35t data analysis : Z-gap crosser
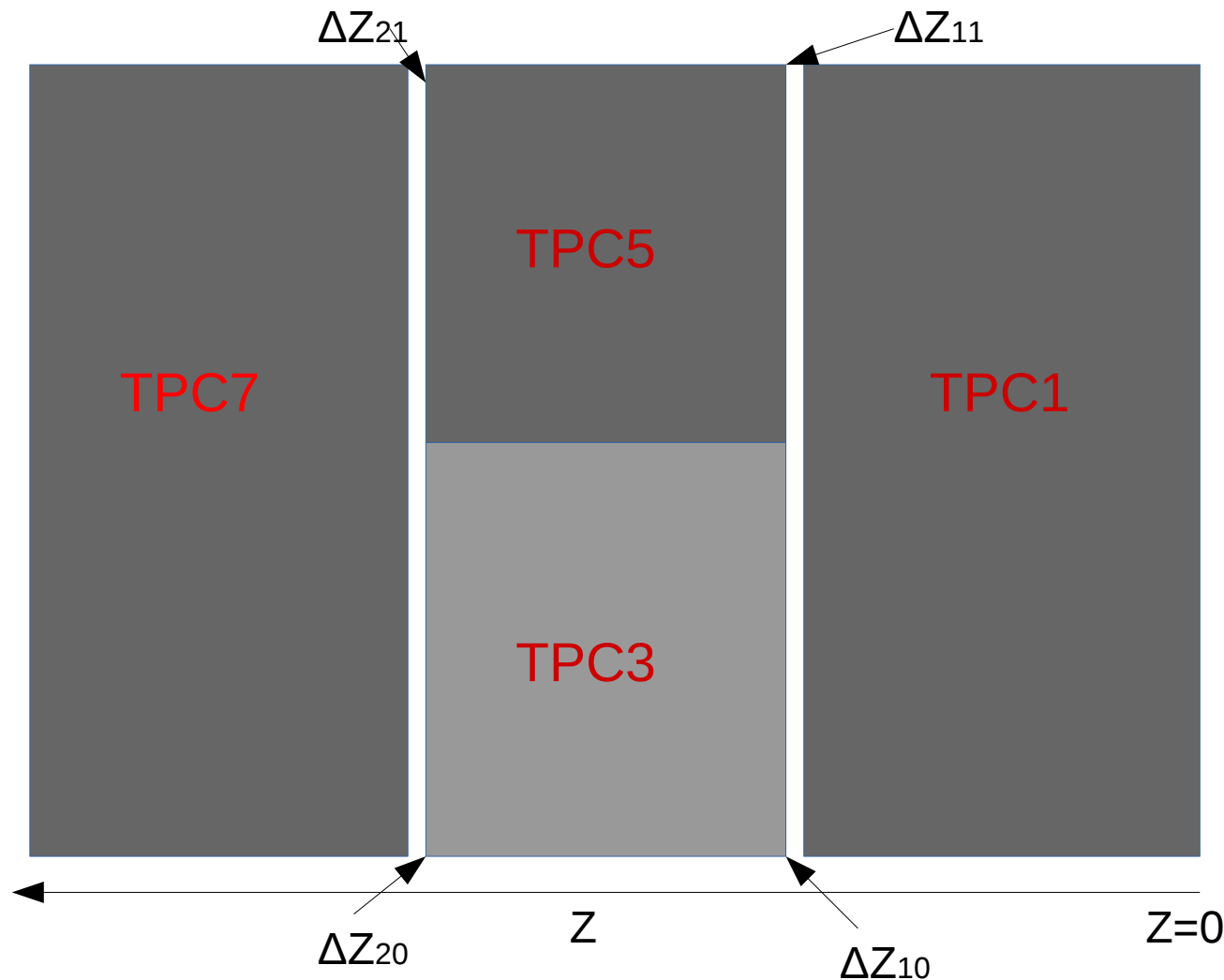
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35t Analysis meeting

2/15/2106

TPC Geometry in the longest drift

Taking from latest gdml file(WireDumpV06.txt)

