



Alignment at the DR, EXT and FF beam lines

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17th ATF2 Project Meeting

February 12, 2014 at KEK 3-goukan 1F





2013



contents

- Linac (not yet surveyed this year)
- BT (not yet alignment)
- DR (a result of a survey)
 - Circumference survey
 - alignment (Oct.)
- EXT/FF (also a result of a survey)
-

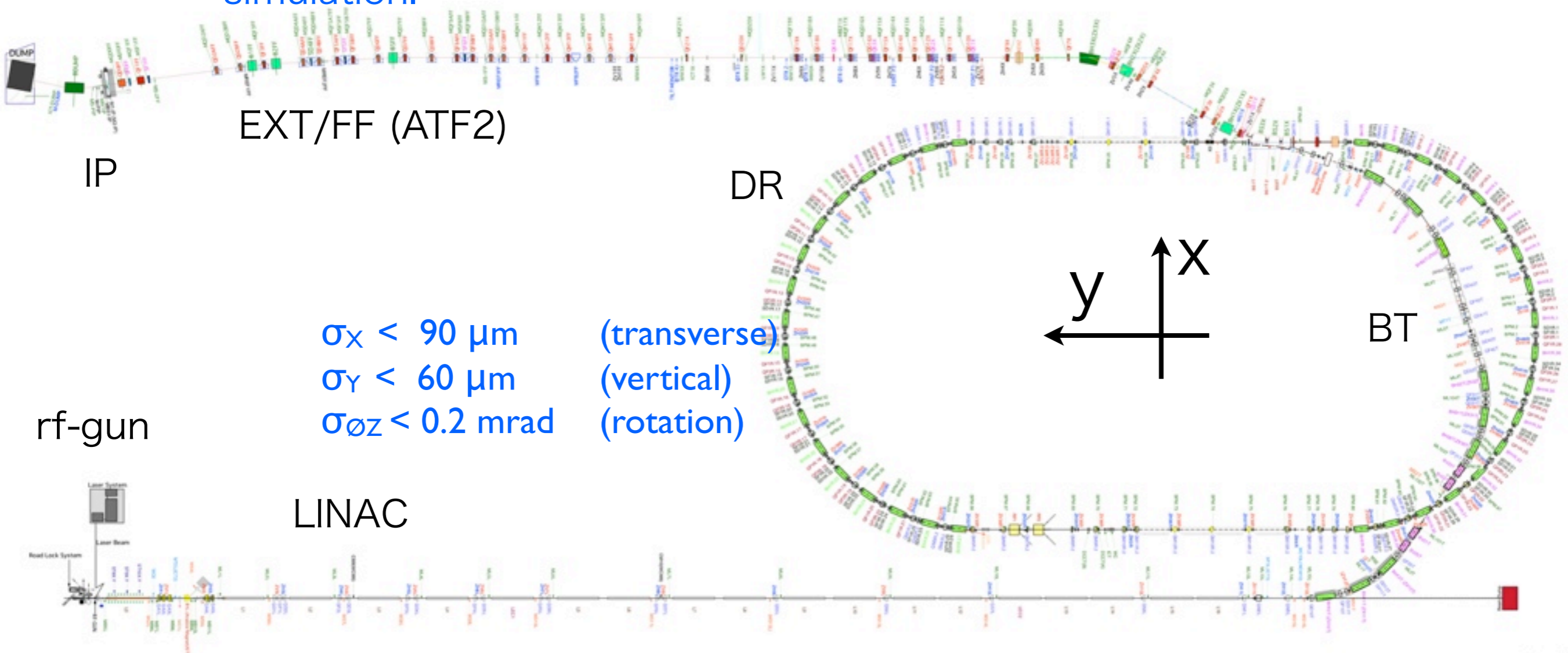




ATF



- Origin of alignment coordinates is a center of DR.
- SETTING ACCURACY
DR Alignment tolerance was evaluated beam tracking simulation.





Alignment tools

using by ..

ACCURACY

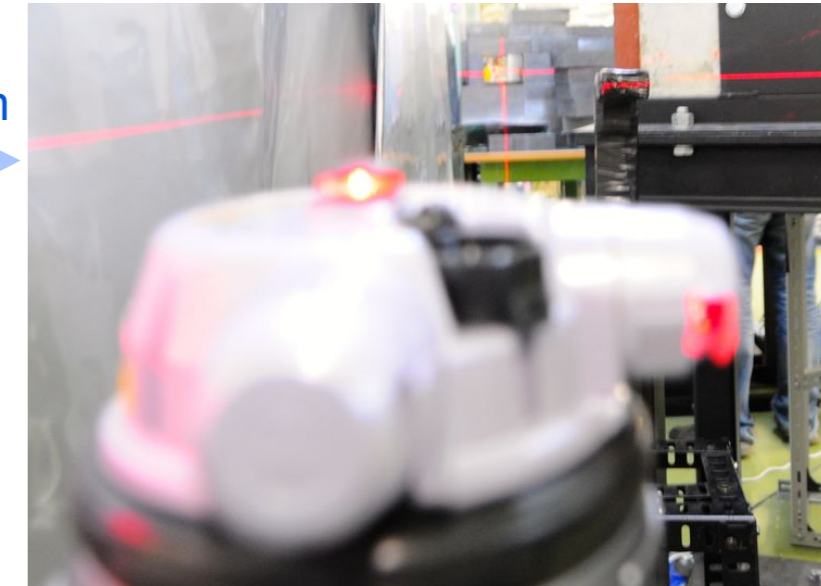
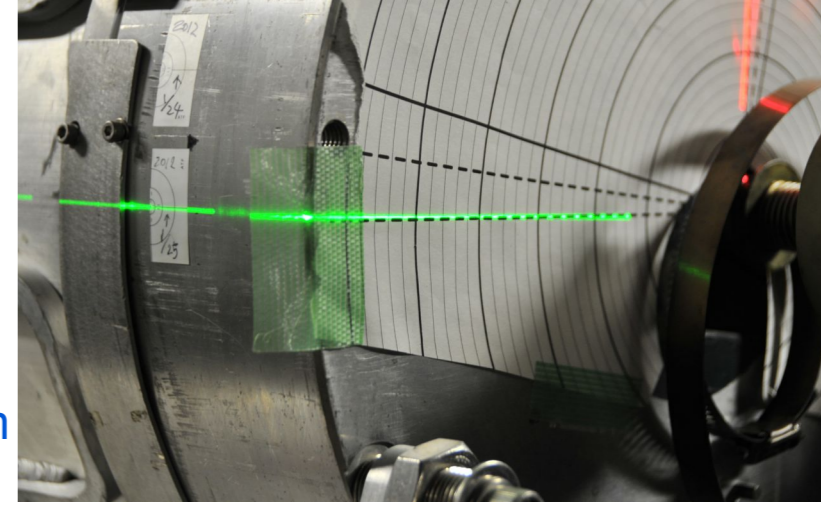
Rotating Laser
≈ 0.15 mm/10m

