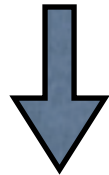


Diffuse high-energy neutrino searches in AMANDA-II and IceCube

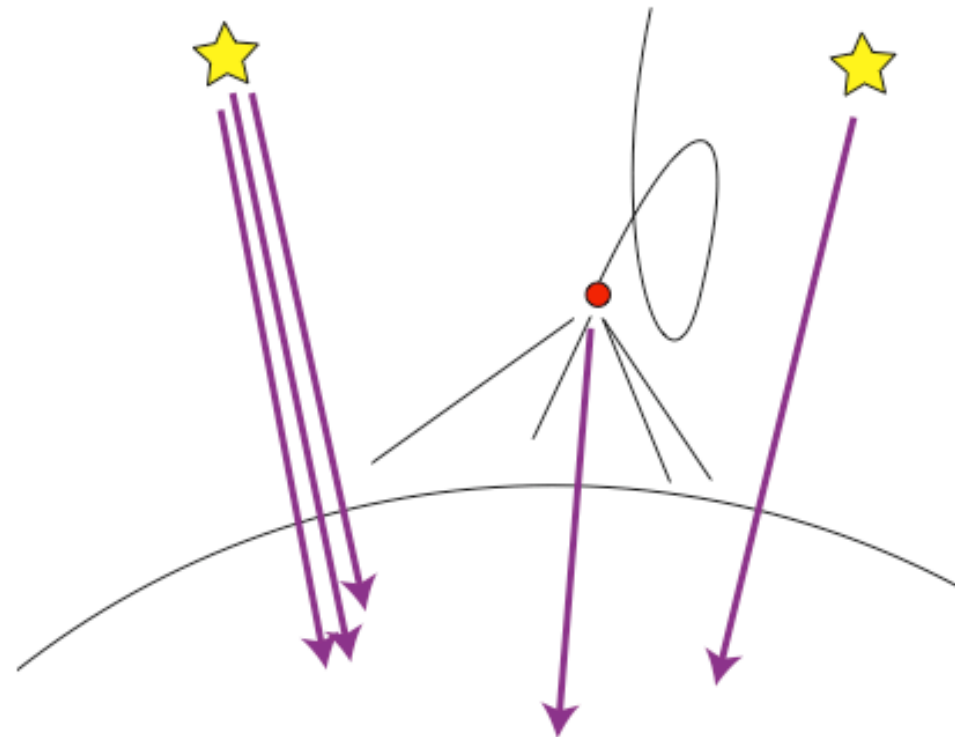
Kotoyo Hoshina, Jessica Hodges, Gary Hill
University of Wisconsin
AMANDA/IceCube Collaboration

What is Diffuse Neutrino Search ?

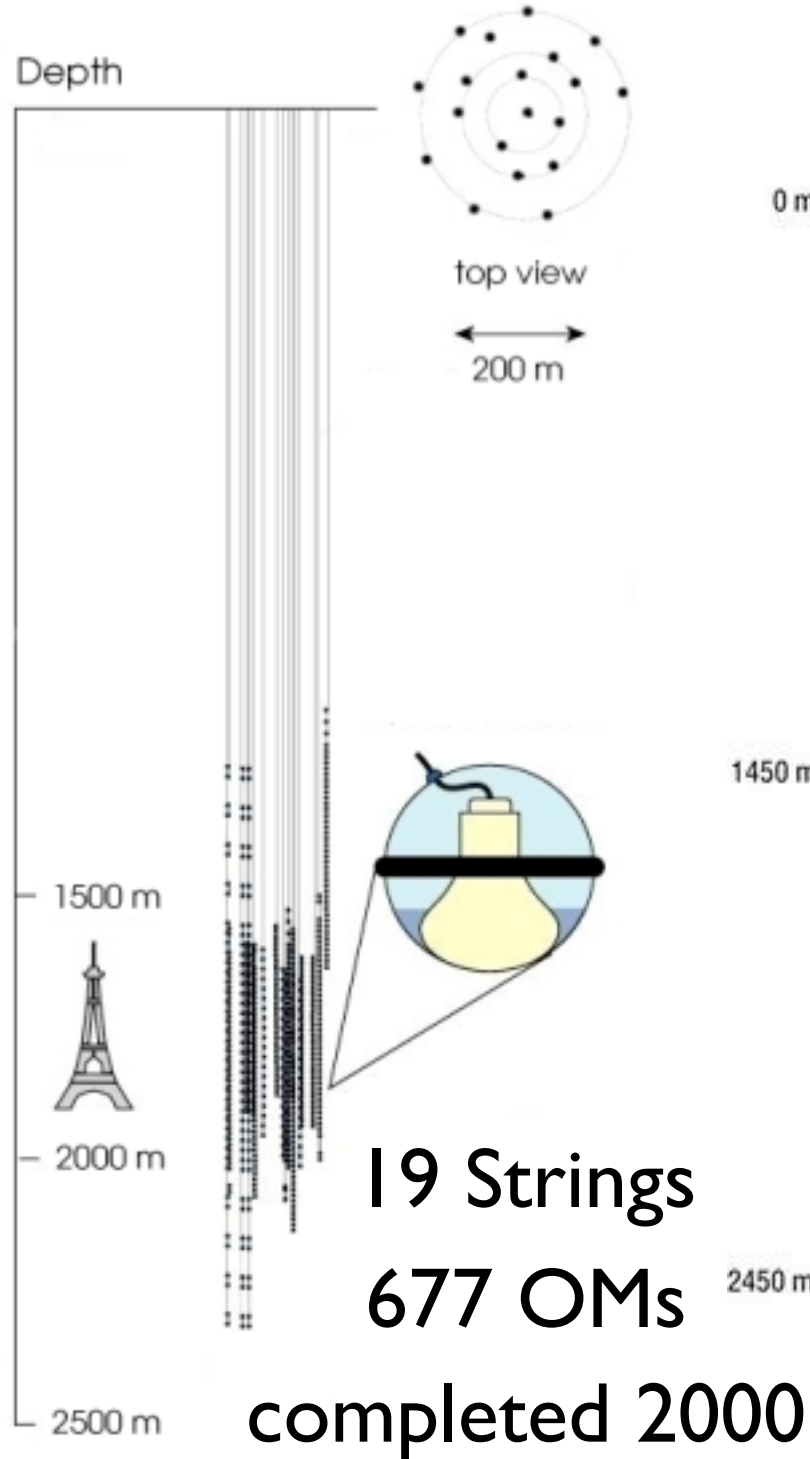
- If individual neutrino sources are too faint...
- Still possible to investigate overall feature of isotropically distributed sources
- If extraterrestrial neutrinos follow more harder energy spectrum than background...



