

Accelerator Systems Division Highlights for the Week Ending May 04, 2001

ASD/LBNL: Front End Systems

RFQ Module #3 has been brazed together late last night and will be back in Berkeley next week. Precise modulation cuts were applied to the two minor vane assemblies of Module #4.

The four ordered RFQ power-coupler windows have been received at LBNL; power conditioning will start next week.

Two FES team members attended the dry runs for the upcoming DOE status review. After the meeting, discussions with ASD management (experiences with equipment handoff for the B-Factory and discussion of FES acceptance parameters) and members of the SNS Ion-Source Group and Project-Controls Group were held. Details for new simulations of the ion-beam formation process were determined in the latter encounter.

ASD/LANL: Warm Linac

Our JLAB visitors started high-power RF conditioning of the SNS prototype couplers. An RF power up to 125 kW has been applied. The LANL RF team will support further tests conducted by JLAB all weekend. (WBS 1.4.1)

Machining of the 402.5-MHz low-level RF test cavity is complete. It is presently at the e-beam weld shop in California. (WBS 1.4.1.3)

The contract for the PMQ drift tubes was awarded on April 30. The first shipment of drift tubes is due to arrive at LANL in mid-October. (Project milestone and WBS 1.4.2.3)

We inspected the DTL forgings at the manufacturer this week (Fig. 1). All twenty look good and they are ready for shipping to LANL. We expect them to arrive in mid-May. The RFP for the end wall forgings was issued. There were six potential vendors on the bid list. Bids are due back by May 16. (WBS 1.4.2.2)



Fig. 1: DTL tank forgings ready for shipping.

The hot model end walls (Fig. 2) have been shipped and received by the vendor for the final braze step to begin on May 7. Also, we performed ultrasonic tests of the equator braze joint test coupons. It appears that the present braze-groove design will perform well for the Hot Model as designed. The body of the hot model bridge coupler is ready for finish machining (Fig. 3). After we perform a quick frequency check, the parts head for the welding shop in California. (WBS 1.1.2.2)

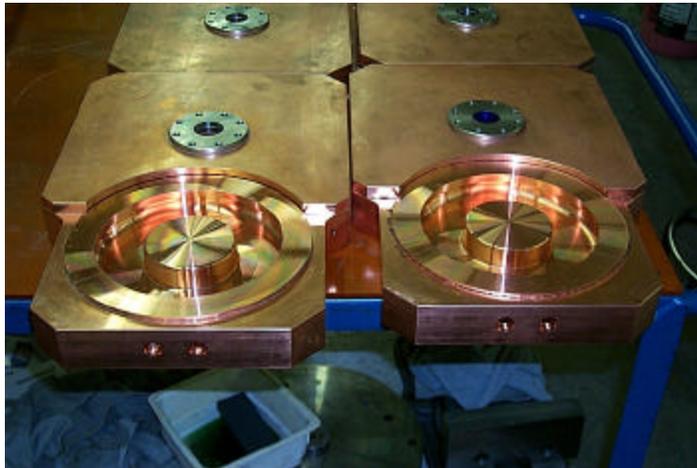


Fig. 2: Hot model end walls.



Fig. 3: Hot model bridge coupler.

We have prepared PCR LI 01 054 for the cost savings associated with the SRF 805 MHz circulators. When implemented, this PCR will return ~ \$1M to contingency. (WBS 1.4.6)

ASD/JLAB: Cold Linac

Fabrication on the Warm Compressors, Cold Compressors, and 4.5K Coldbox continues.

The first four tunnel female bayonet / valve assemblies are complete. The other 124 are in various stages of welding and brazing, photo's attached.

The MB single cell cavity has been installed in the vertical dewar and will be tested for HOM performance next week.

100 kW of forward power has been run into the coupler pair assembly (see attached screenshot); testing will continue thru the weekend.

