



Explosive Events during V.T. in KEK



Sequence of cavity process

as received from a vendor

Optical inspection

f_0 & Field flatness measurement

surface treatment (bulk EP ~ 100 μ m)

annealing

Optical inspection

pre-tuning

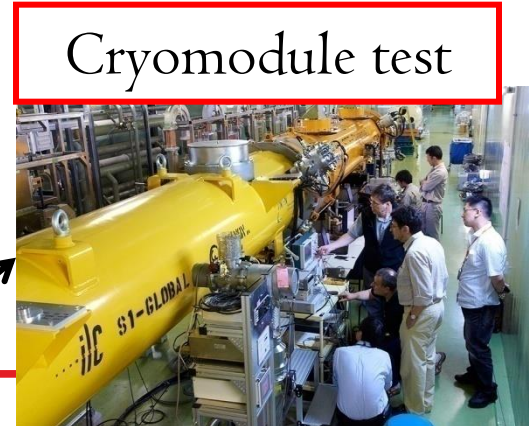
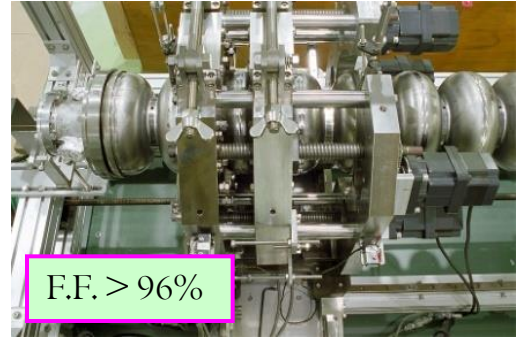
surface treatment (light EP ~ 2-20 μ m, Degreasing, HPR)

failure 

success 

V.T.

