

Contribution ID: 854

Type: Parallel

Unveiling the Gravitational-Wave Universe: Population Insights from the LIGO-Virgo-KAGRA Observations

We present the latest population-level results from the LIGO-Virgo-KAGRA (LVK) Collaboration, based on the growing catalog of gravitational-wave detections from compact binary coalescences. Leveraging data from the O1–O3 observing runs, and incorporating advanced statistical inference techniques, we explore the underlying astrophysical distributions of binary black holes (BBHs), binary neutron stars (BNSs), and neutron star–black hole (NSBH) systems. This talk will cover updated constraints on the mass and spin distributions, merger rate densities, and redshift evolution of these sources. We will also discuss the implications of these findings for stellar evolution, formation channels, and cosmology. Furthermore, we examine potential signatures of hierarchical mergers and primordial black holes, and address the presence of selection biases and detector sensitivity limits. These population studies mark a significant step toward understanding the demographics and origins of compact binaries in the gravitational-wave era.

Secondary track

Author: TBD Session Classification: T01

Track Classification: T01 - Astroparticles, Gravitation and Cosmology