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Measurement backaction and the quantum Zeno effect in a superconducting qubit DANIEL H. SLICHTER, R. VIJAY, IRFAN SIDDIQI, Quantum Nanoelectronics Laboratory, Dept. of Physics, UC Berkeley — Strong measurement of a quantum system can inhibit quantum state evolution, a phenomenon known as the quantum Zeno effect. If the measurement is not perfectly quantum nondemolition, it can also cause spurious transitions between states. We study these effects in a transmon qubit dispersively coupled to a superconducting microwave readout cavity. We use a fast, ultralow-noise parametric amplifier to amplify the microwave photons used to probe the qubit state, enabling continuous high-fidelity monitoring of the qubit. This arrangement allows us to observe quantum jumps between the qubit states in real time. We examine the dependence of the jump times on measurement strength and the qubit excitation protocol.

Daniel H. Slichter
Quantum Nanoelectronics Laboratory, Dept. of Physics, UC Berkeley

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