



# Padova – Legnaro report

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- **Production summary**
- **Analysis summary**
- **Survey checks**
- **Conclusions**

# Legnaro production status\*

## Summary (12/03/04)

**40 CHAMBERS** completed : 36 MB3, 4 MB4-4 (2 eq. with HVB-I)

**132 SuperLayers**

**(88 phi, 44 theta)** (4 more chambers ready to be assembled)

**~ 520 Layers**

**all the tables working ~100% since recabling accomplished**

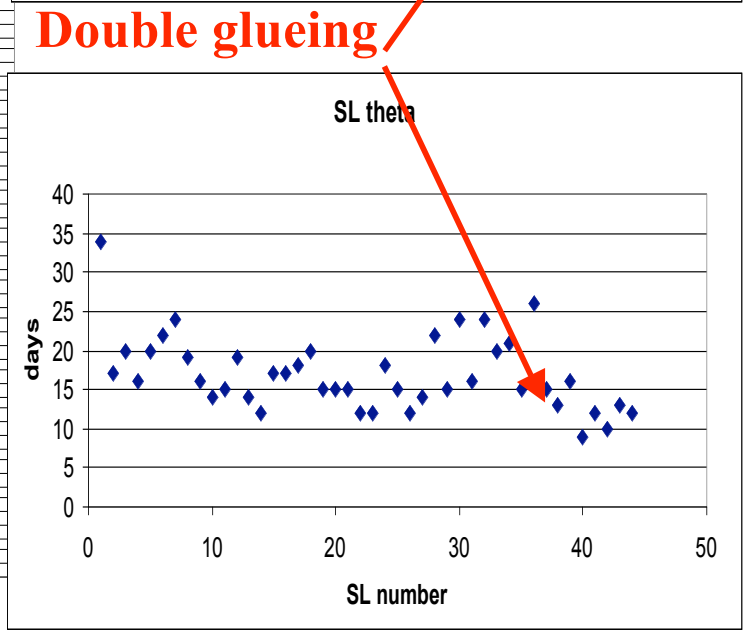
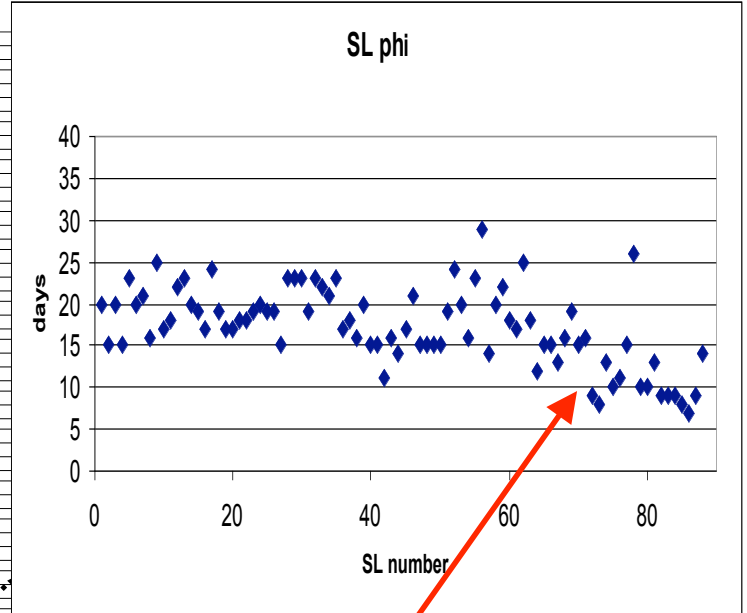
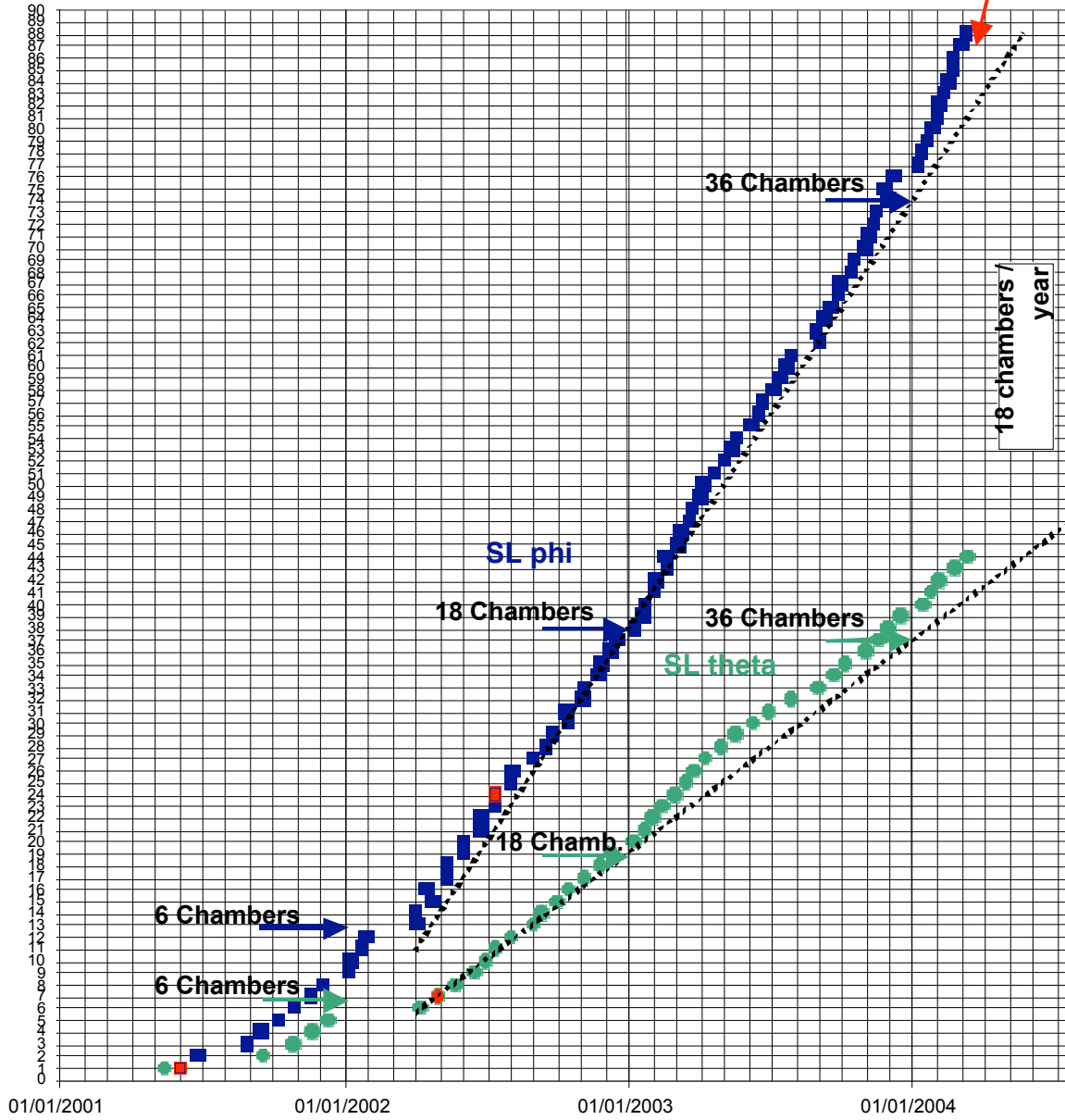
**~ 700 wires produced for Torino**

**(computer for wire machine control substituted)**

\*P.C., E. Torassa.....