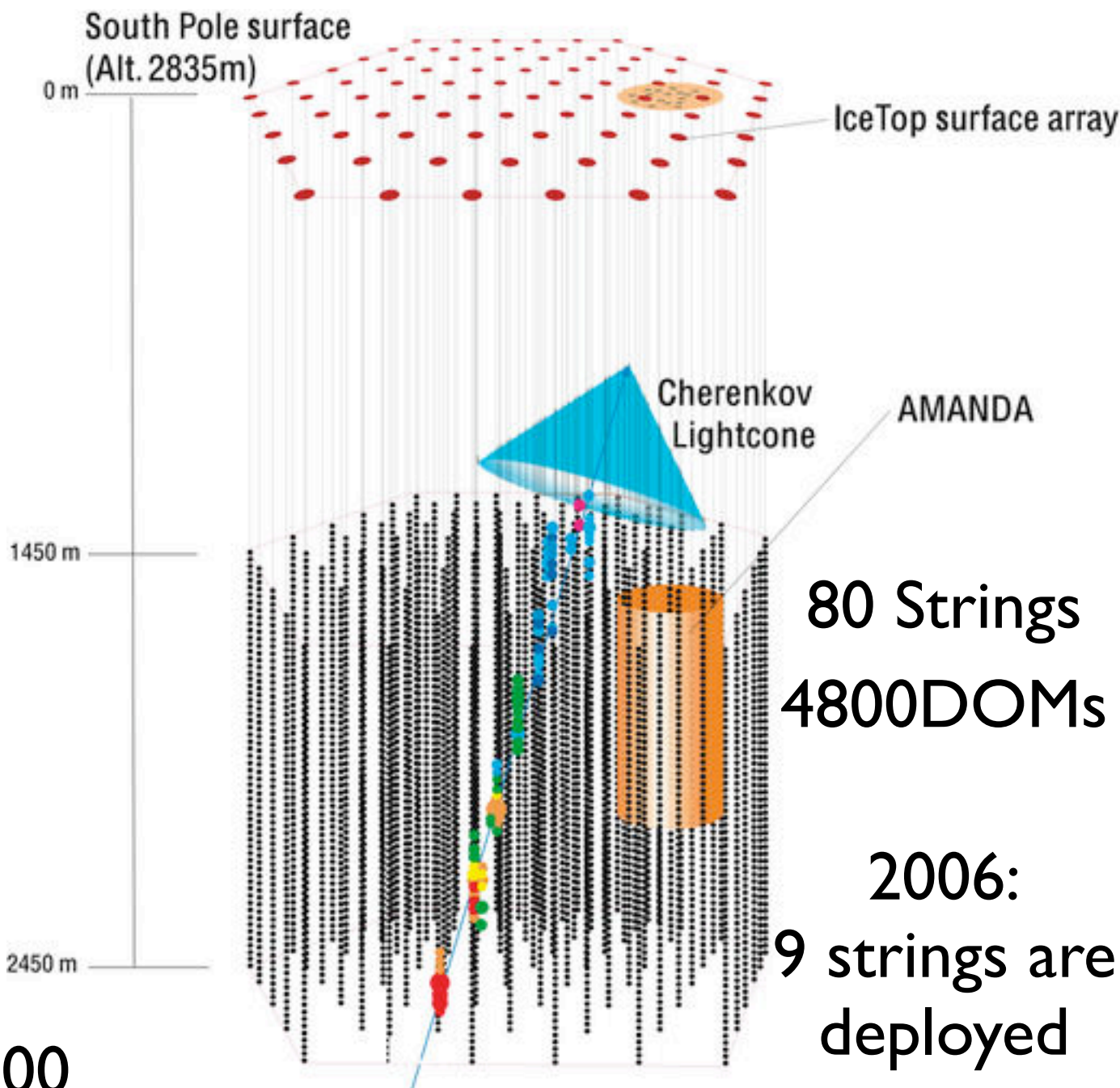
Investigate energy-related observable to search for astrophysical neutrinos!