Cryomodule test

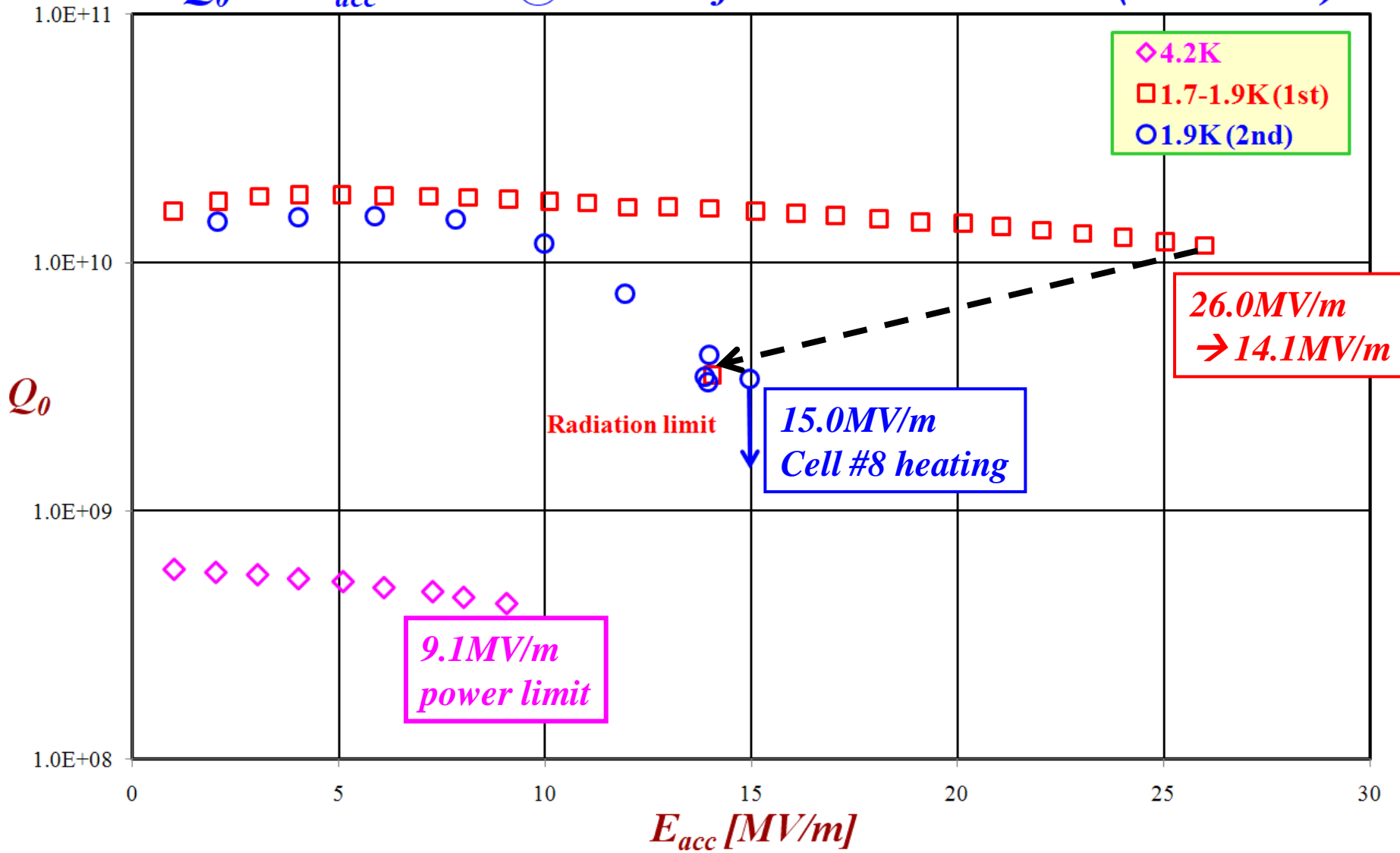




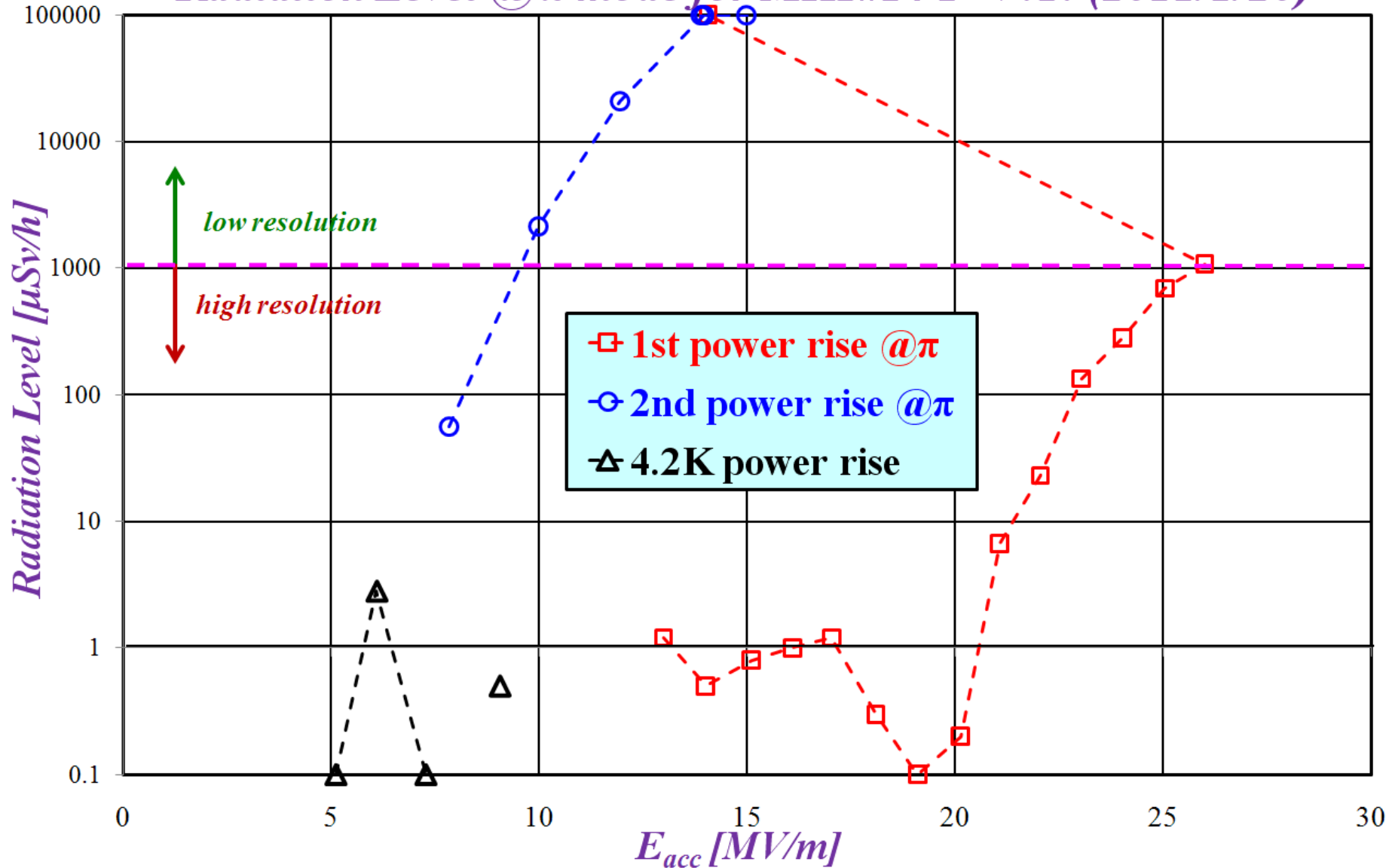
MHI-14

Q₀-E_{acc} Curve for MHI #14 @ 1.8K & 4.2K

