

RF Separation Status

Mark Wissmann
July, 2015

Outline

History

Update Of Three Tasks:

- Resonant Control
- Cavity Tuning
- IOT Power Output Adjustment/Test

Spring History

During the spring run we extracted ~9.6 GeV beam and problems and concerns were uncovered.

- Large Frequency Shift During Operations
 - Water Control System Limited
 - Cavity Tuning Not Optimized
- The IOT Amplifier Near Its Set Power Limit.
- A bit Less Separation Than Expected

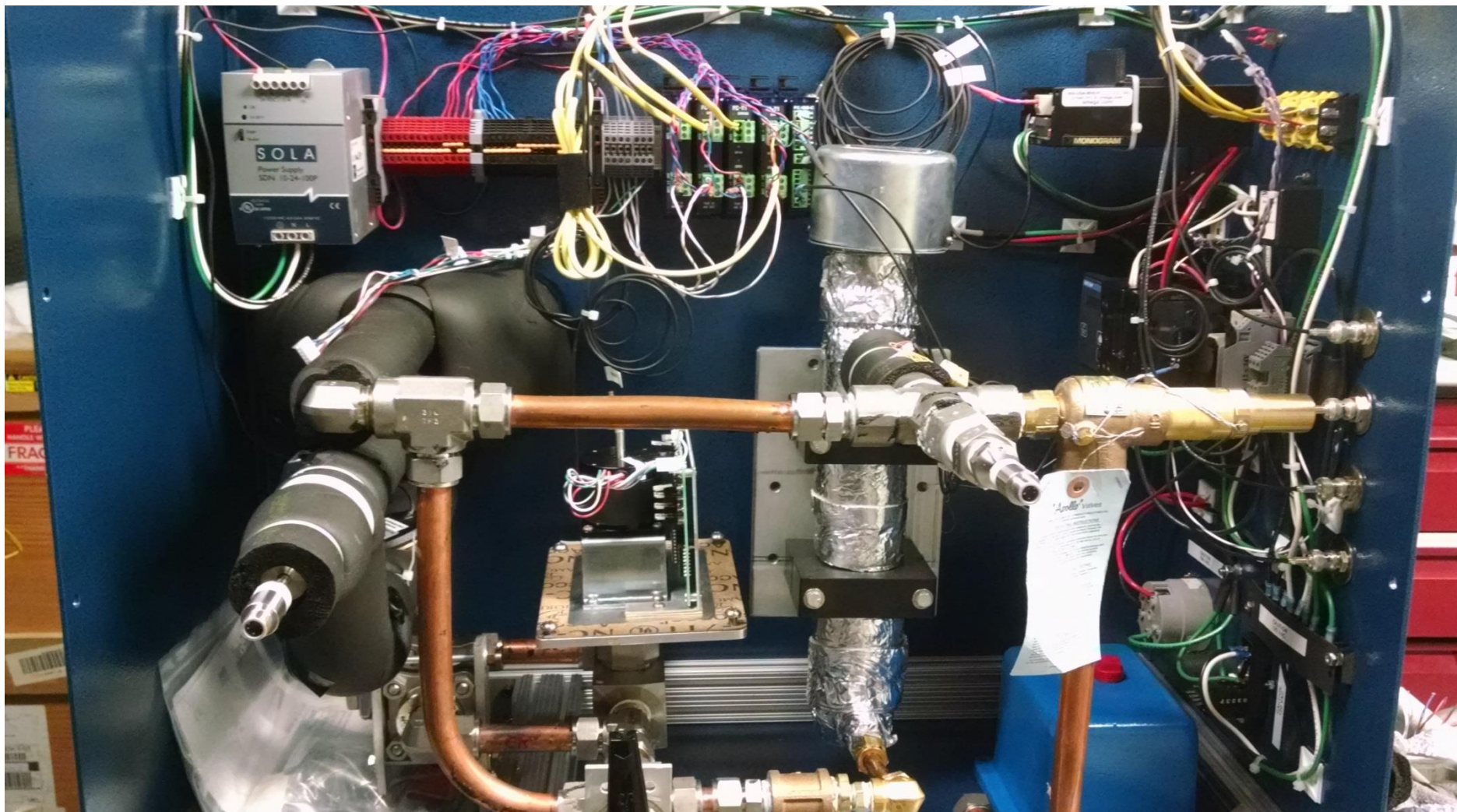
Water Controls Update

Preliminary test was performed for two weeks after suspending machine operations.

FINDINGS: (Tomasz Plawski's ELOG 3343104)

- Operated 2.2 kW into a cavity.
- The cavity was controlled using an upgraded heater chassis.
- Startup and operation to 2.1 power achieved
- Build of upgraded water system scheduled for completion by mid-August

TEST Water Enclosure



Cavity Setup Update

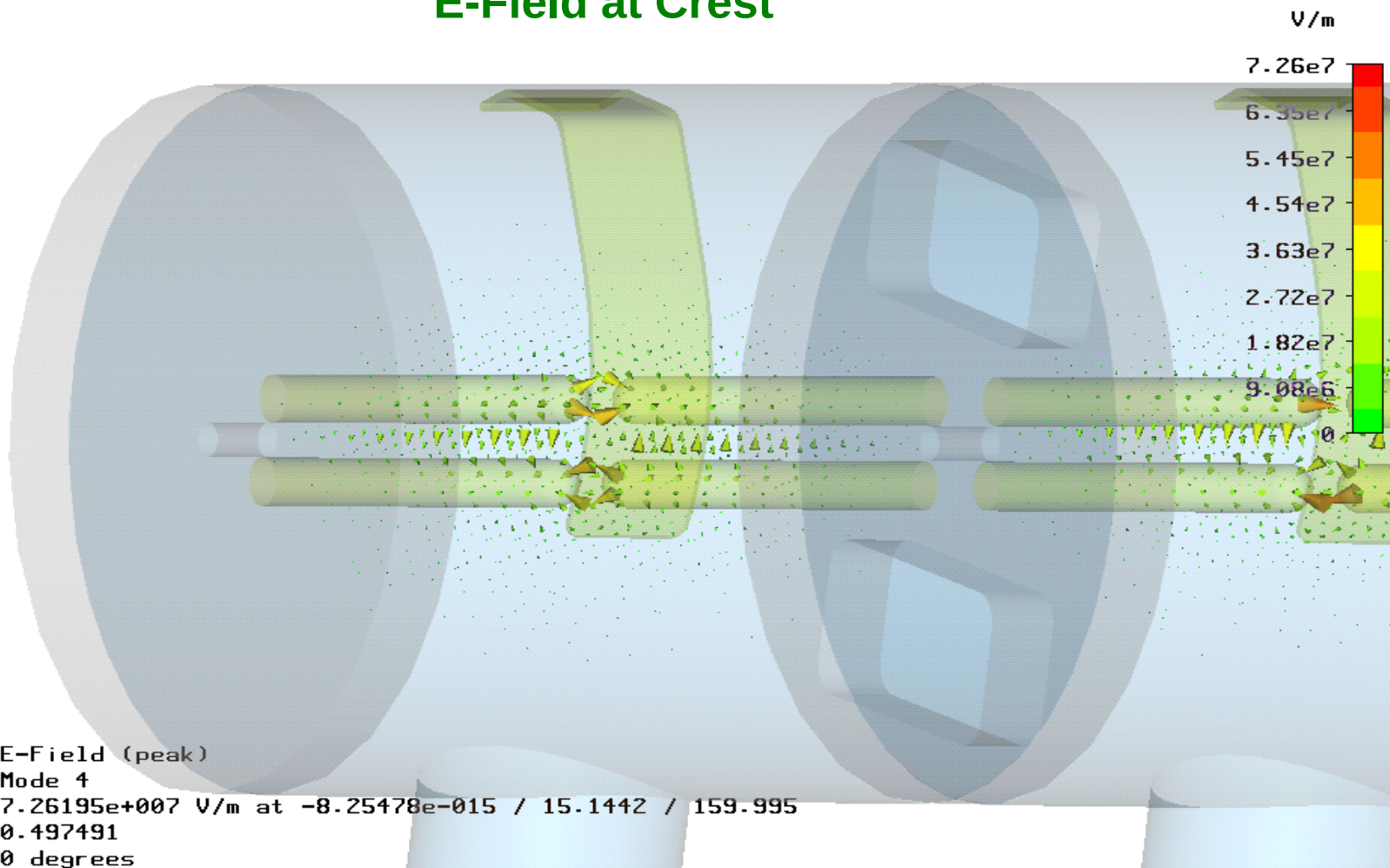
After water controls testing, all four cavities were removed for bench tuning and setup.