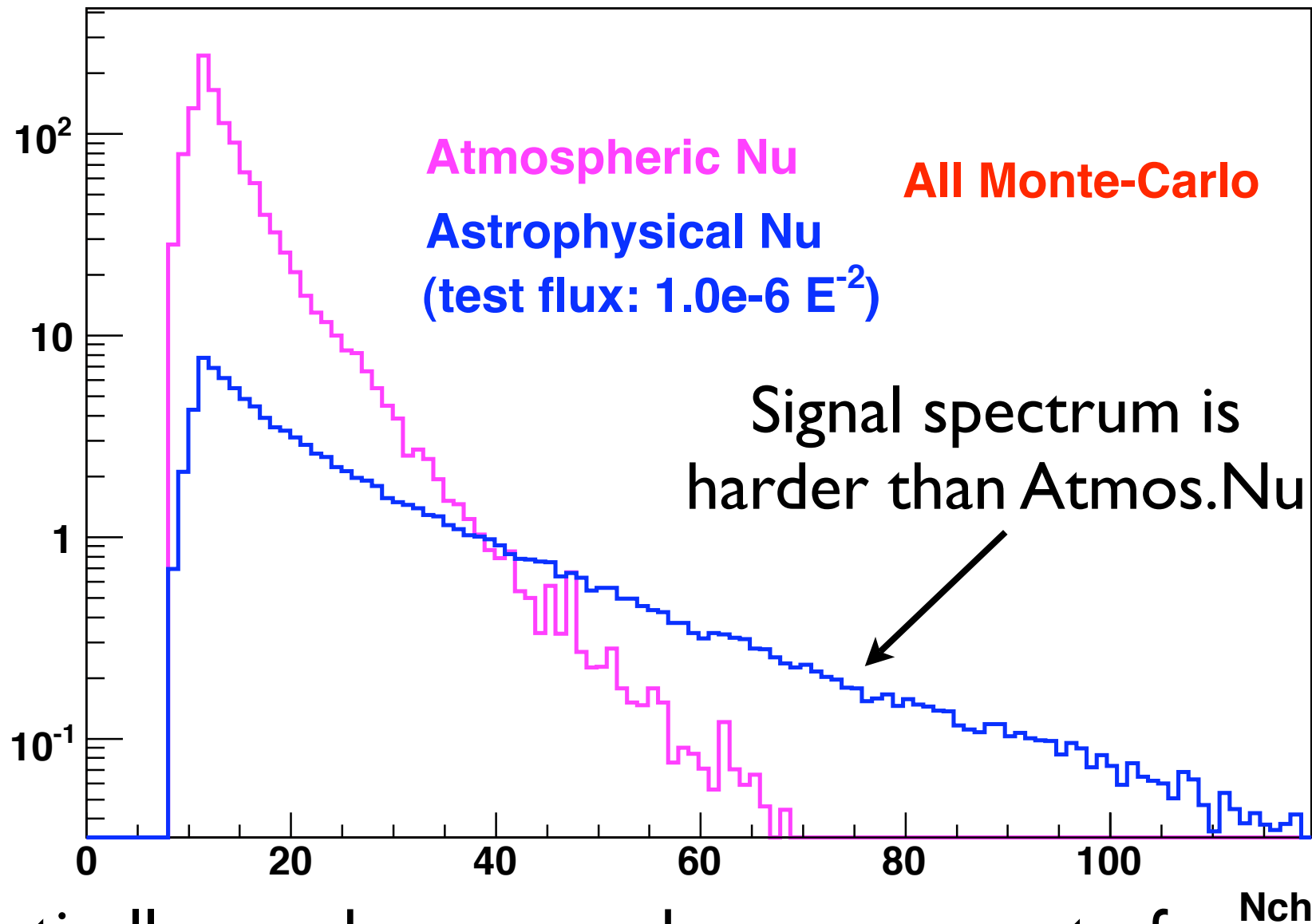
AMANDA-II



IceCube



Energy-related observable - Number of Hit Channels (Nch)

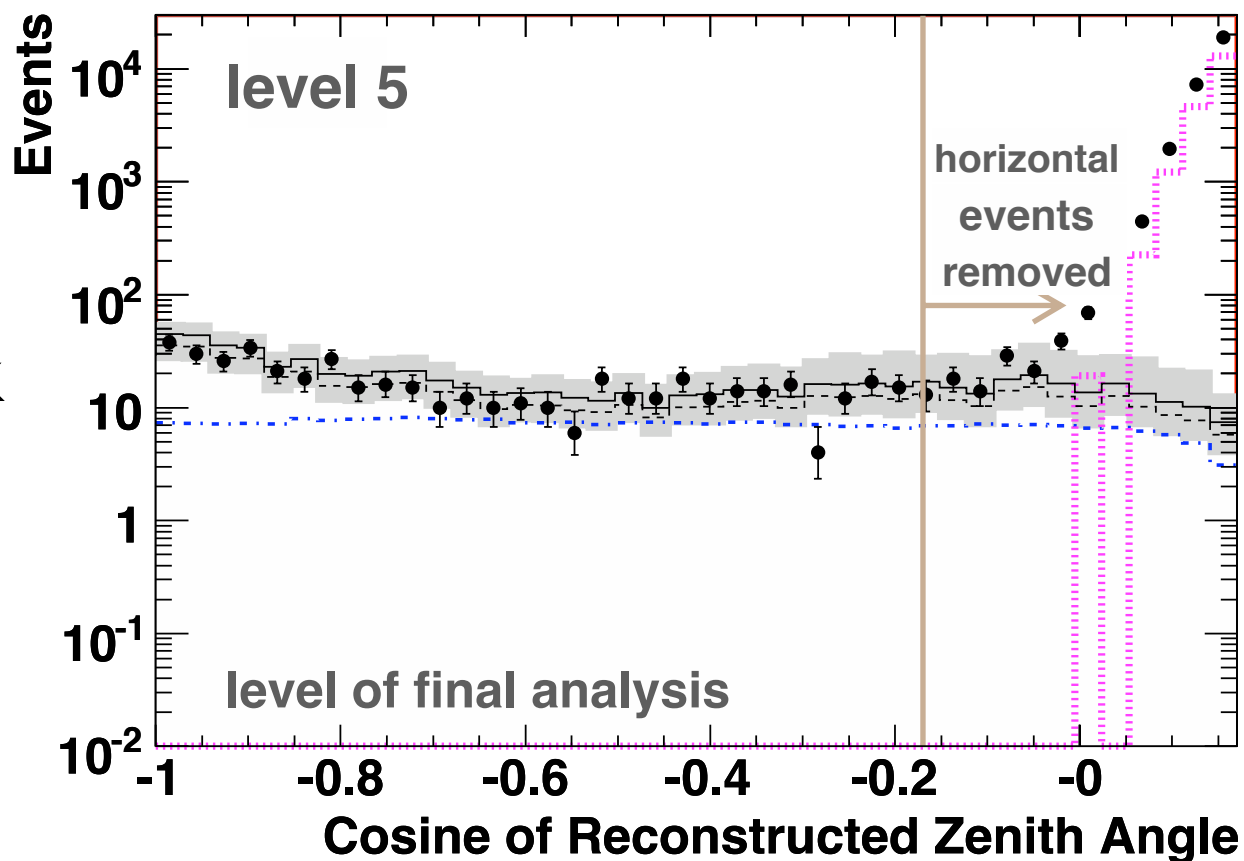
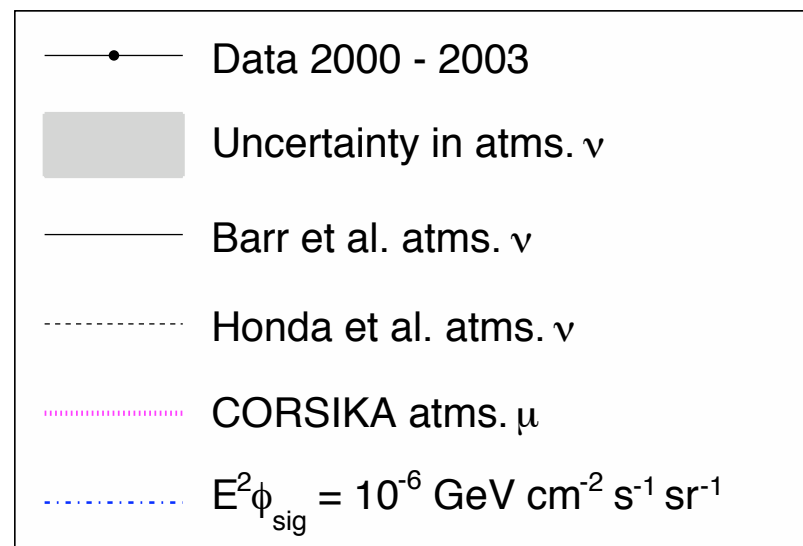


