

PRODUCTION AND TESTING RESULTS OF SUPERCONDUCTING CAVITIES FOR ISAC-II HIGH BETA SECTION



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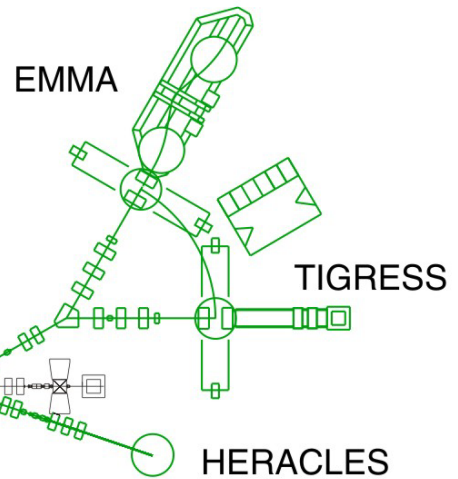
CANADA'S NATIONAL LABORATORY FOR PARTICLE AND NUCLEAR PHYSICS



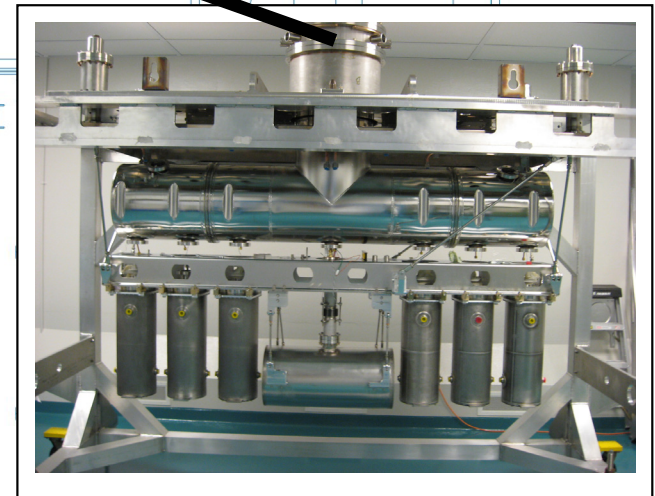
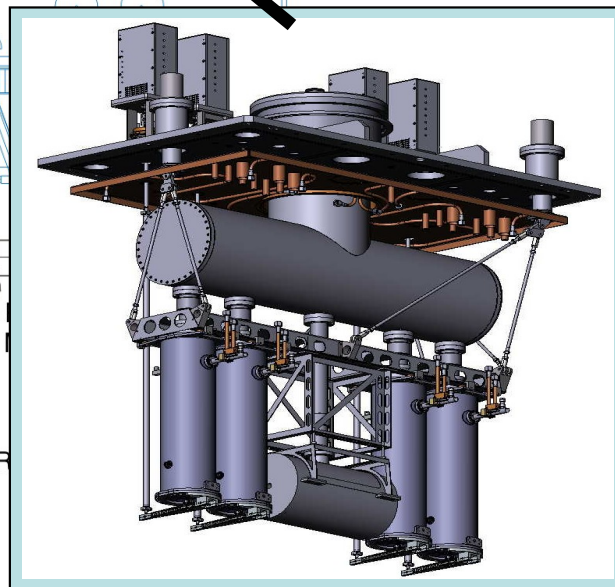
The ISAC-II heavy ion linear accelerator, consisting of 20 cavities, has been in operation at TRIUMF since 2006.

