DEVELOPMENT OF QUARTER WAVE RESONATORS

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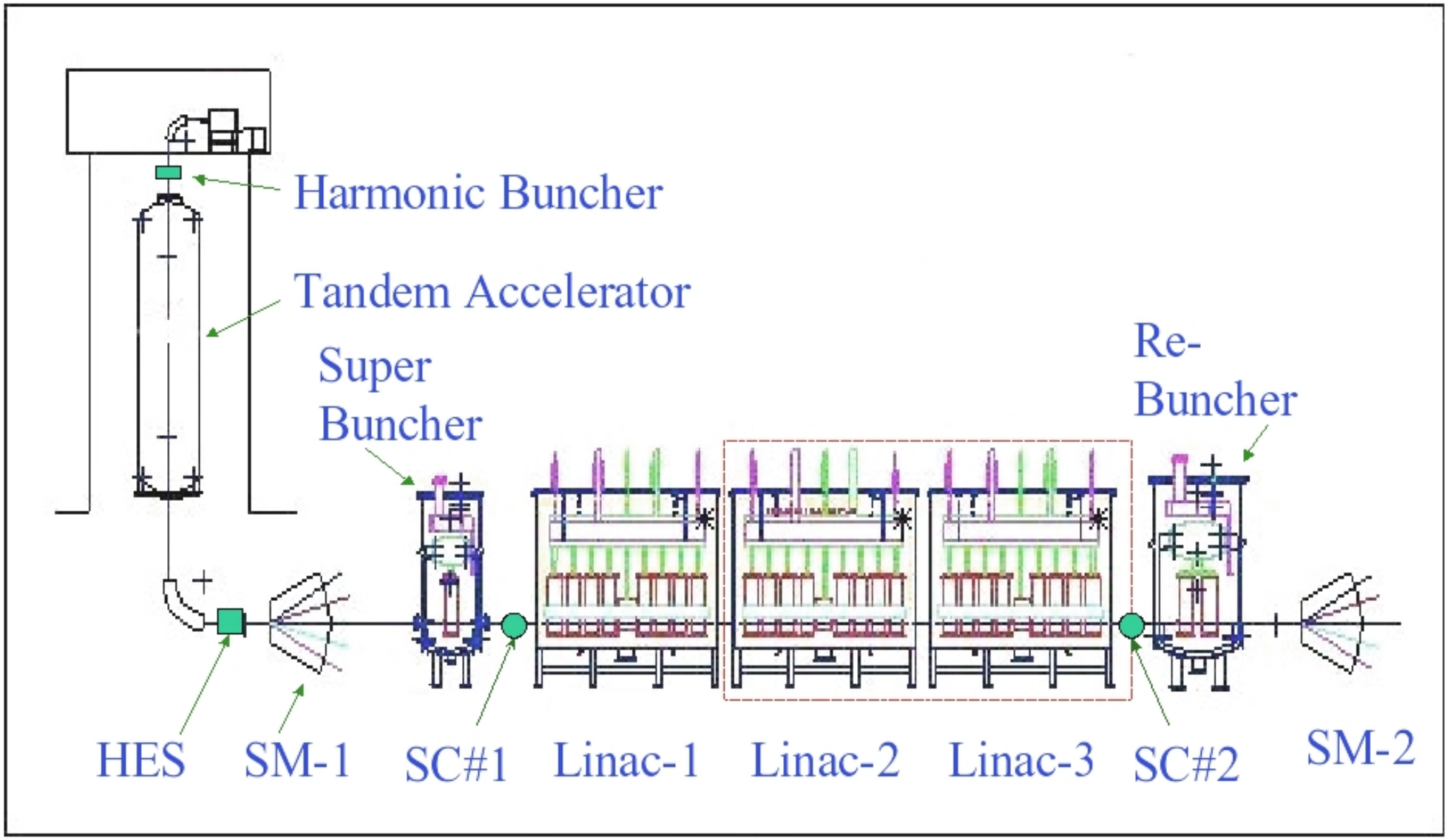
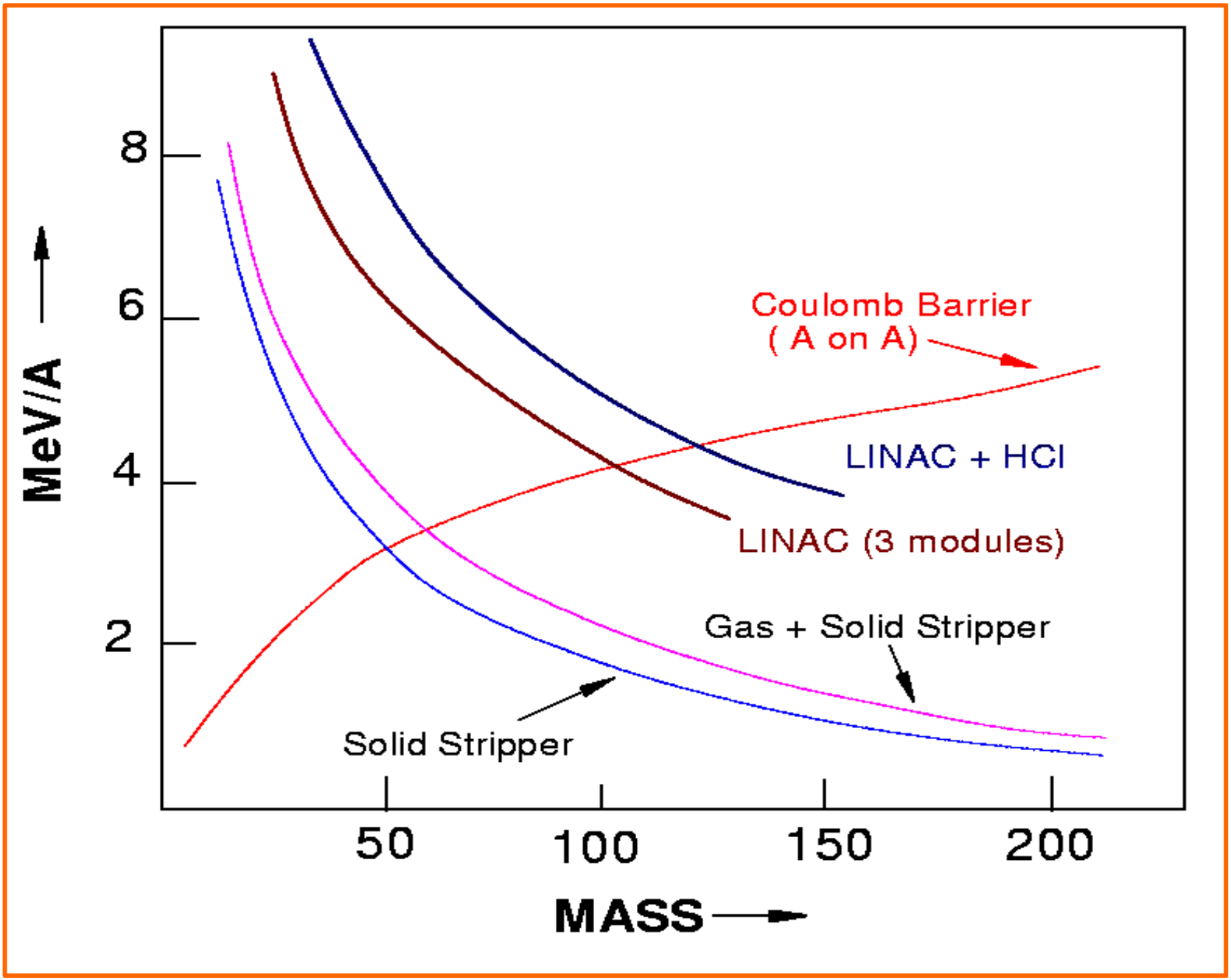
INTRODUCTION
QUARTER WAVE RESONATOR
ON-LINE & OFF-LINE TESTS
MODIFICATIONS
SUMMARY

