Performance Improvement of Ichiro #7 Full 9-Cell Cavity by KEK/Jlab Collaboration

KEK/Jlab

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Ichiro#7 full 9-cell cavity has achieved the ILC-ACD Spec: 40MV/m @ 0.8E+10

Many thanks to Jlab and colleagues for ICHIRO7 collaboration Andrew Hutton, Robert Rimmer, Andrew Burrill, Pete Kushnick, Peter Kneisel, and others.

KEK/Jlab S0-study Schedule on ICHIRO#7

Ichiro#7: a full 9-cell cavity with LL shape

w/ end groups

W/ MO seal

2010 Feb.	March	April	May	June	July
2weeks, Fumio, Kenji 1 RF test (baseline)				10weeks, Fumio 3 RF test (2 EP, 1 re-HPR) Commissioning done for ICHIRO7	

Aug.	Sep.	Oct.	Nov.	Dec.	2011 Jan.
			13weeks, Fumio 3 RF test (1 EP, 1 re-HPR, 1 re-test w/OSTs)		

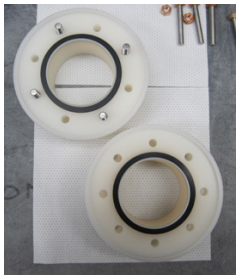
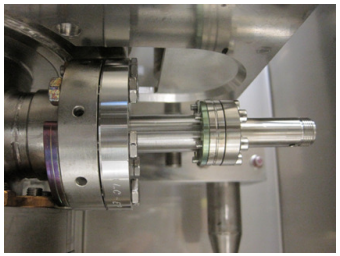
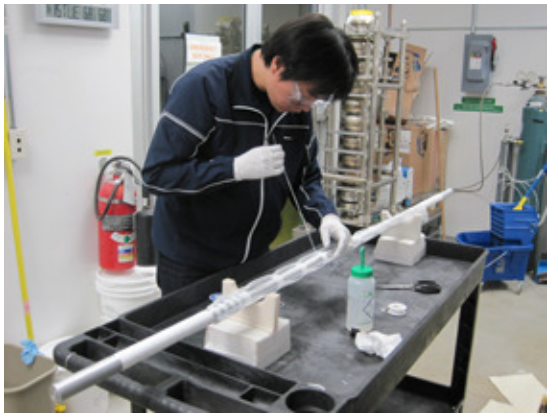
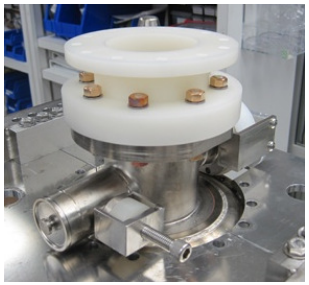
Fumio was invited from Jlab and installed Ichiro#7

Several modifications were done for Ichiro #7 to fit the Jlab system.

(1) Modifided Jlab to attach Ichiro#7 dressed KEK jig

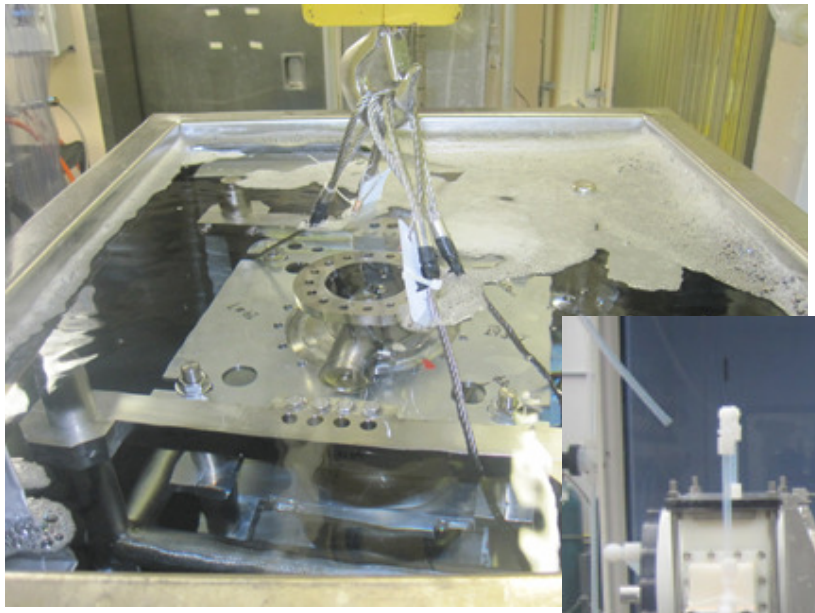
(2) Fabricated adaptor between Beam pipe flange and EP rotary sleeve, and EP cathode.

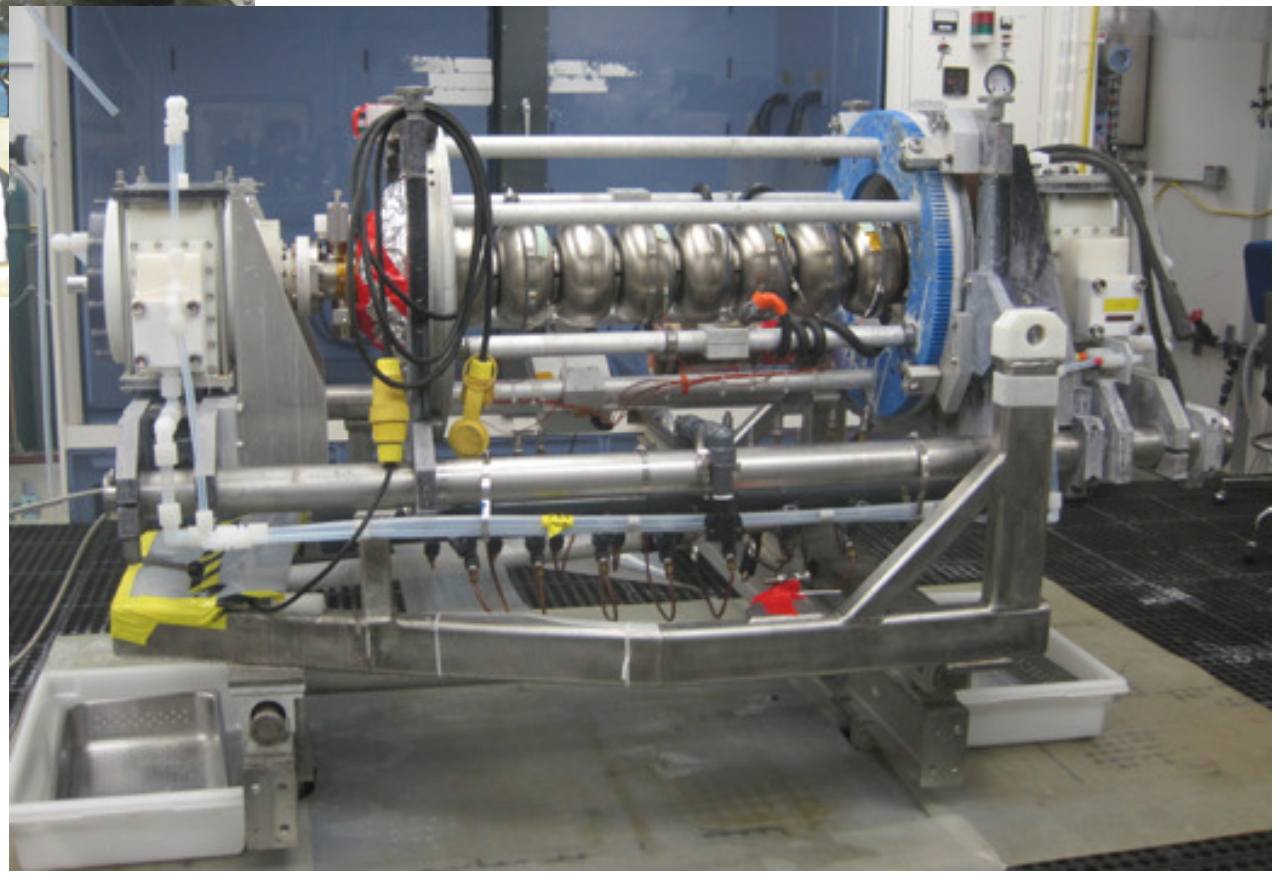
(3) Fabricated an adaptor for input antenna, which tranfer from MO seal to ICF sealing.。


