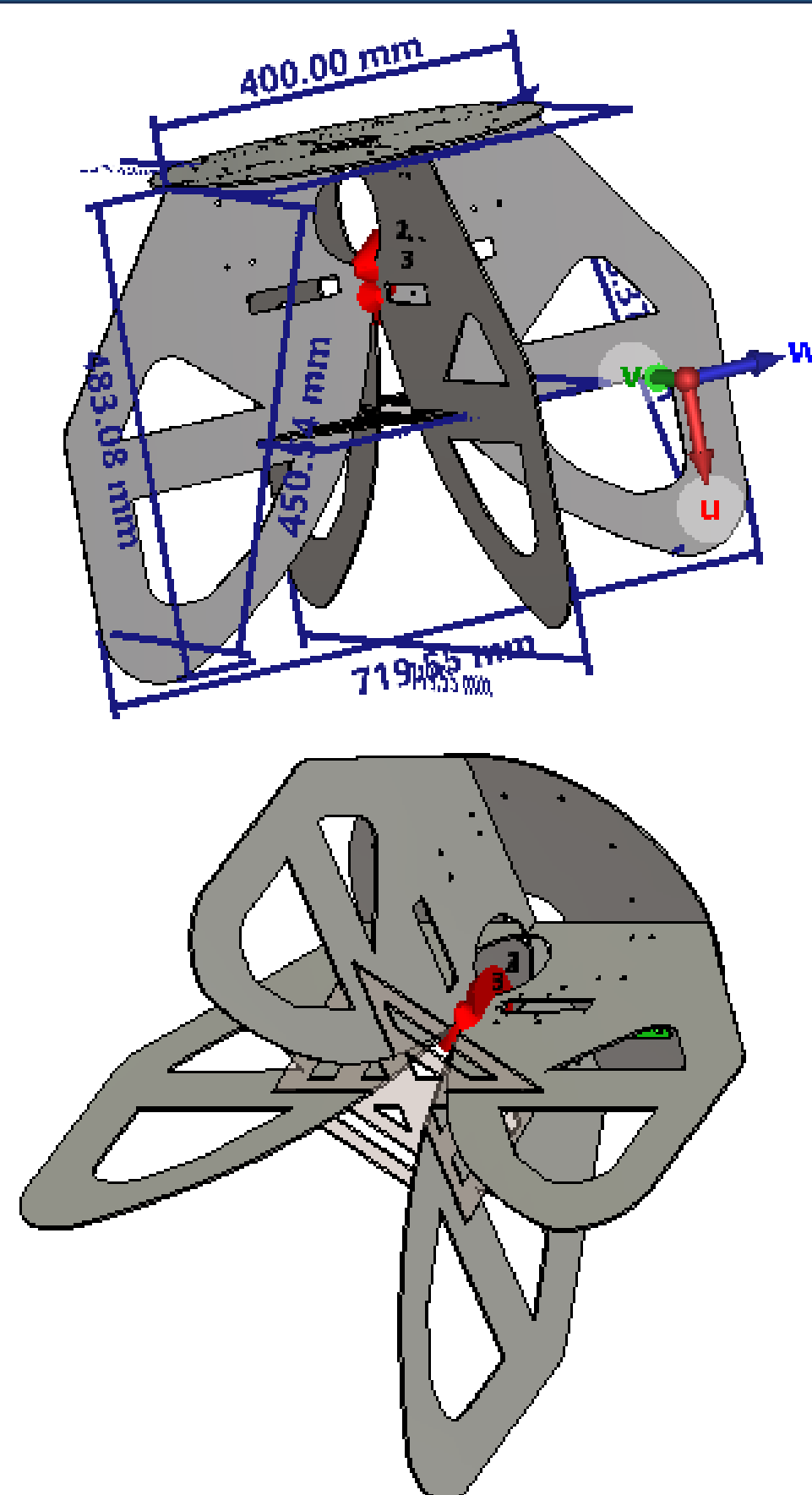


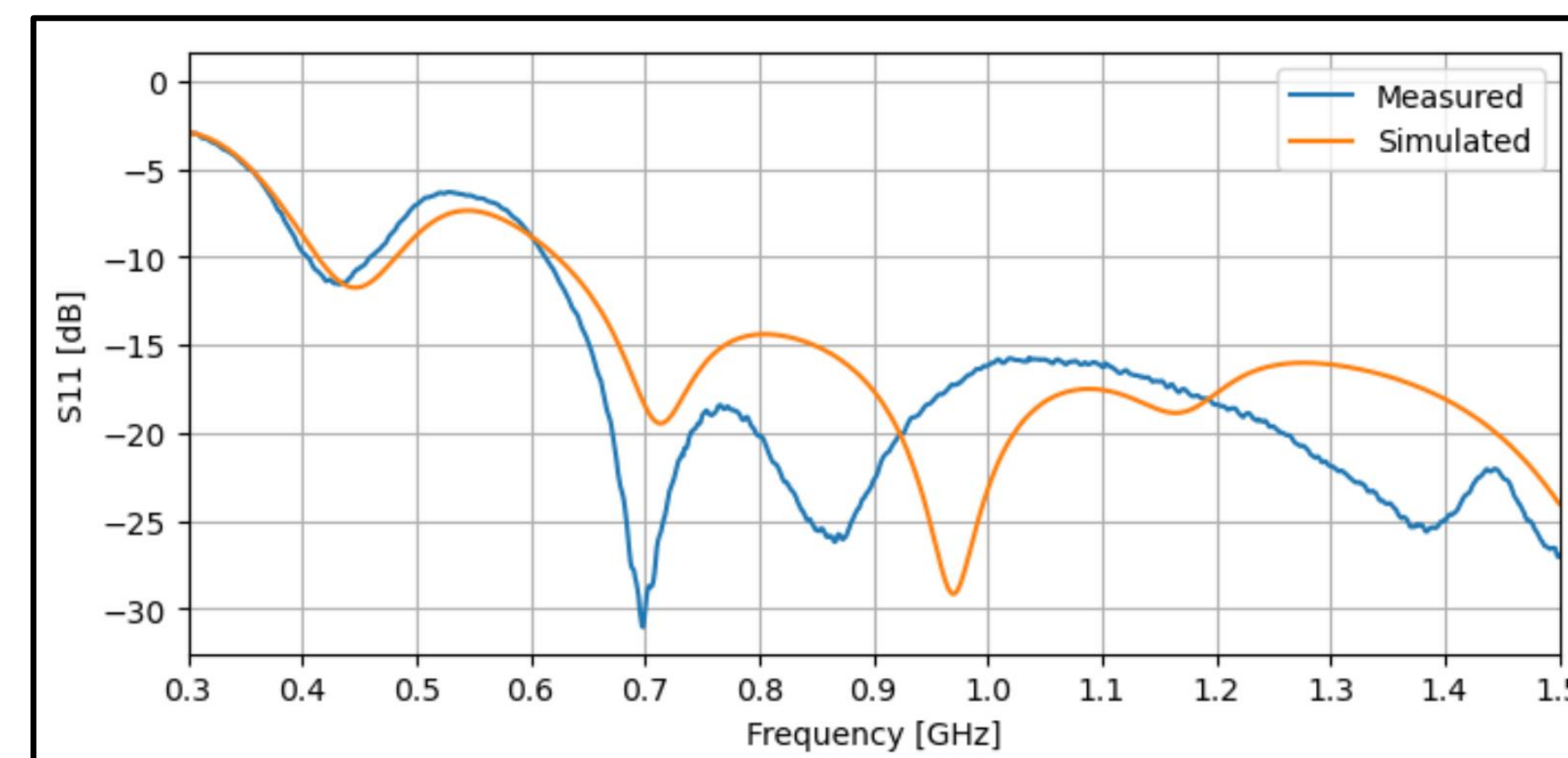
Introduction

- Designed, built and deployed an ultra-wideband receiver chain for the 46-meter telescope located at the Algonquin Radio Observatory (ARO).
- Intended for pulsar scintillation observations.
- Modified design based on the Canadian Hydrogen Observatory and Radio Transient Detector (CHORD), currently being developed at the Dominion Radio Astrophysical Observatory (DRAO).

