

# Fiber Analysis for TPOL

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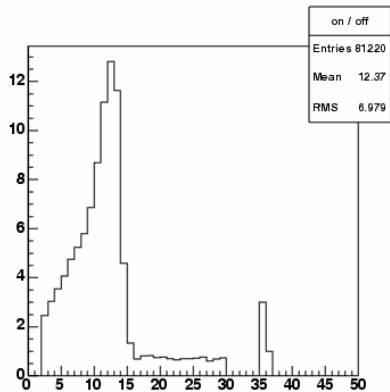
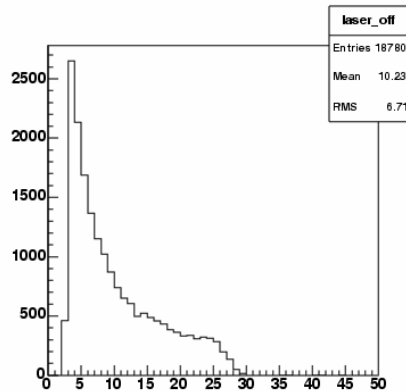
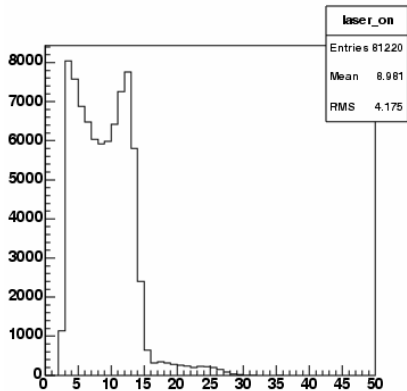
Correlation for Fiber and Si both X and Y  
Beam center position from each detectors  
Summary and Future Plan

## Data sets

Run#	Date	
1681-1697	: 01/Mar	0.5mm step
1720-1746	: 07/Mar	covers area $\pm 4$ mm around CAL center
1801-1818	: 24/May	Center position : 261600 motor counts = 32.7mm from home
1999-2014	: 11/Aug	

# Back ground subtraction

want to leave only compton beam

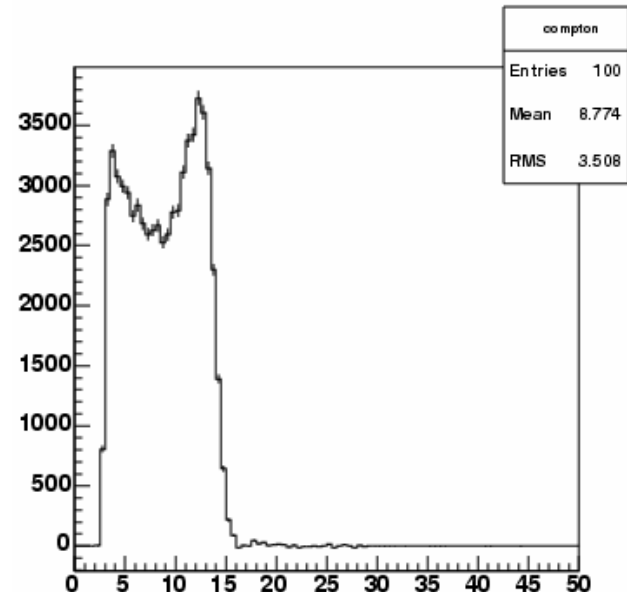


Ratio is stable in  
 $20 < E < 30\text{GeV}$ .



