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Microstrip SQUID Amplifiers for Qubit Readout at Gigahertz Frequencies and Millikelvin Temperatures[1] J. E. JOHNSON, UC Berkeley, E. M. HOSKINSON, QNL, UC Berkeley, D. KINION, Lawrence Livermore National Laboratory, JORN B. HANSEN, Technical University of Denmark, I. SIDDIQI, QNL, UC Berkeley, JOHN CLARKE, UC Berkeley — The dispersive readout of superconducting flux qubits at very low excitation power is currently limited by the noise performance of cryogenic semiconductor HEMT amplifiers. To increase measurement sensitivity, we have fabricated and characterized low noise Microstrip SQUID Amplifiers (MSAs) operating in the 1.2 to 1.6 GHz frequency band. The MSA consists of a microstrip input coil, open at one end, inductively coupled to a SQUID washer which also serves as the microstrip ground plane. The input was critically coupled to a 50-Ω source via a capacitor to optimize the gain and bandwidth. At 25 mK we have observed stable forward gain up to 14 dB on resonance at 1.39 GHz with bandwidths of typically 20 MHz and noise temperatures of about 300 mK (Caves added noise number of about 4.0). This noise temperature is an order of magnitude lower than that of a typical HEMT. Higher frequency operation will be discussed.

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Jedediah Johnson
UC Berkeley

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