

- . STF Cryomodule Test
- . Cavity Magnetic Shield
- . TTF-V Couplers at KEK

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STF Cryomodule Tests (1)



String Assembly
Jan., 2008'



High Power Test of Four Cavities
Sept. ~ Dec., 2008'

STF Cryomodule Tests (2)

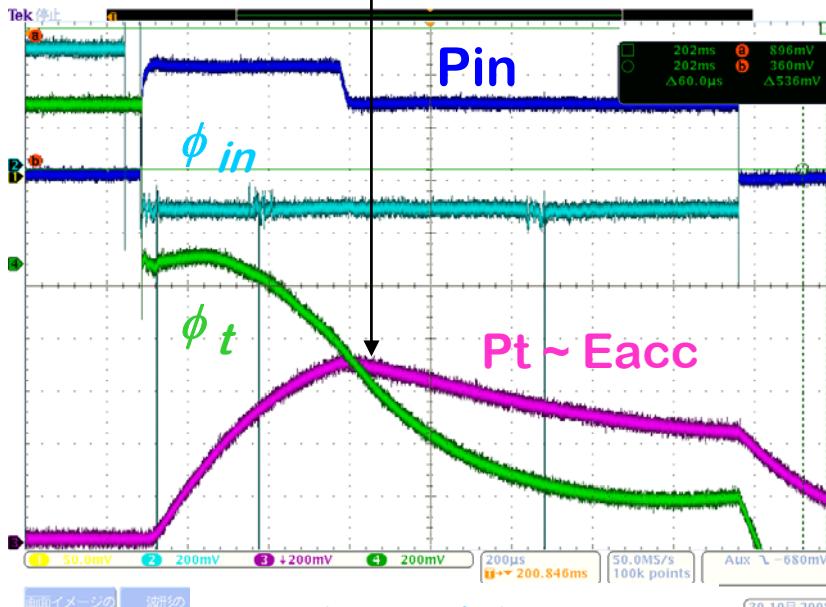
Best Result ; obtained Eacc,max in #2 Cavity

1.5 msec, 5 Hz operation

November, 2008'

RF Feedback / OFF

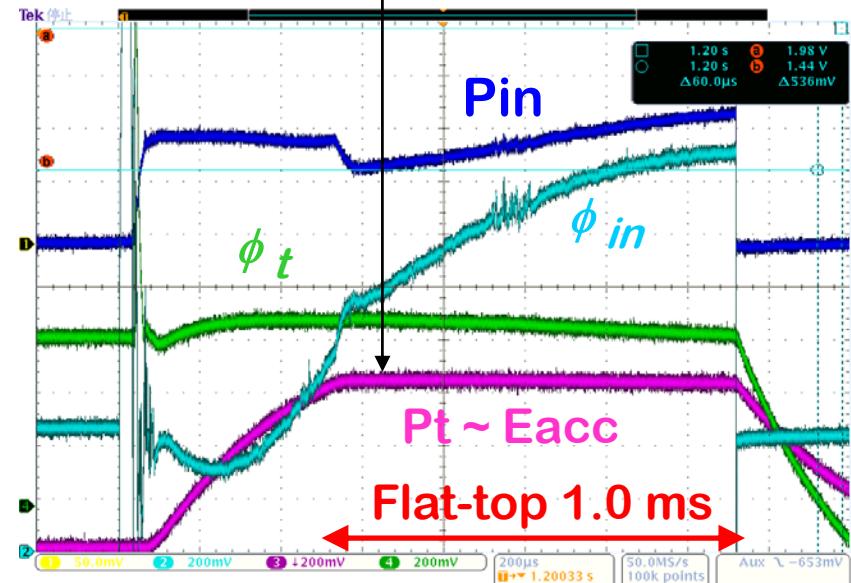
32.7 MV/m



no piezo drive
no pre-detuning

RF Feedback / ON

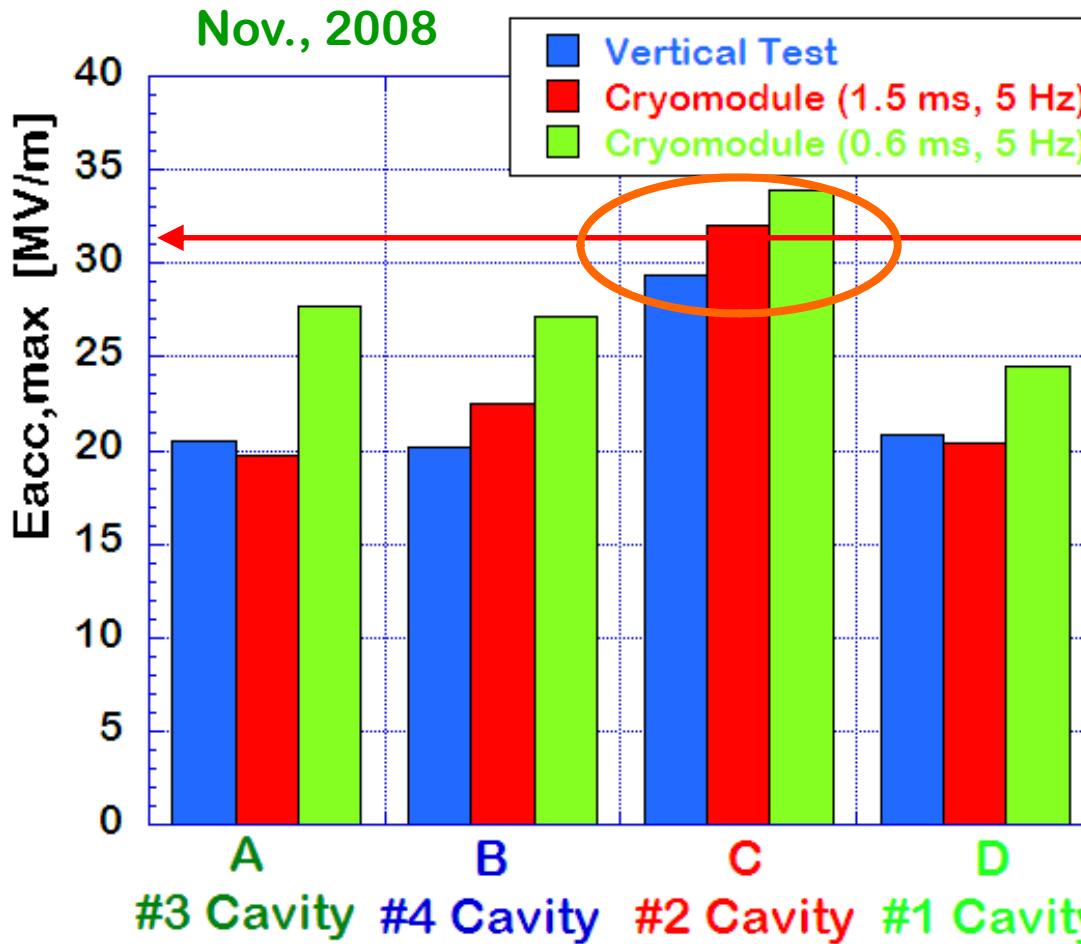
32.0 MV/m



no piezo drive
pre-detuning ($\Delta f = +300$ Hz)

STF Cryomodule Tests (3)