16.03.2004

**~2.5 chamber/month**

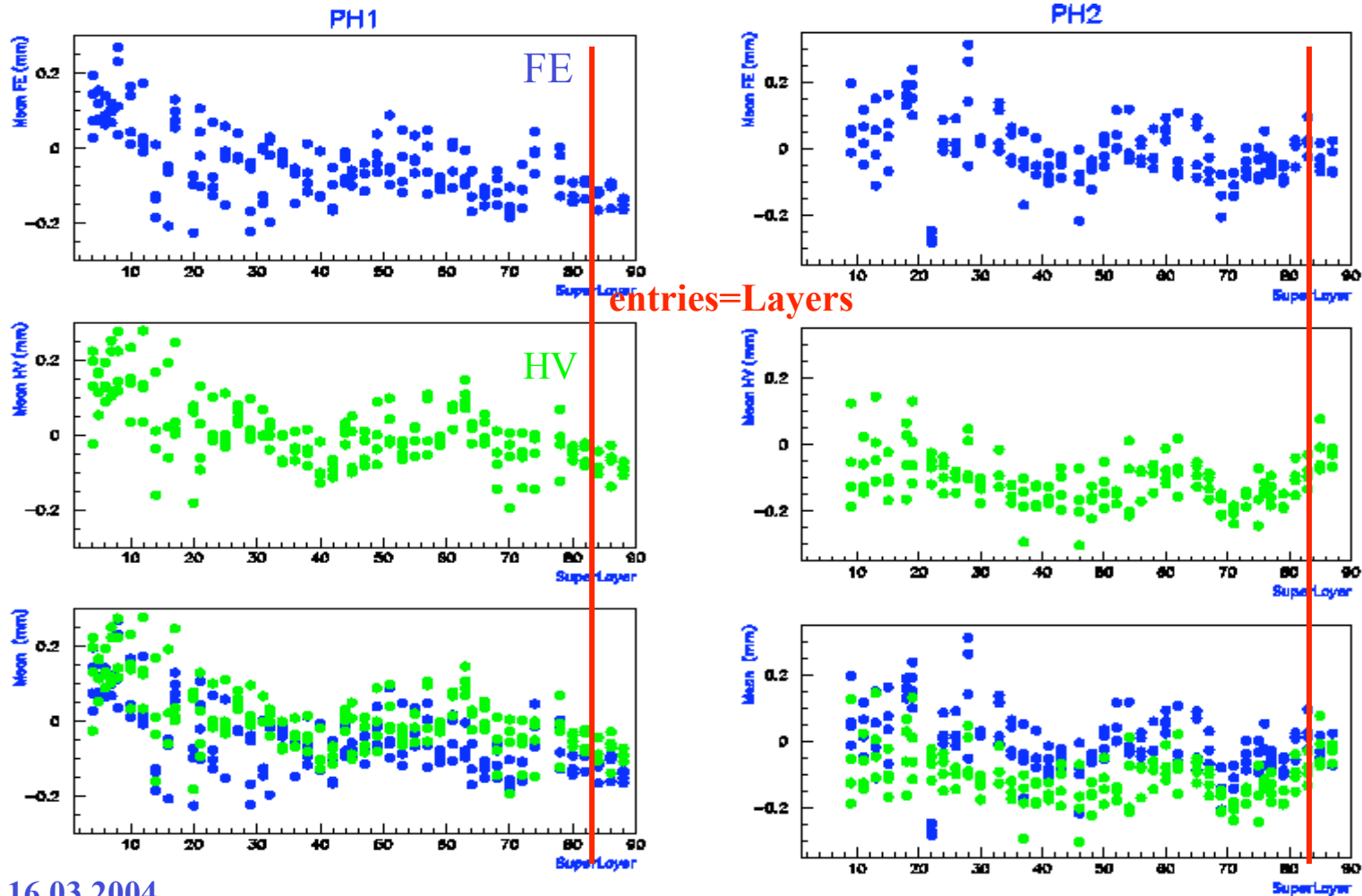


**Double glueing**

16.03.2004

# Analysis Summary (wire position)

new reference system for wire positioning



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SuperLayer

SuperLayer

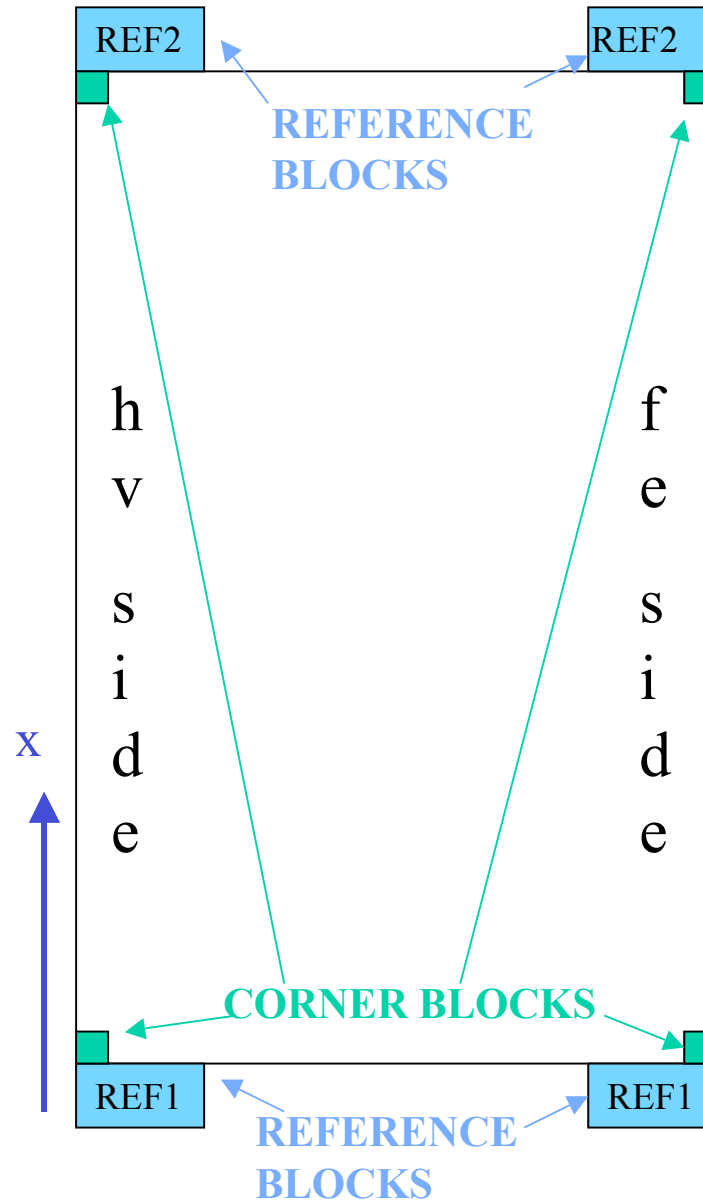
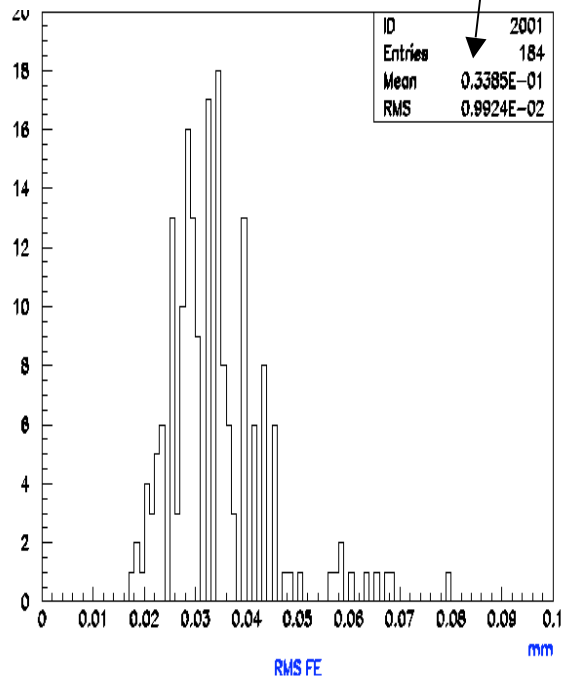
# SURVEY checks

- Legnaro measurements
- CERN LED measurements
- +comparisons
- comparisons with cosmic ray data

# Legnaro measurements

to be considered:

