

Abstract Submitted
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Charging of a Fused Silica Optic by an Electrostatic Drive¹ COLIN FITZGERALD, DENNIS UGOLINI, Trinity University — Gravitational-wave interferometers with suspended optics may use an electrostatic drive (ESD) as a position fine adjust. An ESD is an electrode pattern printed onto a reaction mass with alternating positive and negative voltages. According to measurements at Moscow State University (MSU), the ESD contributes displacement noise by redistributing charge on the optic. We sought to verify the MSU result by measuring the induced charge distribution from an ESD with a Kelvin capacitive probe. A fused silica optic was exposed to an ESD and then moved via a motorized translation stage to the probe for measurement at high vacuum (10^{-5} torr). Calibration with a known voltage source determined a sensitivity $1\text{V} = 6 \times 10^{-12} \text{ C/cm}^2$. A voltage of $\pm 600\text{V}$ was applied to the electrodes for a period of one week, then shut off for one week, and reversed for another week. The charging rate was found to be $7 \times 10^{-15} \text{ C/cm}^2/\text{hr}$, fourteen times slower than the MSU result. The decay time constant found was 3700 ± 900 hours, about 3 times faster than the MSU result.

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