

Accelerator Systems Division Highlights for the Week Ending July 27, 2001

ASD/LBNL: Front End Systems

The first ion-source antenna coated by Cherokee Porcelain continued functioning well and by now has logged the approximate equivalent of 6 hrs at full 6% duty factor. Some improvements were made to the antenna feed-through in the ion source and to the 13.56-MHz matching unit, reducing uncomfortable heat losses that had been experienced with both components.

Utilizing the Cherokee antenna, the new 80-kW/2-MHz amplifier for the ion source was tested at ground potential (no beam extraction) under real operating conditions up to 6% duty factor and passed the test very well. This amplifier will be installed as part of the Front End ancillary equipment during the remodeling effort for the 'Blue Box' that encloses ion-source and LEBT equipment on high potential. Remodeling will start next Monday, July 30, and necessitates interruption of beam production by the Front End for 5 weeks. During that time plasma and antenna tests will continue on the second test stand.

All mechanical fabrication work on RFQ Module #4 has been completed; an end cap for this module is being designed as the last major item in preparation for power conditioning.

Three more power-coupler windows for the RFQ have arrived and will be conditioned; the last three windows are on order from the same vendor and expected to arrive next week.

The MEBT Rebuncher Cavity #1 has reached the nominal 28 kW for a short time; conditioning continues in order to reach full 6% duty factor.

The FES team is putting together the material for the Estimate-To-Complete, due July 31.

D. Peterson of the FES team met with Bill Foyt to discuss LBNL overhead rates and the FES Earned-Value computation method. No concerns were raised.

J. Mashburn audited the LBNL documentation practices for SNS on July 24 and raised no concerns to be addressed.

Martin Stockli visited the FES team on July 26 and 27 to initiate assembly of a new antenna-test setup and discuss ion-source and LEBT issues with FES team members.

ASD/LANL: Warm Linac

High-Power RF, vacuum, and resonance control cooling systems were connected onto the CCL hot model (Fig. 1). The low level RF system for the hot model, including both the hardware and the EPICS interface, is operational. The system is able to provide full power drive to the klystron in either pulsed or CW mode. Currently, the klystron is driving the prototype 550-kW SRF load, and we have not attempted either closed loop operation or resonance control. The fast protect function is operational and available if needed. Next week we expect to attempt pulsed closed loop operation of the hot model cavity, and to use the resonance control module to track the cavity resonance and supply a control signal to the water-cooling system. (WBS 1.1.2.2)

We started work on the LANL portion of the JLab high-power RF test stand. (WBS 1.4.1.1)

The contract for the production high-voltage converter modulator (HVCM) transformer-rectifier substation was placed. (WBS 1.4.1.2)

Bids are back on the amended SCR modules for the HVCM and are under evaluation. We expect to award the contract next week. (WBS 1.4.1.2)

The LANL Contract Review Board reviewed the HVCM converter modulator RFP. We anticipate issuance of the RFP next week. (WBS 1.4.1.2)

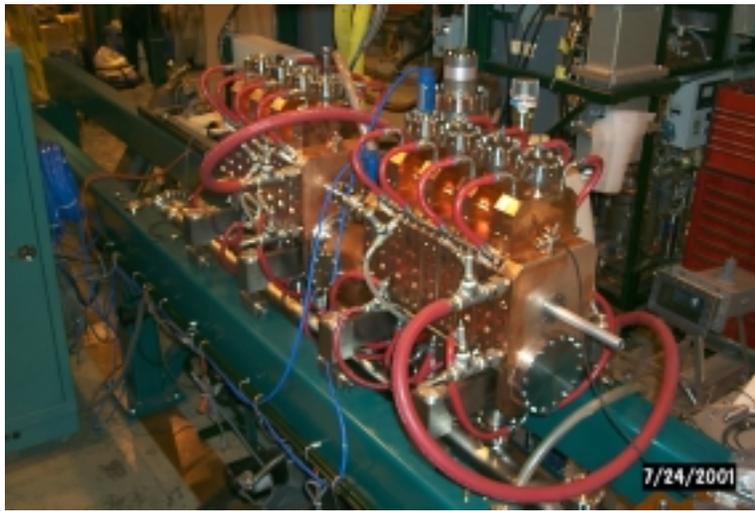


Fig. 1: CCL Hot Model.

