

Targeted Searches and Coherent Sum using Q Pipeline

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One class of sources LIGO is searching for consists of short duration gravitational wave bursts of a priori unknown waveform. Potential sources include supernovae core collapse and the merger phase of coalescing binary black holes. To date, existing burst search algorithms have concentrated only on all-sky searches for such events. We have developed an algorithm that allows for maximum sensitivity to a desired sky location, by forming a linear combination, a coherent sum, of data from a network of detectors. To accomplish this a search is performed over a two dimensional parameterization of signal space. This algorithm was implemented as a part of the Q-pipeline data analysis package, and was tested for various types of simulated data for Hanford and Livingston detectors. A substantial gain on SNR was observed in most cases depending on the incident direction of the gravitational wave; moreover, it was found that for detection purposes it is sufficient to iterate the sum over all possible sky positions. In addition, statistical tests were developed in order to distinguish between glitches and gravitational waves, especially for the two Hanford detectors.