

Installation and Alignment of Magnets  
in the KEKB Main Ring

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## Magnet installation

started in February 1997, and  
finished in August 1998.

So many magnets (~1,600 main magnets + ~1,700 steering magnets), and  
So many varieties as well:

- 11 kinds of B-magnet
- 10 kinds of Q-magnets
- 3 kinds of Sx-magnets
- 1 kind of Wiggler magnets
- + 9 kinds of Steering magnets

and

- All the Q-magnets have L- and R-types.
- The First batch and the second batch of LER-QA magnets cannot be connected to the same power supplies.
- Recycled HER-QA and HER-QB magnets have the different hysteresis according to the type of F (Focusing) and D (Defocusing) in TRISTAN. So F-type and D-type magnets in TRISTAN cannot be connected to the same power supplies.
- Some magnets have to be placed reversely because of the tight space.
- . . . . .

→ We had to refer to the arranging table every time, and  
the arrangement of magnets had to be check over and over again.

## **Magnet alignment**

started in October 1997

finished in November 1998

Alignment in the arc section and Tsukuba straight section:

Laser tracker to adjust the horizontal position

Leveling telescope to adjust the height

Level to adjust the level

Alignment in the straight section except for Tsukuba area:

Stretched wire system to adjust the horizontal position perpendicular to the beam direction

Mekometer to adjust the distance

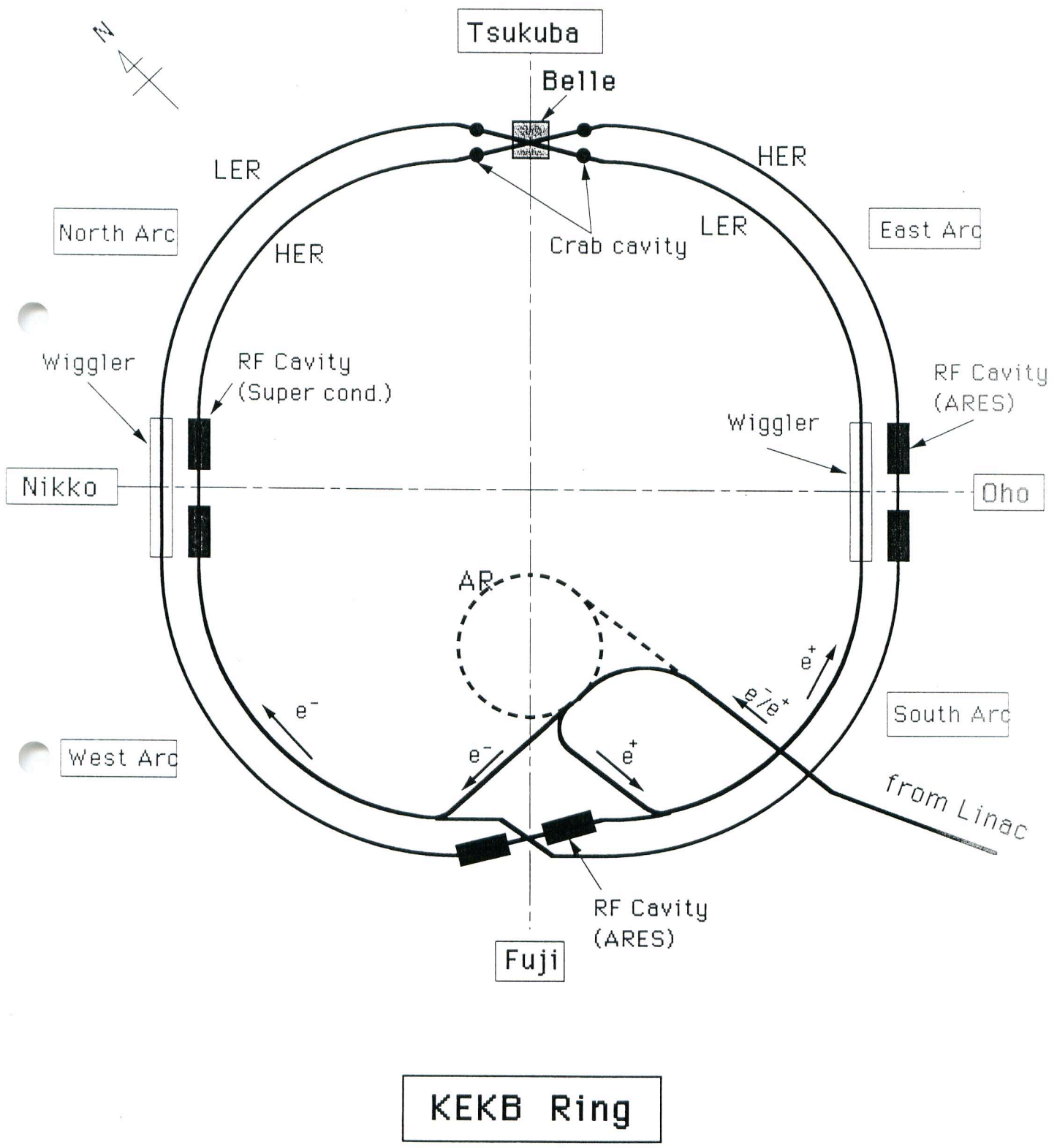
Leveling telescope to adjust the height

to adjust the level

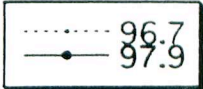
## **Results**

1. Level

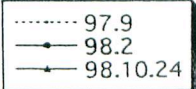
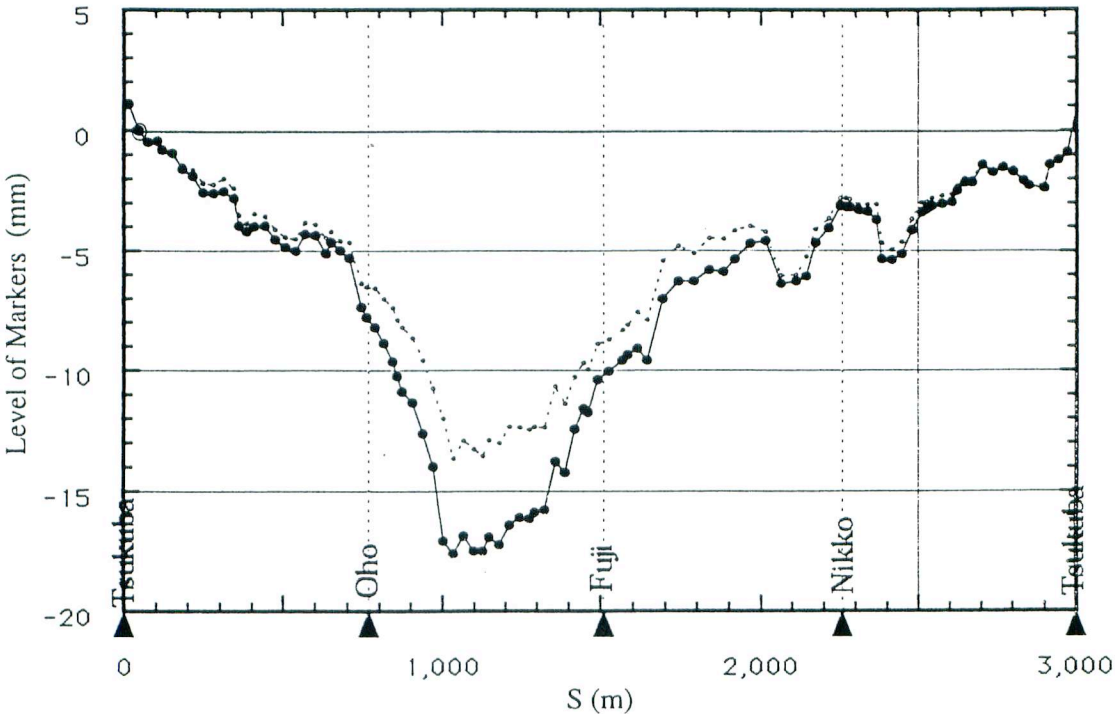
2. Horizontal position