$\Delta Z_{10} = 2.52$
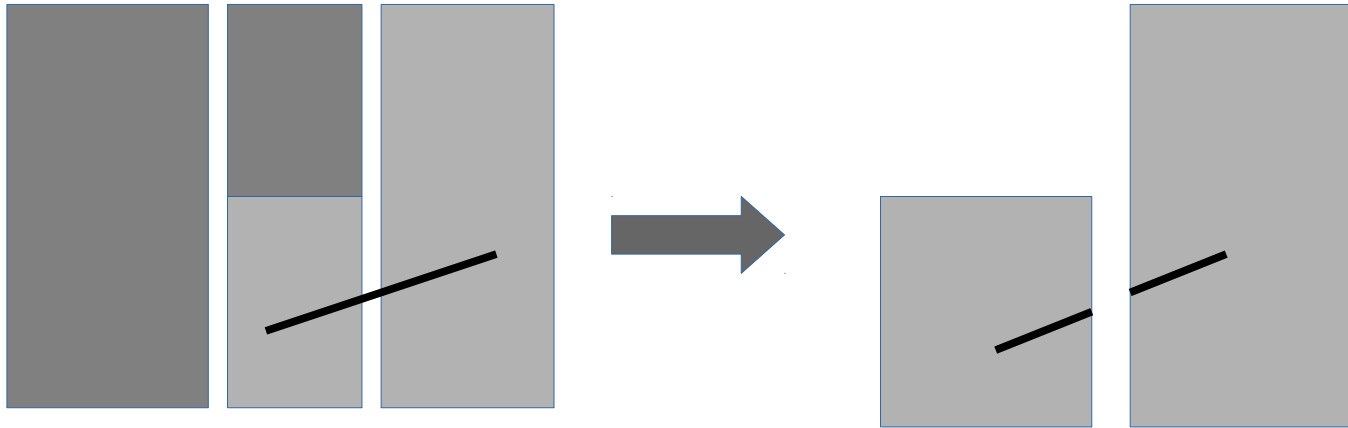$\Delta Z_{11} = 2.08$
$\Delta Z_{20} = 1.63$
$\Delta Z_{21} = 2.08$

- Non uniformity in the gap.

TPC7 TPC5 TPC3 TPC1

ΔZ_{21} ΔZ_{11}

Z Z=0

ΔZ_{20} ΔZ_{10}

- **We are trying to calculate difference between the true gap width and the gap width in the geometry file.**

Steps

- Track which crosses both the TPC has been considered.

- Hits which are within 20 cm from the gap are taken and fitted.

- Each segment of a track (in each TPC volume) should have at-least 3 hits.

- Each section of the track(hits from collection wire) are fitted with 2D straight line.

- Error on Z taken as 0.2 cm and error on X as 1 cm.

- Angle of the track is calculated from the slope of the fit.

- Angle difference between the two segments of a track calculated.

- Difference of the Z gap is measured with different cuts.

- More than 500 runs are taken for the analysis.
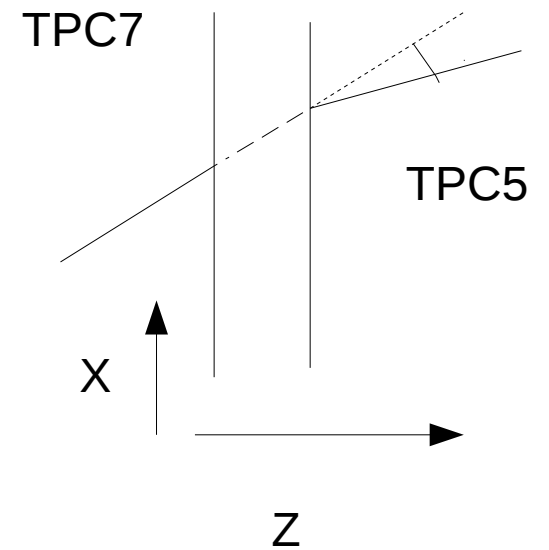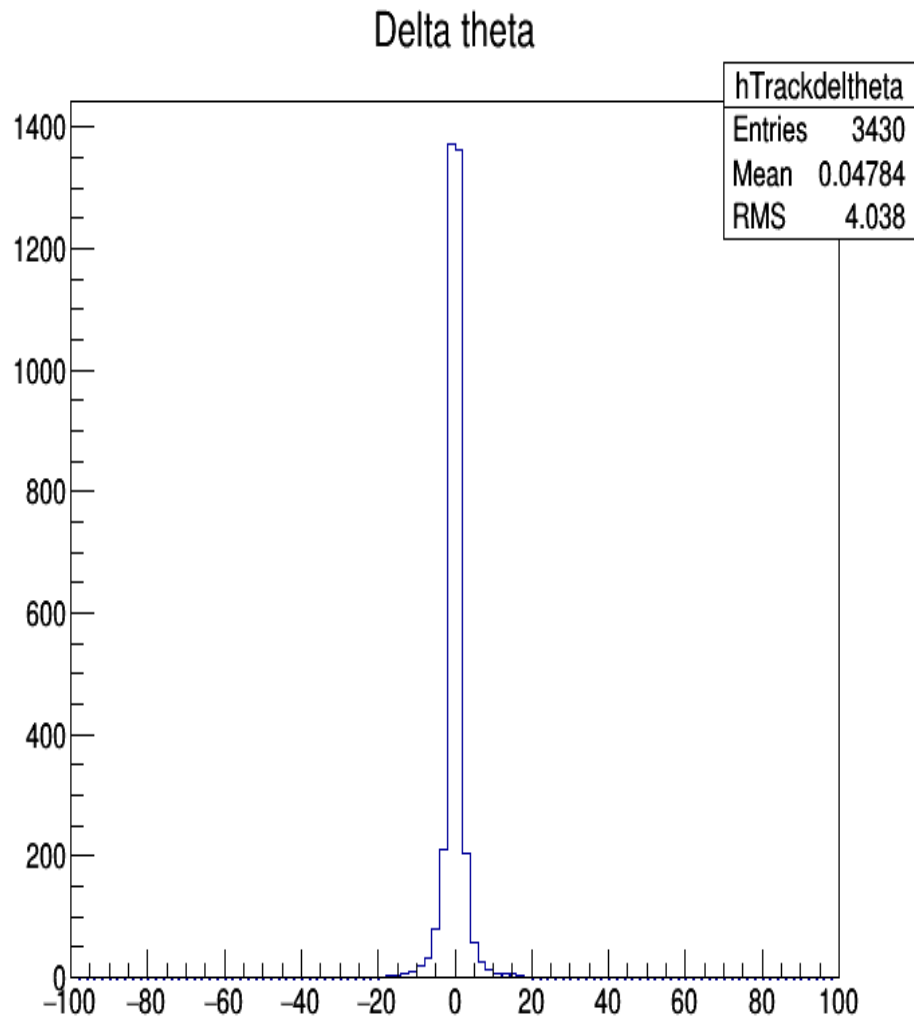
Method to calculate Delta Z

