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Tunable coherence for straylight suppression in high precision interferometers

As straylight is a dominating limitation for the sensitivity of gravitational wave detectors, we investigate the use of tunable coherence in the form of phase modulation following a pseudo-random-sequence on the interferometer laser to break the coherence of the delayed straylight. Thereby, we aim to reduce its intrusive impact on the measurement by effectively realizing a pseudo white-light interferometer with tunable coherence length. While this has been proven to work with digital demodulation for multiplexing in digital interferometry, we now study optical demodulation at the signal ports of a Michelson-interferometer with higher modulation speeds to reduce the remaining coherence length. As a first step, we present results and estimated suppression factors from a numerical simulation in preparation of the experimental studies in a tabletop interferometer.

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