Rick Martineau visited the vendor responsible for the DTL tank machining to review progress and to reinforce SNS schedule requirements. (WBS 1.4.2.2)

The first shipment of OFE copper for the CCL RF structure was received at LANL. (WBS 1.4.4.2)

The RFP for the EMQ power supplies was issued. (WBS 1.4.4.3)

John Power visited the vendor responsible for manufacturing the MEBT chopper pulsed power supply to review progress, system reliability, and delivery schedule. (WBS 1.4.5.1)

Will Fox traveled to ORNL to work a number issues including the ETC exercise, FY00 escalation losses at LANL caused by MPM implementation, handoff, integration, spares, cabling, scope creep, and the CCL PDR response. (WBS 1.4.6.1)

ASD/JLAB: Cold Linac

The design review for the 4.5 K cold box was completed.

Fabrication of transfer line components continues.

Prototype medium- β cavity #2 is undergoing buffered chemical polish (BCP) processing. Welding of cavity #3 is complete. See figure. Three first article helium vessels have been received.

The Fundamental Power Coupler is still on schedule to ship the equipment to LANL for testing on August 4.

Finished design of HOM coupler and field probe feedthroughs and cabling.

Electro-Polish Facility modifications to accommodate installation of the cabinet continue.

Best and final offers on cavity fabrication are due next week.

RF Test Stand: Installation of infrastructure support for the RF test stand has begun.



ASD/BNL: Ring

FY01/FY02 procurements, commitments and obligations are being identified for year-end closing.

Nick Simos and Bill Birkholz are conducting a pre-award visit at "SDMS" of France to review their facilities and bid proposal for the RTBT 1st article collimator beam pipe.

The design package for the 30Q44 and the 30Q58 quadrupole magnets was released this week to BNL Contracts to obtain outside vendor quotes. A total of 21 magnets are included in this bid package.

H. Hseuh and M. Hechler have authored a "Proposed Handoff Agreement between BNL and ORNL for Ring Vacuum Systems", dated July 24, 2001.

To date, seven production Ring dipole magnets have been assembled and surveyed. Field quality measurements of these production magnets will begin in late September.

John Mashburn, SNS Project Office, is visiting with Mel van Essendelft this week to audit the BNL/SNS QA program.

As a result of ongoing weekly teleconferences with magnet vendors, Joe Tuozzolo and Bill Birkholz reported that the first article 21Q40 will be ready for delivery to BNL by late September, the 27CDM30 1st article will be air shipped to BNL in early August, HEBT dipole 1st article magnet core is being machined, and the 2nd article half cell (Ring) vacuum chamber will be shipped to BNL this week.

H. Hseuh reported that all bellows for the Ring half-cells and the HEBT beam line are now in house.

The vacuum system's 1st article ion pump is being shipped next week for BNL testing and approval. The production order for remaining units will be placed in late August or early September.

The specification for the ion pump controller is undergoing final review before an RFQ is released for a 1st article.

H. Hseuh has completed a draft naming convention document for Magnet Vacuum Chambers and Drift Space Beam Pipes. His proposal is being circulated for review.

RFPs for the medium range power supplies were sent out this week. Bid closing date is Friday, August 31st.



Picture #1: Assembly of Ring Half Cell Dipole Magnets (7/26/01)

Controls:

ASD/ORNL: Integration

Installation Support

Hand-off Planning: Draft acceptance criteria for the high power RF and low-level RF were given to LANL for review/comment. ASD met with Will Fox of LANL to discuss general hand-off approach. It was agreed that LANL would prepare the ETC for those items they will lead, and ASD will prepare the estimate, including LANL mentor/consult hours, for the activities that ASD leads. A videoconference is tentatively scheduled for the week of August 8 to review the draft cryomodule acceptance criteria.

The CM QA manager briefed ASD personnel on discuss current inspection & review activities on the construction site. ASD will identify those items requiring additional confirmation for incorporation into an acceptance criteria listing (ACL). Weekly site walkthroughs also will begin.

Accelerator Physics

D. Jeon traveled to BNL to work with I. Hofmann on SNS linac space charge induced resonance studies.

The new three dimensional space charge algorithm was implemented into the ORBIT ring tracking code, and initial testing begun. The initial testing shows reasonable results for simple test cases.

The MEBT RF and quadrupole devices were loaded into the SNS global database. The information associated with these entries will be used in the application-programming environment.

A document describing the coordinate conventions, magnet polarity and console display conventions was issued.

