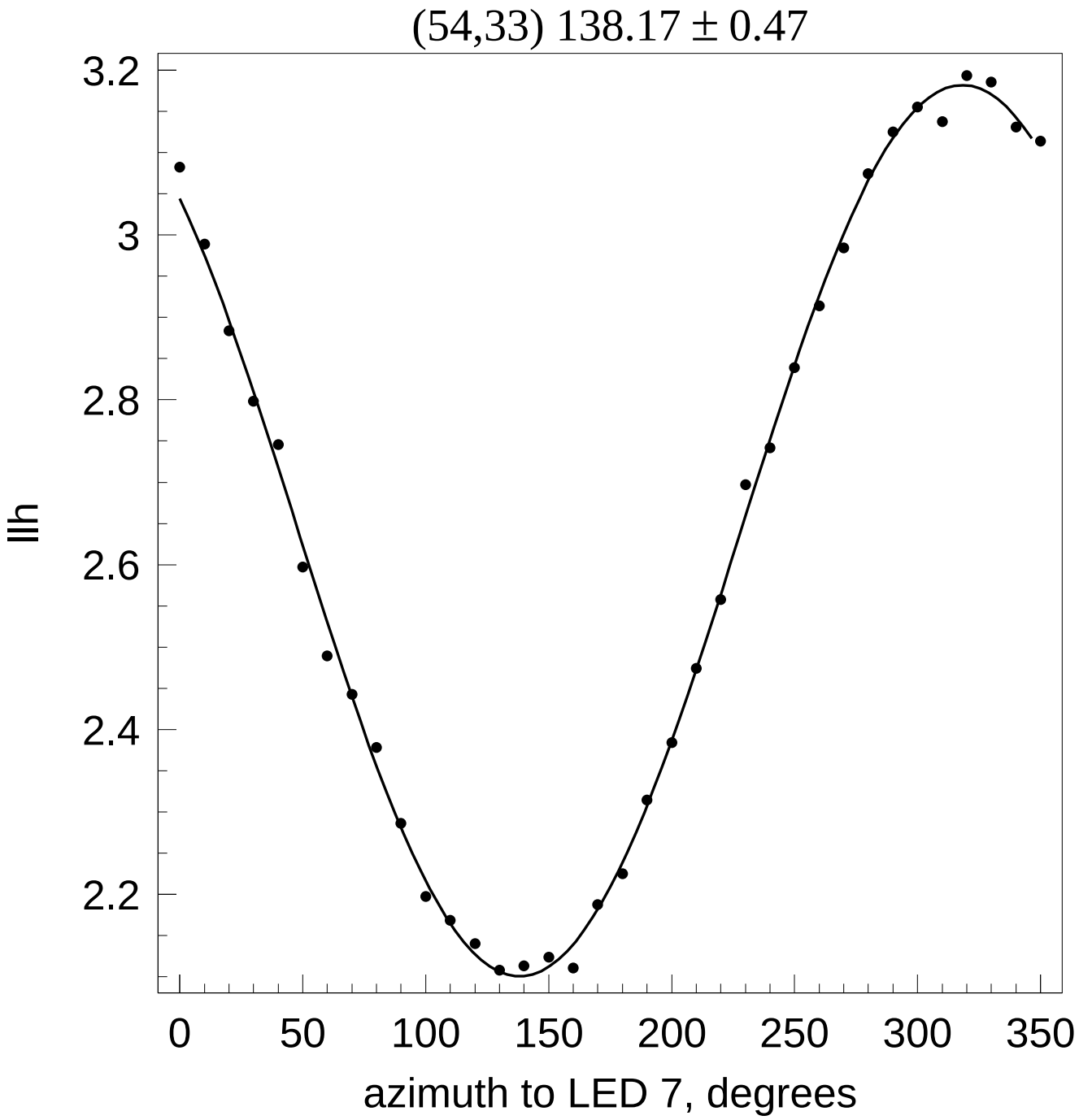

(53,37) 215.20 ± 1.17
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

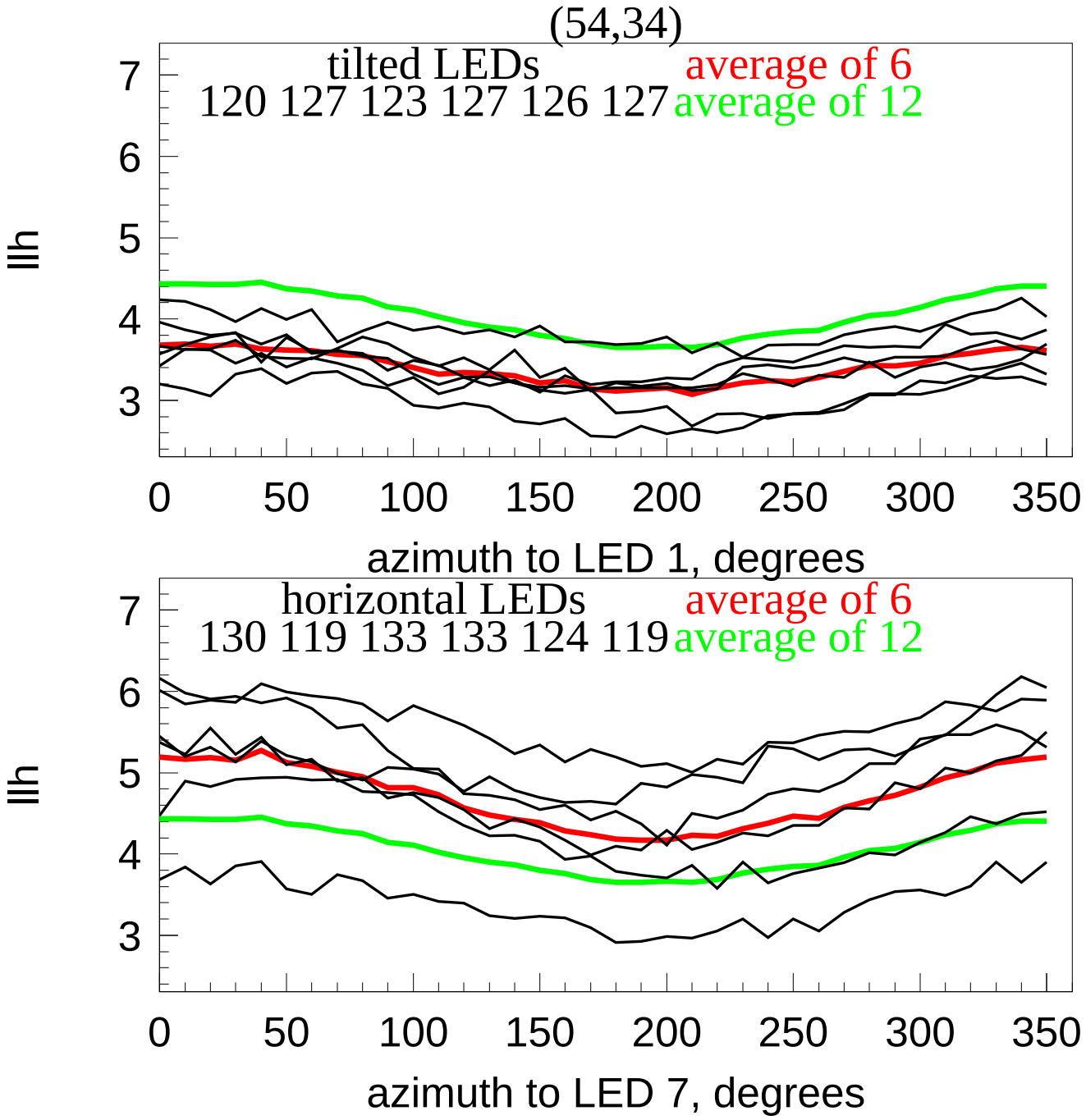

(53,37) 214.99 ± 1.14
2.1
2.05
2
1.95
1.9
1.85
1.8
1.75
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

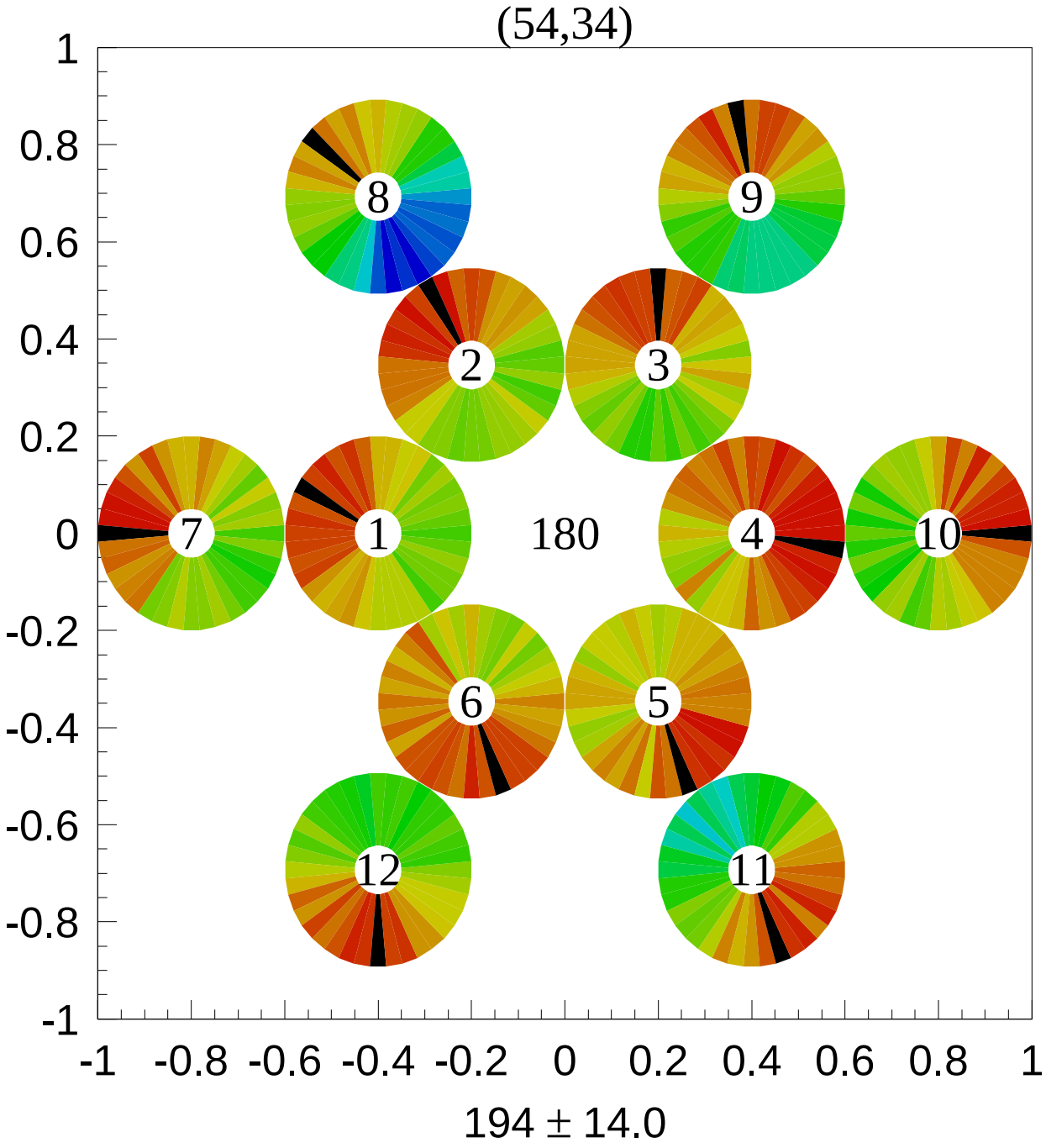

(54,33)
tilted LEDs
130 127 127 134 125 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 130 131 125 124 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

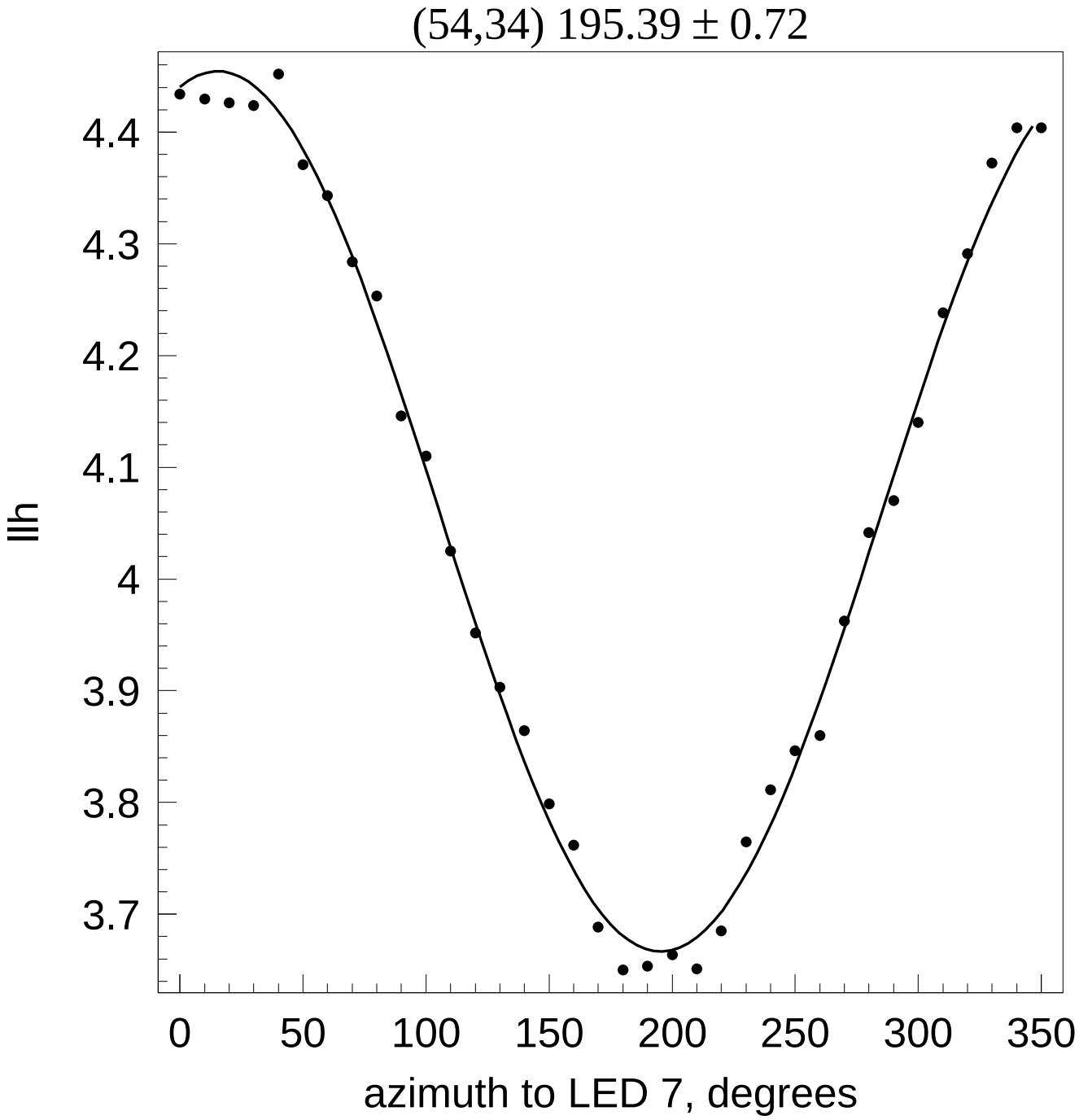

(54,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
9
3
6
130
12
5
4
10
11
138.4 ± 13.9

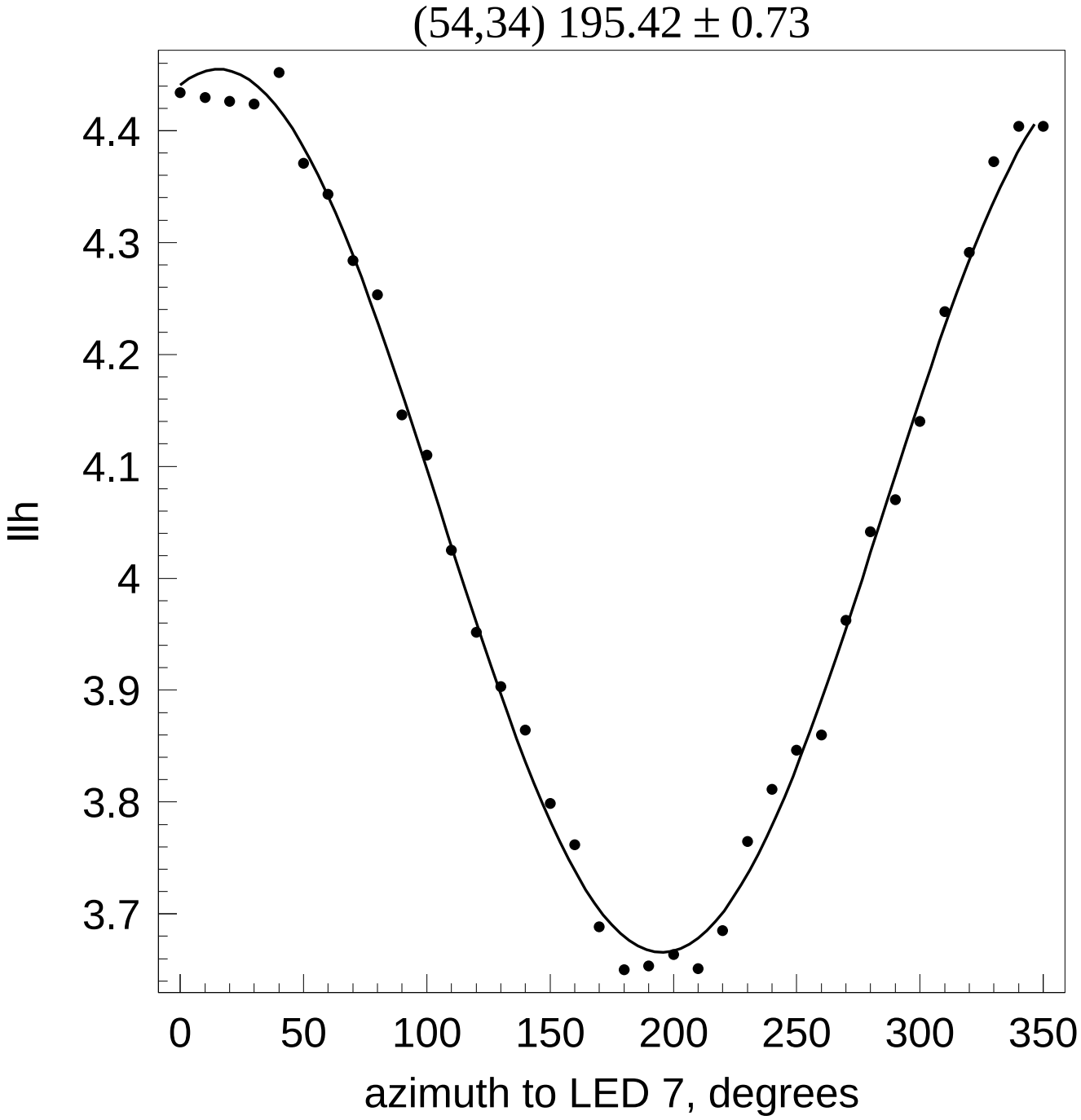

(54,33) 138.23 ± 0.47
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

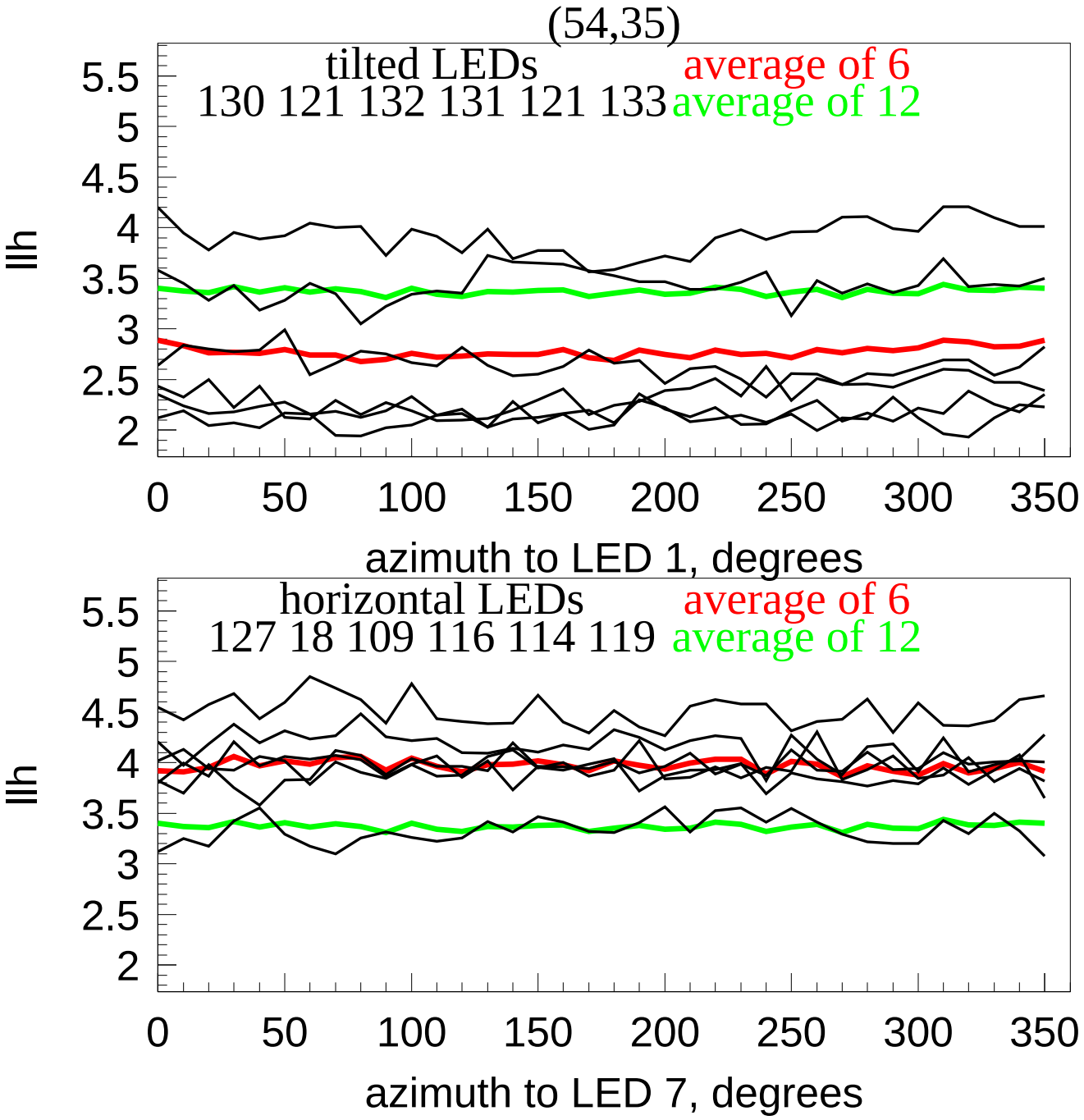

(54,33) 138.17 ± 0.47
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

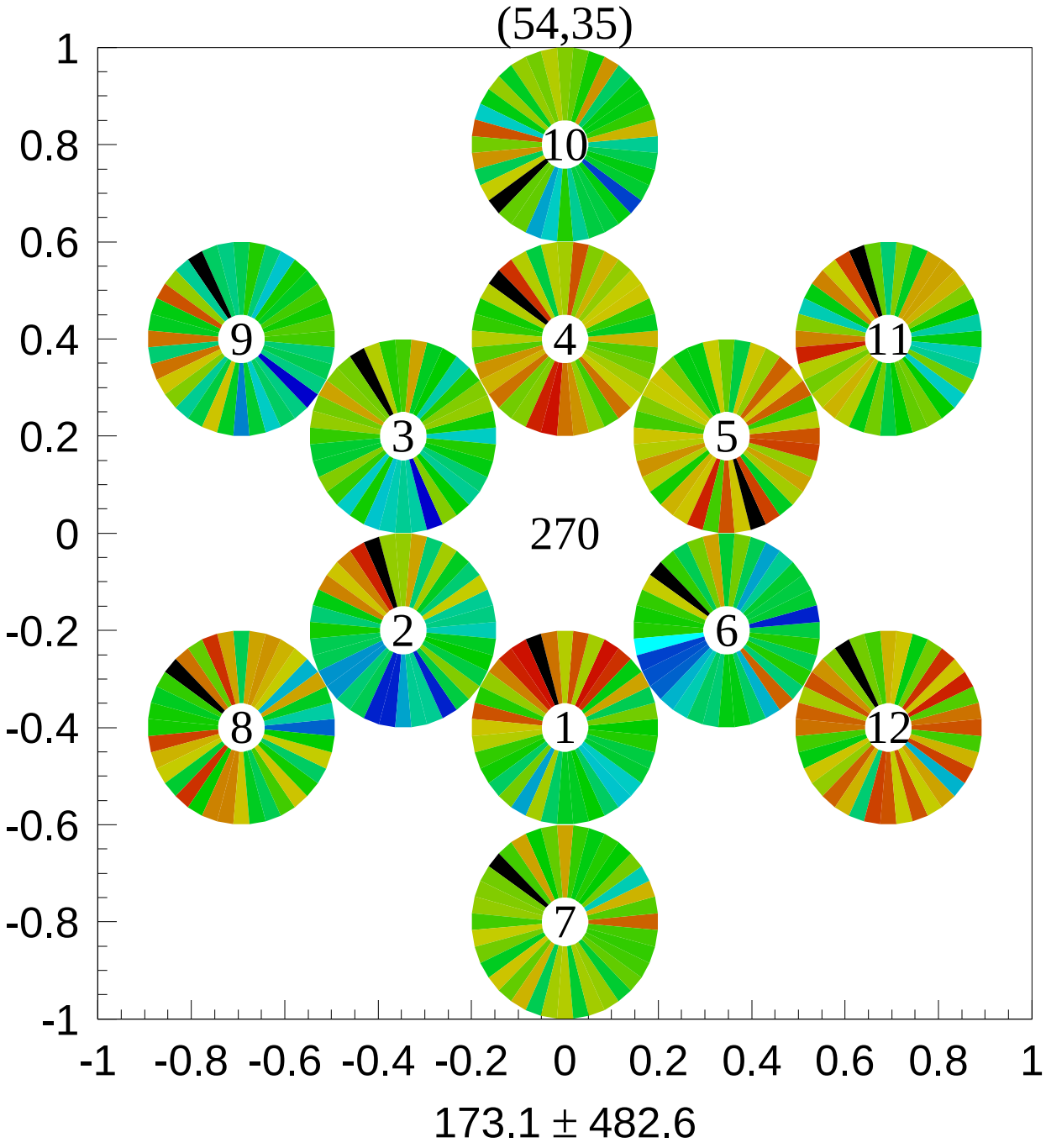

(54,34)
tilted LEDs
120 127 123 127 126 127
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 119 133 133 124 119
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

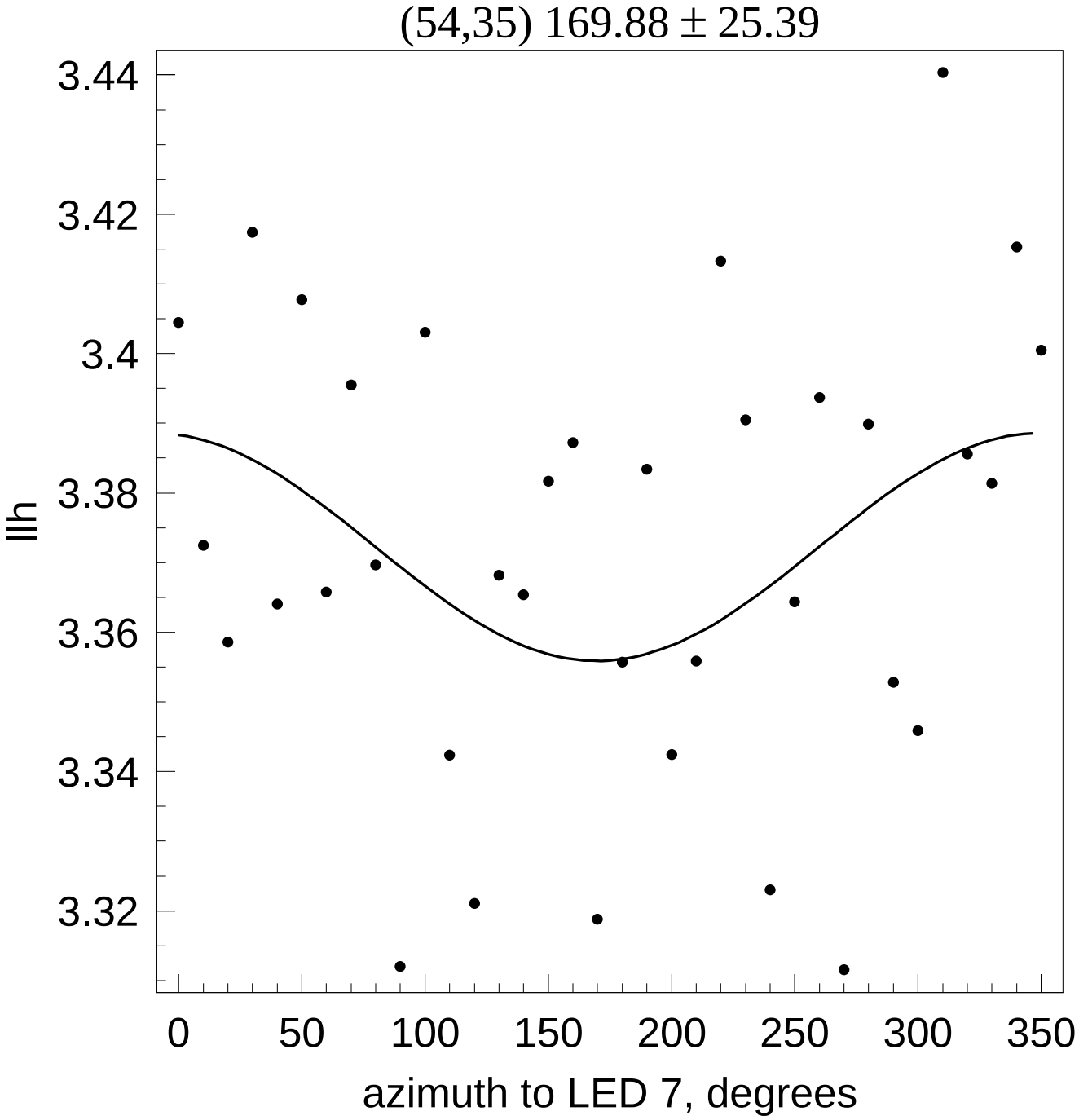

(54,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
194 ± 14.0

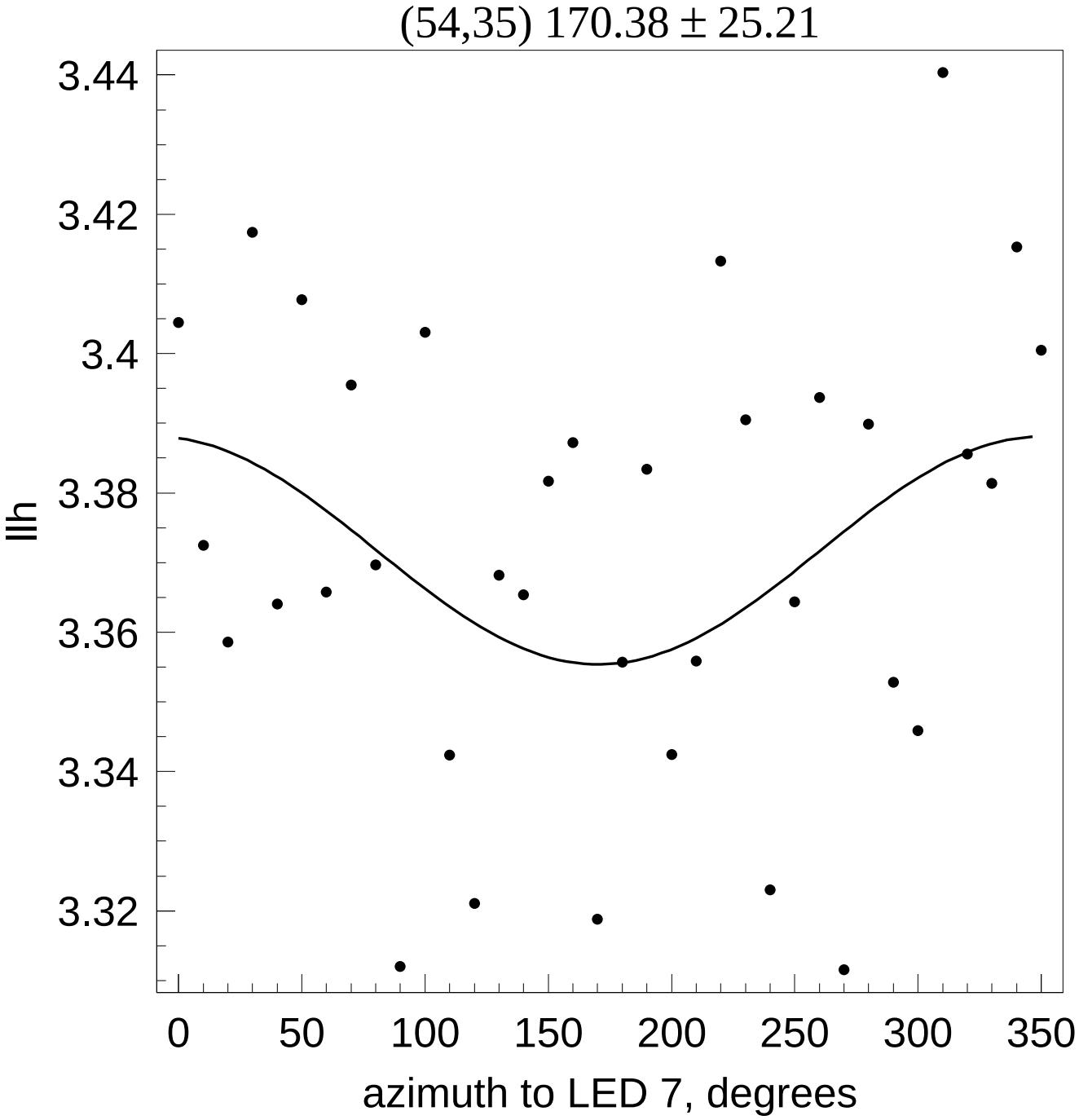

(54,34) 195.39 ± 0.72
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

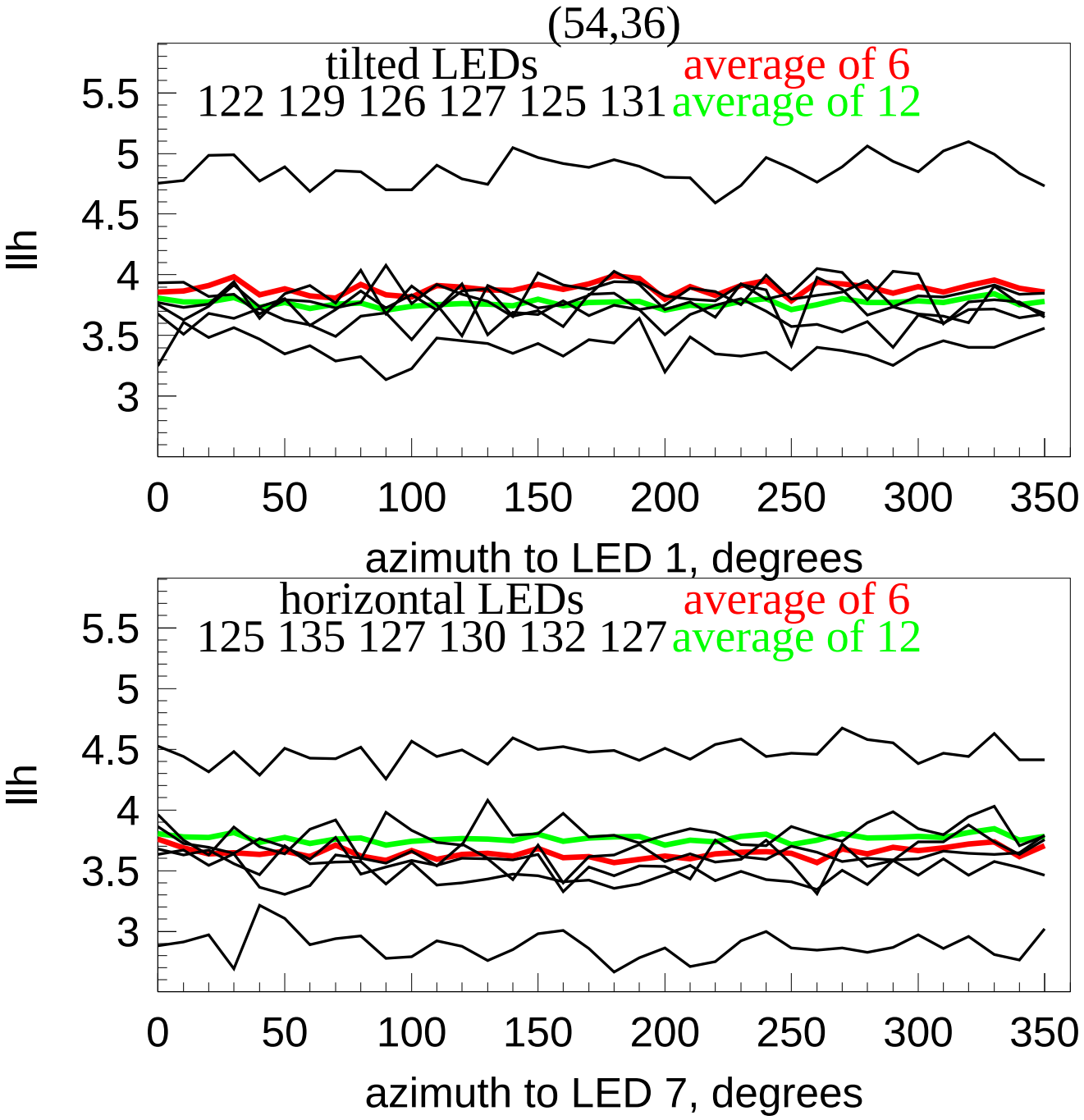

(54,34) 195.42 ± 0.73
4.4
4.3
4.2
4.1
4
3.9
3.8
3.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

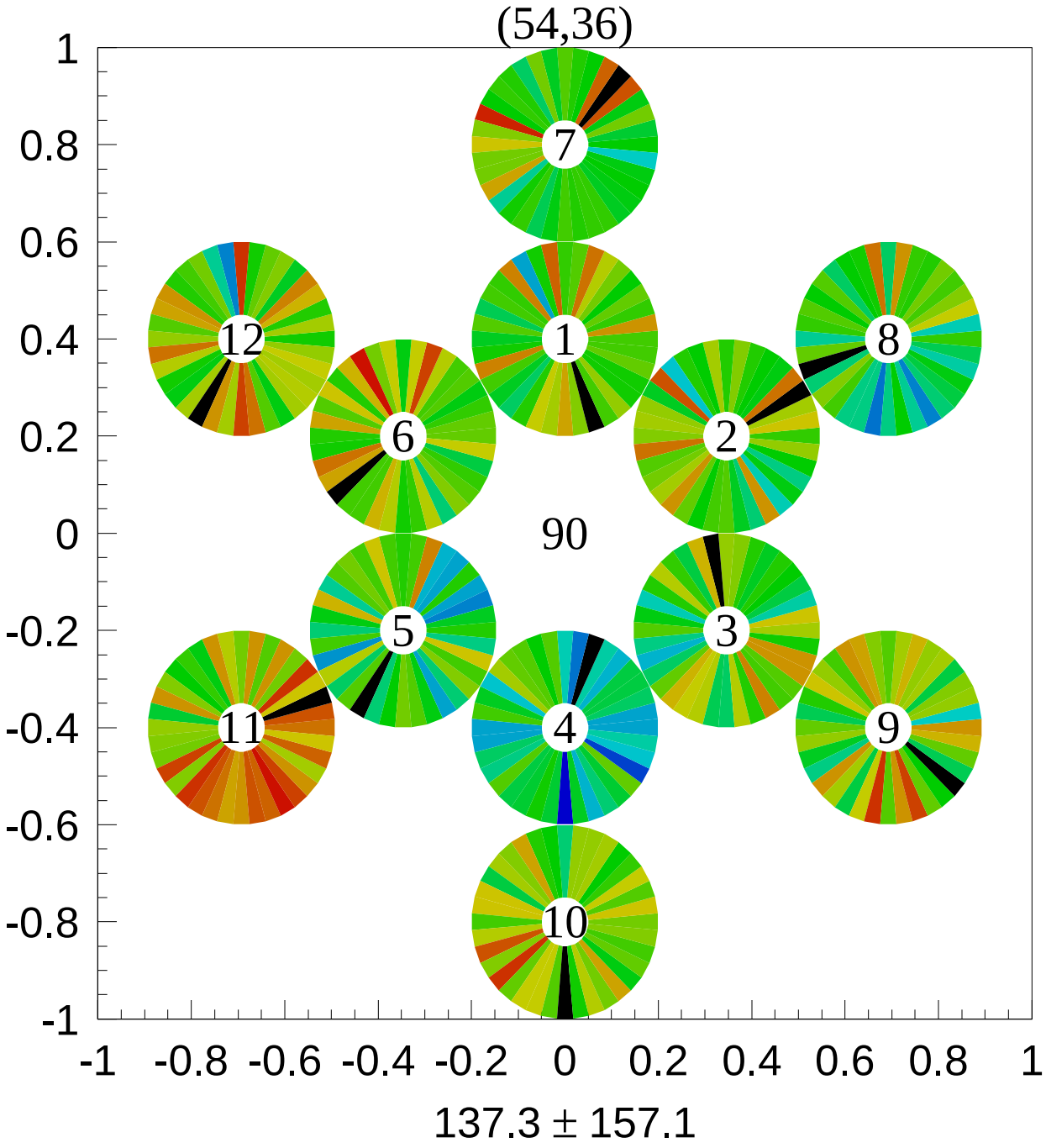

(54,35)
tilted LEDs
130 121 132 131 121 133
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 18 109 116 114 119
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

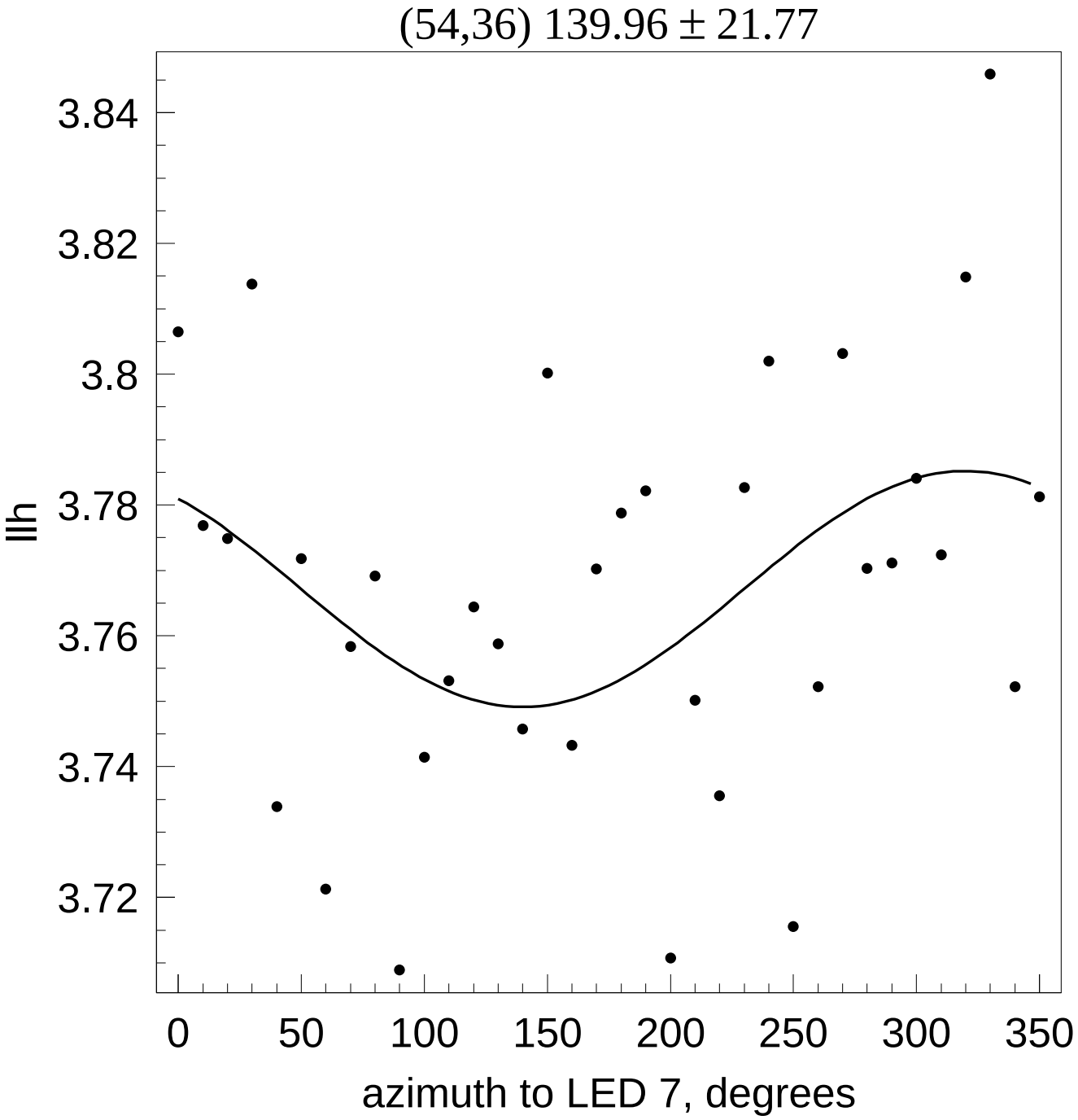

(54,35)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
173.1 ± 482.6

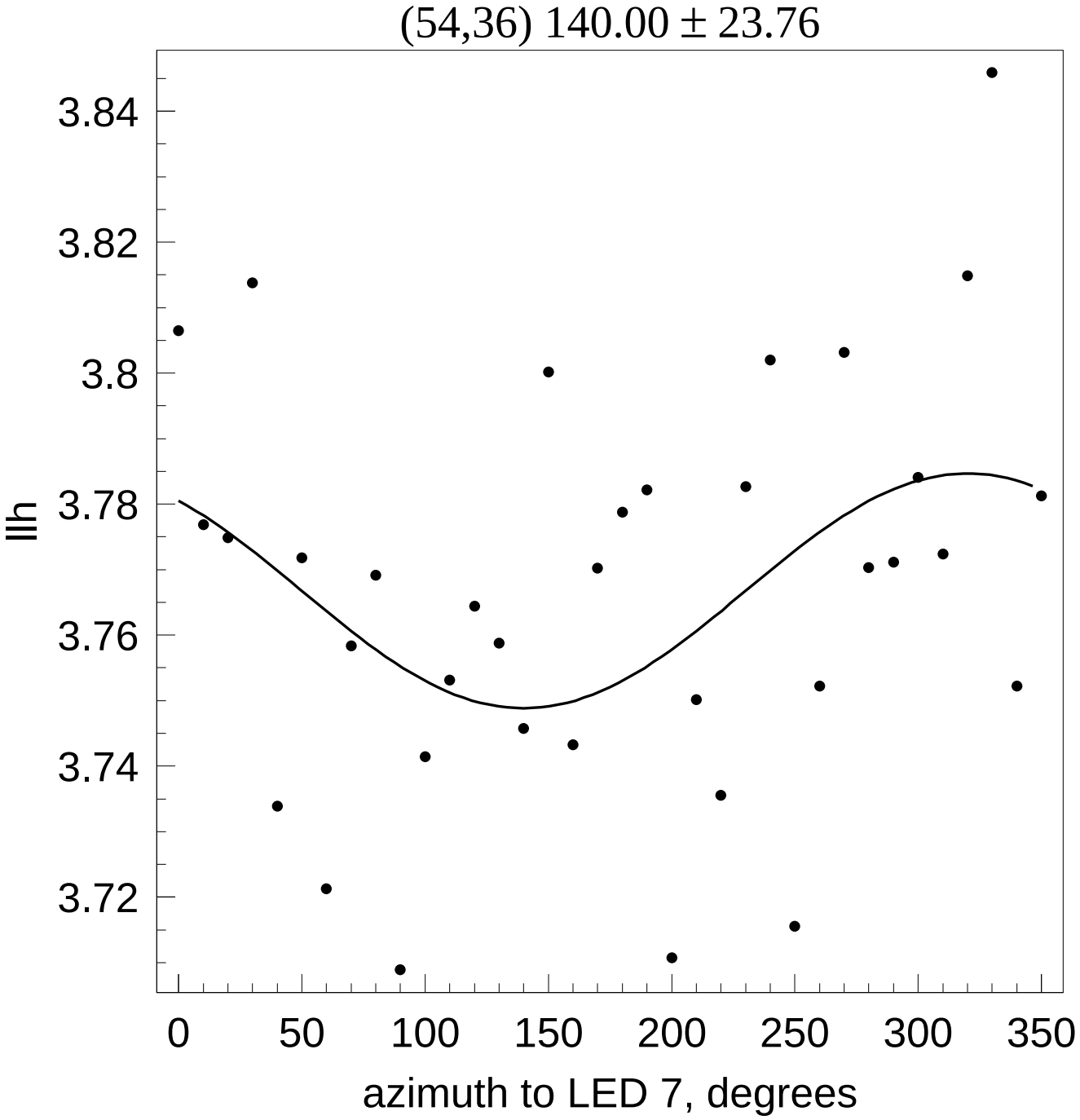

(54,35) 169.88 ± 25.39
3.44
3.42
3.4
3.38
3.36
3.34
3.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

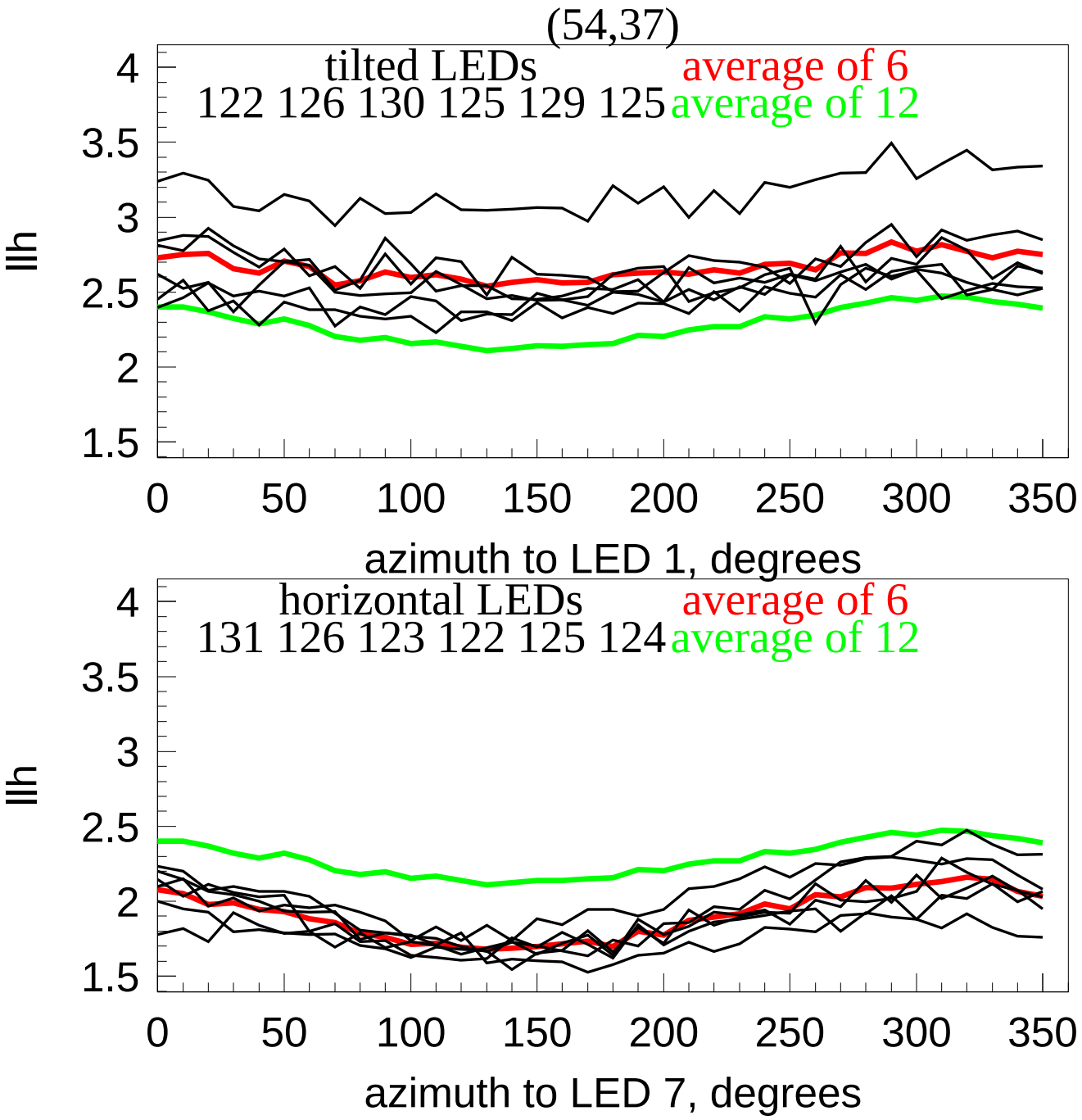

(54,35) 170.38 ± 25.21
3.44
3.42
3.4
3.38
3.36
3.34
3.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

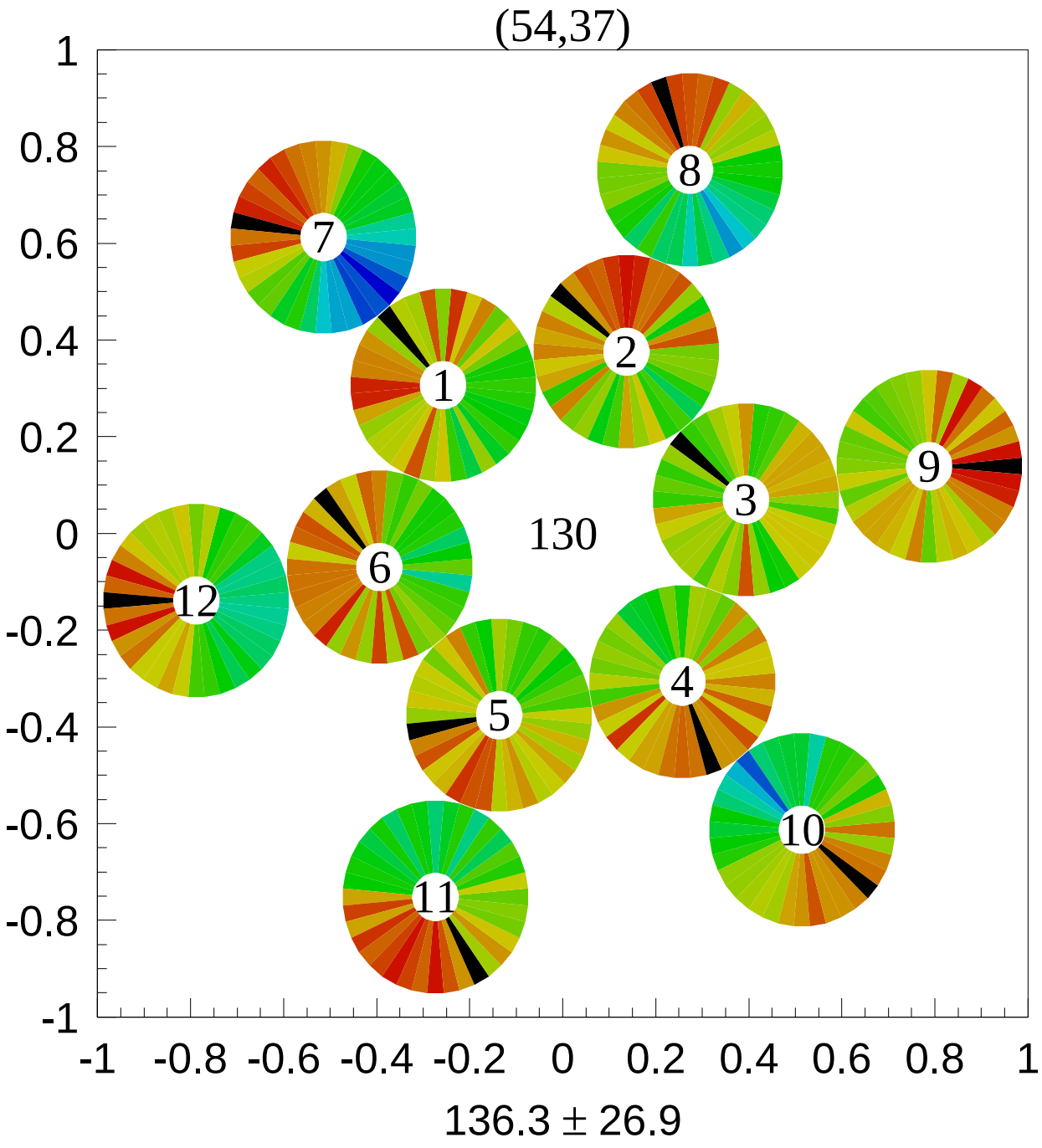

(54,36)
tilted LEDs
122 129 126 127 125 131
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 135 127 130 132 127
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

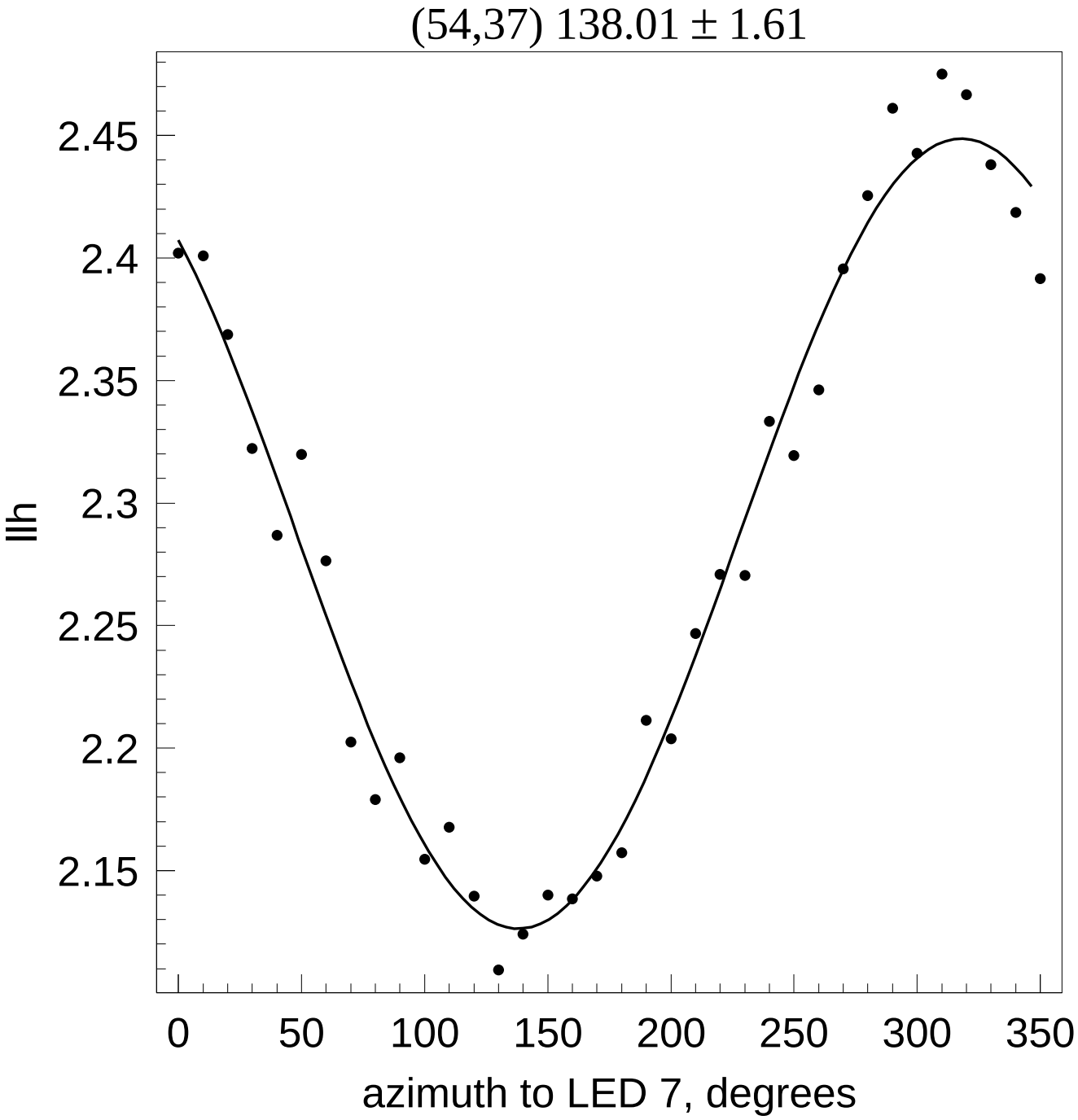

(54,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
8
6
2
90
5
3
11
4
9
10
137.3 ± 157.1

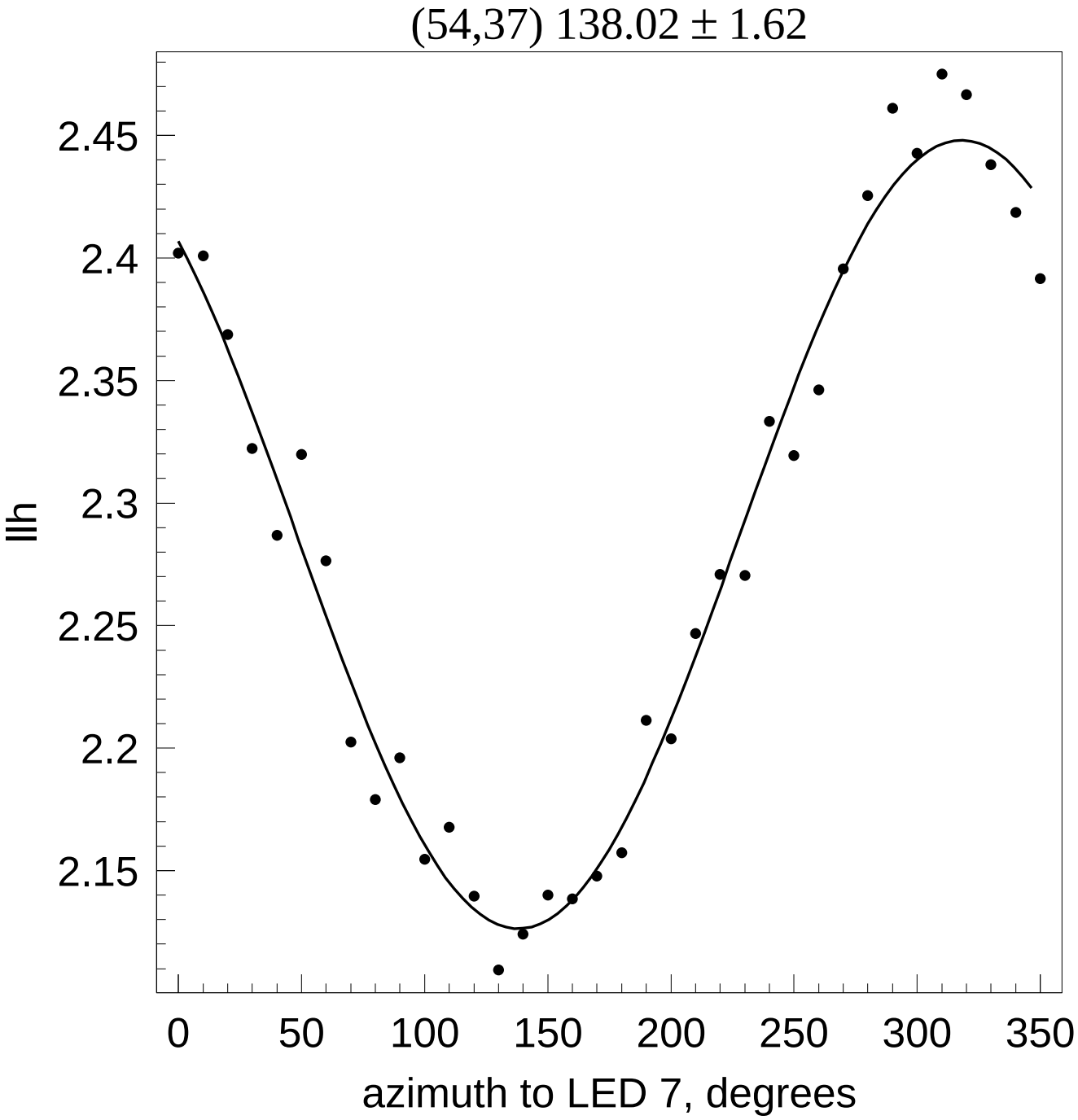

(54,36) 139.96 ± 21.77
3.84
3.82
3.8
3.78
3.76
3.74
3.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

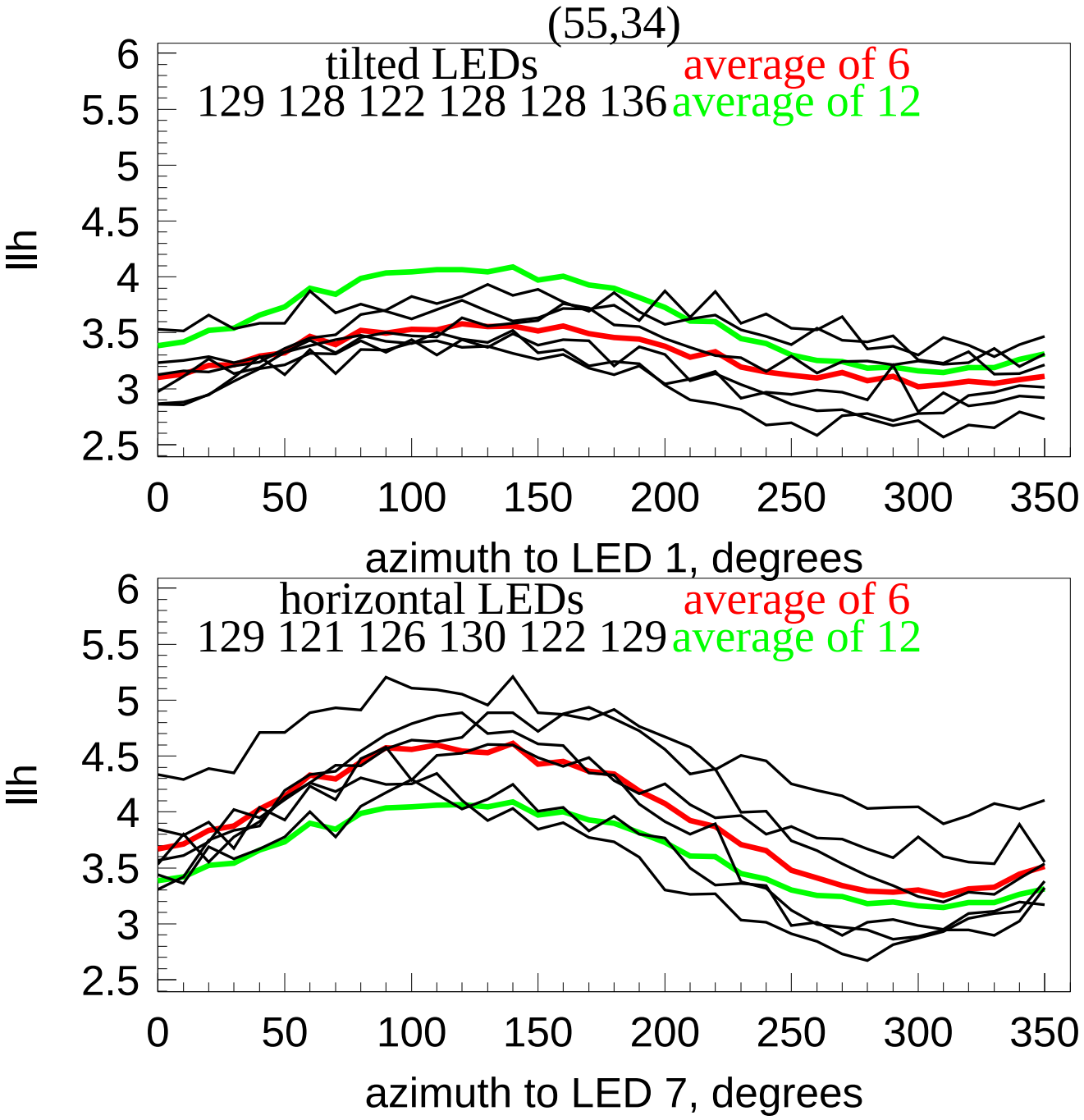

(54,36) 140.00 ± 23.76
3.84
3.82
3.8
3.78
3.76
3.74
3.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

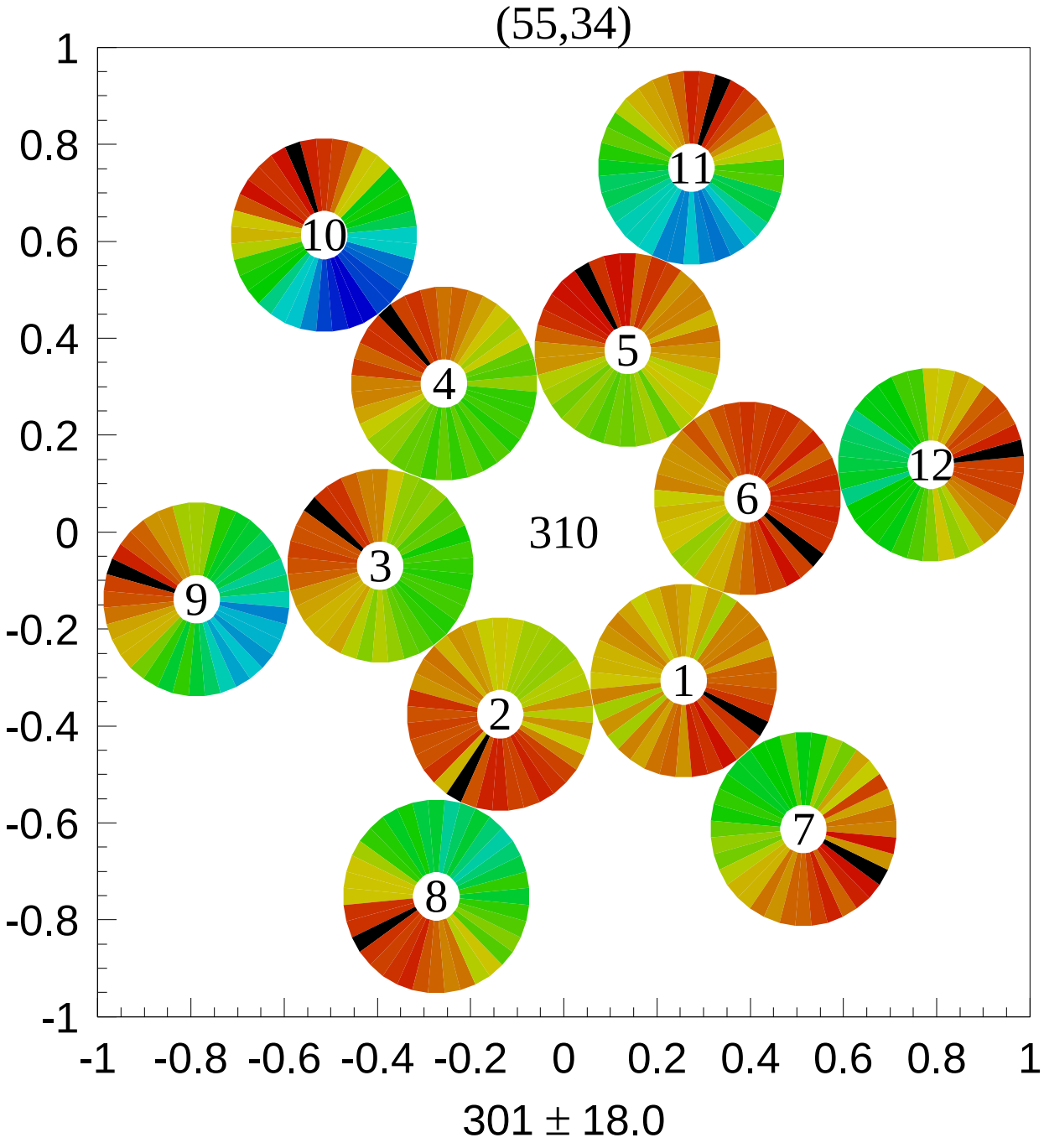

(54,37)
tilted LEDs
122 126 130 125 129 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 126 123 122 125 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

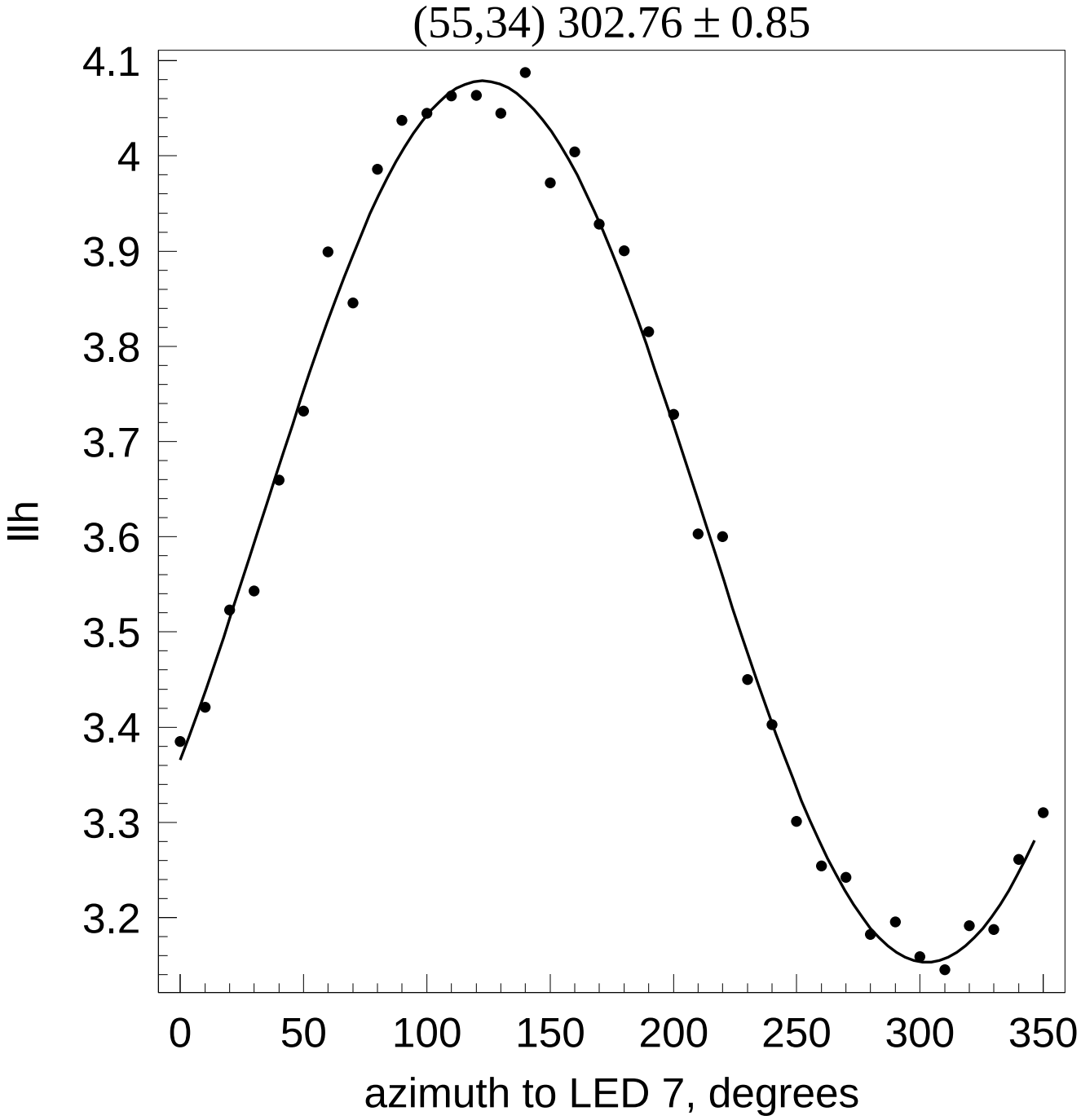

(54,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
136.3 ± 26.9
130
1
2
3
4
5
6
7
8
9
10
11
12

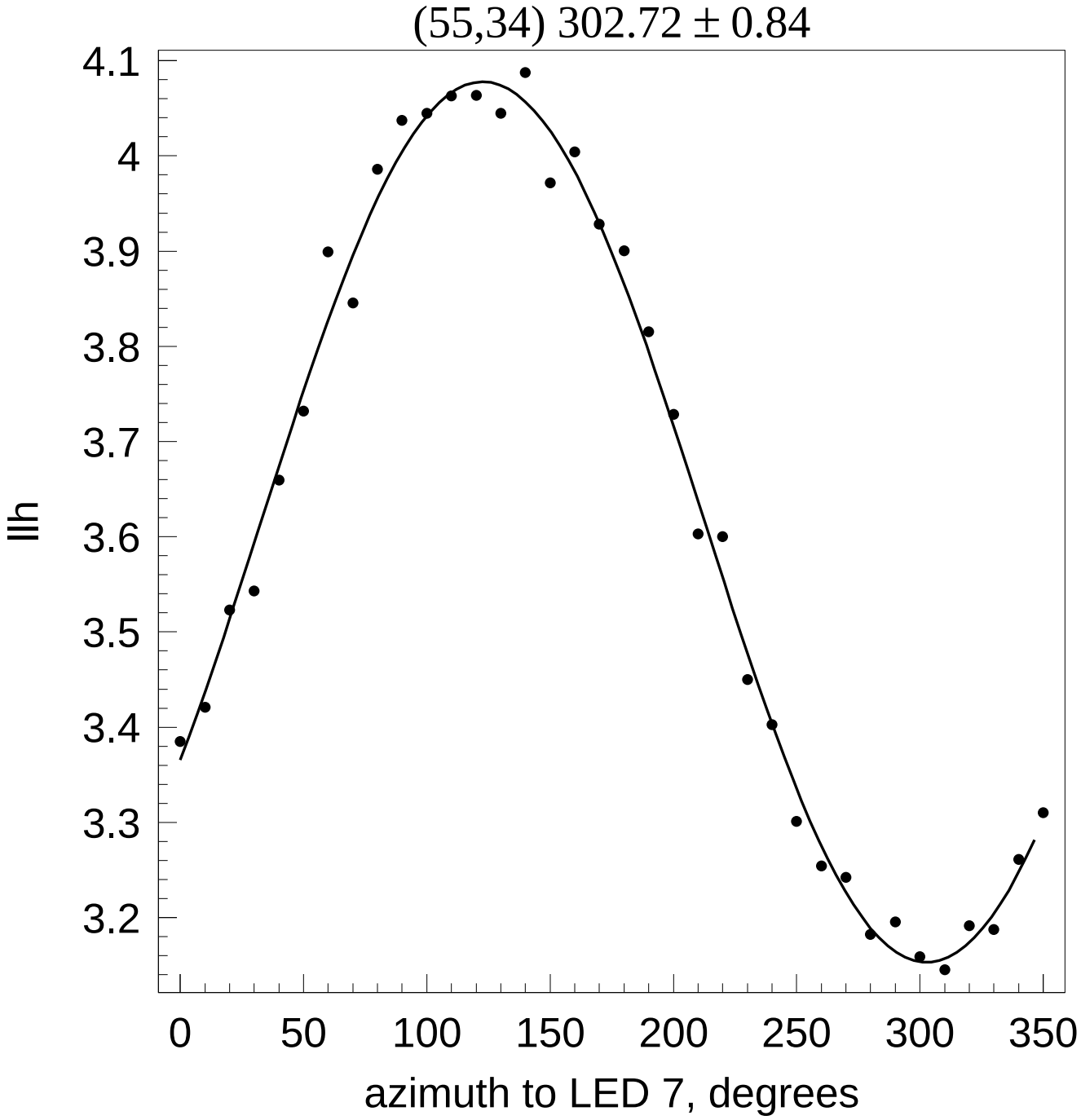

(54,37) 138.01 ± 1.61
2.45
2.4
2.35
2.3
2.25
2.2
2.15
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

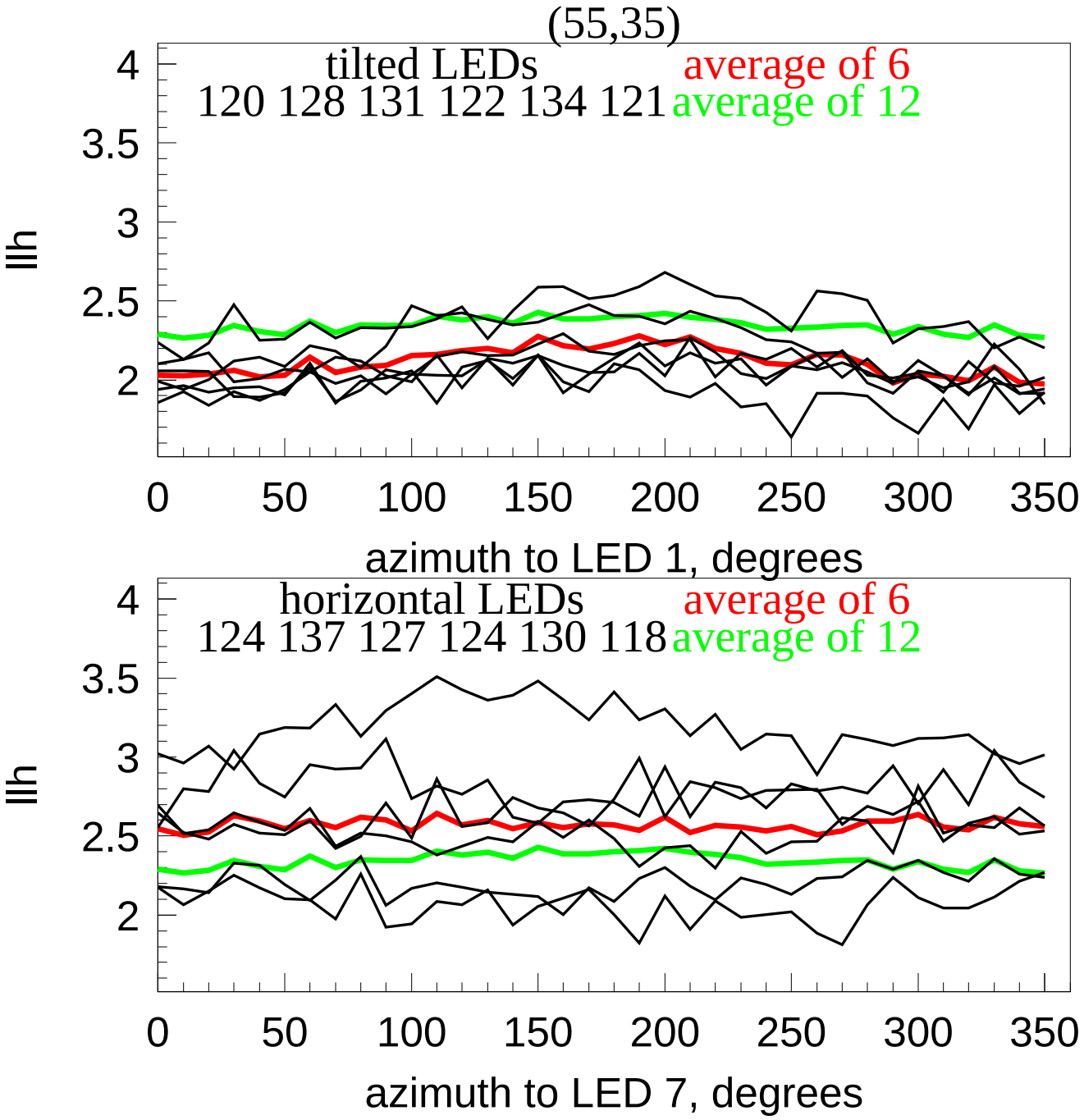

(54,37) 138.02 ± 1.62
2.45
2.4
2.35
2.3
2.25
2.2
2.15
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

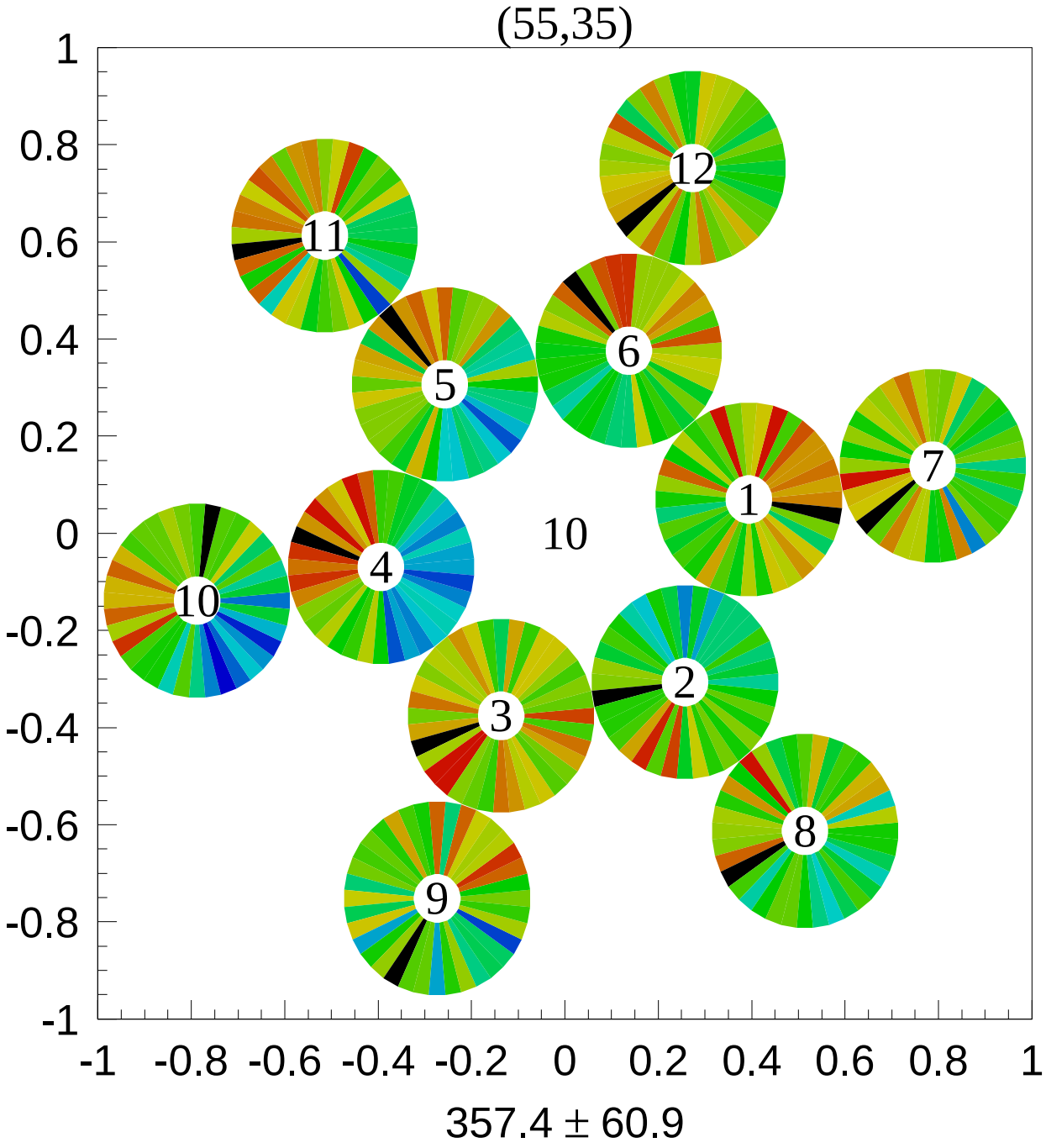

(55,34)
tilted LEDs
129 128 122 128 128 136
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 121 126 130 122 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

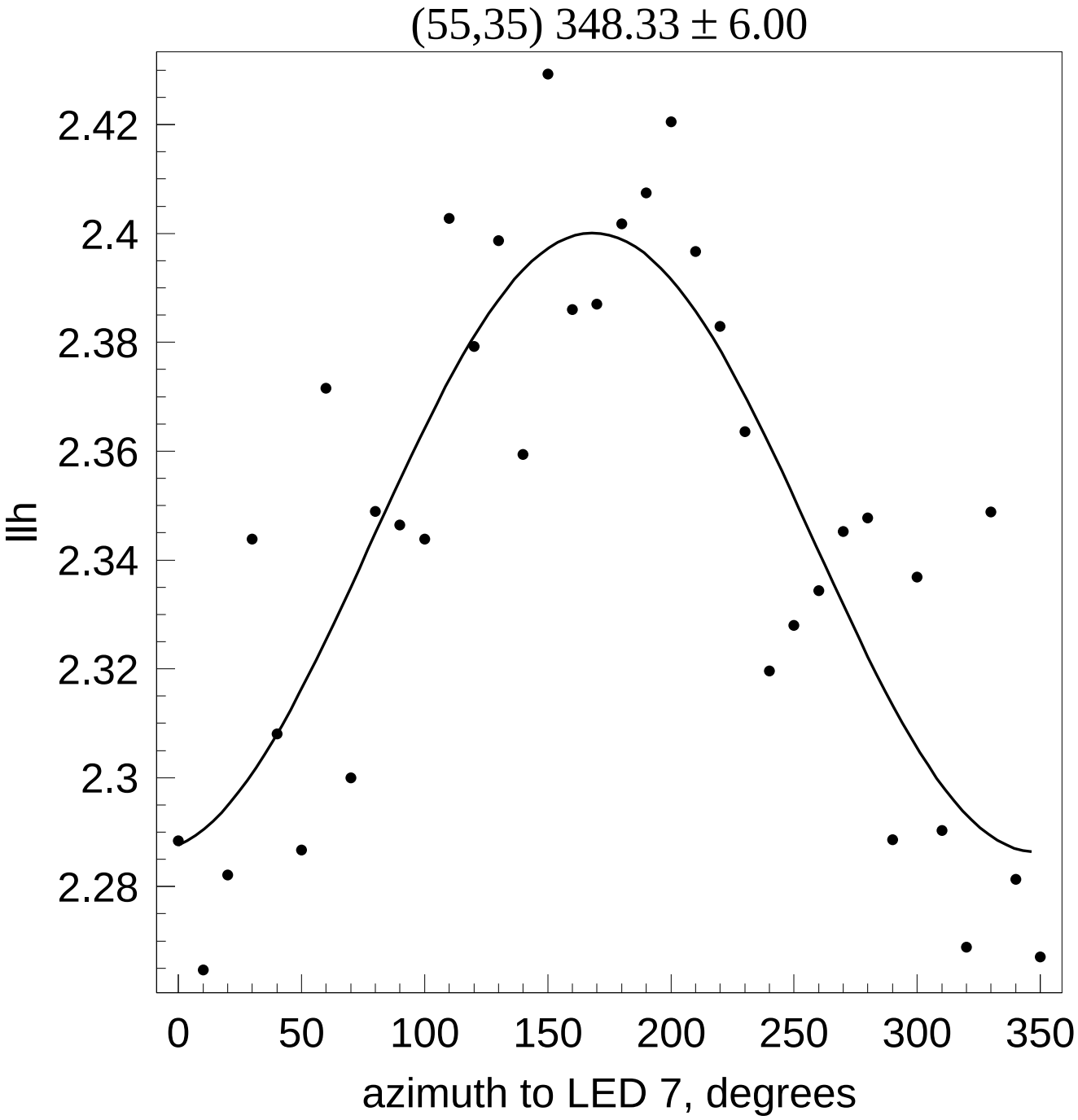

(55,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
301 ± 18.0
310
1
2
3
4
5
6
7
8
9
10
11
12

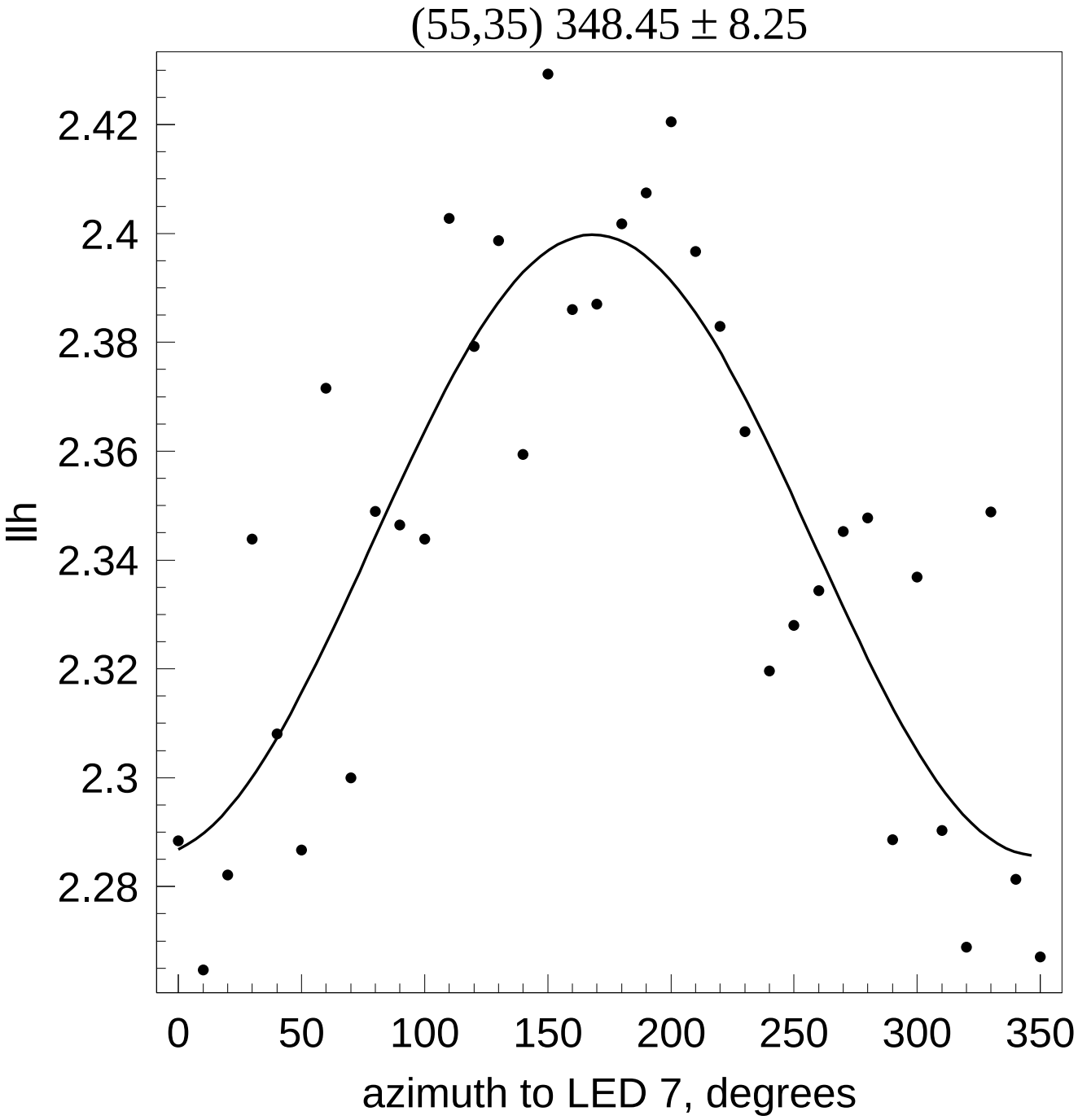

(55,34) 302.76 ± 0.85
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

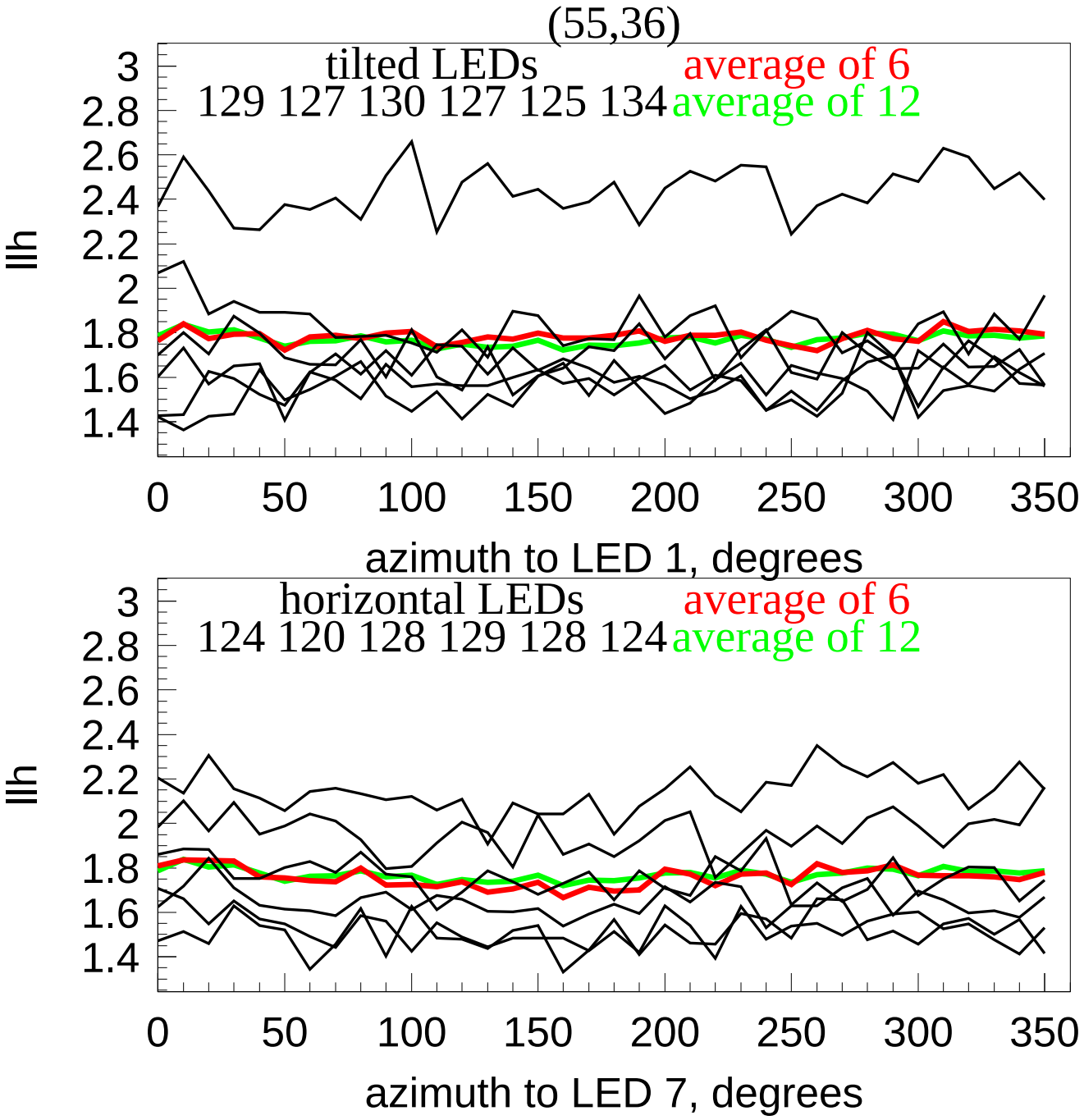

(55,34) 302.72 ± 0.84
4.1
4
3.9
3.8
3.7
3.6
3.5
3.4
3.3
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

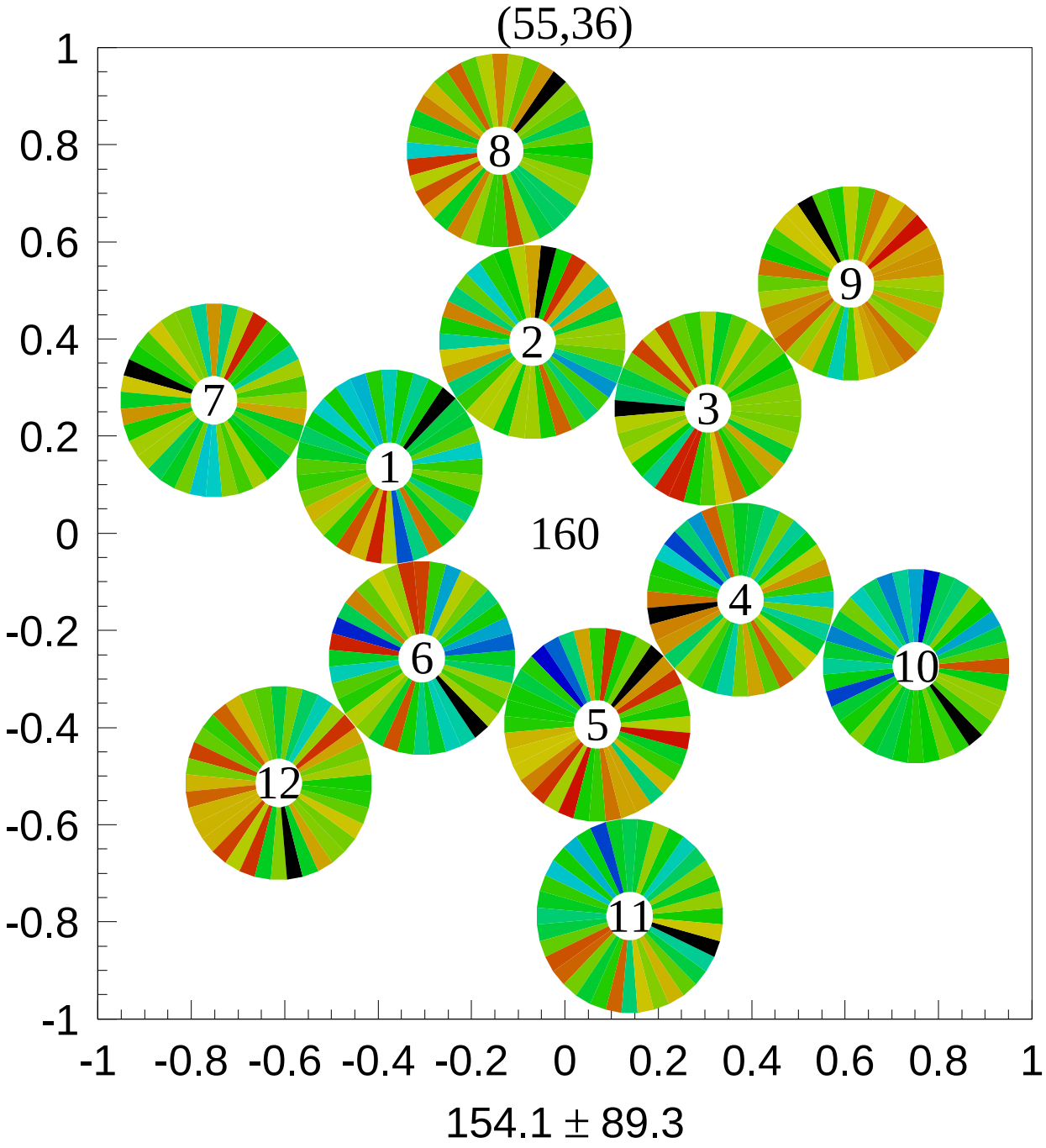

(55,35)
tilted LEDs
120 128 131 122 134 121
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 137 127 124 130 118
average of 6
average of 12
Ilh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

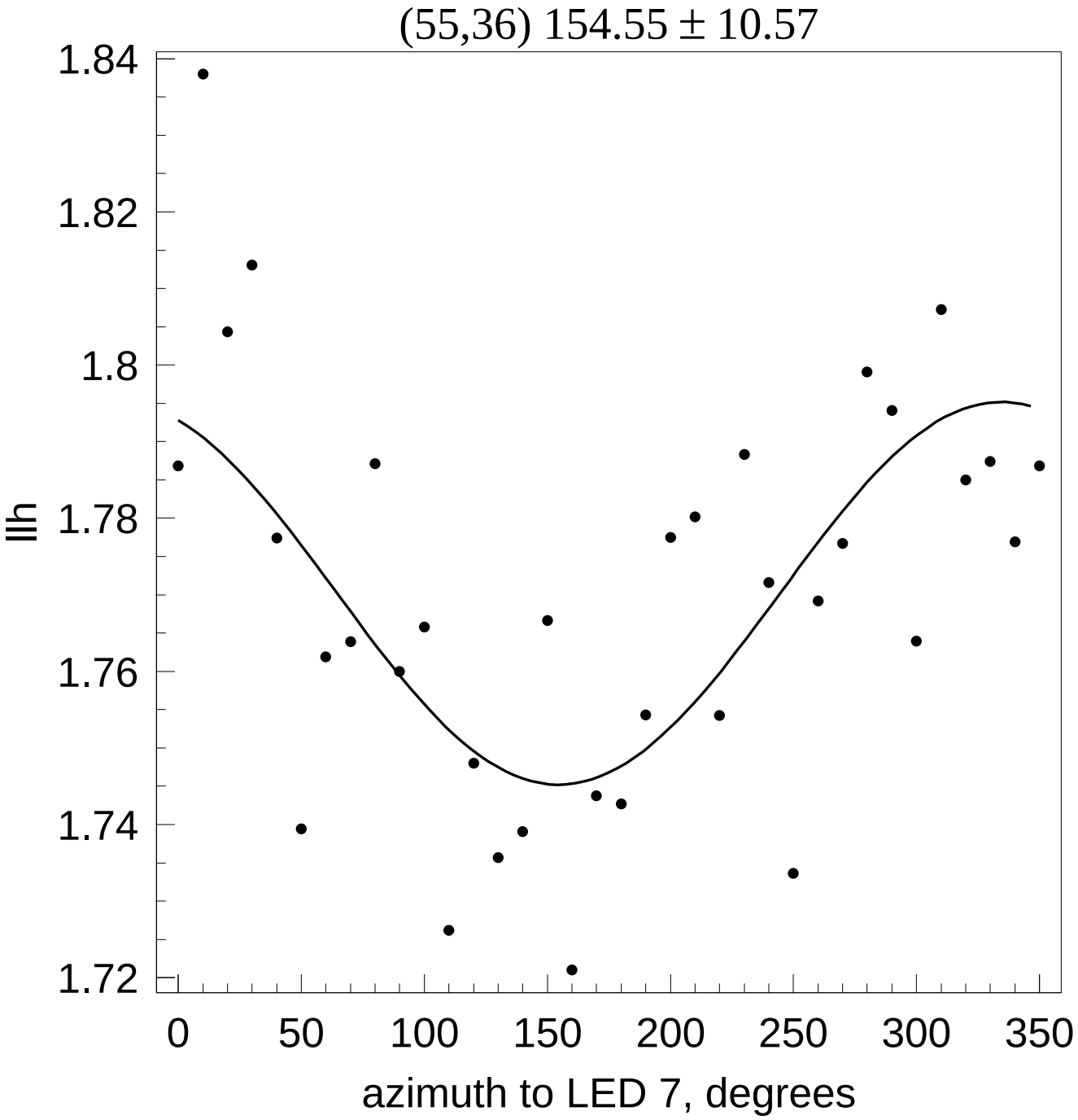

(55,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
357.4 ± 60.9
12
11
6
5
7
1
10
4
10
2
3
8
9

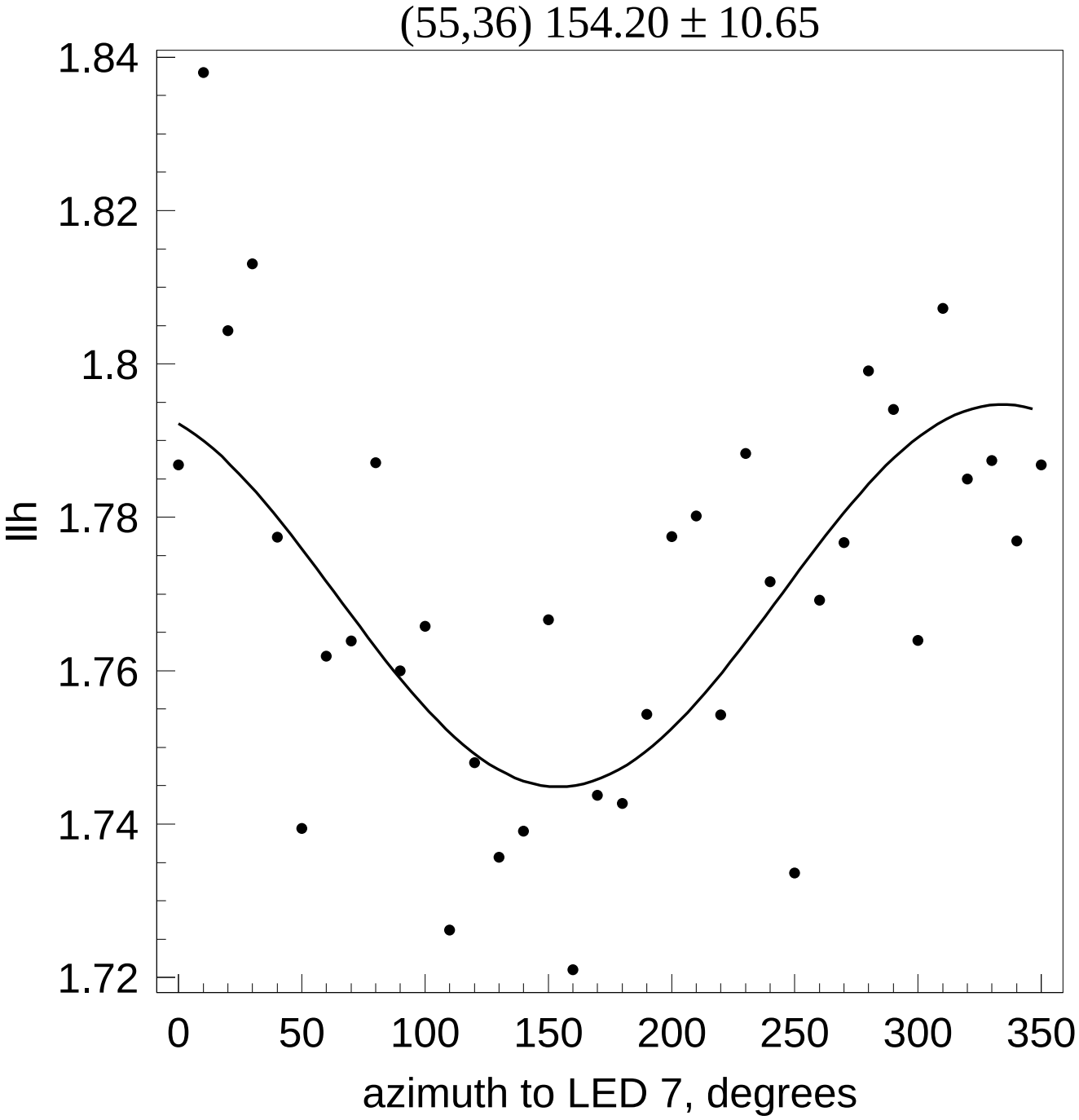

(55,35) 348.33 ± 6.00
llh
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

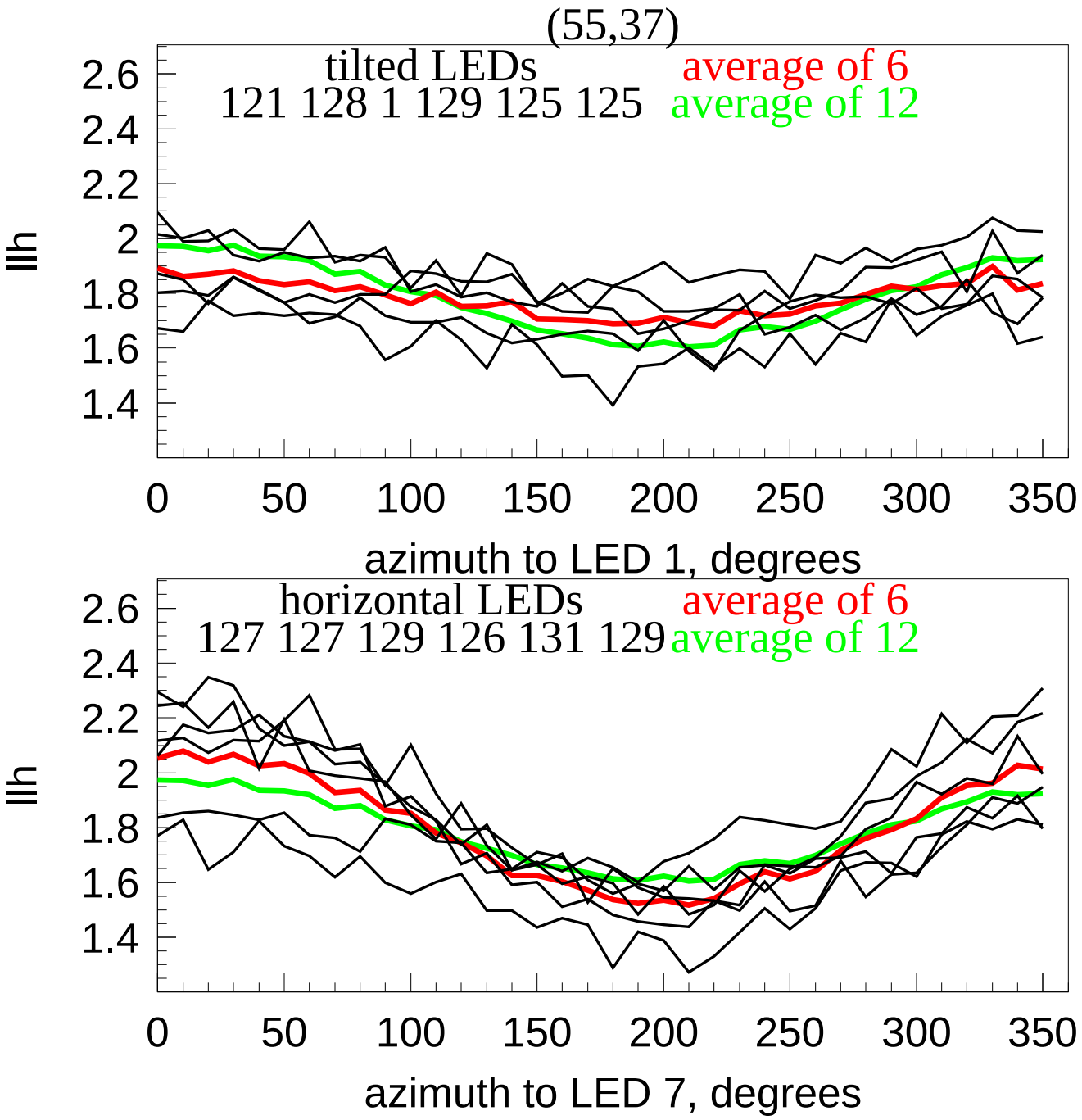

(55,35) 348.45 ± 8.25
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

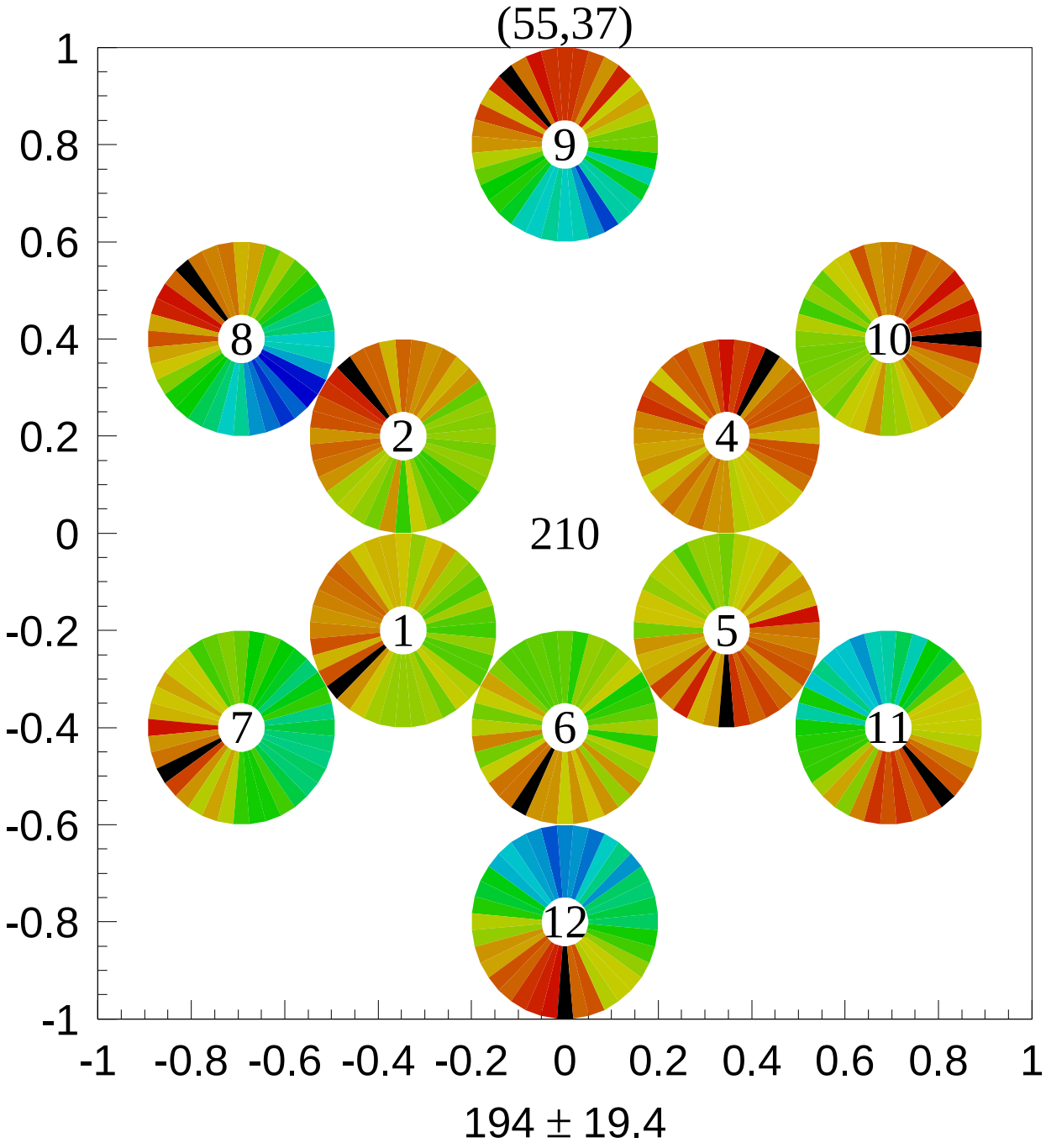

(55,36)
tilted LEDs
129 127 130 127 125 134
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
124 120 128 129 128 124
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

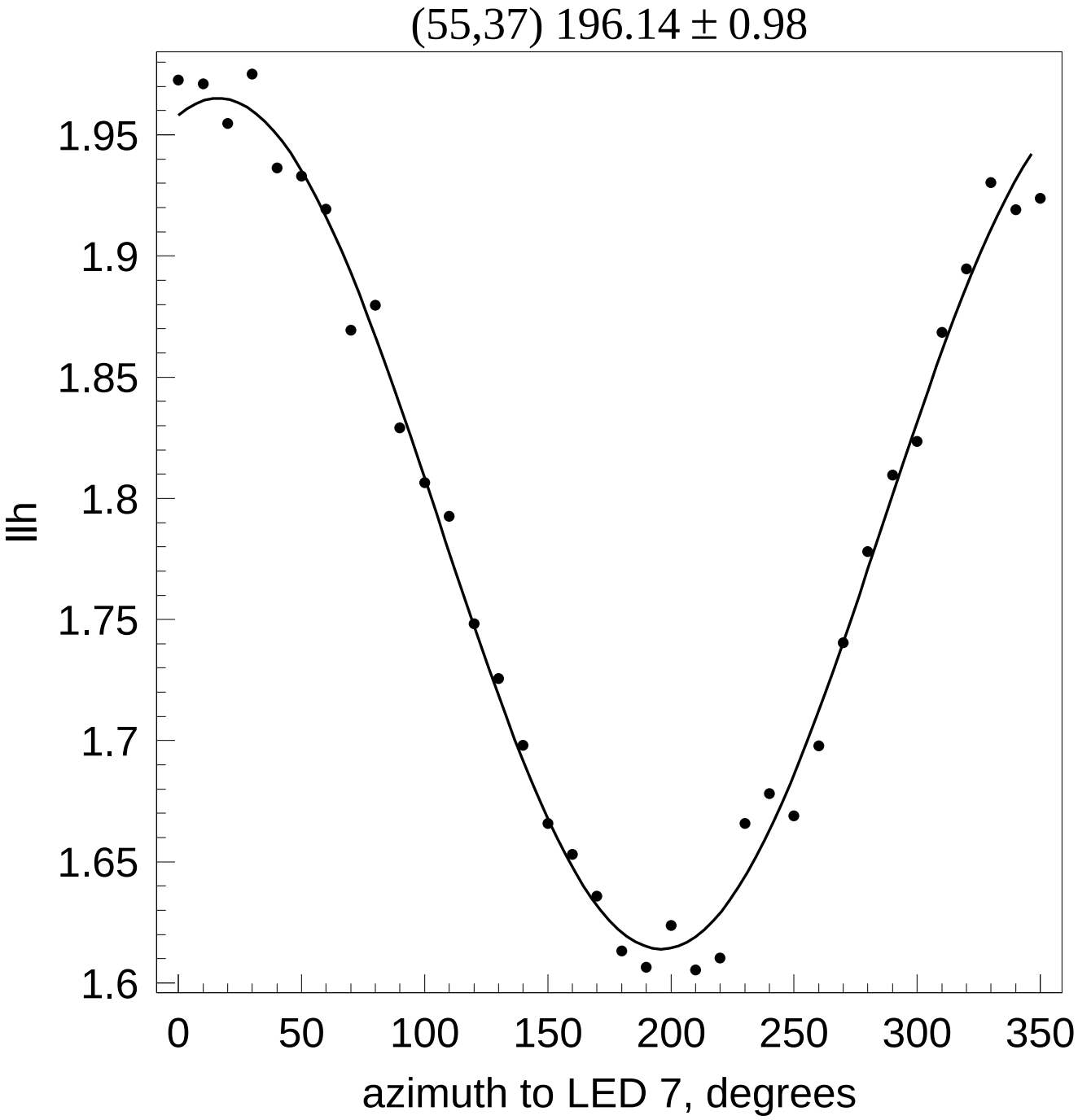

(55,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
7
3
1
160
4
10
6
5
12
11
154.1 ± 89.3

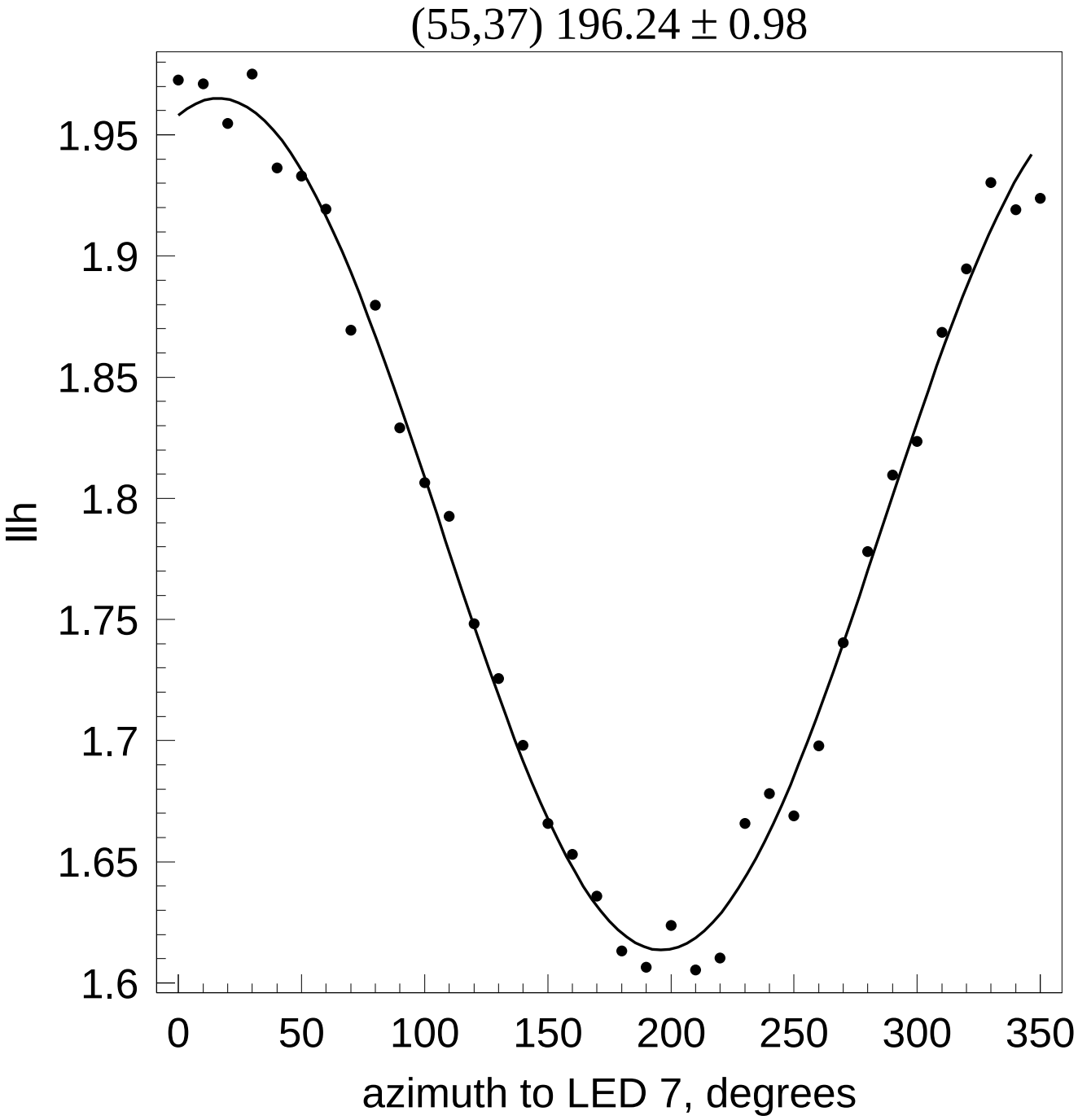

(55,36) 154.55 ± 10.57
1.84
1.82
1.8
1.78
1.76
1.74
1.72
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

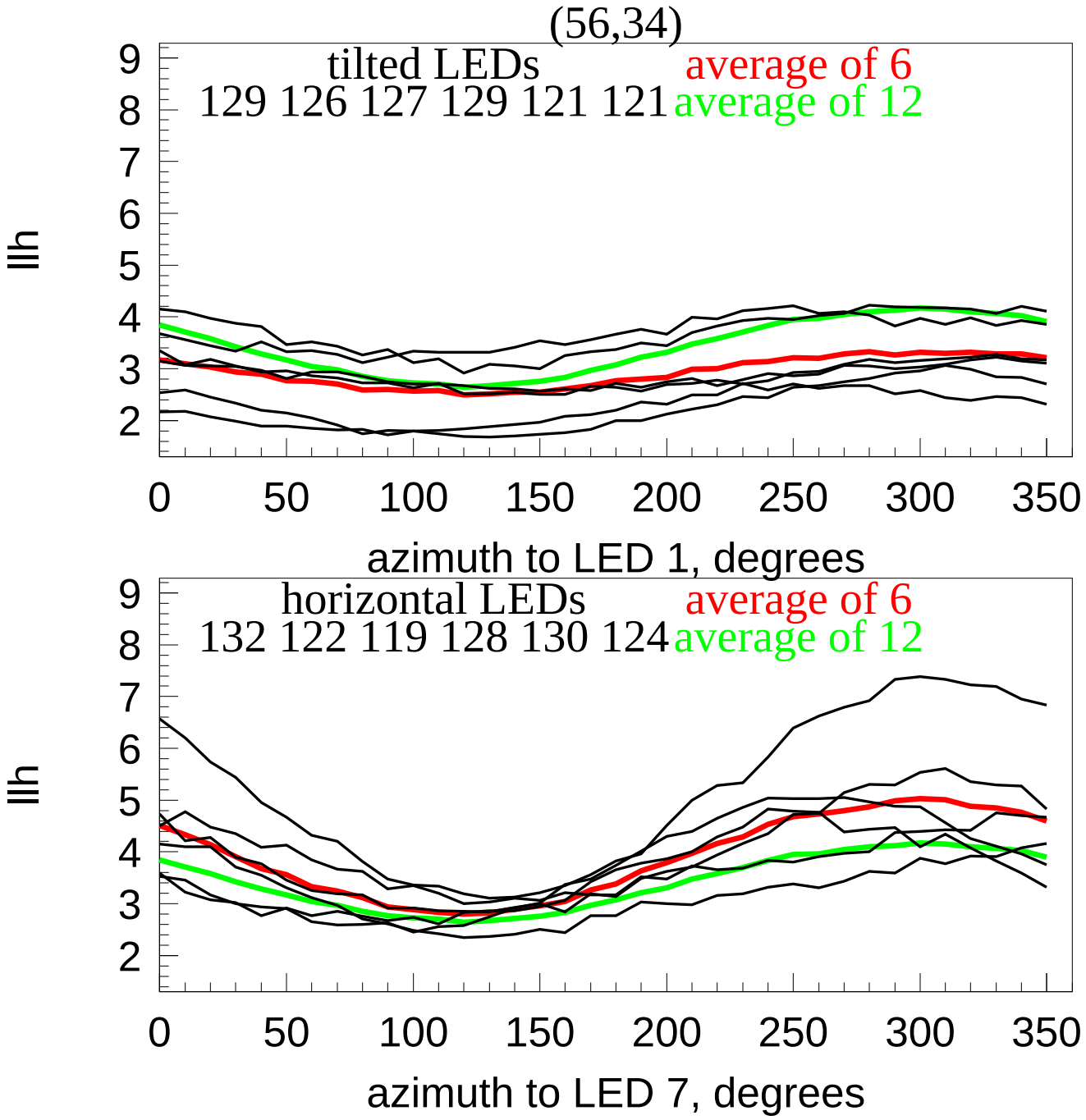

(55,36) 154.20 ± 10.65
1.84
1.82
1.8
1.78
1.76
1.74
1.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

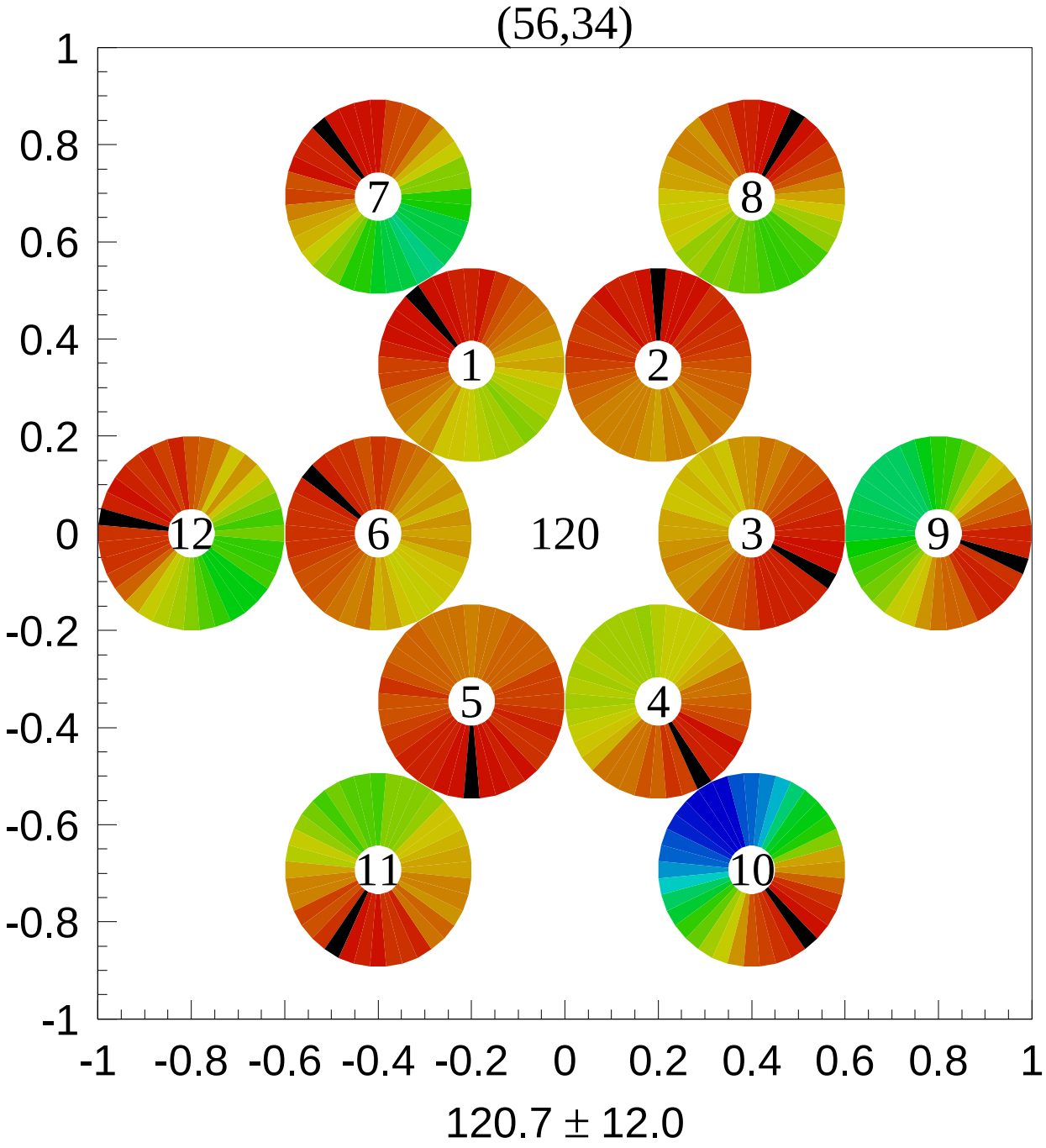

(55,37)
tilted LEDs
121 128 1 129 125 125
average of 6
average of 12
llh
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 127 129 126 131 129
average of 6
average of 12
llh
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

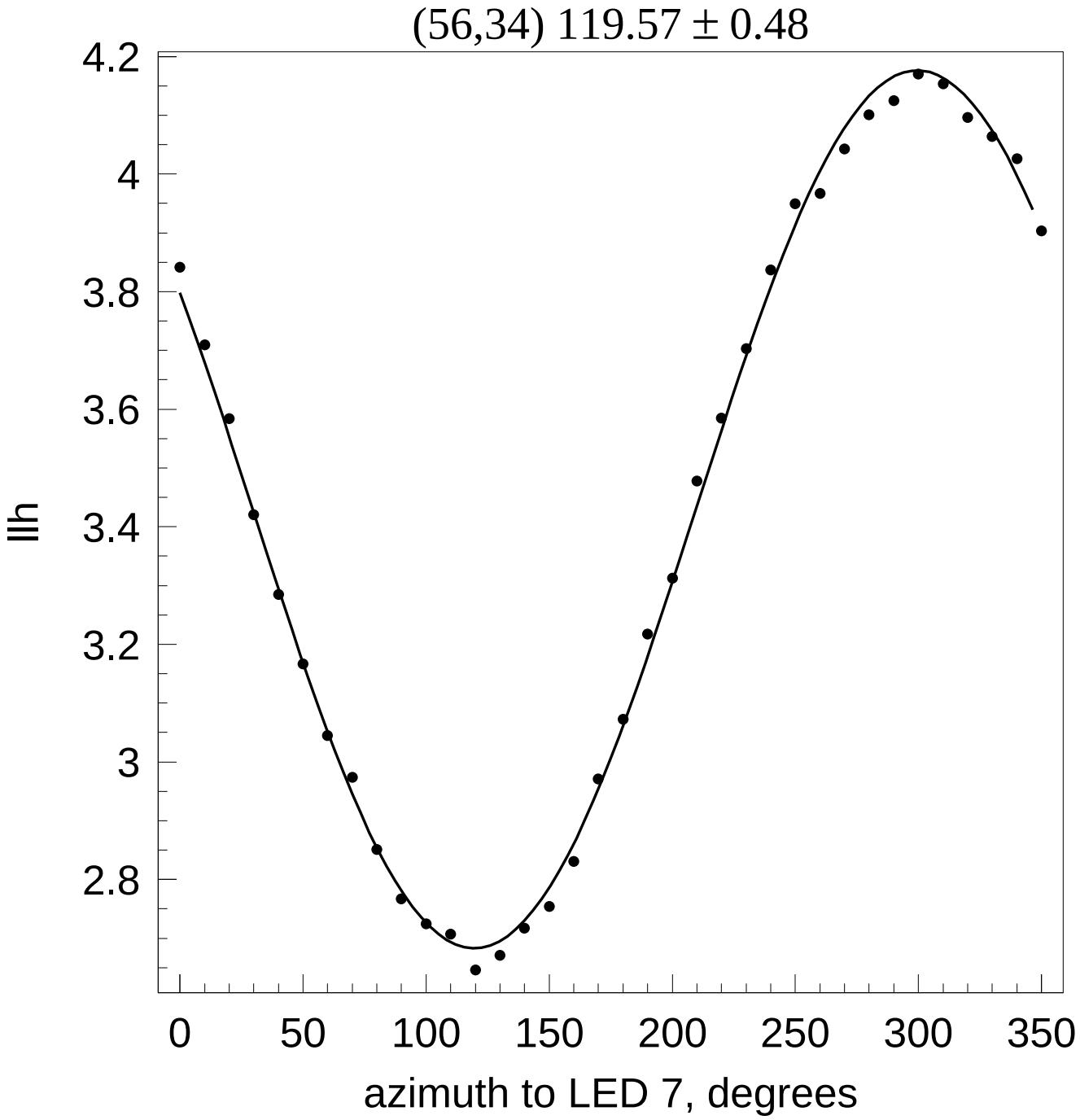

(55,37)
9
8
2
4
10
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
194 ± 19.4

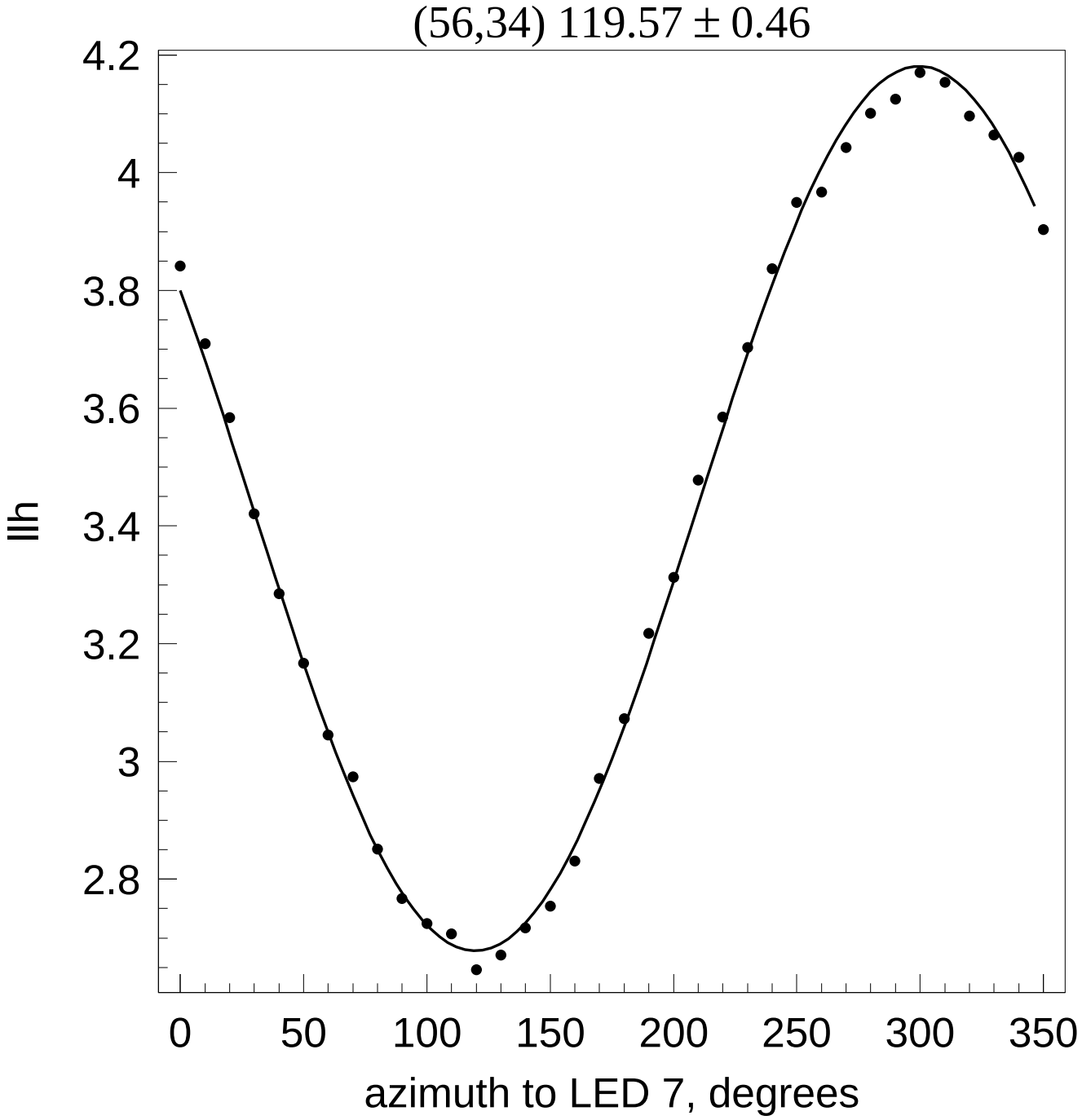

(55,37) 196.14 ± 0.98
1.95
1.9
1.85
1.8
1.75
1.7
1.65
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

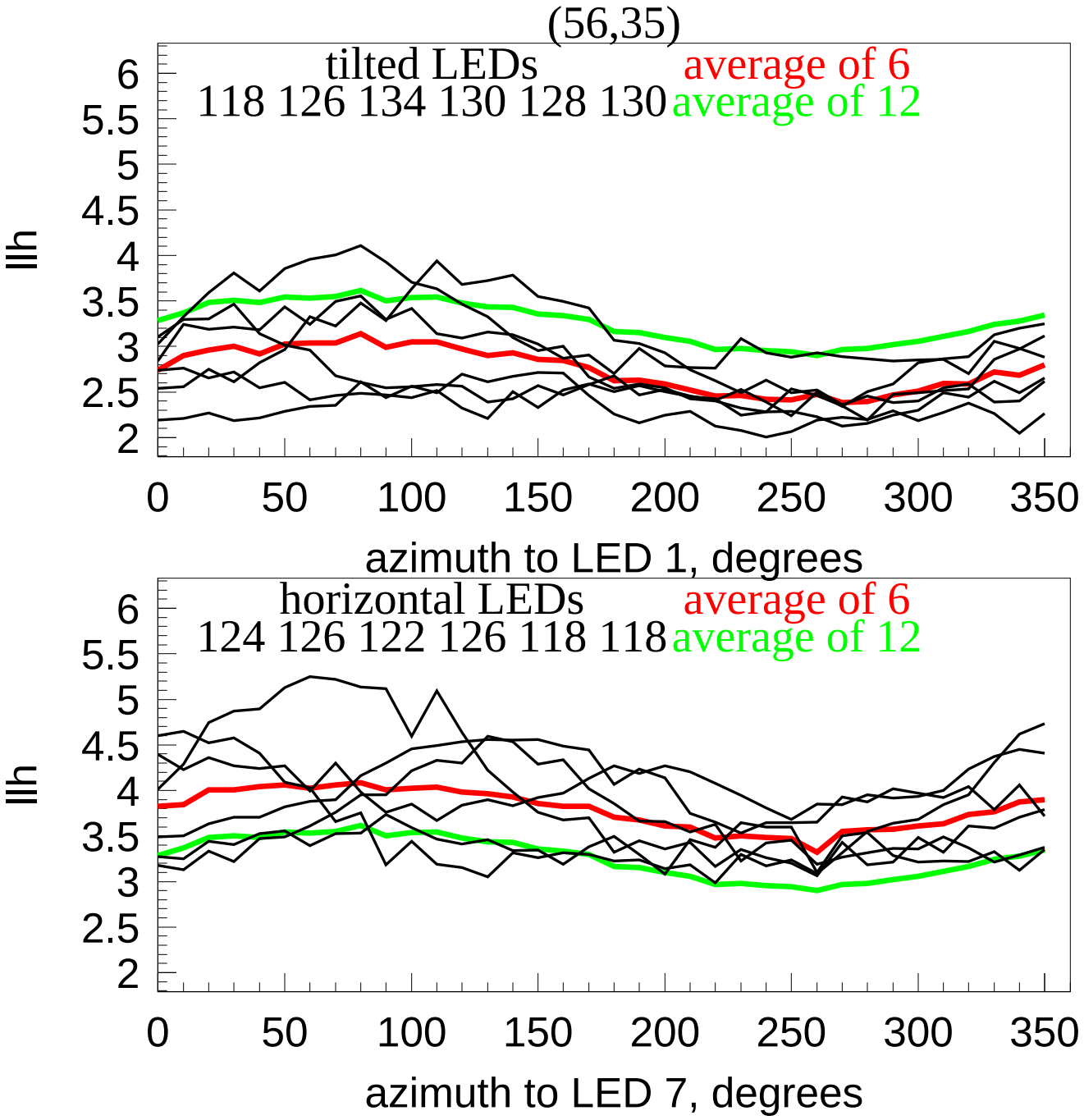

(55,37) 196.24 ± 0.98
1.95
1.9
1.85
1.8
1.75
1.7
1.65
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

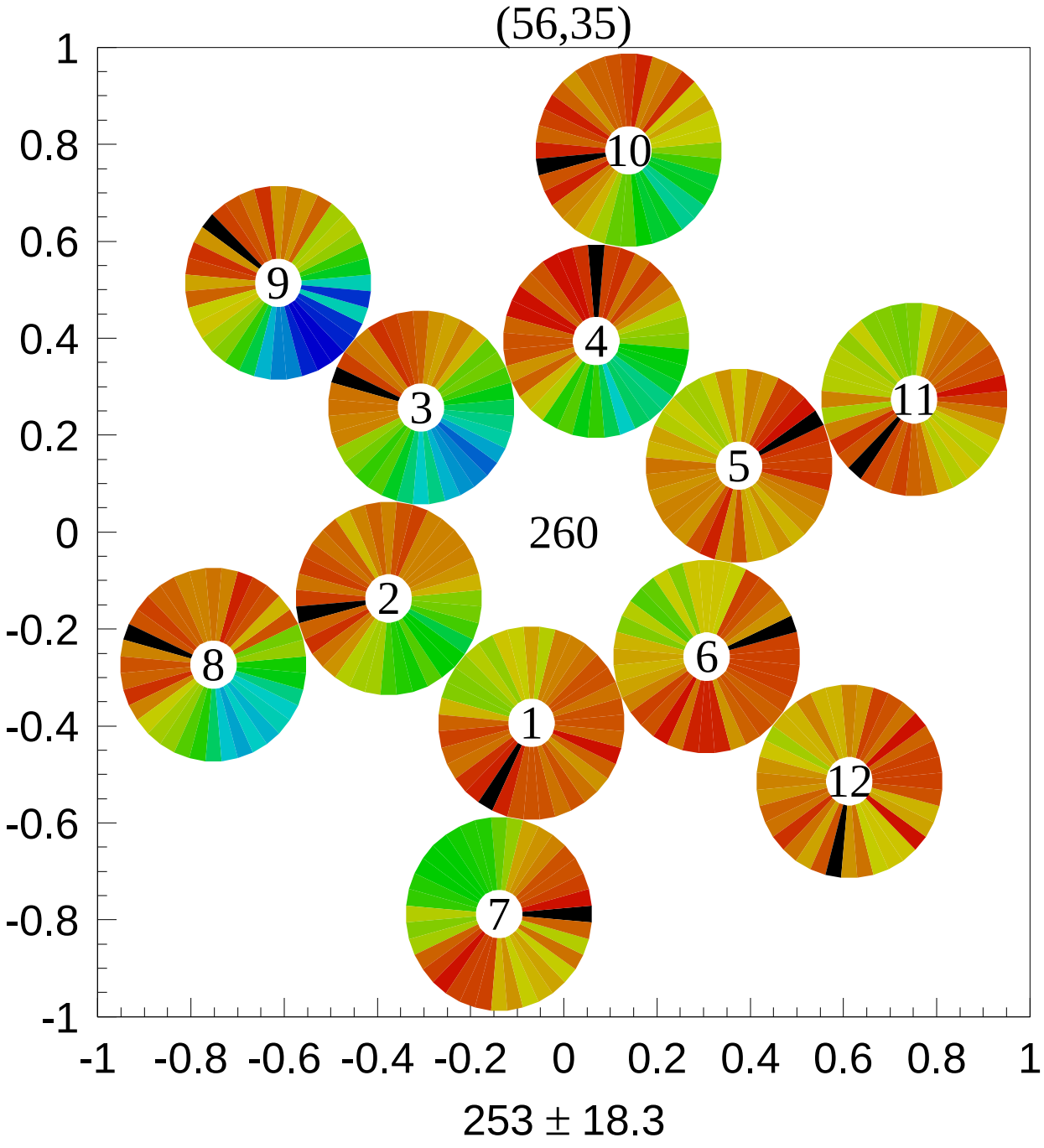

(56,34)
tilted LEDs
129 126 127 129 121 121
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 122 119 128 130 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

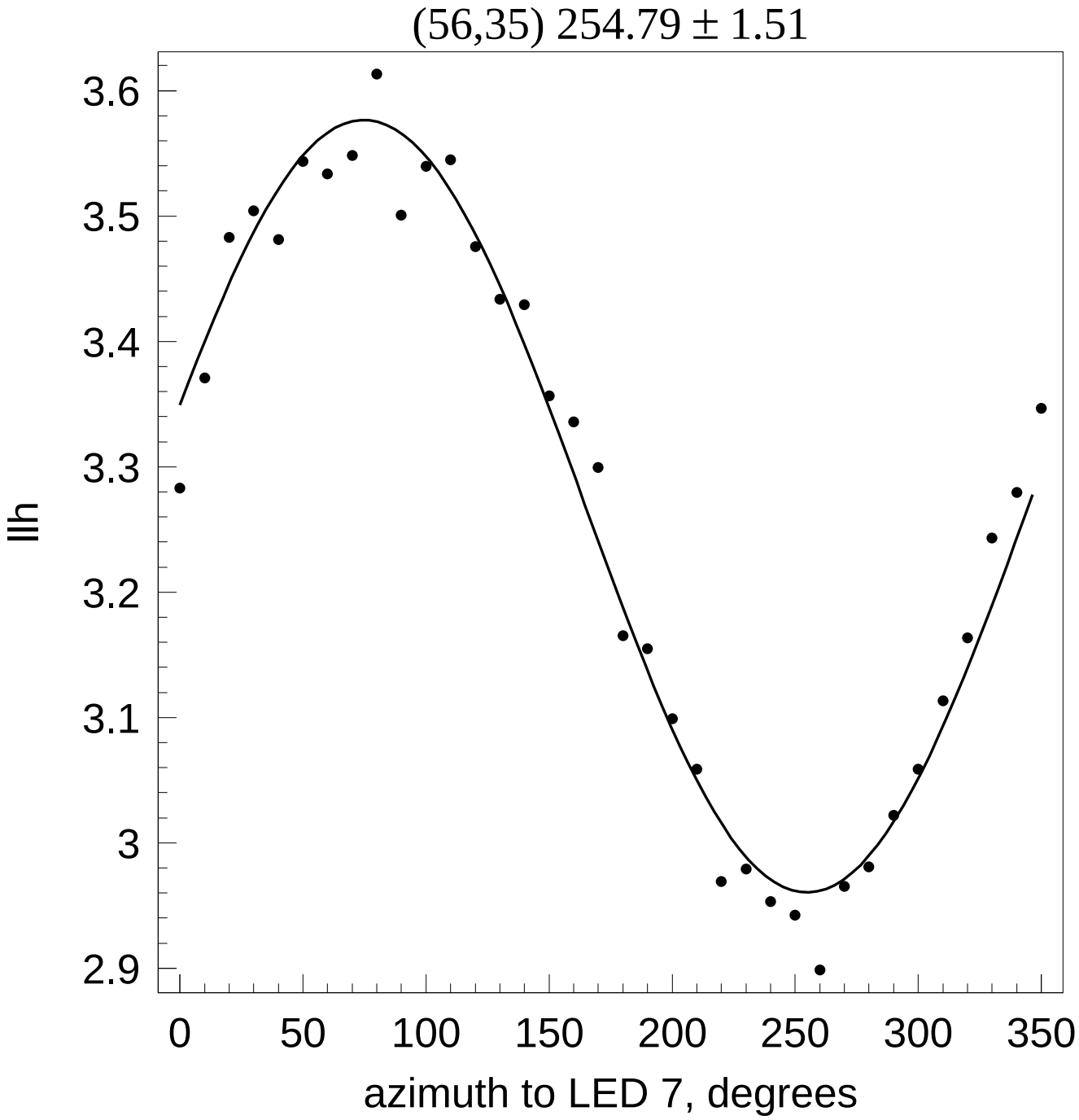

(56,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
120.7 ± 12.0

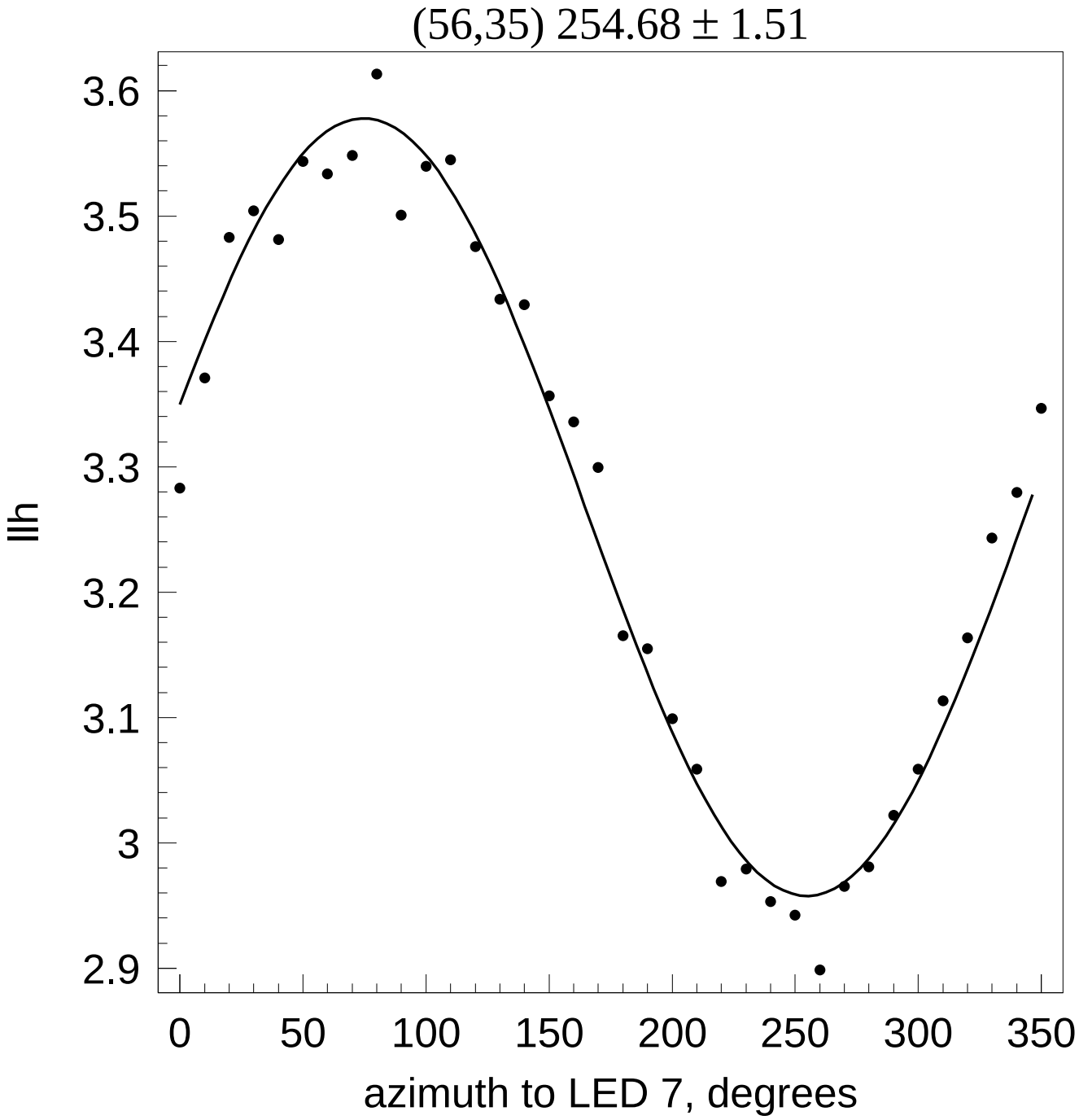

(56,34) 119.57 ± 0.48
4.2
4
3.8
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

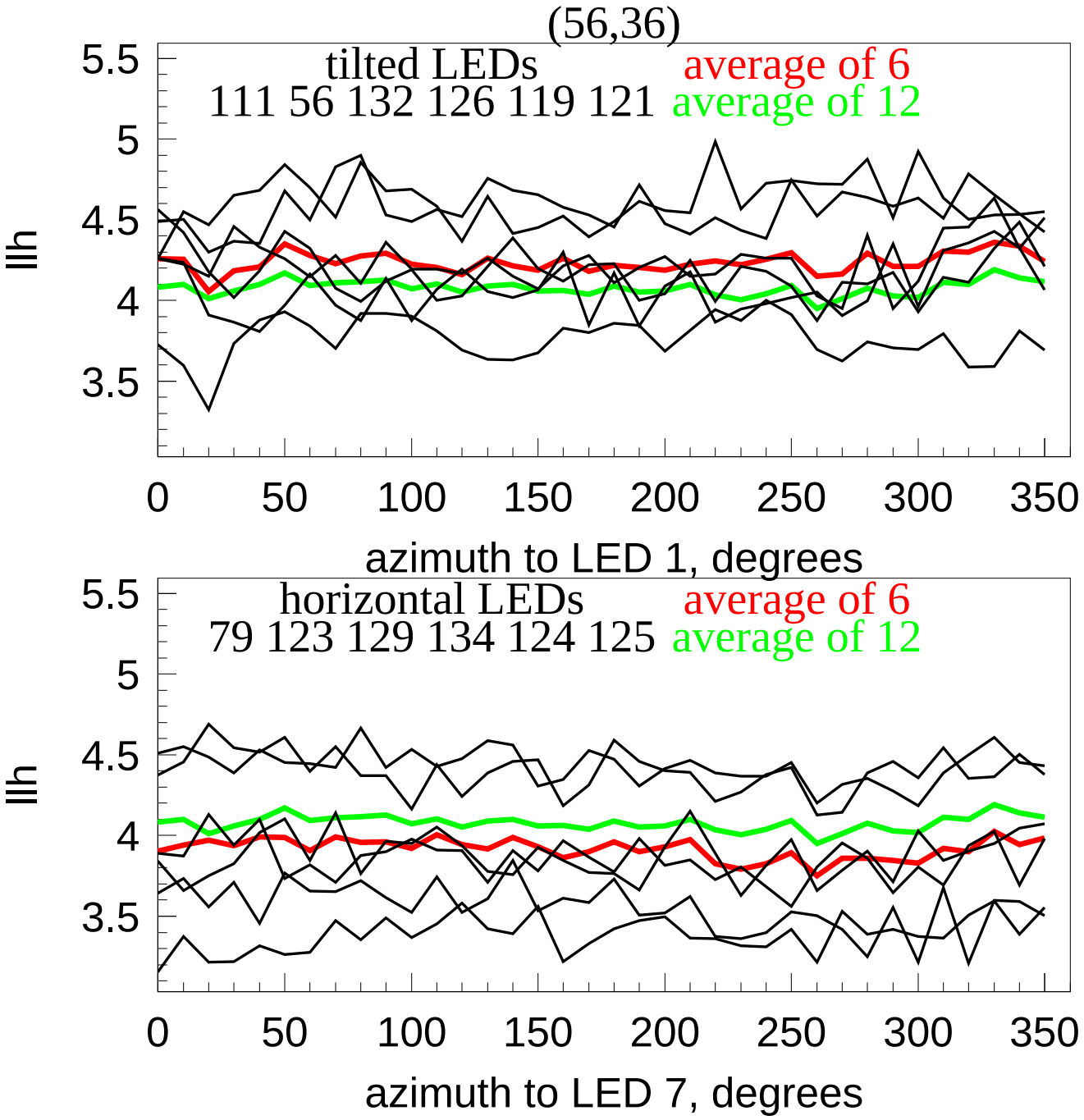

(56,34) 119.57 ± 0.46
4.2
4
3.8
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

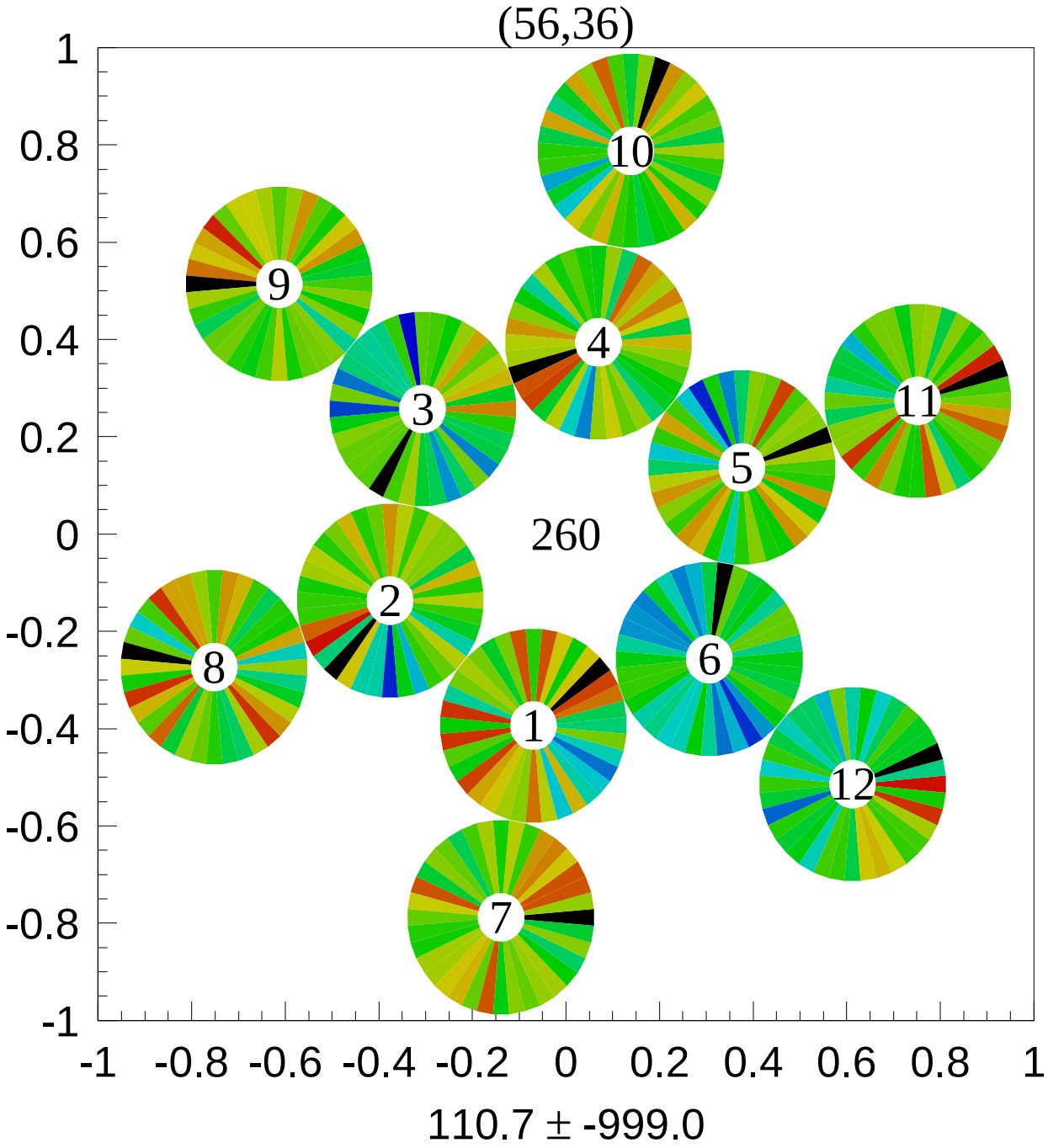

(56,35)
tilted LEDs
118 126 134 130 128 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 126 122 126 118 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

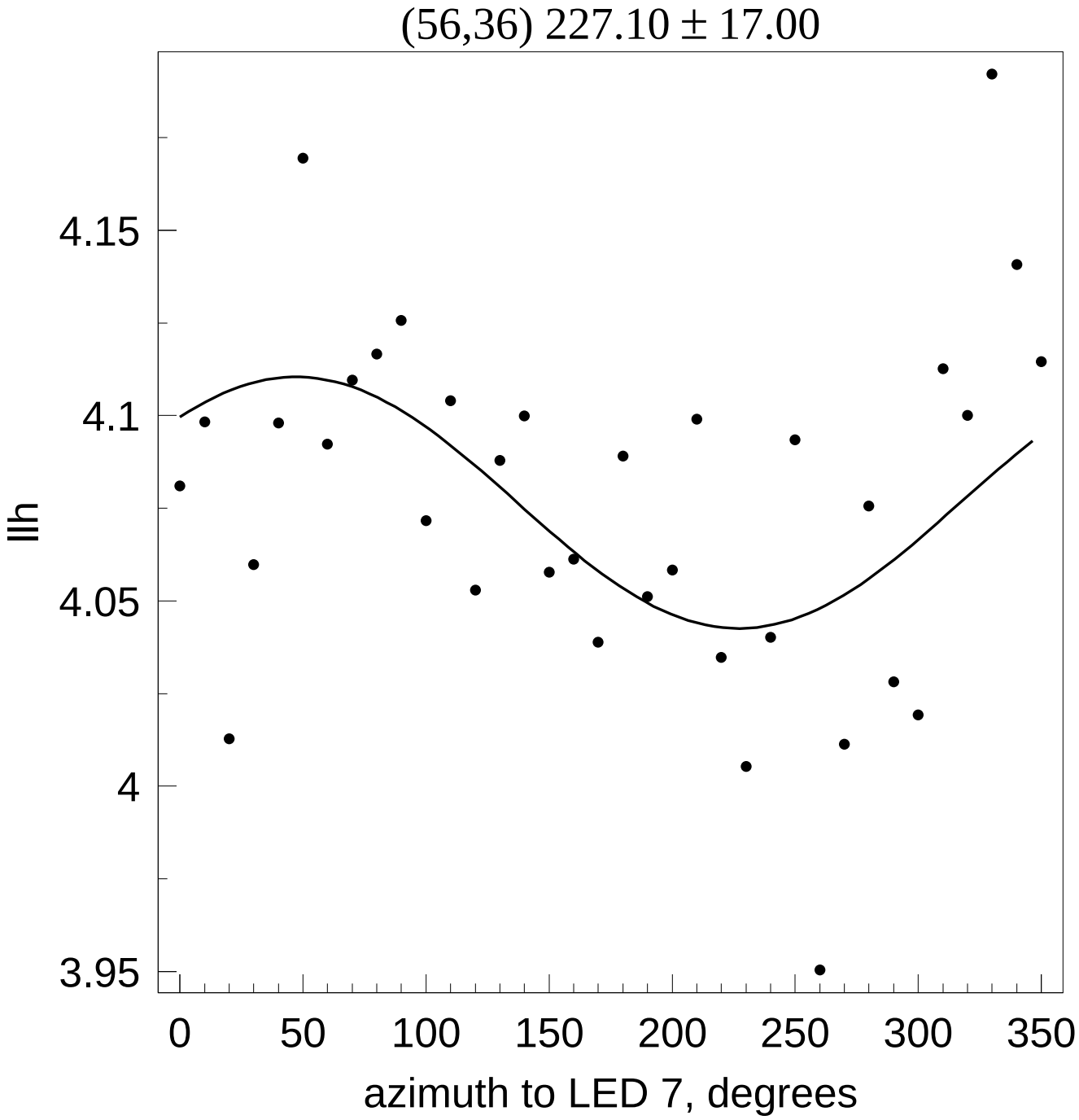

(56,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
253 ± 18.3

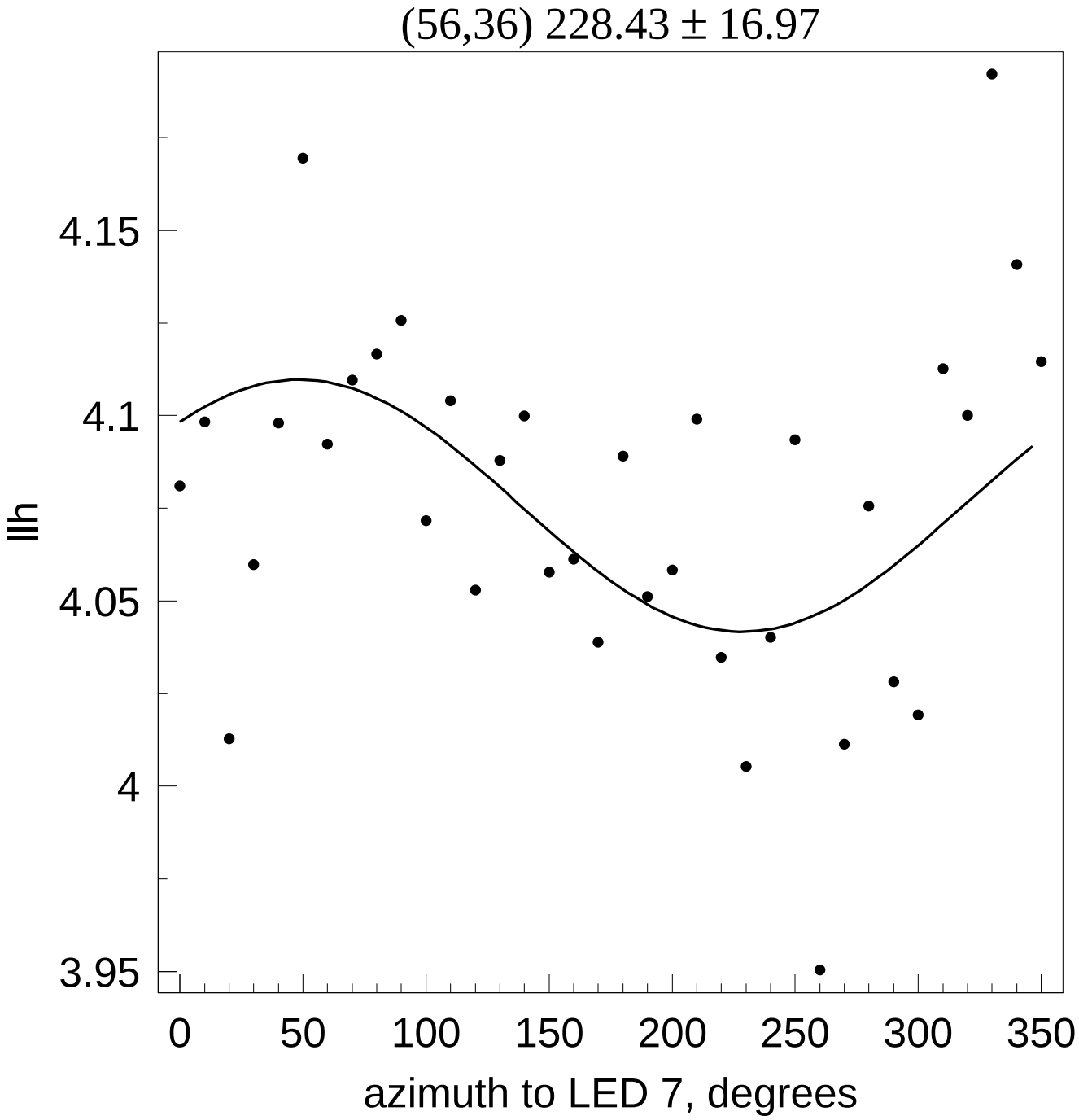

(56,35) 254.79 ± 1.51
llh
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

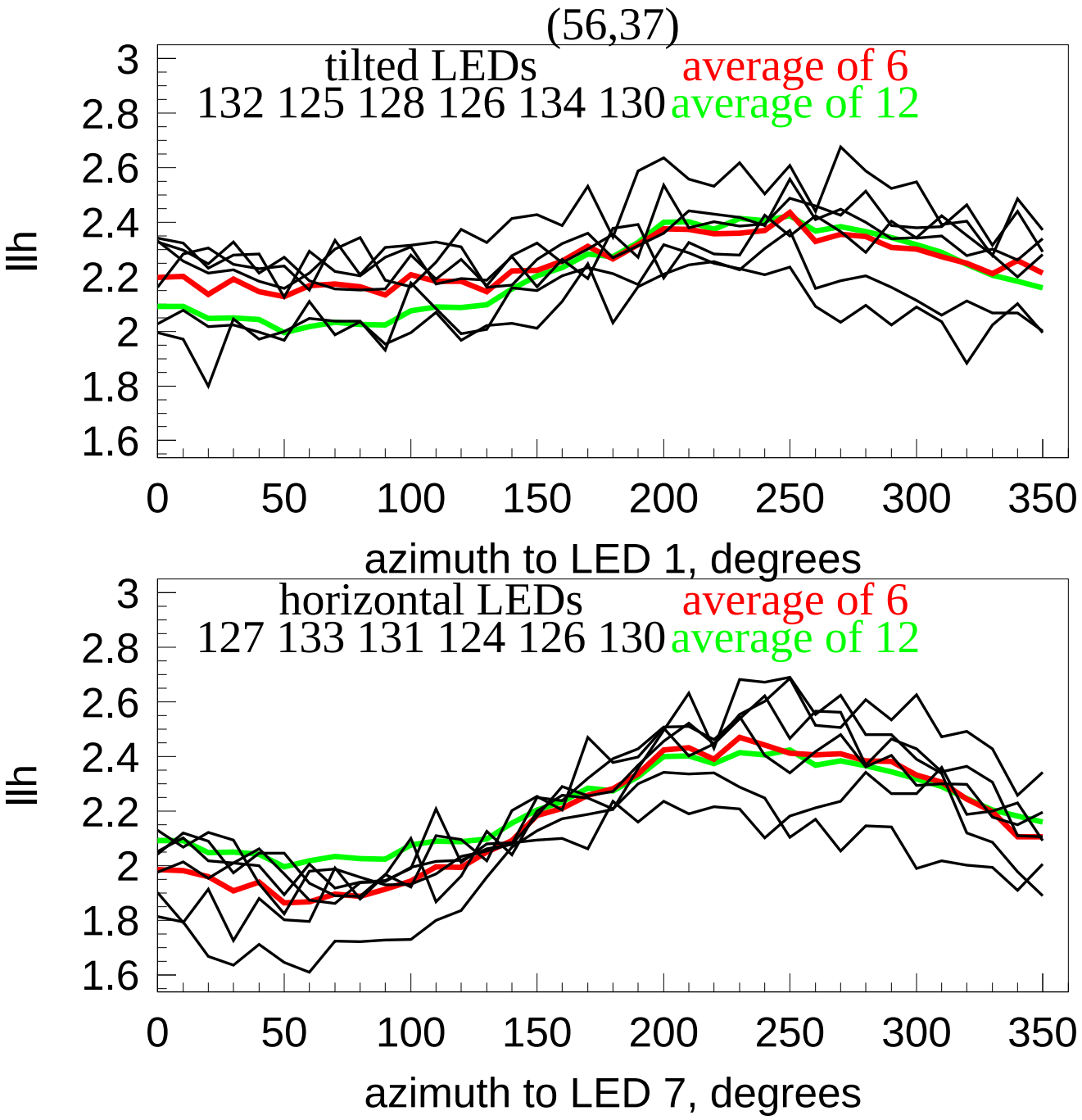

(56,35) 254.68 ± 1.51
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

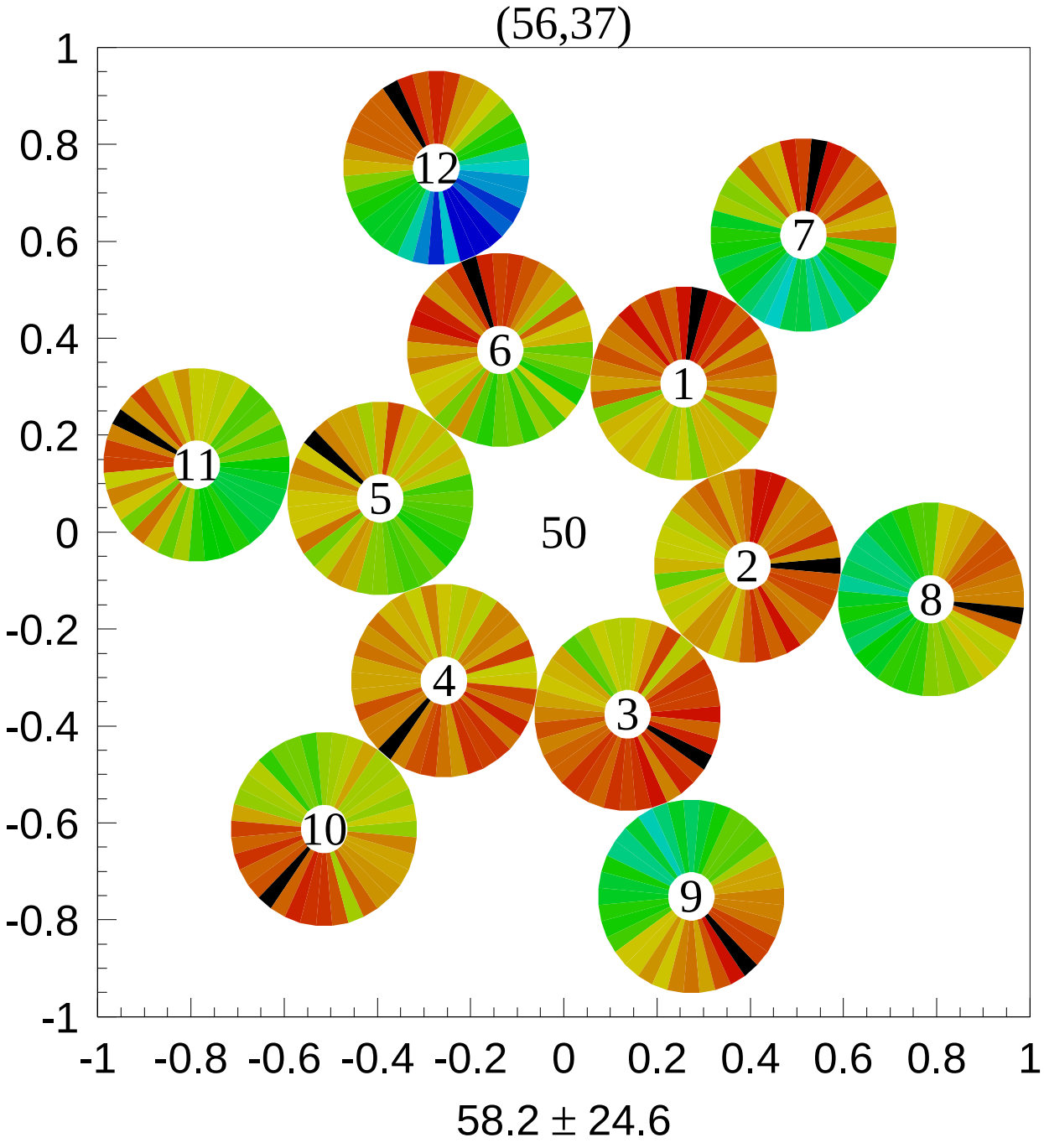

(56,36)
tilted LEDs
111 56 132 126 119 121
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
79 123 129 134 124 125
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

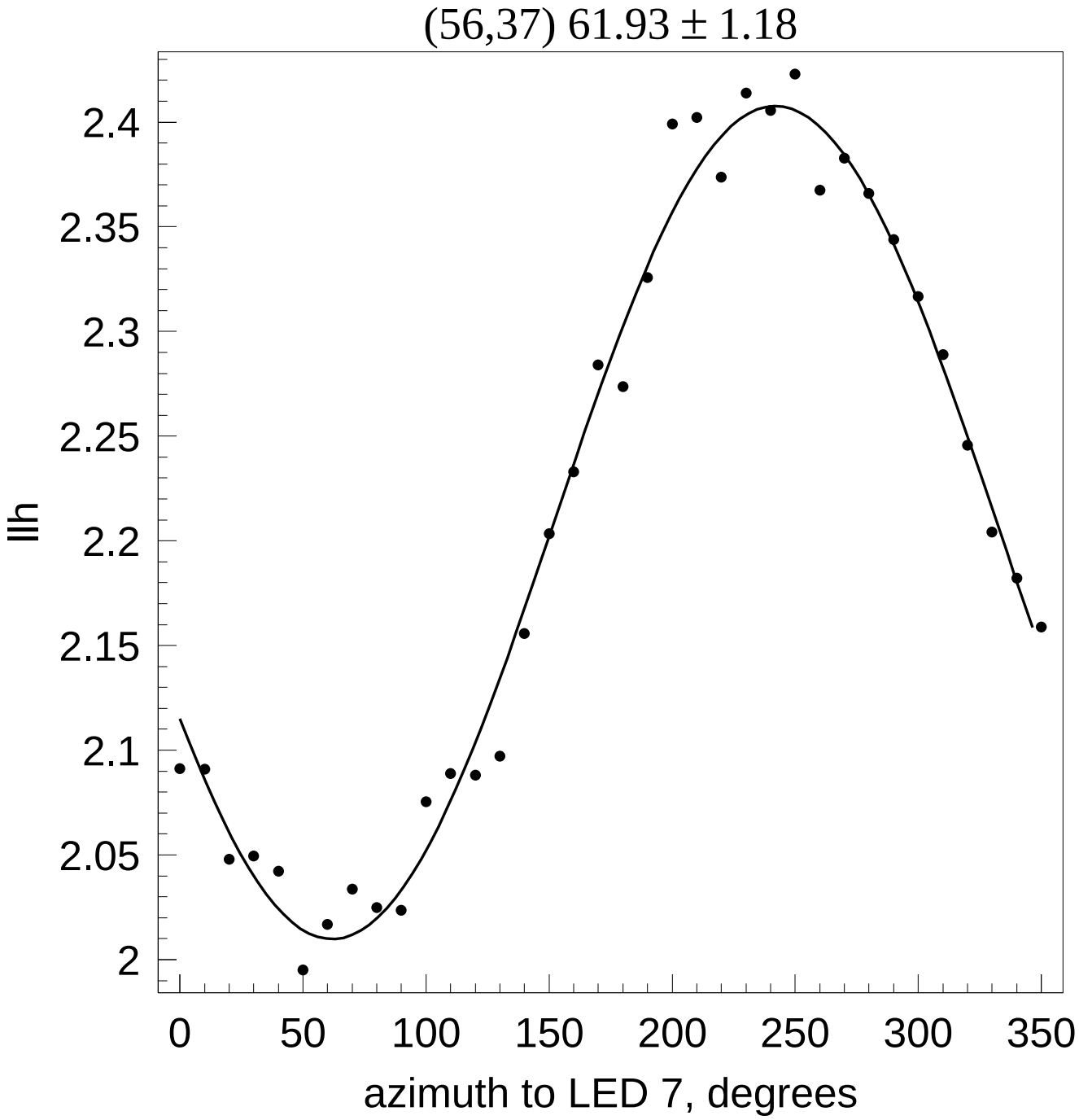

(56,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
110.7 ± -999.0
260
1
2
3
4
5
6
7
8
9
10
11
12

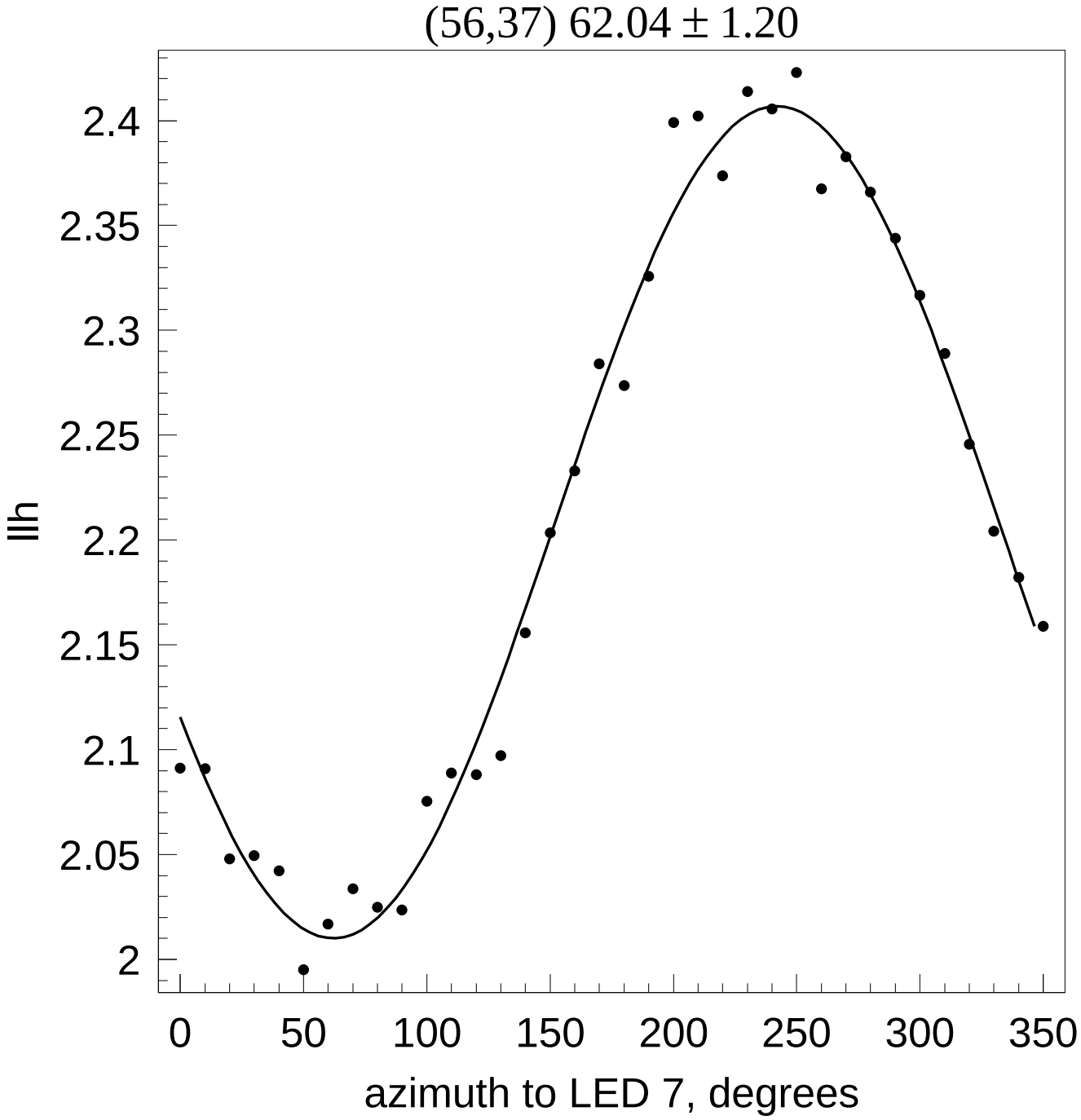

(56,36) 227.10 ± 17.00
4.15
4.1
4.05
4
3.95
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

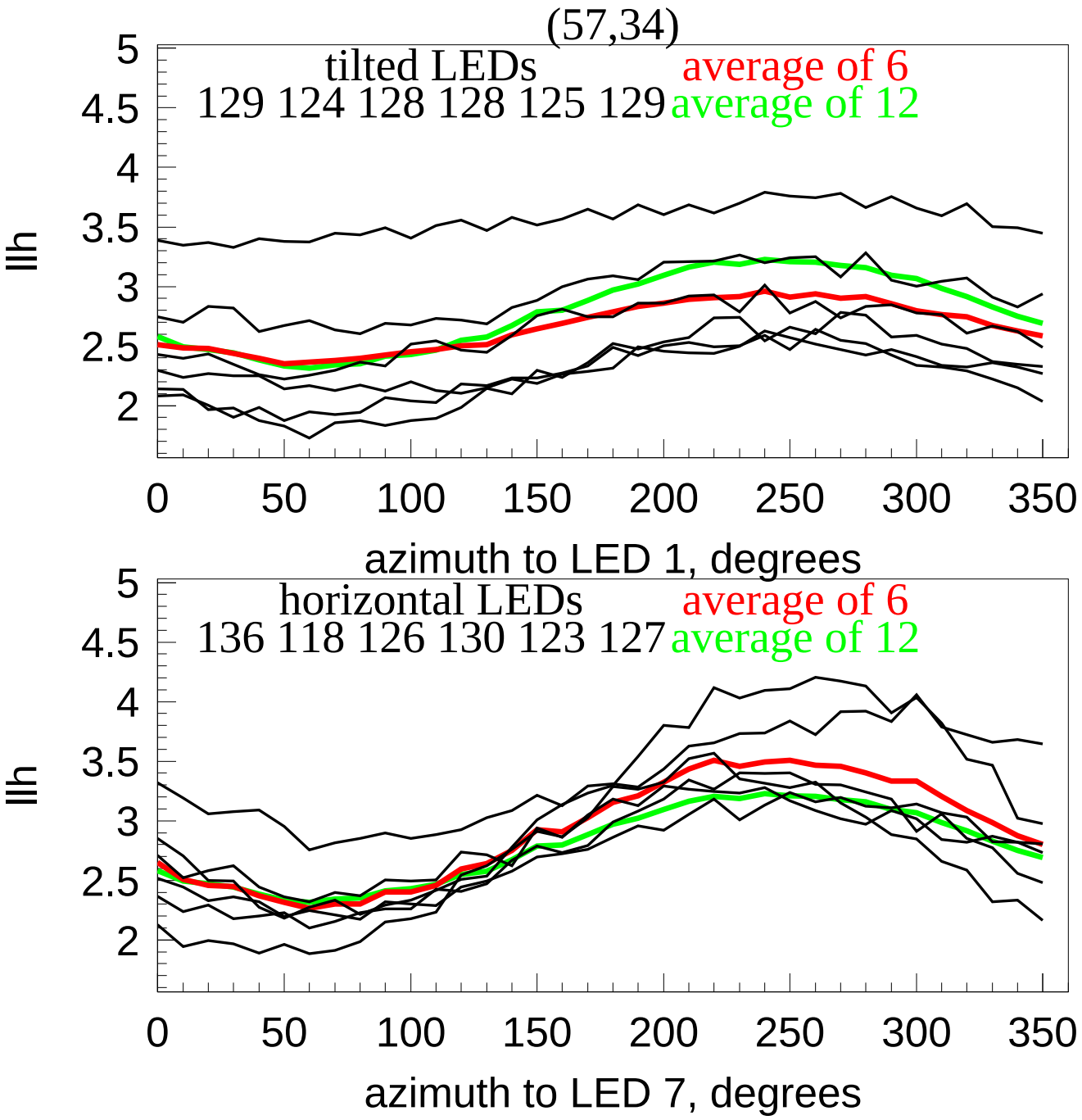

(56,36) 228.43 ± 16.97
4.15
4.1
4.05
4
3.95
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

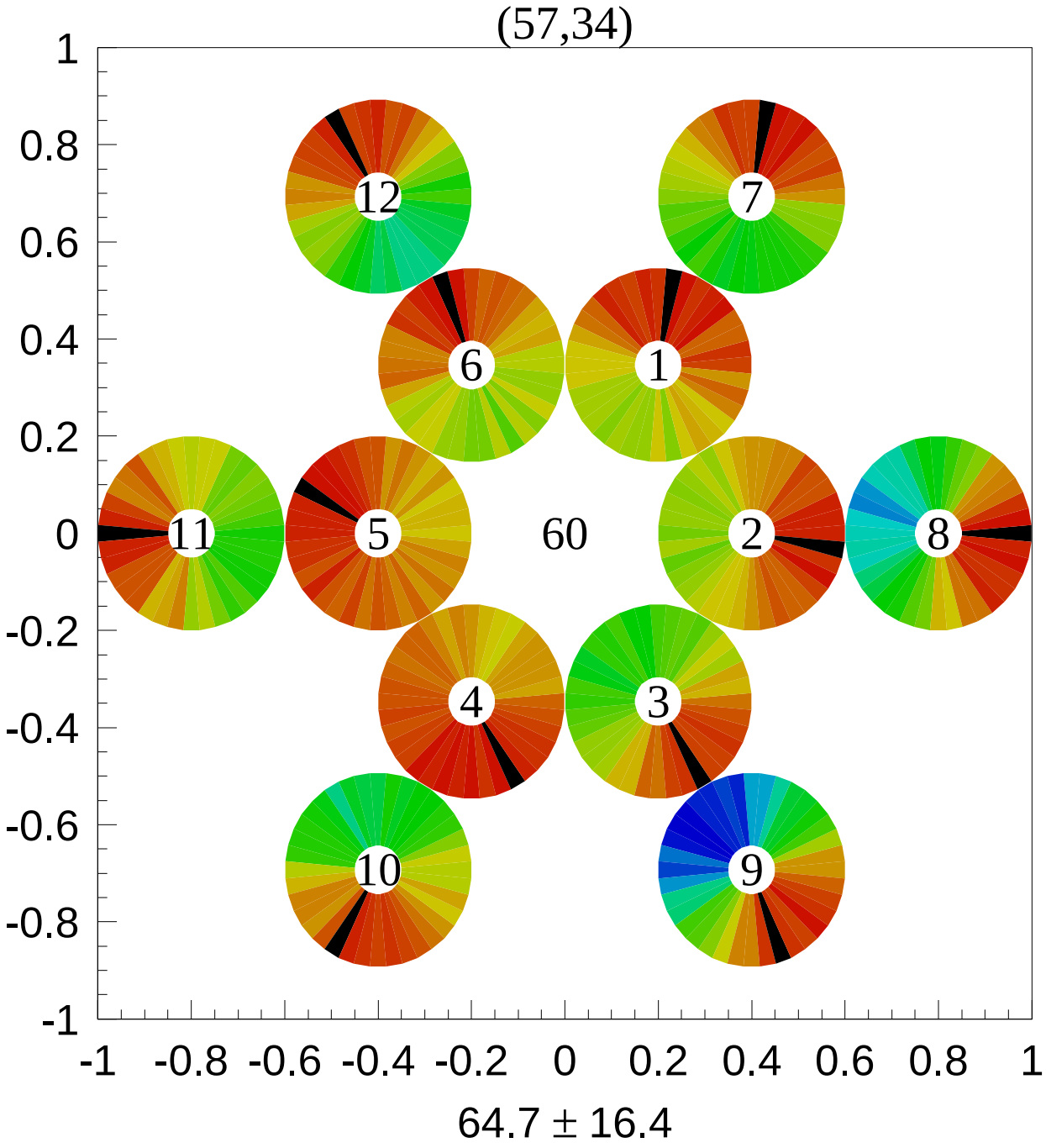

(56,37)
tilted LEDs
132 125 128 126 134 130
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
127 133 131 124 126 130
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

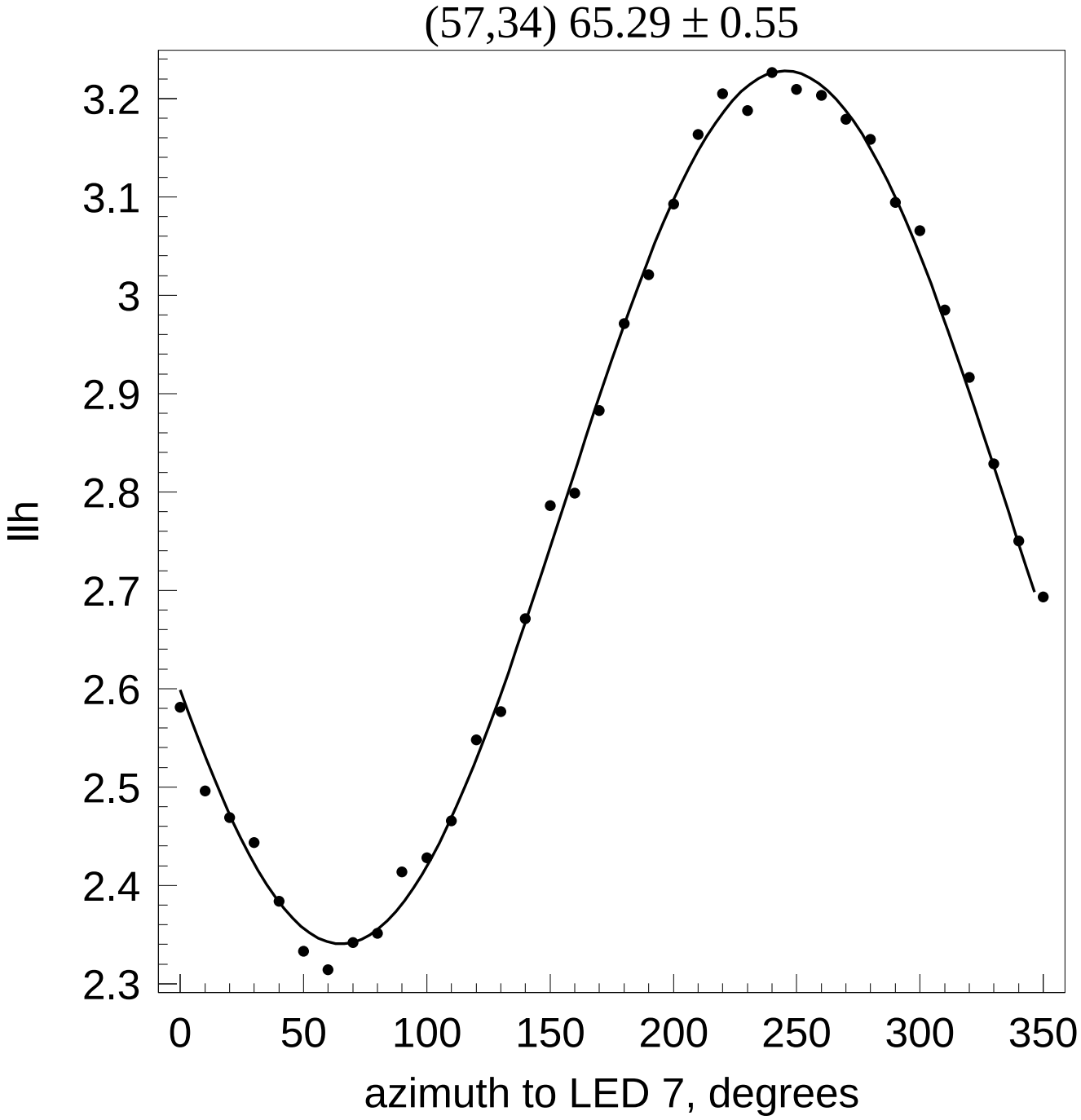

(56,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
58.2 ± 24.6

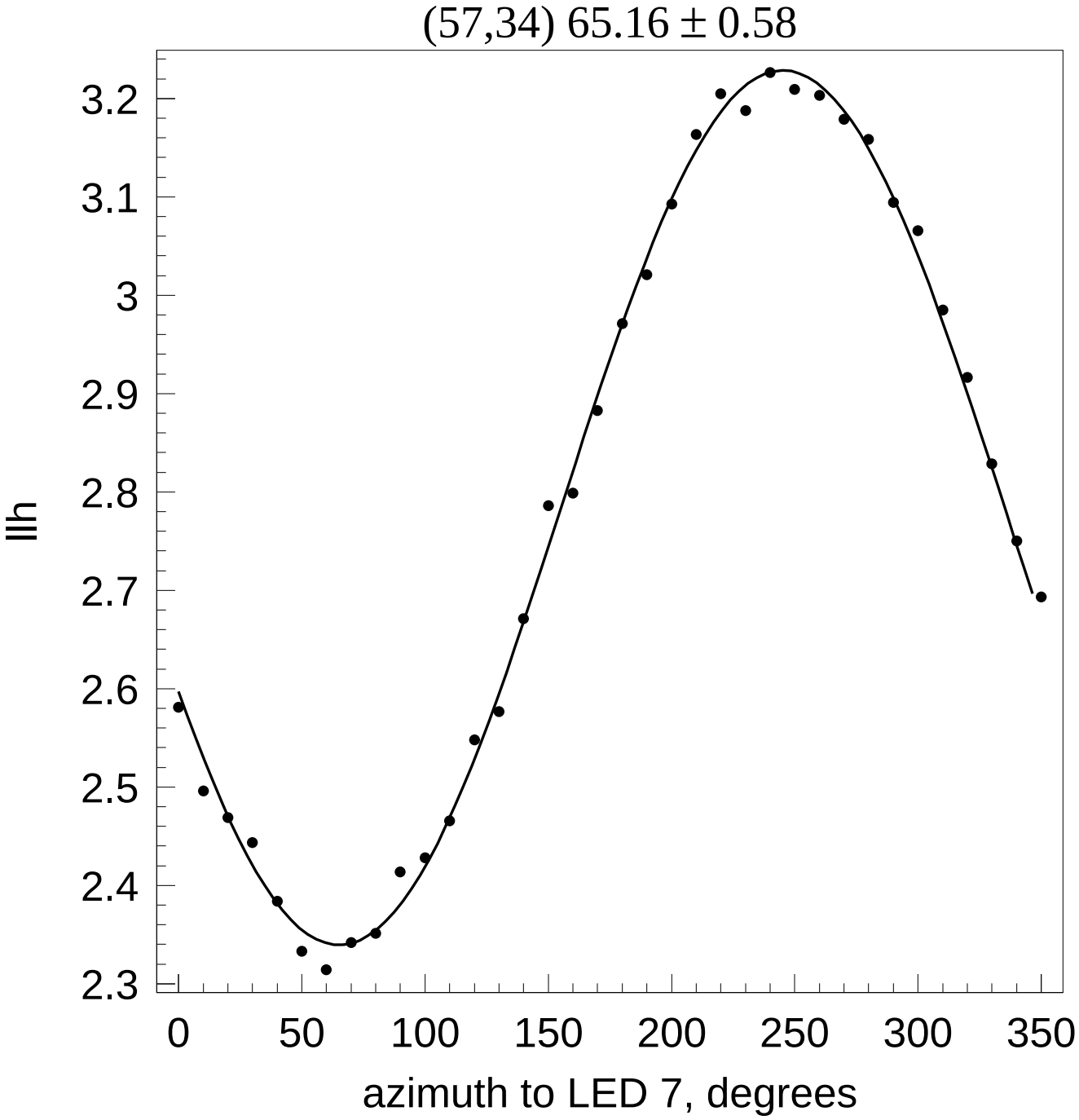

(56,37) 61.93 ± 1.18
2.4
2.35
2.3
2.25
2.2
2.15
2.1
2.05
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

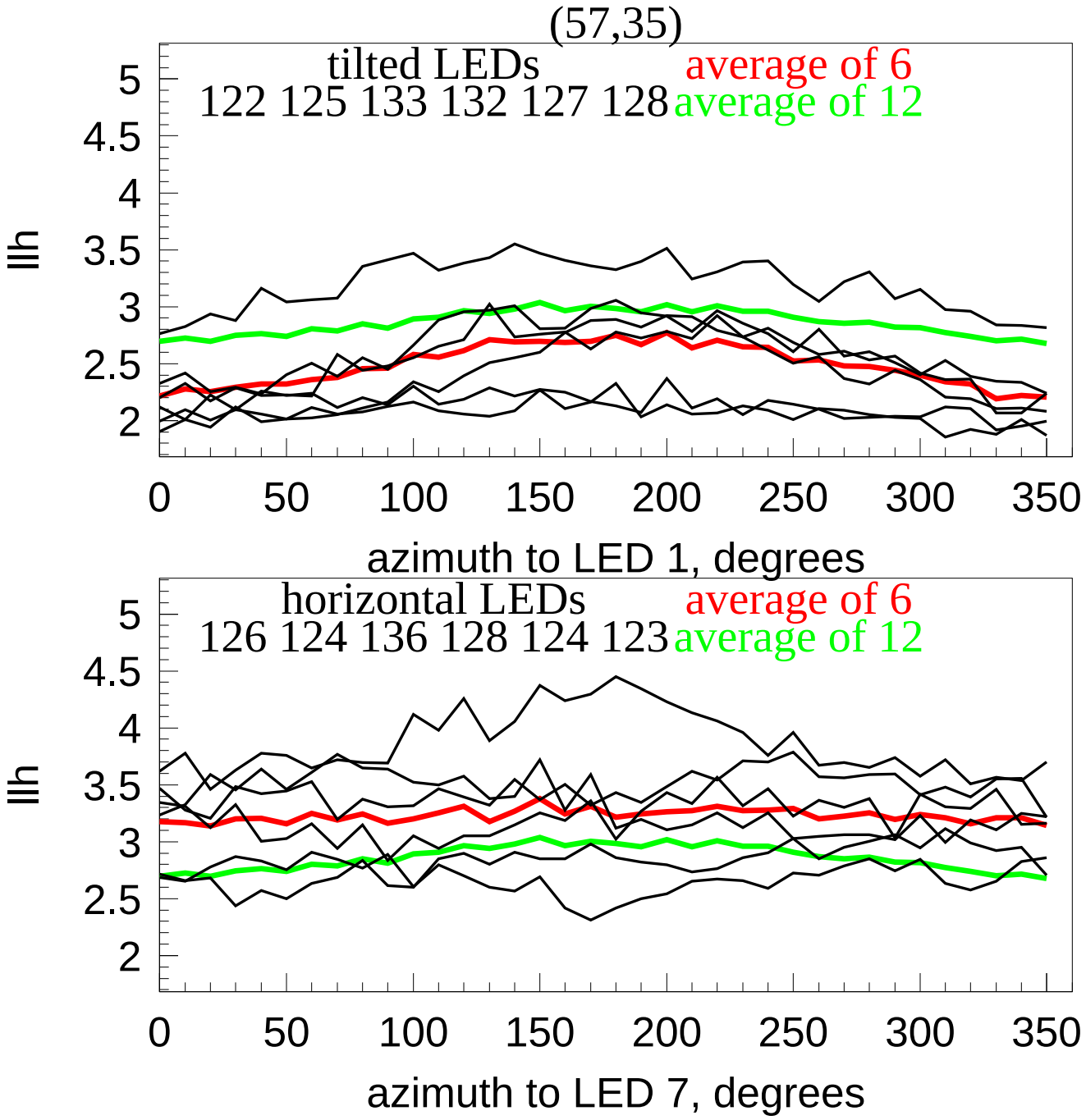

(56,37) 62.04 ± 1.20
2.4
2.35
2.3
2.25
2.2
2.15
2.1
2.05
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

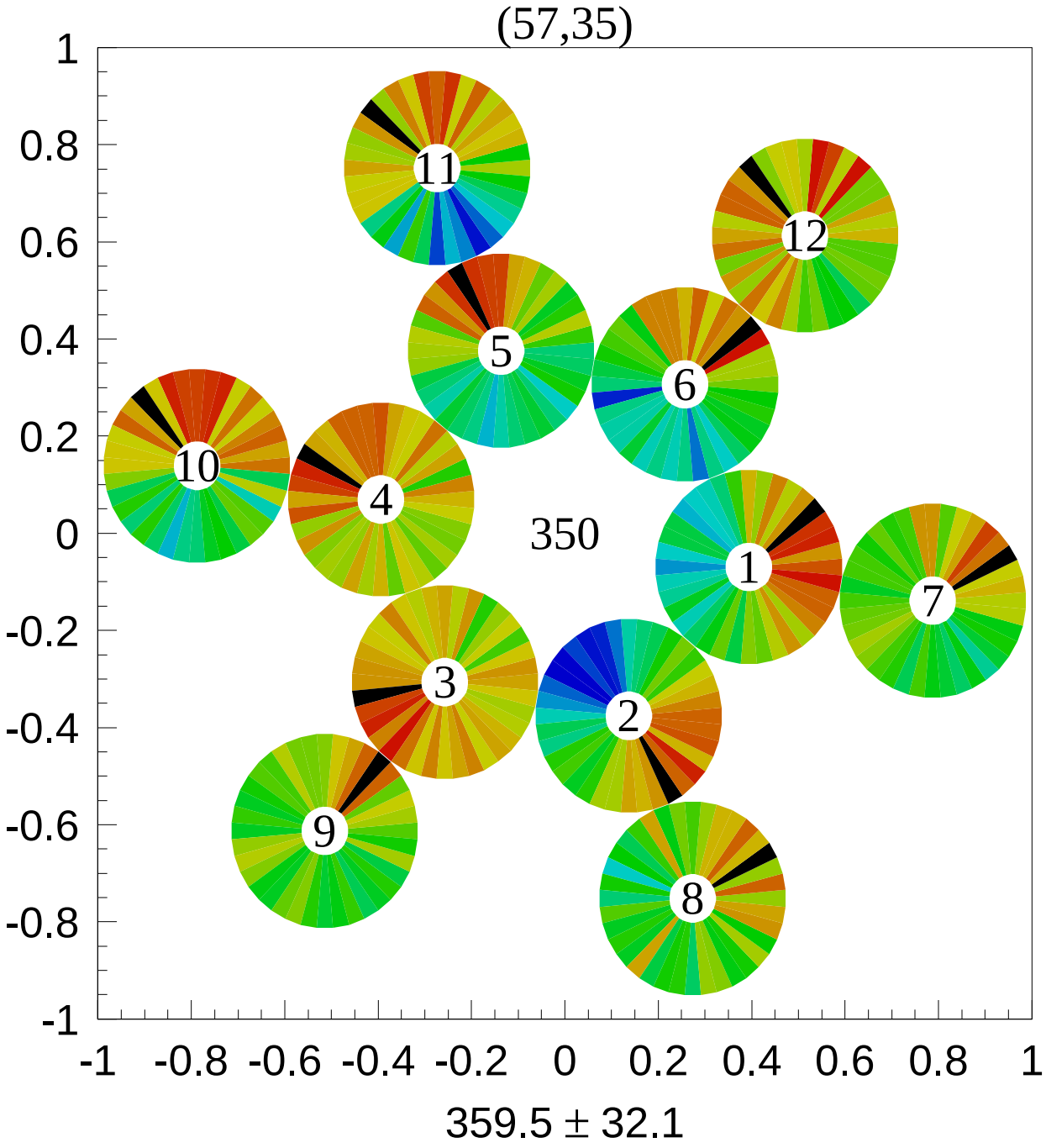

(57,34)
tilted LEDs
129 124 128 128 125 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
136 118 126 130 123 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

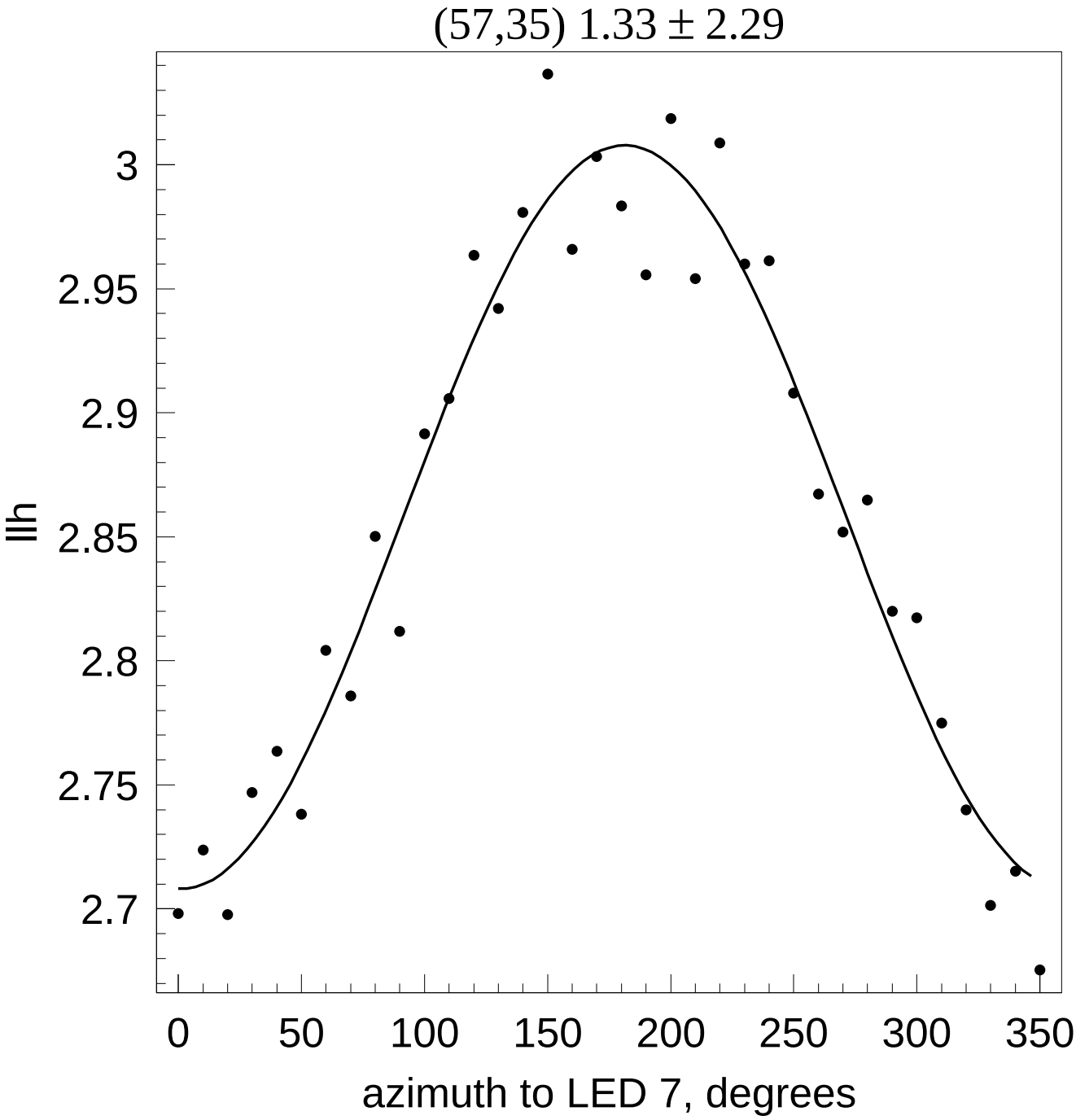

(57,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
64.7 ± 16.4

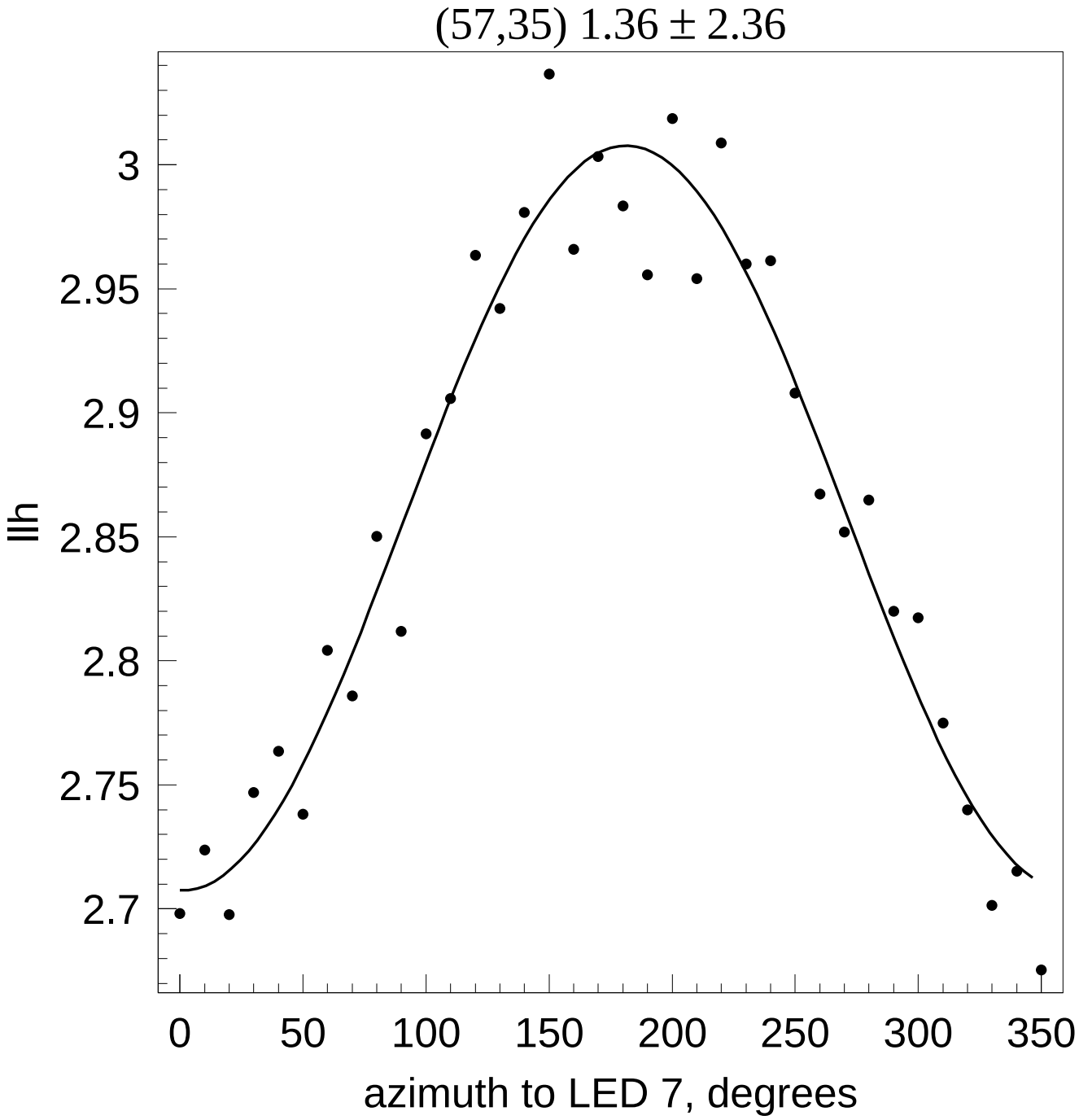

(57,34) 65.29 ± 0.55
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

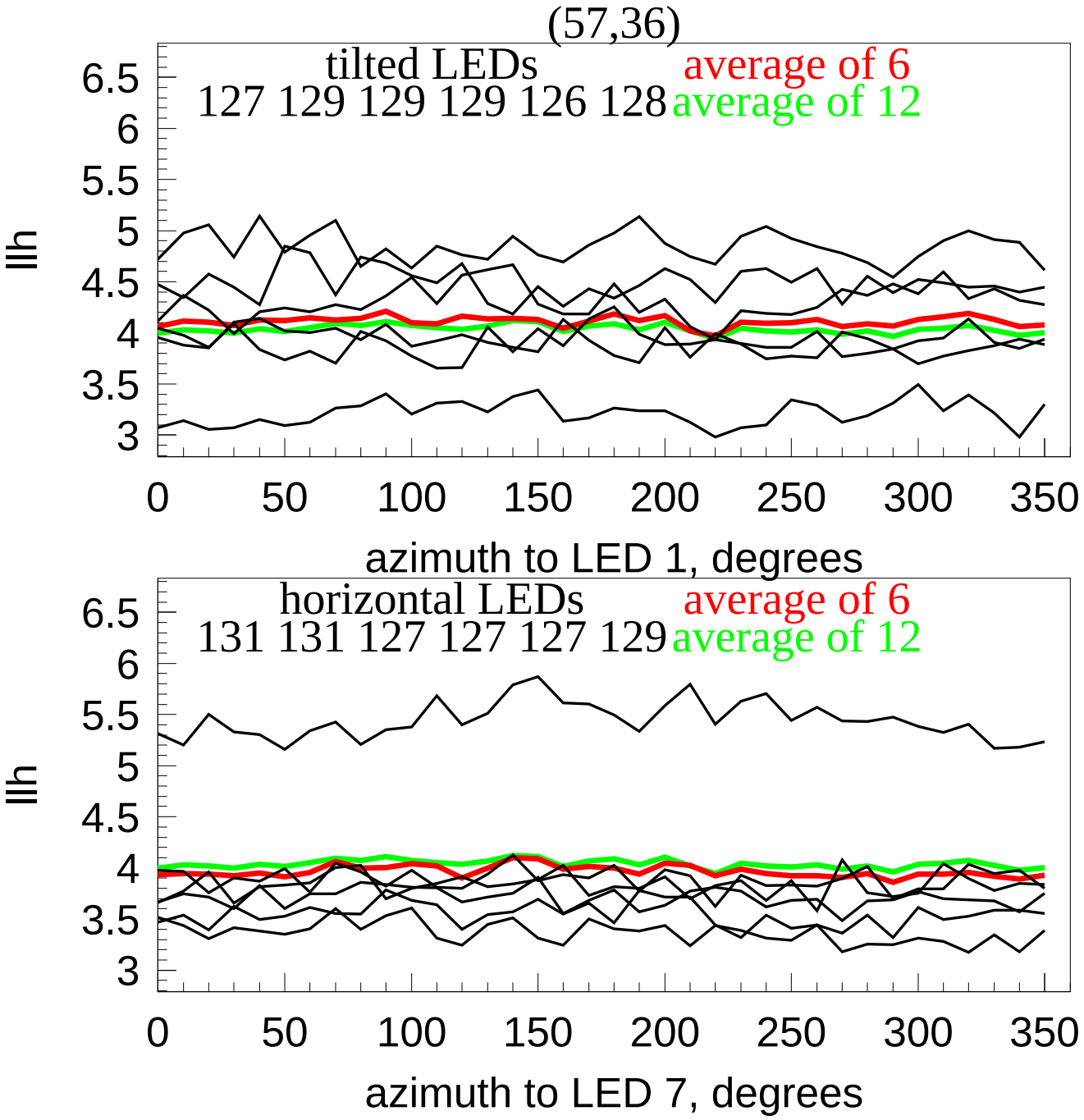

(57,34) 65.16 ± 0.58
llh
3.2
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

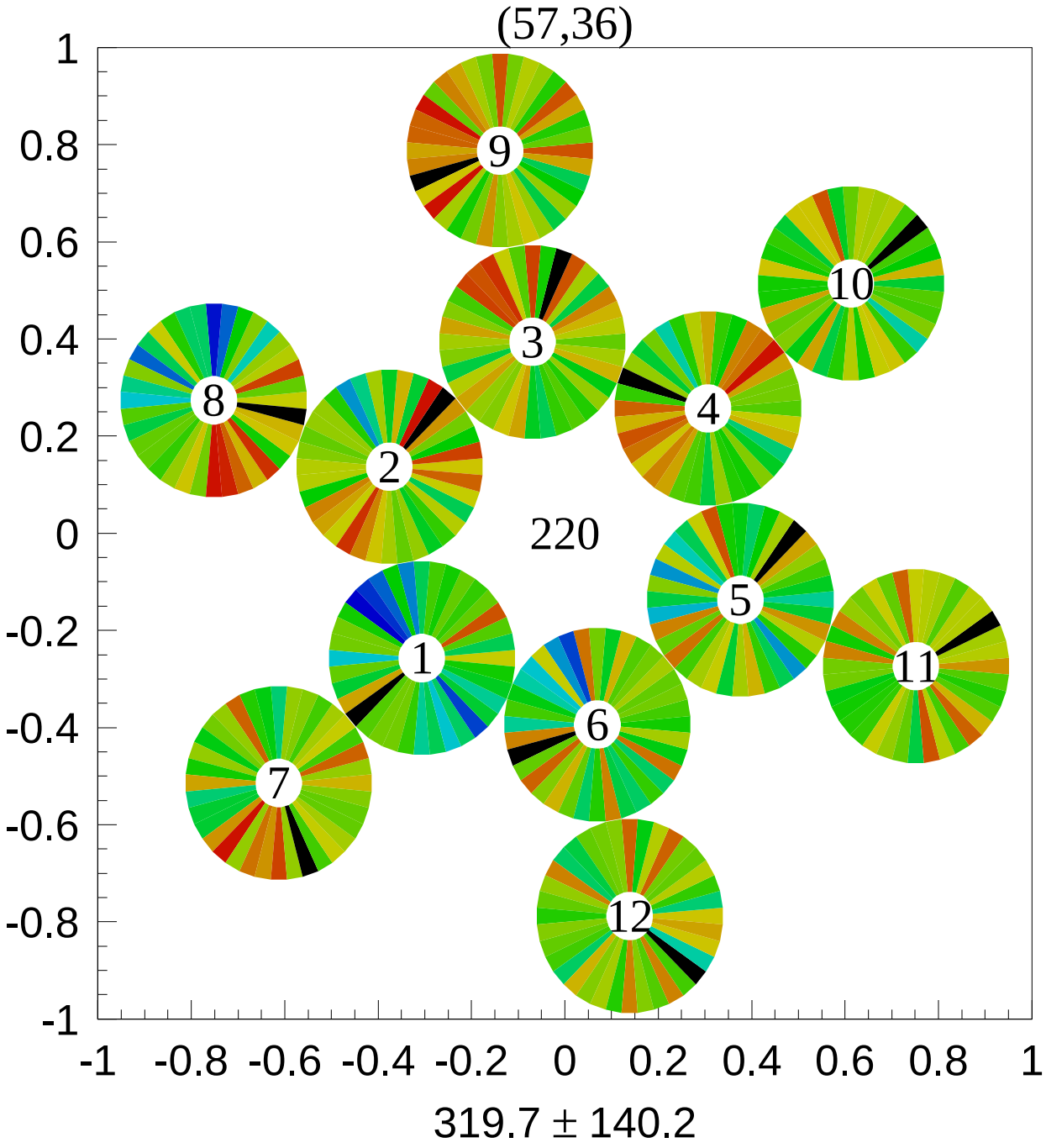

(57,35)
tilted LEDs
122 125 133 132 127 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 124 136 128 124 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

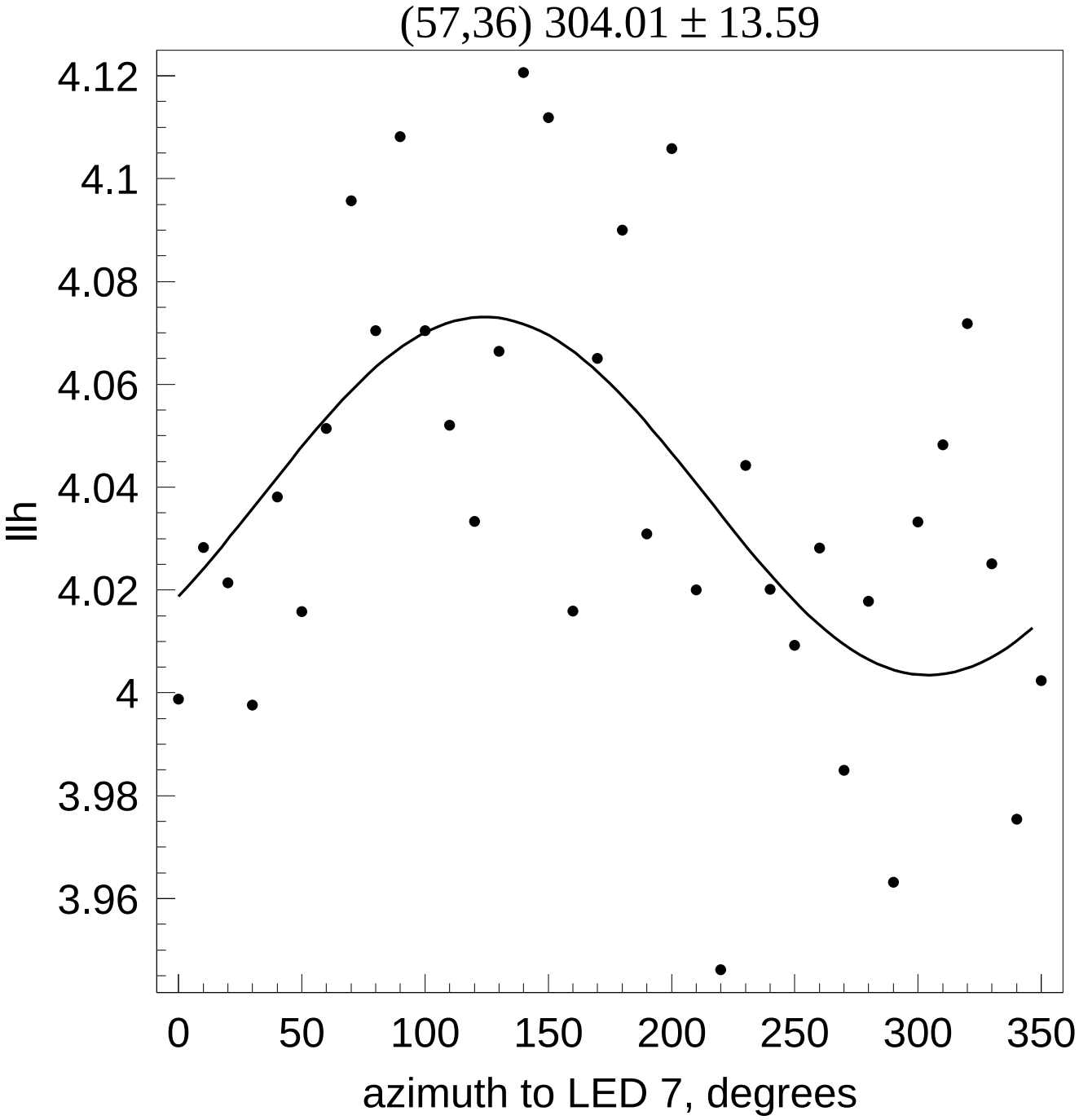

(57,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
359.5 ± 32.1

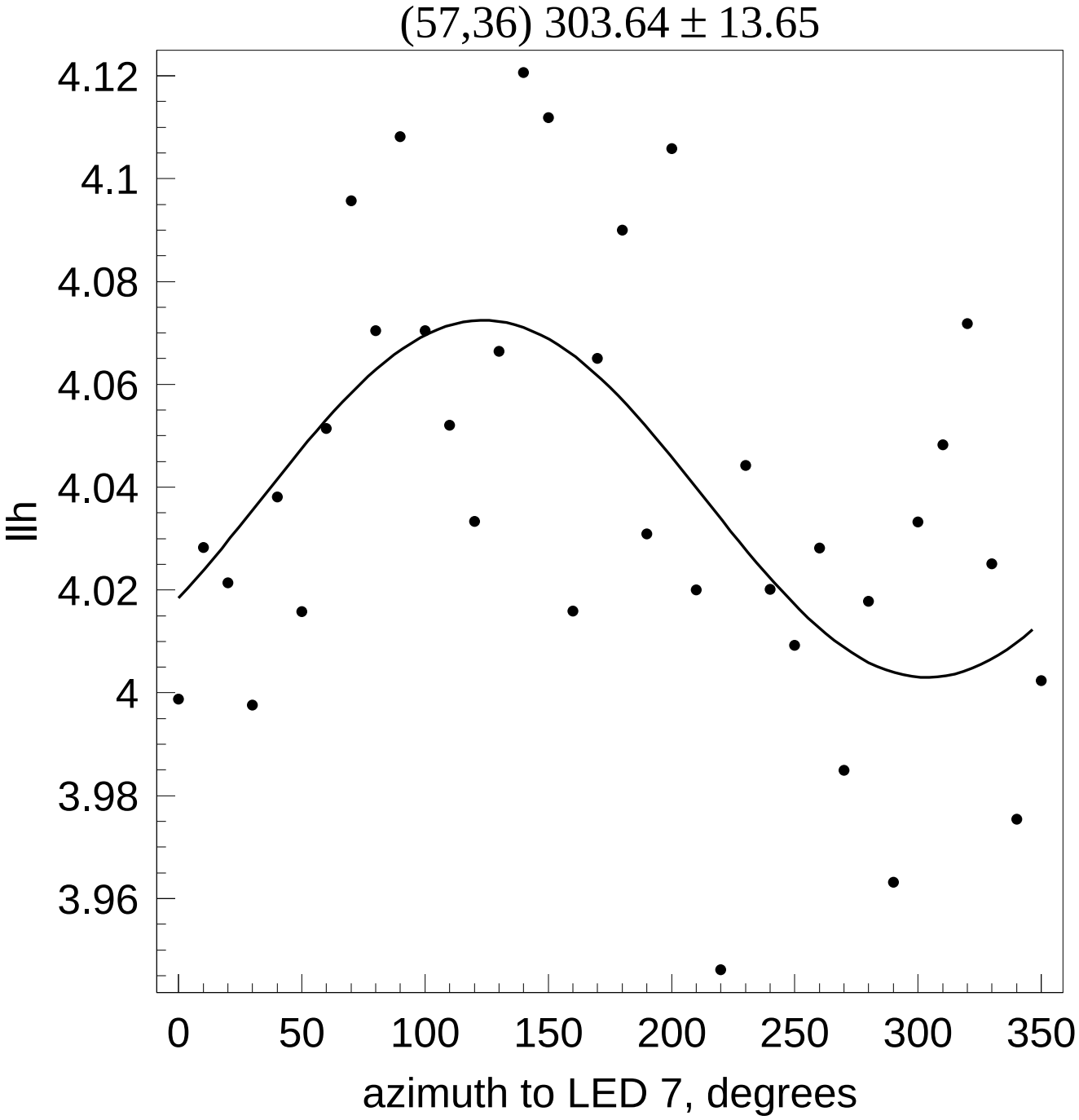

(57,35) 1.33 ± 2.29
3
2.95
2.9
2.85
2.8
2.75
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

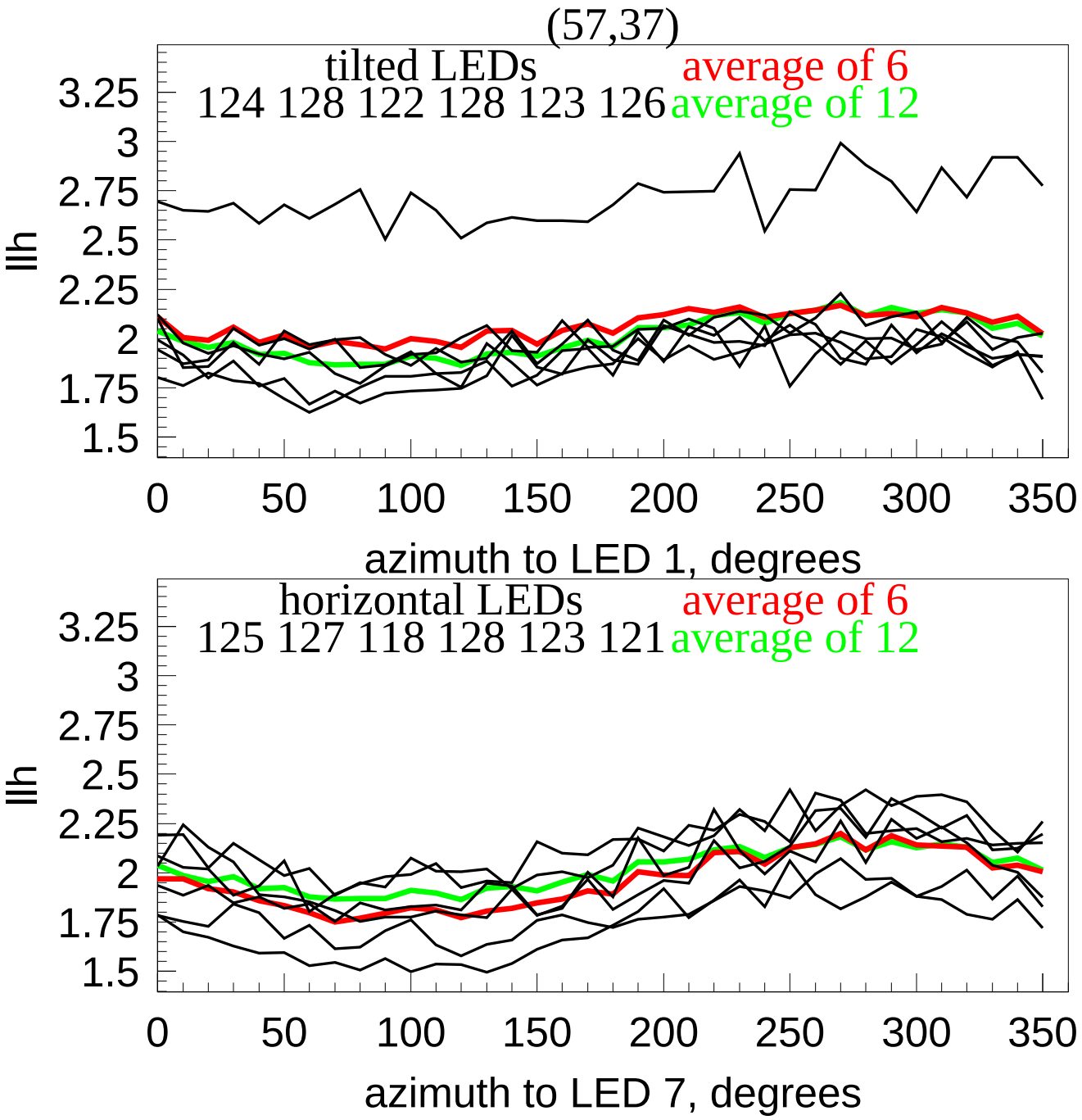

(57,35) 1.36 ± 2.36
3
2.95
2.9
2.85
2.8
2.75
2.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

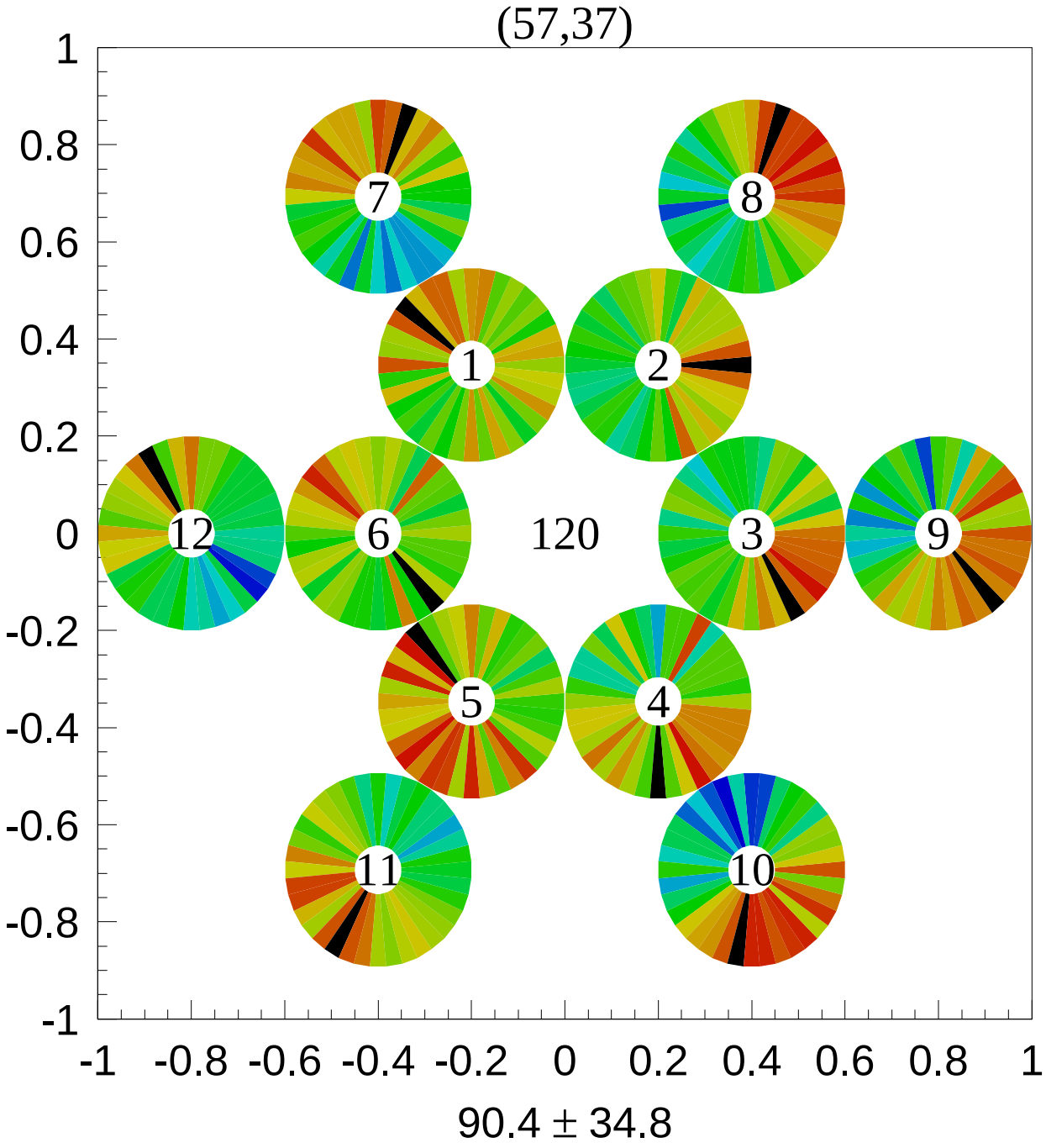

(57,36)
tilted LEDs
127 129 129 129 126 128
average of 6
average of 12
llh
6.5
6
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 131 127 127 127 129
average of 6
average of 12
llh
6.5
6
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

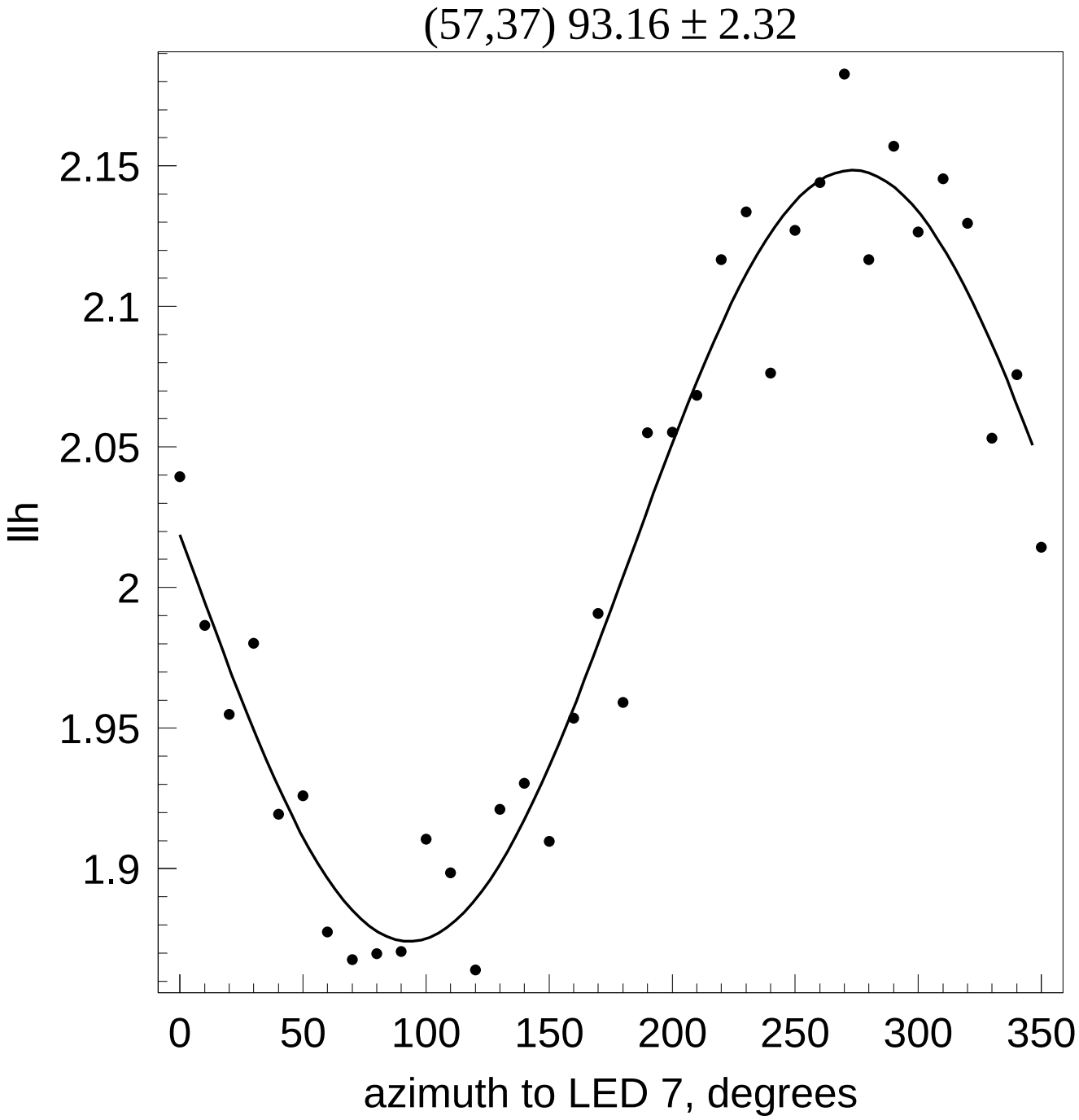

(57,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
8
4
2
220
5
1
11
6
7
12
319.7 ± 140.2

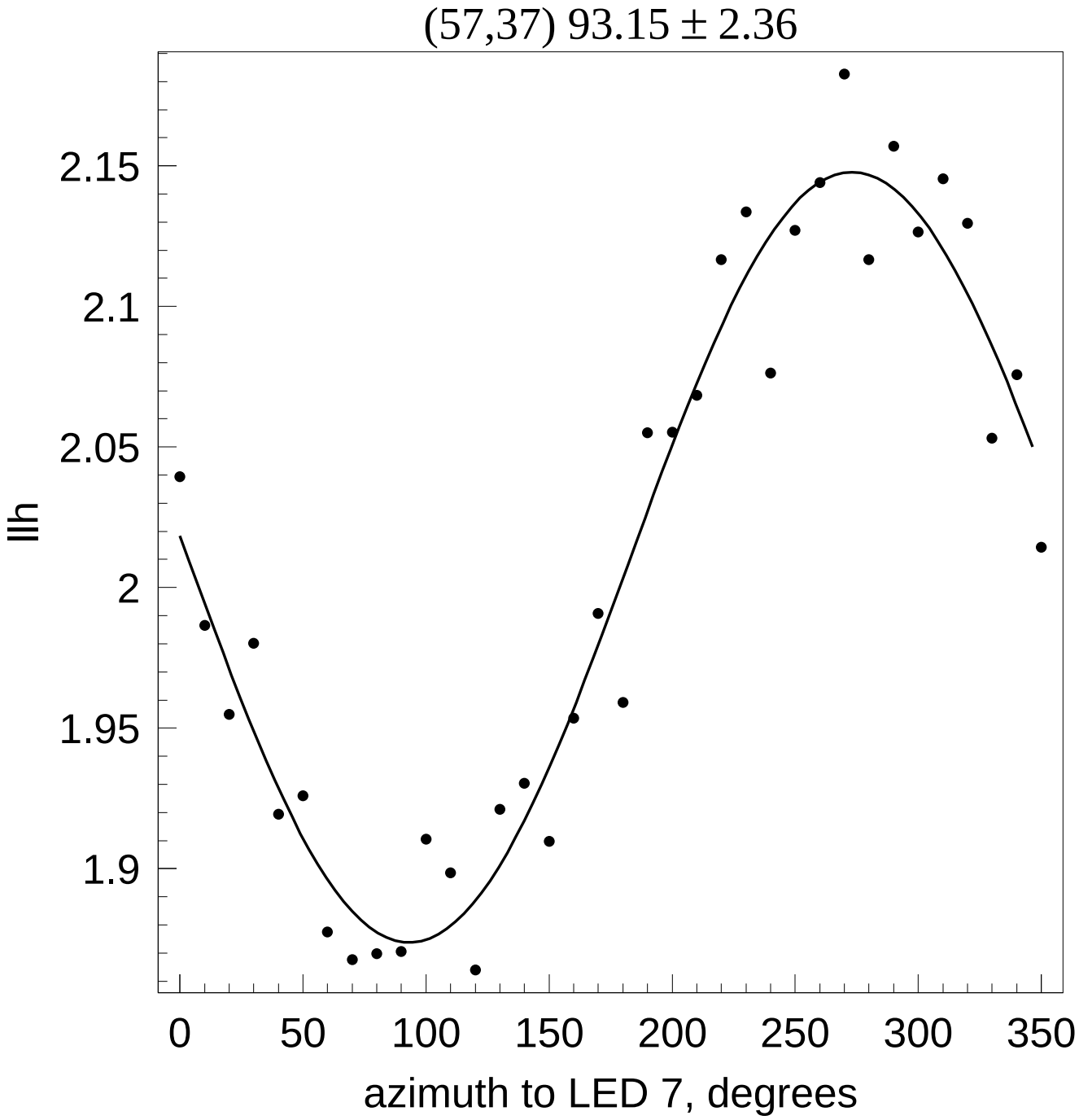

(57,36) 304.01 ± 13.59
4.12
4.1
4.08
4.06
4.04
4.02
4
3.98
3.96
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

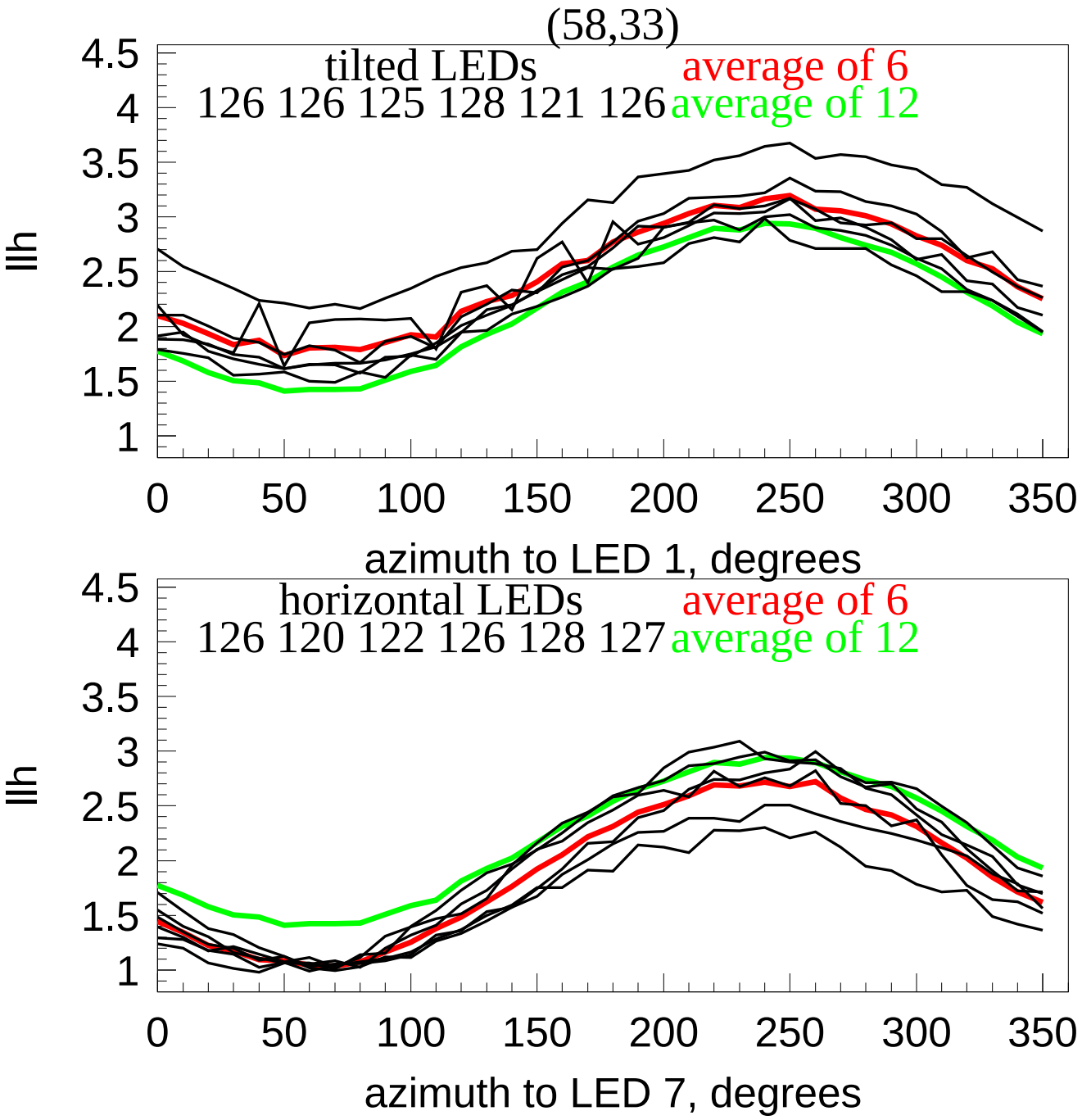

(57,36) 303.64 ± 13.65
4.12
4.1
4.08
4.06
4.04
4.02
4
3.98
3.96
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

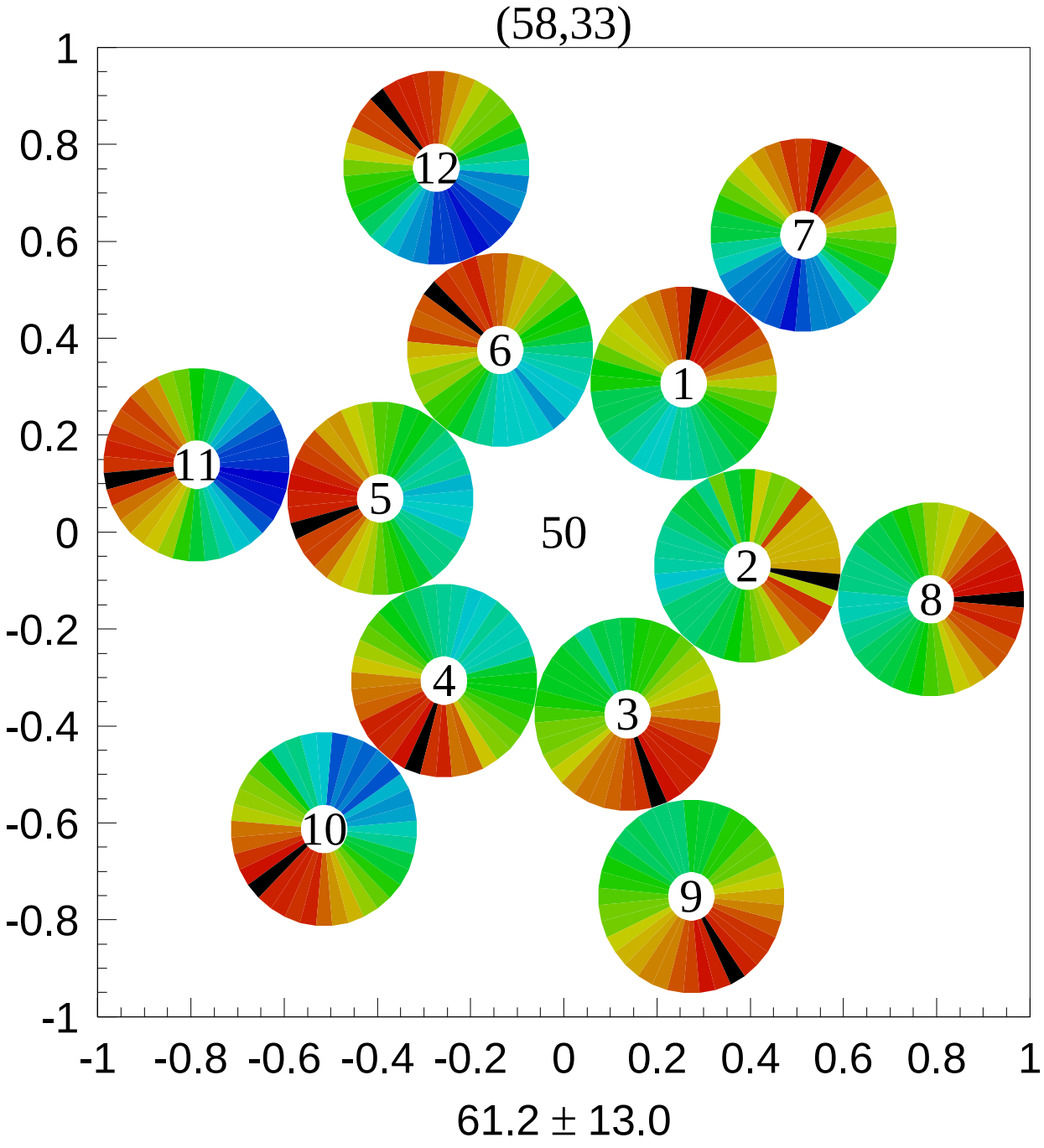

(57,37)
tilted LEDs
124 128 122 128 123 126
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 127 118 128 123 121
average of 6
average of 12
llh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

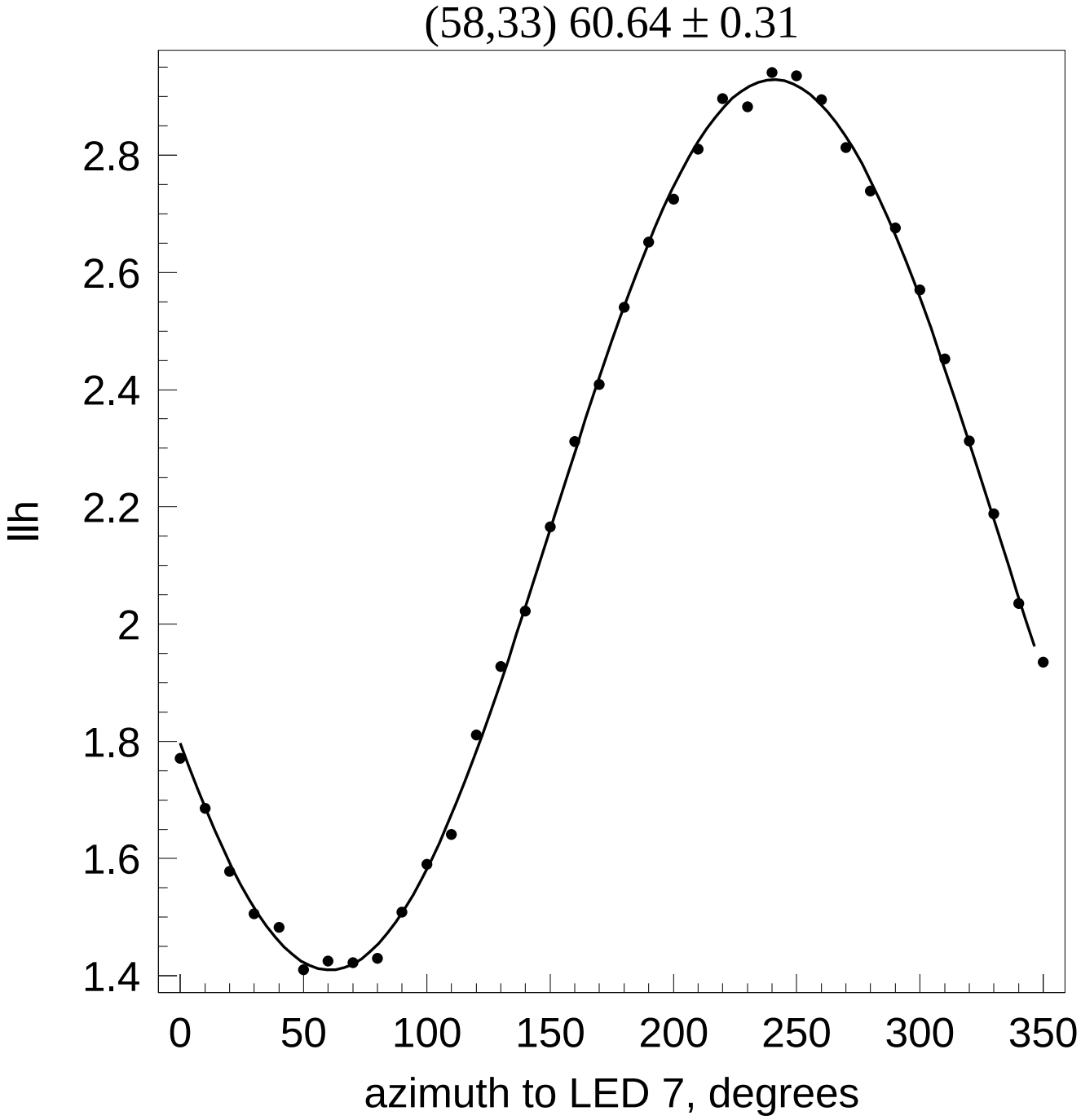

(57,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
90.4 ± 34.8

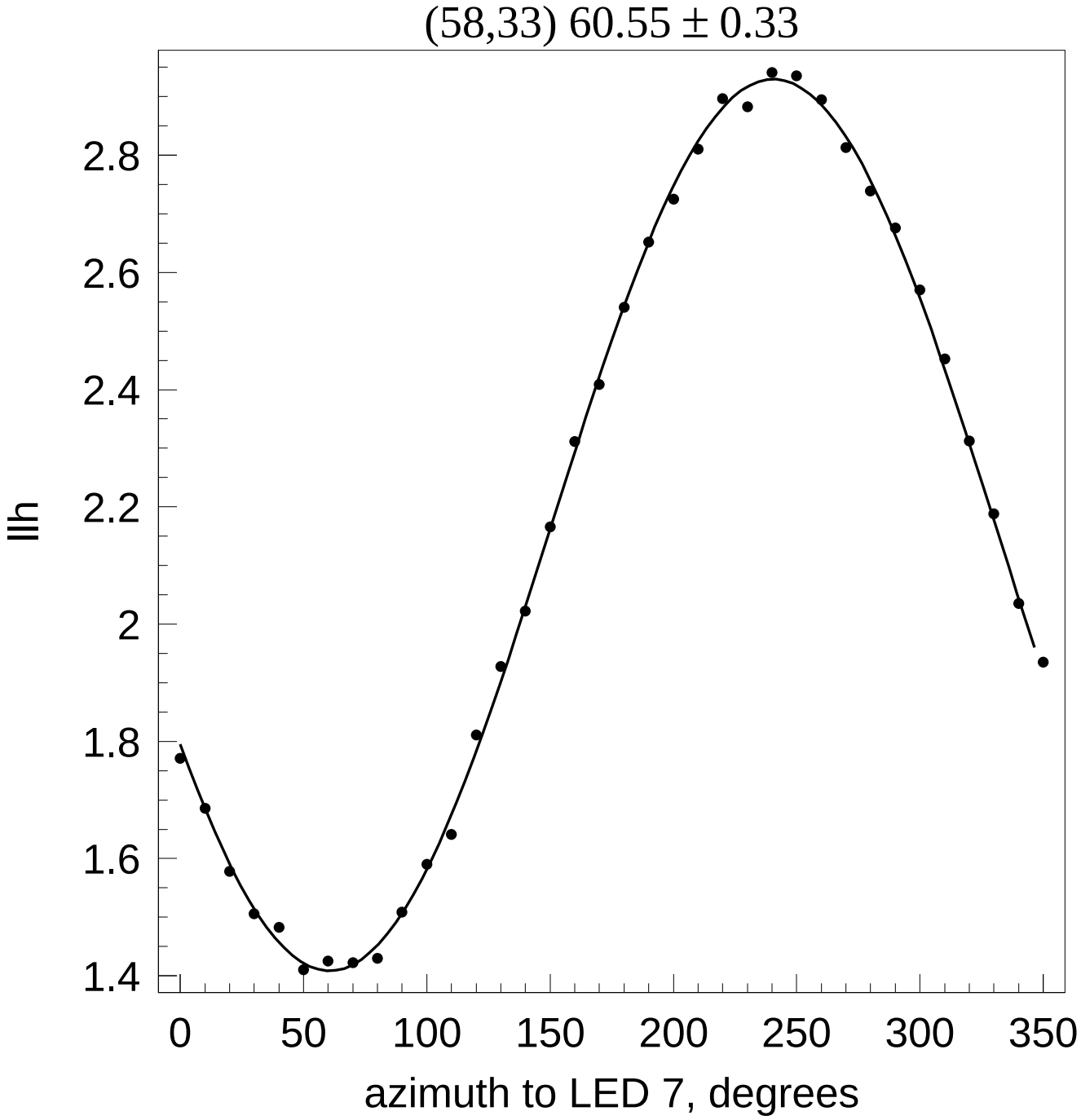

(57,37) 93.16 ± 2.32
2.15
2.1
2.05
llh
2
1.95
1.9
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

