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Bayesian estimation of contributions to the extreme-low-frequency force noise in LISA Pathfinder

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LISA Pathfinder (LPF) has been a successful ESA mission, operating between December 2015 and July 2017. The mission exceeded both its noise requirements and the more stringent requirements for LISA, demonstrating the feasibility of low-noise free-fall in the extended LISA frequency band between 20 μHz and 100 mHz .

Even though below the noise requirements, an excess noise with respect to the predicted one was detected at low frequencies, up to 1 mHz . We propose a method to estimate the contribution to acceleration of physical effects, related to telemetries of onboard sensors. Some contributions may be correlated with measured physical quantities, with a coupling coefficient that is not directly measured. These effects could cross-correlate with one another, and the measured time series could be affected by non-correlating noises.

The purpose of the method presented in this contribution is twofold. The main purpose is to estimate an upper limit to the contribution of physical effects to the measured noise, and the residual after subtraction. Secondly, we give an estimate of the coupling coefficients.

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