



University of Crete  
Department of Physics



**FORTH**  
INSTITUTE OF ASTROPHYSICS



## *Joint Physics & IA/FORTH Colloquium*

Thursday, 12 October 2023 | 17:00 – 18:00, Seminar Room 3<sup>rd</sup> Floor

### **Frontiers of multi-messenger astrophysics with pulsar timing arrays**

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#### **ABSTRACT**

*A Pulsar Timing Array (PTA) is a galactic-scale detector that relies on precision timing of milli-second pulsars. As of this summer, all major PTA collaborations have found evidence of a low-frequency gravitational wave background. The most likely origin of this background is a population of supermassive black hole binaries (SMBHBs) formed in galaxy mergers. I will present the exciting recent results from the North American Nanohertz Observatory for Gravitational waves (NANOGrav), and their meaning for extragalactic astronomy. I will also describe the next major milestone, which is likely the detection on an individual resolved binary. These systems, which should stand above the background, are also expected to be bright sources of electromagnetic emission, and can be detected as quasars with periodic variability. I will summarize the status of current electromagnetic searches and their challenges. Finally, I will discuss my research plans for the next 5 years at IA-FORTH that aim to bring the first multi-messenger detection of a SMBHBs within closer reach combining state-of-the-art electromagnetic data and PTA data of increasing sensitivity.*