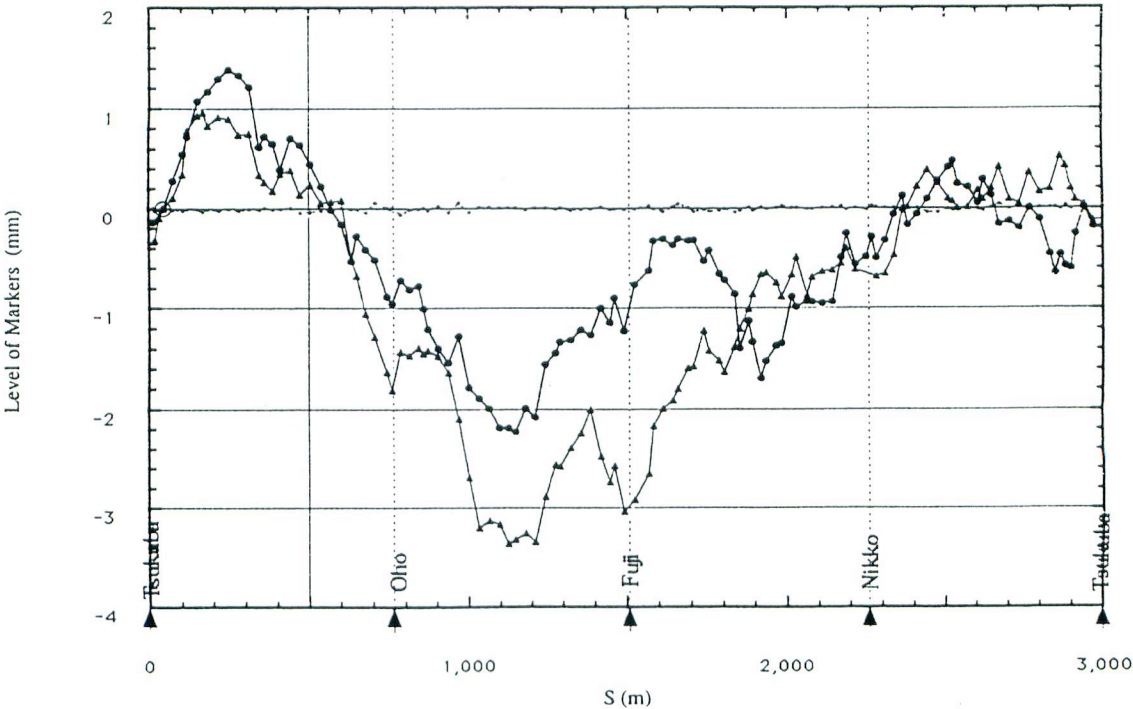
**KEKB Ring**

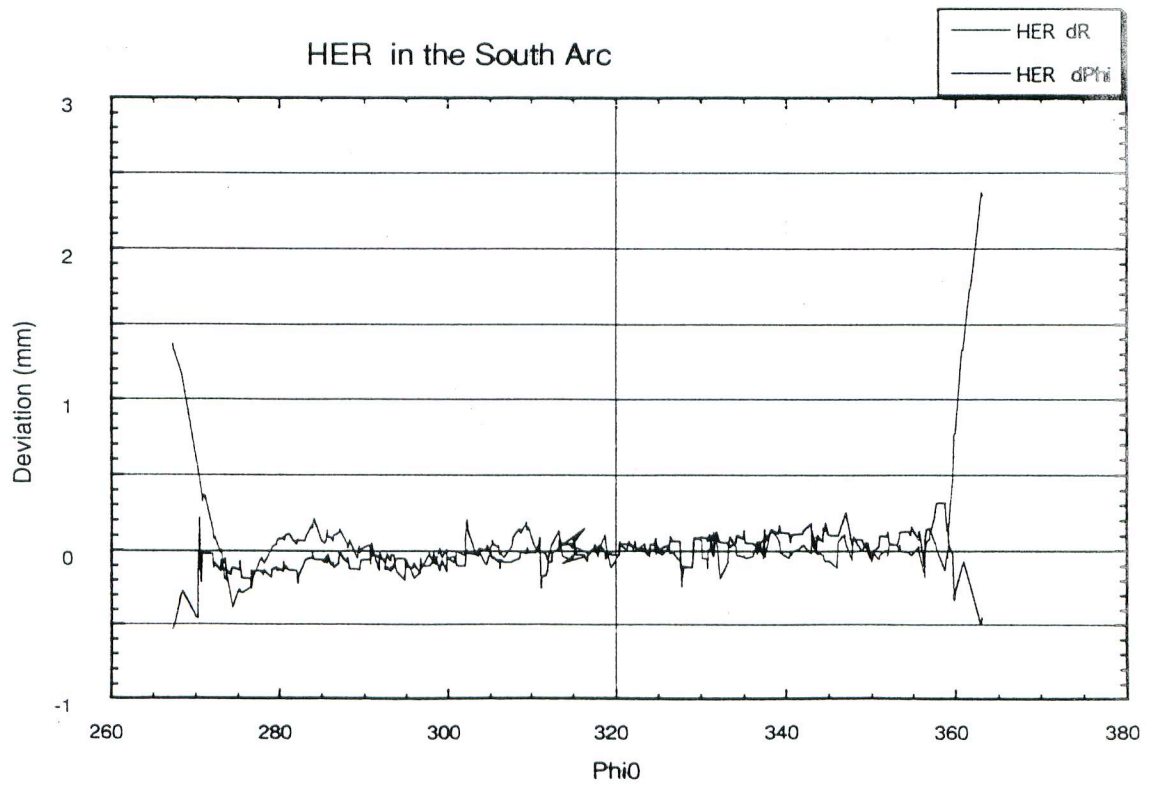
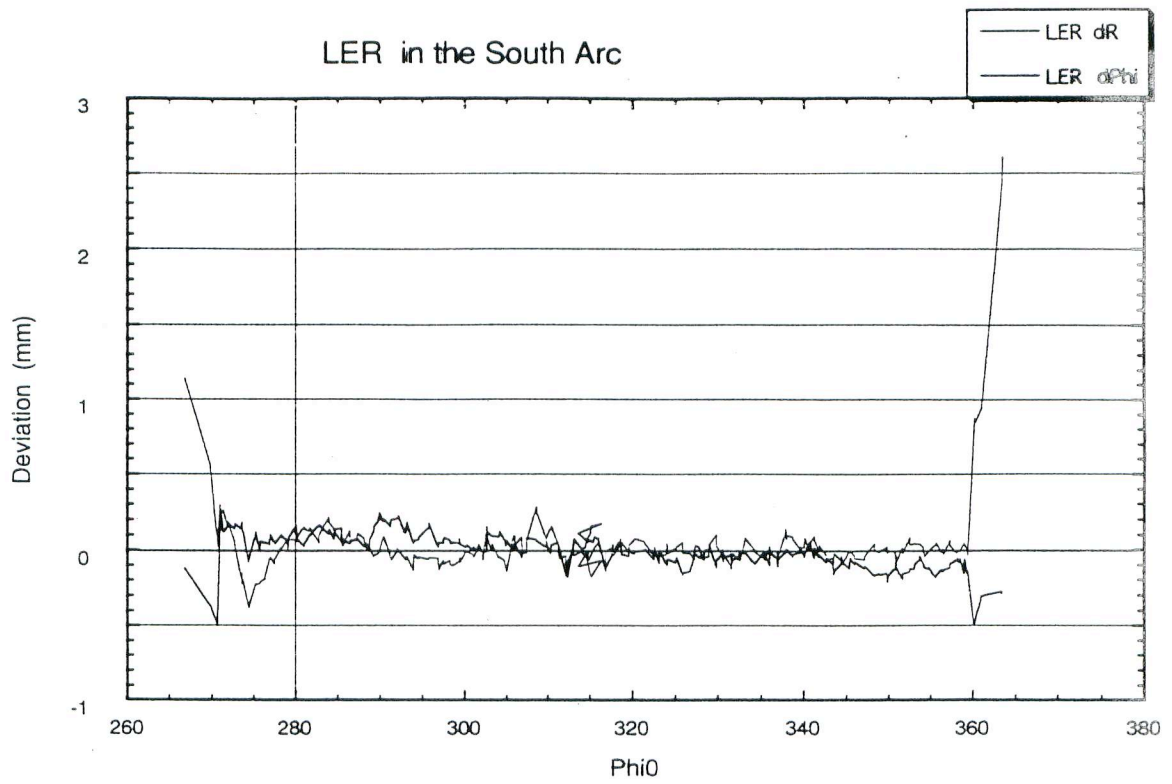


