Abstract Submitted
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Experimental verification of random error-induced beam degradation in high intensity accelerators using a compact Paul trap[1] M. CHUNG, E.P. GILSON, R.C. DAVIDSON, P.C. EFTHIMION, R. MAJESKI, E.A. STARTSEV, Princeton Plasma Physics Laboratory — The effects of random errors in quadrupole magnets on intense beam propagation have been investigated in the Paul Trap Simulator Experiment (PTSX). The PTSX device is a compact linear Paul trap that can simulate the nonlinear transverse dynamics of intense beam propagation over large equivalent distances through an alternating-gradient (AG) transport lattice. The amplitude of the voltage waveform applied to the electrodes in the PTSX device corresponds to the quadrupole focusing field strength in an AG lattice system. Hence, by slightly modifying the voltage amplitude of the PTSX electrodes in every half focusing period, the effect of randomly distributed quadruploe focusing gradient error in high intensity accelerators can be effectively studied. Initial results show that the transverse beam emittance increases linearly with error amplitude and holding time. The experimental results are also compared with results obtained from 2D WARP simulations.

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