Exploring High-Redshift Compact Binary Evolution with Next-Generation GW Detectors

Tuesday 27 May 2025 12:06 (12 minutes)

Current gravitational wave (GW) detectors are observing hundreds of binaries in the low-redshift universe, but to fully understand formation mechanisms we must probe the high-redshift regime. Next-generation detectors, such as Cosmic Explorer and Einstein Telescope, will allow us access to redshifts greater than 20, and even upgrades to existing detectors may allow us to probe the star-formation peak. In this work, we explore the capabilities of next generation observatories, and upgrades of existing GW detectors such as A#, to map the black hole and neutron star population of the Universe. In particular, we investigate the ability of different networks to accurately characterize the star formation peak at redshift 1-3. We focus on measurement of the merger rate for different populations of black holes and neutron stars and the possibility of using this information to distinguish formation scenarios.

Primary authors: ., Divyajyoti (LIGO Scientific Collaboration); HANNAM, Mark; FAIRHURST, Stephen (Cardiff University)

Presenter: "Divyajyoti (LIGO Scientific Collaboration)

Session Classification: Observational Science (OSB)

Track Classification: Observational Science (OSB): Div5