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A THIN COLUMN OF DENSE PLASMA FOR SPACE-CHARGE NEUTRALIZATION OF INTENSE ION BEAMS

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Typical ion driven warm dense matter experiment requires a plasma density of $10^{14}/\text{cm}^3$ to meet the challenge of $n_p > n_b$, where n_p , and n_b are the number densities of plasma and beam, respectively. Plasma electrons neutralizes the space charge of an ion beam to allow a small spot of about 1-mm radius. In order to provide $n_p > n_b$ for initial warm, dense matter experiments, four cathodic arc plasma sources (CAPS) have been fabricated, and the aluminum plasma is focused in a focusing solenoid (8T field). A radial plasma probe with 37 collectors was developed to measure the radial plasma profile inside the solenoid. Initial results show that the plasma forms a thin column of diameter $\sim 7\text{mm}$ along the solenoid axis. The deformation of the magnetic field due to eddy currents, the magnetic mirror effect and plasma condensation are under investigation. Plasma data and ion beam neutralization will be presented.

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