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Noise propagation through TDI for the noise budget of LISA mission

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Gravitational waves (GWs) are opening a new window to investigate our Universe. As an effort to broaden the frequency band of GW observation, LISA will be the first-ever spaceborne GW detector, aiming to detect the GW signals from various astrophysical and cosmological sources in the frequency band from 0.1 mHz to 1 Hz. To study the noises and how to reduce them at the required levels allowing observation of GW, a performance model and an instrument simulator have been developed by the LISA Consortium, in particular the Performance and the Simulation working groups. The understanding of the sources and their propagation are ones of the key elements in the current phase A of the LISA mission. The noise budget will take into account all the noises currently known as well as the propagation of these noises through data processing methods. This talk is aiming to give an overview of how we model the noises from the LISA instrument to the interferometer measurements and calculate the noise propagation through the Time Delay Interferometry (TDI) algorithm to obtain the noise budget. First, we will give a brief introduction about TDI - the method to suppress laser noise, jitter noise, clock noise - as well as the up-to-date beam model for the interferometer measurements we use for the study. Then, the calculation of transfer functions for some noises after TDI processing will be presented. The comparison between the analytic and simulation data from LISANode will also be shown to consolidate our results. These transfer functions then are the input for the Performance working group to study the noise budget for the LISA mission.

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