CSC Alignment

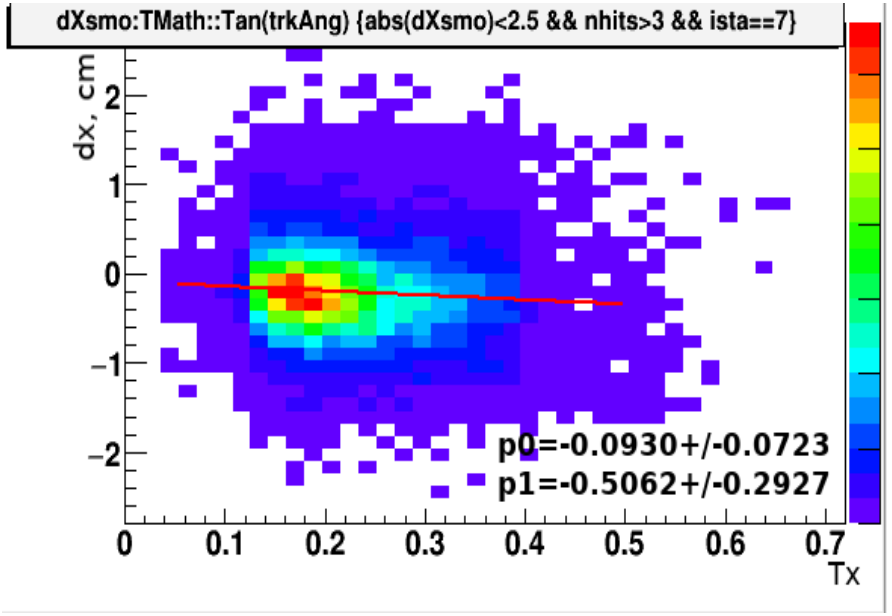
- Alignment for GEM-CSC tracking
- Alignment for Si-GEM-CSC extended tracking
- Strange CSC hits

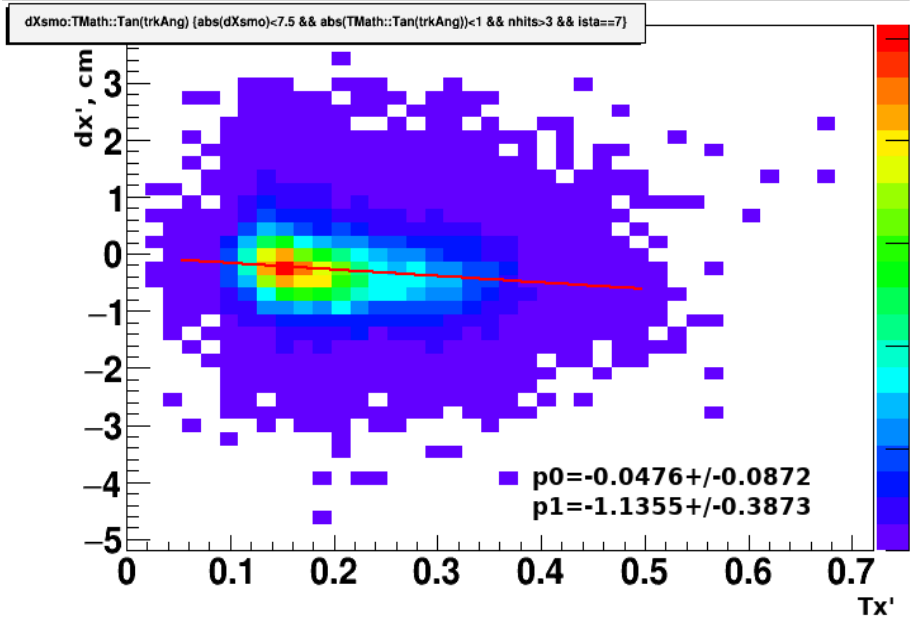
Data without field

- Run 4648
- Argon beam
- Al target 3.3 mm wide

Previous result, GEM-CSC tracking

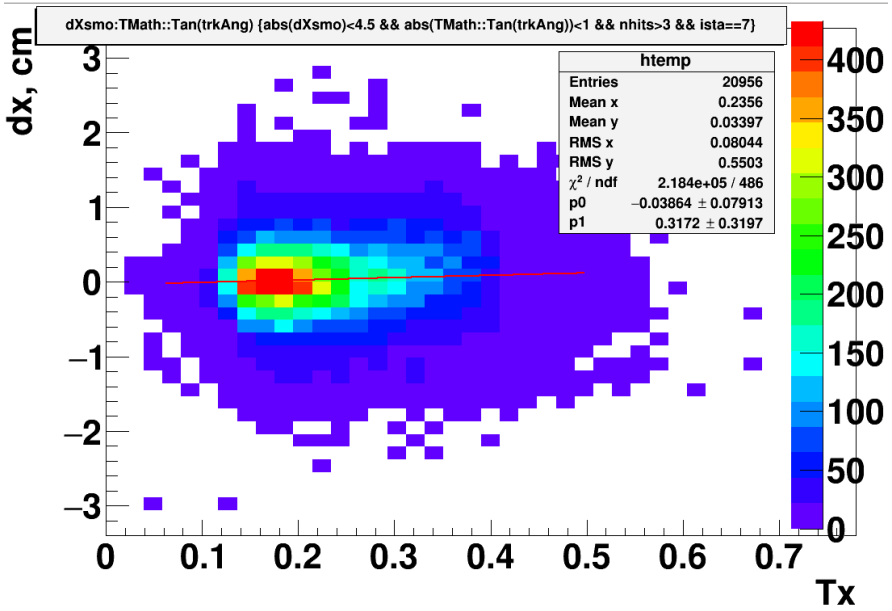
Residuals without field, X and X', Z_{best}+1.5 cm