Ultra-Wideband Feed

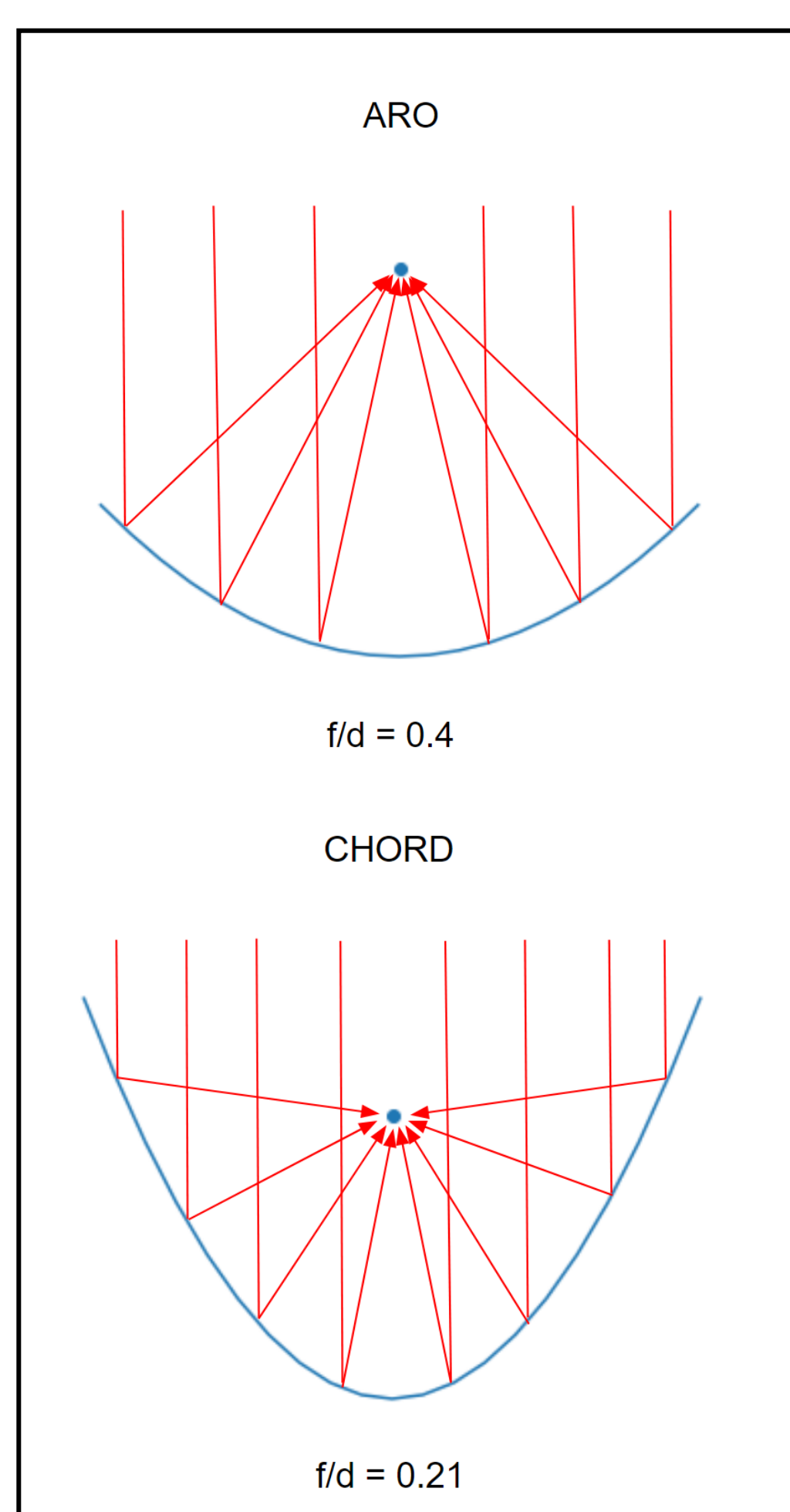


- Re-tuned CHORD feed by adjusting original model parameters (sizing, petal tapering).



- Simulated beam pattern using 3D electromagnetic analysis software and optimized for aperture efficiency and noise reduction across a **300 to 1500 MHz** band.

