

ACCELERATOR SEMINAR

“Fixed-Energy Electron Cooling Ring for MEIC”

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A design is presented for a fixed-energy Electron Cooling Ring for MEIC that can cool and stack polarized ions during a collider store so that they are ready for the next store when luminosity declines. The 6 GeV Electron Cooling Ring would be located within the same cryostat as the Ion Collider Ring. Ions accelerated in the Booster are transferred to the Electron Cooling Ring, cooled using magnetized d.c. electron cooling, and stacked on repeated cycles. By cooling at 6 GeV, limitations on beam intensity and beam brightness from space charge tune shift and intra-beam scattering are greatly improved. The Electron Cooling Ring has been designed with twice the betatron tune of the Ion Ring. It could also be used to accelerate the stack to ~ 12 GeV so that the intense bunches would never cross transition in the acceleration to collision energy.

The electron cooling needed for the above performance requires the benefits of magnetized cooling and space charge neutralization of the electron beam. Those properties were achieved in the past in the non-relativistic beam at the original Fermilab Electron Cooling Experiment, but not in the relativistic beam of the Fermilab Recycler. An R&D program is proposed in which the Recycler electron cooling system would be re-commissioned with improved magnetics and electron beam optics to produce those properties in its relativistic beam. And validate its performance for the requirements of the MEIC Cooling Ring.

Friday, June 5, 2015

1:00 p.m.

Applied Research Center, Room 231

Coffee before seminar beginning at 12:45 p.m.