
BNL CRYOMODULE

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Brookhaven National Lab

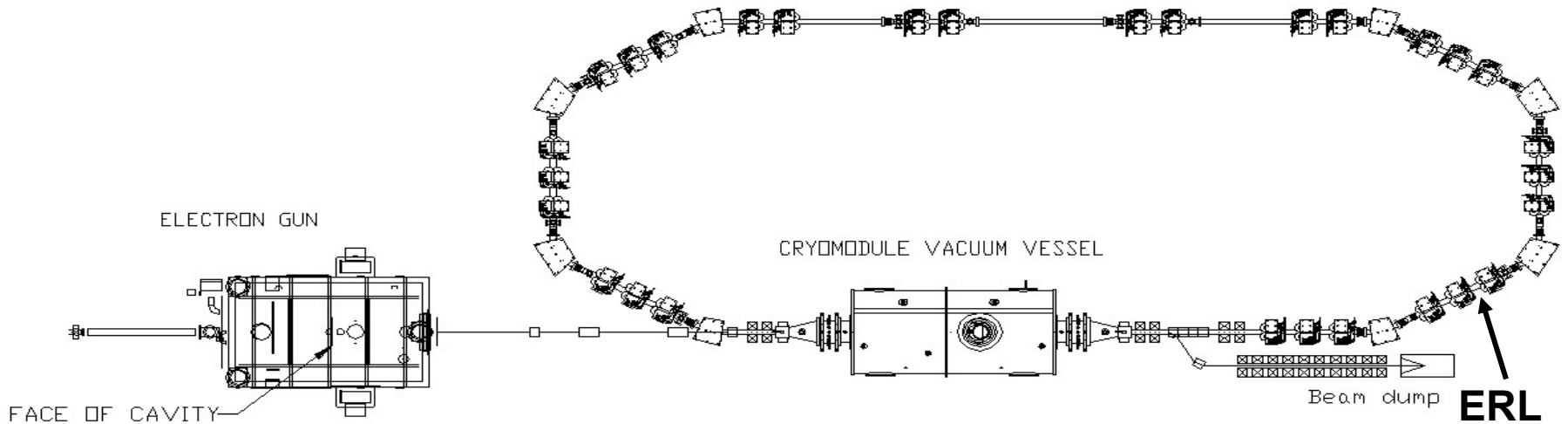
H. Bluem, A. Burger, M. Cole, A. Favale, D. Holmes, J. Rathke, T. Schultheiss, A. Todd

