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ICTS Astrophysics and Relativity Seminar

Title : Lensing, not luck! Forecasting the efficiency of gravitational-wave strong lensing search

Speaker : Ankur Barsode (ICTS-TIFR, Bengaluru)

Date : Thursday, 21 August 2025

Time : 3:30 PM (IST)

Abstract : A small fraction of gravitational-wave (GW) signals detectable by upcoming observing runs of ground-based detectors will be gravitationally lensed by intervening objects such as galaxies and clusters. Strong lensing would produce multiple copies of the signals that arrive at the detector at different times. Observation of strongly lensed GWs could offer new probes of astrophysics and cosmology. However, identification of lensed pairs among a large number of unrelated GW events is challenging-- while the number of lensed events increases with improved detector sensitivity, the false alarms increase quadratically. While this "lensing or luck" problem would appear to be insurmountable, we show that the expected increase in measurement precision of source parameters would allow us to weed out false alarms more effectively. The net result is non-trivial and computationally expensive to predict. We identify a correspondence between the Bayesian and frequentist approaches to this problem, which saves us from expensive background simulations. We then extrapolate the strong lensing posterior odds to future observing scenarios and forecast our efficiency of confidently identifying strongly lensed GWs. Based on current astrophysical models and anticipated sensitivities, we predict that strong lensing detection may happen in the fifth observing run of LIGO, Virgo, and KAGRA.

Venue : Chern Lecture Hall

Zoom Link: <https://icts-res-in.zoom.us/j/96950818394?pwd=oObjwULRHAafnbDLTn2c6PpdpaSmbb.1>

Meeting ID: 969 5081 8394

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