PHYSICS&ASTRONOMY
THE UNIVERSITY OF TEXAS AT SAN ANTONIO

Dissertation Defense

Jing Lou

Date: **Wednesday, April 18th, 2018**

Time: **11:00 am - 1:00 pm**

Location: **Cavalry Conference Room**

Campus: **Brownsville Campus**

Advisor: **Fredrick Jenet**

Abstract

High precision pulsar timing with "PINT", a new software package

Over the past several decades, high precision pulsar-timing experiments have continued to advance, reaching precisions of ~10 nanoseconds where many subtle phenomena can be observed. At this level of precision, extremely careful data handling and sophisticated timing models are required. In this presentation, we present a modern Python-based pulsar timing package, called PINT (from **P**INT **I**s **N**ot **T**empo3), which is designed to analyze high-precision pulsar timing data in a wide variety of applications. PINT is a well-tested, validated, object-oriented, and modular package, enabling interactive data analysis and providing an extensible and flexible development platform for timing applications. PINT utilizes well-debugged public Python packages and modern software development schemes (e.g.the NumPy and Astropy libraries, version control and development with git and GitHub, and various types of testing) for increased development efficiency and enhanced stability. PINT has been developed and implemented completely independently from traditional pulsar timing software (e.g.TEMPO/ TEMPO2) and is, therefore, a robust tool for cross-checking timing analyses and simulating timing data. We start from the background knowledge of high precision pulsar timing and then describe the design and validation of PINT, and compare timing results between it and TEMPO and TEMPO2. In addition, the timing solution of PSR J0916+0658 produced by PINT will be presented.

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