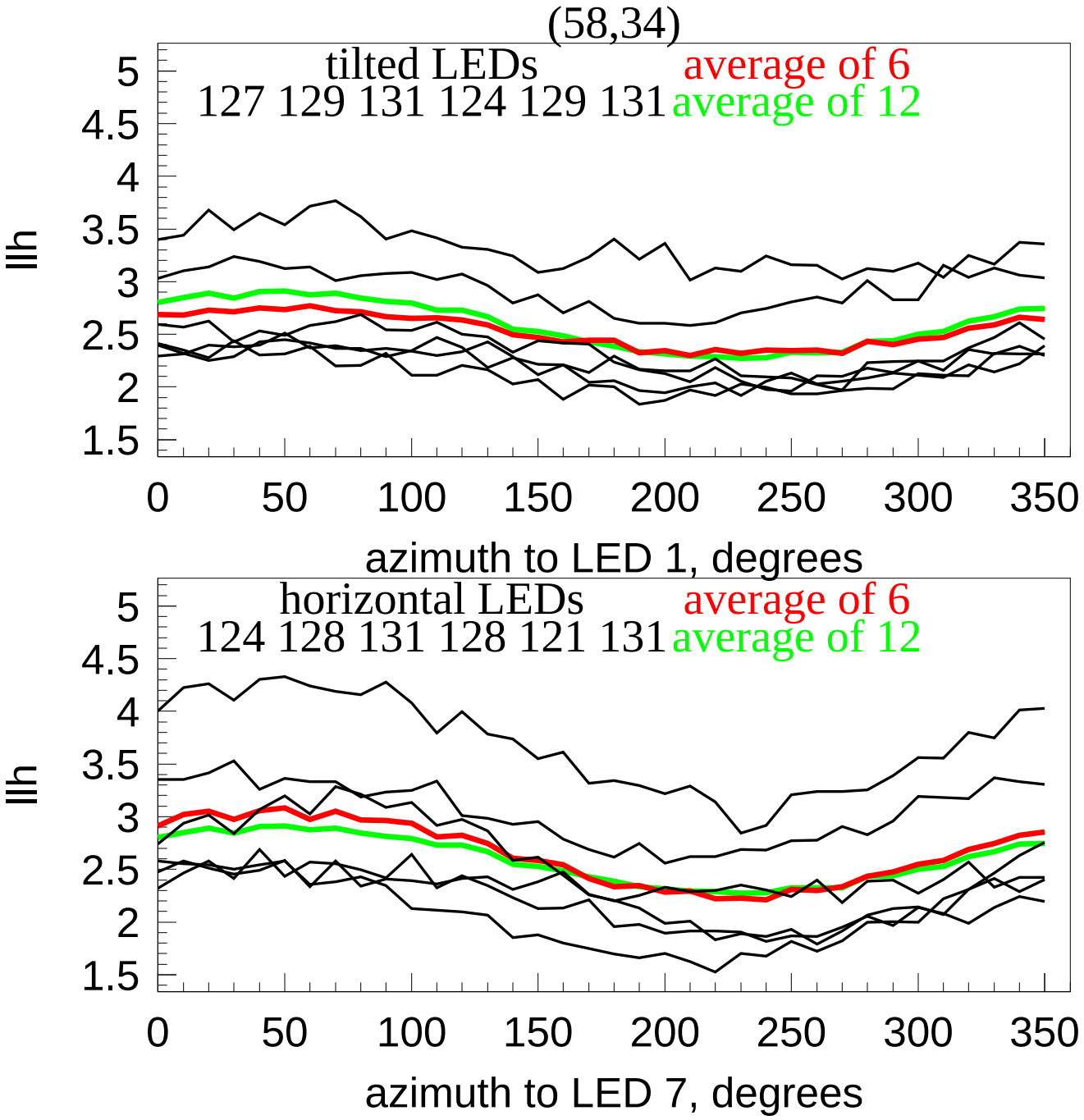

(57,37) 93.15 ± 2.36
2.15
2.1
2.05
2
1.95
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

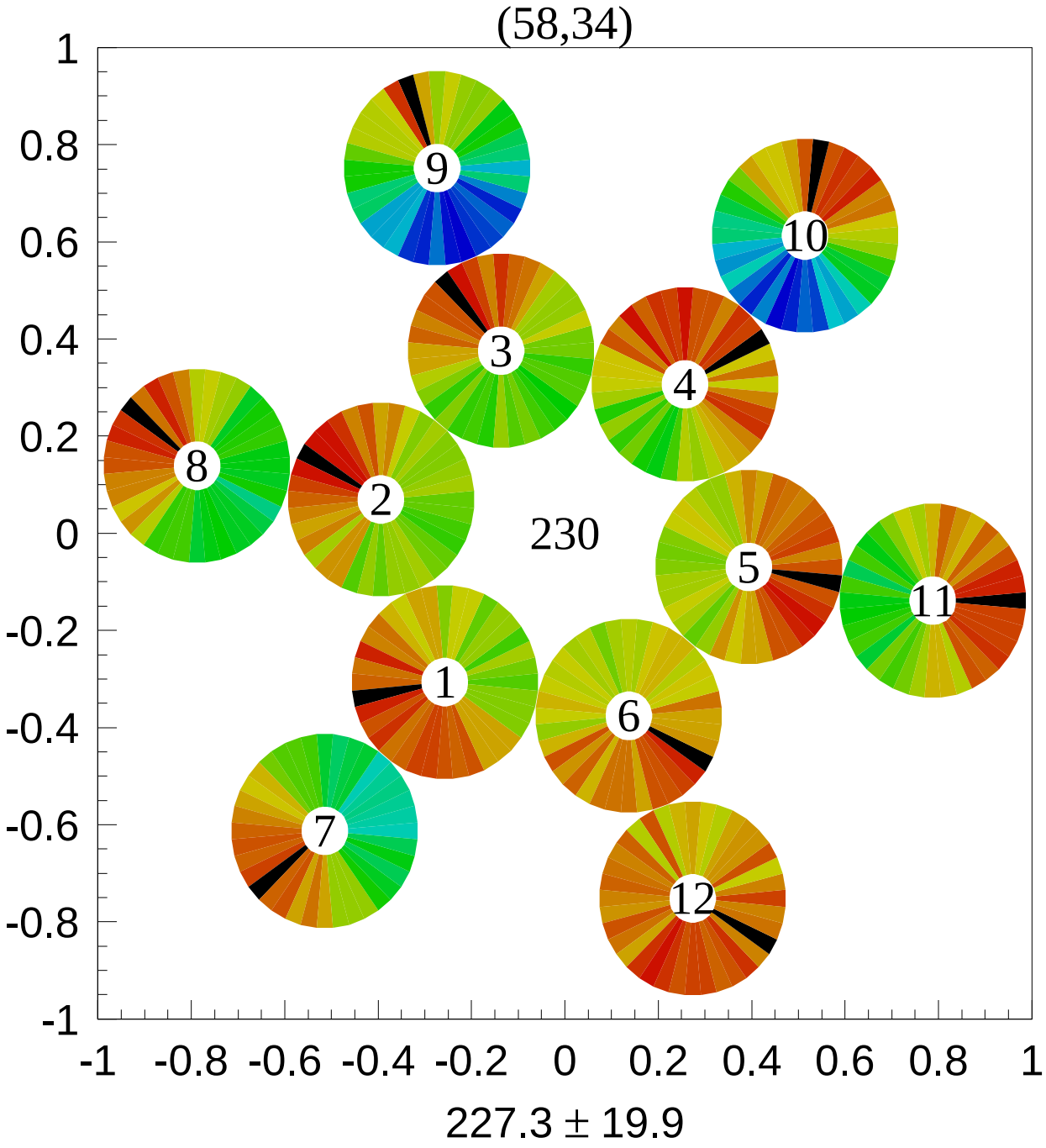

(58,33)
tilted LEDs
126 126 125 128 121 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 120 122 126 128 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

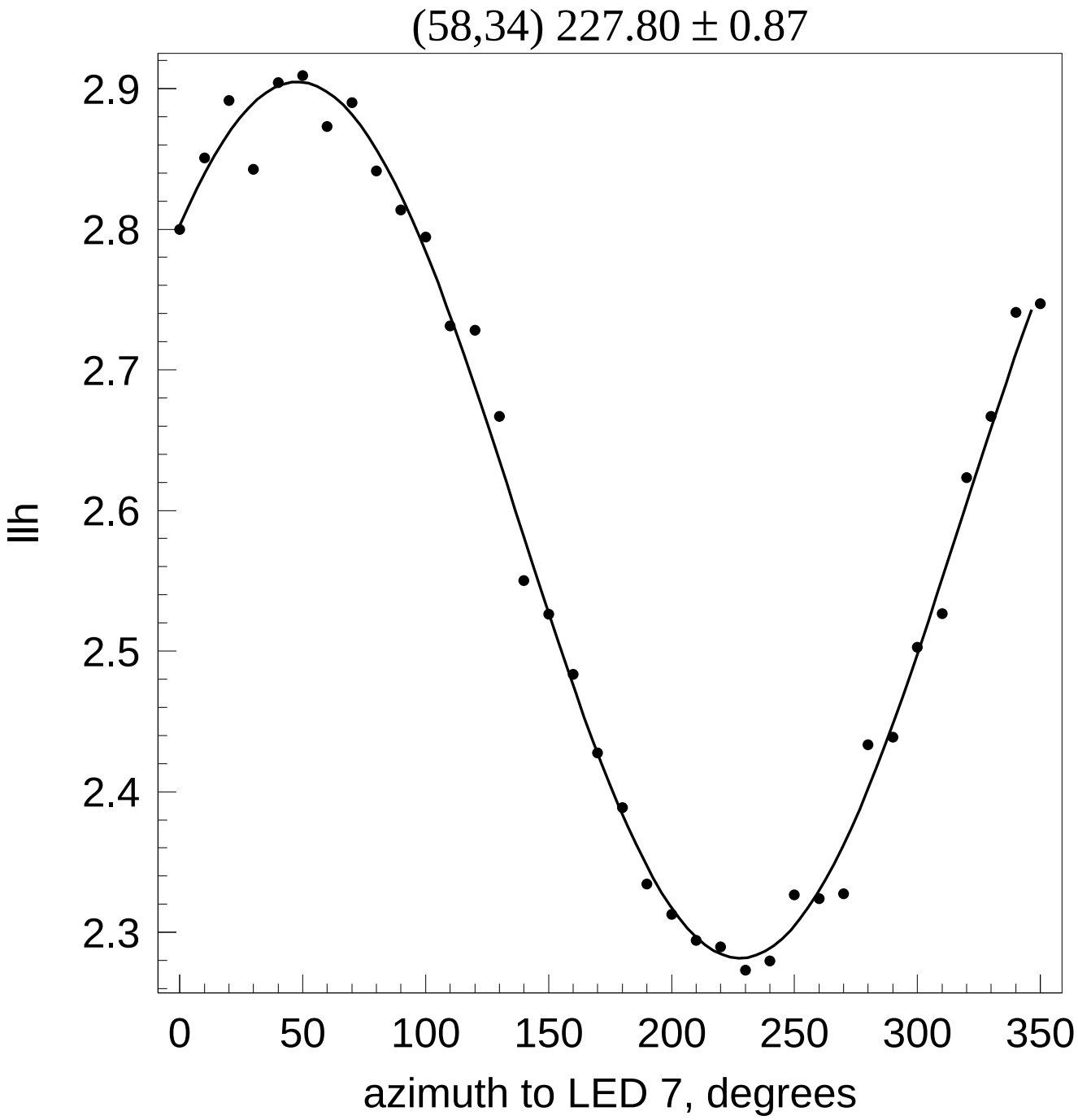

(58,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
61.2 ± 13.0

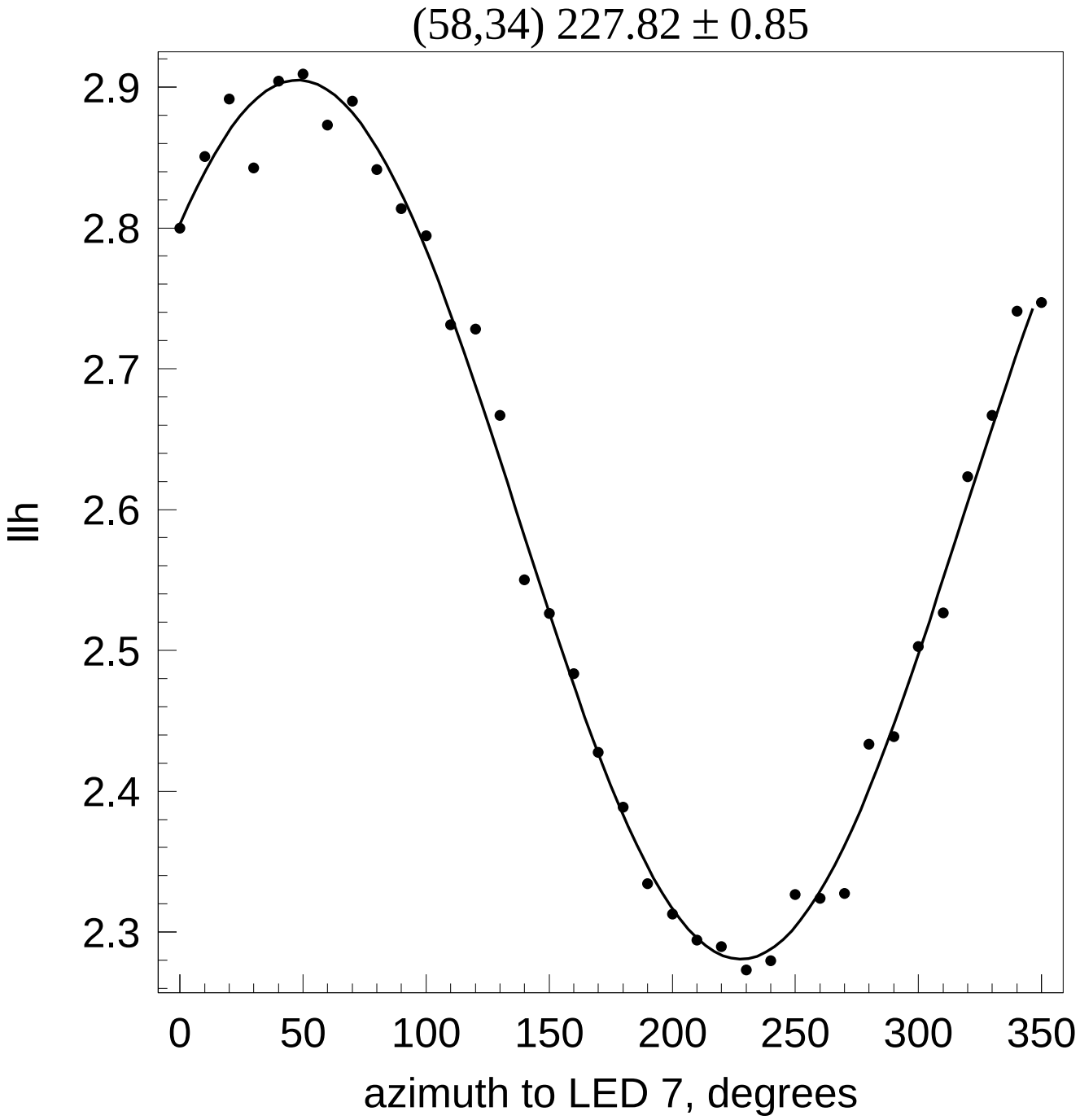

(58,33) 60.64 ± 0.31
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

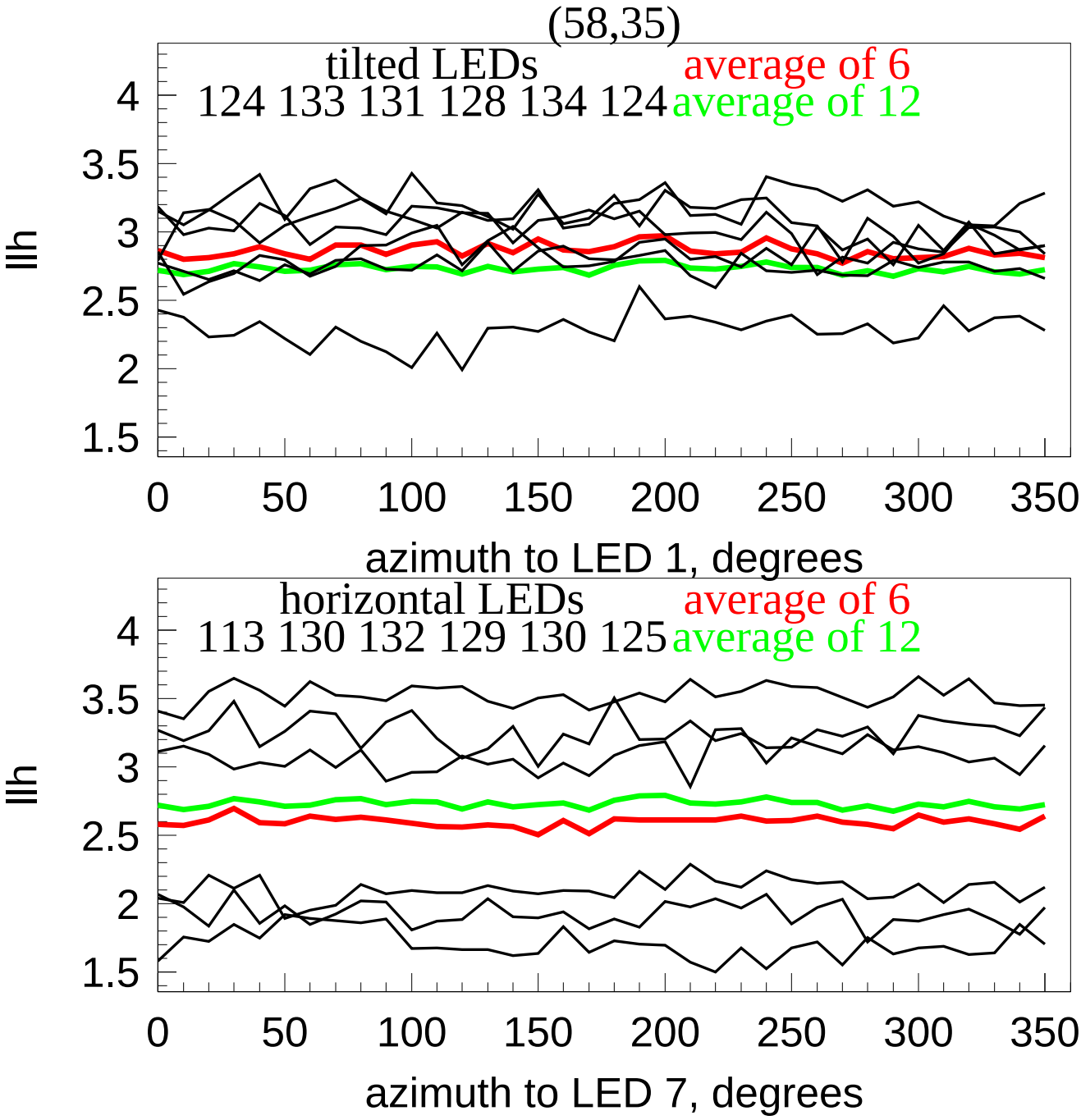

(58,33) 60.55 ± 0.33
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

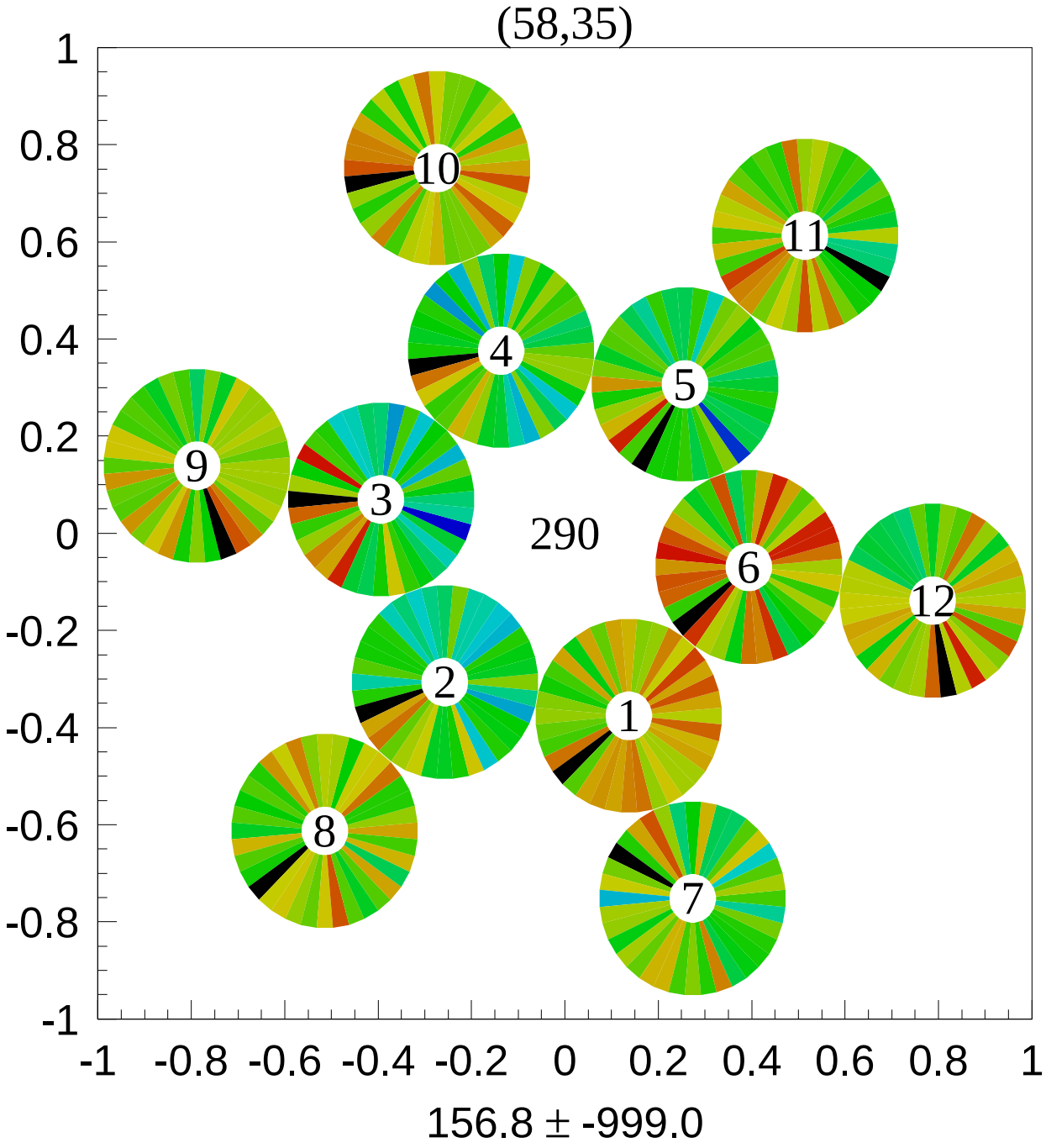

(58,34)
tilted LEDs
127 129 131 124 129 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 128 131 128 121 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

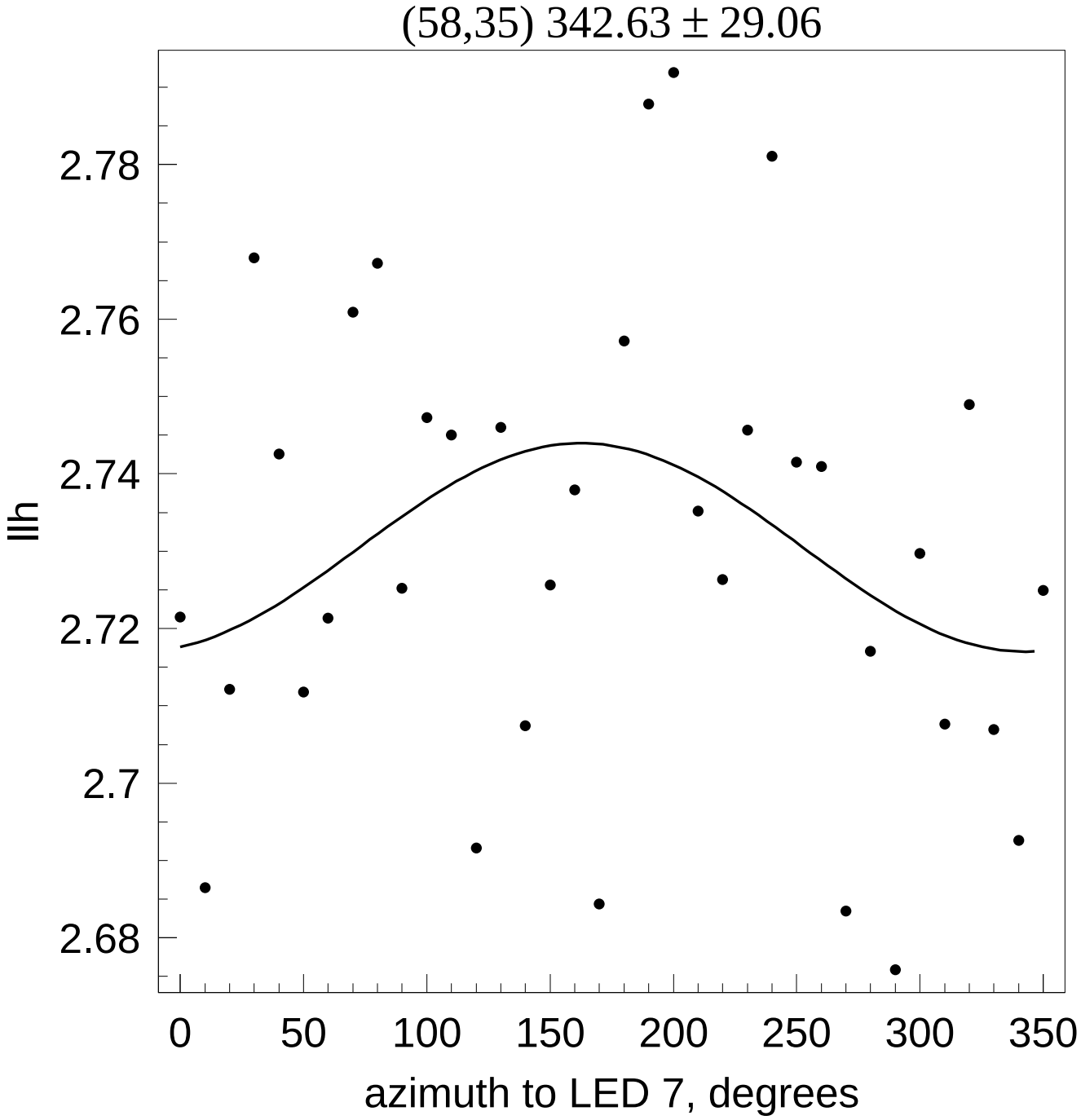

(58,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
227.3 ± 19.9

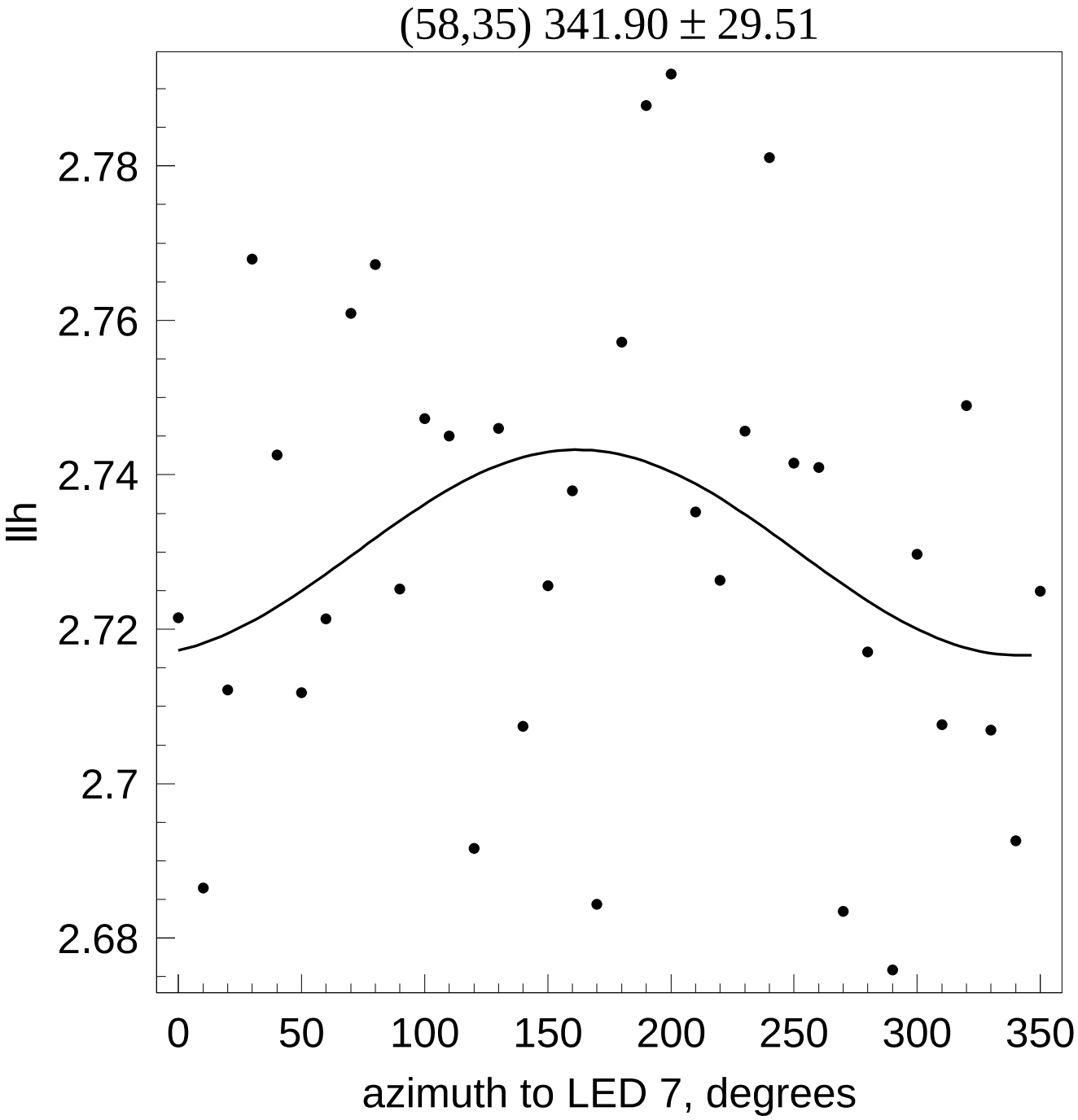

(58,34) 227.80 ± 0.87
2.9
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

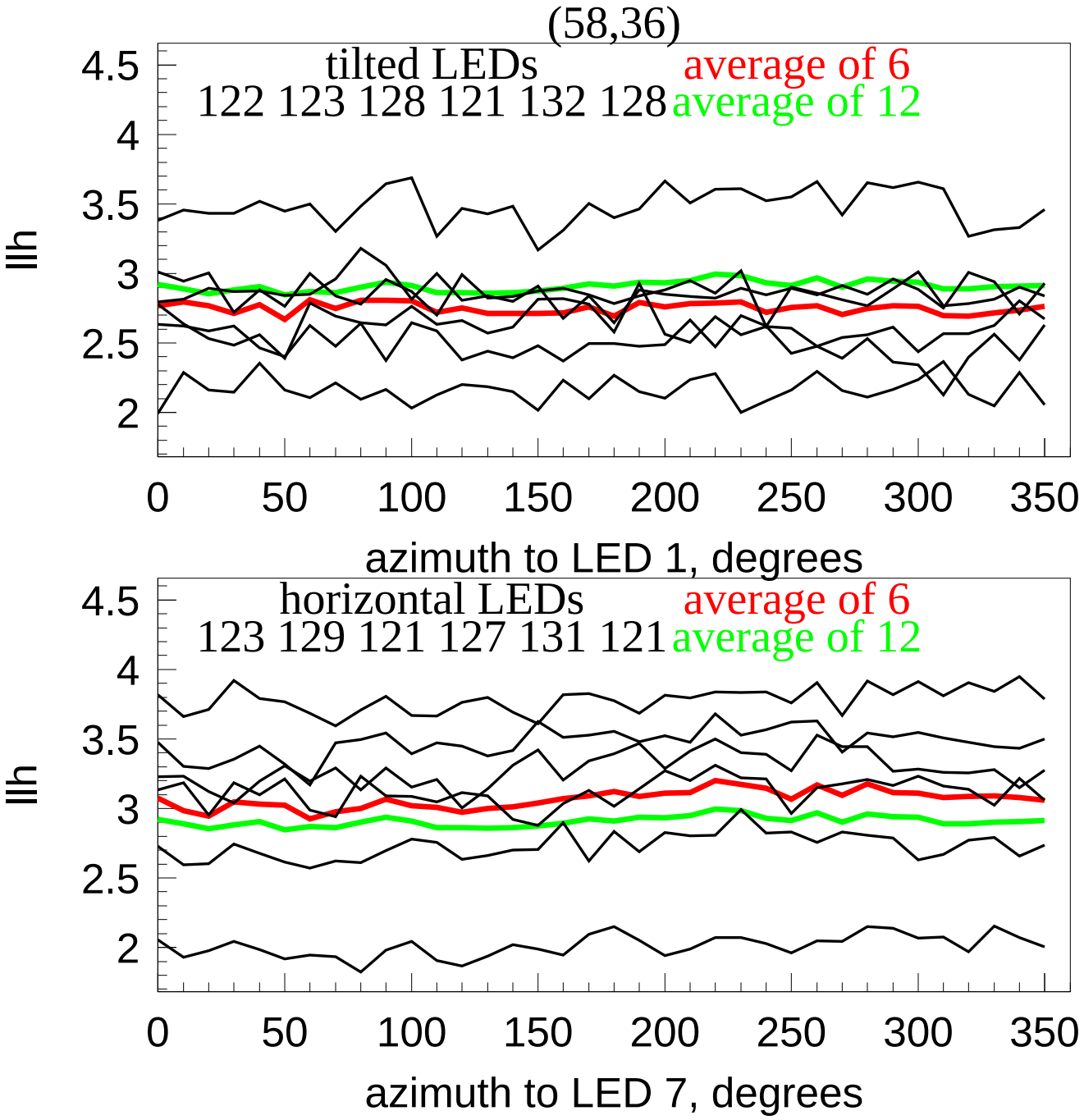

(58,34) 227.82 ± 0.85
2.9
2.8
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

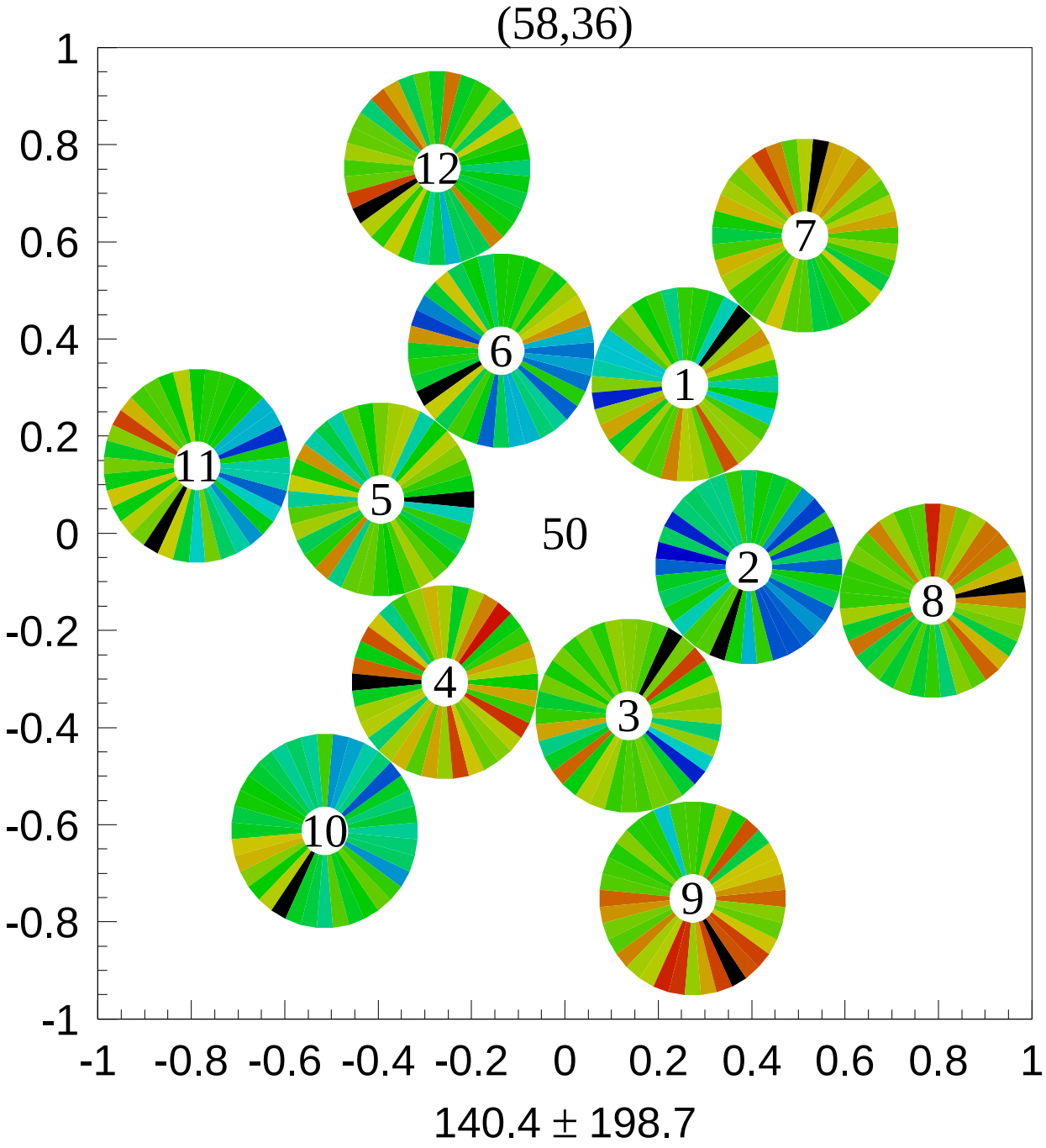

(58,35)
tilted LEDs
124 133 131 128 134 124
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
113 130 132 129 130 125
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

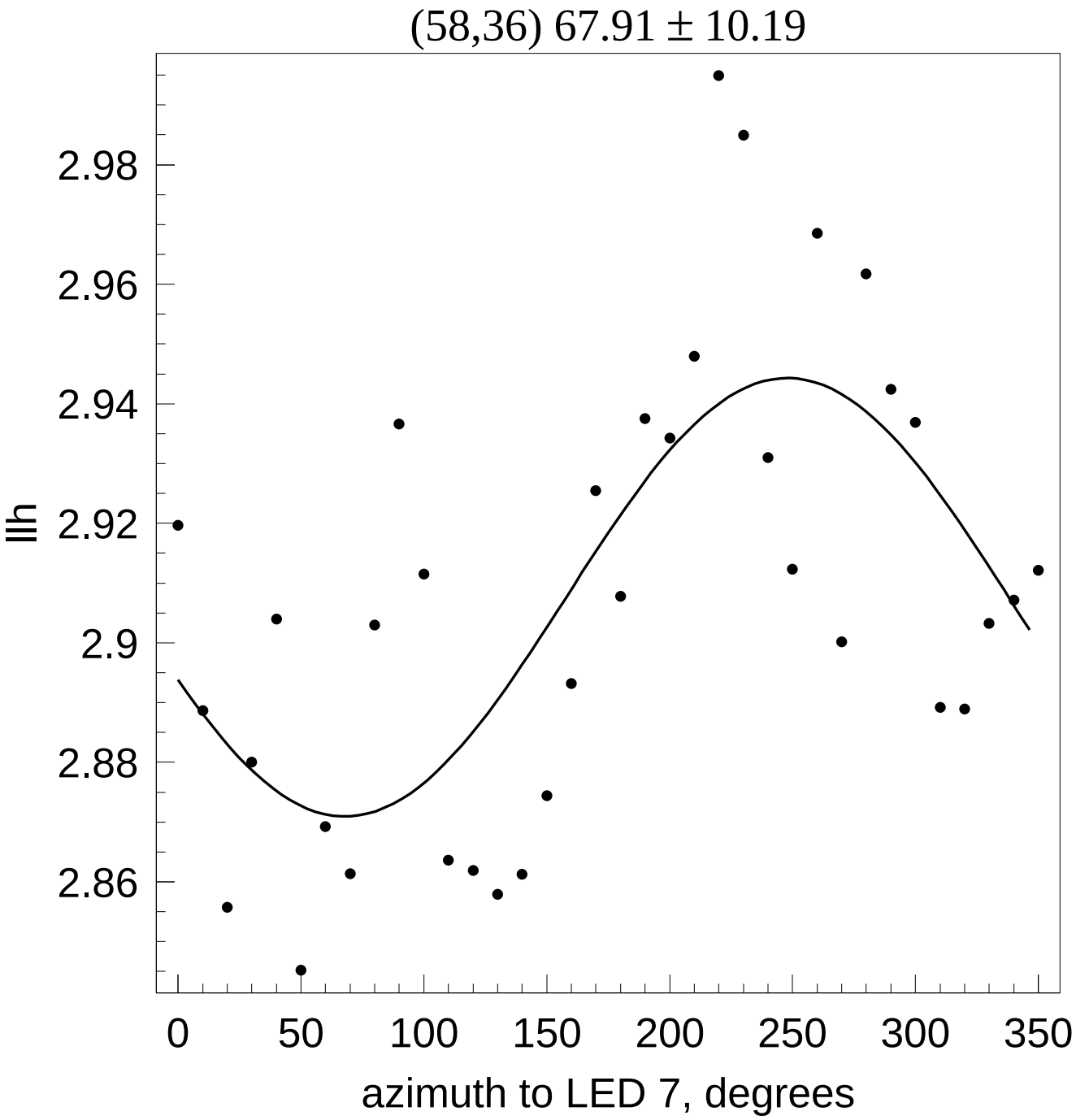

(58,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
156.8 ± -999.0
290
1
2
3
4
5
6
7
8
9
10
11
12

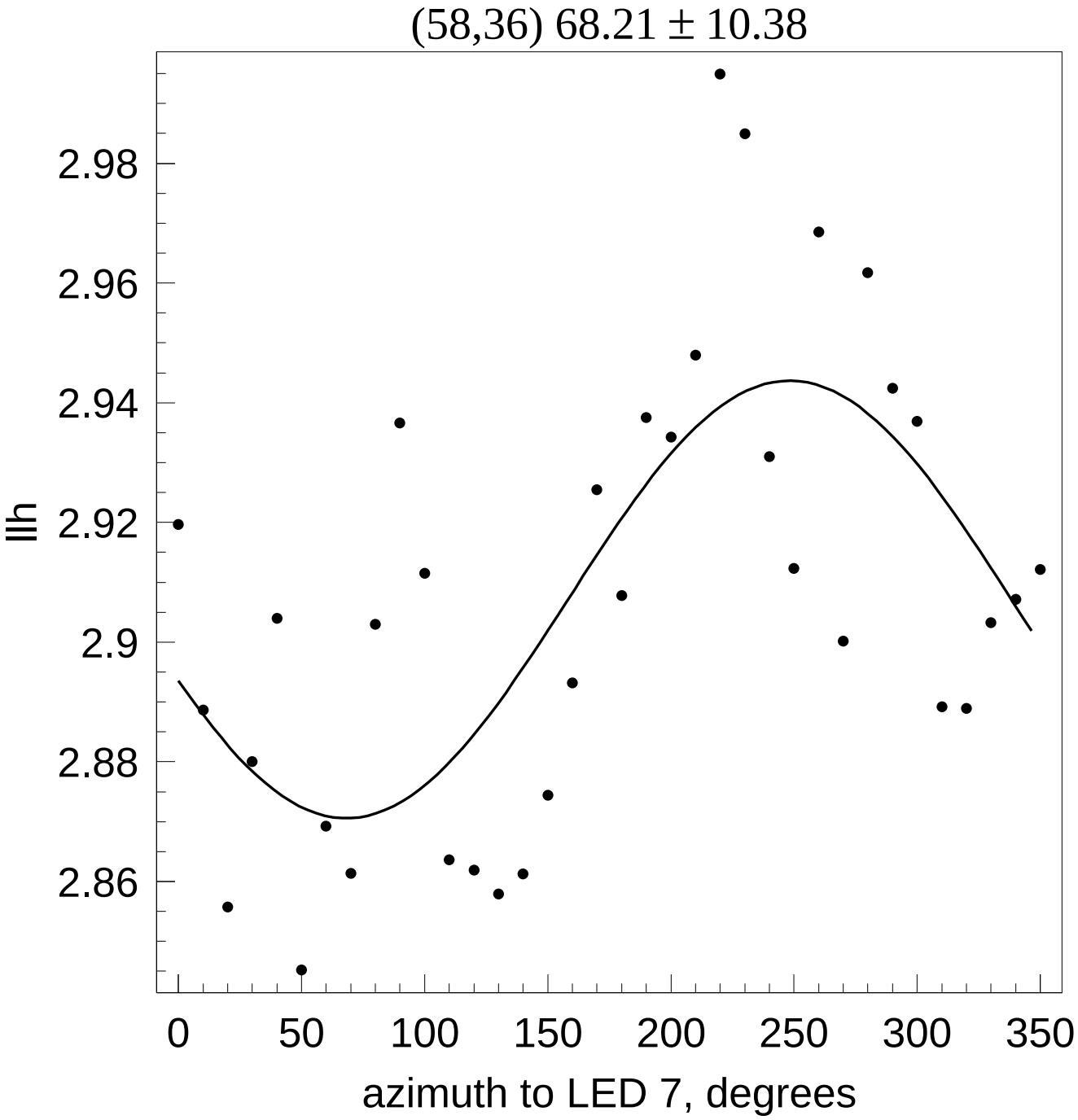

(58,35) 342.63 ± 29.06
2.78
2.76
2.74
2.72
2.7
2.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

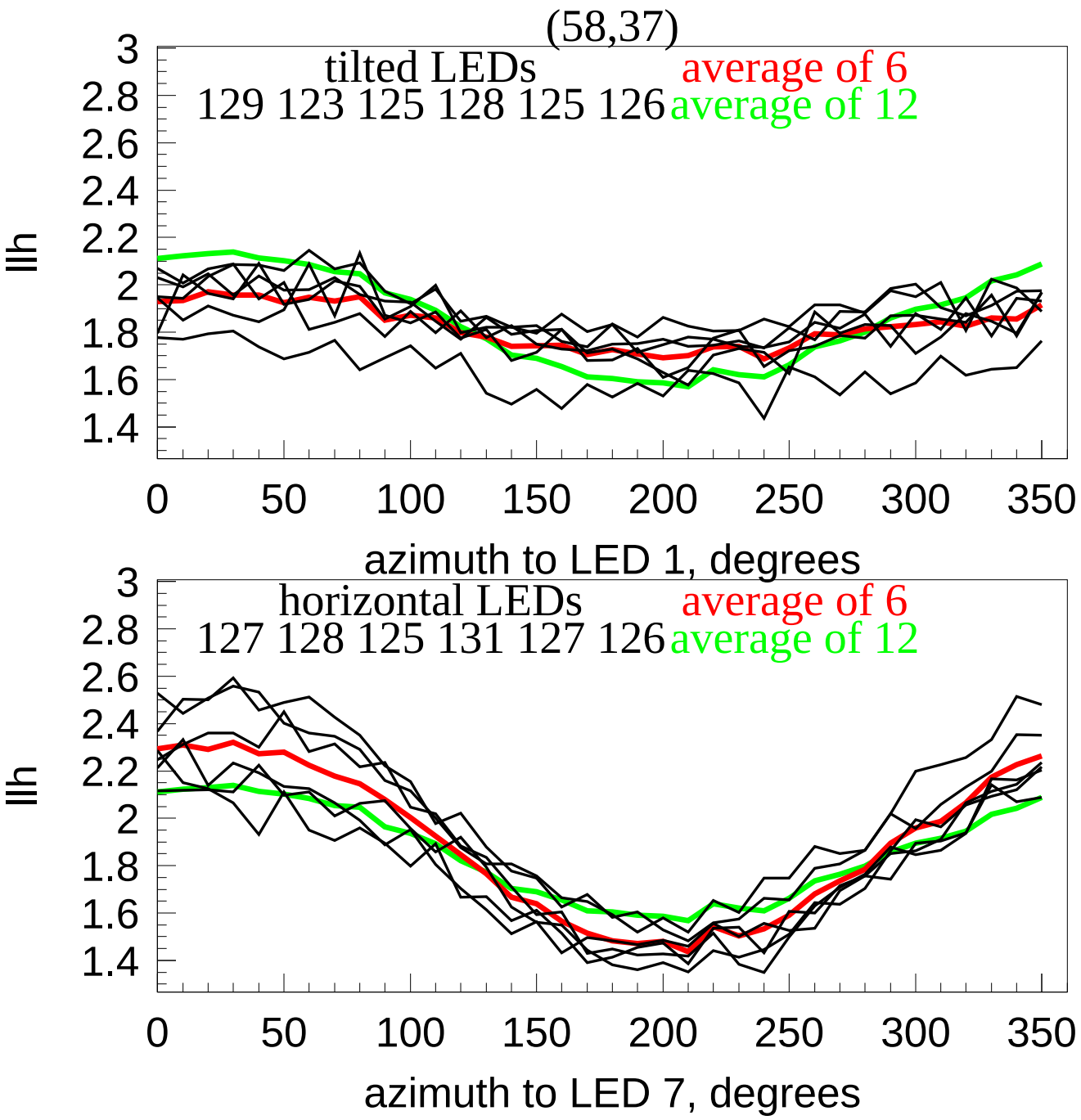

(58,35) 341.90 ± 29.51
2.78
2.76
2.74
2.72
2.7
2.68
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

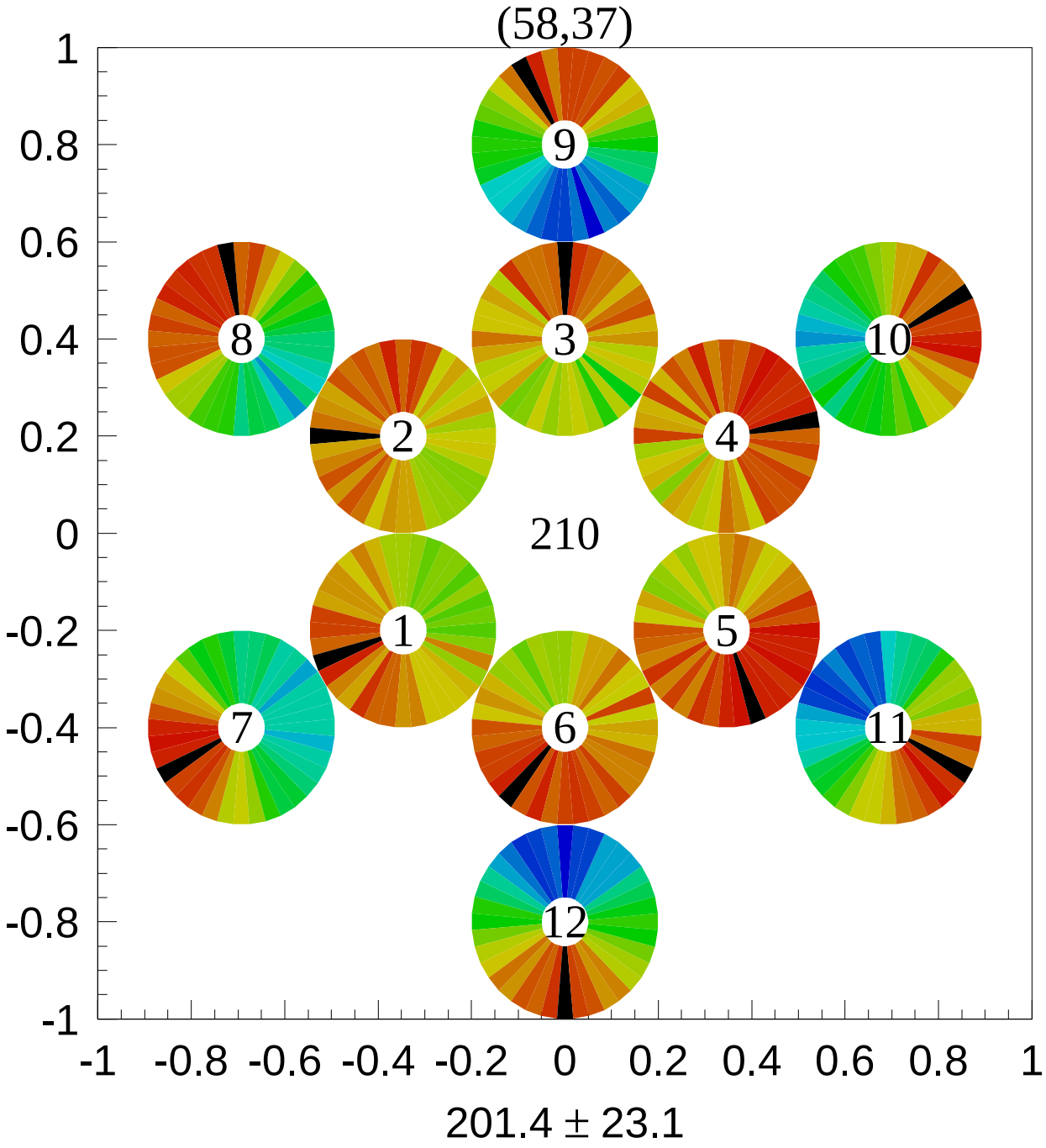

(58,36)
tilted LEDs
122 123 128 121 132 128
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 129 121 127 131 121
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

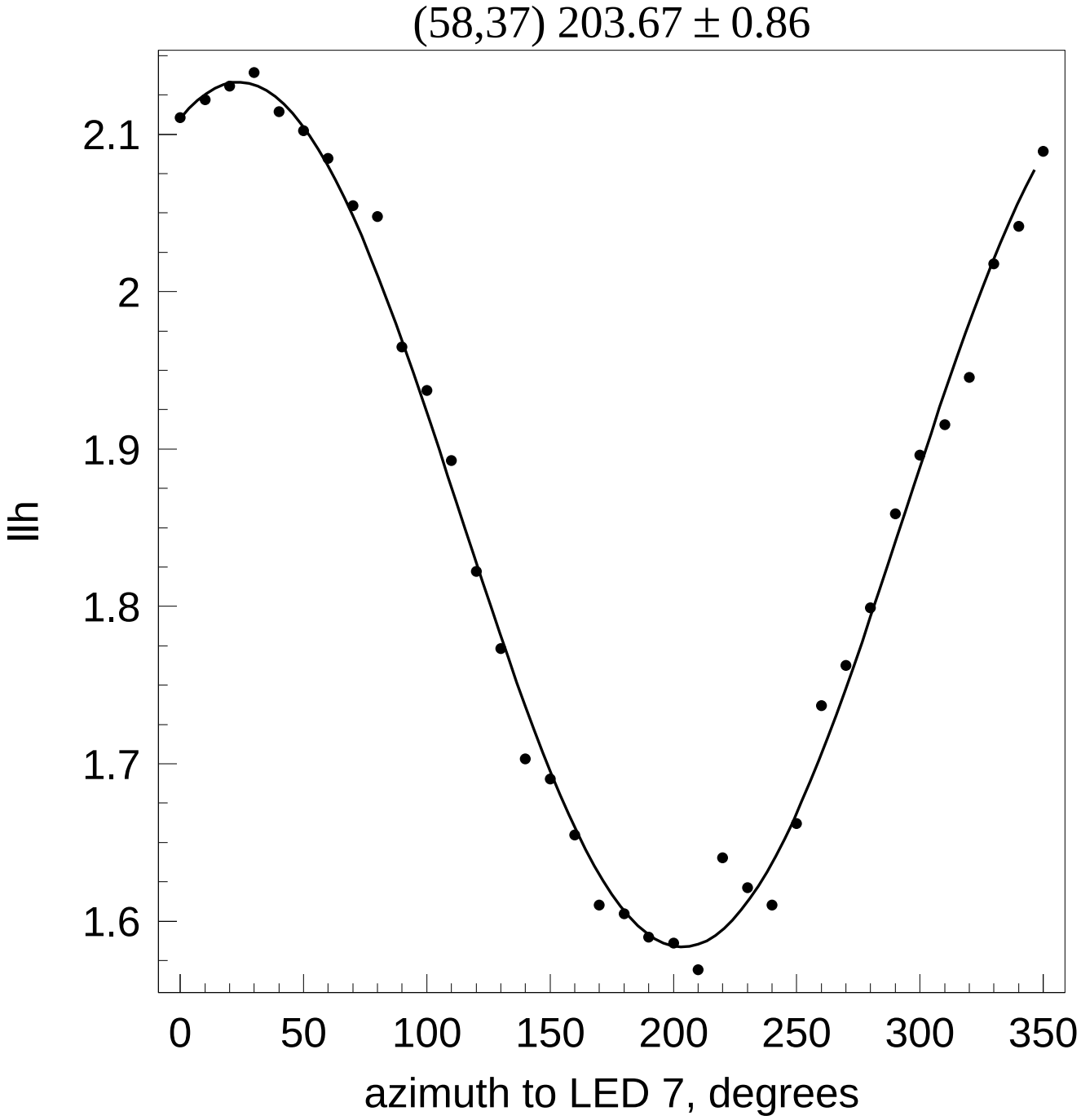

(58,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
140.4 ± 198.7

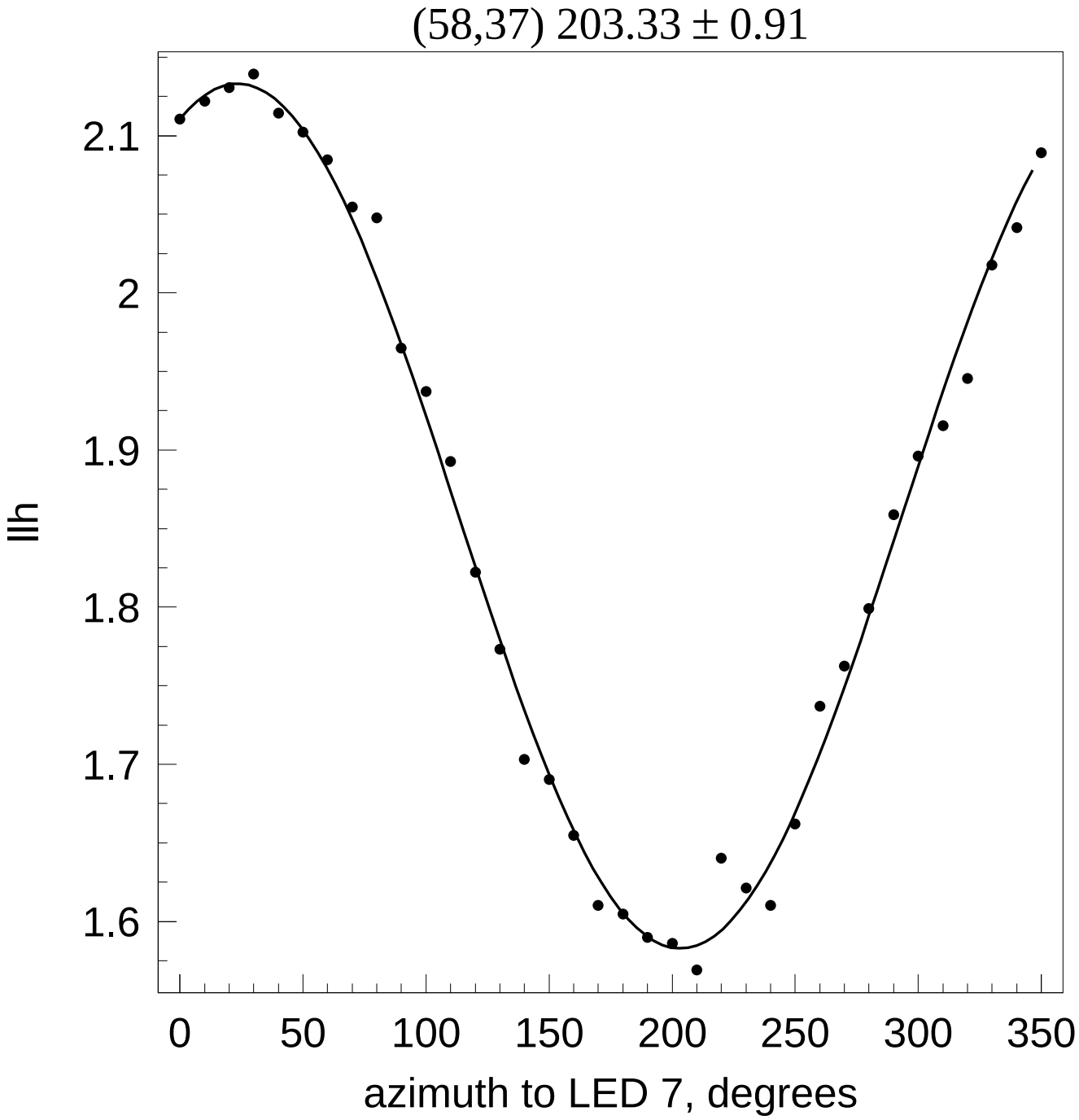

(58,36) 67.91 ± 10.19
2.98
2.96
2.94
2.92
2.9
2.88
2.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

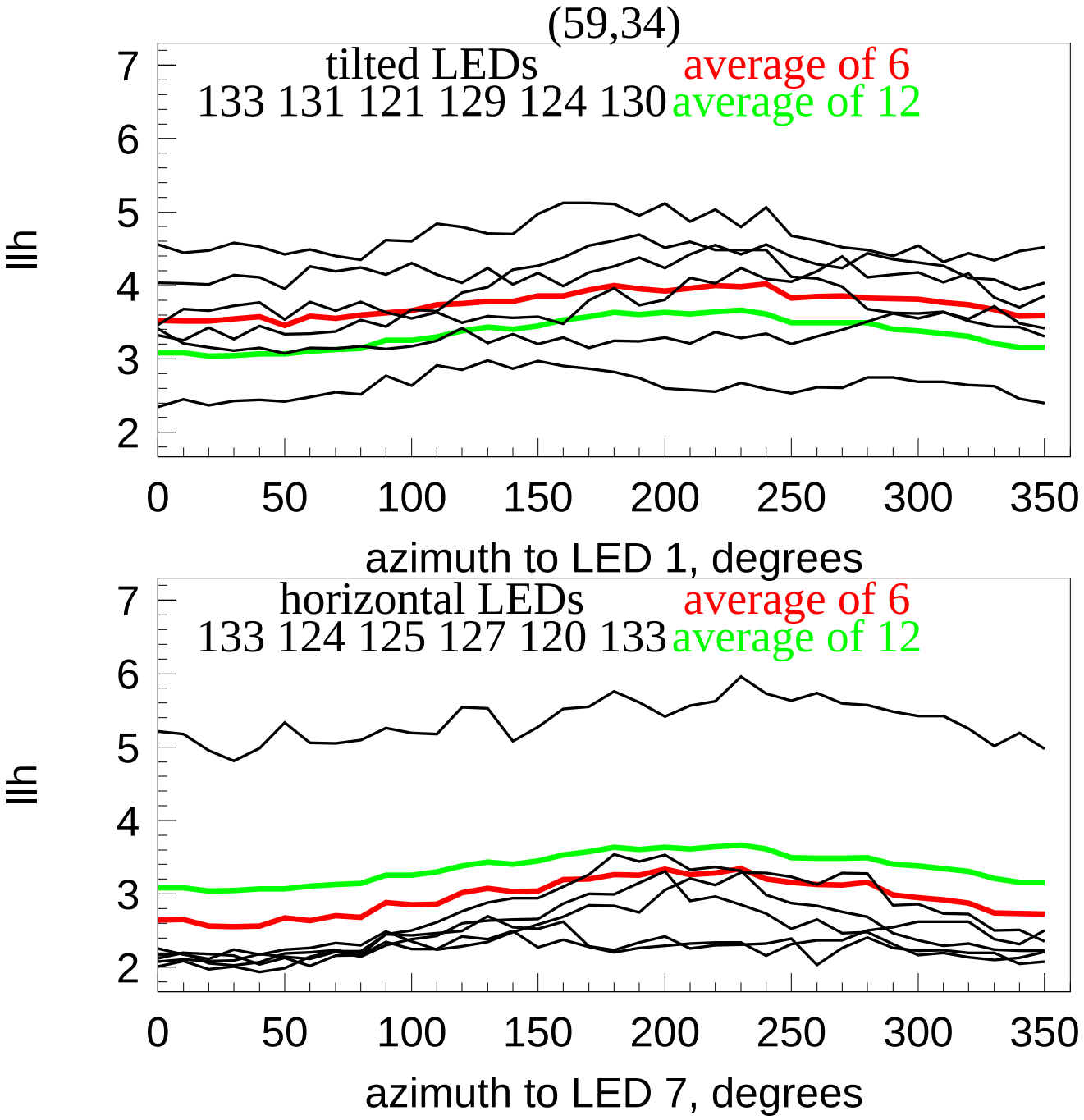

(58,36) 68.21 ± 10.38
2.98
2.96
2.94
2.92
2.9
2.88
2.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

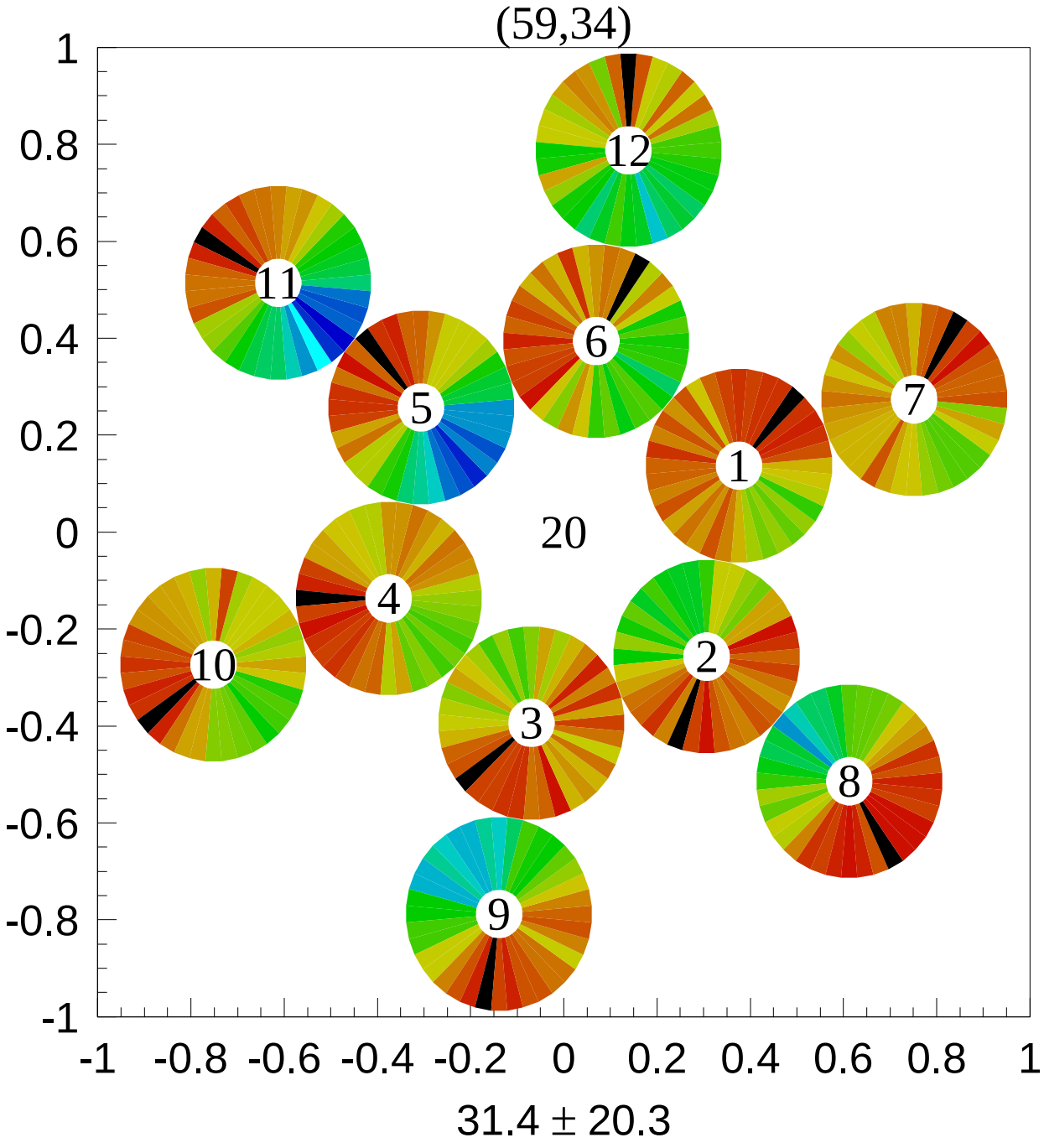

(58,37)
tilted LEDs
129 123 125 128 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 128 125 131 127 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

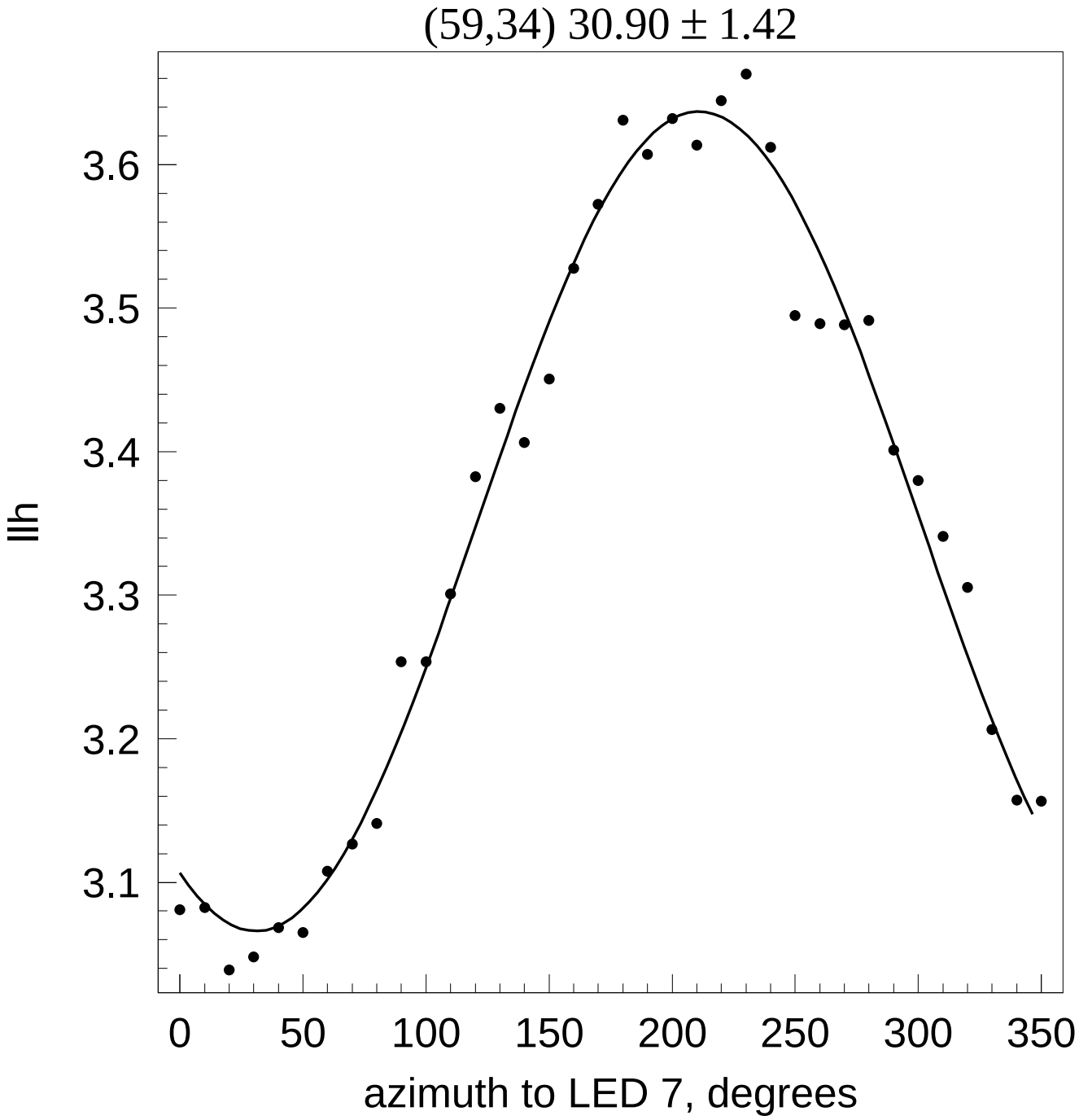

(58,37)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
201.4 ± 23.1

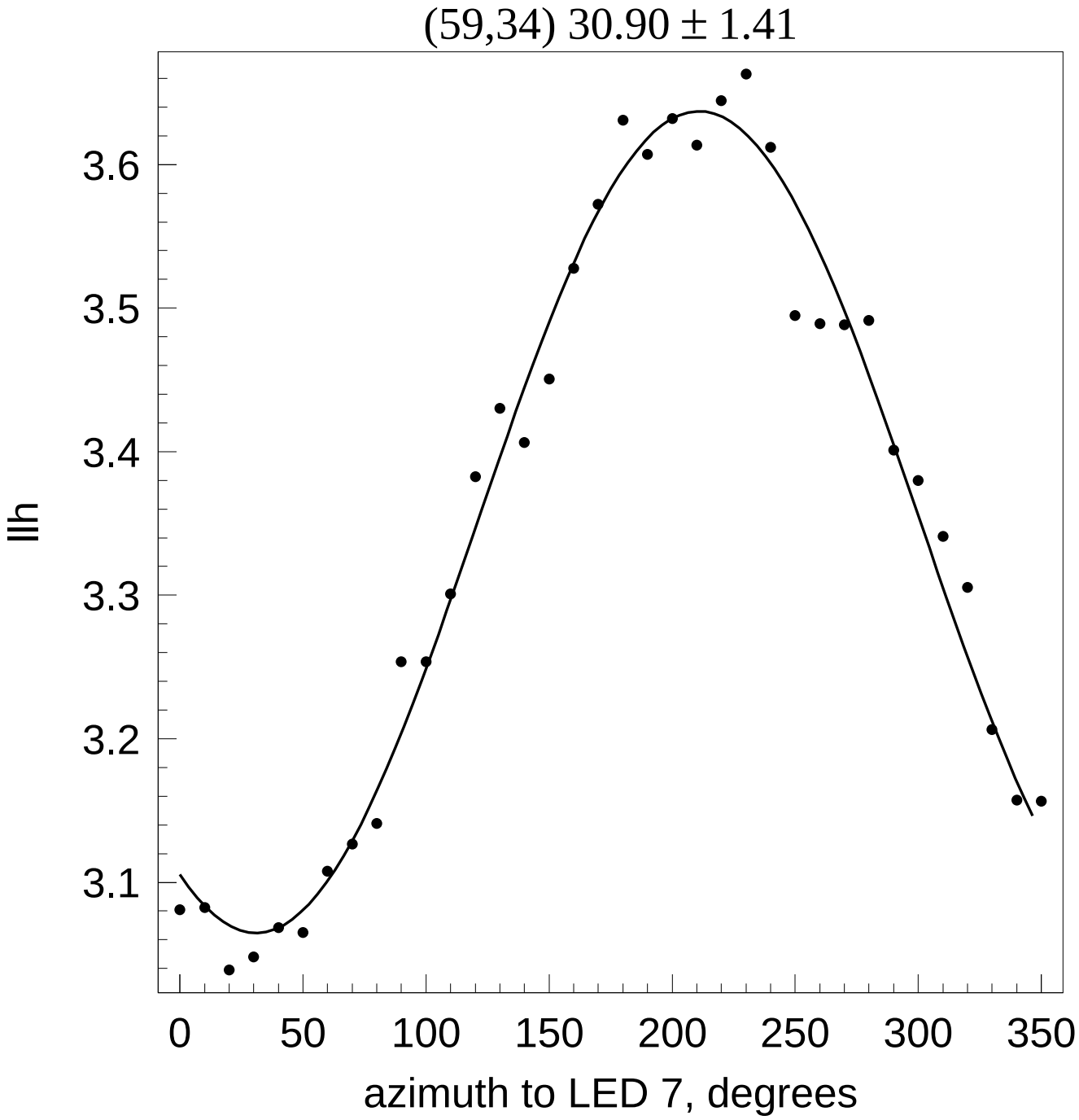

(58,37) 203.67 ± 0.86
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

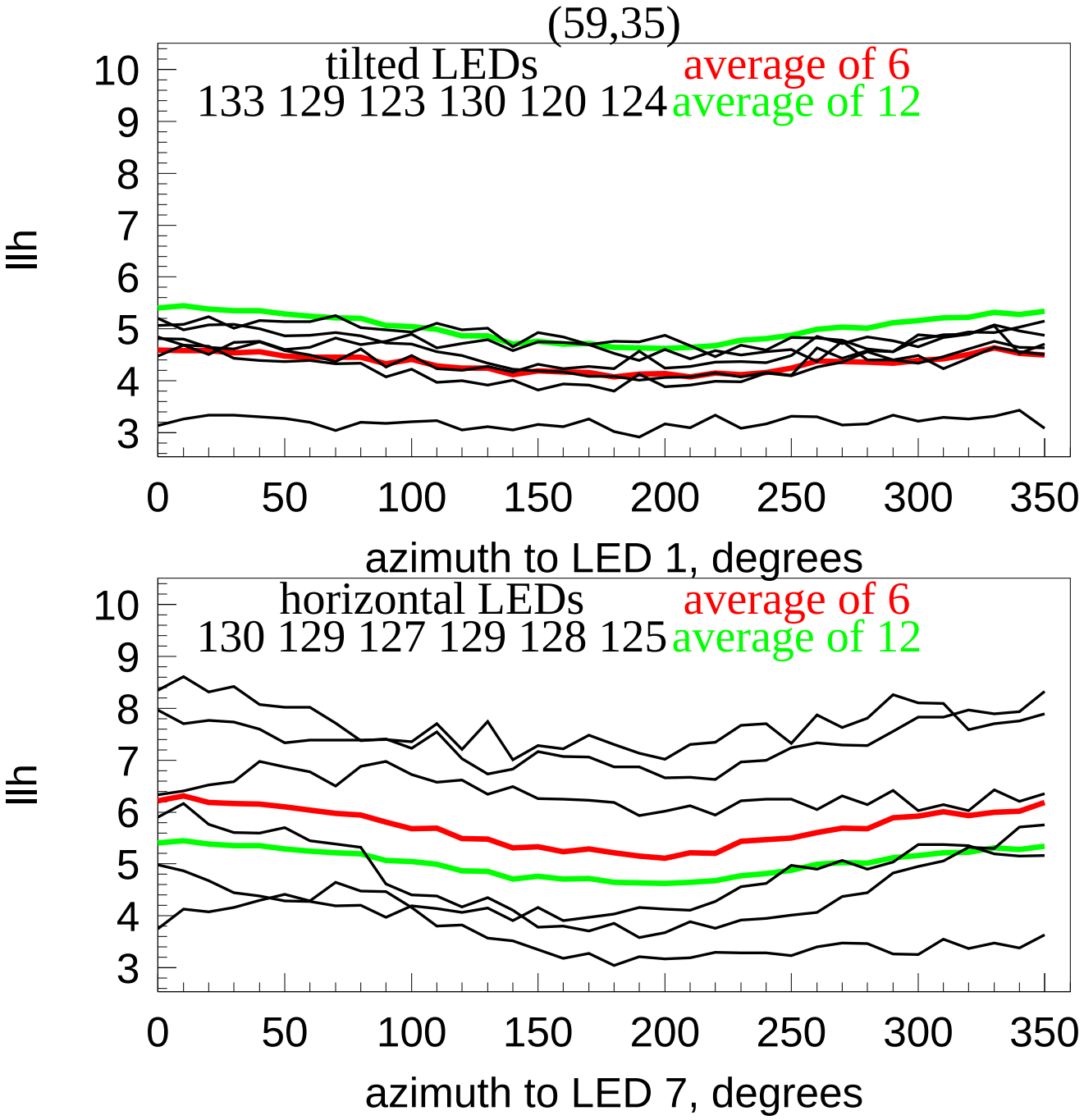

(58,37) 203.33 ± 0.91
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

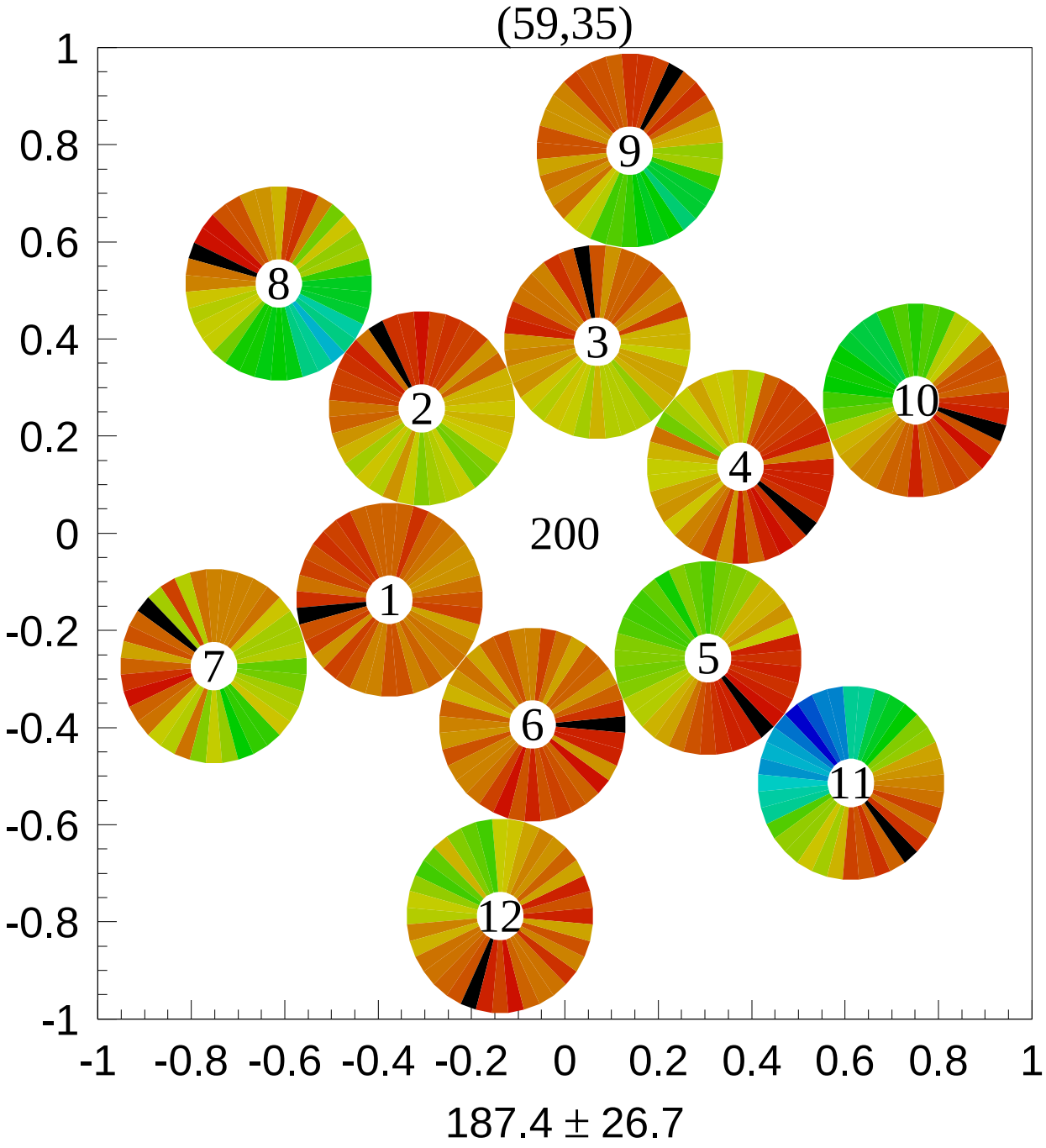

(59,34)
tilted LEDs
133 131 121 129 124 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
133 124 125 127 120 133
average of 6
average of 12
llh
azimuth to LED 7, degrees

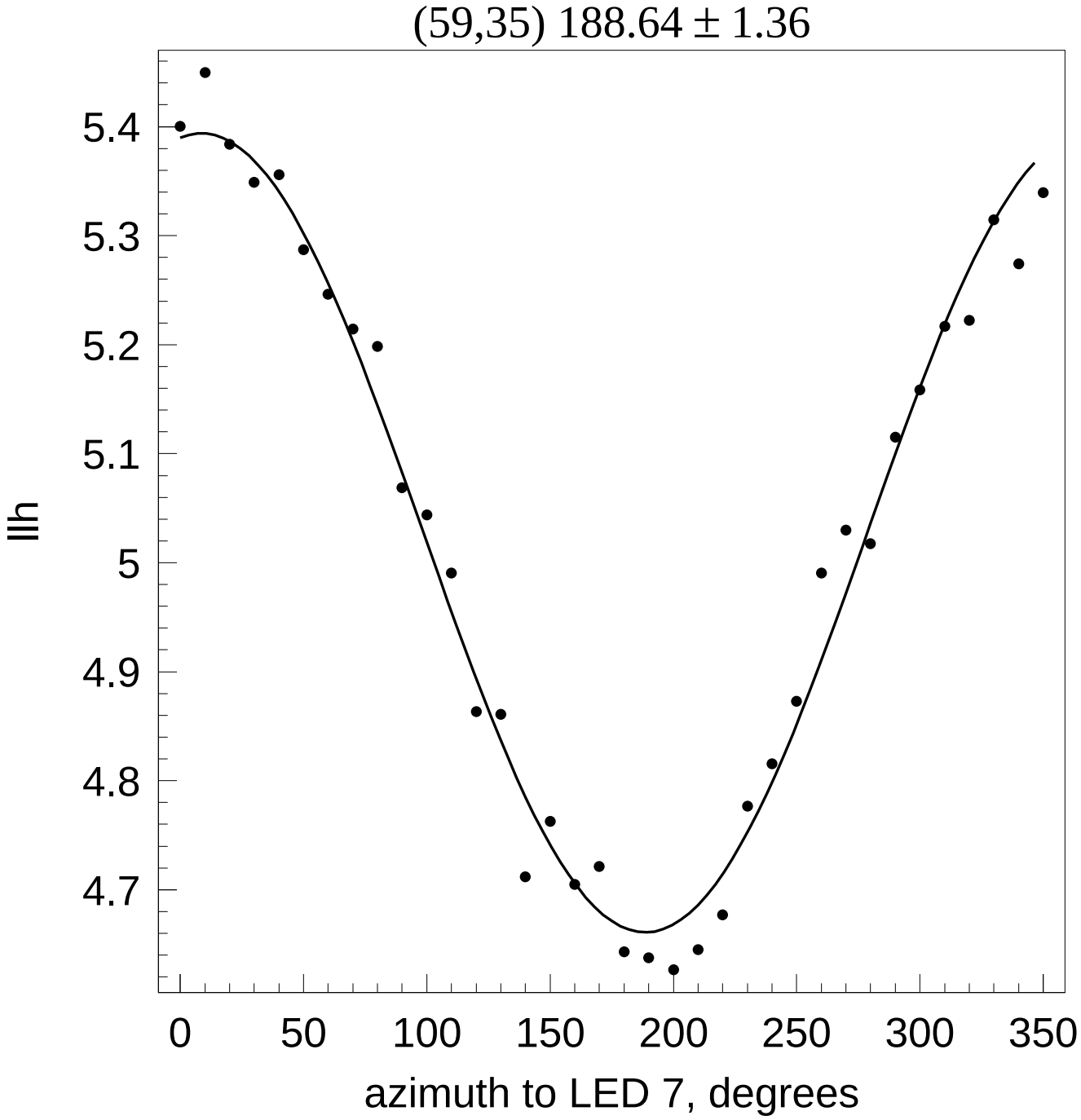

(59,34)
12
11
6
5
7
1
20
4
10
2
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
31.4 ± 20.3

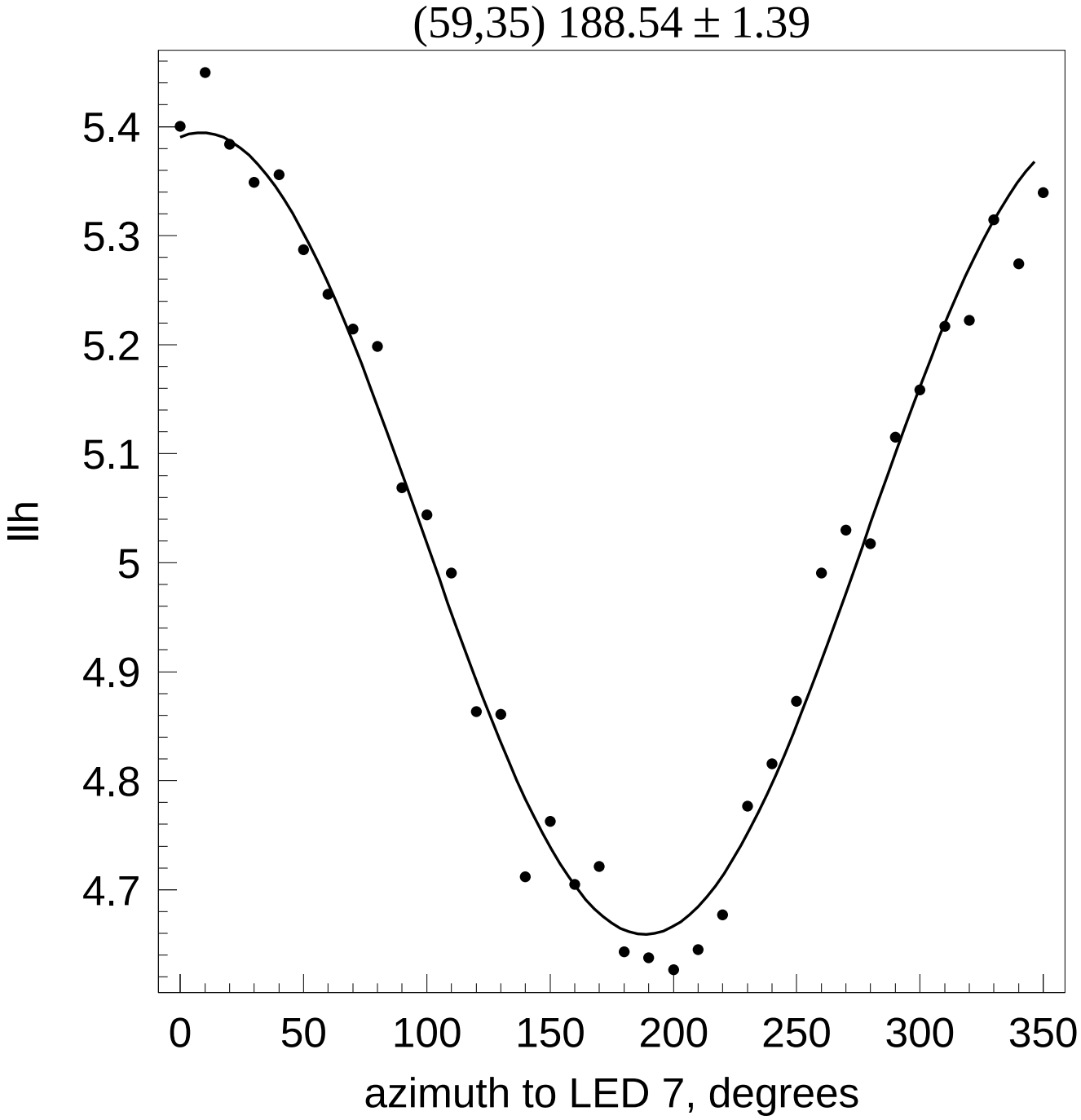

(59,34) 30.90 ± 1.42
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

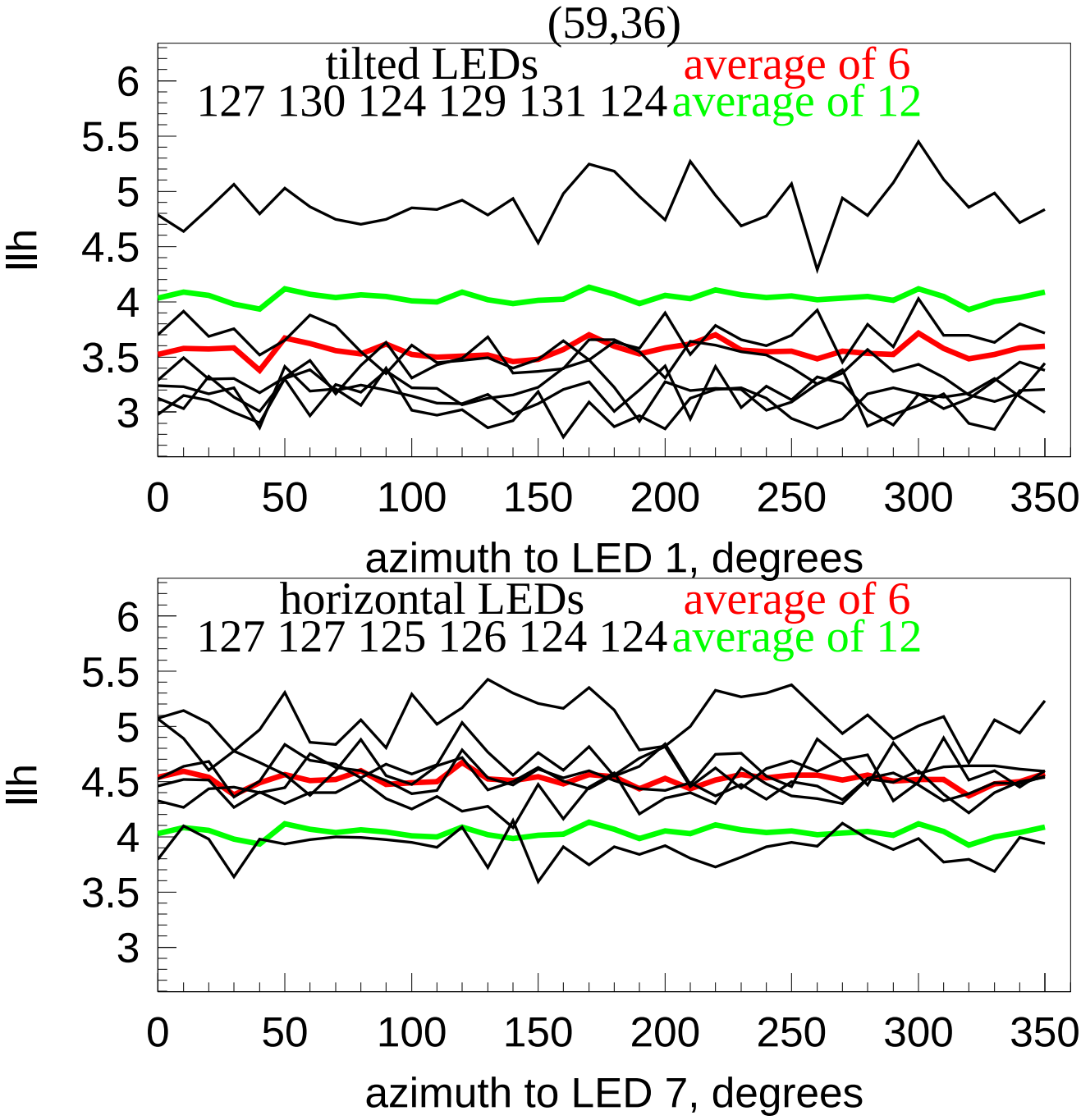

(59,34) 30.90 ± 1.41
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

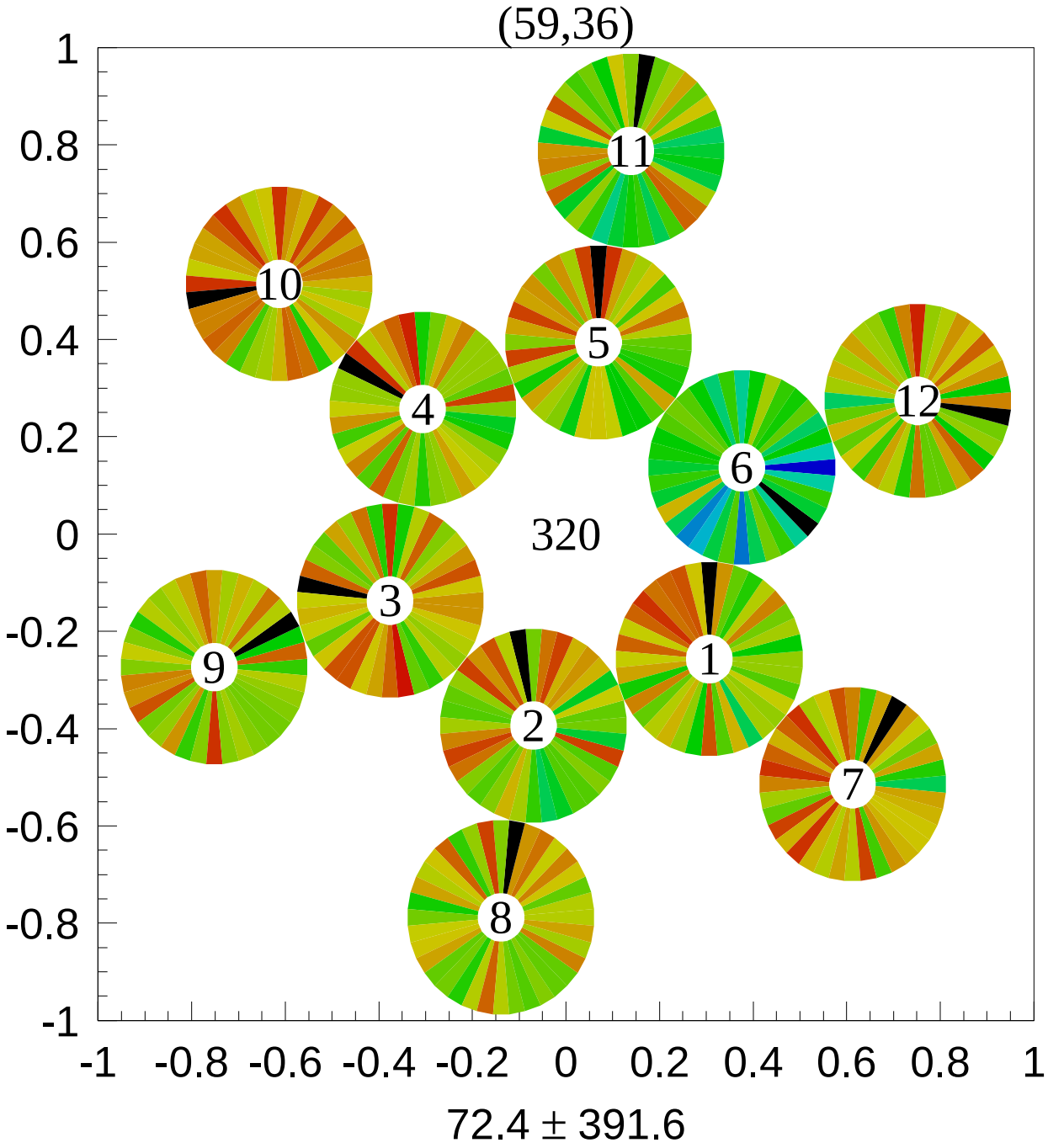

(59,35)
tilted LEDs
133 129 123 130 120 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 129 127 129 128 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

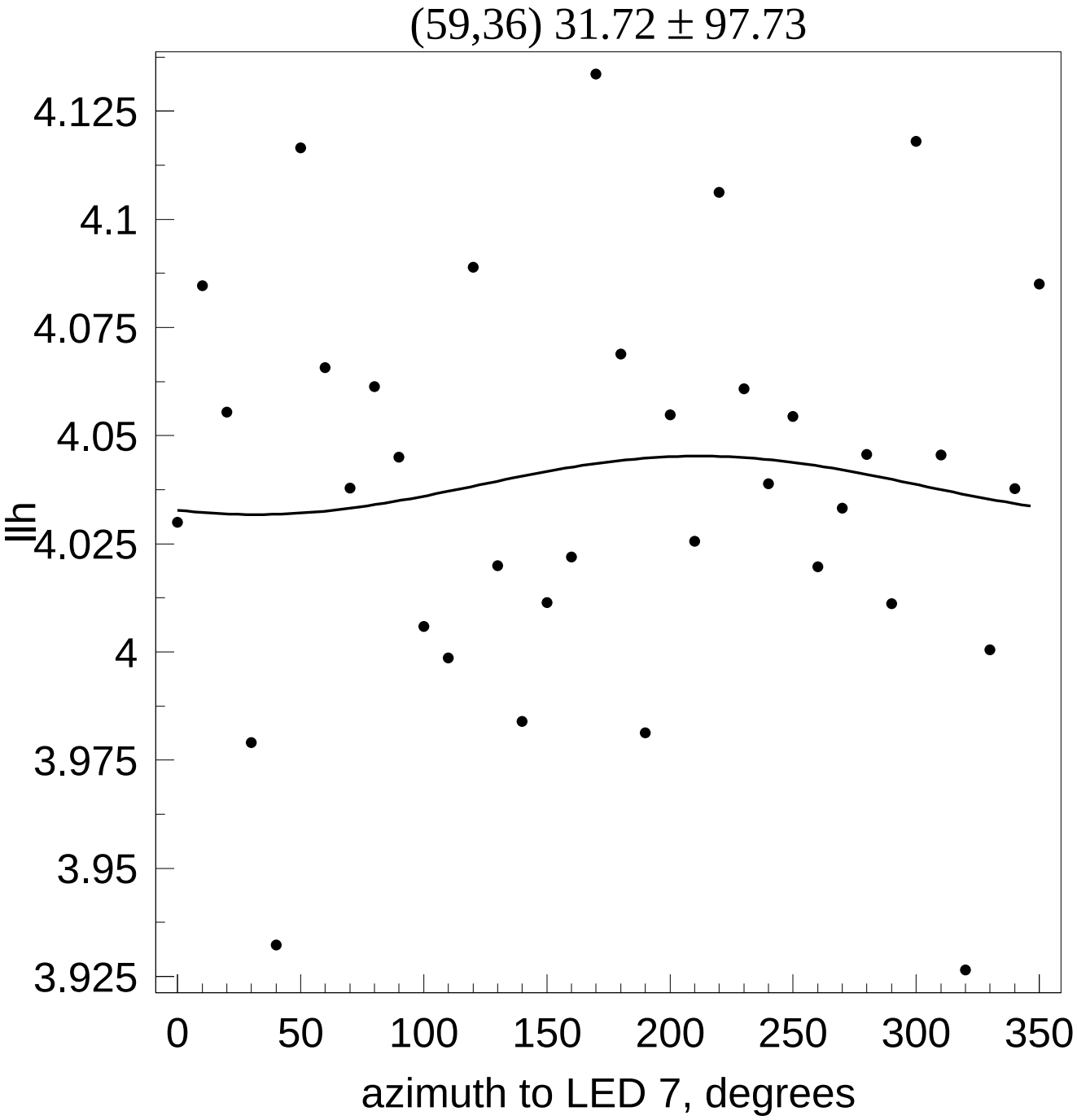

(59,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
8
3
2
10
4
200
1
7
5
6
11
12
187.4 ± 26.7

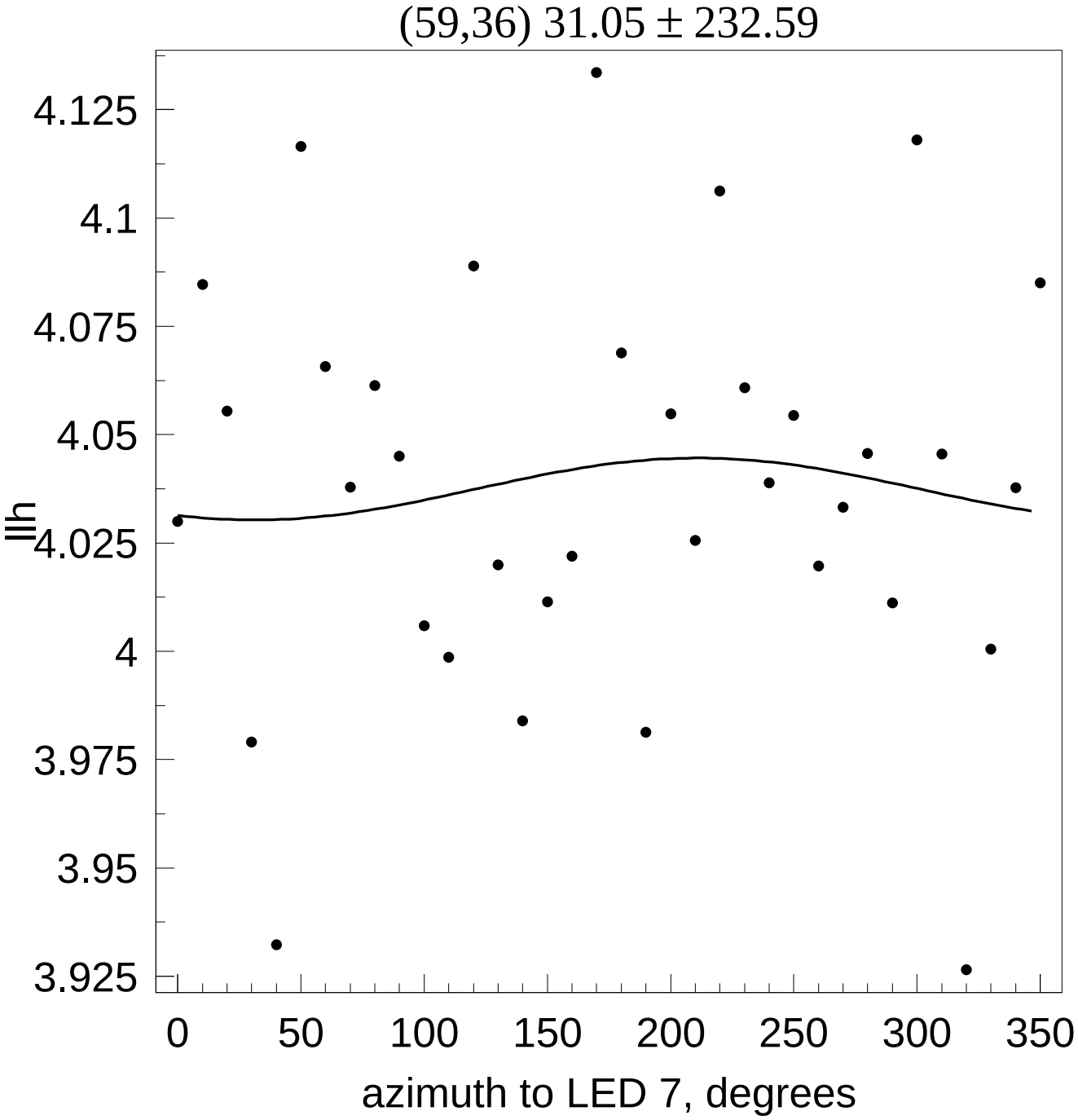

(59,35) 188.64 ± 1.36
5.4
5.3
5.2
5.1
5
4.9
4.8
4.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

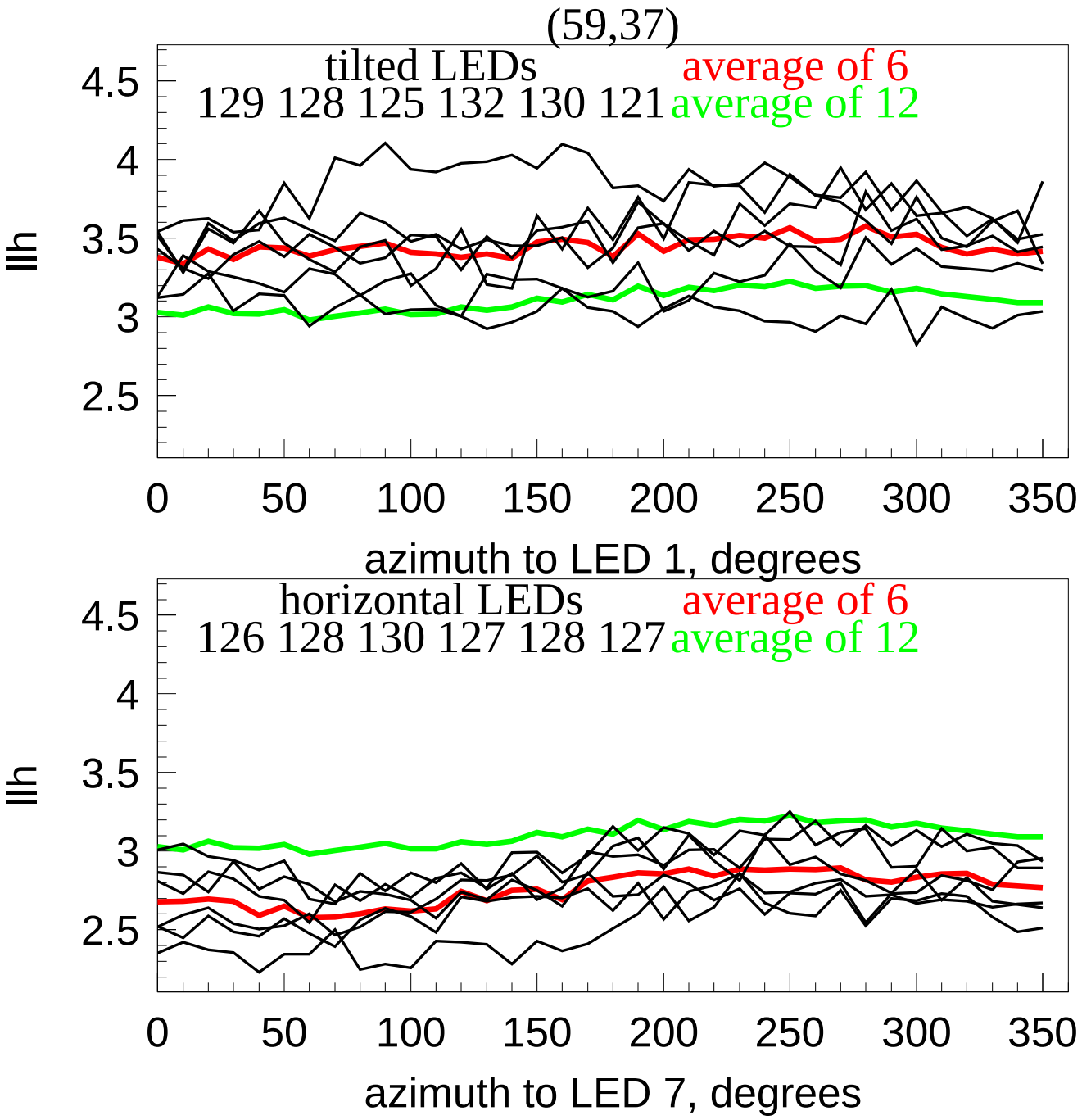

(59,35) 188.54 ± 1.39
5.4
5.3
5.2
5.1
5
4.9
4.8
4.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

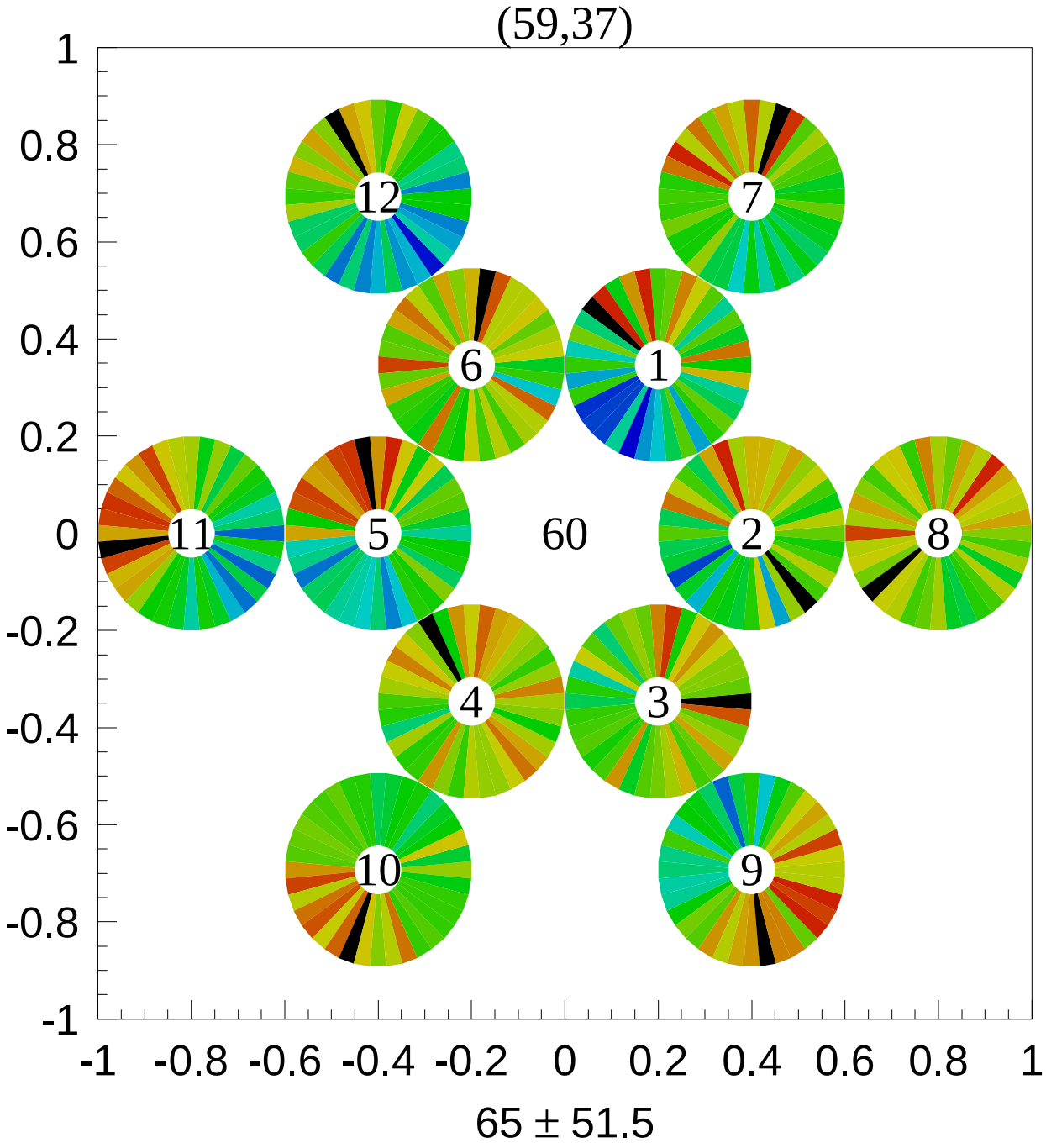

(59,36)
tilted LEDs
127 130 124 129 131 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 127 125 126 124 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

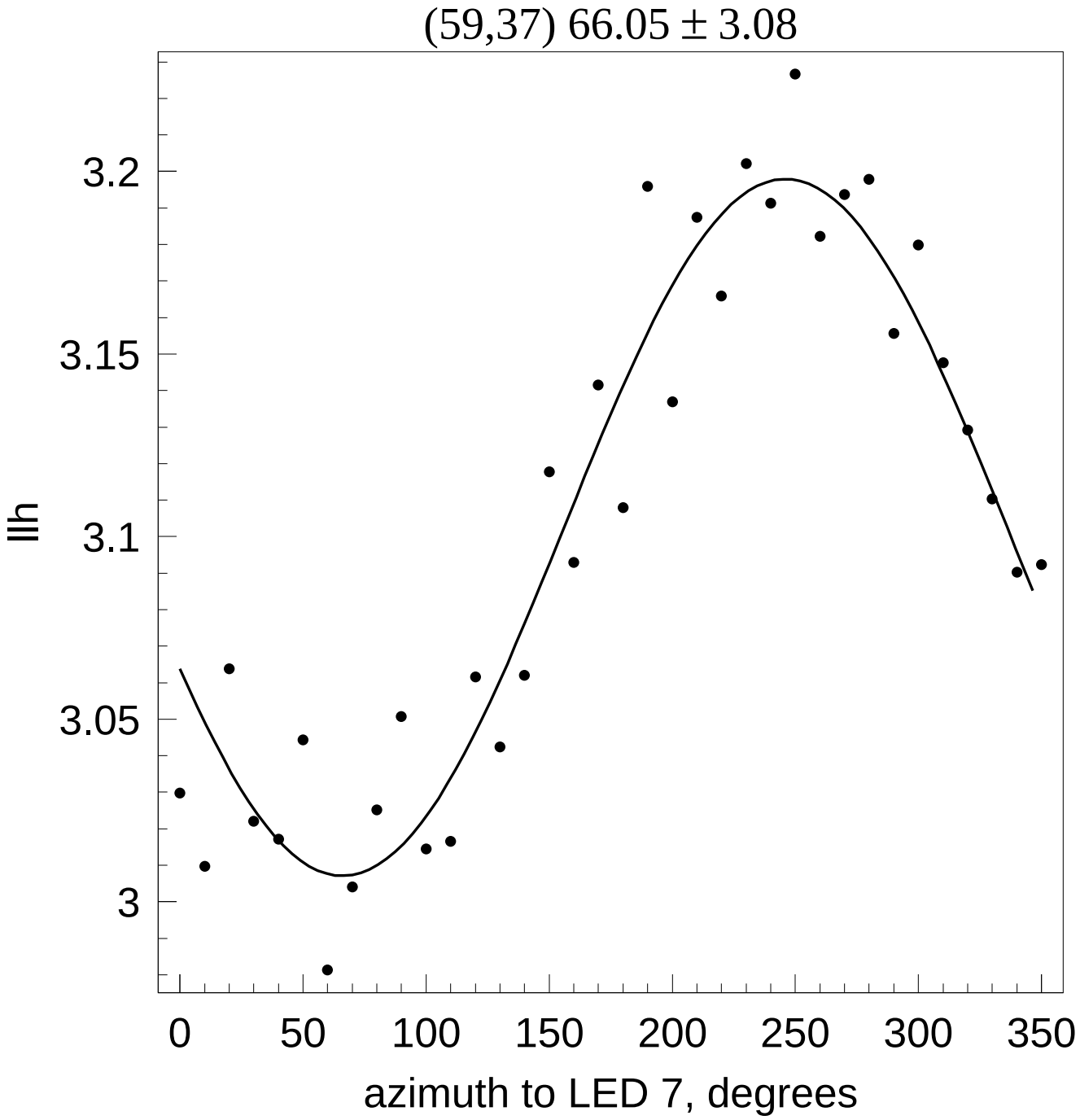

(59,36)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
72.4 ± 391.6

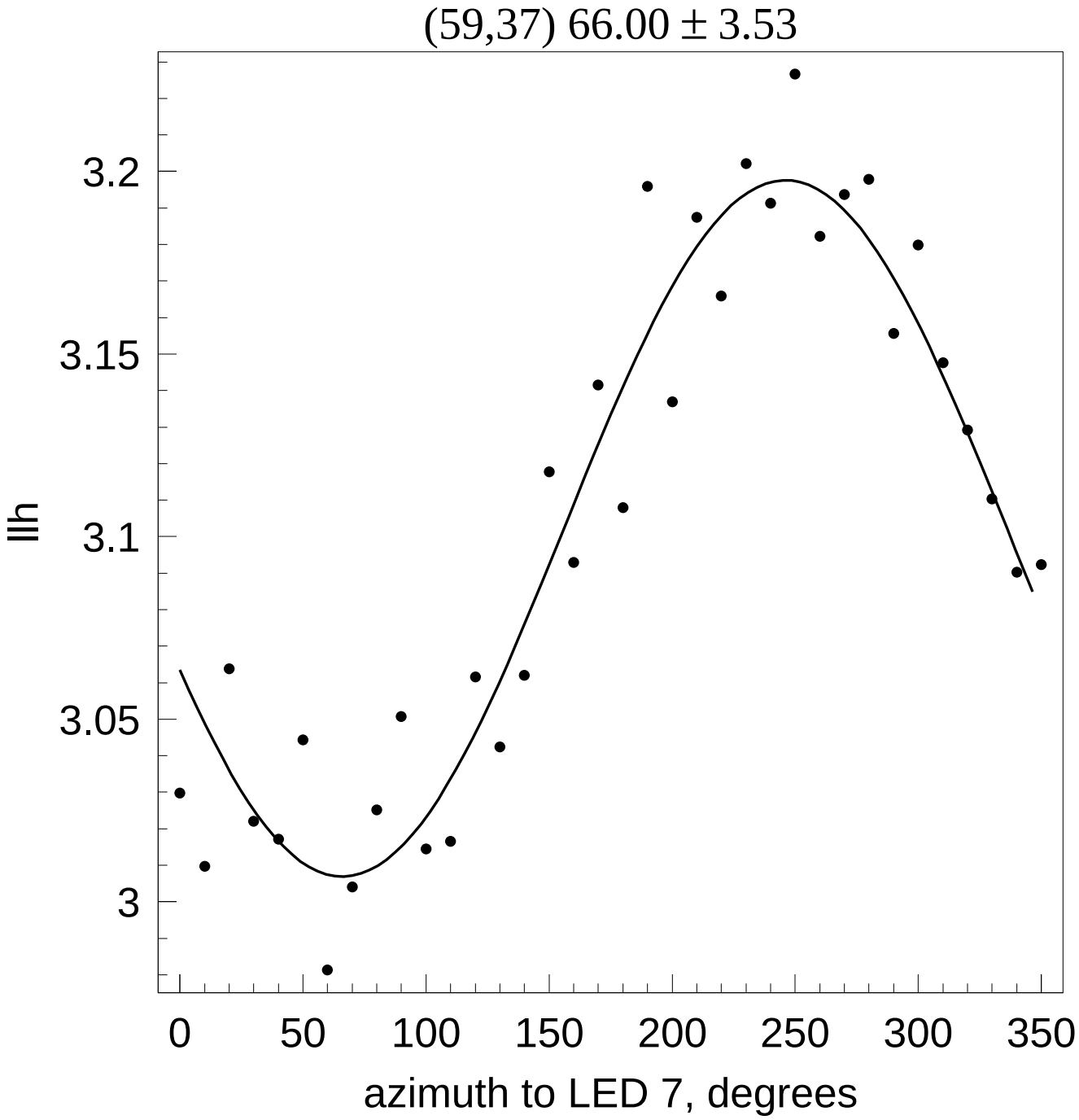

(59,36) 31.72 ± 97.73
4.125
4.1
4.075
4.05
4.025
4
3.975
3.95
3.925
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

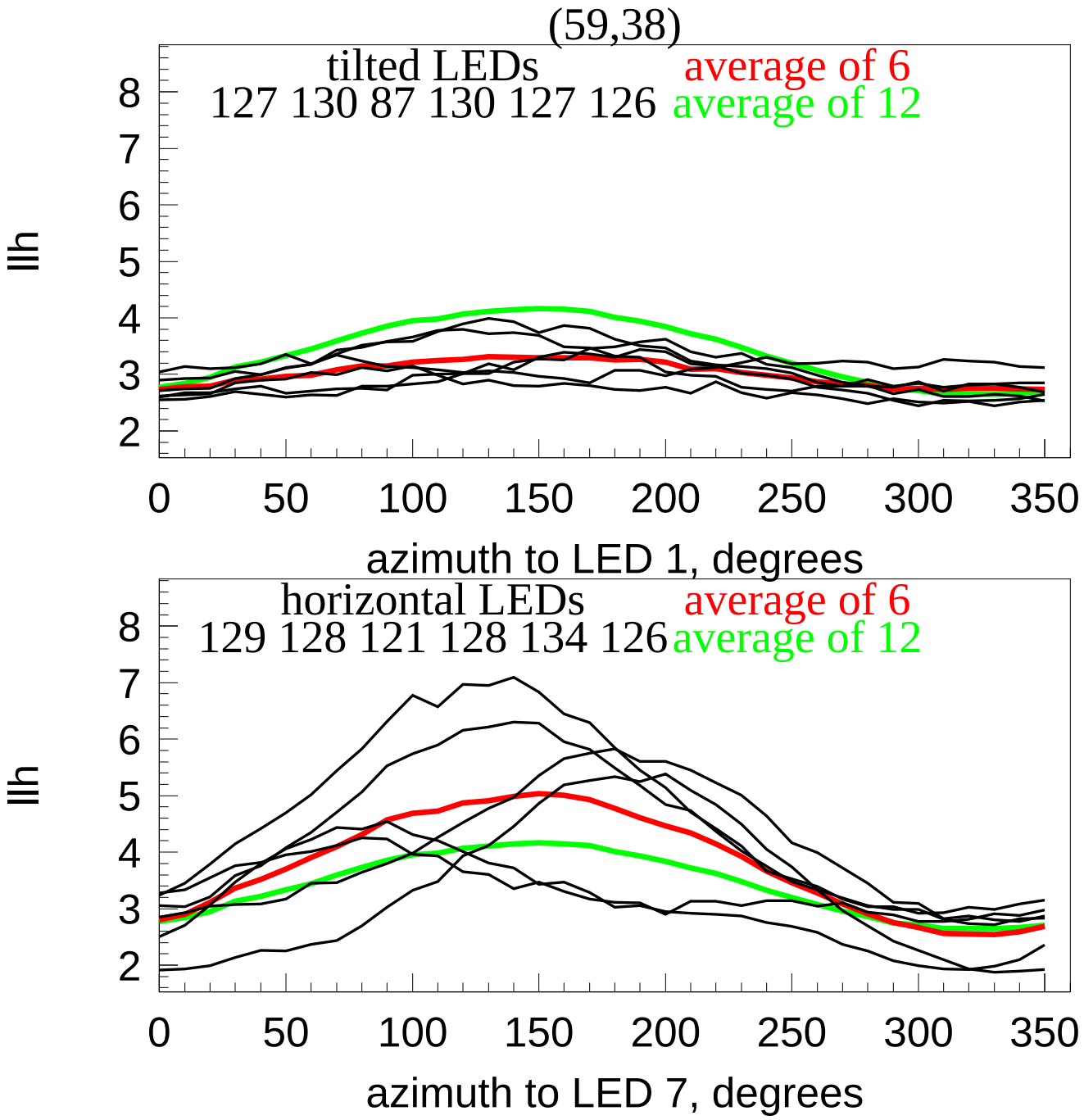

(59,36) 31.05 ± 232.59
4.125
4.1
4.075
4.05
4.025
4
3.975
3.95
3.925
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

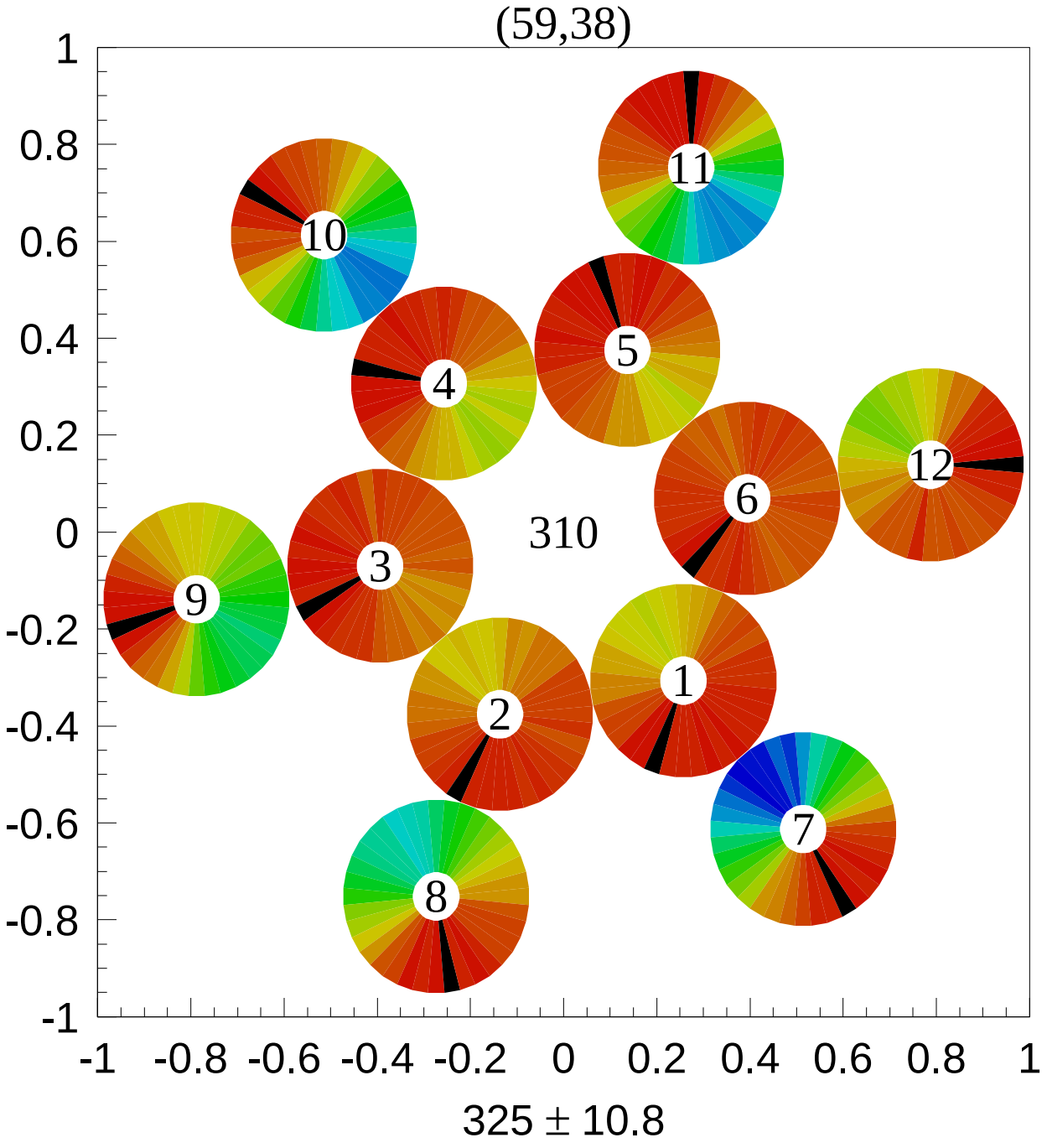

(59,37)
tilted LEDs
129 128 125 132 130 121
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 128 130 127 128 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

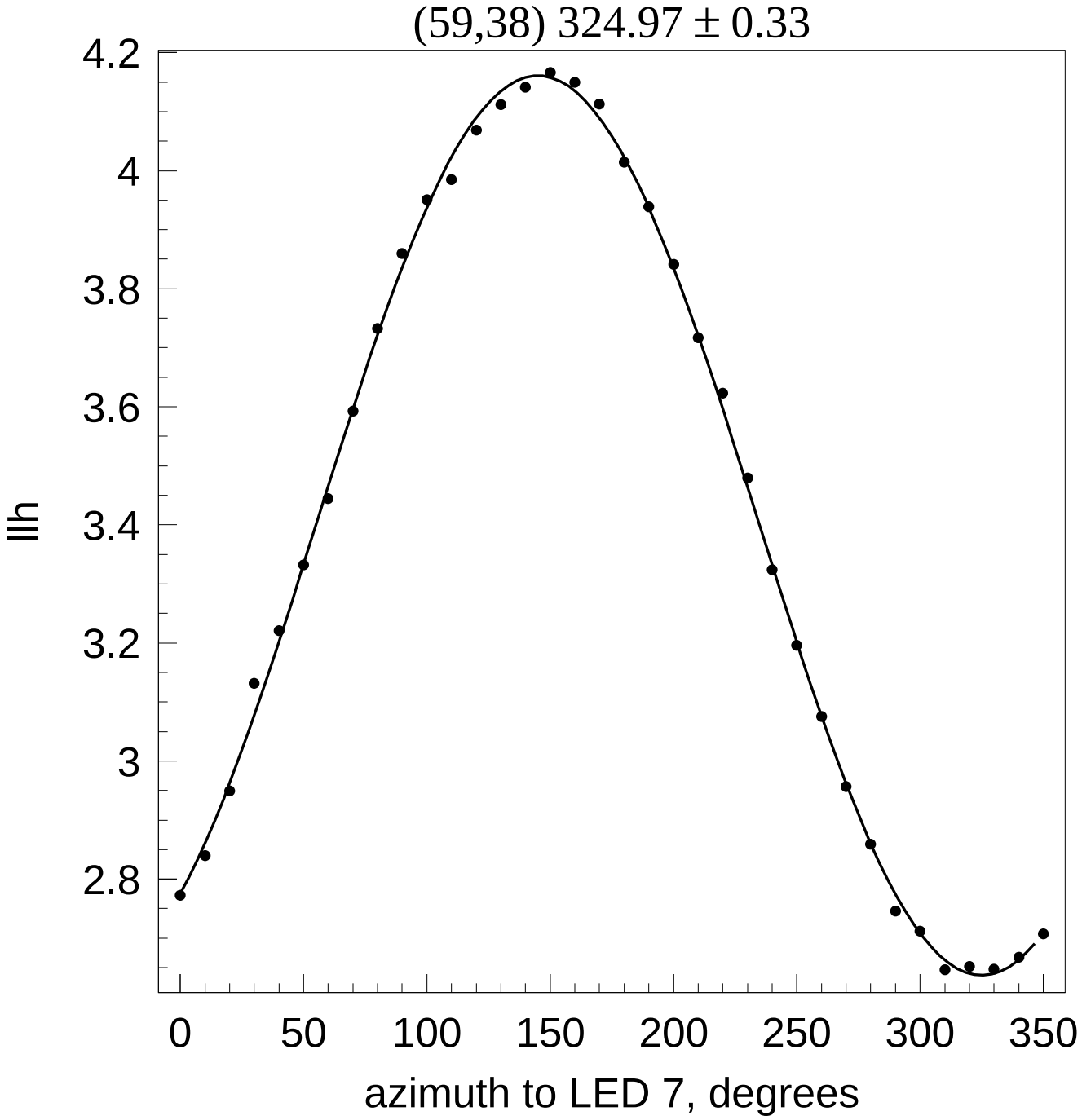

(59,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
65 ± 51.5

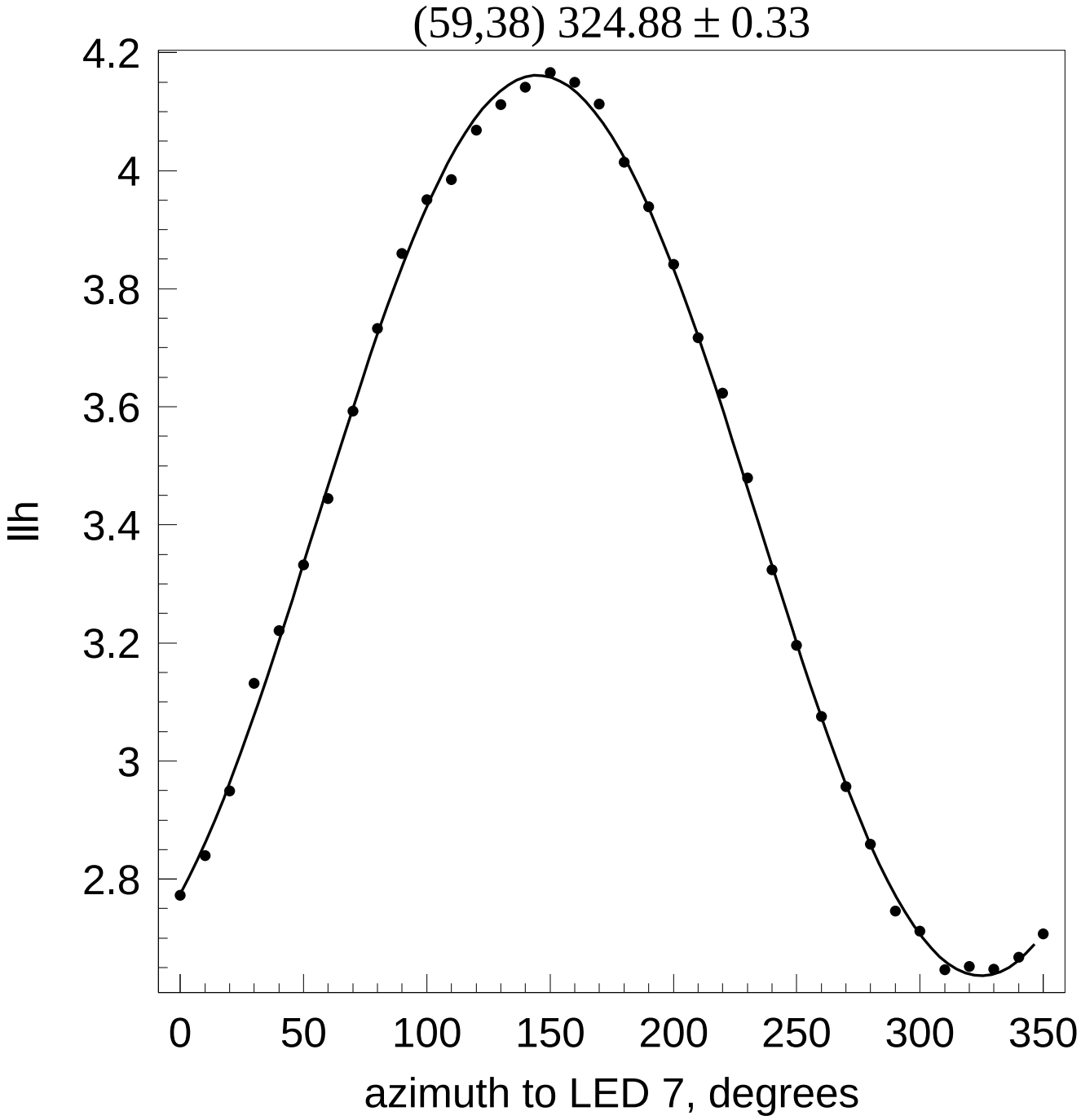

(59,37) 66.05 ± 3.08
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

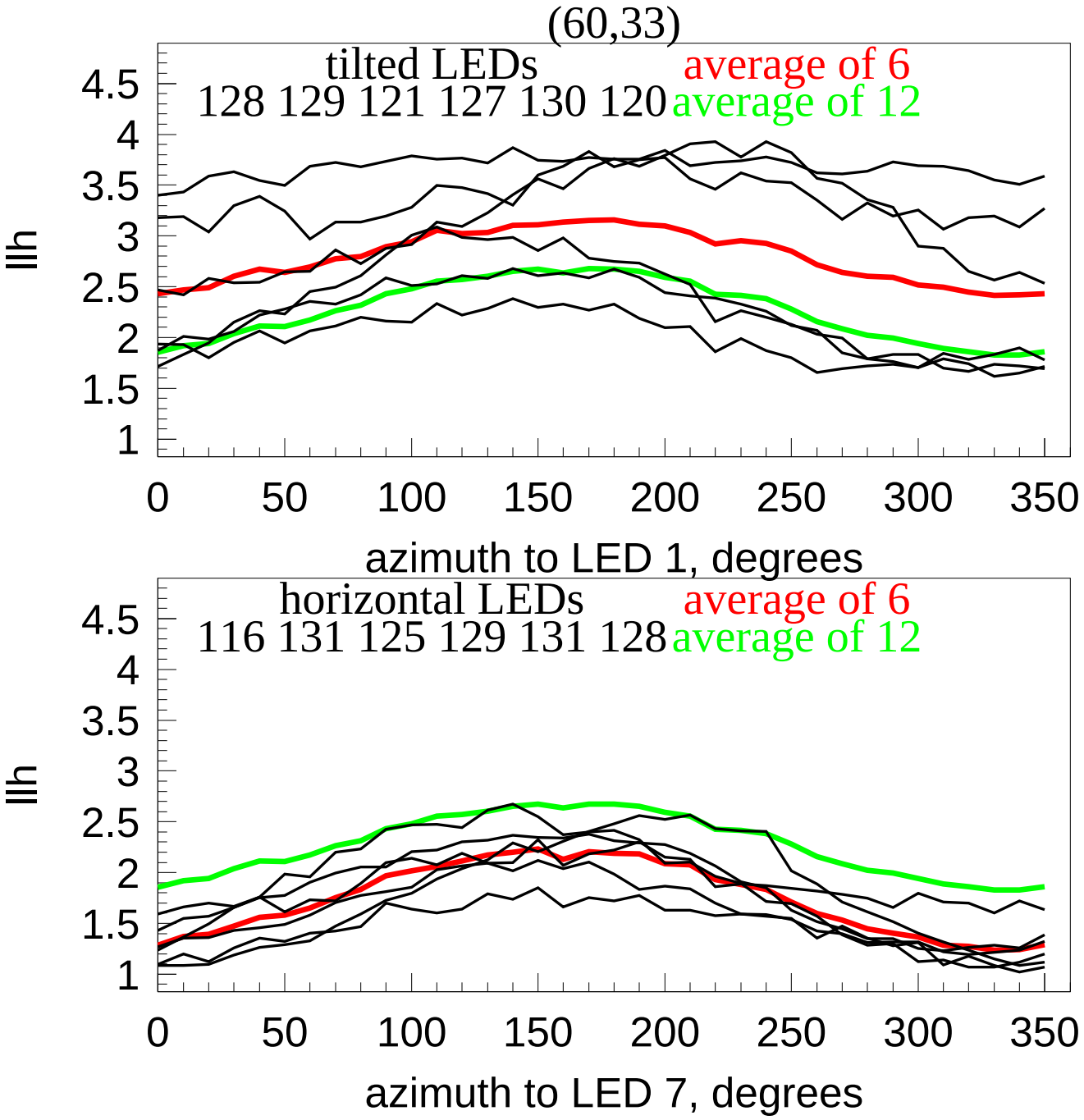

(59,37) 66.00 ± 3.53
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

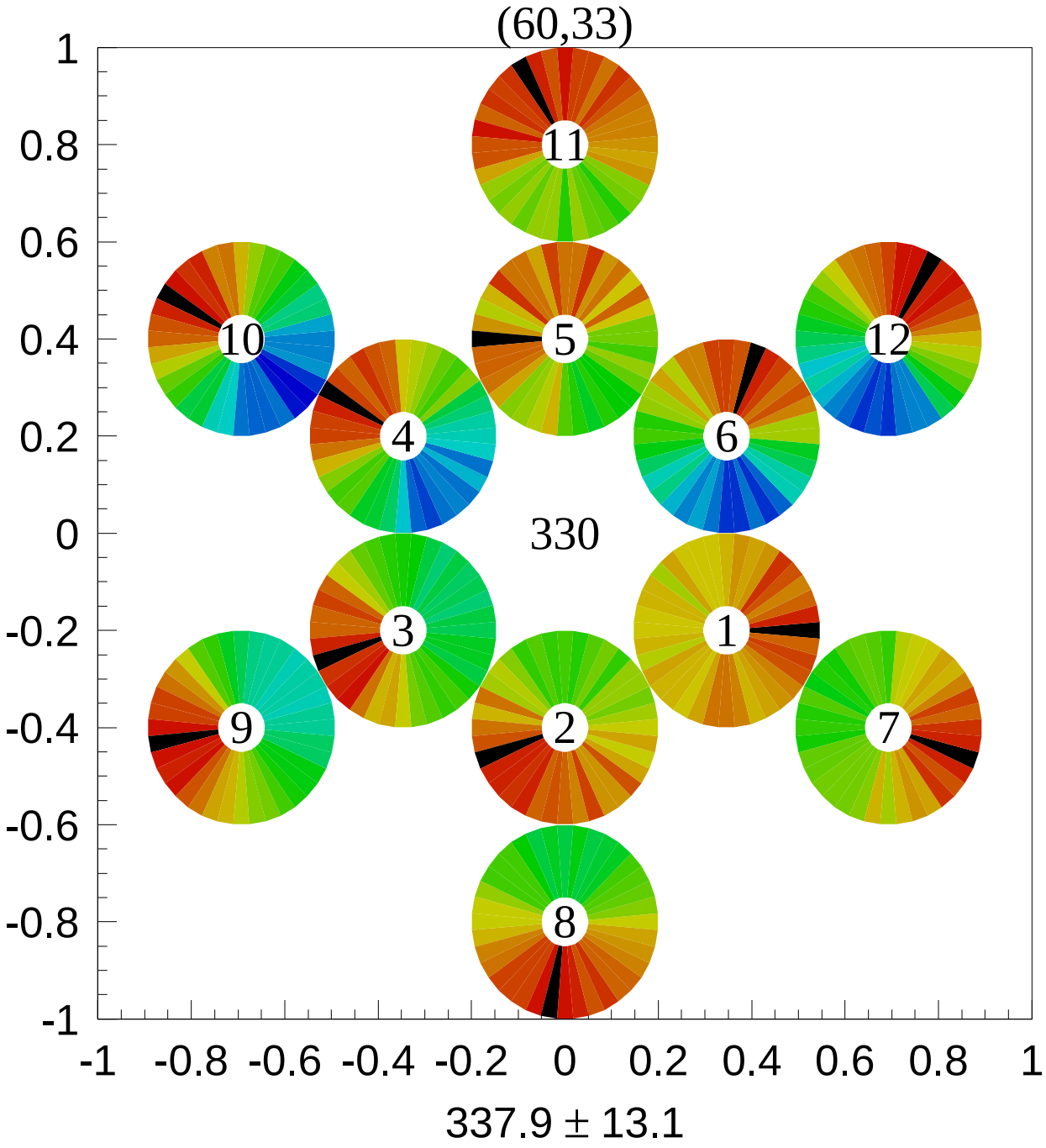

(59,38)
tilted LEDs
127 130 87 130 127 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 128 121 128 134 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

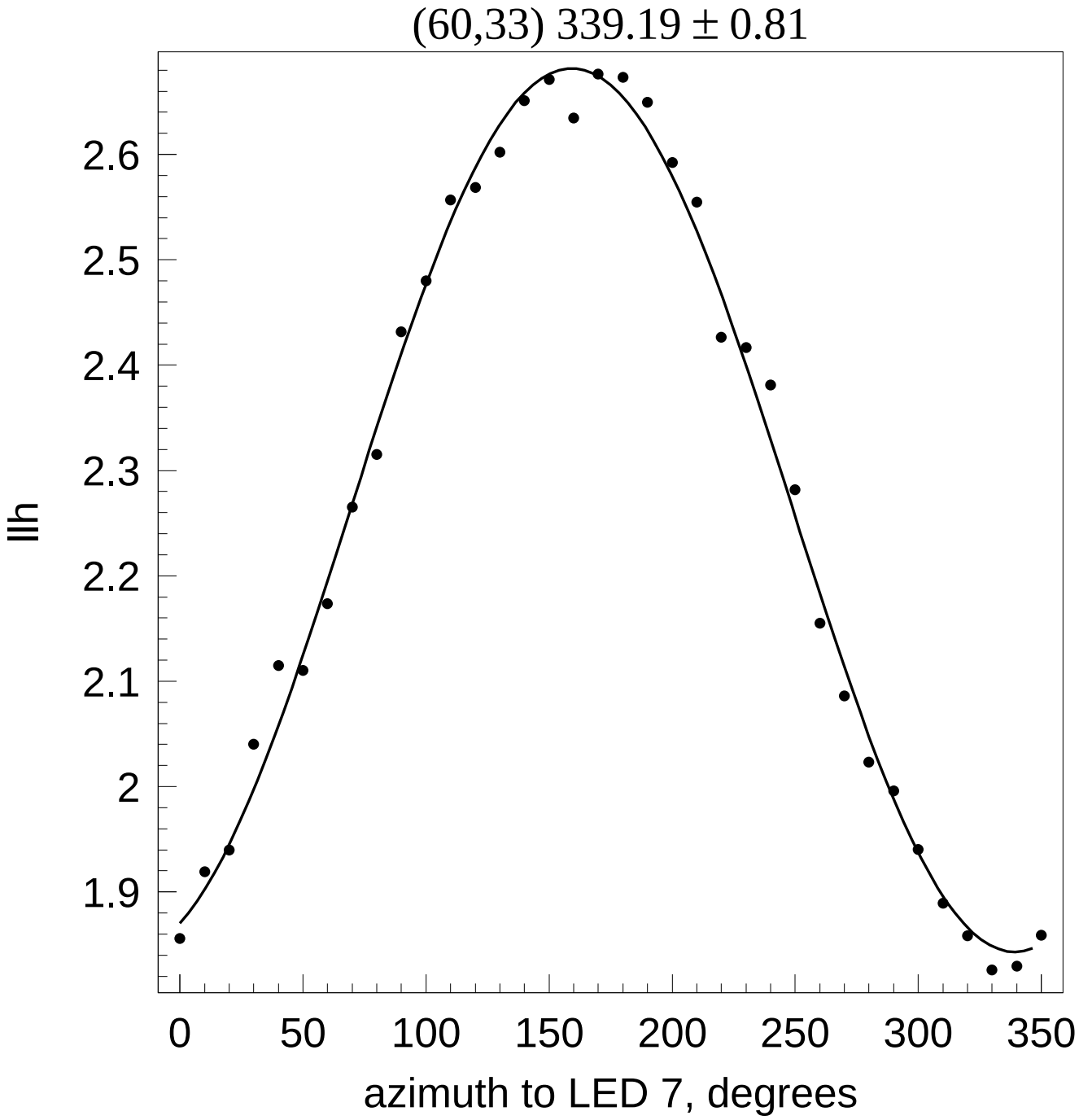

(59,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
325 ± 10.8
310
1
2
3
4
5
6
7
8
9
10
11
12

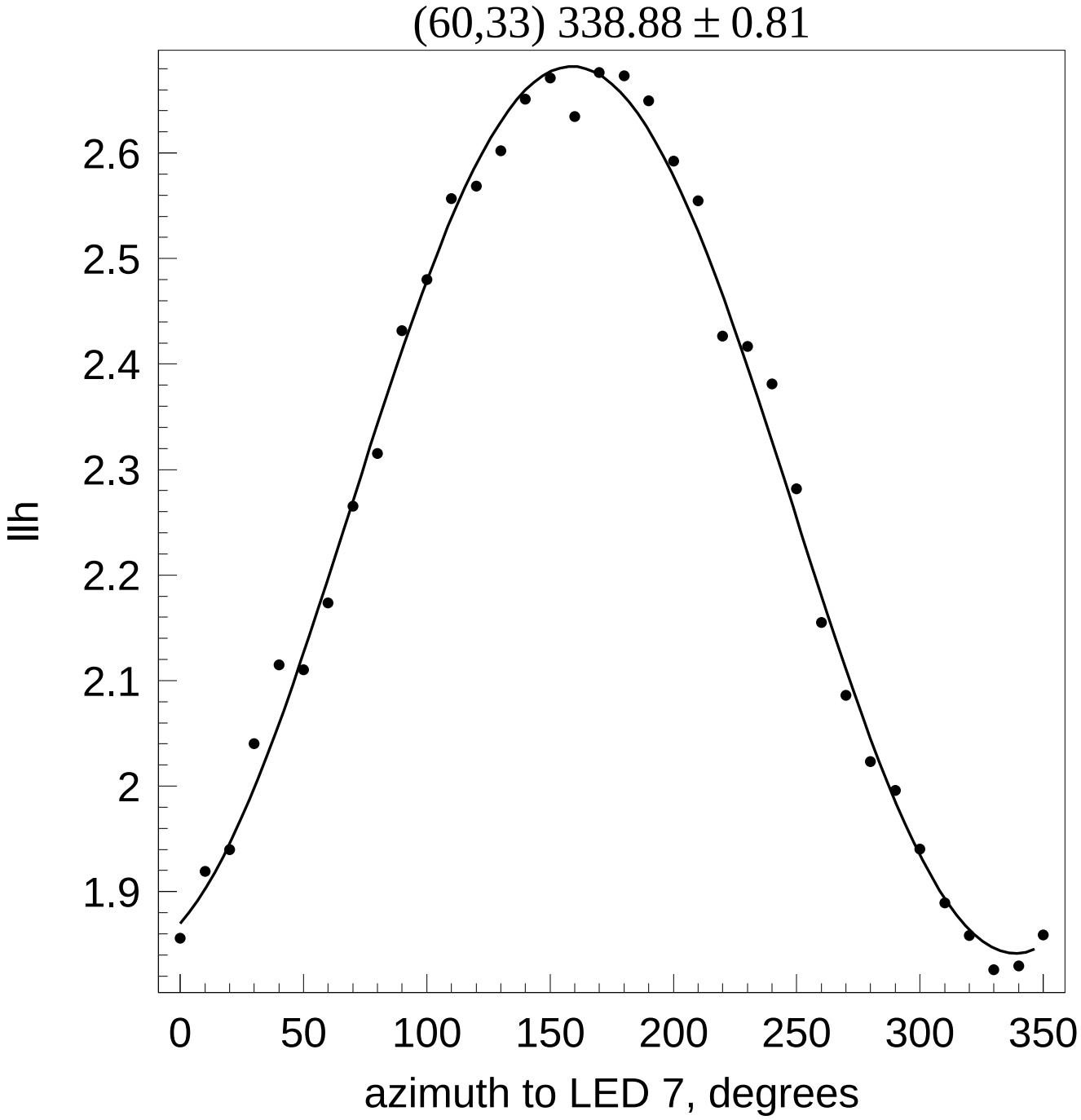

(59,38) 324.97 ± 0.33
4.2
4
3.8
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

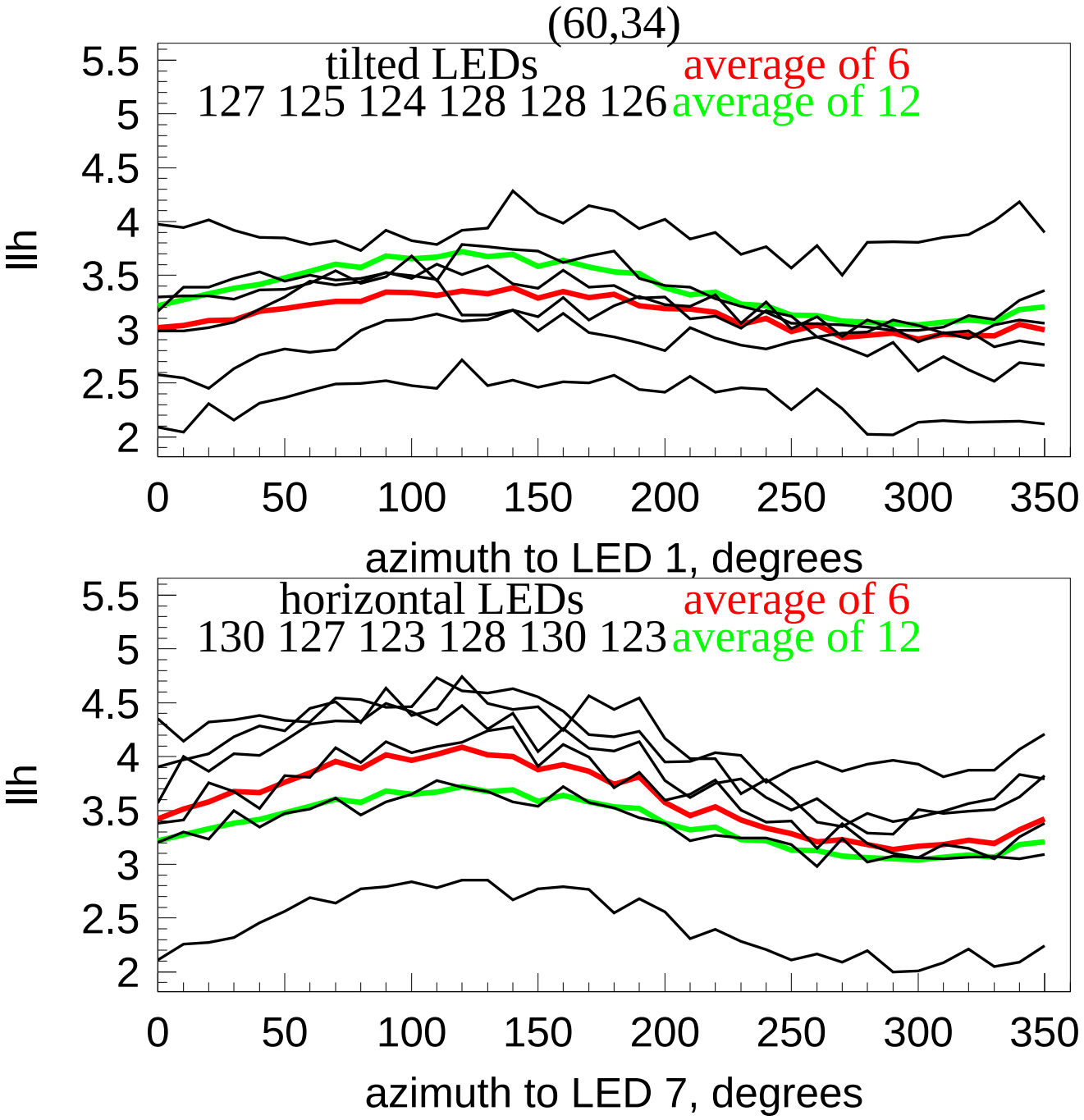

(59,38) 324.88 ± 0.33
4.2
4
3.8
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

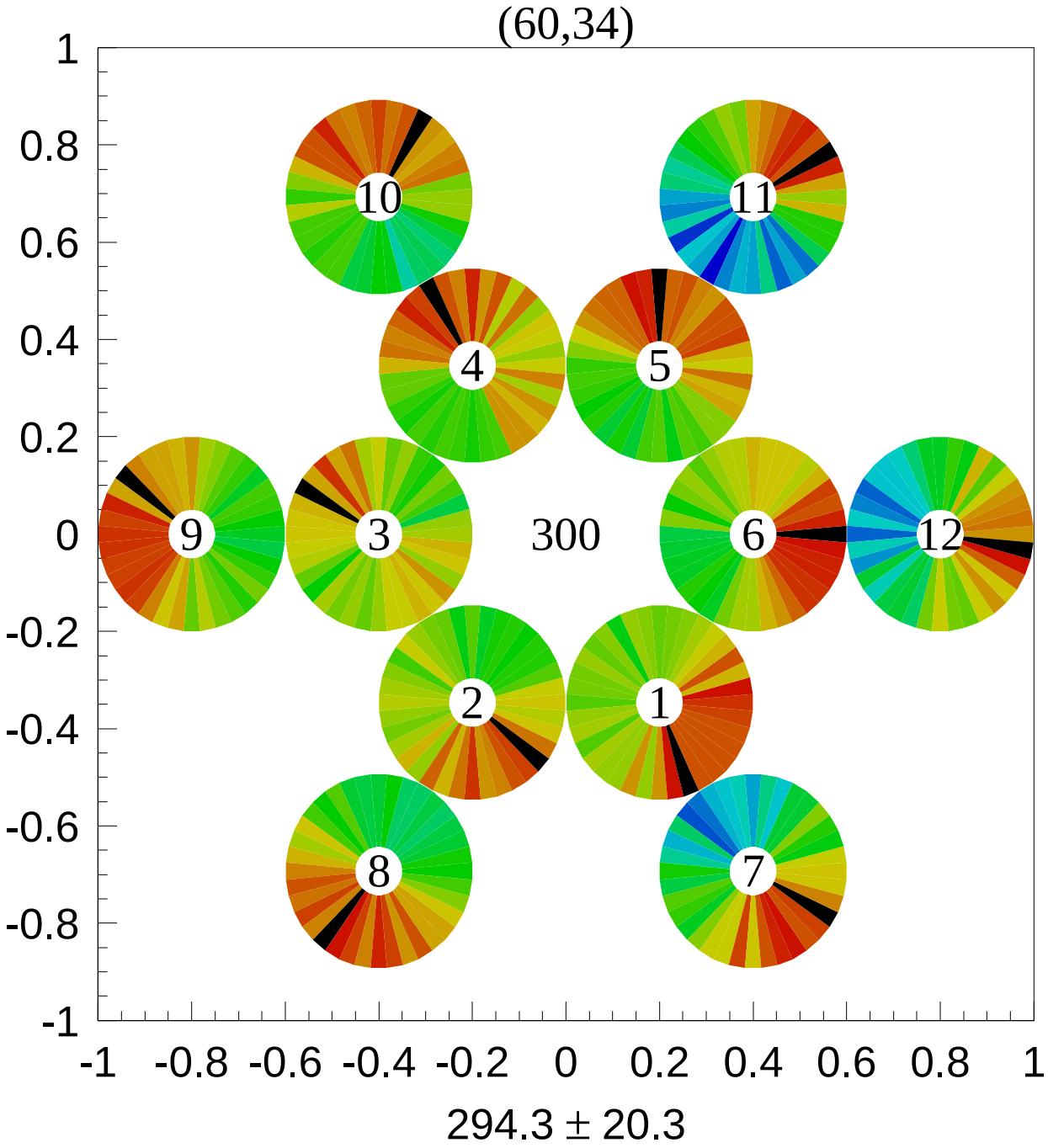

(60,33)
tilted LEDs
128 129 121 127 130 120
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
116 131 125 129 131 128
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

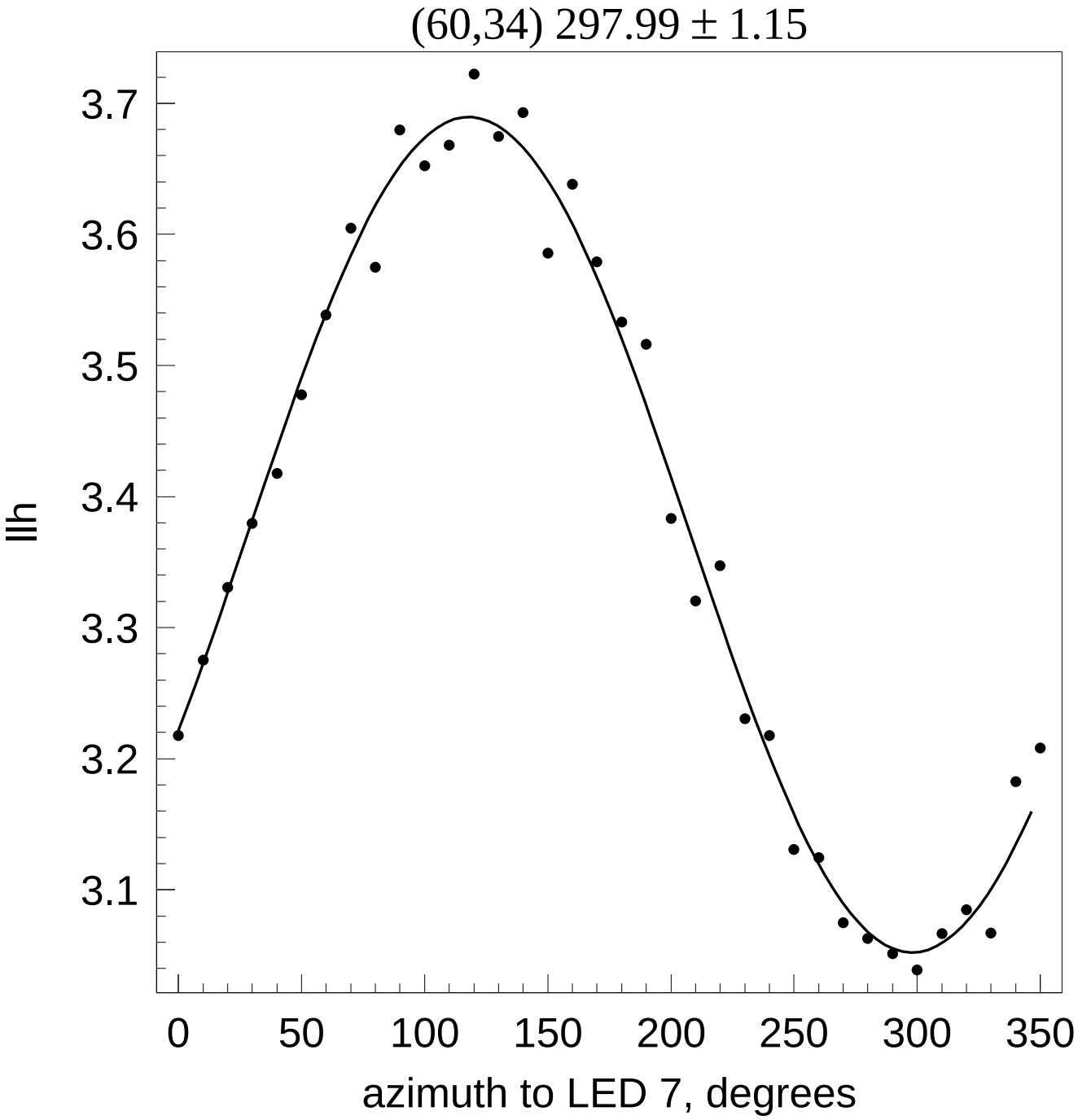

(60,33)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
337.9 ± 13.1

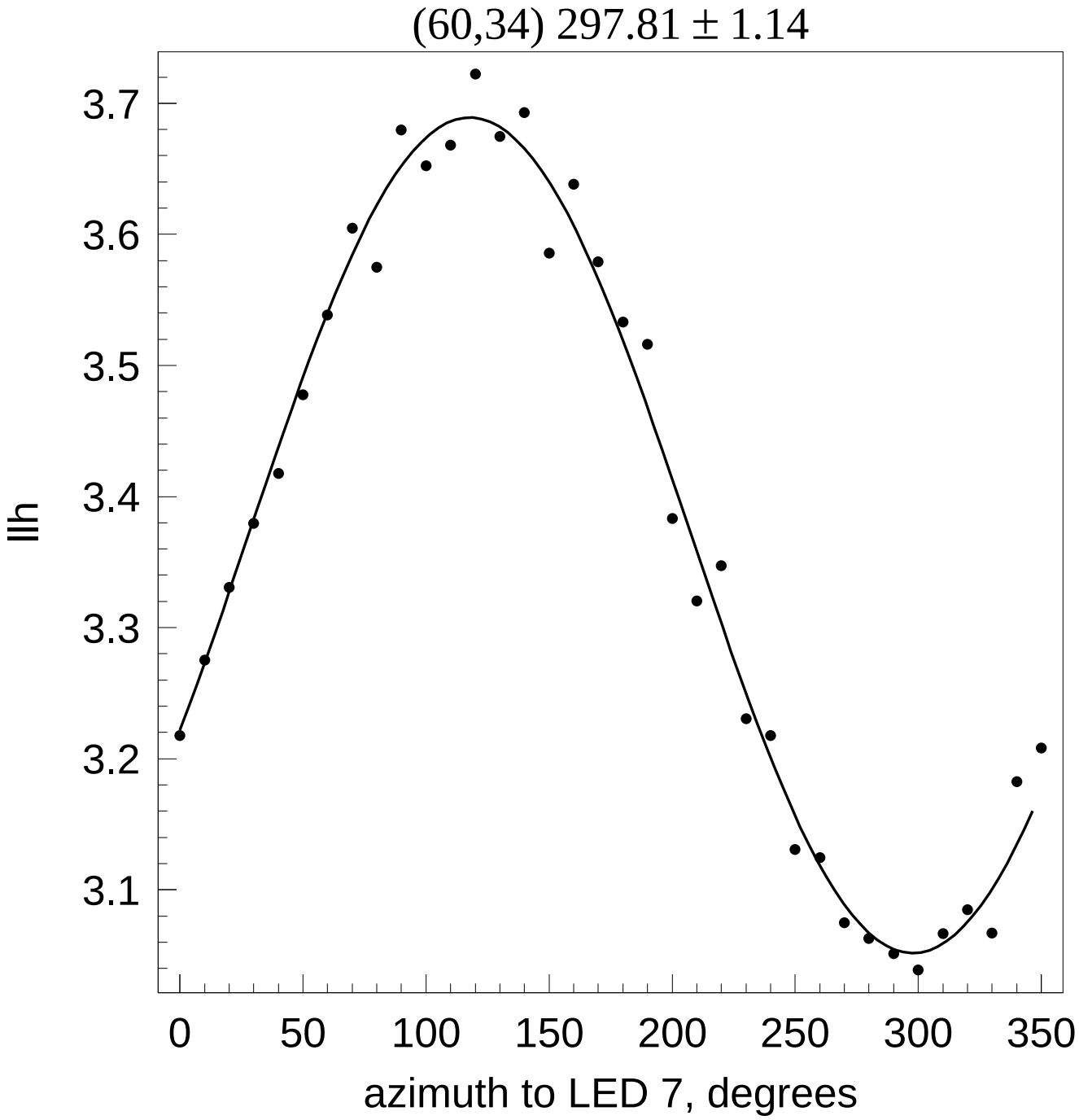

(60,33) 339.19 ± 0.81
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

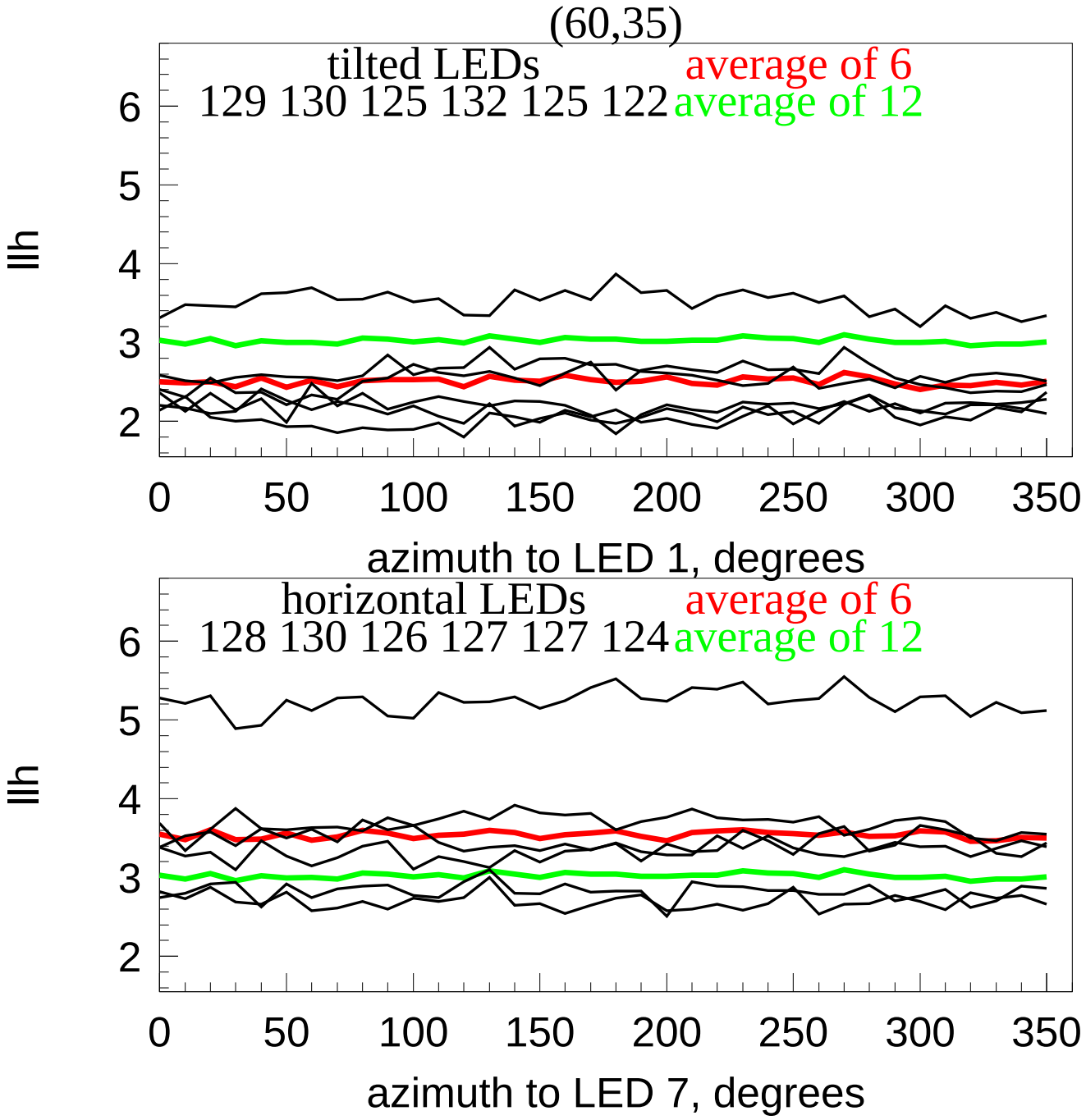

(60,33) 338.88 ± 0.81
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

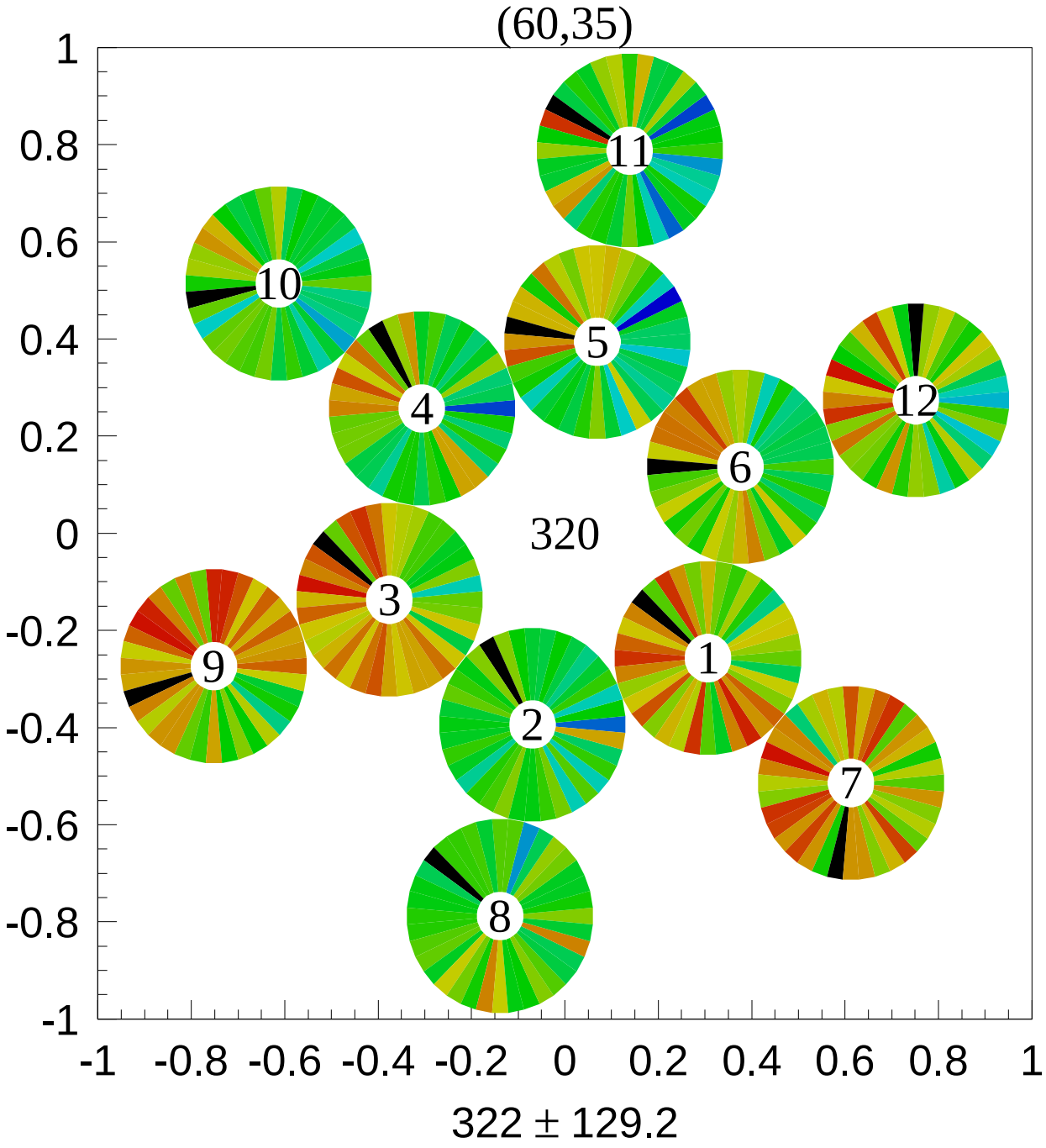

(60,34)
tilted LEDs
127 125 124 128 128 126
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 127 123 128 130 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

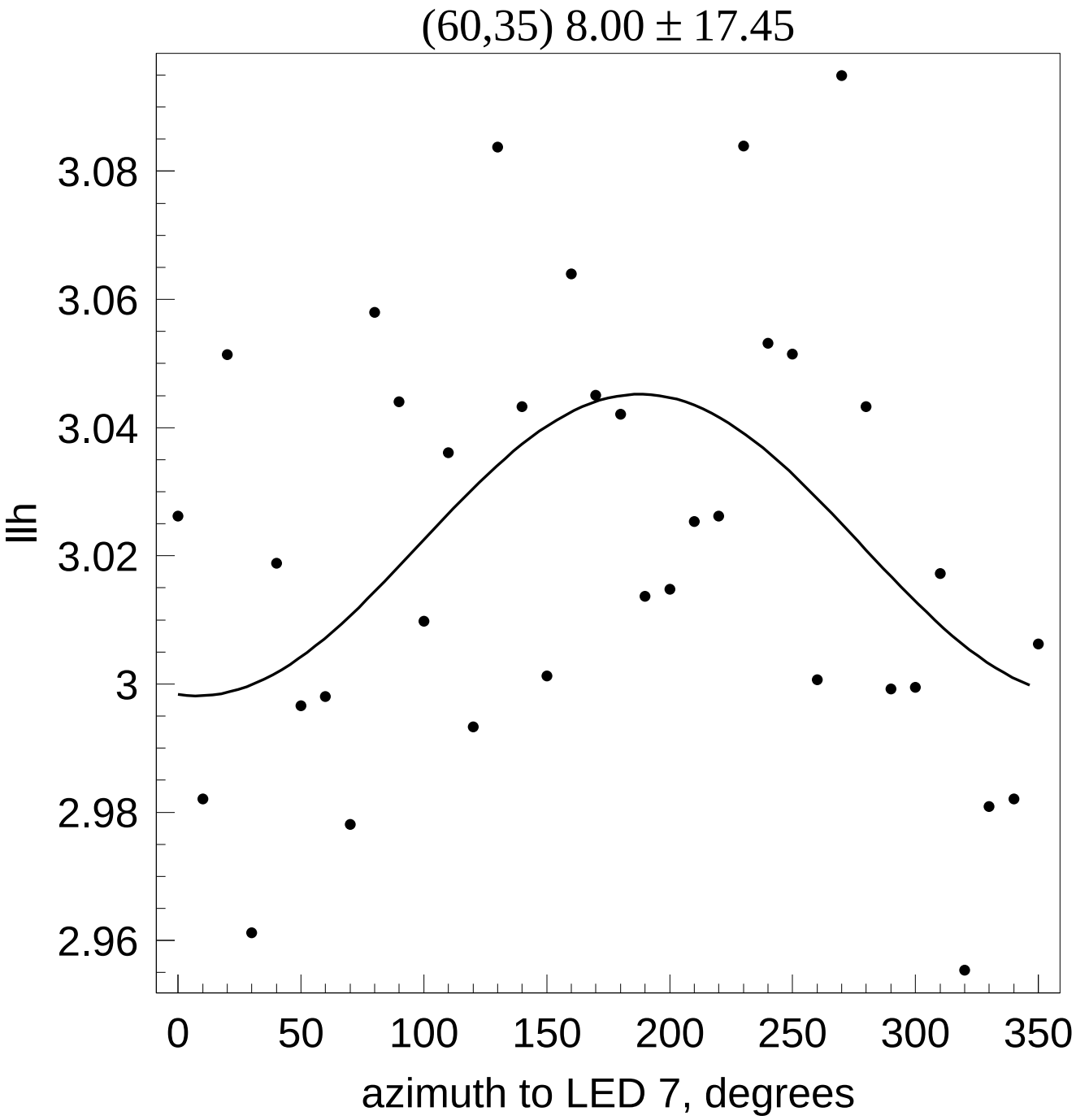

(60,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
294.3 ± 20.3

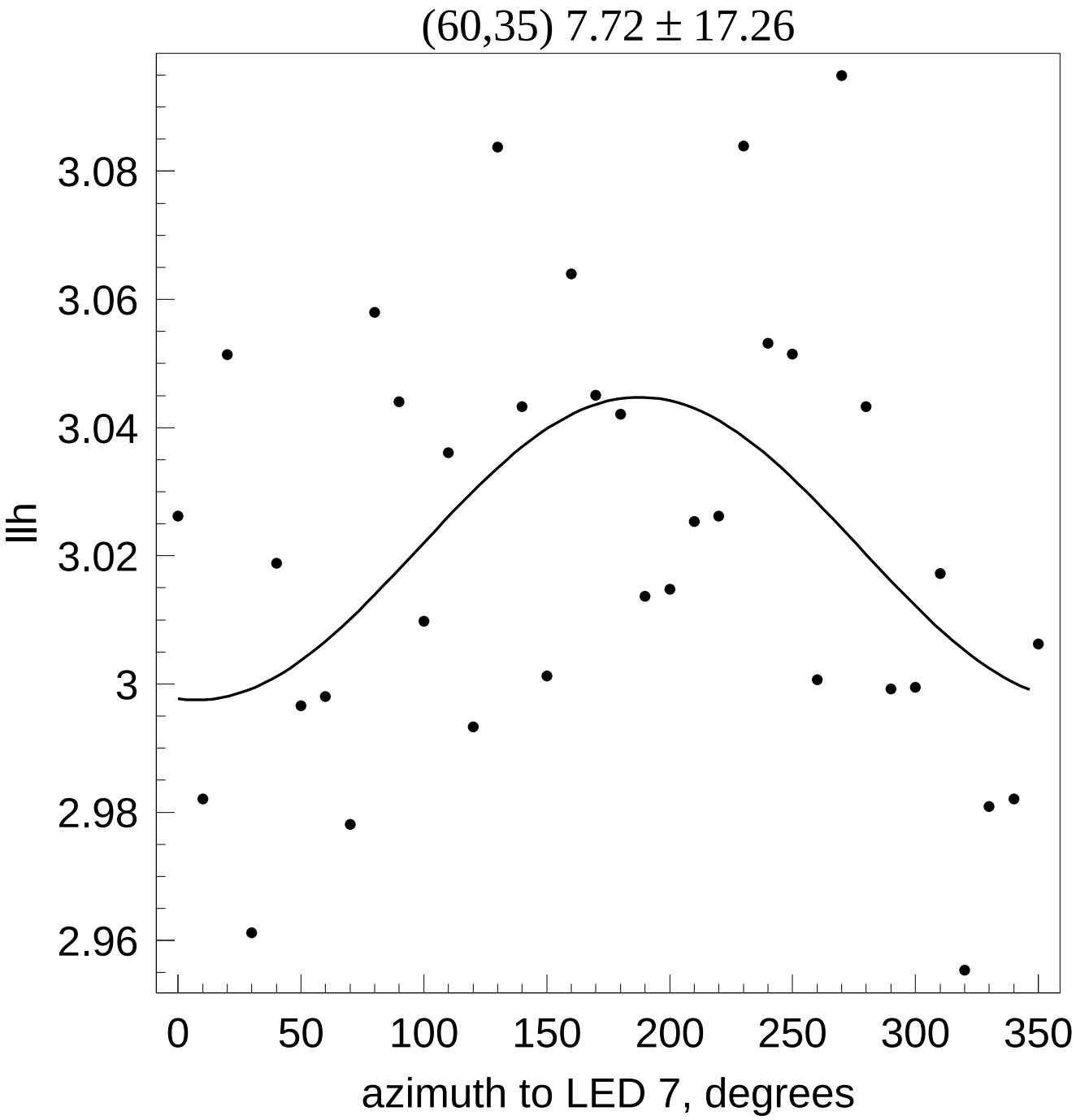

(60,34) 297.99 ± 1.15
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

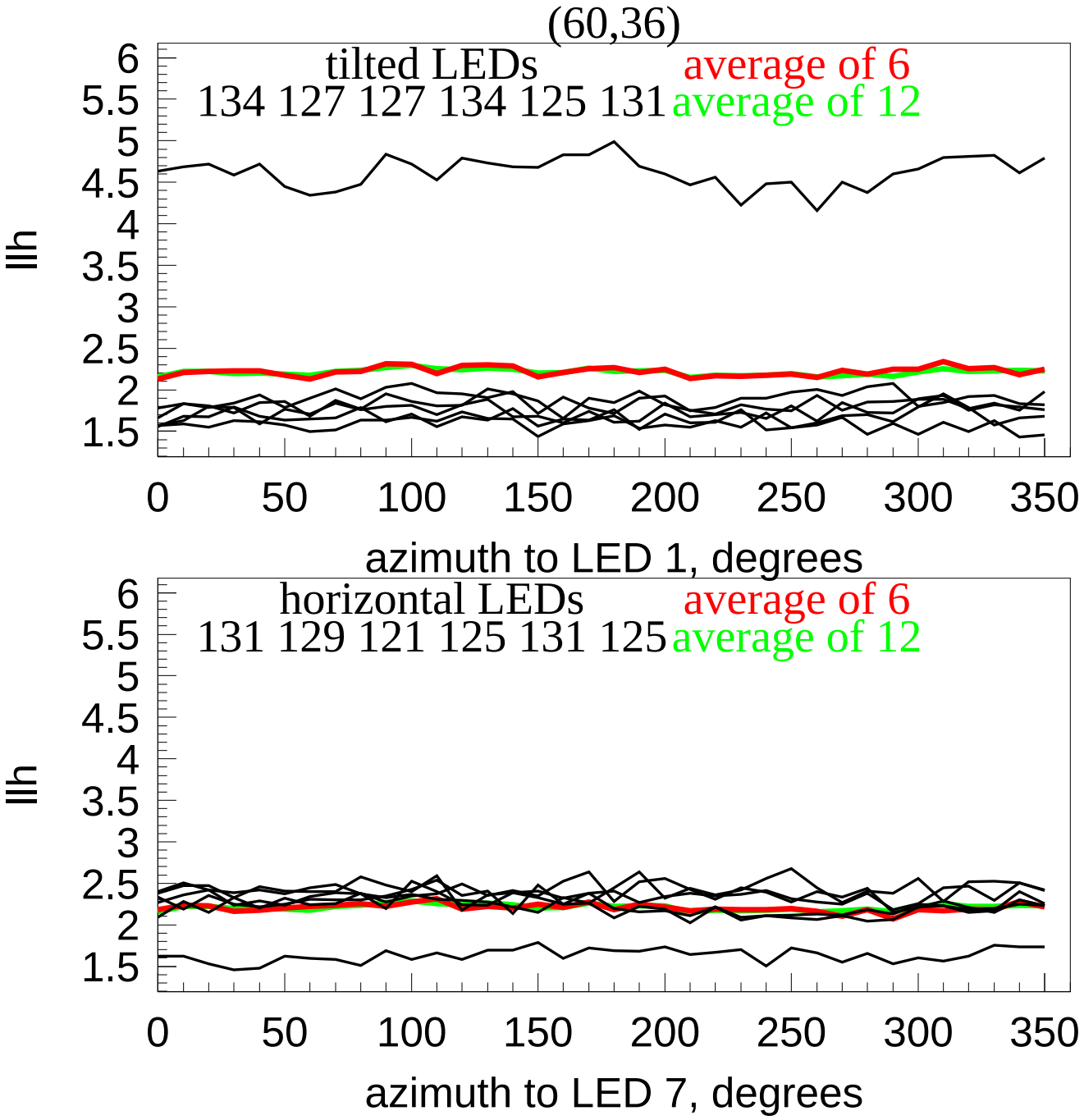

(60,34) 297.81 ± 1.14
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

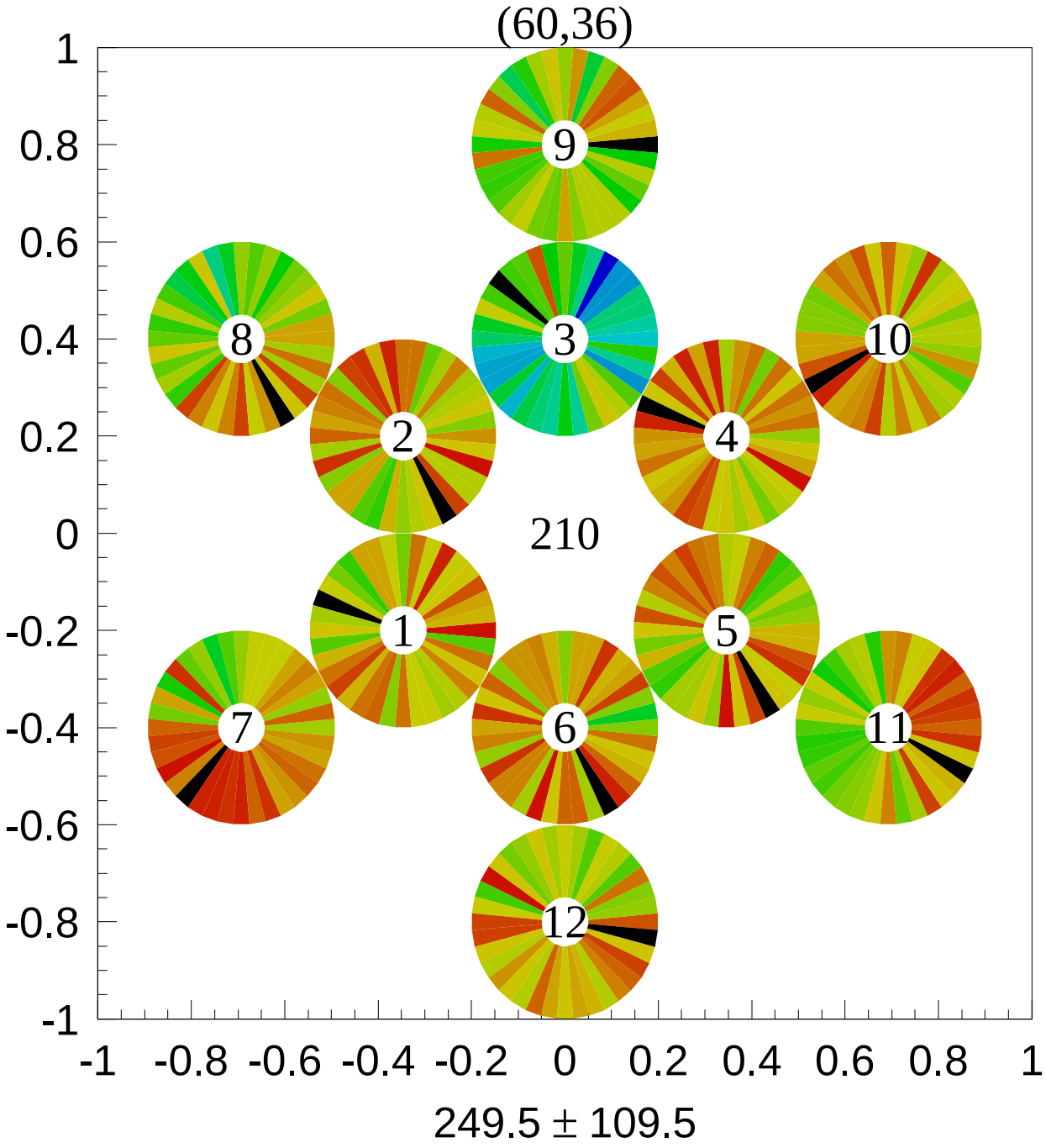

(60,35)
tilted LEDs
129 130 125 132 125 122
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
128 130 126 127 127 124
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

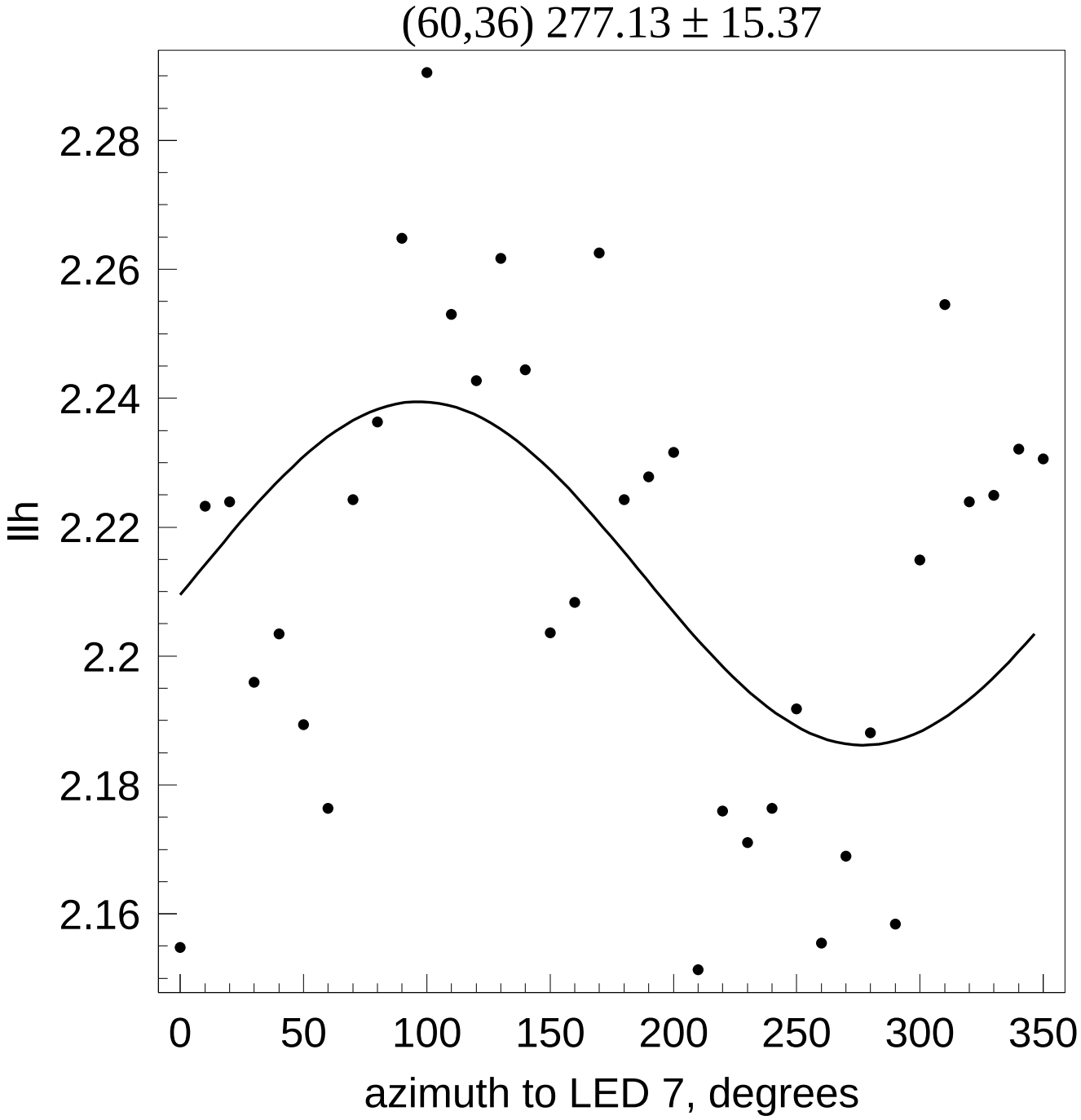

(60,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
10
5
4
12
6
320
3
9
1
2
7
8
322 ± 129.2

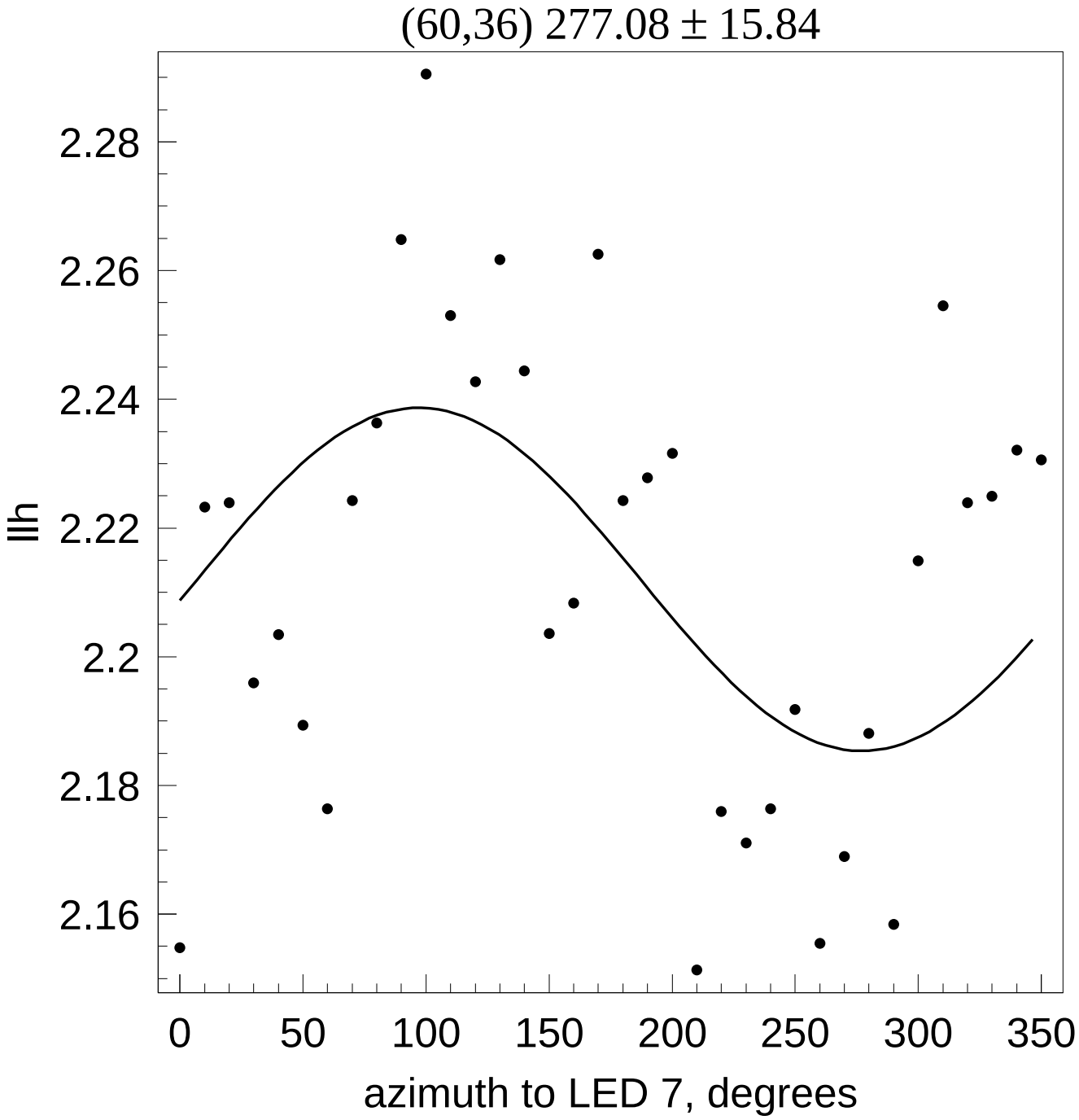

(60,35) 8.00 ± 17.45
llh
3.08
3.06
3.04
3.02
3
2.98
2.96
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

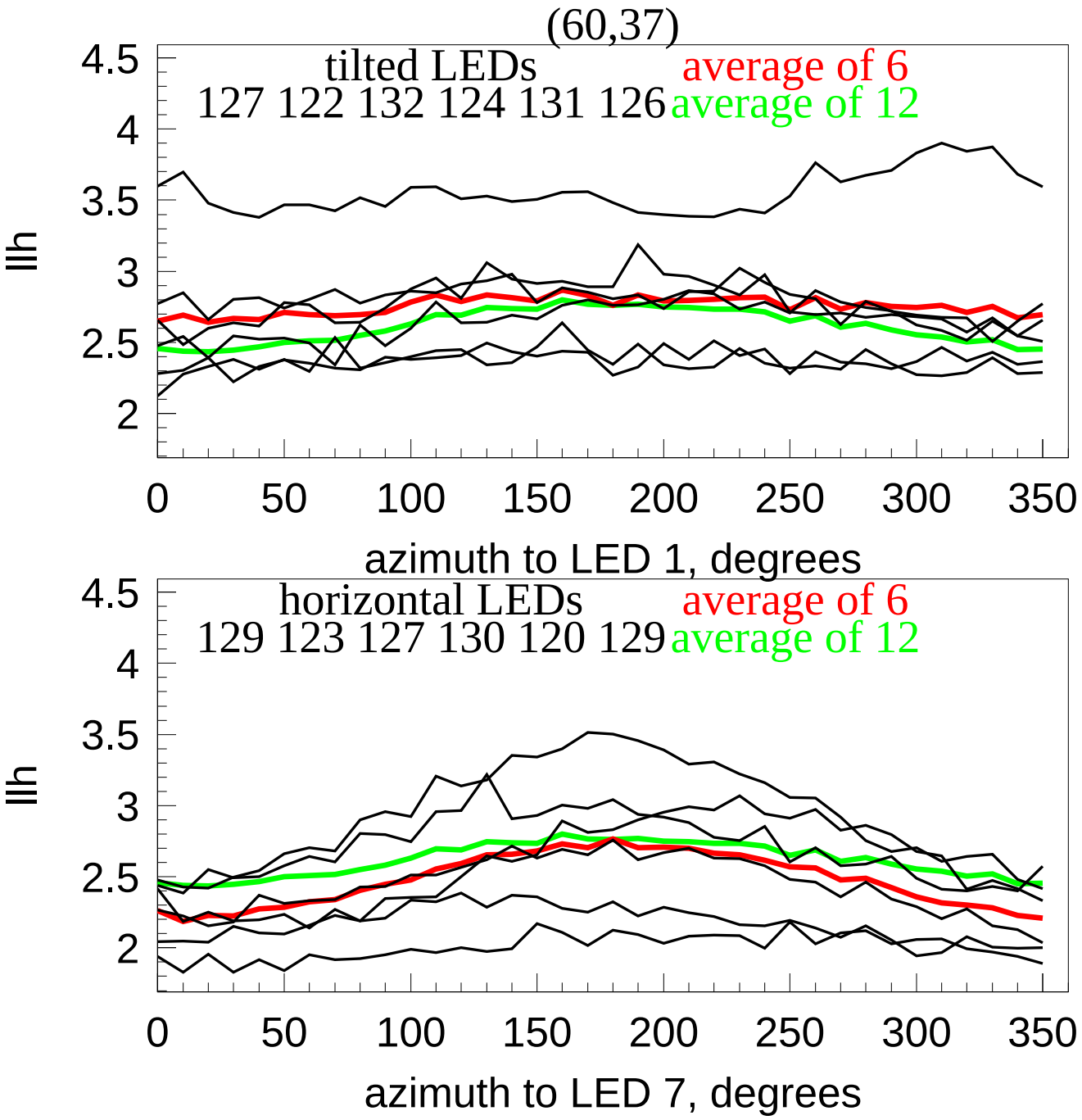

(60,35) 7.72 ± 17.26
llh
3.08
3.06
3.04
3.02
3
2.98
2.96
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

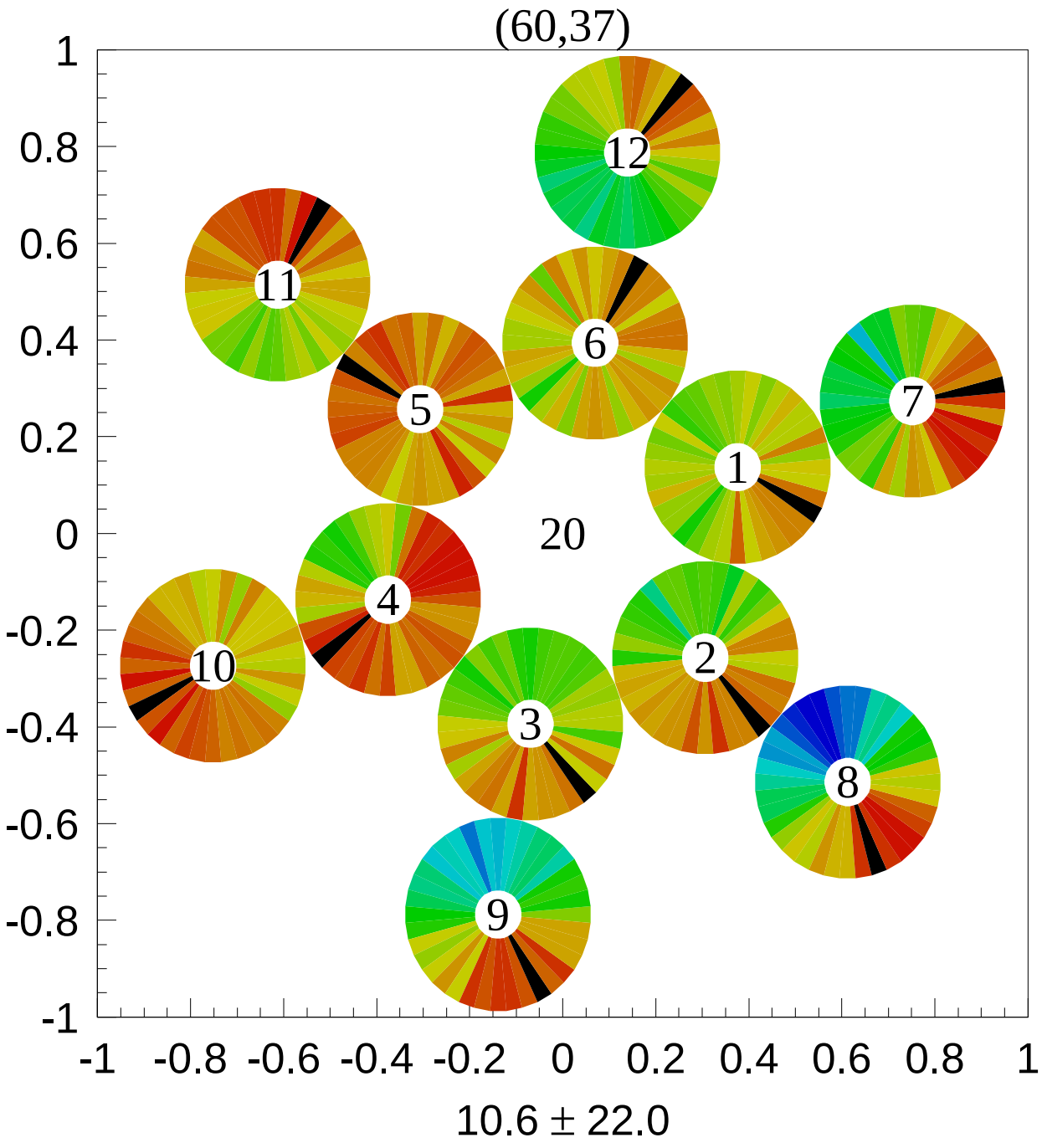

(60,36)
tilted LEDs
134 127 127 134 125 131
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 129 121 125 131 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

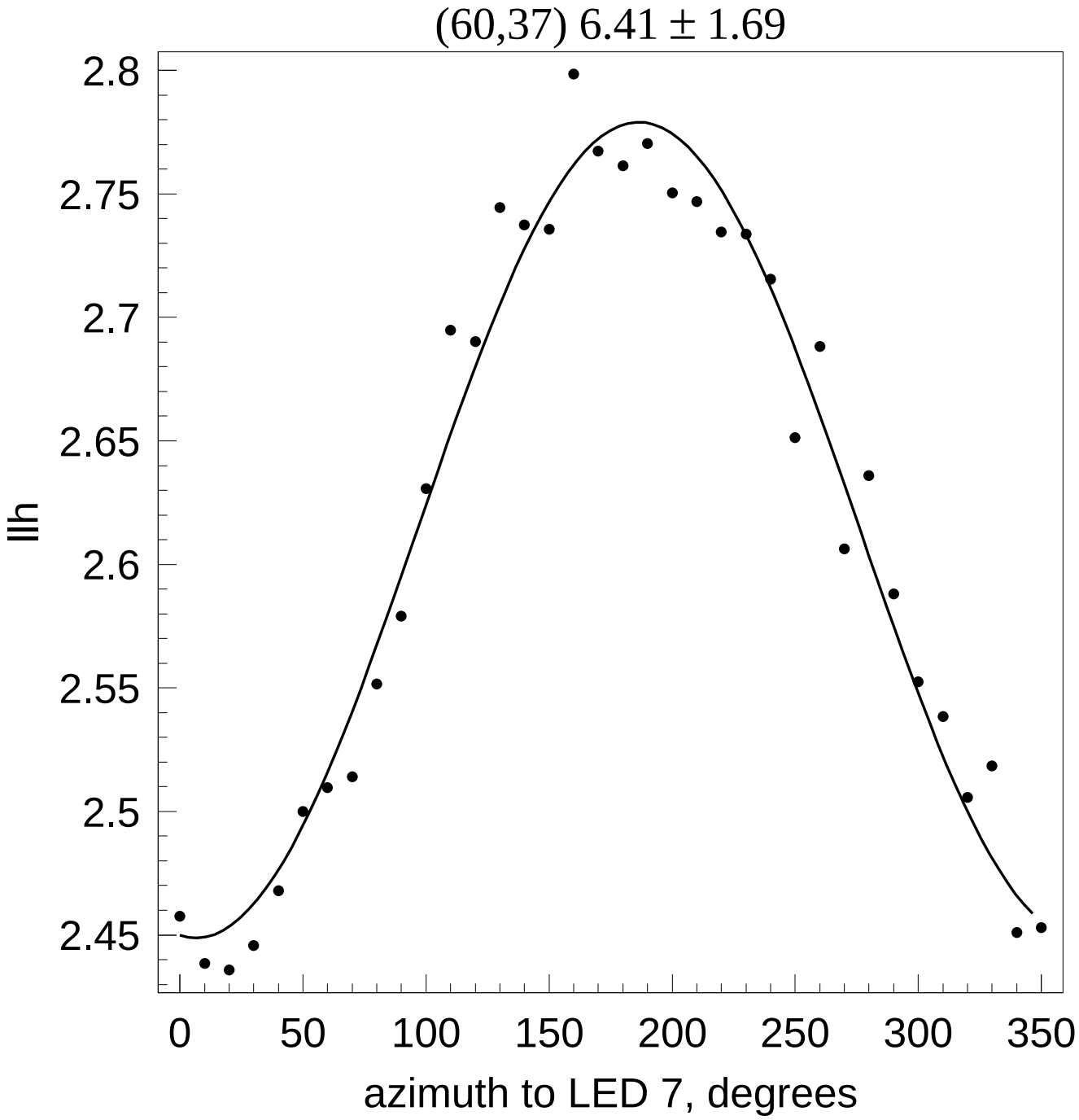

(60,36)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
249.5 ± 109.5

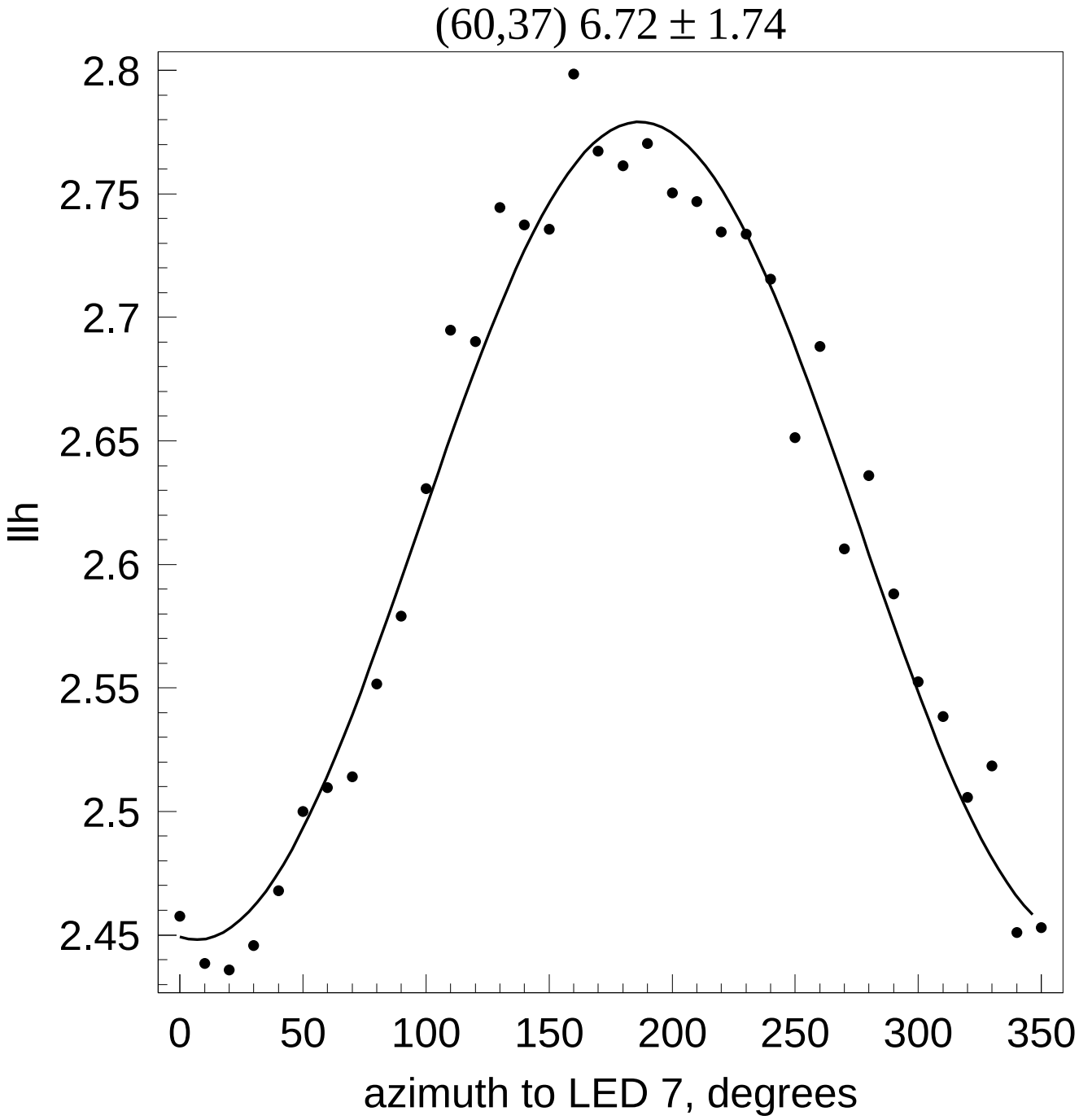

(60,36) 277.13 ± 15.37
2.28
2.26
2.24
2.22
2.2
2.18
2.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

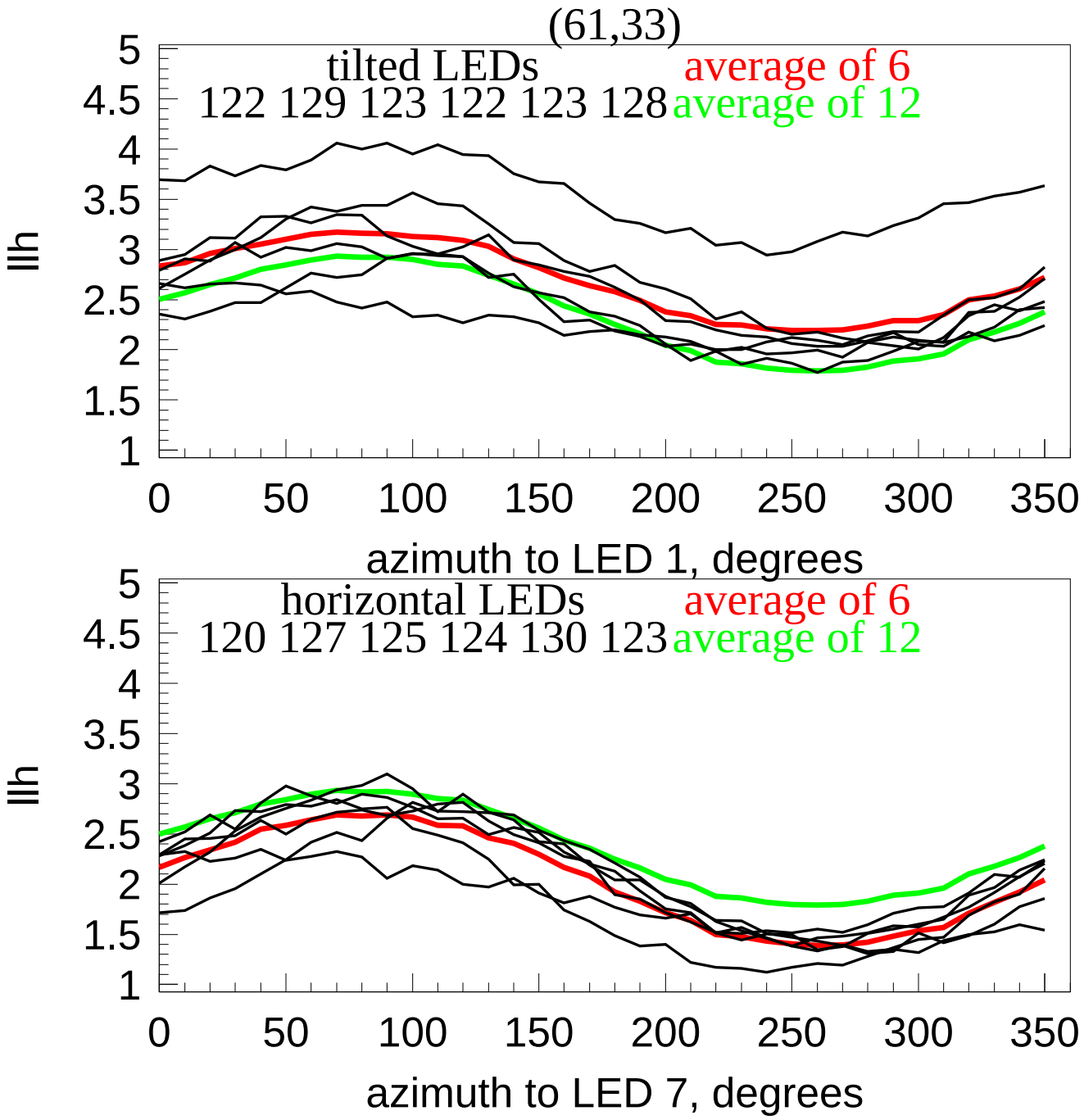

(60,36) 277.08 ± 15.84
2.28
2.26
2.24
2.22
2.2
2.18
2.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

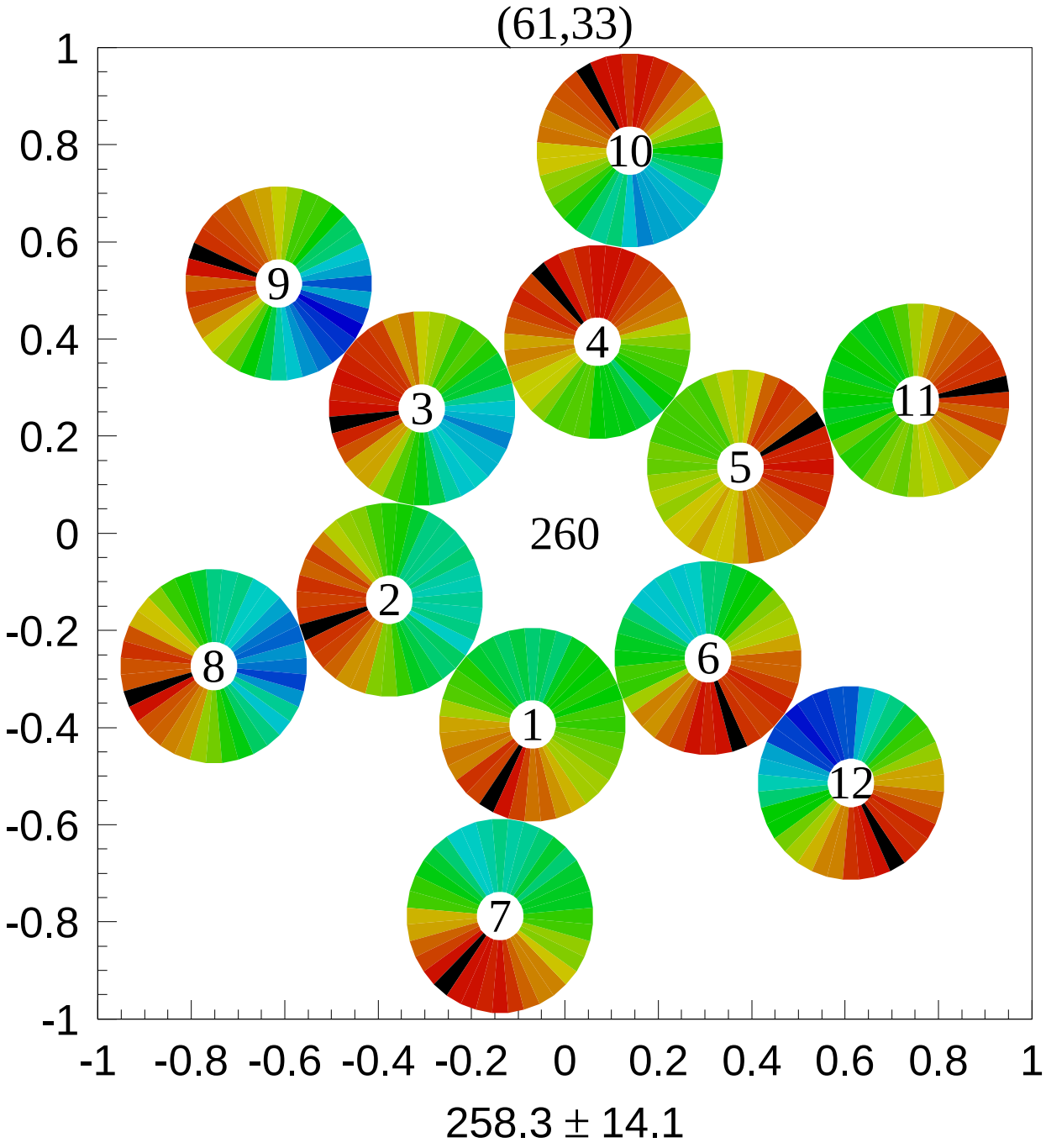

(60,37)
tilted LEDs
127 122 132 124 131 126
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 123 127 130 120 129
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

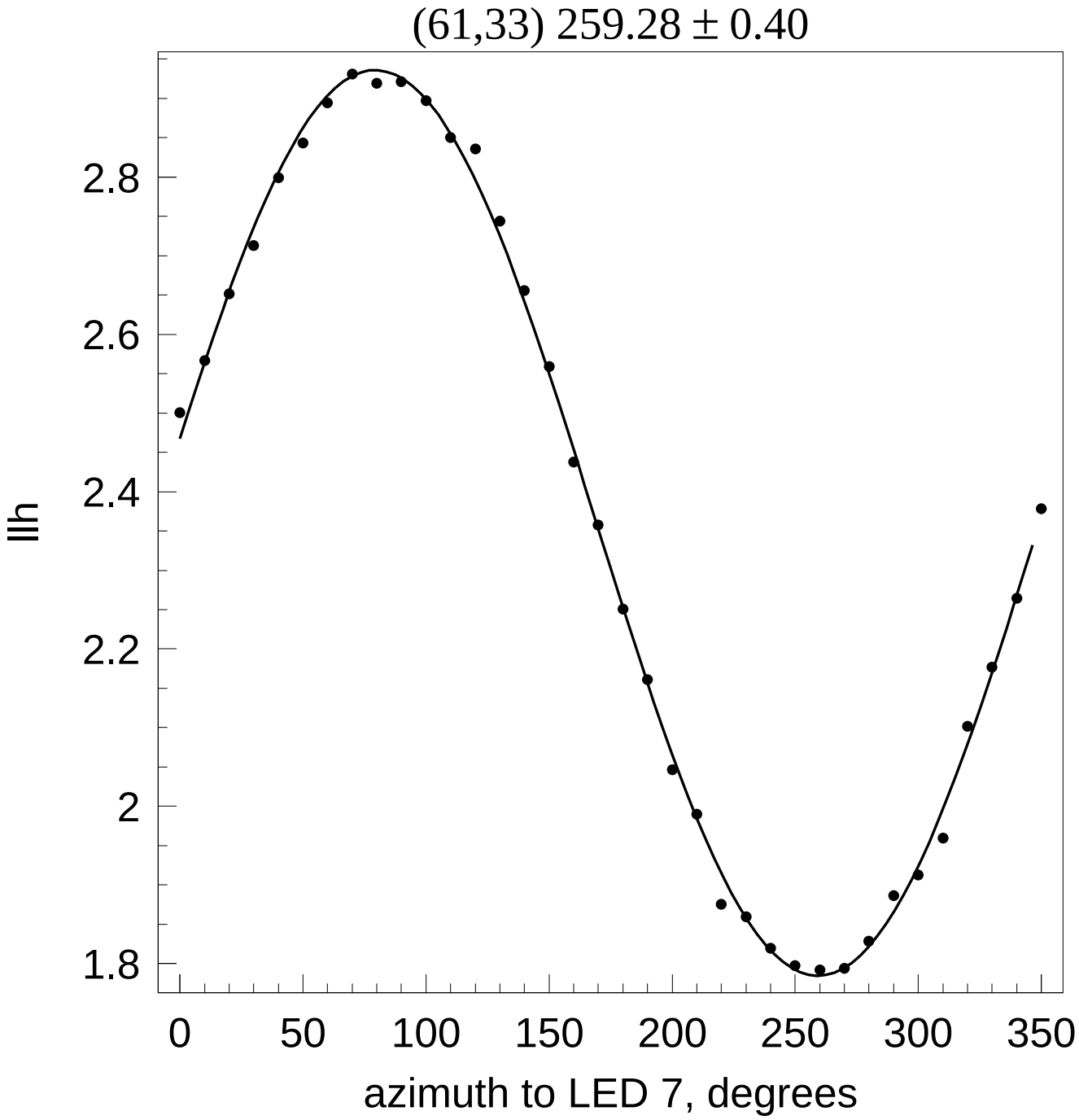

(60,37)
12
11
6
5
7
1
20
4
10
2
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10.6 ± 22.0

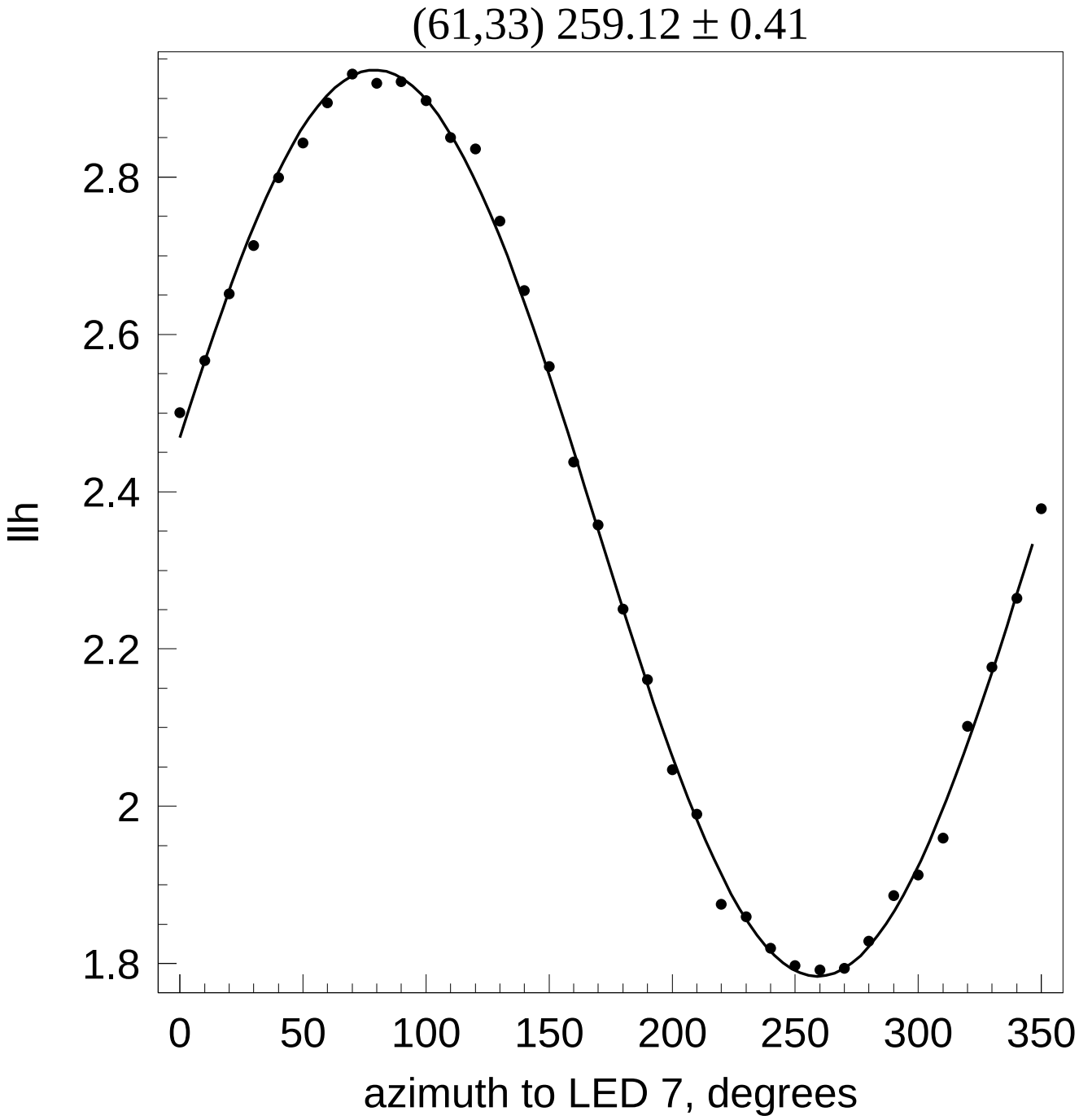

(60,37) 6.41 ± 1.69
2.8
2.75
2.7
2.65
2.6
2.55
2.5
2.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

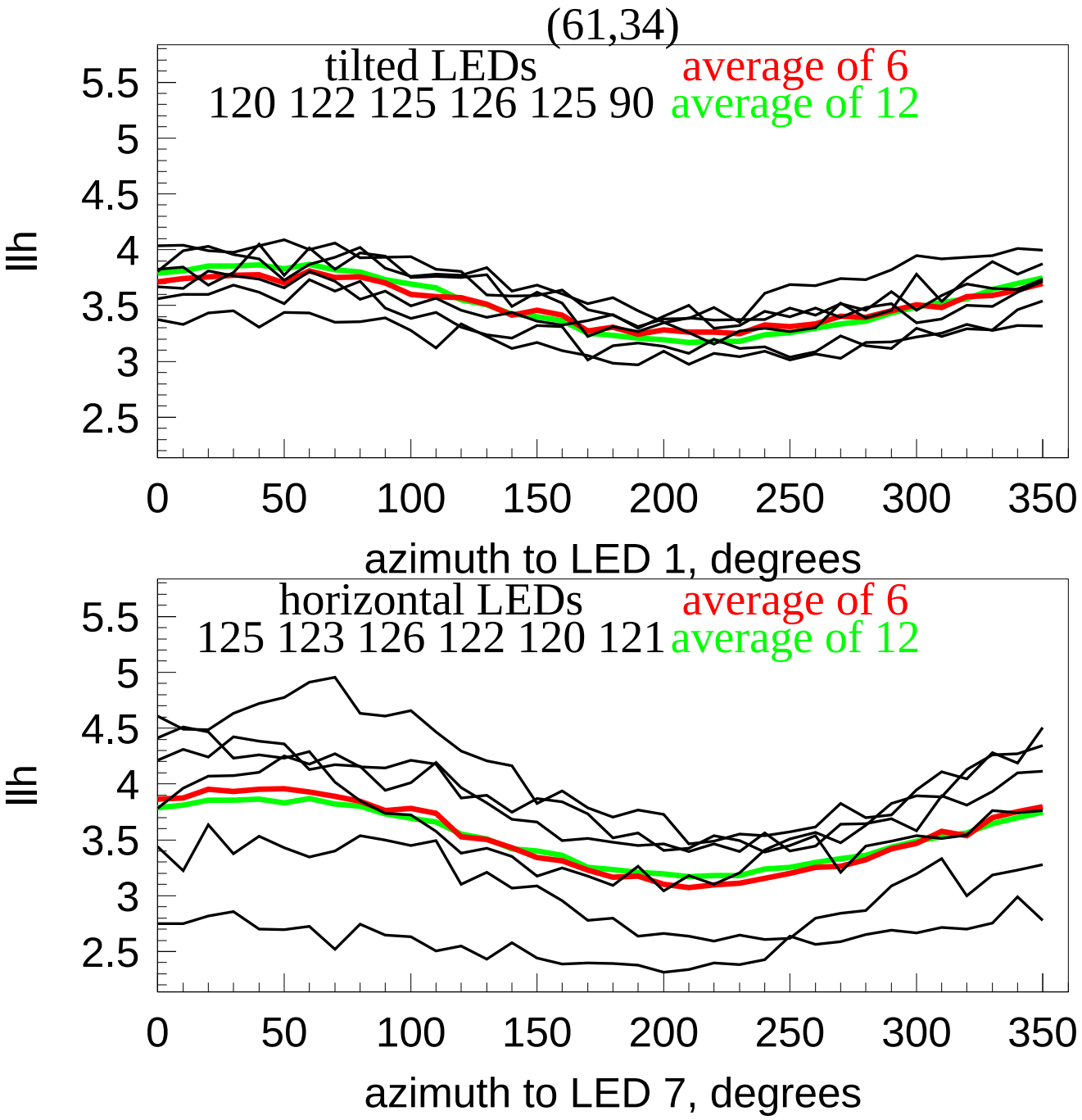

(60,37) 6.72 ± 1.74
2.8
2.75
2.7
2.65
2.6
2.55
2.5
2.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

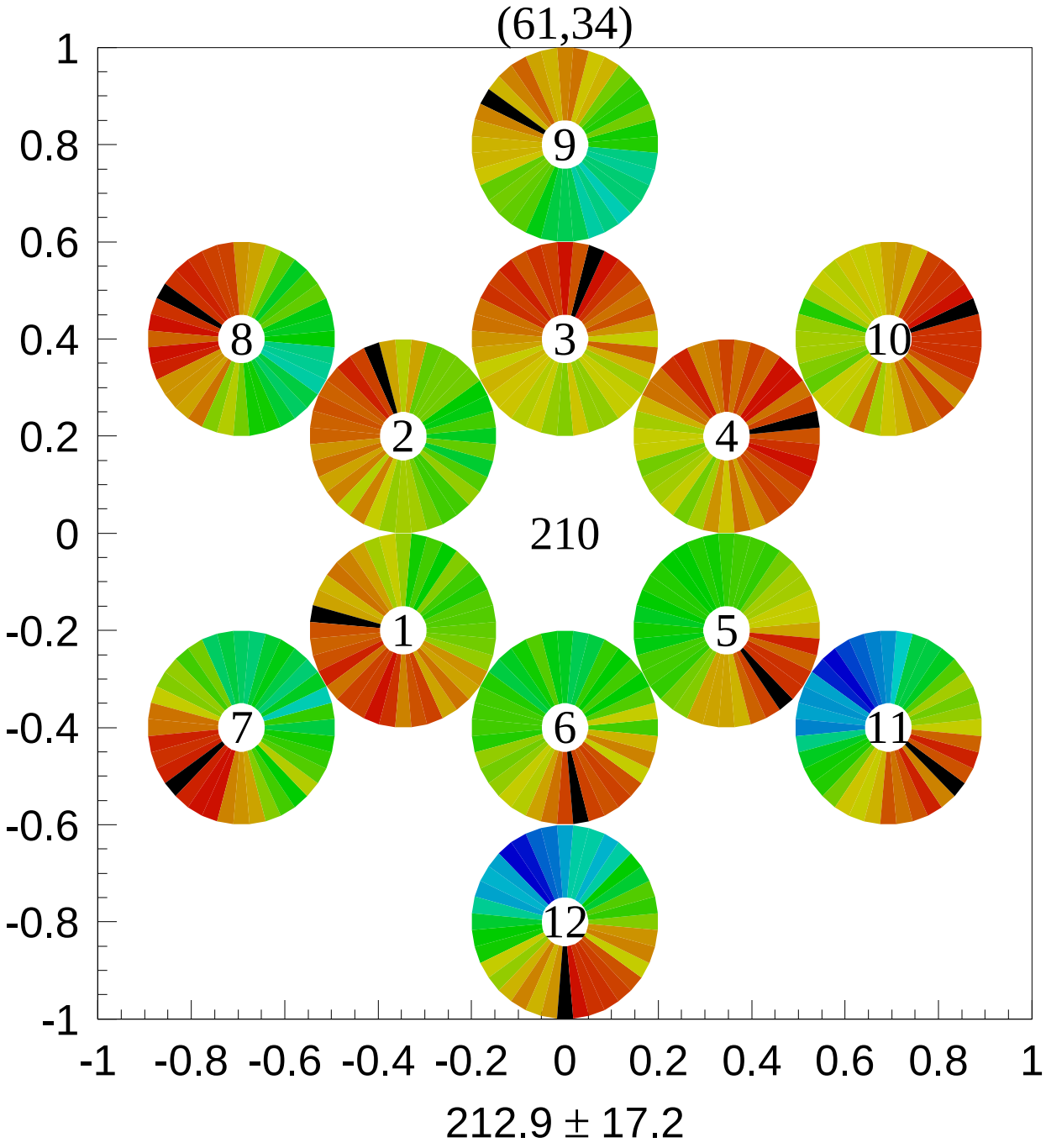

(61,33)
tilted LEDs
122 129 123 122 123 128
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
120 127 125 124 130 123
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

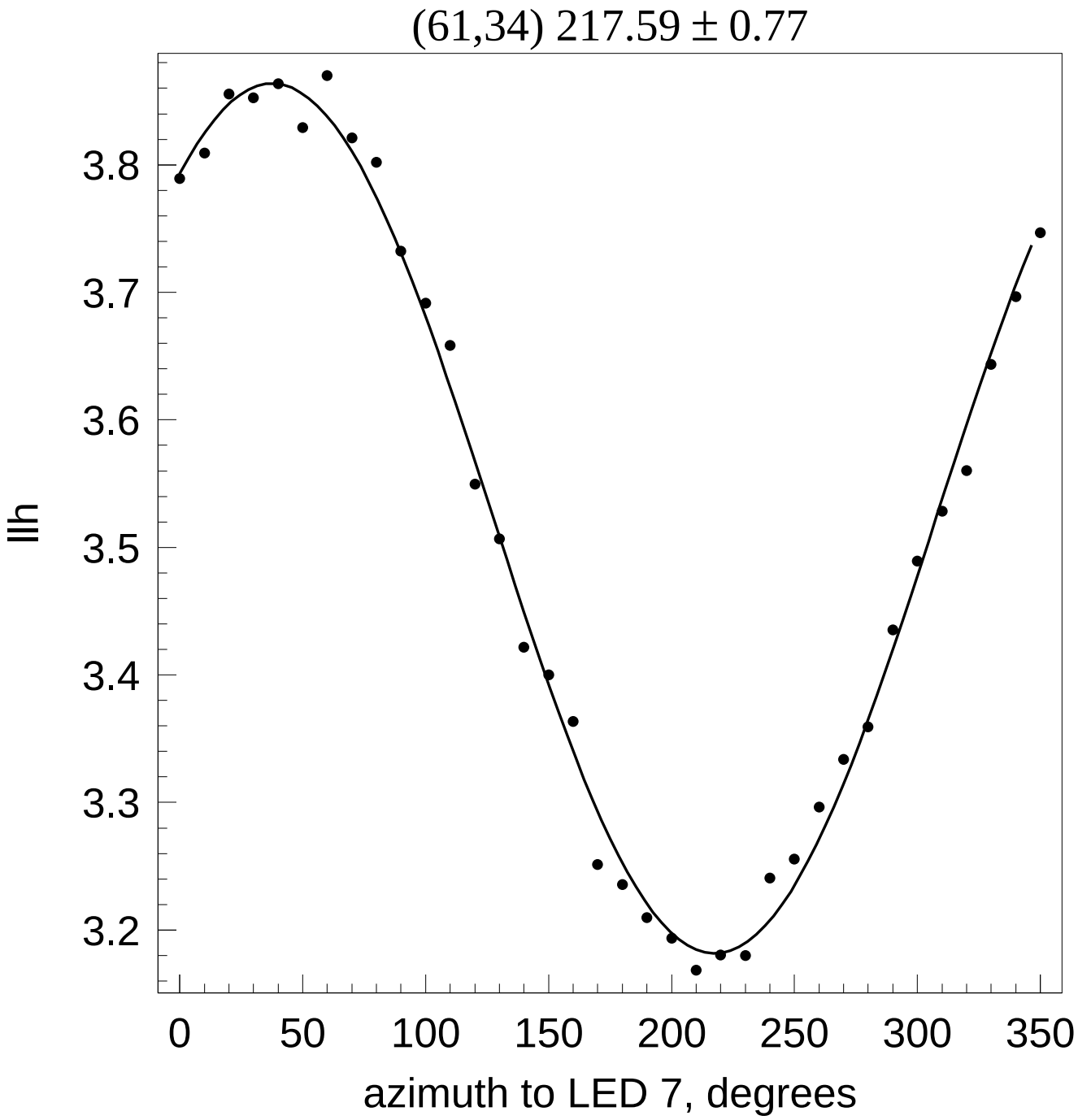

(61,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
258.3 ± 14.1

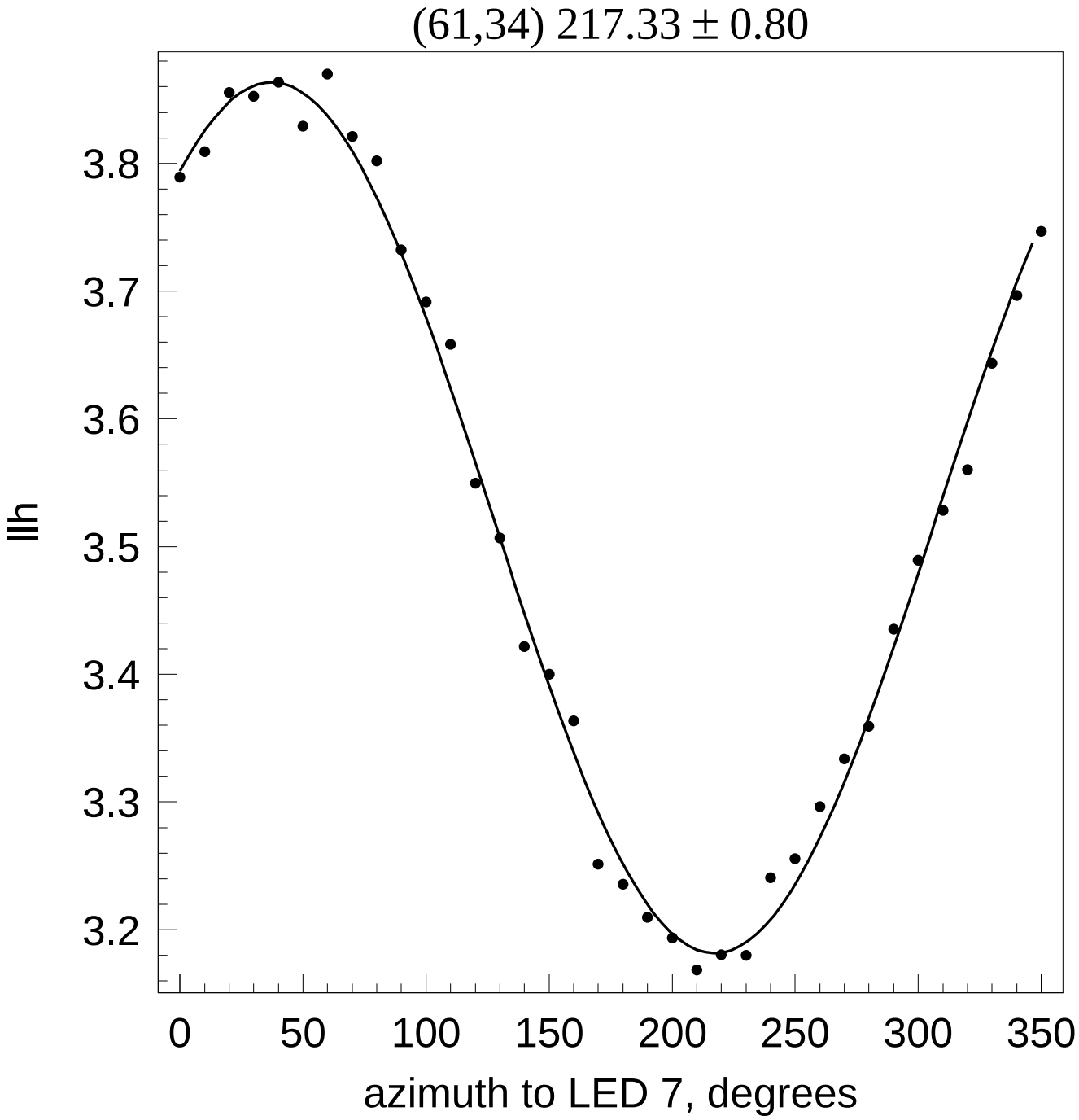

(61,33) 259.28 ± 0.40
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

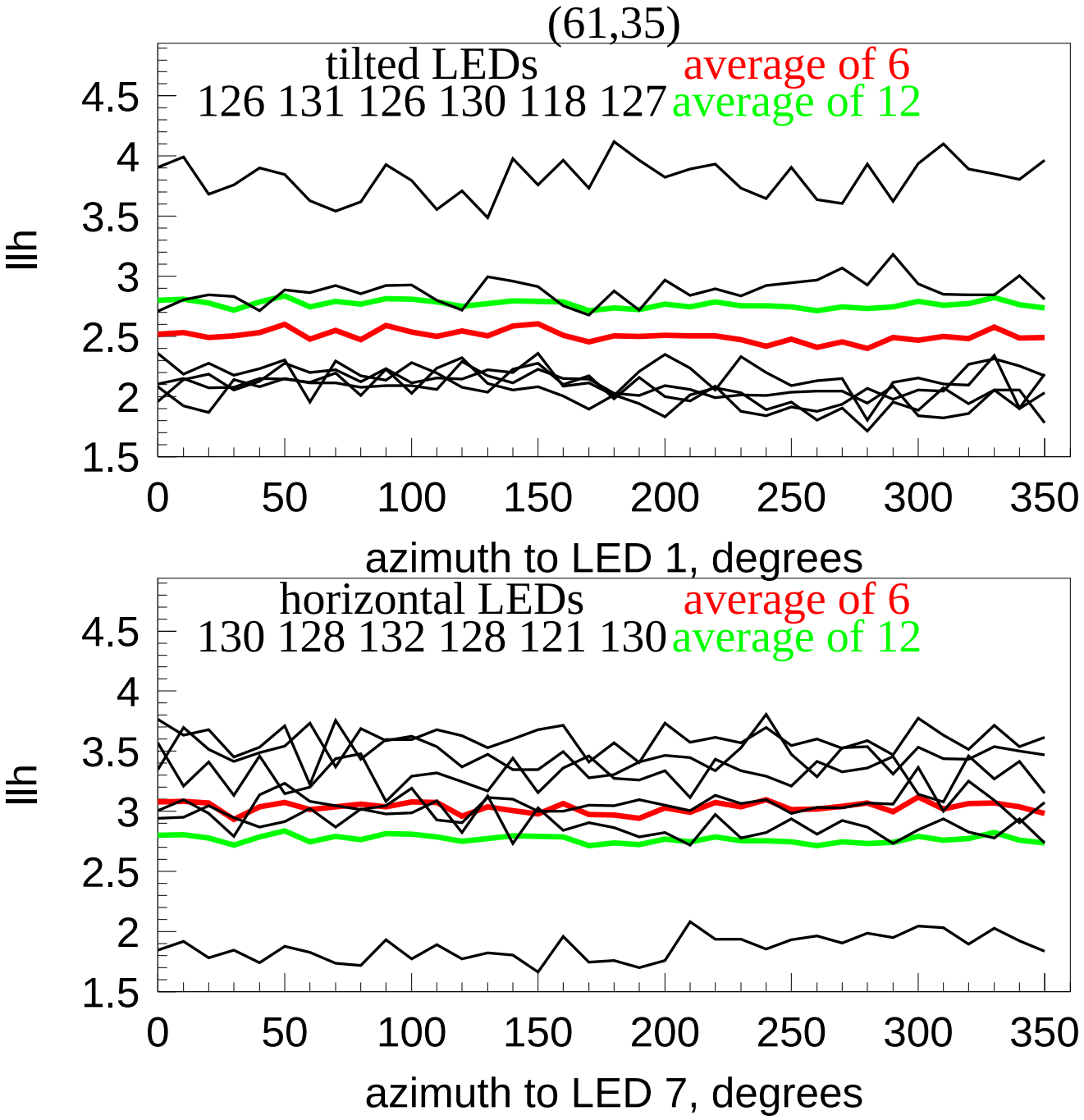

(61,33) 259.12 ± 0.41
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

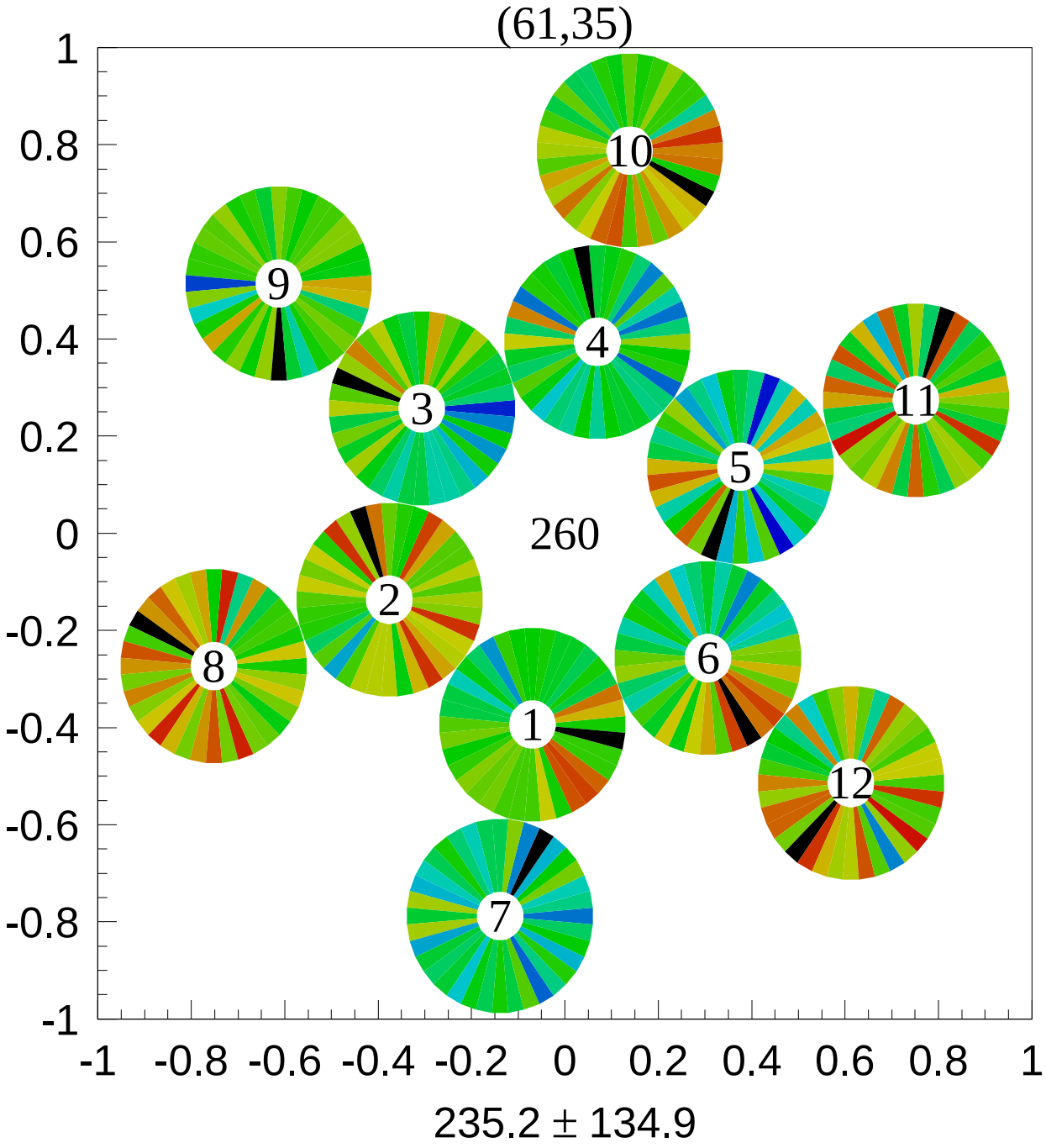

(61,34)
tilted LEDs
120 122 125 126 125 90
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 123 126 122 120 121
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

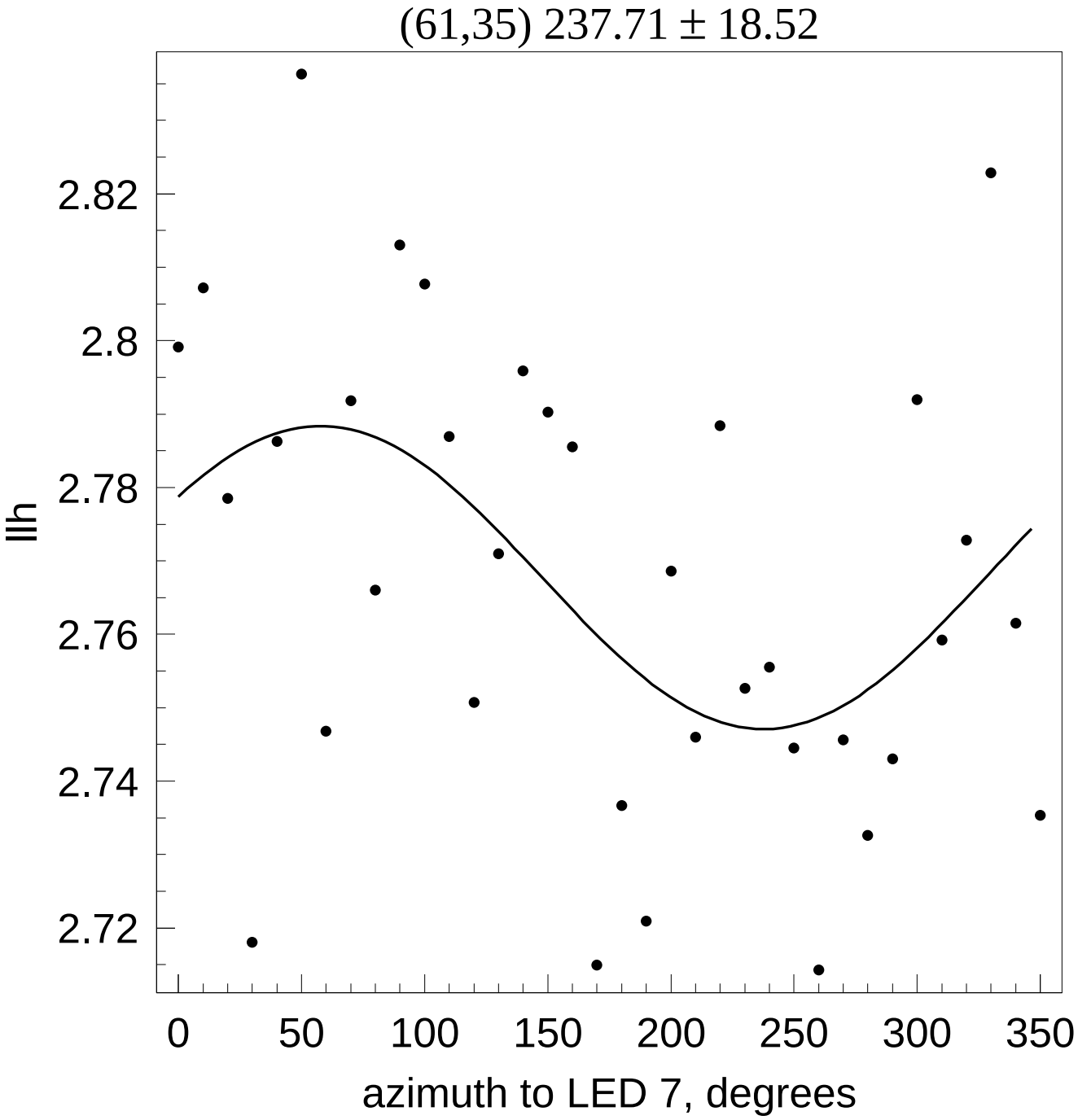

(61,34)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
212.9 ± 17.2

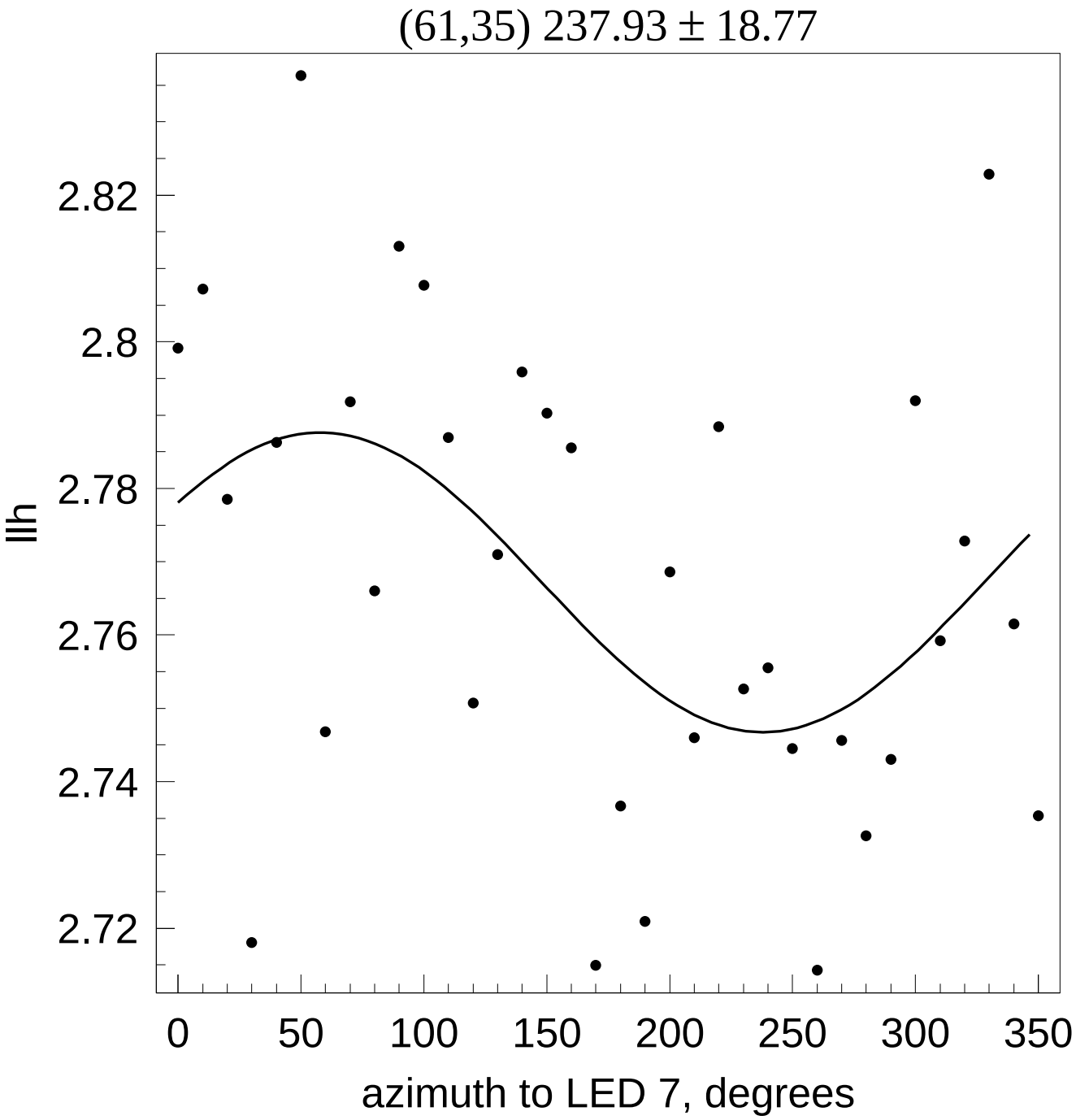

(61,34) 217.59 ± 0.77
llh
3.8
3.7
3.6
3.5
3.4
3.3
3.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