USC~EP set-up

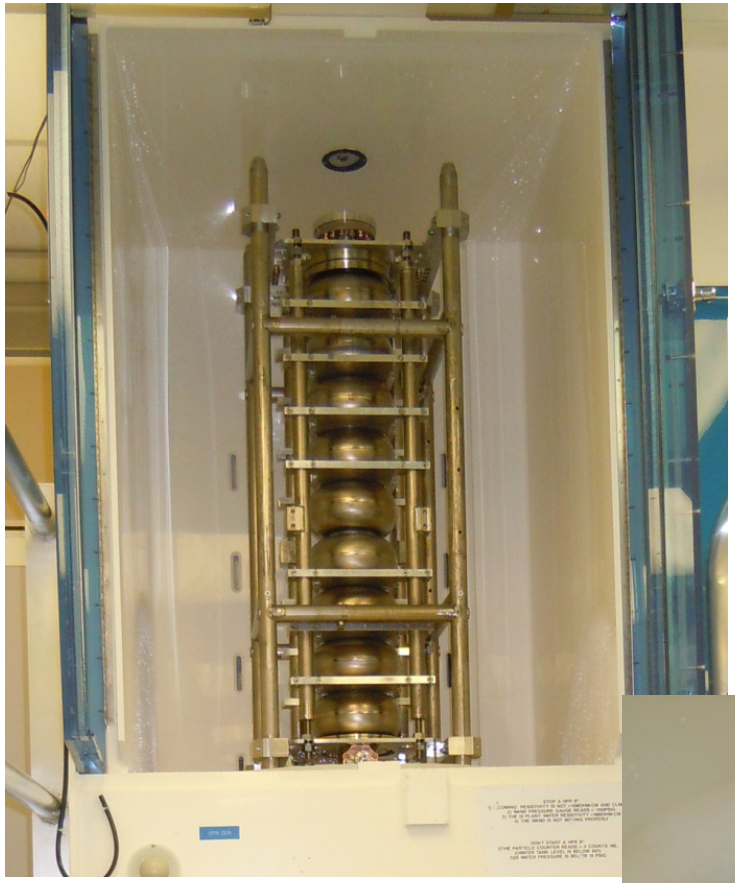
Nov. 9~10th 2010





HPR

Nov. 11,15th 2010

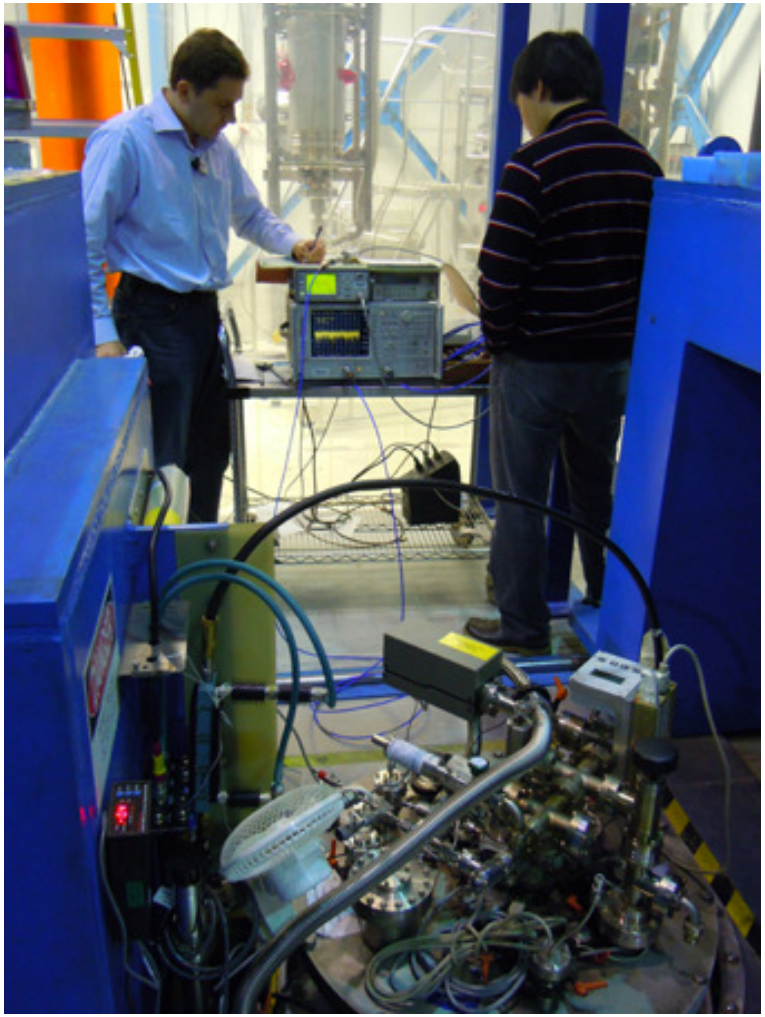


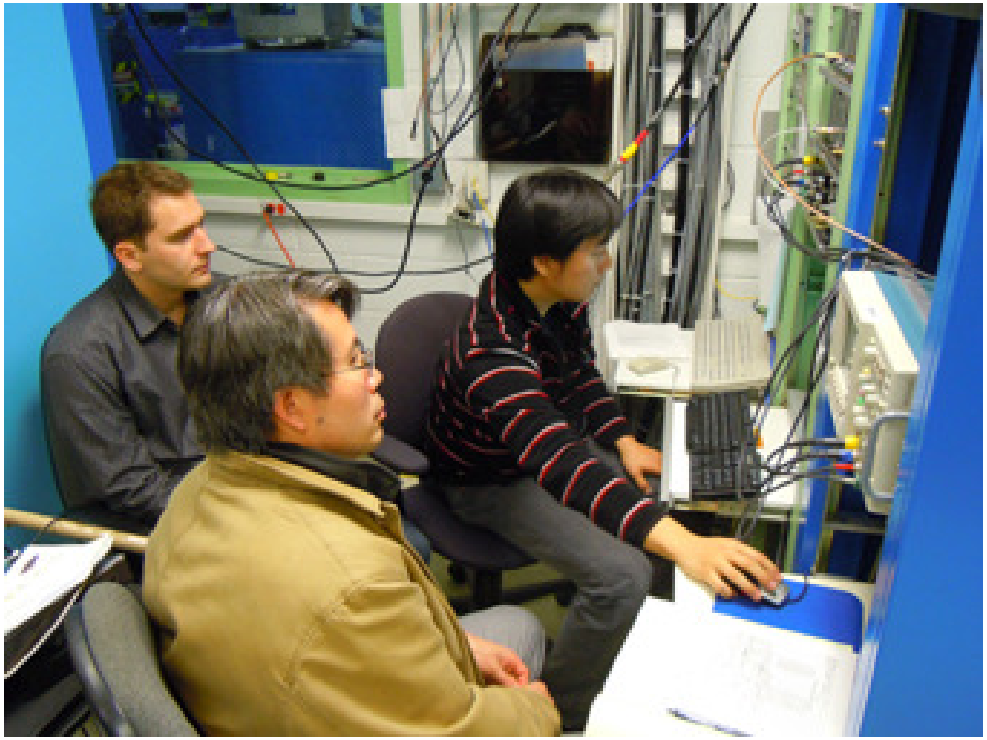
Assembly ~ bake out

Nov. 15~20th 2010

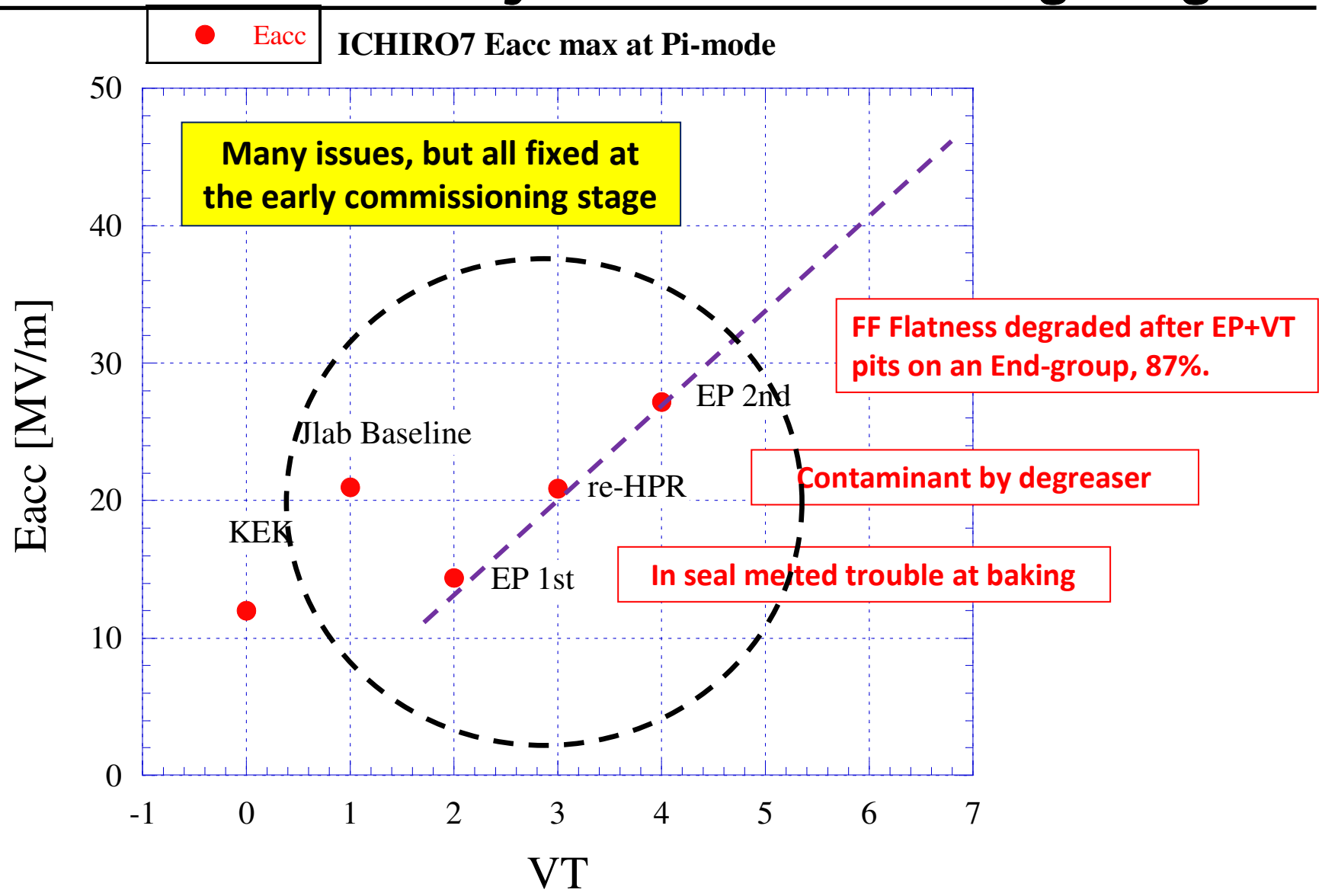
VT

Nov. 24th 2010





