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Hong-Ou-Mandel Interference in Circuit QED Experiments MATTHEW WOOLLEY, Universite de Sherbrooke, CHRISTIAN LANG, CHRISTOPHER EICHLER, ANDREAS WALLRAFF, ETH Zurich, ALEXANDRE BLAIS, Universite de Sherbrooke — The Hong-Ou-Mandel (HOM) effect is a quantum interference effect whereby two indistinguishable photons incident at either side of a balanced beam splitter will be detected together at one output port or the other, but never with one photon at each output port. Such experiments have long been performed in the optical domain, but recent developments have raised the possibility of performing such experiments in the microwave domain, using linear amplifiers and quadrature amplitude detectors instead of photon counting [Bozyigit *et al.*, Nat. Phys. **7**, 154-158 (2010)]. Here we determine the signature of HOM interference in a system consisting of two independent circuit QED systems out-coupled into an on-chip microwave beam splitter. We have calculated the beam splitter output intensity auto- and cross-correlations for both trains of pulsed Lorentzian photons, and continuously-driven sources based on photon blockade. The HOM interference is manifest as antibunching in the output intensity cross-correlation. Controllable distinguishability may be introduced via a time delay in the pulsed case, or via a frequency offset in the continuously-driven case. The frequency offset leads to a quantum beat effect. Preliminary experimental results will be discussed.

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