- Track which crosses TPC are splitted.
- Each portion of the tracks are fitted with a straight line (2d) as

- $X_{TPC3} = P_0 + P_1(Z + \Delta Z)$
  $X_{TPC1} = P_{01} + P_{11}(Z)$

If we take a point inside the gap, then the Z gap width will be

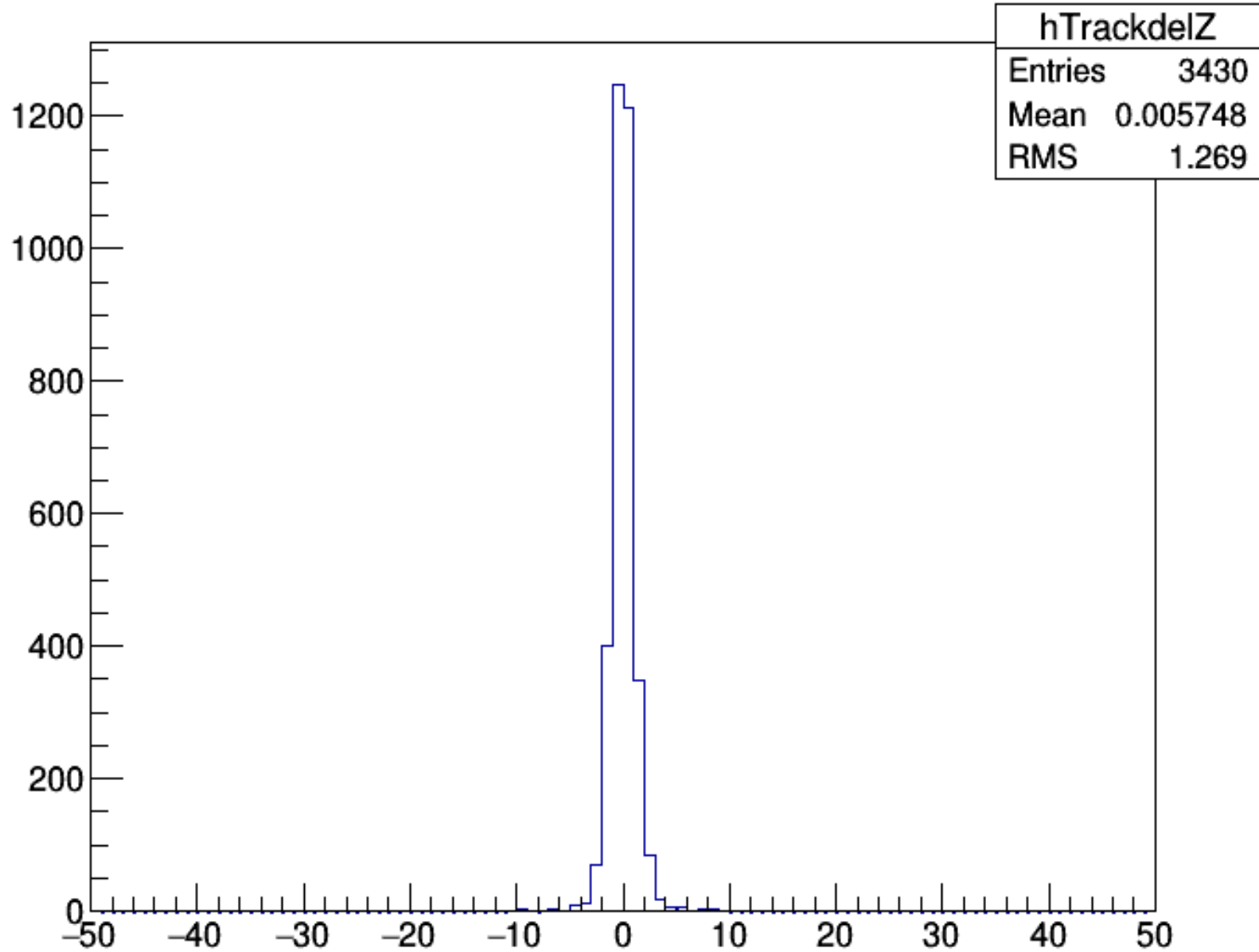$\Delta Z_{@gap} = ((P_{01} - P_0) + (P_{11} - P_1) Zgap) / (P_0 + P_{01})/2$

