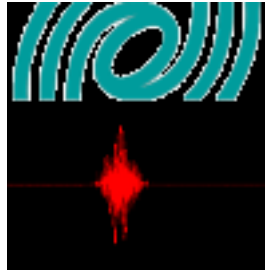


Theory and applications of signal processing methods (in GW detection, medical science and engineering)



Contribution ID : 10

Searches for GW transients with the ground-based detectors.

Tuesday 16 Oct 2012 at 09:15 (02h00')

Content :

In this lecture I give an overview of the gravitational-wave experiment and methods used in the analysis of data from the ground-base detectors.

The purpose of the lecture is to describe how a worldwide network of GW detectors works, with focus on signal processing techniques and reconstruction methods, rather than to describe details of specific search algorithms used so far in the GW experiment. The lecture is organized in three parts:

- 1) Short introduction into the gravitational-wave experiment.
- 2) Signal processing methods and their applications to the analysis of single detector data, including:
 - time-frequency transformations
 - data conditioning with linear prediction error (LPE) filters
 - regression of GW data, Wiener-Kolmogorov filters
 - time-frequency analysis, clustering in TF domain
 - multi-resolution analysis
- 3) Analysis of data from multiple GW detectors (coherent network analysis), including
 - characterization of detector networks
 - Inverse problem for bursts, likelihood methods
 - matched filters, weakly modeled and un-modeled searches
 - detection statistics
 - reconstruction of polarization states
 - reconstruction of GW waveforms
 - sky localization
 - factors affecting GW network performance.

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