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Flux noise in SQUIDs: Electron versus nuclear spins[1] ROGERIO DE SOUSA, STEPHANIE LAFOREST, University of Victoria, BC — Superconducting Quantum Interference Devices (SQUIDs) are limited by intrinsic flux noise whose origin is unknown. We develop a method to accurately calculate the flux produced by spin impurities in realistic superconducting thin film wires, and show that the flux produced by each spin is much larger than anticipated by former calculations. Remarkably, the total flux noise power due to electron spins at the thin side surface of the wires is found to be of similar magnitude as the one due to electrons at the wide top surface of the wires. In addition, flux noise due to lattice nuclear spins in the bulk of the wires is found to be a sizable fraction of the total noise for some SQUID geometries. We discuss the relative importance of electron and nuclear spin species in determining the total noise power, and propose strategies to design SQUIDs with lower flux noise.

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