

Deep Space Exploration Society Science Meeting



June 22, 2020

Dr. Richard Russel

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DSES Pulsar Simulator is used
to test our equipment

Information

- 9 ft Dish – Down because hard drive crashed
- SuperSID – Down because of hard drive crash
- Radio Jupiter – still need to get a new receiver and setup at site (new member project?)
- Pulsar – Last observation trip Saturday – still can only get B0329+54
 - Learned the limits on setting up BW on N210 receiver
 - Improving the pulsar observing tool being built on EXCEL
 - Used the pulsar simulator to test the settings for the next observation trip
- SARA East Conference – recommend everyone virtually attend: August 1-2 www.radio-astronomy.org
- DSES Pulsar featured on Neutron Star Group website <http://www.neutronstar.joataman.net/>

6-13-20 Observing Session:

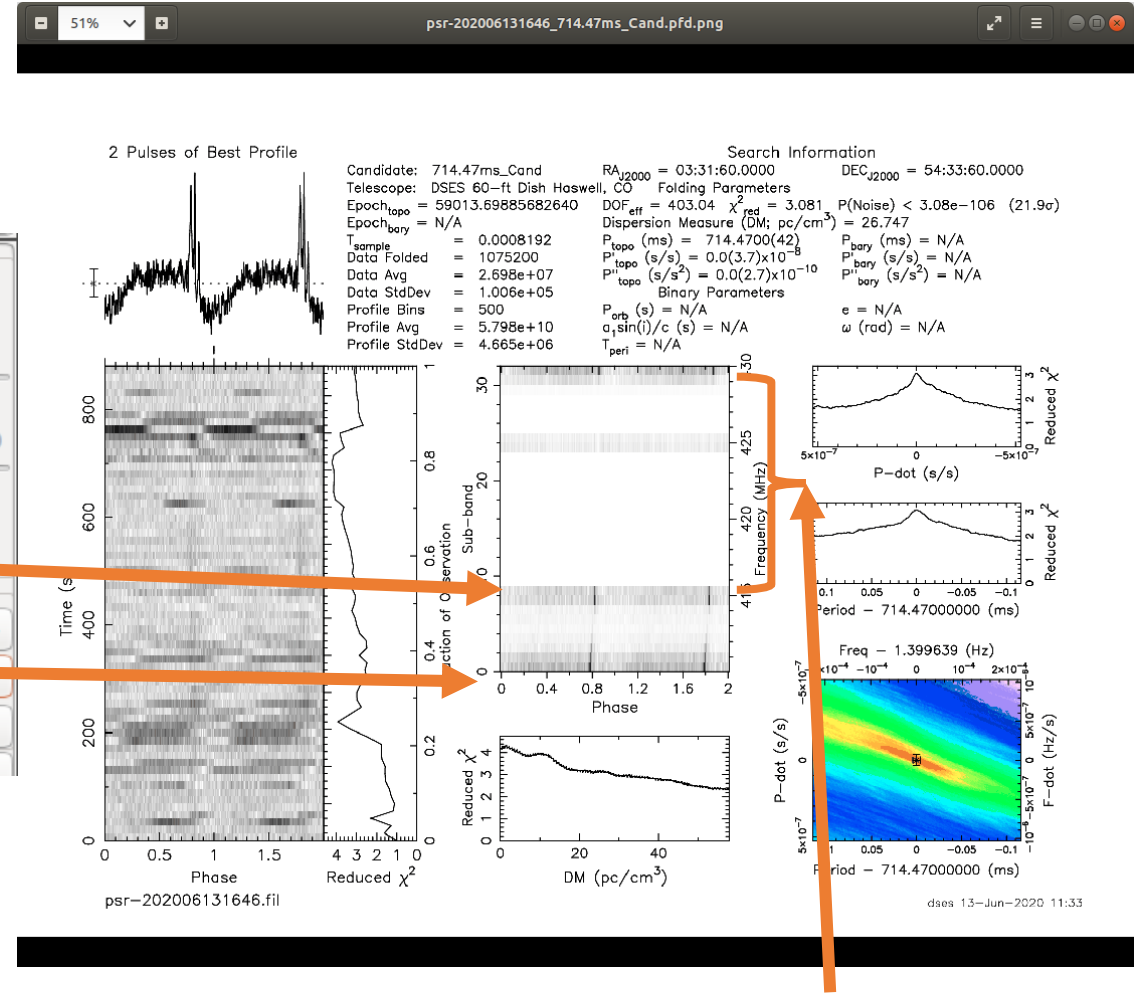
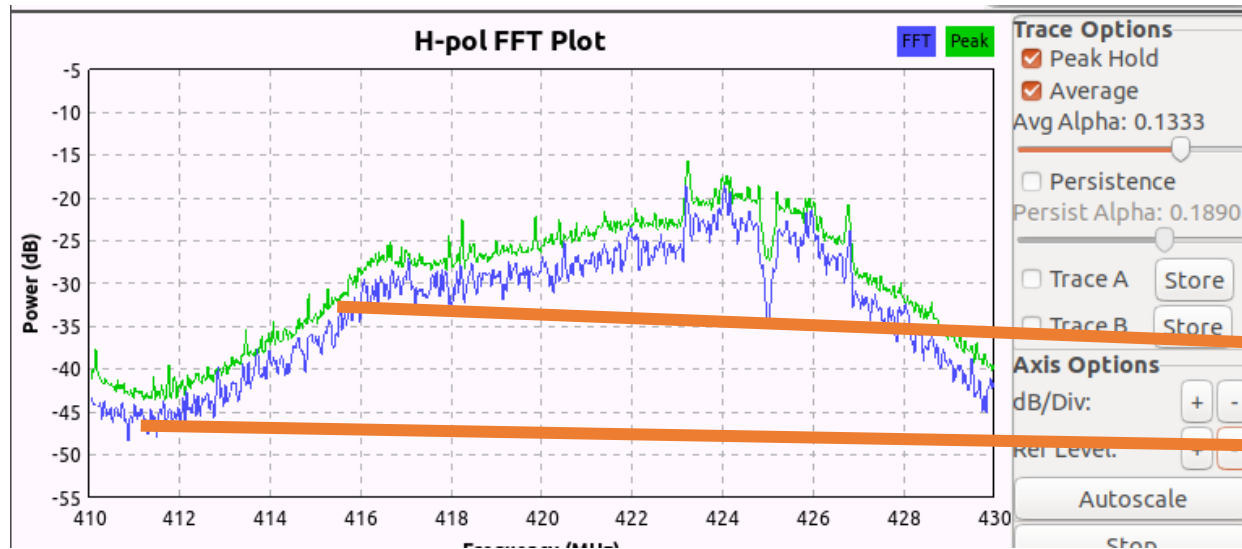
Issue with the gain of the N210 over the bandwidth

