Signal Processing for Gravitational Waves Experiments

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The main instruments for detecting gravitational waves rely on Michelson Interferometry, whose principle was already known more than 100 years ago. However, the extremely tiny effect of GW and the length of the interferometer's arms requires a very good knowledge of all the noise sources and efficient data filtering.

In this lecture, we will first review the design of present ground detectors (LIGO, VIRGO, GEO600, etc) and future space-based mission (eLISA).Second, the different sources of instrumental noise and the different algorithms that are used to filter the data while preserving the effect of the GW will be presented, as well as the method used to compute the so-called 'sensitivity' curve. The examples will be mainly focused on the future eLISA space mission.