Summer SAD Injector – 2018 (REV 1 – April 12, 2018)

- **Perform Bubble Experiment Engineering Run**
  - Vacuum work - install harp and ceramic break on 5D beam line
  - Bubble chamber – reinstall target chamber as before
  - Beam Run – approximately one week of 24/7 running (up to 100uA)
- **Install 350 kV HVPS**
  - Assemble HVPS/SF6 tank near Gun2
  - Install HVPS controls/software
  - Modify and integrate PSS controls
  - Certify operation of HVPS
  - Demonstrate capability to switch between new/old supplies
- **Install 200 kV Gun**
  - Protect photocathode supply in Gun2
  - Vent Gun2 to install/align the 200kV electrode from UITF
  - Bake Gun2, leak free
  - High voltage condition Gun2, vacuum and/or gas conditioning
  - Make photocathode, check laser alignment
  - Restore and run beam at 130keV (new gun and HVPS)
  - Increase voltage to test injector settings needed w/ 200keV beam
- **Reliable Polarized Source**
  - Demonstrate "new gun" ready for operations
  - Gun back-out possible
  - HVPS back-out possible

Week	Program	OPS	CHL	PSS	S&A	Install	EES	RF	DC	Bubble	GUN	HVPS
16-Apr	T-Minus 3									Prep	Prep	Prep
23-Apr	T-Minus 2									Prep	Prep	Prep
30-Apr	T-Minus 1									Prep	Prep	Prep
7-May	Bubble/HVPS Install	Start 5/10	Trans	INJ/NL	x	x	Harp			Install/Run	Fiducialize 200kV	Install at tunnel
14-May	Bubble - Run	End 5/18	2K	INJ/NL						Run	None	None
21-May	Gun/HVPS Install	None	2K	INJ	x	x	Decarad	Chopper	Mag		Install/Pumpdown	Transition to 350kV HVPS
28-May	Gun/HVPS Install	Day	2K	INJ	x		Decarad/BPM	Chopper	Mag		Bake/Align	Test 350 kV HVPS
4-Jun	Float	Day	2K	INJ							Float	Float
11-Jun	Gun/HVPS Run 130	Day	2K	INJ							HV Condition 200kV	Plan A: 350 kV HVPS
18-Jun	Gun/HVPS Run 130	Day	2K	INJ							Restore 130 keV	Plan A: 350 kV HVPS
25-Jun	Float	Day	2K	INJ							Float	Plan A: 350 kV HVPS
2-Jul	Gun/HVPS Run 200	Day	2K	INJ/NL?							Test 200 keV FC1	Plan A: 350 kV HVPS
9-Jul	Gun/HVPS Run 200	Day	2K	INJ/NL							Test 200 keV FC2	Plan A: 350 kV HVPS
16-Jul	PSS Cert	None	Trans	Cert							Backout float	Backout float
23-Jul	PSS Cert	None	Trans	Cert							Backout float	Backout float
30-Jul	HCO		2K	INJ/NL								
6-Aug	Inj Setup		2K	INJ								
13-Aug	Restore		2K	INJ/NL								
20-Aug	Physics		2K	INJ/NL								

May 6 – May 19: First two weeks of SAD are highly integrated

- **Sun/6**
  - Beam off at 6am, then surveys
  - Attach turbo pump to 5D over board valve, clean-up overnight
- **Mon/7**
  - Bubble
    - Secure 5D vacuum valve
    - Unstack lead hut (RCG)
    - Vent 5D, install harp + ceramic break, verify isolation
    - **S&A** set harp rotation
    - Pump down + leak check vacuum OK
    - **Install** move crates tunnel, work w/ Brad begin install
    - **S&A** work w/ Brad set Bubble chamber
    - Install Bubble laser shutter
- **Tue/8**
  - Bubble
    - Final leak check Bubble line
    - **Tony** (re)allocate harp cable, make-up + HCO harp
    - Connect dump picoammeter
    - **Install** work w/ Brad to roughly set Bubble chamber
    - When ready **S&A** check 5D radiator/collimator set Bubble
  - Gun
    - **Install** move Suitcase, mate to Load and start bake
- **Wed/9**
  - Bubble
    - **S&A** complete alignment of Bubble chamber
    - **ACE** support for network controls
    - Brad continues Bubble assembly and training
  - Gun/HVPS
    - **Install** move/assemble SF6 + HV stack w/ John in tunnel
    - End suitcase bake
- **Thu/10**
  - Bubble
    - Complete Bubble assembly and training
    - Complete Bubble HCO checklists
  - Gun/HVPS
    - Continue HVPS assembly (short bar, LV circuit, SF6 charge?)
- **Thu/10 1600 – Fri/18 0800**
  - 24/7 Ops and INJ/NL begins…(CA/RA by exp't as needed)
- **Sat/19**
  - Open House

