Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Generating and verifying entanglement of itinerant microwave modes H.S. KU, W.F. KINDEL, JILA and University of Colorado at Boulder, S.C. GLANCY, E. KNILL, L.R. VALE, G.C. HILTON, K.D. IRWIN, NIST, K.W. LEHNERT, JILA, NIST and University of Colorado at Boulder — Entanglement is a critical resource for quantum information science. In particular, shared entanglement between pairs of electromagnetic fields propagating on two physically separate channels is required for quantum communication protocols with continuous variables. Moreover, the ability to entangle propagating microwave fields provides possible schemes to create quantum communication channels between localized superconducting qubits. In this talk, we will present an experimental demonstration of this type of entanglement. We generate the entangled state by combining a squeezed state and vacuum on a balanced beam splitter. The entanglement is then revealed by strong correlations between the quadrature amplitudes of the two output modes of the beam splitter. Crucial for an eventual teleportation demonstration, the two modes are measured efficiently and with independent choice of measured quadratures.

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Date submitted: 17 Dec 2012 Electronic form version 1.4