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**Measurements of Microwave Single Photon Correlations: Experiment** D. BOZYIGIT, M. SILVA, ETH Zurich, A. BLAIS, Universite de Sherbrooke, A. WALLRAFF, ETH Zurich, ETH QUANTUM DEVICE TEAM — Circuit QED allows for excellent control and measurement of the quantum mechanical properties of qubits, photons and their interactions. As a result, circuit QED is an ideal testbed to investigate the quantum nature of light. In our experiments we prepare a complete family of zero and one photon superposition states in a high quality on-chip resonator by controlling single qubit Rabi and qubit-cavity vacuum Rabi oscillations. By detecting the emitted radiation at both outputs of a symetric two-sided cavity, we are able to perform time-resolved measurements of the cavity field quadratures, photon number and the first-order correlation function. We characterize the prepared field states and also show that we are able to cool a small thermal background field present in the cavity to below its thermal equilibrium value. Furthermore we suggest that any correlation which can be expressed in terms of the cavity field operators can be measured by using beam splitters, homodyne detection and efficient real time signal processing.

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