Level marker survey\_981024.excl

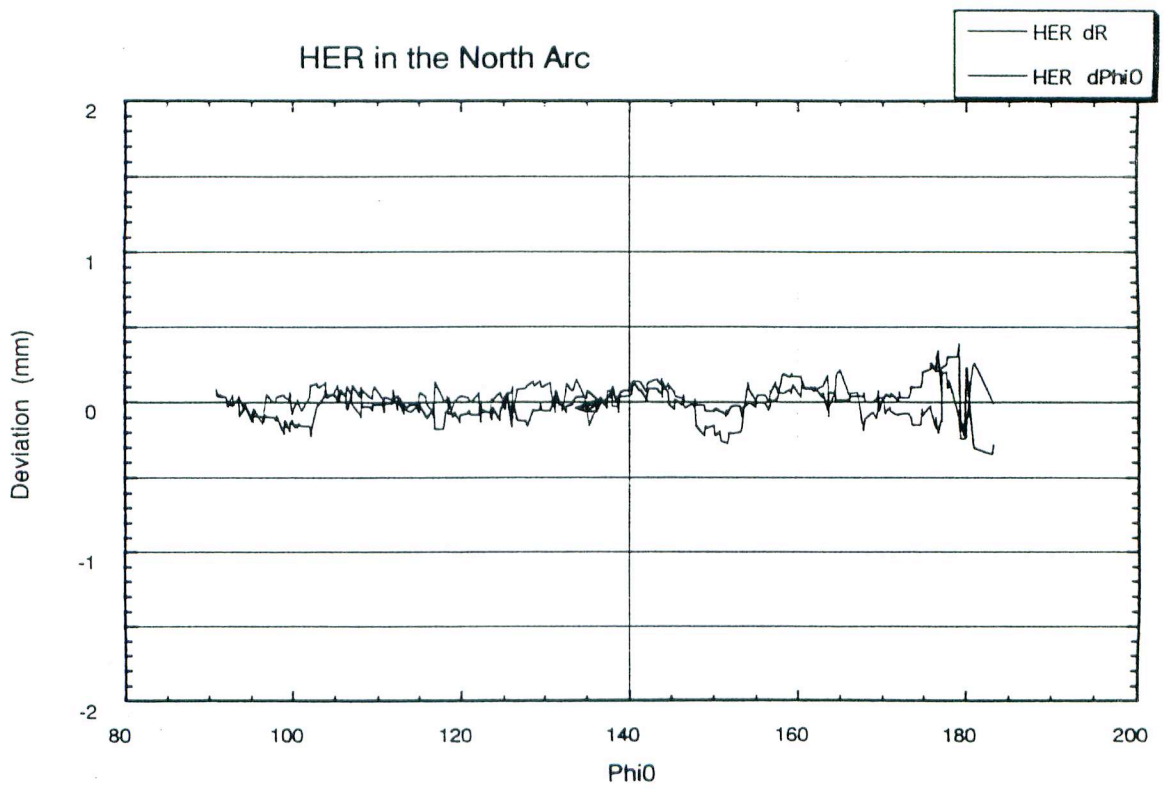
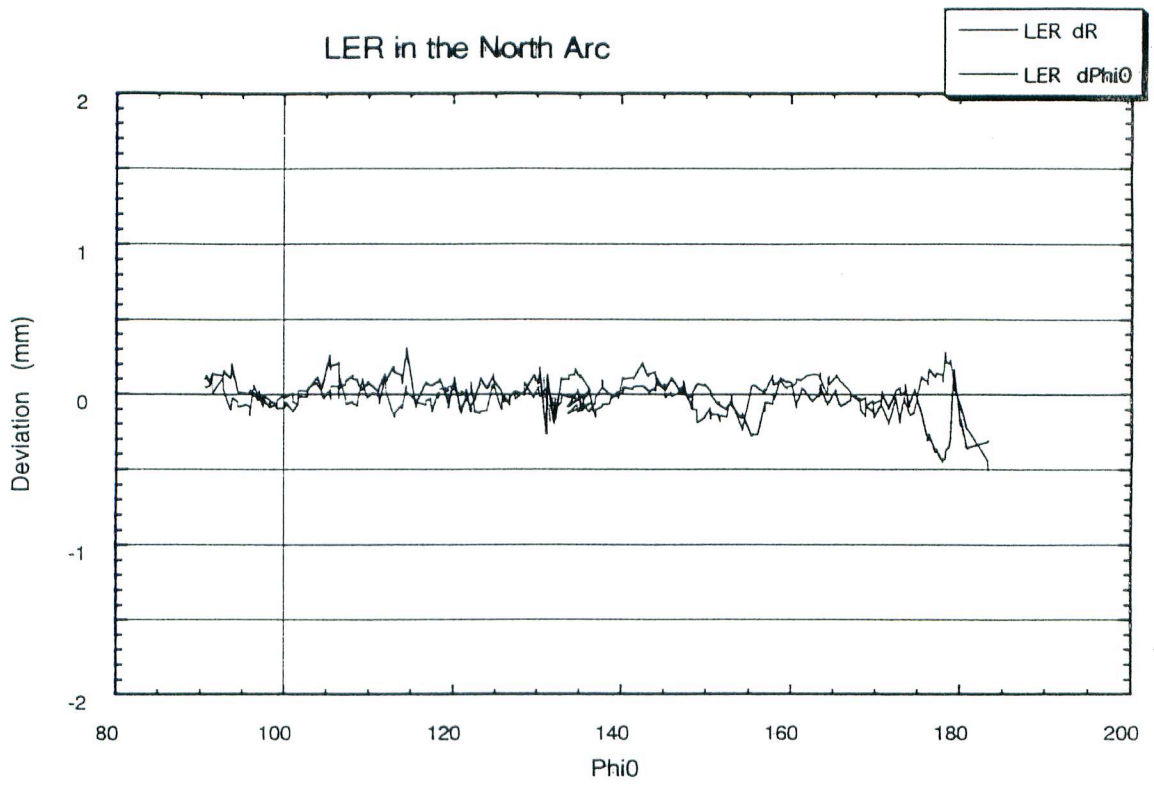


