

Abstract Submitted  
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**Photon Emission from a Self-Oscillating Cavity-Embedded Cooper Pair Transistor**<sup>1</sup> FEI CHEN, JULIANG LI, JOEL STETTENHEIM, Dartmouth College, A. J. SIROIS, University of Colorado, Boulder, R. W. SIMMONDS, National Institute of Standards and Technology, Boulder, M. P. BLENCOWE, A. J. RIMBERG, Dartmouth College — A strongly non-linear superconducting device consisting of a Cooper pair transistor embedded in a dc voltage biased microwave cavity is investigated. The cavity-embedded Cooper pair transistor (CCPT) is driven via the ac Josephson effect by an applied dc bias and exhibits self-oscillation without an external ac drive. Photon emission arising from both sequential tunneling and cotunnelling processes of Cooper pairs has been observed. We have characterized the measured photon field by heterodyne quadrature detection and have reconstructed its quasi-probability distribution by implementing an iterative procedure for maximum-likelihood estimation of its density matrix. The CCPT offers an interesting system for studying nonlinear quantum dynamics and the quantum-to-classical transition.

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