Operations

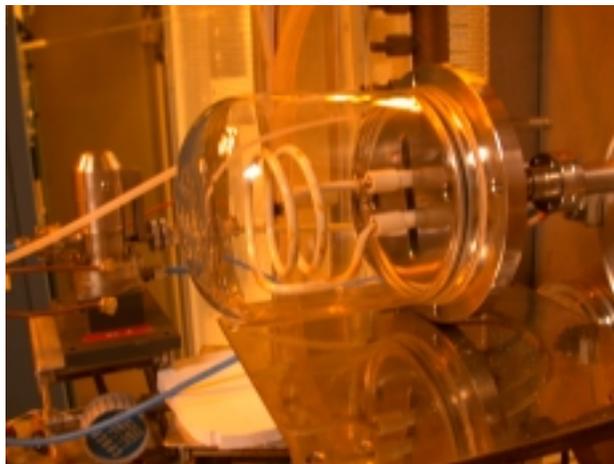
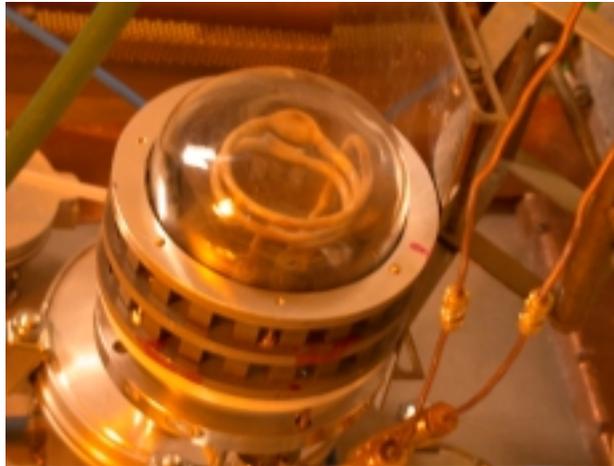
Ion Source Group

Jack Boer has successfully revised the PBGun code to eliminate the hollow beam artifact. Rahul Rauniyar is using the revised code to calculate ion beam emittances for comparison with measured emittances.

Sonali Shukla continues to identify and order some of the many parts required for the hot spare stand.

Rob Welton has completed an optical analysis of several antennas coated by Cherokee. The first batch had an inner layer with high porosity for improved mechanical properties, where as the outer layer was non-porous for enhanced electrical properties. The second batch was coated with two layers of the (initially non-porous) electrical coating. The analysis, however, reveals that now both (the inner and the outer) layers are porous, contrary to the first batch. It is interesting to note that Berkeley reports successful operation with a Cherokee antenna from the second batch, obviously despite the high porosity.

Jani Reijonen, Sami Hahto, and Martin Stockli, with much help from many other LBNL staff members, started up the antenna test-dome. The test-dome is made from a Pyrex tube as one can see in the first picture. Surrounded by cusp magnets and equipped with an internal metal mesh, as shown in picture 2, the enclosure replicates the electrical and magnetic boundaries of the ion source plasma chamber. It allows, however, a visual observation of the discharge as one can see in the third picture. Time constraints allowed only for observation with continuous 13 MHz RF. As with the ion source, the discharge started at very low power levels, filling very nicely the entire volume surrounded by the antenna coil. This is a visual confirmation why it is so beneficial to start the plasma with a continues low level RF.





RF Group

A final design review on the 805MHZ, 5MW tubes was held at Thalys on the 17th and a preliminary review for the 550KW tubes was on the 18th. Major parts for the 5MW tubes are on order cathodes, magnets, etc. The only measurement Thalys is not sure how to do is the "Output phase verses drive power". The issue of quality in manufacture of the electromagnet was raised, which is a concern from past experience. The 1st & 2nd tubes go to LANL on March & April 1st and for acceptance testing, scheduled before June & July 1st, tubes 3 & 4 arrives the middle of July. The schedule should be met.

For the 550 kW tubes the collector that will be used is from a 155 kW average tube using 32 gpm and having a pressure drop of 9 psi, so no problems are foreseen in cooling the 550 kW average tube with 30 gpm. For the factory tests the critical measurements are: Harmonic power (through the 5th, Phase transfer characteristics and filament power (gain variations vs. AC mains). Factory acceptance tests start the middle of May for tube #1 and the middle of July for tube # 2. The rest of the tube starts in Sept. and there will be (2T/7weeks).

