Weekly Report – week of August 15, 2011
Fabrication and Assembly of ERL hardware
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Beam line: In the G5 line downstream of the 5 cell cryomodule stands and magnets have been installed. The magnets have been split to allow the install of the vacuum chambers. Chamber installation is underway requiring a low particulate environment.

Controls: Testing of controls for danfysik power supply is in process as we receive guidance from the manufacturer about communication interface.
An interface development to control Laser from a PC is in progress.
Software for controlling mirror mounts for the laser was tested using 8 channels simultaneously.

Cryogenics:
Vertical test Dewar side: Small vent line is continuing. Parts on ordered to be delivered.
Compressed Air System: Main instrument airlines to 1660 plant /cryo valves and vacuum oven were run by trade techs.
Cryoplant system: Sullair Compressor skid oil some lines being replaced.
Cryogenic transfer lines to ERL cryomodules: Vendor report: LN2 main supply spools completed and ready for final mass spec/pressure test.
Cryo System: FMEA (Failure Mode Effect Analysis) is progressing along for final review with Lab safety committee in Sept.
Large grain gun test: Rotateable CF flange for the last piece of interconnect between 28" dewar and 20Torr return line was ordered.
LN2 11,000 Gal storage dewar: Installation of new level indicator gage and instrumentation valves for PT and DPT transmitter.

Gun Cryomodule/5-cell cavity: Vacuum group continues preparation of all components for cleanroom assembly of FPCs. The air side of the FPC cart assembly was disconnected and put in storage until cryostat assembly. There were evidences of arcing in the FPC2 Kapton capacitor and doorknob area. The Kapton is black in one area, wires connected to the water mat were charred, there soot was found around. The center conductor repaired previously to fix a water leak. The center conductor will be replaced with a new part under fabrication at CPI/Beverly. The doorknob will be cleaned, inspected and polished if necessary. The FPCs were delivered to the cleanroom in BLG 905 for installation into the cavity string**.**
Progress was made on the upgrade of the cathode transporter.

Instrumentation: The instrumentation and motion control device are being assigned specific location based names. The naming convention is under consideration for improvement/expansion with the help of the Controls Group. The complete array of beam loss detectors planned begins to take form as some have

been fabricated (all PMT BLM's complete), pin diodes were purchased, and others are pulled from old experimental areas and recommissioned. The PMT BLM electronics processing interface prototype VME card is in fabrication. Design modifications to the zig-zag magnet chambers continue to pave the way for new YAG based plunging profile monitors at the two dipole locations, currently also in the design stage. Fabrication of Faraday cup amplifiers is complete and await testing. Testing of the prototype DCCT HF bypass cap shows good repeatability after several bake-out cycles. We will proceed with the effort to incorporate this cap in the DCCT shroud enclosure. The ERL extraction transport instrumentation has been defined as a BPM, DCCT, low energy profile monitor, PMT loss monitor, and a IR Camera. A Halo Scraper stepper motor and position transducer has been received from Radiabeam for testing with our driving electronics. The specifications of the feedthroughs and internal wiring details for the SCRF gun stepper tuner and cathode clamp motion control, and readbacks, are being defined.

Laser: Work continues on fourth harmonic generation (266nm), needed for operations with a metal cathode. Beam-sampling and digital imaging setup for laser spot characterization constructed and tested. Decision was reached to equip the gun cross with two separate laser windows at different operation stages, optimized for 266 nm and 532 nm operation. UV windows for transport line are in procurement, delivery expected in 2 weeks. The electronic problem in the phase-locking control now appears to be a power-supply loading issue. A potential simple workaround will be tried when the module is received from the vendor; if that fails a supplementary power supply will be required, but should be straightforward to integrate into the system.

Large Grain Gun: There were two meetings last week. The first was to discuss plans for the vertical test dewar assembly. At the second meeting a design for the optical system for multipactor observation was discuss. The final design will have a camera mounted at the bottom of the cavity looking up into the cathode region via a window. The camera will be housed in an evacuated enclosure and will be kept at room temperature.

