

Alignments of all beam lines

ATF survey 2012

KEK Sakae ARAKI

14th ATF2 Project Meeting

26~28th June 2012 at KEK (Shokuin-Kaikan 2F)



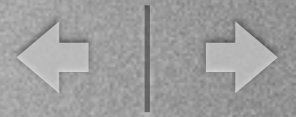
2011

- January ~ Alignment for end of BT line
- Beam operation
- East Japan great earthquake (11 Mar.)
- Test beam operation
- Recover, Survey and Alignment
- Start OP for ATF (Oct)
- Alignment for EXT/FF (Nov)



2012

- Survey for DR and Septum (January)
- Alignment for BT [new design 2012] (February)
- Survey for DR and EXT/FF (April, May)
-



contents

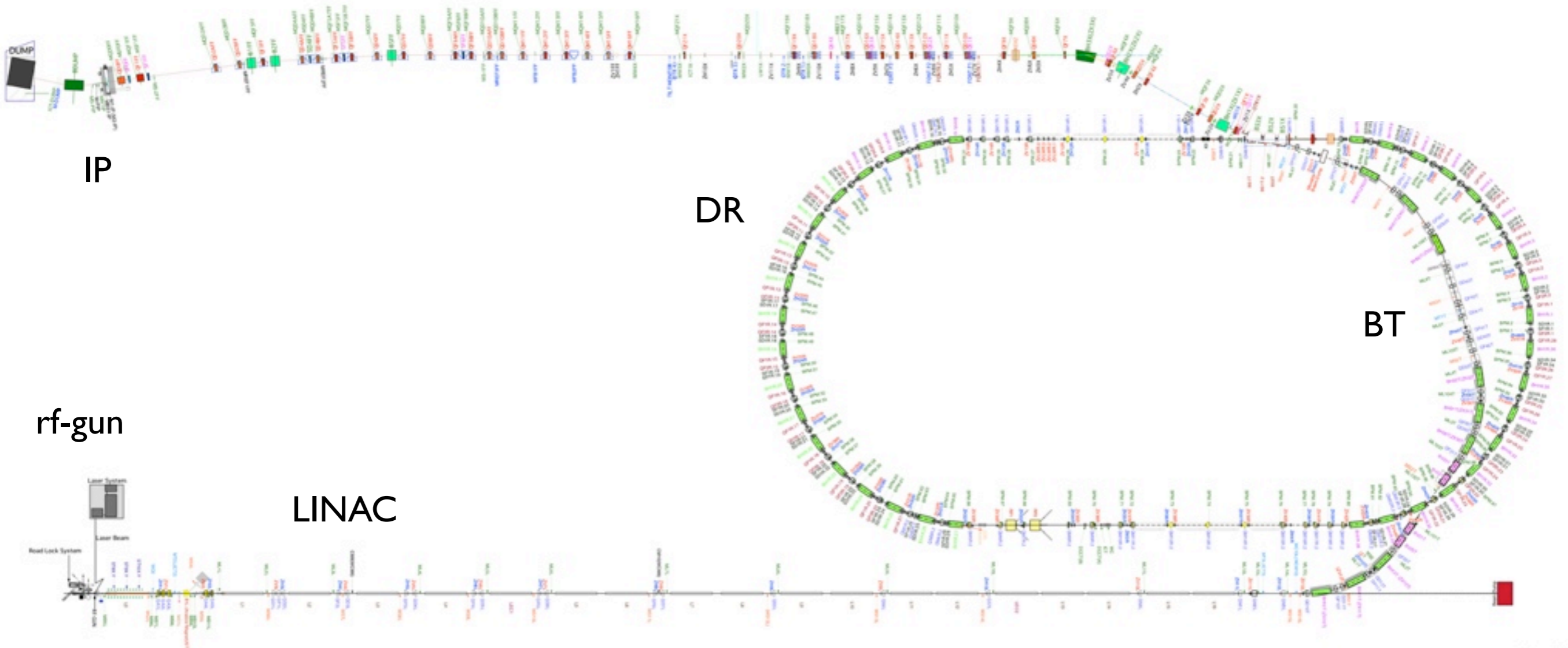
- **Linac** (not yet surveyed this year)
- **BT** (was aligned by a new design)
- **DR** (a result of a survey)
- **EXT/FF** (also a result of a survey)





ATF

EXT/FF (ATF2)



IP

DR

BT

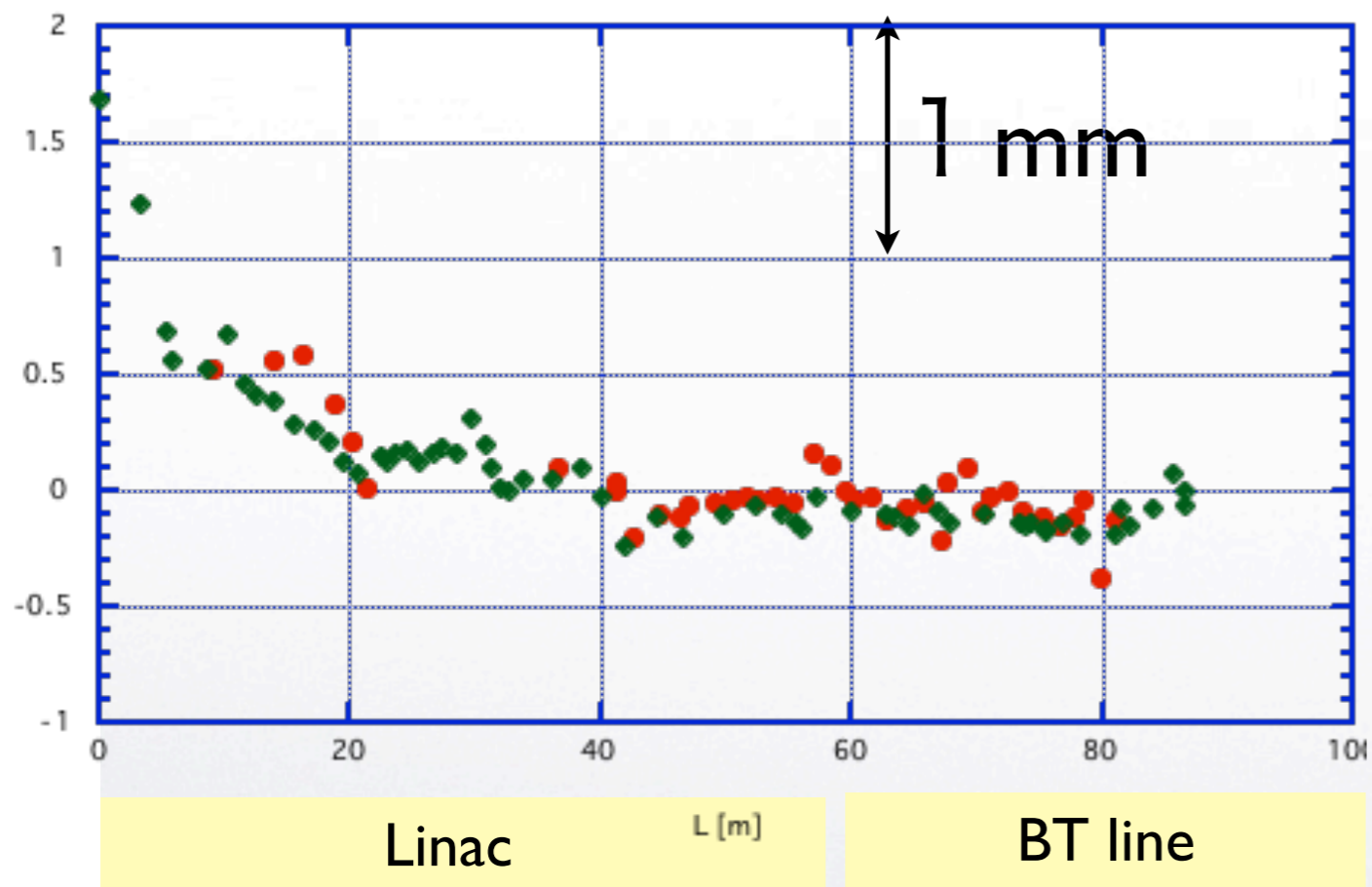
rf-gun

LINAC



LINAC (Level)

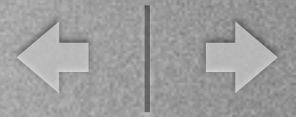
(Height)



- after alignment
Red : cavity
Green :table reference
- 1 mm of Linac downstream parts were raised.
- It tied downstream smoothly from the upper stream.

