

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Coupling a Small Ensemble of Electrons on Helium to a Superconducting Circuit GE YANG, GERWIN KOOLSTRA, University of Chicago, DAVID CZAPLEWSKI, LEONIDAS OCOLA, Argonne National Laboratory Center for Nanoscale Materials, DAVID I. SCHUSTER, University of Chicago — Electrons on helium is a unique two-dimensional electron gas system formed at the interface of a quantum liquid (superfluid helium) and vacuum. If single electrons on helium can be isolated, the motional and spin states could form the building blocks for hybrid quantum computing [1,2]. Here we first review the strong coupling between a large electron ensemble and a microwave resonator [3]. Then we will describe methods to isolate small mesoscopic ensembles with less than 100 electrons in a micron-sized trap at the end of a quarter wavelength microwave cavity. Finally we will discuss the effect of helium fluctuations on the coherence of the hybrid circuit. [1] S. Lyon, Phys. Rev. A. 74, 5 (2006) [2] D.I. Schuster, et al. Phys. Rev. Lett. 105, 040503 (2010) [3] Ge Yang, et al., arXiv:1508.04847(2015)

Ge Yang
University of Chicago

Date submitted: 05 Nov 2015

Electronic form version 1.4