

# Alignment of Magnets at ATF2

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**KEK**

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# What we have done this year

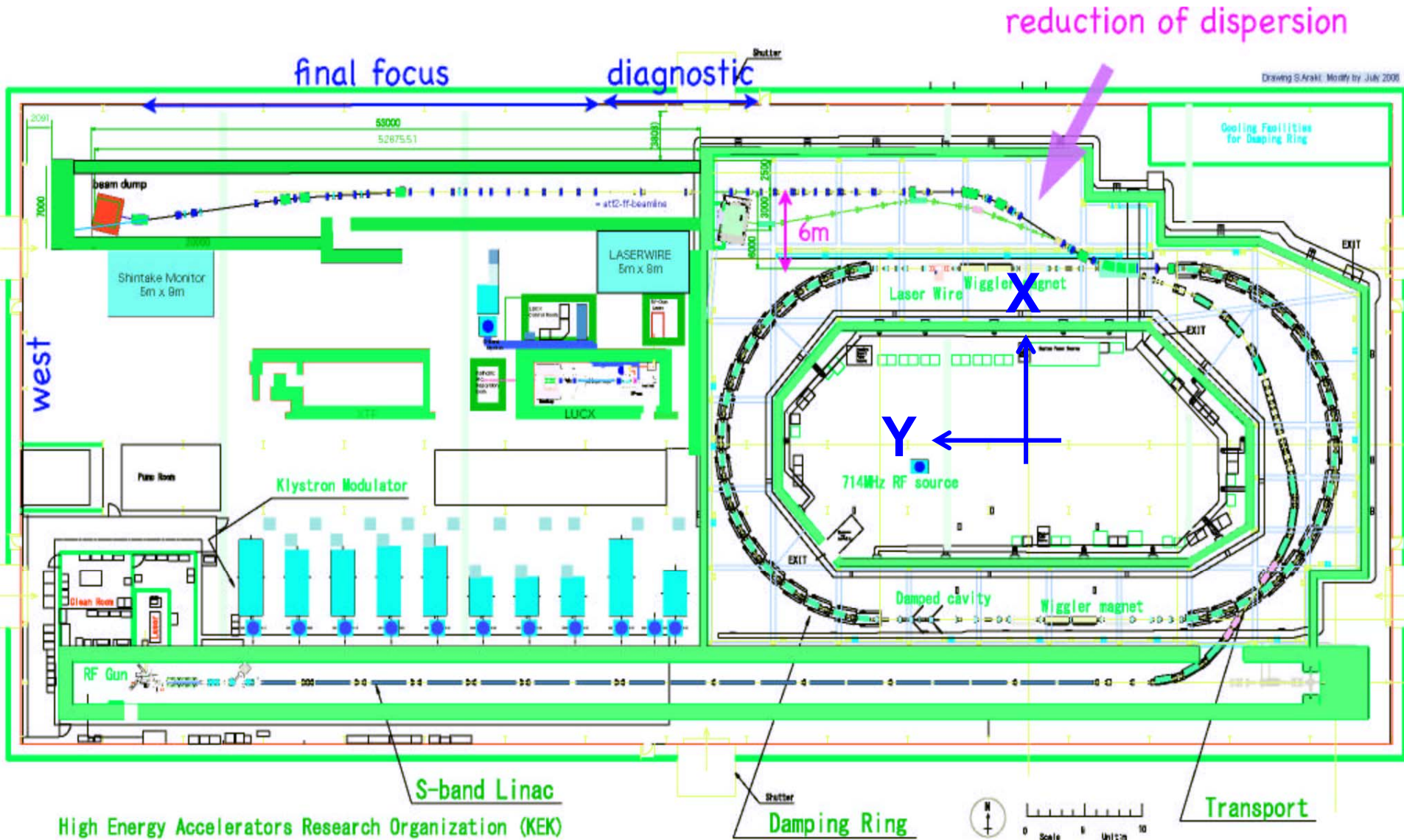
## 2008

- end of June QEA and DEA magnets were installed in the ATF2 beam line
- August Magnets were moved from old beam extraction line to the ATF2 beam line
- 06 - 08 August Floor markers were surveyed again and their coordinates were established
- 19 - 29 August First alignment of QEA and DEA-magnets  
September First alignment of magnets moved from the previous beam extraction line.
- 22 - 30 September Second alignment (smoothing)  
Last three Q-mag (QF03, QD02B, QD02A) were not aligned because movers for these magnets could not be adjusted yet.
- 26 - 27 November Height of three DEA-magnets were corrected

