Abstract Submitted
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Simulation of Experiments on Passive Focusing of TNSA-Produced Proton Beams[1] RONALD COHEN[2], A. YUEN, C. BELLEI, S.M. LUND, LLNL, P.A. NI, LBNL — Intense proton or ion beams can be propagated through a sequence of thin metallic foils to collimate or focus the beam. The foils attenuate the beam's defocusing electrostatic field while not suppressing the focusing magnetic force. Results from recent experiments[3] with TNSA-produced proton beams are qualitatively consistent with this process: the foils substantially reduce the observed spot size. We present simulations of these experiments done with the WARP and LSP particle-in-cell codes. LSP is used to simulate the initial evolution of protons and electrons produced in the TNSA process; the resulting proton distribution provides initial conditions for WARP, which then follows the protons and initially co-moving electrons through the foil stack and beyond to a set of diagnostic films. WARP is run with quasi-static electric and magnetic fields. Effects incorporated in the simulations include field-emitted and knock-on electrons, scattering and slowing down of protons and electrons in the foils, and saturation effects in the diagnostic films. With all of these effects in place we obtain simulation results (spot size versus energy) that are consistent within uncertainties to the experimental measurements.

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[2]Retired
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