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Laser interferometer for space-based mapping of Earth's gravity field

Marina Dehne, Benjamin Sheard, Oliver Gerberding, Christoph Mahrdt, Gerhard Heinzel, and Karsten Danzmann
Max-Planck-Institute for Gravitational Physics and Leibniz University Hannover (Albert-Einstein-Institute), Hannover, Germany (marina.dehne@aei.mpg.de)

Laser interferometry will play a key role in the next generation of GRACE-type satellite gravity missions. The measurement concepts for future missions include a heterodyne laser interferometer. Furthermore, it is favourable to use polarising components in the laser interferometer for beam splitting. In the first step the influence of these components on the interferometer sensitivity has been investigated. Additionally, a length stability on a nm-scale has been validated. The next step will include a performance test of an interferometric SST system in an active symmetric transponder setup including two lasers and two optical benches.

The design and construction of a quasi-monolithic interferometer for comparing the interferometric performance of non-polarising and polarising optics will be discussed. The results of the interferometric readout of a heterodyne configuration together with polarising optics will be presented to fulfil the phase sensitivity requirement of $1\text{nm}/\sqrt{\text{Hz}}$ for a typical SSI scenario.