Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

A Point Paul Trap for Quantum Information Experiments
ROBERT CLARK, LI YANG, ISAAC CHUANG, Massachusetts Institute of Technology — The point Paul trap is a surface electrode ion trap that provides three-dimensional confinement using a single radiofrequency ring electrode, with ground inside and outside. Such a trap may have applications in the development of ion trap lattices for quantum simulation and quantum computation, and has previously been demonstrated using charged microspheres. Here we present a point trap for strontium ions with a ring radius of 1.6 mm and a ring width of .3 mm, consisting of gold electrodes on a laminate susbstrate and loaded by laser ablation. Typical operating parameters are a trap depth of .8 eV and secular frequencies of 250 kHz, for a trap drive of 800 V at 2.5 MHz. Numerical models of the trap are compared to experimentally measured motional secular frequencies of the ions, and the efficiency of laser ablation loading as a function of trap depth is studied. An experiment to measure the heating rate of a single ion as a function of height in the trap is also discussed.

Robert Clark
Massachusetts Institute of Technology

Date submitted: 20 Nov 2006 Electronic form version 1.4