

# **Run 10-17**

## **Analysis in CgemBoss**

**2020-03-04**

**alignment**

# Goals to be achieved

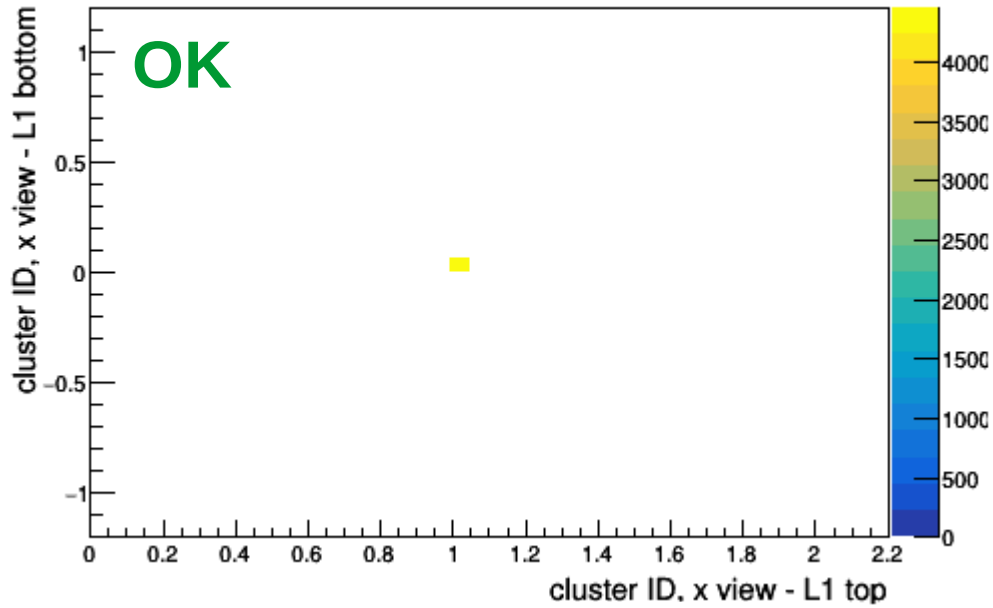
- Higher statistics + better tracking:
  - better alignment
  - better selection (chi2 cut *or* sigma on the trackers cut)
  - better pattern recognition
- Repeat alignment on sample of all runs, without the failing subruns
- Connect two points on L2 and look at residuals on L1 (and viceversa)

....but first try to clean the sample:

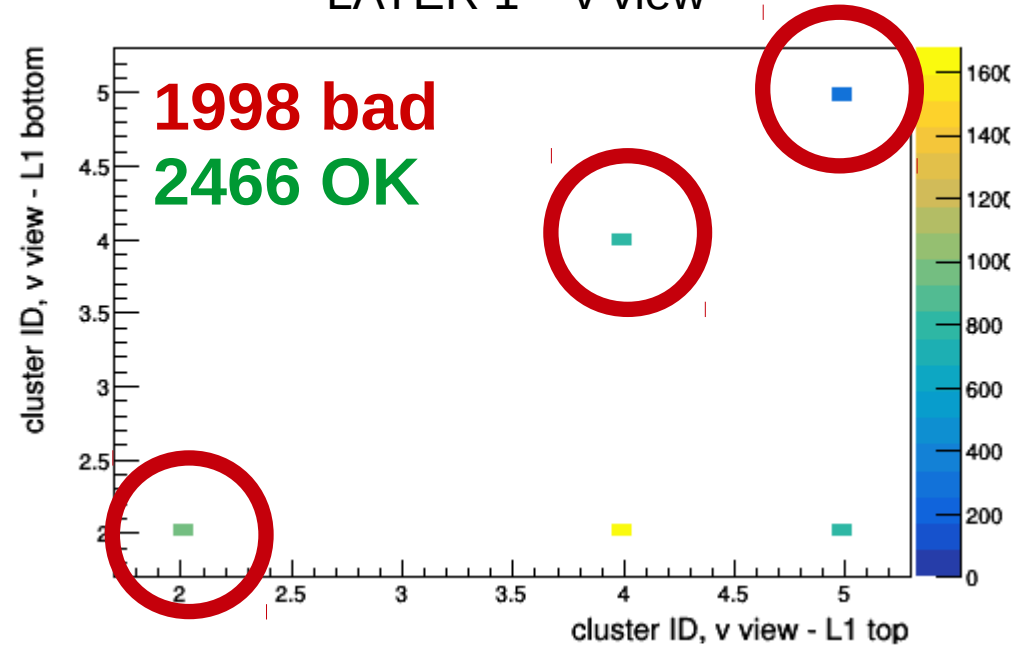
- For alignment require to have ONLY 2 clusters on L1, 1 on L2 top, 1 on L2 bottom
- Find the clusters on L1 top and L1 bottom
- Keep only the events with one cluster on each plane
- Check if the same  $v$  strip is used in both L1 top and L1 bottom clusters...