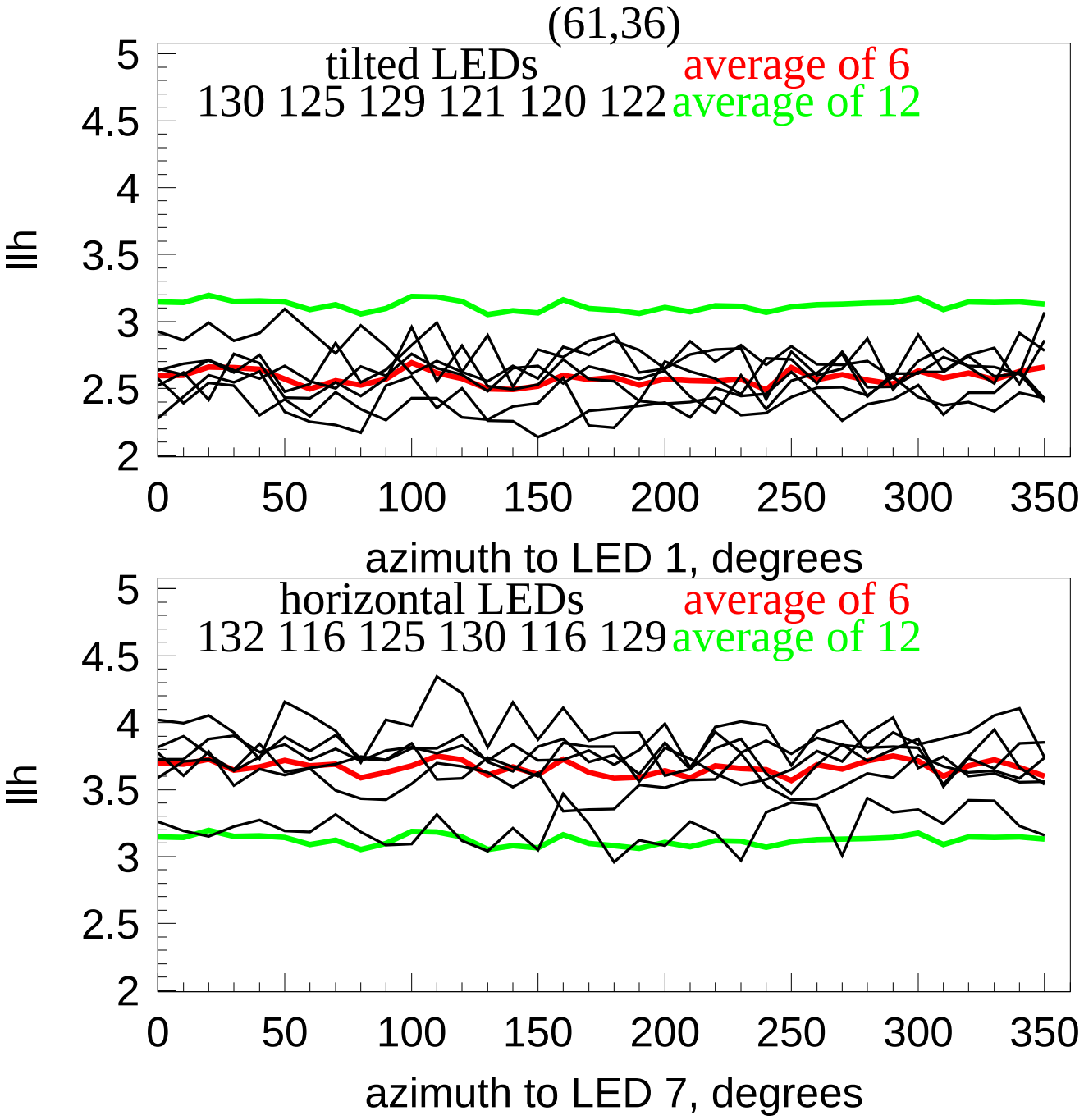

(61,34) 217.33 ± 0.80
3.8
3.7
3.6
3.5
3.4
3.3
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

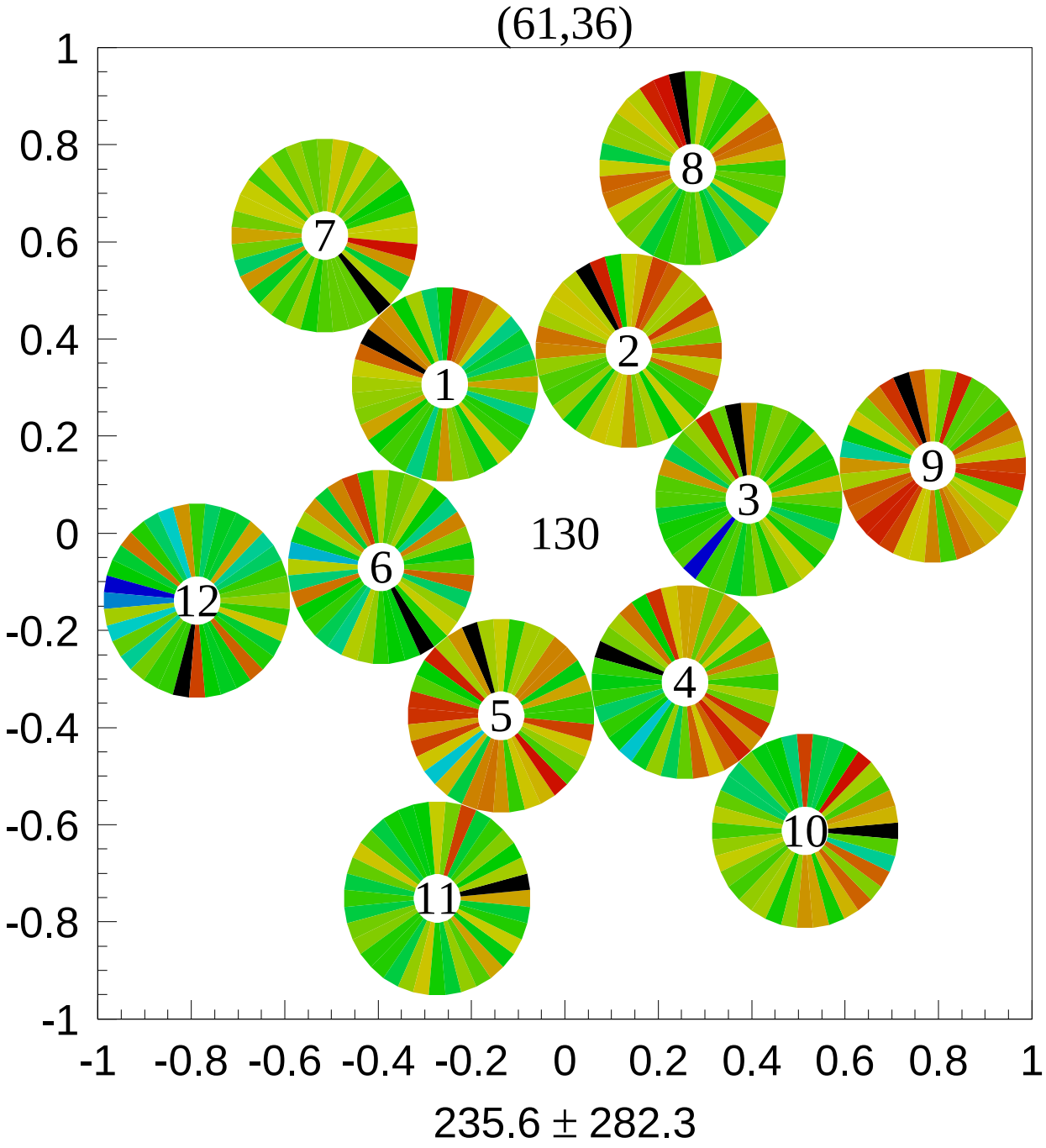

(61,35)
tilted LEDs
126 131 126 130 118 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 128 132 128 121 130
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

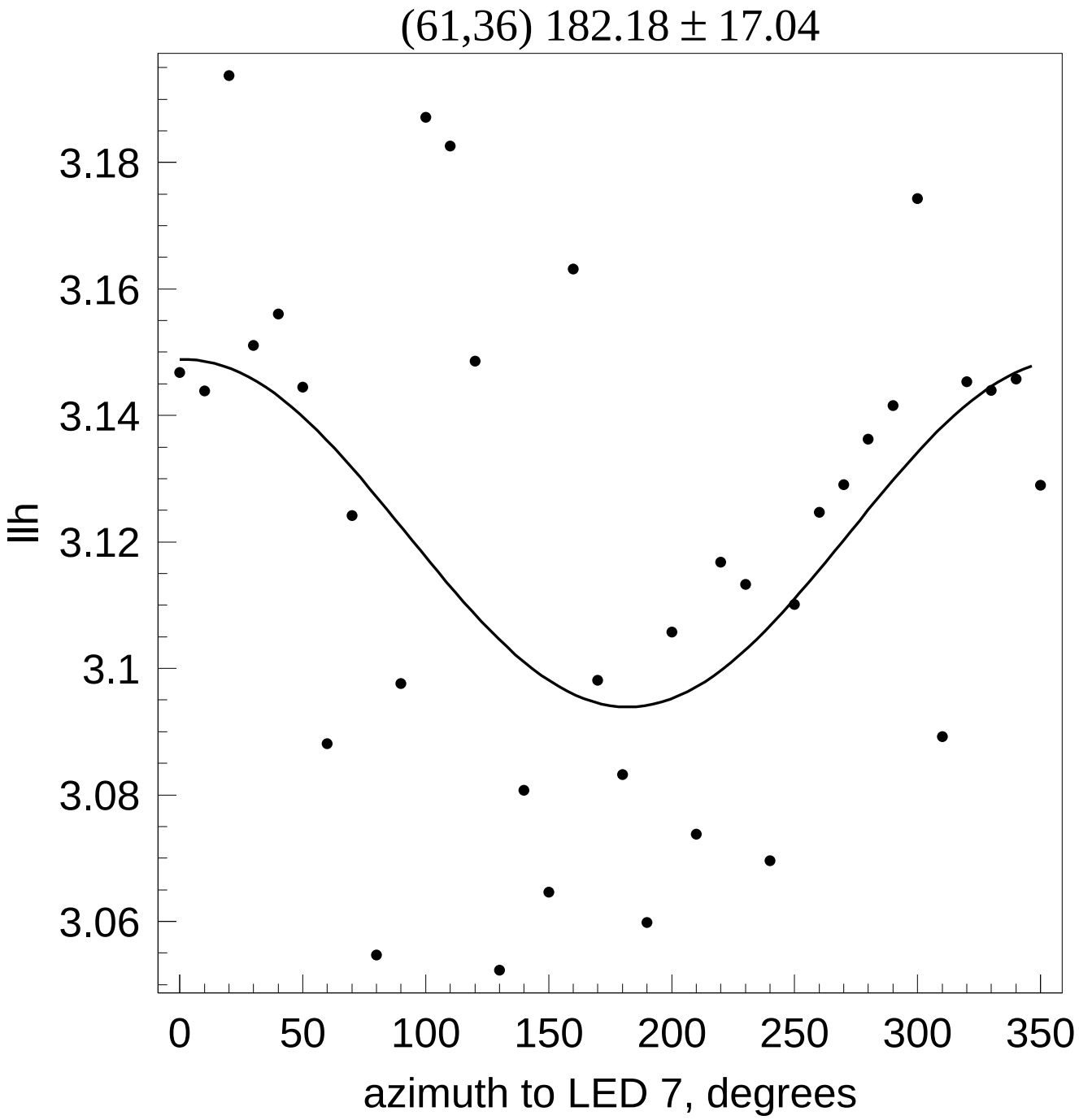

(61,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
235.2 ± 134.9

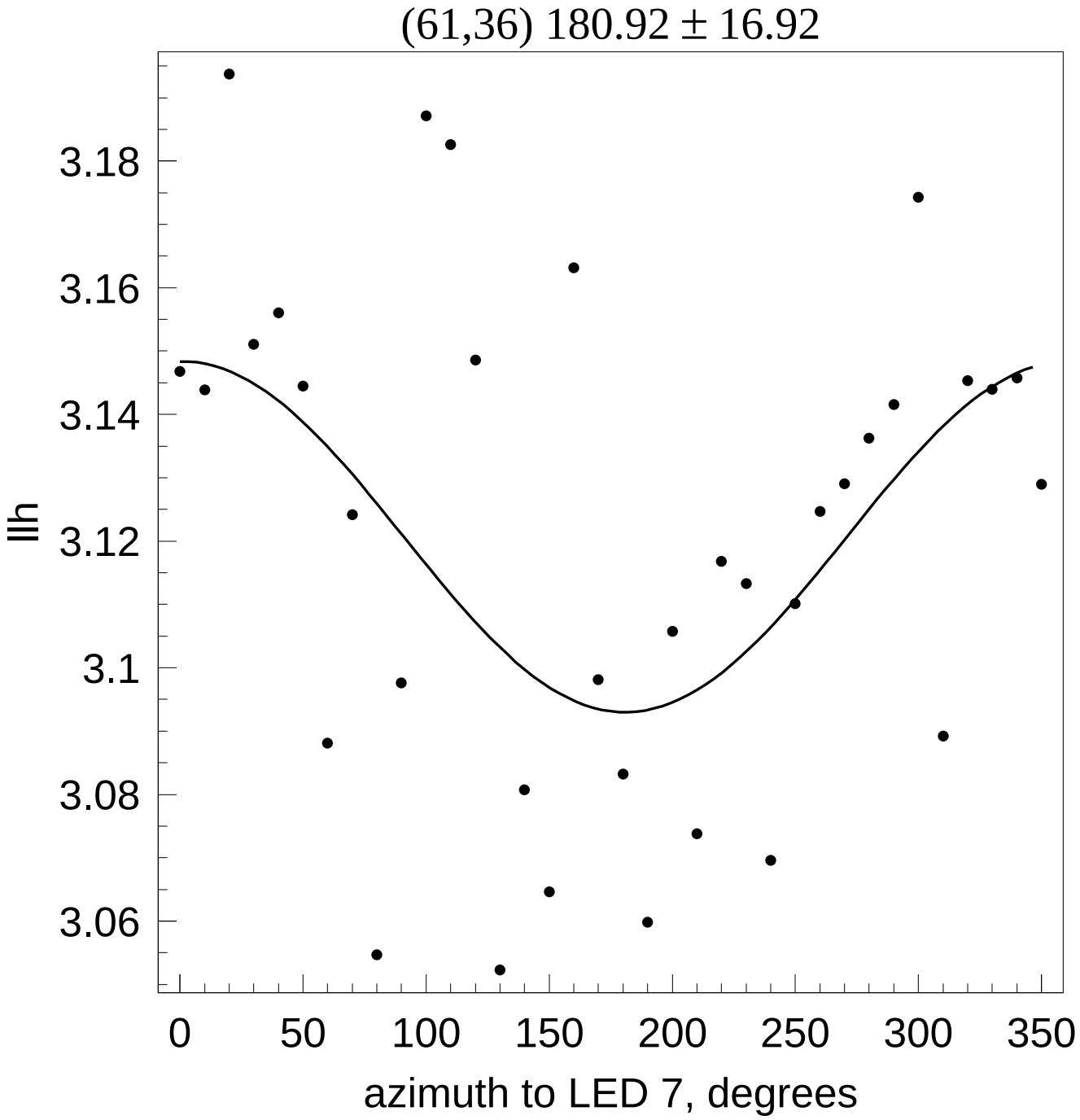

(61,35) 237.71 ± 18.52
2.82
2.8
2.78
2.76
2.74
2.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

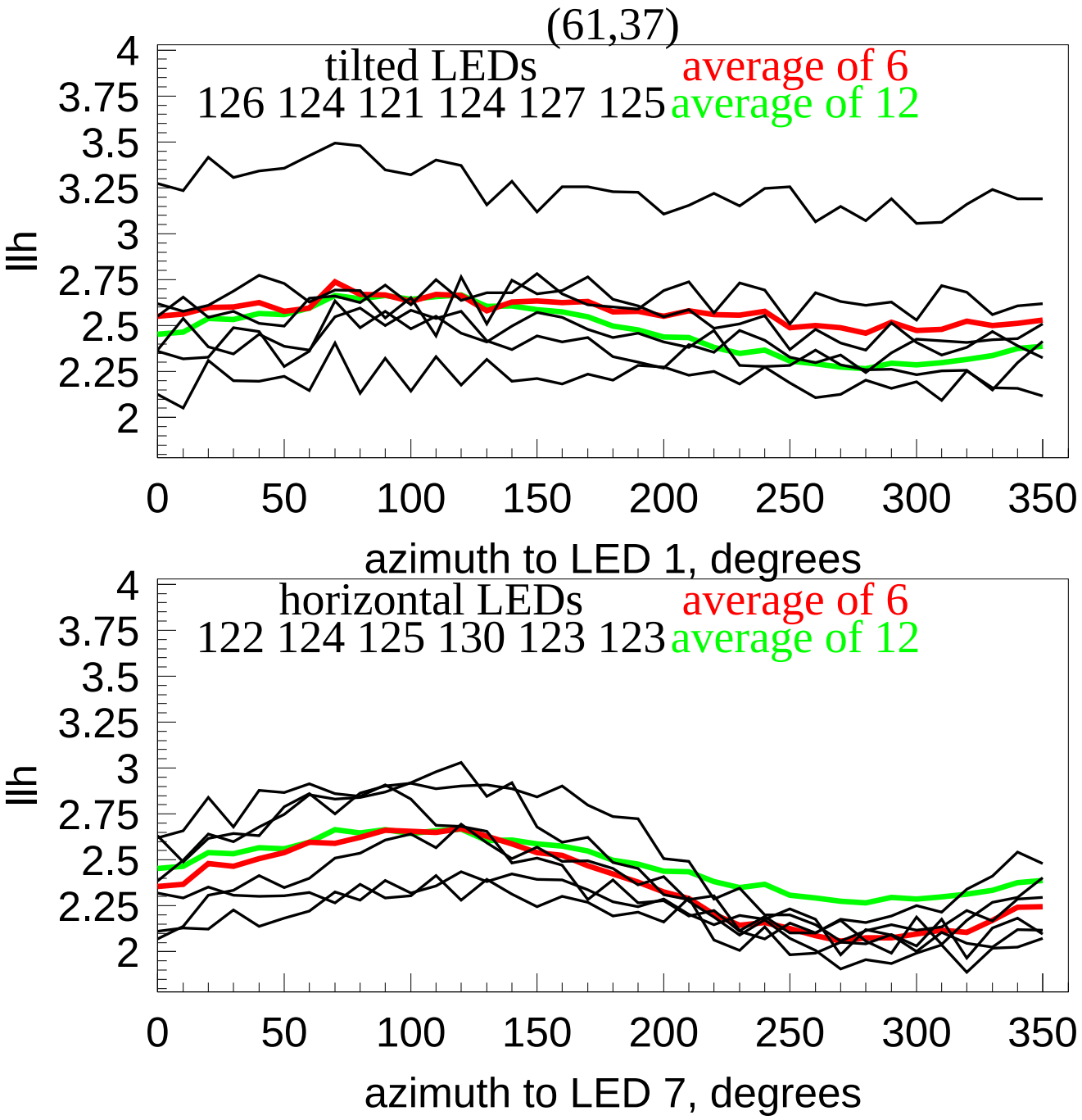

(61,35) 237.93 ± 18.77
2.82
2.8
2.78
2.76
2.74
2.72
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

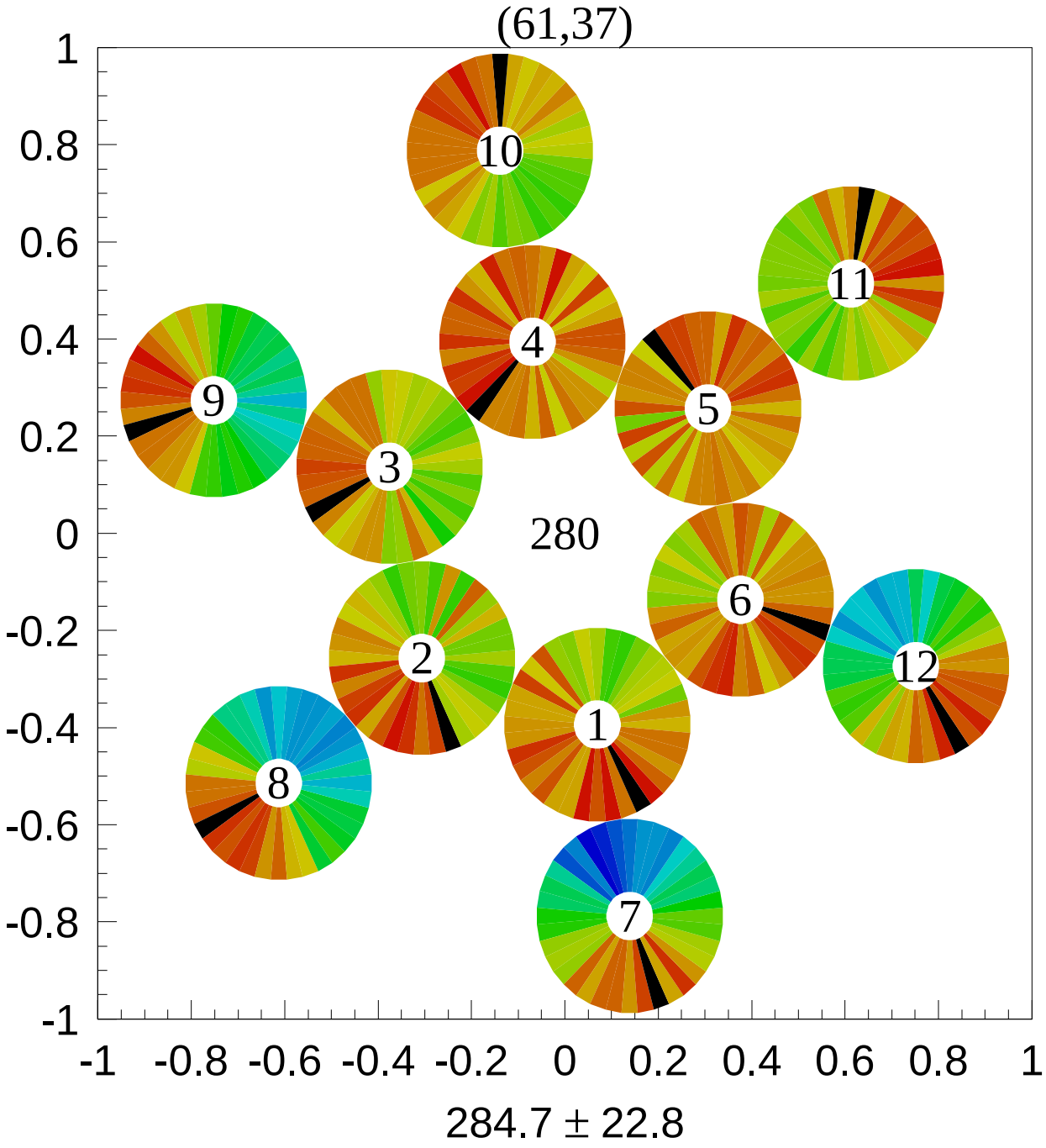

(61,36)
tilted LEDs
130 125 129 121 120 122
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
132 116 125 130 116 129
average of 6
average of 12
IIh
azimuth to LED 7, degrees

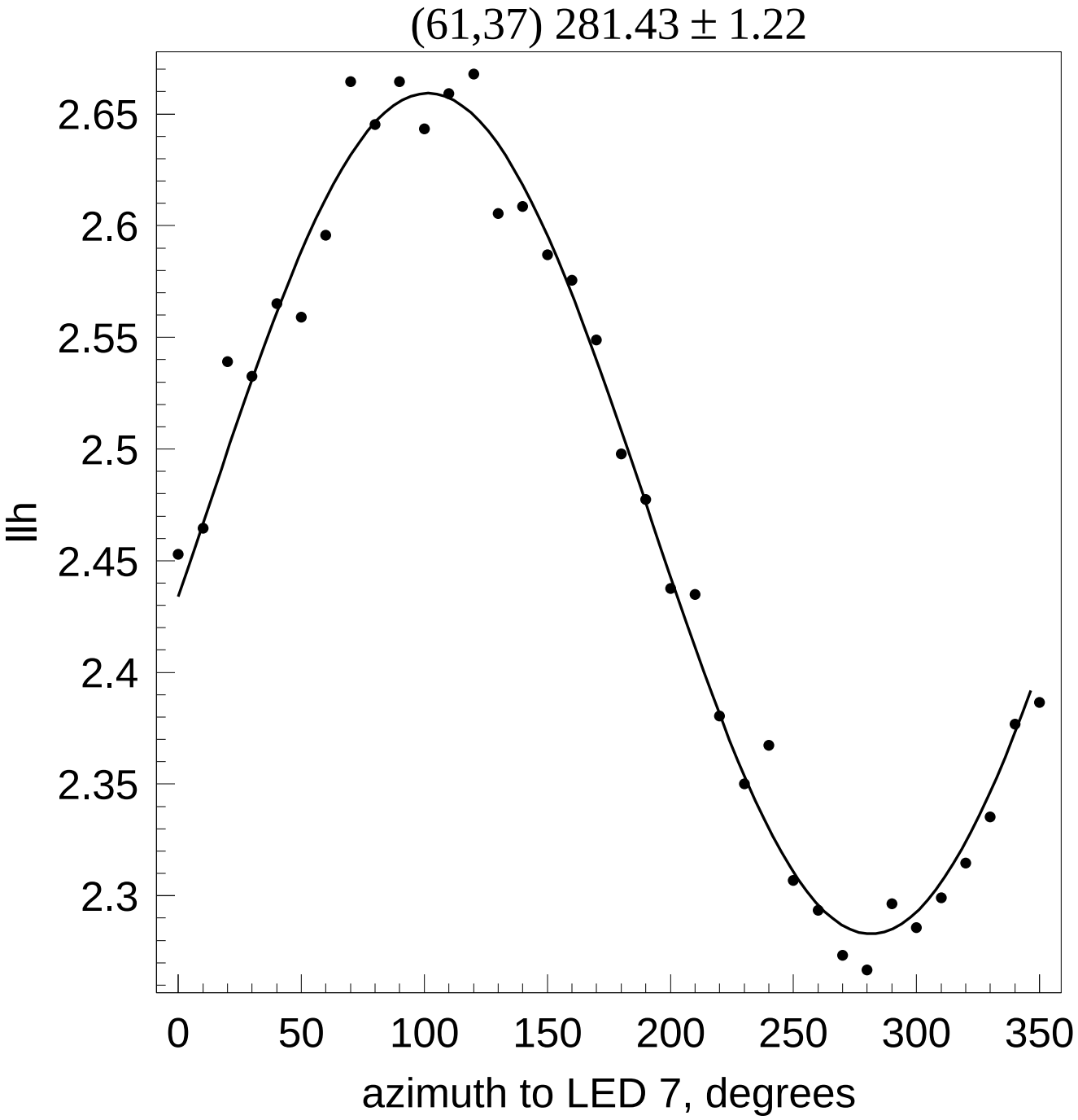

(61,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
235.6 ± 282.3
130
1
2
3
4
5
6
7
8
9
10
11
12

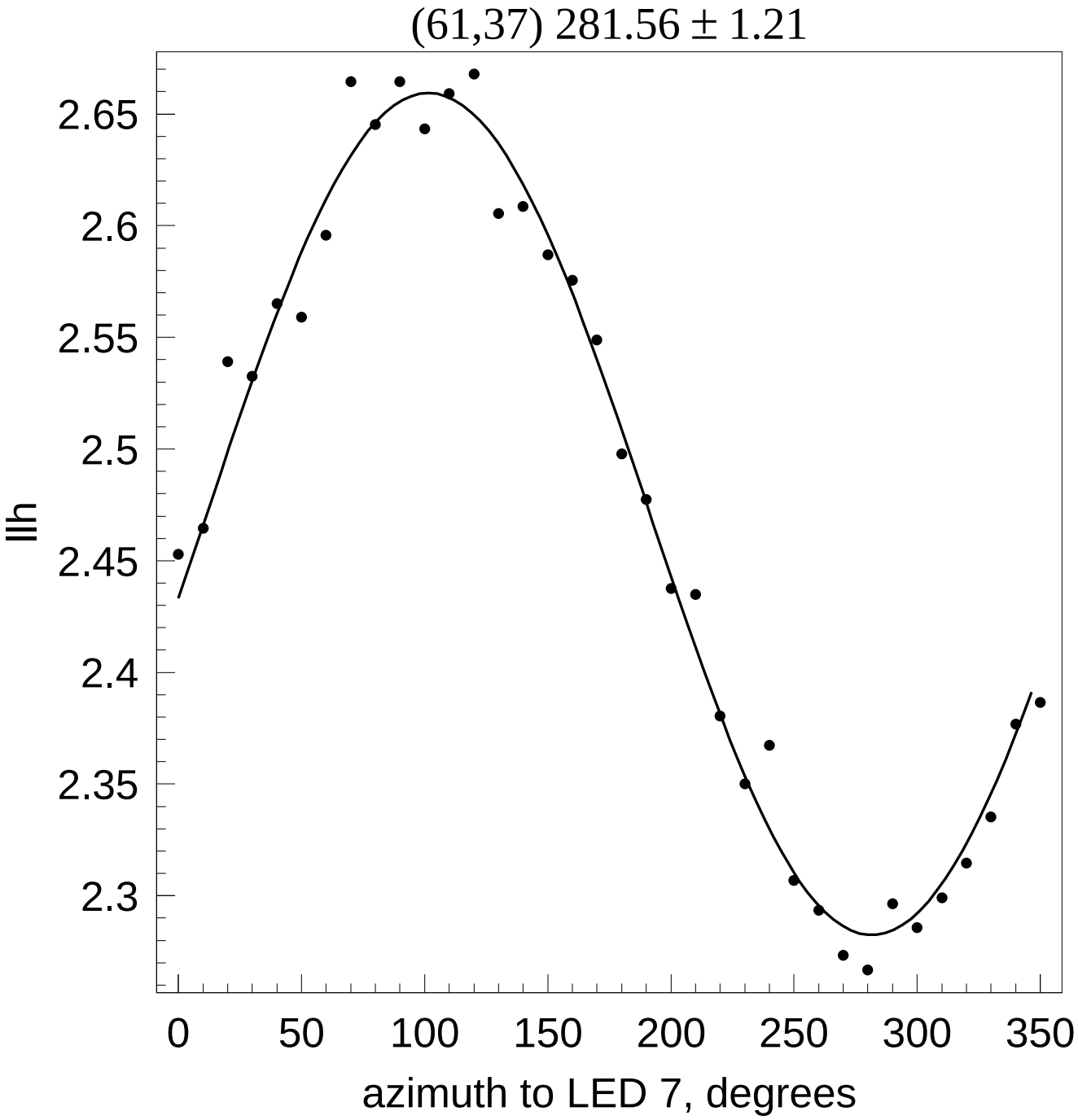

(61,36) 182.18 ± 17.04
3.18
3.16
3.14
3.12
3.1
3.08
3.06
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

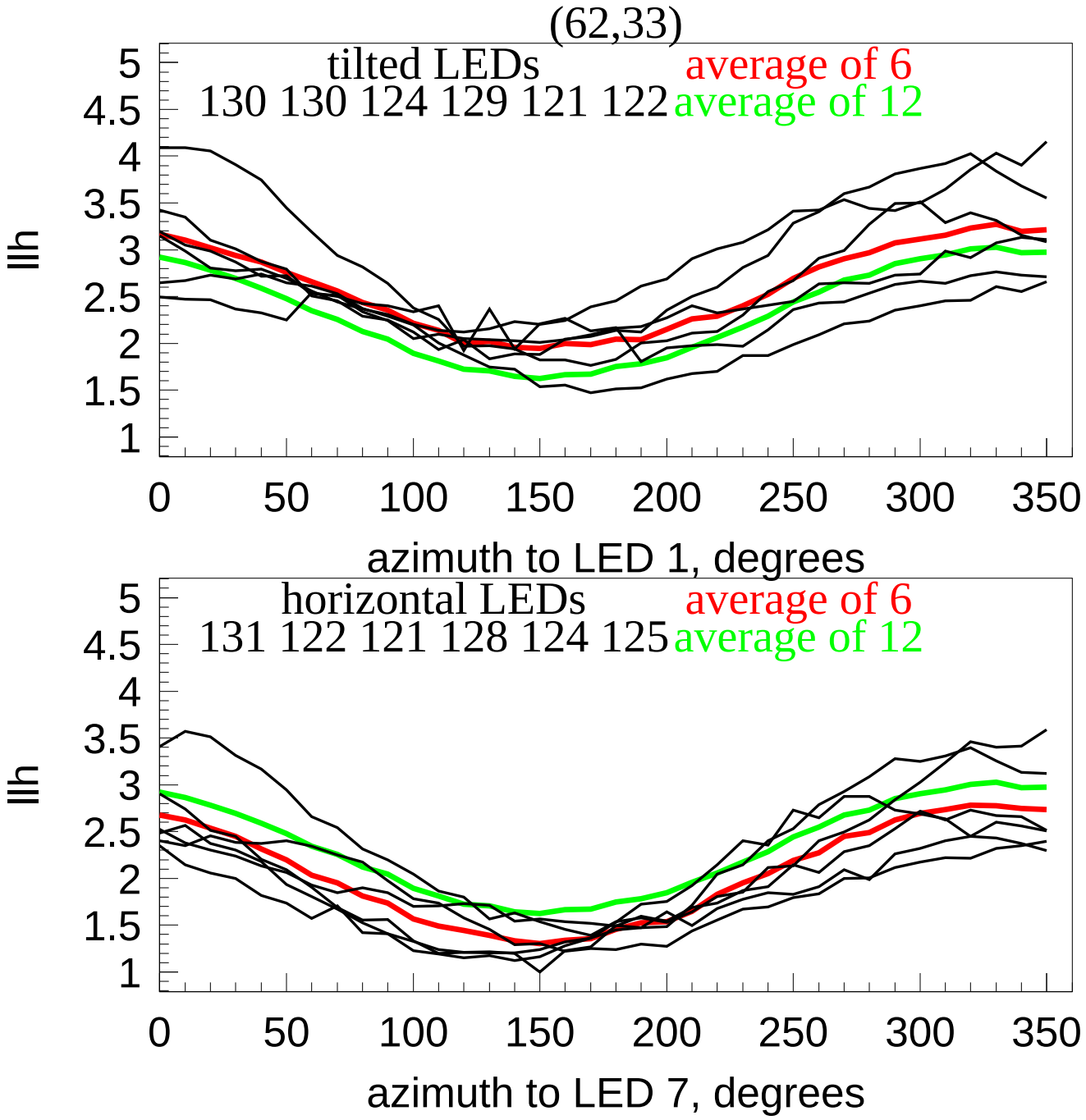

(61,36) 180.92 ± 16.92
3.18
3.16
3.14
3.12
3.1
3.08
3.06
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

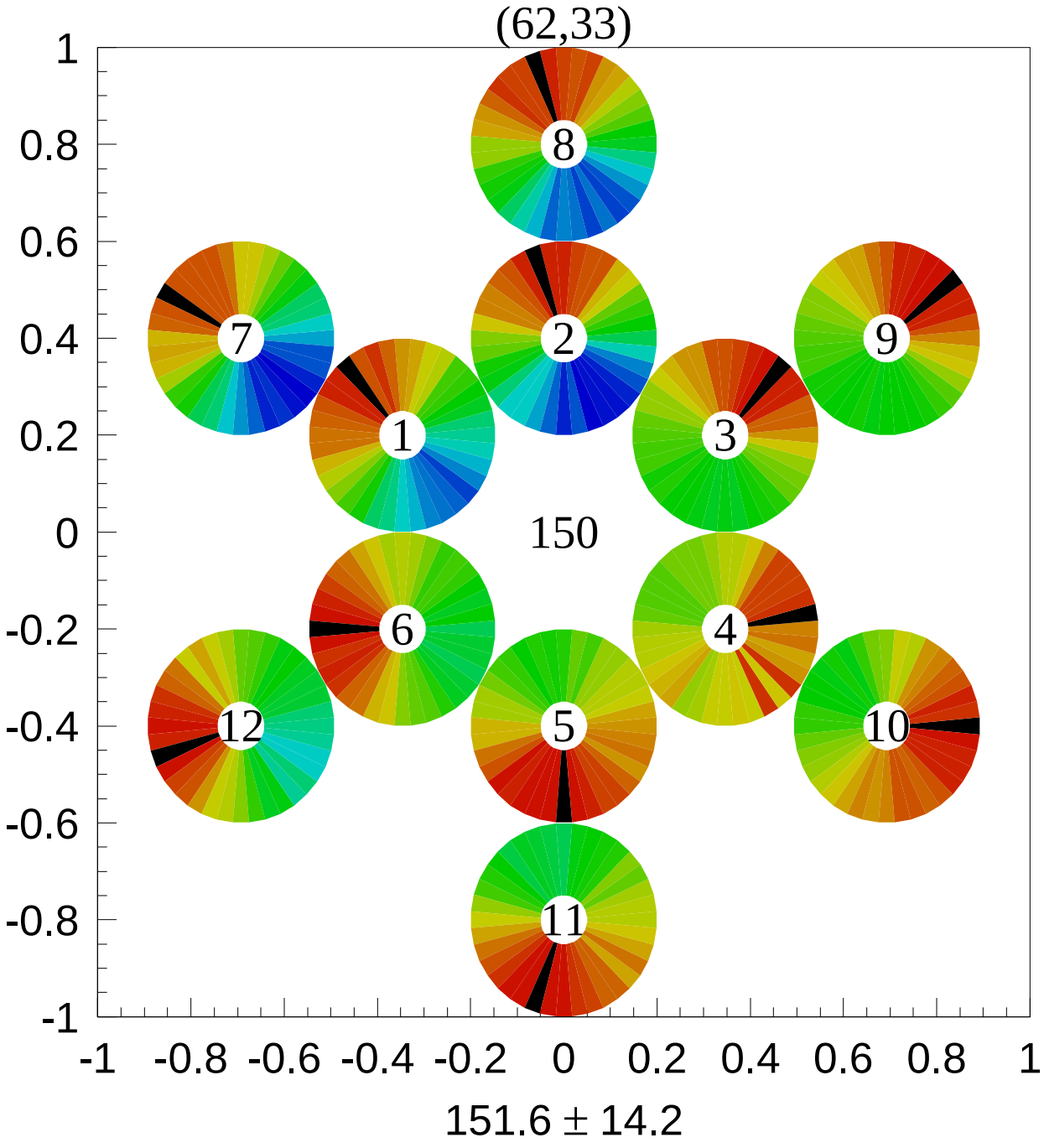

(61,37)
tilted LEDs
126 124 121 124 127 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 124 125 130 123 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

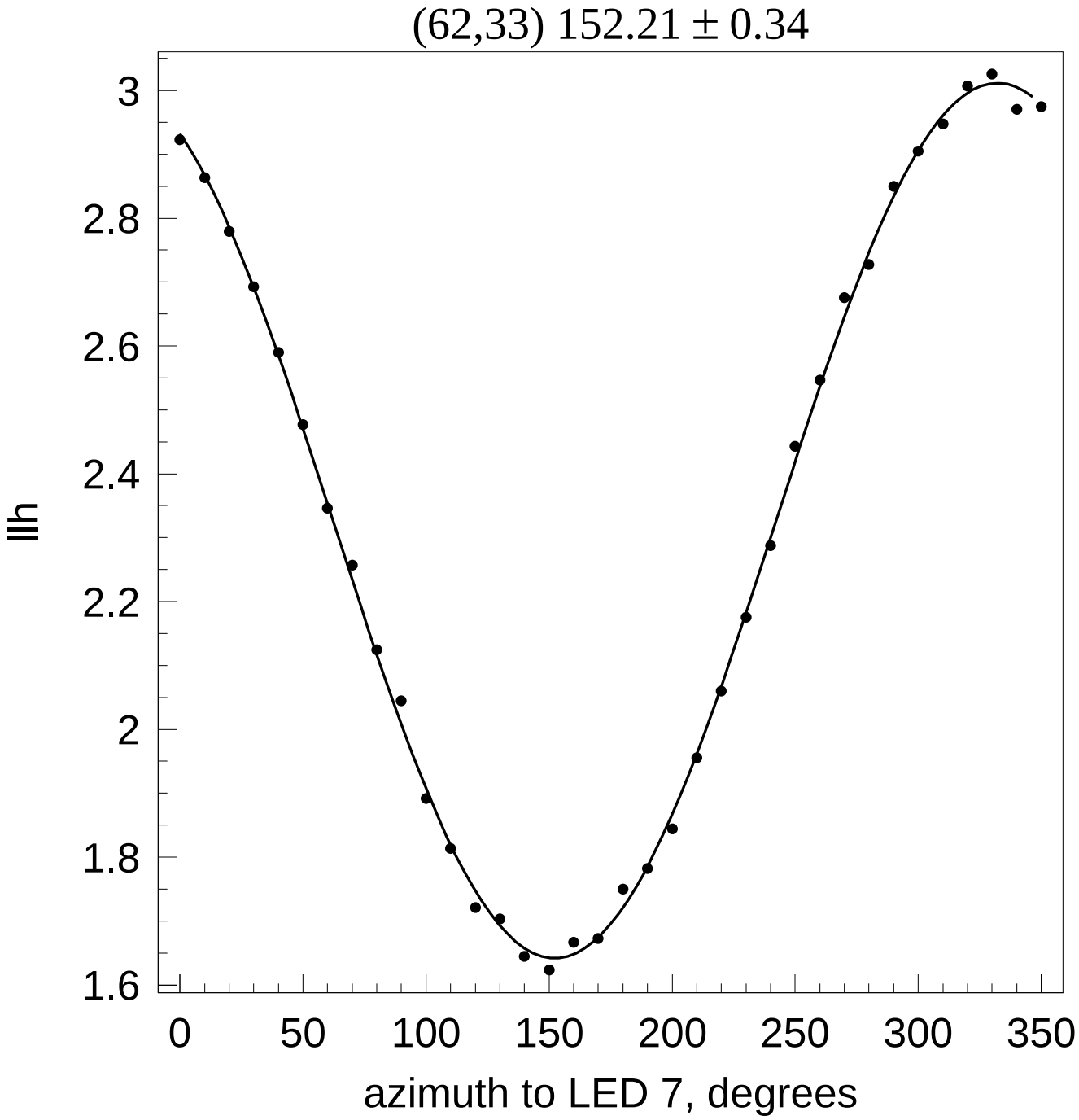

(61,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
9
5
3
280
6
12
2
1
8
7
284.7 ± 22.8

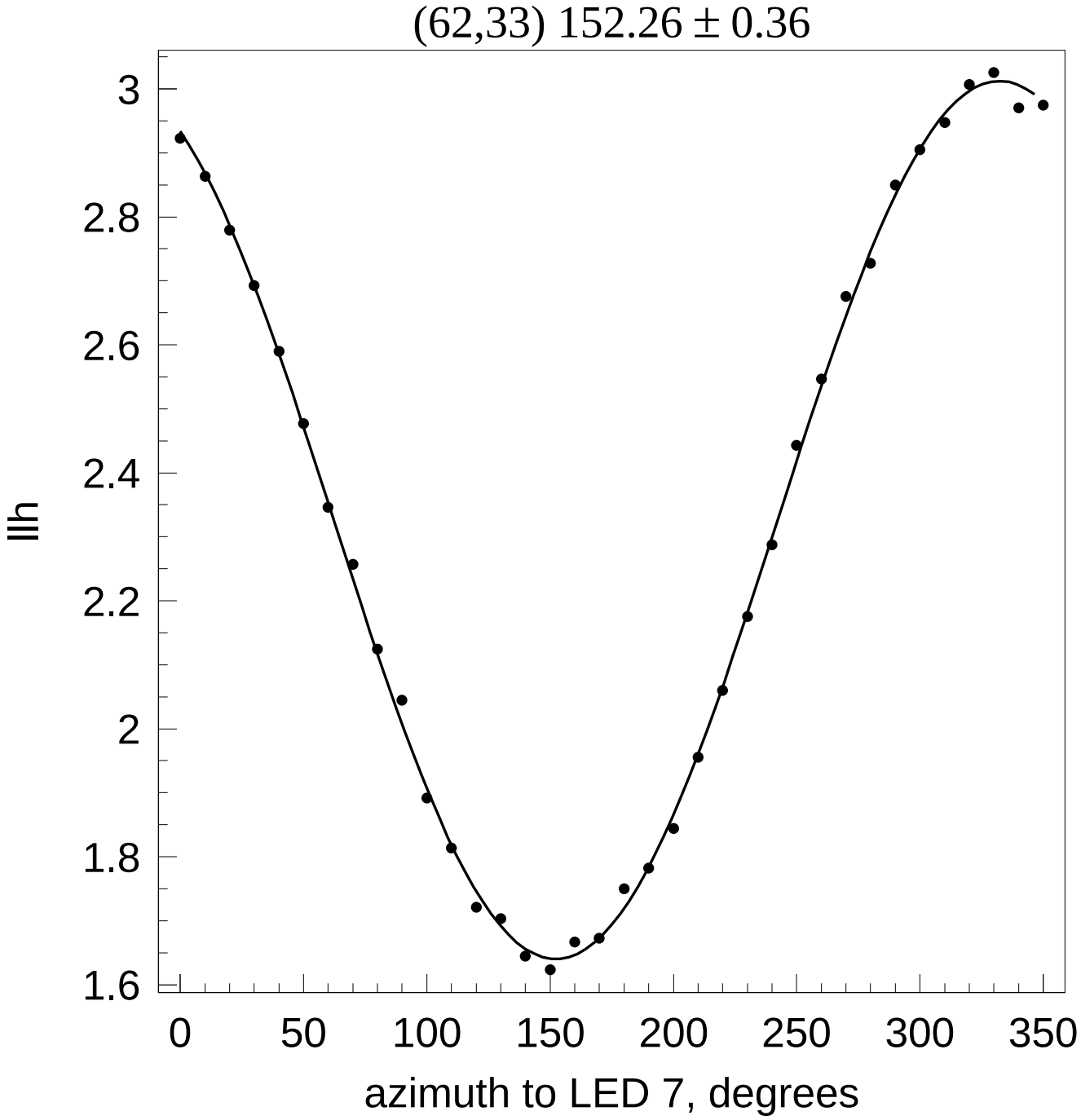

(61,37) 281.43 ± 1.22
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

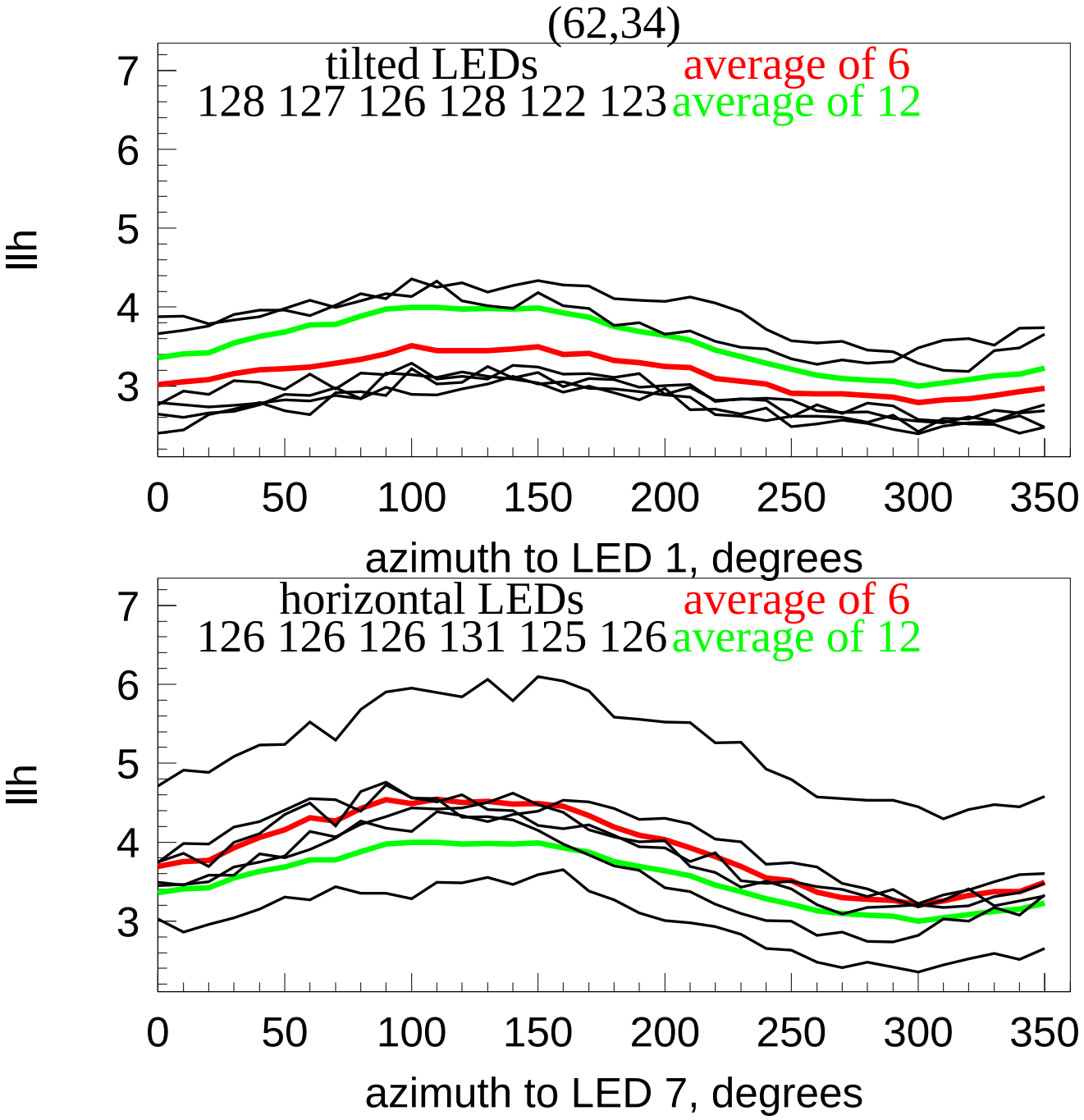

(61,37) 281.56 ± 1.21
2.65
2.6
2.55
2.5
2.45
2.4
2.35
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

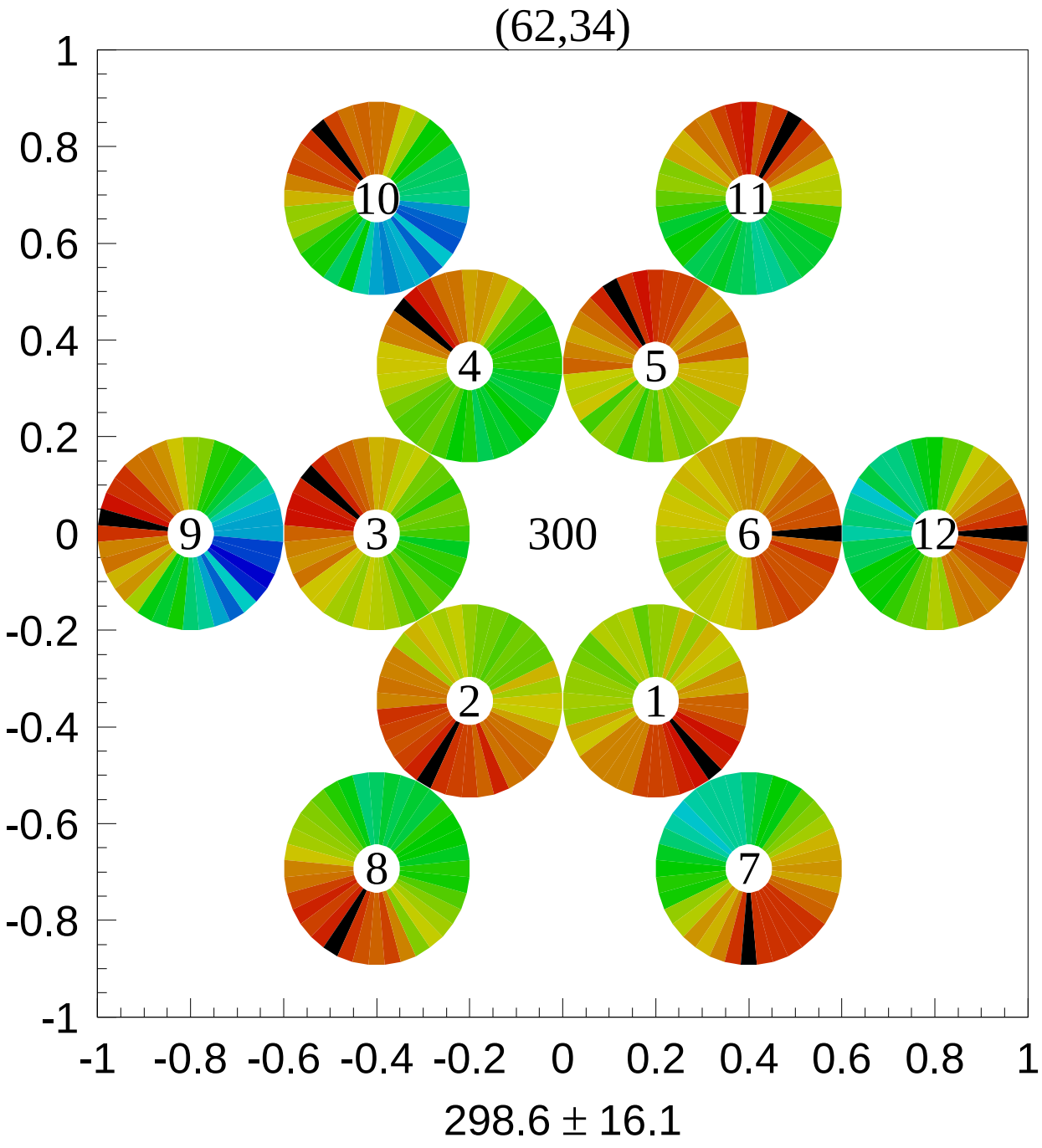

(62,33)
tilted LEDs
130 130 124 129 121 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 122 121 128 124 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

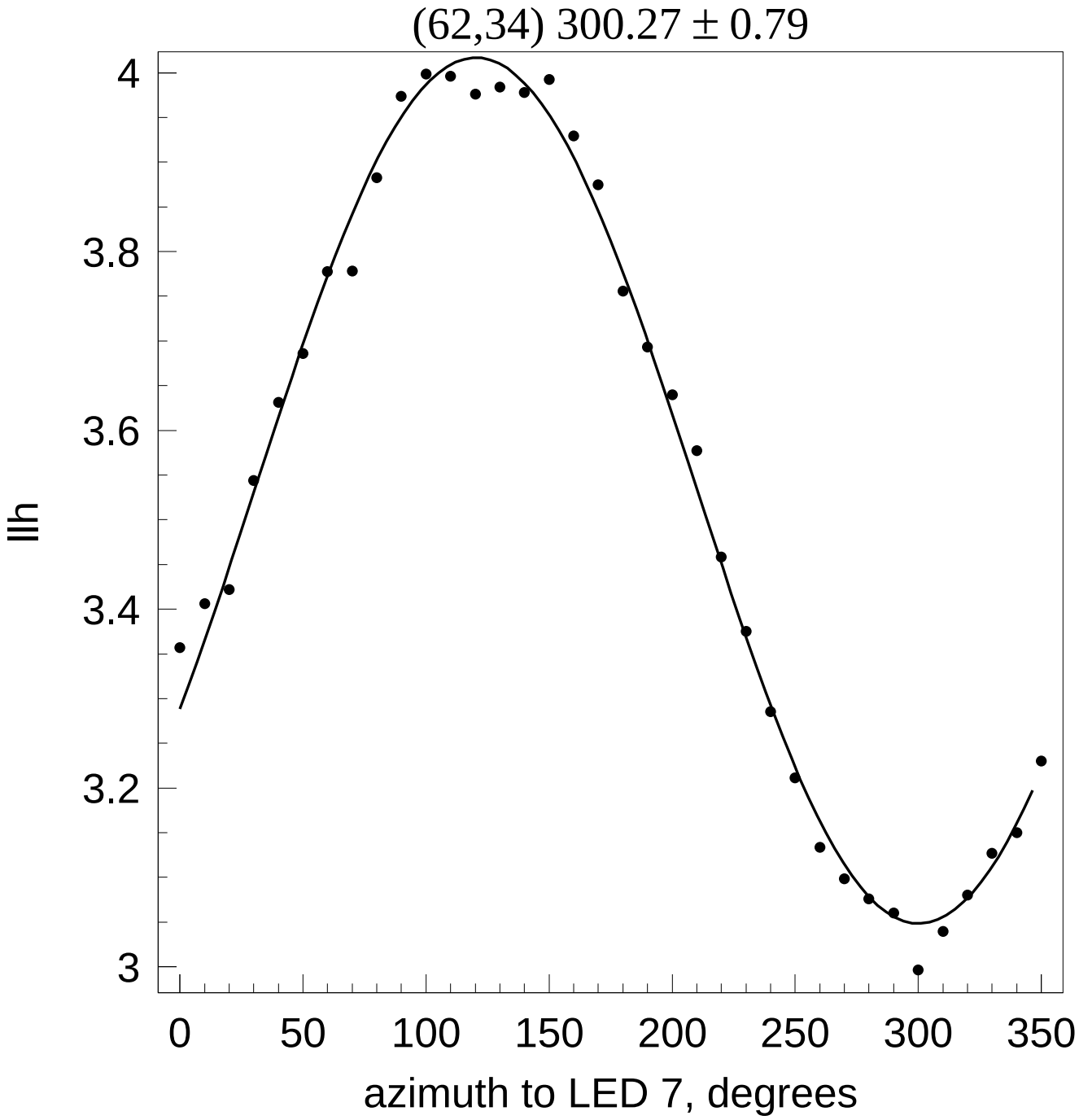

(62,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
7
2
9
1
3
150
6
4
12
5
10
11
151.6 ± 14.2

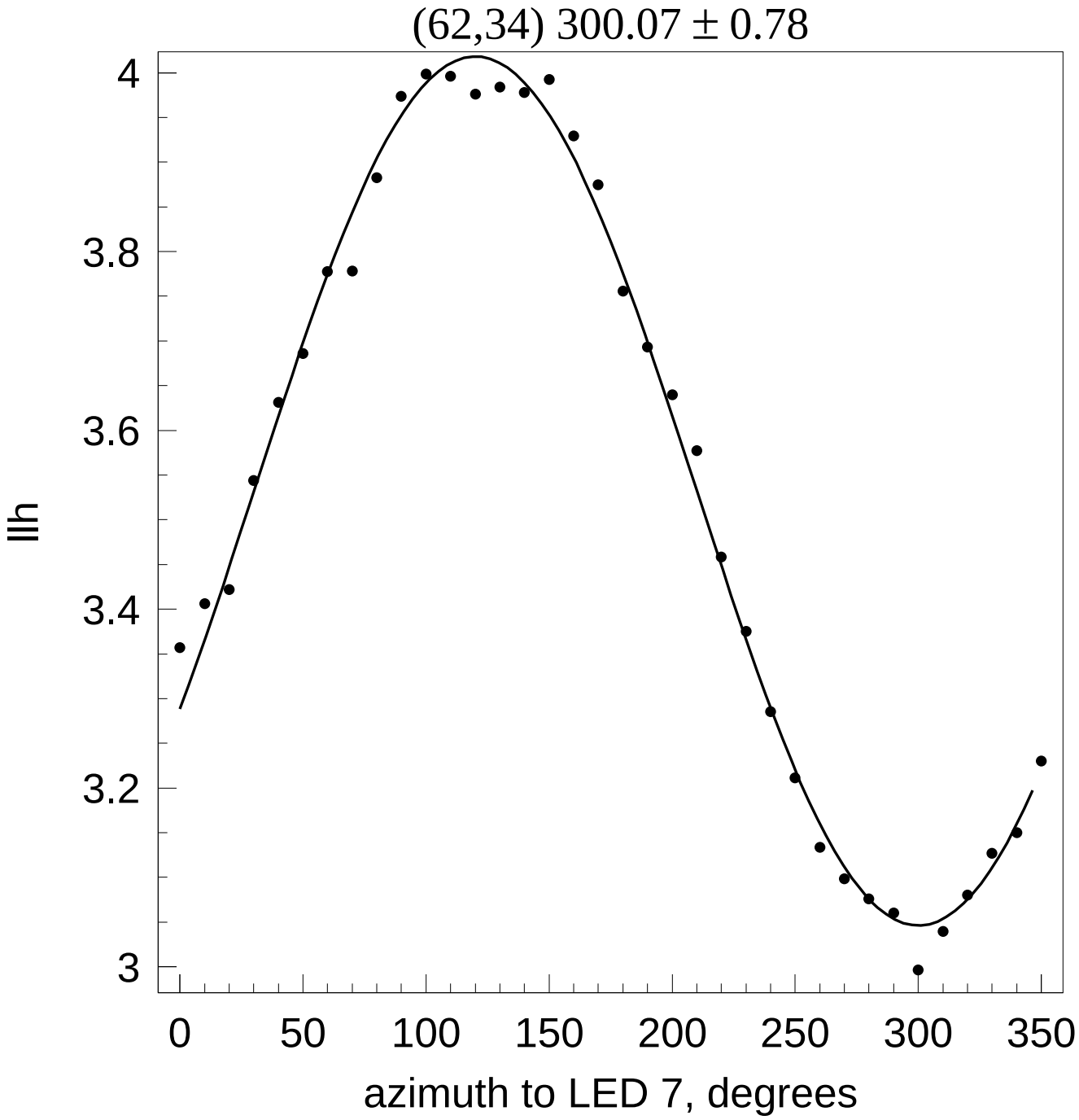

(62,33) 152.21 ± 0.34
3
2.8
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

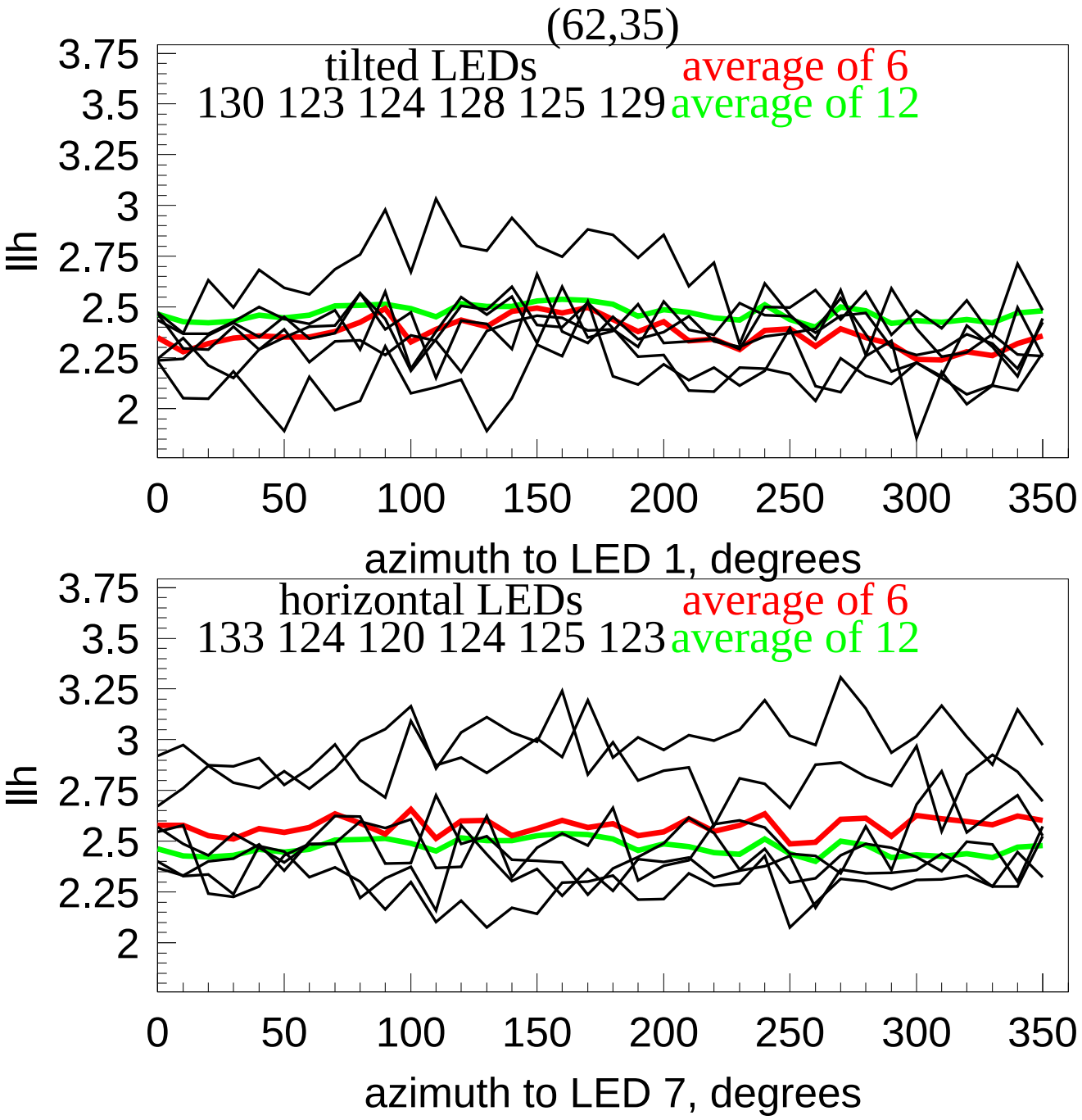

(62,33) 152.26 ± 0.36
3
2.8
2.6
2.4
2.2
2
1.8
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

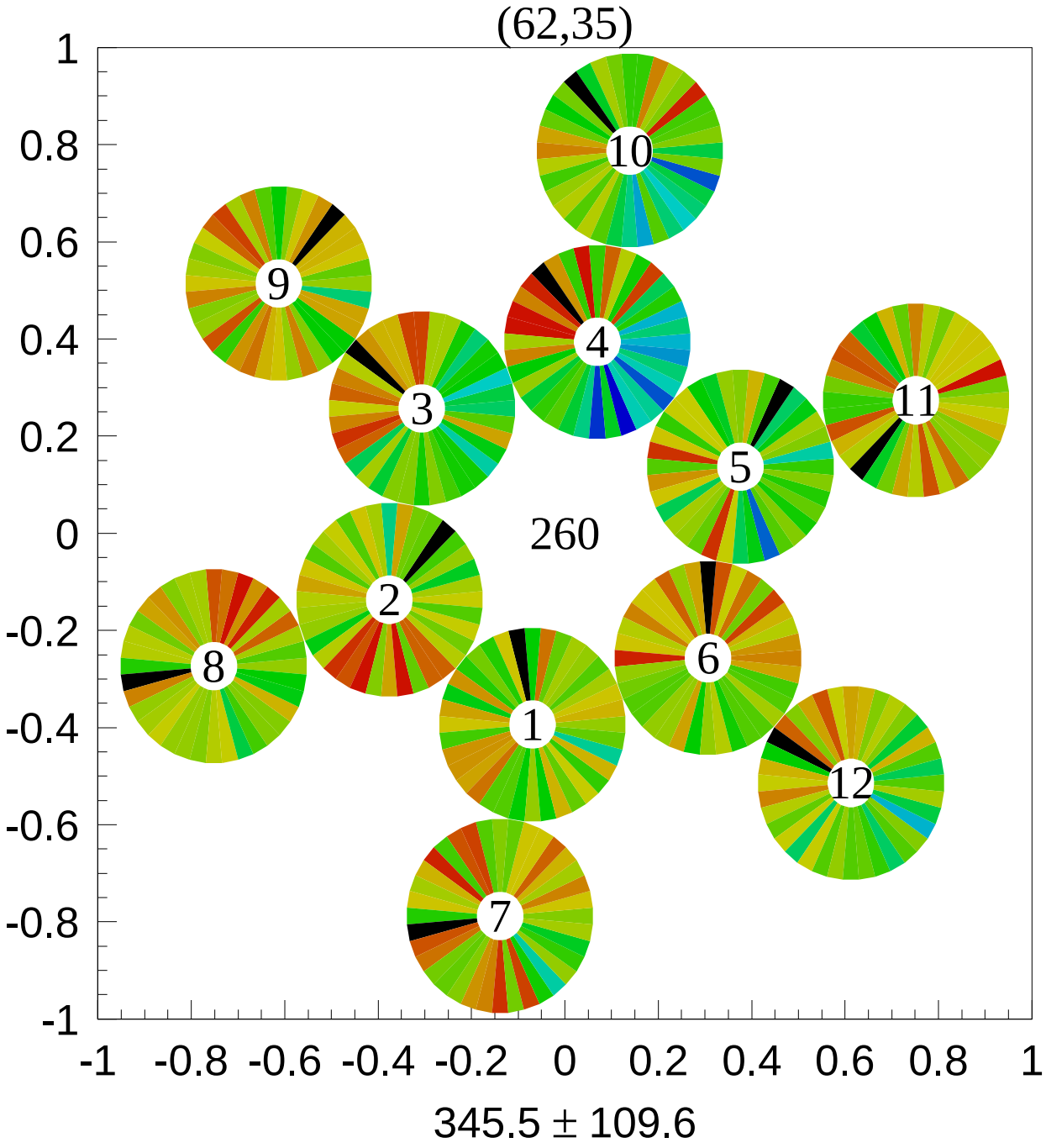

(62,34)
tilted LEDs
128 127 126 128 122 123
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 126 126 131 125 126
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

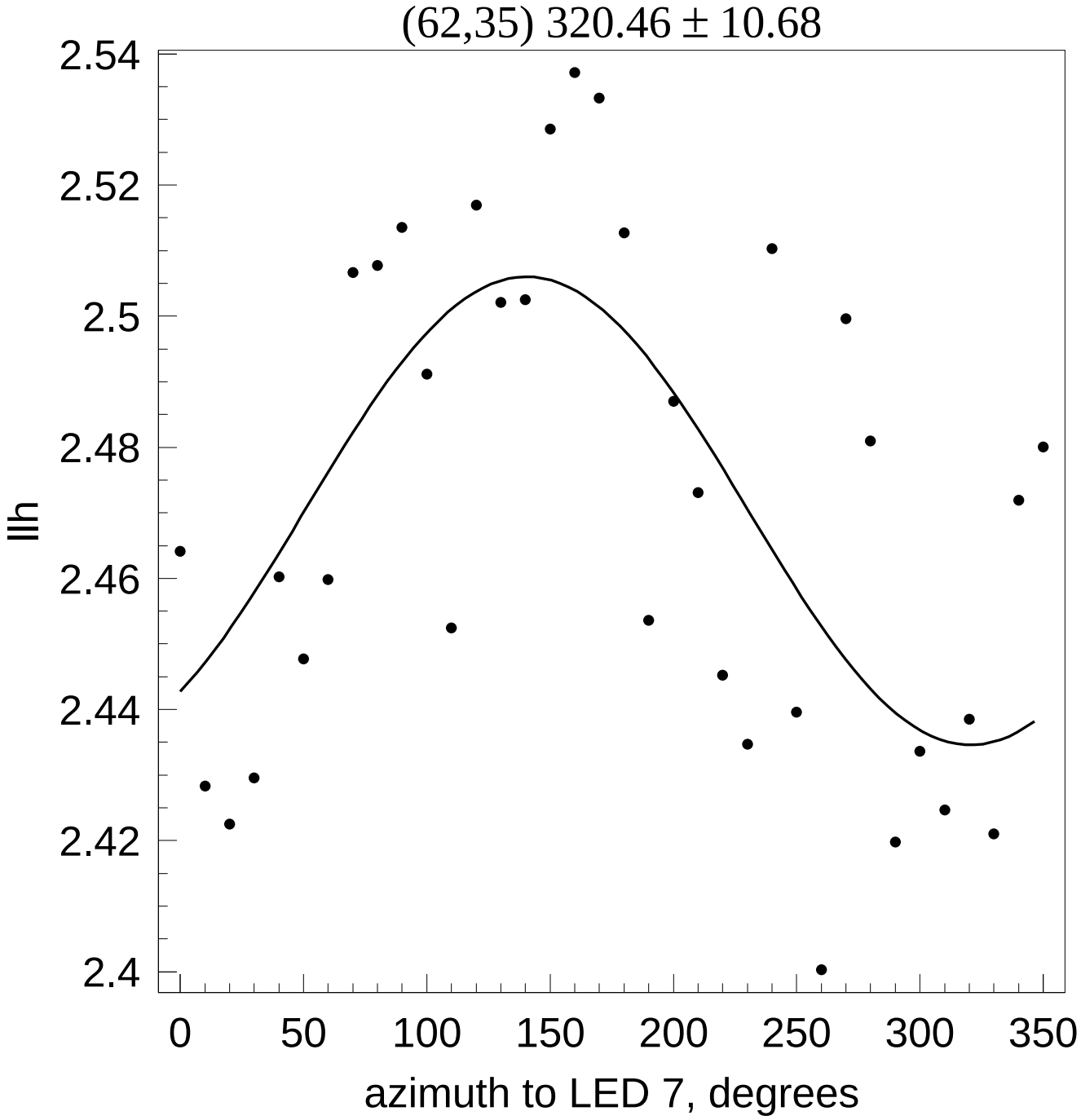

(62,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
300
6
12
2
1
8
7
298.6 ± 16.1

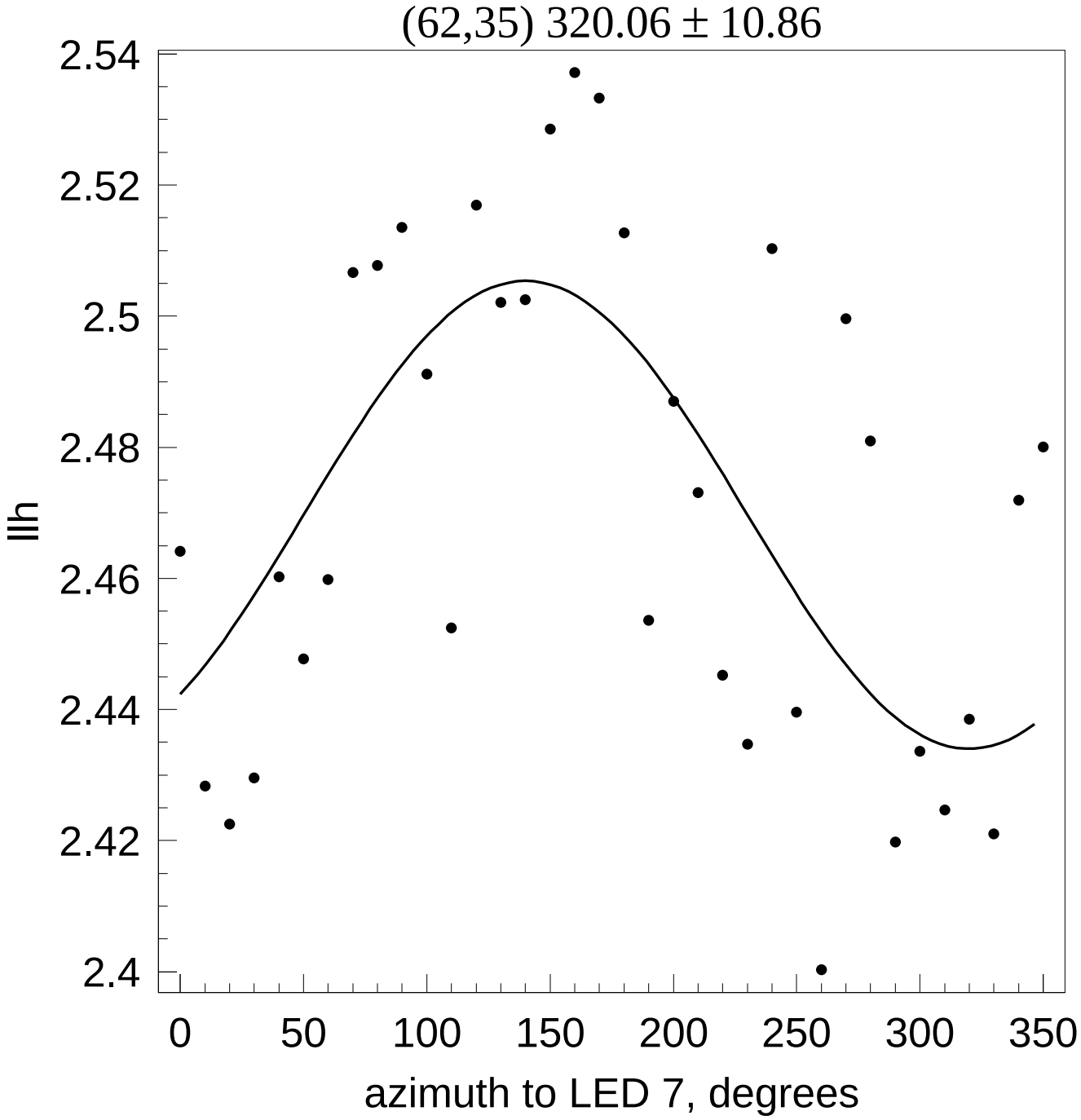

(62,34) 300.27 ± 0.79
4
3.8
3.6
3.4
3.2
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

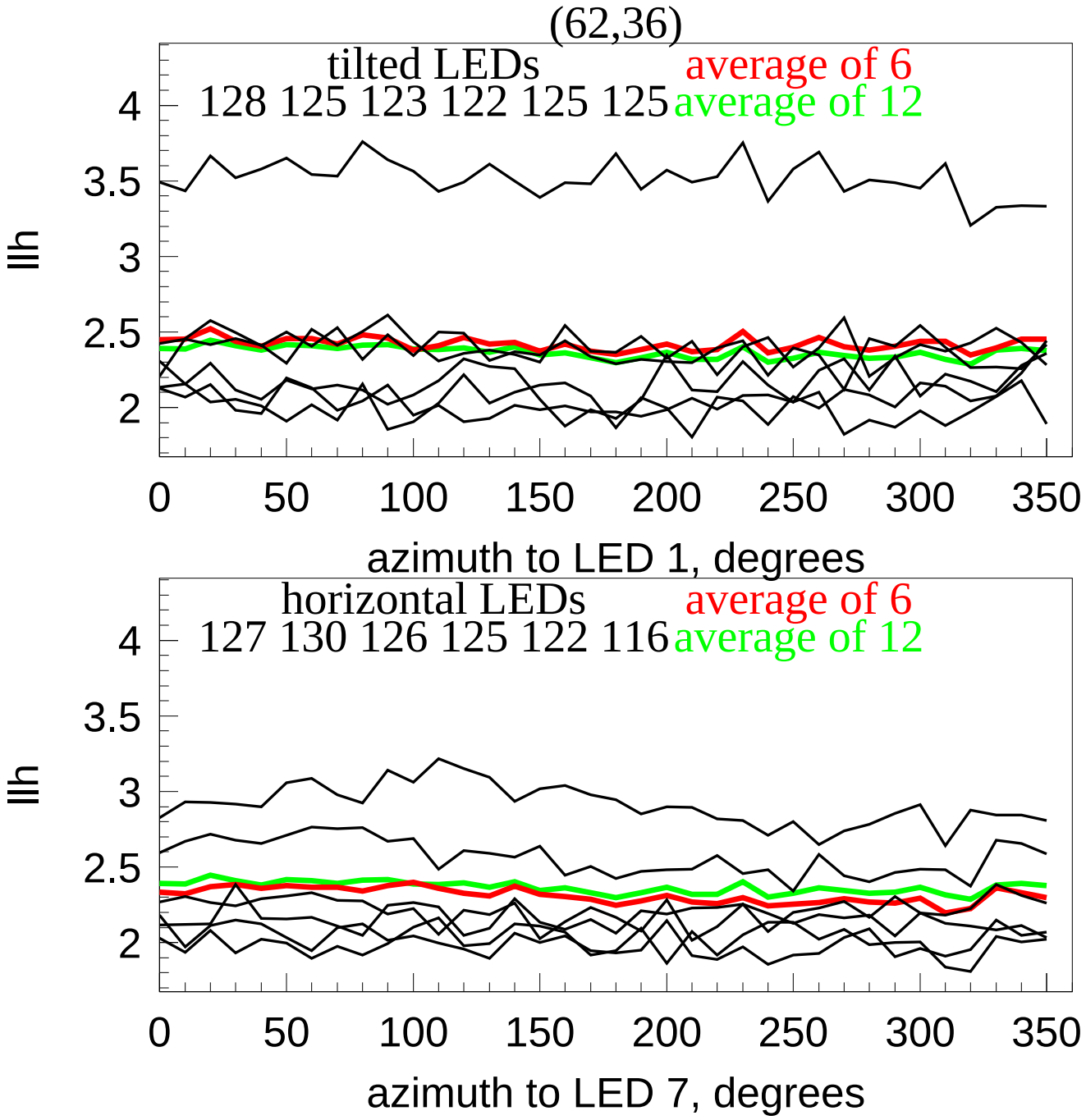

(62,34) 300.07 ± 0.78
4
3.8
3.6
3.4
3.2
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

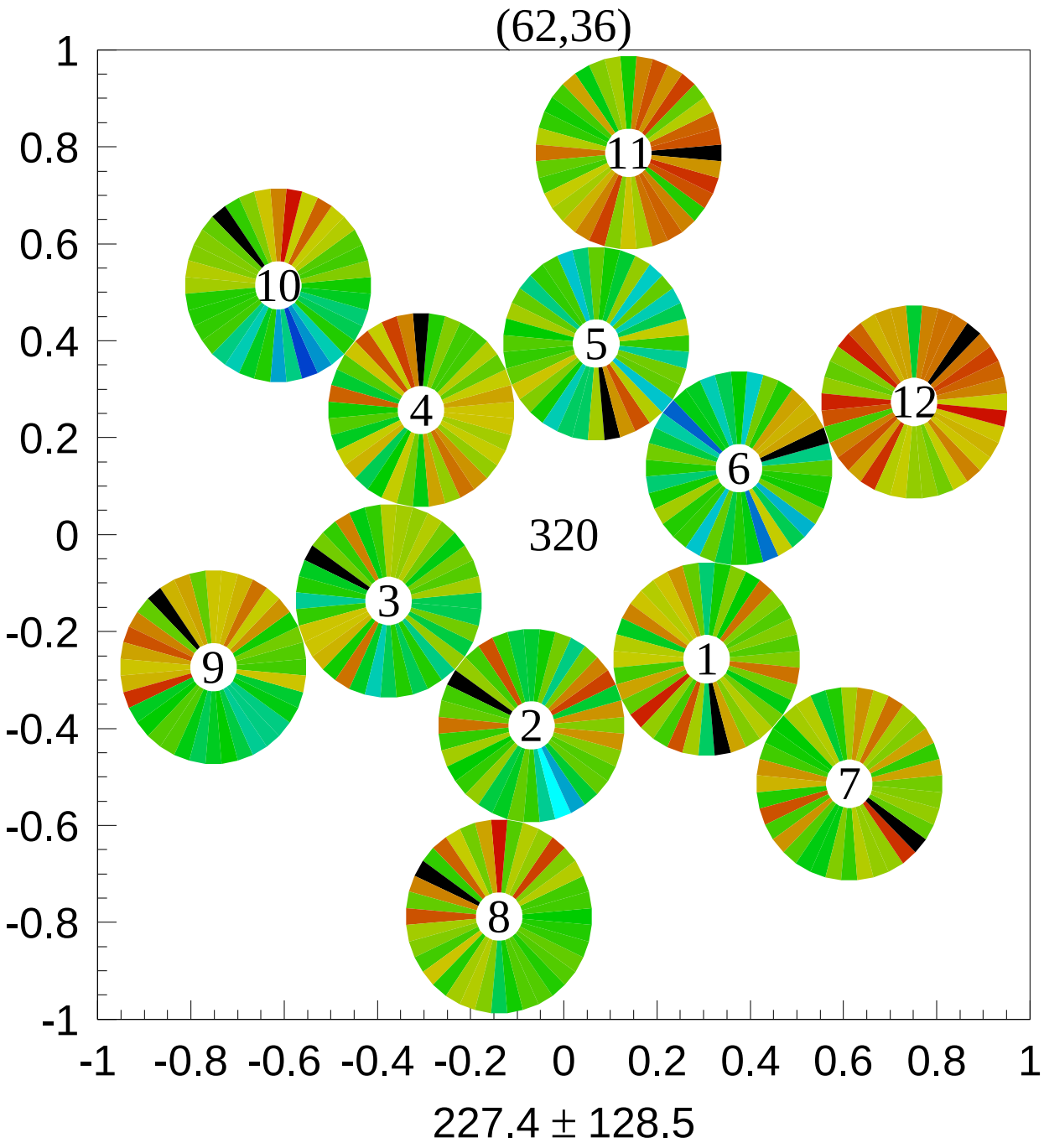

(62,35)
tilted LEDs
130 123 124 128 125 129
average of 6
average of 12
IIh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
133 124 120 124 125 123
average of 6
average of 12
IIh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

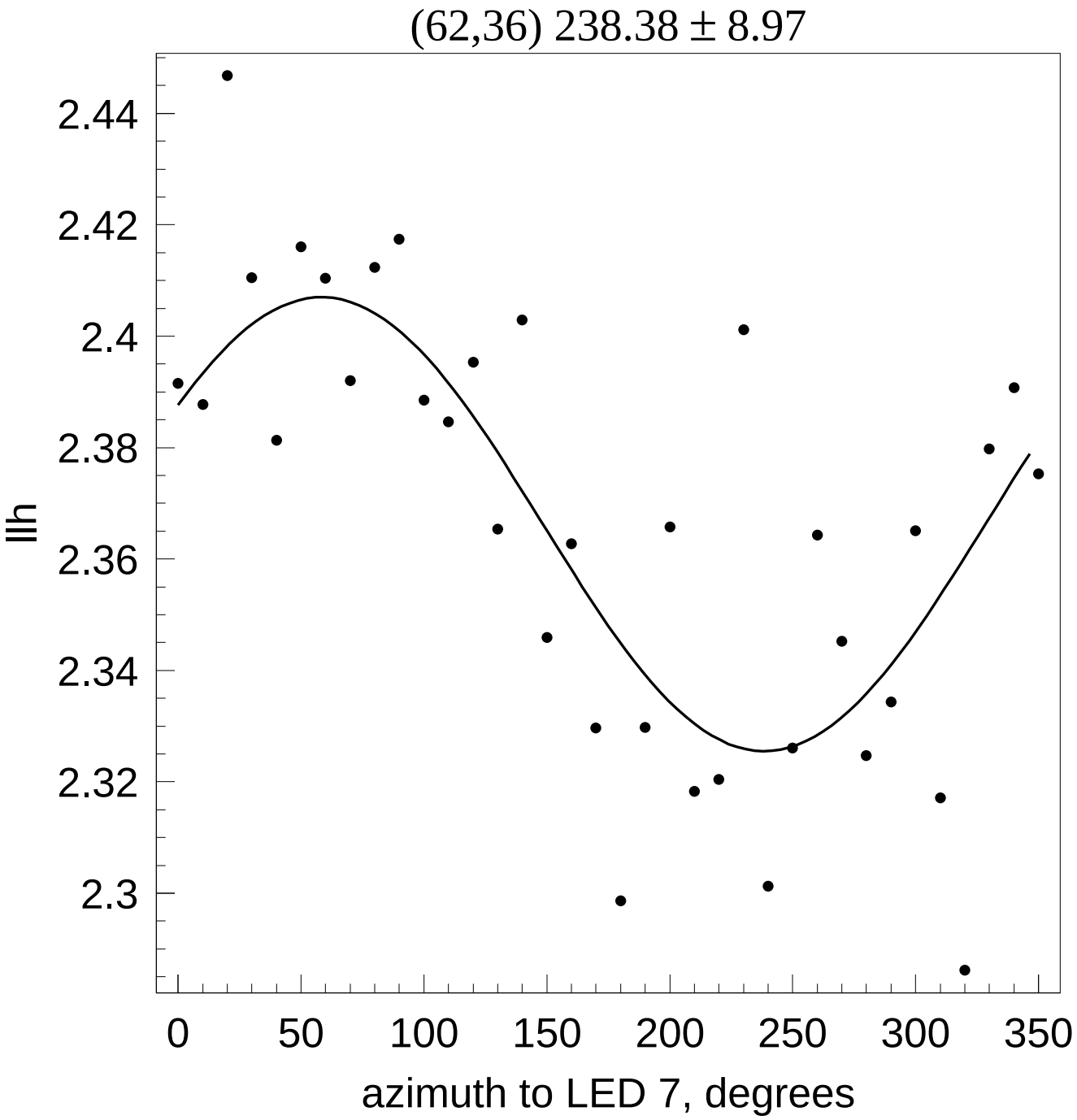

(62,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
345.5 ± 109.6

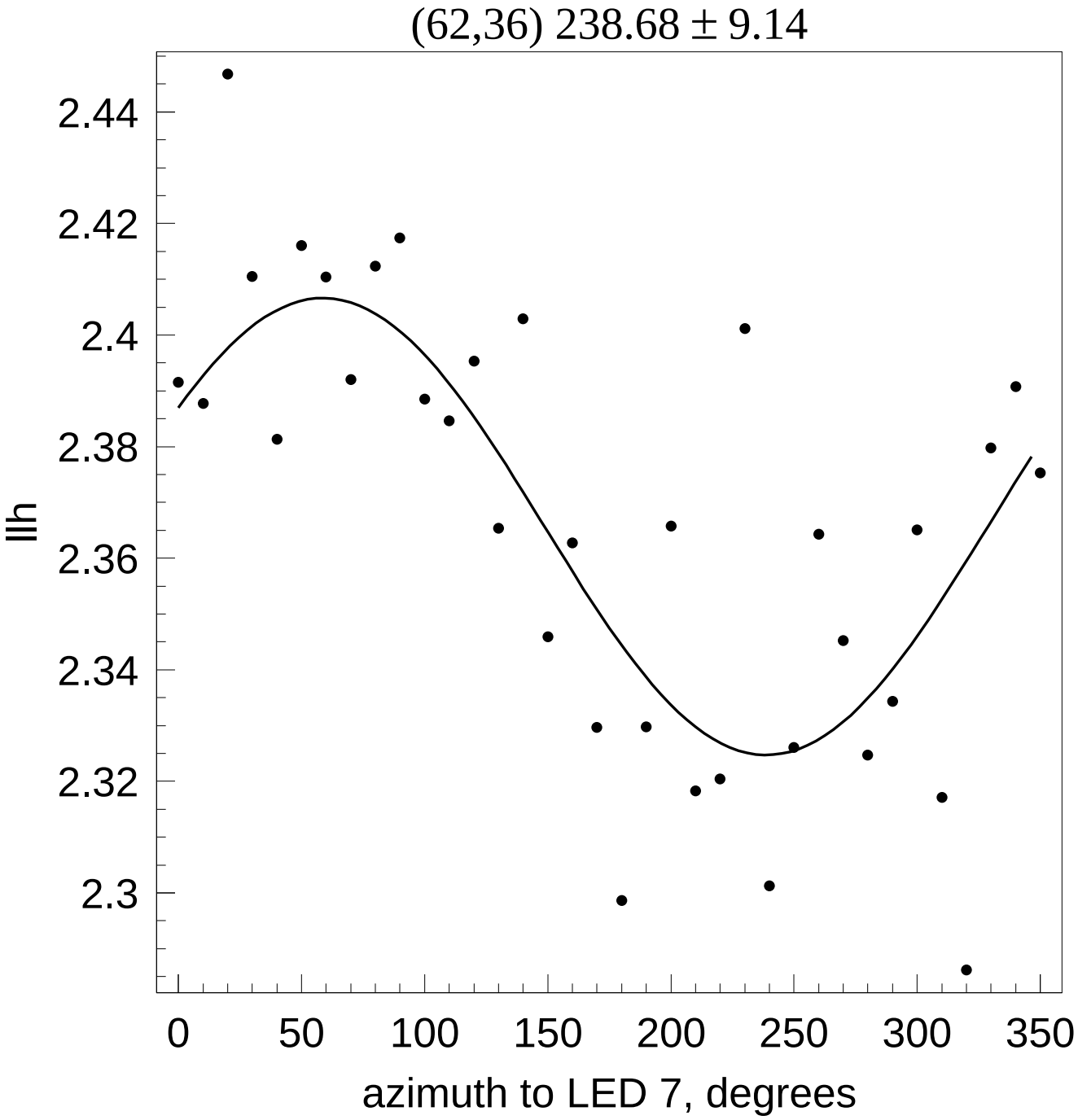

(62,35) 320.46 ± 10.68
2.54
2.52
2.5
2.48
2.46
2.44
2.42
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

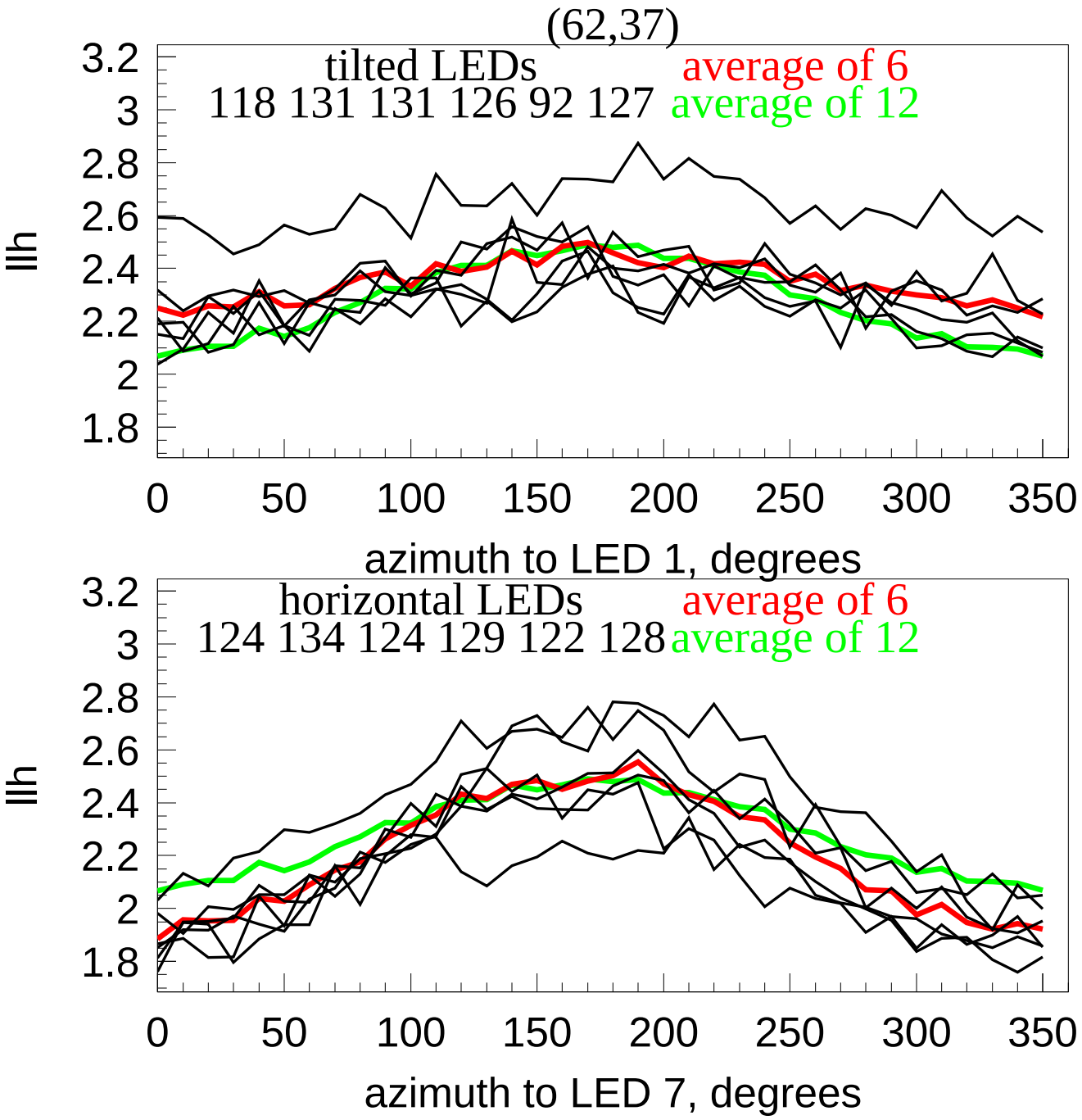

(62,35) 320.06 ± 10.86
2.54
2.52
2.5
2.48
2.46
2.44
2.42
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

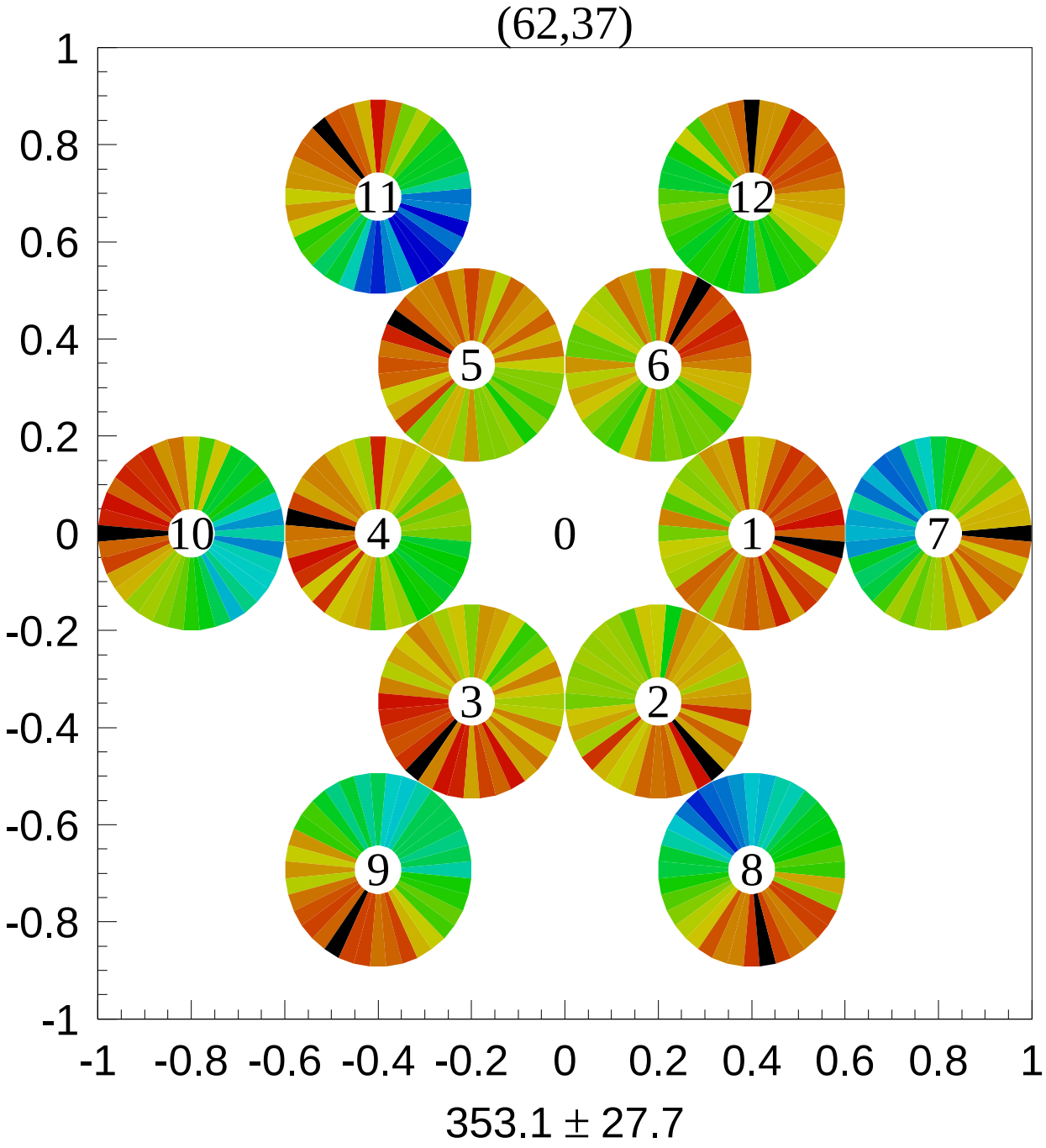

(62,36)
tilted LEDs
128 125 123 122 125 125
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 130 126 125 122 116
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

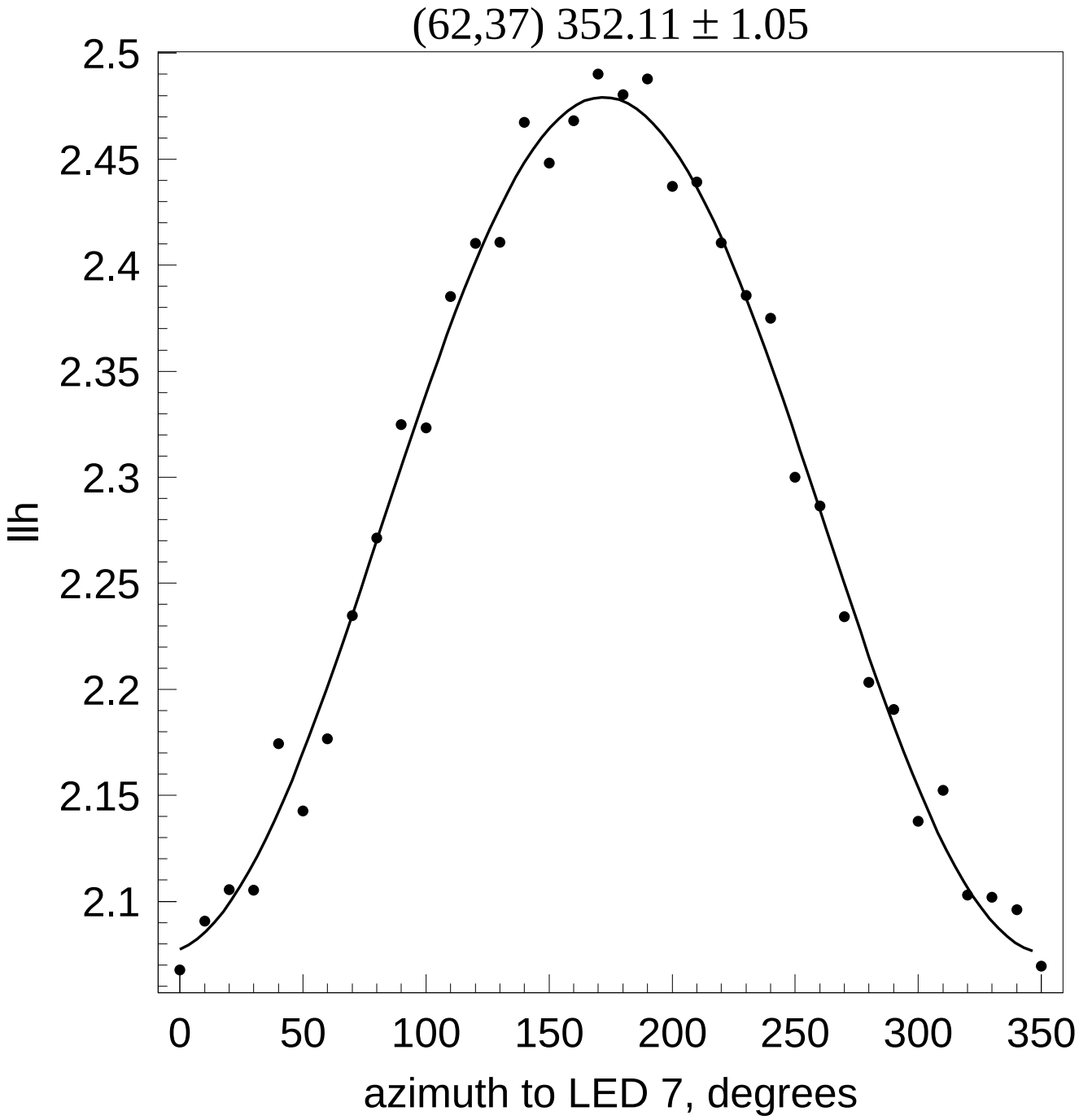

(62,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
10
5
4
12
6
320
3
9
1
2
7
8
227.4 ± 128.5

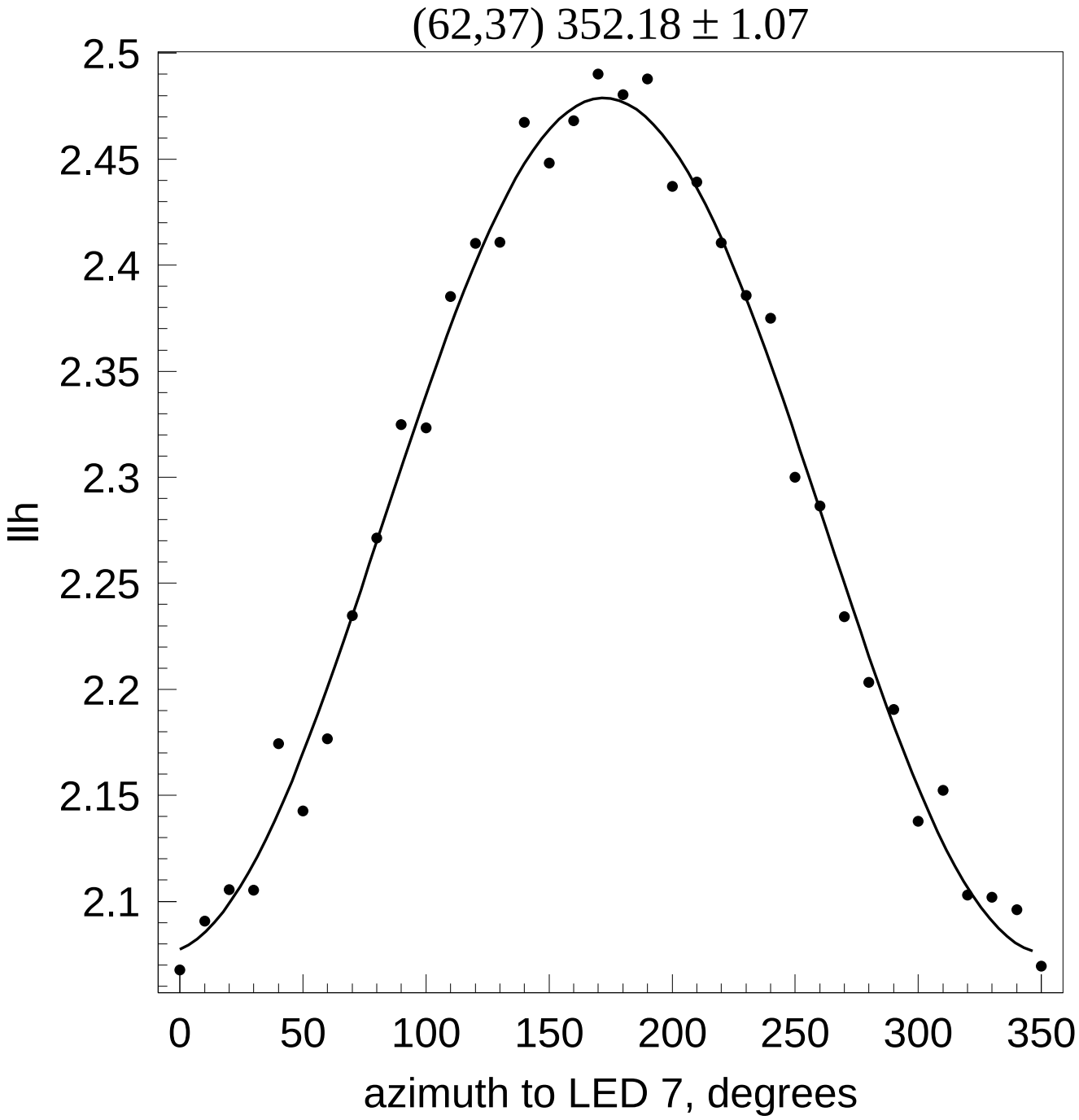

(62,36) 238.38 ± 8.97
2.44
2.42
2.4
2.38
2.36
2.34
2.32
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

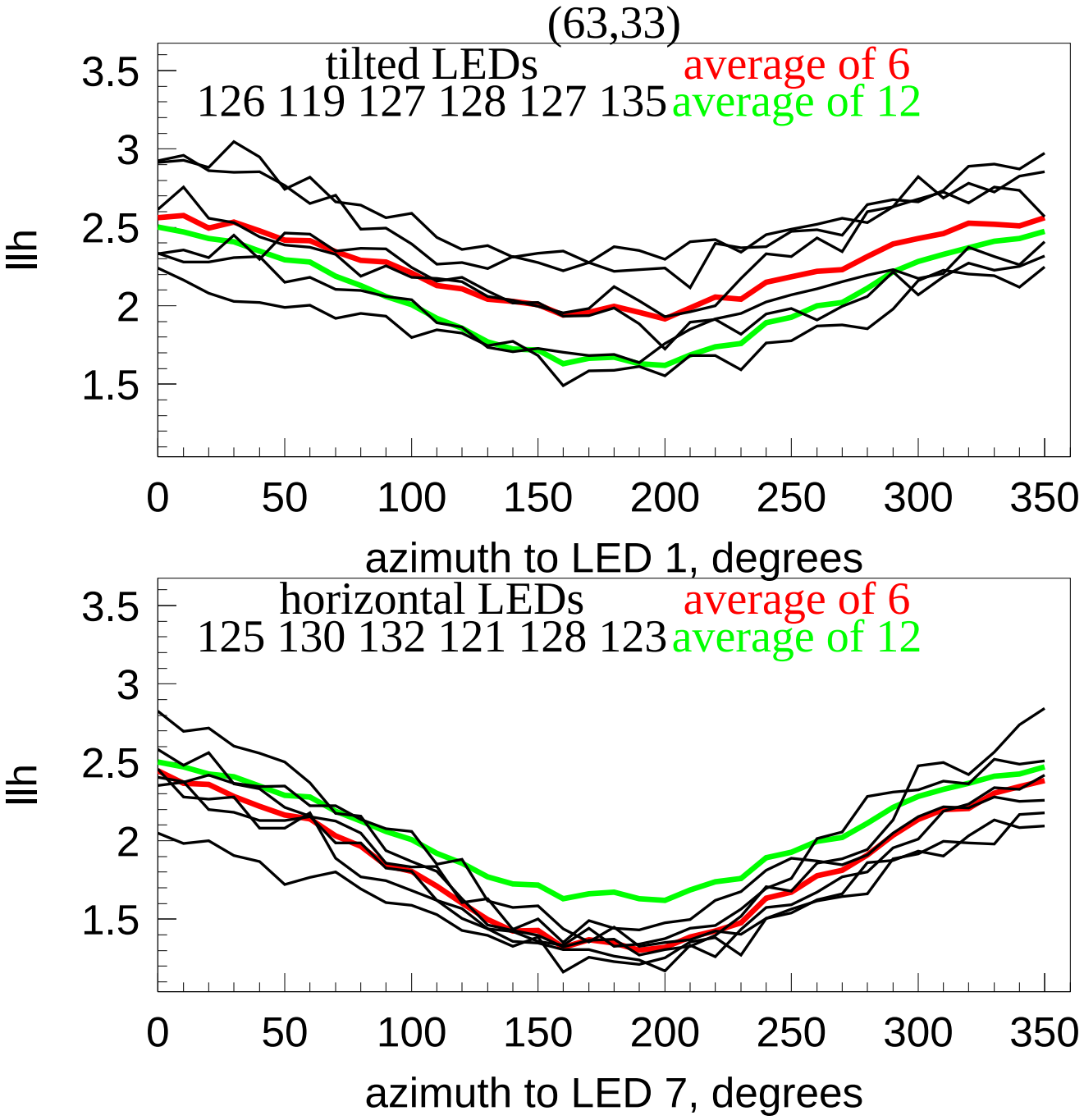

(62,36) 238.68 ± 9.14
2.44
2.42
2.4
2.38
2.36
2.34
2.32
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

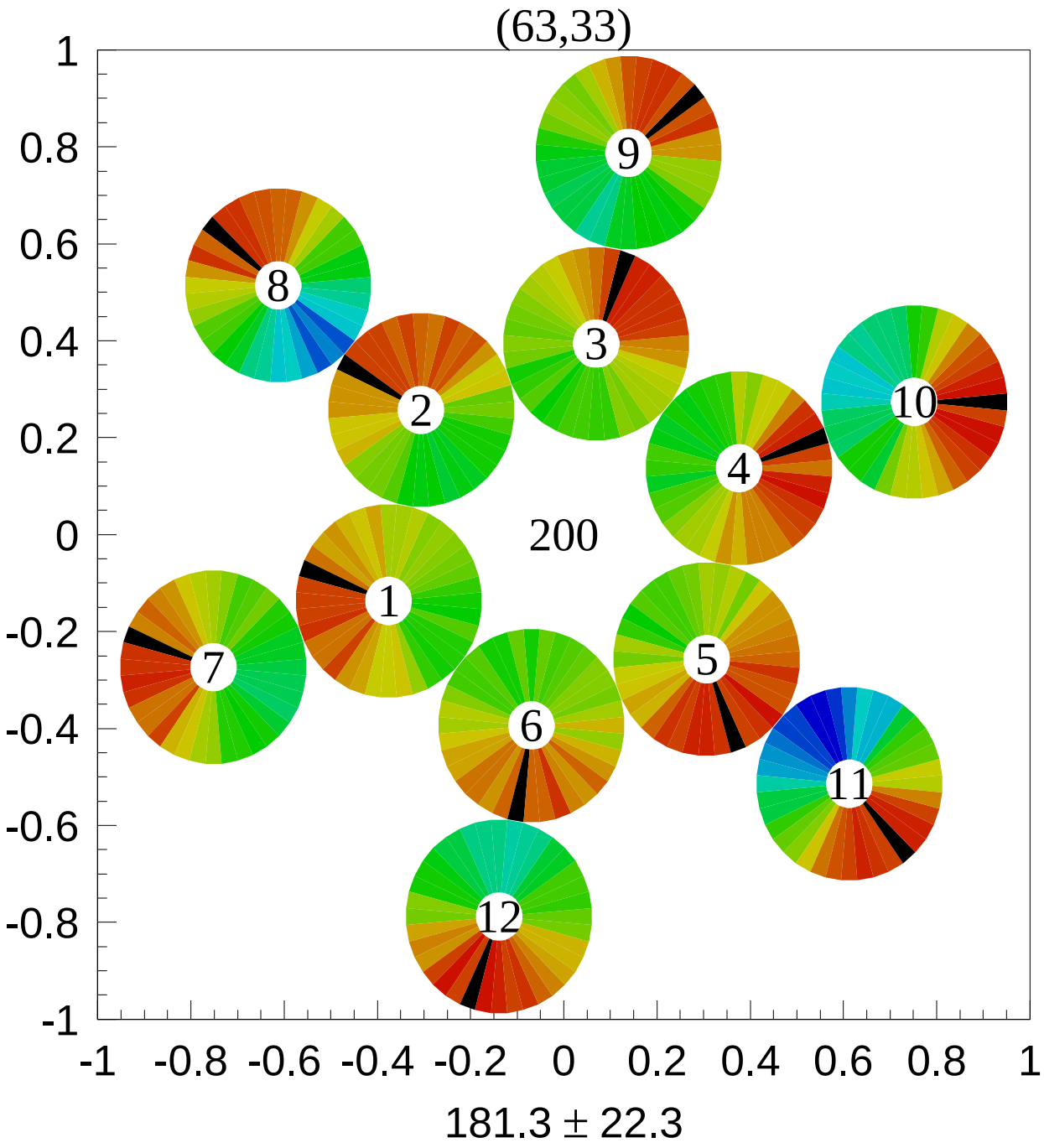

(62,37)
tilted LEDs
118 131 131 126 92 127
average of 6
average of 12
llh
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 134 124 129 122 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

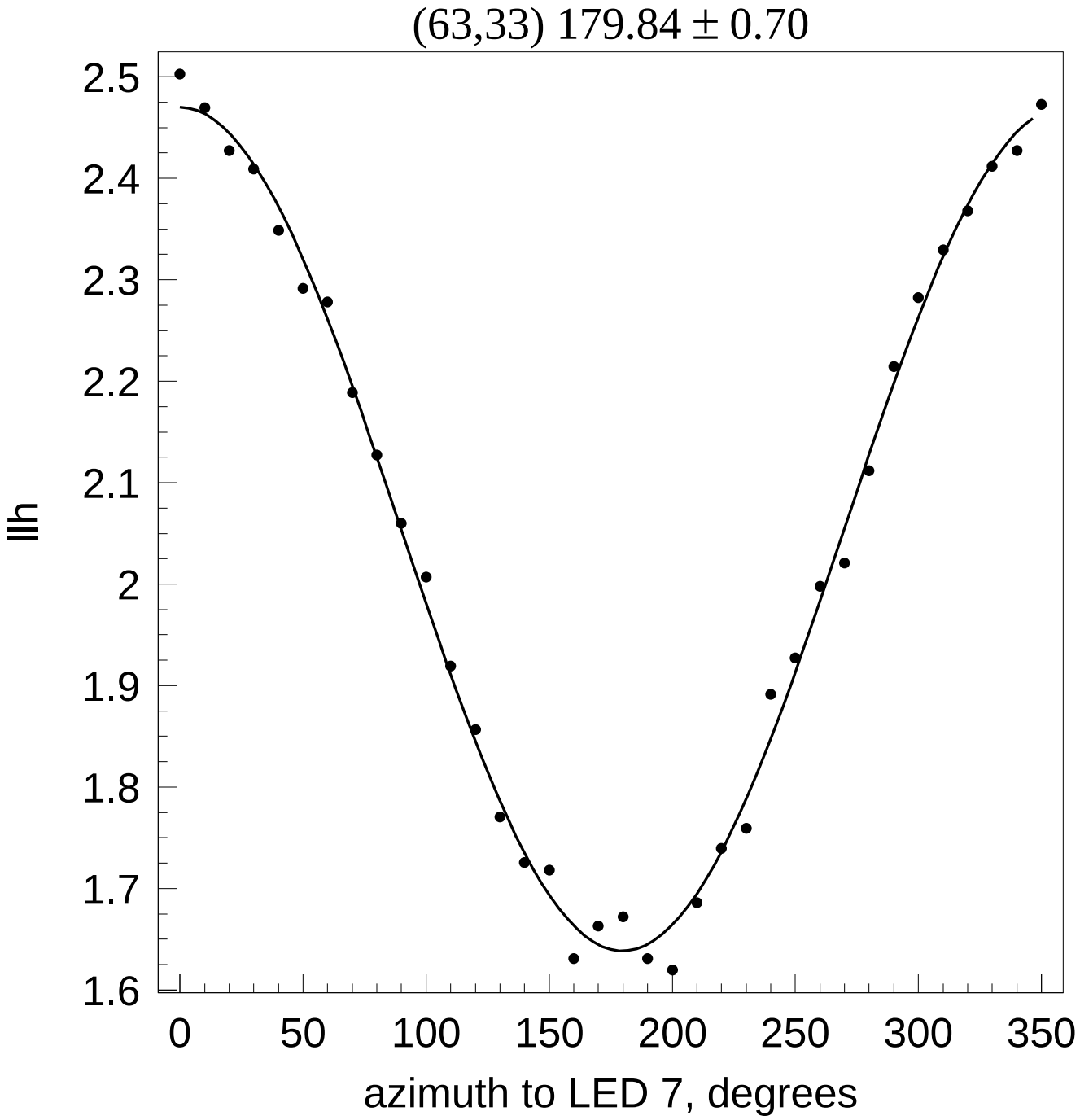

(62,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
353.1 ± 27.7

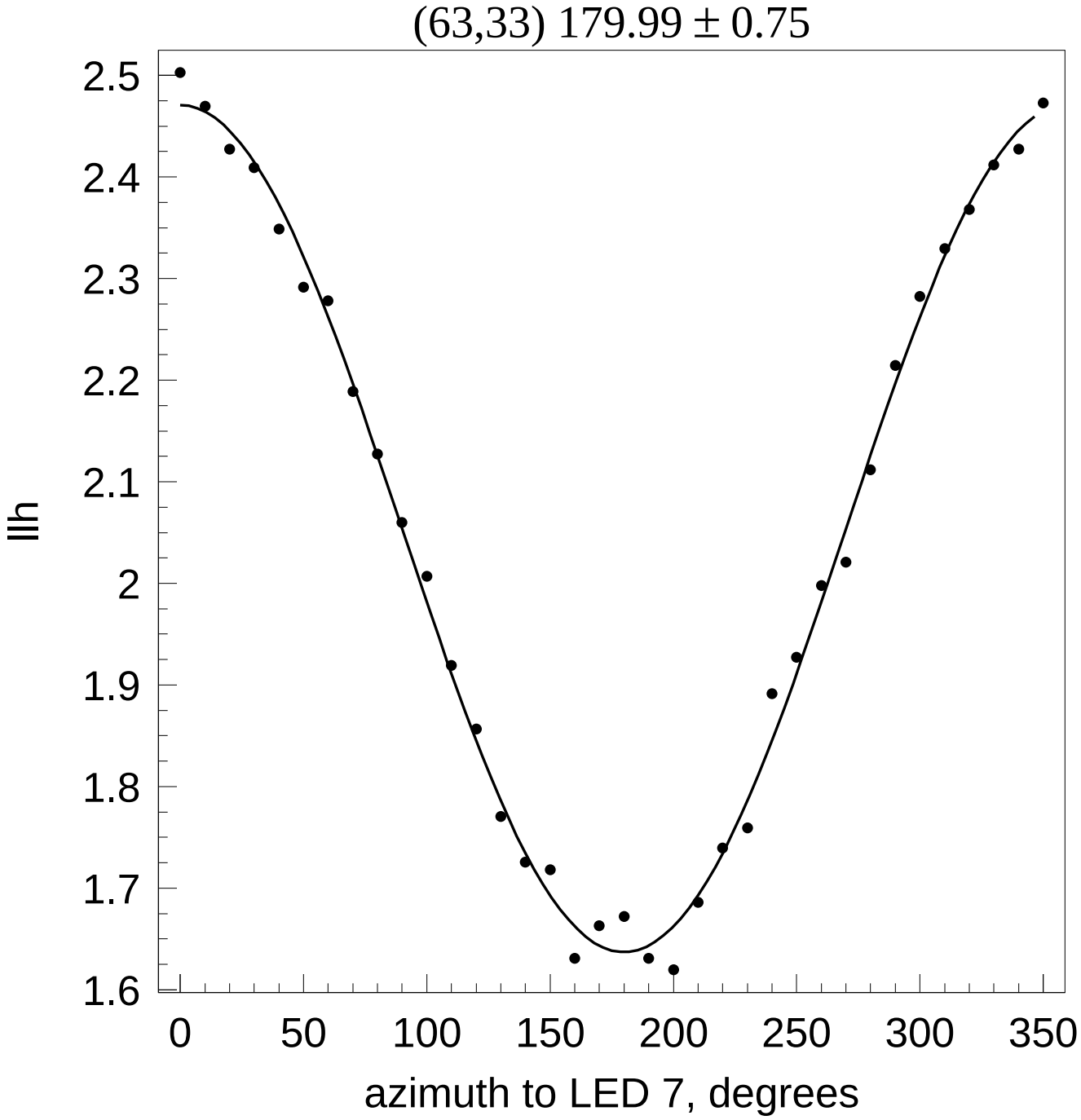

(62,37) 352.11 ± 1.05
2.5
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

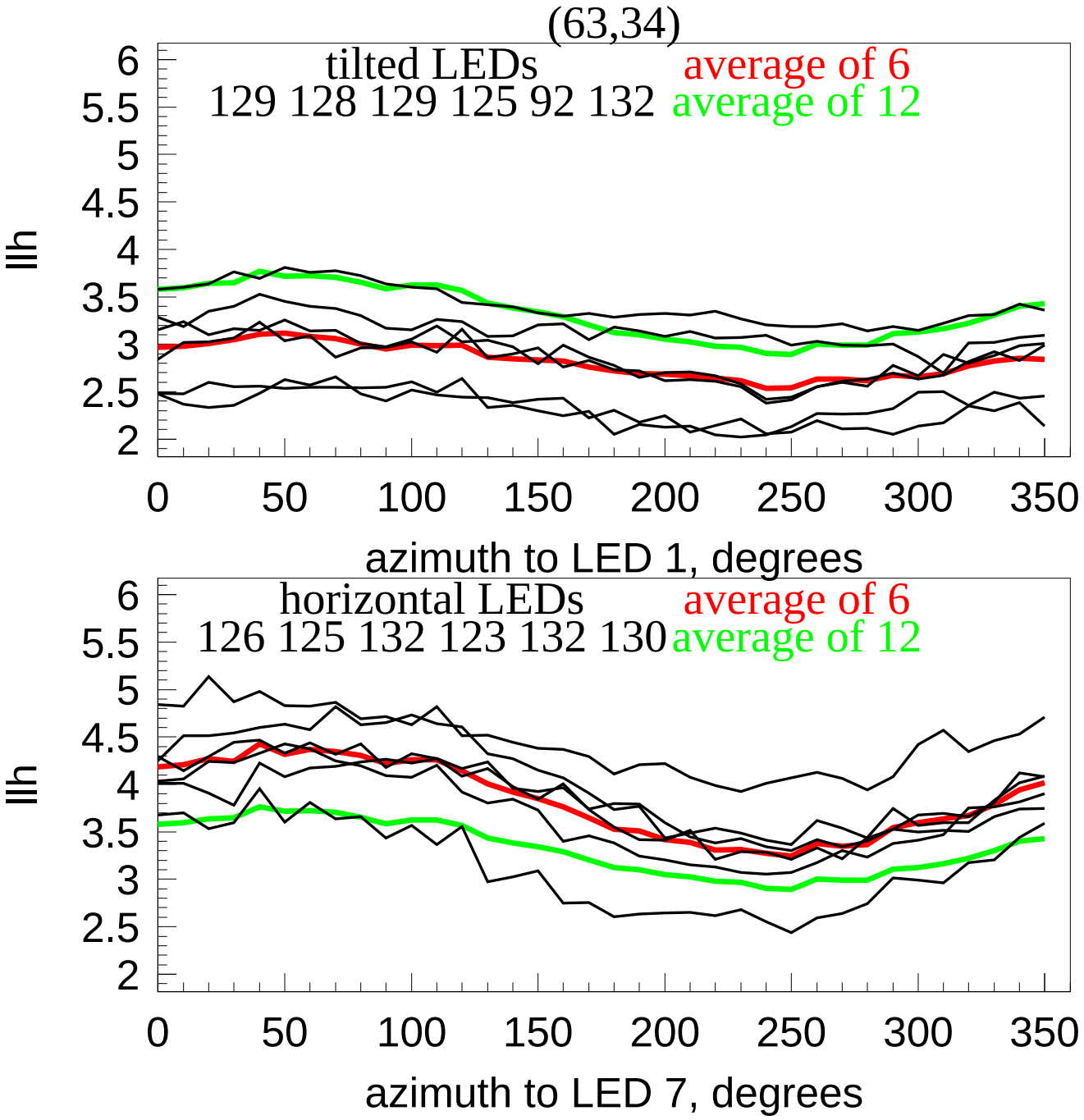

(62,37) 352.18 ± 1.07
2.5
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

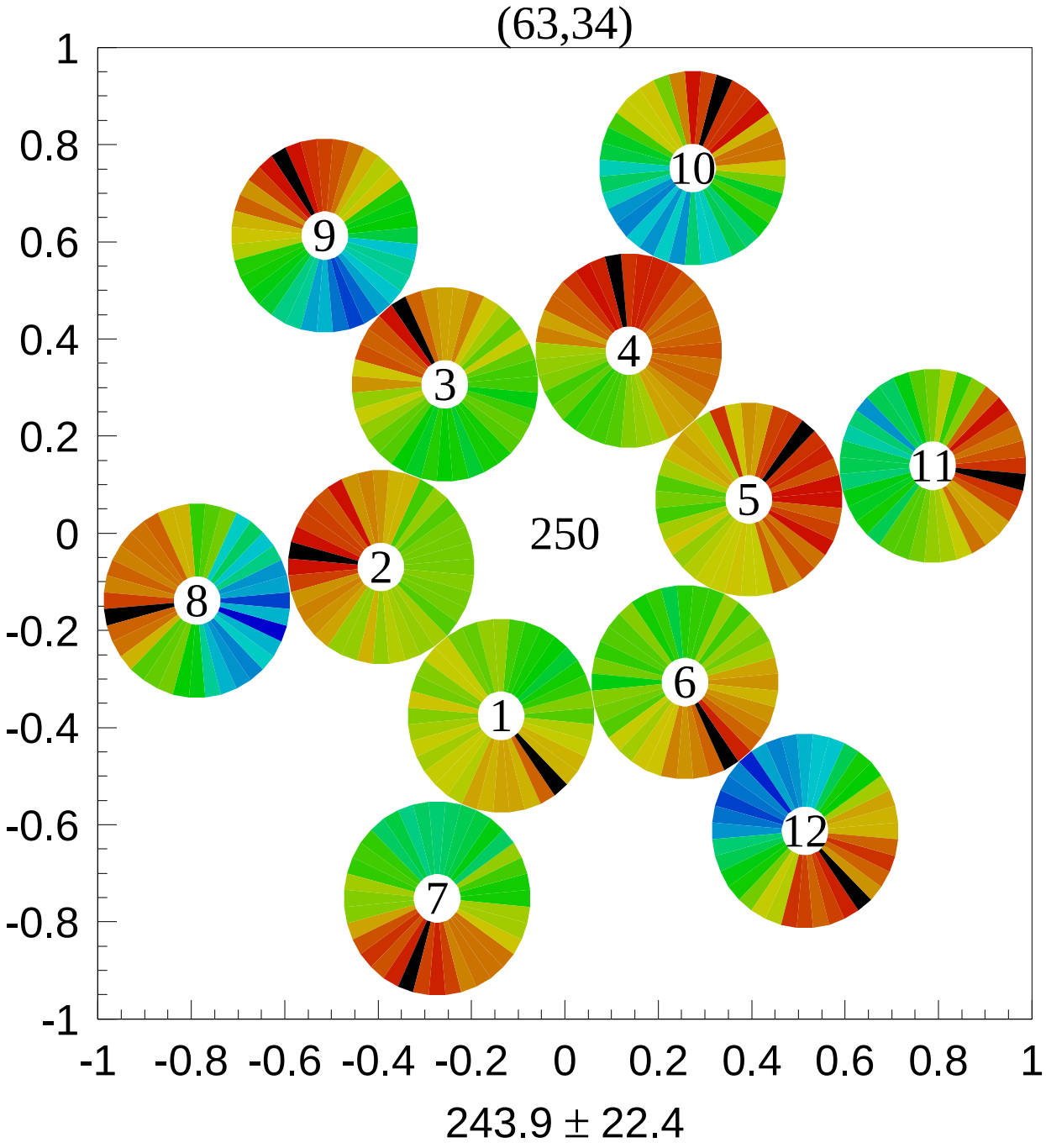

(63,33)
tilted LEDs
126 119 127 128 127 135
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 130 132 121 128 123
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

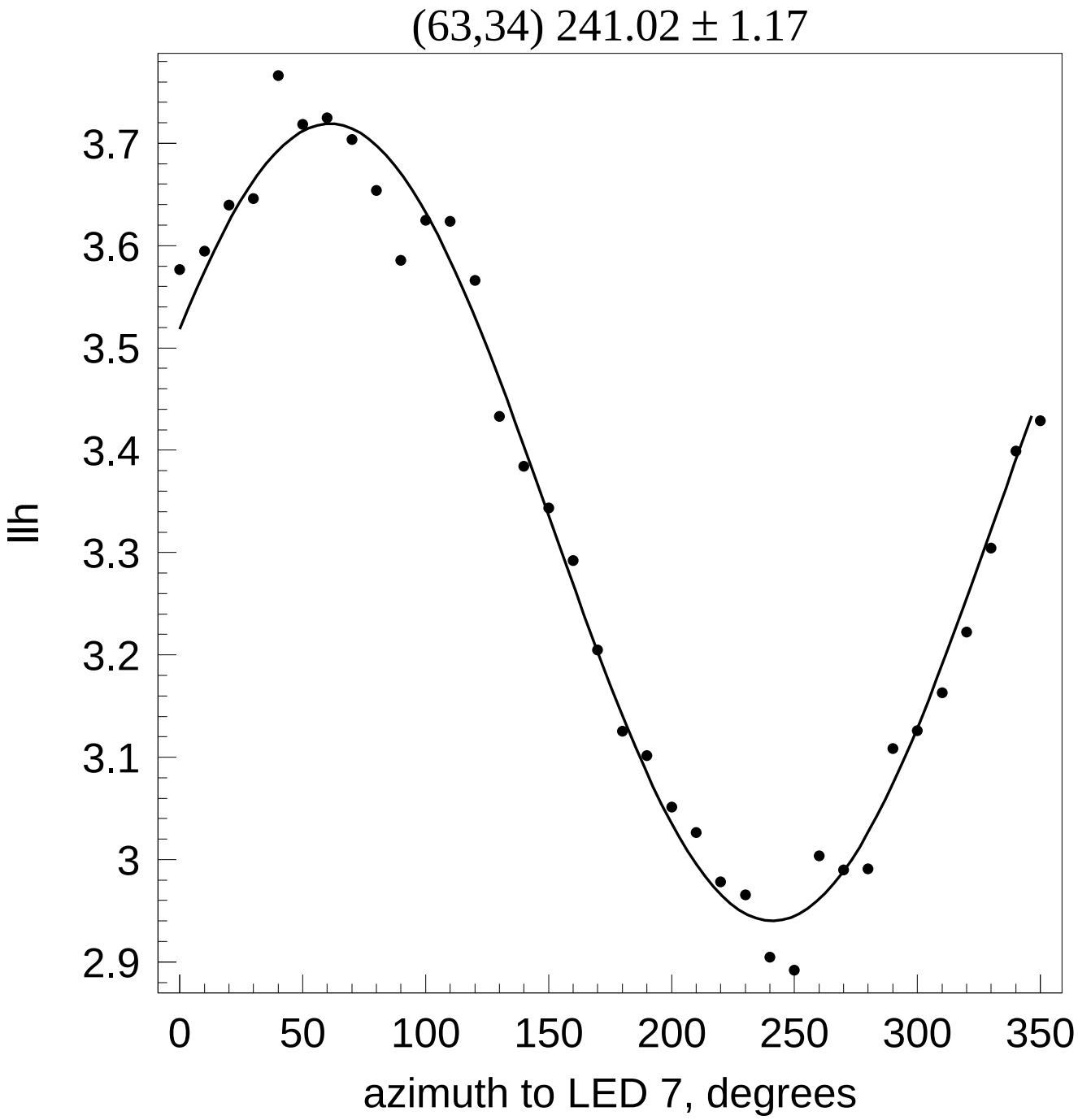

(63,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
181.3 ± 22.3
200
1
2
3
4
5
6
7
8
9
10
11
12

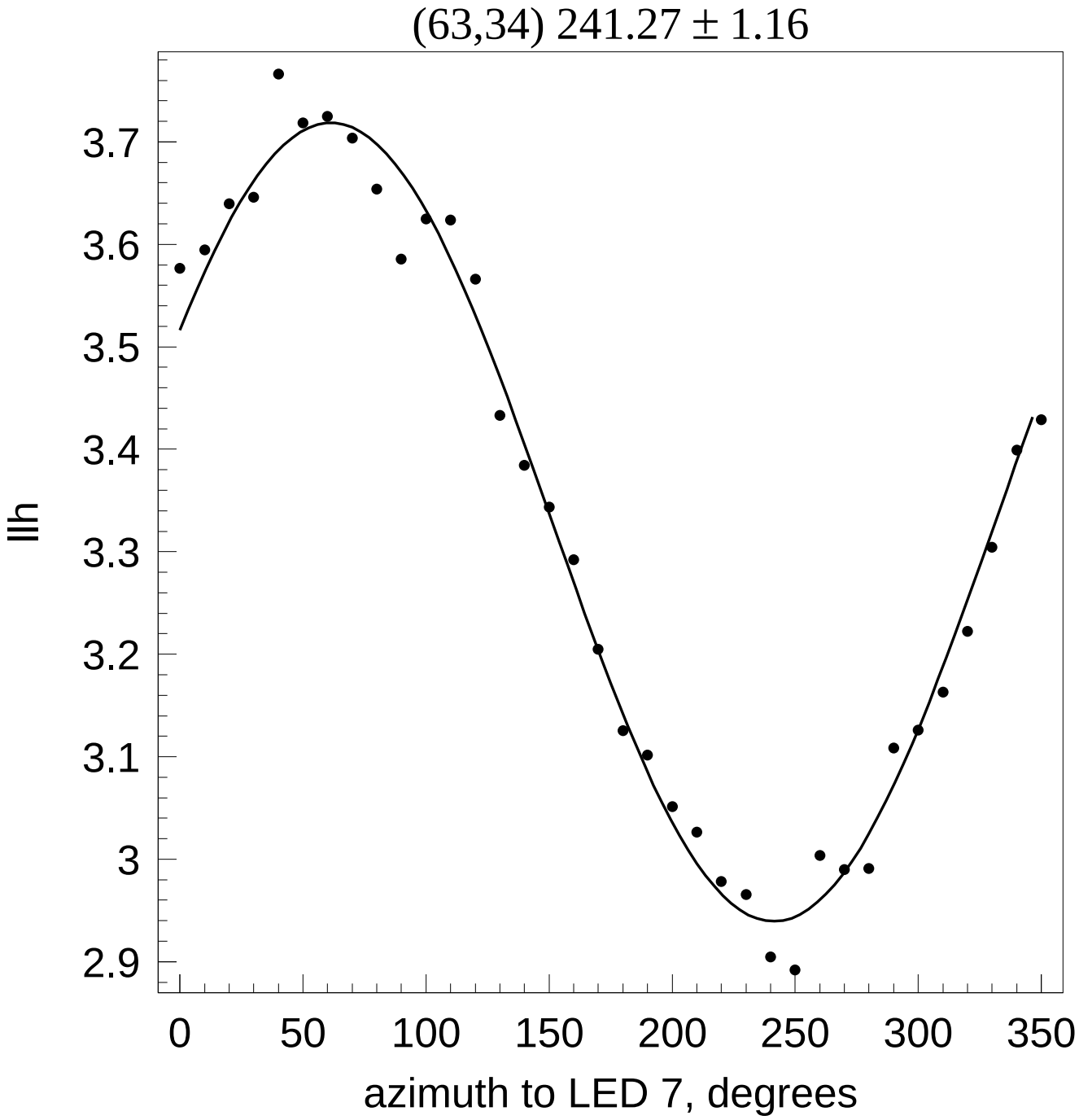

(63,33) 179.84 ± 0.70
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

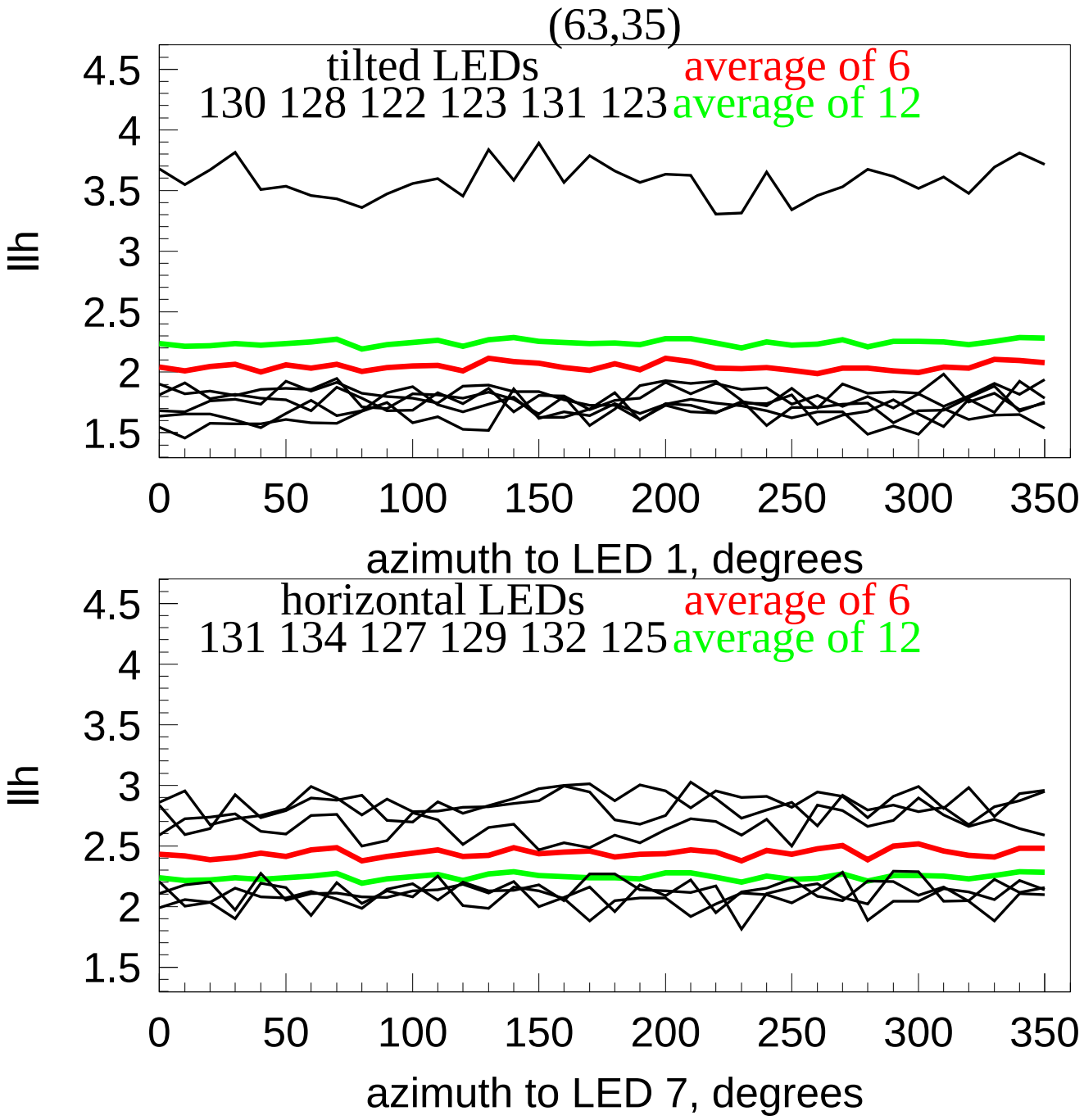

(63,33) 179.99 ± 0.75
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

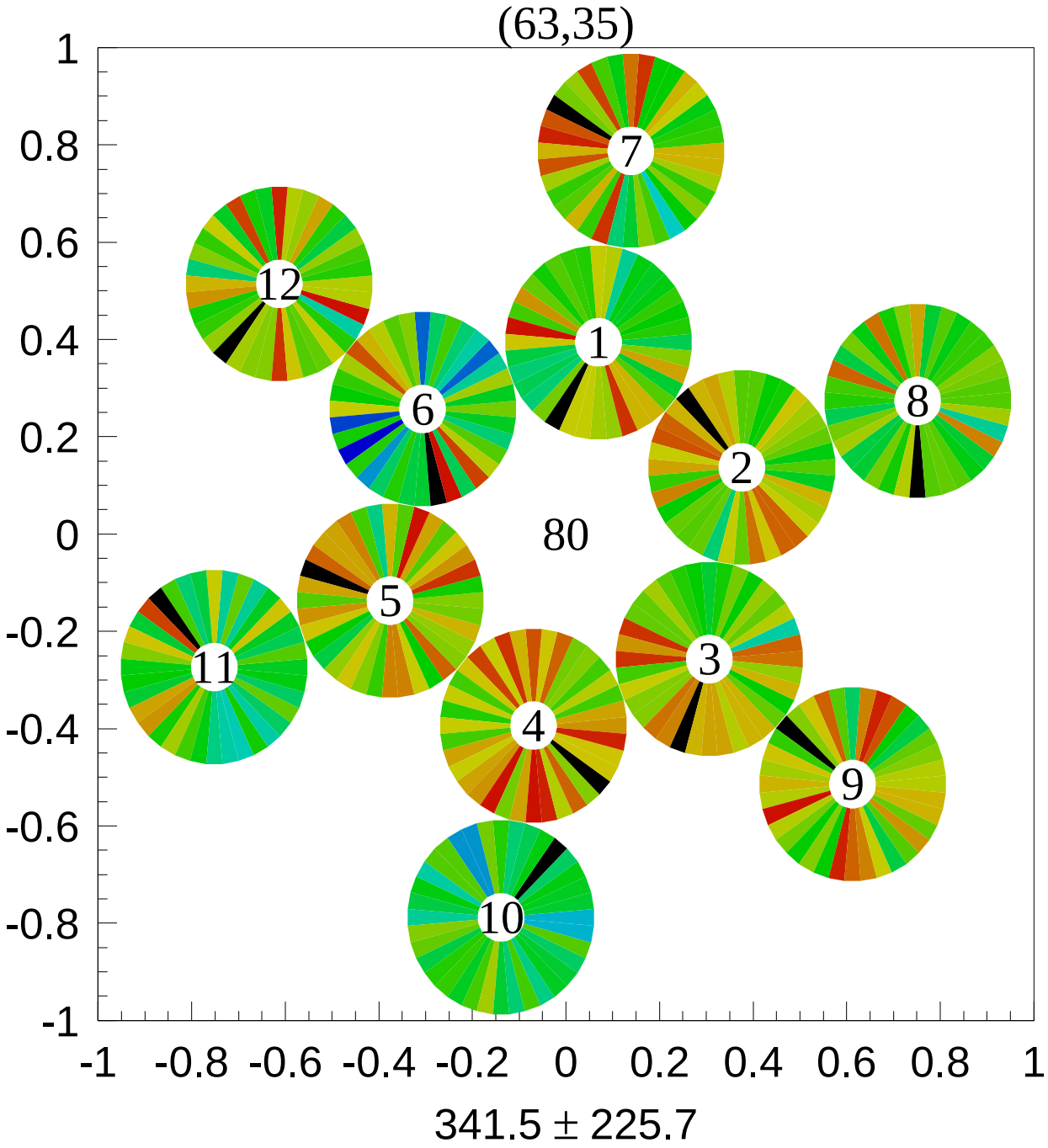

(63,34)
tilted LEDs
129 128 129 125 92 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 125 132 123 132 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

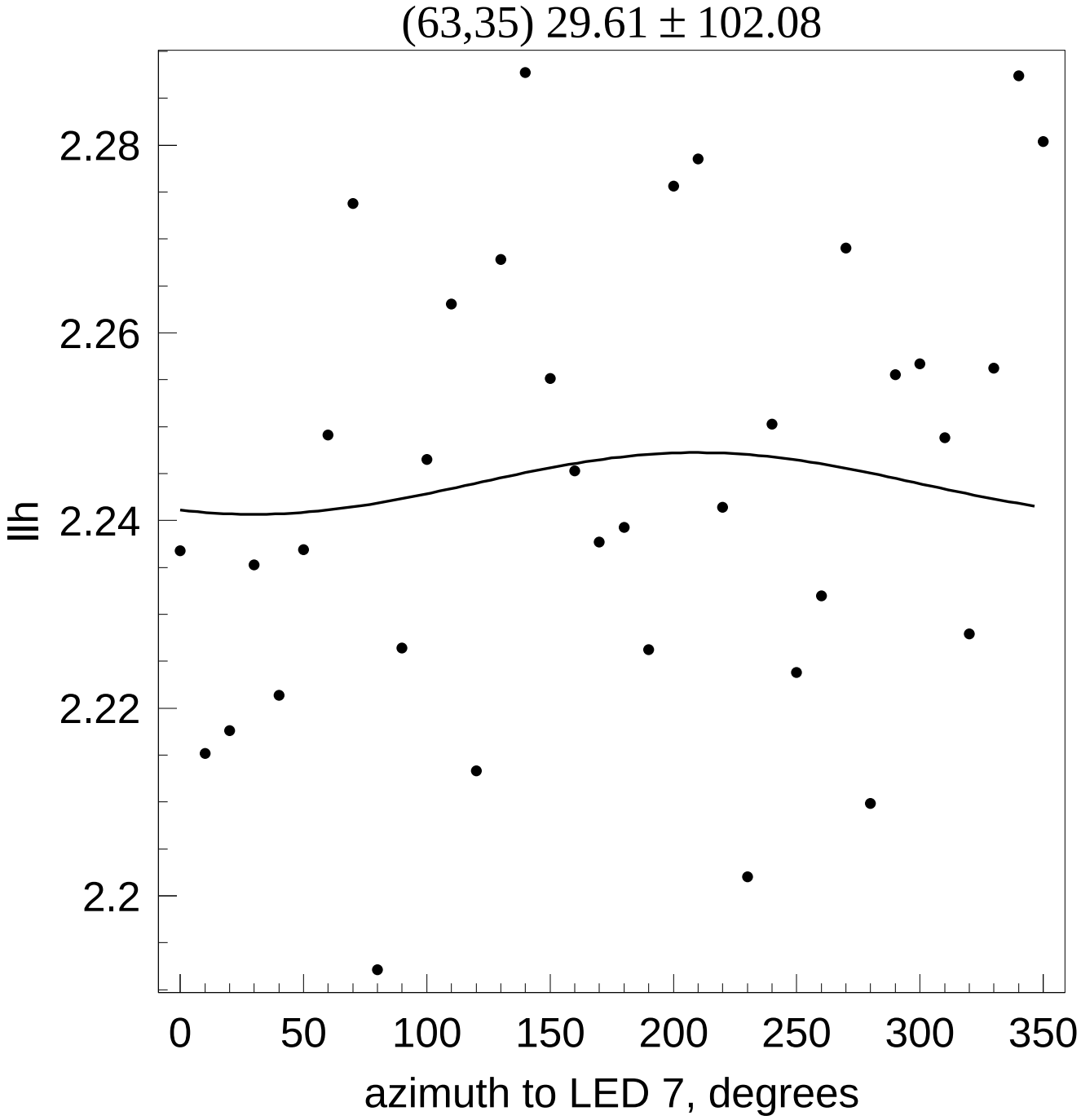

(63,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
250
2
8
6
1
12
7
243.9 ± 22.4

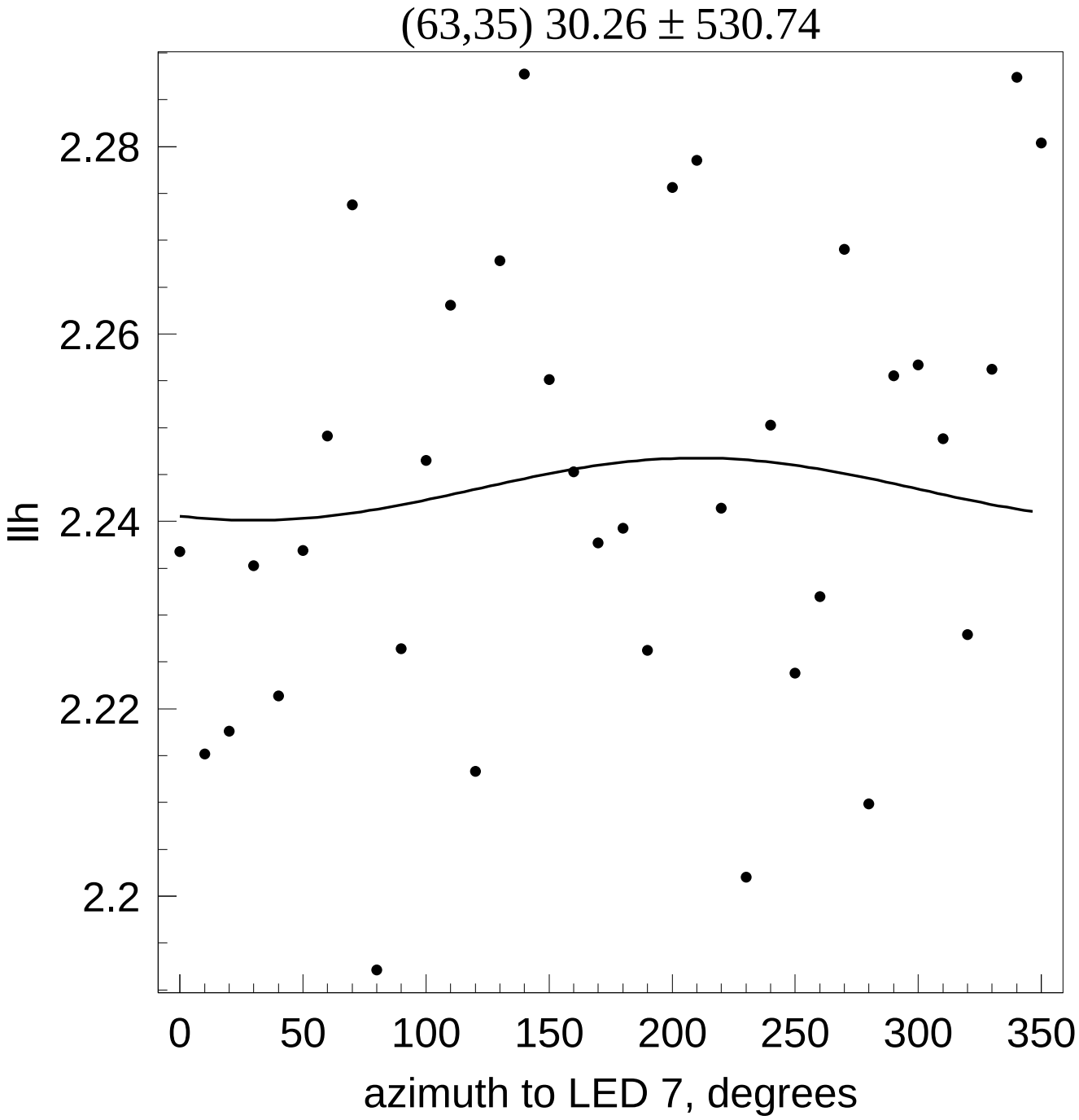

(63,34) 241.02 ± 1.17
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

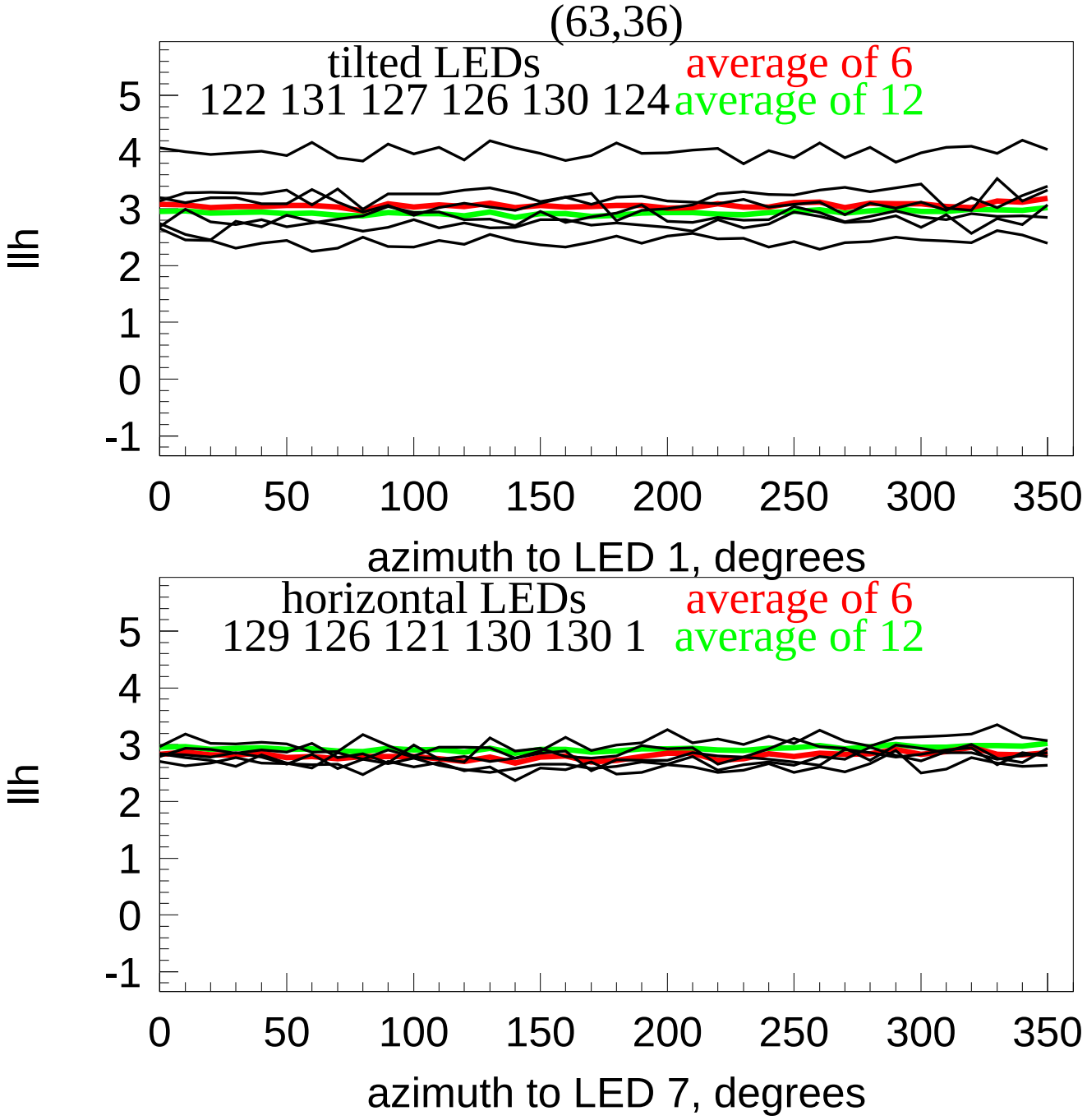

(63,34) 241.27 ± 1.16
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

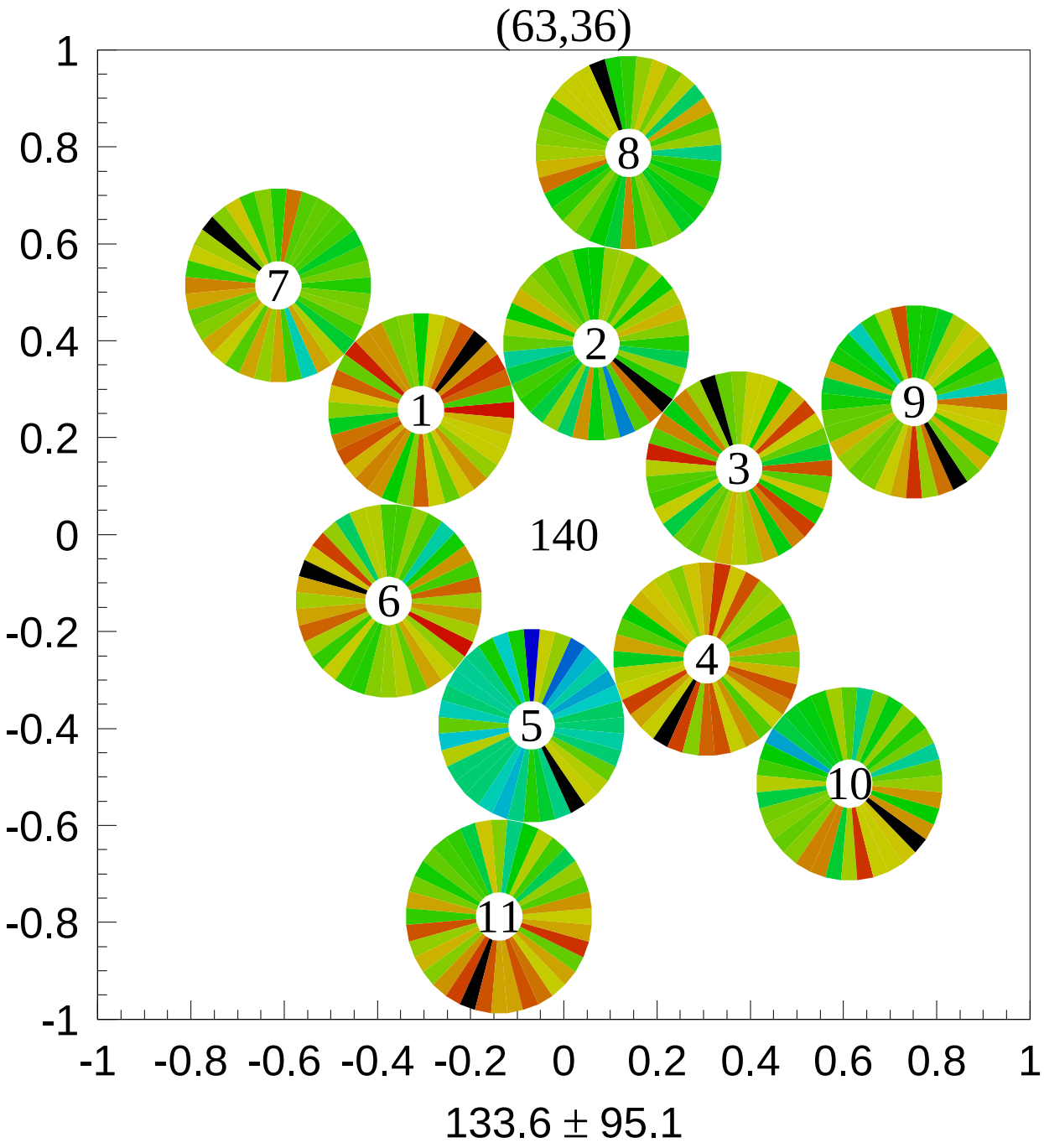

(63,35)
tilted LEDs
130 128 122 123 131 123
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 134 127 129 132 125
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

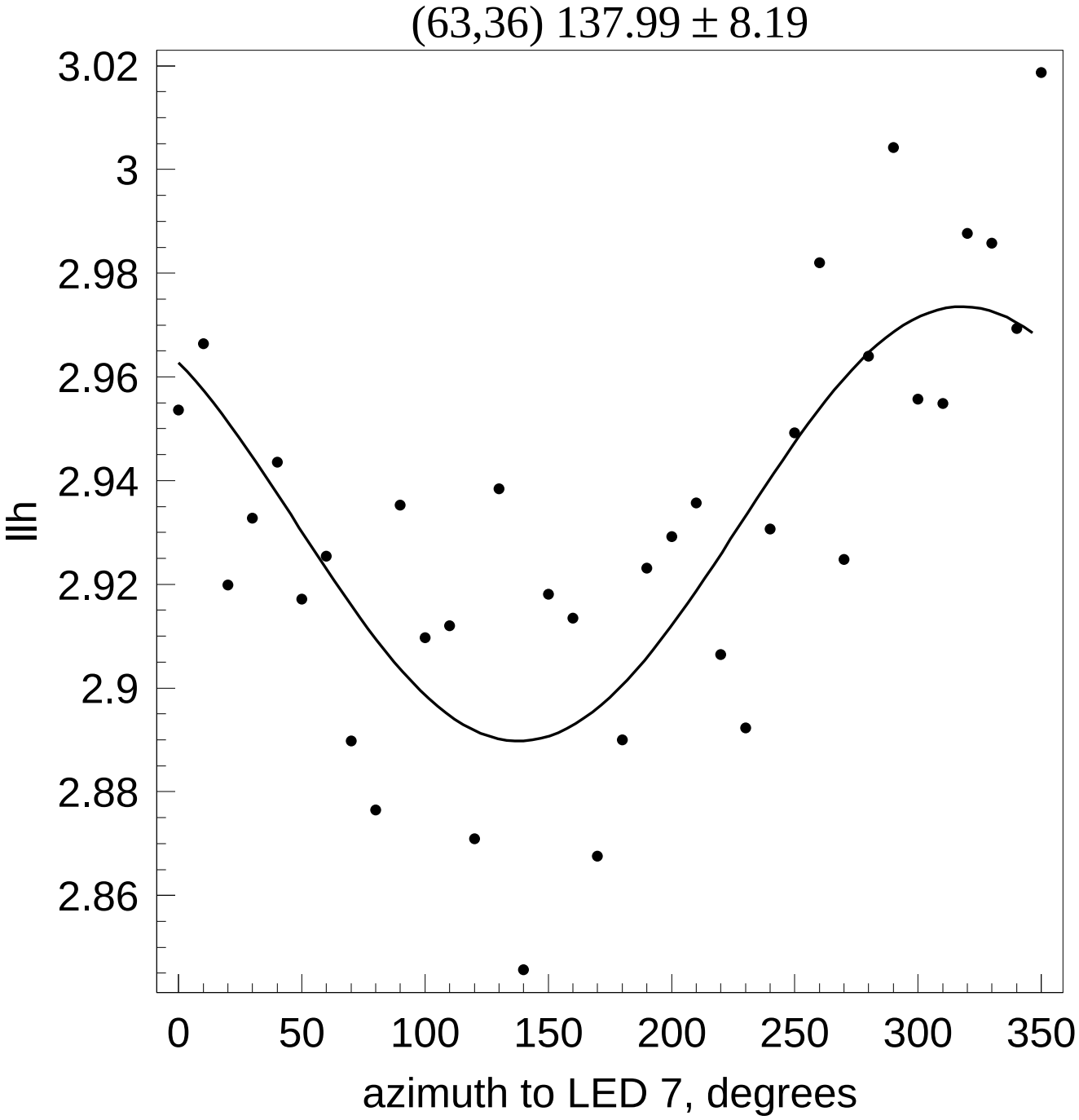

(63,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
80
5
11
3
4
9
10
341.5 ± 225.7

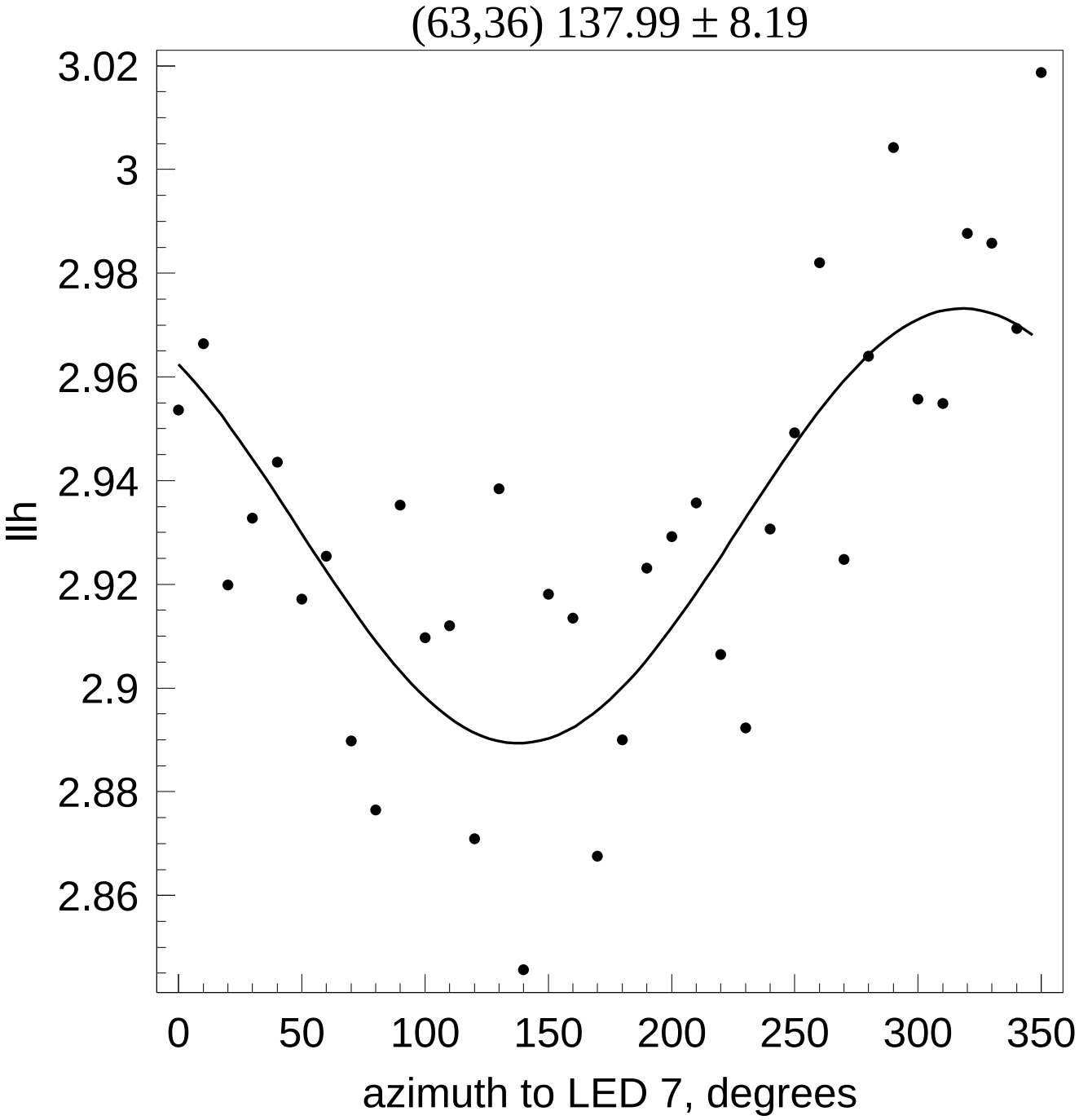

(63,35) 29.61 ± 102.08
2.28
2.26
2.24
2.22
2.2
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

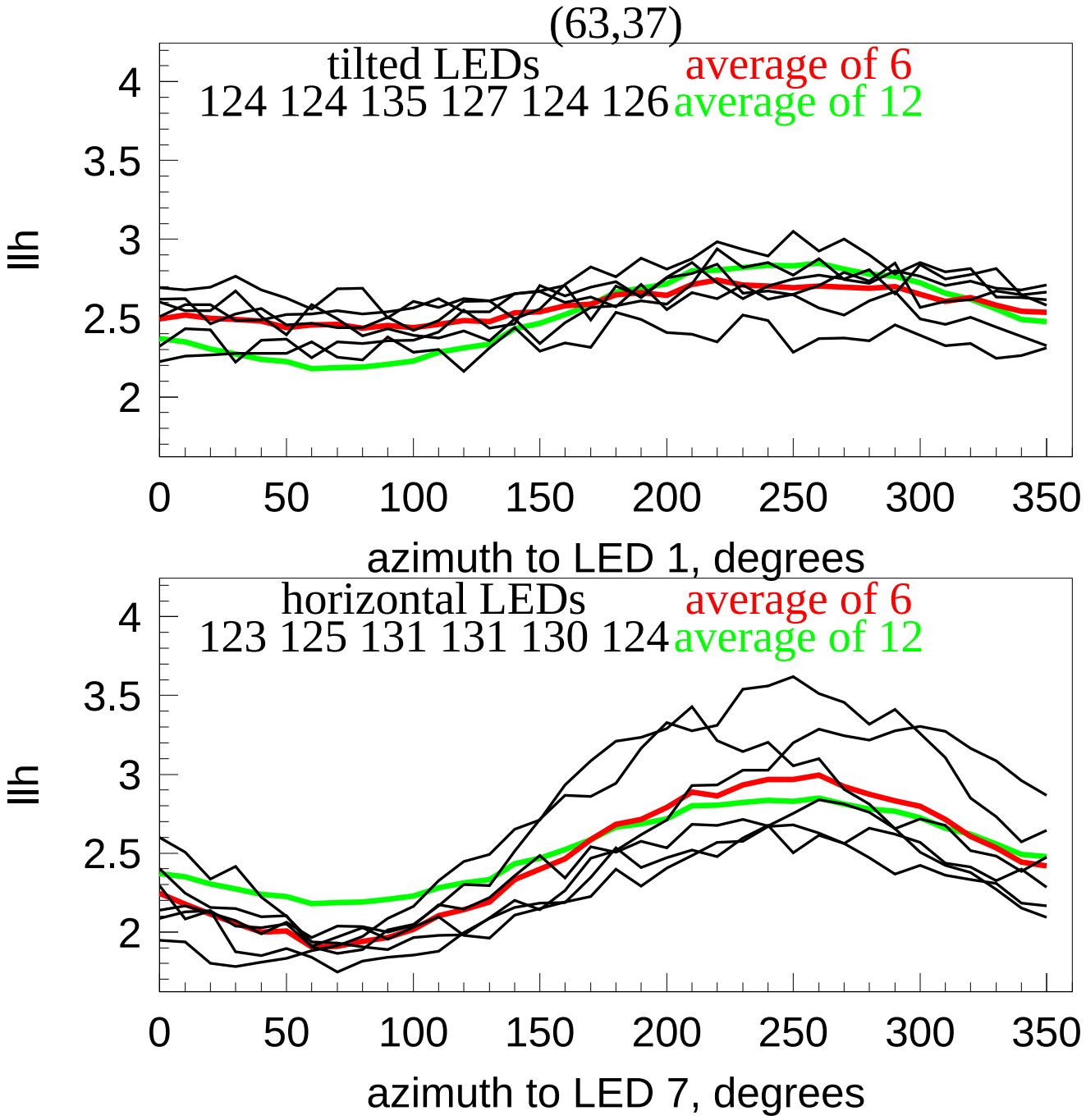

(63,35) 30.26 ± 530.74
2.28
2.26
2.24
2.22
2.2
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

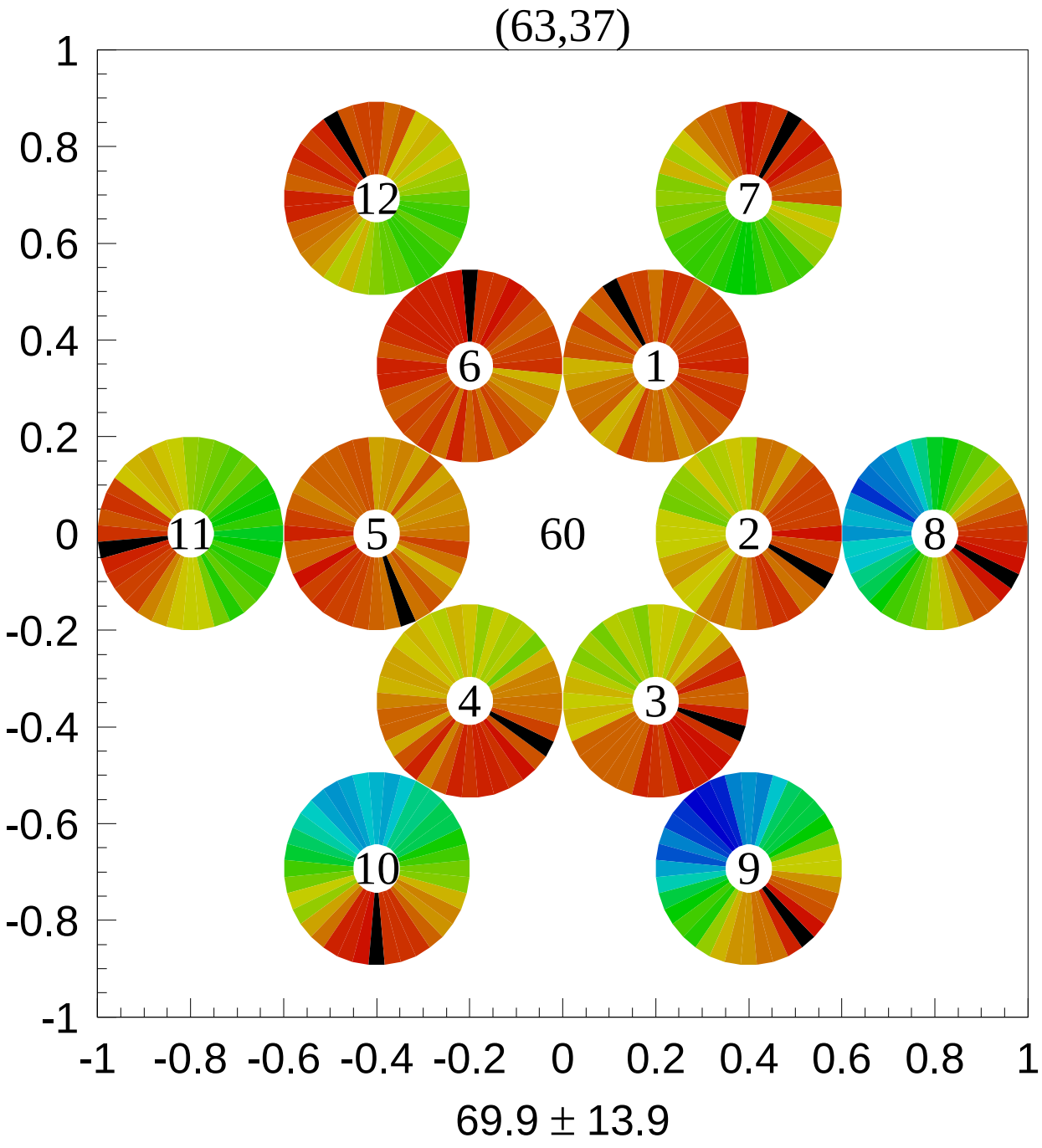

(63,36)
tilted LEDs
122 131 127 126 130 124
average of 6
average of 12
llh
5
4
3
2
1
0
-1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 126 121 130 130 1
average of 6
average of 12
llh
5
4
3
2
1
0
-1
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

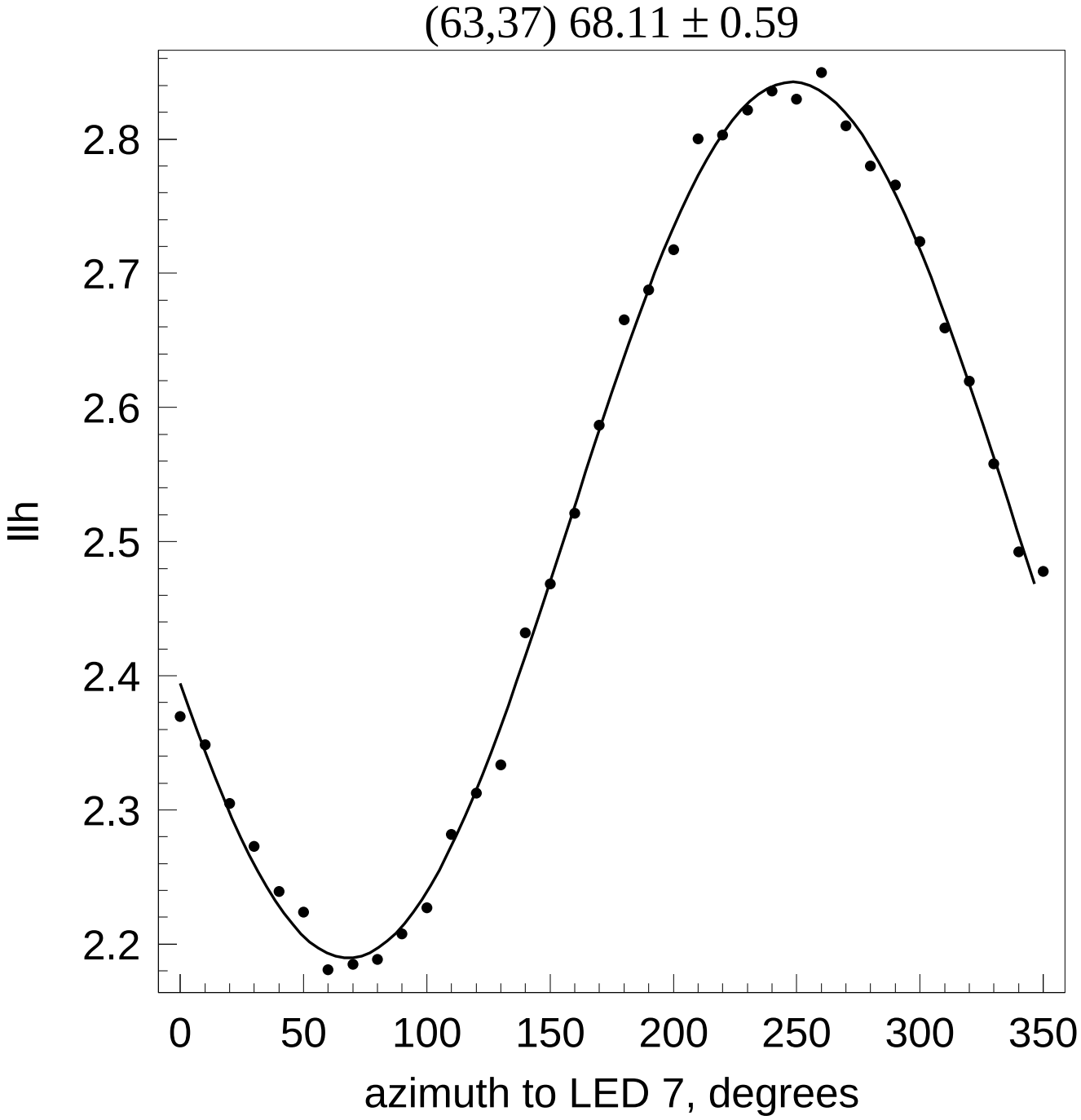

(63,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
133.6 ± 95.1
140
1
2
3
4
5
6
7
8
9
10
11

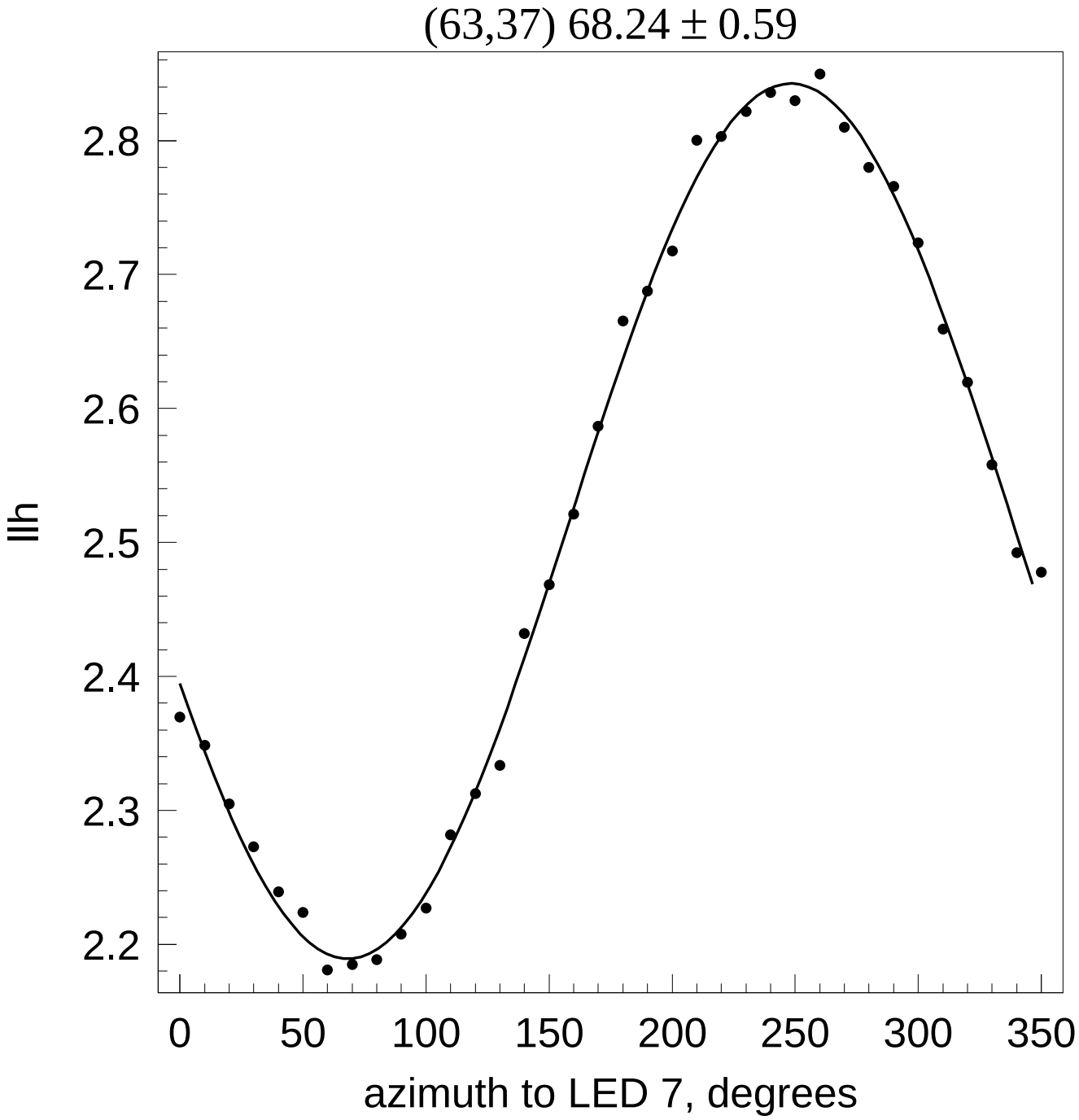

(63,36) 137.99 ± 8.19
3.02
3
2.98
2.96
2.94
2.92
2.9
2.88
2.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

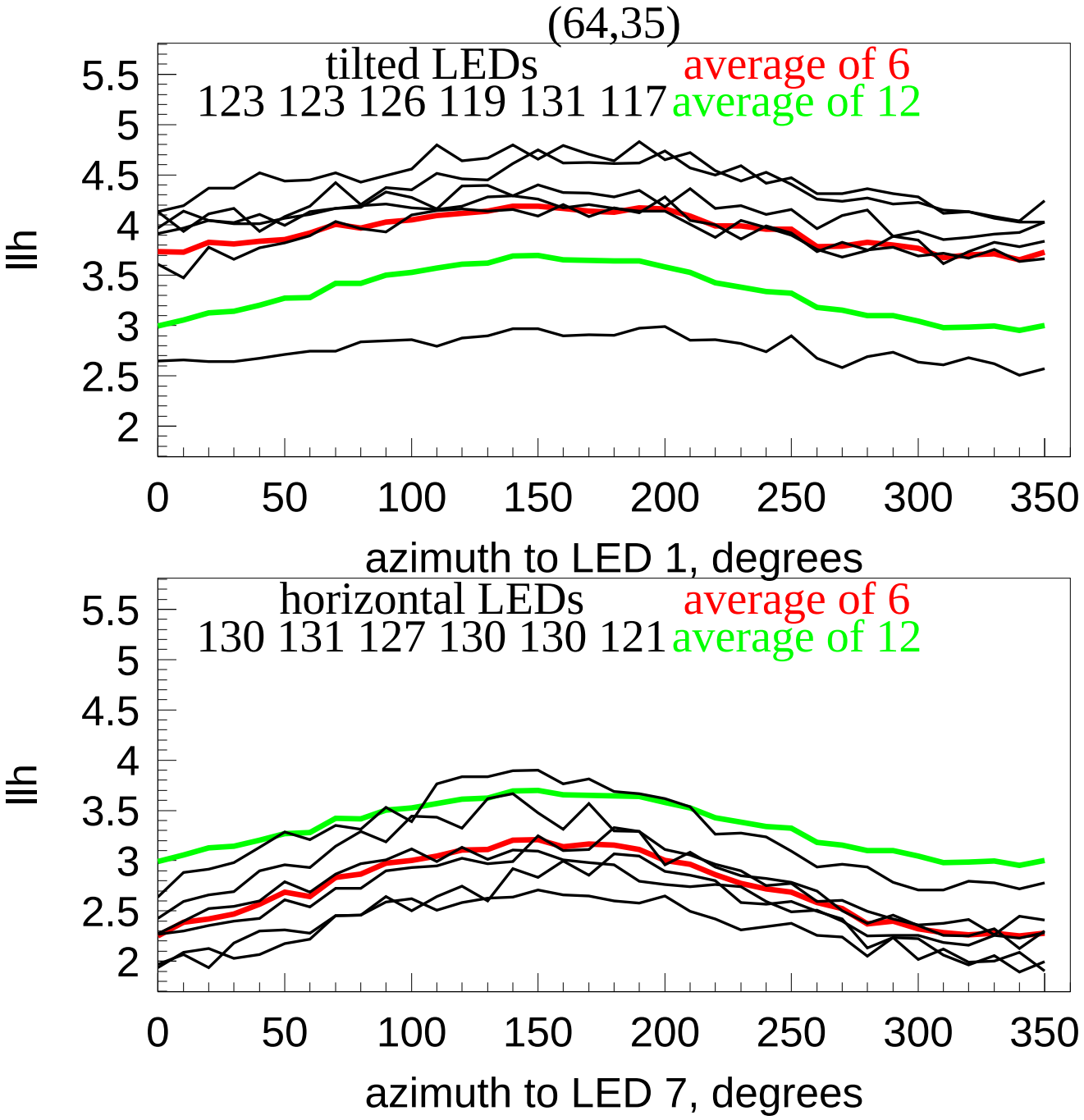

(63,36) 137.99 ± 8.19
3.02
3
2.98
2.96
2.94
2.92
2.9
2.88
2.86
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

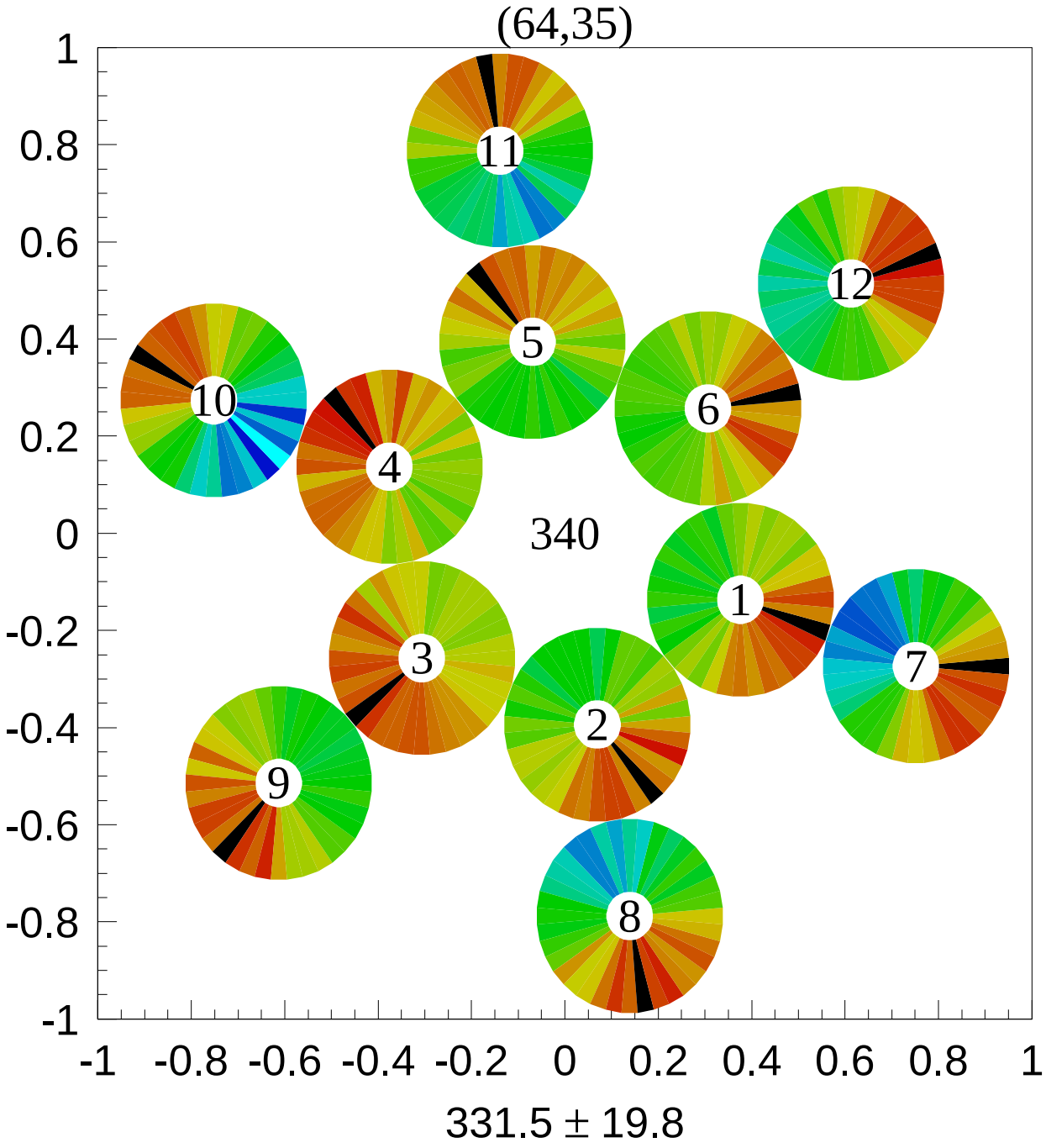

(63,37)
tilted LEDs
124 124 135 127 124 126
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 125 131 131 130 124
average of 6
average of 12
llh
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

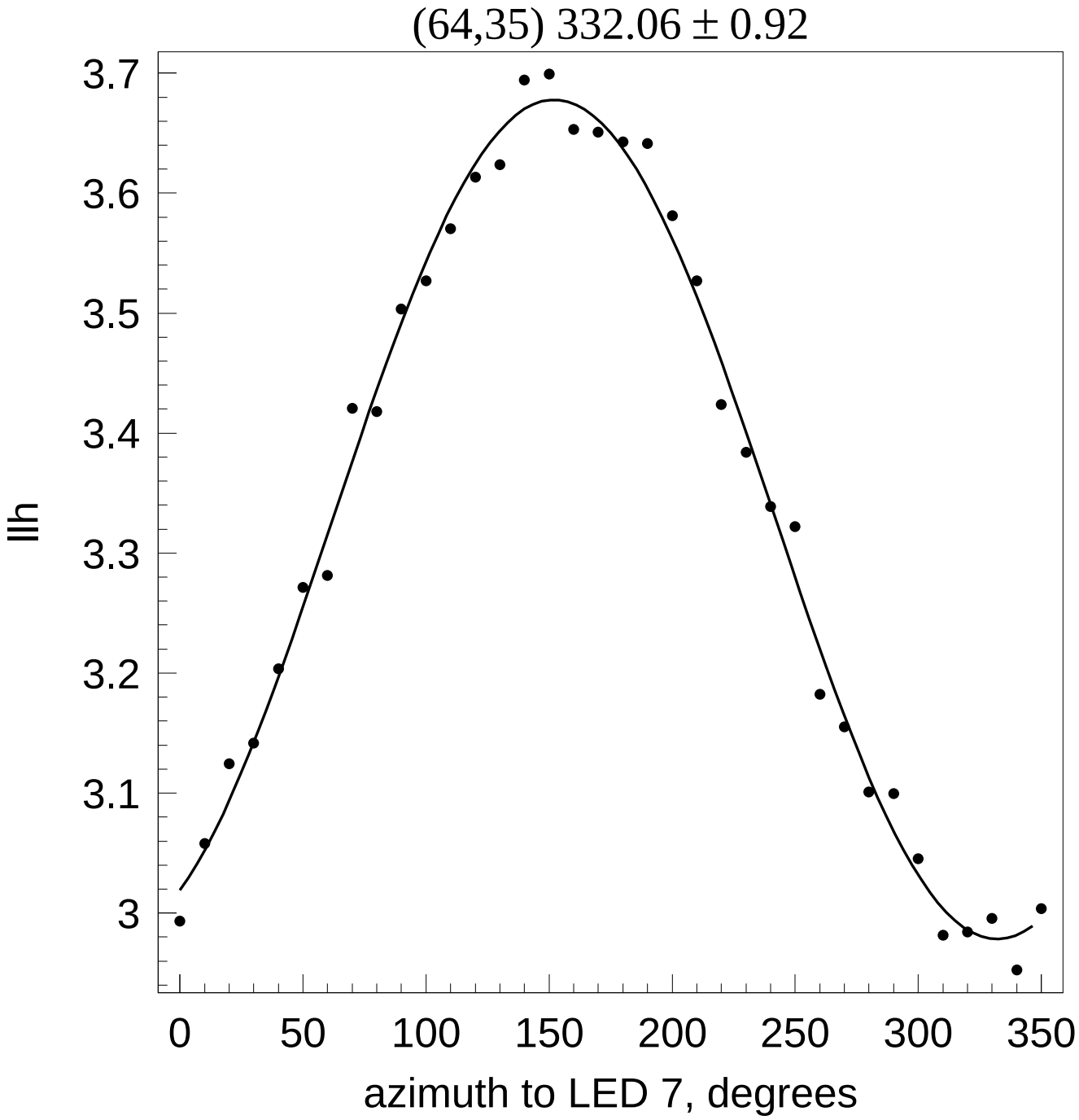

(63,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
69.9 ± 13.9

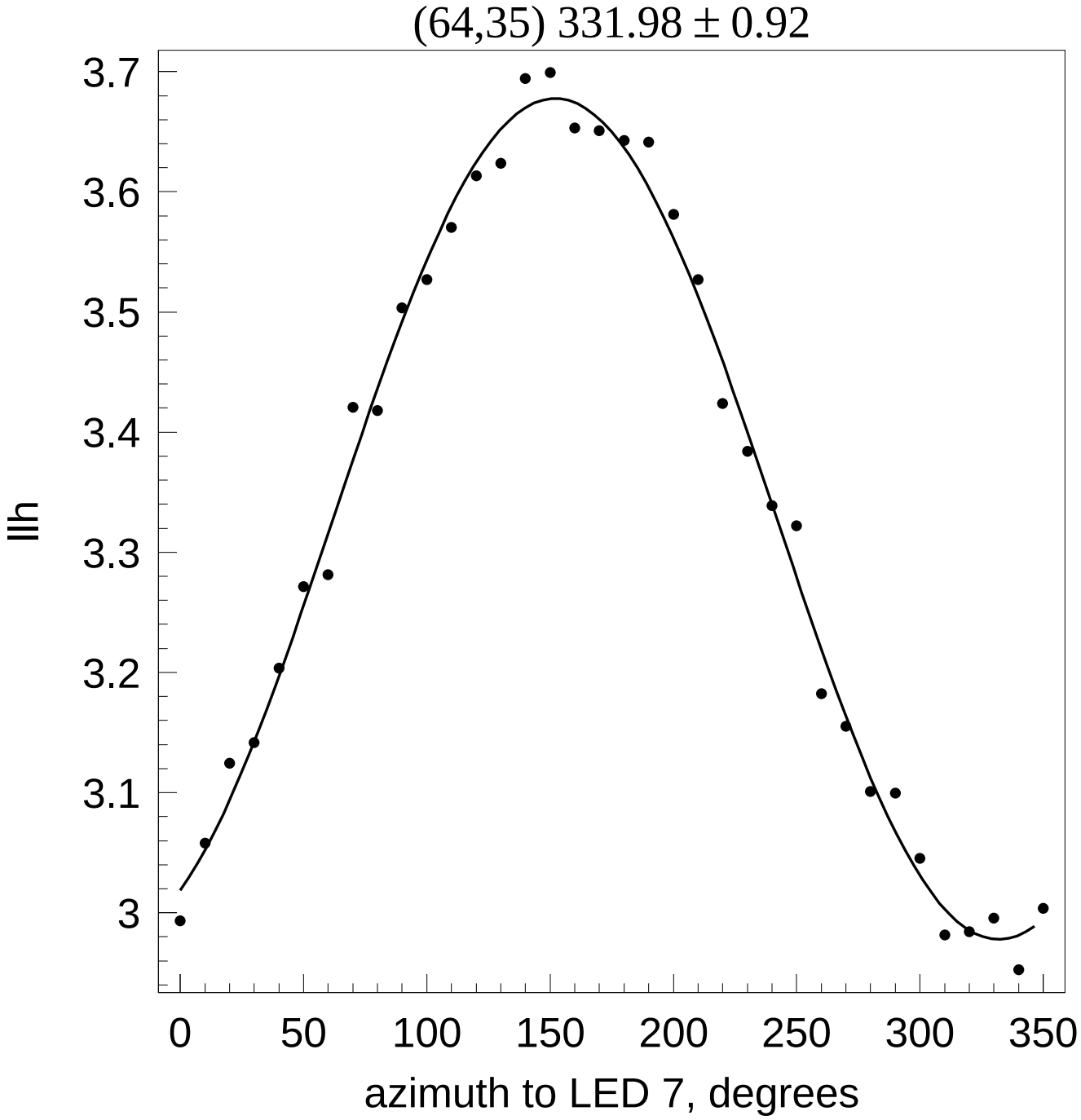

(63,37) 68.11 ± 0.59
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

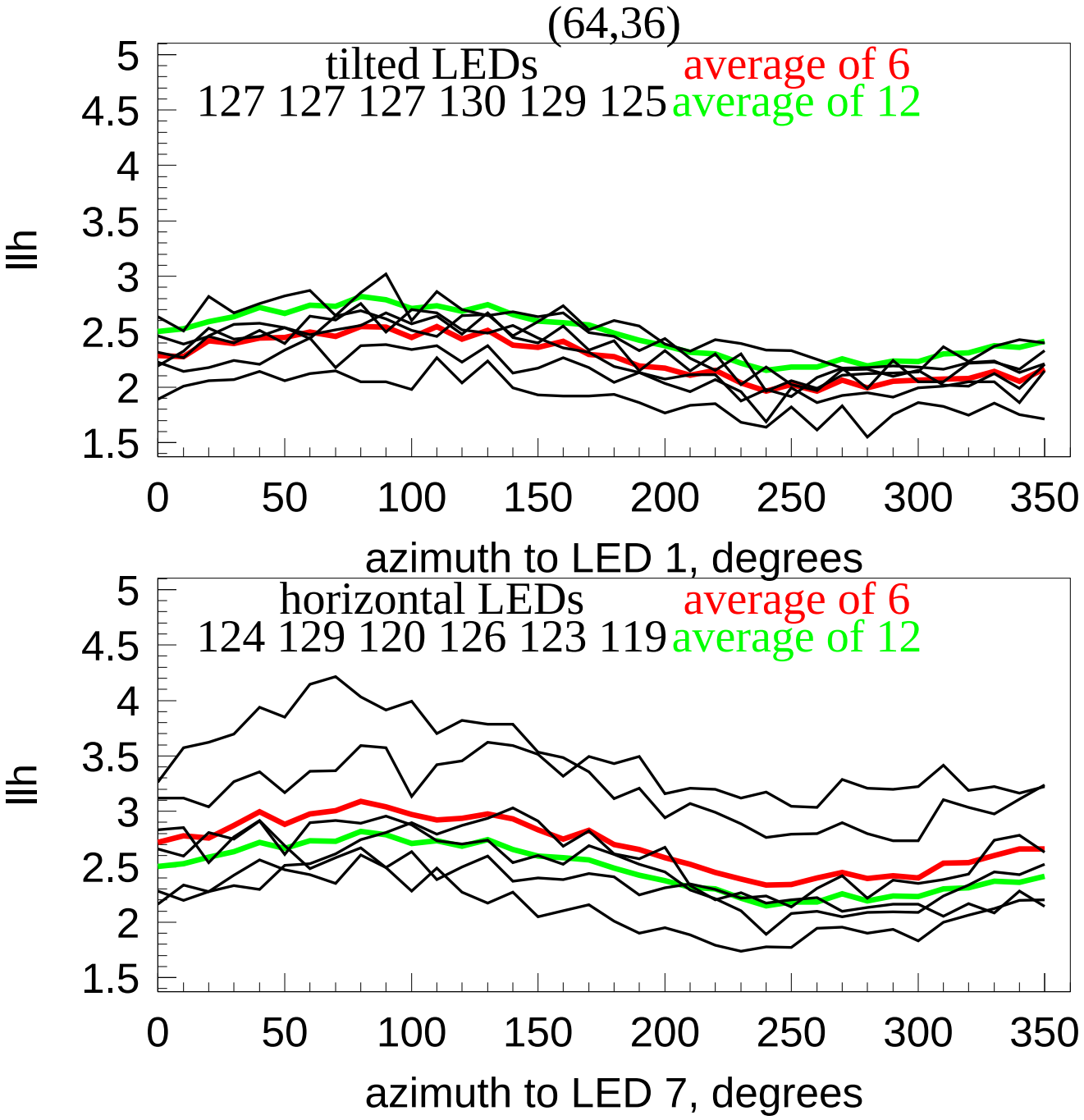

(63,37) 68.24 ± 0.59
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

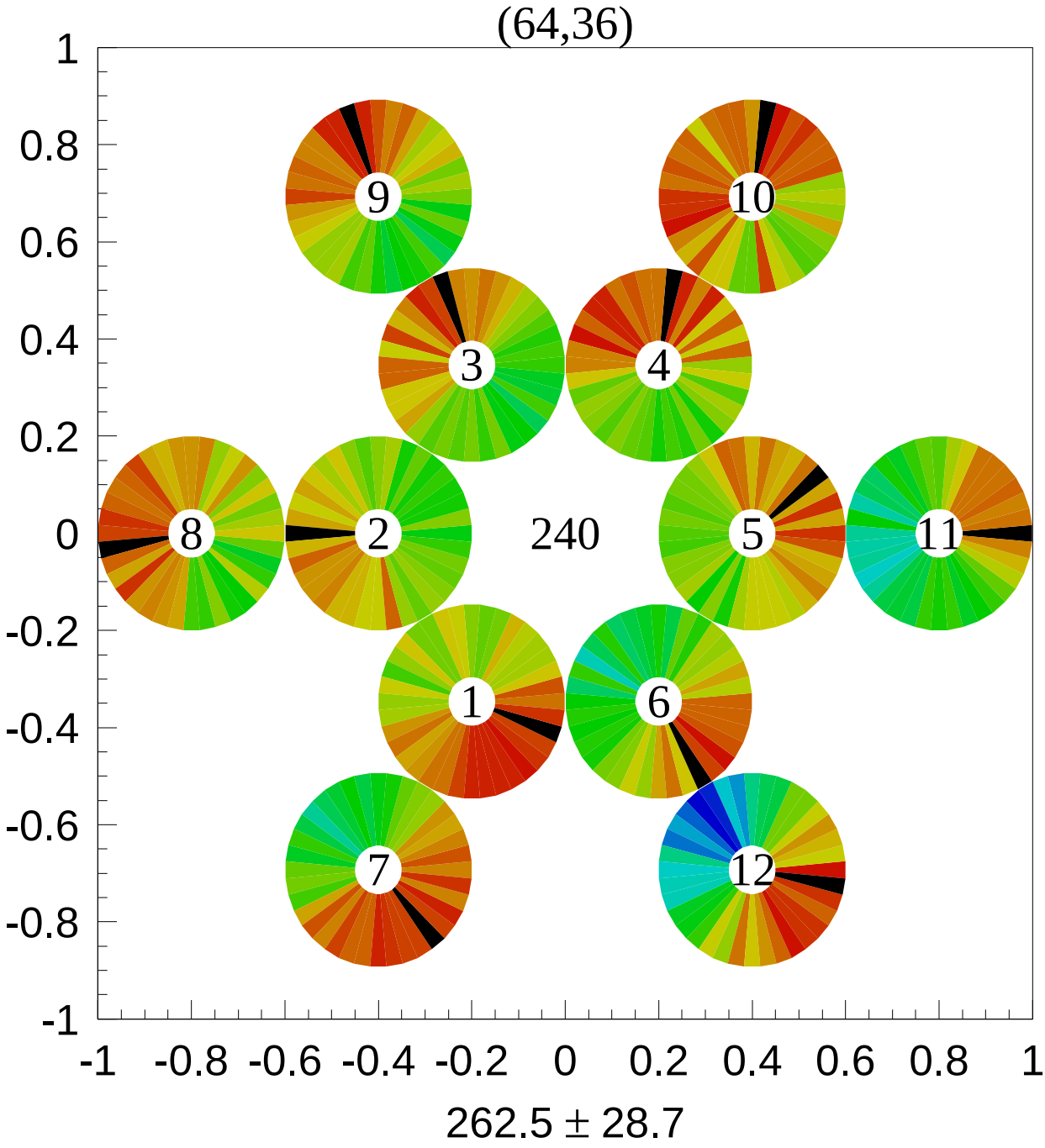

(64,35)
tilted LEDs
123 123 126 119 131 117
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 131 127 130 130 121
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

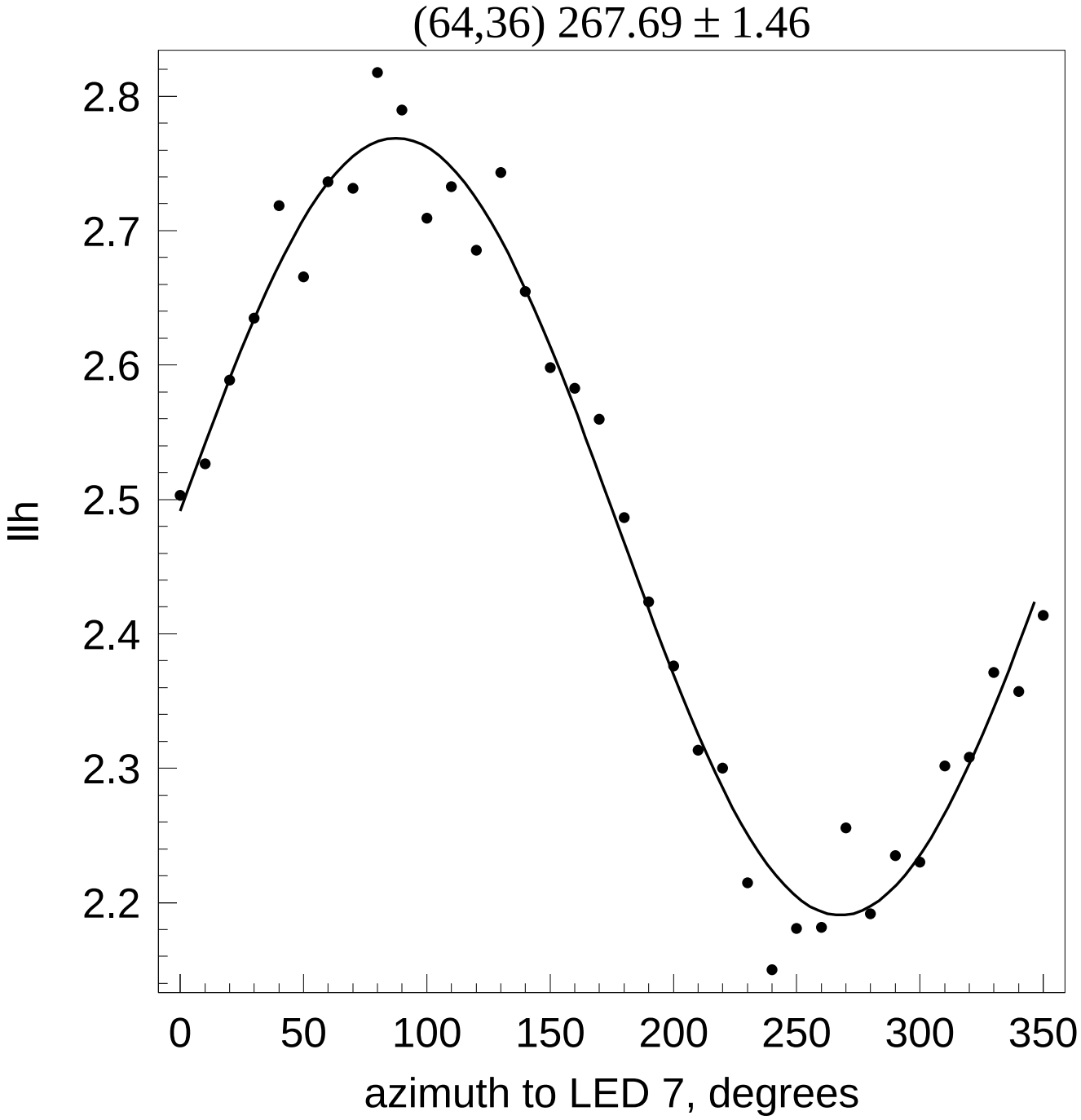

(64,35)
11
12
5
10
6
4
340
1
3
7
2
9
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
331.5 ± 19.8

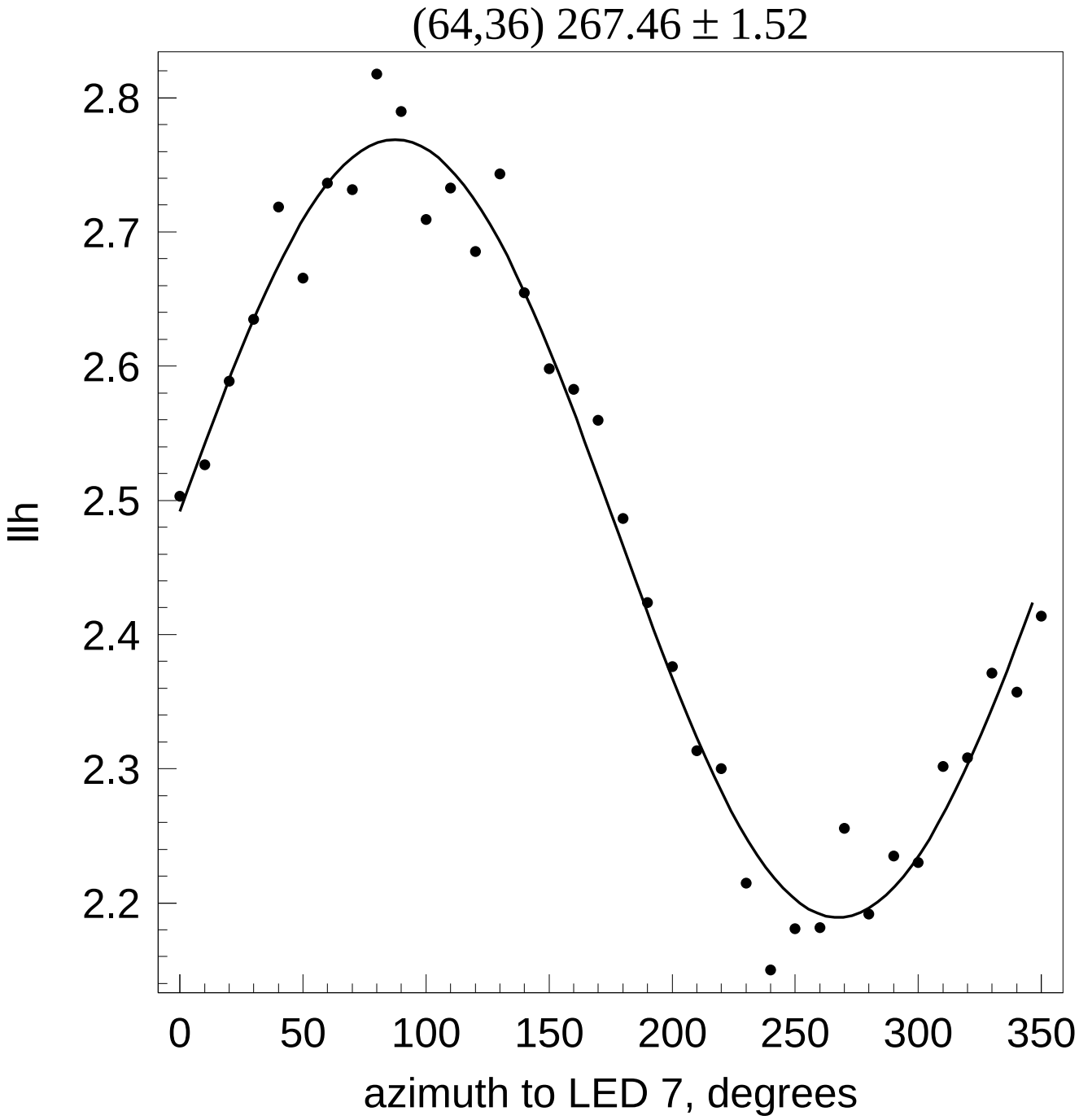

(64,35) 332.06 ± 0.92
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

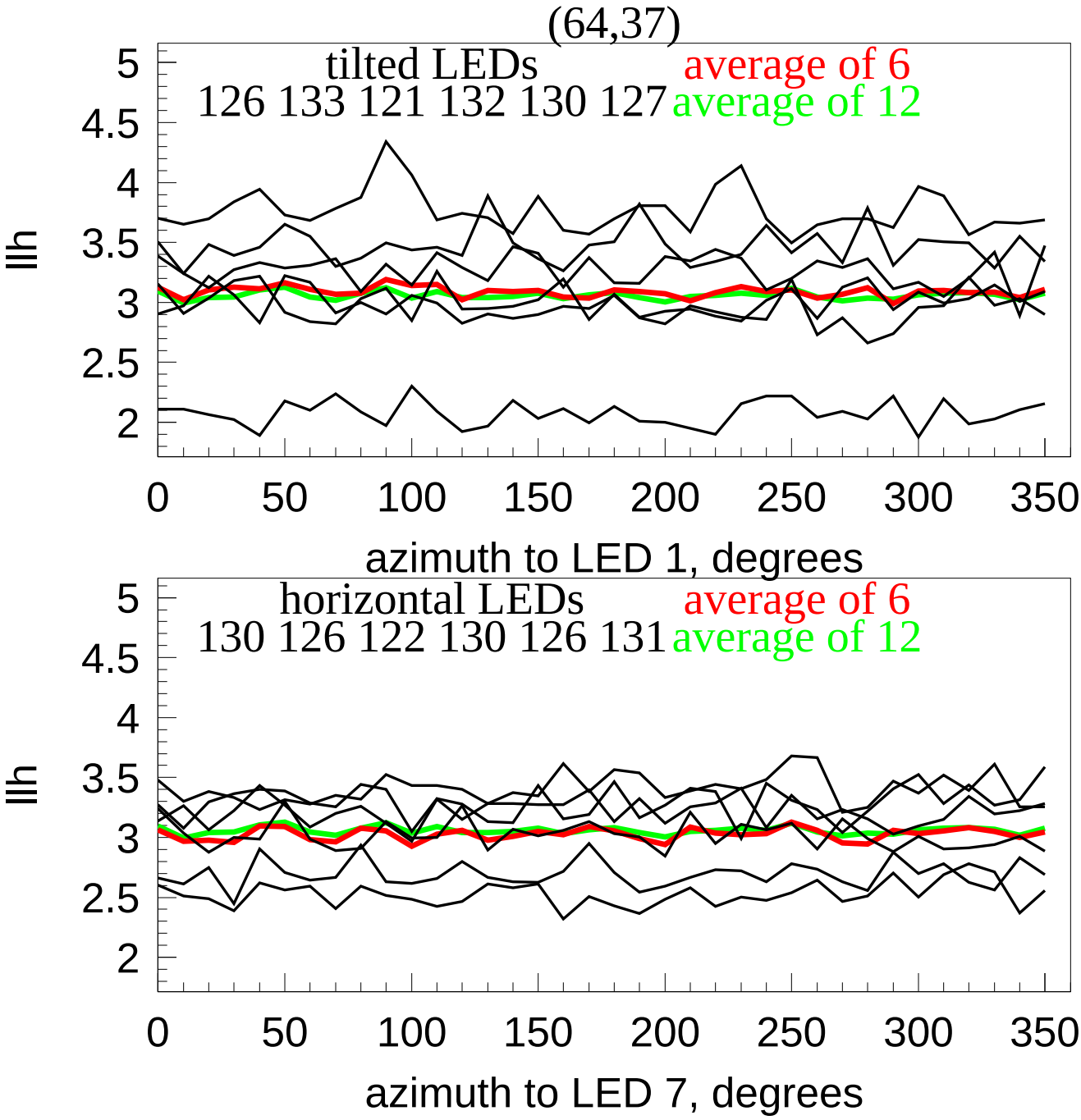

(64,35) 331.98 ± 0.92
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

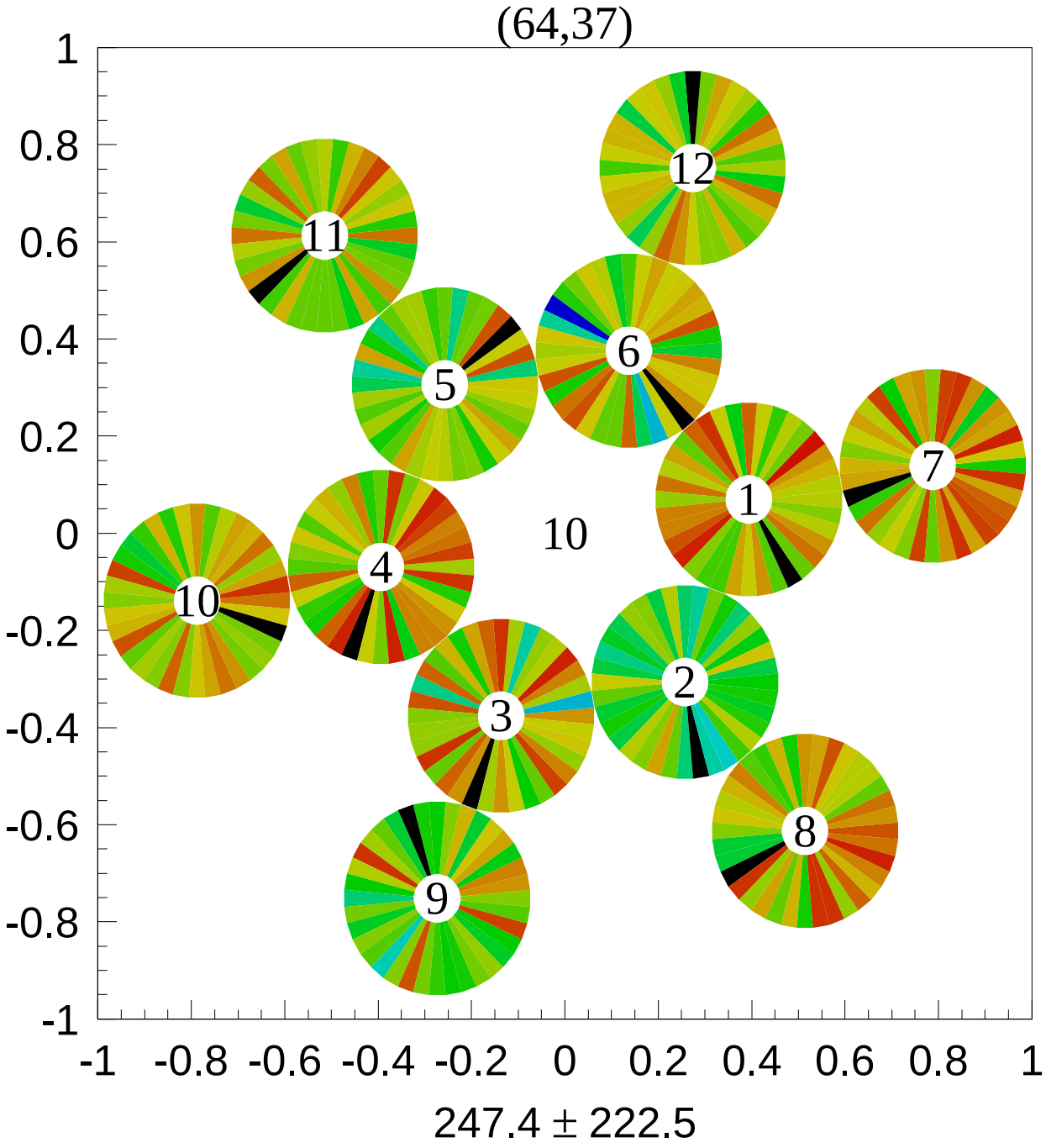

(64,36)
tilted LEDs
127 127 127 130 129 125
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 129 120 126 123 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

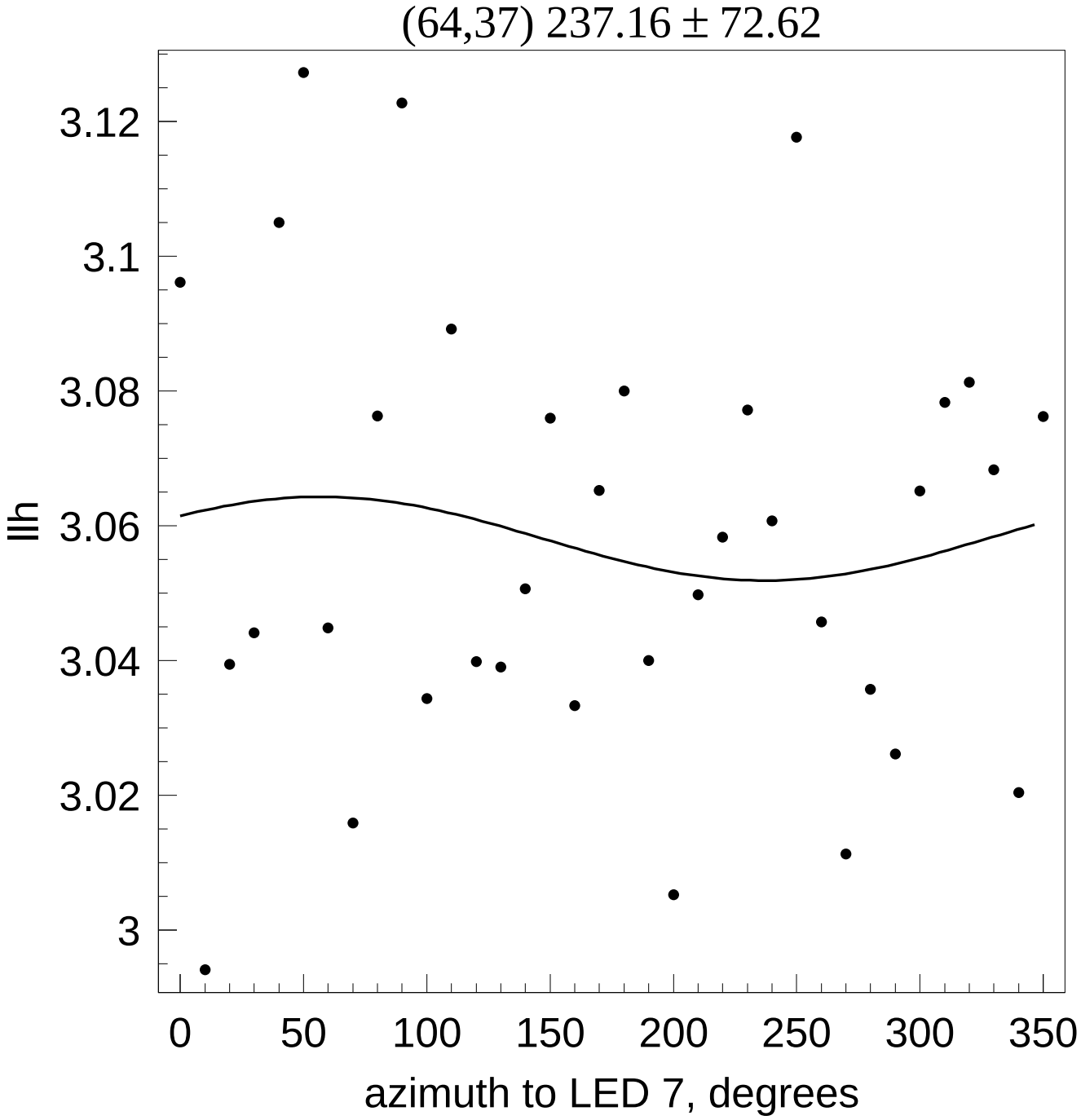

(64,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
262.5 ± 28.7

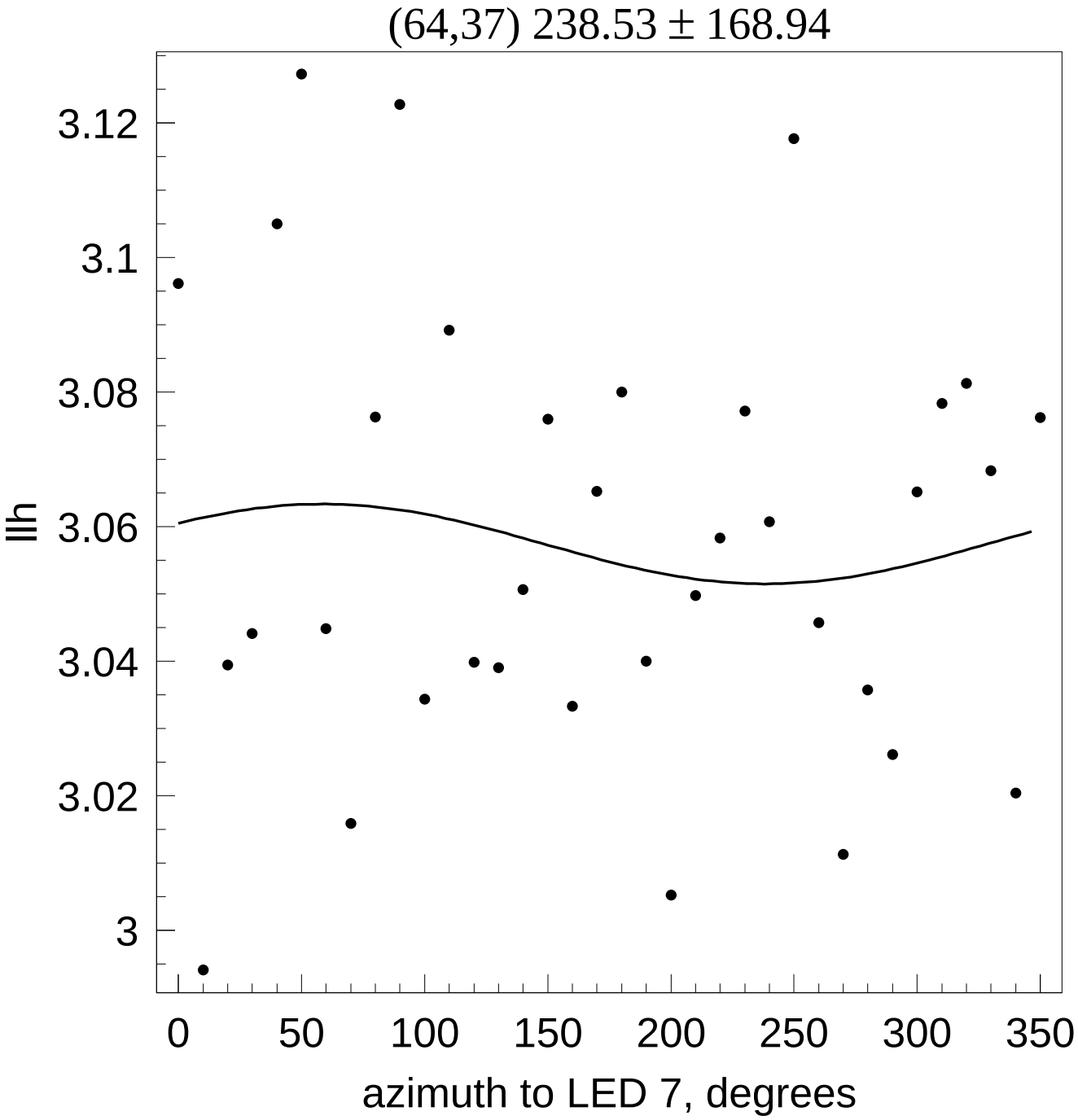

(64,36) 267.69 ± 1.46
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

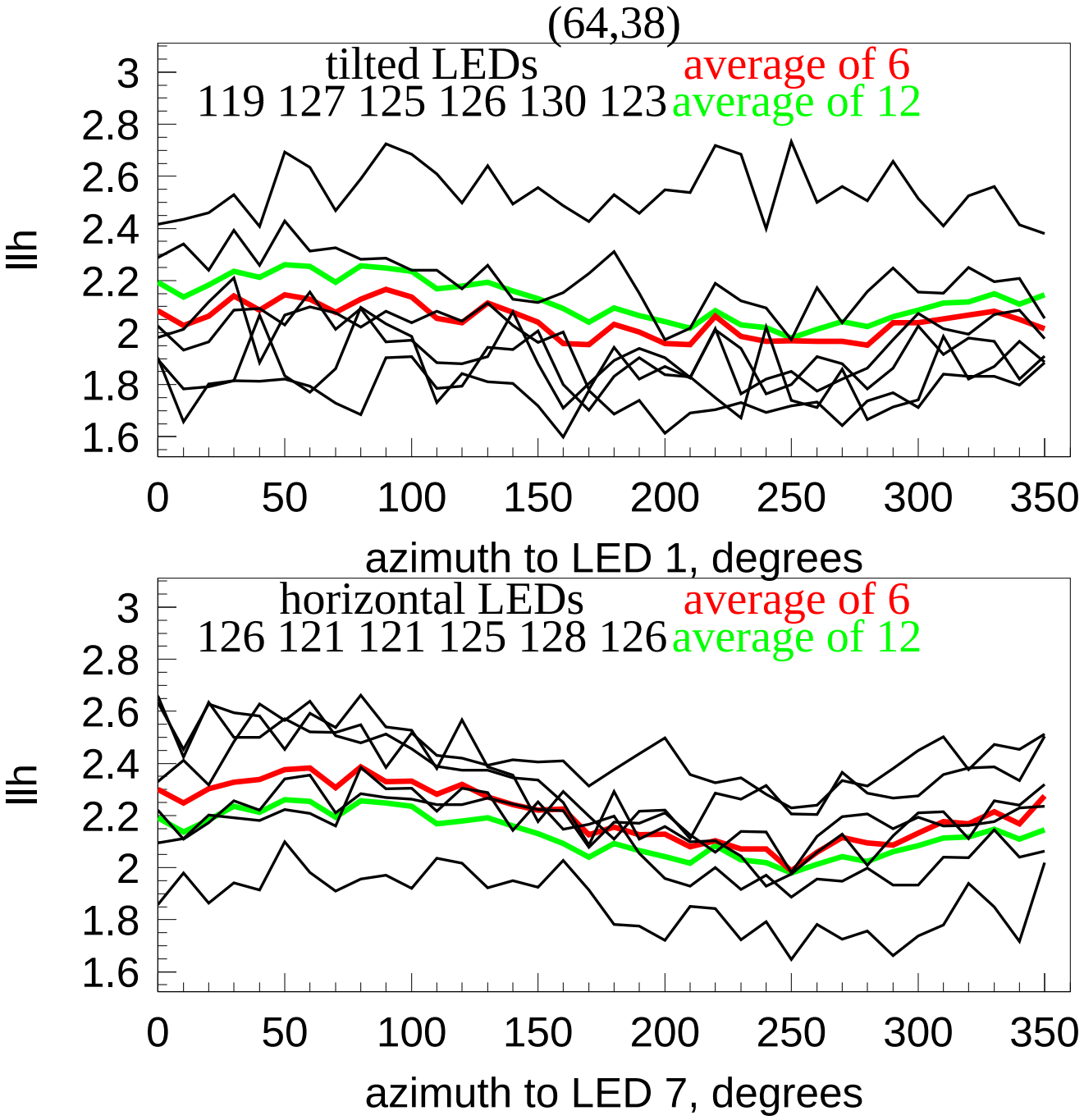

(64,36) 267.46 ± 1.52
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

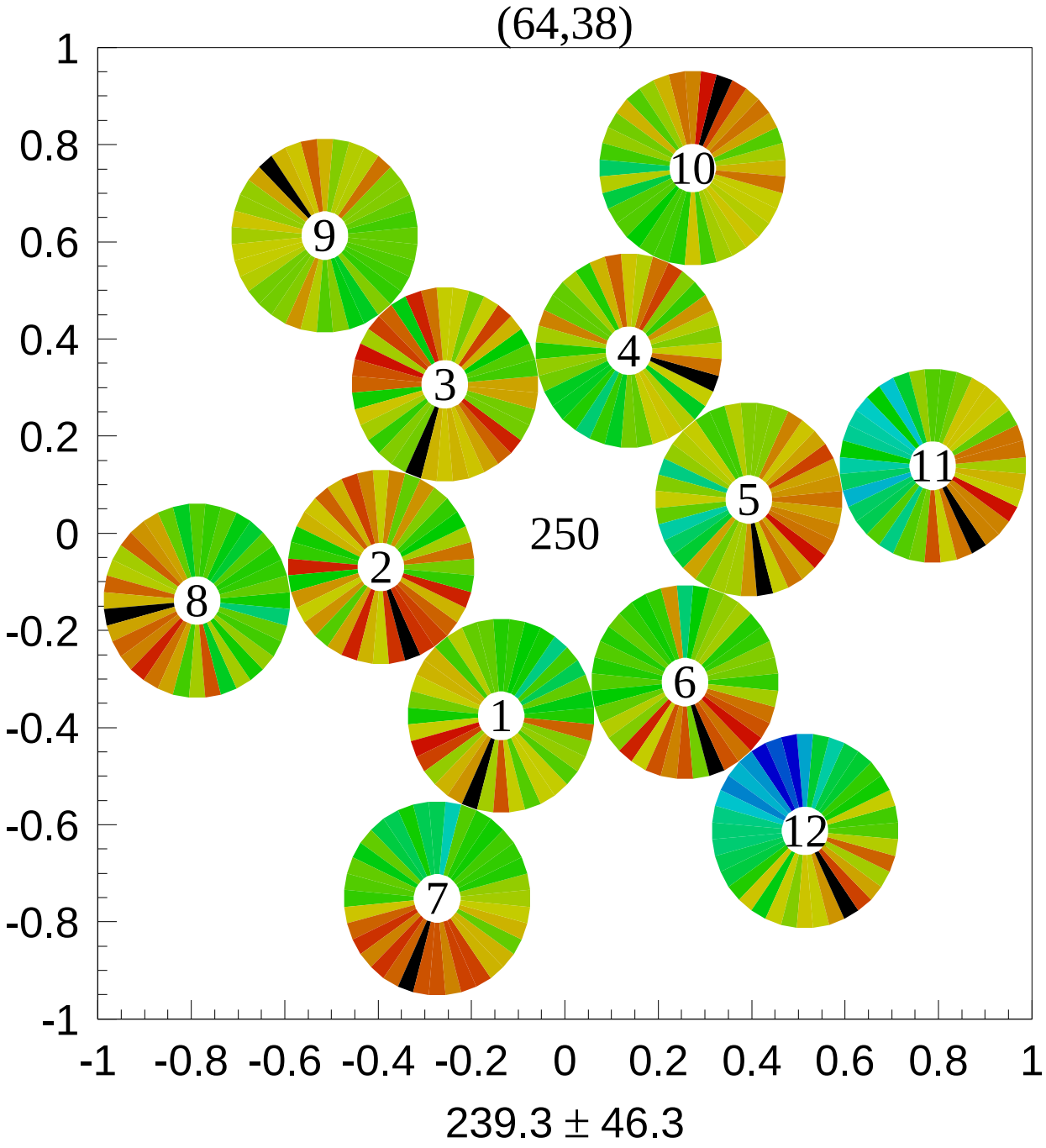

(64,37)
tilted LEDs
126 133 121 132 130 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 126 122 130 126 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

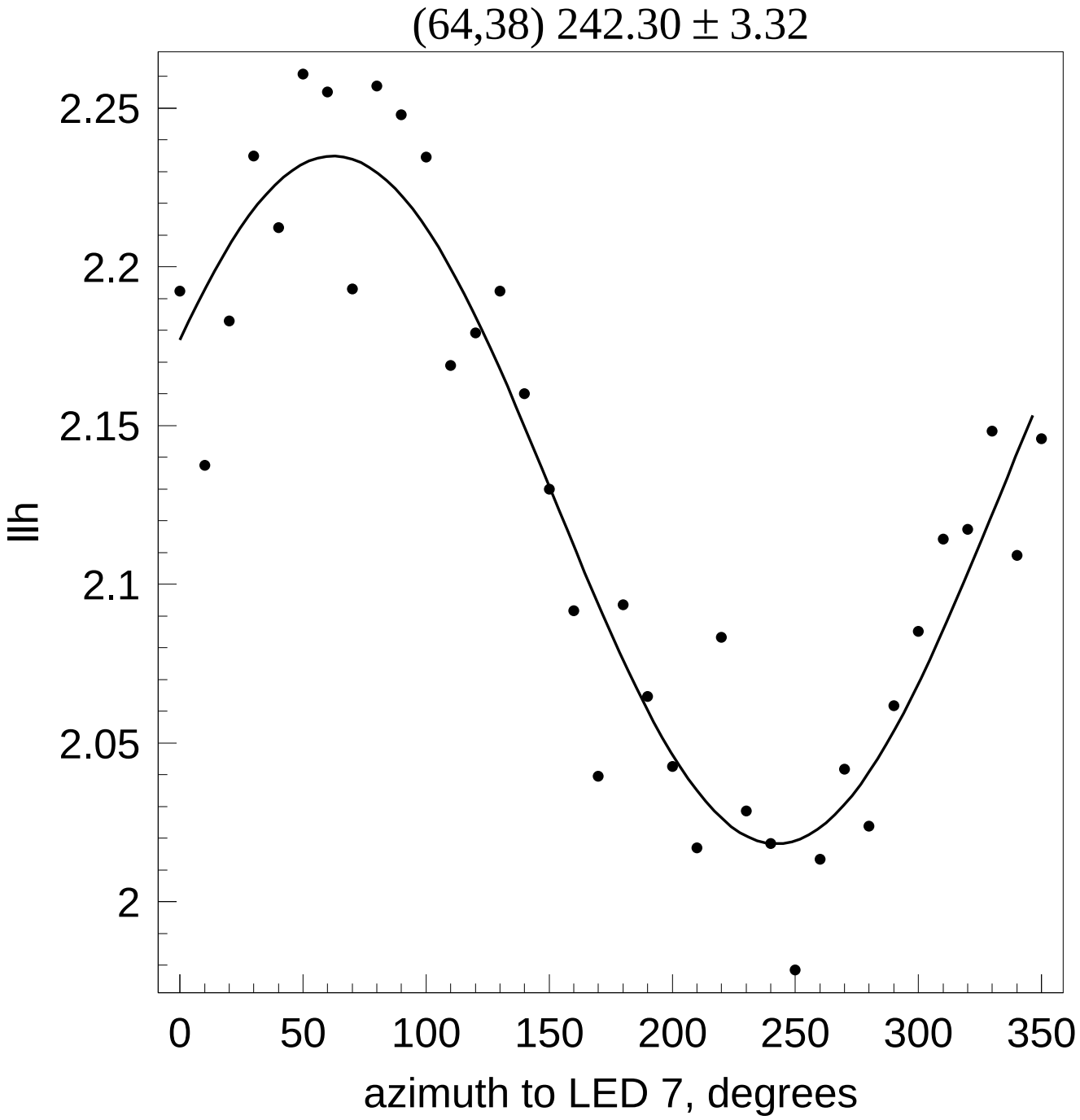

(64,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
10
4
10
2
3
8
9
247.4 ± 222.5

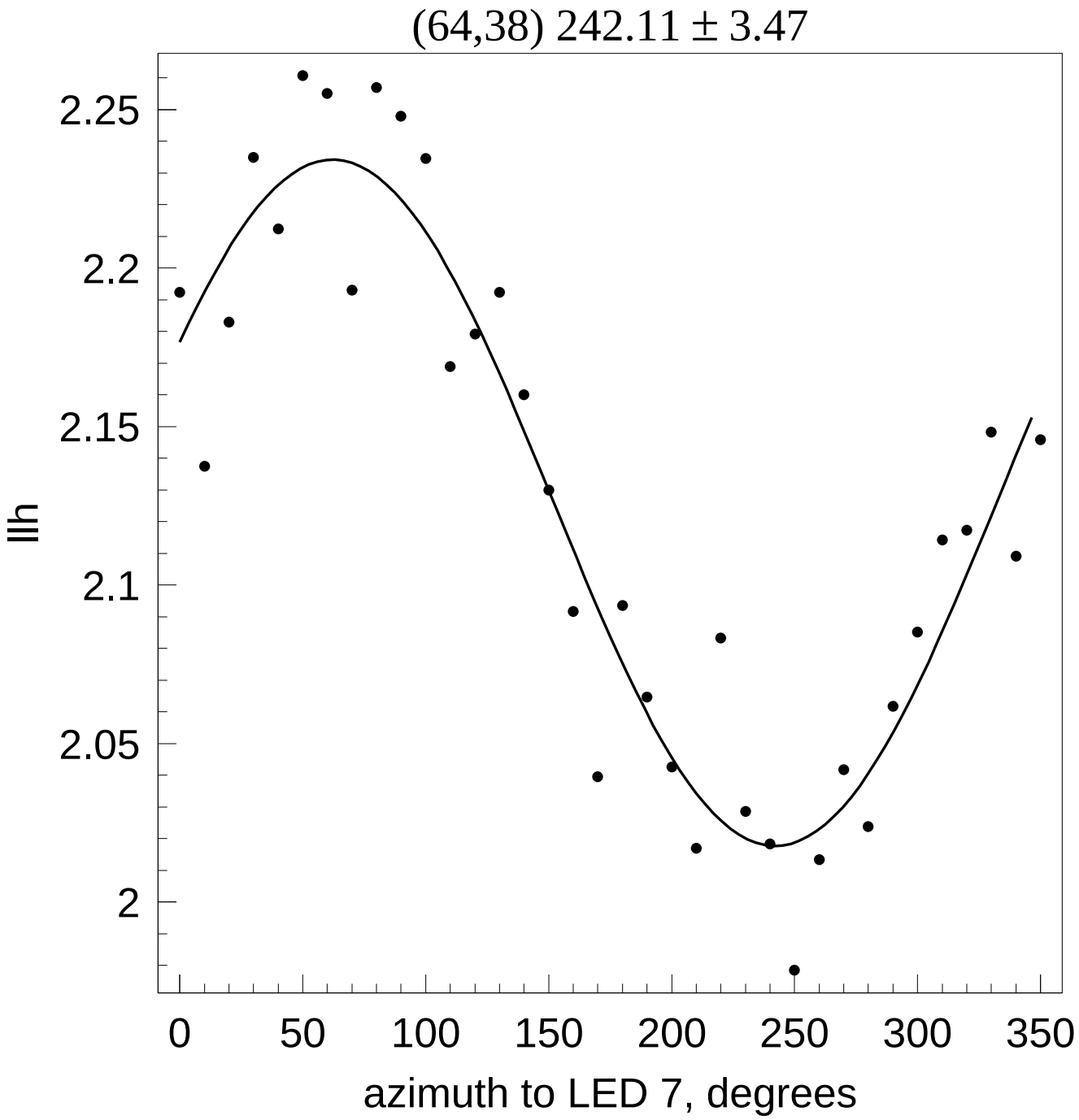

(64,37) 237.16 ± 72.62
3.12
3.1
3.08
3.06
3.04
3.02
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

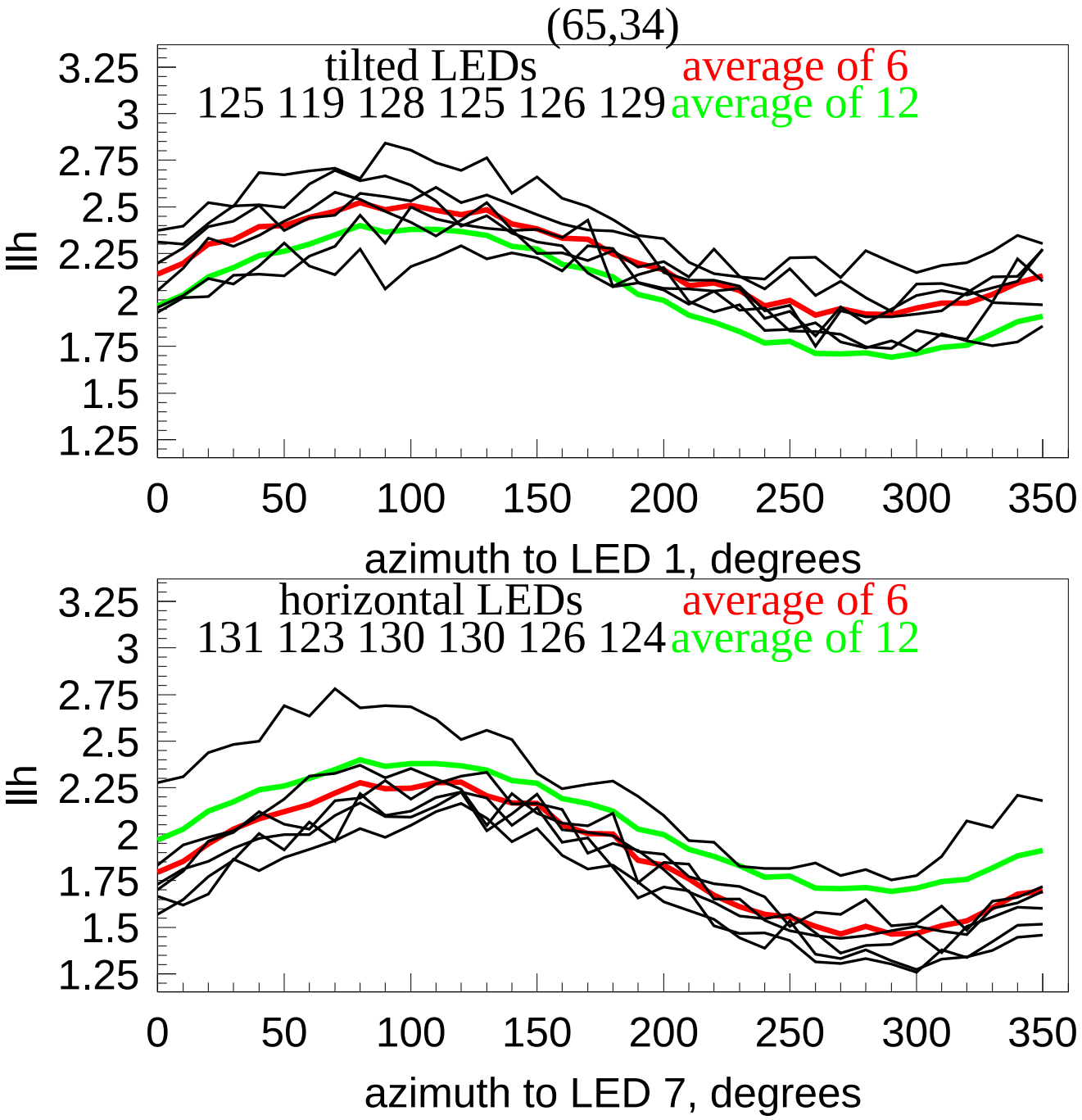

(64,37) 238.53 ± 168.94
3.12
3.1
3.08
3.06
3.04
3.02
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

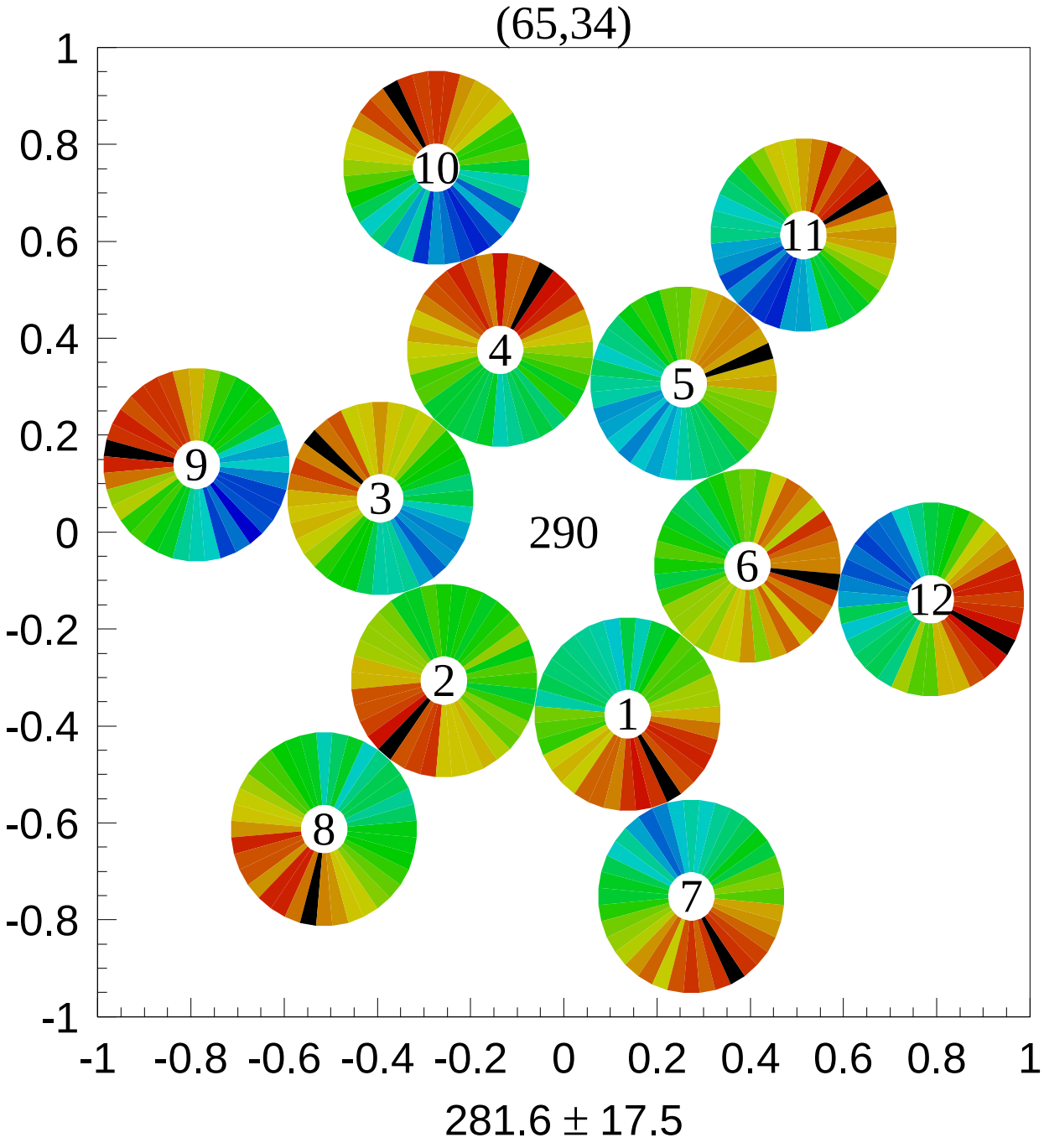

(64,38)
tilted LEDs
119 127 125 126 130 123
average of 6
average of 12
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 121 121 125 128 126
average of 6
average of 12
llh
3
2.8
2.6
2.4
2.2
2
1.8
1.6
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

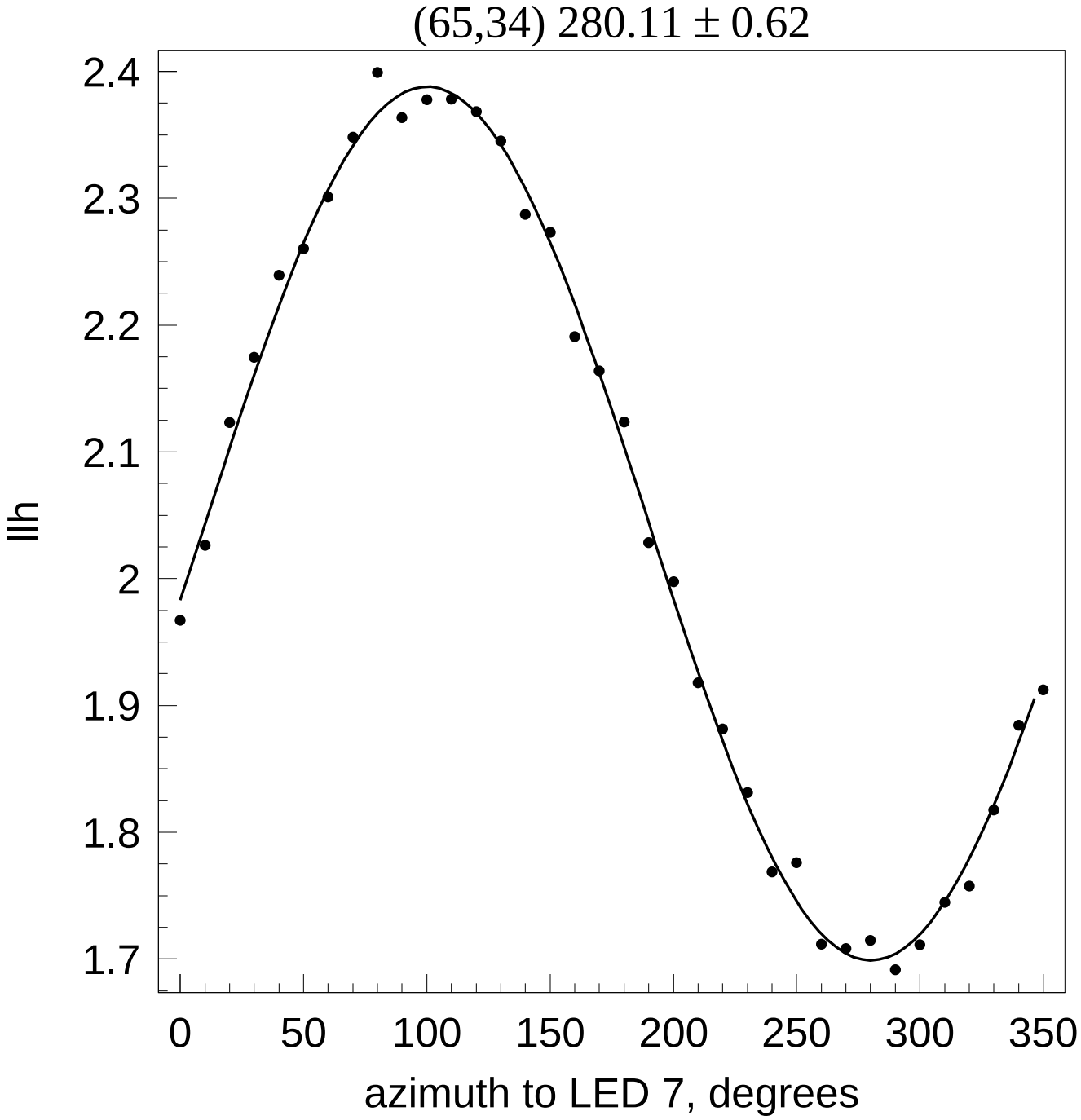

(64,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
239.3 ± 46.3
250
1
2
3
4
5
6
7
8
9
10
11
12

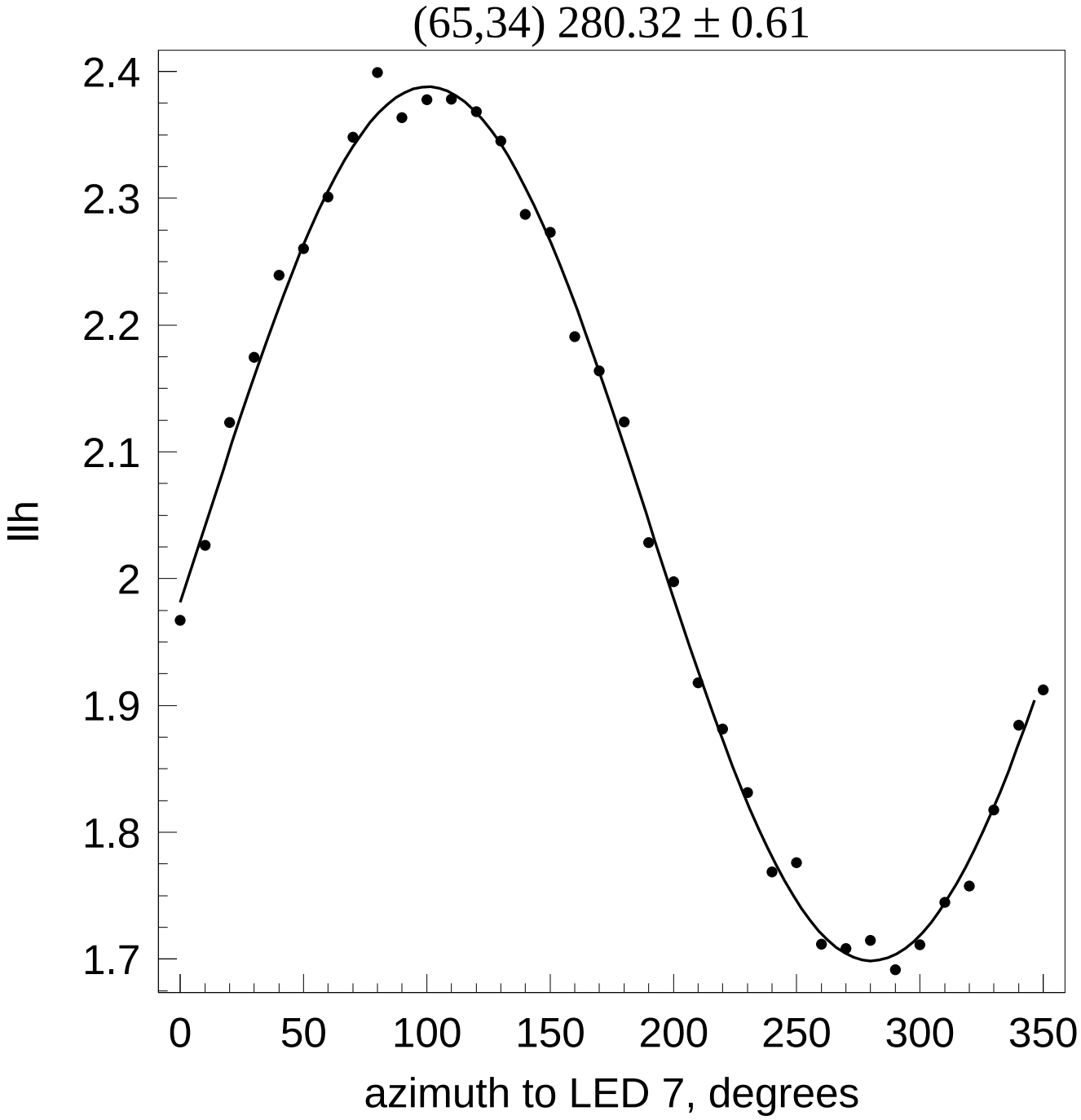

(64,38) 242.30 ± 3.32
2.25
2.2
2.15
2.1
2.05
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

