

Abstract Submitted
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Building and Testing A New Apparatus for Measuring Mass-dependent Forces at Small Length Scales DAVID WELD, JING XIA, BLAS CABRERA, AHARON KAPITULNIK, Stanford University — We will discuss the construction and initial testing of a new type of cantilever-based probe for measuring mass-dependent forces at length scales of order 10^{-5} meters. The apparatus is based on a cryogenic helium gas bearing with a hemispherical quartz rotor. The bearing housing contains a force-sensing microcantilever with a metallic test mass mounted on the tip. An alternating pattern of high- and low-density materials is embedded in the flat surface of the rotor so that when the rotor spins, the mass on the cantilever is subjected to an AC gravitational force. This design combines some of the geometrical advantages of torsion-balance experiments with the small face-to-face separation and good force sensitivity of our previous cantilever-based experiments [1,2]. [1] S. J. Smullin et al., Phys. Rev. D 72, 122001 (2005) [2] J. Chiaverini et al., Phys. Rev. Lett. 90 , 151101 (2003)

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