(Low)

- After alignment (LaserTracker survey in May 2011)

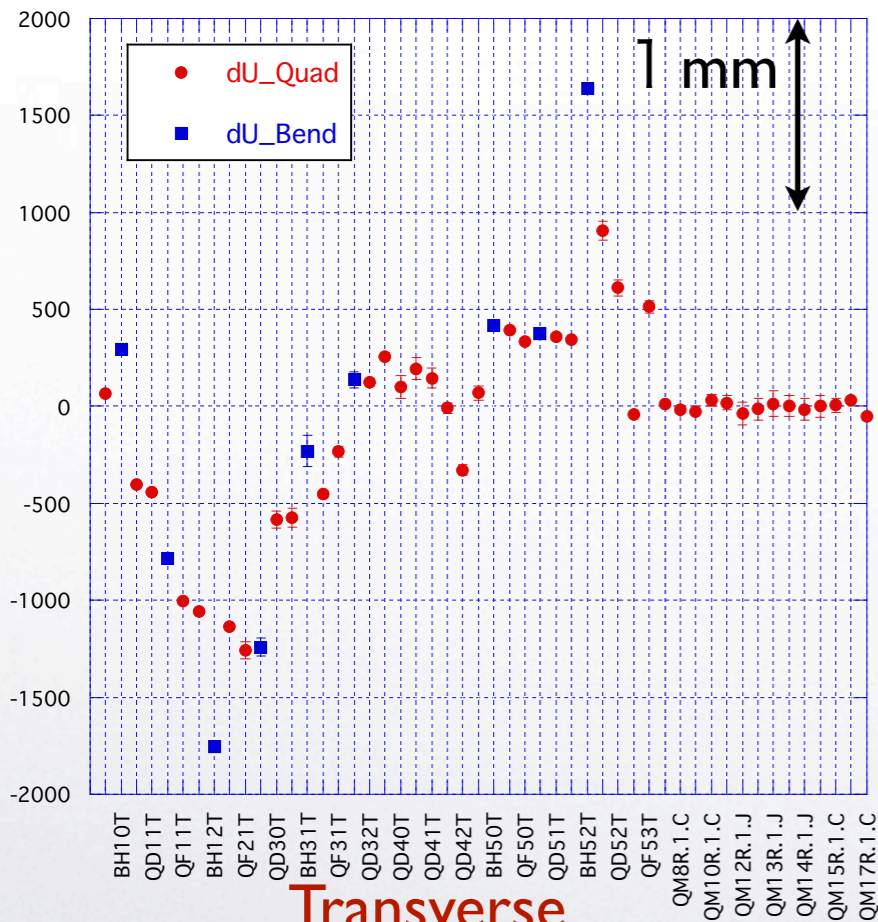


BT ruff-alignment (summer 2011)