Activities continue for the three high beta HOM modes considered dangerous for power generation if not sufficiently damped. Two harmonic modes have been found. The final 7th harmonic mode, does not propagate into

the beam tube and must be damped. This is the mode that could produce 473w of power with a $Q=10^8$ (see Sundelin's ASAC talk).

The EP parts bid was received and evaluated. Work on the specification for the EP cabinet continues.

The Vacuum Tank contract was awarded. Reactor grade Nb bids were evaluated. Cavity ends are being rebid. The Cavity vendor Qualifications are being evaluated; final bids are due 16-May.

The three PCR's for R&D to improve the HB performance from 27.5 to 35.0 MV/m in the horizontal cryostat are waiting for approval (LI 01-016, 17 & 18)

There is only one remaining \$250K procurement to release this year. We could productively use an additional \$2-3M of BA if it became available. In addition we will have \$9M of phased contracts that can be forward funded. Preparations for supplemental procurements are proceeding.

The last 10% of the FY01 R&D funds are required by 1-Jun-01; we currently have less than \$200K remaining. The cost of the Work-a-Round of setting up and testing the FPC's at LANL has accelerated our expenditures. PCR LI 01-058 for JLab's increased cost of testing the first 5 pair at LANL is in draft form.

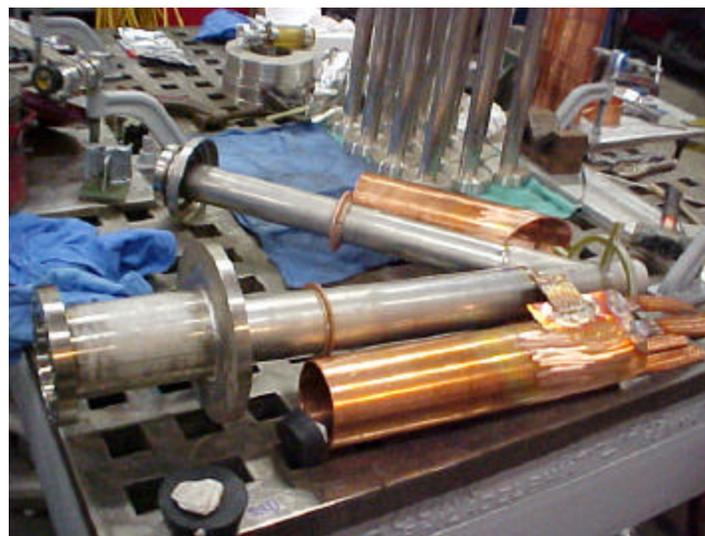
The last 10% of the construction funds are required before we can award the cavity contract.

The LANL 1MW RF system plan for JLab testing needs to be approved (LANL LI 01-035 & JLab LI 00-068). In the fall of 1999 as part of the MOU discussion, it was agreed that SNS would provide a skidded RF system for the JLab testing of CM's and power couplers. It is needed in the 2ndQ FY02 to test the Prototype CM at full power. If the PCR is approved now, the best LANL-SNS can do is deliver a system after we start full 1 CM per month production. (Depending on interpretation, this is also a 6-month slip in the Milestones #1b-3 and 2-30.) The ASAC last year raised this as one of the highest priorities and the last Semi Annual Review listed resolving this as one of the "recommendations". This system is a key element not only for conditioning and acceptance testing but also is the key to raising the High Beta Gradient from 27.5 to 35.0 MV/m. The immediate approval of these PCR's is required to get started working on this. LANL requires a minimum funding of 20% of LI 01-035 to get started planning, and JLab requires a minimum funding of 25% of LI 00-068 in order to procure long lead items (vacuum circuit breakers, heat exchangers, pumps, pipe, and valves). We want to have the system installed and checked out when the Klystron arrives.

SNS and LANSCE management are discussing a Work-a-Round in order to have a plan in place for the Semi Annual Review.