# 1D cluster ID of 2D clusters

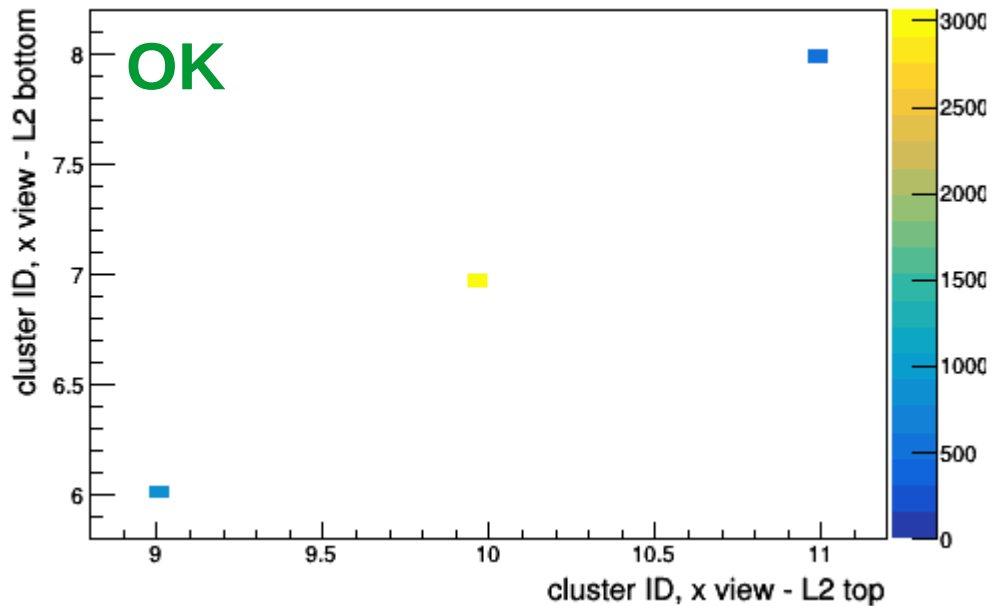
LAYER 1 – x view



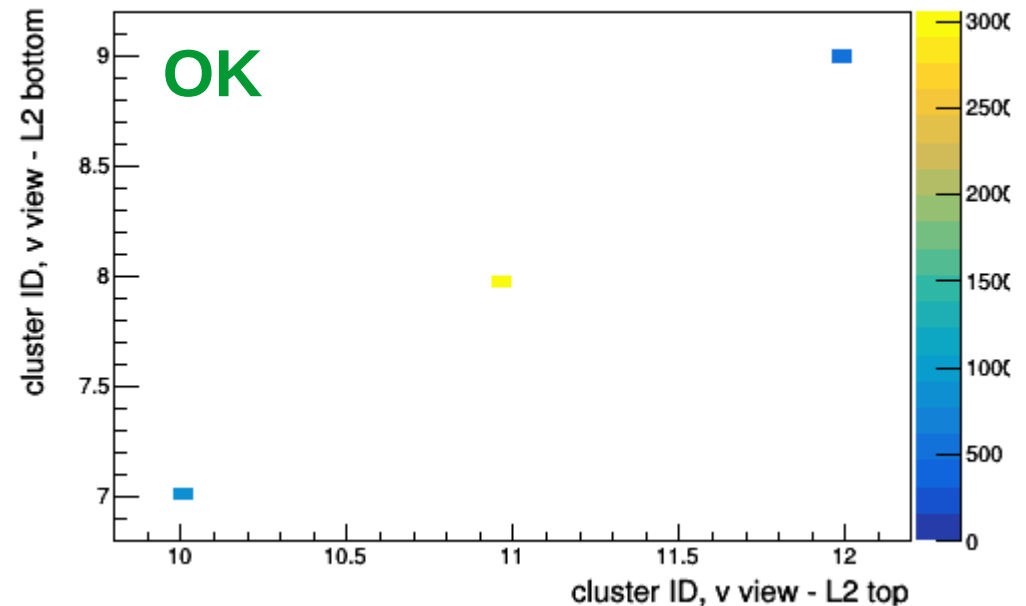
LAYER 1 – v view



LAYER 2 – x view

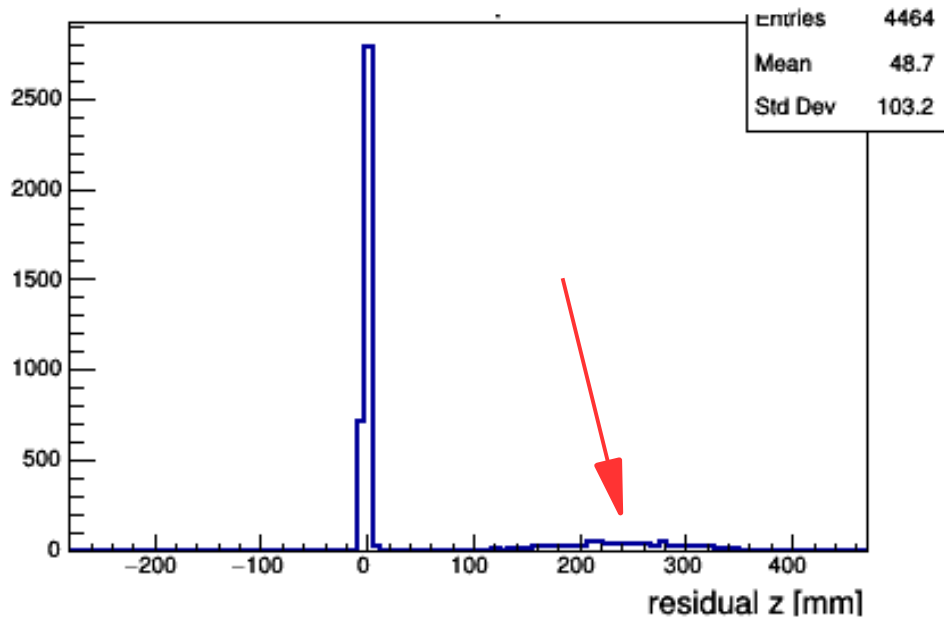


LAYER 2 – v view

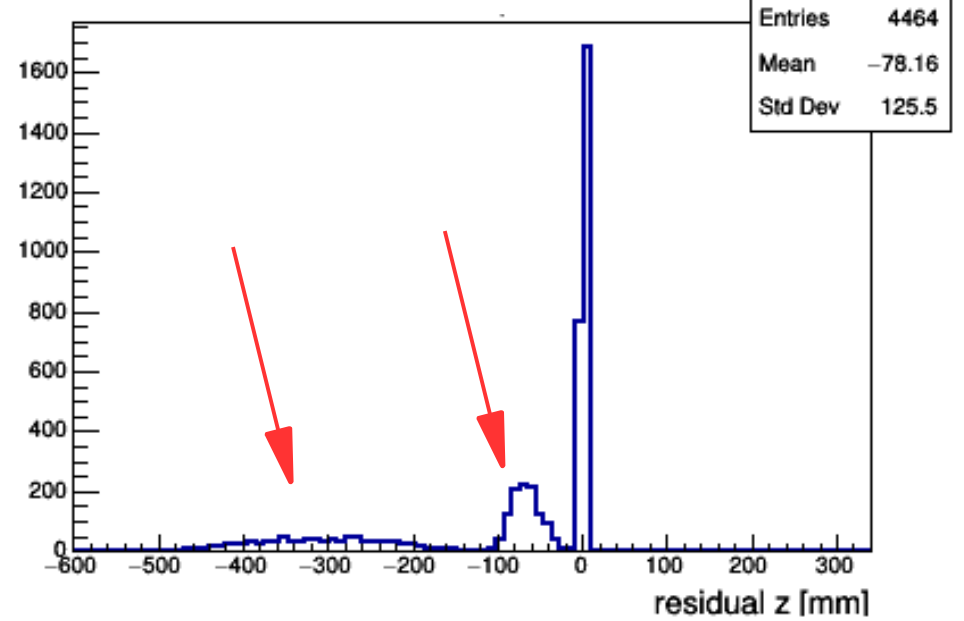


# Residual in z, all events

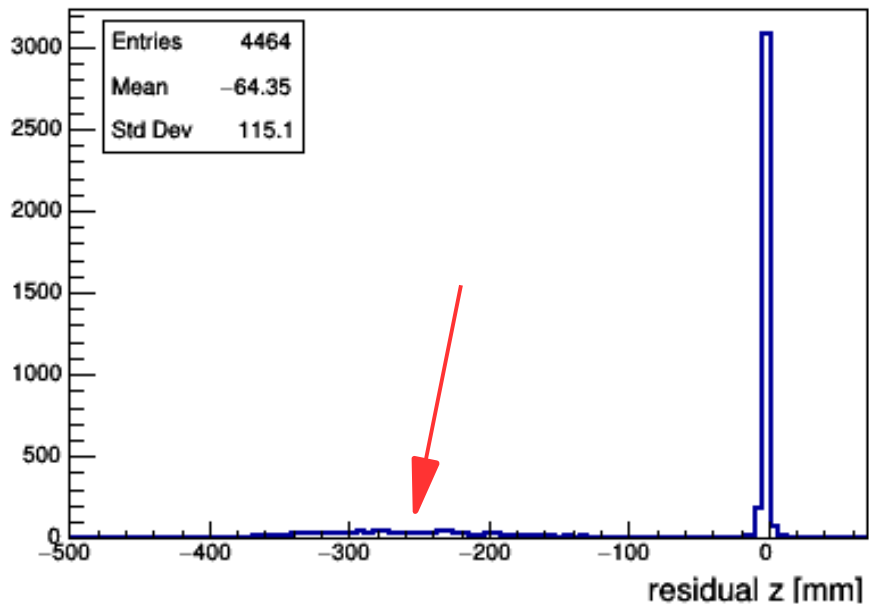
## LAYER 1 TOP



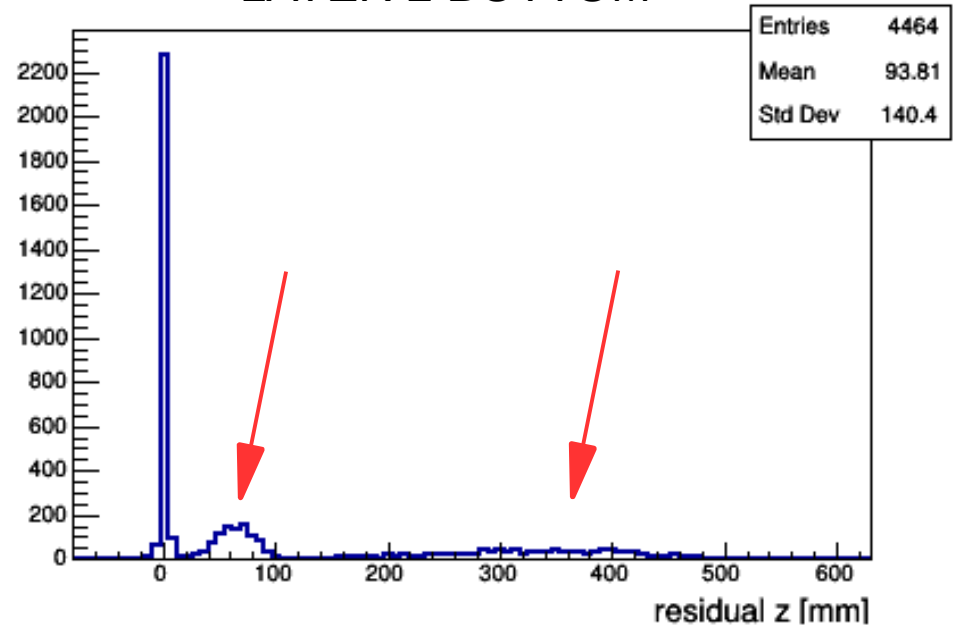
## LAYER 2 TOP



## LAYER 1 BOTTOM



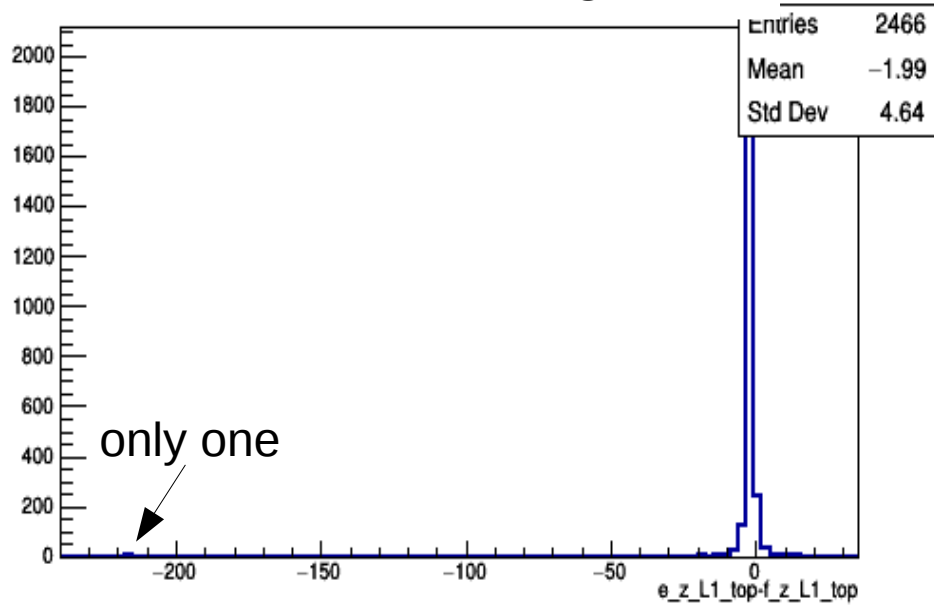
## LAYER 2 BOTTOM



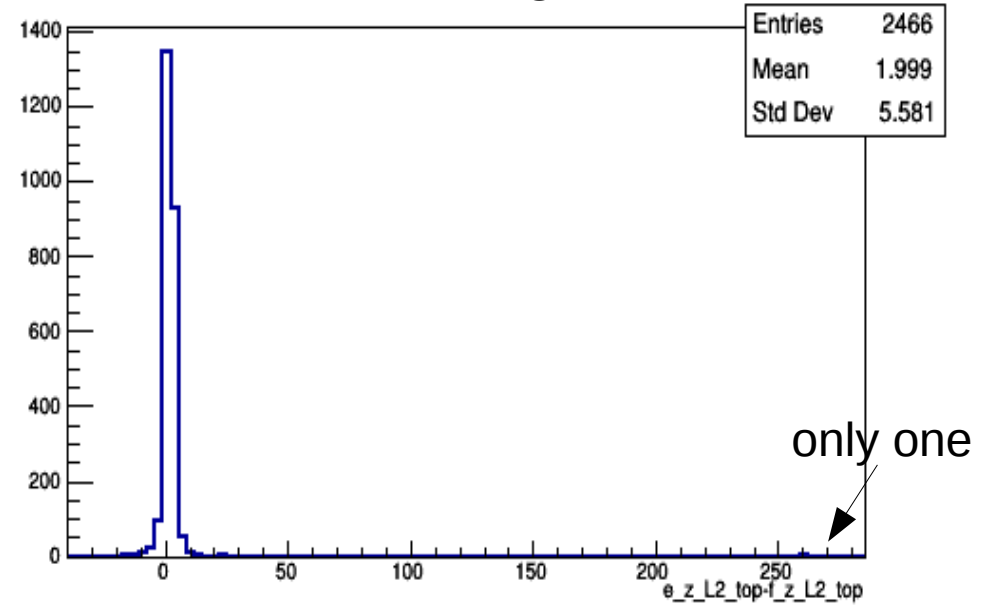


# Residual in z, without double counted events

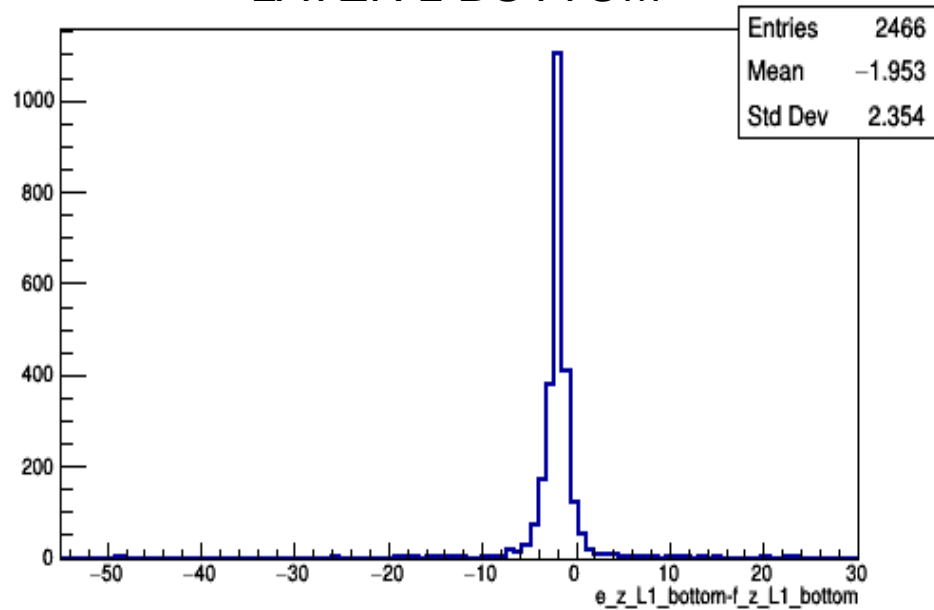
