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Simulations of dependence of low frequency flux noise on SQUID geometry[1] STEVEN ANTON, KEENAN PEPPER, JOHN CLARKE, UC Berkeley, IDA SOGNNAES, NTNU Norway, UC BERKELEY TEAM, NTNU NORWAY TEAM — It is generally accepted that the 1/f magnetic flux noise observed in dc SQUIDs and superconducting qubits originates in the random flipping of a uniform distribution of electron spins localized at the superconductor-insulator interface. Computer simulations and analytical calculations based on this model confirm the experimental result that the noise power at 1 Hz varies only slowly with SQUID dimensions. In particular, analytical calculations for a circular loop with radius R much greater than the loop linewidth W predict that the noise power scales as R/W. We present numerical computations that are valid for arbitrary geometry, including that of the square washer SQUID for which W approaches R. Making use of the reciprocity theorem, we solve the London equations numerically to find the current distribution in the superconductor, evaluate the Biot-Savart integral to find the corresponding magnetic field at any point and integrate over all spins, including those at the edges of the films, to find the total flux noise. We compare our results with our recent experimental measurements.

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Steven Anton
UC Berkeley

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