

Weekly Report – week of November 7<sup>th</sup>, 2011  
Fabrication and Assembly of ERL hardware  
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**Controls:** Controls and power supply testing of the first group of Danfysik modules has been completed. Minor pet interface additions are being made before the remainder of the Danfysik testing proceeds. A demo of the MEDM graphical interface development tool was given for members of the RF Group.

**Cryogenics:**

CryoControls: PLC and SCADA programming continues.

Electric feeds: Review with Electrical engineer for power drops for the CRYO ERL racks with four 20-amp 120 volt circuits and a single 208 v 20-amp circuit in the condo area.

Update on cryo controls logic document and process control with a chart being worked on.

Cryo System: Operating procedures OPM's being worked on.

LN2 Storage Dewar: Splash test completed. Dewar is cold.

Cryogenic transfer lines to ERL cryomodules: Vendor still working on the valve boxes. Installation: Phase hazard Analysis/Detail installation plan is being written.

SRF Gun Cryomodule interfaces: 5K intercept circuits: Heaters on order.

SRF Gun Cryomodule cryo instrumentation:

Large Grain Gun Test: Temperature sensors cables to be wired into the ERL Main control system analog cards. Relief calculations for the UHV volumes will be submitted.

**Gun Cryomodule/5-cell cavity:** With the discovery of e-7 range leaks in both FPCs on the gun string assembly the vacuum group will make necessary repairs. An estimate of cost for spare FPC's will be investigated in the event future FPC replacement would be required. The assembly and survey alignment of the redesigned transport cart continues.

**Instrumentation:** The two emittance measurement Pepper Pots with slotted masks installed have been cleaned and an RGA test showed no vacuum concerns during bakeout. They are ready for survey & inspection. The four halo scrapers have been checked for particulate count, two passed and two require recleaning. A bakeout with a RGA test is being scheduled before recleaning. A site visit last week to Radiabeam (the fabricator of the remaining four profile monitors) revealed useful information about the performance and setup of the profile monitors. The four profile monitors are scheduled to ship within a week. The stepper motor controlled tuner for the 5-cell cavity will be integrated into the new LLRF system soon. We are investigating what is involved with converting the existing 5-cell stepper controls to be more like a conventional C-AD RF tuner closed loop system.

**Laser:** Continuing work on fourth harmonic generation, using simulations to refine configuration and guide crystal purchases. Characterizing current timing cable

connections and researching improved cabling options and possibilities for feedback stabilization against thermal drifts. Laser mirror cross assembly is complete; an interference issue in the gun module placement may require rescheduling its installation in the beamline.

**Large Grain Gun:** R. Than has completed pressure relief calculations in preparation for PCSS review. We are compiling experimental procedures and preparing other documentation necessary for the review. C. Degan has finished putting together a data acquisition system for temperature sensors and the RF system. Plans are underway to test the temperature sensor portion of DAQ shortly. The assembly of the vacuum system is delayed pending availability of the cleanroom and processing of fasteners and gaskets.

**Mezzanine:** The floor has been epoxy painted in preparation for the cleanroom. The contractor Clean Rooms West has begun assembly of the cleanroom.

**Photocathode:** [Deposition System] Cathode stalk assembly is completed. A replacement "K" type thermal couple feed through has been received and installed into the stalk assembly. The ion pump is being processed by the Vacuum Group. NEG pump and source arms have been received with final assembly inspection completed. The manually operated roughing valves have been 90% assembled. Final orientation of arm elbows to be determined when attached to the main deposition chamber. The required silver plated hardware has been ordered for the mounting of the antimony arm gate valve.

At the Photocathode meeting additional requests were made for getting labor commitments for Deposition System assembly. The metal cathode cleaning chamber has reached low  $10^{-9}$  scale vacuum after bake out. Laser cleaning of the first copper cathode will be completed today.

#### **Vacuum:**

1. The gun and FPC's were baked to 120C for 24 hrs. Subsequent to bake, a  $e^{-7}$  range leak was found in each FPC in braze joints. Corrosion was observed in various locations of the FPC. The FPC's were leak tight prior to bake and while at temperature. A meeting was held with AES to discuss FPC leaks in the braze joints. It was decided to spray seal the leaks. The FPC with the larger leak began leaking after spraying at a  $1e^{-7}$  level a few hours after spray. It was sprayed again and began leaking at a rate of  $5.7e^{-8}$  after a few hours. Will continue to monitor and spray as necessary until the spray seal cures. An RGA was mounted to the turbostation and used to monitor vacuum conditions during the spray and no rise in HC was observed.
2. A quote for two HOM ceramics complete with interface junction and high ohmic coating was received. Total for two pieces is ~24K Euro with a ~5 month lead. Will decide on this option, developing our own coating, or perhaps purchasing their ceramics with unique junction that we coat here.

3. Design of an alternate e-gun HOM Damper impedance bridge between the ceramic and metal cuffs continues in parallel with a vendor supplied solution requiring new ceramic breaks. Several candidate grounding bridge designs have been reviewed with Central Shops. A final concept has been detailed and provided to Shops for fabrication.
4. Hardware for the BD vent headers was received.
5. Detail design of the ERL zig-zag dipole chambers is complete. Dipole chamber drawings remain in final checking. Detail design of SST/inconel chambers has resumed. Procurement documents are complete and released, including the PO with spec and SOW attached. Awaiting signed-off drawings to issue RFQ.
6. All laser transport components staged and awaiting anchor drilling which will be followed by transport line installation.
7. Laser mirror holder assembly complete and installed in the laser/ion-pump cross. Leak test complete.
8. A final helium mass spec leak test of the pepper pot following the 200C bake out is complete.
9. One of the 2 Halo scrapers that passed clean room QA is staged for 200C bake out preparations. The 2 halo scrapers that failed clean room QA are staged for disassembly and precision cleaning, including ultra sonic wet processing of the welded bellows.
10. Work continues toward improving the 1<sup>st</sup> and 2<sup>nd</sup> generation cathode transport cart vacuum controls and the interfaces to the deposition system and e-gun.