



UNIVERSITY OF MIAMI  
COLLEGE of  
ARTS & SCIENCES

## Miami Physics Conference 2024

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**Date:** Dec 12-19, 2024  
**Location:** Lago Mar Resort  
**Affiliation:** University of Florida

**Asaf Dror**

### **Abstract**

#### **Title: The Fluctuating Spacetime of Dark Matter**

Abstract: What if dark matter only interacts with the visible sector through gravity? Long considered a grim scenario where its properties (e.g., spin and mass) might remain elusive, it has recently been recognized that bosonic dark matter exhibits oscillating components in its stress–energy tensor. Remarkably, these can induce sizable, time–dependent perturbations to the spacetime metric, reminiscent of gravitational waves, offering promising avenues for direct detection. This talk will focus on a new method to gravitationally detect dark matter using astrometry -- the precise measurement of positions of distant astrophysical sources.

#### **Title: Sub–Nanohertz Gravitational Wave Detection**

Abstract: Gravitational waves with frequencies below 1 nHz are notoriously challenging to detect. With periods exceeding current experimental lifetimes, they induce slow drifts in observables rather than periodic correlations. In this talk, I will demonstrate that pulsar timing parameters can discover such "ultralow" frequency gravitational waves. I will present two complementary observables for which the systematic shift induced by gravitational waves can be extracted. Using existing data for these parameters, I will present the results of searches for ultralow frequency continuous–wave and stochastic gravitational wave signals, finding sensitivities near the expected prediction from supermassive black hole mergers.