Advanced Energy Systems

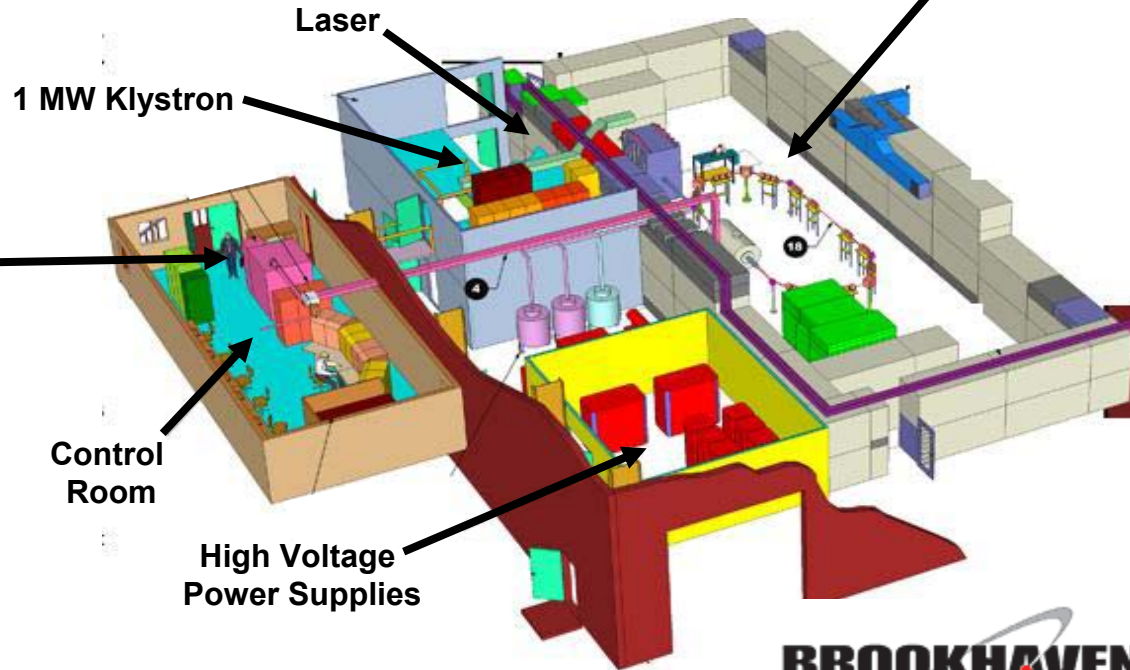
In collaboration with

JLAB

