

Accelerator Systems Division Highlights for the Week Ending June 29, 2001

ASD/LBNL: Front End Systems

After resolution of several installation issues, a dual-frequency set-up for ion-source plasma generation, utilizing an inductive 2-MHz matcher and a capacitive 13.56-MHz matcher performed very well on Test Stand #1, sustaining a stable discharge up to full 6-% duty factor and facilitating H- beam production. A standard porcelain coated copper antenna is used for these ongoing tests.

On Test Stand #2, a copper antenna with alumina-chromia sandwich coating, provided by R. Welton of the SNS-ORNL Ion Source group, was tested for the first time. In spite of a high measured degree of porosity in the ceramic insulator, the antenna performed very well and allowed stable plasma generation and beam production. So far, these tests were performed at low duty factor and utilizing a dual-frequency setup with inductive-inductive matchers.

R. Welton and student assistant S. Shukla are presently visiting the FES team and taking part in ion-source tests at both test stands.

RFQ Modules # 1 and 2 were coupled together, and after some local tuner adjustments a flat field profile at nominal resonance frequency was measured by bead pulls throughout the entire structure.

RFQ Module #4, the last one, was brazed on June 29 and is expected back at LBNL on the coming Monday.

The 402.5-MHz rf distribution hardware was installed on the RFQ support frame.

The MEBT support frame is completed and ready for equipment to be installed.

The last three of six MEBT rebuncher amplifiers passed their acceptance tests at the vendor's site.

T. Shea and C. Deibele of the SNS instrumentation group visited the FES team for two days and discussed layout and instrumentation issues of the FES Diagnostic Beamline. Y. Kang paid a short visit to discuss rf issues and see FES hardware.

Five members of the FES team attended PAC in Chicago and had very useful interactions with SNS staff, colleagues, and vendor representatives.

ASD/LANL: Warm Linac

CCL hot model continues to receive daily attention. The cavity structures were vacuum furnace brazed. Initial inspections have been satisfactory. Plumbing fittings are being welded on today and we expect the completed structures to be delivered at LANL next week. (WBS 1.1.2.2)

High average power tests of the high-voltage converter modulator (HVCM) continue. The prototype system was used to drive the 402.5-MHz BMEWS klystron in support of RFQ/DTL circulator tests. The HVCM efficiency (defined here as the ratio of HVCM power output to the klystron normalized to the dc power output from the SCR controller) was measured to be 92%, which meets the design specification. At the end of these tests, large AC line input transients caused the SCR controller to fail. On SNS, these transients will be suppressed with the harmonic filters in the power substation. While we are waiting for the arrival of the replacement SCRs, we will use the next 10 days to install the prototype SNS substation and reinforce the snubber circuitry on the SCR controller. These actions should prevent future failures. (WBS 1.4.1.2)

The contract for the HVCM production IGBTs was placed. Also, bids for the production power substations, SCR controllers, and equipment control racks (three of the four "Reass' Pieces") were received. They are now under evaluation. (WBS 1.4.1.2)

The DTL tank forgings were shipped from LANL to the vendor responsible for the final machining. (WBS 1.4.2.2)

The contract for the DTL RF drive iris glidcop was awarded. (WBS 1.4.2.2)

The contract for the BPM drift tubes was awarded. (WBS 1.4.2.3)

Draft acceptance criteria for the CCL mechanical systems were developed by ASD and sent to LANL. They are under evaluation. (WBS 1.4.4)

Two PCR's were submitted dealing with scope changes in linac physics (PCR LI 01 077) and for the HVCM (LI 01 070). Two additional PCR's were submitted dealing with schedule changes for manufacturing of the DTL (PCR LI 01 049) and CCL (LI 01 083). The PCR for the LANL part of the JLab RF test stand (PCR LI 01 01 035) was revised to meet the JLab cryomodule production schedule. It is pending ASD approval. (WBS 1.4.6)

LANL presented 25 papers on SNS linac physics and technology at the Particle Accelerator Conference (Chicago, June 18-22) and at the IEEE Pulsed Power Conference (Las Vegas, June 18-22). Several papers were coauthored with ASD staff. LANL also presented 4 talks at the Workshop on Space Charge Effects and Resonances in Linac Designs (Oak Ridge, June 25-26).

