

# MICE RFCC Schedule

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**MICE CM30**

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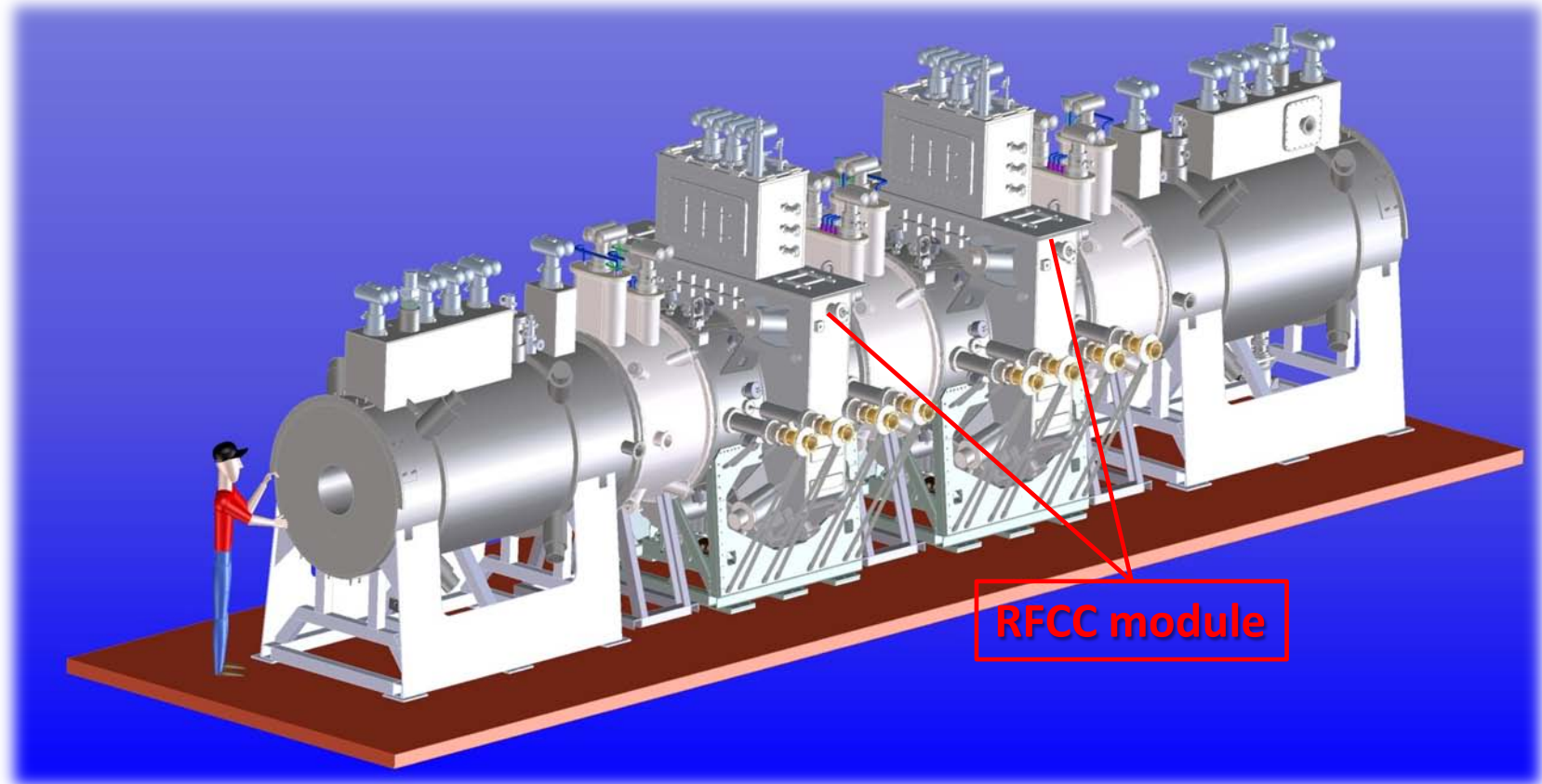
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# MICE RFCC Modules

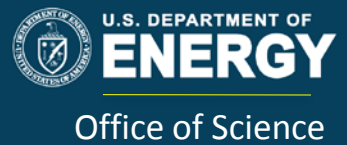


Two RFCC (RF cavity and superconducting Coupling Coil magnet) modules in MICE cooling channel: compensate for muon longitudinal energy losses in AFC