Tasks:

- Establish field flatness in each cell
- Install a second pickup loop
- Fiducialize each cavity
- Reinstall Cavities

Simulation Results

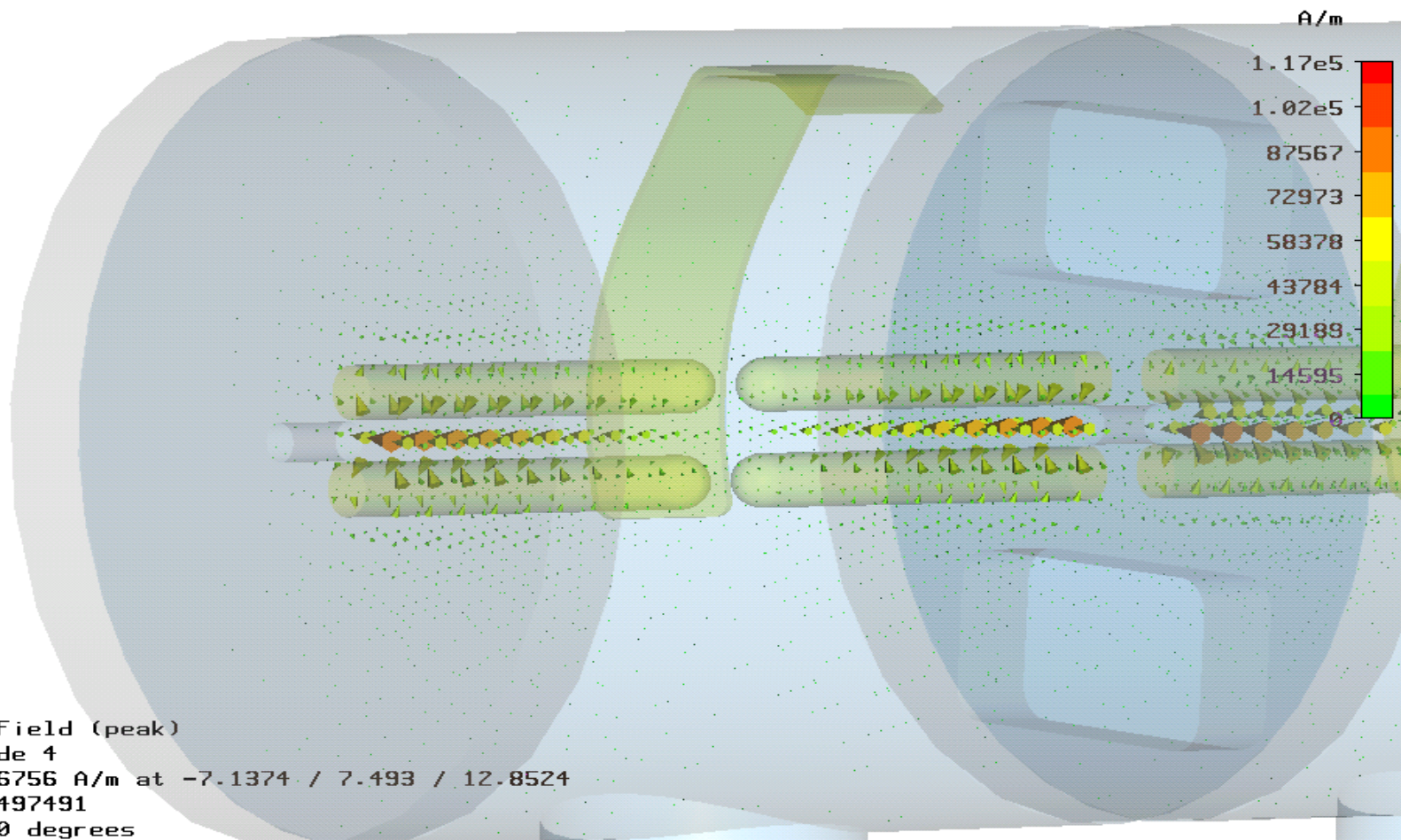
E-Field at Crest



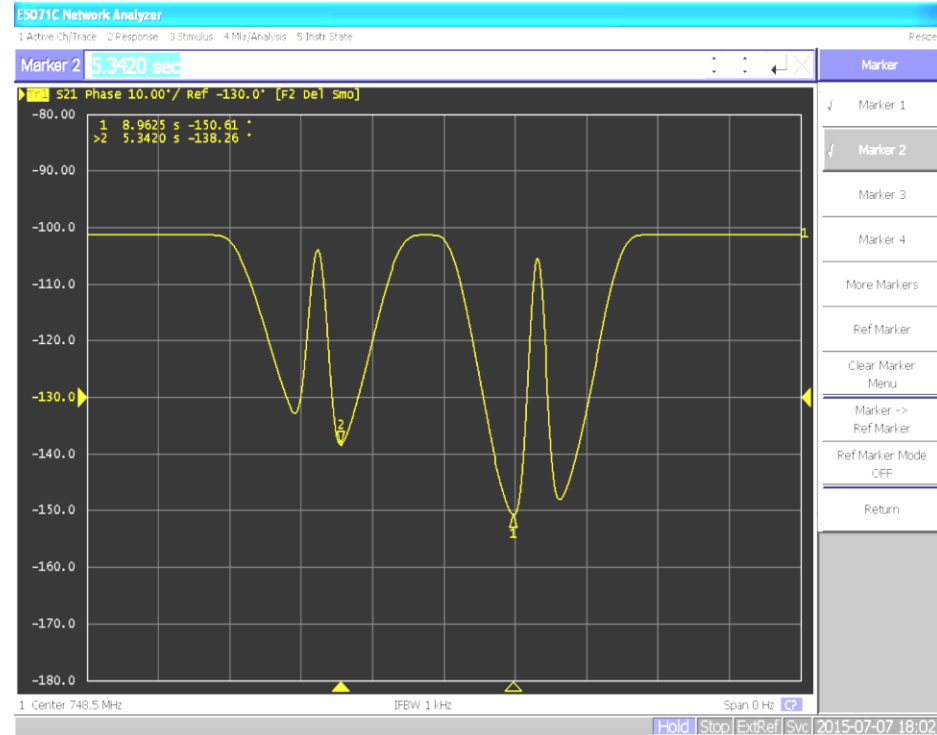
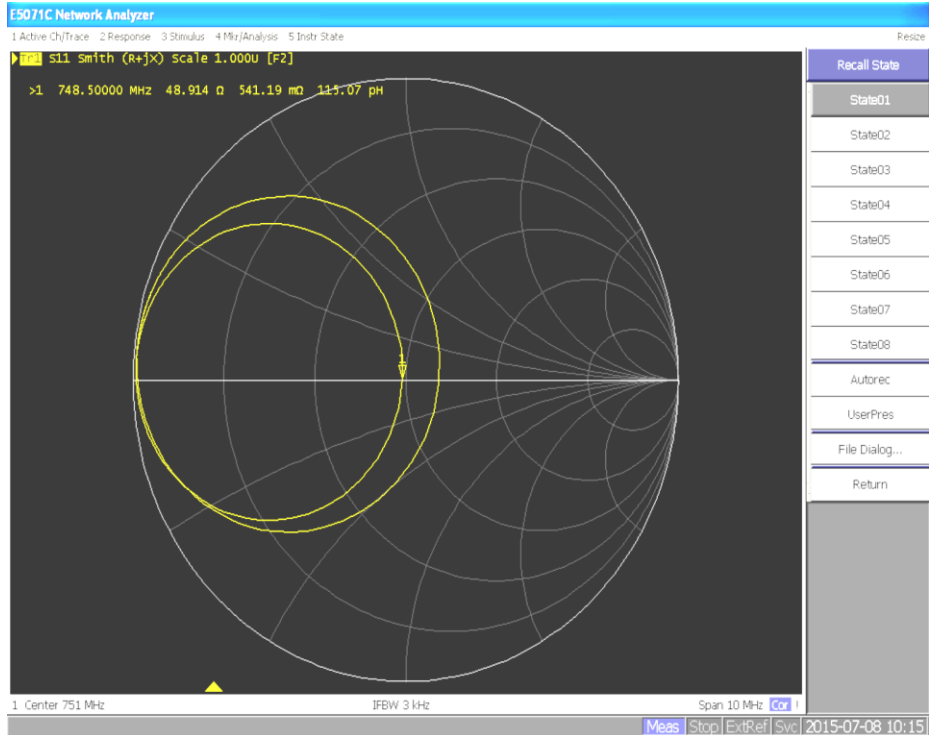
Type = E-Field (peak)
Monitor = Mode 4
Maximum-3d = 7.26195e+007 V/m at -8.25478e-015 / 15.1442 / 159.995
Frequency = 0.497491
Phase = 0 degrees

