

Arecibo Observatory
 William E. Gordon Telescope
 Observing Time Request
 COVER SHEET

Section I - General Information

Submitted for Sep 1 2013.

This proposal has not been submitted before.

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|--|-------------|
| Proposal Type: | Regular |
| General Category: | Pulsars |
| Observation Category: | Galactic |
| Time Requested this semester: | 55.5 |
| Hours already used for this project: | 0 |
| Additional Hours required to complete project: | |
| Minimum Useful Time: | 1.5 h |
| Expected Data Storage: | over 500 GB |

Proposal Title: Searching for Millisecond Pulsars in Low-Latitude Fermi Unidentified Sources
ABSTRACT:

We propose to search for pulsars in fourteen Fermi unidentified sources close to the Galactic plane ($|b| < 4$ degrees). Such searches have been extremely successful at high Galactic latitudes and low frequencies (327 - 820 MHz). The denser ionized gas environment in the Galactic plane necessitates using higher frequencies in order to minimize scattering and dispersion broadening. We plan to search these sources at 1400 MHz. The benefits of potential discoveries include tests of theories of gravity via timing of binary pulsars, facilitating gravitational wave detection through expanding the set of objects included in pulsar timing arrays, and studying the pulsar emission mechanism at various energies.

Outreach Abstract:

The Fermi spacecraft has detected many objects that emit a type of light invisible to the human eye: gamma rays. But it often happens that different types of stars look the same in gamma rays while they look different in other types of light, like radio waves. Using the Arecibo telescope, we want to identify the type of fourteen gamma-ray sources found by Fermi, and specifically to determine whether they are pulsars, a type of star that spins very fast (up to hundreds of times per second) and acts like a lighthouse, giving off a pulse on each rotation. Observing the radio and gamma-ray pulses of Fermi sources that are identified as pulsars helps us learn about how these stars generate the different types of light they emit. These observations will also help us test Einstein's theory of relativity and maybe even detect gravitational waves, ripples in space and time caused by massive objects like stars and black holes orbiting closely around each other.

| Name | Institution | E-mail | Phone | Student |
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This work is not part of a thesis.

Remote Observing Request

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

Section II - Time Request

The following times are in LST.

For these observations night-time is not needed.

| Begin – End Interval–Interval | Days Needed at This Interval |
|----------------------------------|---------------------------------|
| 0500 – 0750 | 6 |
| 1810 – 2100 | 15 |
| – | |
| – | |

Time Constraints (Must Be Justified in the Proposal Text)

Anticenter:

- 3 sessions of 2.75 h each
- 3 sessions of 2.5 h each

Inner Galaxy:

- 9 sessions of 2.75 h each
- 6 sessions of 2.5 h each

If sessions lengths are scheduled as requested, preferably there will be no more than one session on any given day, and also not on days when PALFA/ZOA is scheduled for 2-3h sessions. This will avoid contention for space on the Mock partitions and use of the machines running the data conversion pipeline

that converts Mock data from 16-bit to 4-bit PSRFITS after each PALFA/ZOA session and that will also be used to convert data from this project.

Section III - Instruments Needed

ALFA

Atmospheric Observation Instruments:

Special Equipment or setup: none

Section IV - RFI Considerations

Frequency Ranges Planned

1225 - 1525

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

This proposal requires coordination with GPS L3 at 1381 MHz.

Section V - Observing List

Target List

| Source Name | Ra(hh:mm:ss.s) | Dec(dd:mm:ss.s) | RiseTime | TransitTime | SetTime |
|-------------|----------------|-----------------|----------|-------------|----------|
| P7R40812 | 05:39:21.0 | 35:56:02.0 | 05:00:09 | 05:40:17 | 06:20:24 |
| P7R40856A | 06:05:56.0 | 20:39:39.0 | 04:43:43 | 06:06:45 | 07:29:48 |
| P7R40893 | 06:19:36.0 | 22:42:14.0 | 04:58:19 | 06:20:26 | 07:42:32 |
| P7R40932 | 06:42:59.0 | 09:01:16.0 | 05:32:17 | 06:43:44 | 07:55:11 |
| P7R42942 | 18:52:51.0 | 01:58:16.0 | 18:08:53 | 18:53:34 | 19:38:15 |
| P7R42955 | 18:57:16.0 | 1:00:04.0 | 18:19:54 | 18:57:59 | 19:36:05 |
| P7R42958A | 18:58:06.0 | 01:28:12.0 | 18:17:21 | 18:58:49 | 19:40:17 |
| P7R42984 | 19:06:36.0 | 07:20:20.0 | 18:00:07 | 19:07:17 | 20:14:27 |
| P7R43038 | 19:25:37.0 | 17:26:49.0 | 18:03:31 | 19:26:15 | 20:49:00 |
| P7R43069 | 19:43:53.0 | 25:17:53.0 | 18:25:01 | 19:44:29 | 21:03:57 |
| P7R43083 | 19:49:15.0 | 24:34:23.0 | 18:29:30 | 19:49:51 | 21:10:13 |
| P7R43136 | 20:04:25.0 | 33:38:53.0 | 19:09:43 | 20:04:59 | 21:00:14 |
| P7R43175 | 20:17:54.0 | 36:27:32.0 | 19:43:49 | 20:18:27 | 20:53:05 |
| P7R43217 | 20:35:01.0 | 36:34:51.0 | 20:02:19 | 20:35:35 | 21:08:50 |