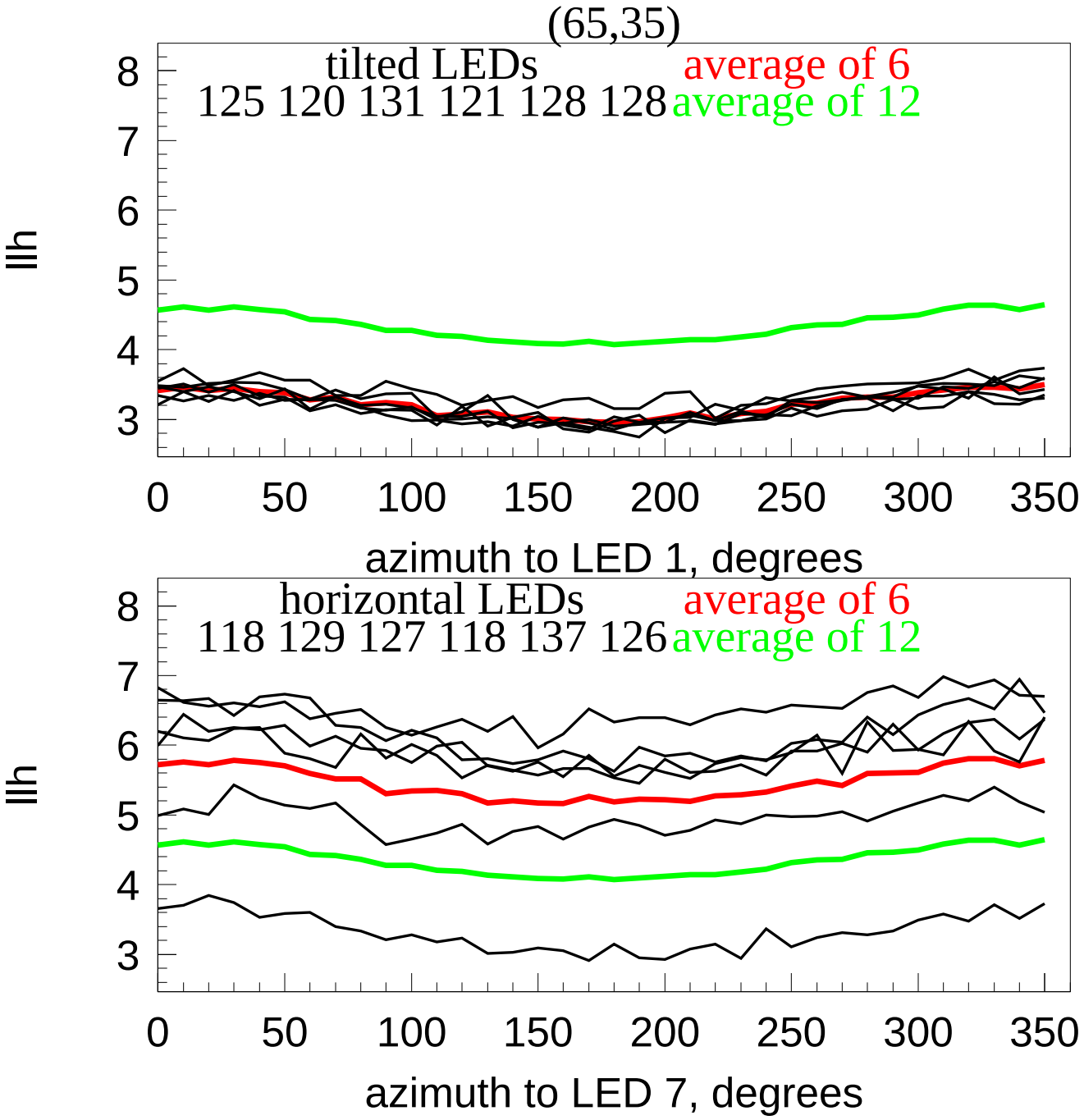

(64,38) 242.11 ± 3.47
2.25
2.2
2.15
2.1
2.05
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

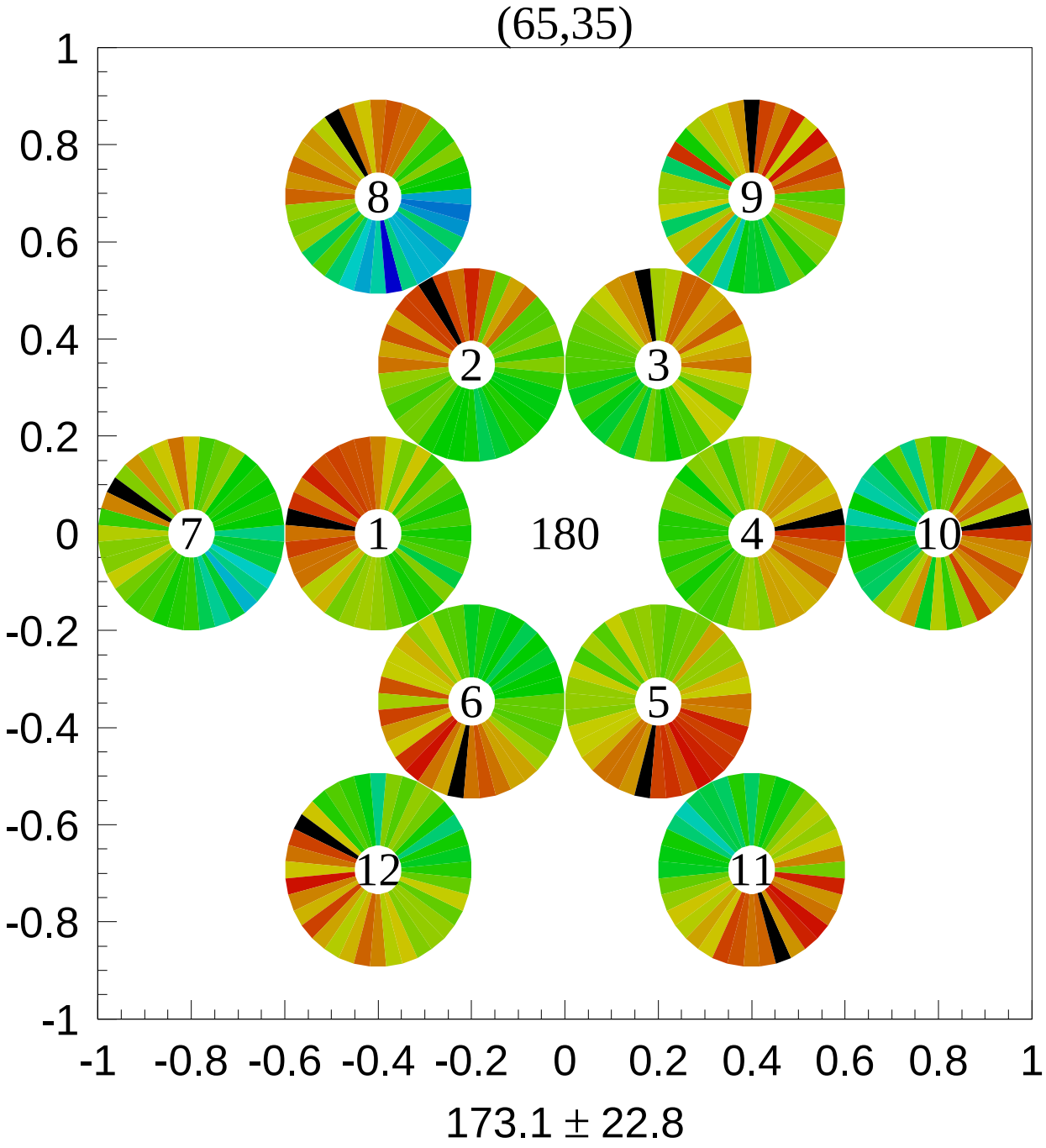

(65,34)
tilted LEDs
125 119 128 125 126 129
average of 6
average of 12
IIh
3.25
3
2.75
2.5
2.25
2
1.75
1.5
1.25
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 123 130 130 126 124
average of 6
average of 12
IIh
azimuth to LED 7, degrees

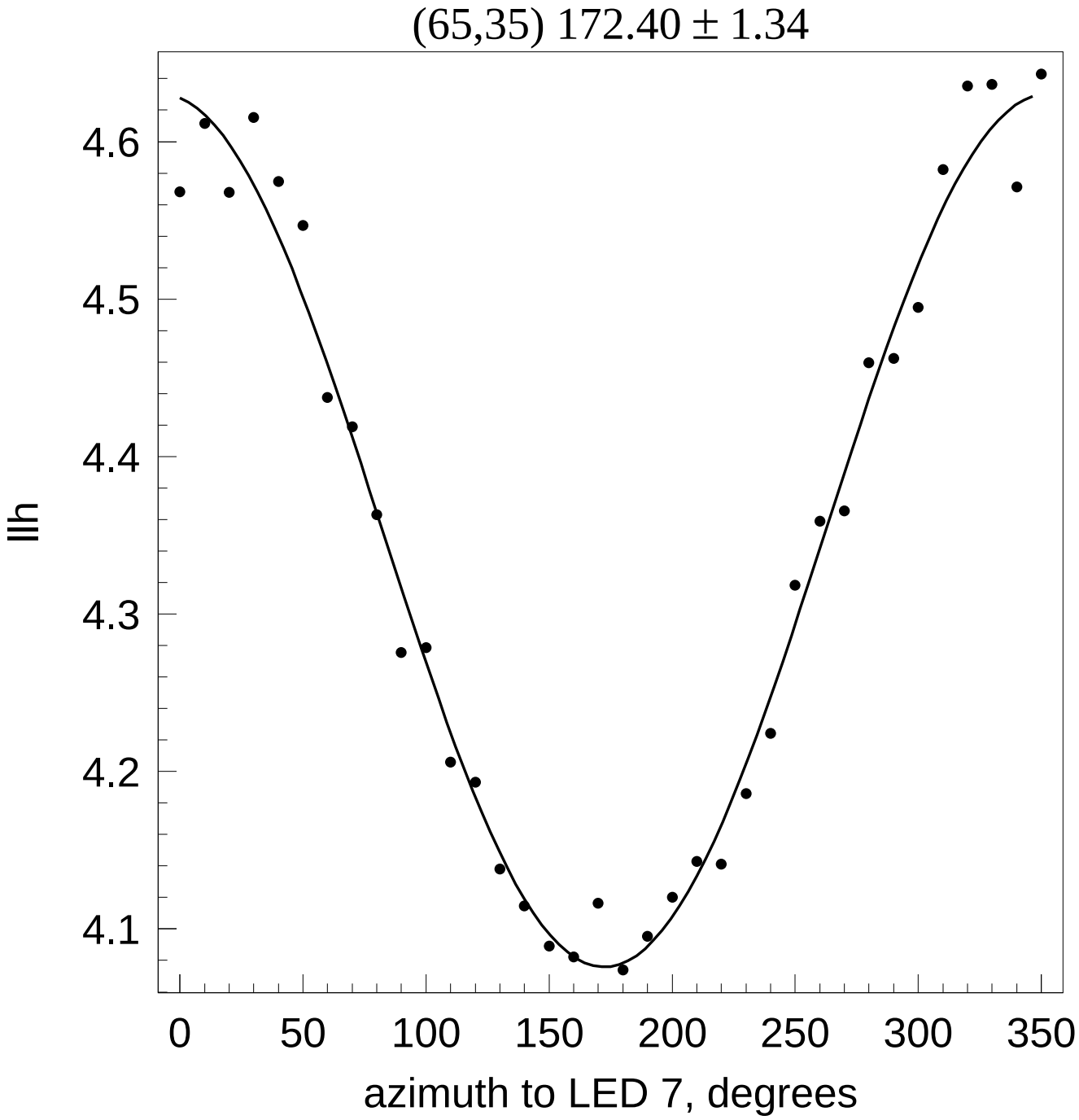

(65,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
5
9
3
290
6
12
2
1
8
7
281.6 ± 17.5

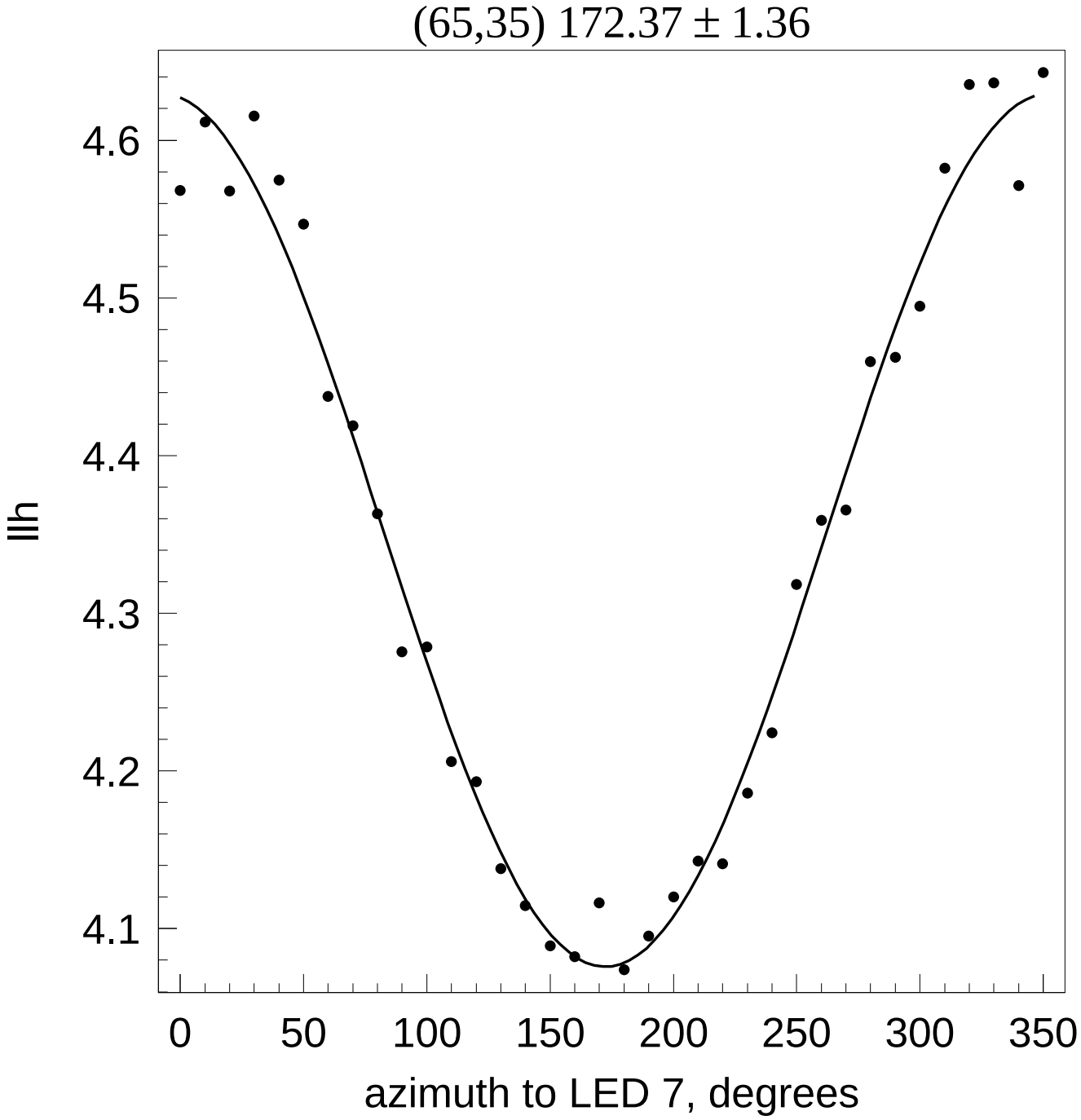

(65,34) 280.11 ± 0.62
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

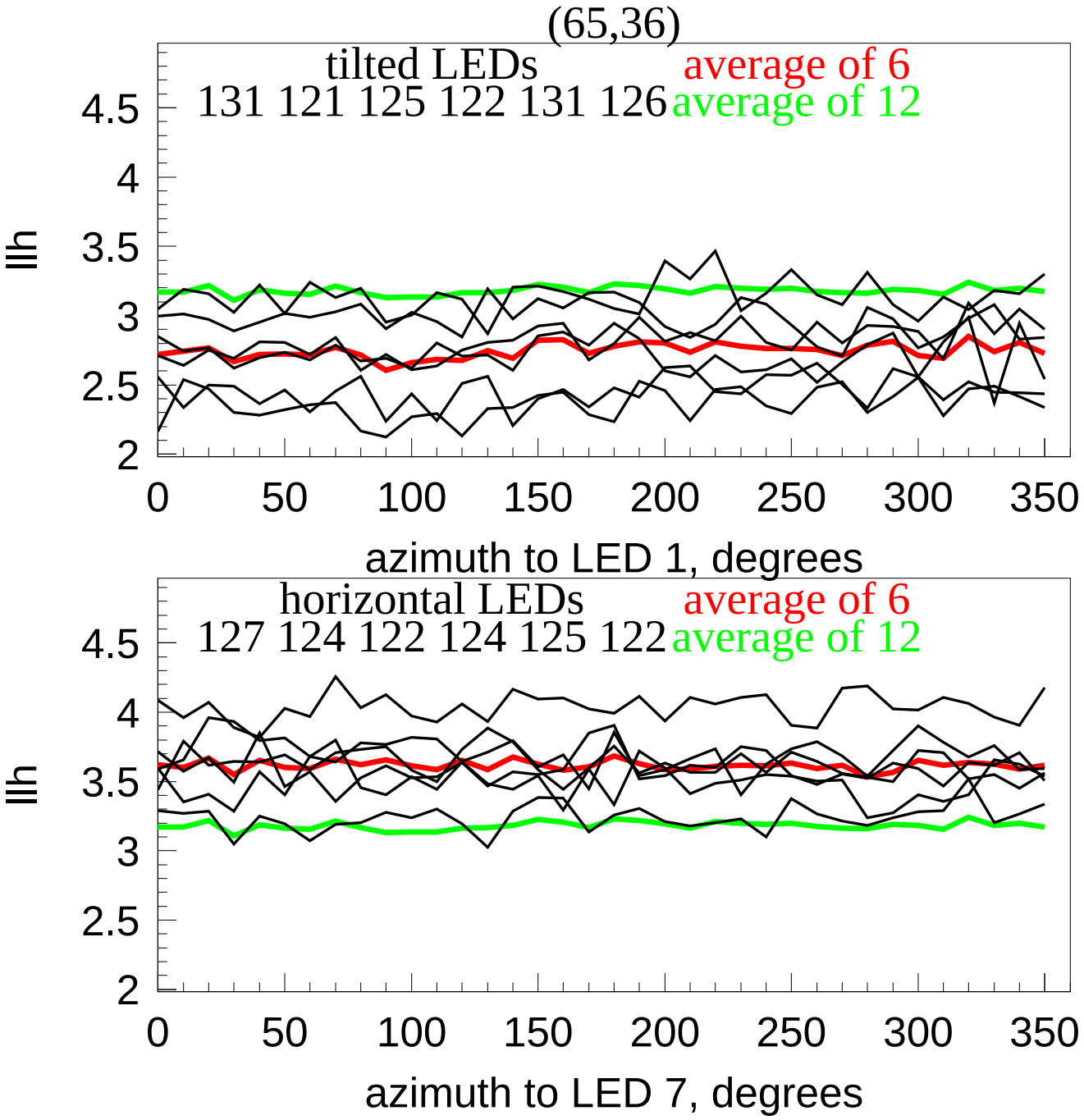

(65,34) 280.32 ± 0.61
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

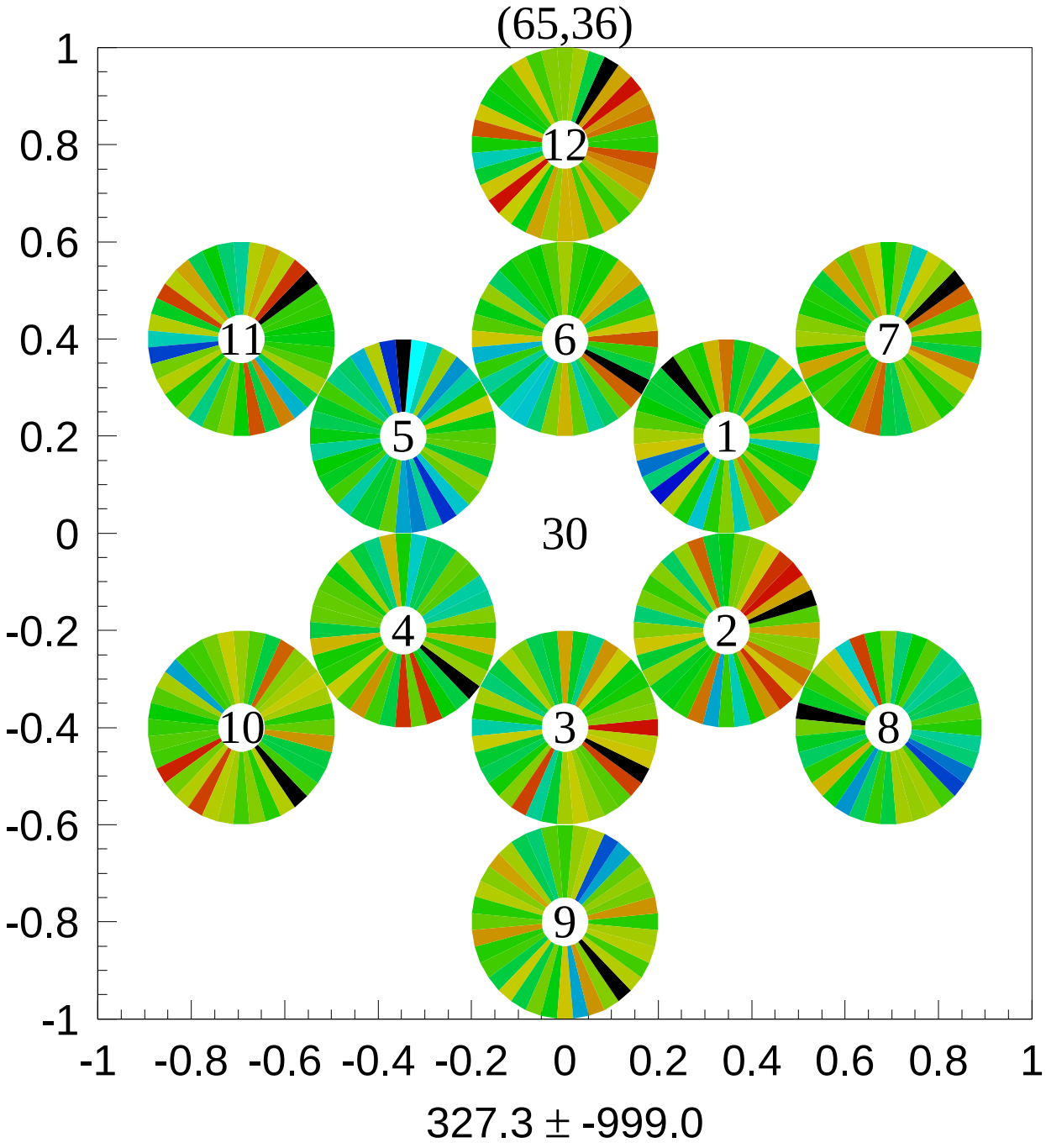

(65,35)
tilted LEDs
125 120 131 121 128 128
average of 6
average of 12
llh
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
118 129 127 118 137 126
average of 6
average of 12
llh
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

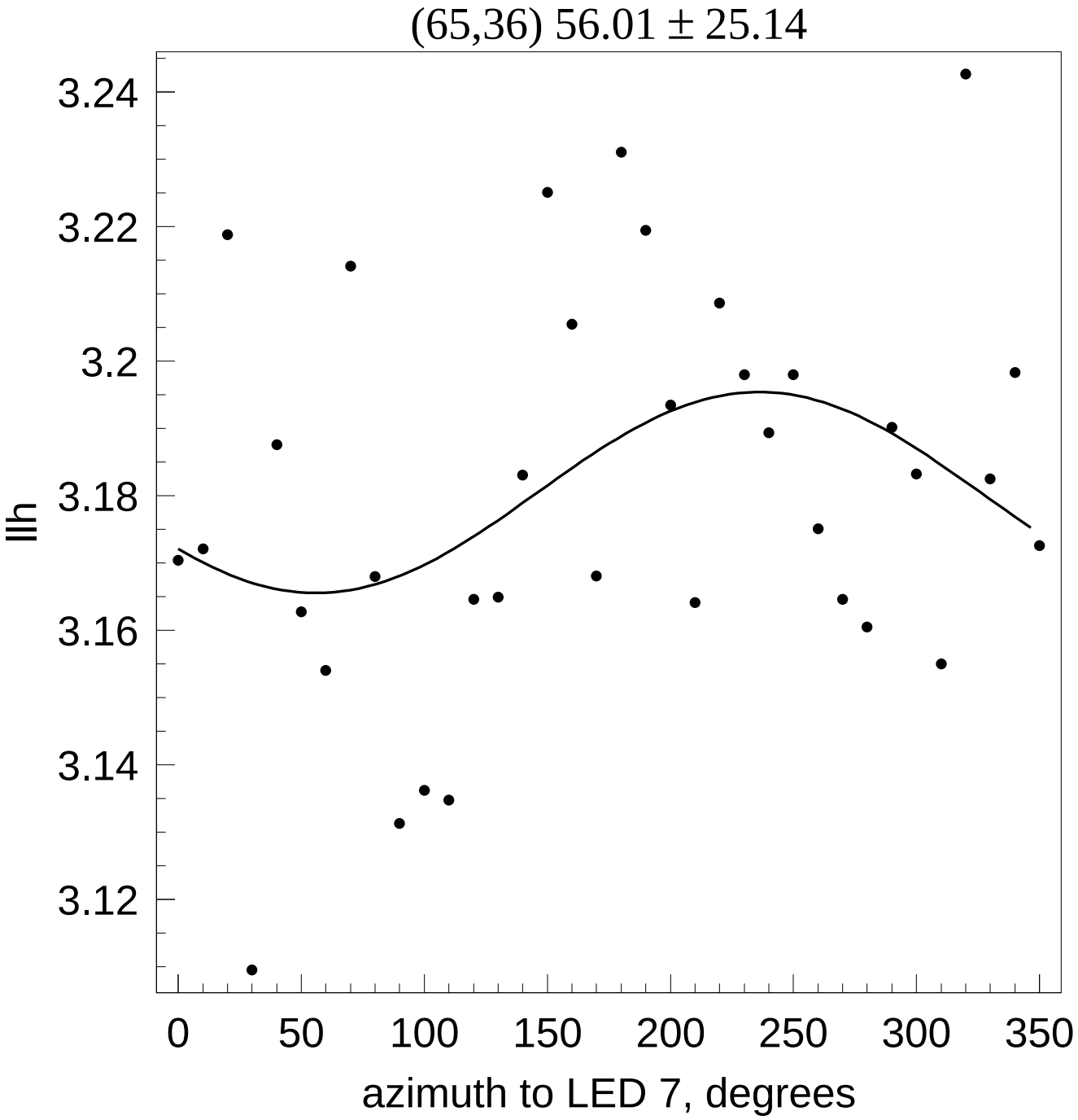

(65,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
180
4
10
6
5
12
11
173.1 ± 22.8

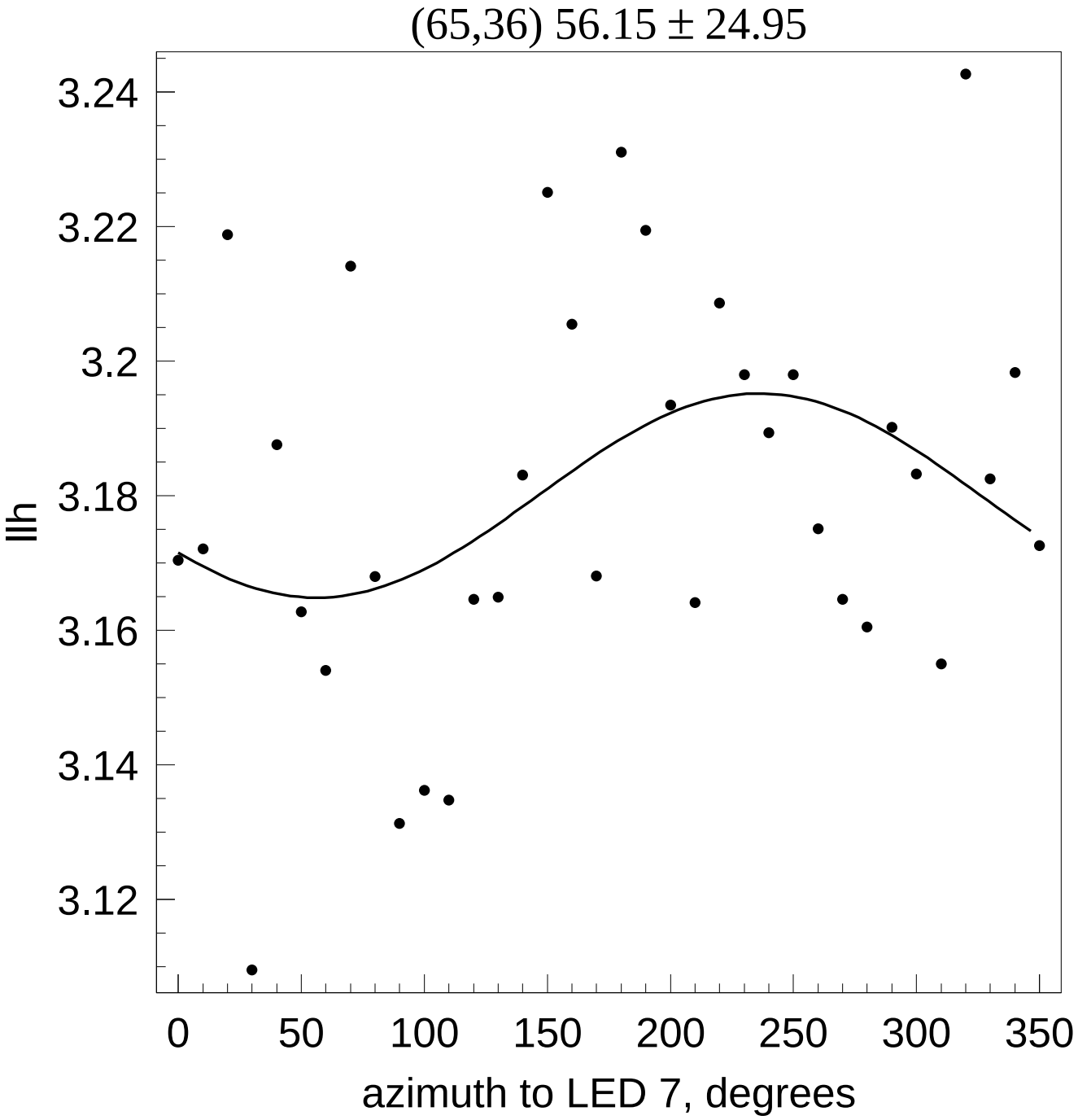

(65,35) 172.40 ± 1.34
4.6
4.5
4.4
4.3
4.2
4.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

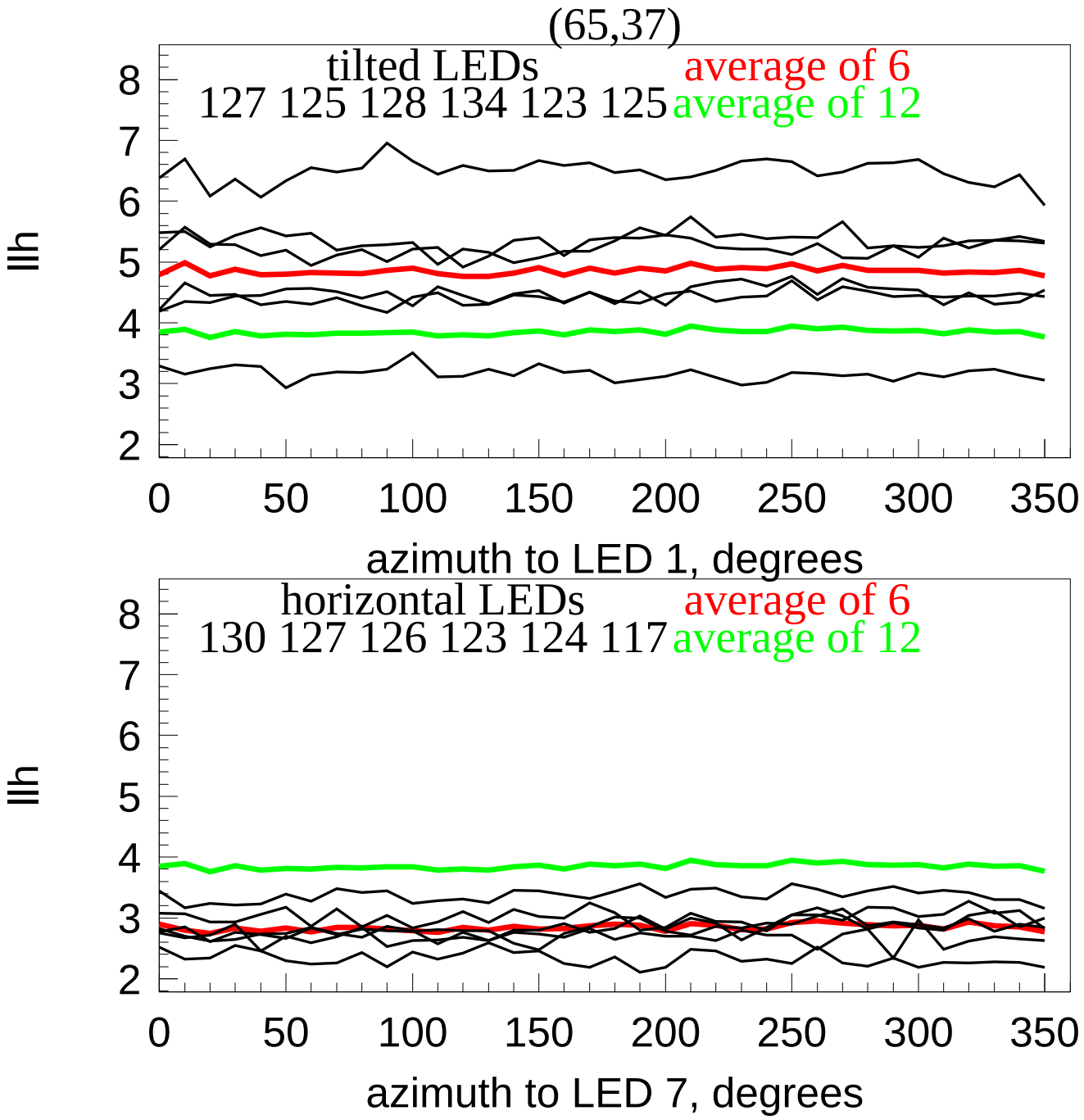

(65,35) 172.37 ± 1.36
4.6
4.5
4.4
4.3
4.2
4.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

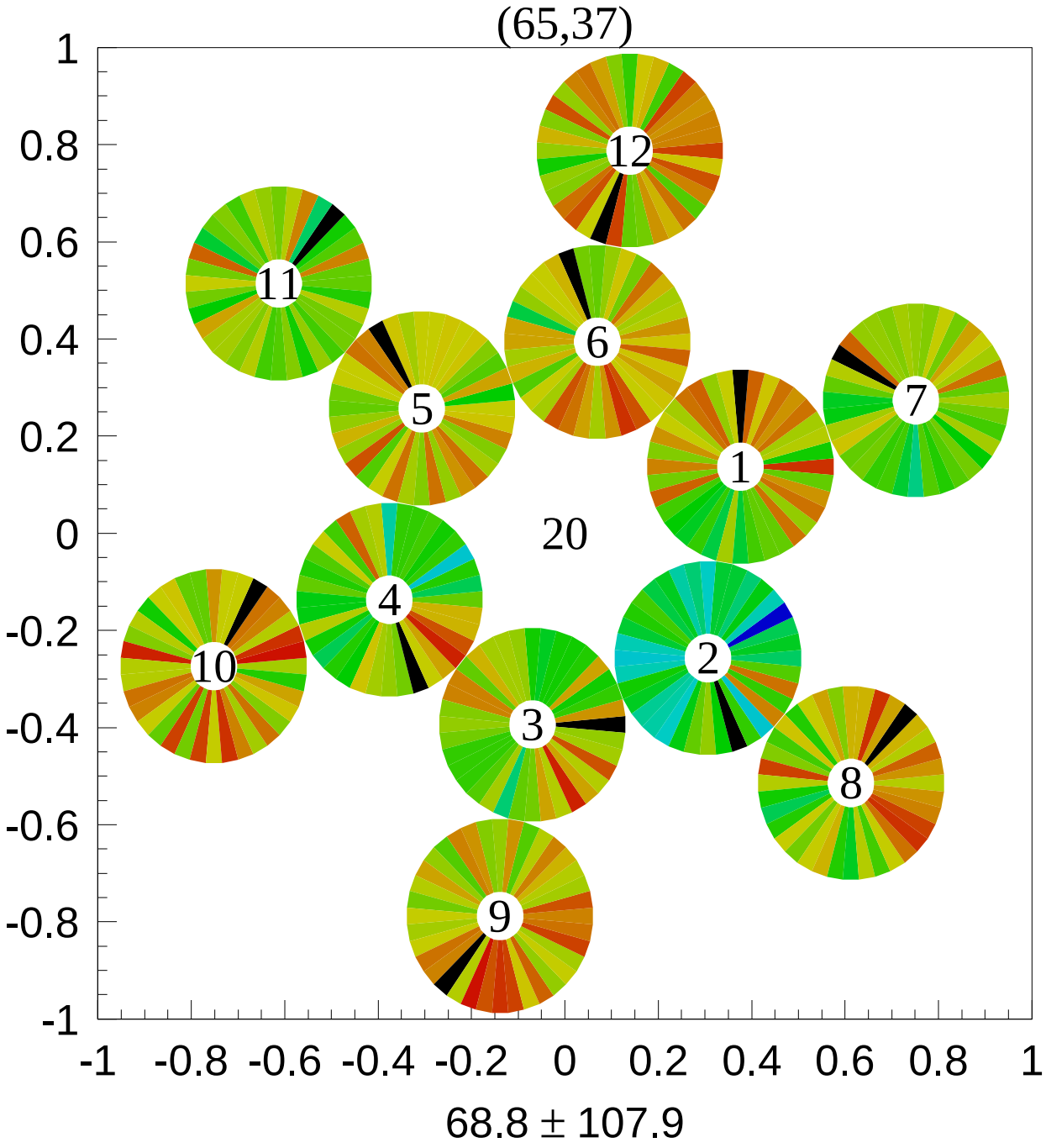

(65,36)
tilted LEDs
131 121 125 122 131 126
average of 6
average of 12
IIh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 124 122 124 125 122
average of 6
average of 12
IIh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

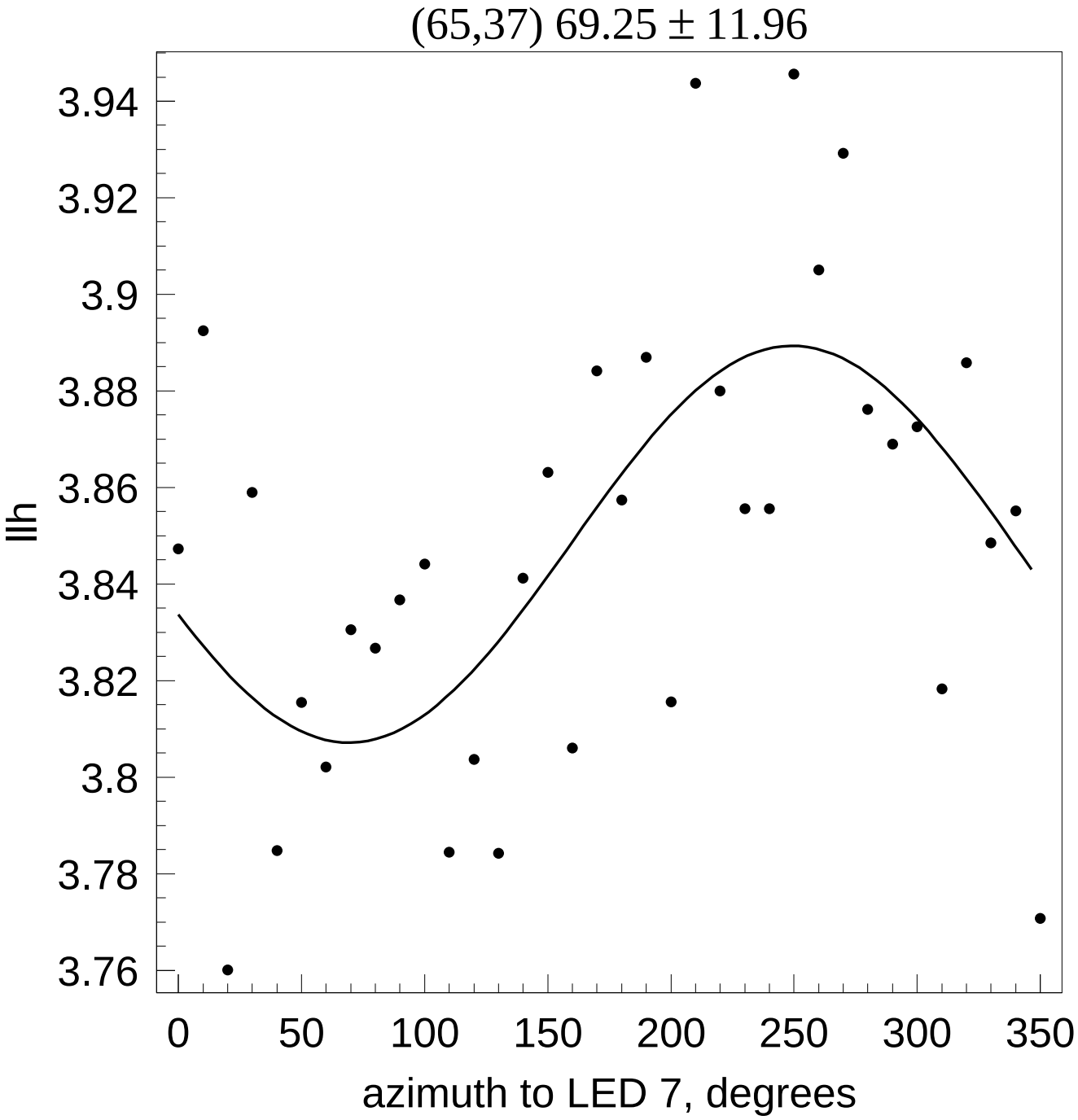

(65,36)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
327.3 ± -999.0

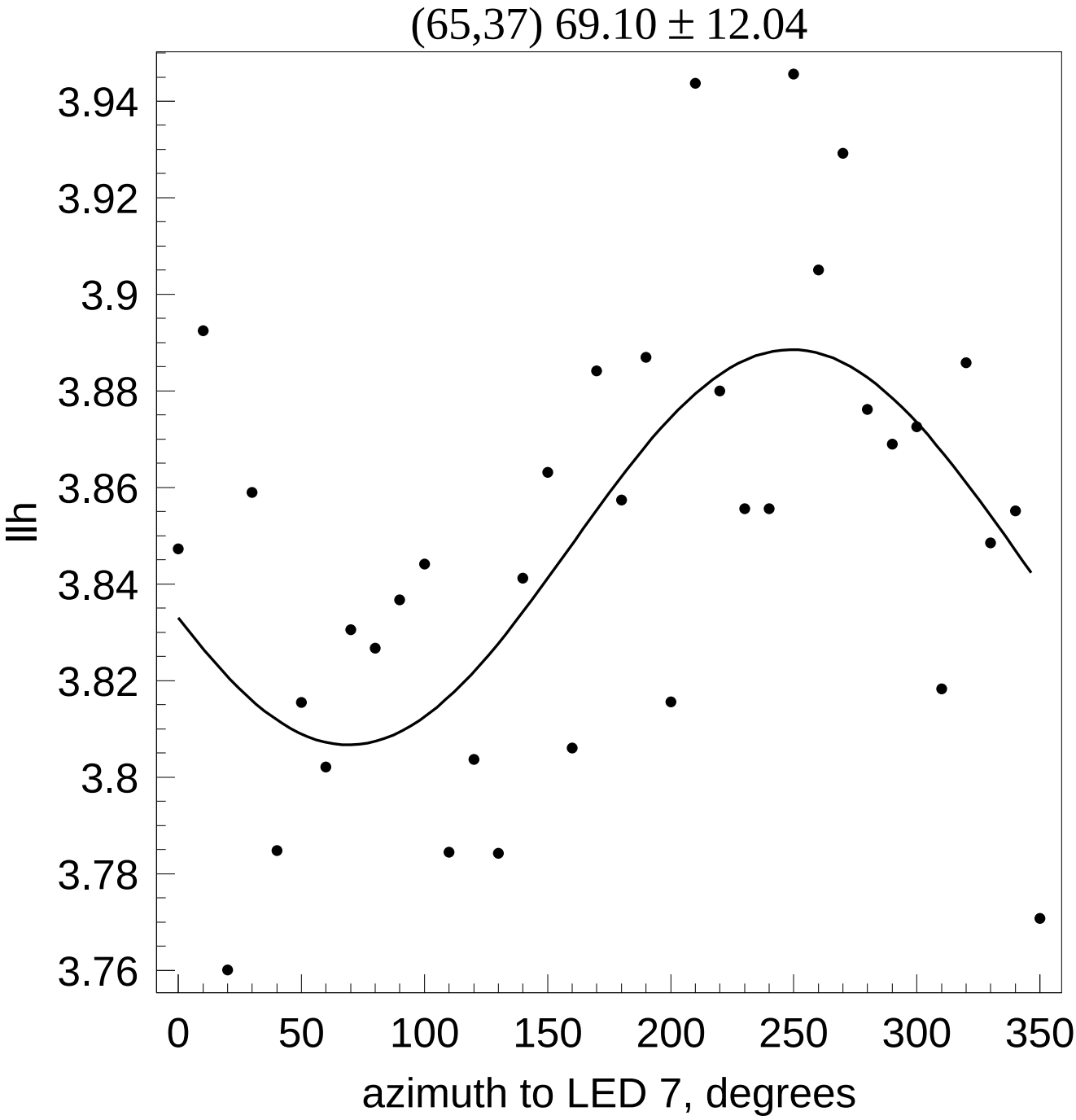

(65,36) 56.01 ± 25.14
3.24
3.22
3.2
3.18
3.16
3.14
3.12
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

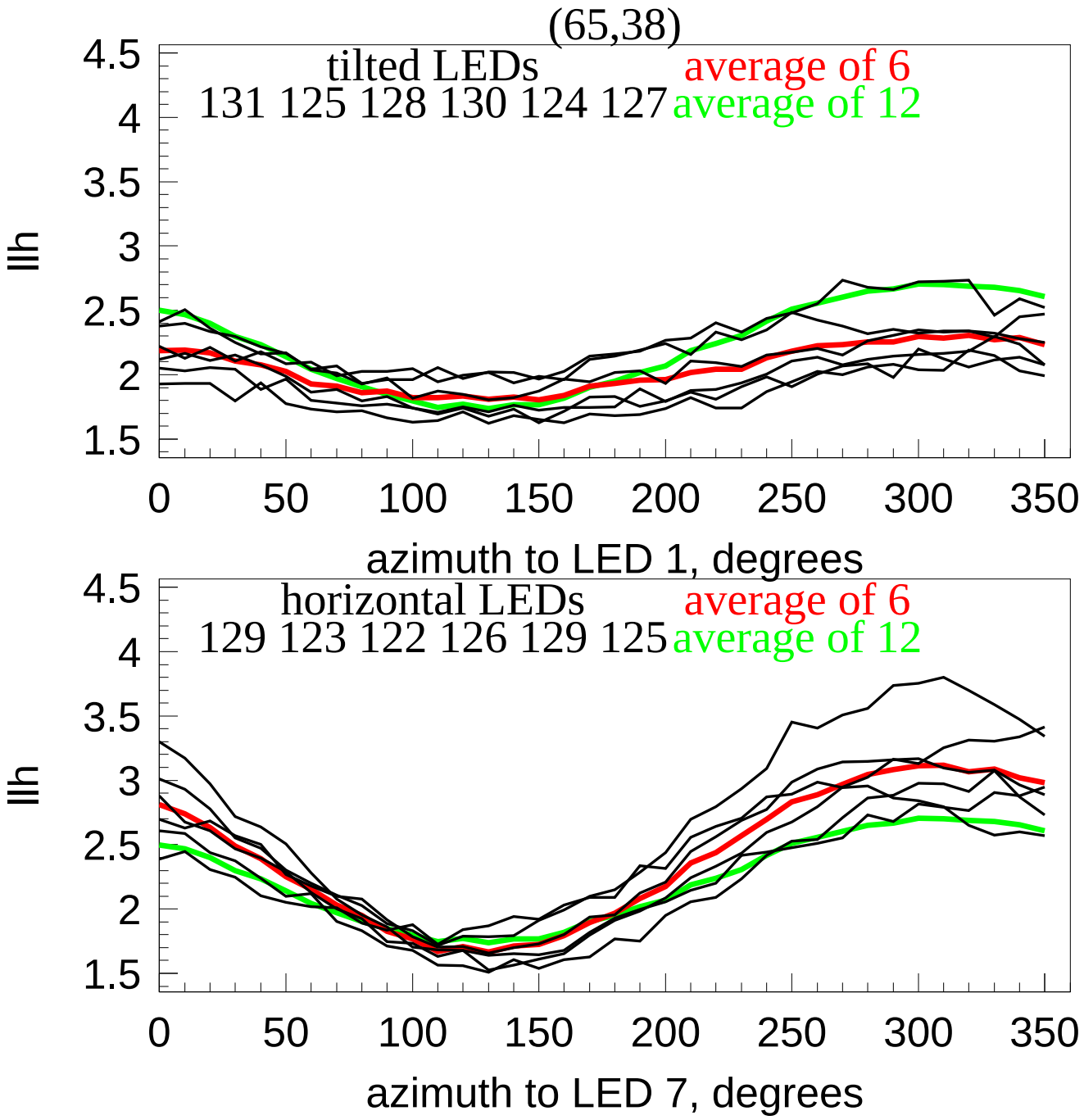

(65,36) 56.15 ± 24.95
3.24
3.22
3.2
3.18
3.16
3.14
3.12
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

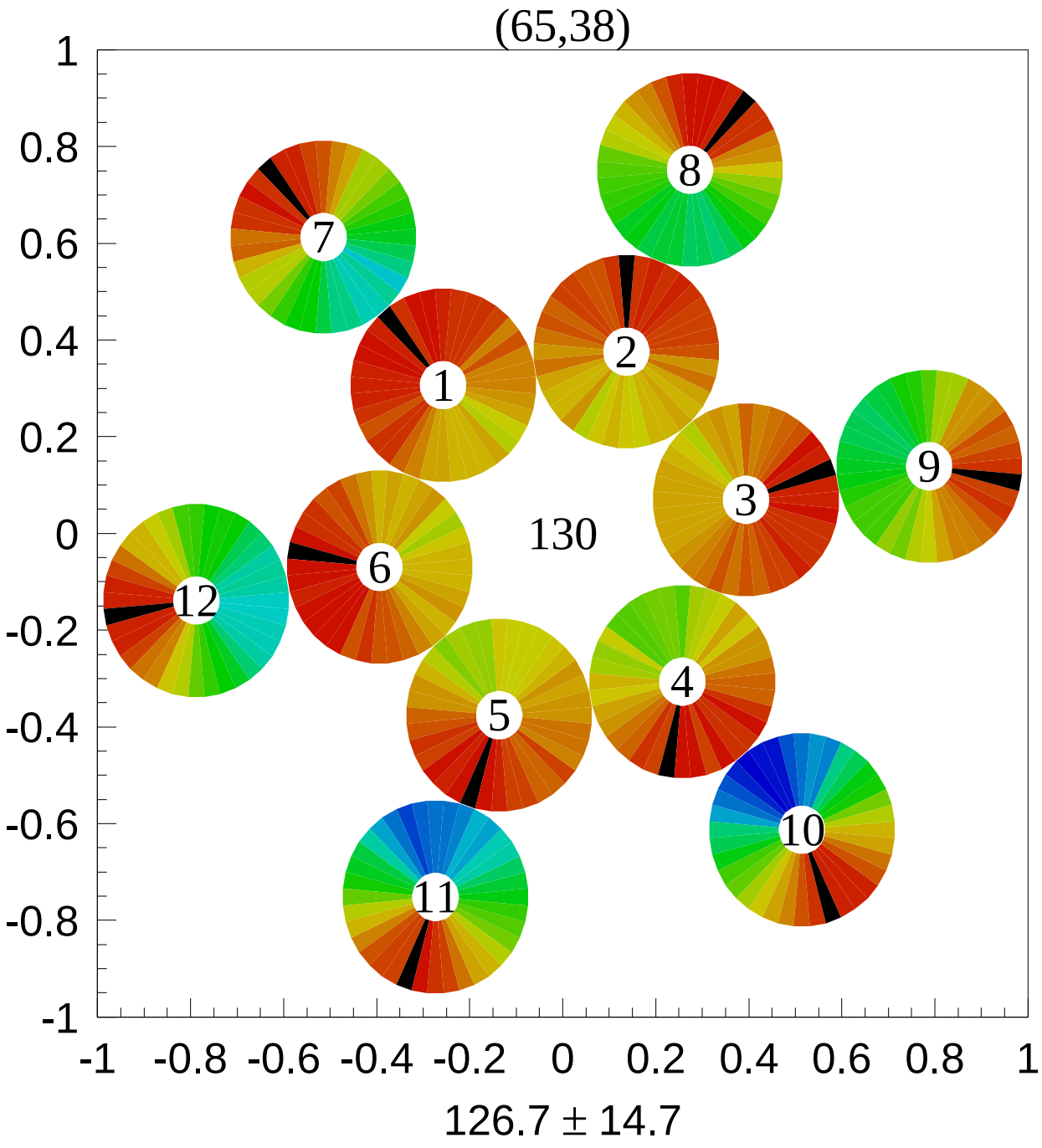

(65,37)
tilted LEDs
127 125 128 134 123 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 127 126 123 124 117
average of 6
average of 12
llh
azimuth to LED 7, degrees

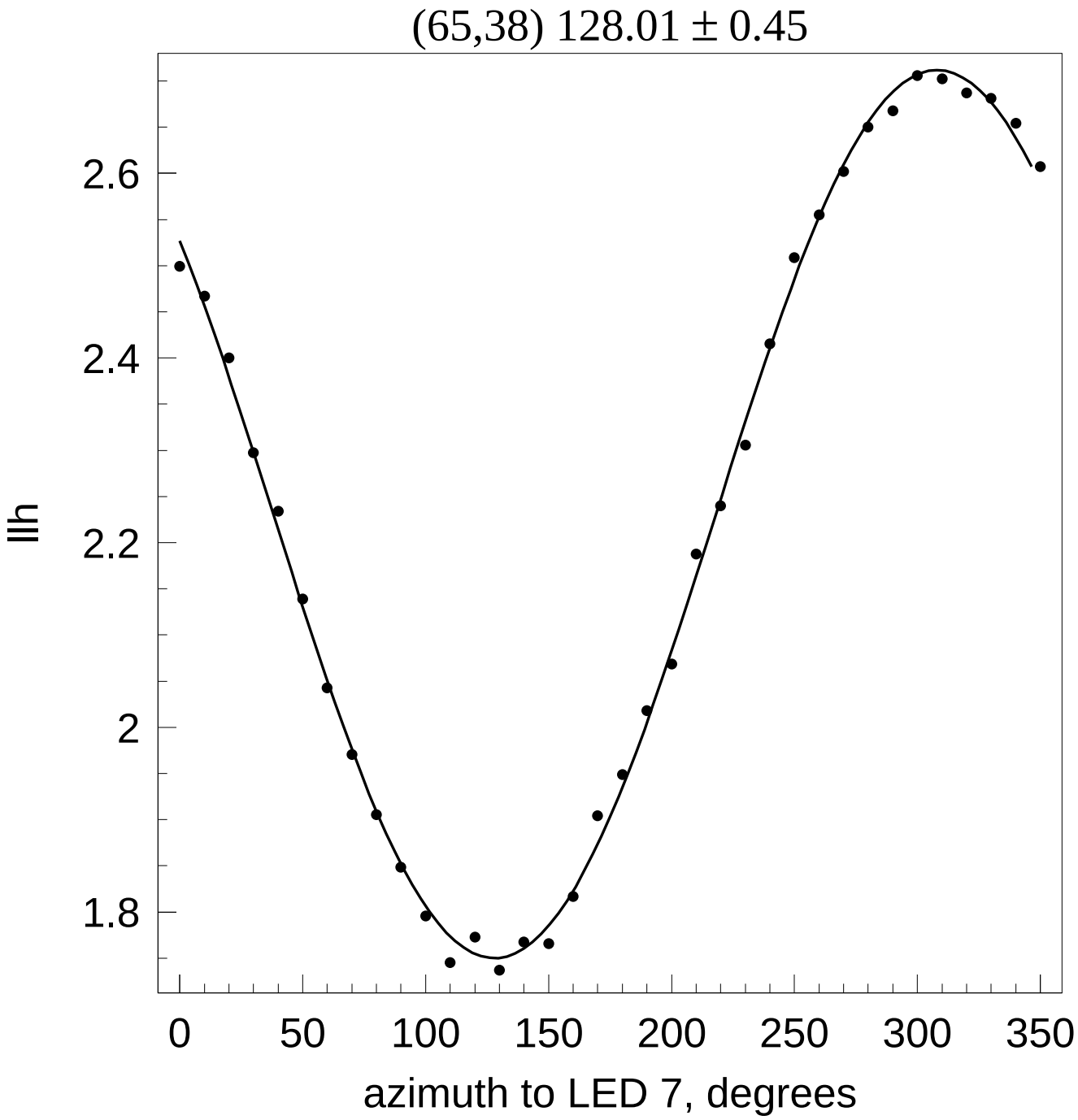

(65,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
20
4
10
2
3
8
9
68.8 ± 107.9

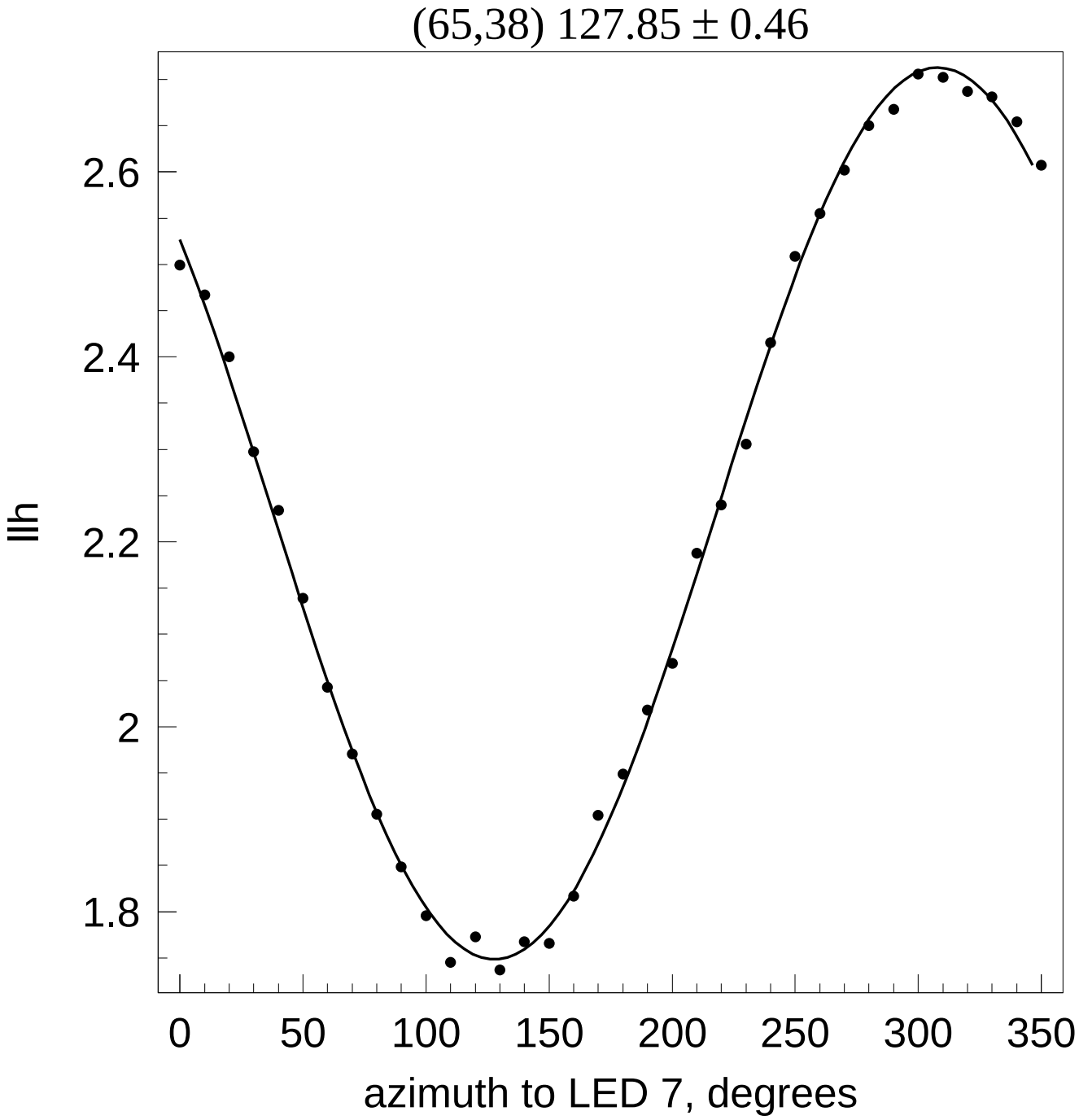

(65,37) 69.25 ± 11.96
3.94
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

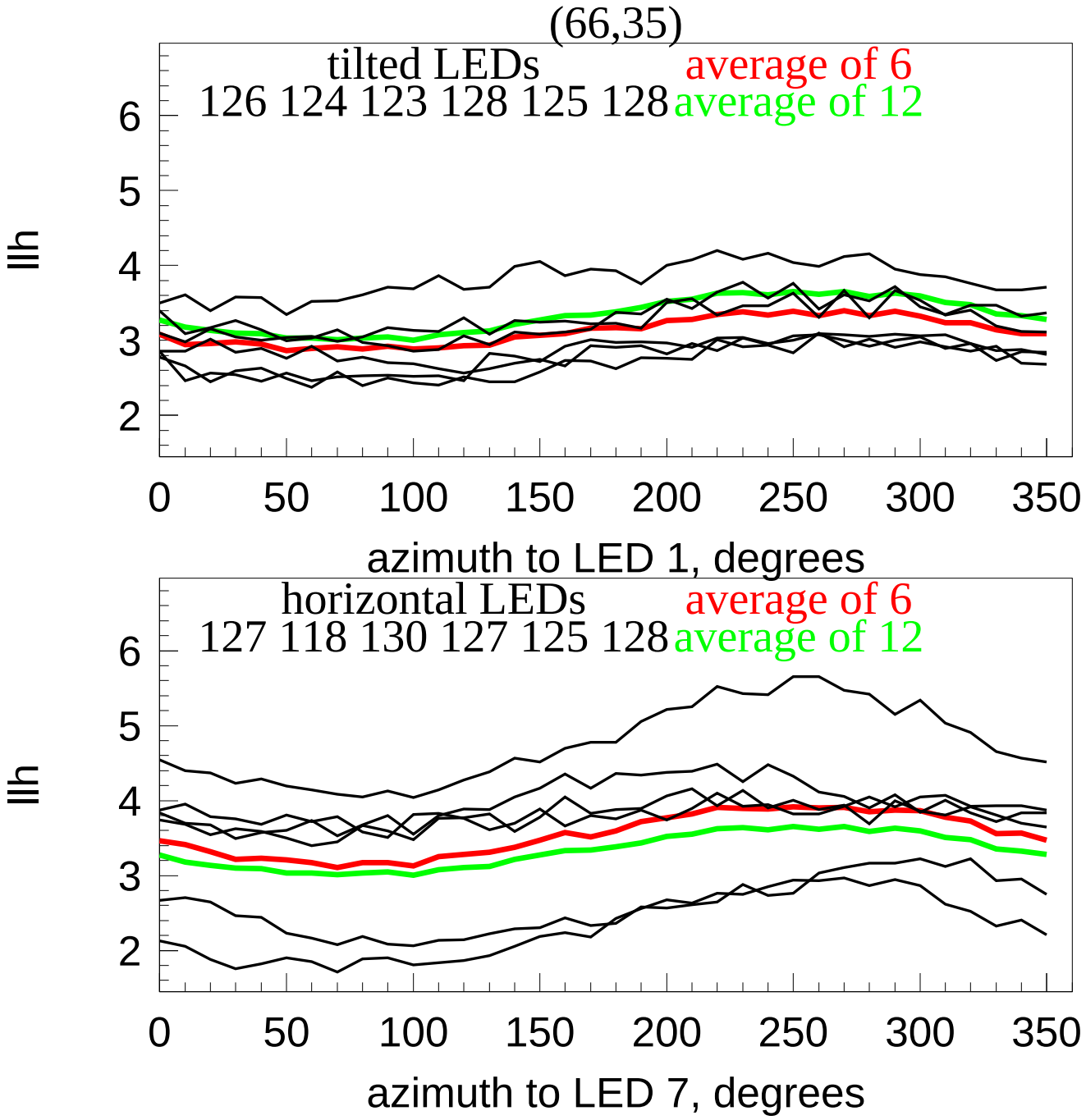

(65,37) 69.10 ± 12.04
3.94
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

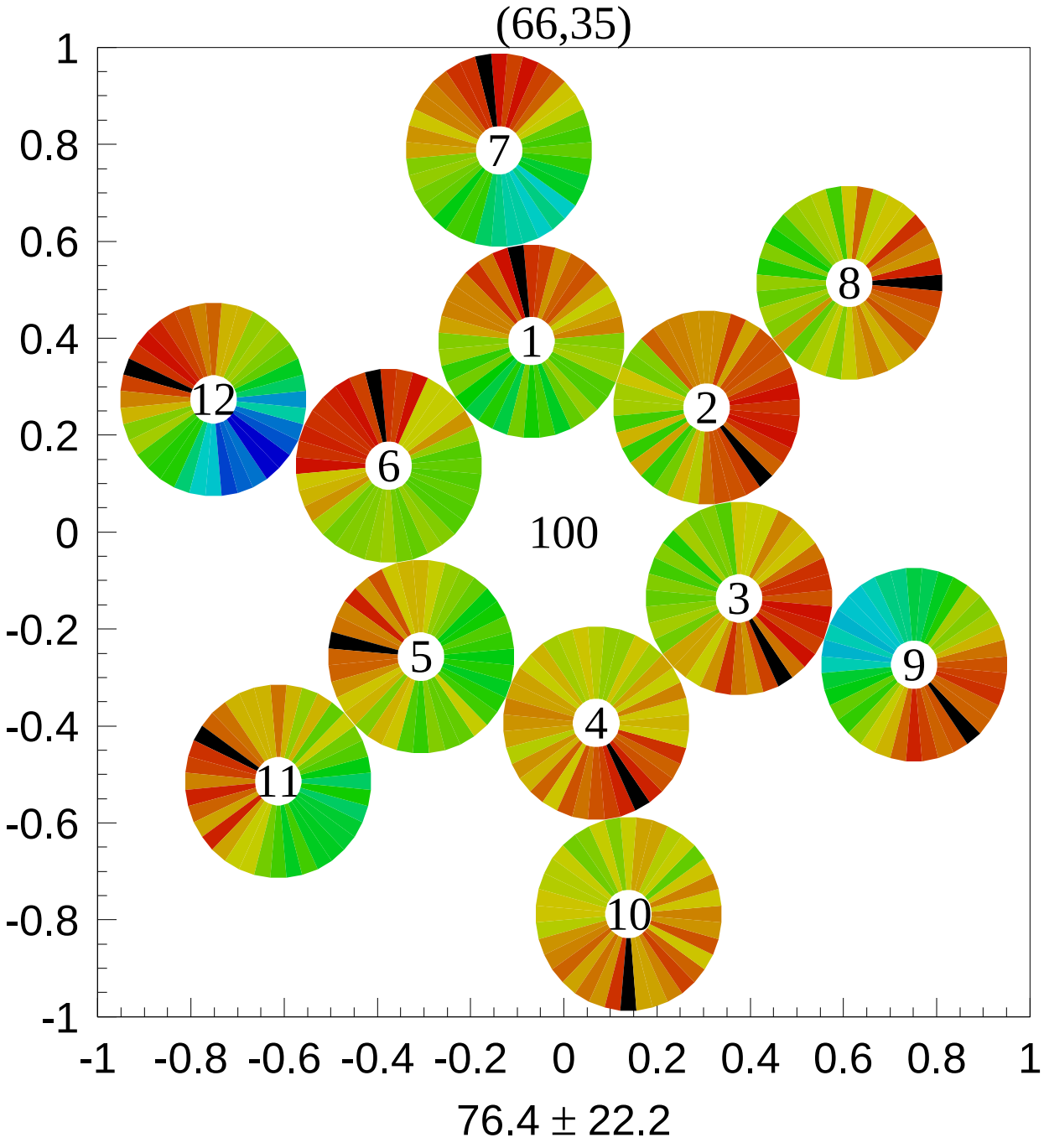

(65,38)
tilted LEDs
131 125 128 130 124 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 123 122 126 129 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

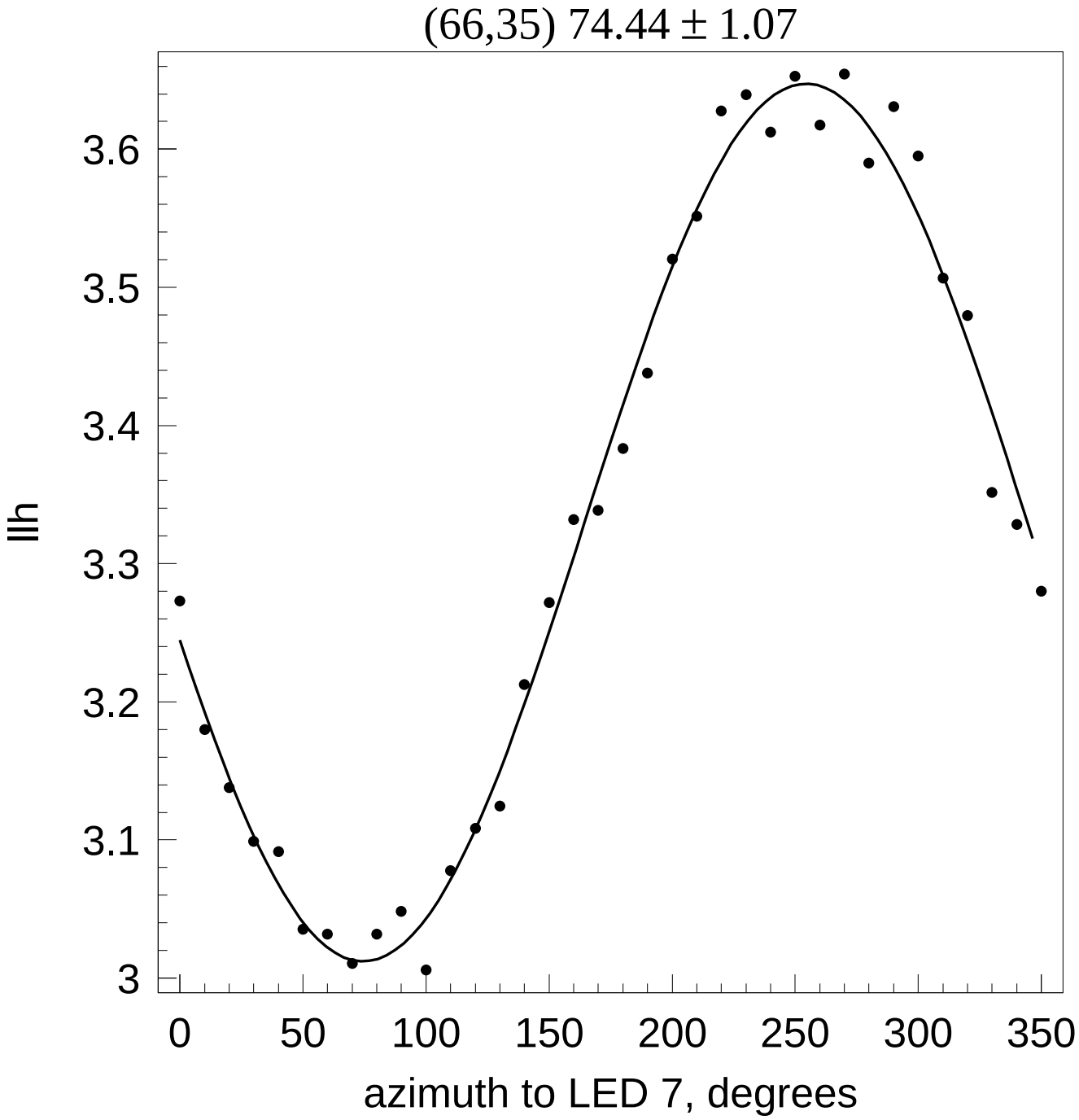

(65,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
126.7 ± 14.7
130
1
2
3
4
5
6
7
8
9
10
11
12

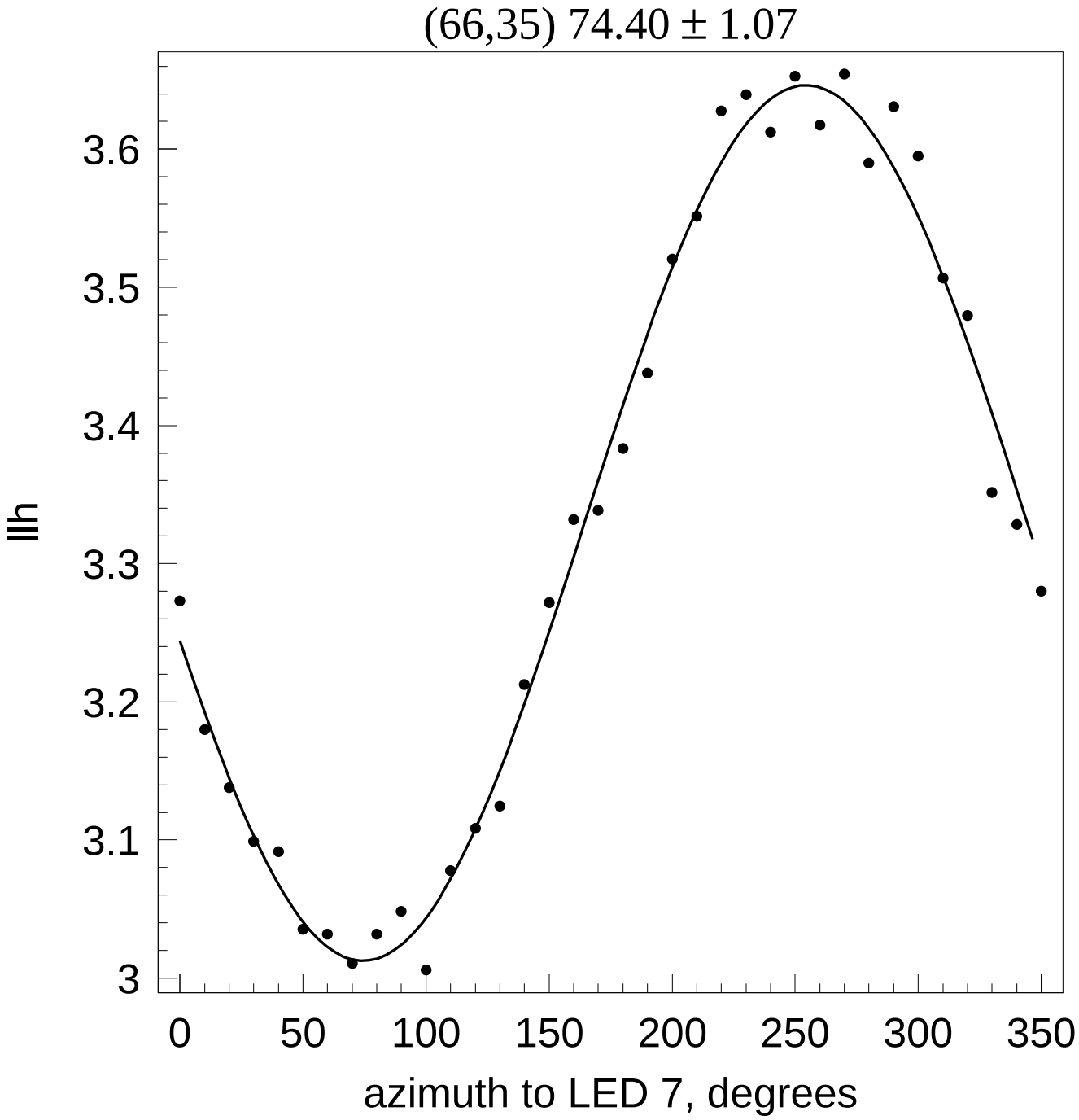

(65,38) 128.01 ± 0.45
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

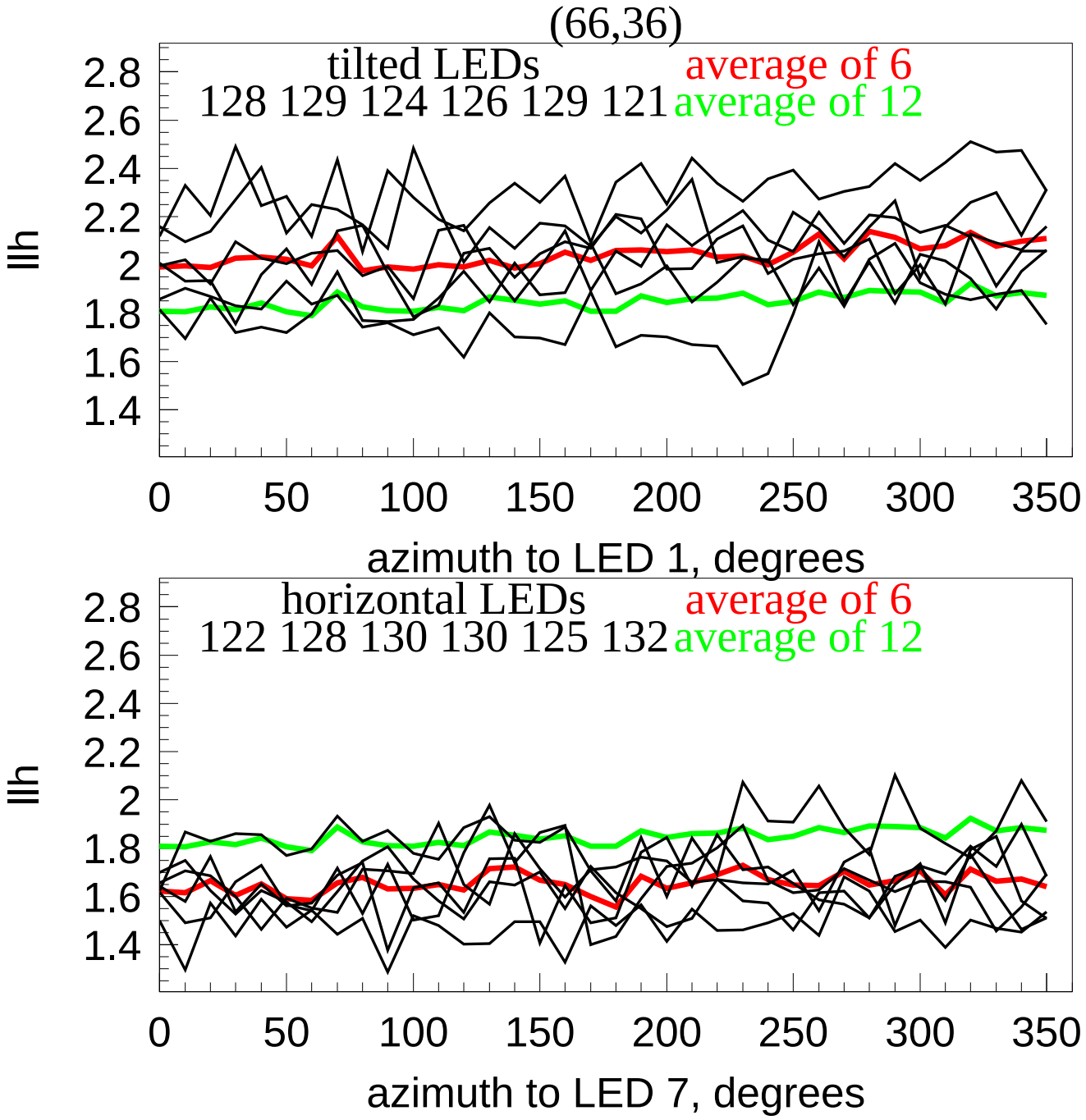

(65,38) 127.85 ± 0.46
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

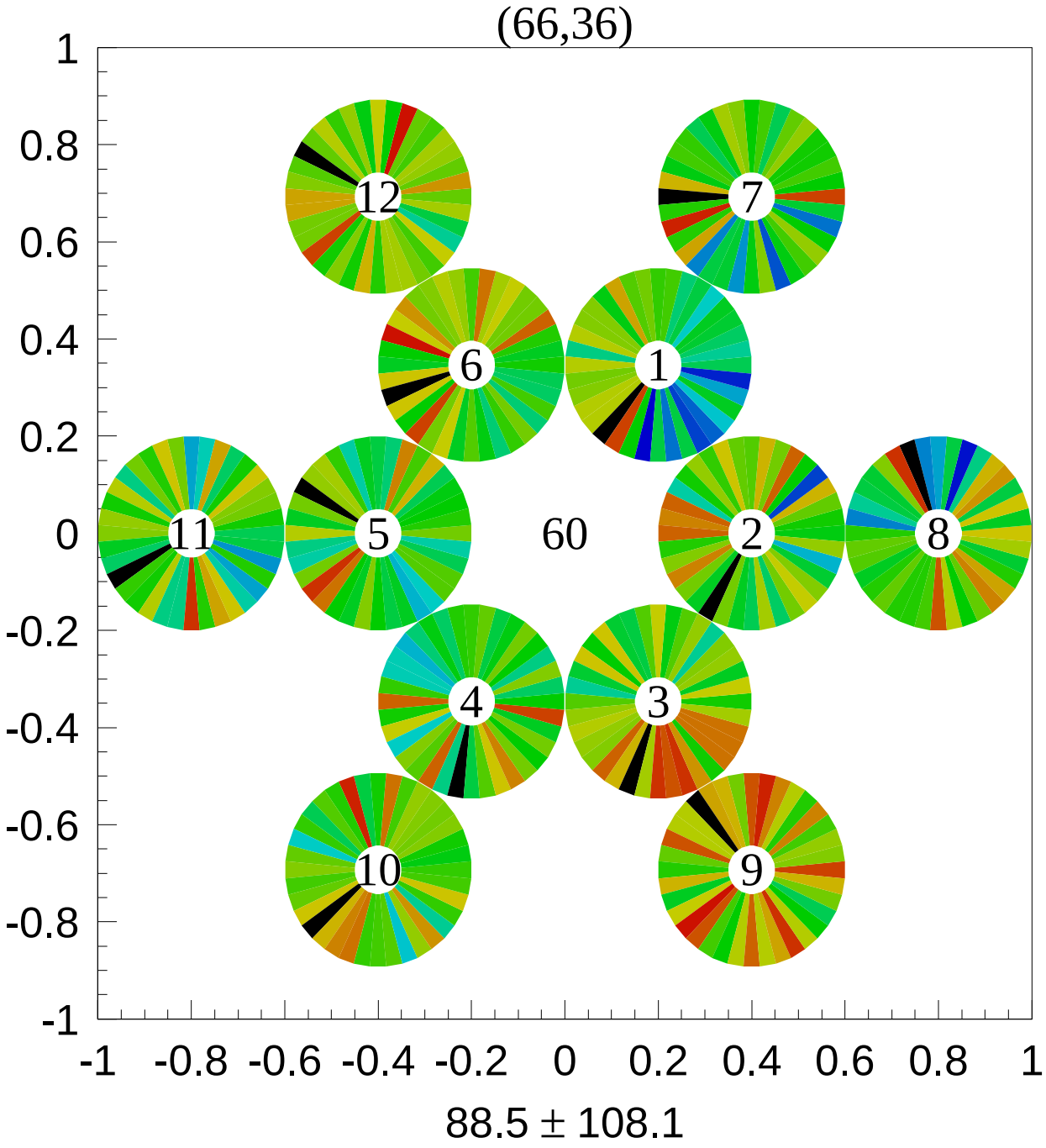

(66,35)
tilted LEDs
126 124 123 128 125 128
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
127 118 130 127 125 128
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

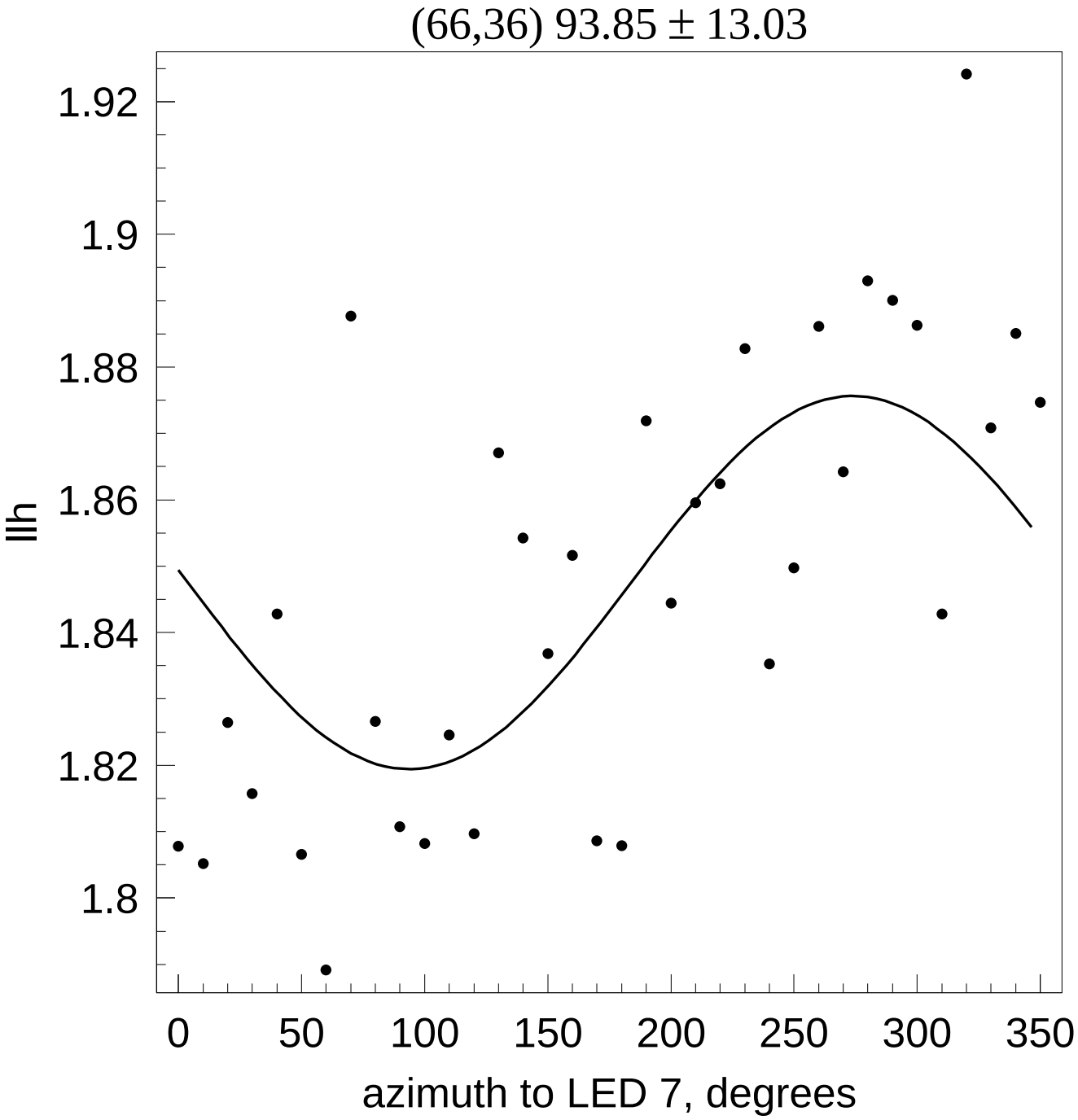

(66,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
76.4 ± 22.2

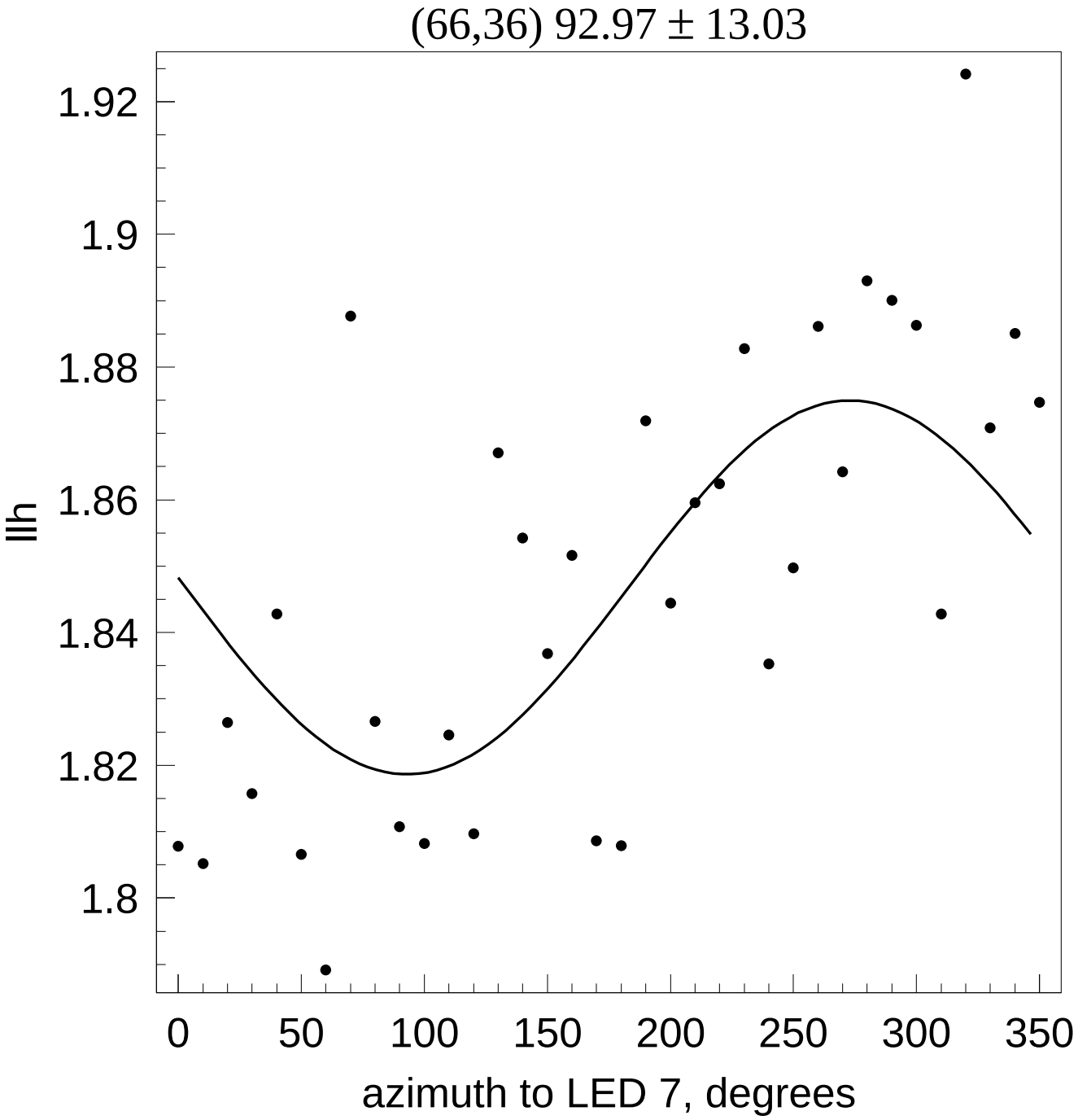

(66,35) 74.44 ± 1.07
3.6
3.5
3.4
3.3
3.2
3.1
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

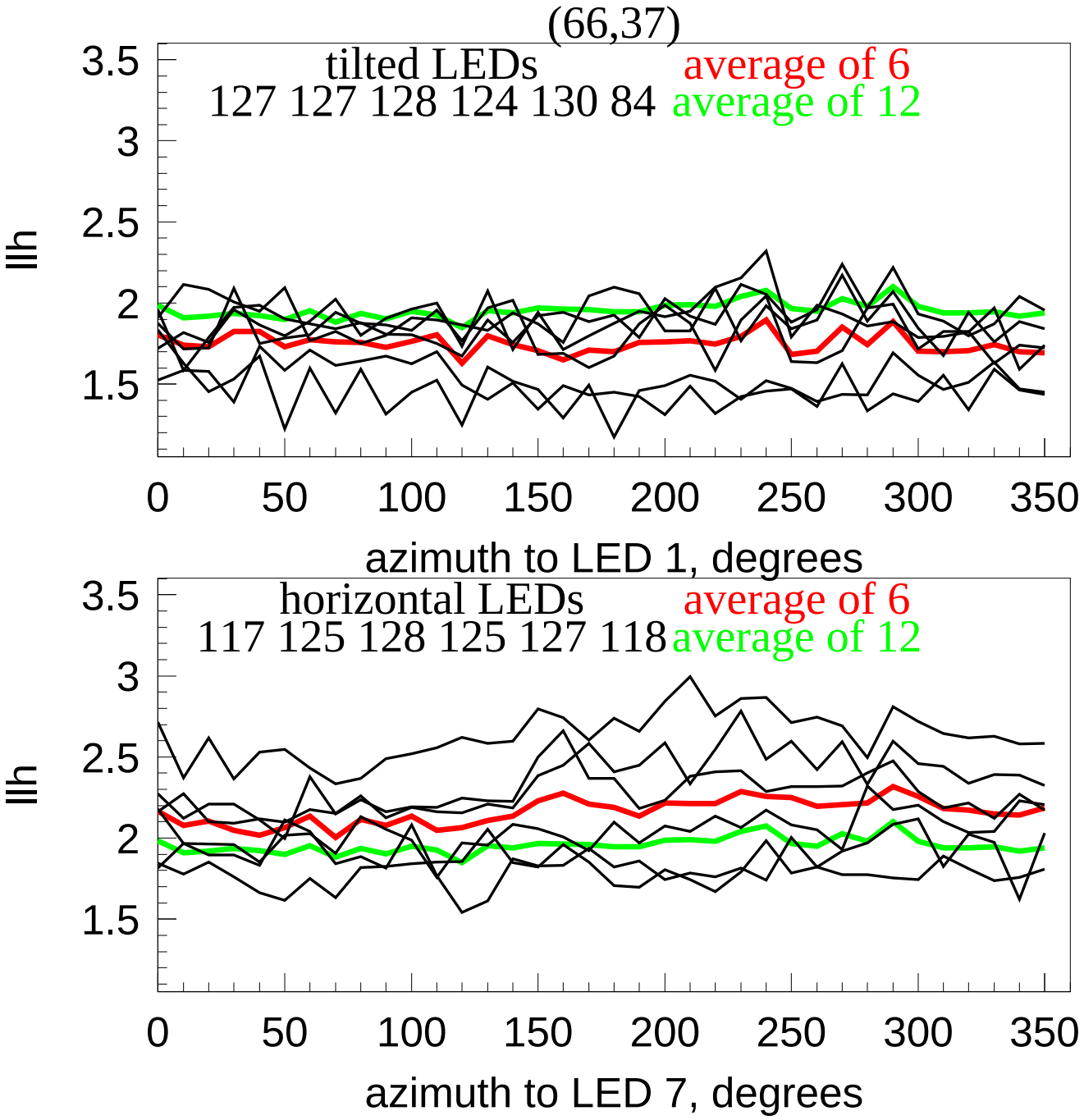

(66,35) 74.40 ± 1.07
llh
3.6
3.5
3.4
3.3
3.2
3.1
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

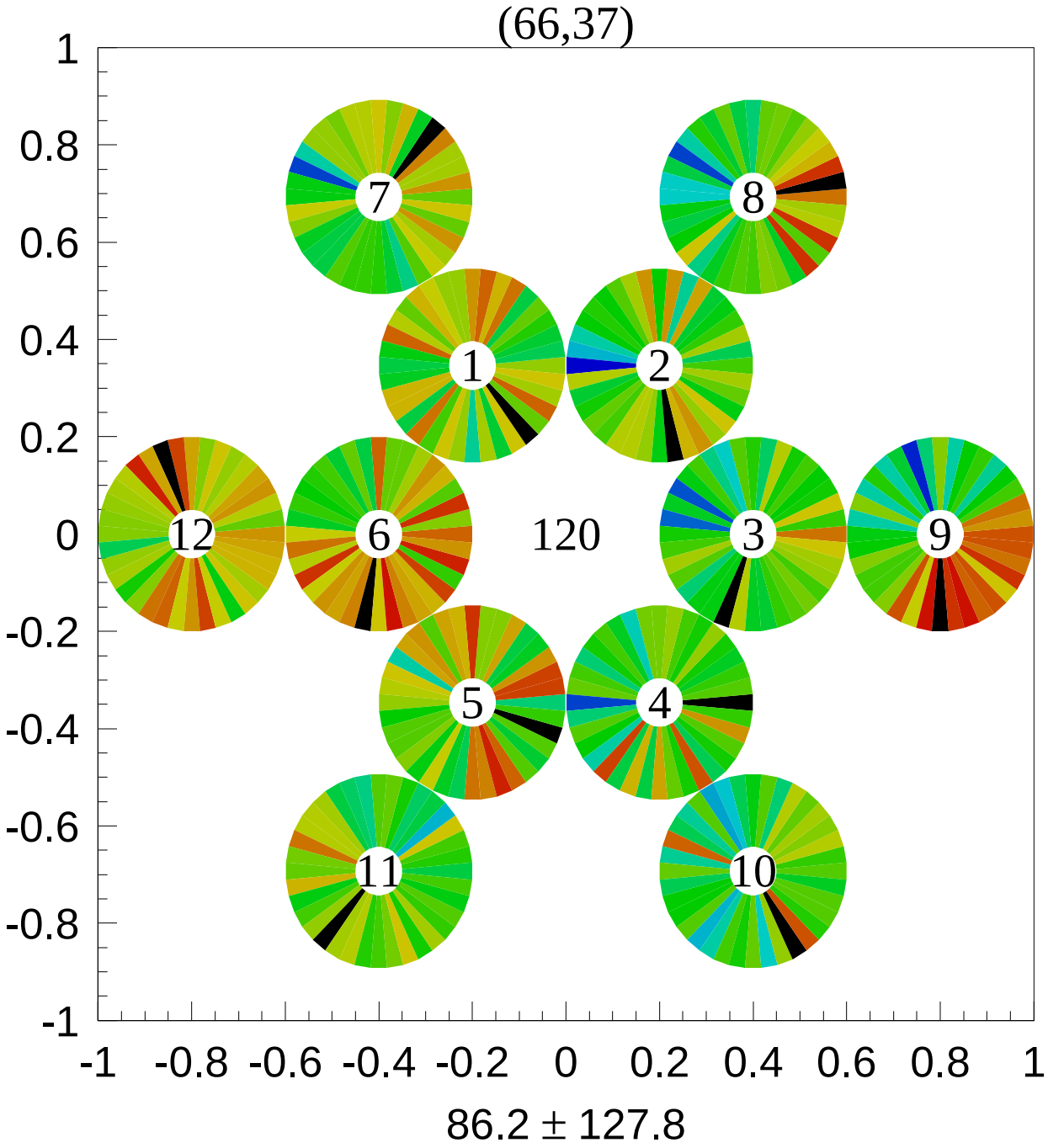

(66,36)
tilted LEDs
128 129 124 126 129 121
average of 6
average of 12
llh
2.8
2.6
2.4
2.2
2
1.8
1.6
1.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 128 130 130 125 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

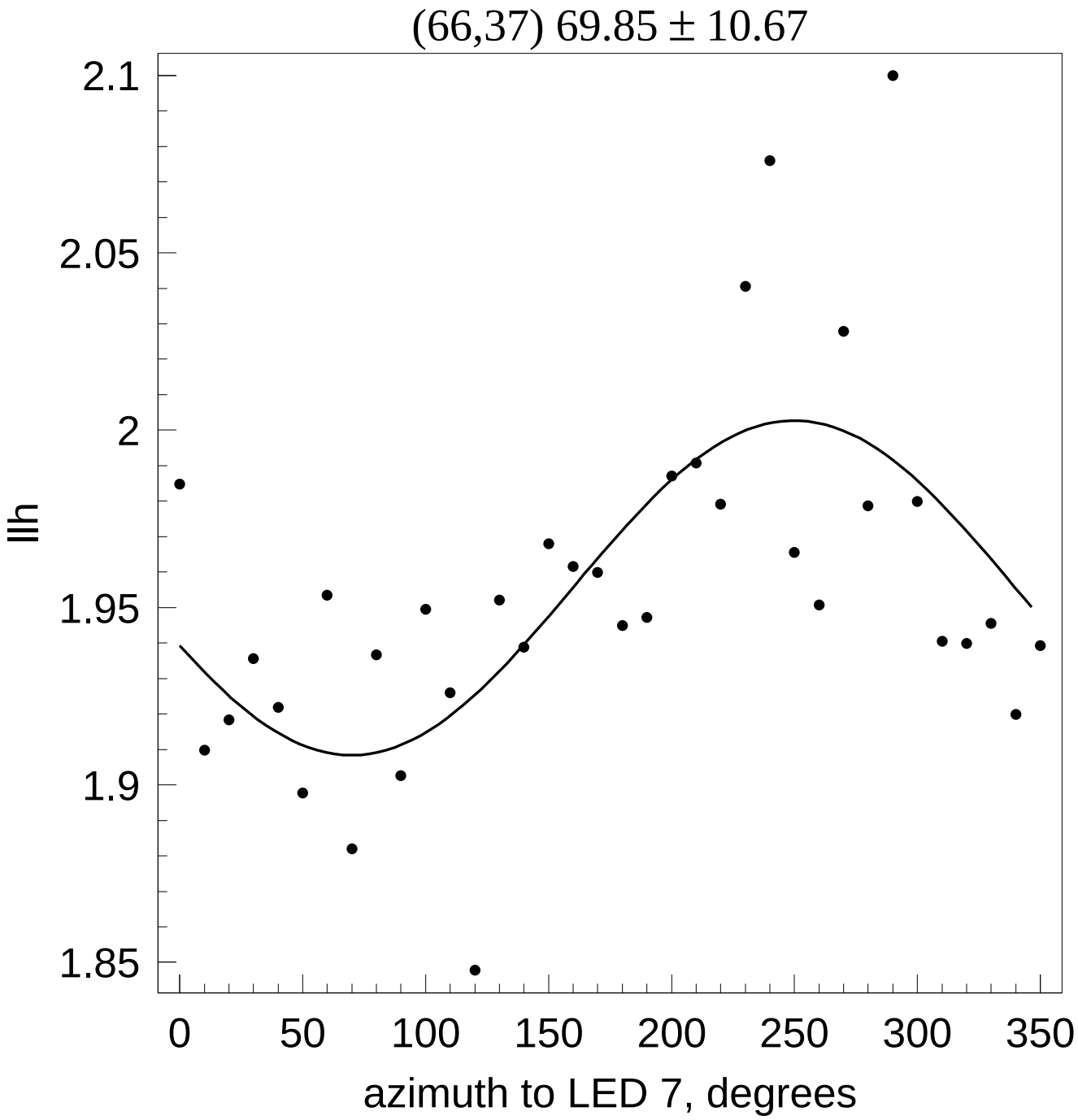

(66,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
88.5 ± 108.1

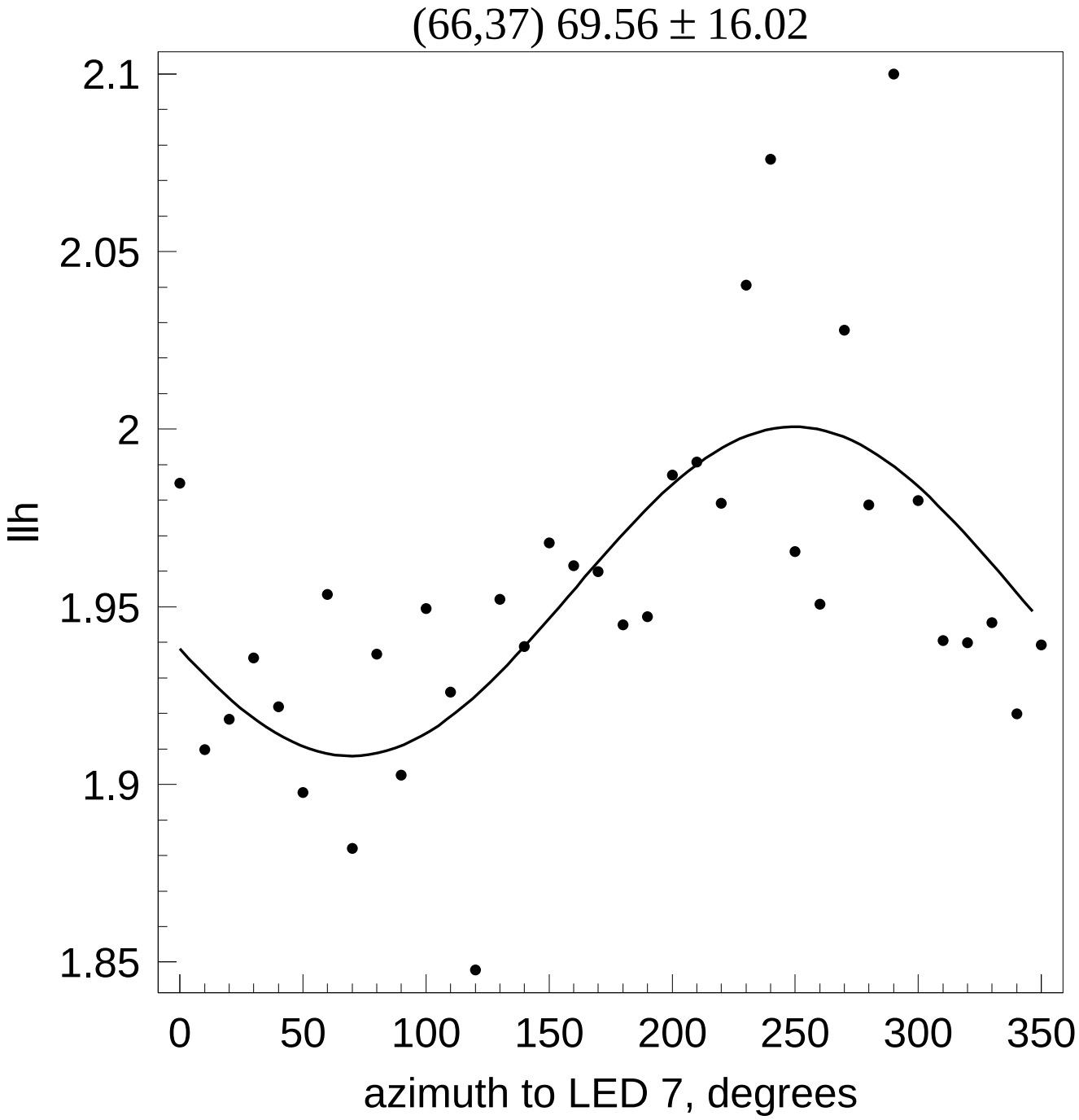

(66,36) 93.85 ± 13.03
1.92
1.9
1.88
1.86
1.84
1.82
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

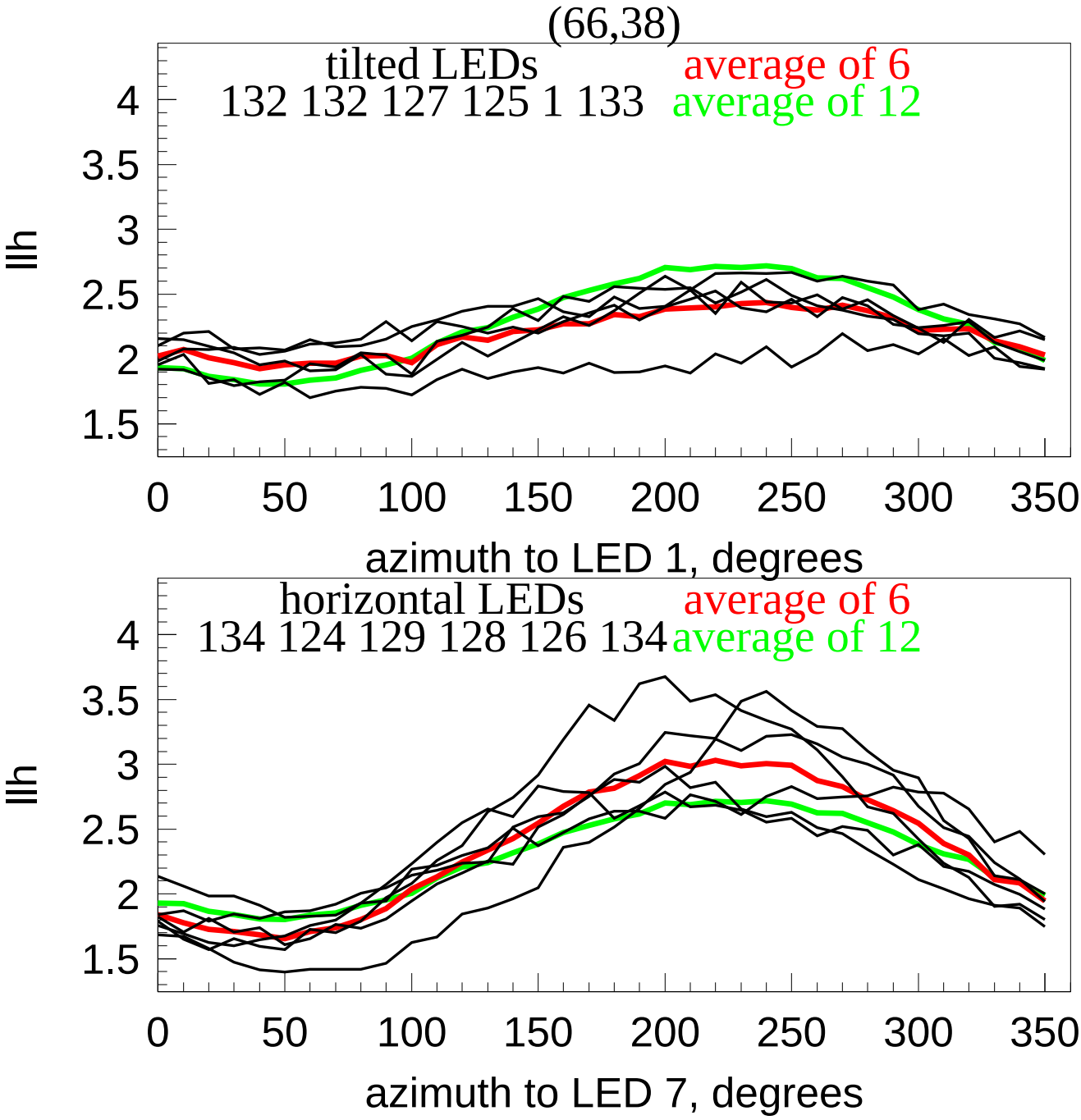

(66,36) 92.97 ± 13.03
1.92
1.9
1.88
1.86
1.84
1.82
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

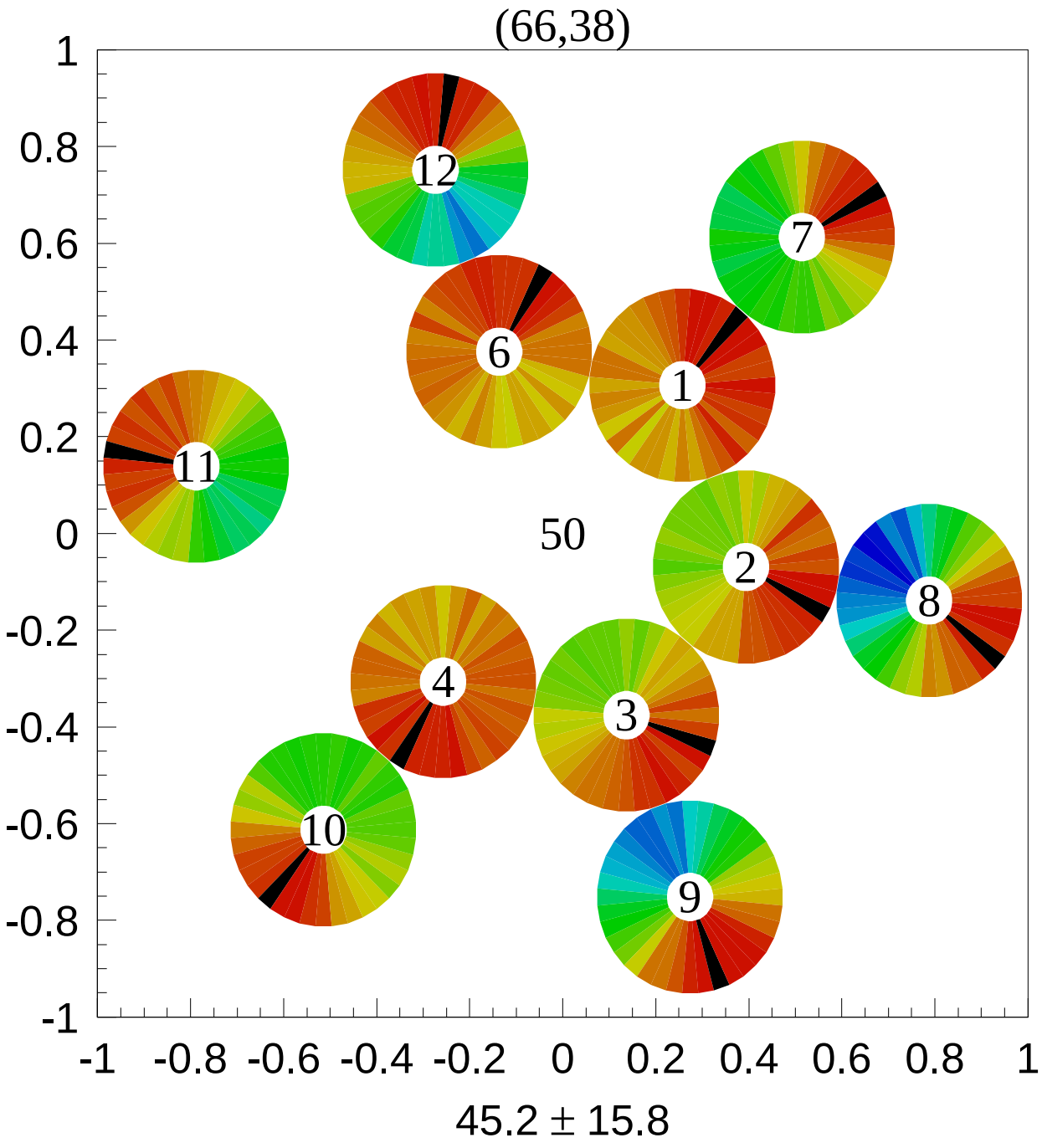

(66,37)
tilted LEDs
127 127 128 124 130 84
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
117 125 128 125 127 118
average of 6
average of 12
llh
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

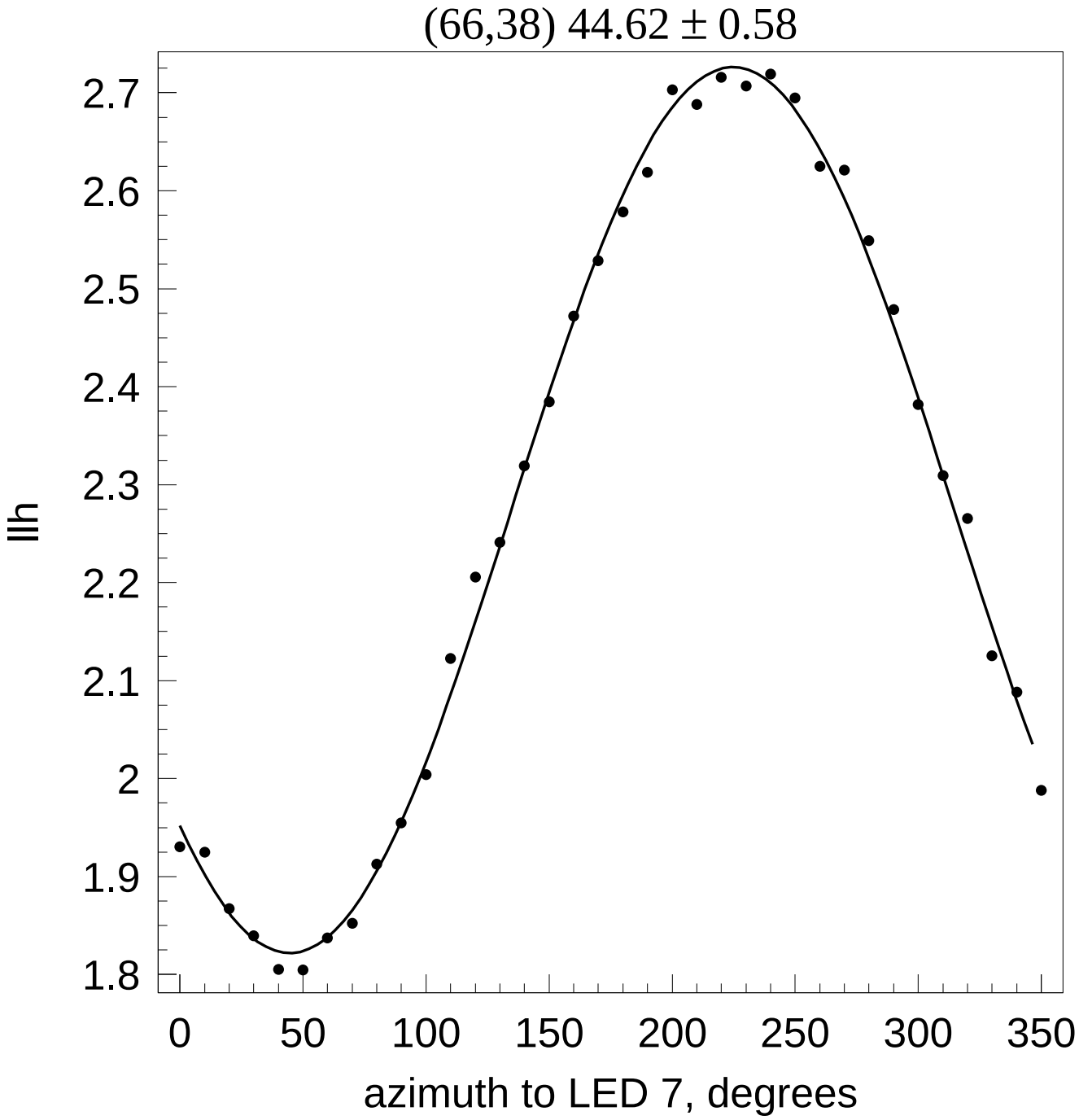

(66,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
8
1
2
12
6
120
3
9
5
4
11
10
86.2 ± 127.8

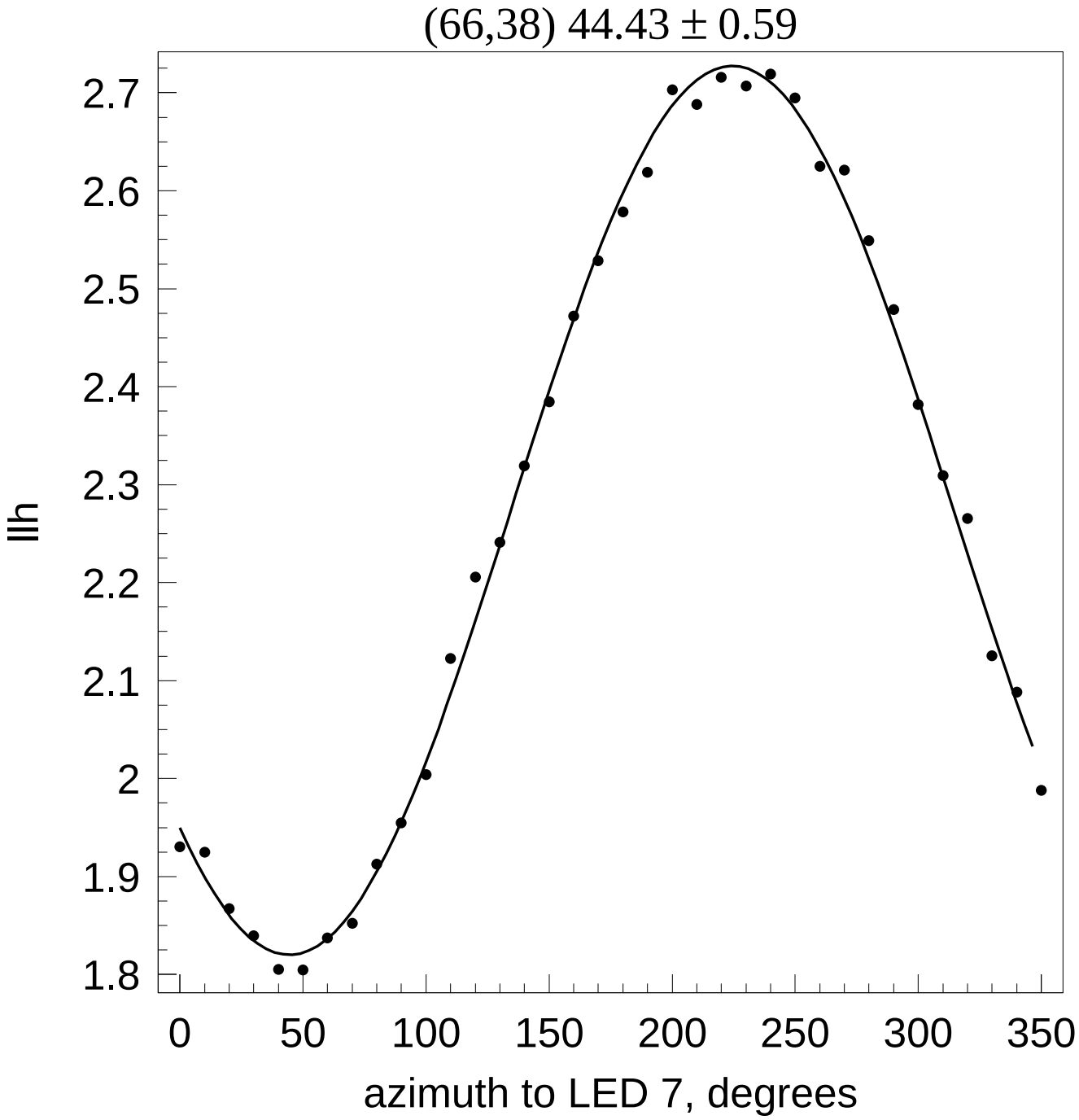

(66,37) 69.85 ± 10.67
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

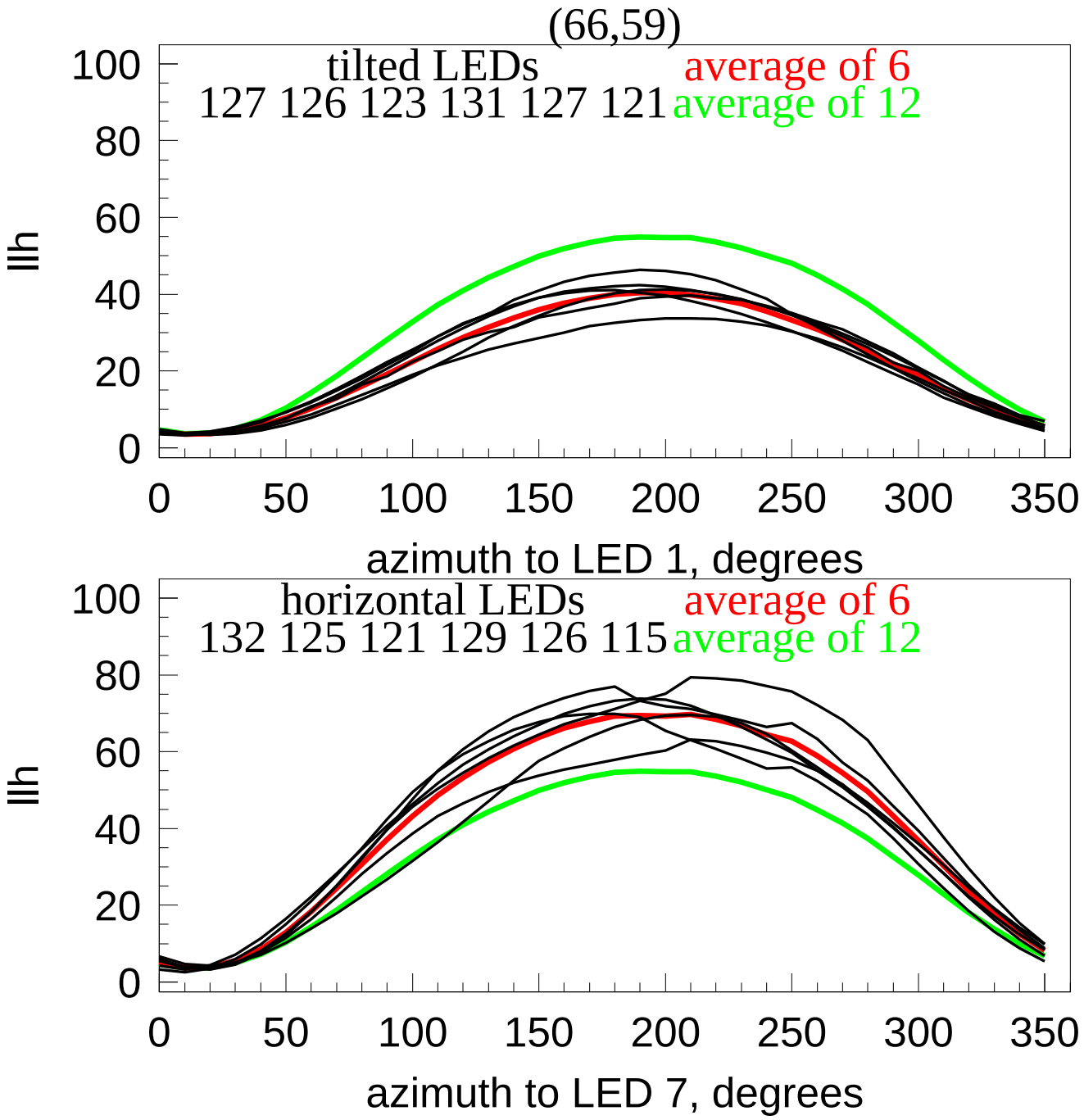

(66,37) 69.56 ± 16.02
2.1
2.05
2
1.95
1.9
1.85
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

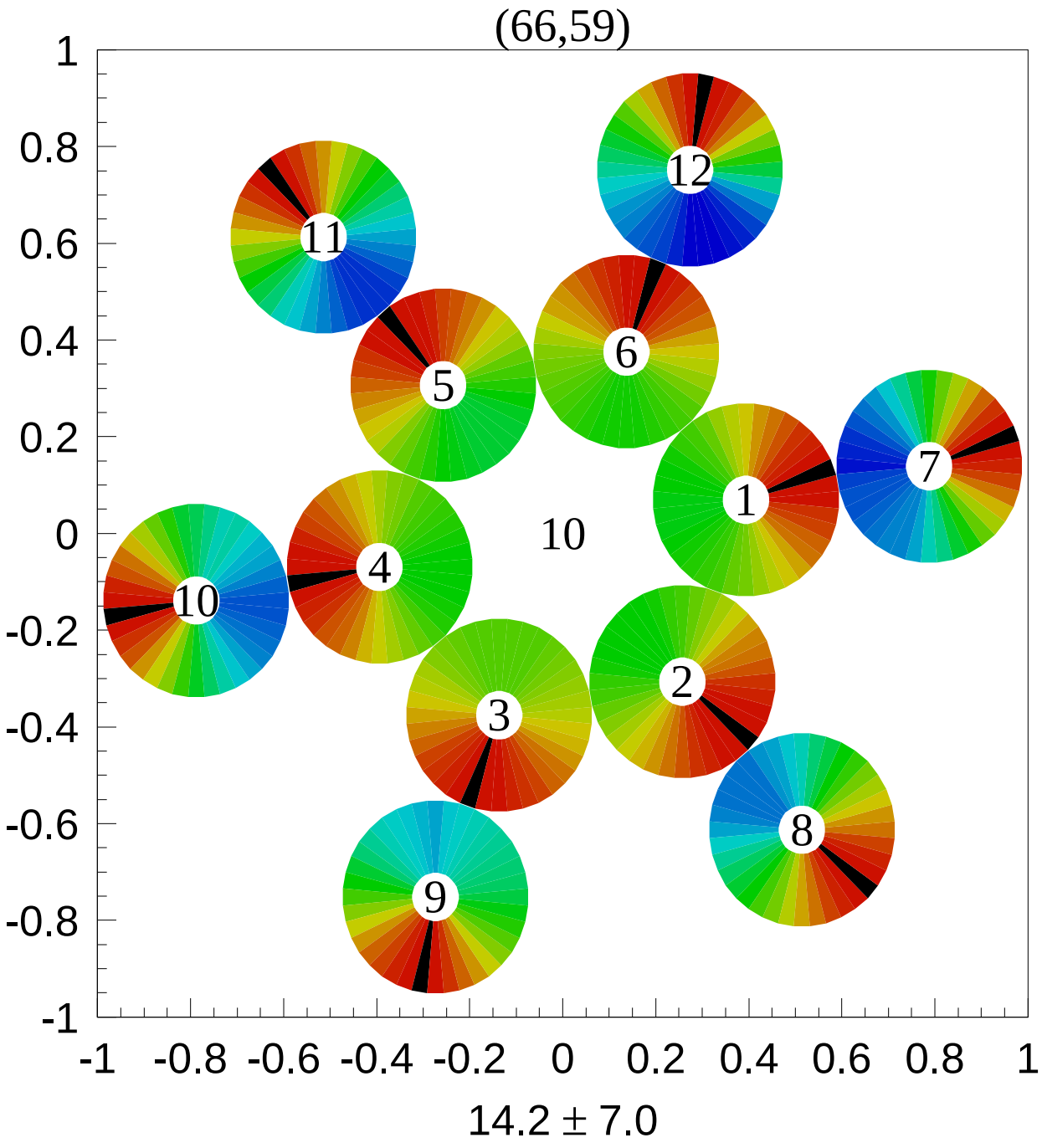

(66,38)
tilted LEDs
132 132 127 125 1 133
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
134 124 129 128 126 134
average of 6
average of 12
llh
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

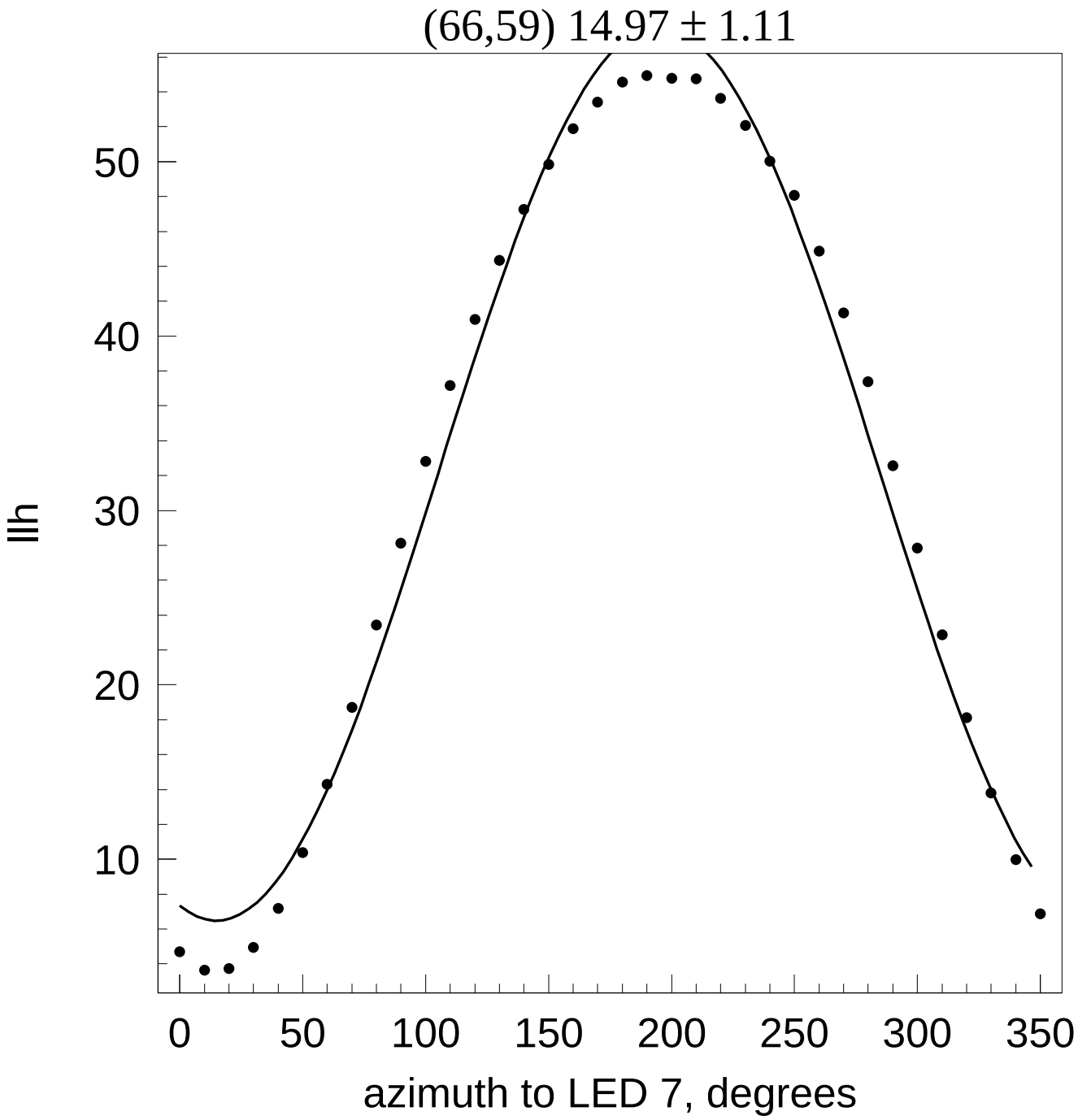

(66,38)
12
7
6
1
11
50
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
45.2 ± 15.8

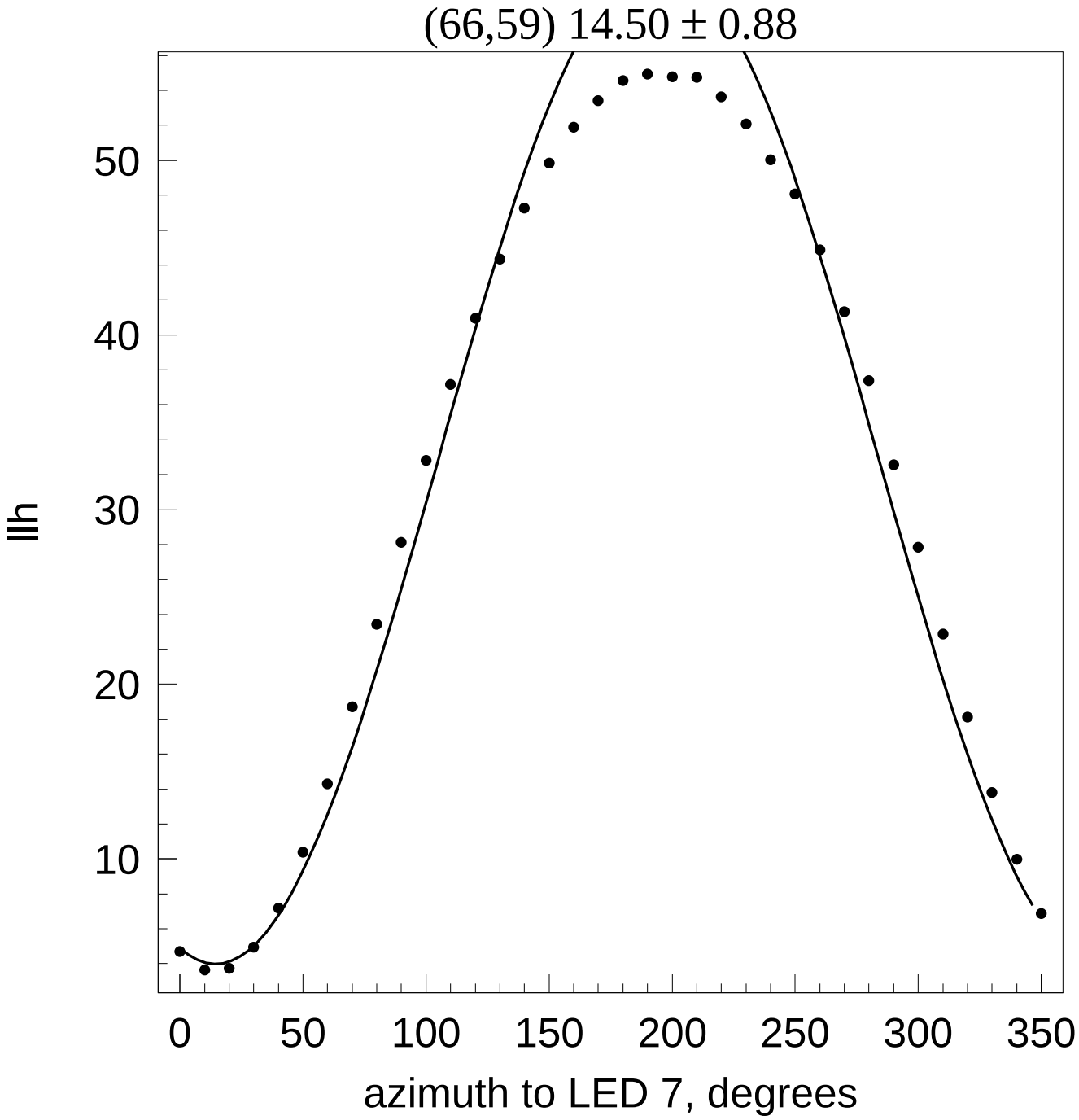

(66,38) 44.62 ± 0.58
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

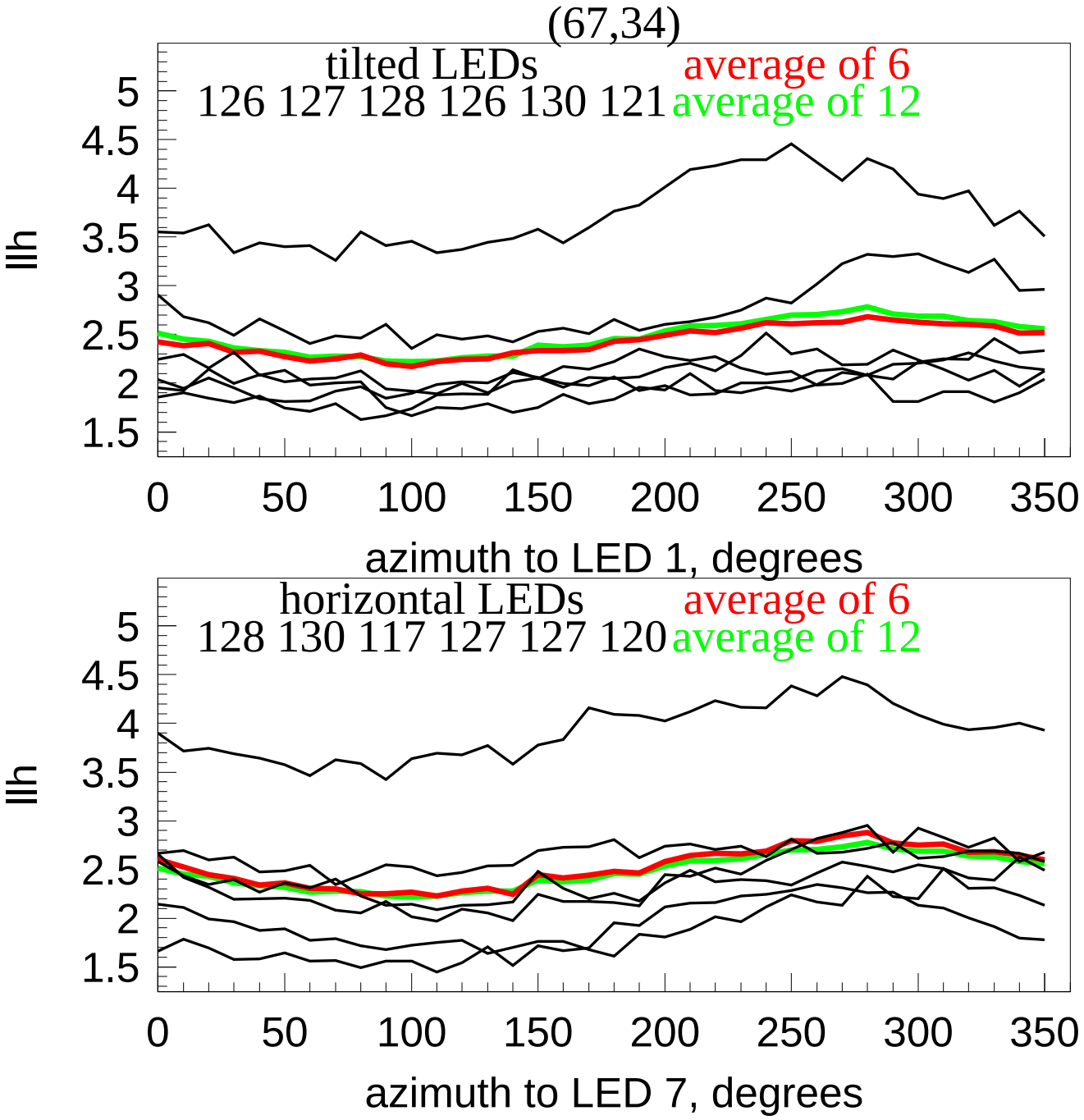

(66,38) 44.43 ± 0.59
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

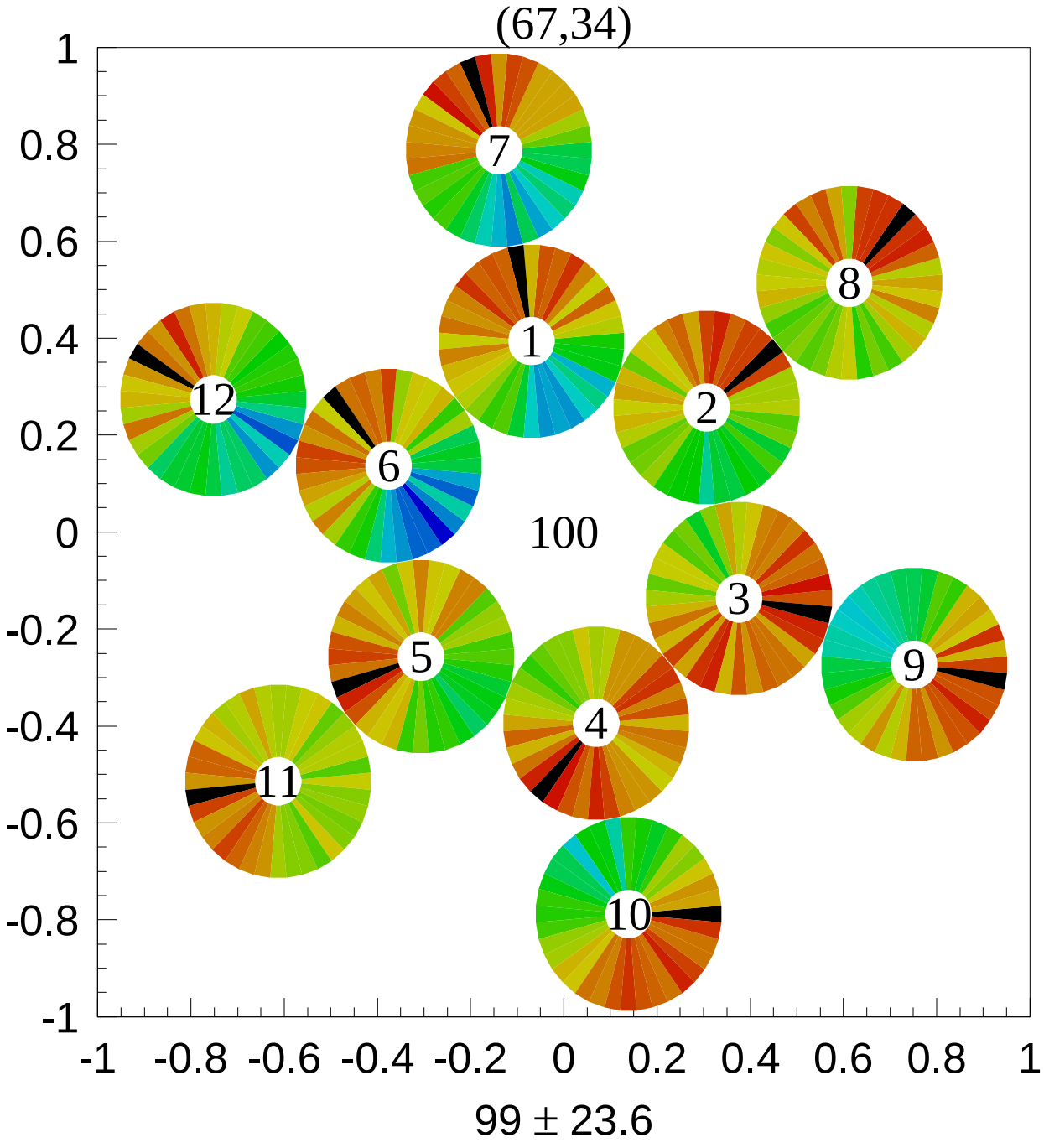

(66,59)
tilted LEDs
127 126 123 131 127 121
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 125 121 129 126 115
average of 6
average of 12
llh
azimuth to LED 7, degrees

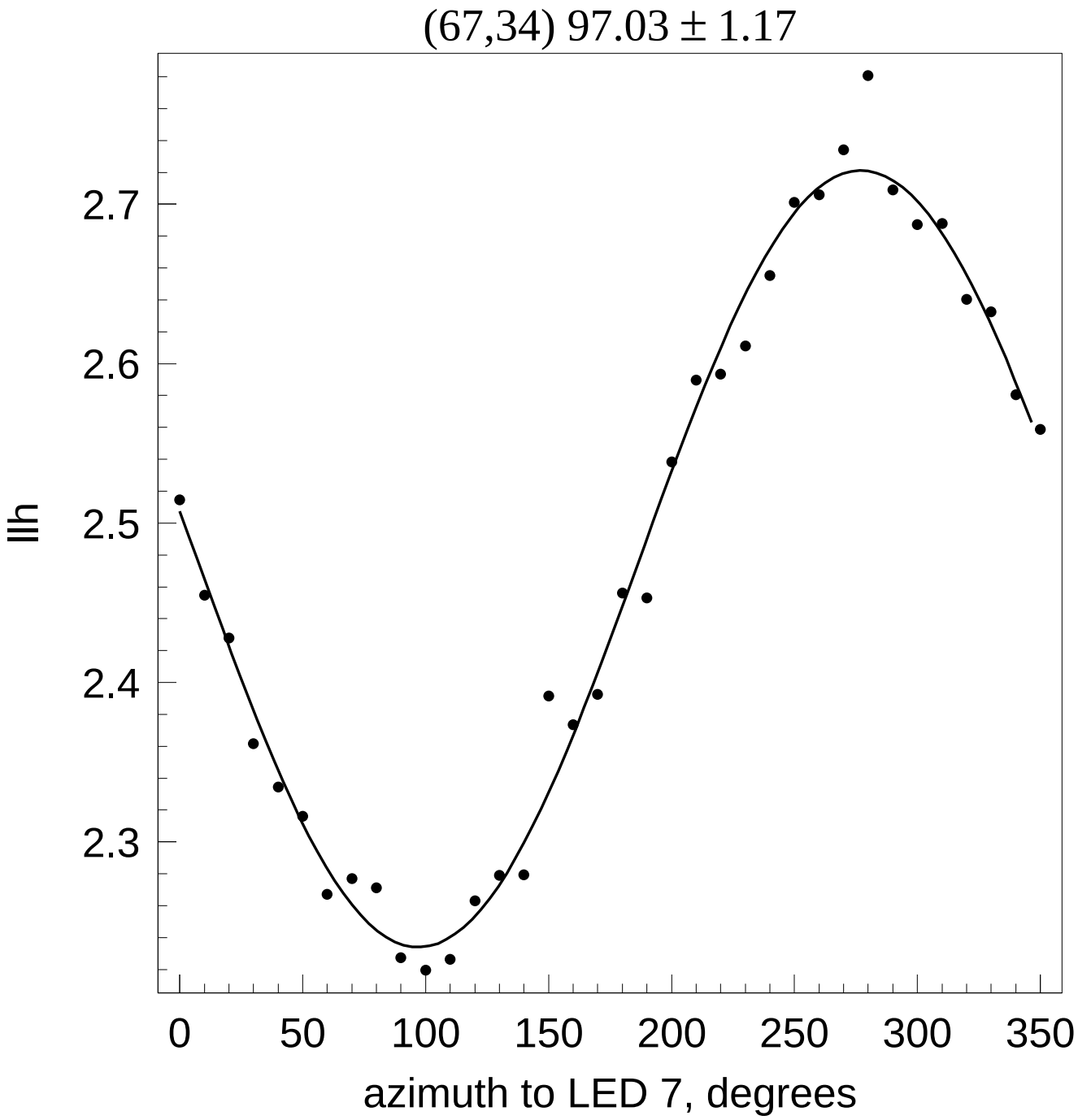

(66,59)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
10
4
10
2
3
8
9
14.2 ± 7.0

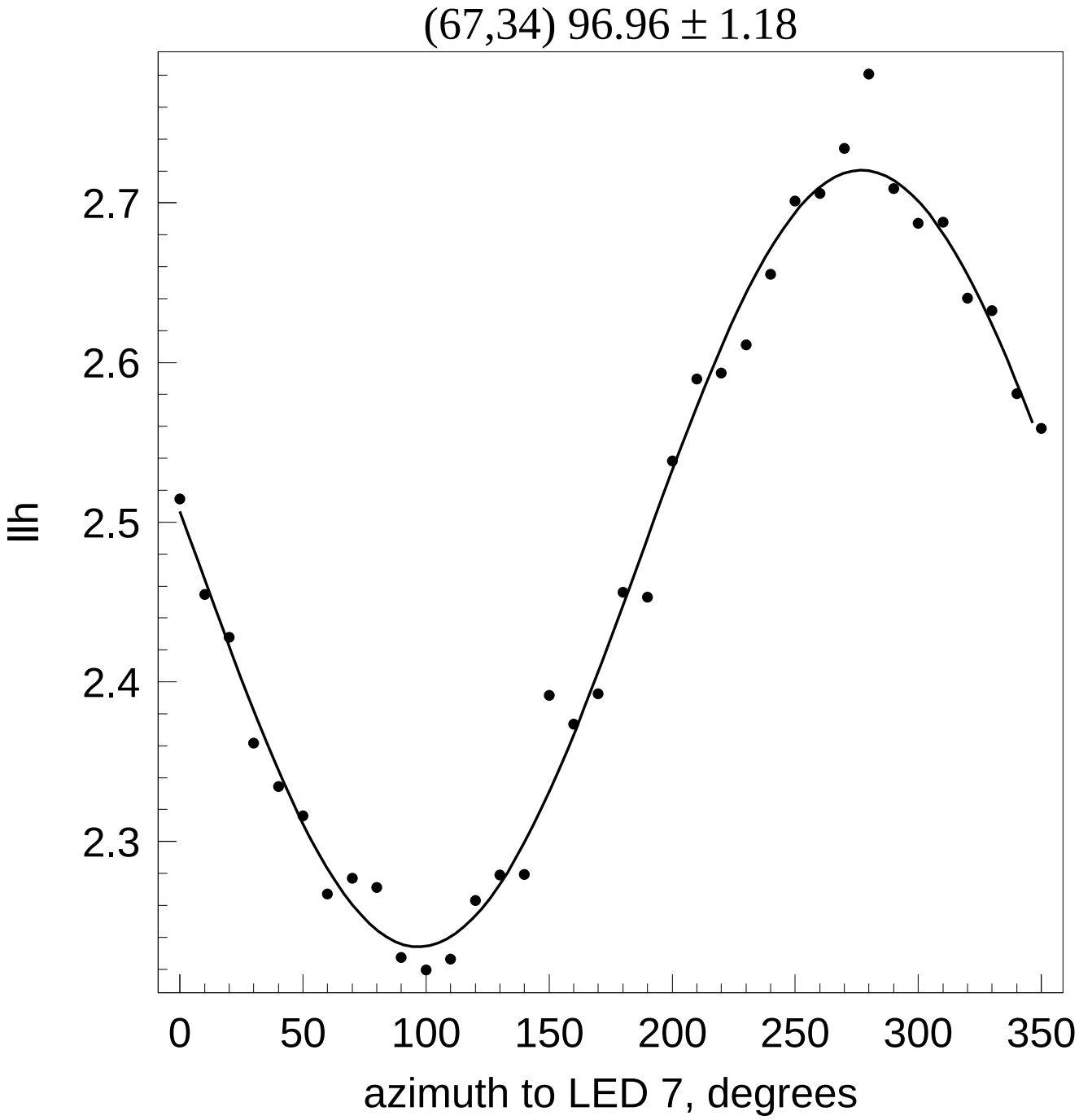

(66,59) 14.97 ± 1.11
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

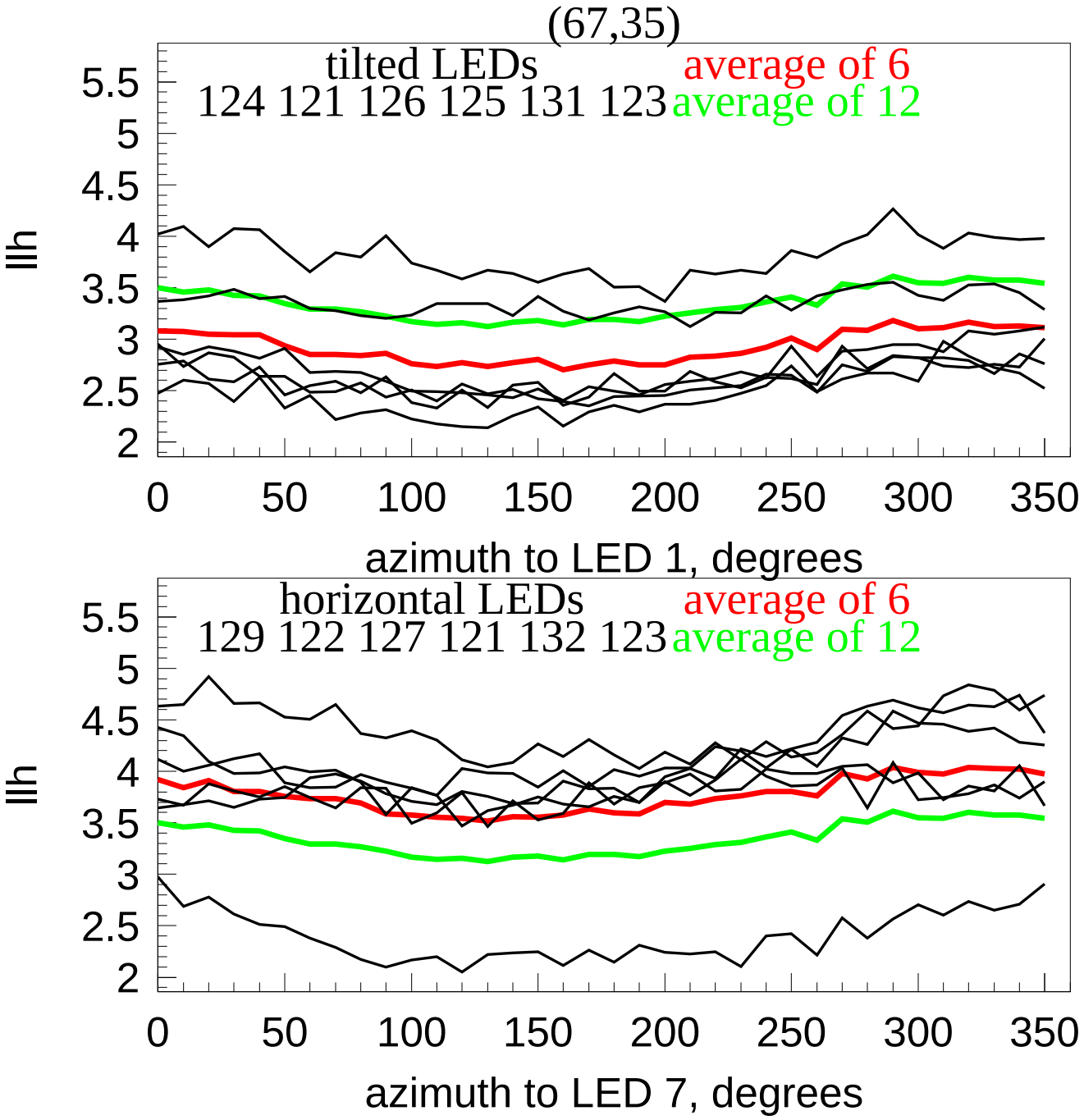

(66,59) 14.50 ± 0.88
50
40
30
20
10
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

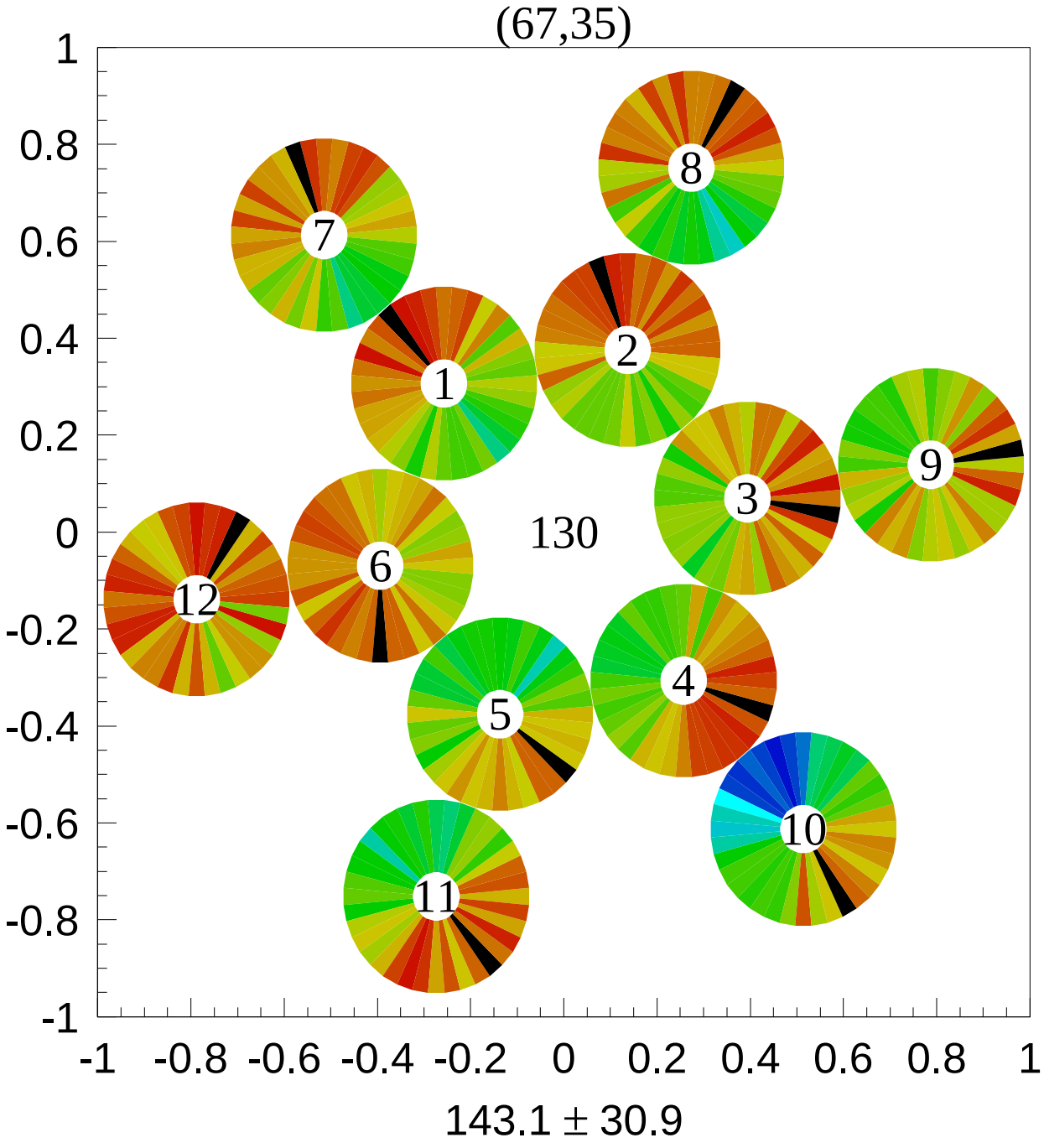

(67,34)
tilted LEDs
126 127 128 126 130 121
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 130 117 127 127 120
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

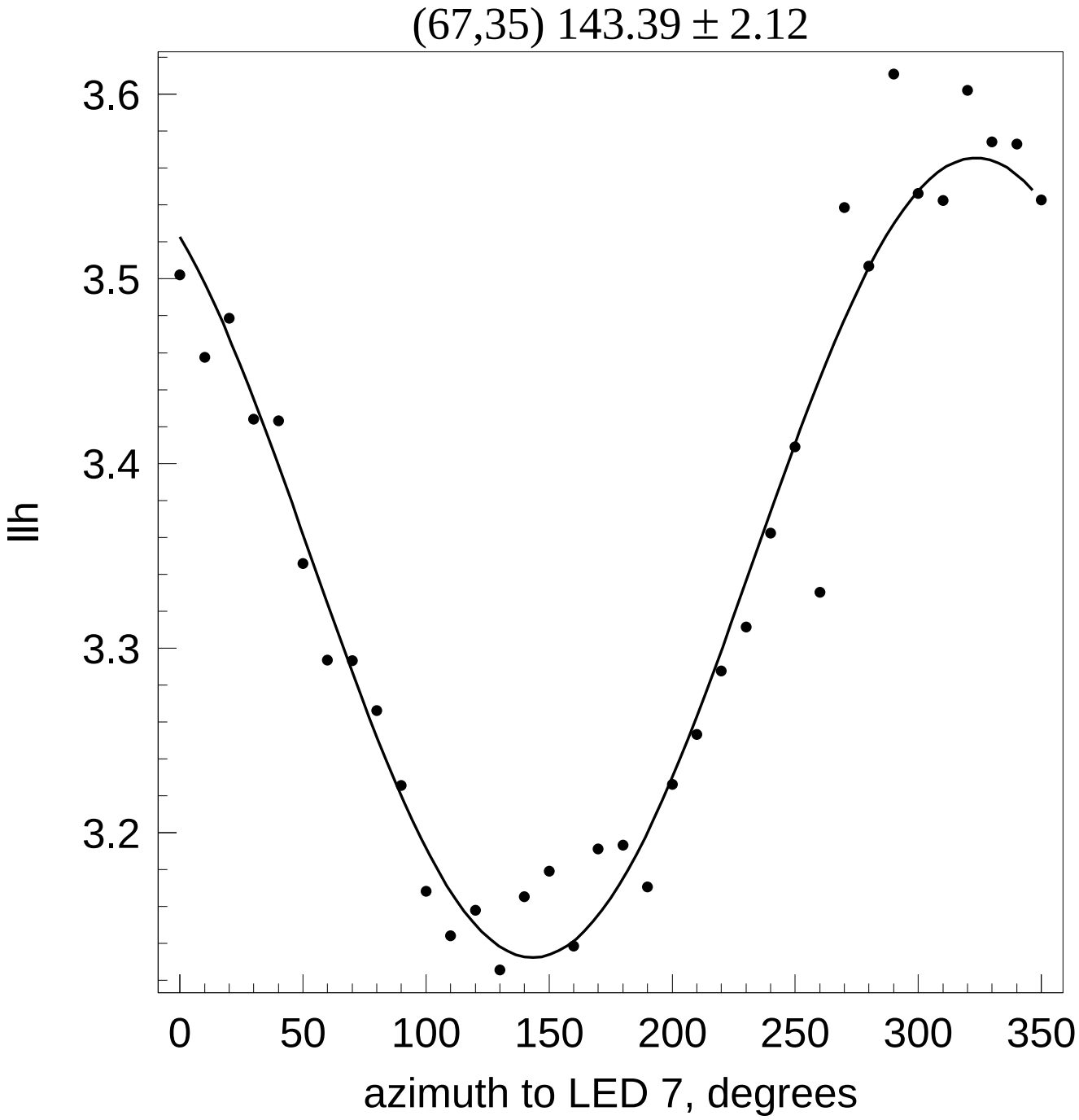

(67,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
99 ± 23.6

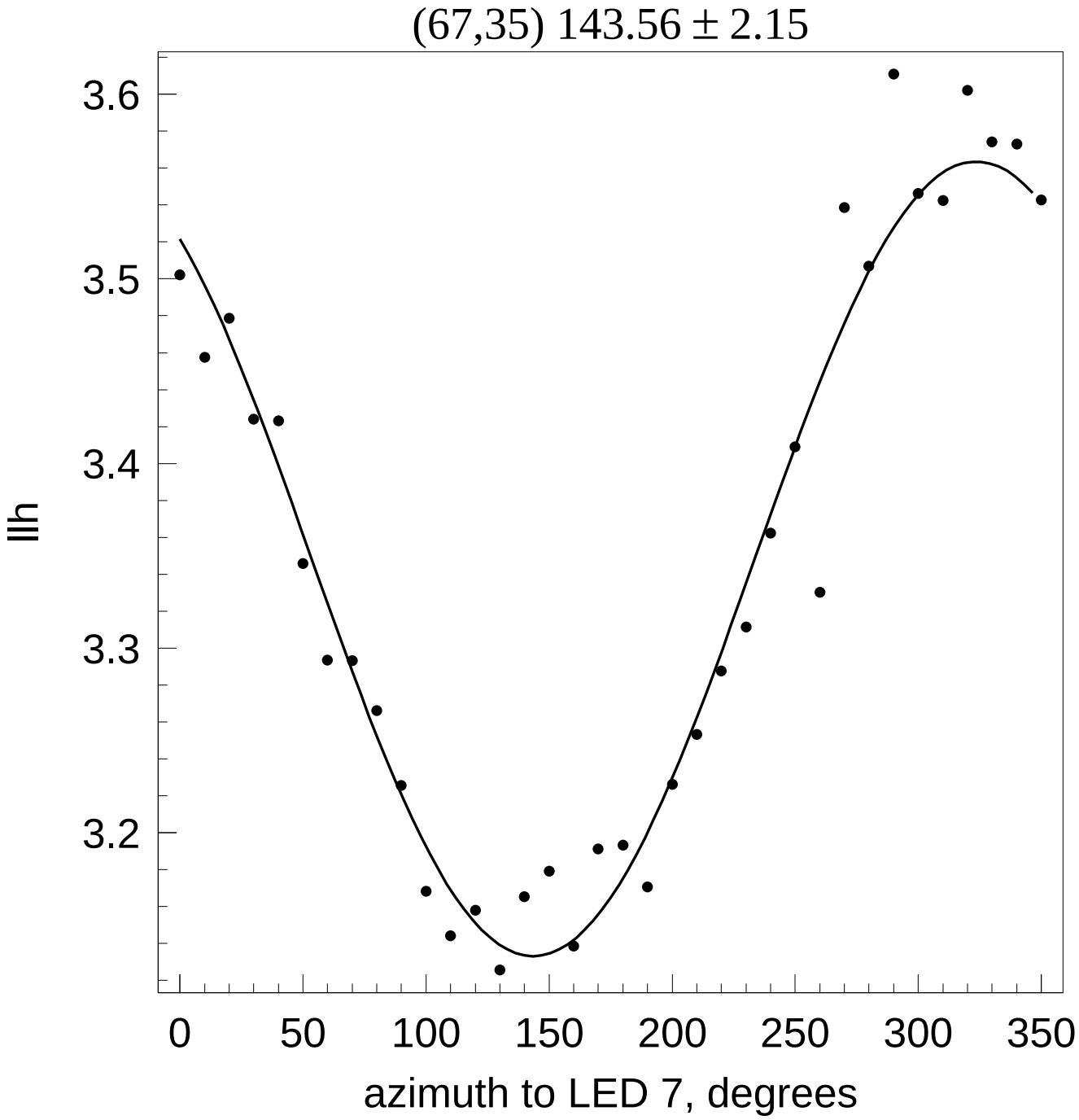

(67,34) 97.03 ± 1.17
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

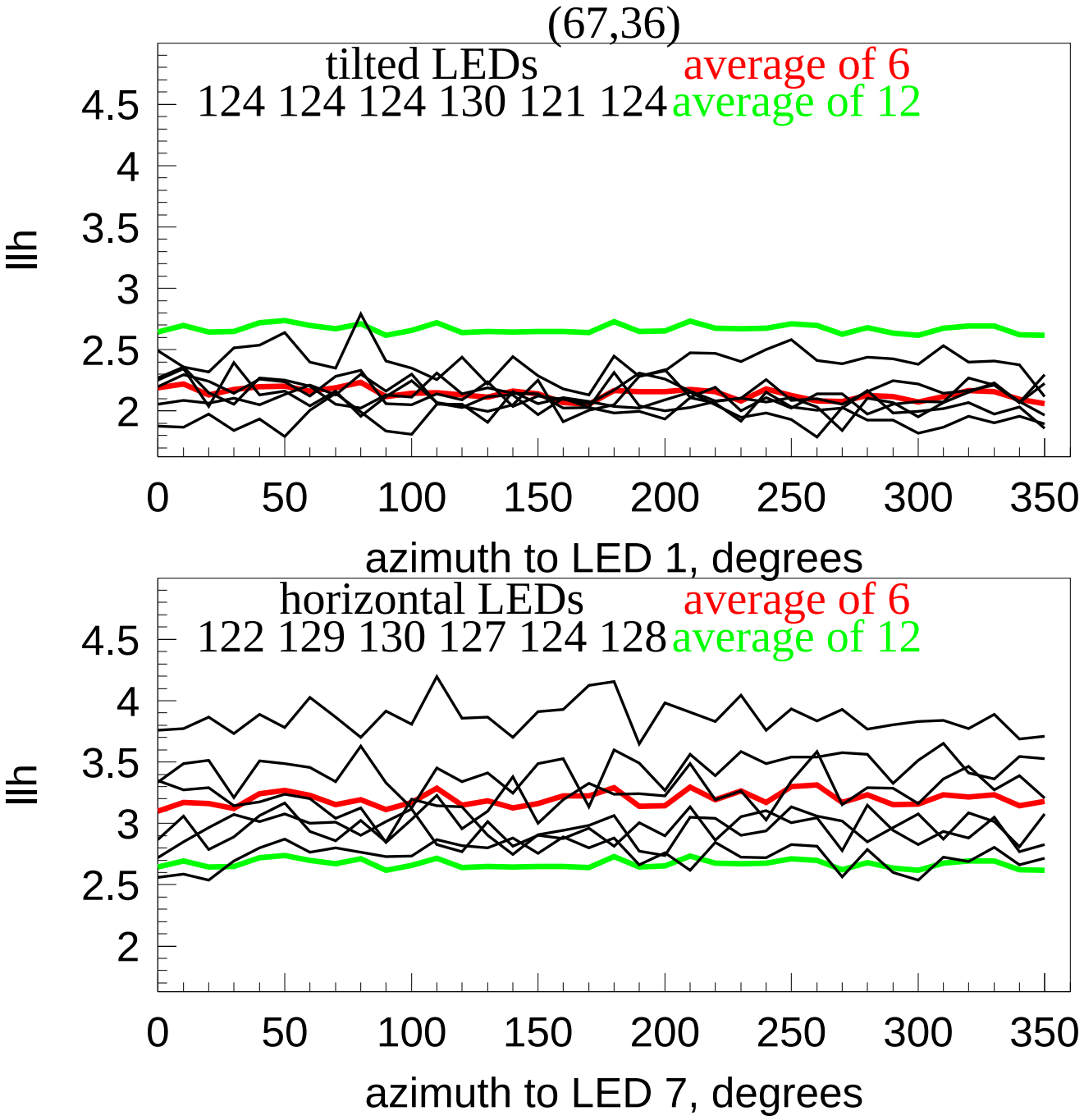

(67,34) 96.96 ± 1.18
2.7
2.6
2.5
2.4
2.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

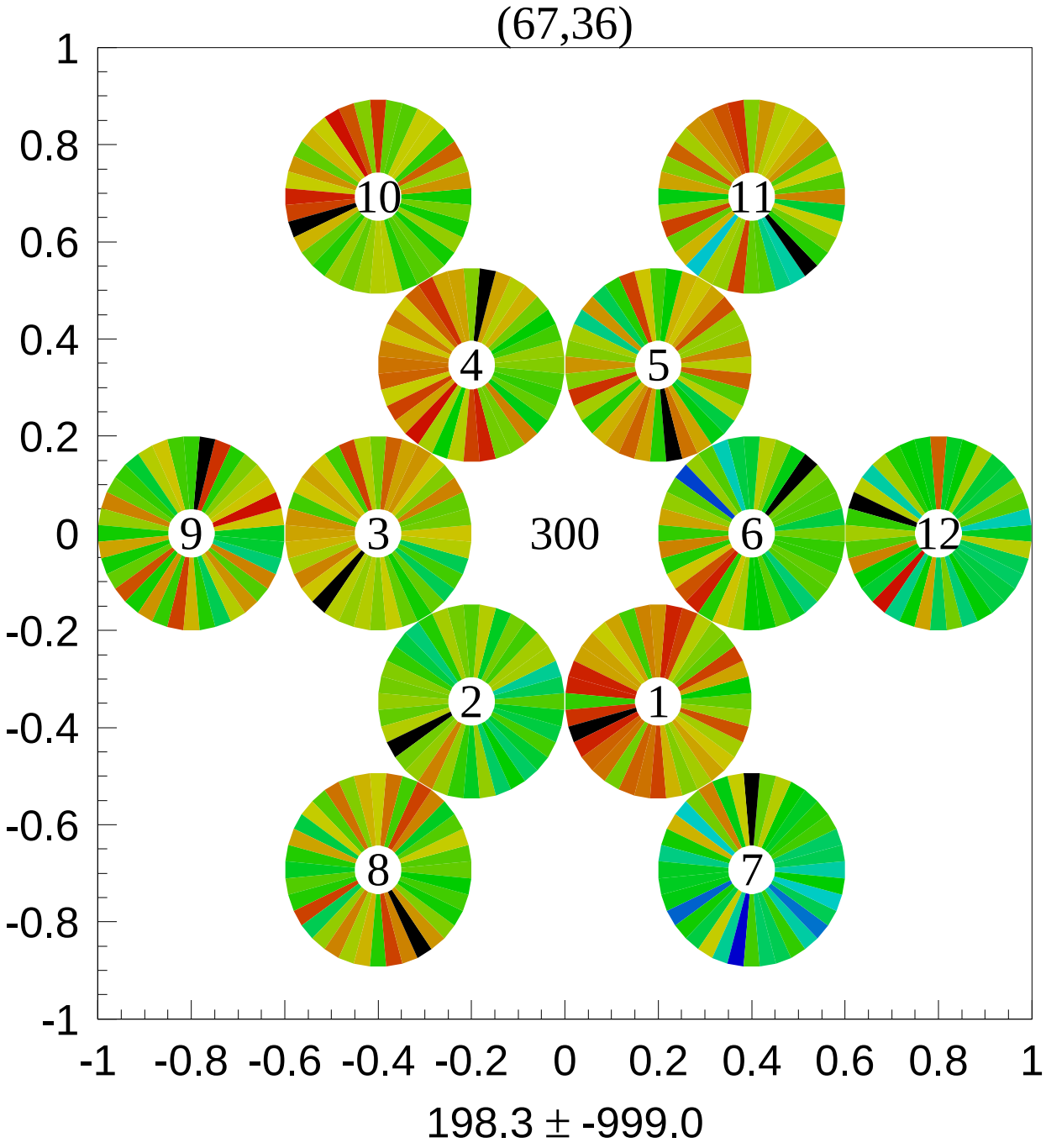

(67,35)
tilted LEDs
124 121 126 125 131 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 122 127 121 132 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

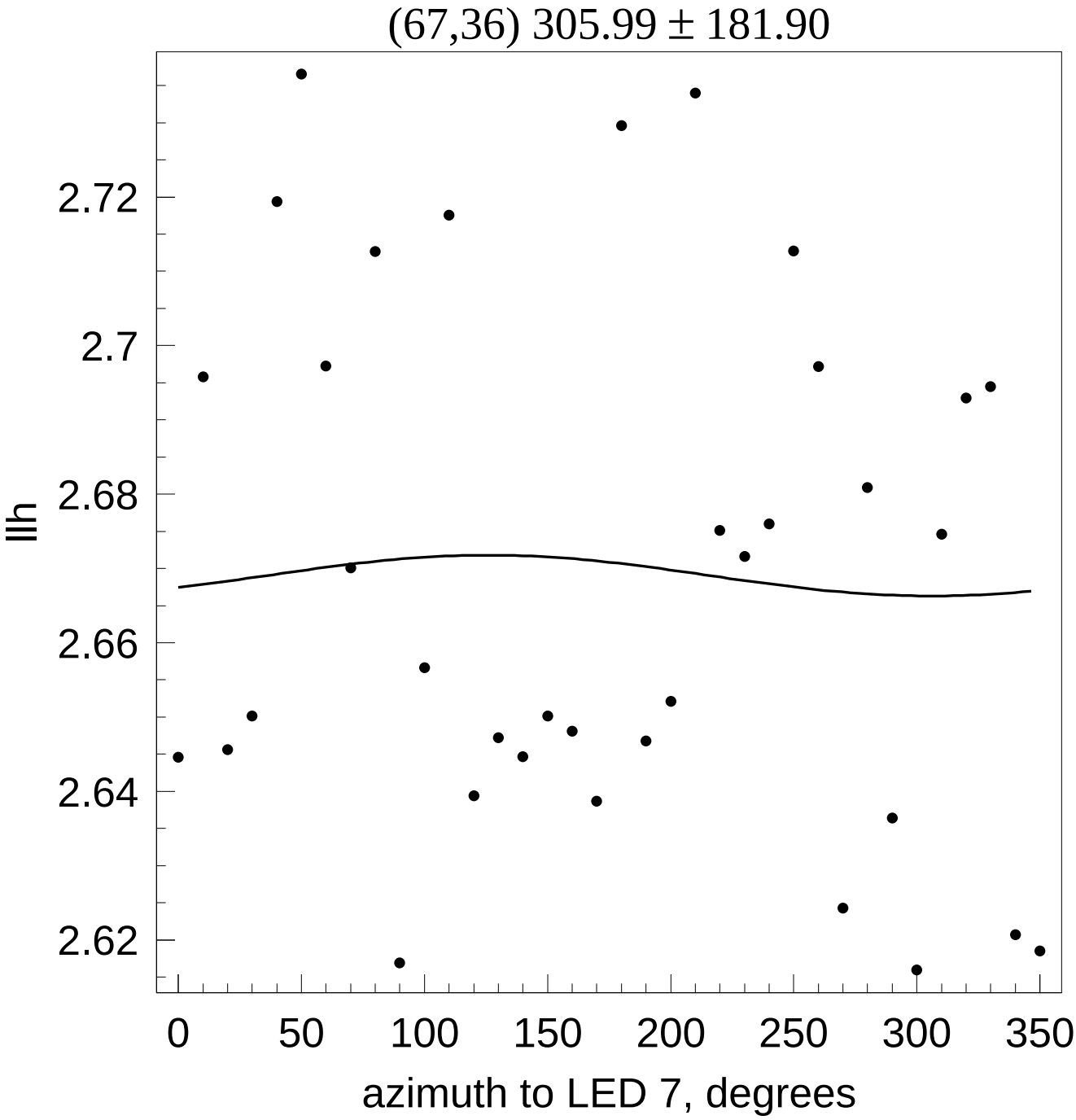

(67,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
1
2
3
4
5
6
7
8
9
10
11
12
130
143.1 ± 30.9

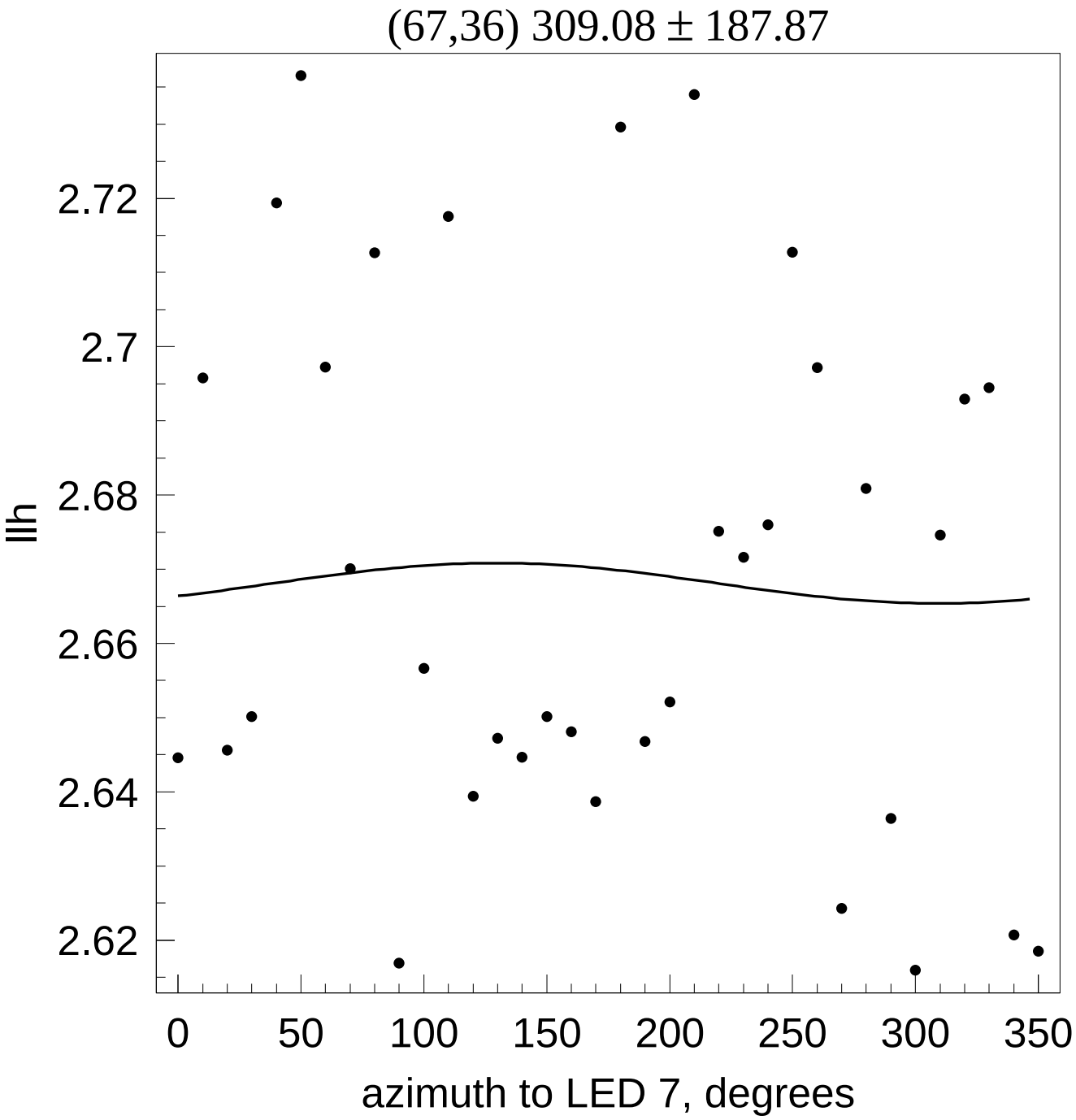

(67,35) 143.39 ± 2.12
3.6
3.5
3.4
3.3
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

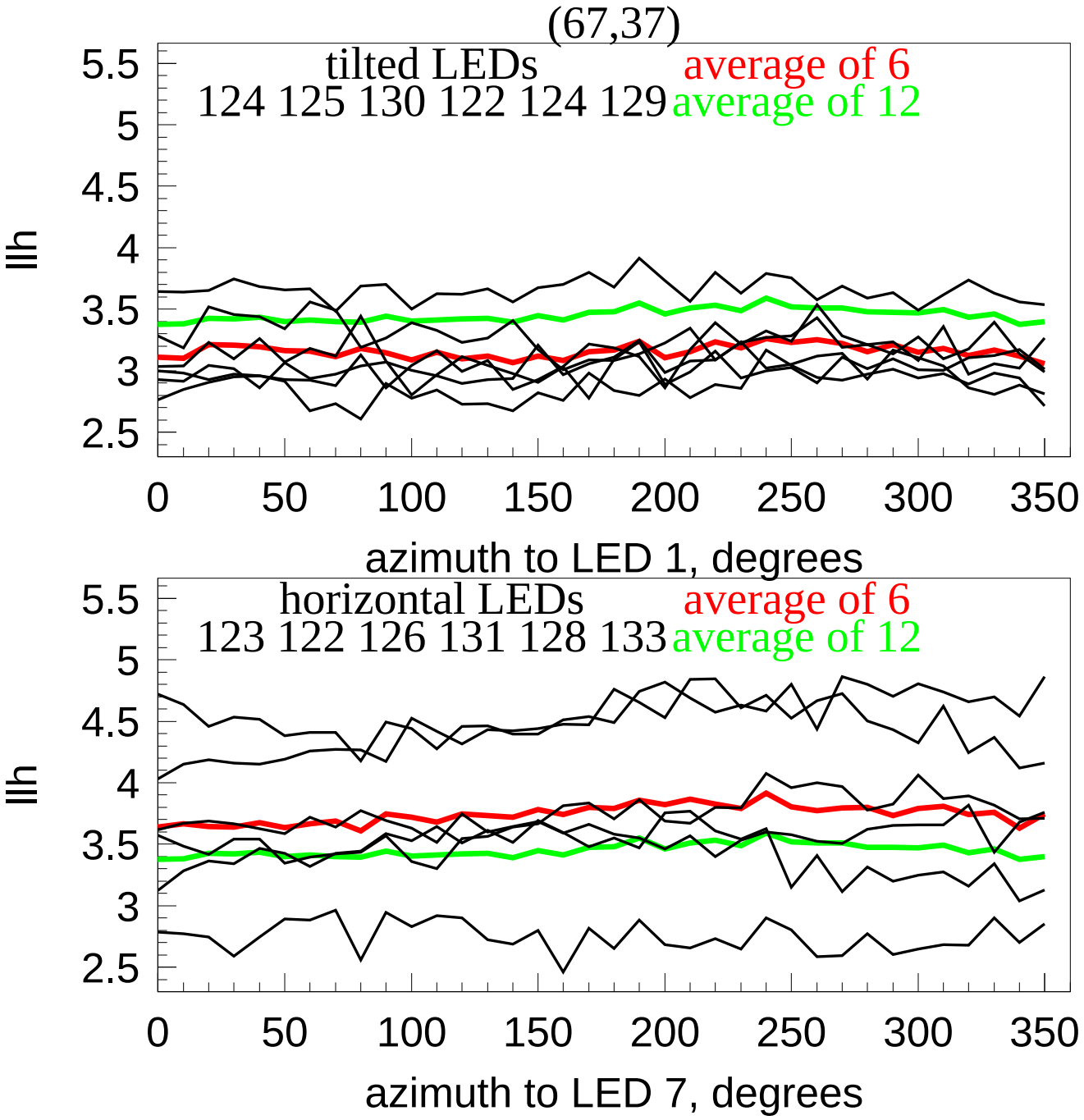

(67,35) 143.56 ± 2.15
3.6
3.5
3.4
3.3
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

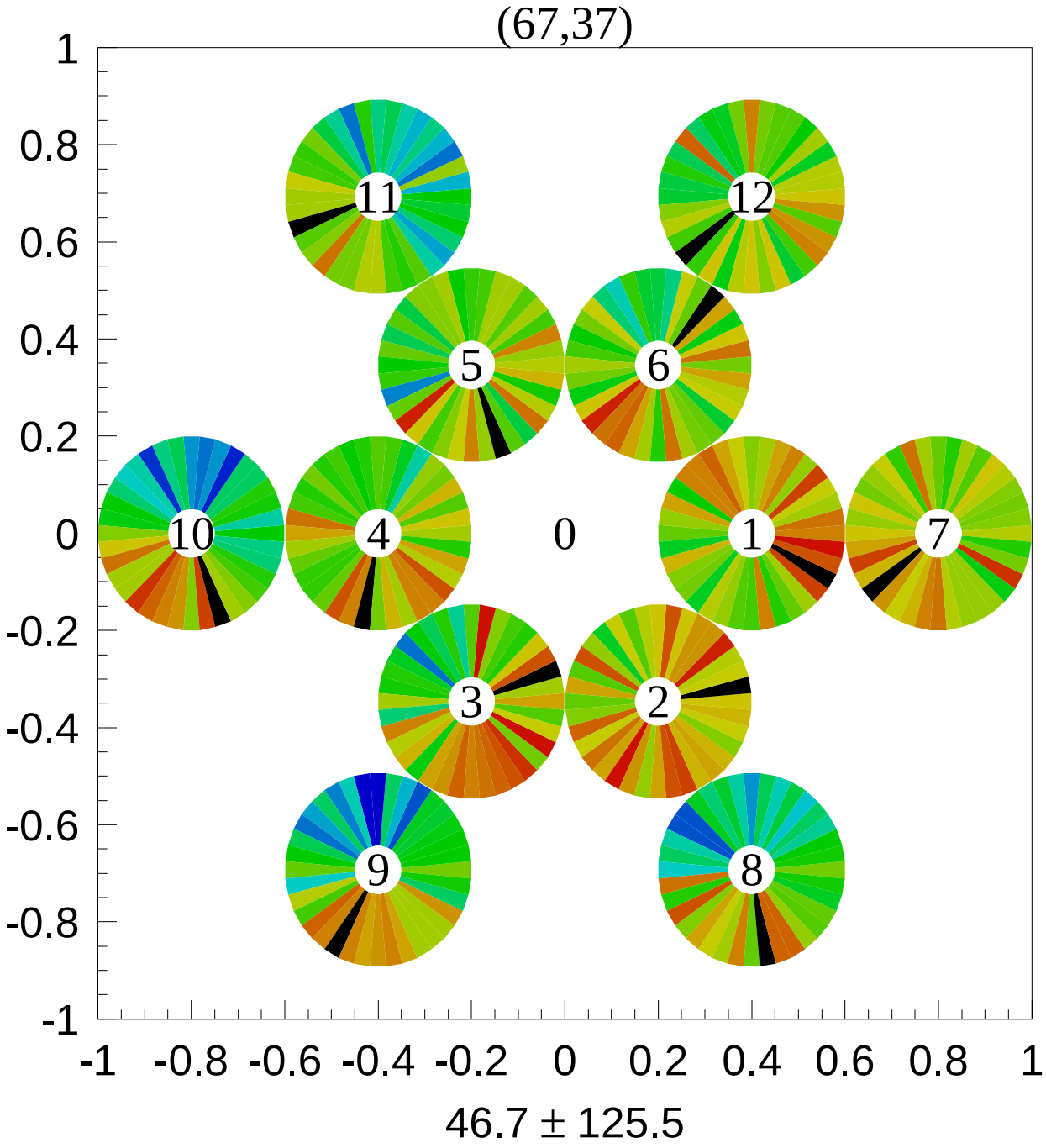

(67,36)
tilted LEDs
124 124 124 130 121 124
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 129 130 127 124 128
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

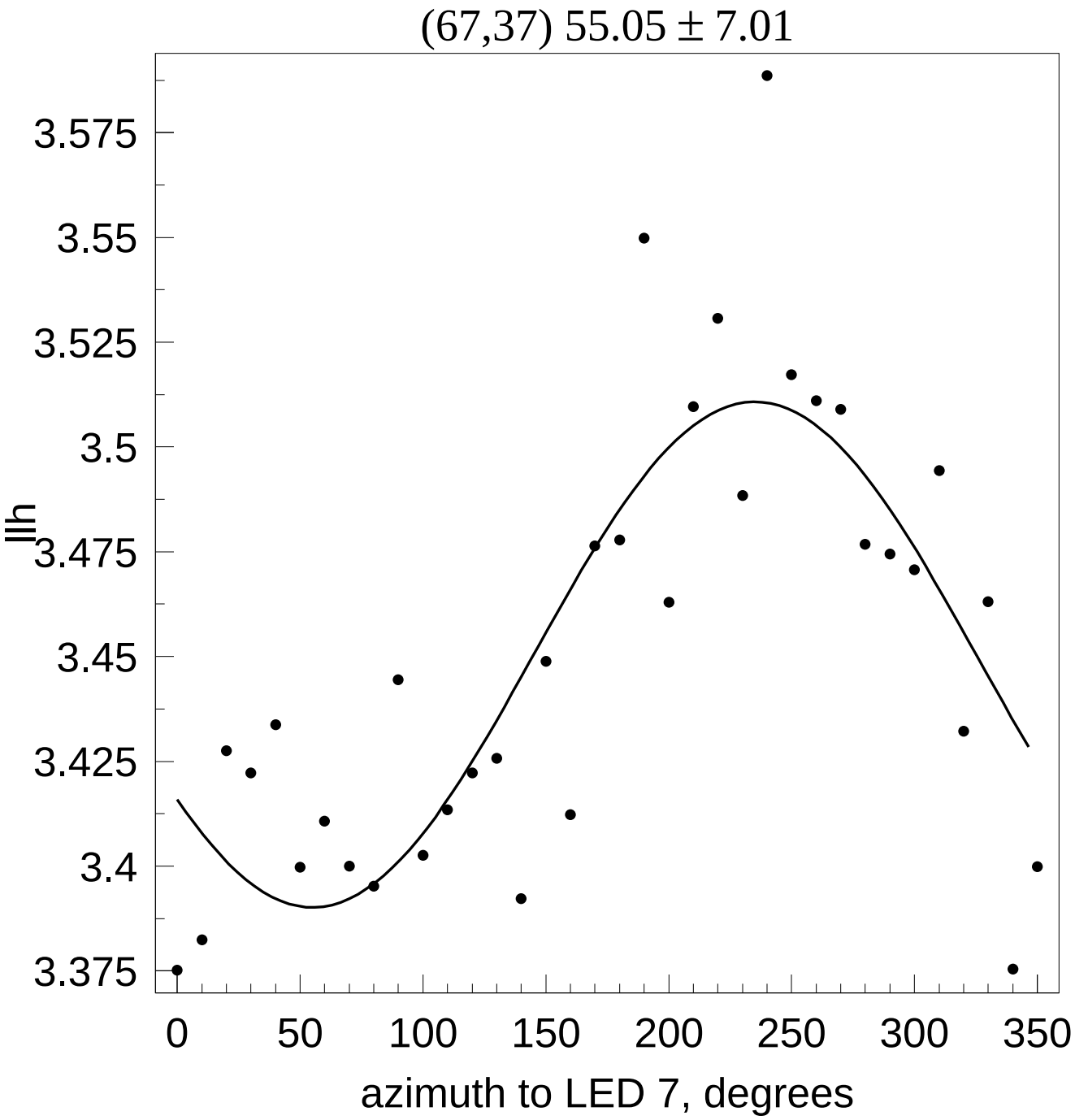

(67,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
198.3 ± -999.0
10
11
4
5
9
3
300
6
12
2
1
8
7

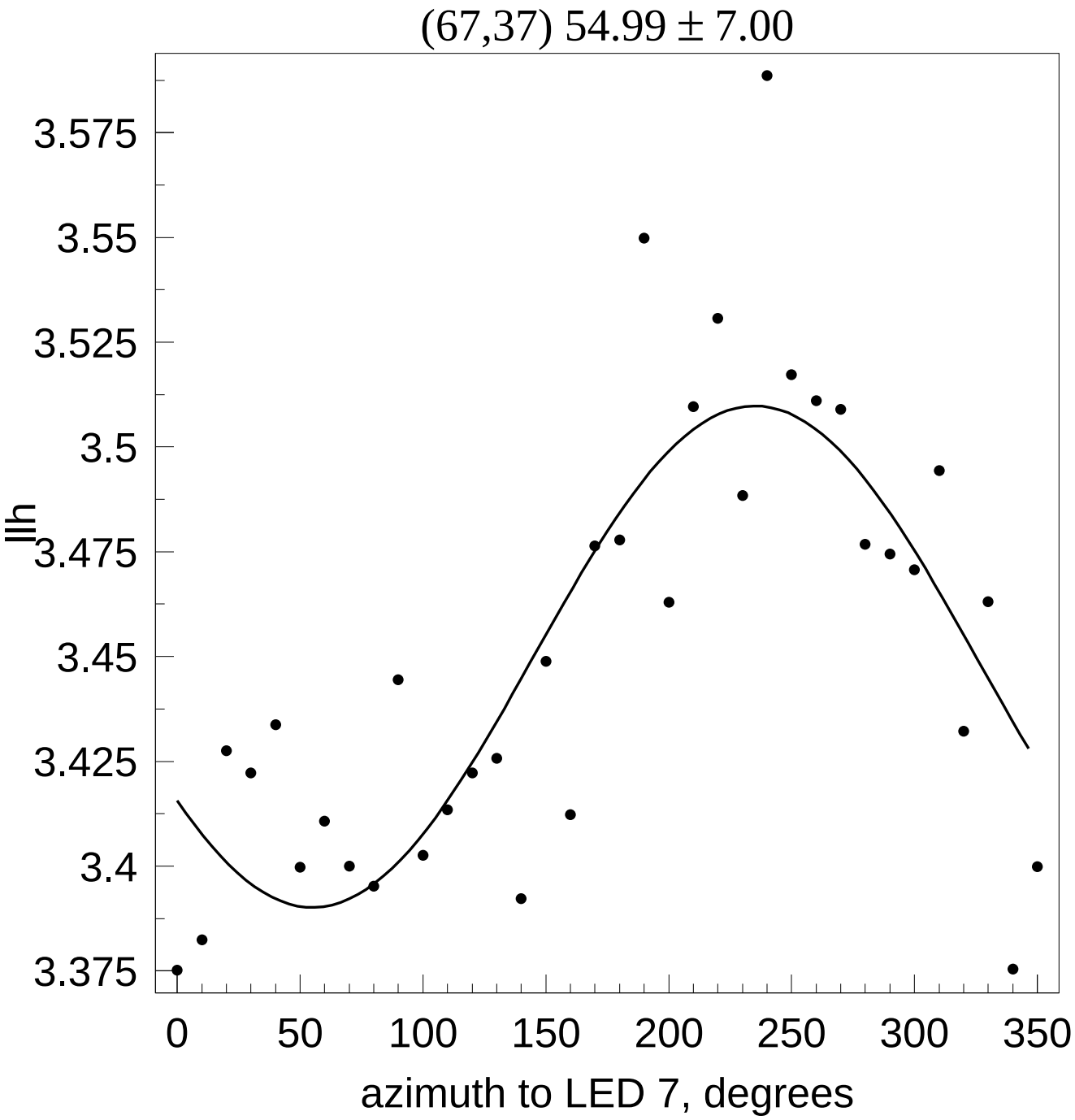

(67,36) 305.99 ± 181.90
2.72
2.7
2.68
2.66
2.64
2.62
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

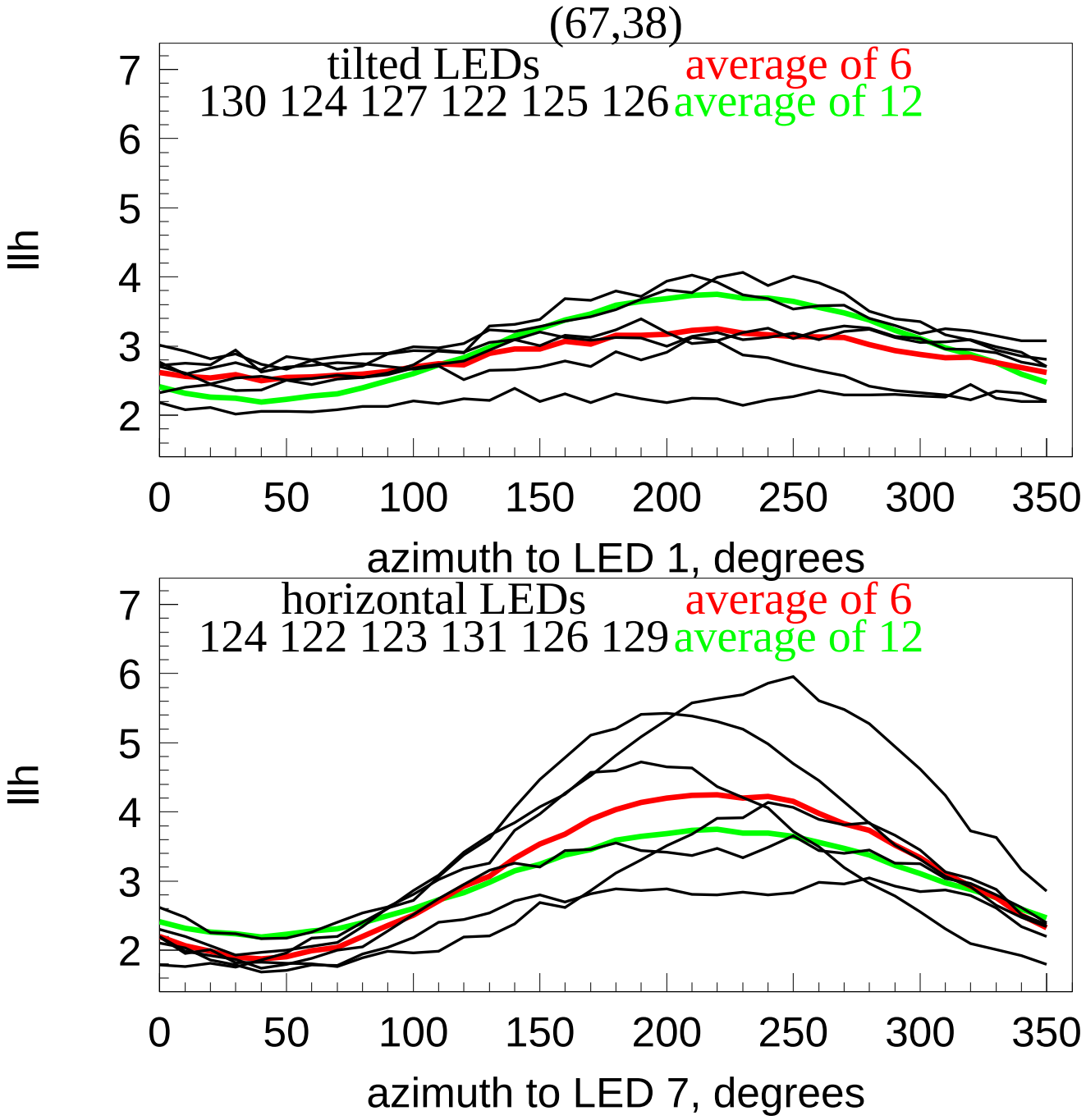

(67,36) 309.08 ± 187.87
2.72
2.7
2.68
2.66
2.64
2.62
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

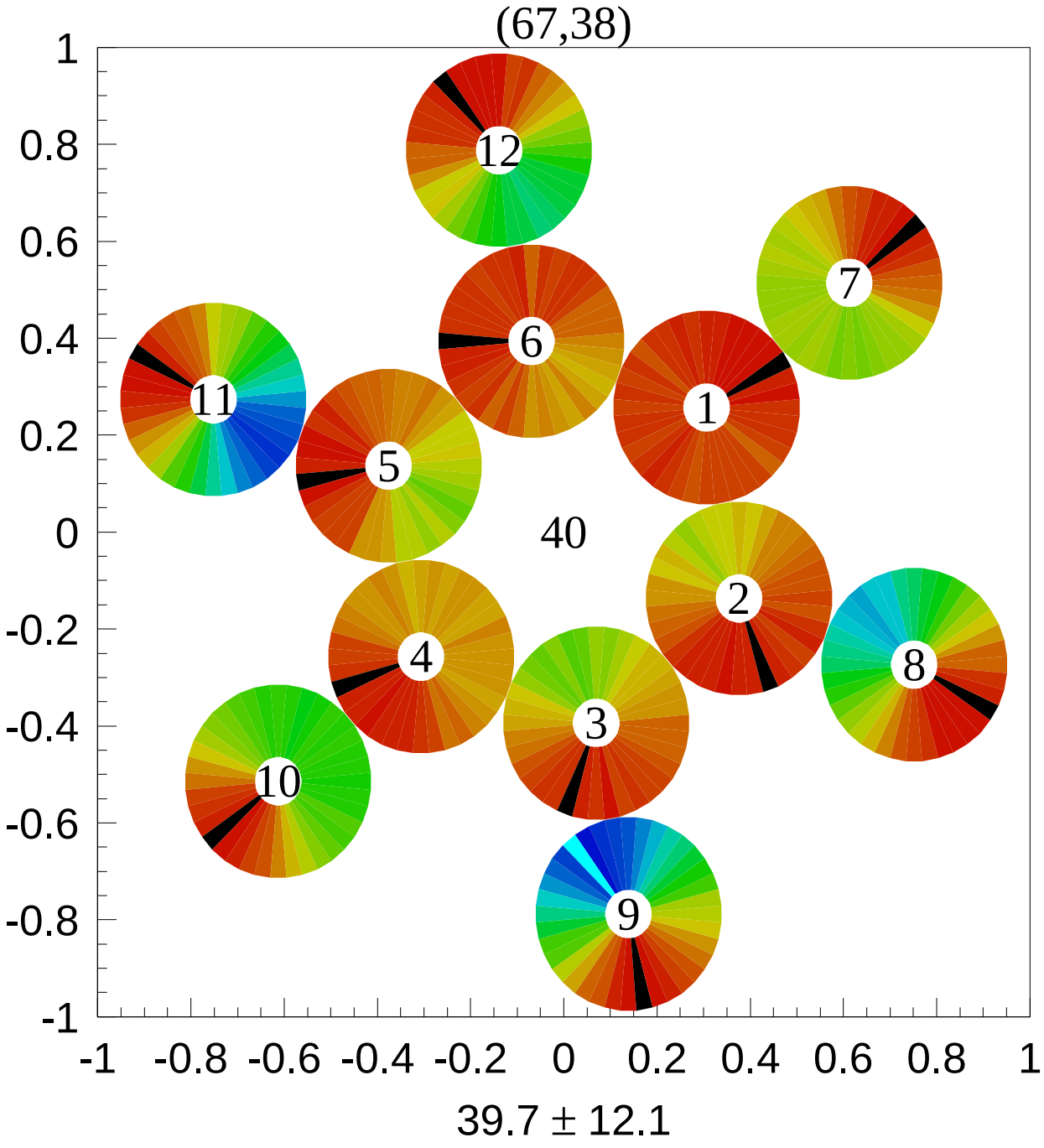

(67,37)
tilted LEDs
124 125 130 122 124 129
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 122 126 131 128 133
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

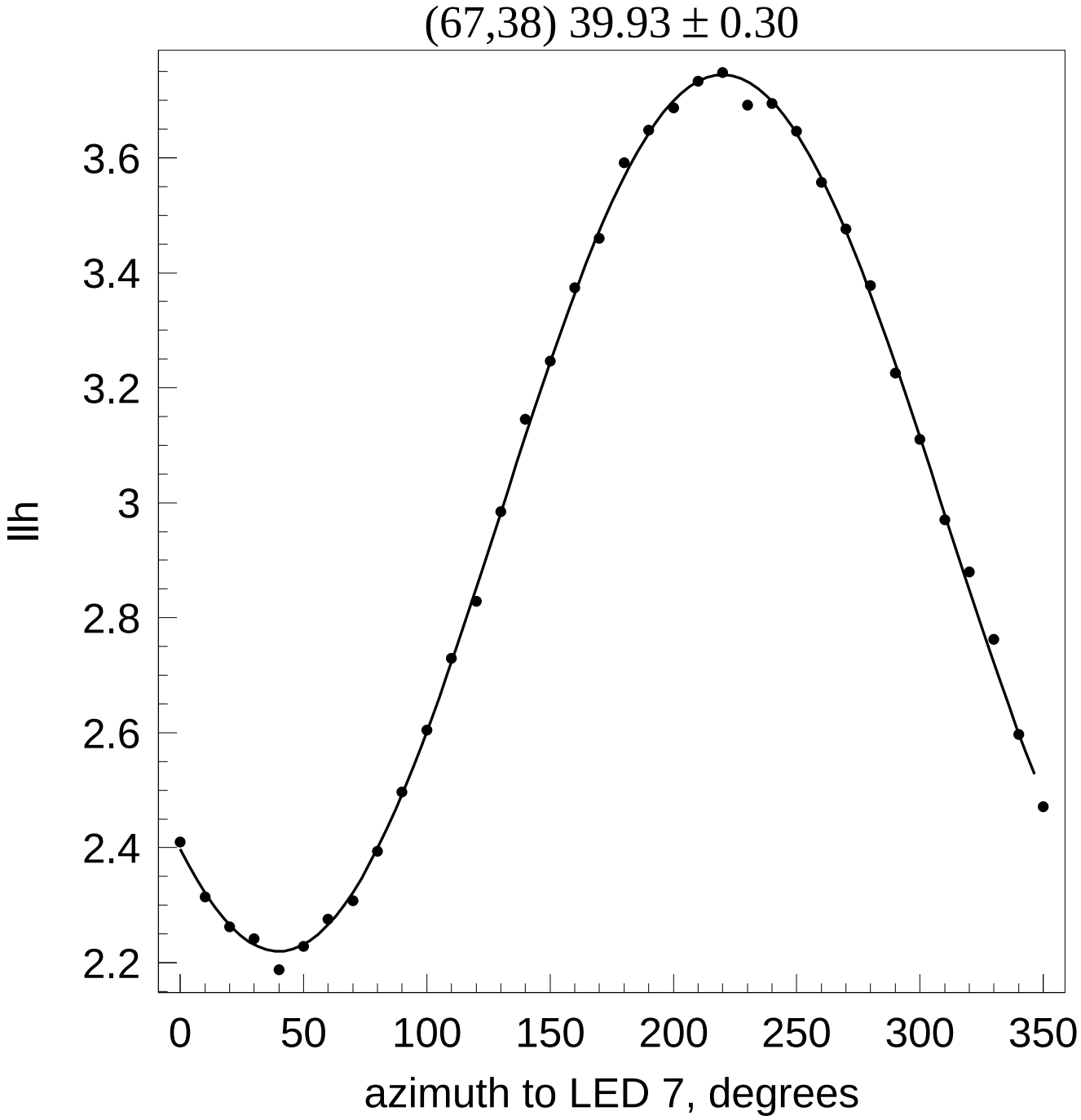

(67,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
46.7 ± 125.5

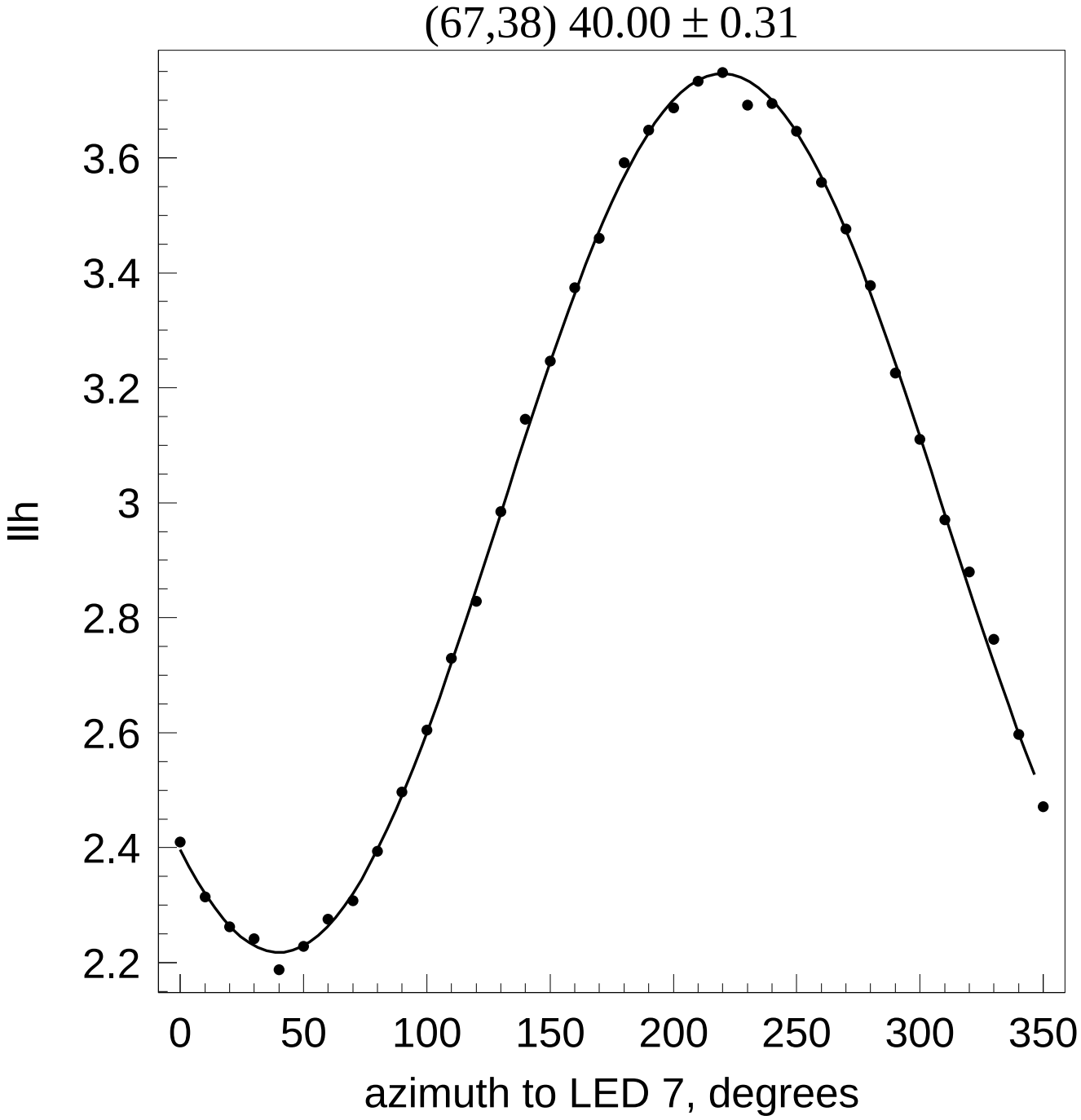

(67,37) 55.05 ± 7.01
3.575
3.55
3.525
3.5
3.475
3.45
3.425
3.4
3.375
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

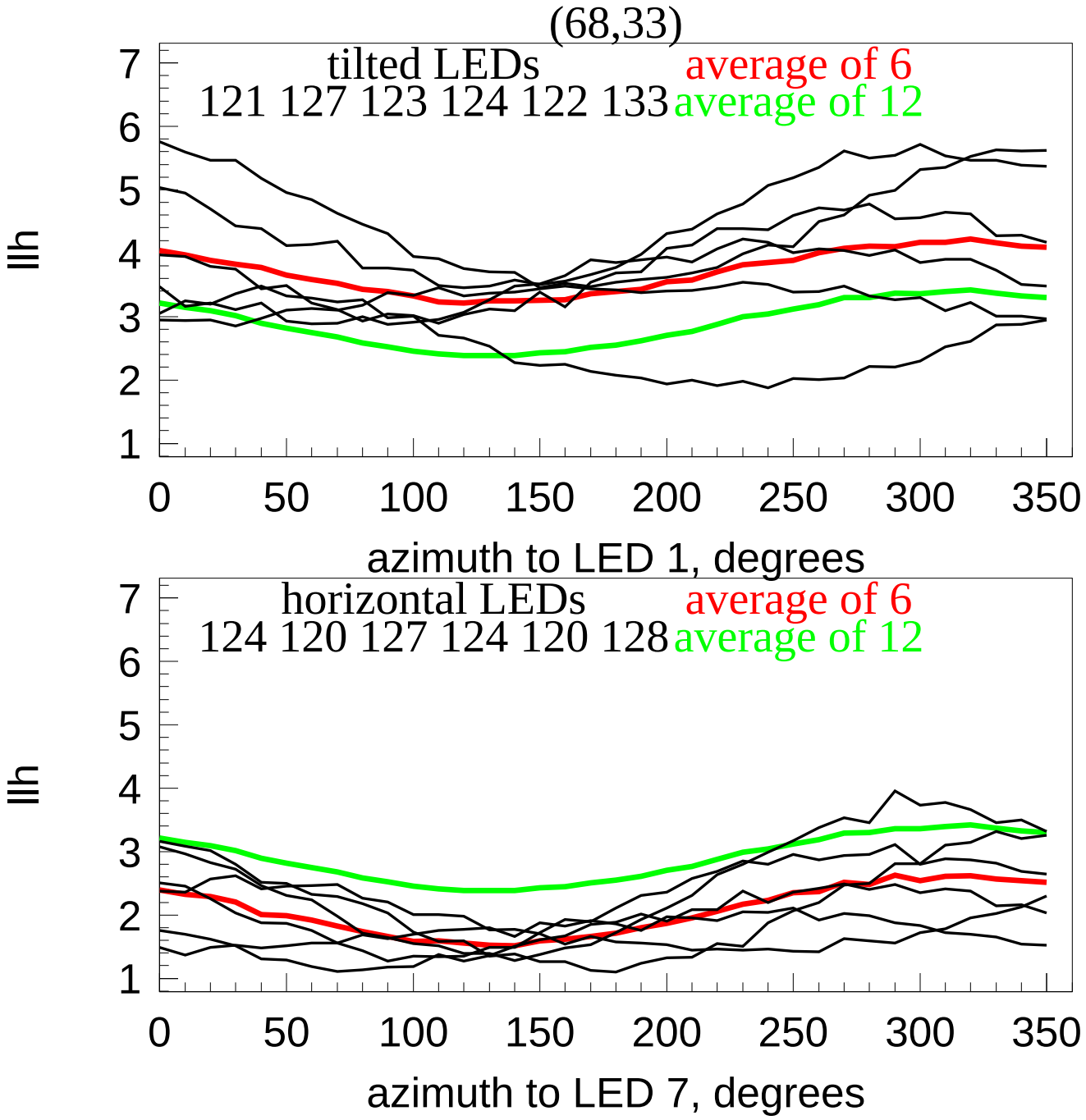

(67,37) 54.99 ± 7.00
3.575
3.55
3.525
3.5
3.475
3.45
3.425
3.4
3.375
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

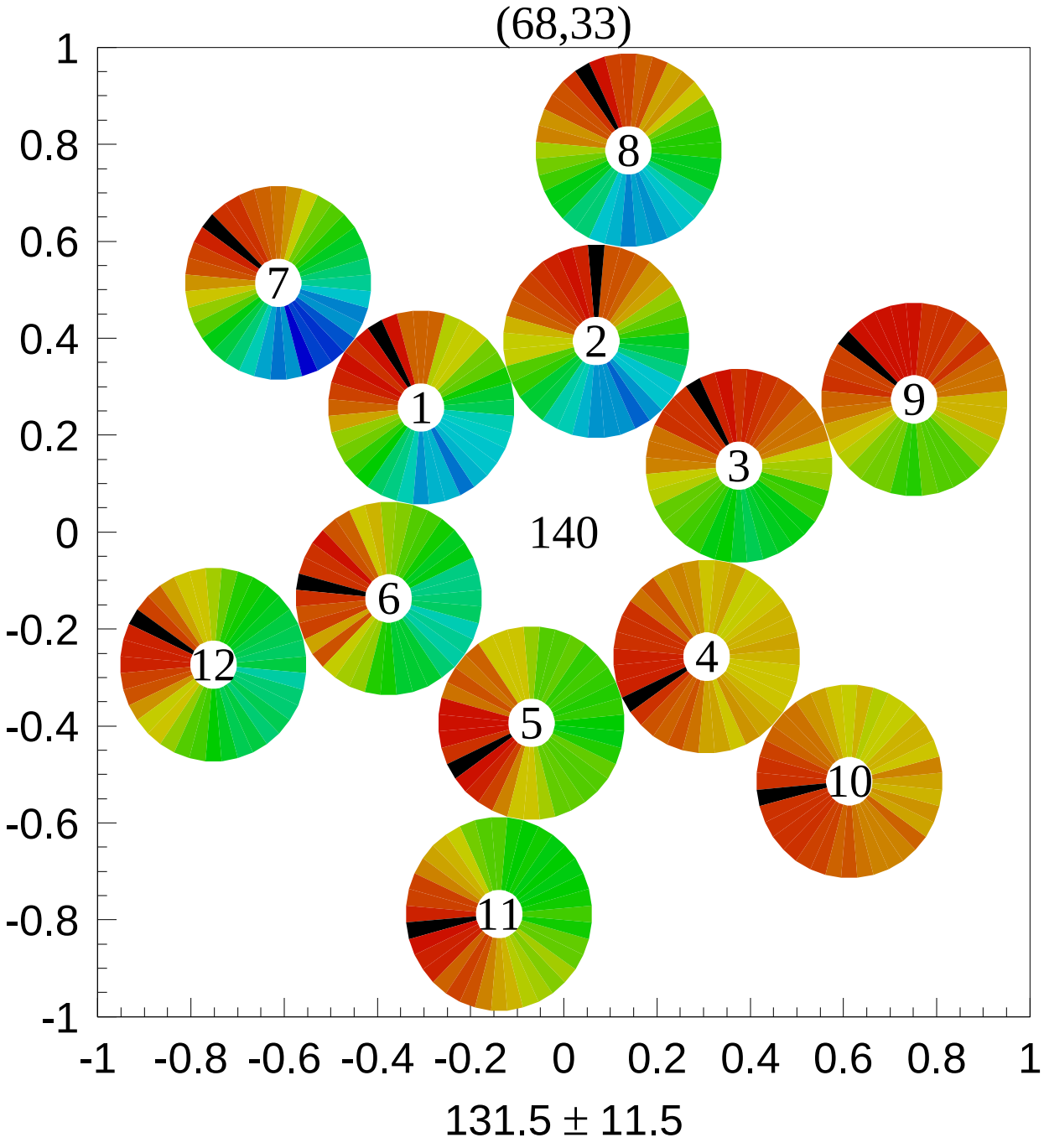

(67,38)
tilted LEDs
130 124 127 122 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 122 123 131 126 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

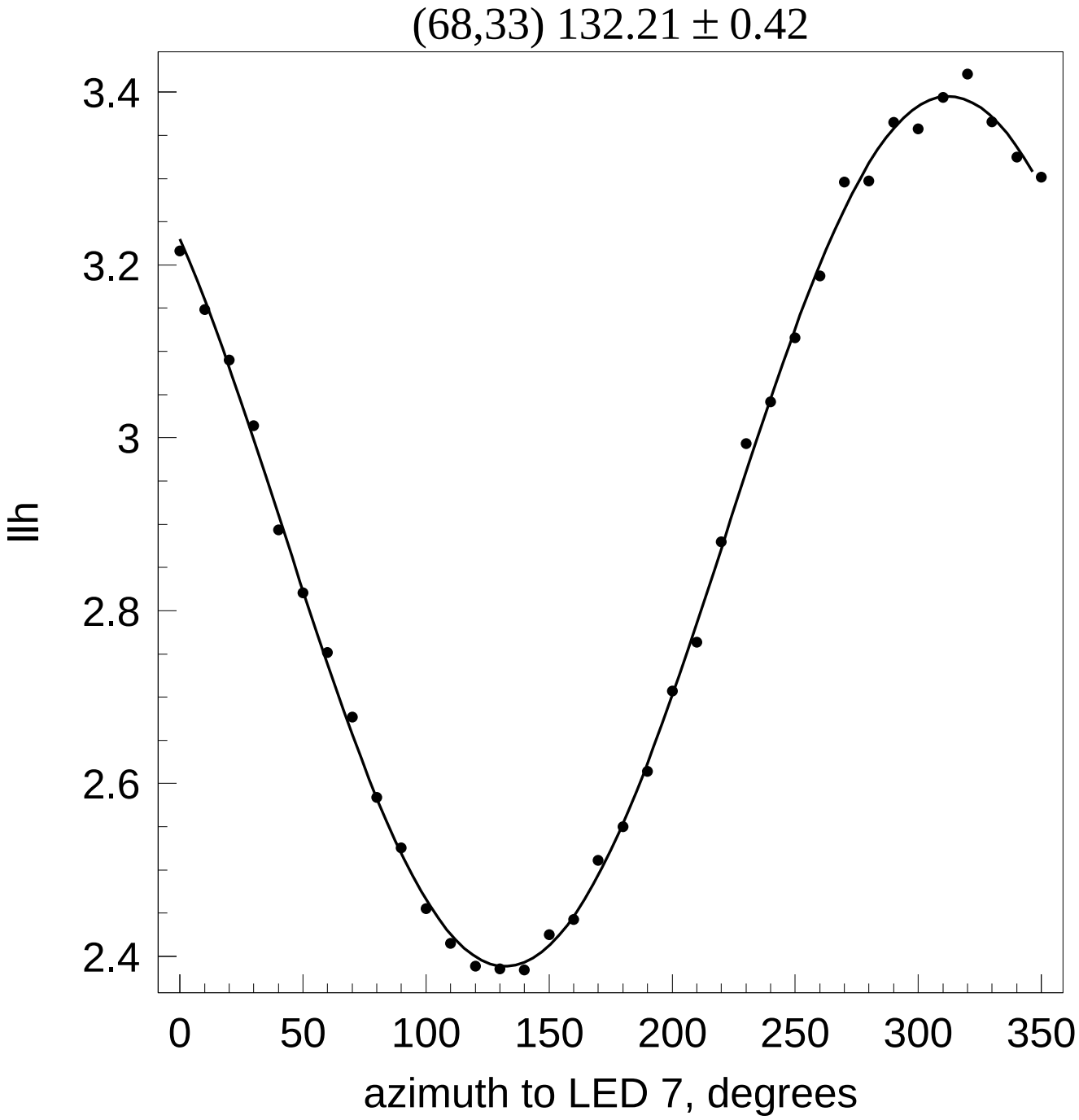

(67,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
11
1
5
40
2
8
4
3
10
9
39.7 ± 12.1

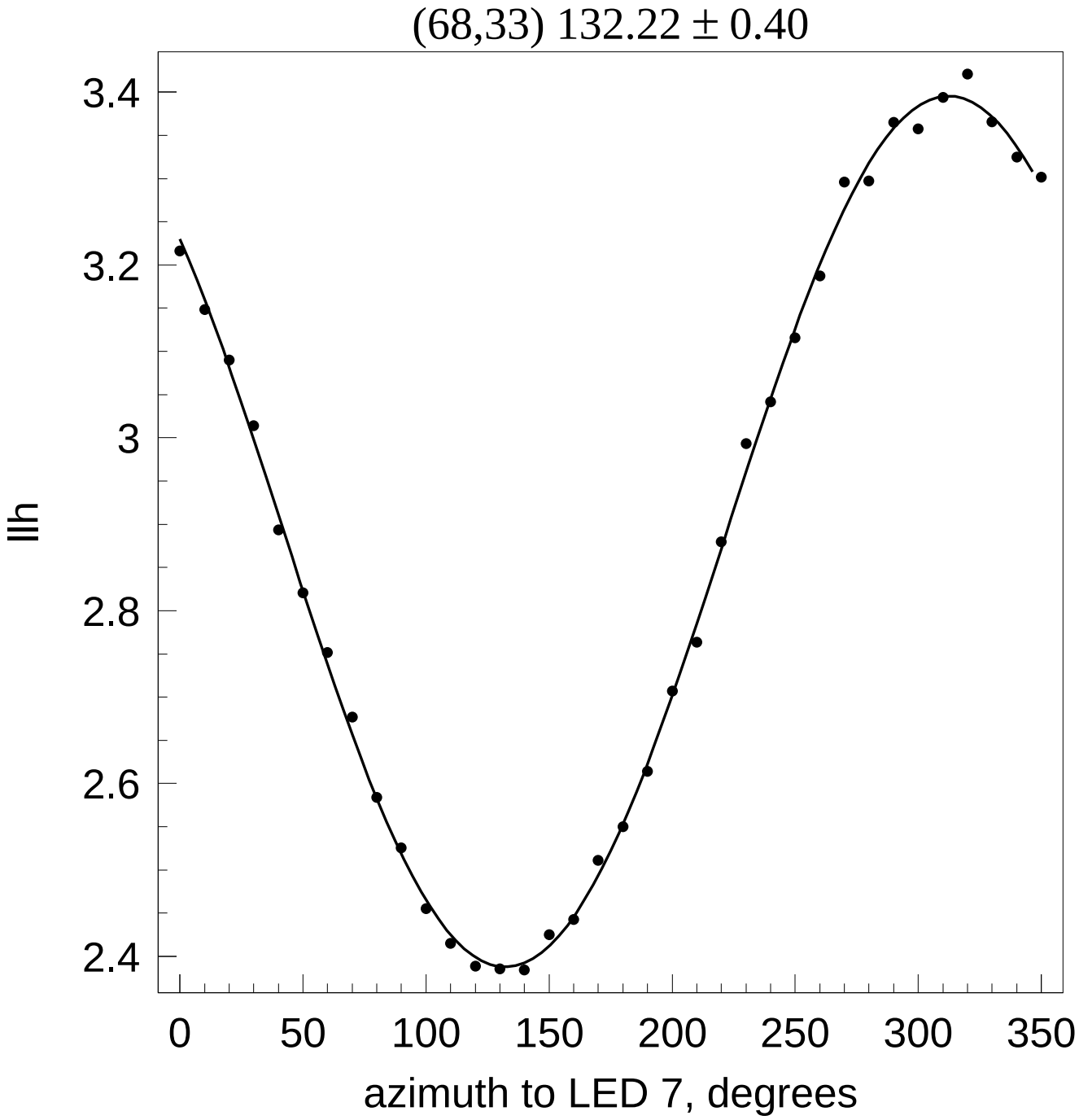

(67,38) 39.93 ± 0.30
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

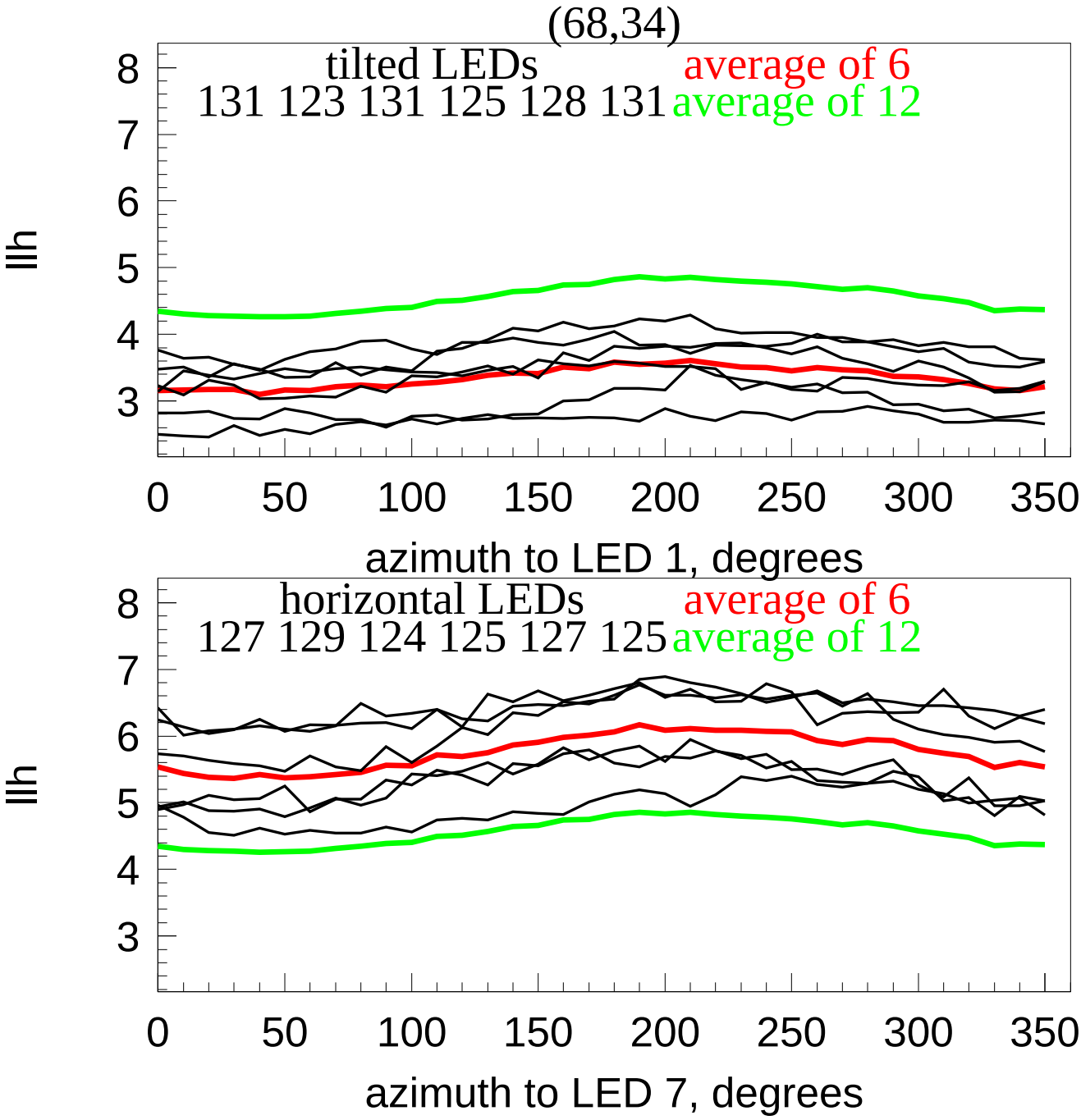

(67,38) 40.00 ± 0.31
llh
3.6
3.4
3.2
3
2.8
2.6
2.4
2.2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

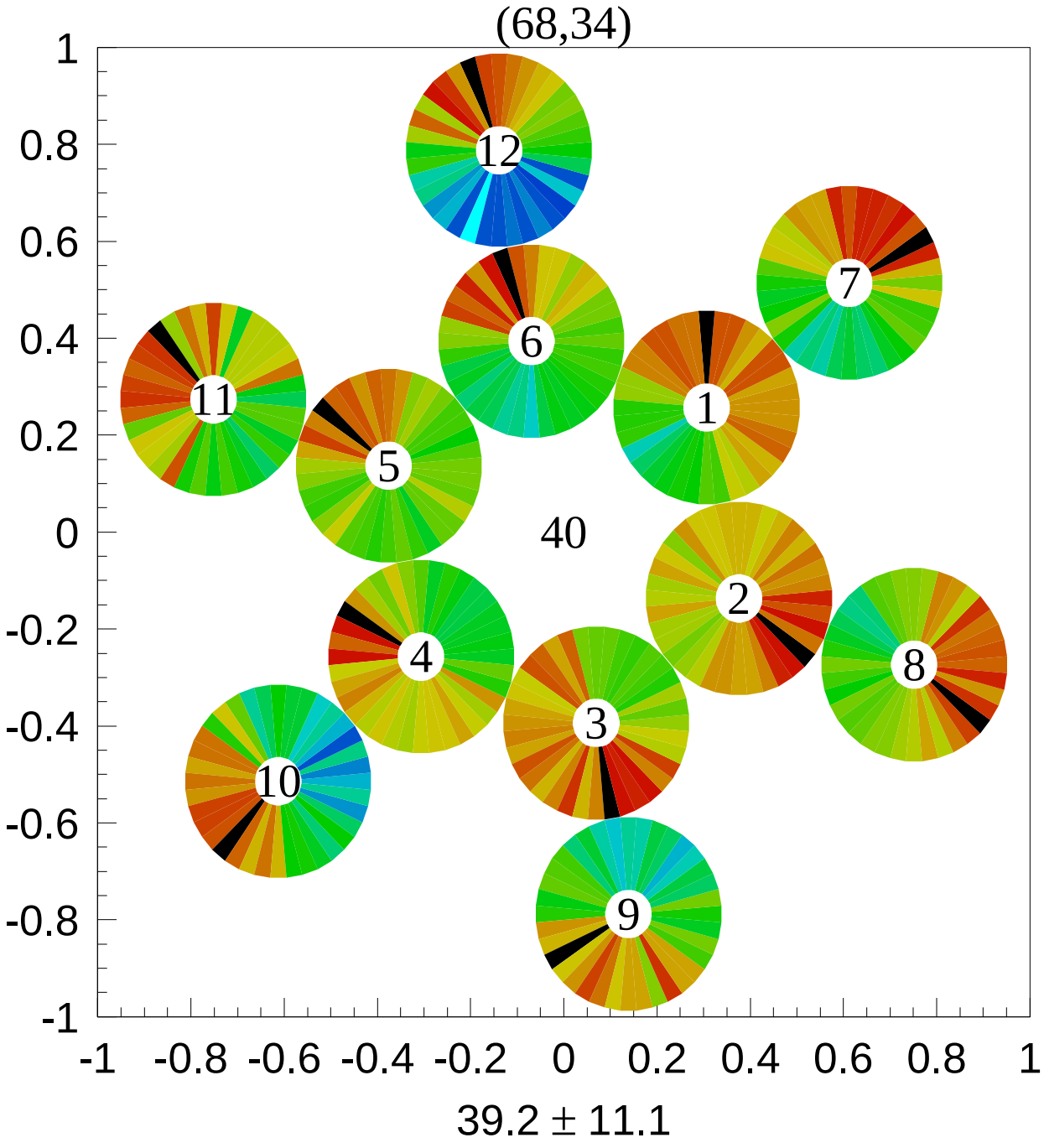

(68,33)
tilted LEDs
121 127 123 124 122 133
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 120 127 124 120 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

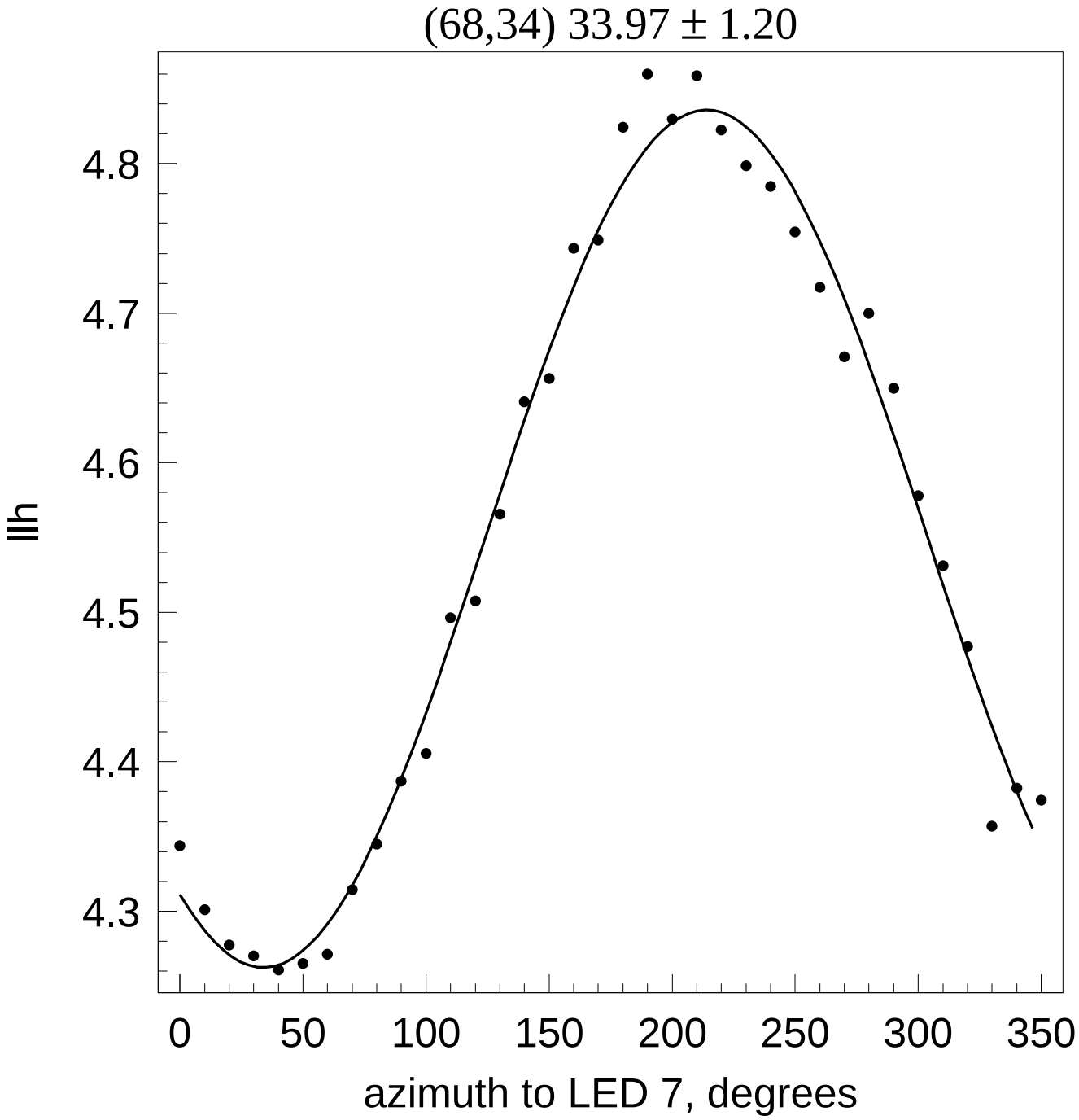

(68,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
131.5 ± 11.5
140
1
2
3
4
5
6
7
8
9
10
11
12

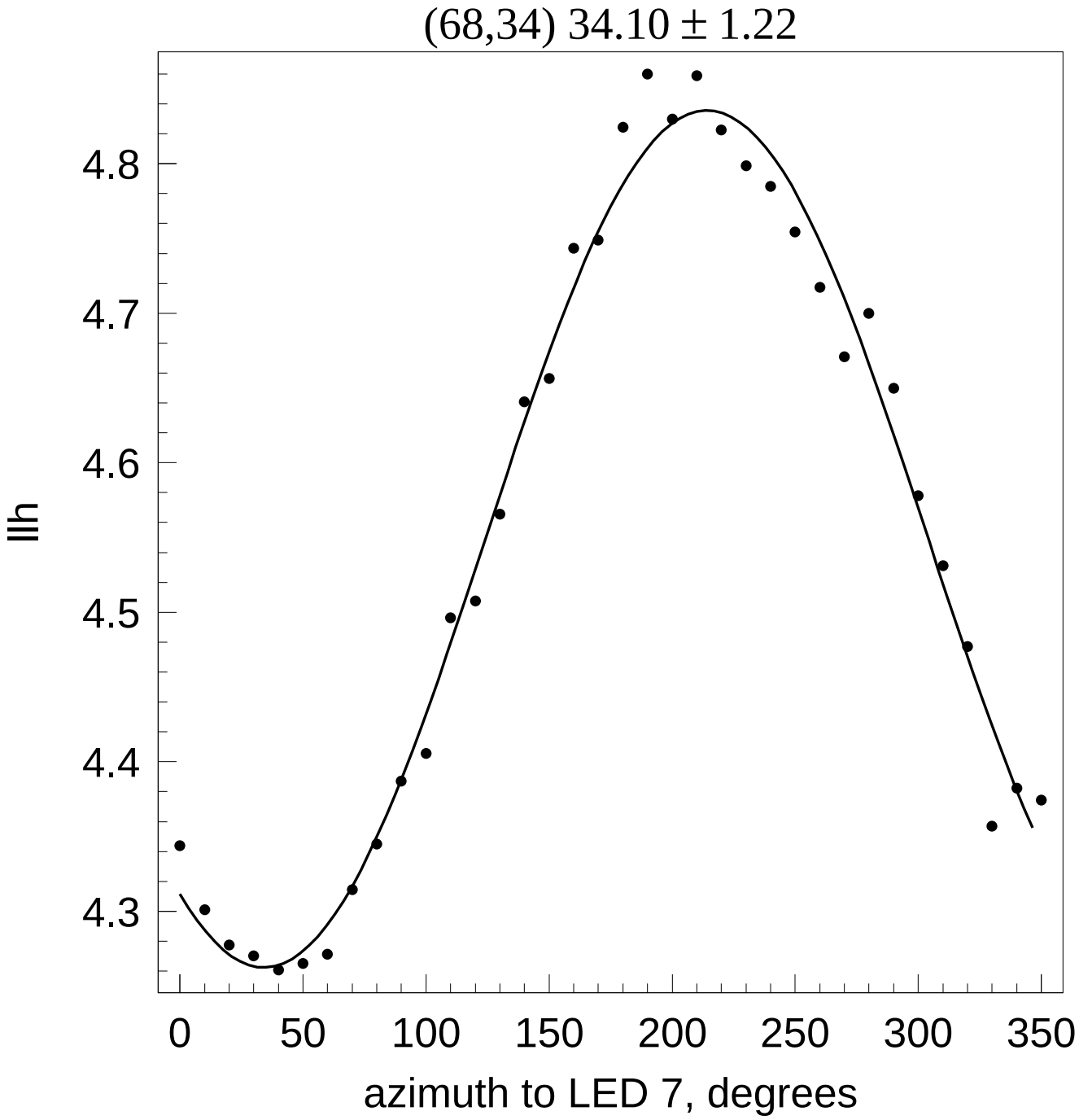

(68,33) 132.21 ± 0.42
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

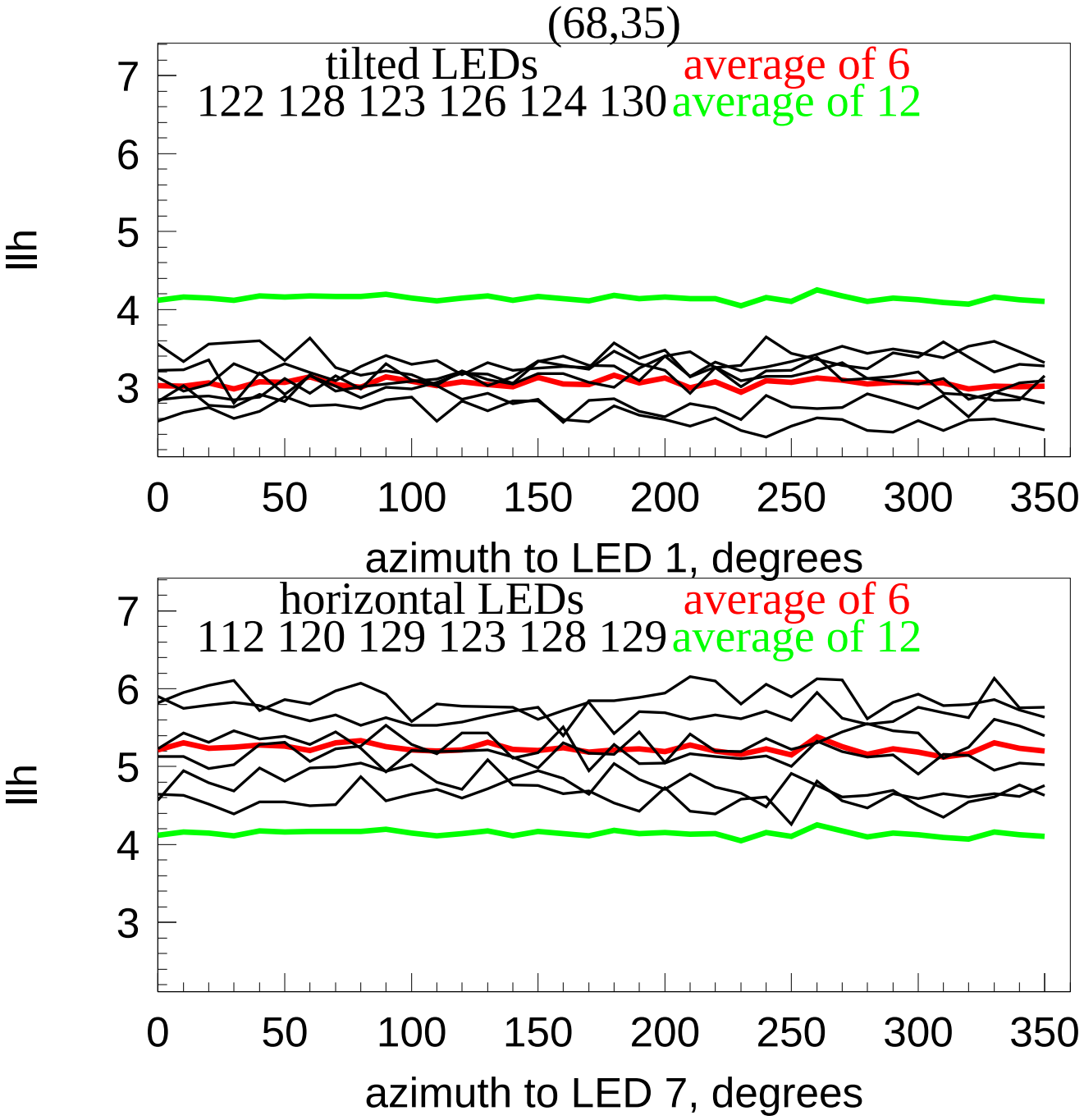

(68,33) 132.22 ± 0.40
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

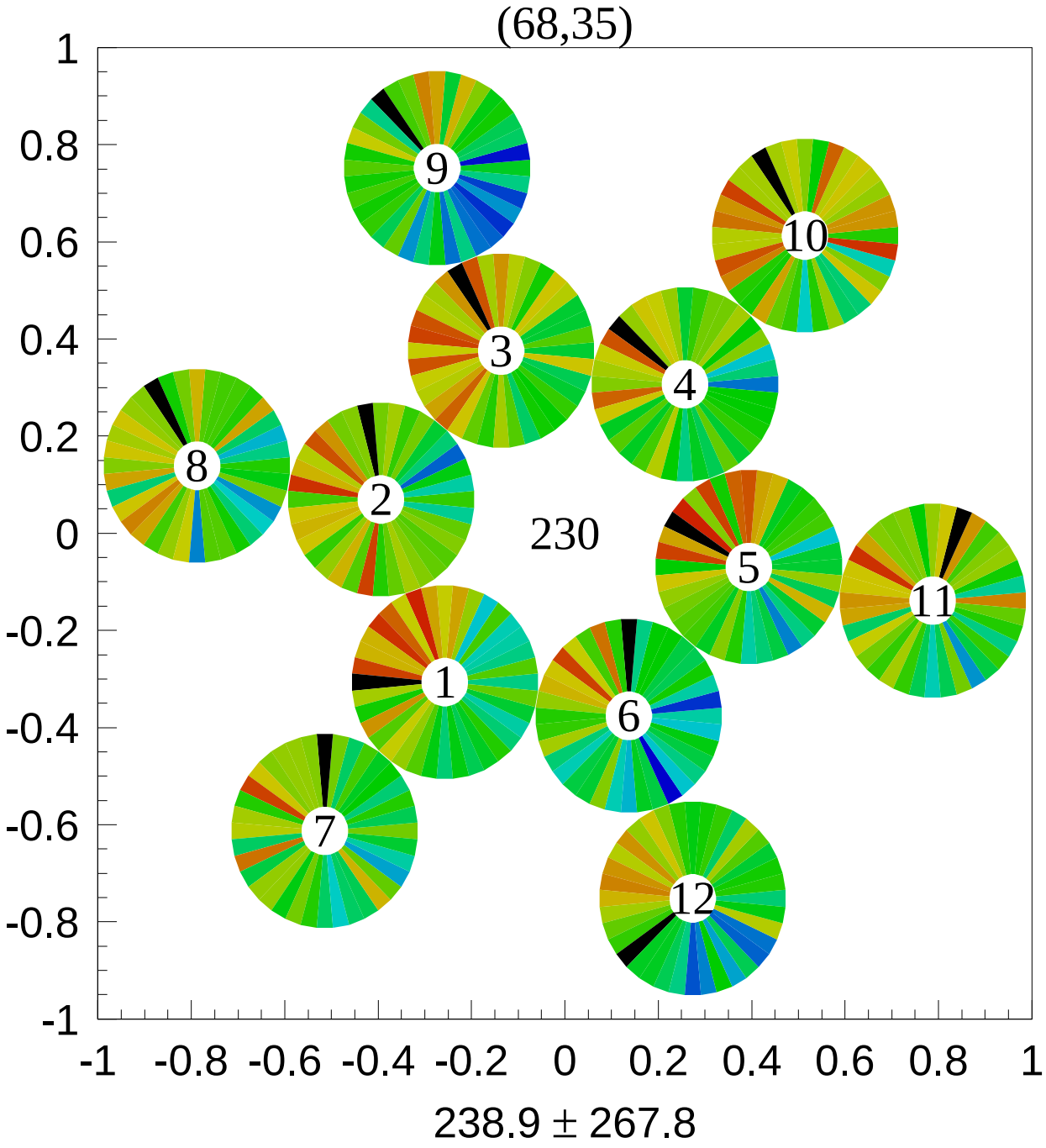

(68,34)
tilted LEDs
131 123 131 125 128 131
average of 6
average of 12
llh
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 129 124 125 127 125
average of 6
average of 12
llh
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

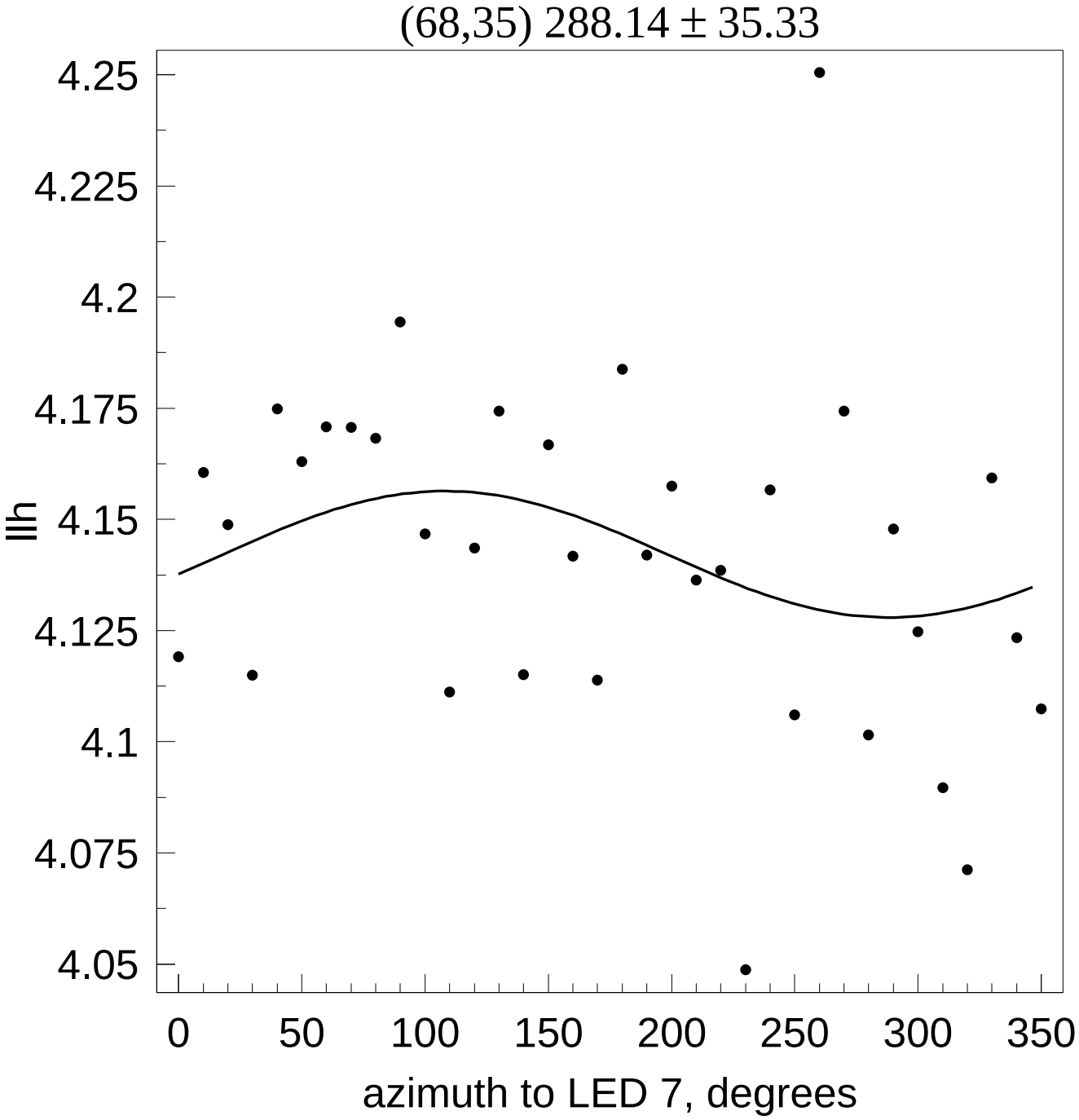

(68,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
11
1
5
40
2
8
4
3
10
9
39.2 ± 11.1

