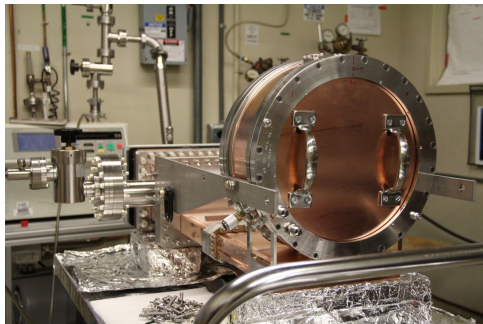


Modular cavity status and test plan

Daniel Bowring

Fermi National Accelerator Facility

May 30, 2014



Modular cavity
status and test
plan

Daniel Bowring

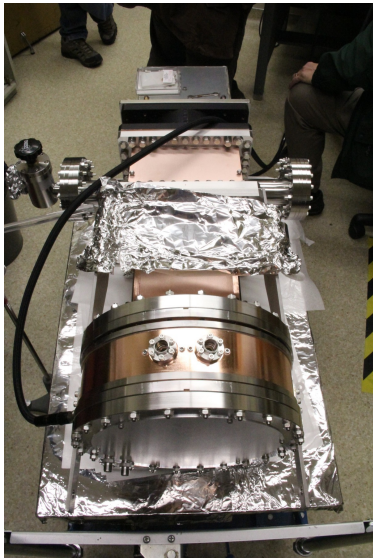
Overview

RF Measurements

Experimental Plan

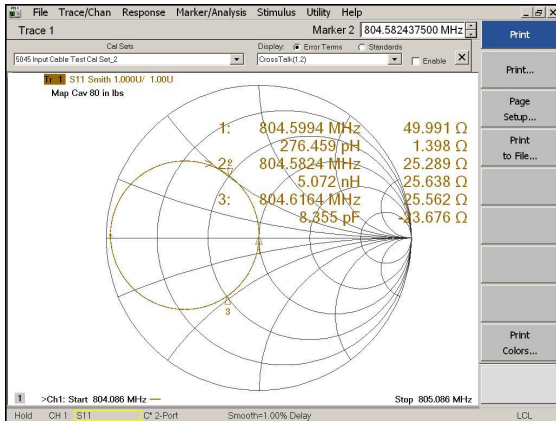
Photos

Overview



1. Frequency and Q have been verified.
2. The cavity has not been delivered to FNAL yet. Endplate flanges are mechanically weak, making the RF joint unstable.
3. We believe this is a solved problem.
4. Meanwhile, what is the experimental plan?
(Plus: photos.)

RF Measurements



We have verified the RF properties of the cavity.

Modular cavity
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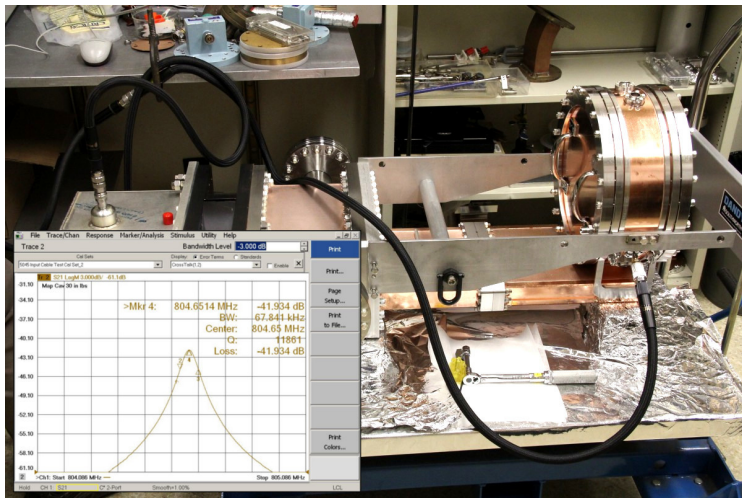
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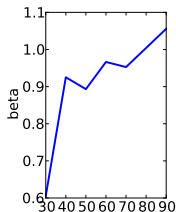
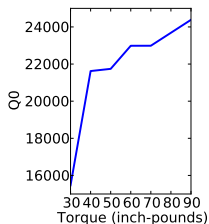
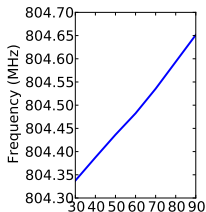
Photos



(Quantitative data on next slide.)

RF design vs. measurement

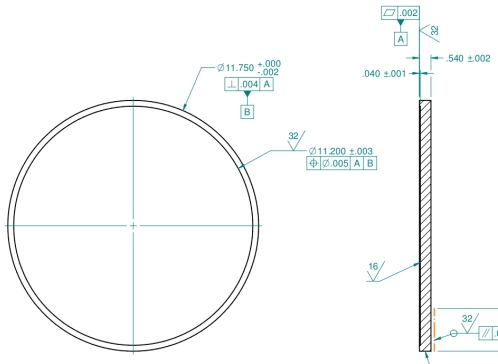
Property	Sim.	Meas.	Notes
Frequency (MHz)	804.99	804.65	Measurement w/o vacuum
Unloaded Q_0	25602	24383	
Loaded Q_L	11861	15141	Not understood. Bad RF adapter?