Q₀ vs. E_{acc} Curve @ π mode for MHI#14 1st V.T. (2011/1/20)



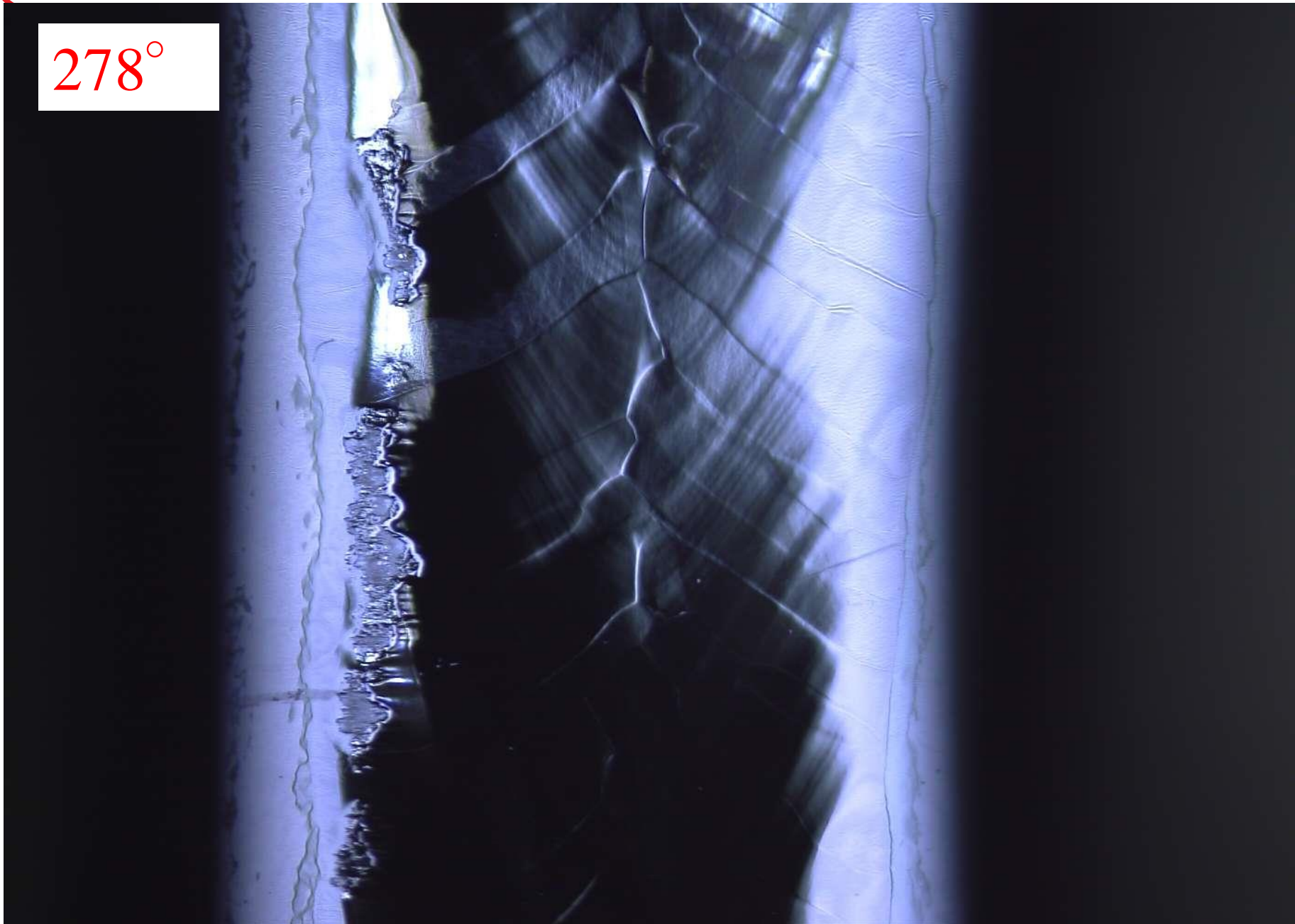
Radiation Level @ π mode for MHI#14 1st V.T. (2011/1/20)