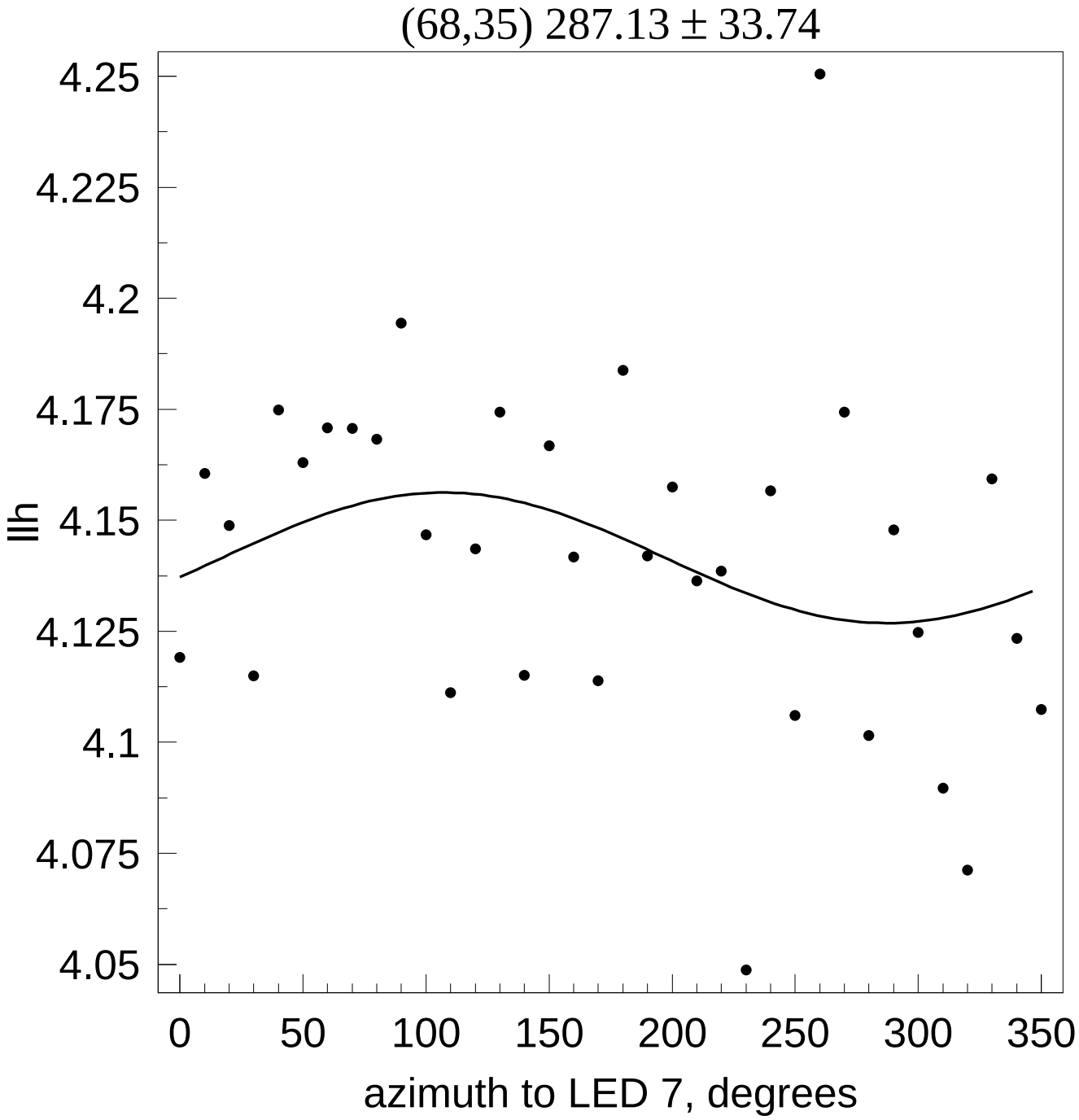

(68,34) 33.97 ± 1.20
4.8
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

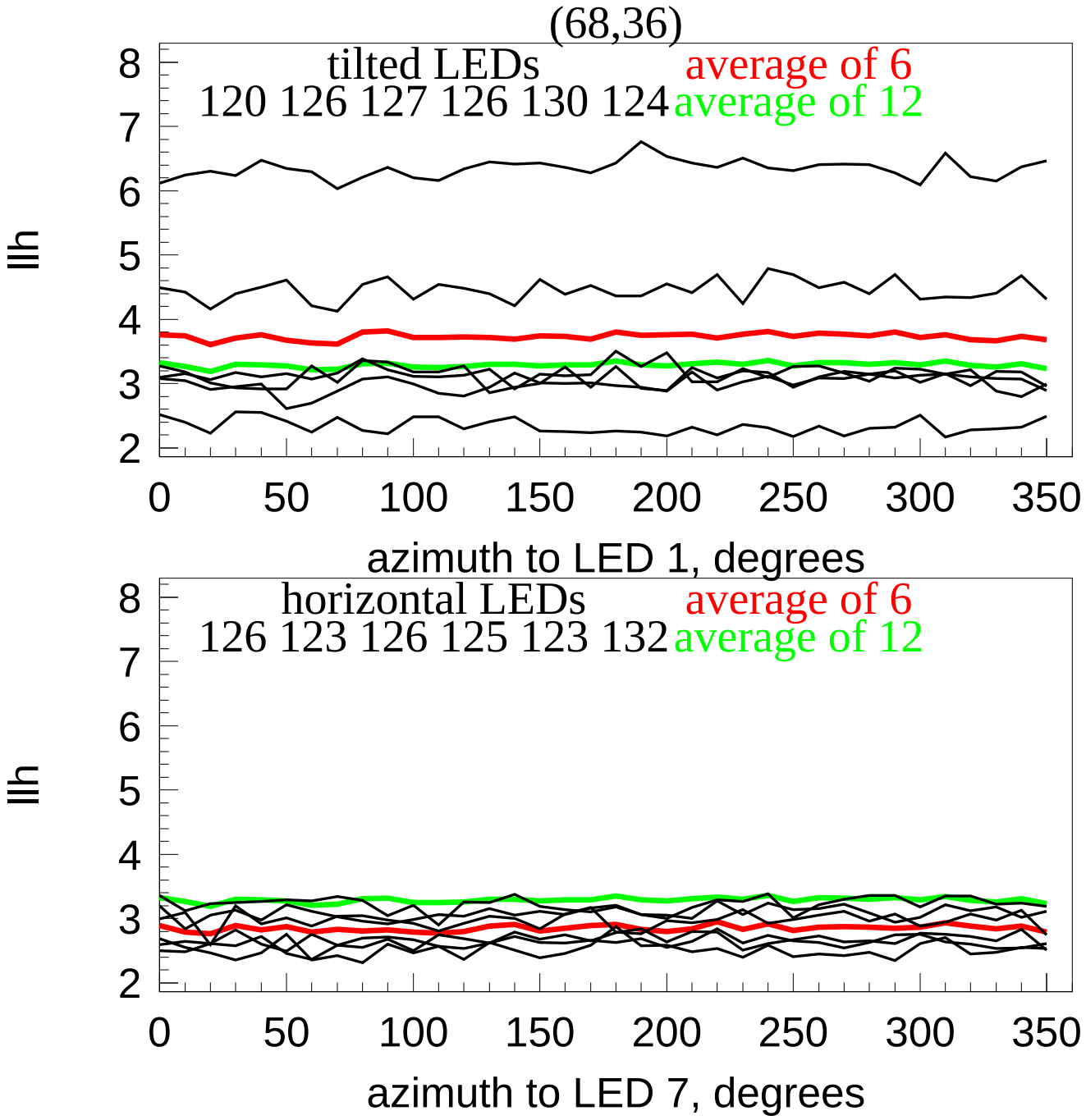

(68,34) 34.10 ± 1.22
4.8
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

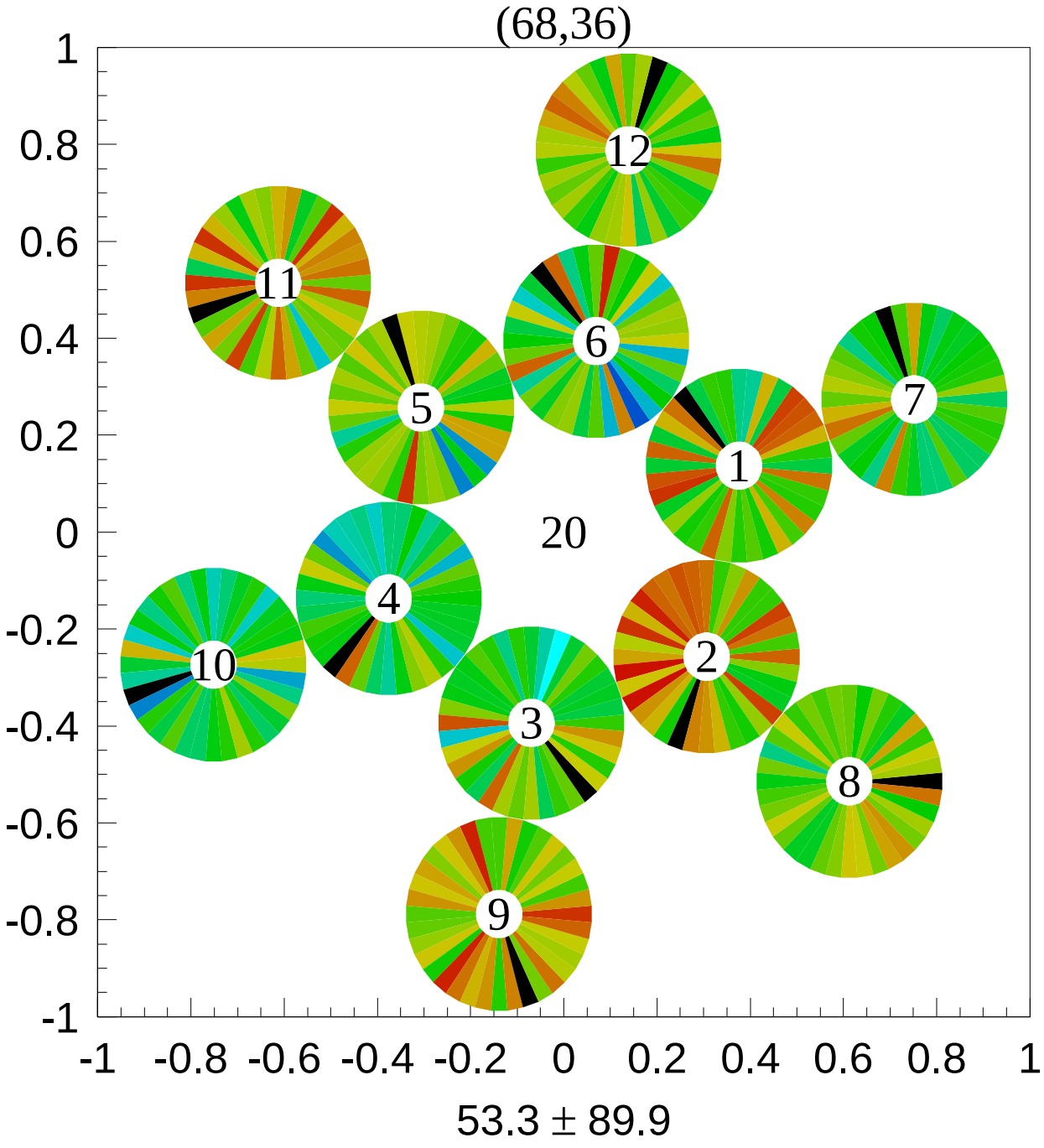

(68,35)
tilted LEDs
122 128 123 126 124 130
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
112 120 129 123 128 129
average of 6
average of 12
llh
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

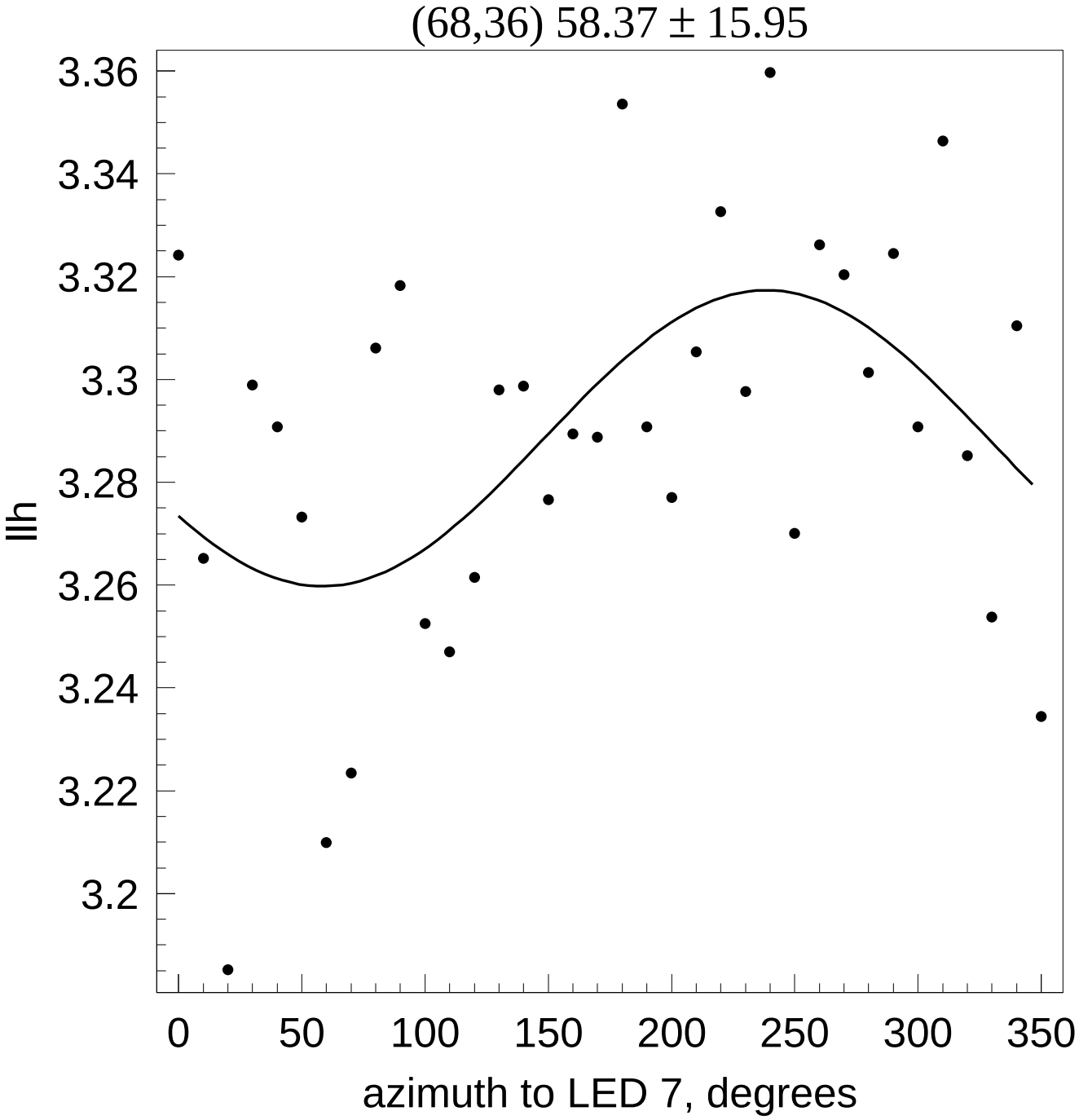

(68,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
238.9 ± 267.8

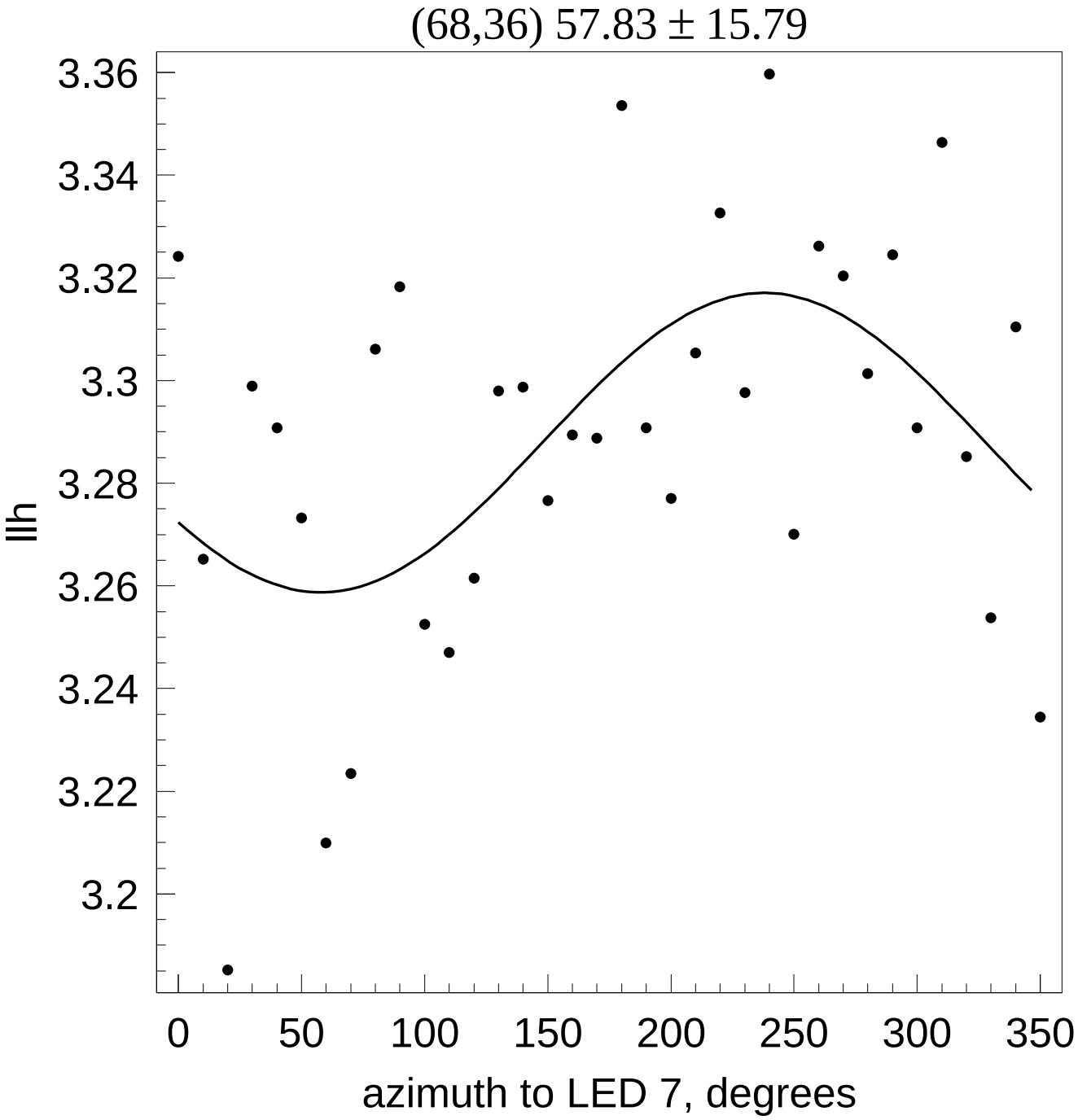

(68,35) 288.14 ± 35.33
4.25
4.225
4.2
4.175
4.15
4.125
4.1
4.075
4.05
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

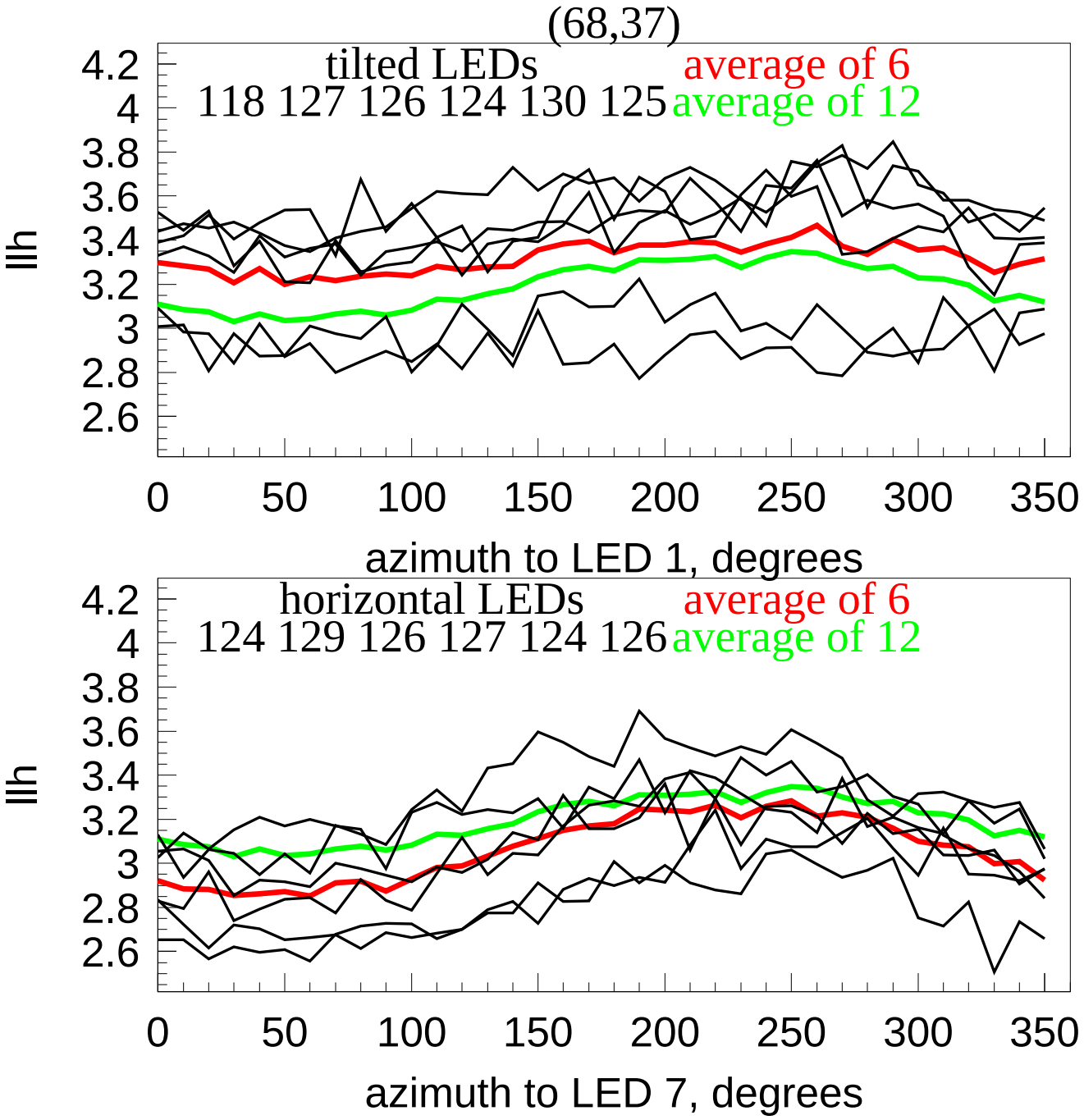

(68,35) 287.13 ± 33.74
4.25
4.225
4.2
4.175
4.15
4.125
4.1
4.075
4.05
ln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

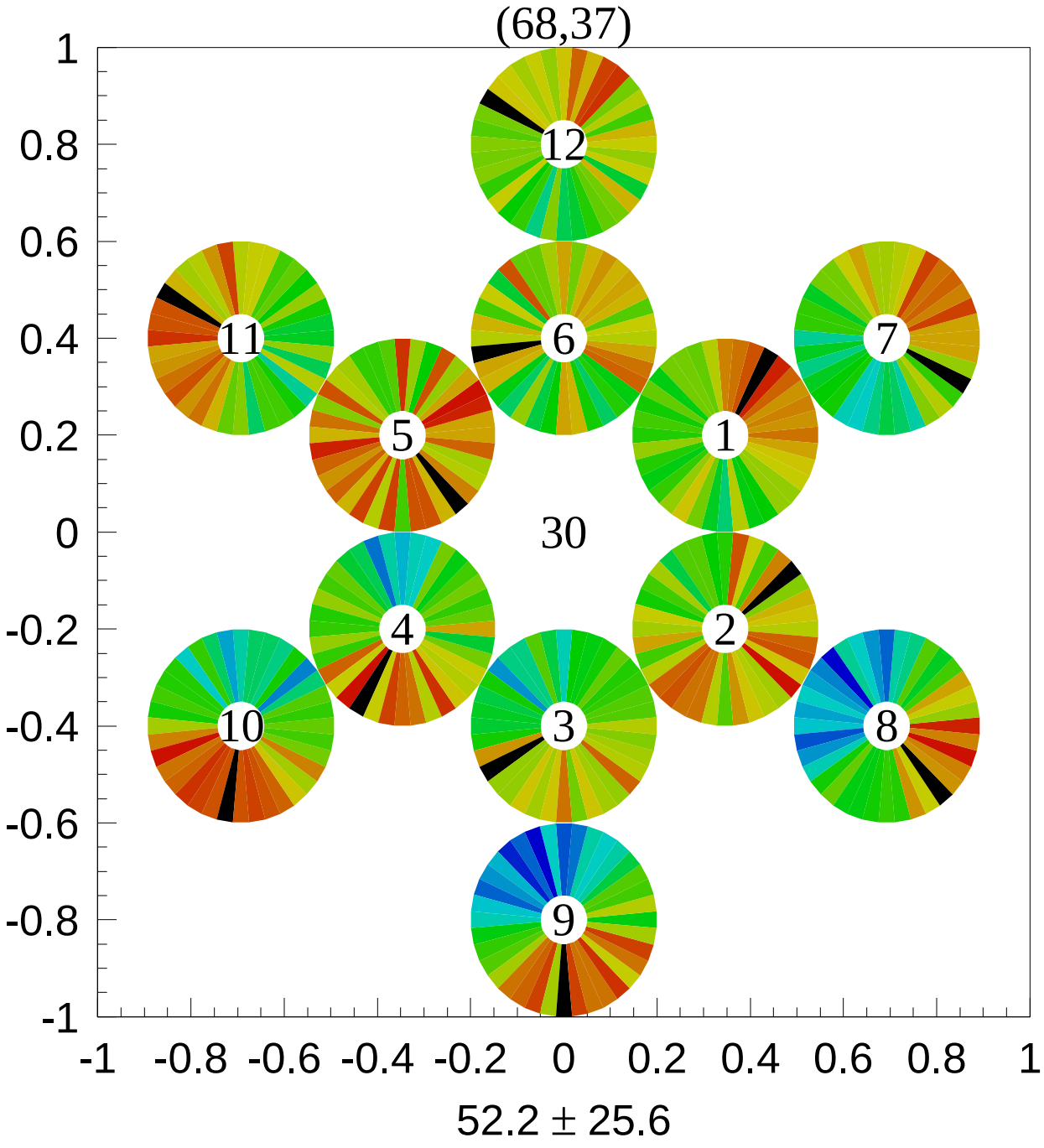

(68,36)
tilted LEDs
120 126 127 126 130 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 123 126 125 123 132
average of 6
average of 12
llh
azimuth to LED 7, degrees

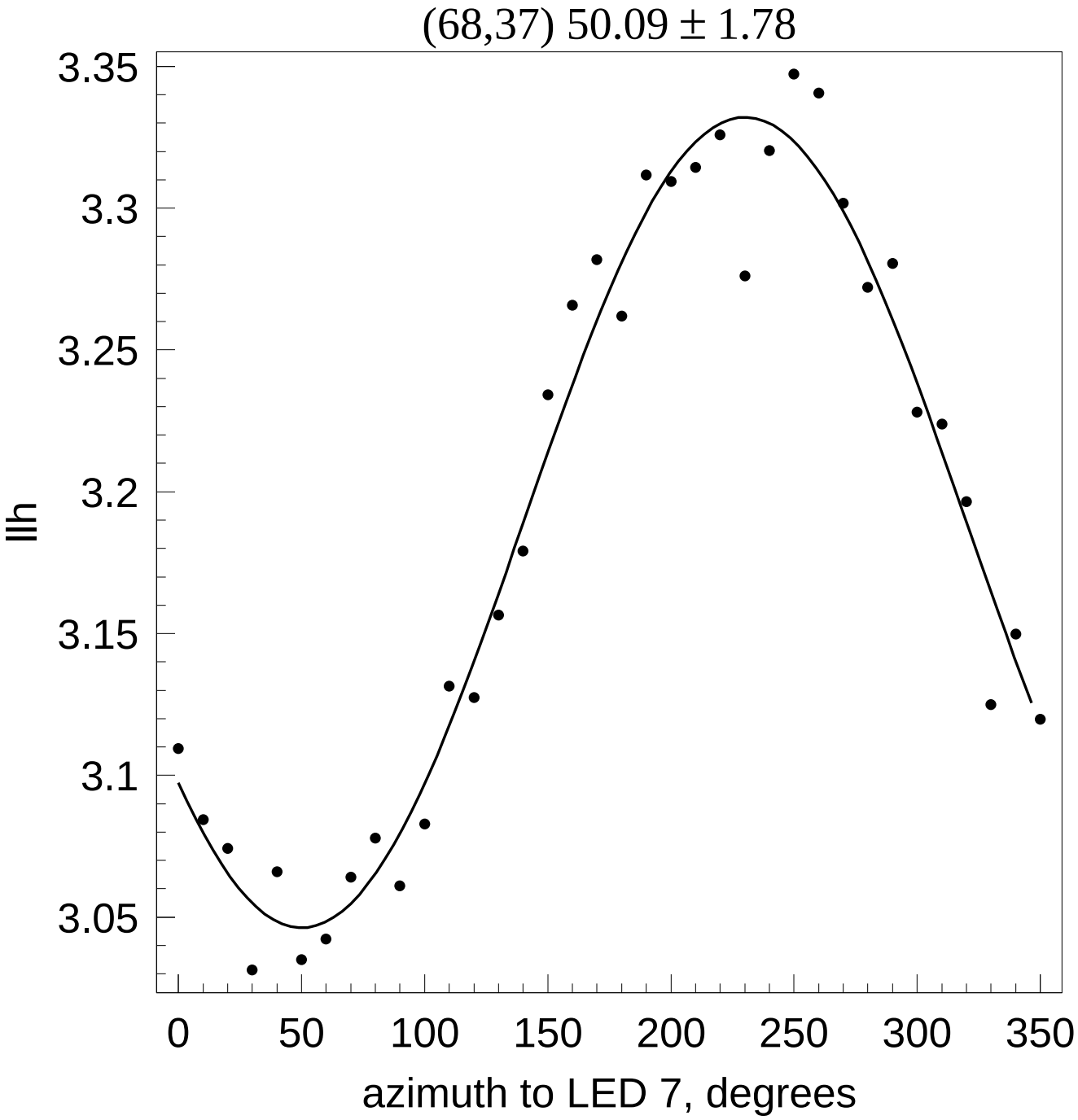

(68,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
11
6
5
7
1
20
4
10
2
3
8
9
53.3 ± 89.9

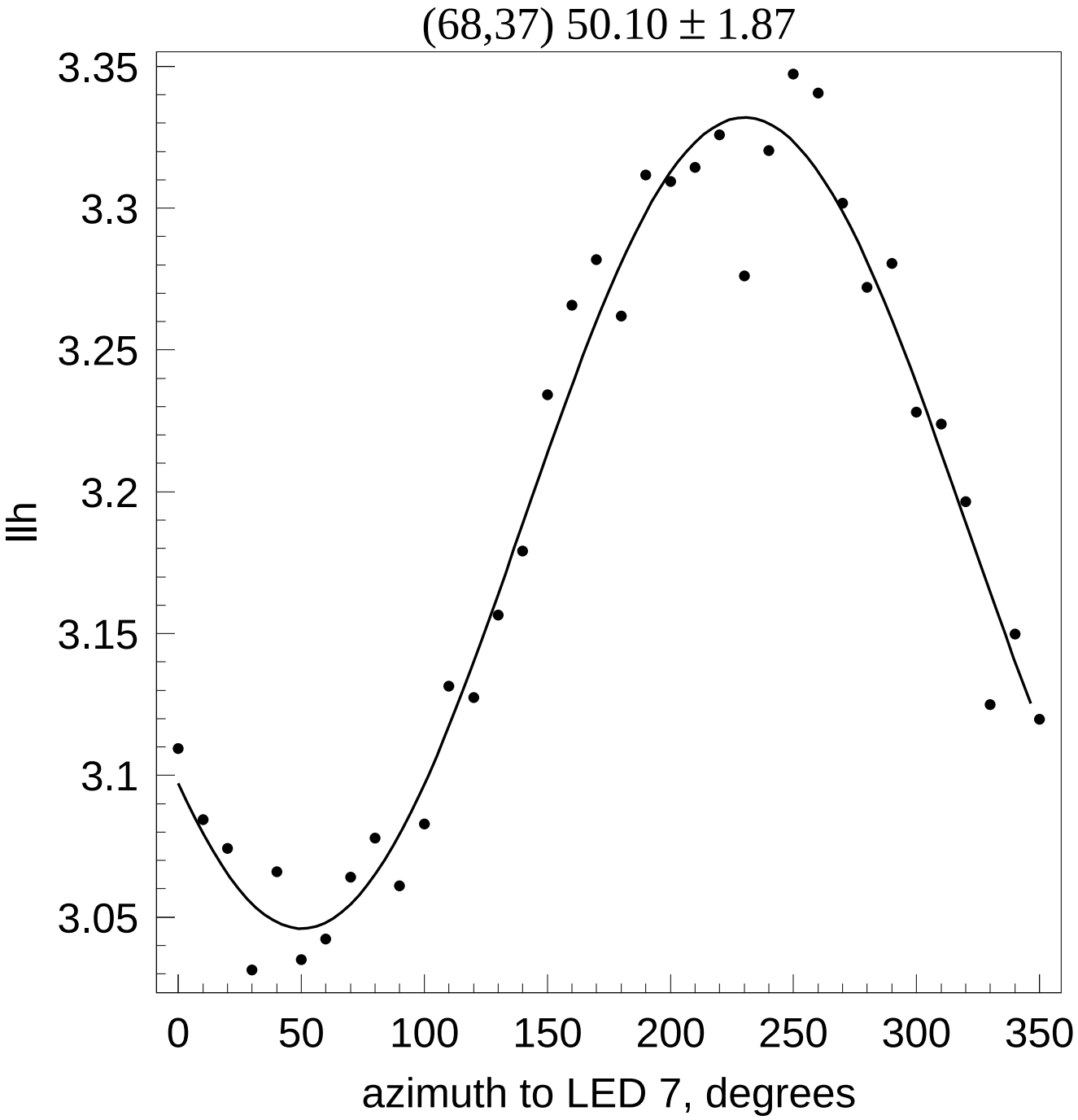

(68,36) 58.37 ± 15.95
3.36
3.34
3.32
3.3
3.28
3.26
3.24
3.22
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

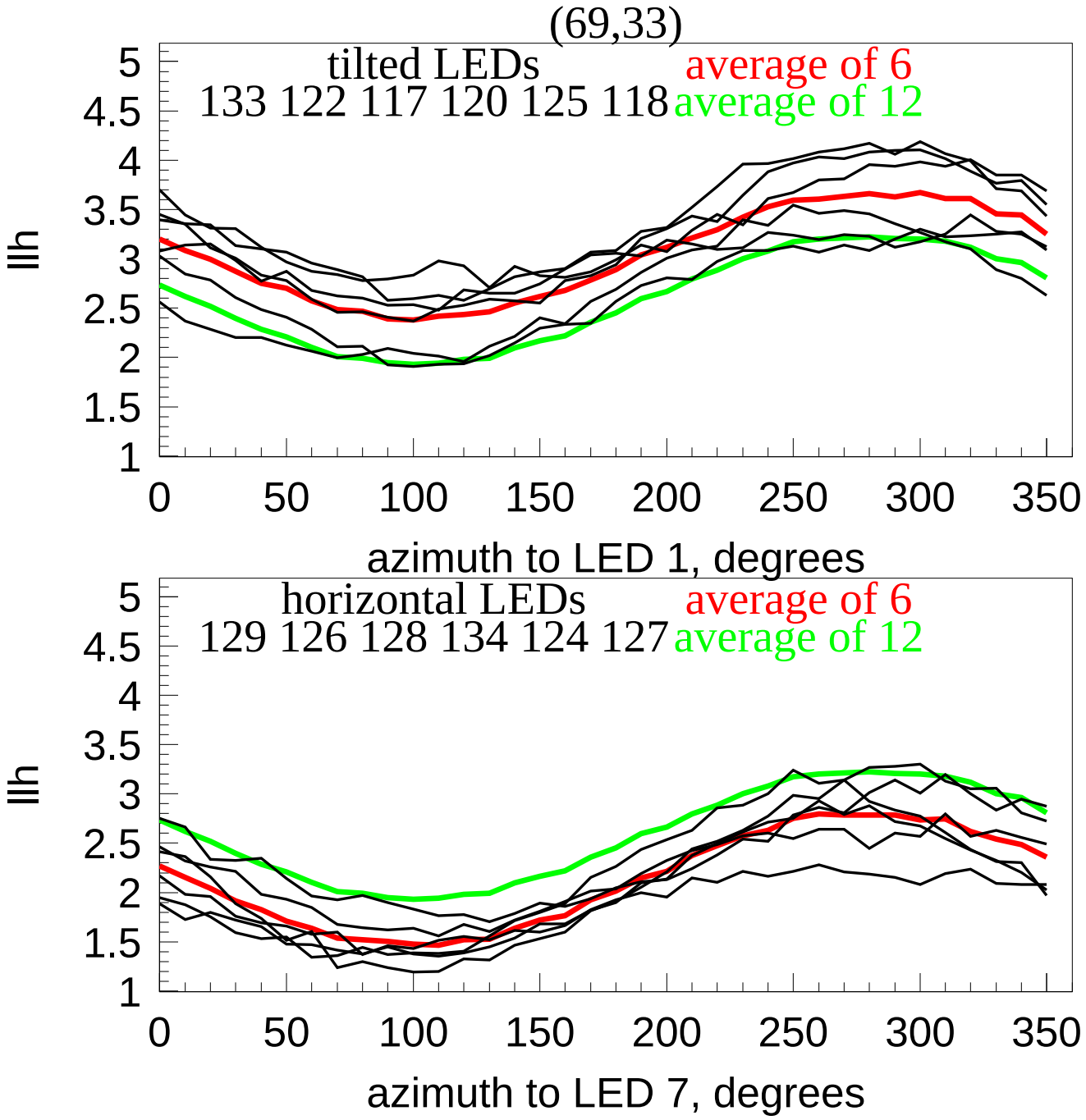

(68,36) 57.83 ± 15.79
3.36
3.34
3.32
3.3
3.28
3.26
3.24
3.22
3.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

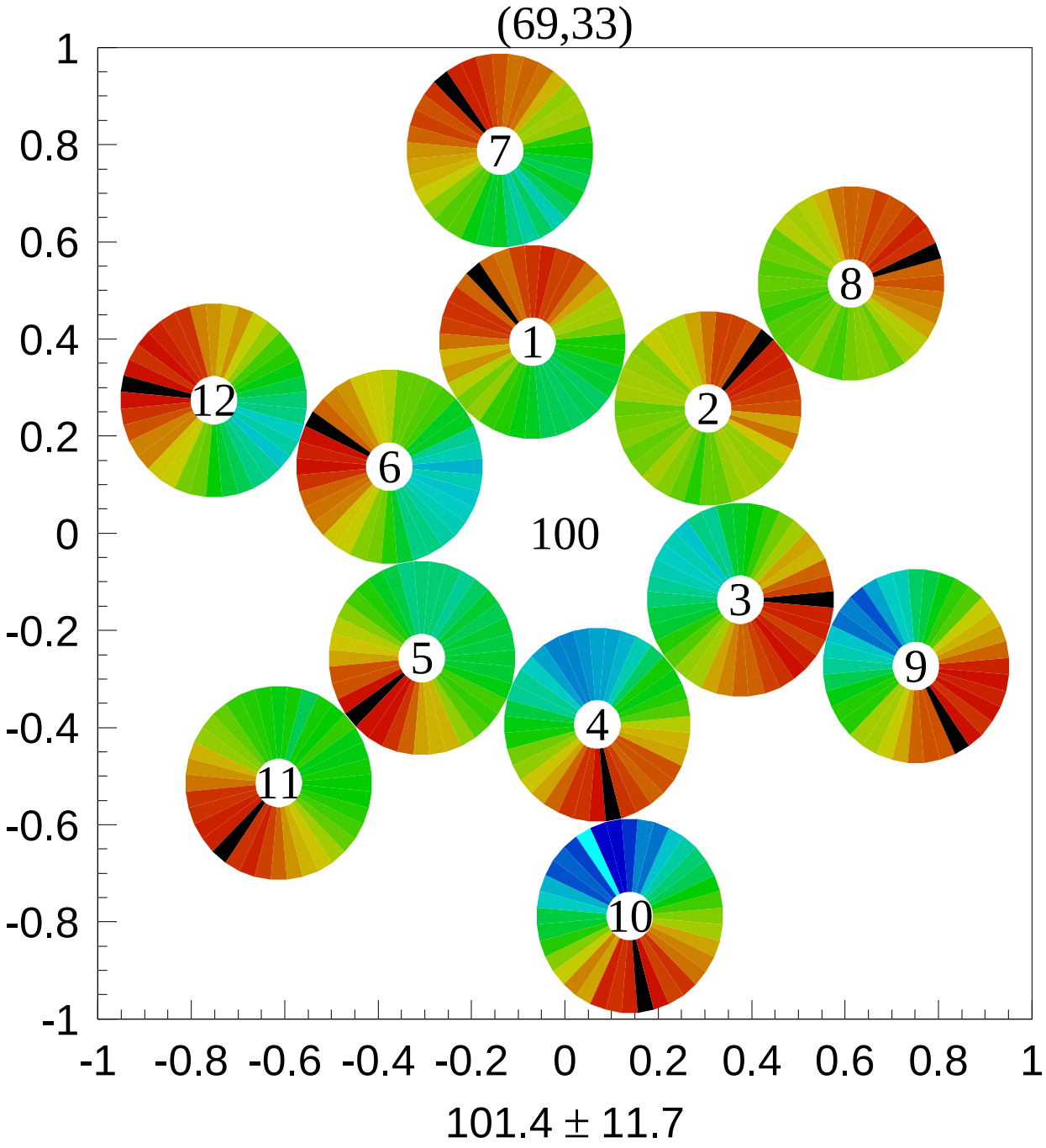

(68,37)
tilted LEDs
118 127 126 124 130 125
average of 6
average of 12
llh
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 129 126 127 124 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

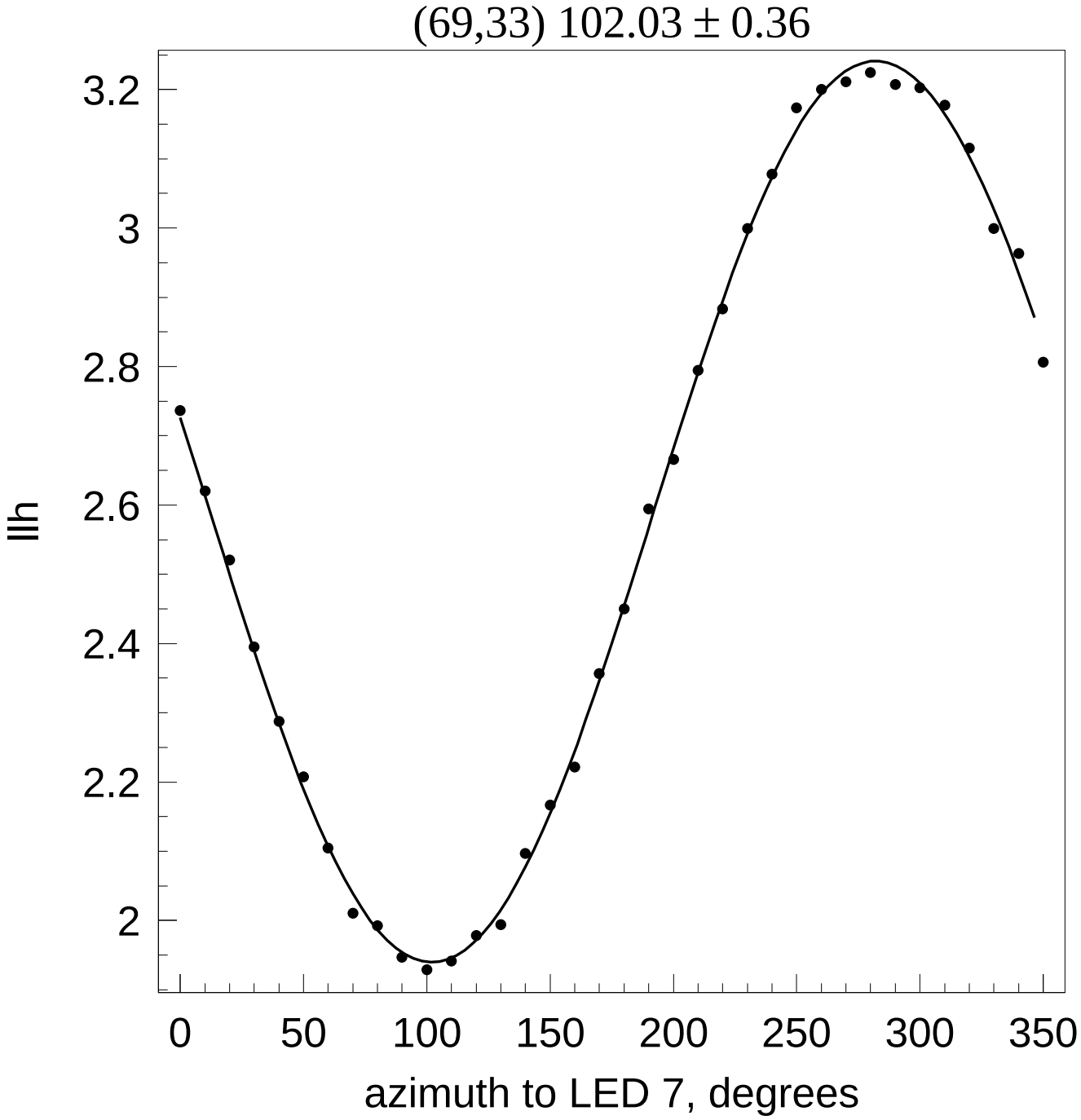

(68,37)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
52.2 ± 25.6

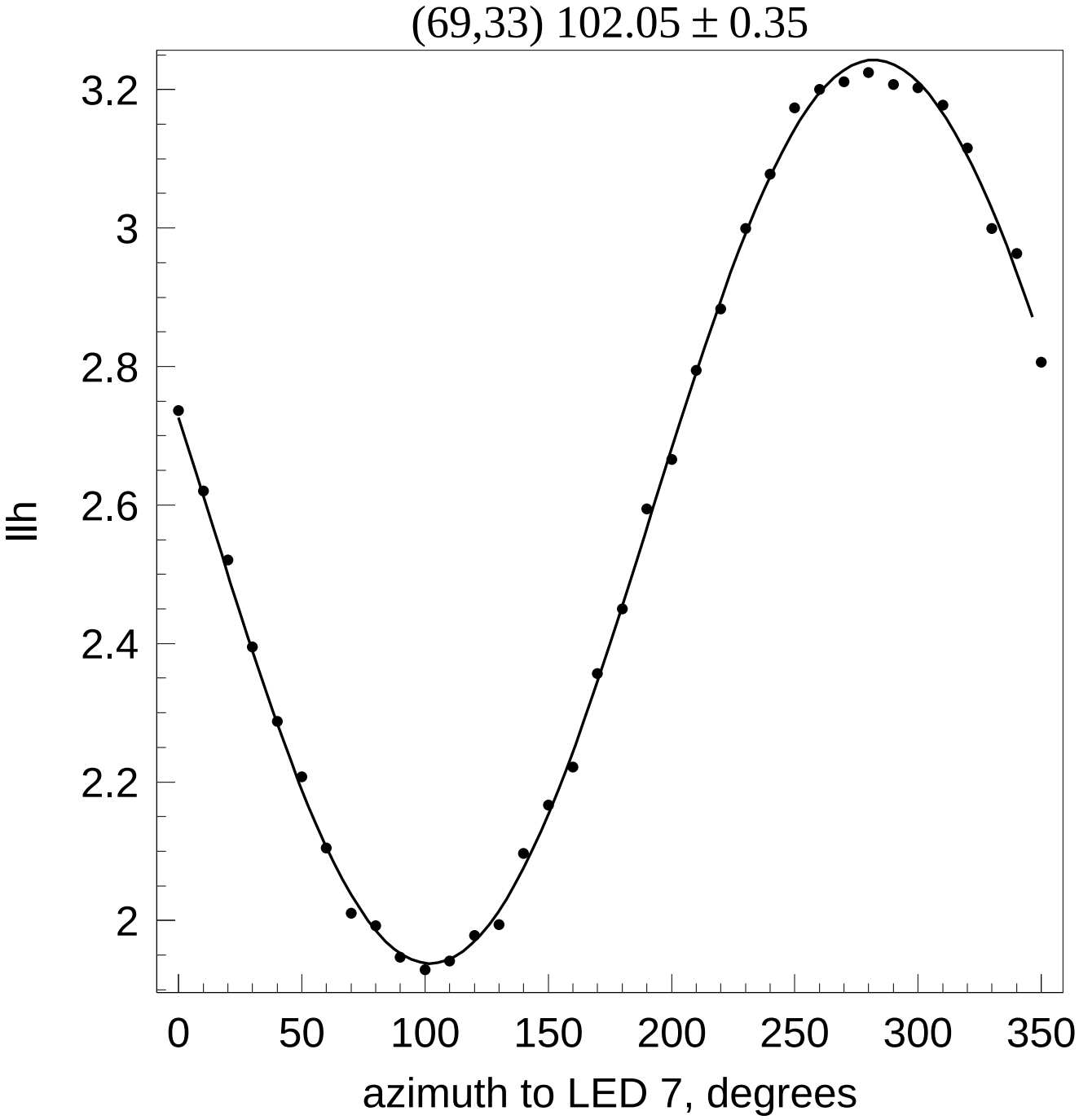

(68,37) 50.09 ± 1.78
3.35
3.3
3.25
3.2
3.15
3.1
3.05
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

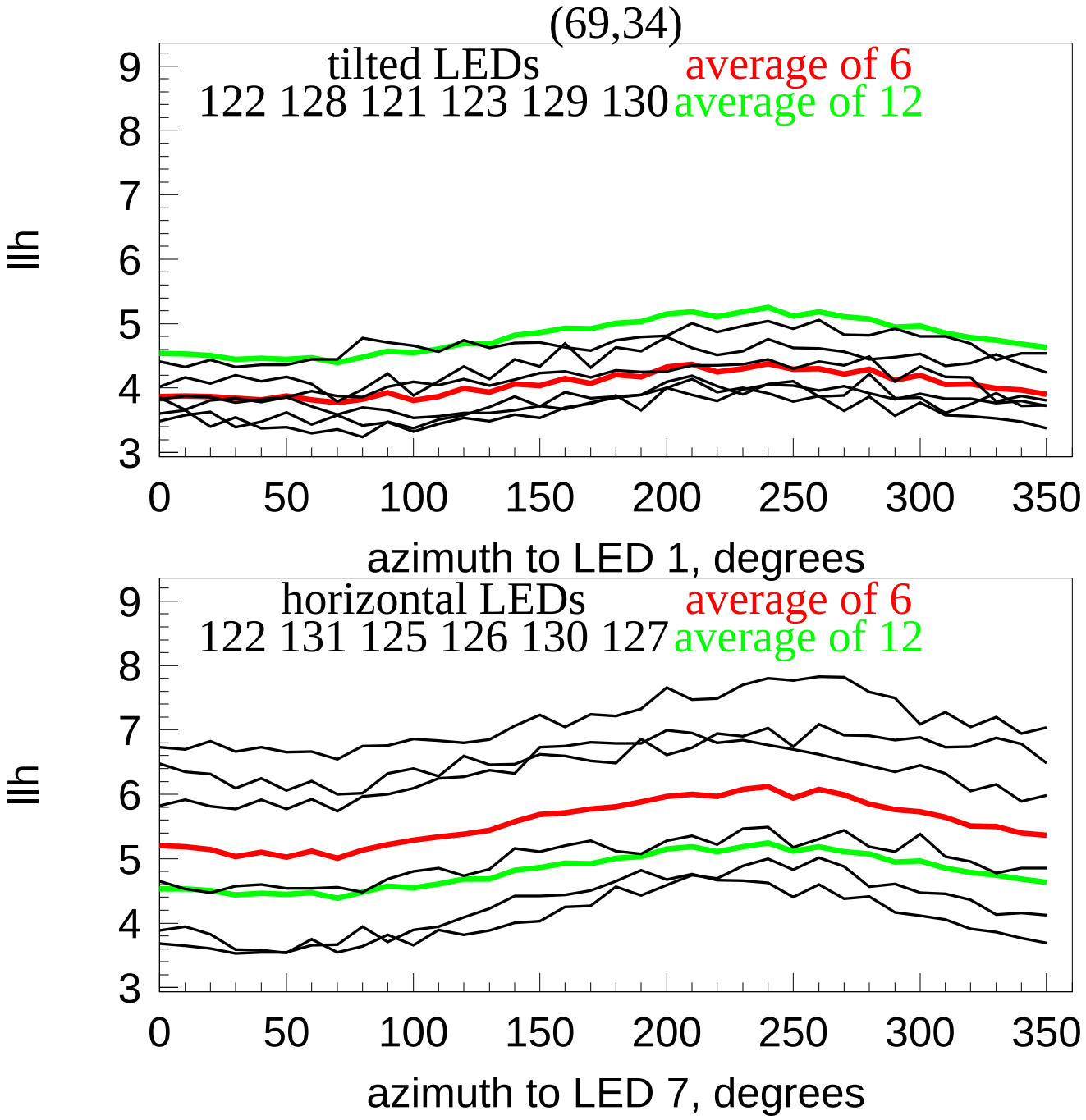

(68,37) 50.10 ± 1.87
3.35
3.3
3.25
3.2
3.15
3.1
3.05
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

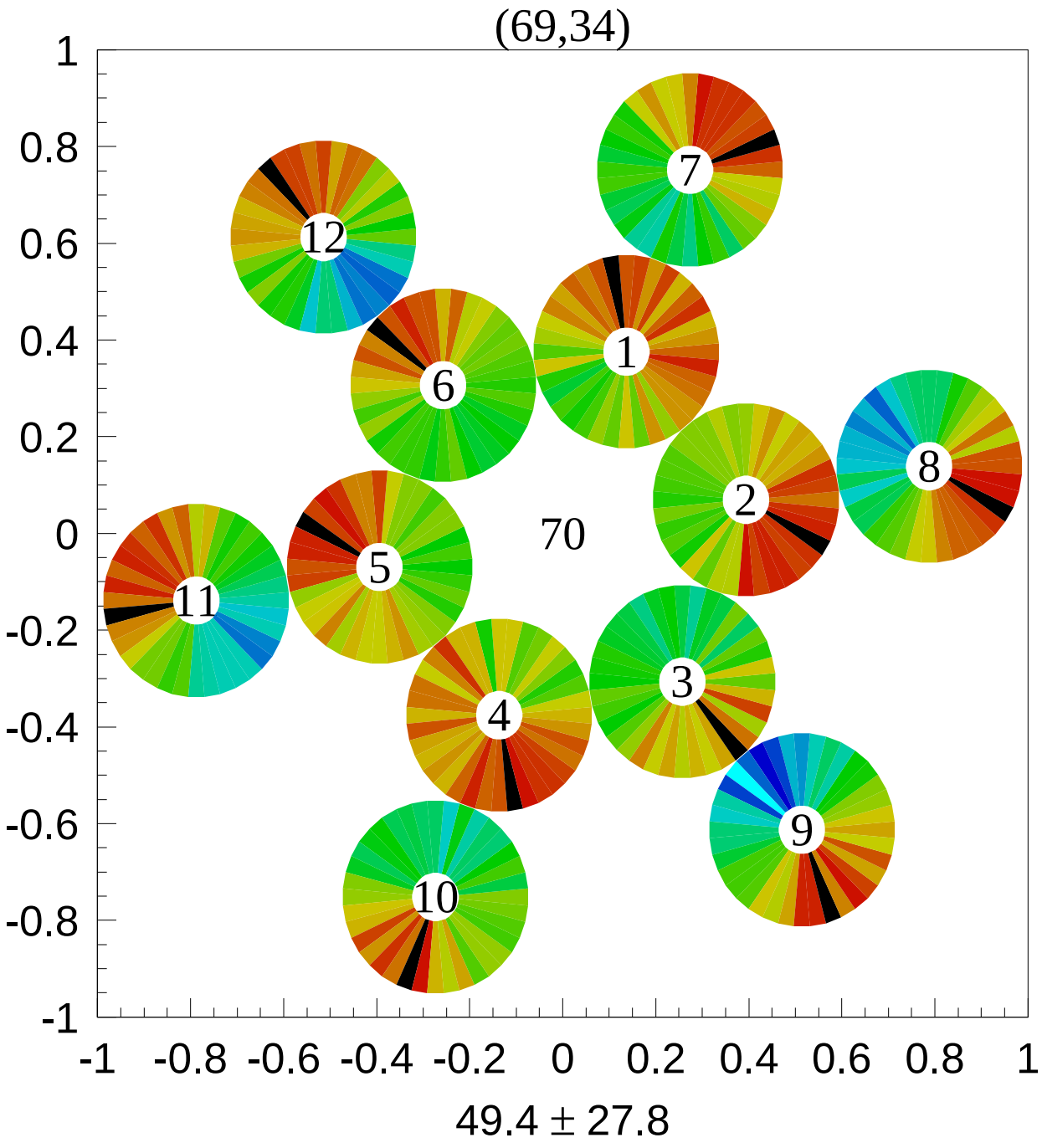

(69,33)
tilted LEDs
133 122 117 120 125 118
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
129 126 128 134 124 127
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

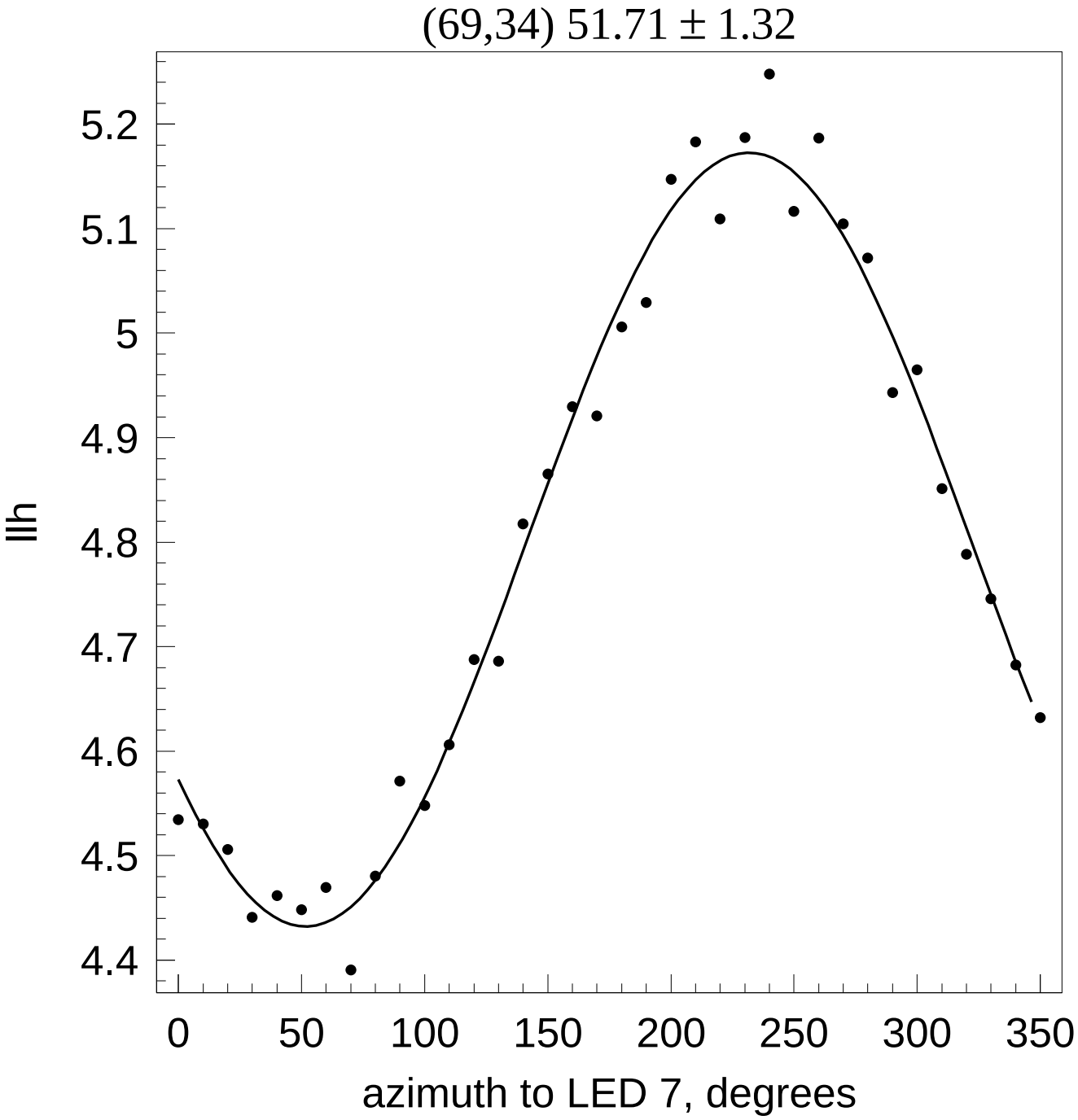

(69,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1
-0.8
-0.6
-0.4
-0.2
0
0.2
0.4
0.6
0.8
1
7
1
8
12
2
6
100
3
5
9
4
11
10
101.4 ± 11.7

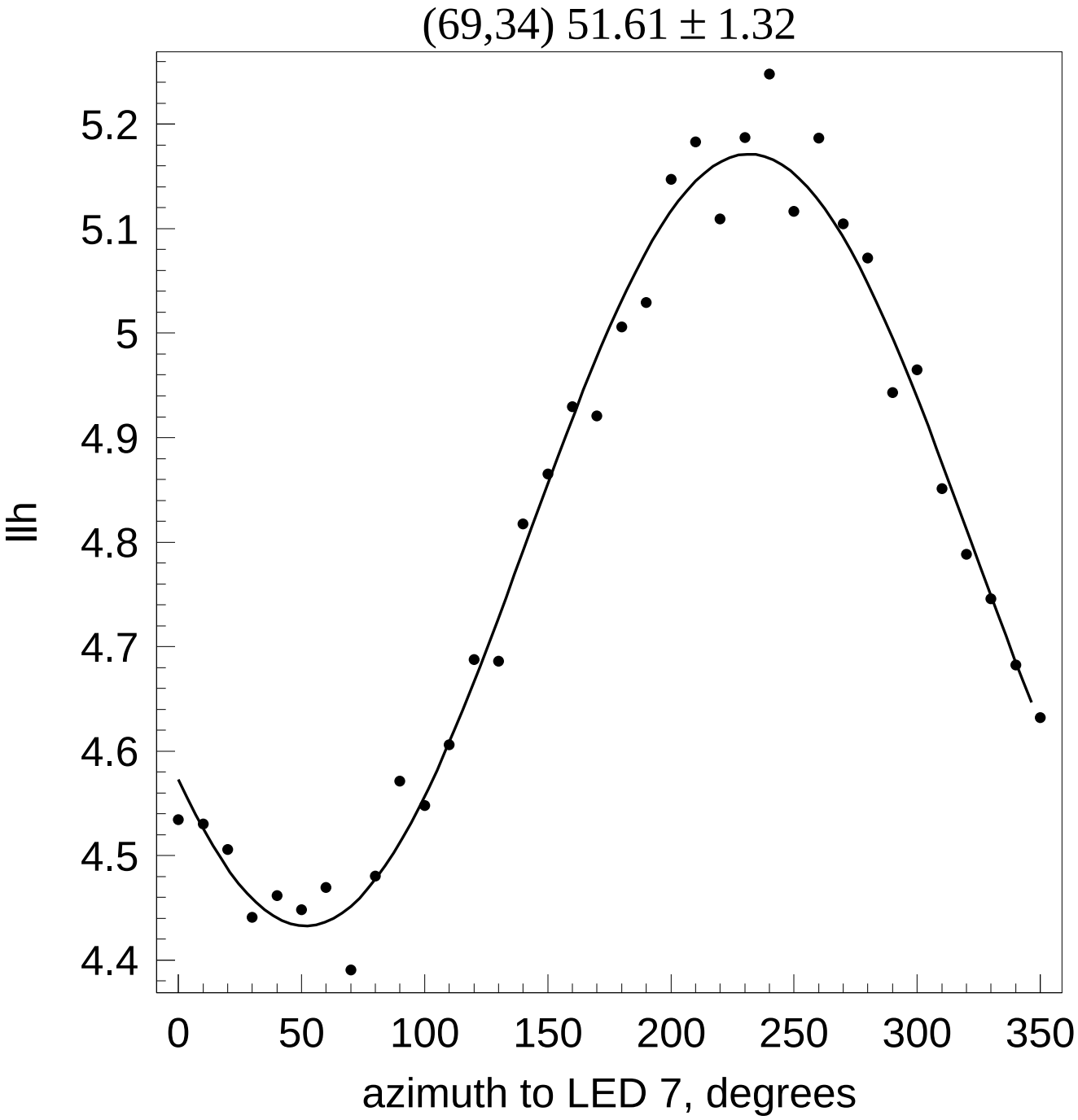

(69,33) 102.03 ± 0.36
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

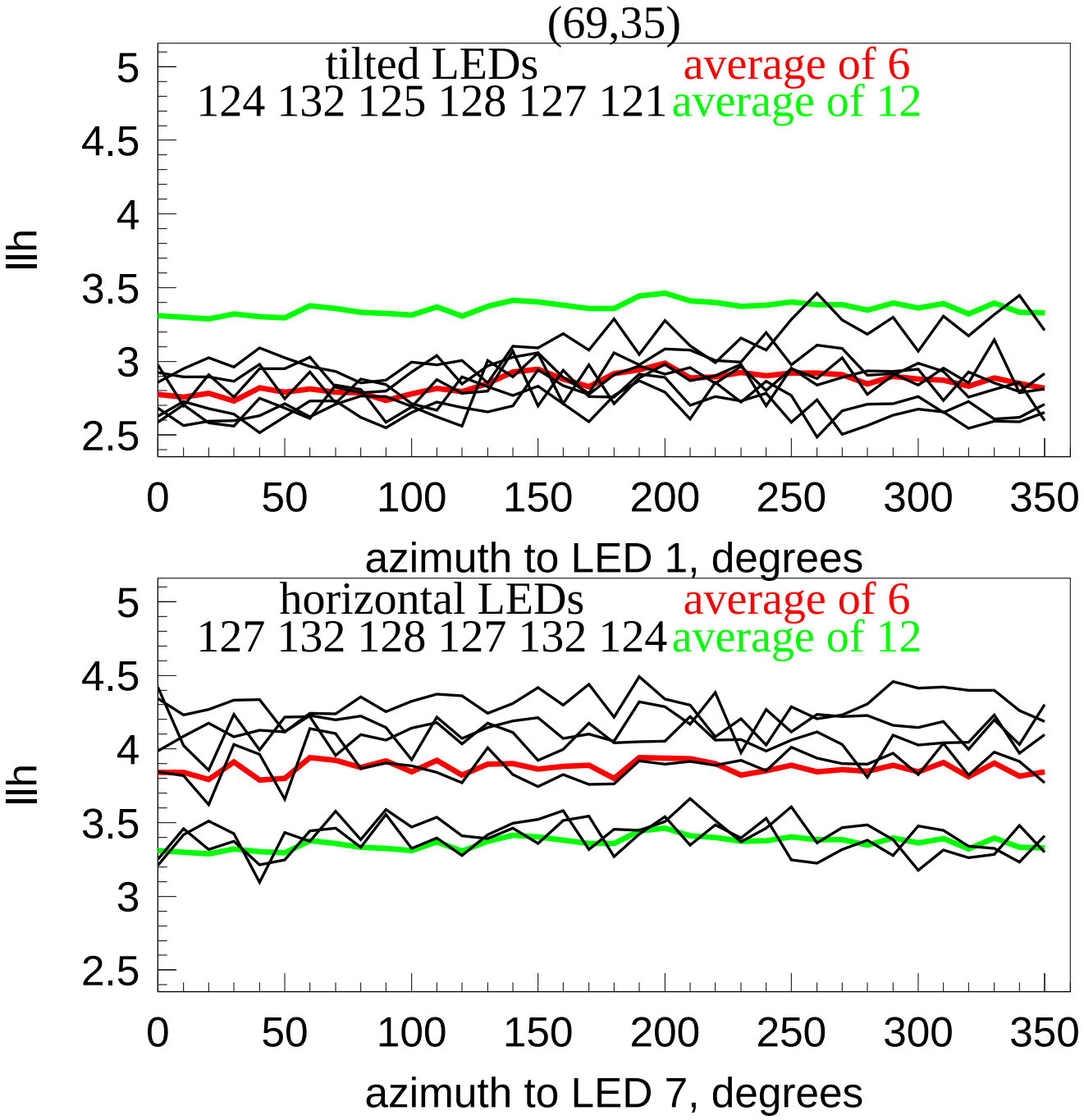

(69,33) 102.05 ± 0.35
3.2
3
2.8
2.6
2.4
2.2
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

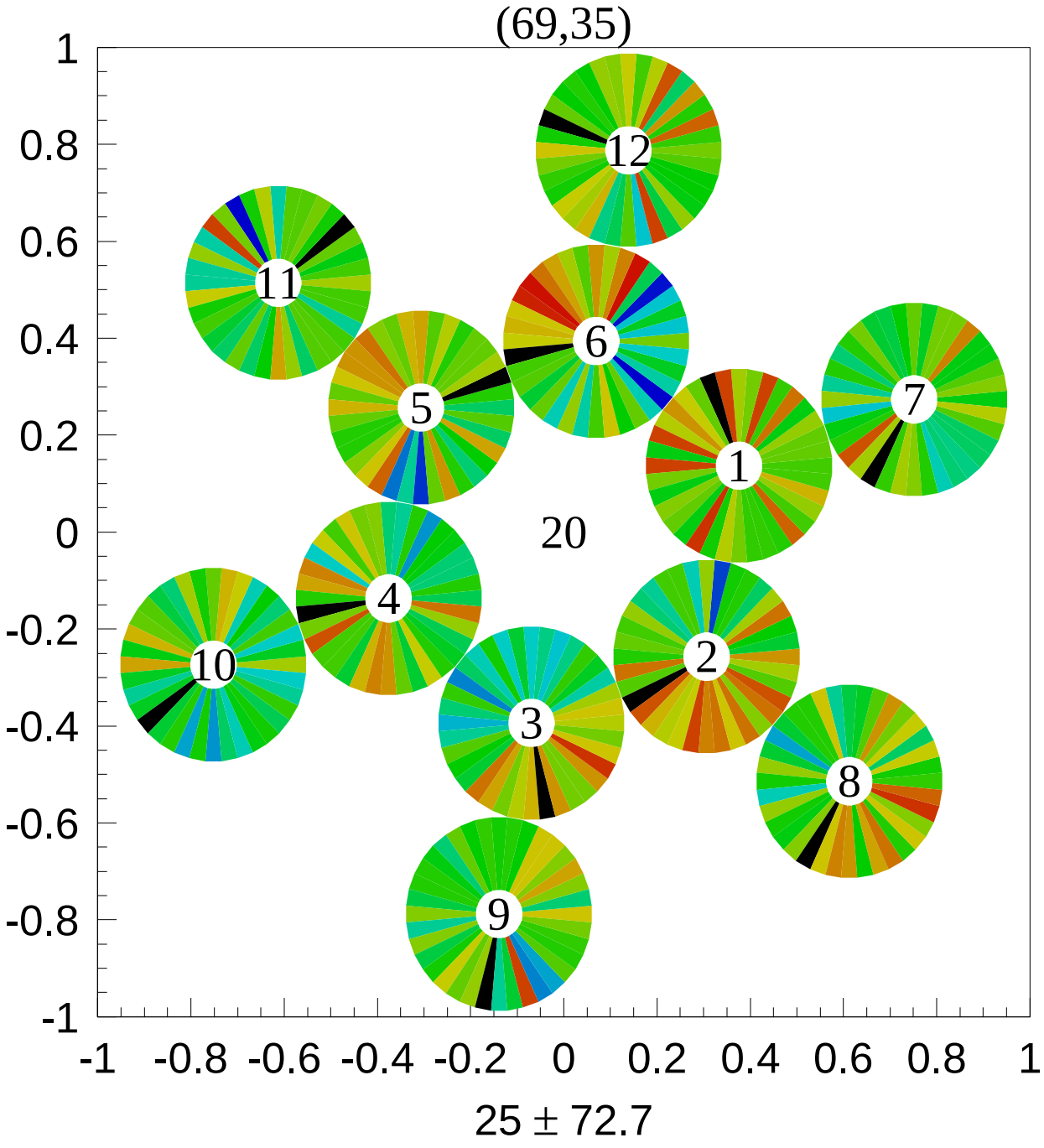

(69,34)
tilted LEDs
122 128 121 123 129 130
average of 6
average of 12
Ilh
9
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 131 125 126 130 127
average of 6
average of 12
Ilh
9
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

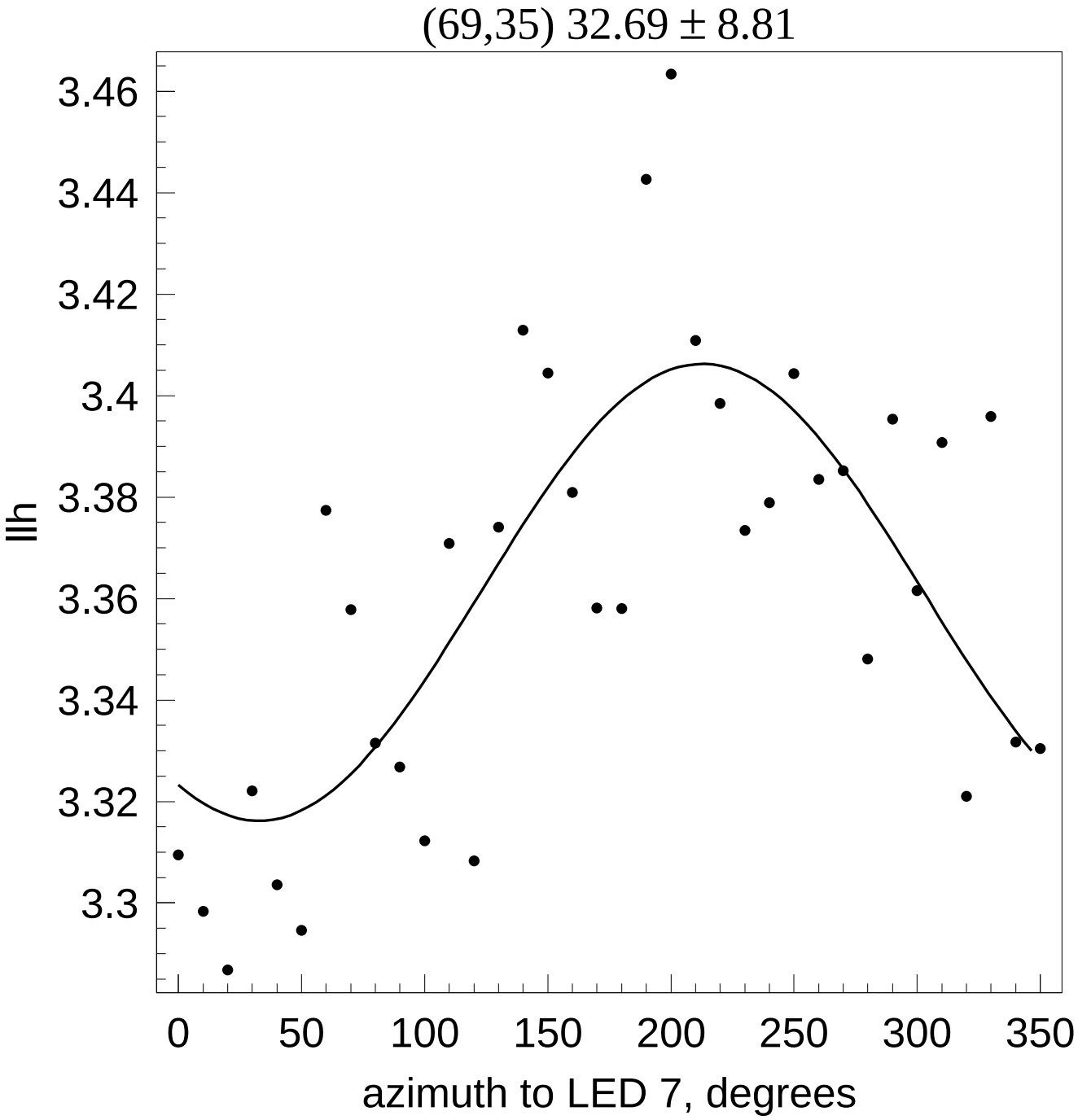

(69,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
70
1
2
3
4
5
6
7
8
9
10
11
12
49.4 ± 27.8

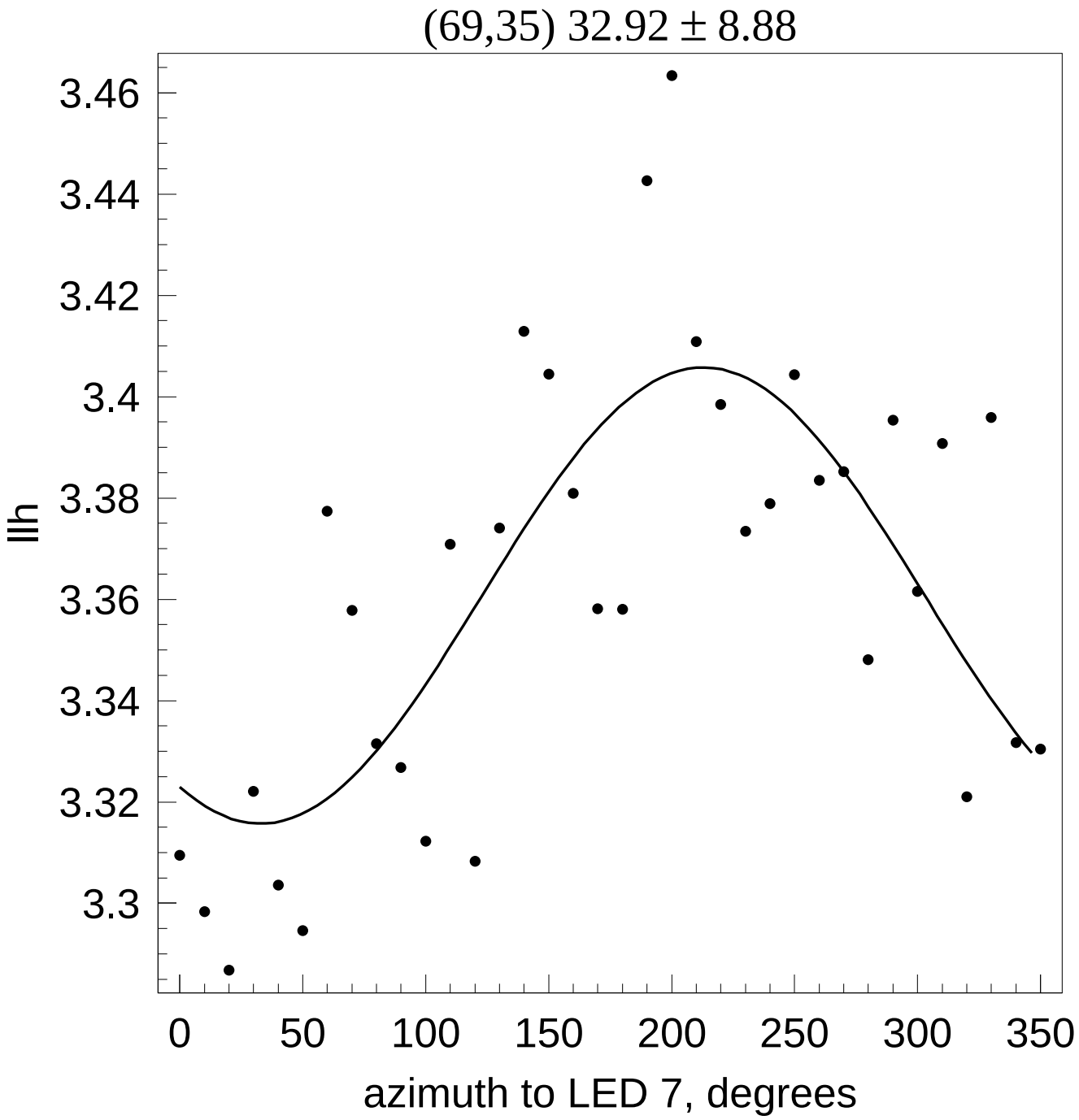

(69,34) 51.71 ± 1.32
5.2
5.1
5
4.9
4.8
4.7
4.6
4.5
4.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

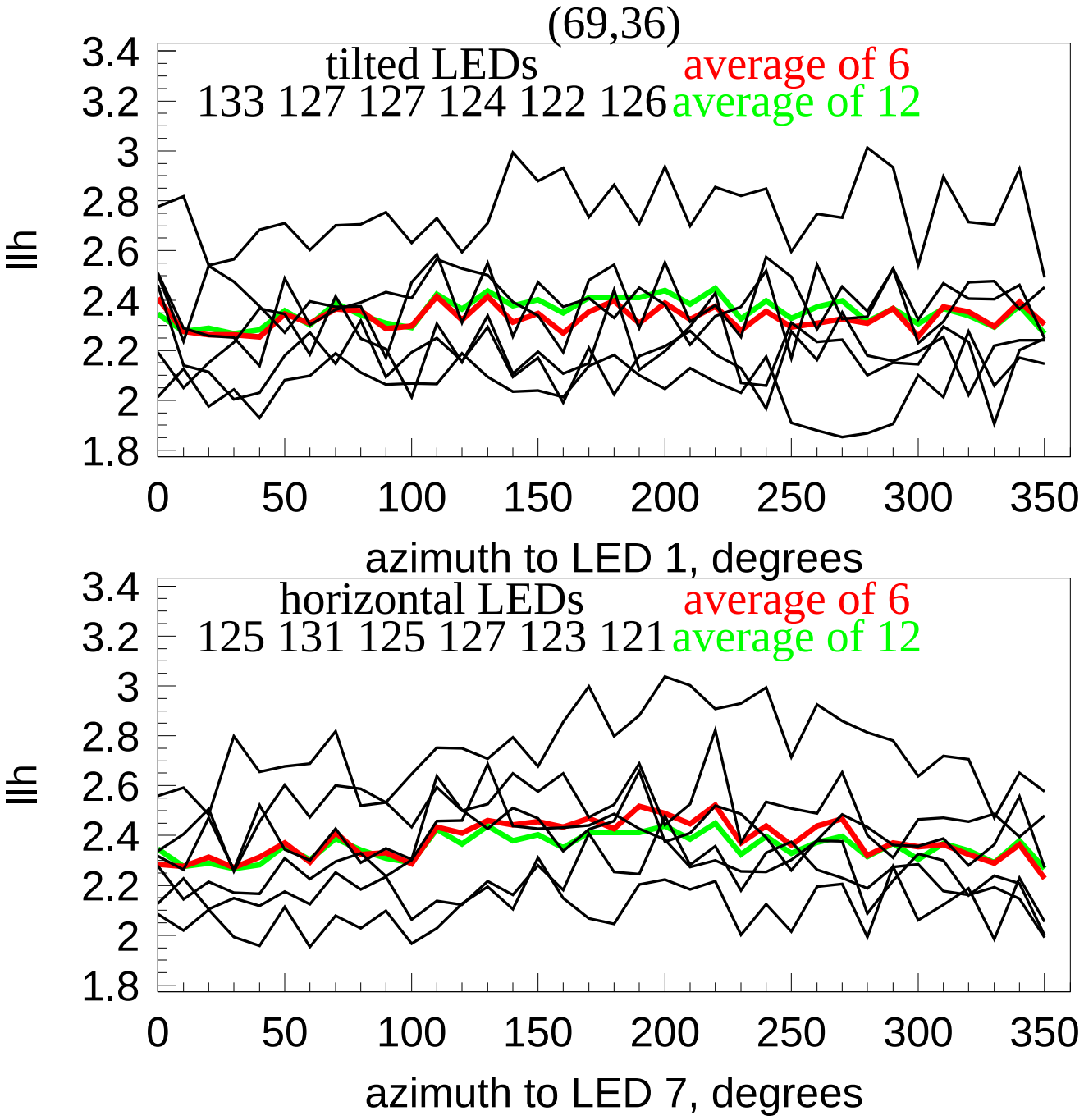

(69,34) 51.61 ± 1.32
5.2
5.1
5
4.9
4.8
4.7
4.6
4.5
4.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

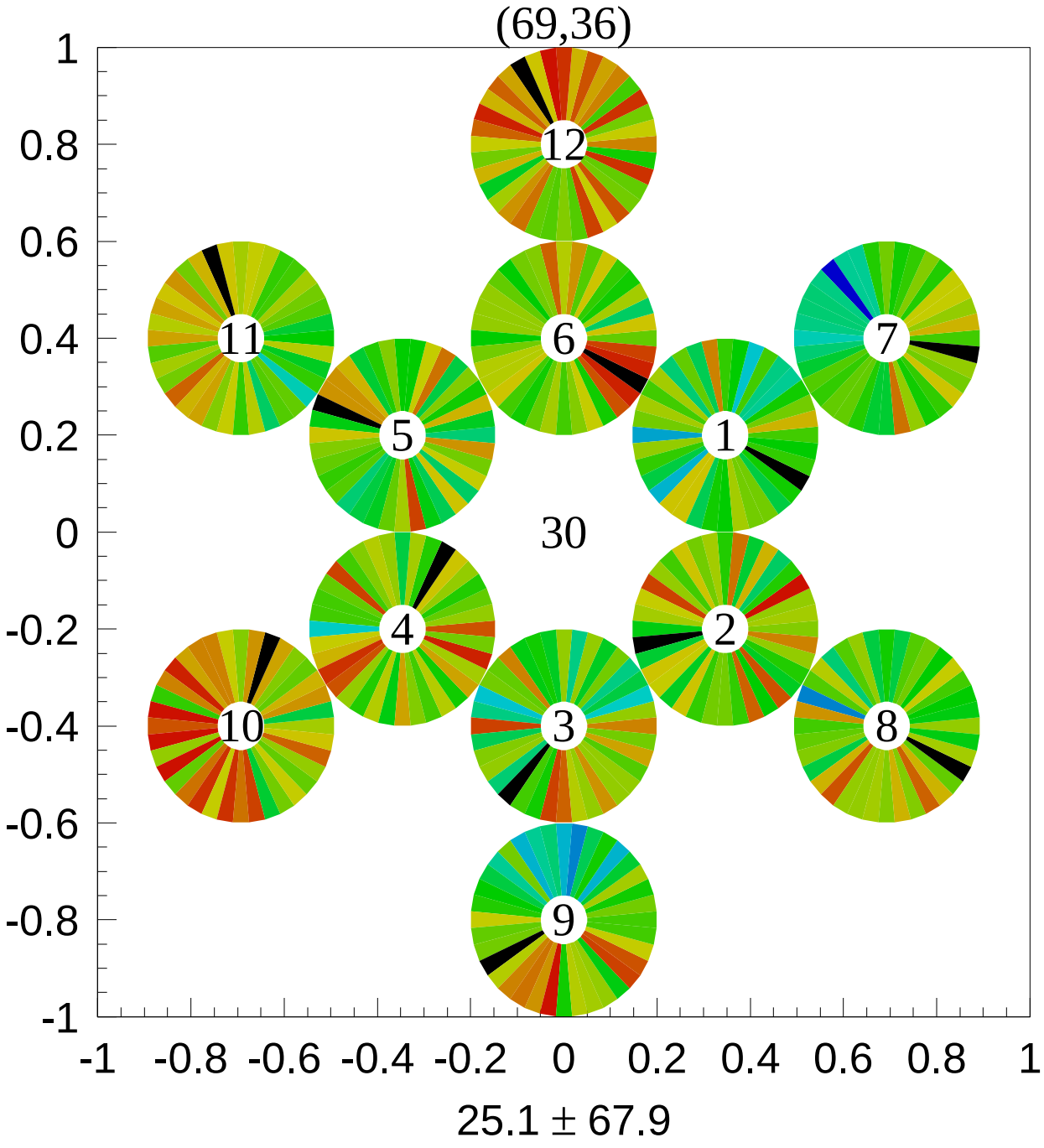

(69,35)
tilted LEDs
124 132 125 128 127 121
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 132 128 127 132 124
average of 6
average of 12
llh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

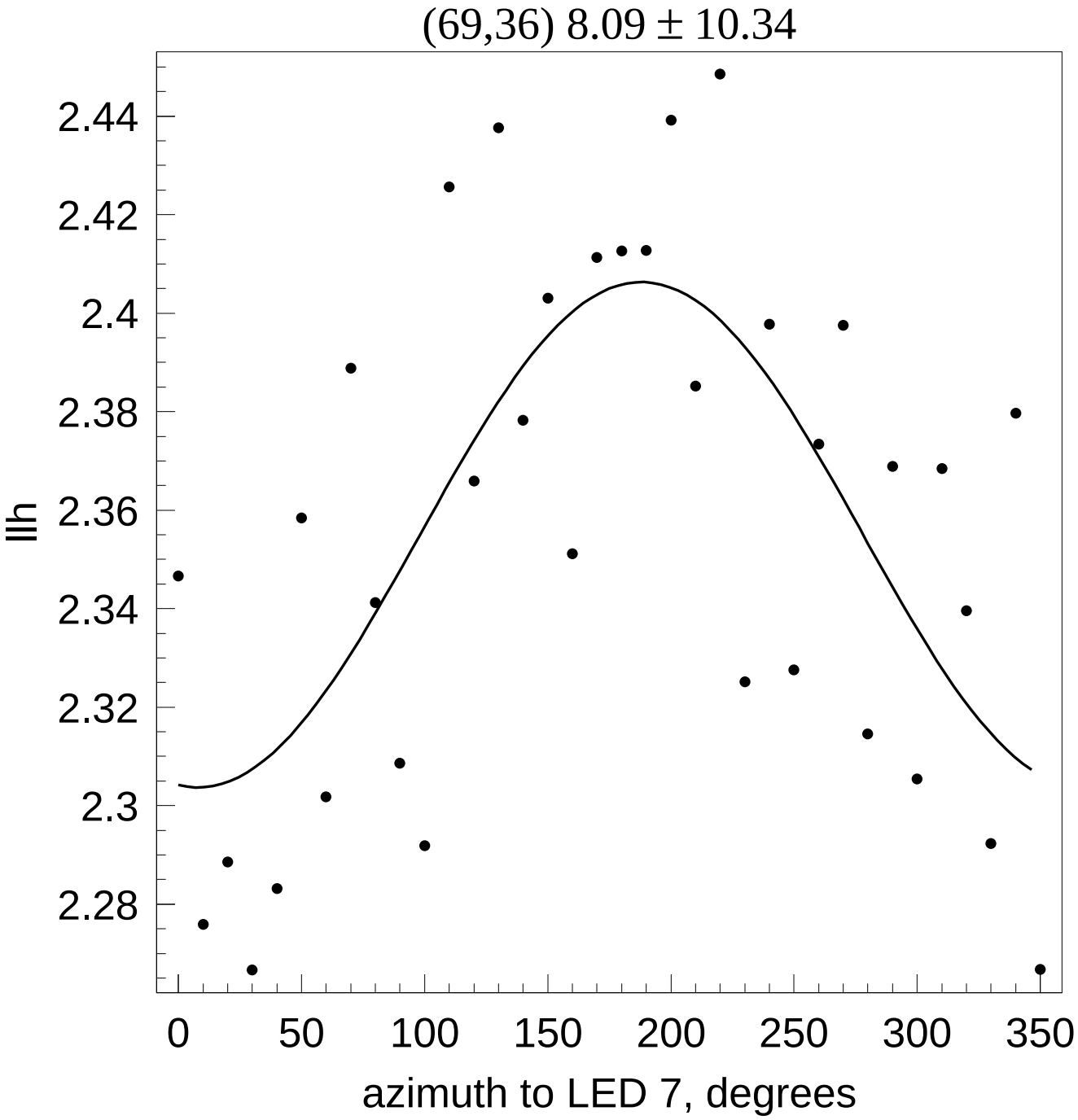

(69,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
25 ± 72.7
12
11
6
5
7
1
20
4
10
2
3
8
9

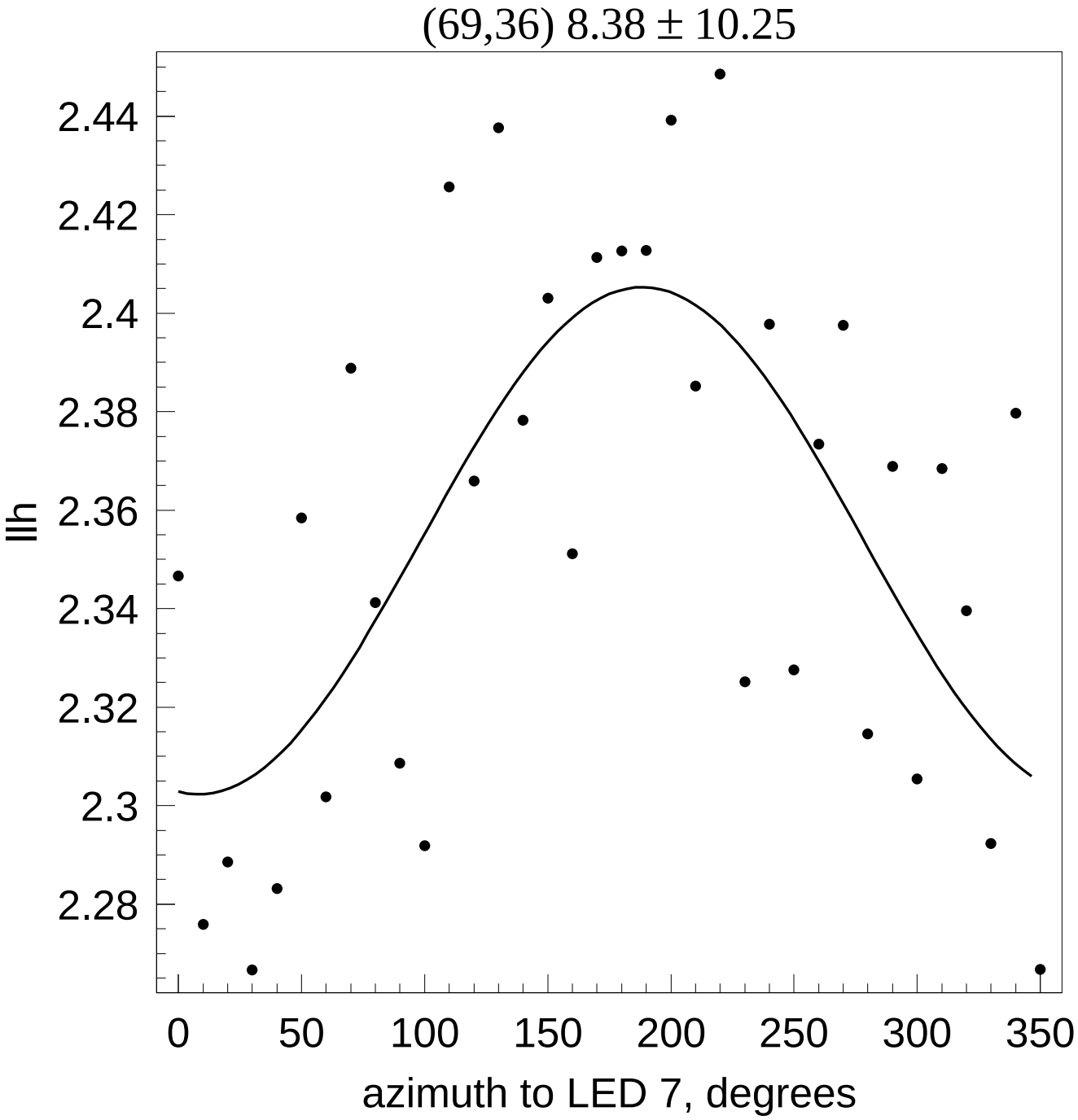

(69,35) 32.69 ± 8.81
3.46
3.44
3.42
3.4
3.38
3.36
3.34
3.32
3.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

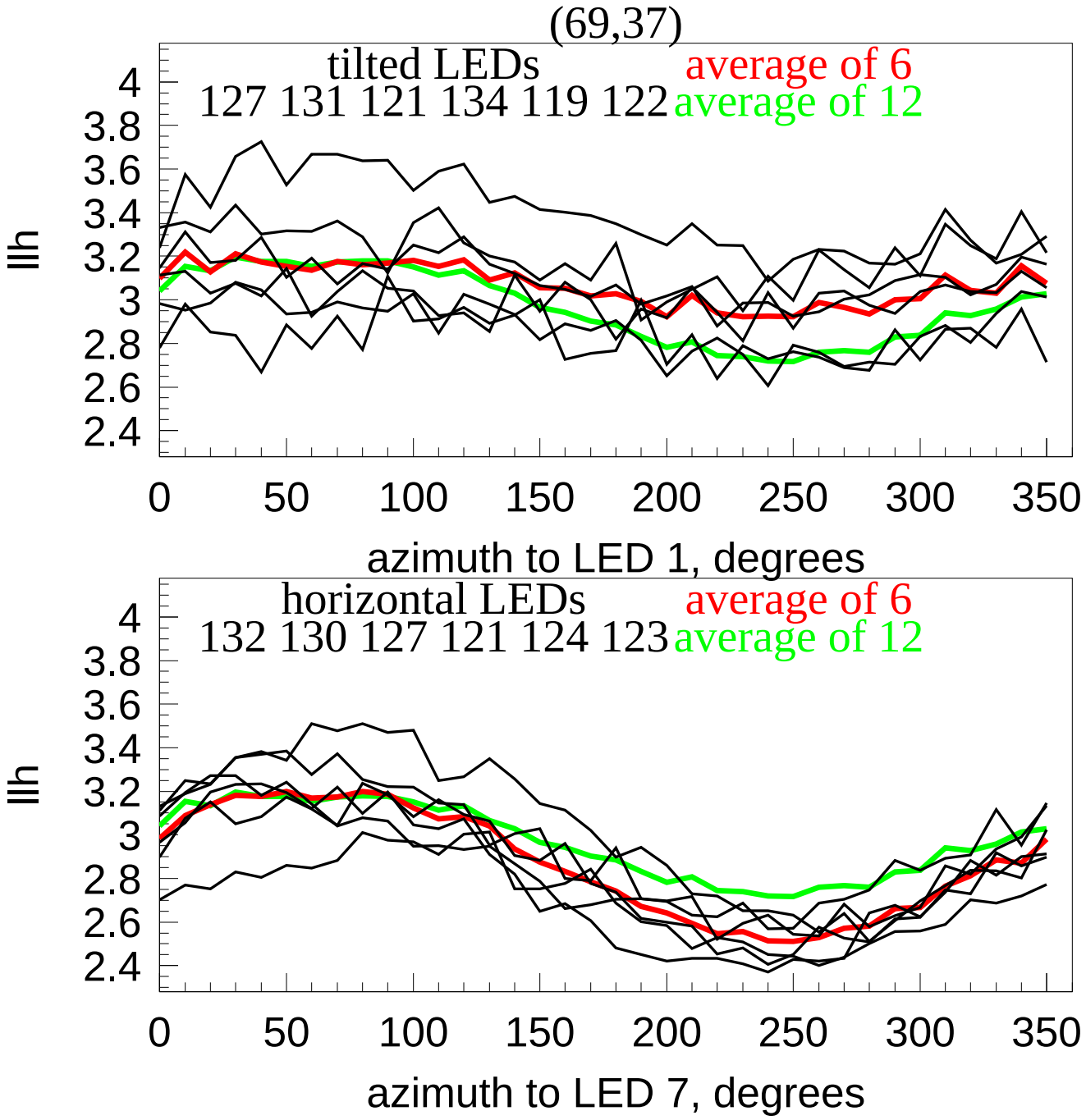

(69,35) 32.92 ± 8.88
llh
3.46
3.44
3.42
3.4
3.38
3.36
3.34
3.32
3.3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

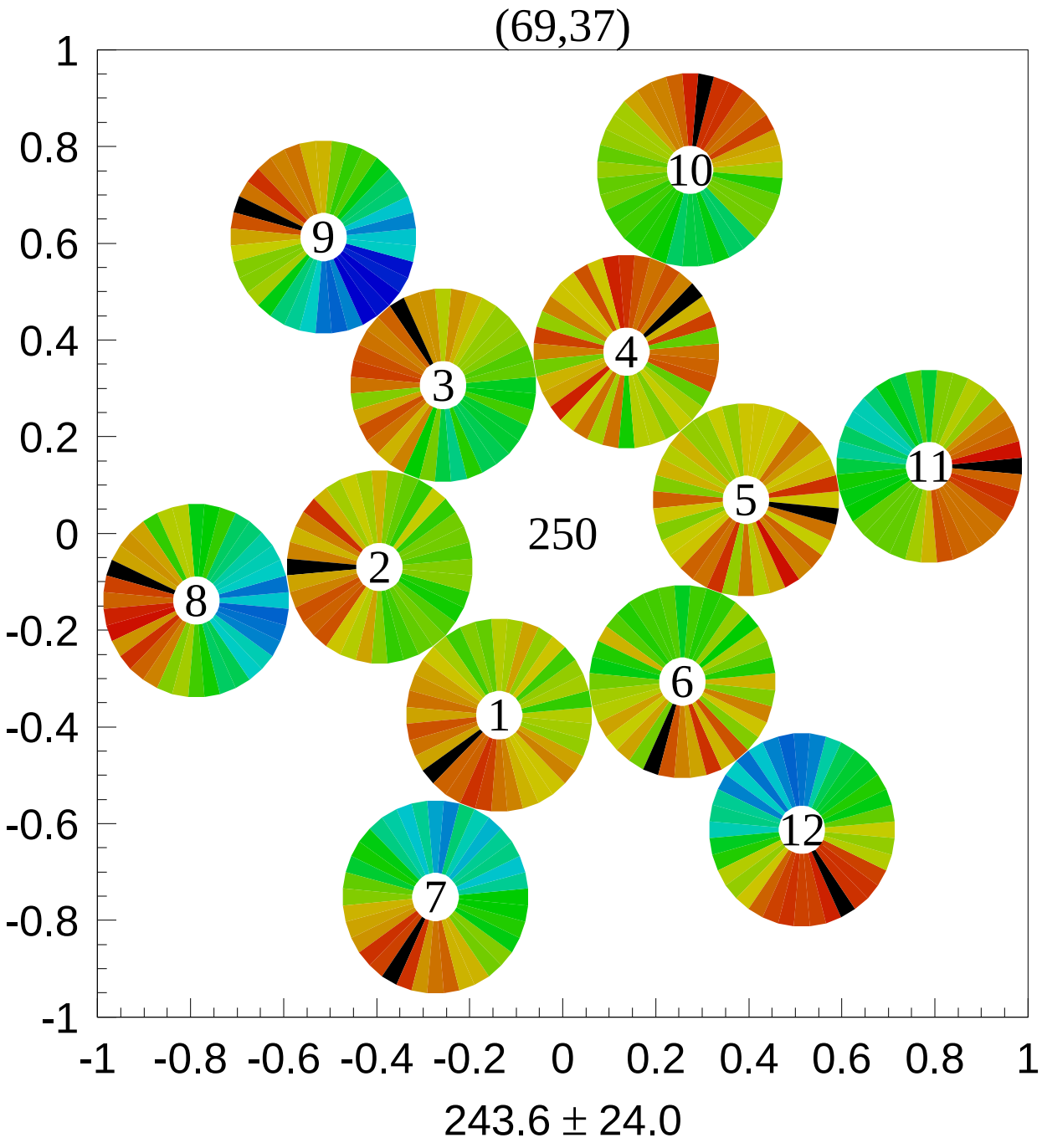

(69,36)
tilted LEDs
133 127 127 124 122 126
average of 6
average of 12
llh
3.4
3.2
3
2.8
2.6
2.4
2.2
2
1.8
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 131 125 127 123 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

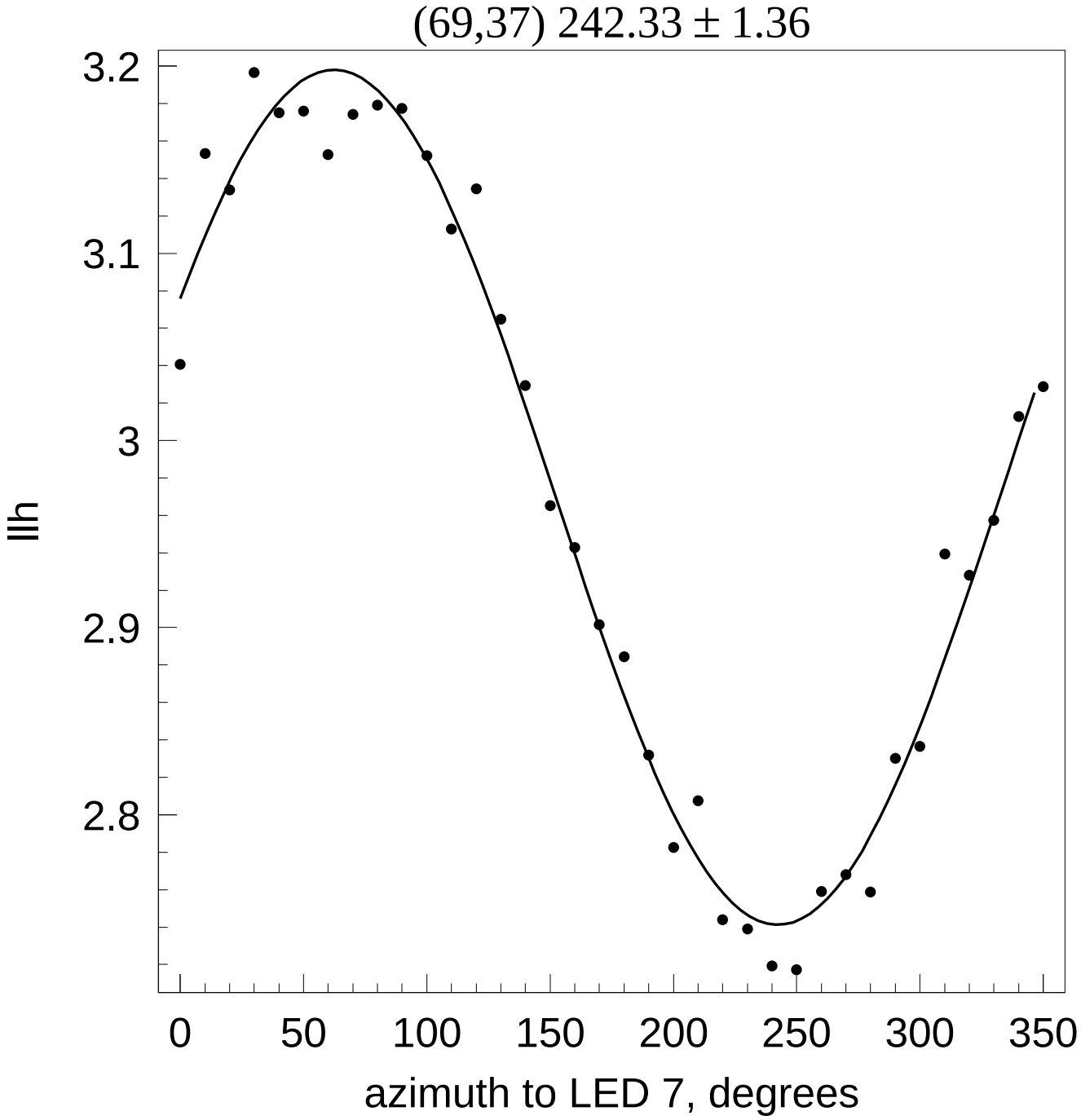

(69,36)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
25.1 ± 67.9

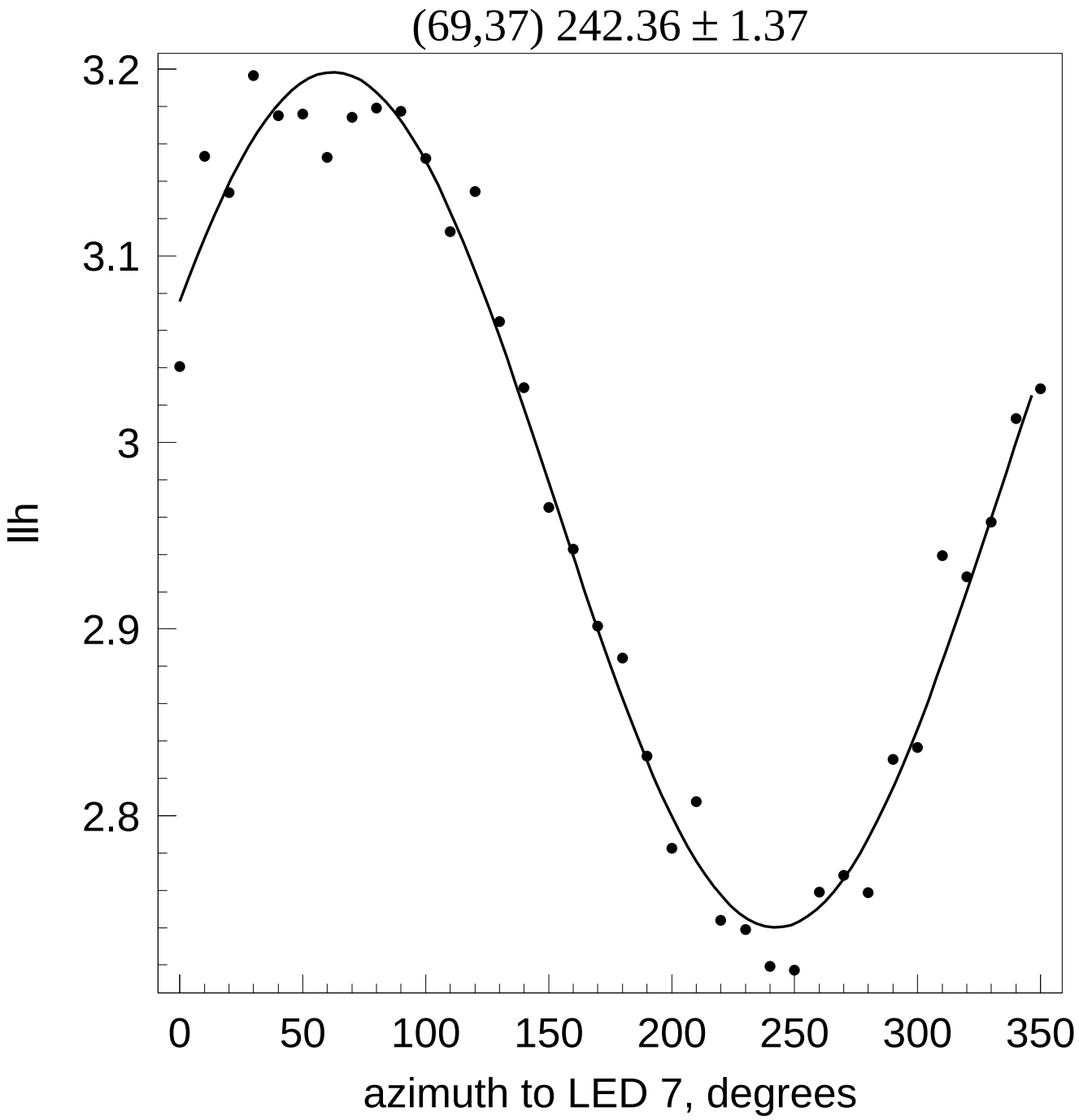

(69,36) 8.09 ± 10.34
2.44
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

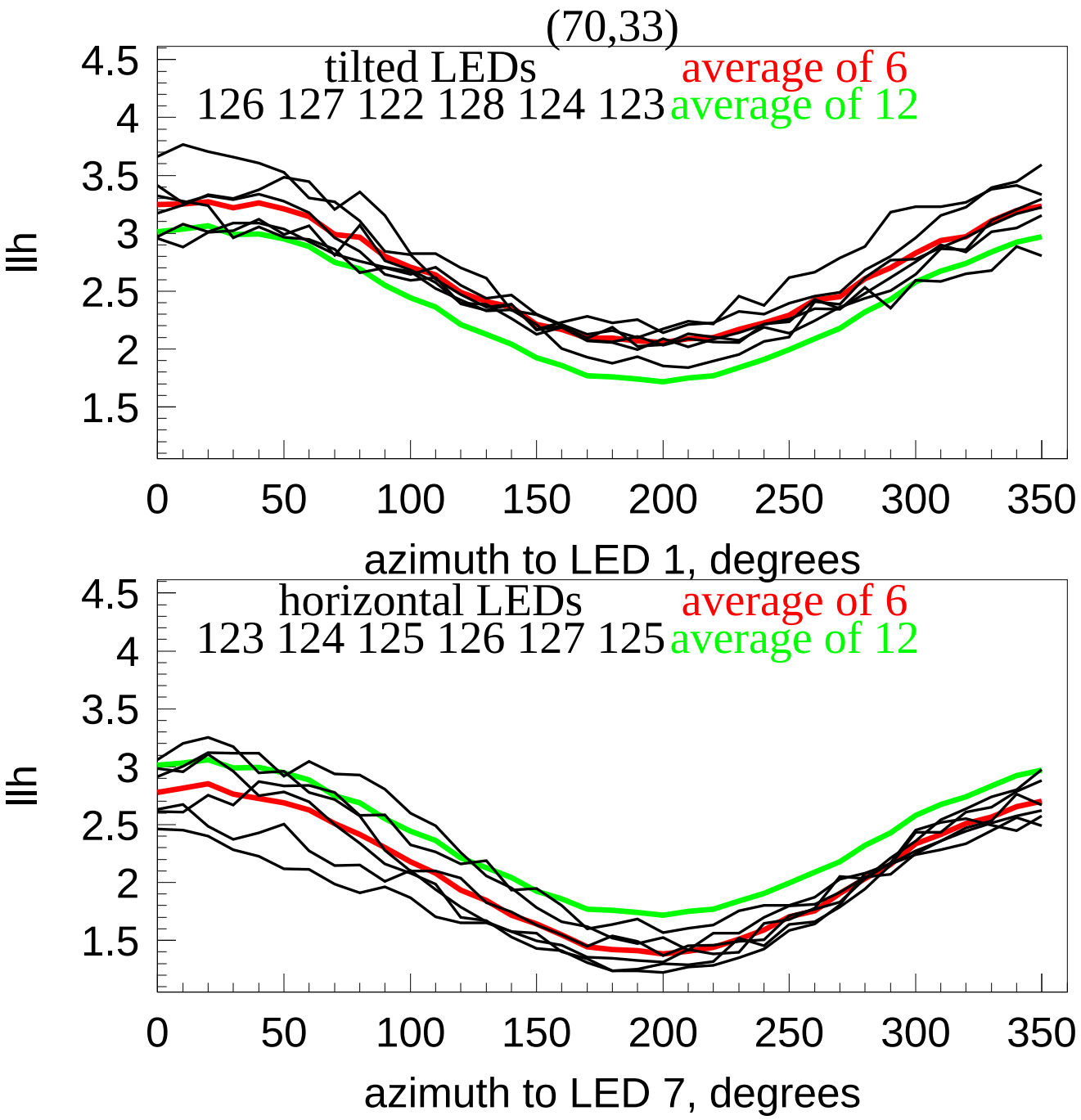

(69,36) 8.38 ± 10.25
2.44
2.42
2.4
2.38
2.36
2.34
2.32
2.3
2.28
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

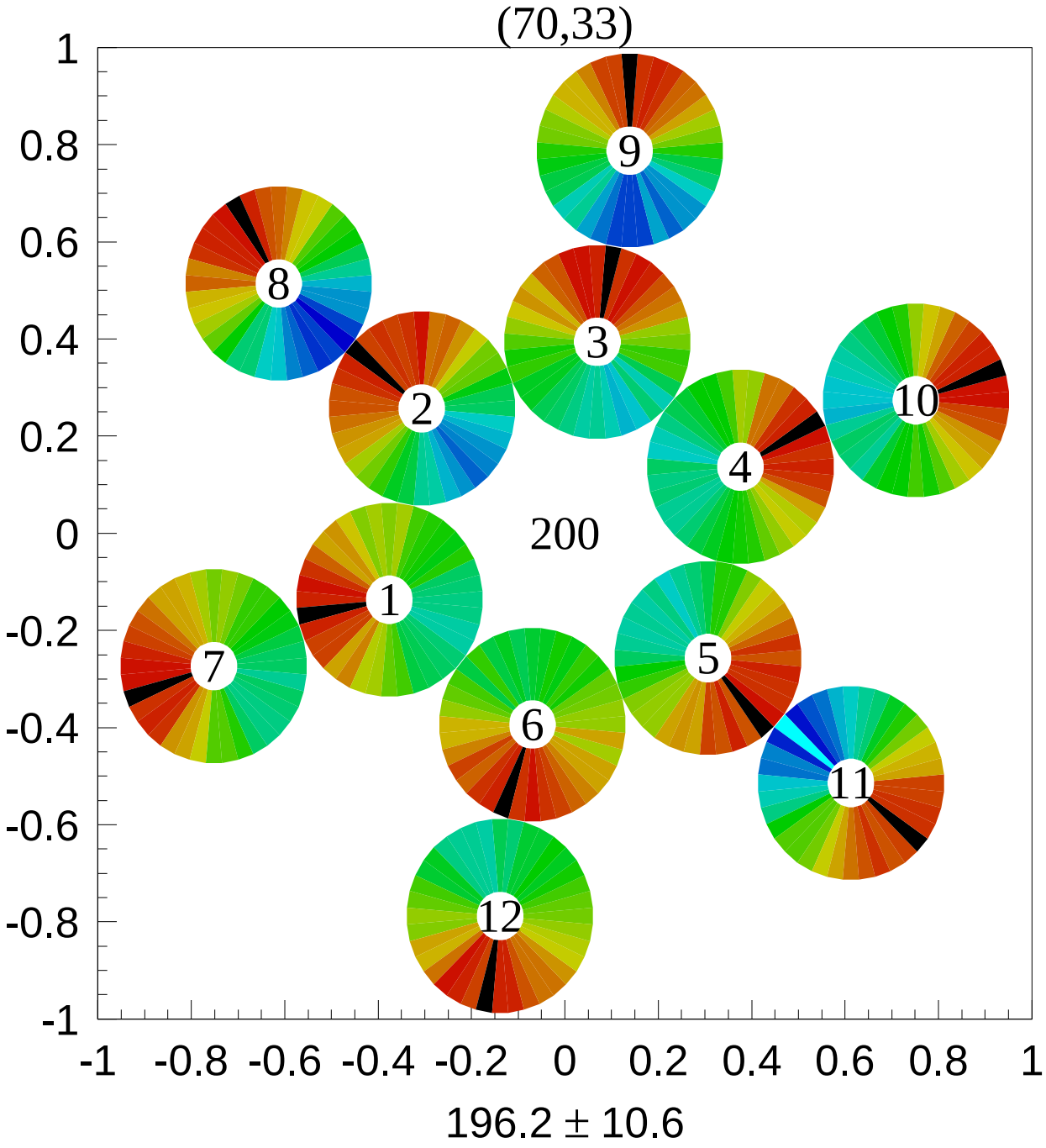

(69,37)
tilted LEDs
127 131 121 134 119 122
average of 6
average of 12
IIh
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 130 127 121 124 123
average of 6
average of 12
IIh
azimuth to LED 7, degrees

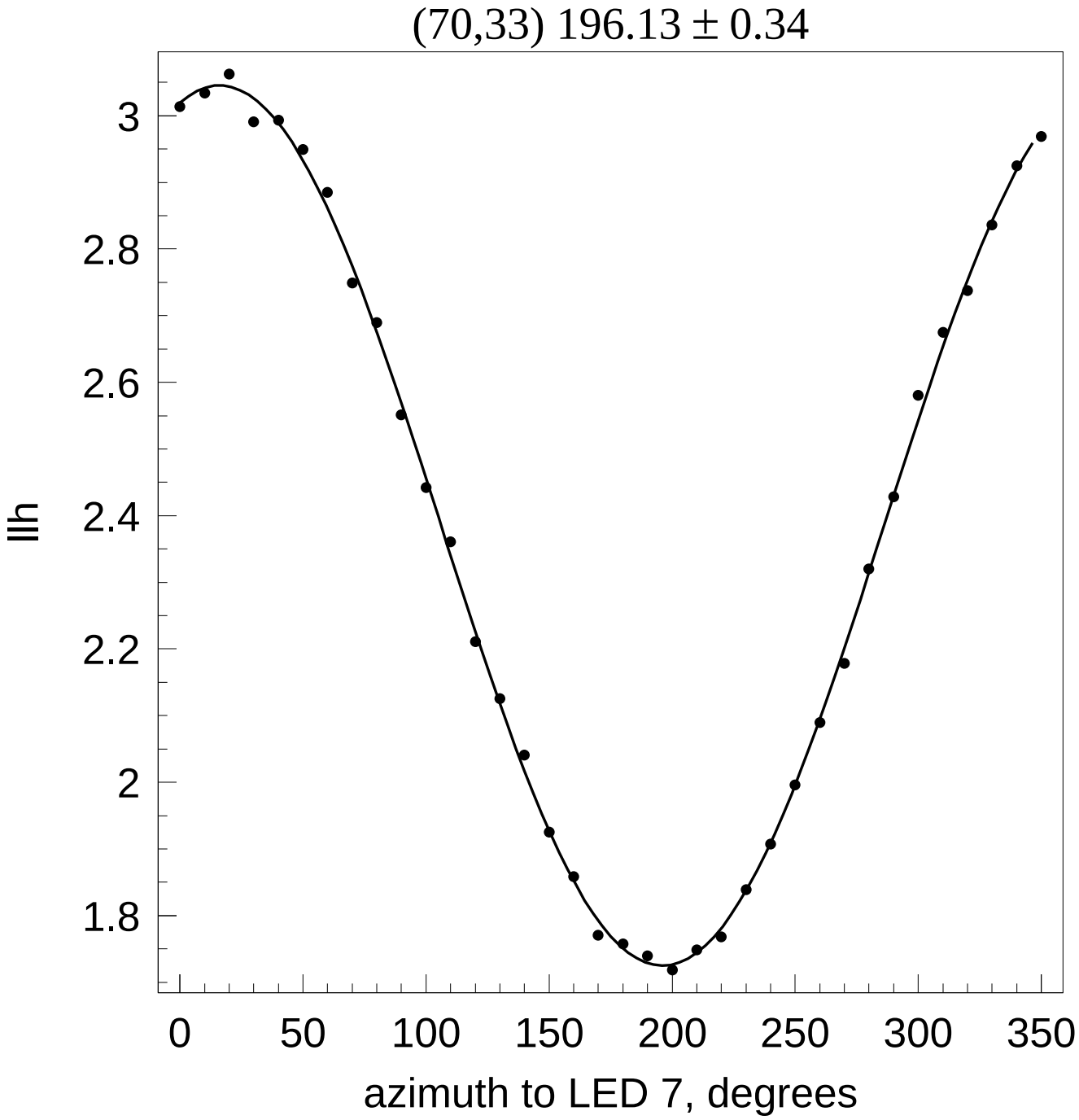

(69,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
243.6 ± 24.0
250
1
2
3
4
5
6
7
8
9
10
11
12

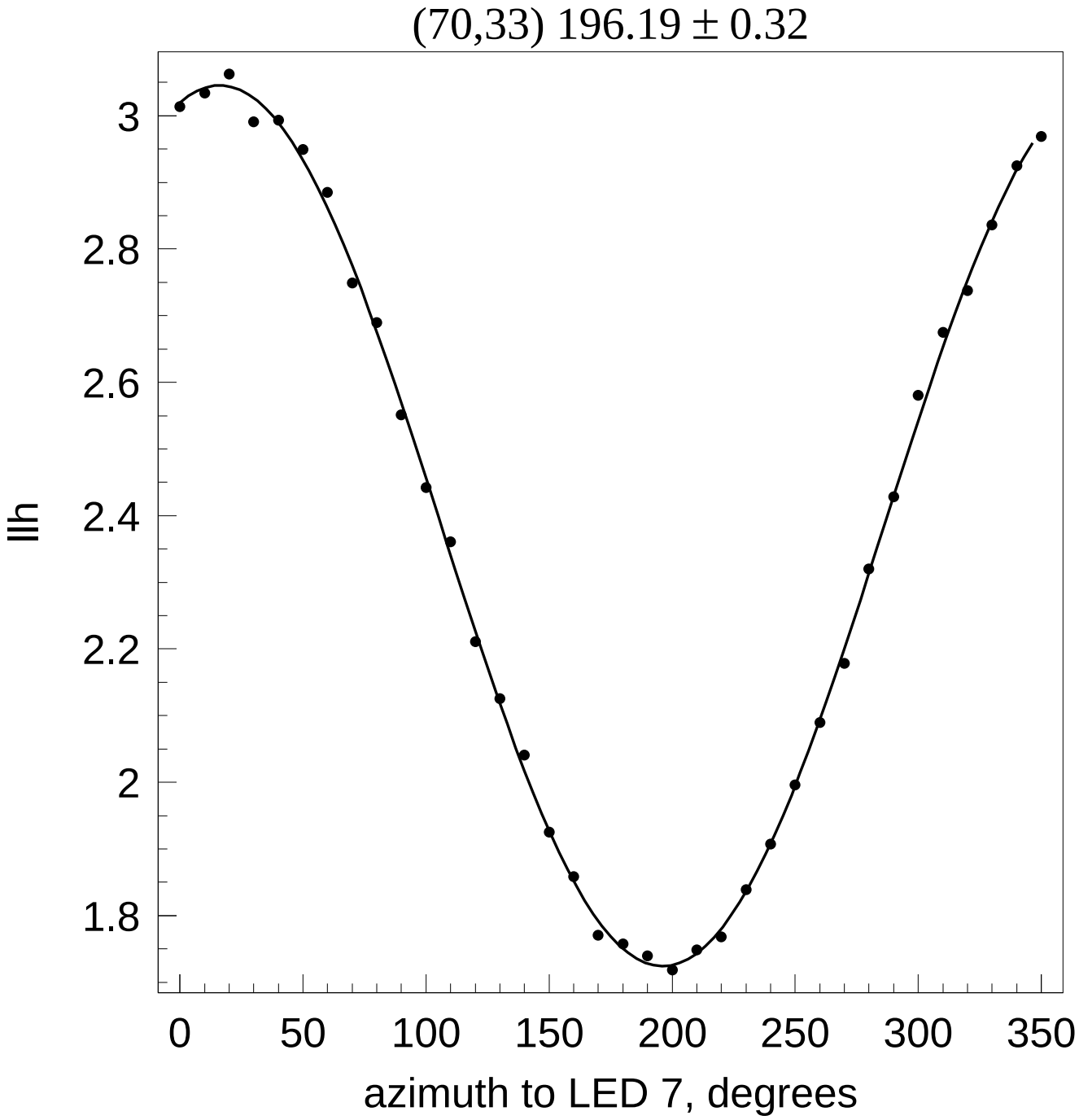

(69,37) 242.33 ± 1.36
3.2
3.1
3
2.9
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

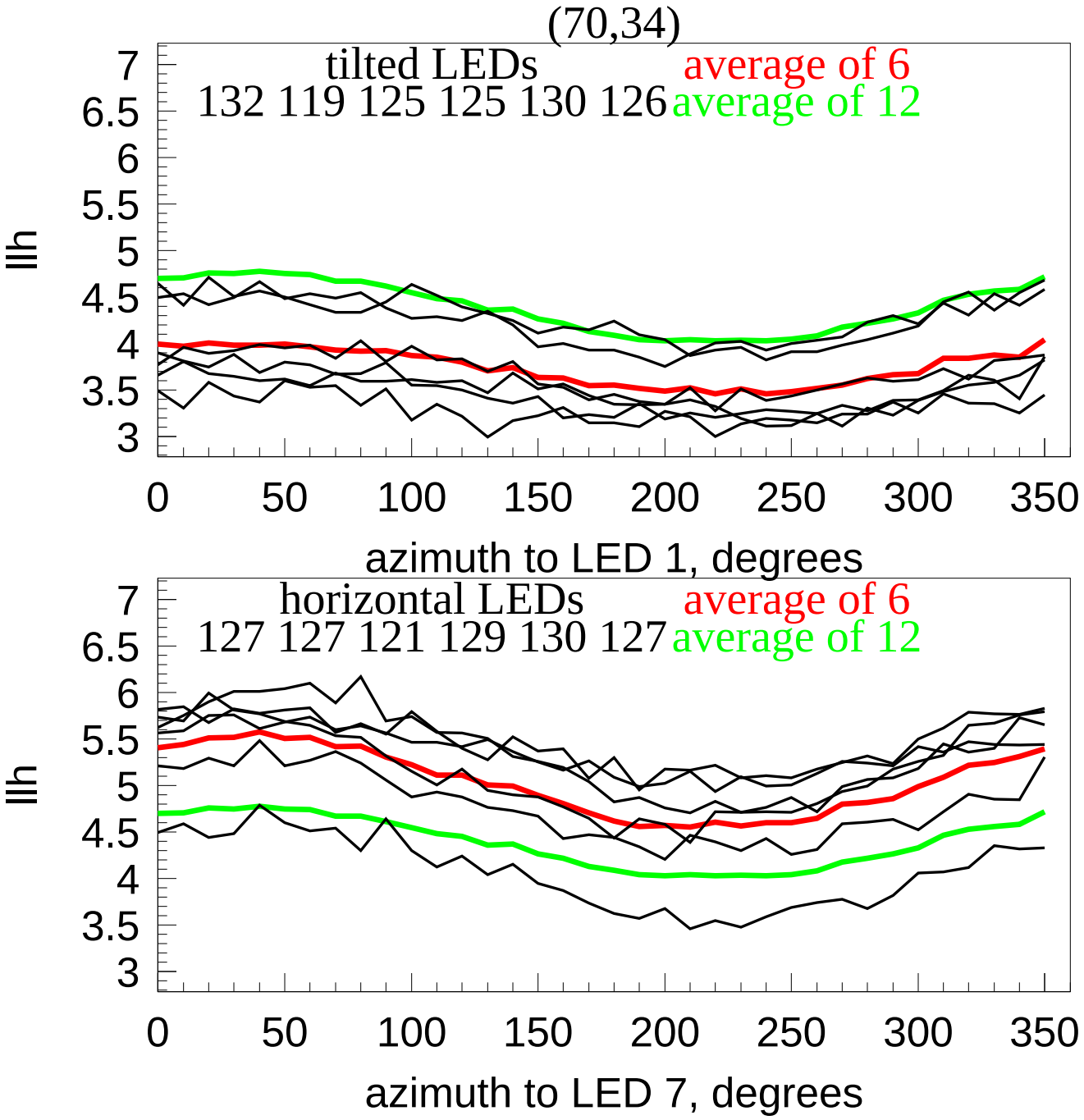

(69,37) 242.36 ± 1.37
3.2
3.1
3
2.9
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

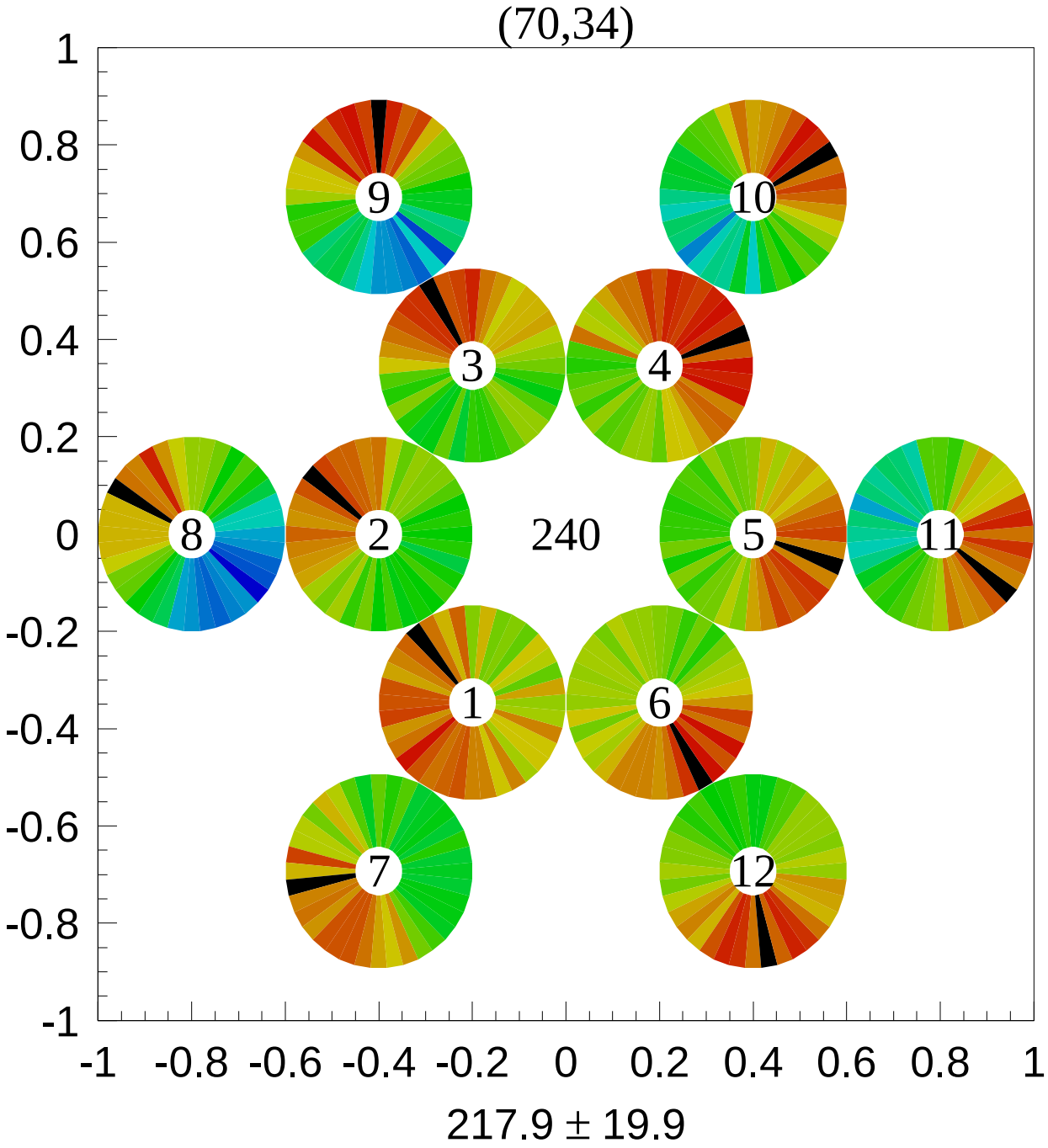

(70,33)
tilted LEDs
126 127 122 128 124 123
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 124 125 126 127 125
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

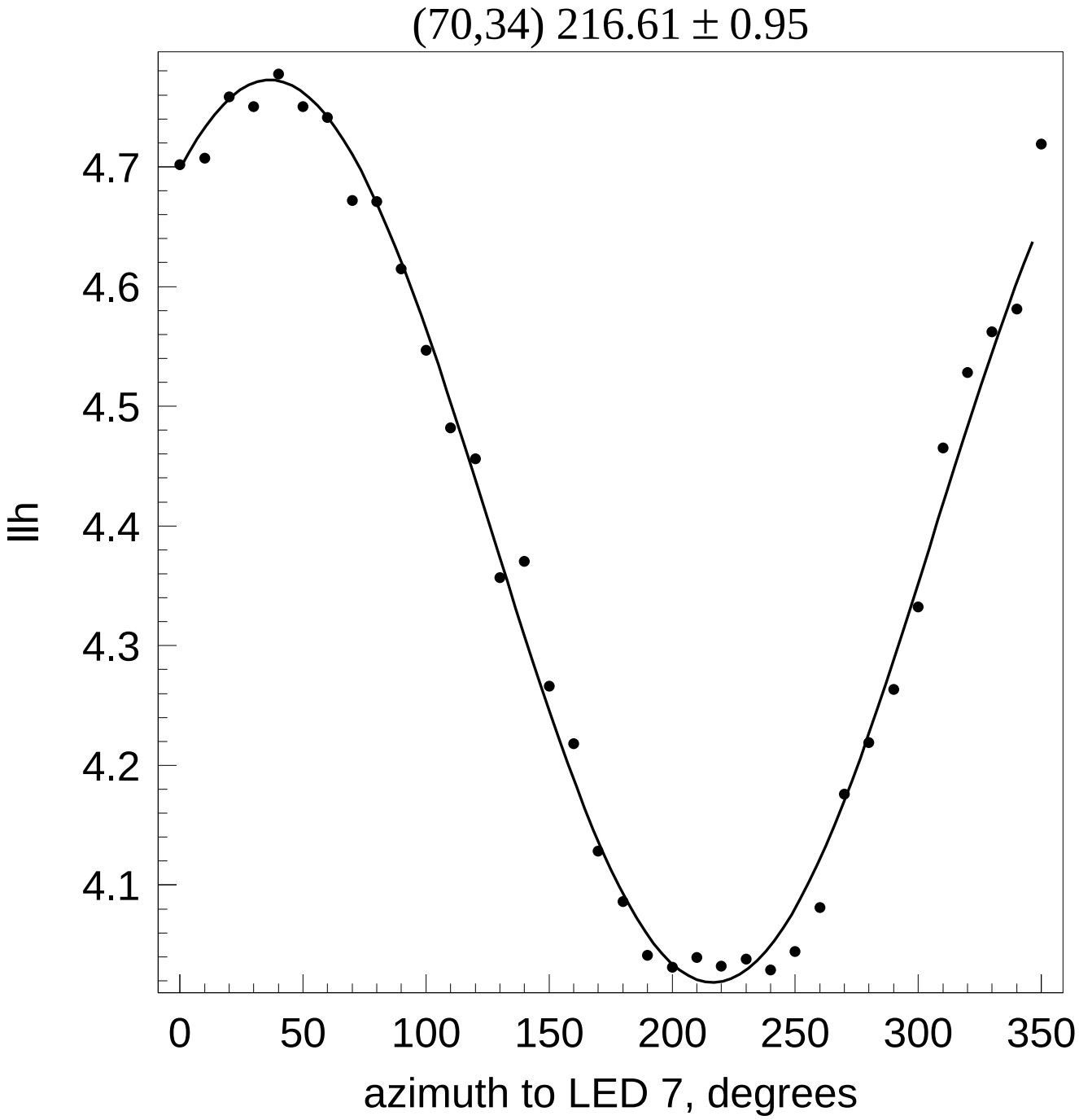

(70,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
196.2 ± 10.6
200
1
2
3
4
5
6
7
8
9
10
11
12

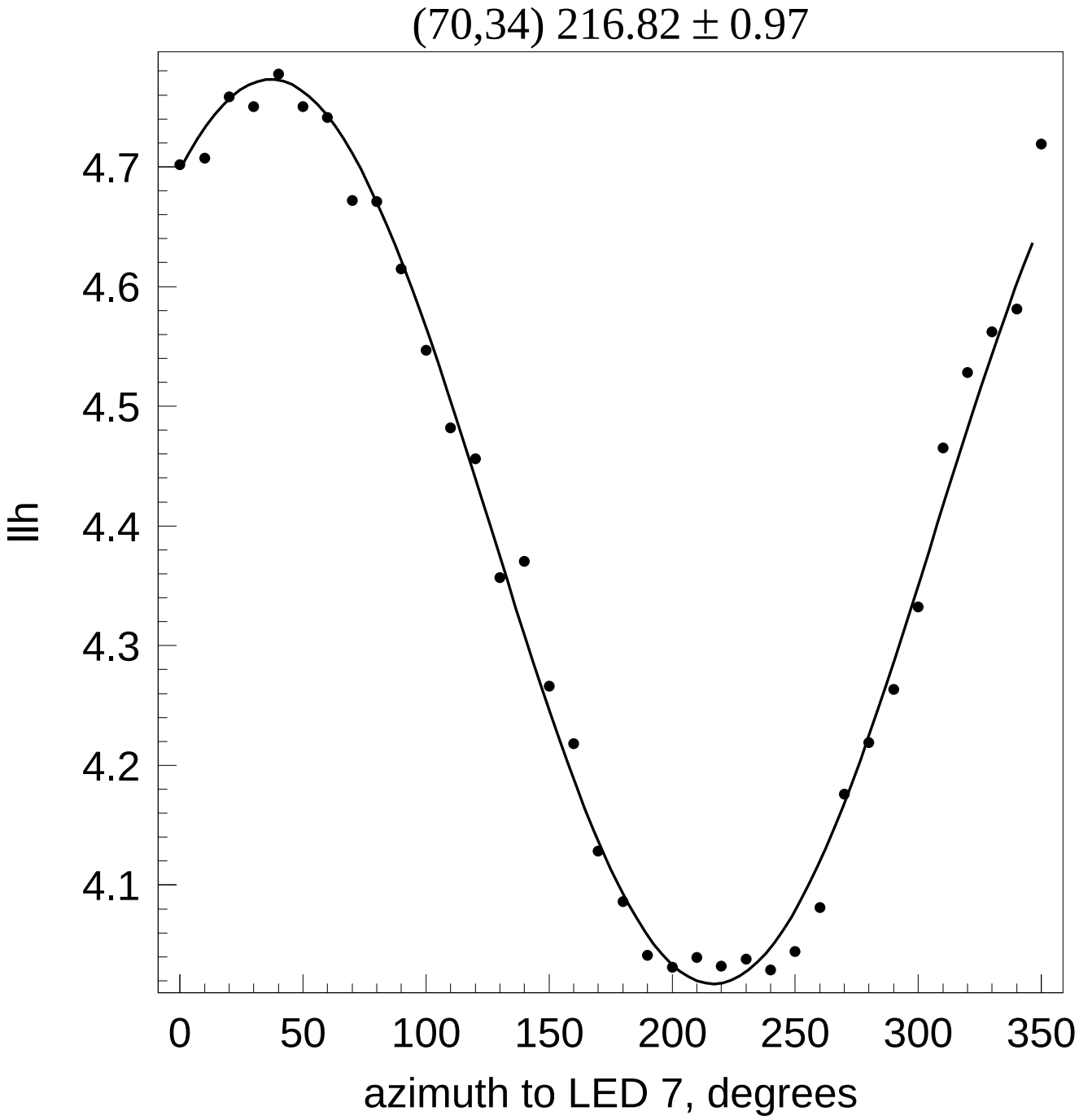

(70,33) 196.13 ± 0.34
3
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

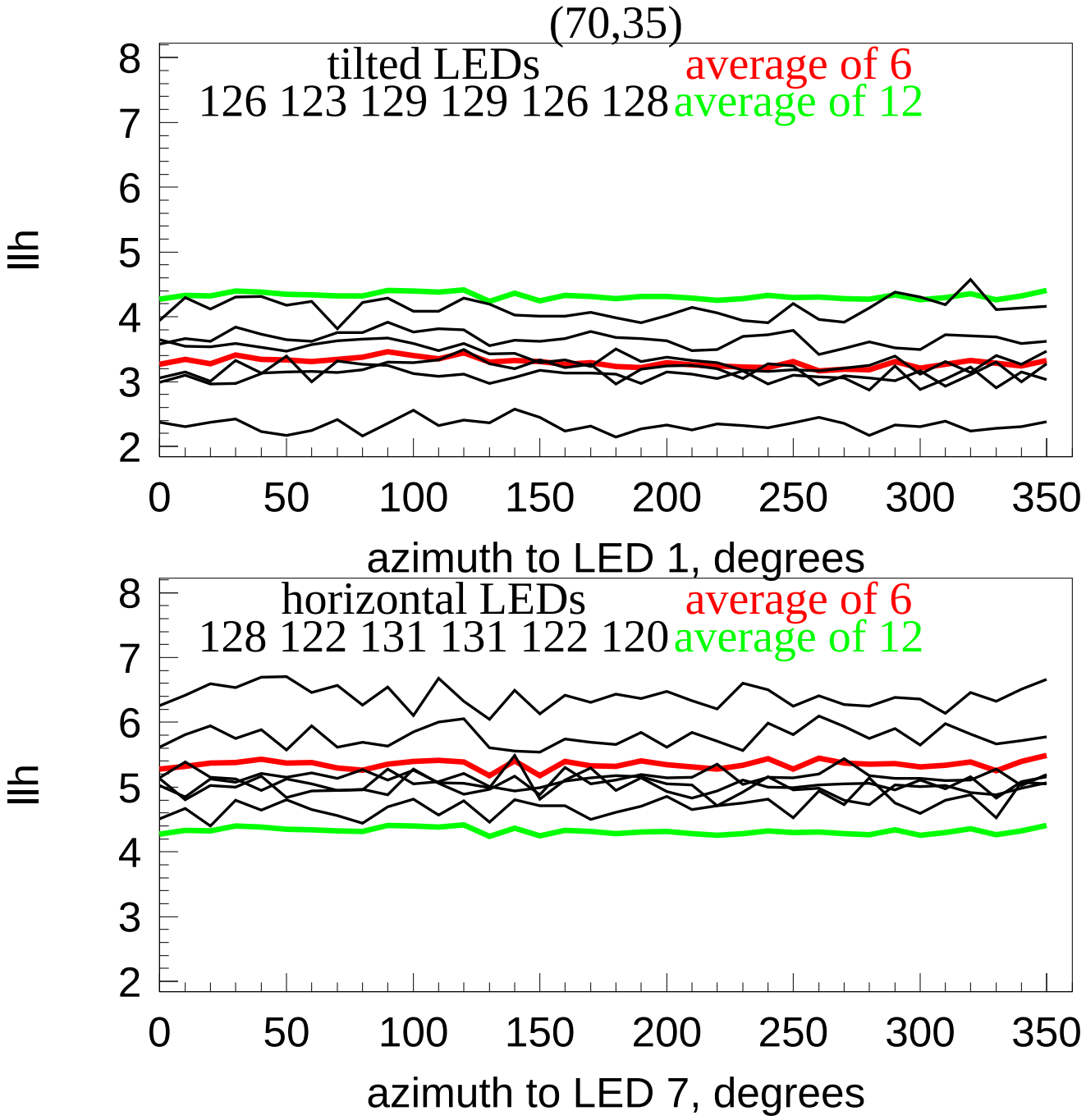

(70,33) 196.19 ± 0.32
3
2.8
2.6
2.4
2.2
2
1.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

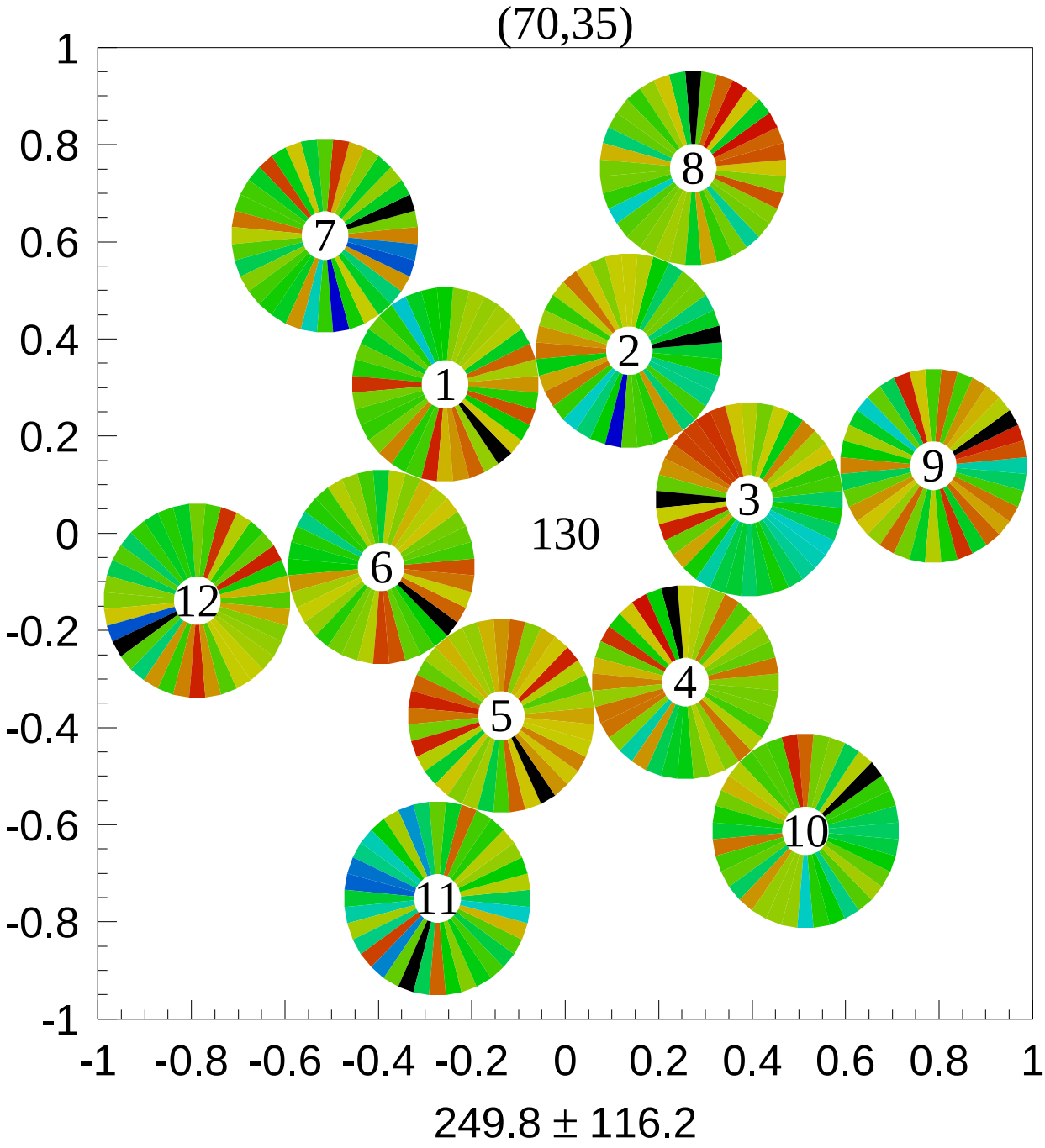

(70,34)
tilted LEDs
132 119 125 125 130 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 127 121 129 130 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

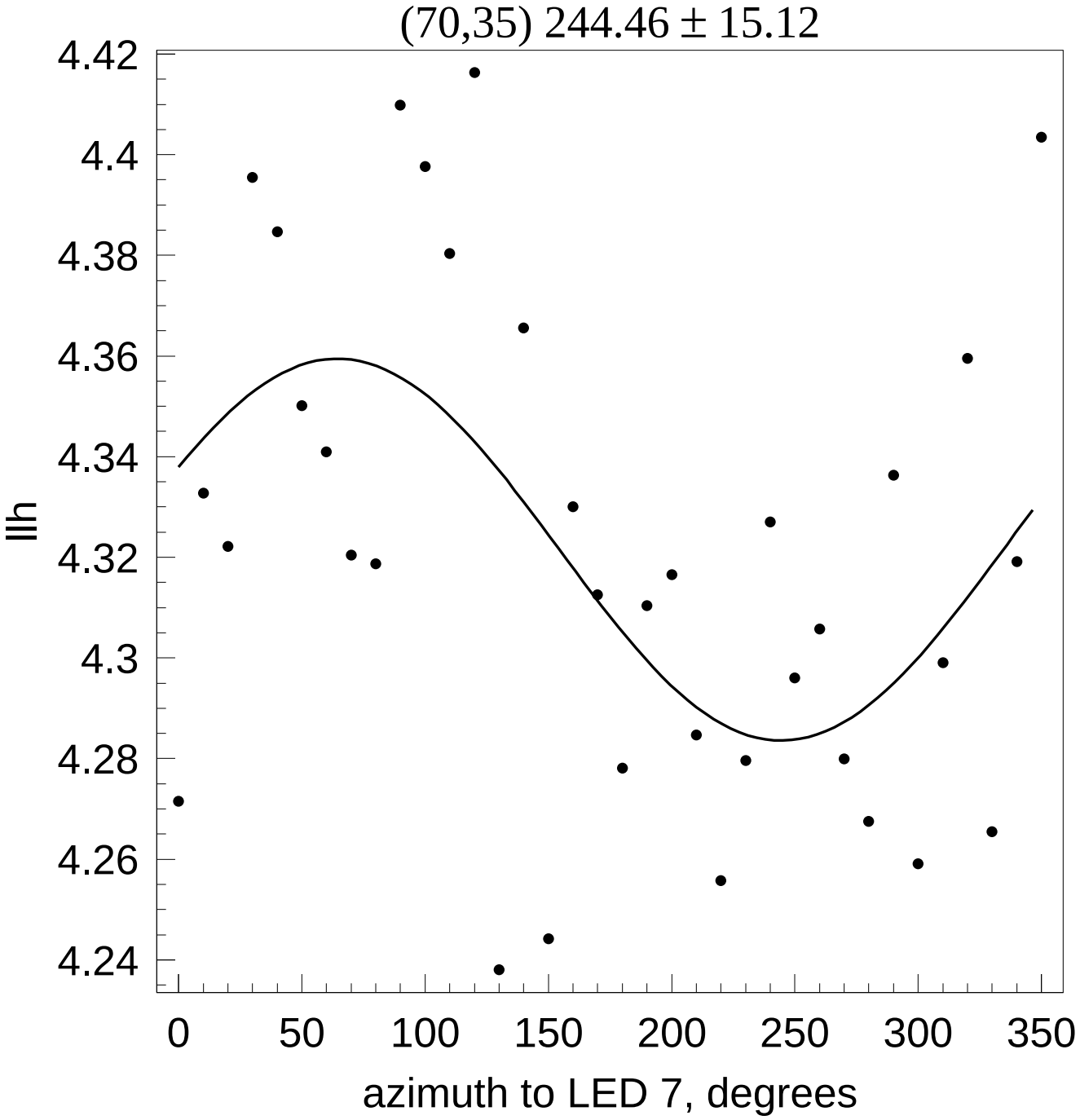

(70,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
240
5
11
1
6
7
12
217.9 ± 19.9

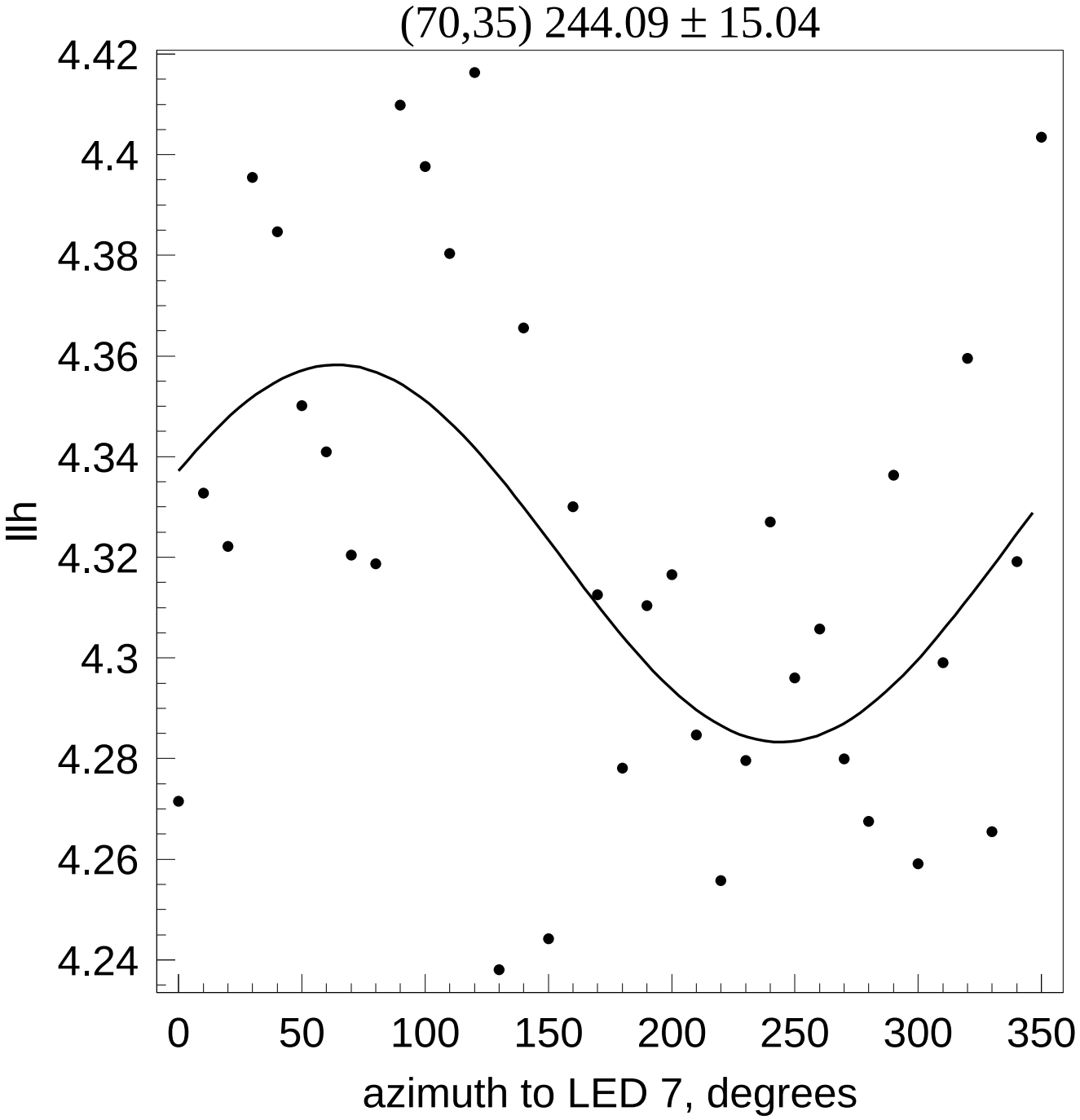

(70,34) 216.61 ± 0.95
4.7
4.6
4.5
4.4
4.3
4.2
4.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

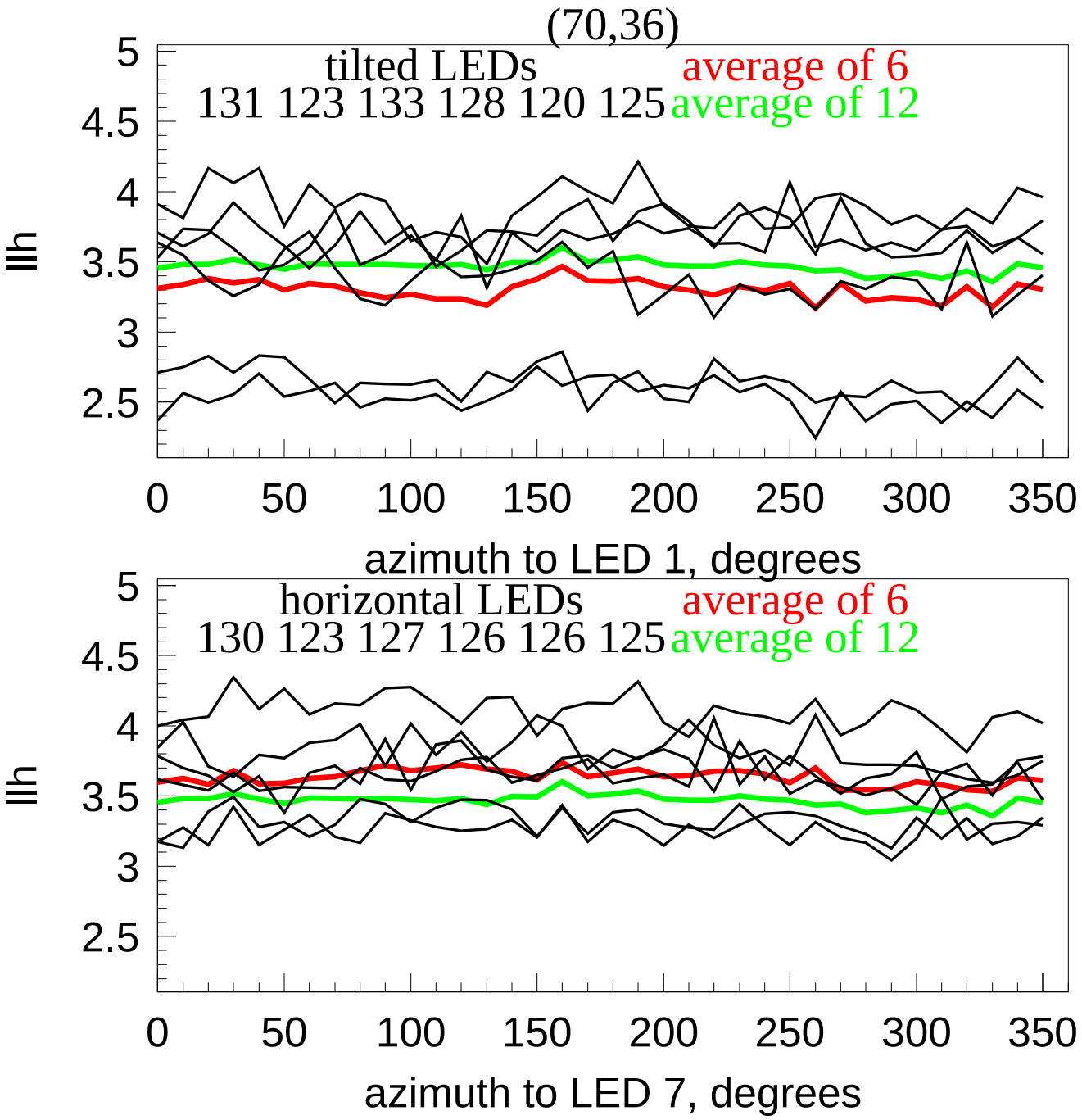

(70,34) 216.82 ± 0.97
4.7
4.6
4.5
4.4
4.3
4.2
4.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

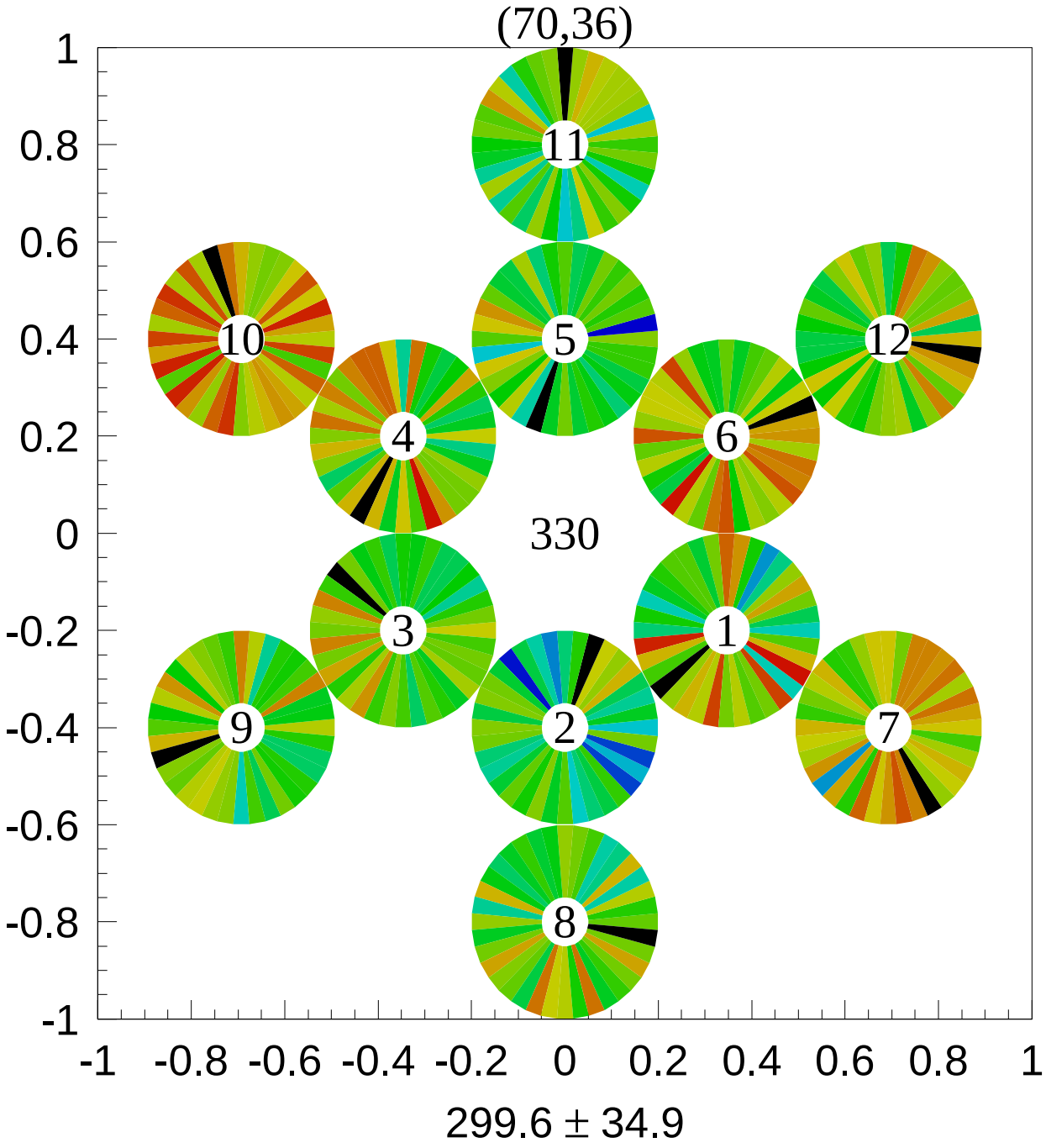

(70,35)
tilted LEDs
126 123 129 129 126 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 122 131 131 122 120
average of 6
average of 12
llh
azimuth to LED 7, degrees

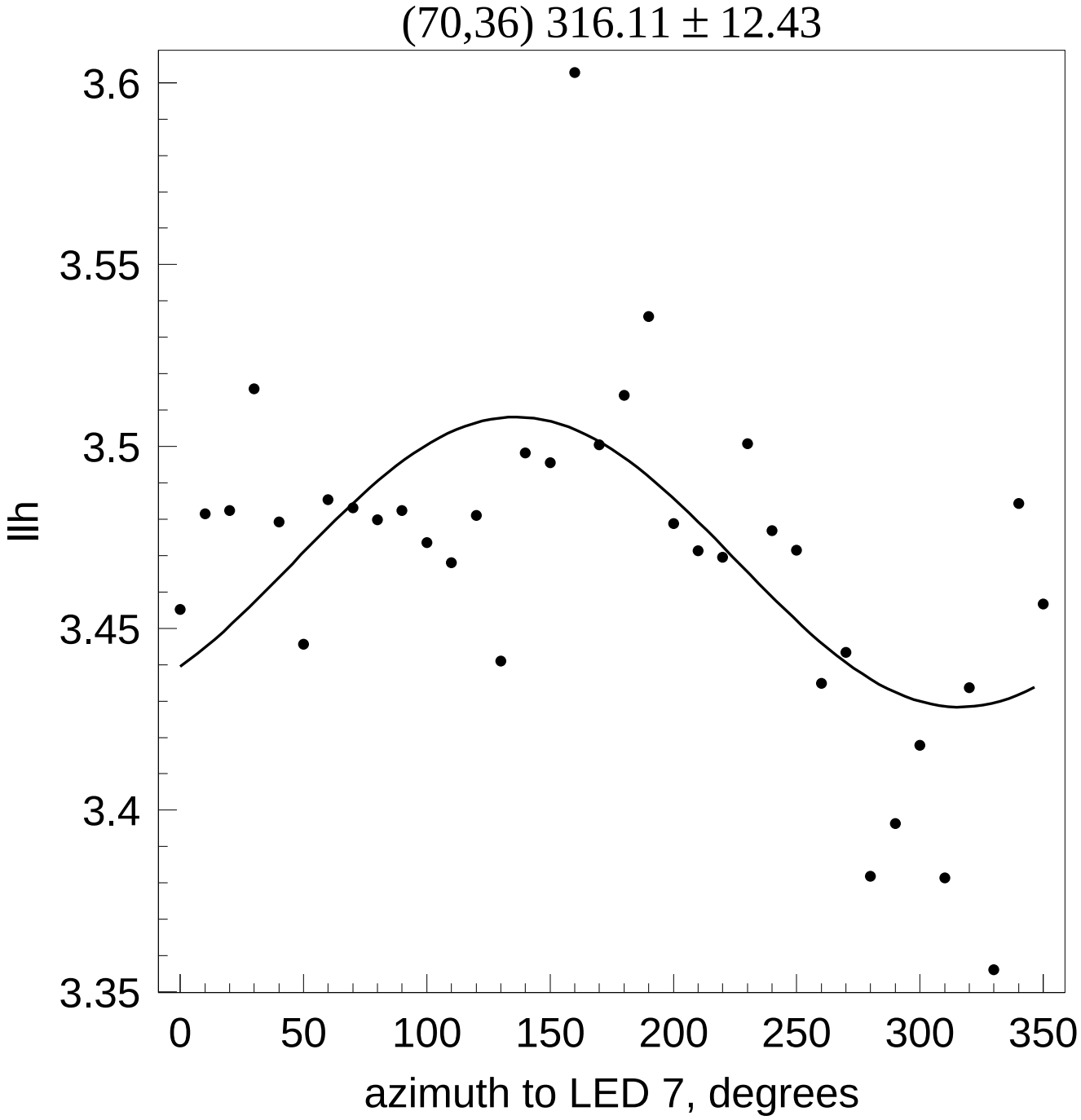

(70,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
249.8 ± 116.2
130
1
2
3
4
5
6
7
8
9
10
11
12

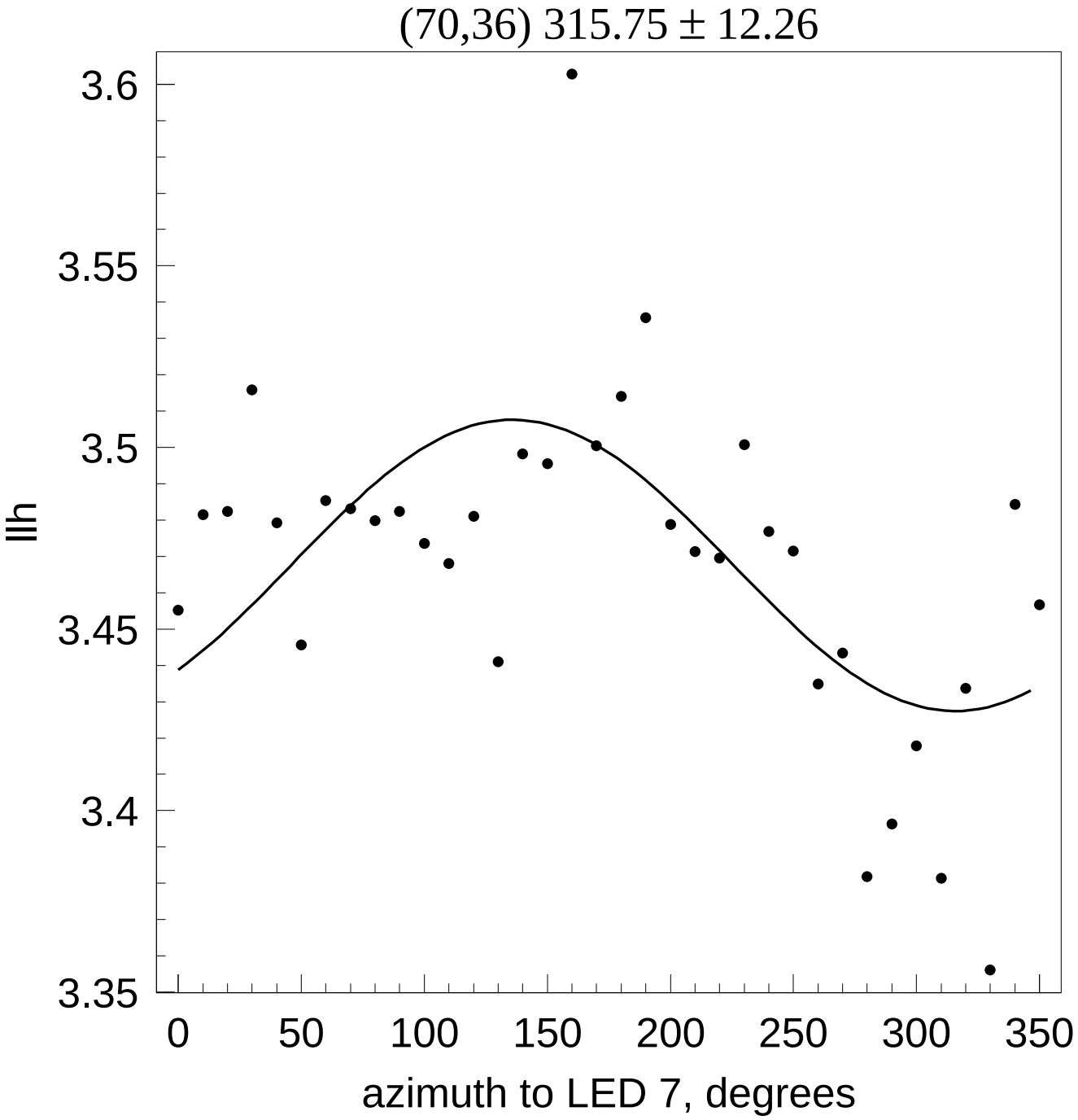

(70,35) 244.46 ± 15.12
4.42
4.4
4.38
4.36
4.34
4.32
4.3
4.28
4.26
4.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

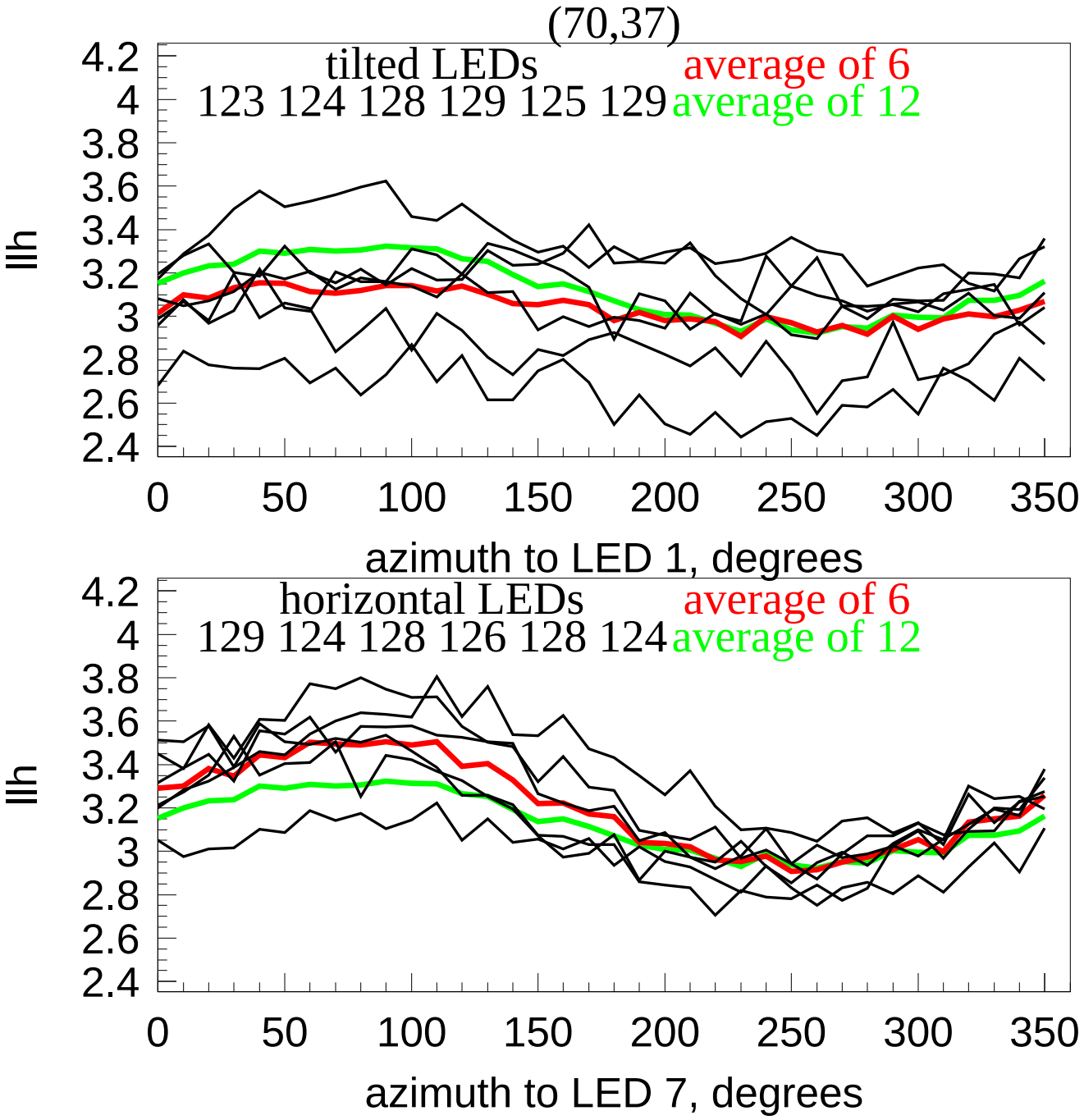

(70,35) 244.09 ± 15.04
4.42
4.4
4.38
4.36
4.34
4.32
4.3
4.28
4.26
4.24
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

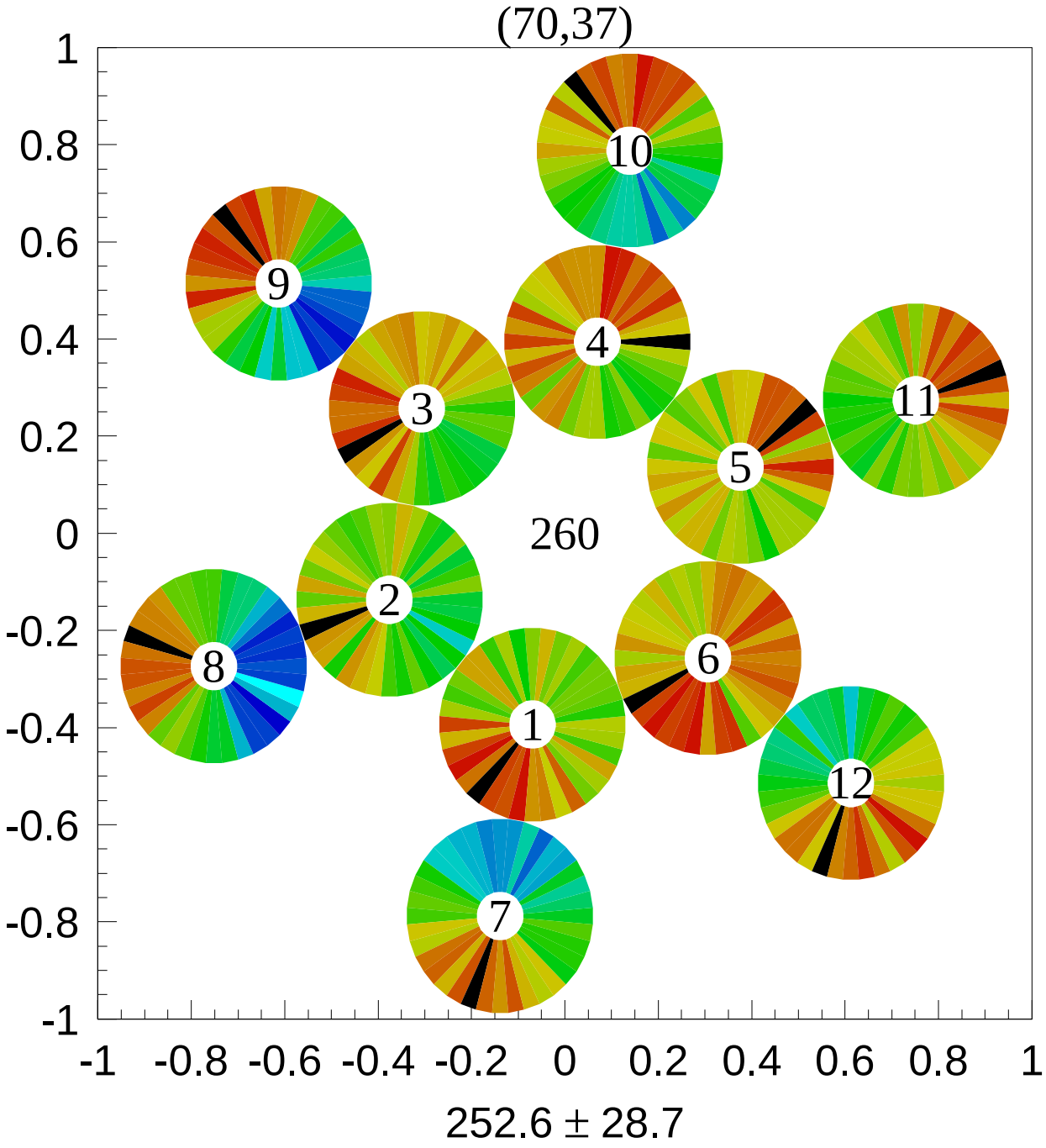

(70,36)
tilted LEDs
131 123 133 128 120 125
average of 6
average of 12
IIh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 123 127 126 126 125
average of 6
average of 12
IIh
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

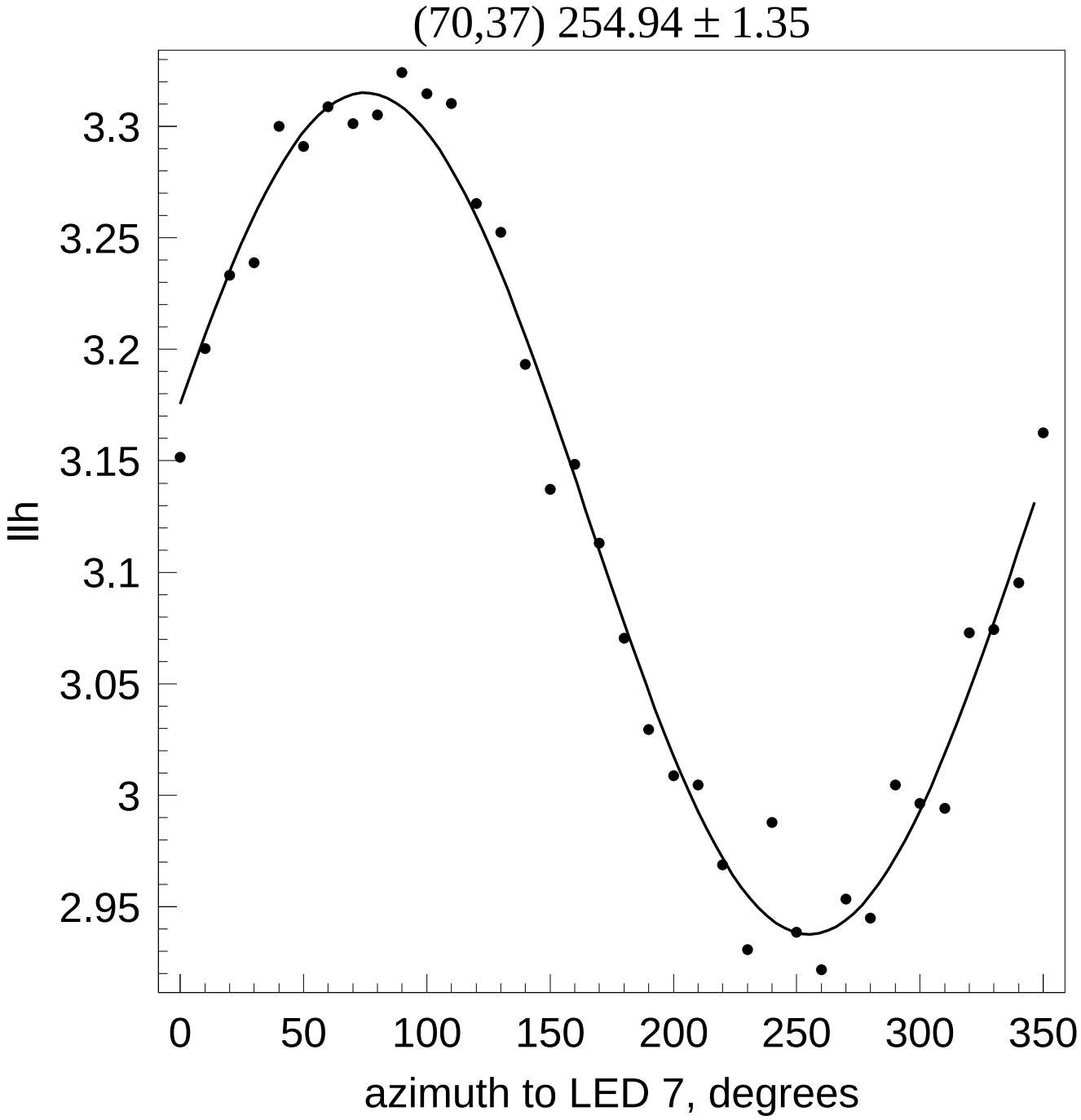

(70,36)
11
10
5
12
4
6
330
3
1
9
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
299.6 ± 34.9

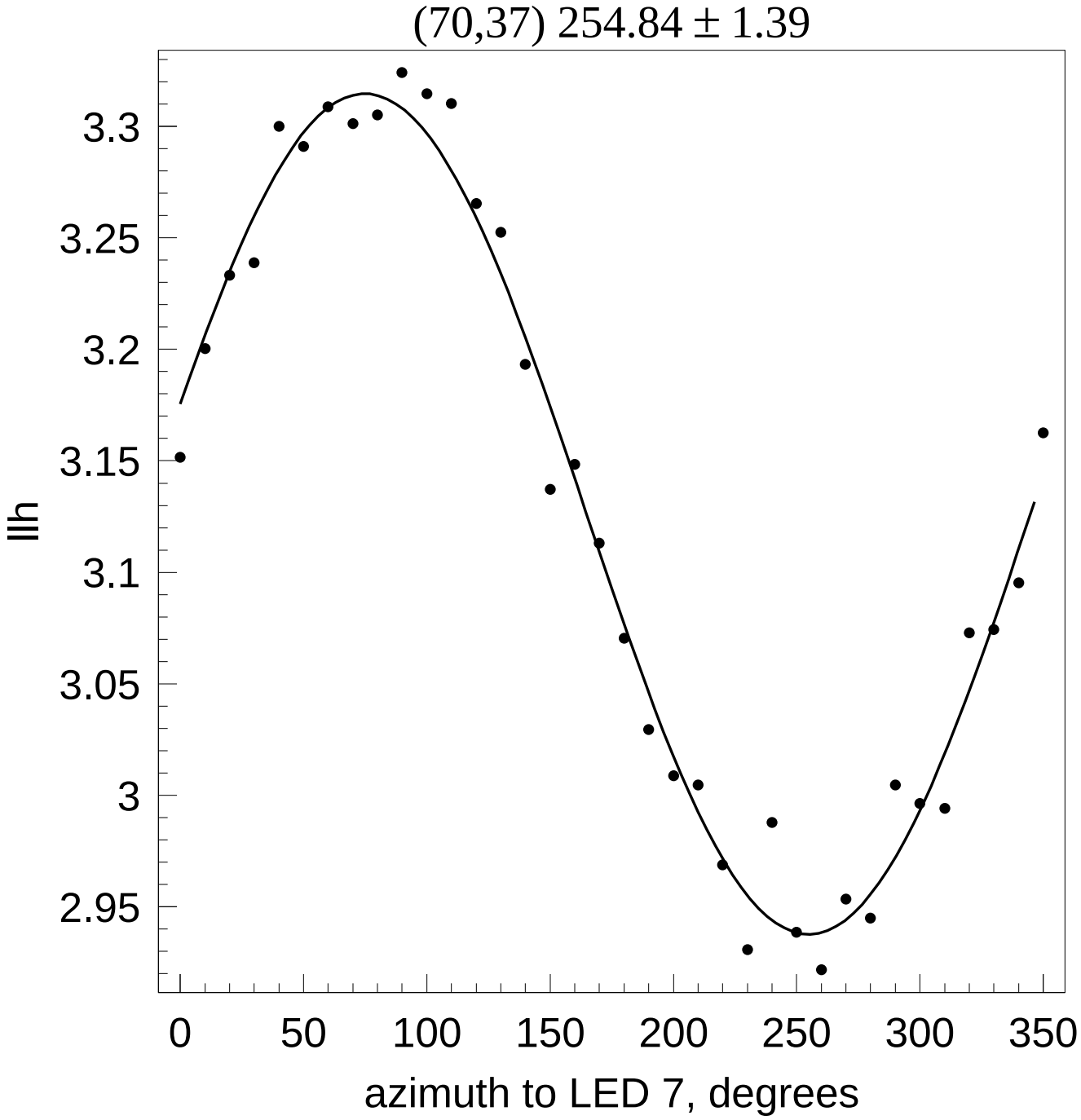

(70,36) 316.11 ± 12.43
3.6
3.55
3.5
3.45
3.4
3.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

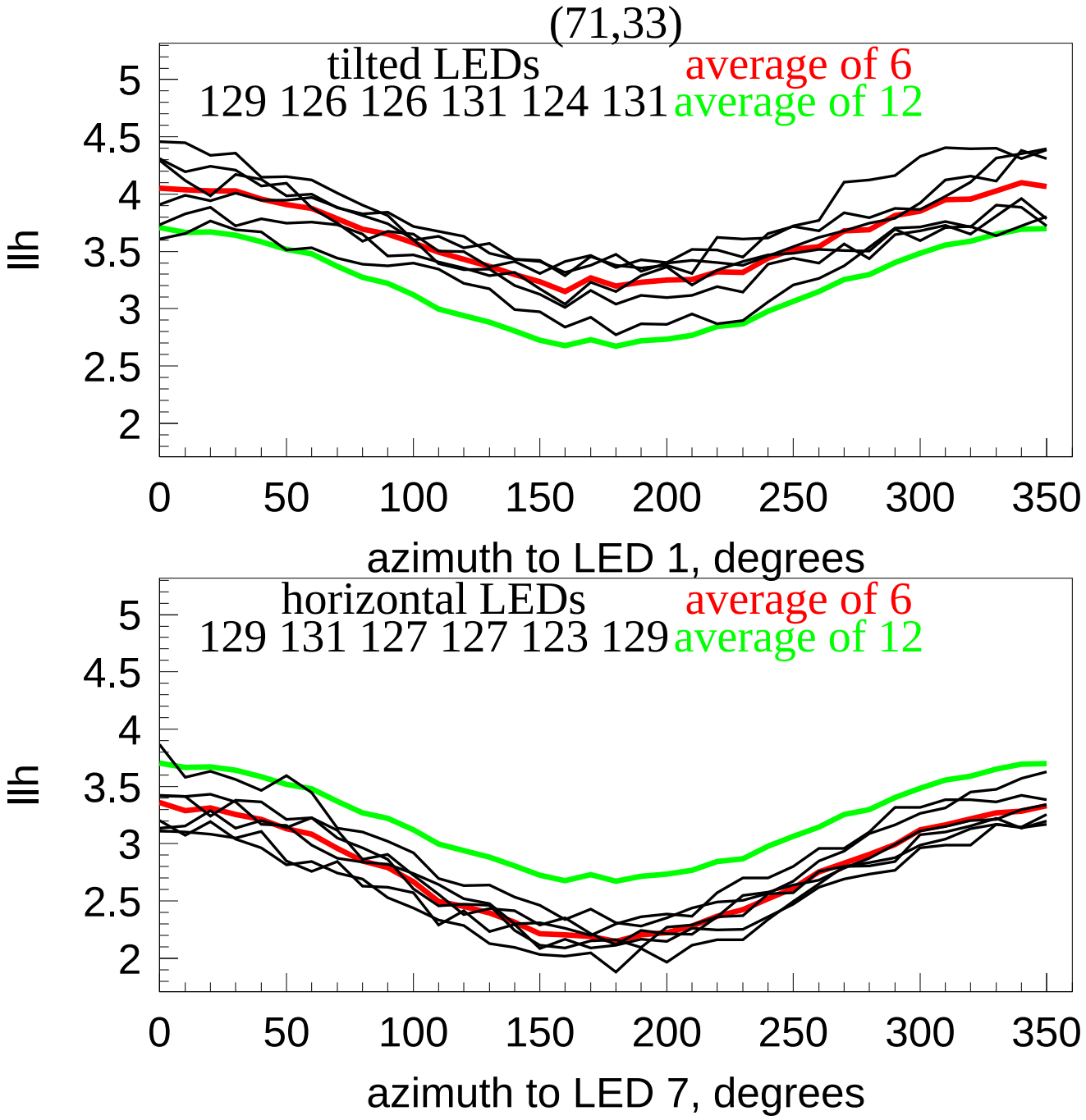

(70,36) 315.75 ± 12.26
3.6
3.55
3.5
3.45
3.4
3.35
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

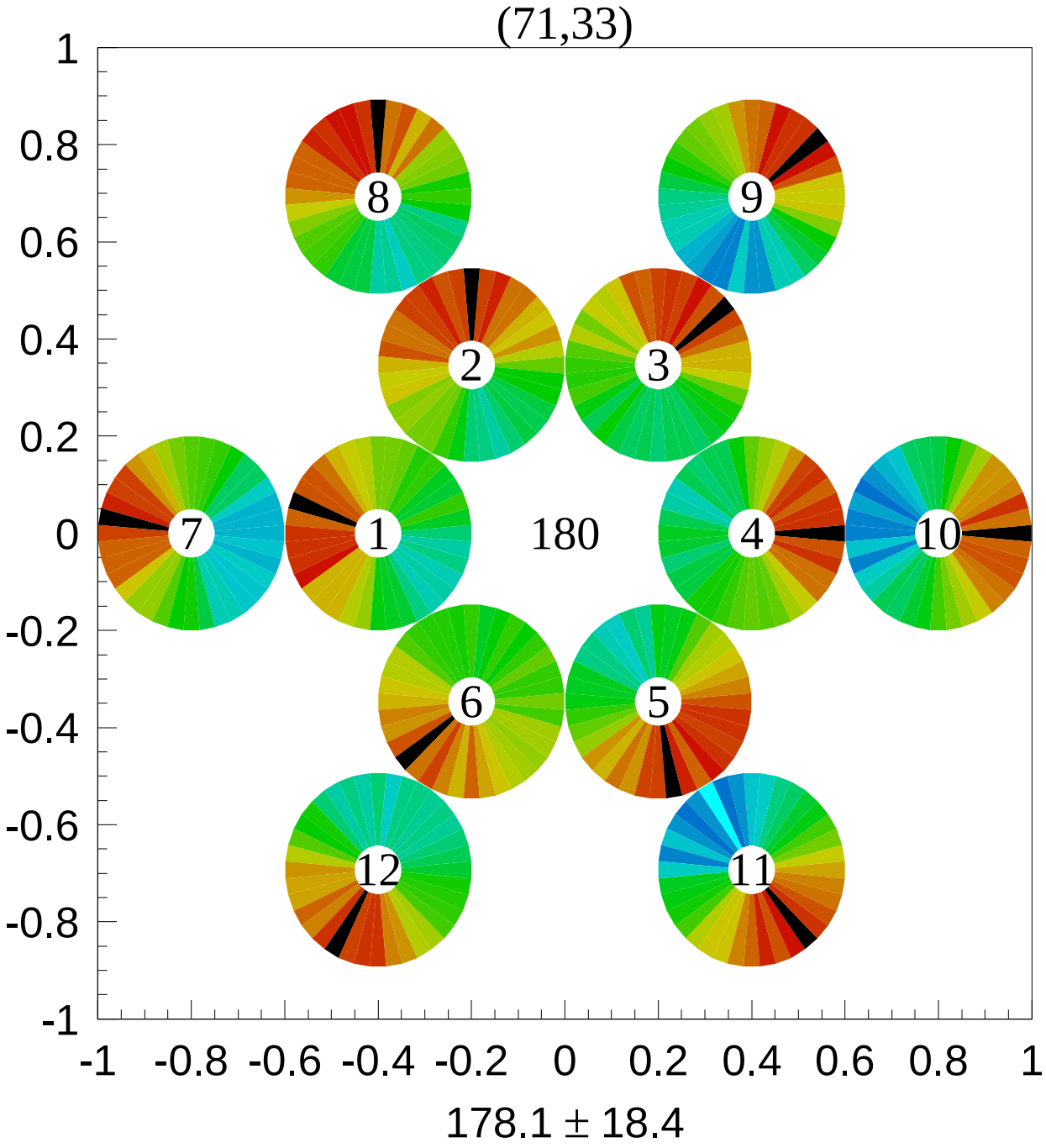

(70,37)
tilted LEDs
123 124 128 129 125 129
average of 6
average of 12
llh
4.2
4
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 124 128 126 128 124
average of 6
average of 12
llh
azimuth to LED 7, degrees

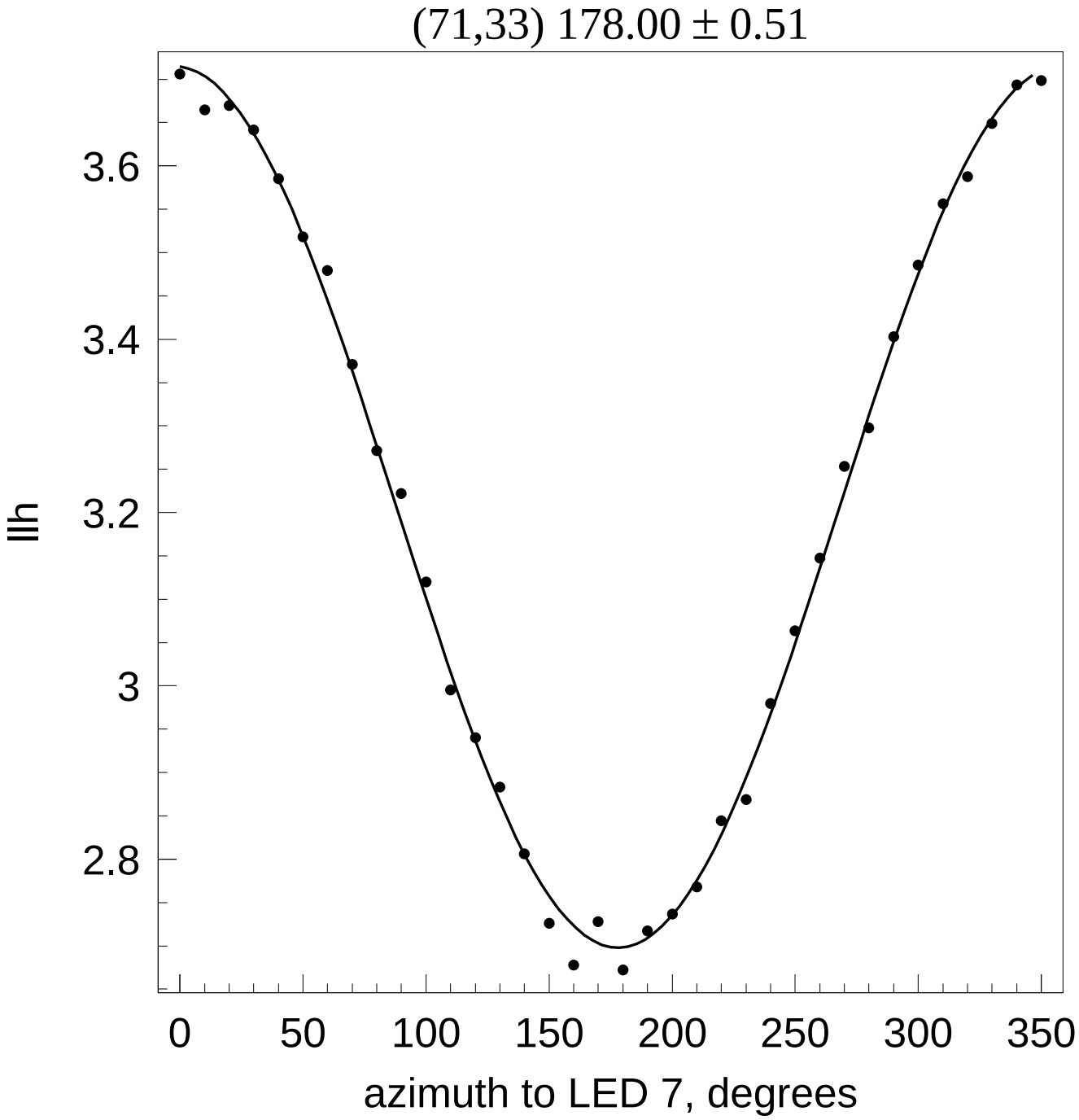

(70,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
9
4
3
11
5
260
2
8
6
1
12
7
252.6 ± 28.7

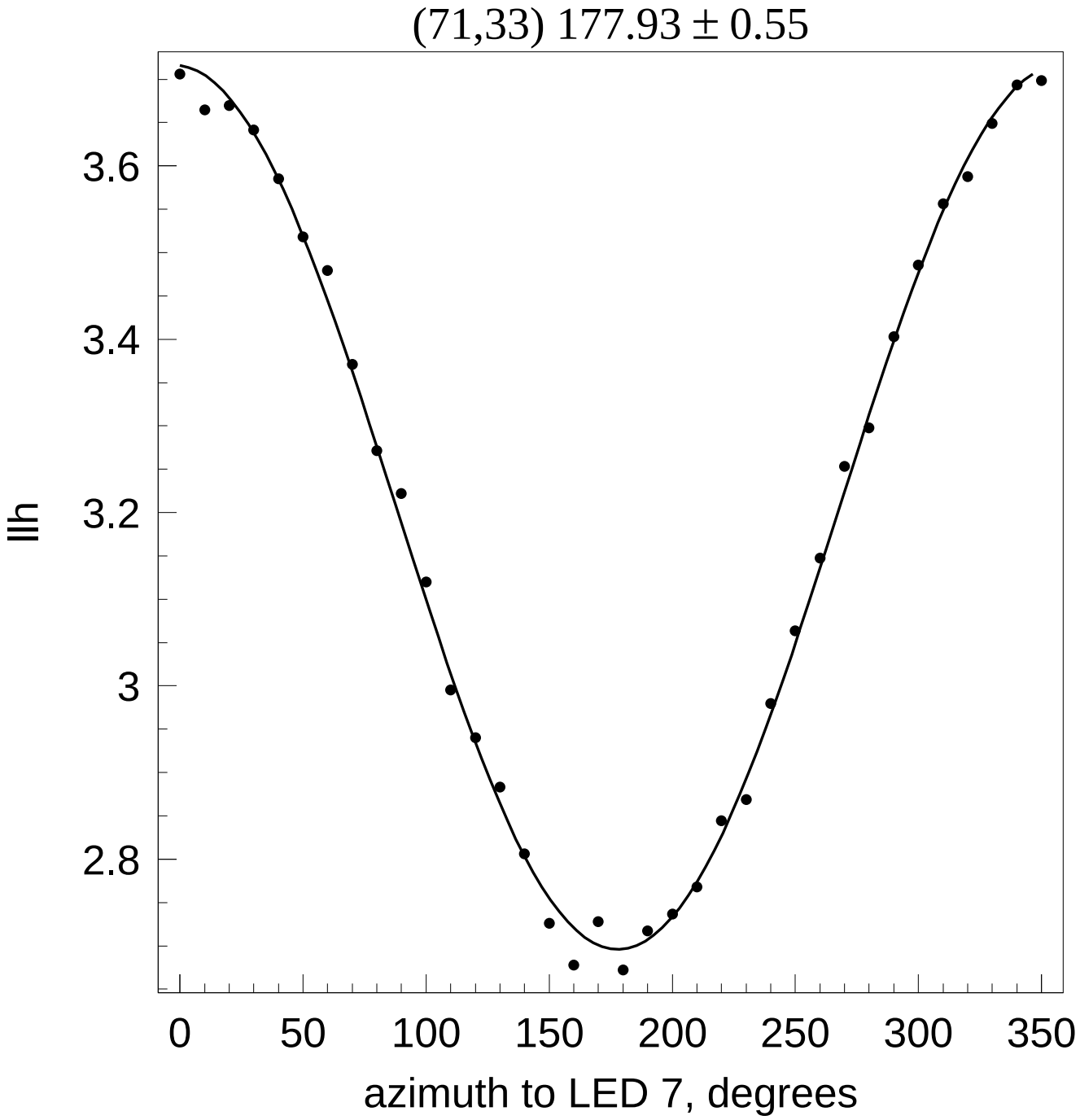

(70,37) 254.94 ± 1.35
llh
3.3
3.25
3.2
3.15
3.1
3.05
3
2.95
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

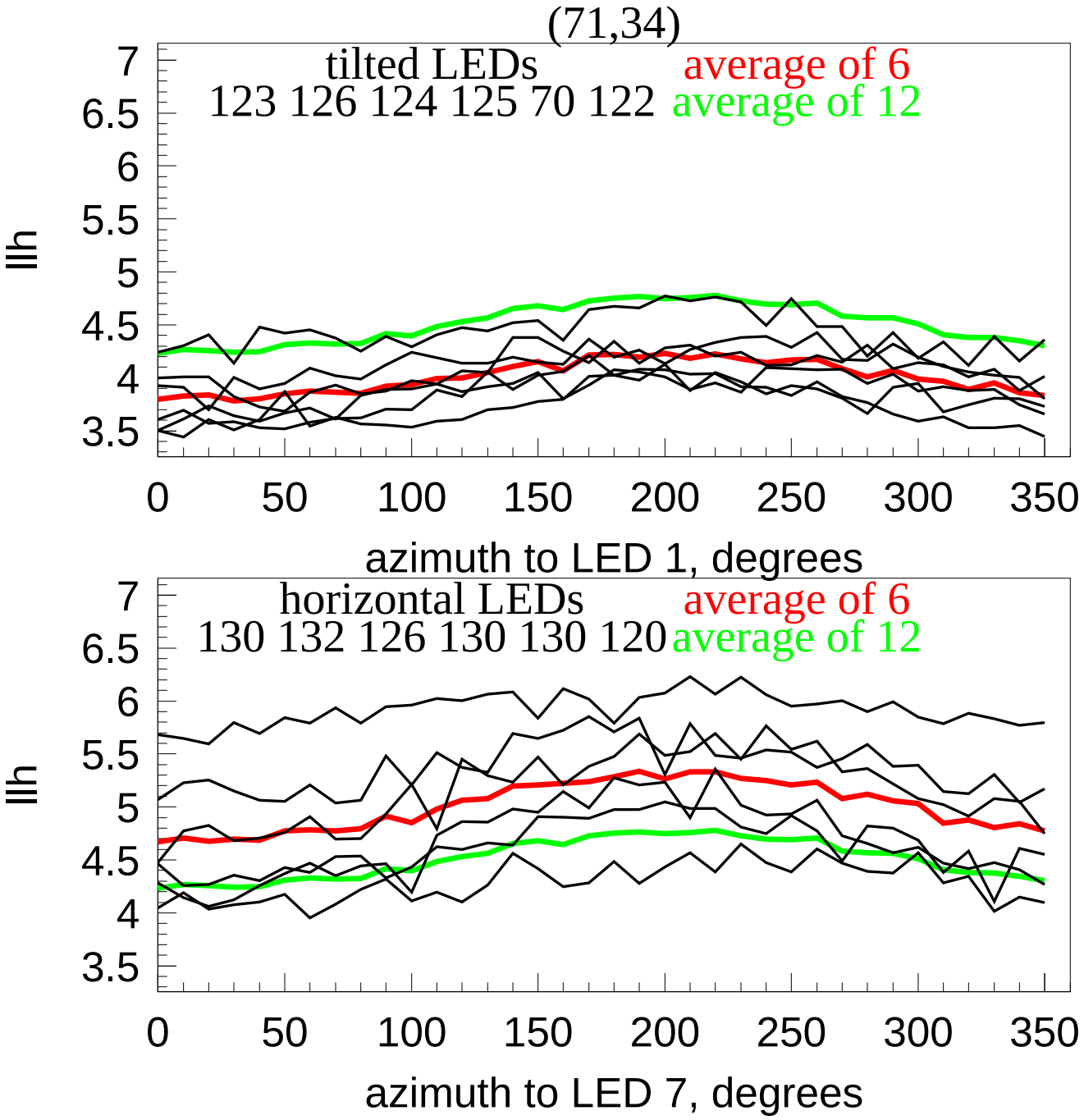

(70,37) 254.84 ± 1.39
llh
3.3
3.25
3.2
3.15
3.1
3.05
3
2.95
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

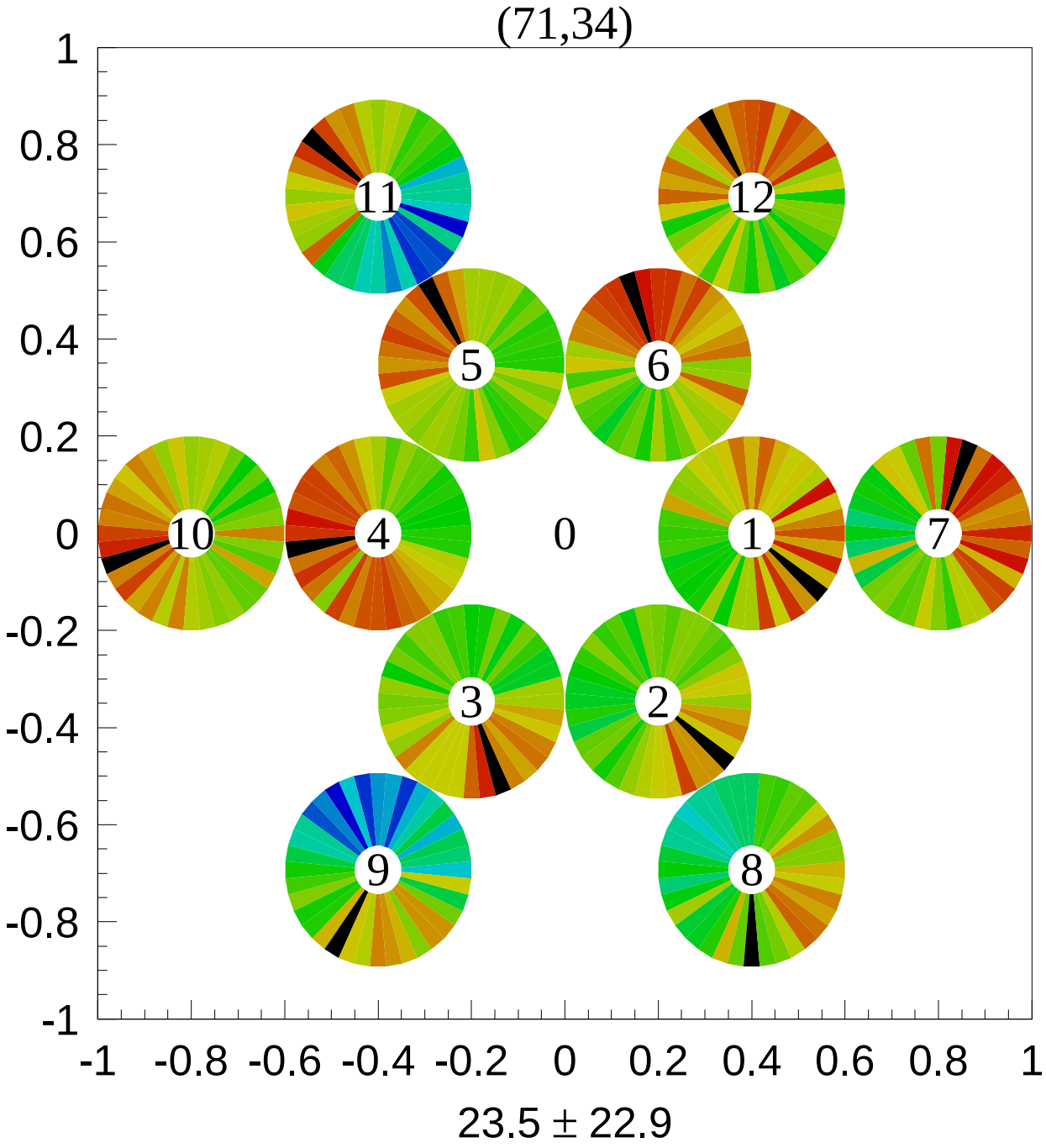

(71,33)
tilted LEDs
129 126 126 131 124 131
average of 6
average of 12
IIh
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
129 131 127 127 123 129
average of 6
average of 12
IIh
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

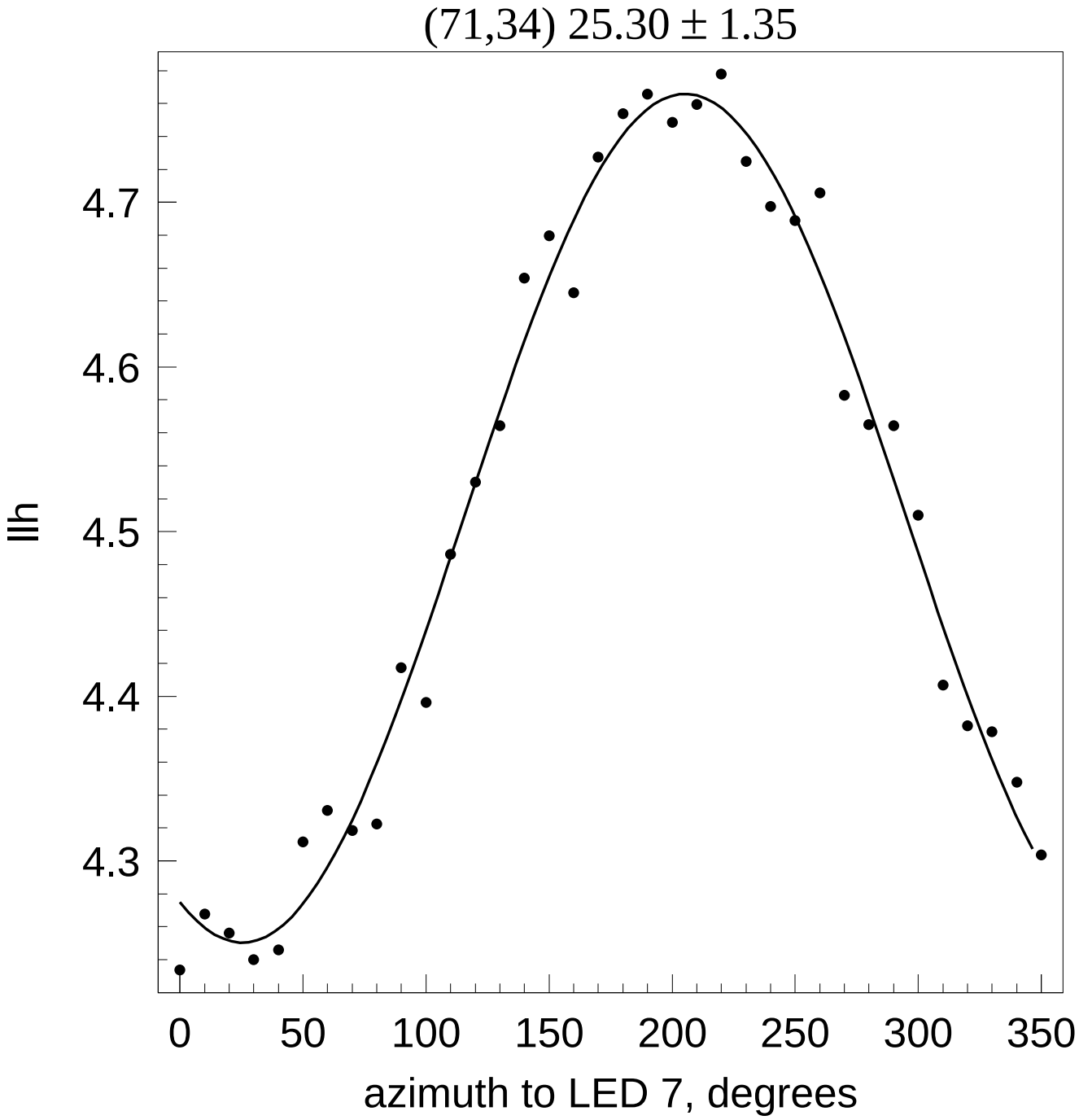

(71,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
178.1 ± 18.4
8
9
2
3
7
1
180
4
10
6
5
12
11

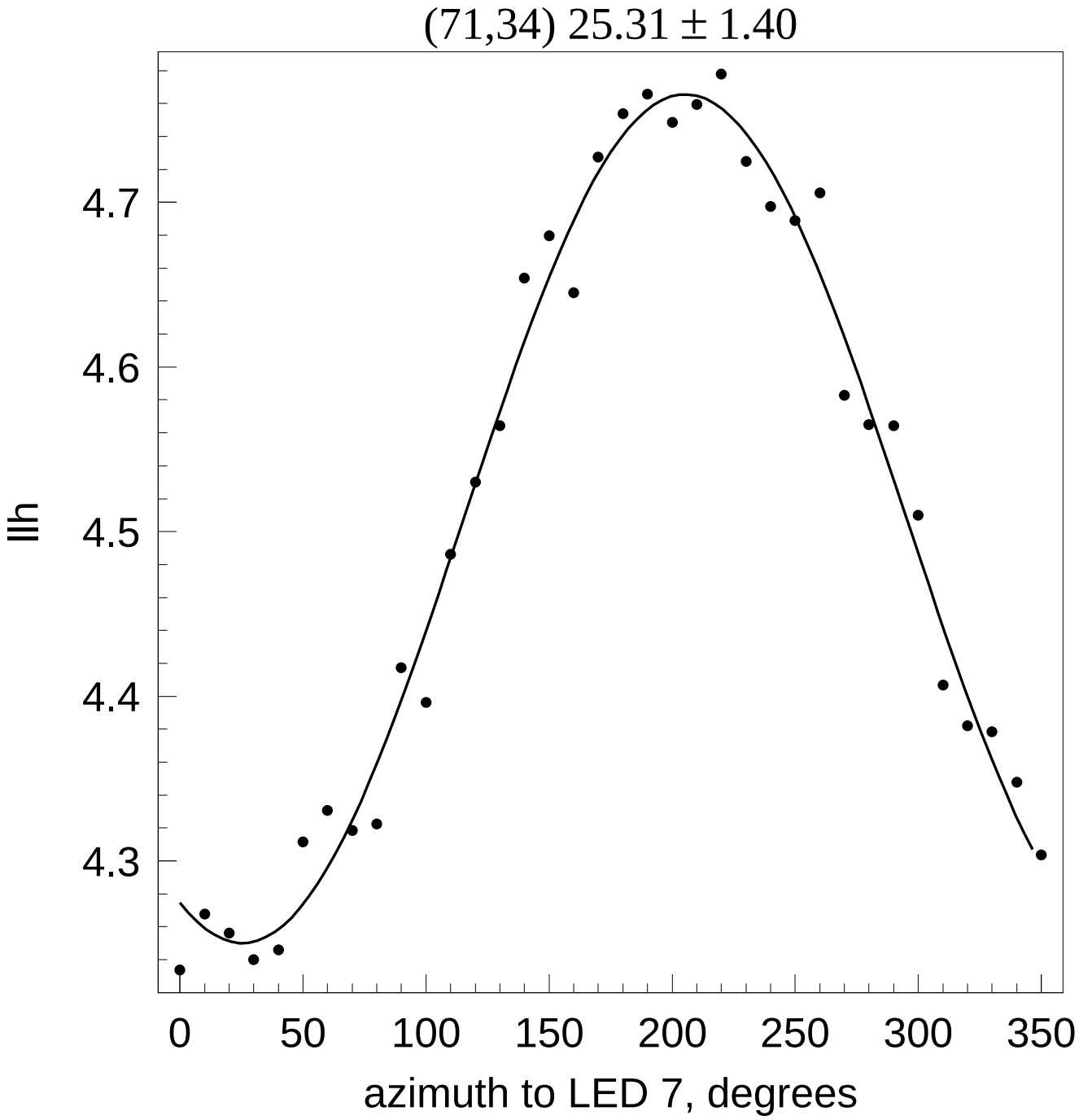

(71,33) 178.00 ± 0.51
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

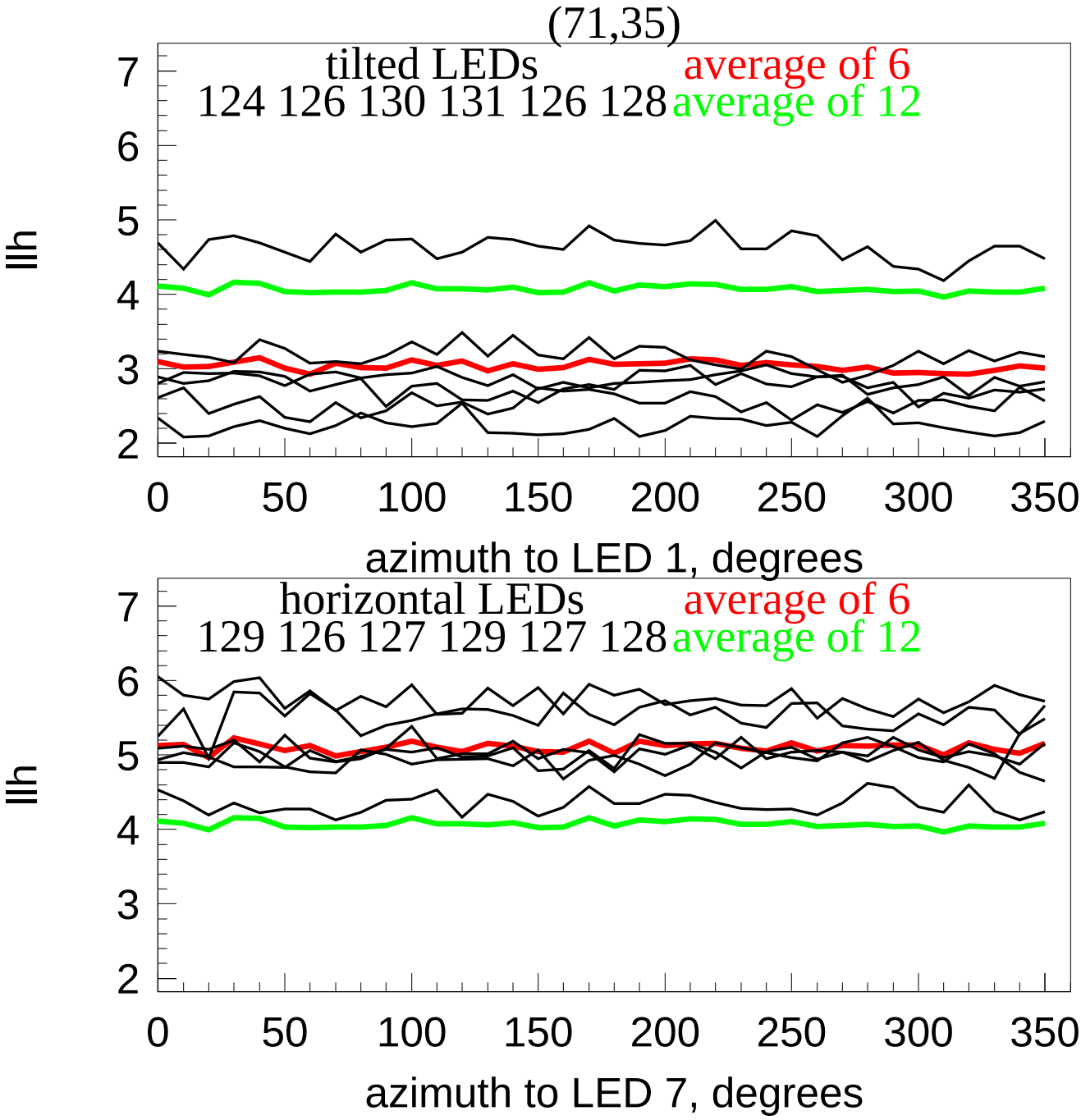

(71,33) 177.93 ± 0.55
3.6
3.4
3.2
3
2.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

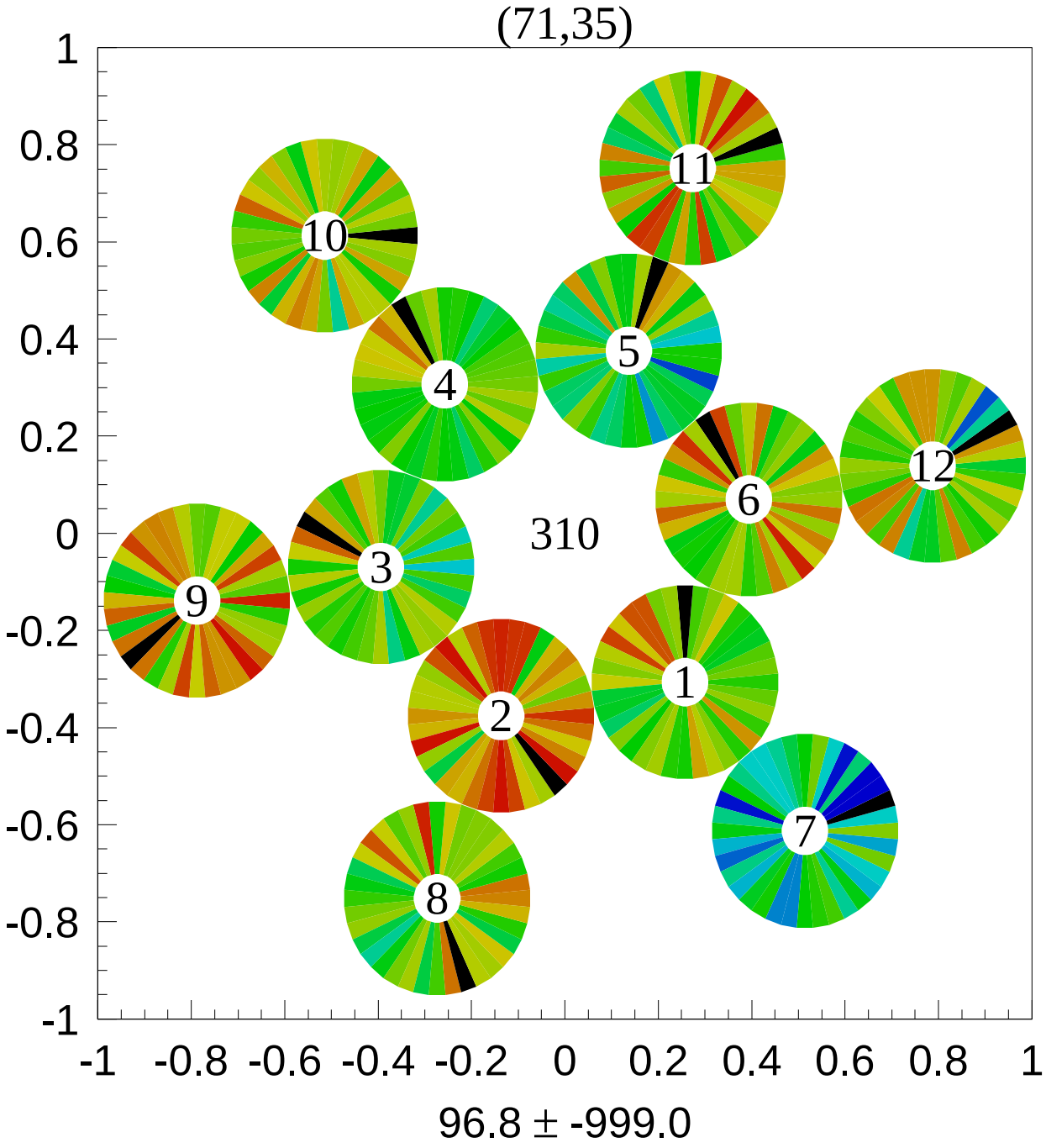

(71,34)
tilted LEDs
123 126 124 125 70 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 132 126 130 130 120
average of 6
average of 12
llh
azimuth to LED 7, degrees

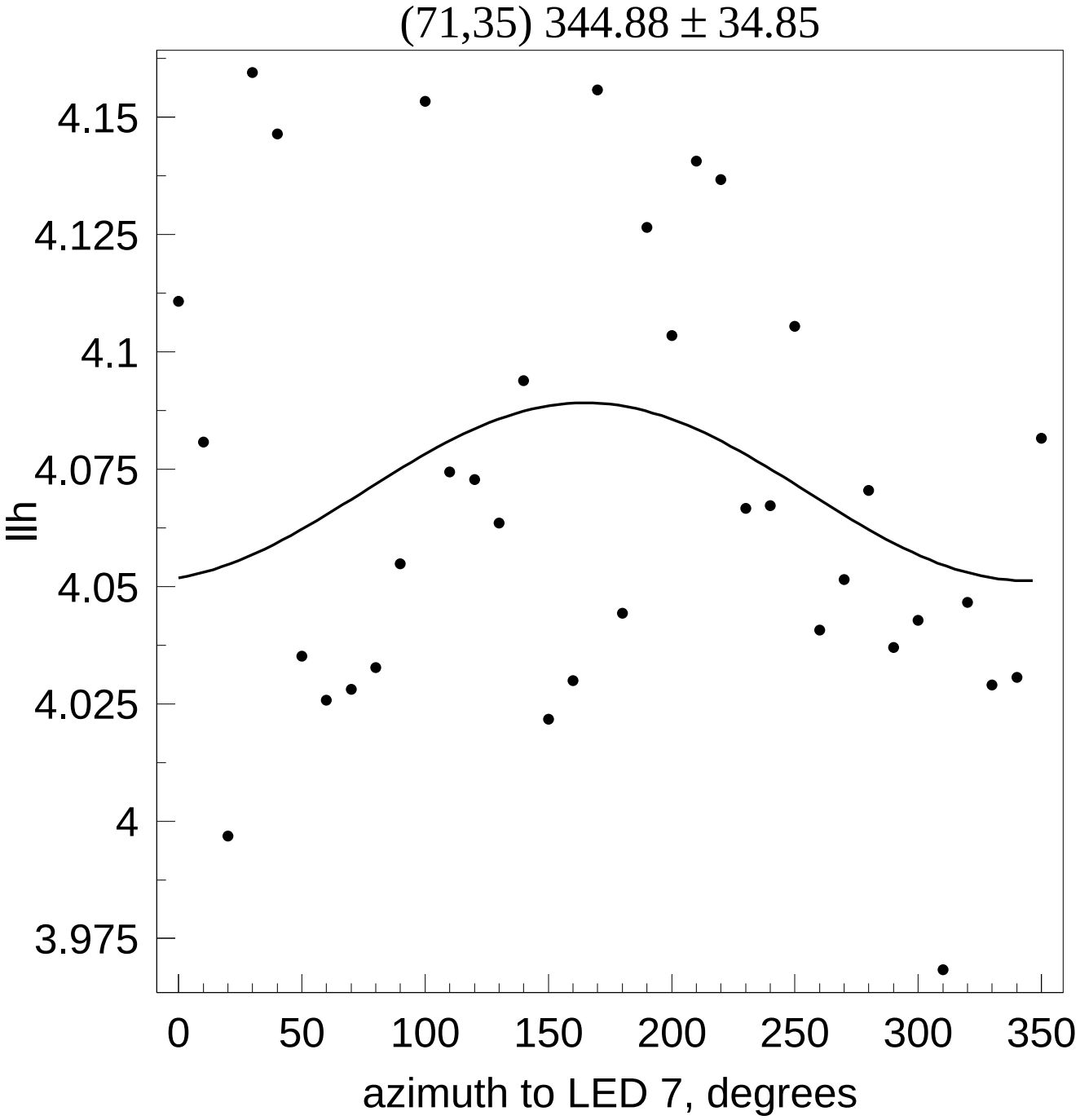

(71,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
23.5 ± 22.9

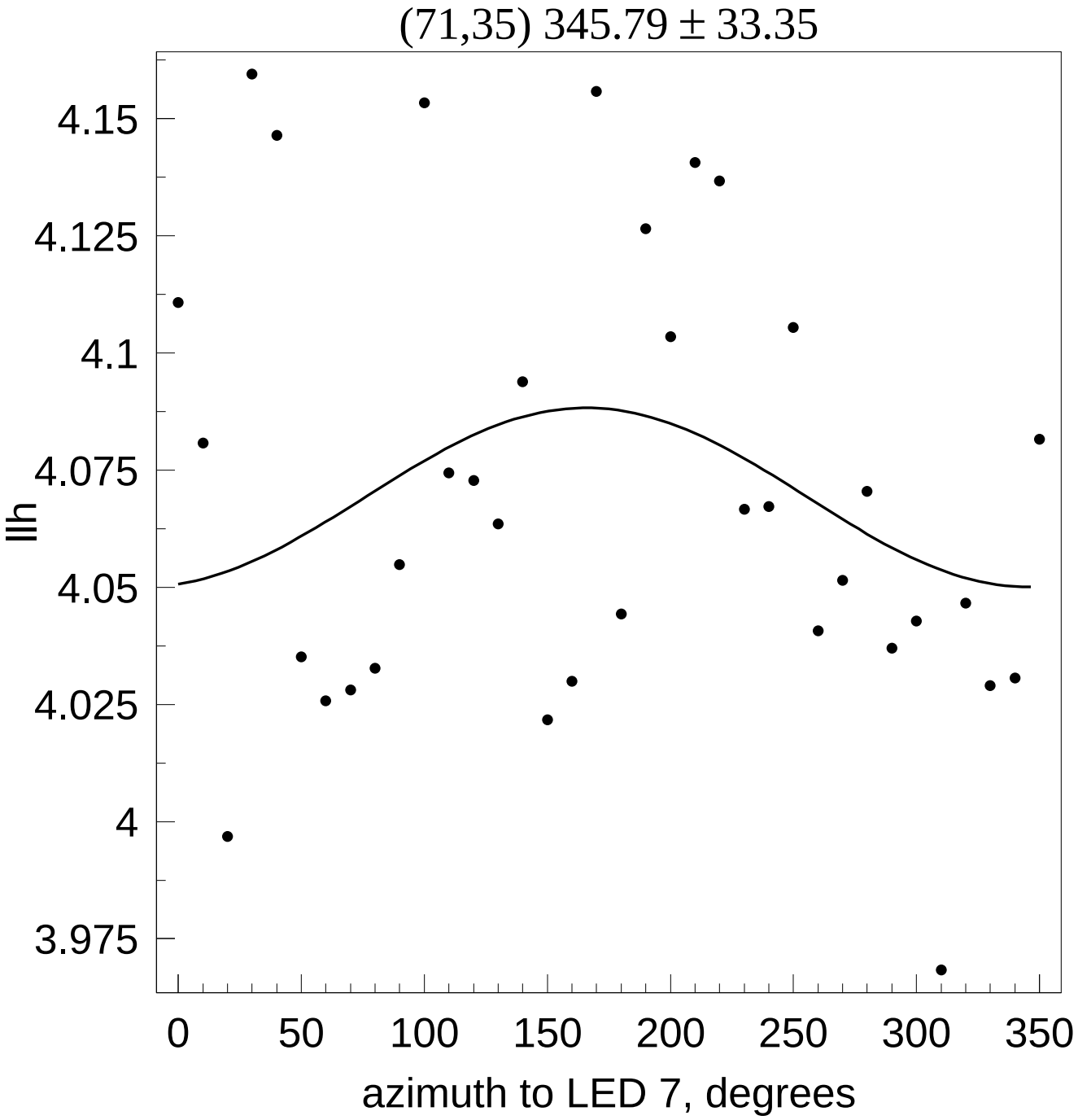

(71,34) 25.30 ± 1.35
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

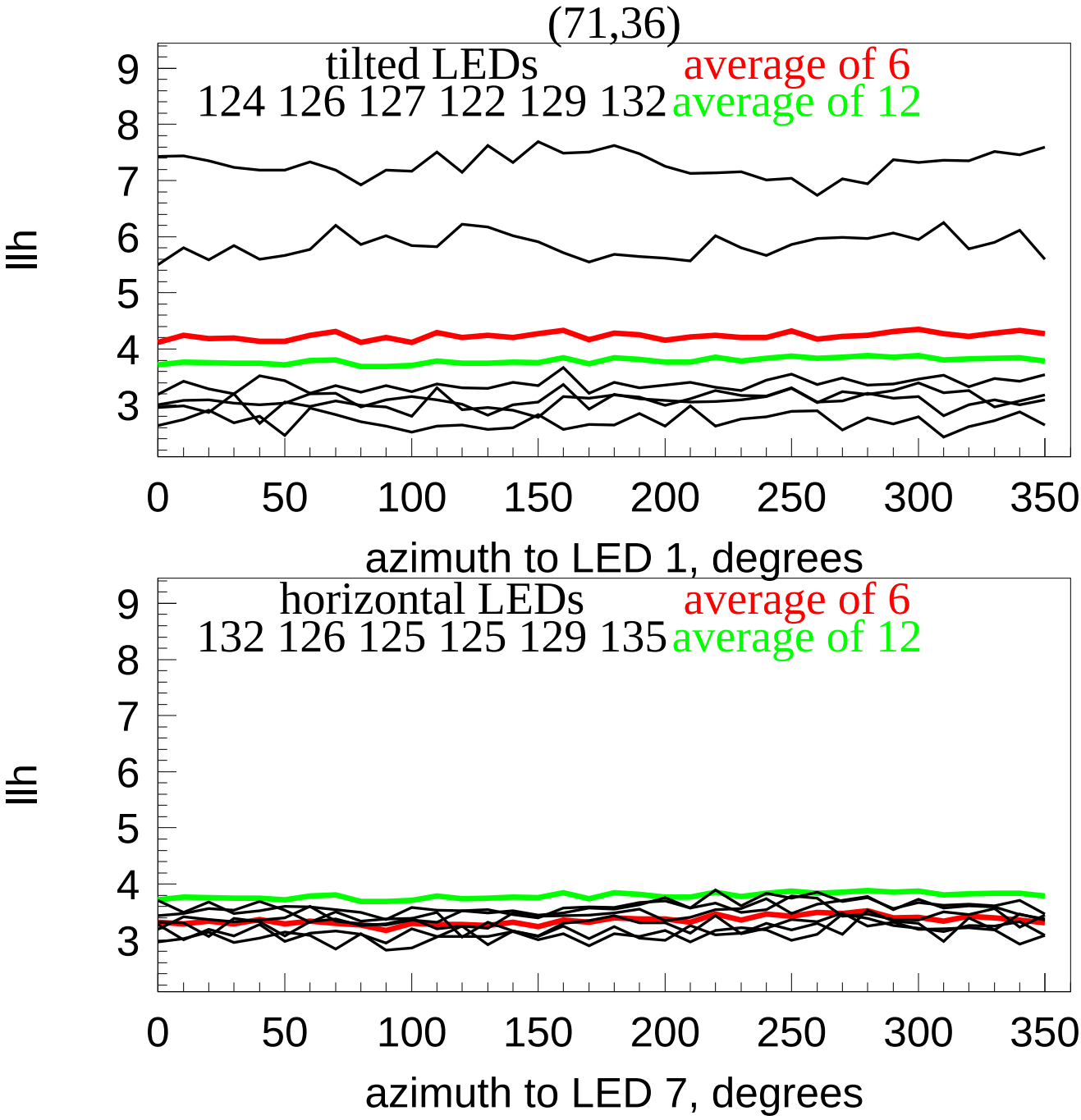

(71,34) 25.31 ± 1.40
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

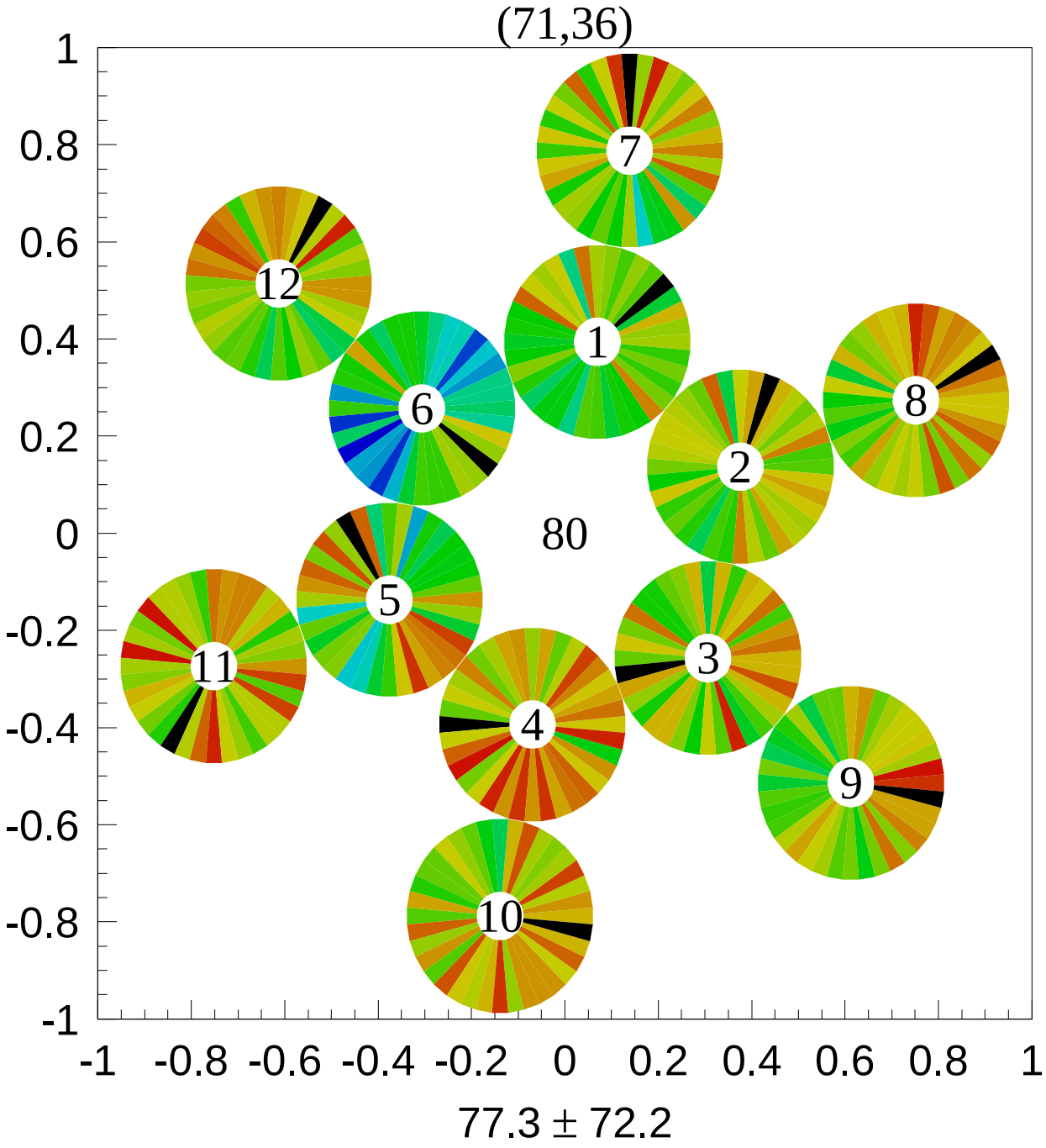

(71,35)
tilted LEDs
124 126 130 131 126 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 126 127 129 127 128
average of 6
average of 12
llh
azimuth to LED 7, degrees

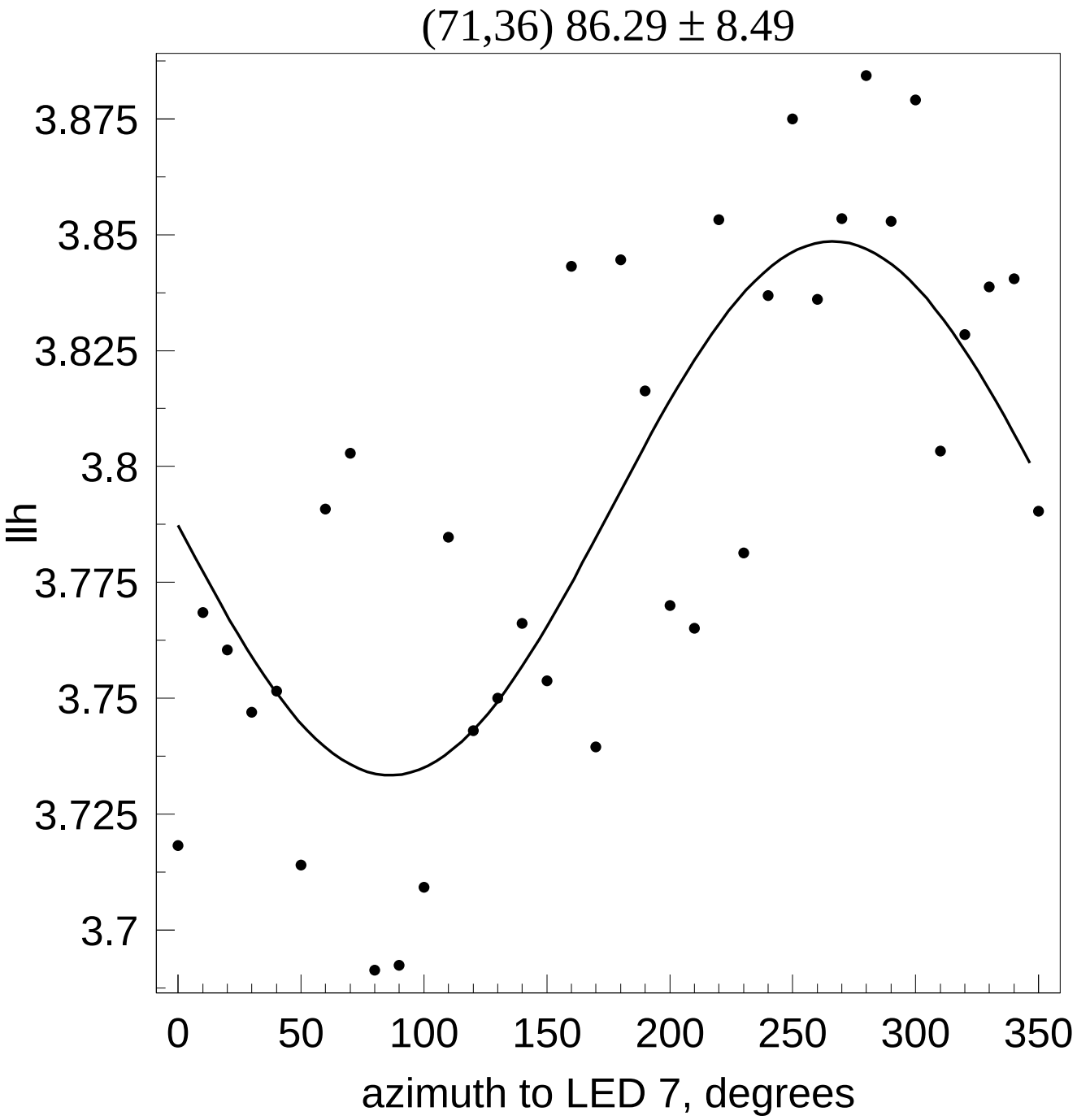

(71,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
96.8 ± -999.0
310
1
2
3
4
5
6
7
8
9
10
11
12

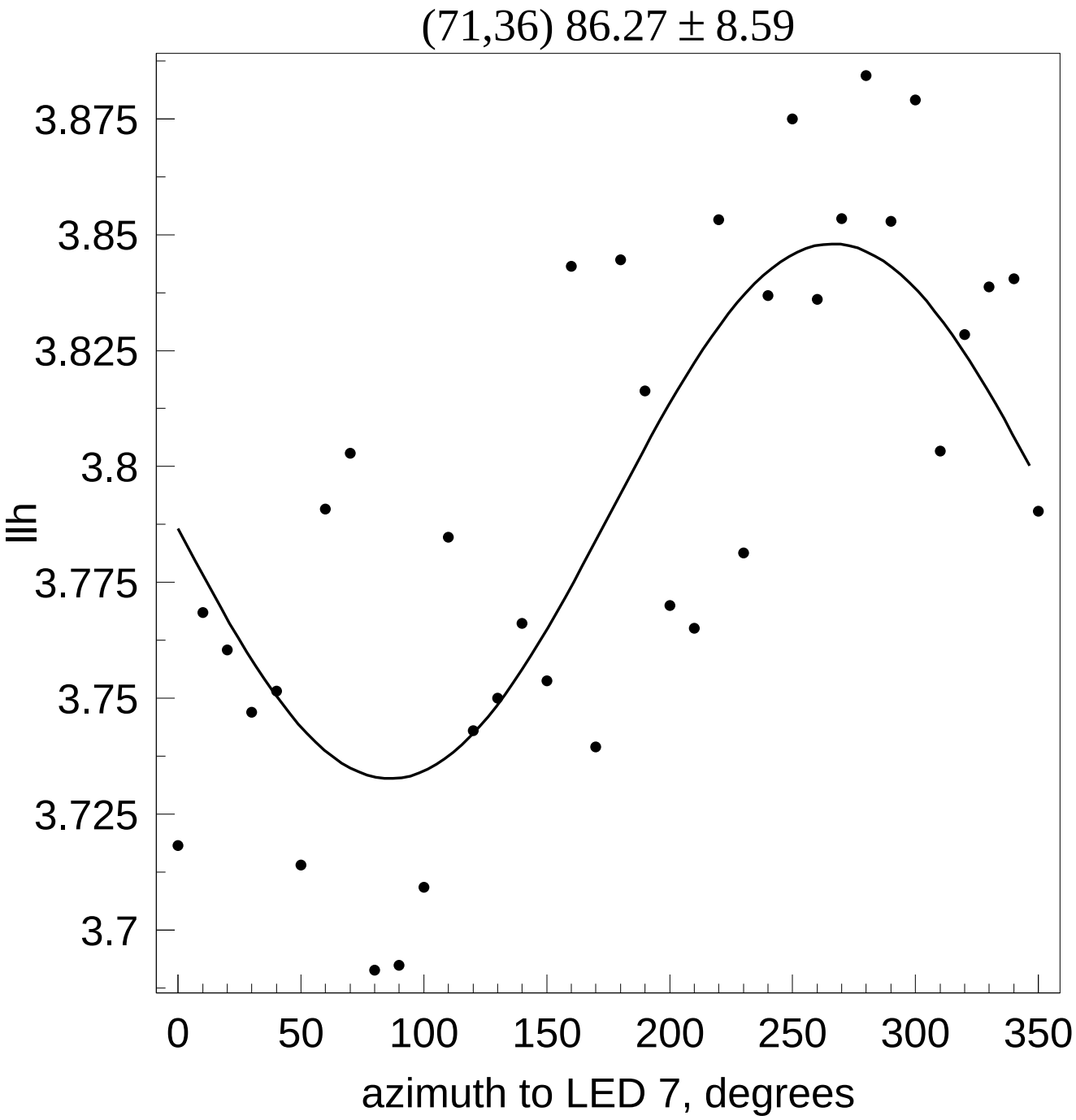

(71,35) 344.88 ± 34.85
4.15
4.125
4.1
4.075
4.05
4.025
4
3.975
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

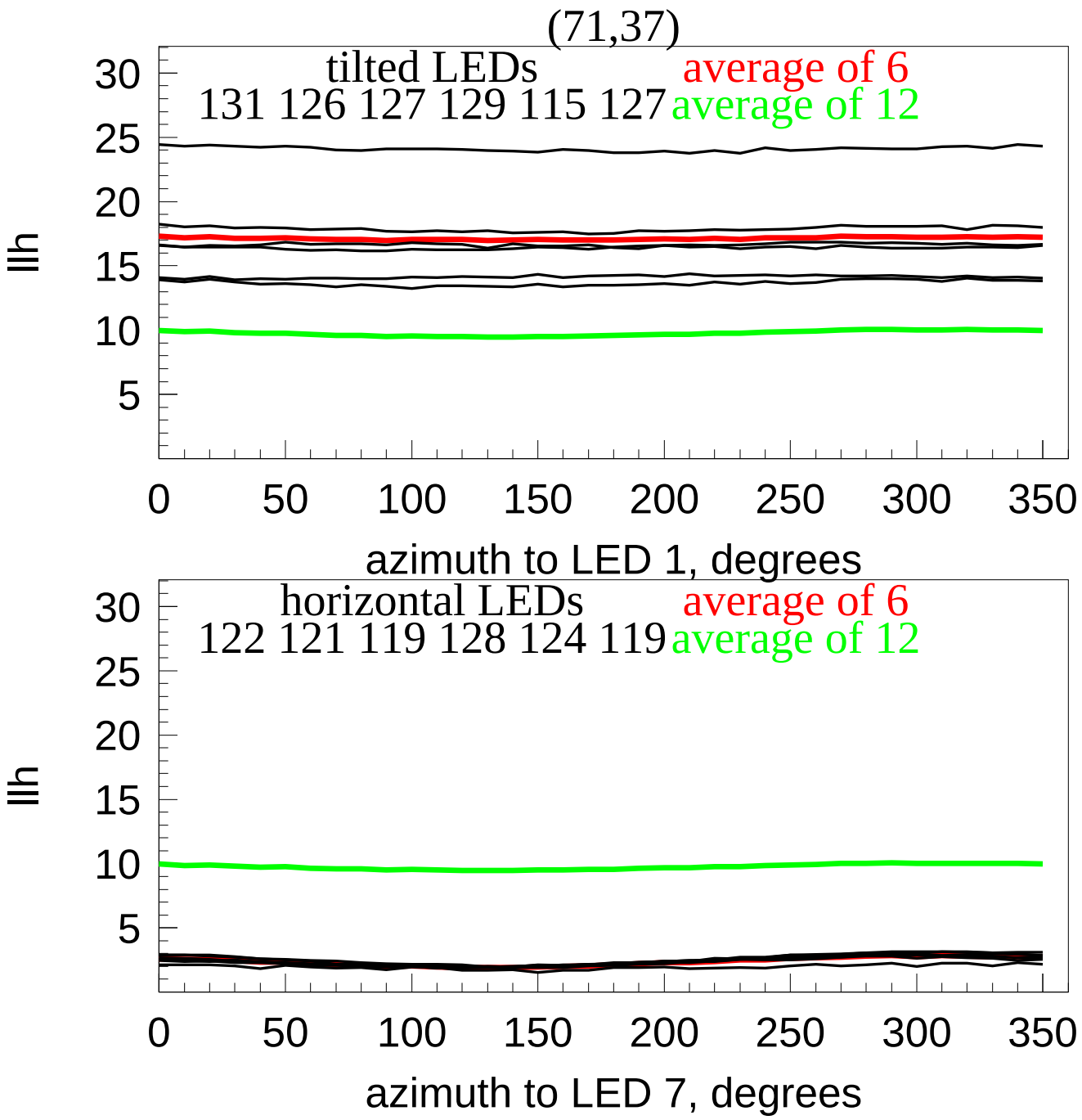

(71,35) 345.79 ± 33.35
4.15
4.125
4.1
4.075
4.05
4.025
4
3.975
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

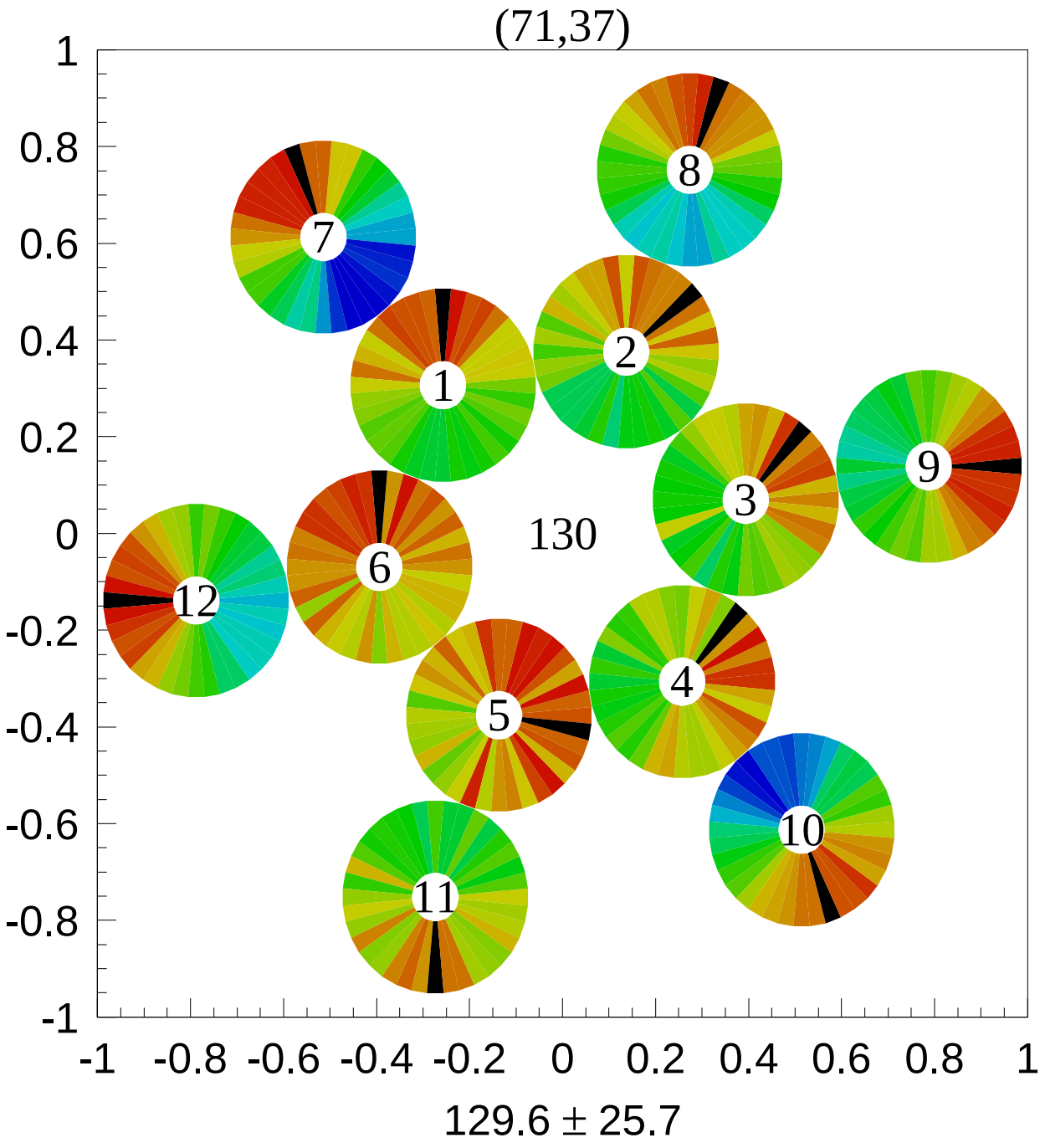

(71,36)
tilted LEDs
124 126 127 122 129 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 126 125 125 129 135
average of 6
average of 12
llh
azimuth to LED 7, degrees

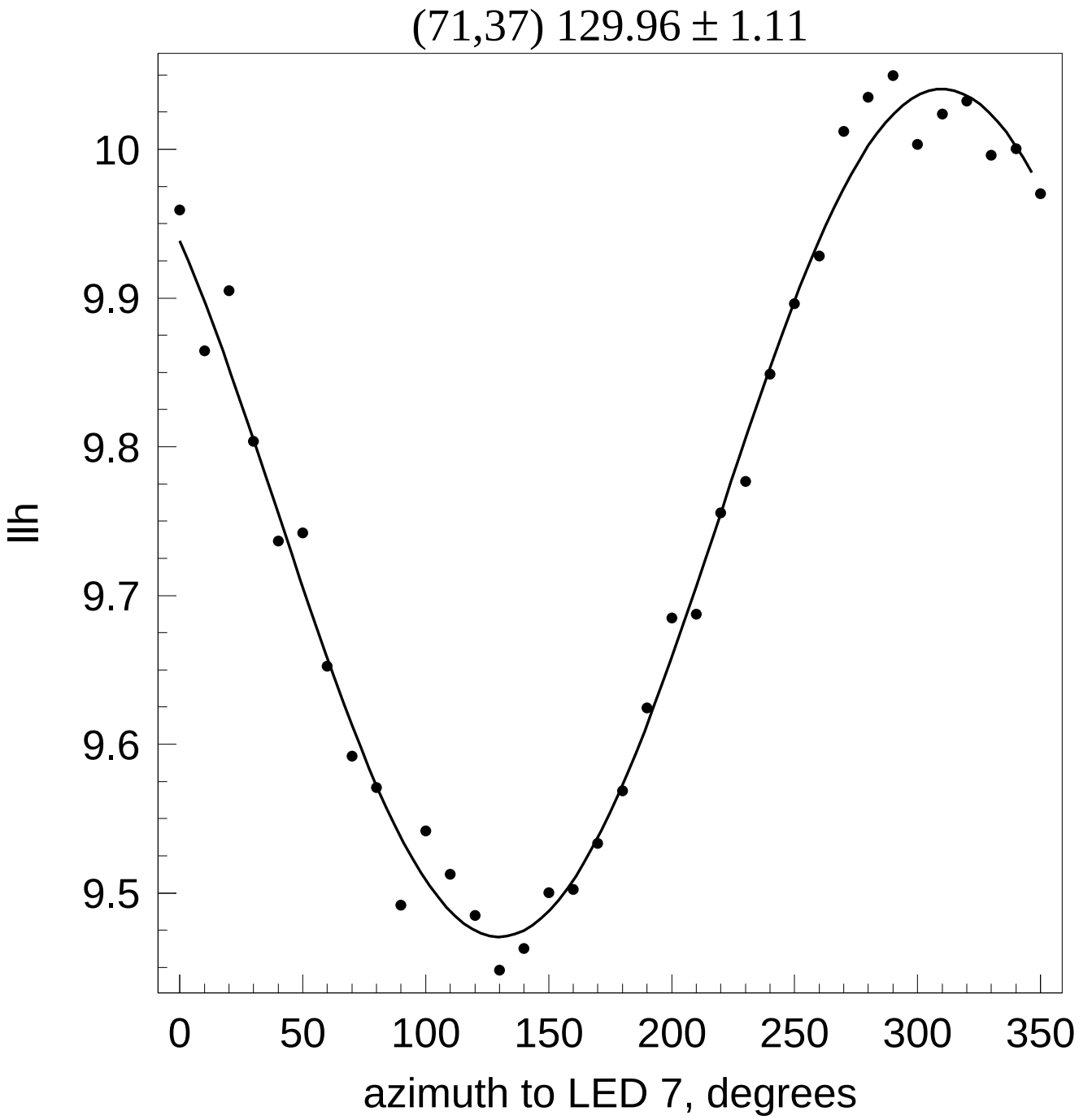

(71,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
77.3 ± 72.2
7
12
1
6
8
2
80
5
11
3
4
9
10

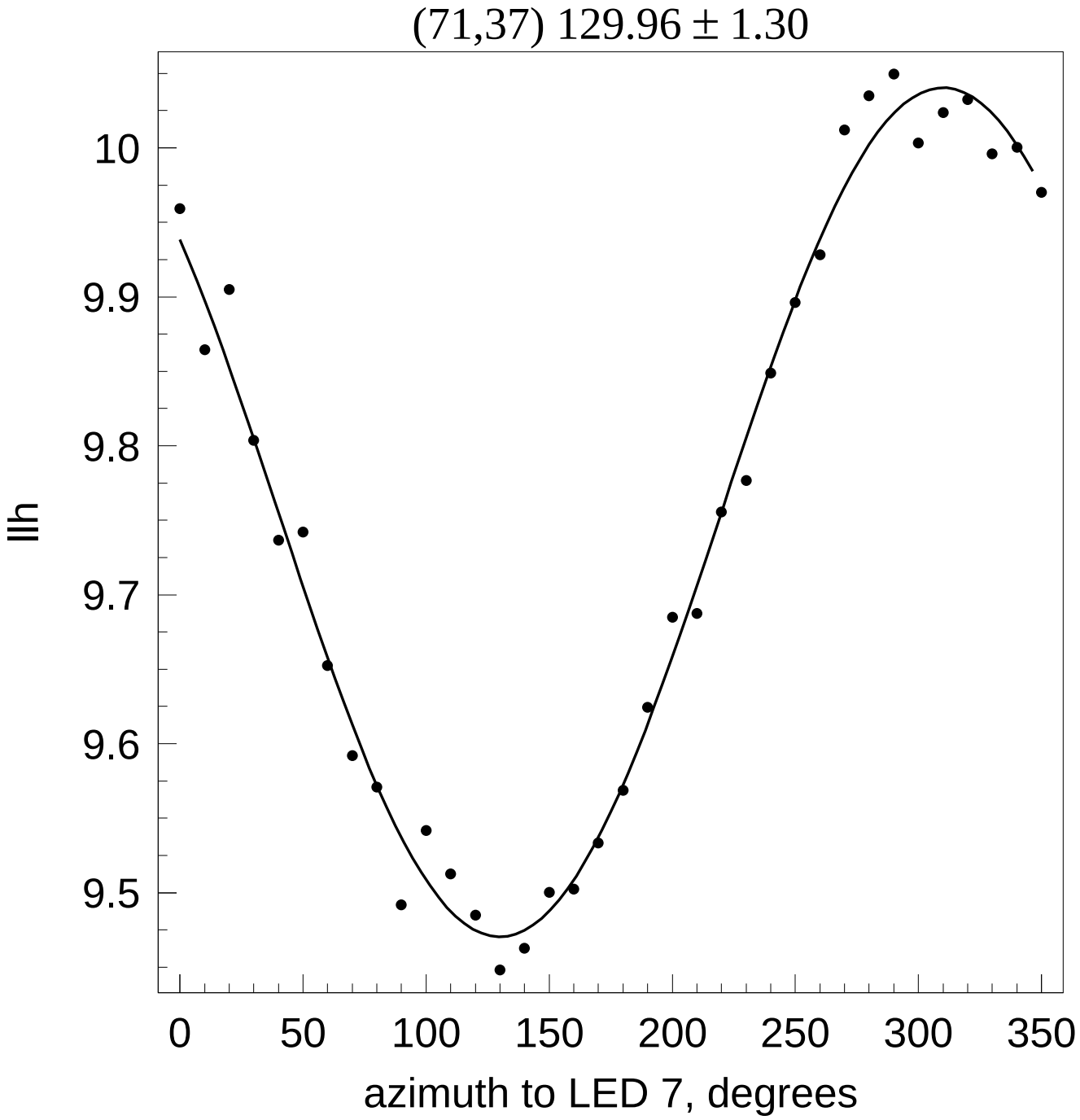

(71,36) 86.29 ± 8.49
3.875
3.85
3.825
3.8
3.775
3.75
3.725
3.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

