Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

The temperature dependence of decoherence in superconducting flux qubits coupled to microwave resonators JEAN-LUC ORGIAZZI, University of Waterloo, Department of Electrical and Computer Engineering, Institute for Quantum Computing, CHUNQING DENG, FEIRUO SHEN, NICOLAS GONZALEZ, ADRIAN LUPASCU, University of Waterloo, Department of Physics and Astronomy, Institute for Quantum Computing — We present experiments on decoherence of superconducting flux qubits coupled to superconducting resonators [1]. We characterized decoherence over a temperature range between 35 and 150 mK. The energy relaxation rate increases sharply with temperatures beyond 120 mK due to thermal quasiparticles. The Ramsey and spin echo relaxation times, measured at the flux insensitive point, only have a weak dependence on temperature. Coherence measurements are also used to determine the power spectral density of flux noise at low and high frequencies, using Ramsey sampling and dynamical decoupling respectively. The flux noise is found to only weakly depend on temperature over the explored range. We will discuss the relevance of these results for improving coherence times in flux qubits and for understanding flux noise in superconducting devices.

[1] *J.-L. Orgiazzi, C. Deng, D. Layden, R. Marchildon, F. Kitapli, F. Shen, M. Bal, F. R. Ong, A. Lupascu, arXiv preprint arXiv:1407.1346 (2014).*

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Date submitted: 14 Nov 2014 Electronic form version 1.4