Iris between Cell#8-#9

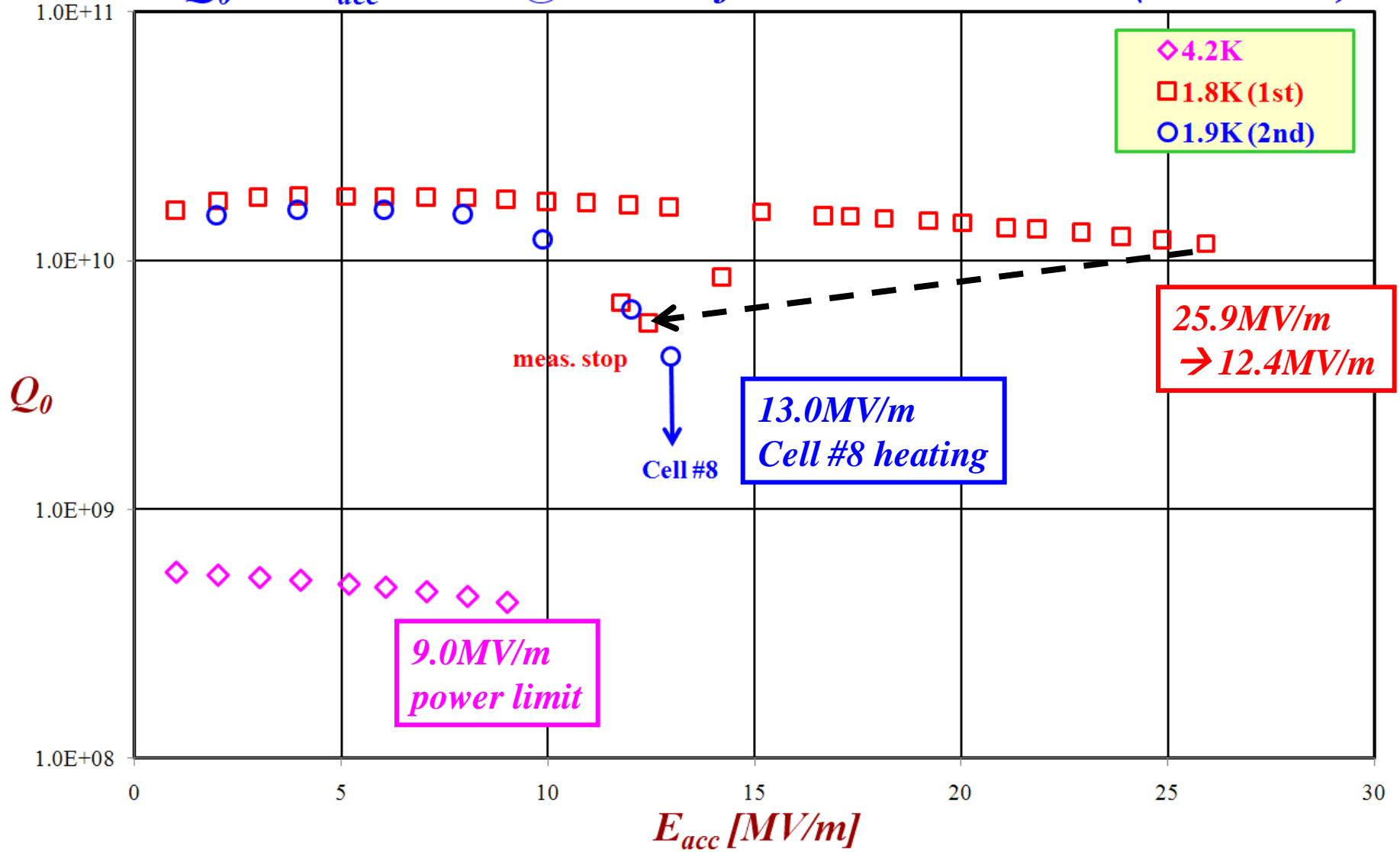
278°



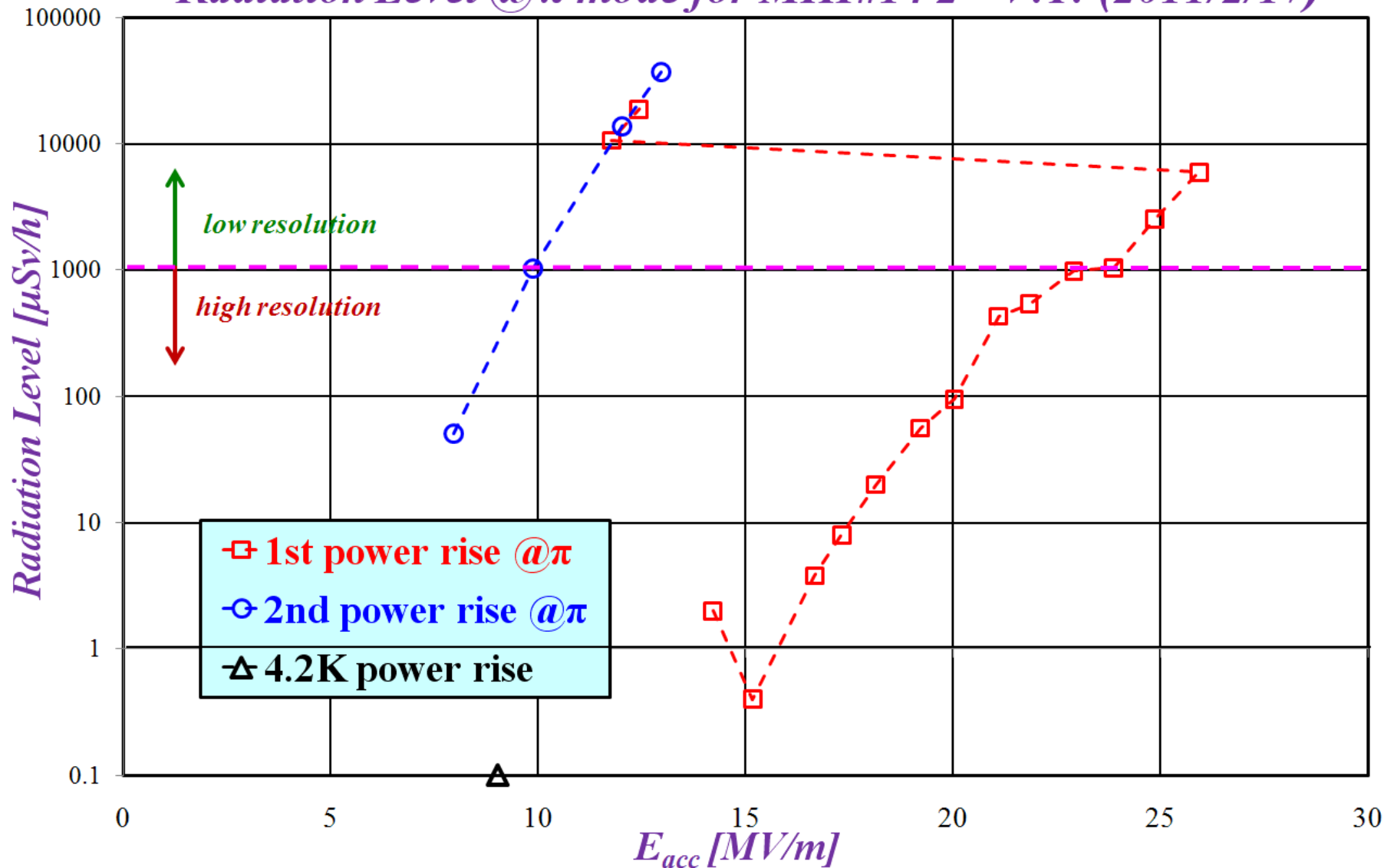


At this time, we **didn't believe** this defect was problematic. Then, we did the same surface treatment, not local grinding.

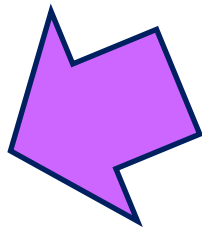
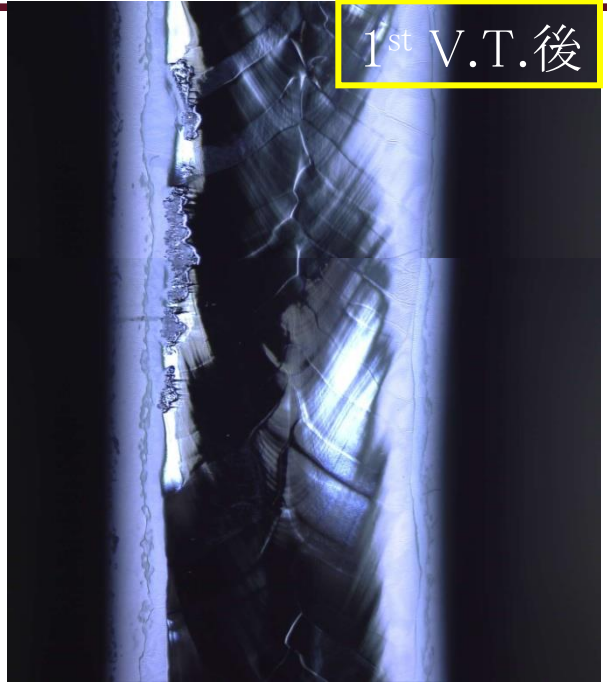
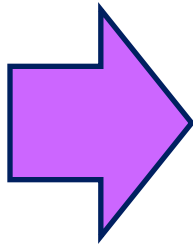

 Q_0 - E_{acc} Curve for MHI #14 @ 1.8K & 4.2K
 Q_0 vs. E_{acc} Curve @ π mode for MHI#14 2nd V.T. (2011/2/17)



Radiation Level @ π mode for MHI#14 2nd V.T. (2011/2/17)



