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CORRECTION OF OPTICAL ABERRATION: LESSONS FROM 2nd GENERATION TOWARDS FUTURE DETECTORS

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Wave-front aberrations in the core optics of interferometric gravitational waves detectors can represent a strong limitation to their operation and sensitivity. These aberrations are due to intrinsic defects in the optics (surface figure errors and refraction index inhomogeneity) and to the rise of thermal effects, i.e. optical power absorption in the substrate and coatings of the test masses that induces both an increase of the optical path length (thermal lensing) and a thermo-elastic deformation of the optic itself along the optical axis. All these imperfections can be compensated for by generating proper optical path length corrections. An adaptive optical system has been installed and is operating in Advanced Virgo. The high frequency component of Einstein Telescope will also suffer from optical aberrations as in second generation interferometers, with the additional issue of the possible use of the LG33 mode, instead of the TEM00. Here, the ongoing research activity for improvements of the adaptive optical system in view of third generation detectors is presented

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