**Fischbach *et al.* Respond:** Since the publication of our reanalysis[1] of the experiment of Eötvös, Pekár, and Fekete (EPF), considerable attention has been devoted to the question of what the actual source of the Eötvös anomaly is. The answer to this question is important not only in the design of experiments to check the EPF results, but also in establishing a theoretical connection between the EPF experiment and other systems which are sensitive to the putative "fifth force." These include the geophysical data and the $K^0$-$\overline{K^0}$ system (see Ref. 1), where anomalies have been reported, as well as the satellite data from which interesting limits can be inferred.

The heart of the EPF apparatus consists of two dissimilar test masses attached to a bar, which is itself suspended from a torsion fiber. A force (such as the fifth force) which affects the test masses differently can cause a torque about the fibre axis, which is what EPF look for. However, even if the fifth force existed, its presence could go undetected if it were directed along the fiber axis. Since the fiber axis is determined by the local acceleration field $\mathbf{g}_0 = \mathbf{a}_c + \mathbf{g}_N$, where $\mathbf{a}_c$ is the centrifugal acceleration due to the Earth's rotation, and $\mathbf{g}_N$ is the Newtonian gravitational contribution due to the Earth, *it follows that the fifth force can be detected in the EPF experiment only if the acceleration field* $\mathbf{y}$ *that it produces is not parallel to* $\mathbf{g}_0$.[2,3] The following examples illustrate the implications of this observation.

(1) Suppose, following Ref. 1, that the Earth is pictured as a uniform rotating sphere, and that $\mathbf{y}$ arises from a force whose nominal range is 200 m. In this case $\mathbf{y}$ is parallel to $\mathbf{g}_N$, but $\mathbf{y}$ and $\mathbf{g}_0$ are not parallel since $\mathbf{a}_c \neq \mathbf{0}$. However, the angle $\beta$ between $\mathbf{y}$ and $\mathbf{g}_0$ is very small, $\beta \cong \tan\beta = a_c \sin\theta / g_0 \cong 1/581$, where $\theta \cong 45°$ is the latitude where the EPF experiment took place.

(2) Assuming the same picture for the Earth, let us add in the effects of local matter anomalies such as buildings (and their basements) and mountains. For these contributions $\mathbf{y}$ is nearly horizontal, so that $\mathbf{y}$ produces a relatively large torque about the fiber axis. This observation, which has been made previously by us[2,3] and others,[4] indicated the advantages of carrying out EPF-type experiments near mountains, and also demonstrated[2,3] the importance of the building (and basement) where the EPF experiment took place. If we examine Eq. (1) of Ref. 3 we see that if the strength and range of the fifth force are as suggested by the geophysical data, then the effects of the building (and particularly its basement) are much larger than that of the Earth as a whole, even though the Earth is the main source of the gravitational force.

(3) We next consider the effects of a nonspherical Earth by assuming that the Earth elastically deforms so that its surface lies along an equipotential of $\mathbf{g}_0$. As we noted in Ref. 2, this is a good assumption since the deviation of $\mathbf{g}_0$ from vertical is only 70″ even in the vicinity of Mt. Everest. (A similar point was made previously by Bizzeti[4] and is the content of the accompanying Comment by Eckhardt.[5]) Since $\mathbf{y}$ is determined by the matter within a hemisphere of radius $\approx 200$ m, $\mathbf{y}$ will be locally perpendicular to the Earth's surface, and if this surface is also an equipotential of $\mathbf{g}_0$, $\mathbf{y}$ and $\mathbf{g}_0$ will be strictly parallel. Under these circumstances the Earth as a whole makes no contribution whatever to the EPF anomaly, as Eckhardt has also noted. However, this observation has limited practical significance, since we have already demonstrated in Refs. 2 and 3 that if the force is of short range then the dominant contributions in the EPF experiment will come from local departures from the Earth's geoid.

(4) Finally we can consider the same situation as in (3) above, but under the assumption that $\mathbf{y}$ arises from a force whose range is comparable to (or larger than) $R_\oplus$. In this case $\mathbf{y}$ is parallel to $\mathbf{g}_N$, as in (1), and the angle tween $\mathbf{y}$ and $\mathbf{g}_0$ will again be of order $\beta$. Here local departures from the geoid are no longer important, since the whole Earth contributes to both $\mathbf{y}$ and $\mathbf{g}_N$, and the EPF anomaly depends on the circumstance that $\mathbf{a}_c \neq \mathbf{0}$. This was the picture that EPF had in mind in the design of their experiment.

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