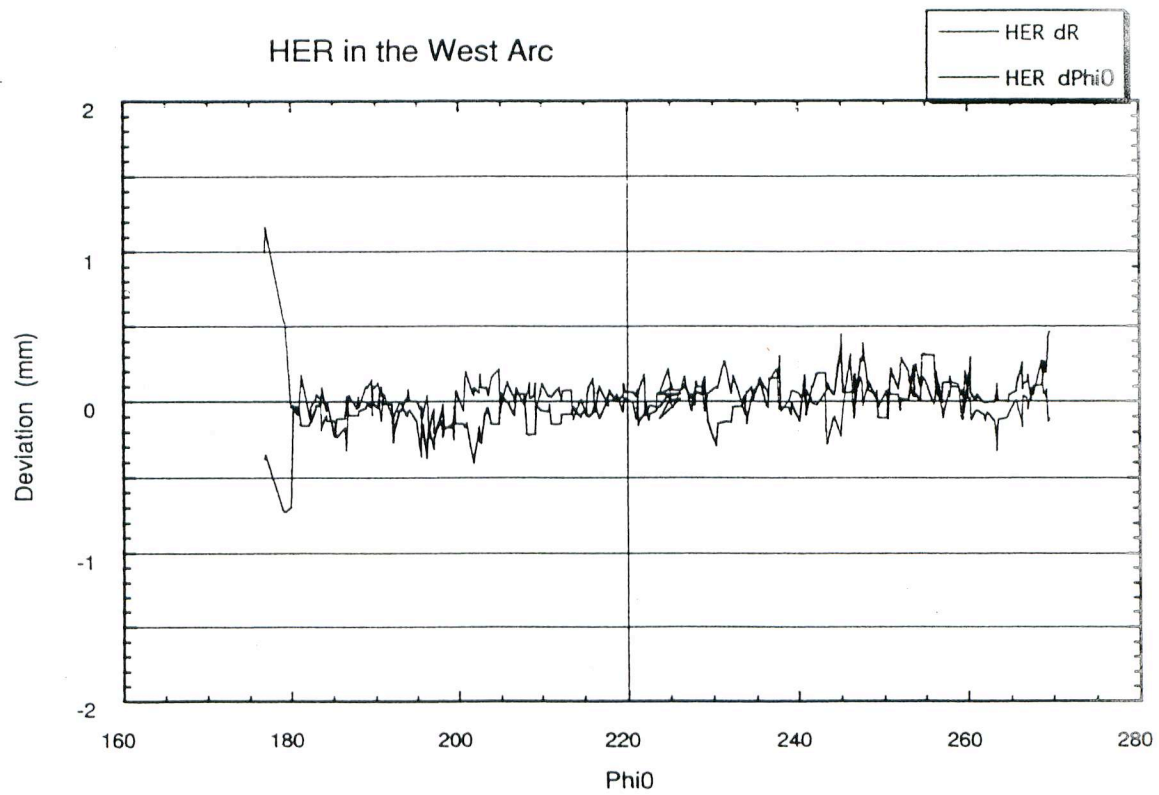
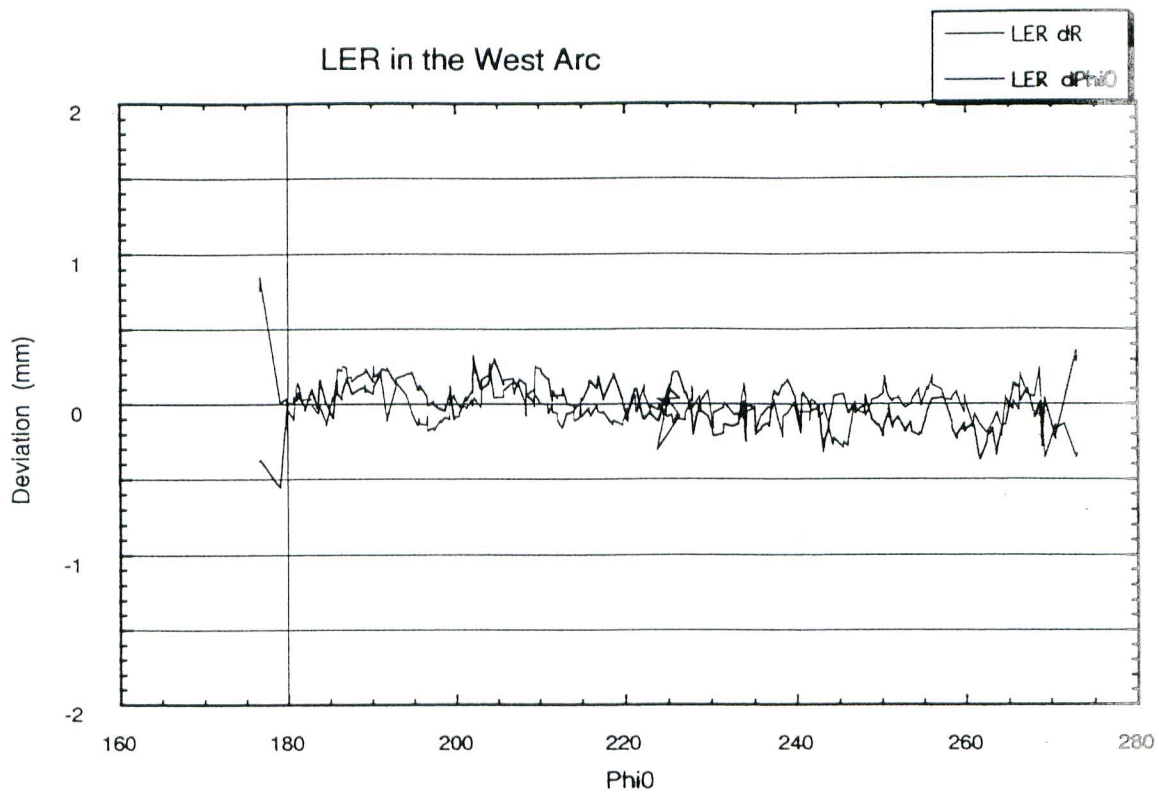
Level marker survey\_981024.excl



