Poster Session #D
Binary sources of Gravitational Waves and cosmology

D11

Search for Black Hole Merger Families

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The origin, environment, and evolution of stellar-mass black hole binaries are still a mystery. One of the proposed binary formation mechanisms is manifest in dynamical interactions between multiple black holes. A resulting framework of these dynamical interactions is the so-called hierarchical triple merger scenario, which happens when three black holes become gravitationally bound, causing two successive black hole mergers to occur. In such successive mergers, the black holes involved are directly related to each other, and hence this channel can be directly tested from the properties of the detected binary black hole mergers. Here we present a search for hierarchical triple mergers among events within the GWTC-1 and GWTC-2 catalogs of LIGO/Virgo, the eccentric localization of GW190521 and those found by the IAS-Princeton group. We perform our analysis for different upper bounds on the mass distribution of first generation BHs. Our results demonstrate the importance of the mass distributions' properties for constraining the hierarchical merger scenario. We present the individually significant merger pairs. The search yields interesting candidate families and hints of its future impact.