Practically we observe much more amount of atmospheric muon events which are misreconstructed as upgoing track. → Apply quality cuts

AMANDA-II 2000-2003 integrated analysis

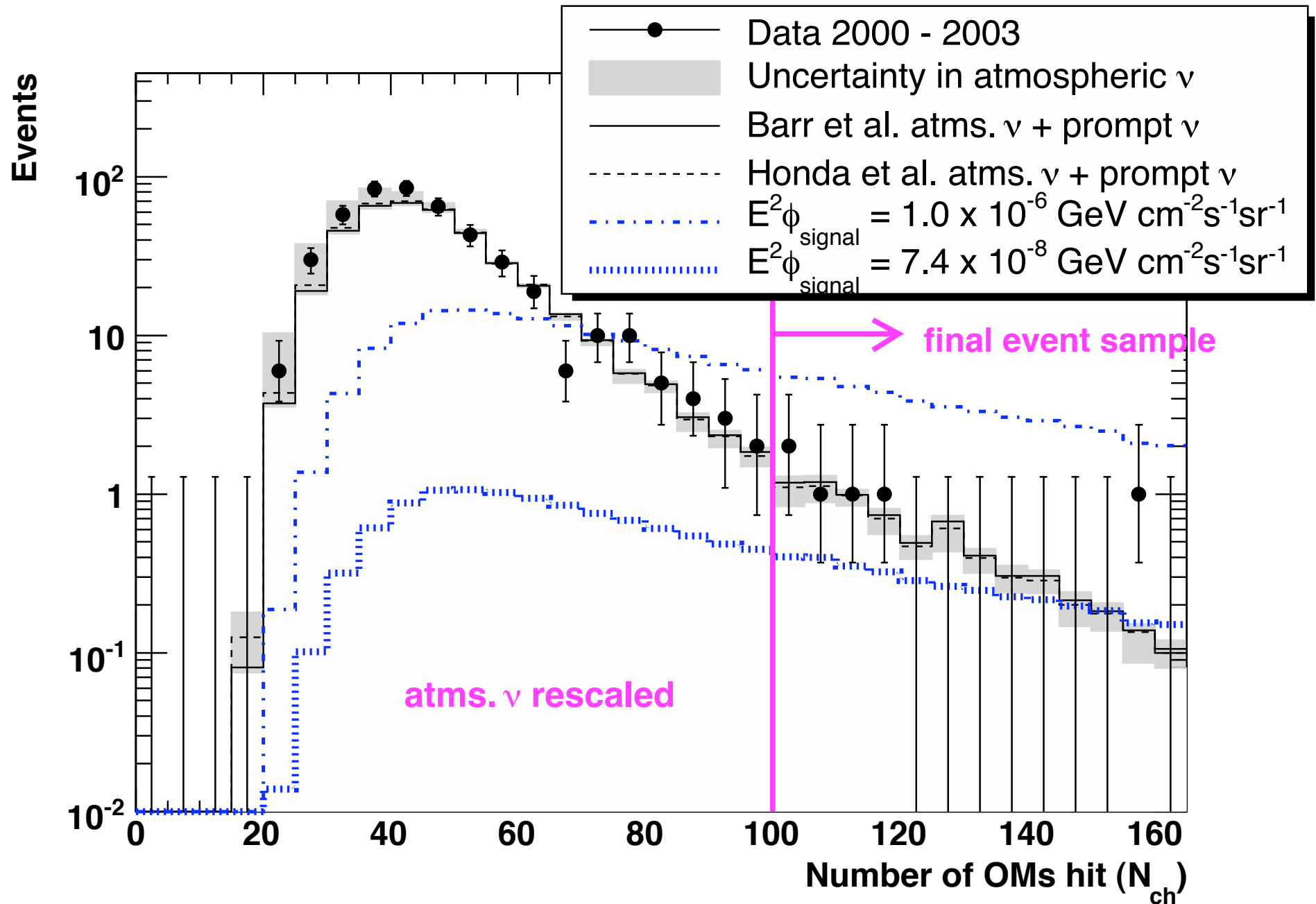
Event selection

- Require enough number of hit close to the expected hit time for the reconstructed track
- Hits should distribute smoothly along with the reconstructed track
- Require enough long track
- Remove horizontal events



