

Measurement and identification of coherent stray light in complex interferometers

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Stray light is an issue in any optical interference measurement, particularly in interferometric gravitational wave detectors, where stringent limits are placed on the noise floor: the control and mitigation of stray light are critical. After general considerations about stray light, this presentation will address the development underway of an instrumentation for stray light measurement at system level, where a frequency-swept laser beam is injected into the system under test, and the signals from the photoreceivers are recorded and processed. This allows to measure, and identify, the different contributions to stray light, each contribution being given by

- the optical path length difference (OPD) of stray light, with respect to the nominal beam
- its fractionnal optical amplitude, with respect to the nominal beam.

The performance of our prototype, in terms of OPD resolution, measurement floor etc., has been checked in measurements of stray light in two interferometric demonstrators, in view of its use with the Interferometric Detection System (IDS) of the LISA project.

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