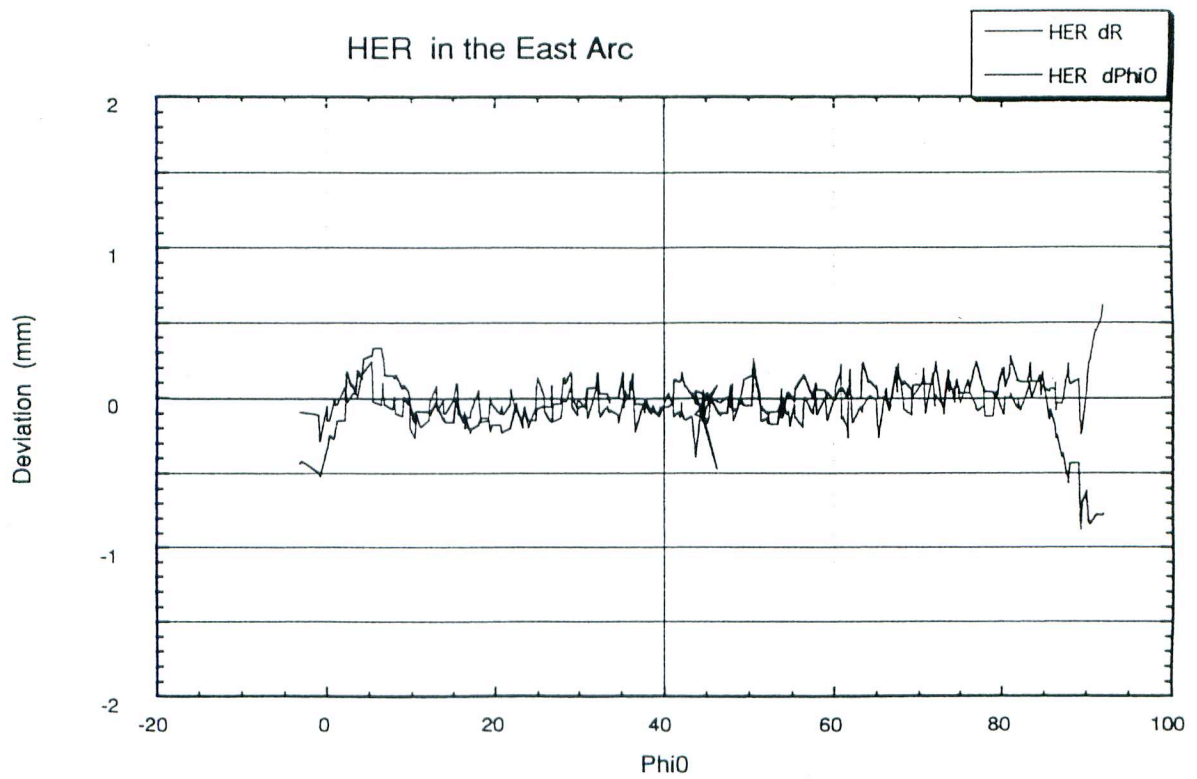
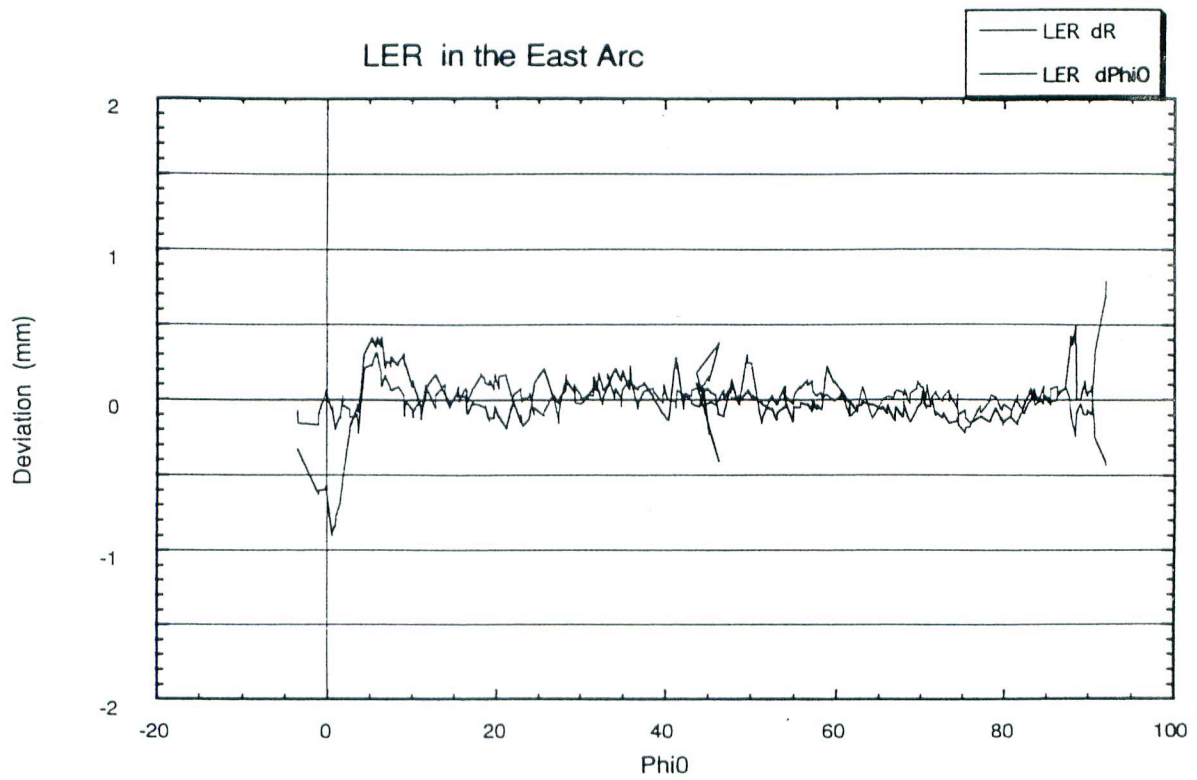




