Adelberger and Heckel Reply: We agree completely with Morpurgo's [1] emphasis on the difficulty of interpreting measurements of the "free-fall" acceleration of charged particles. Although, for heuristic reasons, we gave Schiff and Barnhill's "explanation" [2] for Witteborn and Fairbank's observation [3] that electrically shielded electrons fell with $a < 0.09g$, we also showed that none of our conclusions about what can be learned from charged-particle free-fall experiments rely on this explanation, but instead follow from very general considerations. Specifically, we showed that to eliminate the effects of electric fields one has to compare forces on two different particles with the same charges, say, a $\bar{p}$ and an H^- ion, so that (in the notation of Ref. [4]) $\mathbf{F}_{\bar{p}} - \mathbf{F}_{H^-} = (M_p - M_{H^-})\mathbf{g} - 2(q_e + q_p)\mathbf{Y}$. To solve for the "new physics," $(q_e + q_p)\mathbf{Y}$, one must first determine $\mathbf{F}_{\bar{p}} - F_{H^-}$, which does not lend itself to a differential measurement, and then subtract a term due to ordinary gravity.

On the other hand, we do not agree with Goldman *et al.* [5]. To state our views succinctly, uncertainties in interpreting the free-fall acceleration of an electrically charged particle place a more serious limitation on searches for gravivector interactions than does the possibility of virtually exact graviscalar/gravivector cancellation that Goldman *et al.* advocate without having demonstrated in any definite theory. It is always possible to introduce enough *ad hoc* parameters and fine tune them to obtain null results in a given set of experiments, but this is not of much physical interest. Our response to the specific objections of Goldman *et al.* follows.

(1) We did not assume that q_V was proportional to the baryon number, but rather treated the vector charges of protons, neutrons, and electrons as arbitrary parameters. For example, Fig. 1 of our Letter shows constraints on an interaction whose charges are $q_e + q_p$ and q_n, which are also the relevant quantities in free-fall experiments. (2) As stated above, none of our conclusions depend upon Schiff and Barnhill's arguments about the electron "sag." (3) In case (3), we used a phenomenological expression for q_S simply because most previous discussions of "quantum-gravity" models relied on phenomenological forms rather than actual calculations of the scalar charge. (4) Our case (2), which is subject to constraints from $1/r^2$ tests as well as from equivalence-principle tests, is not equivalent to our case (1), which is constrained only by equivalence-principle data.

The equivalence-principle tests of gravitational theory that we analyzed have the following advantage over the tests advocated by Goldman *et al.* They are *null tests* —the confirmed observation of an effect necessarily implies new physics, they are *general*—being equivalent in principle to a set of free-fall experiments with antiprotons, antineutrons, and positrons; and they are *highly sensitive.* Therefore the most promising avenues for *microscopic* tests of gravitational theories will probably involve electrically neutral bodies, such as antihydrogen [6] or laser-cooled atoms [7].

We take this opportunity to correct a minor error in Ref. [4]. The inset in Fig. 3 incorrectly showed a term of μ in the scalar charge; the figure caption correctly stated that $q_S = |B| + \delta|B|^2$.

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