B0329+54

First attempt at 20 MHz

Problem: Worse than 10 MHz

Can I fix in RF and/or in PRESTO?



Ettus Research N210

- 20 MHz BW
- Get same shape on both 60 ft dish and home yagi so I believe it is the N210
- Can I fix this - make it flatter so PRESTO uses the entire BW?

It appears that the white area is not being used

- Is there a setting in PRESTO to allow me to recover this area?

Issue

- Gain is not flat across bandwidth
- Solution appears to be that BW needs to be even integer of $100/\text{BW}$
- Ray and Rich took system to Ray's lab
- Used Ray's pulsar simulator and was able to synthesize a pulsar signal!

Pulsar System Test Setup



Pulsar Simulator

Frequency Counter

Acquisition Laptop

N210 Receiver

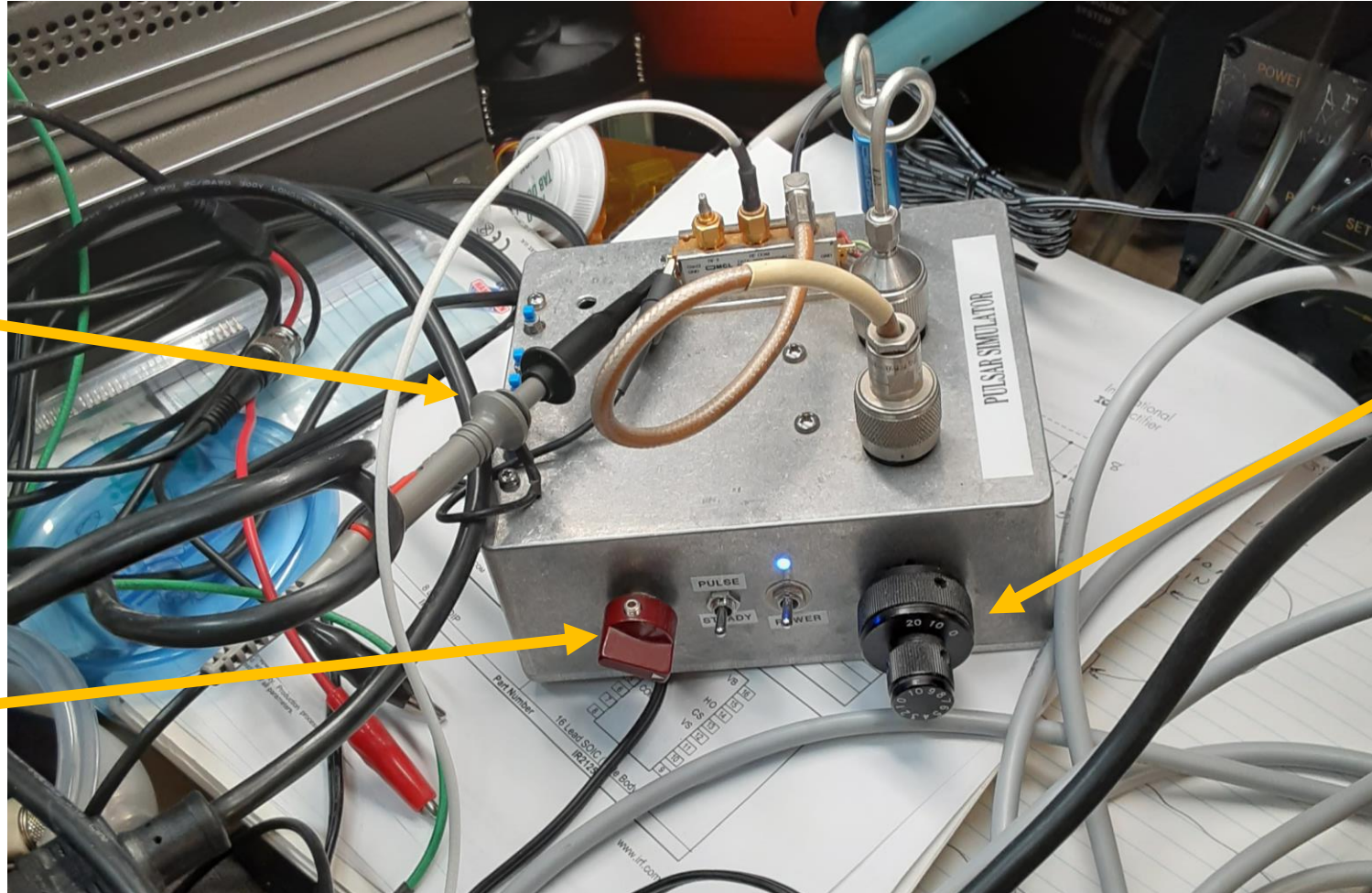
Pulsar Simulator

Designed and Built by Ray Uberecken

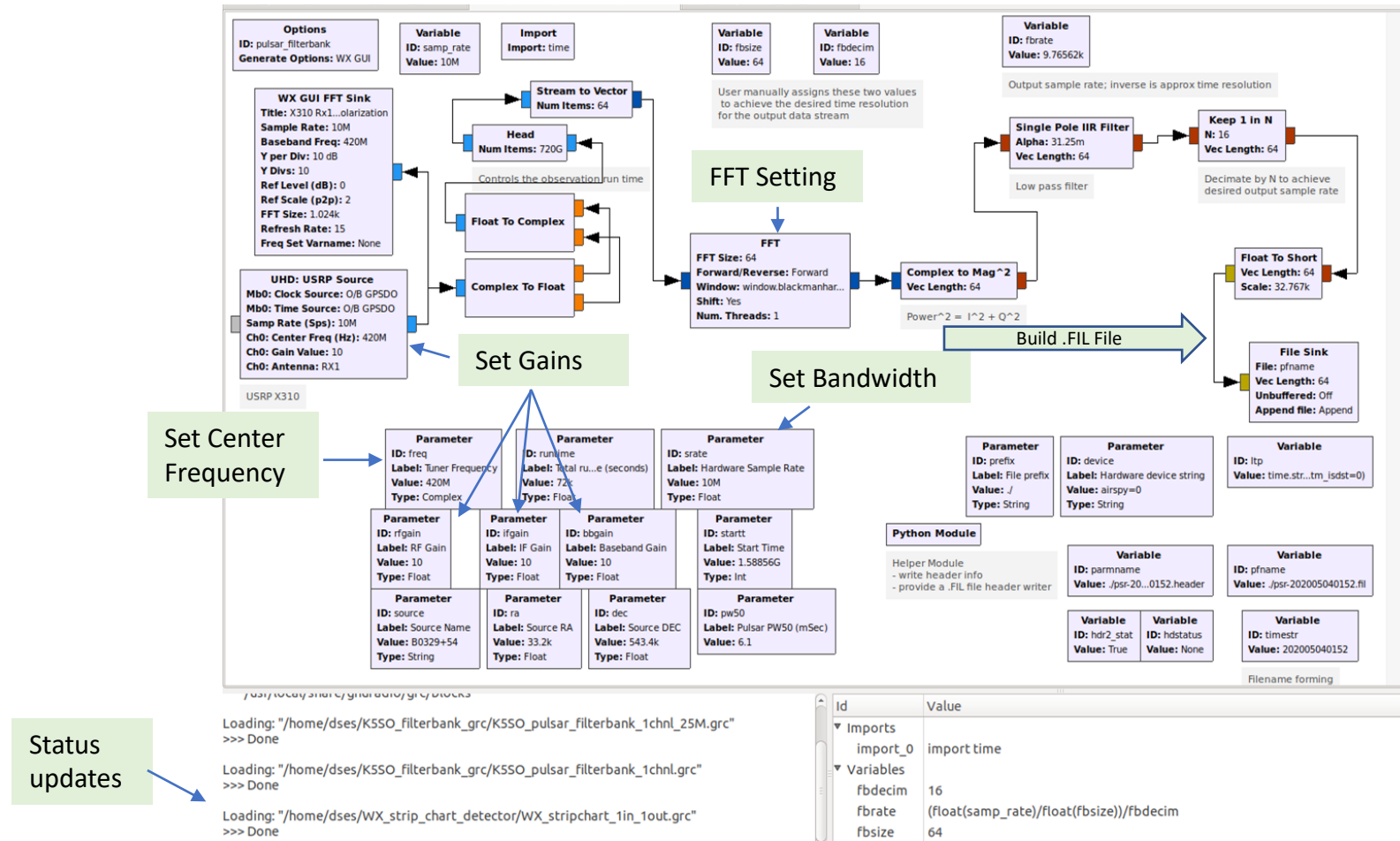
Pulse Width
selector

Attenuator

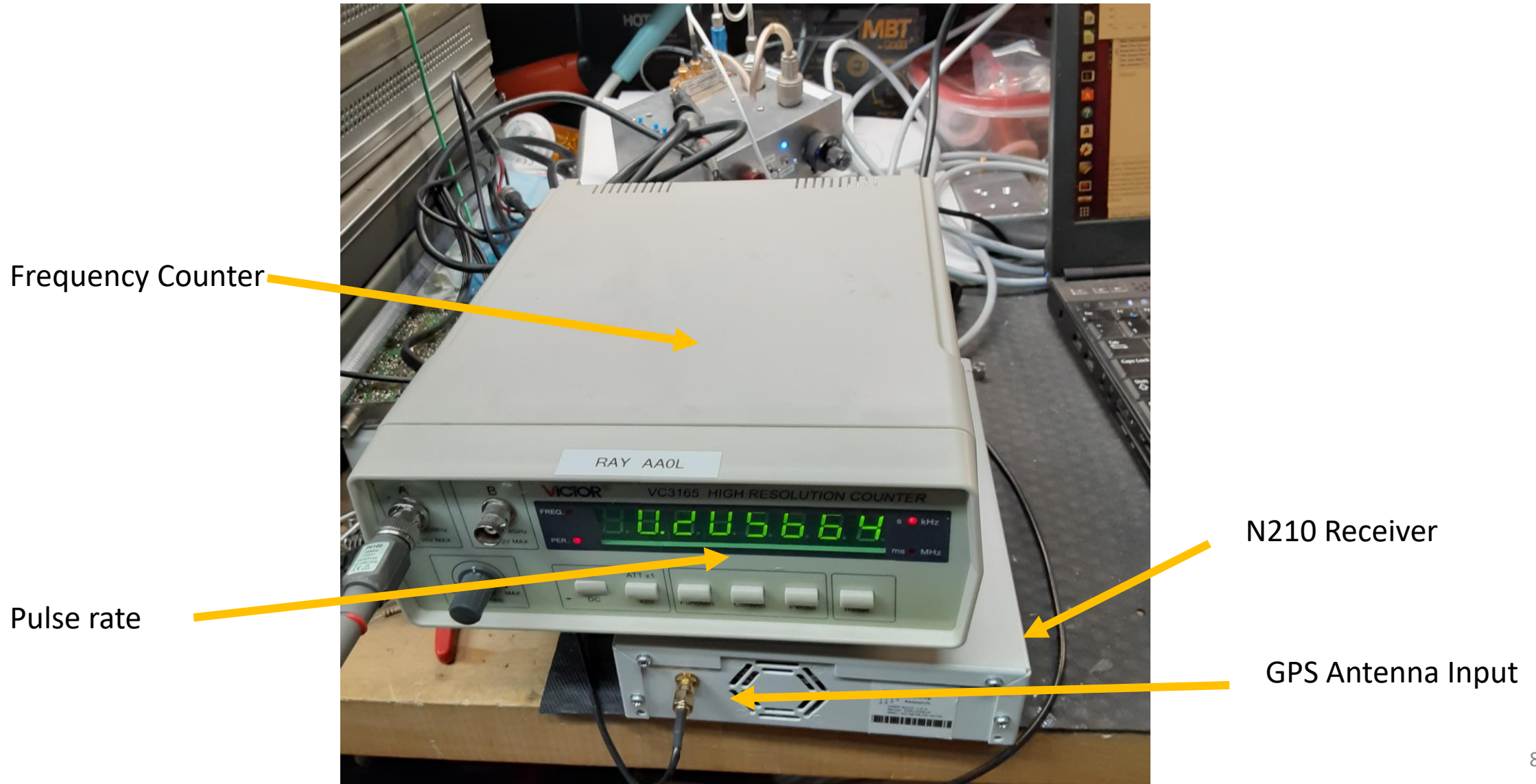
Pulse rate selector



GNU Software

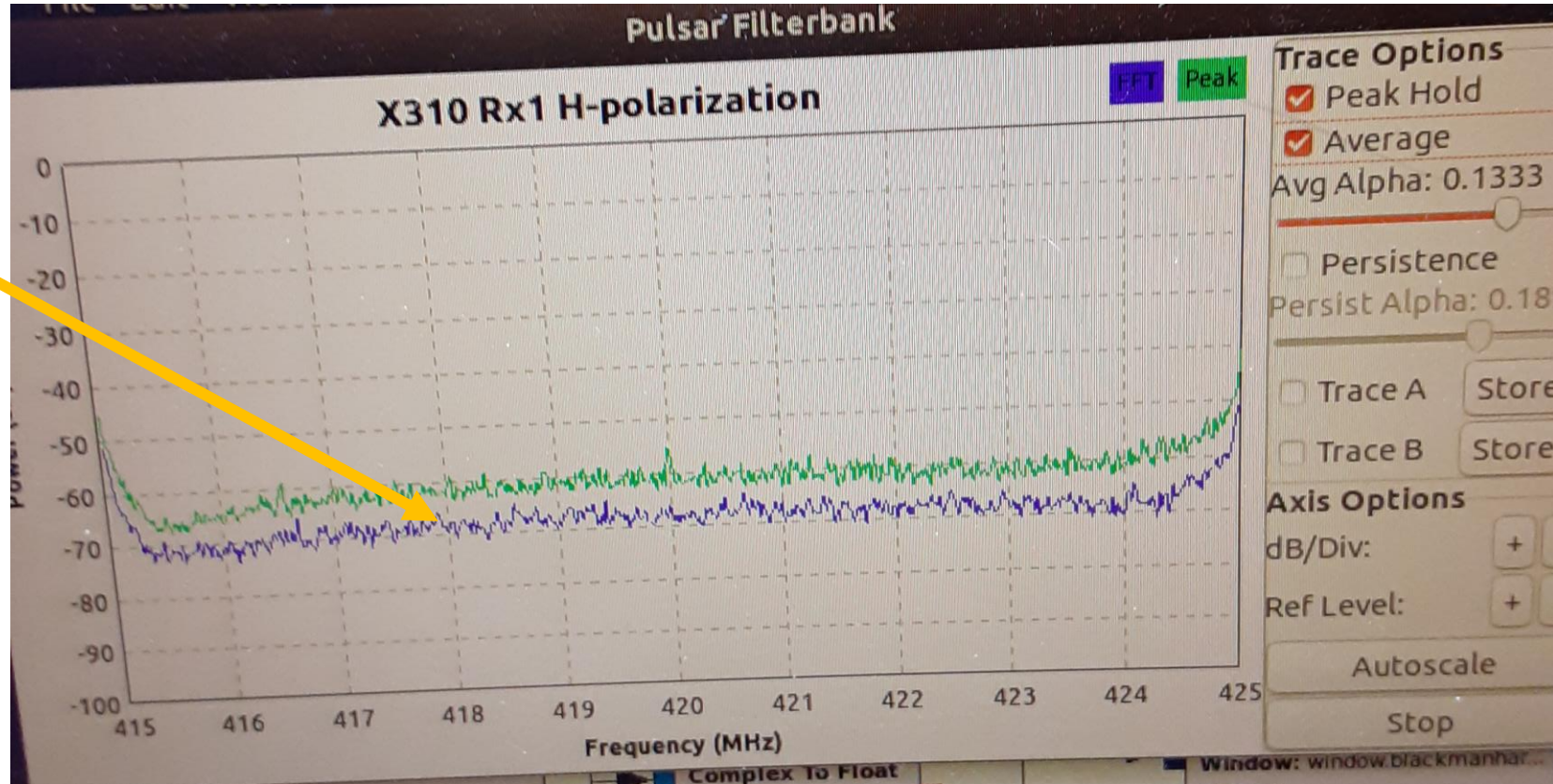


Frequency Counter and N210 Receiver



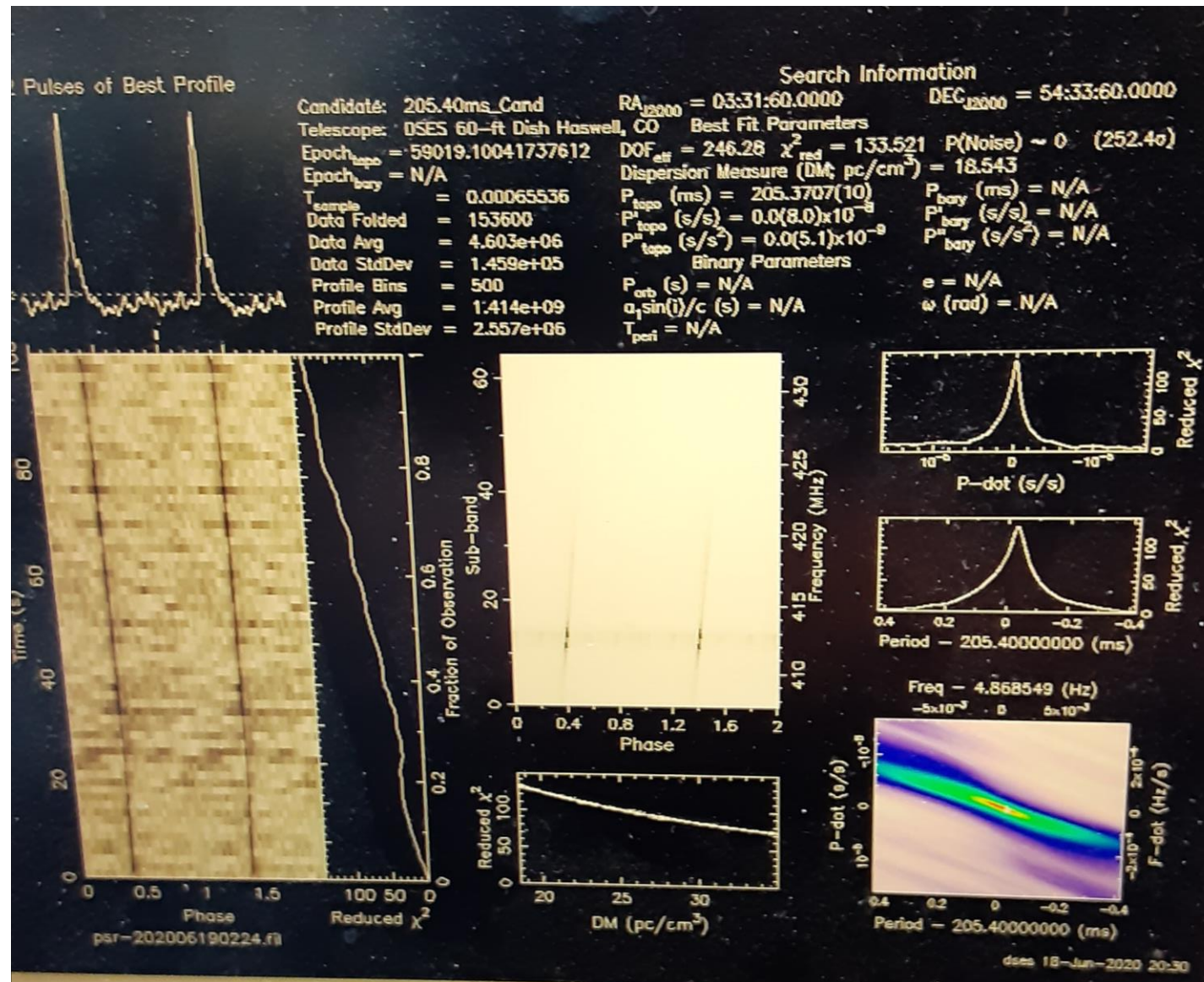
Acquisition

Spectrum



Bandwidth

PRESTO Output using pulsar simulator



Pulsar Observing Team 6-13-20



Pulsar Equation

$$\Delta S_{min} = \beta \frac{2k_b (S/N_{min}) T_{sys}}{A_e \sqrt{n_p t_{int} \Delta f}} \sqrt{\frac{W}{P - W}}$$