Medium β Section

High β Section

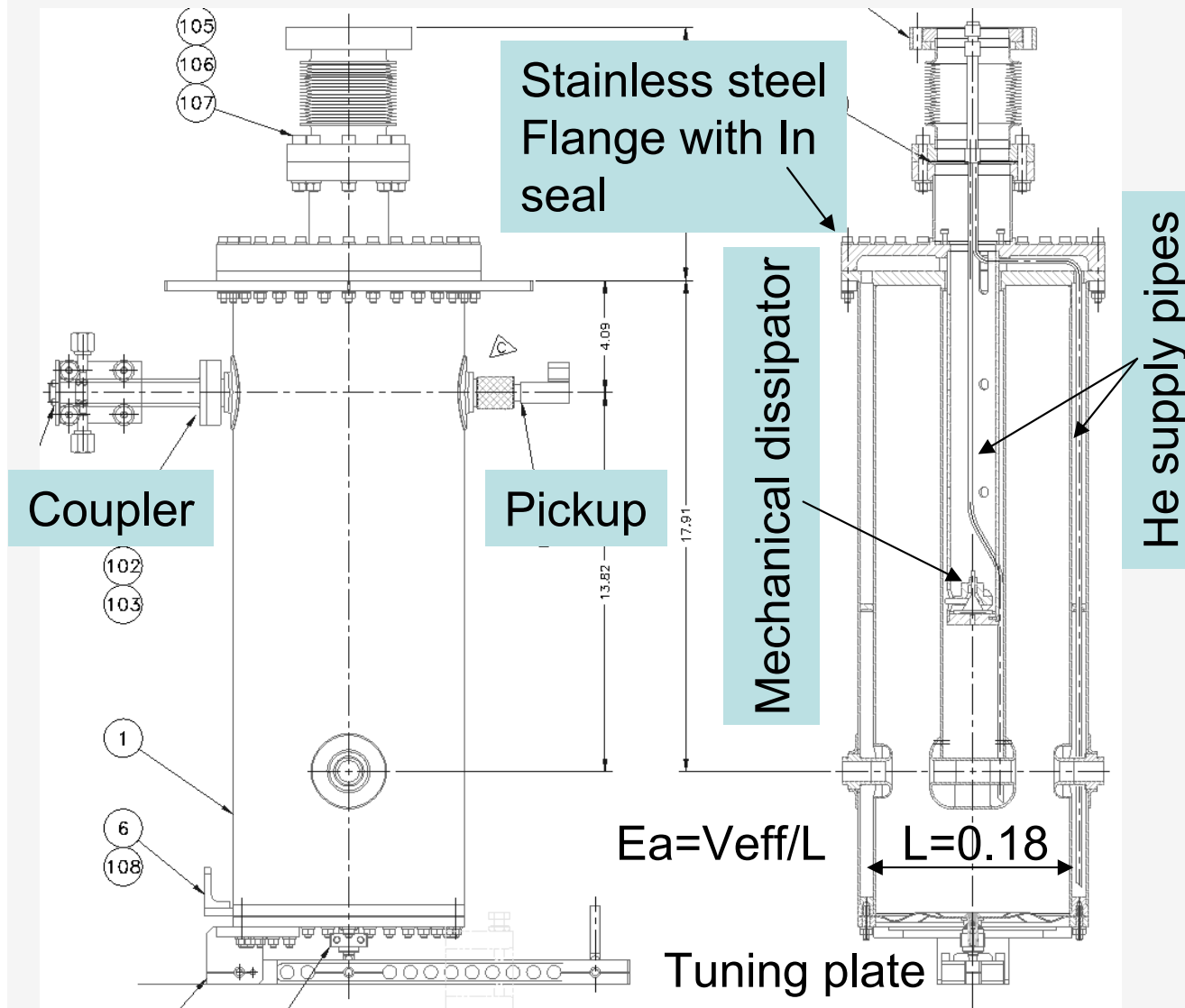


EL. 289.00'



High β section with 20 cavities in 3 cryomodules (6+6+8) will double the energy

Cavity Design



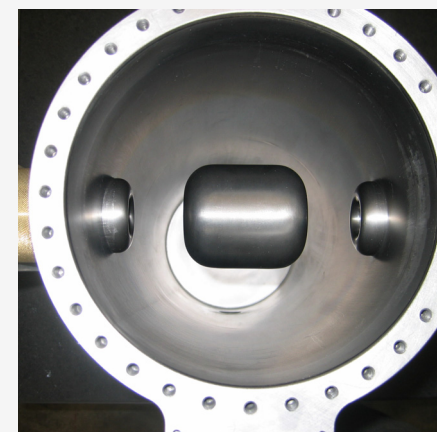
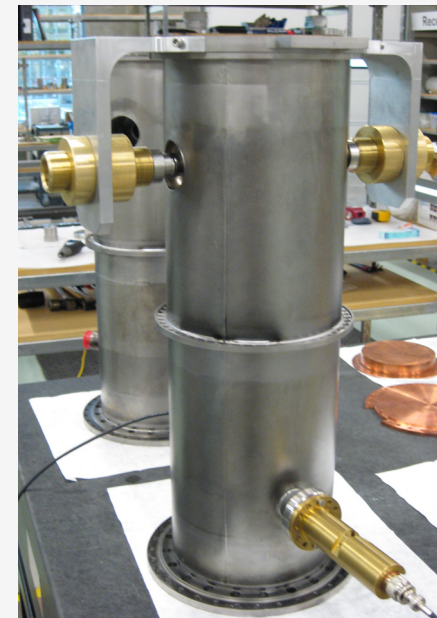
Cavity Parameters

f	MHz	141.440
β_0		0.112
TTF ₀		0.936
U/E_a^2	J/(MV/m) ²	0.067
$R_s Q_0$	Ω	26
E_p/E_a		4.9
B_p/E_a	mT/(MV/m)	10

