

RF Modules Update

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MICE CM47, RAL
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U.S. DEPARTMENT OF
ENERGY

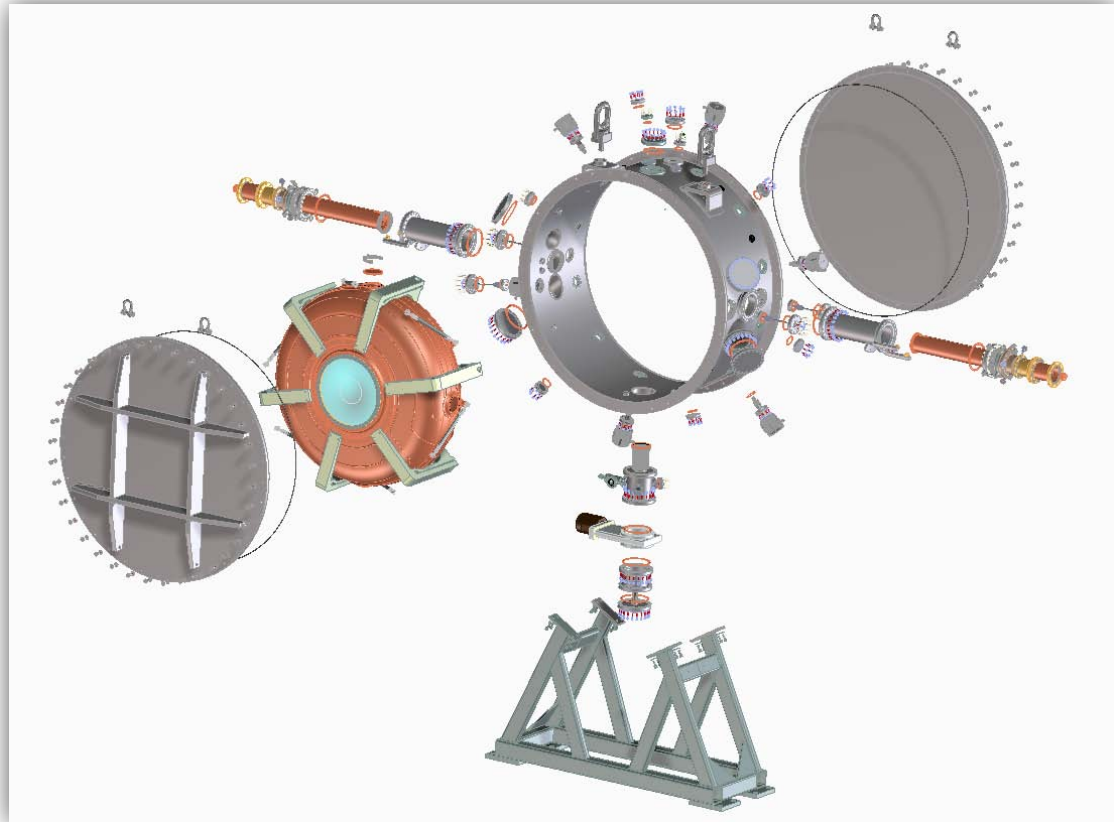
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Outline

