

GEM Angular Offset

HyCal GEM Offset

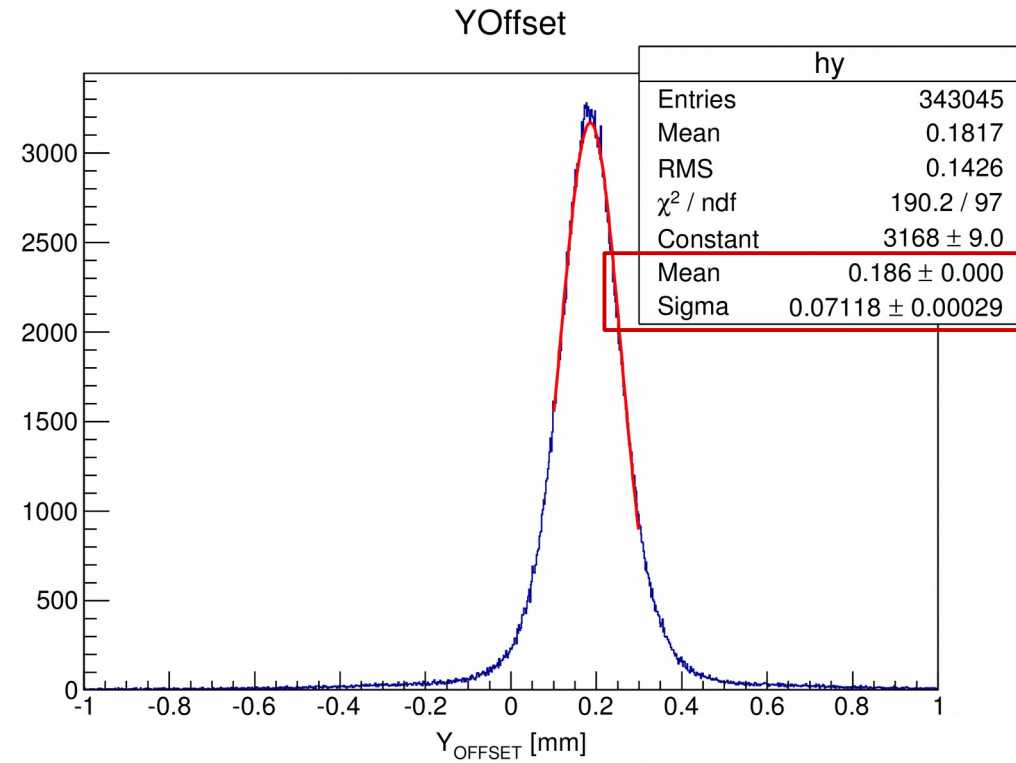
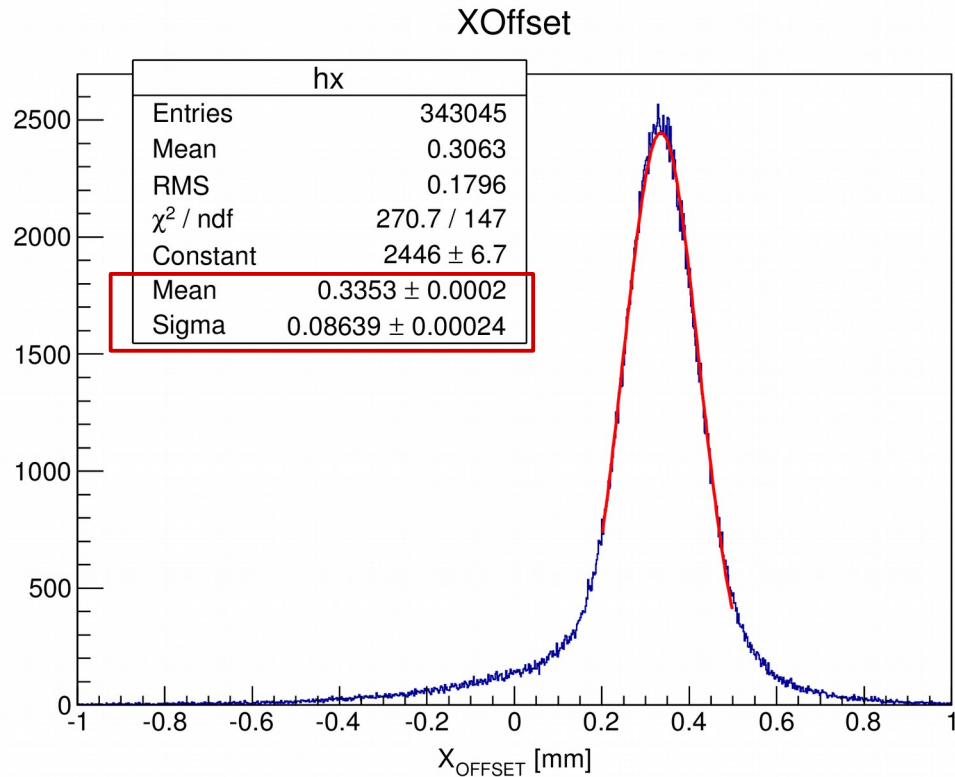
GEM Beam Line Offset

Summary

# GEM Offset

Using Overlapping area **e-p events** detecting offsets between two GEM Chambers.

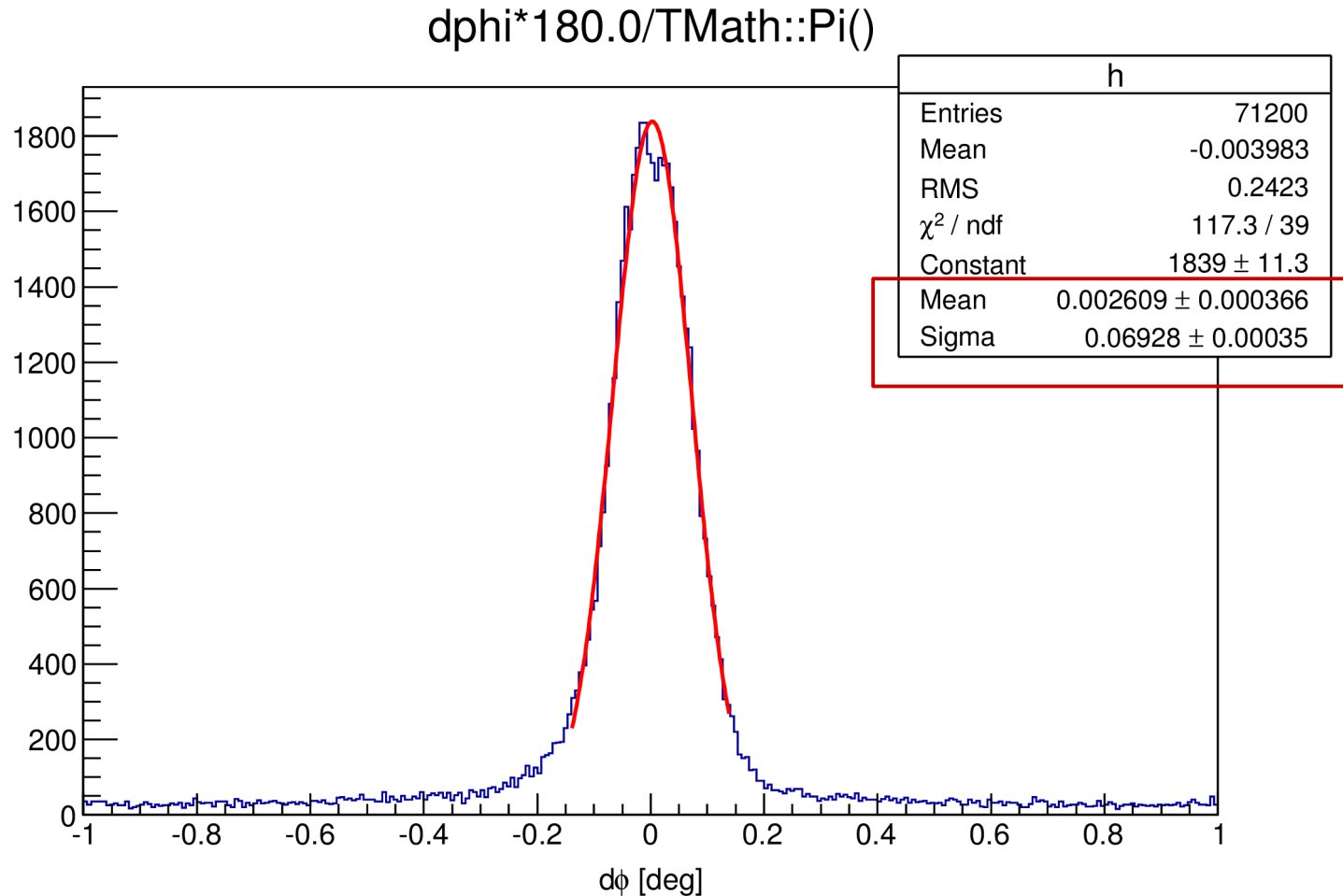
[refer to last week]



