

## GTS Meeting minutes

December 1, 2015

(Yan, Riad, Poelker, Carlos, Danny, Josh, Fay)

- 1) Carlos explained the difference between traditional field emission, and voltage induced gas desorption
- 2) We discussed our phased approach to building a beamline. Phase1, we agree to "simply" use the VA beamline as built, plus perhaps add another cross, diff pump can and dump. Phase 1 beamline will be used to measure thermal emittance vs CsK2Sb surface morphology, and also vs gun voltage. In addition, the Phase1 beamline will be used to measure lifetime of CsK2Sb photocathode
- 3) For Phase 2 and 3, Fay prefers short steering magnets, like the ones Jay designed. But we are a bit confused with Jay's design, which seems to be changing? Riad will coordinate a magnet discuss once Jay is done with CEBAF gradient issues
- 4) Phase1 beamline will employ 4" long haimson steering coils at locations where we have 2.5" pipe. For other locations, where pipe is 3" diameter, we will need to find or make appropriate steering magnets, or replace some pipe with 2.5" diameter pipe and use more haimsons. Carlos will look for steering magnets for 3" pipe.
- 5) Yan will model the Phase1 beamline and determine if the first solenoid can tightly focus the beam sufficiently upstream of the first viewer cross. If this won't work, he will imagine using the second viewer cross, but maybe it's too far away.....
- 6) Yan and Carlos and Bubba will continue to apply high voltage to our Plan Y gun: white R30 with electrode that holds dummy puck, and with John's original shed. All parts were diamond paste polished and heated inside Big Blue to 900C. Presently, the gun has seen 325kV but with field emission.
- 7) The plan is to continue to high voltage process the gun, such that we can make beam at 325kV without field emission. Typically, this requires we process the gun to some higher voltage value, say ~ 350kV.
- 8) Once we can sit at 325kV without field emission, our focus shifts to making beam. This means we stop to build the CsK2Sb depo chamber and the beamline, with all things bolted to floor.
- 9) The magnetic sample manipulators have arrive, the linear translation stages are here, we can add this stuff to the sheep chamber
- 10) Phil noted we cannot use a Kurt Lesker linear translation stage with hand wheel adjust, it is too big to fit in the hole of the table. He will construct a simple bellows manipulator using three Thompson rails and a homemade motor adjust, like we use on the photocathode load chamber.
- 11) Once the bellow stages are added to the top and bottom of the chamber, we can add the heaters to determine how much longer we need the shop to make them....
- 12) Did we agree to purchase top and bottom flanges, with 5 ports? From Kurt Lesker?
- 13) Then it's time for mask, NEG pumps, the antimony boat, and garages
- 14) John would need to make another effusion source air heater

- 15) We would like to soak the gun at voltage without being present in the GTS control room. I asked Henry and Harry if this was ok.
- 16) After the depo chamber is built and the beamline has been added and baked, there is epics work that must happen: magnet controls, viewers and cameras, current monitoring, rad monitors, laser attenuator, laser scanner for QE maps, laser shutter.
- 17) Still waiting for Vashek to provide shielding assessment. How much current can we run at GTS?
- 18) Once the gun and beamline are bolted to the floor, we can determine if there's room enough inside GTS to construct the second gun for high voltage conditioning. (we are in a bind, there are no other places to high voltage condition a gun. It takes months to condition a gun, and we don't have months at UITF, we can't kick people out of cave to condition a gun at UITF, they need to be inside the cave to build beamline, plumb in LHe, add cables to magnets and viewers, etc.,)
- 19) A second gun chamber could employ the big GP500 in place of the anode....this would help improve vacuum during HV conditioning.
- 20) The second gun will employ black R30, the barrel polished electrode that Bubba will fine tune, and Yan's optimized shed.
- 21) Bubba can start hand polishing the barrel polished electrode
- 22) Yan needs to complete the design of the Plan Y optimized shed, and give this to John, who will draw it via CAD. WE can then ask the shop to make it. Then send it out for barrel polishing, then fine tuning....
- 23) Phil is considering how to add WP950s to the second gun, in front and behind the ball electrode.
- 24) Plan Z: Yan's idea to modify the gun chamber is probably a good one (i.e., rather than use today's chamber that has a tight clearance for big FEL insulator, and high field strength). We discussed pros and cons of cylindrical gun chamber, with cylinder axis orthogonal to beam direction, and parallel to beam direction. Regardless of how we orient the gun chamber cylinder, we want the chamber to be big enough to hold lots of WP1250 NEG pumps....
- 25) We discussed using the Frankengun chamber....since it already exists...but it is very big!