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# Memo

*DATE:* *October 29, 2004*

*TO:* RHIC E-Coolers

*FROM:* *Ady Hershcovitch*

*SUBJECT:* **Minutes of the October 29, 2004 Meeting**

Present: Ilan Ben-Zvi, Rama Calaga, Peter Cameron, Xiangyun Chang, Yury Eidelman (ORNL & BINP Novosibirsk, Russia), Alexei Fedotov, Wolfram Fischer, Ady Hershcovitch, Animesh Jain, Jorg Kewisch, Vladimir Litvinenko, Derek Lowenstein, William Mackay, Christoph Montag, Thomas Roser, Dejan Trbojevic, Gang Wang (SUNY Stony Brook), Jie Wei.

Topics discussed: Diamond Cathode, Transverse IBS in RHIC

**Diamond Cathode**: Xiangyun opened the meeting with a talk on the electron gun cathode that is based on diamond amplification of photo-emission electrons. It is basically an emission enhanced photo-injector. Xiangyun started by explaining operation principles, followed by advantages of this novel cathode; he concluded with description of various design considerations.

The advantages of this cathode are:
1. Lower laser power is needed
2. Cathode construction has intrinsic protection from contamination
3. Since the cathode does not require deposition, the gun is no longer subjected to internal contaminants
4. High average current output of up to 1 A; higher than what is available from other cathodes
5. Novel cathode has long life expectancy

Throughout the talk discussions ensued regarding various associated physical phenomena associated with cathode operation, and regarding the choice of diamond over silicon. The latter can potentially generate twice the yield. Ilan summarized the reasons for choosing diamond has having negative electron affinity (hydrogen can be used instead of cesium), diamond has better thermal conductivity and is stronger mechanically. Also, diamond is a good dielectric (breakdown prevention).

**Transverse IBS in RHIC**: meeting concluded with a short talk by Vladimir, in which he identified the major contributions of IBS in RHIC to be in arcs comprising mostly of FODO cells. Calculations reveal that if currents are to be increased in these setupole and quadrupole

magnets, luminosity lifetime increases. If this theory works, RHIC luminosity lifetime can, in principle, be extended by a factor of 3. It would be interesting to test this idea. Presently arc quadrupoles operate at about 4.4 kA, while their power supplies can deliver 5.6 kA. Vladimir's simulations indicated that by increasing magnet currents to power supply capability, 30% - 40% increase in luminosity lifetime can be realized.