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# An Improved Template Matching Algorithm for LIGO

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The current method of identifying gravitational wave signals in the data from the Laser Interferometer Gravitational Wave Observatory is to compute the inner product of the incoming data with predetermined gravitational waveforms. Although conceptually simple, the technique identifies far too many candidate signals, due largely to momentary spikes in the data. A more rigorous method of identifying true signals is to compute a $\chi^2$ fit to the data. A new matching algorithm has recently been implemented which utilizes this fitting technique to identify gravity wave signals. In addition to reducing the number of false candidates identified, the algorithm provides estimates of the signal parameters, such as the masses of the astrophysical objects which created the disturbance. However, the highly complex topology of the $\chi^2$ surface severely complicates the search for a global minimum using standard minimization techniques. The mechanics and function of this new data fitting algorithm, along with potential improvements in minimization techniques, will be discussed in detail.

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