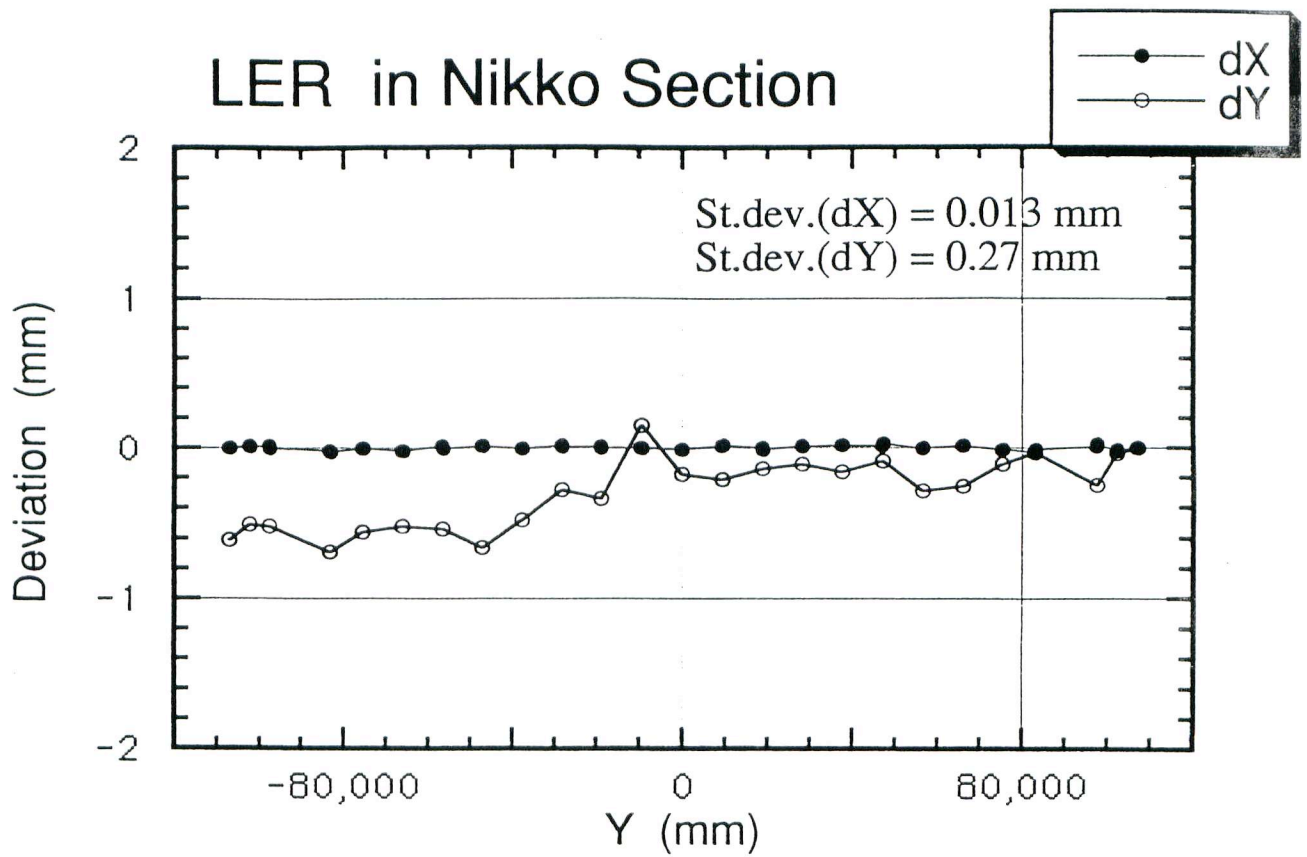




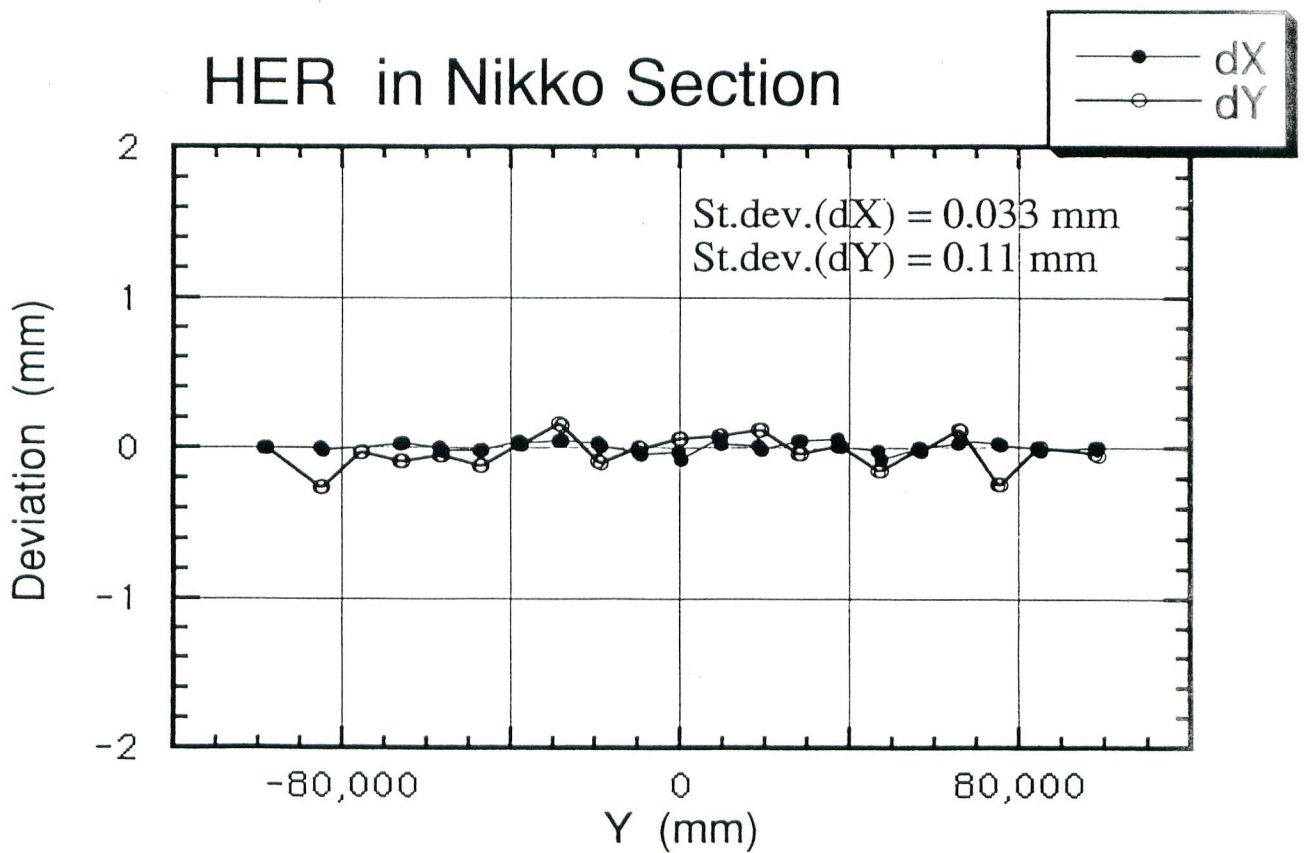




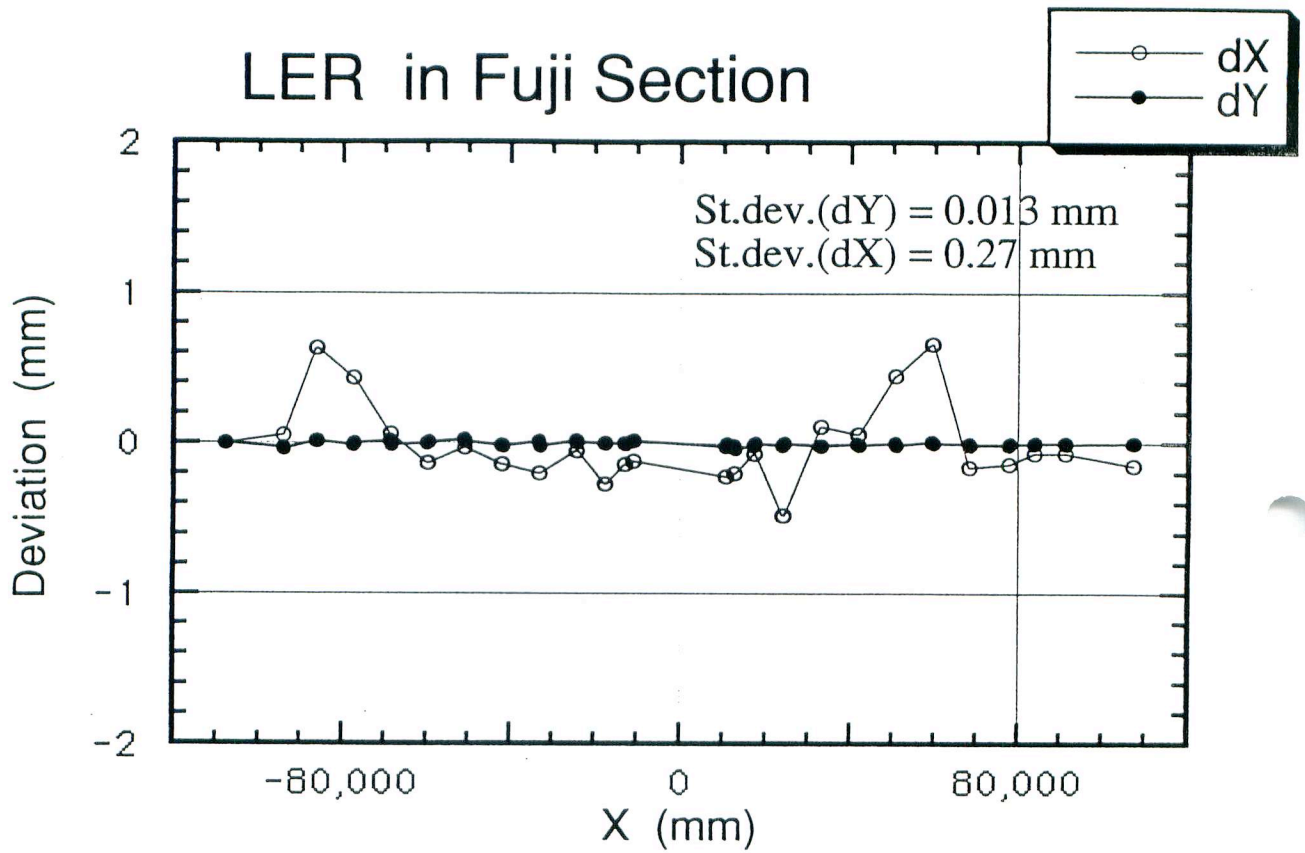
# LER in Nikko Section



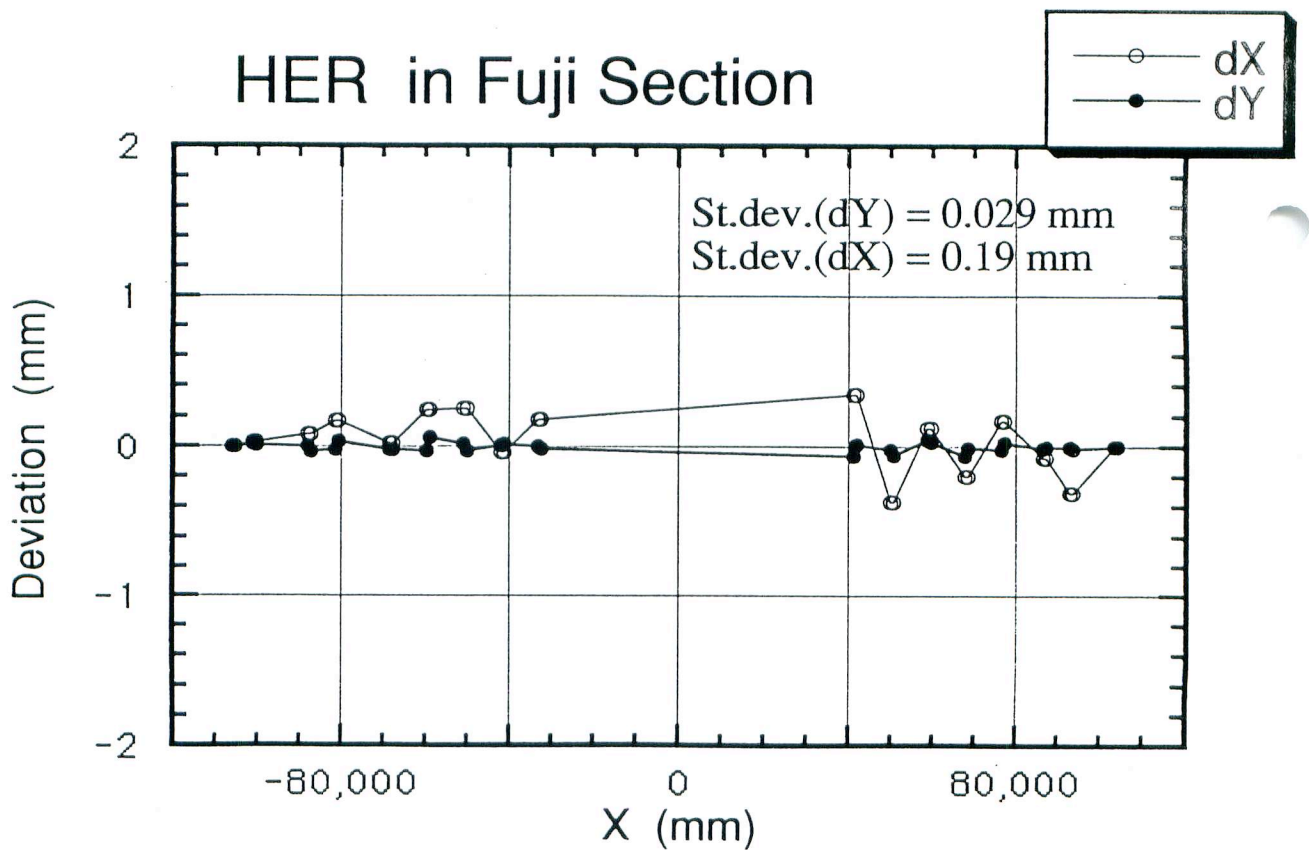
# HER in Nikko Section



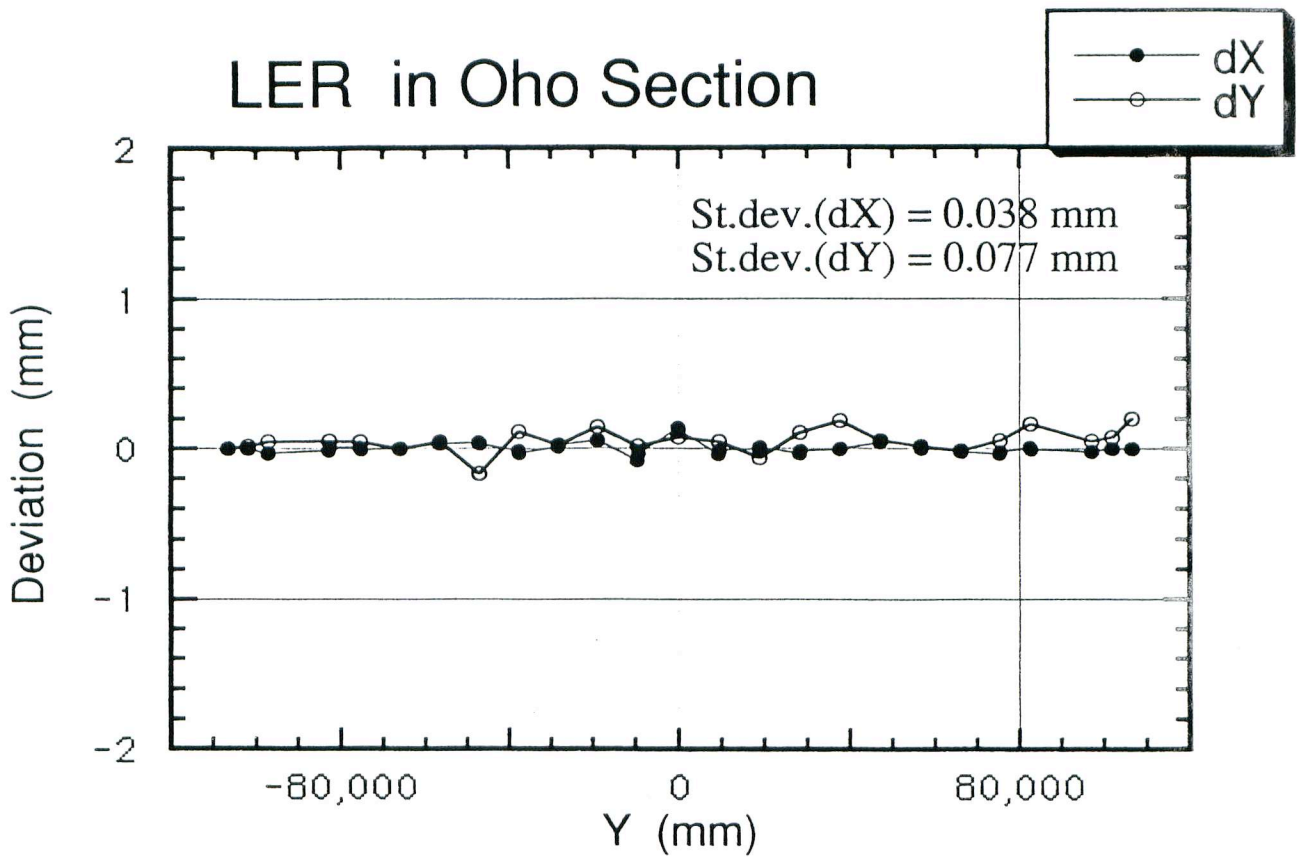
## LER in Fuji Section



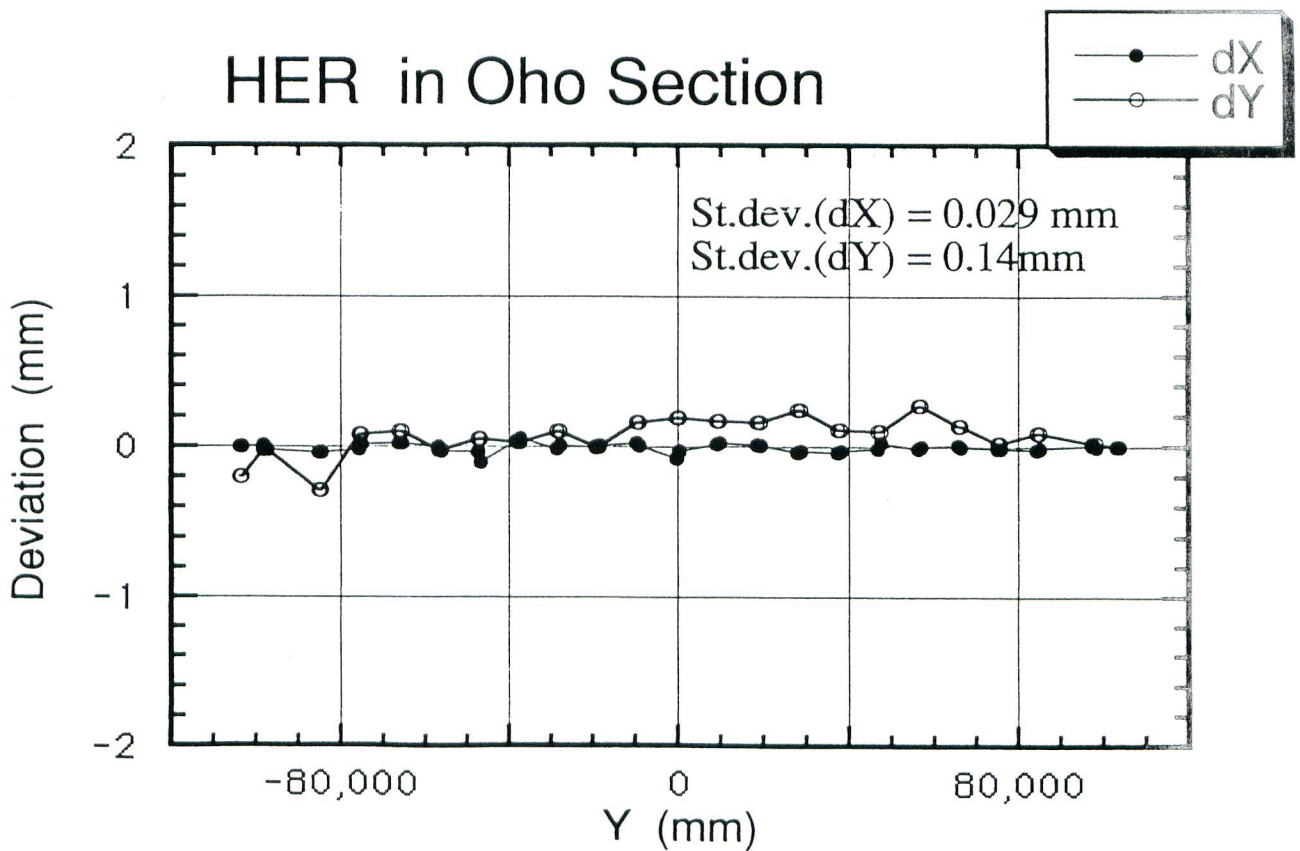