= 0.002 mm/m

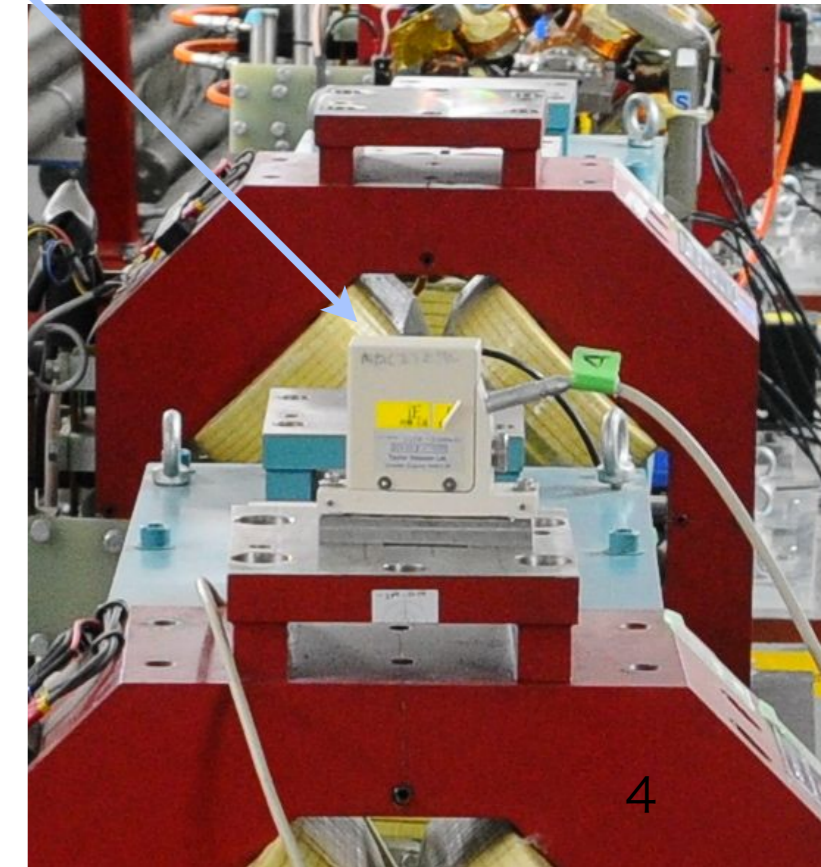
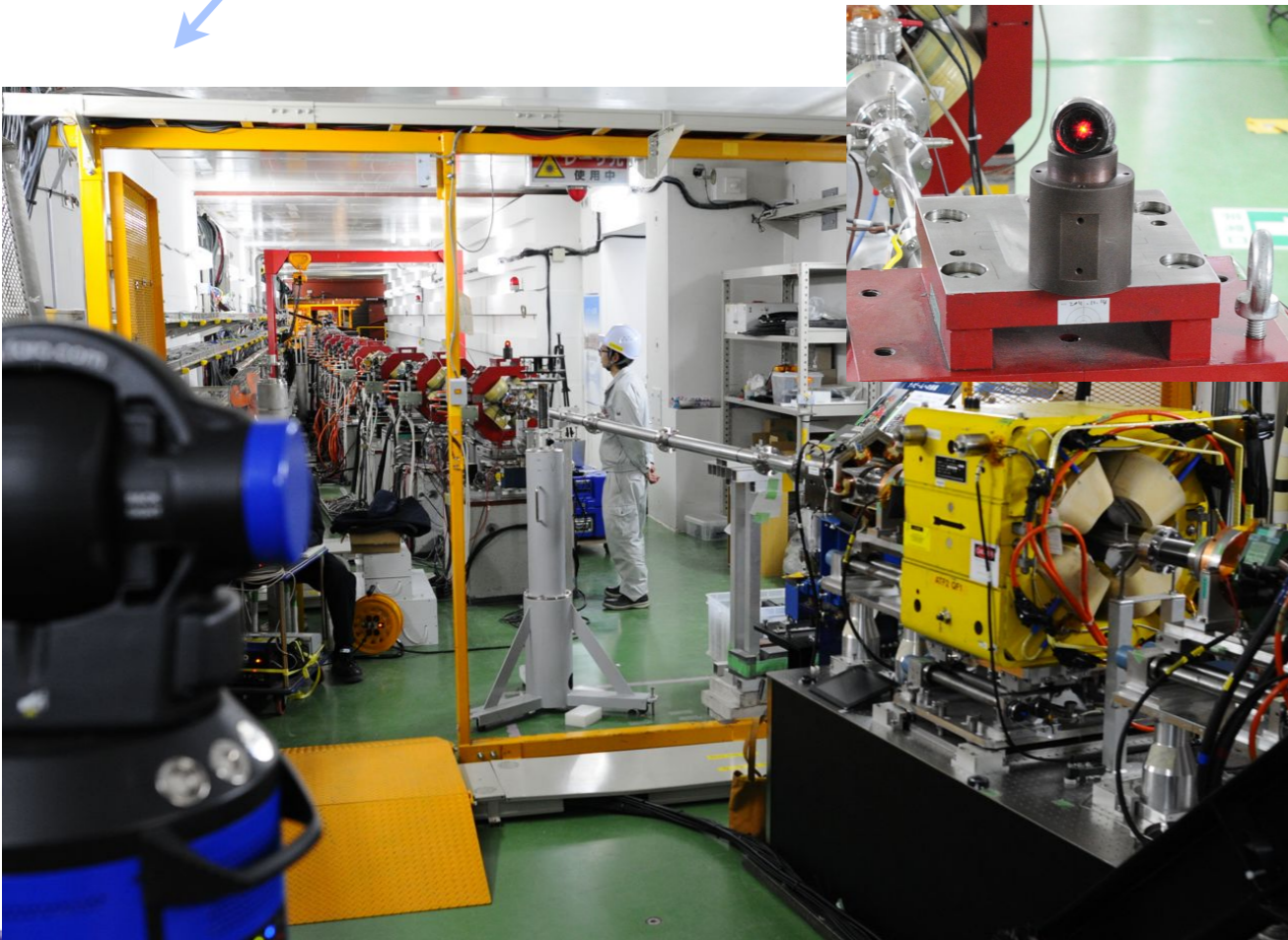
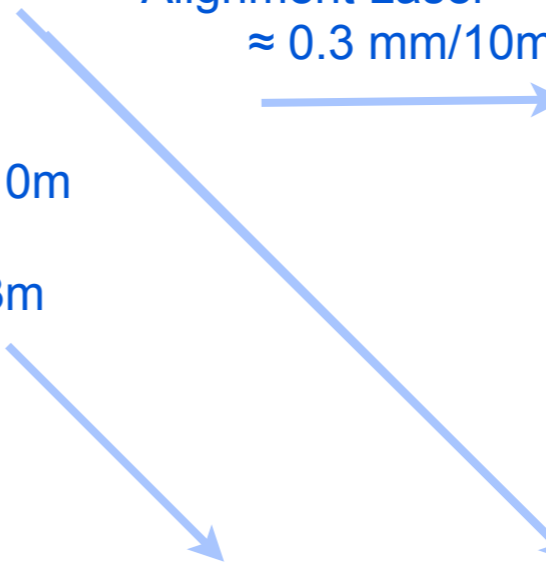
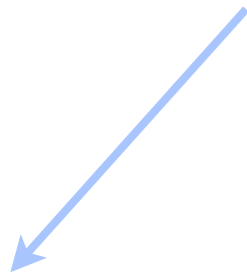
Alignment Laser
≈ 0.3 mm/10m

≈ 0.1 mm/10m

≈ 0.1 mm/3m



- Bubble Level & Digital Tilt meter (Roll & Pitch)
- Alignment / Rotating Laser
- Laser Tracker (3D spacing survey) & Portable CMM

