

Abstract Submitted
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Using a PID Feedback Loop to Correct Apparatus Tilt via Thermal Expansion NOAH DUNKLEY¹, CHARLES HOYLE, Humboldt State University — Theories which attempt to unify the Standard Model and General Relativity often include features which violate the Weak Equivalence Principle (WEP) and gravitational Inverse-Square Law (ISL). A violation of either the WEP or ISL at any length scale would bring into question our fundamental understanding of gravity. Motivated by these considerations, undergraduates and faculty at Humboldt State University are building an experiment to probe gravitational interactions below the 50-micron length scale. One challenge that the experiment faces is the daily tilt variation of the building that houses the experiment. This changes the separation of the pendulum with respect to the other experimental components, thereby introducing potential systematic uncertainties. This problem was corrected the implementation of a feedback system that thermally expands the support leg of the apparatus to maintain its level throughout the course of data acquisition. The associated potential systematic uncertainties have been reduced by roughly a factor of five with this system.

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