- Deviation of Magnets

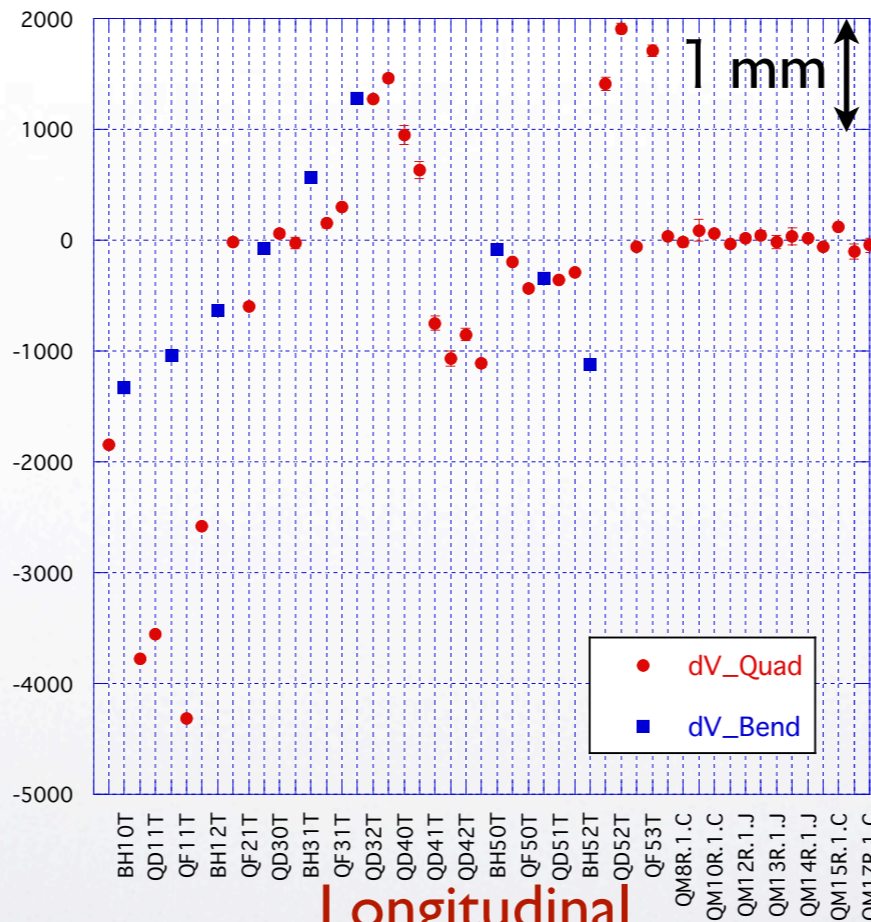
This picture is already shown last

BT



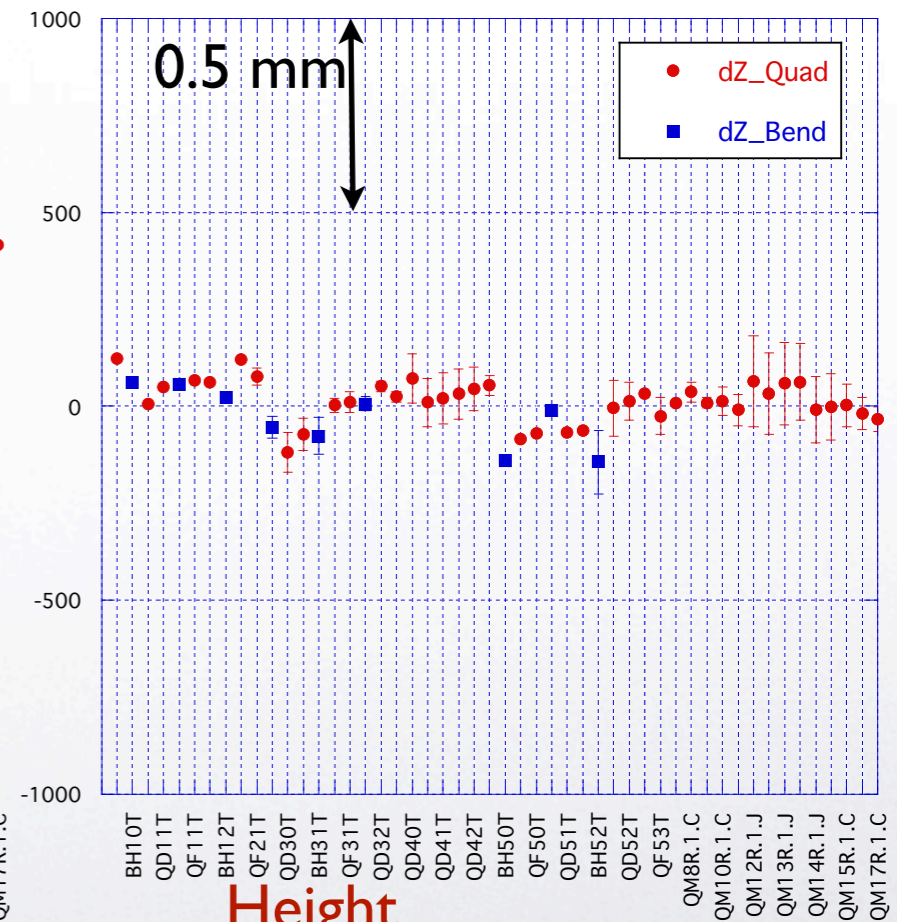
Transverse

BT



Longitudinal

BT



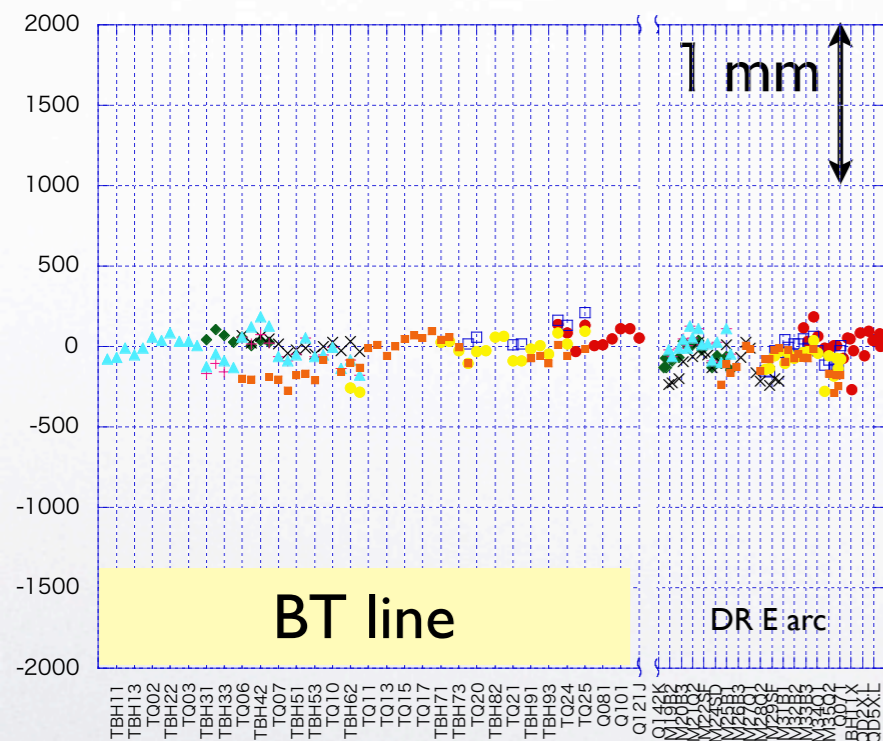
Height

[ID] Survey result in December by new BT design

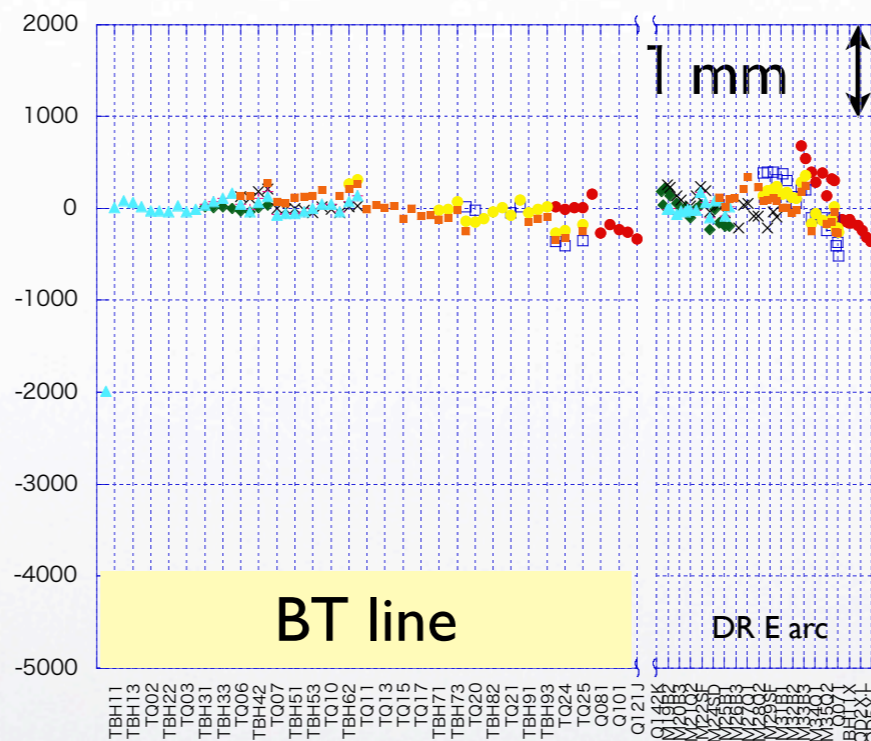


BT alignment (Feb~March '12)

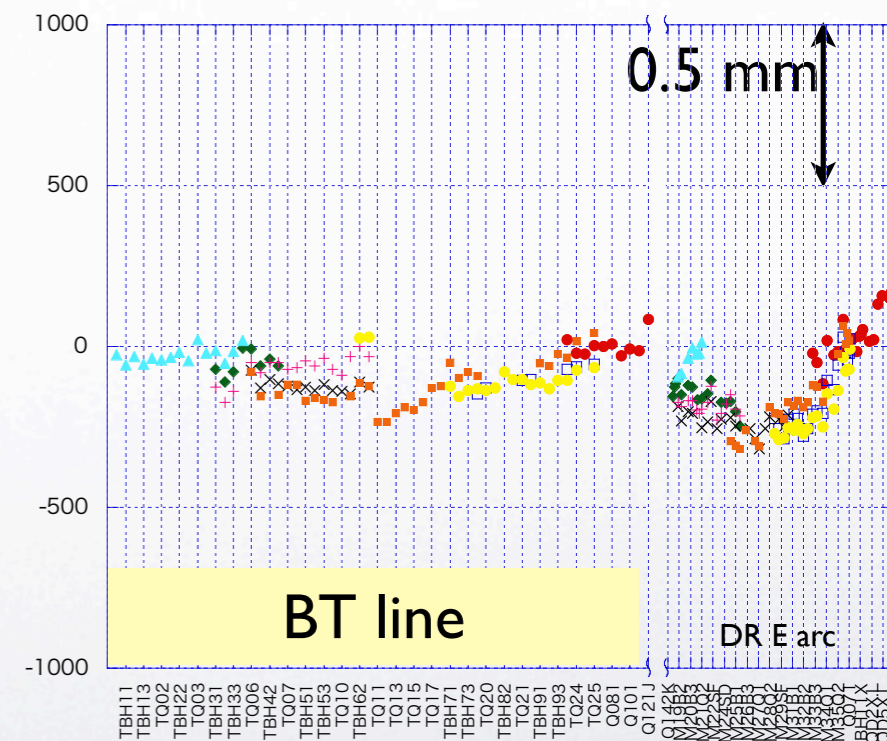
- Deviation of Magnets
- Longitudinal value has a 0.5mm FIT error for DR.
- Change is seen by Z value. (DR)
- Seasonal variation ??



Transverse



Longitudinal



Height

[ID] Alignment result in December by new BT design

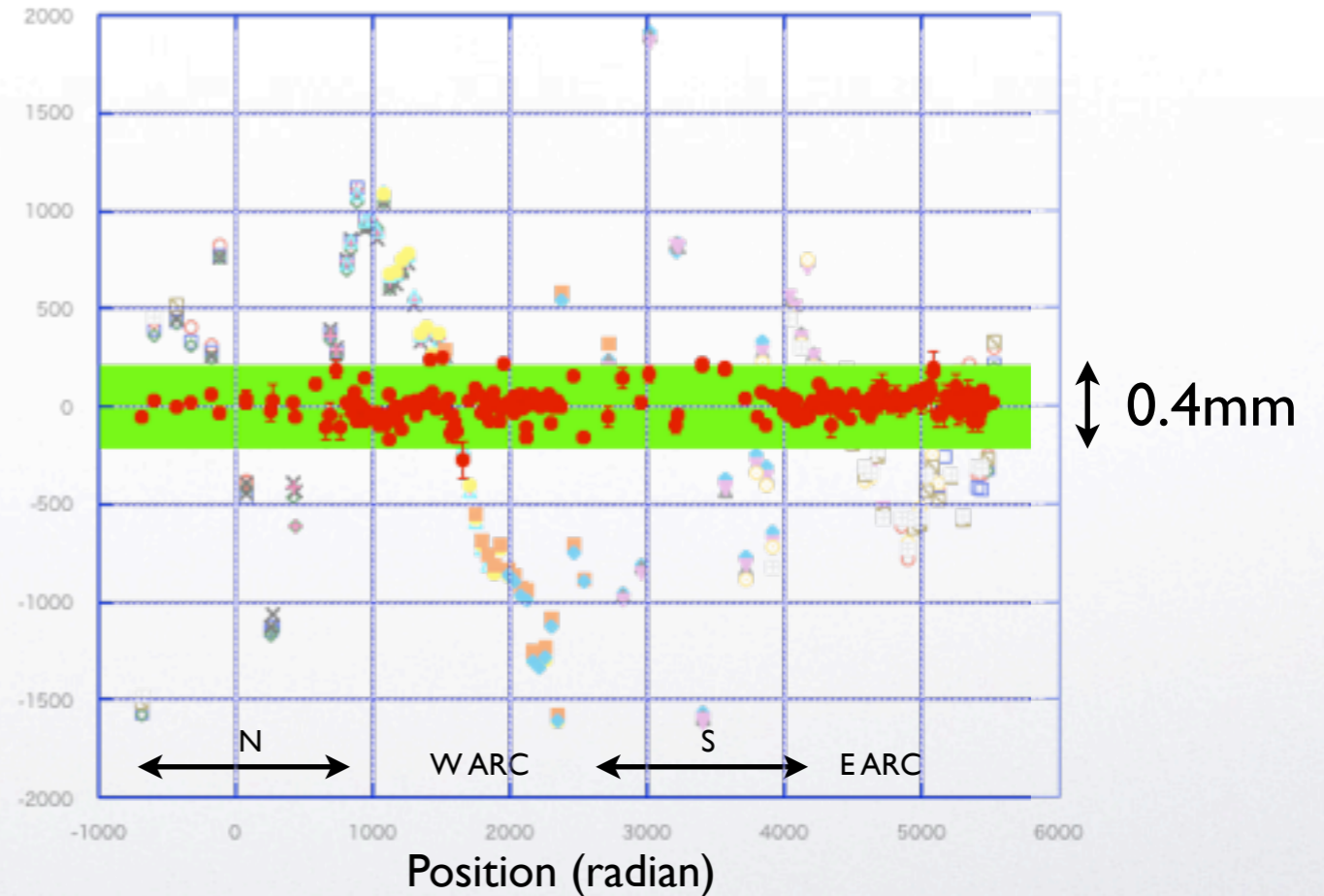
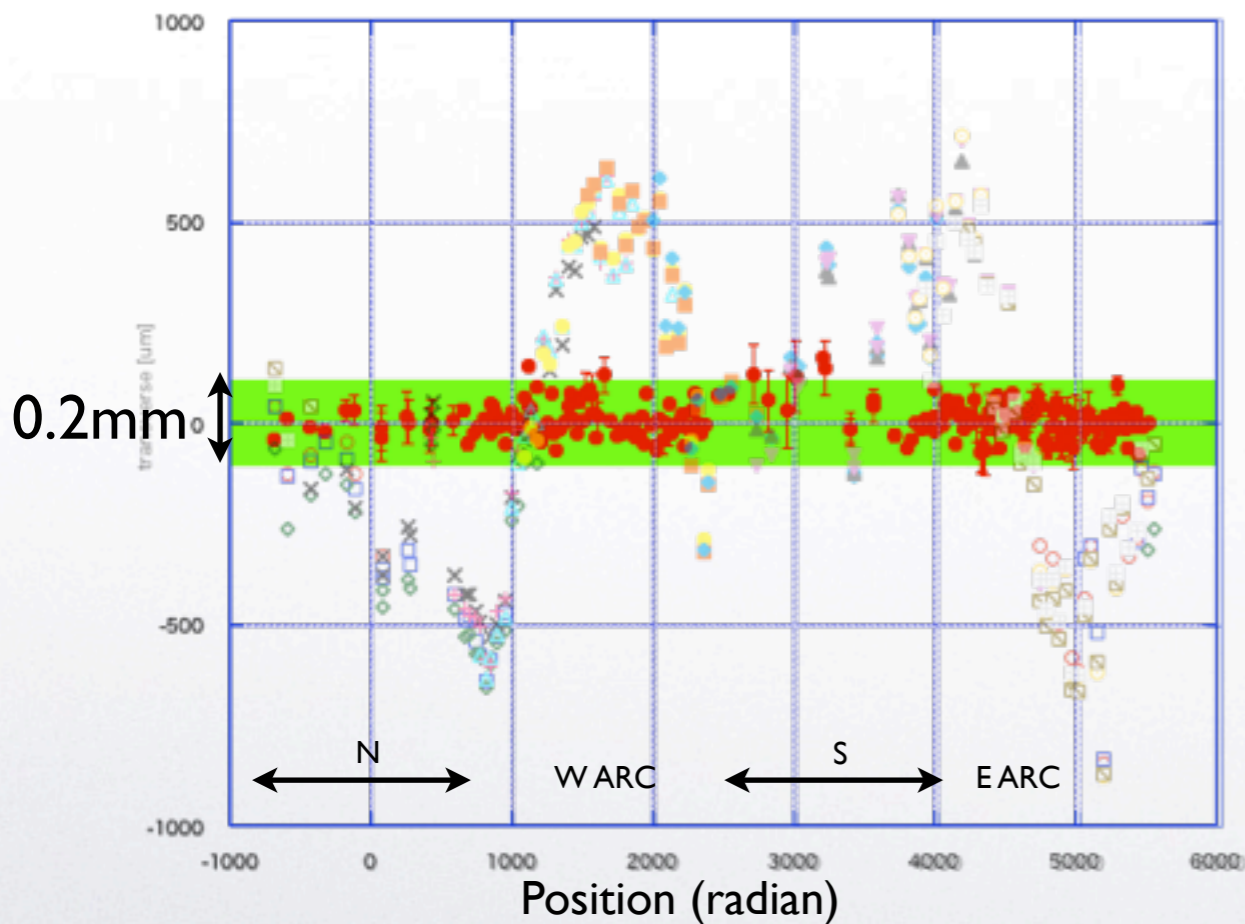


