

# Technology Development MAP Friday Meeting

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# Outline

- TD Highlights
- L2 Summary reports
- Topical Report - *Modular Cavity Status* , C. Adolphsen, SLAC

# Technology Development Highlights for June, 2013



- RF Studies
  - Modular 805MHz Cavity on track for delivery by end of FY13 (SLAC, LBNL)
  - All-season cavity re-measurement on hold
- Targets
  - Studies for 1MW, 3GeV proton target
- Magnets
  - Repairs of YBCO coils for high-field solenoid
  - BISCCO 2212 coil tested at 4.2<sup>0</sup> K
- 12 TD related abstracts submitted to NA-PAC

# Monthly L2 Status Report -

## WBS: 03 01: Normal Conducting RF

July 12, 2013  
Presenter: Derun Li

### Milestone Status (Progress)

- Modular cavity (collaboration with SLAC)
  - Cavity fabrication in progress and will be delivered to Fermilab by end of FY13
  - Test plan is being developed
  - Interface document between LBNL and FNAL nearly ready
- 201 MHz MICE prototype cavity
  - RF coupler fabrication at LBNL
  - Some material and parts received
  - TiN-coating setup at LBNL

### Summary of Previous Month

- Modular cavity
  - Fabrication at SLAC continues
  - Ready for PO of the Be plates
  - Bi-weekly meetings at SLAC to monitor/oversee fabrication progress
- Support the single cavity installation at MTA, Fermilab
- Fabrication of 201-MHz coupler at LBNL
- Cryostat (vacuum vessel) fabrication for MICE CC magnet at LBNL continues

### Upcoming Work (Next Month)

- Sign-off of the interface document between LBNL and Fermilab
- Continue the fabrication of the modular cavity at SLAC
- Support of the 201 MHz installation at MTA, Fermilab
- Oversee 201-MHz cavity coupler fabrication at LBNL
- TiN-coating of the coupler setup preparation at LBNL
- Oversee the CC cryostat fabrication at LBNL

### Resource Conflicts, Plan Changes and Issues

- MICE magnets: SS and CC
- Oversight of the fabrication of RF couplers for MICE prototype cavity

### Late Items

- PO of Be plates for the modular cavity

### Quarterly Plans

- Continue the modular cavity fabrication
- EP of the remaining MICE cavities at LBNL
- Development of the modular cavity testing plan
- Data analysis of previous 805 MHz testing results
- MP simulation studies of the MICE cavity and coupler with external magnetic fields and explore other possible solutions
- Fabrication of two 201 MHz RF couplers for the first MICE cavity in preparation for the testing at MTA
- Support MTA RF testing programs

# Monthly L2 Status Report -

WBS: 3.2 – Superconducting RF

12 July, 2013  
 Presenter: Don Hartill

<p><b><u>Milestone Status (Progress)</u></b></p>	<p><b><u>Resource Conflicts, Plan Changes and Issues</u></b></p> <ul style="list-style-type: none"> <li>.</li> </ul>
	<p><b><u>Late Items</u></b></p> <ul style="list-style-type: none"> <li>• Research Instruments shipment of 500 MHz cavities expected by end of FY13</li> </ul>
<p><b><u>Summary of Previous Month</u></b></p> <ul style="list-style-type: none"> <li>• Begun examining stored energy issues for both 325MHz and 650MHz SRF cavities</li> <li>• Progress for the SRF program reported at the MAP Collaboration meeting at FNAL</li> </ul>	<p><b><u>Quarterly Plans</u></b></p> <ul style="list-style-type: none"> <li>• Testing of 500 MHz explosion-bonded cavities expected in late summer. Testing to be completed end of FY13</li> <li>• Preparation of Cu on Nb electroformed 1.3GHz cavity by end of FY13</li> </ul>
<p><b><u>Upcoming Work (Next Month)</u></b></p> <ul style="list-style-type: none"> <li>• 500MHz cavity preparations by Research Instruments</li> <li>• Study of electroforming Cu on Nb process</li> </ul>	

# Monthly L2 Status Report -

July 12, 2013

WBS: Magnets – 03-03

Presenter: J. Tompkins

## Milestone Status (Progress)

**Rapid Cycling Magnets /HTS** : Completed engineering design of Rapid Cycling HTS Magnet test system to be assembled at E4R enclosure

## Summary of Previous Month

- **HTS (2212) Program** - The 2212 coil under development was instrumented and installed on coil probe. It was tested at 77 K and will be tested in 4.2 K up to 14 T on 07/11/13. A new acoustic emission sensor system has been set up for diagnosing coils and also for quench detection.
- **HTS Magnets / ReBCO - ReBCO** The repair procedure described earlier has now been applied to all 24 pancakes of 100 mm midsert. 14 of 24 of those pancakes have been re-tested at 77 K. This includes testing of all of those 6 pancakes whose performance changed noticeably during a 77 K test. Test results show that 3 of those 6 pancakes have been fully repaired; the rest only partially.
- **Helical Solenoid (HCC)** – Mechanical support simulations have been carried out; preliminary work on the prototype manufacturing process; consensus developed on the support structure concept and material to be used (Stainless steel 316 or similar non-magnetic)
- **General Magnet Design – No activity this month.**
- **Rapid Cycling Magnets / Conv** – We are working on the design of an ultra low carbon steel 1.8 Tesla dipole with 15mm gap.
- **Rapid Cycling Magnets / HTS** -Presented at MAP Collaboration meeting the HTS-based magnet concept for Muon Accelerator. Fabrication of magnet and leads cryostat components partially completed