ICHIRO#7 summary on commissioning stage



Another two more S0 tight loops might push up the gradient over 40MV/m.

Polish off pits on an end group Nov. 3~4th 2010

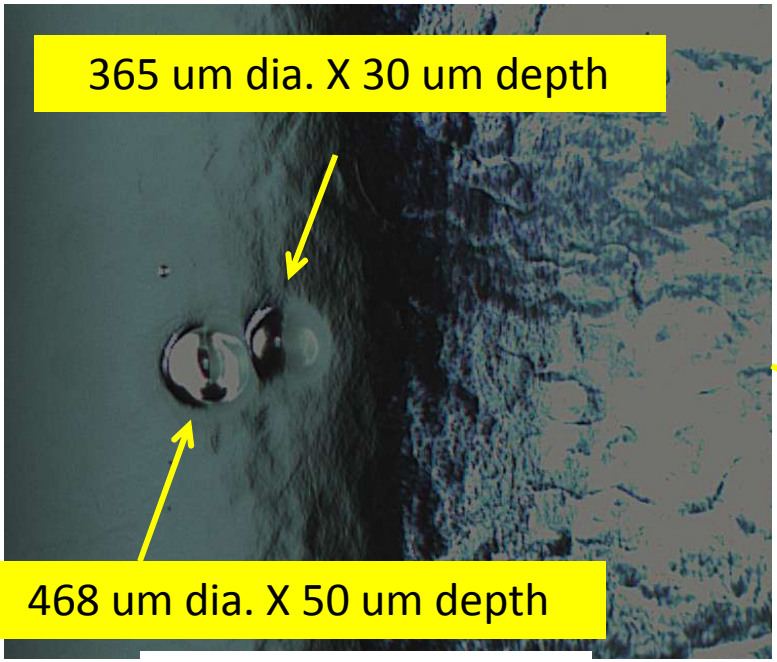
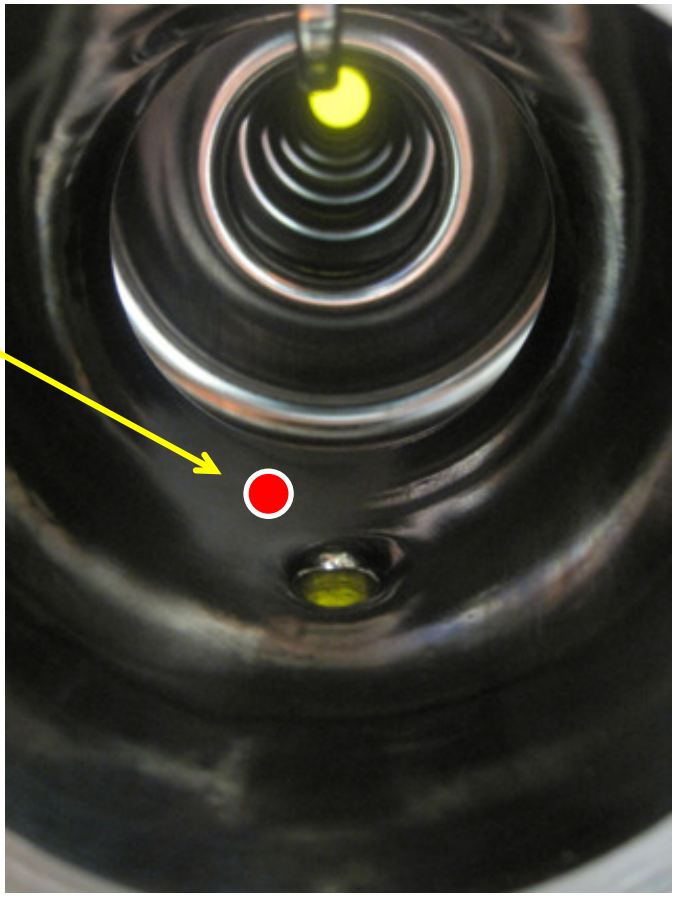
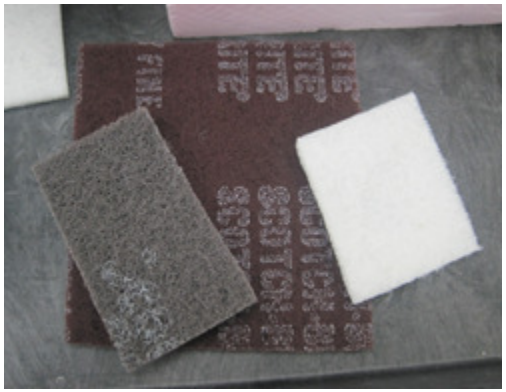


