Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Realizing a Heavy Fluxonium Circuit[1] NATE EARNEST, YAO LU, University of Chicago, NICHOLAS IRONS, Northwestern University, JAY LAWRENCE, Dartmouth University, JENS KOCH, Northwestern University, DAVID SCHUSTER, University of Chicago — Superconducting qubits are a promising technology for quantum information processing, with several orders of magnitude improvement in coherence times. However, in order to achieve a fault tolerant quantum computer, these times need to be improved. One promising path to enhance lifetimes is to engineer a circuit with suppressed transition matrix elements between the qubit states, making the lifetime robust to environmental sources of decay. While the suppressed transition matrix element improves the lifetime, it also makes state preparation challenging. Here we show that a capacitively shunted fluxonium qubit, a heavy fluxonium, is a promising avenue for realizing a double lambda system: a 4-level system with a double well structure. In this system, transitions between wells (fluxons) is exponentially suppressed by the large effective mass from the increased capacitance, leading to enhanced lifetimes. Meanwhile, transitions within the same well (plasmons) are easily driven and have small dephasing due to their flat band structure, and help couple fluxon transitions. In this talk we will present the experimental results of our heavy fluxonium, addressing measurements of lifetimes/dephasing in different regimes, and exploring different schemes for state preparation and measurement

[1]Argonne National Laboratory, National Science Foundation

Nathan Earnest
University of Chicago

Date submitted: 11 Nov 2016 Electronic form version 1.4