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Investigation of $1/f$ flux noise in SQUIDs and Superconducting Qubits ANTONIO PUGLIELLI, STEVEN SENDELBACH, TAYLOR KLAUS, ROBERT MCDERMOTT, University of Wisconsin-Madison, Department of Physics — Low-frequency $1/f$ flux noise is a dominant source of dephasing in the Josephson phase and flux qubits. Recent work has revealed the presence of a high density of unpaired spins at the surfaces of superconducting thin films; it is now believed that these spins are the source of the noise, although the microscopic noise mechanism is not understood. We have recently shown that the dielectric encapsulation of the SQUID loop substantially impacts the noise magnitude and noise exponent. Here we describe experiments on SQUIDs and Josephson phase qubits designed to shed light on the underlying noise mechanism, and we describe efforts to develop Josephson phase qubits with reduced levels of $1/f$ flux noise and improved dephasing times.

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