

Abstract Submitted  
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**Force, curvature, or mass: disambiguating causes of uniform gravity**<sup>1</sup> YUAN SHI, Lawrence Livermore National Laboratory — In addition to Newtonian forces and spacetime curvature, gradients of the Higgs vacuum expectation value (VEV), which can be induced by the presence of matter, also lead to particle acceleration and photon redshift. Here, I compare distinct effects of force, curvature, and Higgs VEV gradient that cause uniform acceleration. In particular, I show that a spurious stress-energy tensor is required if the acceleration is in fact due to the Higgs VEV gradient but is falsely attributed to spacetime curvature. On cosmological scales, the spurious density coincides with the observed dark energy density and may contribute to the Hubble tension; on galactic scales, the inferred dark matter density falls within expectation and may explain the lopsidedness of galaxy spectrographs; and on the Earth scale, the spurious density is minuscule. The experimental precision required to disambiguate causes of the Earth's gravity is estimated. Laboratory tests are challenging but possible.

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