ASD/JLAB: Cold Linac

ASD/BNL: Ring

A contract has been awarded to Stangenes, Inc. for the eight (8) 26Q40 quadrupole magnets.

The requisition for the medium range power supplies is complete and being circulated for final review before release by D. Dale.

Vendor bids for the 21cm sextupole/octupole corrector magnet procurement packages are in and being reviewed. Techni-Coil of New Hampshire is the apparent low bidder.

PAC01 conference in June - thirty-seven talks were given by BNL/SNS staff.

Joe Tuozzolo, Bill Birkholz, and the ME Design Group have initiated weekly telephone conference calls with Tesla Engineering and Danfysik to track production progress and answer related technical questions before they become issues.

Jim Rank presented an internal design review of the RTBT vacuum system, including Diagnostic's interface.

George Mahler and John Brodowski visited the Tesla plant this week for production inspections of the HEBT dipoles and the 21Q Ring quads.

Designers completed drawings for the HEBT dipole magnet stands. An RFQ/PO is being prepared for these eight units.

Half-cell base #8 was delivered in late June.

Bids are in for all seven Ring System collimators. Three good bids were received. Vendors will be asked to consider two alternate (less expensive) design options for SNS/PO evaluation before awarding this contract.

An RFQ was issued in June for the Injection Pulse Magnet Coils.

A statement of work and web req. was issued in June for the BPM production contract. Assembled two 21 cm HEBT BPMs and two 12cm HEBT BPMs. These units will be sent "outside" for copper brazing next week.

Bids for the vacuum system ion pumps are in and currently being evaluated. An option for future add-on procurements (LANL) is included.

Participated in a Project Office videoconference to help define the configuration and interface of the RTBT extraction beam dump vacuum windows, drift tube helium seal, and shielding arrangements.

Work continues full speed ahead on the design and specs for the high field chromaticity sextupoles.



Figure #1 - The 6-meter long HEFT dipole vacuum chamber arrived at BNL last week. The chamber is in QA for acceptance inspection. Upon approval of this first article, the vendor will ship production units directly to SNS/OR for magnet assembly.

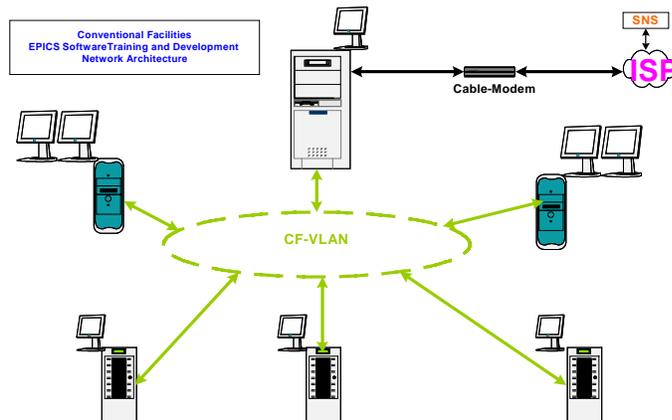


Figure #2 - All half-cell pump "T" assemblies have been received. This assembly includes the pump "T" and the vacuum beam pipe for the 21cm Ring quad.

Controls:

Training Material was delivered, installed and tested at Sverdrup Tullahoma during the week of June 18-22. EPICS training took place there during the week of June 25-29. Five controls team members participated. Although there

were a few “glitches,” training went well, and the crew of Sverdrup are now ready to start the development of EPICS screens and databases. The installed configuration is shown below.



Several Controls Team members participated in the Particle Accelerator Conference in Chicago, and delivered papers and/or posters there.

Power Supply Interface Boards went into production this week. Production boards should be available for testing in six weeks. Some modifications are still needed to the Power Supply Controller board, but they should be ready for production in two weeks.

Work is proceeding at BNL on Interface Control Documents for the BPM, BLM and BCM Systems.

ASD/ORNL: Integration

Installation Support

The Linac tunnel mock-up has been extended 50' to accommodate a CCL half module and a high beta cryomodule mock-up. Work has begun on the CCL module.