# ATF-ring and ATF2 Beam Line

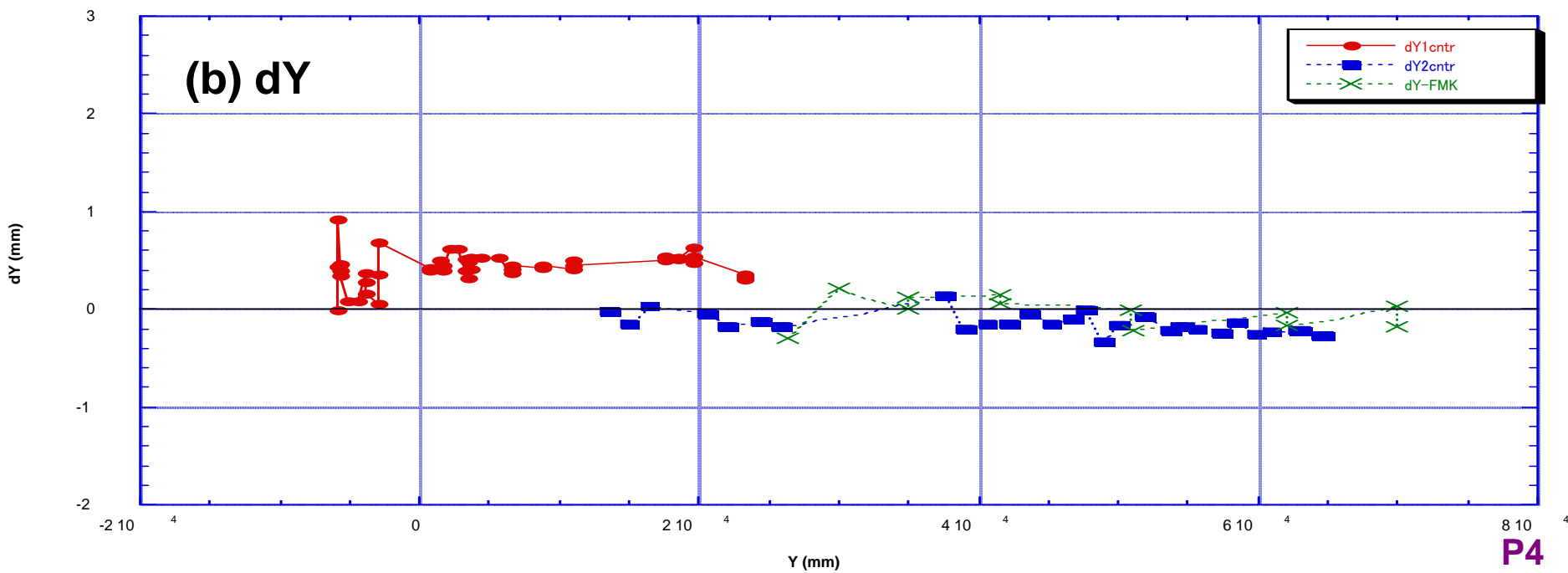
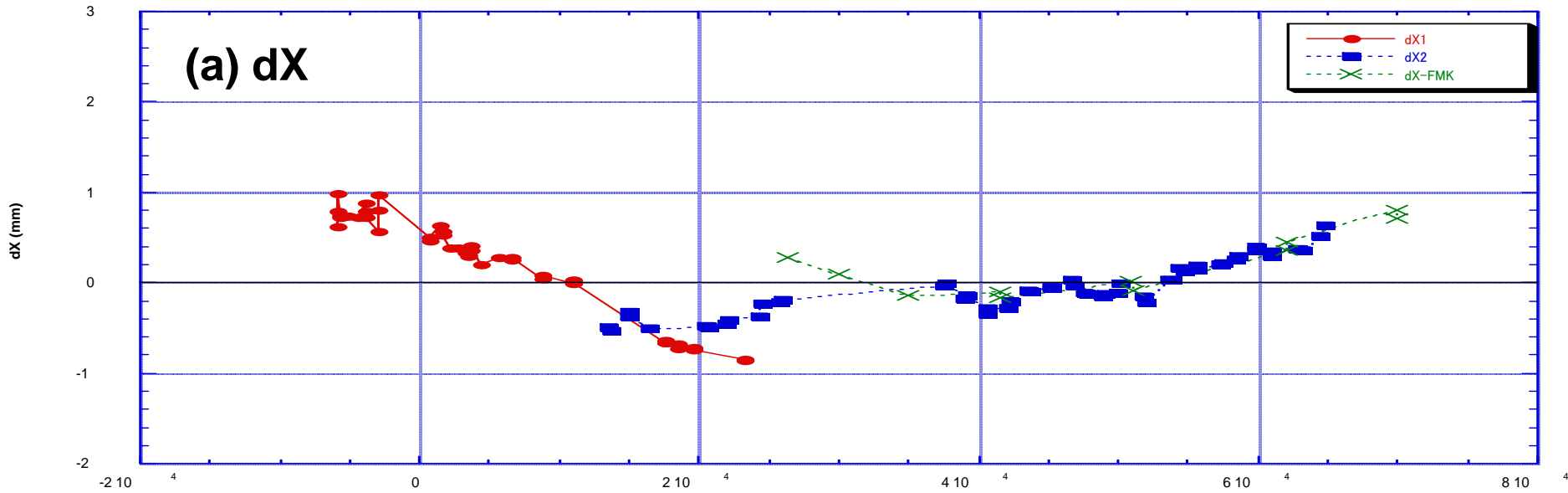
## Definition of the coordinate

