GW150914/GW170817: Gravitational Wave Data Analysis Using ROOT and Fast Fourier Transform

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In this project, it is presented a ROOT developed database for gravitational waves (GW) signal decomposition. Thus, it allowed the analysis of two GW detection events: GW150914 and GW170817/GRB170817A. Thereafter, it was possible to establish correlations amongst multiple variables that LIGO made available to the public, with emphasis on the correlation between the experimental data and the respective noise. This correlation is higher than expected (32% and 42%, for H1 and L1 observatories, in this order). To unravel the reason behind this anomaly the Fourier Transform was applied, which allowed, using ROOT, the filtering of the difference between the observed data and the theoretical signal noise. Thus being, we proceeded to analyse the H1 residual Fourier transform, followed by a low pass filter frequency scanning. In the end, it is presented a graphical representation of the inverse Fourier transform, which describes the low frequency range chosen, thus explaining the high correlation previously determined.

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