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## **Measurement of the fine-structure constant as a test of the Standard Model**

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Measurements of the fine-structure constant require methods from across subfields and are thus powerful tests of the consistency of theory and experiment in physics. Using the recoil frequency of cesium-133 atoms in a matter-wave interferometer, we recorded the most accurate measurement of the fine-structure constant to date:  $\alpha = 1/137.035999046(27)$  at  $2.0 \times 10^{-10}$  accuracy. Using multiphoton interactions (Bragg diffraction and Bloch oscillations), we demonstrate the largest phase (12 million radians) of any Ramsey-Bordé interferometer and control systematic effects at a level of 0.12 part per billion. Comparison with Penning trap measurements of the electron gyromagnetic anomaly  $g-2$  via the Standard Model of particle physics is now limited by the uncertainty in  $g-2$ ; a 2.5-sigma tension rejects dark photons as the reason for the unexplained part of the muon's magnetic moment at a 99% confidence level. Implications for dark-sector candidates and electron substructure may be a sign of physics beyond the Standard Model that warrants further investigation.

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