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Novel Tests of Short-range Gravitational Physics at Humboldt State University[1] HOLLY LEOPARDI[2], BRANDON BAXLEY[3], C.D. HOYLE, MATTHEW RICHARDS[4], Humboldt State University, DAVID SHOOK, CENPA (University of Washington) and Humboldt State University — Due to the incompatibility of the Standard Model and General Relativity (GR), tests of gravity remain at the forefront of experimental physics. There is yet to be a theory that unifies inconsistencies between GR and quantum mechanics; however, some scenarios of String Theory predict more than three spatial dimensions that could alter the gravitational inverse-square law at short distances. Some models also predict unobserved subatomic particles that may cause short-range violations of the Weak Equivalence Principle. At Humboldt State University, undergraduates and faculty are developing an experiment that will test gravitational interactions 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. To observe the twist of the pendulum inside the vacuum chamber, an optical system with nano-radian precision is required. This talk will focus on the current status of the experiment, and the development of an optical system with the required sensitivity.

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[2]undergraduate presenter
[3]undergraduate
[4]undergraduate

C.D. Hoyle
Humboldt State University

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