TPC7 and TPC 5 (delta theta)

Delta theta

hTrackdeltheta	
Entries	3430
Mean	0.04784
RMS	4.038

TPC7

TPC5

X

Z

Delta Z (TPC 7 and 5)

Delta Z = true gap - gap in geometry file(cm)

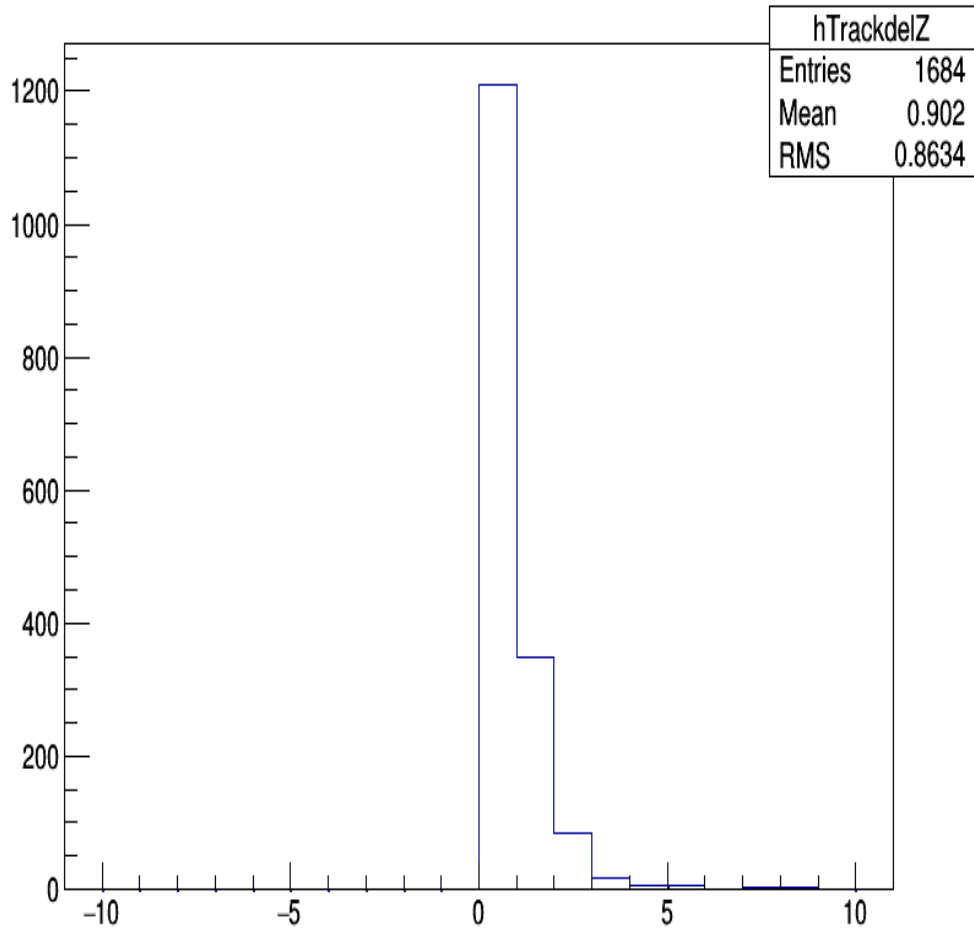| hTrackdelZ	
Entries	3430
Mean	0.005748
RMS	1.269

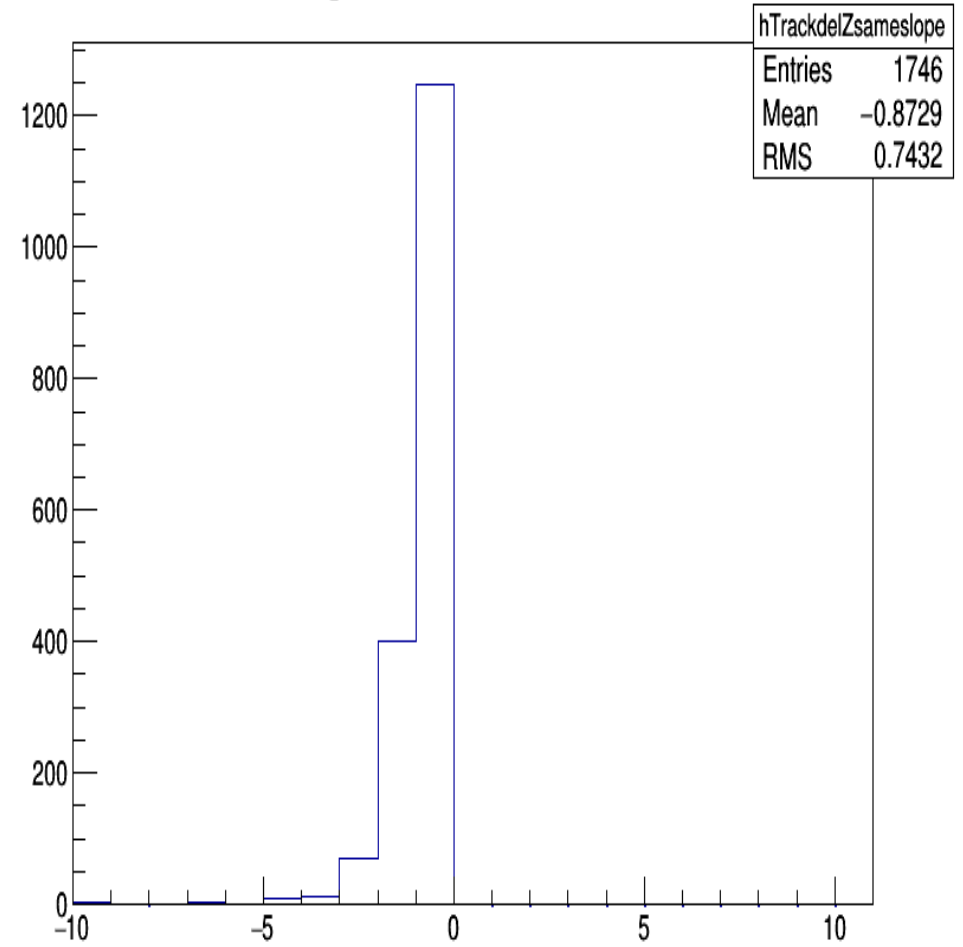# DeltaZ and the sign of the slope of track.

