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Hybrid Rings for circuit Quantum Electrodynamics E. HOFFMANN, F. DEPPE, T. NIEMCZYK, E. P. MENZEL, G. WILD, H. HUEBL, M. MARIANTONI, A. MARX, R. GROSS, Walther-Meissner-Institut and TU Muenchen, Garching, Germany, T. WIRTH, A. LUKASHENKO, A. USTINOV, Karlsruher Institut fuer Technologie (KIT), Karlsruhe, Germany, A. P. ZHURAVEL, B. I. Verkin Institute for Low Temperature Physics and Engineering, Kharkov, Ukraine — Experiments in the field of circuit QED require detection schemes for microwave signals on the single photon level. In particular, devices acting as microwave beam splitters are necessary. Using Nb thin films on silicon and sapphire substrates, we fabricated superconducting 180° microstrip hybrid rings acting as beam splitters with center frequencies of about 6 GHz. For the magnitude of the coupling and isolation we find -3.5 ± 0.5 dB and at least -15 dB, respectively, in a bandwidth of 2 GHz. We also investigate the effect of reflections at the contact between the superconducting hybrid ring and the normal conducting wiring using low temperature laser scanning microscopy. Our measurements indicate that our hybrid rings are well suited for on-chip applications in circuit QED experiments. We acknowledge financial support by the DFG via SFB 631, as well as support by and CFN, EU project SOLID and the German Excellence Initiative via NIM.

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