Photocathode: Photocathode: The deposition system is being baked with temperature and pressure being logged. The (K) arm was leak checked due to poor vacuum compared to the other arms on the system. There were no leaks found and we now suspect some sought of contamination in the (K) arm. This portion of the deposition system will be opened up and inspected for contamination and further cleaning with a bakeout to follow. The plan is to continue cathode development with the (Sb) arm and (Cs) arms. The new roughing turbos have been delivered and will be scheduled for installation onto the deposition system. Transport cart modification is in progress. Delivery of copper cathode is expected in 4-6 weeks. Laser system for cleaning the cathode is being designed.

Project Management: Nothing new to report.

Vacuum: ERL Zig-Zag Beam line: The two 30 degree dipole chambers have been redesigned to accommodate plunging profile monitors with YAG screens. Corrections to the beam line layout to maintain a centered beam are complete. Detail design of the chamber fabrication drawings will resume.

ERL G5 Beam line: An interim G5 design focusing on e-gun commissioning with minimal beam instrumentation has been accepted and design complete. A few additional simple vacuum components will be needed. The new spool needed to provide space for conventional mounting of the high-energy profile monitor is fabricated and processed. The triplet chamber and dipole chamber are installed on the downstream end of the 5-cell. Mechanical Group is supplying supports. The portable clean room will be repositioned after a burst diaphragm is installed on the triplet chamber allowing magnets to be closed. Focus of installation will shift upstream to the solenoid chamber adjacent to G5 and the laser/ion-pump cross region until instrumentation arrives.

A decision was made to test the resistor coating chemicals on an existing RHIC injection ceramic tube for particulate compatibility. If it is acceptable, then the HOM ceramic can be fully coated with this product (10Kohm or 100 Kohm), eliminating the need for a sputter coating. We will still need to navigate the safety and curing issues of the coating, but if we eliminate the sputter coating development, we may be able to complete for the first gun test.

e-gun: The string continues to be prepared for FPC installation. Areas of high particulate are being masked with clean room plastic sheeting. The BackTech and FPC tooling mount is being cleaned and blown down. The vacuum components necessary to carry out the procedure have been assembled. The "30-30" gauges recommended by JLab for bleedup were received contaminated with glycerin. BNL will instead install a particulate free convection gauge (this will allow accurate measurement of the bleedup and pumpdown rates). The Conflat diffuser was received from JLab. The FPC conditioning cart was delivered to 905 and is being stripped of the air side conductor so it can be cleaned and prepped for entry into the clean room. The cavity will not be vented until the FPC cart is also prepared and ready for FPC removal.

A brief discussion was held with Triveni, Dave Pate and Doug Holmes regarding the need to particulate free process the cathode transport cart. The cart in building 966 was cleaned by AES and baked at BNL with acceptable (for Cu cathode) e-9 Torr vacuum. AES ultrasonic cleaned the parts (including the welded bellows) for the cathode cart. The AES cleaning process was found to be effective in removing particulate for the 1.3 GHz polarized gun test, so it was decided to evaluate the cart in the 905 clean room to measure the contamination level. If it is, or can be made acceptable, it may be the cart to use for the first test if the second cart is not ready in time.

Reviewed the assembly strategy for the large grain cavity with Lee Hammons. Will use a horizontal HEPA filter bank to allow for particulate free assembly. Waiting on vendor for quote.

Clean room consumables were ordered (garments and clean room tape). A delivery of UHP nitrogen was received.

The portable ac unit cooling the 10x10 clean room has been working well to lower the temperature in the clean room, but will be relocated outside of tent to eliminate a negative pressure situation where it is located now.

Vertical Test Facility: The VTF roof shielding blocks have been installed which will allow the PASS group to continue testing and certifying the VTF PASS system.