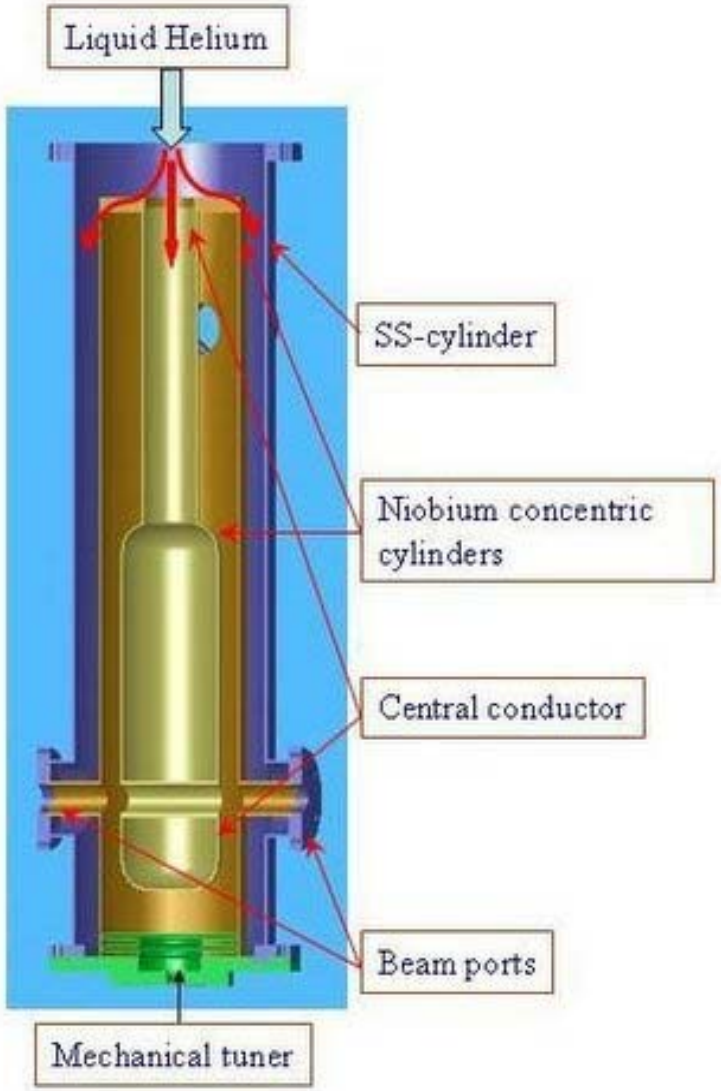
Inter-University Accelerator Centre Pelletron & Linac Booster



ENERGY AUGMENTATION PROGRAMME



Quarter Wave Resonator



97 MHz, βopt = 0.08

Q_{RS} ~ 18, E_{Peak}/E_{Acc}~3.9

Superconducting Resonator Fabrication Facility (SuRFF)

