

Title: Impact of high-order tidal terms on binary neutron-star waveforms

Abstract:

GW170817, the milestone gravitational wave (GW) event originated from the inspiral and merger of a binary neutron star system has allowed the scientific community for the first time to place constraints on the equation of state (EoS) from the GW channel. So far, the tidal information is mostly encoded in the leading-order 5PN and the next-to-leading order 6PN tidal terms of the waveform phase. Recently, there have been computed new tidal contributions to the gravitational-wave phase at next-to-leading 6PN and next-to-next-to-leading order 6.5PN, that also account for the magnetic tidal Love numbers, tail effects, and the spin-tidal couplings. Although the SNR required to observe these new terms have been unreachable for current LIGO-Virgo detectors, the imminent upgrade of the detectors may anticipate a SNR gain of about a factor 2-3 for O3 (optimal) while about factor 45 for the third-generation ET. In this seminar, I will discuss the possibilities and challenges of BNS waveform approximants and the new physics and/or systematics that could emerge from further extending them in the near future high SNR era.