Suppression of Spontaneous Decay at Optical Frequencies: Test of Vacuum-Field Anisotropy in Confined Space

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The radiative decay of Cs atoms excited into the $5D_{5/2}$ level and passing between two metallic mirrors spaced by a 1.1-μm gap is observed to depend upon their angular momentum. Spontaneous emission at a wavelength of 3.49 μm is suppressed for the substates with maximum angular momentum normal to the mirrors, which survive without substantial decay during $\sim$13 natural lifetimes. The radiation rate is modified by application of a magnetic field which mixes sublevels having different lifetimes in the gap. This experiment illustrates the anisotropy of the vacuum field in confined space.