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Microstrip SQUID amplifiers with cooling fins[1] DARIN KINION, LLNL, JOHN CLARKE, UC Berkeley and LBNL — Amplifiers based on dc SQUIDs (superconducting quantum interference devices) with integrated input coils configured as a microstrip resonator operate at frequencies between 50 MHz and 2 GHz, and in principle are capable of reaching the Standard Quantum Limit (SQL) for linear amplifiers. The SQUIDs are fabricated with Nb-AlOx-Nb tunnel junctions with Pd shunt resistors to eliminate hysteresis. In practice, Johnson noise in the shunt resistors often limits the noise temperature before the SQL is reached. To reduce this noise contribution we have attached large area cooling fins to the shunts to minimize hot- electron effects when the amplifier is operated at miilikelvin temperatures. Previous measurements were performed at frequencies corresponding to peak gain, but theory predicts that the lowest noise temperature should be attained at a slightly lower frequency. We have measured the noise temperature of a number of devices as a function of frequency and bath temperature. We compare our results to the predicted frequency dependence of the noise temperature and to the predicted value of the SQL.

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Darin Kinion
LLNL

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