- measurement error (<40  $\mu$ m from wire measurements)
- construction effects

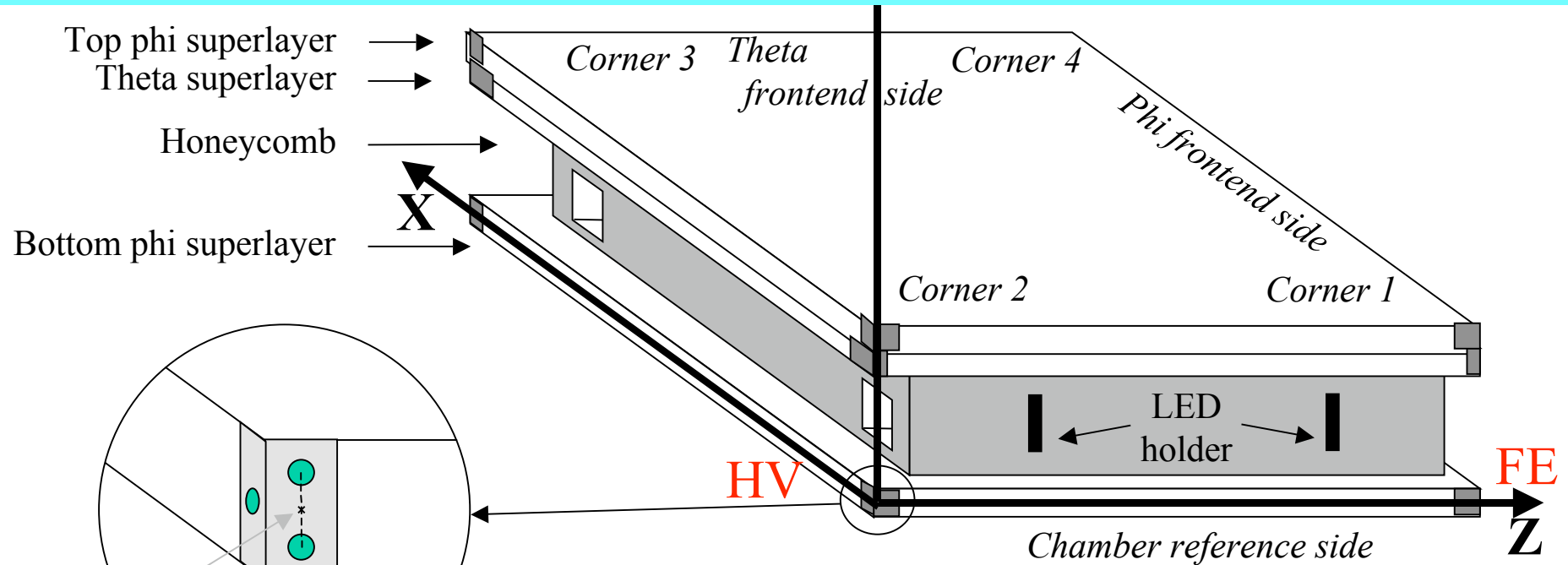


SL ONLY

x-length take:

$x\text{REF2} - x\text{REF1}$   
and subtract the nominal value  
(still missing absolute calibration)

# CERN LED measurements



Corner block reference point: middle-point of the line drawn on the surface and connecting the centres of the holes on the two-hole side.

*The chamber coordinate system is attached to the corner blocks 1,2,3 of the bottom superlayer:*

**Origo:** corner 2 (HV).

**Z-axis:** trough corner 1 (FE)

**X-Z plane:** corners 2,3,1.

## Chamber measurements:

•x SL3-SL1

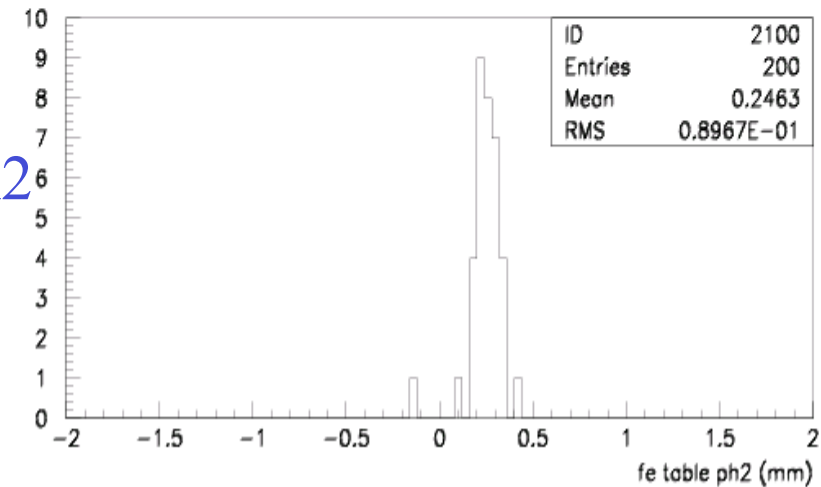
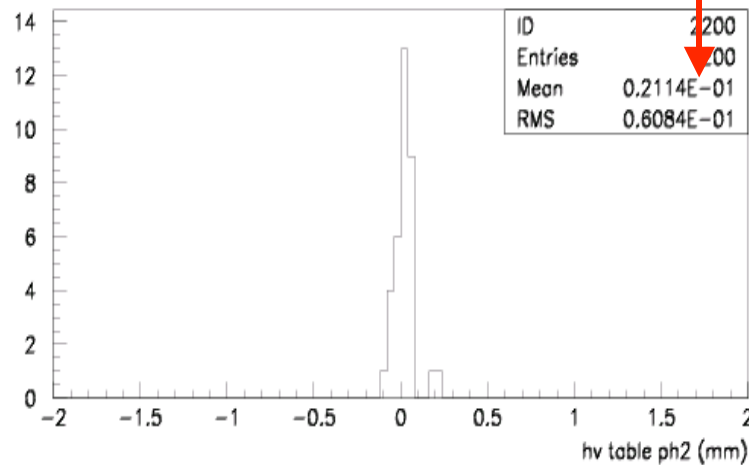
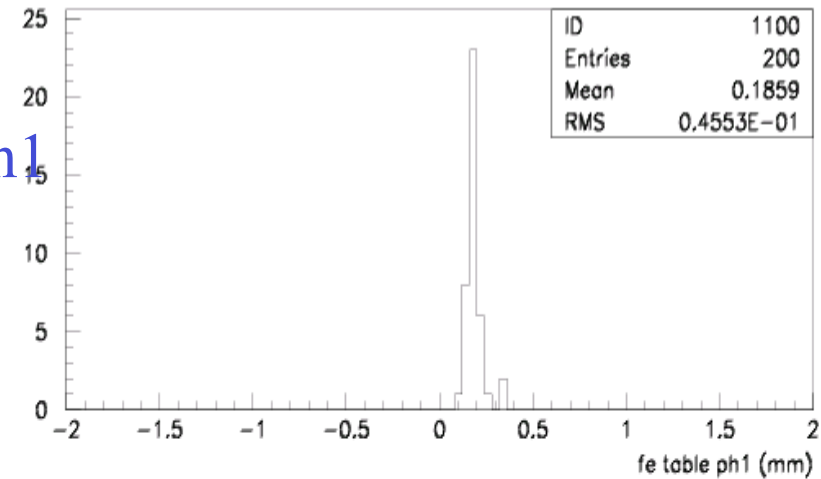
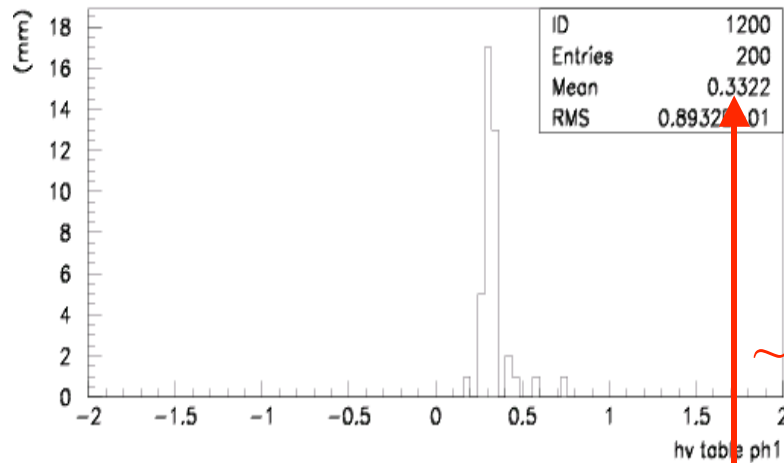
•z (SL3-SL1)

Chamber coordinate system

G. Bencze

# Legnaro measurements

x-length (-nominal)



