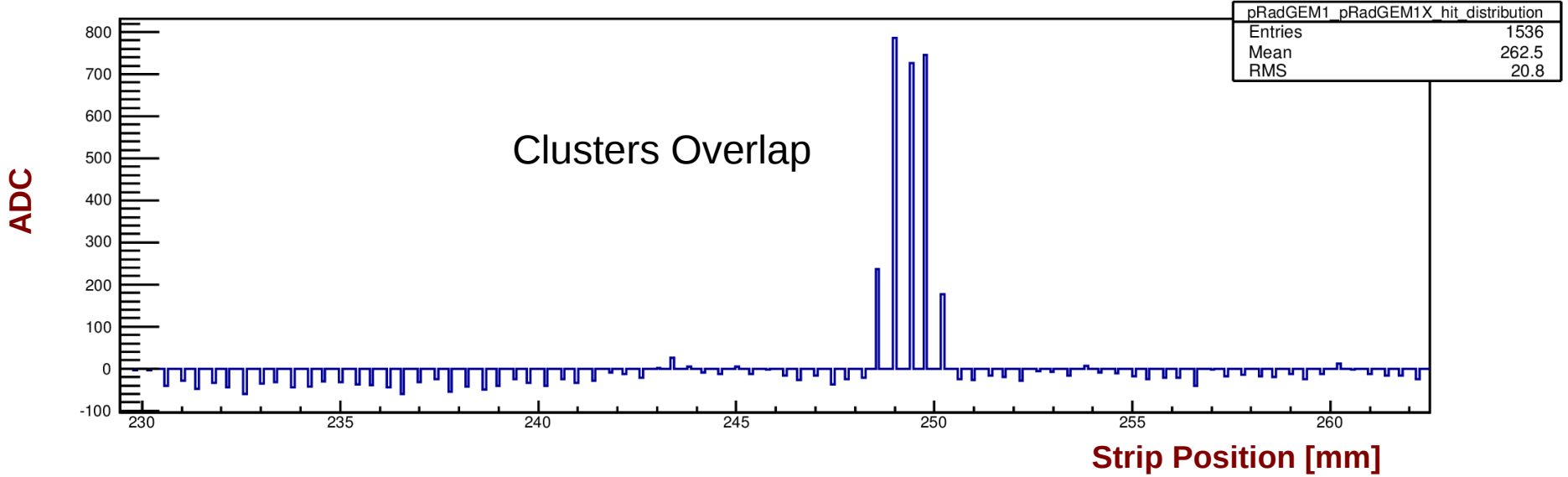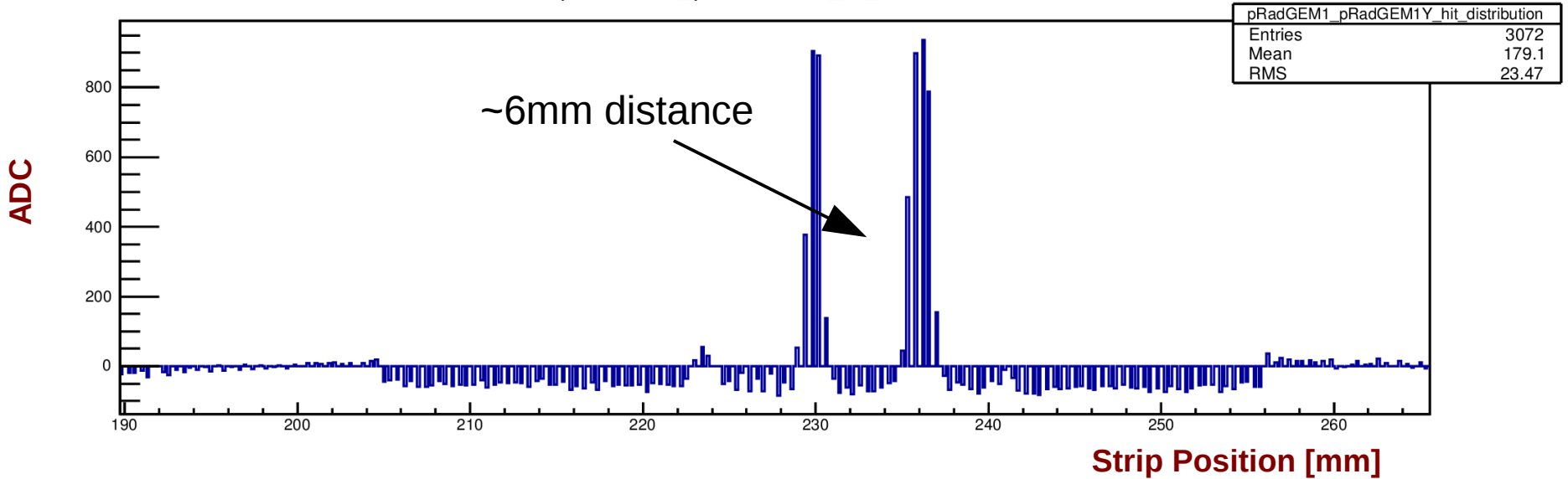# Pair Events From Calibration Run