Moller events have same results.

# GEM Angular Offset

Using Overlapping area **moller events** detecting Angular offsets between two GEM Chambers.



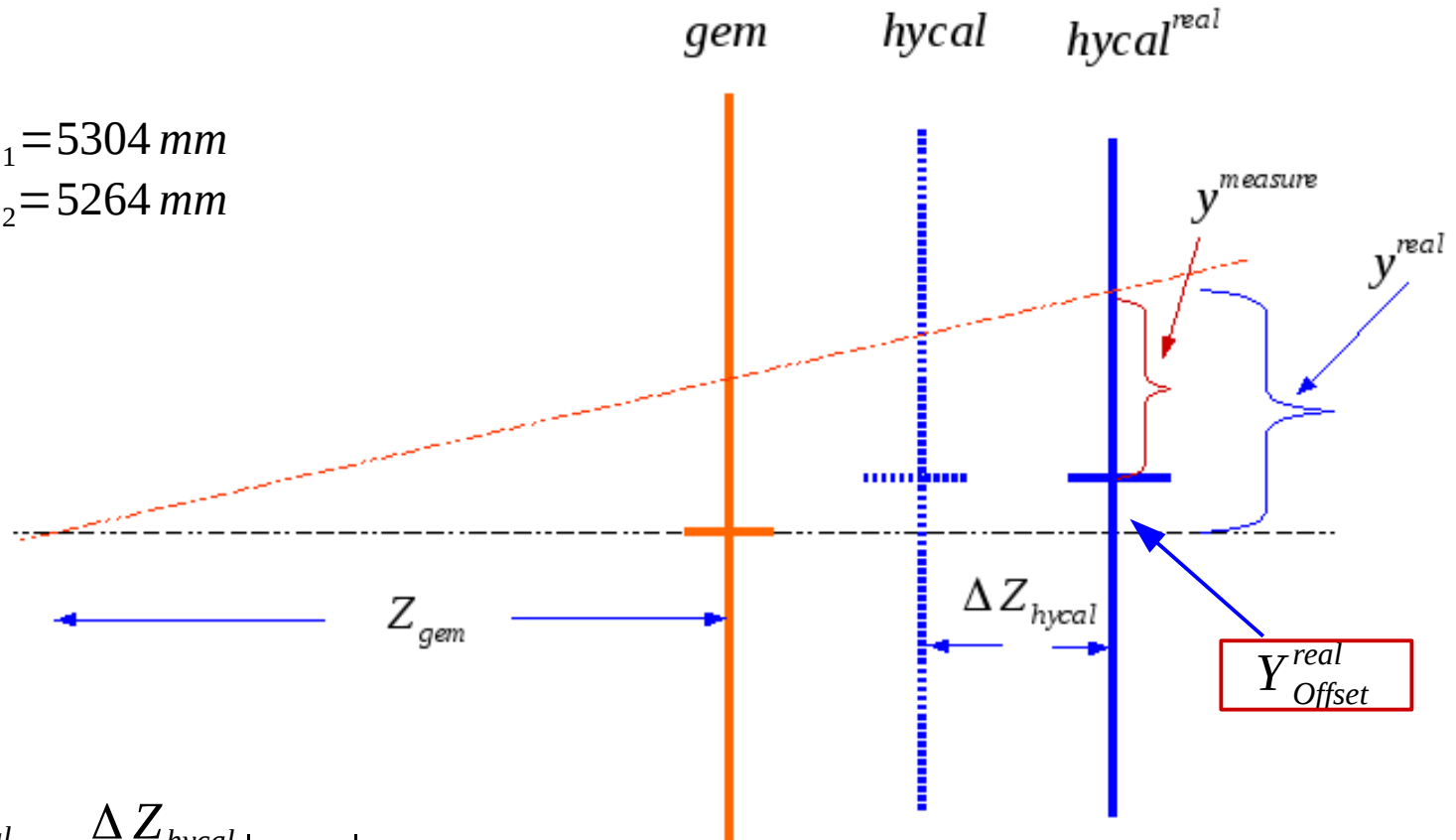
X-Y offsets do not affect angular offset

# GEM HyCal Offsets

- 1, Align Chamber 1 to Chamber 2 (means correct the offsets).
- 2, Similar procedure to get HyCal Offsets relative to Chamber2.
- 3, From Survey:

$$z_{gem1} = 5304 \text{ mm}$$

$$z_{gem2} = 5264 \text{ mm}$$



$$Y_{Offset}^{up} = Y_{Offset}^{real} - \frac{\Delta Z_{hycal}}{Z_{gem}} |Y_{gem}|$$

$$Y_{Offset}^{down} = Y_{Offset}^{real} + \frac{\Delta Z_{hycal}}{Z_{gem}} |Y_{gem}|$$