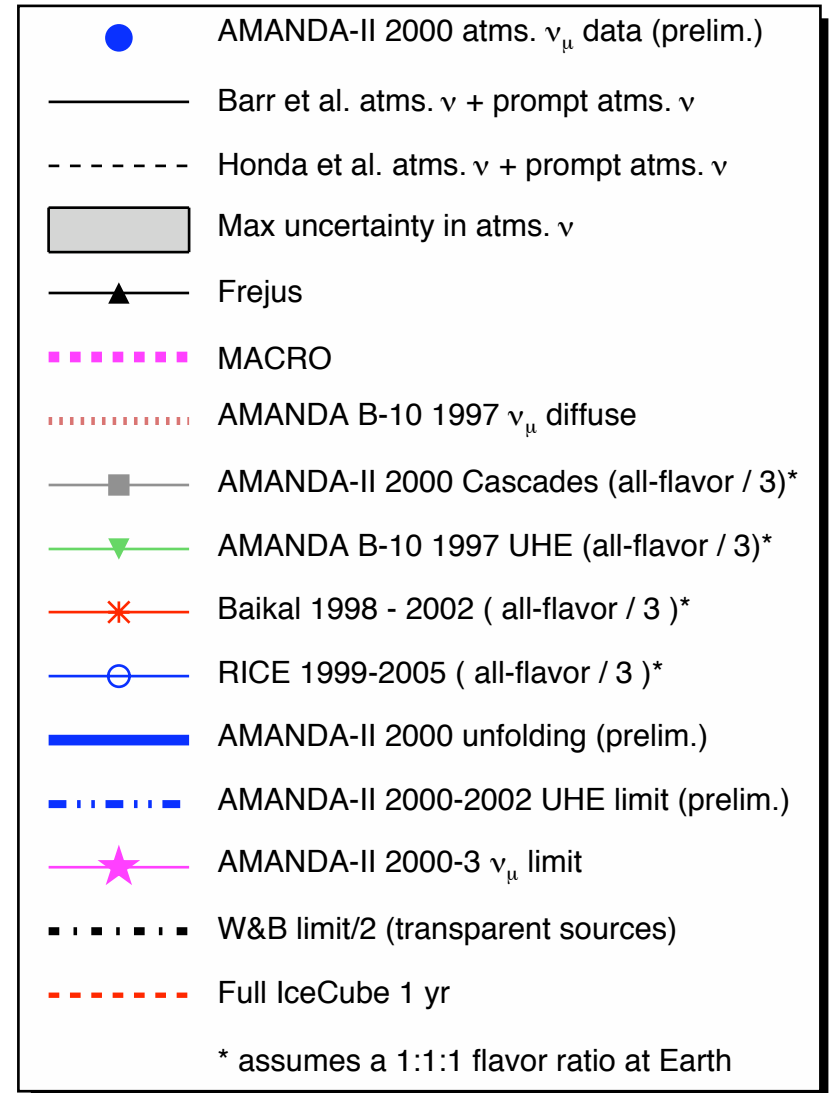
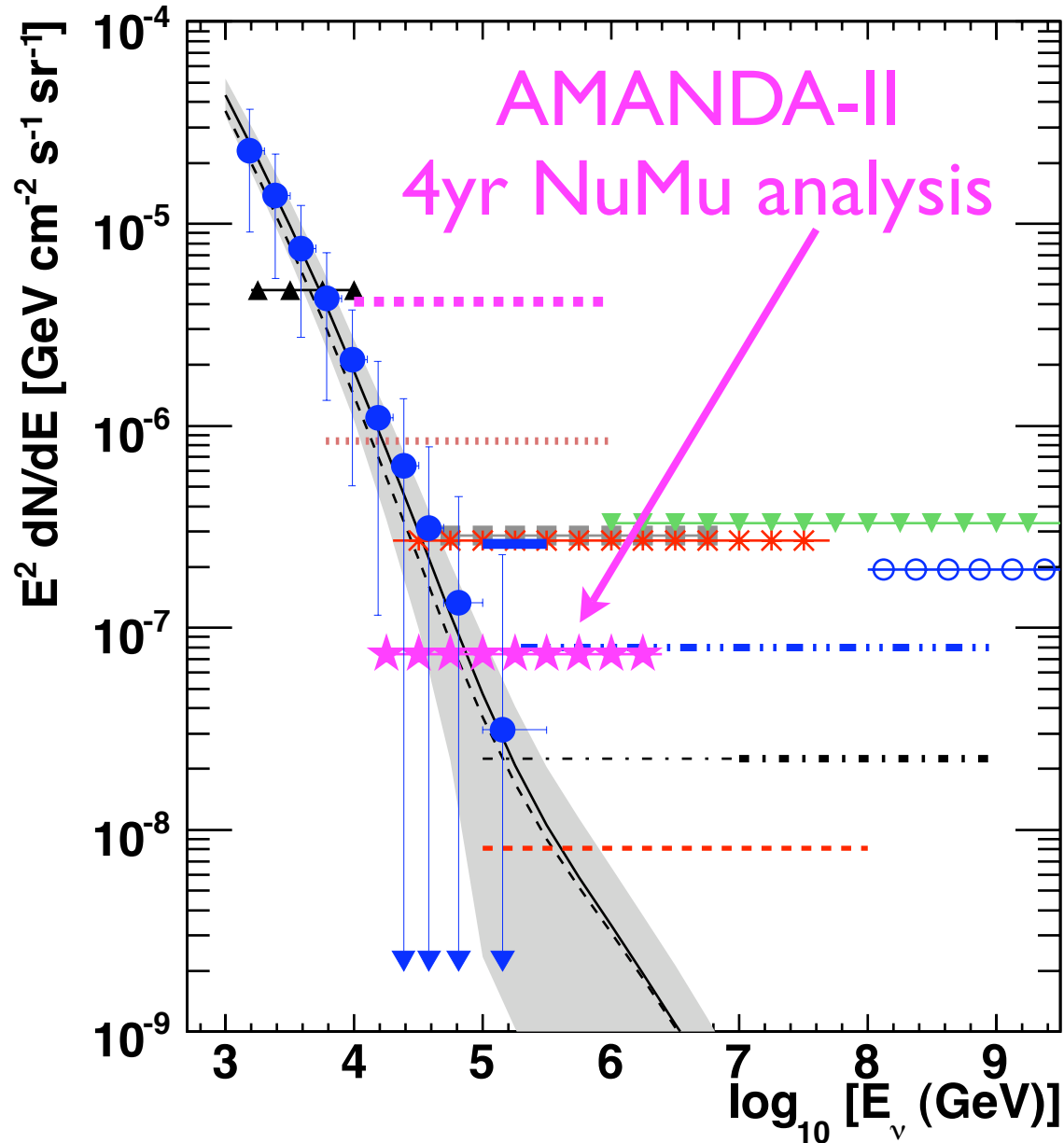
AMANDA-II 2000-2003 integrated analysis

