

## ET-OPT - A facility for optical mode control at high intracavity powers

LIGO and Virgo are limited in the amount of power they can build up in the arms. The limitation arises from the absorption of optical power in the main optics, causing mirror surface deformations. This in turns couples scatters light into higher order modes and causes several problems, notably, parametric instabilities, degraded buildup of the control sidebands and limited squeezing enhancement. ET-HF plans to use 3MW of optical power, in contrast, during O4 LIGO planned to use 750 kW and achieved 350 kW.

In this presentation, I describe plans for the ET-OPT facility, a high optical power facility in the EMR region. We will construct a suspended optical cavity, operating at similar peak intensity and g-factor to ET-HF. We will use our real-time cavity spectroscopy technique to measure mirror surface deformations as the cavity thermalises and demonstrate that the optical mode basis can be brought back under control. In this talk, we introduce the real-time cavity spectroscopy technique and then describe the plans for the facility.

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