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Meter-Long Plasma Source for Heavy Ion Beam Charge Neutralization[1] P.C. EFTHIMION, E.P. GILSON, R.C. DAVIDSON, Princeton Plasma Physics Lab, B.G. LOGAN, P.A. SEIDL, Lawrence Berkeley National Lab, W. WALDRON, Lawrence Bekeley National Lab — Plasmas are a source of unbound electrons for charge neutralizing intense heavy ion beams to focus them to a small spot size and compress their axial length. The source should operate at low neutral pressures and without strong externally-applied electric or magnetic fields. To produce long plasma columns, sources based upon ferroelectric ceramics with large dielectric coefficients have been developed. The source utilizes the ferroelectric ceramic $BaTiO_3$ to form metal plasma. The drift tube inner surface of the Neutralized Drift Compression Experiment (NDCX) is covered with ceramic material. High voltage ($\sim$ 8 kV) is applied between the drift tube and the front surface of the ceramics. A $BaTiO_3$ source comprised of five 20-cm-long sources has been tested and characterized, producing relatively uniform plasma in the $5x10^{10}$ cm^{-3} density range. The source has been integrated into the NDCX device for charge neutralization and beam compression experiments. Initial beam compression experiments yielded current compression ratios $\sim$ 120. Future research will develop longer and higher density sources to support beam compression experiments for high energy density physics applications.

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