N_{ch} distribution after final selection



AMANDA-II 2000-2003 integrated analysis

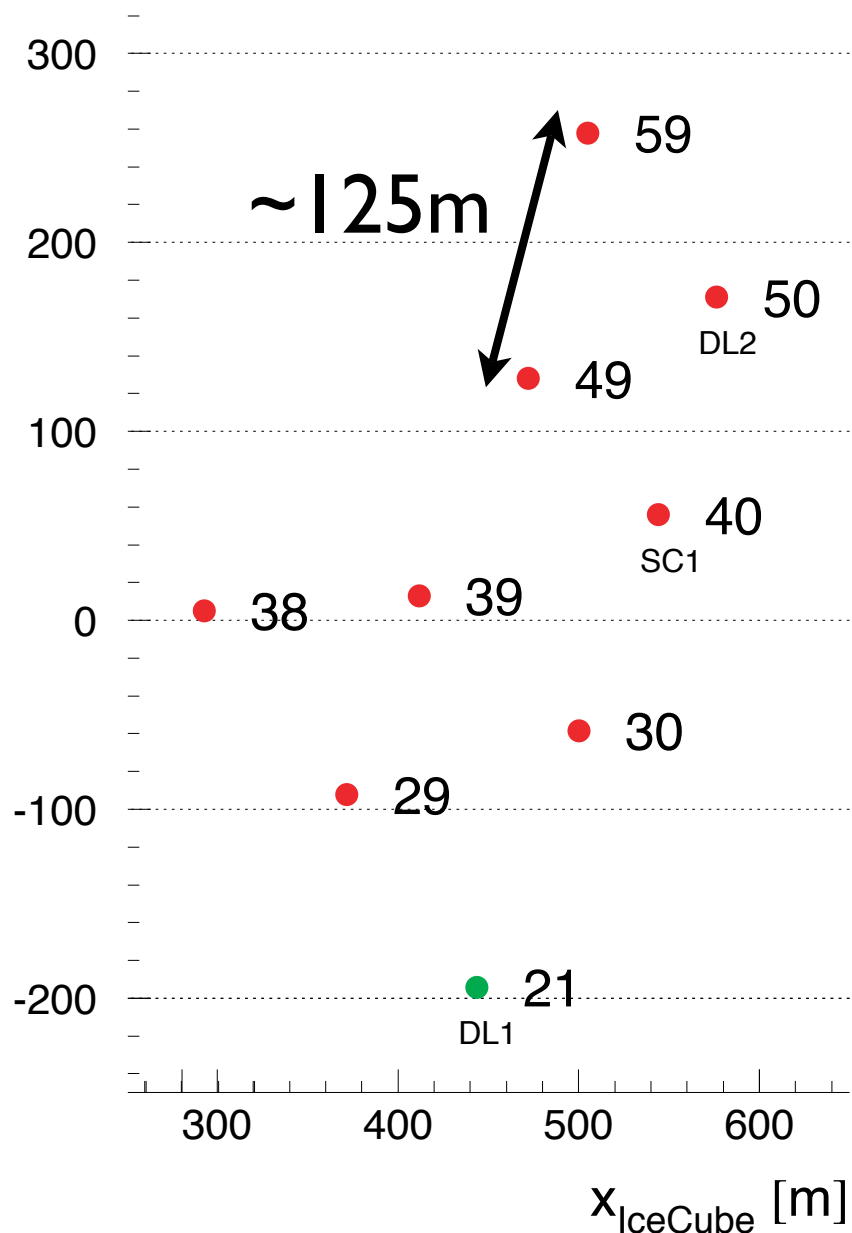
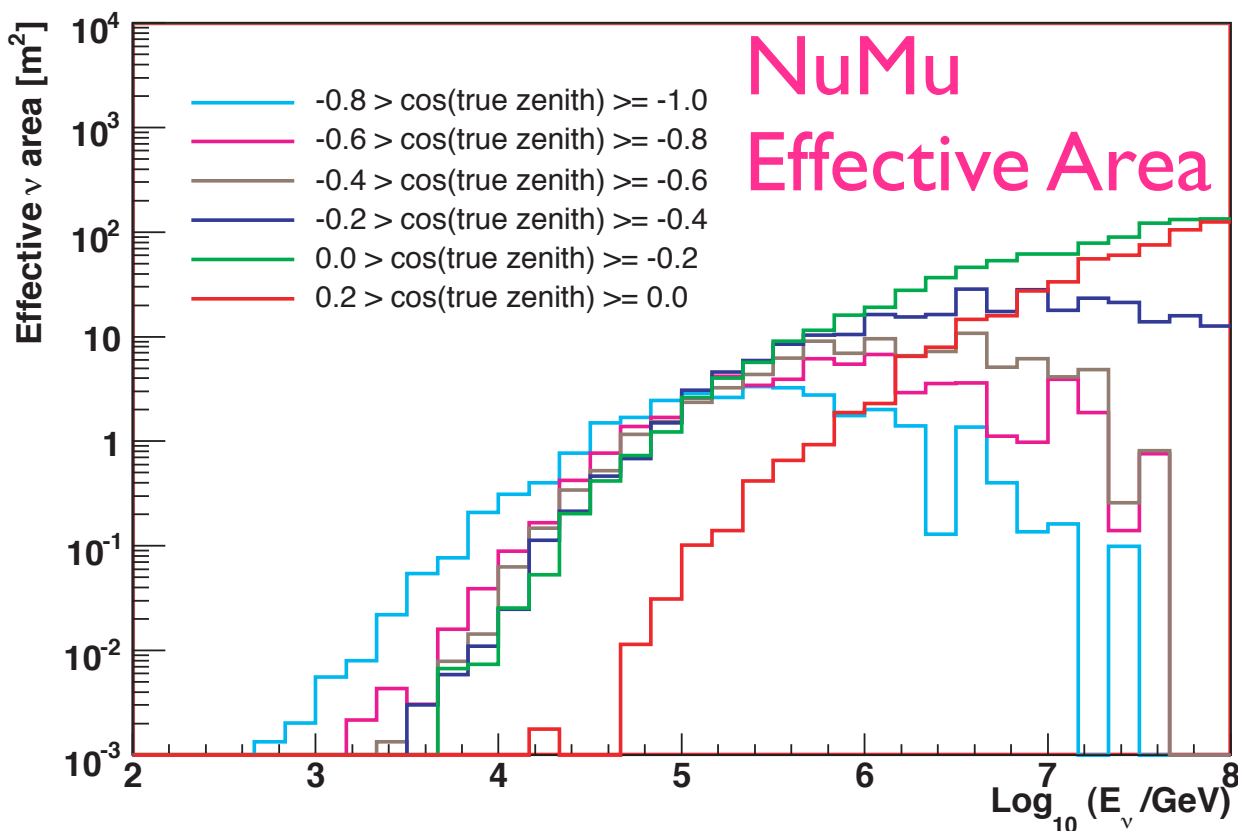
Upper Limit