## Event #7, Chamber 1



pRadGEM1_pRadGEM1X_hit_distribution
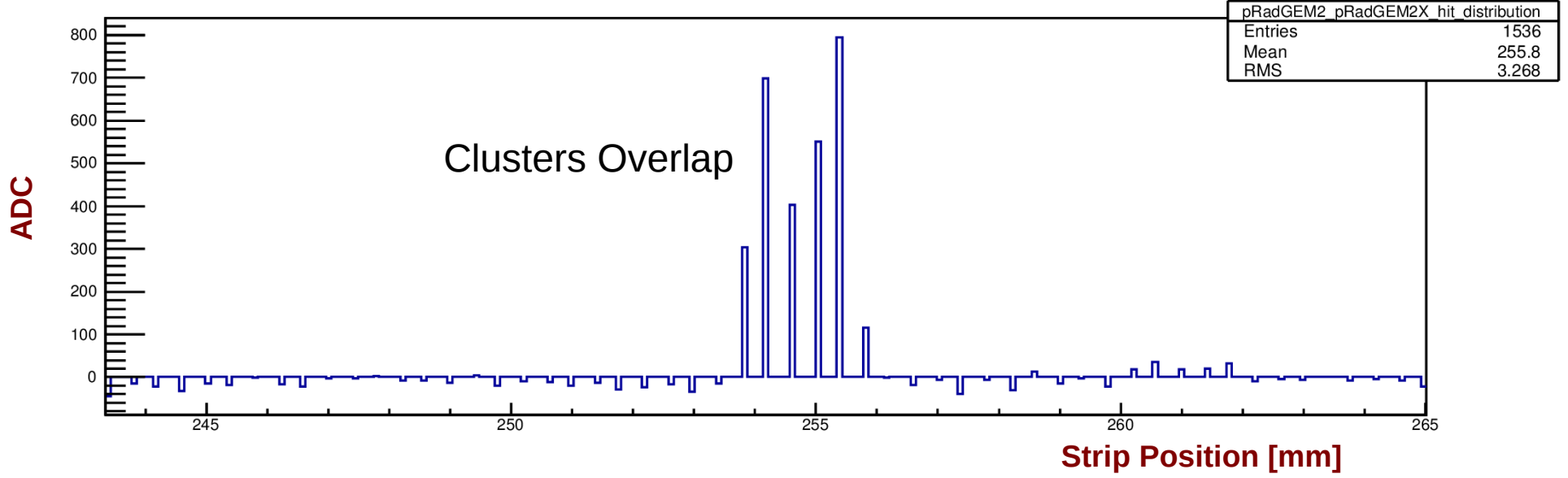
| pRadGEM1_pRadGEM1X_hit_distribution | |
|---|---|
| Entries | 1536 |
| Mean | 262.5 |
| RMS | 20.8 |

Clusters Overlap

**ADC**

**Strip Position [mm]**

pRadGEM1_pRadGEM1Y_hit_distribution

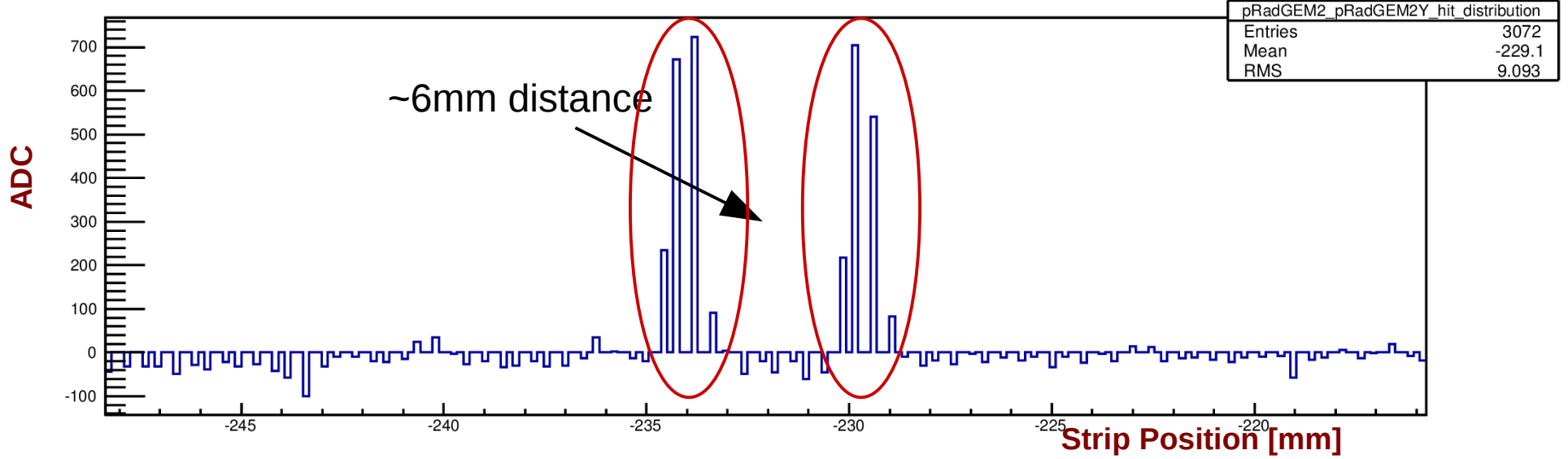| pRadGEM1_pRadGEM1Y_hit_distribution | |
|---|---|
| Entries | 3072 |
| Mean | 179.1 |
| RMS | 23.47 |

