Abstract Submitted
for the DAMOP05 Meeting of
The American Physical Society

Scalable architecture for solid state quantum computation JACOB TAYLOR, H.-A. ENGEL, Harvard University, W. DÜR, P. ZOLLER, University of Innsbruck, C. M. MARCUS, M. D. LUKIN, Harvard University — Solid state approaches to quantum computation offer intriguing prospects for large scale integration and long term stability. Most of the current approaches restrict the computation to nearest-neighbors interactions. This condition generally decreases thresholds for fault tolerant computation. We explore the prospects for improving the scalability of solid-state quantum computation schemes via cavity QED on chip or long range transport of electron spin, and consider analogies between solid-state computation and scalable architectures for ion-based computation. Specifically we investigate dominant sources of errors in electron spin transport and study techniques to purify and correct these errors. Finally, we discuss several approaches for long-lived storage of electronic spin qubits and investigate novel architectures that utilize these resources for scalable quantum computation.

Jacob Taylor
Harvard University Physics Department

Date submitted: 28 Jan 2005 Electronic form version 1.4