The CHL BOD has slipped 8 months; it is now after the last of the refrigeration equipment has been delivered. The installation, commissioning, and burn in schedule has been compressed by 4 months to recover half of this slip, but the sub-system acceptance test deadlines and most of the warranties will have expired. The A&E has supplied an RFE date 6weeks before BOD, which matches the delivery date of the 4.5 K Coldbox. Discussions are continuing.





ASD/BNL: Ring

Mike Nekulak and Y.Y. Lee were at SNS/OR this week to participate in the DOE dry run. Staff continued with preparations for the upcoming Review.

Systems Integration Documents:

The DCD for Ring Vacuum Systems has been submitted to DCC.

The DCD for the Ring RF System is complete and being reviewed.

The DCD for Ring Magnet Systems is complete and being reviewed.

The draft ICD between Linac and HEFT has been submitted to DCC.

The DCD for Ring Collimation Systems is in progress.

Jim Rank distributed a layout of the extraction dump area to individuals at BNL, ASD, Conventional and the Target Group. The layout has been generated for use as an interface tool by the partner labs.

Joe Tuozzolo conducted a preliminary design review on the high field (chromaticity) sextupoles. ASD was notified in advance.

The RFQ package for the RTBT Collimator is complete and will go to Purchasing next week. Packages will be sent to the Project Office.

Allied Engineering has started machining the steel cores for the 17D120 ring arc dipoles. The first set is scheduled to arrive at BNL by June 30th.

Fabrications of the vacuum chambers for the HEBT and Ring dipoles are complete. These components have been shipped and are now in route to BNL.

Tom Nehring has been working with ASD and Conventional on: 1.) Embedded Conduits in the Ring, and 2.) Electrical Alcoves.

Peter Cameron reported that all of the machined parts for the production 21 cm HEBT BPMs have been received while machining of the strip-lines for the pre-production 12cm HEBT BPMs is in-progress.

Work was initiated to mount our “reference” 17D120 dipole on the first half-cell base. We plan to mag measure this assembly in order to confirm magnetic isolation between the magnet core and its base. After testing, the assembly will be shipped to SNS/OR. See photo below:



Fig. 1 – Reference Dipole on ½ Cell Base with Quad Stand

Controls:

Equipment, including five workbenches, began to arrive at 701 for the expanded controls laboratory. Additional equipment was received that will allow us to build and test a mock-up of a “four-headed” SNS control console. Vendors have been contacted, and lists compiled, to further equip the lab with necessary tools and test equipment, as well as to construct simulators for the personnel protection system.

The controls group participated in the Dry Runs for the upcoming DOE semi-annual review. The link to the Berkeley Front End Control System, using the EPICS “PV Gateway,” was demonstrated as part of this exercise.

Work on EPICS vR3.14 is complete, and work has begun on large array support.

The local/remote issue has been resolved as a zero cost change for the High Power RF systems. The Low-level RF test stand at LANL is complete.

The Fortran interface for channel access is operational. It does not do asynchronous notification - so we have been able to measure the synchronous support to reliably support 10 Hz operation. Between there and 60 Hz, we start losing some data. We will come back and add asynchronous support.

Calculation Records have been added to EDM – the SNS display manager. This allows the definition of variables in EDM that are the mathematical combination of up to 12 other variables. The calculation server will notify display widgets when any of the variables is changed – and the calculation is recomputed.

Work has begun at LANL on the Machine Protection System Driver.

