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Straylight suppression with tunable coherence in high precision interferometers

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As straylight is a dominating limitation for the sensitivity of gravitational wave detectors, we investigate new laser operation concepts and interferometer topologies for a more straylight-resilient detector configuration. Our main focus is the use of tunable coherence realized by phase modulation following a pseudo-random-sequence on the interferometer laser.

While this breaks the coherence of the delayed straylight and thereby reduces its intrusive impact, it effectively realizes a pseudo white-light interferometer with tunable coherence length which we investigate in more complex topologies.

We already simulated this concept in a Michelson-interferometer and present now recent findings on the response of cavities to the PRN modulation from our numerical simulations. At the same time we are progressing with experimental studies and give an overview of the current status.

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