Simulation Results

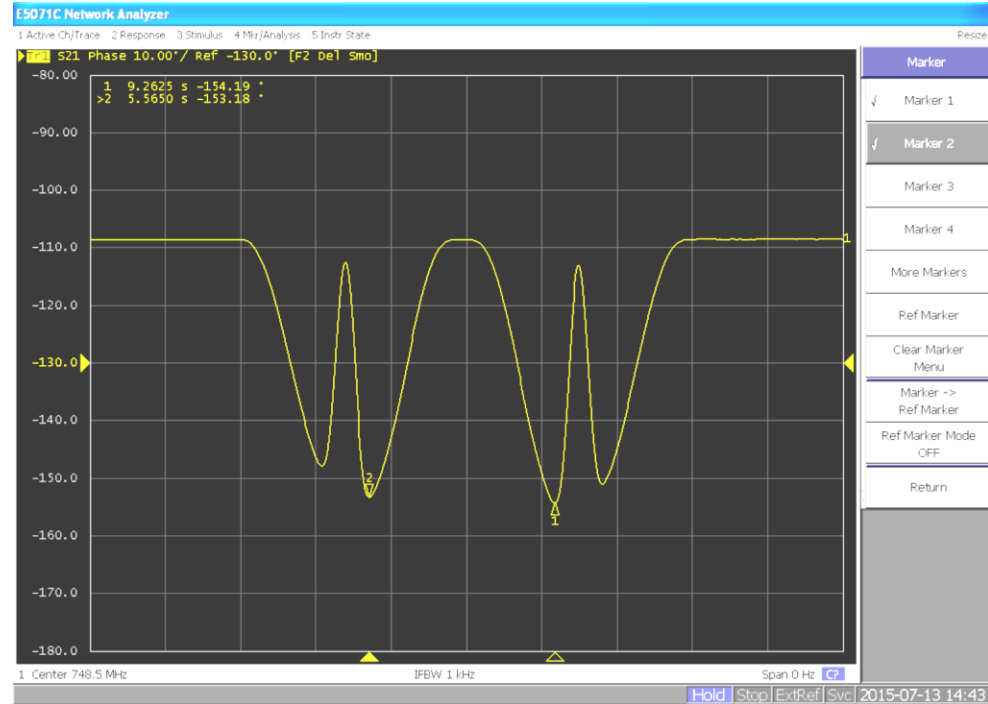
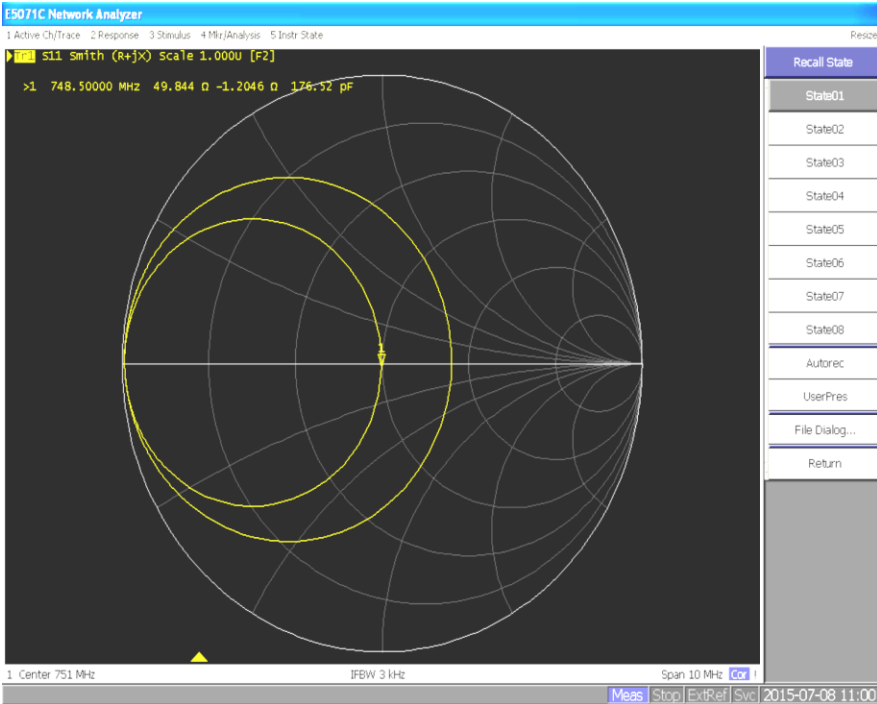
H-Field at Crest