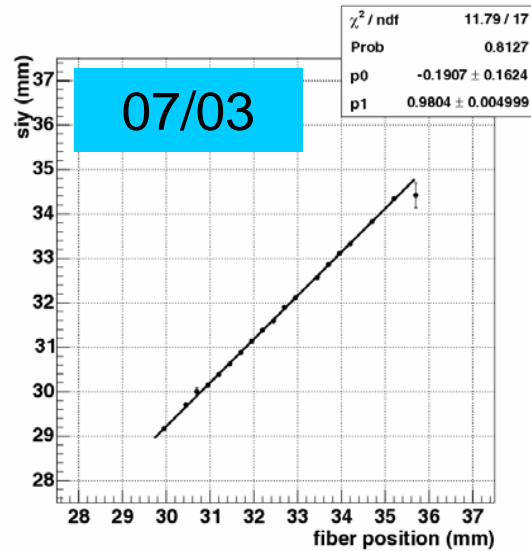
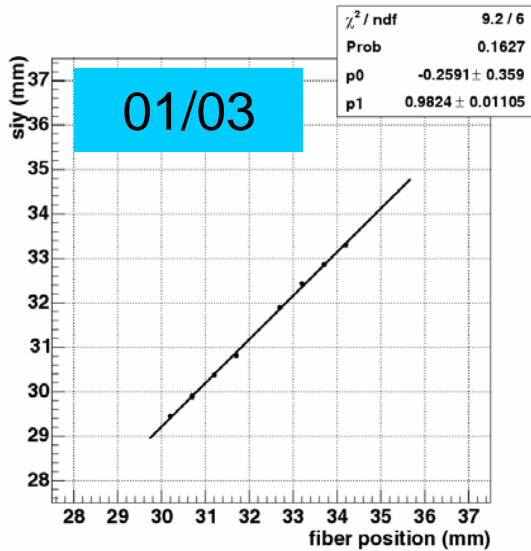
can be used for  
normalisation factor.

On - Off\*norm



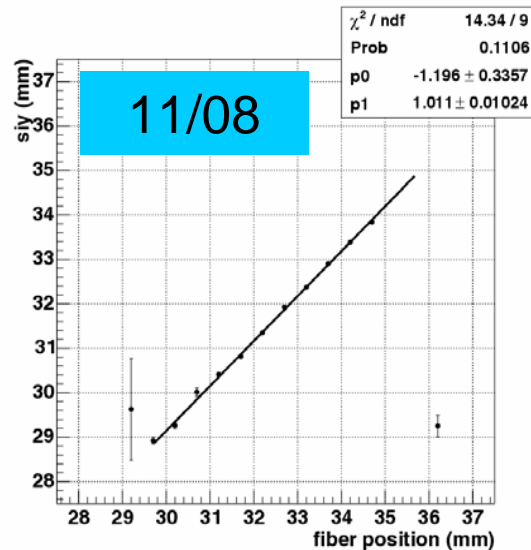
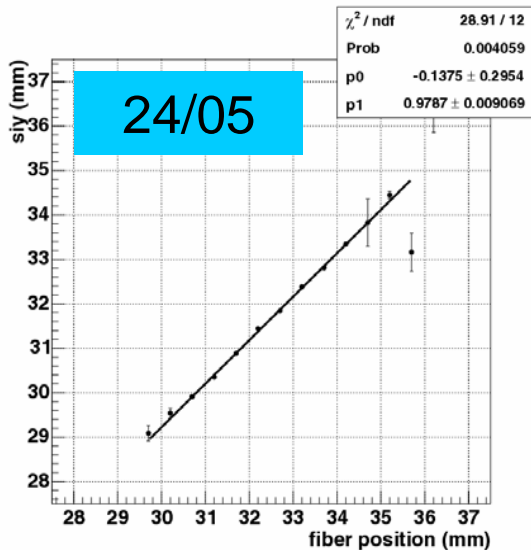
normalisation factor is used for  
other histograms.