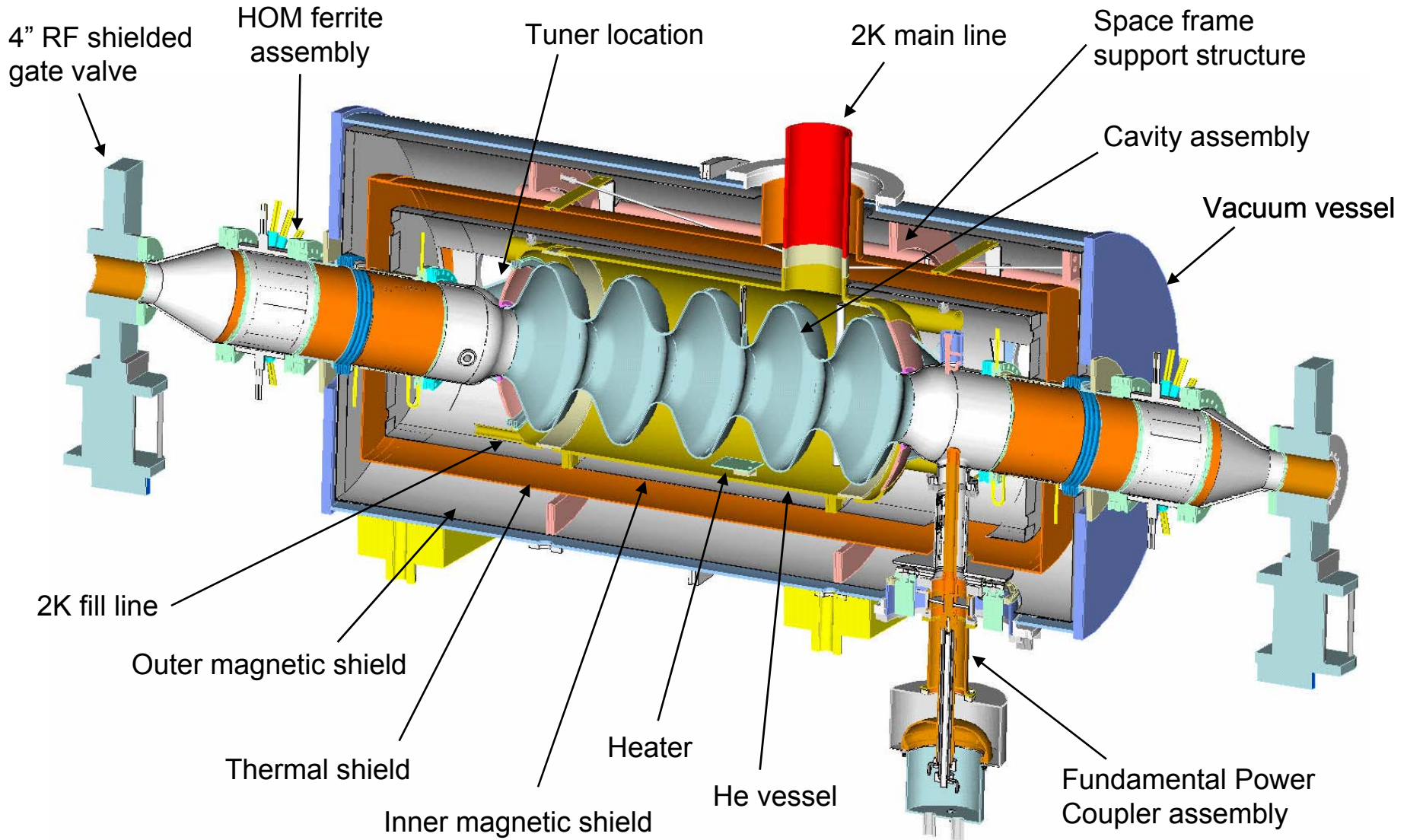
ERL Prototype Layout (D. Kayran, G. McIntyre, J. Scaduto, R. Bowman et.al.)