7th ATF2 Project Meeting  
15 - 18 December 2008

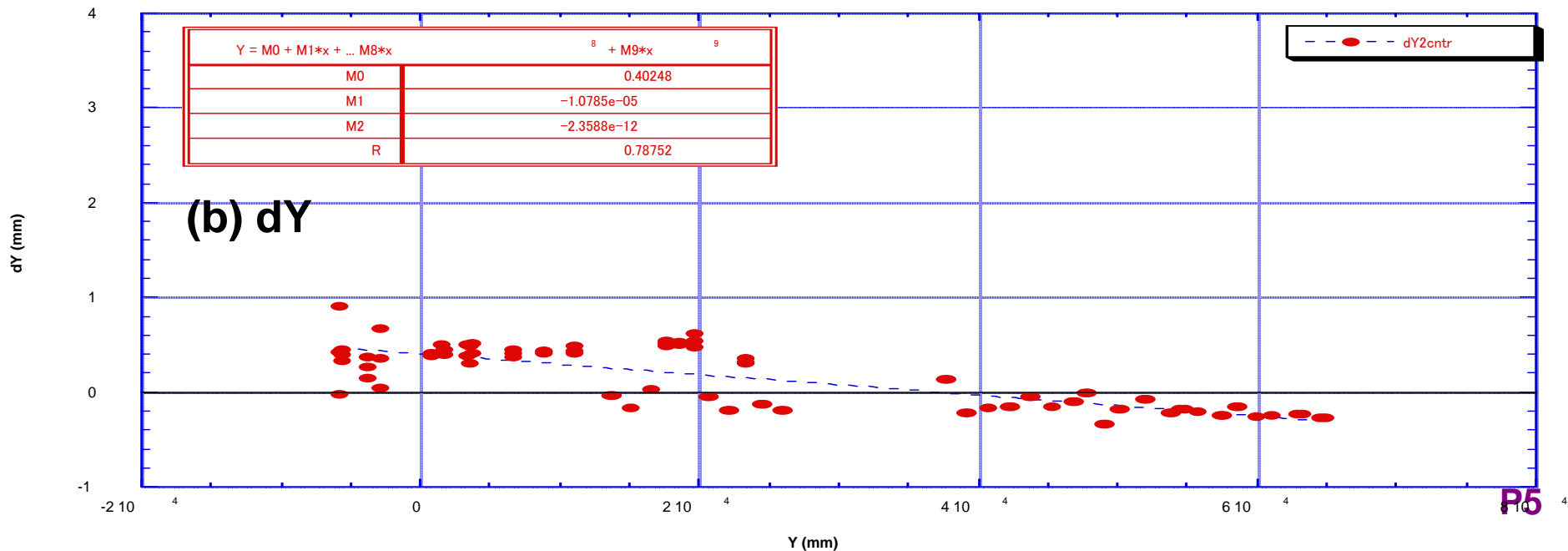
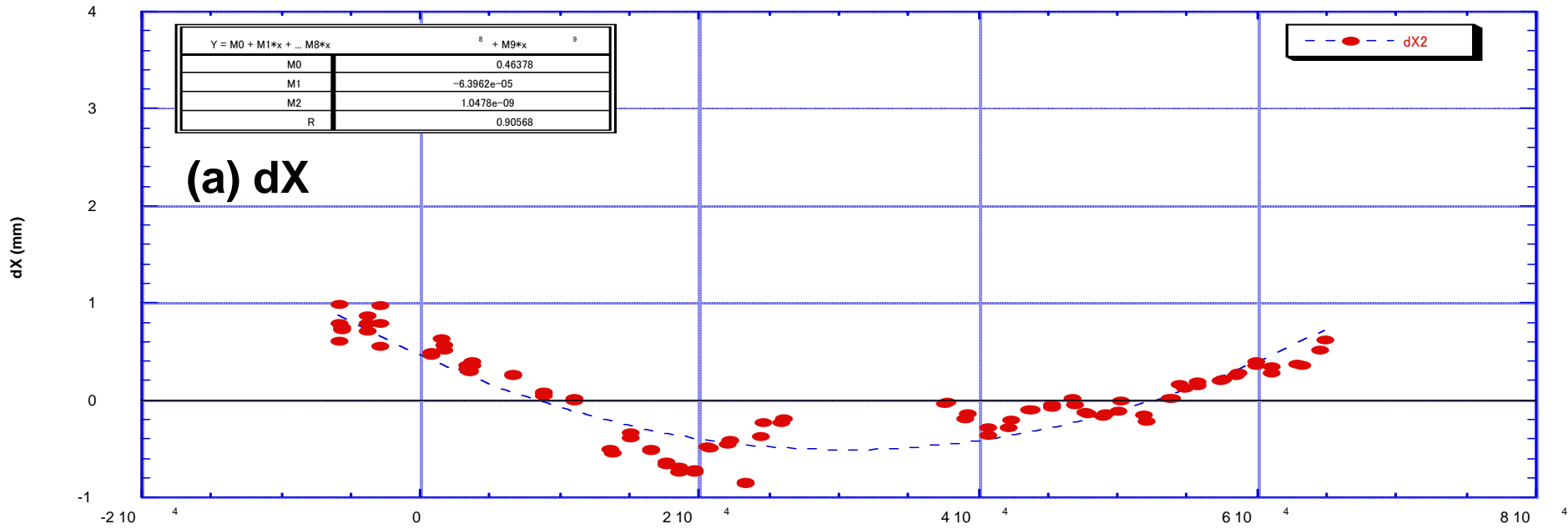


