Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Ion Motion Control and Heating Measurements in a Y Junction Surface Electrode Trap GANG SHU, Georgia Institute of Technology, GRAHAME VITTORINI, JQI, University of Maryland, CURTIS VOLIN, GTRI, Georgia Institute of Technology, KENNETH BROWN, Georgia Institute of Technology — Trapped atomic ions have demonstrated all the basic quantum operations necessary to implement quantum computation. Micro-fabricated surface electrode ion traps are a promising tool for implementing the scalable Kielpinski-Monroe-Wineland (KMW) architecture [1]. In the KMW scheme, trapped ions are held in small chains and communication between chains is performed by shuttling ions. Here we present our measurements of shuttling operations on a Sandia Y-junction trap [2] over a two year period. We have measured the ion heating after an adiabatic linear shuttling and after transport through the junction. The low linear shuttling heating is consistent with adiabatic motion. The high heating after crossing the junction indicates that sympathetic cooling will be required to perform high-fidelity two qubit operations. [1] D. Kielpinski, C. Monroe, and D. J. Wineland, Nature **417**, 709, (2002) [2] D. L. Moehring, C. Highstrete, D. Stick, K. M. Fortier, R. Haltli, C. Tigges, and M. G. Blain, New J. Phys. **13**, 075018, (2011)

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Date submitted: 15 Nov 2013 Electronic form version 1.4