Comparison of Eacc,max between V.T and C.T



RF Feedback / ON

Operational Gradient
at 31.5 MV/m for ILC

Ave. Eacc,max (V.T)
= 22.7 MV/m

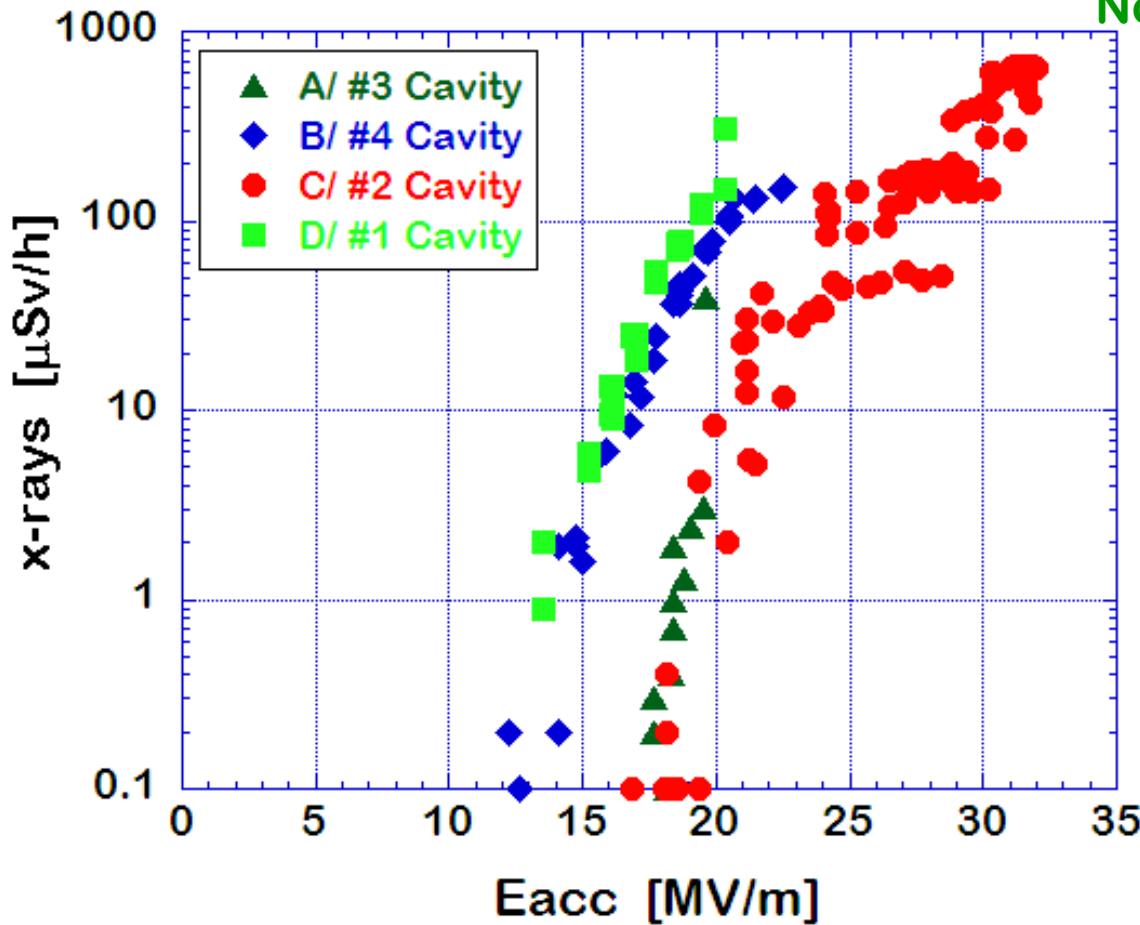
Ave. Eacc,max (Cryo. T)
= 23.7 MV/m

No degradation was observed
in the cryomodule tests.

STF Cryomodule Tests (4)

X-rays Radiation vs. Eacc

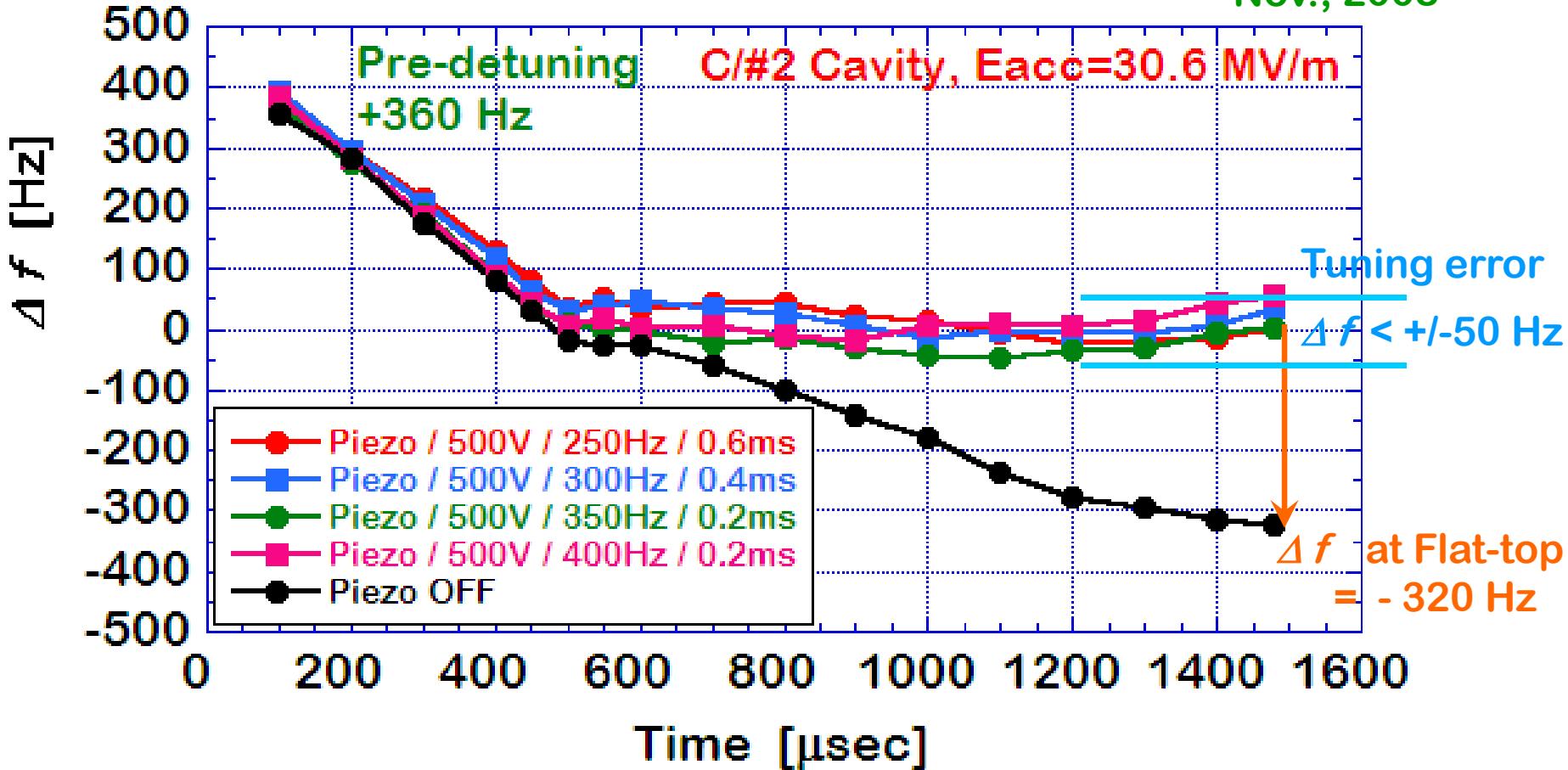
Nov., 2008



STF Cryomodule Tests (5)

