

Gravitational wave signals from single-binary black hole encounters in nuclear star clusters

The next generation of interferometers will be able to detect a great number of signals from different kinds of sources. Among these sources there may be bursts from close encounters between black holes (BHs) in star clusters. In our work, we present a first study of how often single-binary BH encounters can happen in nuclear star clusters (NSCs) as a function of redshift, and whether these encounters are observable by gravitational-wave (GW) detectors. We focus the study on single-binary encounters that are effectively hyperbolic, leaving out the resonant encounters. We find that in NSCs single-binary encounters occur rarely compared to binary mergers, and that the hyperbolic ones most likely produce the strongest GW emission below the observation band of terrestrial GW detectors. While several of them can be expected to occur per year with peak energy in the LISA band, their amplitude is low, and detection by LISA seems improbable.

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