ISAC-II Specification

P_c	W	7
V_{eff}	MV	1.08
E_a	MV/m	6
E_p	MV/m	29.4
B_p	mT	60

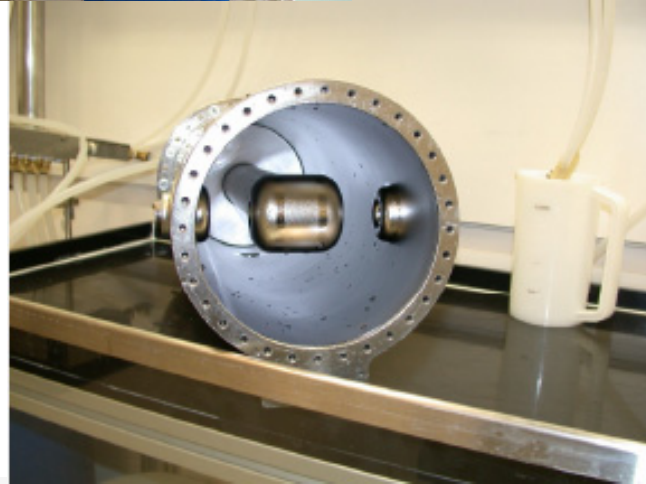
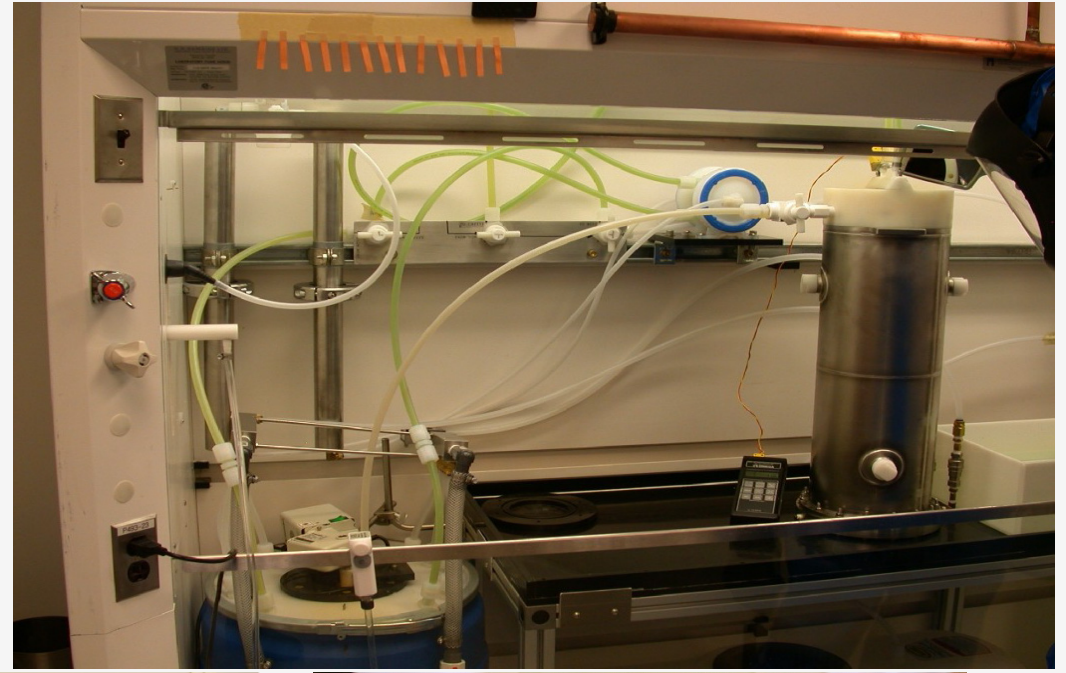
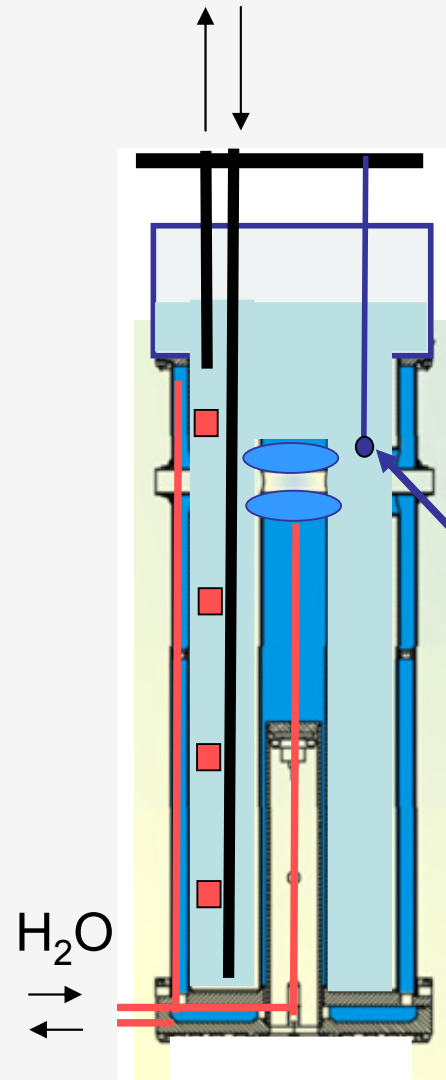
Cavity Production at PAVAC

