

*DATE:* February 1, 2002

*TO:* RHIC E-Coolers

*FROM:* Ady Hershcovitch

*SUBJECT:* **Minutes of the February 1, 2002 Meeting**

# Memo

Present: Ady Hershcovitch, Jorg Kewisch, Derek Lowenstein, William MacKay, Satoshi Ozaki, Thomas Roser, Dong Wang, Jie Wei.

Topics discussed: Electron Gun, Simulation & Calculations.

**Electron Gun:** Dong opened the meeting by showing the gun and the needed solenoids. Discussion followed (again!) about the physical interference of the cooling pipes with the solenoids. Ady showed the possibility of using a low current magnetized plasma lens at the gun exit to prevent beam blow-up. However, a plasma lens will have a pressure of  $10^{-6}$  Torr. In answer to question regarding tolerable pressure in the gun, Thomas claimed that at the cathode  $10^{-12}$  Torr is needed to avoid poisoning. Satoshi claimed that higher pressure may be acceptable in an inert gas.

Waldo's suggestion was to make large aperture solenoids, since the needed magnetic field is only a few hundred Gauss. Best solution is to combine Waldo's suggestion with AES electron gun design to accommodate both requirements by placing the pipes around large coils.

**Simulation & Calculations:** Jorg showed calculation to reduce electron energy spread inside the cooling solenoid. To achieve a spread of  $10^{-4}$ , freedom is needed to adjust the alpha parameter, which is the ratio of the cavity wavelength to the cavity voltage. The use of electromagnets will facilitate optimizing alpha, and hence minimizing the energy spread. Dong showed that conversion from round to flat beam is possible. However, in experiments by Edwards et al., the conversion resulted in an emittance that was three times larger than expected. Based on the ensuing discussion that followed, the problem is not fully understood.