ICTS Astrophysics & Relativity Seminar

Title : Machine learning approximations to gravitational waveforms from compact binary mergers

Speaker : Suyog Garg (University of Tokyo, Japan)

Date : Thursday, 22 January 2026

Time : 3:30 PM (IST)

Abstract : Numerical relativity modelling for gravitational waves from compact binary sources with complicated source characteristics is computationally expensive. To tackle this, several gravitational waveform approximations have been developed, however, these either lack desired accuracy or are valid only in certain parameter regimes. Accurate source parameter estimation for detected gravitational waves in turn requires repeated calls to these theoretical waveforms. A generalized framework for highly accurate theoretical inspiral-merger-ringdown gravitational waveforms valid across wide parameter ranges, is still lacking. In this talk, I will introduce machine learning based waveform models that we have developed to resolve this issue. I will first detail machine learning methods currently employed for various gravitational waveform data analysis tasks by the LIGO-Virgo-KAGRA collaboration. Then I will describe the bottleneck in the parameter estimation and inference frameworks that needs to be tackled for the upcoming gravitational wave observatories. Finally, I will introduce auto-encoder models we have been developing towards this end, our current results and the road ahead.

Venue : Online
Zoom Link: https://icts-res-in.zoom.us/j/95458053188?pwd=YLtoAAOOsa1FdahDLt1aJpcNPUbTSk.1
Meeting ID: 954 5805 3188
Passcode: 222026