Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Microwave Spectroscopy of a Josephson Junction Rhombi Chain[1]
MATTHEW BELL, JOSHUA PARAMANANDAM, LEV IOFFE, MICHAEL GERSHENSON, Rutgers University — It has been proposed that Josephson Junction (JJ) Rhombi chains can be used as a superconducting qubit symmetry protected from local noises [1]. We have studied the microwave response of a two-rhombi chain coupled to a lumped-element microwave resonator. The resonance frequency of this circuit was measured as a function of the phase φ across the JJ Rhombi chain. The effective inductance of the JJ Rhombi as a function of φ oscillates with a period $\Delta\varphi{=}\pi$ when the magnetic flux Φ in the Rhombi approaches half a flux quantum. In this regime, microwave spectroscopy of the first excited state of the JJ Rhombi was performed as a function of φ and the gate-controlled charge on the central island of the two-Rhombi chain. The results of the microwave spectroscopy are in agreement with numerical simulations. We also discuss the results of time domain measurements of the Rhombi chain which establishes a baseline for the future coherence time measurements for longer (and, thus, more protected) chains.

[1] S. Gladchenko et al., "Superconducting Nanocircuits for Topologically Protected Qubits," Nature Physics 5, 48 (2009).

[1]This work was supported by DARPA (HR0011-09-1-0009), NSF (DMR 1006265), and ARO (W911NF-09-1-0395).

Matthew Bell
Rutgers University

Date submitted: 04 Dec 2012 Electronic form version 1.4