Abstract Submitted
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Low back-action magnetometers for high-speed readout of Nb flux qubits[1] VLADIMIR KUZNETSOV, VIJAY PATEL, DOUGLAS BENNETT, JAAN MANNIK, JAMES LUKENS, Stony Brook University, Stony Brook, NY 11794-3800 — Hysteretic dc-squid magnetometers are used to measure the state of a large area gradiometric rf-squid qubit. The current bias and flux bias of the magnetometer are designed to avoid direct inductive coupling to the qubit. However the current bias affects the circulating current in the magnetometer and hence indirectly couples to the qubit. By designing an asymmetry in the two junctions of the magnetometer we can achieve bias points where fluctuations in the bias currents do not change the circulating current and effectively decouple the readout from the qubit. High-speed readout is achieved by pulsing the flux in the magnetometer, which is inductively coupled to microstrip lines on a separate chip. Resonant tunneling between the quantum wells of the qubit is measured at 10 mK using different sequences of controlling pulses including 10ns flux bias pulses. The effect of bias conditions of the magnetometer on the shape and positions of tunneling peaks indicated the low back-action of the measurements.

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