# Results of First Alignment

7th ATF2 Project Meeting  
15 - 18 December 2008



# Deviation from Smoothing Curves



# Results of Second Alignment

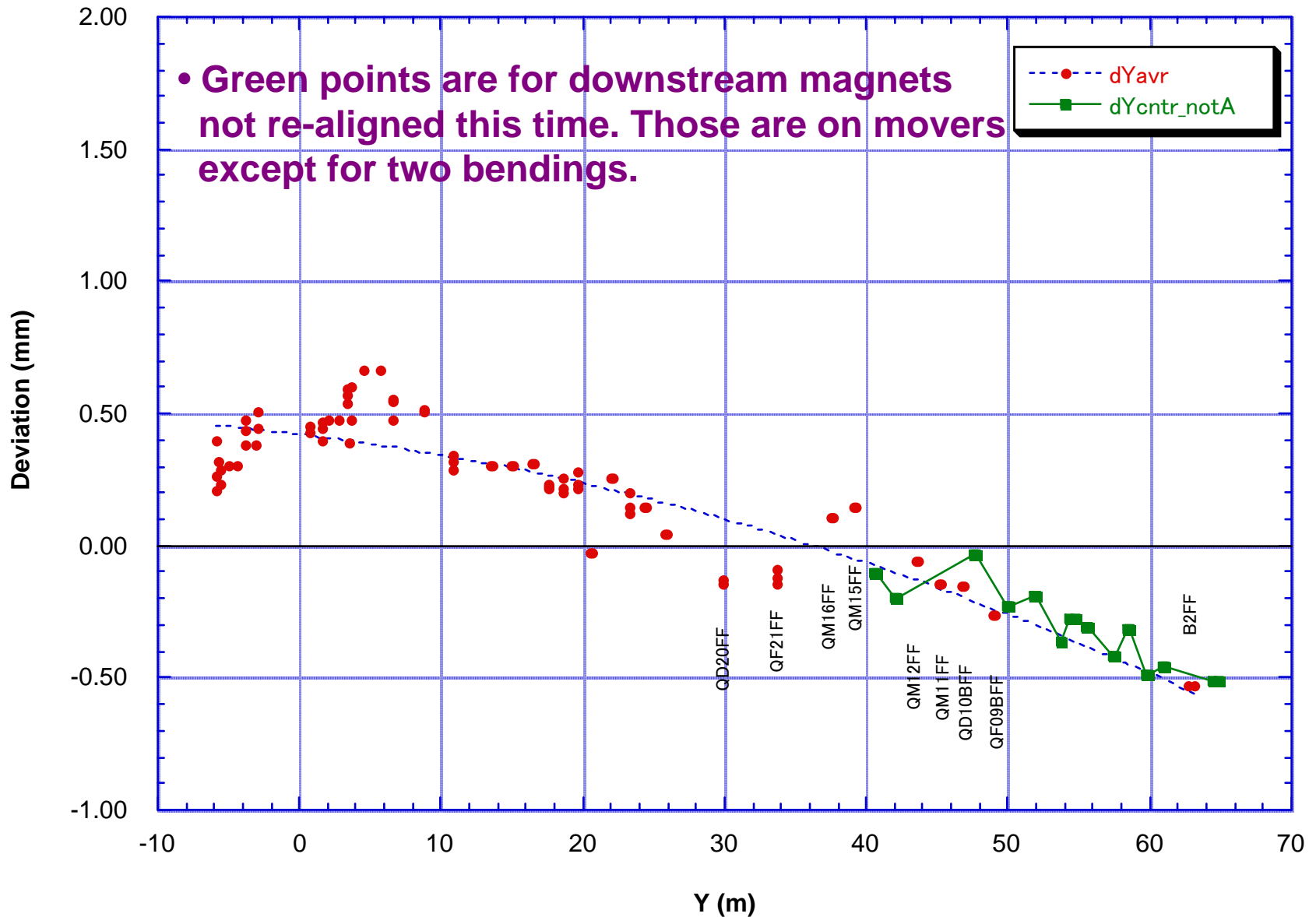
7th ATF2 Project Meeting  
15 - 18 December 2008

## dX



# Results of Second Alignment

## dY



- It is obvious that some movers have moved after 1st alignment, because abnormal deviations are observed only in X direction

--> Movers' voltage and levels were checked for those which have abnormal X deviation

<u>Mag-ID</u>	<u>V1</u> / <u>V2</u> / <u>V3</u>	<u>ΔRoll</u>
QD10A	-5.035/-5.040/-5.344	0.990
QF07	-5.046/-5.039/-5.441	1.203