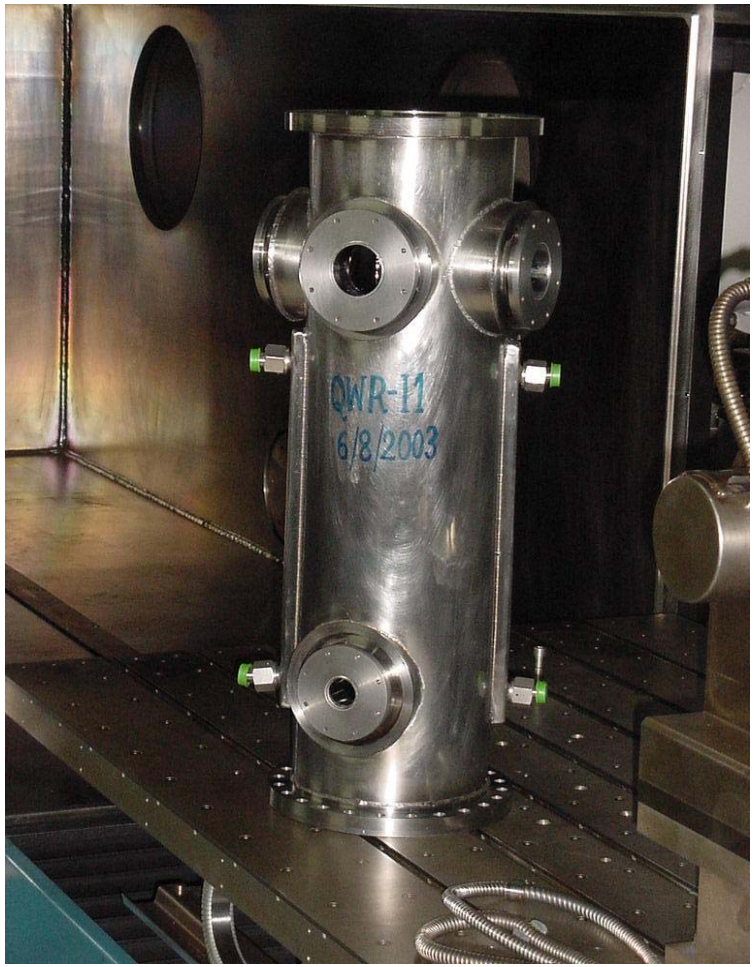
Electron Beam Welding Machine

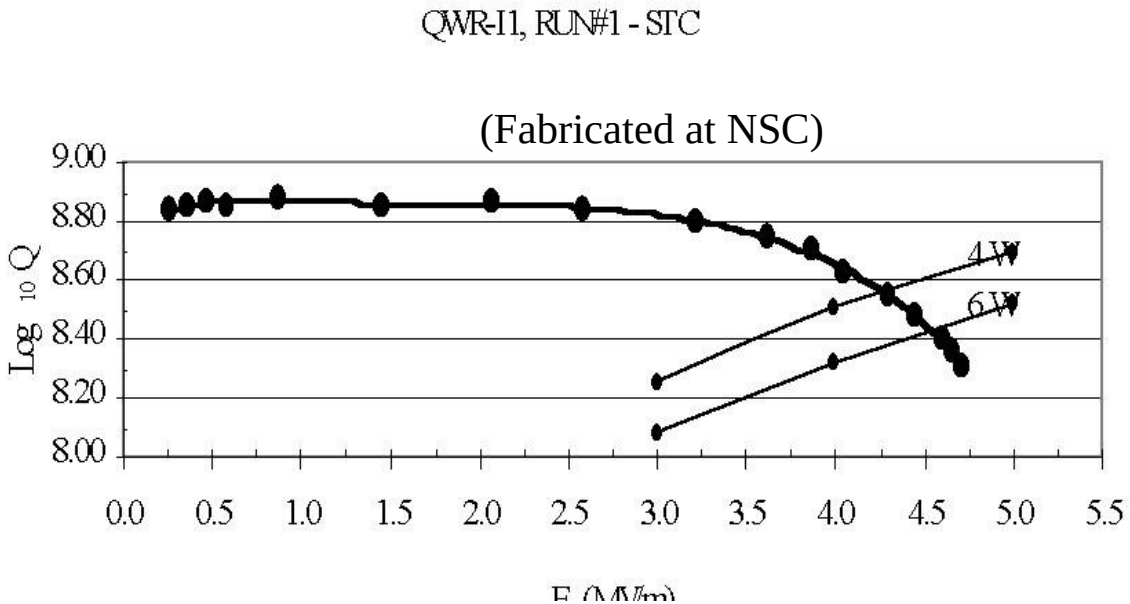
Fumehood, Power supply, Ultrasonic bath, Refrigerator & Acid Pump

High Vacuum Furnace

Test Cryostat

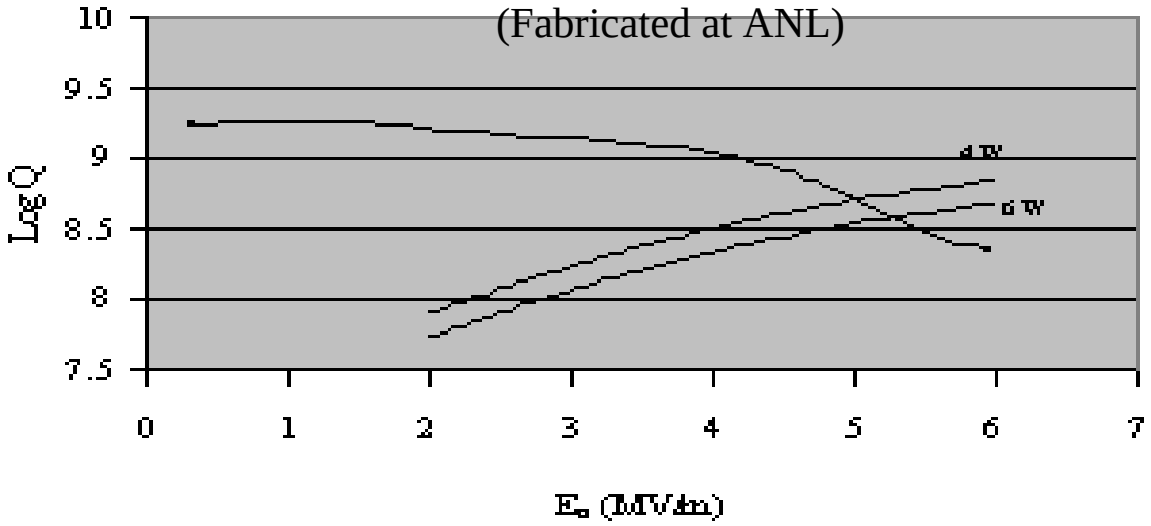
High Pressure Rinsing assembly





(Fabricated at NSC)