DR survey

- after alignment (september)
This picture is already shown last time.

Perpendicular to the beam (動径方向)

Along the beam (ビーム方向)



• Transverse +/- 0.15mm

• Longitudinal +/- 0.27mm

RMS: 0.05mm

RMS: 0.08mm

DR

- DR reference POS. is area of SEPTUM
- **RED line:** alignment on September 2011
- **Green line:** no alignment shrunk in the survey in April from the SAD design.

0.5mm





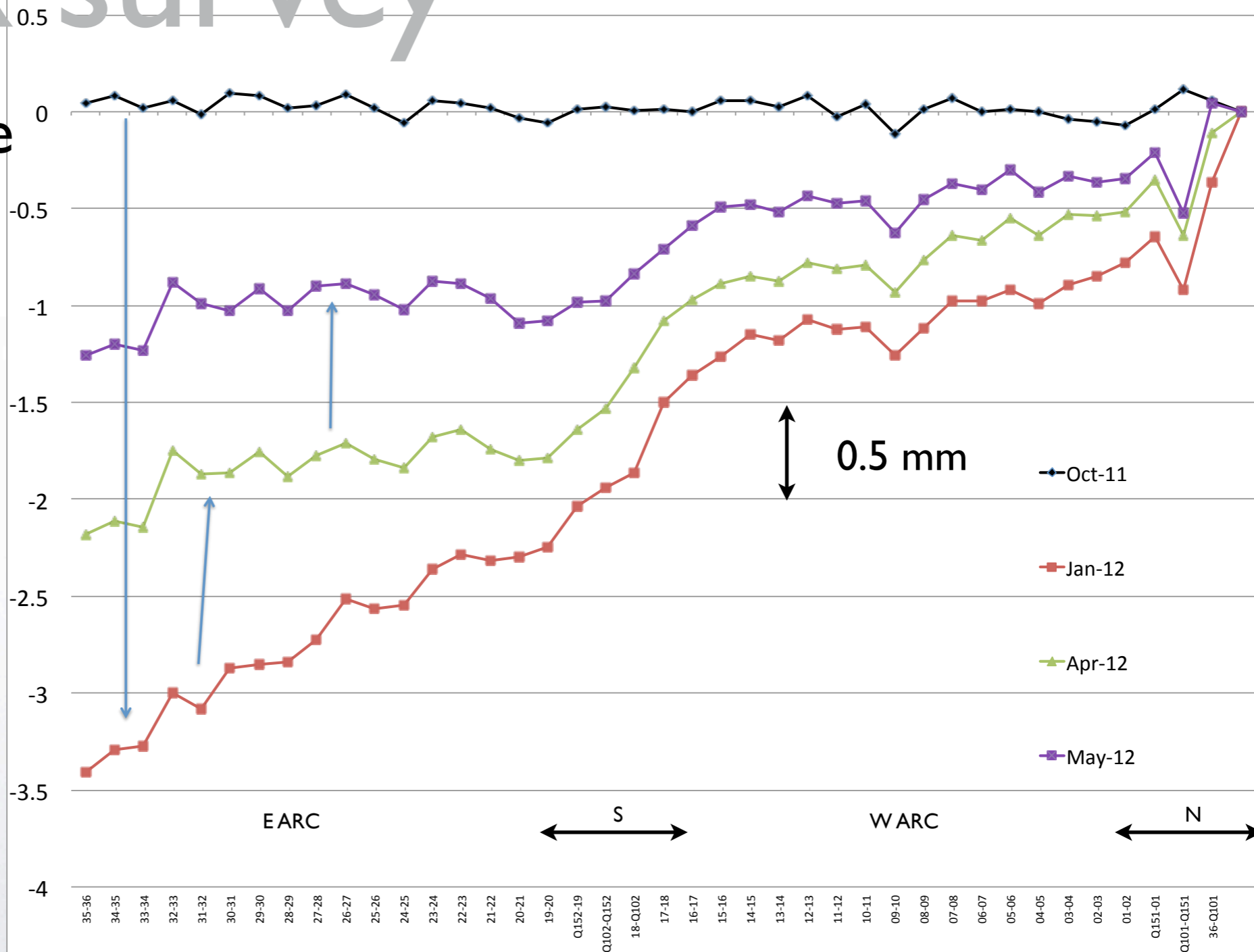
DR survey

[measurement - design] Δ distance sum

● circumference

(Bend to Bend distance)

