Verifying LISA core technology on ground: a hexagonal optical bench

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Abstract

The Laser Interferometer Space Antenna (LISA) will allow scientists to listen to the cosmic concert played by gravitational wave sources in the mHz regime. At the core of LISA's metrology chain, the interferometric phase, carrying the scientific signal, needs to be extracted with picometer-equivalent precision and linearity over a high dynamic range of up to eleven orders of magnitude. Verifying on ground that the technology developed for this purpose (a phasemeter) fulfills these stringent requirements poses an experimental challenge. Here we present an hexagonal quasimonolithic optical bench, implementing a three-signal linearity test, as the first test bed precise enough to conduct the aforementioned verification. This includes the characterization of the test bed as well as a benchmark measurement using a LISA phasemeter prototype. Furthermore, future extensions of the bench to verify more aspects of the LISA technology chain (e.g. clock tone transfer and removal) are presented.

References

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