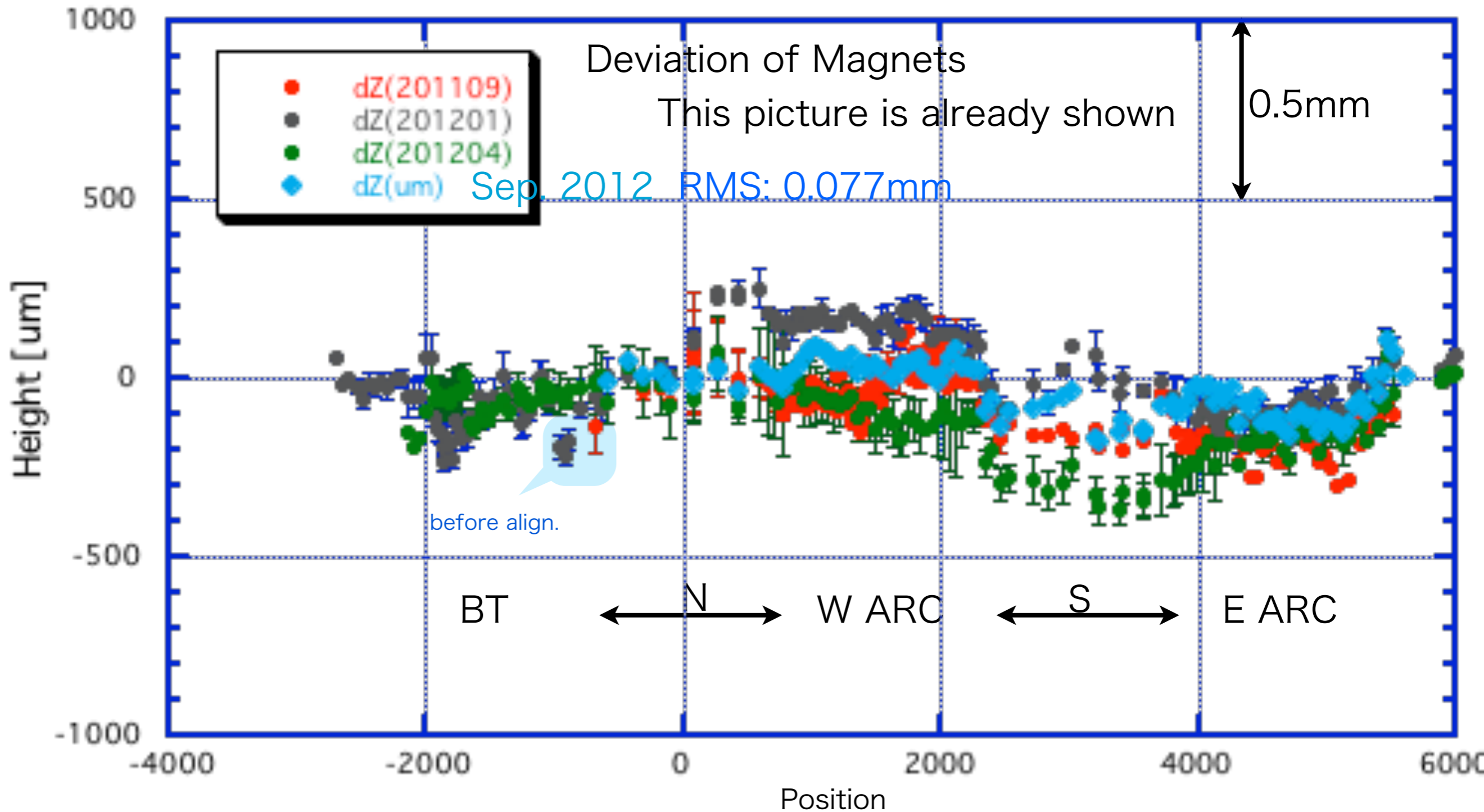




DR survey Sep.'11~Sep.'12

Height (Vertical)

survey of DR-all Height





DR survey

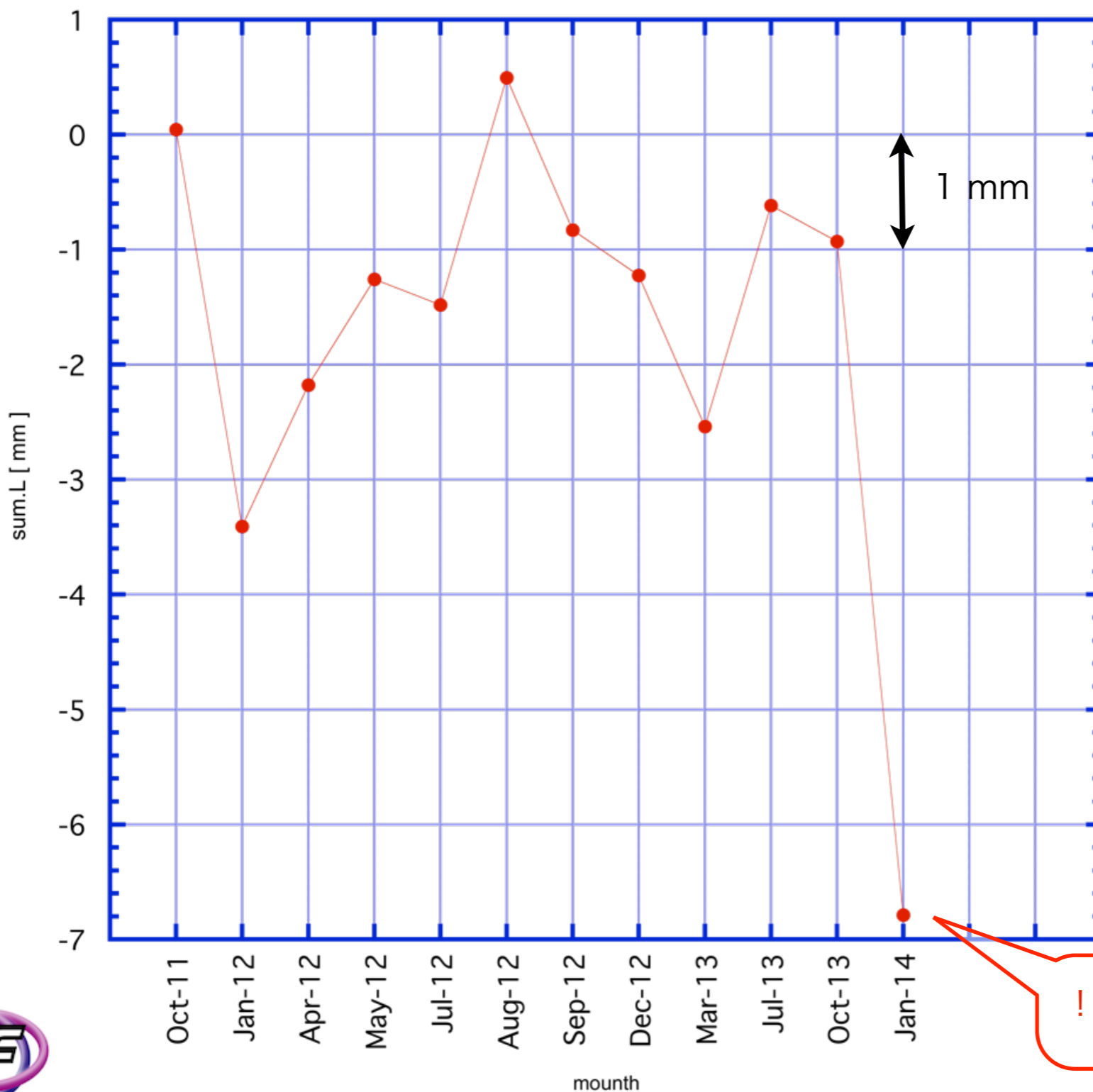
Oct.'11 ~ Jan.'14



circumference

(Bend to B distance)

[measurement - design] Δ difference is totaled.



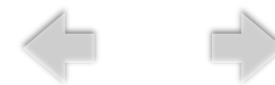
- +0.1 mm Oct. '11 Operation
- - 3.4 mm Jan. '12 Maintenance
- - 2.2 mm Apr. '12 Operation
- - 1.3 mm May '12 Operation
- - 1.5 mm Jul. '12 Operation
- +0.5 mm Aug. '12 Maintenance
- - 0.8 mm Sep. '12 Maintenance
- - 1.2 mm Dec. '12 Operation
- - 2.5 mm Mar. '13 Maintenance
- - 0.6 mm Jul. '13 Operation
- - 0.9 mm Oct. '13 Operation
- - 6.8 mm Jan. '14 Maintenance /120m

! COLD ! magnets, water, room..

