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Low absorption thermally adjustable telescope[1] J. GLEASON, V. QUETSCHKE, M. RAKHMANOV, J. LEE, G. MUELLER, D.H. REITZE, D.B. TANNER, University of Florida — In the advancing field of gravitational wave interferometry, the desire for greater sensitivity leads to higher laser powers to reduce shot noise. One of the major challenges in using higher power lasers is the creation of thermal lenses in optical components. This is especially problematic in transmissive optical components even at very low levels of absorbed power. Using an additional laser with a wavelength heavily absorbed by the substrate, an aberration-free parabolic lens can be created. We present experimental and theoretical results on thermally adjustable lenses using fused silica as a substrate material with very low absorption for the 1064nm wavelength Nd:YAG lasers that are used for GW detectors. We characterize the dynamical focal range of the system, measure the resulting aberrations on the transmitted Nd:YAG beam and use this lens to mode match into an optical cavity. Our results are in good agreement with theoretical model incorporating the temperature distribution of the lens and the relevant thermo-optic parameters.

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