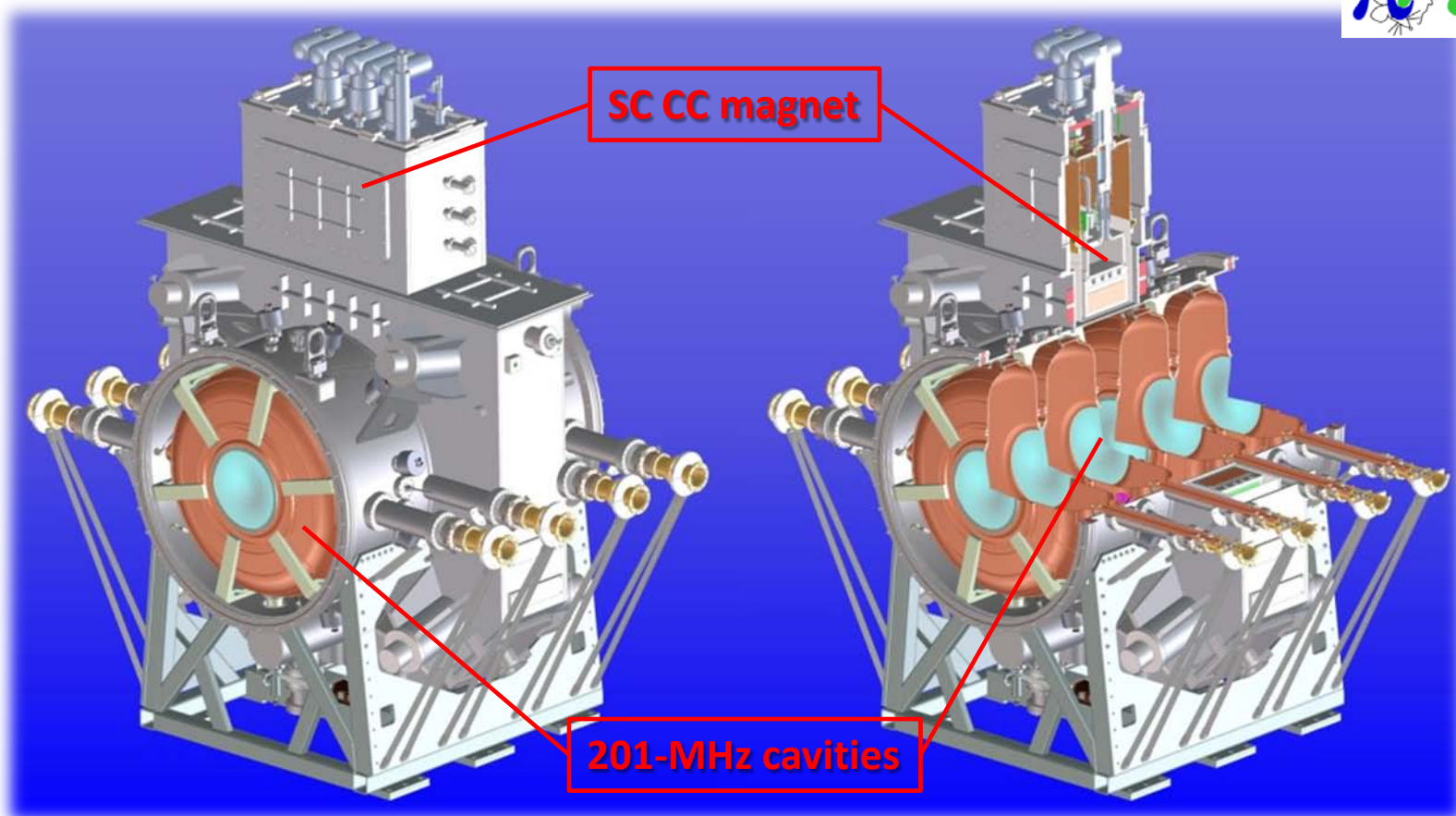
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# MICE RFCC Modules



Each RFCC module has four 201-MHz NC RF cavities and one SC coupling coil (solenoid) magnet; each RF cavity has a pair of curved Be windows and coaxial loop couplers

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# Current Status of RFCC Module



- **RF cavities:**

- All ten cavities (two spares) received at LBNL and five measured;
- Received and accepted nine beryllium windows;
- Ten ceramic RF windows ordered and received ( 4 at LBNL and 6 at UM);
- Six full size tuner flexures are being fabricated at UM and LBNL;
- Components for 6 actuators are to be fabricated at UM;
- Cavity post-processing (surface cleaning and preparation for EP) to start this year at LBNL;
- The single cavity vacuum vessel drawings are complete and sent to Fermilab, and fabrication will start.