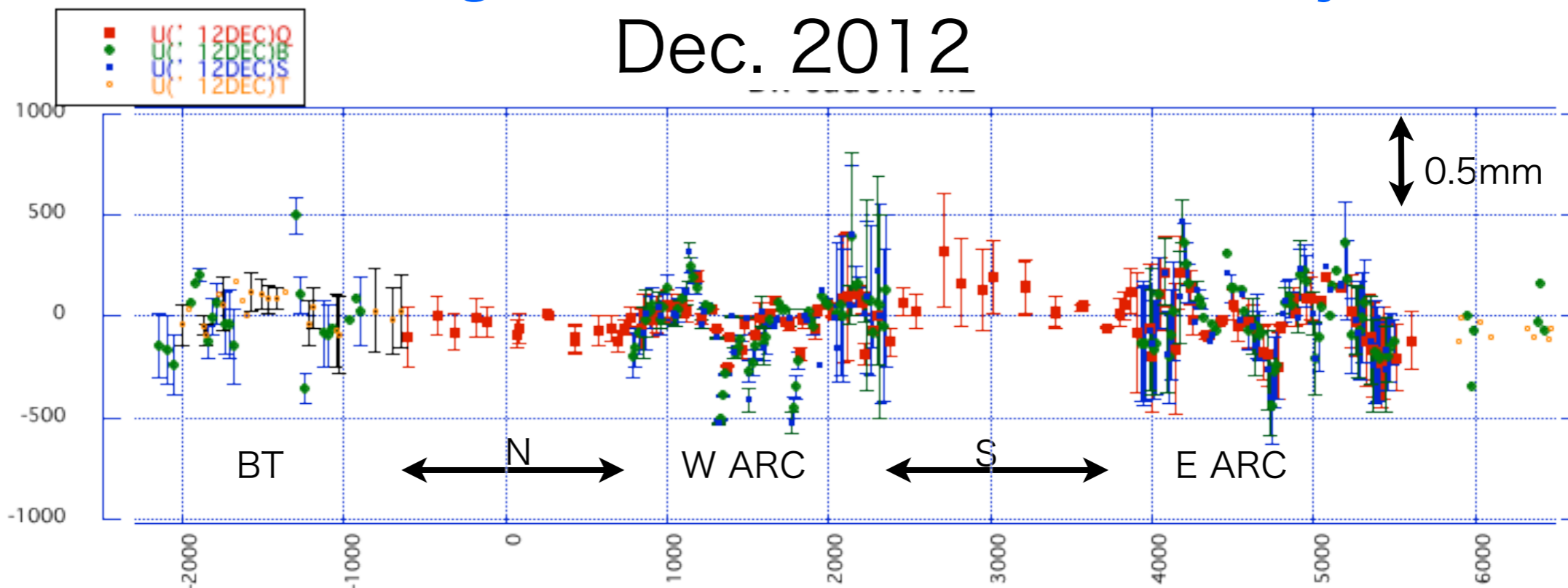




DR survey Transverse (1)

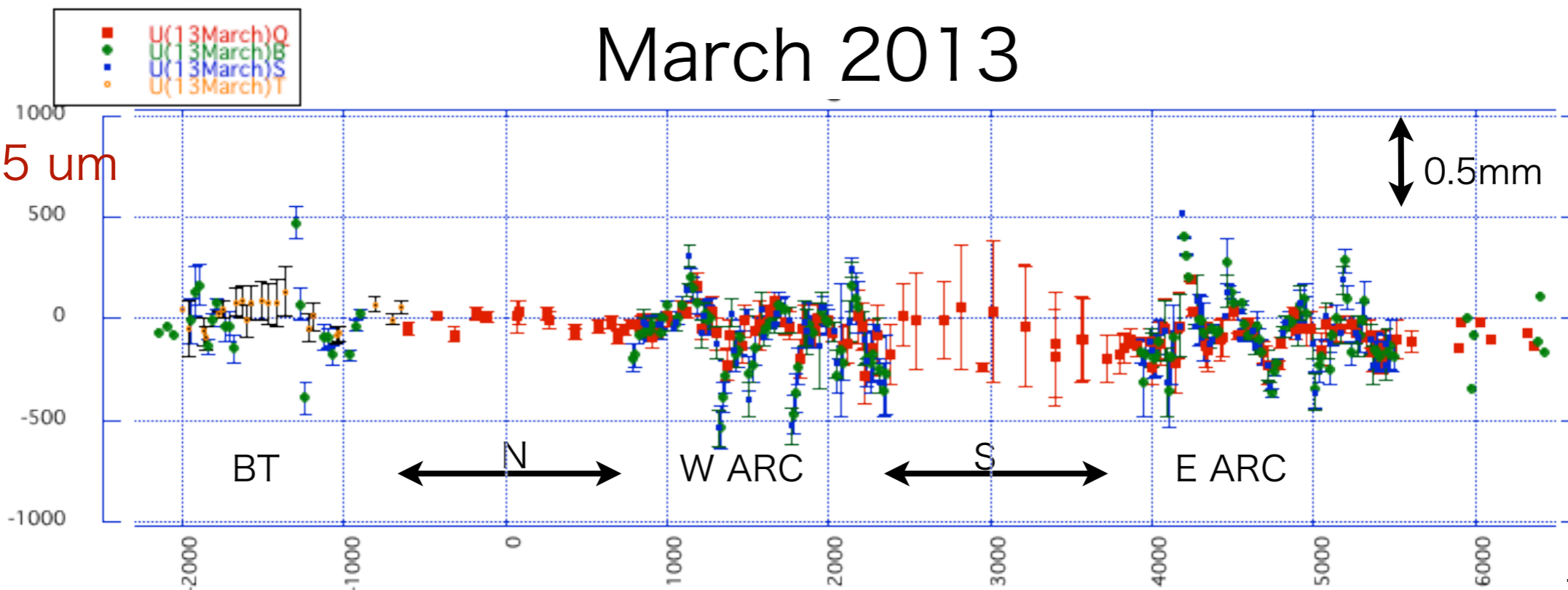


- It seems that alignment is shifting little by little.



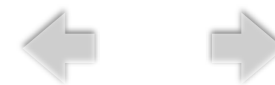
(RMS)

ALL = 145 μm





DR survey Transverse (2)

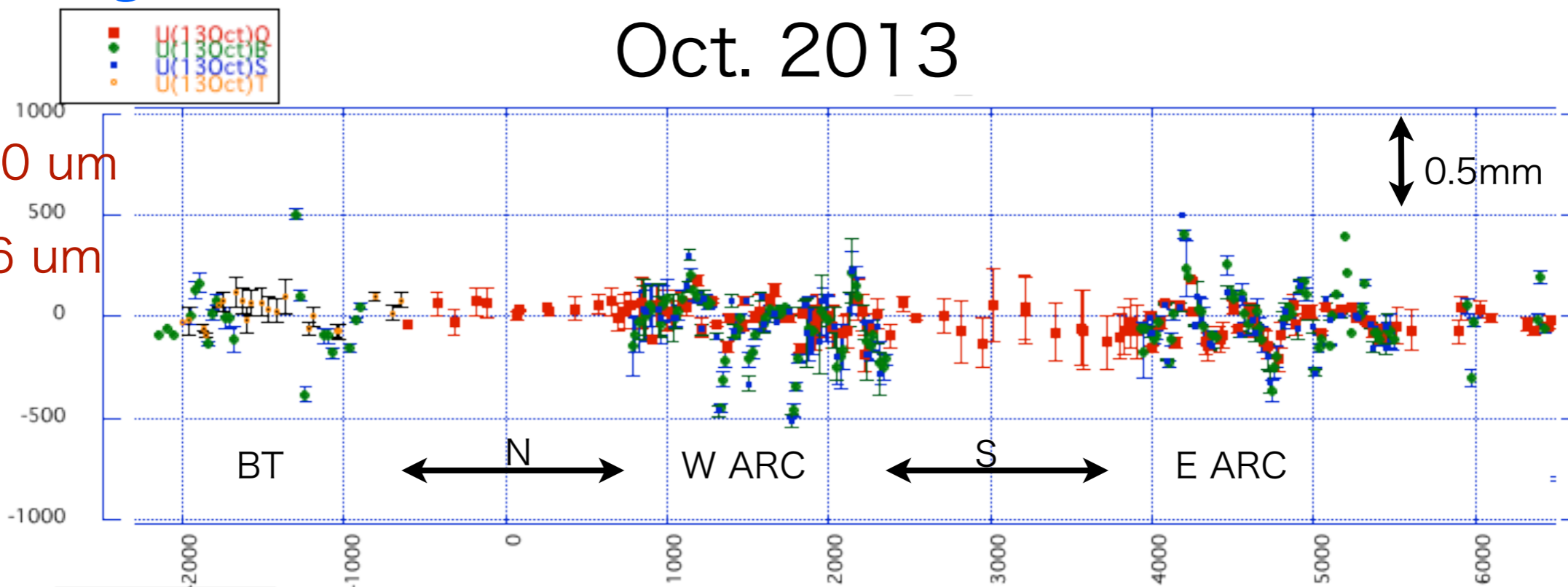


DR alignment 2013

(RMS)

