Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Using Boosting Decision Trees in Gravitational Wave Searches triggered by Gamma-ray Bursts[1] SARAH ZURAW, University of Massachusetts, LIGO COLLABORATION — The search for gravitational wave bursts requires the ability to distinguish weak signals from background detector noise. Gravitational wave bursts are characterized by their transient nature, making them particularly difficult to detect as they are similar to non-Gaussian noise fluctuations in the detector. The Boosted Decision Tree method is a powerful machine learning algorithm which uses Multivariate Analysis techniques to explore high-dimensional data sets in order to distinguish between gravitational wave signal and background detector noise. It does so by training with known noise events and simulated gravitational wave events. The method is tested using waveform models and compared with the performance of the standard gravitational wave burst search pipeline for Gamma-ray Bursts. It is shown that the method is able to effectively distinguish between signal and background events under a variety of conditions and over multiple Gamma-ray Burst events. This example demonstrates the usefulness and robustness of the Boosted Decision Tree and Multivariate Analysis techniques as a detection method for gravitational wave bursts.

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Date submitted: 09 Jan 2015 Electronic form version 1.4