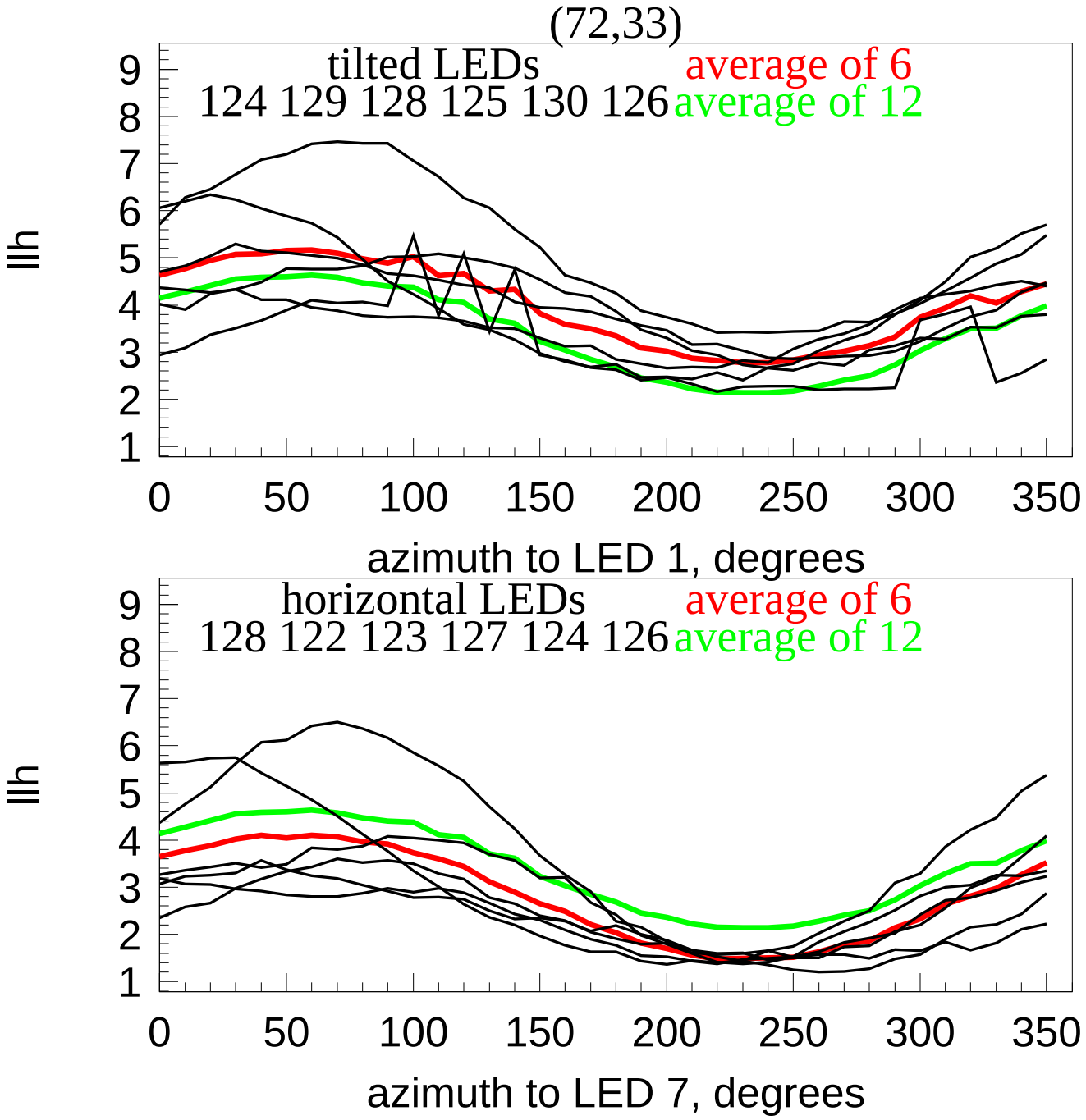

(71,36) 86.27 ± 8.59
3.875
3.85
3.825
3.8
3.775
3.75
3.725
3.7
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

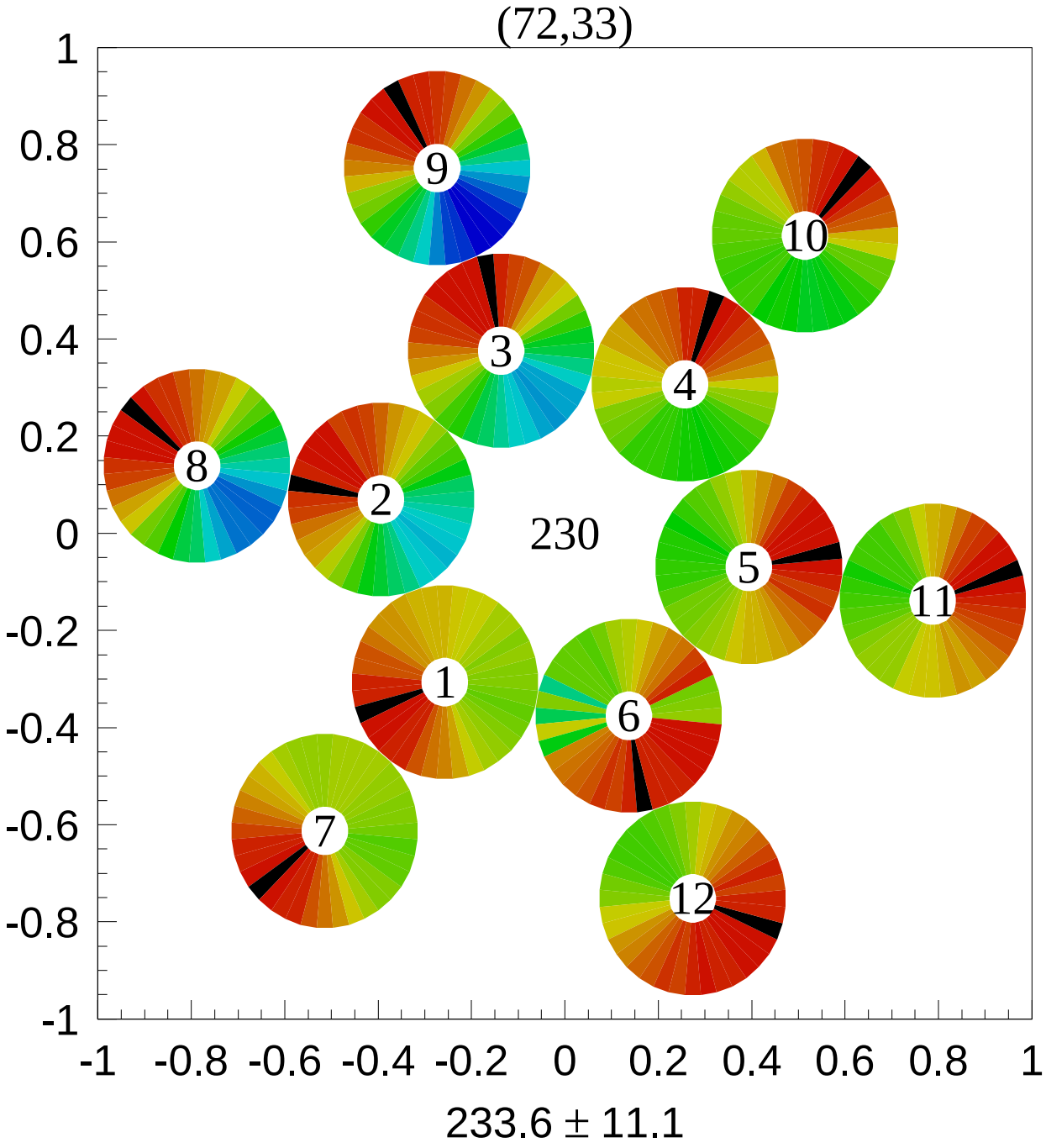

(71,37)
tilted LEDs
131 126 127 129 115 127
average of 6
average of 12
llh
30
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 121 119 128 124 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

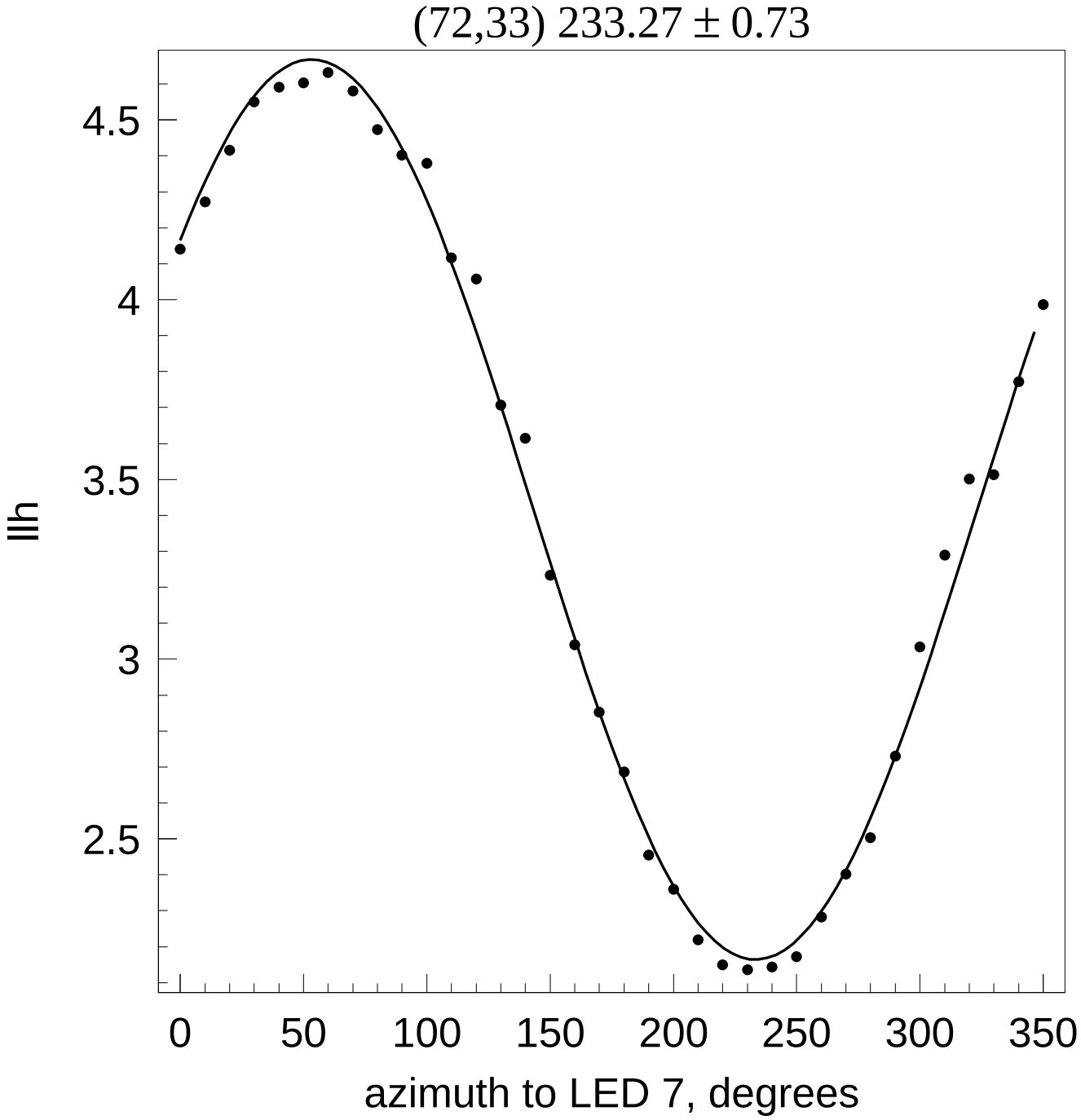

(71,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
129.6 ± 25.7
130
1
2
3
4
5
6
7
8
9
10
11
12

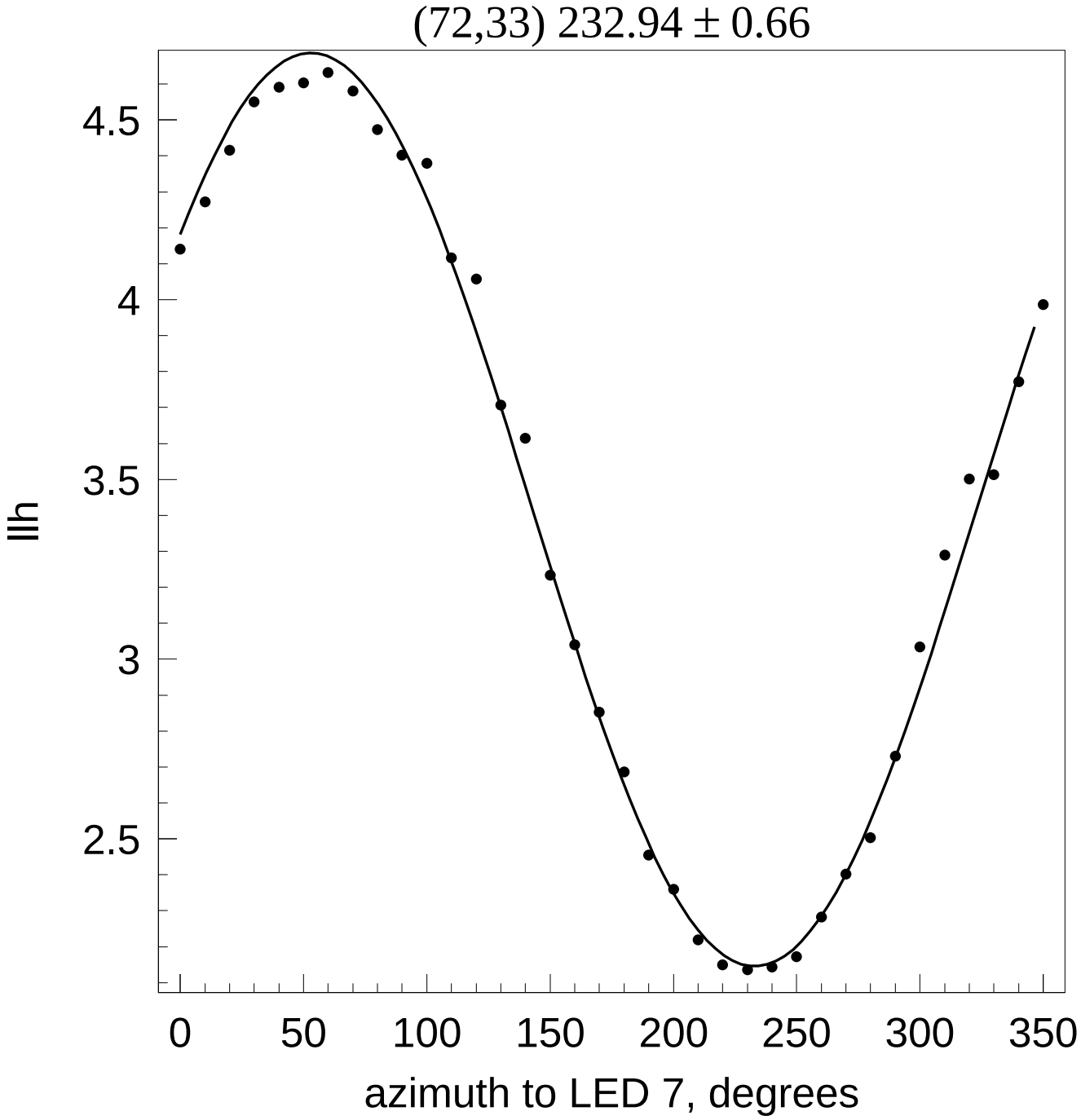

(71,37) 129.96 ± 1.11
10
9.9
9.8
9.7
9.6
9.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

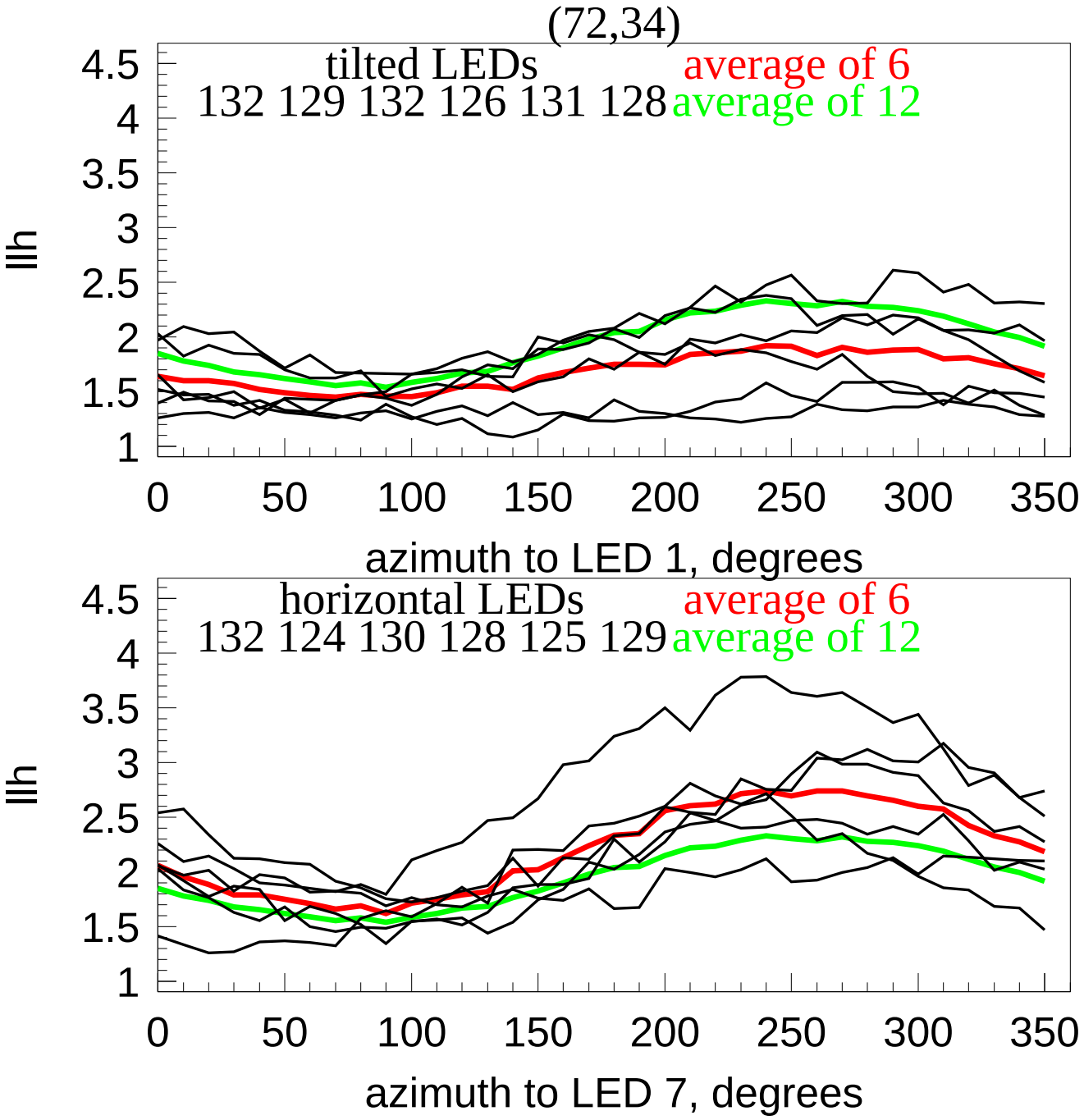

(71,37) 129.96 ± 1.30
10
9.9
9.8
9.7
9.6
9.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

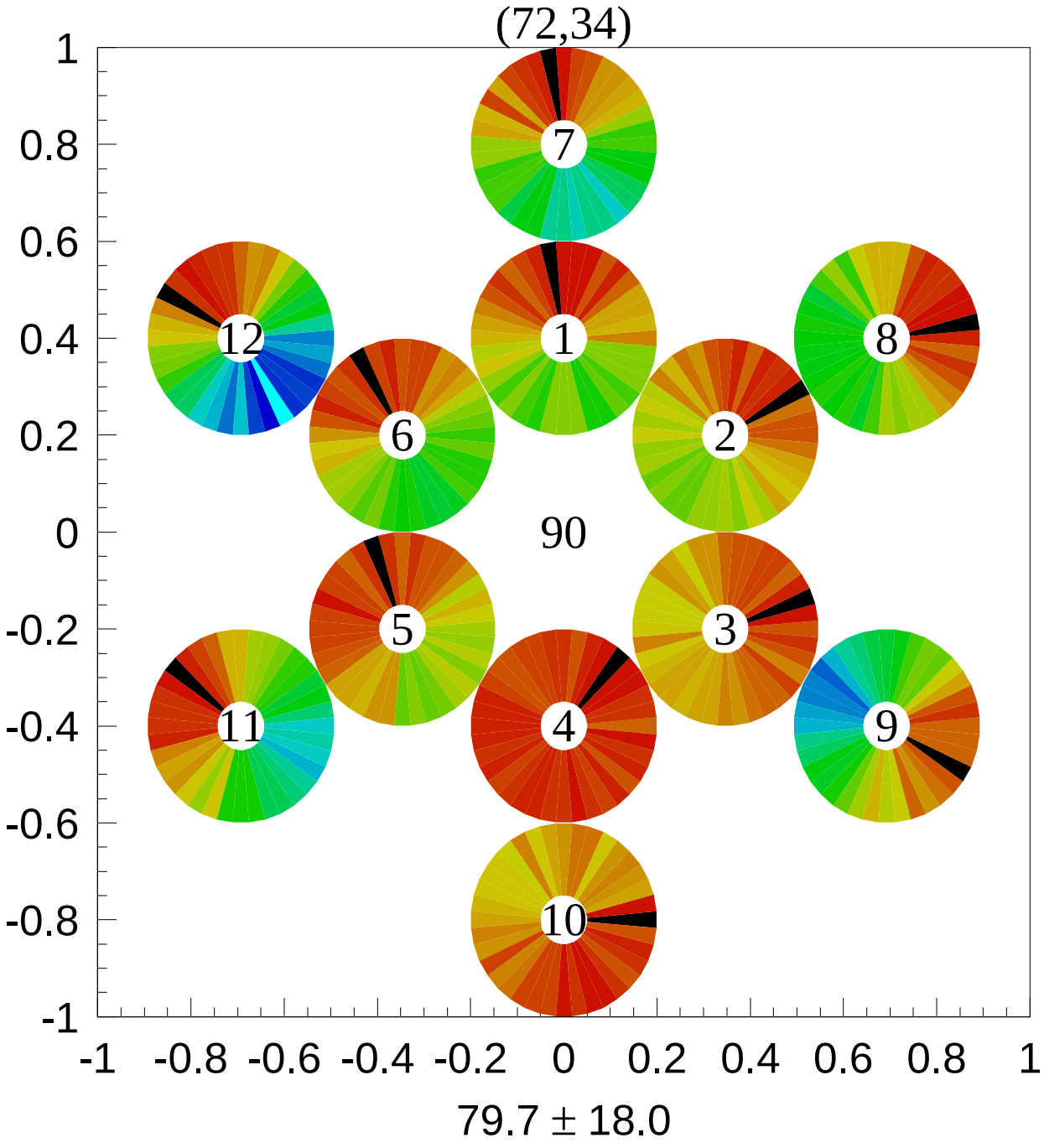

(72,33)
tilted LEDs
124 129 128 125 130 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 122 123 127 124 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

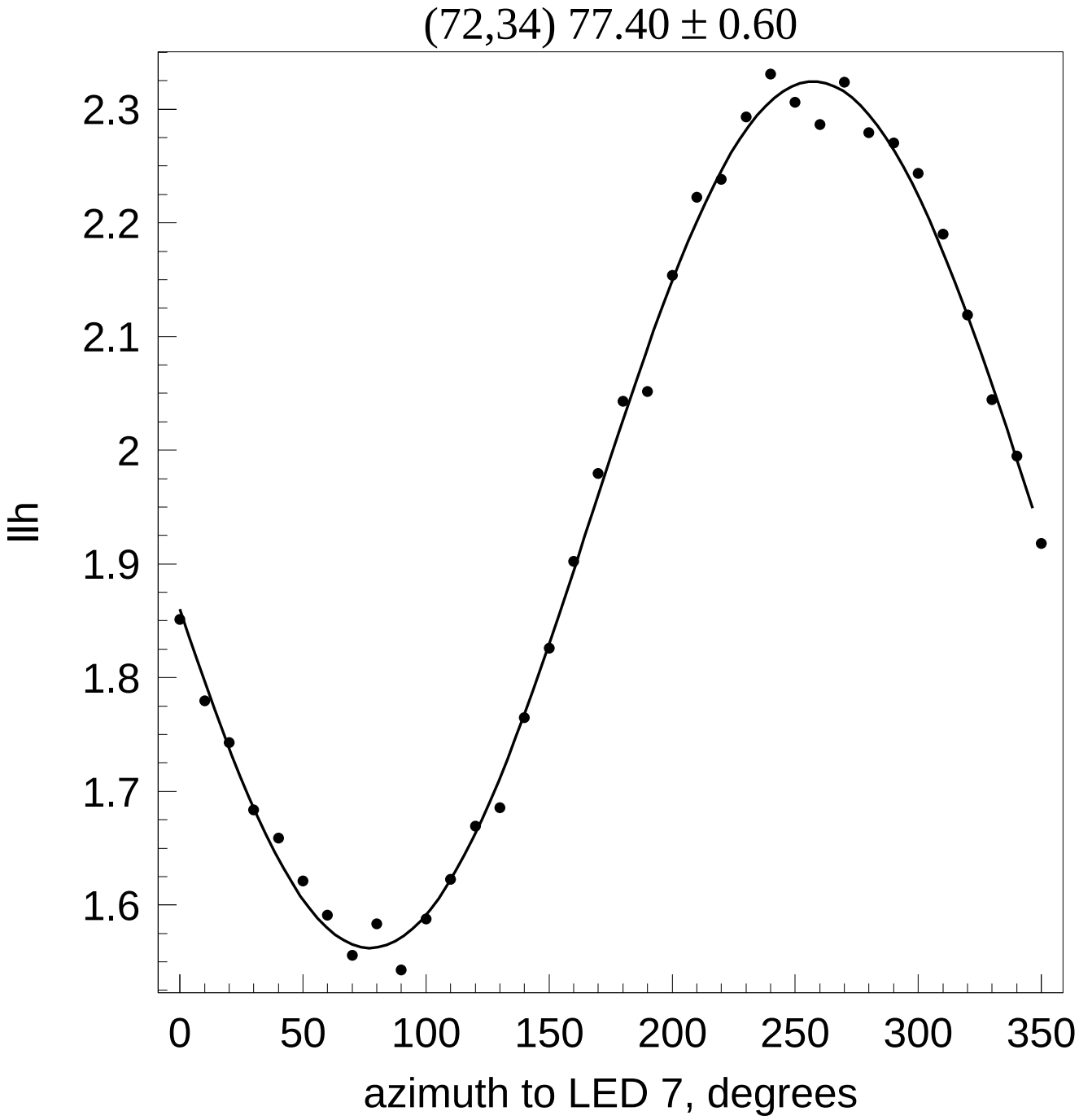

(72,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
233.6 ± 11.1

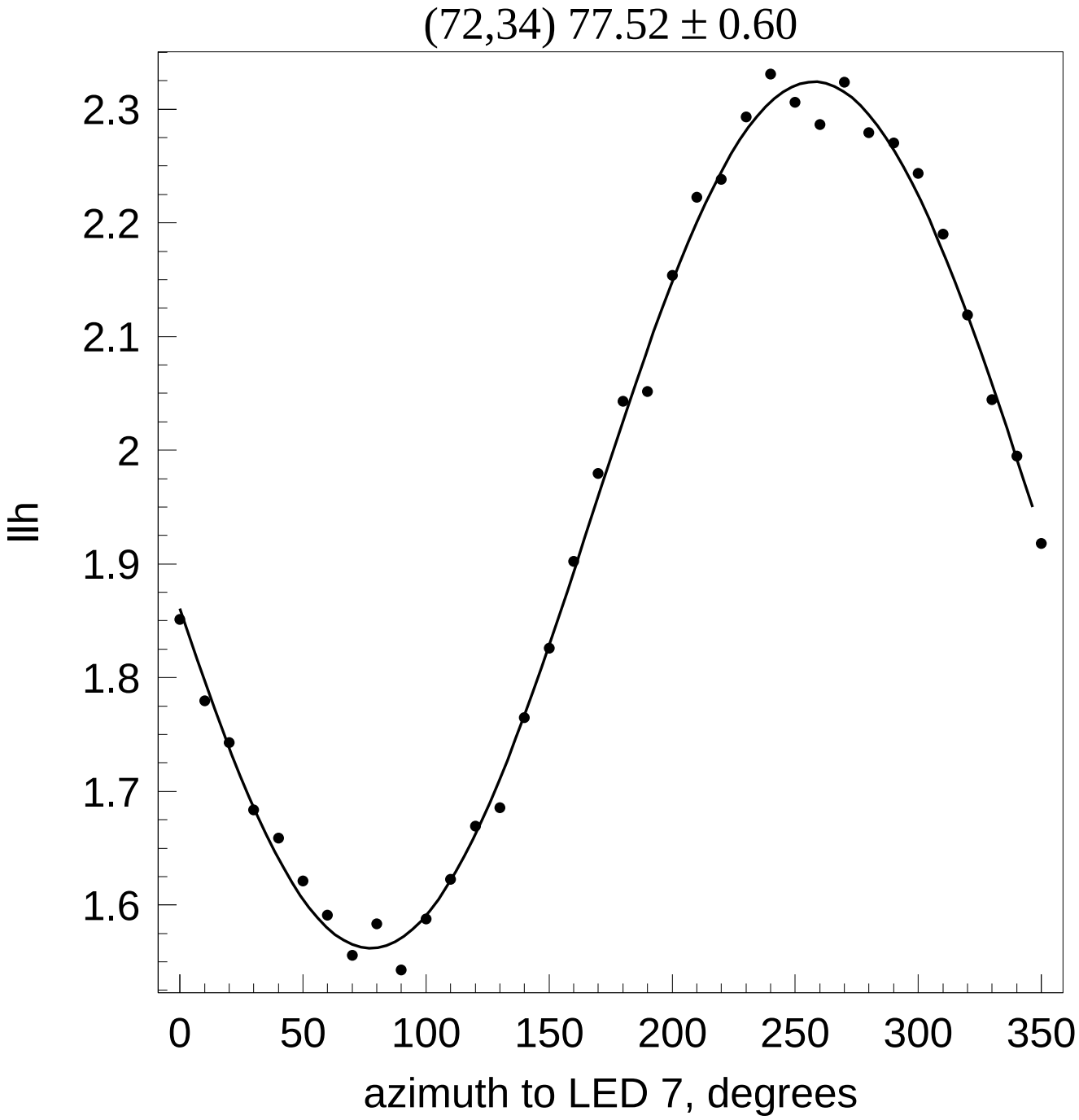

(72,33) 233.27 ± 0.73
4.5
4
3.5
3
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

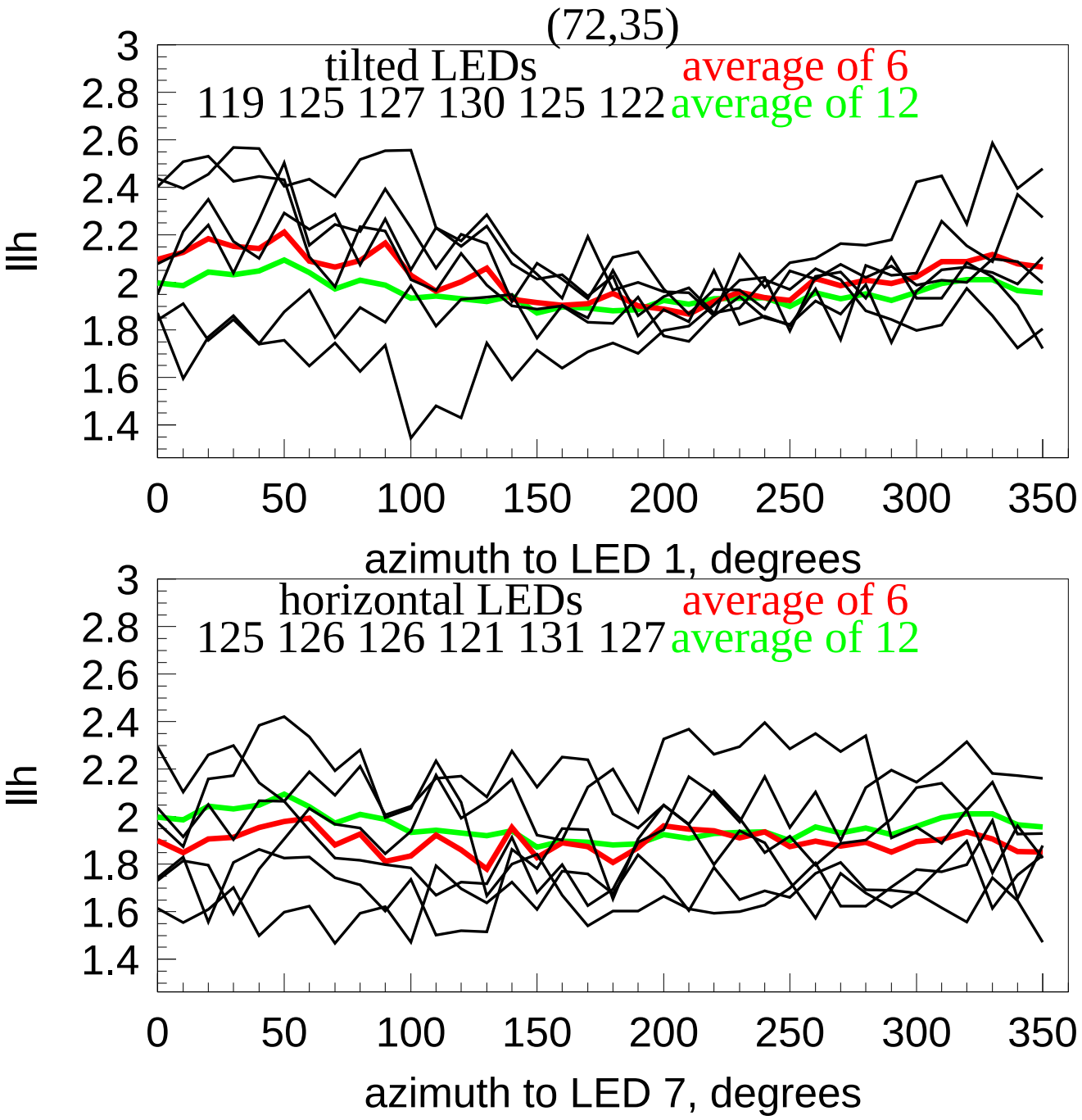

(72,33) 232.94 ± 0.66
4.5
4
3.5
3
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

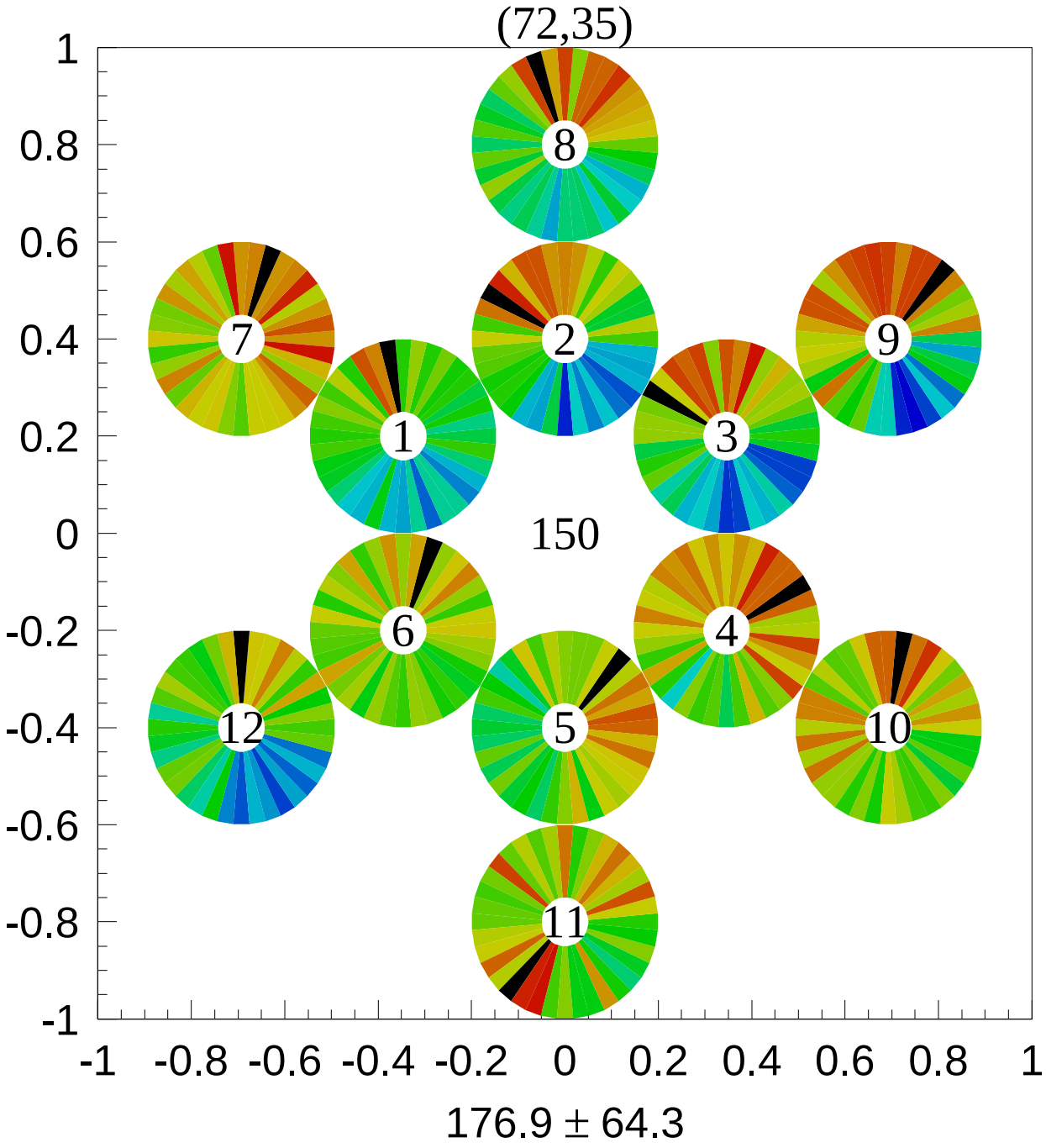

(72,34)
tilted LEDs
132 129 132 126 131 128
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 124 130 128 125 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

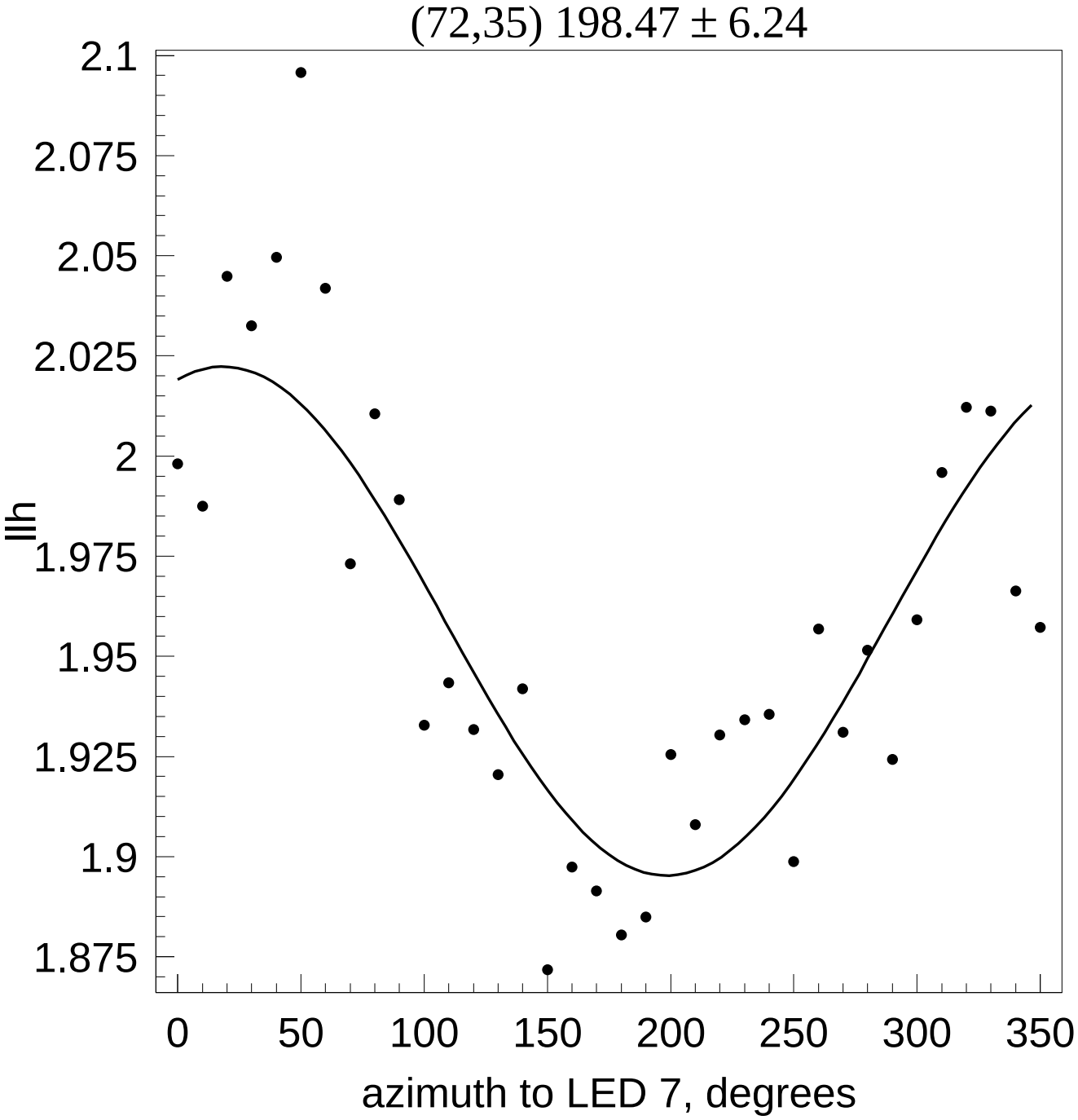

(72,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
8
6
2
90
5
3
11
4
9
10
79.7 ± 18.0

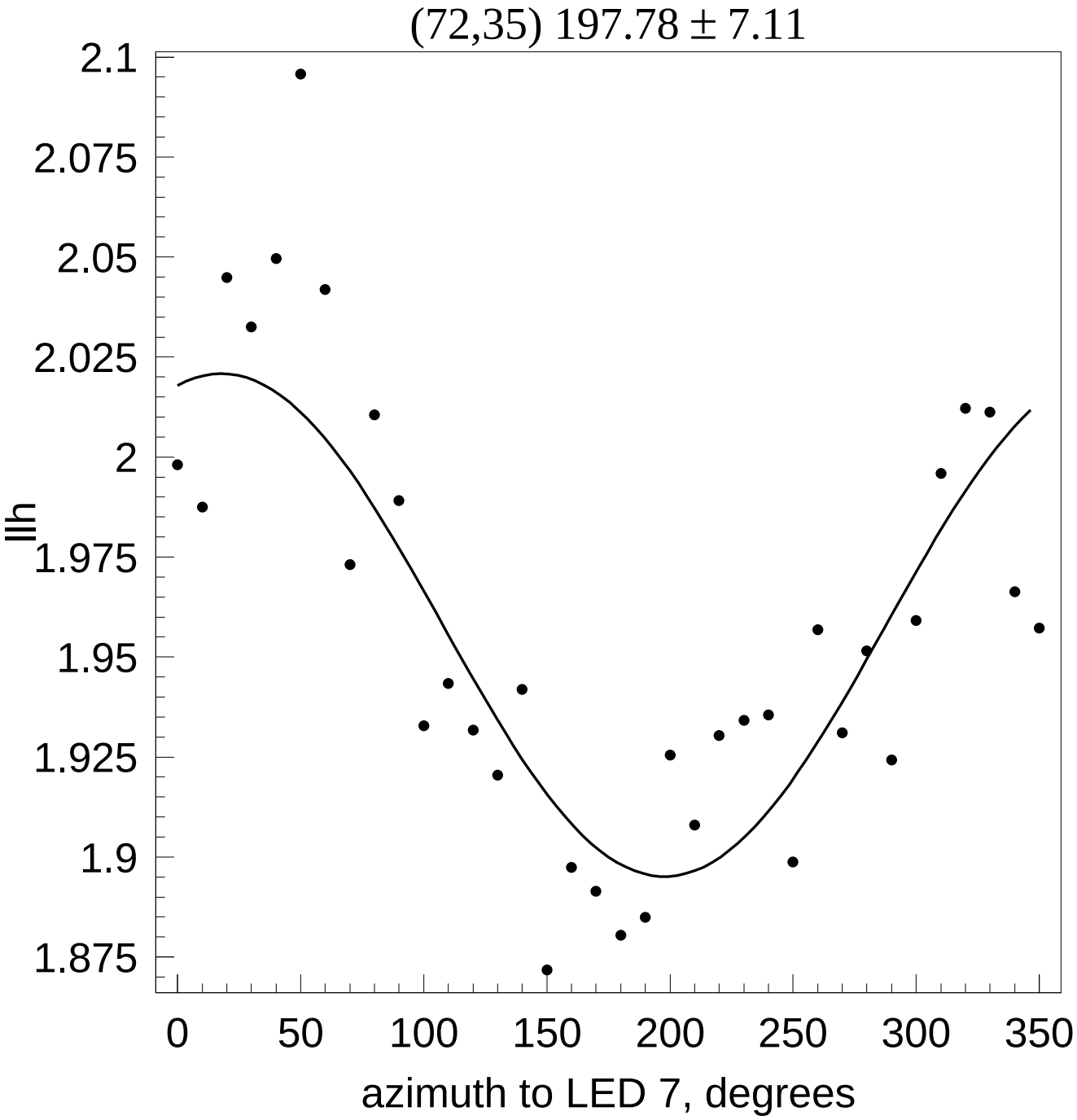

(72,34) 77.40 ± 0.60
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

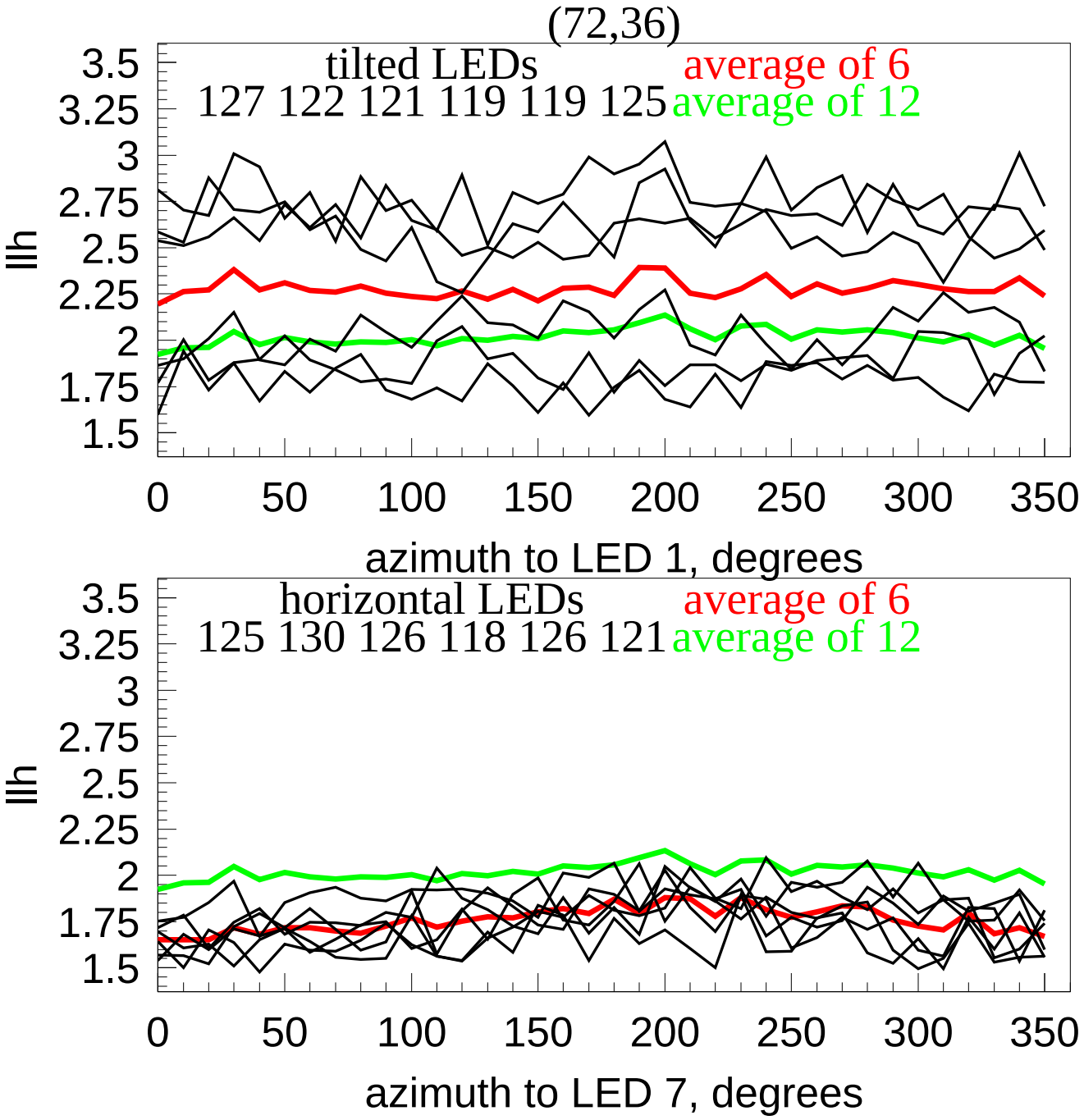

(72,34) 77.52 ± 0.60
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

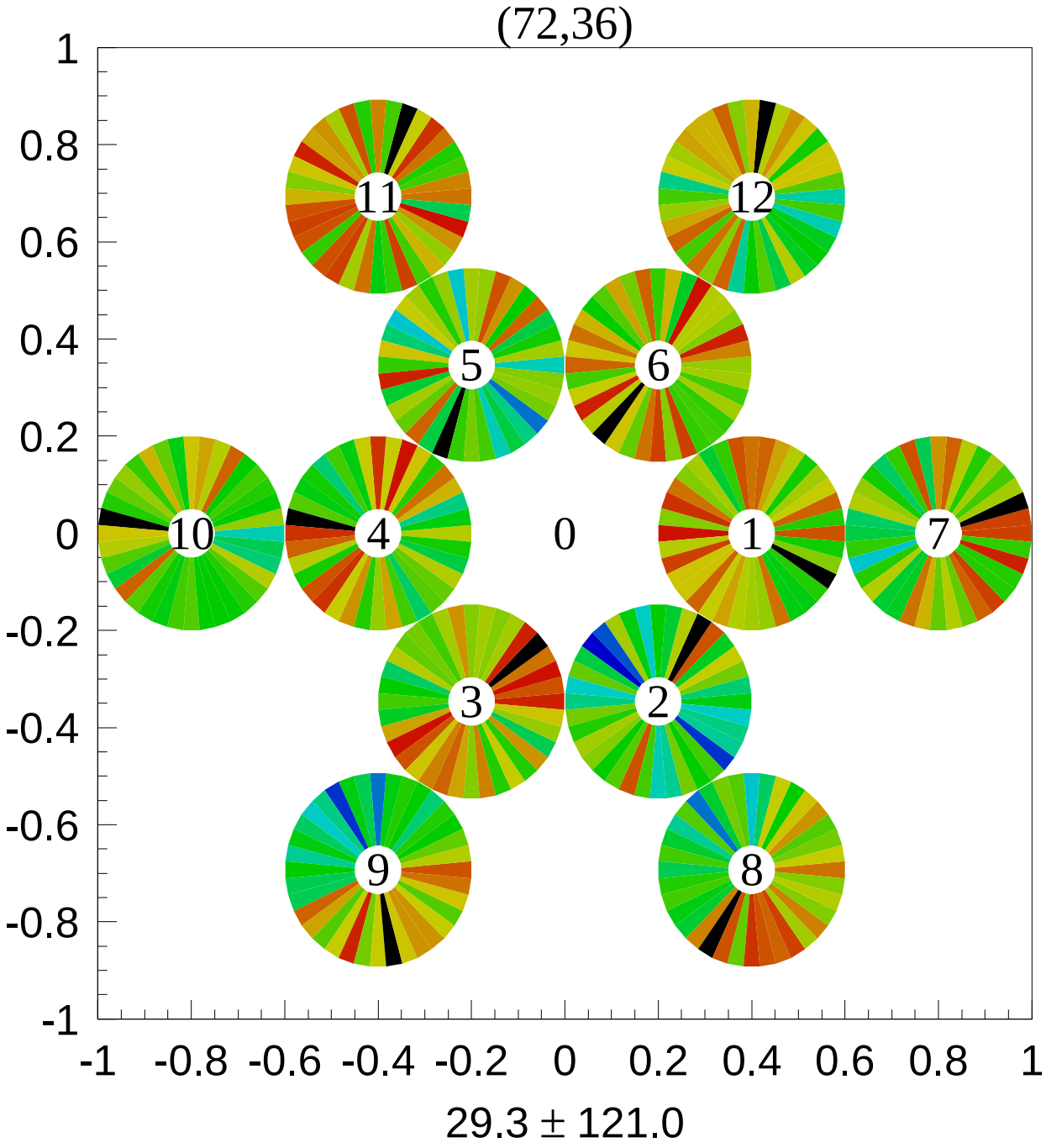

(72,35)
tilted LEDs
119 125 127 130 125 122
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
125 126 126 121 131 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

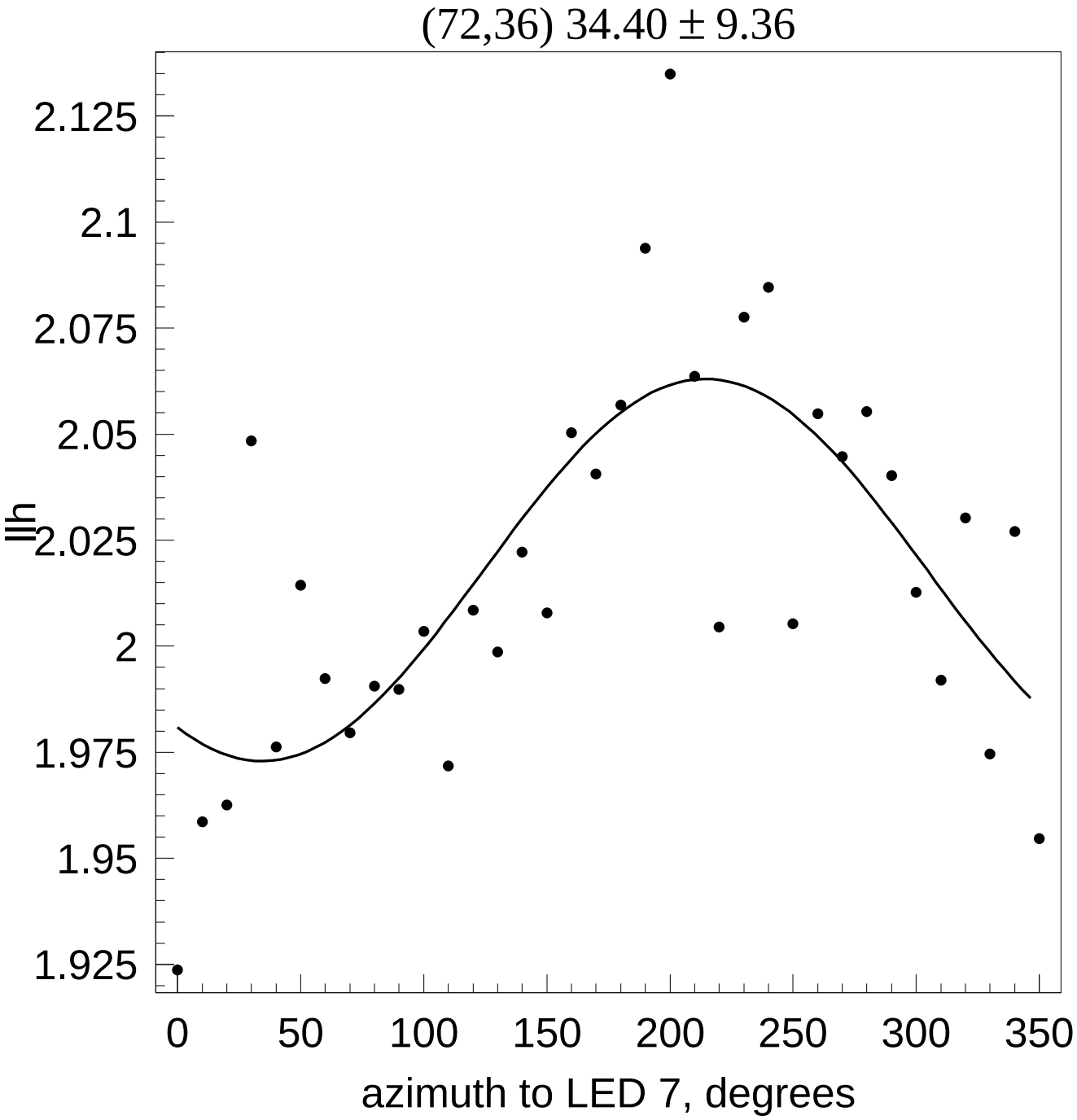

(72,35)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
176.9 ± 64.3

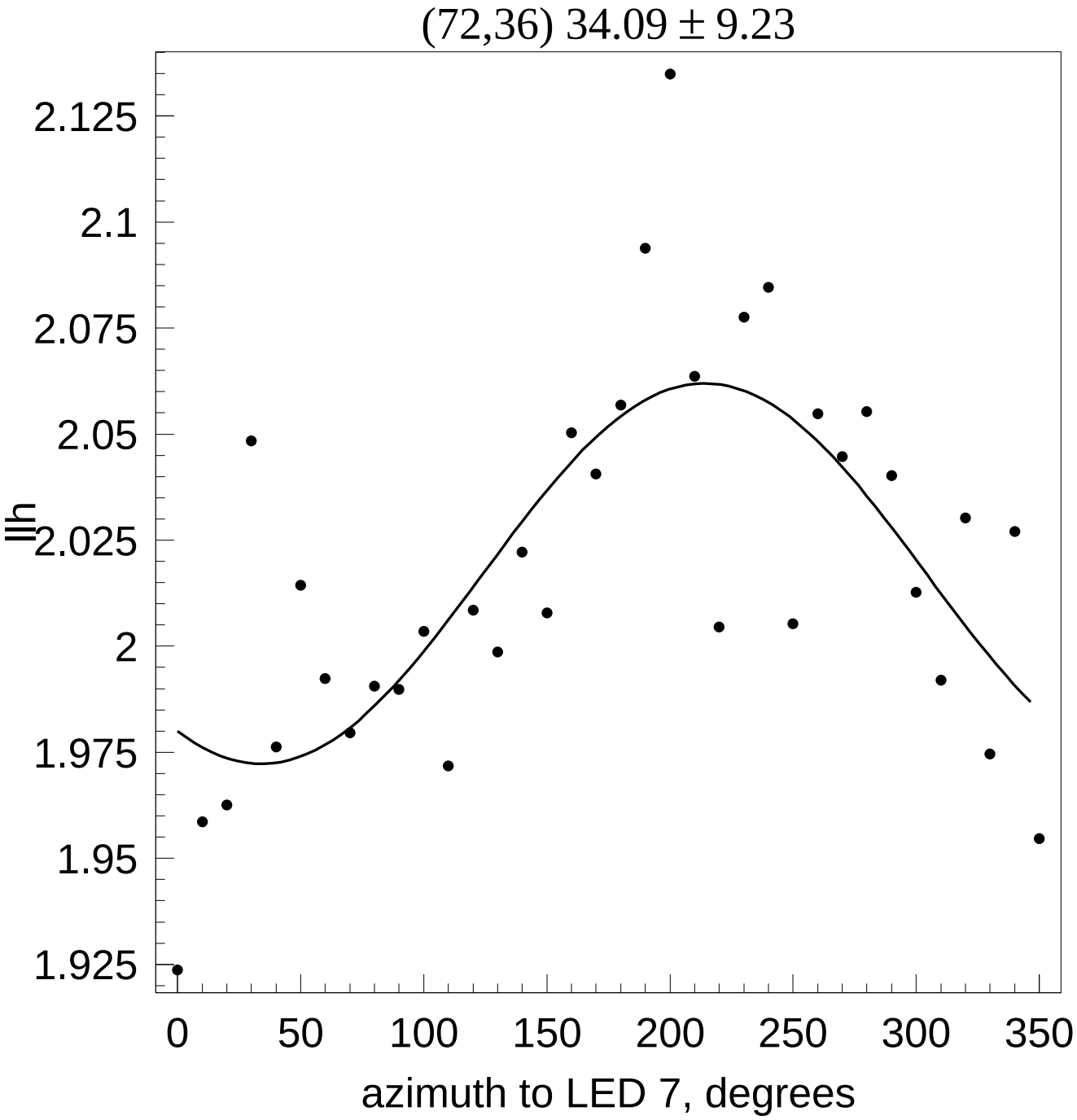

(72,35) 198.47 ± 6.24
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
1.9
1.875
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

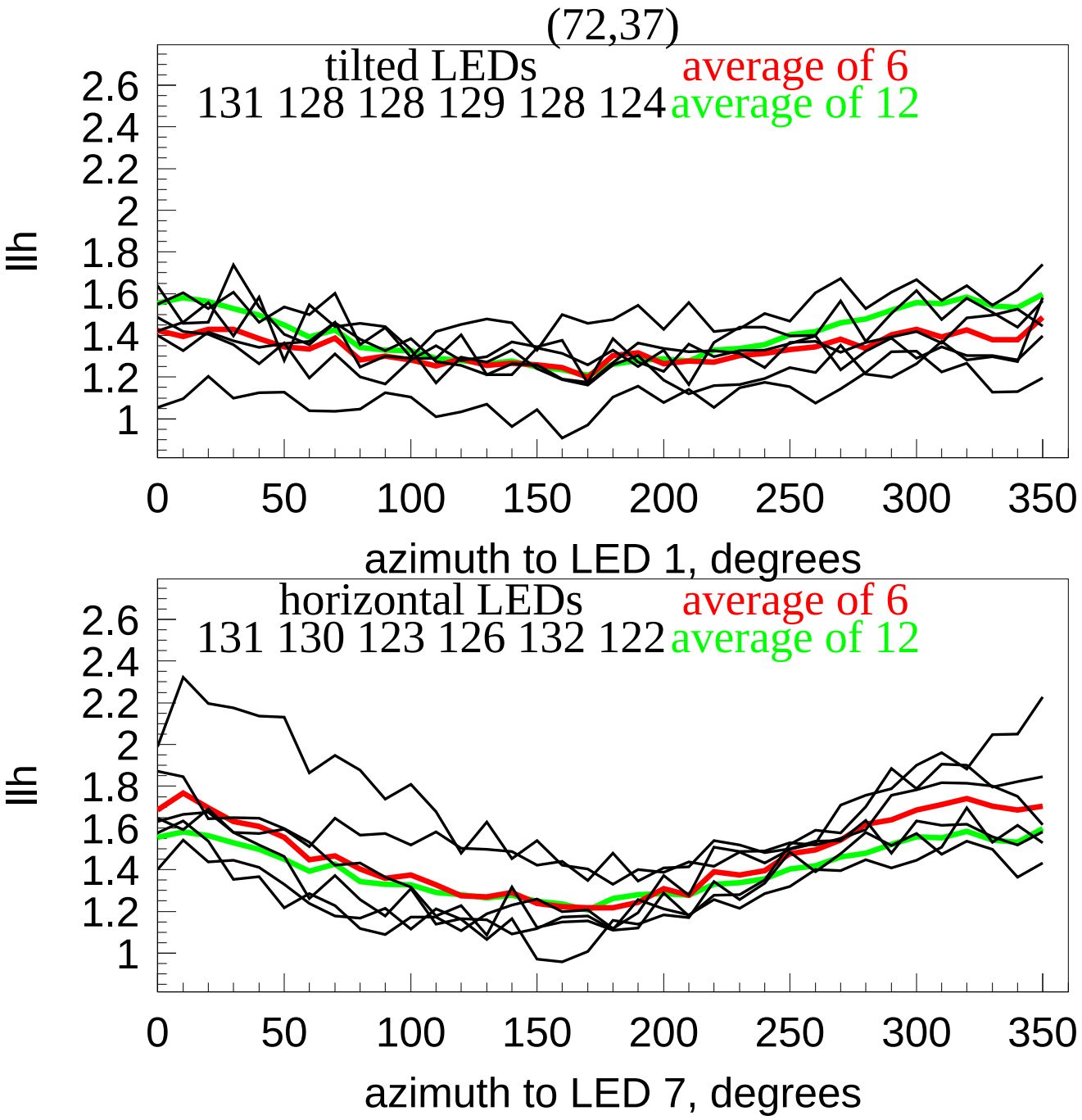

(72,35) 197.78 ± 7.11
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
1.9
1.875
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

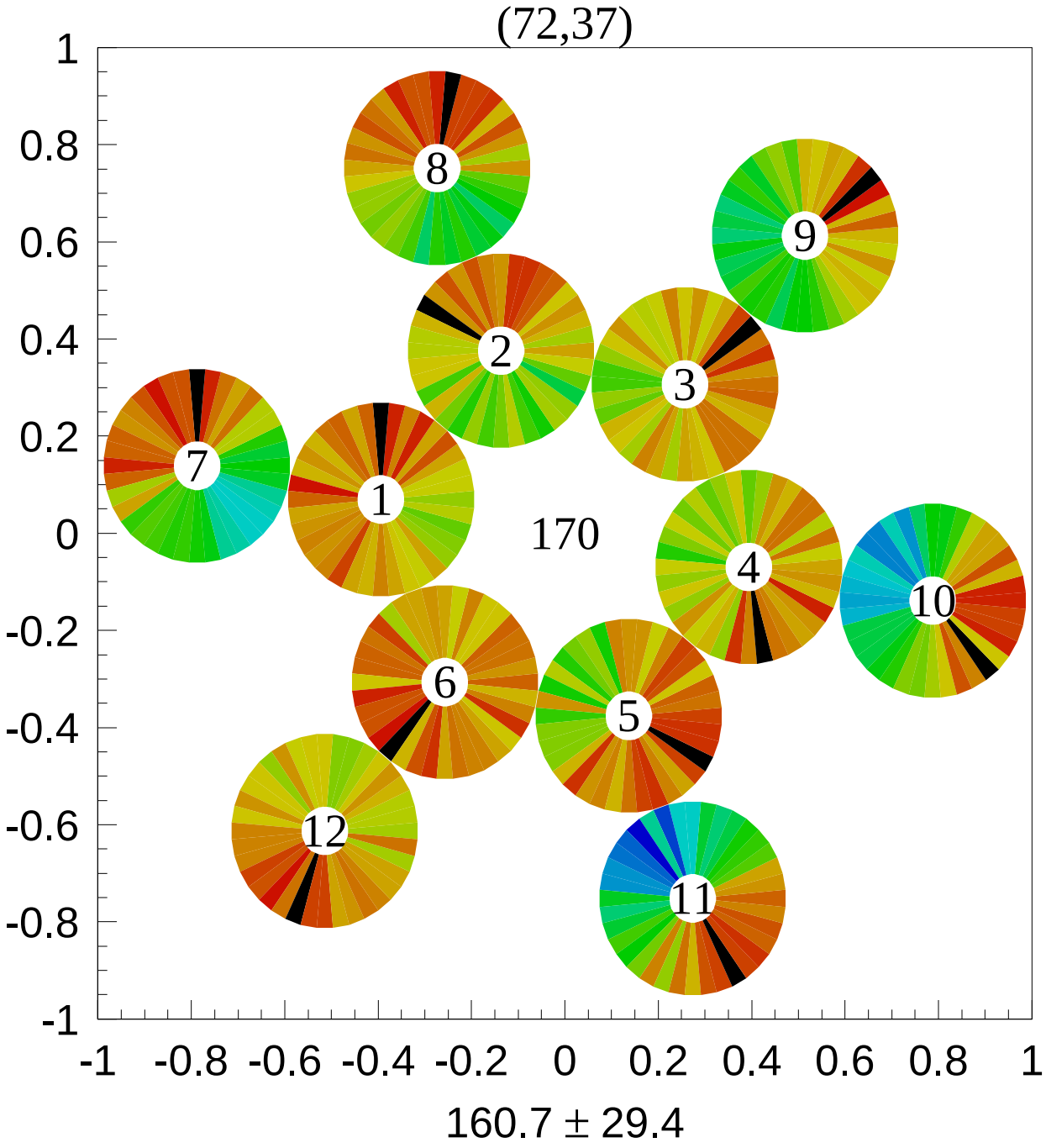

(72,36)
tilted LEDs
127 122 121 119 119 125
average of 6
average of 12
llh
3.5
3.25
3
2.75
2.5
2.25
2
1.75
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
125 130 126 118 126 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

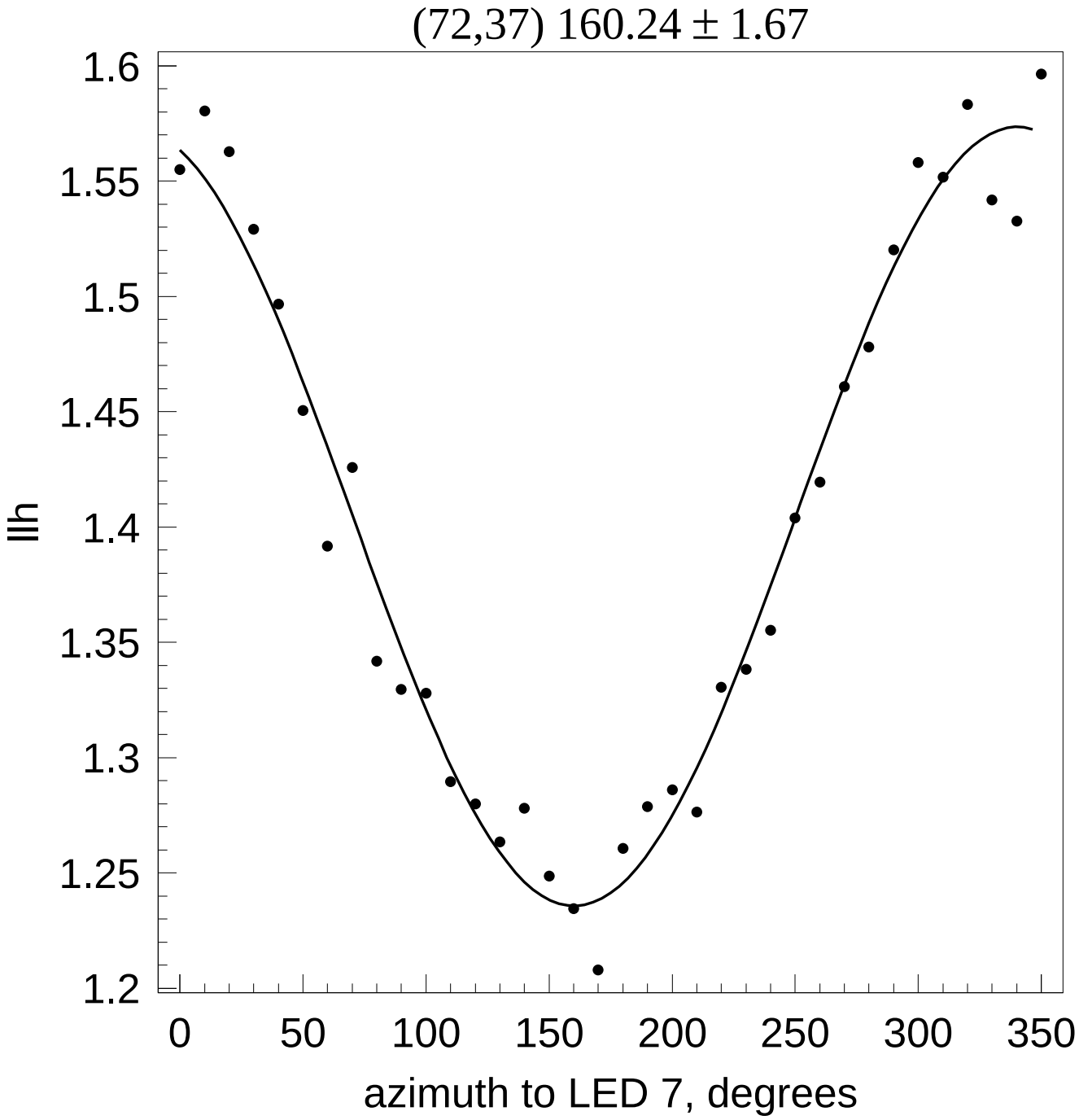

(72,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
29.3 ± 121.0
11
12
5
6
10
4
0
1
7
3
2
9
8

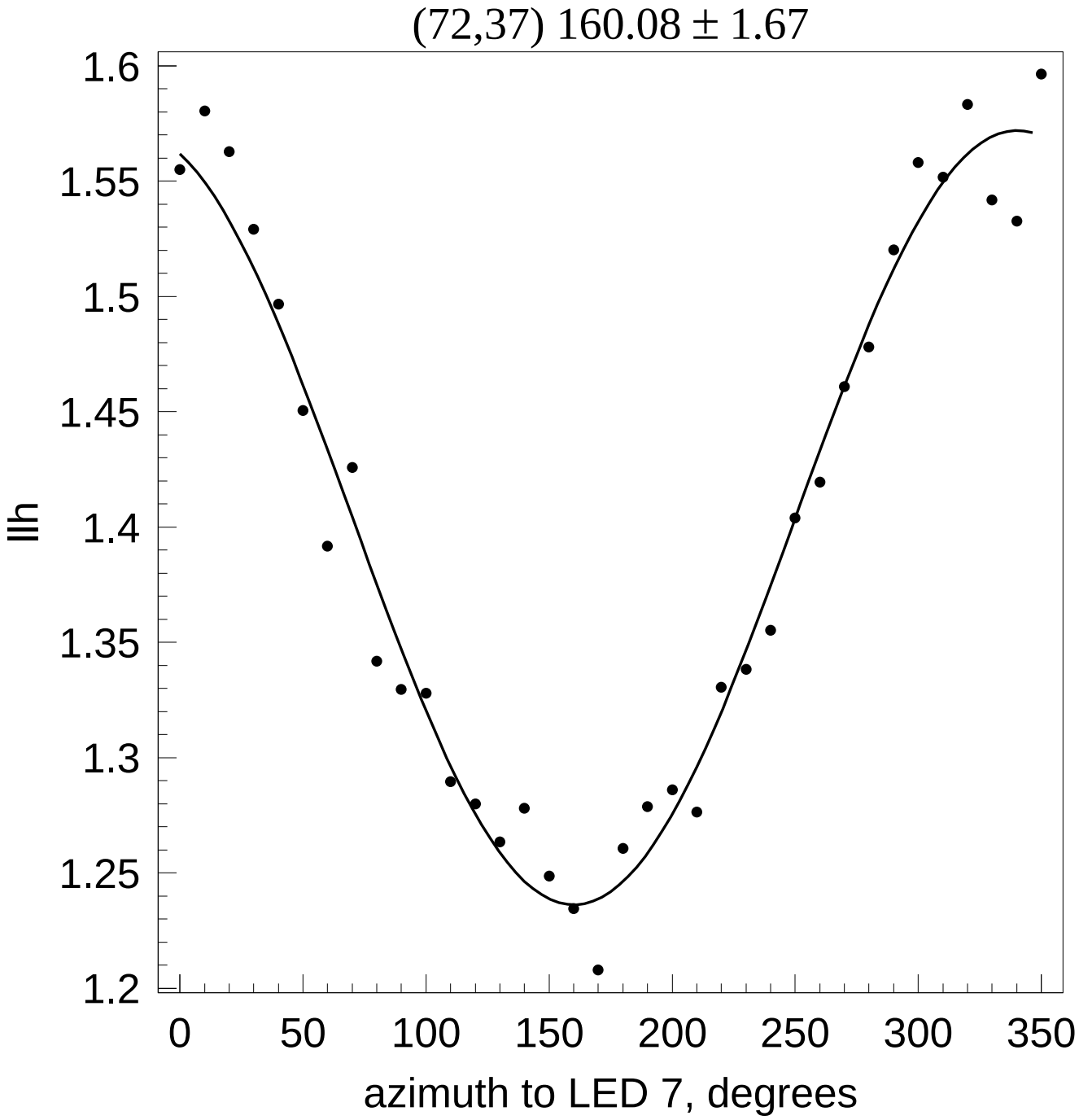

(72,36) 34.40 ± 9.36
2.125
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

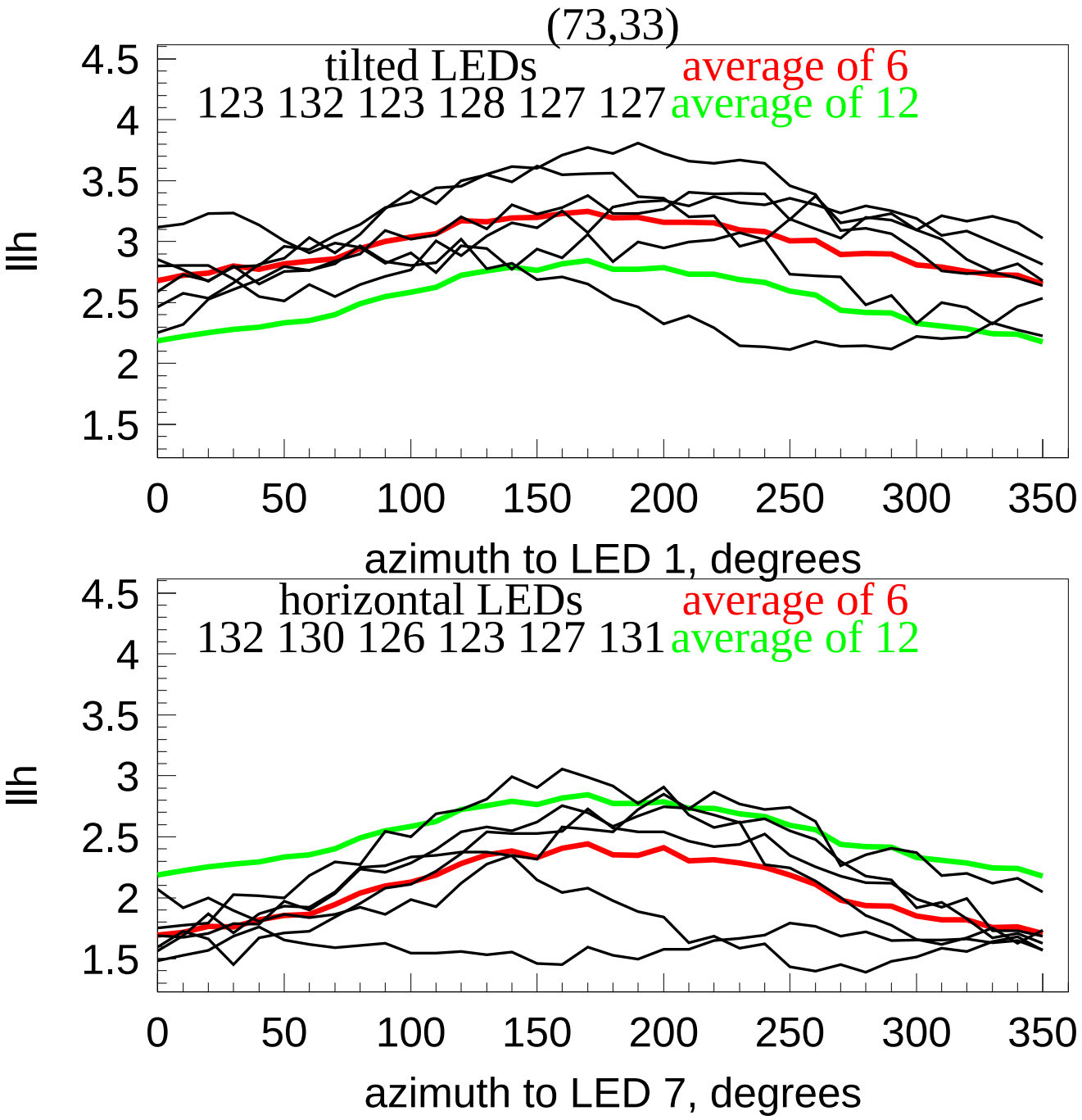

(72,36) 34.09 ± 9.23
2.125
2.1
2.075
2.05
2.025
2
1.975
1.95
1.925
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

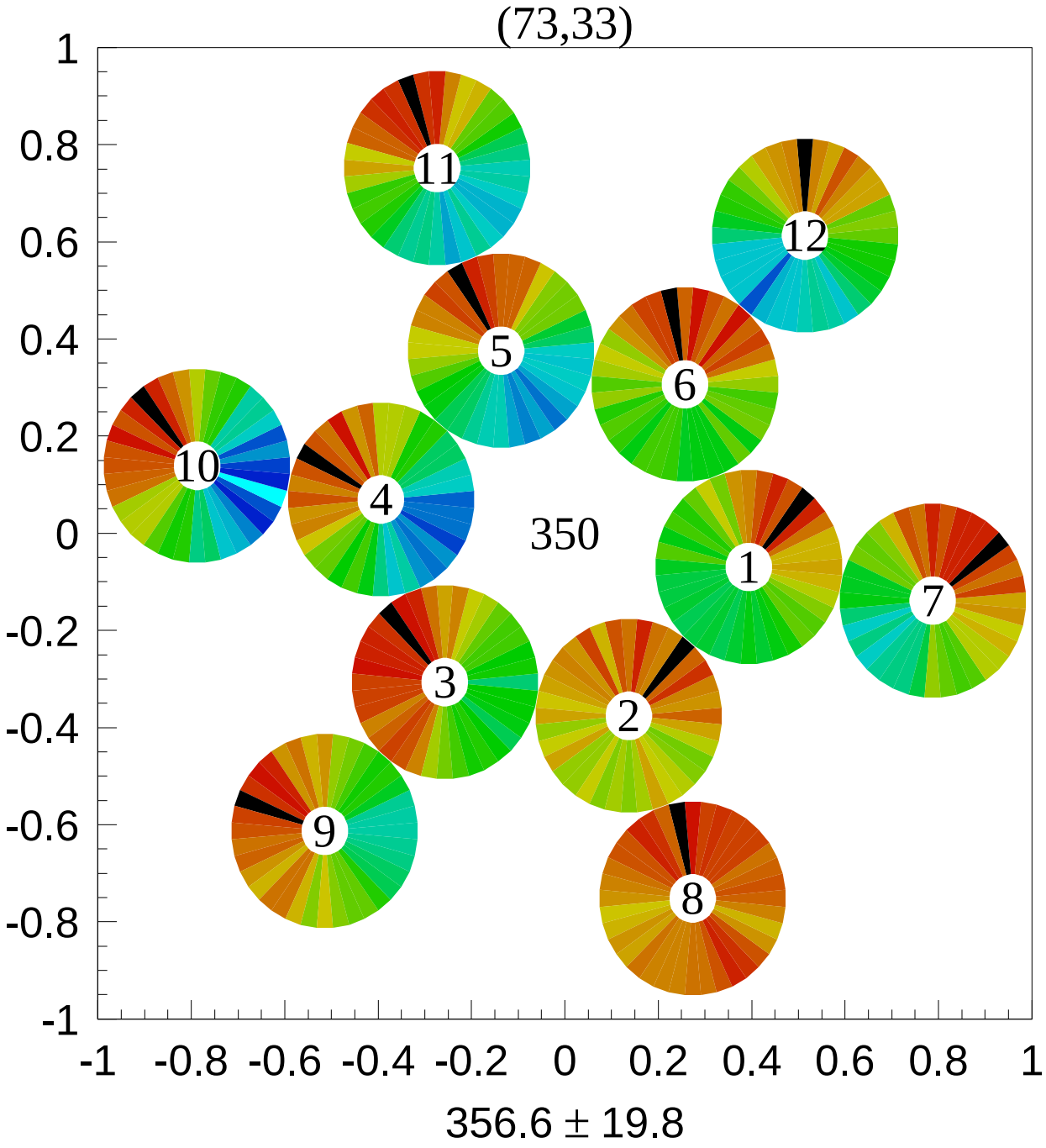

(72,37)
tilted LEDs
131 128 128 129 128 124
average of 6
average of 12
Ilh
2.6
2.4
2.2
2
1.8
1.6
1.4
1.2
1
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 130 123 126 132 122
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

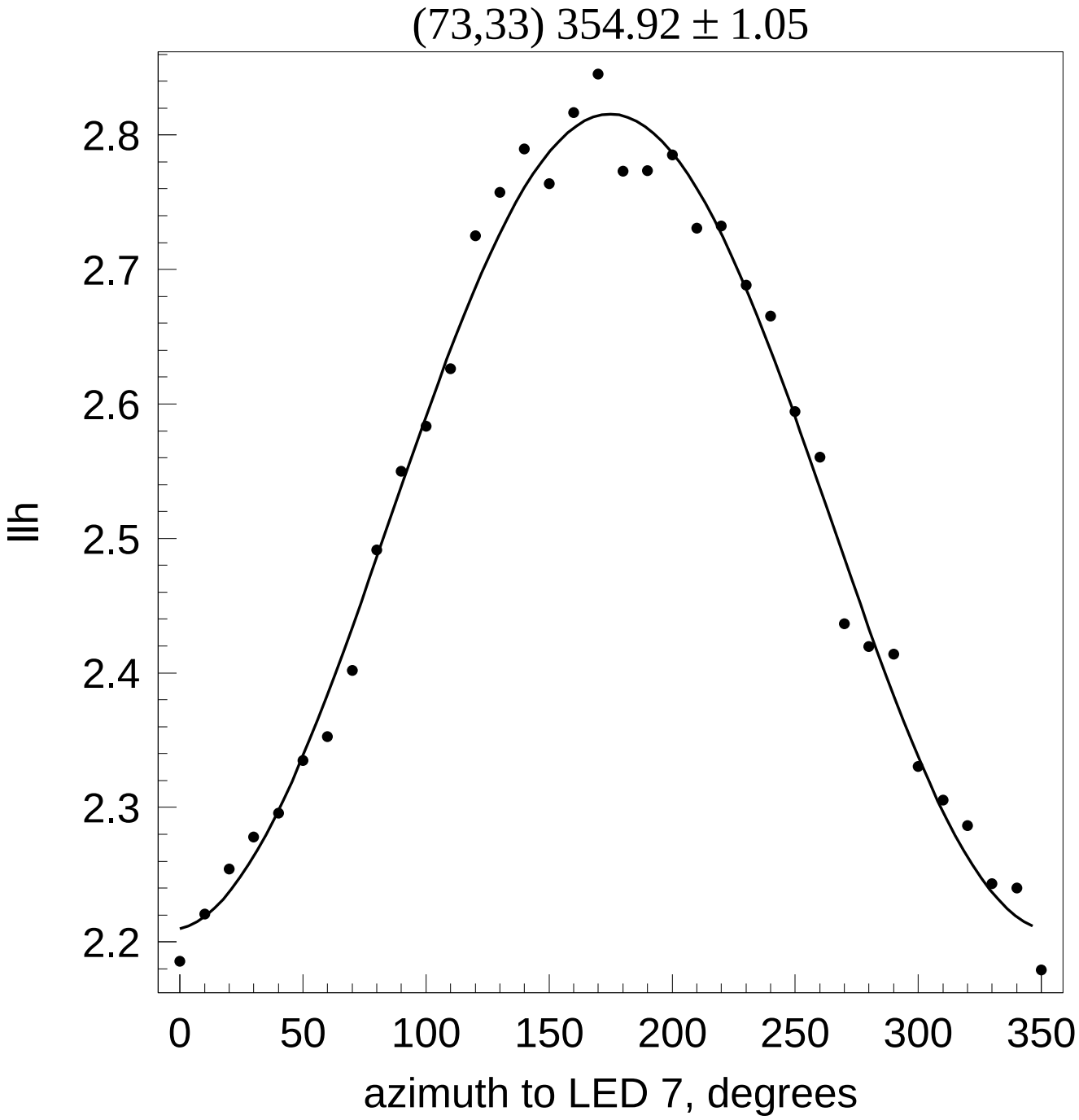

(72,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
3
7
1
170
4
10
6
5
12
11
160.7 ± 29.4

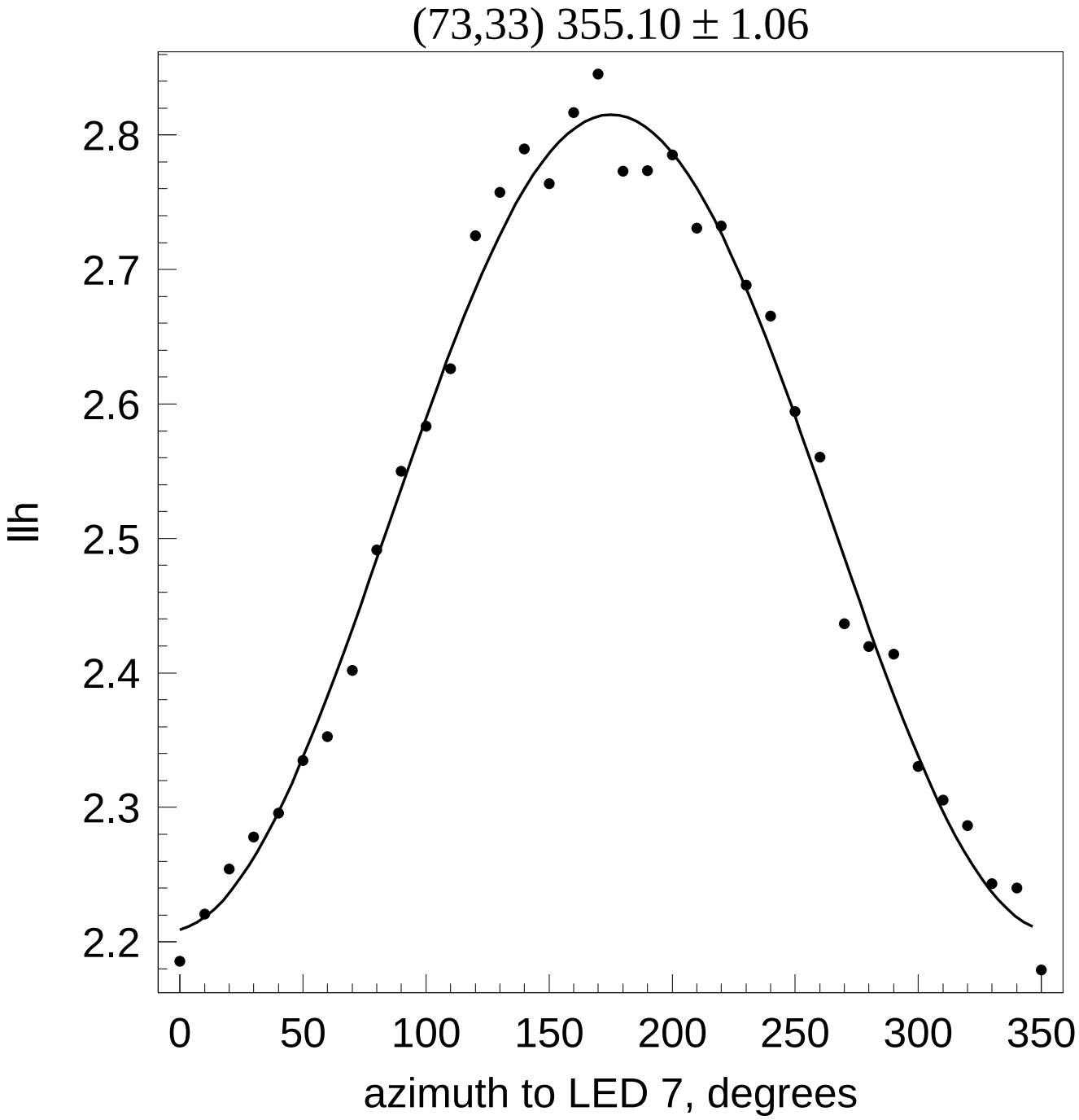

(72,37) 160.24 ± 1.67
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

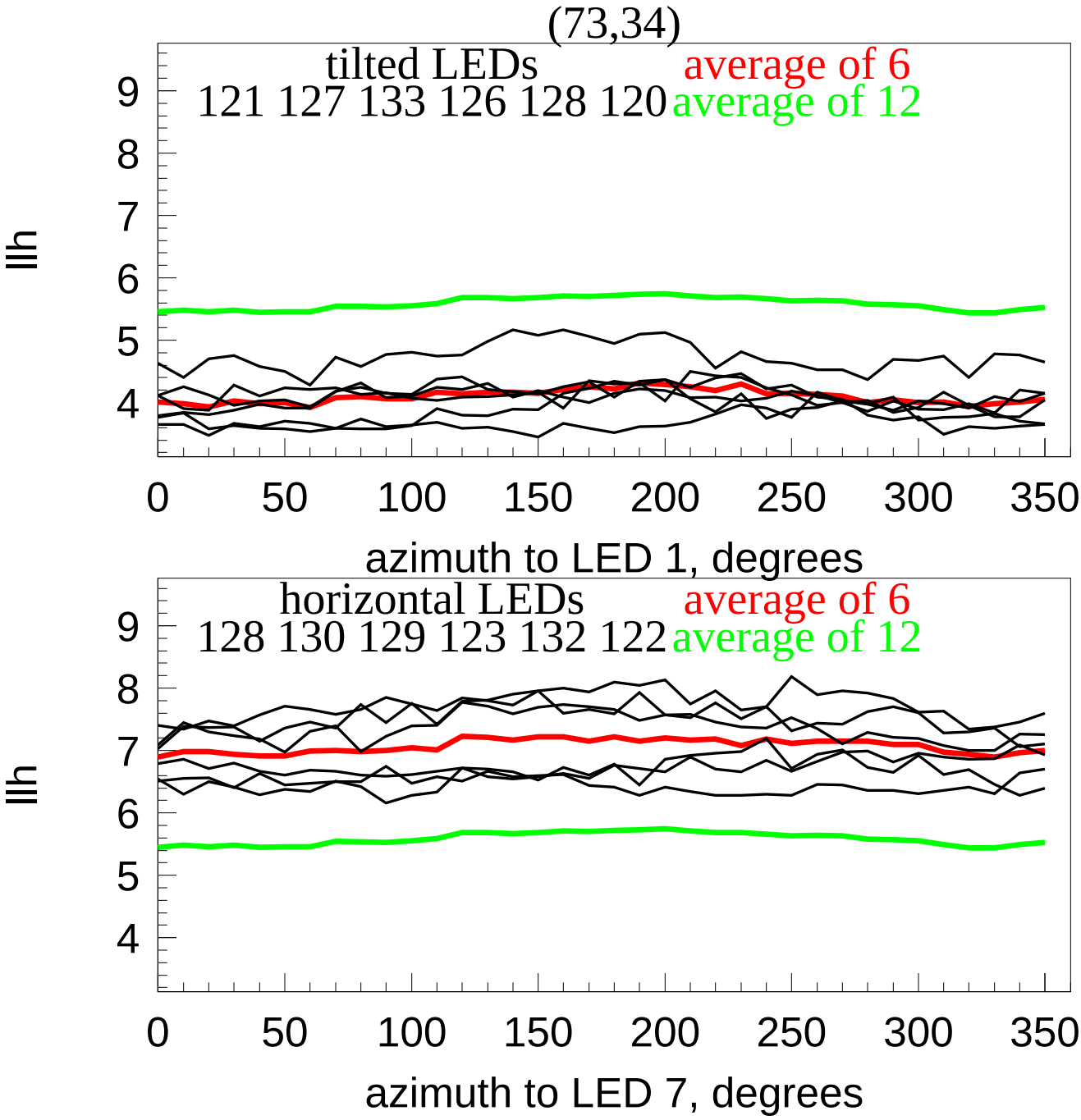

(72,37) 160.08 ± 1.67
1.6
1.55
1.5
1.45
1.4
1.35
1.3
1.25
1.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

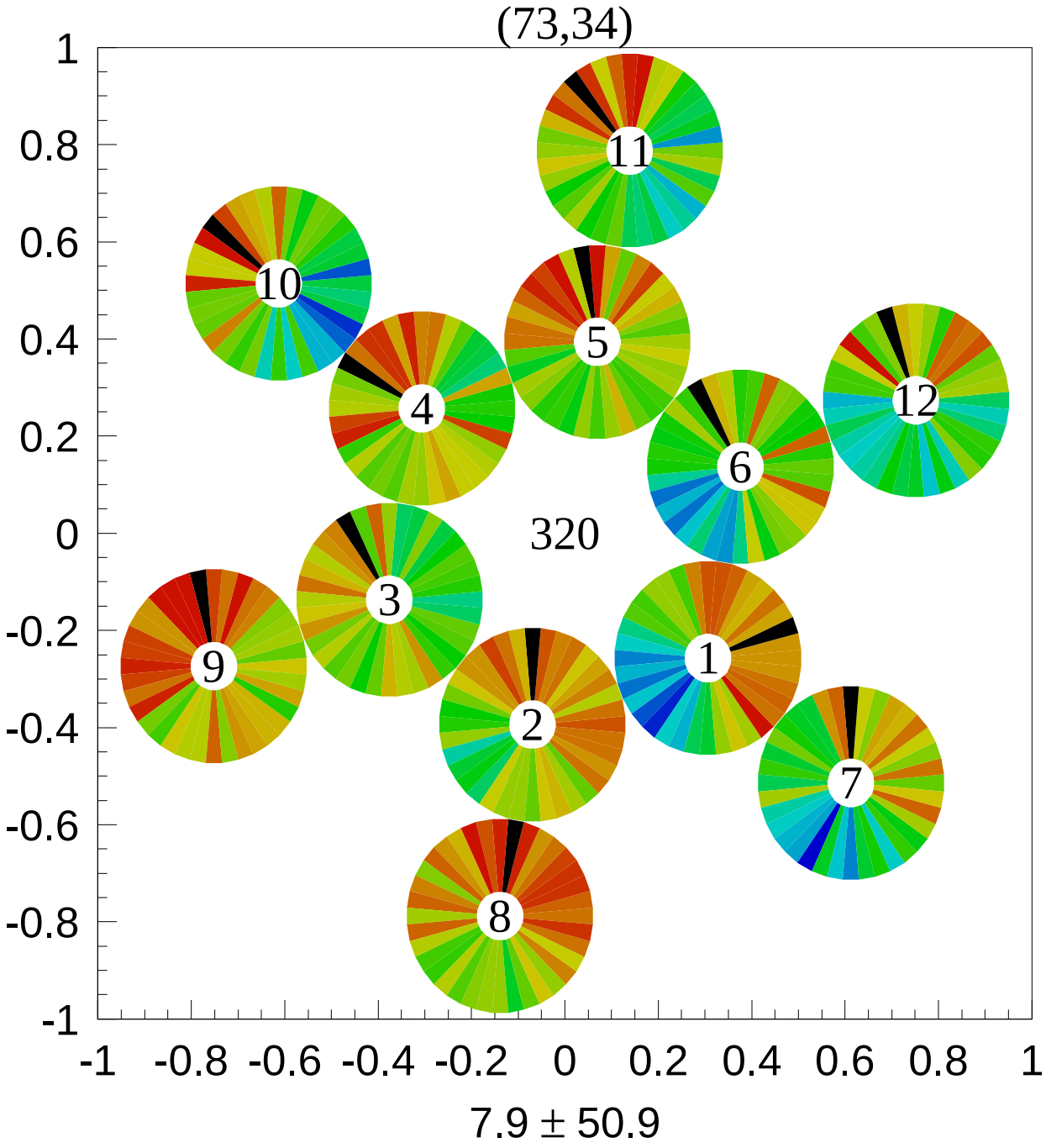

(73,33)
tilted LEDs
123 132 123 128 127 127
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
132 130 126 123 127 131
average of 6
average of 12
llh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

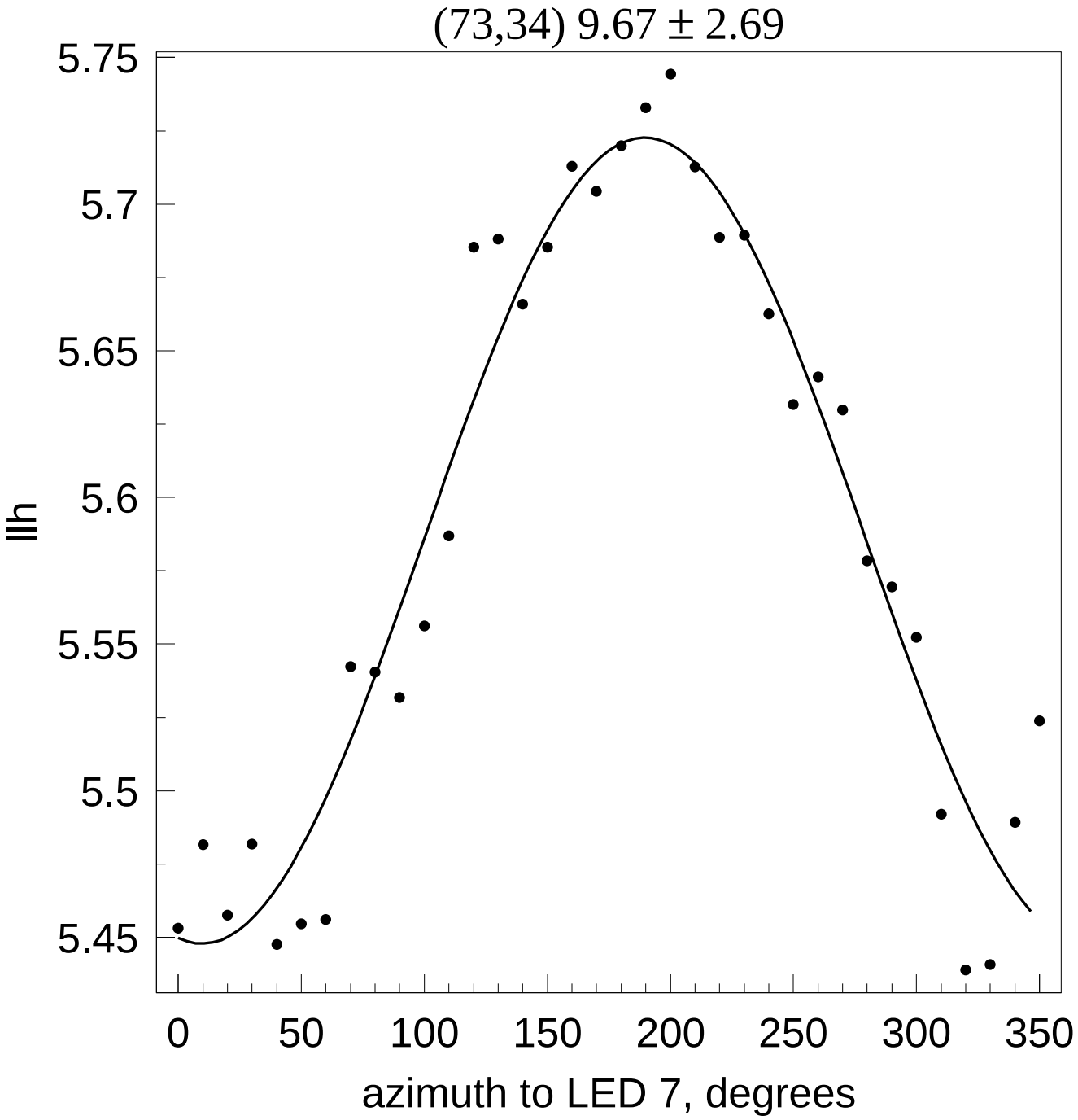

(73,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
356.6 ± 19.8
11
12
5
6
10
4
350
1
7
3
2
9
8

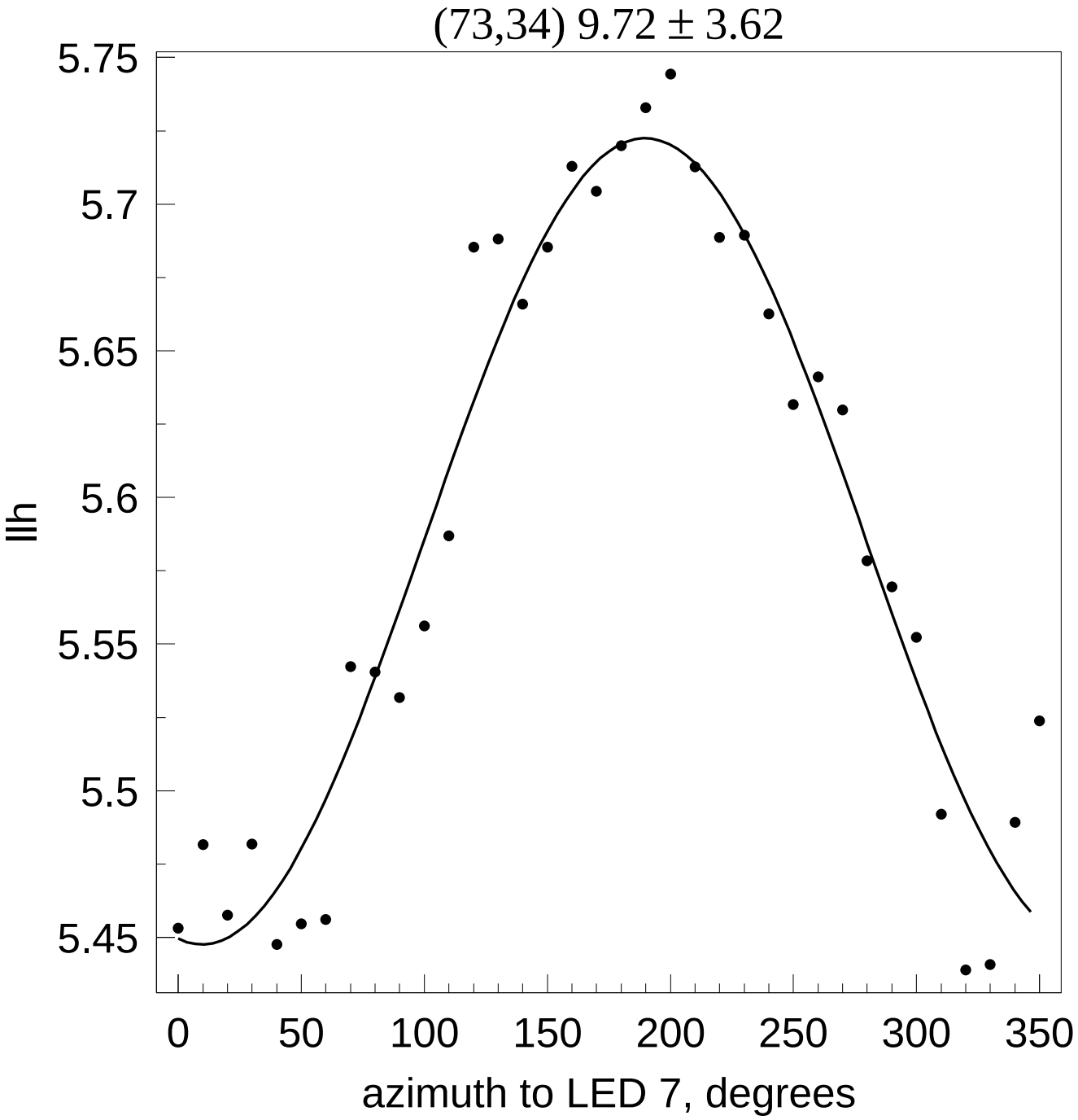

(73,33) 354.92 ± 1.05
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

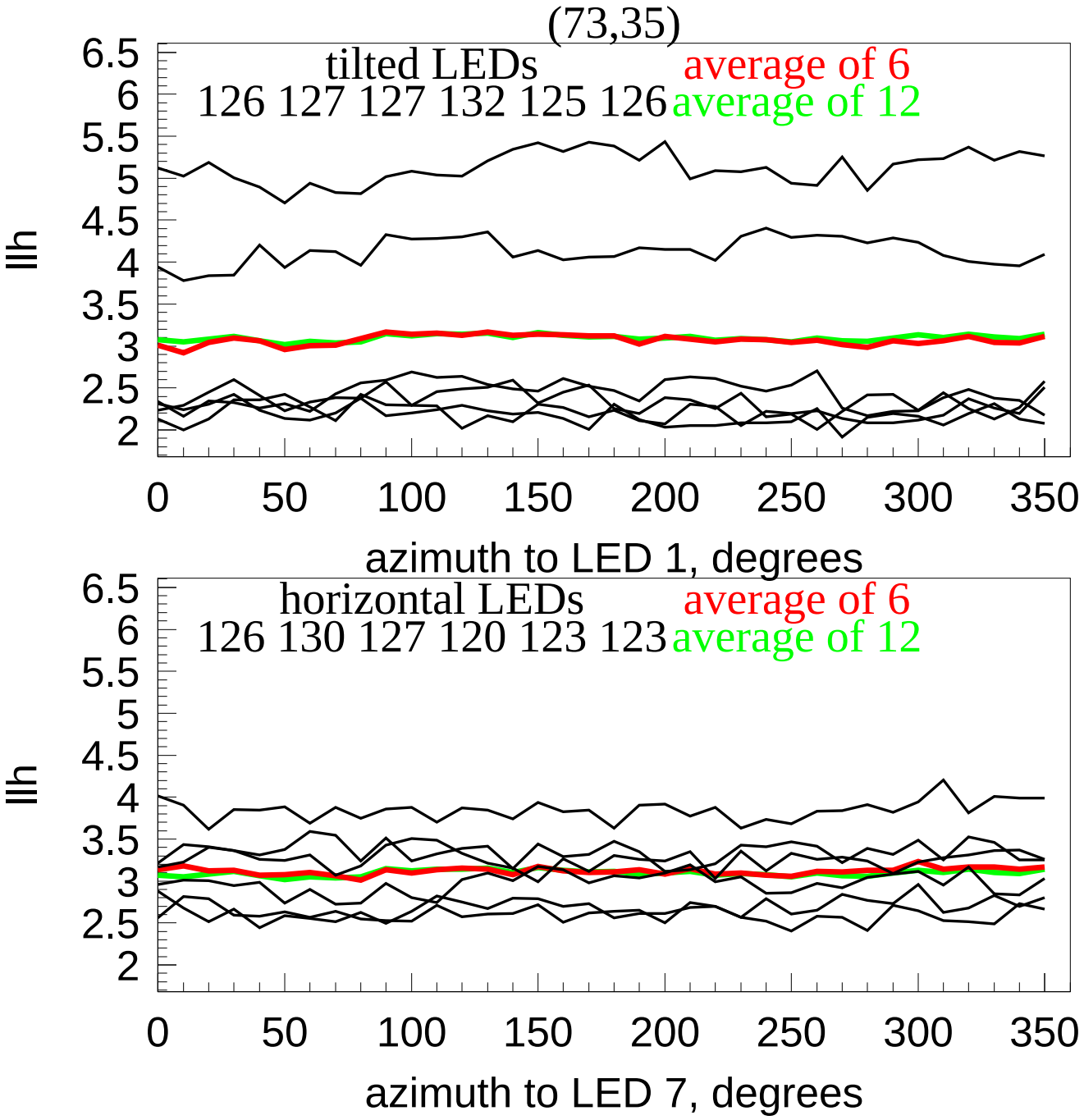

(73,33) 355.10 ± 1.06
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

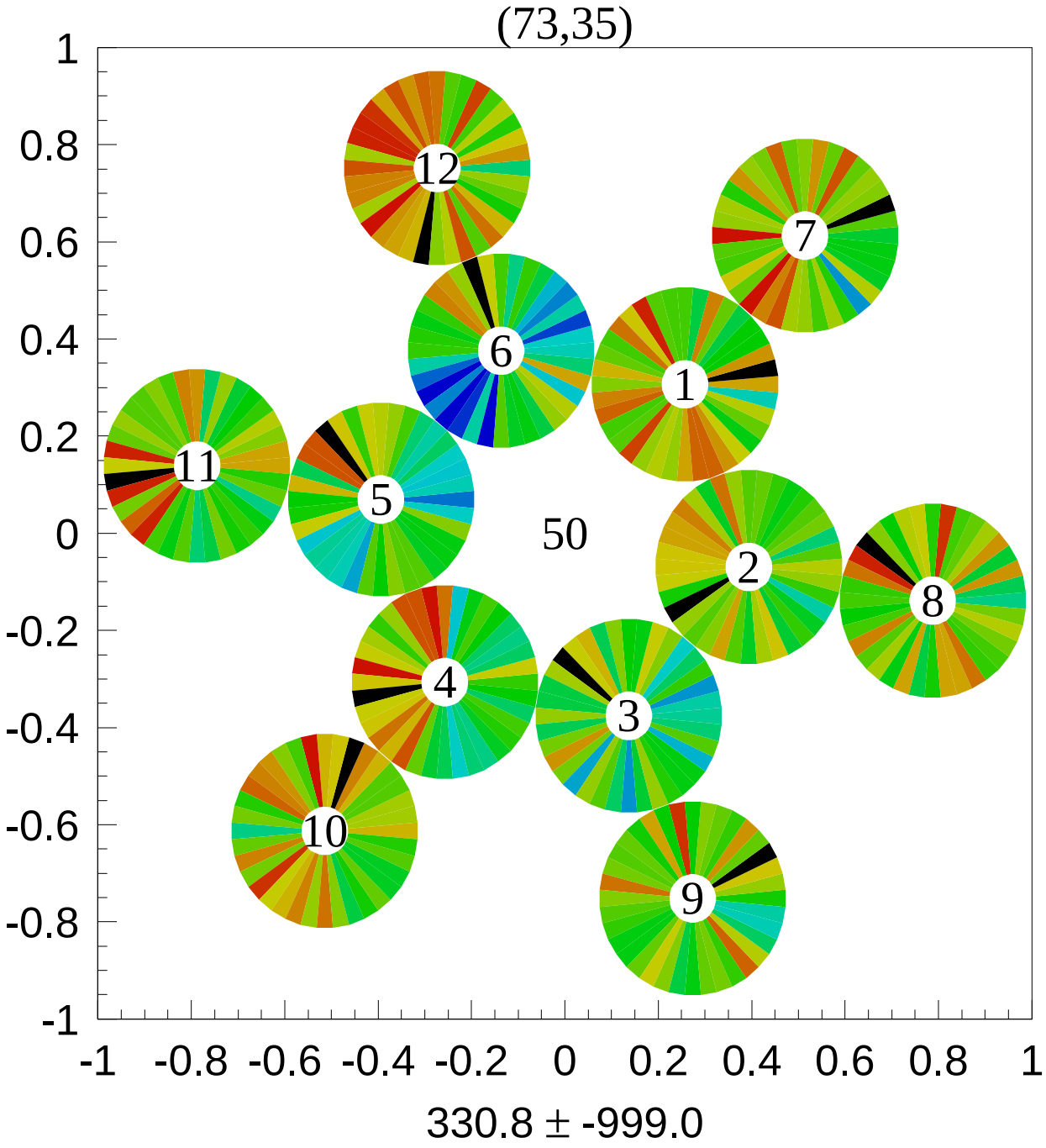

(73,34)
tilted LEDs
121 127 133 126 128 120
average of 6
average of 12
llh
9
8
7
6
5
4
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 130 129 123 132 122
average of 6
average of 12
llh
9
8
7
6
5
4
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

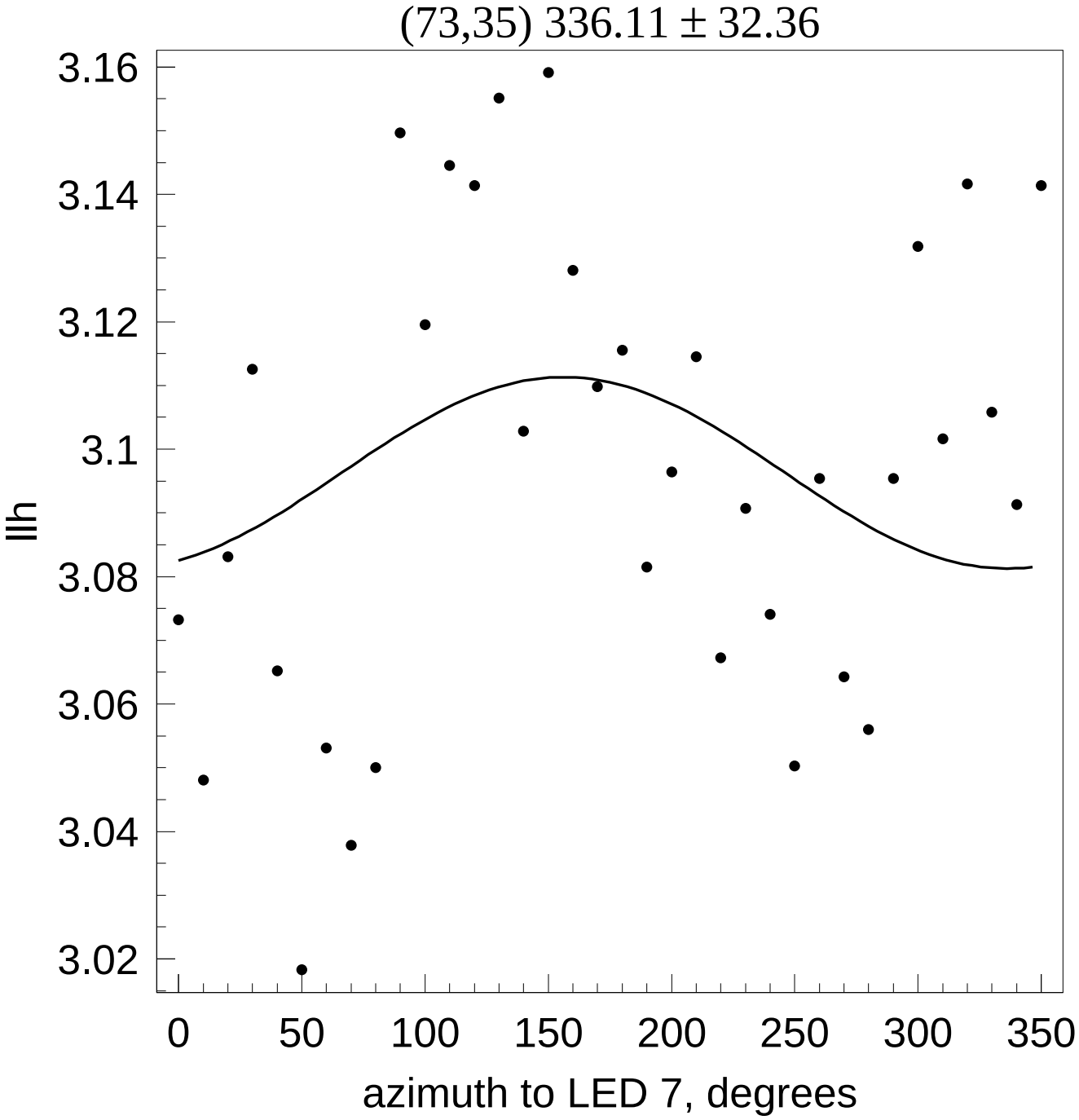

(73,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
10
5
4
12
6
320
3
9
1
2
7
8
7.9 ± 50.9

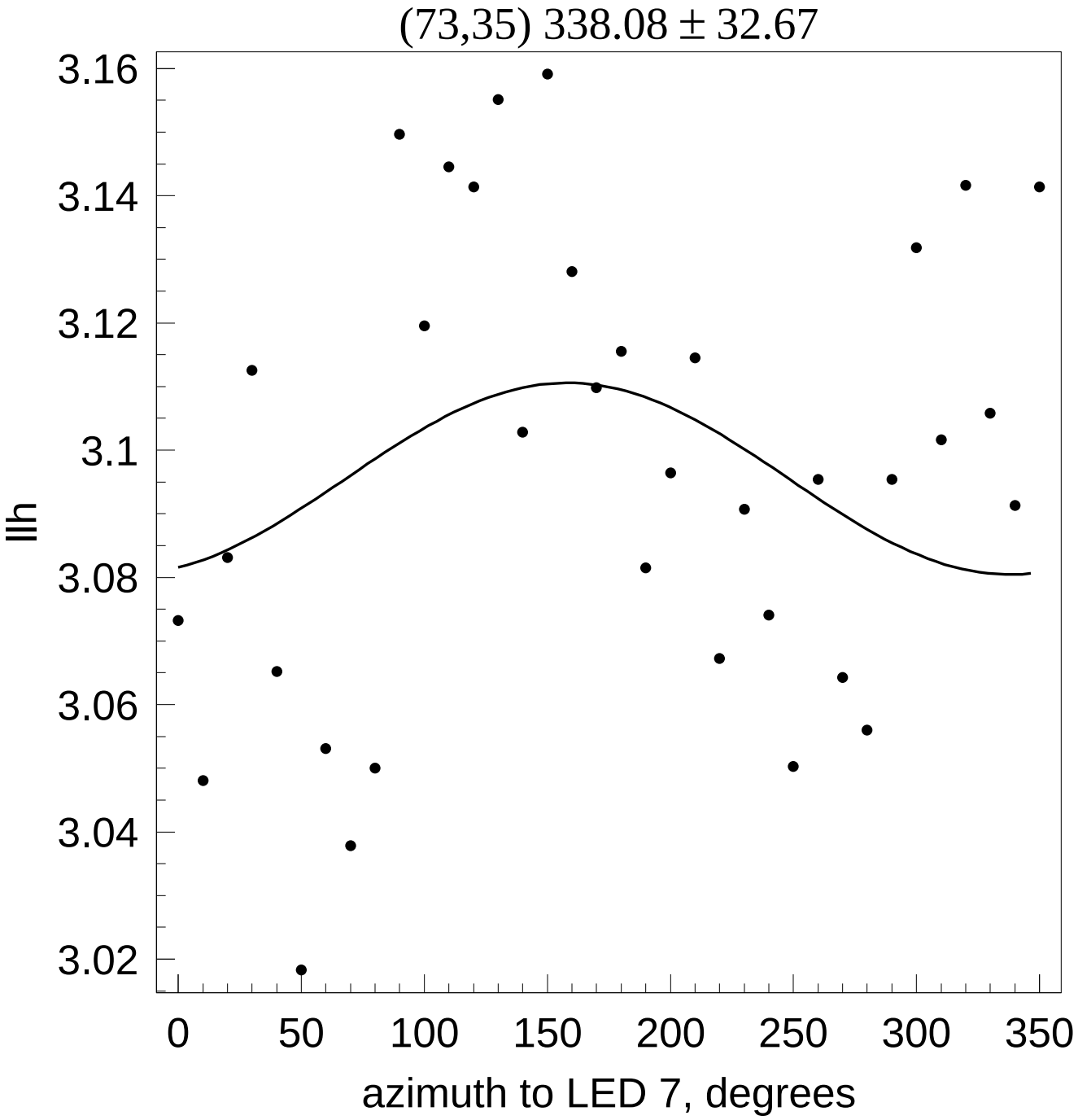

(73,34) 9.67 ± 2.69
5.75
5.7
5.65
5.6
5.55
5.5
5.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

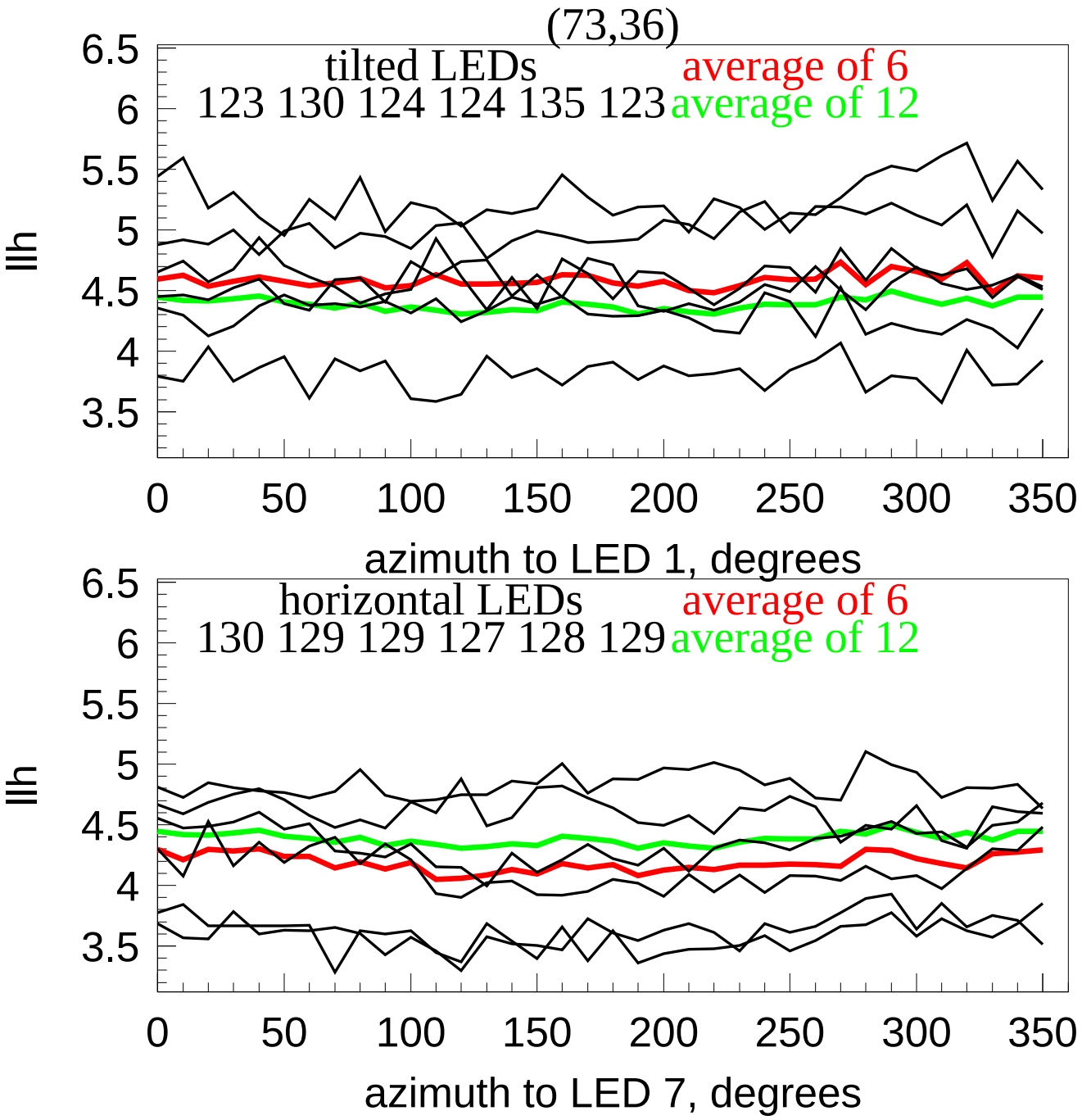

(73,34) 9.72 ± 3.62
5.75
5.7
5.65
5.6
5.55
5.5
5.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

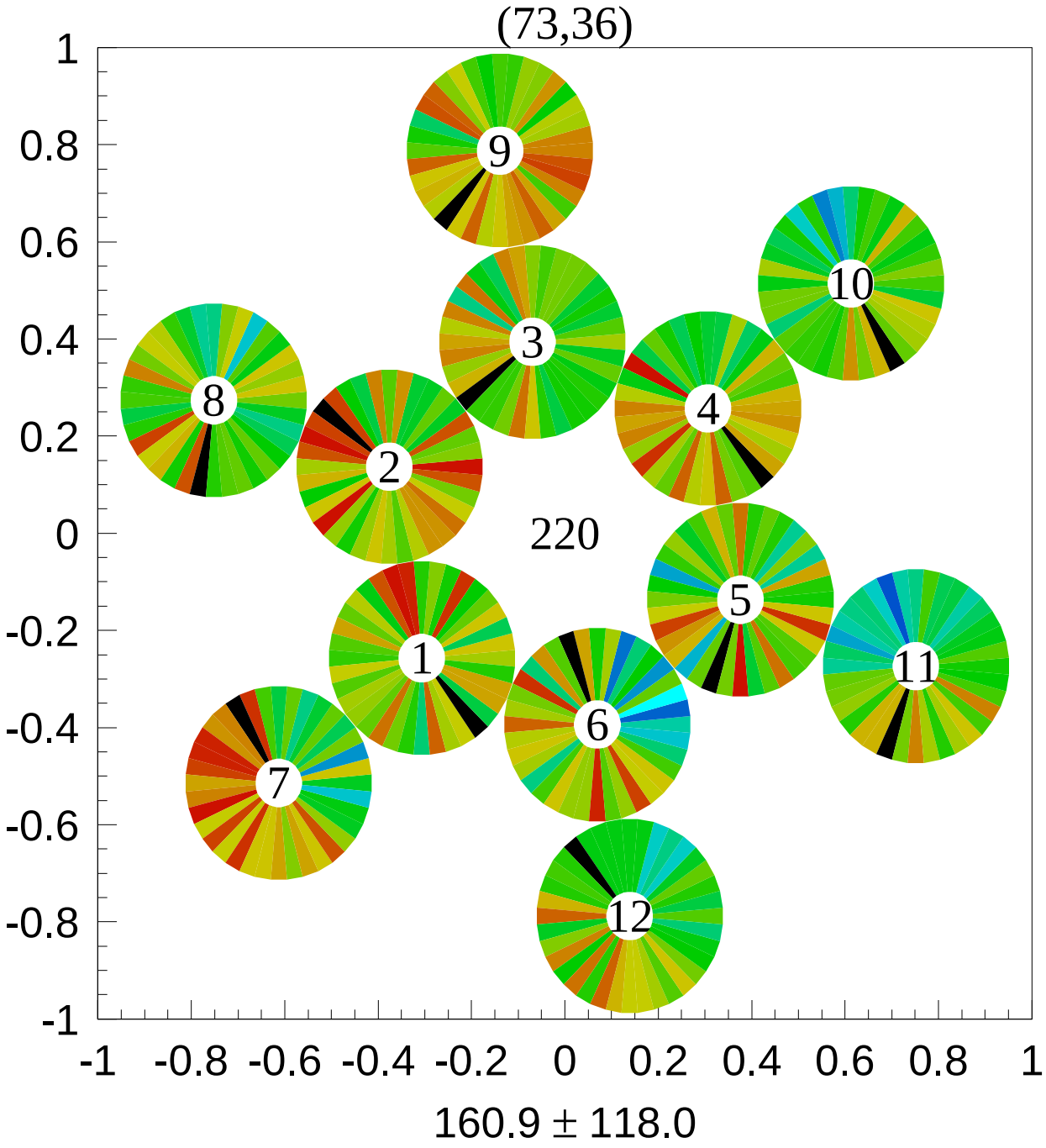

(73,35)
tilted LEDs
126 127 127 132 125 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 130 127 120 123 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

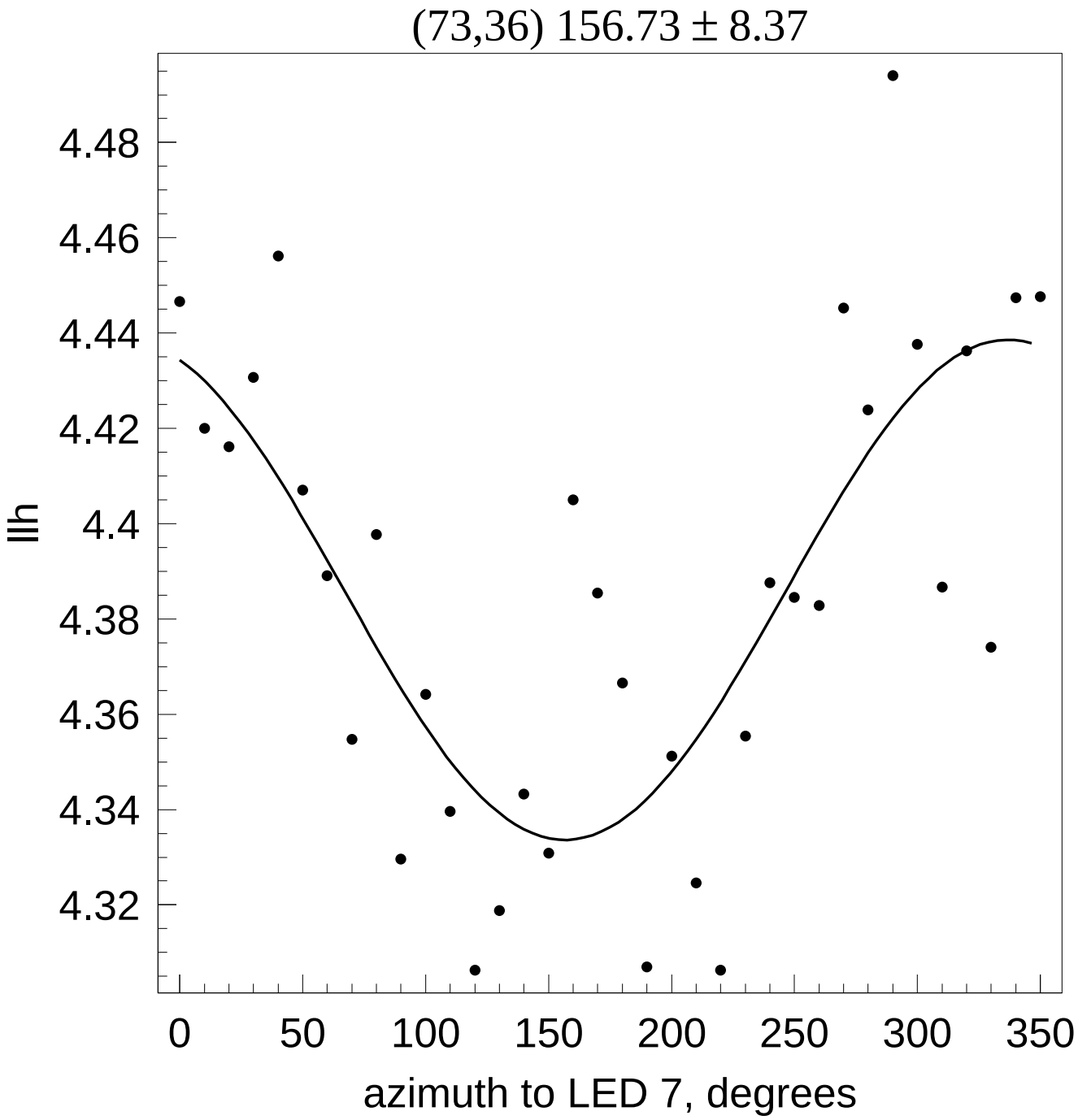

(73,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
50
2
8
4
3
10
9
330.8 ± -999.0

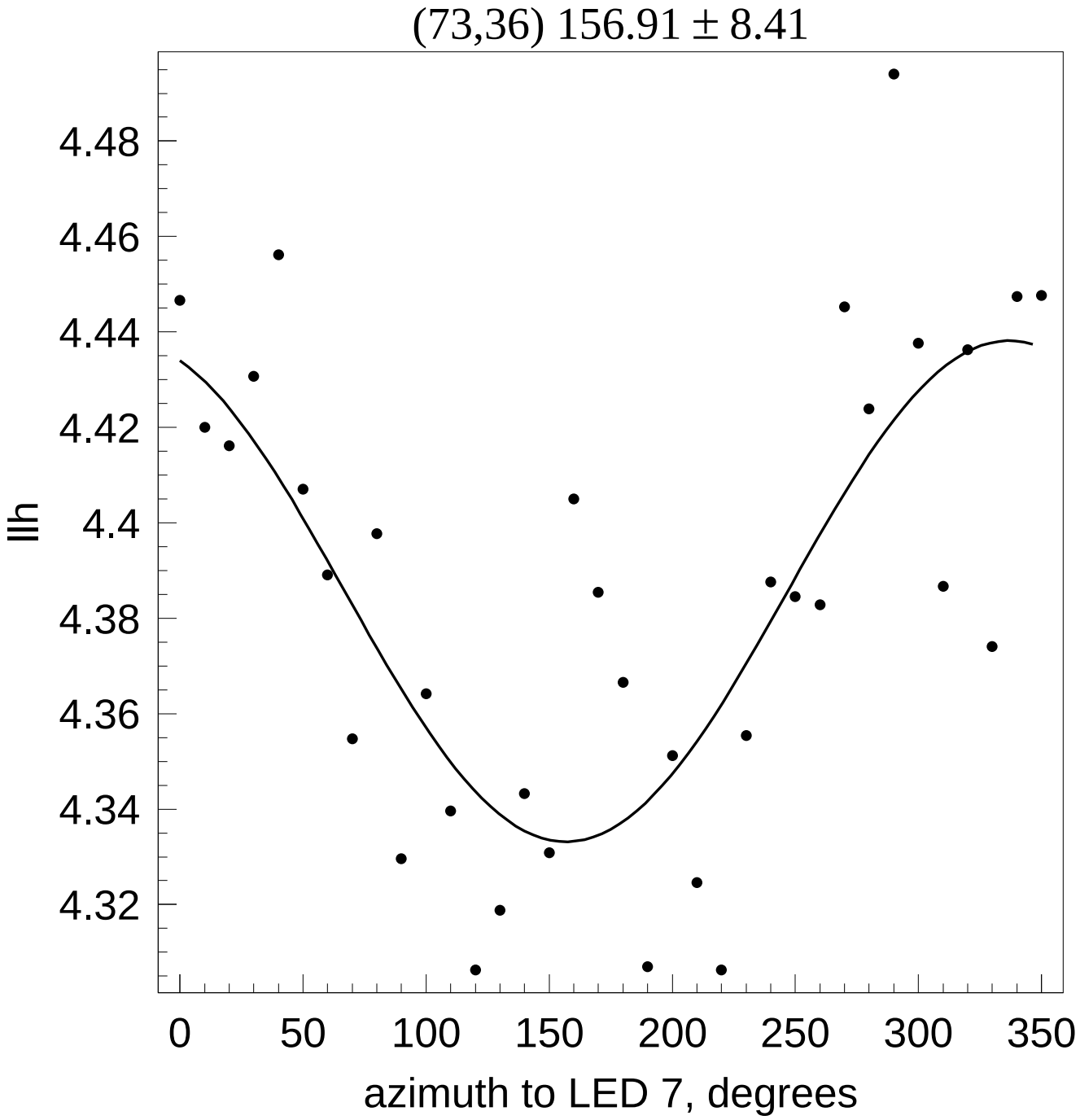

(73,35) 336.11 ± 32.36
3.16
3.14
3.12
3.1
3.08
3.06
3.04
3.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

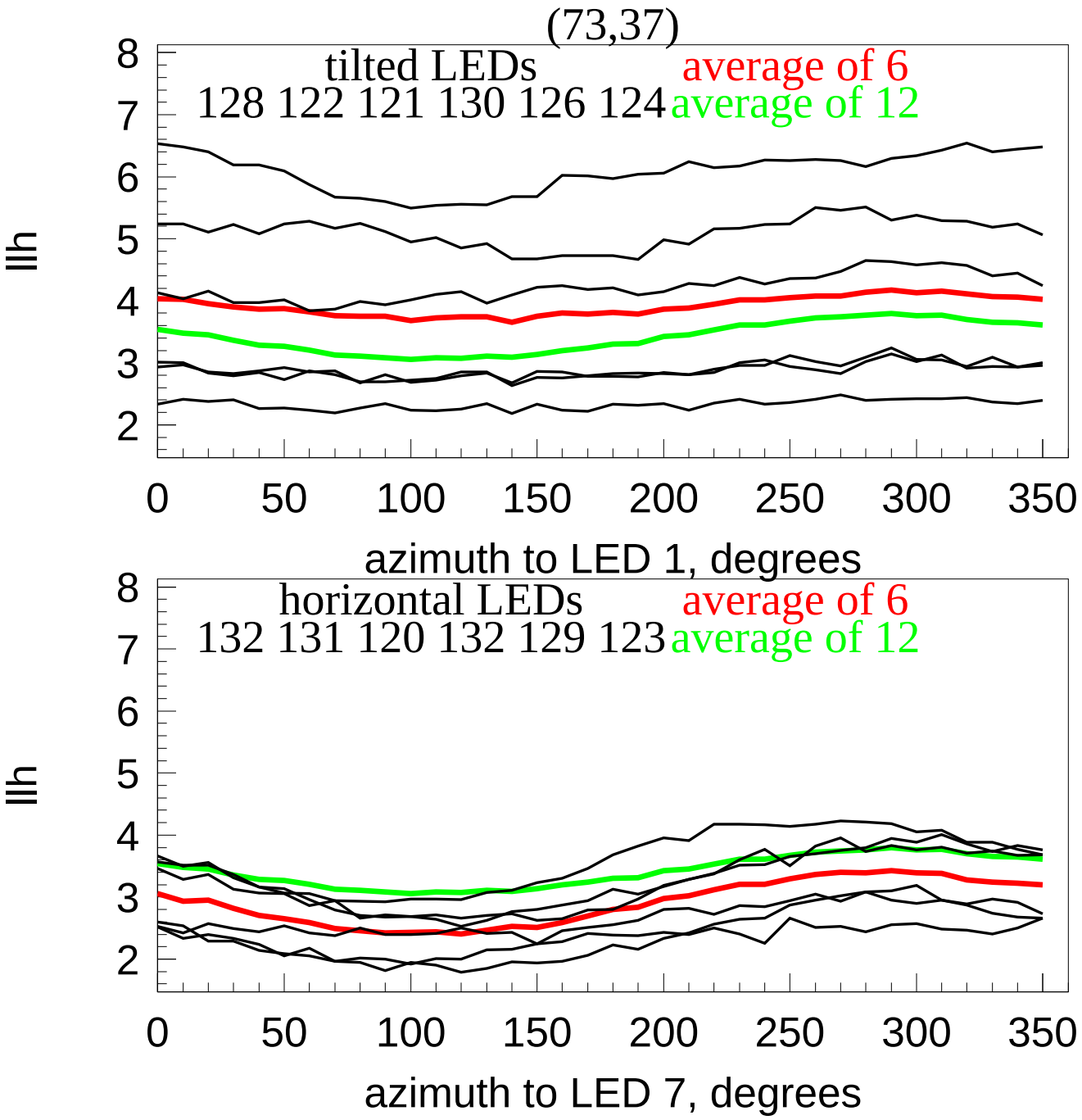

(73,35) 338.08 ± 32.67
3.16
3.14
3.12
3.1
3.08
3.06
3.04
3.02
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

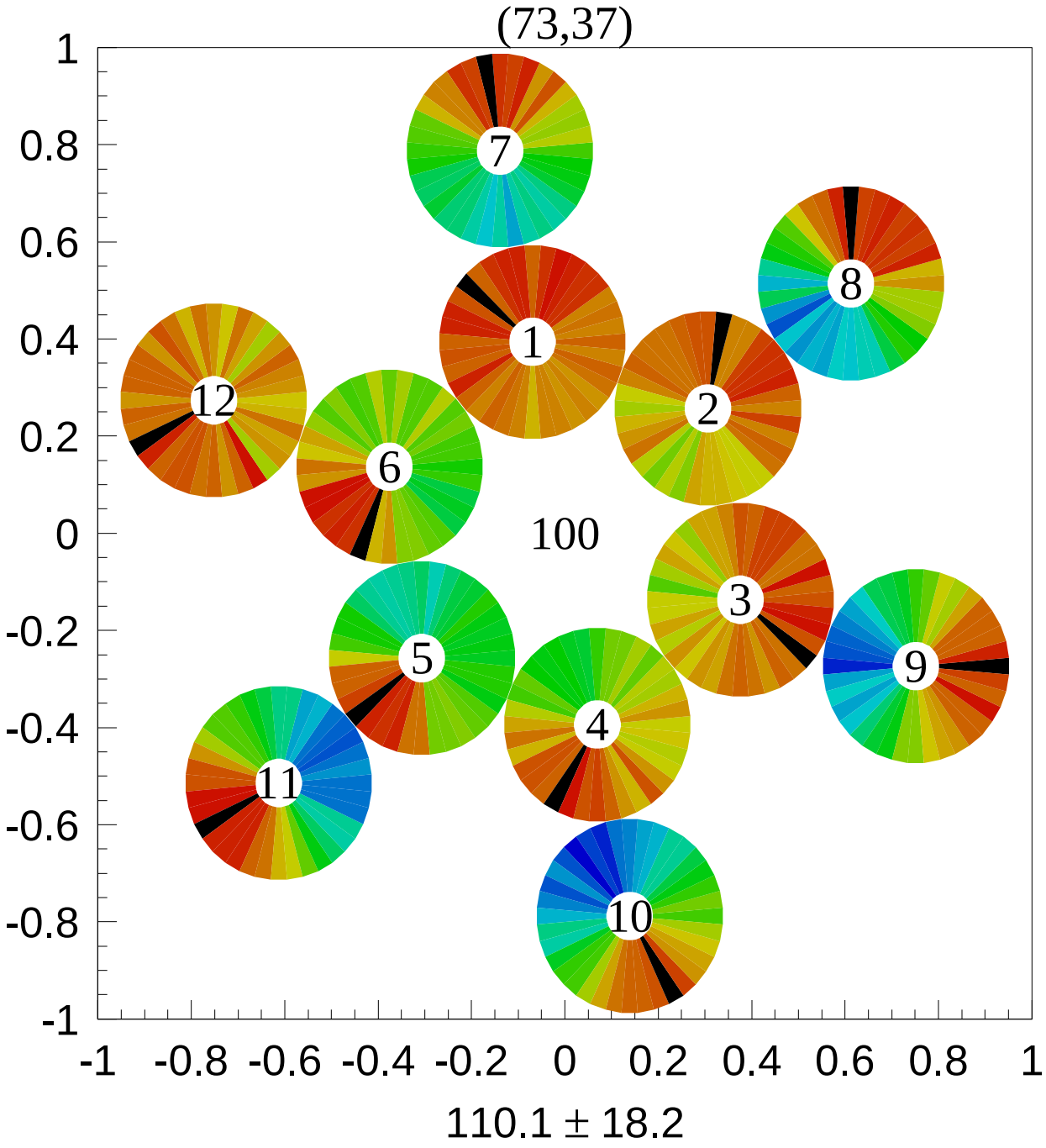

(73,36)
tilted LEDs
123 130 124 124 135 123
average of 6
average of 12
llh
6.5
6
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
130 129 129 127 128 129
average of 6
average of 12
llh
6.5
6
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

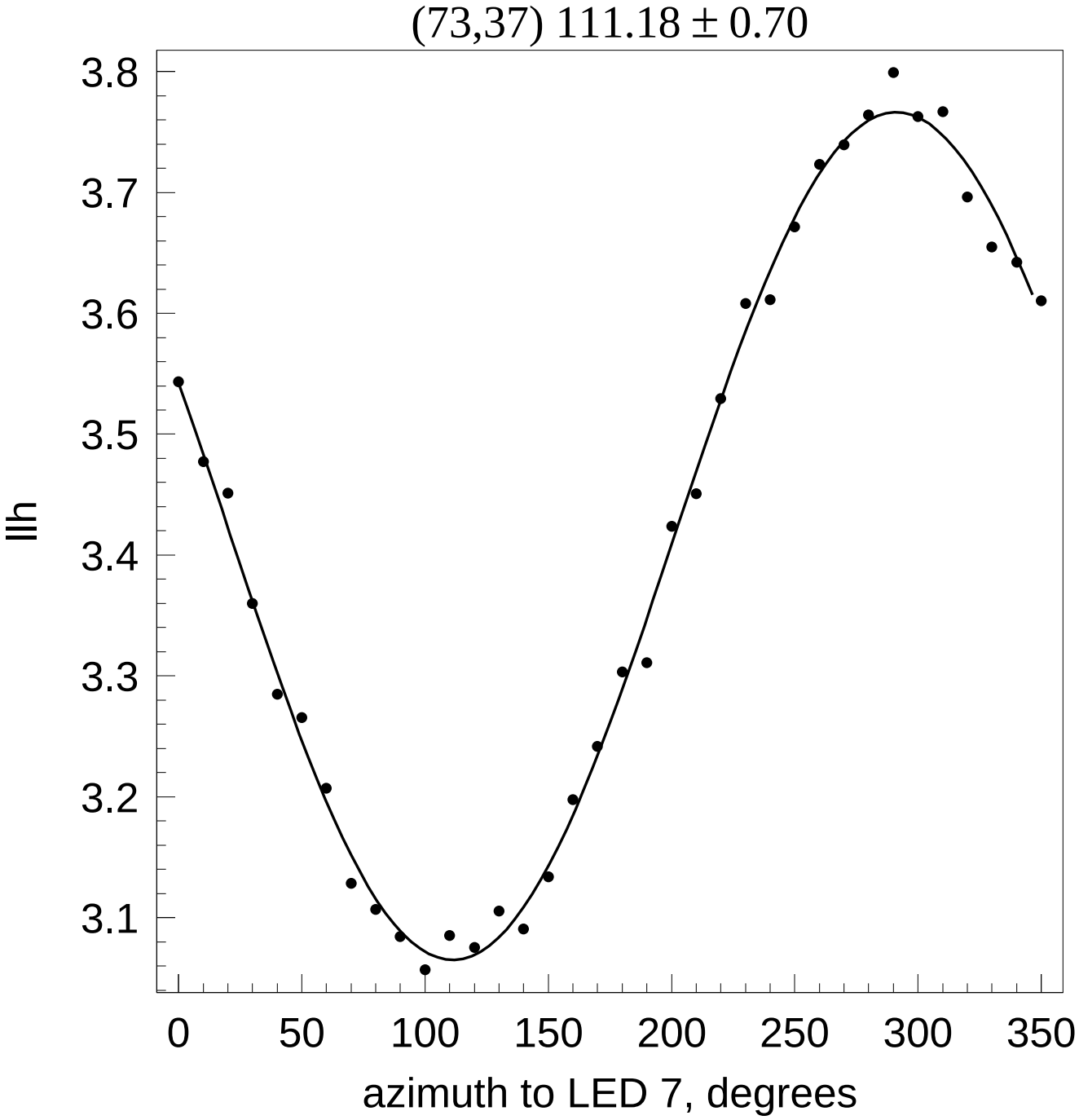

(73,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
8
4
2
220
5
1
11
6
7
12
160.9 ± 118.0

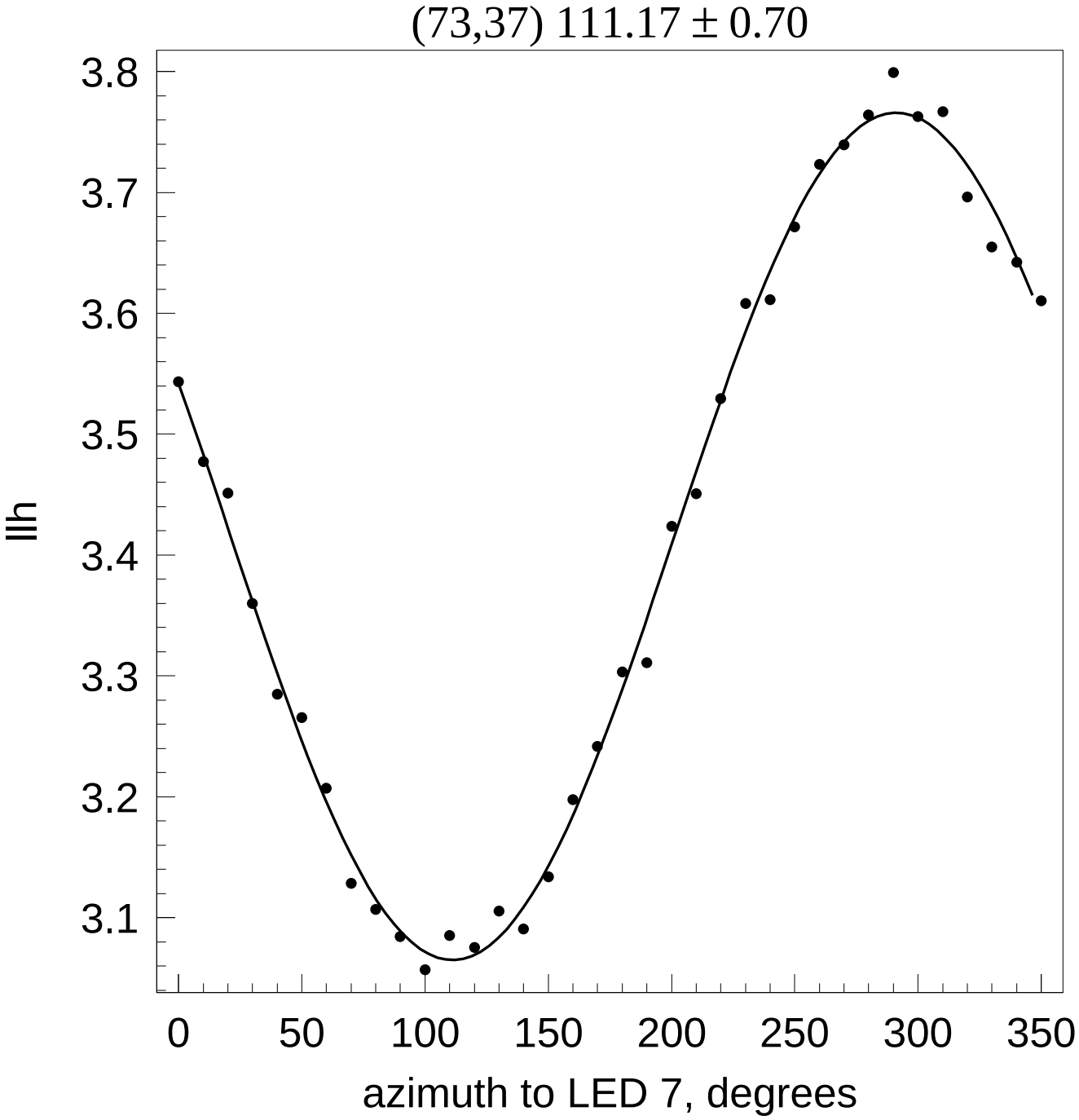

(73,36) 156.73 ± 8.37
4.48
4.46
4.44
4.42
4.4
4.38
4.36
4.34
4.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

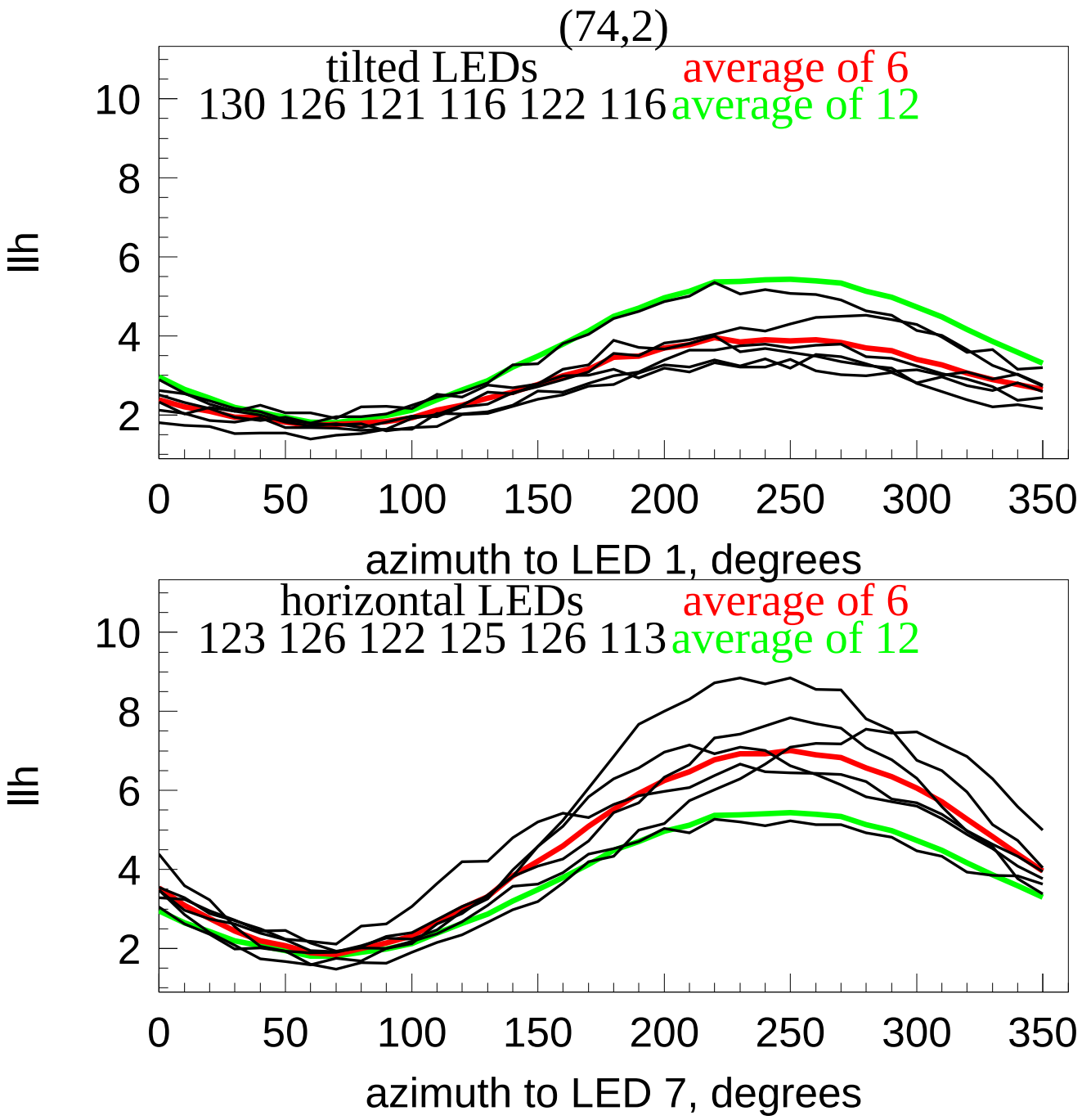

(73,36) 156.91 ± 8.41
4.48
4.46
4.44
4.42
4.4
4.38
4.36
4.34
4.32
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

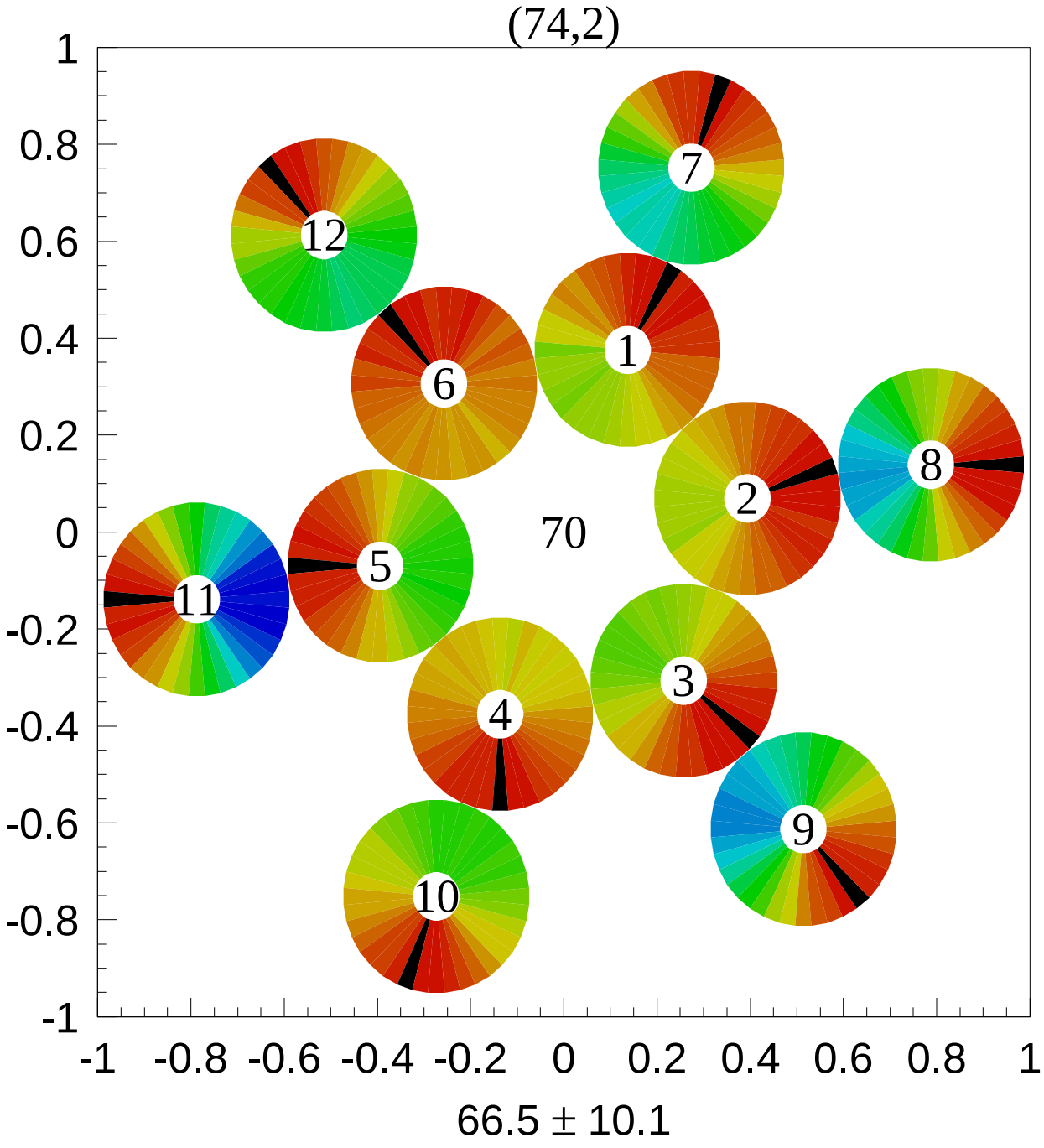

(73,37)
tilted LEDs
128 122 121 130 126 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
132 131 120 132 129 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

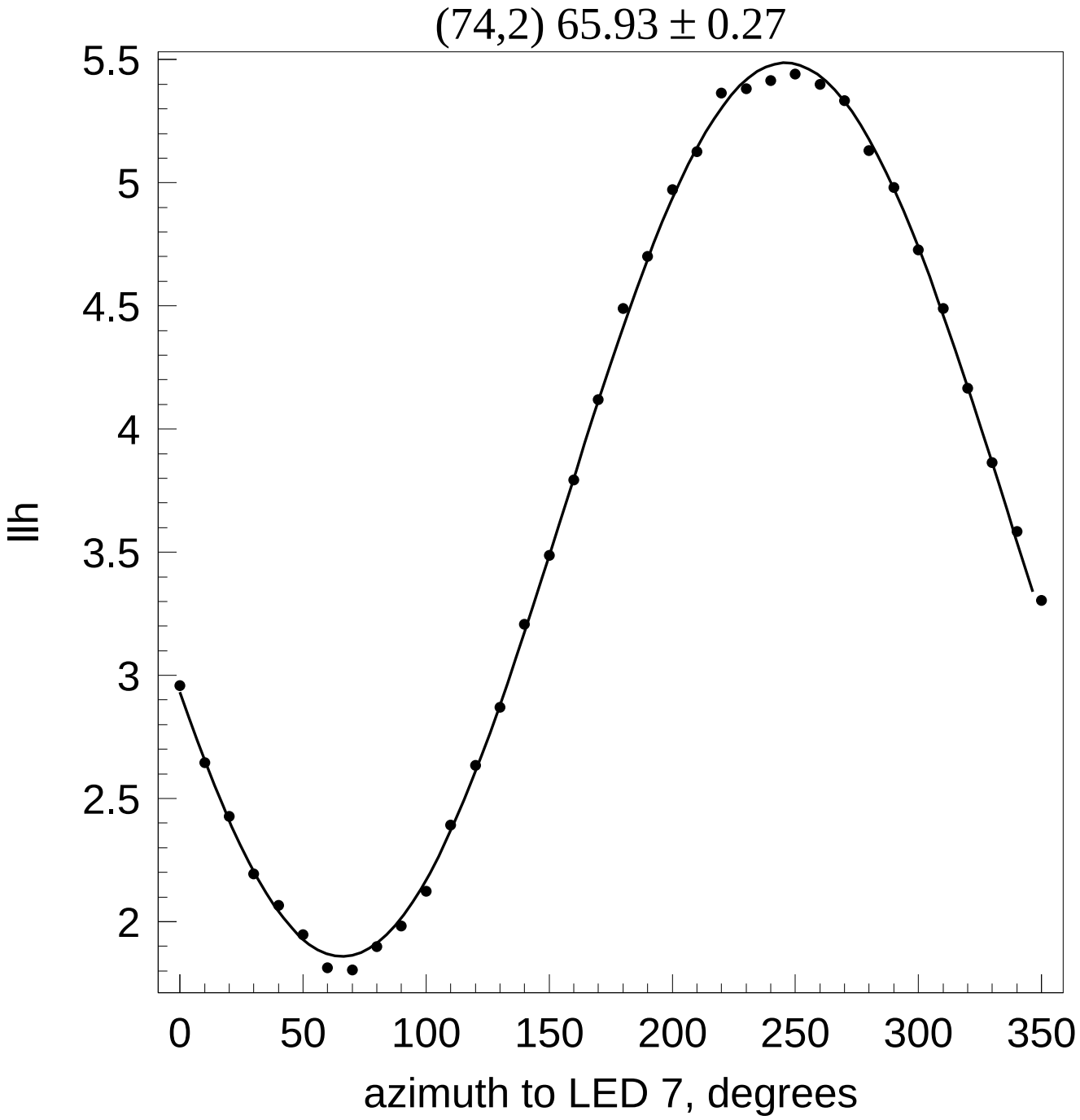

(73,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
110.1 ± 18.2

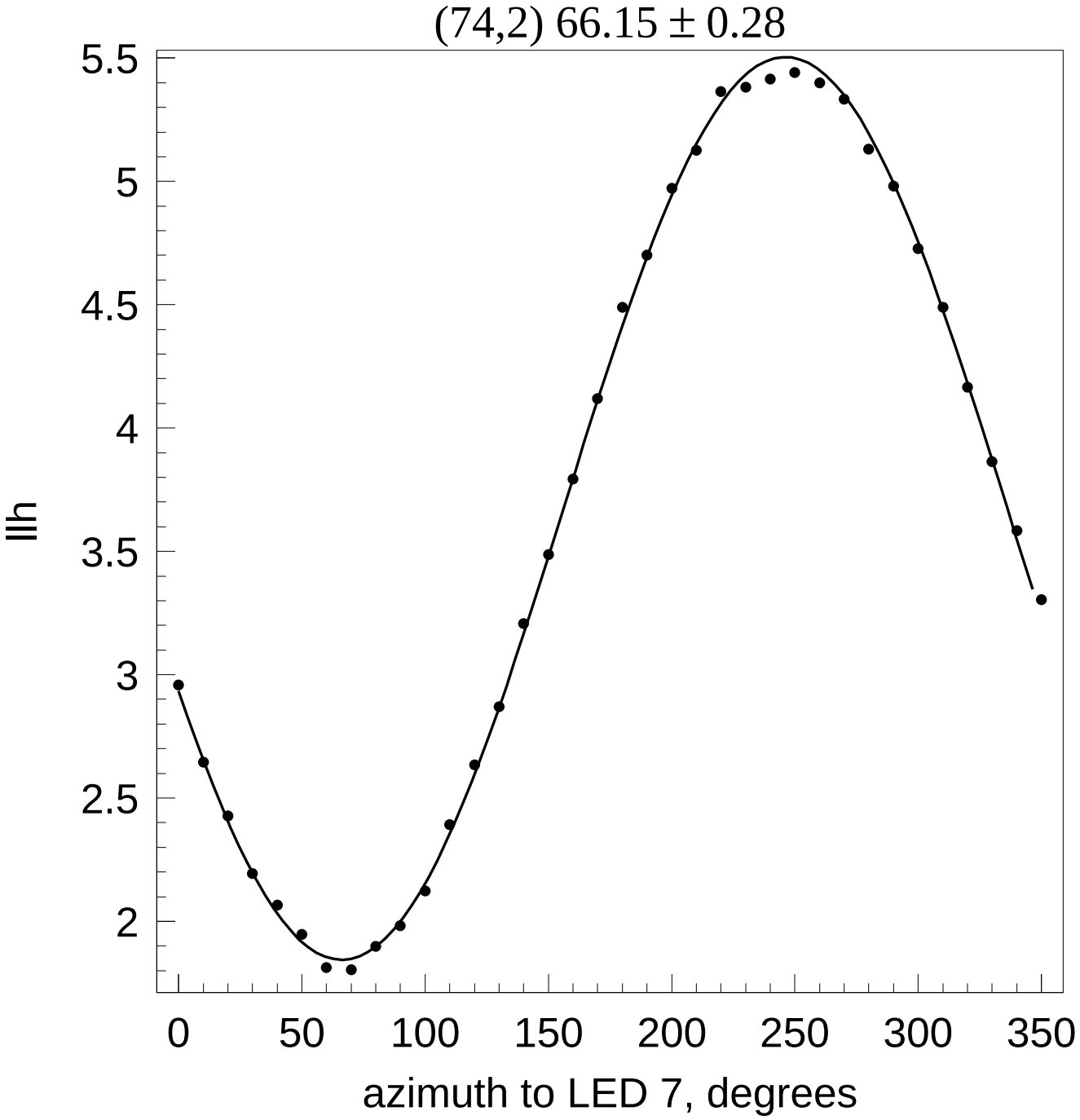

(73,37) 111.18 ± 0.70
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

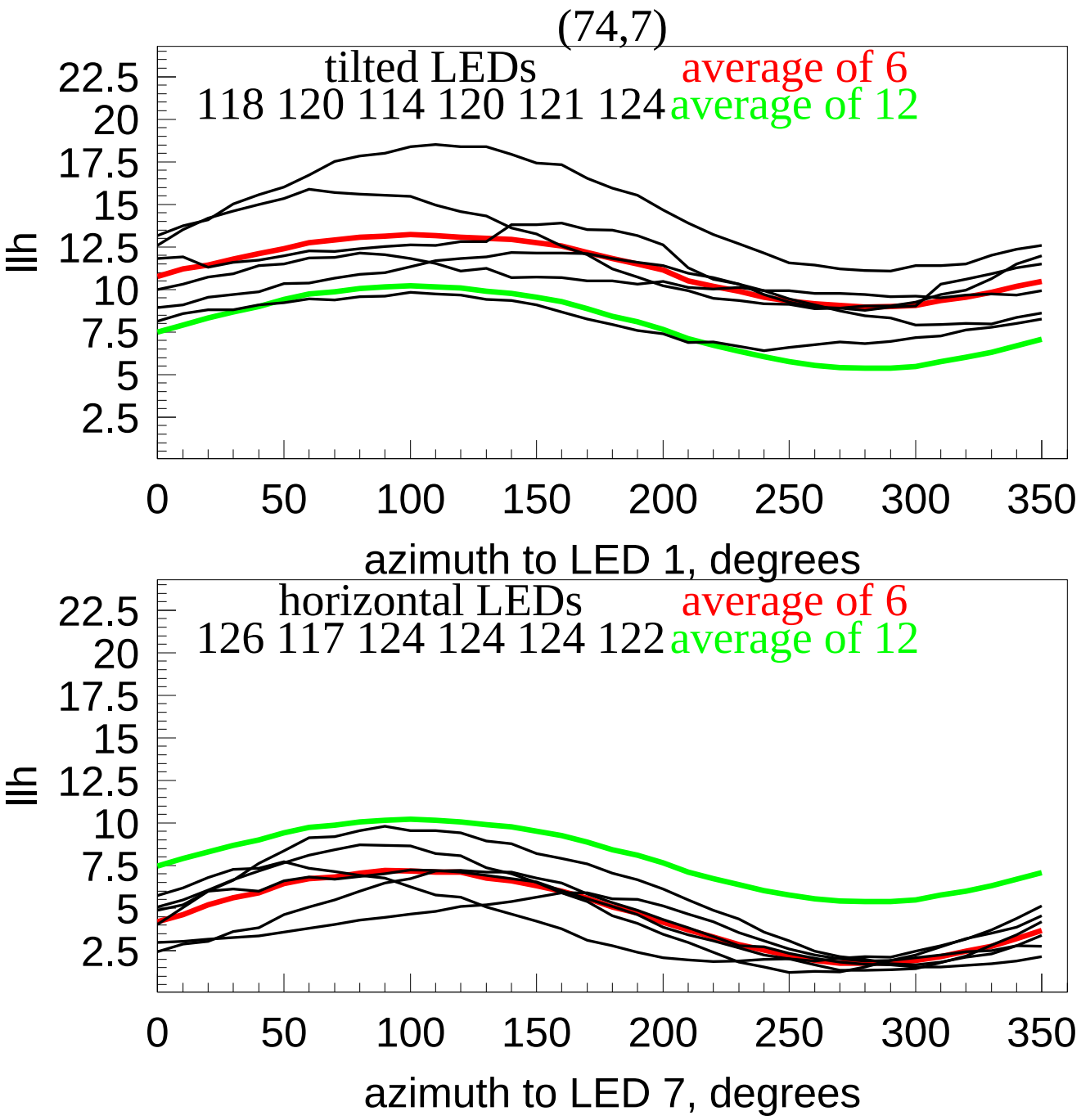

(73,37) 111.17 ± 0.70
3.8
3.7
3.6
3.5
3.4
3.3
3.2
3.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

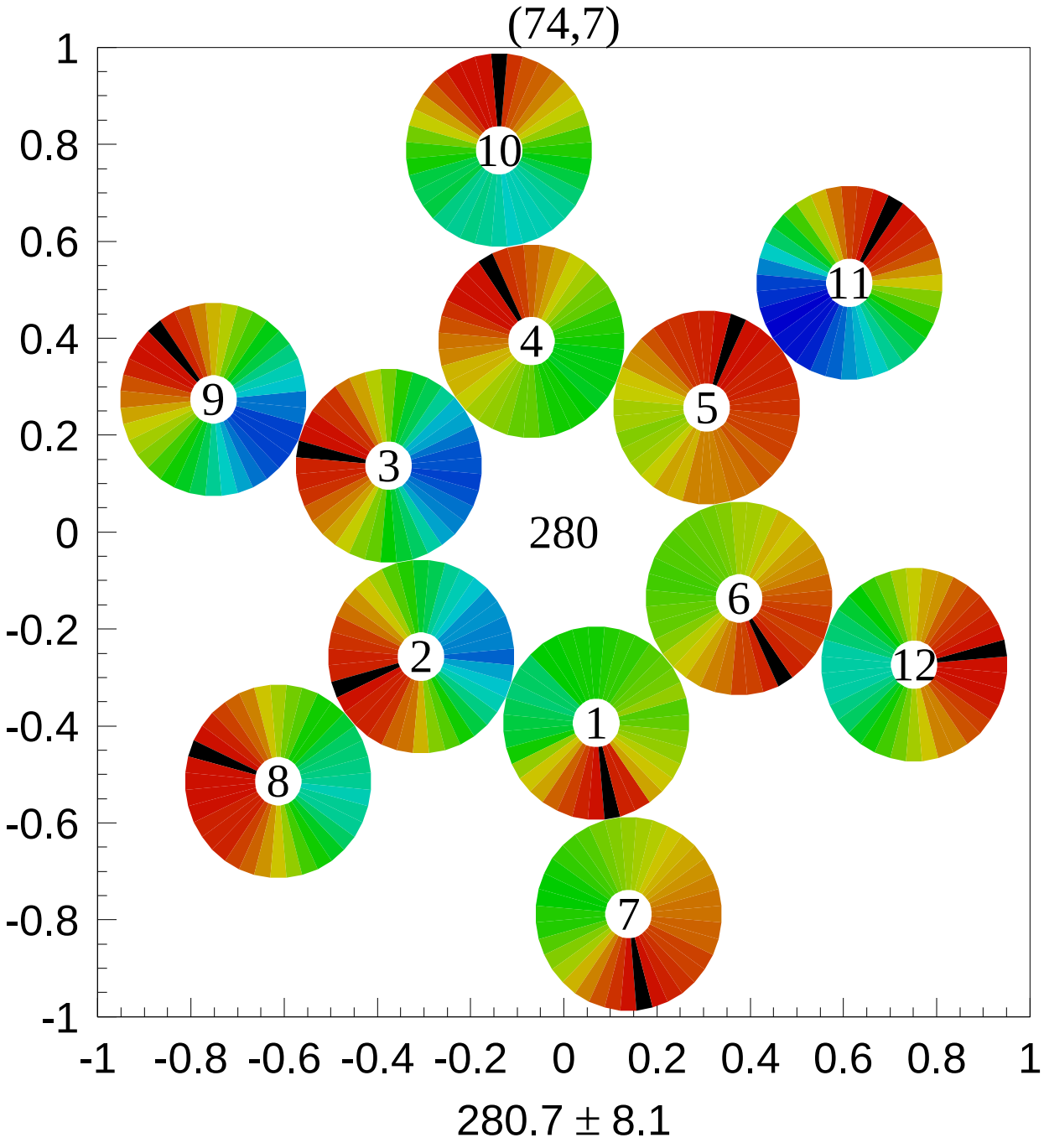

(74,2)
tilted LEDs
130 126 121 116 122 116
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
123 126 122 125 126 113
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

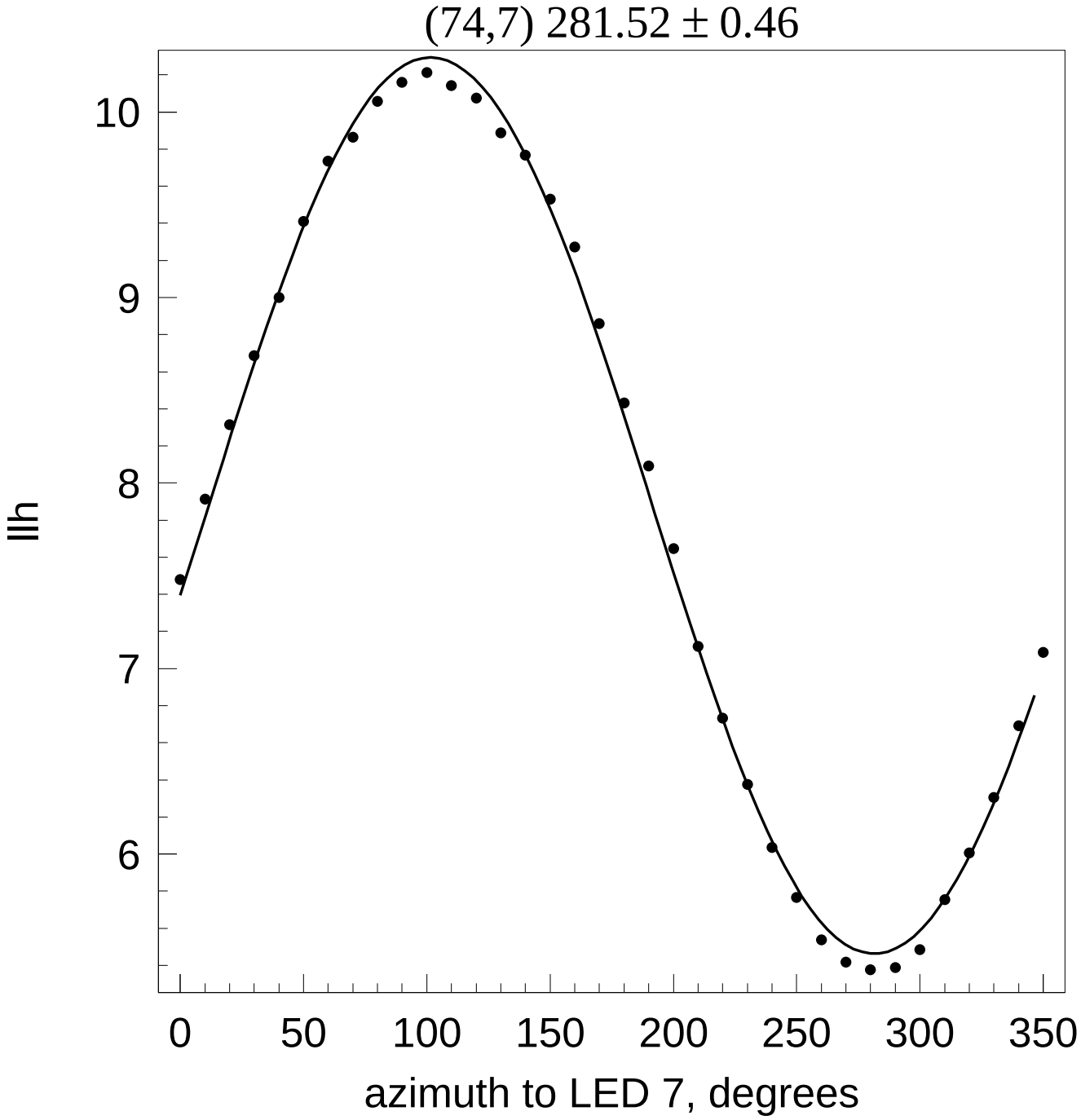

(74,2)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
5
70
11
4
3
9
10
66.5 ± 10.1

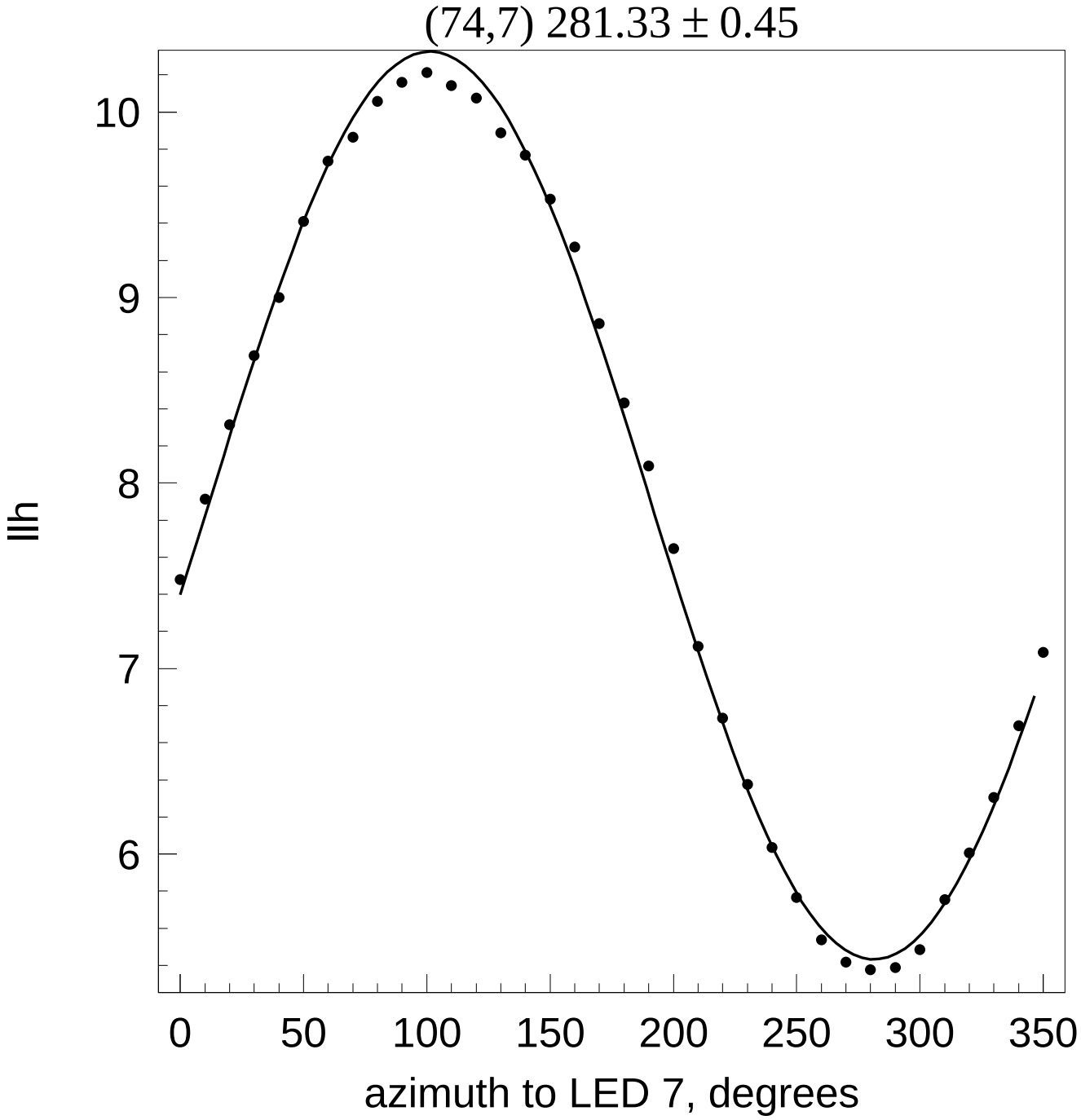

(74,2) 65.93 ± 0.27
5.5
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

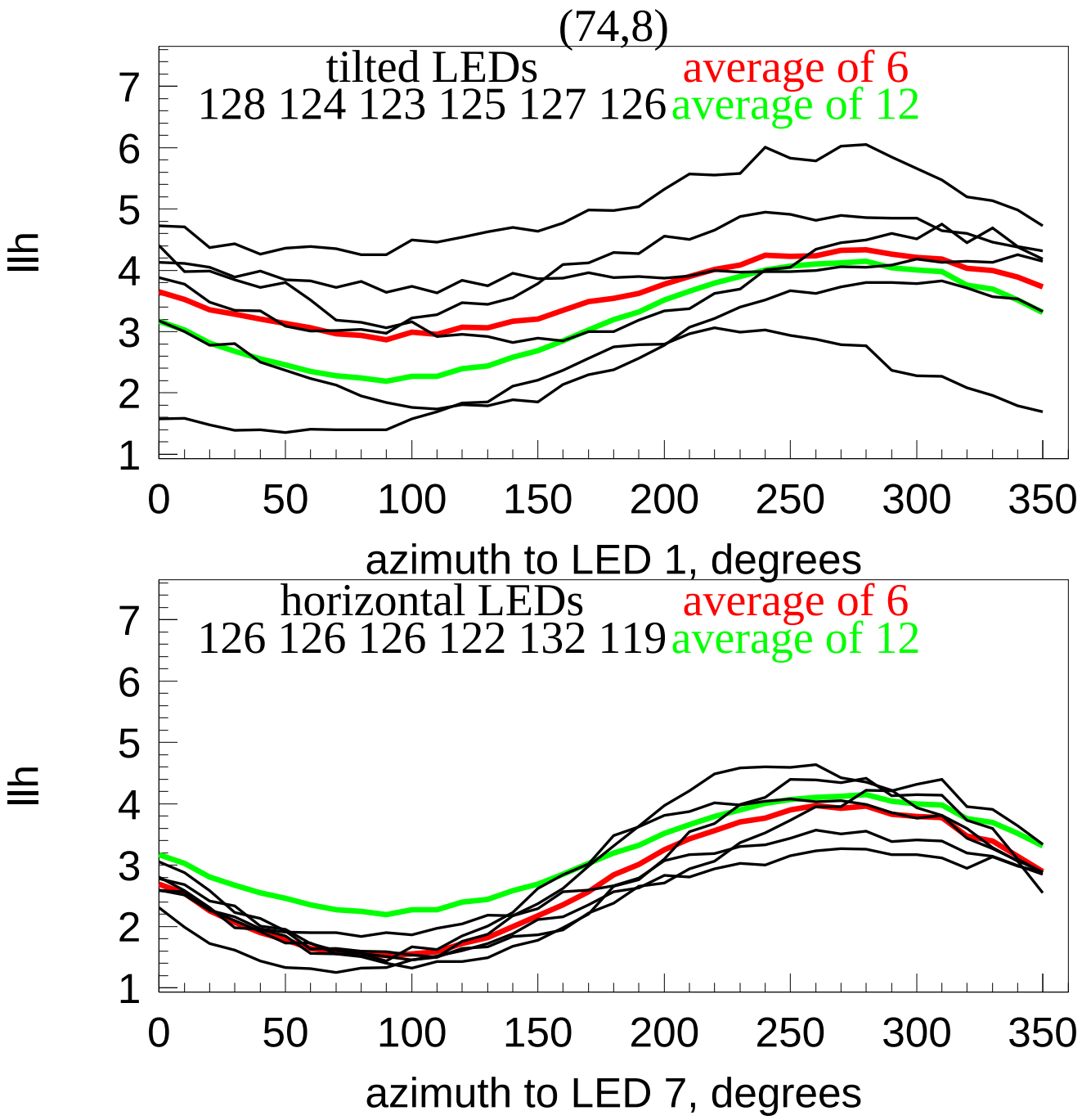

(74,2) 66.15 ± 0.28
5.5
5
4.5
4
3.5
3
2.5
2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

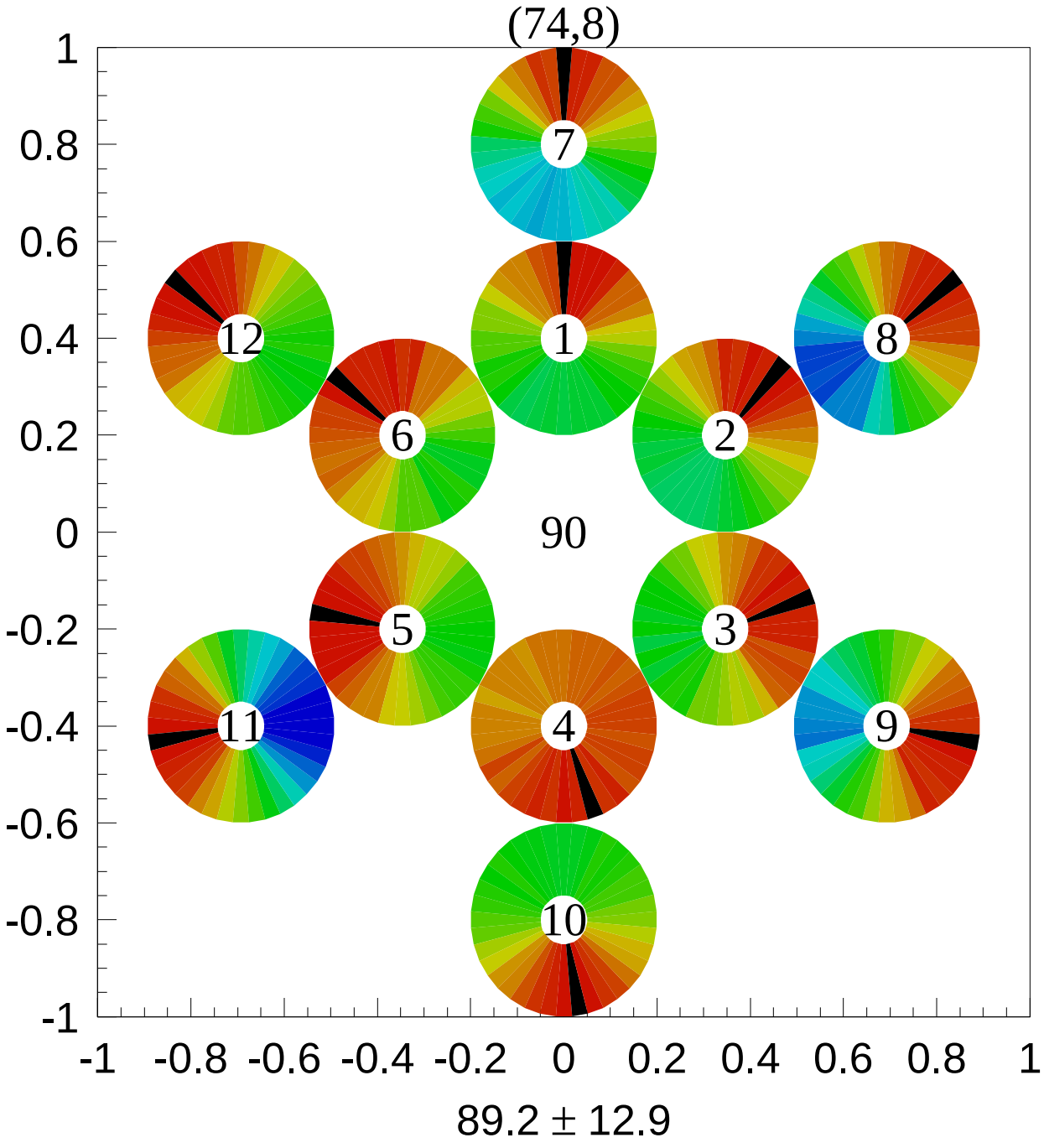

(74,7)
tilted LEDs
118 120 114 120 121 124
average of 6
average of 12
22.5
20
17.5
15
12.5
10
7.5
5
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 117 124 124 124 122
average of 6
average of 12
22.5
20
17.5
15
12.5
10
7.5
5
2.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

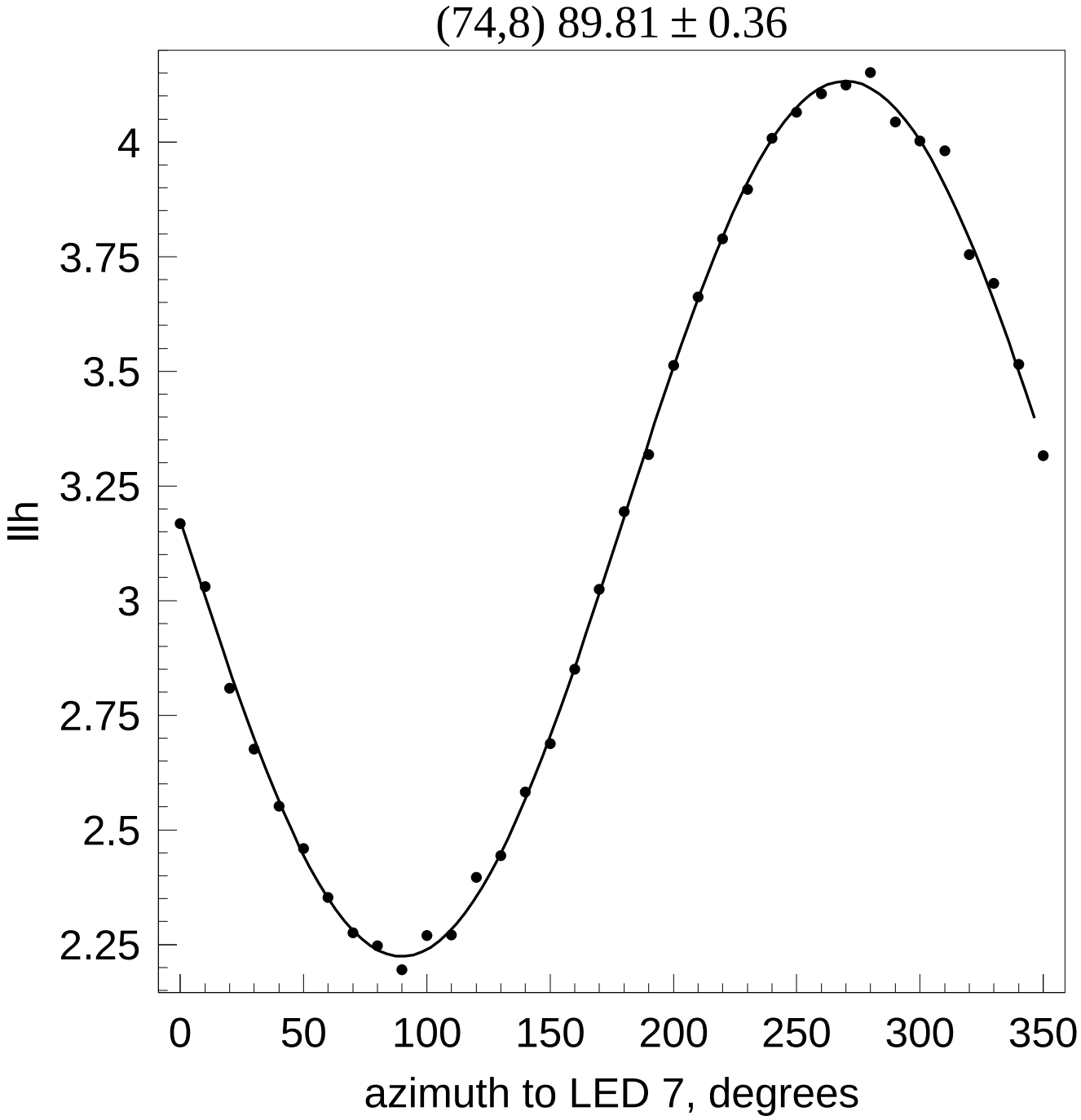

(74,7)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
10
11
4
9
5
3
280
6
12
2
1
8
7
280.7 ± 8.1

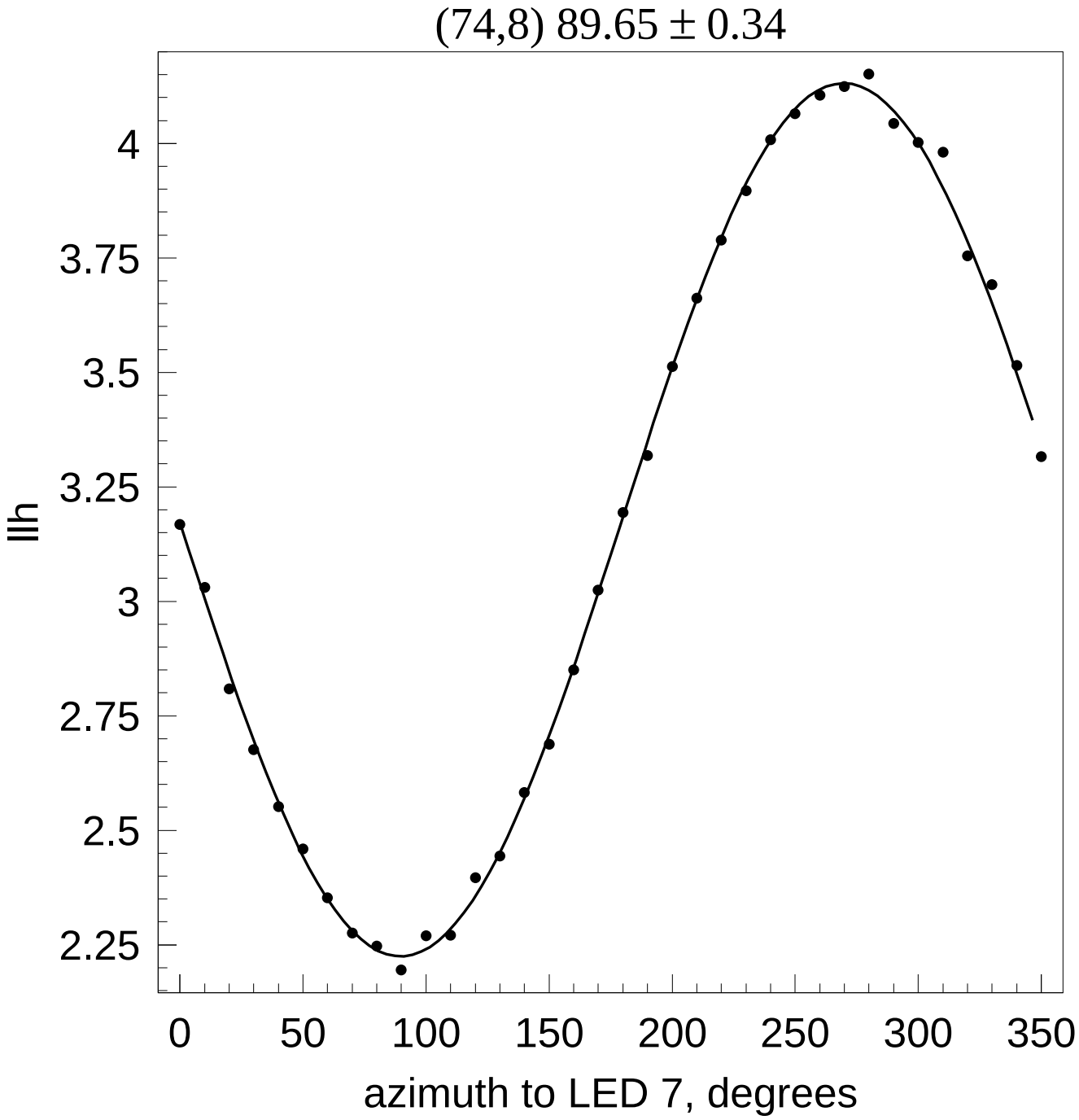

(74,7) 281.52 ± 0.46
10
9
8
7
6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

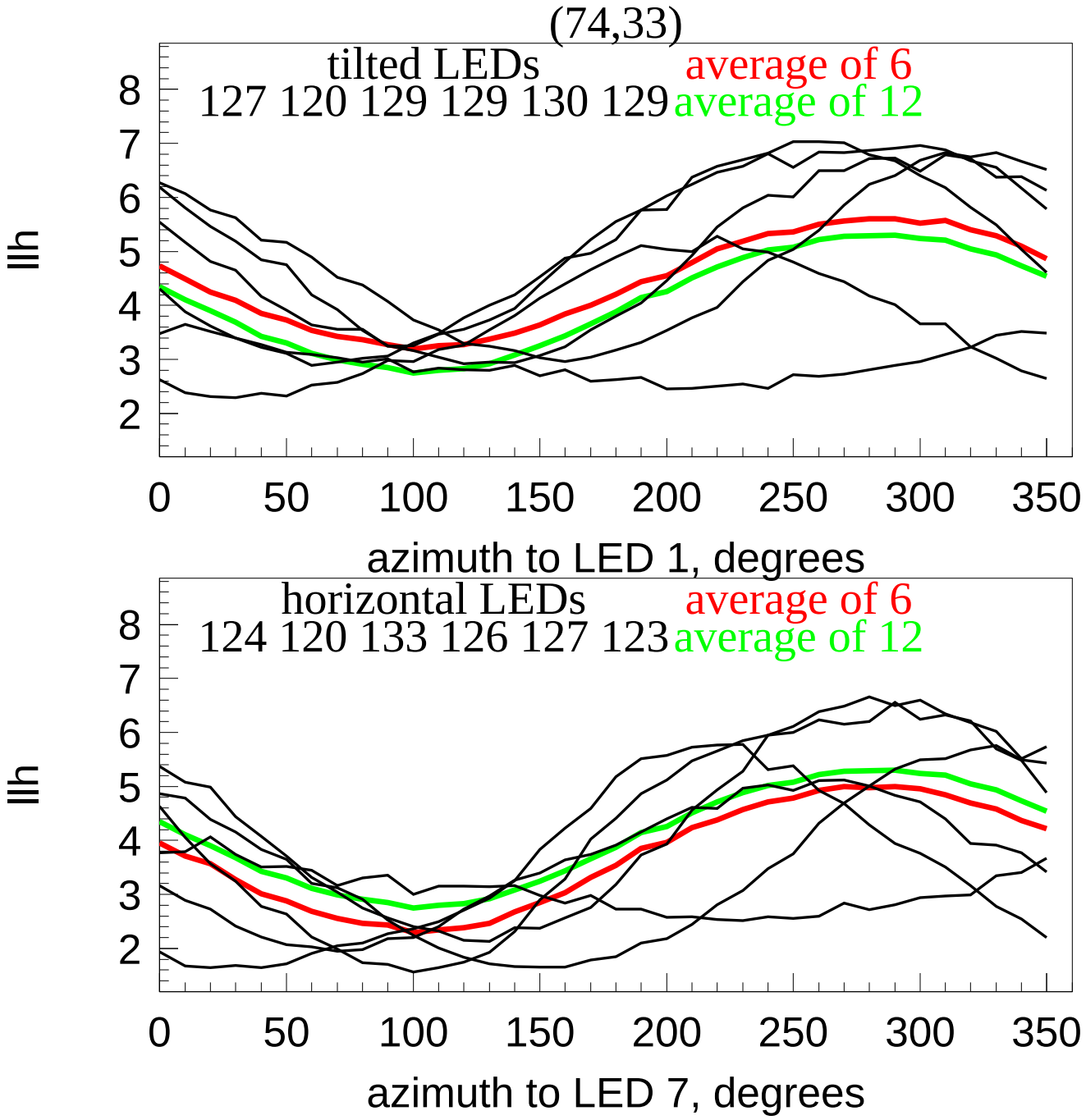

(74,7) 281.33 ± 0.45
10
9
8
7
6
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

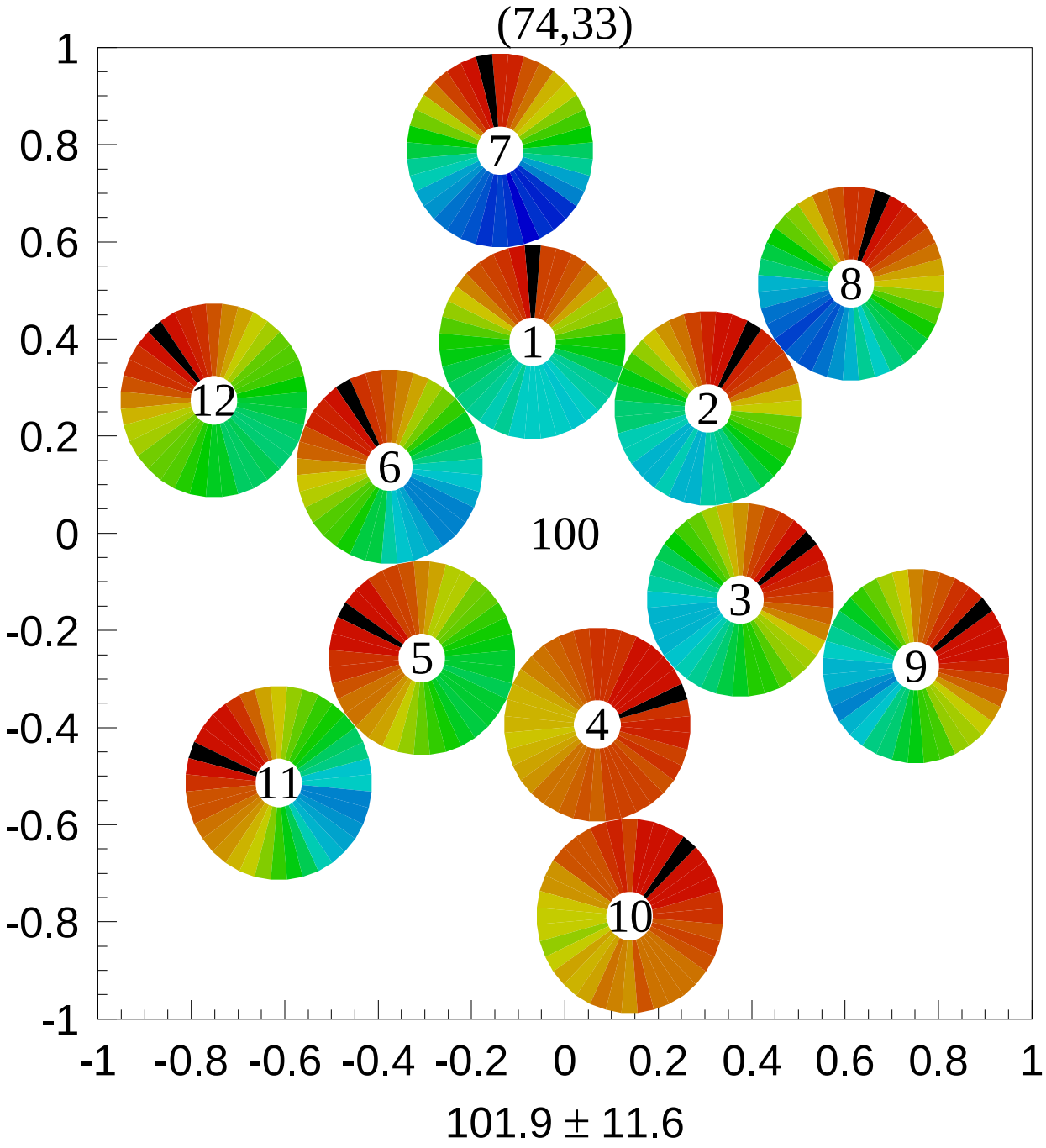

(74,8)
tilted LEDs
128 124 123 125 127 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 126 126 122 132 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

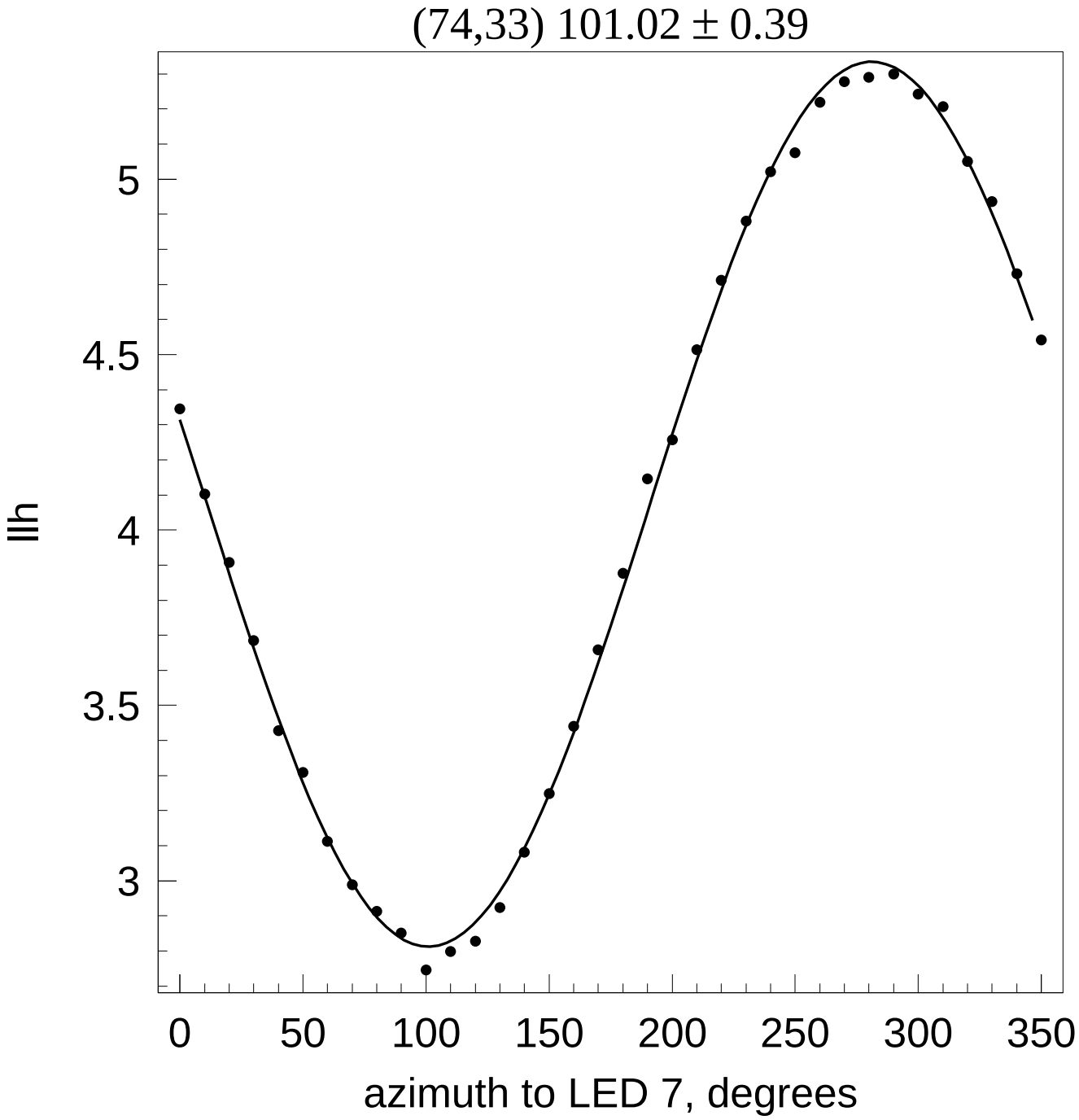

(74,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
8
6
2
90
5
3
11
4
9
10
89.2 ± 12.9

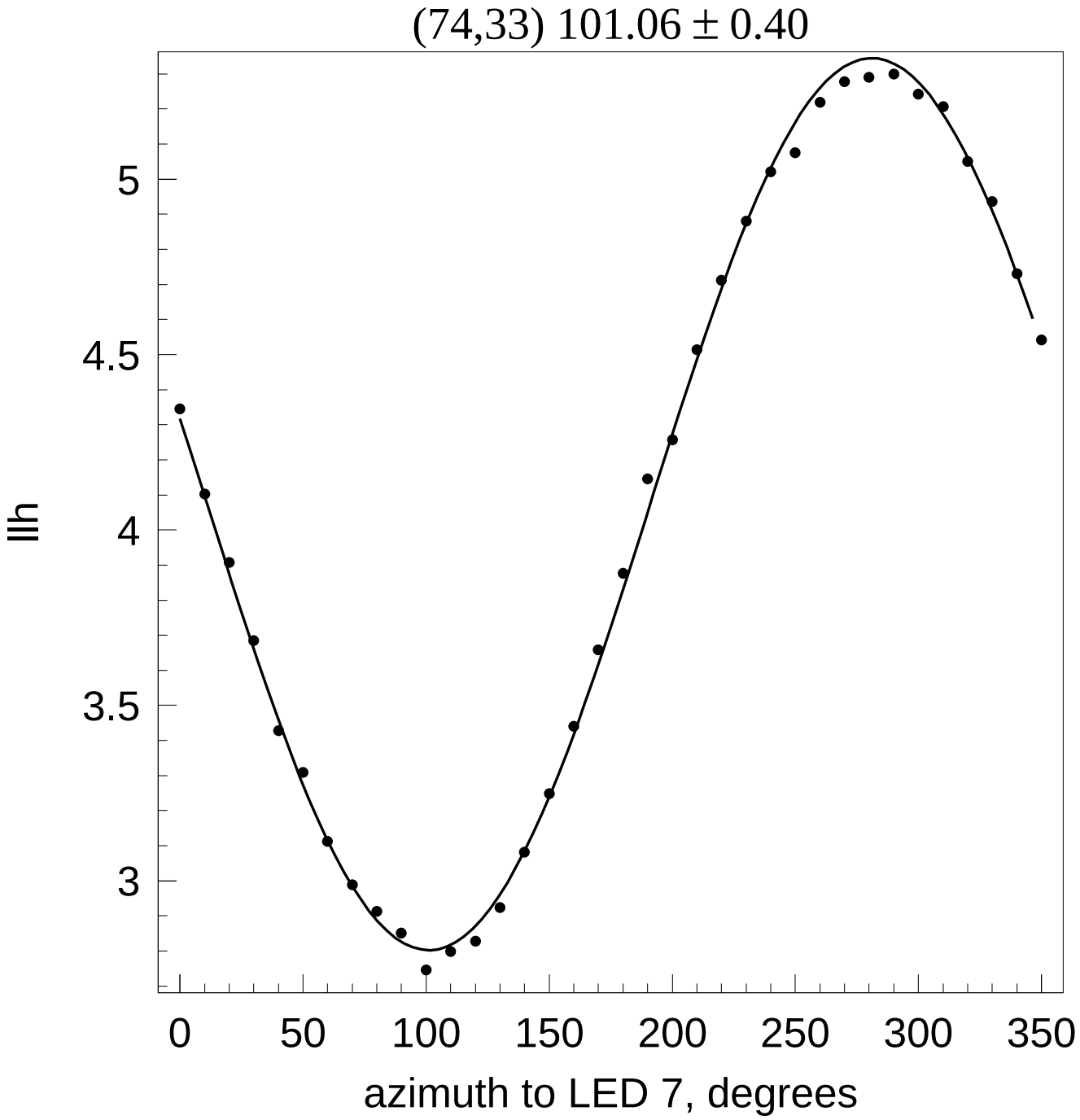

(74,8) 89.81 ± 0.36
4
3.75
3.5
3.25
3
2.75
2.5
2.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

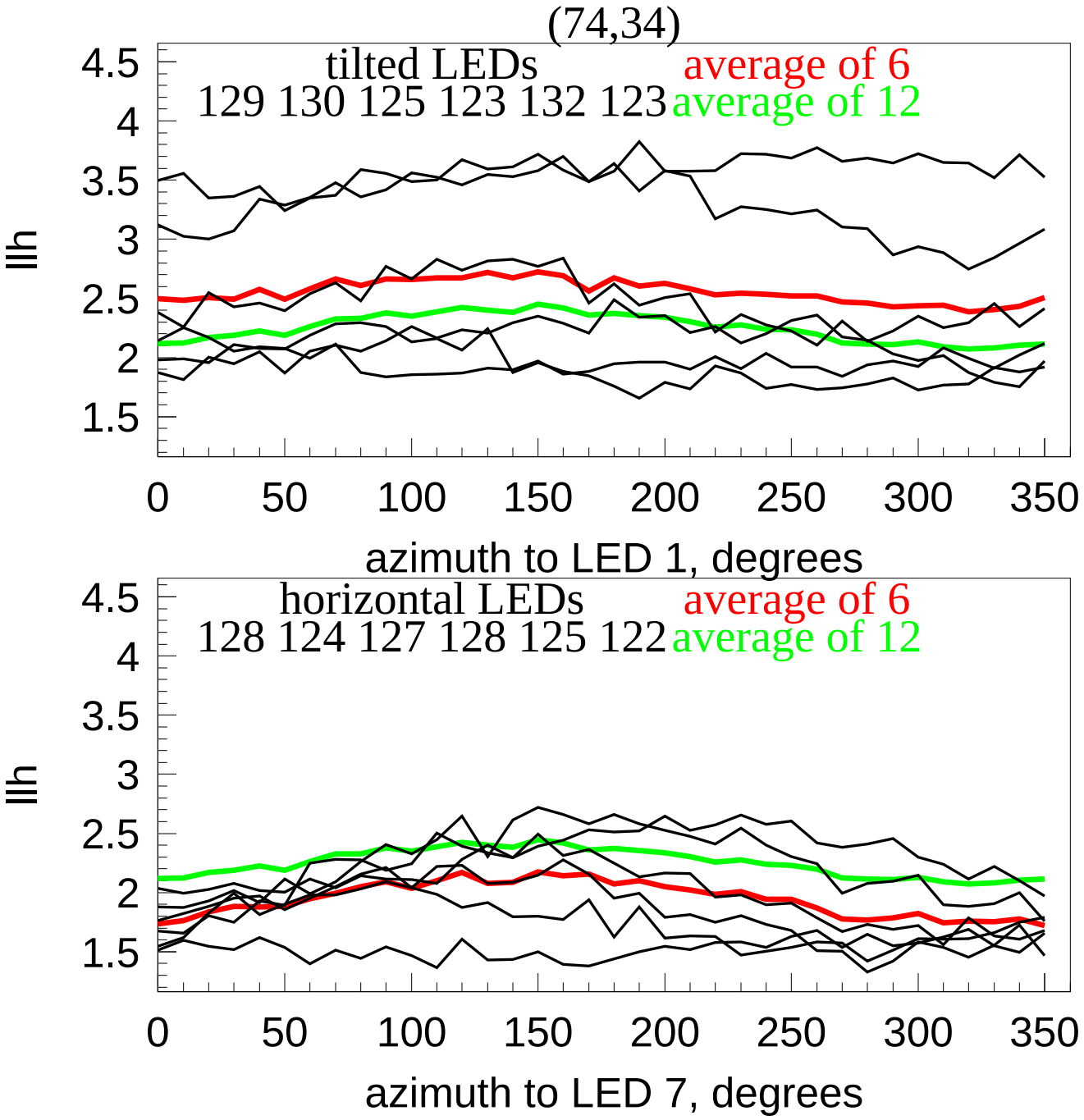

(74,8) 89.65 ± 0.34
4
3.75
3.5
3.25
3
2.75
2.5
2.25
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

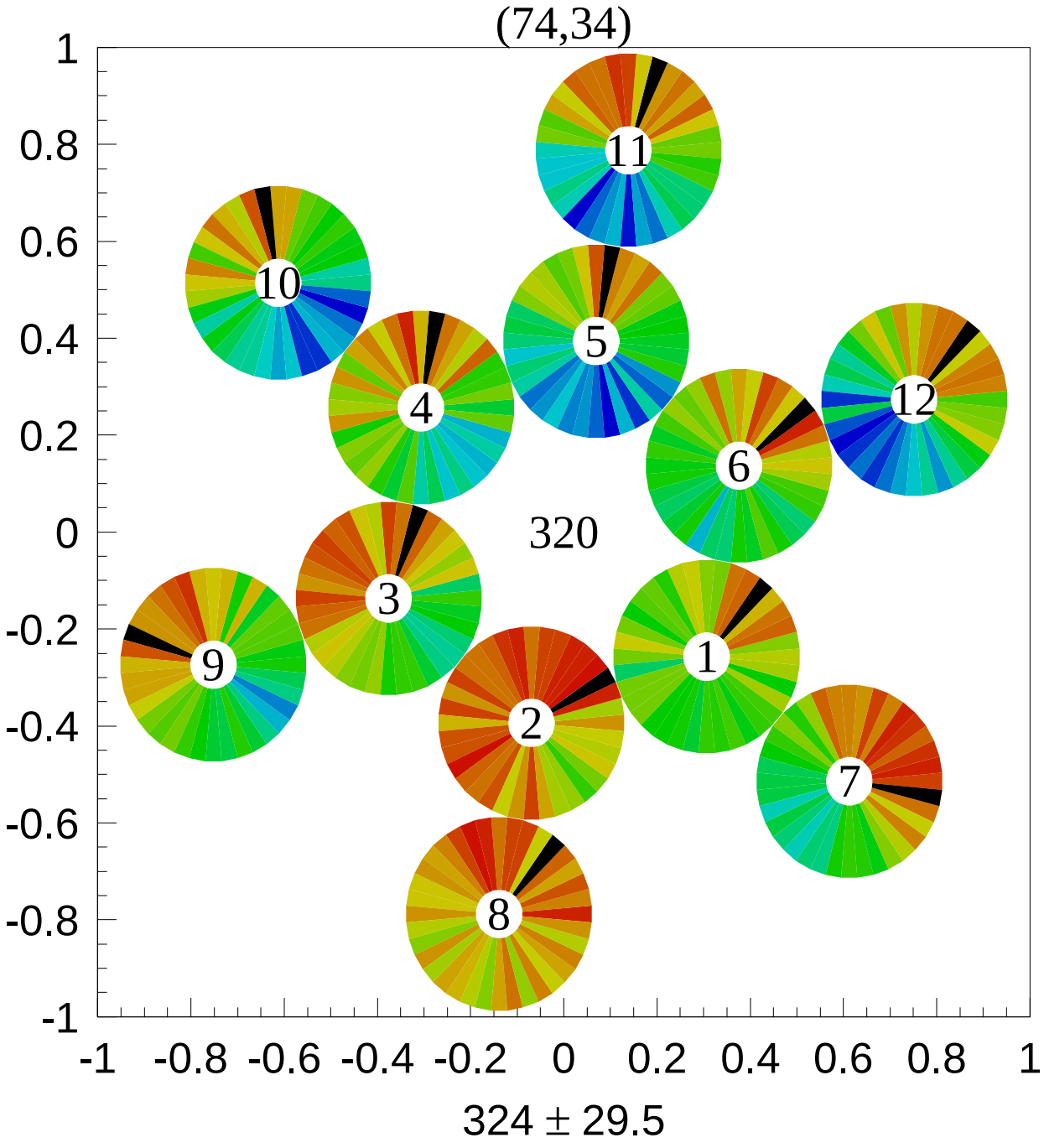

(74,33)
tilted LEDs
127 120 129 129 130 129
average of 6
average of 12
llh
8
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 120 133 126 127 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

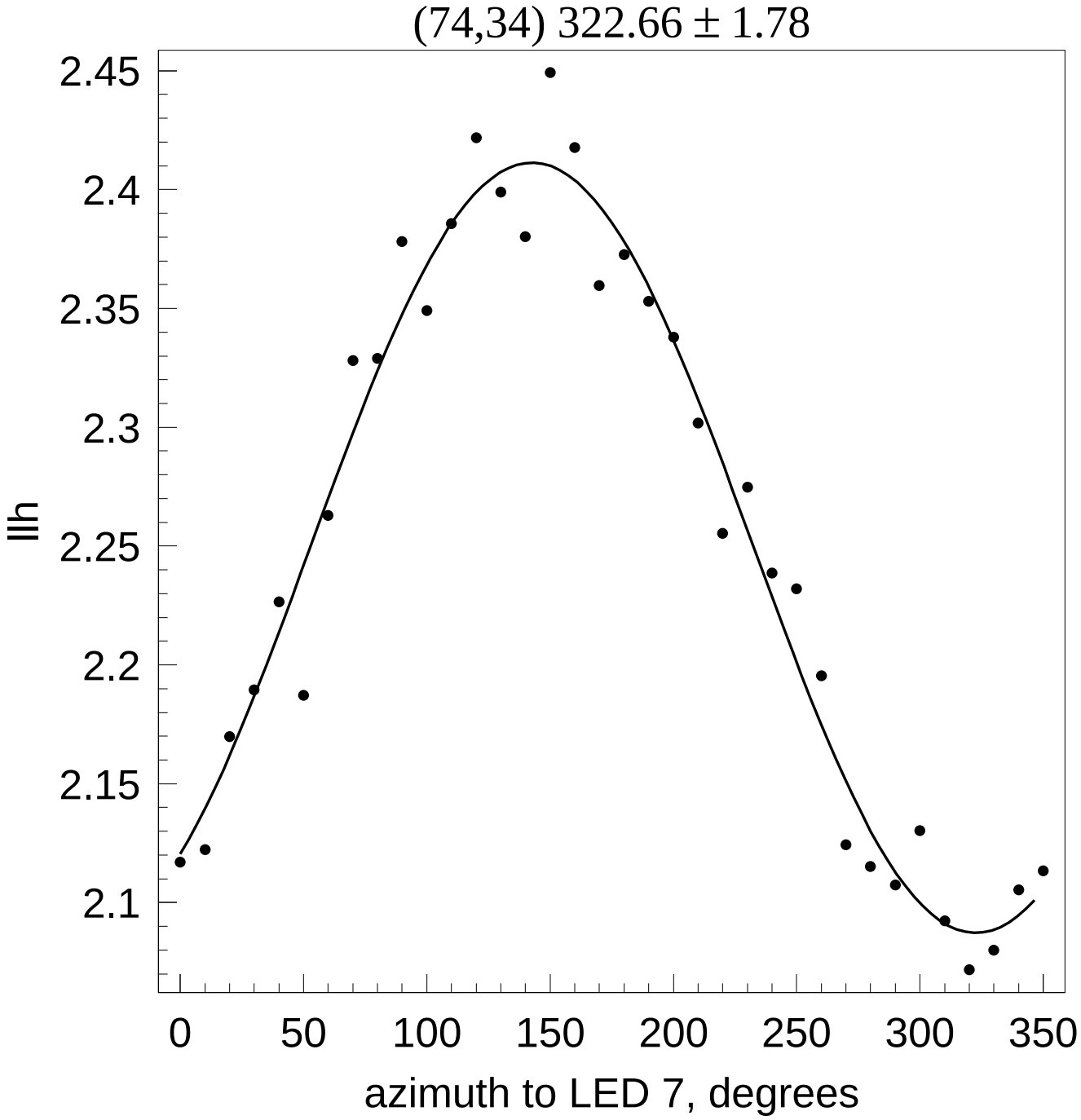

(74,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
1
8
12
2
6
100
3
5
9
4
11
10
101.9 ± 11.6

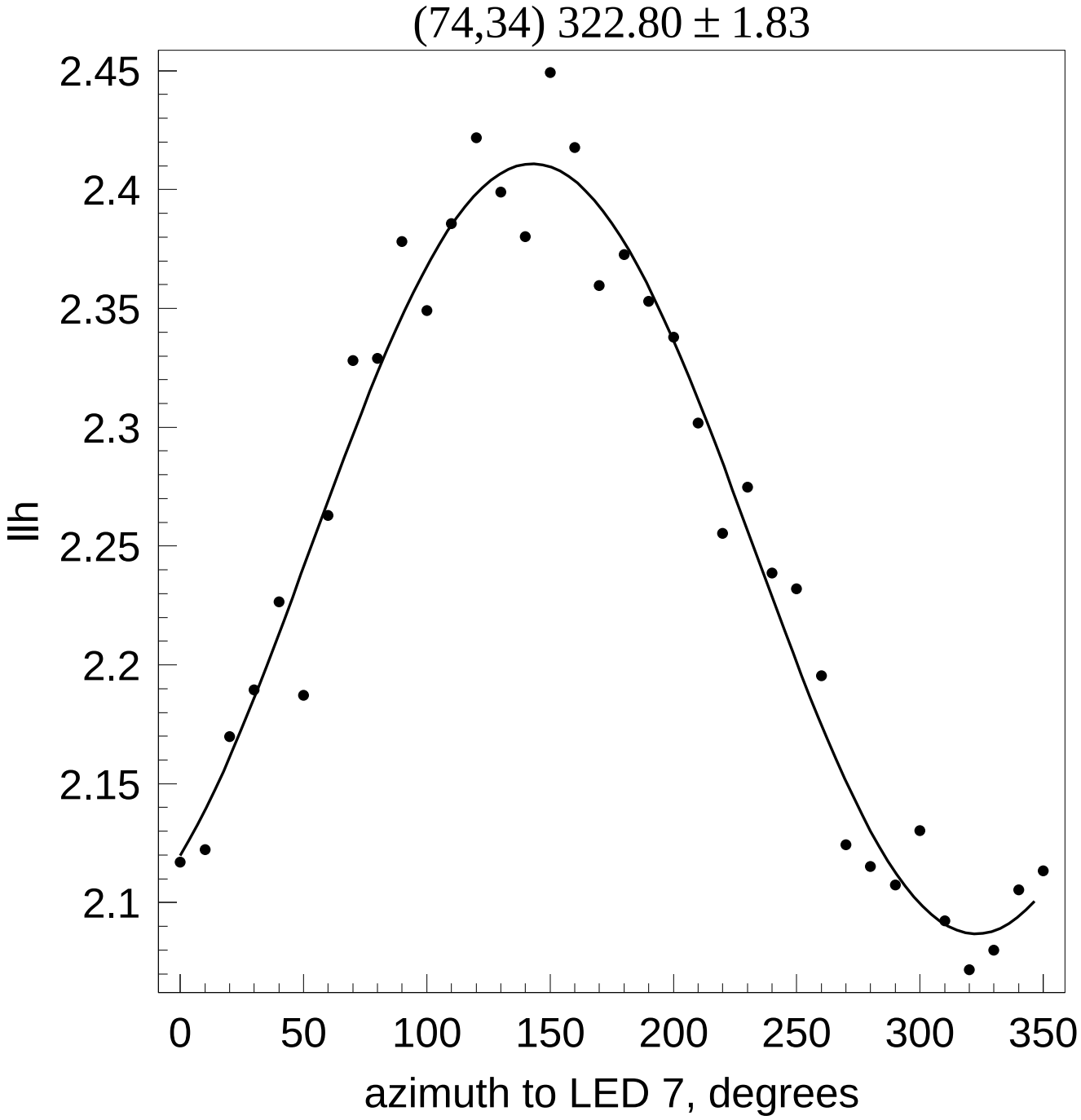

(74,33) 101.02 ± 0.39
5
4.5
4
3.5
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

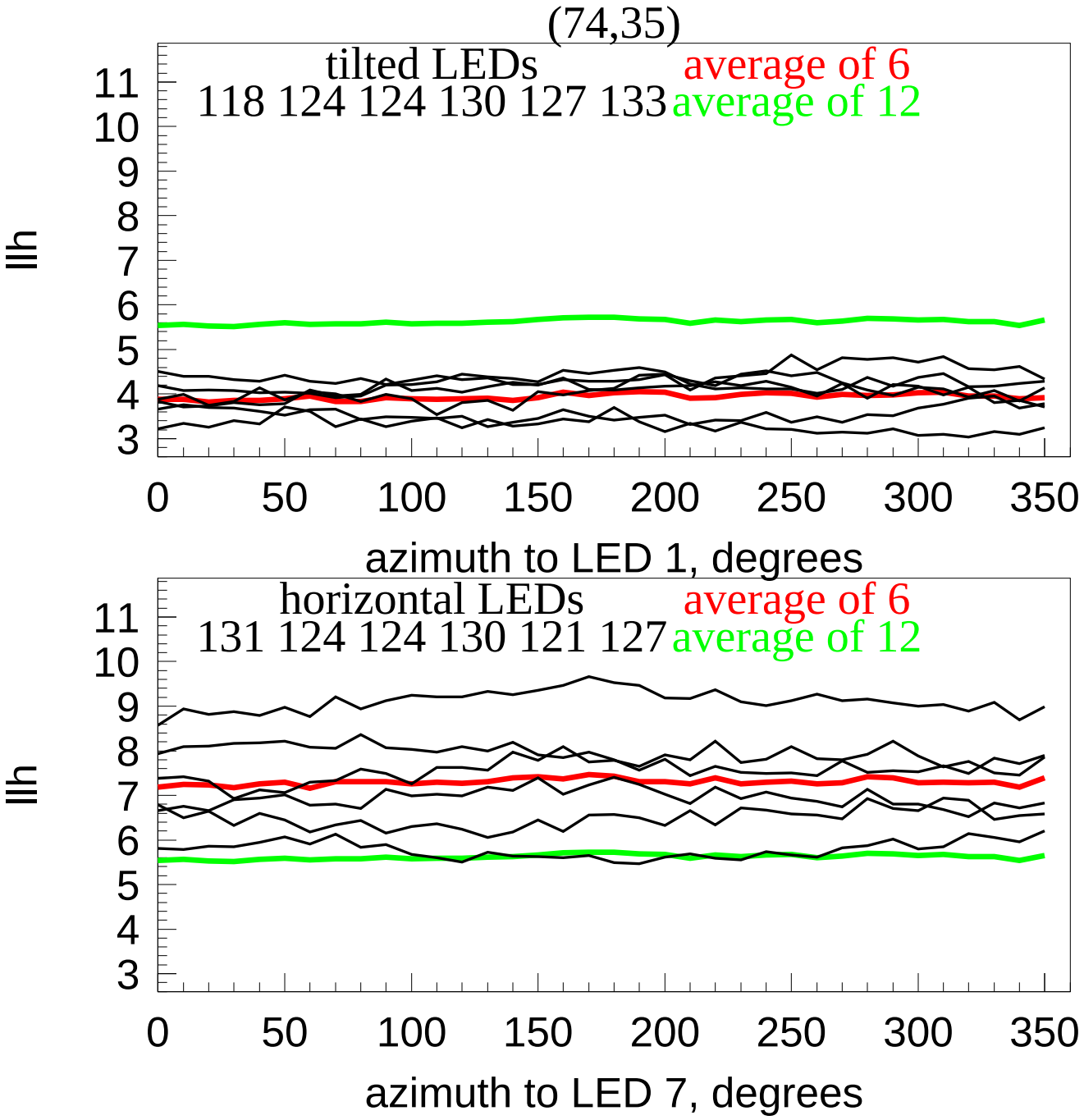

(74,33) 101.06 ± 0.40
5
4.5
4
3.5
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

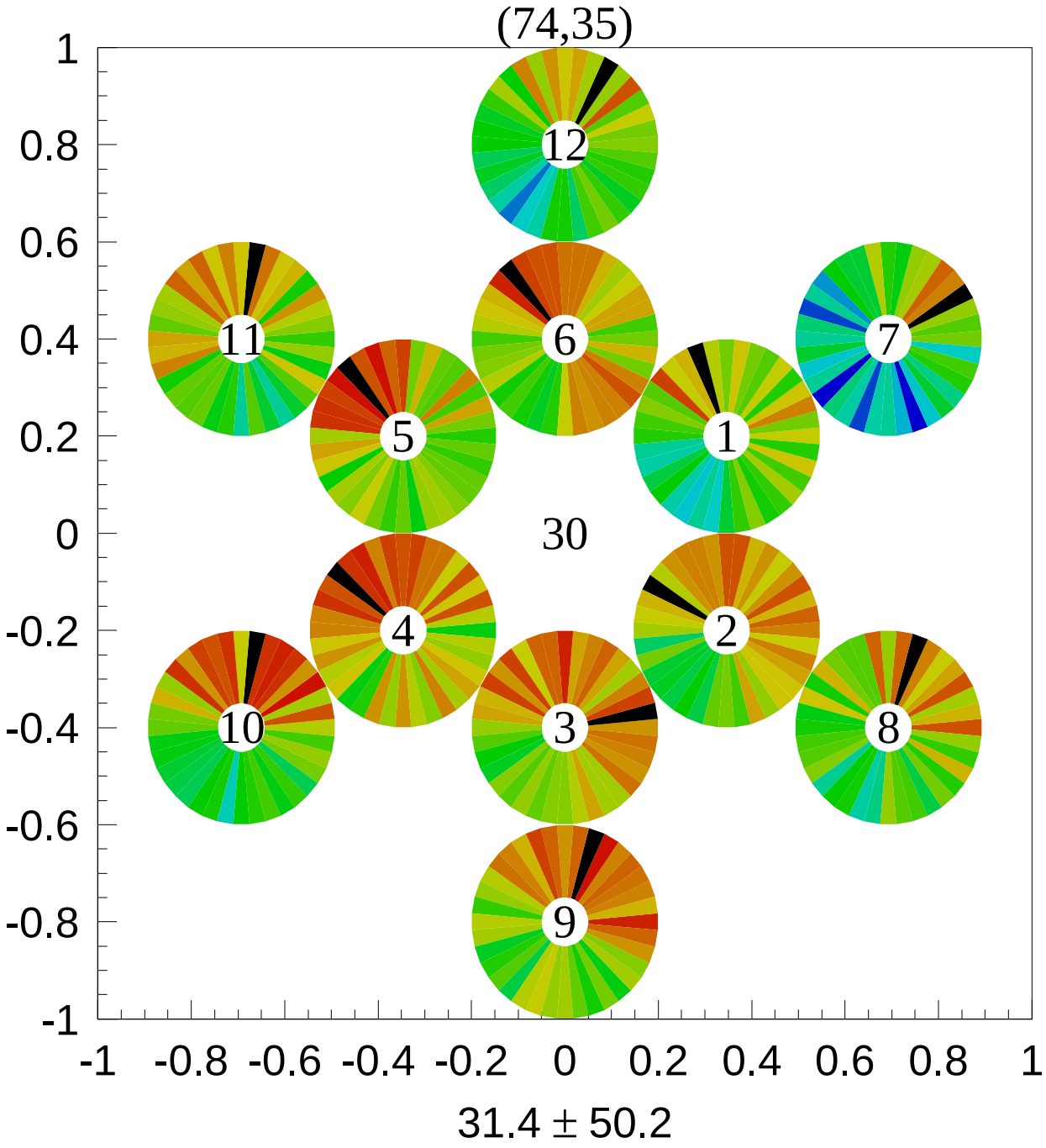

(74,34)
tilted LEDs
129 130 125 123 132 123
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
128 124 127 128 125 122
average of 6
average of 12
Ilh
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

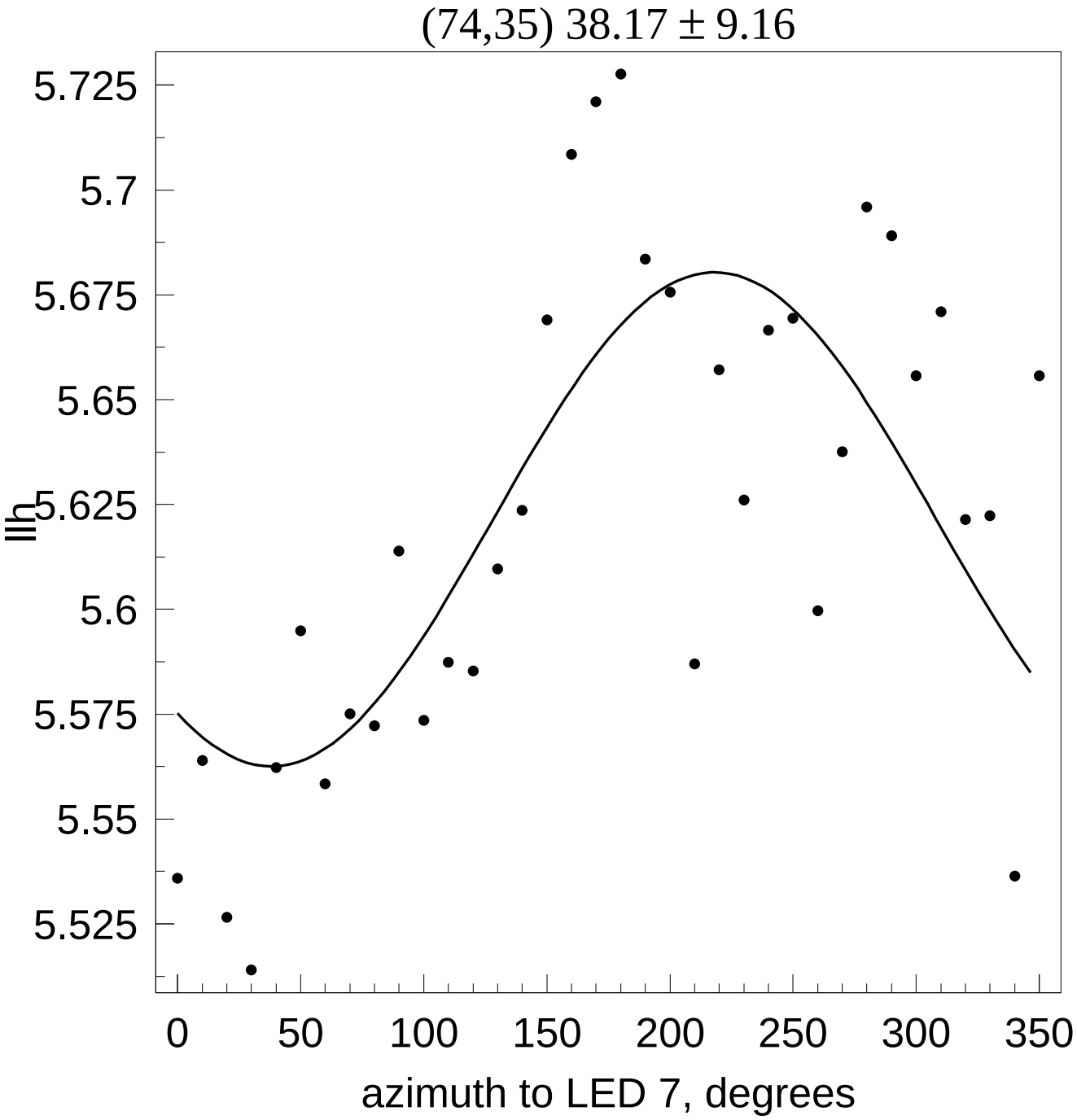

(74,34)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
324 ± 29.5

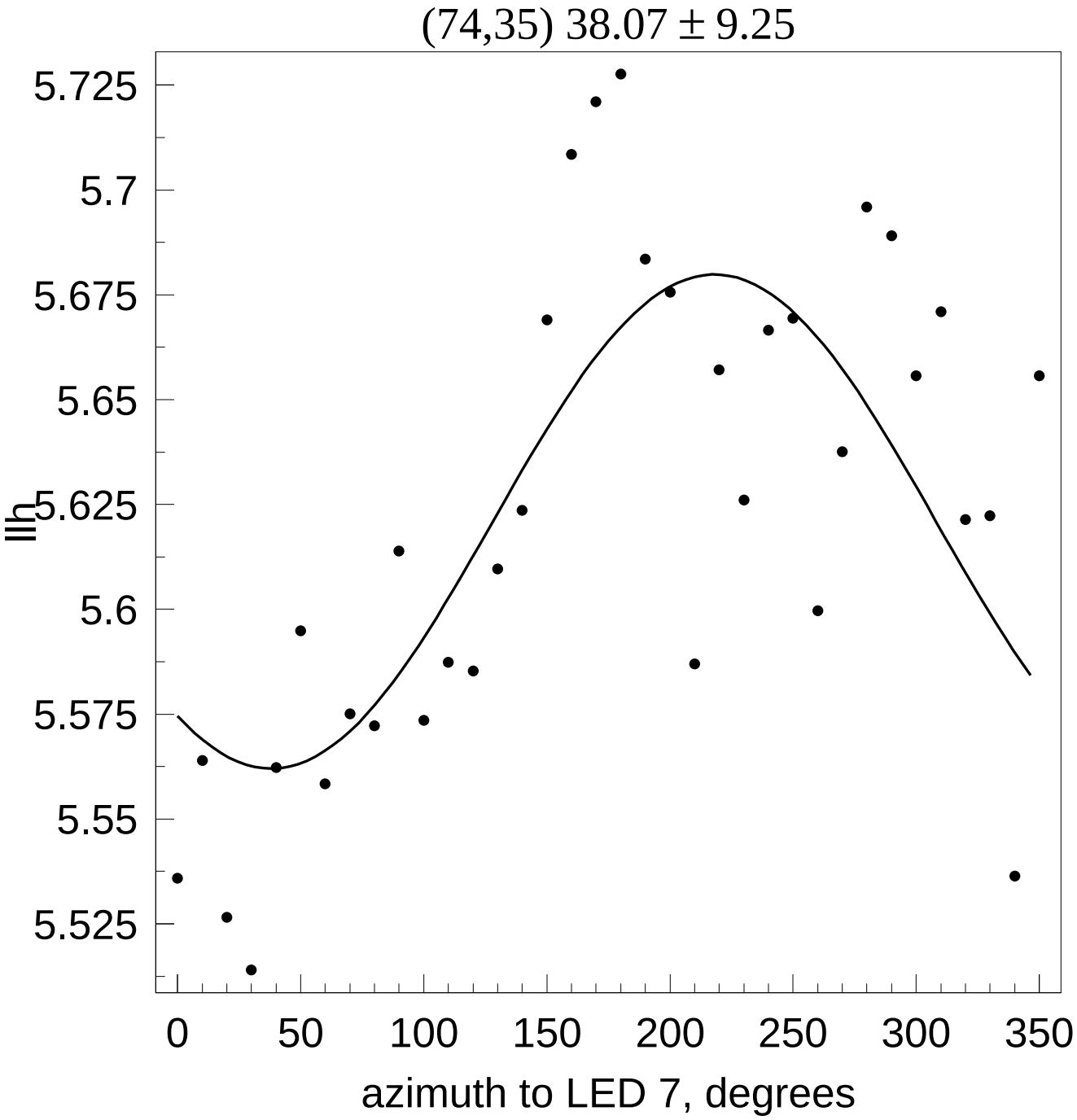

(74,34) 322.66 ± 1.78
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

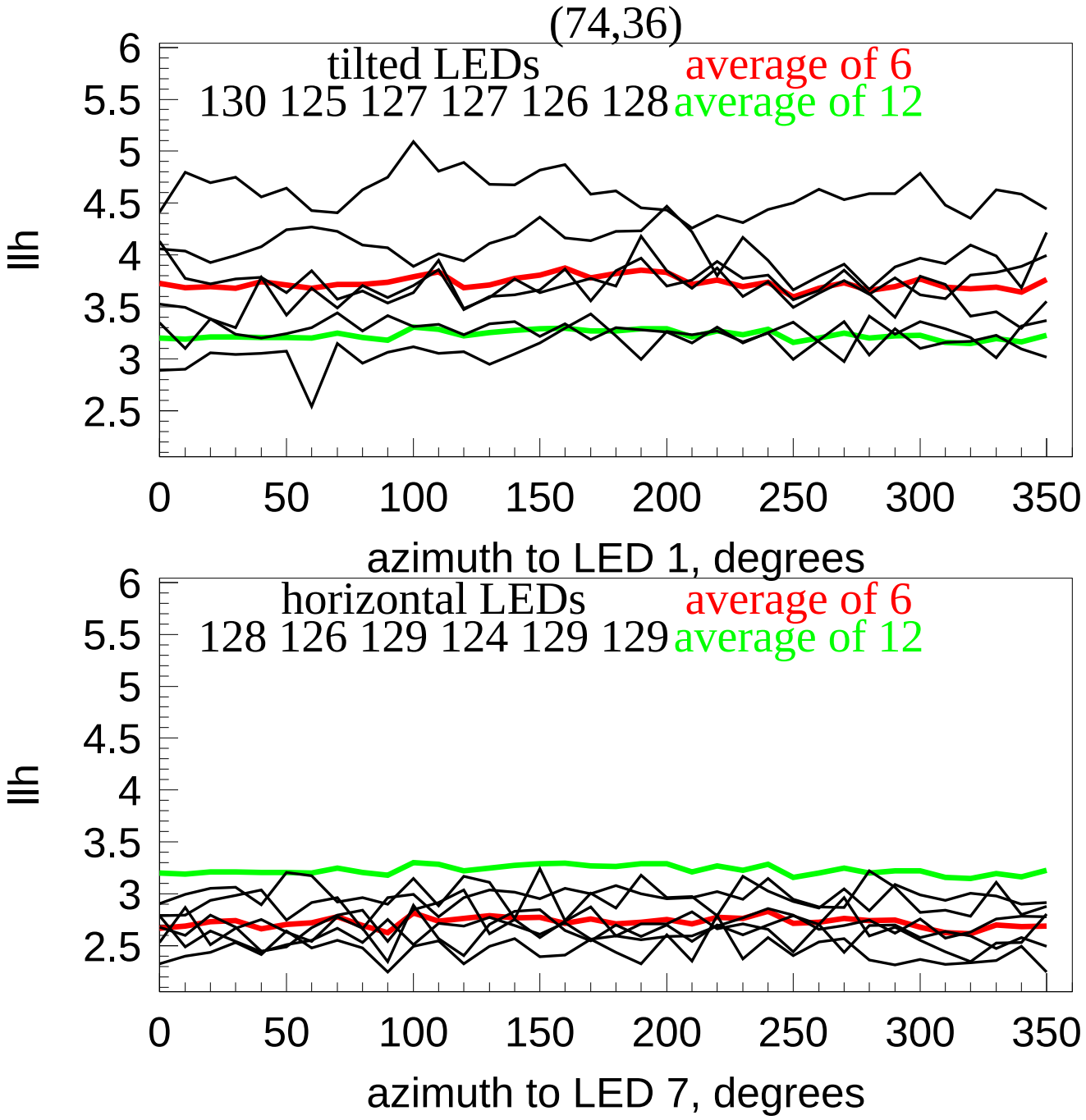

(74,34) 322.80 ± 1.83
2.45
2.4
2.35
2.3
2.25
2.2
2.15
2.1
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

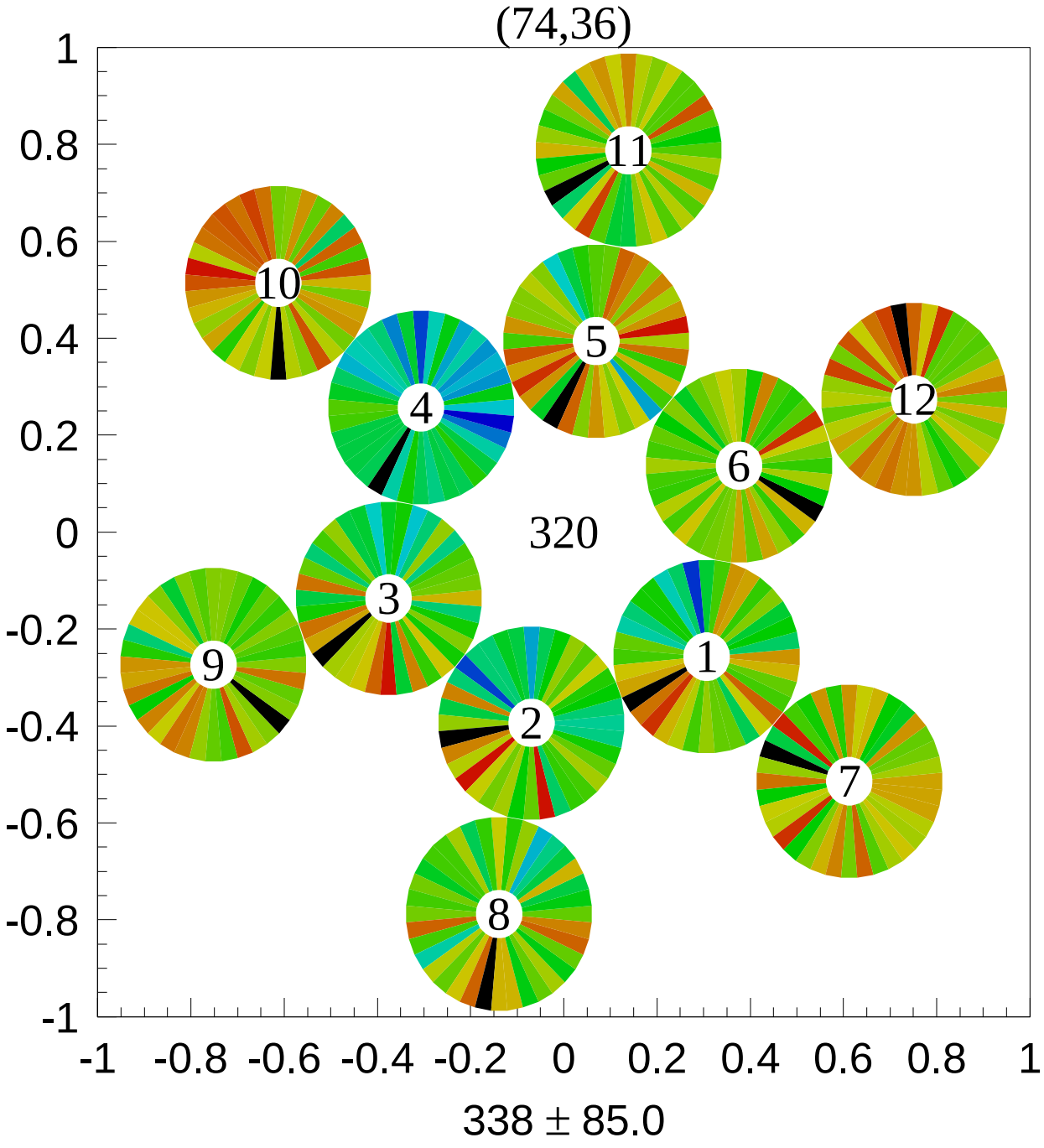

(74,35)
tilted LEDs
118 124 124 130 127 133
average of 6
average of 12
llh
11
10
9
8
7
6
5
4
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 124 124 130 121 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

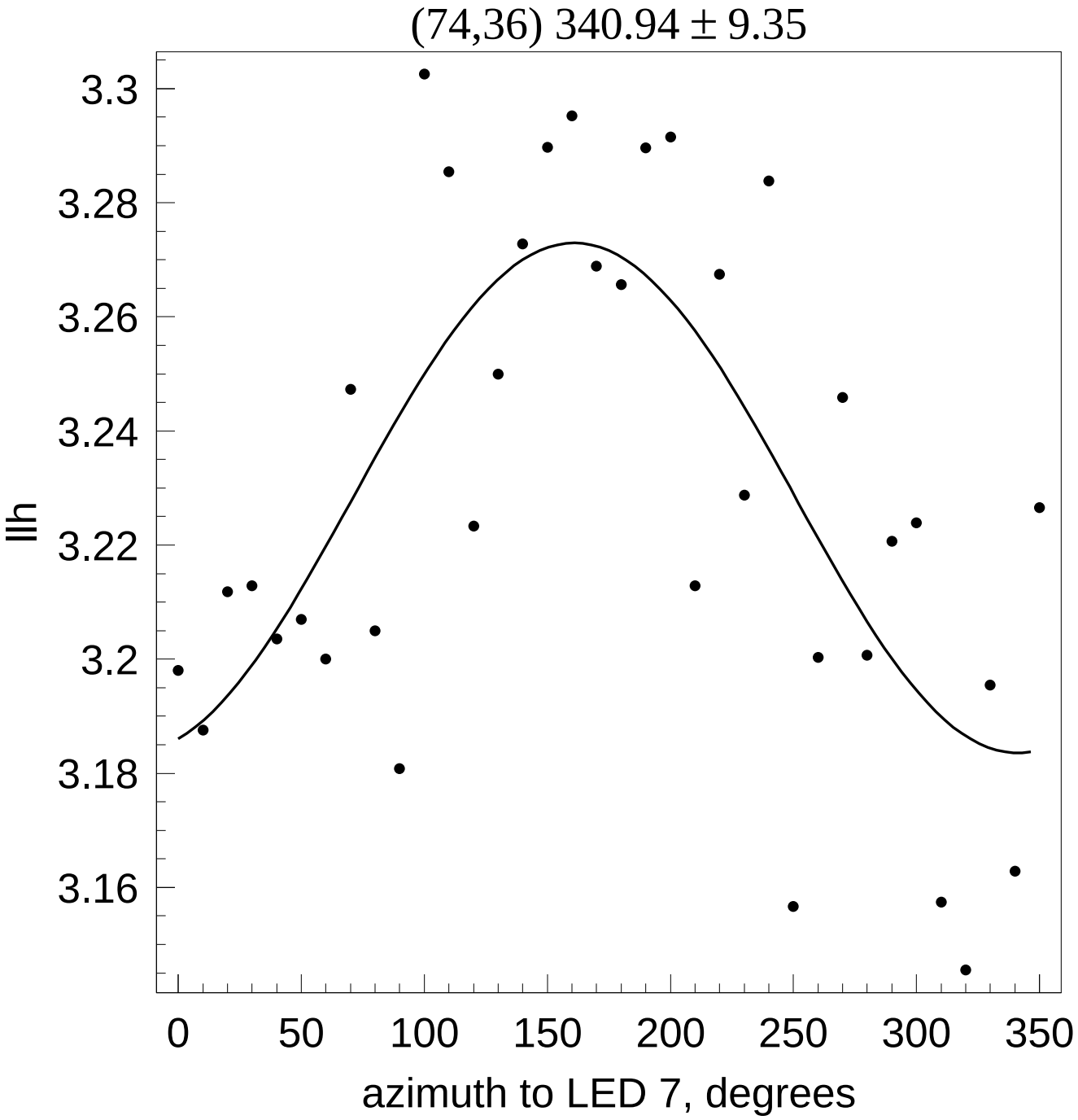

(74,35)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
31.4 ± 50.2

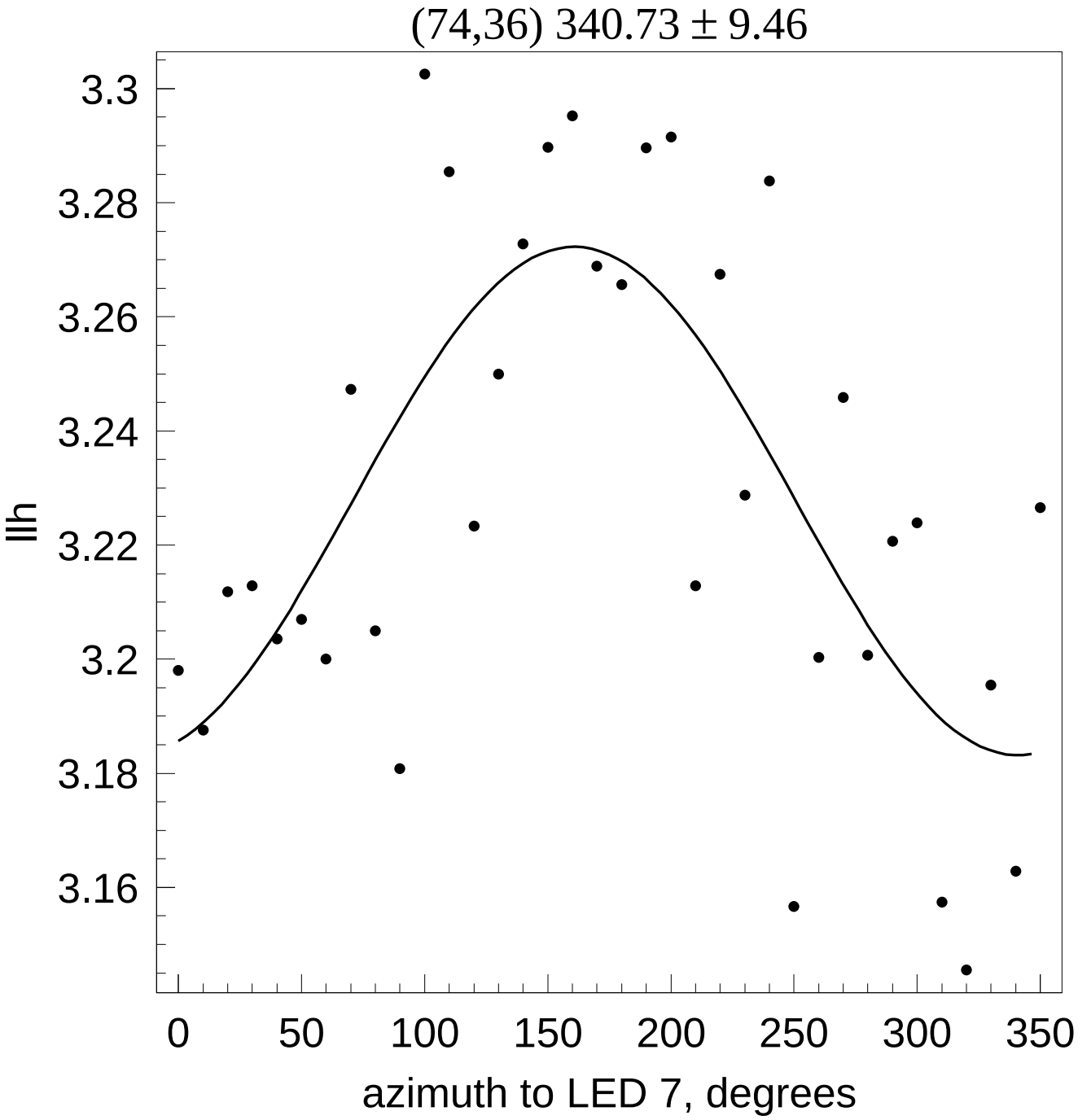

(74,35) 38.17 ± 9.16
5.725
5.7
5.675
5.65
5.625
5.6
5.575
5.55
5.525
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

