Abstract Submitted
for the SES11 Meeting of
The American Physical Society

High Speed Alignment Control of an Optical Resonator DANIEL AMARIUTEI, University of Florida, LIGO UF TEAM — Laser interferometric gravitational wave detectors are by far the most sensitive interferometer in the world. They require exquisite control over all degrees of freedom of the optical components comprising the main detector but also over all degrees of freedom of the used laser beam. One of the most critical degrees of freedom is the propagation direction and beam location of the input beam when it enters the interferometer. Any variations in these two parameters will couple to static misalignments inside the interferometer and will generate spurious signals, which can easily limit the sensitivity of gravitational wave detectors such as Advanced LIGO. This has long been recognized and has led to alignment sensing and control systems, which use piezo mounted mirrors to control the alignment of the laser beam. The disadvantage of these systems is their low bandwidth and intrinsic noise. We have are in the process of characterizing actuators which use the electro-optical effect to steer the laser beam. These systems have a significantly higher bandwidth and don't require any moving parts which usually means much higher reliability. We report on the performance of these devices.

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Date submitted: 26 Aug 2011 Electronic form version 1.4