## LAYER 1 TOP



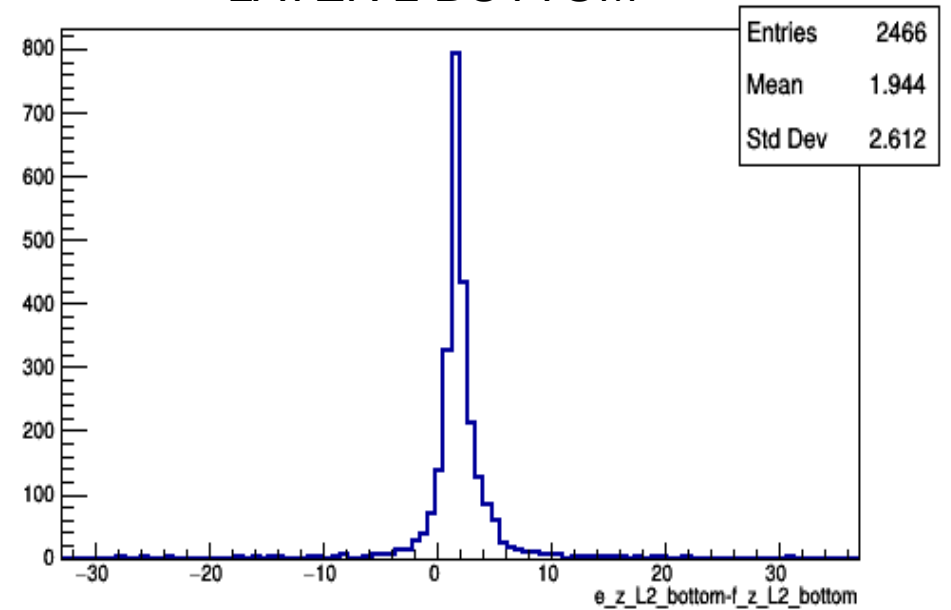
## LAYER 2 TOP



## LAYER 1 BOTTOM



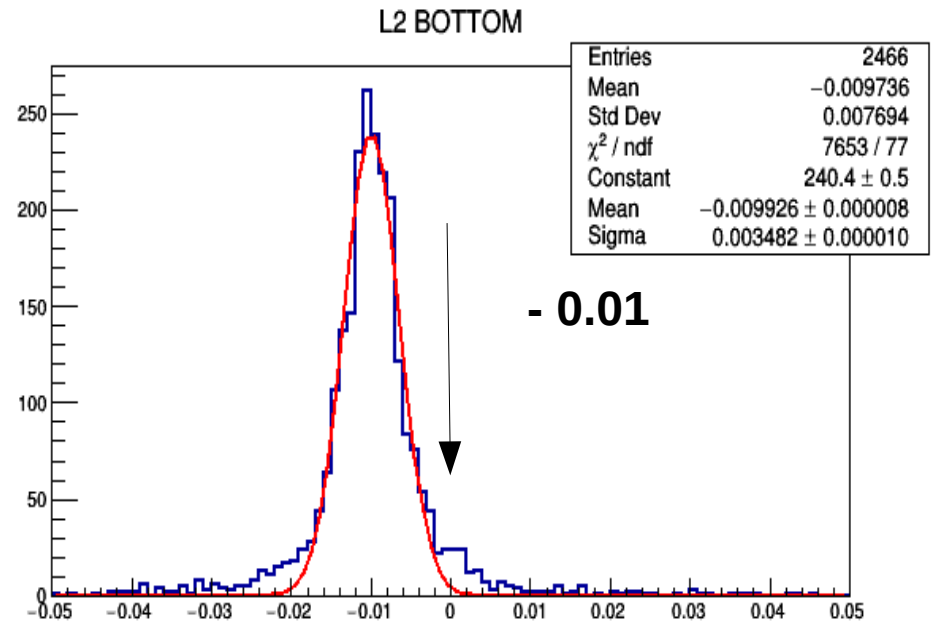
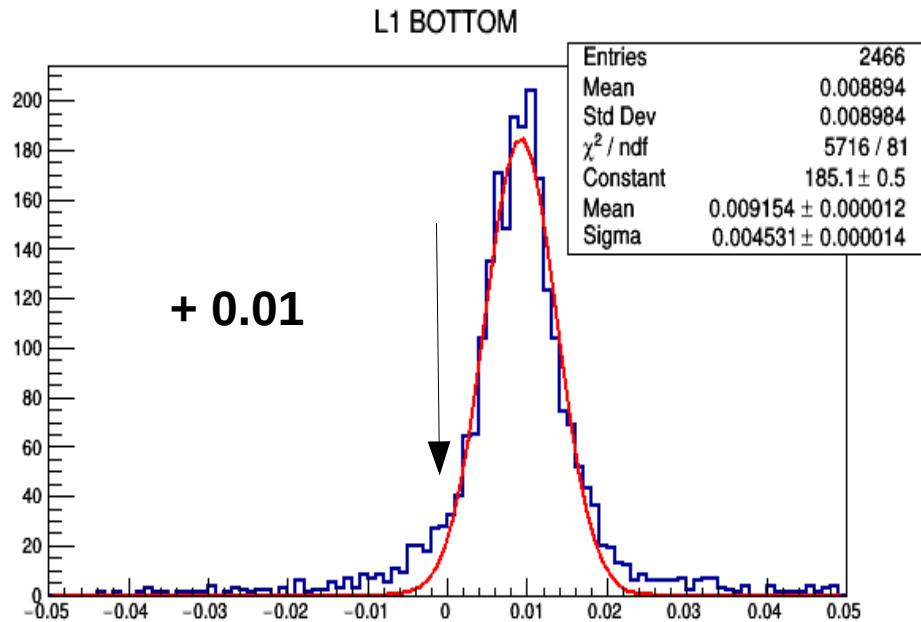
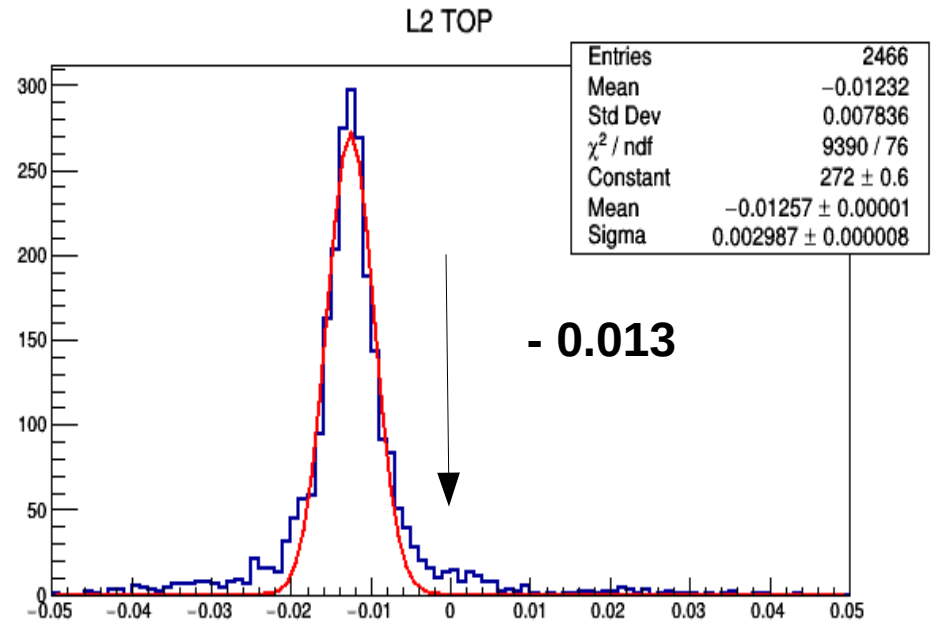
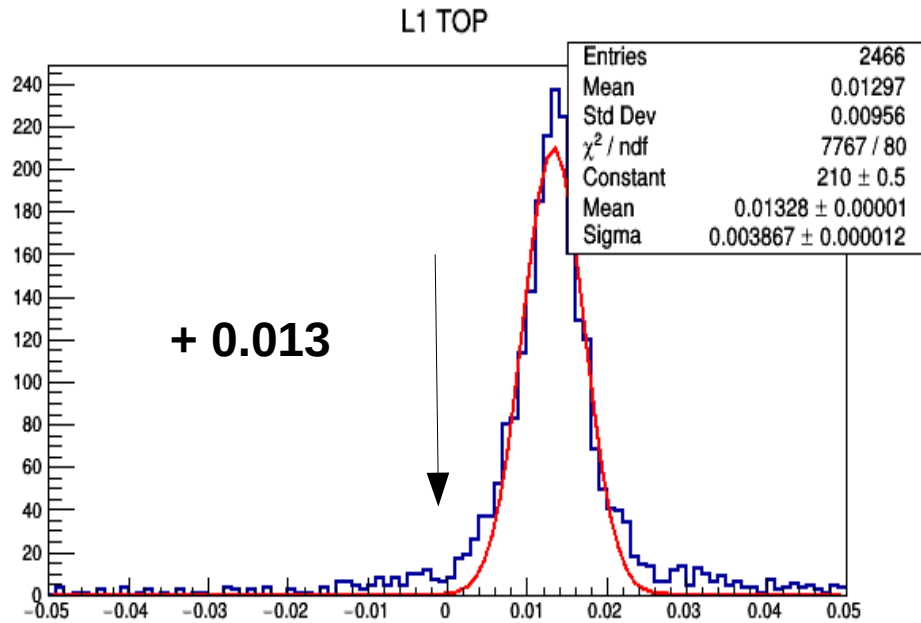
## LAYER 2 BOTTOM



# Situation BEFORE ALIGNMENT

- no failing subruns
- no double counted v clusters
- 1 cluster only on each plane

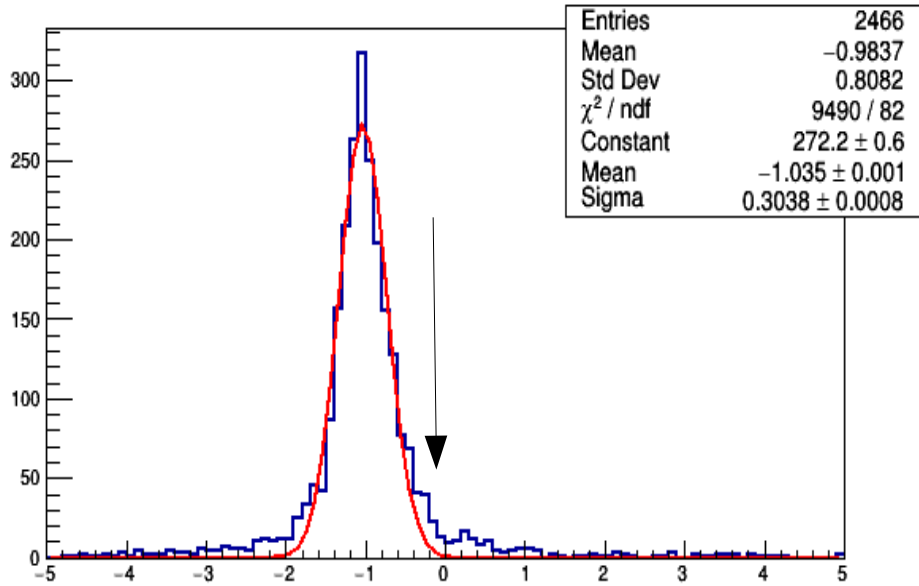
# Residual in phi (exp-fit, rad)



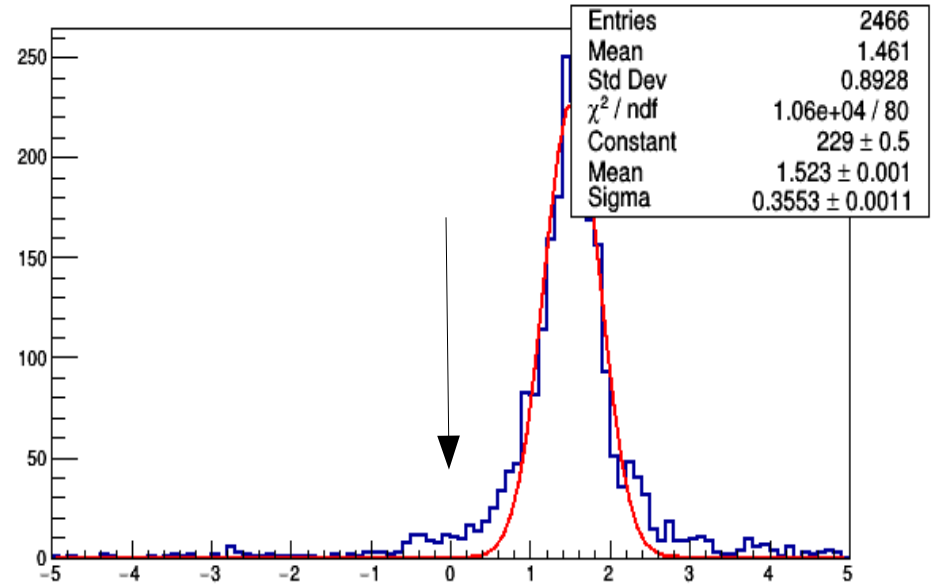
The shift is not the same in TOP and BOTTOM