Photo by Rongli



After polishing, no visible pits.
Then, go to Ultra-sonic cleaning

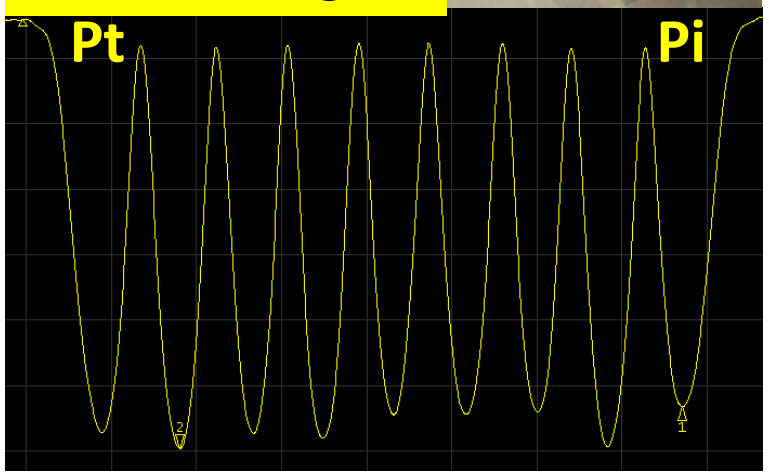
Polishing w/ Scotch-Brite



Flatness tuning before 3rd EP Nov. 5~6th 2010

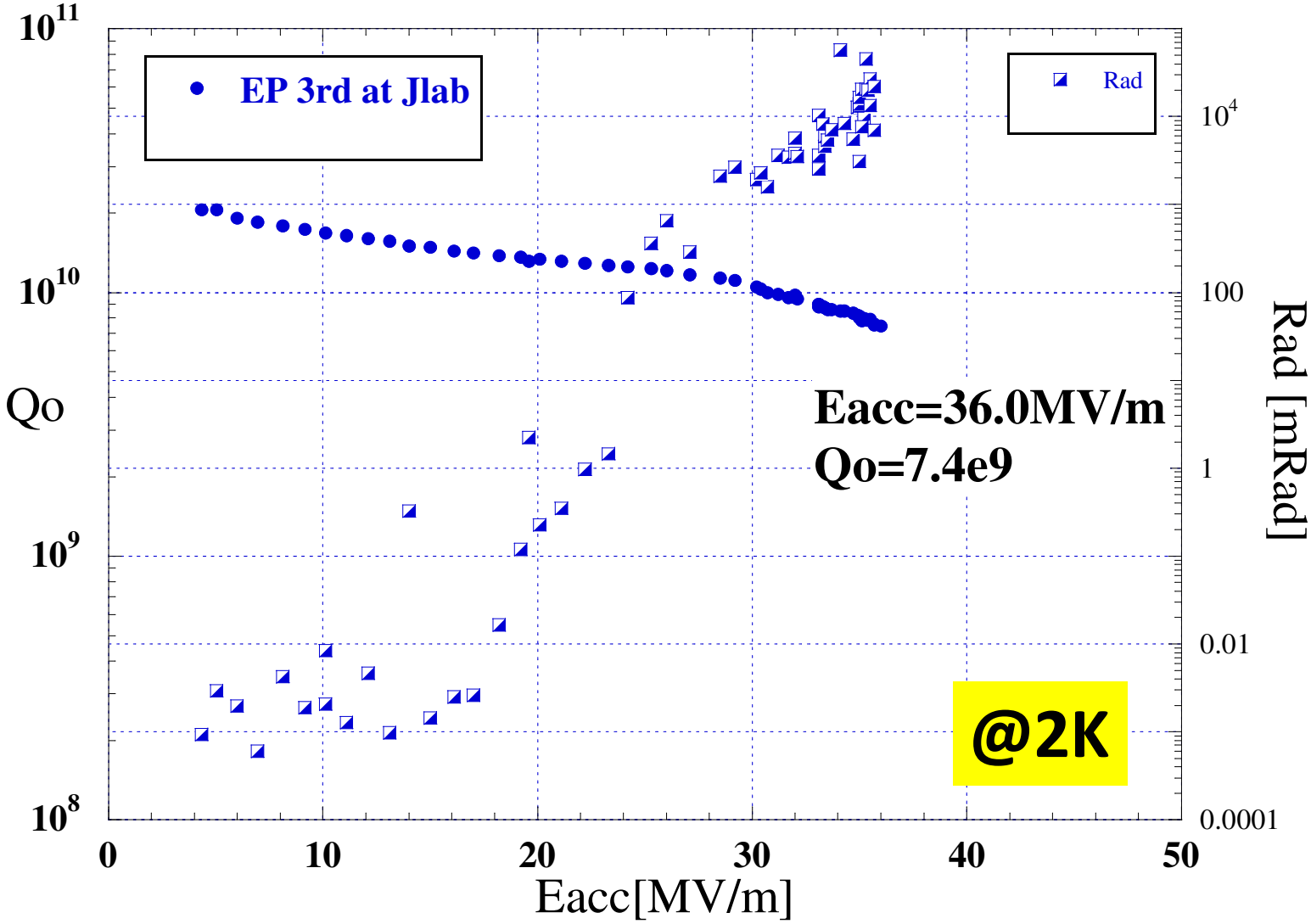
f.f.=96% on tuning table

f.f.=95% in cage



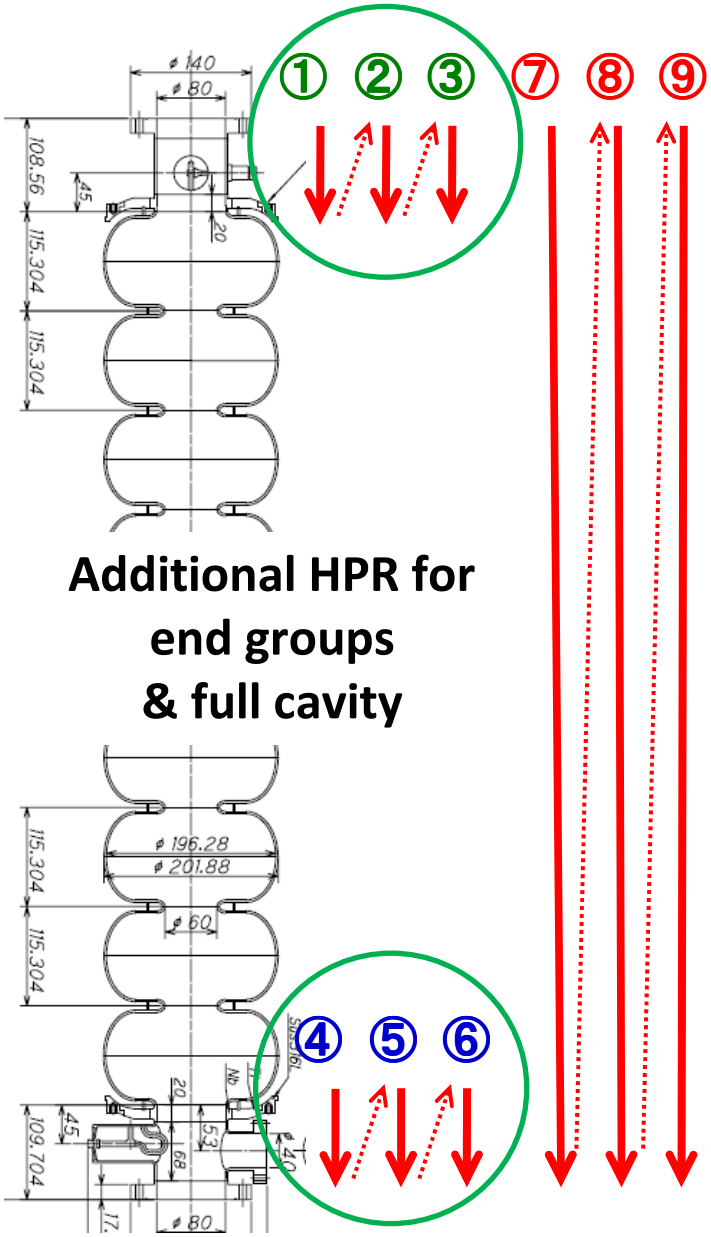
ICHIRO#7 VT after 3rd EP at Jlab

Nov. 24th 2010

