Contribution ID: **44** Type: **Oral**

Exploring black hole mergers through gravitational wave

Gravitational waves are the ripples in the fabric of spacetime predicted by einstein's theory of general relativity, have opened a new observational window into the dynamics of objects such as black holes. In this study, I present preliminary results from the analysis of publicly available LIGO data which has been associated with a binary black hole merger and gravitational wave. Using python-based data analysis, the strain signal from the Hanford (H1) detector was processed with a bandpass filter in the range of 30–400 Hz to suppress noise outside the astrophysical relevant frequencies. The whitening technique was then applied to enhance signal visibility against background noise. The resulting spectrogram illustrates the time–frequency evolution of the signal relative to the event. While much of the frequency band remains dominated by noise, the event region shows enhanced power at lower frequencies, consistent with the expected behavior of compact binary coalescence. Since this is a lower-SNR (signal-to-noise ratio) event, the chirp doesn't jump out clearly. Instead, you see slight enhancements in color power in the 30–100 Hz range near the event time. This is consistent with the idea that the merger signal is present but buried in noise.

Authors: Dr R.G., Prijitha (Jain university); AMAAN, S A Ghani Mohammad

Presenter: AMAAN, S A Ghani Mohammad

Track Classification: Physical Sciences