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ICTS Astrophysics & Relativity Seminar

- Title** : Tidal responses of black holes and their imprints in gravitational waves emitted by their binaries
- Speaker** : Sukanta Bose (Washington State University, USA)
- Date** : Friday, 24 October 2025
- Time** : 11:30 AM (IST)
- Abstract** : Black holes are often regarded as the ultimate “rigid” objects — absorbing, but not deforming, under external influences. Yet in General Relativity, their interaction with external tidal fields reveals a surprisingly rich structure. I will explore how both Schwarzschild and Kerr black holes respond to tidal perturbations, e.g., produced by an orbiting companion. We use the Teukolsky equations of black hole perturbation theory to show that for Schwarzschild black holes, the tidal response is largely dissipative, leading to absorption of horizon flux (tidal heating) without a permanent deformation. This result is encapsulated in the vanishing of their static tidal Love numbers. Spin introduces new features, where the dynamical Love number is not always zero. The effects of scalar and vector perturbations are summarized as well. I end with highlighting the subtle effect of tidal heating on the gravitational-wave signals of black hole binaries and the efforts underway for detecting it.
- Venue** : Chern Lecture Hall
Zoom Link: <https://icts-res-in.zoom.us/j/92923548824?pwd=7VnnibdeTdFwKbpMaQlfdSG68ASMtG.1>
Meeting ID: 929 2354 8824
Passcode: 242526