16.03.2004

table ph1: 300  $\mu$ m additional length on HV side



# Legnaro measurements

average (4 wires) position difference

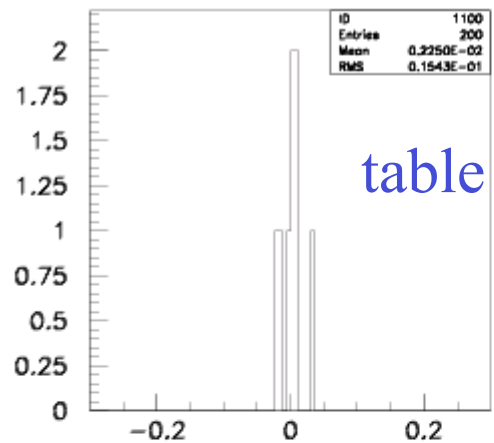


table ph1

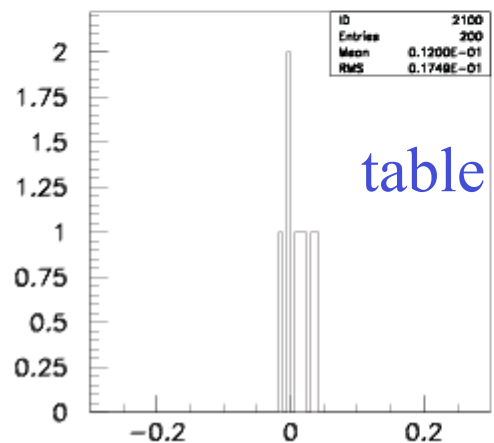
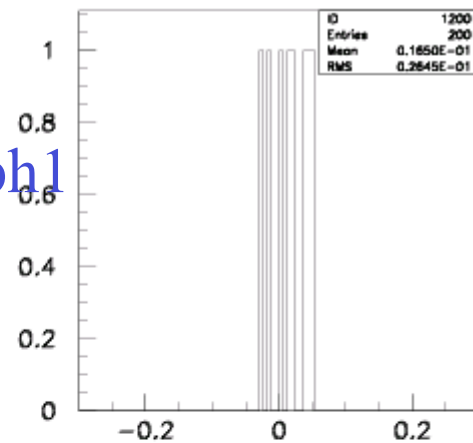
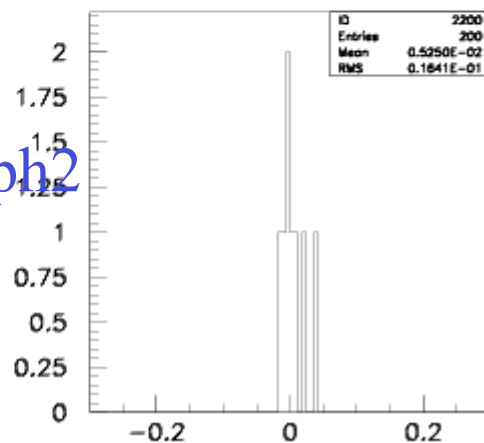


table ph2



during construction  
ref. blocks are removed  
before corner block  
insertion .

To check the position  
reproducibility 4 wires  
of the 4<sup>th</sup> layer are  
remeasured after  
corner block fixing

better than 25  $\mu$ m

# CERN LED measurements

SL measurements:

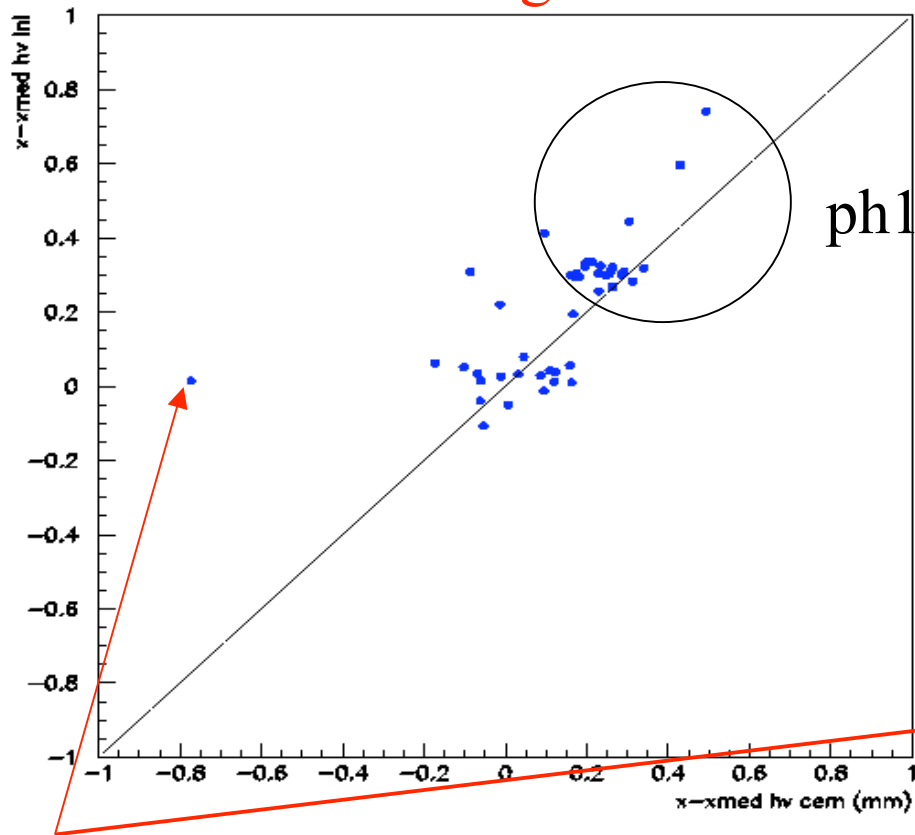
- x: take x hv corner as reference
  - z: “ z “ “ “ “
- see.....

Chamber measurements:

- x SL3-SL1
- z (SL3-SL1)

# comparison

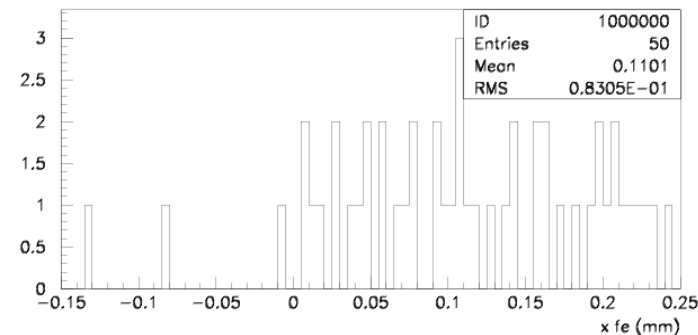
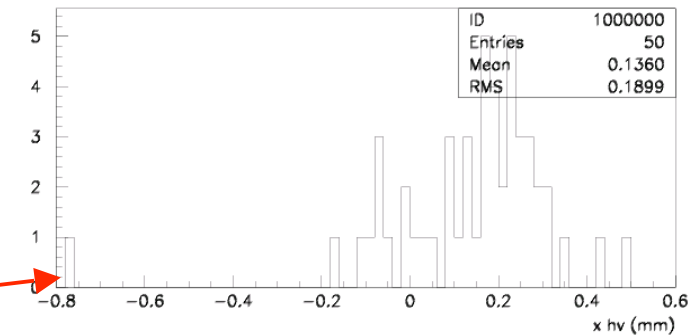
SL x-length



? MB3\_03 SL3  
possible explanation: bad corner block  
contact with reference block  
(construction problem)

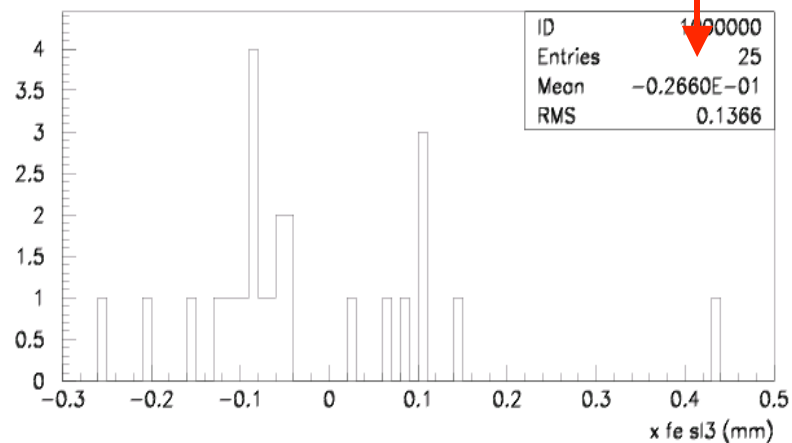
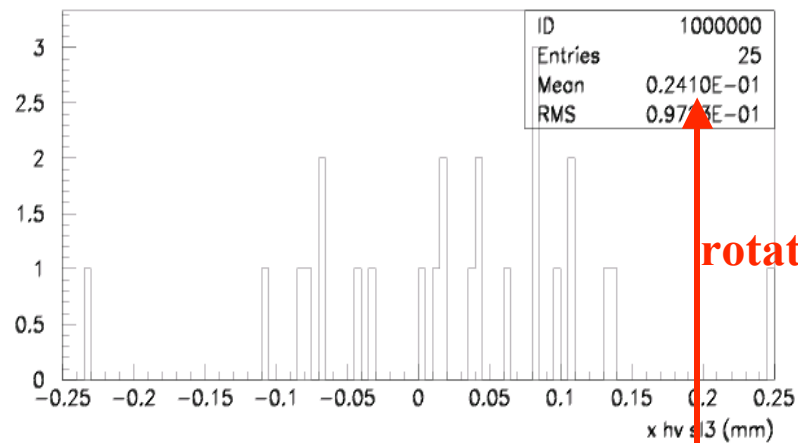
from correlation:

