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Progress on Novel Tests of Gravity at the Submillimeter Scale[1]
ALYSSA JOHNSON, KYLE GALAZ, MICHAEL GENGO, EMILY ORD, FRANK TROMBETTA, KASSANDRA WEBER, C.D. HOYLE, Humboldt State University — The unification of the Standard Model and General Relativity may result in the failure of the Weak Equivalence Principle (WEP) and/or the gravitational Inverse-Square Law (ISL). Our fundamental understanding of gravity is questioned by these incongruities. However gravity is not well tested below the millimeter scale. Undergraduate researchers and faculty at Humboldt State University are using an experiment to measure gravitational interactions below 50 microns. The experiment uses a torsion pendulum with equal masses of two different materials arranged as a composition dipole. The twist of the torsion pendulum is measured as an attractor mass in a parallel-plate configuration is oscillated nearby. This oscillation creates a time dependent torque on the pendulum. The magnitude and size of this torque may be studied lead to test for deviations in the WEP or ISL at this untested scale. This talk will focus on the mitigation of the variations in the apparatus' inclination by use of an active leveling scheme that utilizes data from a tilt sensor that is fed to a PID loop.

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