# HyCal GEM Offsets

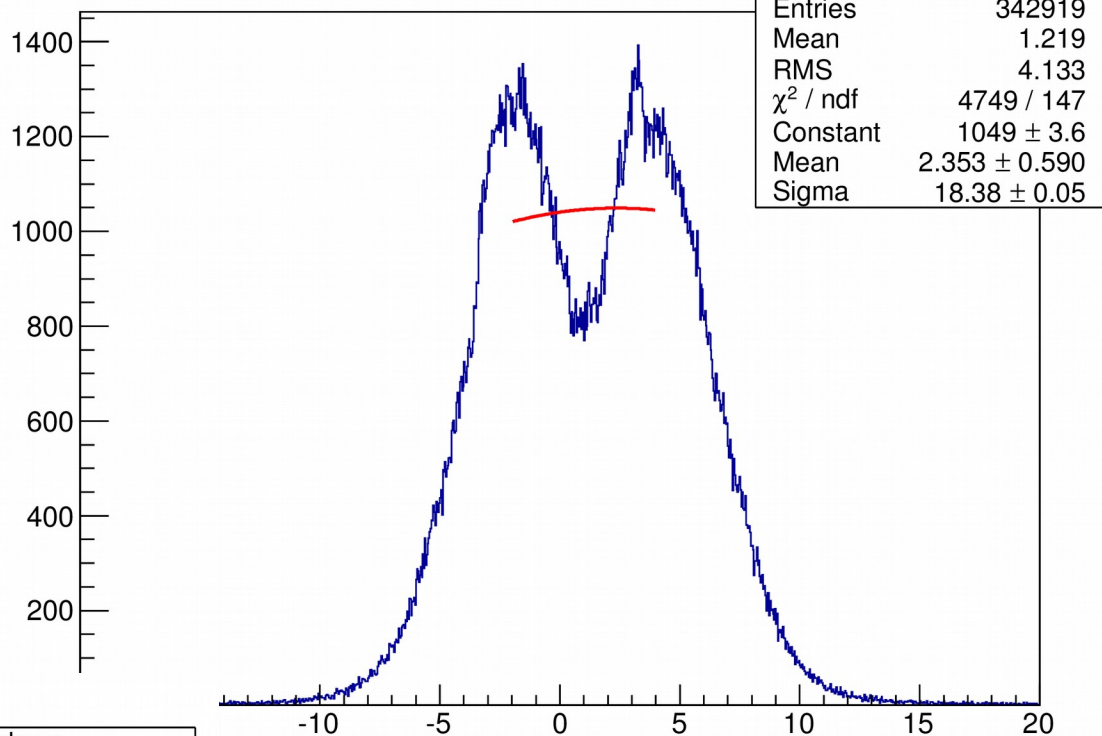
Offsets to gem plane.

$$Y_{Offset}^{up} = Y_{Offset}^{real} - \frac{\Delta Z_{hycal}}{Z_{gem}} |Y_{gem}|$$

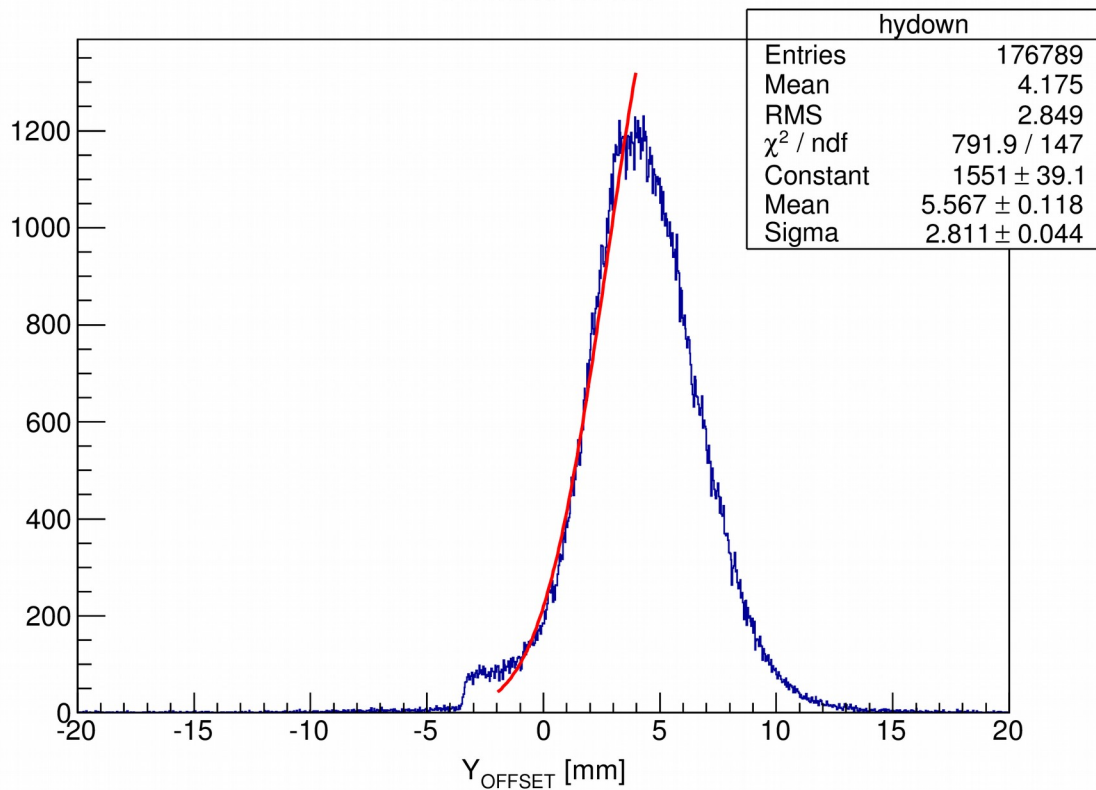
$$Y_{Offset}^{down} = Y_{Offset}^{real} + \frac{\Delta Z_{hycal}}{Z_{gem}} |Y_{gem}|$$

Assume :  $z_{hycal} = 5600 \text{ mm}$

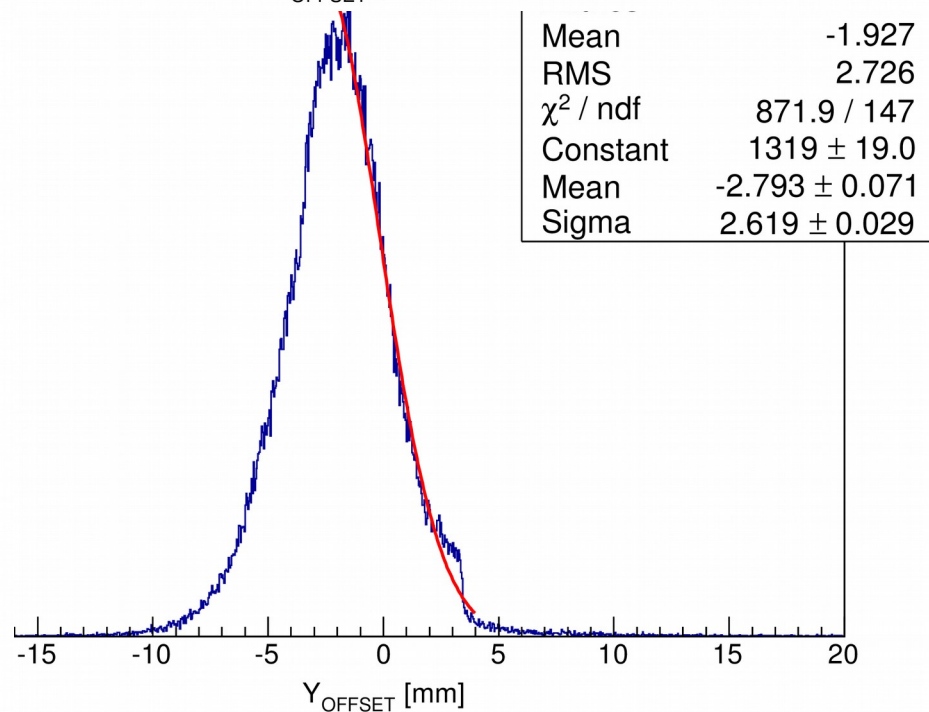
YOffset



YOffset down



$Y_{OFFSET}$  [mm]