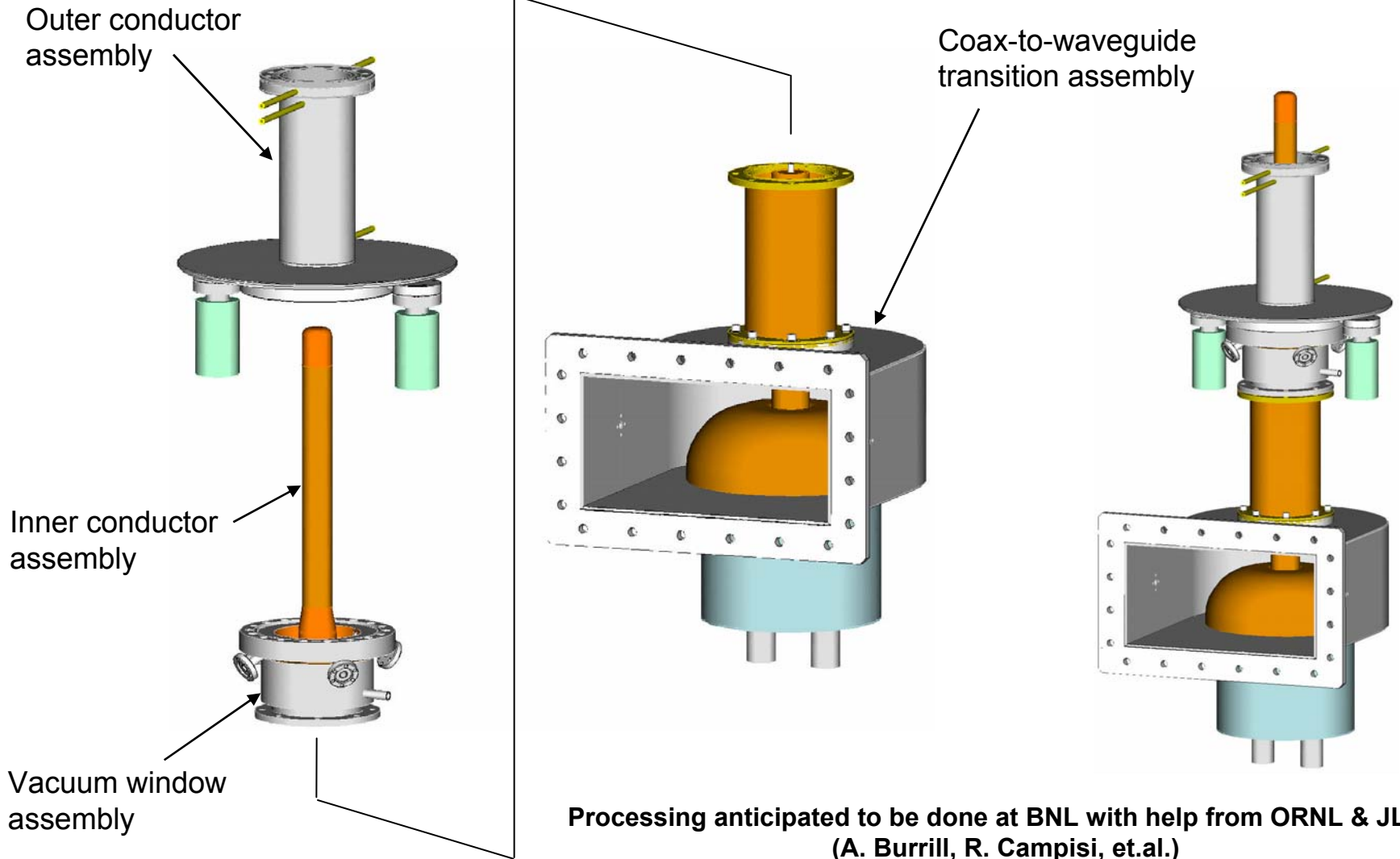
50 KW Transmitter



Cryomodule Components (A. Burger, D. Holmes et.al.)