- +0.1mm Oct '11
- -3.4mm Jan '12
- -2.2mm Apr '12
- -1.3mm May '12



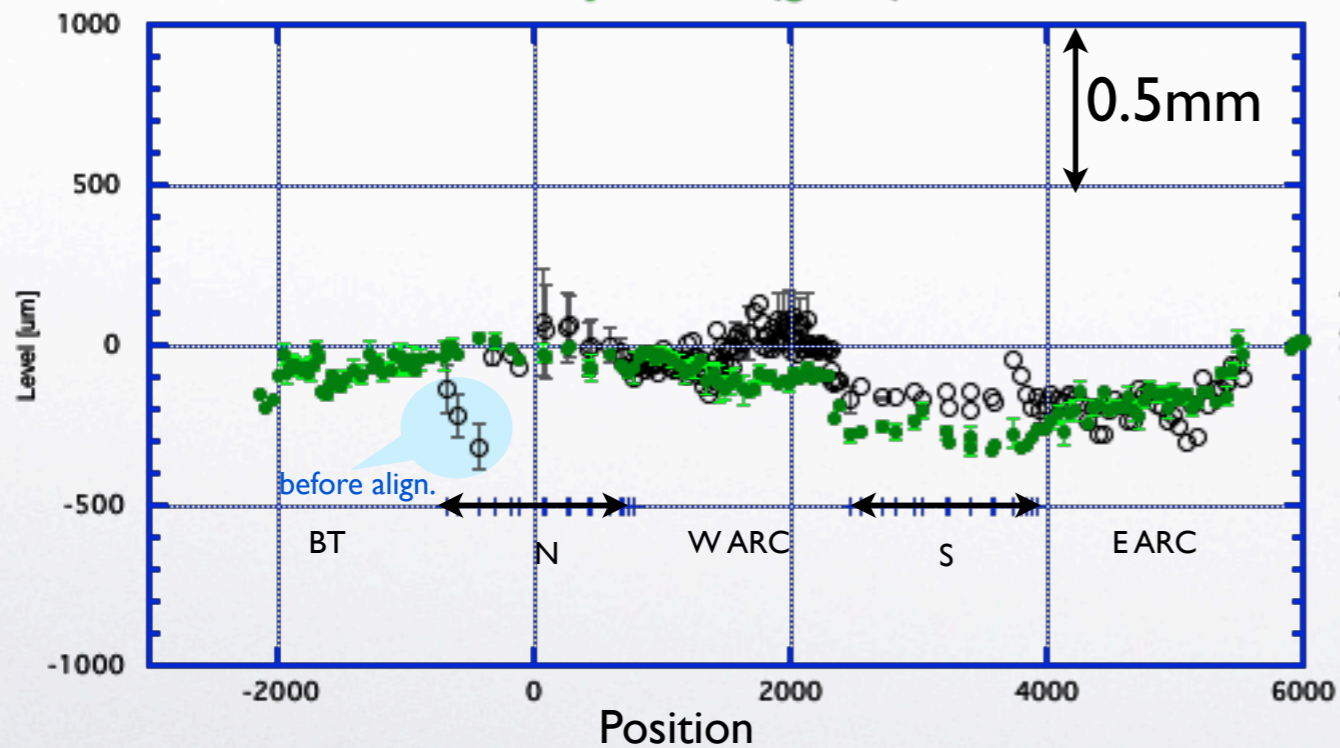


DR survey

- Vertical (Height)

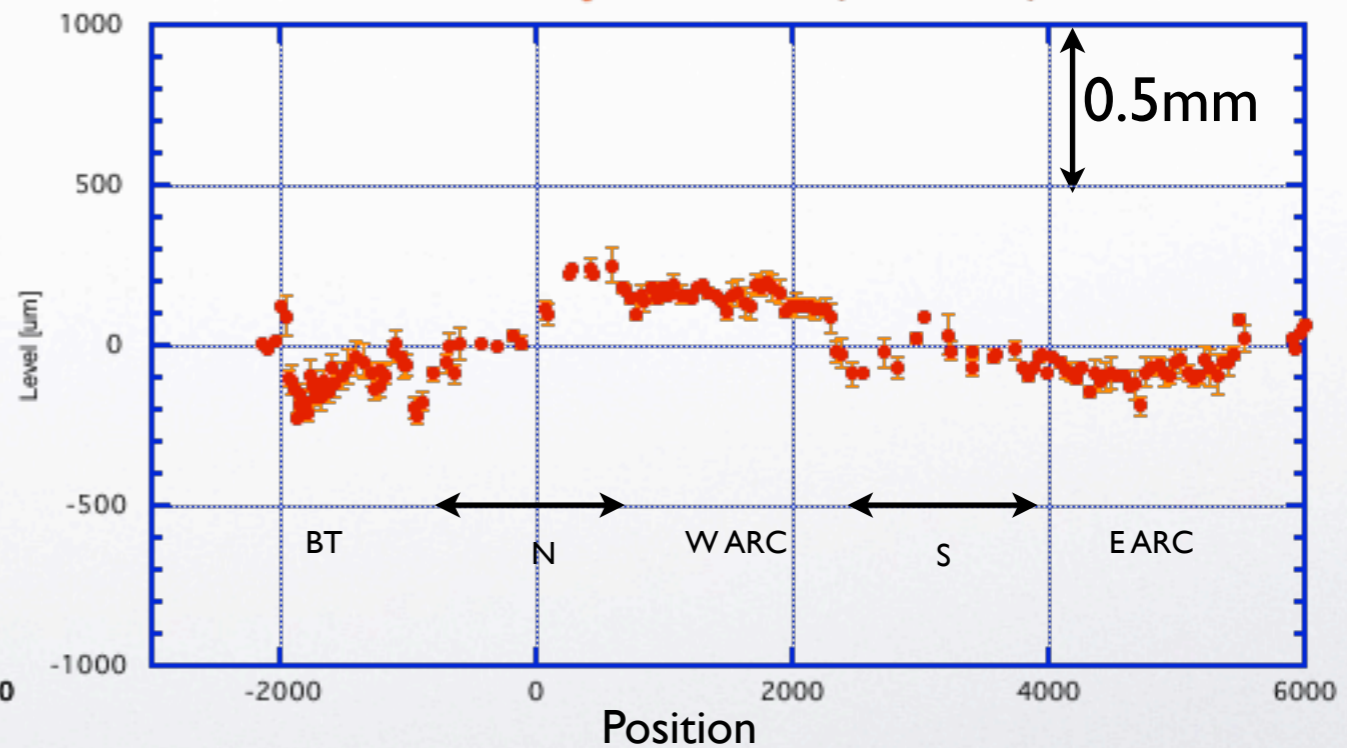
aligned in summer (2011)

survey of APR(green) 2012



- South area fell in spring?

survey of winter (JAN2012)

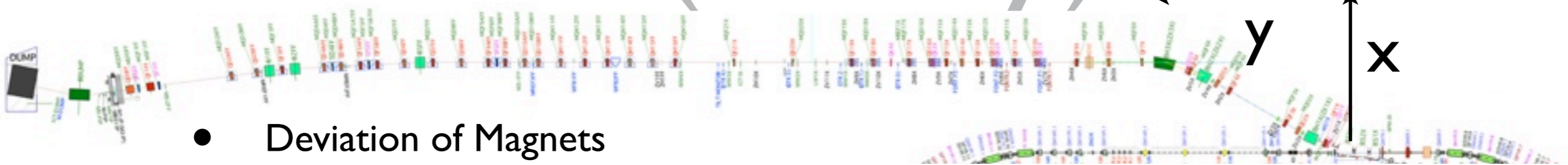


- West area went up in winter?

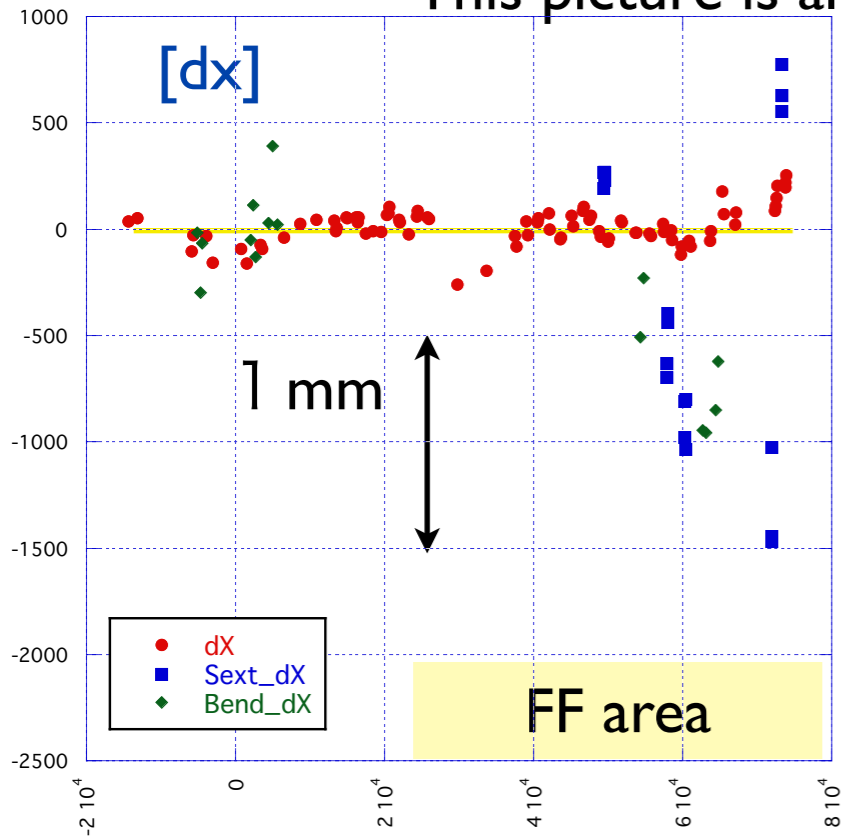


EXT/FF(survey)