The procurement package for the JLab Test Stand High Voltage Power Supply was released for bid on July 24th. Providing there are no questions or clarifications from bidders, bid packages will be due back July 31st. We should be able to award this procurement by mid-August.

I have acquired several drawings from the LANSCE-5 group at LANL of the RF equipment slated for the JLab Test Stand. Next week we'll use that information to develop a "bill of materials" for all equipment to be shipped to JLab to support coupler and cavity testing.

Cryo Transfer Line Group

Mechanical Group

Magnet Measurement Group

Power Supply Group

Survey and Alignment Group

Beam Diagnostics Group

LBNL-SNS Beam Diagnostics Weekly Report:

Larry Doolittle and Alex Ratti have prepared a plan to recover schedule on the timing interface and emittance data acquisition boards. A high level technician has begun work on the timing interface first article. Tom Shea will find an engineer to assist in future gate array design. The STAR detector data acquisition board has been proposed for

use in the emittance system. This is a well tested, 32 channel board that includes a gated integrator and a fast digitizer on each channel.

BNL-SNS Beam Diagnostics Weekly Report:

General: System Specialists are preparing cost to complete estimates for all WBS's

1.5.7.1 BPM: The four pre-production (two 21cm and two 12cm) HEBT BPMs passed the leak check. Worked with QA to develop a traveler for the pre-production BPM assembly.

1.5.7.3 BLM: BLM analog front-end was tested on a test board (breadboard). Each stage of the circuitry was checked. Drawings were submitted to CAD for the electrical design of a circuit board.

1.5.7.4 BCM: A breakout board has been stuffed. Testing has continued using the breakout board for power distribution and signal injection/extraction. Initial testing revealed a potential input-to-output isolation problem for amplifiers that are disabled at large input signal levels. This requires additional investigation. A consolidated BCM design considerations document is under development.

1.5.7.6b Laser Wire Scanner: A videoconference was held this week to discuss the feasibility of using the laser wire as the transverse profile monitor for all locations in the SCL. Preparations are underway for installation of a laser wire in the old Linac-to-AGS transfer line (not in use since commissioning of the Booster). This line is used only for equipment testing, allowing us to have the control over bunch current and length, necessary to avoid damaging the carbon wire when we compare carbon-wire profiles to the laser wire profiles.

LANL-SNS Beam Diagnostics Weekly Report:

D-plate: To alleviate concerns that beam miss-steered may damage the D-plate, we have modified the design to allow the beam stop to function as a Faraday Cup. A simple circuit that monitors the difference between the beam current measured at the beginning of the D-plate and the beam current intercepted by the beam stop can shut off the beam if the difference exceeds a preset threshold. With the PDR and this modification behind us, we are now ready to proceed with the final detailing and dimensioning of the D-plate.

BPMs: Work began on the FPGA's needed for the DFE daughter board. Several errors are found with the DFE PC board, as such another revision will be needed. DTL pickup brazing is complete and they are being fabricated per design. The next step is the e-beam welds. Final checking is complete on the CCL and SCL pickup design and we are ready to fab some prototypes. The TR pickup design is ready for checking. We have selected "Times Cable LMR 100A" cable for inside the drift tubes. Work is underway to locate Teflon-free SMA connectors for use on these cables.

Wire Scanners: Modifications are complete for the SCL actuator design to allow the stepper motor to be swapped out while the actuator is under vacuum. The drawing package is ready for checking. We hope to get the order placed for the prototype in the next couple weeks.

ORNL-SNS Beam Diagnostics Weekly Report:

Craig is working on doing a broadband match to the faraday cup, he has achieved a -12 dB match on the theoretical model. he has also found a company which might be able to manufacture the faraday cup on a ceramic circuit card. Dave will work with Coles to provide the BLM/MPS consol application. He continues working on the diagnostic database needs. Saeed is working on the draft of D-plate transfer and acceptance from the LANL document. Saeed and Tom attended the Laser wire scanner video conference. Tom spent the week at BNL, primarily working on laser wire design and test plans. Goals for 200 MeV tests were prepared with BNL diagnostics and linac personnel. Unfortunately, there is no scheduled maintenance period available for beamline hardware installation. To assure success of these tests, BNL (CA-D) management will have to place them at a high priority. Tom also reviewed the BCM-controls interface, the BNL diagnostics budget, and handoff issues.