**Wastewater & Booster Commissioning Runs (May – Sep, 2021)**

**Prepare source to provide 100 nA cw reliably, >10 uA for pulsed beam modes**

**~2 mo. to investigate and perform corrective actions (May, Jun)**

|  |  |  |
| --- | --- | --- |
| Area | Issue | Corrective Actions |
| Pucks | ID too small (5 of 9 pucks) | Shop widening/repairing (job 330347) 5 pucks  Pucks 6, 8, 22 installed w/ new bulk |
| Long Manip. | Mis-aligned to cathode  Likely due to “bad” pucks | Replace Ag plate schneedle w/ Nitronic low gall  2nd 316L fabricated, spare and for fit-up tests |
| Cathode | Field emission 150-200 kV  Mis-alignment uncertainty | Install and **operate Nb electrode at 200 kV**  **HV gas conditioning to reasonable voltage**  Located cathode 1.6 mm right wrt gun chamber |
| Insulator | Insulator punctured  Grease sucked to chamber | Successive bakes required to eliminate grease  **Should not run with excessive field emisson** |
| Anode | Mis-aligned 3 mm beam **left** relative to cathode | Aligned to cathode within about 100 um, awaiting finals |
| Gun Table | Grossly mis-aligned to beam line | Surveyed Y-chamber, align cath-anode to y-chamber, then **table laser to cath-anode** |
| Mask | Screw holes didn’t line up | Tube hole drilled, set screw now fits  Mask aligned to puck #8 (elog 3881085) |
| Laser | Low power <3 mW | **Restore settings to provide ~30 mW to cave** |

**~1 mo. to test rebuilt gun (Jul)**

* leak check, bake, activate negs
* Find and repair (small) SF6 leak in HVPS tank
* high voltage test, soak
* activate GaAs, dark lifetime
* evaluate beam orbit

**~2 mo. support LDRD and Booster Commissioning (Aug, Sep)**

* Make source ready
* CIS on-call during LDRD & Booster tests
* Participate in Booster characterization measurements, i.e. specific deliverables

**Resources**

* CIS (8 pw)
* S&A (2 pw)
* DC power (2 day)
* I&C (2 day)
* Machine shop (pucks, manipulator “schneedles”)

**Reliable 200 kV Gun for CEBAF & then UITF (Jul 2021 - Mar 2022)**

**14” gun chamber geometry suffers from FE >150 kV (gradients marginally too high)**

**Take approach to build larger 18” gun chamber, like GTS operated w/o FE @ 200 kV reliably**

**~3 mo. mainly gun assembly, some fabrication (Jul, Aug, Sep)**

* vacuum – NEG coated 18” chamber, isolated NEGs, **symmetric ground screen**, new over-board IP, Kr leak valve line, no RGA, check UITF/CEBAF mate to Prep and NEG tube
* cathode – R30 alumina insulator, new fiducialized degassed flange ready, ball & shed electrodes polished, puck cage on-hand, two styles rear cathode rings on-hand
* anode – anode fabricated, **polish**, feed-through on-hand, **evaluate offset anode hole (at GTS and by simulation)**, **fabricate off-set anode if needed**.

**~3 mo. to test (Oct, Nov, Dec)**

* Fiducialize insulator flange to gun chamber
* Assemble gun in 1137
* Replace 14” gun R350 – R28 cable with 18” gun R350 – R30 cable
* Swap guns at UITF, align table
* Leak check, bake gun
* high voltage test, soak
* activate GaAs, dark lifetime
* evaluate beam orbit
* evaluate operating lifetime biased v. grounded bulk, SSL?
* **Green or Red light for CEBAF…**
* Might be used for the Cornell activation studies

**~6 mo. to build reliable 200 kV gun for UITF (Oct 2021 – Mar 2022)**

**Resources**

* CIS (8 pw)
* Designer (4 pw)
* S&A (2 pw)
* DC power (2 day)
* I&C (2 day)
* Machine shop (2 jobs)
* **M&S ($150k for spare HV chamber)**

**Photocathode R&D with Cornell (May 2021 – Sep 2022)**

**Accelerator Stewardship FOA (NCE to Sep. 1 2022) to study “robust” activation of GaAs**

**Compare QE, lifetime and polarization w/ and w/o Sb in the activation**

**200 kV gun and Sb depo chamber (Oct 2021 – Mar 2022)**

* photocathodes – use bulk (maybe SSL from Cornell, add Sb source, use O2
* laser power – boost to >30 mW (assumes 6 mA/W/%)
* gun – use 18” 300 kV gun chamber initially, after that upgrade chamber, spare to CEBAF

**Install Wien filter (Jan – Mar 2022)**

* 3rd vacuum chamber on hand
* **Polish new non-brazed style electrodes (6)**
* HV PS exist, functional work, but **firmware needed for EPICS polarity control**
* Magnet core re-worked, Ni plates exist, **map magnet at MMF.**
* DC PS exists.
* Wien quad crosses & viewers, ready
* Assemble and **S&A align electrodes, Ni plates**
* **ME designer finalize design, fabricate fixture for UITF 80/20 install, S&A install**

**Mott polarimeter (Jan – Mar 2022)**

* scattering chamber – dump, windows, detectors, pump on-hand
* collimators – **ME design?, and fab large acceptance**
* target ladder – ladder, controller on-hand; **order new foils**

**Data acquisition (on-going, should wrap up by Jan**

* hardware – VXS crate, ADC’s, Server installed. **Install NIM crate, signal amplifiers**
* firmware – ADC firmware and CODA are ready
* analysis – **write software “decoder” and “analyzer”**

**~3 mo. support LDRD and Booster Commissioning (Apr – Jun 2022)**

* Setup/test high current to cup, Mott dump (thru) and w/ chopping aperture
* Commission Wien filter and polarimeter
* ~6 wks Lifetime w/ polarization study (1 baseline, 4 Sb, 1 SL cathode x 1 week/test)

**Resources (Robust AWP)**

* CIS (12 pw)
* Designer (3.4 pw)
* S&A (1 pw)
* DC power (0.5 pw)
* I&C (0.5 pw)
* MMF (1 pw)
* Fast electronics group (2 pw)
* Machine shop (~5 jobs)
* M&S $50k