Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Optimization of SQUID-based microwave parametric amplifiers for qubit readout CHRIS MACKLIN, R. VIJAY, E. LEVENSON-FALK, D. SLICHTER, Z. MINEV, I. SIDDIQI, QNL, UC Berkeley — We present recent experimental and theoretical results on the optimization of SQUID-based parametric microwave amplifiers for ultra low noise readout of superconducting and spin-based qubits. The devices consist of an unshunted two-junction SQUID in parallel with an on-chip capacitor, forming a non-linear microwave resonator. The SQUID is operated in a non-linear regime below the critical current, thus producing no local dissipation. These amplifiers have gain exceeding 20 dB, 10 MHz of broadly tunable bandwidth, and quantum-limited noise performance. We present measurements on amplifiers with tunnel type and weak link Josephson junctions. We discuss the use of array structures to optimize dynamic range as well as a resonant flux-coupled input capable of operation in a transmission configuration and potentially suitable for on-chip integration.

Chris Macklin
QNL - UC Berkeley

Date submitted: 18 Nov 2010 Electronic form version 1.4