Technical Page

This proposal has not been submitted before.

Proposal Type: Regular
General Category: Pulsars
Observation Category: Galactic
Total Time Requested: 23 Hours
Minimum Useful Time: 45 minutes

Proposal Title: A Search for High-Impact Millisecond Pulsars for the NANOGrav Pulsar Timing Array

ABSTRACT:

We have identified a 20-degree-radius region of sky in which a single new radio millisecond pulsar (MSP) would provide up to a 20% increase in NANOGrav’s sensitivity to a stochastic gravitational wave background. We propose to search for MSPs in unassociated Fermi sources in this region of sky. With 10-minute L-band integrations, we will be 2-10 times more sensitive to radio MSPs than the deepest pulsar surveys that have (or will soon) observe this part of the sky. From our population simulation, we expect 100 MSPs to be detectable in this region within our sensitivity limits. Given this MSP density, we expect to find MSPs in a significantly larger fraction of our targets than the nominal rate of 6.5% for Fermi-guided searches. We request 23 hours for 25 sources using the L-Wide/PUPPI or ALFA/Mock Spectrometer receiver and backend; the specific receiver/backend combination will depend on the source (see Technical Justification).

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<tr>
<th>Name</th>
<th>Institution</th>
<th>E-mail</th>
<th>Phone</th>
<th>Student</th>
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<tbody>
<tr>
<td>Megan E DeCesar</td>
<td>University of Wisconsin-Milwaukee</td>
<td><a href="mailto:decesar@uwm.edu">decesar@uwm.edu</a></td>
<td>(484) 574-1335</td>
<td>no</td>
</tr>
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Remote Observing Request

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

Instrument Setup

L-wide ALFA

Atmospheric Observation Instruments:
**Special Equipment or setup:** We are requesting observations with the L-wide/PUPPI and/or ALFA/Mock Spectrometer receivers and backends. We are searching for pulsars in Fermi Large Area Telescope (LAT) sources. We will use the Fermi LAT internal 4FGL point source catalog to obtain updated positions and positional uncertainties for all our targets prior to beginning our observations. (These updated positions will be available within 1 month of submitting this proposal.) The 4FGL position uncertainties are smaller than or of order the same size as the L-band beamwidth. If the 4FGL position error ellipses are contained by the beam, then we will use one pointing with the L-wide/PUPPI system. If the error ellipse is larger, then we will use three pointings with the ALFA/Mock system, with each pointing offset in position such that the full error ellipse is covered. In a given observing session, we will use either the L-wide/PUPPI or the ALFA/Mock setup, in order to not spend time switching receivers and backends during the session. We will decide which receiver to use prior to beginning the observation. Because all our sources are in the same part of the sky, we will observe the sources that are best suited for the given receiver/backend setup during the given session.

**RFI Considerations**

**Frequency Ranges Planned**

- 1225 - 1525
- 1150 - 1730

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

This proposal requires coordination with GPS L3 at 1381 MHz.