

Weekly Report – week of October 31st, 2011
Fabrication and Assembly of ERL hardware
PI: Ilan Ben-Zvi, Brookhaven National Laboratory

Controls: Software development was completed for the system that will provide an interlock signal to the Machine Protection System from digitized thermocouple data. Plans have been established for integrating the EBIS pepper pot emittance measurements into the Controls System, which will ultimately be leveraged in order to provide the same functionality at the ERL.

Cryogenics:

CryoControls: Instrumentation installation for the SRF Gun module will be done once the cryostat is in place.

PLC and SCADA programming continues.

Electric feeds: 480VAC connection to Cryoplant expander brakes panel is next on job list.

Cryo System: FMEA (Failure Mode Effect Analysis) has been completed. Some drawing updates to be released by doc dept. Review has been rescheduled to Nov. 29. The walk-thru of the vertical test dewar facility has been scheduled for Dec 1 with ASSRC & LESH-PCSS committees.

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

Cryogenic transfer lines to ERL cryomodules: Vendor still working on the valve boxes. Installation will be a December start.

Cryogenic transfer lines to ERL cryomodules: piping supports: The engineering and design for the piping supports has been completed. Drawings need to go to doc control dept for release. Materials list being prepped for requisition.

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

SRF Gun Cryomodule cryo instrumentation: Bake out monitoring setup of temperature sensors that is inside the cavity's helium volume side is complete.

Large Grain Gun Test: Review with Liaison Physicist regarding relief calculations for beam vacuum / window chamber vacuum volume.

Gun Cryomodule/5-cell cavity: The assembly of the gun string assembly continues with a successful bake out. After leak check and bleed-up the assembly will continue with installation of the e-gun into the cryostat.

Instrumentation: A BNL engineer is visiting the Radiabeam facility this week to receive training, and witness the final testing of the four profile monitor stations that are all scheduled to be delivered within a few weeks. The 100 micron thick YAG:Ce screens that were expected to have an extended delayed delivery have arrived at Radiabeam, these will be installed with the delivered profile monitors. A procedure is under development to provide directions on how to replace the slotted emittance masks on the pepper pot assembly with the hole matrix heads, and preserve the critical alignment characteristics. We have received information from the Bergoz ICT and DCCT current transformer manufacturer that a protective

metallization coating on the inside of the ceramic breaks is not necessary based on experience at many other facilities with similar electron beam parameters.

Laser: Successfully tested locking of the laser to the low-level RF for the 5-cell cavity, using additional amplification. More gain will be built into the low-level RF, and losses between the control room and the laser room will be reduced when the appropriate dedicated cable is installed. Tests of fourth harmonic generation continue: produced 1.1 Watt of 266 nm light, using a BBO crystal, without the thermal problems we encountered in KDP. Spot quality needs to be improved; we will procure crystals of different lengths and try to optimize the optical configuration.

Large Grain Gun: The final hardware for the vacuum system has been received. The fasteners, gaskets, and tools are being processed in preparation for assembly of the system. R. Than is working on pressure calculations of camera and cavity vacuum systems in preparation of paperwork for a safety review. W. Xu is working on preparation of operating procedures for the experiment. A contract is being prepared with AES for procurement of a vertical test cathode.

Mezzanine: All materials have been received for the clean room that will reside under the mezzanine. The preparation for the floor refinishing started this week. A materials list is being generated for clean room equipment, work benches, particle counter, and consumables.

Photocathode: [Deposition System] Cathode stalk assembly is 90% completed. A replacement "K" type thermal couple feed through has been ordered to finish assembly. The final parts; the ion pump, NEG pump, and source arms are being processed by the Vacuum Group. The manually operated roughing valves have been delivered after cleaning and are being assembled. The gate valve for the antimony arm has been returned from VAT after repair.

At the Photocathode meeting there were discussions about getting labor commitments for Deposition System assembly, building a mock laser box for safety approval, and machining the laser breadboard for the metal cathode cleaning chamber. The copper cathode required for the G-5 test is expected to be finished in four weeks after high temperature braze attachment of the skirt and cooling fittings are completed.

Vacuum:

1. Detail design of the ERL zig-zag chambers continues. Dipole chamber drawings are in final checking. Detail design of SST/inconel chambers has resumed. Awaiting signed-off drawings to issue RFQ.
2. All laser transport components staged and awaiting anchor drilling which will be followed by transport line installation.

3. Laser mirror holder assembly complete and installed in the laser/ion-pump cross. Leak test of assembly to follow.
4. 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.
5. 200C Bakeout of one of the pepper pots is complete. Vacuum has improved and the RGA scan is clean and reveals no leaks. A final helium mass spec leak test will follow.
6. 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.
7. The heating process of the e-gun SRF cavity bake out is complete.
8. Work has begun to improve understanding of the cathode cart to deposition system vacuum interface and controls.
9. Bakeout of the e-gun is complete. The cavity was held at 120C for 24 hrs, then the string was leak checked at temperature. The cavity will be leak checked again at room temperature and then bled up to UHP nitrogen for assembly into cryostat.
10. Large grain cavity assembly work has begun in the clean room.
11. Mechanical assembly of two ERL turbopumps continues.
12. All parts for the deposition chamber have been fired and the mechanical arms are being assembled for helium leak check