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Flux Noise in an Inductively Isolated Josephson Junction Qubit[1]

B. K. COOPER, HANHEE PAIK, R. M. LEWIS, S. K. DUTTA, T. A. PALOMAKI, A. J. PRZYBYSZ, J. R. ANDERSON, ALEX J. DRAGT, C. J. LOBB, F. C. WELLSTOOD, Department of Physics, University of Maryland — Martinis et al. [1] first proposed a technique for inductively isolating a Josephson junction qubit from the bias leads. It involves using one junction of a dc SQUID as a qubit, and the SQUID inductance and second junction of the SQUID as an inductance divider. This arrangement allows for isolation from current bias lines but potentially introduces greater sensitivity to flux noise. By introducing counterwound inductors on the qubit arm of the SQUID, we can reduce spatially uniform flux noise. We compare experimental coherence times for a $Nb/Al_2O_3/Nb$ qubit in such gradiometer designs to similar devices lacking the counterwound inductors. No significant difference is seen, suggesting that uniform flux noise is not the major source of decoherence in our system. [1] J. M. Martinis et al., PRL **89**, 117901

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