**Wastewater & Booster Commissioning Runs (May, Jun, Jul, Aug, Sep)**

**Prepare source to reliably provide 100 nA cw beam and 10 uA pulsed beam modes**

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

|  |  |  |
| --- | --- | --- |
| Component | Issue | Corrective Actions (bold still remain a concern) |
| Pucks | ID too small (5 of 9 pucks) | Shop widening/repairing (job 330347) 5 pucks.  Pucks 6, 8, 22 installed, ready for run |
| Long Manip. | Mis-aligned to cathode  Likely due to “bad” pucks | Replace Ag plate schneedle w/ Nitronic low gall  Spare 316L fabricated, spare and for test fit-up |
| Cathode | Field emission (>xxx kV) | **14” gun chamber design is unreliable at 200 kV**  HV gas conditioning to reasonable voltage |
| Insulator | Insulator punctured  Grease sucked to chamber | Successive bakes to eliminate grease from RGA  Limit excessive conditioning |
| Anode | Mis-aligned 3 mm beam **left** relative to cathode | Cathode flange is 1.6mm beam **right**  Human error? |
| Gun Chmbr. | Mis-aligned | Cathode-anode + laser aligned to Y-chamber  NEG tube replaced w/ bellows both ends |
| 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 | Tune settings to provide ~30 mW to cave |

**~1 mo. to test “rebuilt” gun at UITF (Jul)**

* leak check, bake, activate negs
* high voltage test, soak
* activate GaAs, dark lifetime
* evaluate beam orbit

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

* Source checks
* CIS on-call during the LDRD runs
* Participate in Booster characterization measurements

**Resources**

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

**Reliable 200 kV CEBAF Gun (Jul, Aug, Sep, Oct, Nov, Dec)**

**14” gun chamber geometry suffers from FE >150 kV**

**Take approach of building 18” “300 kV” gun which operates reliably at 200 kV**

**~3 mo. to build gun (Jul, Aug, Sep)**

* vacuum – NEG coated 18” chamber, isolated NEGs, symmetric ground screen, new over-board IP, Kr leak valve line, no RGA surfaces, checking UITF/CEBAF mating to Prep and NEG tube
* cathode – R30 alumina insulator on new fiducialized degassed flanged ready and leak checked ok, ball electrode polished, shed polished, puck cage assembly on-hand, solid and modified rear ring adaptors on-hand
* anode – anode fabricated but has some scratches, anode flange w/ feed-through on-hand, evaluate offset anode hole (at GTS and by simulation), evaluate anode support (spider) to check for permissible anode shift in every direction.

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

* survey gun chamber to determine top flange position wrt anode support mounting fixture machined on the gun downstream side.
* install, align on UITF gun table, and align long end manipulator to cathode back end
* leak check, bake, activate negs
* Find and repair (small) SF6 leak in HVPS tank
* Replace 14” gun R350 – R28 cable with 18” gun R350 – R30 cable
* apply and evaluate HV, dark lifetime, radiation, anode current, soak at high voltage
* evaluate beam orbit
* evaluate operating lifetime biased v. grounded bulk, SSL?
* may be used for Cornell activation studies
* prep for CEBAF

**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**

**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**

**Source**

* 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

**Wien filter (copy of CEBAF)**

* 3rd vacuum chamber on hand
* Six SS single part machined electrodes on-hand, spline fit to B. Dunham’s original design. **One pair of electrodes needs to be polished**.
* Functional in UITF, positive and negative power supplies, 30 kV each. HV switcher is functional but firmware is needed to control polarity in EPICS.
* Magnet core re-worked with steel fillers spot welded to the core. **Magnet needs to be mapped again.**
* Functional in UITF, 20A SCE PS, like CEBAF.
* Wien quad crosses, ready
* All vacuum components on hand. S& check electrode gap, establish magnet plane, and axis defined by Nickel plates.
* Fixture with alignment features like the ones used for the CEBAF Wiens is on hand, **ME designer needed to finalize design.**

**Mott polarimeter**

* scattering chamber – on-hand
* fixed dump – on-hand
* detectors – on-hand
* collimators – **rework at shop with larger acceptance**
* target ladder – ladder, controller on-hand; **order new foils**

**Data acquisition**

* hardware – VXS crate, ADC cards, and Server are installed at UITF mezzanine. **Need to install NIM crate and signal amplifiers**
* firmware – ADC firmware and CODA are ready
* analysis – **need to develop a “decoder” and an “analyzer”**

**Resources (Robust AWP)**

* CIS (5 pw)
* Designer (3.4 pw)
* S&A (1 pw)
* DC power (0.4 day)
* I&C (3 day)
* Fast electronics group (2 pw)
* Machine shop (~5 jobs)
* M&S $50k