Abstract Submitted
for the DAMOP11 Meeting of
The American Physical Society

Driving Trapped Molecular Ions with a Microwave Transmission Line DAVID MEYER, ADAM MCCAUGHAN, ANDERS MORTENSEN, PAUL ANTOHI, AROLYN CONWILL, KARL BERGGREN, ISAAC CHUANG, MIT — Trapped ion quantum computing builds on the strengths of ions as qubits: they can be trapped for hours with coherence times exceeding tens of seconds. Polar molecular ions have a further advantage as their rotational transitions are in the microwave frequency regime and can be electronically read and controlled. Driving these transitions requires the ions be placed in large electric fields that are achievable through the integration of planar ion traps with a superconducting coplanar waveguide (CPW) transmission line. Our novel trap design successfully trapped and crystallized Sr+ ions and trapped a mixed species cloud of Sr+ and SrCl+. Microwave signals sent through the transmission line under a mixed cloud could drive the rotational transitions of SrCl+ and would cause sympathetic heating of Sr+ ions, which is detectable through a change in fluorescence. This work will help enable quantum computation with polar molecular ions

David Meyer
MIT

Date submitted: 04 Feb 2011 Electronic form version 1.4