ALL = 130 μm

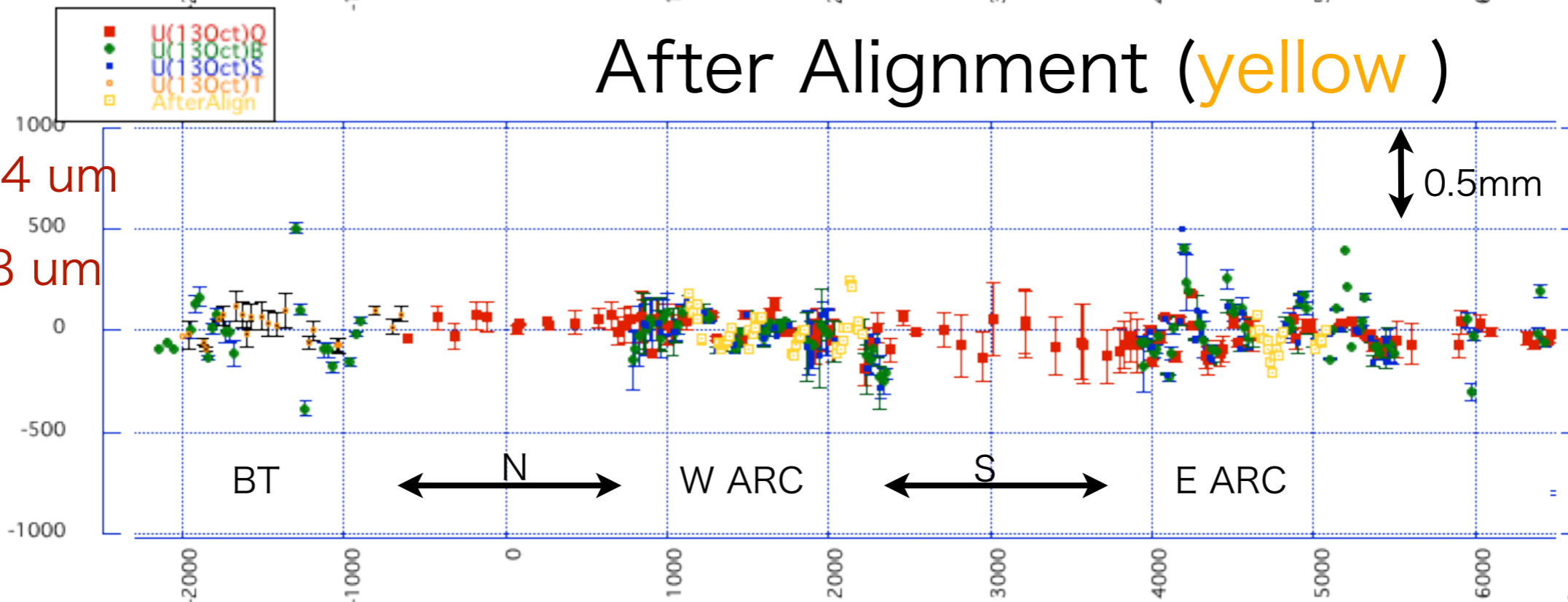
Qmag = 76 μm



(RMS)

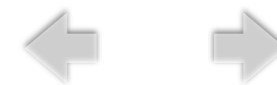
ALL = 104 μm

Qmag = 68 μm





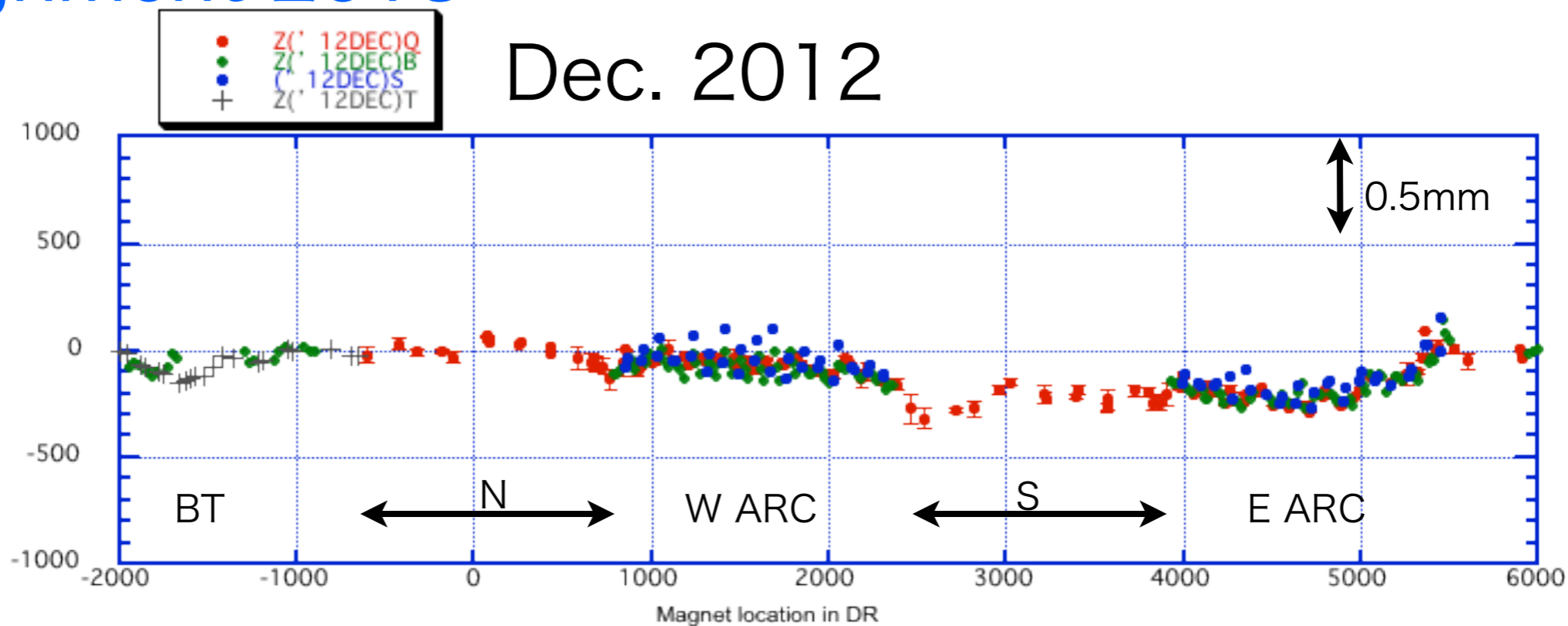
DR survey Vertical (1)



• DR alignment 2013

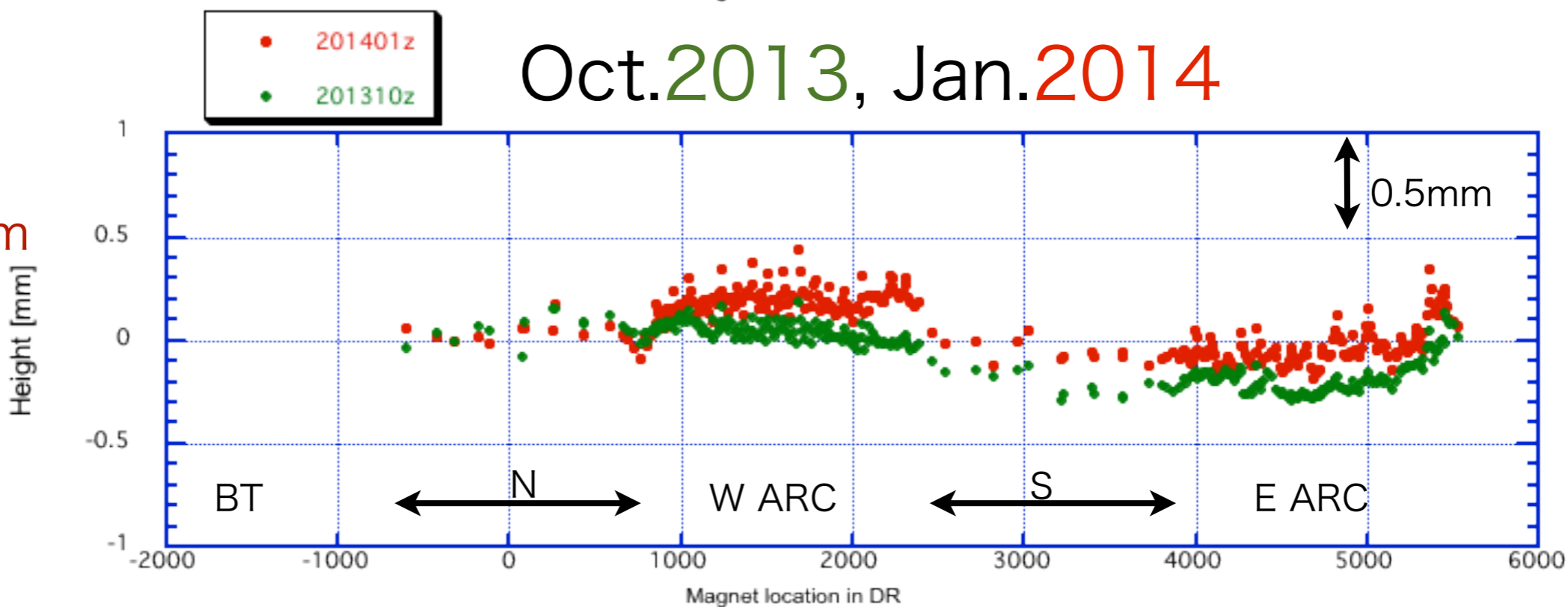
(RMS)