Plastic water piping has been purchased and is being installed in the DTL mock-up.

We've hired a millwright to bring our total to 4 craft people now working in RATS. He has been busy core drilling for survey monuments in the survey and magnet measurement areas. Grouting those monuments will start Monday 6/25.

The DI water skid and distribution piping has been tested and passed. We're now setting up a time sometime the week of 6/25 to bring in the skid vendor to train our people how to operate.

A draft resource loaded schedule for the Front End installation including associated RF systems should be complete sometime mid week the week of 6/25.

An installation meeting was held at J-Lab on June 12th.

Accelerator Physics

Eight ORNL accelerator physics personnel attended the Particle Accelerator Conference during the week of 6/22-6/26, contributing 21 papers.

A mini-workshop on space charge issues for high intensity proton linacs was held on 6/25- 6/26. Machine design, beam dynamics and simulation code topics were addressed. Participants included personnel from ORNL, BNL,

LANL, LBNL, U. Md., as well as international representation from CERN, Saclay, INFN, KEK. In addition to discussing the present understanding of the physics governing space charge induced beam loss, follow on steps were identified.

Participants from the space charge workshop stayed for a few days and exchanged codes and work on setting up SNS input files for their models. This effort will help to provide additional modeling capability for different sections of the SNS linac.

Operations

Ion Source Group

We are fortunate that Rahul Rauniyar joined the SNS@ORNL ion source group. Presently Rahul is performing extensive model calculations of the ion beam extracted from the SNS ion source to evaluate how the emittance is affected by modifications of the electron dump electrode. Rahul graduated recently from the Indiana Wabash college. He will leave us in fall to start his graduate education at Georgia Tech.

Robert Welton and Sonali Shukla are presently at LBNL to help testing the antennas coated by Thermal Spray Technologies and the bare Tantalum antenna that were previously shipped to LBNL. In addition they work on transferring the information needed to build the hot-spare stand in Oak Ridge.

The Knoxville, TN, Cherokee Porcelain Enamel Corporation has coated several antennas with a two-layer coat. The inner layer is optimized for mechanical properties, such as adhesion, where the outer layer is optimized for electrical properties. This coating has performed well in other electrical applications.

Mark Janney from the ORNL metals and ceramic division is exploring to possibility to coat Niobium tube antennas with a mixture of Al₂O₃, BaO and CaO. This proprietary process and mixture, developed by GE, perfectly matches the thermal expansion of Niobium. Matched expansion and a 1400-1500C melting point should produce antennas with a substantially increased thermal limits.

Martin Stockli attended PAC'01 and had extensive discussions with FNAL staff focusing on their H- sources.

RF Group

Cryo Transfer Line Group

We have completed the sealing of the 8 helium gas storage vessels presently stored at the site. We back filled the vessels with inert argon gas and the storage pressure is 3.5 PSIG. We will monitor the pressure every Friday and maintain records of our inspections.

We have completed 85% of the second return 40' transferline from the CHL to the tunnel "T".

We have completed 15% of the third(3) return 40' transferline from the CHL to the tunnel "T".

We have completed all six (6) tooling support tables for the tunnel expansion cans and have loaned them out to magnet measurements.

Mechanical Group

Magnet Measurement Group

Power Supply Group

Members of the group attended the Particle Accelerator Conference and the Pulsed Power Conference the week of 6/18/01

Ken Rust visited IE Power in Toronto, Canada to witness the first-article injection kicker power supply acceptance tests.

Paul Holik and staff are working on Linac and Front End ac wiring diagrams.

Operations and spares budgets for 07 were finished

Survey and Alignment Group

Beam Diagnostics Group

1.5.7.1 BPM: Four pre-production BPMs (two 21 cm HEBT and two 12 cm HEBT BPMs) were sent out for brazing. BNL Expects the units back next week. Statement of work for the BPM PUE purchase was finalized. PO for BPM PUEs production was submitted to purchasing. We requested the design group to expedite the 30 cm Ring BPM drawings, which are still in checking.

