Contribution ID: **55** Type: **not specified**

Eccentricity and spin precession: an Effective-One-Body model informed by Post-Newtonian studies

Monday, 16 September 2024 15:20 (20 minutes)

Gravitational wave models have in recent years expanded beyond circularized compact binary systems to cover a larger and larger swath of the parameter space. Models incorporating the spin-precession effect, which occurs when the components' spins are misaligned with the orbital angular momentum, in the quasi-circular case are now routinely used for parameter estimation; meanwhile, several groups have developed prescriptions to accurately describe planar non-circular (eccentric, hyperbolic-like) motion. Models combining both these effects have only recently started to see active work by the community.

In this talk I would outline the development of one such model (introduced in https://arxiv.org/abs/2404.15408), first highlighting valuable insights gained in the Post-Newtonian regime regarding the interplay of eccentricity and spin precession (particularly focusing on the Euler and scattering angles). With this knowledge in hand, I would then show how a state-of-the-art non-circular, planar Effective-One-Body model can be extended to cover eccentric, precessing systems through a simple, in both concept and implementation, but effective prescription, as validated through comparisons with Numerical Relativity.

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Session Classification: Contributed Talks 2