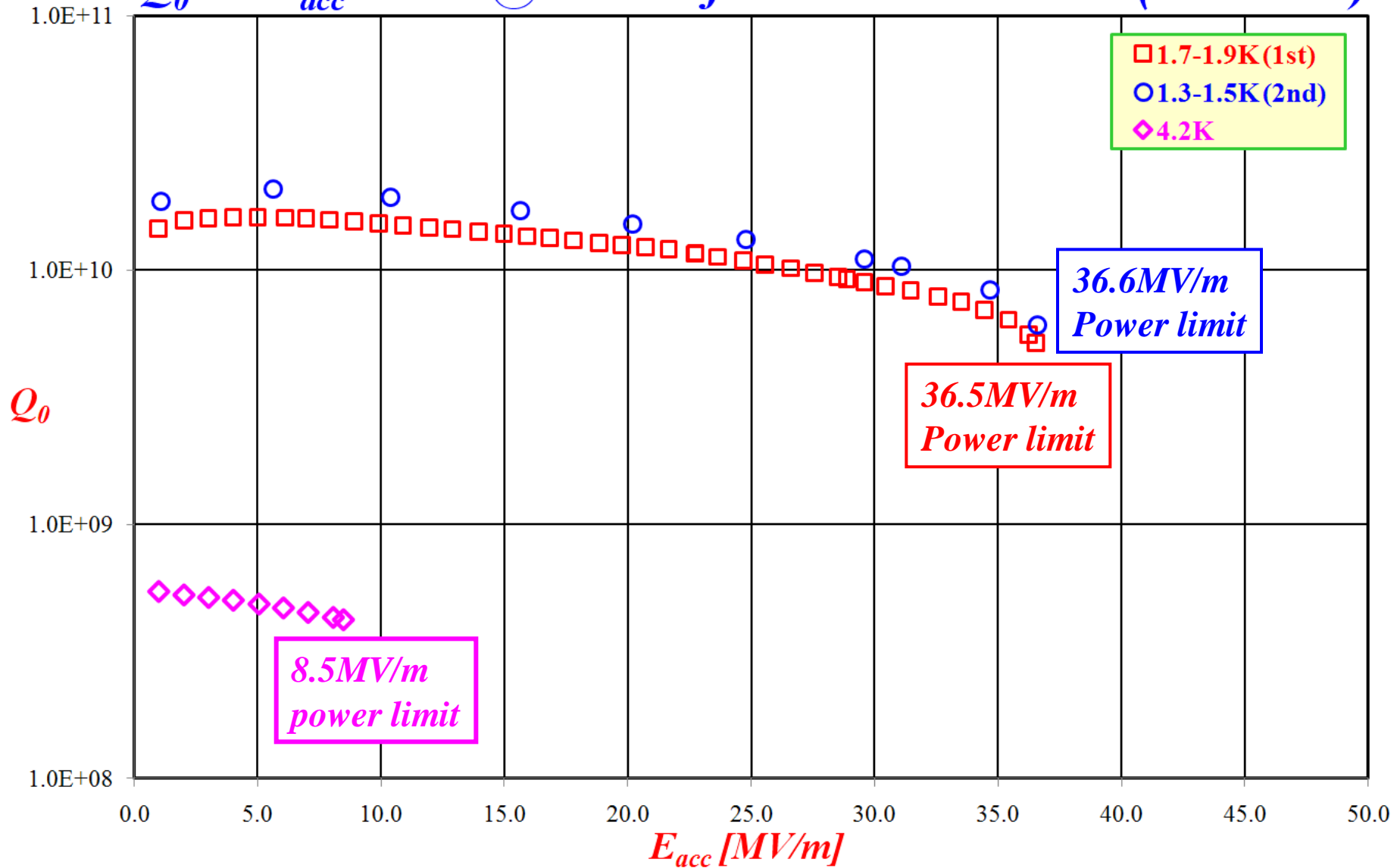
History of Iris 280° between Cell#8-#9





At this time, we **believe** this defect was problematic.
Then, we did the local grinding for the removal.

