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Displacement of squeezed propagating microwave states KIRILL G. FEDOROV, LING ZHONG, STEFAN POGORZALEK, PETER EDER, MICHAEL FISCHER, JAN GOETZ, FRIEDRICH WULSCHNER, EDWAR XIE, EDWIN MENZEL, FRANK DEPPE, ACHIM MARX, RUDOLF GROSS, Walther-Meissner-Institut; Technische Universitaet Muenchen; Nanosystems Initiative Munich — Displacement of propagating squeezed states is a fundamental operation for quantum communications. It can be applied to fundamental studies of macroscopic quantum coherence and has an important role in quantum teleportation protocols with propagating microwaves. We generate propagating squeezed states using a Josephson parametric amplifier and implement displacement using a cryogenic directional coupler. We study single- and two-mode displacement regimes. For the single-mode displacement we find that the squeezing level of the displaced squeezed state does not depend on the displacement amplitude. Also, we observe that quantum entanglement between two spatially separated channels stays constant across 4 orders of displacement power. We acknowledge support by the German Research Foundation through SFB 631 and FE 1564/1-1, the EU project PROMISCE, and Elite Network of Bavaria through the program ExQM.

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