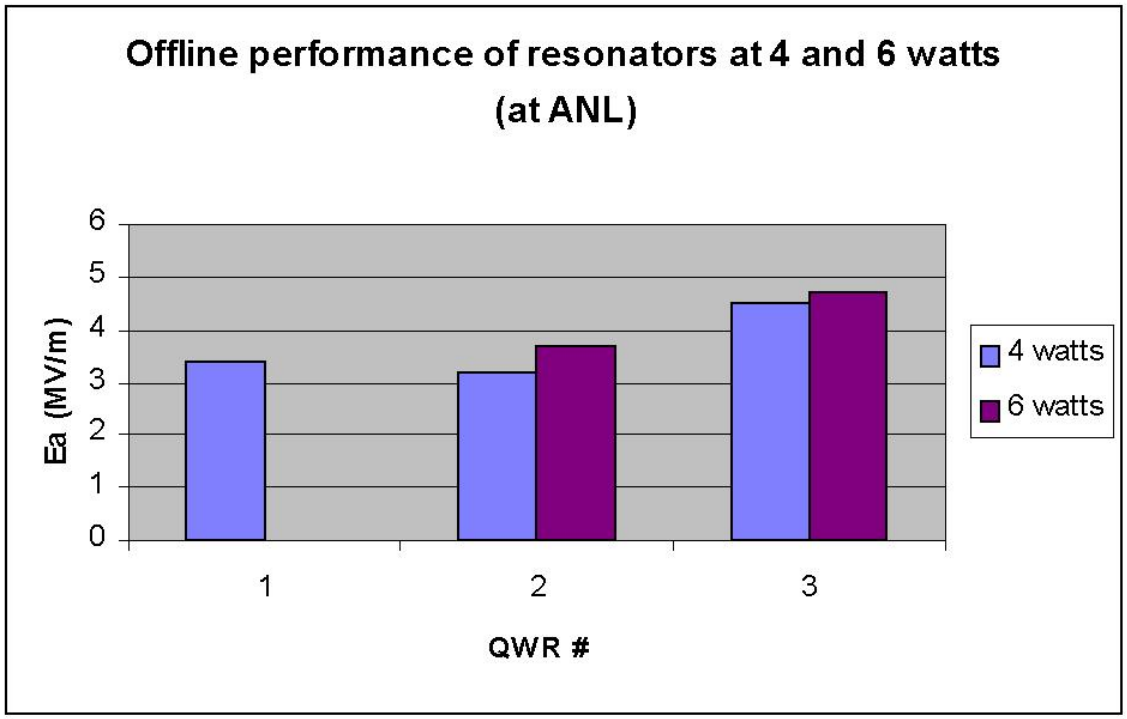
QWR-3 Cold Test Results

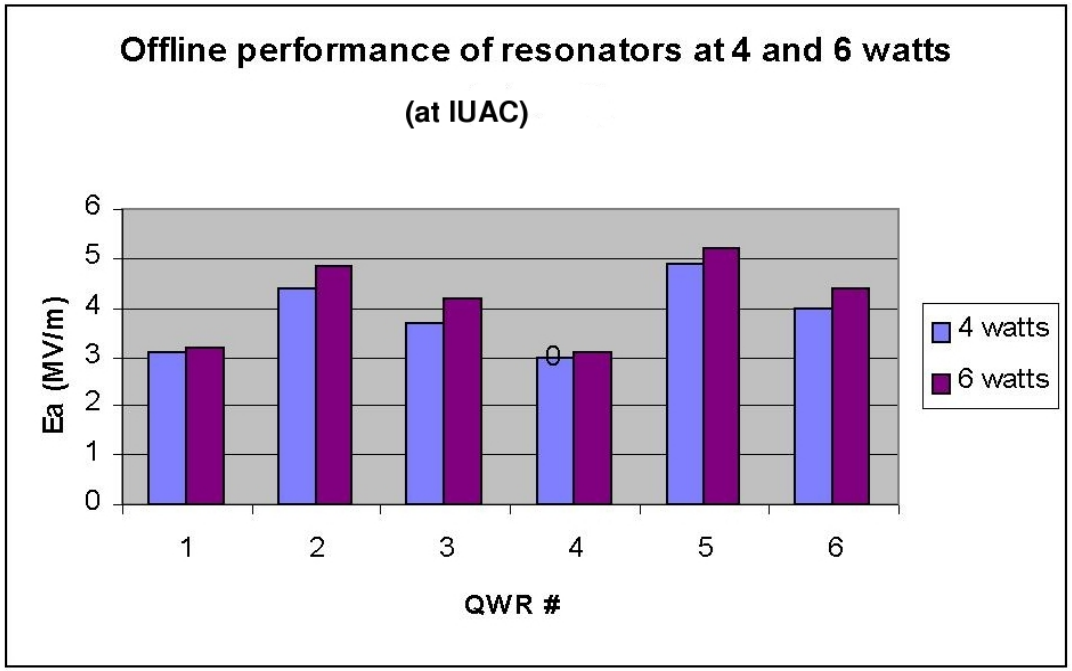


(Fabricated at ANL)

