Observation of Quantum Jumps in a Single Atom

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We detect the radiatively driven electric quadrupole transition to the metastable $^2D_{5/2}$ state in a single, laser-cooled Hg II ion by monitoring the abrupt cessation of the fluorescence signal from the laser-excited $^2S_{1/2} \rightarrow {}^2P_{1/2}$ first resonance line. When the ion "jumps" back from the metastable D state to the ground S state, the $S \rightarrow P$ resonance fluorescence signal immediately returns. The statistical properties of the quantum jumps are investigated; for example, photon antibunching in the emission from the D state is observed with 100% efficiency.