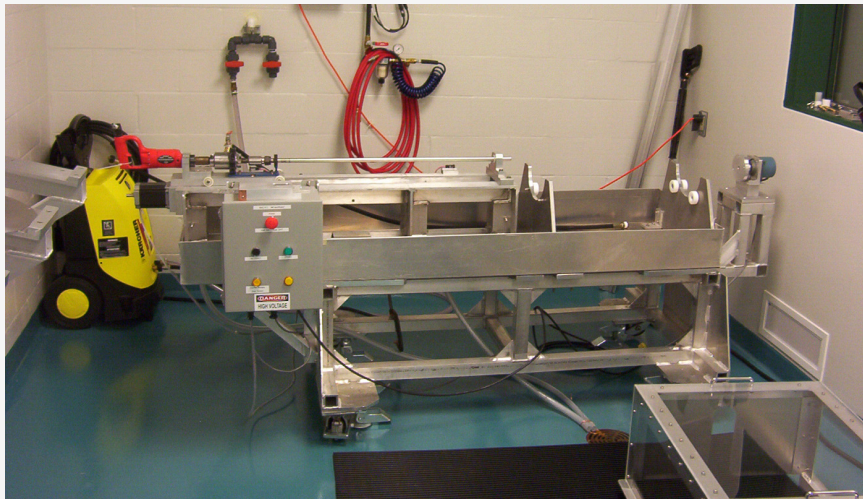


BCP Etching at TRIUMF

BCP 1:1:2

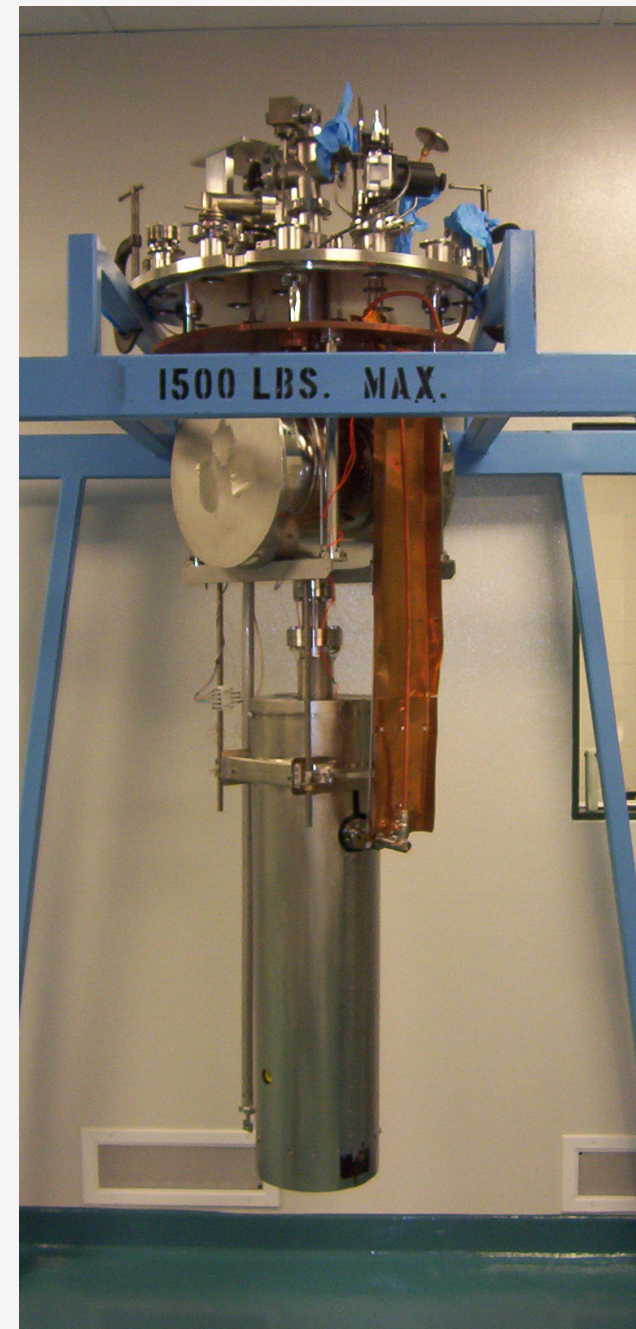
HF, HNO₃, H₃PO₄



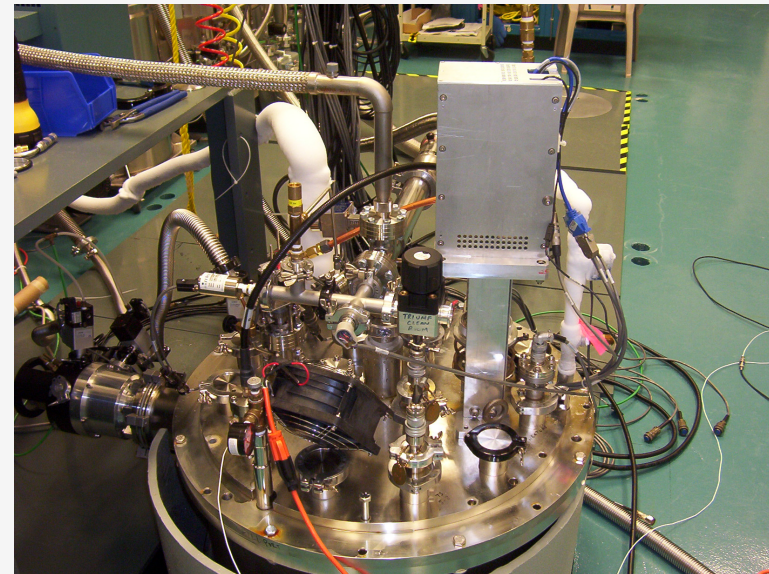
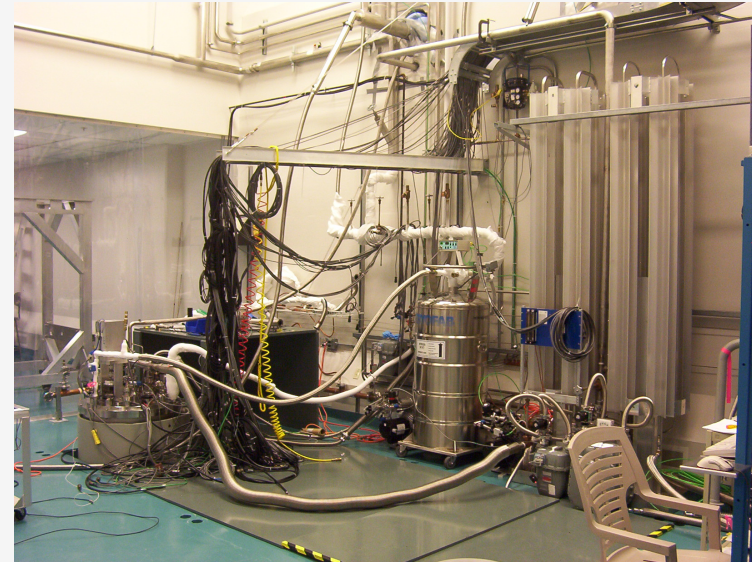