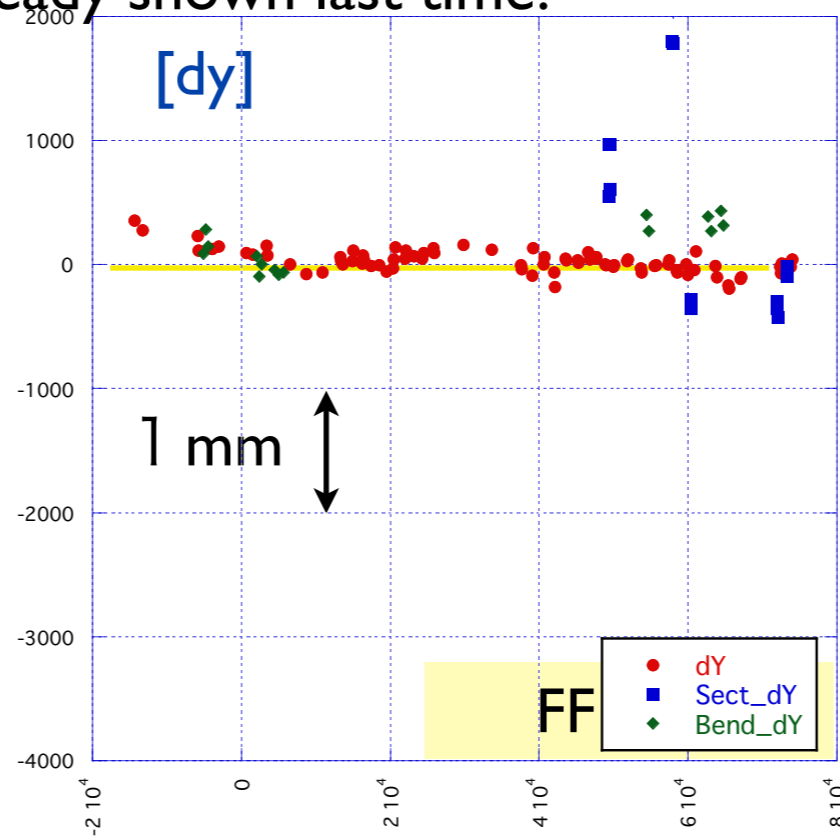
Dec.' 11



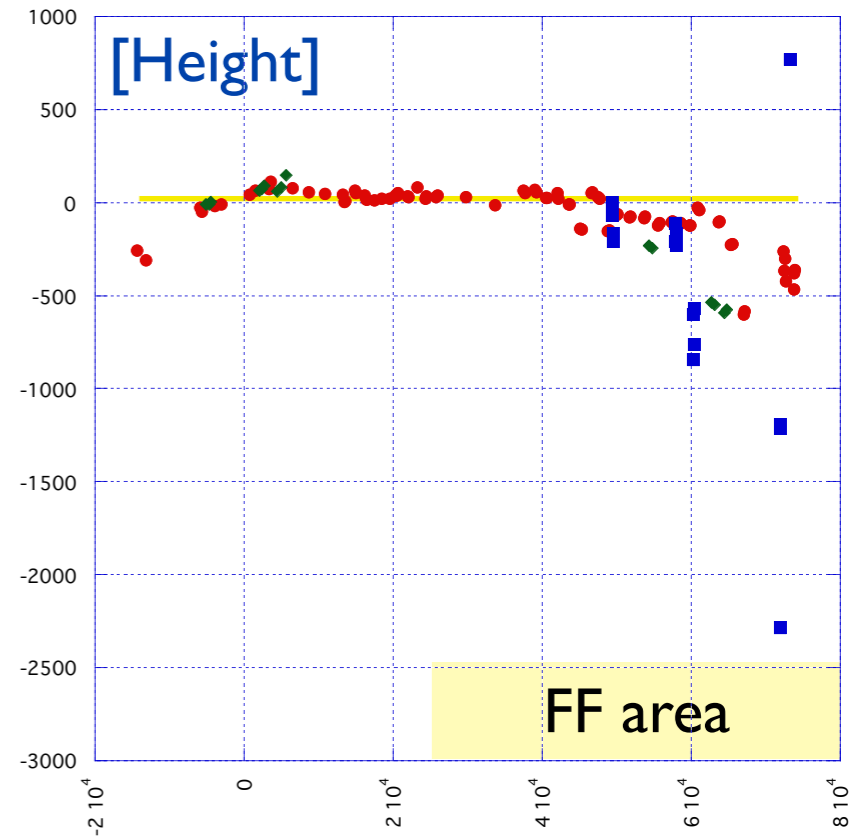
- Deviation of Magnets
This picture is already shown last time.



(\approx Transverse) Q_{mag_RMS} : 0.087mm



(\approx Longitudinal) Q_{mag_RMS} : 0.095mm

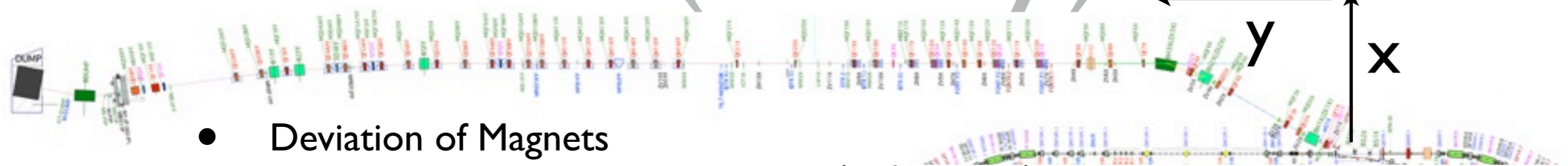


(Height) Q_{mag_RMS} : 0.165mm



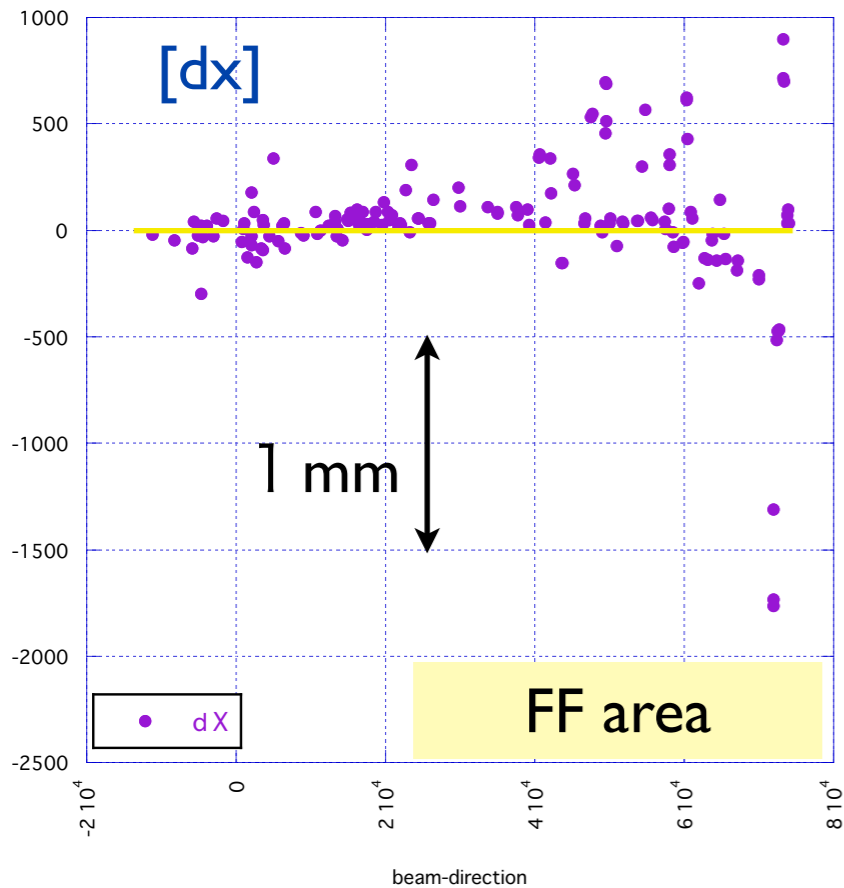
EXT/FF(survey)

