Carlos’ last day at the Lab is Friday July 25.

Carlos’ recommendations regarding the electrode and insulator testing:

This Wed Jul 16, the crane will be at the GTS to remove the concrete shield block. Bubba will roll out the aluminum SF6 tank and the gun stand, then the blocks will be re-positioned by the crane. Afterwards, I suggest the following:

1. Move the chamber back to the GTS

2. Put the system back together with the GP500 nipple, and install the NEG sheet only, if the mesh is too cumbersome to install.

3. Mount the black R28 insulator and the dummy electrode ball that Bubba polished.

4. Replace the R30 receptacle in the SF6 tank with the R28, and utilize the R28 cable.

5. Proceed with HV conditioning up to 365kV. We know that at that voltage in Kr conditions, and at 350kV under vacuum conditions, FE is only a few counts per second.

UP to this step you will be assessing if the NEG/mesh induces any field emission. I think it won't but it is worth testing.

6. Replace dummy ball electrode with the new one that is being barrel polished by Fay.

7. Proceed with HV conditioning as in step 5, and assess field emission.

UP to this step, you will be assessing the effectiveness of barrel polishing compared to mechanical polishing. I hope you see no field emission.

CONTINUING WITH THE INSULATOR TEST PLANS:

The new black R30 insulators should be here in October, including one more that has been coated with a proprietary recipe by SCT. We committed to test that insulator.

1. The HV cable system has to be reverted back to the R30, ie. replace the R28 socket in the HVPS side with the R30, and utilize the R30 cables.

2. Replace the black R28 insulator with the new R30 coated, and utilize the ball electrode that rendered less field emission.

3. Proceed with voltage conditioning, and evaluate performance under Kr and vacuum conditions.

4. We will have to write a report, which I will be happy to write once you guys let me know that the test has concluded, I can check the FGTS logs and get feedback from you via email.

5. Replace the coated R30 with the new, black R30.

6. Proceed with high voltage conditioning and evaluate performance under Kr and vacuum conditions. The goal is to have the system w/o field emission at 375 kV in Kr, and at 365 kV in vacuum, sustained, for tens of hours. The hope is that this insulator is sufficient to achieve that kind of performance.

7. If successful, replace dummy ball electrode with actual electrode, replace GP500 nipple with actual anode, and repeat step 6.

At this point, you should have a prototype gun that work with an actual electrode at 350kV w/o field emission.

In parallel, I strongly agree Matt about optimizing the design of the shed in POISSION to achieve less than 10 MV/m at 350kV and to explore the possibility of having a smaller shed. The goal is to have a shed that shields the ceramic-electrode-vacuum junction but does not produce field emission.

All the best!!!

Carlos

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GTS to do list:

Poelker, July 8, 2014

What needs to be done?

1.    Assist with the supervision of the removal of concrete blocks and the old gun and SF6 tank from FEL GTS. July 16, early am.

2.    the gun

a.    Waiting for new insulators, should arrive in September…

b.    we have a niobium electrode, you can test fit this electrode on an old R30 insulator

c.    we have a stainless steel electrode: you can demonstrate that a sphere can be properly assembled on the insulator

d.    Bubba is polishing a copper electrode, Poelker is trying to get a quote for TiN coating

e.    The machine shop is manufacturing front and back faces for our steel and copper spheres

f.     Phil is trying to install ground screen and NEG sheet inside gun, and having difficulty. He could use help.

g.    Replace the table top with new one.

h. Danny Machie created a drawing of the new CsK2Sb chamber, Poelker to order it.

h.    Poelker to order more heater crucibles and CsOH and KOH pellets

i.      Poelker to give broken effusion sources to machine shop, for repair (need new valves)

j.      start making CsK2Sb photocathodes

3.    the gun continued: Hansknecht to explore the option of anode with holes, to feed laser light, and thereby replace complicated “light box” with something that is easier to build and easier to use

4.    The diagnostic beamline needs to be finalized, Yan’s big job

5.    solenoids (at least 2), which ones?  I guess we need a model via your preferred particle tracking code.

6.    steering magnets, how many? do we have them or do we need to buy them (wherever possible, I want 2.5" diameter vacuum pipe, so we need larger diameter bore Haimsons)

7.    Pick a beampipe size and a flange size (4 5/8” flanges and 2.5” beampipe? The FEL standard). How much of the old GTS beamline is of value?

8.    YAG viewers, at least three (one near each dump, one near the slit/brock cavity). Learn from Pavel the limitations of these viewers. Am I mistaken? can we put significant beam on these viewers? Yes, I am mistaken, they operate at very low duty factor. Are there any available “for free” from FEL?

9.    When does it make sense to install a Brock cavity? From the outset? The aperture is small, is this a problem? Probably. Maybe we just leave space on the beamline for a cavity and install it later.?

10. The slit chamber…

a.    Can we find the 100um slits Engwall used?

b.    Slits must be moveable, so we need stepper motors

c.    Want a viewer in this chamber too

d.    Plus NEG pumps

e.    We need a designer….

11. Joe found the spectrometer dipole magnet, what about the dipole vacuum can?

12. Begin understanding the available computer control that exists at the GTS. where are the racks? is there a VME crate(s) already there? they ran beam at GTS before, how much of the computer control system remains? We need to control valves, viewers, optical frame grabber/digitizer, maybe harps, magnets, stepper motors for slits, current monitoring at anode/slits/dumps, ion pump readback, rad monitors, laser shutter, laser attenuator, tune mode generator, moveable lens to sample different parts of photocathode

13. Become a POISSON expert, and design a better “shed”, which constitutes our fall back option, in case the black R30 insulator doesn’t work out for us.