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Memo

DATE: *June 20, 2003*

TO: RHIC E-Coolers

FROM: *Ady Hershcovitch*

SUBJECT: **Minutes of the June 20, 2003 Meeting**

Present: Michael Brennan, Ady Hershcovitch, Jorg Kewisch, Vladimir Litvinenko, Derek Lowenstein, Christoph Montag, Stephen Peggs, Thomas Roser, Dejan Trbojevic, Jie Wei.

Topics discussed: Simulation & Calculations, Stochastic Cooling, Collaboration with JLAB.

Simulation & Calculations: Jorg opened the meeting with a report on recent electron beam tracking simulations. The electron beam is being tracked from the cathode through the electron gun and into a solenoidal magnetic field that extends a few meters beyond the electron gun. The beam is divided into five "slices" whose emittance is calculated. The generated curves indicated emittance growth. A discussion ensued of whether it's real growth or just a rotation. Vladimir commented that it seemed that emittance was not conserved. In answer to Derek's question regarding what emittance was acceptable Jorg replied 2.5×10^{-6} RMS. Next Jorg showed plots of alpha functions, which indicated there is a point where all slices line up nicely. What's needed is a system where minimum emittances line up at the solenoid exit. In conclusion two solenoids are needed. A main constant field solenoid that extends over the electron gun and short adjustable solenoid between the gun and the main solenoid exit. Basically, Jorg has now a tool that enables optimization that can yield a magnetized electron beam with low emittance. Thomas pointed out that this "tool" facilitates a (never done before) solution for an emittance compensated magnetized electron beam.

Next, the discussion shifted to the feasibility of having such a system of overlapping solenoids. Thomas claimed that it would be very difficult to have a solenoid (the shorter) with magnetic fields that does not extend much. Ady pointed out that the SuperEBIS solenoid has this characteristic. That magnet has a number of compensating windings (it's basically a seven-coil system). Dejan said that the muon collider design also may provide for such a system. Regarding the ability to physically fit such a solenoid between the gun and the main solenoid, Ady commented that it is possible using foil magnet technology, which is used when very compact high field solenoids are needed for devices that are sent to space aboard satellites.

Finally, Vladimir reported that at GSI an excellent electron beam cooling program was developed. Although it presently simulates non relativistic beams, Thomas claimed that it is really very good news. Vladimir added that this saves us much work. All that is now needed is to modify it for our case.

Please Note! There will be a workshop Monday (June 30) – Wednesday (July 2) to discuss this and other E-Cooling and simulations issues. The meeting will be attended by Burov (FNAL), Ya. Derbenev (JLab), A. Sidorin (Dubna), D. Bruhwiler (Tech-X), D. Abell (Tech-X) and the BNL team. Everyone interested in E-Cooling is welcome.

Stochastic Cooling: in answer to Thomas' question Mike said that he is proceeding with stochastic cooling test.

Collaboration with Jefferson Laboratory: Thomas said that later in the day he, Derek, and Swapan Chattopadhyay from Jefferson lab are to meet to finalize a collaboration with focus on the development of a 700 MHz solenoid and an energy recovery LINAC.

Reminder: Waldo has been posting meeting minutes on the web. They can be found at http://www.rhichome.bnl.gov/RHIC/luminosity/upgrade/minutes/. Additional pages of interest are: http://www.rhichome.bnl.gov/RHIC/luminosity/ a general page for luminosity issues in RHIC; and, http://www.rhichome.bnl.gov/RHIC/luminosity/upgrade/ a page for upgrade issues.