# Linearity between SiY and Fiber 1



compton only

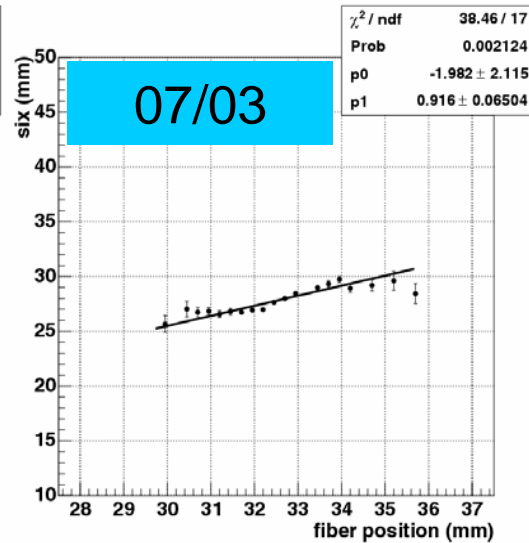
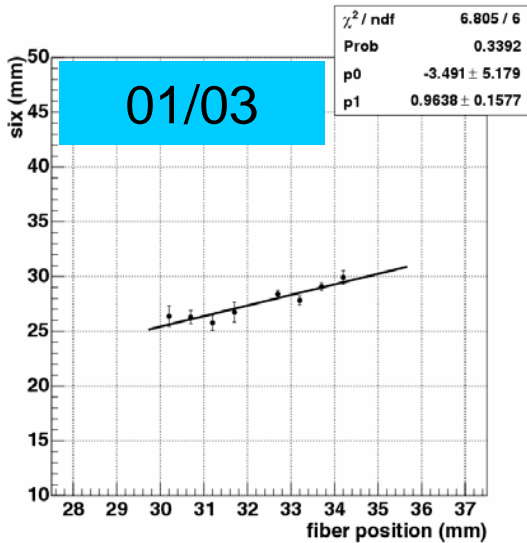
fiber position : stepping motor  
 siy : mean with fiber hit & ncx,ncy=1



date : slope  
 03/01 :  $0.98 \pm 0.01$   
 07/03 :  $0.98 \pm 0.01$   
 24/05 :  $0.98 \pm 0.01$   
 11/08 :  $1.01 \pm 0.01$

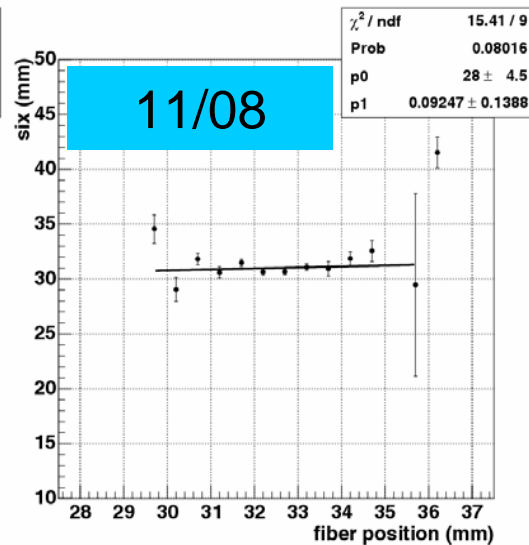
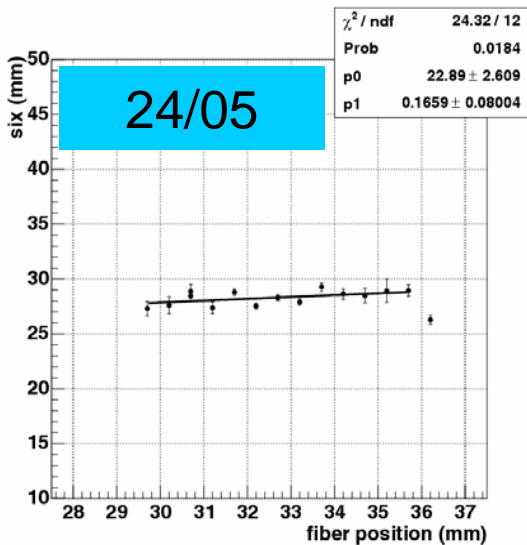
Good Linearity for each data sets.

