GTS Meeting Minutes: July 7, 2015

1) In our on-going quest to condition a gun to ~ 400 kV and operate it reliably at 350 kV, the group supports our intention to use a long FEL inverted insulator. We will work with Danny Machie to push this design, which includes a nipple to hold the insulator at appropriate location to center the puck on the beamline, a cable connection to the R350 receptacle that lives inside the insulator, and a modified electrode that includes some sort of "shed" triple point protection.
2) Realistically, it could take Danny 1 month to finish the designs, a couple weeks to manufacture the nipple and cable/SF6 connection. The most significant time will be devoted to fabricating an electrode (or piece of electrode) and having it polished. Bubba returns August 3 and we can assign polishing as critical task. Hope for implementation of this Plan Z by mid-September? I promised Mont a functional 350 kV gun by December 2015.
3) In the interest of building and maintaining momentum, we agree it would be worthwhile to rebuild our 350 kV gun with a white R30 insulator (the only insulator we have on-site that can position an electrode in the right place). We would attach to this insulator our niobium electrode with dummy puck. Yan could then high voltage process this "production" electrode to ~ 250 kV, well below the voltage where R30 insulators have failed. In effect, operate our 350kV gun as a 250kV gun. WE could even use a Spellman supply if this makes life easier (e.g., no SF6 at all), but maybe this complicates our OSP?
4) Before installing, the niobium electrode needs to be heated in Big Blue.
5) Along these lines, we need to polish our 316L Stainless Steel electrode (welded hemispheres). This needs to be heated in Big Blue too. I gave this ball to Fay Hannon for barrel polishing, don't know if she started the polishing process.
6) SCT has promised four more black R30 doped insulator by November 2015, but they are often late delivering things. If it arrived sooner, we expect this insulator could support 300 kV operations….
7) Yan agreed to model the new gun that Danny and John have designed, John to send Yan the step files.
8) We need to get designer Joshua Tschirhart attending the weekly GTS meeting, so that he learns to appreciate our concerns and level of urgency. I will ask Danny for permission to invite him.
9) List all the epics controlled things we expect to use at GTS, start building the controls software to make and deliver beam to dump
10) Work with RadCon to get approval to deliver ~ 5mA at 350kV to dump. Do we have enough shielding?
11) Install the CsK2Sb depo chamber onto the gun table as soon as we can. We need appropriate supports for the gun and depo chamber, Josh to help us set height of supports, ideally. Start putting components on the CsK2Sb depo chamber (effusion source, RGA, etc). WE should weld ears to the CsK2Sb chamber, which would allow us to easily remove the bottom 10" flange in case we want to make modifications later.

12) I'd like to bolt the gun table to the floor, and attach VA beamline to the gun, as soon as possible. We can wait for designer to tell us where things go, or we can build up the gun, add the CsK2Sb chamber with manipulators, and figure out the best place on our own.
13) Riad outlined our magnetized beam milestones for next three years. In short, mA beam from gun to dump by this time next year, with good lifetime, and magnets designed and ordered.

Yan please edit the last row describing your results with new R30 doped insulator.

Table 1. Material properties for each insulator/electrode test configuration and corresponding high voltage performance. The R30 insulators were composed of unaltered 97.7% alumina, while the R28 doped insulator was 94.7% alumina. The manufacturer provided the alumina concentration for each insulator type and corresponding transversal resistivity and dielectric constant. All test were performed using the same spherical test electrode.

Insulator type	Length (cm)	Transversal resistivity (Ohm-cm)	Dielectric constant $\varepsilon_1/\varepsilon_0$	Maximum voltage (kV)	Performance
R30 sample 1	20	5.0×10^{15}	9.1	329	Breakdown and puncture near high voltage end
R30 sample 2	20	5.0×10^{15}	9.1	300	Breakdown
R30 with additional screening electrode	20	5.0×10^{15}	9.1	375	370 kV with krypton 4-hr soak, 350 kV in vacuum 4-hr soak. Significant field emission in both cases
R30 ZrO-coated	20	5.0×10^{15}	9.1	340	Breakdown and puncture near ground end
R28 doped	13	7.4×10^{15}	8.4	360	360 kV with krypton 1-hr soak, 350kV in vacuum 5-hr soak, 2 times Minimal field emission in both cases
R30 doped	20			360	Breakdown originating at high voltage end and puncture near ground end

GTS to do list, slightly amended:

1. Gun
    a. modify design to use long FEL insulator, a R350 receptacle in bore of this long insulator, and a "shed" style triple point protector to electrode
    b. we need to add WP1250 NEG pumps, with semi-circle shape, upstream and downstream of the electrode
    c. modify the gun drawing to use the 5 hole anode and the 10" flange John designed (unfortunately, the half nipple on this flange is not long enough for a haimson)
    d. we need the correct height supports for the gun chamber, such that gun ion pump clears table top
2. CsK2Sb depo chamber (sheep chamber)
    a. height consistent with gun
    b. manipulators

    c. heaters
    d. other things
3. Beamline
    a. mate the VA beamline to gun
    b. add a dif pump can and dump to the other end of VA beamline we can leave space for a spectrometer beamline
4. Overall
    a. where to put the gun and beamline in the small room, rigid HV cable from supply to gun, manipulators, a spectrometer beamline, how to ensure walkway.