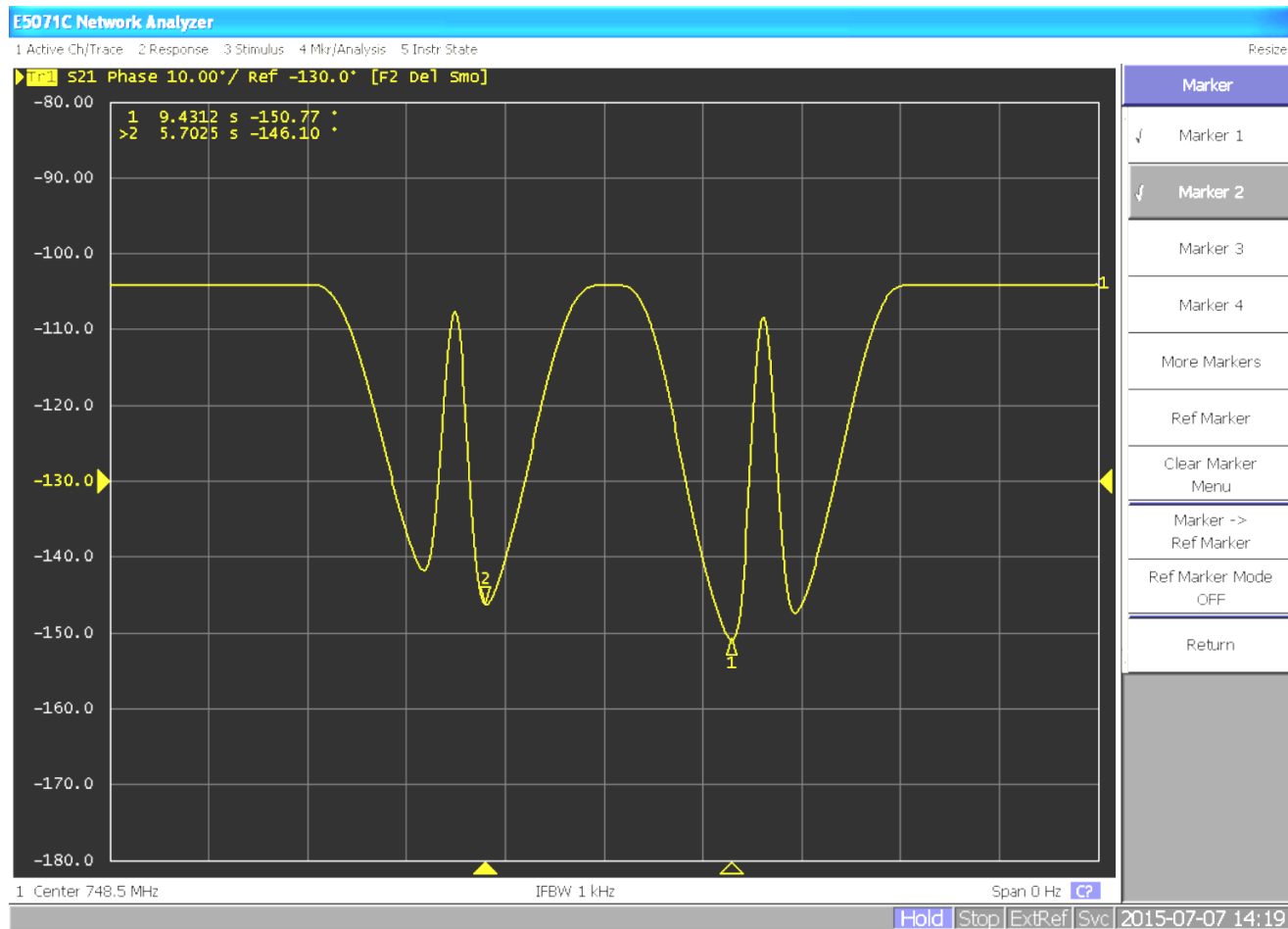
Typical Spring Run Cavity Setup



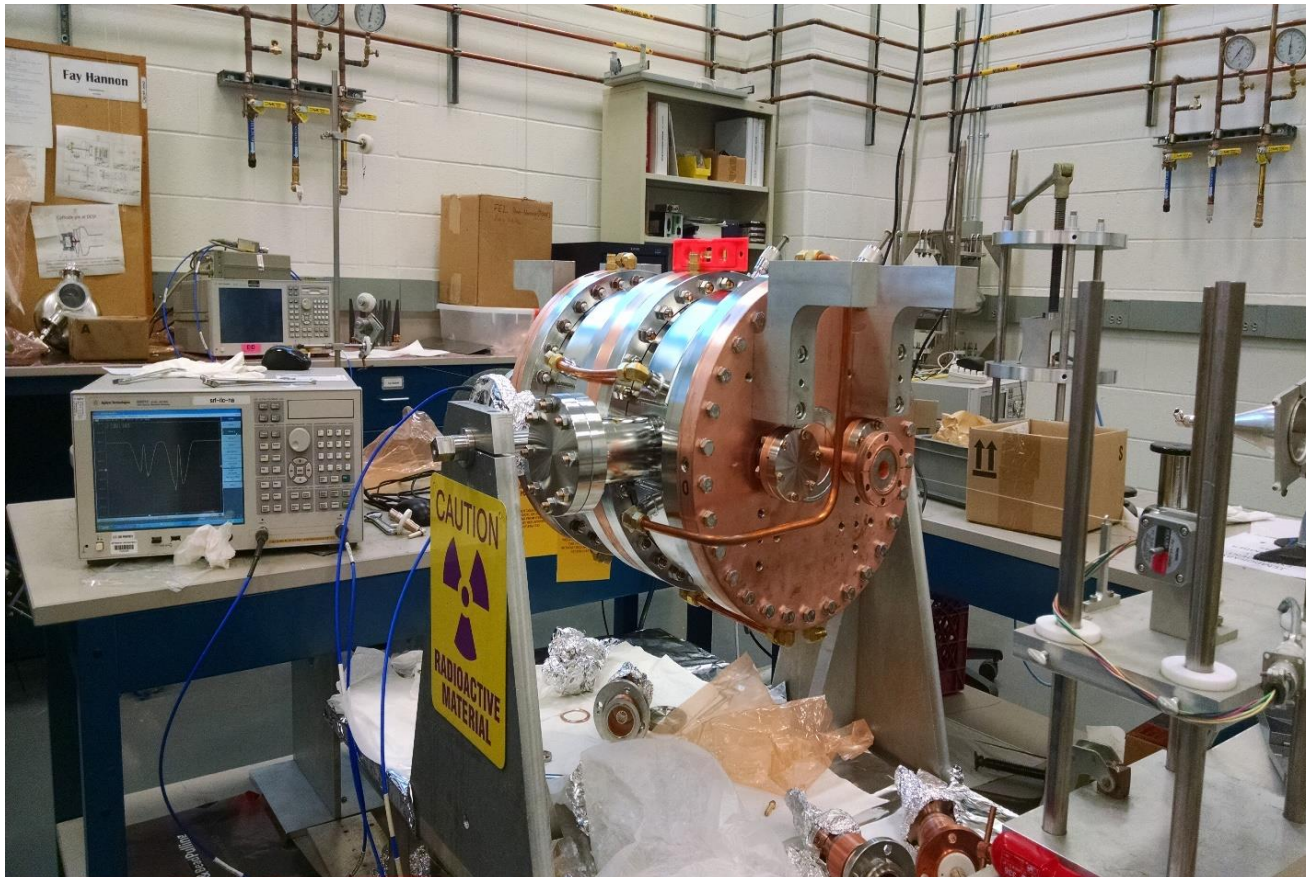
Cavity Setup With Fields Flat



RRFAE00A's Final Bench Setup



Bead Pull In RF Structures Lab



RRFAE00A Setup For Beadpull

Cavity Setup Update

- **Establish field flatness in each cell**

RRFAE00A set and in high power test

RRFAE00D set and soon on Alignment Stand

RRFAE00B & RRFAE00C awaiting Pickup Loops

- **Install a second pickup loop**

RRFAE00A, RRFAE00B and RRFAE00C need pickups. They arrived from MDC yesterday.

- **Fiducialize each cavity**

RRFAE00A, RRFAE00B and RRFAE00C complete.

- **Reinstall Cavities**

Plan to be ready by first week in August

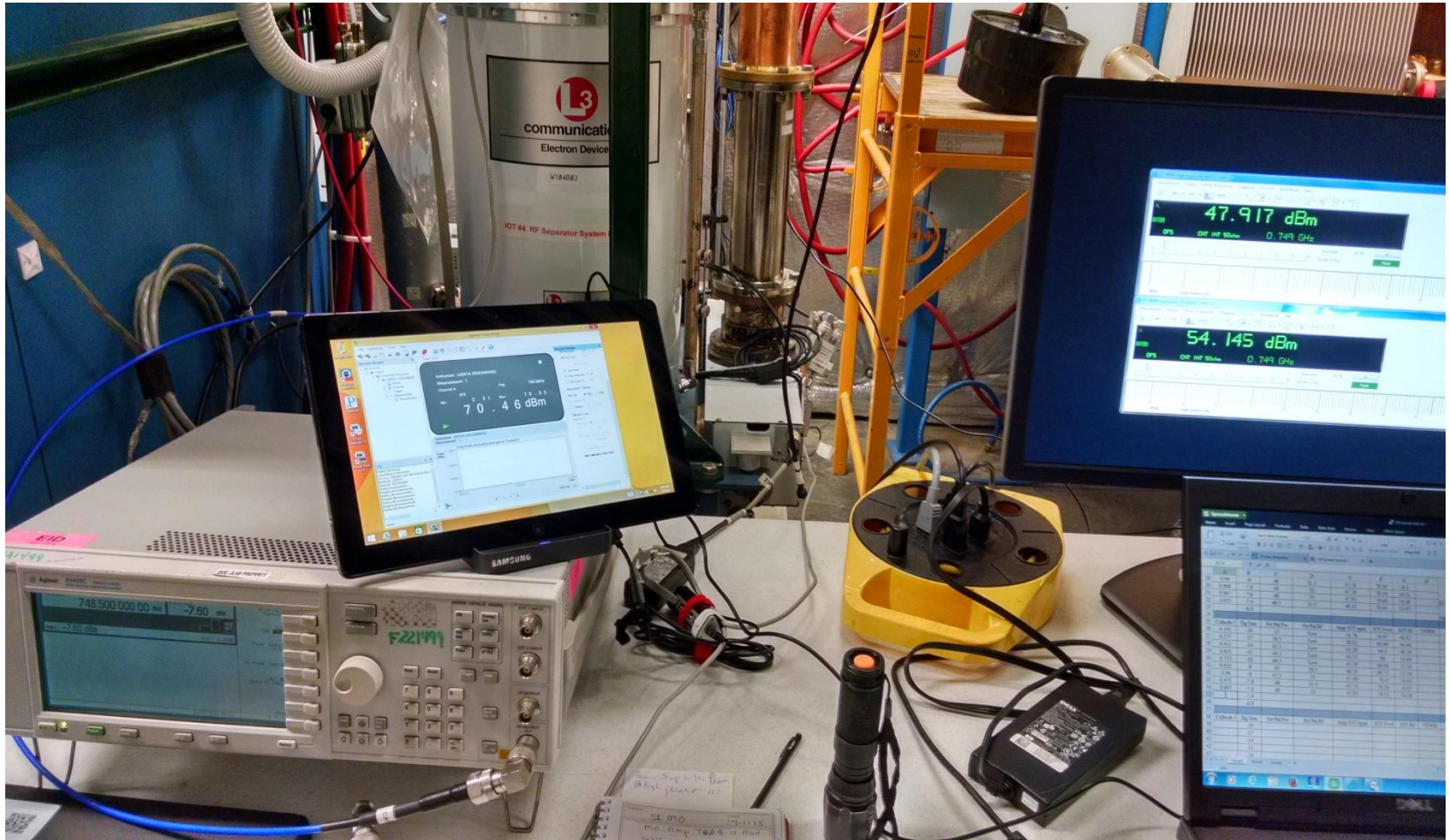
IOT Power Update

- Goal is 14 kW Steady Power
- To do this the HVPS needs to provide ~24 kV
- The transformer taps were changed and the power supply is at 22 kV.
- At 22 kV 14 kW has been achieved but it drifts.

