Contribution ID: **83** Type: **Presentation**

Parameter estimation of the overlapping signals: descending in frequency and ascending in speed

Wednesday 8 May 2024 14:00 (15 minutes)

The increased sensitivity of the Einstein Telescope will lead to a significant increase in the number of gravitational wave signals we can detect. In addition, it will allow us to observe the gravitational wave signals for a longer duration. While both of these factors, a large number of signals and longer signals can open windows to previously unexplored science cases, they also introduce the problem of overlapping signals. The increase in the number of detections and the duration of the signals will cause them to overlap, which leads to biases in the measurement of the signal's source parameters. This can hinder the pursuit of precision science. The state-of-the-art parameter estimation pipelines have not been designed to analyze overlapping signals or long-duration signals. In this work, we present two different methods, hierarchical subtraction and joint parameter estimation, to perform parameter estimation of the overlapping signals. These methods are supplemented with a relative binning algorithm to speed up the parameter estimation and with the effect of earth rotation to attempt more realistic scenarios, especially for the long-duration signals emitted by binary neutron star systems or low-mass binary black hole systems. By performing parameter estimation on a large set of simulated gravitational wave signals we demonstrate the performance of the two methods.

Primary author: NAROLA, Harsh

Co-authors: SAMAJDAR, Anuradha (University of Milan, Bicocca); VAN DEN BROECK, Chris; JANQUART, Justin (Utrecht University/Nikhef); DIETRICH, Tim (University of Potsdam); BAKA, Tomasz

Session Classification: OSB

Track Classification: Observational Science Board (OSB)