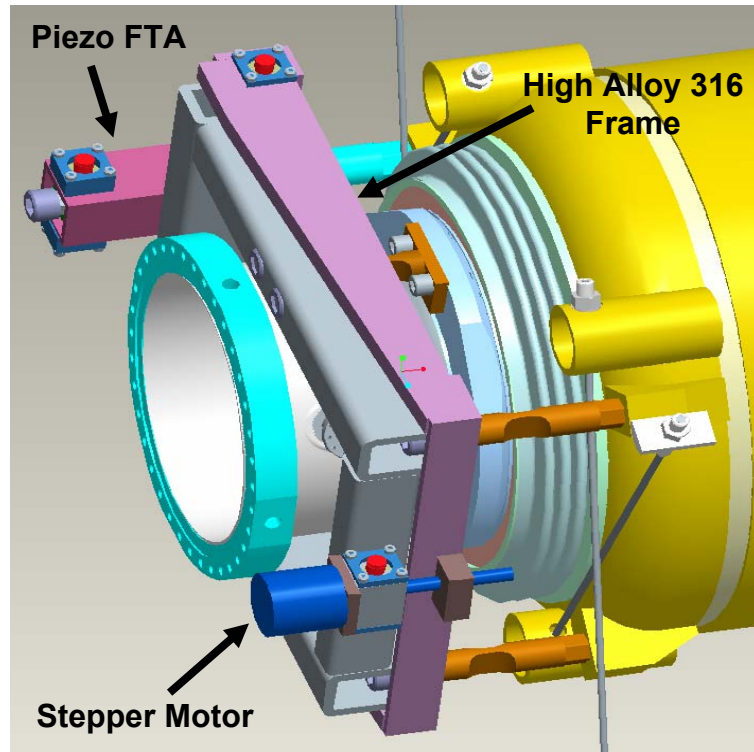


Fundamental Power Coupler (M. Cole, D. Holmes et.al.)



Tuner Assembly (J. Rank, D. Holmes et.al.)

