Study of the Statistical Effect of Data Whitening and Anomalous Behaviour in Gravitational Wave Events

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To start to question the general theory of relativity, one has to go back and has to be sure that everything that comes before is safe and sound. In the following pages, LIGO pipelines were used to treat gravitational wave events and SEOBNRv4 approximant to generate the theoretical relativist models. Hereon, correlations were extracted between the observed signals from the first science run from LIGO and the respective residues, thus finding that there is a strange decorrelation, common to several events, some time before the black-hole merger. To try to shed some better light, as was done in the previous year, ROOT was used to analyze the signals, specially from GW150914 event. As mentioned, the correlation between the signals and the residues are somewhat anomalous, having a 42\% and 32\% correlation, each for each of LIGO observatories, Hanford and Livingston. The Fourier Transform allowed the visualization of a part of the signal that is behind this correlation, very similar to a GW event. As expected, all the results are similar to last year, even identical, thus improving the good use of LIGO pipelines. Thus, there is in fact something wrong happening when dealing with GW data. What is proposed here is that either the whitening of GW data is contributing with some systematic errors or that there is something right before the black-hole merger that is still unexplained.

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