Abstract Submitted
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Decoherence of superconducting flux qubits in coplanar waveguide resonators[1] ADRIAN LUPASCU, University of Waterloo, Department of Physics and Astronomy, Institute for Quantum Computing, JEAN-LUC ORGIAZZI, University of Waterloo, Department of Electrical and Computer Engineering, Institute for Quantum Computing, DAVID LAYDEN, RYAN MARCHILDON, MUSTAFA BAL, CHUNQING DENG, FLORIAN ONG, University of Waterloo, Department of Physics and Astronomy, Institute for Quantum Computing — We present detailed measurements of decoherence of persistent current qubits coupled to coplanar waveguide resonators. We find energy relaxation times reaching up to 10 μs. Dephasing is characterized in detail for different flux biasing points, corresponding to coupling of flux noise with different strength, using Ramsey, spin-echo, and multiple pulse dynamical decoupling. The coherence decay changes in a continuous manner from Gaussian to exponential as the strength of the coupling to flux noise is reduced. This indicates the presence of a source of noise with a flat spectrum around the flux insensitive point of the qubit, a result which is also confirmed by extracting the spectral density of the noise based on different sets of measurements with decoupling sequences. This noise source limits dephasing times at the flux insensitive point to about 1-2 μs. In qubits with a smaller Josephson to charging energy ratio, we observe decoherence induced by quasiparticles.

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