Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Quantum state tomography of a circuit QED dark state SHAVINDRA PREMARATNE, Department of Physics, University of Maryland; Laboratory for Physical Sciences, FREDERICK WELLSTOOD, JQI/CNAM/Dept. of Physics, University of Maryland, BENJAMIN PALMER, Laboratory for Physical Sciences; Department of Physics, University of Maryland — A wide variety of quantum optics phenomena can be observed in circuit QED systems due to the capability to widely vary or tune the system parameters. Here, we carefully engineered the dissipation among three quantum levels of a superconducting $Al/AlO_x/Al$ transmon qubit coupled to a 3D Al microwave cavity and used two steady-state drives to observe multi-photon coherent Raman effects including coherent population trapping [1]. Coherent population trapping involves the formation of a steady-state dark state composed of a coherent superposition of two of the initial states in a lambda-system. We examined the dark state by performing quantum state tomography and observed the average fidelity of generation to be $> 92\%$. We demonstrate that good control of the generated dark state over the Bloch sphere, for the two initial states, can be achieved by changing the relative amplitudes and phases of the drives.

[1]Novikov *et al.*, Nat. Phys. **12**, 75 (2016)

Shavindra Premaratne
Univ of Maryland-College Park

Date submitted: 10 Nov 2016 Electronic form version 1.4