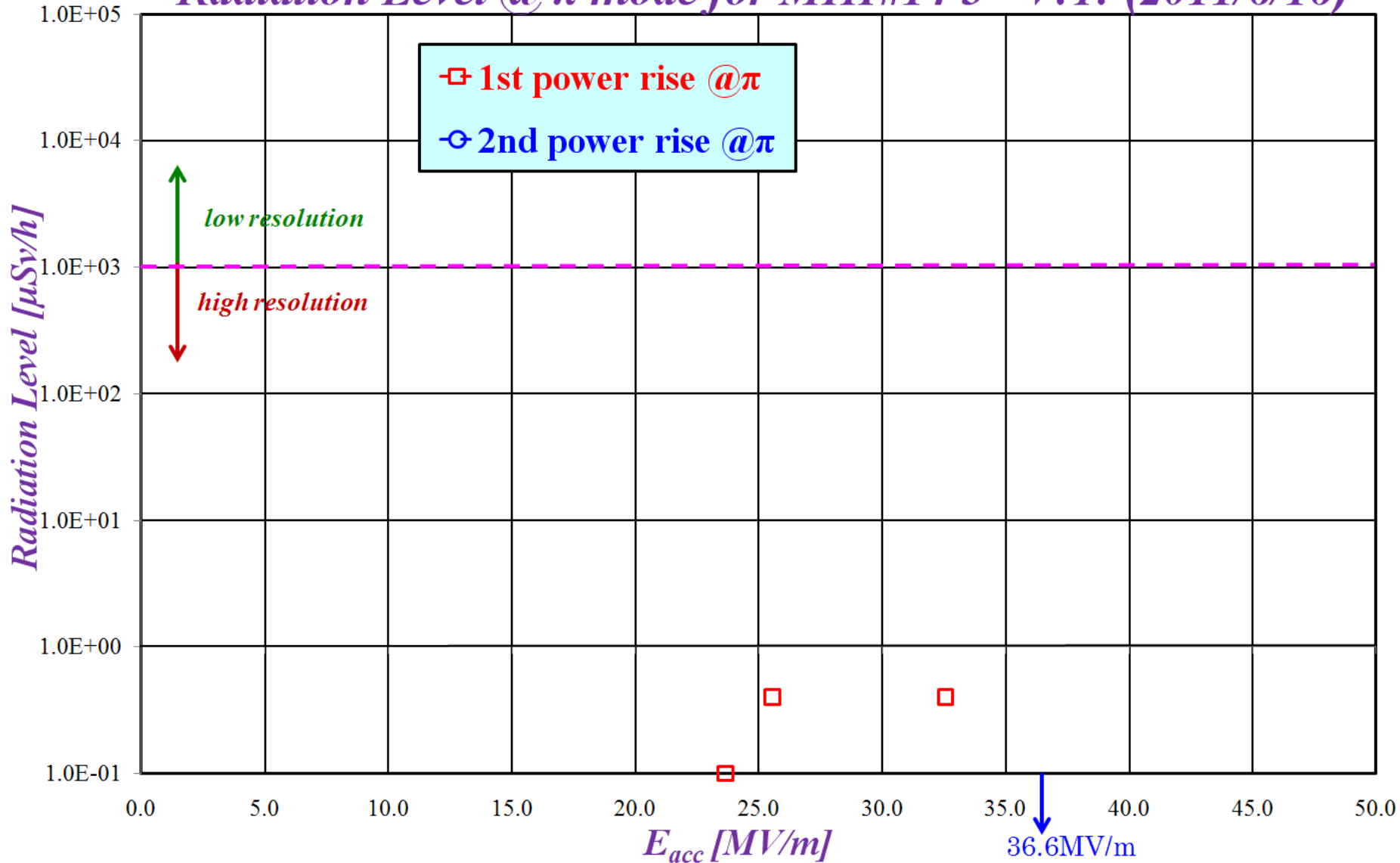

 Q_0 - E_{acc} Curve for MHI #14 @ 1.8K & 4.2K
 Q_0 vs. E_{acc} Curve @ π mode for MHI#14 3rd V.T. (2011/6/16)





Radiation Level in π mode measurement @2K

Radiation Level @ π mode for MHI#14 3rd V.T. (2011/6/16)





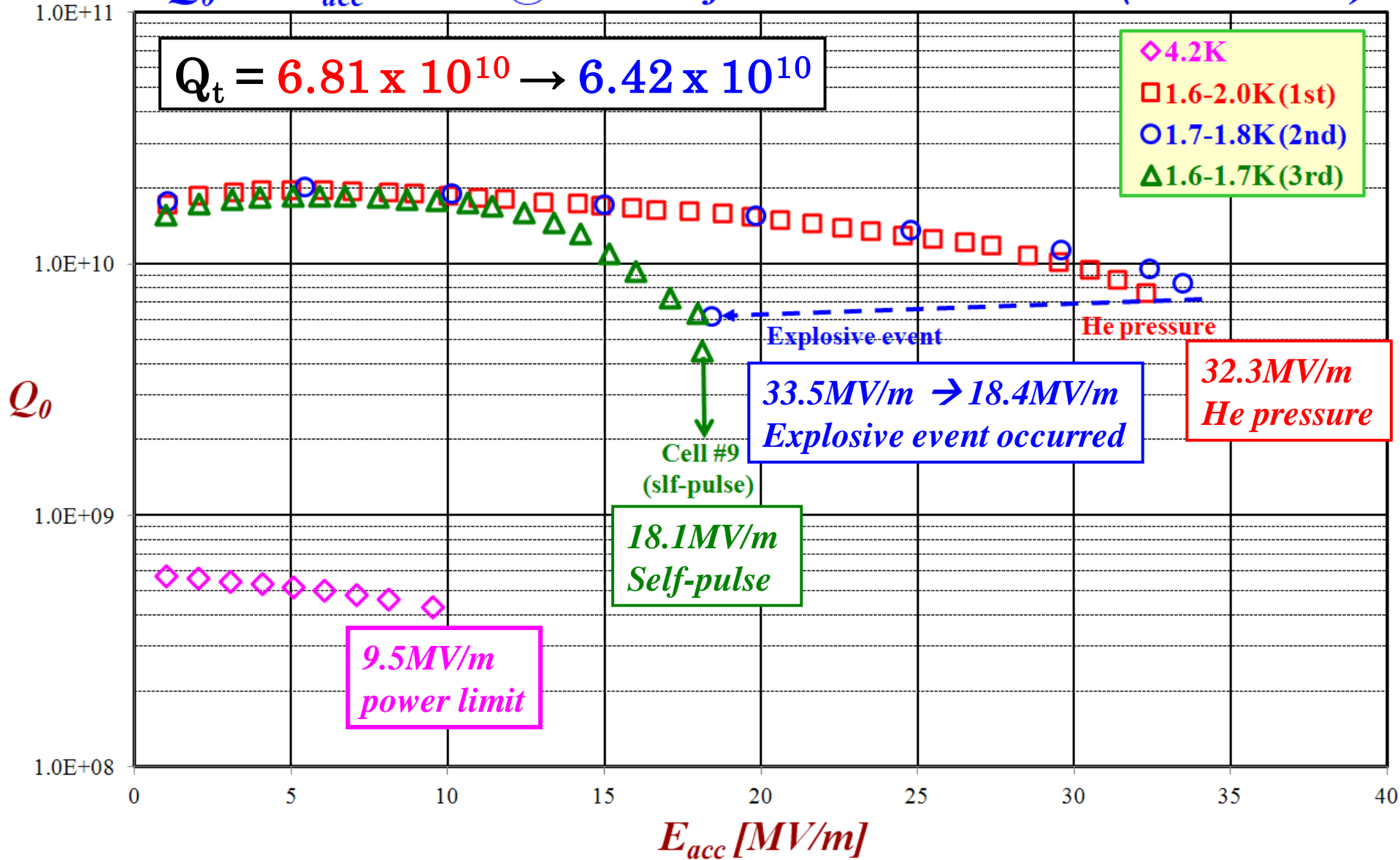
MHI-15

Q₀-E_{acc} Curve for MHI #15 @ 1.8K & 4.2K

Q₀ vs. E_{acc} Curve @ π mode for MHI#15 3rd V.T. (2011/12/21)

