Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Tunable Superconducting Qubits with Reduced Sensitivity to 1/f flux noise M. D. HUTCHINGS, Syracuse University, J. B. HERTZBERG, IBM TJ Watson Research Center, Y. LIU, Syracuse University, J. M CHOW, IBM TJ Watson Research Center, B. L. T. PLOURDE, Syracuse University — Superconducting qubits are a leading candidate in the pursuit of creating a fault tolerant quantum computer. However, as these devices scale in complexity, significant challenges must be overcome. Qubits that are both flux-tunable and show less sensitivity to flux noise have the potential to assist scalability. Splitting the junction of a transmon qubit creates a SQUID (Superconducting QUantum Interference Device) loop that allows for tuning of the qubit energy level with magnetic flux. However, this tunability can lead to excess dephasing due to flux noise. By creating asymmetry between the junctions of the SQUID loop, the level of qubit frequency tunability can be adjusted. We compare coherence from qubits with a range of junction asymmetries. We will report on how, in these qubits, the sensitivity to dephasing by flux noise scales with junction asymmetry. Furthermore, we use this understanding to fabricate a qubit where the level of dephasing due to flux noise has been reduced below the background set by other, non-flux dependent dephasing sources. This is achieved whilst still maintaining a useful level of frequency tunability.

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Date submitted: 12 Nov 2016 Electronic form version 1.4