This drift is believed to be from IOT Cavity heating

- Drift can also be addressed by IOT tuning
- Possible HVPS transformer tap change

IOT Power RUN



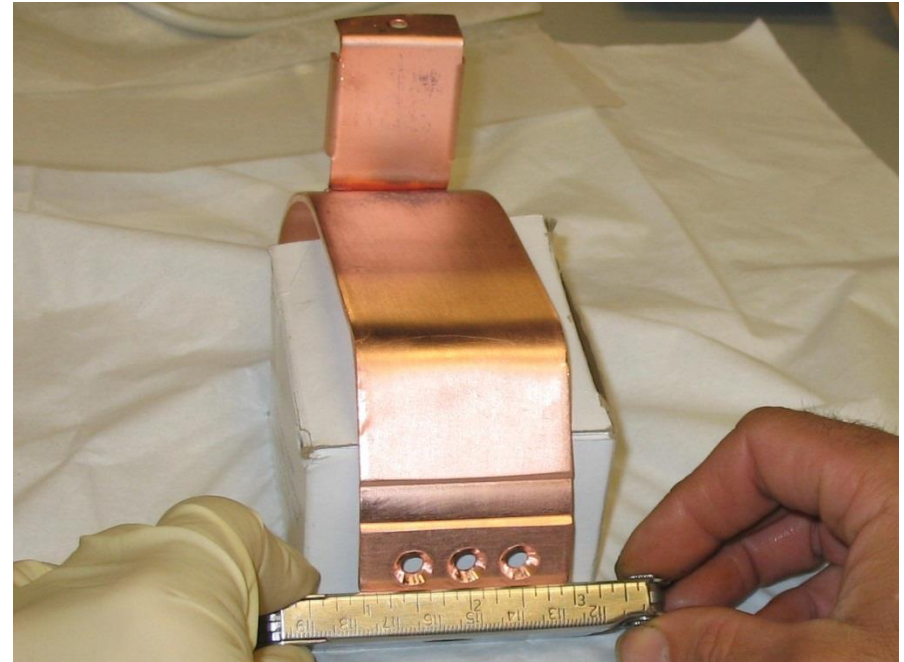
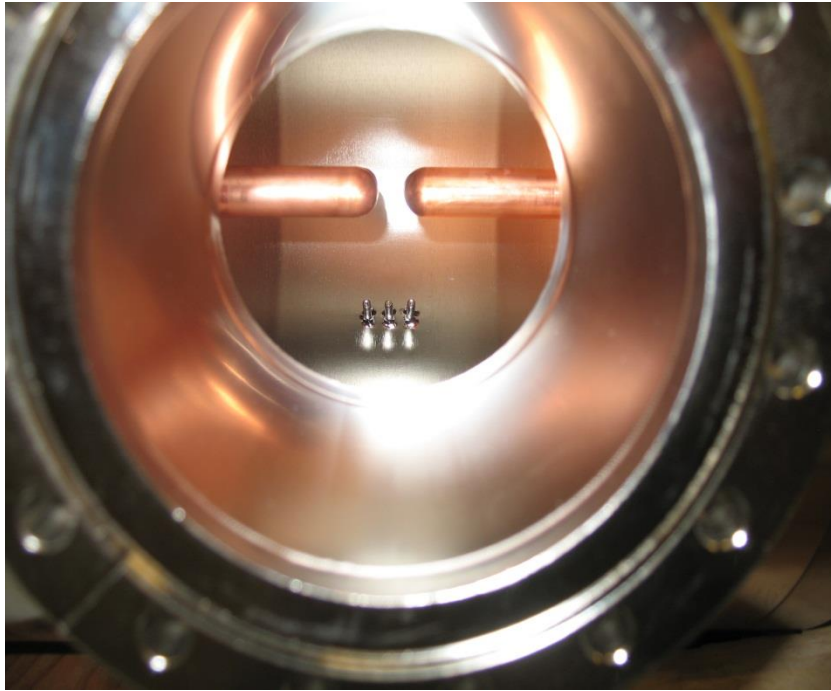
Summary

- Resonance Control Test complete and construction of chassis on schedule for Mid August Delivery
- Cavity tuning optimization on schedule but benefit is in question.
- IOT power upgrade is still in progress and it appears power is achievable and can be stabilized with IOT tuning at the higher powers.

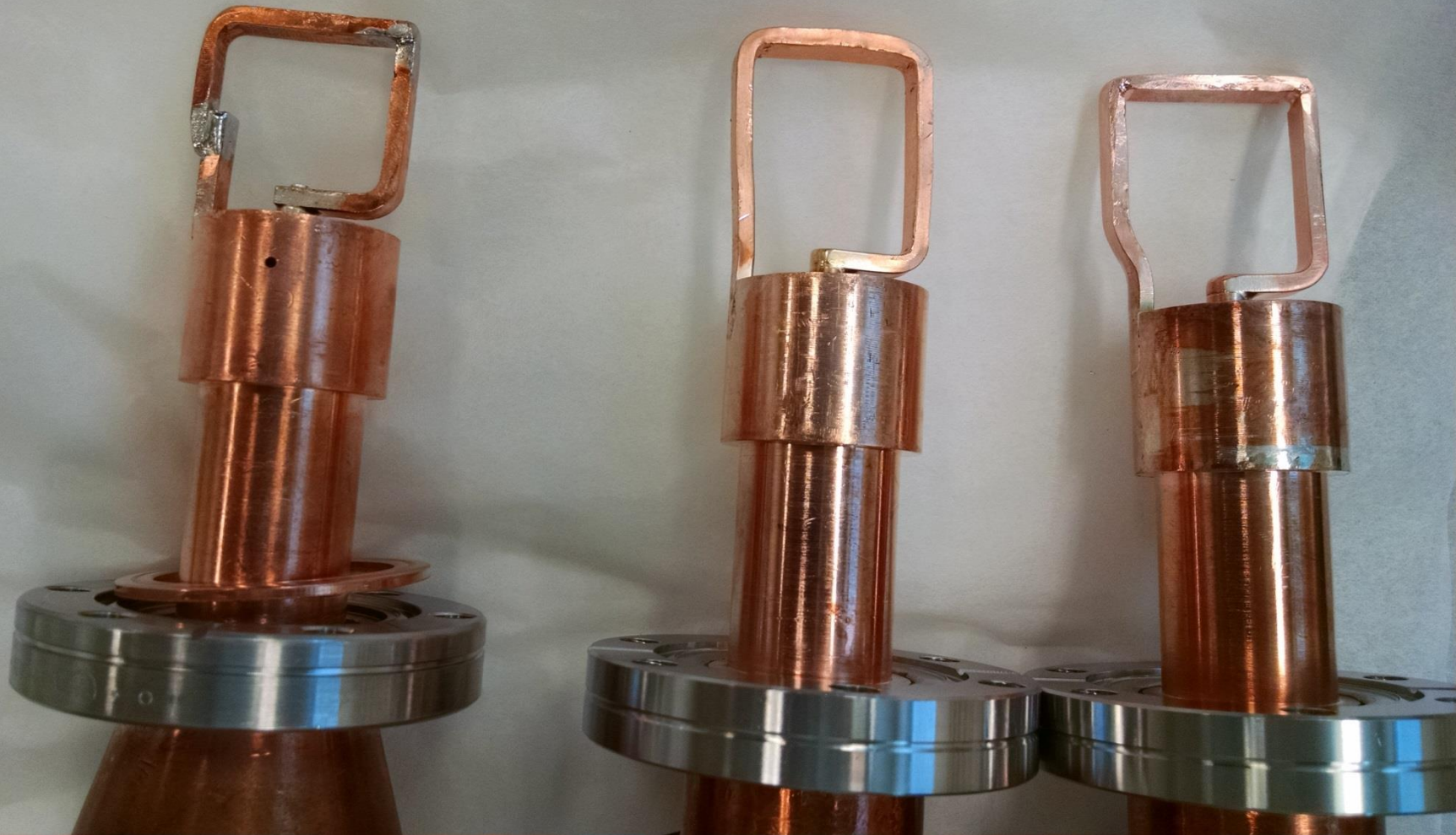
Questions?