~6mm distance

**ADC**

**Strip Position [mm]**

# Pair Events From Calibration Run

## Event #7, Chamber 2



pRadGEM2_pRadGEM2X_hit_distribution

| pRadGEM2_pRadGEM2X_hit_distribution | |
| --- | --- |
| Entries | 1536 |
| Mean | 255.8 |
| RMS | 3.268 |

Clusters Overlap

ADC

Strip Position [mm]

pRadGEM2_pRadGEM2Y_hit_distribution

| pRadGEM2_pRadGEM2Y_hit_distribution | |
| --- | --- |
| Entries | 3072 |
| Mean | -229.1 |
| RMS | 9.093 |

~6mm distance

ADC

Strip Position [mm]

# Pair Events From Calibration Run

## Event #9, Chamber 1



pRadGEM1_pRadGEM1X_hit_distribution

| pRadGEM1_pRadGEM1X_hit_distribution | |
| --- | --- |
| Entries | 1536 |
| Mean | 287.7 |
| RMS | 33.09 |

~4mm distance

**ADC**

**Strip Position [mm]**

pRadGEM1_pRadGEM1Y_hit_distribution

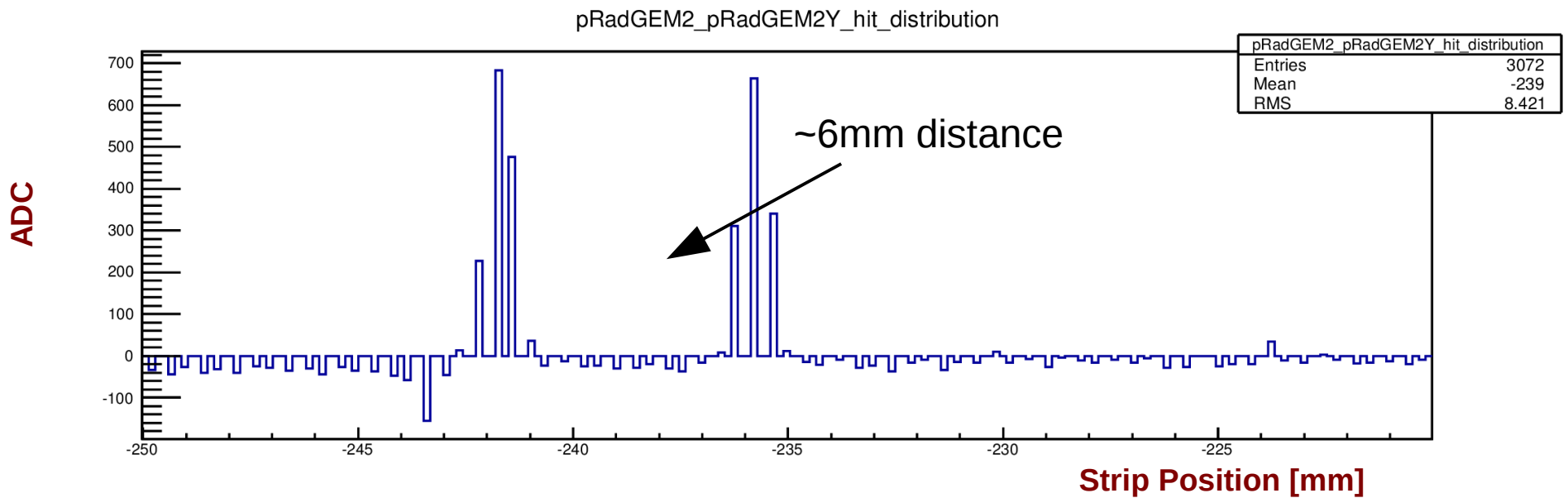| pRadGEM1_pRadGEM1Y_hit_distribution | |
| --- | --- |
| Entries | 3072 |
| Mean | 244.7 |
| RMS | 21.78 |

