Abstract Submitted
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Towards a lossless and integrable circulator for quantum superconducting microwave systems: design and initial testing[1] BENJAMIN J. CHAPMAN, JOSEPH KERCKHOFF, JILA, University of Colorado Boulder, KEVIN LALUMIÈRE, ALEXANDRE BLAIS, Sherbrooke University, K.W. LEHNERT, JILA, National Institute of Standards, Boulder, CO, University of Colorado Boulder — Microwave circulators enforce a single propagation direction for the signals in an electrical network. Commercial circulators, however, are lossy and cannot be integrated near superconducting circuits because of the large magnetic fields they emit. We report on progress toward the development of a lossless, on-chip, active circulator for superconducting microwave circuits in the 4-8 GHz band. Nonreciprocity is achieved by the active modulation of circuit elements on a slow time scale (100 MHz). The circulator's active components are dynamically tunable inductors constructed from series arrays of SQUIDs. SQUID inductance is tuned by varying the magnetic flux through the SQUID's loop with fields weaker than 1 G. Device features include a tunable bandwidth between 10-100 MHz, a tunable center frequency between 4-8 GHz, a high (-93 dBm) saturation power, a factor of 50 separation between the center and modulation frequencies, low loss, and 1 mm^2 footprint. This presentation will cover the design and initial testing of the device.

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