1.5.7.3 BLM: Continue to test and evaluate components/amplifiers for the prototype front end unit.

1.5.7.4 BCM: The BCM circuit board has been stuffed, and initial testing has begun. Analog signals have been tracked through all stages and filters in the chain to the ADC. The DAC used for gain control has been temporarily disabled due to an inability to communicate digitally with the board on the bench. A reference voltage for testing has replaced the DAC. The ADC seems to be generating digital information. The ADC clock (65MHz) causes disturbance on the analog lines. We are making revisions to better isolate the RF/digital signals from the signal conditioning electronics is required. A "break-out circuit board", for testing, is being designed to plug into the daughter board connectors allowing access to the digital signaling connections without inserting the BCM circuit board into Matt's (LNAL) digital interface board. The digital signal analyzer will be used to generate digital commands and store digital data. Two computers (2Uchassis) have been requested for purchase.

1.5.7.6a Carbon Wire Scanner: Vibration, repeatability, and accuracy testing has started on the MEBT wire scanner.

1.5.7.6b Laser Wire Scanner: Assembly is starting on the BLIP 200 MeV Laser Profile Monitor (LPM). The Goal is to have this system in place and operational by July 17th. Slides and motion control electronics for MEBT LPM prototype have been ordered.

BPMs: The Bergoz AFE has arrived. DFE rev. 1 has also arrived. We have not yet had a chance to test either of these units. The PCI motherboard continues to test out well. The DTL pickups are at the brazing shop. The CCL pickup drawings have been checked and we are ready for prototype fabrication. The SCL pickup drawings are ready for checking.

D-plate: The slit, energy degrader, and Faraday Cup solid models are complete. We are waiting for designer resources so we can proceed with detailing the designs. The D-plate solid model is almost complete. We will wait for the results from the PDR before we proceed with the detailing. The spare coils we're trading for the quadrupole magnet arrived.

Wire scanners: Work continues to prepare an estimate for the HEBT, ring, and RTBT wire scanner actuators. The prototype electronics PC board has arrived and is being stuffed.

We are preparing for a wire scanner PDR on July 17 and a D-plate PDR on July 18.

LNAL has prepared a revised PCR that incorporates suggestions from ORNL-SNS ASD.

Tom went to Berkeley and SLAC this week. Dave has finished Database training at LNAL and went to Tullahoma to refine his EPICS skill. Saeed attended the SNS space charge mini-workshop. AP and diagnostic group will work on suggestions from Ingo Hoffman on modeling space charge tune shift in frequency domain. Students are advancing in writing GUI codes. A PCI-GPIB card is installed in one of the diagnostic lab's PCs.

Review dates and committee membership were finalized for the wire scanner review (July 17) and the DTL D-plate review (July 18).

As promised in this week's application meeting, a simulated BPM will be available on the controls network by August. Craig and Tom visited LBNL at a time of excellent progress on both the ion source and the second RFQ module. Due to the efforts of John Staples and the mechanical design team, we made significant progress on the analysis and design of the diagnostics beamline. Requirements for the fast faraday cup were refined and a layout of the beamline was reviewed. Craig reviewed Larry's model of the MEBT RF systems. These show that beam loading transients may settle in 10 microseconds, leading to reduced power handling requirements for interceptive diagnostics. Several action items arose: - Because the diagnostics beam line will be used extensively at ORNL, Tom and the ORNL diagnostics group will increase involvement in its design and will eventually assume responsibility for this system. - Later this summer, Steve Lewis will host Dave Purcell as he works on MEBT overview and diagnostics screens. - The link interface module is still not ready for testing. Berkeley will develop a plan to accelerate progress. - Tom met with Hamid Shaoee and Matthias Clausen at SLAC (on Matthias' last day there) and reviewed their suggestions for synchronized data acquisition. Tom will collect comments from SNS, RHIC, and Fermilab, and then prepare a summary in about one month. - Tom also followed up on PAC discussions with Jeff Corbett and Andrei regarding their Matlab accelerator toolbox (AT). Andrei will provide us with the current version of the Matlab channel access libraries (mca) and will also support our application of AT. Saeed use the toolbox to model MEBT.