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Engineering of micron-sized electron trap in a superconducting tuning-fork resonator GE YANG, University of Chicago, DAVID CZAPLEWSKI, LEO OCOLA, Argonne National Laboratory Center for Nanoscale Materials, DAVID 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. The motional and spin states of single-electron quantum dots defined on such systems have been proposed for hybrid quantum computing [1,2]. Here, we will present experiments in which an ensemble of electrons are trapped above a tuning fork superconducting resonator and describe their coupling with both the differential and common mode. Next, we will discuss the design of superconducting resonators with a micron-sized trapping area and a reduced number of trapped electrons, and the experimental progress towards a single trapped electron regime.

[1] S. Lyon, Phys. Rev. A. 74, 5 (2006)
[2] D.I. Schuster, et al. Phys. Rev. Lett. 105, 040503 (2010)

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