Cavity Parameters



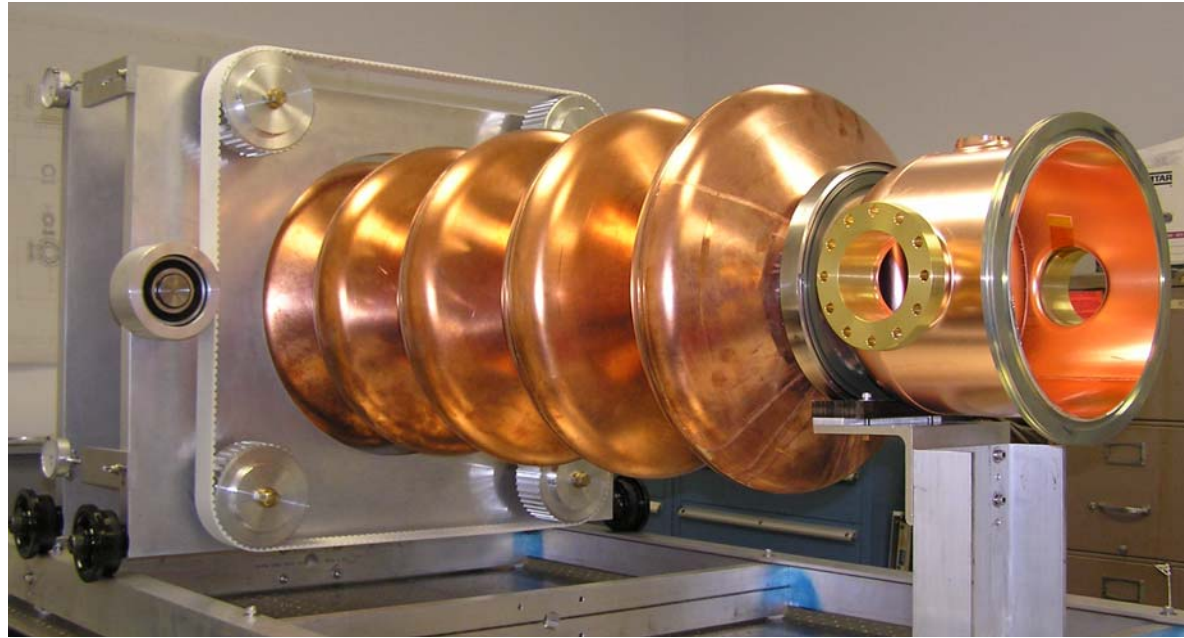
Tuning Range	475 kHz
Tuning Coeff	100 Hz/ $\mu\text{m} \pm 10$
Max Cav. Displacement	4.75 mm
Cavity Stiffness	6.84 kN/mm
Max Load at cavity	32.5 kN

Tuner Parameters

	Coarse	Fine
Freq. Range	475 kHz	2000 Hz
Resolution	1 kHz	25 Hz
Speed	1 sec/kHz	< 10 $\mu\text{s}/\text{Hz}$
Duty	< 8 /day	cw

Copper Prototypes

Tuning Fixture (AES)



Bead Pull & Testing



2 x 2 Superstructure



Nb Cavity Manufacturing (A. Burger, D. Holmes et.al.)

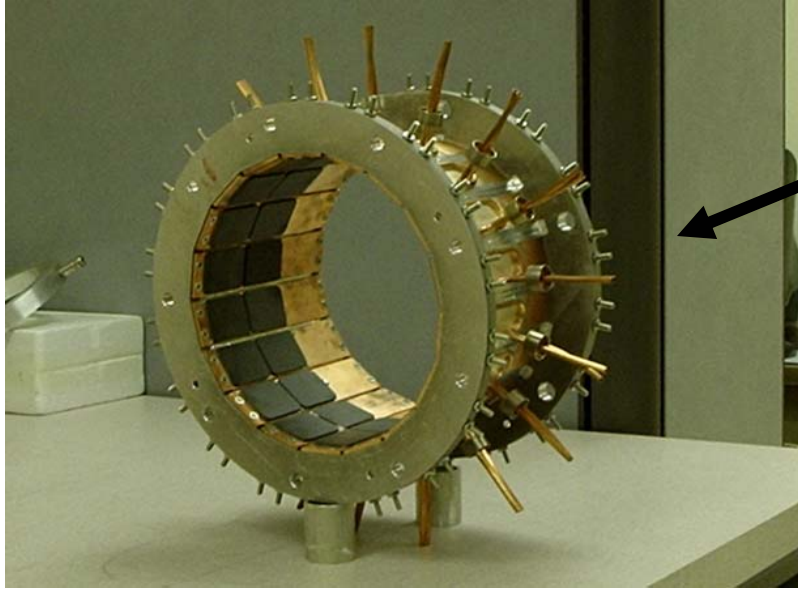
Middle Cell (Dumbbells)