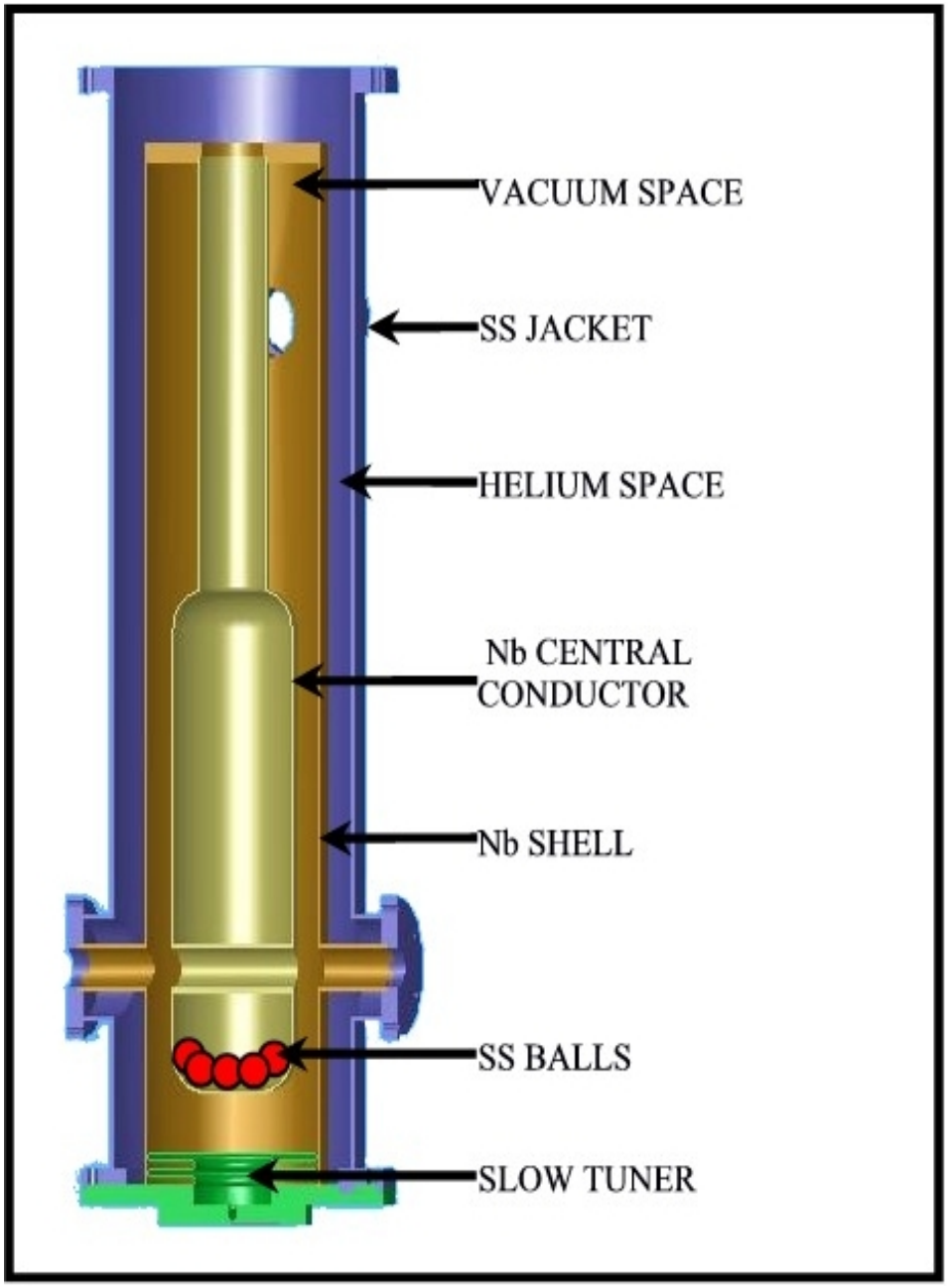
First QWR cavity fabricated at NSC

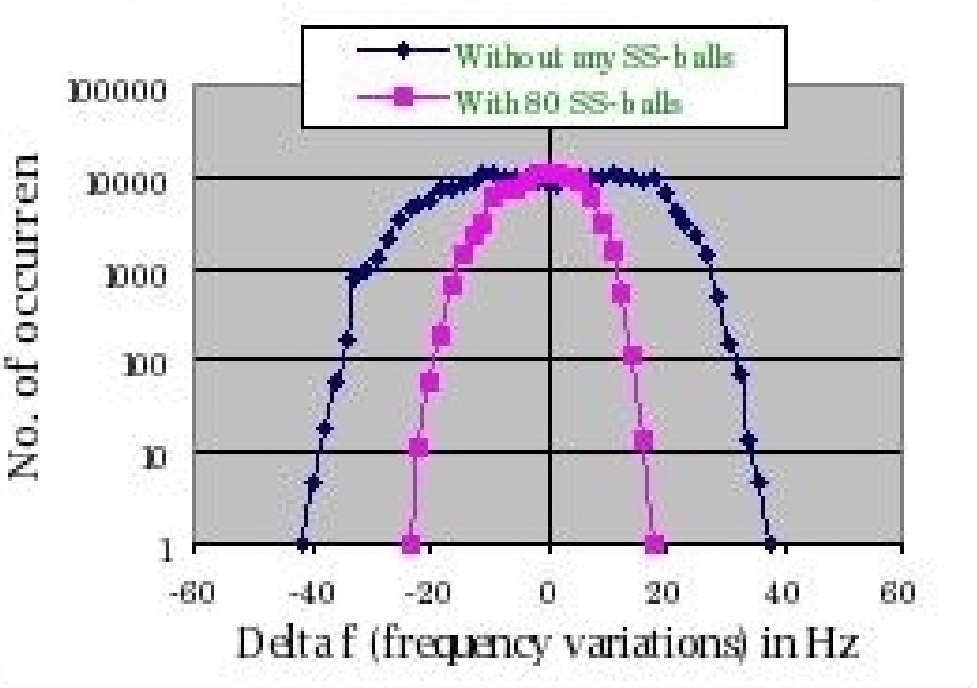
2 more cavities made.
15 under construction (P.N.Prakash et al, Poster WEPMA132)


Offline performance of resonators at 4 and 6 watts
(at ANL)
Ea (MV/m)
0
1
2
3
4
5
6
1
2
3
QWR #
4 watts
6 watts


Offline performance of resonators at 4 and 6 watts
(at IUAC)
Ea (MV/m)
0
1
2
3
4
5
6
1
2
3
4
5
6
QWR #
4 watts
6 watts

Damping of Frequency Jitter

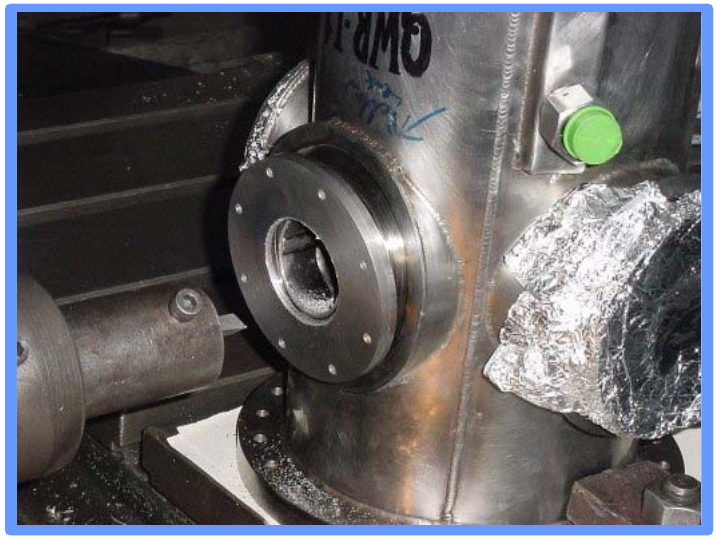


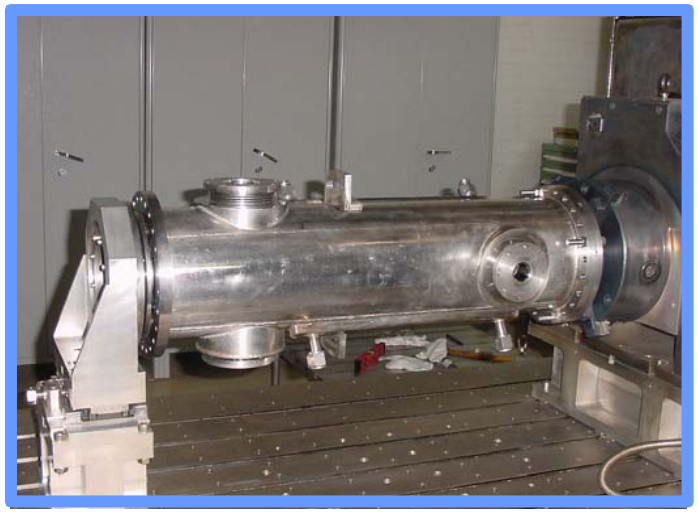


QWR #	Accelerating Field (MV/m)@ 6 W	Required Forward Power (Watts)	
		Without Damping	With Damping
1	2.2	240	65
2	3.95	180	90
3	4.5	240	80
4	2.37	160	80
5	3.75	140	Not Measured
6	3.68	Not Measured	85
7	5.3	230	85
8	4.3	320	100
9	6.0	180	90

