S N BOSE NATIONAL CENTRE
FOR BASIC SCIENCES
Block JD, Sector III, Salt Lake, Kolkata 700 106

DEPARTMENTAL SEMINAR

Department of Astrophysics and High Energy Physics

01st May.2025 **4.00 PM** **FERMION / ONLINE**

SPEAKER

Dr. Andrew Miller,

Postdoctoral Researcher,
National Institute for Subatomic Physics (Nikhef),
Amsterdam, Netherlands

TITLE OF THE TALK

Multi-messenger astronomy with continuous gravitational waves

ABSTRACT

Continuous gravitational waves—long-lived, nearly monochromatic signals—offer a powerful means to study compact objects beyond traditional transient detections. We use these signals to investigate the deformations of both old and newborn neutron stars. Using the most recent publicly available LIGO data, we show that continuous waves can constrain neutron stars with millimeter-sized deformations and provide a probe of the enigmatic GeV excess originating from the Galactic Center. Looking ahead, we show that space-based detectors like DECIGO will uniquely probe highly deformed, slowly rotating (~1 Hz) compact objects that are currently inaccessible to LIGO/Virgo. We also explain that this low-frequency range can be used in future ground-based observatories, such as the Einstein Telescope, to enable the detection of early neutron star inspirals, providing astronomers with advance warning of impending mergers and facilitating multi-messenger observations. Finally, we comment on the versatility of continuous waves to constrain the existence of dark matter.

HOST FACULTY

Dr. Tapas Baug

Dept. of ASTROPHYSICS AND HIGH ENERGY PHYSICS

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