~6mm distance

**ADC**

**Strip Position [mm]**

# Pair Events From Calibration Run

## Event #9, Chamber 2



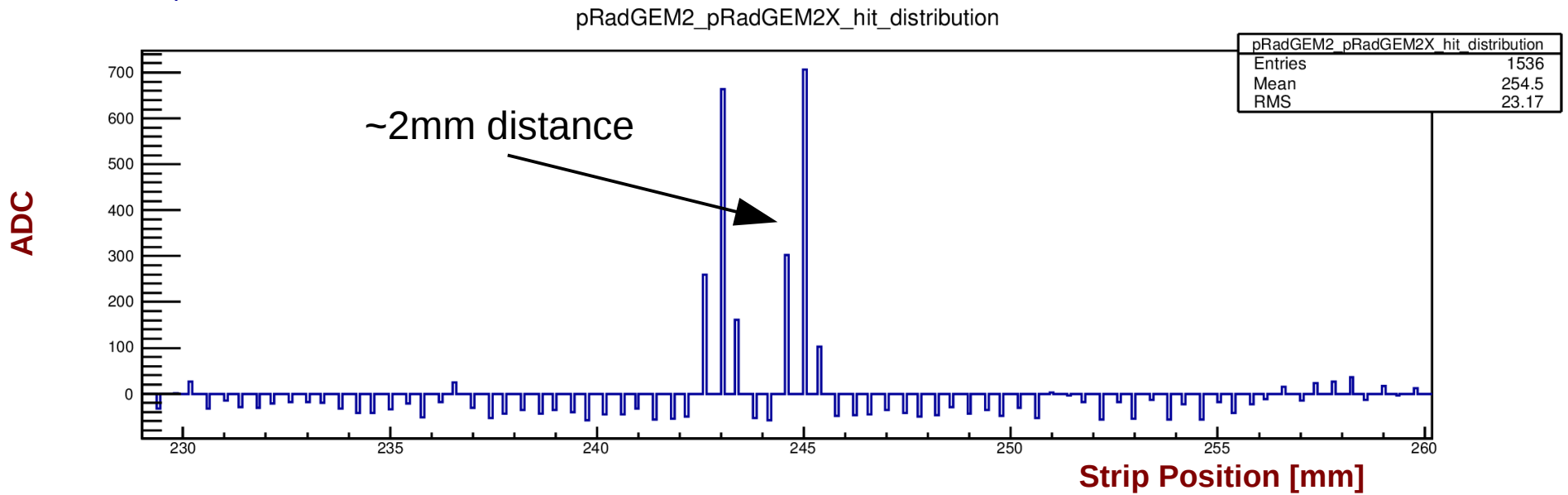pRadGEM2_pRadGEM2X_hit_distribution

| pRadGEM2_pRadGEM2X_hit_distribution | |
| --- | --- |
| Entries | 1536 |
| Mean | 254.5 |
| RMS | 23.17 |

~2mm distance

ADC

Strip Position [mm]

pRadGEM2_pRadGEM2Y_hit_distribution

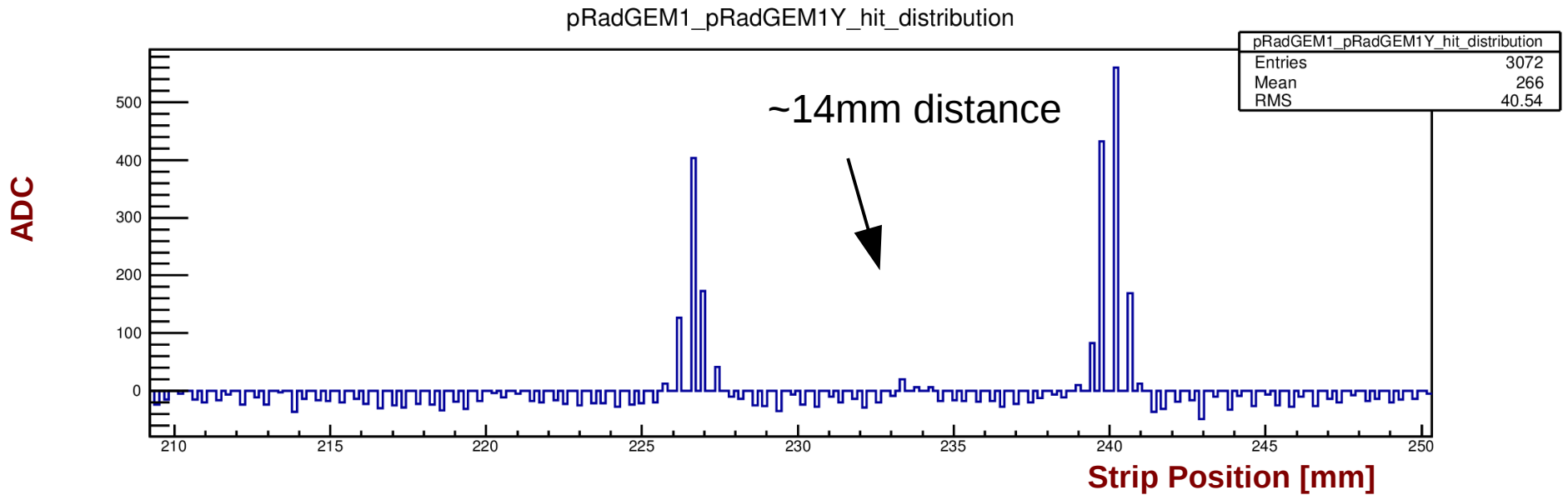| pRadGEM2_pRadGEM2Y_hit_distribution | |
| --- | --- |
| Entries | 3072 |
| Mean | -239 |
| RMS | 8.421 |