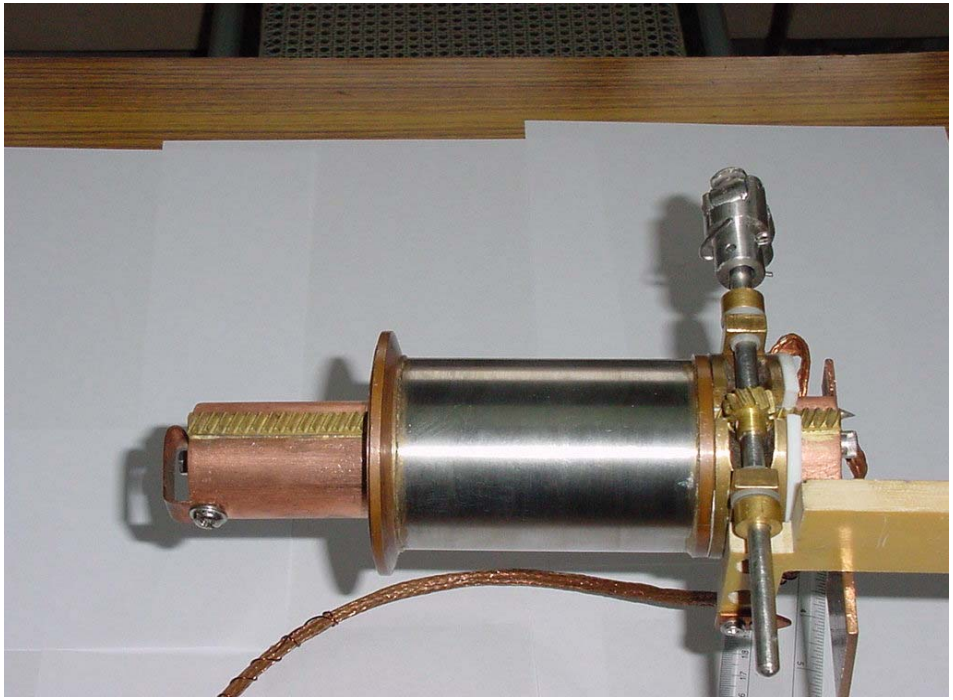
Development of Beam & Coupling Port Transition Flange Assemblies

- Leaks in Transition Flange Bellows in existing QWRs
  - Use of formed, instead of welded, bellows appeared as an option.
  - Tests with the new design are successful.
- New Transition Flange Assembly





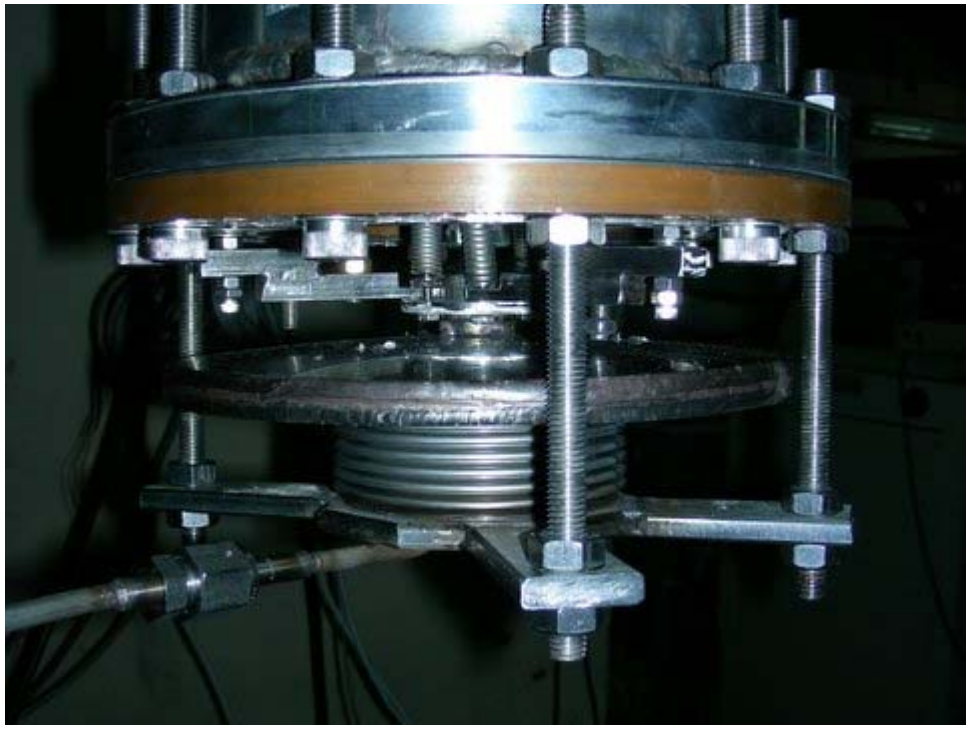
- Several QWRs were modified using this technique.
- The 1st Linac Module could be loaded with all 8 QWRs for beam tests.