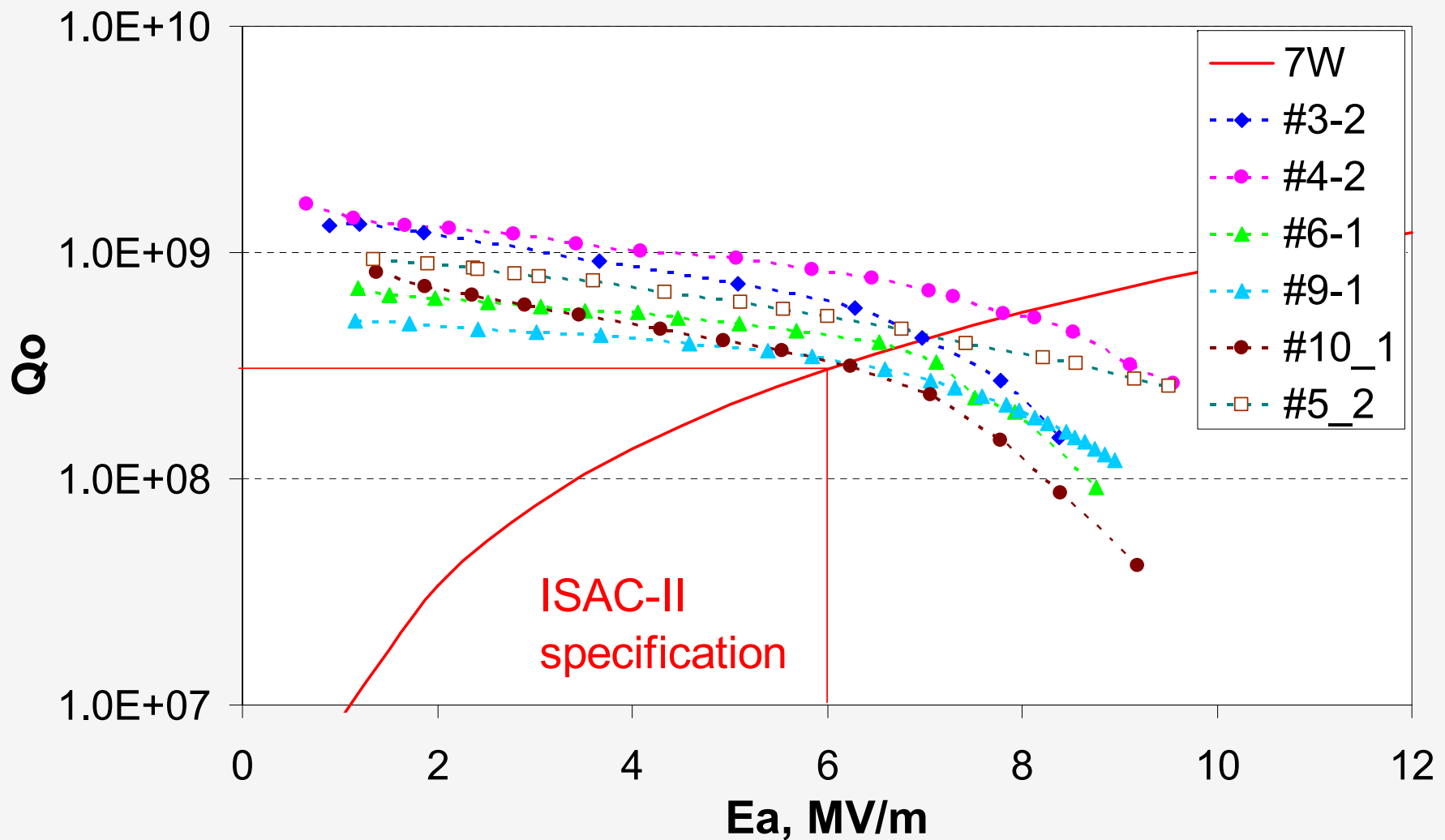
Typical treatment before the test Involves