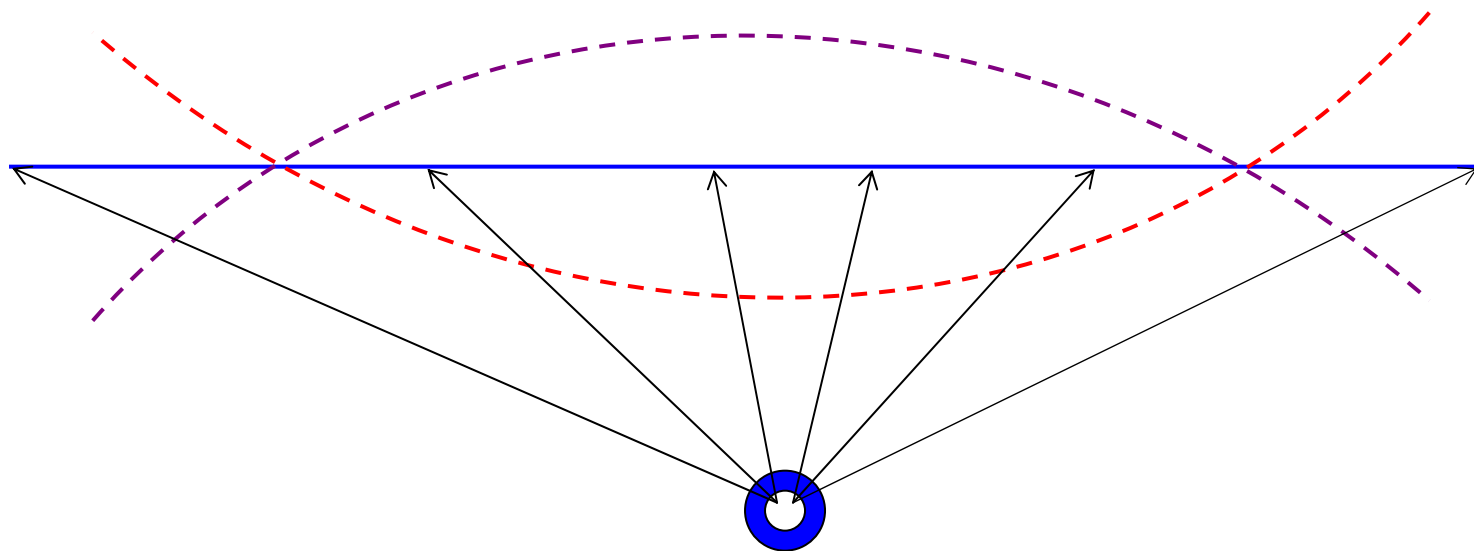
\* Here, V1, V2 and V3 are voltages at the potentiometers for twin cam shaft (V1 and V2) and single one (V3), and ΔRoll stands for the (roll measured - expected value)

Fortunately, movers' voltage for magnets re-aligned looked normal.



About the variation of the smoothing curve, I am suspicious of the tracker's systematic error in angle measurement, because the tracker is not good in straight line measurement.

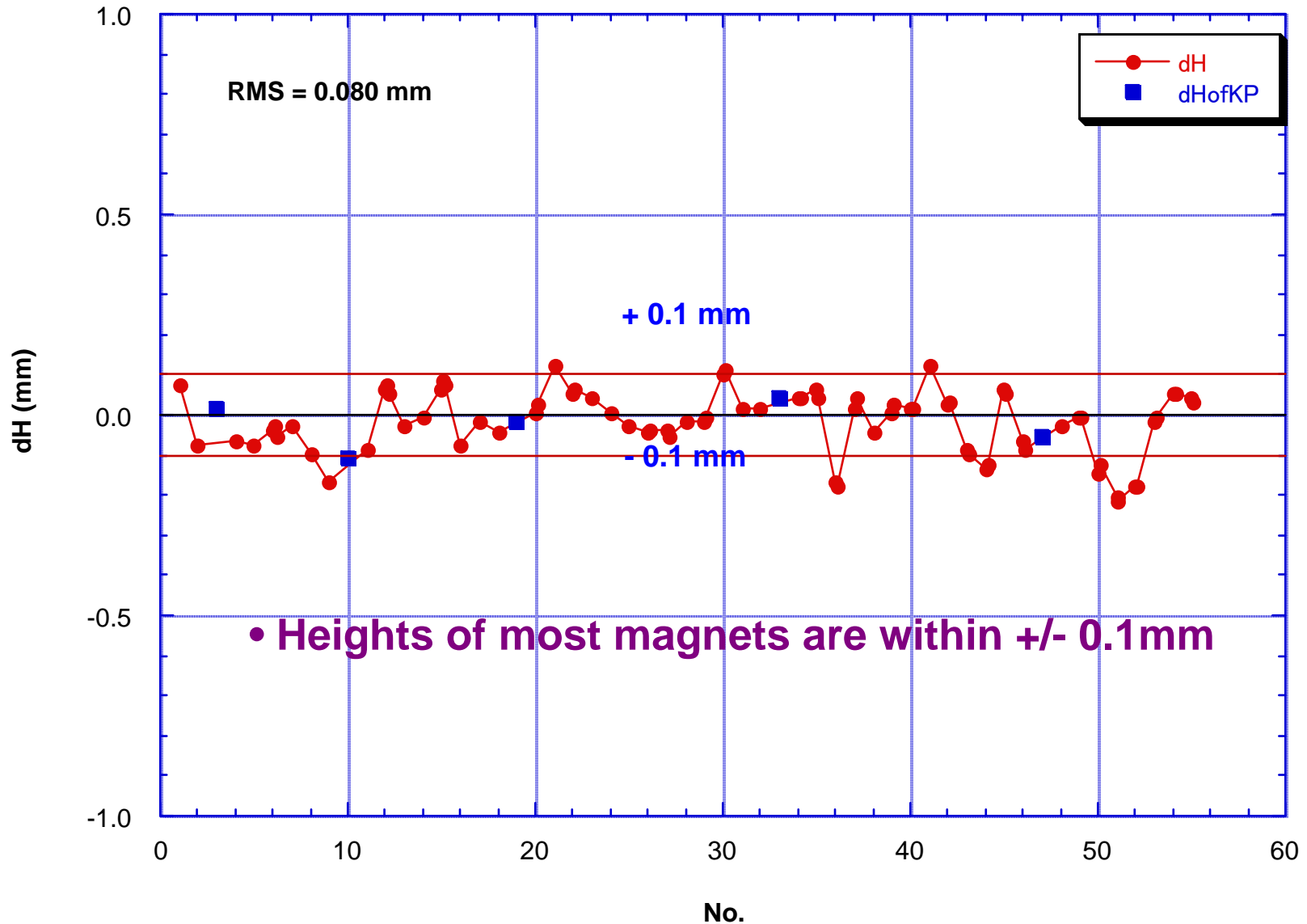
--> We will do the tracker calibration before the next ATF2 beam line survey, and let's see .....