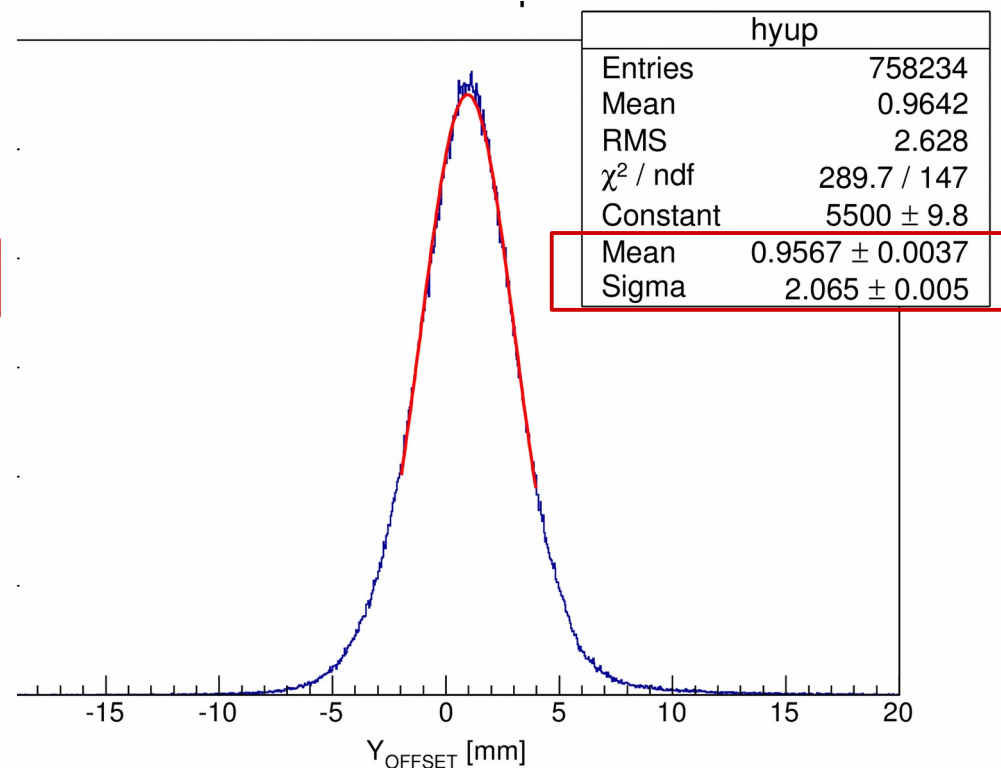
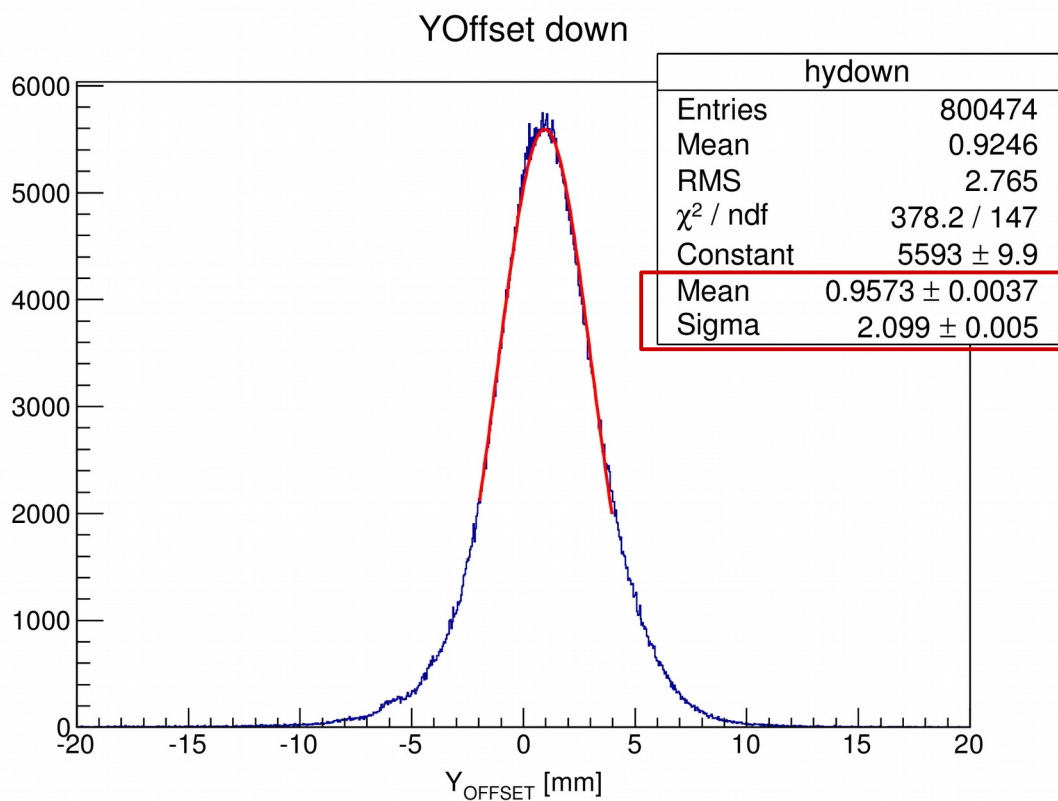
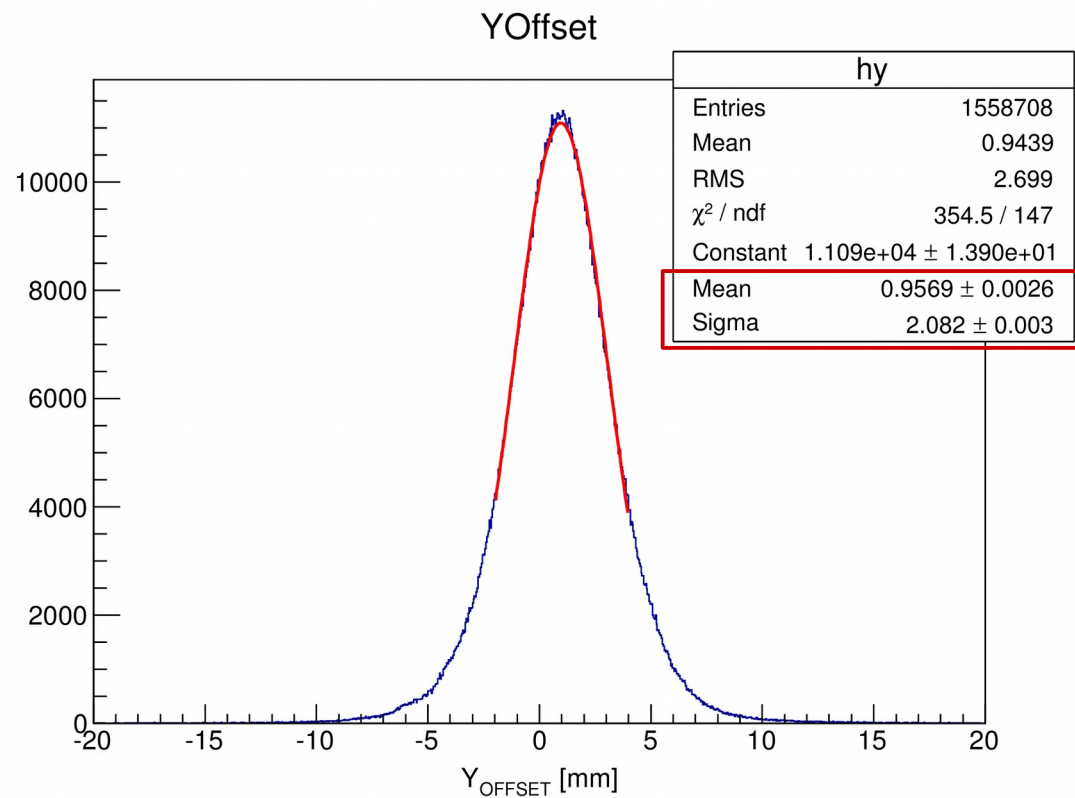


# HyCal GEM Y Offset

Offsets to gem plane.