- 40min high pressure rinse
- 24 hour air dry in a clean room

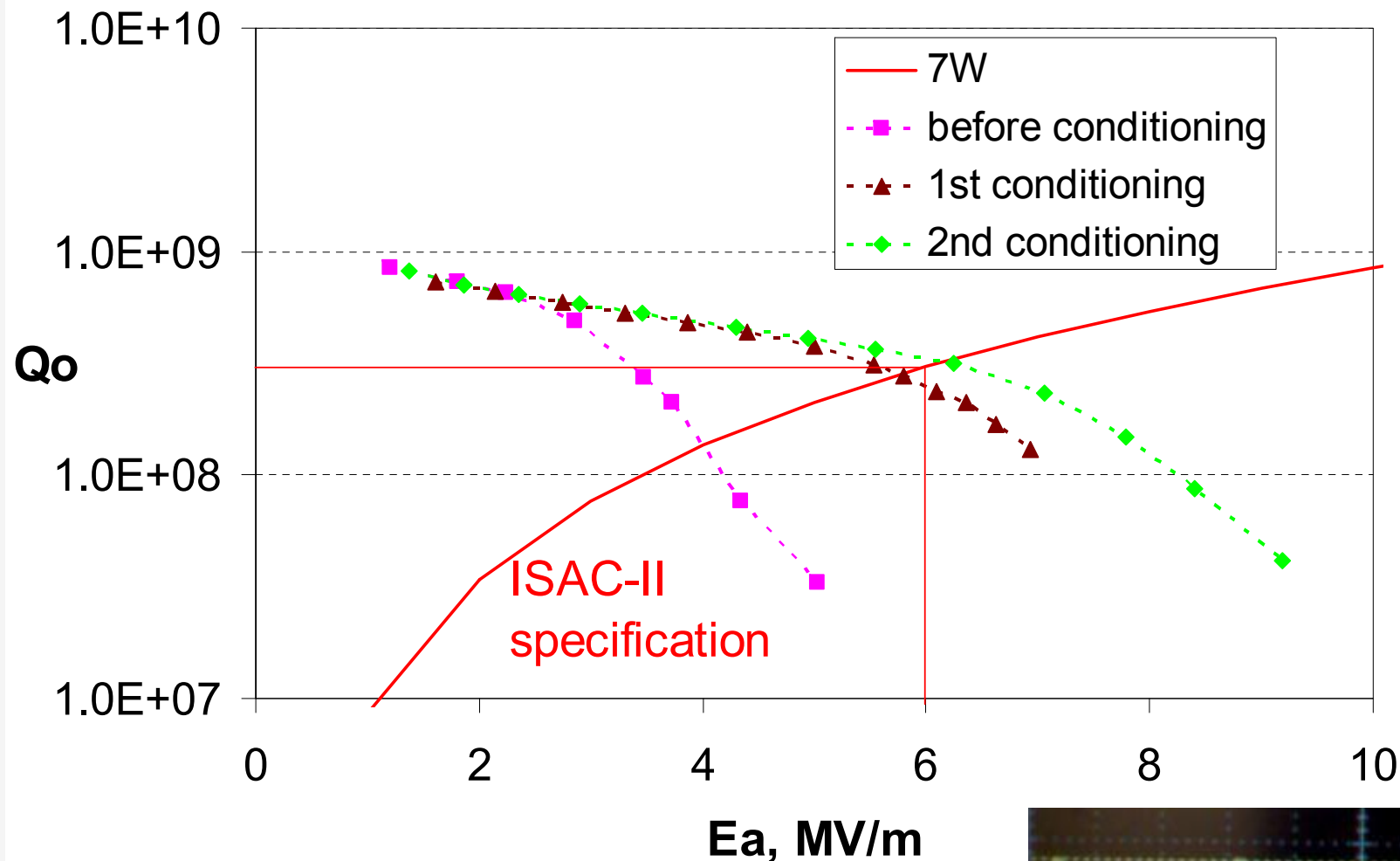


Single cavity cryostat and superconducting test area



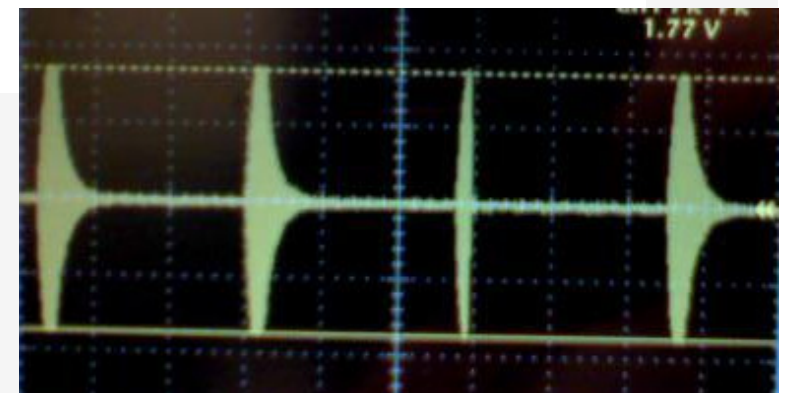


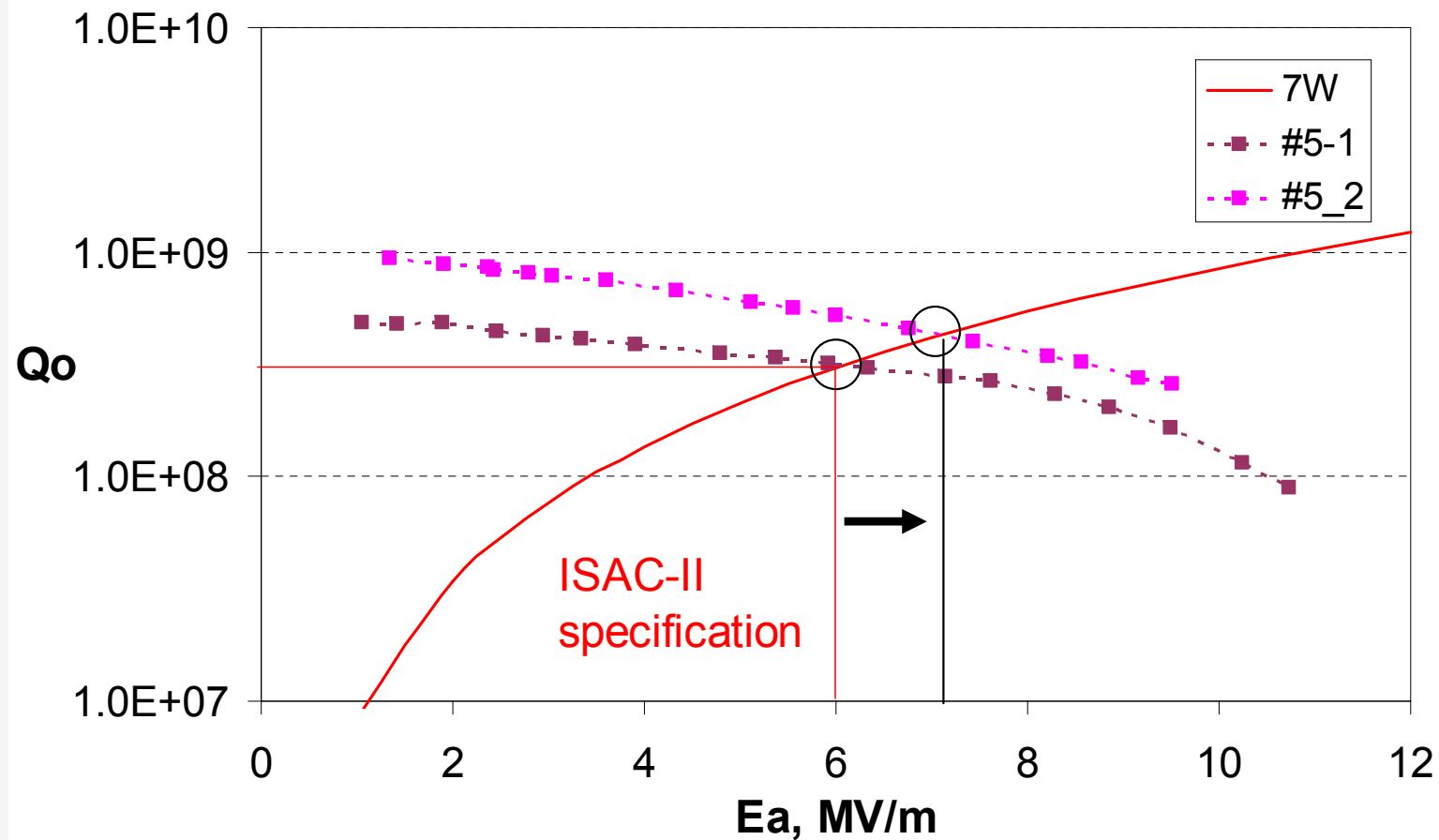
The tested cavities meet and even exceed ISAC-II specification ($E_a=6\text{MV/m}$ or $V_{\text{eff}}=1.08\text{MV}$, $E_p=29.4\text{MV/m}$ at 7W power dissipation)