Laser tracker

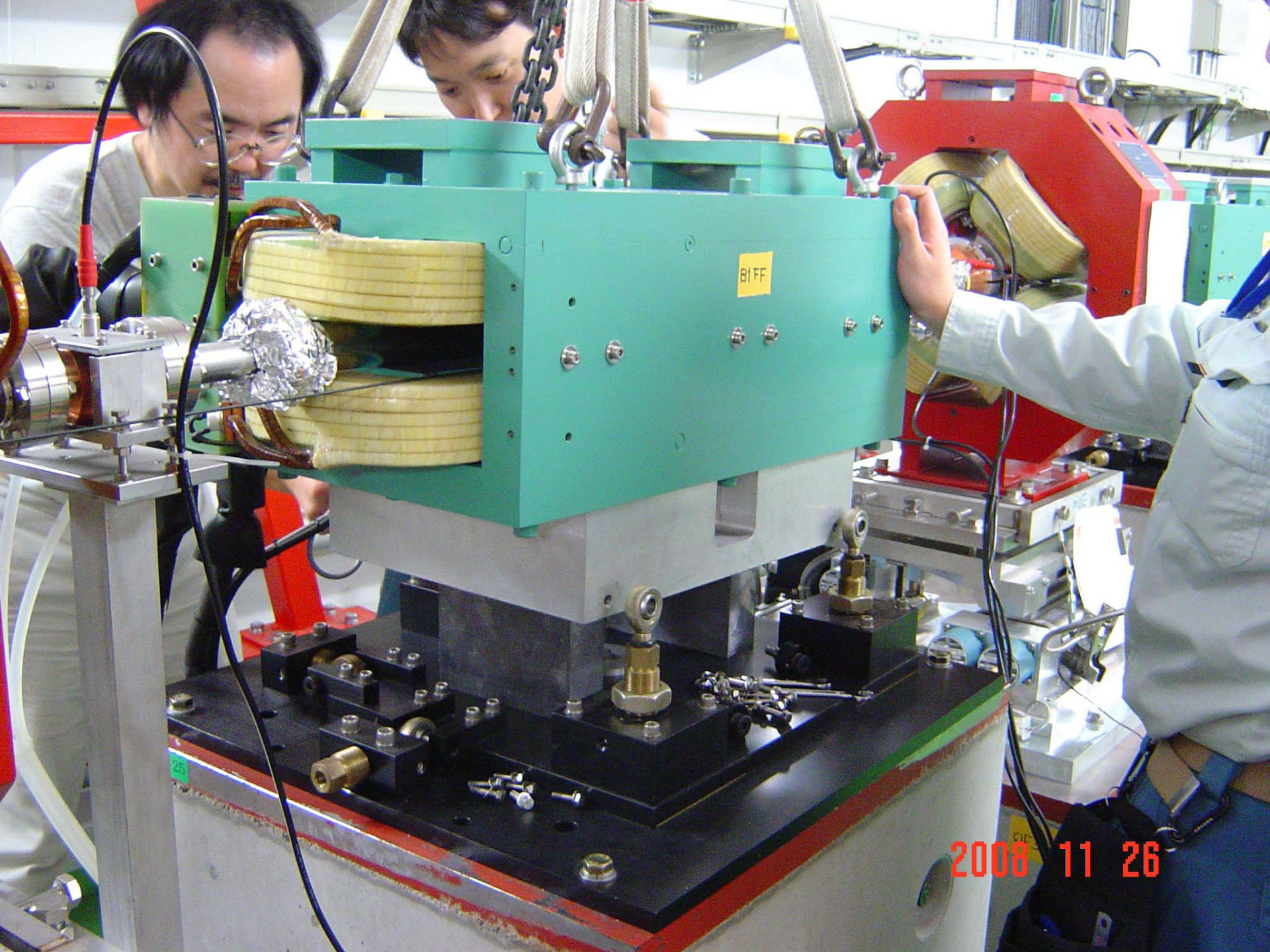
# Height Survey after the Second Alignment

aftrAlign\_level



# Mis-alignment of DEA-magnets

- In November, Vacuum group claimed that the height of three dipole magnets (B1FF, B2FF and B5FF) were lower by about 3mm!
- It was found that the height of the top surface of the alignment reference plate from the magnet center (Href in short) was changed by 2.71mm from the drawing issued in early September 2006 to those issued in the end of September 2006. And KEK alignment group referred to the old drawing.
- The height of the DEA-magnets had to be corrected, and it was done in 26th and 27th November.

