

Abstract Submitted
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Lossless on-chip microwave circulator using Josephson parametric converters¹ BALEEGH ABDO, ARCHANA KAMAL, MICHAEL HATRIDGE, FLAVIUS SCHACKERT, KURTIS GEERLINGS, MICHEL DEVORET, Applied Physics Department, Yale University — Motivated by our recent theoretical work on non-reciprocal parametric devices [1], we propose a novel scheme for realizing a four-port, lossless, on-chip microwave circulator using a compact design of Josephson parametric converters (JPC's) and hybrids. The JPC, which is normally used as a phase-preserving quantum-limited amplifier, is operated here in a pure conversion mode with unity photon gain. The non-reciprocity of the device is induced by a phase shift between the two pump signals feeding two JPC's sharing a common idler port. The non-reciprocity direction can thus be reversed much more rapidly than by changing a magnetic field. Furthermore, since the device consists only of purely dispersive components, the proposed circulator should not add any noise to signals it processes.

[1] A. Kamal, J. Clarke and M.H. Devoret, accepted by Nature Physics, arXiv:1010.1794

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