Contribution ID: **90** Type: **not specified**

Detection and modelling of eccentric intermediate mass ratio inspirals

Wednesday 5 July 2023 16:20 (20 minutes)

The first confirmed detection of a 150 solar mass black hole in the form of the gravitational wave event, GW190521, did put an end to decades long debate concerning the existence of intermediate mass black holes. Black holes with masses typically in the range of 100-10,000 solar masses, when paired with stellar or supermassive black holes, become one of the most interesting sources for planned space missions such as eLISA and B-DECIGO and are commonly classified as intermediate mass-ratio inspirals (IMRIs). While there have been remarkable developments in modeling sources with comparable mass components or with extreme mass ratios in the past, there has been relatively little progress in modeling IMRIs even for simplest of binary configuration such as those in circular orbits. We present an eccentric hybrid (inspiral-only) model obtained by combining the waveform inputs from post-Newtonian theory and black hole perturbation theory and find it suitable for analyzing IMRIs in orbits with eccentricities of 0.3 in DECIGO band. Detection of selected eccentric higher order modes in the context of DECIGO configuration is also explored. These models should prove to be useful in performing accurate comparisons with similar models from the self-force and other semi-analytical approaches such as EOB. Collaborators : Ryuichi Fujita (Otemon Gakuin University), Laxman M (IIT Madras), Estuti Shukla (Penn State University),

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Session Classification: Wednesday Afternoon