

Technical Page

Proposal Type: Long-term
 General Category: Pulsars
 Observation Category: Galactic
 Total Time Requested: 57 Hours
 Minimum Useful Time: 30 minutes

Proposal Title: Measuring the masses of the components of two binary millisecond pulsars discovered in the ALFA pulsar survey

ABSTRACT:

So far, the ALFA pulsar survey has discovered two new millisecond pulsars (MSPs), PSR J1903+0327 and PSR J1949+31. The first has a unique combination of characteristics that will allow a precise measurement of the mass of a MSP: its fast spin period ($P = 2.15$ ms) allows for high precision timing, its eccentric orbit (unique among MSPs in the disk of the Galaxy) has already allowed the measurement of the periastron advance, and because of its massive companion (another unique case among disk MSPs with $P < 9$ ms) we have apparently detected the Shapiro delay. These effects point to a high pulsar mass (1.8 solar masses). Here we propose to use the high sensitivity of the Arecibo Telescope to verify the relativistic nature of these parameters and, if so, to make a precise determination of the masses of the pulsar and companion. A firm measurement of a large pulsar mass would have fundamental implications for the study of super-dense neutron matter. We also propose to observe the second MSP discovered by the ALFA pulsar survey, PSR J1949+31. It has a spin period of 13 ms and a relatively massive companion, which might allow us to measure the masses of the two components in the system using the Shapiro delay.

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Remote Observing Request

- Observer will travel to AO
- Remote Observing
- In Absentia (instructions to operator)

Instrument Setup

L-wide S-low

Atmospheric Observation Instruments:

Special Equipment or setup: none

RFI Considerations

Frequency Ranges Planned

1120 - 1220

1360 - 1560

2700 - 3100

This proposal requires coordination with Punta Salinas radar within the band 1222-1381 MHz..

This proposal requires coordination with GPS L3 at 1381 MHz.