# Residual in x (exp-fit, mm)

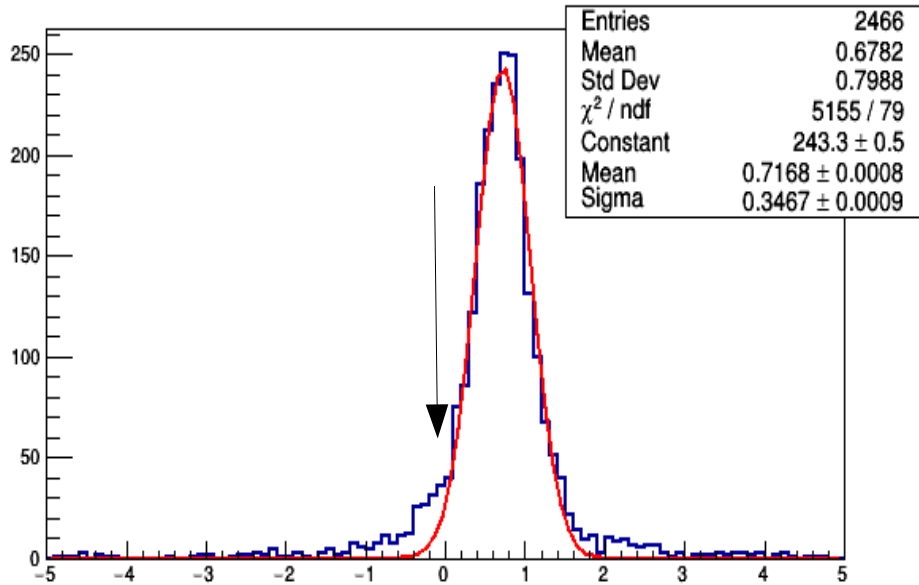
L1 TOP



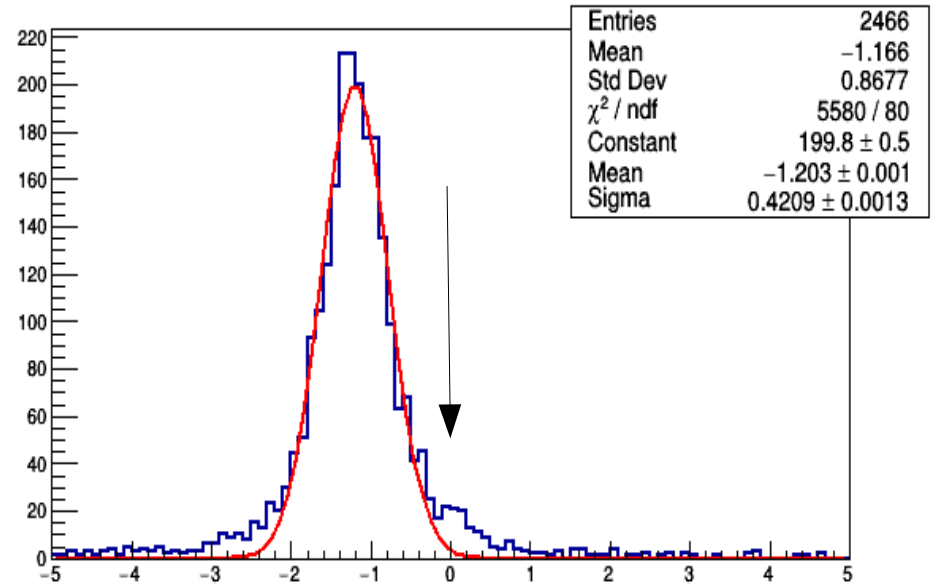
L2 TOP



L1 BOTTOM

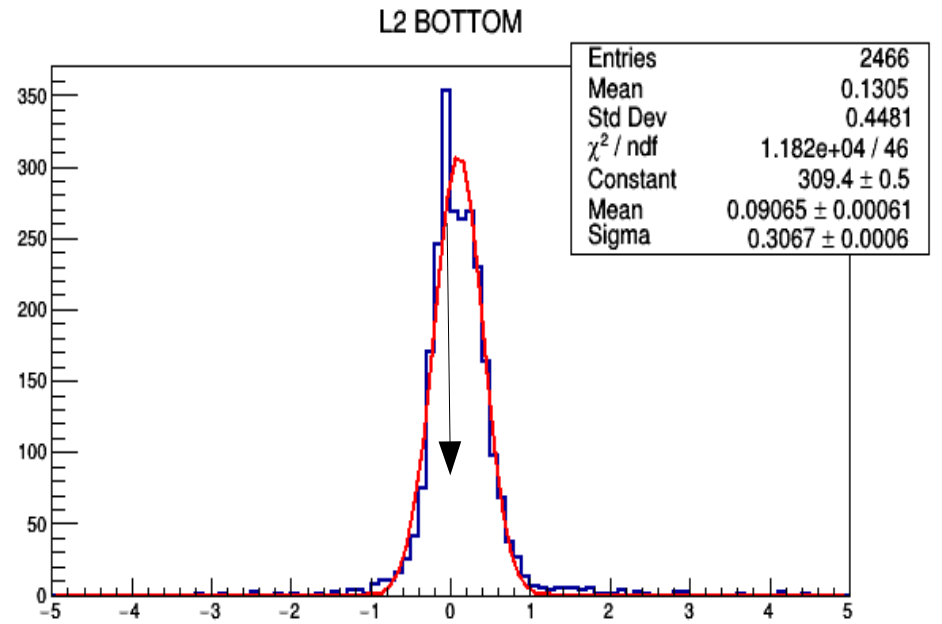
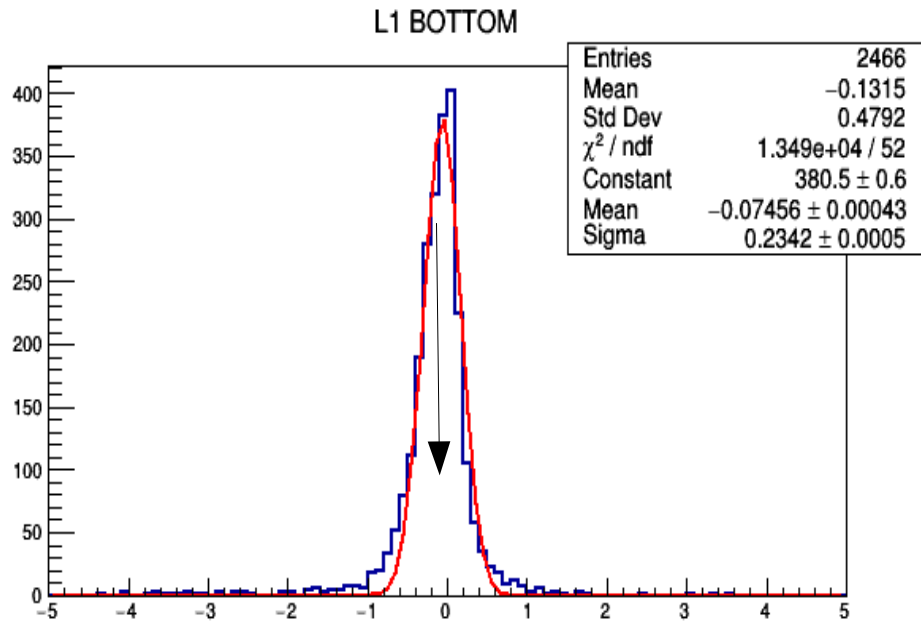
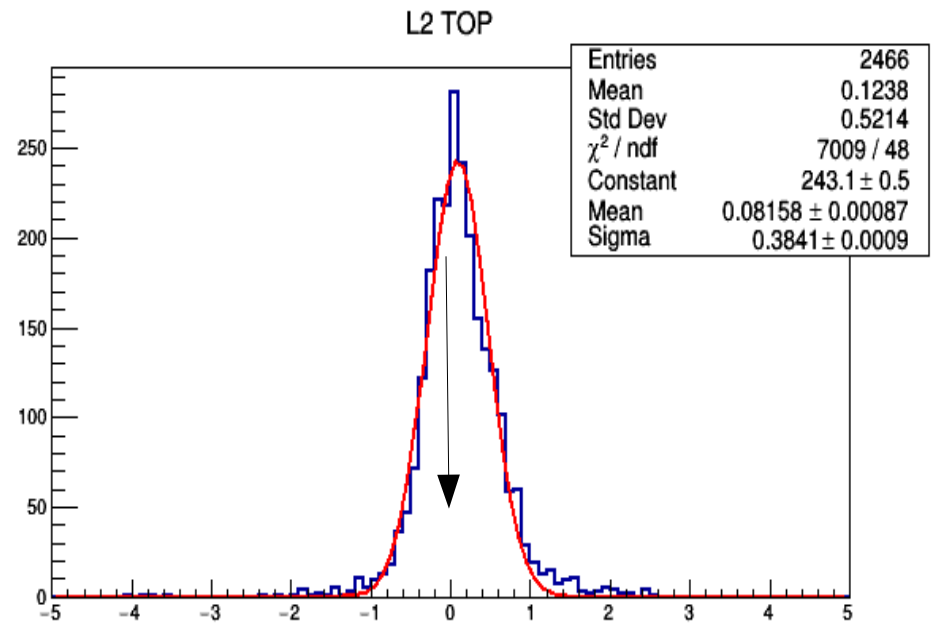
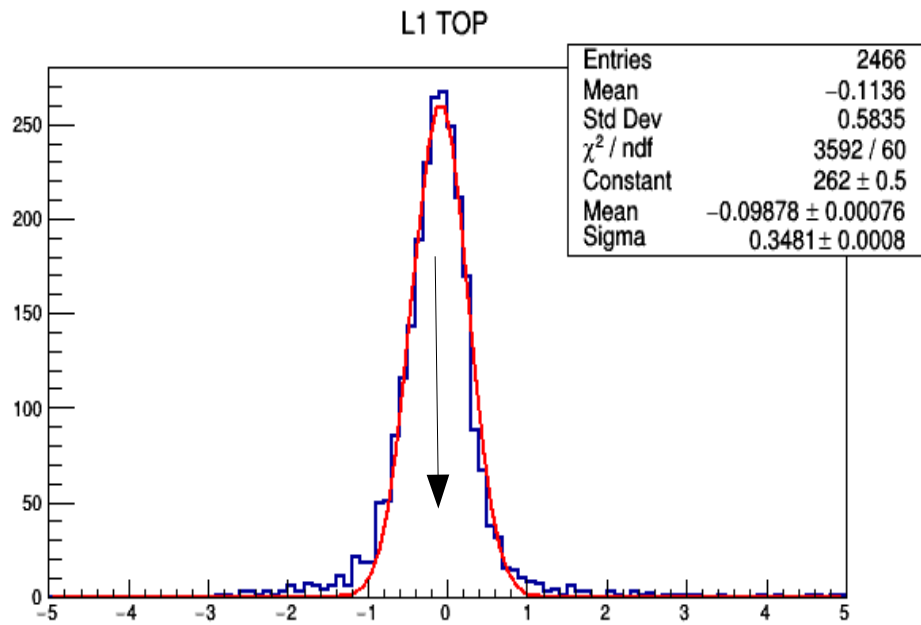


L2 BOTTOM



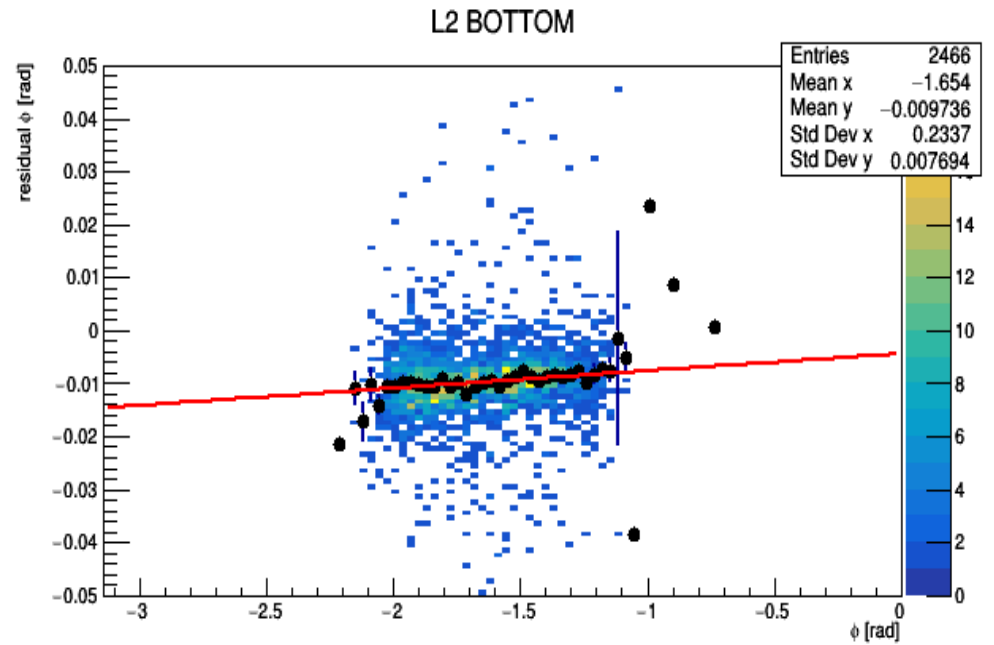
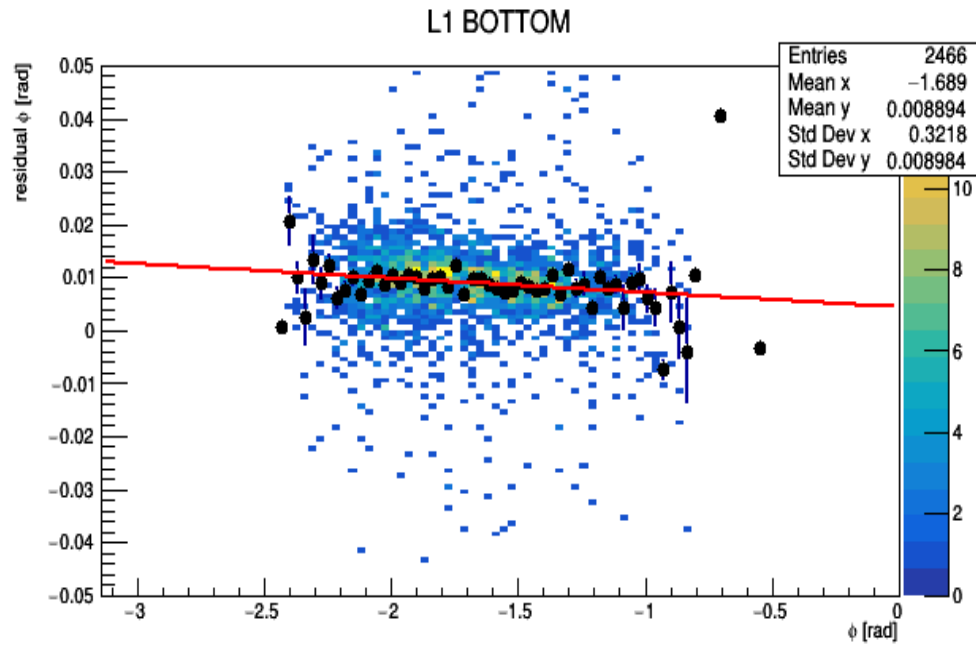
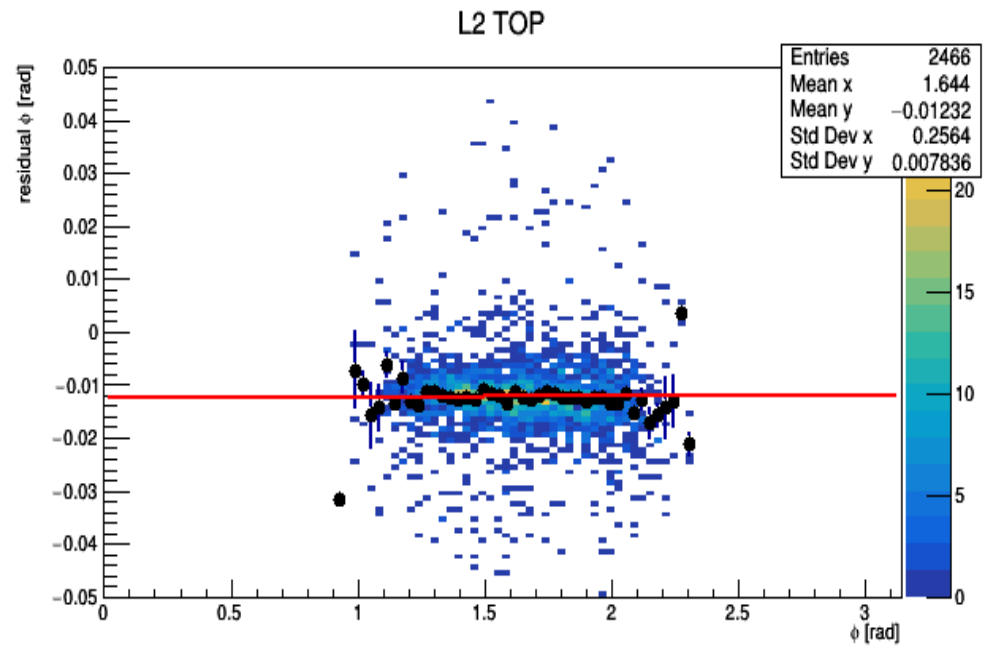
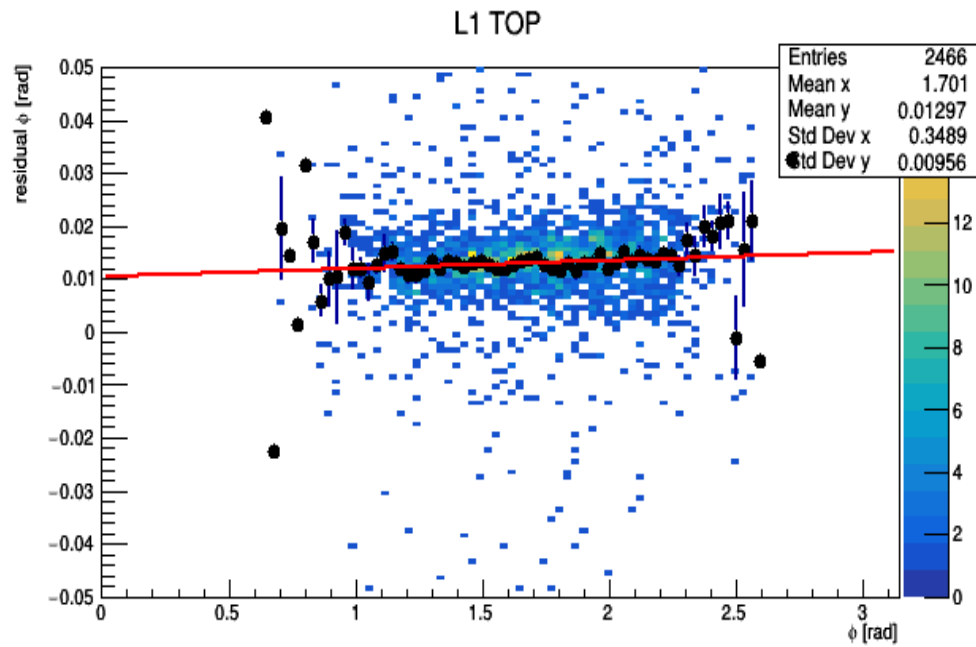
Still a visible shift