ALL = 130 μm



(RMS)

ALL = 104 μm





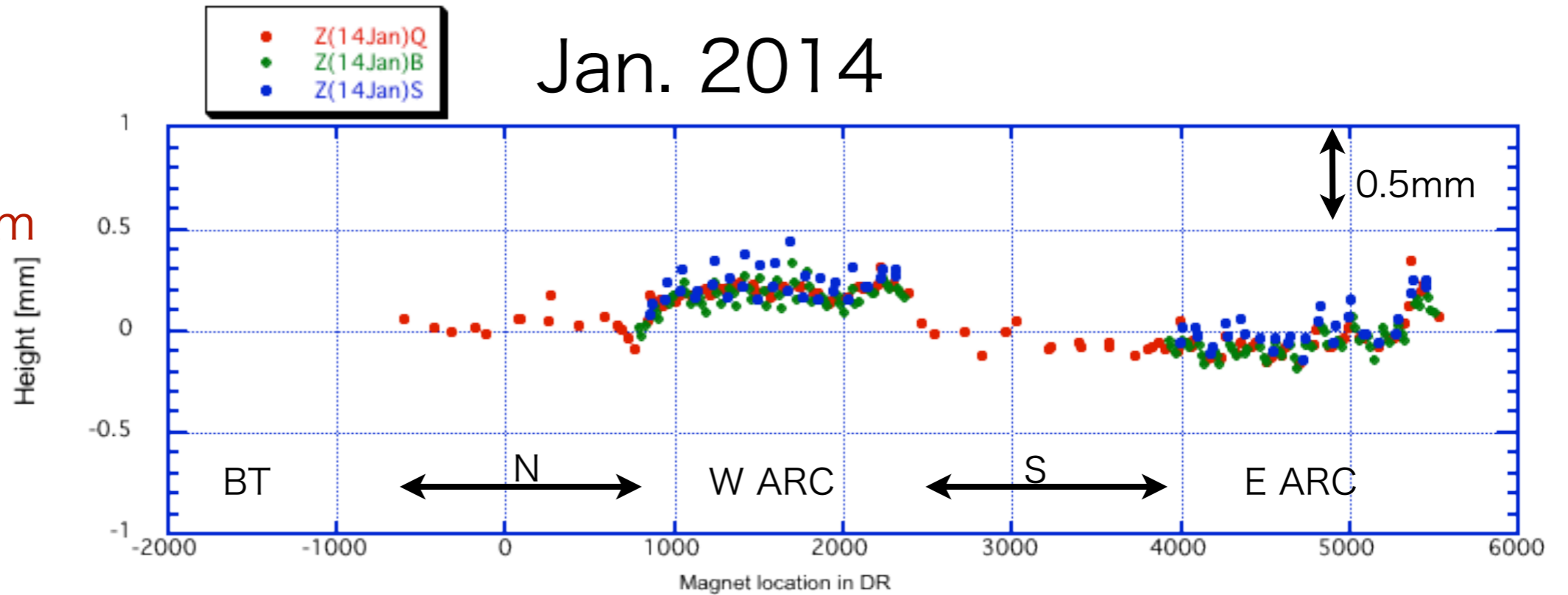
DR survey Vertical (2)



- DR Height adjustment is one mover. Others kept.

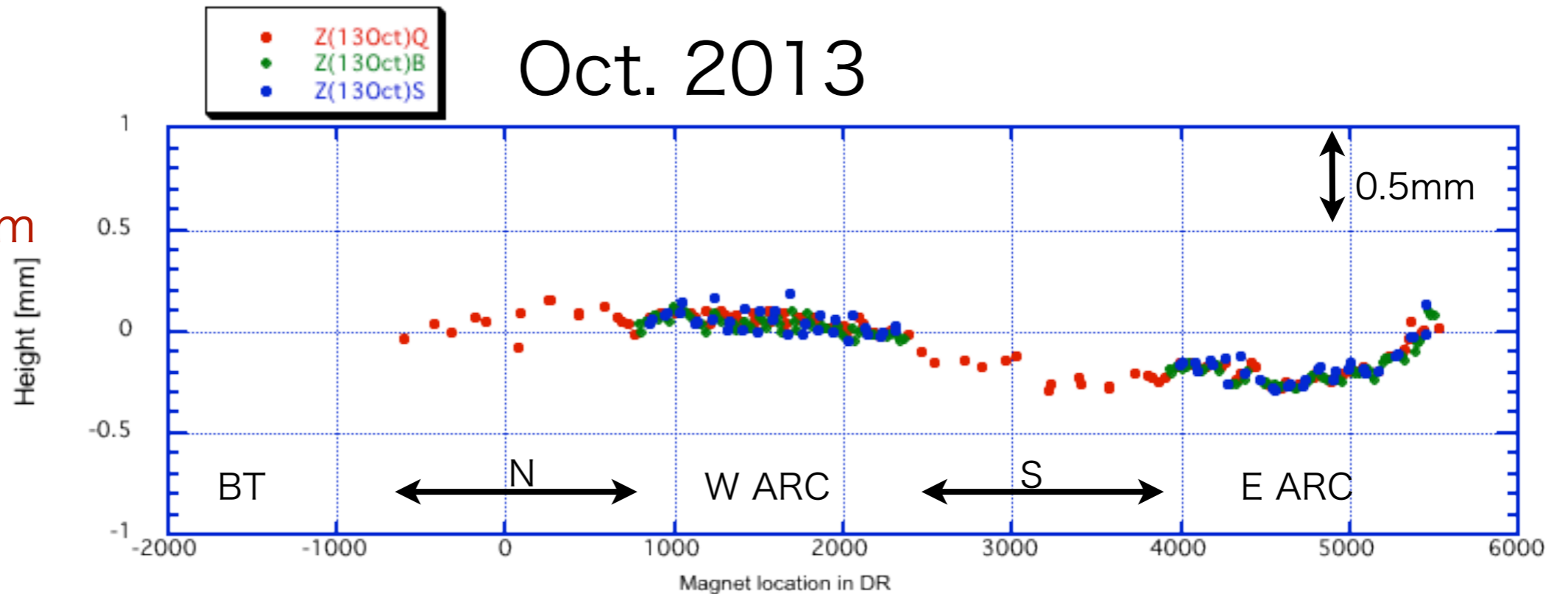
(RMS)

ALL = 155 μm



(RMS)

