



University of Crete
Department of Physics



FORTH
INSTITUTE OF ASTROPHYSICS



Joint Physics & IA/FORTH Colloquium

Thursday, 22 February 2024 | 17:00 – 18:00, Seminar Room 3rd Floor

Past present and future of low-frequency gravitational wave astronomy

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ABSTRACT

Gravitational waves with frequencies below a few microhertz hold the key to address multiple open questions in fundamental physics, from hierarchical formation theories, to dark matter, cosmic strings and inflation. Pulsar timing arrays, such as the European Pulsar Timing Array (EPTA), have recently announced the detection of a strong candidate signal consistent with a stochastic GW background at these frequencies.

In this talk, I will summarize the 30-year long efforts that led to this discovery, give an overview of the relevant methodology, and discuss the implications for fundamental physics.

As pulsar timing array experiments move past their first detection, they will face important challenges related to the exploration of the low-frequency GW landscape, and the identification of contributions from various astrophysical and cosmological sources.

This next era that we are now entering will require a precise characterization of the GW spectrum, especially at frequencies above few tens of nanohertz, where sources of low-frequency GWs exhibit the highest diversity and non-GW contributions are the most prominent.