- Since delta Z is a difference between the true gap width and the gap width in the gdml file, the sign of the delta Z is important.

- delta Z positive mean that the gap is too narrow in the gdml file and that the true gap is wider.

- delta Z negative mean that the true gap is narrower than the gdml file.

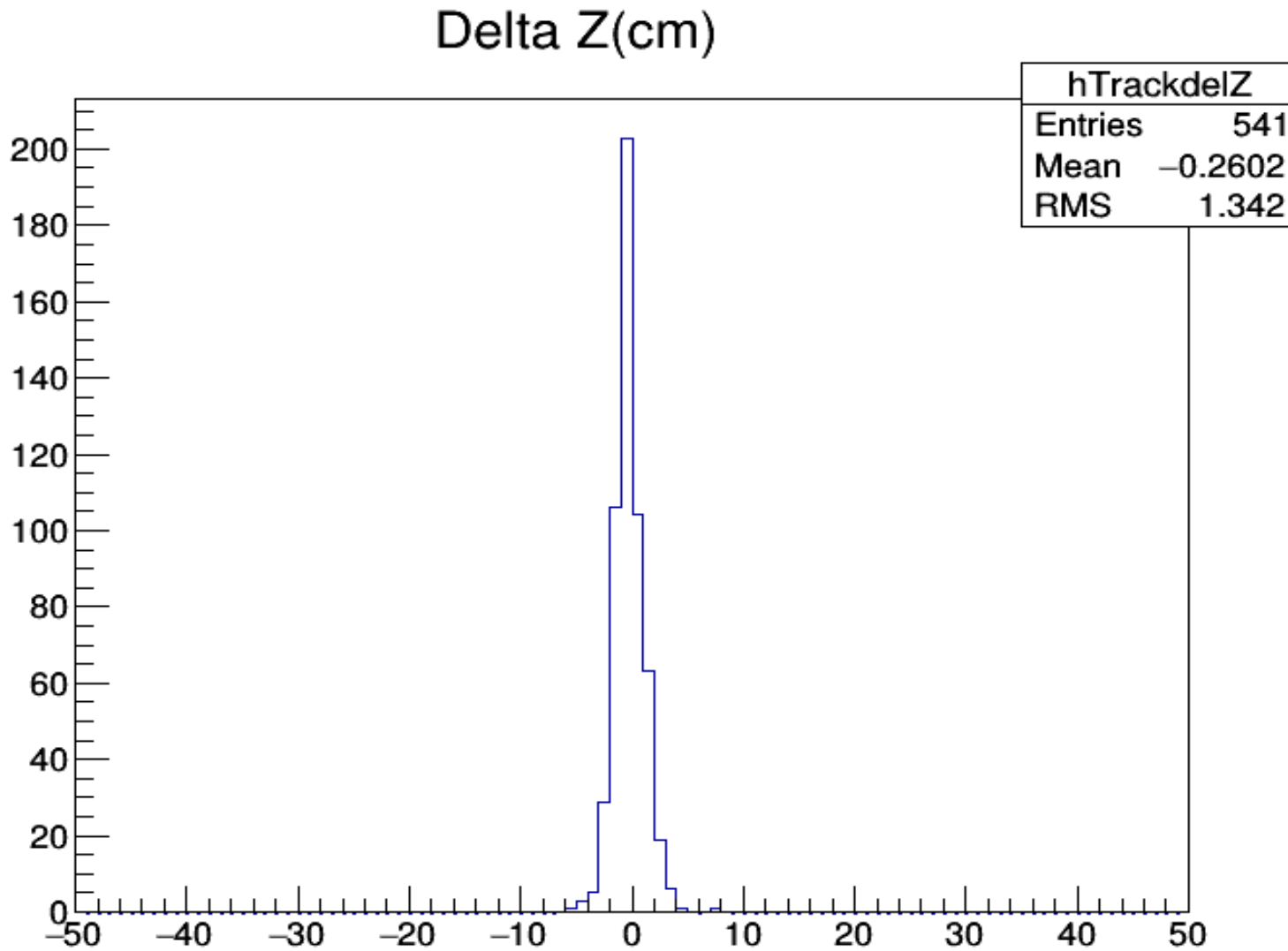- The delta Z does not changes with the sign of the slope.
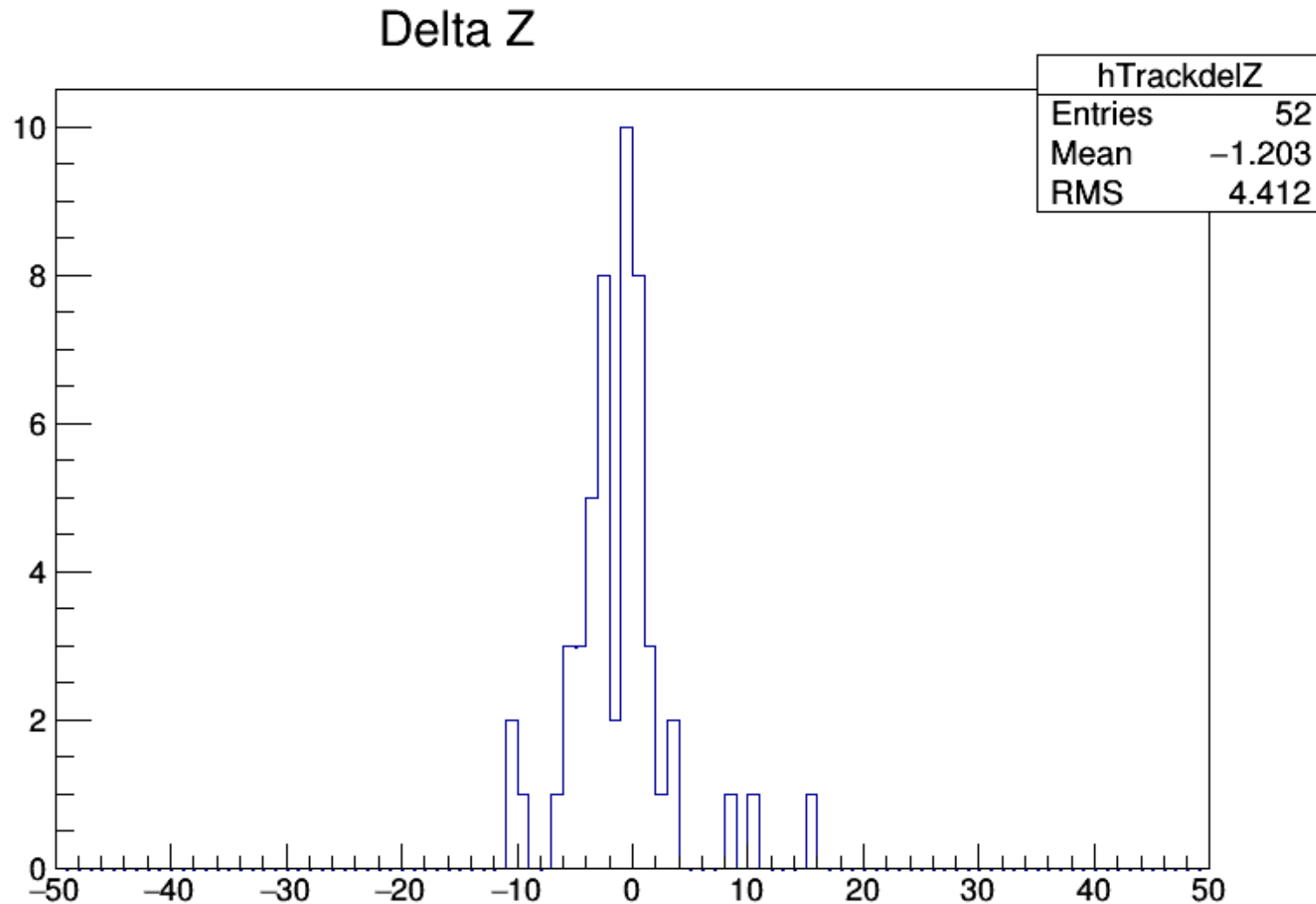
Sign of DeltaZ

- Delta Z does not depend on the sign of the slope of a track.