The recovery/shipping plan has now been vetted.

- ▶ Full design analysis and recovery discussion took place yesterday evening:
<https://indico.fnal.gov/contributionDisplay.py?sessionId=16&contribId=133&confId=8326>
- ▶ Minimally invasive plan gets the cavity to FNAL ASAP.
- ▶ Staged “upgrades” possible if the minimally invasive fix proves insufficient.

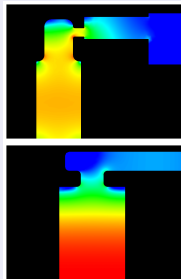
Experimental Plan



Experimental goals of the modular cavity program

The modular cavity allows us to collect “clean” data.

- ▶ Mimics coupling strategy in a cooling channel.
- ▶ Strongest surface E -field (by $5\times$) is on-axis.



We can test different materials and surface treatments.

- ▶ Beryllium vs. copper
- ▶ Half-hard vs. fully-annealed Cu
- ▶ Chemical polishing vs. electropolishing
- ▶ Other materials?

Using the modular cavity

Modular cavity
status and test
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Daniel Downing

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Sequence of runs

1. Chemically-polished Cu plates, $B=3/0$
2. Chemically-polished Cu plates, $B=0/3$
3. Beryllium plates, $B=TBD$
4. Fully-annealed Cu plates
5. "Other" (15 cm body, Cu alloy plates, etc.)

What does a single run look like?

- i. Inspection
- ii. Conditioning
- iii. Inspection
- iv. Establish safe operating gradient
- v. Inspection

Notation: $B=3/0$ denotes a run at 3 T followed by a run at 0 T.

Frequent inspection help us understand when damage occurs.

Modular cavity
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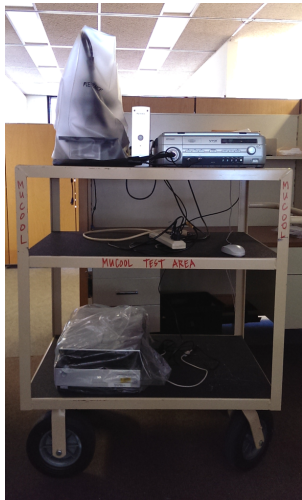
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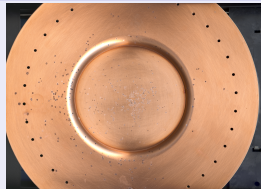
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ASC: High-res scanner



