

Lab Test Updates on Pressure Vessel Antenna (PVA) With Pulsers & CW Generator For Radio Neutrino Observatory - Greenland

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Introduction

The purpose of this document is to provide sufficient and updated information to perform the SPICE Pulsar experiment in Greenland for the session of 2021 - 2022. This experiment involves dropping a PVA (Pressure Vessel Antenna) with a Pulsar down a hole (filled with Isopar-K). This document will cover lab test results of CW generator and 4 different Pulsars along with the possible setups using these.

Pulser Characteristics (Maximum Voltage): July 07, 2021

Pulsers	Polarization	Using ANITA Horn	Using Log Periodic Antenna
HVSP 1	VPol	250mV	2.0V
	HPol	600mV	2.5
HVSP 2	VPol	150mV	1.5V
	HPol	400mV	2.0V
IDL 1	VPol	300mV	500mV
	HPol	1.25V	700mV
IDL 2	VPol	500mV	1.25V
	HPol	1.25V	1.25

Equipment Used For The Test 1/4

Battery Packs

(4V Each)



Male Terminals
(To the Battery Packs)



Female Terminal
(To the Relay)



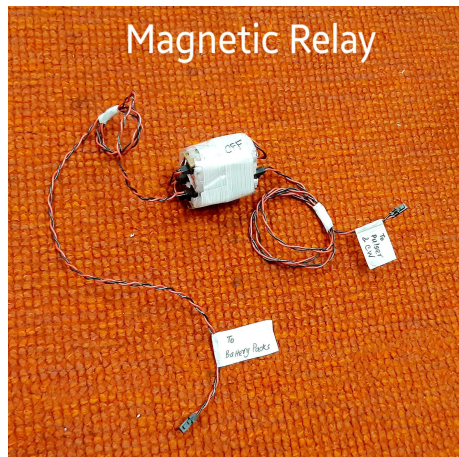
4V

4V



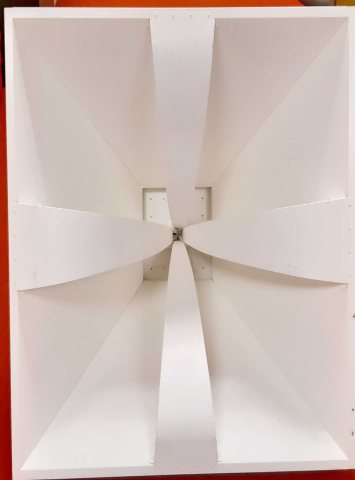
8V Output

Equipment Used For The Test 2/4



Equipment Used For The Test 3/4

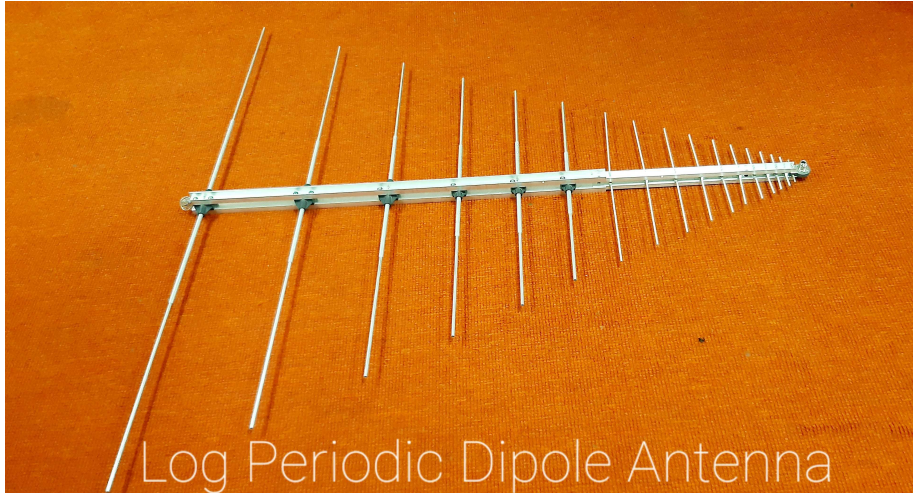
ANITA Horn (Front)



ANITA Horn (Back)



Equipment Used For The Test 4/4



Different Pulsers



IDL1
(Backup)



IDL2
(Main)

