

## Technical Page

This proposal has not been submitted before.

Proposal Type: Regular  
 General Category: Pulsars  
 Observation Category: Galactic  
 Total Time Requested: 21.25 Hours  
 Minimum Useful Time: 1.25 hr

**Proposal Title:** Mass and Radius of a Neutron Star

*ABSTRACT:*

NASA's upcoming NICER mission will make a high precision (+-10%) measurement of the mass-to-radius ratio of PSR J0751+1807, a millisecond pulsar in a compact orbit with a white dwarf. We propose high-precision timing observations of this pulsar at Arecibo to refine measurements of its relativistic orbital decay, Shapiro delay, and astrometry, including proper motion and parallax. From these measurements we will be able to infer the mass of the pulsar with 4% precision. This, combined with the NICER measurement, will yield its radius to 10% precision. Both mass and radius are of fundamental importance in understanding the structure of neutron stars and the behavior of nuclear matter at high pressure. A second purpose of these observations is to provide phase tracking of the pulsar for accurate pulse-phase folding of the NICER data across its 18-month mission duration, enabling the essential X-ray pulse profile modeling required to infer the stellar mass-to-radius ratio.

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### Remote Observing Request

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

### Instrument Setup

430 G                      L-wide

### Atmospheric Observation Instruments:

**Special Equipment or setup:** none

## **RFI Considerations**

### **Frequency Ranges Planned**

422-442

1150-1730

This proposal requires Iridium RFI protection at 1612 MHz between 10pm and 6am EST.

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

This proposal requires coordination with GPS L3 at 1381 MHz.