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Population Inference of Merging Compact Binaries in the Presence of Lensing

Lensing due to intervening matter such as clusters or galaxies can (de)magnify a gravitational-wave (GW) event, leading to a biased measurement of the source mass and redshift. Hierarchical inference on the detected GW events can be performed to estimate the population properties of binary black holes, such as their mass and redshift distributions. Currently, it is assumed that the current events are not significantly magnified due to their low lensing probability. When the lensing probability is higher (as expected for future detectors), this can bias our estimation of the population hyperparameters. In this work, we develop a Bayesian hierarchical inference formalism estimate of the true population hyperparameters of the GW sources as well as lenses.

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