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First constraints on binary black hole environments with LIGO-Virgo observations

Wednesday 23 August 2023 08:30 (20 minutes)

The LIGO-Virgo detections made so far have neglected the realistic astrophysical environment where the compact binaries live. Gravitational wave emission will be affected by the source surroundings and the environment imprints should be observable in a dephasing of the emitted signal with respect to the vacuum scenario.
We present a first investigation on environmental effects for the events in the first gravitational wave catalog by LIGO-Virgo. In particular, we focus on accretion, dynamical friction and gravitational pull by adding corrections at -4.5 and -5.5 Post-Newtonian order to the GW phase relative to the vacuum quadrupole emission. We also give an estimation of the 90% bounds on the densities surrounding the sources.

Collaboration / Activity

LIGO-Virgo

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