May 21– June 1: These two weeks we install 350kV HVPS and 200kV gun

- HVPS
  - Secure 150kV Glassman
  - Facilities/PSS install conduit and AC contactors, cabling
  - John install 350kV Glassman control unit
  - Install 350kV Glassman interface chassis
  - Install 350kV Glassman control software
  - Move Keithley readbacks from 150kV to 350kV (no soft lock)
  - John/Software install DAC iocin3, software/cabling
  - PSS/Software install VME comparator card (HV window), cabling
  - Complete assembly/cabling, HCO w/o PSS permissive
  - When ready BP lock-up for HCO up to resistor tank
- Gun
  - Check laser retro-reflection
  - Secure HVPS from Gun
  - Isolate Gun valve
  - Move photocathodes to Suitcase
  - S&A fiducialize 10" flange to gun
  - Vent gun, remove electrode to S&A lab
  - S&A fiducialize electrode to 10" flange => to set 200kV electrode
  - Check 200kV vs. 130kV puck cage => choose best one
  - Remove existing NEG tube
  - Install **fiducialized** 200kV electrode to Gun2, set/align
  - Install NEG tube w/ M20 BPM's
  - Replace RGA? w/ Kr gas valve/plumbing
  - Check all electrical isolations
  - Pump down Gun2, leak check
  - Setup bake (HV chamber, NEG tube, Kr line, overboard)
  - Careful bake: up – soak – down – activate – down => leak check
  - Rejoice in leak free bake, check vacuum
  - When ready, move photocathode to HV, check retroreflection
  - Hook-up two new BPM's, perform HCO
  - Reconnect cables, magnets (not HV yet!)
- Other
  - Install Decarad
  - Move PSS kicker to "200kV location"
  - RF condition choppers for 200kV operation
  - Test magnets/PS for 200kV limits

June 4 – June 8: This week is FLOAT, but if going well we move to next stage…

June 11 – June 22 : These weeks we restore gun operation!

1. Perform HCO of PSS/HVPS (interlocks, controls, software)
2. W/o connection to gun demonstrate PSS/HVPS operation
3. W/ connection to gun via resistor tank HV condition w/ vacuum condition
4. Assess x-ray/vacuum vs. HV, then Kr condition if needed
5. Complete conditioning to X kV
6. Make photocathode, install gun, use LV to measure QE, check retro-reflection
7. Restore at 130kV for standard operation INJ SEG mode
8. Use 130kV beam and test PSS kicker in "200kV location"
9. Test operations of 130 keV beam using new gun, HVPS and PSS… to FC2
10. Once satisfied, stop so can test migration/steps to go between 350/150 HVPS
11. Rejoice!

June 25 – July 6: Another week of float, but if successful we charge forward !!!

July 2 – July 13: Break for the July 4th , and test for 200 keV operation

1. Configured and scale injector for 200keV beam
2. Operate gun at 200kV, setup/test injector for beam to FC1 (chopper OFF)
3. Perform PSS kicker and PSS dipole (INJ SEG) testing/certification
4. Use Wien or spectrometer to measure energy stability
5. Turn on chopper, measure deflection v. power, perform chopper setup
6. Benchmark beam v. charge (transmission, emittance)
7. Decide on possible setup to FC2 (chopper ON/OFF, capture ON/OFF)

July 16 – July 27: Backout Float !

1. Planning on success we are done by now, and would consider introducing opportunistic INJ studies over these two weeks, e.g. PQB laser/beam work.
2. IF we had any problem w/ Gun or HVPS or NEG tube we would've learned this ~two weeks ago, and by now would have resolved or backed-out…so, this is really Float for a Backout.