General Relativity and Quantum Cosmology

A weak equivalence principle test on a suborbital rocket

Robert D. Reasenberg, James D. Phillips (Smithsonian Astrophysical Observatory, Harvard-Smithsonian Center for Astrophysics)

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We describe a Galilean test of the weak equivalence principle, to be conducted during the free fall portion of a sounding rocket flight. The test of a single pair of substances is aimed at a measurement uncertainty of sigma(eta) < 10^-16 after averaging the results of eight separate drops. The weak equivalence principle measurement is made with a set of four laser gauges that are expected to achieve 0.1 pm Hz^-1/2. The discovery of a violation (eta not equal to 0) would have profound implications for physics, astrophysics, and cosmology.

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