Contribution ID: **137** Type: **Poster**

Testing General Relativity in presence of binary eccentricity

The parametrized post-Newtonian (PN) test of general relativity (GR) currently assumes binary black holes (BBHs) in quasi-circular orbits. However, population simulations predict that a subpopulation of BBHs retain residual eccentricity in the frequency-band of ground-based detectors. To perform robust parametrized tests of GR with eccentric binaries, corrections due to orbital eccentricity need to be taken into account in the waveform. Here, we develop two different waveform parametrizations that capture GR deviations for BBHs in eccentric orbits. In the first parametrization, we introduce deviations in both the circular and eccentric parts of the gravitational-wave phase in a theory agnostic way. The second parametrization is motivated by the periastron advance, a physical effect that is only present in eccentric binaries. BBHs in eccentric orbits have two dynamical frequencies, radial and azimuthal, related via a periastron advance parameter (alpha). GR deviations are parametrized in terms of alpha, with GR recovered In the limit when alpha goes to one. Using these parametrizations, we obtain bounds on deviation parameters in both the ground-based (aLIGO/CE) and space-based (LISA/DECIGO) GW detectors. We find that the best constraint on alpha is obtained with an accuracy of ˜10ˆ-5 in the DECIGO band, complementary to the bound (˜1.5 x 10ˆ-5) obtained via double-pulsar observations. Both parametrizations provide initial steps towards testing GR with eccentric BBHs.

Email

sajadtarigami@gmail.com

Affiliation

IUCAA

Author: BHAT, Sajad Ahmad (IUCAA)

Co-authors: Prof. K. G., Arun (Chennai Mathematical Institute); Dr MISHRA, Chandra Kant (IIT Madras); Mr GANDEVIKAR, Chinmay (IIT Madras); Prof. FAVATA, Marc (Montclair State University); Mr SAINI, Pankaj (Chennai Mathematical Institute)

Presenter: BHAT, Sajad Ahmad (IUCAA)

Session Classification: Gravitational Waves

Track Classification: Gravitational Waves