



ICTS

INTERNATIONAL
CENTRE *for*
THEORETICAL
SCIENCES

TATA INSTITUTE OF FUNDAMENTAL RESEARCH

ICTS Astrophysics & Relativity Seminar

Title : Gravitational waves passing through matter

Speaker : Nigel Tempest Bishop (Rhodes University, South Africa)

Date : Friday, 24 October 2025

Time : 3:30 PM (IST)

Abstract : The interaction of gravitational waves (GWs) passing through matter is regarded as very weak. We have re-investigated this issue using linearized perturbations within the Bondi-Sachs formalism. The model comprises a background geometry of Minkowski, Schwarzschild or that of a general static and spherically symmetric distribution of matter, together with a perturbed spherical shell of matter. We found that the interaction can be very significant when the shell radius is less than the GW wavelength. Even a dust shell leads to phase changes and echoes; and if the shell is viscous, then the shear induced in the velocity field results in an energy transfer so damping the GWs and heating the matter. The astrophysical applications include supernova explosions, the quasinormal mode regime after a neutron star merger, and a binary black hole merger at which matter is present, as well as to primordial gravitational waves in cosmology.

Venue : Chern Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/92328416866?pwd=ugmLvOxAS5V2pbvMslv6nl4ikDABzA.1>

Meeting ID: 923 2841 6866

Passcode: 202030