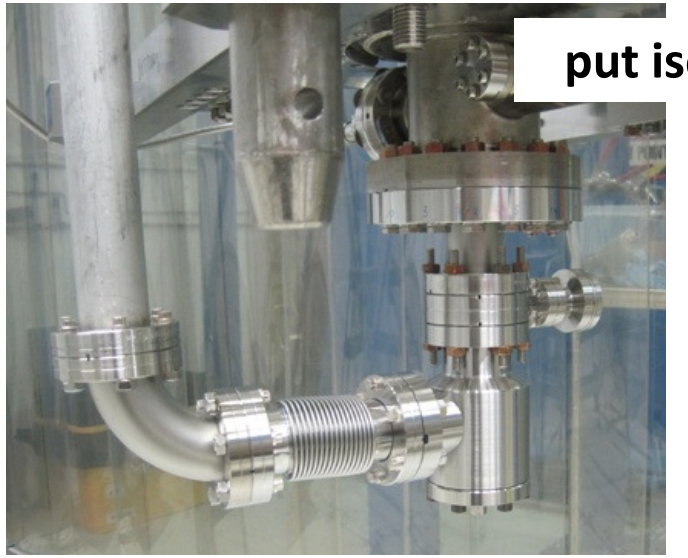


ICHIRO#7 re-HPR

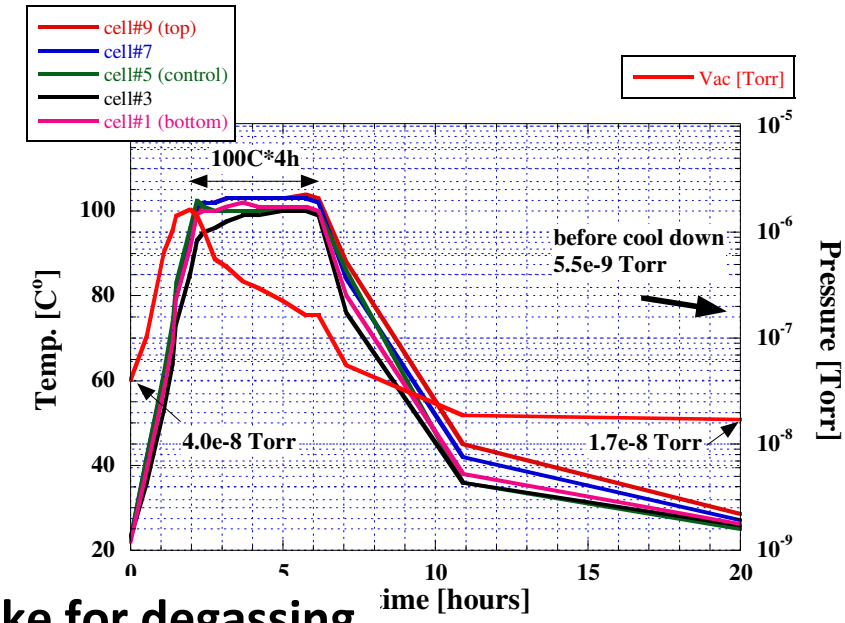
Dec. 6~9th 2010



Additional HPR for
end groups
& full cavity



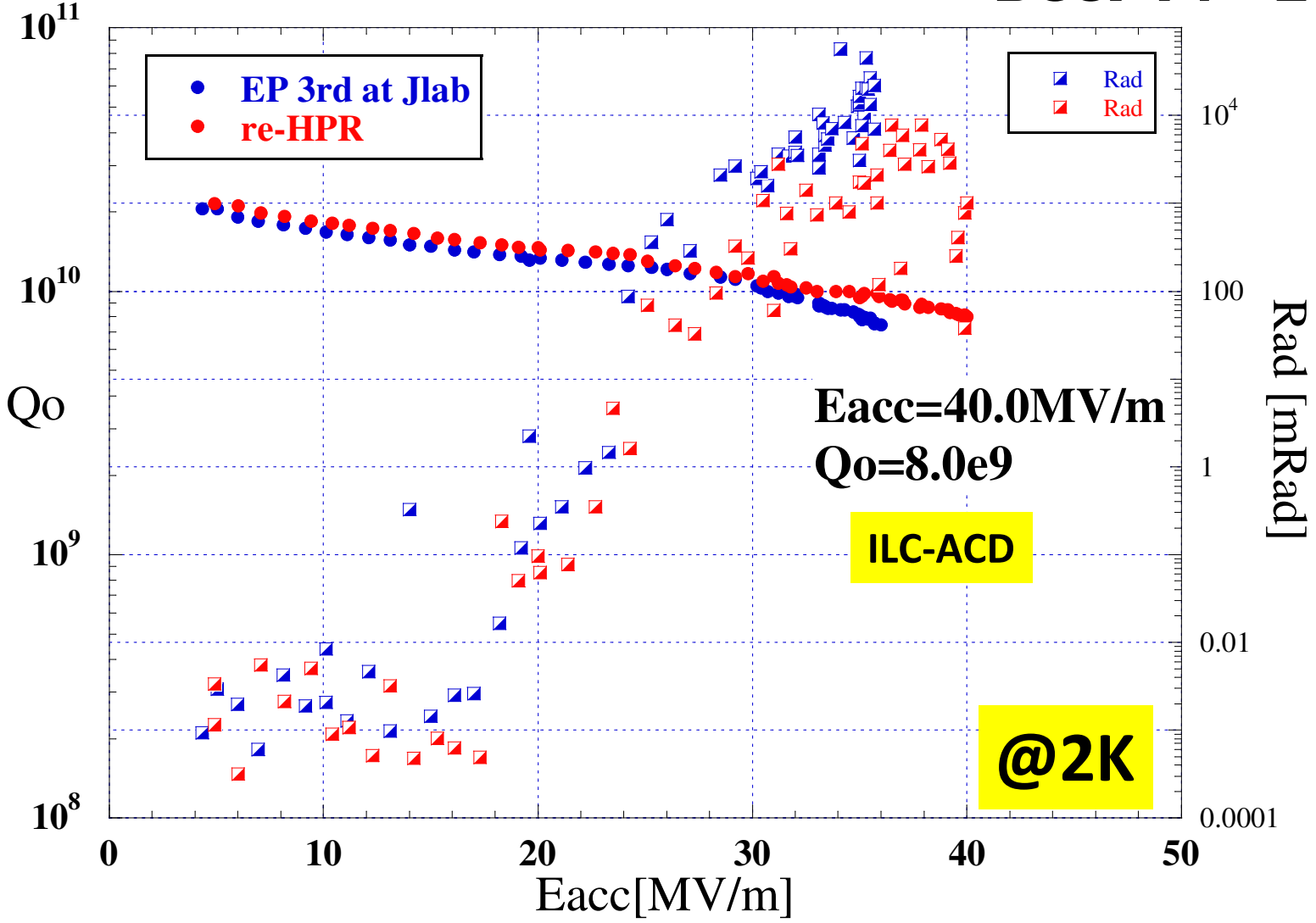
put isolation valve



Short bake for degassing

ICHIRO#7 VT after re-HPR at Jlab

Dec. 14th 2010



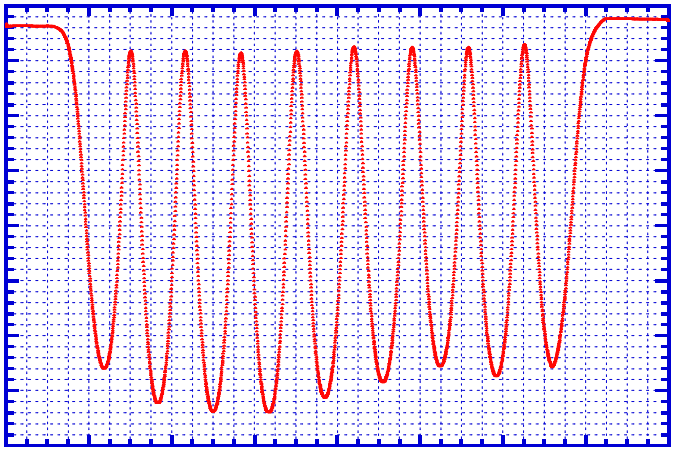
Not seen serious FE loading but a lot of X-ray happened.

