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A SPACE-CHARGE NEUTRALIZING PLASMA CHANNEL FOR AN INTENSE BEAM

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Abstract

Ion bunches have been suggested as means to heat matter to the warm dense matter, or strongly coupled plasma regime (Temperature ~ 0.1 to 10 eV). For a K^+ beam at 0.4 MeV, ~ 1 J/cm² is required to reach 1 eV in solid Aluminum. Also the pulse duration must be short (< 2 ns) to avoid hydrodynamic cooling. A spot radius ~ 0.5 mm, and current ~ 10 A are thus need to reach this flux level and pulse duration. Currents will be achieved by compressing the beam axially with an IBM.. To further increase the beam intensity on target, an $8T$ field solenoid, filled with beam neutralizing plasma will be used. A plasma is injected from filtered cathodic arc plasma sources. The Neutralized Drift Compression Experiment (NDCX-1) at LBNL is intended to test these neutralized focusing techniques with the goal of reaching target temperatures ~ 0.5 eV. Experimental measurements including the on axis plasma density distribution and, the beam density distribution, will be presented.

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