ALL = 146 μm





- ATF2

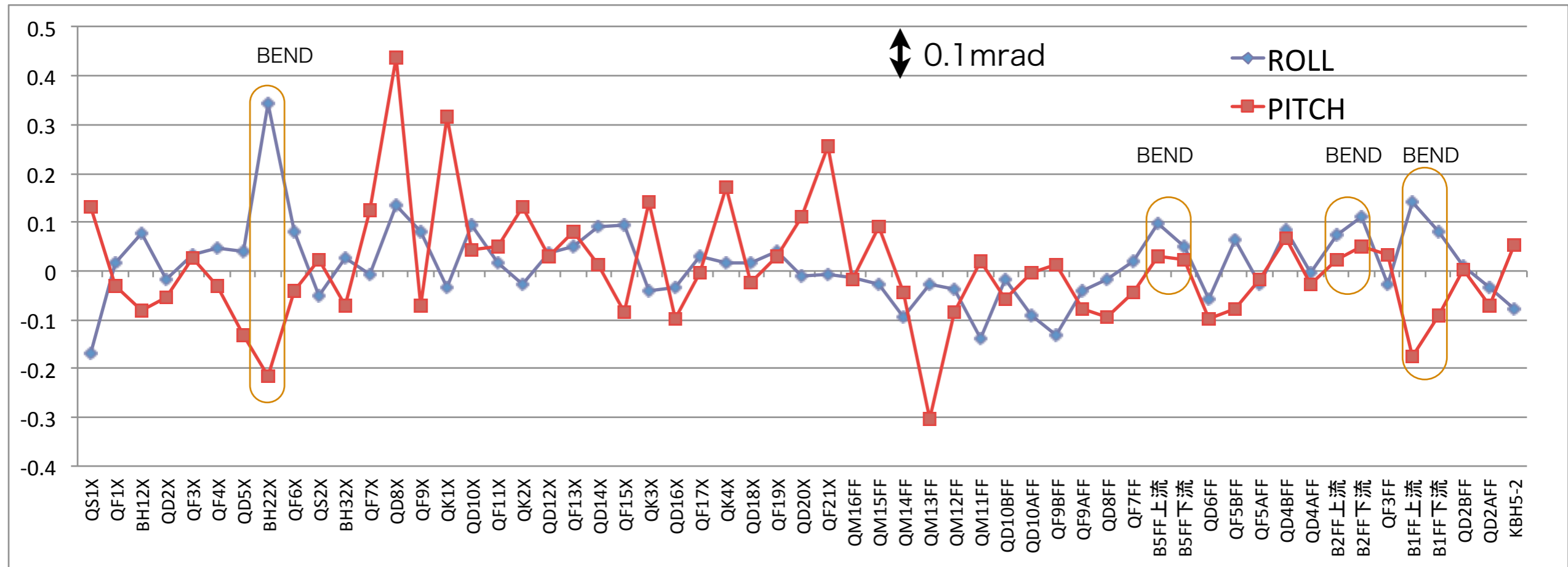
-



EXT/FF_{Q,B}, ROLL&PITCH

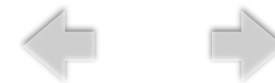
2013 Alignment of a beam pipe at the ATF2.

Magnets position were kept.





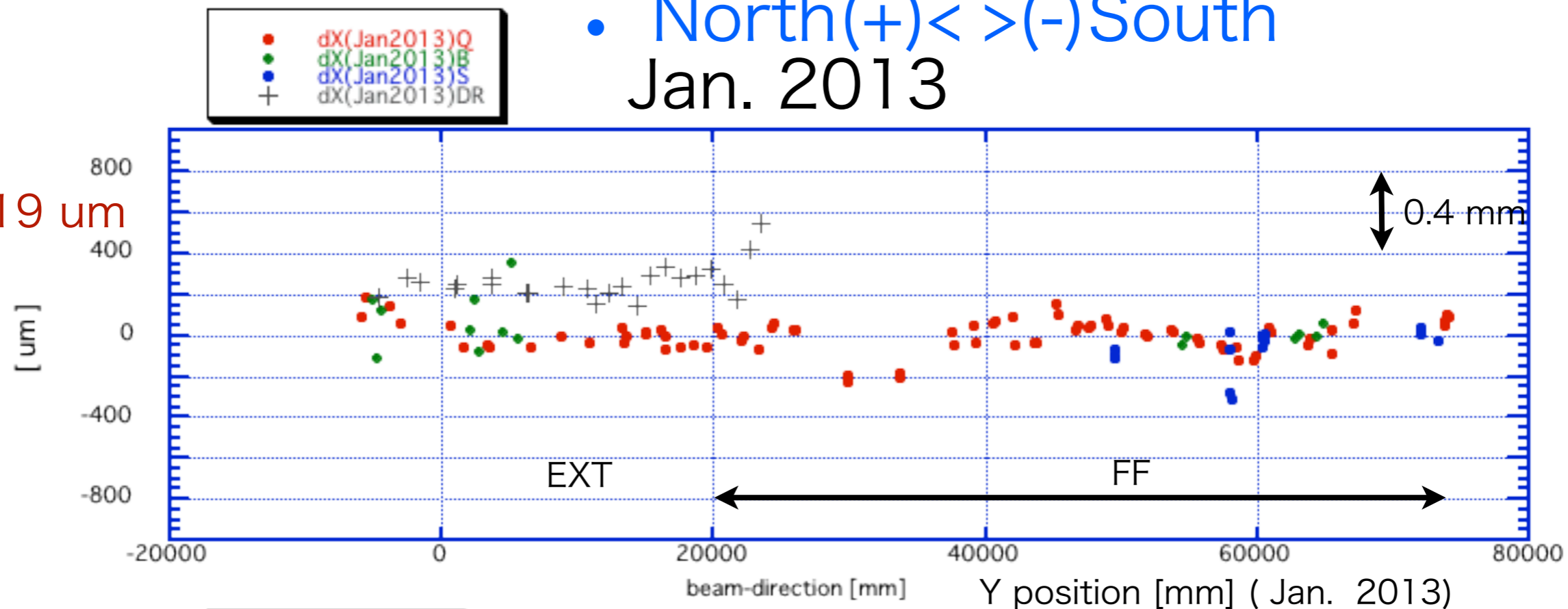
ATF2 survey Transverse



- North(+) < > (-) South
Jan. 2013

(RMS)

Qmag = 119 μm

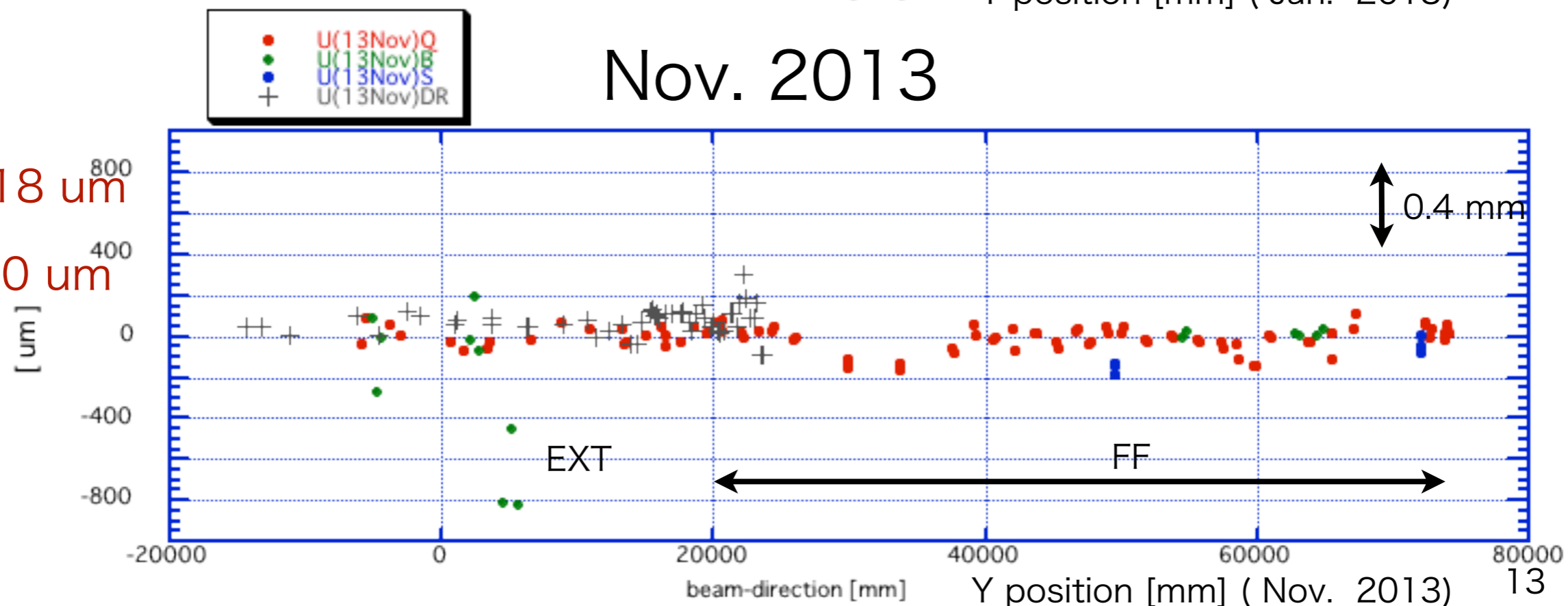


(RMS)