Data cross-checking

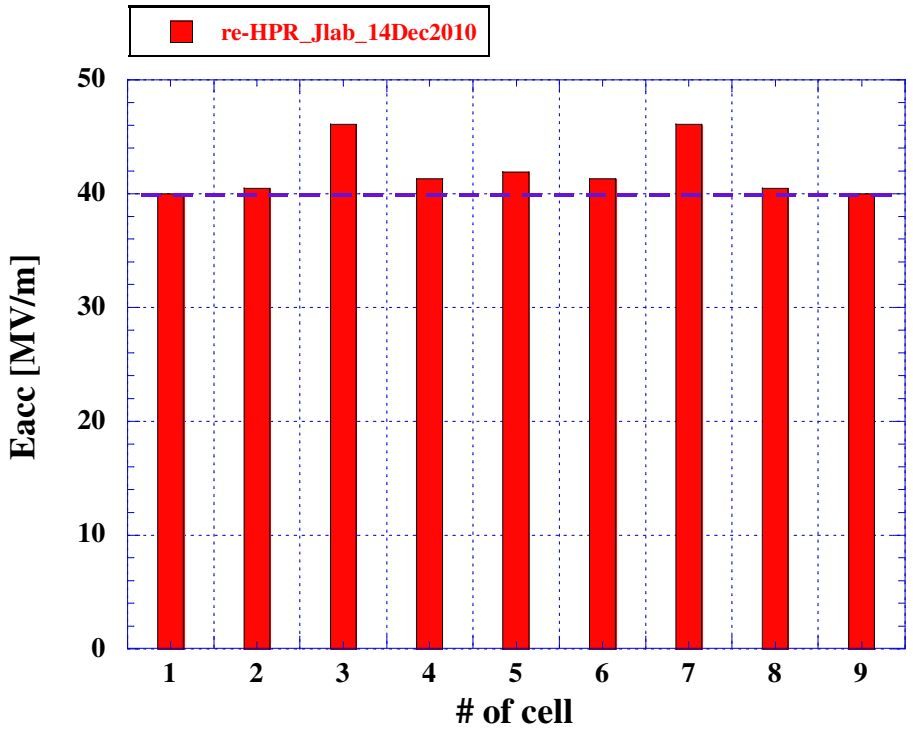
Jan. 22nd 2010

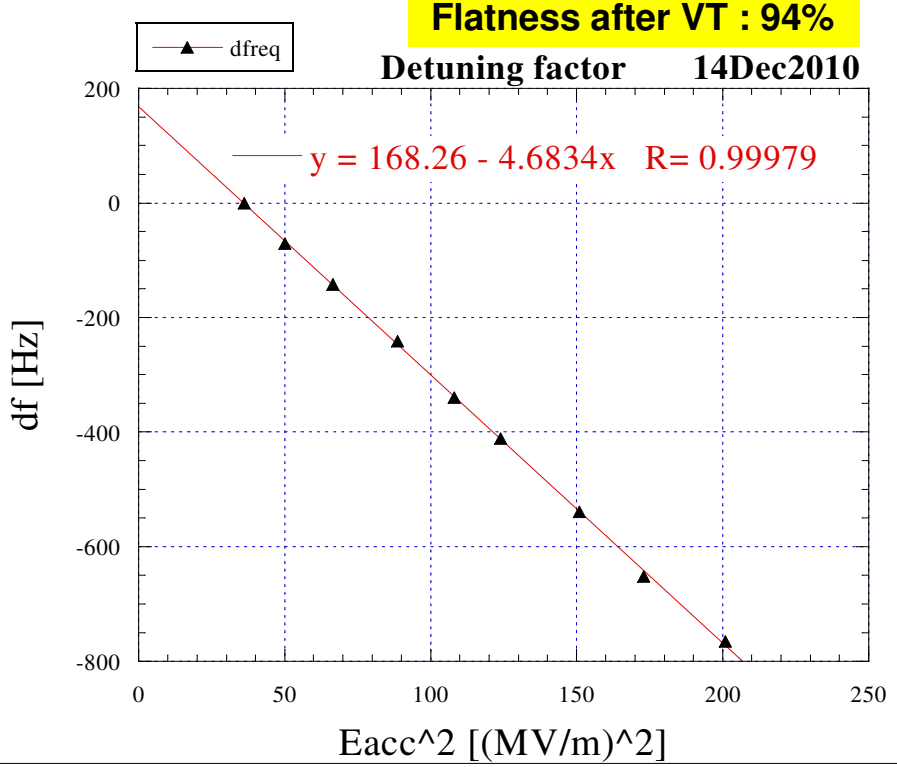
To confirm the data relaibility, cross check was done.

1. Cable correction factors. Scatter was within 1.5%.
2. Pass-band and Lorentz-detuning factor. κ=4.7, consitent.
3. Field flatness after VT, 94%.