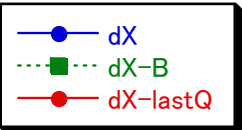


BIFF

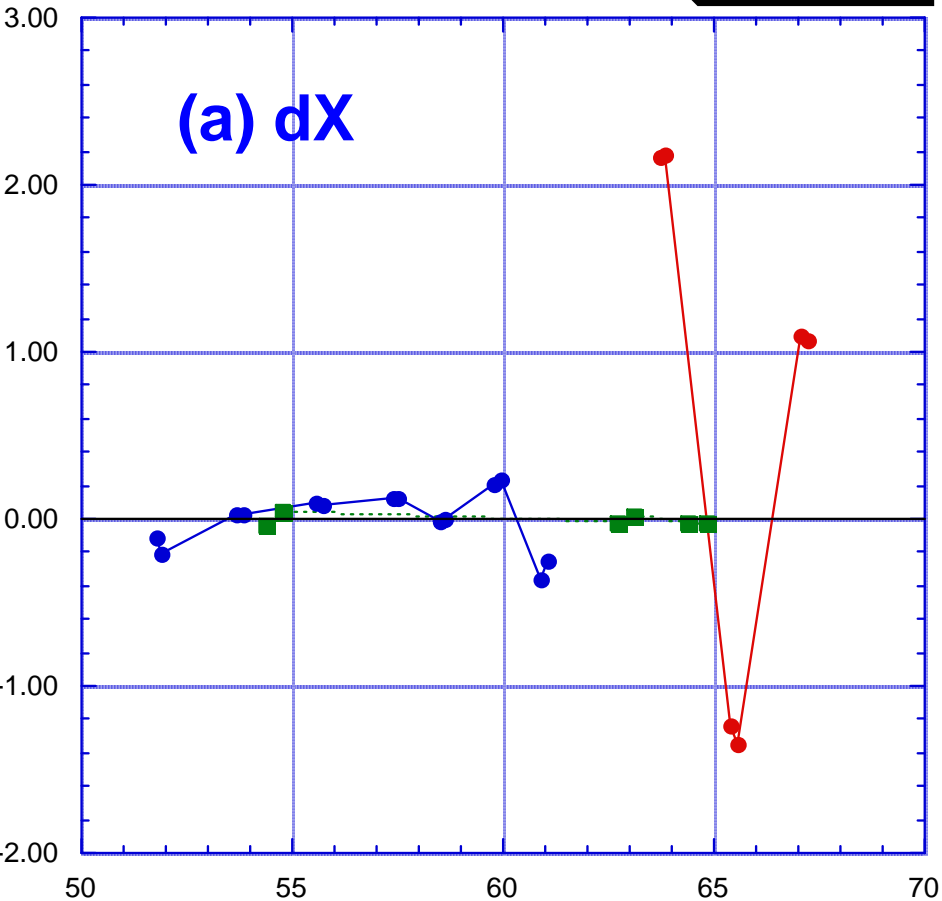
2008 11 26

# Horizontal Position of Magnets at the End of ATF2 Beam Line

After DEA-mag Alignment

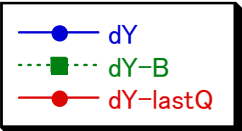


(a) dX

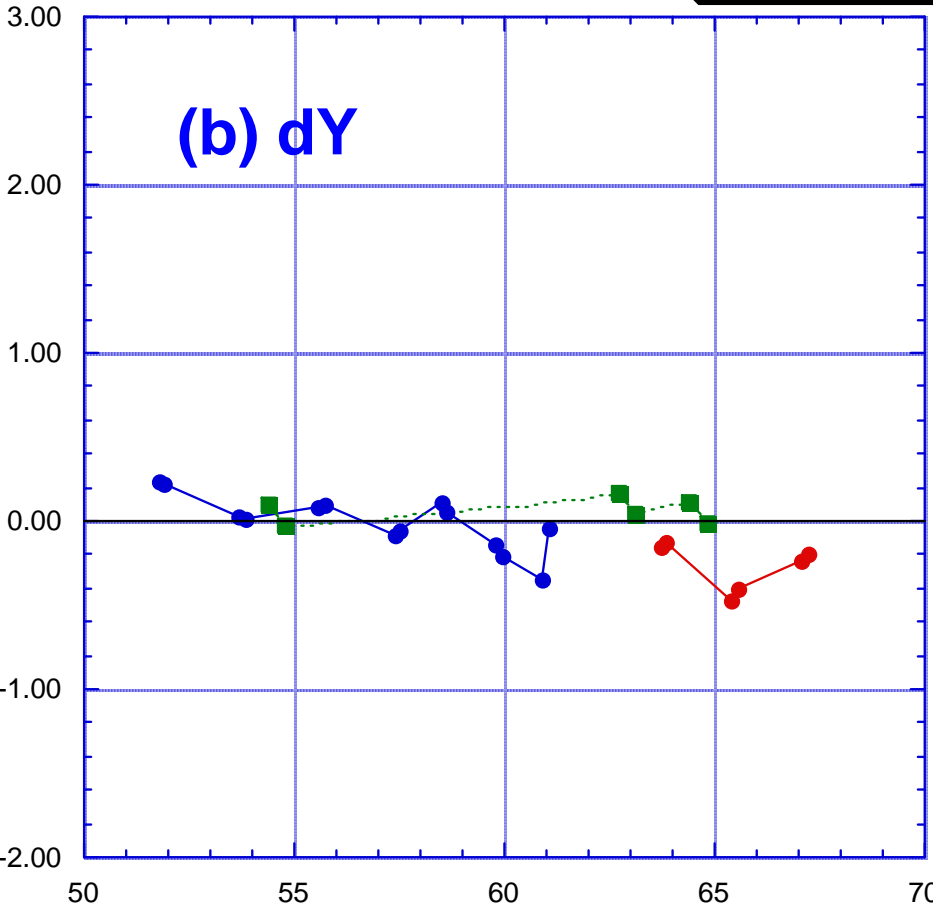


Y (m)