Compensation of Lorentz-detuning by Piezo Tuner

Nov., 2008

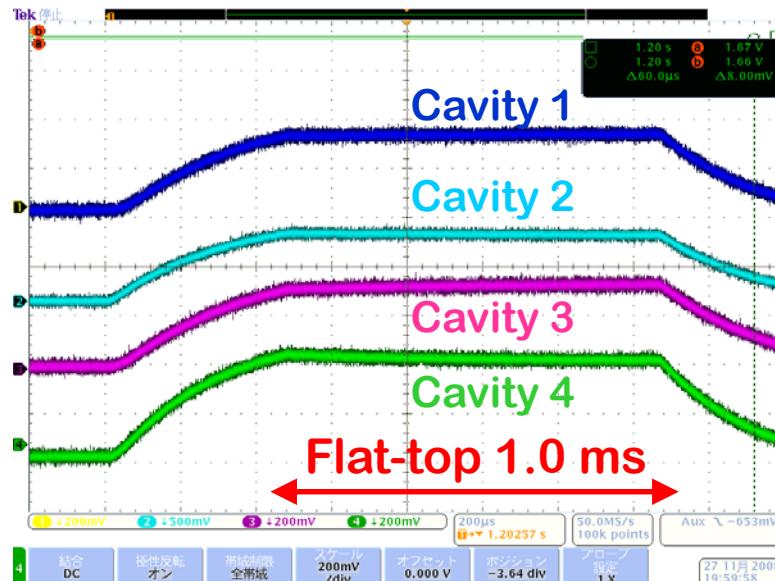


STF Cryomodule Tests (6)

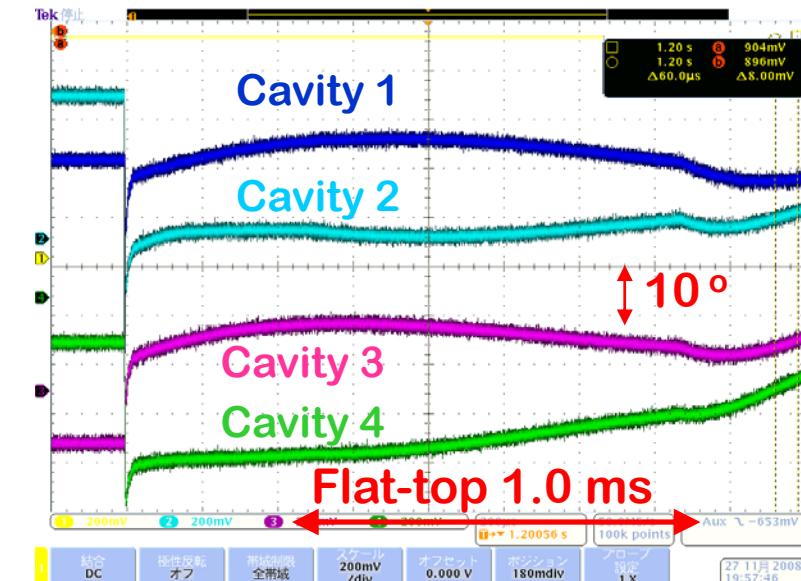
Four-cavity operation with vector-sum control

Accelerating Gradient (Eacc)

Cavity Phase (ϕ_t)



Cavity 1 ; Eacc = 17.6 MV/m
 Cavity 2 ; Eacc = 18.0 MV/m
 Cavity 3 ; Eacc = 17.9 MV/m
 Cavity 4 ; Eacc = 15.2 MV/m

