

Abstract Submitted  
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**Almost-Ideal Filtering: A Demonstration of New Signal Processing Tools in GW150914, The First Observation of Gravitational Waves**  
CALEB BROODO<sup>1</sup>, GEMUNU GUNARATNE<sup>2</sup>, University of Houston — aLIGO (The Advanced Laser Interferometer Gravitational-Wave Observatory) was designed to search for gravitational waves, opening up a new era of astronomy. As notably sensitive instruments (able to detect distortions of  $10^{-18}$  m), the detectors are subjected to various vibrations caused by microseismic waves and anthropogenic sources (traffic, construction, etc.). This noise can drown out the minor astrophysical signals possibly embedded in the observation. It is therefore necessary to conduct careful signal processing in order to establish the presence of gravitational waves. In this presentation, we explore minor ways to improve techniques used in aLIGOs matched-filtering analysis. We present a novel approach: adjusting Welch's method by replacing the default periodizing Hann window with a recently developed kDAF window. The kDAF window has a flat top with smooth roll-off, allowing it to consolidate lost information unaccounted for by the Hann window. This window exchange expects to improve the matched-filtering calculation by providing a better estimate to the detectors noise. A full demonstration of this approach has been done using aLIGO network data from the first confirmed BBH event GW150914, observed in 2015. More events will be pursued in future studies.

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