Annual Scientific Meeting & Harley Wood School



Contribution ID: 5

Type: Oral

The formation of merging compact binaries from massive binary stars

Monday 7 July 2025 17:30 (15 minutes)

Several hundred compact binary mergers have now been observed in gravitational waves by LIGO, Virgo and KAGRA. Most of these are binary black hole mergers. The origin of these merging binaries is currently uncertain; they may originate from massive binary stars, be dynamically formed in star clusters or galactic nuclei, or may have contributions from multiple formation channels. We study the formation of merging compact binaries using the rapid population synthesis suite COMPAS. We present the current state of COMPAS, detailing recent updates in modelling physics relevant to compact binary formation, including the mass-loss rates of massive stars. We show that current population synthesis models are already in tension with (ruled out by) existing gravitational-wave observations. Using a simple mixture model, we show that while more than half of observed gravitational-wave events are not formed through massive binary evolution, the vast majority of compact binaries merging in the local universe originate from massive binary stars.

Author: STEVENSON, Simon (Swinburne University of Technology)
Presenter: STEVENSON, Simon (Swinburne University of Technology)
Session Classification: Compact / High-Energy Objects