

# Observing the Quantum Limit of an Electron Cyclotron: QND Measurements of Quantum Jumps Between Fock States

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Quantum jumps between Fock states of a one-electron oscillator reveal the quantum limit of a cyclotron. With a surrounding cavity inhibiting synchrotron radiation 140-fold, the jumps show a 13 s Fock state lifetime, and a cyclotron in thermal equilibrium with 1.6 to 4.2 K blackbody photons. These disappear by 80 mK, a temperature 50 times lower than previously achieved with an isolated elementary particle. The cyclotron stays in its ground state until a resonant photon is injected. A quantum cyclotron offers a new route to measuring the electron magnetic moment and the fine structure constant.