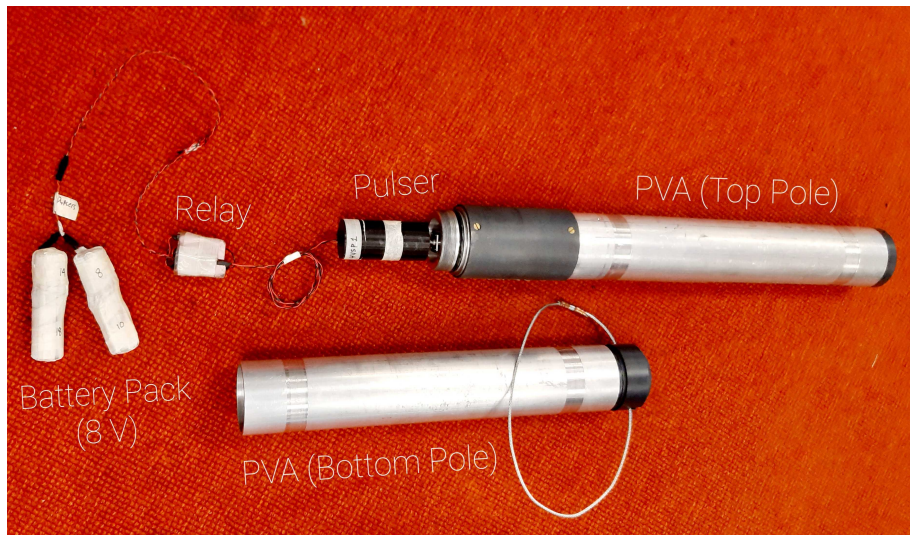


HVSP1
(Main)

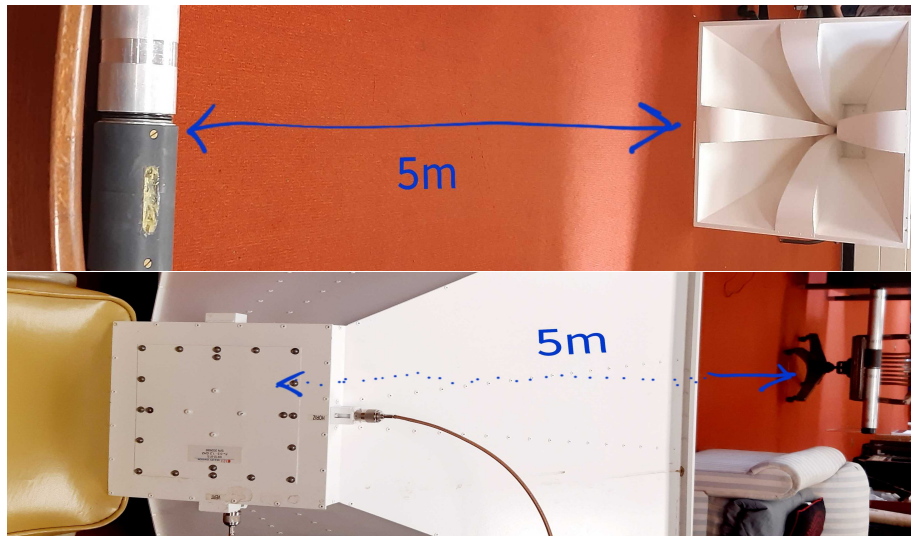


HVSP2
(Backup)

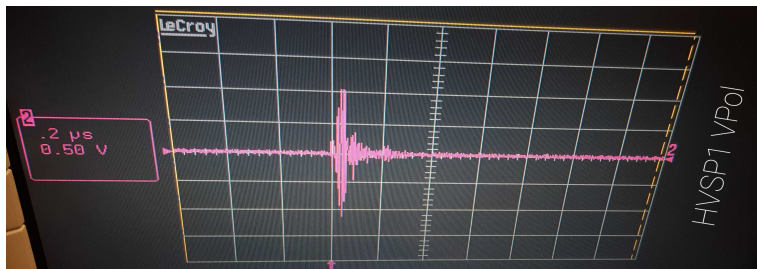
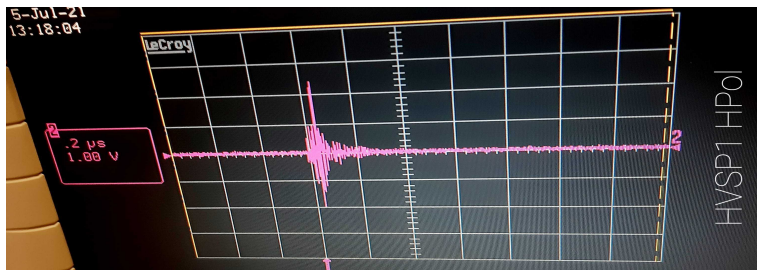
PVA Assembling with Pulsers



