

The origin of inequality. Isolated formation of 30 Msun and 10 Msun BH-BH merger.

The LIGO/Virgo collaboration has reported the detection of GW190412, a black hole-black hole (BH-BH) merger with the most unequal masses to date: $m_1 = 24.4\text{--}34.7$ Msun and $m_2 = 7.4\text{--}10.1$ Msun, corresponding to a mass ratio of $q = 0.21\text{--}0.41$ (90% probability range). Additionally, GW190412's effective spin was estimated to be $\chi_{\text{eff}} = 0.14\text{--}0.34$, with the spin of the primary BH in the range $a_{\text{spin}} = 0.17\text{--}0.59$. Based on this and prior detections, 10% of BH-BH mergers have $q < 0.4$.

Major BH-BH formation channels (i.e., dynamics in dense stellar systems, classical isolated binary evolution, or chemically homogeneous evolution) tend to produce BH-BH mergers with comparable masses. Here we test whether the classical isolated binary evolution channel can produce mergers resembling GW190412.

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Session Classification: Student presentations