Abstract Submitted
for the DPP08 Meeting of
The American Physical Society

Effects of Injection and Confinement Imperfections on Plasma Stability in the Paul Trap Simulator Experiment[1] N. THOMAS, Massachusetts Institute of Technology, M. CHUNG, R.C. DAVIDSON, M. DORF, P.C. EFTHIMION, E.P. GILSON, R. MAJESKI, E.A. STARTSEV, H. WANG, Princeton Plasma Physics Laboratory, A. ARORA, Cornell University — Analyses of preliminary results are presented from experiments studying the effects of perturbations during plasma injection and confinement on the stability properties of pure ion plasmas trapped in the Paul Trap Simulator Experiment (PTSX). The PTSX is a two-meter-long Paul trap that simulates a long, thin beam of ions travelling through a kilometers-long lattice of quadrupole magnets because the space-varying magnetic fields can be Lorentz transformed into time-varying electric fields. The analogy includes all nonlinear space-charge effects, enabling cost-effective accelerator design prototyping and troubleshooting in a compact laboratory experiment. The effects studied include perturbations to the beam as it enters the lattice and the effects of lattice imperfections on transverse beam confinement, including periodic perturbations, which correspond to imperfections in cyclic particle accelerators.

[1]This research is supported by the US Department of Energy and the National Undergraduate Fellowship Program.

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Date submitted: 20 Jul 2008 Electronic form version 1.4