Finite-time correlations and noise tolerance of two-mode squeezed microwave states

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Generation of balanced two-mode squeezed states is a key task in quantum communication and illumination with continuous variables, as it enables distribution of quantum entanglement between distant parties. For this reason, the investigation of such states is of high interest in the field of propagating quantum microwaves. In our work, we perform tomography of balanced two-mode squeezed microwave states which are created by the means of two flux-driven Josephson parametric amplifiers generating orthogonally squeezed states at the inputs of a microwave beam splitter. We study finite-time correlations in order to measure a characteristic time of entanglement decay in quantum channels. Further, we investigate robustness of entanglement to thermal and shot noise via a negativity criterion and determine fundamental negativity versus noise limits. Our studies show that quantum communication and illumination protocols with continuous-variable propagating microwaves are experimentally feasible.