## HER in Fuji Section



## LER in Oho Section

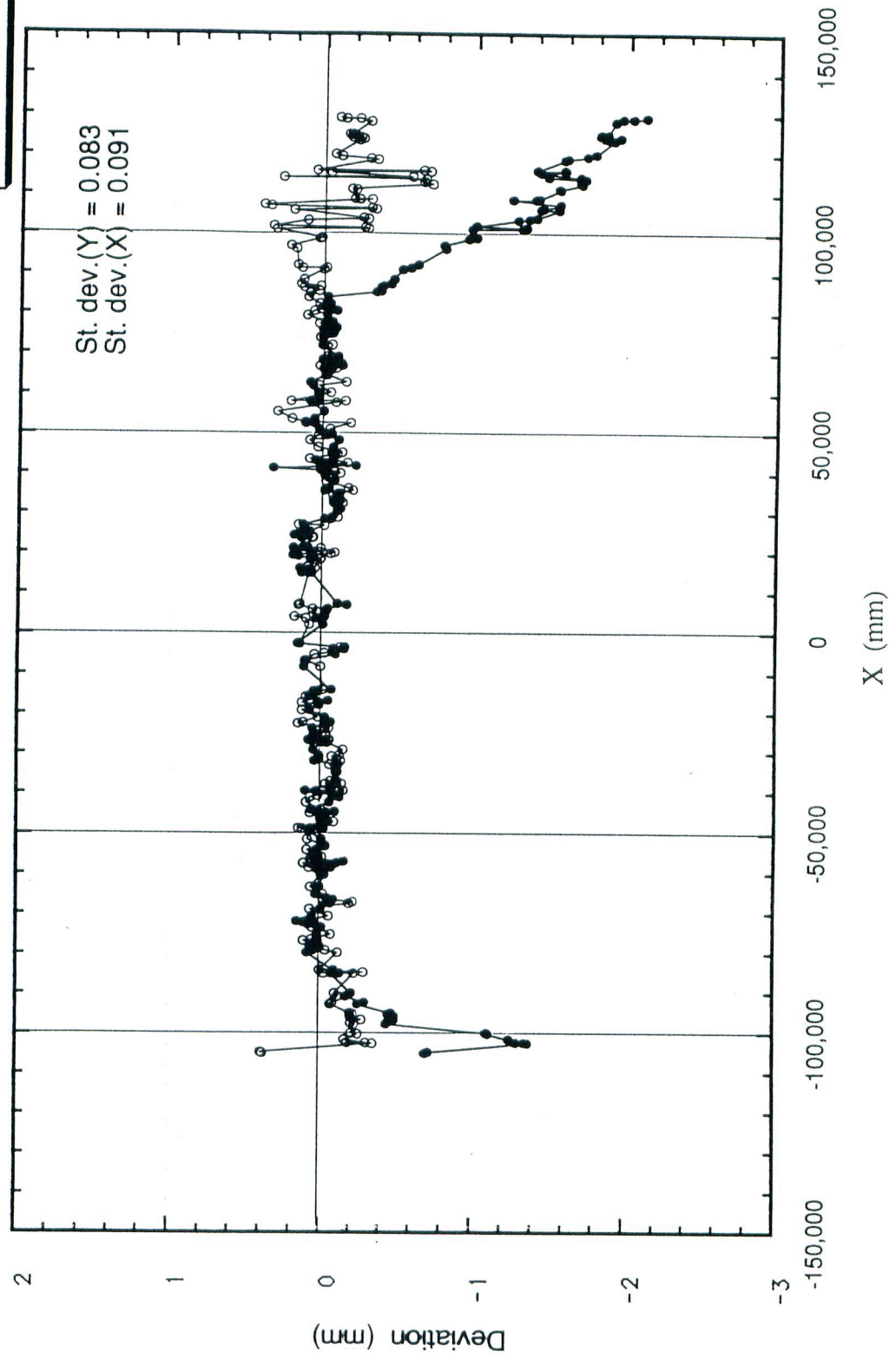
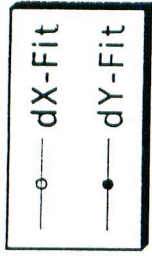


## HER in Oho Section



*Preliminary*

Tsukuba Straight Section





## Errors in the Magnet Alignment

	LER		HER	
	dR (mm)	dPhi (mm)	dR (mm)	dPhi (mm)
Tsukuba	0.08	0.09	← LER + HER	
North Arc	0.09	0.12	0.10	0.10
West Arc	0.11	0.14	0.12	0.14
South Arc	0.09	0.10	0.11	0.10
East Arc	0.10	0.17	0.11	0.16
All Arc Sections	0.10	0.14	0.11	0.13
Nikko	0.01	0.27	0.03	0.11
Fuji	0.01	0.27	0.03	0.19
Oho	0.04	0.08	0.03	0.14
All Straight Sections	0.02	0.22	0.03	0.15
Tolerance	0.15	0.50	0.15	0.50

## Kink at the Joint of Arc and Straight Sections

	R Side (mrad)	L Side (mrad)
Tsukuba	0.04	0.04
Nikko	< 0.01	0.09
Fuji	0.07	< 0.01
Oho	0.05	< 0.01



