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(G*) Prospects for Reconstructing the Gravitational Wave Signal from Core-Collapse Supernovae in the LIGO-Virgo Advanced Detector Era

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Our current understanding of the core-collapse supernova explosion mechanism is incomplete, with multiple viable models for how the initial shock wave might be energized enough to lead to a successful explosion. Detection of a gravitational wave (GW) signal emitted in the initial few seconds after core-collapse would provide unique and crucial insight into this process. With the Advanced LIGO and Advanced Virgo gravitational wave detectors expected to soon approach their design sensitivity, we could potentially detect this GW emission from most core-collapse supernovae within our galaxy. But once identified, how well can we recover the signal from these detectors? Here we use the BayesWave algorithm to maximize our ability to accurately recover GW signals from core-collapse supernovae. Using the expected design sensitivity noise curves of the advanced global detector network, we inject and recover supernova waveforms modeled with different explosion mechanisms into simulated noise, tuning the algorithm to extract as much of the signal as possible. We report the preliminary results of this work, including how the reconstruction is affected by the model and what we can hope to learn from the next galactic supernova.

Authors: Mr RAZA, Nayyer; Dr MCIVER, Jess (The University of British Columbia)

Presenter: Mr RAZA, Nayyer

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