End Groups



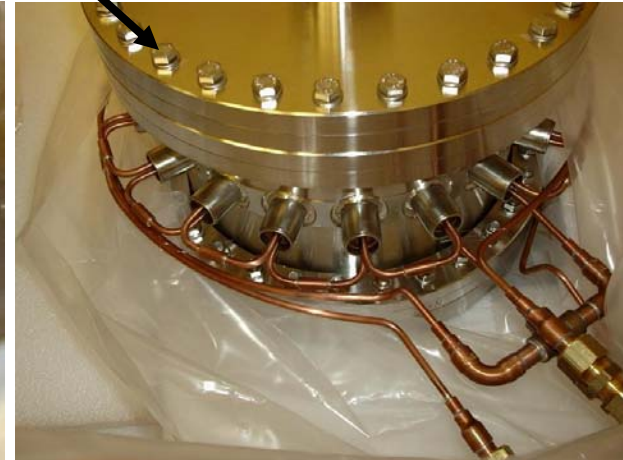
Ferrite Dampers



Ferrite prototype for testing

HOM Power Capacity: 5-10 kW/ferrite

Real Ferrite Absorbers
(Vendor: ACCEL)



Chemical Processing (JLAB - P. Kneisel, J. Mammosser et.al.)

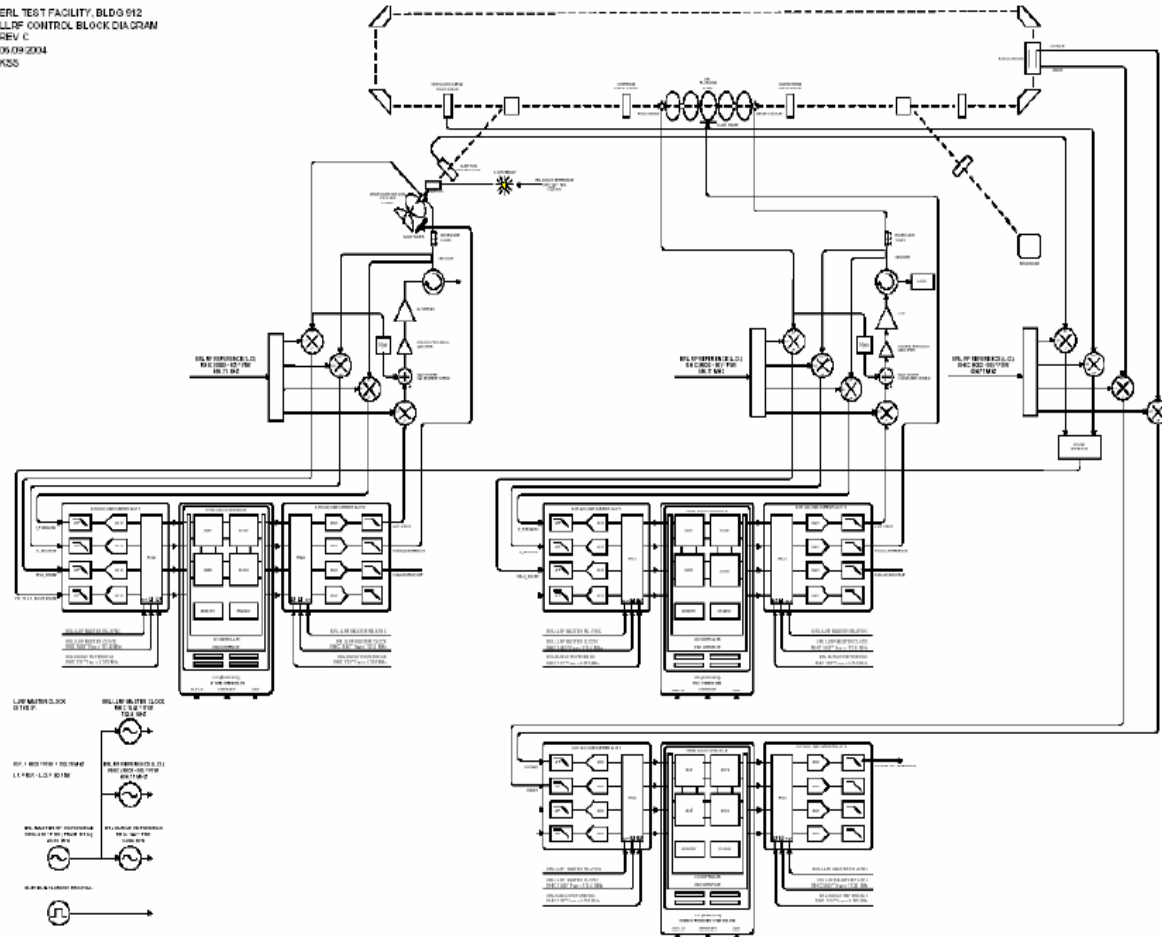
- BCP to be performed at the JLAB Facility
- The procedure has been defined (similar to SNS cryomodule):
 - Initial RF testing
 - BCP (200 μm)
 - Baking (600^o C)
 - Tuning & Testing (VTA - 2K)
 - Re-BCP (if required)
 - High Pressure Rinsing
 - He Vessel Assembly
- Cryomodule Installation at BNL (~ Dec 2005)



