

Unraveling formation channels of binary black holes

Authors

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Abstract

Ten binary black hole (BBH) sources have already been detected during the first two observing runs of advanced LIGO and Virgo, and many more are expected to be detected in the near future. This opens the possibility for gravitational wave (GW) astronomy to better constrain the properties of BBHs not only as single sources but as a whole astrophysical population. In this talk, I will discuss a new approach to use GW measurements to estimate the proportion of merging BBHs produced either via isolated binaries or binaries evolving in young star clusters. To this end, we use a Bayesian hierarchical modeling framework applied to catalogs of merging BBHs sources generated using state-of-the-art population synthesis and N-body codes. In particular, we will show that while the current observations of advanced LIGO/Virgo still leave a big uncertainty on the mixing fraction $\lambda \in [0, 1]$ between the two formation channels, we expect to narrow down the fractional errors on λ down to 10 - 20 % after a few hundreds detections.