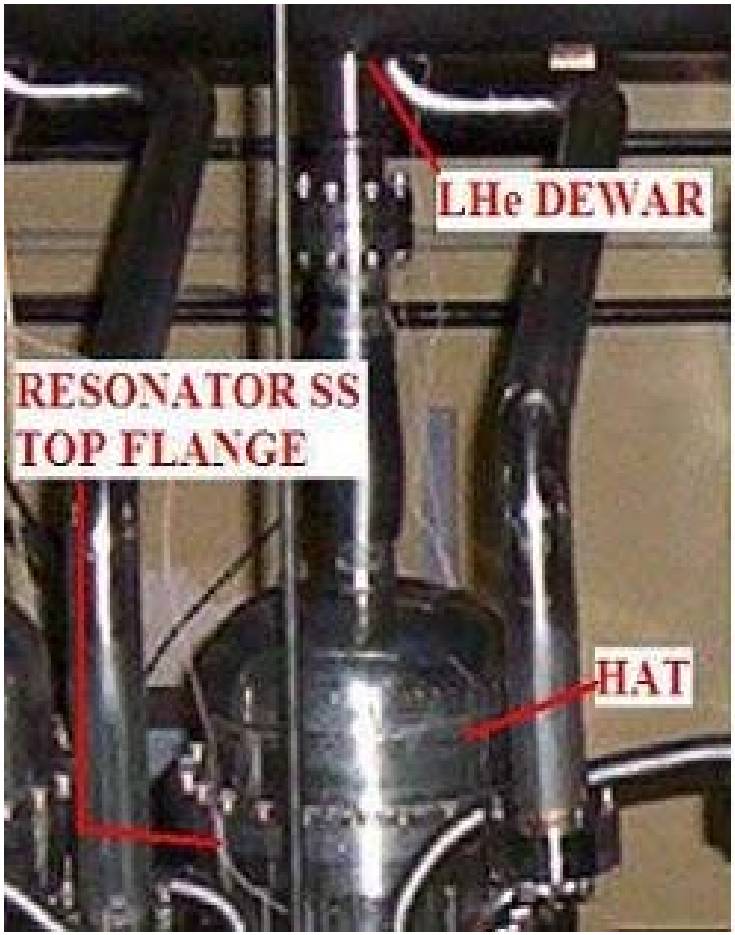
Old Drive

New Drive with linear & rotary motion

New Drive with rack & pinion outside



SS bellow for slow-tuner pneumatic control



HAT shaped top cover flange for SS Jacket

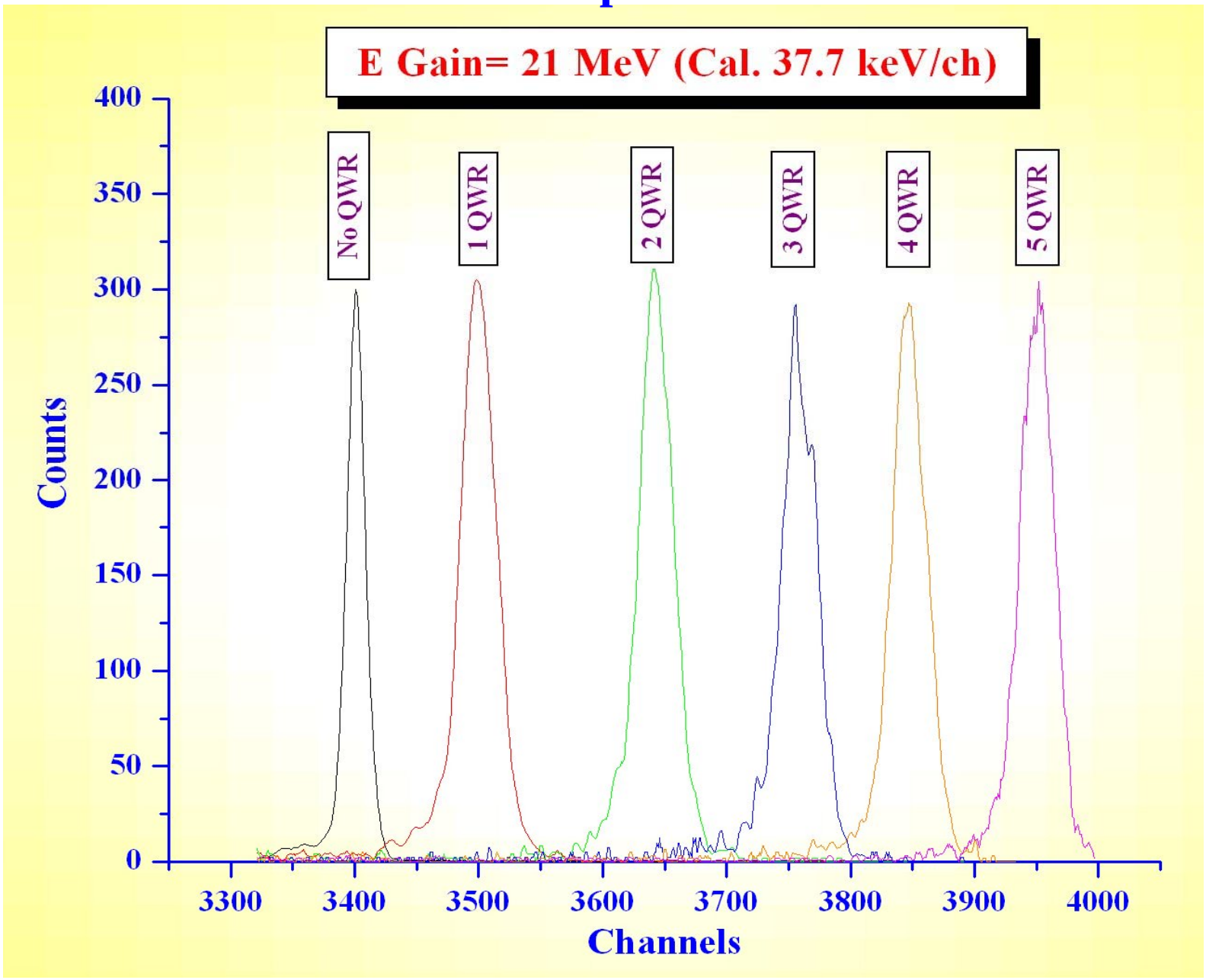
Superbuncher cryostat

Linac Module with Beam Line and Cryogen distribution lines (T.S. Datta et al, Poster THPMA050)

