

Successful MeV-Range Electron Beam Recirculation, A.C. CRAWFORD, S. NAGAITSEV, FERMILAB*; A. SHARAPA, A. SHEMYAKIN, BINP - Electron cooling of ion beams with energies of some GeV per nucleon requires high-quality dc electron beams of MeV energies and currents as high as several amperes. The enormous electron beam power dictates that the beam current be returned to the high voltage terminal which provides the accelerating potential. In this paper we describe the successful operation of a dc recirculation electron beam system at energies 1-1.5 MeV and currents in excess of 200 mA. This system employs an electrostatic HV supply like a Van de Graaff with maximum charging current of a few hundred microamps. Electron beam line consists of a 10 m long channel with discrete focusing elements (lenses, quads, dipoles) flanked by high-gradient (10 kV/cm), small aperture (2.54 cm ID) acceleration and deceleration tubes. This work is a continuation of the previous attempt [1] to extend electron cooling into GeV energy range.

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[1] D.J. Larson et al., Operation of a prototype intermediate-energy electron cooler, NIM A (1992), pp. 30-33.