

Abstract Submitted
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Simultaneous bistability of qubit and resonator in circuit quantum electrodynamics GIOVANNA TANCREDI, University of Oxford , THEMIS MAVROGORDATOS, University College London, MATTHEW ELLIOTT, University of Surrey, MICHAEL PETERER, ANDREW PATTERSON, JOSEPH RAHAMIM, PETER LEEK, University of Oxford, ERAN GINOSSAR, University of Surrey, MARZENA SZYMANSKA, University College London — We explore an intermediate nonlinear driving regime in circuit QED for a transmon qubit coupled to a 3D cavity, both theoretically and experimentally. In this regime we demonstrate that the qubit and cavity switch simultaneously between metastable states, consistent with quantum activated dynamics of two quantum oscillators. We measure the cavity lineshape and its developing nonlinear features as the drive power is increased and show that neither a Duffing nor a Jaynes-Cummings model are sufficient to provide a good description of the cavity nonlinearity. A generalized Jaynes-Cummings model, taking into account the first four levels of the transmon, does however capture the observed features remarkably well, including a clear partial coherent cancellation of cavity transmission just below the cavity resonance.

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