

Doppler Tracking Analysis

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The current status of signal processing in the search for gravitational waves using Doppler tracking is reviewed. Distinction is made between (a) the Doppler tracking method in the low-frequency band (three-pulse response to gravitational radiation; antenna large compared with the wavelength) and detectors in the high-frequency band (merged-pulse response; antenna small compared with the wavelength) and (b) how the differences in transfer functions between the signals and the noises can be exploited to improve signal detection probability. Analysis examples are given for burst, background, periodic, and quasi-periodic sources, drawing on data from Galileo, Mars Observer, Pioneer, and Ulysses. The current and projected future sensitivity of gravitational wave searches using Doppler tracking of spacecraft is presented.