Contribution ID: **8** Type: **Presentation**

Dedicated-frequency analysis of gravitational-wave bursts from core-collapse supernovae with minimal assumptions

Thursday 24 July 2025 16:10 (20 minutes)

Gravitational-wave (GW) emissions from core-collapse supernovae (CCSNe) provide insights into the internal processes leading up to their explosions. Theory predicts that CCSN explosions are driven by hydrodynamical instabilities like the standing accretion shock instability or neutrino-driven convection, and simulations show that these mechanisms emit GWs at low frequencies ($lesssim$250 Hz). Thus the detection of low-frequency GWs, or lack thereof, is useful for constraining explosion mechanisms in CCSNe. In this talk, we introduce the dedicated-frequency framework, designed to follow-up GW burst detections using bandpass analyses. We discuss how low-frequency follow-up analyses, limited to $\leq$ 256 Hz, can be used to detect low-frequency GW signatures, and therefore constrain CCSN explosion mechanisms in practical observing scenarios. The dedicated-frequency framework also has other applications, such as enhancing signal detectability. As a demonstration, we present a high-frequency follow-up analysis, limited to $\geq$ 256 Hz, of the loudest trigger from the SN 2019fcn supernova.

Primary authors: LEE, Yi Shuen Christine (The University of Melbourne / OzGrav (Australia)); SZCZEPANCZYK, Marek (University of Warsaw); Dr MISHRA, Tanmaya (University of Florida); Dr MILLHOUSE, Margaret (Georgia Institute of Technology); Prof. MELATOS, Andrew (The University of Melbourne / OzGrav (Australia))

Presenter: LEE, Yi Shuen Christine (The University of Melbourne / OzGrav (Australia))

Session Classification: Detection