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Measurements of Microwave Single Photon Correlations: Theory
MARCUS DA SILVA, Universite de Sherbrooke, DENIZ BOZYIGIT, ANDREAS WALLRAFF, ETH Zurich, ALEXANDRE BLAIS, Universite de Sherbrooke — Superconducting circuit implementations of cavity QED have enabled the exploration of various regimes of light-matter interaction. In this work, we present theoretical aspects of the observation of quantum properties of the field emitted from a cavity without access to non-linear/single-photon detectors (which have not been demonstrated reliably in the microwave regime). In particular, we focus on how to perform the measurement of optical coherence functions in pulsed circuit QED experiments using field quadrature measurements of the outputs of a two-sided cavity. We illustrate how the standard Hanbury Brown and Twiss setup can be replaced with the monitoring of these cavity outputs, while still allowing for the calculation of arbitrary first and second order correlation functions. Moreover, we illustrate how the significant noise contributions from thermal fields, amplifiers and mixers can be accounted and compensated for.

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