# Residual in y (exp-fit, mm)



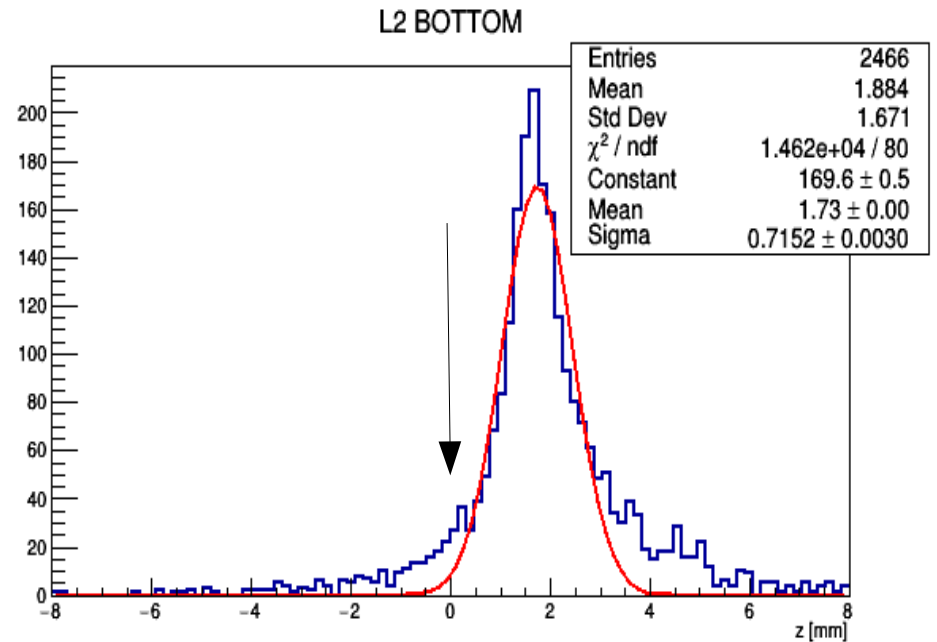
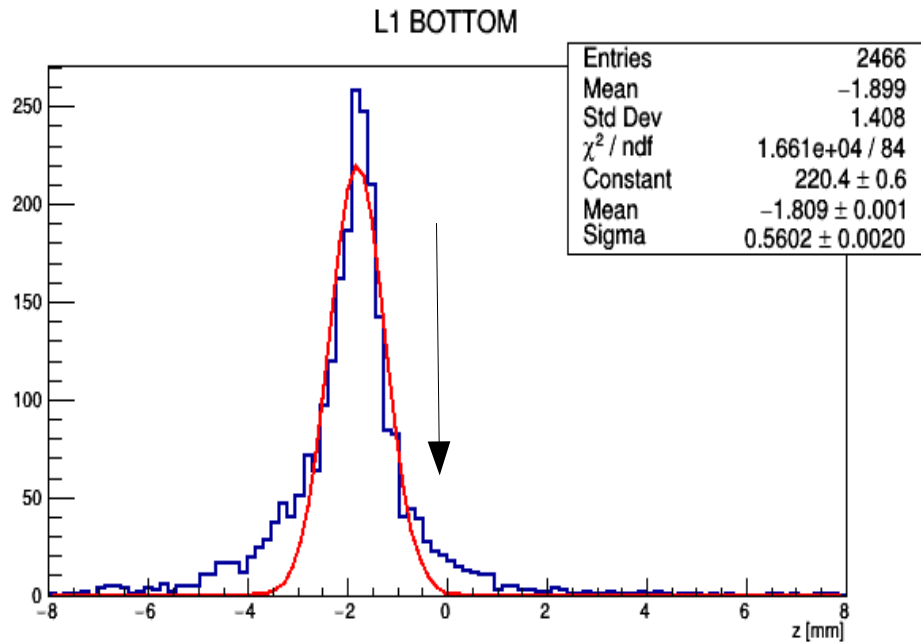
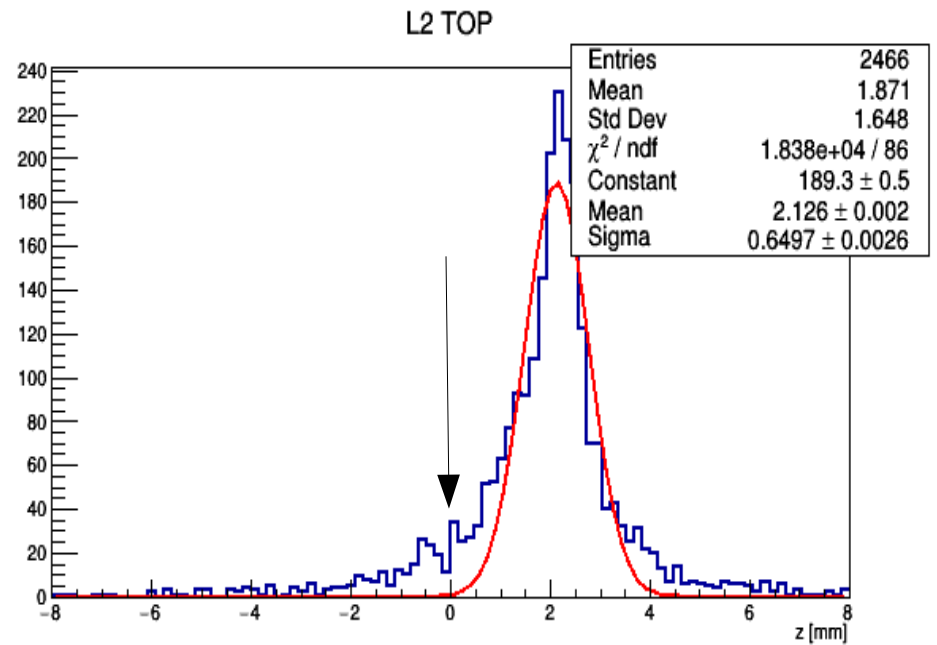
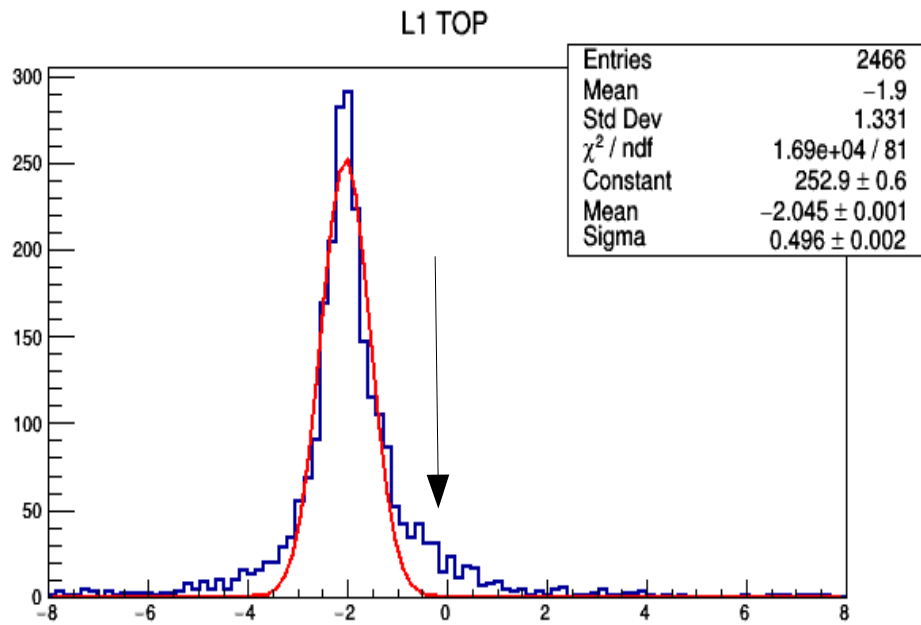
Distributions are quite centered

# Residual in phi vs phi (rad vs rad)



There is a *trend*, the slope is of the order of  $10^{-3}$

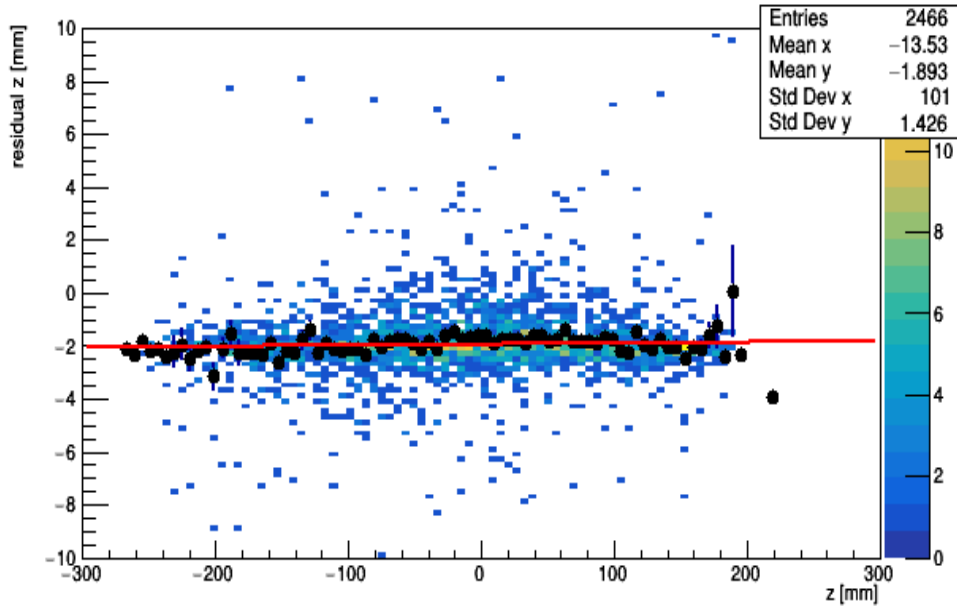
# Residual in z (exp-fit, mm)



