Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Fiber Fabry-Perot Interferometric Characterization of Dissipation in LIGO Mirror Coatings STEPHAN LEBOHEC, CONNER WINDER, COLBY SMITH, MARIO HOMER, BRECKEN LARSEN, CEDRIC SHASKEY, VIKRAM DESHPANDE, KAY PARK, University of Utah, UTAH LIGO MIRROR COATINGS GROUP TEAM — An important sensitivity limitation of interferometric gravitational wave detectors is directly related to the mechanical dissipation of the mirrors used as test masses. This dissipation happens primarily because of the reflective coating applied on the surface of the mirror. The microscopic mechanism of this coupling is not understood but it is believed to be associated with the presence of crystalline structures constituting defects in the coating. Hence, currently, the goal is to identify coatings that are free of such defects. The identification of improved coatings will be exploited in the future and regular upgrades of gravitational wave detectors and will enter the design of future gravitational wave observatories. In the newly formed University of Utah LIGO mirror coatings group, we have implemented a fiber Fabry-Perot interferometric characterization of mechanical dissipation in the so-called "gentle nodal suspension" geometry. Proof-of-principle measurements have been performed at room temperature in ambient conditions and integration with vacuum and cryogenic conditions is currently underway. In the future, characterization of the coating will be done as a function of temperature toward an understanding of the dissipation mechanisms, in order to identify ideal coating candidate materials and temperatures of operation.

Vikram Deshpande
University of Utah

Date submitted: 13 Sep 2019 Electronic form version 1.4