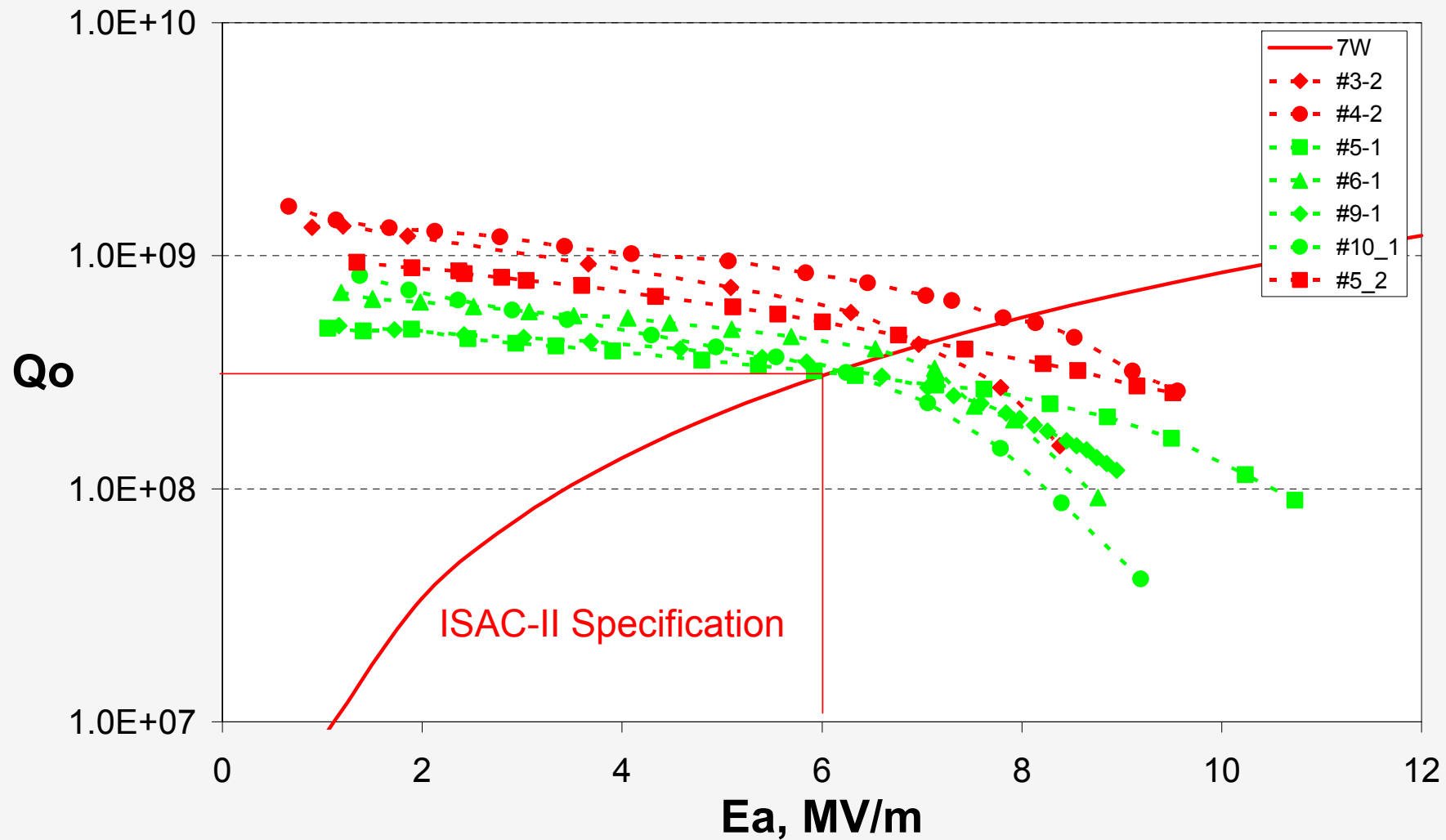
Q-curves measured after cavity RF conditioning cycles

RF pulsing (0.1s/1s) of overcoupled cavity with $P_f \sim 200\text{--}400\text{W}$. For better efficiency we do leak of $\sim 10^{-5}$ Torr He in the cavity volume.





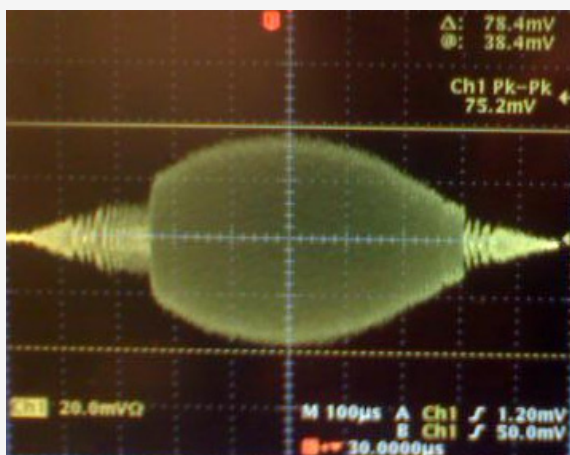
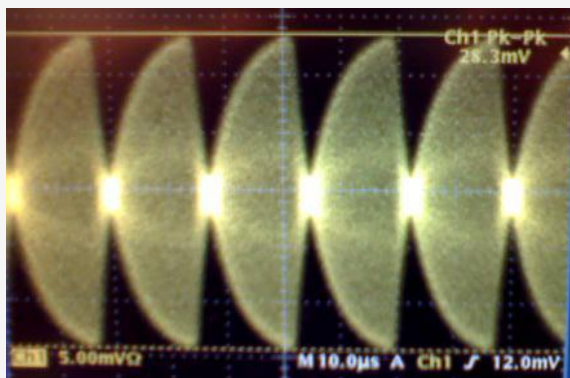
Q-curves measured after cavity #5 1st BCP ($\sim 60 \mu\text{m}$) and 2nd BCP ($\sim 40 \mu\text{m}$, and final machining of bottom flange)