Receiver Chain Design and Deployment

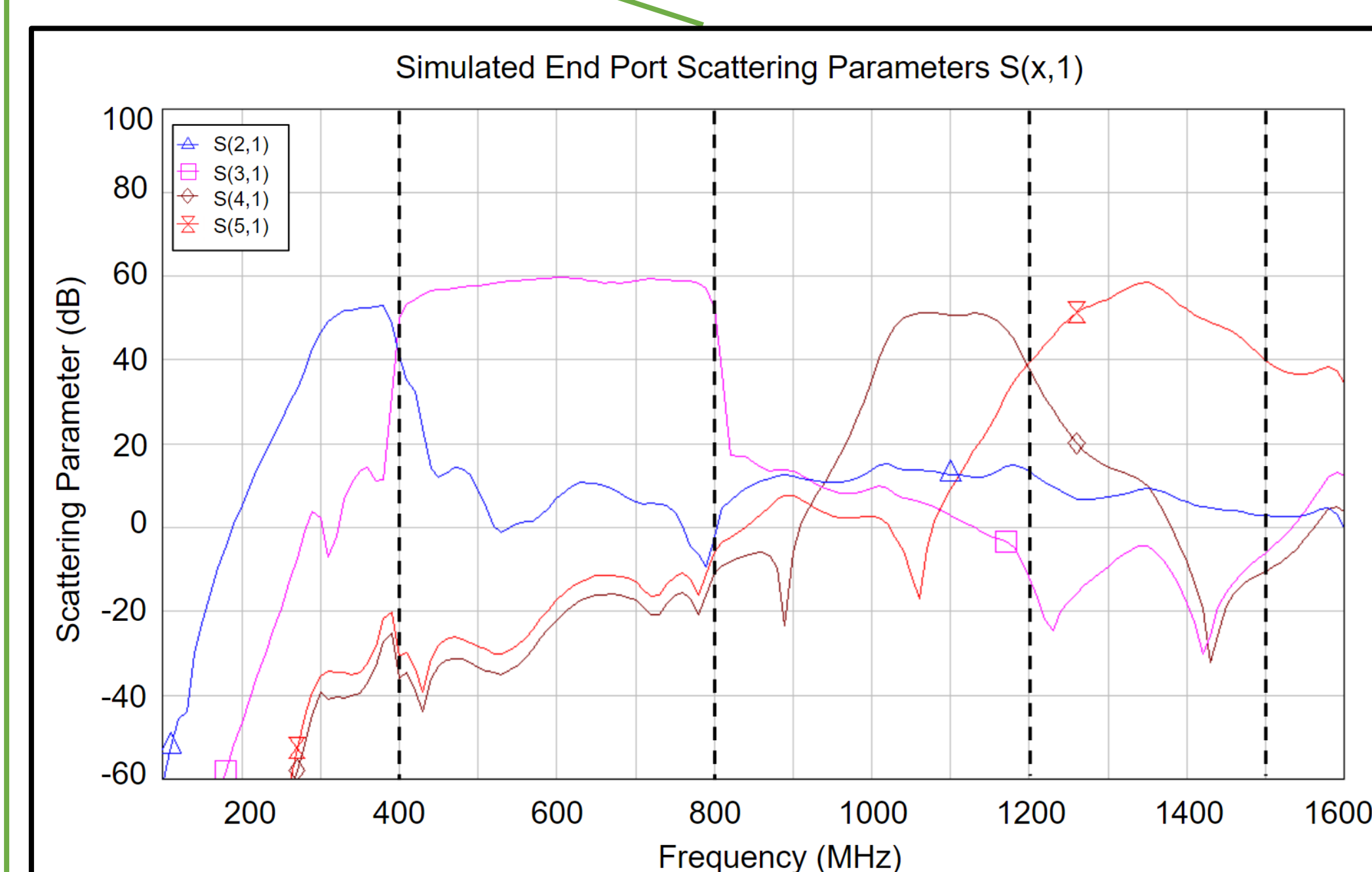
