Contribution ID: **256** Type: **Poster**

Localizing binary neutron star sources with LIGO-Aundha

LIGO-Aundha is expected to join the network of terrestrial broadband gravitational wave (GW) detectors and begin operations in the early 2030s. We study the impact of this additional detector on the accuracy of determining the direction of incoming transient signals from coalescing binary neutron star sources. Our study involves performing a full Bayesian parameter estimation (PE) over a heterogeneous detector network from a lower seismic cut-off frequency $f_{\rm low} = 10$ Hz, using the recently developed meshfree approximation aided fast Bayesian inference pipeline, providing a more robust approach than the `BAYESTAR` algorithm. With the improvements in network sensitivities, the future observing runs shall require performing estimation of source parameters from $f_{\rm low} = 10$ Hz in second generation ground based detectors, hence increasing the computational cost drastically. Our analysis takes this scenario into account. This distincts our work from previous related studies involving multi-detector sky localization of GW sources. We find that even in a 'worst-case scenario', where a typical BNS source is sub-threshold in the LIGO-Aundha detector (a significant possibility in the early commissioning stages), it could play an essential role in improving the localization of the source and thus contribute to the exciting science from multi-messenger astronomy. The analysis involves taking into account the varying detector sensitivities and duty cycles representing different stages of improvements in the operational phases over the course of years. Once the detector reaches design sensitivity, further improvements in source localization are seen, as expected. We also present its impact on reconstructing other parameters of these compact binary sources.

Email

sachins@alumni.iitgn.ac.in

Affiliation

Indian Institute of Technology Gandhinagar

Author: Mr SHUKLA, Sachin (Indian Institute of Technology Gandhinagar)

Co-authors: Mr PATHAK, Lalit (Indian Institute of Technology Gandhinagar); Prof. SENGUPTA, Anand (Indian Institute of Technology Gandhinagar)

Presenter: Mr SHUKLA, Sachin (Indian Institute of Technology Gandhinagar)

Session Classification: Gravitational Waves

Track Classification: Gravitational Waves