After 1st BCP – pretest – Ea=6-7 MV/m

After 2nd BCP – final – Ea=7-8 MV/m

3 cavities (6,9 and 10) are ready for 2nd test to be done soon in cryomodule



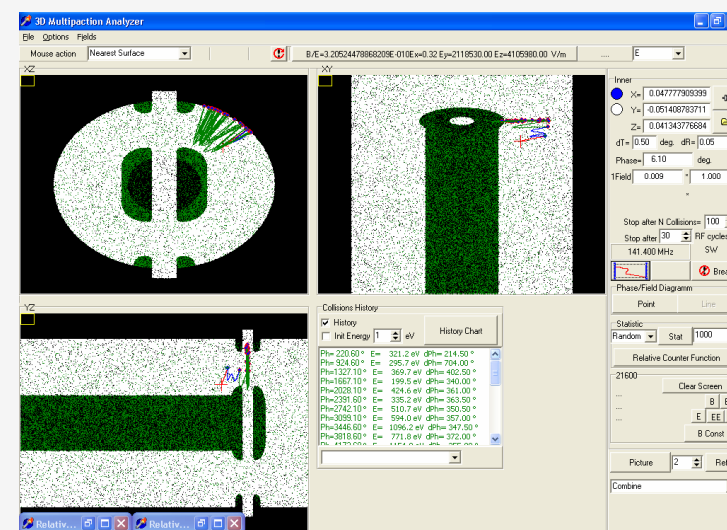
“MULTIPACTING SIMULATION IN ISAC-II SUPERCONDUCTING CAVITIES”

May 8, Morning Poster 8:30-12:30, FR5PFP076

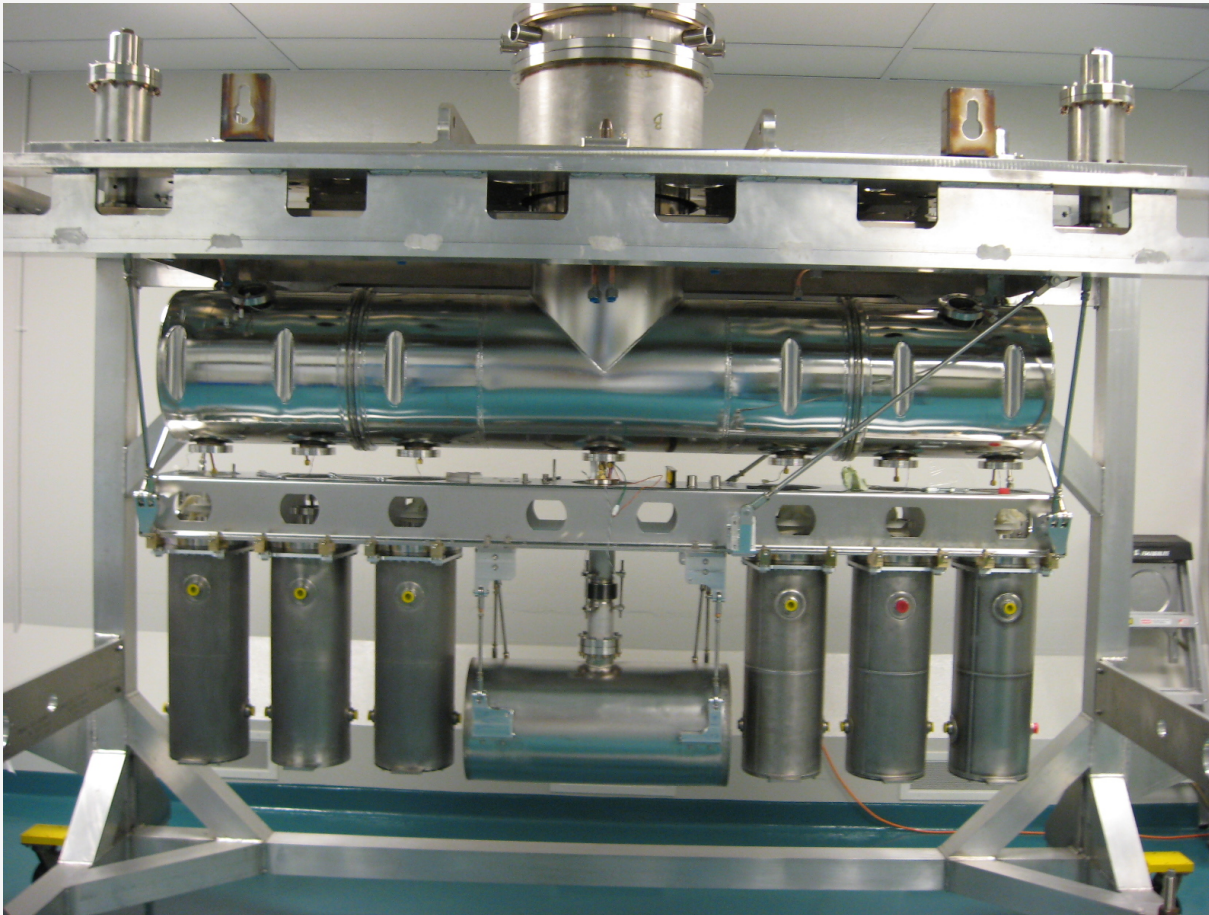
Simulation by MultP-M code

Measured

E_a , kV/m	Cavity region	E_a , kV/m
12.0 – 26.0	accelerating gap, donut – coax outer conductor	10 – 24
27.0 – 33.0	donut – coax outer conductor	28 – 33
35.0 – 54.0	coax line donut – end cap	42 – 50
58.0 – 193.0	donut – end cap	77 – 80



CONCLUSIONS



- Production of the 20 High Beta Cavities is going full speed at PAVAC.
- The first 6 cavities are produced, tested and installed in the first ISAC-II High Beta cryomodule.
- The tested cavities meet and even exceed ISAC-II specification ($V_{\text{eff}}=1.08$ MV at 7W power dissipation).
- Next 6 in the end of May 2009
- Next 8 in August 2009

Thanks!

