Contribution ID: **33** Type: **Contributed talk**

Deep learning approach to detect gravitational waves from binary close encounters

Wednesday, 5 October 2022 17:00 (20 minutes)

Gravitational wave (GW) emission from close encounters (CEs) between neutron stars (NSs) and/or black holes (BHs) are recently being considered as new potential astrophysical sources for ground-based detectors. CEs are mostly part of three-body systems, constrained by a dense stellar environment and configured in eccentric inspirals, characterized by repeated dynamical captures. These are predicted to occur with both GW and gamma-ray emission, thus resulting interesting for multimessenger astronomy. Their GW waveform is hard to model with respect to quasi-circular isolated inspiraling binary systems, already observed by the LIGO/Virgo collaboration. Unmodeled burst search could be a viable method for detecting such systems in Advanced LIGO and Virgo data. We propose a deep learning-based approach for CE detection, based on convolutional neural networks capable of detecting transient signals associated to CEs and distinguishing them from transient noises that can mimic GW signals (glitches). The training of the algorithm is based on simulated timeseries of Virgo data. We present preliminary results on of this approach, using a one-dimension convolutional neural network architecture, as a first step toward the application to real data.

Presenter: NUNZIATO, Sorrentino (University of Pisa and INFN)

Session Classification: Stellar and Intermediate black holes