



Contribution ID: 13

Type: **Poster**

Compact Optical Vault Grade Inertial Sensors.

Tuesday, 23 May 2023 18:15 (1 minute)

Vault-grade inertial sensors are essential for isolating test masses in gravitational wave detectors from ground motion. In order to achieve excellent noise performance, these sensors are typically big bulky and not vacuum compatible. These features limit the deployment of such sensors and contribute to control noises, which currently prevent the low-frequency performance of LIGO from reaching design sensitivity. We will present designs of optical inertial sensors that can reach competitive performance to these vault-grade inertial sensors in a compact optic and, further, show results from our prototype sensors. The sensors encode their motion in an oscillating piece one inch in diameter. The oscillators achieve high Q factors of about 300000 to suppress thermal noise to a vault-grade level. We further present a readout scheme for such oscillators, which is sufficiently precise to achieve vault-grade performance. Designs like this will be an essential part of any future ground-based gravitational wave detector's mission to achieve its goals for low-frequency detection.

Primary author: CARTER, Jonathan (Max Planck Institute for Gravitational Physics)

Presenter: CARTER, Jonathan (Max Planck Institute for Gravitational Physics)

Session Classification: Tuesday Poster session

Track Classification: Low Frequency Noise: Low Frequency Sensing and Control