Abstract Submitted
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Non-QNDness of Dispersive Measurement in Superconducting Qubits, Part I: Theory MOSTAFA KHEZRI, University of California, Riverside, DANIEL SANK, Google, ZIJUN CHEN, University of California, Santa Barbara, RAMI BARENDS, YU CHEN, AUSTIN FOWLER, ROBERT GRAFF, EVAN JEFFREY, JULIAN KELLY, ERIK LUCERO, ANTHONY MEGRANT, JOSH MUTUS, PEDRAM ROUSHAN, TED WHITE, MATTHEW NEELEY, Google, BROOKS CAMPBELL, BENJAMIN CHIARO, ANDREW DUNSWORTH, CHARLES NEILL, PETER O'MALLEY, CHRISTOPHER QUINTANA, AMIT VAINSENCHER, JAMES WENNER, University of California, Santa Barbara, JOHN M. MARTINIS, Google, University of California, Santa Barbara, ALEXANDER N. KOROTKOV, University of California, Riverside — We theoretically analyze the dispersive measurement of an Xmon qubit in the circuit QED setup at moderately high power, so that the number of photons in the resonator exceeds the so-called critical number by up to an order of magnitude. Our results show an abrupt change of the qubit state when the number of photons reaches a certain threshold, which depends on the detuning between the qubit and the resonator. The simulation results are in agreement with experimental findings for Xmon measurement at moderately high power. We will discuss the physical mechanism causing an abrupt deterioration of the measurement QNDness at the threshold.

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