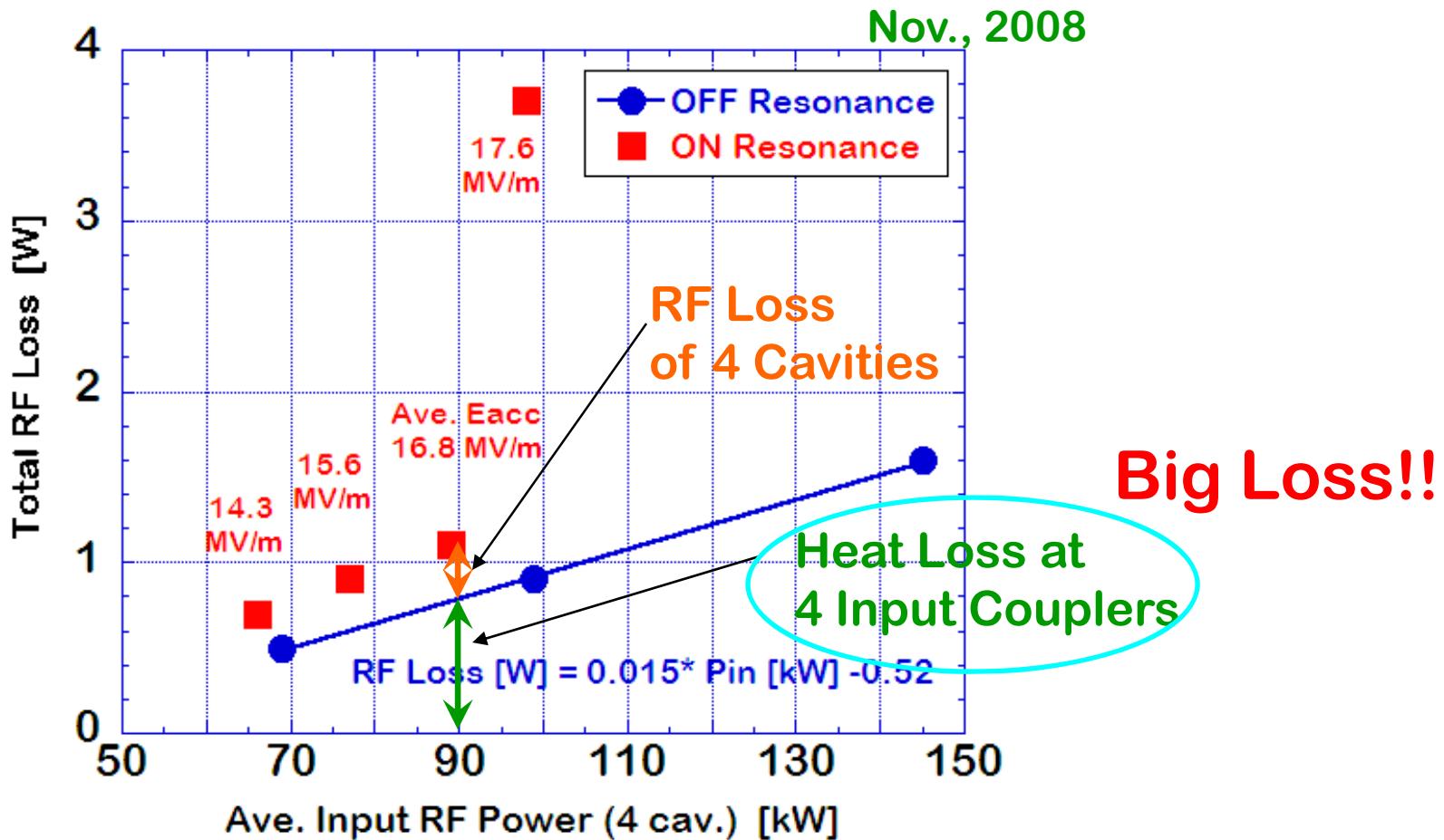


Nov., 2008

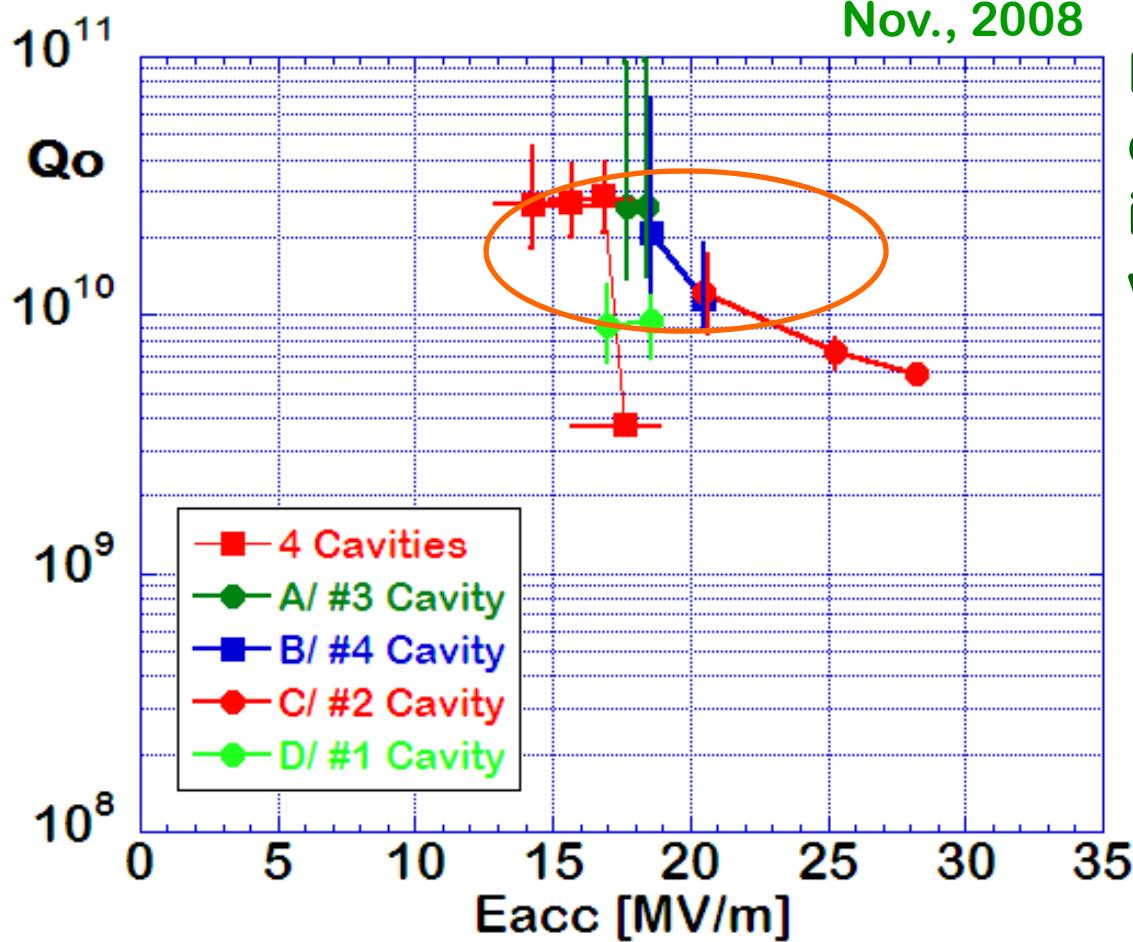
Total Acceleration Voltage
 70 MV with $\phi_t < +/- 5^\circ$

STF Cryomodule Tests (7)

Dynamic RF Loss Meas. in on/off Resonance



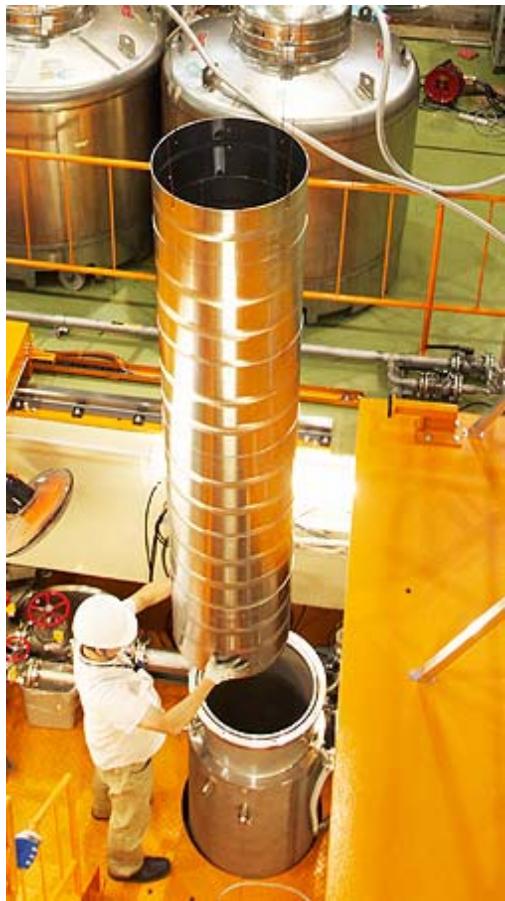
Qo Values by Dynamic RF Loss Measurements



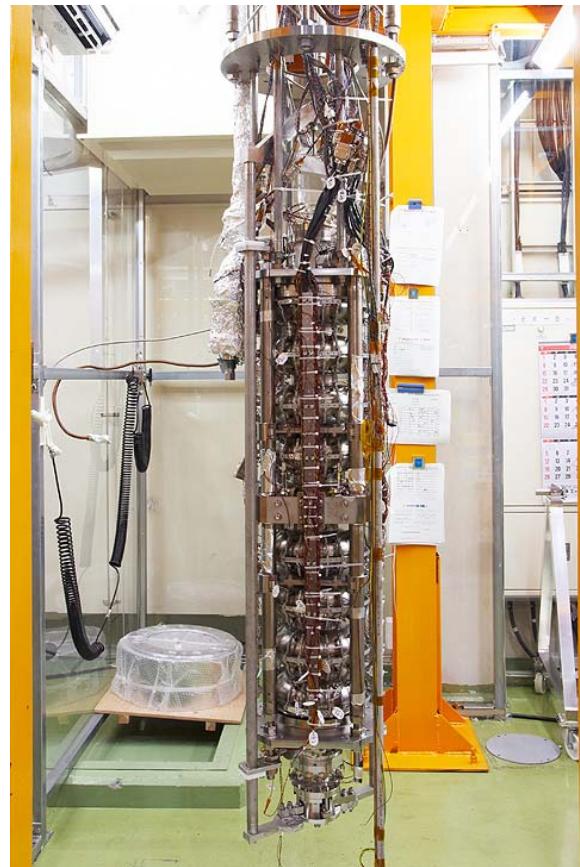
Effectiveness of the cavity magnetic shield inside the He jacket was confirmed !!



