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**Inhibited Spontaneous Emission in a Time-Dependent Cavity** DAVID BRANNING, Trinity College — In the process of inhibited spontaneous emission, an excited atom is prevented from spontaneously emitting radiation by a reflecting cavity that surrounds it. Quantum theory predicts that, when an atom is first placed into the cavity, it initially radiates at the free-space rate, and the interference from the returning radiation halts any further evolution of the atom into the ground state. To observe this initial radiation directly, a wall of the cavity must be quickly replaced with a photon-counting detector, but the femtosecond time scales involved make this observation impossible for atoms. Intsead, our experiment uses spontaneous parametric downconversion, a process in which a single ultraviolet photon from a laser is spontaneously converted into two lower-frequency photons in a nonlinear optical medium. The downconversion is inhibited using a mirror, at much greater distances than is possible for atoms, and the mirror is then "replaced" by a detector on a timescale of several nanoseconds using a Pockels cell as a switch. At the detector, the arrival time of the photons indicates whether or not they had existed in the cavity before the switch was activated.

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