

Constraining higher-dimensional cosmology with gravitational wave standard sirens

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The propagation of gravitational waves (GWs) at cosmological distances offers a new way to test the gravitational interaction at the largest scales. In this talk I will consider a homogeneous and isotropic cosmology with extra spatial dimensions at large scales, which represents a simple phenomenological prototype for extra-dimensional modified gravity cosmological models. By assuming that gravity propagates through the higher-dimensional spacetime, while photons are constrained to the usual four dimensions of general relativity, one can constrain the number of cosmological extra dimensions by using the relation between the luminosity distance measured by GW detectors and the one inferred by EM observations. After pointing out a redshift dependence in this relation which has been neglected in previous literature, I will present constraints obtained with the binary neutron star event GW170817 and forecasts for the Laser Interferometer Space Antenna (LISA) based on the simulation of multi-messenger observations of massive black hole binary (MBHB) mergers.

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