May '12

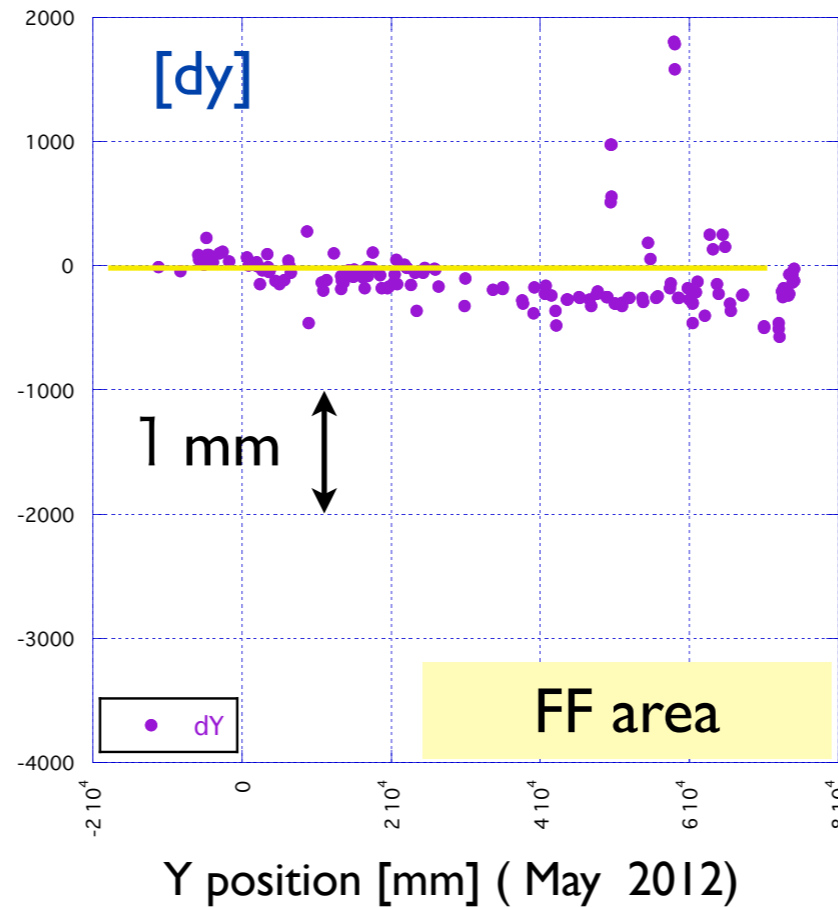


- Deviation of Magnets

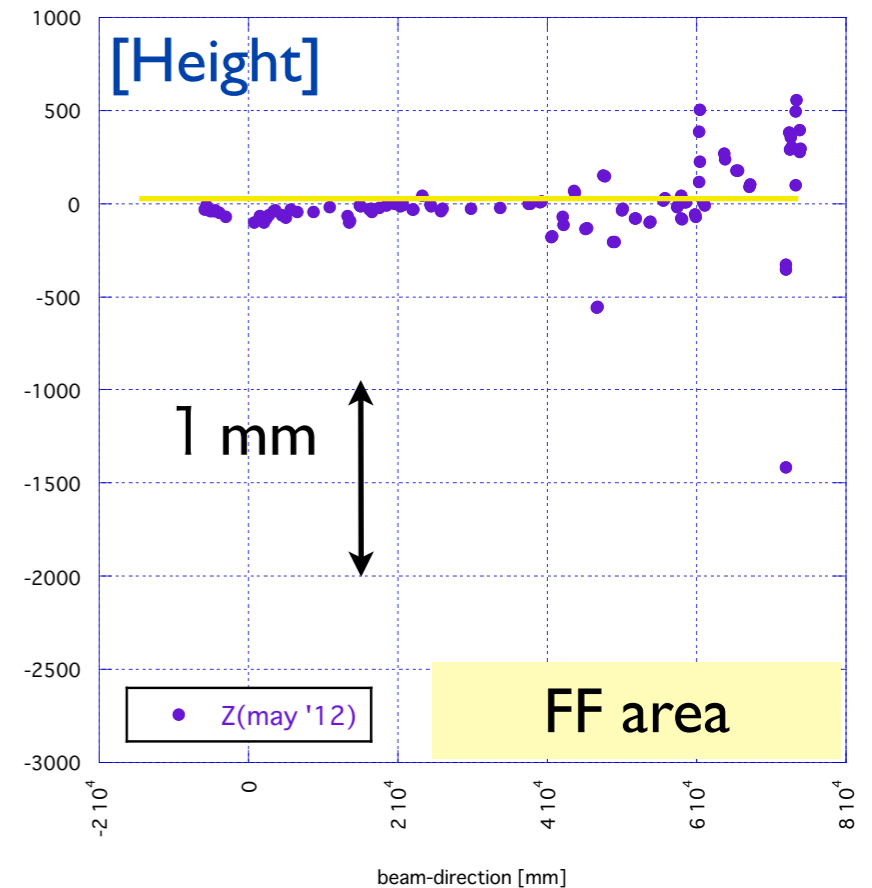
EXT-FF measurement (was SET to FFMover)



(\approx Transverse) Q_{mag_RMS} : 0.153mm



(\approx Longitudinal) Q_{mag_RMS} : 0.200mm



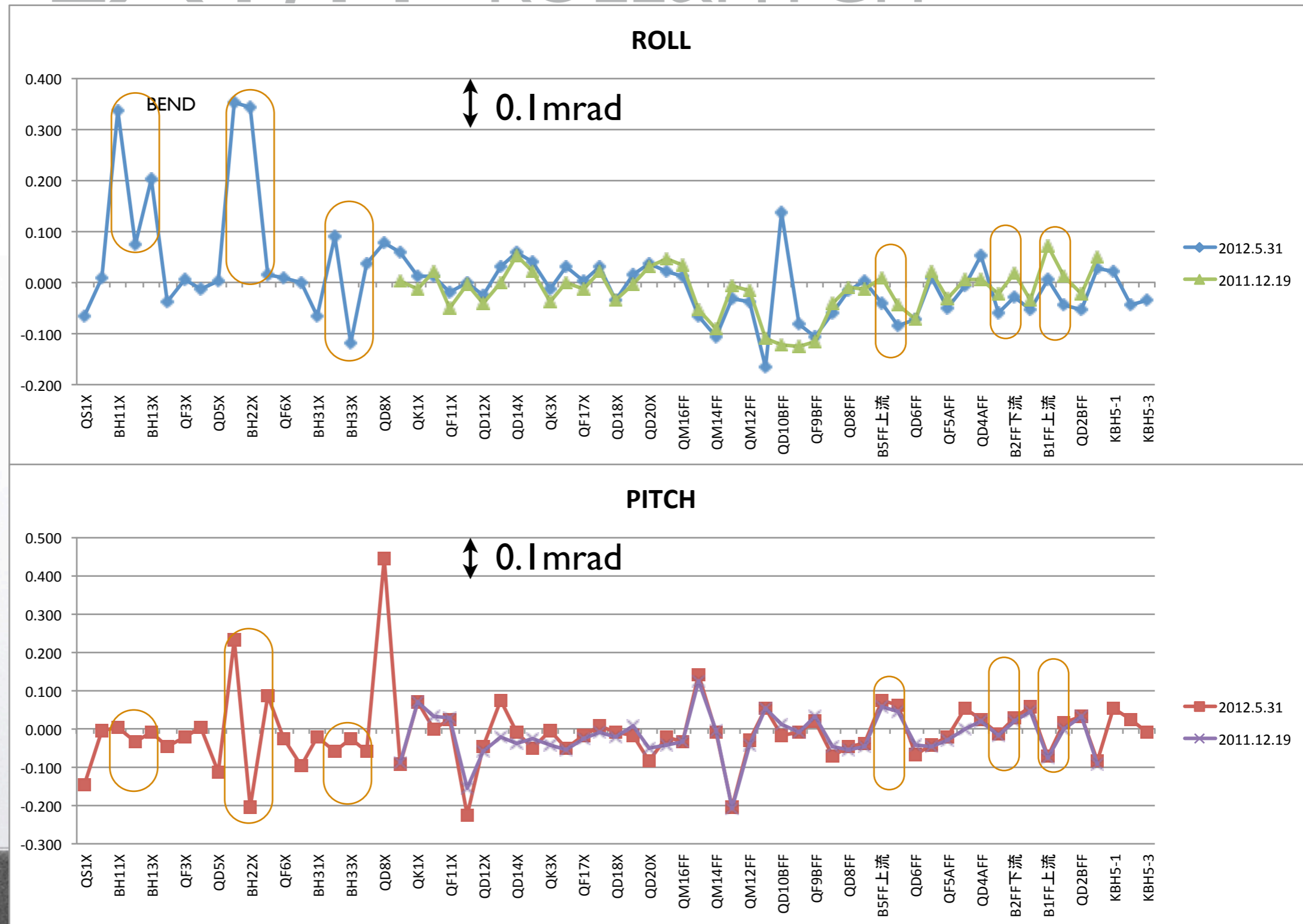
(Height) Q_{mag_RMS} : 0.149mm



EXT/FF ROLL&PITCH

Dec '11
May '12

Dec '11
May '12



BEND gave priority to height over ROLL of the reference



summary & next step

- BT & DR has a seasonal variation.
- DR circumference was shrunk by about -3.4 mm (1/2012) and recovered to -1.3 mm.(5/2012)
- It seems that the seasonal variation of FF is not large.
- **Next step (in this summer)**
 - Detail survey for DR
 - Survey and alignment for LINAC



