Type: Poster

Optical Cross Coupling in Space-Based Gravitational Wave Detectors

Saturday 7 November 2020 14:00 (1 hour)

Gravitational waves are a hot topic in science at least since Rainer Weiss, Kip Thorne and Barry Barish got the Nobel prize in 2017. The LIGO and Virgo collaborations have presented us with exceptional detections in the last years and will continue even more so in the future. However, there are gravitational waves that cannot be detected from ground. The future space based gravitational wave detector LISA will therefore enrich the gravitational wave science with additional sources and scientific questions. LISA will consist of three spacecraft exchanging laser beams over a distance of 2.5 million kilometers. One of the most relevant optical noise sources in LISA, is the coupling of unwanted space craft motion into the phase readout, also called Tilt-To-Length (TTL) coupling. This noise was already observed during the technology demonstration mission LISA Pathfinder (2015-2017), and dedicated experiments were performed to study this noise type in detail.

In my talk, I will briefly introduce the LISA and LISA Pathfinder missions. Based on this, I will explain TTL noise and how it couples into the phase readout. I will describe how geometric and non-geometric effects contribute and show why a detailed analysis of TTL is a complex problem.

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