# Correlation between SiX and Fiber 1



compton only

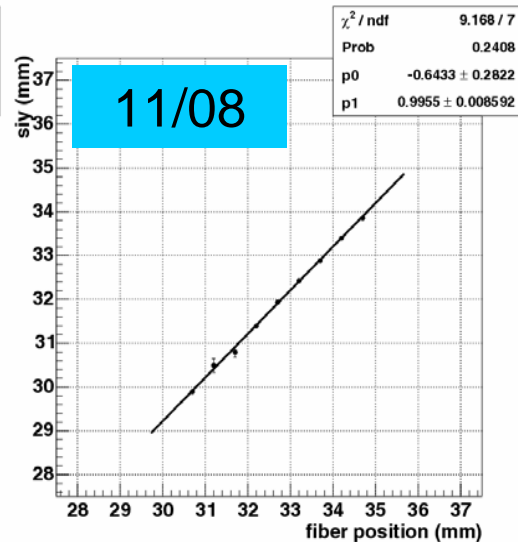
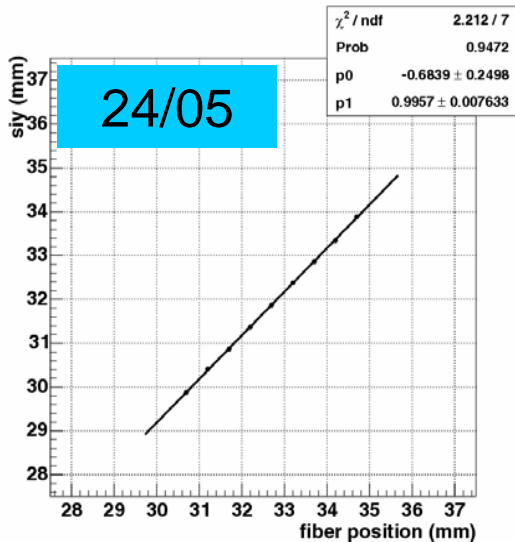
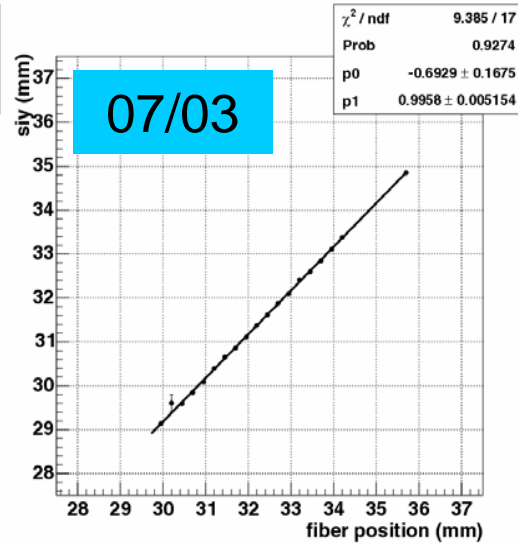
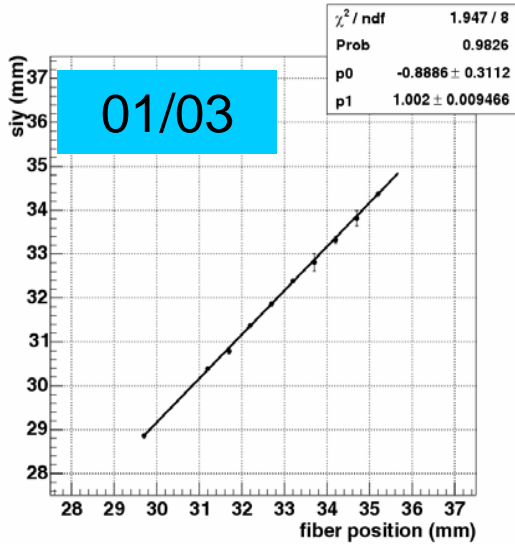
fiber position : stepping motor  
 six : mean with fiber hit & ncx,ncy=1



date : slope  
 03/01 : 0.96 ± 0.16  
 07/03 : 0.92 ± 0.07  
 24/05 : 0.17 ± 0.08  
 11/08 : 0.09 ± 0.14

Large slope in Mar.  
 Reasonable slope in Aug.  
 Why differ for data sets?

# Linearity between SiY and Fiber 2



fiber position : stepping motor  
 siy : mean of ratio (fiber hit / all)

