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Dependence of transmon qubit relaxation rate on cavity photon population[1] S.O. MUNDHADA, S. SHANKAR, Y. LIU, M. HATRIDGE, A. NARLA, K.M. SLIWA, S.M. GIRVIN, M.H. DEVORET, Department of Applied Physics, Yale University — In circuit QED experiments, a qubit is dispersively coupled to a cavity such that the cavity frequency depends on the qubit state. This dispersive shift enables quantum non-demolition readout of the qubit by exciting the cavity with a microwave pulse and detecting the phase shift of the reflected signal. However, this cavity excitation has been observed in experiments to increase the qubit relaxation rate, hence demolishing the qubit state and limiting the maximum measurement strength. Here we experimentally study this effect in a transmon qubit coupled to a three-dimensional superconducting cavity. We also explore alternate qubit circuits designed to mitigate this demolition effect.

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