Inside A Separator Cavity

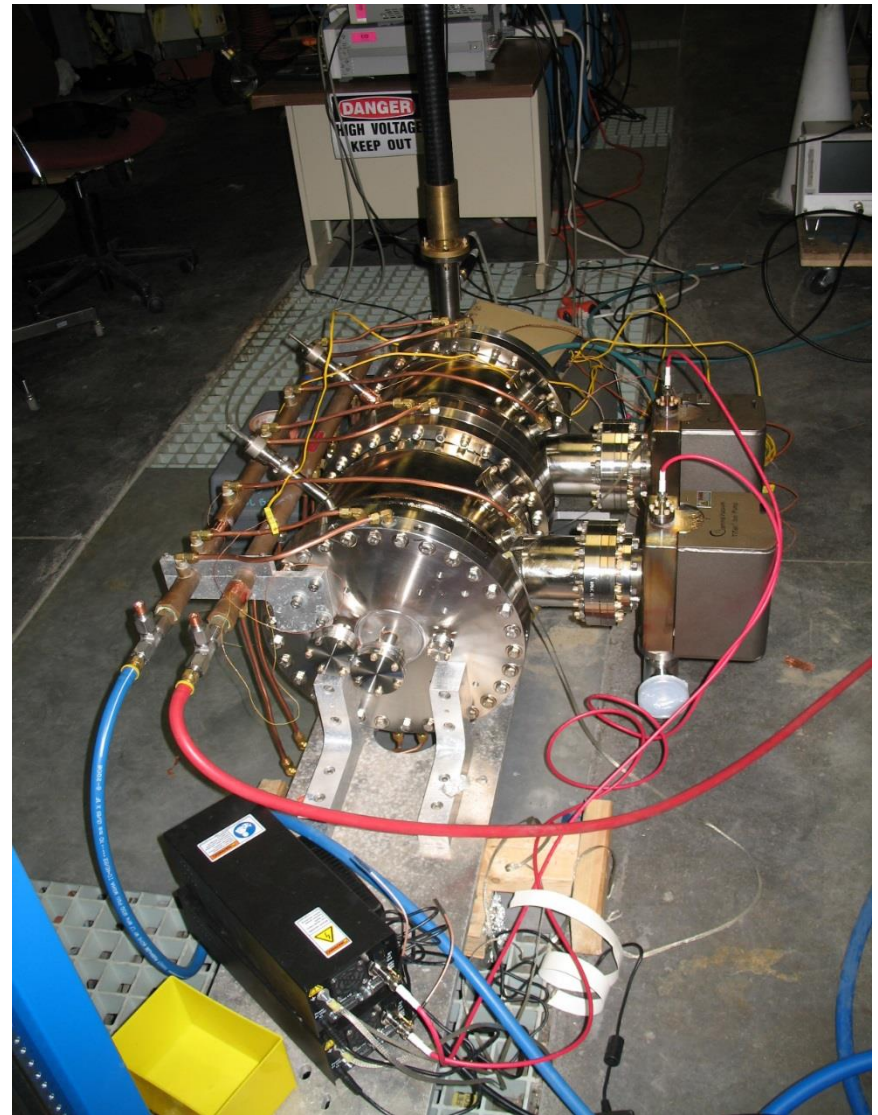
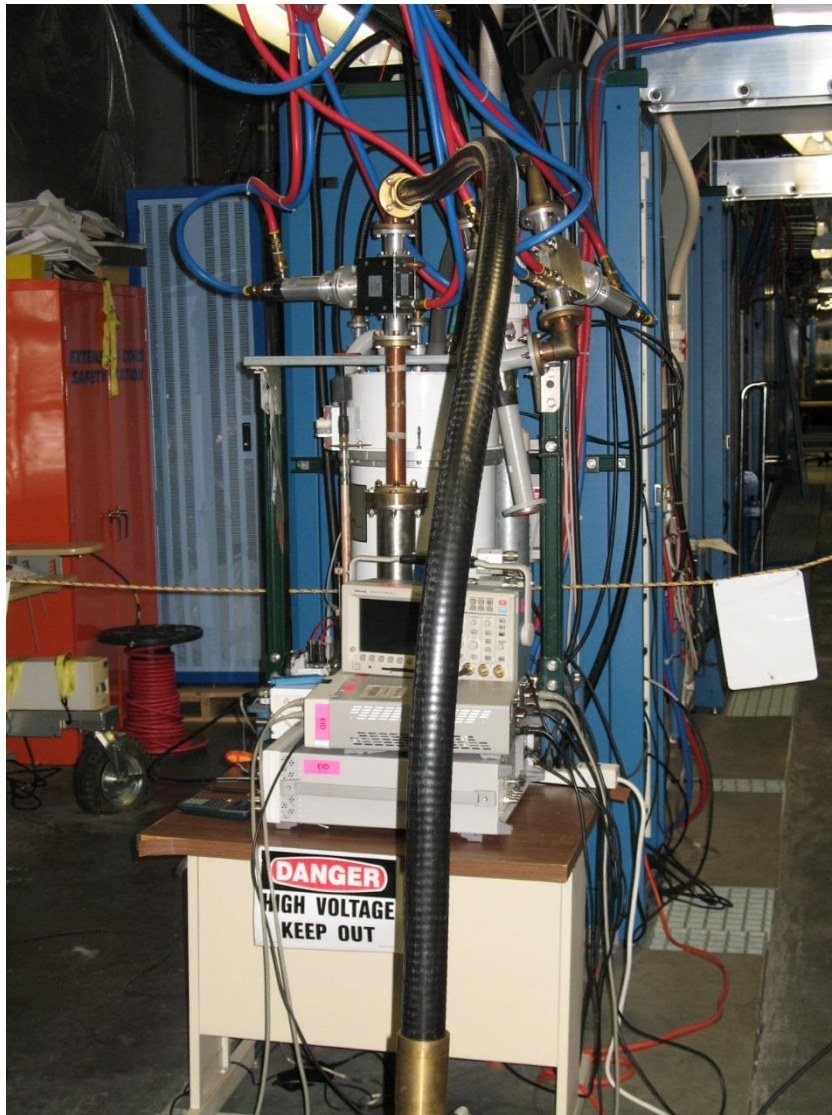
Tuning Plate Removed