$z_{hycal} = 5817 \text{ mm}$

From Survey: 5815.6mm



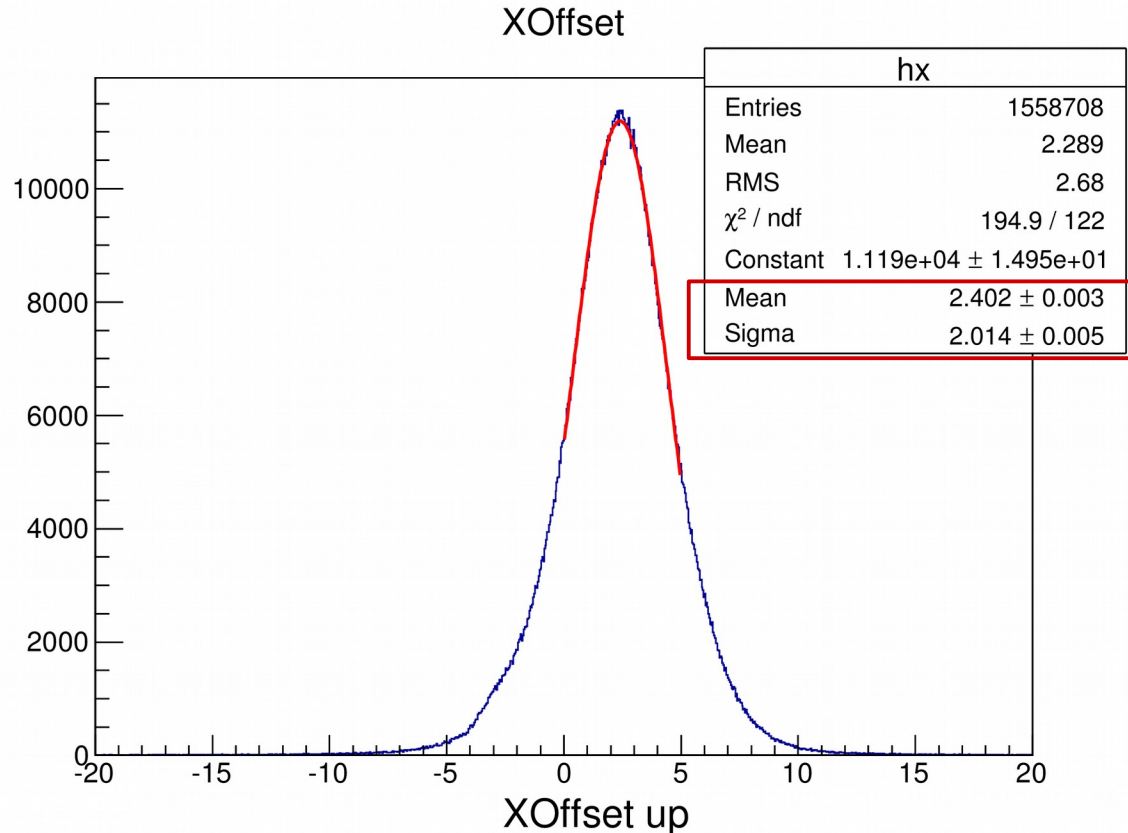


# HyCal GEM X Offset

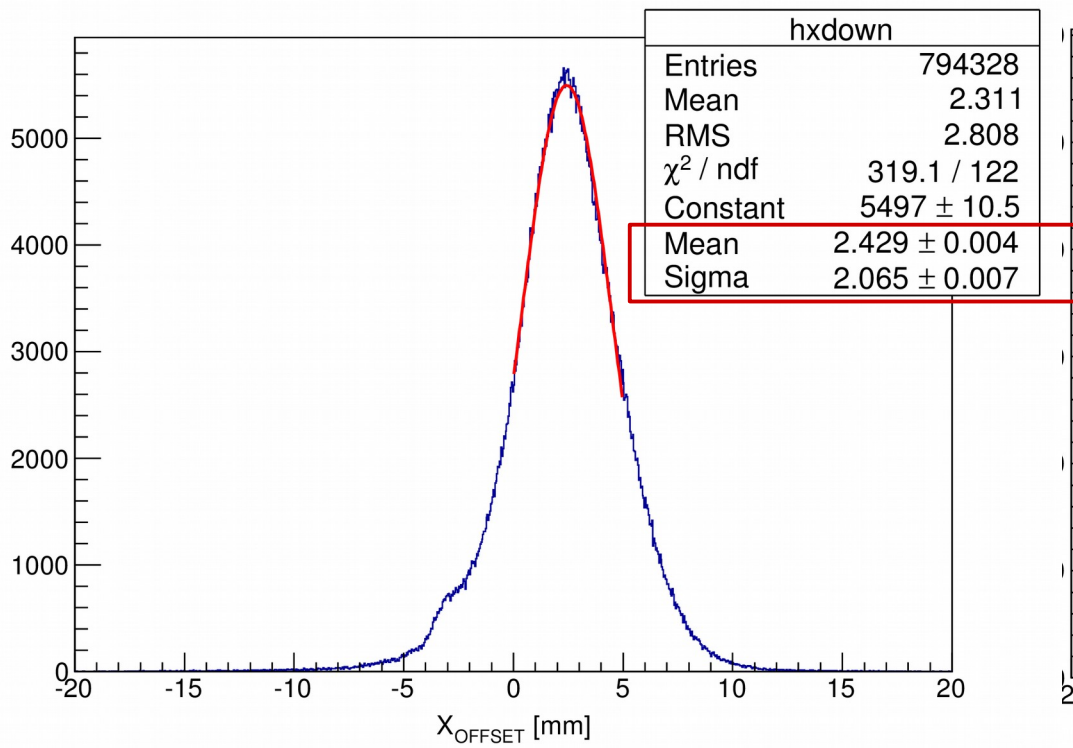
Offsets to gem plane.