## Upcoming Work (Next Month)

- **HTS (2212) Program** – Coil test results will be analyzed. A new coil will be wound, reacted, and tested to verify the result obtained. It will also be prepared to quench characteristics tests.
- **HTS Magnets / ReBCO** – A decision to wind more coils or to build midsert with 20 pancakes (it has to be an even number) instead of 24 will be made. Performance of half-midsert and insert during previous 4 K tests (they were able to operate at significant higher current than initially designed) and budget (tight) will play a role
- **Helical Solenoid (HCC)** – Design of the support structure (mechanical drawings) ; manufacturing of the support structure to begin (2 months); design of the external shell
- **General Magnet Design** – Discussions with machine design and modeling group will determine focus and level of effort
- **Rapid Cycling Magnets / Conv** – Working on the next planned prototype. Pole shaping will be needed if a uniform field is to be achieved.
- **Rapid Cycling Magnets /HTS** – Proceed with splicing of HTS strands to power lead; completed fabrication of magnet and leads cryostat components at VMS; continue studies of HTS-based rapid cycling magnet technology for Muon Accelerator

## Resource Conflicts, Plan Changes and Issues

- [....]

## Late Items

## Quarterly Plans

- **HTS (2212) Program** – Continue work to develop tooling and Rutherford cable from the improved conductor; wind, react, and test coil using 1.2 mm single strand using overpressure processing; 4.2K testing is next.
- **HTS Magnets/ReBCO** – ReBCO Solenoid – Prepare for 4 K test of 100 mm midsert solenoid.
- **Helical Solenoid (HCC)** – Begin fabricating first model: winding and reaction of a short model (40 turns per layer, 2 layers)
- **General Magnet Design** – continued collaboration on development of CR/IR magnets: cross-sections, field characteristics, heat loads, etc. with CR Group (Mokhov) on requirements, as needed
- **Rapid Cycling Magnets – HTS** Perform splicing of HTS strands to copper blocks connecting with leads; Fabricate cryostats for magnet and leads; continue study of HTS-based rapid cycling magnet technology for Muon Accelerator; Write a APC Note on feasibility of Muon Accelerator with HTS-based rapid-cycling magnet technology
- **Rapid Cycling Magnets – Conv** Develop procedure for transposed Cu strands; test and compare to calculations

# Monthly L2 Status Report -

# 12 July, 2013

WBS: 03.04 Targets and Absorbers

Presenter: Kirk T. McDonald

# Monthly L2 Status Report -

# 12 July, 2013

WBS: MuCool Test Area

Presenter: Yağmur Torun

## Milestone Status (Progress)

- 201-MHz vacuum RF: assembly work about to start
- Infrastructure – on track but late: beamline upgrade, RF switch re-commissioning, station-2 vacuum system
- Data analysis: HPRF beam test PRL in final editing (B. Freemire, K. Yonehara, A. Tollestrup, M. Chung); all-season cavity data under review

## Resource Conflicts, Plan Changes and Issues

- Mechanical support for RF program
- Electrical support for beamline upgrade

## Late Items

- Single-Cavity Module assembly, installation
- Pillbox with grid windows, all-season cavity high-B run
- Beamline commissioning

## Summary of Previous Month

- All-season cavity: disassembly, testing
- Modular cavity: vacuum and instrumentation parts ordered
- 201-MHz Single-Cavity Module: coupler parts/materials ordered (A. DeMello, YT); progress on instrumentation (L. Somaschini, D. Peterson, R. Pasquinelli, A. Moretti); assembly procedure prepared (J. Volk); more parts moved to Lab-6

## Quarterly Plans

- Data analysis/publication
- magnetic insulation
- Be-Cu buttons
- HPRF beam test
- Current program
- All-season cavity in magnetic field
- $B > 3T$
- Dielectric-loaded HPRF
- Next on the list
- Grid windows on pillbox cavity
- 201-MHz Single-Cavity Module
- New 805-MHz modular cavity
- Other
- Beamline commissioning

## Upcoming Work (Next Month)

- 805-MHz all-season cavity: operation in  $B > 3T$ ?
- DL-HPRF cavity: retesting with dielectric rod
- Old pillbox cavity: install grid windows
- 201-MHz Single-Cavity module: RF control system upgrade, instrumentation tests, mount cavity in Lab-6, start LLRF measurements
- Modular cavity: instrumentation and inspection setup