

CNN fo inspiral detection: going down in frequency

Friday, November 5, 2021 2:20 PM (20 minutes)

Gravitational waves play an essential role in multi-messenger astronomy. In principle, they could be detected before the other channels. This is particularly important for binary neutron star mergers, where electromagnetic counterparts can be observed. To issue alerts, one would require the detection in the early inspiral part of the signal, well before the maximum frequency is reached. Our previous work showed that machine learning techniques such as convolutional neural networks are well suited to detect this early inspiral. This proof of principle was for a single detector with simulated Gaussian noise. We have shown that our designed neural network architecture performs with similar accuracy as the matched filtering while being much faster. We now extend the search at multiple detectors, and study different possibilities: one network taking the input of all the detectors, or one network by detector. We also evaluate the performance of such a network on different power spectral densities, especially design O4, Gaussian noise O3, and into some real noise of O3. We investigate the efficiency of those techniques for the Einstein Telescope, where the signal should be visible even earlier in the inspiral.

Primary author: BALTUS, Grégory (University of Liège)

Presenter: BALTUS, Grégory (University of Liège)

Session Classification: Parallel 2C