Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Electron transport on ultra thin helium MAIKA TAKITA, E.Y. HUANG[1], S.A. LYON, Department of Electrical Engineering, Princeton University — Electrons floating on the surface of superfluid helium have been suggested as promising mobile spin qubits, and they have shown extremely efficient transport above micron-sized helium-filled channels. While the calculated spin decoherence and relaxation times on helium are long, no experimental measurements have been made. Efficient thermalization of the spins is necessary for ESR measurements of their coherence, and a lack of thermalization has hindered these experiments. Bringing electrons onto a thin helium film above a metallic layer will speed spin relaxation due to Johnson noise current in the metal. At the same time, higher electron densities can be supported by thin helium films. Ideally, the electrons could be thermalized on the thin helium film coating a metal surface, and then moved to a helium-filled channel for electrical measurements of their density and the spin measurements. However roughness of the metal surface severely limits the electron mobility. Preliminary work show that electrons can be transported from one channel, across a helium-coated metal layer, and to the neighboring channel, by creating a smooth transition from the channel to the thin film.

[1]Present address: Carnegie Mellon University

Maika Takita
Department of Electrical Engineering, Princeton University

Date submitted: 08 Nov 2012 Electronic form version 1.4