Abstract Submitted
for the APR14 Meeting of
The American Physical Society

Active thermal lensing elements for mode matching optimization in optical systems[1] PAUL FULDA, University of Florida, UF LIGO TEAM — In interferometric gravitational wave detectors of the advanced era and beyond, the high laser powers used lead to the generation of thermal lenses in the optics. This can lead to a reduction in the coupling between the various optical cavities comprising the detector, thus reducing its overall sensitivity. We present here an active device which can be used to compensate for such thermal effects, as well as static mismatches between cavities. The device uses a 4 segmented heater to heat a transmissive optic, generating a spherical or astigmatic lens which can be used to compensate other thermal lenses within an optical system. We report on in-vacuum tests of the device, including an interferometric measurement of the wavefront distortions induced by the device, and measurements of the dynamic range and response time. The device was shown to have no observable detrimental effect on wavefront distortion, a focal power dynamic range of 0 to -40 mD, and a response time of the order 1000 s.

[1]Supported by NSF grant PHY-1205512.

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Date submitted: 10 Jan 2014 Electronic form version 1.4