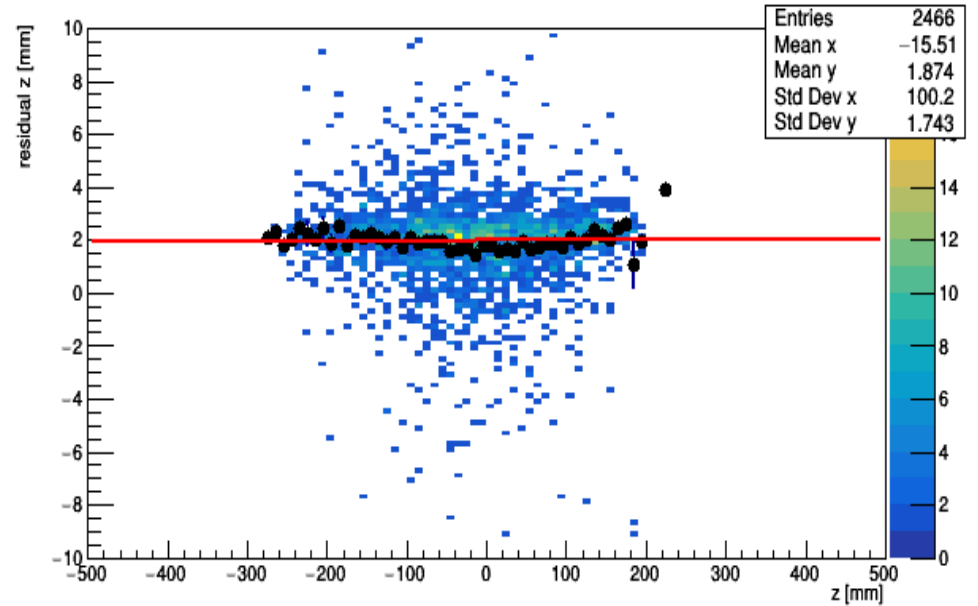
Shifts are different in different plots

# Residual in z vs z (mm vs mm)

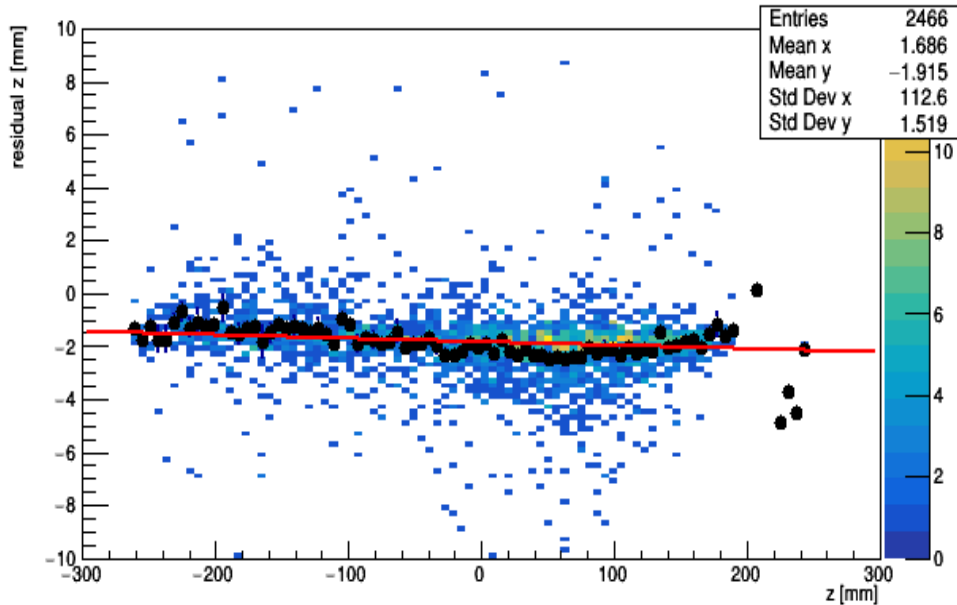
L1 TOP



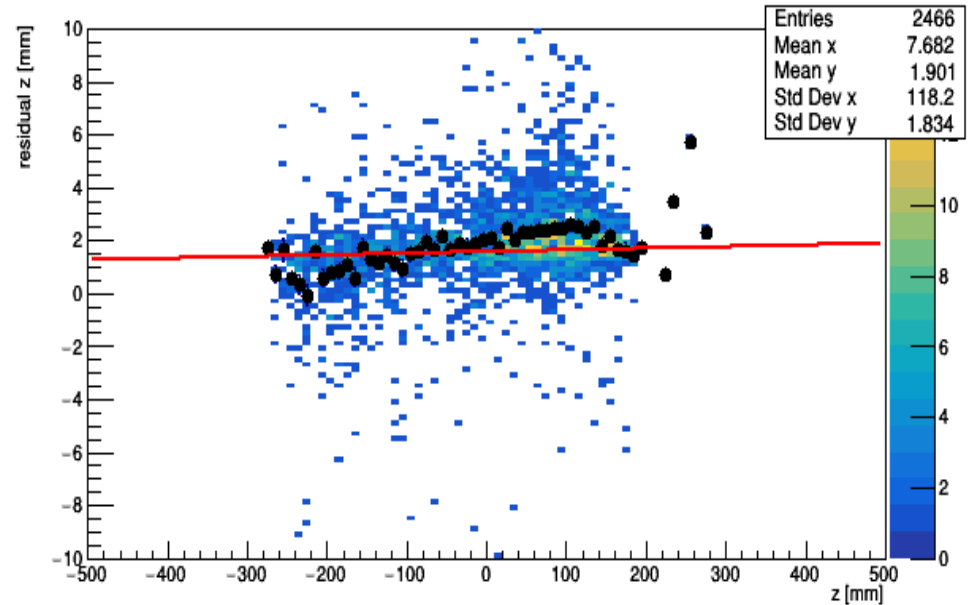
L2 TOP



L1 BOTTOM



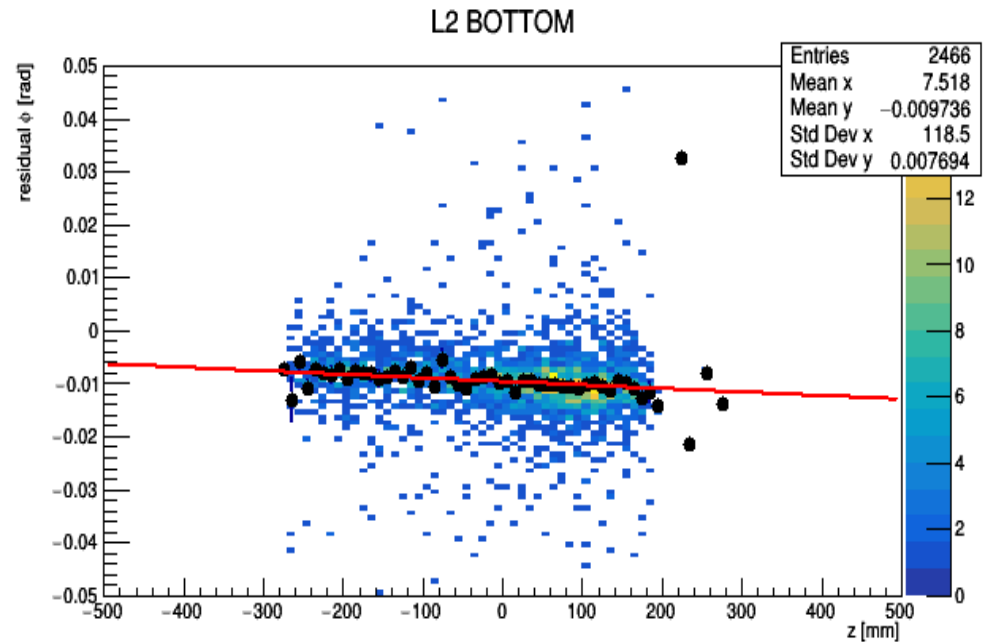
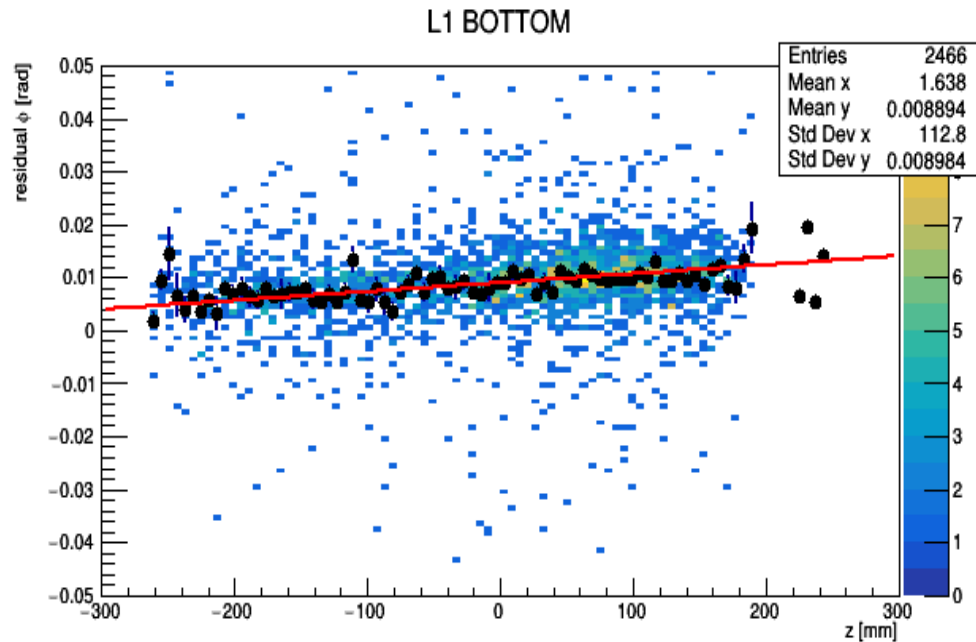
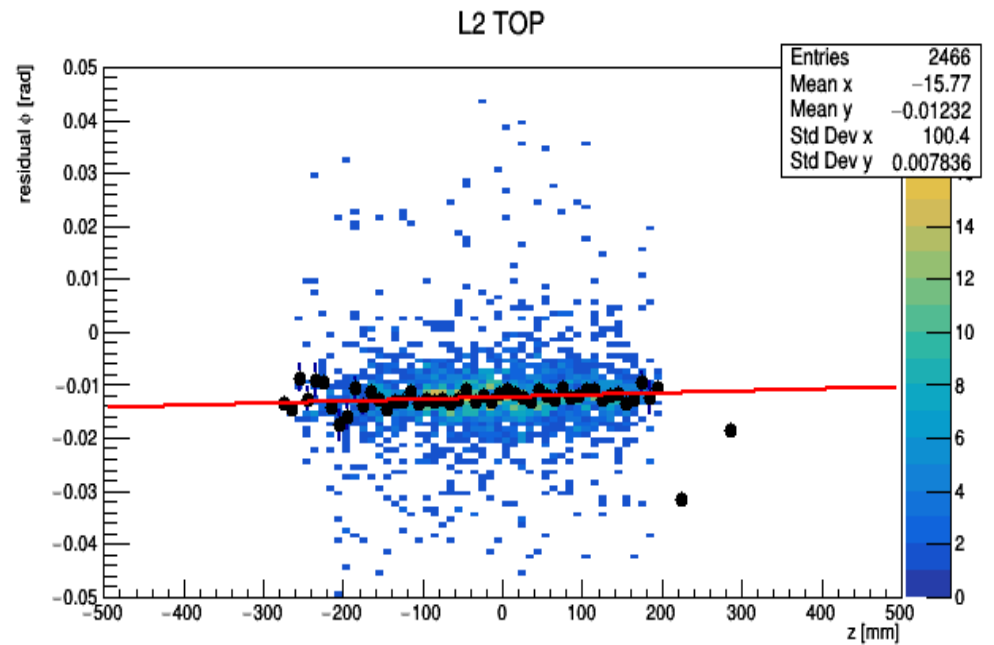
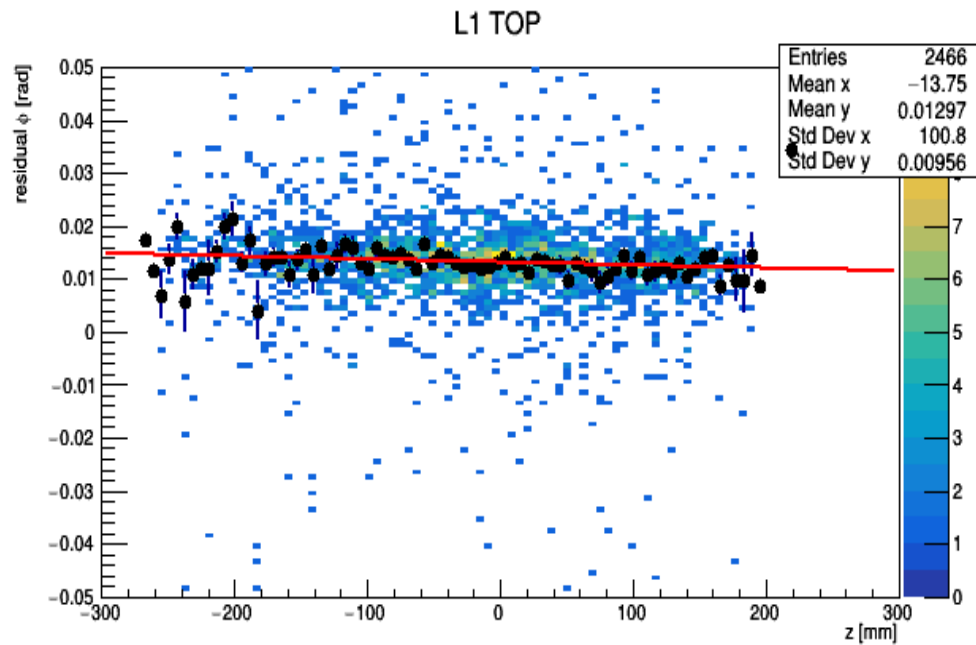
L2 BOTTOM



There is a *trend*, but the slope is of the order of  $10^{-4}$



# Residual in phi vs z (rad vs mm)



There is a *trend*, but the slope is of the order of  $10^{-5}/10^{-6}$

# Alignment

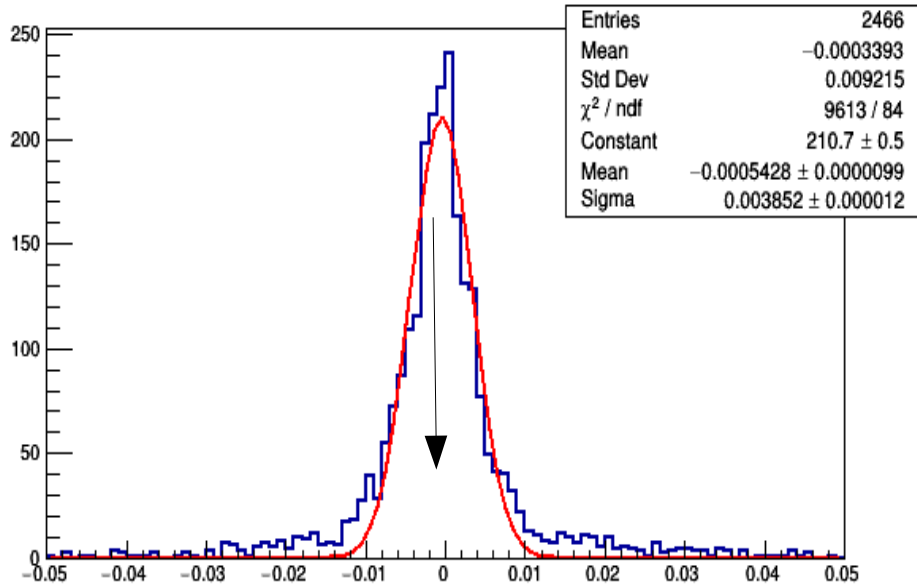
- **Shift in phi**, different in top e bottom  
→  $\Delta\phi = 0.013 - 0.01 = 0.003 \text{ rad} = 0.17 \text{ deg} \rightarrow 372 \text{ micron on L2}$
- **Shift in z:**
  - L1/L2 top = 2.1 mm ?
  - L1/L2 bottom = 1.7 mm ?
- **Tilts** can be neglected for now
- Apply **alignment on L2**, since it is composed by two sheets

