PAiP-2025 conference "Particle Astrophysics in Poland"



Contribution ID: 154

Type: Short plenary talk (PhD students only)

Eccentric Inspiral-Merger-Ringdown Models for Binary Black Holes with Gauge-invariant Eccentricity

Friday, 21 February 2025 16:36 (5 minutes)

Residual eccentricity in gravitational waveforms can be a unique tool to identify binary systems formed in dynamical environments. In general relativity, eccentricity is not defined uniquely. Different waveform models rely on gauge-dependent definitions of eccentricity, which leads to incompatibility between them. We remove this ambiguity by employing a gauge-invariant eccentricity definition in our modelling approaches. We present an eccentric Inspiral-Merger-Ringdown (IMR) model for binary black holes, calibrated against a set of target IMR waveforms. The model is also validated against an independent waveform family resulting overlaps better than ~ 96.5% within the calibrated range of binary parameters.

Primary author: MANNA, Pratul (Astronomical Observatory, University of Warsaw)

Co-authors: Mr MISHRA, Chandra Kant (Indian Institute of Technology Madras); Mr ROYCHOWDHURY,

Tamal (University of Wisconsin Milwaukee)

Presenter: MANNA, Pratul (Astronomical Observatory, University of Warsaw)

Session Classification: PhD short talks

Track Classification: Gravitational Waves