Abstract Submitted
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Stabilizing the phase of superpositions of cat states in a cavity using real-time feedback N. OFEK[1], A. PETRENKO, R. HEERES, P. REINHOLD, Y. LIU, Z. LEGHTAS, B. VLASTAKIS, L. FRUNZIO, LIANG JIANG, Yale University, Department of Applied Physics, M. MIRRAHIMI, INRIA Paris-Rocquencourt, M.H. DEVORET, R.J. SCHOELKOPF, Yale University, Department of Applied Physics — In a superconducting cQED architecture, a hardware efficient quantum error correction (QEC) scheme exists, called the cat code [1,2], which maps a qubit onto superpositions of cat states in a superconducting resonator, by mapping the occurrence of errors, or single photon jumps, onto unitary rotations of the encoded state. By tracking the parity of the encoded state, we can count the number of photon jumps and are able to apply a correcting unitary transformation. However, the situation is complicated by the fact that photon jumps do not commute with the deterministic anharmonic time evolution of a resonator state, or Kerr, inherited by the resonator from its coupling to a Josephson junction. As predicted in [1], a field in the resonator will inherit an overall phase $\theta = KT$ in IQ space each time a photon jumps that is proportional to the Kerr K and the time T at which the jump occurs. Here I will present how we can track the errors in real time, take them into account together with the time they occur and make it possible to stabilize the qubit information. [1]Leghtas et.al. PRL 111 120501 2013 [2]Mirrahimi et.al. NJP 16 045014 2014

[1]Please place my talk right after the talk of Andrei Petrenko.

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