Cavity Magnetic Shield (1)



Magnetic shield of
vertical cryostat



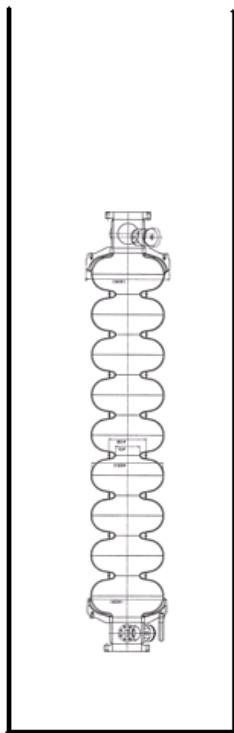
without cavity
magnetic shield



with cavity
magnetic shield

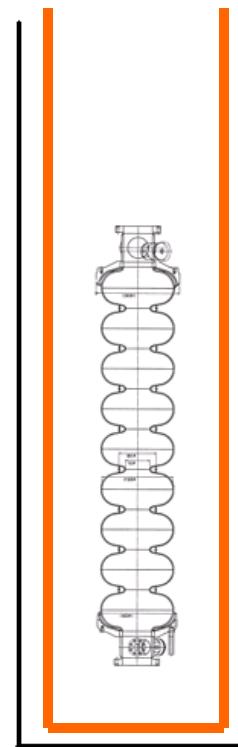
Cavity Magnetic Shield (2)

Case - I



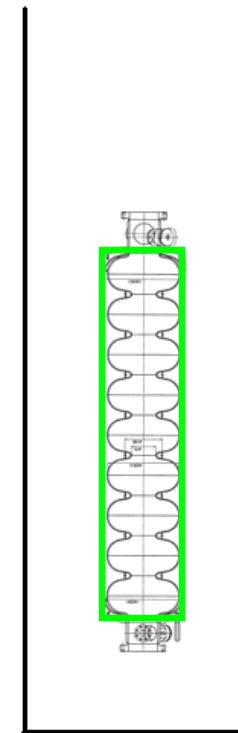
No
mag. shield

Case - II



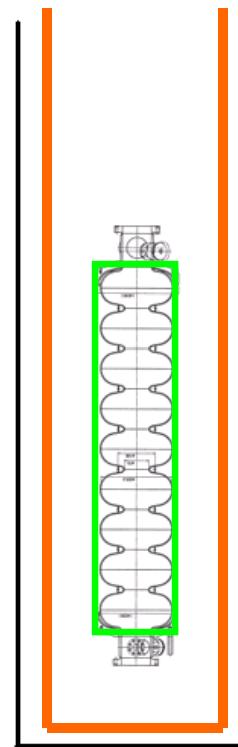
Cryostat
mag. shield

Case - III



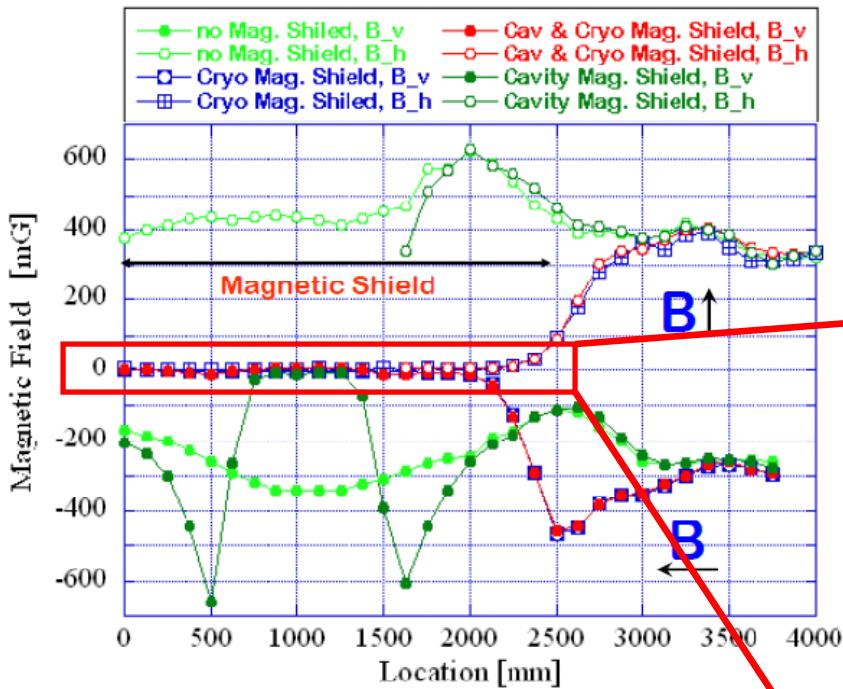
Cavity
mag. shield

Case - IV



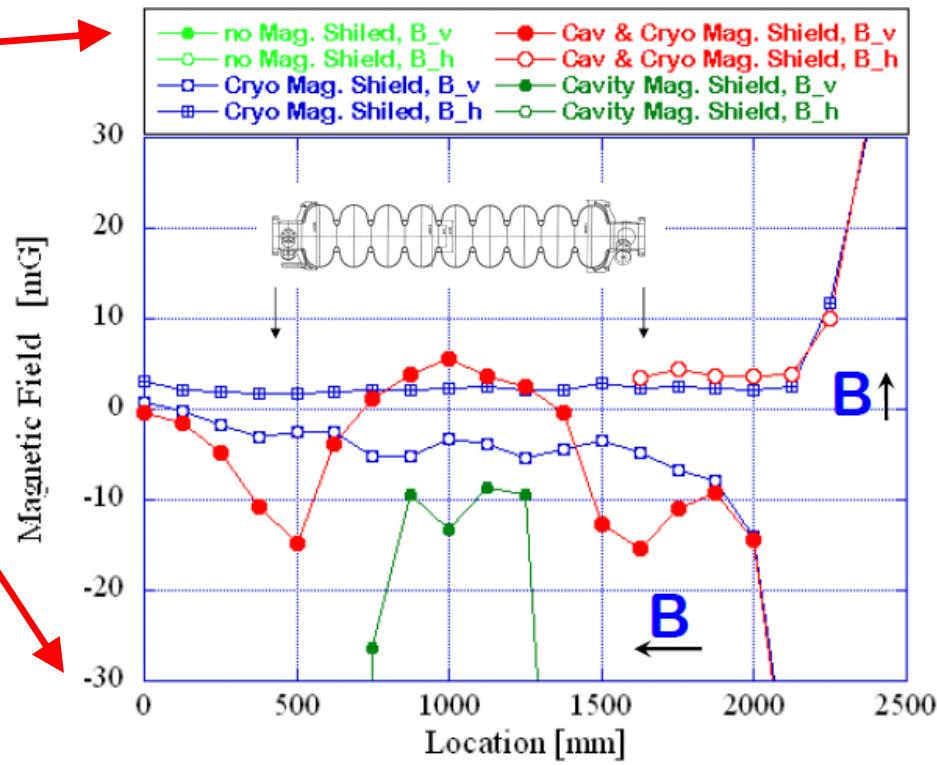
Cavity +
Cryostat
mag. shield

Cavity Magnetic Shield (3)