- both measurements make sense
- the hv effect in table ph1 is real
- the LED measurement precision is  $<100 \mu\text{m}$



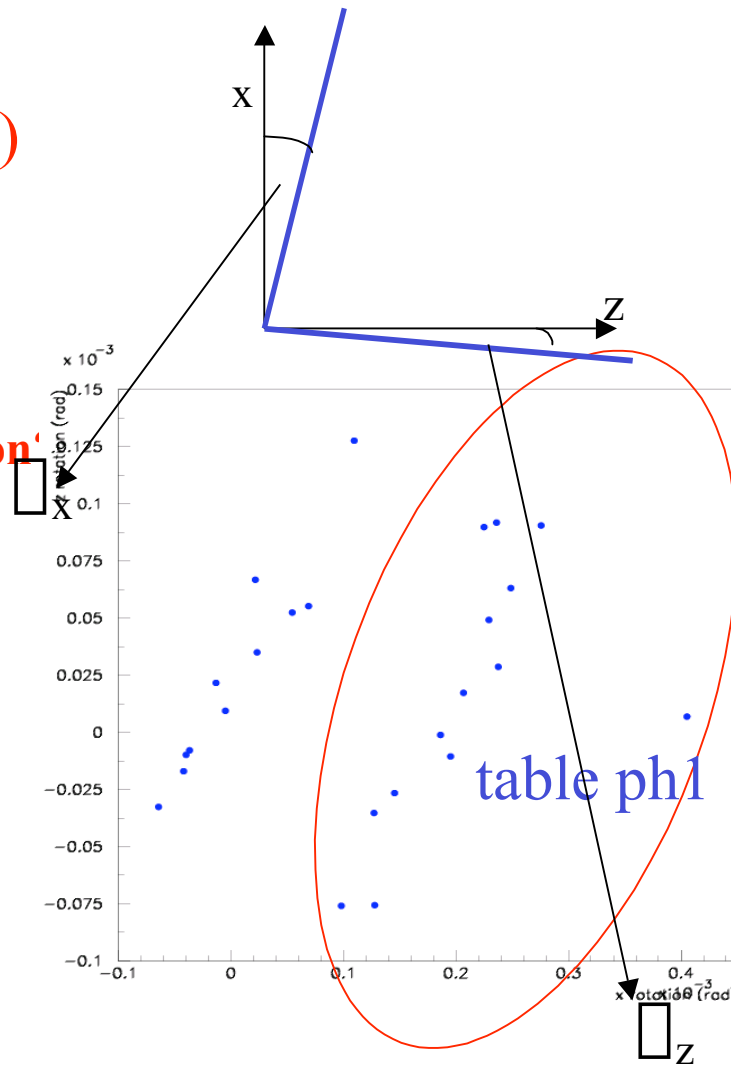
# CERN LED measurements

3<sup>rd</sup> SuperLayer position  
(chamber construction check)



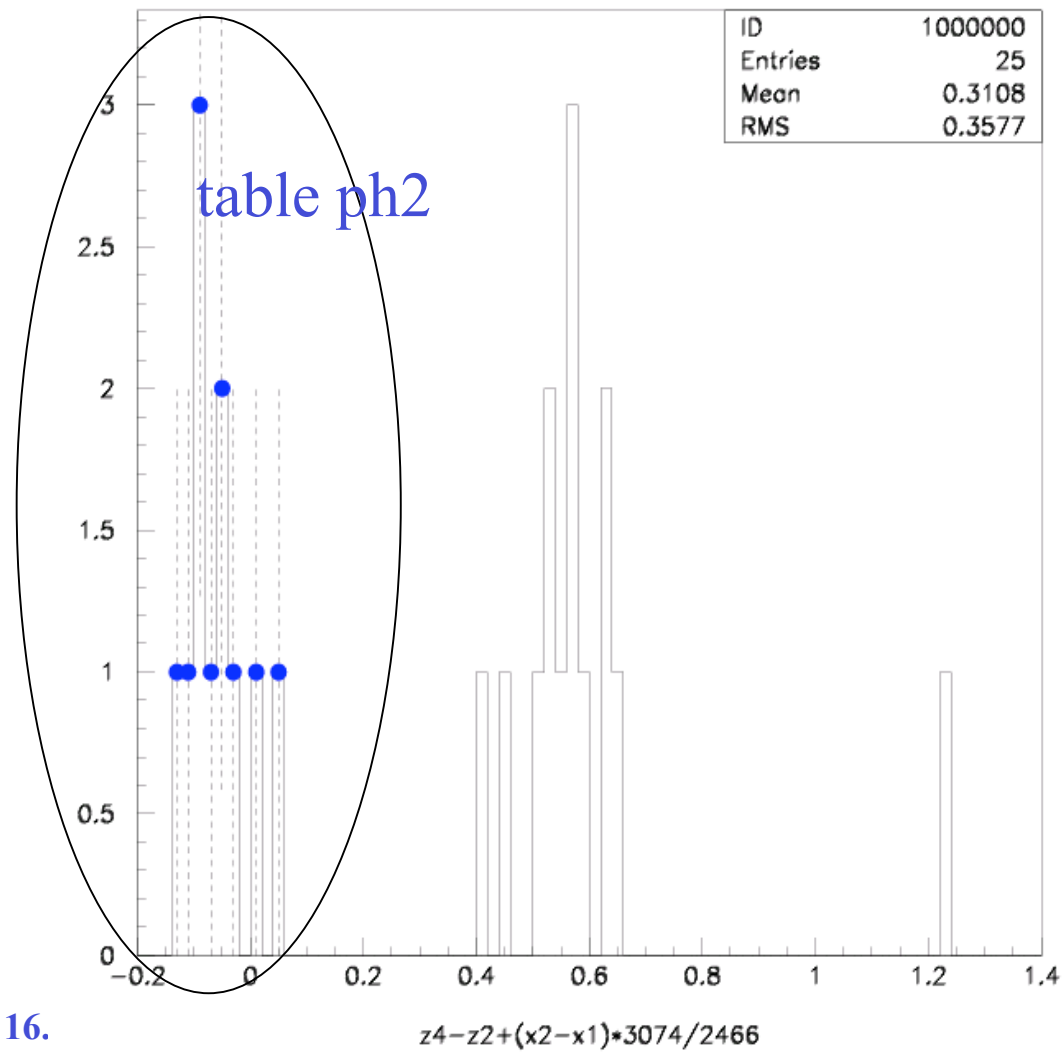
100 μm r.m.s.

rotation'

