10th International Conference on Gravitation and Cosmology: New Horizons and Singularities in Gravity (ICGC 2023)



Contribution ID: 269

Type: Poster

Modelling eccentricity in Not-So-Equal mass binary black hole inspirals

Most of the gravitational wave (GW) signals detected so far by LIGO and Virgo detectors consist of comparable mass binary black holes (BBHs). Another interesting source of GWs is highly eccentric intermediate mass ratio inspirals (IMRIs). GW signals from IMRI sources are expected to be highly eccentric when they enter the detection band of the space based detectors such as LISA and DECIGO. Eccentricity is a feature which can be used as a discriminator for BBH's formation pathways. Data analysis studies of GW signals from such asymmetric sources using a higher mode IMRI waveform will help us measure the source parameters more precisely and accurately. In this work, we combined the post-Newtonian and black hole perturbation results to model IMRIs in highly relativistic eccentric orbits with higher modes. We have also explored the possibility of the detection of such eccentric high mass ratio sources in the context of DECIGO band.

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Session Classification: Gravitational Waves

Track Classification: Gravitational Waves