Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Experimental limit on the ratio of the gravitational mass to the inertial mass of antihydrogen[1] JOEL FAJANS, JONATHAN WURTELE, ANDREW CHARMAN, ANDREY ZHMOGINOV, U.C. Berkeley, ALPHA COLLABORATION — Physicists have long wondered if the gravitational interactions between matter and antimatter might be different from those between matter and itself. While there are many indirect indications that no such differences exist, i.e., that the weak equivalence principle holds, there have been no direct, free-fall style, experimental tests of gravity on antimatter. By searching for a propensity for antihydrogen atoms to fall downward when released from the ALPHA antihydrogen trap, we have determined that we can reject ratios of the gravitational mass to the inertial mass of antihydrogen greater than about 100 at a statistical significance level of 5%. A similar search places somewhat lower limits on a negative gravitational mass, i.e., on antigravity.

[1]Support from DOE, NSF, and LBNL.

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Date submitted: 23 Aug 2012 Electronic form version 1.4