

Title:

Millisecond Pulsars, Basic Physics, and NANOGrav

Abstract:

Pulsars are some of physics and astrophysics' most exotic objects, and they have already earned two Nobel Prizes. We currently know of more than 2500 of them in our Galaxy, but a small subset, the millisecond pulsars (MSPs), are truly remarkable. These systems are notoriously hard to detect, yet their numbers have more than doubled in the past 5 years via surveys using the world's most sensitive telescopes, new instrumentation, and huge amounts of computing.

Specialized "timing" observations of these systems, using Arecibo and the GBT, and accounting for each and every one of the billions of rotations of the stars, are providing fantastic results. In this talk I'll focus on the efforts to directly detect gravitational waves from super-massive black hole binaries and some surprising new physics opportunities from a unique triple system consisting of an MSP orbited by two compact white dwarf stars.