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Flux Noise in SQUIDs Due to Hyperfine Interactions[1]

JIANSHENG WU, CLARE YU, Department of Physics and Astronomy, University of California, Irvine, — Although there have been significant advances in superconducting qubits, they continue to be plagued by noise and decoherence. Low frequency $1/f$ flux noise in superconducting quantum interference devices (SQUIDs) is one of the dominant sources of noise in superconducting flux and phase qubits. Recent experiments implicate spins on the surface of metals as the source of flux noise in SQUIDs, and indicate that these spins are able to relax without conserving total magnetization. We present a model of $1/f$ flux noise in which electron spins on the surface of metals can relax via hyperfine interactions. Our results indicate that flux noise would be significantly reduced in superconducting materials where the most abundant isotopes do not have nuclear moments such as zinc and lead.

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