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CCD-like Architecture for Quantum Computing on Liquid Helium GUILLAUME SABOURET, Princeton University, STEPHEN LYON, Princeton University — Electrons floating above liquid helium form a 2-dimentional gas with high mobilities at low densities due to the absence of a lattice and associated defects and impurities. There are almost no spin-orbit interactions or other magnetic coupling with the surroundings which in turn leads to a long electron spin coherence time. This system therefore lends itself to a quantum computing architecture similar to those proposed for electron spins in semiconductors but with mobile qubits. Scalability requires the ability to shift individual electrons around the surface to either store them in remote locations that can be thought of as memory or to bring pairs close to one another to interact and realize the two-qubit operations. We present a CCD-like architecture for transporting spins above the surface of liquid helium and the ongoing work pertaining to it.

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