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Lesson's from LIGO-Virgo's Biggest Black Holes

Thursday, 8 July 2021 16:50 (20 minutes)

Stellar theory predicts the existence of a black hole mass gap in the range ~50 to ~120 solar masses resulting from pair instability supernovae. The binary black holes of LIGO-Virgo's first two observing runs supported this prediction, showing evidence for a dearth of component black hole masses above 45 solar masses. Meanwhile, among the 30+ new observations from the third observing run, there are several black holes that appear to sit above the 45 solar mass limit. I will discuss how these unexpectedly massive black holes fit into our understanding of the binary black hole population. The data are consistent with several scenarios, including a mass distribution that evolves with redshift and the possibility that the most massive binary system, GW190521, straddles the mass gap, containing an intermediate-mass black hole heavier than 120 solar masses. I will also discuss applications of the binary black hole population to cosmology.

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