$z_{hycal} = 5817 \text{ mm}$

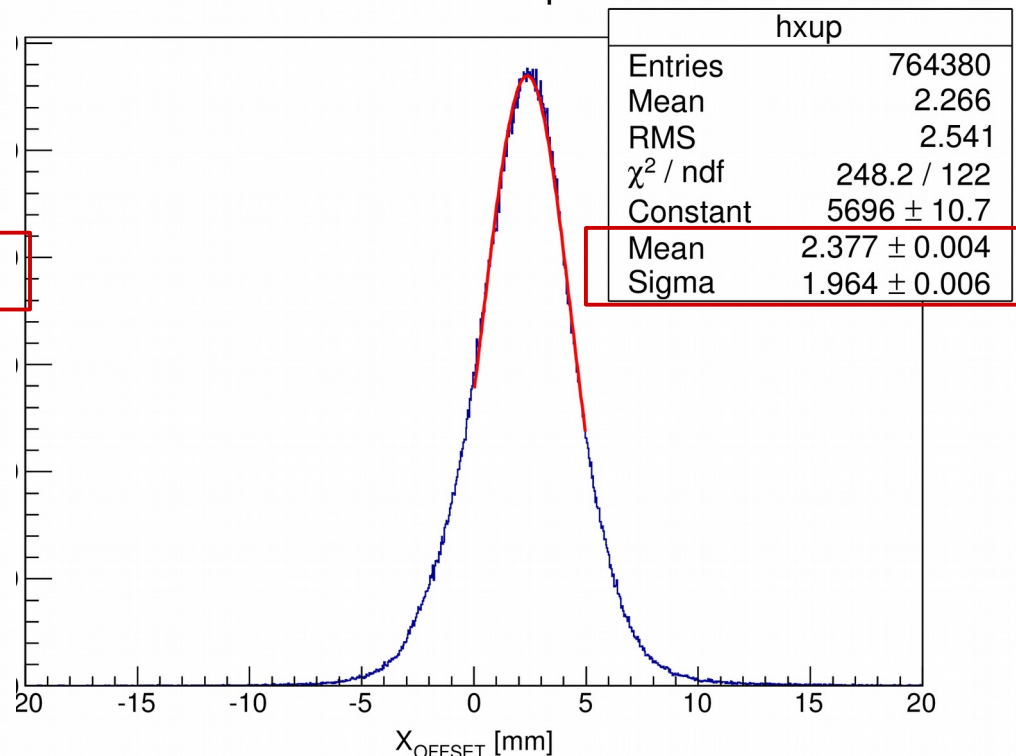
From Survey: 5815.6mm



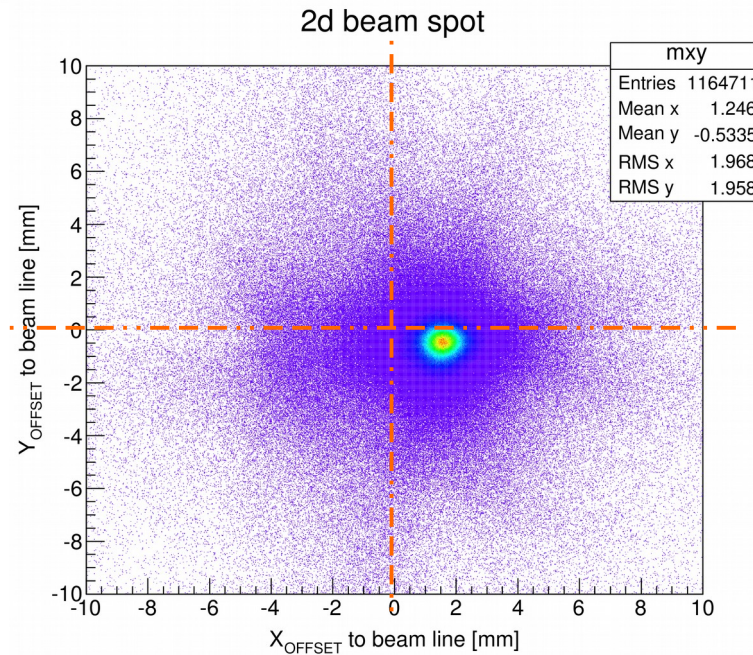
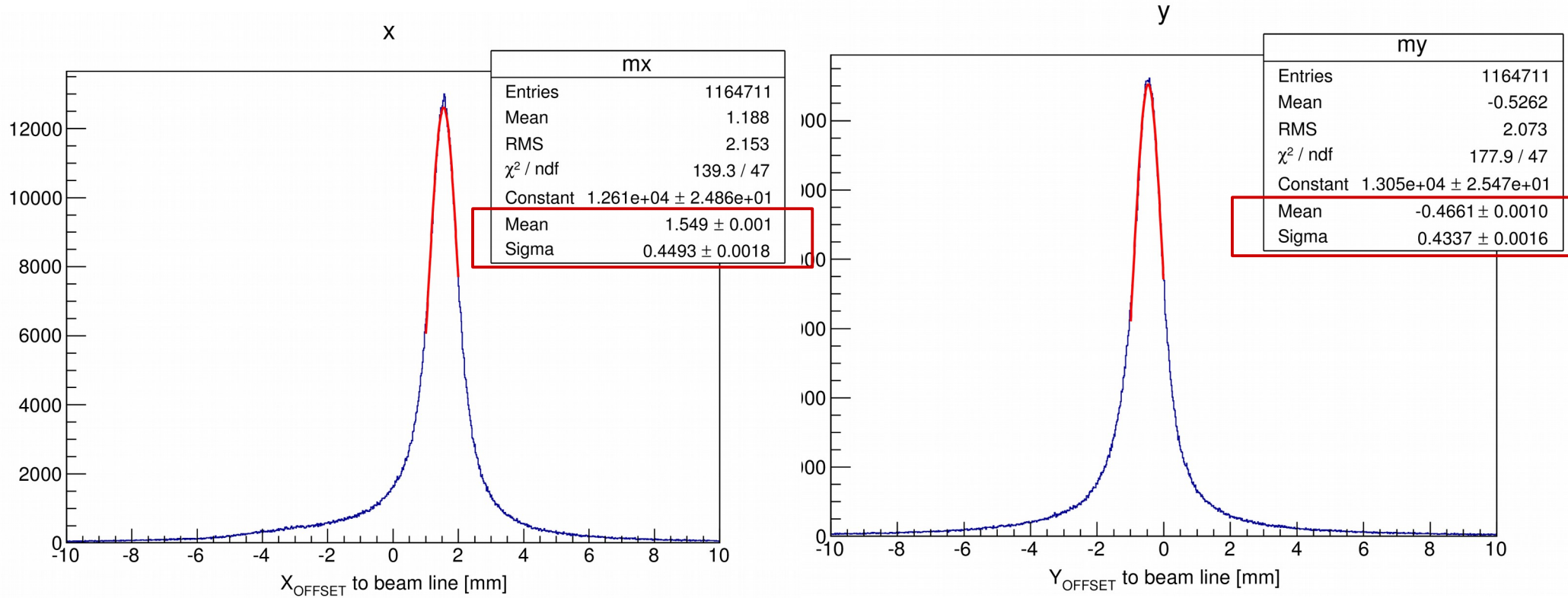
XOffset down