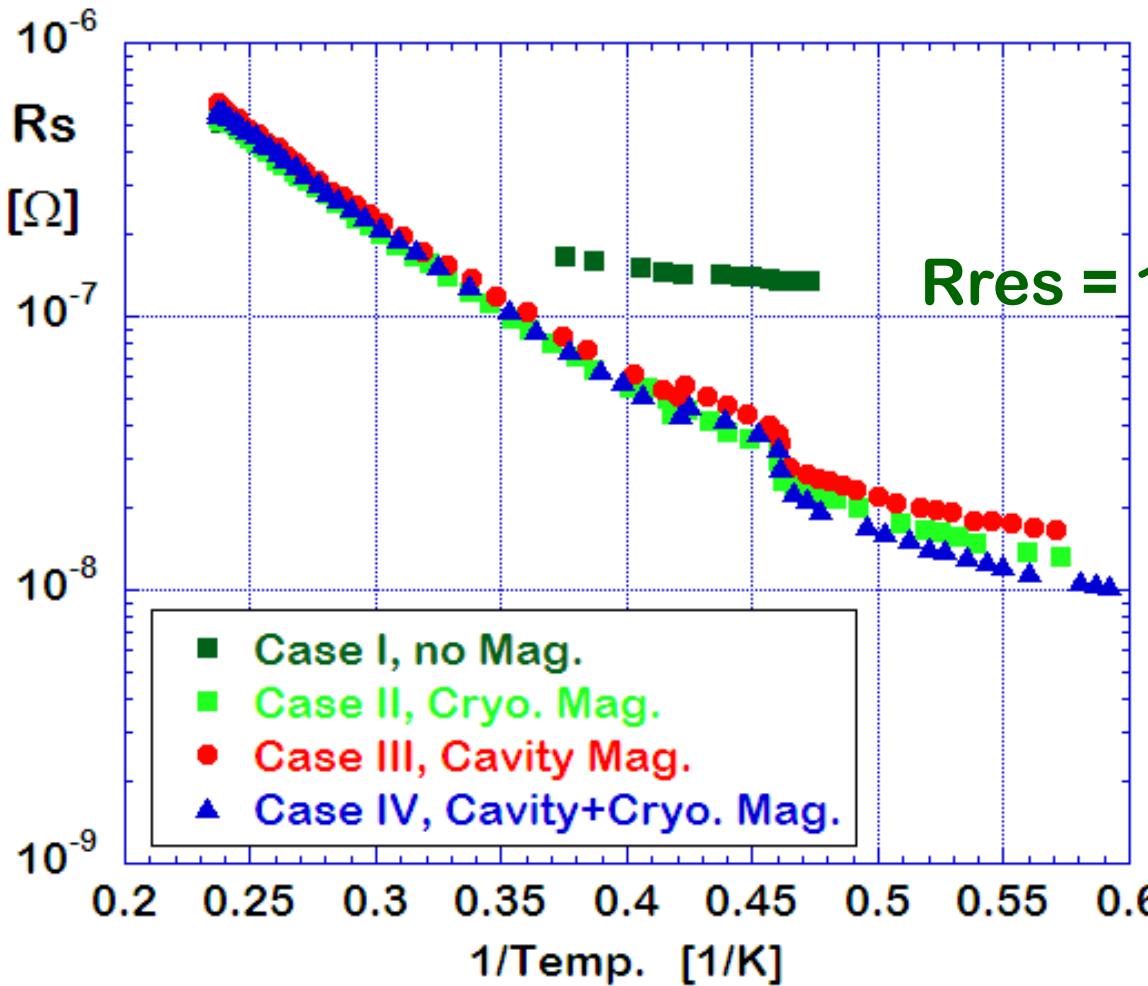
no Magnetic Shield, $B \sim 400$ mG
with Magnetic Shield, $B < \sim 10$ mG

Residual Magnetic Field (B) in the Vertical Cryostat



Cavity Magnetic Shield (4)

Temperature Dependence of Surface Resistance (R_s)



Residual Surface
Resistance (R_{res})

$$R_{\text{res}} = 126 \text{ n}\Omega$$

$$(R_{\text{res}} = \sim 0.3 \text{ n}\Omega/\text{mG})$$

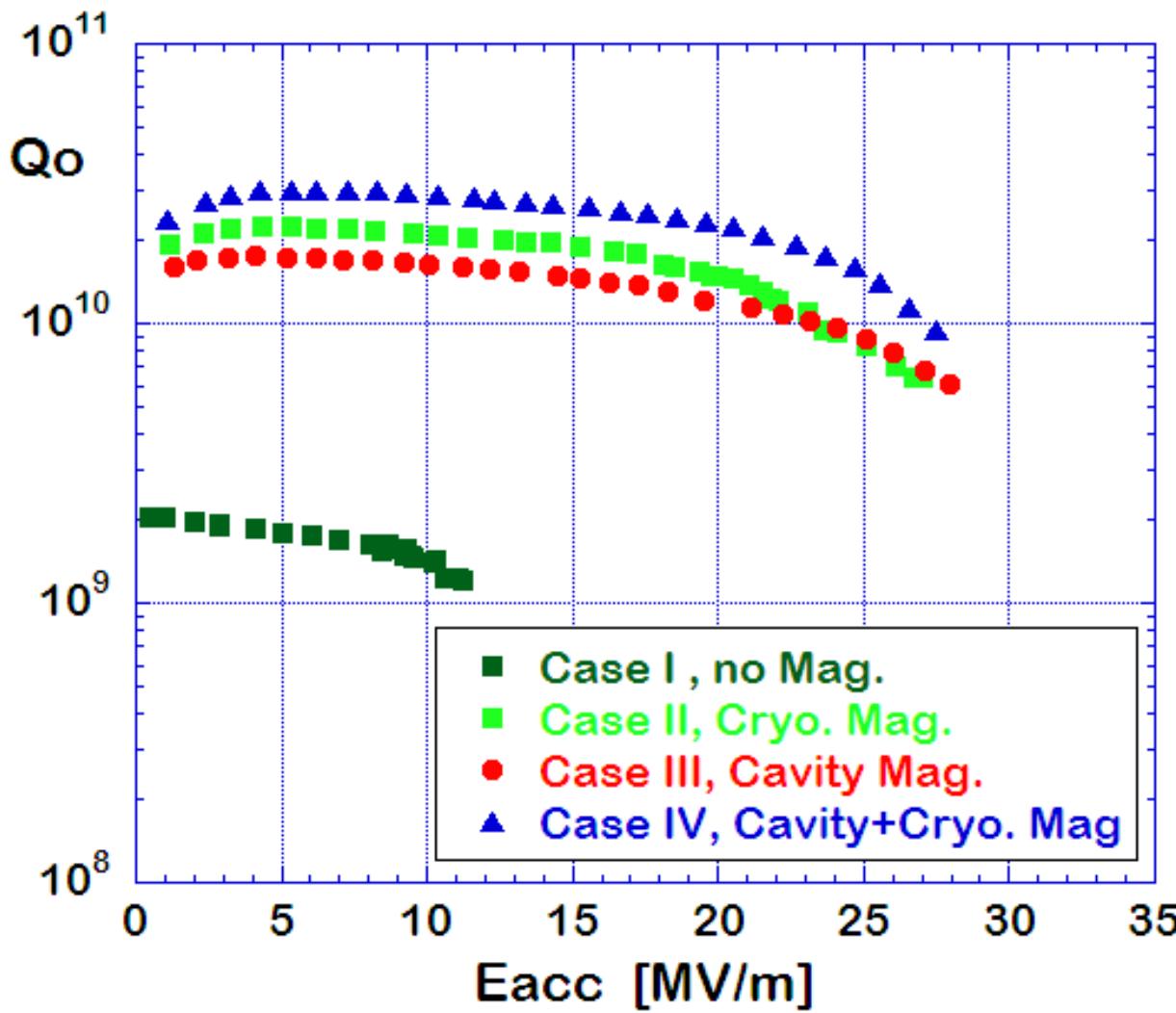
$$R_{\text{res}} = 13.2 \text{ n}\Omega$$

$$\uparrow \Delta R_{\text{res}} \sim 3 \text{ n}\Omega$$

$$R_{\text{res}} = 10.3 \text{ n}\Omega$$

$$R_{\text{res}} = 8.3 \text{ n}\Omega$$

Cavity Magnetic Shield (5)



Q_o at 5 MV/m
(1.8 K)