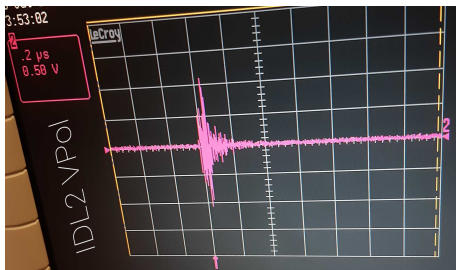
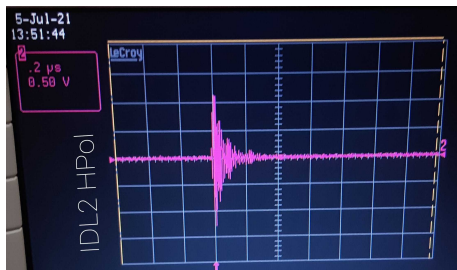
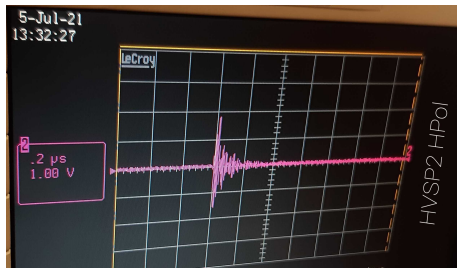
Test Setup



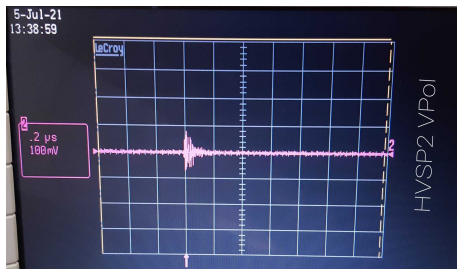
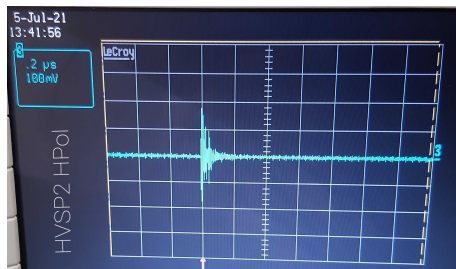
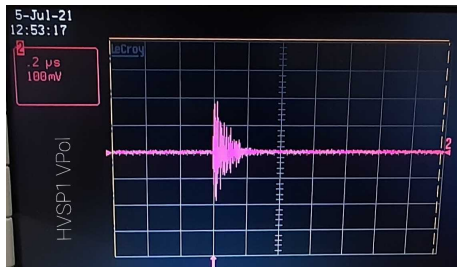
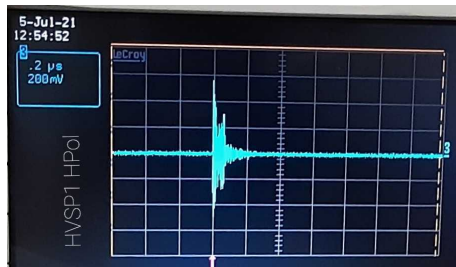
Measurements with Log Periodic Dipole Antenna 1/2



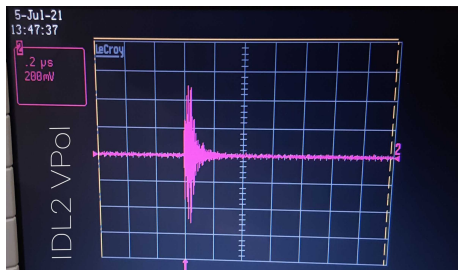
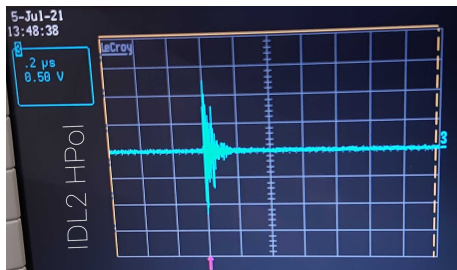
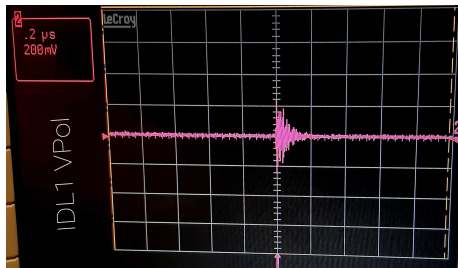
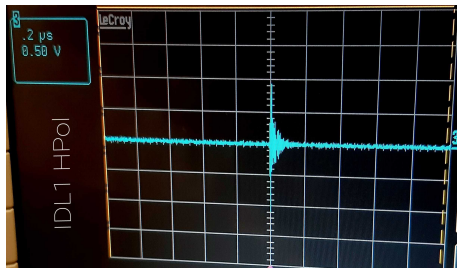
Measurements with Log Periodic Dipole Antenna 2/2