date : slope

03/01 :  $1.00 \pm 0.01$

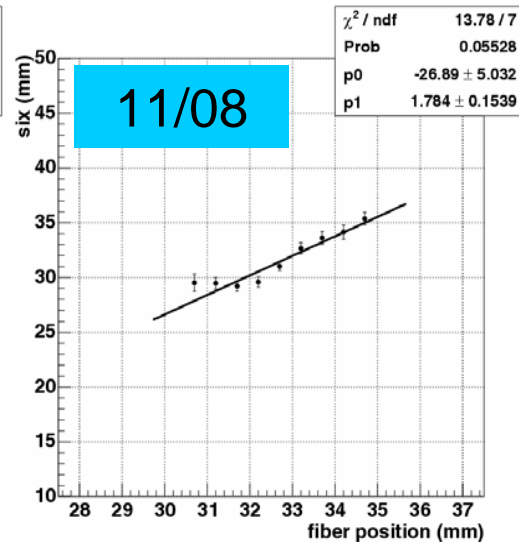
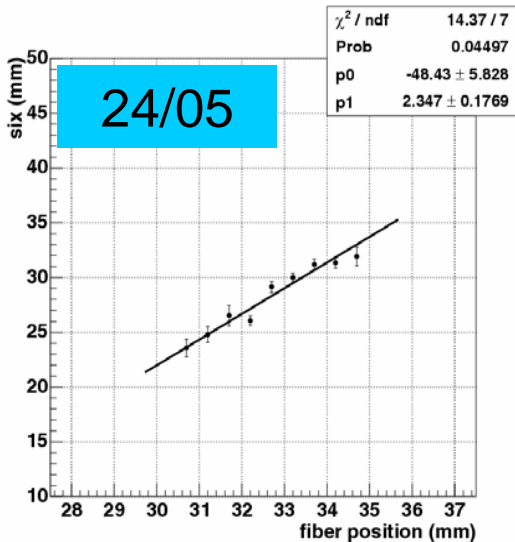
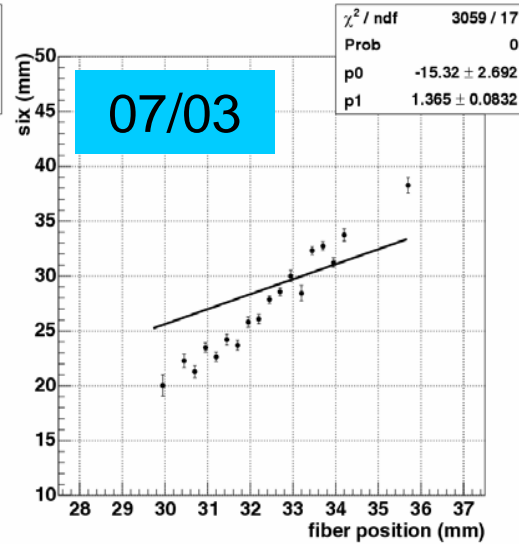
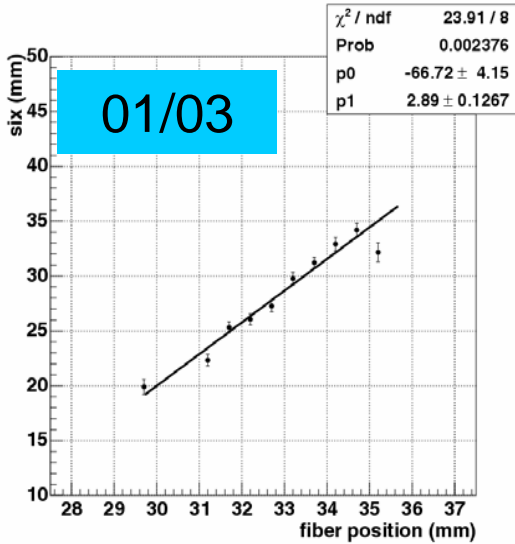
07/03 :  $1.00 \pm 0.01$

24/05 :  $1.00 \pm 0.01$

11/08 :  $1.00 \pm 0.01$

Very good Linearity for each data sets.

# Correlation between SiX and Fiber 2



fiber position : stepping motor  
 six : mean of ratio (fiber hit / all)

date : slope  
 03/01 : 2.89  $\pm$  0.13  
 07/03 : 1.37  $\pm$  0.08  
 24/05 : 2.35  $\pm$  0.18  
 11/08 : 1.78  $\pm$  0.15

Too large slope???