- Status at CM46
- Assembly
- Vacuum
- RF Testing
- Shipping
- Close

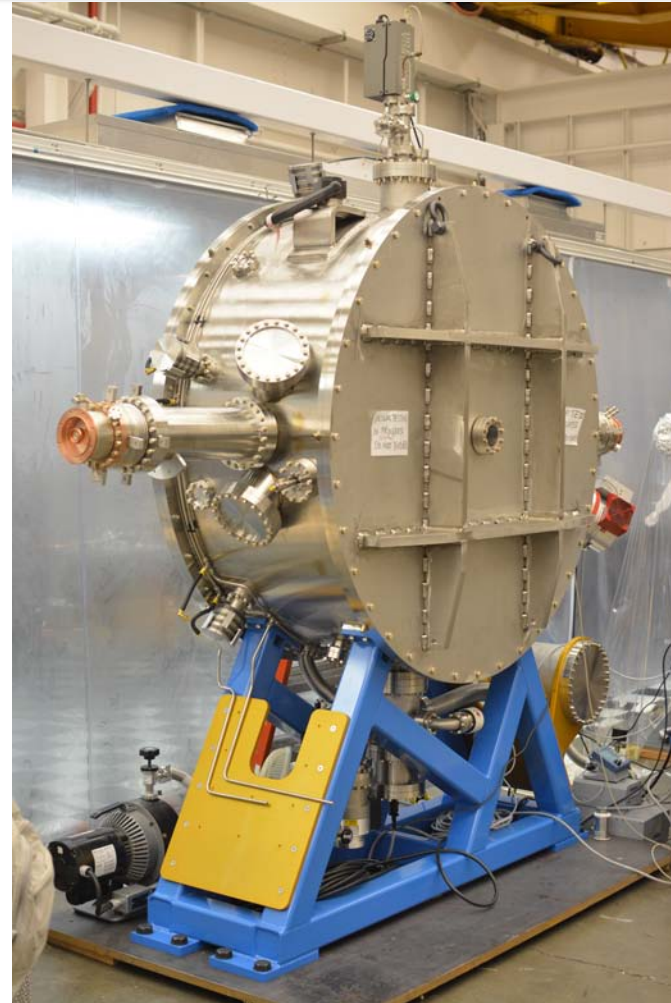


Status at CM46

- **Module #1 assembly is complete**
 - Sans Be windows
- **Module #2 assembly is underway**
- **Module #1 Vacuum system test is almost finished**
- **RF tests for both modules are under preparation**
- **Shipping pallets, crates and documents are under preparation**
- **Since CM46.....**

Module #2 Assembly Complete

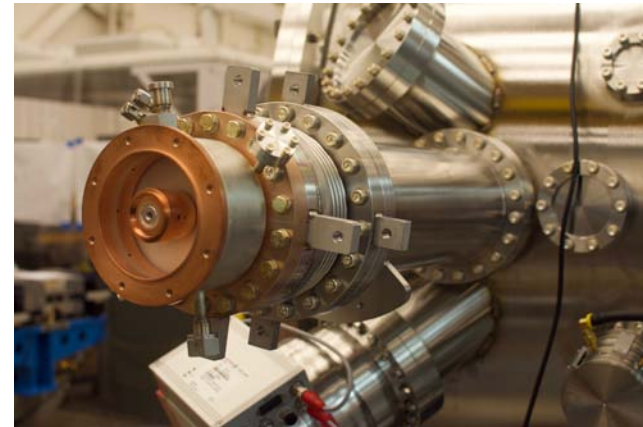
- Same procedure as module #1 with a few modifications based on experience from module #1 assembly
 - Leak tight
 - RF couplers
 - Cavity water feedthroughs
 - Actuators and gas lines
 - Beryllium windows
 - RF pickups
 - Turbo-pump and NEG
 - Vacuum gauges
 - Bypass line and pressure box