~6mm distance

ADC

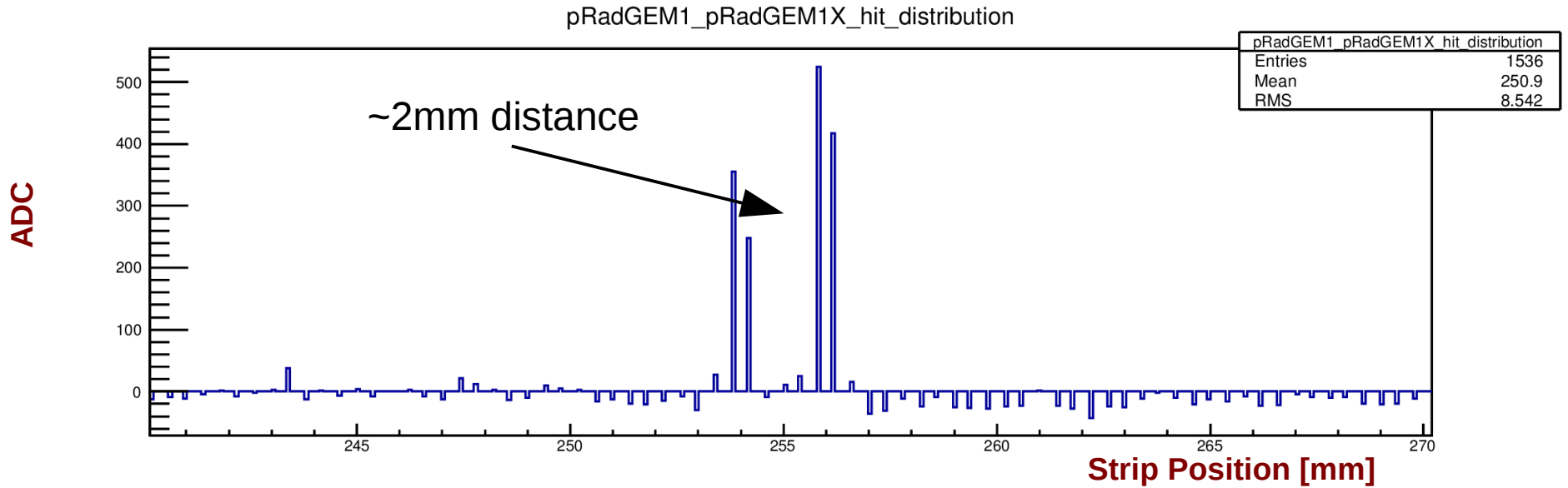Strip Position [mm]

# Pair Events From Calibration Run

## Event #19, Chamber 1



pRadGEM1_pRadGEM1X_hit_distribution

| pRadGEM1_pRadGEM1X_hit_distribution | |
| --- | --- |
| Entries | 1536 |
| Mean | 250.9 |
| RMS | 8.542 |

~2mm distance

ADC

Strip Position [mm]

pRadGEM1_pRadGEM1Y_hit_distribution

| pRadGEM1_pRadGEM1Y_hit_distribution | |
| --- | --- |
| Entries | 3072 |
| Mean | 266 |
| RMS | 40.54 |

