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**Geometry and temperature dependence of low frequency flux noise in dc SQUIDs**[1] JEFFREY BIRENBAUM, S.M. ANTON, S.R. O'KELLEY, UC Berkeley, V. BOLKHOVSKY, D.A. BRAJE, G. FITCH, M. NEELEY, W.D. OLIVER, MIT Lincoln Laboratory, F.C. WELLSTOOD, Univ of Maryland, JOHN CLARKE, UC Berkeley — Measurements of low frequency magnetic flux noise in dc SQUIDs demonstrate a spectral density $S_\Phi(f) = A^2/f^\alpha$ in which the magnitude $A$ scales only weakly with the washer geometry and typically $0.5 < \alpha < 1$. An analytical model assuming non-interacting spins localized to the surface of the SQUID loop predicts that $A^2 \propto R/W$ for $R/W \gg 1$. Here, $R$ and $W$ are the outer radius and linewidth, respectively. Our numerical calculations extend the analytical results to arbitrary washer geometries. We compare both models to flux noise measurements on several dc SQUIDs fabricated simultaneously on a single chip using a Nb trilayer process. Multiple SQUIDs were measured within a single cool-down. The SQUID geometries were divided into two categories: fixed $W$=500 nm with $3 < R/W < 24$ and fixed $R/W = 3$ with 1.5 $\mu$m < R < 24 $\mu$m. Our measurements are in approximate agreement with the theoretical predictions for temperatures between 100 mK and 4 K, despite the fact that the slope $\alpha$—for which we have no theoretical model—varies with temperature. We present measured values of $\alpha$ as functions of both geometry and temperature. Finally, we interpret our results within the framework of the non-interacting spin model.

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