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Memo

DATE: *March 7, 2003*

TO: RHIC E-Coolers

FROM: *Ady Hershcovitch*

SUBJECT: **Minutes of the March 7, 2003 Meeting**

Present: Ilan Ben-Zvi, Xiangyun Chang, Michael Harrison, Ady Hershcovitch, Jorg Kewisch, William Mackay, Christoph Montag, Satoshi Ozaki, Triveni Srinivasan-Rao, Dejan Trbojevic, Dong Wang.

Topics discussed: Simulation & Calculations.

Simulation & Calculations: Xiangyun presented electron beam simulation results that have been performed with PARMELA. The simulations focused on the injection region and followed the electron beam from the photocathode and solenoid where the electron beam is magnetized, through the beam merging magnets and the superconducting, energy recovery linac to a "Test solenoid" where the beam emittance shows as it would be in the cooler solenoid.

Xiangyun presented two cases. In case A, where there is an extra bending magnet, while in case B, the electron beam is bunched by a buncher cavity. The case A system proved to be more stable, since the electron beam is always on axis. Ilan questioned on whether it was worth combining the two systems. The answer is probably no since case A is good enough and since the cavity would be expensive and costly to maintain. Optimization of the injection region of case A can be accomplished by adjusting the position and strength of the first solenoid.

Beam envelope evolution of case A showed a small beam (better than case B). It is a good result, since transverse forces are proportional to beam radius. The beam envelope evolution showed pretty much a constant beam envelop from after the gun to the solenoid entrance. Emittance and energy spread parameters of the case A electron beam are: rest frame emittance in x-direction 51 mm.mR, y-direction 60 mm.mR, z-direction 285 deg. KeV. The energy spread is 3.5×10^{-3}. It can be minimized after Jorg's "arc" to 1.5×10^{-4}. In case B those parameters are: rest frame emittance in x-direction 71 mm.mR, y-direction 76 mm.mR, z-direction 280 deg. KeV. The energy spread is 3×10^{-3}. It can be minimized after Jorg's "arc" to 1.4×10^{-4}, i.e., the transverse emittance of case B is somewhat larger than case A.

A discussion followed Xiangyun's presentation of bunch slices results, which showed slightly better results for individual slices than the complete bunch. Can the bunch emittance

be further improved? Ilan suggested trying to improve matching into the test solenoid, and to run an unmagnetized beam to see if emittance growth is due to thermalization of angular momentum components of magnetized beams.