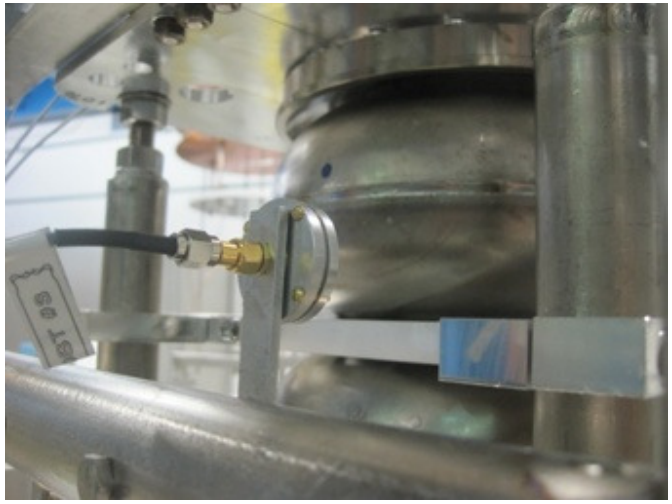
Flatness after VT : 94%

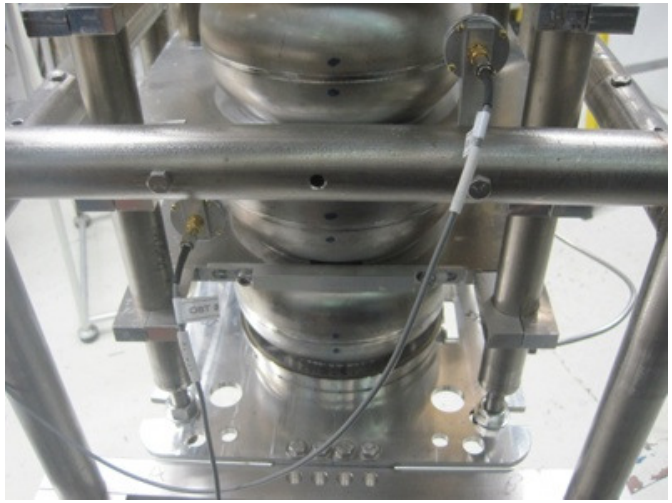




Quench location by re-test w/ OSTs

Jan. 11th 2010





8 OST sensors were put around the cavity.

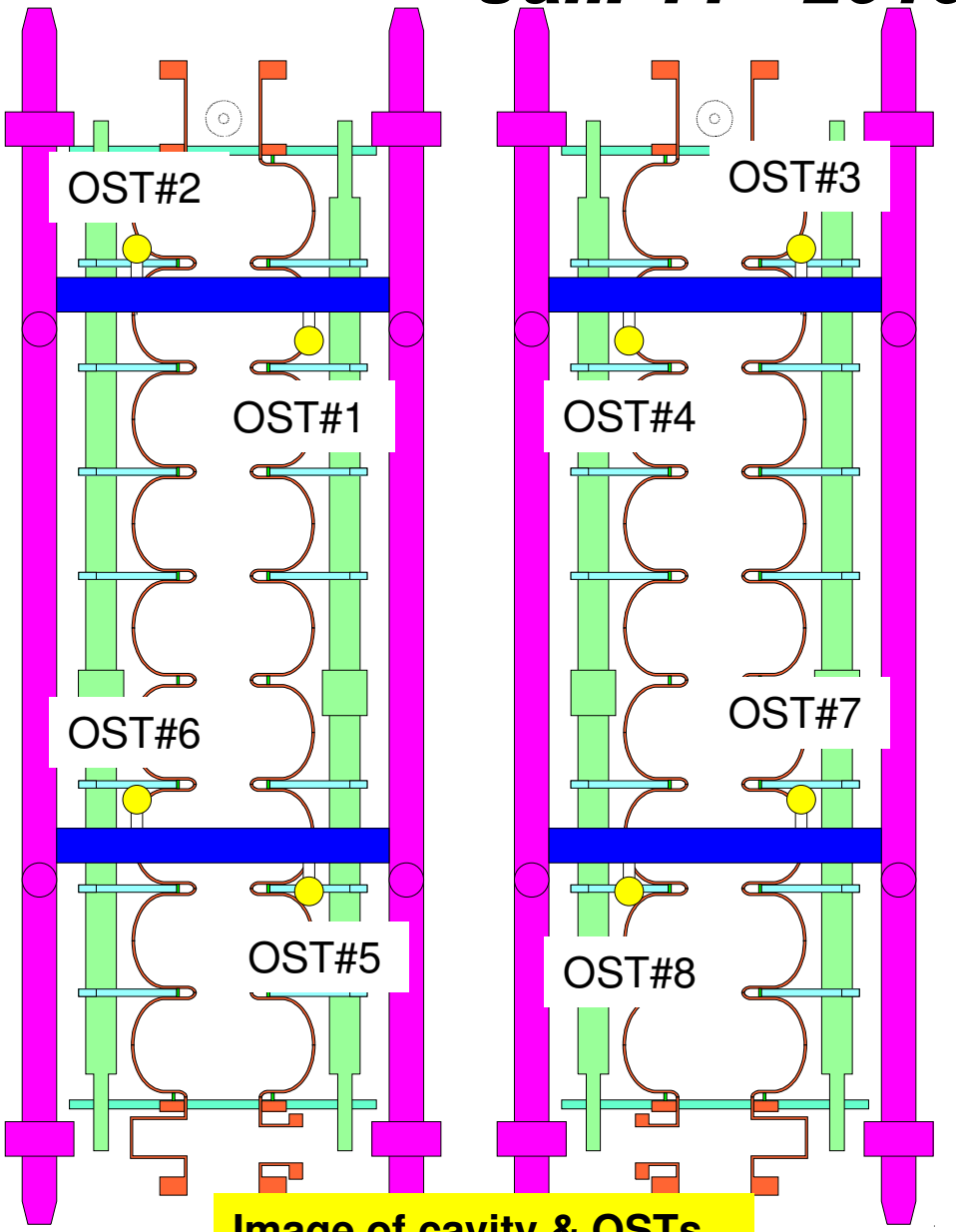
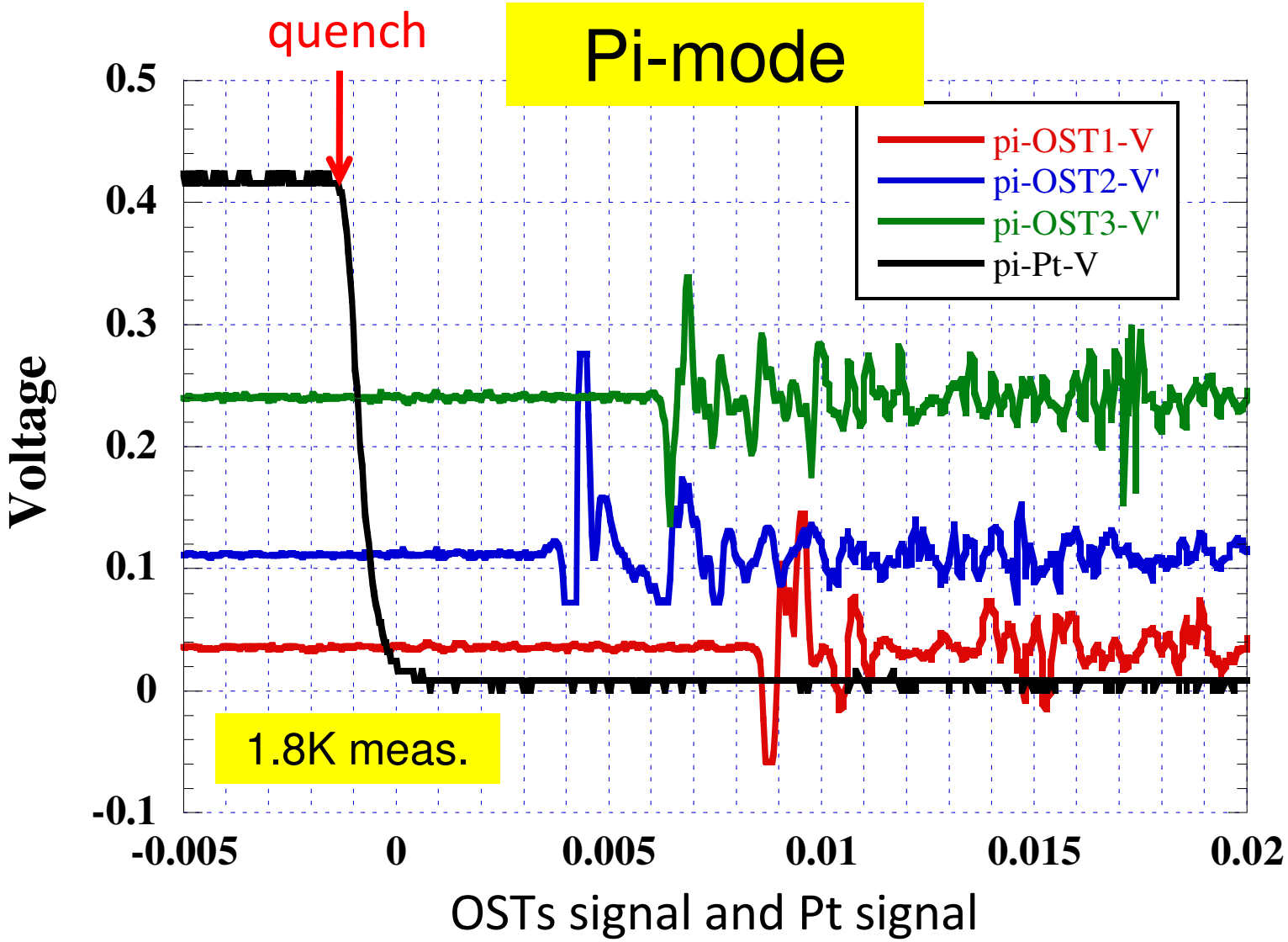


Image of cavity & OSTs

Signals from OSTs at quench @ 40MV/m

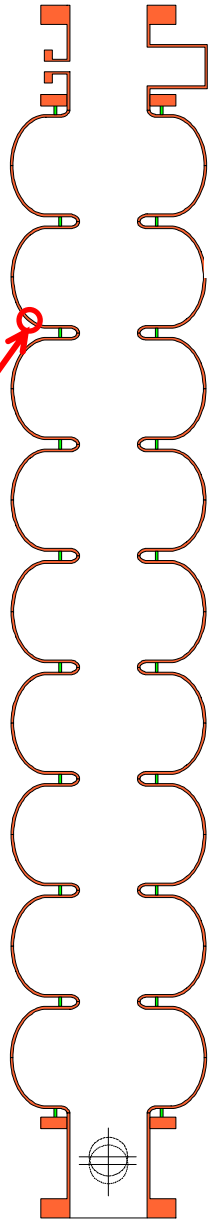
Jan. 15th 2010



OST measurment was done at 1.8K in order to reduce noises.