After DEA-mag Alignment



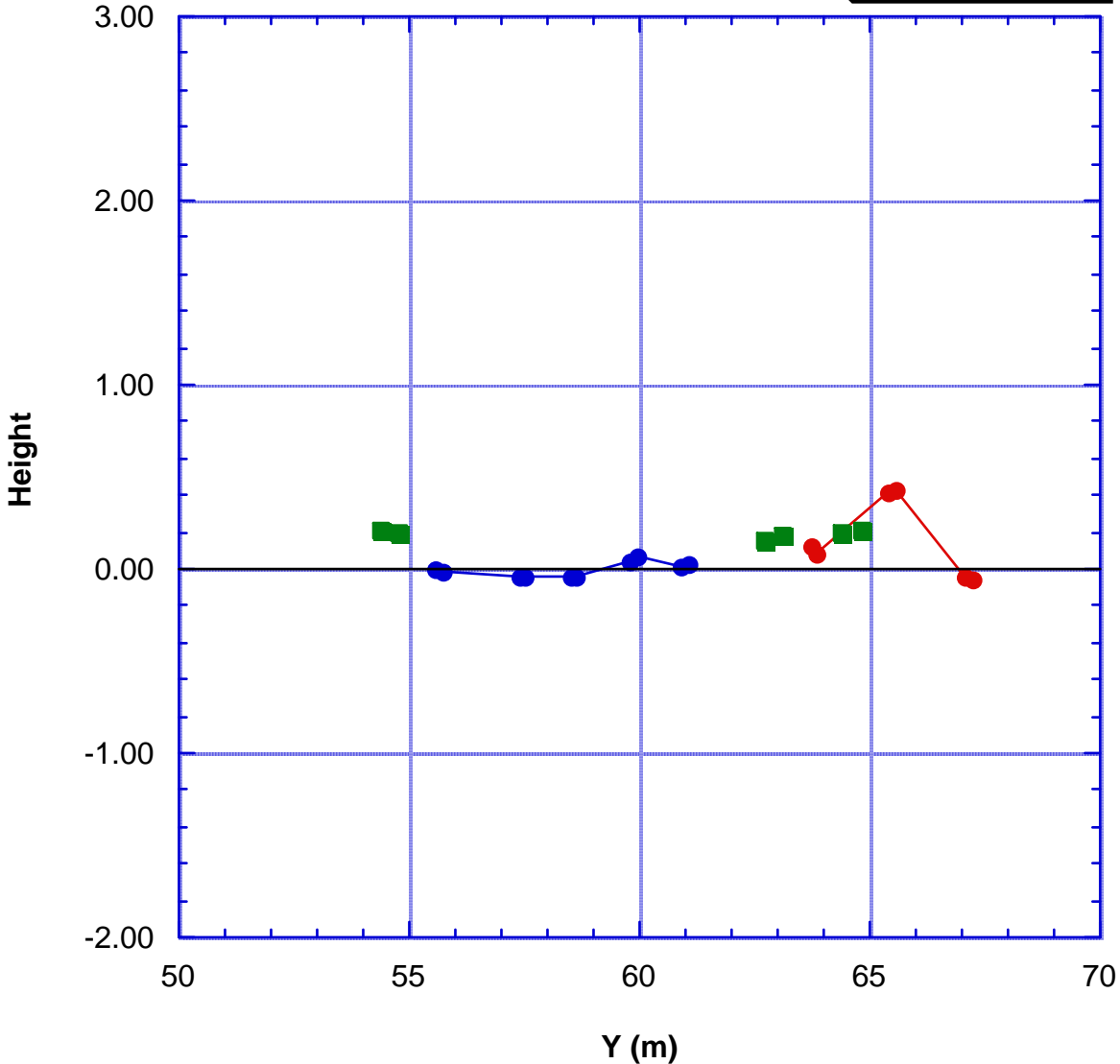
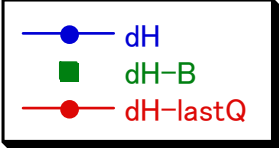
(b) dY



Y (m)

# Height of Magnets at the End of ATF2 Beam Line

After DEA-mag Alignment



## Height of Magnets at the End of ATF2 Beam Line (cont.)

- Errors of heights of DEA magnets looks about 0.2mm this time for all three magnets.

After the alignment of DEA magnets, their heights were measured. And errors of heights of all three magnets were less than 0.05mm.

**--> WHY!**

The optical target in the alignment of height of DEA magnets is a 60cm long metallic scale.

We compared several 60cm long metallic scales, and **found there were some differences among makers by about 0.2mm!**

**--> We have to choose metallic scales carefully in the alignment of the height of magnets.**

# What has to be done

- **Alignment of three magnets (QD3FF, QF2BFF, QD2AFF)  
(scheduled in the end of December)**
- **Survey all through the ATF2 beam line  
(scheduled in the end of December)**
- **Fine adjustment of magnet position if necessary**
- **Measurement of the tilt of movers using a laser tracker  
(scheduled in January 2009)**