~14mm distance

ADC

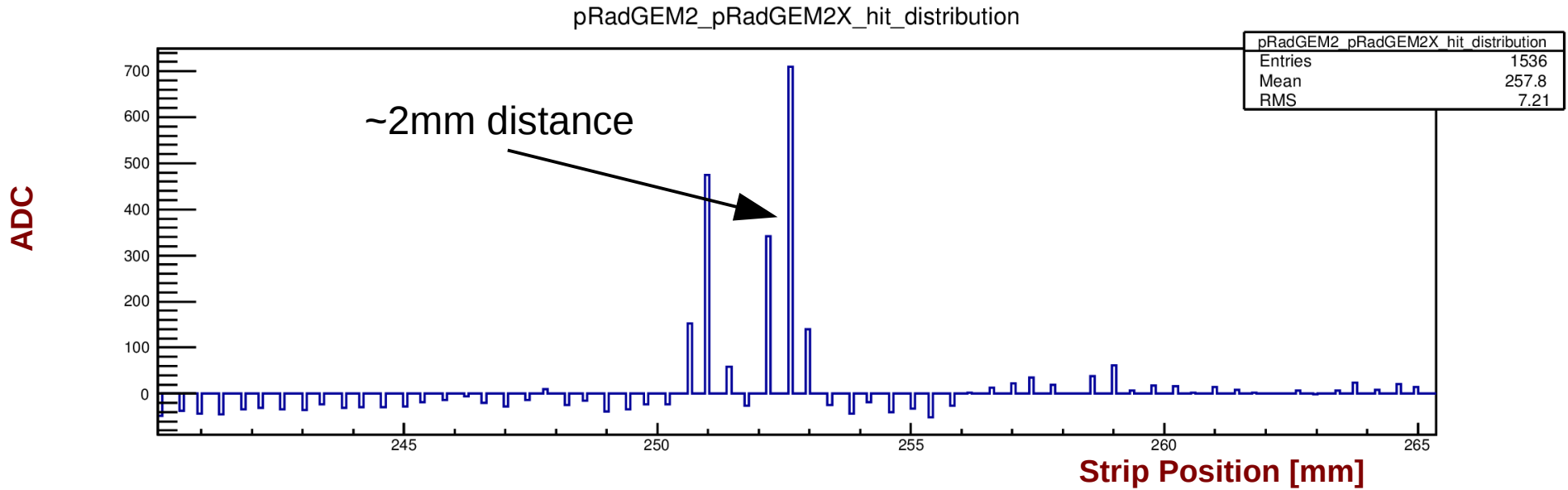Strip Position [mm]
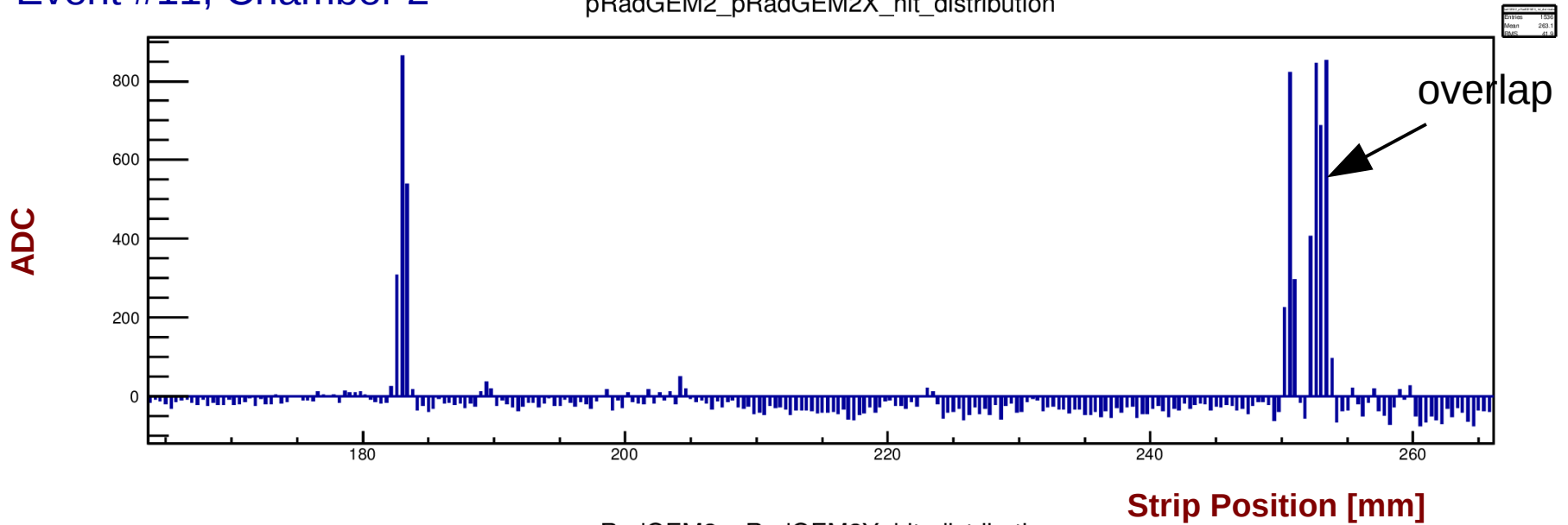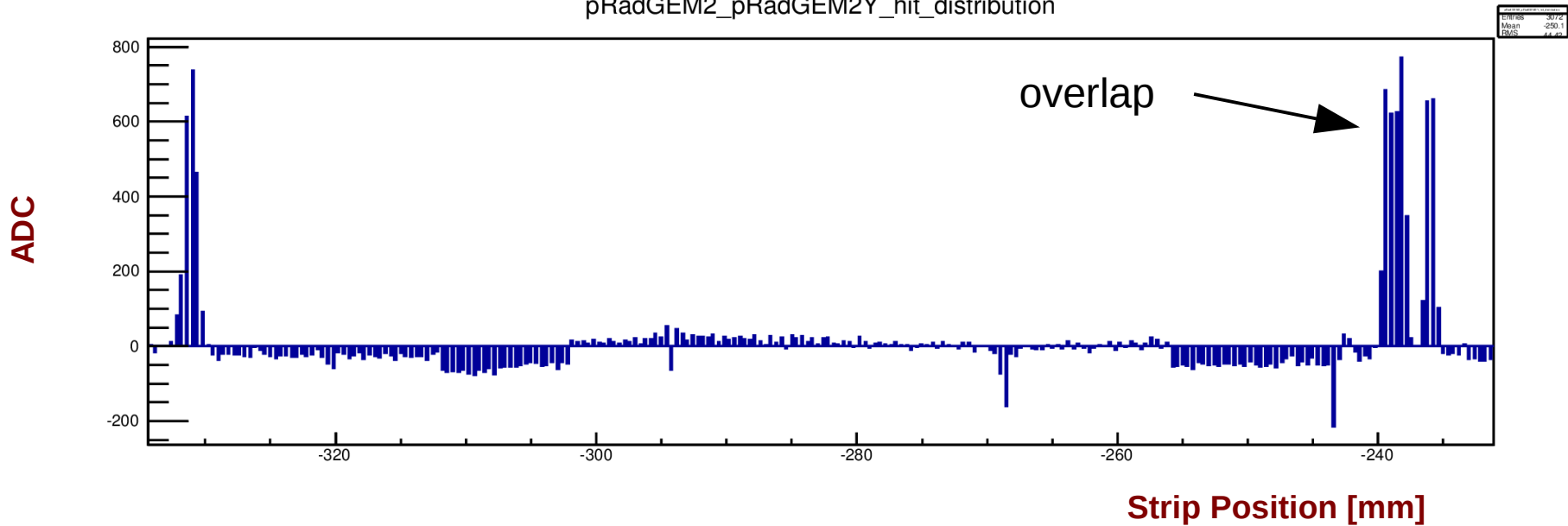
# Pair Events From Calibration Run

## Event #19, Chamber 2



pRadGEM2_pRadGEM2X_hit_distribution

| pRadGEM2_pRadGEM2X_hit_distribution | |
| --- | --- |
| Entries | 1536 |
| Mean | 257.8 |
| RMS | 7.21 |

~2mm distance

ADC

Strip Position [mm]

pRadGEM2_pRadGEM2Y_hit_distribution

| pRadGEM2_pRadGEM2Y_hit_distribution | |
| --- | --- |
| Entries | 3072 |
| Mean | -220.5 |
| RMS | 18.9 |

