

ΑΡΙΣΤΟΤΕΛΕΙΟ ΠΑΝΕΠΙΣΤΗΜΙΟ ΘΕΣΣΑΛΟΝΙΚΗΣ
ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΣΕΜΙΝΑΡΙΟ

ΤΟΜΕΑΣ ΑΣΤΡΟΦΥΣΙΚΗΣ, ΑΣΤΡΟΝΟΜΙΑΣ ΚΑΙ
ΜΗΧΑΝΙΚΗΣ

Θέμα: Frontiers of multi-messenger astrophysics with pulsar timing arrays

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Περίληψη:

The first detection of gravitational waves (GWs) from merging black holes in 2015 opened a new window on the universe. The next major milestone in GW astronomy is already in the horizon; Pulsar Timing Arrays (PTAs), a galactic-scale detector that relies on precision timing of milli-second pulsars, may soon detect nanohertz GWs from supermassive black hole binaries (SMBHBs) formed in galaxy mergers. PTAs will first detect the GW background from the superposition of many unresolved binaries followed by individually resolvable binaries that stand above the background. These binaries are exceptional targets for multi-messenger observations, since they also emit strong electromagnetic radiation. I will present exciting recent results from the North American Nanohertz Observatory for Gravitational waves (NANOGrav) and the international PTA collaboration, which may provide the first hints of the GW background. I will also summarize the status of electromagnetic searches, and multi-messenger constraints on SMBHBs from recent NANOGrav upper limits. Finally, I will discuss the prospects for multi-

messenger detections in the upcoming era of the Rubin Observatory.