# Situation AFTER ALIGNMENT

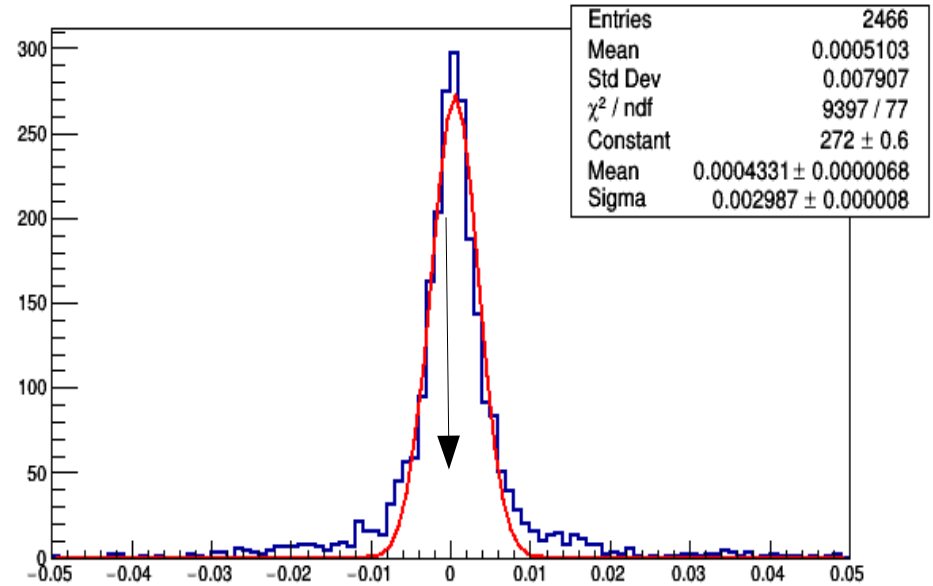
- no failing subruns
- no double counted v clusters
- 1 cluster only on each plane
  
- Shift on phi
- Shift on z
- Different in L2 top and L2 bottom

# Residual in phi (exp-fit, rad)

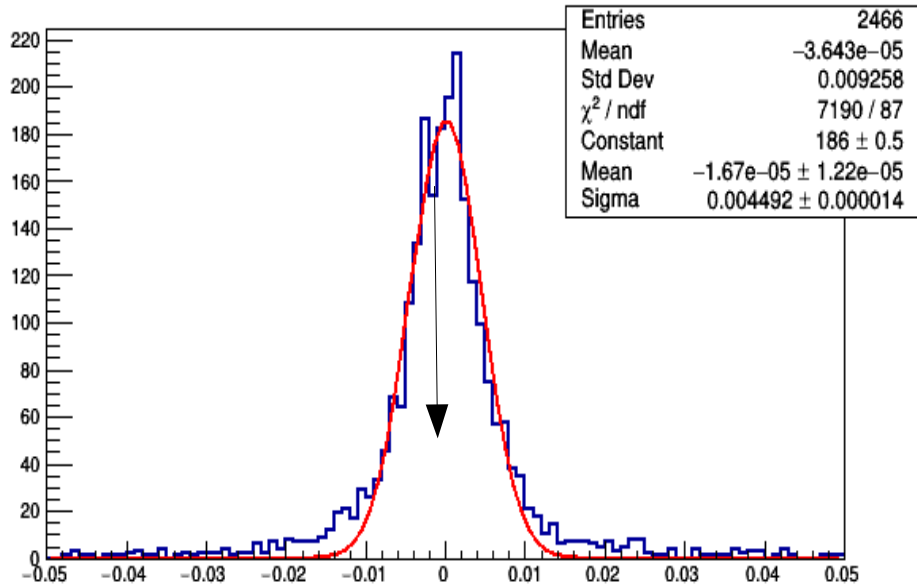
L1 TOP



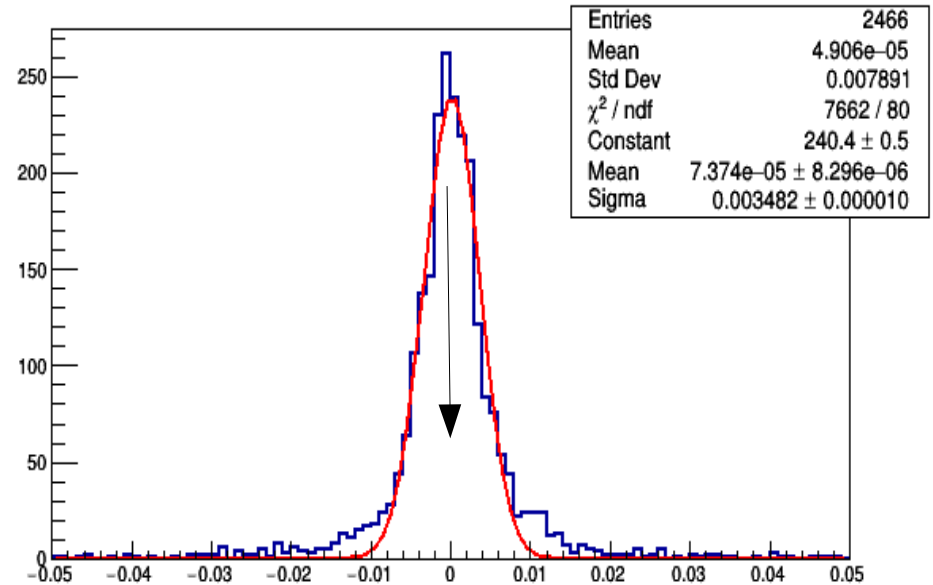
L2 TOP



L1 BOTTOM

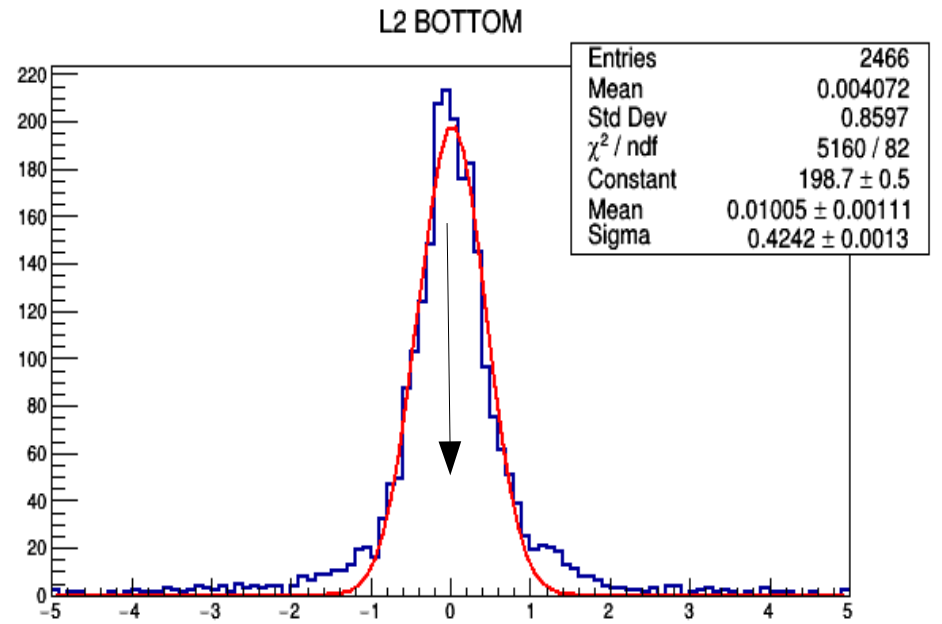
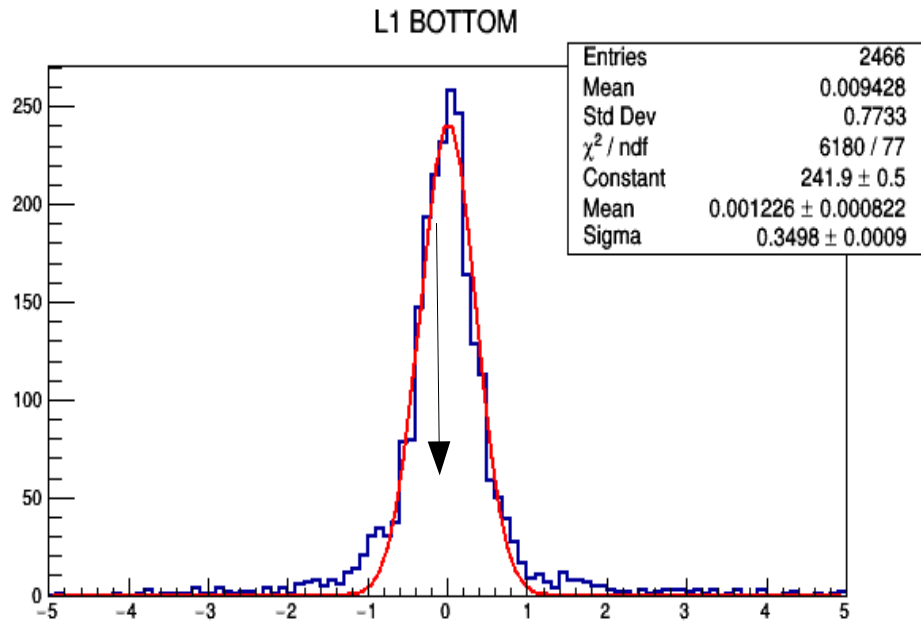
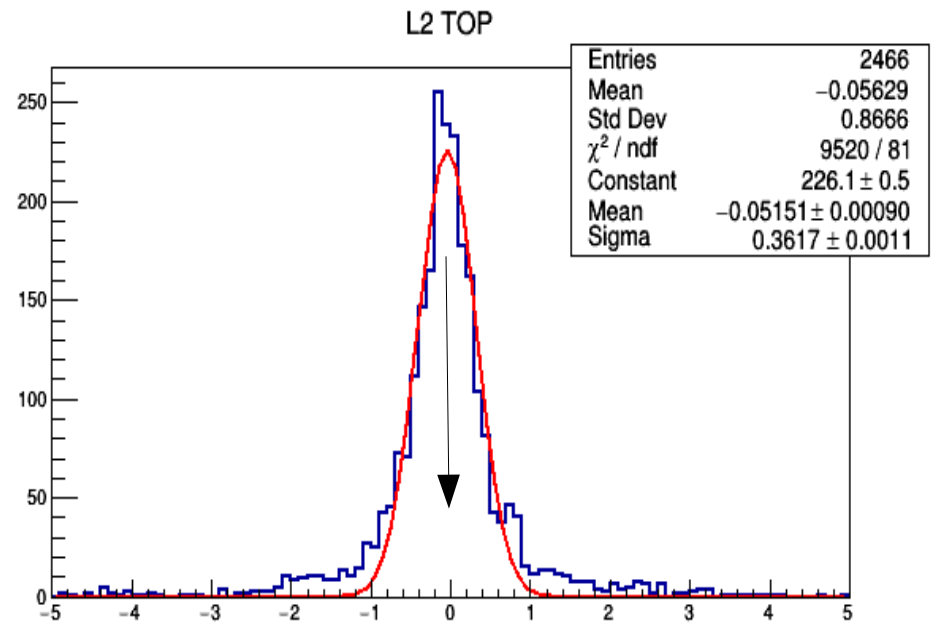
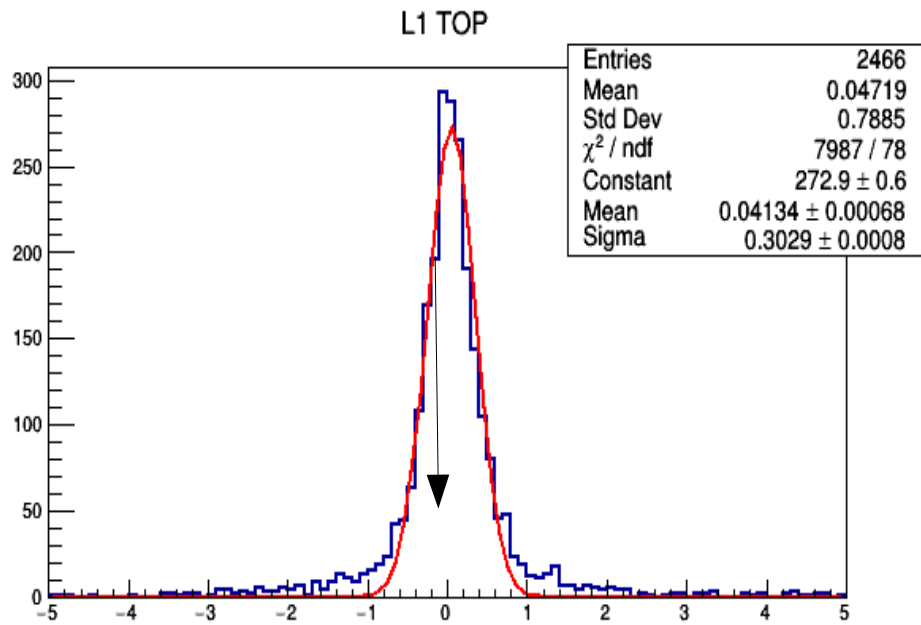