~11mm distance

ADC

Strip Position [mm]

# Pair Events From Calibration Run

## Event #11, Chamber 2



pRadGEM2_pRadGEM2X_hit_distribution

overlap

ADC

Strip Position [mm]

pRadGEM2_pRadGEM2Y_hit_distribution

overlap

ADC

Strip Position [mm]

# Pair Events From Calibration Run

1), Single Cluster Event Ratio: ~9.3%

2), Double Cluster Event Ratio: ~20.6%

3), >= 3 Cluster Event Ratio: ~70.1%
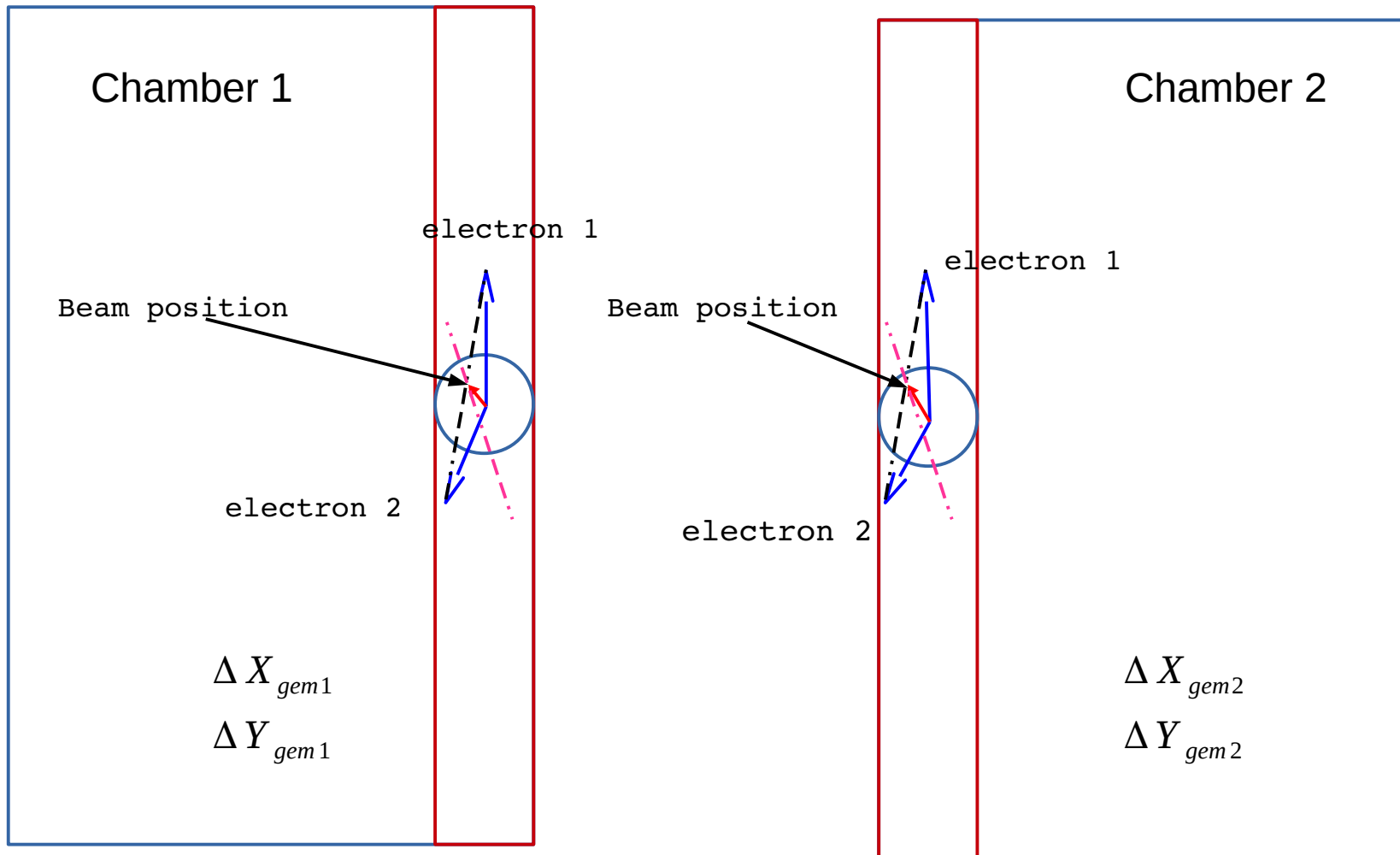
4), If two clusters have about equal ADCs:

$$\left| \frac{ADC_{cluster\,1} - ADC_{cluster\,2}}{ADC_{cluster\,1} + ADC_{cluster\,2}} \right| < \frac{20}{100}$$

Cluster positions will be within ~20mm.

5), If ADCs have larger difference, Positions will have larger difference.

6), In most cases, HyCal has only 1 cluster. It does not set apart pairs.

7), For now, GEM take overlapped cluster as one cluster, re-writing clustering.