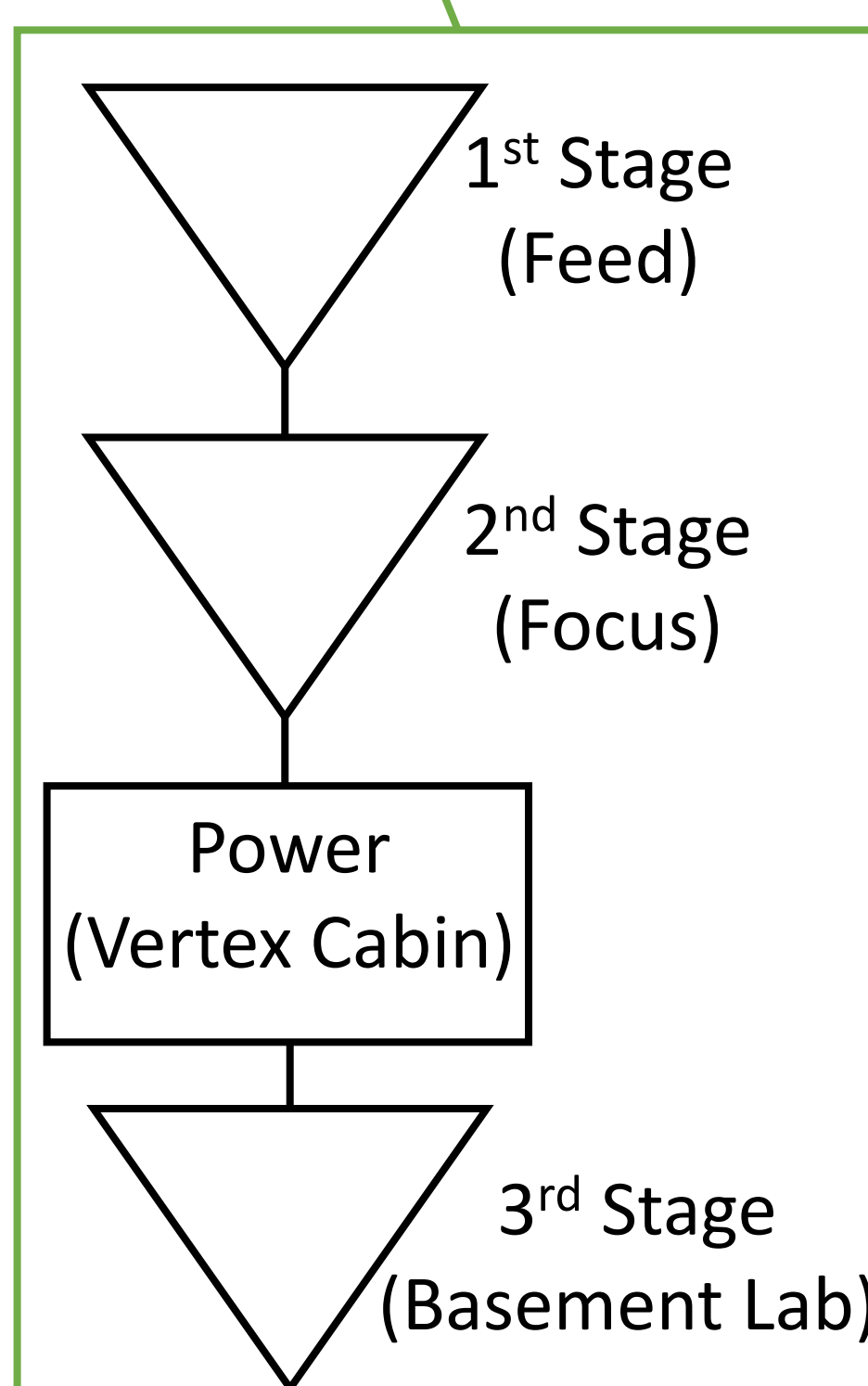


