Abstract Submitted
for the DPP13 Meeting of
The American Physical Society

Studies of Ion Beam Charge Neutralization by Ferroelectric Plasma Sources[1] A. STEPANOV, E.P. GILSON, L. GRISHAM, R.C. DAVIDSON, PPPL — Space-charge forces limit the possible transverse compression of high perveance ion beams that are used in ion-beam-driven high energy density physics applications; the minimum radius to which a beam can be focused is an increasing function of perveance. The limit can be overcome if a plasma is introduced in the beam path between the focusing element and the target in order to neutralize the space charge of the beam. This concept has been implemented on the Neutralized Drift Compression eXperiment (NDCX) at LBNL using Ferroelectric Plasma Sources (FEPS). In our experiment at PPPL, we propagate a perveance-dominated ion beam through a FEPS to study the effect of the neutralizing plasma on the beam envelope and its evolution in time. A 30-60 keV space-charge-dominated Argon beam is focused with an Einzel lens into a FEPS located at the beam waist. The beam is intercepted downstream from the FEPS by a movable Faraday cup that provides time-resolved 2D current density profiles of the beam spot on target. We report results on: (a) dependence of charge neutralization on FEPS plasma density; (b) effects on beam emittance, and (c) time evolution of the beam envelope after the FEPS pulse.

[1]Research supported by the U.S. Department of Energy.

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Date submitted: 12 Jul 2013 Electronic form version 1.4