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Beam plasma interaction in the solenoidal focusing of intense ion beams

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Beam plasma interaction in the solenoidal focusing of intense ion beams¹ DALE WELCH, DAVID ROSE, THOMAS GENONI, Voss Scientific, LLC, PETER SEIDL, JOSH COLEMAN, PRABIR ROY, Lawrence Berkeley National Laboratory, IGOR KAGANOVICH, ADAM SEFKOW, Princeton Plasma Physics Laboratory — Extreme longitudinal and transverse bunching of space charge dominated ion beams is required to heat targets into the warm dense matter regime. Longitudinal bunching factors in excess of 70 with a several millimeter spot have been demonstrated on the 300-keV, 27-mA K⁺ ion beam Neutralized Drift Compression Experiment in rough agreement with particle-in-cell end-to-end simulations. To achieve the necessary spot size for target heating (< 1 mm), a strong final focus solenoid is currently being fielded. To neutralize the large perveance beam, a plasma with density greater than that of the beam must be injected into or produced within the solenoid. In this paper, we present theory and simulation of the neutralization of such an ion beam in a highly magnetized plasma. Beam neutralization and instability in the plasma are modeled in highly resolved simulations. The impact of instabilities and resulting turbulence on the focusing ion beam phase space is studied.

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Prefer Oral Session
 Prefer Poster Session

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