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Multi-Meter-Long Plasma Source for Heavy Ion Beam Charge Neutralization[1] P.C. EFTHIMION, E.P. GILSON, R.C. DAVIDSON, Plasma Physics Laboratory, Princeton University, Princeton, NJ, B.G. LOGAN, P.A. SEIDL, W. WALDRON, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA — Plasmas are a source of unbound electrons for neutralizing heavy ion beams to focus their radial and compress their axial dimensions to achieve high intensity beams for warm dense matter experiments. Long metal plasma columns are produced by the ferroelectric ceramic, $BaTiO_3$. The drift tube inner surface of the Neutralized Drift Compression Experiment (NDCX) is covered with ceramic material. High voltage ($\sim$ 8 kV) is applied across the ceramics. A $BaTiO_3$ source comprised of five 20-cm-long sources produced uniform plasma in the $5x10^{10}$ cm^{-3} density range and was used to achieve high beam compression ratios on NDCX. The source was extended to 2 meters and resulted in the heavy ion beam density increasing from $2x10^{8}$ to $7x10^{11}$ cm^{-3} and reducing the spot size to 1.5 mm. Present research is developing higher density sources by examining smaller diameter ferroelectric sources and flashboard circuits. A ferroelectric source of 2.9 cm ID achieved densities of $6x10^{11}$ cm^{-3}. Flashboards have the potential to achieve densities approaching 10^{13} cm^{-3}.

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