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Measurement of the charge transfer efficiency of electrons on liquid helium in a CCD-like architecture[1] GUILLAUME SABOURET, E. A. SHANER, S. A. LYON, Princeton University — Electrons floating on the surface of liquid helium are possible qubits in quantum computing; the necessary two quantum levels can either be the charge states or the spin states of the electrons. Varying electric potentials do not modify spin states, which allows the transport of qubits on the surface of liquid helium using a CCD-like array of underlying gates. A quantum computer will require the controlled movement of single electrons and the reliability of this scheme depends on how readily an electron can be transferred from one gate to another and on the absence of electron traps along the way. We will present a measurement of the charge transfer efficiency (CTE) of electrons clocked back and forth above a short CCD-like structure submerged under liquid helium. This was achieved by using a special clocking sequence that ejects any electrons left above a chosen gate at the end of each clock cycle. The CTE obtained at low clocking frequencies is very high with an electron density of about 0.3 electrons/cm^2, comparable to the CTE of silicon CCD's with much higher electron densities. We find no evidence for deep electron trapping in our system.

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