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Ferroelectric Plasma Source for Heavy Ion Beam Charge Neutralization[1] PHILIP C. EFTHIMION, ERIK P. GILSON, LARRY GRISHAM, RONALD C. DAVIDSON, Plasma Physics Laboratory, Princeton University, Princeton, NJ, 08543 USA, SIMON YU, WILLIAM WALDRON, B. GRANT LOGAN, Lawrence Berkeley National Laboratory, University of California, Berkeley, CA, 94720 USA — Plasmas are a source of unbound electrons for charge neutralizing intense heavy ion beams to allow them to focus to a small spot size and compress their pulse length. Calculations suggest that plasma at a density of 1-100 times the ion beam density and at a length $\sim$ 0.1-1 m would be suitable. To produce one-meter-long plasma, sources based upon ferroelectric ceramics are being developed. They can be scaled to large volumes and operate at low neutral pressures. The source utilizes the ferroelectric ceramic $BaTiO_3$ to form metal plasma. The drift tube inner surface of the Neutralized Drift Compression Experiment (NDCX) will be covered with ceramic, and high voltage ($\sim$ 5 kV) will be applied between the drift tube and the front surface of the ceramic. A prototype ferroelectric source 20 cm long has produced plasma densities of 5×10^{11} cm^{-3}. It was integrated into the previous Neutralized Transport Experiment (NTX), and successfully charge neutralized the K^+ ion beam. Presently, the one-meter-long source is being fabricated. It will be characterized and integrated into NDCX for charge neutralization experiments.

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