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Photon blockade in circuit quantum electrodynamics[1] ANTHONY HOFFMAN, SRIKANTH SRINIVASAN, BEUMSEOK SHIM, ANDREW HOUCK, Princeton University — Strong photon-photon interactions arise in a cavity strongly coupled to an atom or qubit, resulting in blockaded transmission[1]. In such a system, the resonant frequency of the cavity shifts with the presence of a single photon due to the strong number-dependent nature of the cavity nonlinearity. Here, we investigate the photon blockade regime in superconducting circuits with integrated transmon qubits. To maximize the nonlinear effects, both the cavity Q and qubit-cavity coupling are made extremely large by design, with Q exceeding 100,000. Cavity transmission is characterized using a microwave generator with a controllable output bandwidth. Measurements of transmitted power and spectra versus incident center frequency and bandwidth are presented. [1] K.M. Birnbaum et al., Nature, 436, 87 (2005).

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