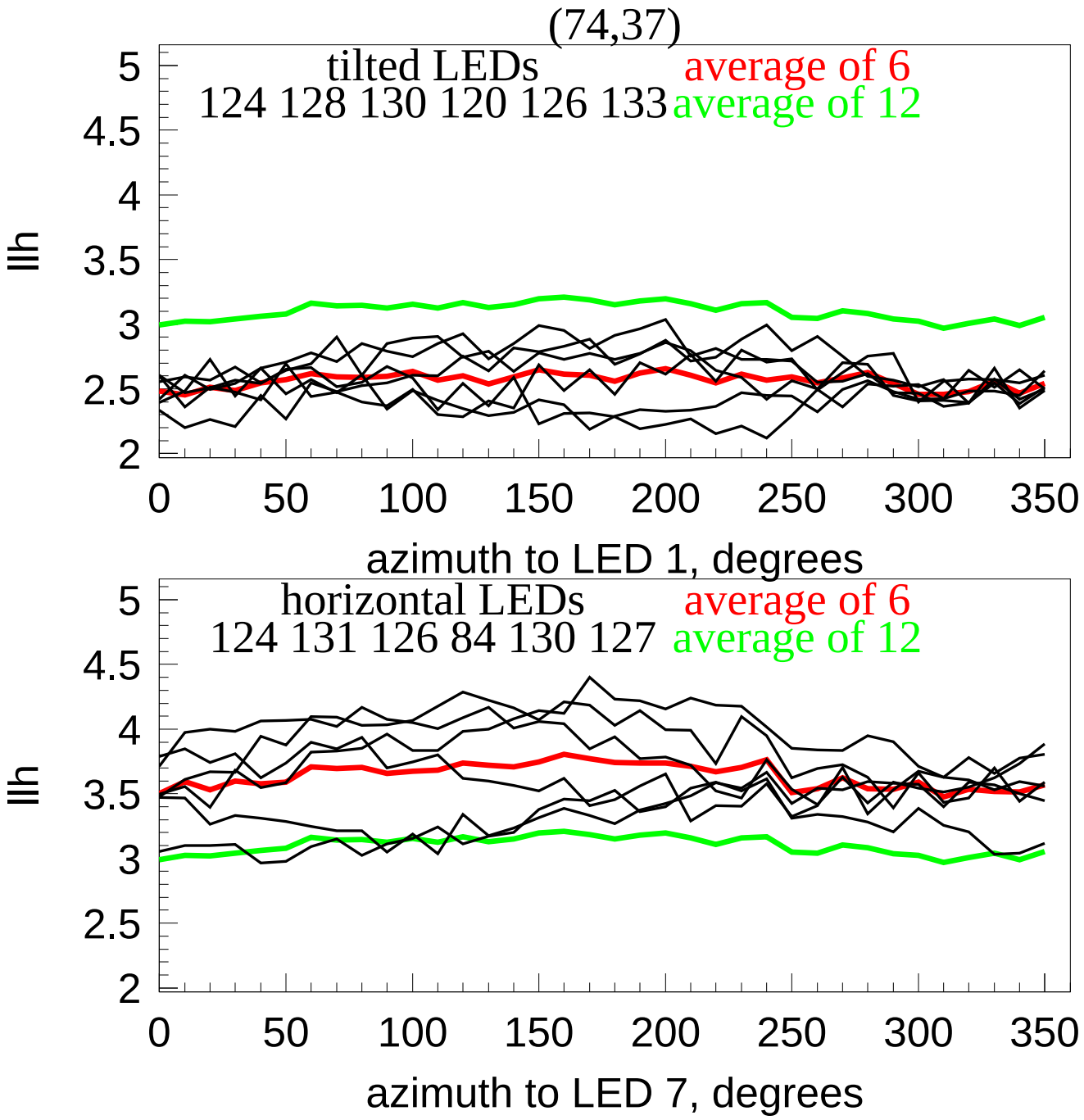

(74,35) 38.07 ± 9.25
5.725
5.7
5.675
5.65
5.625
5.6
5.575
5.55
5.525
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

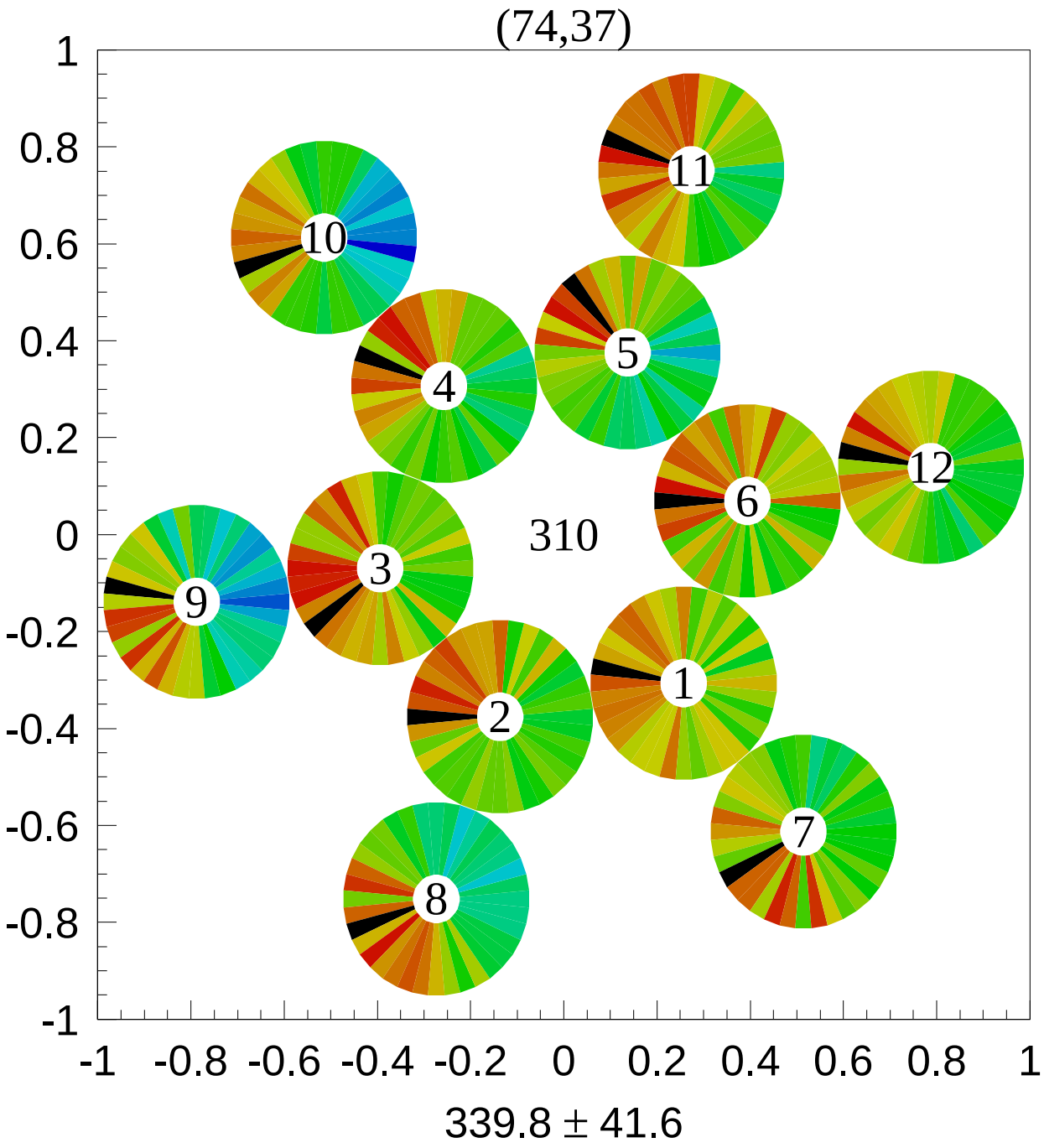

(74,36)
tilted LEDs
130 125 127 127 126 128
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
128 126 129 124 129 129
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

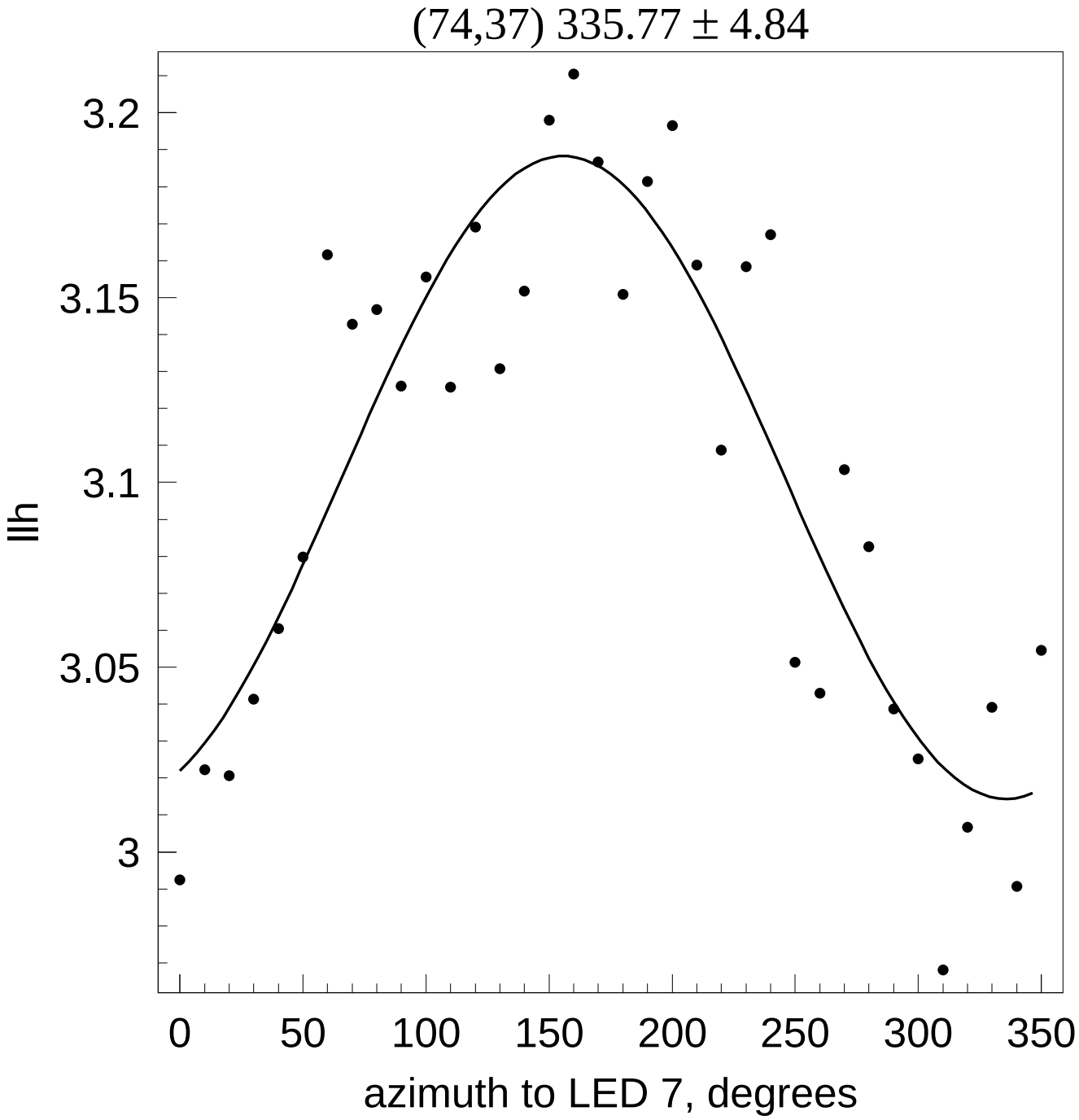

(74,36)
11
10
5
4
12
6
320
3
9
1
2
7
8
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
338 ± 85.0

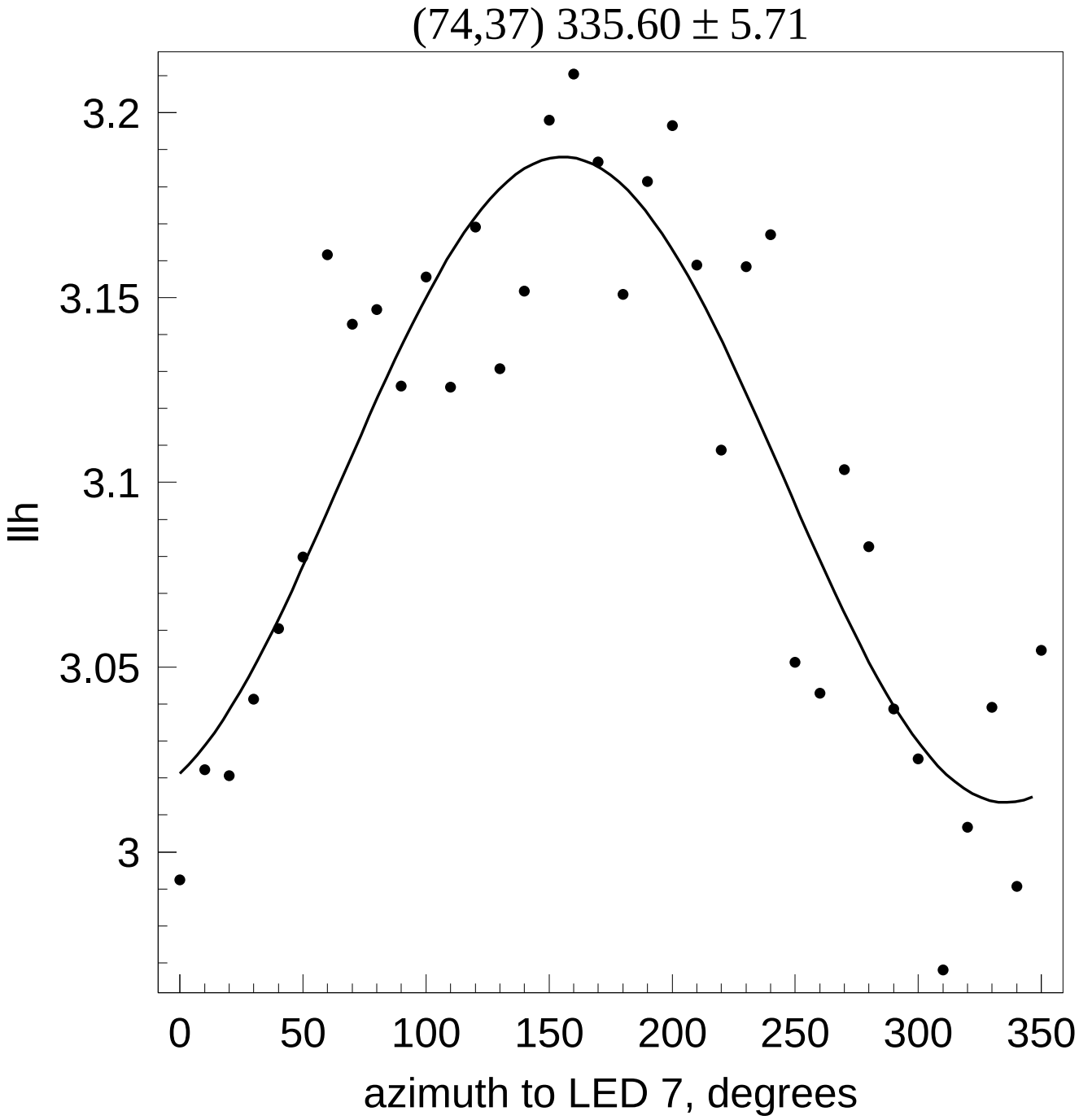

(74,36) 340.94 ± 9.35
3.3
3.28
3.26
3.24
3.22
3.2
3.18
3.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

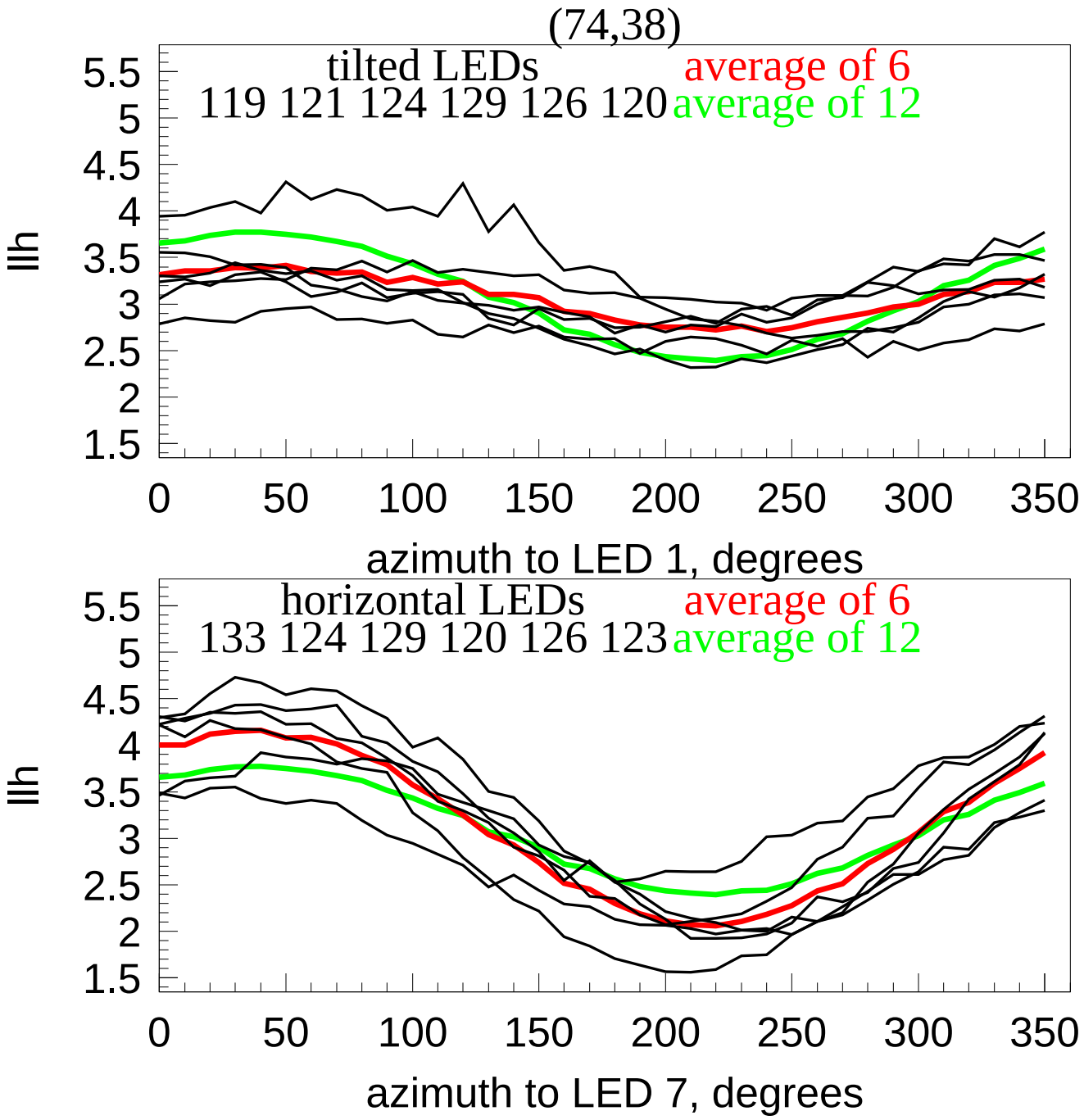

(74,36) 340.73 ± 9.46
3.3
3.28
3.26
3.24
3.22
3.2
3.18
3.16
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

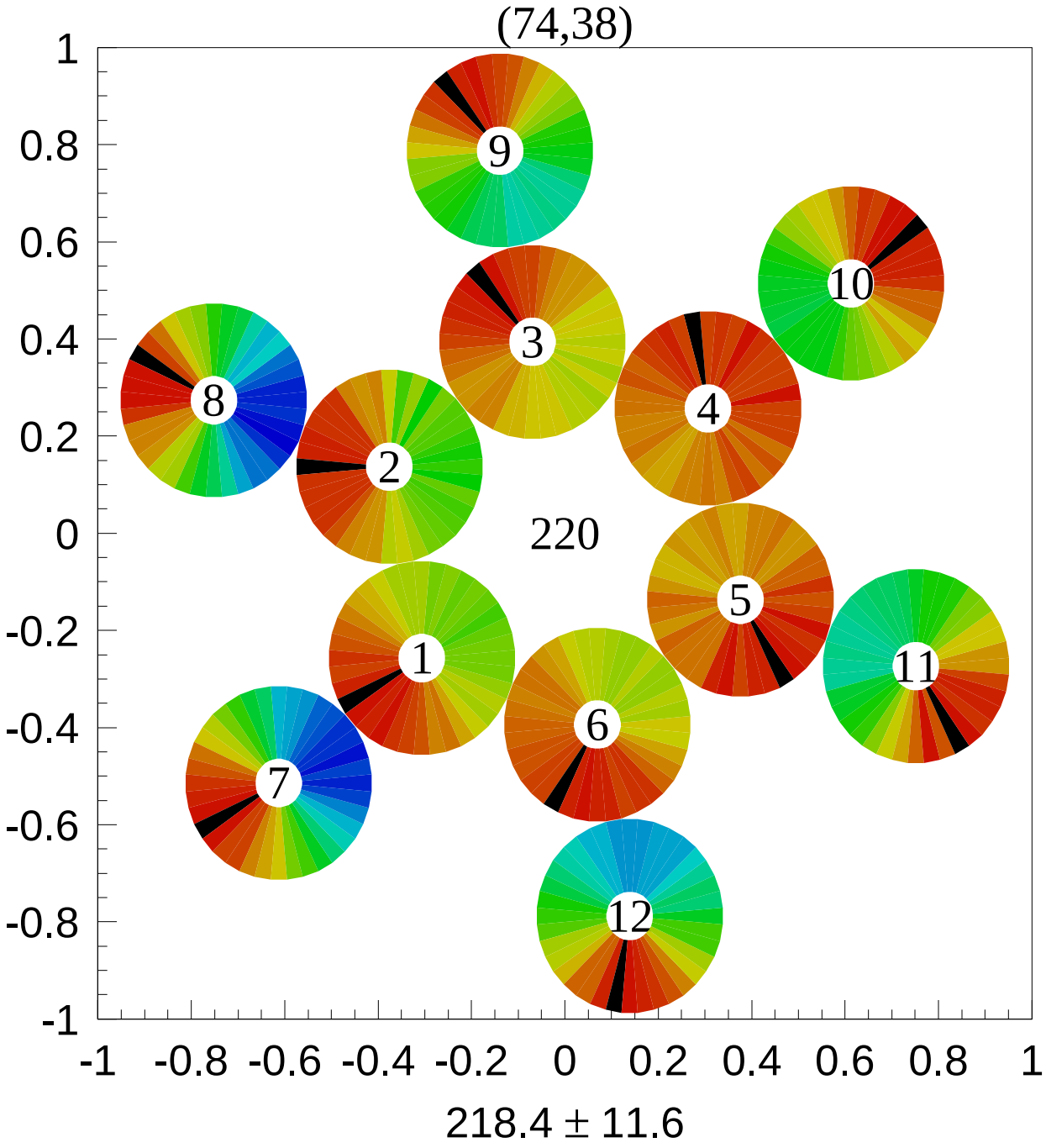

(74,37)
tilted LEDs
124 128 130 120 126 133
average of 6
average of 12
IIh
azimuth to LED 1, degrees
horizontal LEDs
124 131 126 84 130 127
average of 6
average of 12
IIh
azimuth to LED 7, degrees

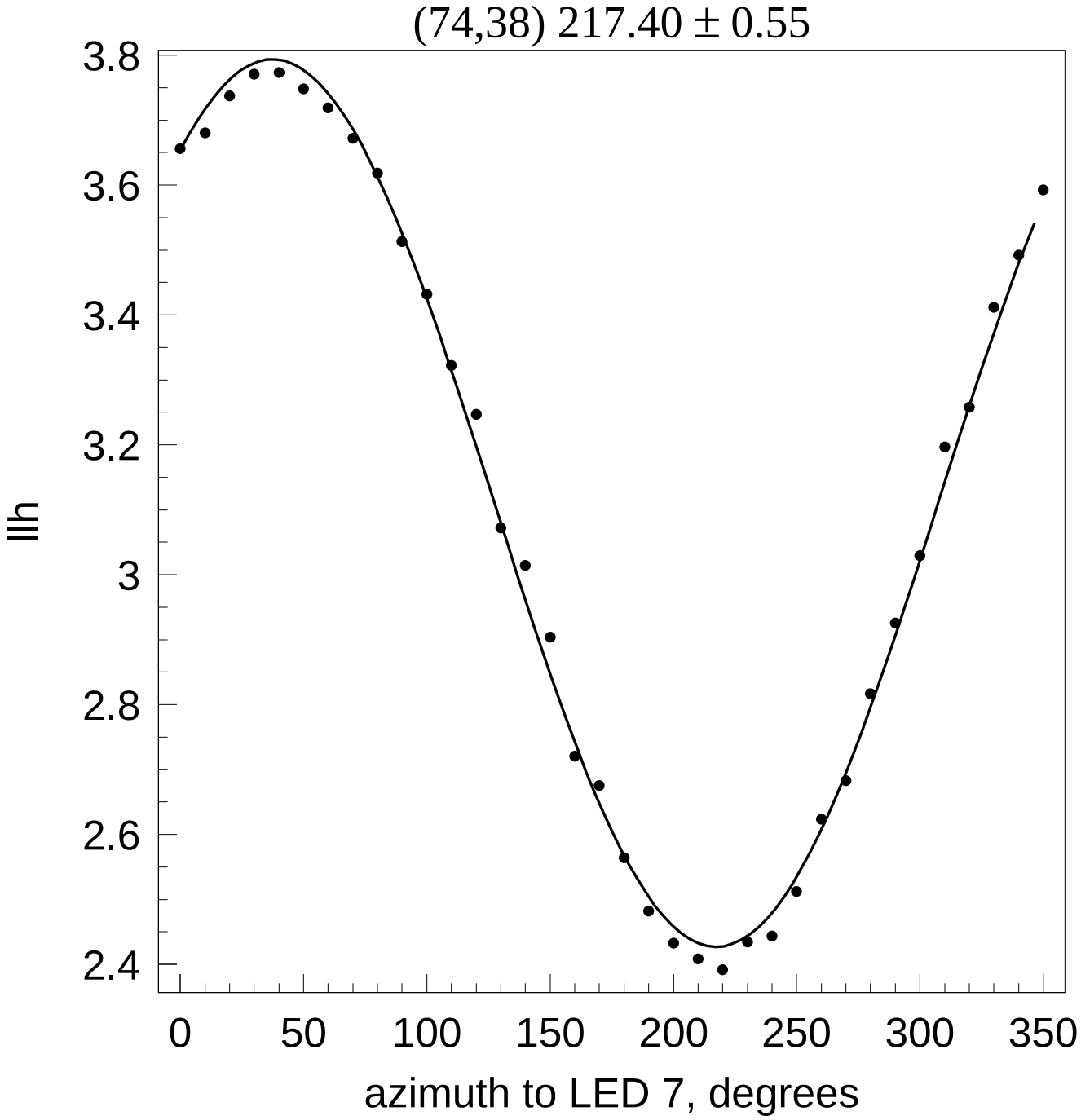

(74,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
339.8 ± 41.6
310
1
2
3
4
5
6
7
8
9
10
11
12

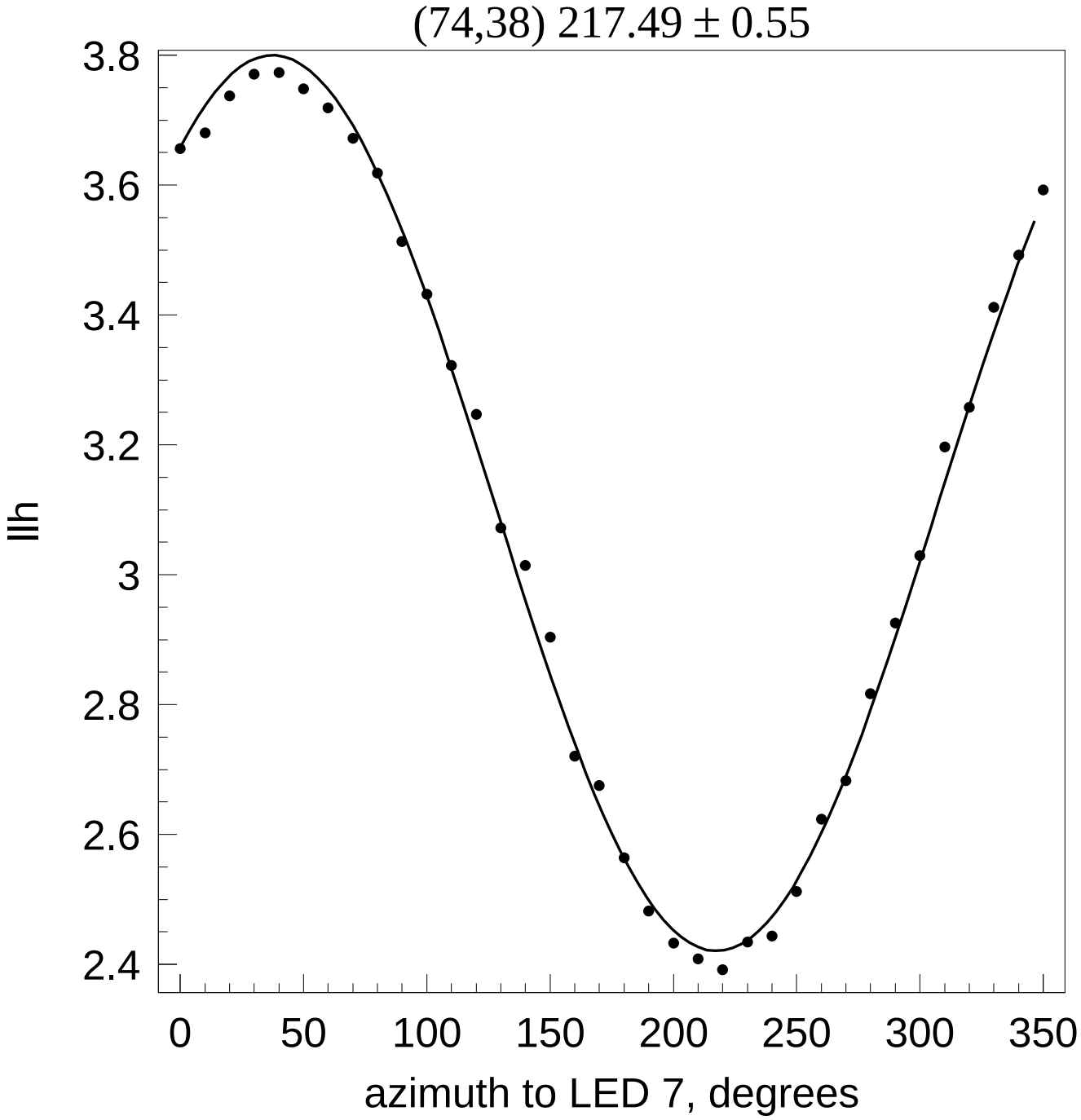

(74,37) 335.77 ± 4.84
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

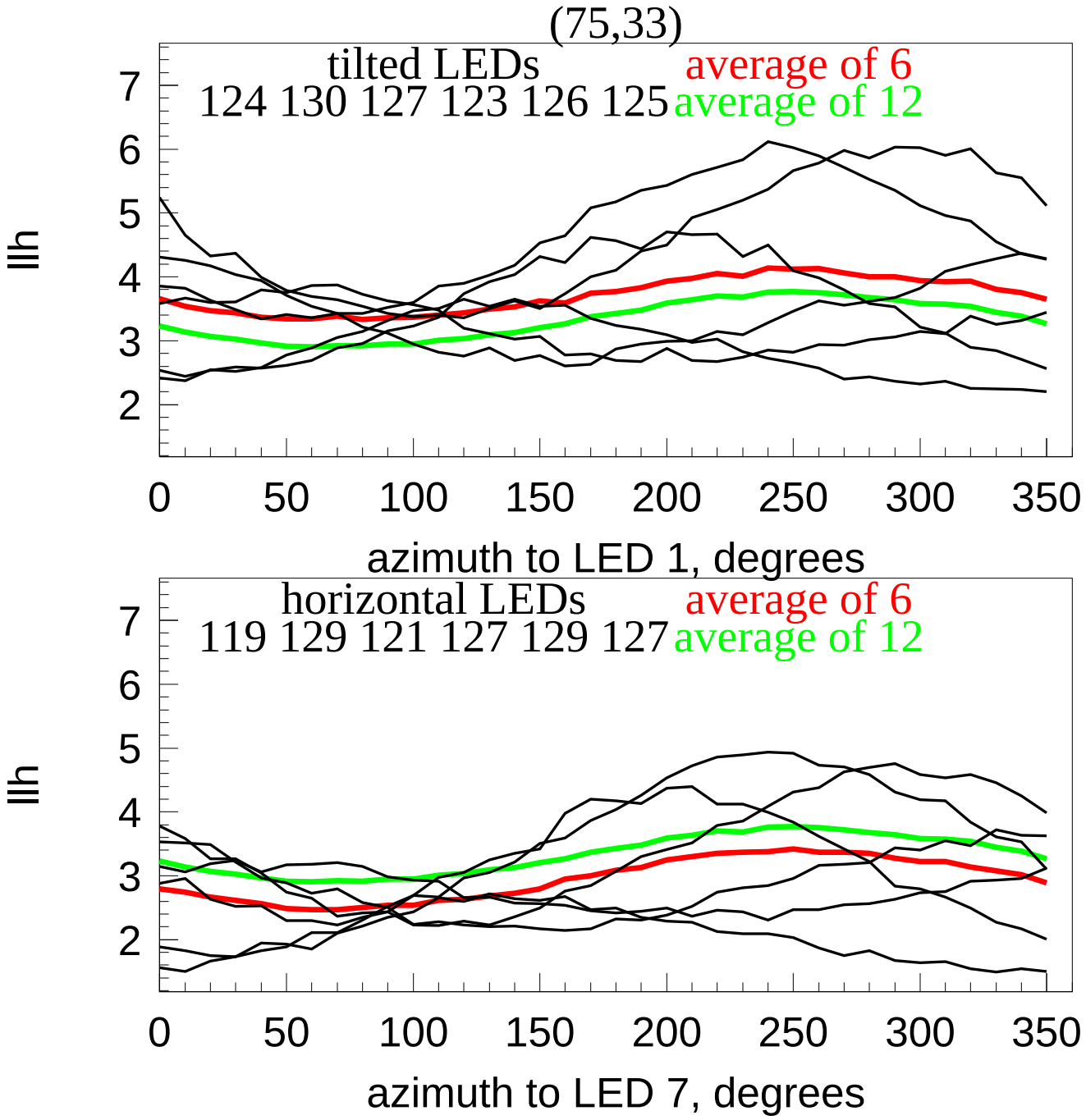

(74,37) 335.60 ± 5.71
3.2
3.15
3.1
3.05
3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

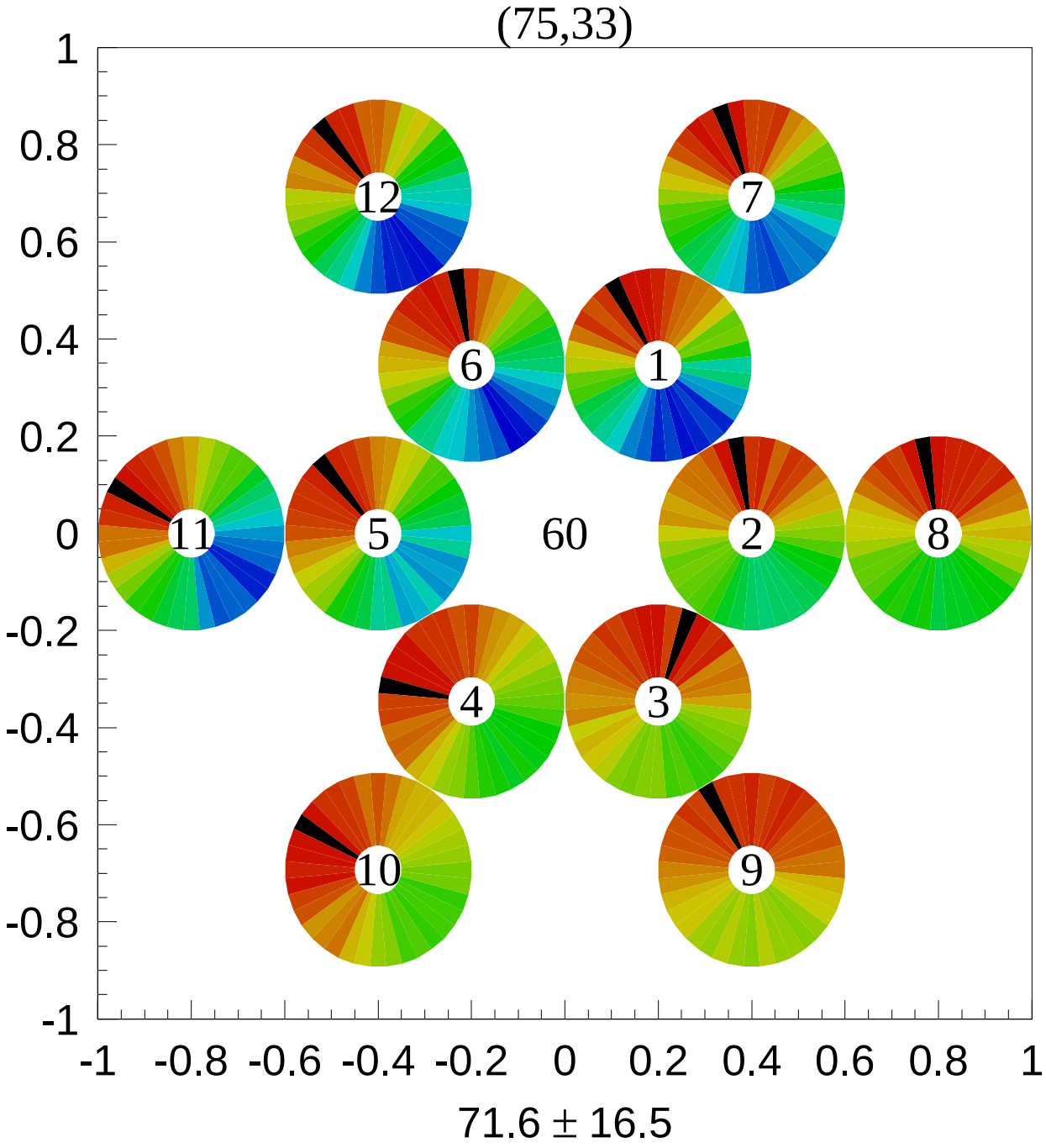

(74,38)
tilted LEDs
119 121 124 129 126 120
average of 6
average of 12
IIh
5.5
5
4.5
4
3.5
3
2.5
2
1.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
133 124 129 120 126 123
average of 6
average of 12
IIh
azimuth to LED 7, degrees

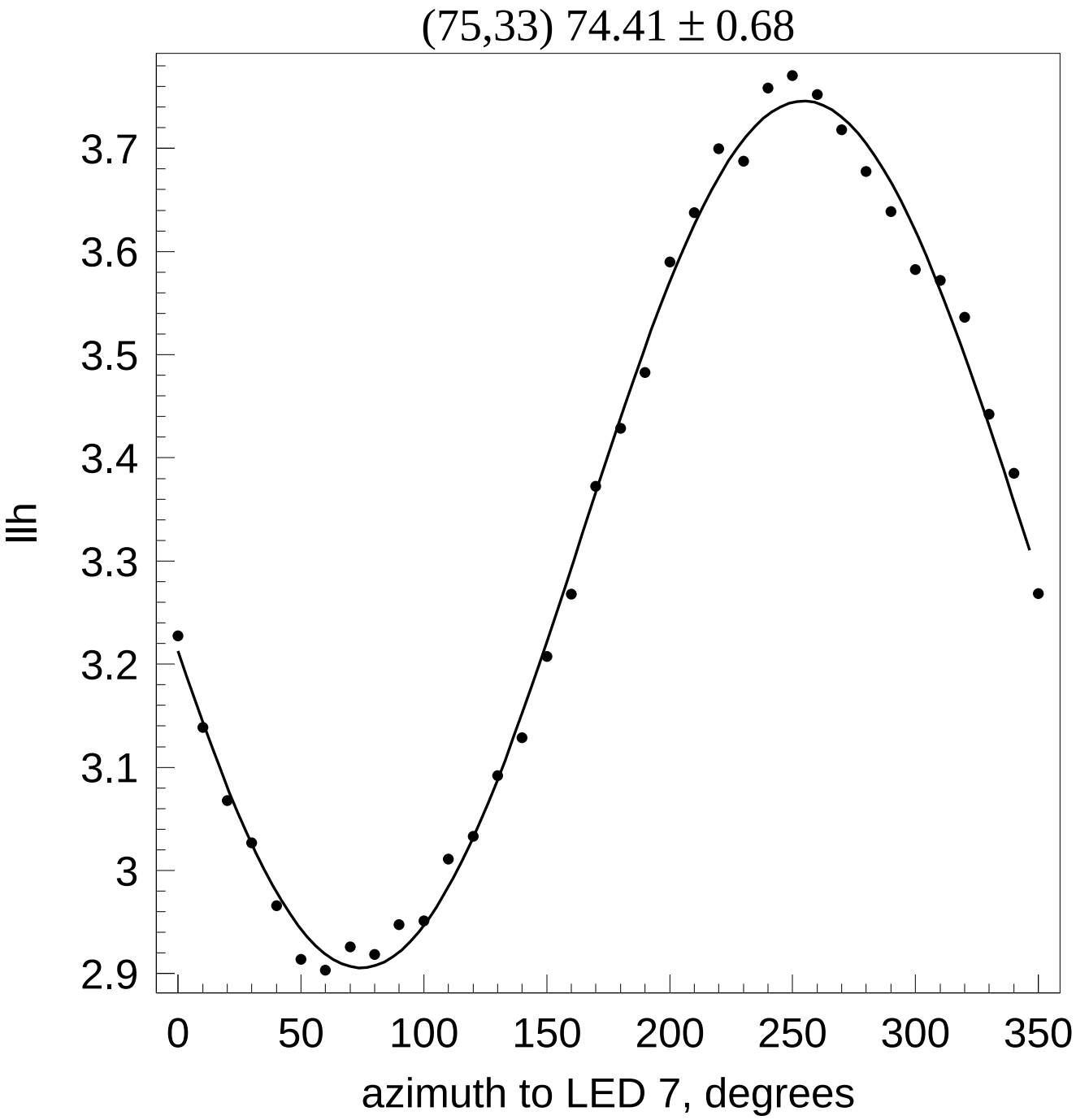

(74,38)
9
10
3
8
4
2
220
5
1
11
6
7
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
218.4 ± 11.6

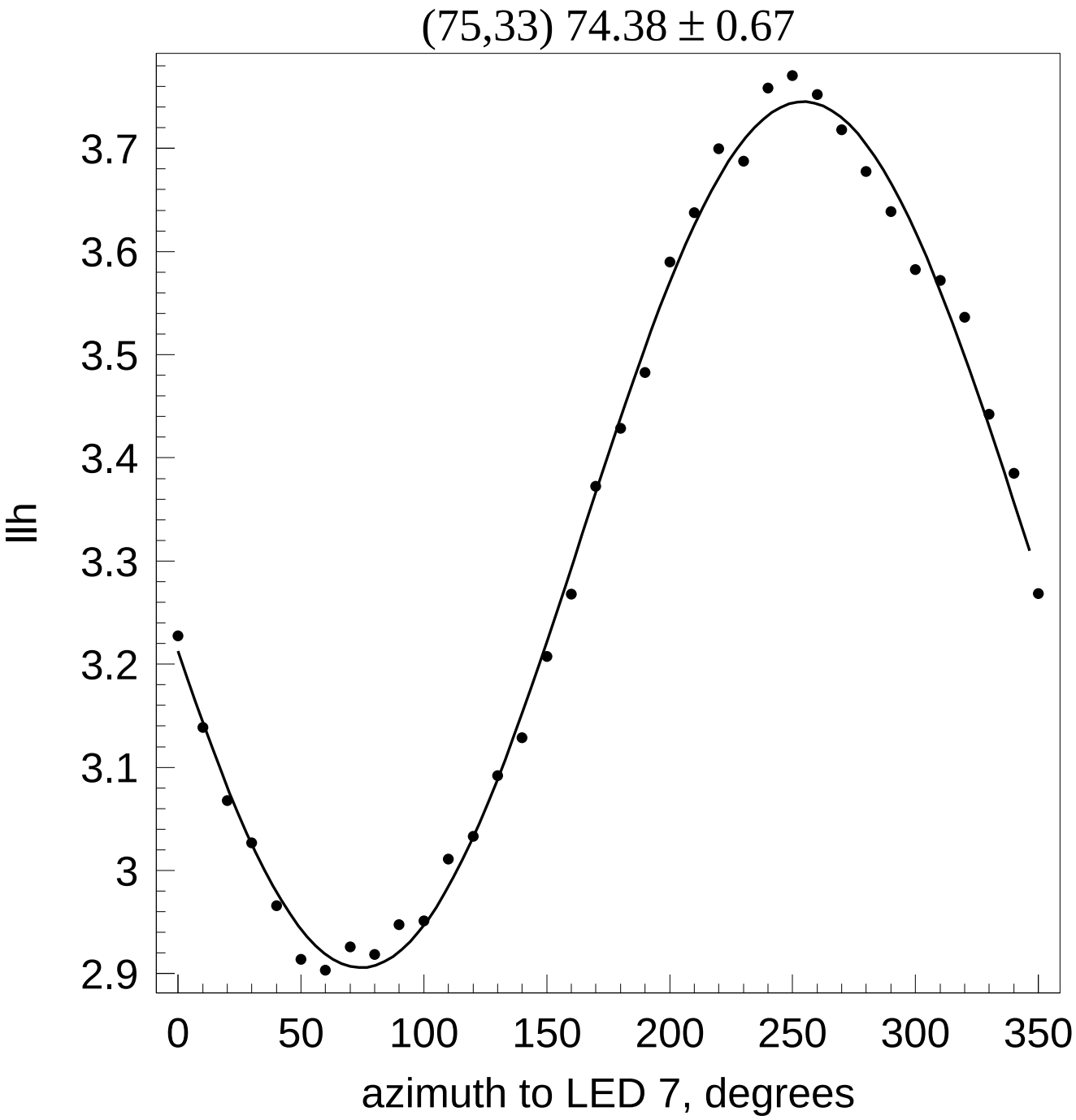

(74,38) 217.40 ± 0.55
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

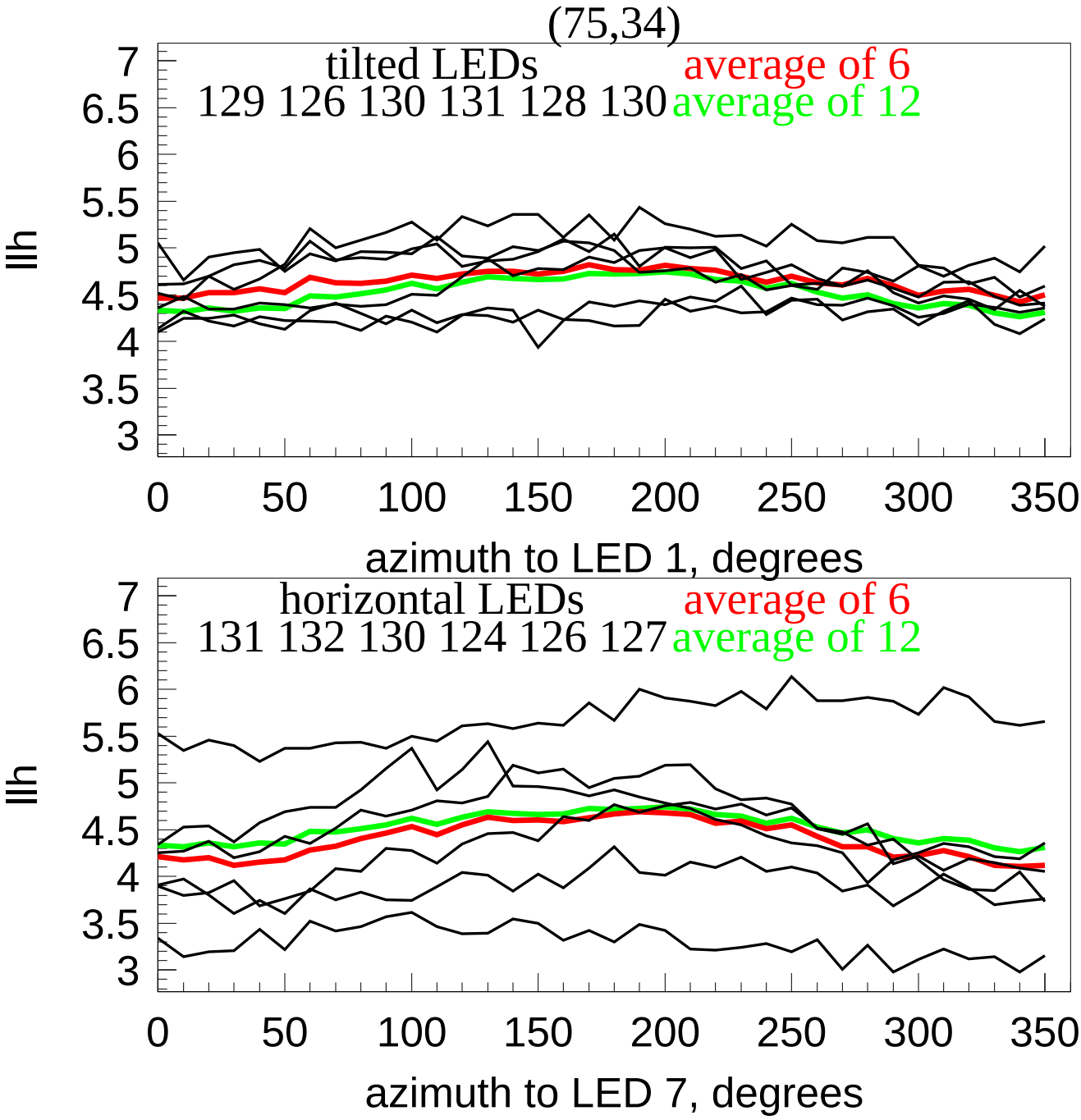

(74,38) 217.49 ± 0.55
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

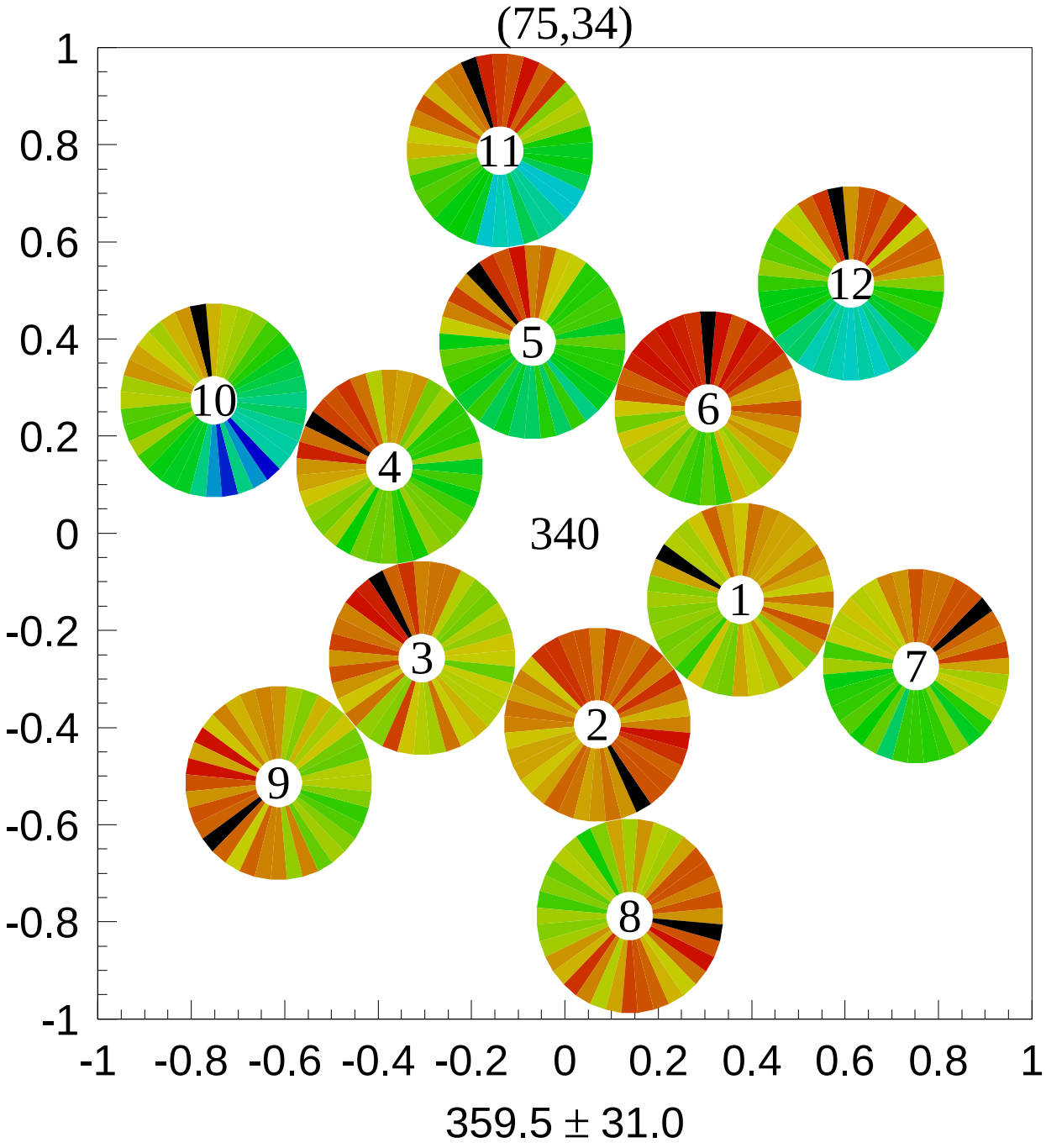

(75,33)
tilted LEDs
124 130 127 123 126 125
average of 6
average of 12
llh
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 129 121 127 129 127
average of 6
average of 12
llh
7
6
5
4
3
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

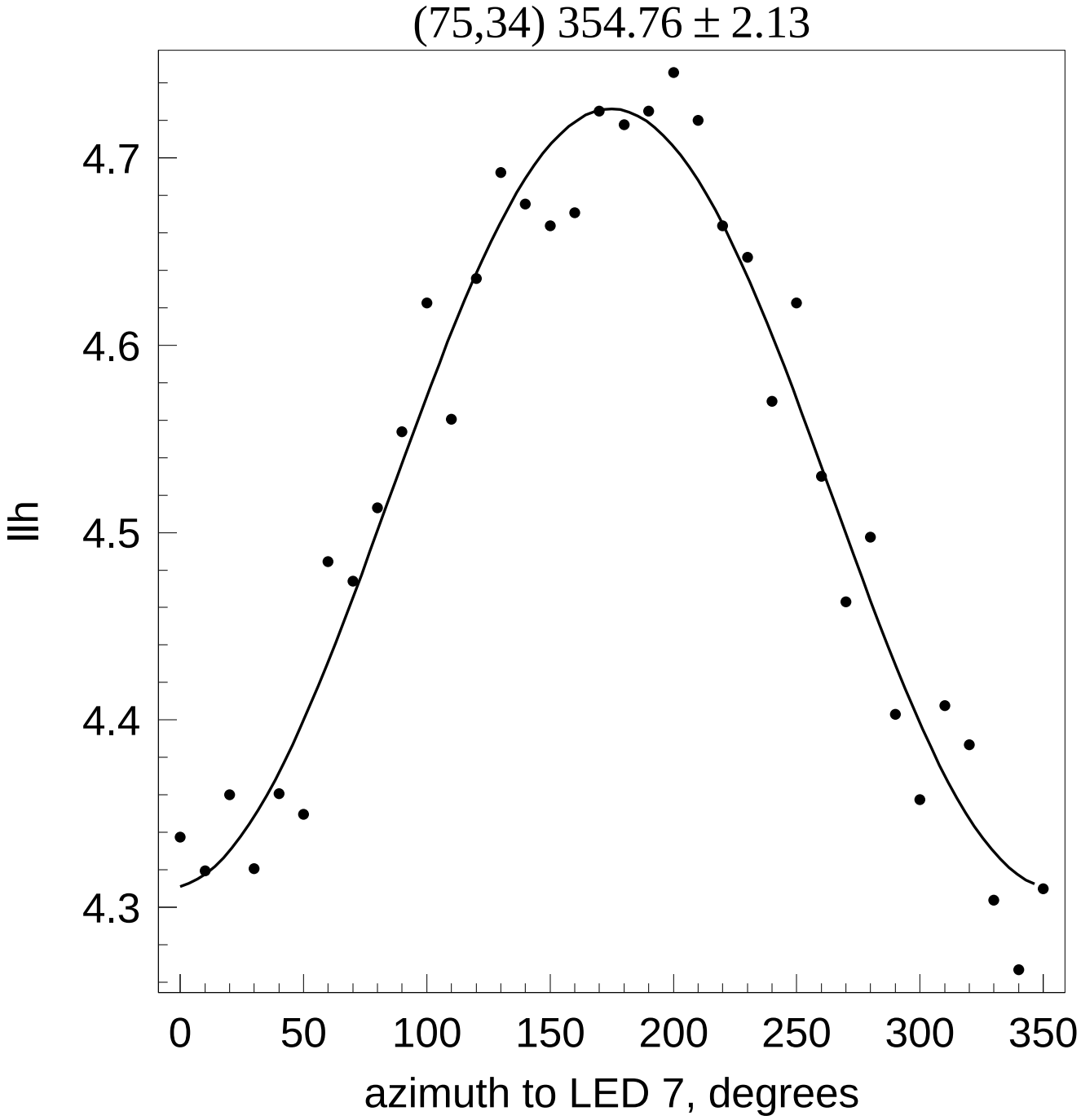

(75,33)
12
7
6
1
11
5
60
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
71.6 ± 16.5

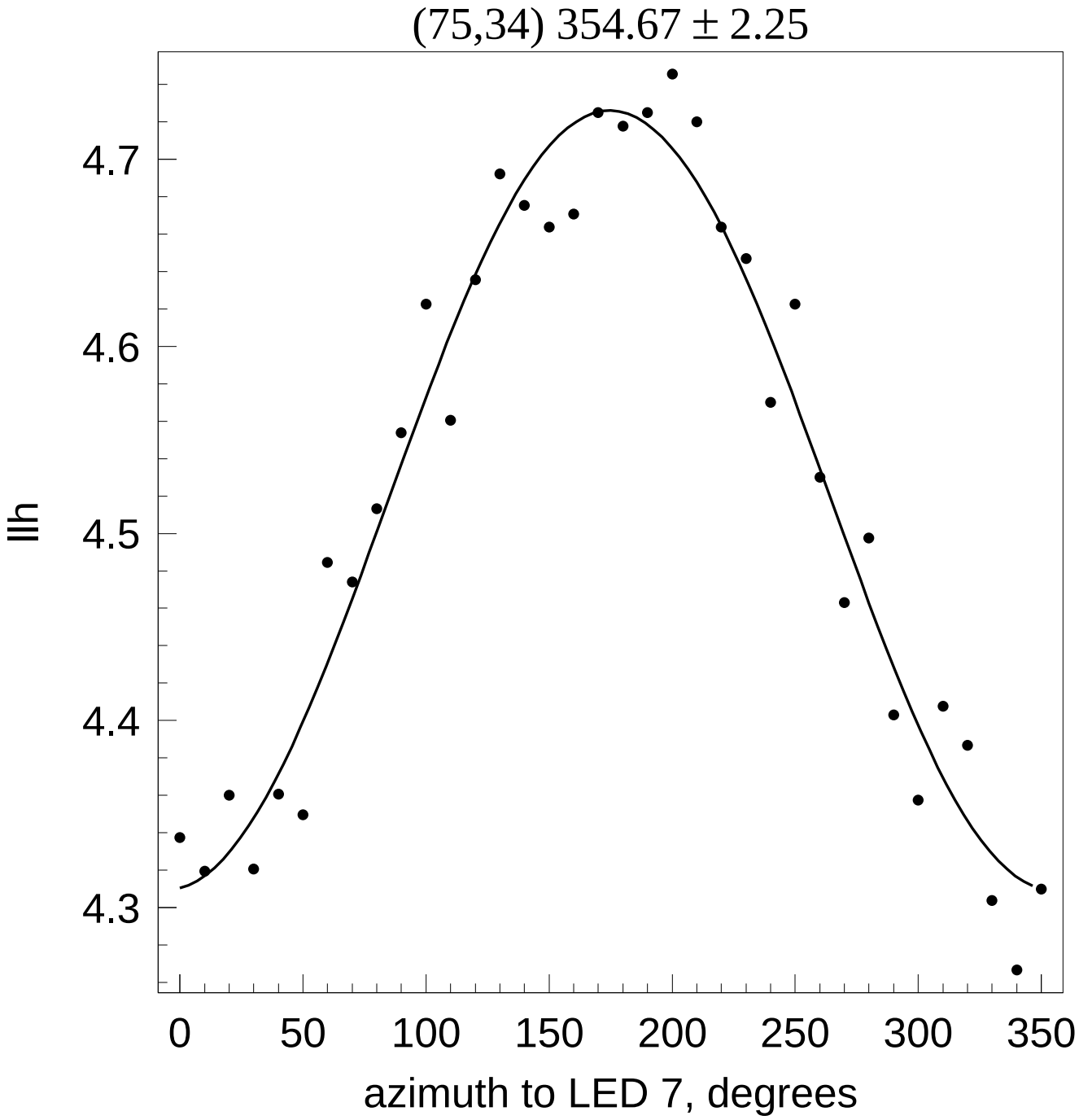

(75,33) 74.41 ± 0.68
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

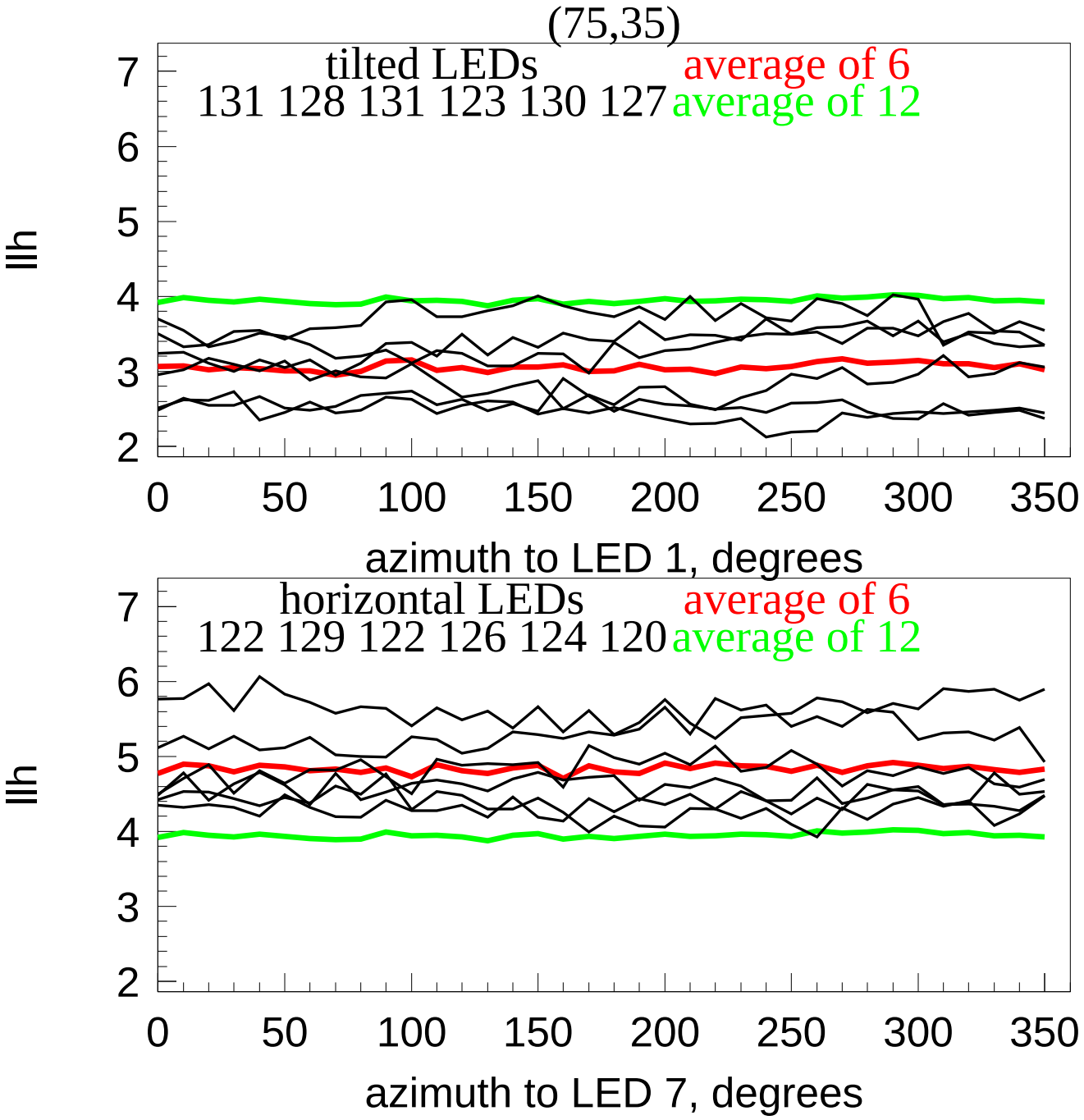

(75,33) 74.38 ± 0.67
llh
3.7
3.6
3.5
3.4
3.3
3.2
3.1
3
2.9
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

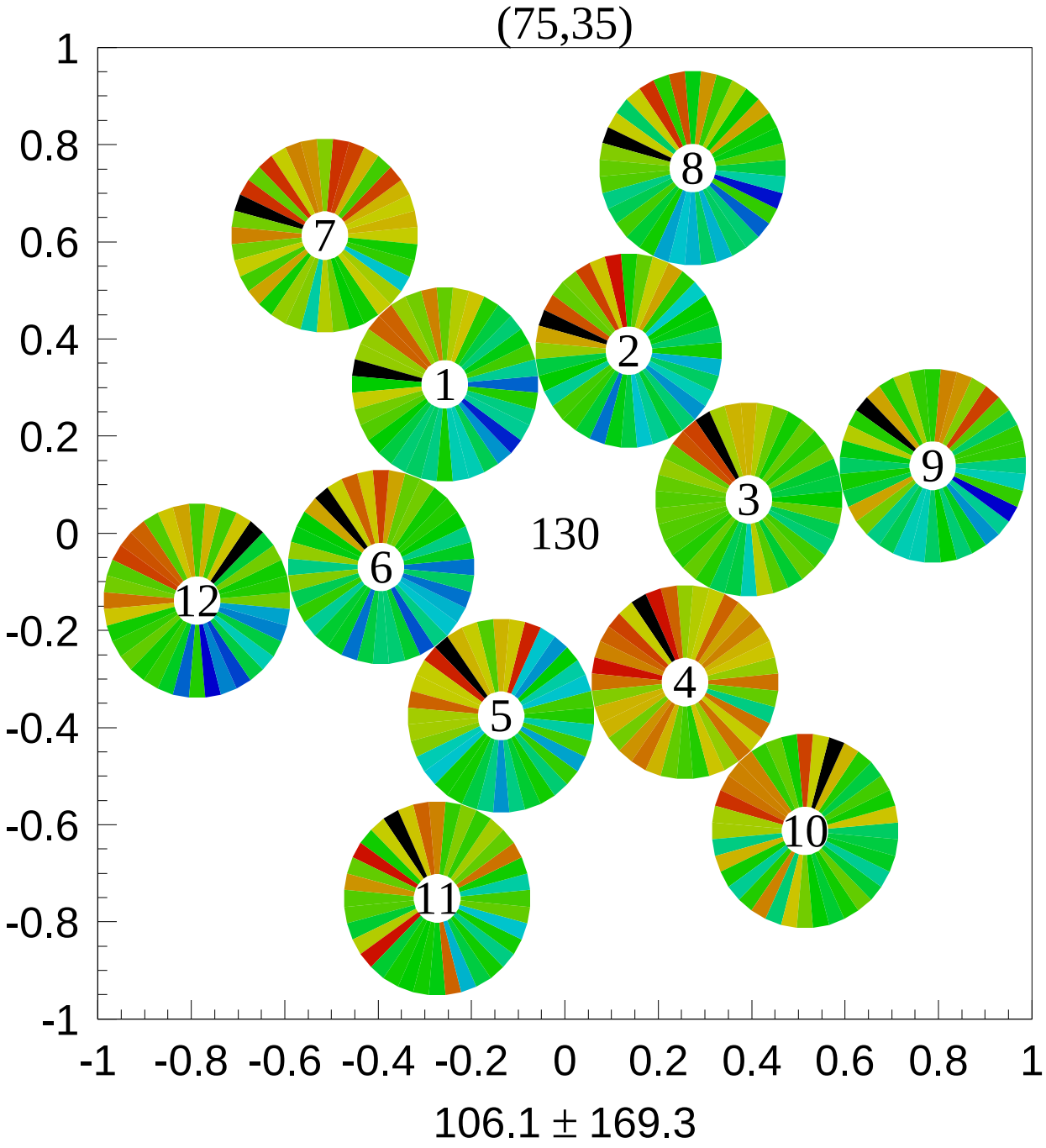

(75,34)
tilted LEDs
129 126 130 131 128 130
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 132 130 124 126 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

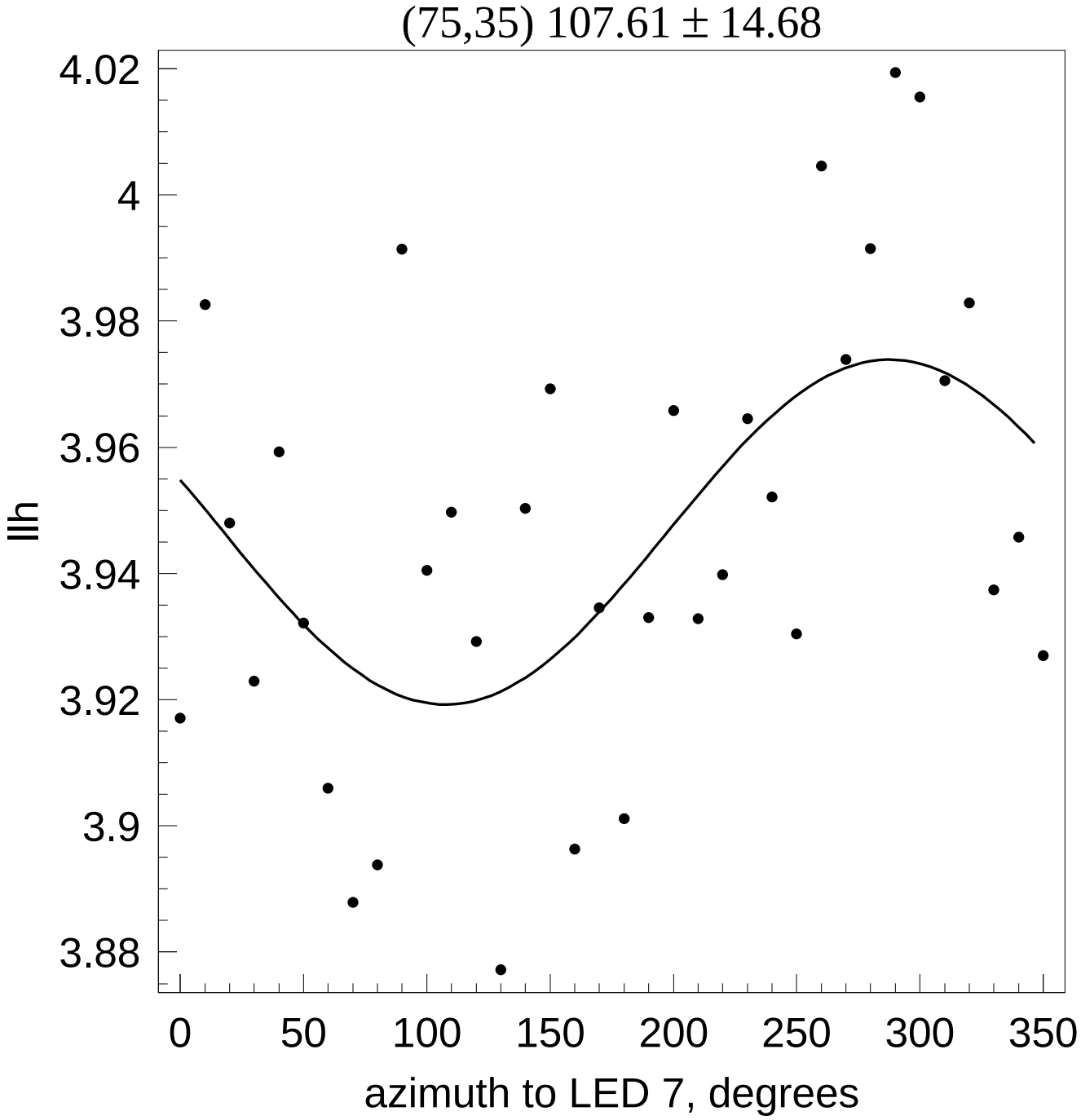

(75,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
10
6
4
340
1
3
7
2
9
8
359.5 ± 31.0

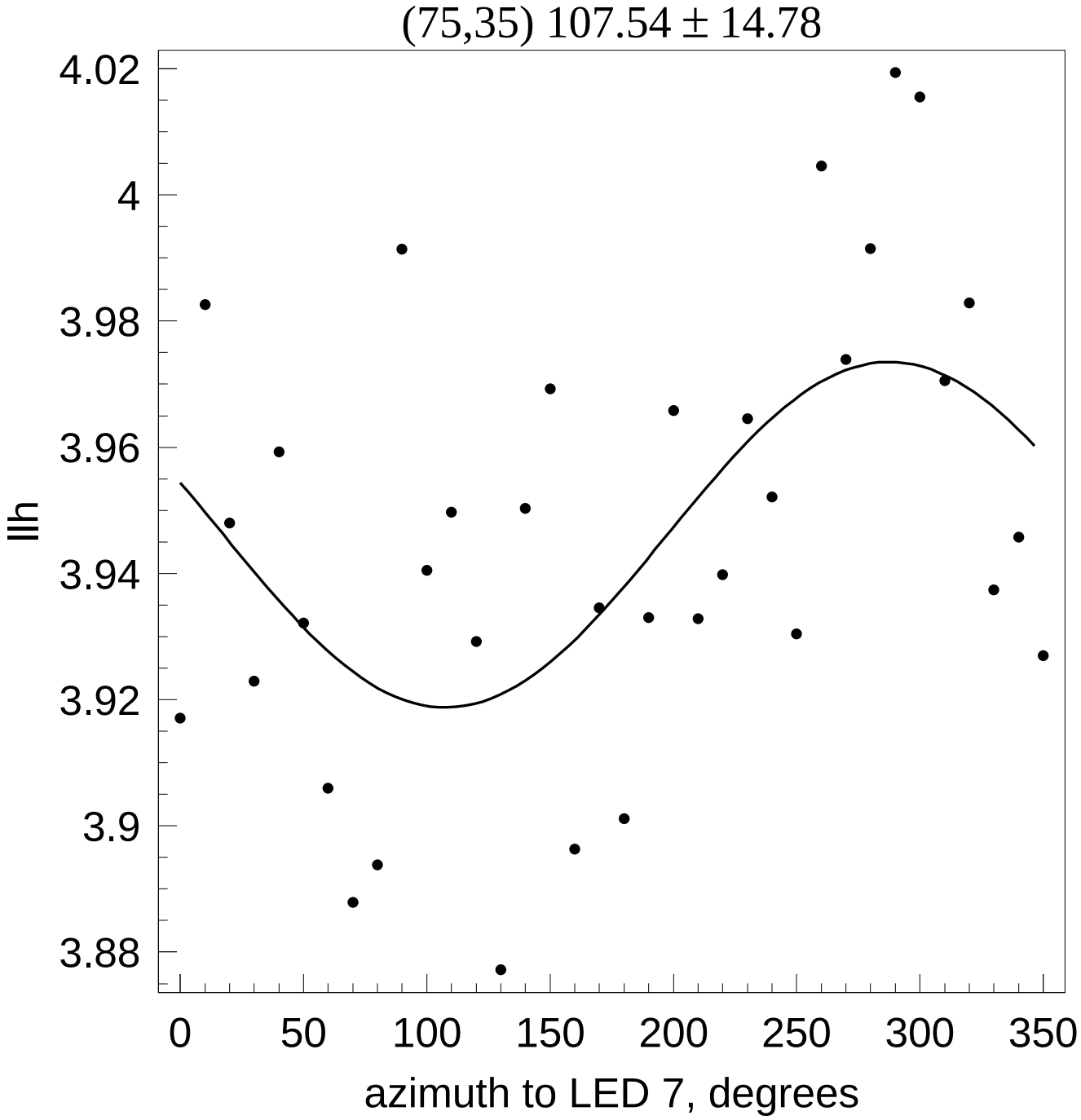

(75,34) 354.76 ± 2.13
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

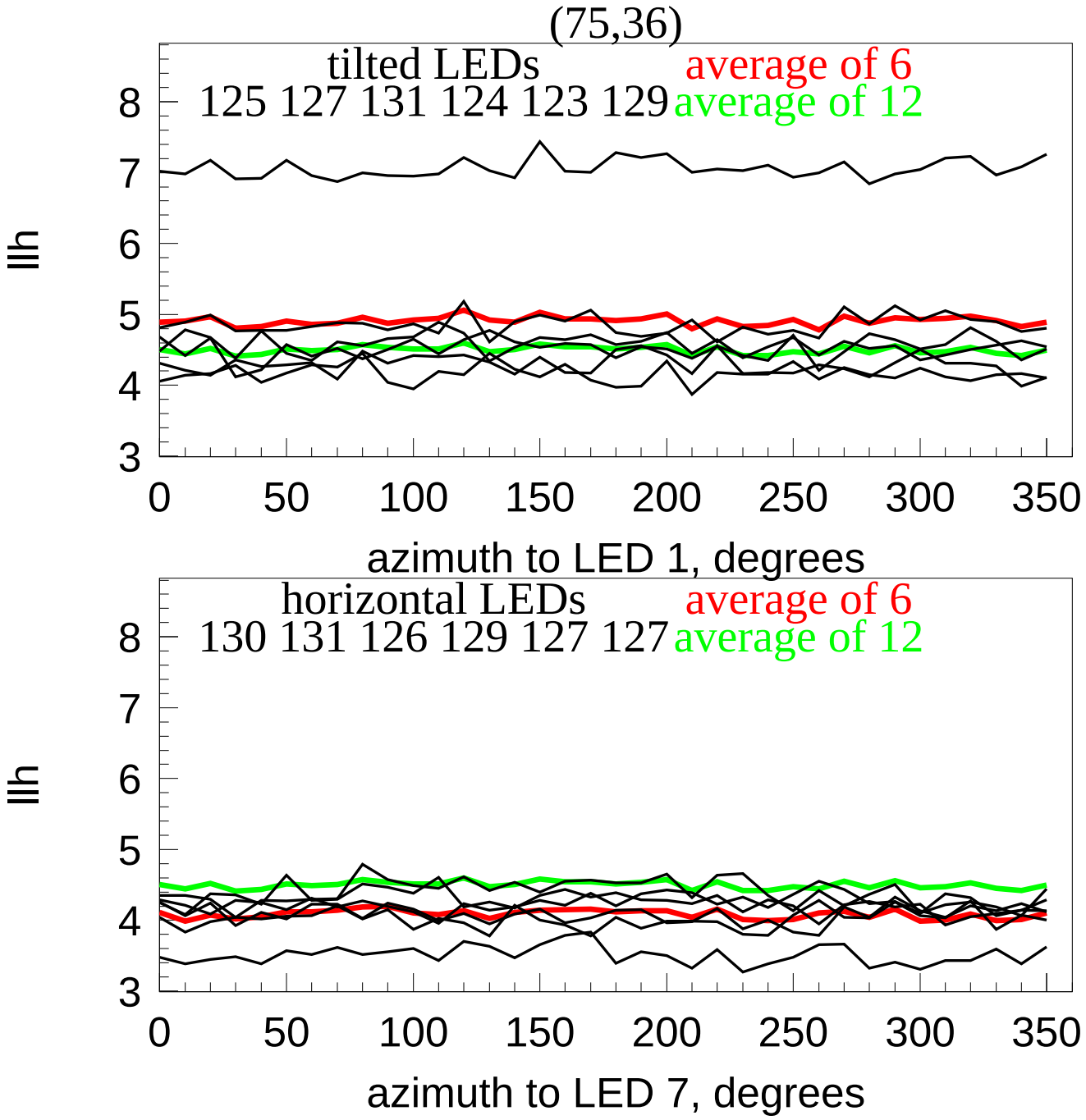

(75,34) 354.67 ± 2.25
4.7
4.6
4.5
4.4
4.3
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

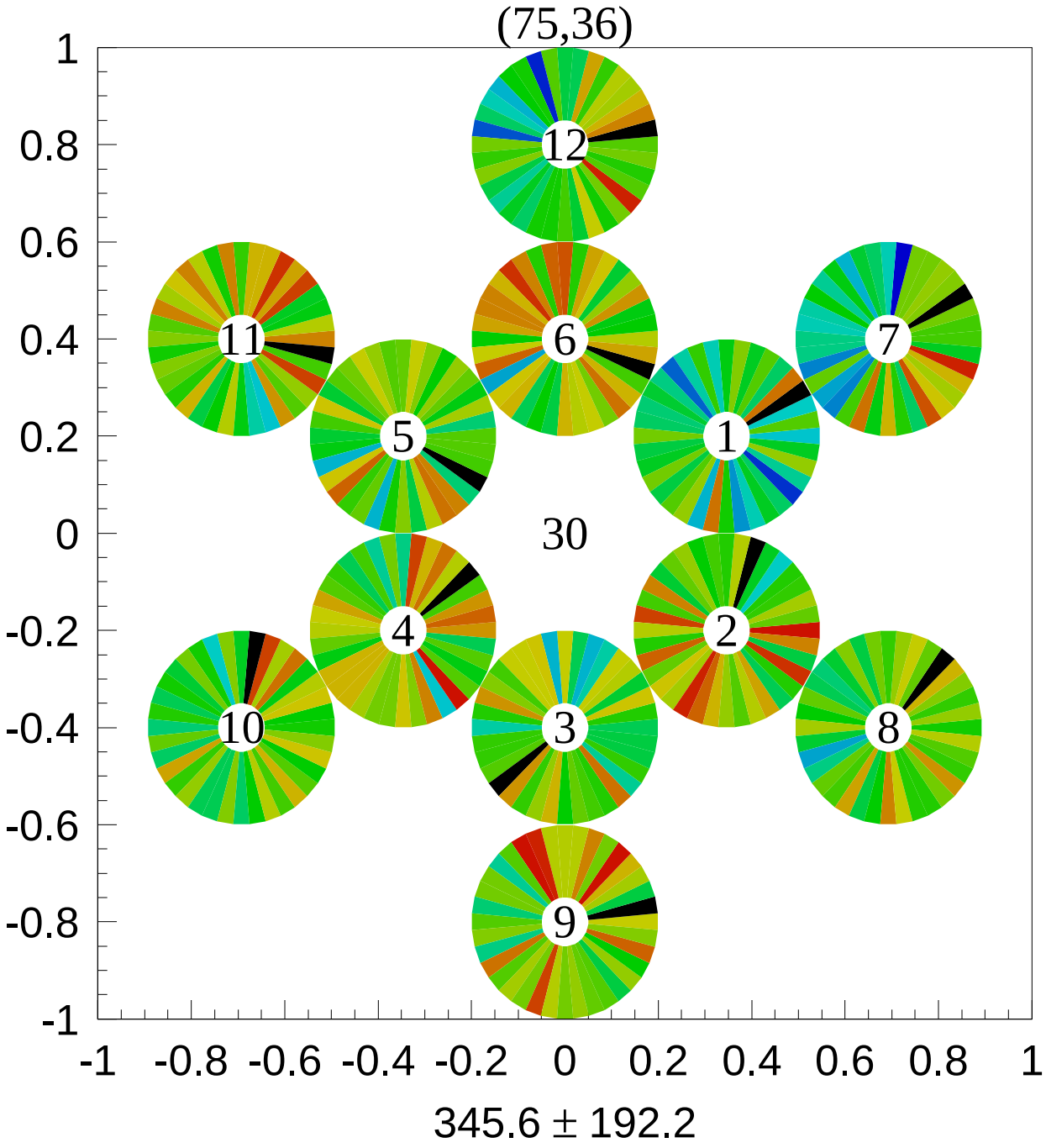

(75,35)
tilted LEDs
131 128 131 123 130 127
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 129 122 126 124 120
average of 6
average of 12
llh
azimuth to LED 7, degrees

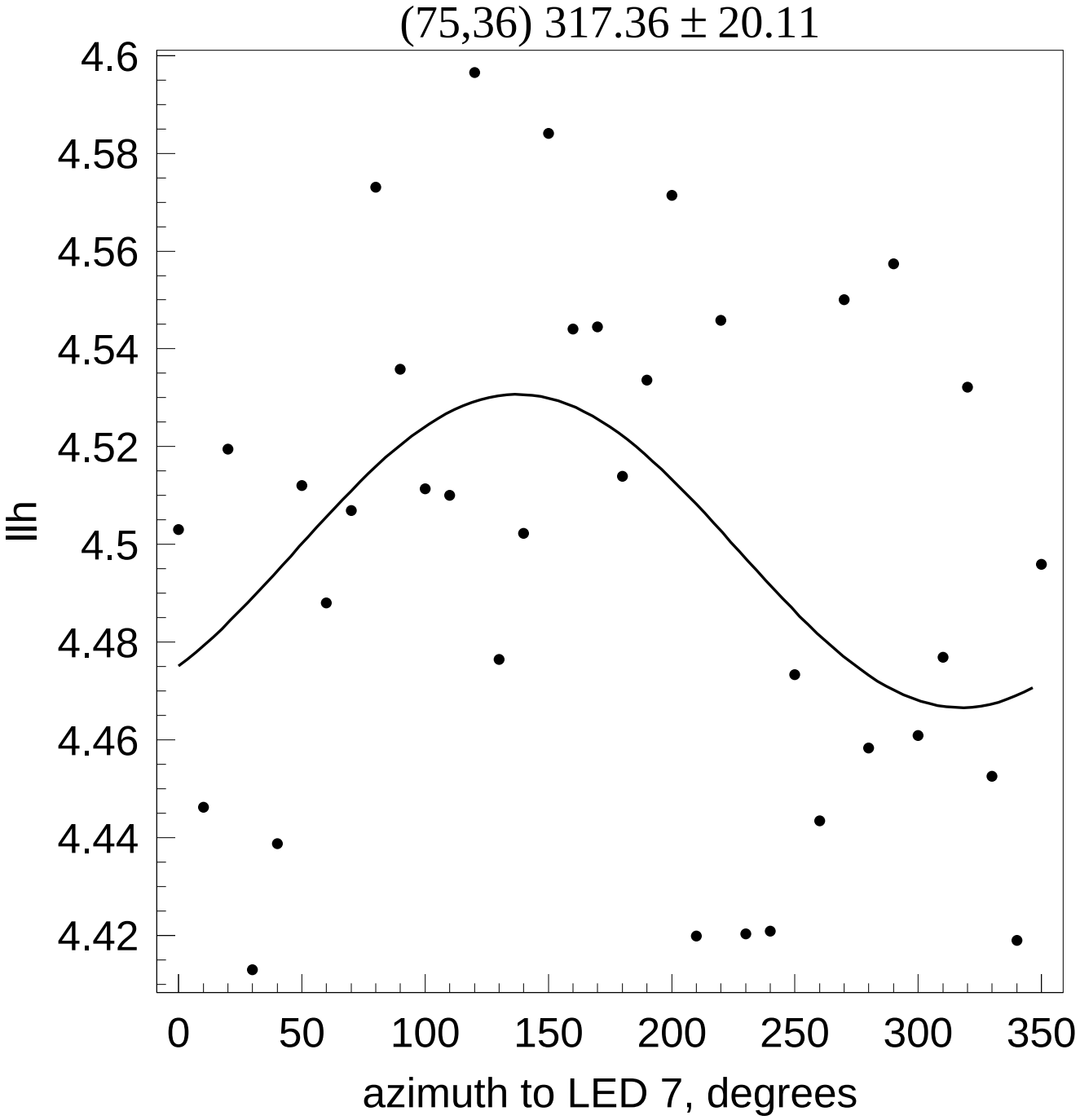

(75,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
106.1 ± 169.3
130
1
2
3
4
5
6
7
8
9
10
11
12

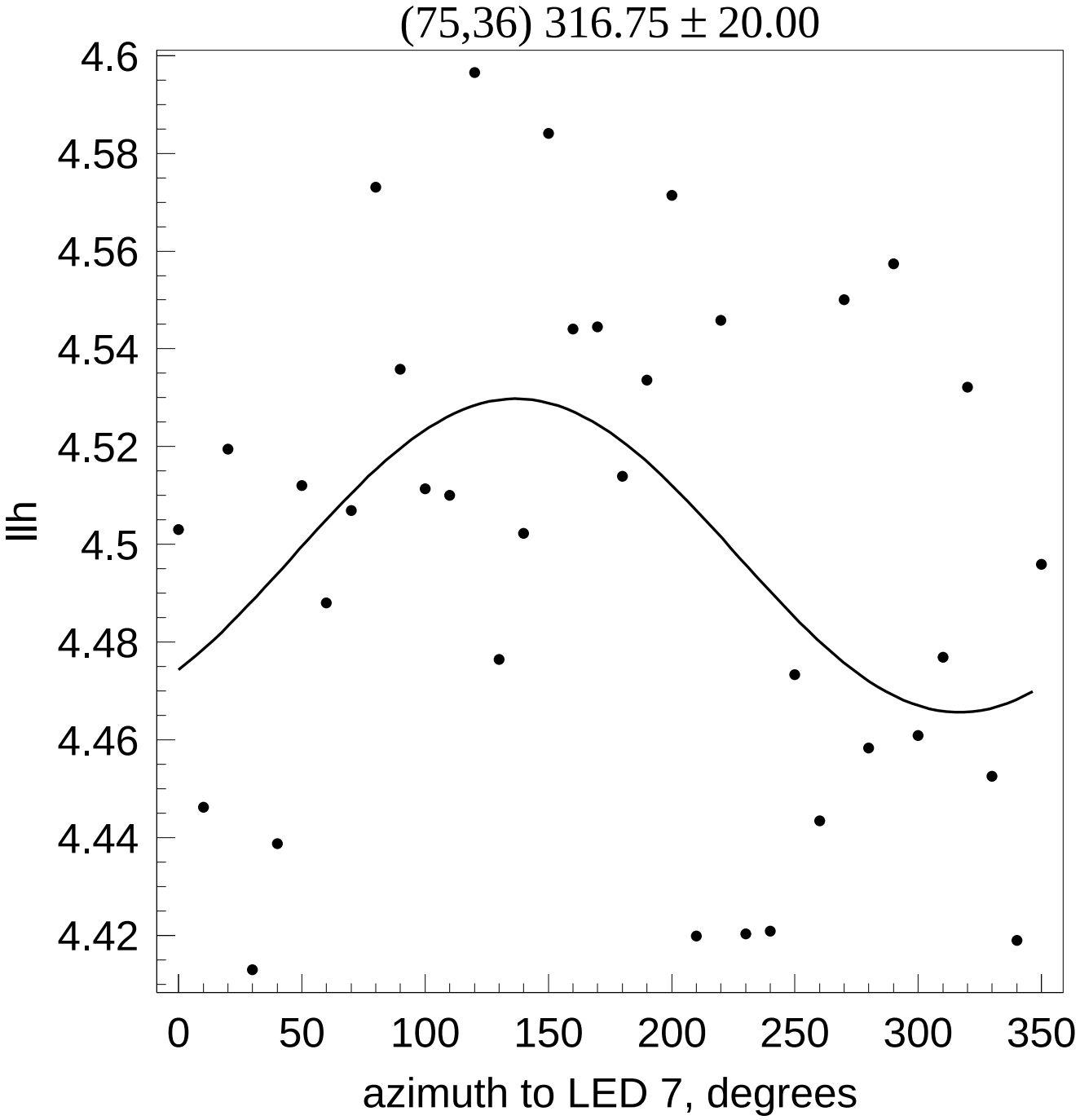

(75,35) 107.61 ± 14.68
4.02
4
3.98
3.96
3.94
3.92
3.9
3.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

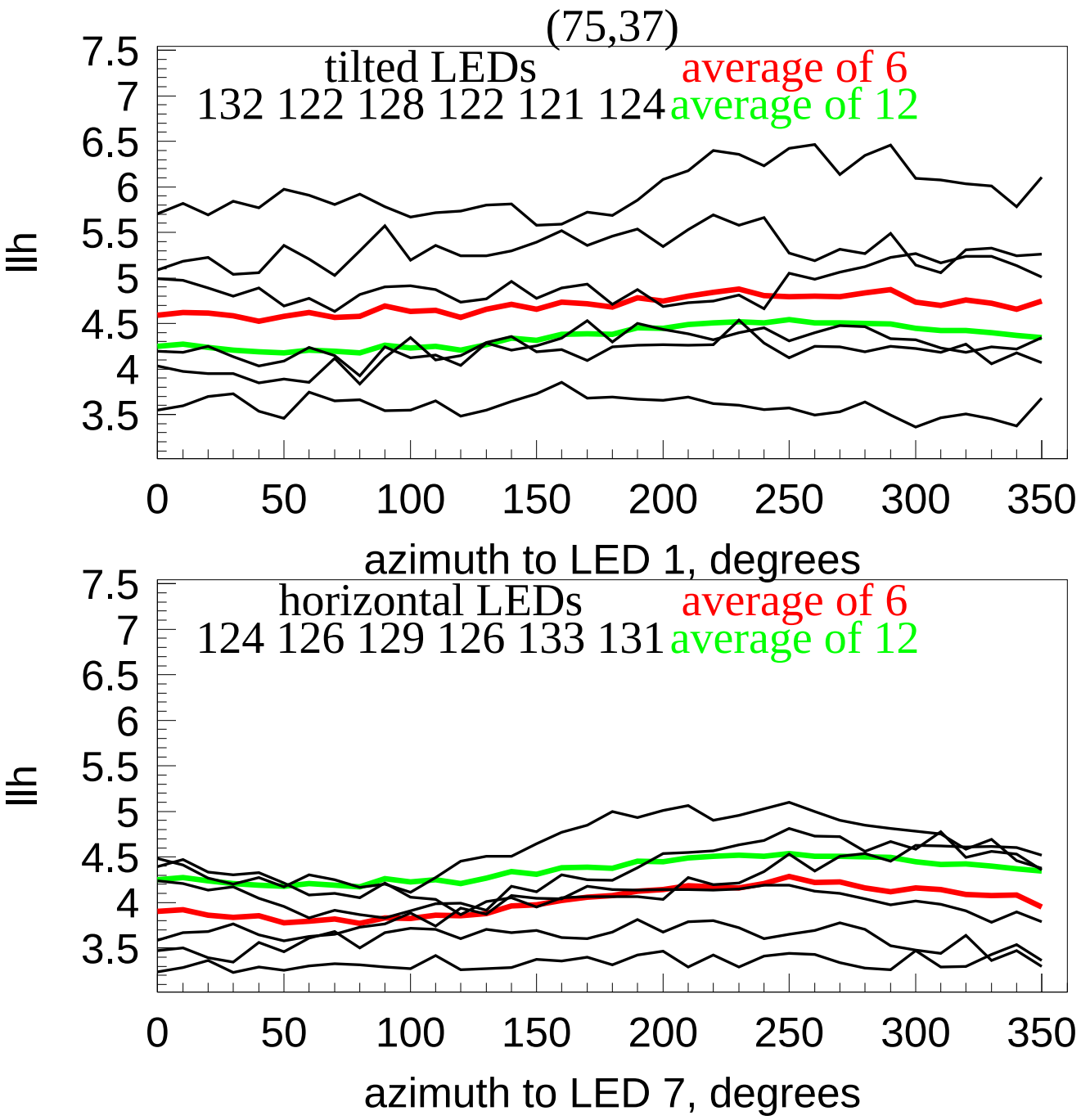

(75,35) 107.54 ± 14.78
4.02
4
3.98
3.96
3.94
3.92
3.9
3.88
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

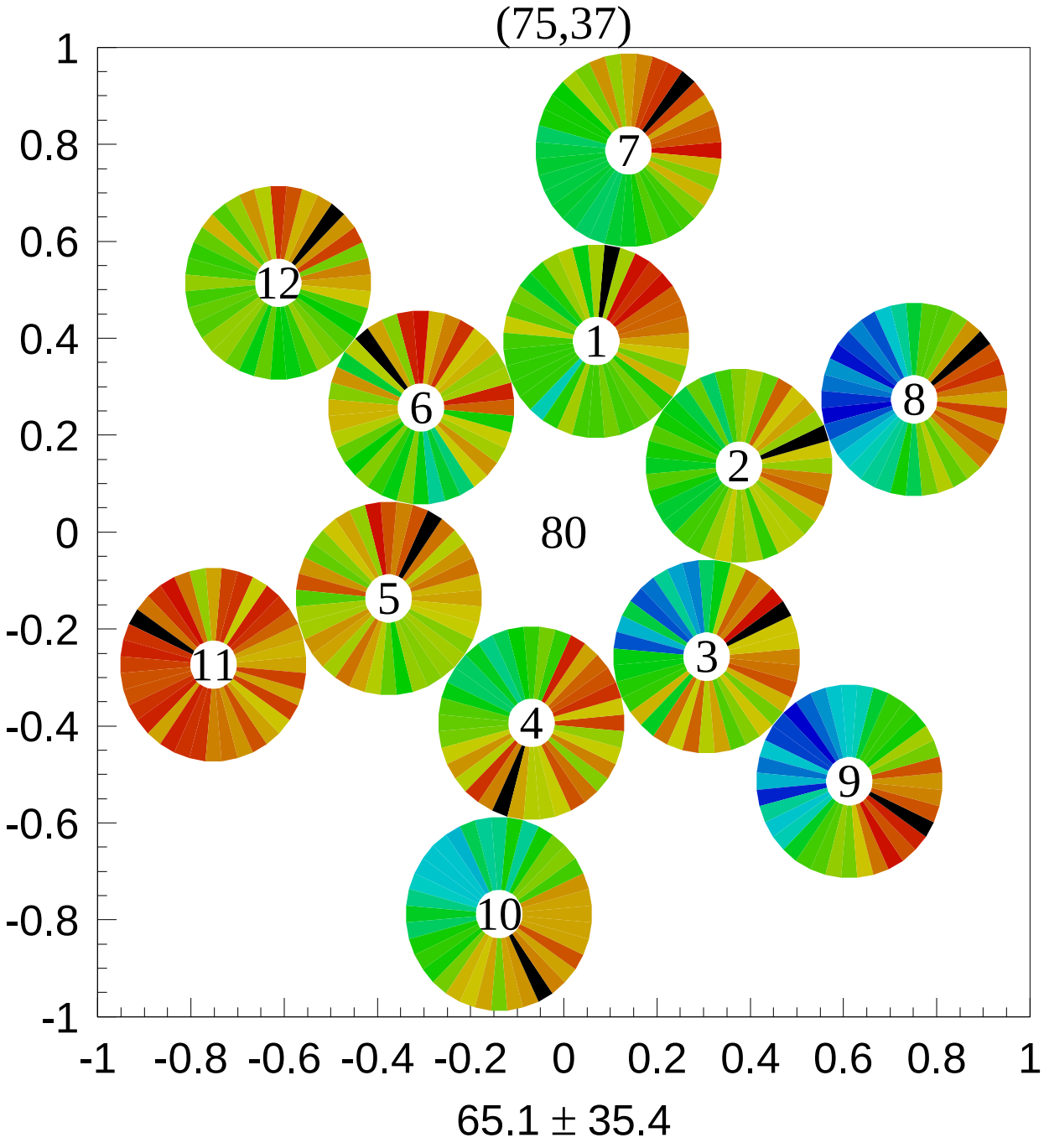

(75,36)
tilted LEDs
125 127 131 124 123 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 131 126 129 127 127
average of 6
average of 12
llh
azimuth to LED 7, degrees

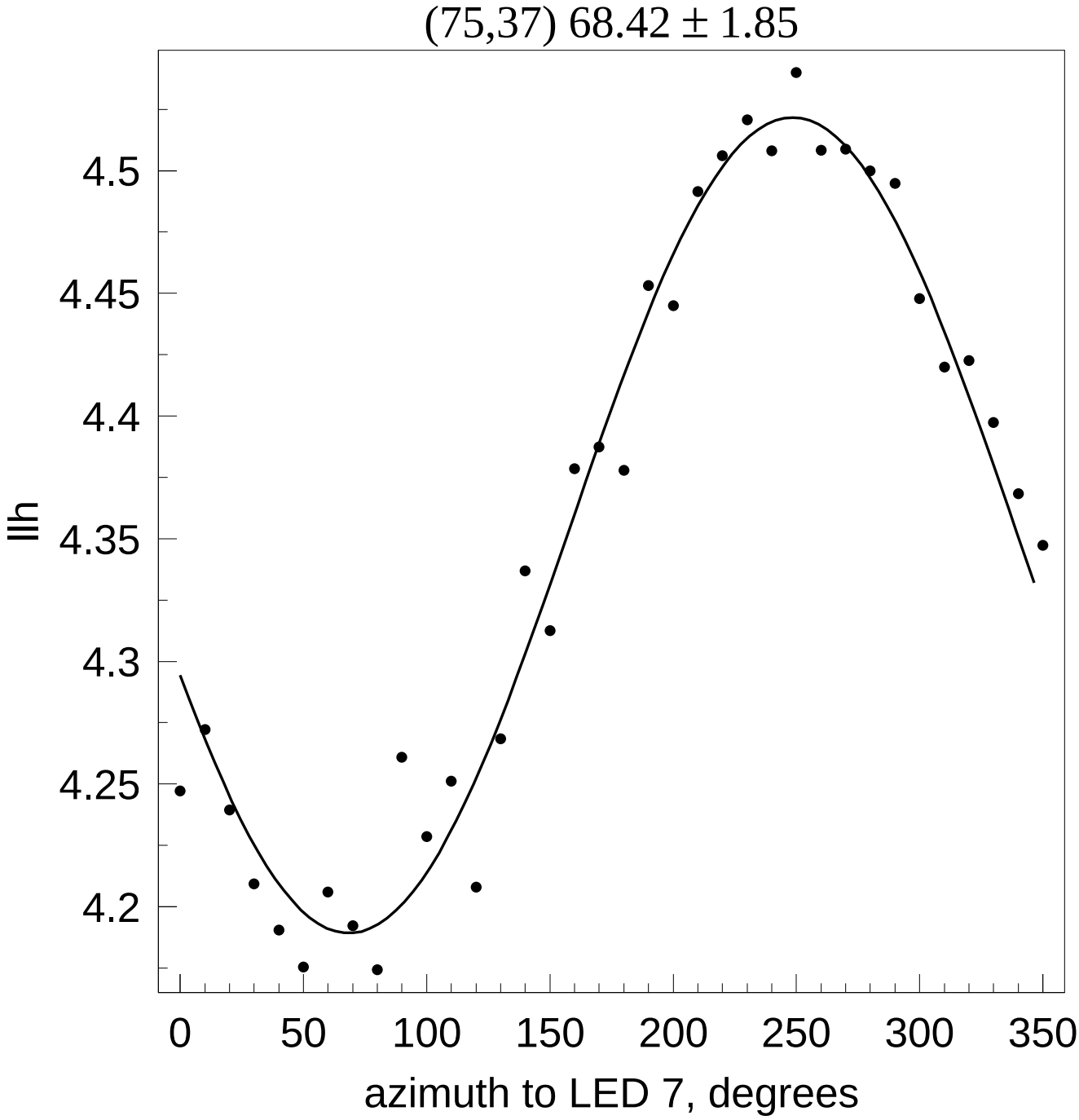

(75,36)
12
11
6
7
5
1
30
4
2
10
3
8
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
345.6 ± 192.2

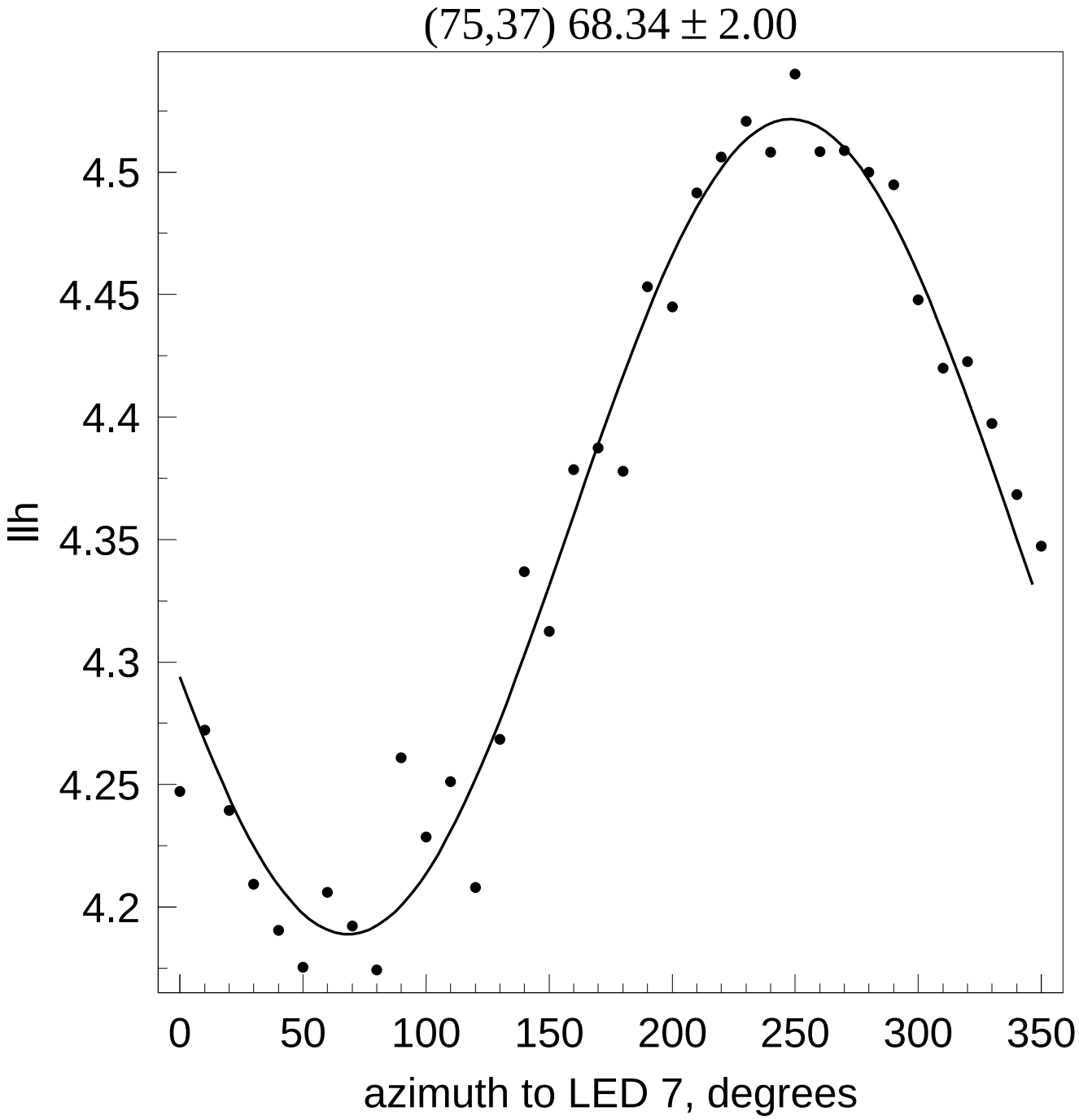

(75,36) 317.36 ± 20.11
4.6
4.58
4.56
4.54
4.52
4.5
4.48
4.46
4.44
4.42
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

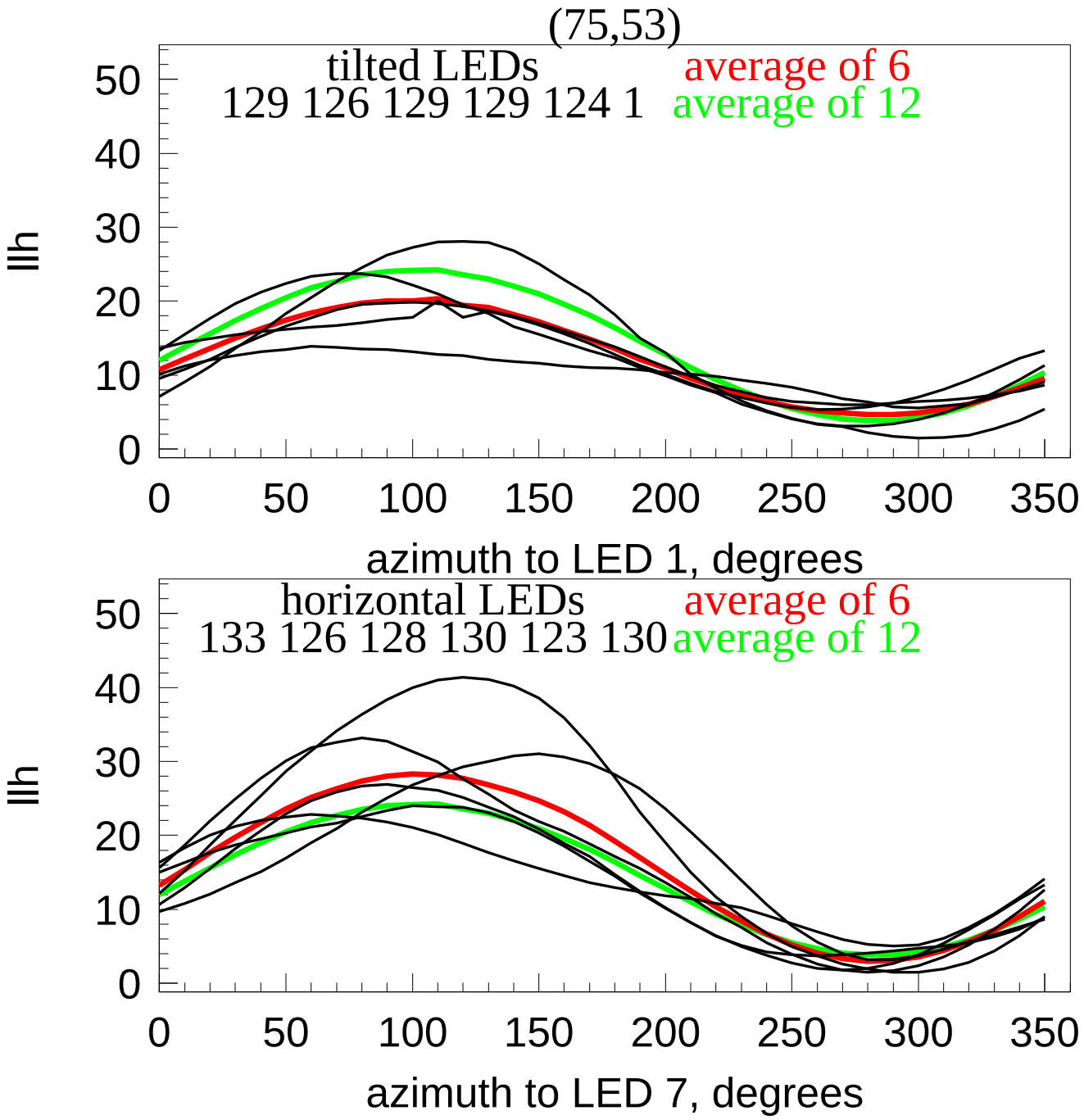

(75,36) 316.75 ± 20.00
4.6
4.58
4.56
4.54
4.52
4.5
4.48
4.46
4.44
4.42
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

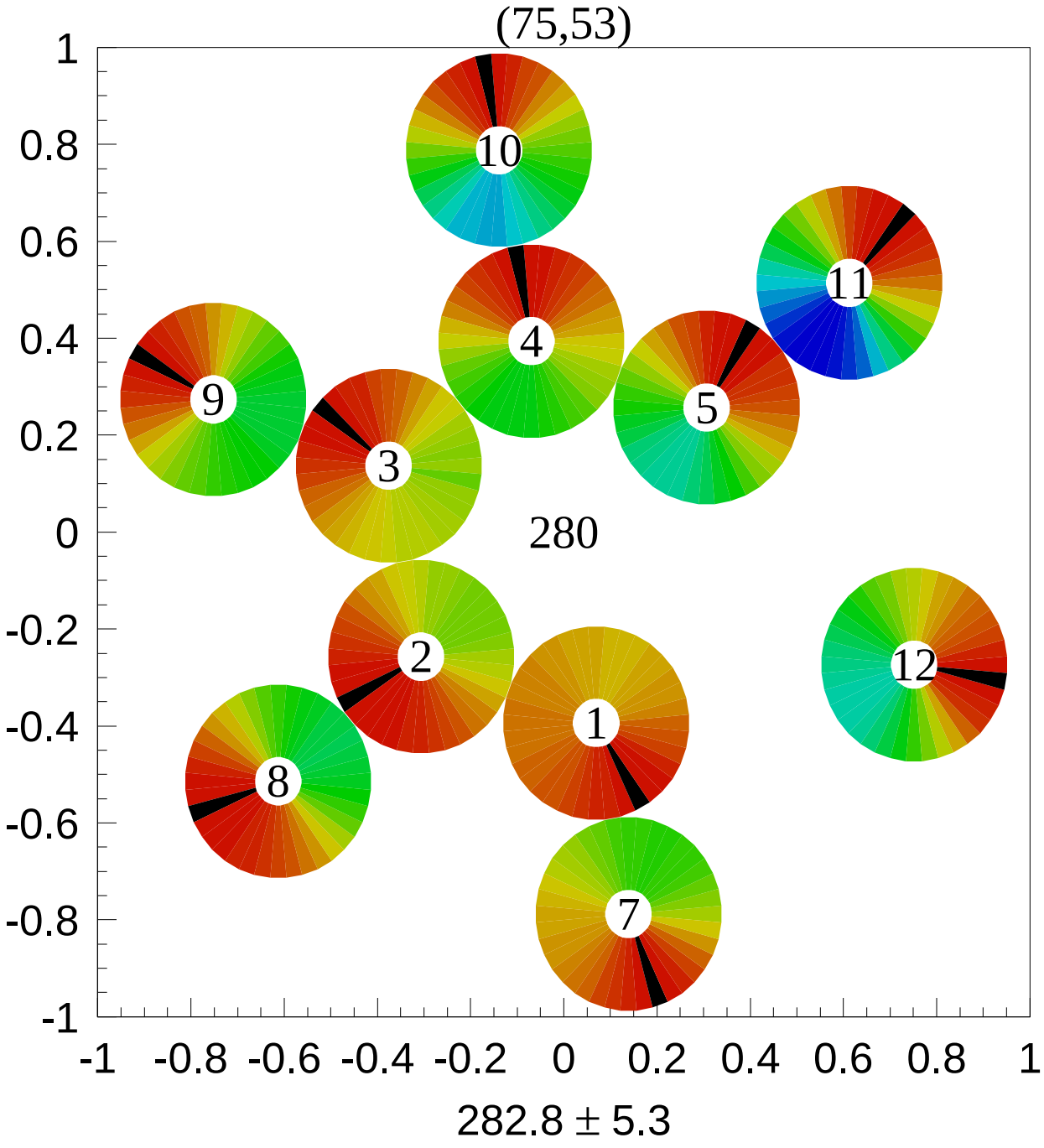

(75,37)
tilted LEDs
132 122 128 122 121 124
average of 6
average of 12
llh
7.5
7
6.5
6
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 126 129 126 133 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

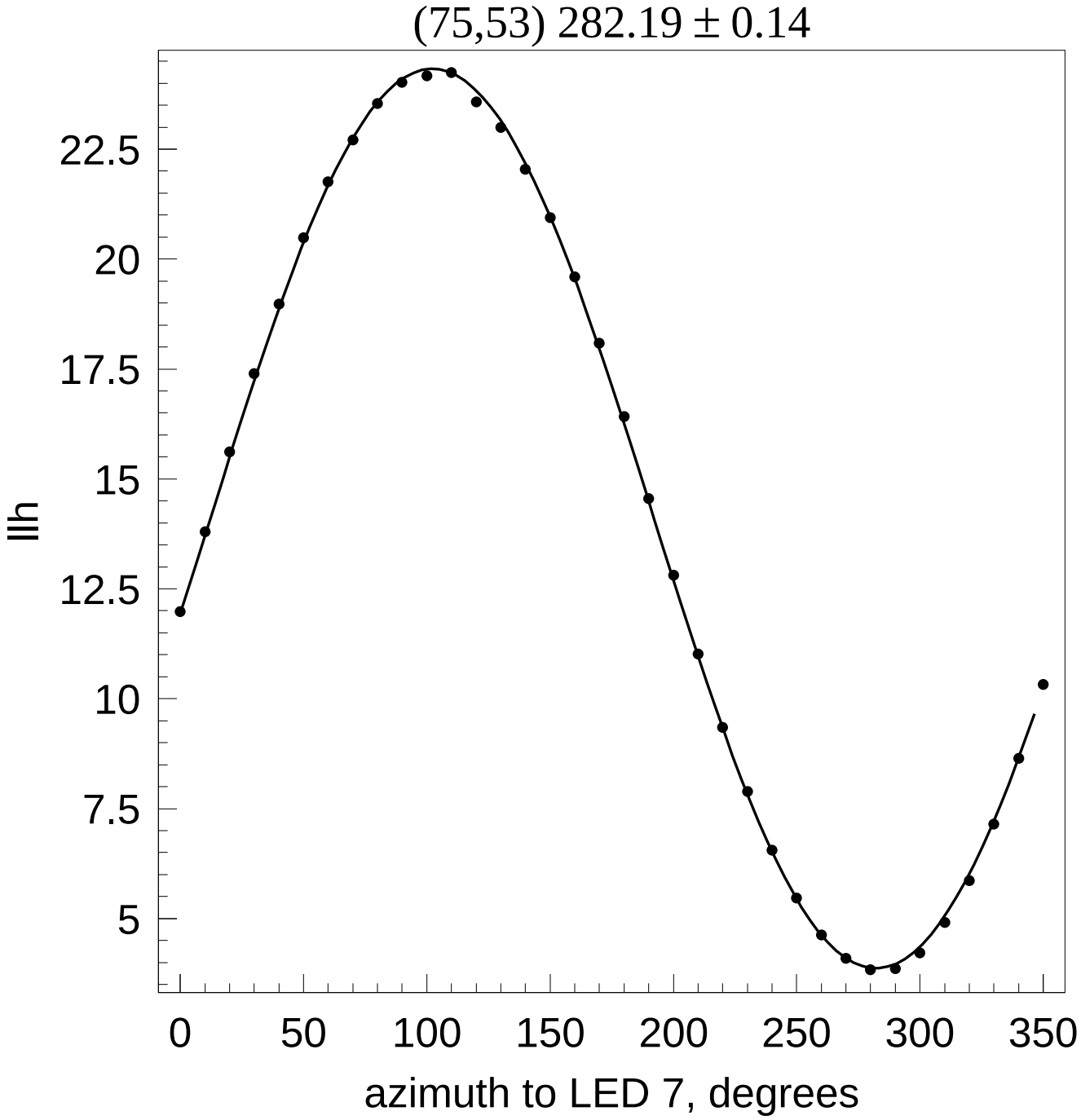

(75,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
80
5
11
3
4
9
10
65.1 ± 35.4

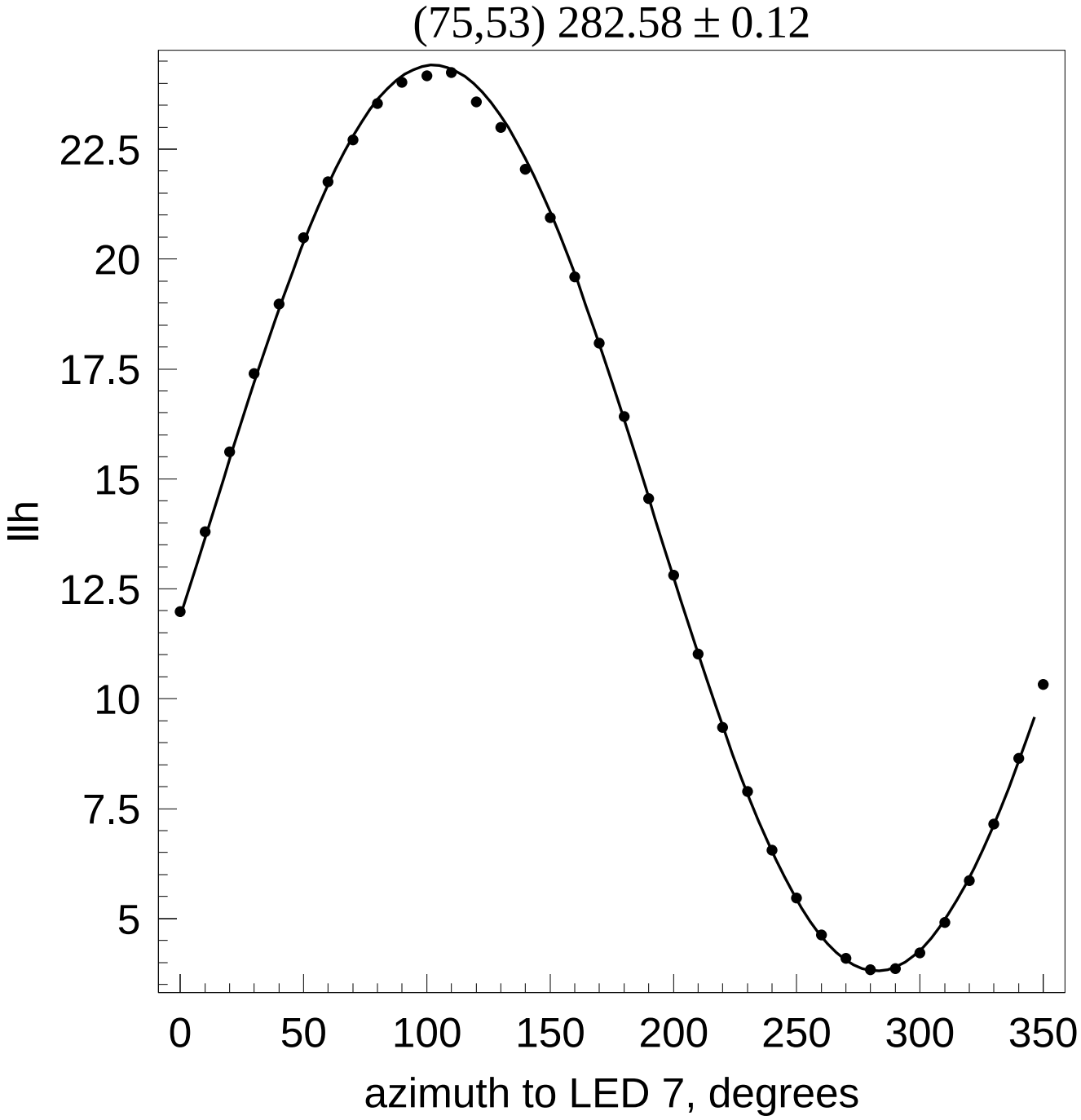

(75,37) 68.42 ± 1.85
4.5
4.45
4.4
4.35
4.3
4.25
4.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

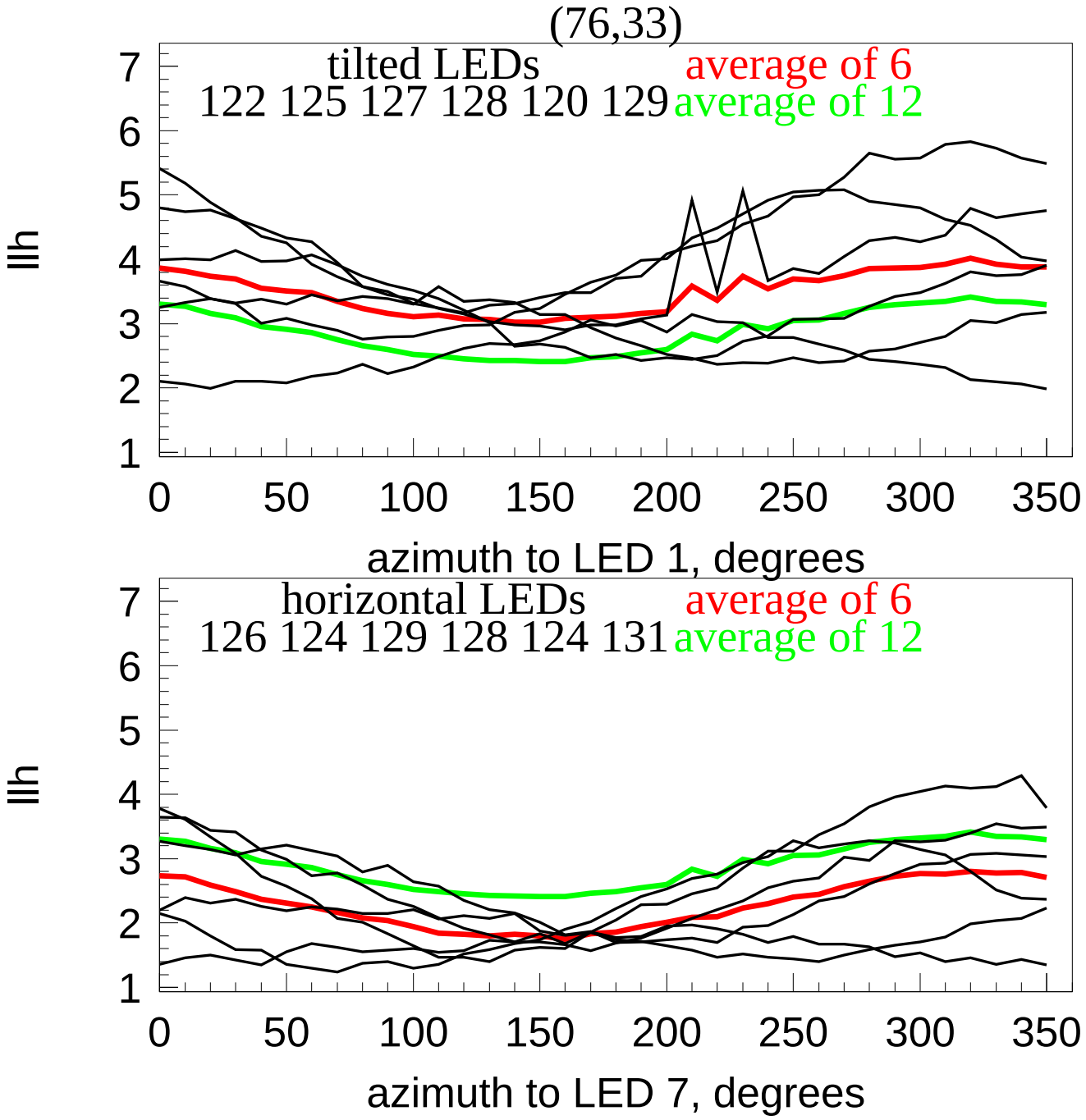

(75,37) 68.34 ± 2.00
4.5
4.45
4.4
4.35
4.3
4.25
4.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

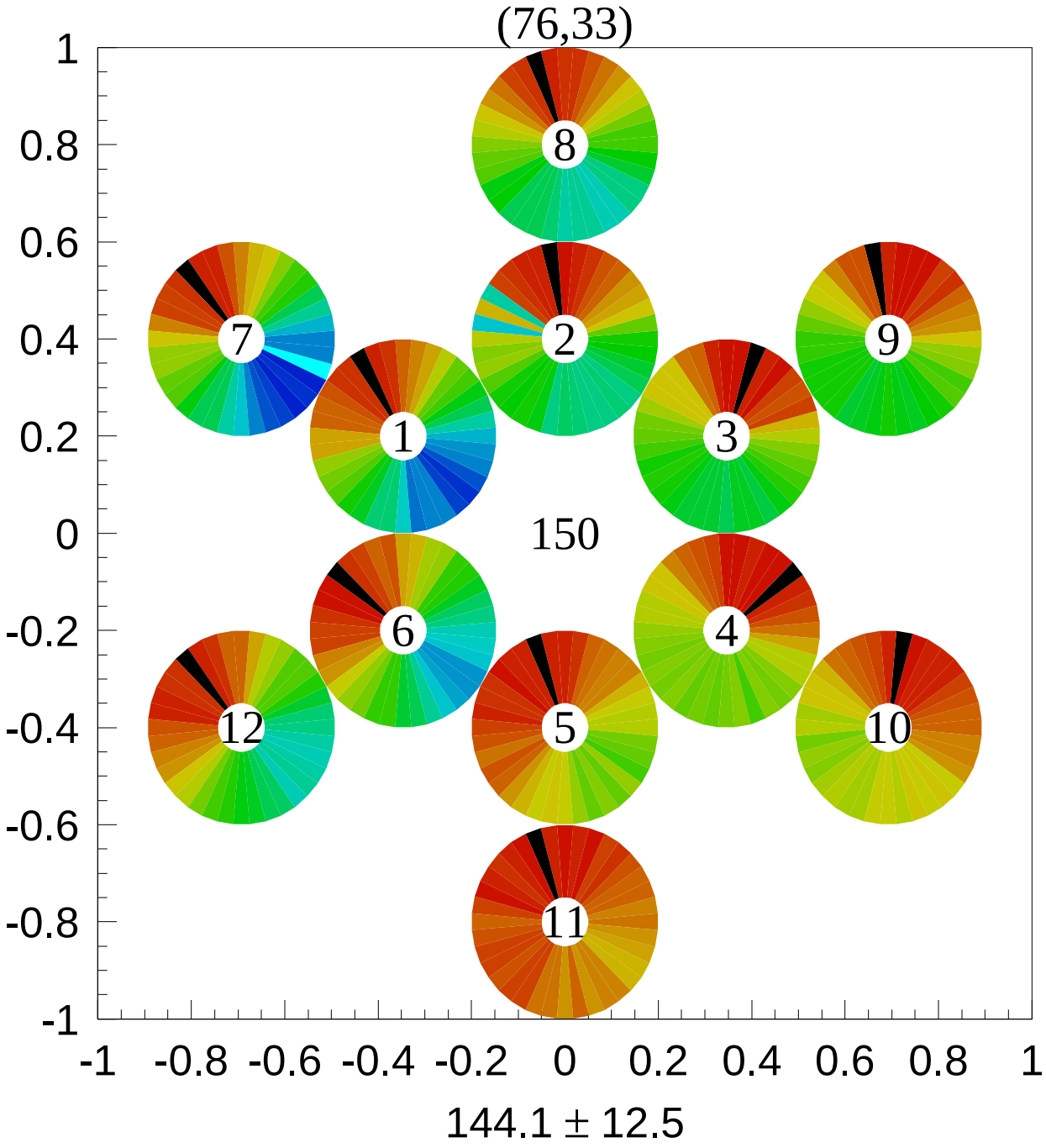

(75,53)
tilted LEDs
129 126 129 129 124 1
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
133 126 128 130 123 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

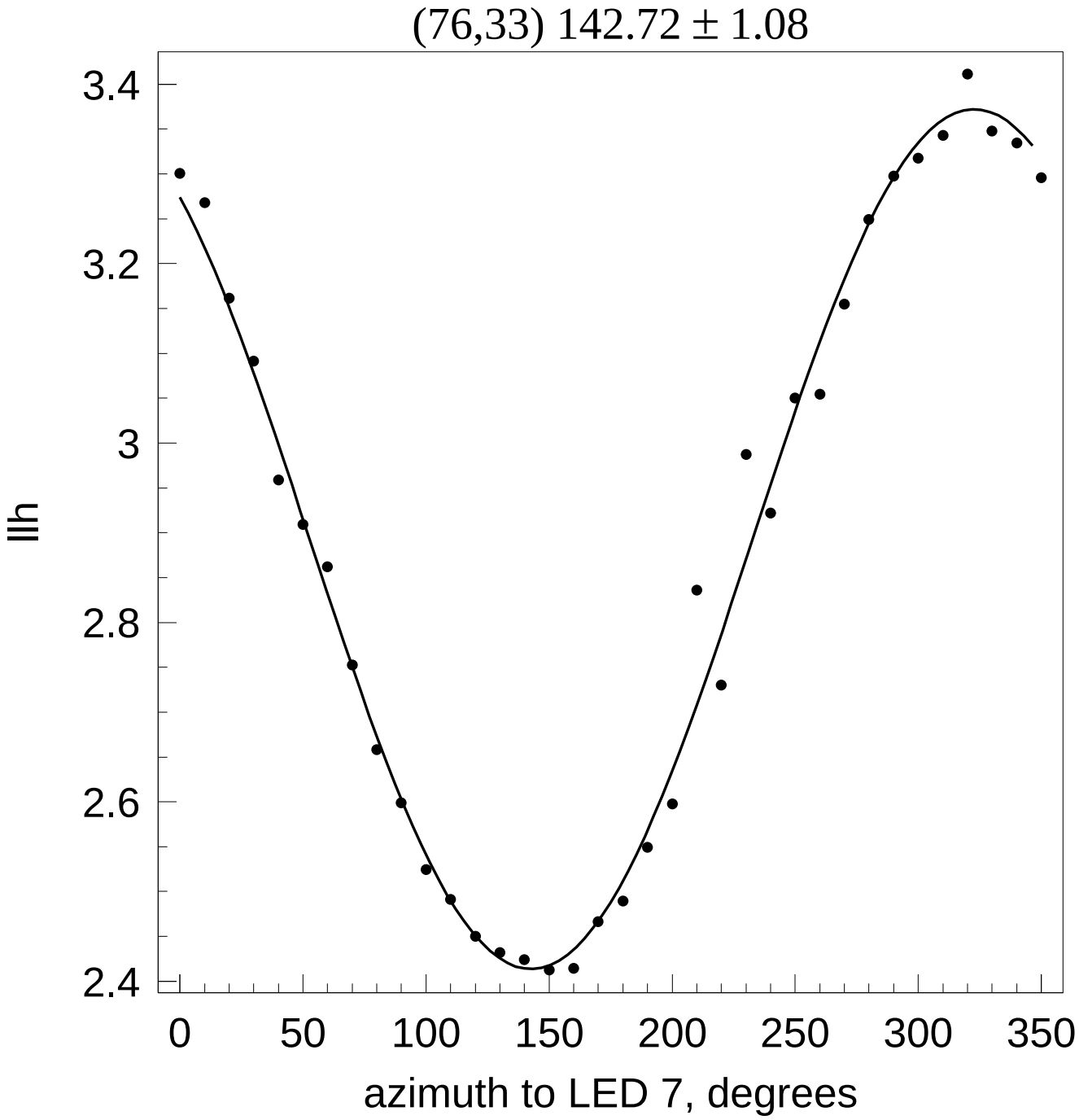

(75,53)
10
11
4
9
5
3
280
2
12
1
8
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
282.8 ± 5.3

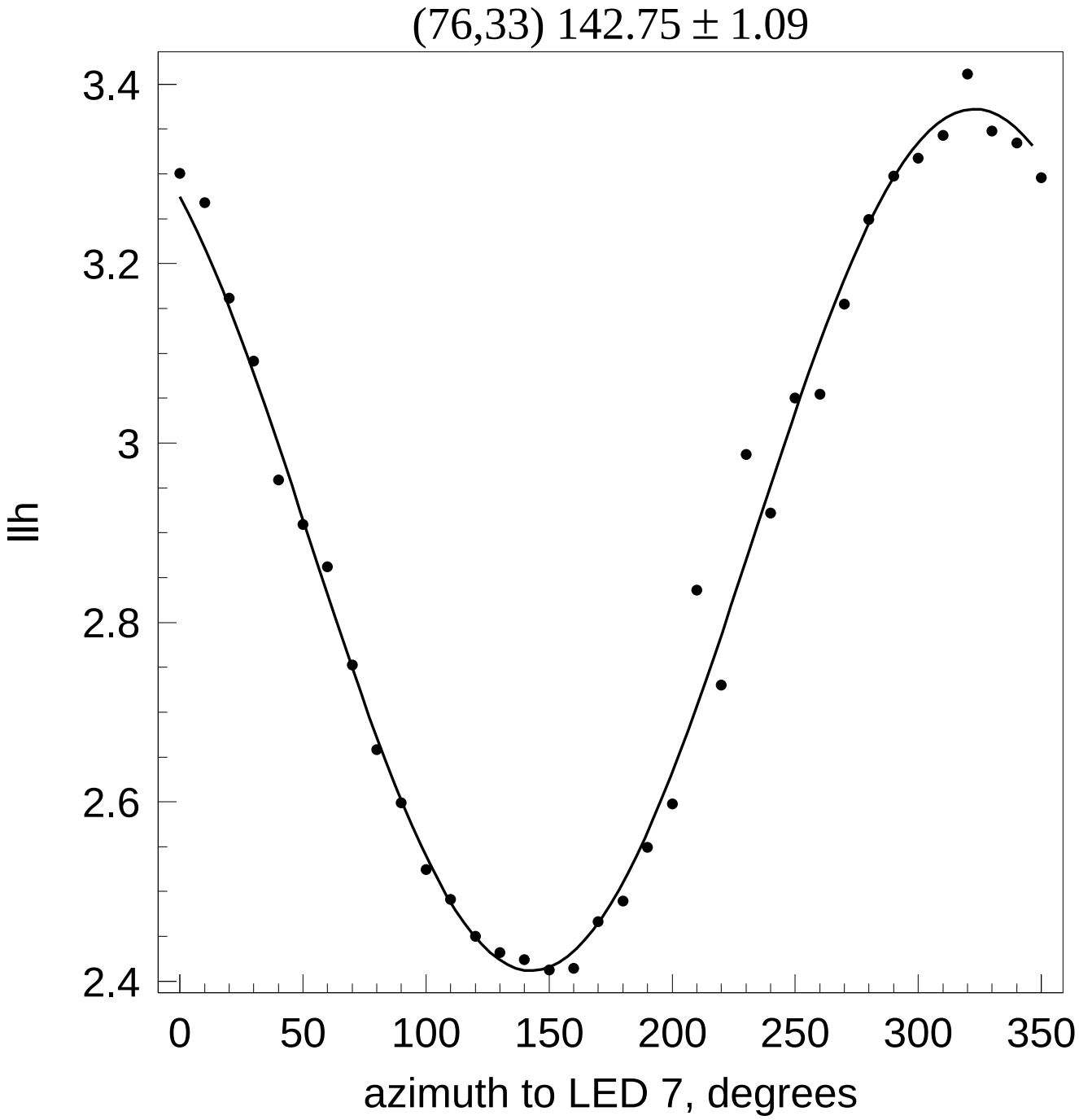

(75,53) 282.19 ± 0.14
22.5
20
17.5
15
12.5
10
7.5
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

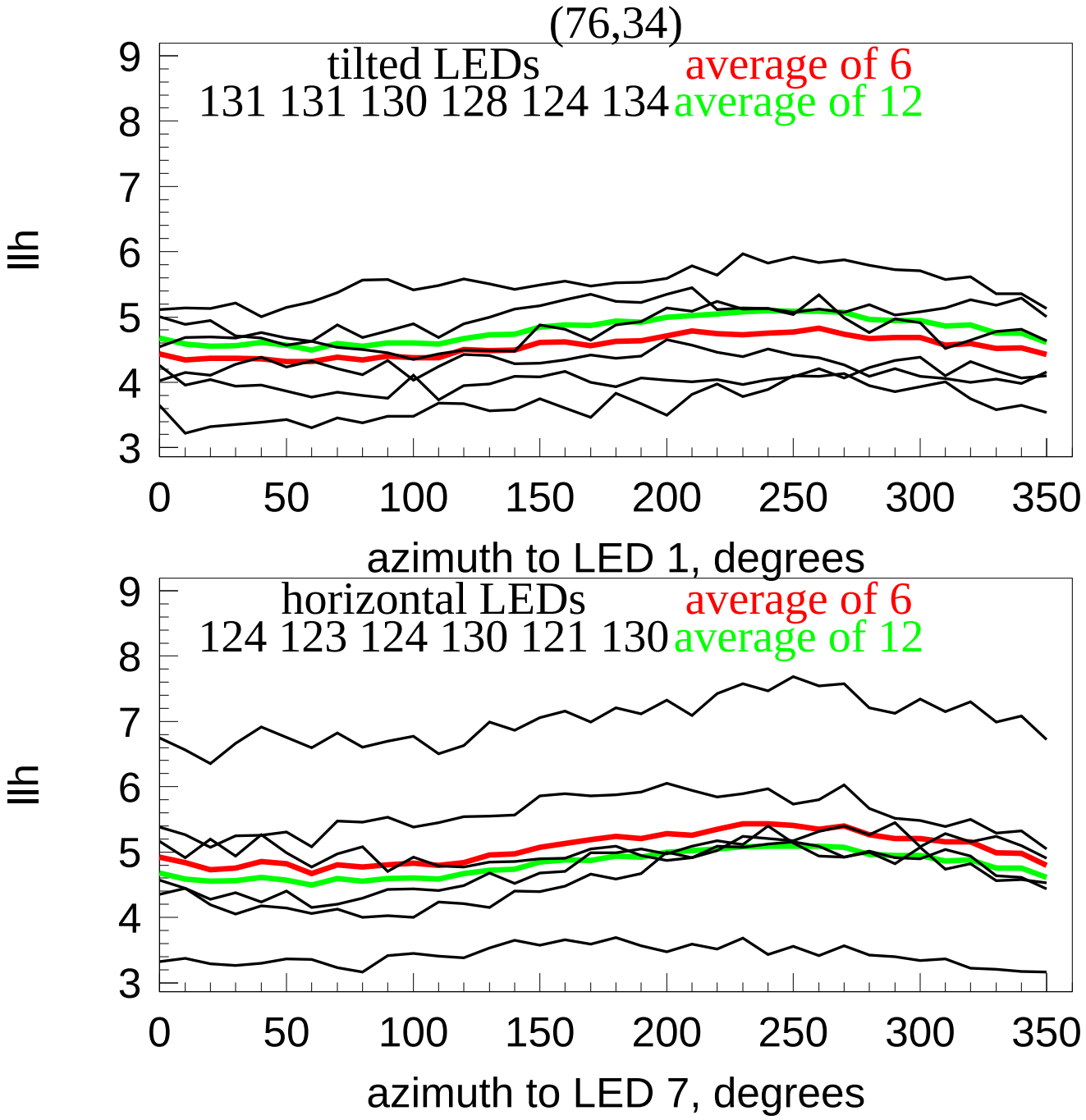

(75,53) 282.58 ± 0.12
22.5
20
17.5
15
12.5
10
7.5
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

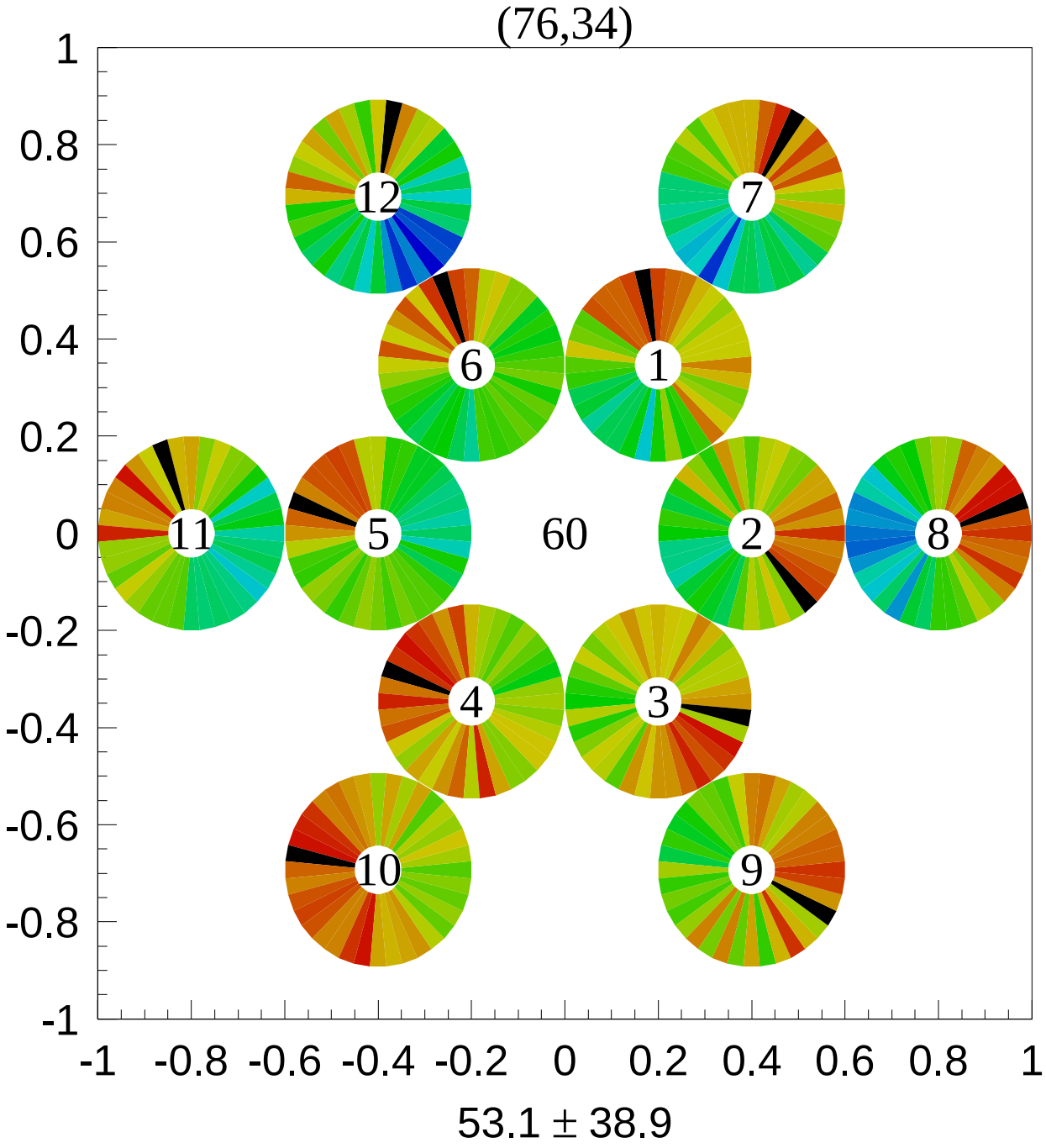

(76,33)
tilted LEDs
122 125 127 128 120 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 124 129 128 124 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

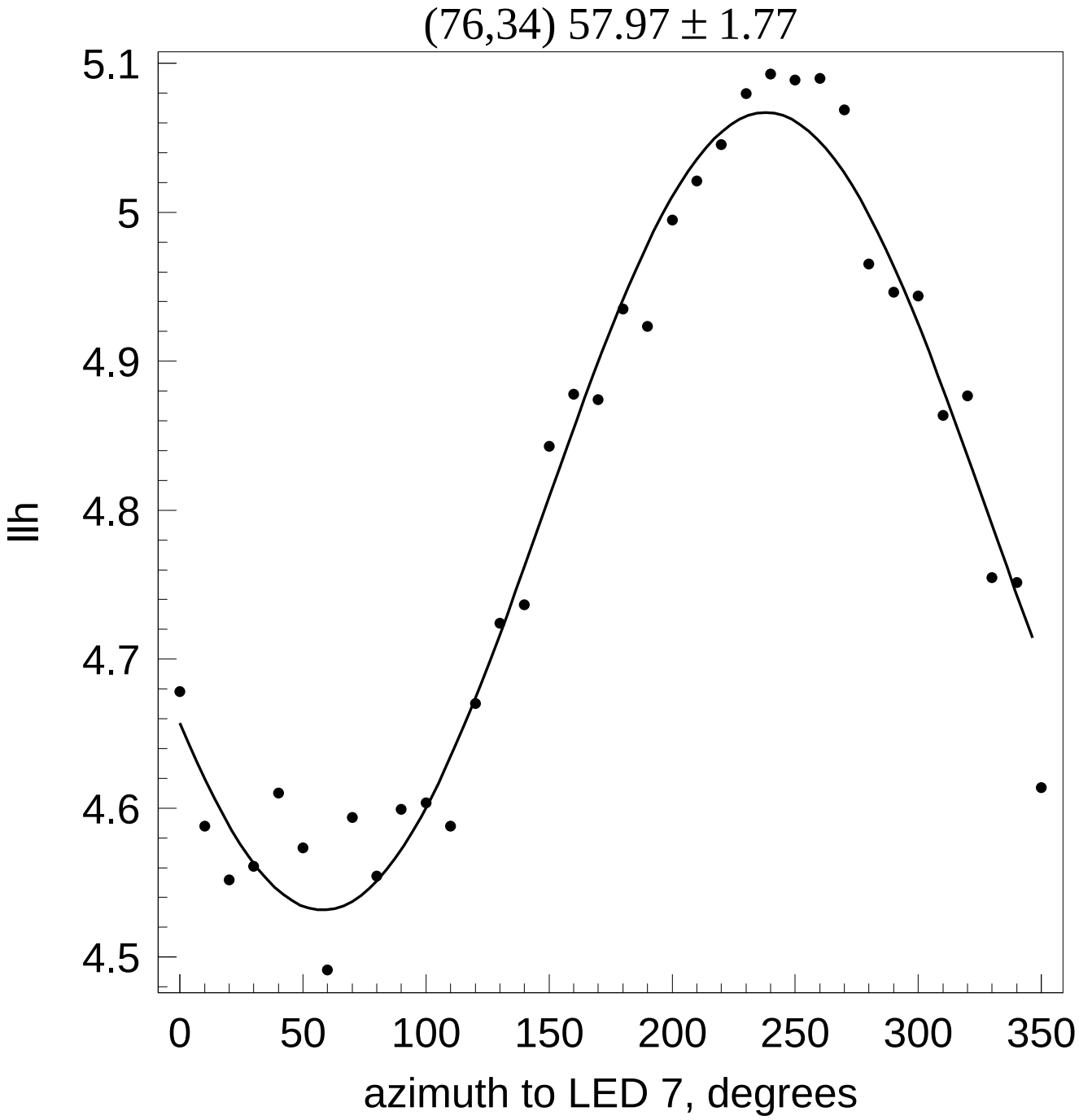

(76,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
7
2
9
1
3
150
6
4
12
5
10
11
144.1 ± 12.5

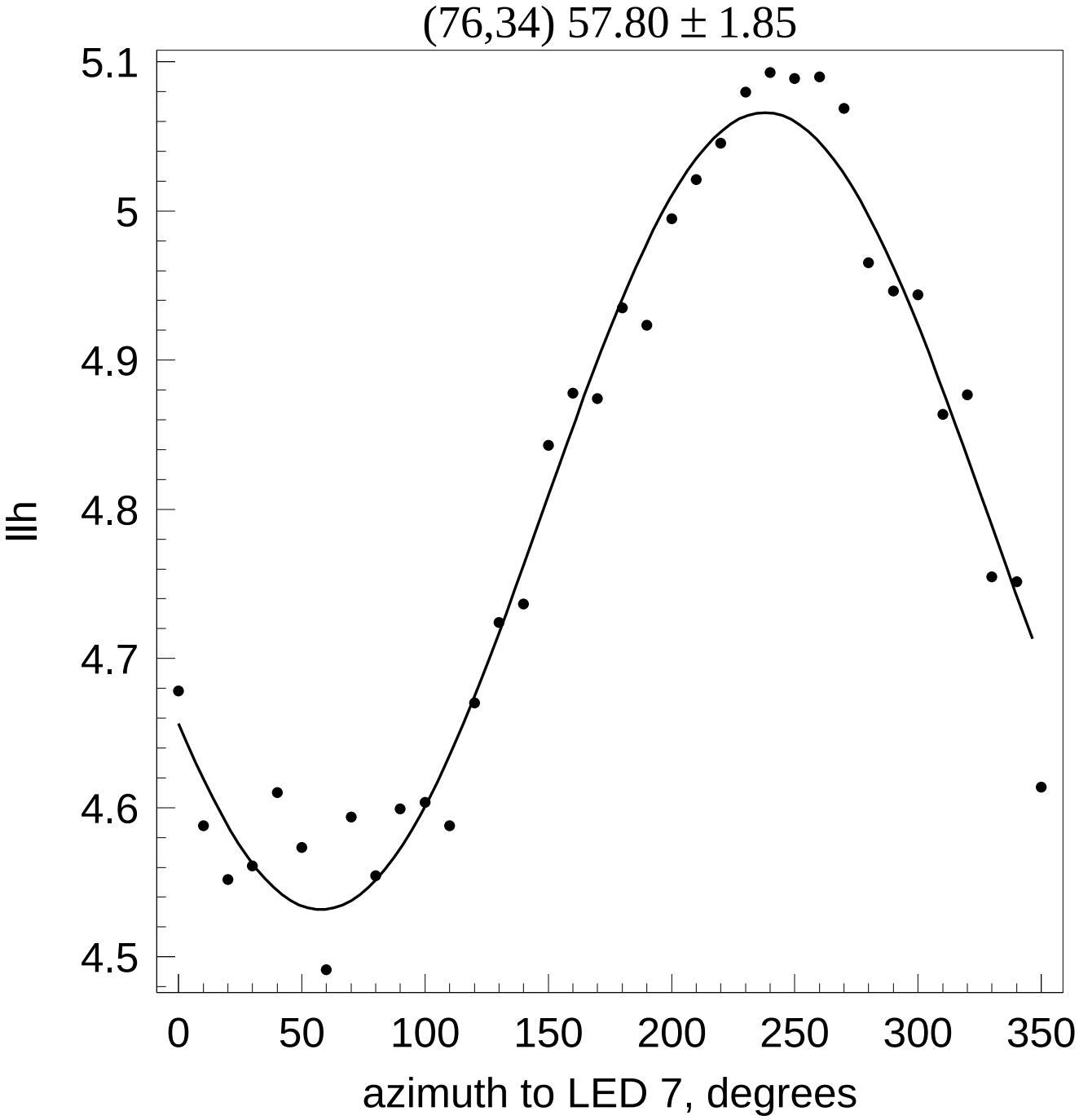

(76,33) 142.72 ± 1.08
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

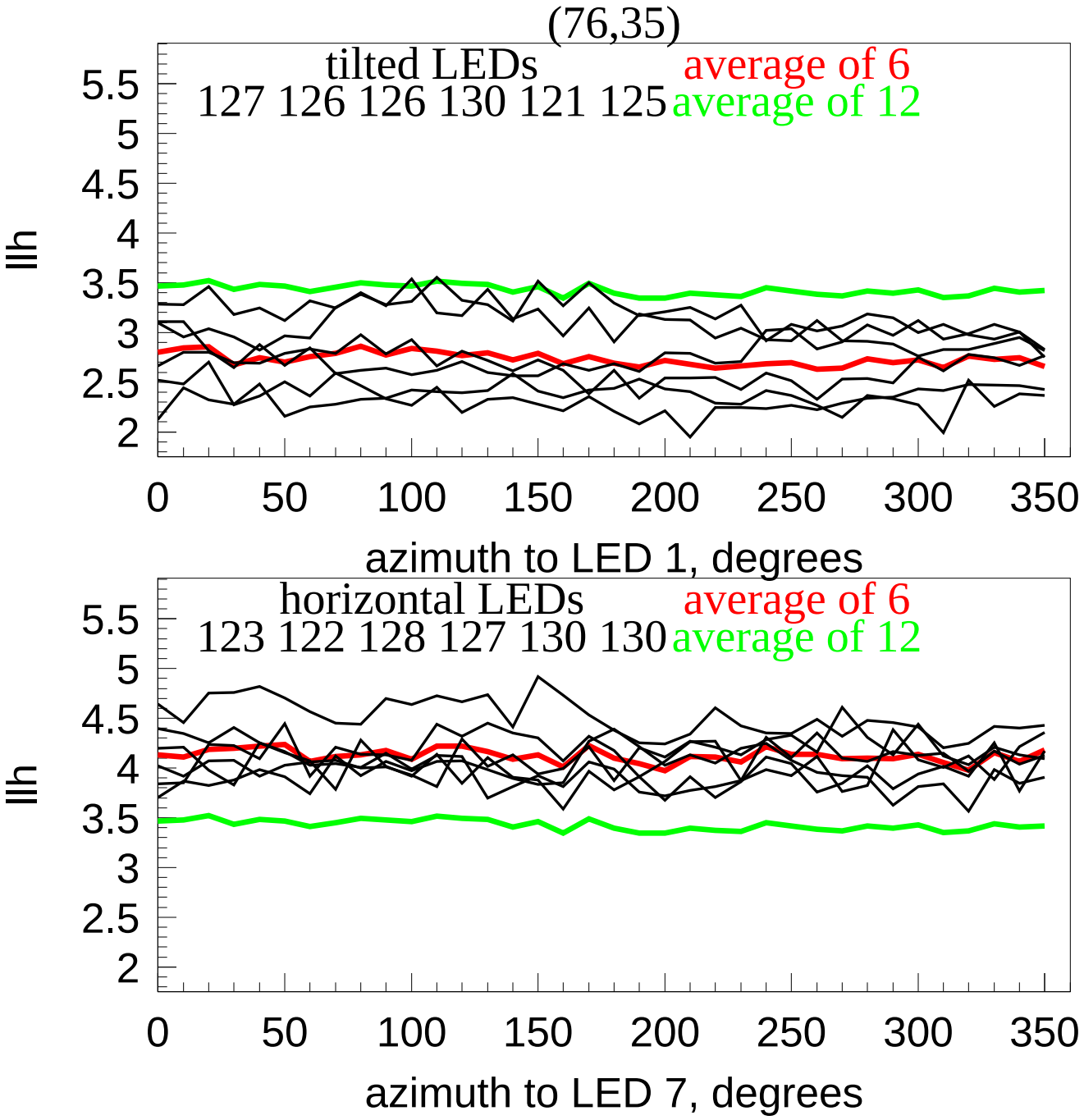

(76,33) 142.75 ± 1.09
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

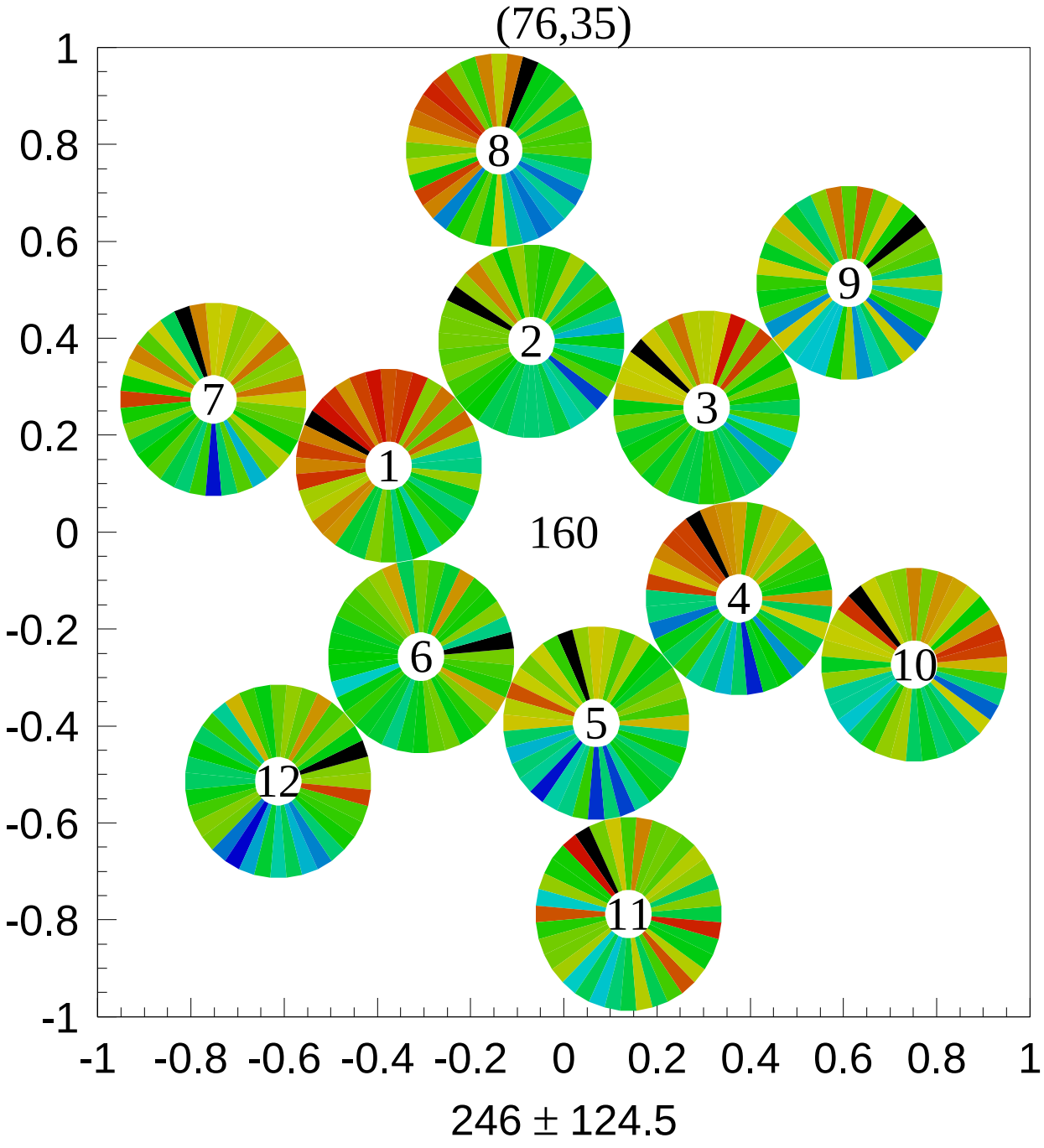

(76,34)
tilted LEDs
131 131 130 128 124 134
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 123 124 130 121 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

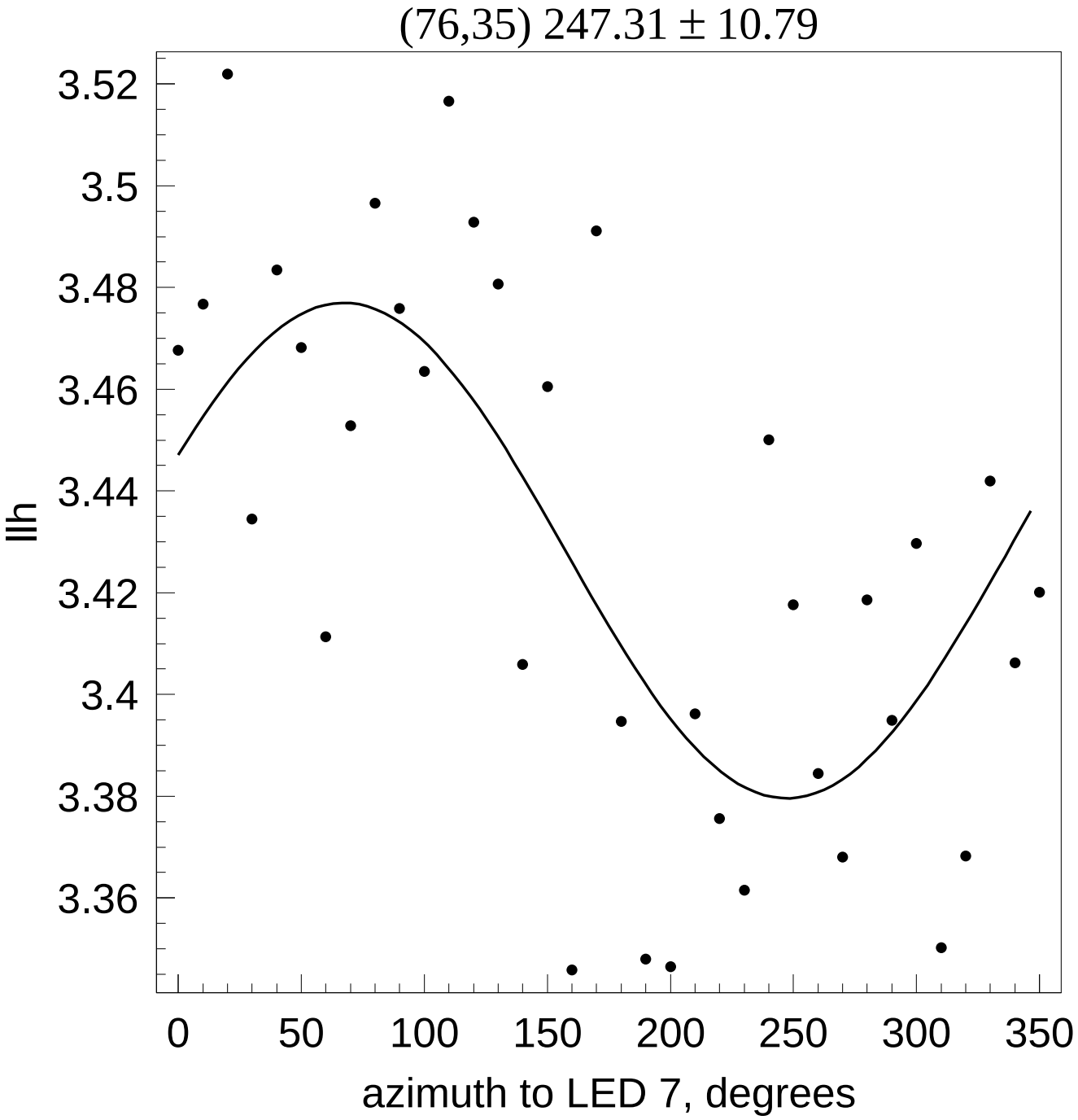

(76,34)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
11
5
60
2
8
4
3
10
9
53.1 ± 38.9

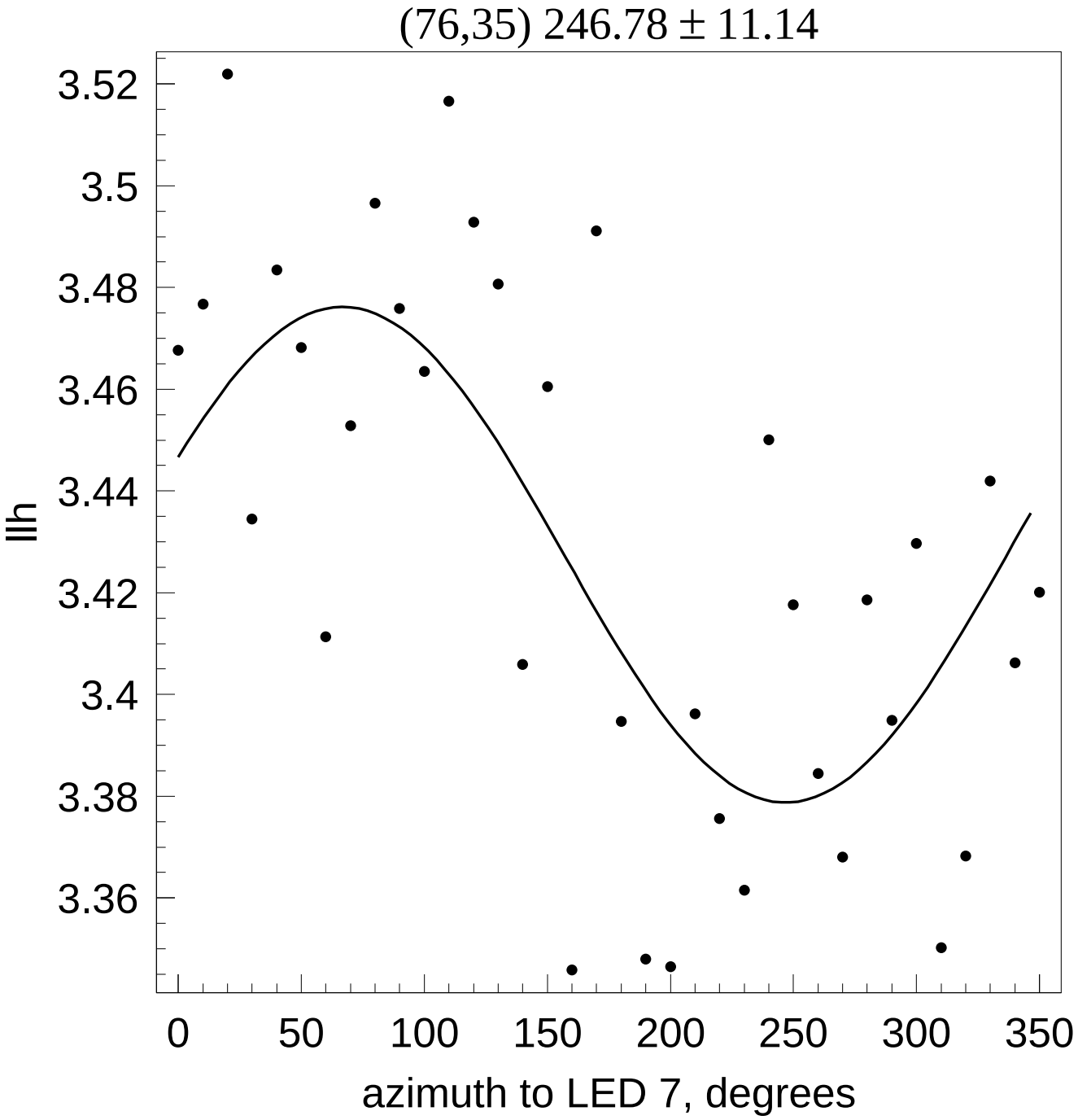

(76,34) 57.97 ± 1.77
5.1
5
4.9
4.8
4.7
4.6
4.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

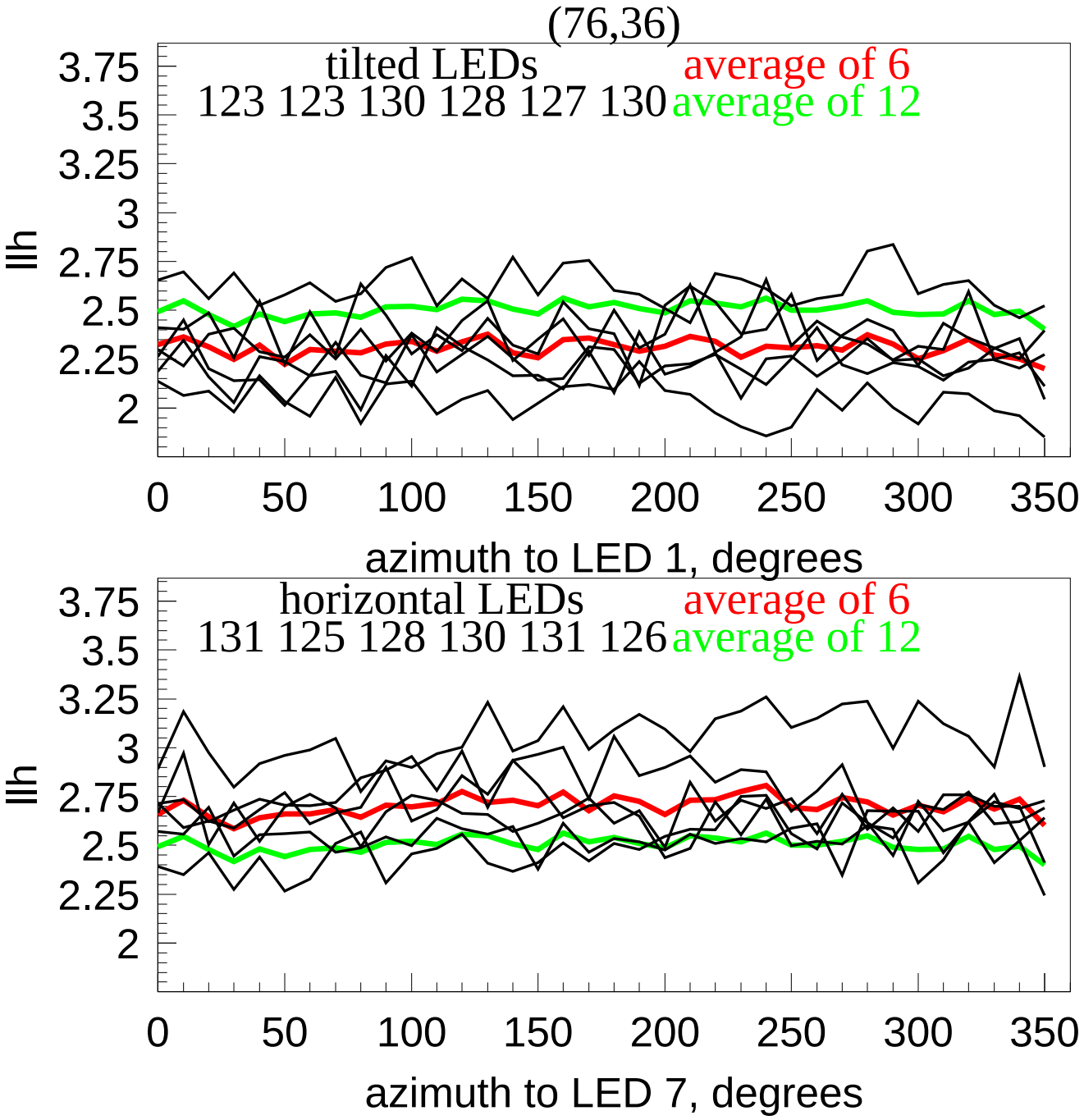

(76,34) 57.80 ± 1.85
5.1
5
4.9
4.8
4.7
4.6
4.5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

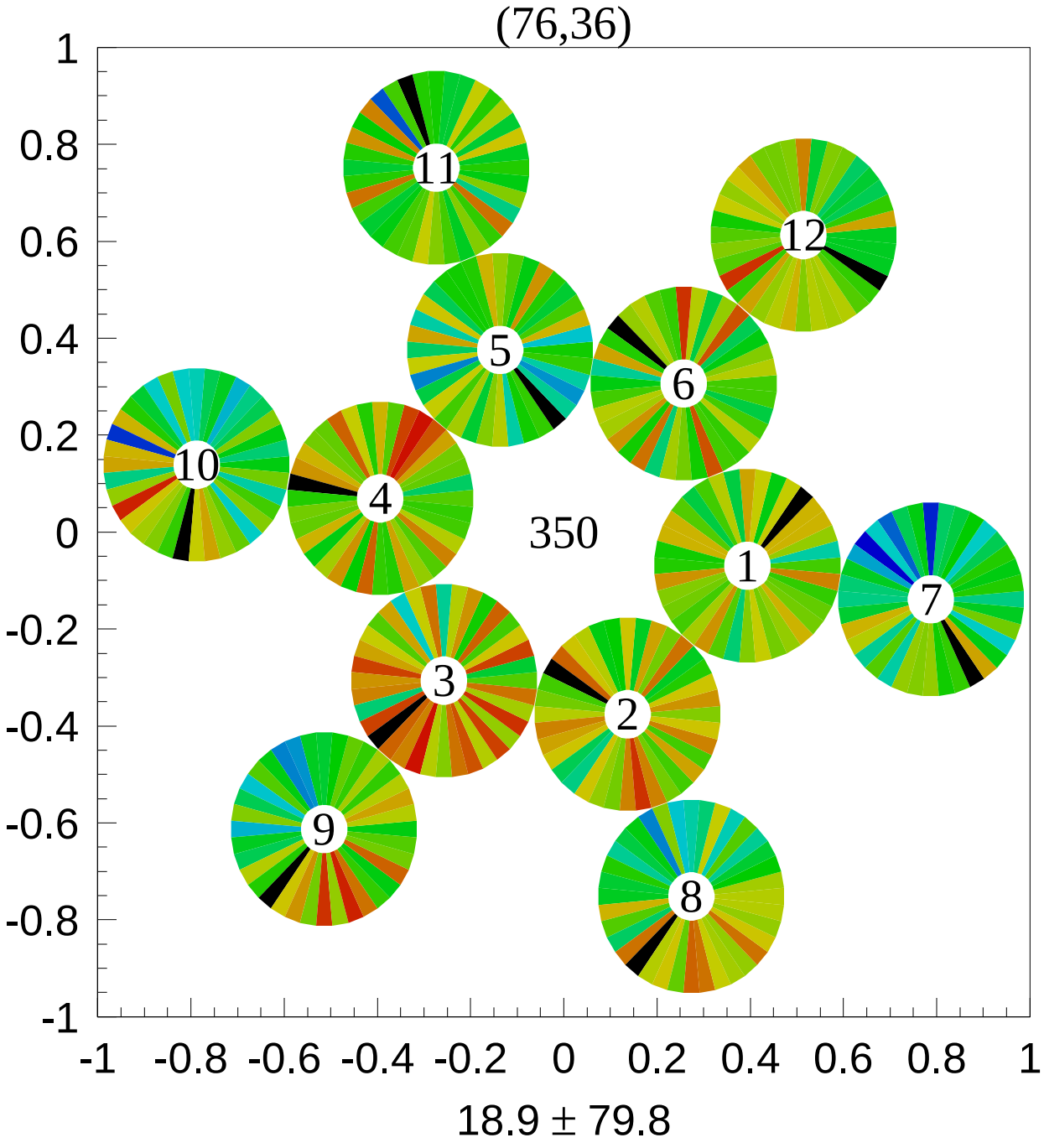

(76,35)
tilted LEDs
127 126 126 130 121 125
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
123 122 128 127 130 130
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

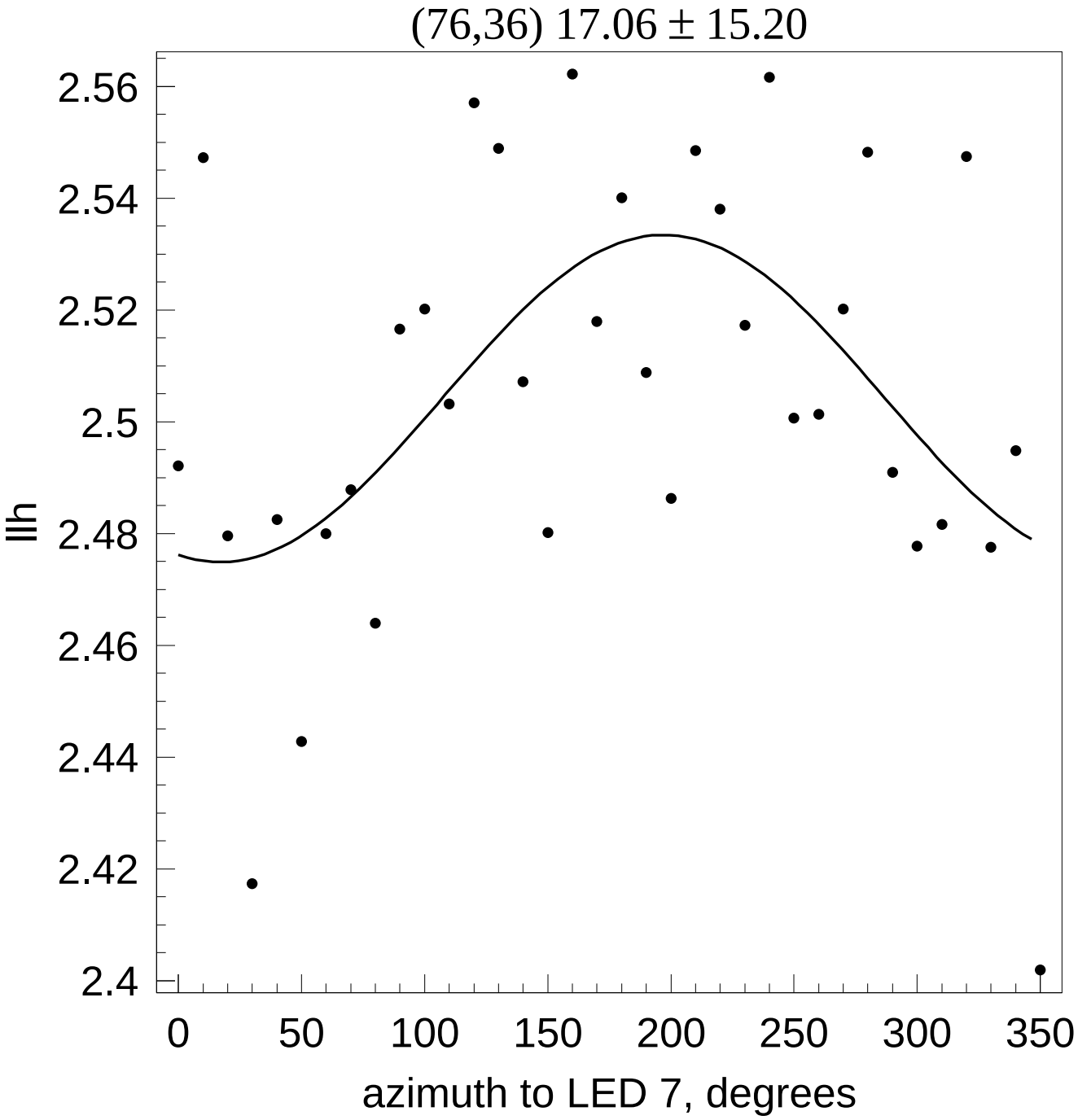

(76,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
9
2
7
3
1
160
4
10
6
5
12
11
246 ± 124.5

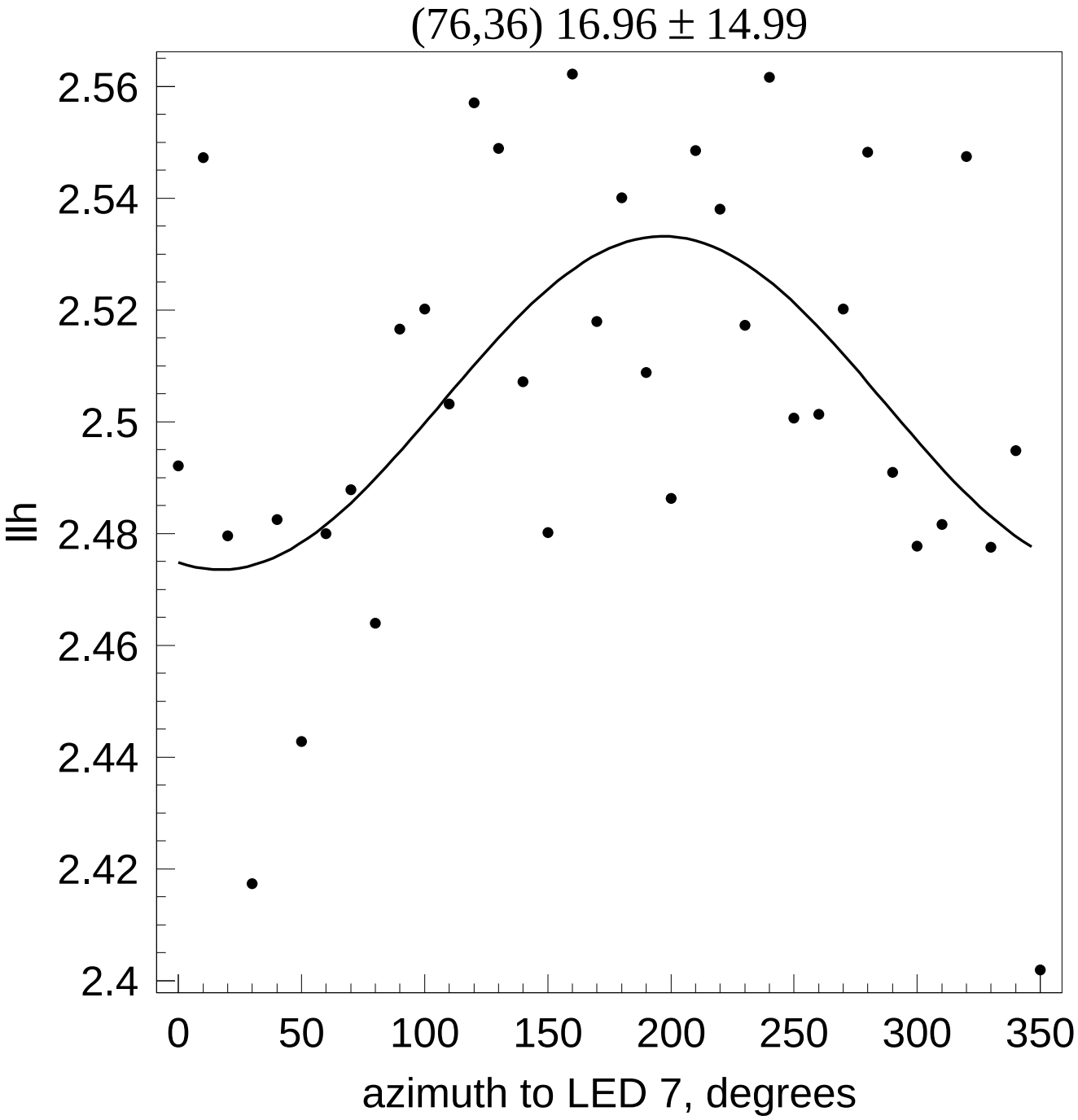

(76,35) 247.31 ± 10.79
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
3.36
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

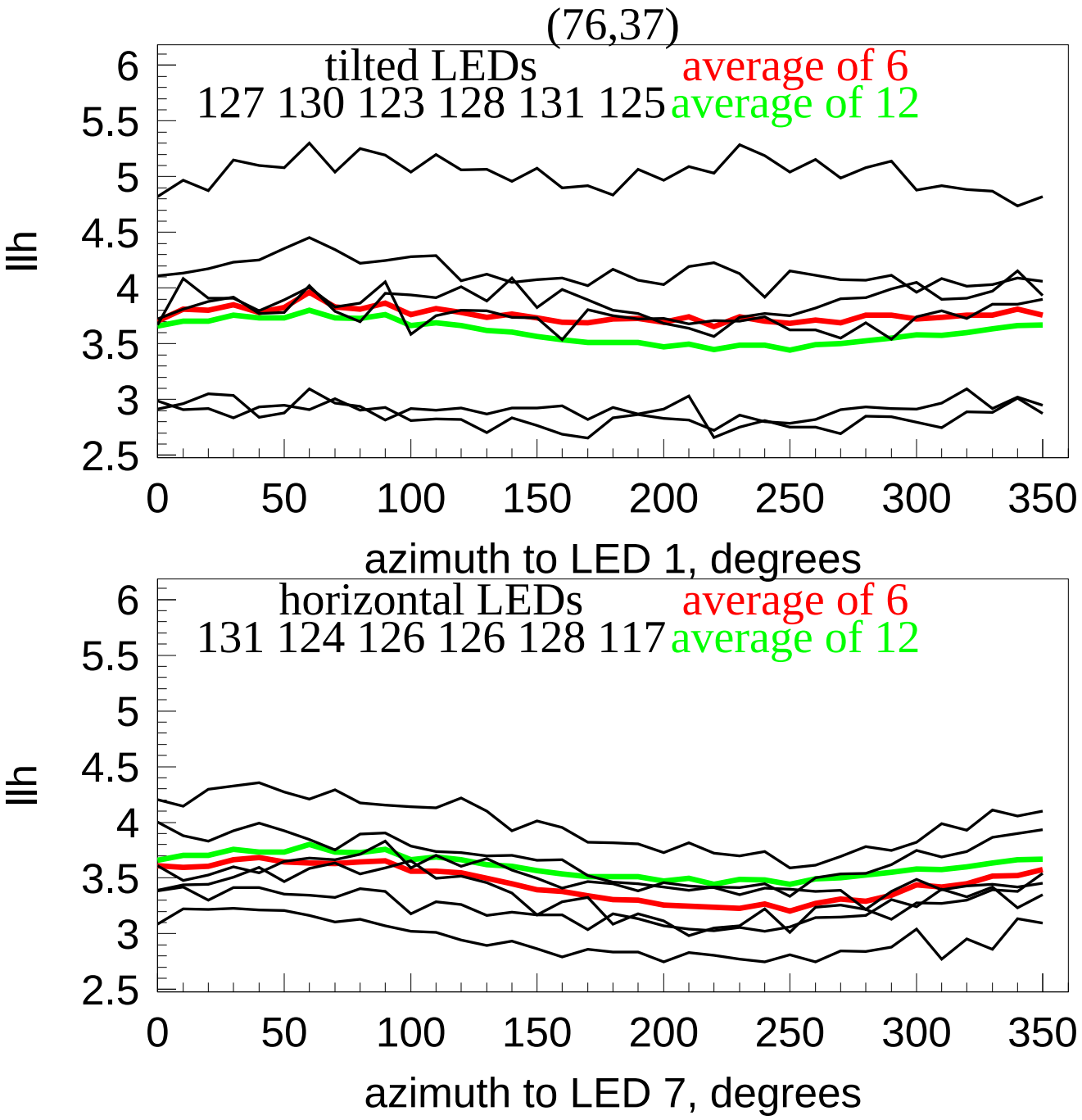

(76,35) 246.78 ± 11.14
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
3.36
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

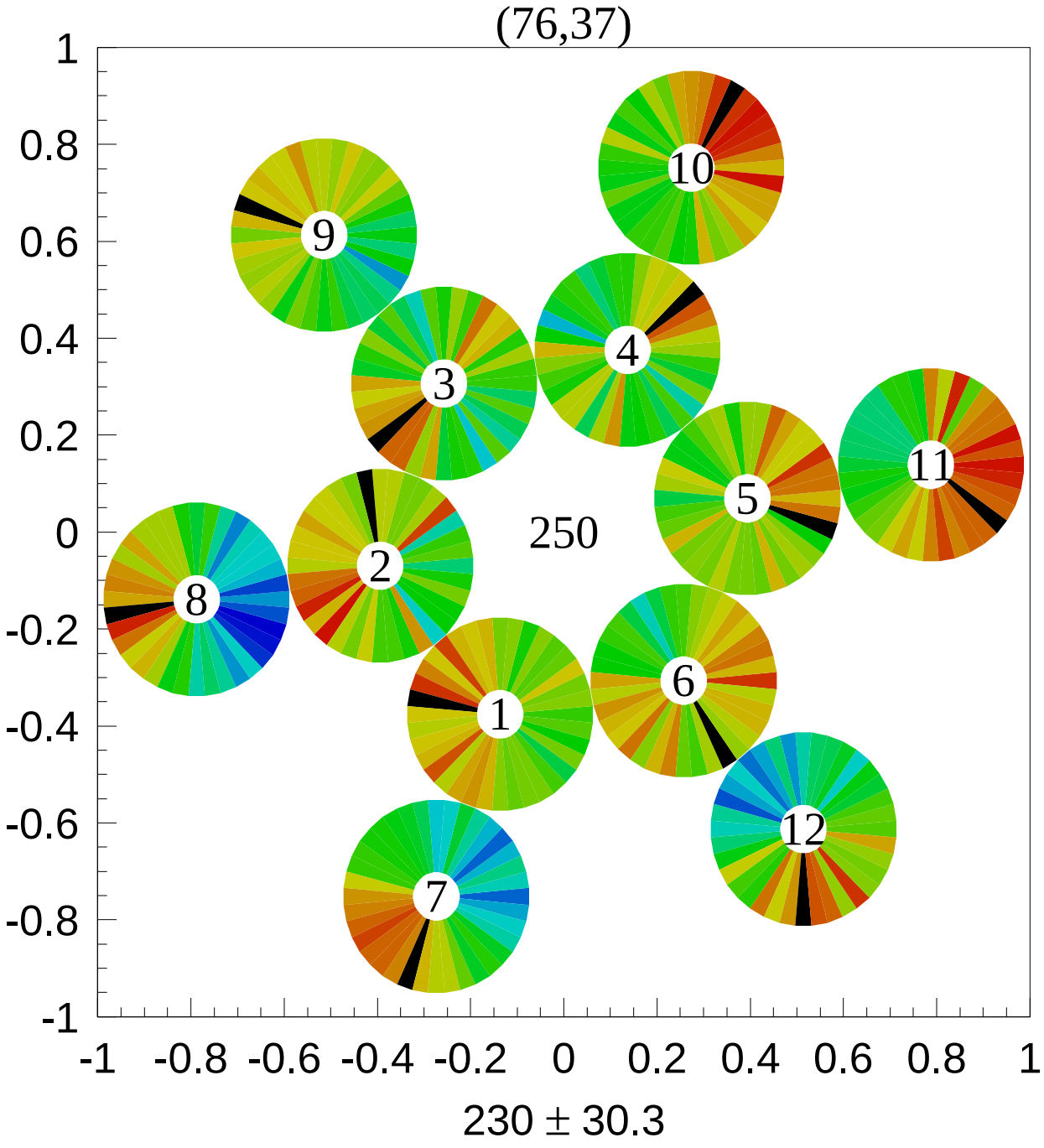

(76,36)
tilted LEDs
123 123 130 128 127 130
average of 6
average of 12
IIh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 125 128 130 131 126
average of 6
average of 12
IIh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

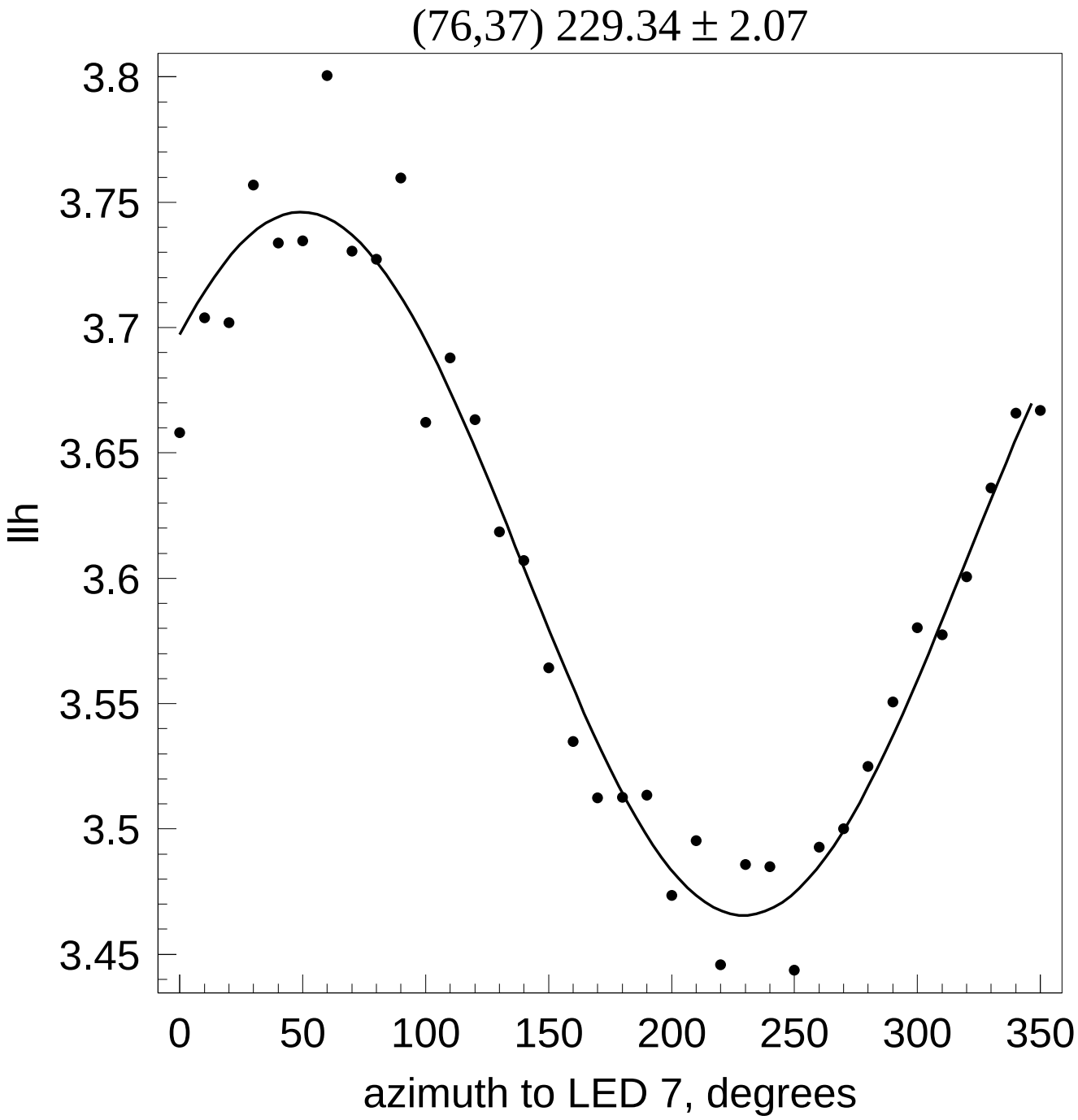

(76,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
350
1
7
3
2
9
8
18.9 ± 79.8

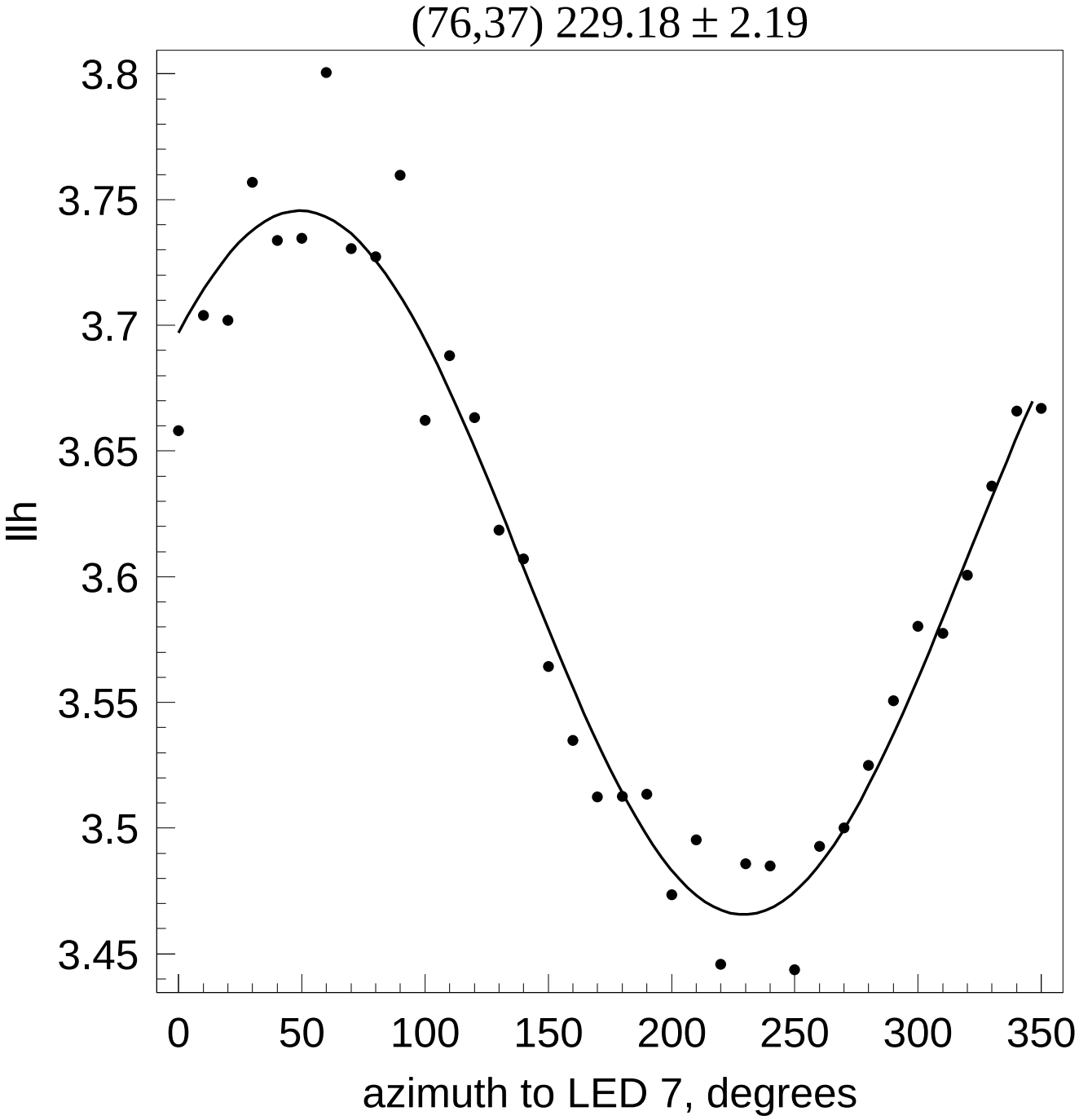

(76,36) 17.06 ± 15.20
2.56
2.54
2.52
2.5
2.48
2.46
2.44
2.42
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

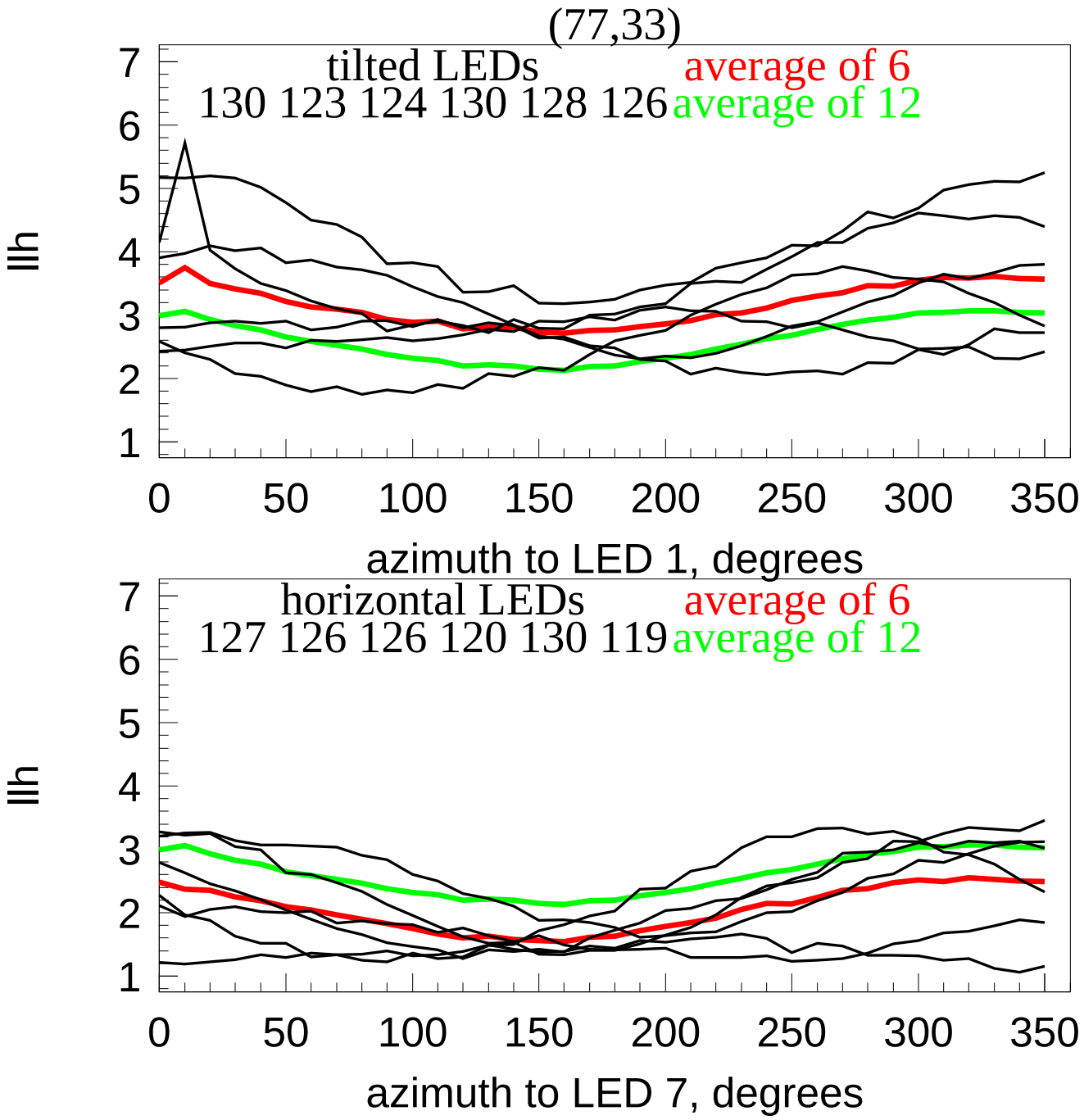

(76,36) 16.96 ± 14.99
2.56
2.54
2.52
2.5
2.48
2.46
2.44
2.42
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

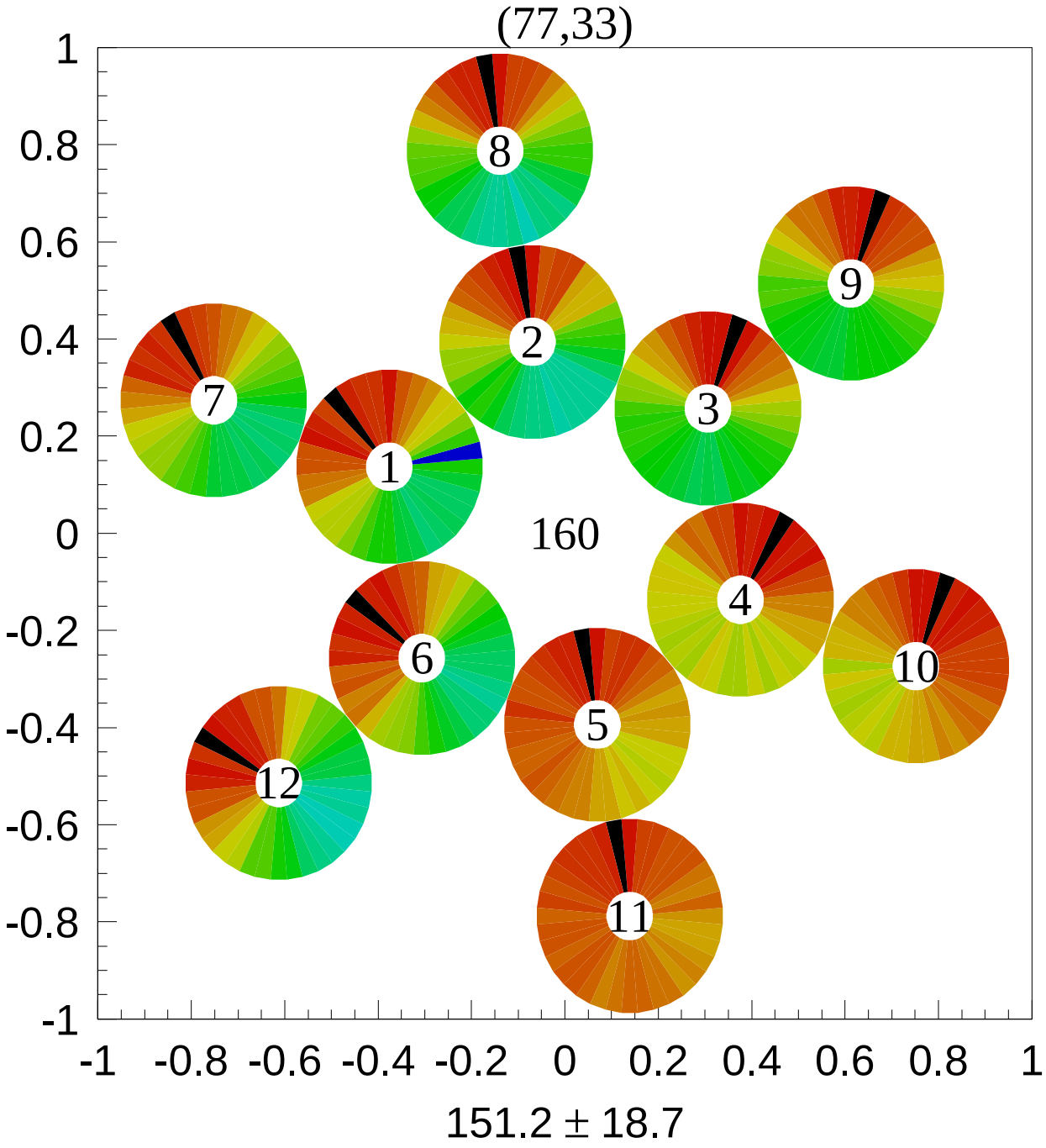

(76,37)
tilted LEDs
127 130 123 128 131 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
131 124 126 126 128 117
average of 6
average of 12
llh
azimuth to LED 7, degrees

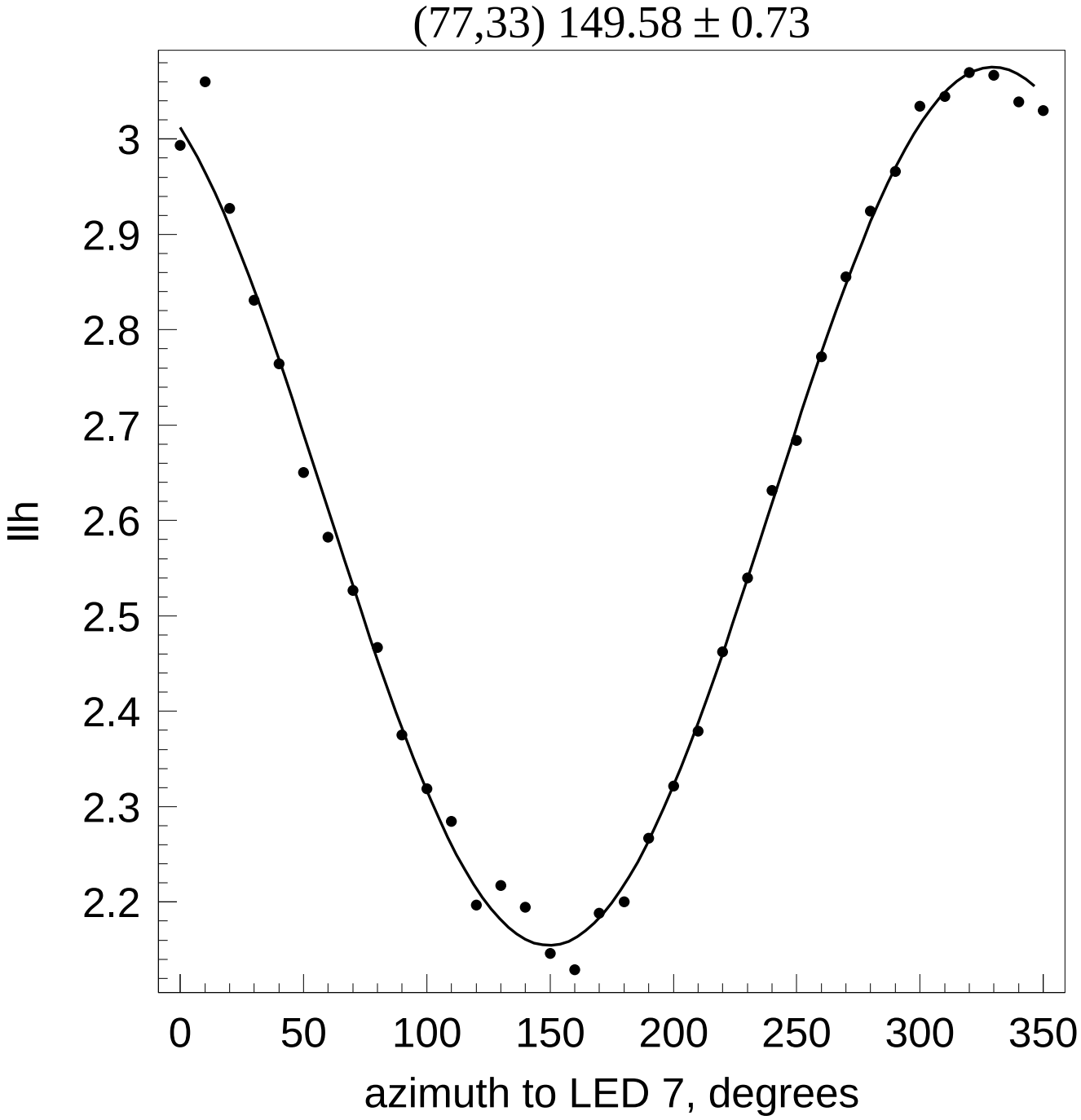

(76,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
230 ± 30.3
250
1
2
3
4
5
6
7
8
9
10
11
12

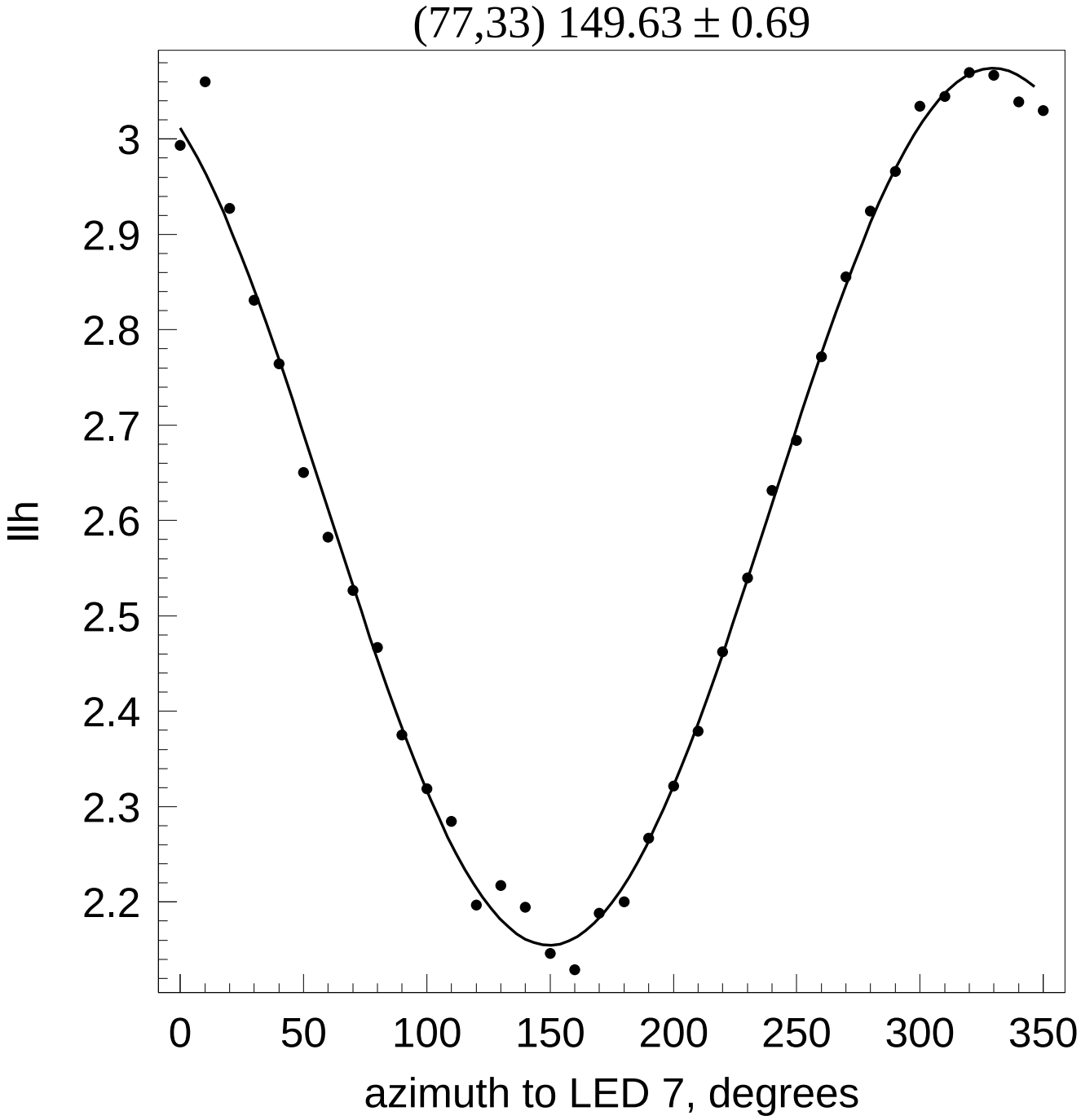

(76,37) 229.34 ± 2.07
3.8
3.75
3.7
3.65
3.6
3.55
3.5
3.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

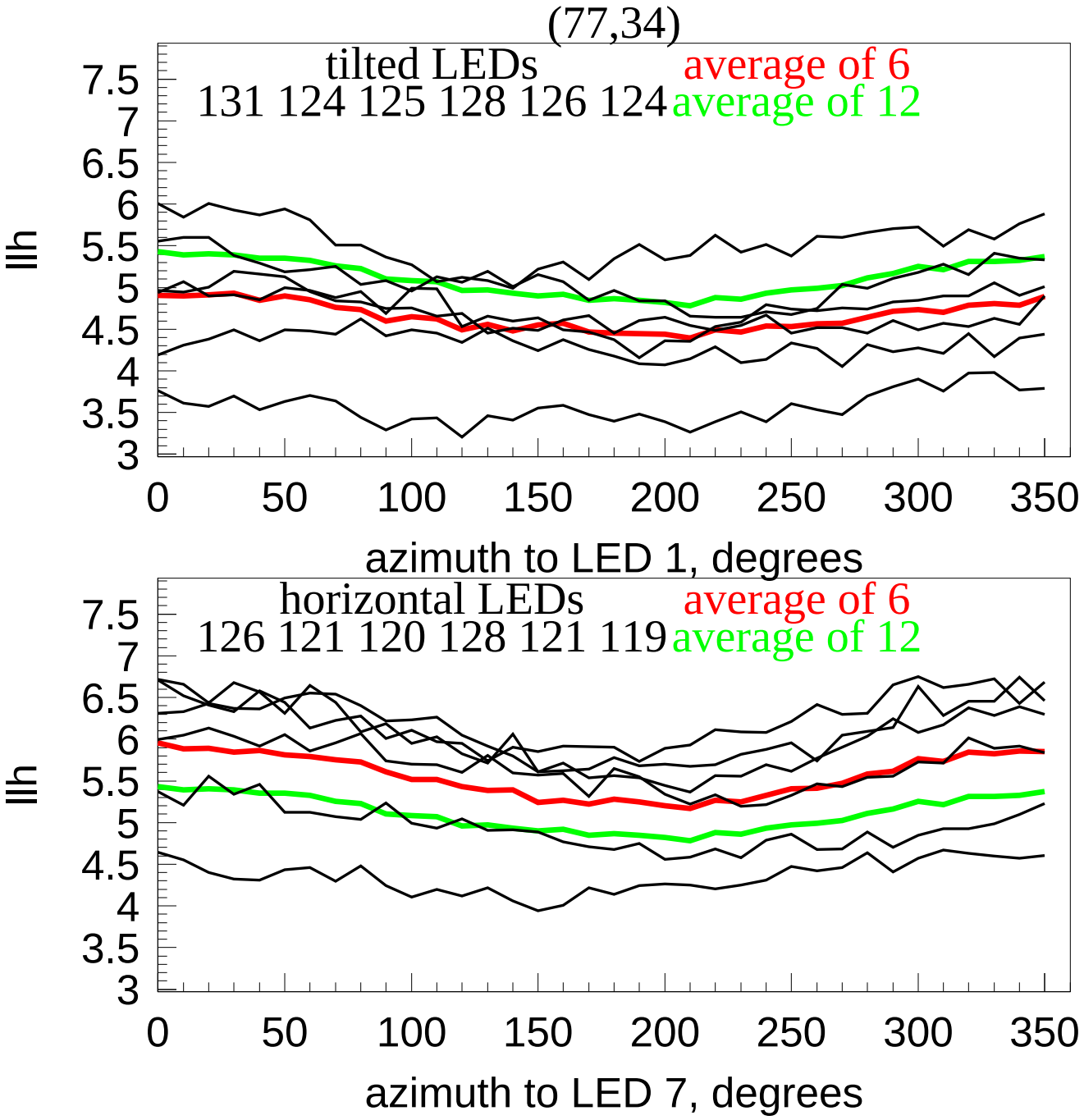

(76,37) 229.18 ± 2.19
3.8
3.75
3.7
3.65
3.6
3.55
3.5
3.45
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

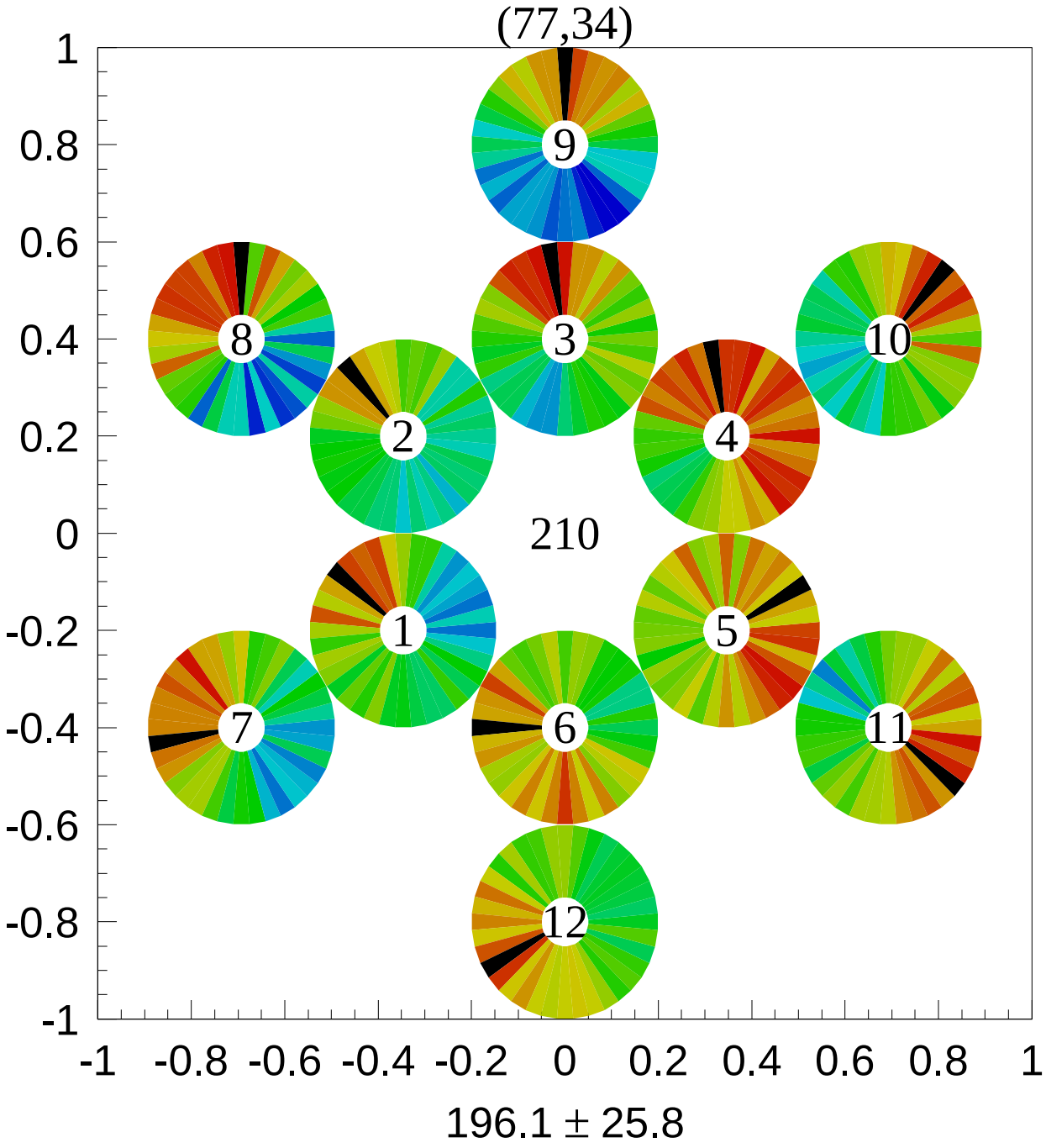

(77,33)
tilted LEDs
130 123 124 130 128 126
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
127 126 126 120 130 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

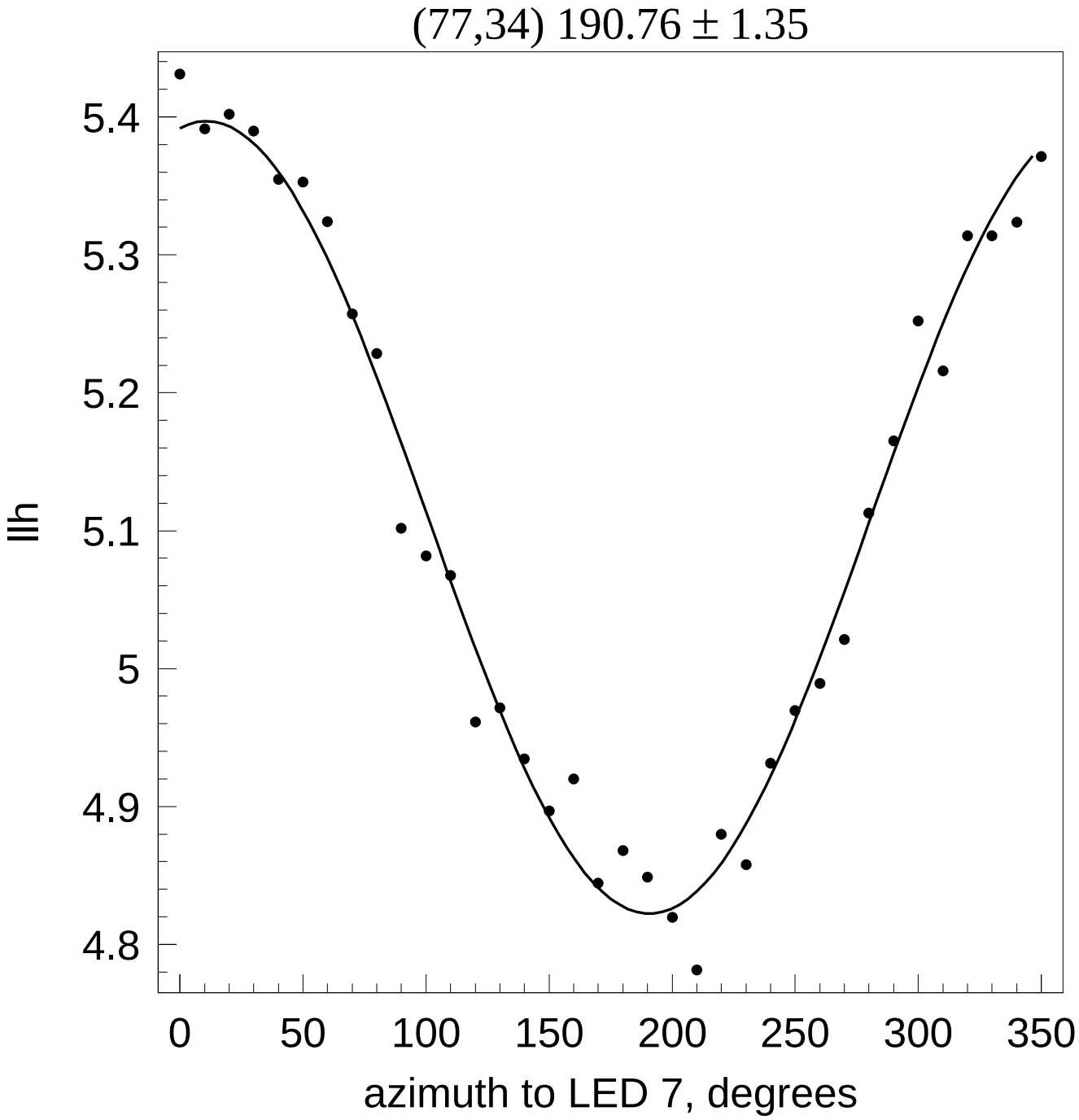

(77,33)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
8
2
9
7
3
1
160
4
6
10
5
12
11
151.2 ± 18.7

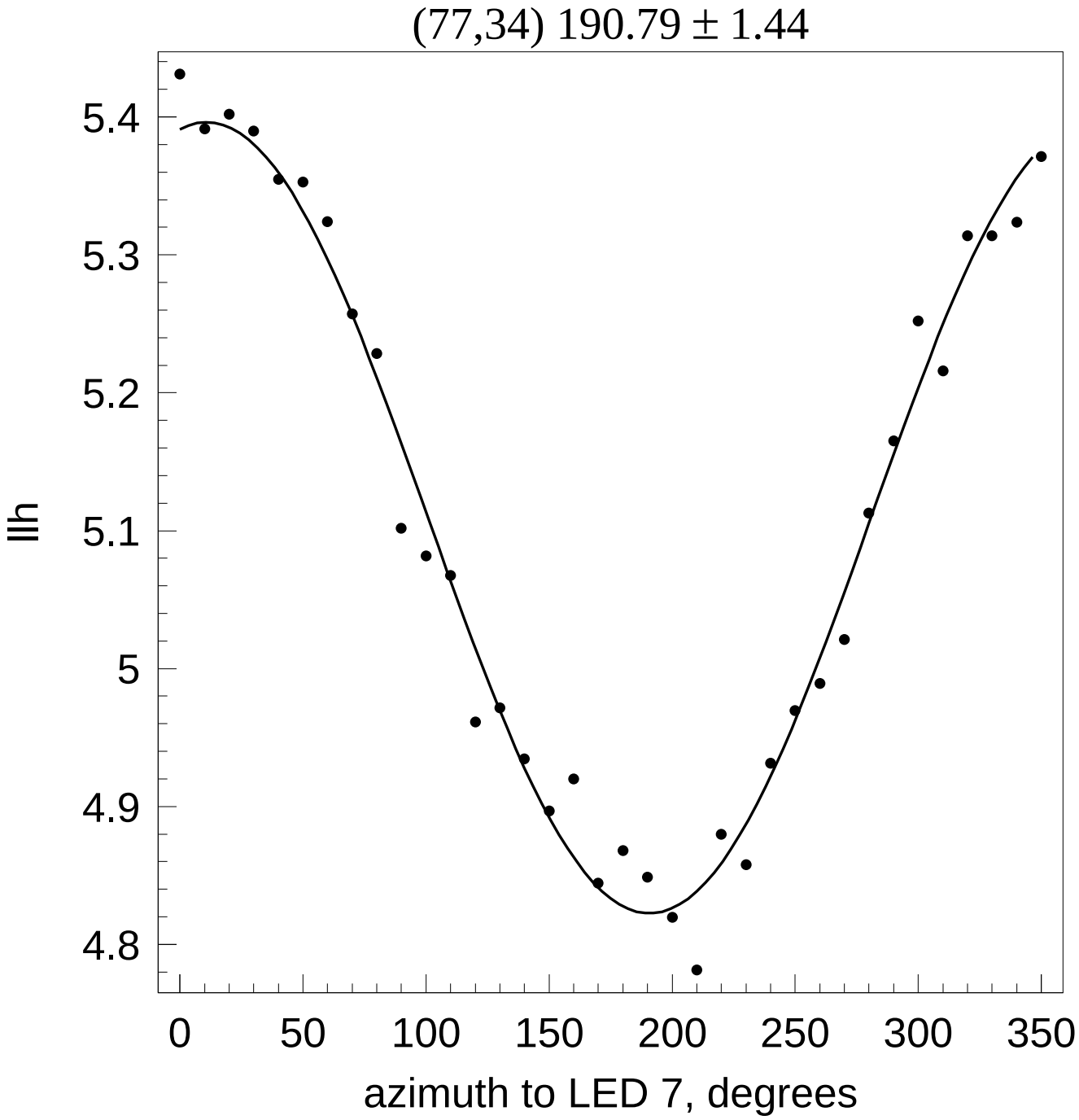

(77,33) 149.58 ± 0.73
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

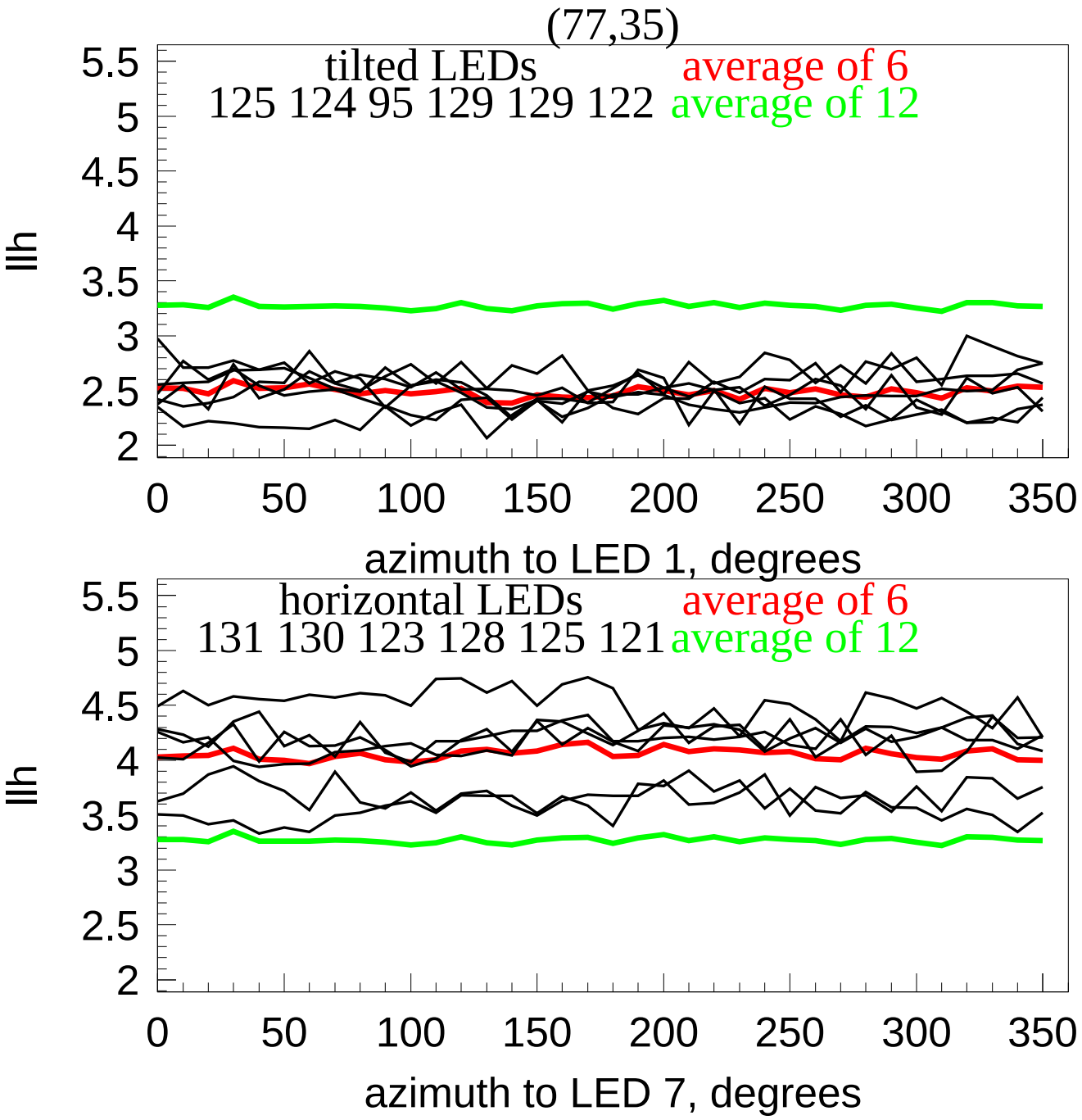

(77,33) 149.63 ± 0.69
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

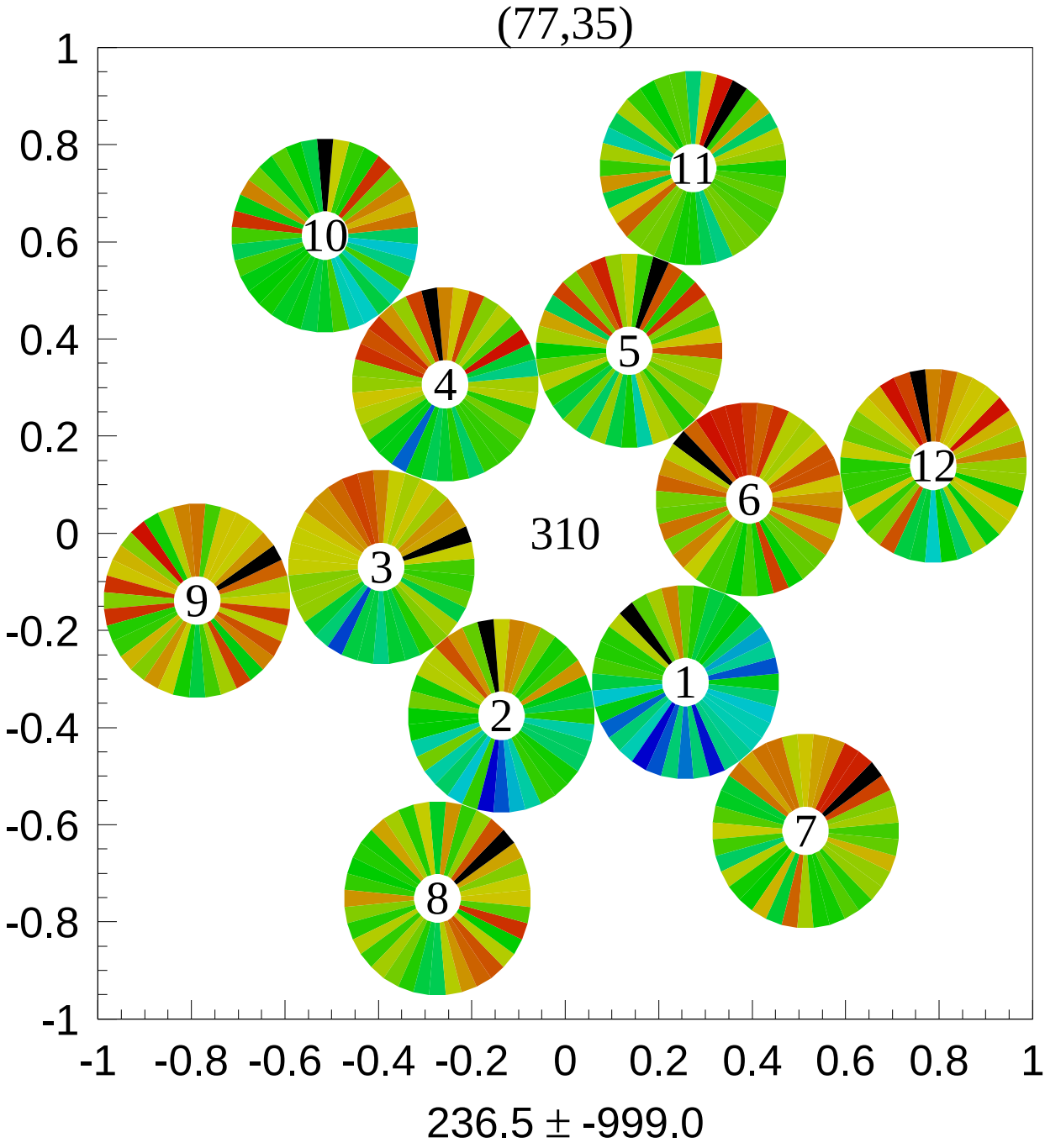

(77,34)
tilted LEDs
131 124 125 128 126 124
average of 6
average of 12
llh
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
126 121 120 128 121 119
average of 6
average of 12
llh
azimuth to LED 7, degrees

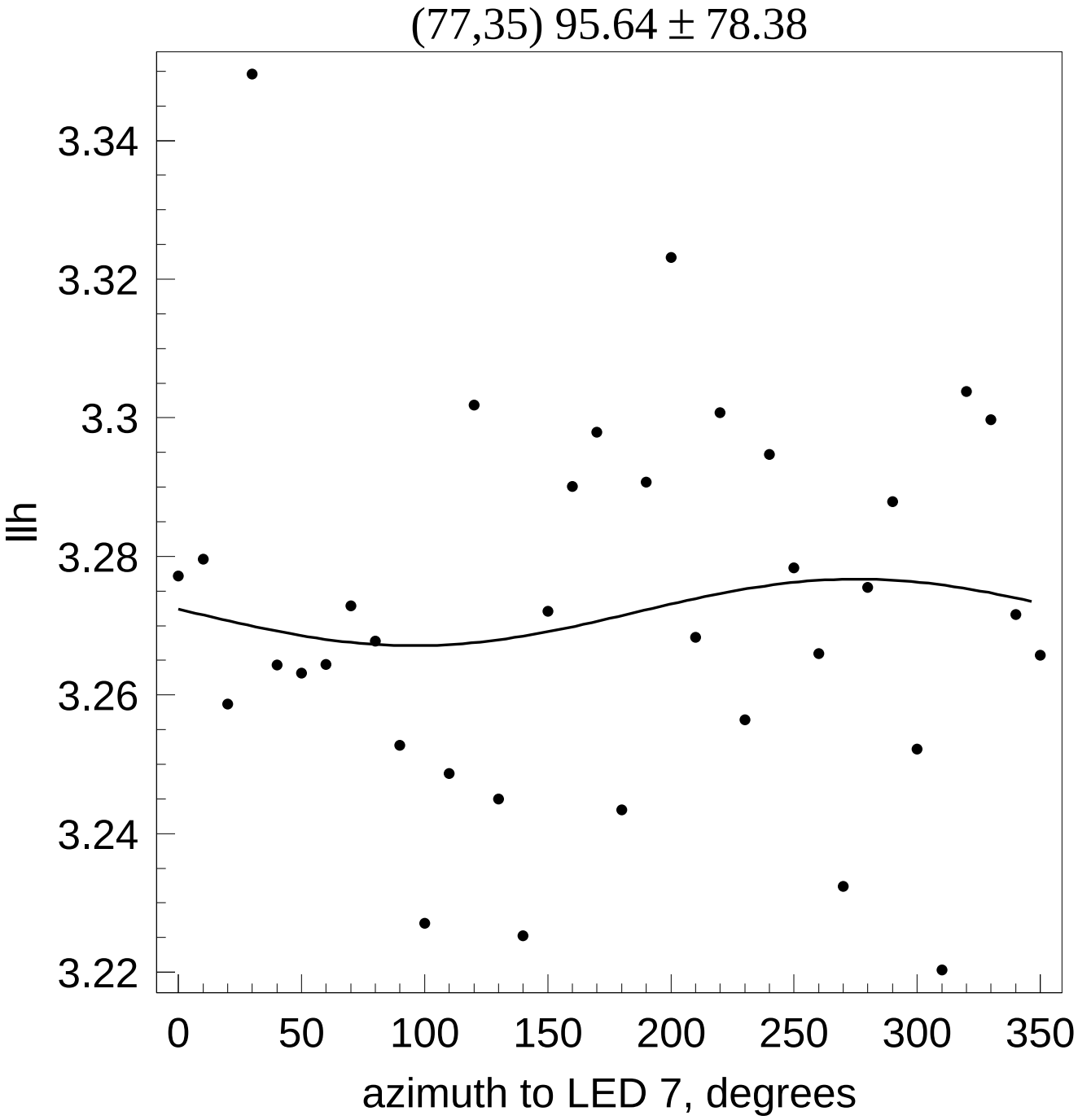

(77,34)
9
8
3
10
2
4
210
1
5
7
6
11
12
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
196.1 ± 25.8

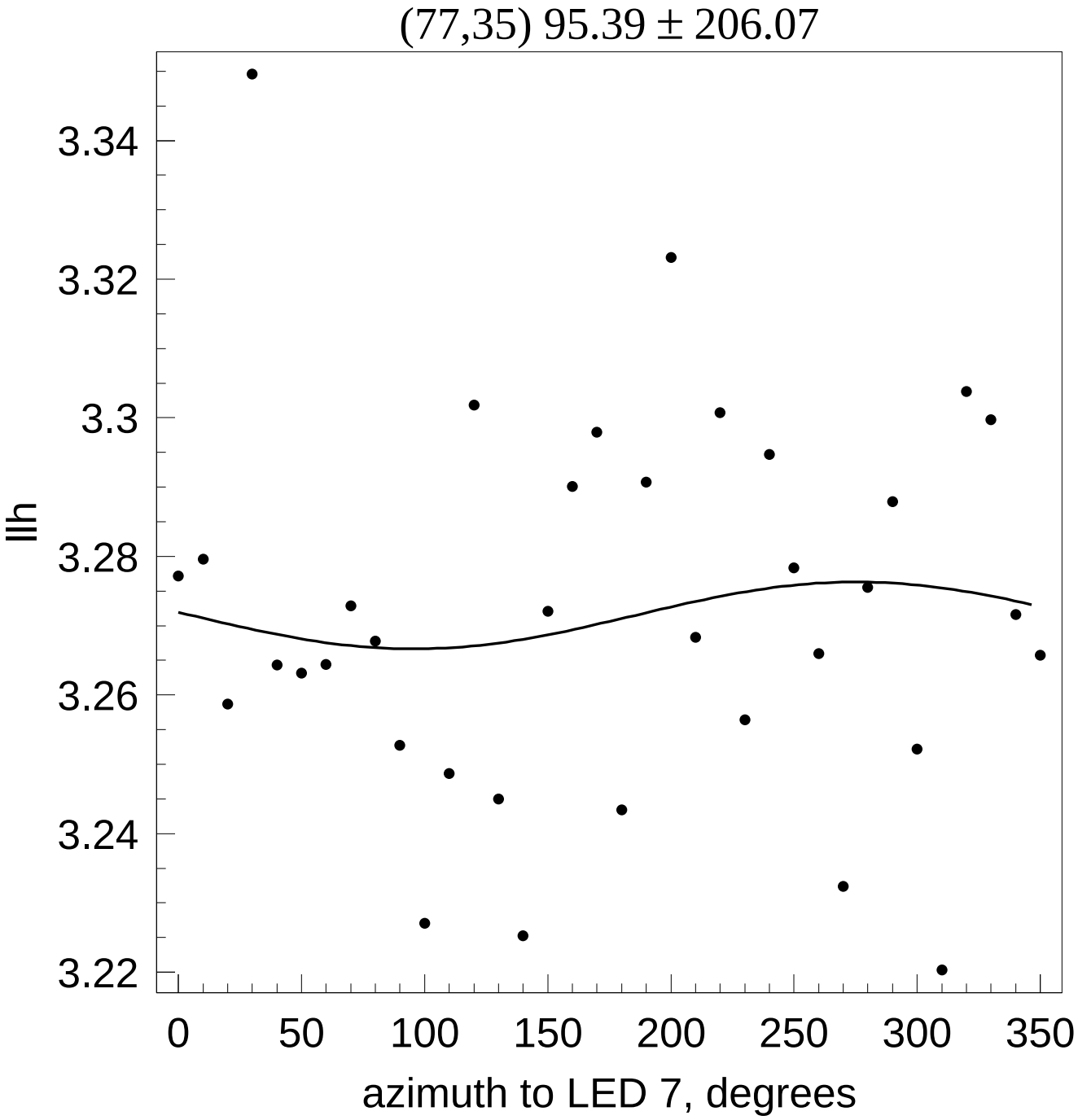

(77,34) 190.76 ± 1.35
5.4
5.3
5.2
5.1
5
4.9
4.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

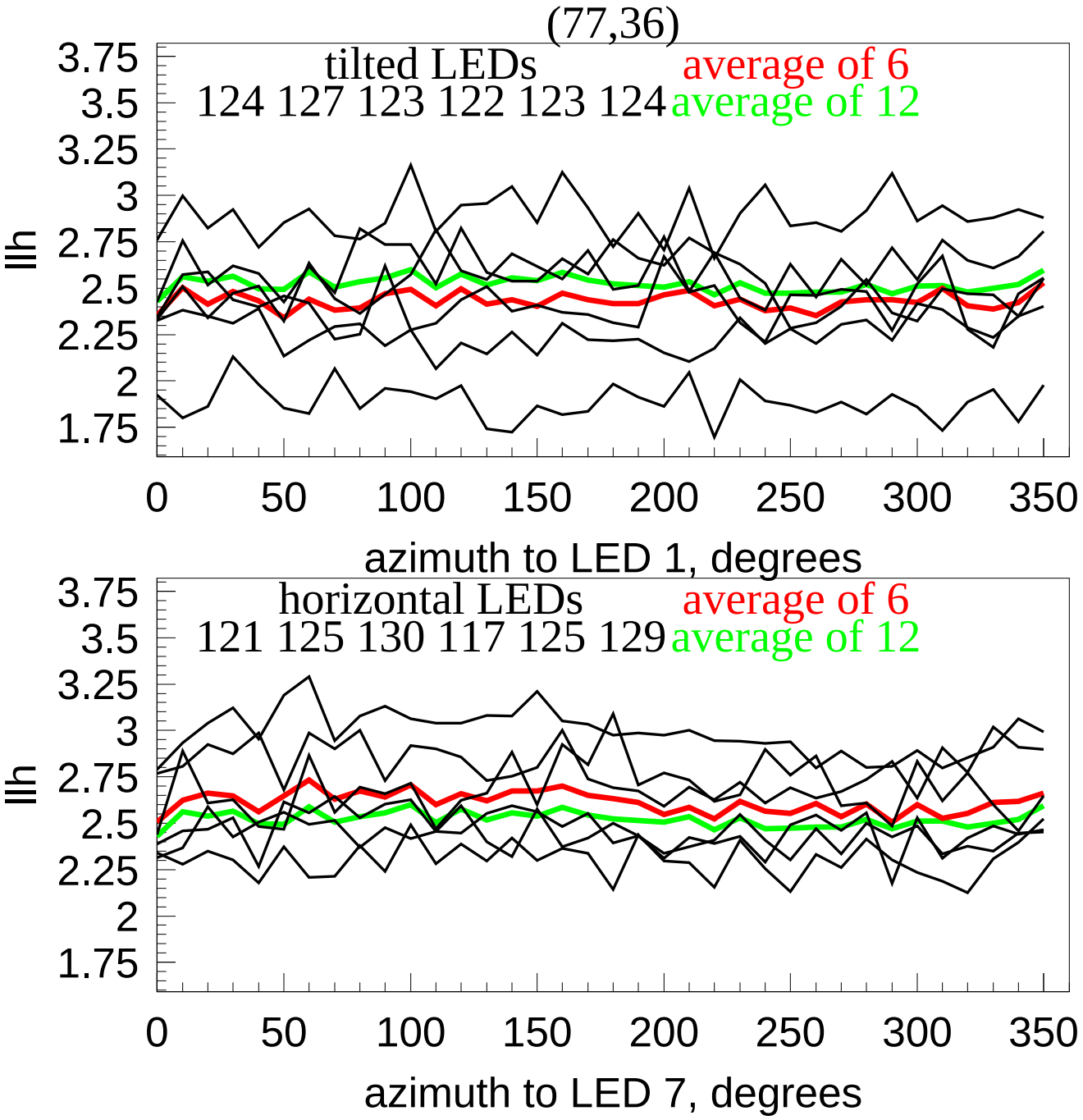

(77,34) 190.79 ± 1.44
5.4
5.3
5.2
5.1
5
4.9
4.8
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

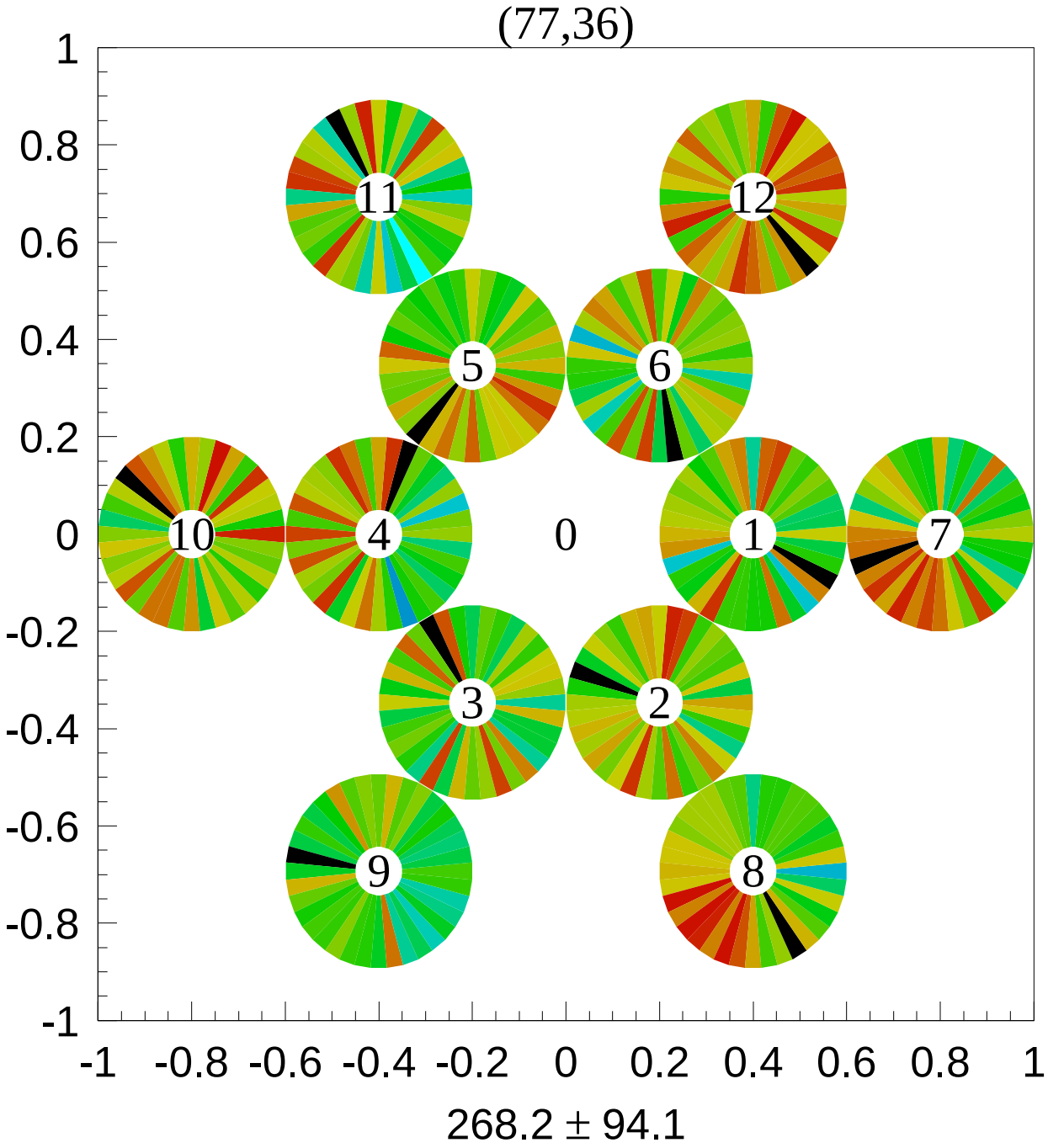

(77,35)
tilted LEDs
125 124 95 129 129 122
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
131 130 123 128 125 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

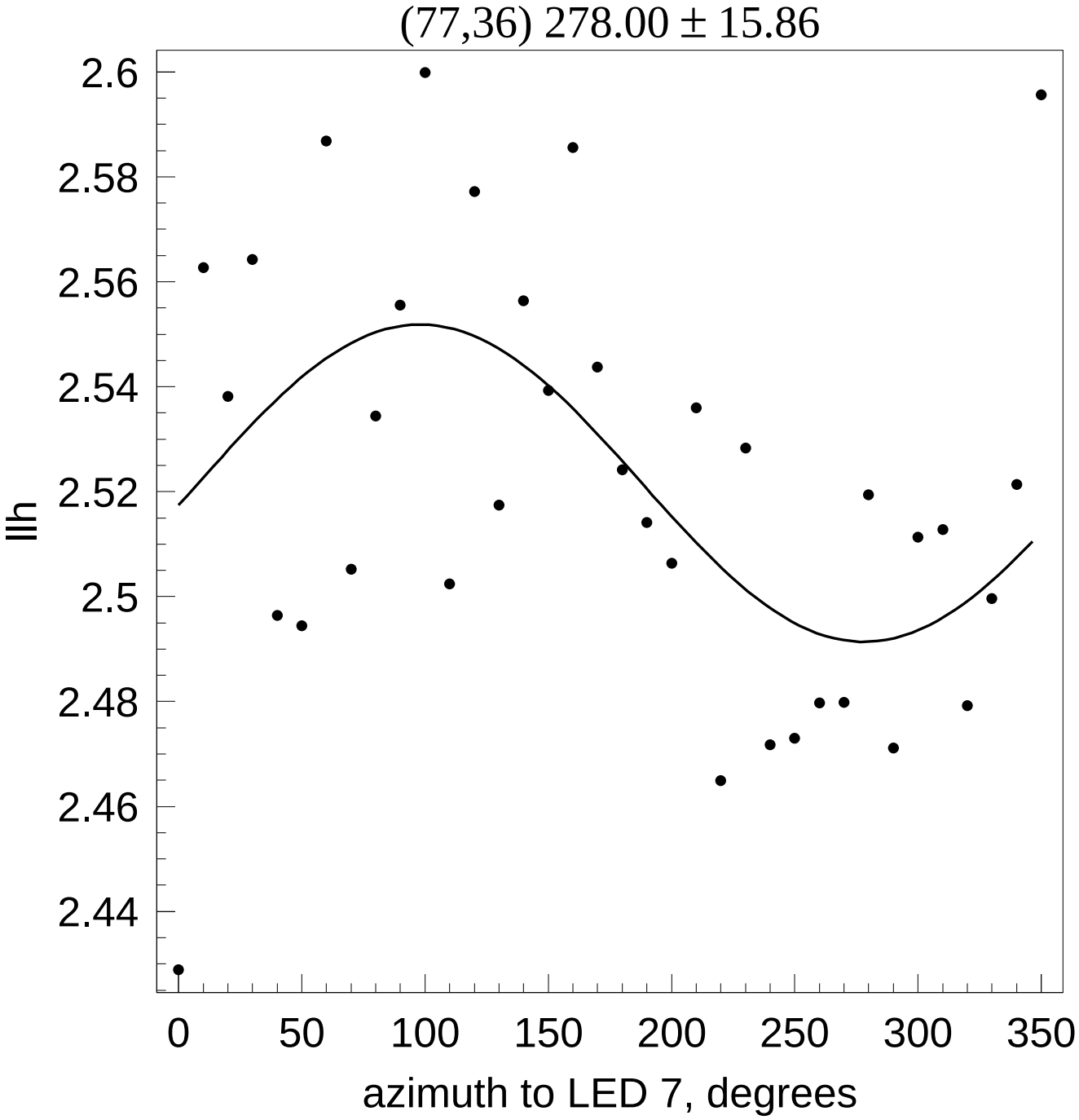

(77,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
236.5 ± -999.0
310
1
2
3
4
5
6
7
8
9
10
11
12

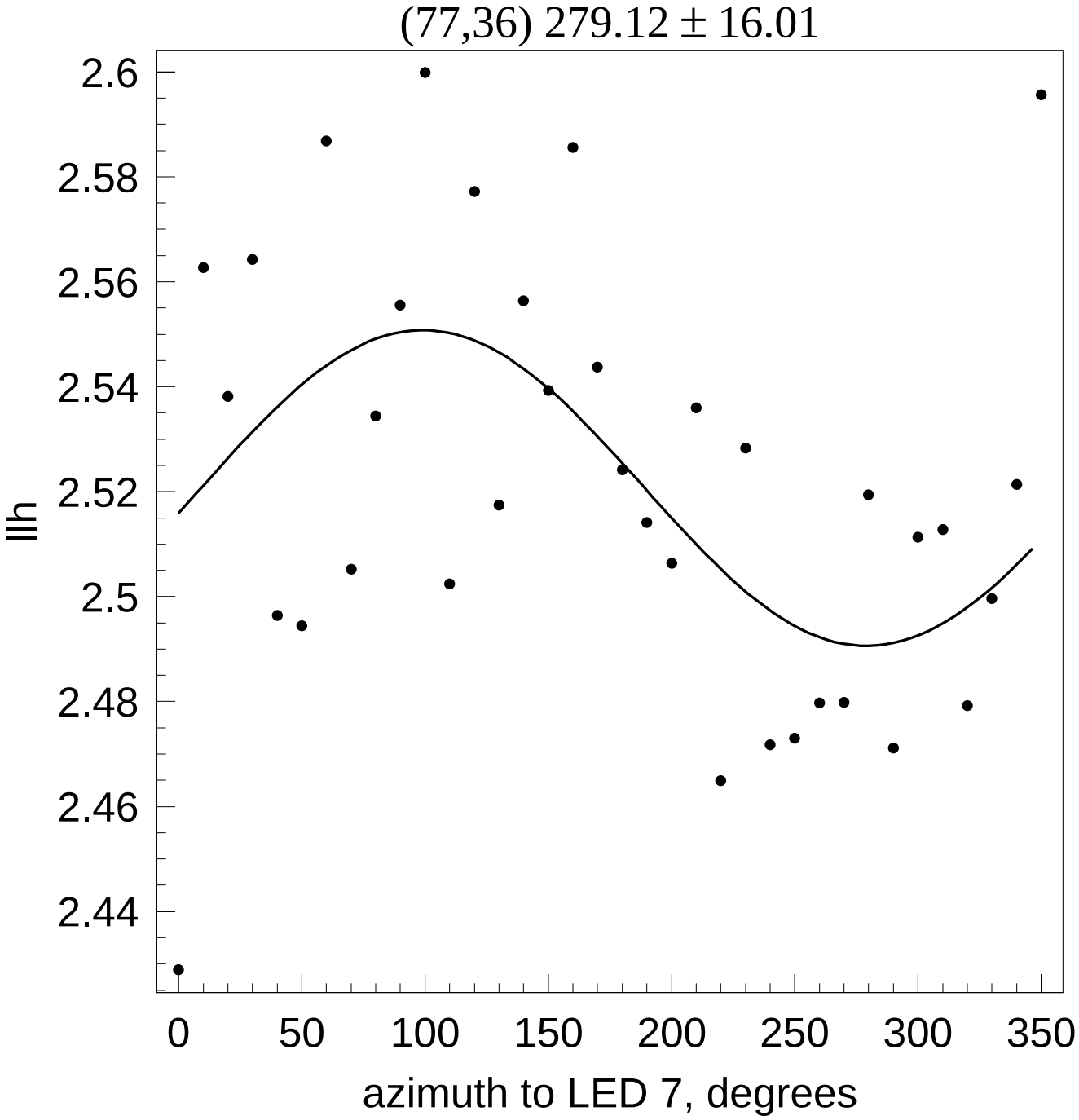

(77,35) 95.64 ± 78.38
3.34
3.32
3.3
3.28
3.26
3.24
3.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

