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Low-frequency Critical Current Fluctuation Measurements in Nb/AlOx/Nb Junctions[1] SHAWN POTTORF, VIJAY PATEL, J. E. LUKENS, Stony Brook University — We have measured the low frequency critical current noise in Nb/AlO_x/Nb Josephson junctions used for qubits in quantum computation circuits. Low frequency current noise measurements were made using a bridge circuit with a SQUID null detector. The current noise spectra density showed a $1/f$ component at low frequencies for both an unshunted junction biased near 6 mV and a shunted junction biased near ~ 7 μV. In both cases this corresponded to critical current fluctuations with a spectral density at 1 Hz of $2.2 \cdot 10^{-24}$ A^2/Hz. Our measured value of critical current fluctuations is roughly two orders of magnitude less than the average of various technologies reported by Van Harlingen et al. (2004).

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