- **SC CC magnets:**

- 1<sup>st</sup> coil winding complete at Qi Huan Company;
- Cover plate of cold-mass and LHe pipe welding started at HIT
- Cryostat design complete;
- Plans for cold-mass and cryostat testing are being developed.

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# RF Cavity Future Work



- Physical and frequency measurements will be performed on the remaining 5 cavities;
- Electro-polish of the inside surface of each cavity remains to be done at LBNL;
- The cavities must be “tuned” to each other for best center frequency (10 cavities) by plastic deformation after completion of RF measurement of all 10 cavities;
- Final design and drawings of RF power coupler;
- Single cavity vessel fabrication and testing at MTA, Fermilab.

Not a schedule threat but funding driven/limited

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# Coupling Coils

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# Coupling Coil Status



- Qi-Huan

Machining of the Cover plate complete, cooling pipes are being bent to final dimensions and angles;

The coil and cover plate were shipped to HIT on June 9, 2011

- ICST/HIT

Received the coil and cover plate on June 10, 2011;

Design of welding fixture complete;

Welding of the cover plate (two joints to weld) to be complete by July 15, 2011;

Paperwork for shipping to the US is in progress

- LBNL

Cryostat drawings out for review

# Schedule



Adopt MICE requirement -  
Deliver RFCC module by April 2013

Seems doable at this point but there are several  
implications and challenges



# Schedule Impacts



- New conductor order
  - Increase piece length spec
  - Reduced delivery time
    - Align spec with existing conductor designs?
    - Pay premium if possible
- Test of first coil
  - Must complete test of first coil by the end of the calendar year
  - Exploring options with Fermilab
  - Other options?
- Cryostating of coils
  - First coil must be tested
  - Is Qi-Huan capable? – This is current baseline
  - Can Fermilab do at least the first one?

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# Current Actions



- Working aggressively to validate the current design
  - Augment the team in key areas
  - Contract with MIT in process
    - Need quench protection analysis and lead design
- We have located a dewar large enough for the test at NHMFL
  - Fermilab is willing to install the dewar (useful for mu2e testing as well)
  - NHMFL wants to test SMES coil (currently in cryostat) in 2013!
  - Need to negotiate
    - Offer to test coil at FNAL
    - Gourlay to visit NHMFL in a couple of weeks



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# Near-Term Milestones to Achieve MICE Target for the First RFCC



- Get conductor order out with aggressive delivery date
- Resolve coil test
  - Fermilab the first option
  - $\frac{1}{4}$  coil test at HIT
    - Can HIT do the testing?
    - The only “Plan B” we have
- Can Fermilab cryostat at least the first coil?
  - We gain a big advantage by working the bugs out of each procedure in the US
  - Plan to bring Qi-Huan personnel to FNAL for key activities
    - Hand-off shouldn't be as risky
  - But must have personnel based in China for significant intervals at critical times

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# Near-Term Milestones cont'd



- Evaluate Qi Huan capability to do cryostating
  - Subsequent coils
- Under consideration
  - Start winding a second coil after review of quench protection
- Cryostat design/production readiness review
  - Schedule for this fall
- Develop RFCC risk register
- Final approval of RFCC plan

# Summary



- Key elements for meeting April 2013 target
  - First coil test is critical
    - Fermilab willing to help but need to obtain dewar from NHMFL
  - Next hurdle is cryostat assembly
    - Fermilab is option again, but need to obtain commitment
    - Explore other options as well
      - Qi-Huan, BNL?
  - Timely delivery of conductor
- Once key drivers are understood we can proceed with project schedule development

Thanks to DOE and MICE management for their continued encouragement and support