$Q_t = 6.81 \times 10^{10} \rightarrow 6.42 \times 10^{10}$

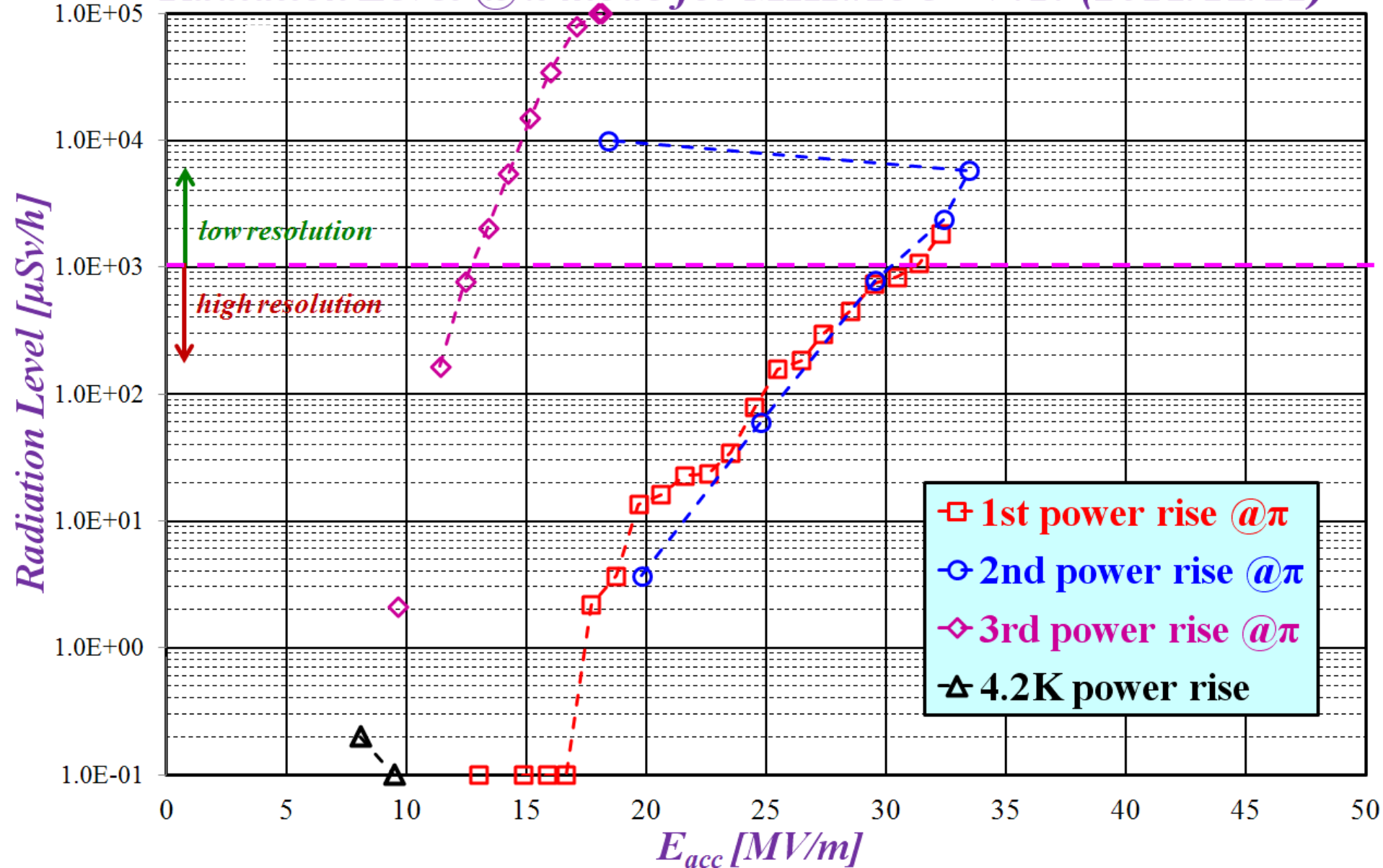
- ◇ 4.2K
- 1.6-2.0K (1st)
- 1.7-1.8K (2nd)
- △ 1.6-1.7K (3rd)





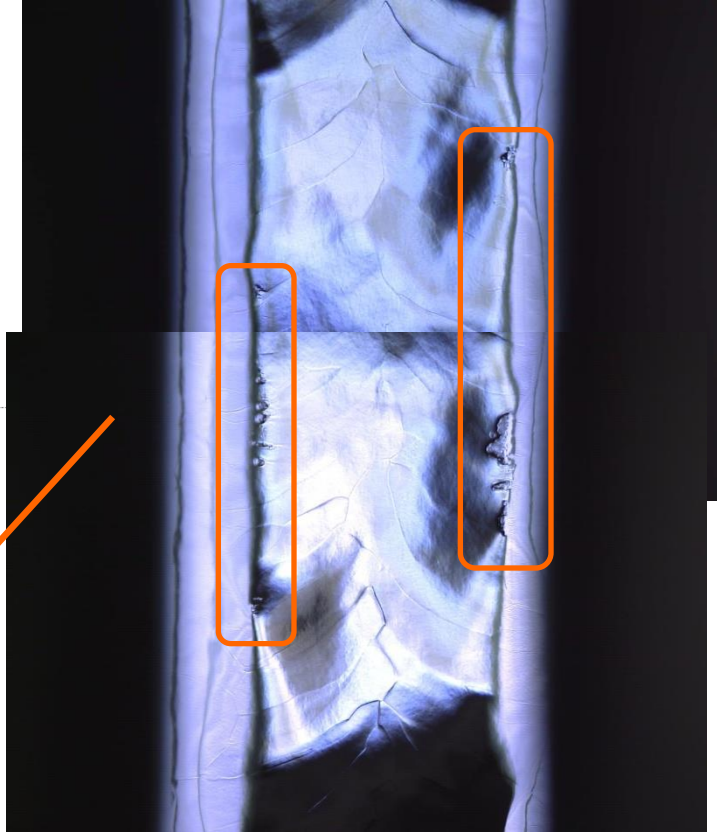
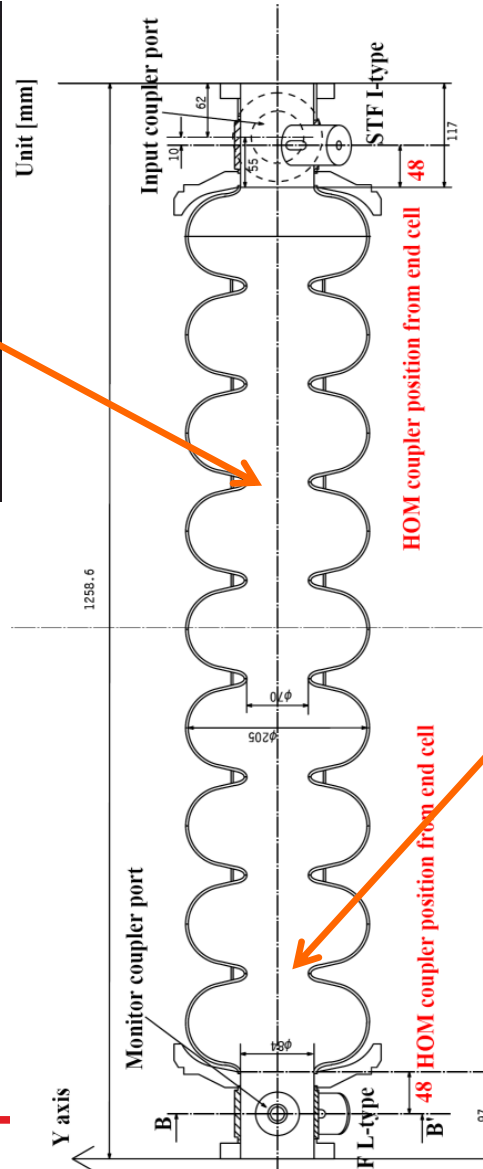
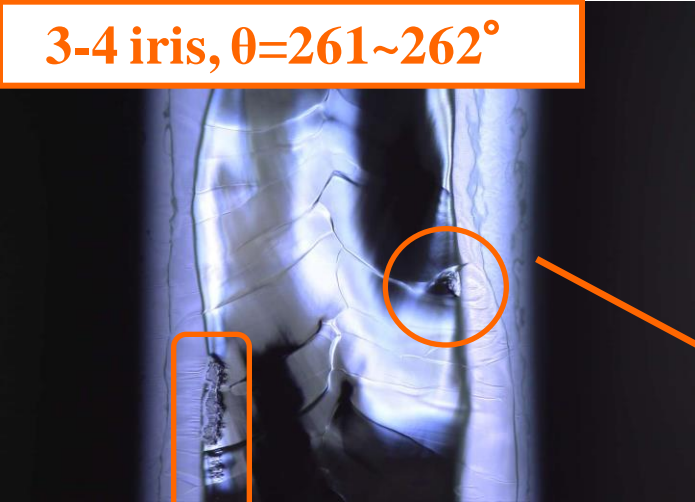
Radiation Level in π mode measurement @2K

