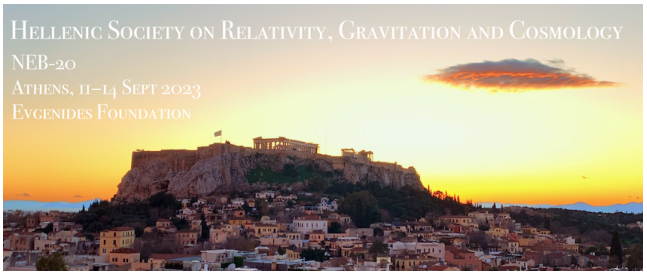

Contribution ID: **98** Type: **not specified**

Rapid calculation of the signal-to-noise ratio of gravitational-wave sources using artificial neural networks

In parameter estimation calculations of gravitational wave sources, it is useful to know the optimal signal-to-noise ratio of an individual model waveform. We train an artificial neural network on a random sample of one million theoretical waveforms of binary black hole systems with random spins and achieve an accuracy of 97\% in predicting the signal-to-noise ratio. The neural network evaluates the results orders of magnitude faster than the original calculation. We show the results of the optimization of different hyperparameters with a grid search and with selective searches. Finally, we show that the logarithm of the accuracy is linearly related to the logarithm of the number of points in the dataset. This allows us to predict that a dataset size of about 7 million data points will be required to achieve an accuracy of 99\% in predicting the SNR with the neural network that we constructed.

Presenter: TSIOULIS, IOANNIS

Session Classification: Parallel Session B