Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Scattering in Quantum Lattice Gases[1] ANDREW O'HARA, PETER LOVE, Haverford College — Quantum Lattice Gas Automata (QLGA) are of interest for their use in simulating quantum mechanics on both classical and quantum computers. QLGAs are an extension of classical Lattice Gas Automata where the constraint of unitary evolution is added. In the late 1990s, David A. Meyer as well as Bruce Boghosian and Washington Taylor produced similar models of QLGAs. We start by presenting a unified version of these models and study them from the point of view of the physics of wave-packet scattering. We show that the Meyer and Boghosian-Taylor models are actually the same basic model with slightly different parameterizations and limits. We then implement these models computationally using the Python programming language and show that QLGAs are able to replicate the analytic results of quantum mechanics (for example reflected and transmitted amplitudes for step potentials and the Klein paradox).

[1]Supported by Howard Hughes Medical Institute and the Sherman Fairchild Foundation

Peter Love
Haverford College

Date submitted: 21 Nov 2008 Electronic form version 1.4