

*DATE:* December 17, 2004

*TO:* RHIC E-Coolers

*FROM:* *Ady Hershcovitch*

*SUBJECT:* **Minutes of the December 17, 2004 Meeting**

# Memo

Present: Ilan Ben-Zvi, Peter Cameron, Xiangyun Chang, Wolfram Fischer, Ady Hershcovitch, Dmitry Kayran, Jorg Kewisch, Derek Lowenstein, William Mackay, Thomas Roser, Triveni Srinivasan-Rao, Dejan Trbojevic, Gang Wang (SUNY Stony Brook), Jie Wei.

Topics discussed: Diamond Cathode, SRF gun, ERL.

**Diamond Cathode:** in answer to Thomas regarding the status of diamond cathode development, Triveni gave an update on experiments that are being set up for various studies. Due to very high cost of the needed diamonds, all the previous work as well as the upcoming set of experiments are to be conducted starting with cheaper samples of diamonds that have either the proper quality but the wrong thickness, or the proper thickness and poor quality. As our confidence grows, we move to better quality samples. Nevertheless, these experiments, which are to be performed on smaller samples, should address all issues except for mechanical strength.

According to Triveni the following three tests are being planned:

1. First test, which is using the set-up in building 939, is designed to primarily gain experience with handling delicate objects. Among the studies on this set-up are to repeat other measurements in the reflection mode, and measure diamond gain dependence on temperature.
2. In parallel an experiment is being set up in the Instrumentation Division for transmission experiments.
3. A choke joint to insert diamond cathodes into our superconducting photoinjector has been ordered from AES.
4. Based on the results of the above experiments, a choke joint experiment in the 1.3 GHz injector will be performed with a good quality diamond.

A discussion from questions by Dejan ensued regarding experimental details and their relevance to the final cathode. Triveni pointed out that about 5 - 6 test are needed before the final cathode can be fabricated.

Next Ilan described encapsulation tests for the cathode, which is diamond amplification of photo-emission electrons that are emitted from a cesium-potassium-antimonide surface. To

achieve encapsulation that maintains good vacuum, high thermal and electrical conductivities as well as high mechanical strength, diffusion bonding is to be used.

**SRF Gun:** Xiangyun briefly described his work on the design of the 703.75 MHz SRF gun. He has now a good theoretical understanding of the emittance compensation in the various stages of the accelerator, and that should lead to improved emittance.

**ERL:** Dmitry reported about his start-to-end simulation. One issue that resulted is the high beta function of the electron beam at the end of the LINAC. The reason is that very strong focusing effect of the 35 MV/m RF fields results in a focal length of 10 cm after the first cell, while the 5 cell cavity is 2 meter long. Ilan pointed out that the main purpose of the ERL is to demonstrate very high current. It would be nice, but not necessary to also have high brightness.