IceCube 9 string ~ Event selection

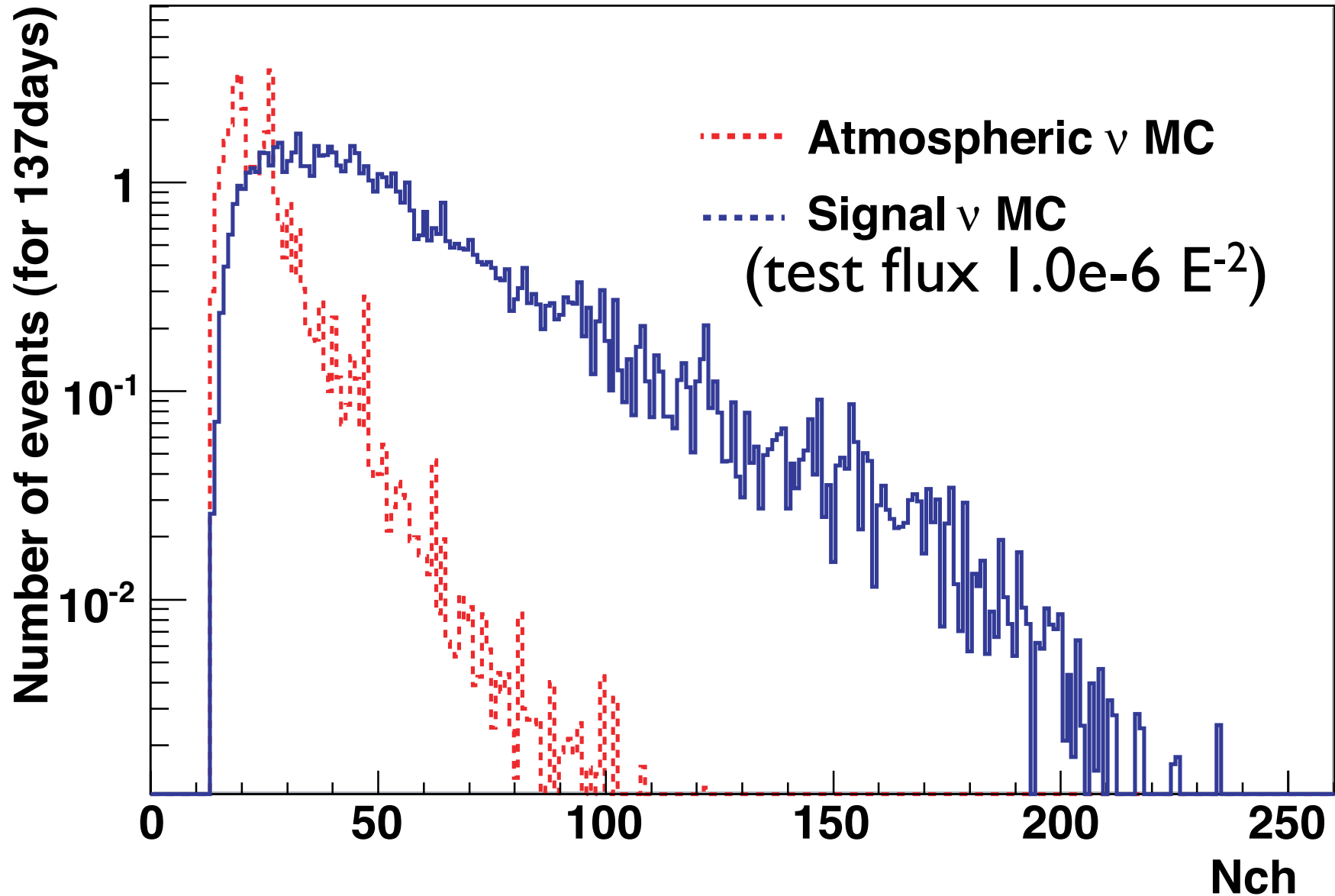
Basically same as AMANDA-II analysis, but...

- do not require track length
- Keep events that arrive from horizontal direction then apply energy-related cut to reject horizontal atms. muon



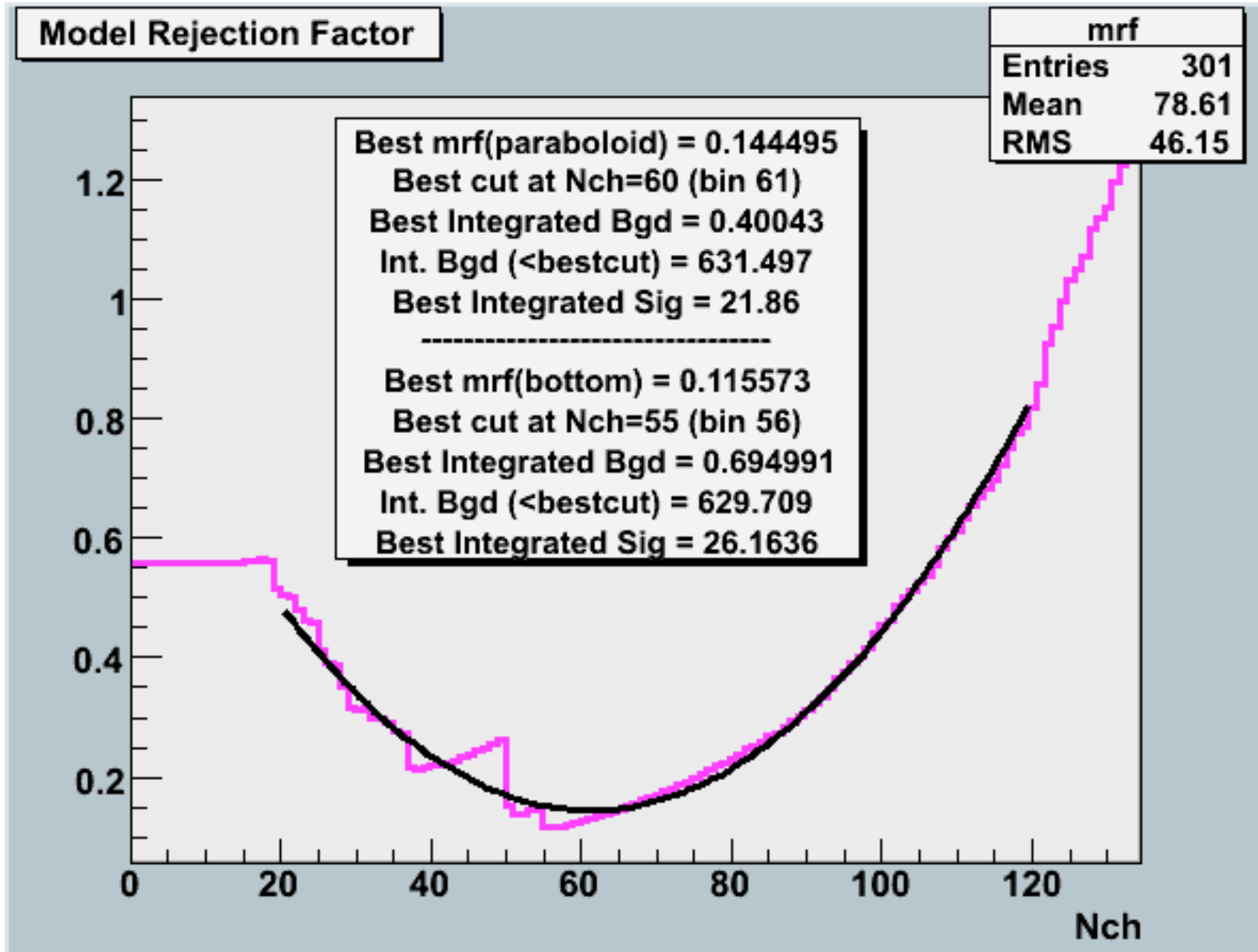
IceCube 9 string ~ 137days Nch distribution (MC)

