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Realization of an on-chip superconducting microwave switch
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OPPLIGER, ANDREAS WALLRAFF, ETH Zurich — As state-of-the-art super-
conducting quantum devices get increasingly complex, they require a growing num-
ber of control and detection channels. On-chip routing and multiplexing of signals
presents a way to realize these without requiring an unrealistically large number of
microwave lines. The ability to route signals on a chip will also be a useful tool
for fast in-situ characterization of superconducting devices. Here, we describe and
experimentally demonstrate a superconducting on-chip microwave switch which can
be integrated with current superconducting quantum circuits. The device is based
on interference effects and is in principle lossless, making it well-suited for oper-
ation in dilution cryostats and for routing of signals at the single quantum level
with near-unity efficiency. The first proof-of-principle device has a bandwidth of
150 MHz, a 1 dB compression point of −80 dBm and turn-on/off times on the order
of 5 ns. On/off power ratios reach values of approximately 30 dB. We expect that
our device will find use in (de)multiplexing of control and readout in superconduct-
ing circuits and routing of microwave fields in quantum optical experiments and
quantum communication applications.

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