ASC: Digital microscope



Photos

Modular cavity
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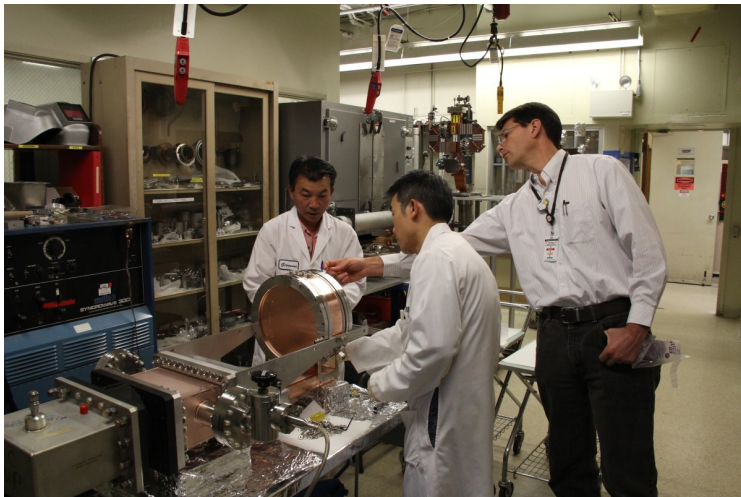
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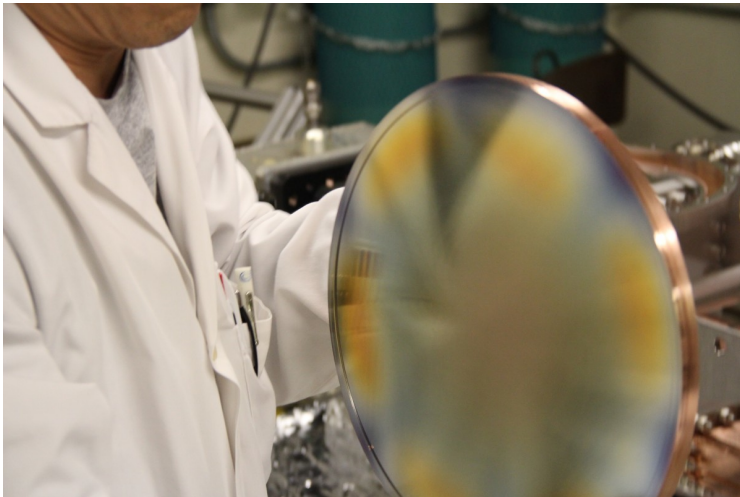
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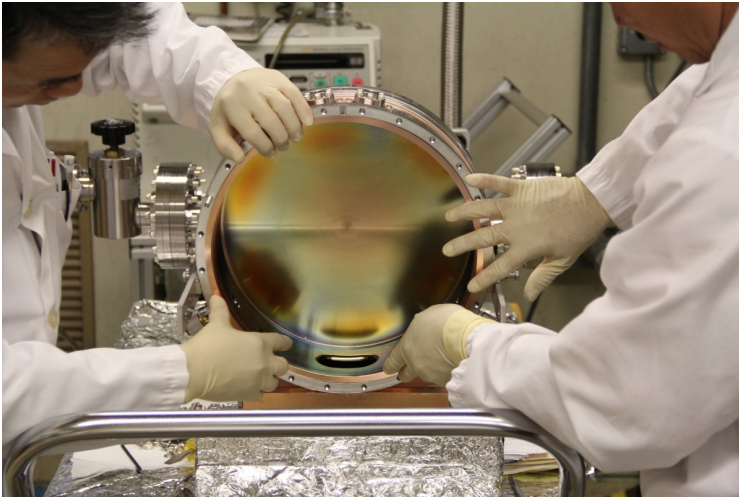
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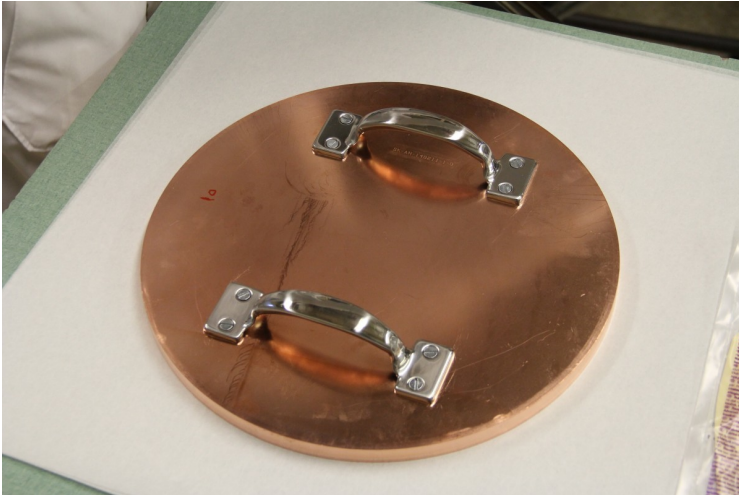
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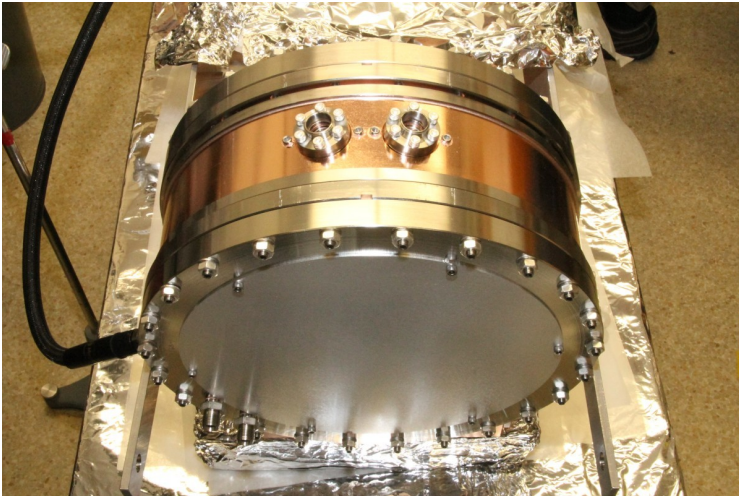
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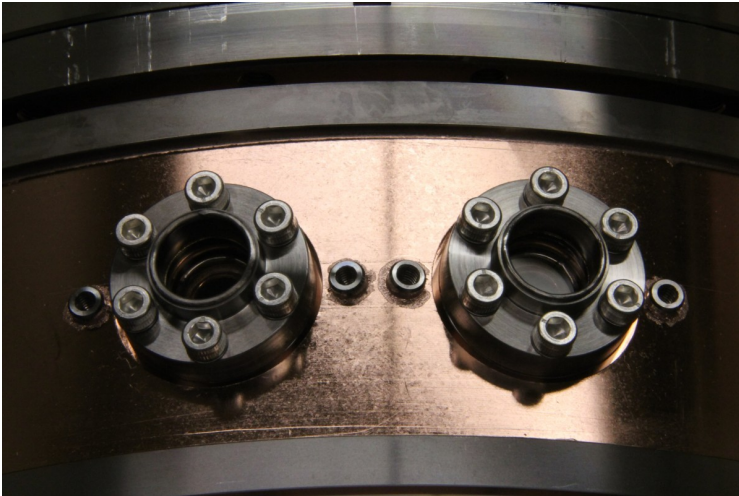
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