Sensitivity Considerations for a Short-range Test of the Gravitational Inverse-square Law[1] DAVE SMITH[2], CRYSTAL CARDENAS[3], A. CONRAD HARTER[4], C.D. HOYLE, HOLLY LEOPARDI[5], Humboldt State University — The gravitational Inverse-Square Law (ISL) has been verified from infinity down to the 0.1 mm regime. Several theoretical scenarios predict possible violations of the ISL at short distances. At Humboldt State University, we are developing an experiment that will test gravitational interactions below 50 microns. The experiment will be approximately null by using a stepped torsion pendulum and a large attractor plate. Thus, in the approximation that the attractor mass is an infinite sheet of matter, the Newtonian gravitational force does not depend on the separation distance between the pendulum and the attractor. The experiment will measure the torque applied to the pendulum as the attractor mass is oscillated nearby. The size and distance dependence of the torque variation will provide a means to determine any deviations from the ISL at untested scales. The mass distribution of the pendulum and attractor determine the sensitivity of the experiment. This talk will focus on the investigation of the ISL and the experimental sensitivity. Topics such as Gauss' Law of Gravitation, the infinite plane approximation, Yukawa potential, and Newtonian vs. Yukawa torque will be discussed. Fabrication, modeling, and interaction of the attractor mass and pendulum will also be covered.

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