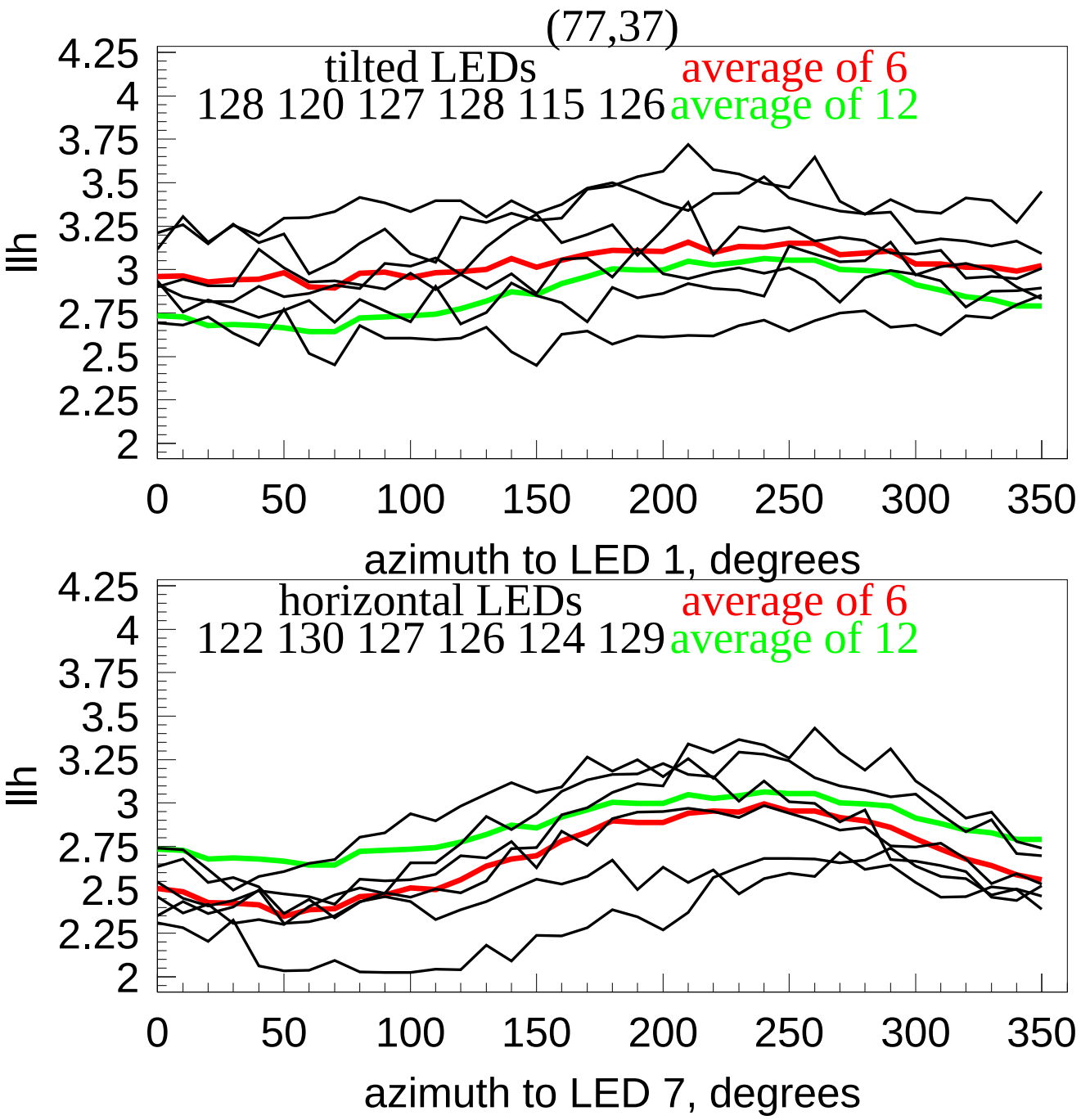

(77,35) 95.39 ± 206.07
3.34
3.32
3.3
3.28
3.26
3.24
3.22
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

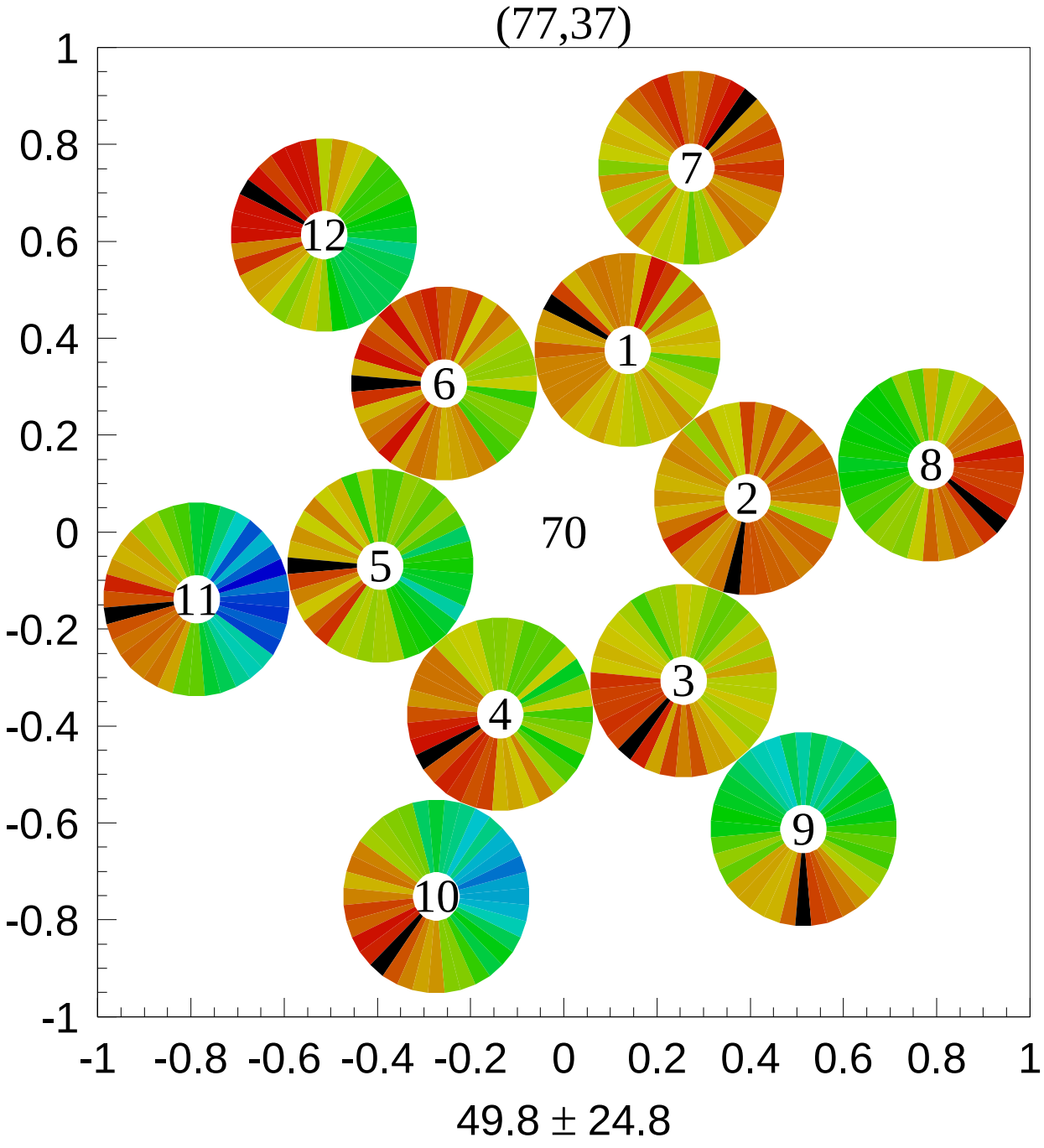

(77,36)
tilted LEDs
124 127 123 122 123 124
average of 6
average of 12
llh
3.75
3.5
3.25
3
2.75
2.5
2.25
2
1.75
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
121 125 130 117 125 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

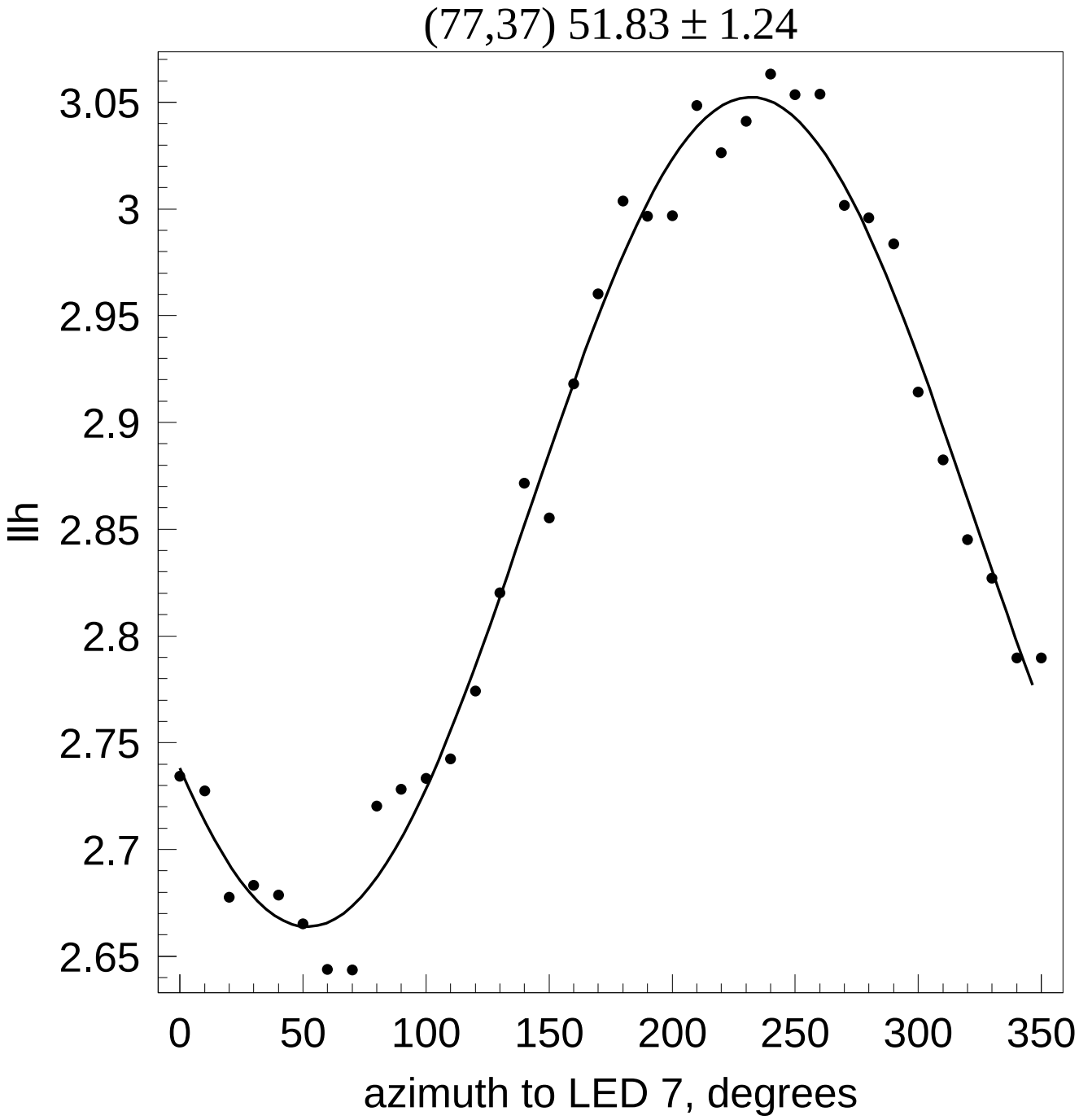

(77,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
268.2 ± 94.1

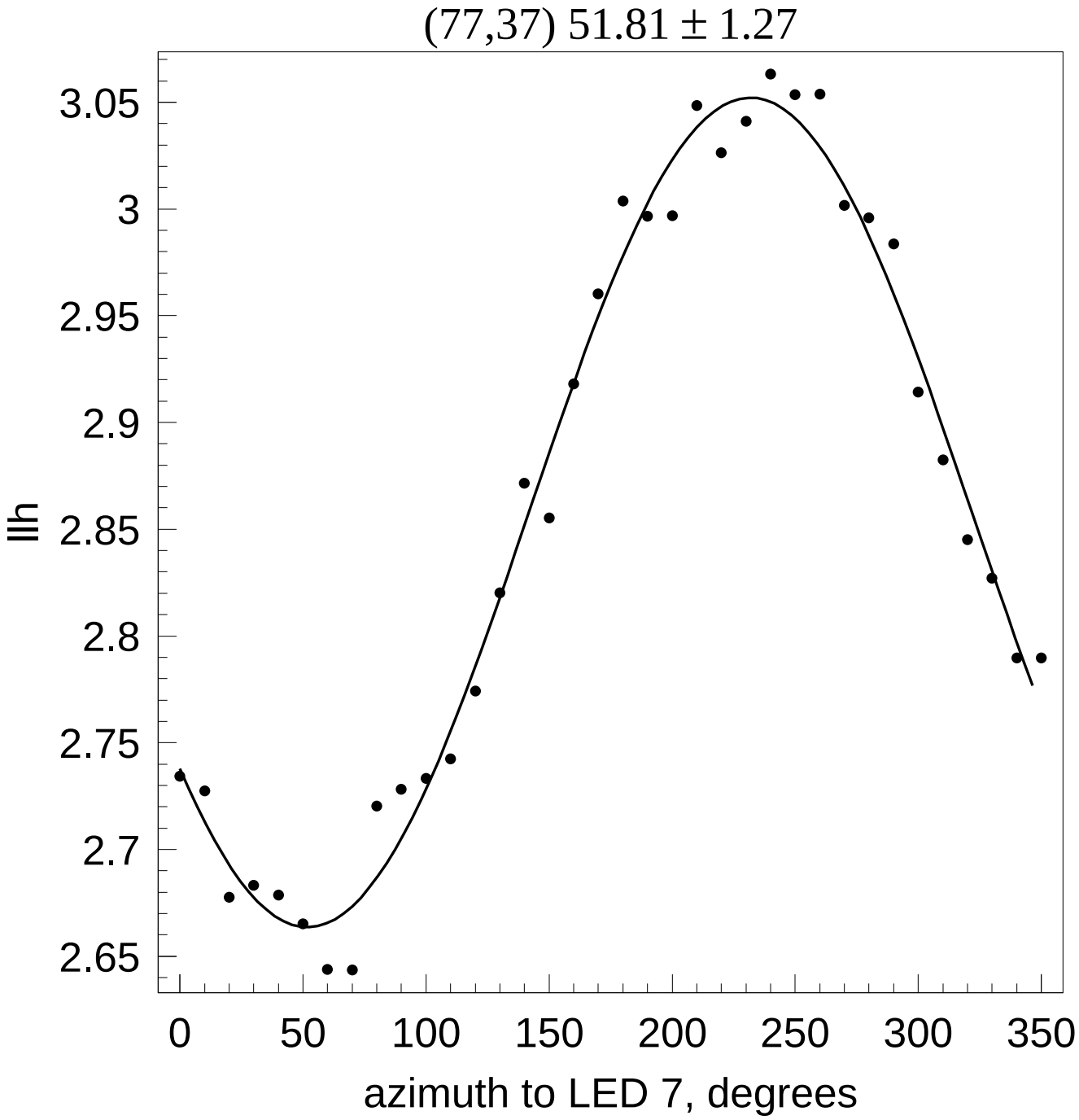

(77,36) 278.00 ± 15.86
2.6
2.58
2.56
2.54
2.52
2.5
2.48
2.46
2.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

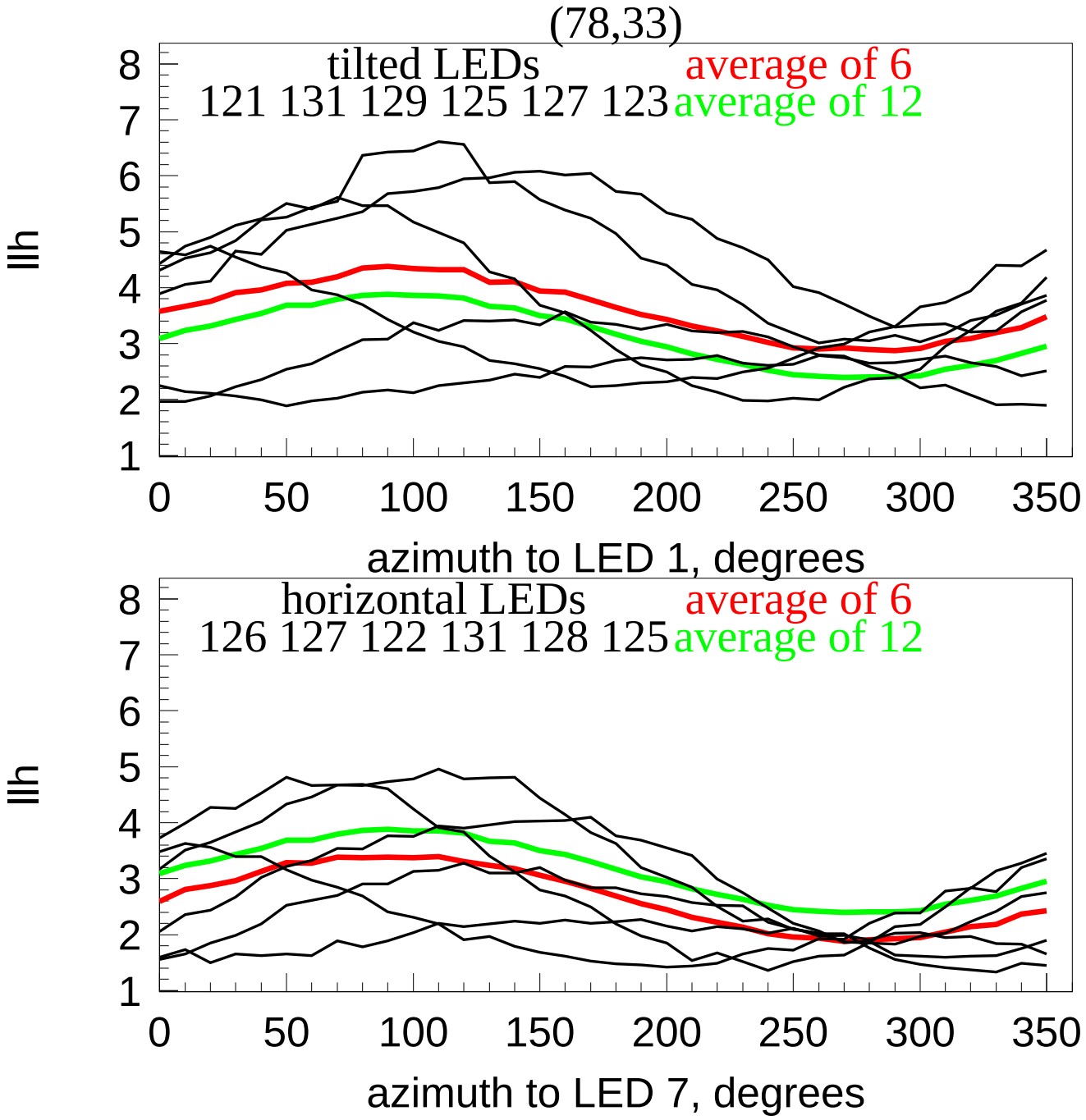

(77,36) 279.12 ± 16.01
2.6
2.58
2.56
2.54
2.52
2.5
2.48
2.46
2.44
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

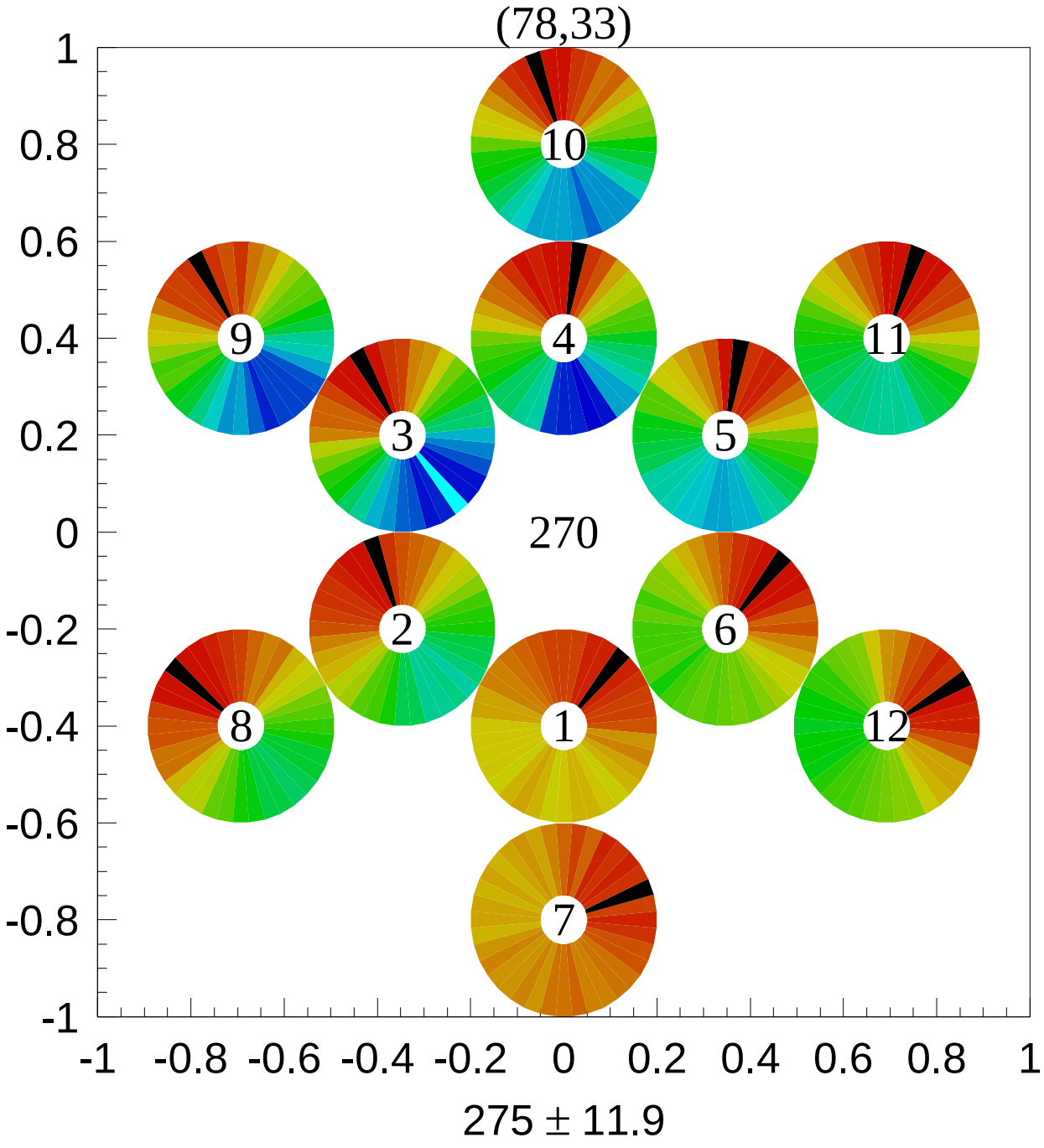

(77,37)
tilted LEDs
128 120 127 128 115 126
average of 6
average of 12
llh
4.25
4
3.75
3.5
3.25
3
2.75
2.5
2.25
2
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
122 130 127 126 124 129
average of 6
average of 12
llh
azimuth to LED 7, degrees

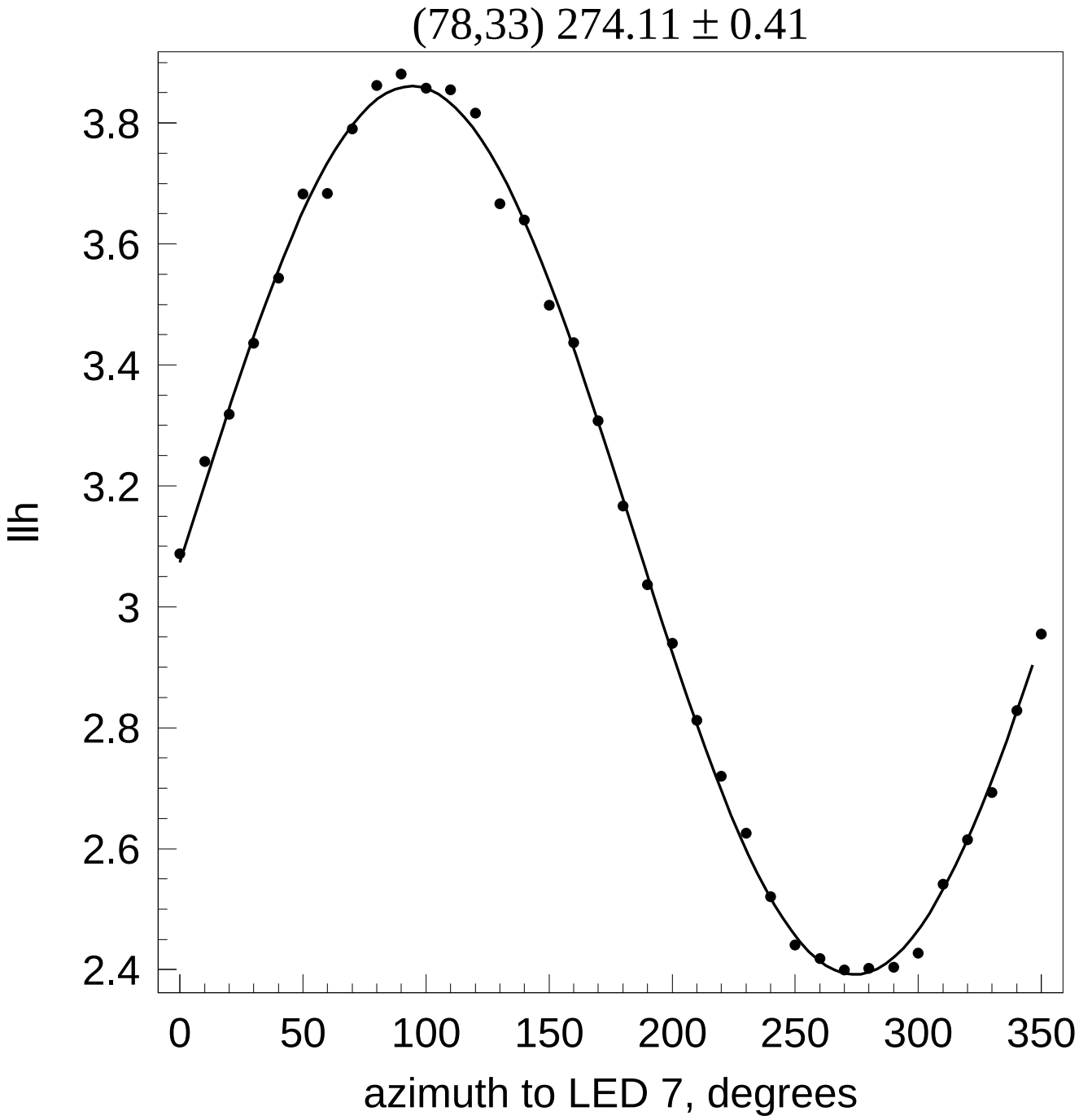

(77,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
1
8
2
70
5
11
3
4
9
10
49.8 ± 24.8

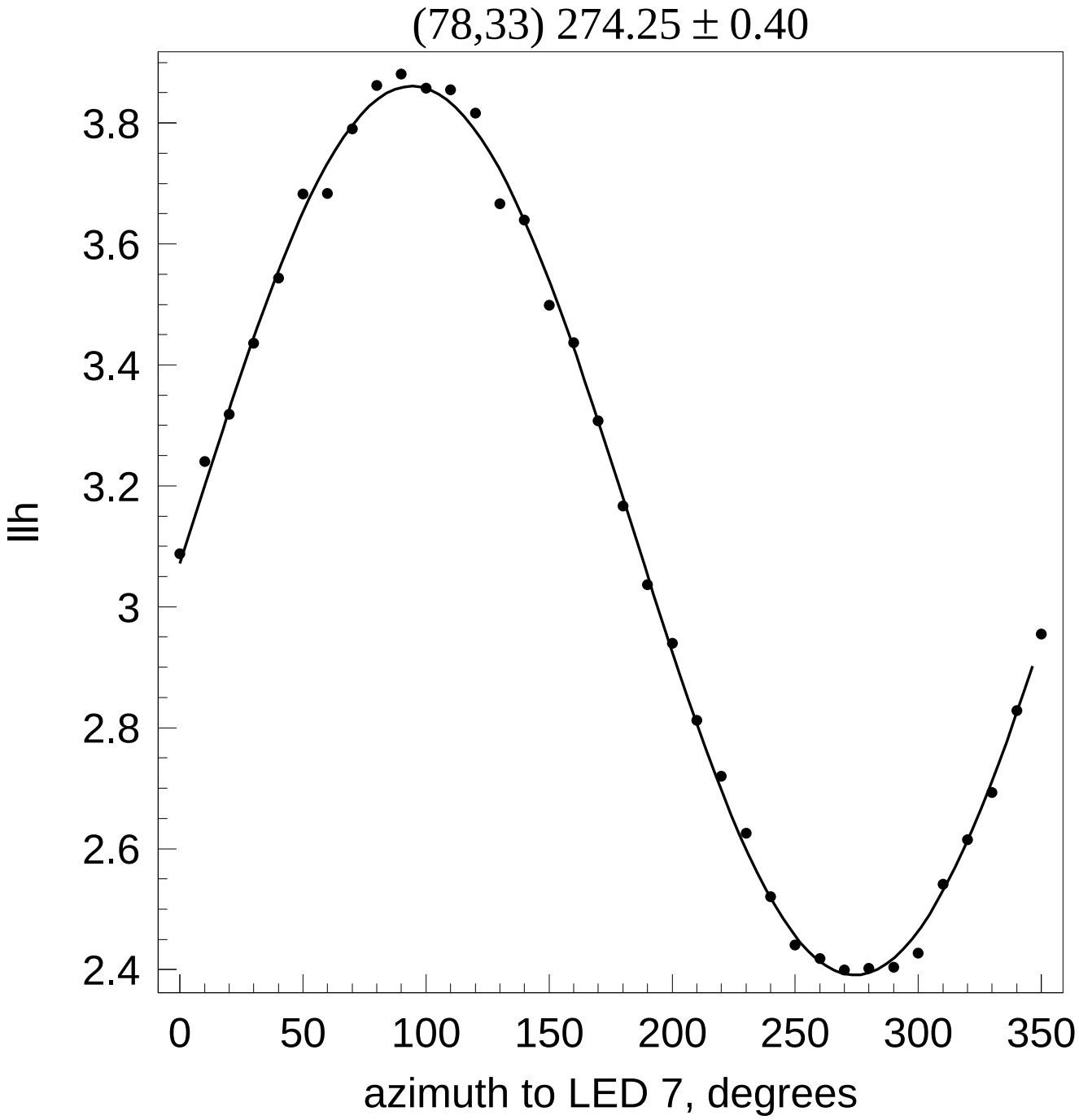

(77,37) 51.83 ± 1.24
3.05
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

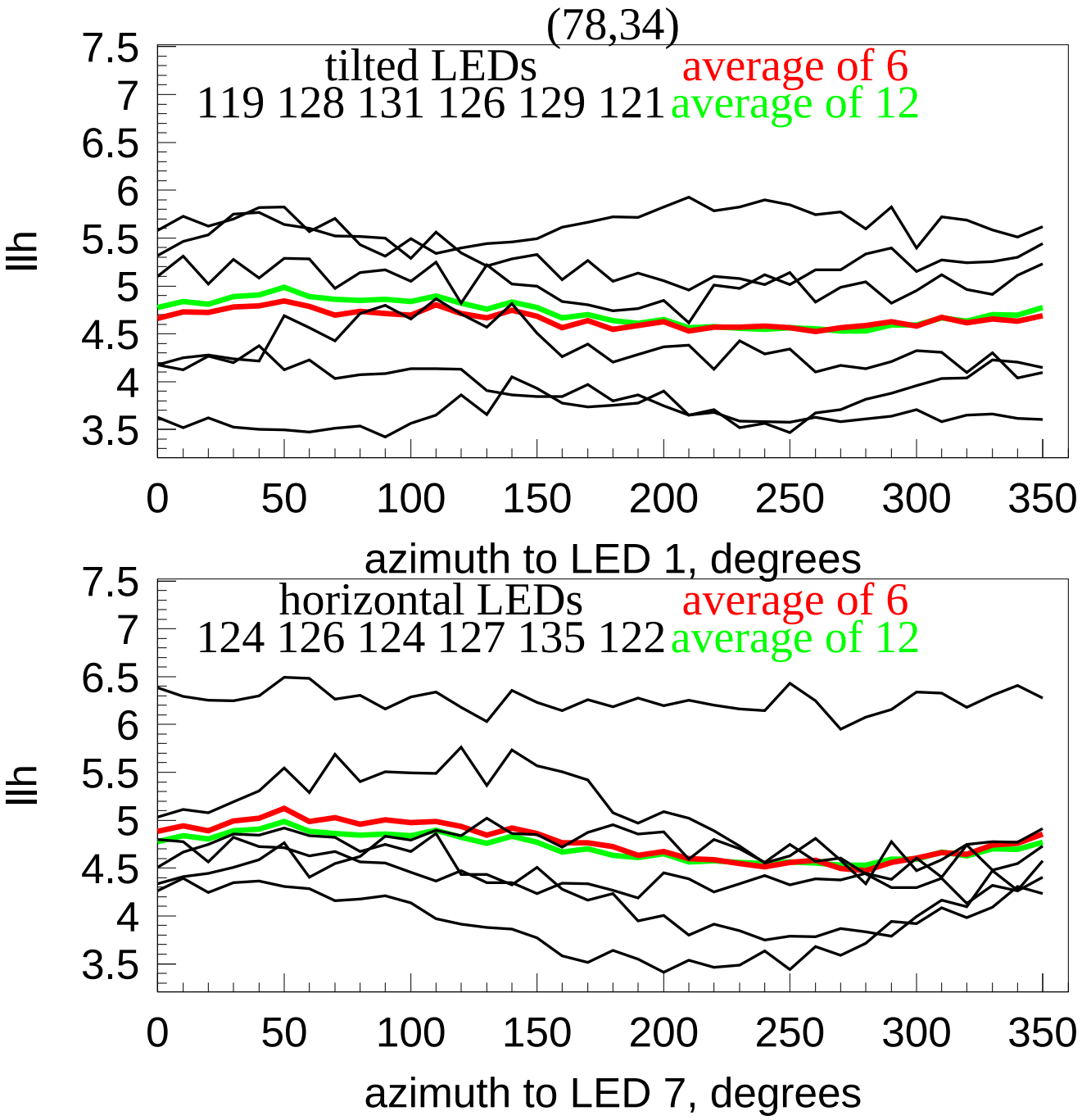

(77,37) 51.81 ± 1.27
3.05
3
2.95
2.9
2.85
2.8
2.75
2.7
2.65
lln
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

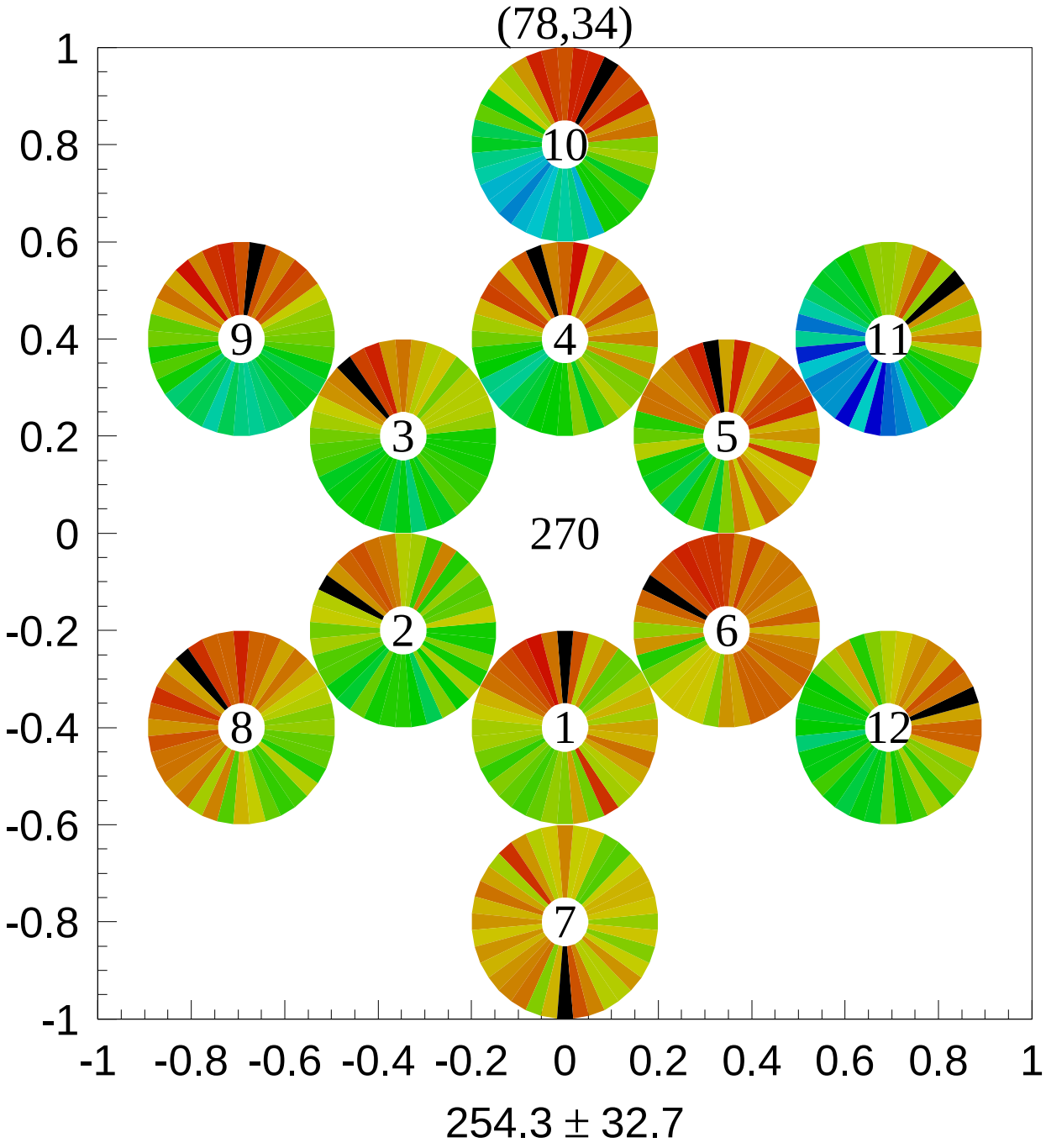

(78,33)
tilted LEDs
121 131 129 125 127 123
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
126 127 122 131 128 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

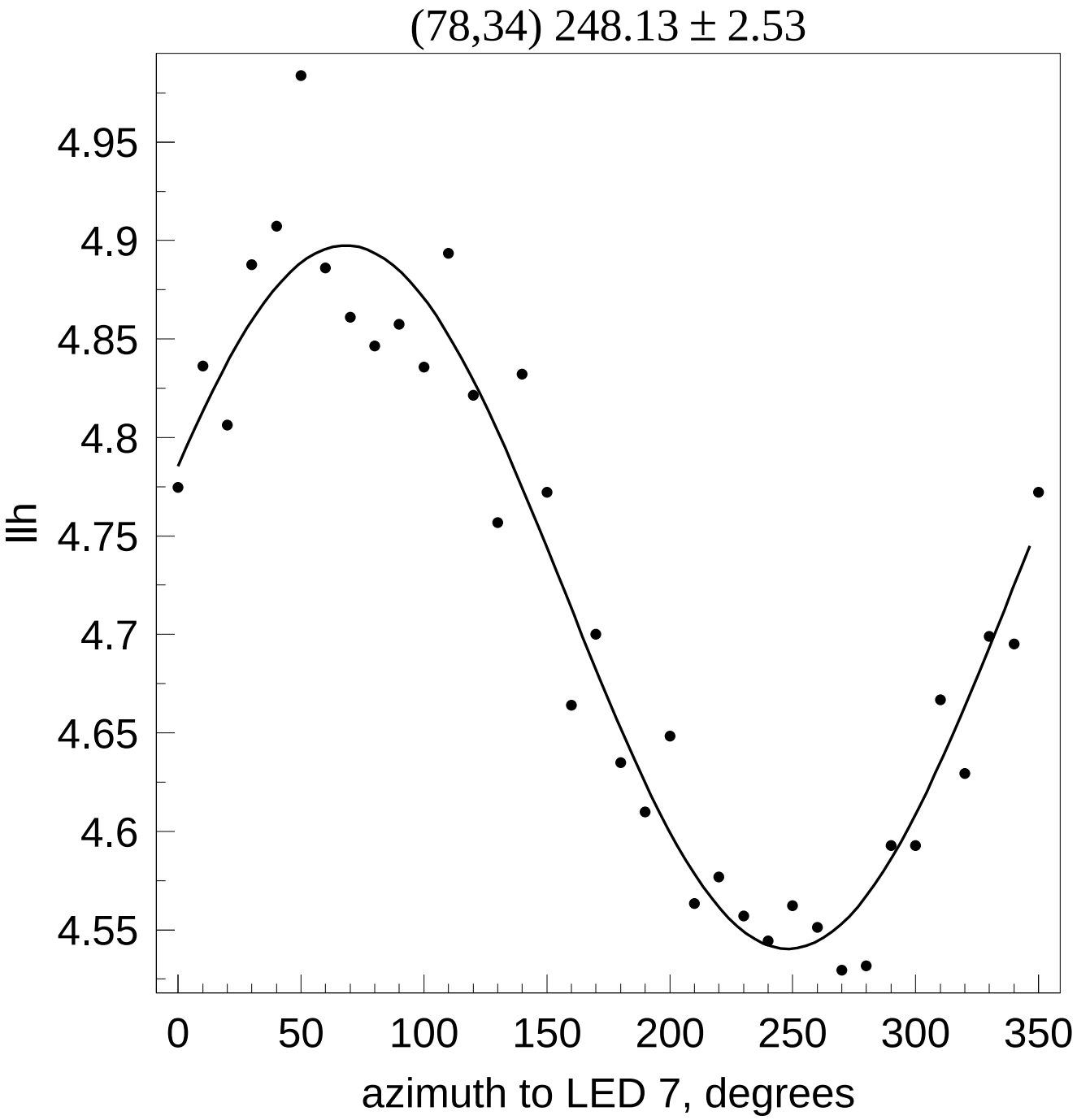

(78,33)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
275 ± 11.9

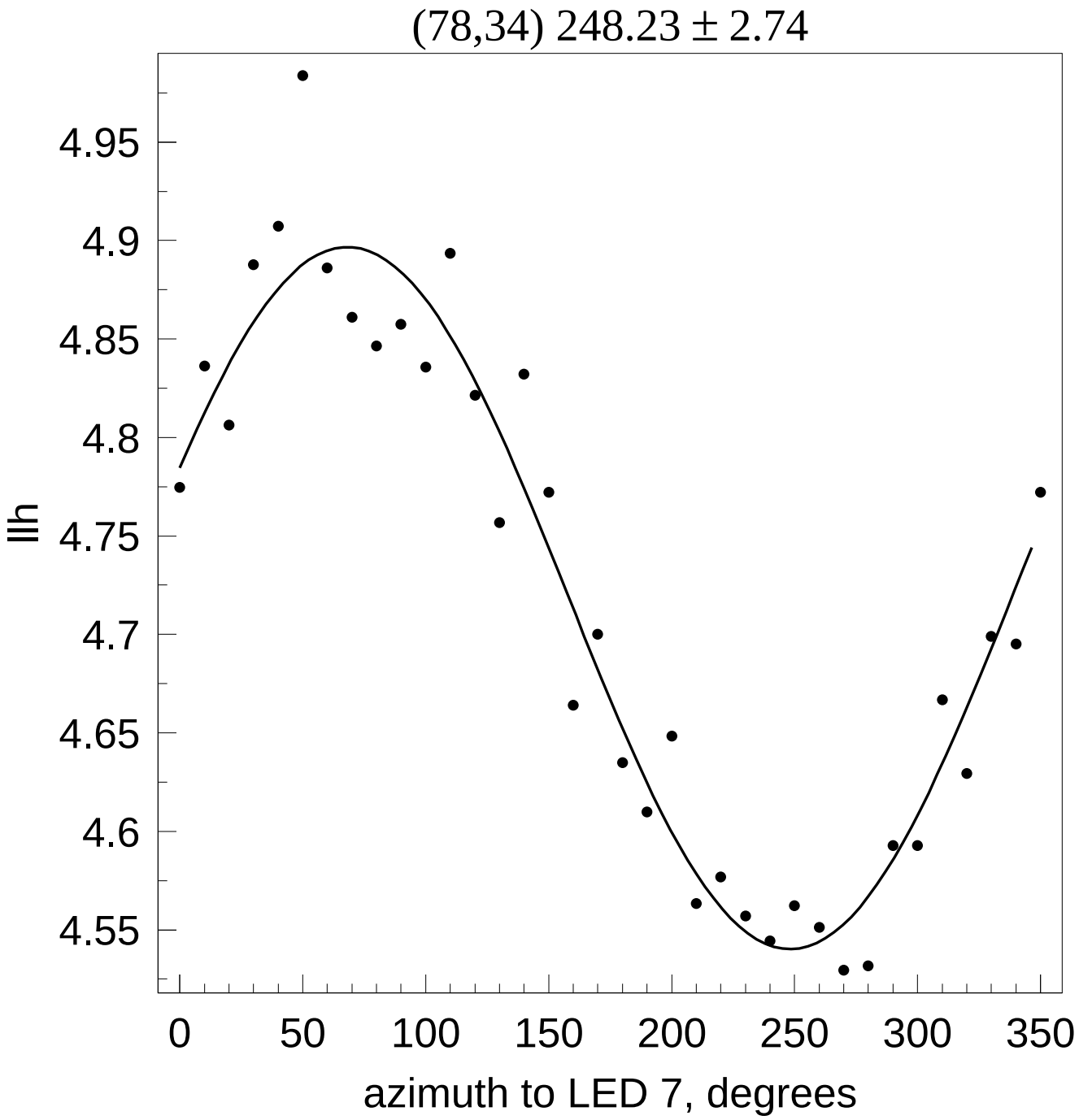

(78,33) 274.11 ± 0.41
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

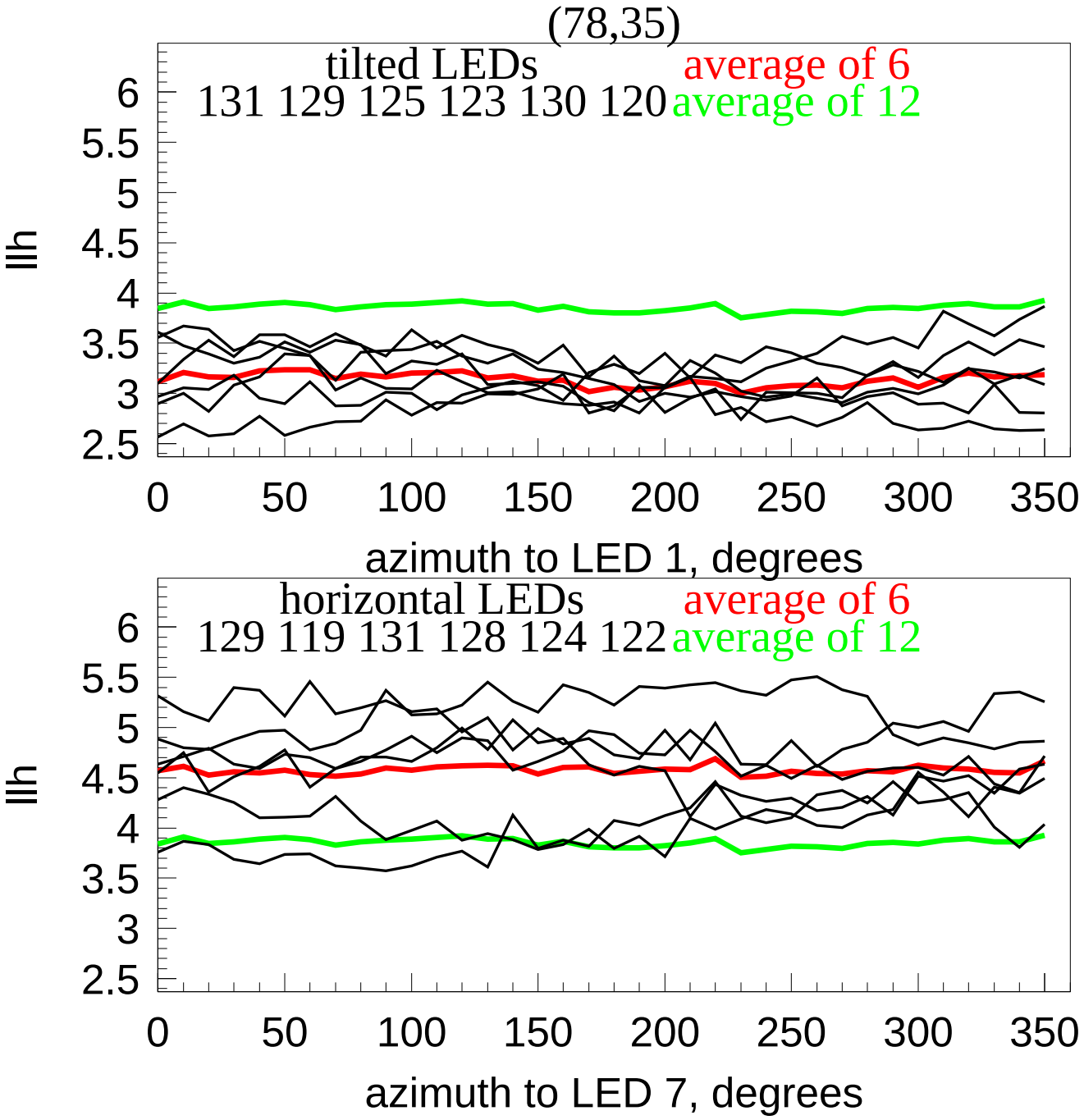

(78,33) 274.25 ± 0.40
3.8
3.6
3.4
3.2
3
2.8
2.6
2.4
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

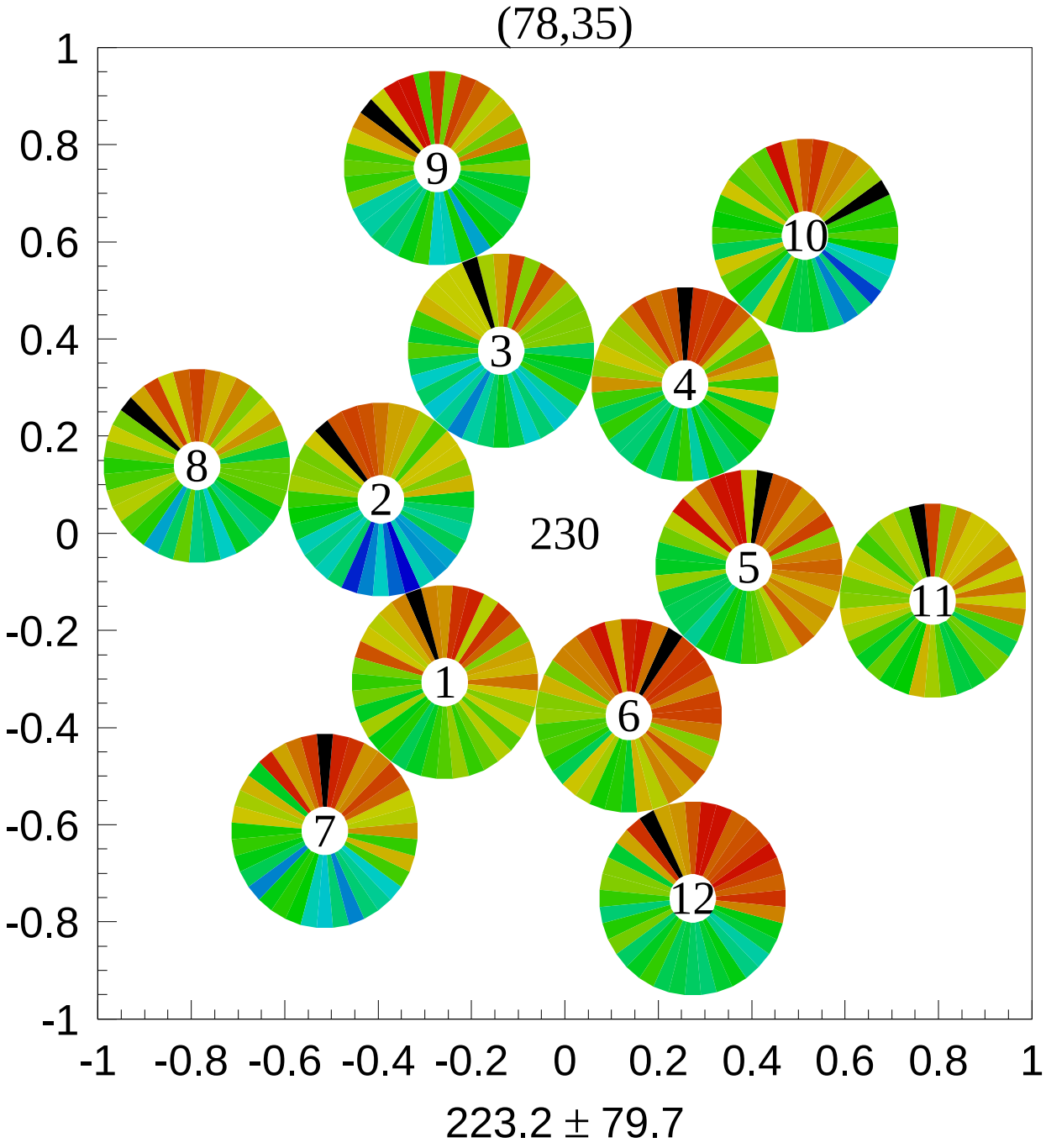

(78,34)
tilted LEDs
119 128 131 126 129 121
average of 6
average of 12
llh
7.5
7
6.5
6
5.5
5
4.5
4
3.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
124 126 124 127 135 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

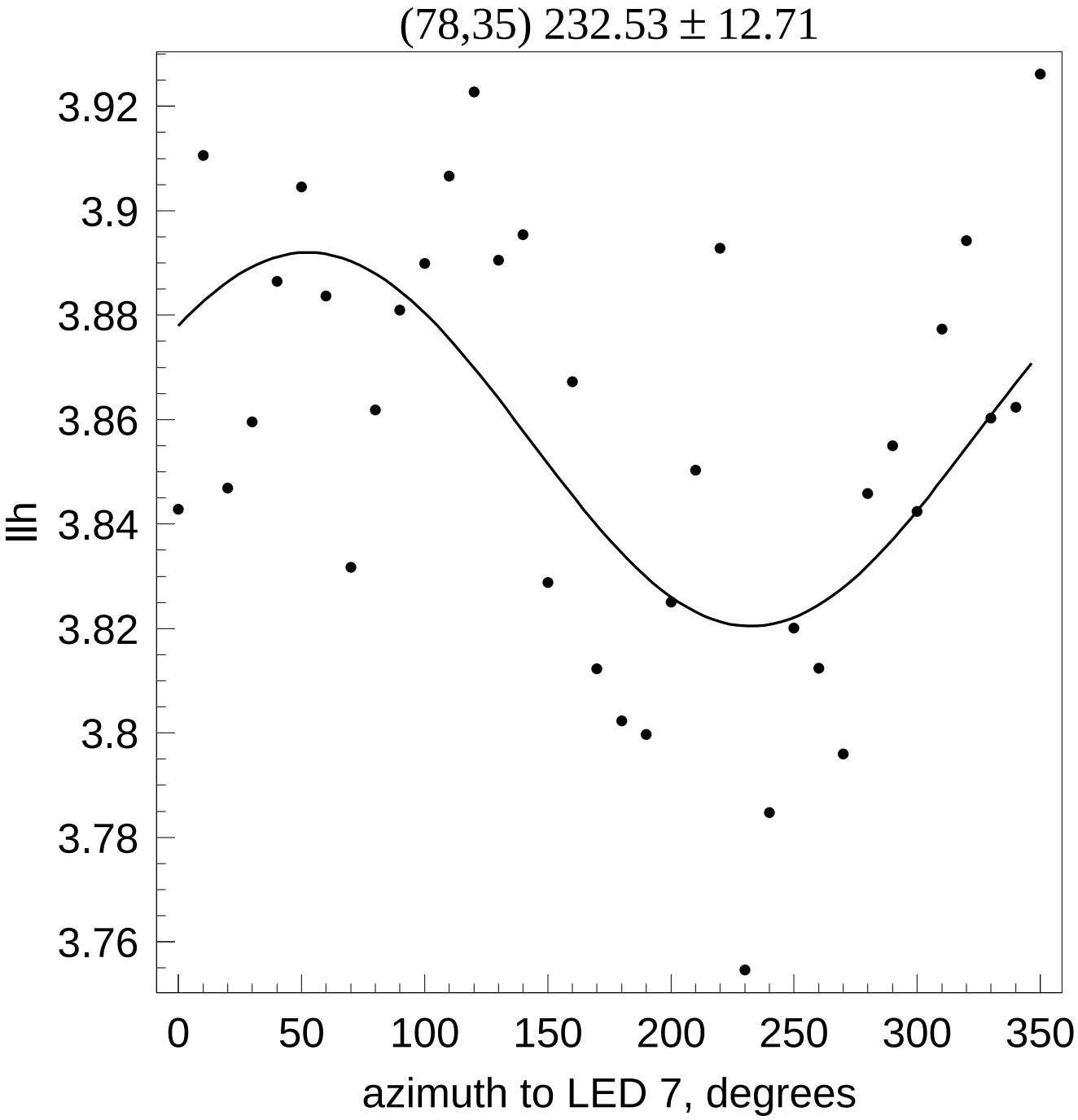

(78,34)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
254.3 ± 32.7

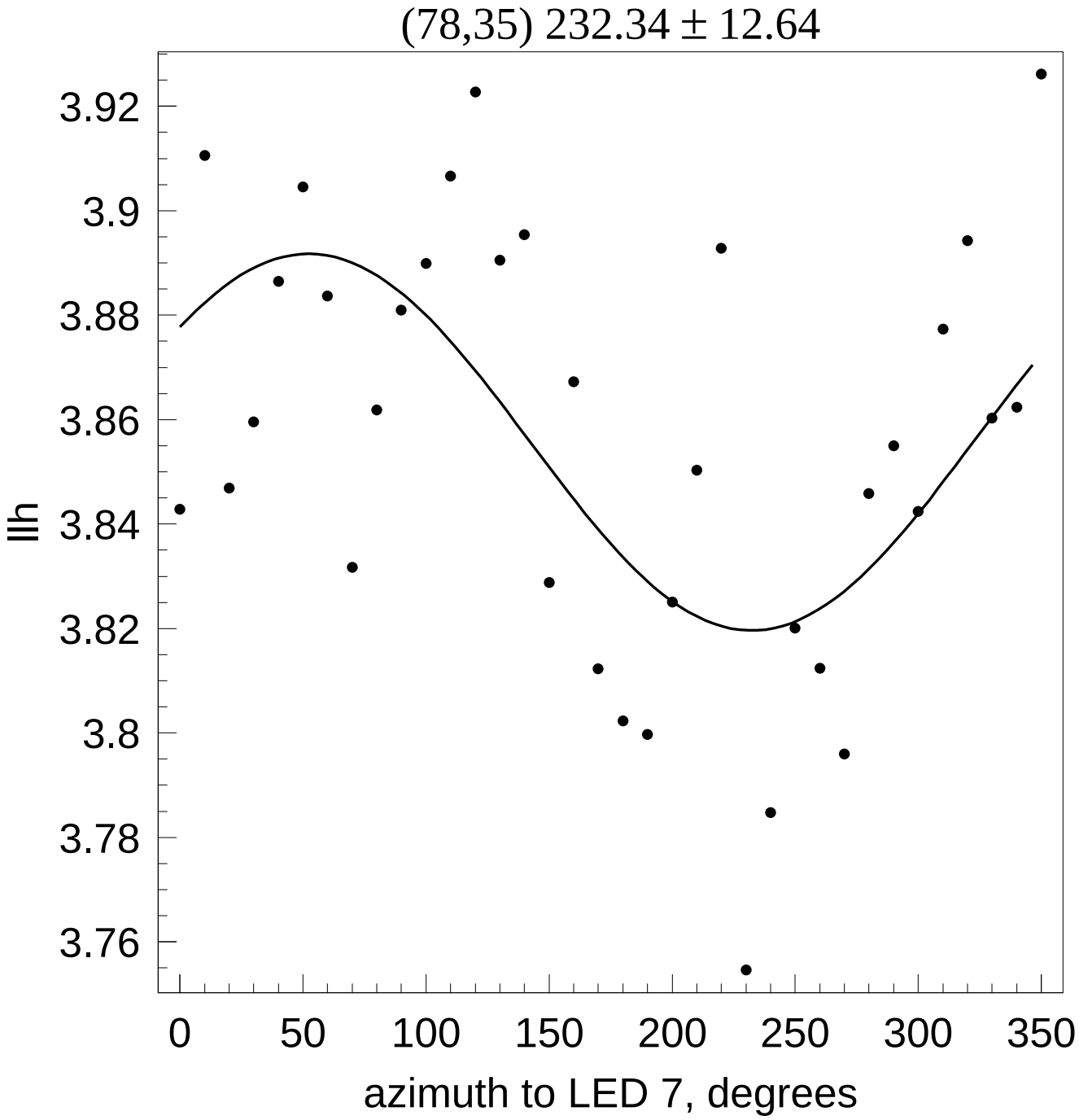

(78,34) 248.13 ± 2.53
4.95
4.9
4.85
4.8
4.75
4.7
4.65
4.6
4.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

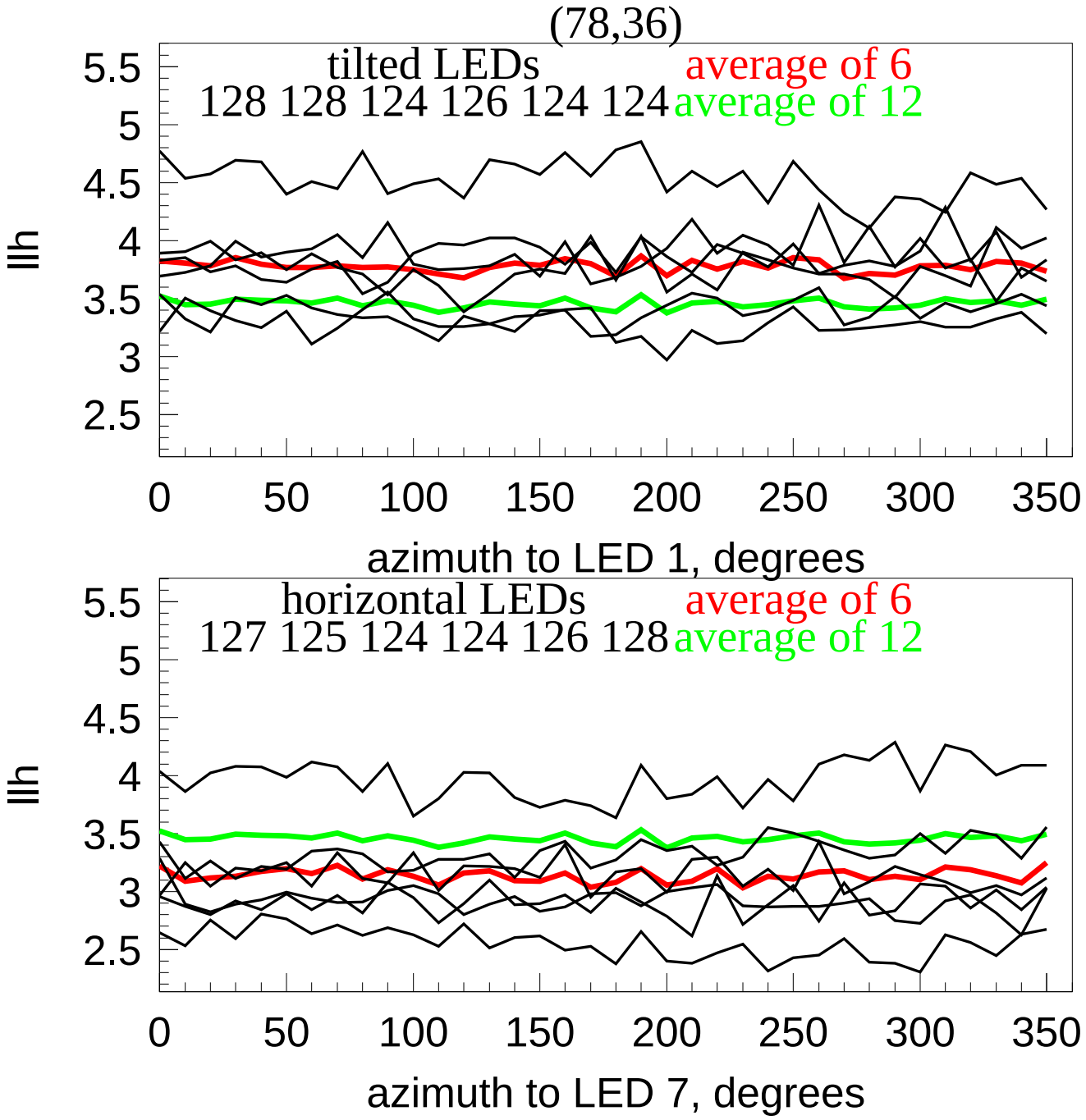

(78,34) 248.23 ± 2.74
4.95
4.9
4.85
4.8
4.75
4.7
4.65
4.6
4.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

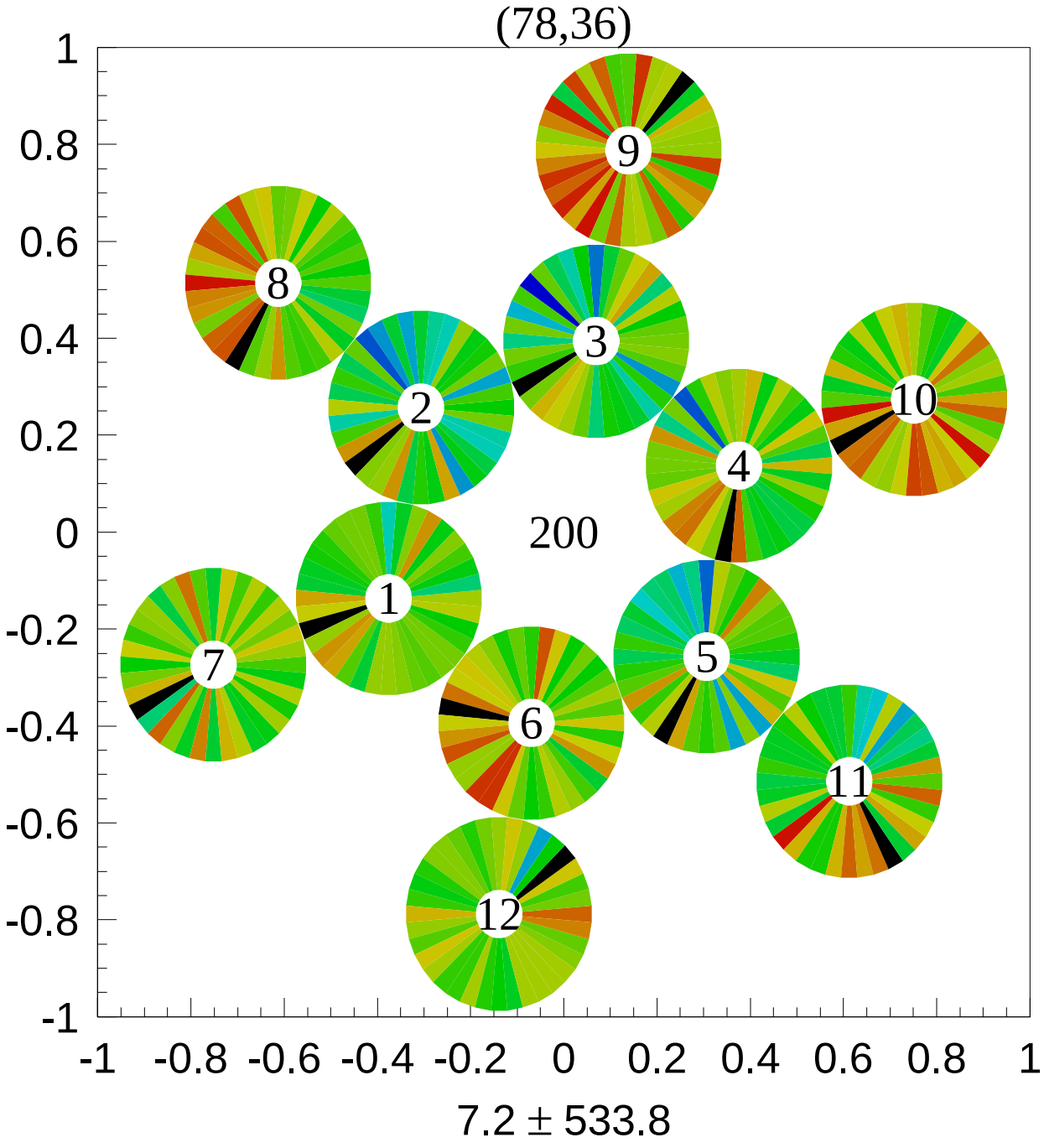

(78,35)
tilted LEDs
131 129 125 123 130 120
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 119 131 128 124 122
average of 6
average of 12
llh
azimuth to LED 7, degrees

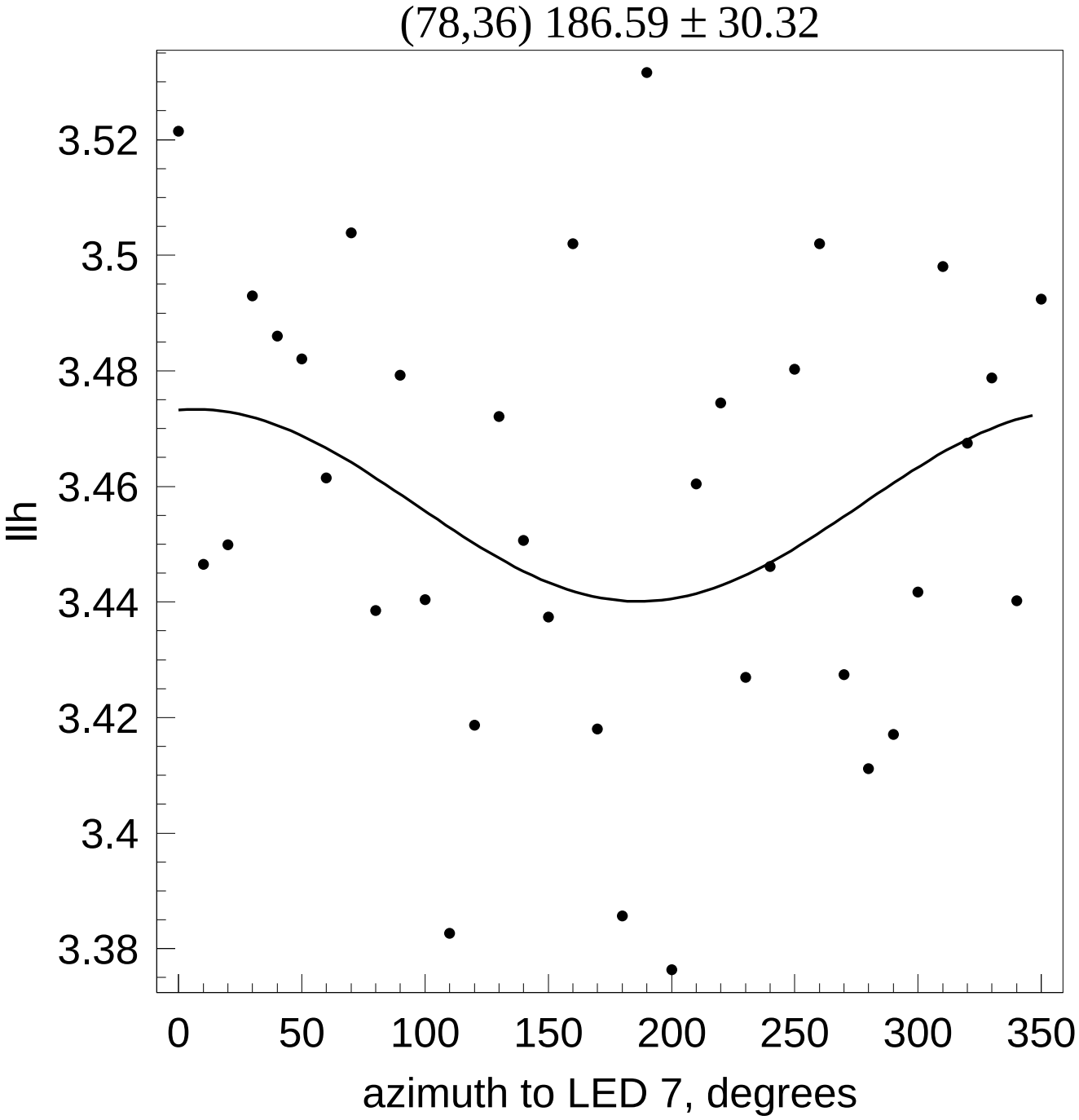

(78,35)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
4
8
2
230
5
11
1
6
7
12
223.2 ± 79.7

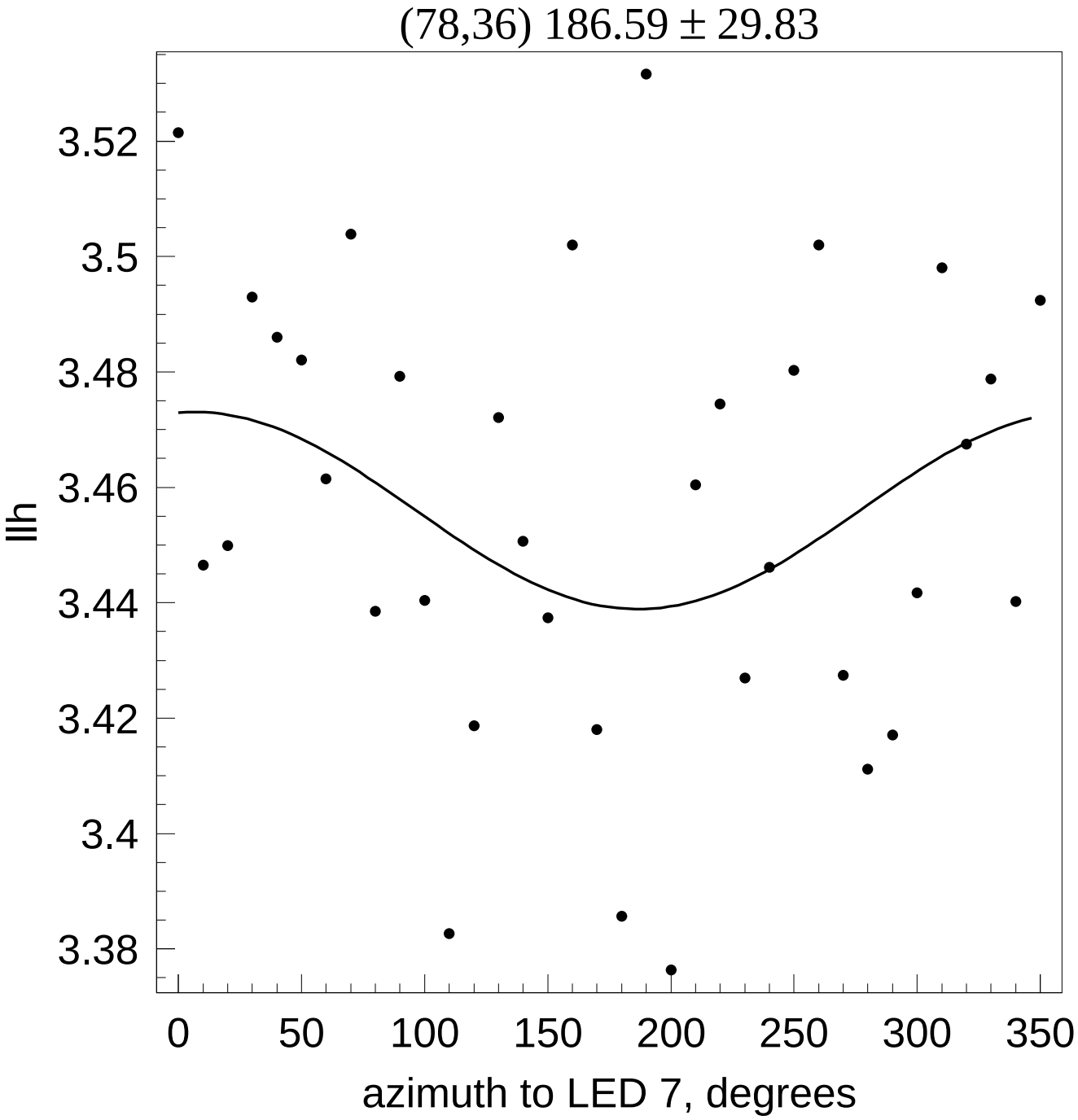

(78,35) 232.53 ± 12.71
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

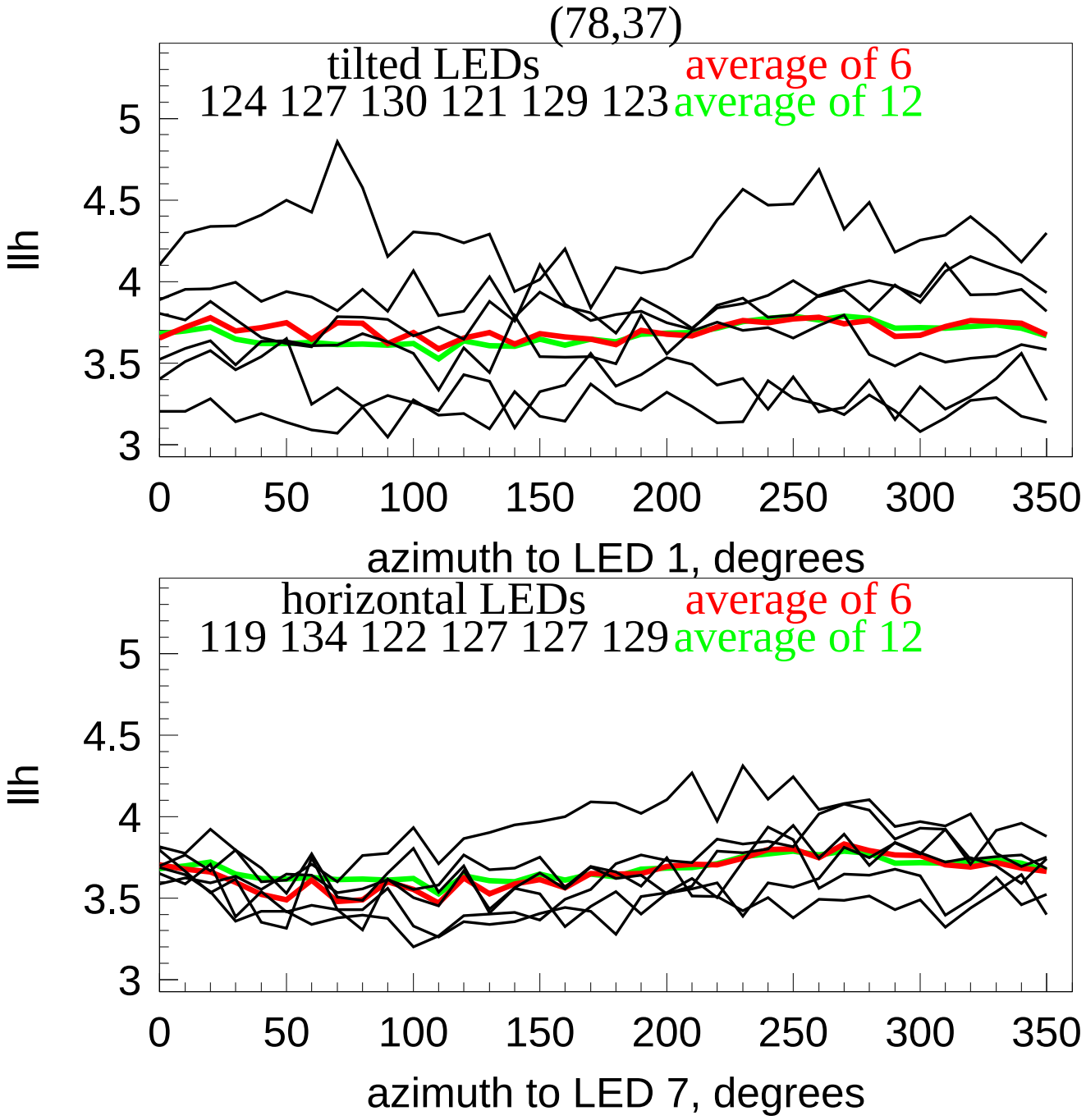

(78,35) 232.34 ± 12.64
3.92
3.9
3.88
3.86
3.84
3.82
3.8
3.78
3.76
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

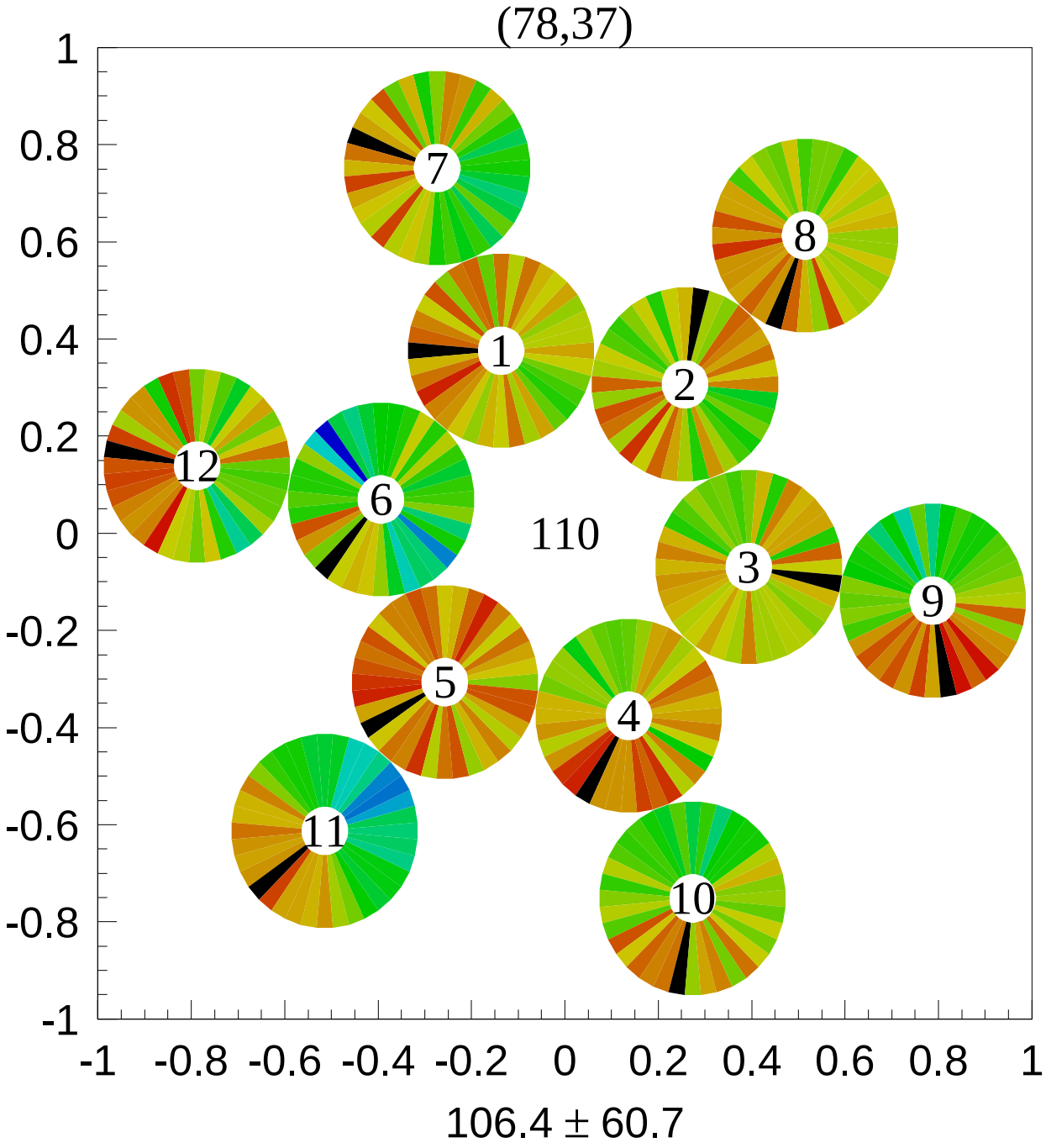

(78,36)
tilted LEDs
128 128 124 126 124 124
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
127 125 124 124 126 128
average of 6
average of 12
llh
5.5
5
4.5
4
3.5
3
2.5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

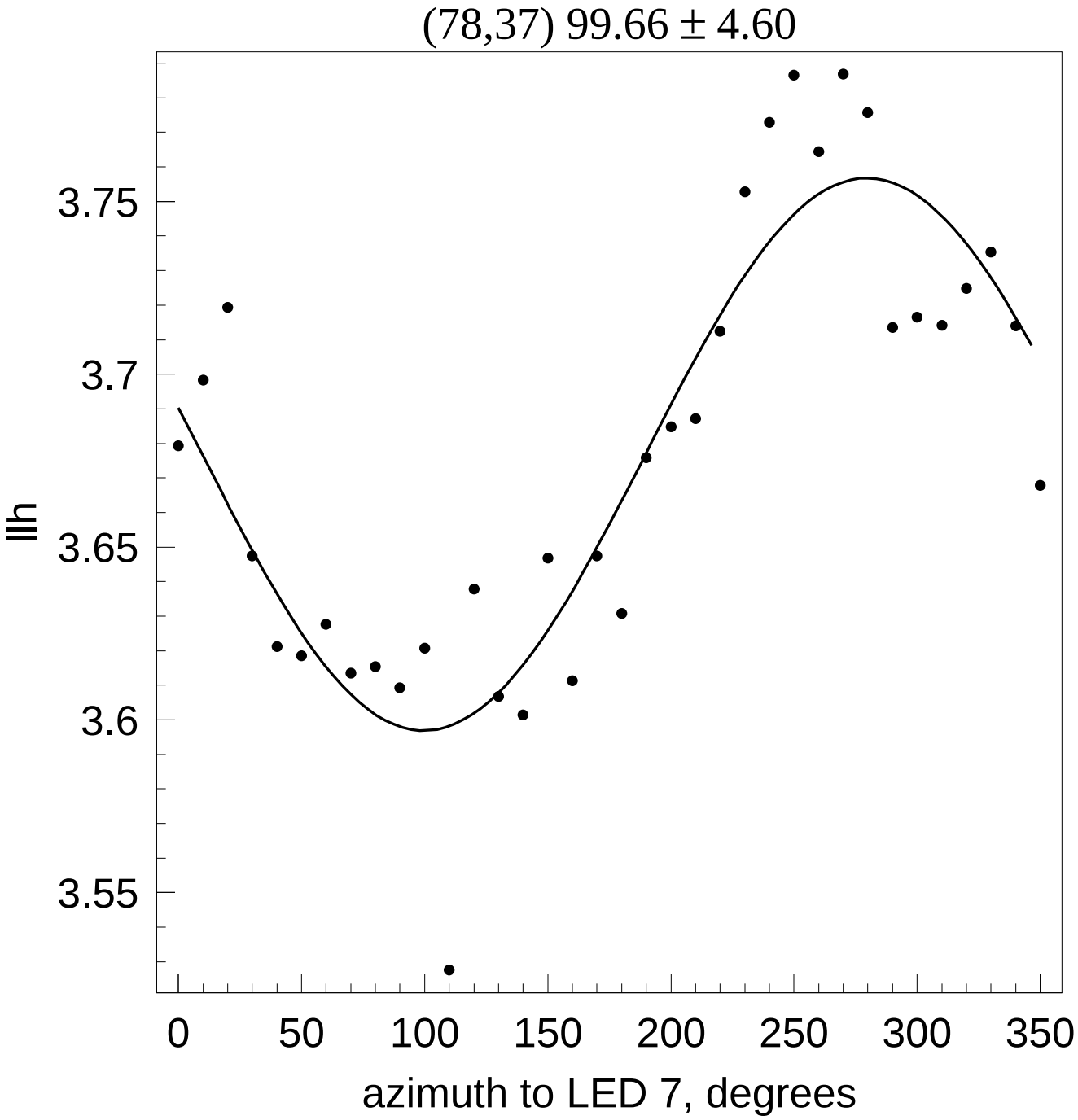

(78,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7.2 ± 533.8
200
1
2
3
4
5
6
7
8
9
10
11
12

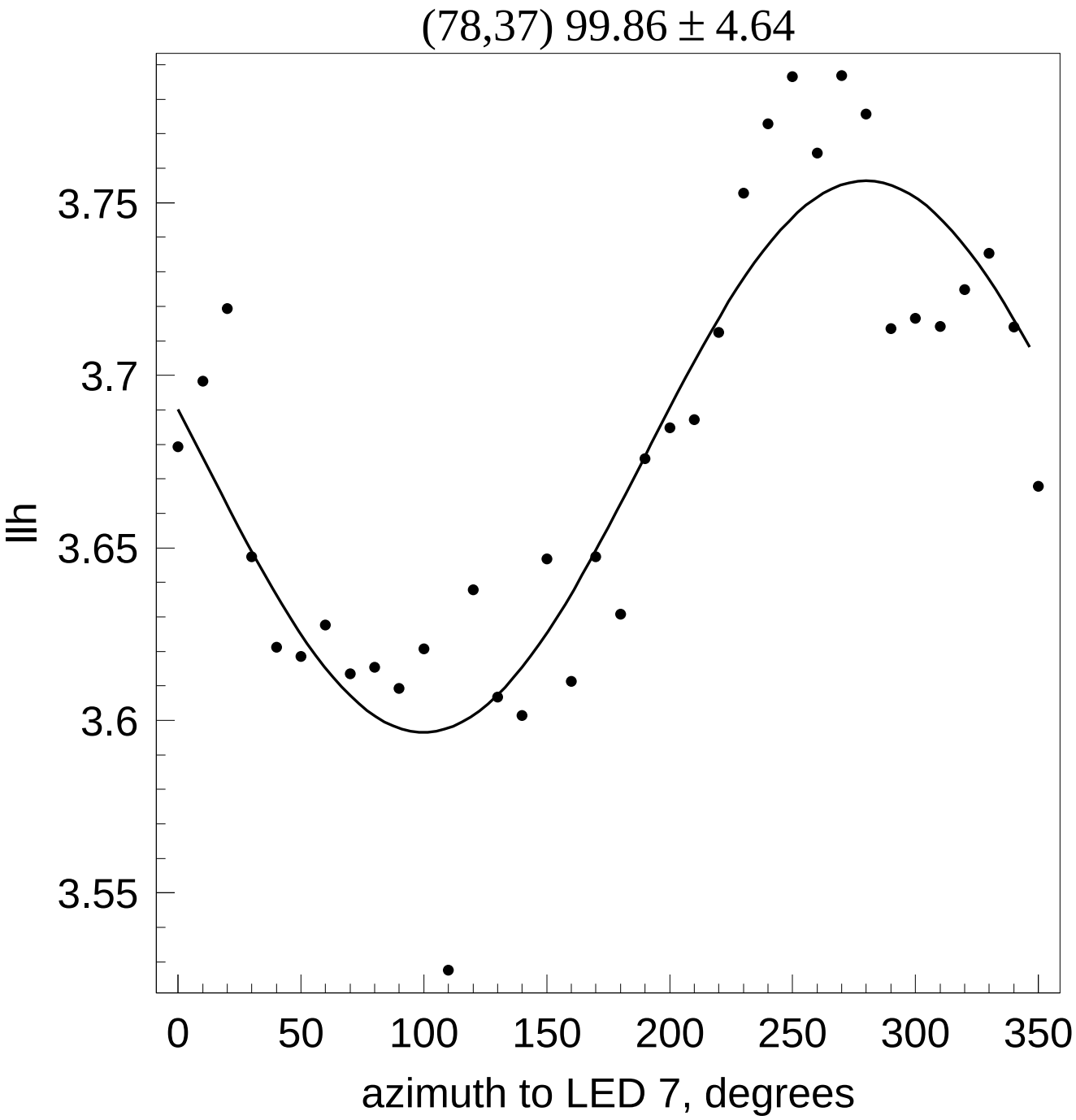

(78,36) 186.59 ± 30.32
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

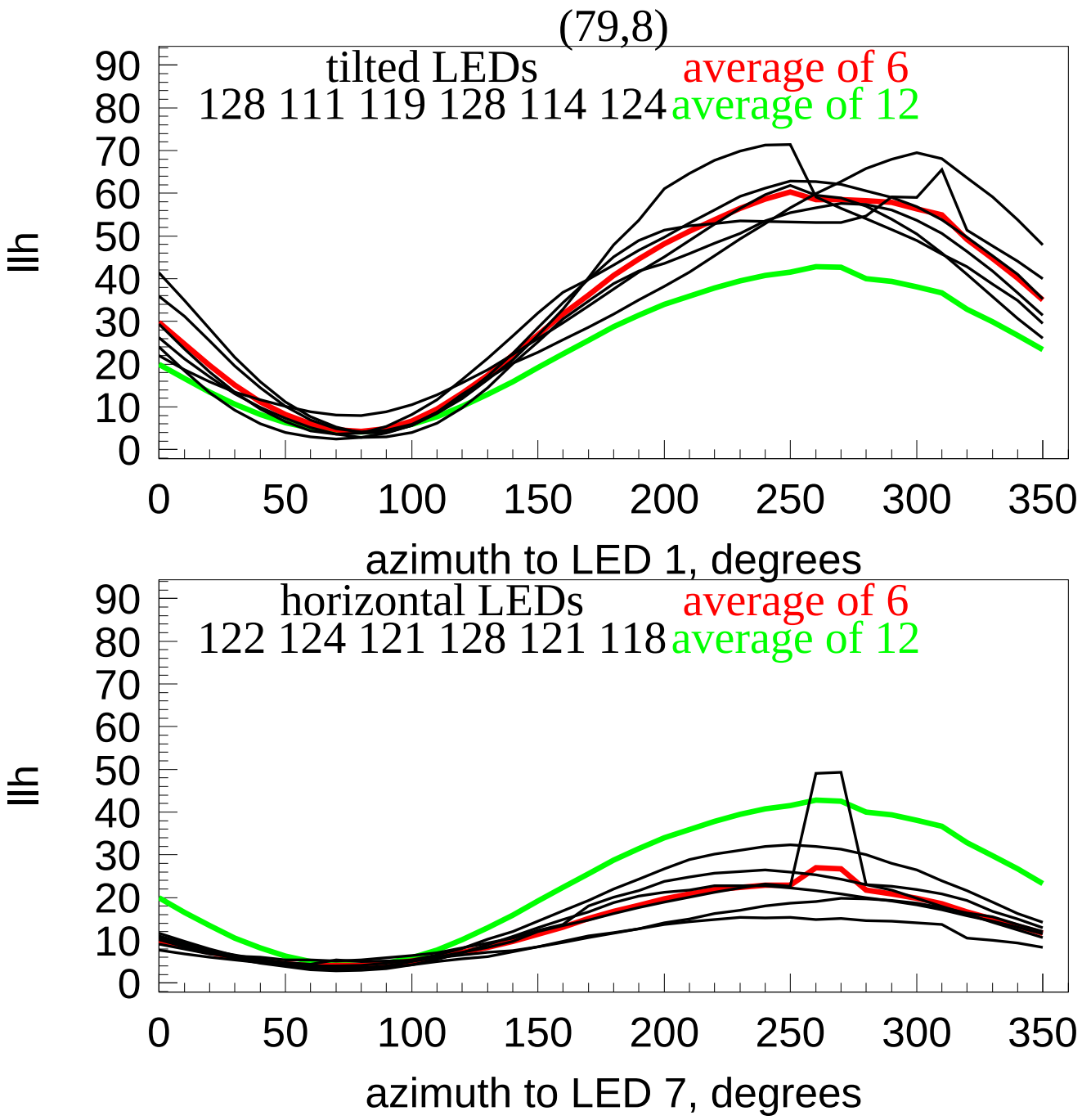

(78,36) 186.59 ± 29.83
3.52
3.5
3.48
3.46
3.44
3.42
3.4
3.38
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

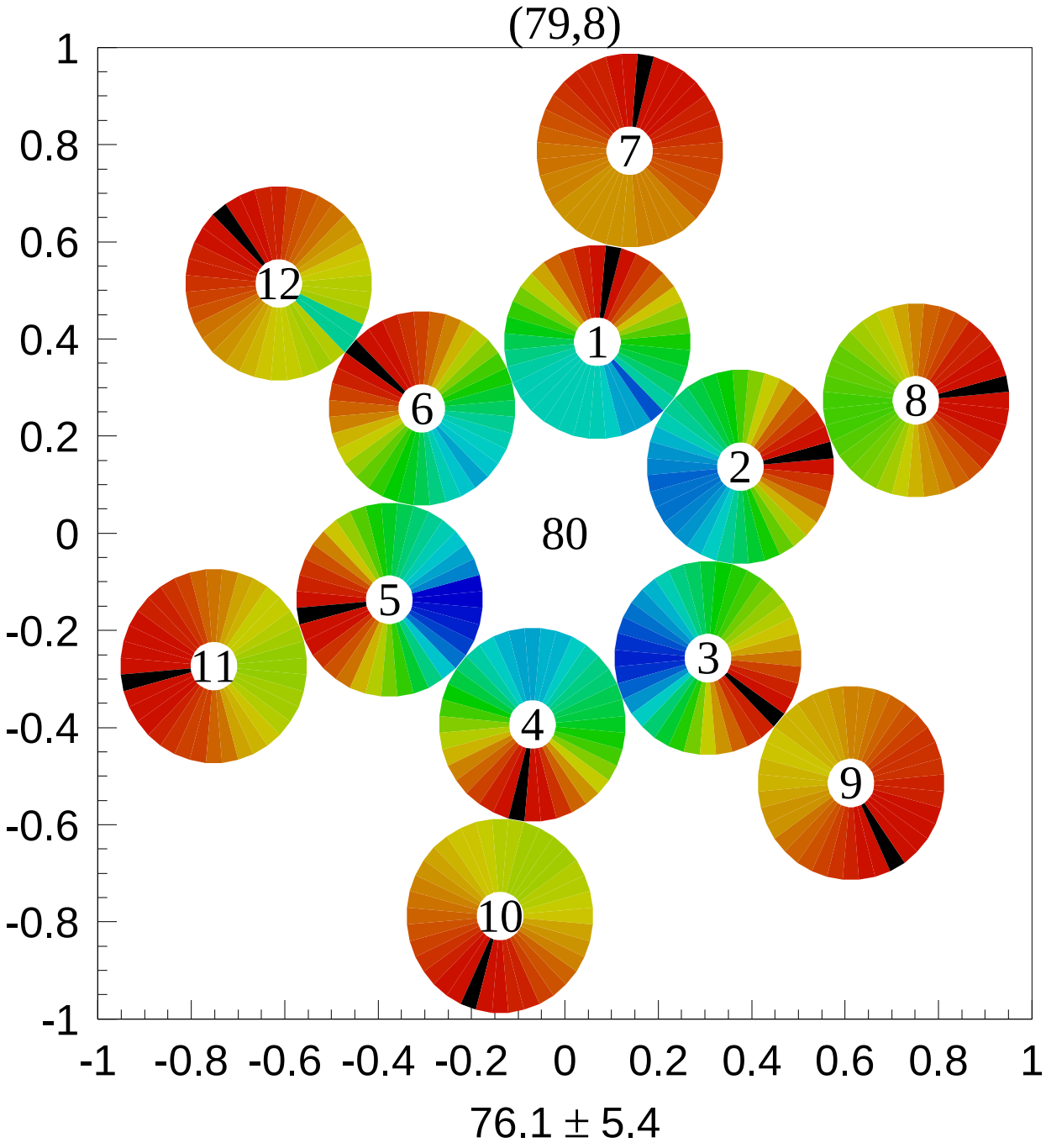

(78,37)
tilted LEDs
124 127 130 121 129 123
average of 6
average of 12
llh
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 1, degrees
horizontal LEDs
119 134 122 127 127 129
average of 6
average of 12
llh
5
4.5
4
3.5
3
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

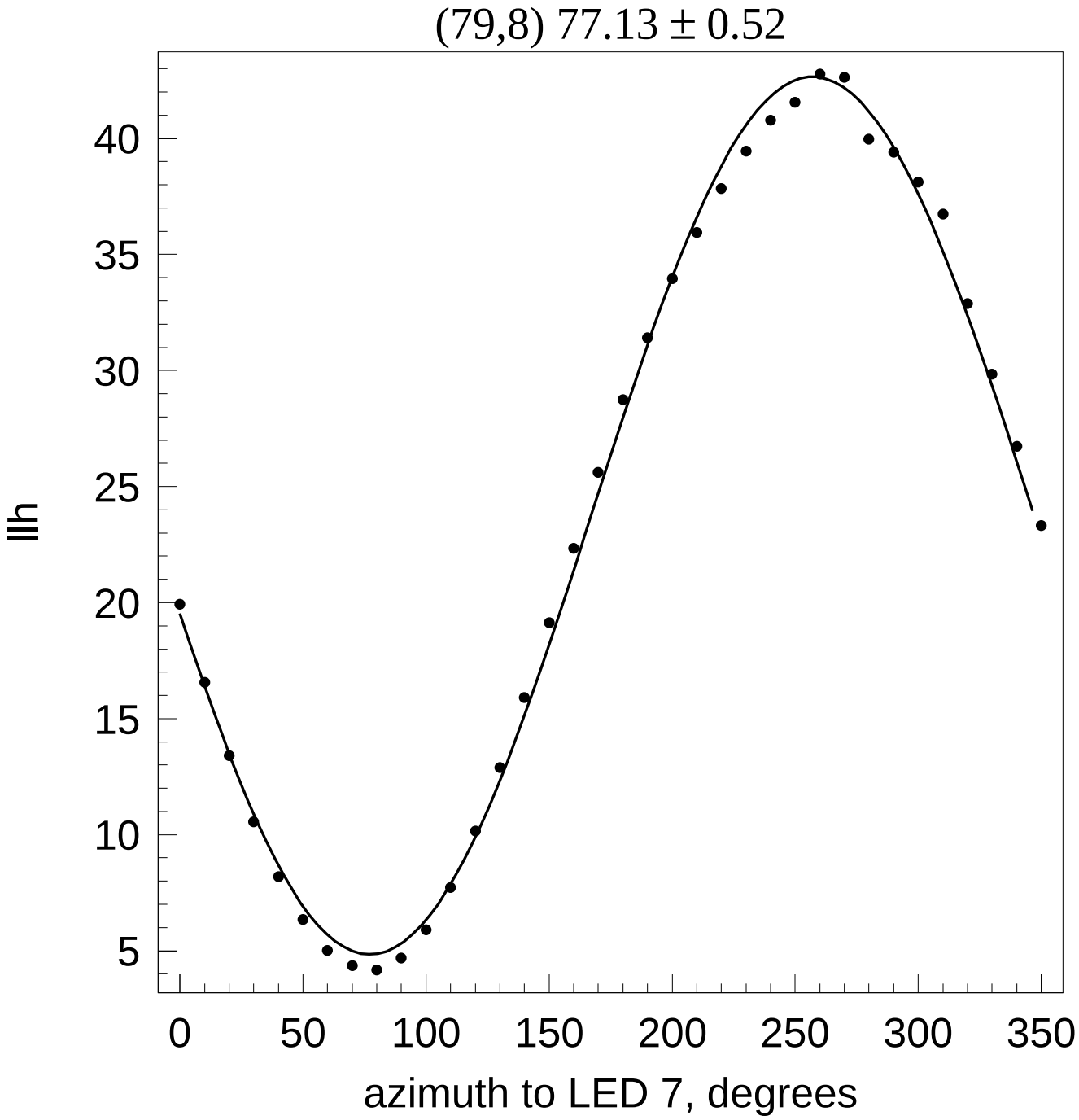

(78,37)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
106.4 ± 60.7
7
8
1
2
12
6
110
3
9
5
4
11
10

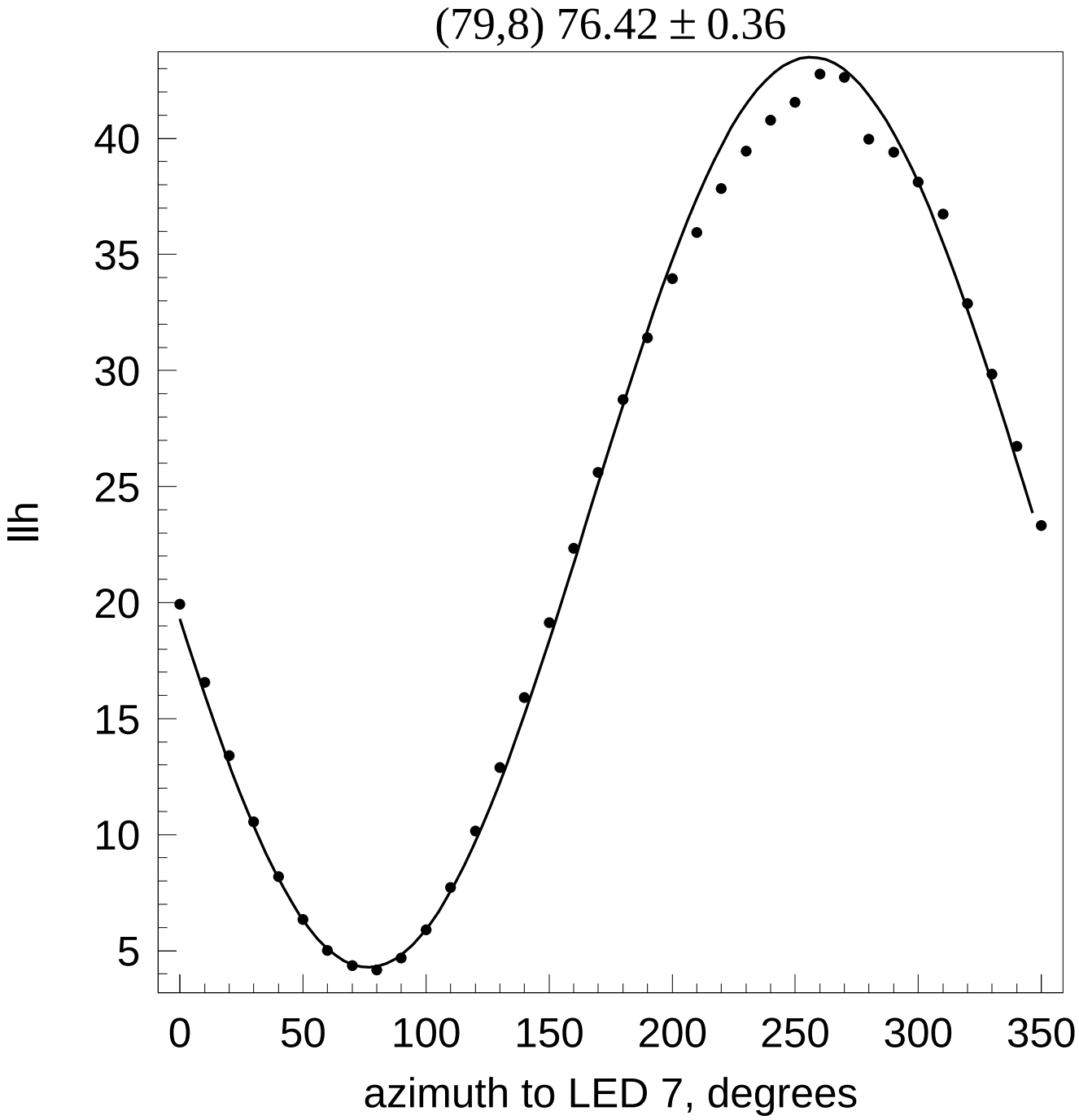

(78,37) 99.66 ± 4.60
3.75
3.7
3.65
3.6
3.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

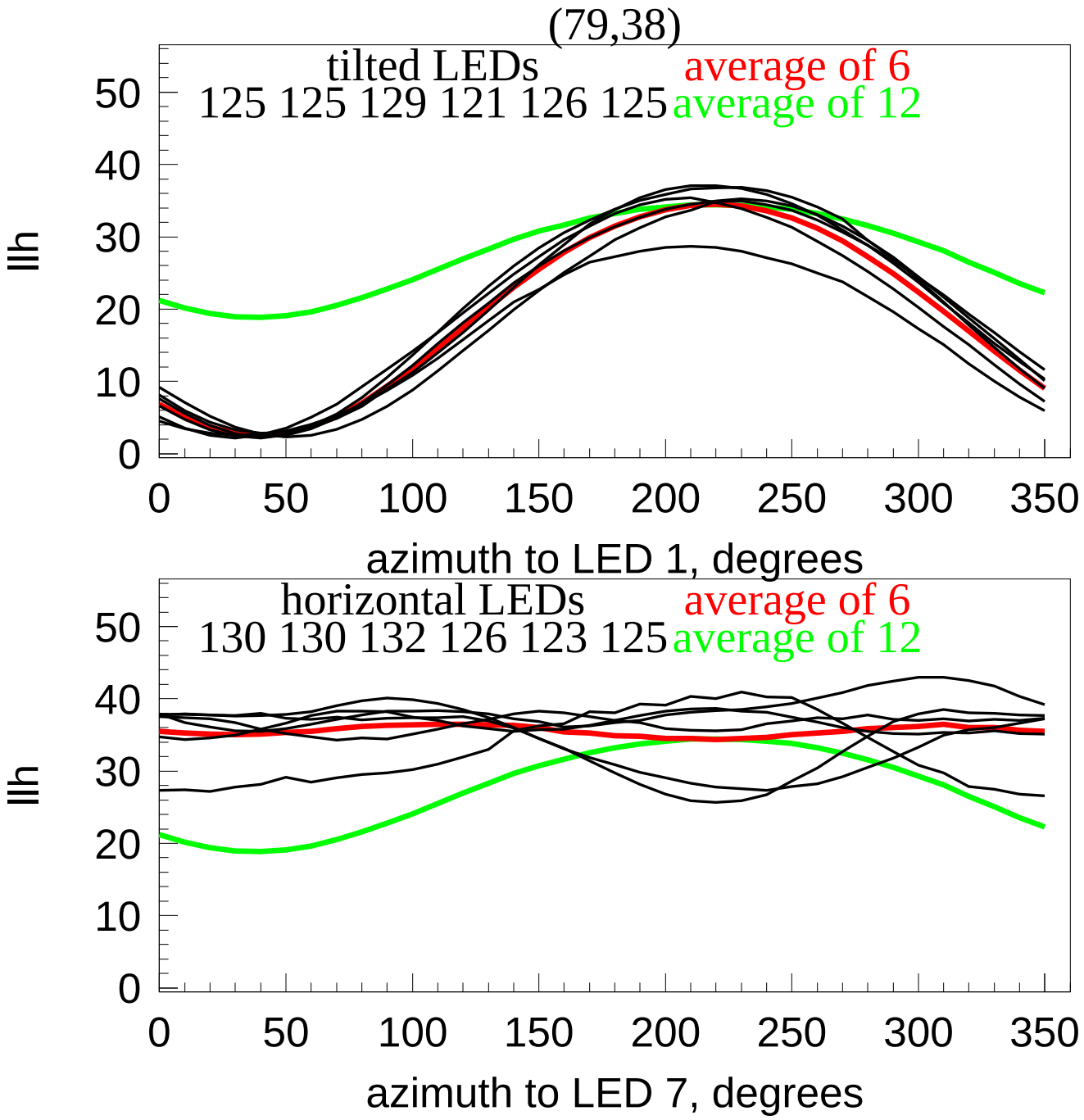

(78,37) 99.86 ± 4.64
3.75
3.7
3.65
3.6
3.55
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

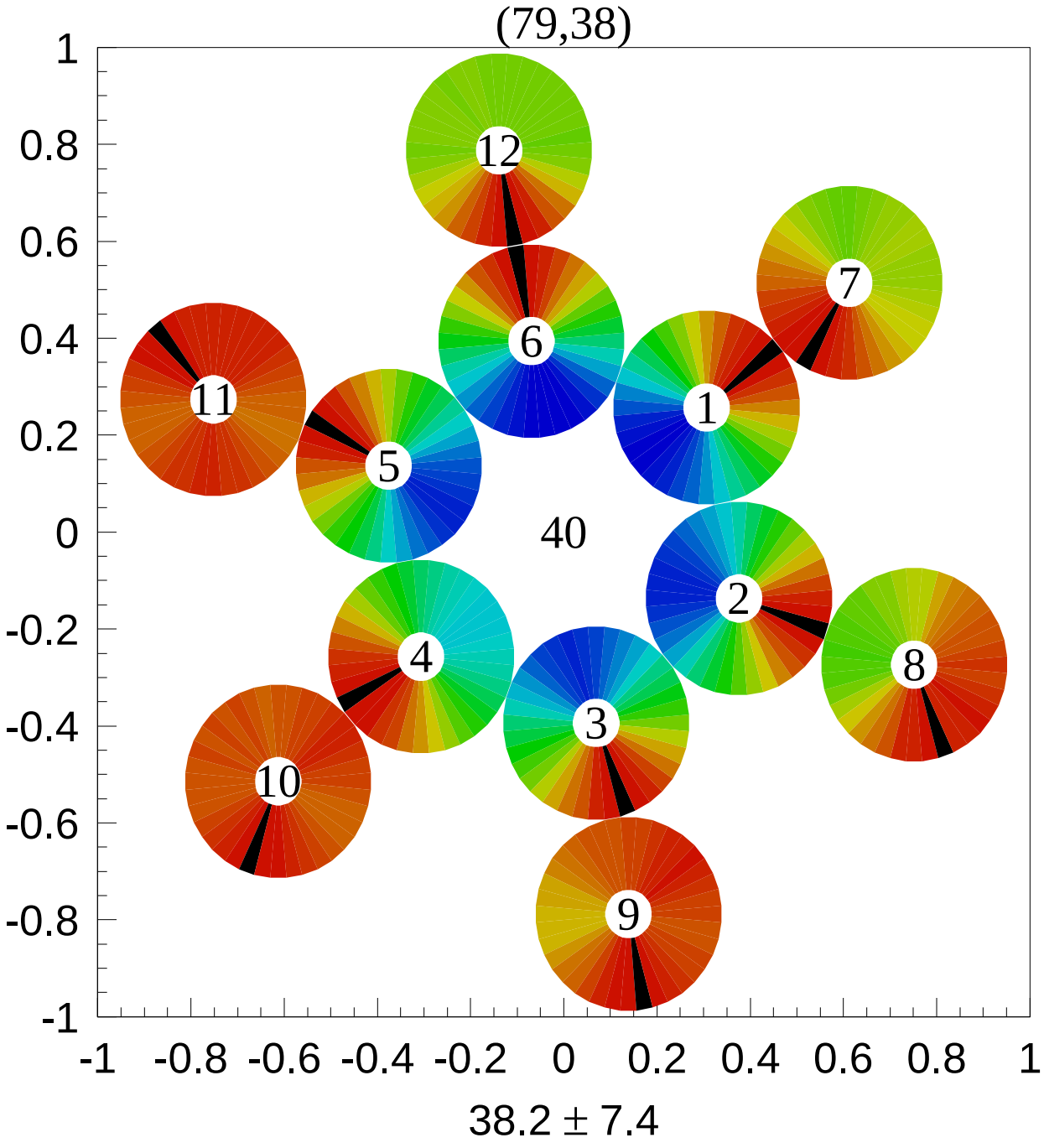

(79,8)
tilted LEDs
128 111 119 128 114 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
122 124 121 128 121 118
average of 6
average of 12
llh
azimuth to LED 7, degrees

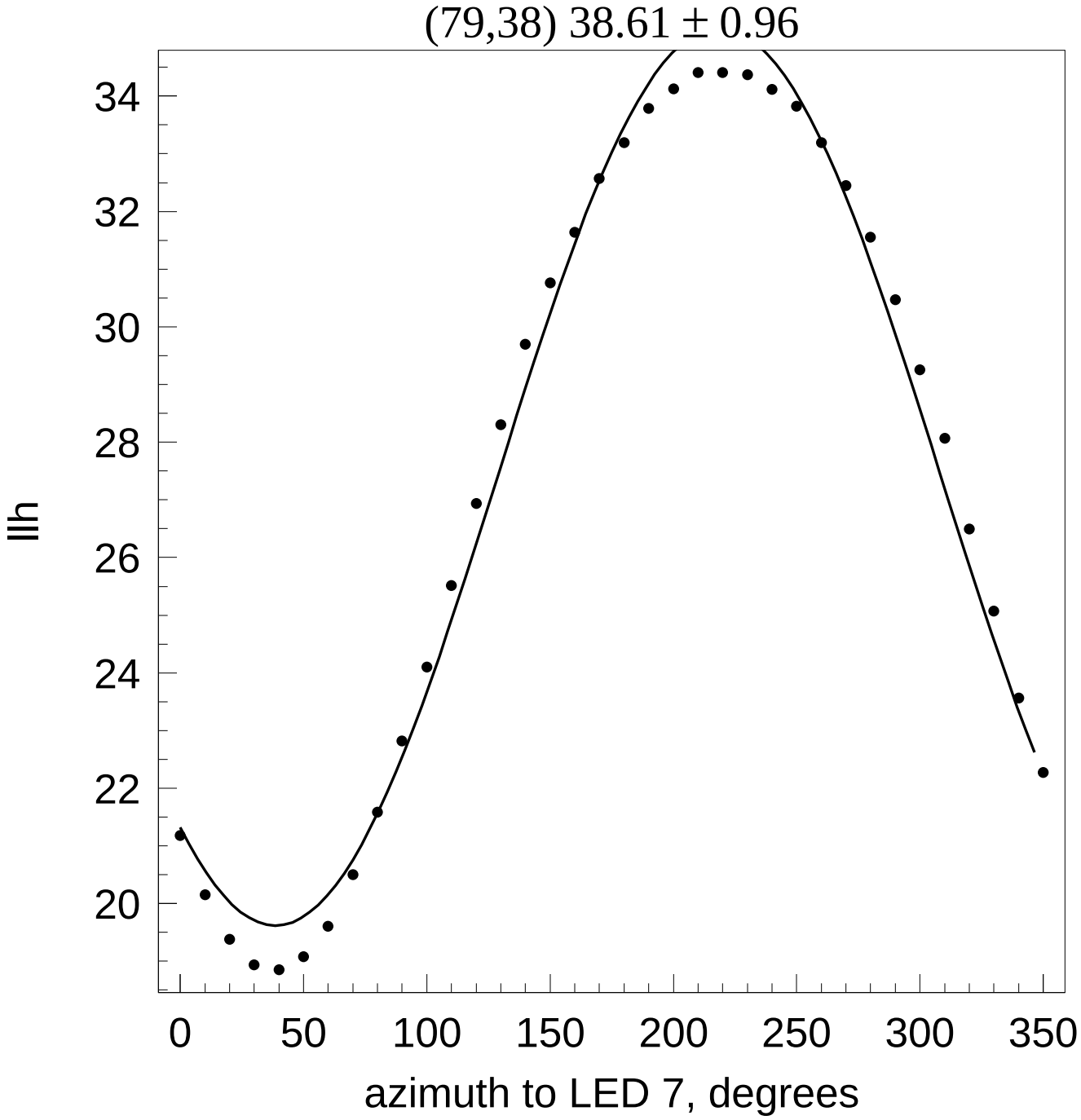

(79,8)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
80
5
11
3
4
9
10
76.1 ± 5.4

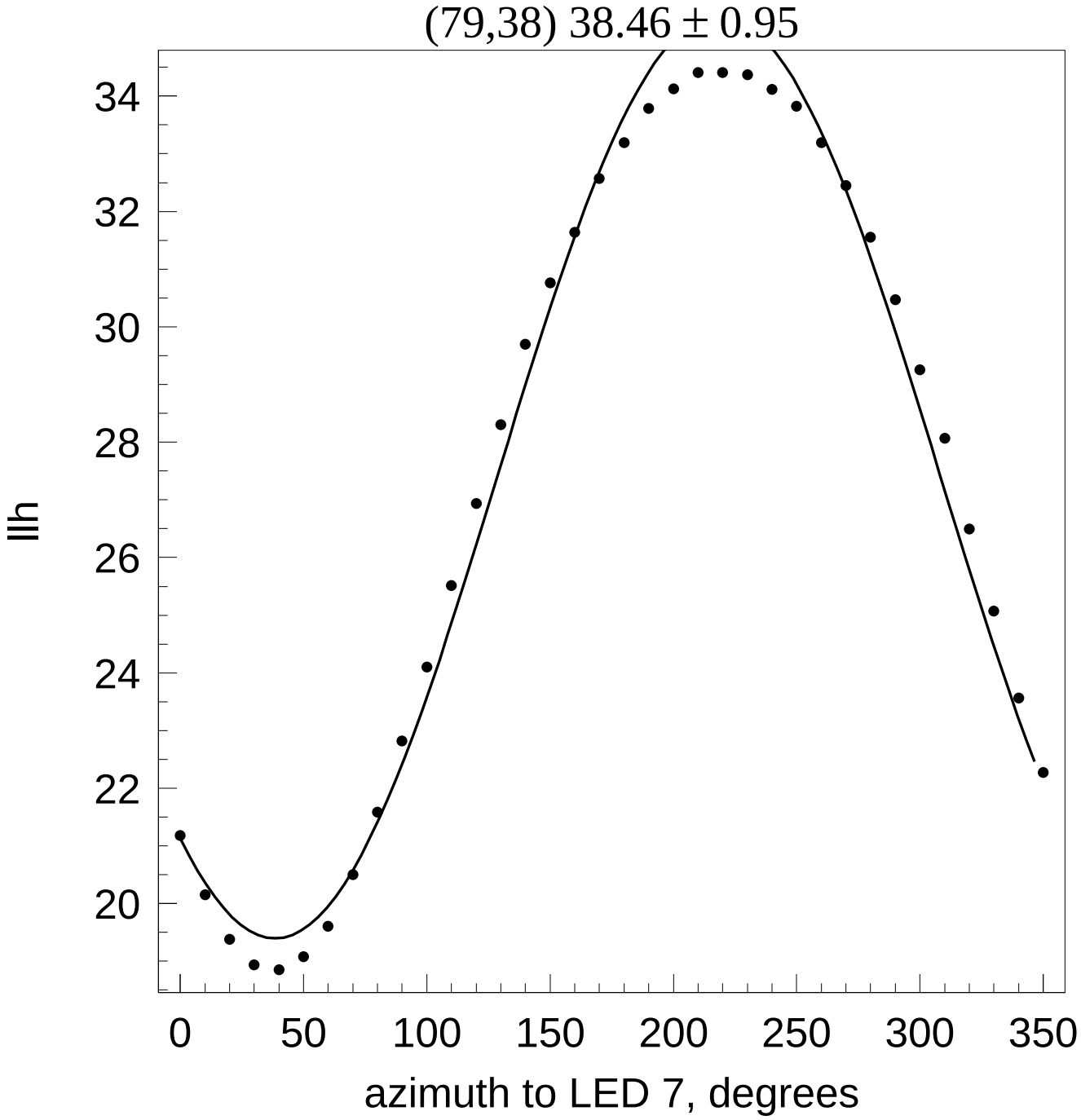

(79,8) 77.13 ± 0.52
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

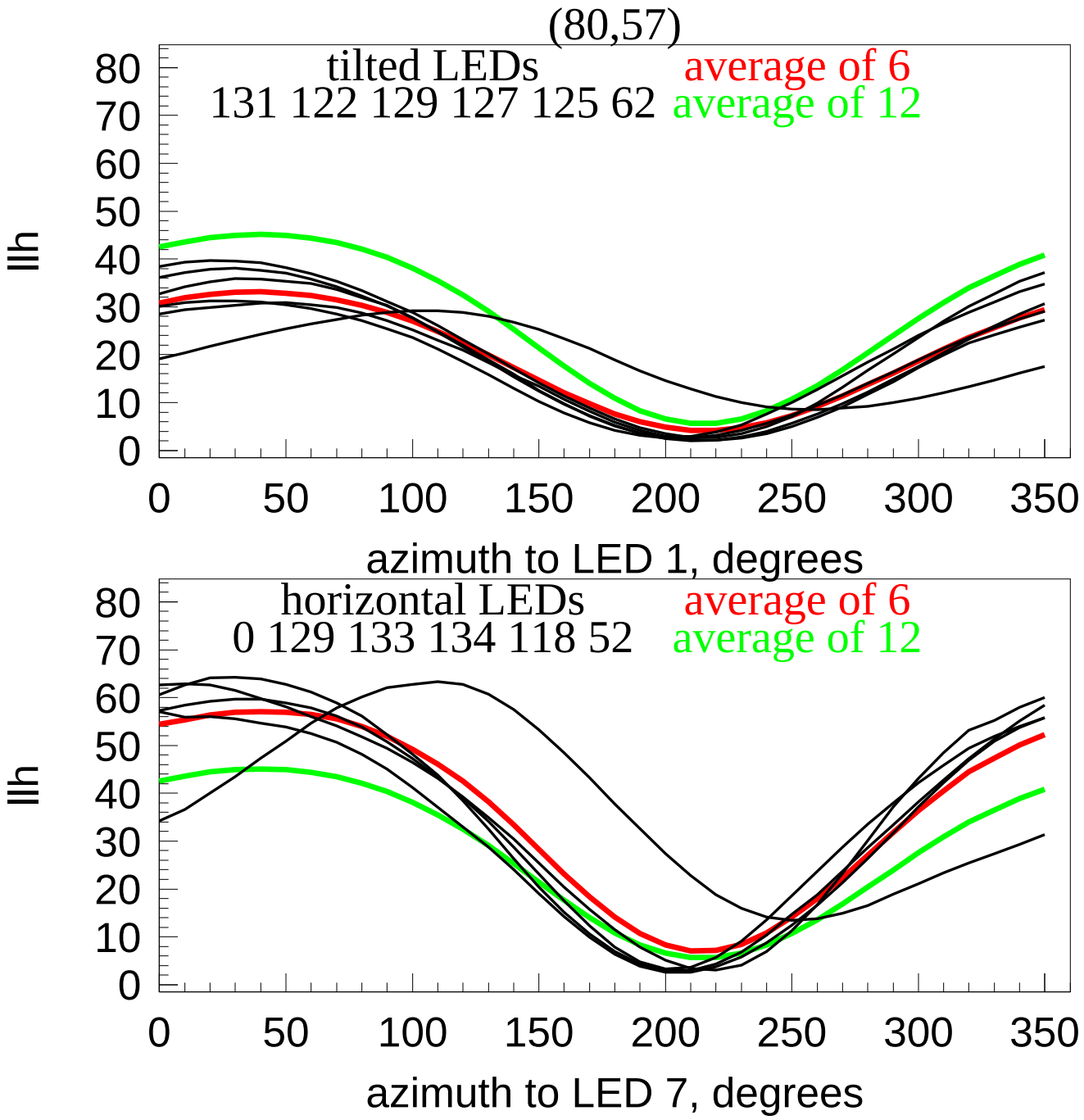

(79,8) 76.42 ± 0.36
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

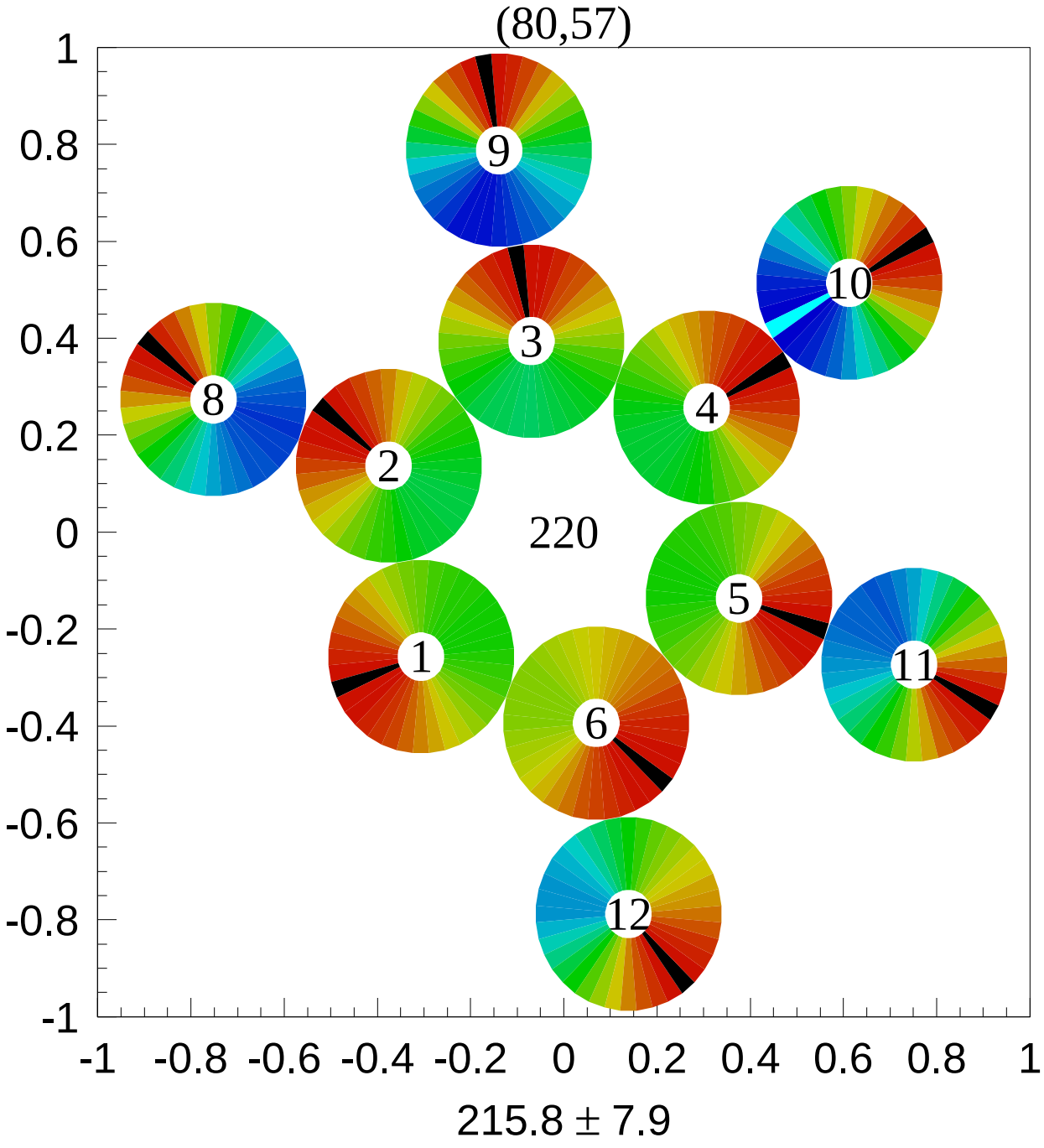

(79,38)
tilted LEDs
125 125 129 121 126 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
130 130 132 126 123 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

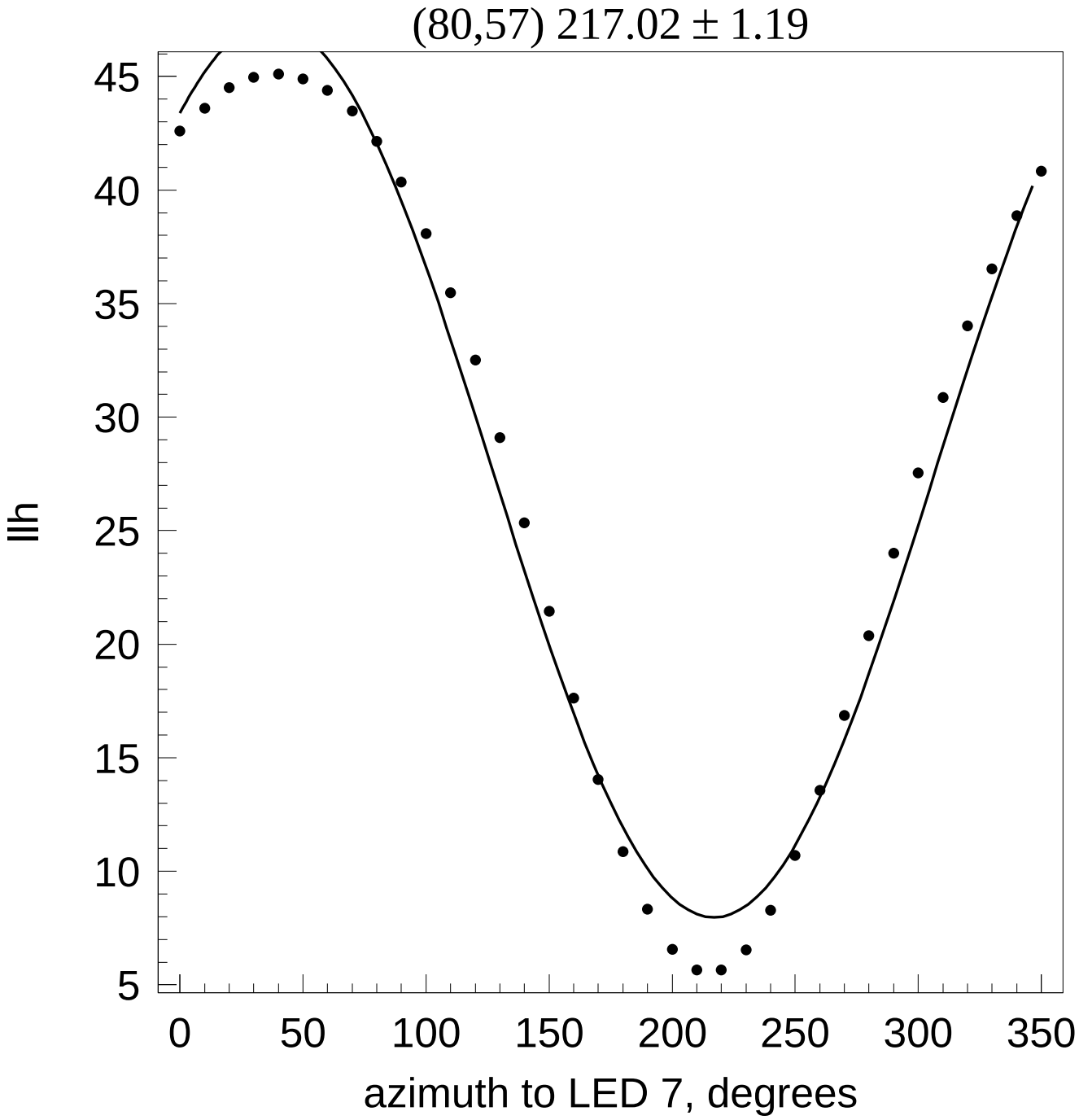

(79,38)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
12
7
6
11
1
5
40
2
8
4
3
10
9
38.2 ± 7.4

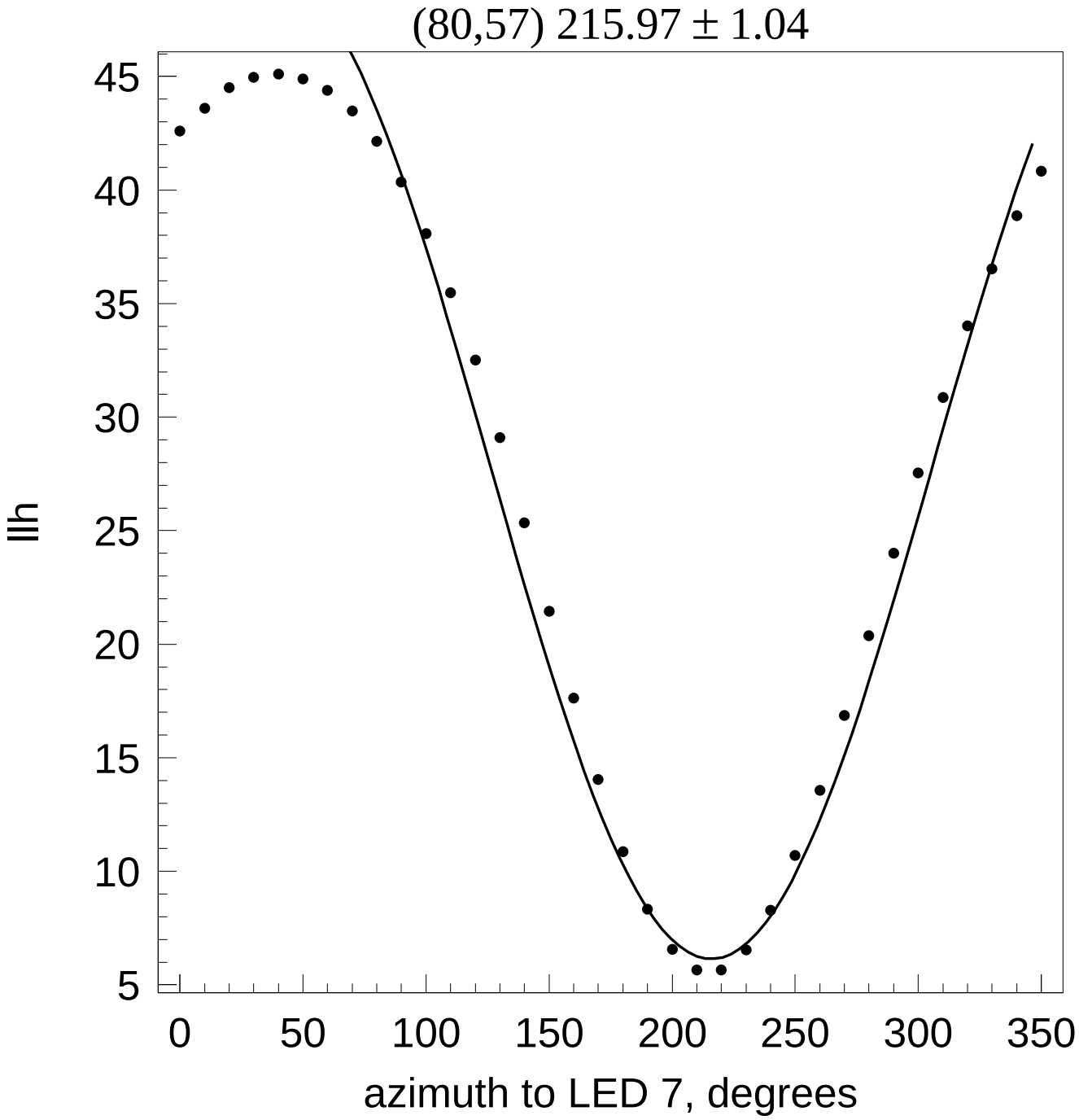

(79,38) 38.61 ± 0.96
34
32
30
28
26
24
22
20
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

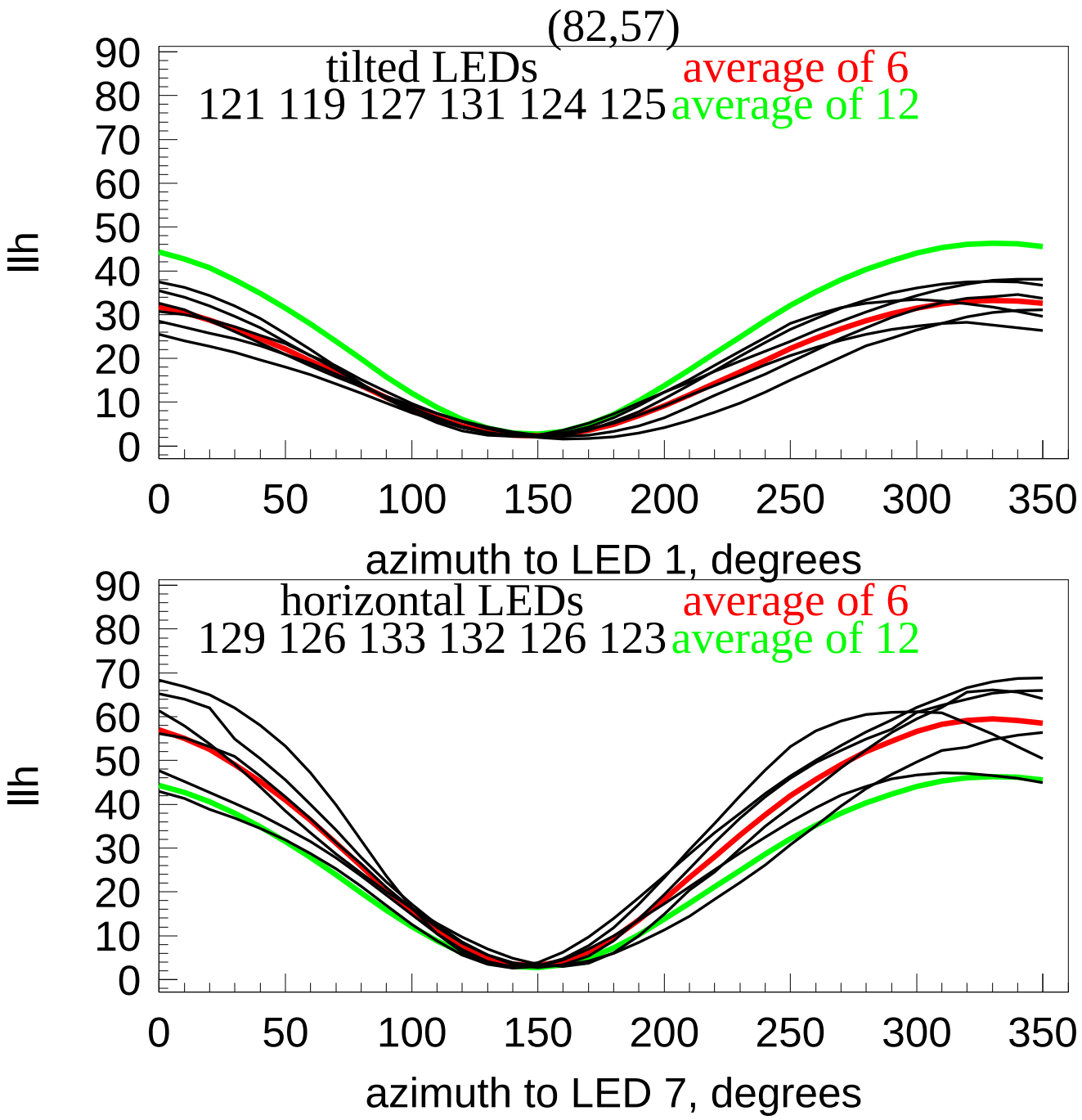

(79,38) 38.46 ± 0.95
34
32
30
28
26
24
22
20
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

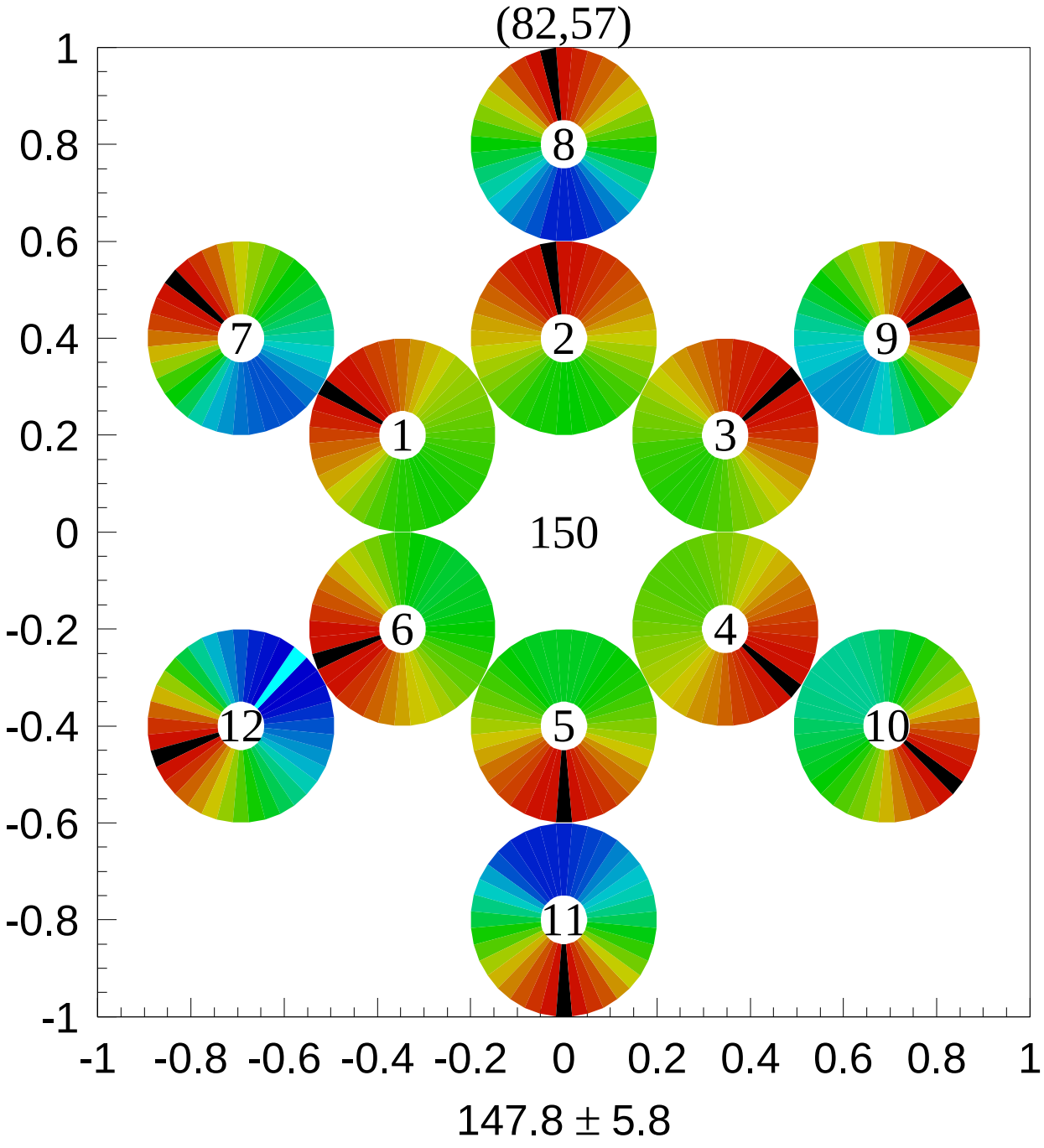

(80,57)
tilted LEDs
131 122 129 127 125 62
average of 6
average of 12
Ilh
azimuth to LED 1, degrees
horizontal LEDs
0 129 133 134 118 52
average of 6
average of 12
Ilh
azimuth to LED 7, degrees

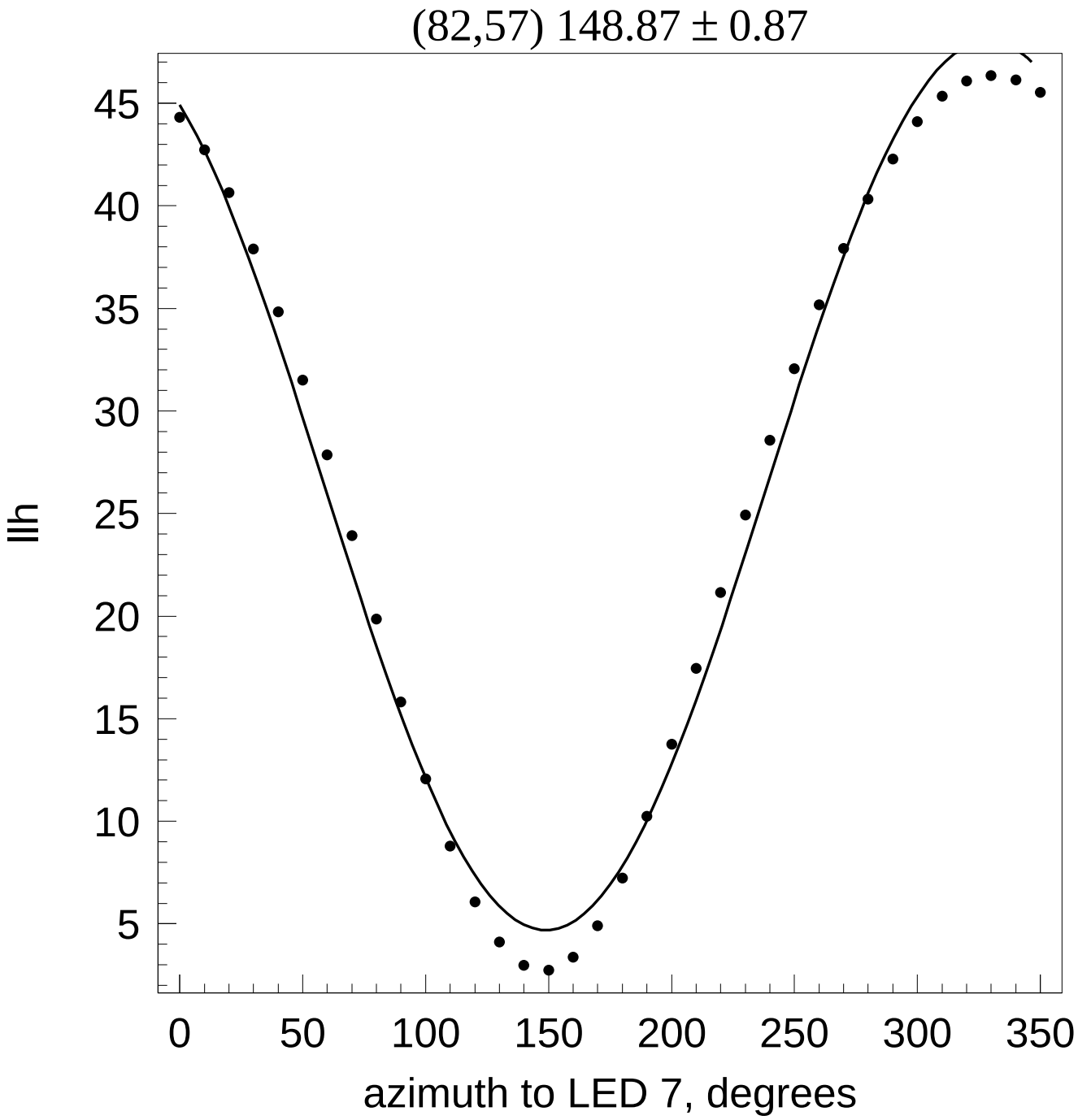

(80,57)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
9
10
3
8
4
2
220
5
1
11
6
12
215.8 ± 7.9

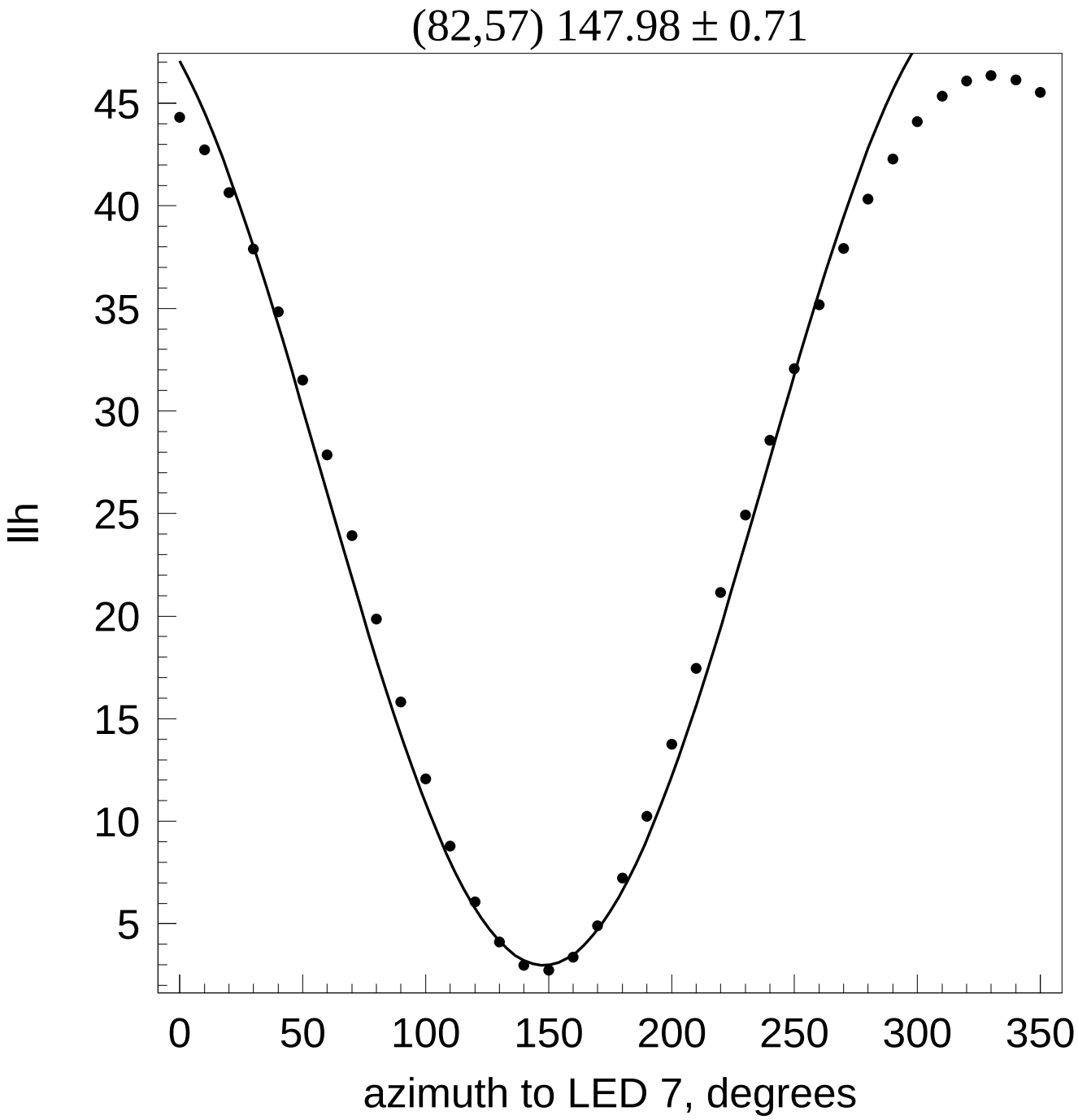

(80,57) 217.02 ± 1.19
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

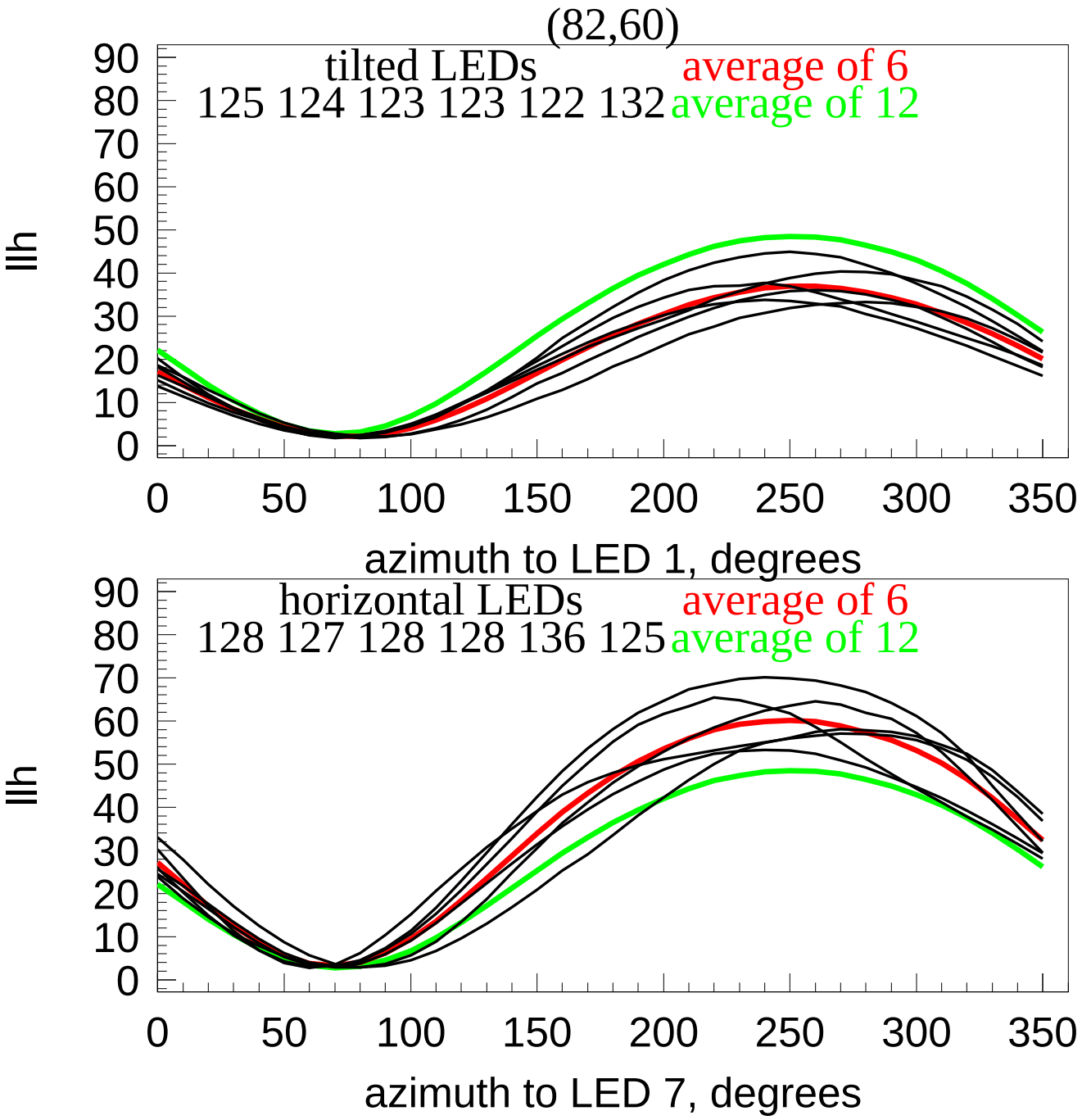

(80,57) 215.97 ± 1.04
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

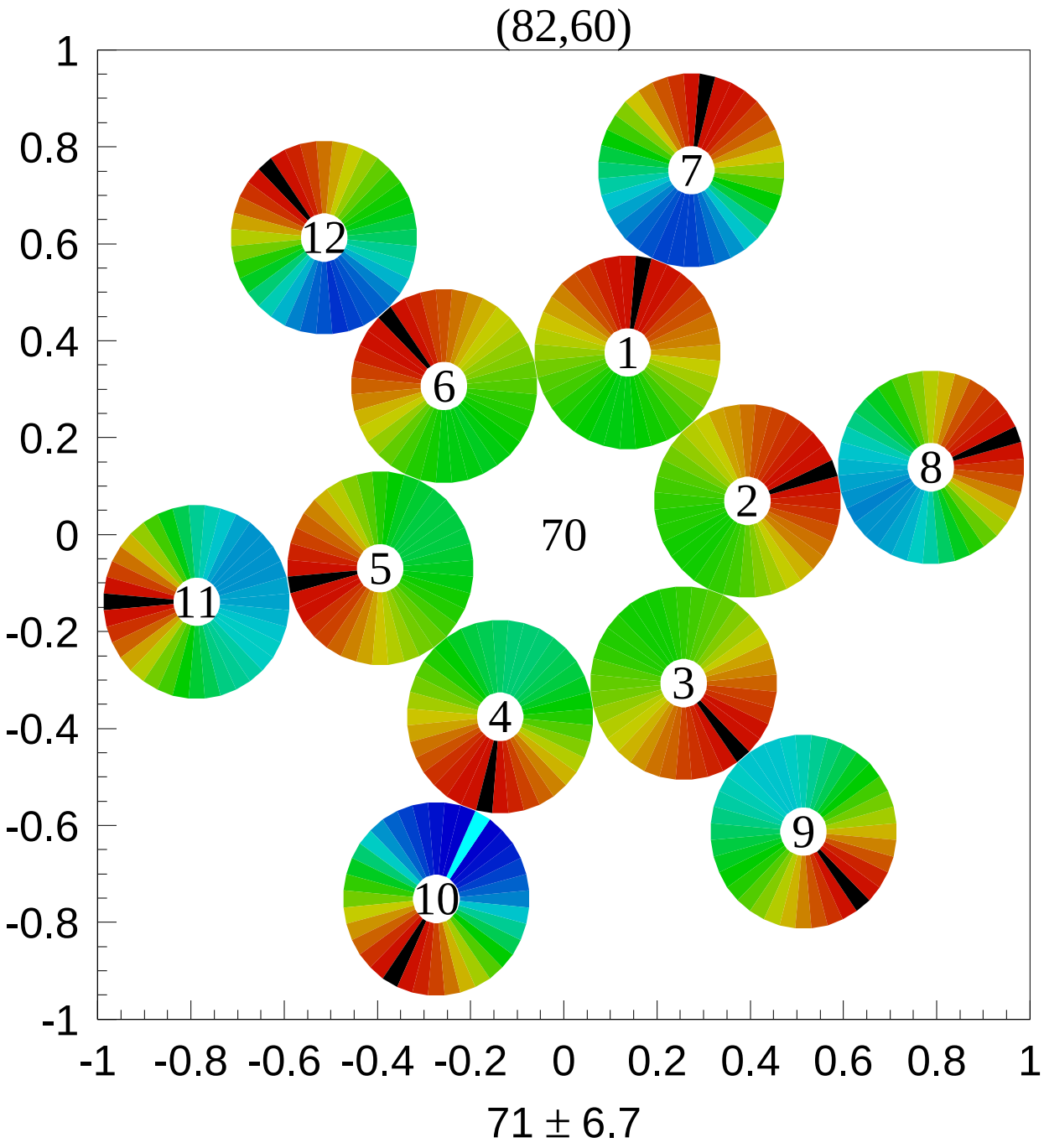

(82,57)
tilted LEDs
121 119 127 131 124 125
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
129 126 133 132 126 123
average of 6
average of 12
llh
azimuth to LED 7, degrees

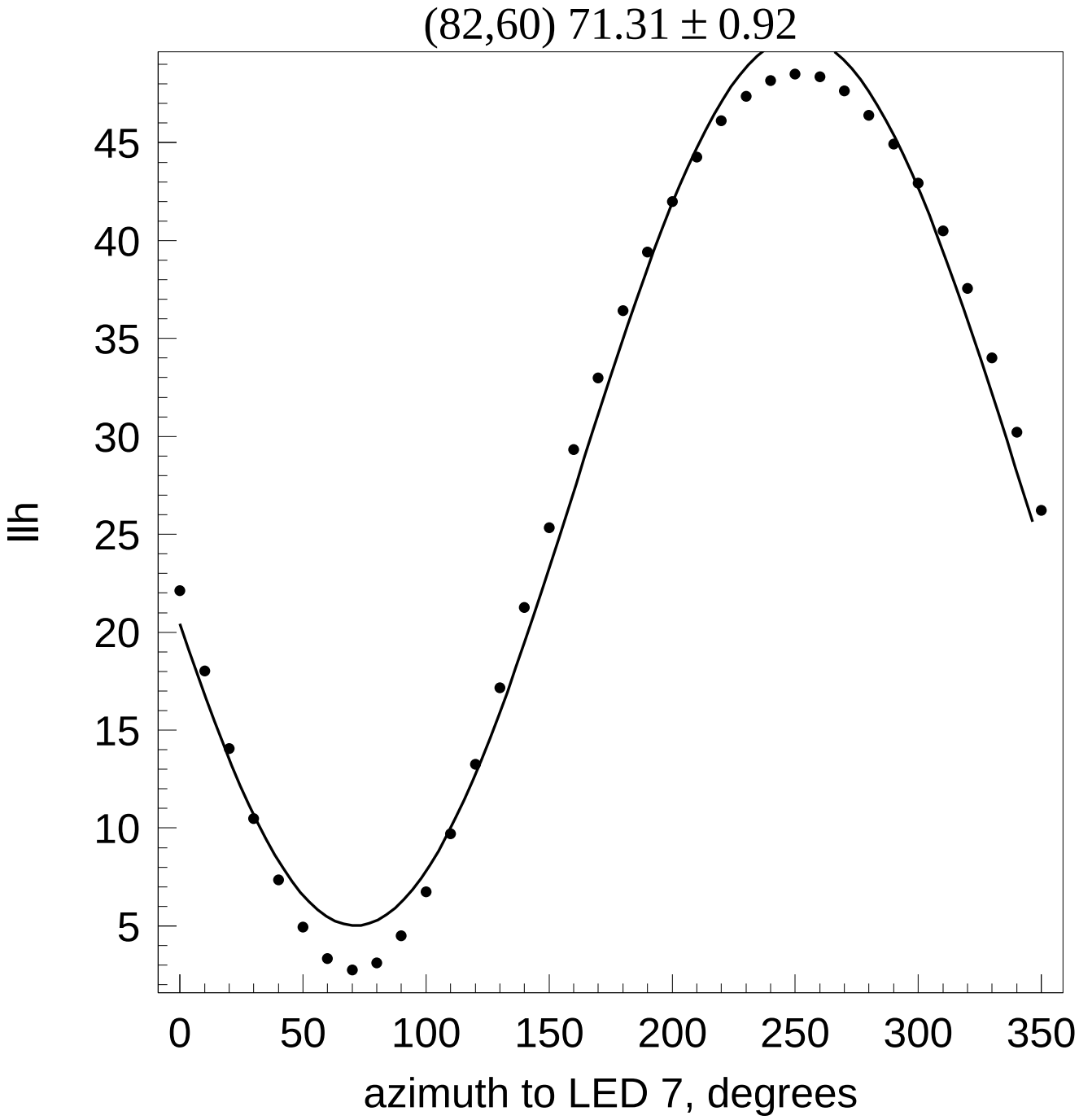

(82,57)
8
7
2
9
1
3
150
6
4
12
5
10
11
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
147.8 ± 5.8

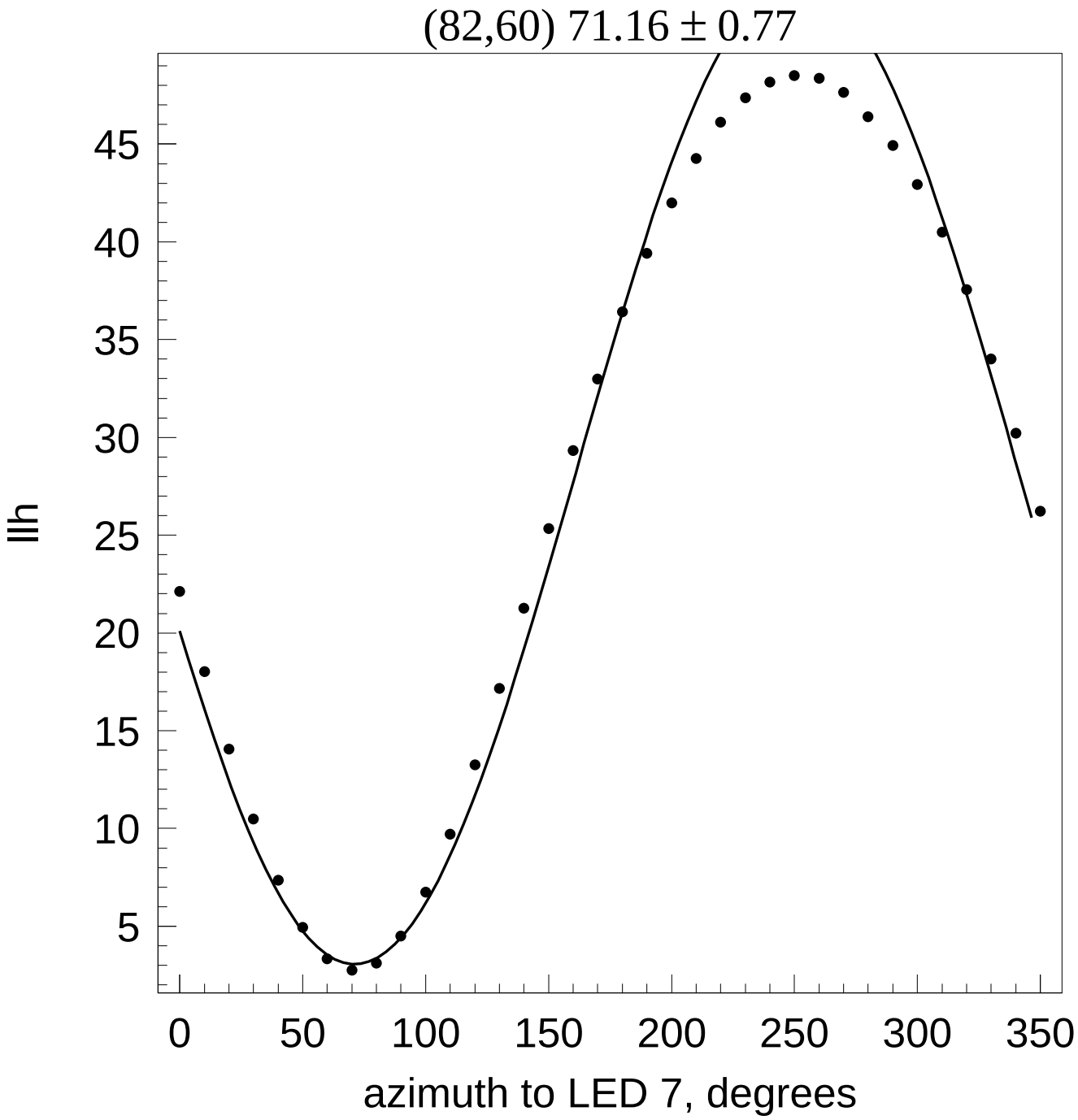

(82,57) 148.87 ± 0.87
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

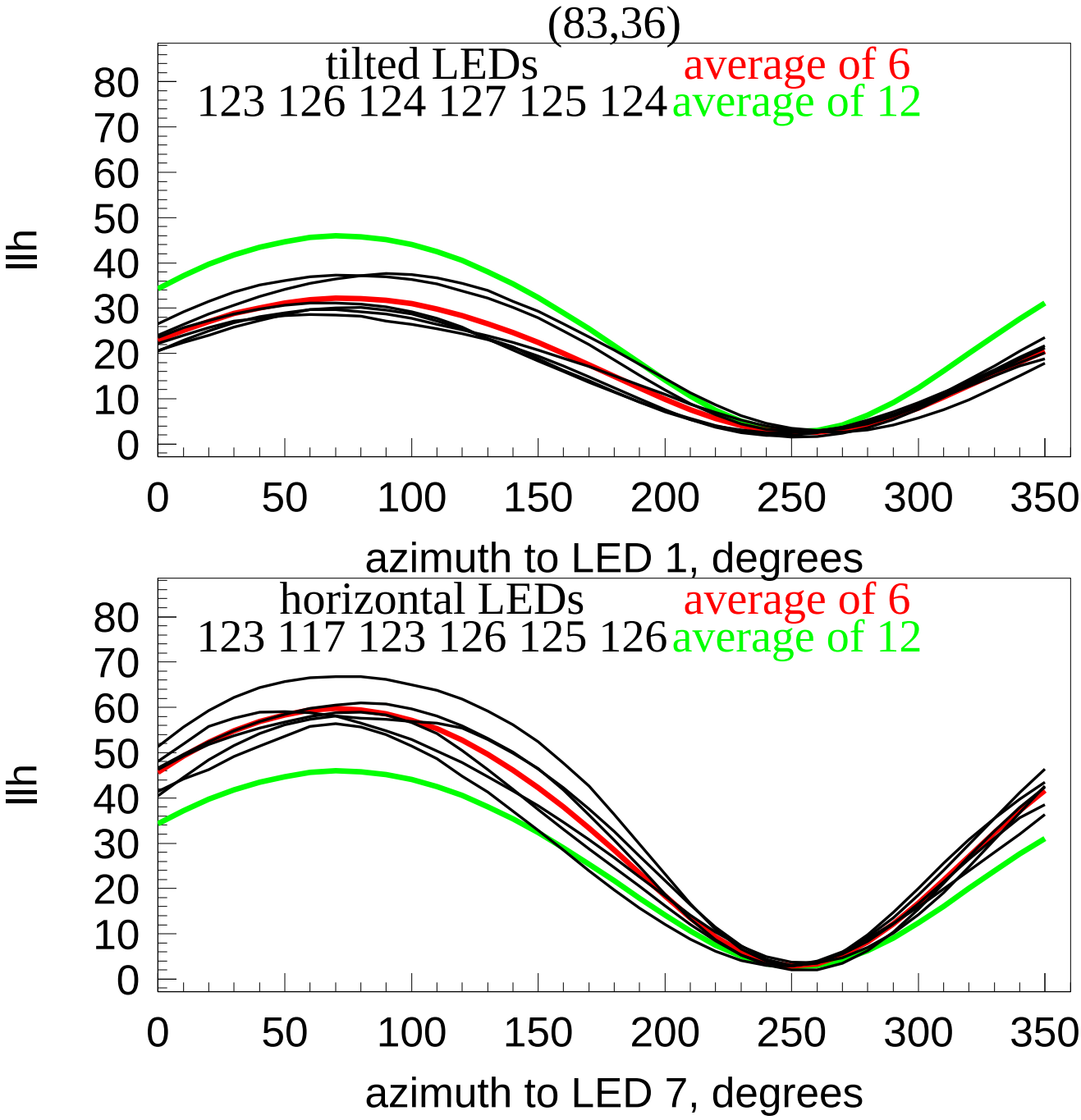

(82,57) 147.98 ± 0.71
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

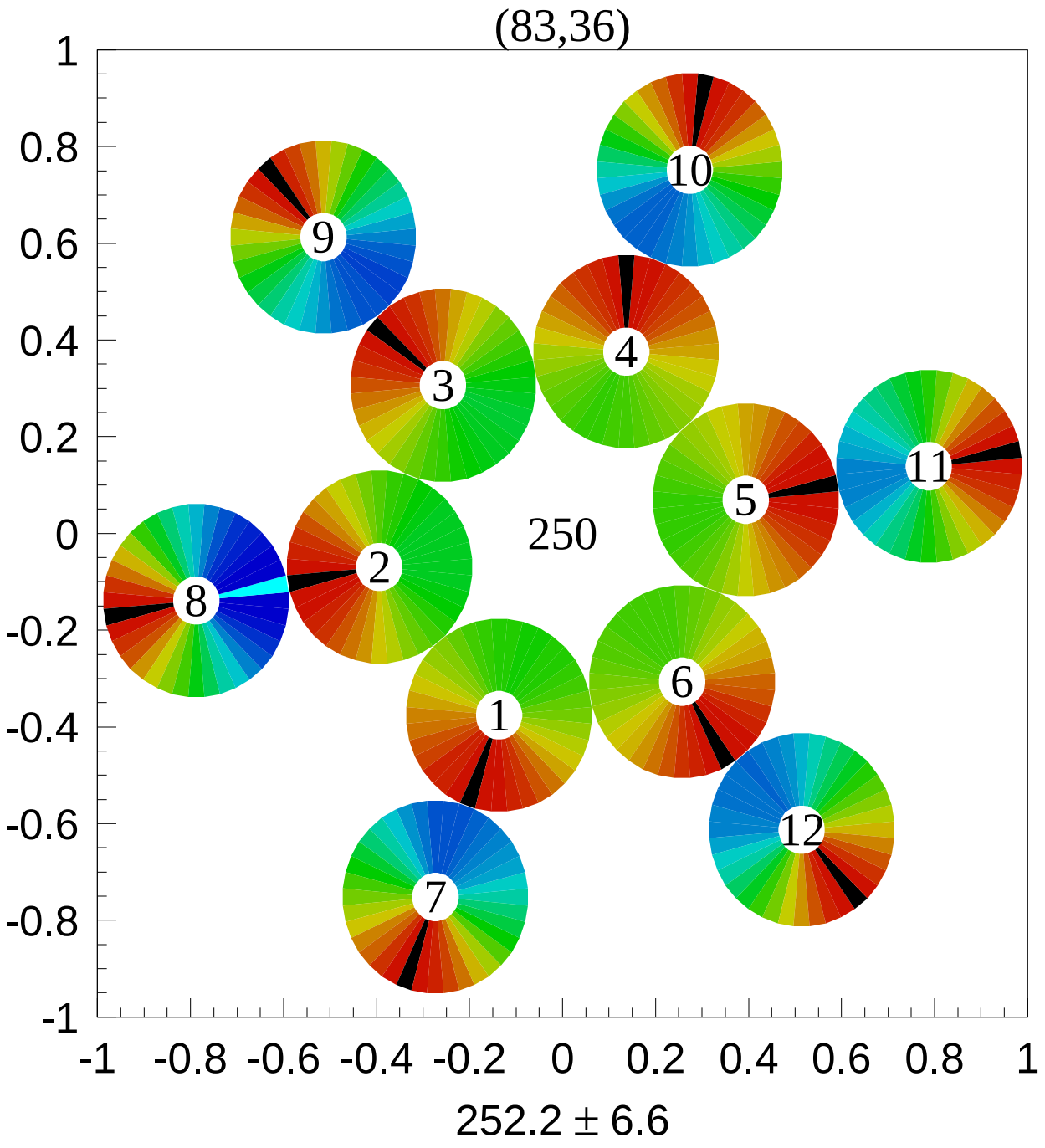

(82,60)
tilted LEDs
125 124 123 123 122 132
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 127 128 128 136 125
average of 6
average of 12
llh
azimuth to LED 7, degrees

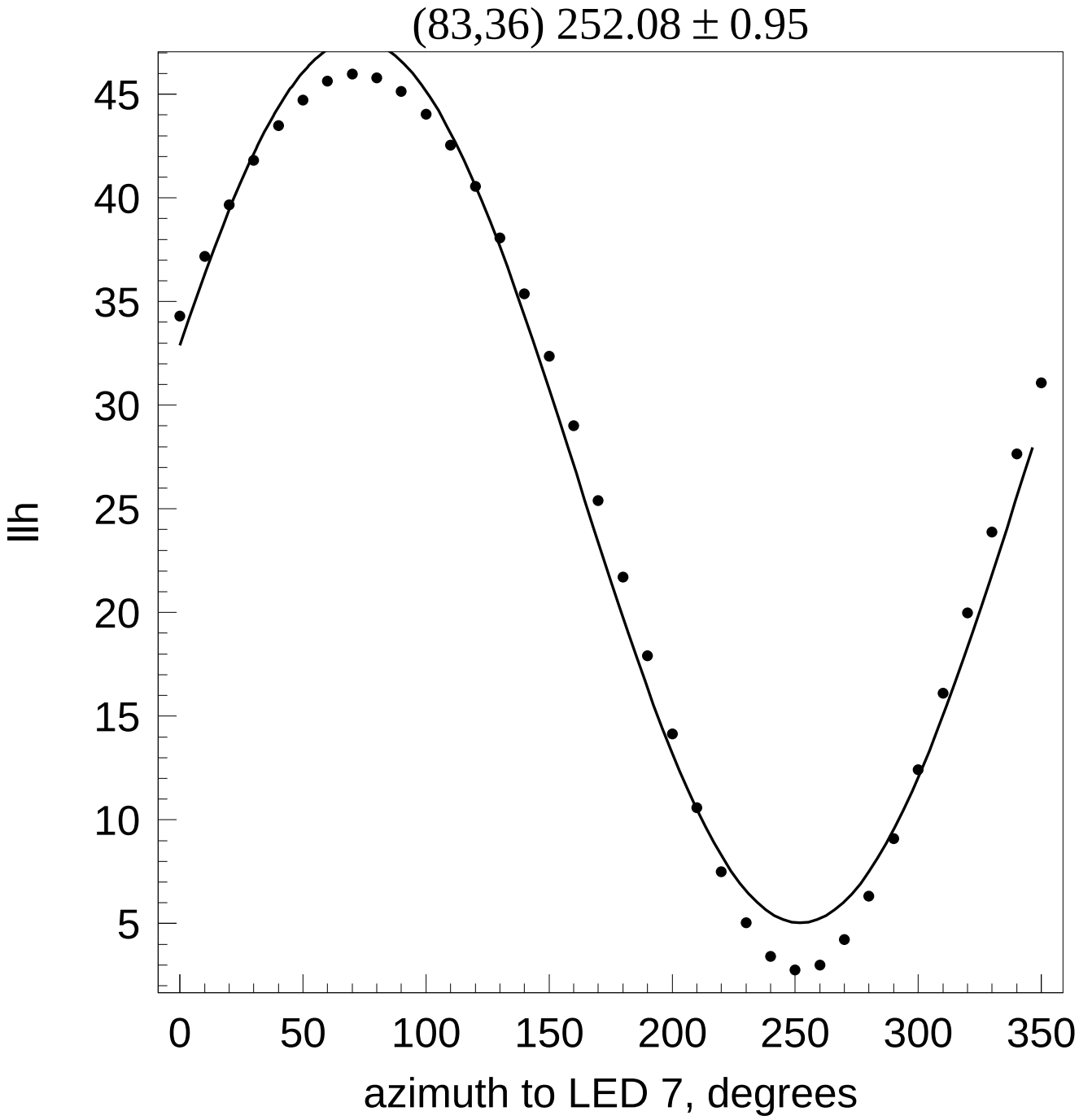

(82,60)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
7
12
1
6
8
2
70
5
11
3
4
9
10
71 ± 6.7

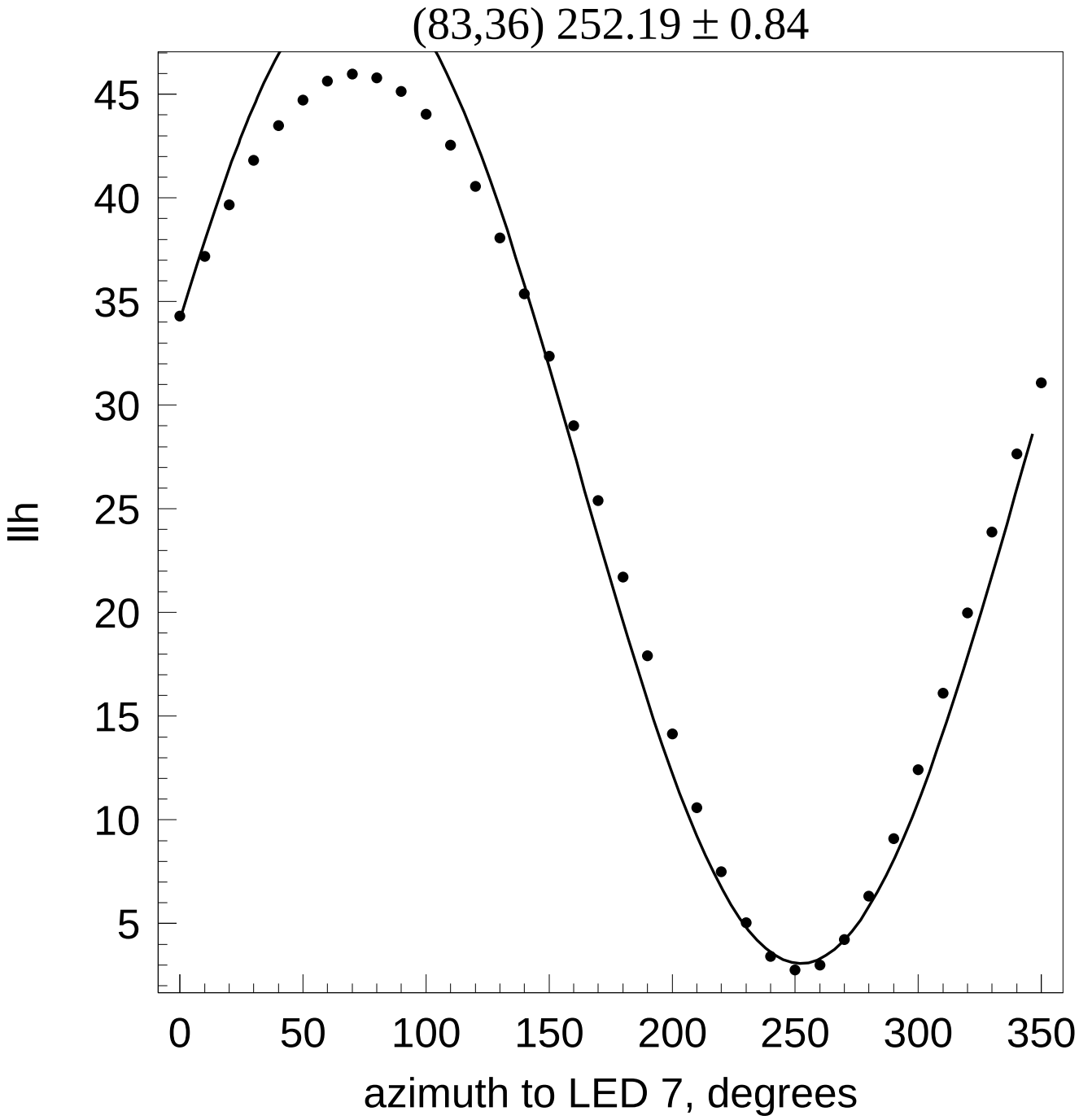

(82,60) 71.31 ± 0.92
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

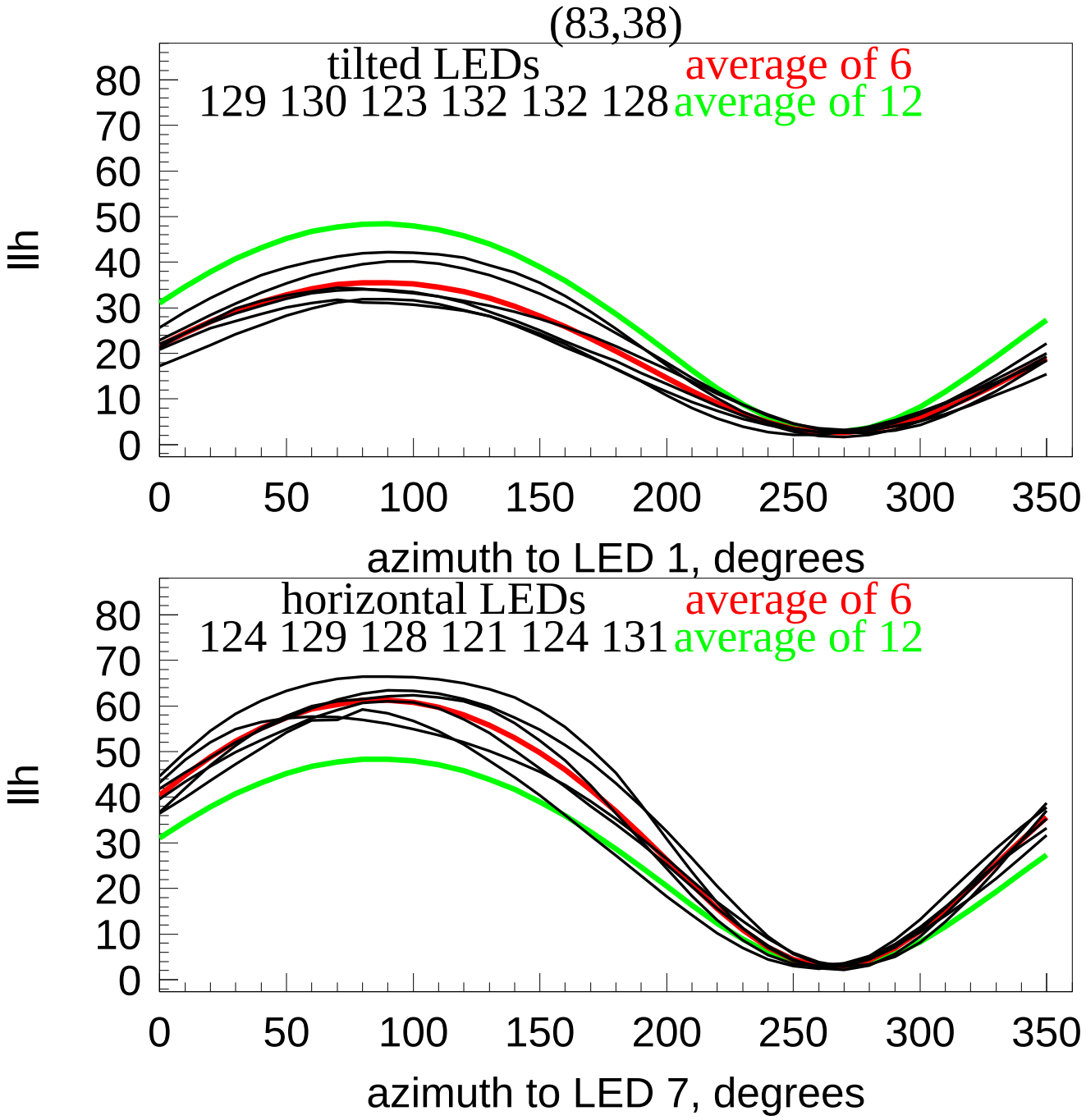

(82,60) 71.16 ± 0.77
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

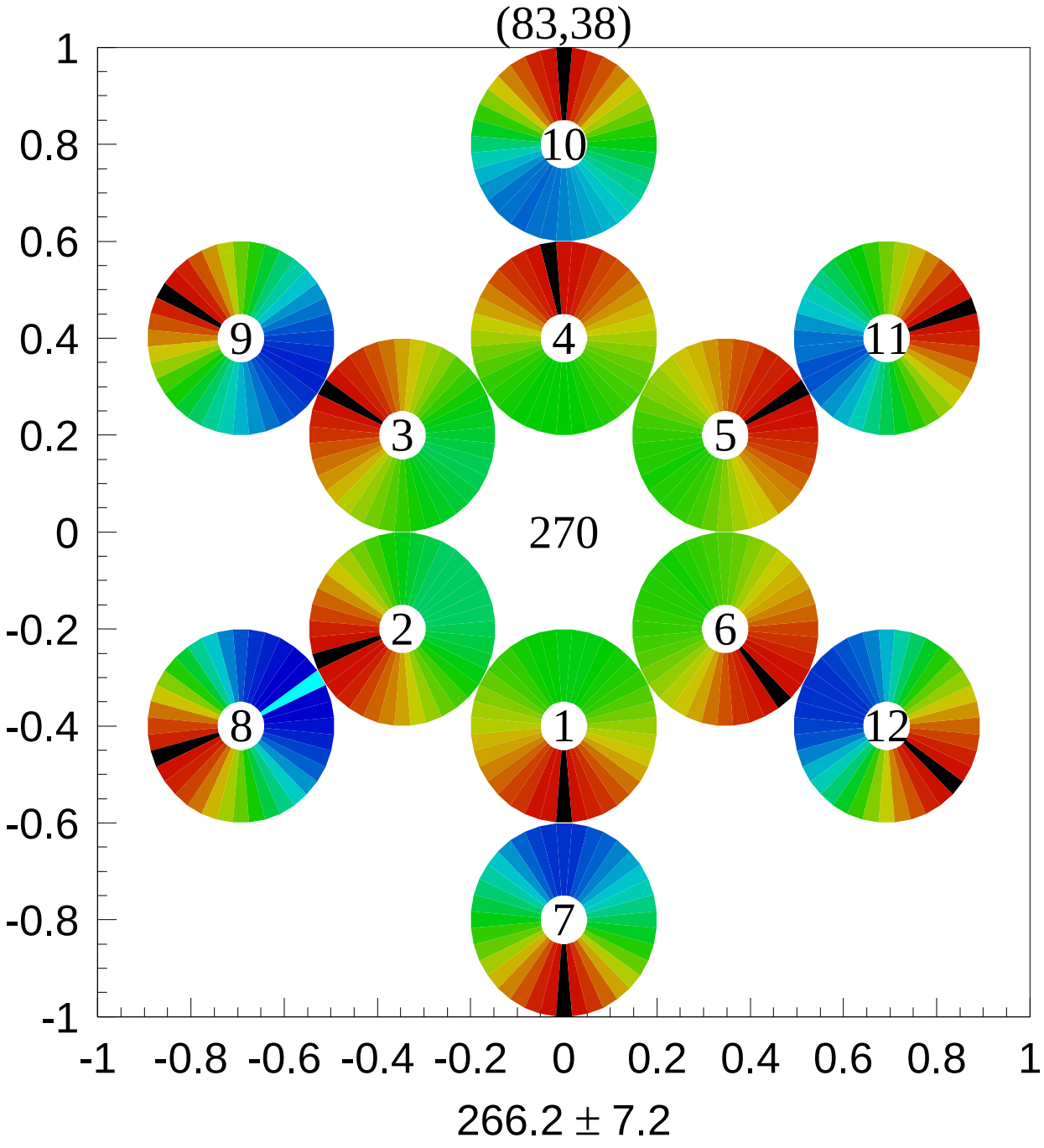

(83,36)
tilted LEDs
123 126 124 127 125 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 117 123 126 125 126
average of 6
average of 12
llh
azimuth to LED 7, degrees

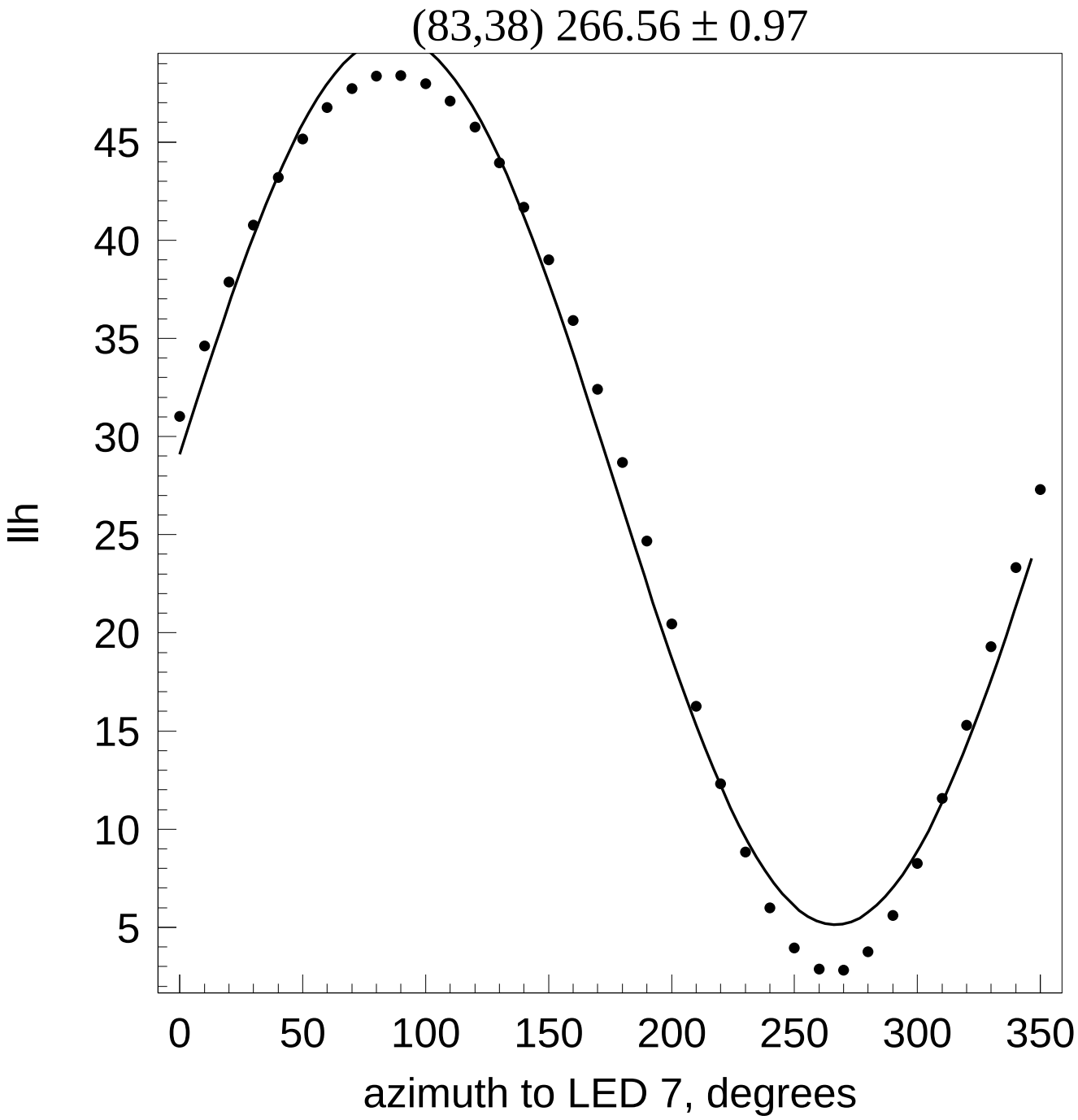

(83,36)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
250
1
2
3
4
5
6
7
8
9
10
11
12
252.2 ± 6.6

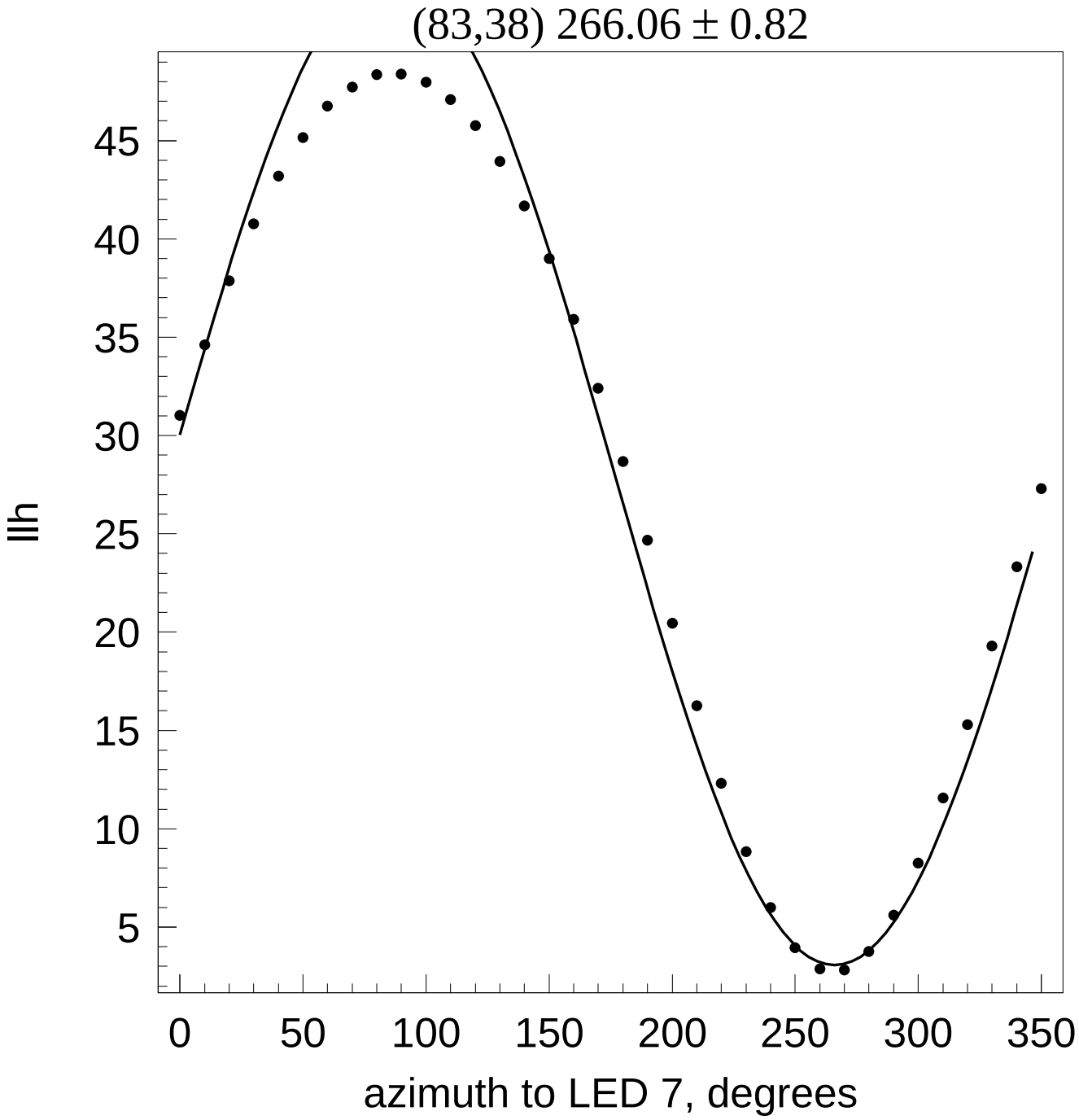

(83,36) 252.08 ± 0.95
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

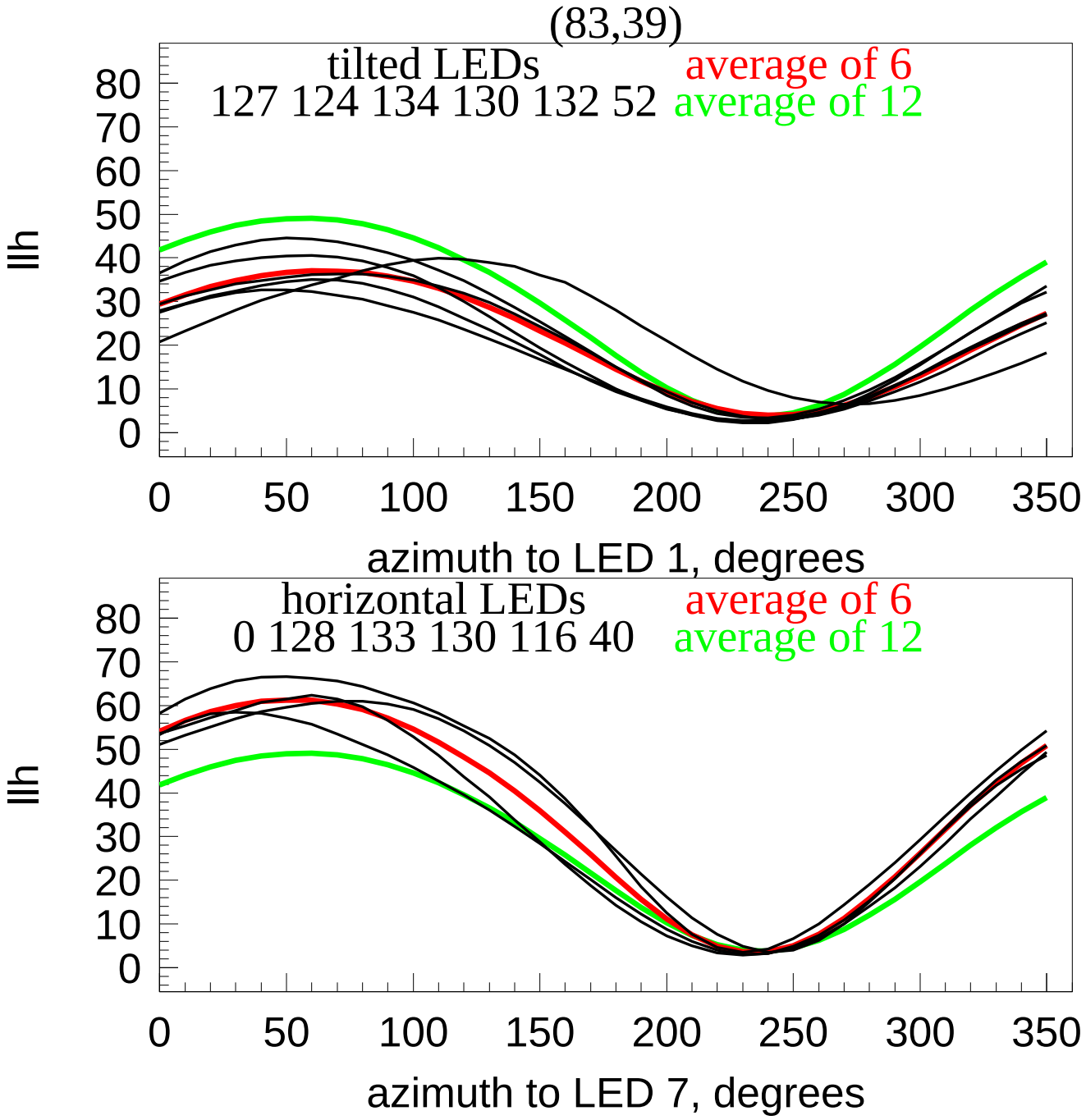

(83,36) 252.19 ± 0.84
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

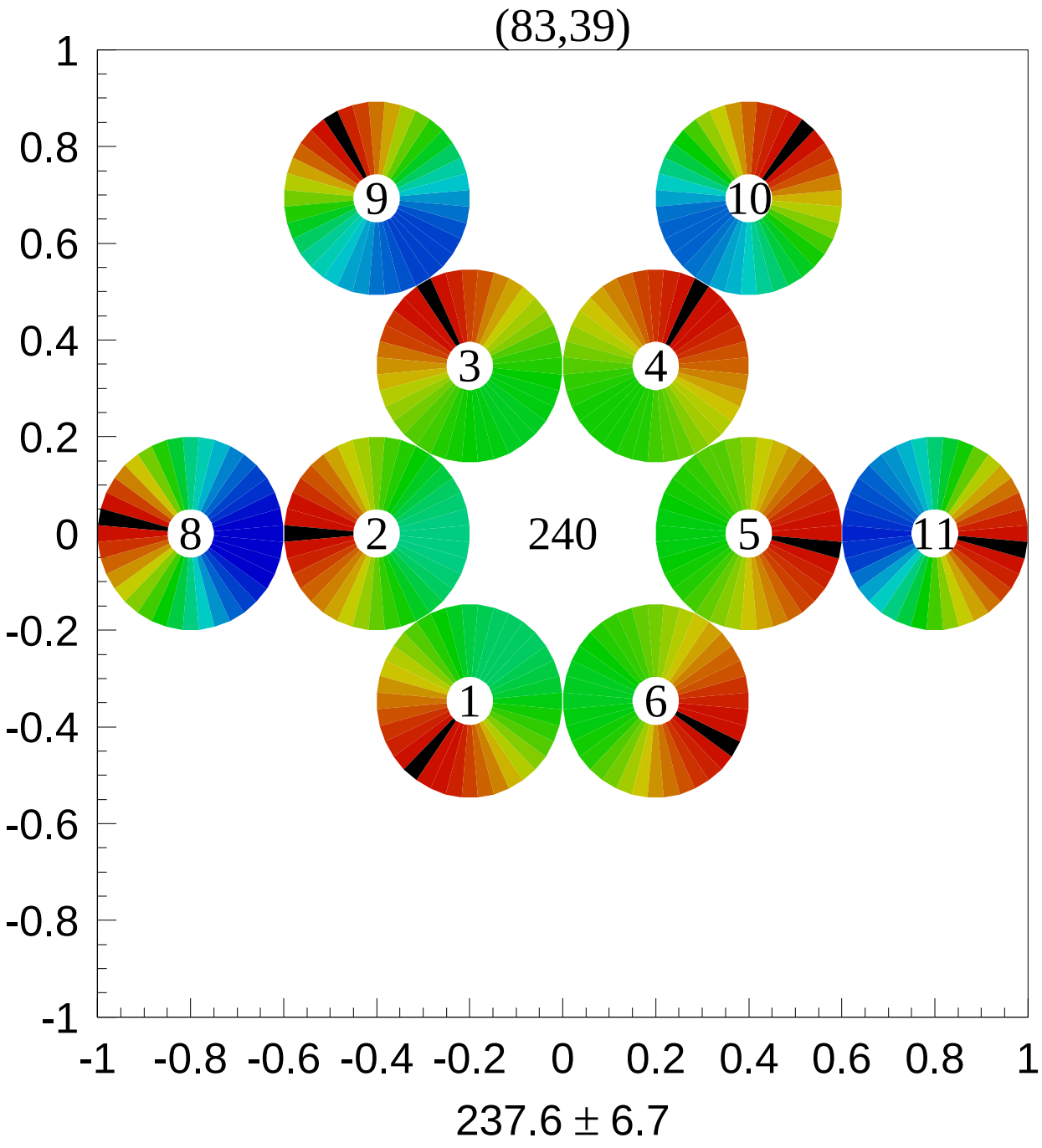

(83,38)
tilted LEDs
129 130 123 132 132 128
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
124 129 128 121 124 131
average of 6
average of 12
llh
azimuth to LED 7, degrees

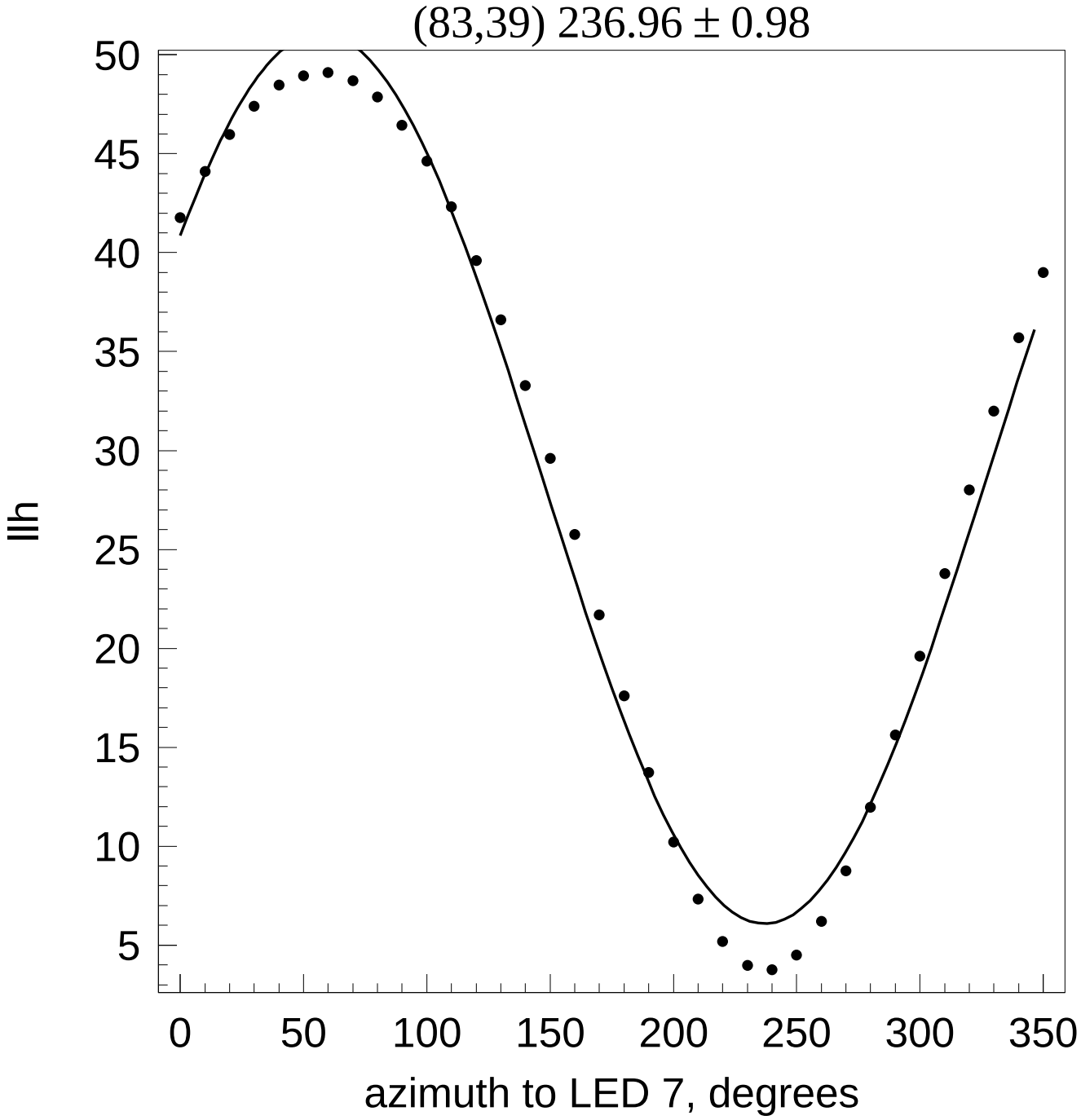

(83,38)
10
9
4
11
3
5
270
2
6
8
1
12
7
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
266.2 ± 7.2

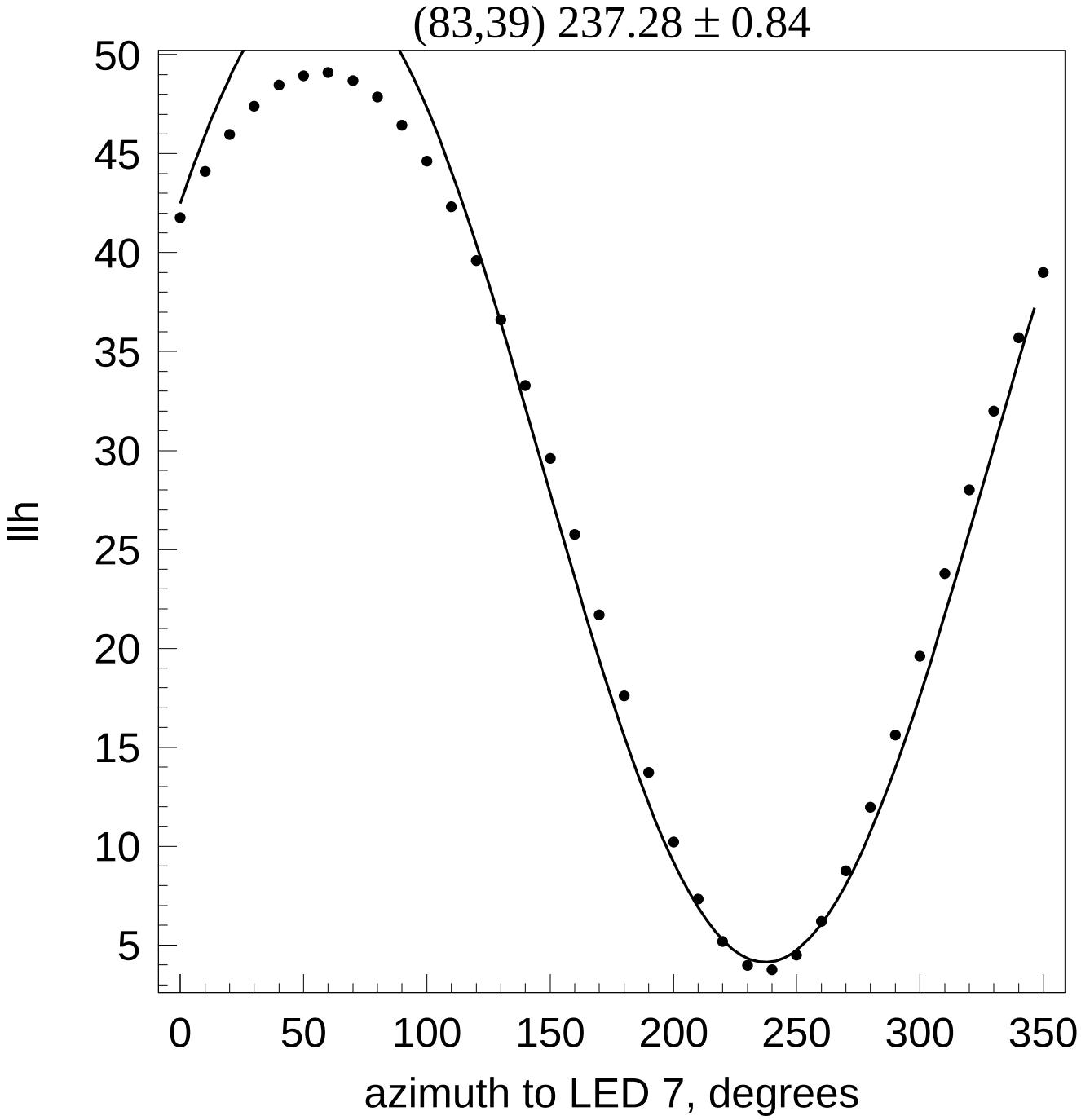

(83,38) 266.56 ± 0.97
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

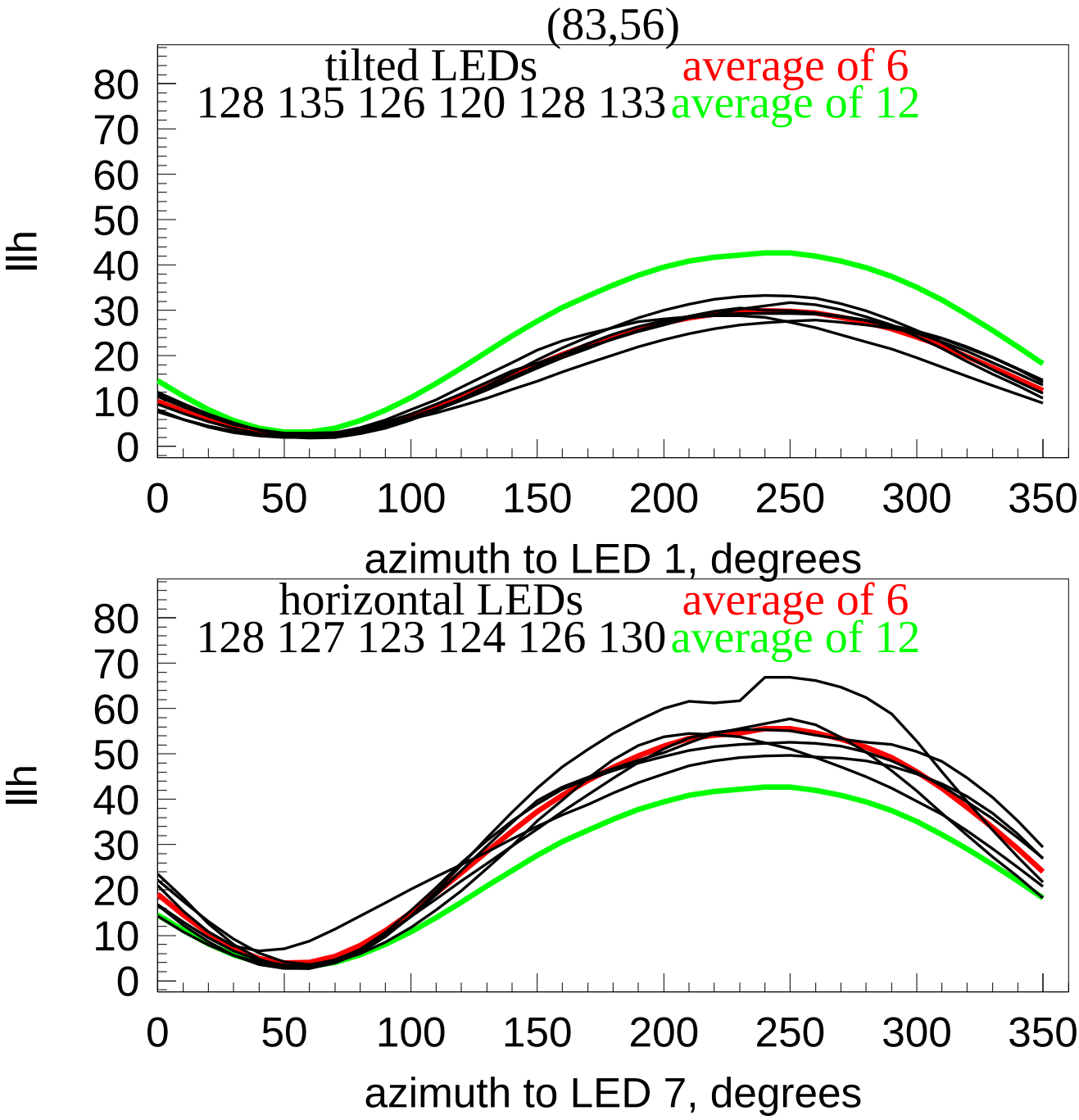

(83,38) 266.06 ± 0.82
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

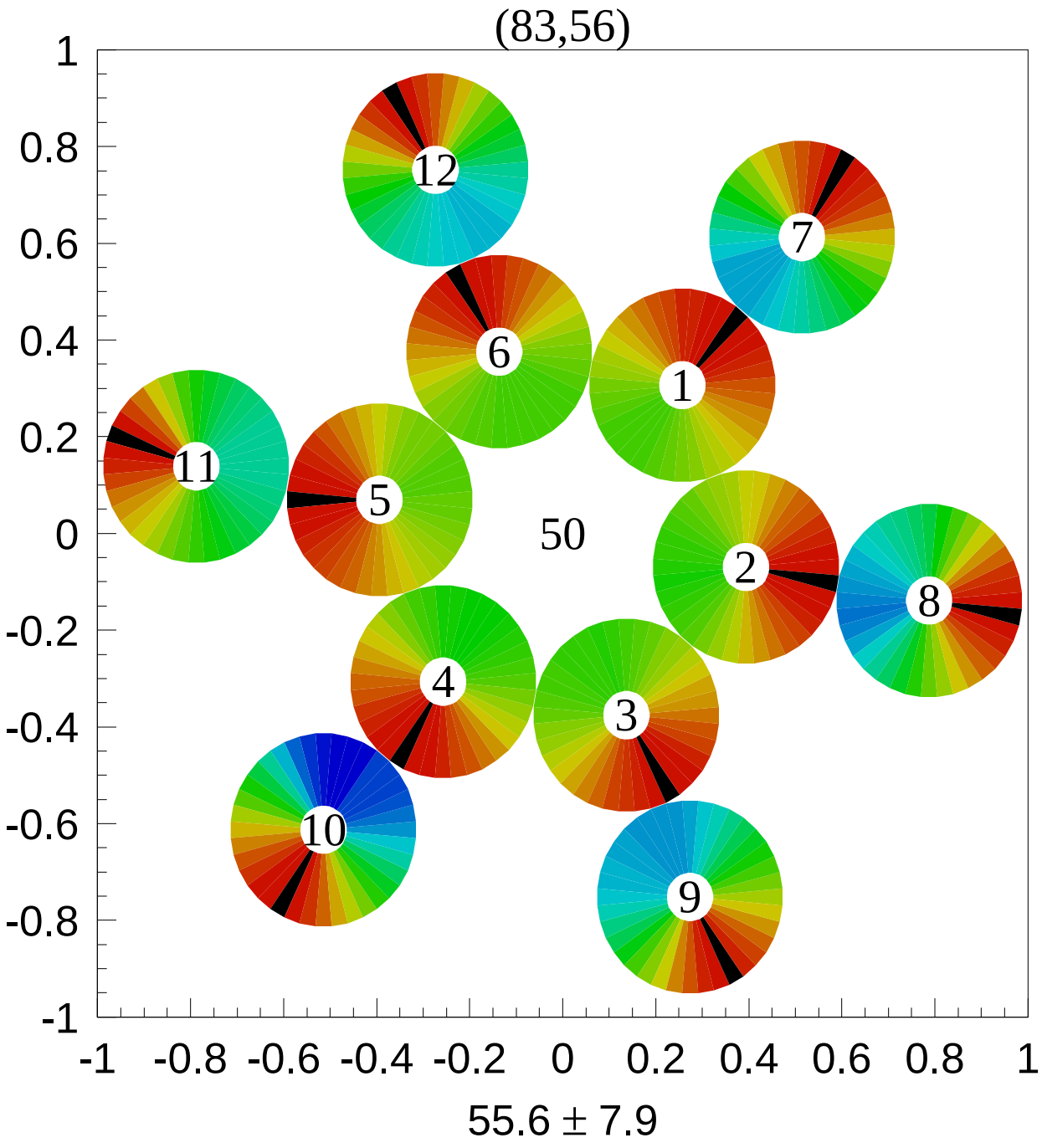

(83,39)
tilted LEDs
127 124 134 130 132 52
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
0 128 133 130 116 40
average of 6
average of 12
llh
azimuth to LED 7, degrees

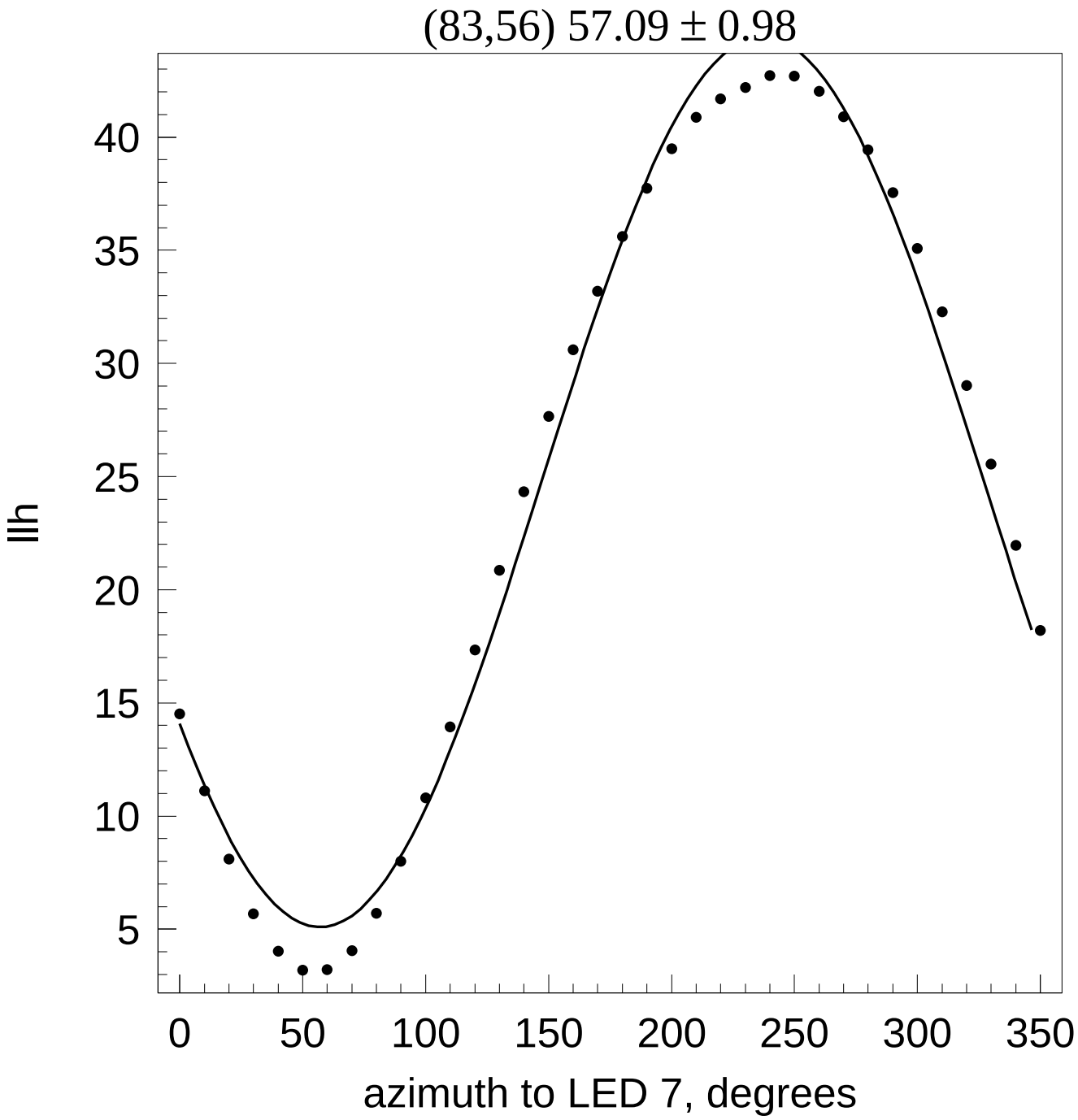

(83,39)
9
10
3
4
8
2
240
5
11
1
6
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
237.6 ± 6.7

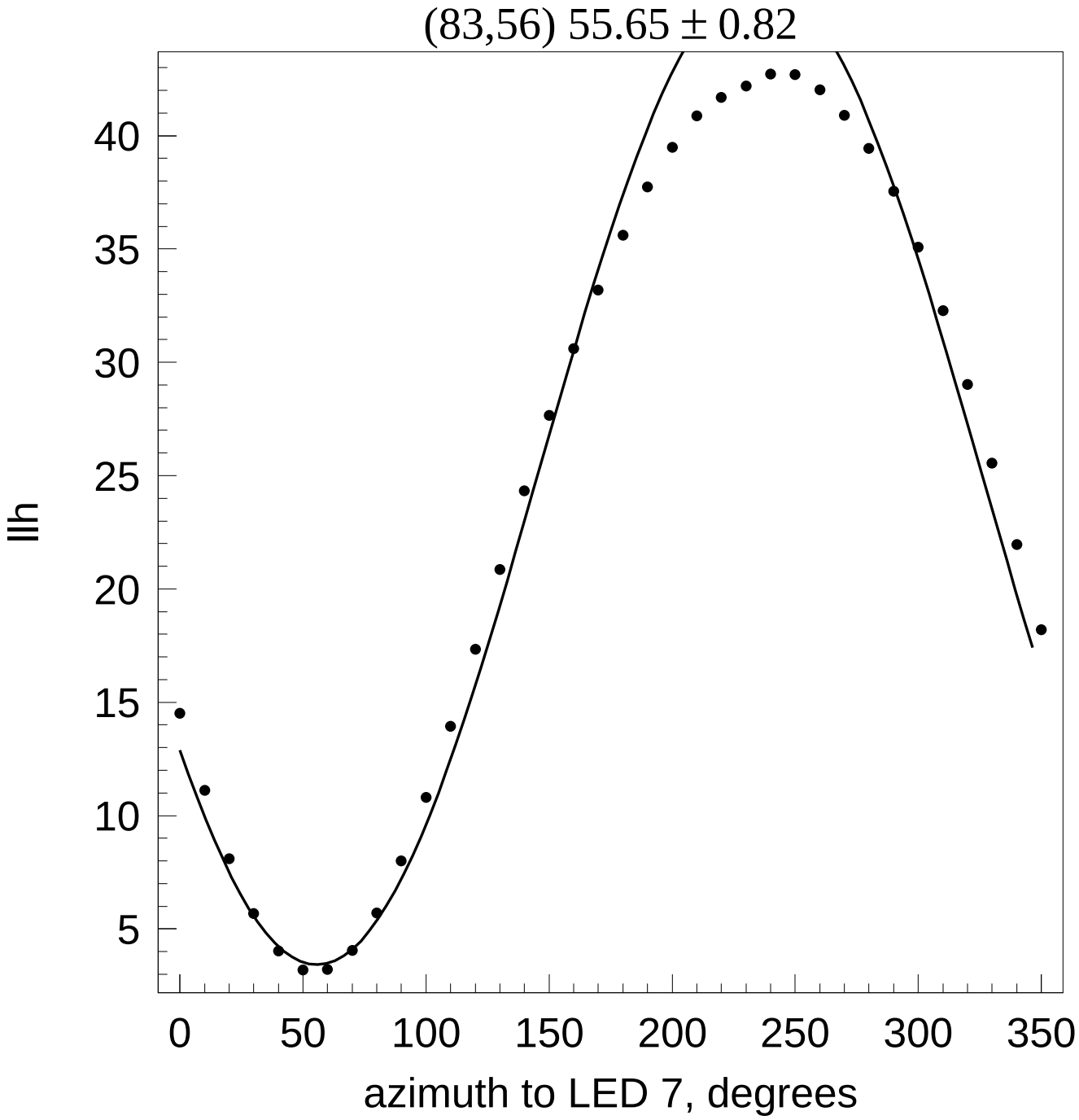

(83,39) 236.96 ± 0.98
50
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

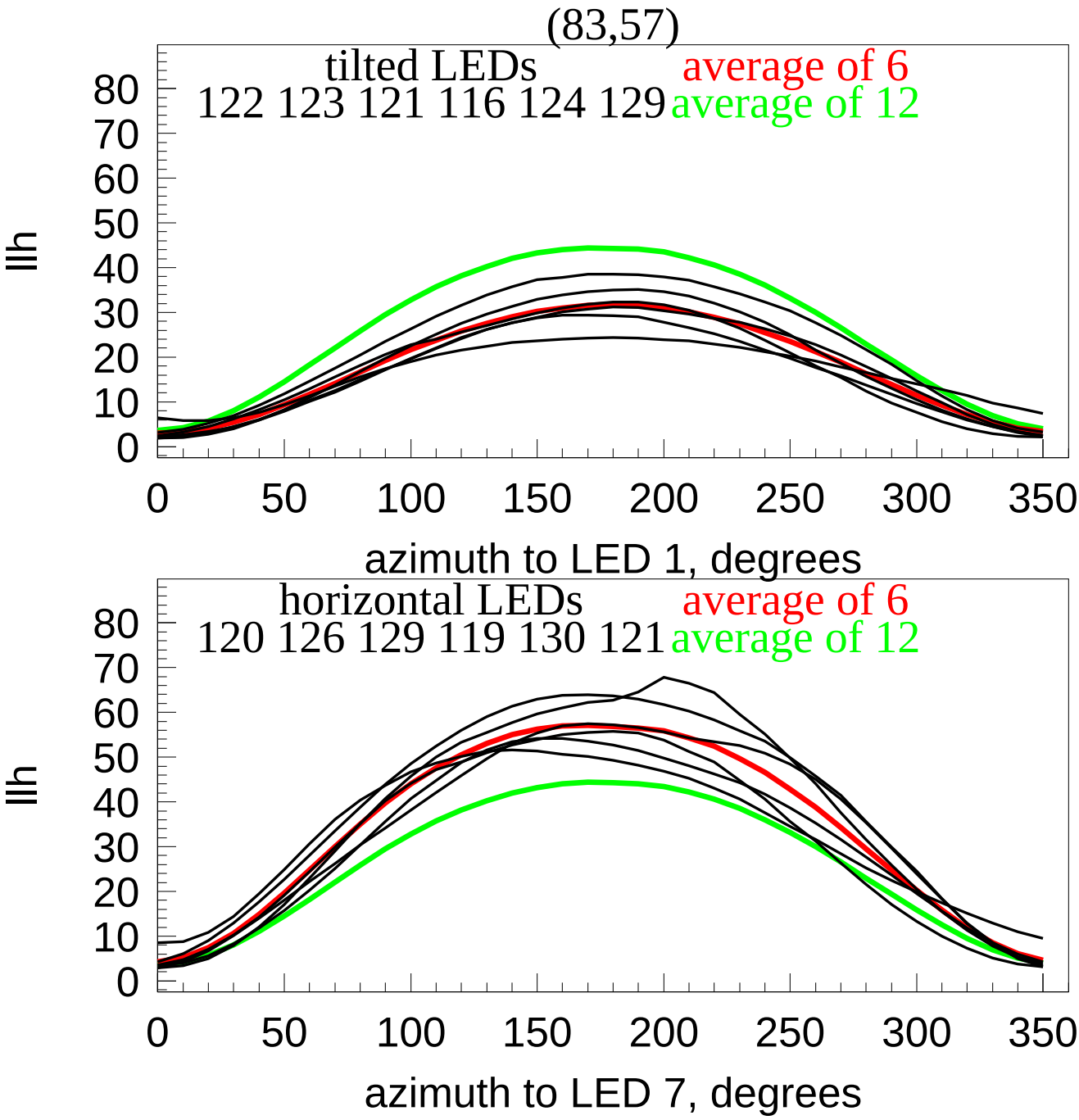

(83,39) 237.28 ± 0.84
50
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

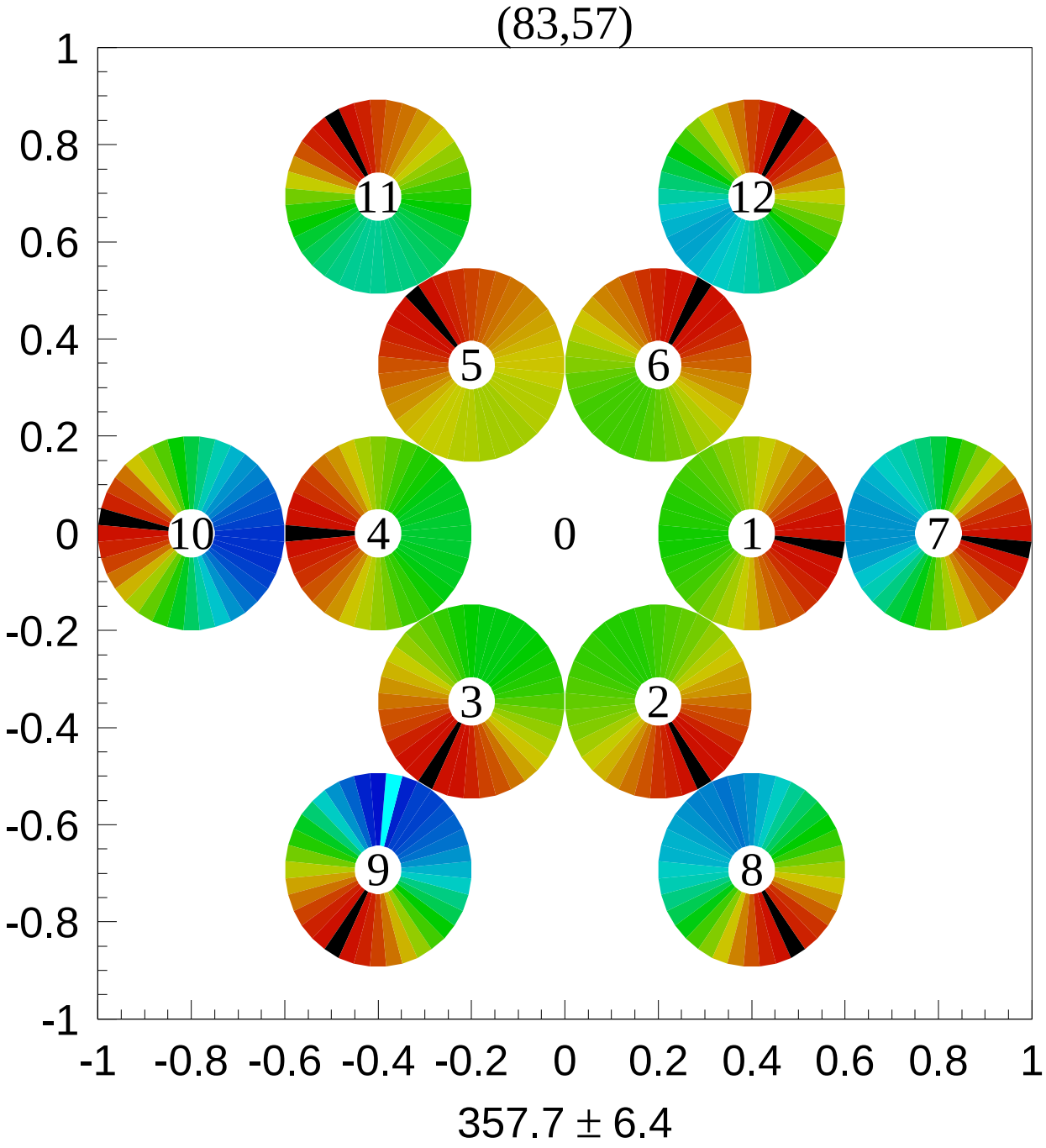

(83,56)
tilted LEDs
128 135 126 120 128 133
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
128 127 123 124 126 130
average of 6
average of 12
llh
azimuth to LED 7, degrees

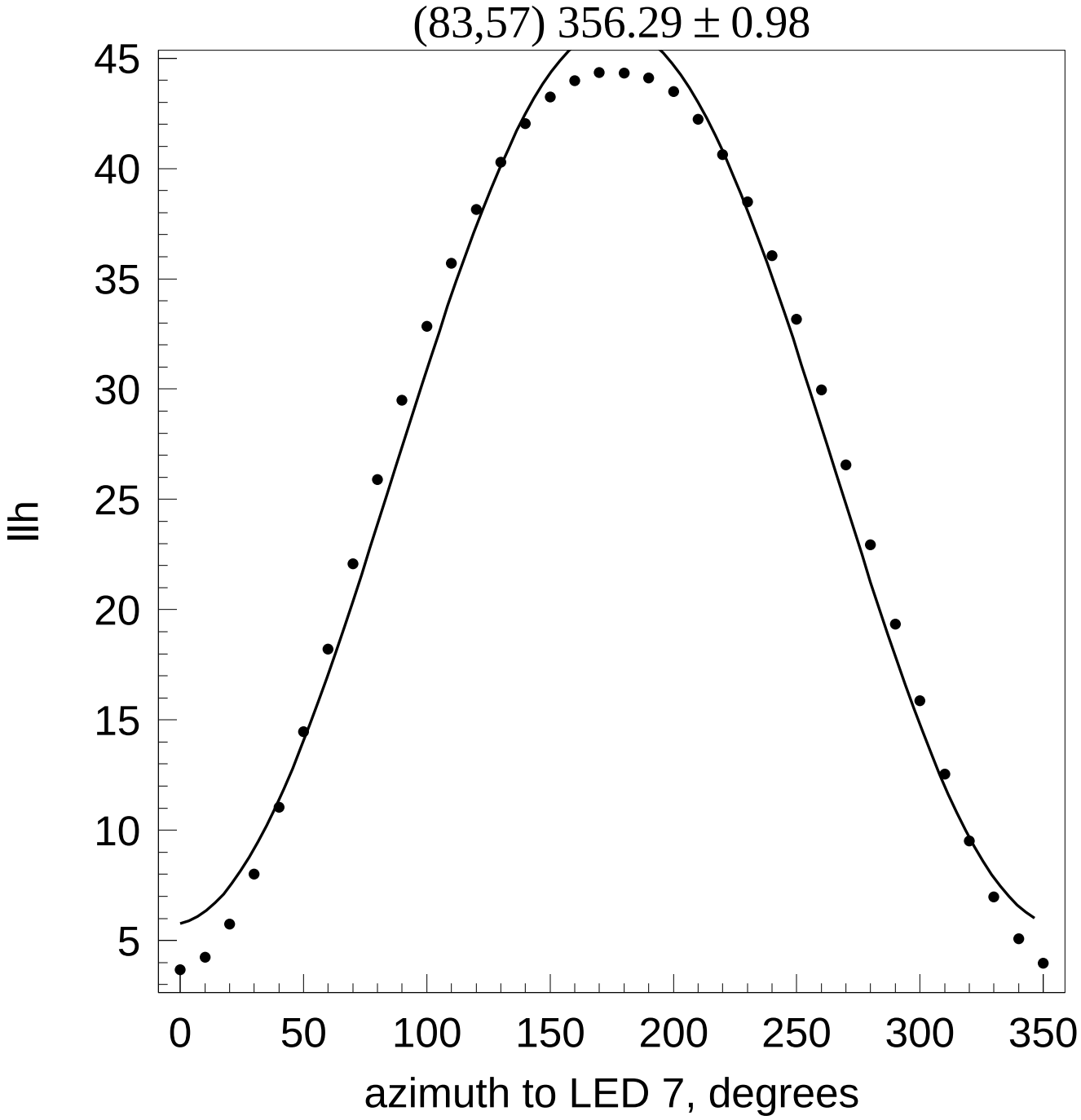

(83,56)
12
7
6
1
11
5
50
2
8
4
3
10
9
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
55.6 ± 7.9

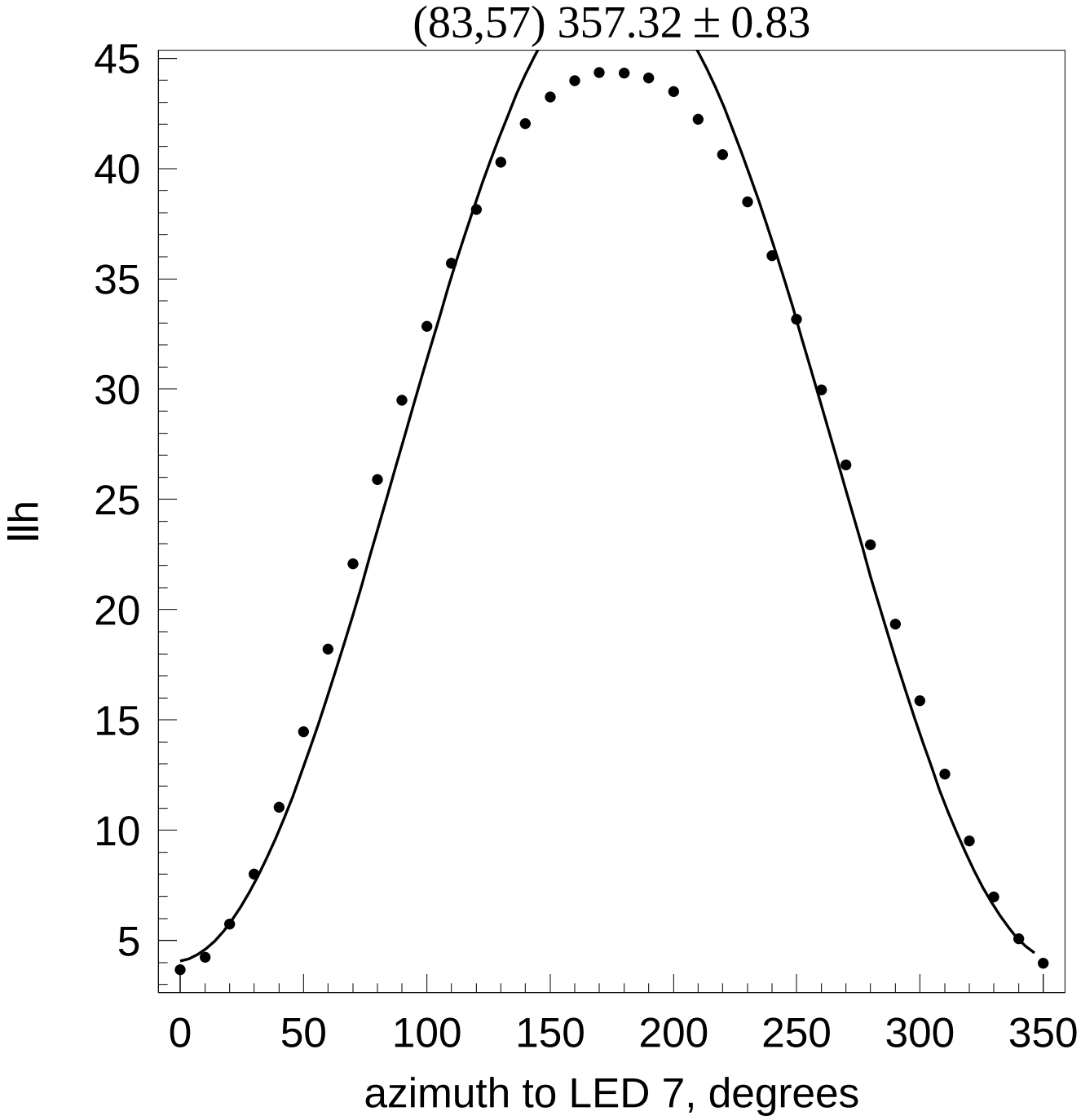

(83,56) 57.09 ± 0.98
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

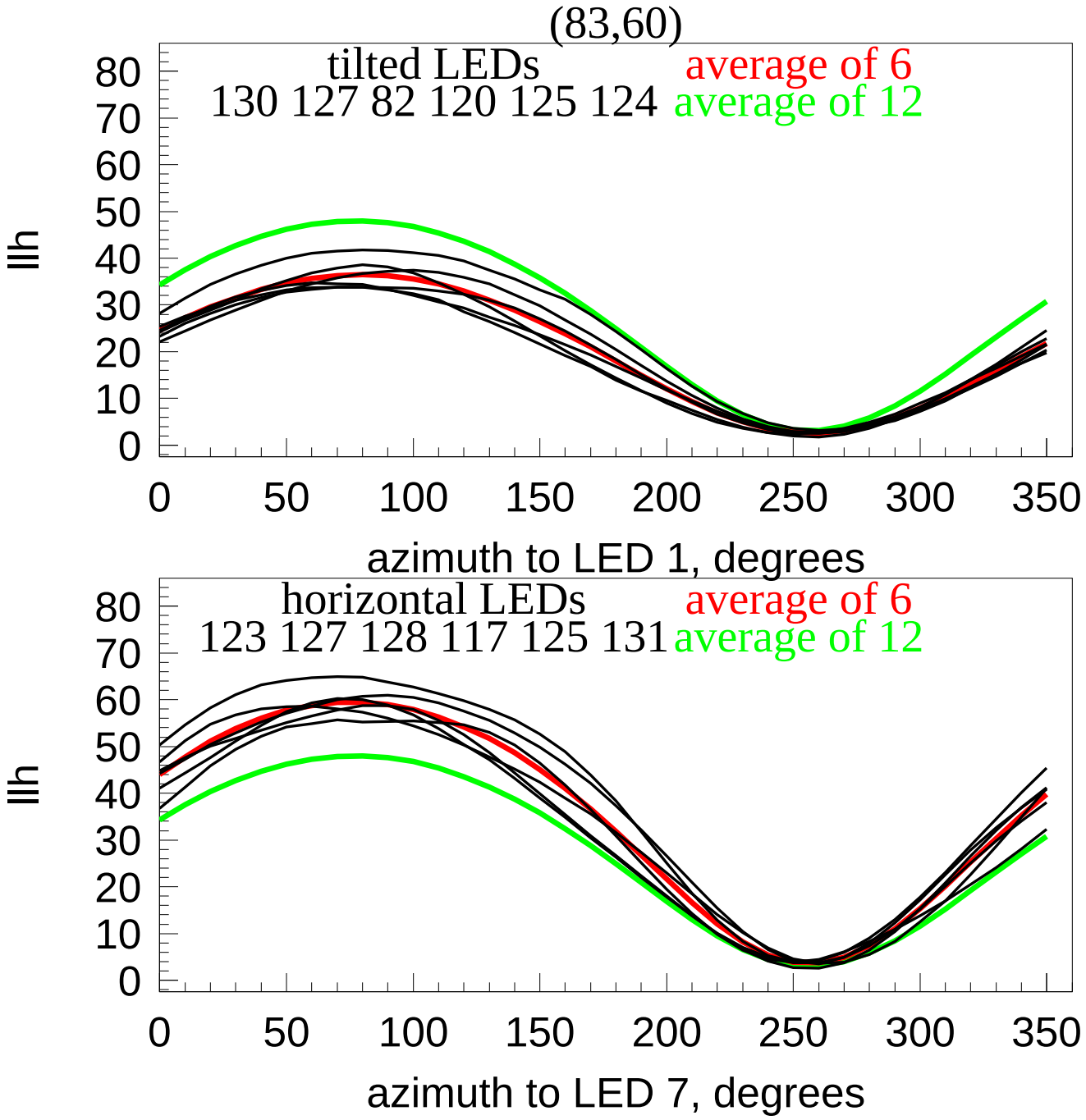

(83,56) 55.65 ± 0.82
llh
40
35
30
25
20
15
10
5
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees

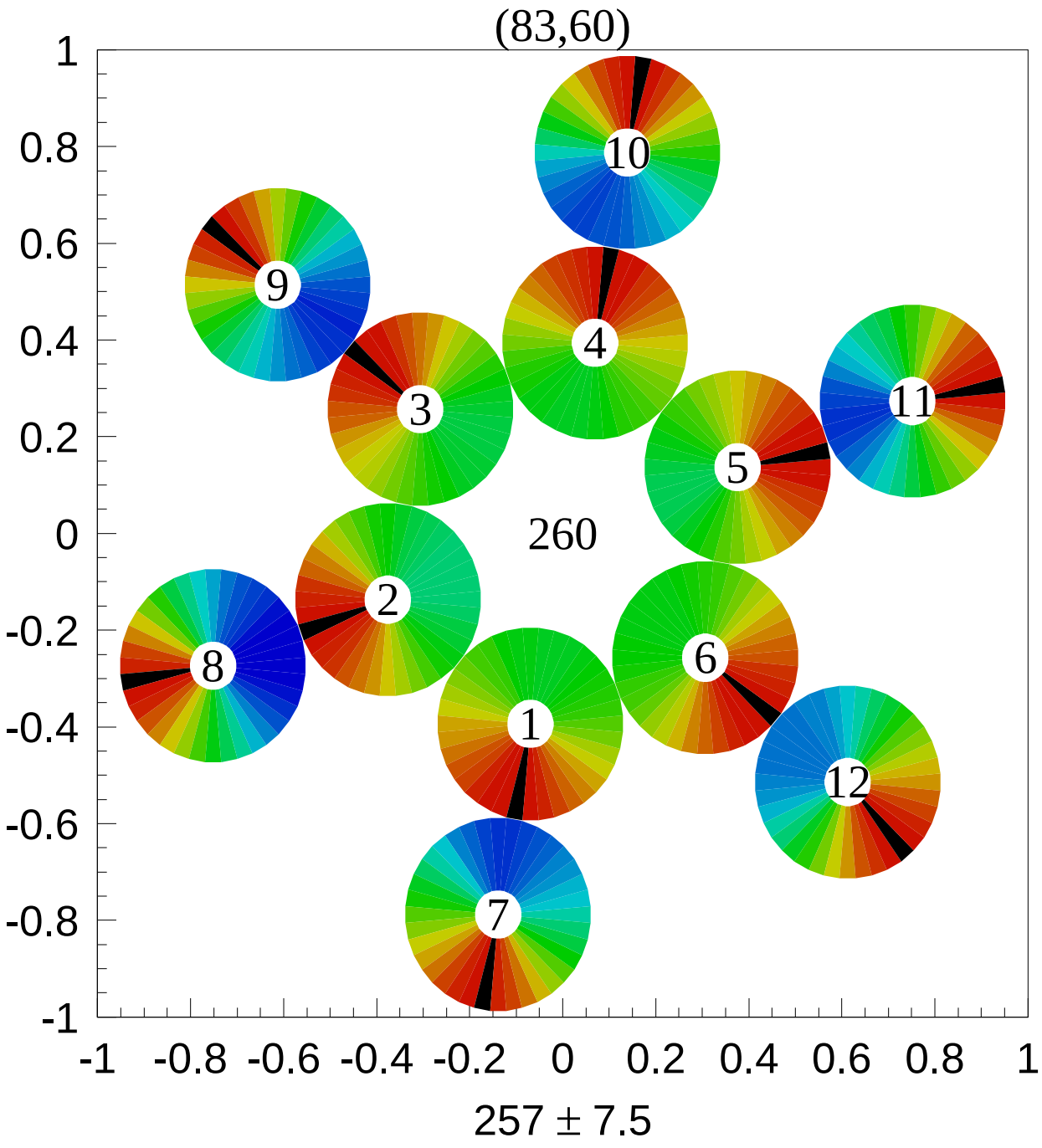

(83,57)
tilted LEDs
122 123 121 116 124 129
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
120 126 129 119 130 121
average of 6
average of 12
llh
azimuth to LED 7, degrees

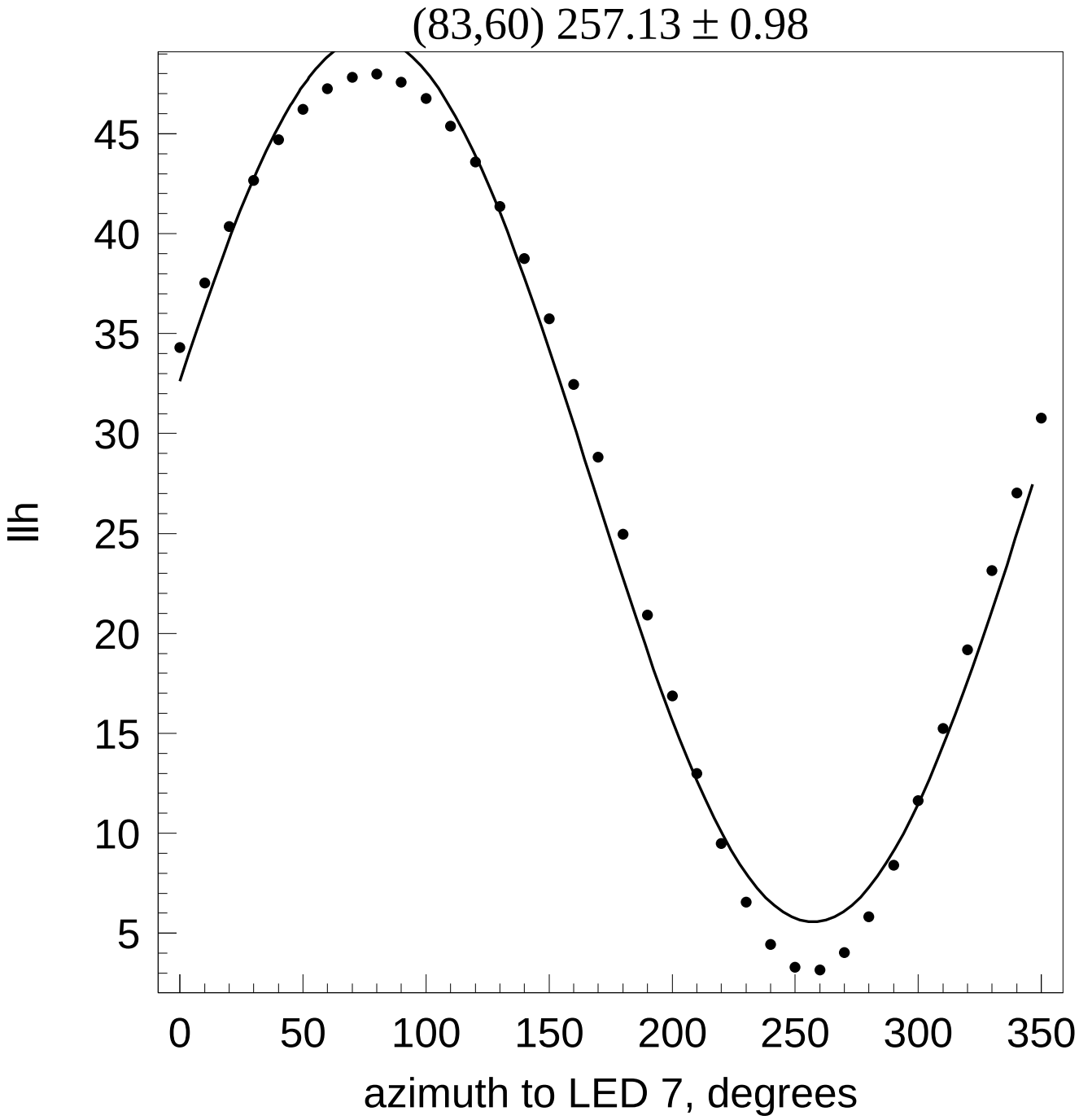

(83,57)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
11
12
5
6
10
4
0
1
7
3
2
9
8
357.7 ± 6.4

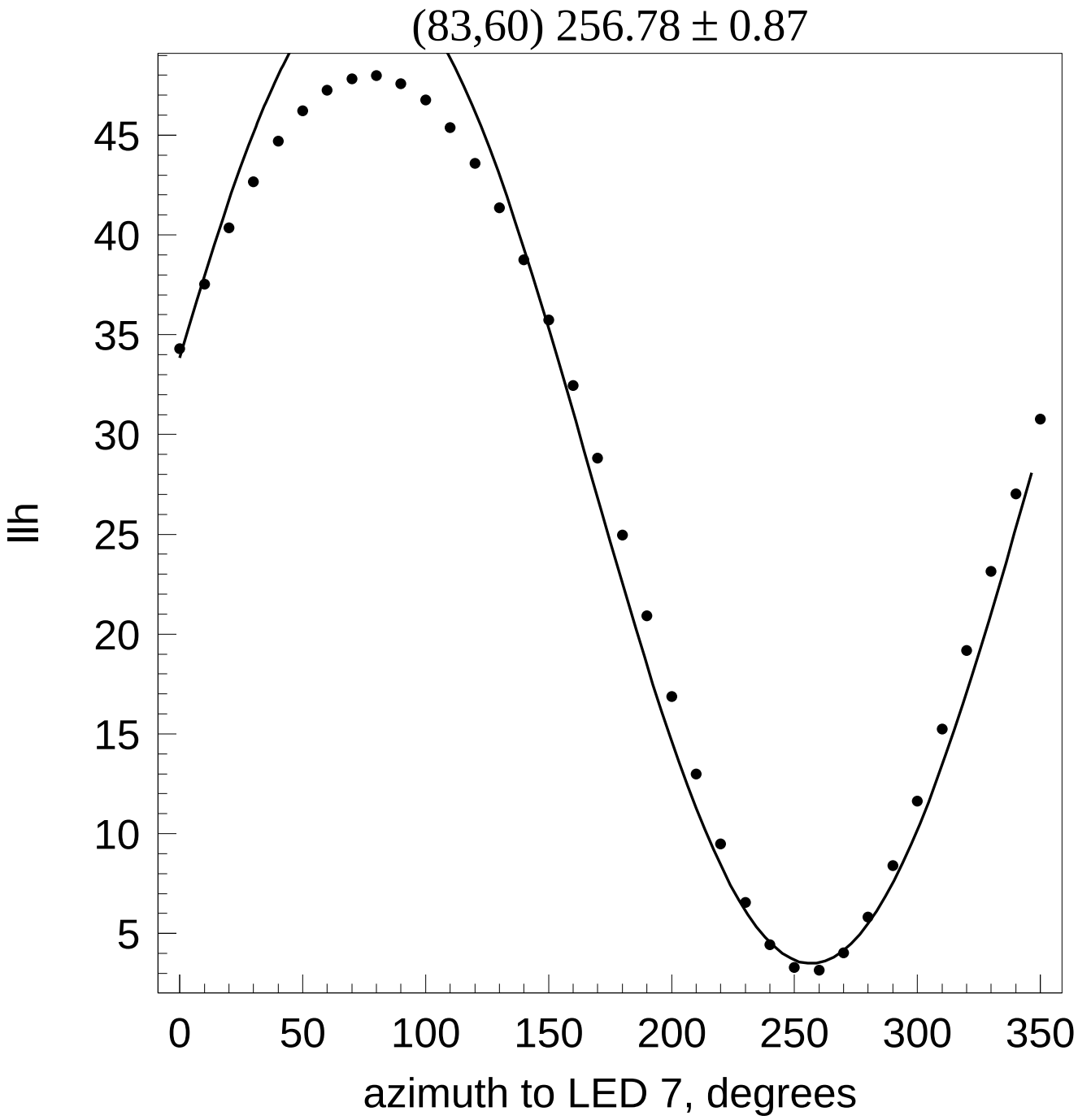

(83,57) 356.29 ± 0.98
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees


(83,57) 357.32 ± 0.83
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees


(83,60)
tilted LEDs
130 127 82 120 125 124
average of 6
average of 12
llh
azimuth to LED 1, degrees
horizontal LEDs
123 127 128 117 125 131
average of 6
average of 12
llh
azimuth to LED 7, degrees


(83,60)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.8 -0.6 -0.4 -0.2 0 0.2 0.4 0.6 0.8 1
257 ± 7.5
260
1
2
3
4
5
6
7
8
9
10
11
12


(83,60) 257.13 ± 0.98
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees


(83,60) 256.78 ± 0.87
45
40
35
30
25
20
15
10
5
llh
0
50
100
150
200
250
300
350
azimuth to LED 7, degrees