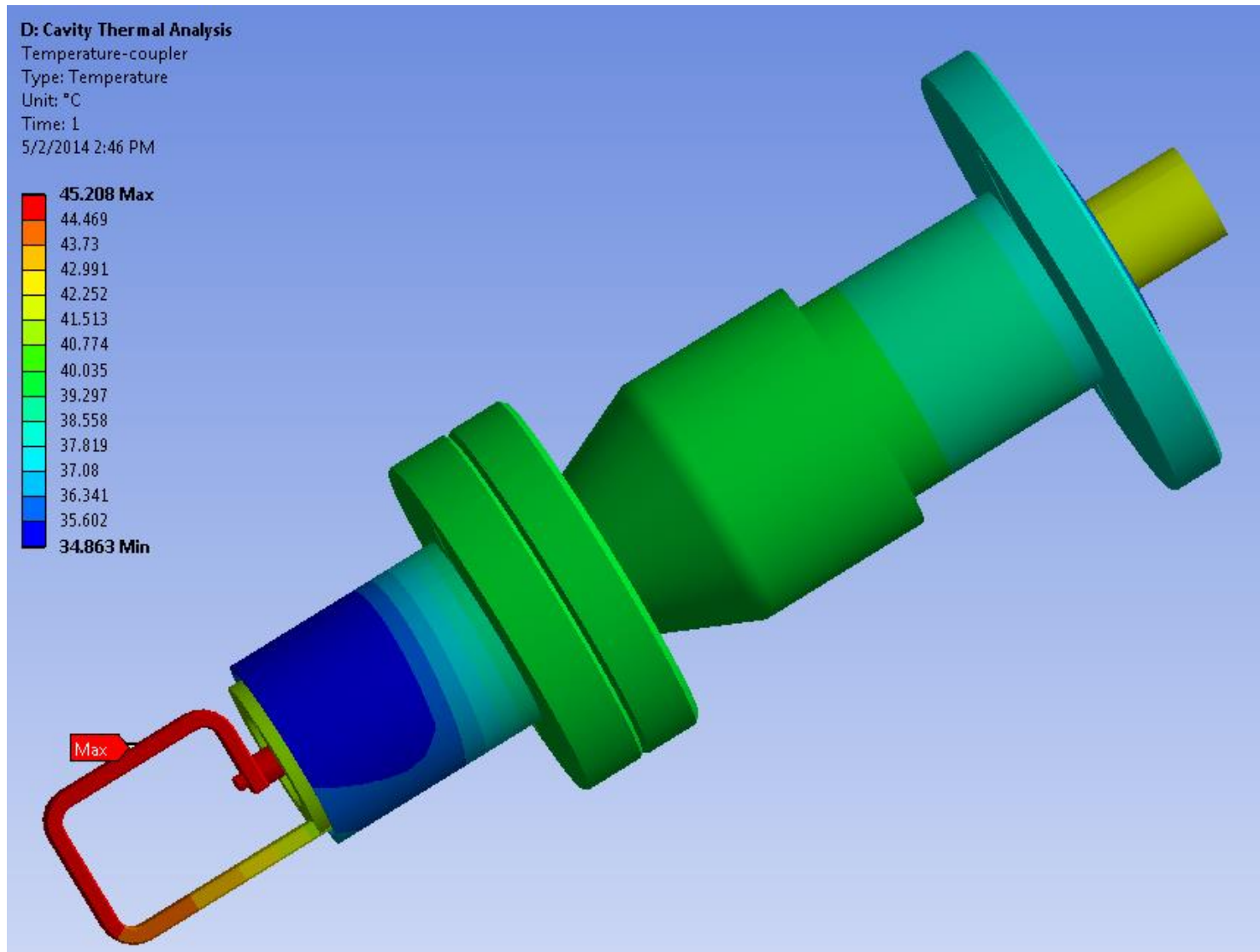
750 MHz Cavity Couplers



Prototype Under High Power Test

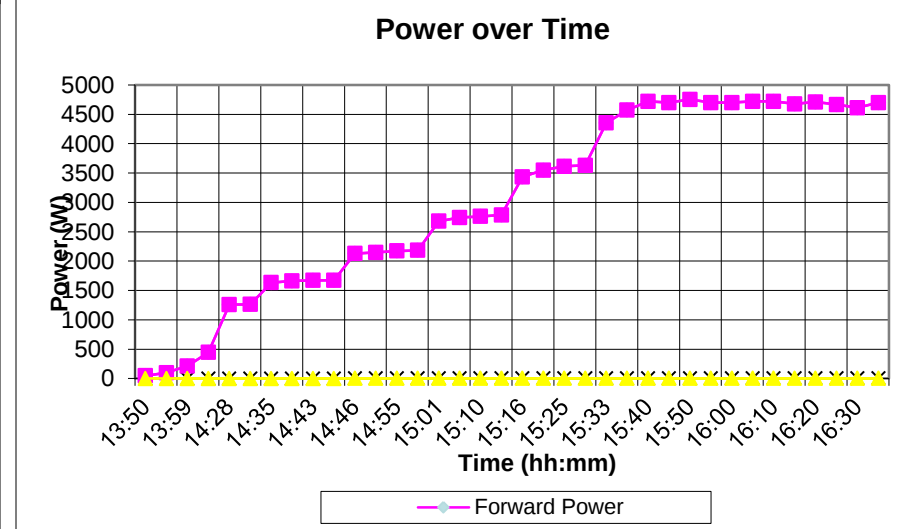
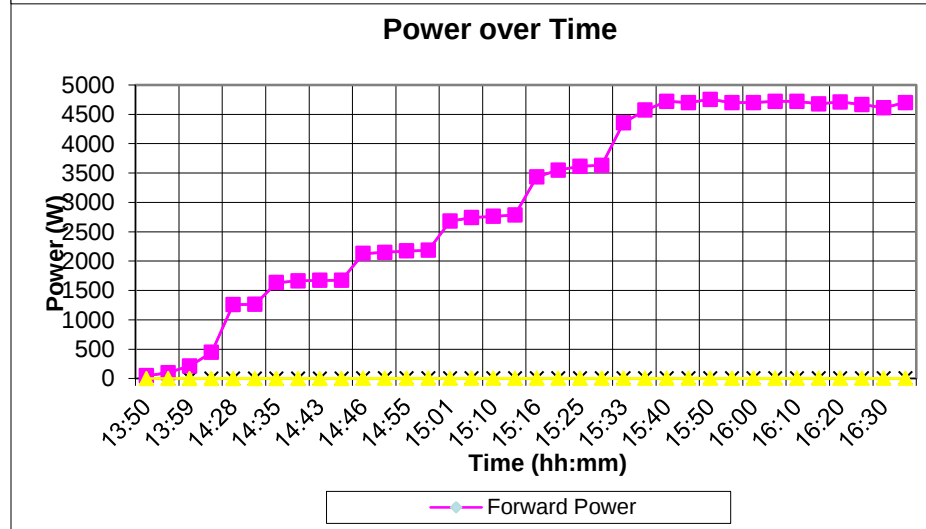
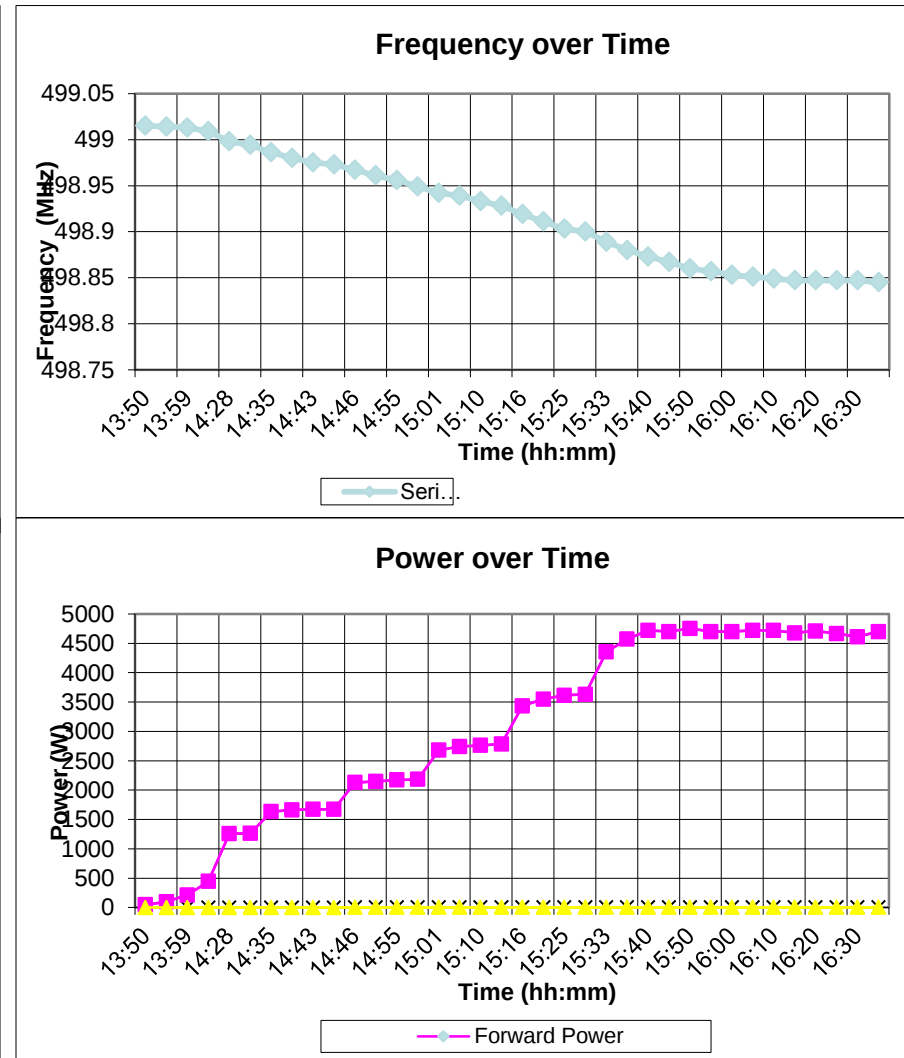
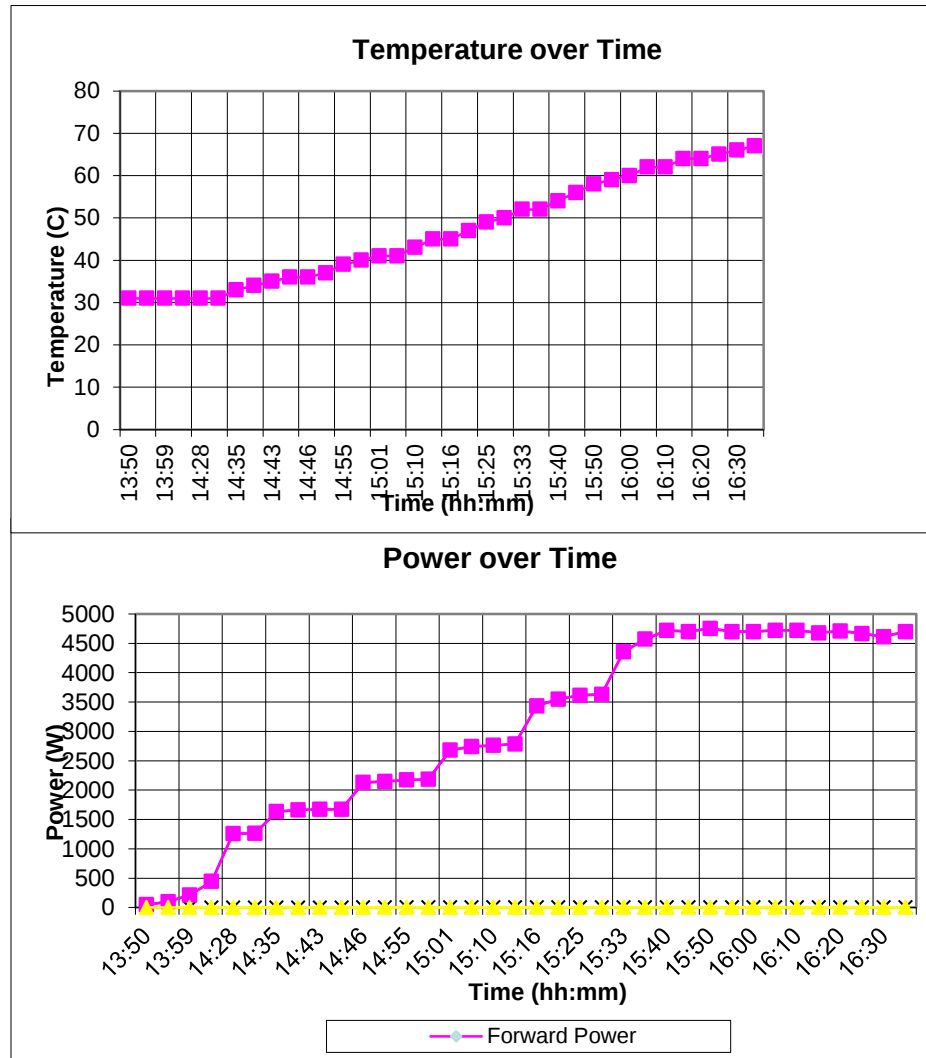