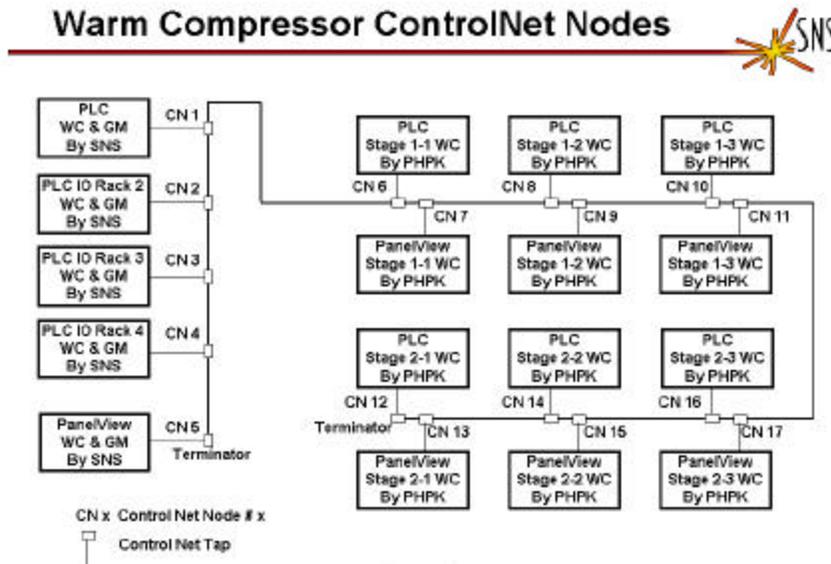
RFQ module #1 vacuum is now under EPICS control at LBNL using the modular Flex-I/O EPICS interface.

The Ion Source DC accelerating potential operation now uses the DTI -65kV supply with modular Group-3 EPICS interface.

The first rack-mounted PLC for the PPS development system was installed, and the local network IP and Ethernet addresses for PLC set up. A test PLC program was run successfully.

The CEBAF PPS Software Requirements documentation as well as their control strategies and philosophies are being evaluated for use in SNS PPS PLC programs.

The Programmable Logic Controllers (PLCs) provided by the Central Helium Liquefier Warm Compressors are to communicate status and control information to the SNS provided Warm Compressor and Gas Management (WCGM) PLC via ControlNet. In the December Warm Compressor Design Review, the Vendor agreed to supply information concerning the transfer of data via ControlNet. This data is needed to complete the WCGM PLC software design. The data has yet to be supplied. A request was sent to the vendor to obtain this information. Included in the request was a proposed layout of the ControlNet network.



ASD/ORNL: Integration

Accelerator Physics

A prototype X-Y correlation plotting application program is running. This program displays in real time two arbitrary channel access signals from the EPICS. Presently the time correlation verification is being developed.

A first version of a collimation routine for the ORBIT beam tracking model is completed. This model includes scattering algorithms appropriate for the low energy SNS range, and represents the first integration of beam tracking and the collimation physics.

Operations

Ion Source Group

Tracy Tipping from I3 sent us three "dead" antennas. They were used in the SSC ion source installed at the I3 LINAC facility. The antenna style differs somewhat from the current SNS antenna style, and all antennas show substantially different signs of usage. Some of the antennas will be analyzed by the ORNL metal and ceramics division in an effort to improve our understanding of antenna failures.

We are preparing for entering a proposal in the cooperative grants program of the U.S. Civilian Research & Development Foundation (CRFD) for the independent states of the Former Soviet Union (FSU). If successful, a team from the Institute of Applied Physics of the National Academy of Science in Sumy, Ukraine, will, over a two year period, modify and develop an inverse magnetron source for possible use at SNS. This source may be rather interesting because it does not require cesium. A relatively high gas flow may pose a potential problem. In any case it would be a substantial contribution to the development of highly reliable, high current, high power H- ion sources.

The current efforts of the SNS@ORNL ion source group were described in several power-point slides which were prepared for presentation at the DOE-review.

RF Group

After approximately 5 full days of operation, we discovered two failed gate driver boards on the IGBT test stand. These driver boards, which are not the baseline design for the high voltage converter modulator (HVCM), failed due to a shorted electrolytic capacitor on the +5 V buss (in both cases). Shortly after acquiring replacement driver boards, we also discovered a failed IGBT device (older generation Eupec FZ1200R33KF2). We will be reviewing the data to determine if the IGBT failed as a result of the failed driver board, due to normal operation, or due to another cause.

