The Contraction of Radiation and Matter in a Gravitational Field: a Comment on viXra:1009.0067

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Abstract

The author of viXra:1009.0067 claims that radiation experiences a contraction in energy in a gravitational field, such as that of the Earth. Why, then, did Pound-Rebka measure an increase in energy of radiation?

Obviously matter experiences a greater contraction than does radiation. Pound-Rebka never considered that their instruments experienced more contraction in Earth's gravitational field than did the photons falling in the field. Pound-Rebka measured the photon energy to increase, but we will show that that is because the receiver contracted more than the photon.

General Relativity Theory predicted that the energy of a photon would increase in the act of falling in a gravitational field. To test the theory, Robert Pound and Glen Rebka at Harvard University in 1960 performed a series of experiments to see if they could measure this expected increase.[1] A generator of gamma rays was placed 74 feet (~27 meters) above a receiver at ground level, and the receiver did indeed measure an increase in photon energy. According to the author of viXra:1009.0067 and others,[2,3,4] the photon energy should have been measured to decrease. So why did Pound-Rebka measure an increase?

They measured an increase, but they forgot to consider one very important fact: the receiving instrument contracted more than the photon. Pound-Rebka declared General Relativity proven, but General Relativity was not proven. In fact close analysis reveals that the photon energy actually decreased. We appreciate, therefore, viXra:1009.0067's attempt to correct the analysis.

The author of viXra:1009.0067 writes the contraction for the photon

$$h_{gr} f = hf\left[1-\frac{v_{esc}^2}{c^2}\right] \tag{1}$$

where v_{esc} is escape, or free fall, velocity; and c is vacuum speed of light.

The contraction of the receiver,[4] however, is

$$\left(h_{gr} f\right)_{recvr} = hf\left[1-\frac{v_{esc}^2}{c^2}\right]^{3/2} \tag{2}$$

We can see therefore why Pound-Rebka measured an increase in energy for the photon: the receiver contracted more than the photon. Thus an increase was measured for the photon in spite of the fact that a decrease actually occurred.

References

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