# Beam center from each detectors

Calculate the beam center to determine the center position of fiber scan

1. Fiber : check the # (fiber hit) / # (all) for each fiber position
2. Si : mean position with  $ncx, ncy=1$  for compton only
3. CAL+Fiber : eta-y from CAL+Fiber,  $y(\eta=0)$  means beam center
4. CAL+Si : eta-y from CAL+Si,  $y(\eta=0)$  means beam center

All value is translated in Fiber coordinate.

eta-y function

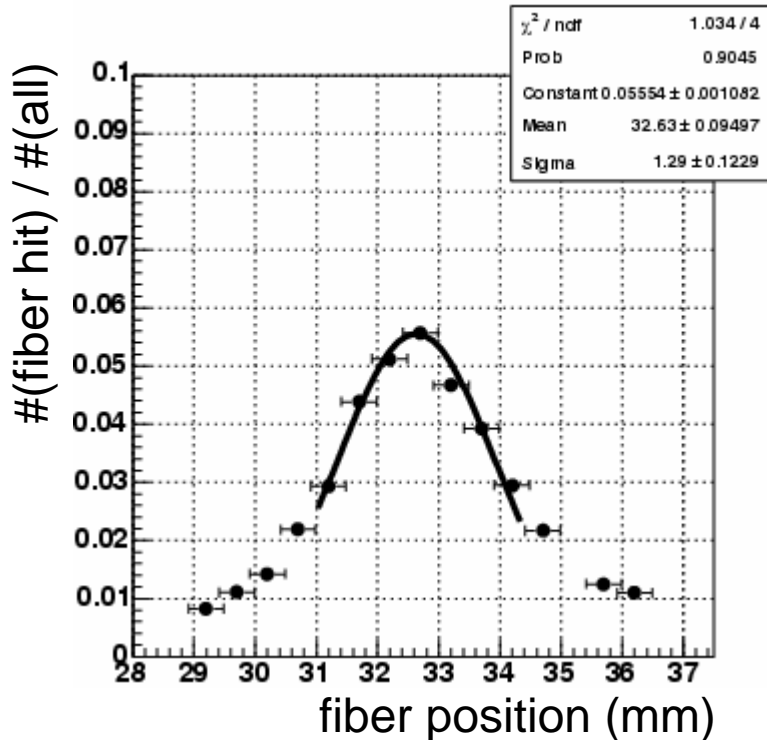
$$y(\eta) = P_4 + \ln \frac{1+\eta}{1-\eta} \times (P_0 + P_1 \left(\ln \frac{1+\eta}{1-\eta}\right)^2 + P_2 \left(\ln \frac{1+\eta}{1-\eta}\right)^4 + P_3 \left(\ln \frac{1+\eta}{1-\eta}\right)^6)$$

# Beam center from Fiber, Si

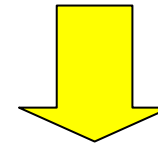
data taken on 11/08

1.Fiber

2.Si



Get the mean with  $ncx, ncy=1$  for compton only.



Translate the mean in Si coordinate to in fiber coordinate using linearity function from Si and Fiber.

