

On the effectiveness of null TDI channels as instrument noise monitors in LISA

jeudi 24 novembre 2022 10:00 (15 minutes)

I will present a recent paper we submitted on the use and limits of the Time-Delay Interferometry null channels for in flight estimation of the Laser Interferometer Space Antenna instrumental noise. In the talk I will consider how the two main limiting noise sources, test-mass acceleration noise and interferometric phase measurement noise, propagate through different Time-Delay Interferometry channels: the Michelson combination X that is the most sensitive to gravitational waves, then the less-sensitive combinations α , and finally the null channel ζ . We note that the null channel ζ , which is known to be equivalent to any null channel, not only has a reduced sensitivity to the gravitational waves, but also feature a larger degree of cancellation of the test mass acceleration noise relative to the interferometry noise. This severely limits its use in quantifying the low frequency instrumental noise in the Michelson X combination, which is expected to be dominated by acceleration noise. However, we show that one can still use in-flight noise estimations from ζ to put an upper bound on the considered noises entering in the X channel, which allows to distinguish them from a strong stochastic gravitational wave background.

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