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Hierarchical triples can explain LIGO-Virgo mergers

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The recent discovery of gravitational waves has opened new horizons. The LIGO-Virgo events have made possible to estimate rates, masses, eccentricities, and projected spins of merging black holes (BHs) for the first time. The astrophysical origin of these mergers is among the most puzzling open questions of our time. Two primary channels have been proposed to explain the observed population of merging BHs and NSs: field binary evolution and dynamical formation in a cluster environment. Observations show that about one fourth of massive stars is in triple systems, comprised of an inner binary orbited by a third companion. Despite being rarer than binaries, a large fraction of triples can merge as a result of the Kozai-Lidov mechanism, imposed on the inner binary by the field of the third companion. Within current uncertainties, triples can potentially account for most of the observed events. Remarkably, triples are expected to produce many mergers with relatively high total mass and low mass ratios relative to the other formation channels. The triple scenario is definitively the third pathway to compact object mergers.

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