

STRAY LIGHT IN THE LISA MISSION

Perturbation of an interferometer due to back-scattered light

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GWADW, May 2021

BACKLINK & STRAY LIGHT

- The Backlink establishes a phase reference between the two OBs
 - Current base line: Direct Fiber



Image from: LISA Instrument Group, ESA-L3-EST-INST-DD-001

Sources of stray light



secondary surfaces (beam stops)

reflections at lenses, etc. (tilted components)

fiber backscatter



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Measuring Fiber Backscatter

- Heterodyne Mach-Zehnder interferometer
- 2 step measurement
 - (b) Calibration, with known optical power
 - (c) Backscatter measurement





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Environmental Effects

- Satellite in space
 - Radiation



Mitigation

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- MOSA
 - Fiber motion



- Temperature environment
 - Phase coupling



- Shielding, characterization
- Fiber routing, stress reduction
- Fiber routing, stable temperature environment



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CHARACTERIZATION



• 4 types \rightarrow backscatter constant



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- Movement currently under investigation



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Image from: eLISA-AEI-PRDS-2019-04-TN-PRDSrec

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Thank you for your attention!

J. M. Rohr et al. (2020), Optics Express **28**(23) p. 34894, doi: 10.1364/oe.404139

More for the backlink: K.-S. Isleif et al. (2018), CQG **35** 085009, doi: 10.1088/1361-6382/aaa879 K.-S. Isleif et al. (2017), *J. Phys.: Conf. Ser.* **840** 012016, doi: 10.1088/1742-6596/840/1/012016

This work was supported by the European Space Agency (ESA) within the project "Phase Reference Distribution System" (8586/16/NL/BW) and the Deutsches Zentrum für Luft- und Raumfahrt (DLR) with funding from the Bundesministerium für Wirtschaft und Technologie (Project Ref. Number 50 OQ 1801)



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