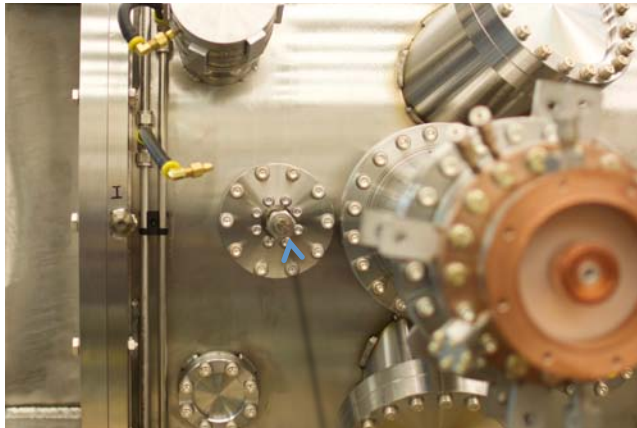
Module #2 Assembly Complete



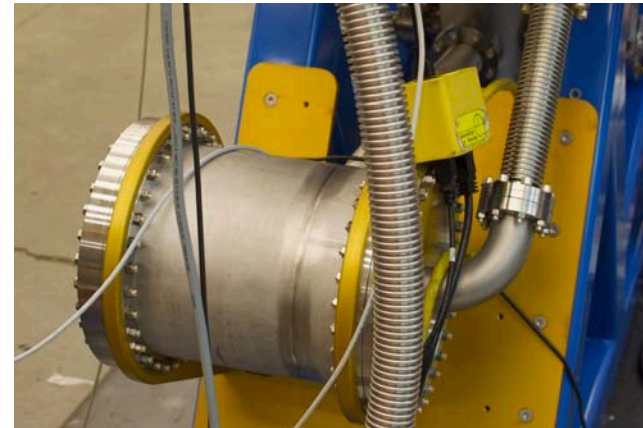
Actuator with gas lines



RF Coupler



Cooling Water Line

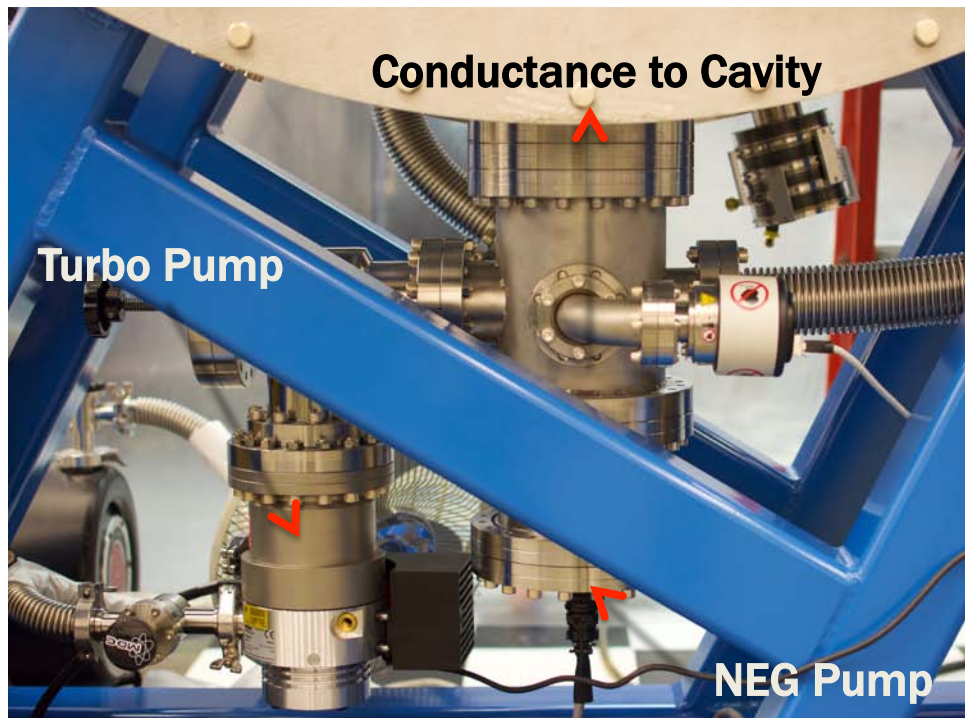


Differential Pressure Box

Module #2 Vacuum Verified

Vessel: 4.0×10^{-7} torr

Cavity: 4.8×10^{-8} torr



Pumping System



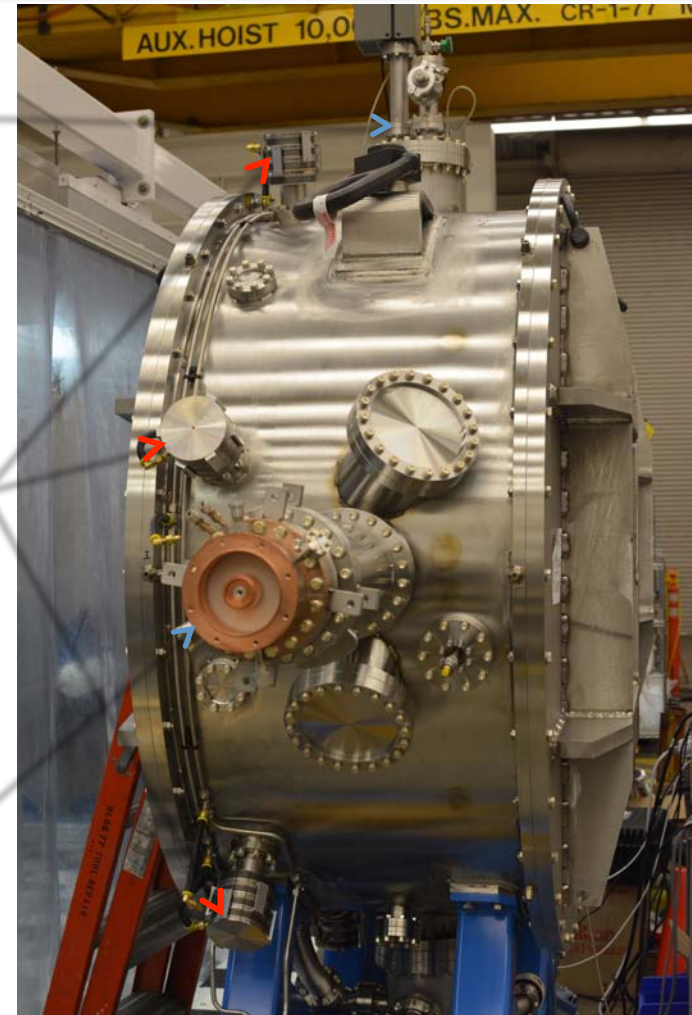
RGA



Controls

Module #2 Low Level RF test ready to start

- FNAL control system under installation
 - LLRF test includes:
 - Cavity frequency and Q_0 measurement
 - RF tuning system test
 - RF coupling measurement
 - Mark coupler orientation -> critical coupling
- RF pickups x2
- Actuators x6
(mechanically tune cavity frequency)
- RF couplers x2
(tuned and marked during LLRF test)



Module #1 Status

- **Final assembly work**
 - Install Be windows – initial pressure box tests were done with aluminum windows in case of failure
 - Reconnect vacuum system + RGA
 - Pump-down and leak check
- **Module #1 RF testing follows**

Be Window Selection and Cavity Frequency

- Cavity bodies are selected based on their body frequencies and surface conditions
- Be windows are selected based on their frequency perturbation to the cavity

Cavity body (MHz)	Be Window In (MHz)	Be Window Out (MHz)	Final Frequency (MHz)
200.976	- 0.537	+ 0.674	201.113
200.970	-0.517	+ 0.663	201.116

- According to the cavity running experience at MTA, the RF heating will decrease frequency by few tens of kHz, the vacuum will increase frequency by about 60 kHz
- RF tuning range is about +/- 200 kHz

Module Shipping

- Ship in March 2017
- Modules will ship together
- RF couplers not installed, instead shipped separately
 - Clear acrylic inspection windows installed on RF coupler spool pieces
- Be windows installed
 - Sealed in vessel
 - Exterior window for inspection
- Vacuum pumps and gauges installed
- Modules backfilled with N₂
- Modules mounted to isolating pallet
- Heavy duty crate, forklift-able
- Air shipment – arrival at Heathrow Airport

Thank You!



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