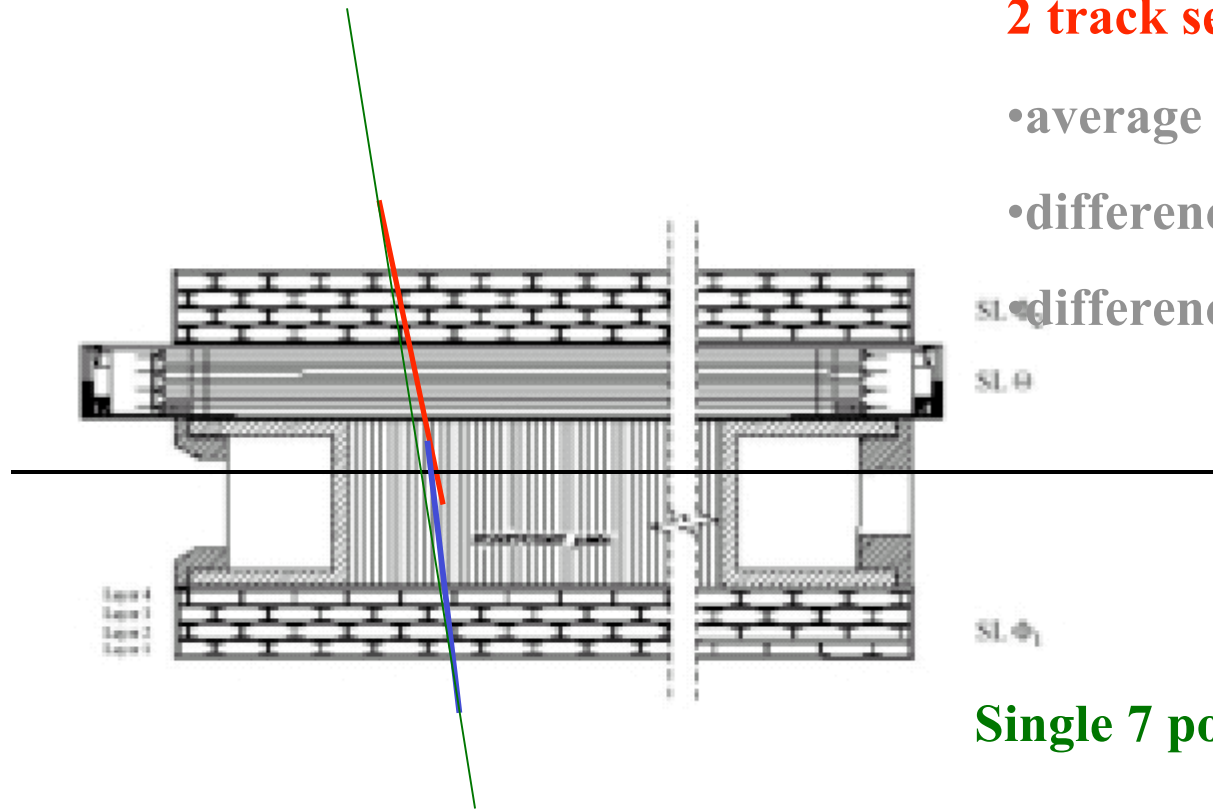


$O(10^{-4})$  rad  $\square$  100 μm/m  $\square$  ~OK

# CERN LED measurements



# Legnaro Cosmic Analysis\*



**2 track segments from  $\square$  SL:**

- average residual per layer
- difference of intercepts at middle pl.
- difference of slopes at middle pl.

**Single 7 point track to all but-one layer:**

- average residual of the excluded layer
- table measurement comparison

\* CMS note on alignment (U. Gasparini et al.)

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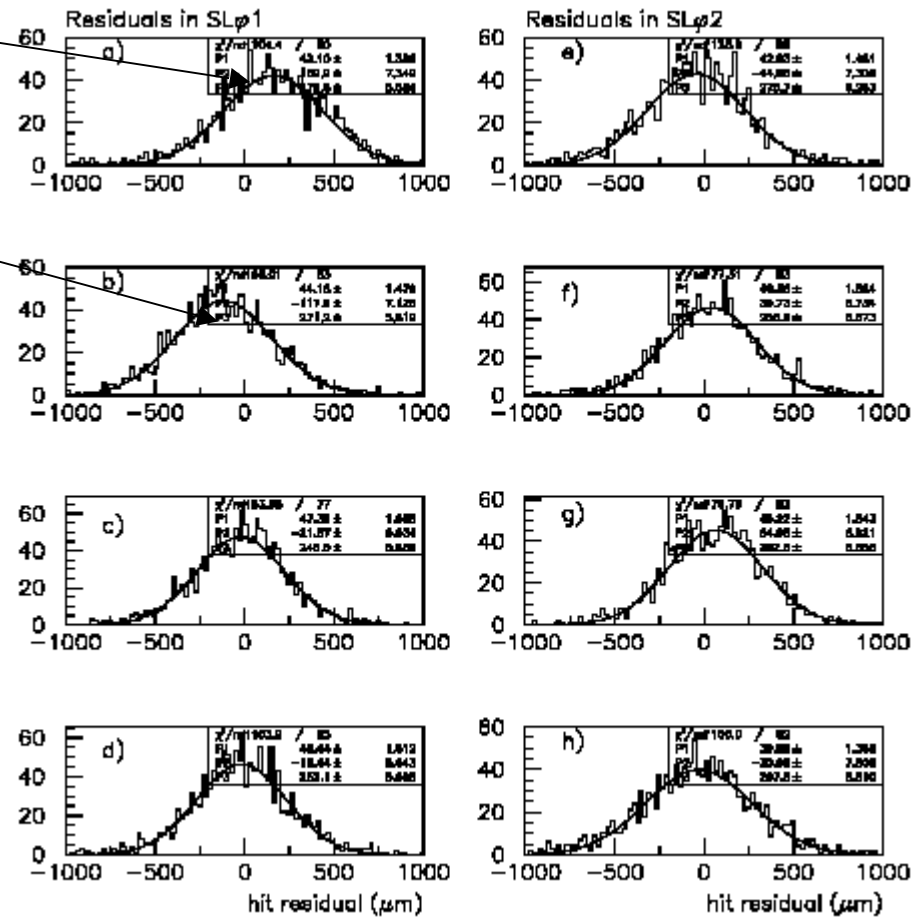
14

# Cosmic-Table Analysis

average residual of the excluded layer: i.e.

160

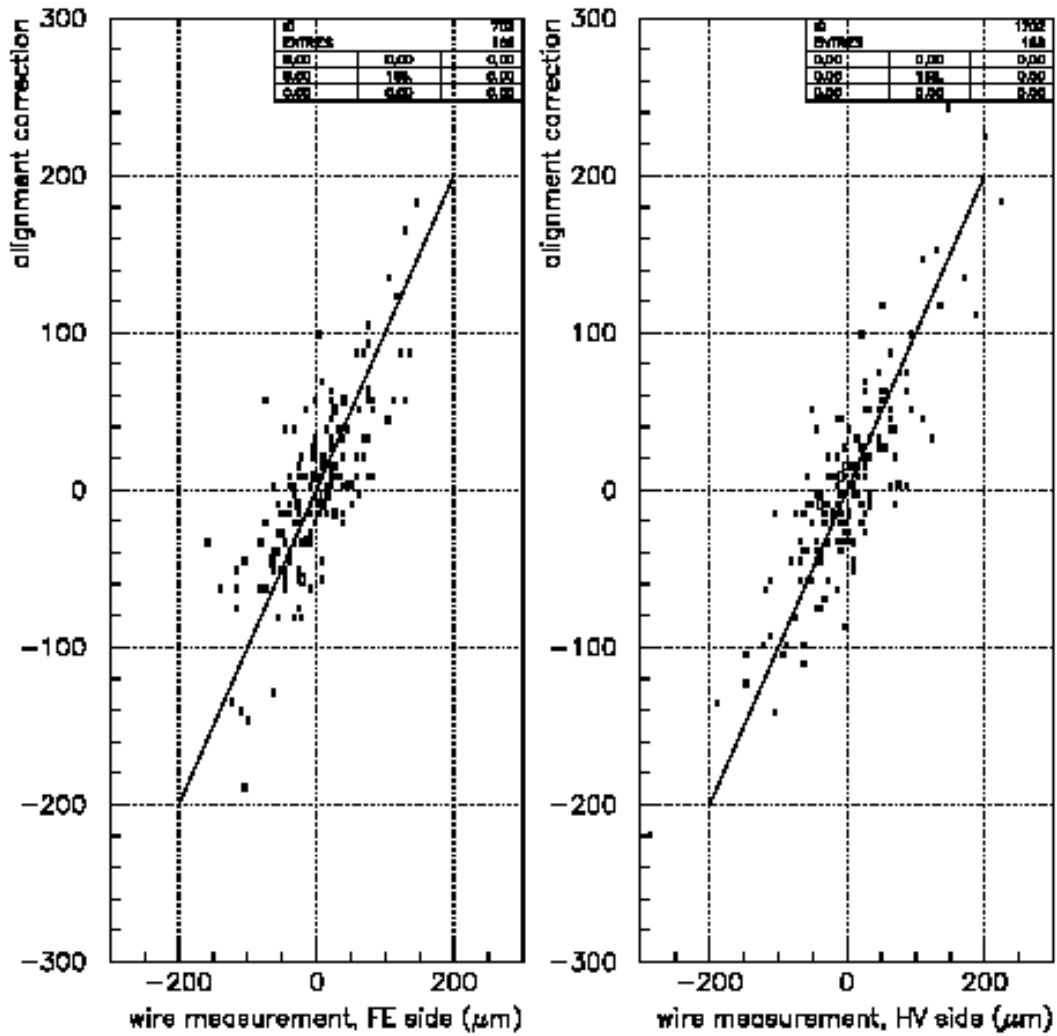
-118



Ch 11 FE side  
7 point fit

correlation means both measurements make sense!!!

