

# Development of the phasemeter core for LISA

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## Abstract

The Laser Interferometer Space Antenna (LISA) mission aims to detect gravitational waves in a frequency regime below 1 Hz. LISA will consist of three satellites trailing the earth on its orbit around the sun and will utilize heterodyne laser interferometry to perform precise length measurements between the satellites. The signal of interest is encoded in the phase of the optical heterodyne beatnote and is extracted by a phasemeter over a range of frequencies from 5 to 25 MHz. The core of the phasemeter comprises an analog and a digital part, both critical for reaching the required performance levels of  $\mu\text{rad}/\sqrt{\text{Hz}}$  over a dynamic range of eleven orders of magnitude. Here we give an overview about the design and functionality of the core. We analyze the influence of different noise sources, identify limiting factors and present different testing schemes. Finally, we compare the performance of different phasemeter prototypes which were tested under various experimental conditions.

## References

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