Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Universal qubit stabilization with parametric tunable qubit-cavity interaction YAO LU, SRIVATSAN CHAKRAM , NELSON LEUNG , RAVI NAIK , NATHAN EARNEST , James Franck Institute and Department of Physics, University of Chicago, MINGWEI WEI, Department of Physics Astronomy, Northwestern University, ELIOT KAPIT , Department of Physics Engineering Physics, Tulane University, JENS KOCH, Department of Physics Astronomy, Northwestern University, DAVID SCHUSTER , James Franck Institute and Department of Physics, University of Chicago — Quantum state stabilization provides a promising path to preserving coherence for quantum systems which is crucial to quantum information science. In this talk, we propose a parametric scheme for stabilizing arbitrary single qubit state with a new type of tunable coupler circuit, where the coupling strength between a transmon qubit and a lumped-element resonator is mediated by a superconducting interference device (SQuID). We show that with this device, the static coupling strength can be tuned from less than 15 MHz to more than 250 MHz by tuning the dc flux that threads into the SQuID loop, while a sideband rate of more than 100MHz can be achieved through ac flux tones at the detuning or the summation of the qubit and cavity frequencies. We demonstrate how the universal qubit stabilization scheme is experimentally realized by a proper selection of difference flux tones and voltage drives.

Yao Lu
James Franck Institute and Department of Physics, University of Chicago

Date submitted: 11 Nov 2016 Electronic form version 1.4