

# Miami Physics Conference 2022

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Title: Gravitational wave source populations: Disentangling an AGN component

The LIGO-Virgo gravitational wave observatories have discovered  $\sim 90$  binary mergers, including at least one confirmed detection of an intermediate-mass black hole GW190521. While the unusual mass and spin of some of the discovered mergers constrain progenitor scenarios, most of the observed mergers are consistent with multiple interpretations, making the origin of the bulk of LIGO-Virgos black hole mergers an open question. However, different scenarios for these binaries predict different relative contributions versus masses and spins, so the contribution from different channels could be identified. We use a new hierarchical population analysis framework to assess the relative contribution from different formation channels simultaneously including both semi-analytic population models and stochastic models evaluated directly via Monte Carlo. In my talk, I have demonstrated this method with the formation of binary black holes in AGN disks along with the conventional phenomenological models (power laws and Gaussians). We find that we can explain the high mass and high-mass-ratio components of the observed population with our AGN model, compared to a confounding power-law distribution.