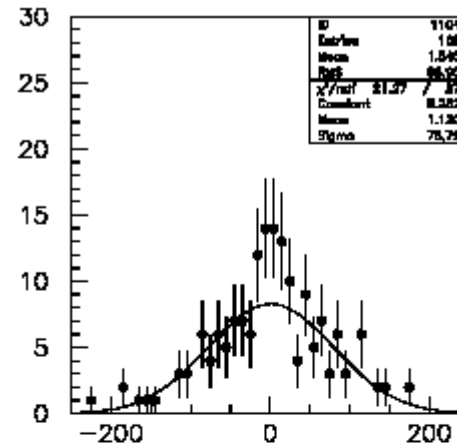
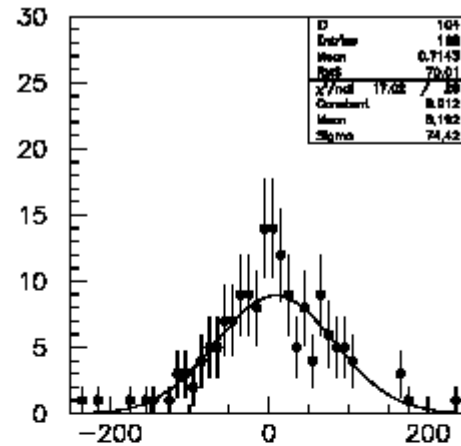
cosmic 7 point track residual



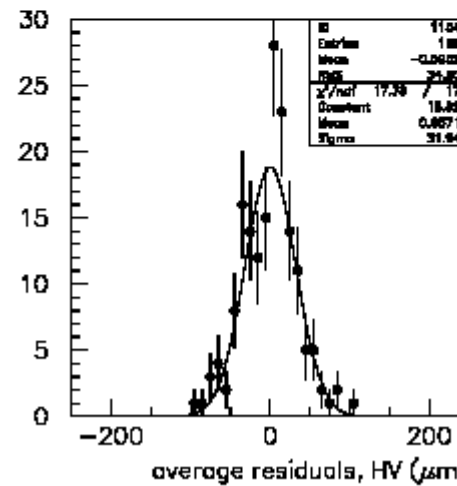
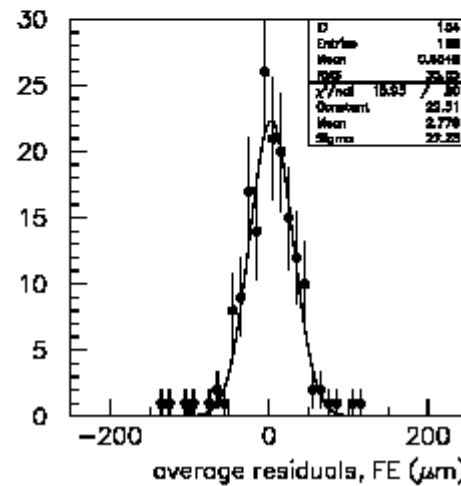


# Cosmic-Table Analysis

## 7 point fit average residuals



before

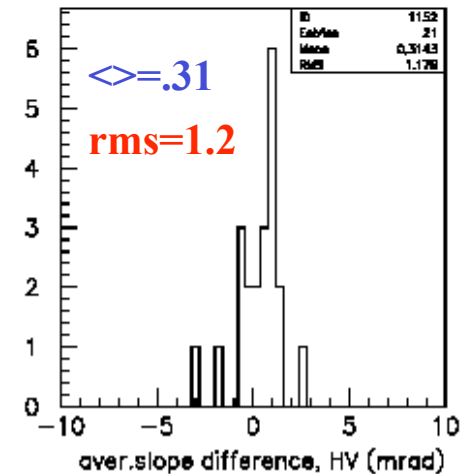
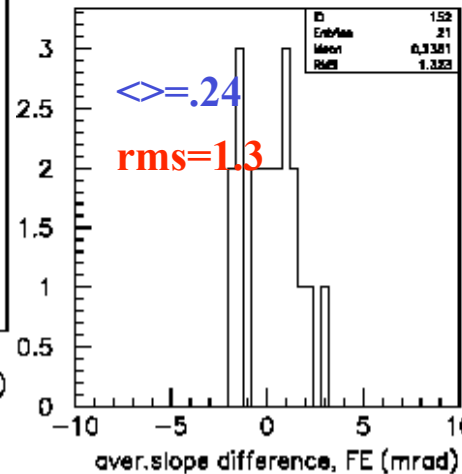
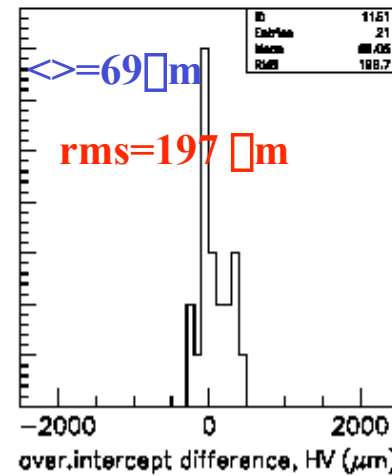
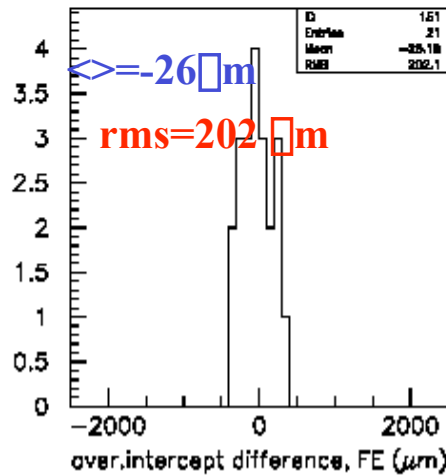
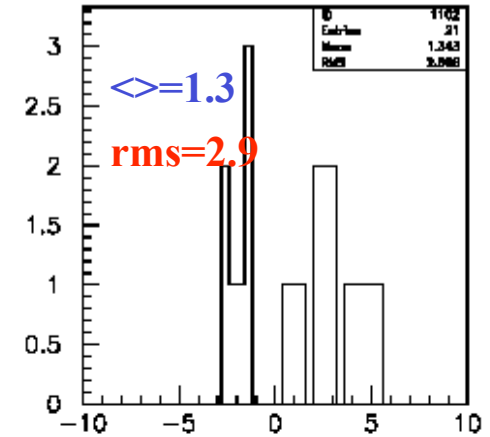
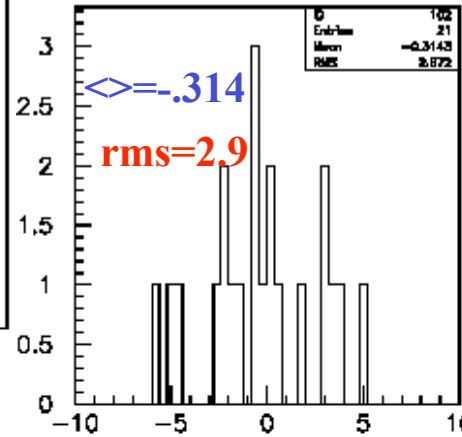
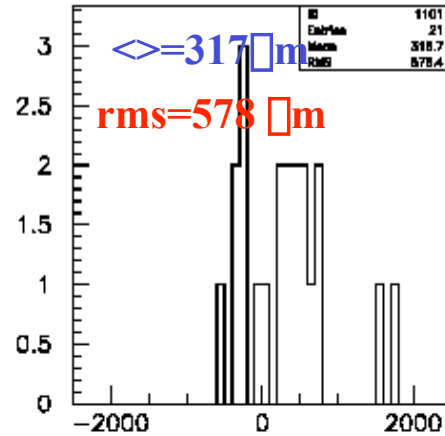
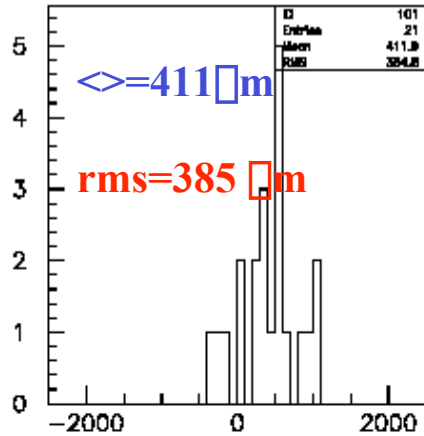