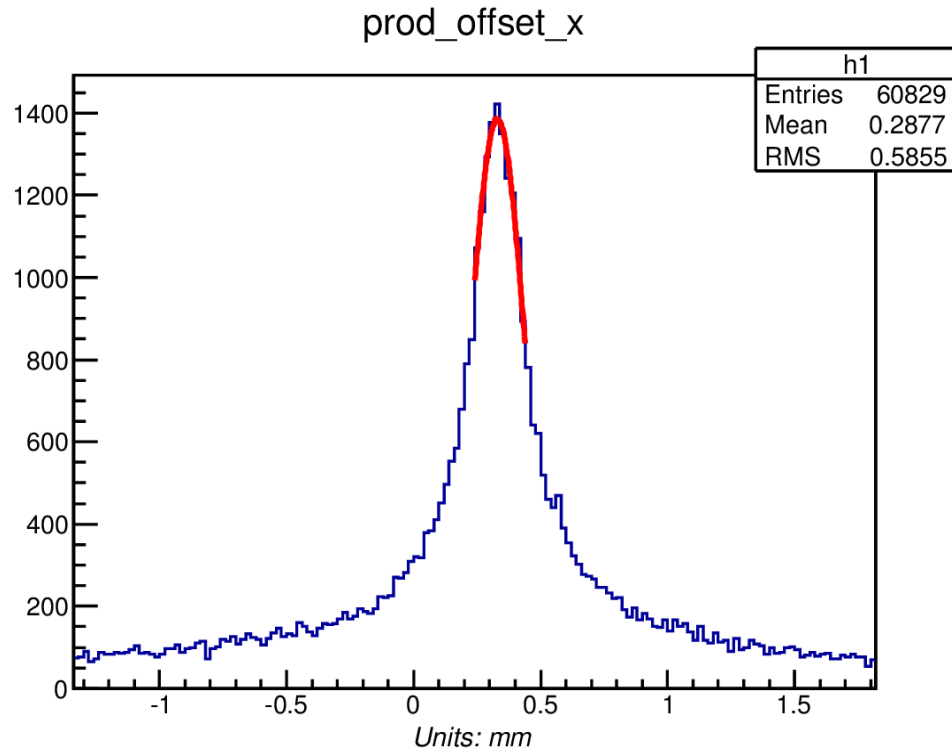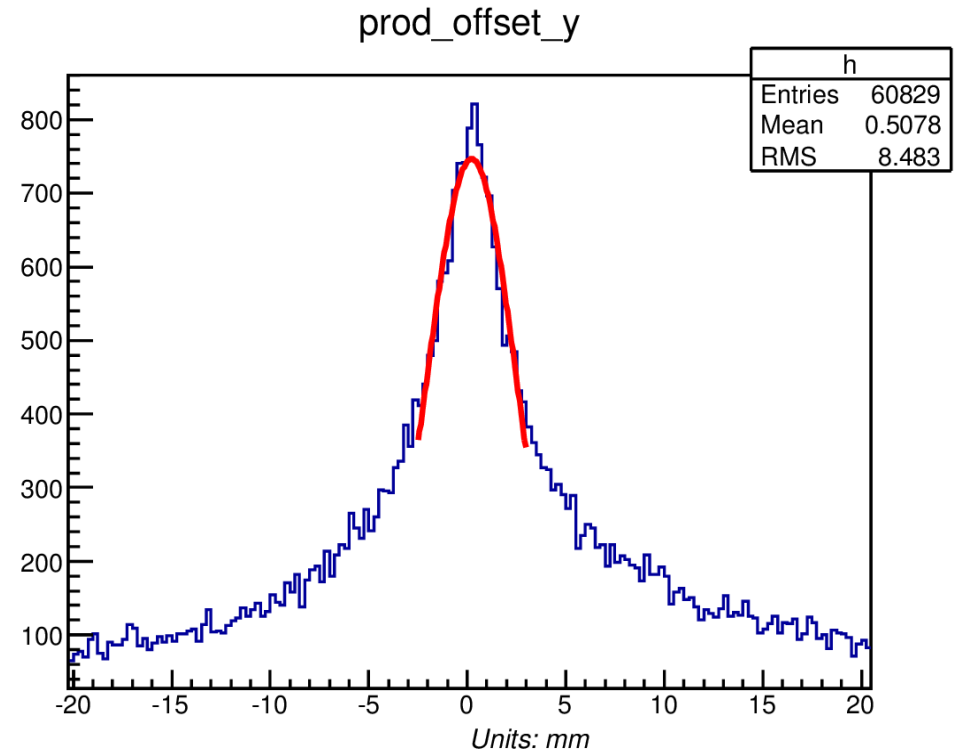8), Distance from Scintillator to GEM: 16cm

# Offsets From Production Run



Chamber 1

electron 1

Beam position

electron 2

$\Delta X_{gem1}$

$\Delta Y_{gem1}$

Chamber 2

electron 1

Beam position

electron 2

$\Delta X_{gem2}$

$\Delta Y_{gem2}$

In each Event:

$$X_{offst} = \Delta X_{gem2} - \Delta X_{gem1}$$

$$Y_{offst} = \Delta Y_{gem2} - \Delta Y_{gem1}$$

# Offsets From Production Run



**prod_offset_x**

| h1 | |
|---|---|
| Entries | 60829 |
| Mean | 0.2877 |
| RMS | 0.5855 |

Units: mm

Offset: 0.33 mm
Error:   0.0021 mm

**prod_offset_y**

| h | |
|---|---|
| Entries | 60829 |
| Mean | 0.5078 |
| RMS | 8.483 |

Units: mm

Offset: 0.223 mm
Error:   0.0309 mm