

CONSTRAINING THE HUBBLE CONSTANT USING GRAVITATIONAL WAVES FROM DARK SIRENS

SEMINAR

DR. TATHAGATA GHOSH

University of Tokyo



10 DECEMBER 2025



03:00 PM



PAMU SEMINAR ROOM



Abstract

Gravitational waves (GWs) from compact binary coalescences, such as binary black holes (BBHs) or binary neutron stars (BNSs), offer a novel probe to study the expansion rate of the Universe. GWs provide a direct estimate of the luminosity distances of binary mergers but not their redshifts unless their electromagnetic (EM) counterparts are observed. In this presentation, I will discuss two Bayesian formalisms to estimate the Hubble constant from dark sirens, BBHs, and BNSs, which are not accompanied by EM counterparts. First, I will describe an approach to infer the Hubble constant from the cross-correlation between galaxies with known redshifts and individual BBH events, utilizing large-scale information that has so far not been used when statistically identifying the host of the GW event. Second, I will present a method that uses tidal deformabilities in BNS signals, combined with the knowledge of the neutron star equation of state (EoS), to break the redshift-mass degeneracy. This enables joint inference of the Hubble constant, EoS, and BNS population and remains effective for current as well as next-generation detectors.

Everyone is invited to attend