Contribution ID: **26** Type: **Talk**

Combining individual binary black hole detections and gravitational-wave background data to infer the binary black hole time-delay distribution

Monday, 23 October 2023 17:00 (15 minutes)

The advent of gravitational-wave astronomy is now allowing for the study of compact binary merger demographics throughout the Universe. This information can be leveraged as tools for understanding massive stars, their environments, and their evolution. One active question is the nature of compact binary formation: the environmental and chemical conditions required for black hole birth and the time delays experienced by binaries before they merge. Gravitational-wave events detected today, however, primarily occur at low or moderate redshifts due to current interferometer sensitivity, therefore limiting our ability to probe the high redshift behavior of these quantities. We circumvent this limitation by using an additional source of information: observational limits on the gravitational-wave background from unresolved binaries in the distant Universe. Using current gravitational-wave data from the first three observing runs of LIGO-Virgo-KAGRA, we synthesize catalogs of directly detected binaries and limits on the stochastic background to constrain the time-delay distribution and metallicity dependence of binary black hole evolution. Looking to the future, we also explore how these constraints will be improved at the Advanced LIGO A+ sensitivity.

Primary author: TURBANG, Kevin (Vrije Universiteit Brussel/Universiteit Antwerpen)

Presenter: TURBANG, Kevin (Vrije Universiteit Brussel/Universiteit Antwerpen)

Session Classification: Data Analysis

Track Classification: Data Analysis