Dynamic Response and Locking of Optical Resonators for LIGO

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University of Texas at Brownsville — The Laser Interferometer Gravitational Wave
Observatory (LIGO) is a large-scale detector capable of direct observation of
gravitational waves from various astrophysical sources. The detector utilizes a highly
stabilized laser beam which requires a high-purity mode content. The spatial
filtering (modecleaning) of the laser beam is done by a triangular ring resonator
(Fabry-Perot cavity), which is made of a monolithic fused-silica spacer and low-loss
mirrors bonded to it with precision alignment. We fabricated and characterized 3
such ring resonators at the LIGO Hanford Observatory. Several measurement
techniques have been applied to measure the optical losses in these resonators. In
this poster we present the results of these measurements and provide physical
explanation of the resonator filtering properties.