- If the intercept of the two tracks (segment) are same, deltaZ does not depend on the sign of the slope of the two different tracks.

-
```
if((slope1 > 0 && slope >0) || (slope1 < 0 && slope <0))
{



    double deltaz = ((cont1-cont) +((slope1)-(slope))*103)/(((slope1)+(slope))/2);
```

Delta Z : TPC 5 and TPC 1
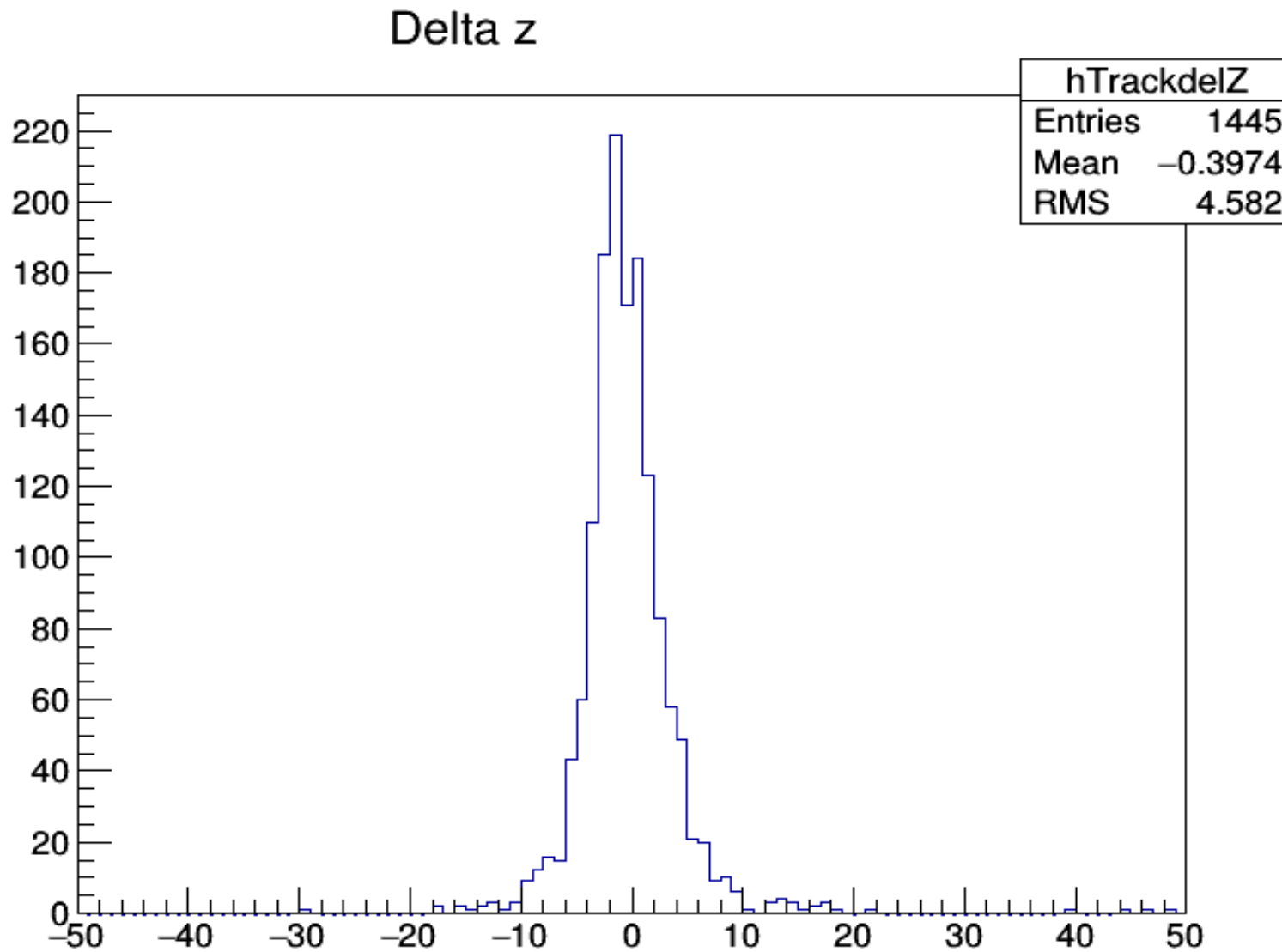

Delta Z(cm)

hTrackdelZ	
Entries	541
Mean	−0.2602
RMS	1.342

Delta Z :TPC 3 and TPC 1

Statistics is very low, although all important runs are taken.