XOffset up



# Beam Line GEM Offset

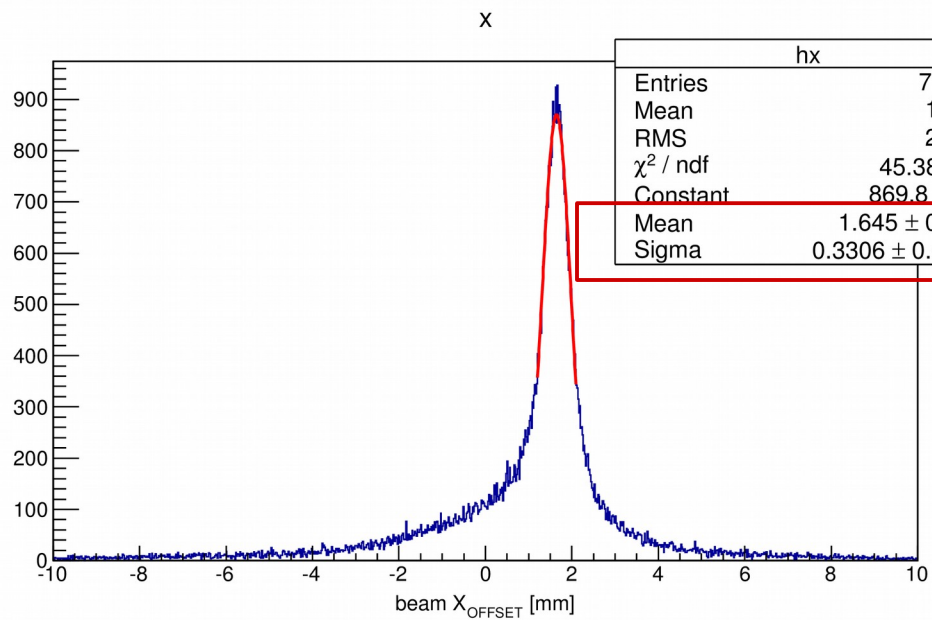


- 1), correct gem offsets.
- 2), use whole gem plane.

Reconstructed beam spot

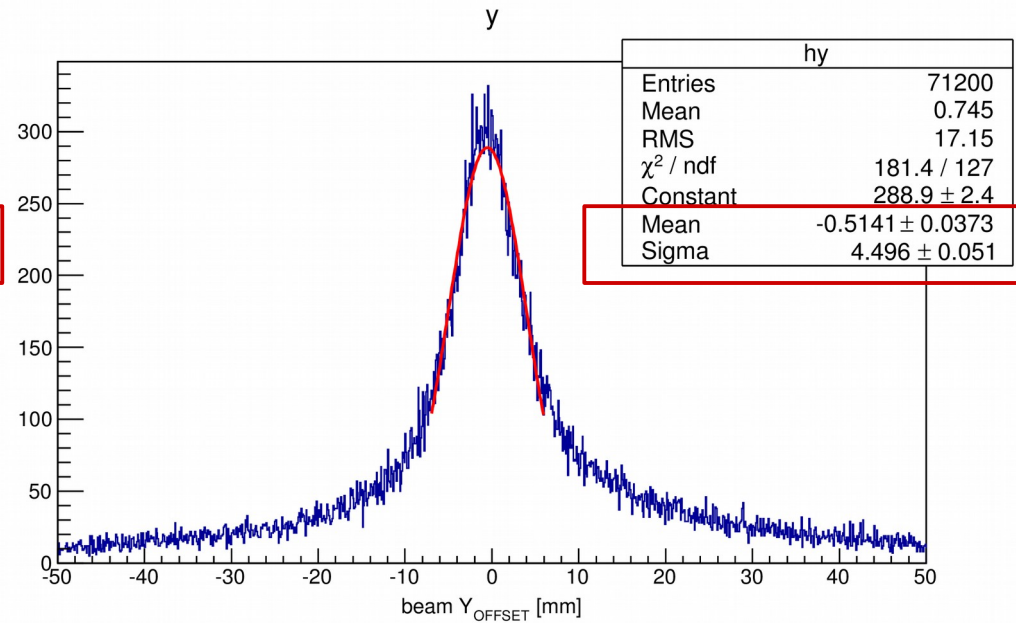


# Beam Line GEM Offset



Compare with using whole gem plane

Difference: 96 microns



Compare with using whole gem plane

Difference: 48 microns

1), Use overlap area.

# Offset Summary

## Procedure:

- 1), align chamber 1 to chamber 2. (GEM Offsets).
- 2), align HyCal to GEM.
- 3), align GEM plane to Beam Line.

## Preliminary Results:

- 1), GEM Offsets:
  - 1), chamber 1, Z: 5304mm
  - 2), chamber 2, Z: 5264mm
  - 3), No angular rotation.
  - 4), X Offset: 0.33mm; Y Offset: 0.18mm;
- 2), hycal Offsets (relative to gem plane)
  - 1), Z: 5817mm
  - 2), X Offset: 2.4mm; Y Offset : 0.96mm;
- 3), beam line gem plane Offsets
  - 1), X Offset: 1.55mm
  - 2), Y Offset: -0.47mm

# Offset Summary

<i>Offsets</i>	$X_{\text{OFFSET}}$	$Y_{\text{OFFSET}}$
<i>GEM 1 against GEM2</i>	<i>0.3353mm</i>	<i>0.186mm</i>
<i>HyCal against GEM plane</i>	<i>2.402mm</i>	<i>0.9569mm</i>
<i>Beam line against GEM plane</i>	<i>1.549mm</i>	<i>-0.466mm</i>
<i>GEM relative Rotation</i>	$2.6 \times 10^{-3}$ (degree)	

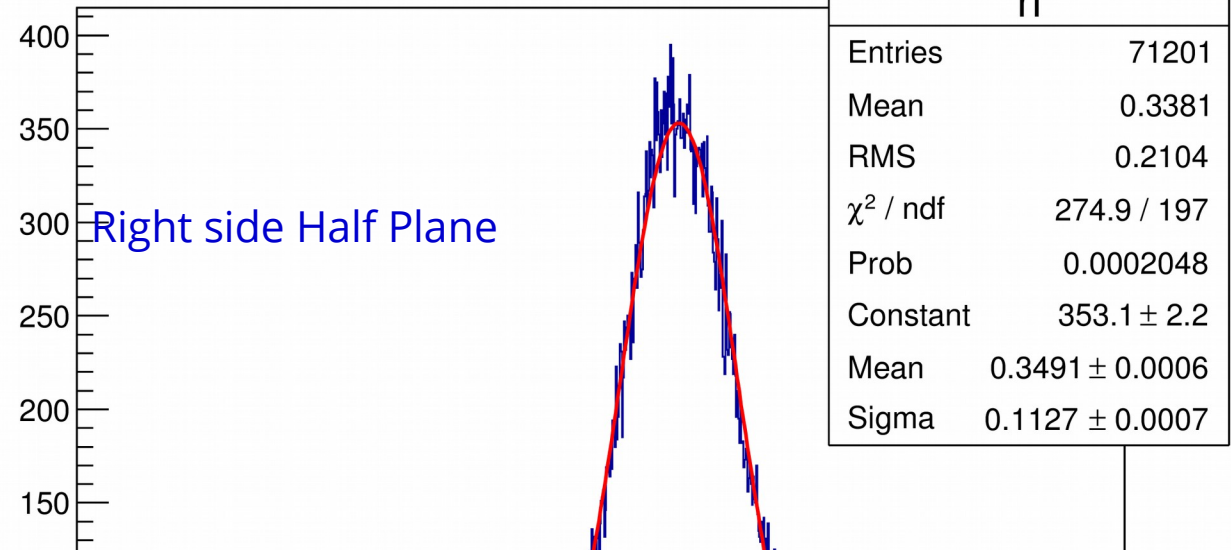
<i>Z</i>	<i>value</i>	<i>survey</i>
<i>GEM1</i>	<i>5304mm</i>	<i>5304mm</i>
<i>GEM2</i>	<i>5264mm</i>	<i>5264mm</i>
<i>HyCal</i>	<i>5817mm</i>	<i>5815.6mm</i>