L2 BOTTOM



OK

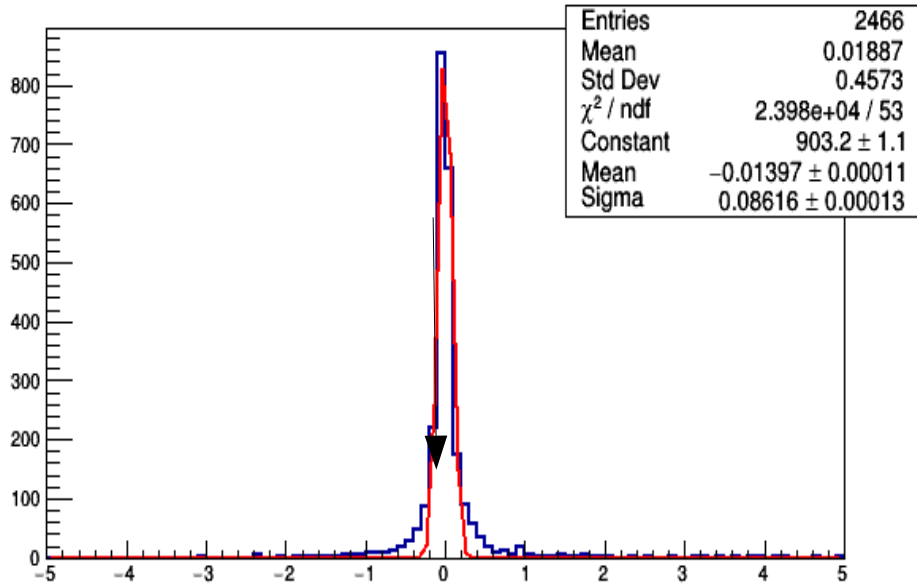
# Residual in x (exp-fit, mm)



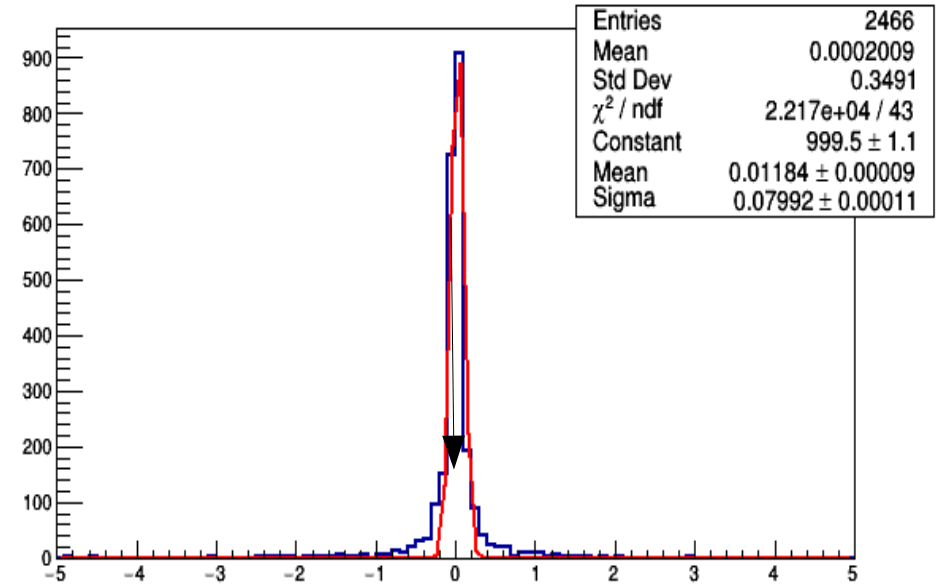
~OK

# Residual in y (exp-fit, mm)

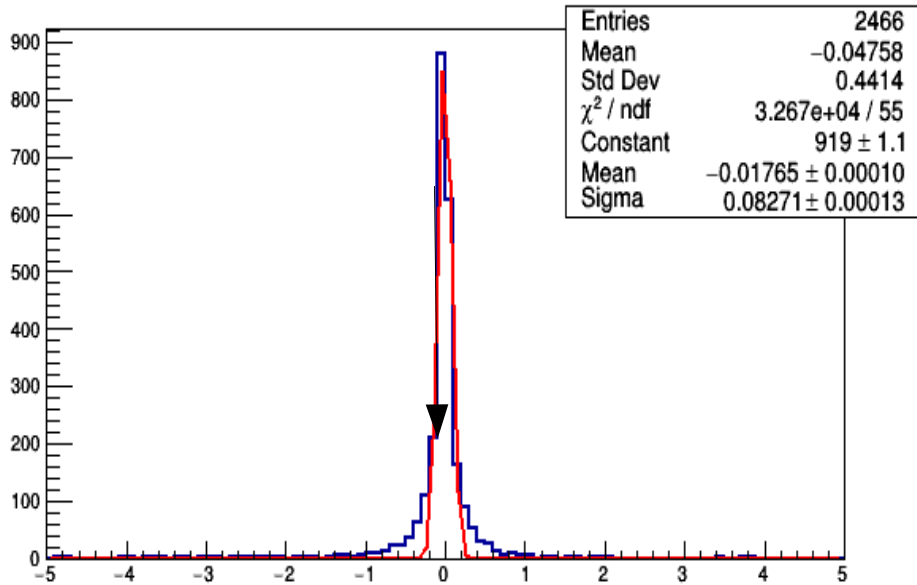
L1 TOP



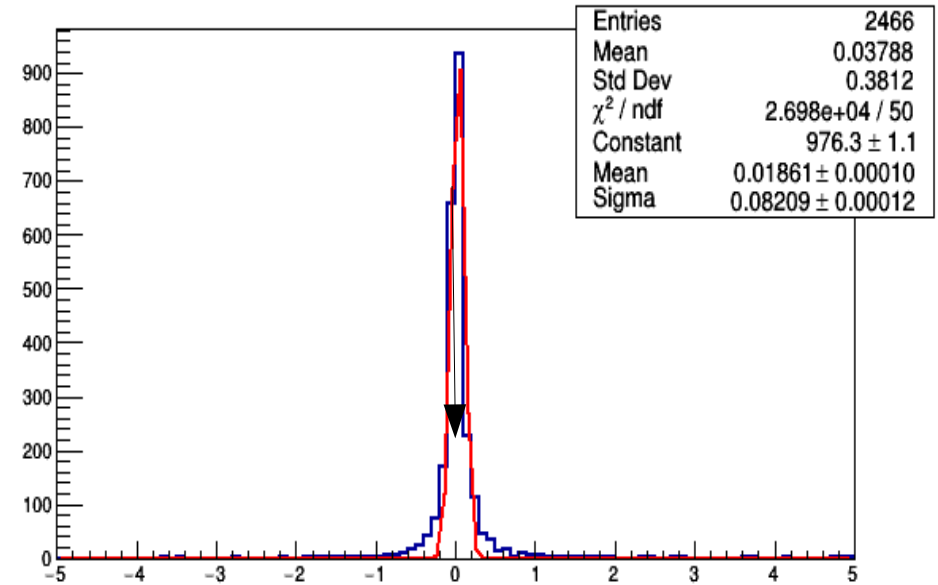
L2 TOP



L1 BOTTOM



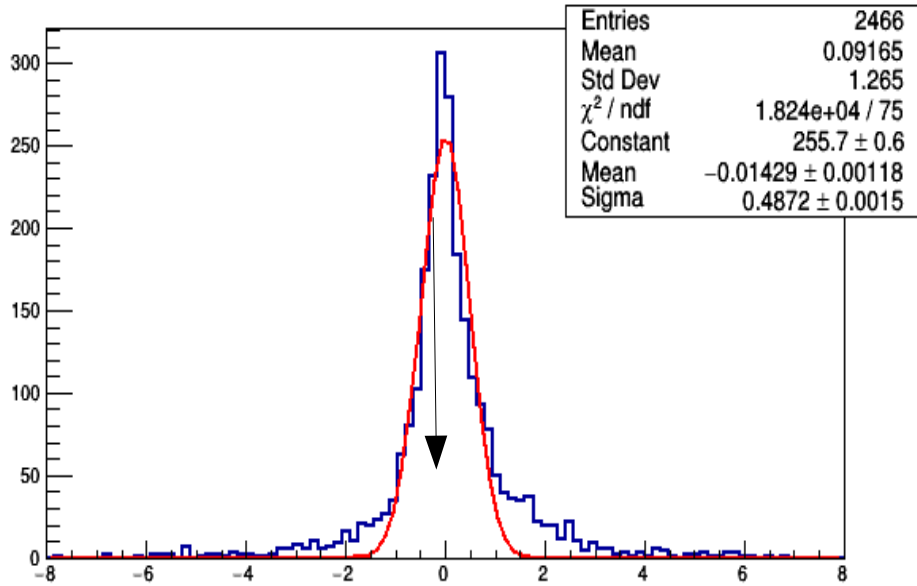
L2 BOTTOM



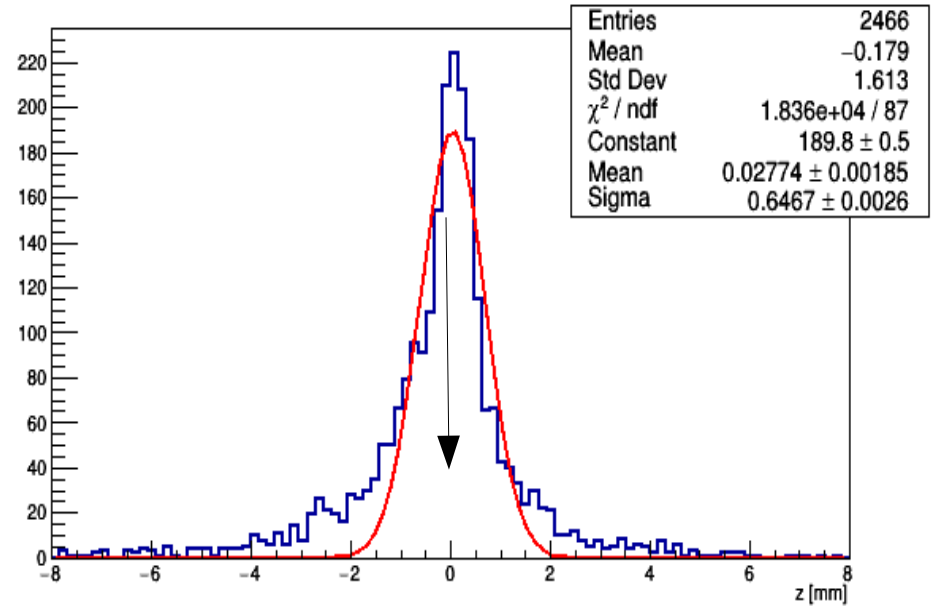
~OK

# Residual in z (exp-fit, mm)

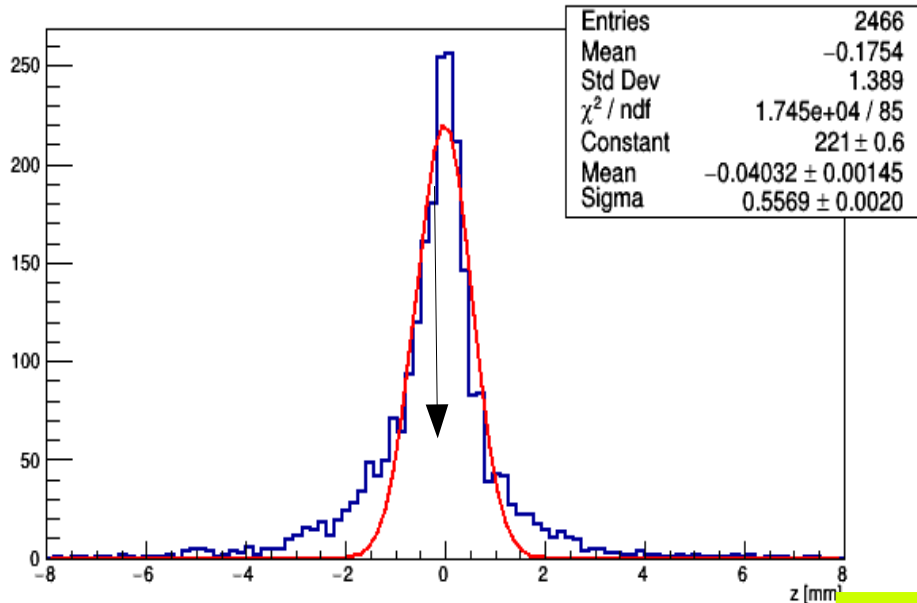
L1 TOP



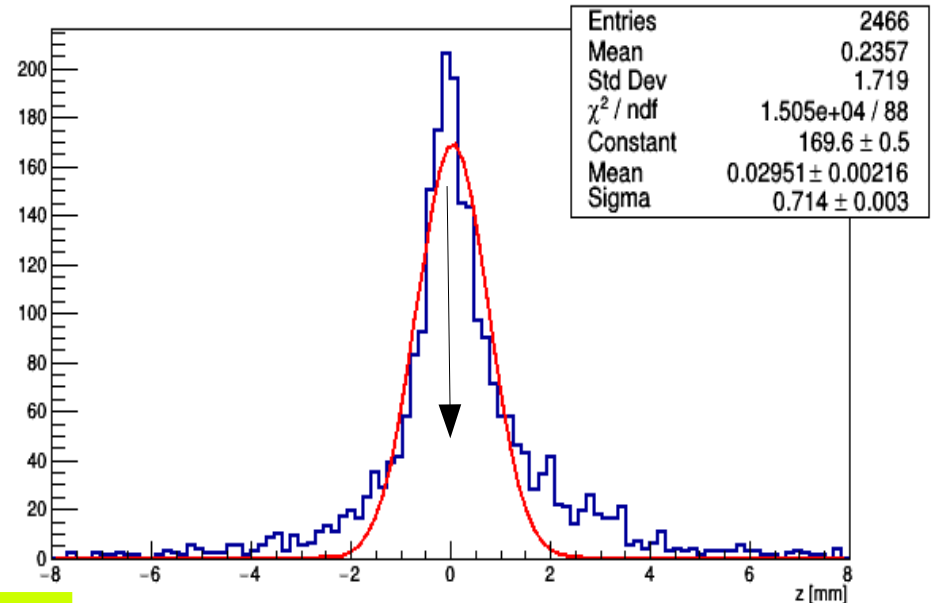
L2 TOP



L1 BOTTOM



L2 BOTTOM



~OK