Temperatures in the Power Coupler



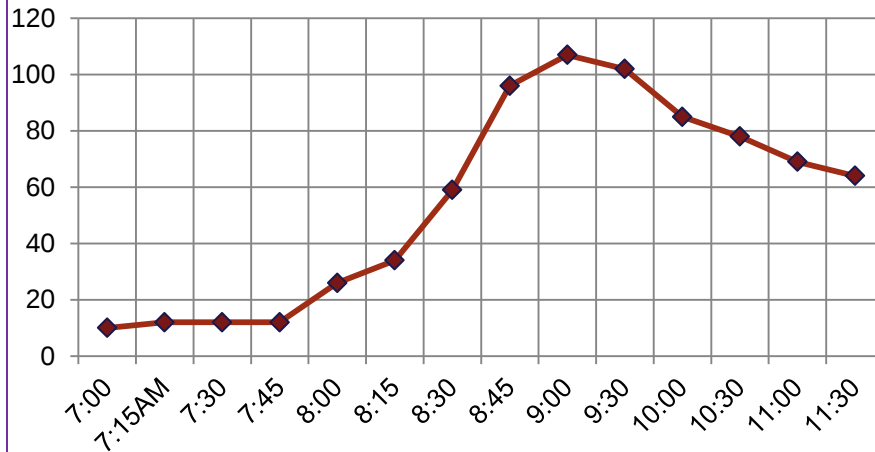
RESONANCE CONTROL CRITERIA

Cavity Temp and Frequency Response

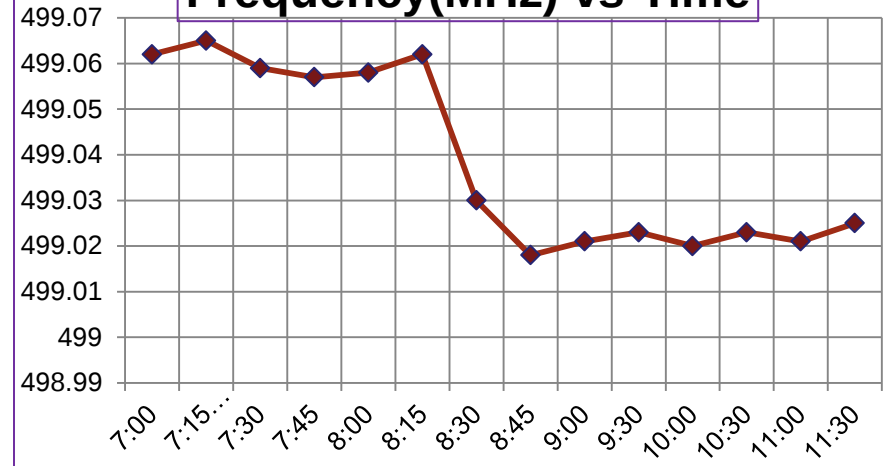


Powering A Cavity With Solid State Amp

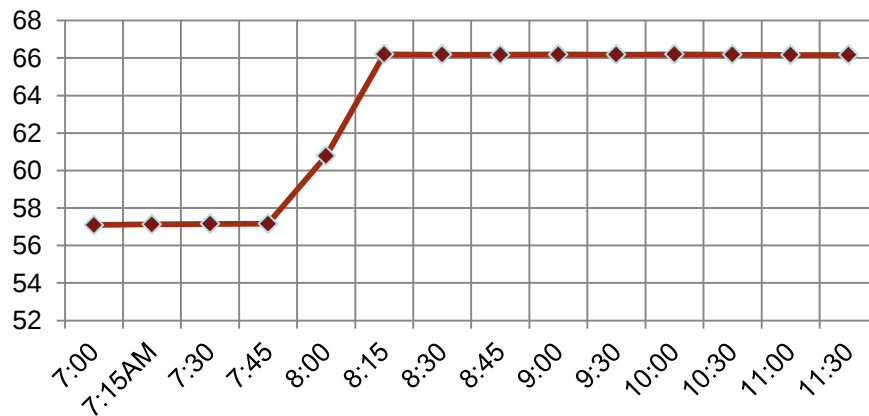
Vacuum vs Time



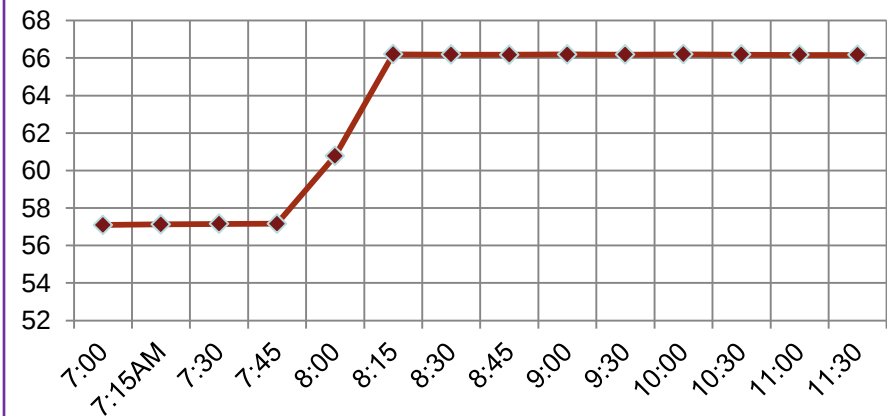
Frequency(MHz) vs Time



Fwd Pwr(dBm) vs Time



Fwd Pwr(dBm) vs Time



Resonance Control



PLC Controller



Heater Module



Heater System

Cavity Temp. vs. Frequency Response

