

Abstract Submitted
for the DAMOP06 Meeting of
The American Physical Society

Scaling and Suppression of Heating in an Adjustable Ion Trap¹

STEVEN OLMSCHENK, LOUIS DESLAURIERS, DAN STICK, WINFRIED HENSINGER, JON STERK, CHRISTOPHER MONROE, FOCUS Center and Department of Physics, University of Michigan; Department of Physics and Astronomy, University of Sussex — One of the major hurdles in the realization of large entangled states among trapped ions is anomalous heating of trapped ion motion [1]. We implement a novel rf ion trap featuring moveable electrodes that has enabled a controlled investigation of this motional decoherence. First, we characterize heating as a function of electrode proximity, related to the geometry of noisy potentials on the electrode surface. Second, we cool the electrodes via contact with a liquid nitrogen reservoir and observe that the decoherence rate is suppressed by an order of magnitude. The insight gained through these experiments may have relevance to scaling the ion trap quantum information processor. 1. Q. A. Turchette, et. al., Phys. Rev. A 61, 063418 (2000).

¹Work supported by the Disruptive Technology Office under Army Research Office contract and the National Science Foundation ITR Program.

Steven Olmschenk
FOCUS Center and Department of Physics, University of Michigan

Date submitted: 27 Jan 2006

Electronic form version 1.4