Measurements with ANITA Horn 1/2



Measurements with ANITA Horn 2/2



Special Case with CW Generator

Continuous Wave (CW) Generator

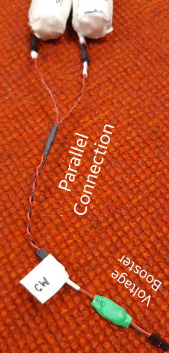


Male Terminals
(To the Battery Packs)



Male Terminal
(To the Relay)

4V 4V



5V Output

- Preprogrammed pattern (the generator will start following it once powered up):
 - Frequency sweep: 100-400MHz, 100MHz step, 10 seconds of each frequency;
 - Power set to maximum (~ 20 dBm);
- In contrast to the setup with the pulsers for the CW a relay must be connected between the generator and the voltage booster, since the relay itself can't operate at 4V. Thus there will be a small current draw even when the relay is off, and it is better not to leave it connected for a long time
- If the pattern needs to be changed a special software (next slide) can be used.

Customizing the CW Generator

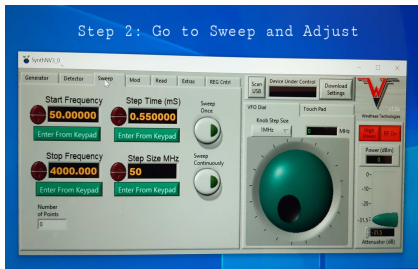
- Connect the CW generator with the Windows Surface laptop. On the Desktop, open the application “SynthNV3_0”. You might see message like “SynthNV Not Detected, Please Connect and Rescan”. In that case try to reconnect the USB and cancel this message.
- Go to “Sweep” option and adjust the start and stop frequency, time interval (Step Time) and frequency interval (Step Size).
- Make sure to increase the Attenuator (dB) level to Zero and click on “Sweep Continuously”. This will take some time.
- Go to “Extras” option and click on “Program EEprom” to save the setting to CW generator.

Customizing the CW Generator: Images

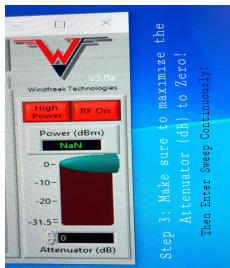
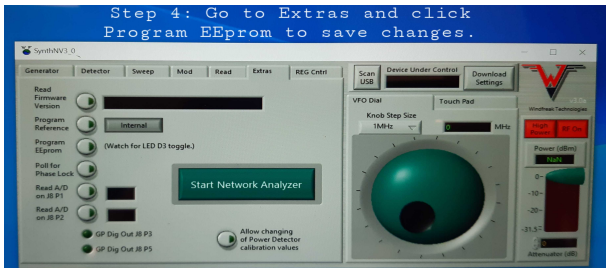
Step 1: Open SynthNV3_0 App



Step 2: Go to Sweep and Adjust



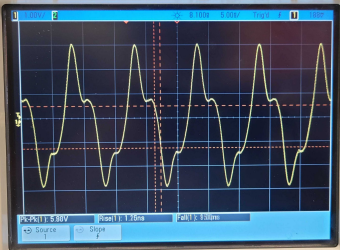
Step 4: Go to Extras and click Program EEPROM to save changes.



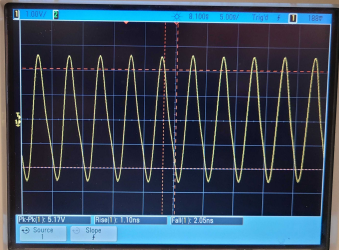
Step 3: Make sure to maximize the Attenuator (dB) to Zero! Then Enter Sweep Continuously!

CW of Different Frequencies at -35°C

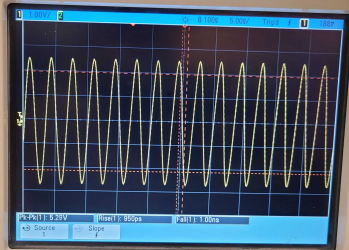
CW 100 MHz



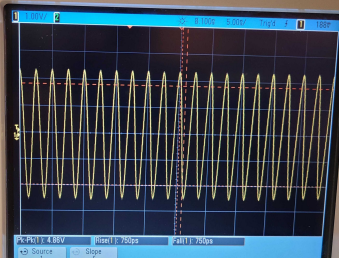
CW 200 MHz



CW 300 MHz



CW 400 MHz



Batteries Charging

- 4V pack - constant voltage (4.9V-5.0V);
- Single 2V battery - **constant** voltage (2.45V - 2.50V).
- Current draw can be up to a couple of amps;
- If there is no current draw a battery (battery pack) is charged

References



<https://www.overleaf.com/project/5f92019e84223d0001883f57>

SPUNK Team (2021).



<https://usermanual.wiki/Document/SpicePulserTheGuide.1535821065/html>

Shultz, Latif, Novikov (2018).