Quench location on the cavity by OST

Pi-mode



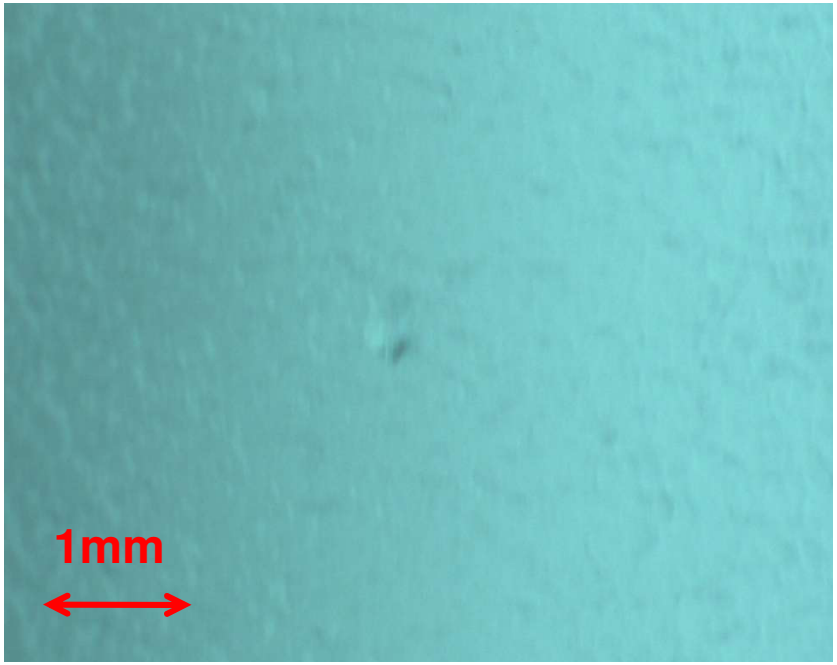
Cell#8

Jan. 19th 2010

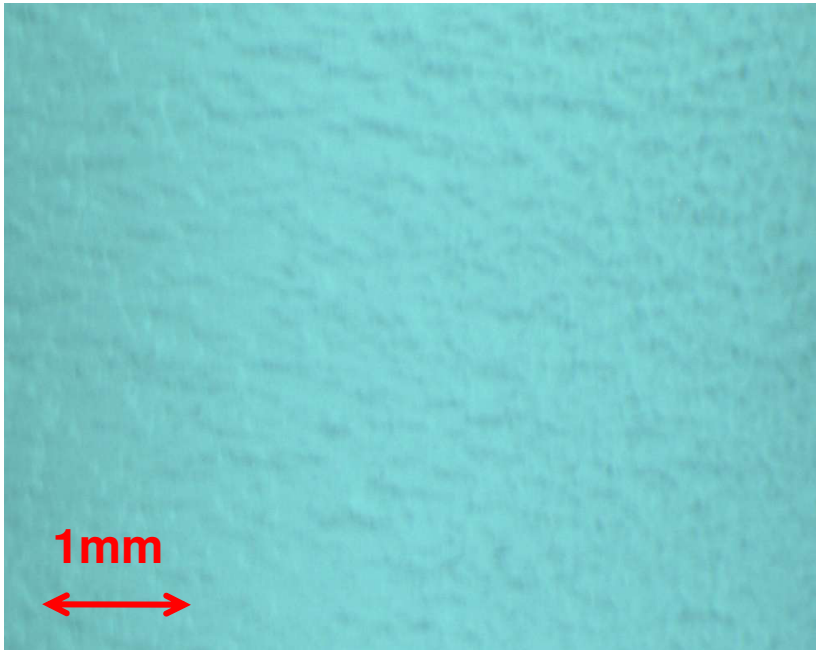
Inspection after VT

2011 Jan. 28th

Cell#8, quench location of pi-mode



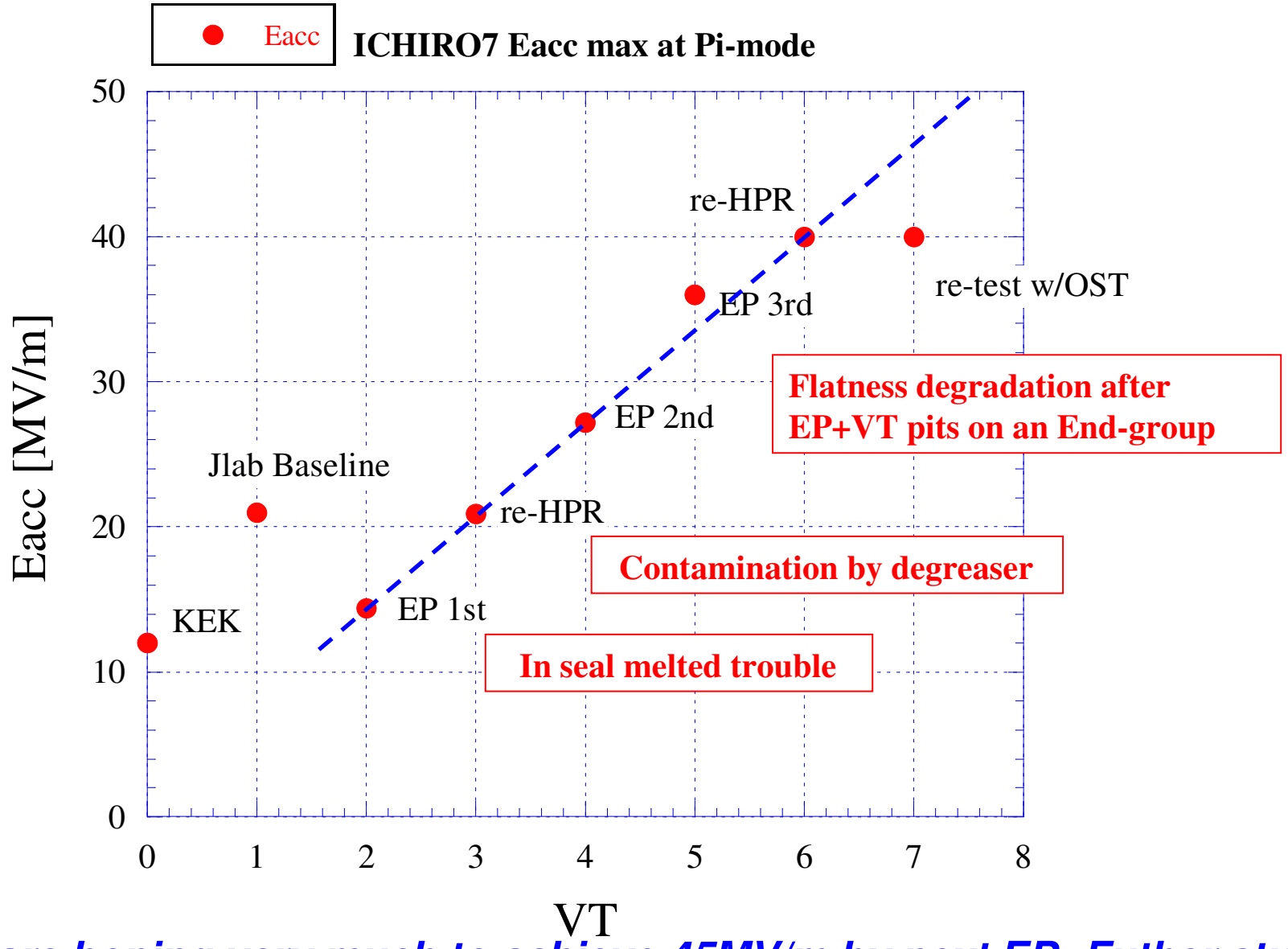
quench area at pi-mode



other area
for comparison

The deftect geometry dose not look not so serious!

ICHIRO#7 S0-study current summary



We are hoping very much to achieve 45MV/m by next EP, Futher study will be done very soon.