$Q_o = 3.0 \times 10^{10}$

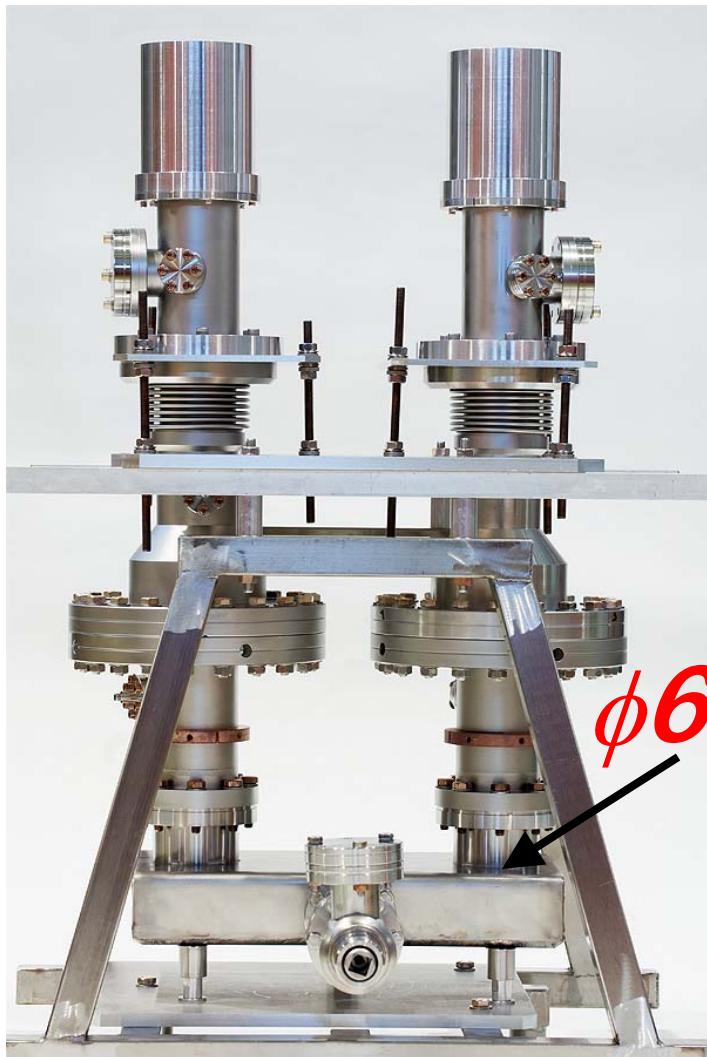
$Q_o = 2.2 \times 10^{10}$

$Q_o = 1.7 \times 10^{10}$

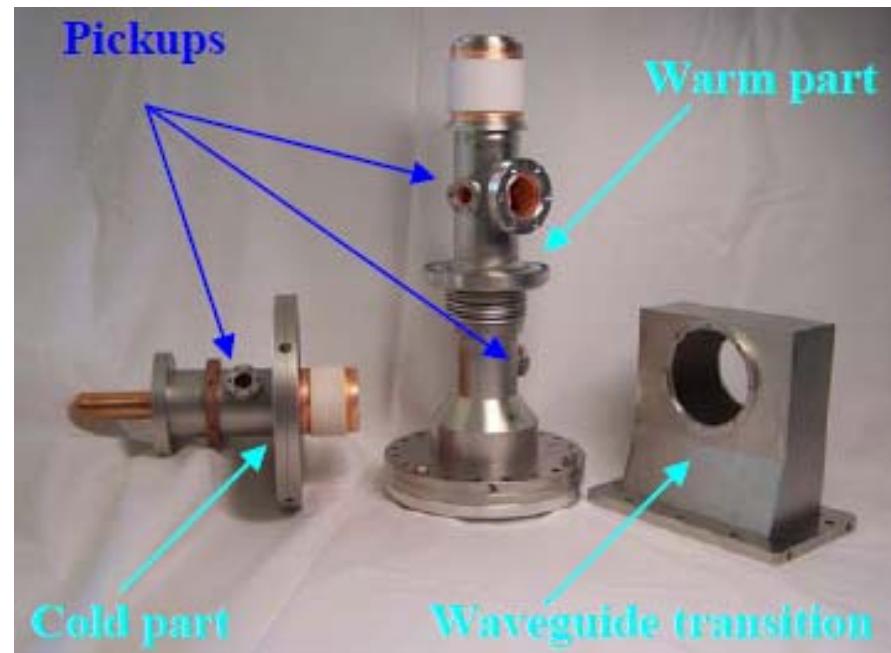
OK

$Q_o = 1.8 \times 10^9$

TTF-V Couplers at KEK (1)



FJPPL Collaboration
between KEK and LAL
(H. Jenhani, P. Lepercq, M. Lacroix, A. Variola)



The TTF-V is a LAL design based on the TTF-III coupler design at DESY, and they were fabricated by ACCEL.

TTF-V Couplers at KEK (2)