ALL = 118 μm

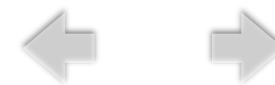
Qmag = 60 μm

Nov. 2013





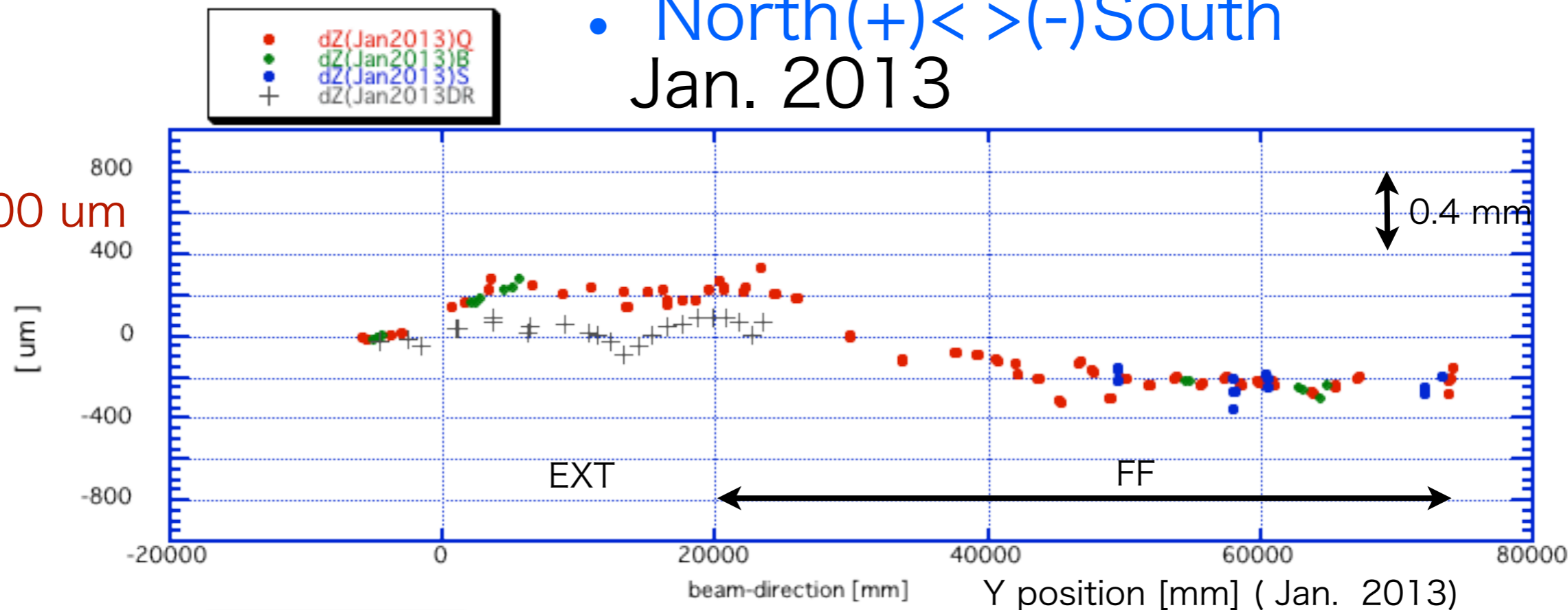
ATF2 survey Vertical



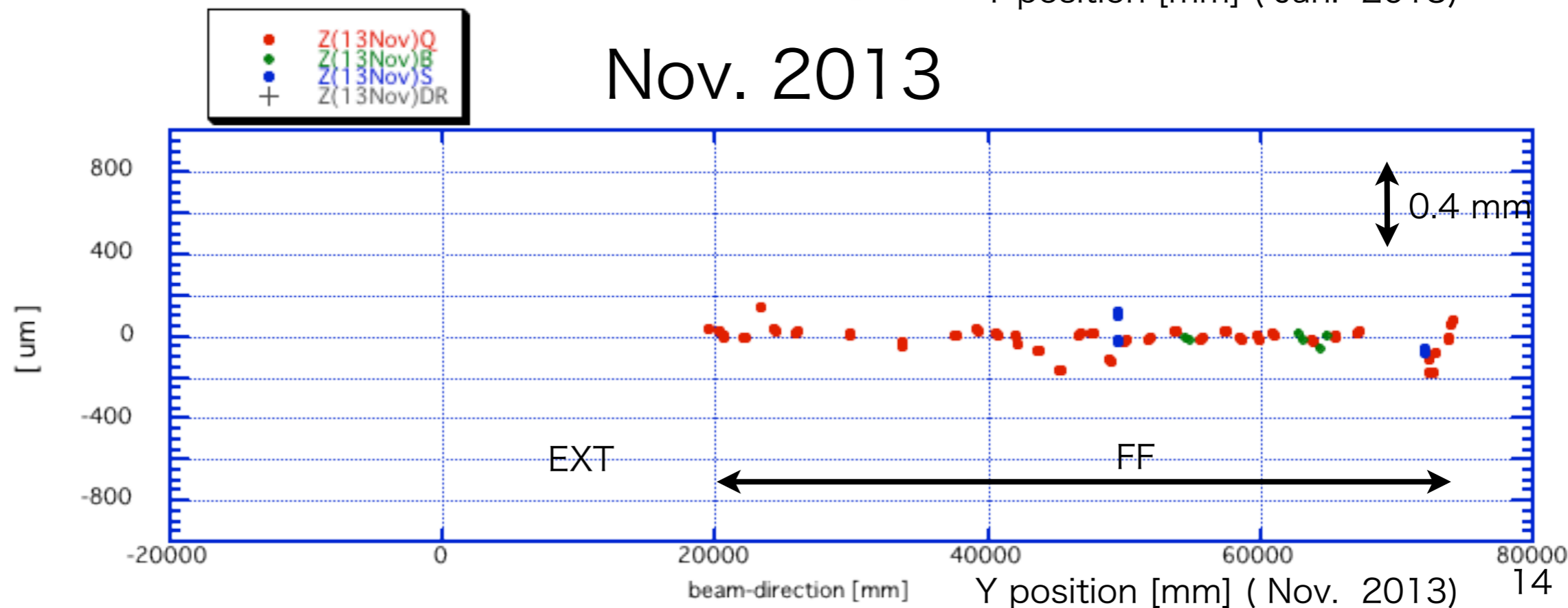
- North(+) < > (-) South
Jan. 2013

(RMS)

Qmag = 200 μm



Nov. 2013





summary



- The survey for DR/ATF2 has been repeated every season.
- We had work for alignment at the some DR mover
- It seems that DR & ATF2 has a **temperature** and a seasonal variation.
- Result of a survey DR, ALL magnets
Vertical **(RMS)** :146 -> 155 um, Horizontal **(RMS)** :104 um (Oct.2013)
- FF, ALL magnets (Oct.2013)
Vertical **(RMS)** : ≤ 200 um, Horizontal **(RMS)** :118 um

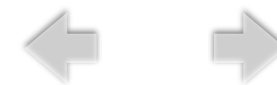
issues

- The alignment was done under the magnets were off.
(cooled down)
- How to align when warm?





おわり



- Thanks for your attention!







ATF2 survey Vertical (2)



Nov. 2013

