

Technical Page

Proposal Type: Long-term
 General Category: Pulsars
 Observation Category: Galactic
 Total Time Requested: 605 Hours

Proposal Title: Probing the NanoHertz Gravitational Wave Background with a Pulsar Timing Array

ABSTRACT:

Precision timing of an array of millisecond pulsars provides the only method for direct detection of gravitational radiation at nanoHertz frequencies. Detection is possible owing to the fact that space-time between the pulsar and the Earth is ‘flexed’ by gravitational radiation, and periodic pulsar signals provide sensors similar to the operation of laser interferometers. The stochastic background we seek to measure may be the relic of global processes before the recombination epoch, or may result from the coalescence of Massive Black Holes following galaxy mergers. Since the upgrade, we monitored monthly a number of millisecond pulsars at Arecibo for gravitational radiation background measurement and other pulsar astrophysics. We have made good progress with establishing a Pulsar Timing Array experiment and wish to continue toward our goal of a rms strain measurement level of $\sim 10^{-15}$ at 10 nHz, an order of magnitude improvement on existing measurements.

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I want to do remote observing.

Instrument Setup

430 G L-wide 430 CH receiver S-low

Atmospheric Optical Instruments:

Description of Observer Equipment: Arecibo-Berkeley Pulsar Processor (ABPP)

BACSPIN
 Princeton Mark IV recorder

Special Equipment or setup: Assistance with maintenance of ABPP/BACSPIN is currently under development.

Maintenance of integrity of receivers and cable paths is crucial for this long term experiment. This includes GPS monitoring of time.

Development of flux and polarization calibration through the pulsar backend is also critical.

RFI Considerations

Frequency Ranges Planned

420-440

605-615

1200-1500

2250 2500