Low Level RF (K. Smith, M. Blaskiewicz et.al.)

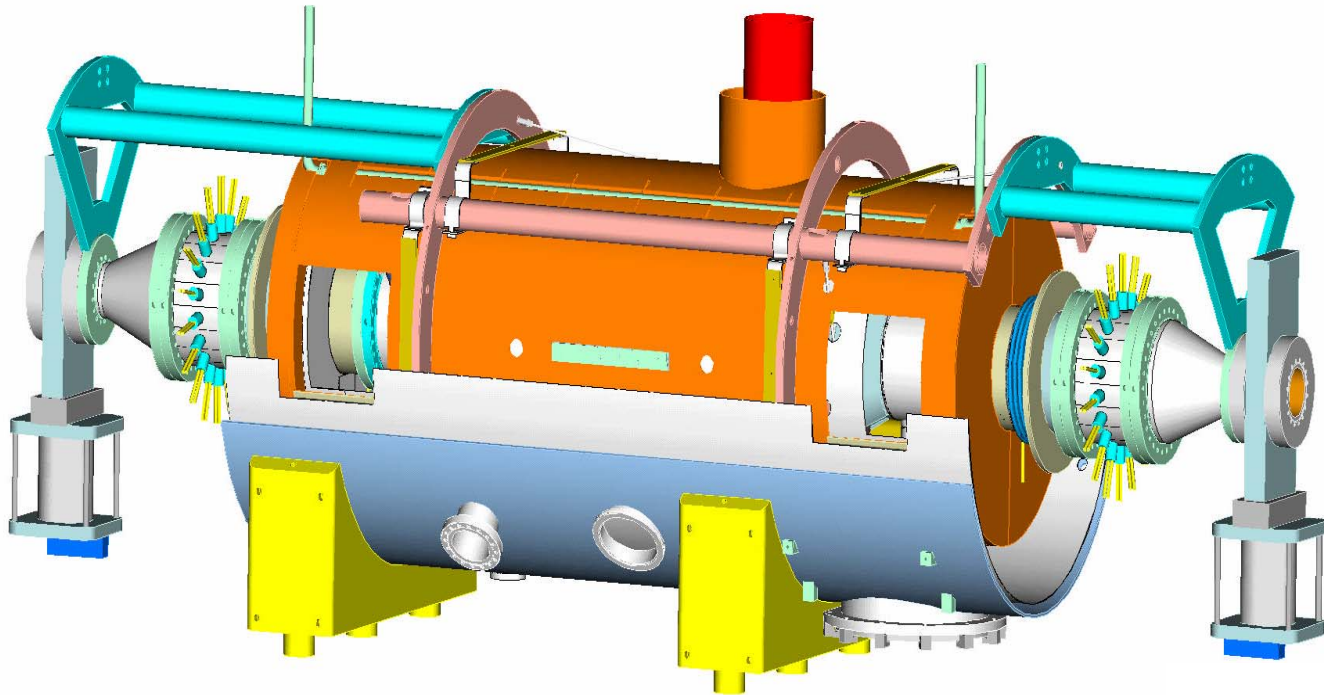
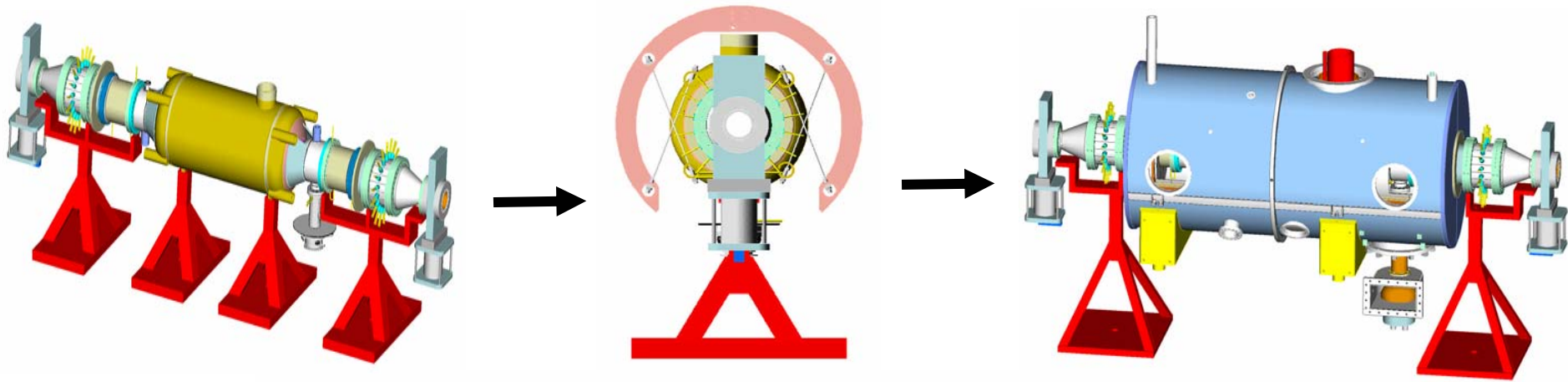
- LLRF Design is in progress
- Maximize commonality for RHIC, AGS, Booster, **ERL**, EBIS.
- Digital IQ fast feedback for RF field amplitude and phase control.
- Stability targets for ERL cavity and gun are $< 10^{-4}$ amp. and $< 0.1^0$ phase.
- Phase locked to RHIC master oscillator.
- "Generic" carrier platform, PowerPC based embedded FEC (IOC) running VxWorks.
- XMC daughter sites for daughter modules (DSP & FPGA signal processing, DAC/DDS, ADC, etc.) which implement all control functionality.

ERL TEST FACILITY, BLDG 912
LLRF CONTROL BLOCK DIAGRAM
REV C
09/09/2004
RSS



Schematic of a SNS design adapted for 703.75 MHz

Cryomodule Assembly (BNL, AES, JLAB)



Conclusion

Cryodmodule Completion ~ Dec 2005