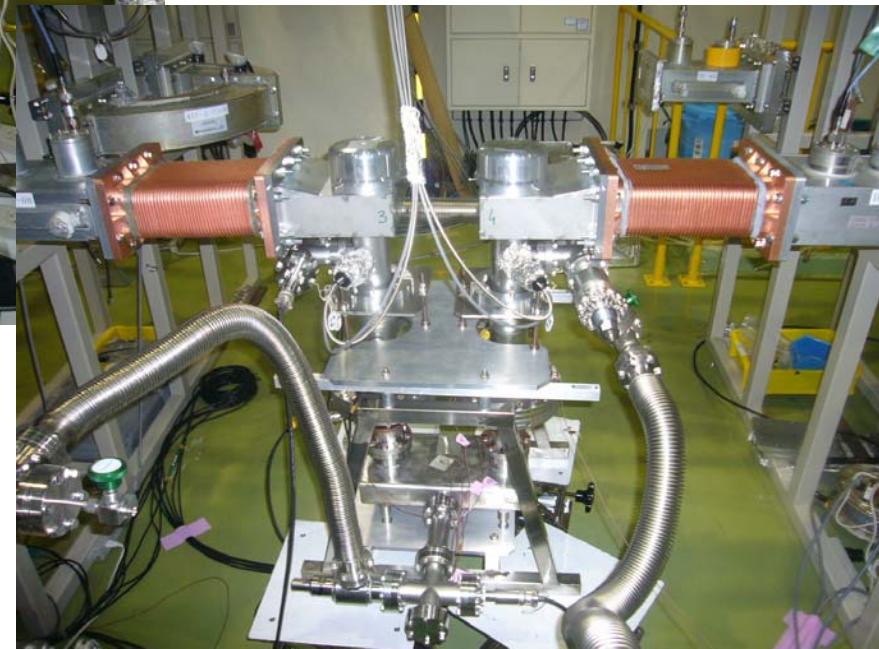


Assembly of
pumping ports
and vacuum gauges



Baking at 130°C

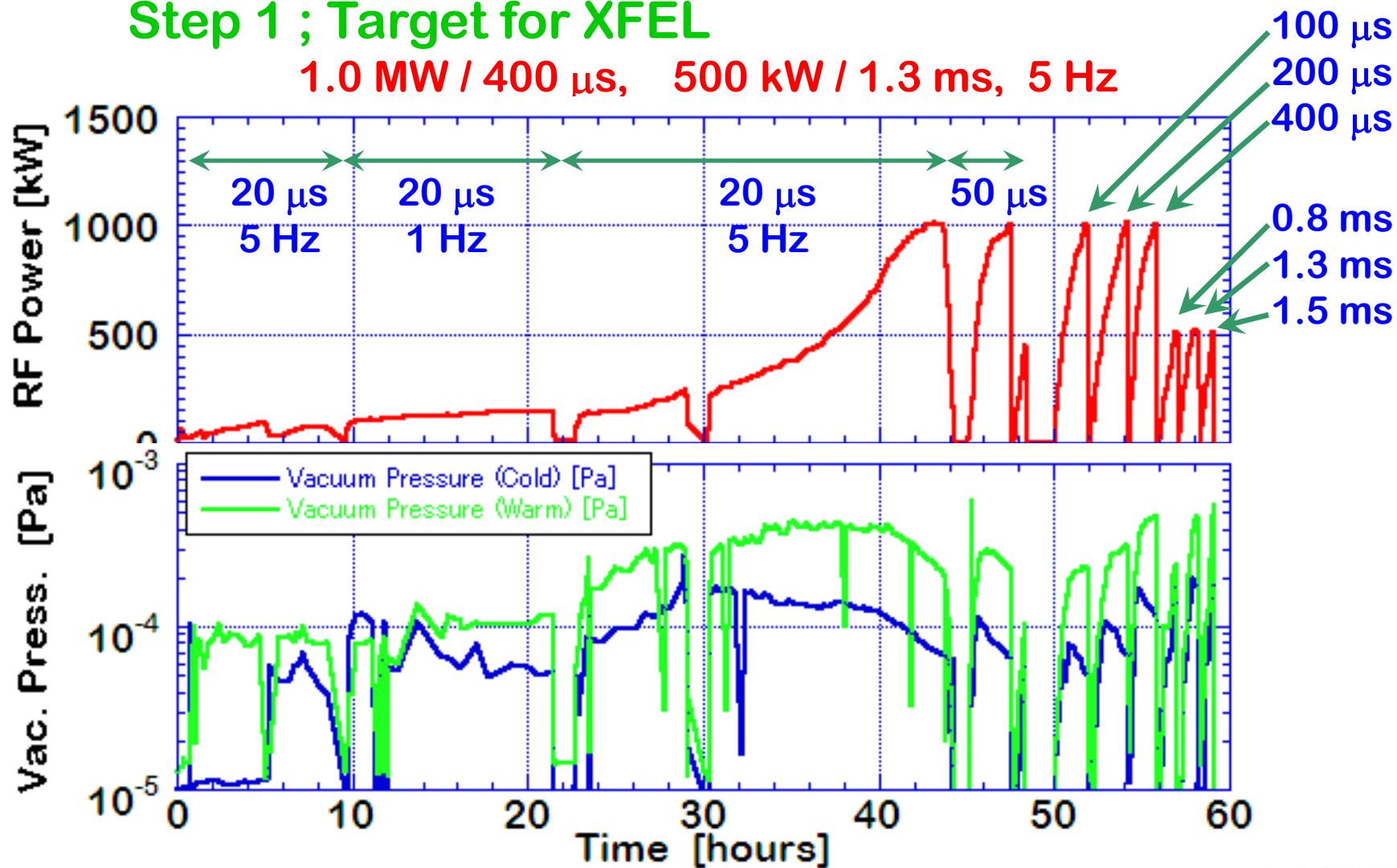
Set-up of
High Power Test Stand



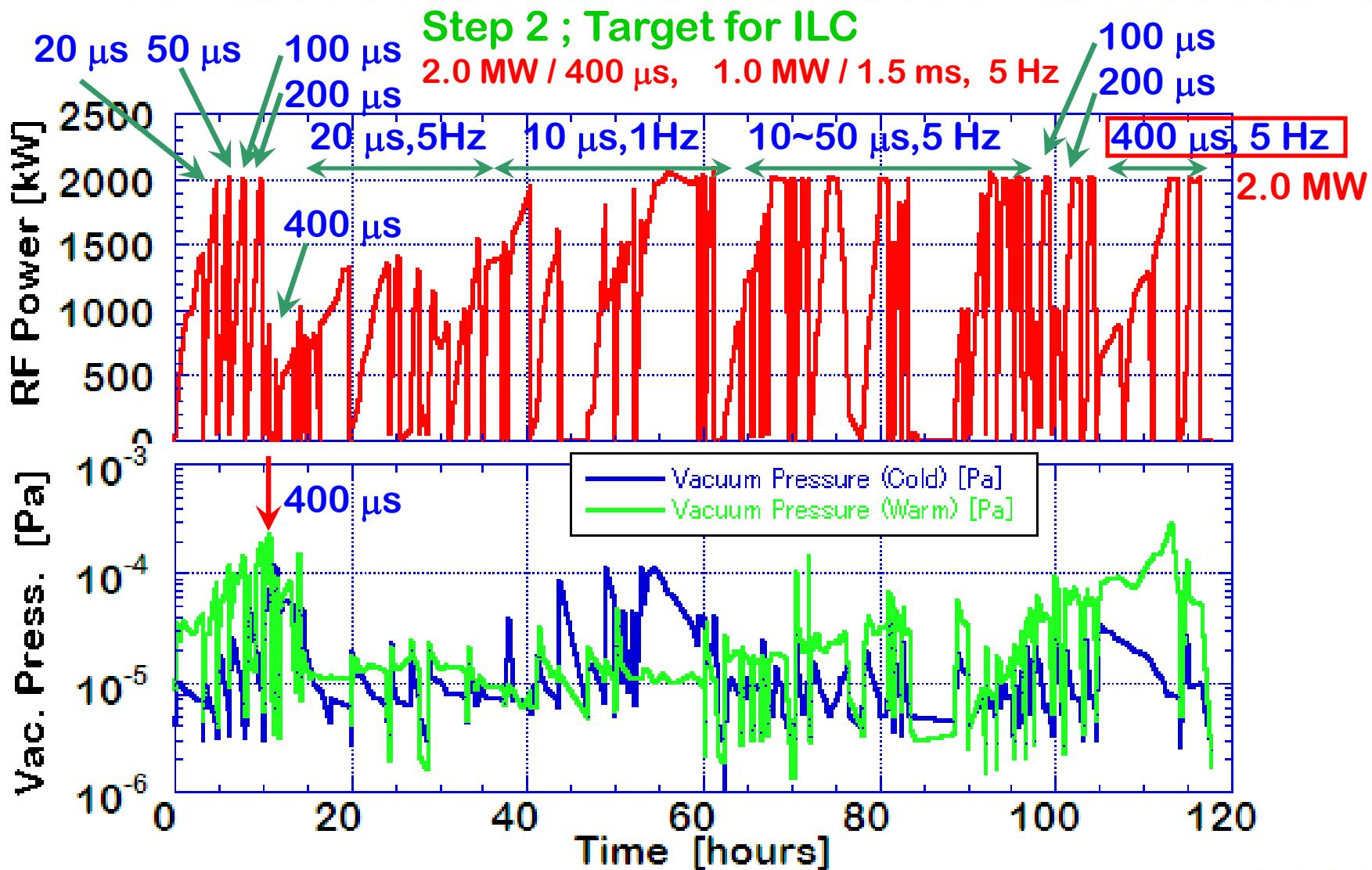
TTF-V Couplers at KEK (3)

Step 1 ; Target for XFEL

1.0 MW / 400 μ s, 500 kW / 1.3 ms, 5 Hz



TTF-V Couplers at KEK (4)



- In the STF cryomodule tests, a stable pulsed operation at 32 MV/m was achieved.
- Effectiveness of the cavity magnetic shield inside the He vessel was confirmed in both the cryomodule tests and the vertical tests.
- Processing of the TTF-V couplers was carried out up to 2.0 MW with 400 μ sec and 5 Hz operation.

Thank you
for your attention.....