Backup

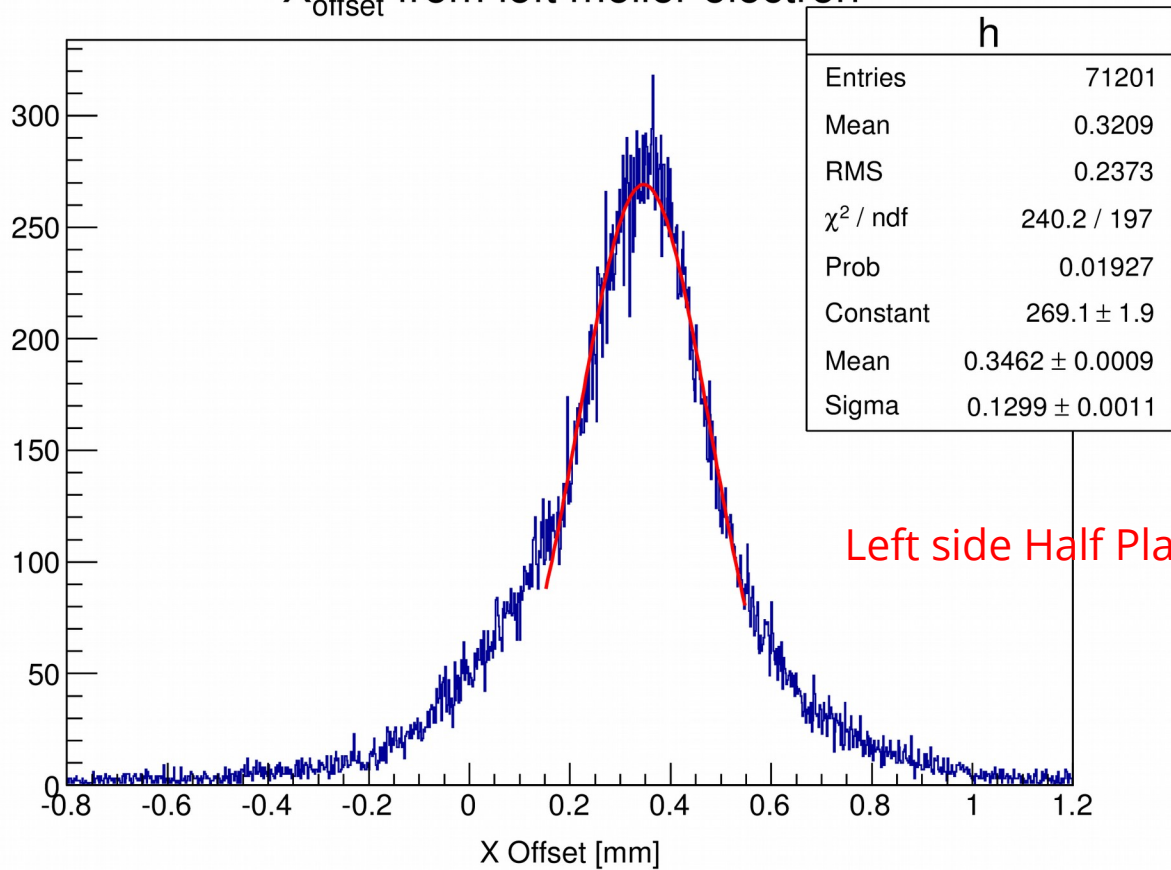
# GEM Offset

Using Overlapping area  
**moller events** detecting  
 offsets between two GEM Chambers.

$X_{\text{offset}}$  right moller electron



$X_{\text{offset}}$  from left moller electron



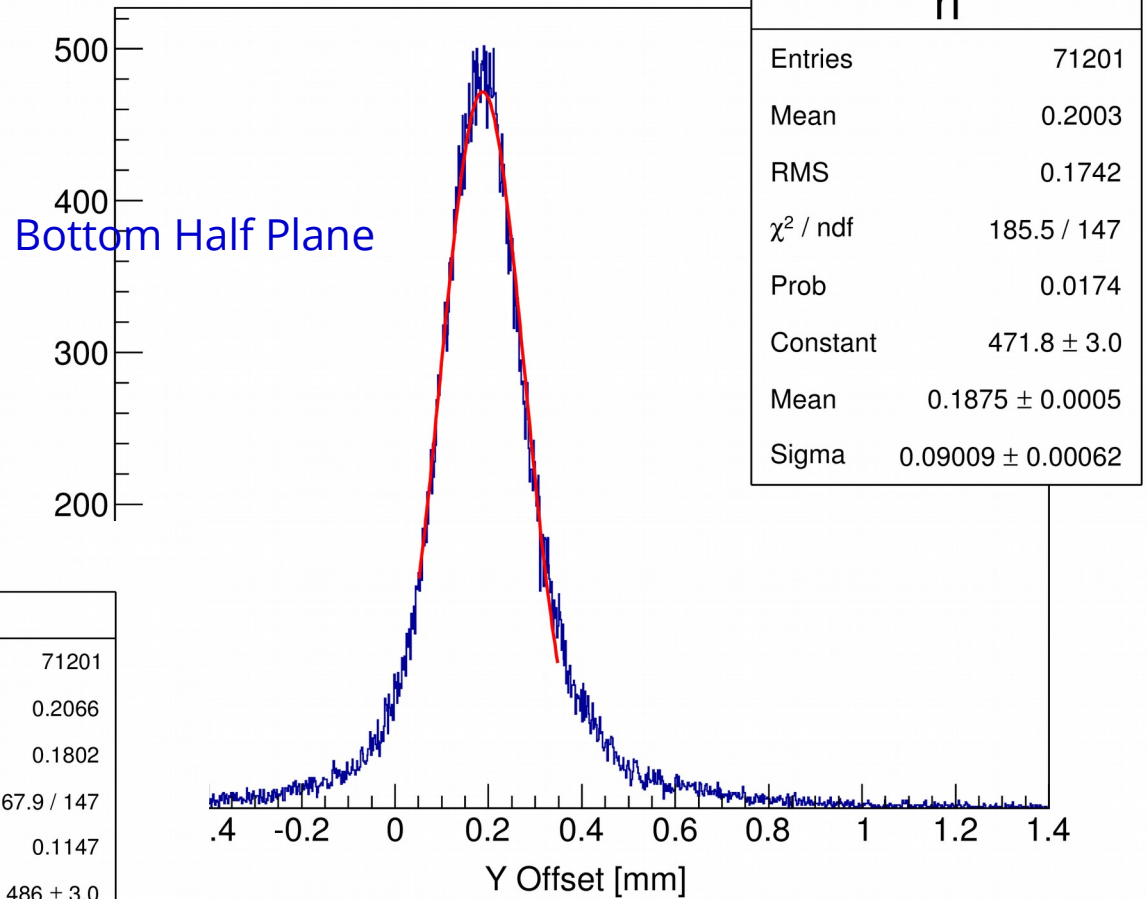
X Offset [mm]



# GEM Offset

Using Overlapping area  
**moller events** detecting  
 offsets between two GEM Chambers.

$Y_{\text{offset}}$  from bottom moller electron



$Y_{\text{offset}}$  from top moller electron