Presently, without any maintenance, calculations indicate a HVCM MTBF of approximately 3/4 of a year per system. Refining the component and subsystem MTBF database through vendor contact, as well as developing routine maintenance recommendations to improve system MTBF, have been the major activities this week.

Cryo Transfer Line Group

The first 40 foot section of helium supply transferline was completed Wednesday 5/2/01.

We are installing the return transferline tooling onto table #1, adjacent to the existing supply transferline fixtures.

Installation and RATS Building

Magnet Measurement Group

Mechanical Group

Power Supply Group

Survey and Alignment Group

Beam Diagnostics Group

Beam diagnostic progress report from LANL:

Wire scanners: The Huntington actuator order will be placed in by the end of this week. Back checks of the SCL WS actuator are now in progress. The drawing will be sending out to the fabrication shops by next week.

D-plate: Preliminary detailing work on the first beam box is complete. We are now ready to start the detailed design of the second beam box. We have decided to eliminate the third beam box by adding its functionality to the second beam box module. This will result in cost savings; yet still allow us to meet all the physics goals.

Energy degraders and Faraday Cups: Solid models are complete on the units for DTL tanks 1 and 2, and the D-plate. Work on detailing the designs should begin soon.

BPMs: Work continues to fabricate three of each DTL BPM pickups. We expect them to be manufactured by the end of the May 2001. The AFE is expected from Bergoz in the next two weeks. The DFE board design was completed on 2/May/2001. It should go out for fabrication on 3/May/2001. The PCI motherboard revisions were completed on 3/May and it should go out for fabrication the same day. The order for the LO chassis was placed early this week.

Other: M. Plum and R. Shafer spent most of Thursday refining the loss monitor system design with S. Assadi, D. Gassner, and R. Whitcover.

Announcements: We have set a possible date for the wire scanner system PDR. It will be held at Los Alamos on Thursday, May 31, 2001.

Beam diagnostic progress report from BNL:

BPM: Cost estimate for production quantity of 21cm Ring BPMs was received from the shops, and the ILR was adjusted. Additional BPM drawings were submitted to an outside vendor for quote. A PO was written for additional material for 30cm Ring BPM flanges. These unusual flanges are required to accommodate the very limited space available on the pole ends for BPM mounting. The special mounting design for this flange is complete, and drawings are being verified. HEBT 12cm BPMs are being fabricated in the shops.

PM: All of the material has been ordered for the additional electron detectors, and shops have started fabrication. Signals from existing electron detectors in AGS Booster are swamped by image current effects (the same lesson we learned on the IPM), and design of a screen is in progress to alleviate this issue.

BLM: A meeting was held this week at LANL (see above).

BCM: The need for an analog signal from the BCM system to normalize the LANL wire scanners has been eliminated. Board layout has progressed and we expect it to be complete on Monday (May 7,2001). A draft ICD is complete. It incorporates all suggested changes and is distributed to group members for review. An initial scheme to provide a fast responding Machine protection System (MPS) pulse by using differential current measurements of up-stream and down-stream current monitor signals has been completed, and distributed to group members for comments.

Tune: Work continues on the prototype tune meter system.

Carbon Wire Scanner: The MEBT wire scanner fork is under construction and expected to be completed by the end of May.

HEBT wire scanner information is being collected, and a layout has started.

Laser Wire Scanner: AGS operations personnel have expressed interest in collaborating on a Laser Wire for the 200 MeV BLIP line. To demonstrate the feasibility and understanding the limitations of the laser wires in an environment similar to SNS, studies on BLIP line are the next logical step. We are rapidly moving ahead with this installation.

Beam diagnostic progress report from ORNL:

Tom prepared an oral presentation of SNS diagnostic design and progress to be presented at the DOE review. He also prepared a technical talk to be given in Europe next week. Saeed Worked on SNS loss monitors and needs.

He attended a meeting with partner labs at LANL on that subject (see above). Dave Purcell has a working Web based diagnostic database query model. He also tested a LINUX rack mountable box. A similar PC box will be used to test a digitizer board at ORNL.