after  
correction  
according to  
wire  
measurements

# Legnaro Cosmic Analysis

Intercept difference

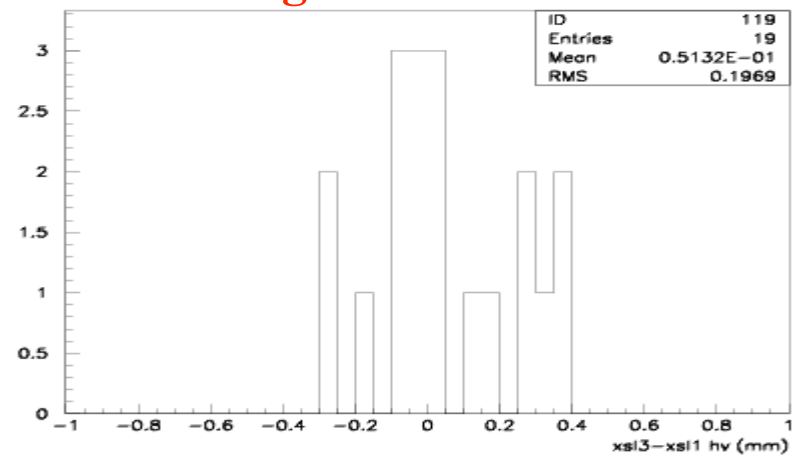
Slope difference



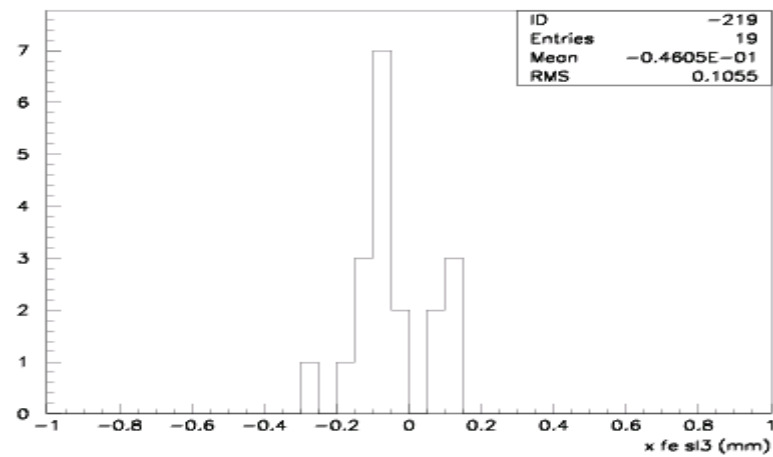
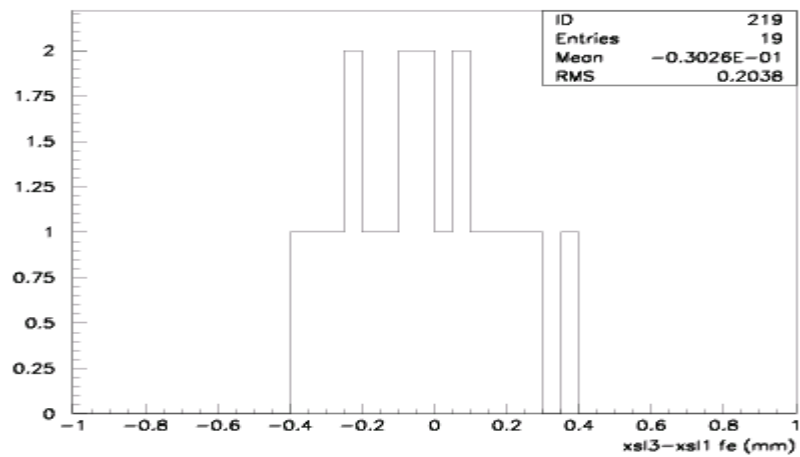
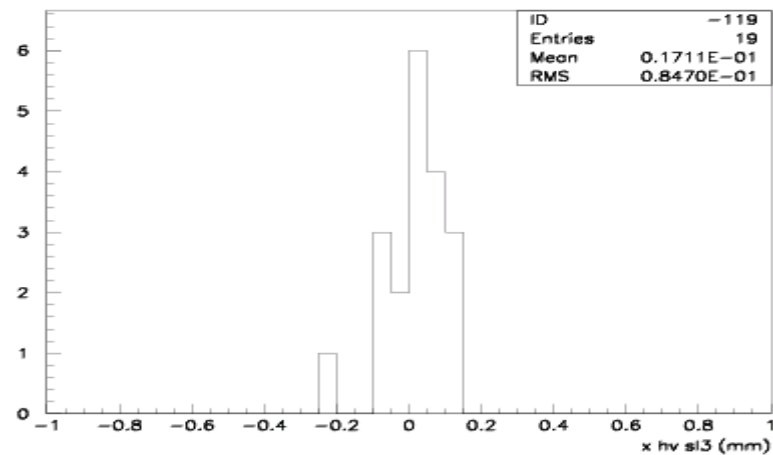
assumed measurement error:  $\pm 160 \mu\text{m}$

# comparison

## Legnaro Cosmics



## CERN LED



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no significant correlation !

# comparison

possible interpretation for the absence of correlation:

- **Both measurements wrong!**

unlikely since both show correlation with table measurements

- **LED measurement insensitive to a real SL3 displacement**

why? NB: it is able to taggle SL rotation !

- **The Cosmic measurement has a poorer precision ( 160  $\mu\text{m}$   $\sim$  200  $\mu\text{m}$ ) and the displacement of the SL3 is as small as the one measured by LED**

this would explain the absence of correlation as due to a Cosmic measurement error much larger than the effect to detect

# Conclusions

- Largely passed the **half** production
- Production **rate** increased to **~2.5 chamber/month**
- Quality Analysis shows reasonable results
- Survey measurements confirmed  $\square$  by Legnaro table measurements
- Chamber construction well within required specifics
- Cosmic tests confirm  $\square$  table measurements

		Theta B disconnected (HVB)
MB3C10	20/01-04/02	Very frequent I_w and some I_c spikes, I_W spikes are much worse than usual
MB3C12	20/01-04/02	OK
MB3C13	20/01-08/02	Discharges Wire-Cathodes < 1/day
MB3C14	20/01-03/02	OK,
MB3C15	01/12-11/12	Discharges Wire-Cathodes ~2/day
MB3C16	20/01-03/02	OK Phi2 B disconnected
MB3C17	01/12-11/12	Discharges Wire-Cathodes ~1/hour
MB3C18		Frequent Wire -Cathodes discharges
MB3C20	01/12-11/12	Discharges Wire-Cathodes ~5/day
MB3C22	01/12-11/12	OK
MB3C24	11/12-19/12	OK (Theta disconnected,HVB))
MB3C26	02/02-08/02	OK
MB3C28	01/02-08/02	Discharges Wire-Cathodes ~2/day PHI1 B disconnected
MB3C32	20/01-08/02	OK
MB3C34	22/01-28/01	Very frequent discharges Wire-Cathodes several/hour Theta SL , A connector
MB3C38	22/01-29/01	Discharges Wire-Cathodes < 1/day
MB3C81= C17+C22	20/01-08/02	Discharges Wire-Cathodes ~2/day
MB3C82= C20+C30	20/01-08/02	Discharges Wire-Cathodes ~5/day
MB3C83= C21+C15	20/01-08/02	Discharges Wire-Cathodes ~3/day and some wire-ground
MB3C84= C24(Ph1+Phi2) +C28	15/01-17/01	Discharges Wire-Cathodes ~4/day
MB3C85= C24+C30	29/01-08/02	Discharge Wire-cathode (MB3C34 Theta A connector disconnected, HVB) Discharge Wire

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