Simulation of LISA Time Delay Interferometry

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The planned LISA formation follows nearly drag-free orbits. From solar-system dynamics, this formation evolves with time and time delay interferometry (TDI) is needed to achieve sufficient equal optical paths for laser frequency noise to be suppressed to below the level of secondary noises (such as the optical path noise, acceleration noise etc.) in order to attain the requisite sensitivity. Simulation of arm length variation and laser-frequency-noise induced measurement noise using the present LISA requirement both indicate that the first-generation TDIs are not sufficient for meeting the LISA interferometry requirement [1, 2]. However, second-generation TDIs are sufficient. A combined analysis with both simulations [1, 2] reinforces this conclusion. In this presentation, we will report on our updated simulation results.

[1] G. Wang and W.-T. Ni, Numerical simulation of time delay interferometry for TAIJI and new LISA, *Research in Astron. Astrophys.* 19 (2019) xxxx; a lengthy version with other applications is in arXiv:1707.09127.
[2] Jean-Baptiste Bayle, Marc Lilley, Antoine Petiteau and Hubert Halloin, Analytic Model and Simulations of Residual Laser Noise after Time-Delay Interferometry in LISA, arXiv:1811.01575.