Delta Z : TPC 7 and TPC 3

Delta z

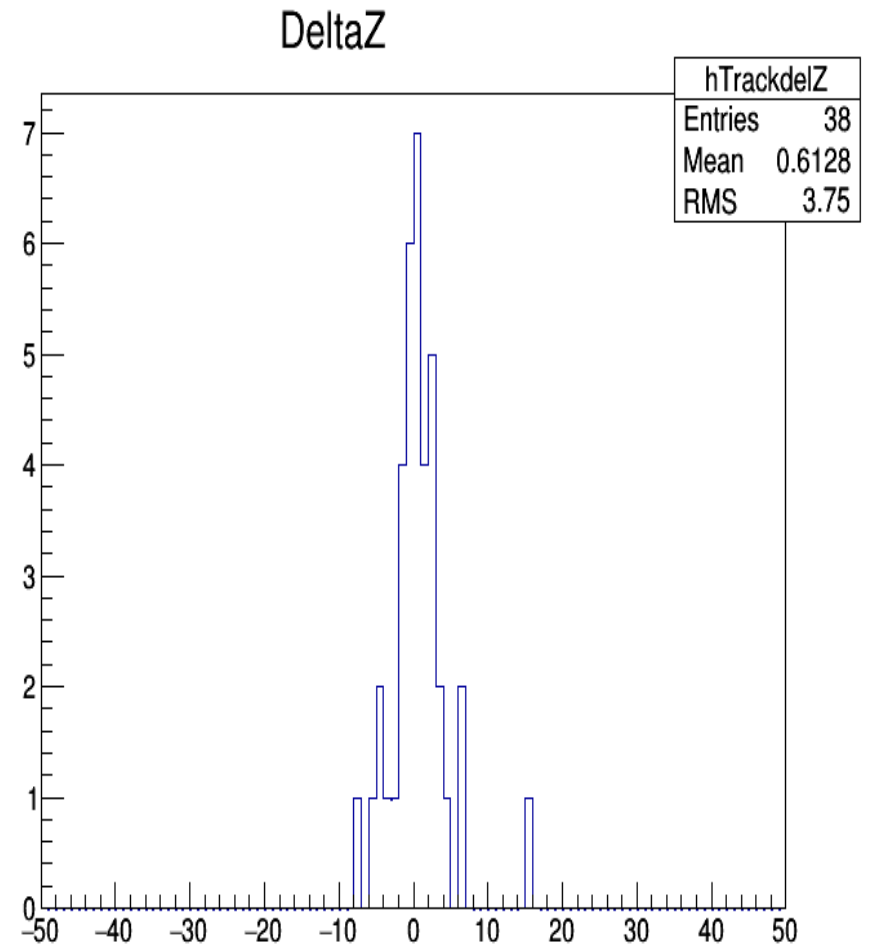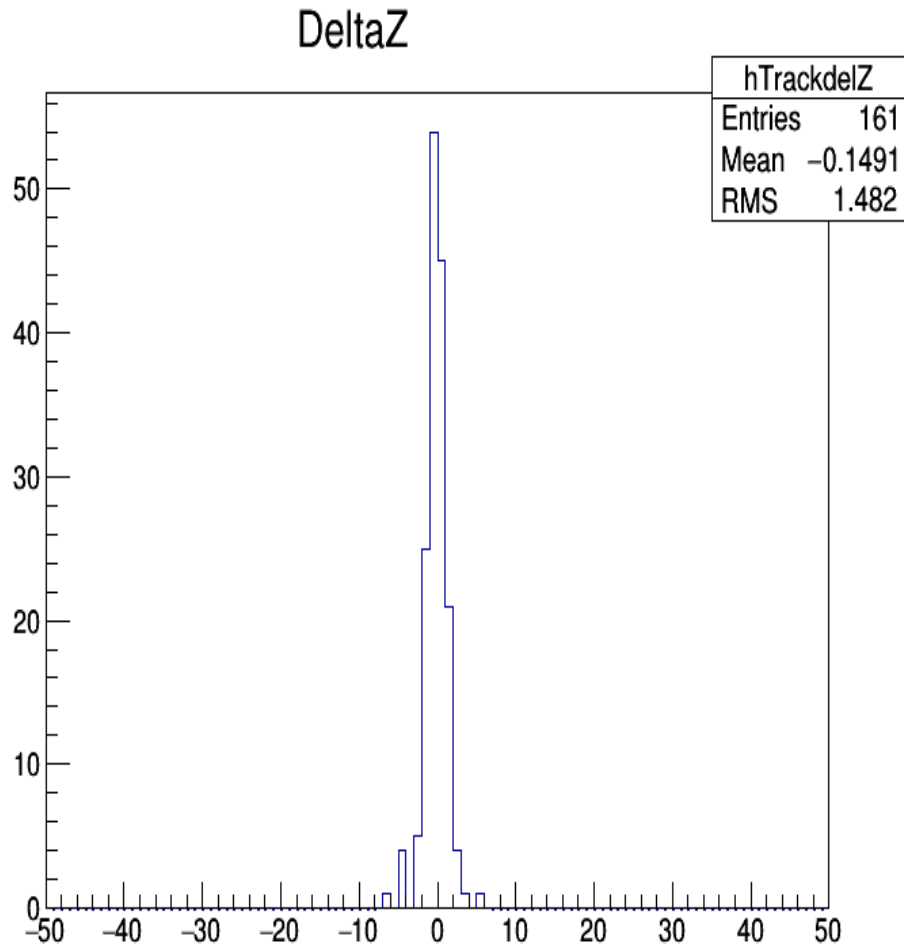| hTrackdelZ	
Entries	1445
Mean	−0.3974
RMS	4.582

Short drift

TPC 6 and 4

TPC 6 and TPC2

Summary

- All the relevant runs are included in the analysis.

- 3 hits and 20 cm length cut looks reasonable.

- DeltaZ does not depend on the sign of the slope..

- delta Z or the difference between the true gap width and the gap width in the gdml file is less than 1 cm for all the gaps.

- It will really good if Mike also cross check my results.