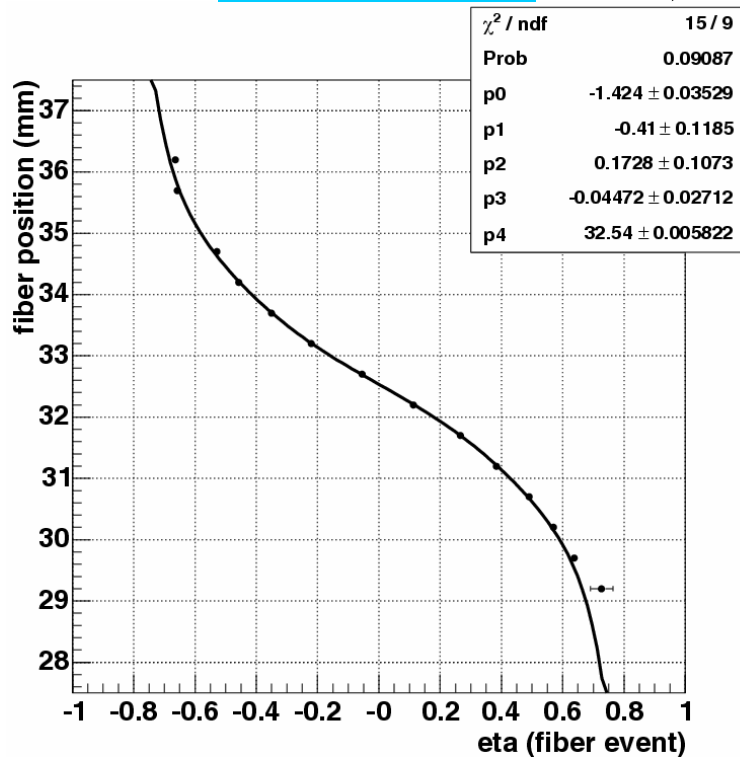
Mean = beam center



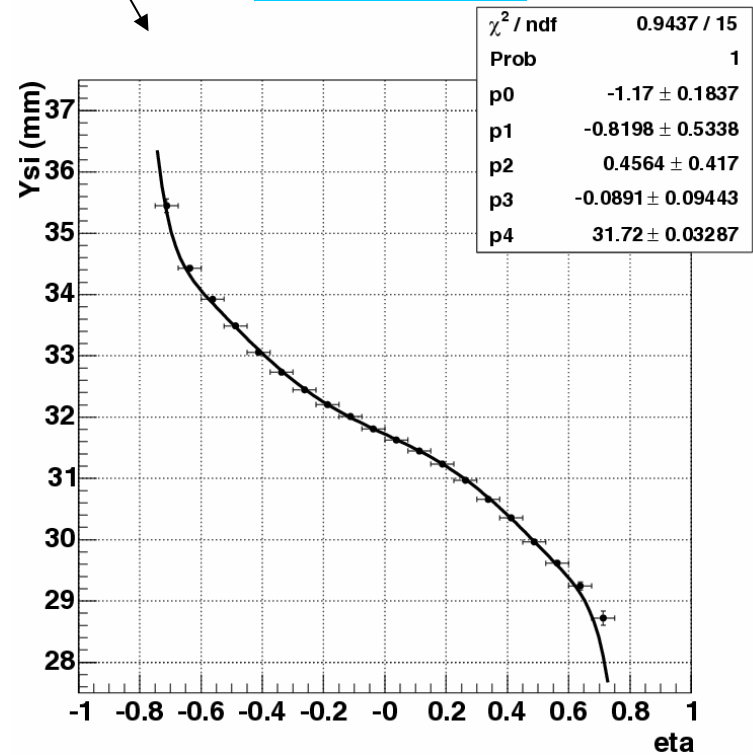
# Beam center from CAL+Fiber, CAL+Si

data taken on 11/08

3.CAL+Fiber



4.CAL+Si



$y_{\text{fiber}}(\eta=0) = \text{beam center}$

$y_{\text{si}}(\eta=0) = \text{beam center}$

# Results of beam center

01/03	Fiber	: 32.61(mm)	260895(motor count)
	Si	: 32.62(mm)	260988(motor count)
	CAL+Fiber	: 32.54(mm)	260330(motor count)
	CAL+Si	: 32.55(mm)	260389(motor count)
07/03	Fiber	: 32.56(mm)	260448(motor count)
	Si	: 32.58(mm)	260654(motor count)
	CAL+Fiber	: 32.55(mm)	260436(motor count)
	CAL+Si	: 32.55(mm)	260394(motor count)
24/05	Fiber	: 32.61(mm)	260862(motor count)
	Si	: 32.51(mm)	260114(motor count)
	CAL+Fiber	: 32.54(mm)	260348(motor count)
	CAL+Si	: 32.53(mm)	260262(motor count)
11/08	Fiber	: 32.63(mm)	261073(motor count)
	Si	: 32.54(mm)	260325(motor count)
	CAL+Fiber	: 32.54(mm)	260281(motor count)
	CAL+Si	: 32.55(mm)	260429(motor count)

Good agreement for each method and data sets.

Difference :  $\sim 0.05\text{mm}$

center position for fiber scan = 260400  
(261600 until now)

# Summary and Future Plan

## Summary

- ✓ Linearity between Fiber and SiY is good for each data sets.
- ✓ Correlation between SiX and Fiber is strange.
- ✓ Beam centers from each detectors are consistent.

## Future Plan

- ✓ Further check of the correlation between SiX and Fiber.
- ✓ Take the fiber scan around motor count = 260400 after HERA ready.