Radiation Level @ π mode for MHI#15 3rd V.T. (2011/12/21)





3-4 iris, $\theta=261\sim 262^\circ$



8-9 iris, $\theta=277\sim 286^\circ$

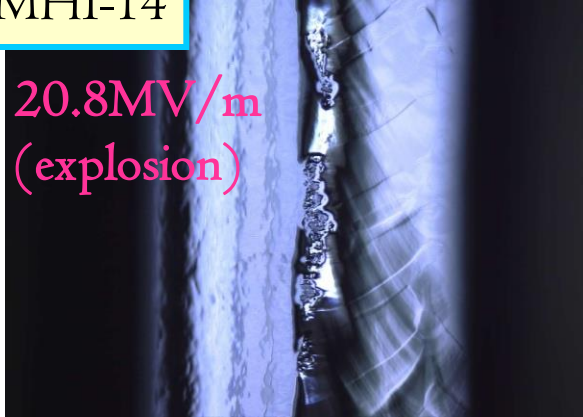


Type II: Defect on bead of Iris

MHI-06, 09, 14, 15, 18, 19, 20, 22 and HIT-02 were limited by Type II.

MHI-I4

20.8MV/m
(explosion)



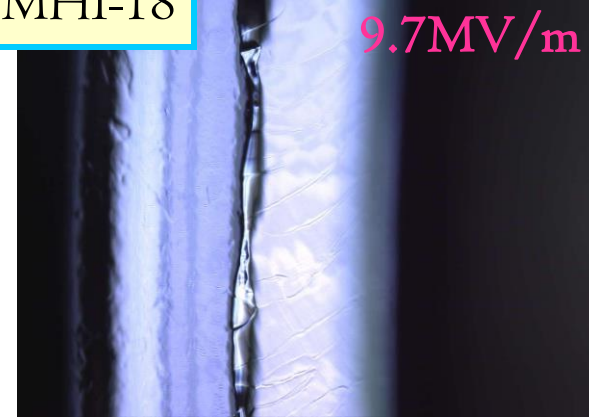
MHI-I5

18.1MV/m
(explosion)



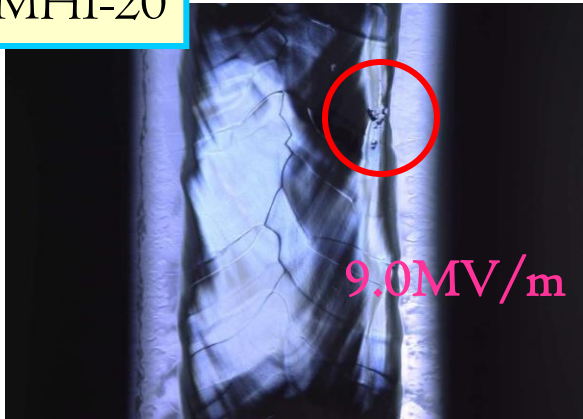
MHI-I8

9.7MV/m



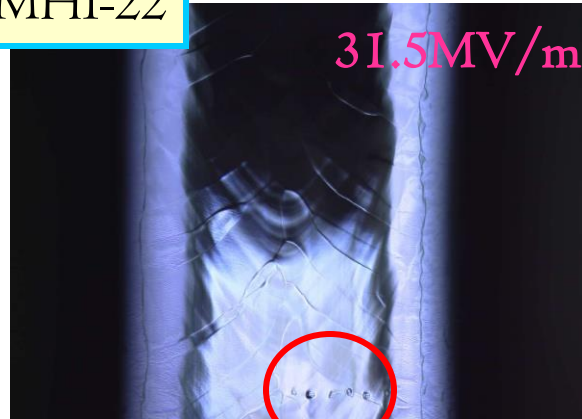
MHI-20

9.0MV/m



MHI-22

31.5MV/m



MHI-09

27.0MV/m
(explosion)



When a cavity has such a defect at iris region, the heavy field emission certainly occurs.



What is different between DESY and KEK?

- ① In KEK, only EP process is used, never BCP.
- ② Problematic defect appears suddenly after EP.
- ③ It can not be removed by only EP (HPR),
because of the mechanical structure.

I doubt the BCP as one possibility.



Thank you for your attention.