

Abstract Submitted  
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**Tests of the Weak Equivalence Principle Below Fifty Microns**  
HOLLY LEOPARDI, C.D. HOYLE<sup>1</sup>, DAVE SMITH, CRYSTAL CARDENAS, ANDREW CONRAD HARTER, Humboldt State University — Due to the incompatibility of the Standard Model and General Relativity, tests of gravity remain at the forefront of experimental physics research. The Weak Equivalence Principle (WEP), which states that in a uniform gravitational field all objects fall with the same acceleration regardless of composition, total mass, or structure, is fundamentally the result of the equality of inertial mass and gravitational mass. The WEP has been effectively studied since the time of Galileo, and is a central feature of General Relativity; its violation at any length scale would bring into question fundamental aspects of the current model of gravitational physics. A variety of scenarios predict possible mechanisms that could result in a violation of the WEP. The Humboldt State University Gravitational Physics Laboratory is using a torsion pendulum with equal masses of different materials (a “composition dipole” configuration) to determine whether the WEP holds below the 50-micron distance scale. The experiment will measure the twist of a torsion pendulum as an attractor mass is oscillated nearby in a parallel-plate configuration, providing a time varying torque on the pendulum. The size and distance dependence of the torque variation will provide means to determine deviations from accepted models of gravity on untested distance scales.

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