

Abstract Submitted
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Can the effect of gravity on electromagnetism be measured locally?¹ MARIA BECKER, Department of Physics and Astronomy, University of Nebraska-Lincoln, ADAM CAPREZ, Holland Computing Center, University of Nebraska-Lincoln, HERMAN BATELAAN, Department of Physics and Astronomy, University of Nebraska-Lincoln — Coupling between electromagnetism and gravity, manifested as the distorted Coulomb field of a charge distribution in a gravitational field, has never been observed. Furthermore, it has been suggested that the effect is too small to be accessed experimentally [1]. We propose that an electron in a charged shell could provide measurable, albeit indirect, evidence of the coupling. Both energy and force arguments are used to investigate the electromagnetic interaction between two charged particles in a gravitational field. This dumbbell model [1, 2] is extended to our proposed system. The coupling between gravity and the electric field of the charged shell is shown to affect the acceleration of a charged particle in the shell. A shell voltage of only 1MV leads to a gravitationally induced electric force that can counterbalance the force of gravity on an electron. The experimental feasibility of detecting the effect of gravity on an individual electron will be discussed in its historical context [3]. The effect establishes a relation between Einstein's energy-mass equivalence, gravitational deflection of light, and the coupling between electromagnetism and gravity.

[1] T.Boyer, Am. J. Phys. **47**, 129 (1979). [2] D.Griffiths & R.Owen, Am. J. Phys. **51** 1120 (1983). [3] F.Witteborn & W.Fairbank, Nature **22**, 436 (1968).

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