Antenna
(Dish + Feed)

Amplification

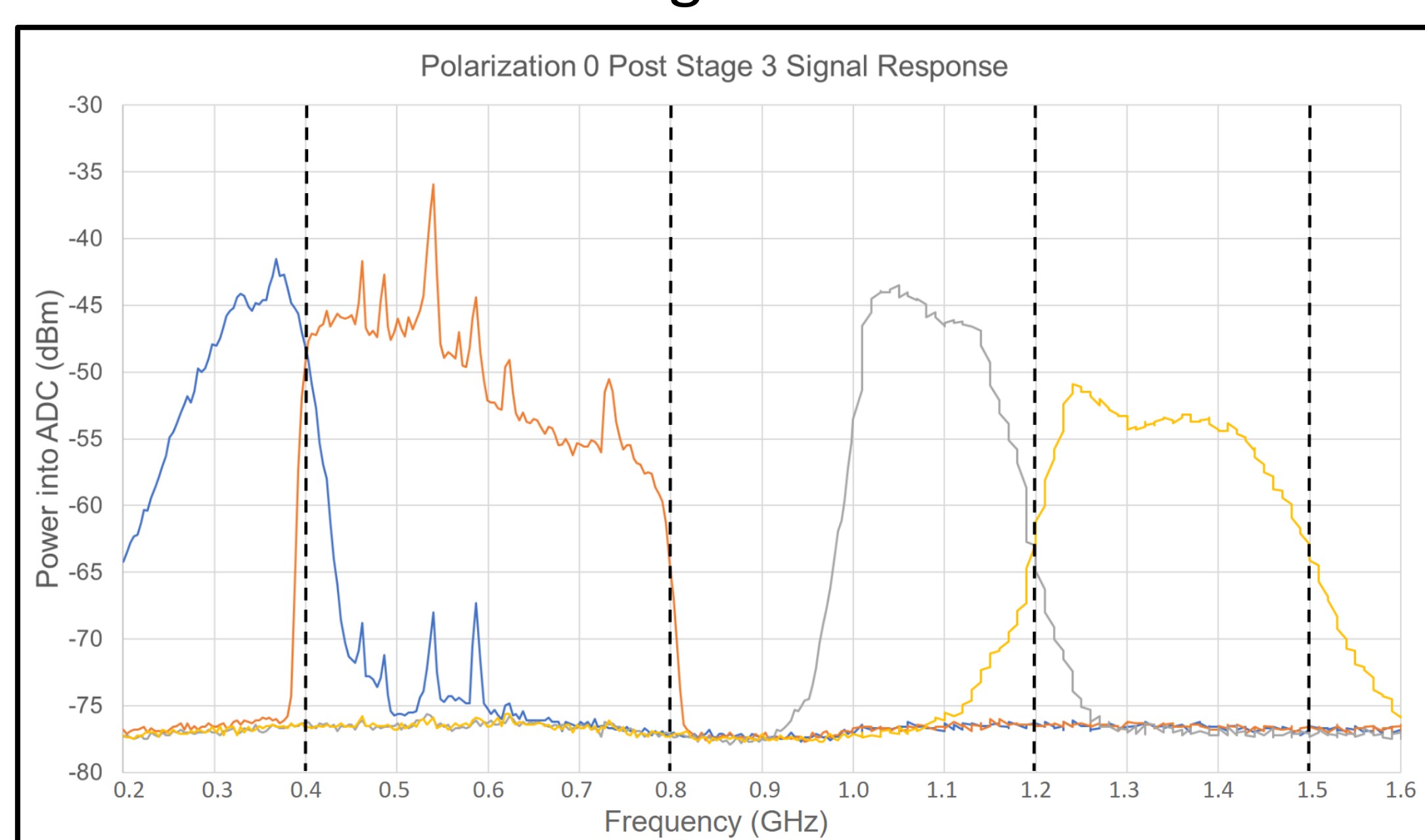
Filtering

Digitization

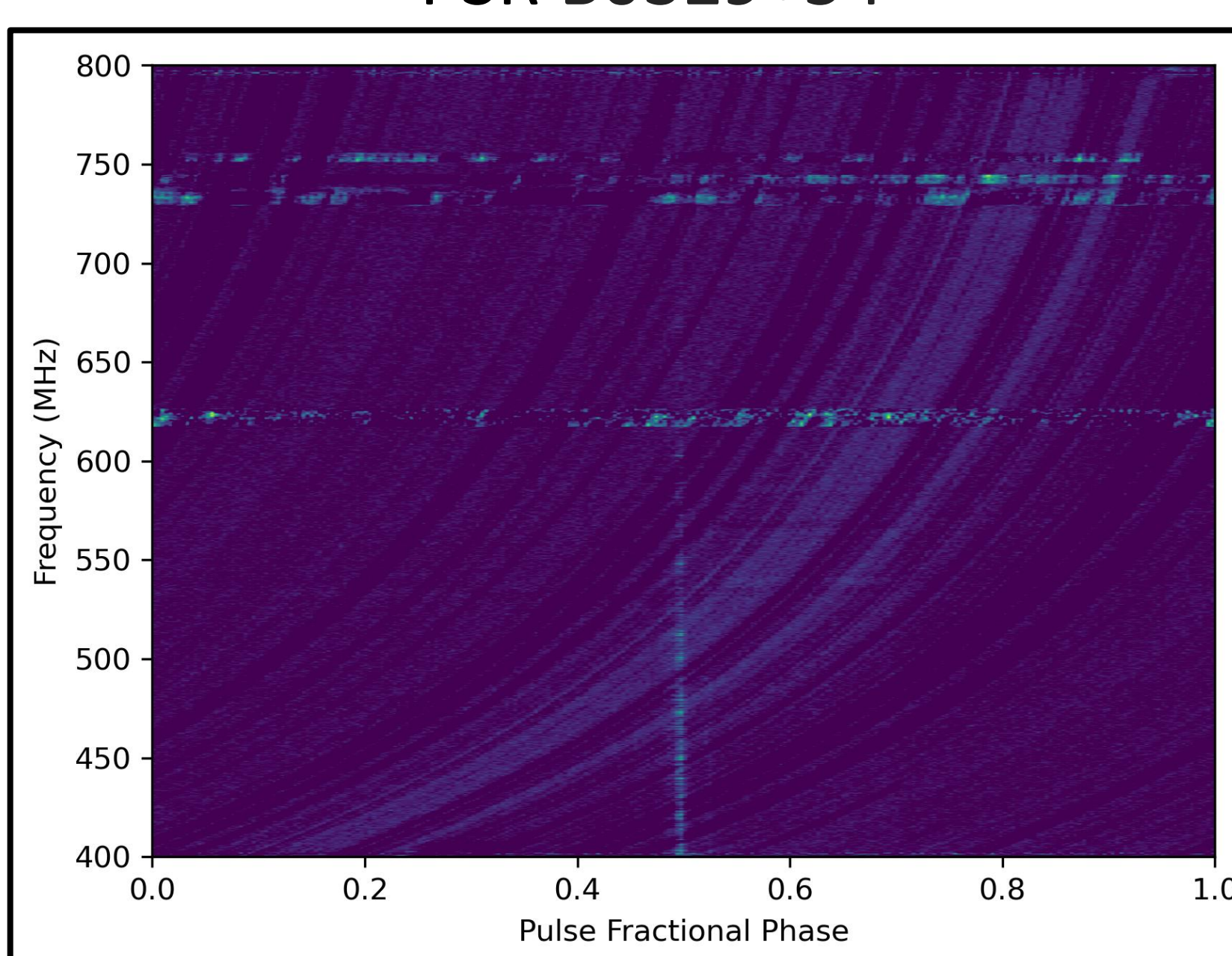


Results

- Observable results between 300-800 MHz.
- Increased attenuation in frequencies above 800 MHz due to high loss cables.



First Pulsar Observation
PSR B0329+54



Conclusion

- An ultra-wideband receiver chain operating at 300-1500 MHz was developed and deployed at ARO for the study of pulsar scintillation.
- Pulsar observations were successful in the range of 300-800 MHz.
- Unanticipated signal loss in cabling caused higher frequencies of the band to underperform; requiring increased amplification.

Future Improvements

- Additional amplifiers for higher frequency band followed by a band flattener is expected to aid in signal response issues.
- 3D modeled weather proofing mechanism to increase feed lifespan.

Acknowledgments

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- [2] Vanderlinde, Keith, et al. "The Canadian hydrogen observatory and radio-transient detector (CHORD)." *Canadian Long Range Plan for Astronomy and Astrophysics White Papers 2020* (2019): 28.