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Thermal effects on the Input Test Mass (ITM) of the Einstein Telescope High-Frequency arm

Thermal gradients in the Input Test Masses (ITM) introduce optical aberrations that pose a critical challenge for both current and next-generation gravitational wave (GW) interferometers, significantly affecting their stability and sensitivity. Using the temperature map obtained through finite element analyses, the optical path difference (OPD) caused by thermal lensing and the deformation of the high-reflecting (HR) surface are computed. The impact on the Fabry-Perot cavity is then assessed, and the potential for thermal compensation through a laser actuation system is evaluated preliminarily.

Primary author: DI ANTONIO, Ivan (INAF - Osservatorio Astronomico d'Abruzzo)

Presenter: DI ANTONIO, Ivan (INAF - Osservatorio Astronomico d'Abruzzo)

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