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Generation and Reconstruction of Propagating Quantum Microwaves

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Propagating quantum microwave signals are promising building blocks for quantum communication and quantum computation. In particular, such itinerant quantum microwaves can be generated by Josephson parametric amplifiers (JPAs) in the form of squeezed states. At the same time, JPAs are widely used as low noise amplifiers for the detection of microwave signals on the single photon level. In this work, we characterize the basic properties of flux-driven JPAs at millikelvin temperatures. We investigate the squeezed states generated by the flux-driven JPAs with a dual-path setup. Squeezed coherent states could be generated by sending coherent states into a JPA. Alternatively, displacement operations can be applied to squeezed states using a directional coupler. We discuss our experiments in the context of remote state preparation and quantum teleportation with propagating microwaves.

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