After final selection

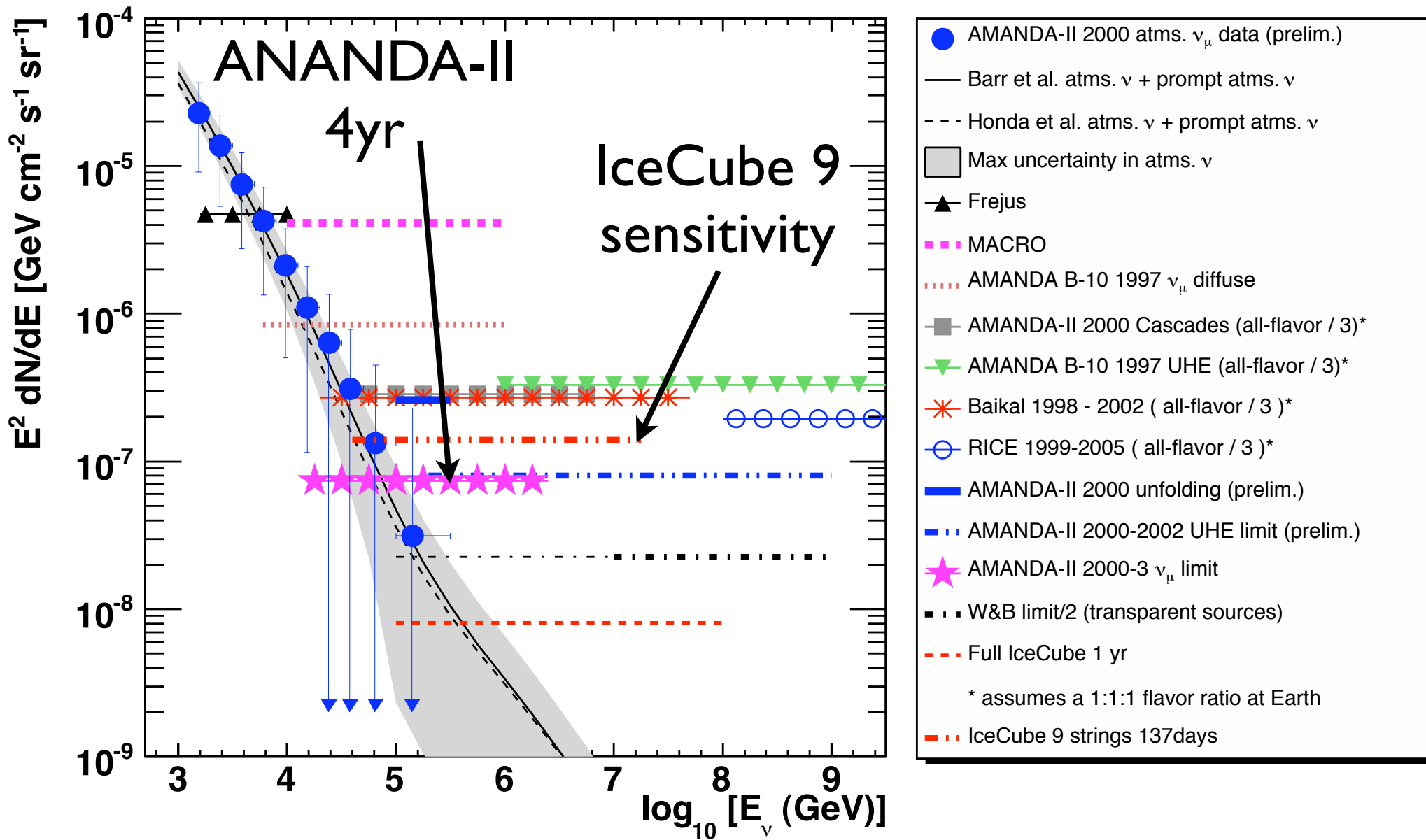


IceCube 9 string ~ 137days

Scale factor of test flux vs Nch cut threshold



IceCube 9 string ~ 137days Sensitivity



IC9 137days sensitivity is factor 2 above AMANDA-II 4yr!

Summary

- AMANDA-II 4 year upper limit on the diffuse flux of muon neutrino with a $A_{\text{const}}E^{-2}$ spectrum for the energy range 16 TeV to 2.5PeV is

$$E^2 < 7.4 \times 10^{-8} \text{ GeV cm}^{-2} \text{ s}^{-1} \text{ sr}^{-1}$$

- The sensitivity of IceCube 9 string 137days for the energy range from 40TeV to 20PeV is

$$E^2 < 1.4 \times 10^{-7} \text{ GeV cm}^{-2} \text{ s}^{-1} \text{ sr}^{-1}$$

which is factor 2 above from AMANDA-II 4yr

- Physics run of IceCube 22 string started
Analyses for 22 string is now ongoing