

Abstract Submitted
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Origin of the Flux Noise in Superconducting Quantum Interference Devices¹ HUI WANG, Department of Physics, Fudan University, Shanghai 200433, China, CLARE C. YU, RUQIAN WU, Department of Physics and Astronomy, University of California, Irvine, CA 92697-4575, USA — Quantum computers hold out the promise of being massively parallel and thus performing calculations much faster than conventional computers. A major obstacle for reliable quantum computation is flux noise generated by fluctuating magnetic spins in qubits. It is thus crucial to find out the microscopic origin of spins. In this work, we find that these spins result from the surface-induced magnetism, through systematic density functional theory calculations. Both O₂ adsorbates and Al vacancies can produce spontaneous magnetization on the Al₂O₃(0001) surface. Meanwhile, the magnetic anisotropy energies are extremely small. These results explain the origin of flux noise on Al qubits.

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