ΔS_{min} = minimum detectable flux density (watts per square metre per hertz - averaged over the period of the pulse)
 β = factor for imperfections in the observatory system, usually near to 1 (values >1 makes the system less sensitive)
 k_b = Boltzmann's constant ($1.38064852 \times 10^{-23}$ Joules • K⁻¹)
 S/N_{min} = required minimum linear S/N for validation of result (professional require at least 6, amateurs ≥ 4)
 T_{sys} = System noise temperature (K⁰)
 A_e = antenna aperture (m²)
 n_p = number of polarisations (usually 1 for amateurs, generally a maximum of 2)
 t_{int} = integration time (observation time in seconds)
 Δf = pre-detection bandwidth (Hz)
 W = width of pulse (seconds)
 P = period of pulse (seconds)

SARA Virtual Eastern Conference

www.radio-astronomy.org



Society of Amateur Radio Astronomers

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Society of Amateur Radio Astronomers (SARA) Mission Statement



2019 SARA Group Photo



2019 Western Conference



2018 SARA group photo

2020 SARA Conference Keynote Speaker



For all the curious minds in the world, Paul M. Sutter is a new, fresh voice in science communication. Everywhere from his hit podcast Ask a Spaceman! to his role on TV's How the Universe Works, Paul strives to bring science to new audiences.

[Read more](#)

The SARA Eastern Conference has gone 100% Virtual!

We are sorry that we will not be able to see each other at Green Bank this year but we are planning to restart the physical conferences next year at the VLA for the Western Conference and Green Bank for the Eastern Conference. The virtual conference will be held on Saturday and Sunday to allow for peoples work. The new dates are 1-2 August 2020. The schedule will include sessions all day Saturday and half of the day Sunday afternoon to accommodate peoples worship services in the morning.

Join SARA!

SARA Annual Conference

- Live streaming
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- Keynote Speaker
- Paper Abstracts
- Conference registration



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Questions?