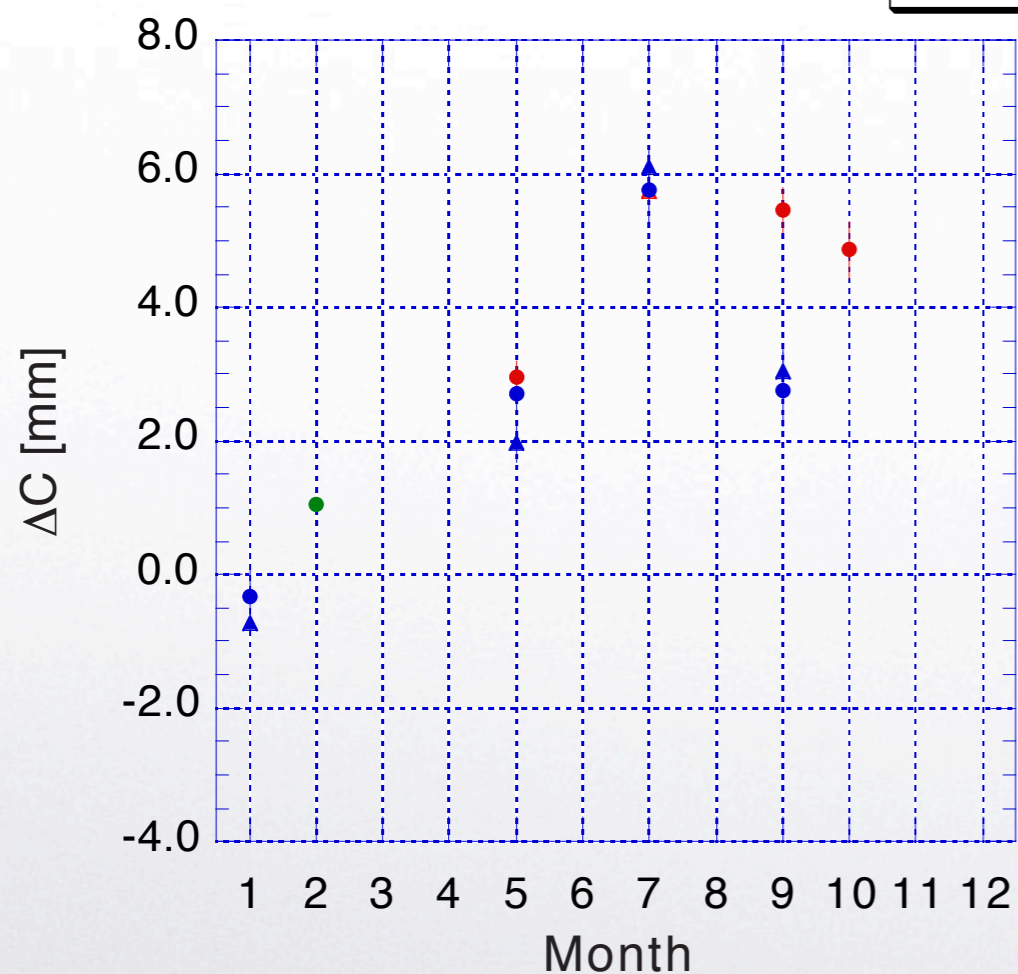
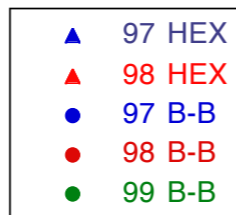
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- **Thanks for your attention!**

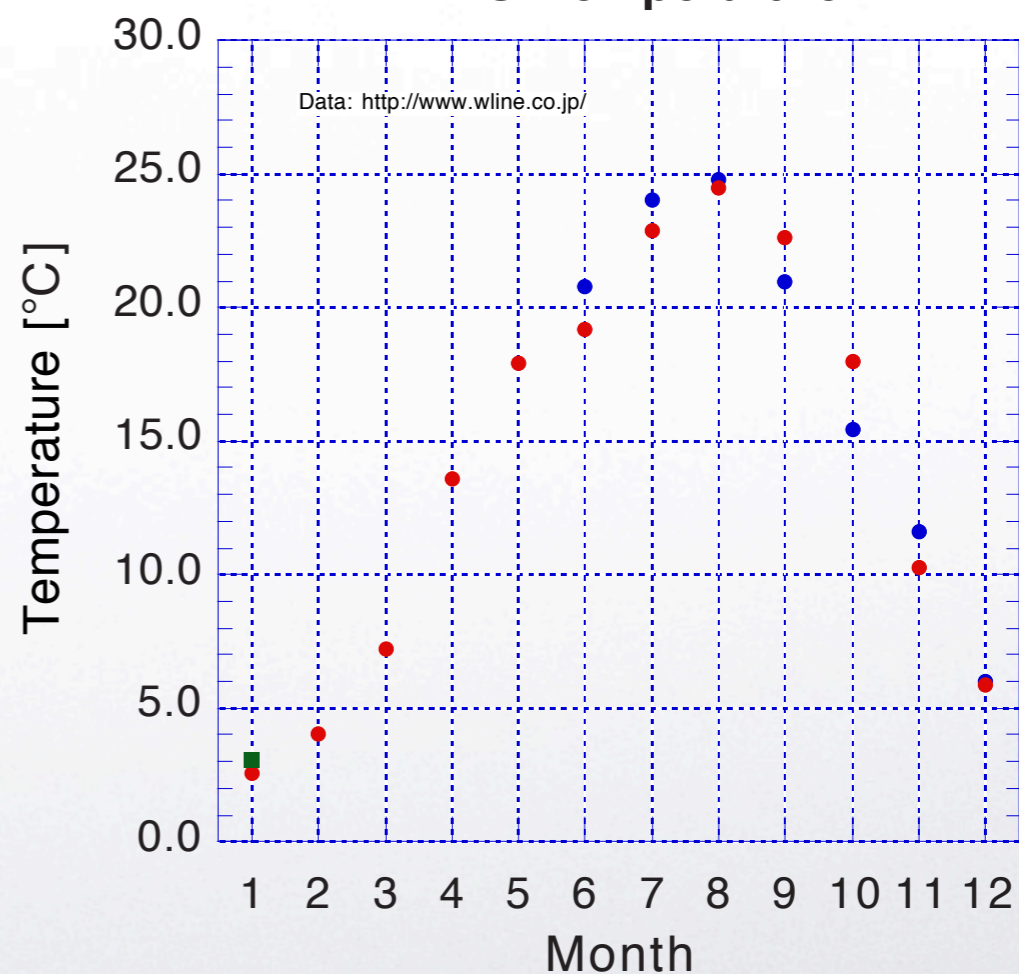
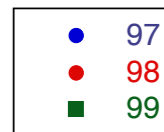


● Circumference

DR Circumference

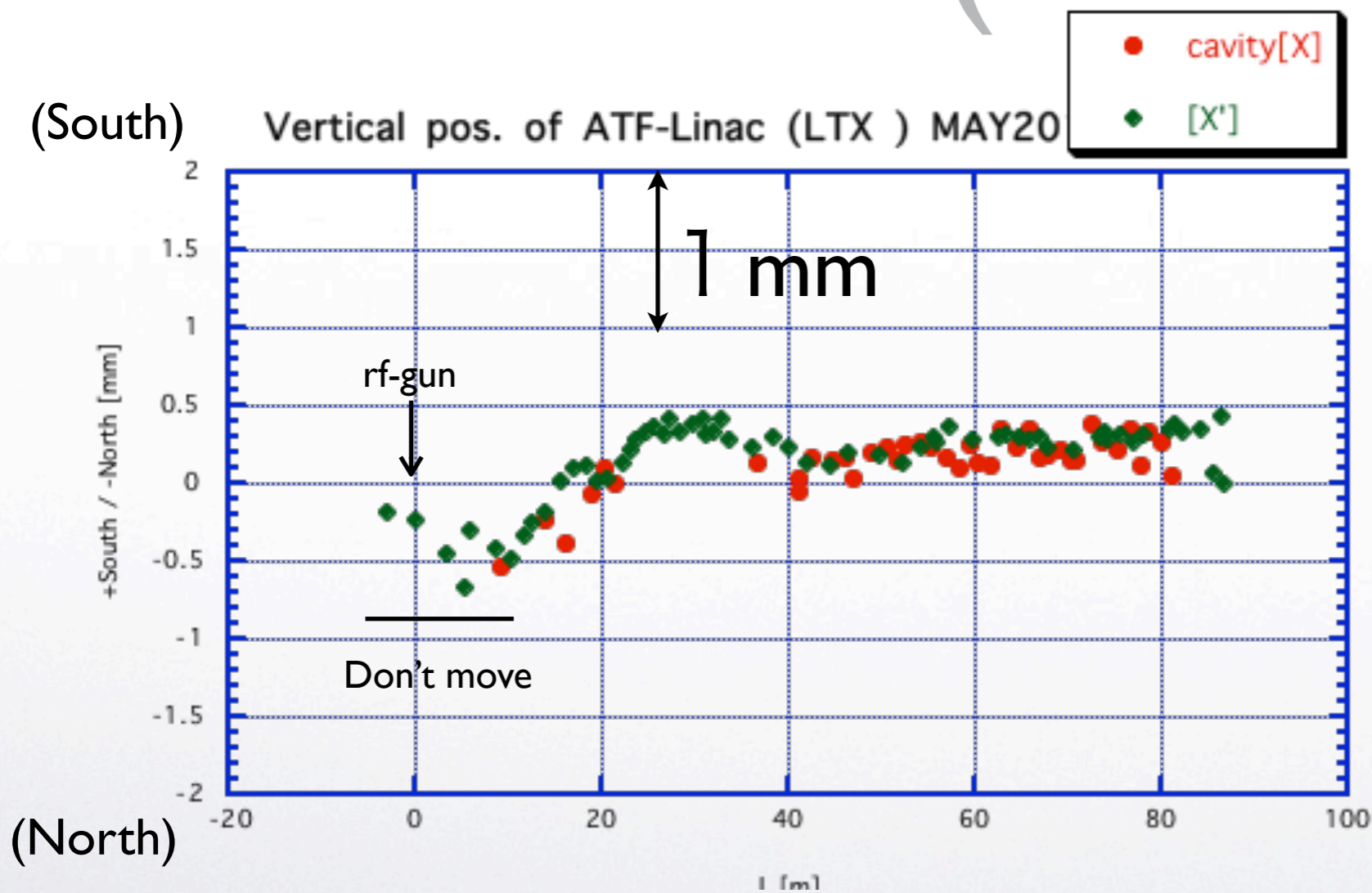


MITO Temperature





LINAC (transverse)



- after alignment
Red : cavity
Green :table reference
- did not move "L0."
- Roll ≈ 0.2 mrad (table)

- After alignment (LaserTracker survey in May)