Rebuncher Cryostat top plate with two QWRs

8 QWRs and superconducting solenoid in Linac module 1

Injected beam: $^{28}Si^{10+}$, 130 MeV, Output E = 151 MeV
Sep2006



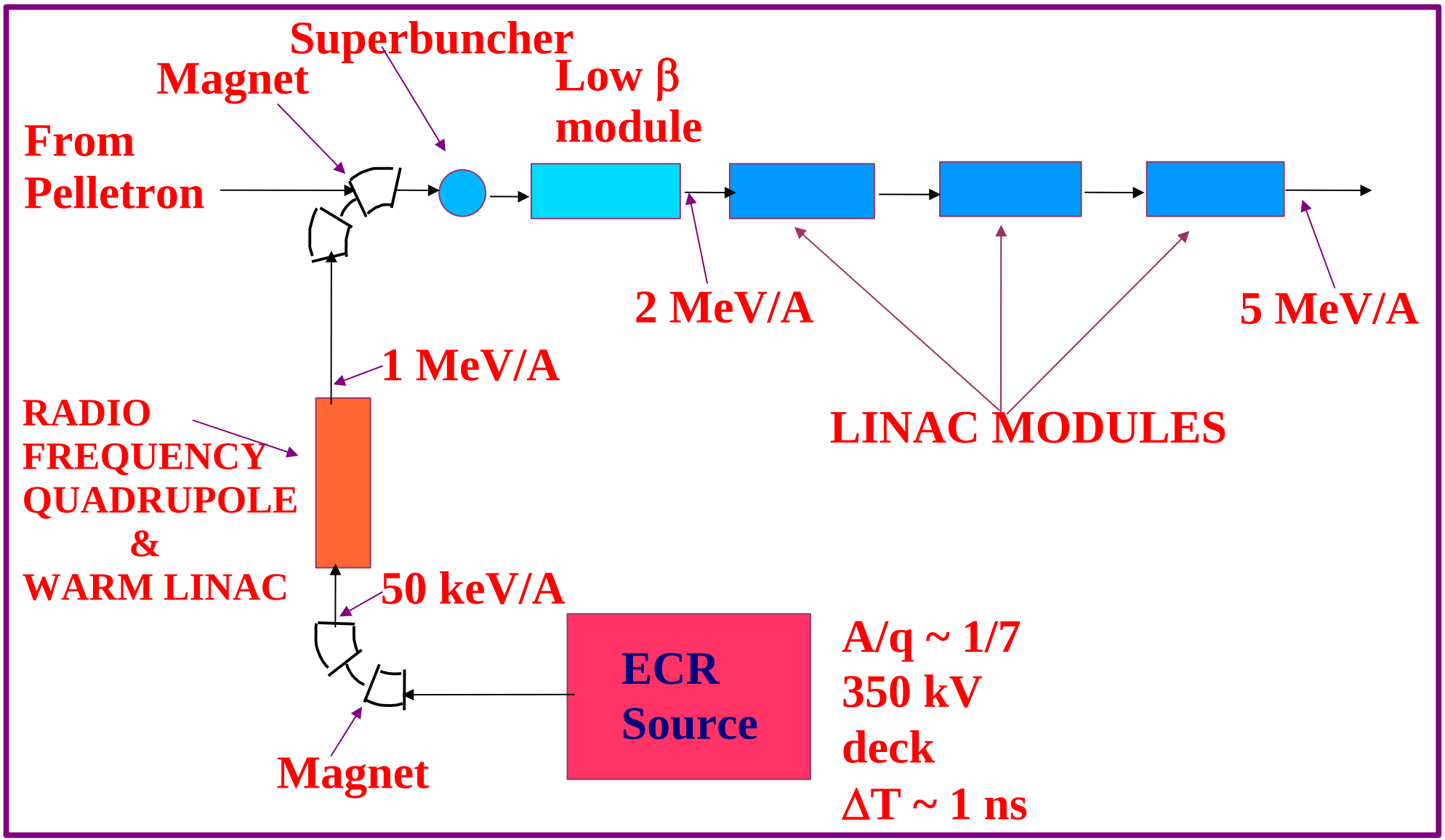
Schedule

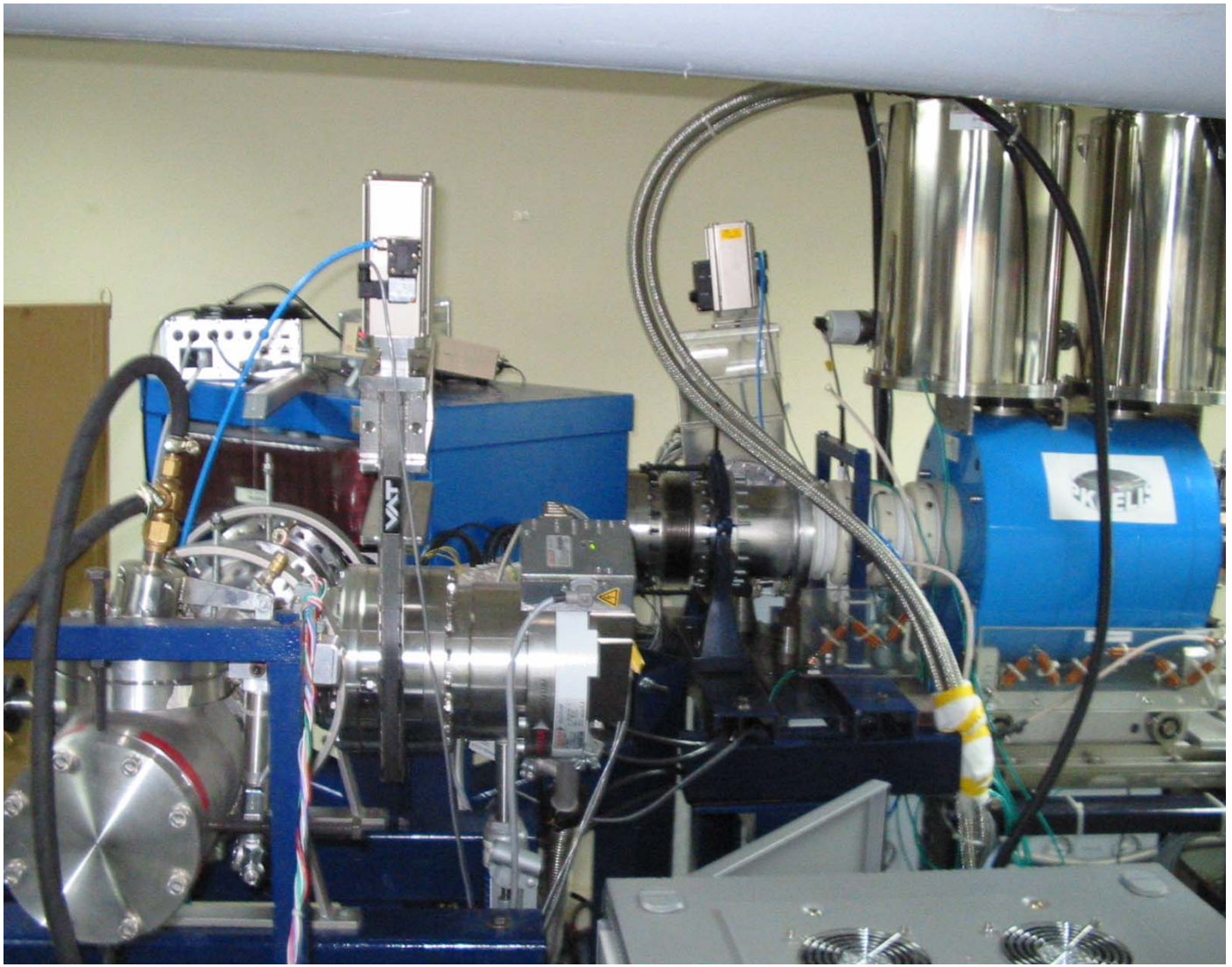
Experiments with one module: April 2007

Fabrication of cavities for 2^{nd} & 3^{rd} modules: July 2007

Installation of 2^{nd} &3^{rd} modules: July 2008

ECR based High Current Injector for LINAC





World's first ECR source with High Tc Magnet (G.O.Rodrigues et al, Poster WEPMA078)


Thank You for your attention.