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Phenomenologically reconstructing properties of multiple compact binary merger populations: the small-N limit DANIEL WYSOCKI, RICHARD O'SHAUGHNESSY, Rochester Institute of Technology — The LIGO and Virgo gravitational wave (GW) observatories have detected both binary black hole (BBH) and binary neutron star (BNS) mergers, with the potential to detect neutron star–black hole (NSBH) mergers as well. Based on expected masses for black holes and neutron stars, the majority of these signals fall clearly into one of these three source categories. In this case, the three source populations can be constrained independently, considering only sources from that category. Some sources may have ambiguous classification, e.g., because GW observations often poorly constrain the binary's mass ratio, as was recently demonstrated by GW190425. Conversely, mergers may lie inside previously-anticipated mass gaps, both at high mass (above the pair instability gap) and at low mass (between BH and NS). Thus, we must in principle consider detections from all source categories simultaneously, when trying to measure the properties of any one category's population properties. In this work, we demonstrate phenomenological modeling of the combined BBH+BNS+NSBH population. We investigate the measurability of mass gaps between source categories. We also demonstrate some of the biases that can arise when attempting to only consider a single source category at a time.

Daniel Wysocki
Rochester Institute of Technology

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