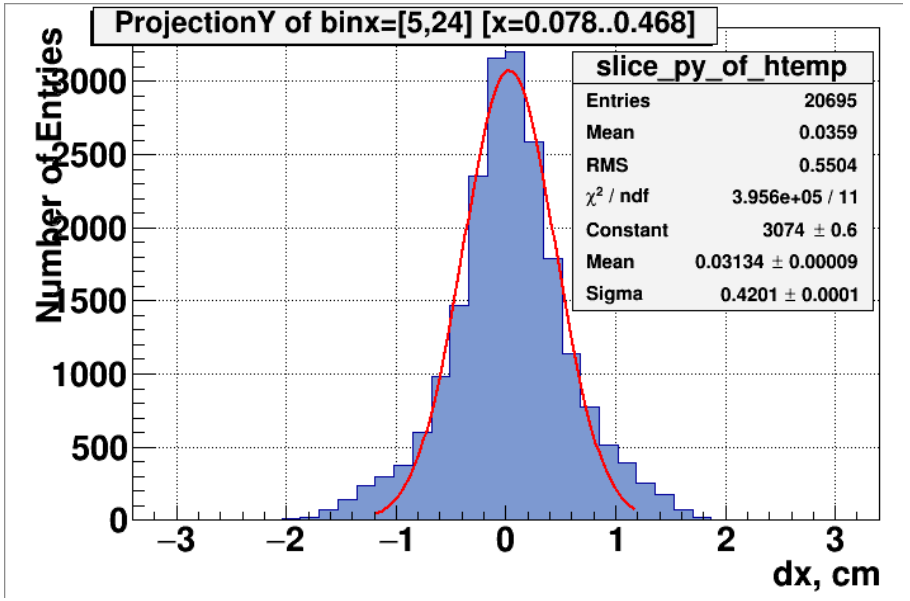


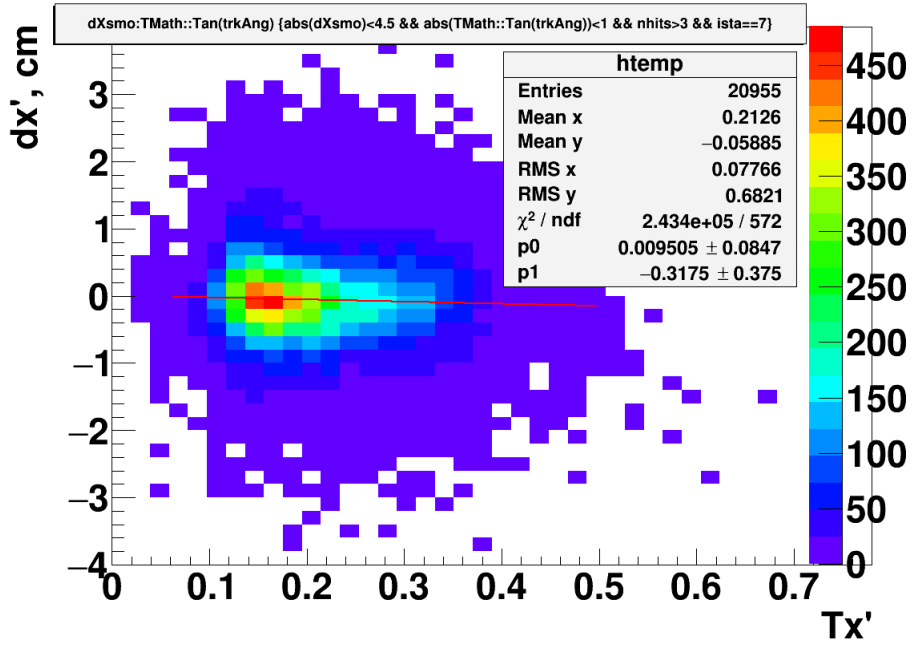


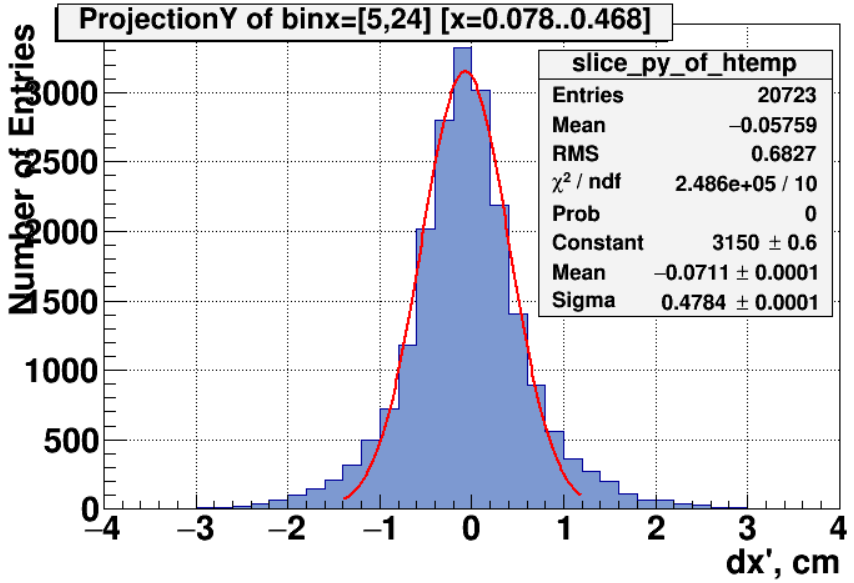
- Residuals for Z, shifted by 1.5 cm relative to the "optimal" Z
- Negative slope is visible for X and X '
- The slopes are different and correspond to the difference in position along Z $\Delta Z \approx 6.5$ mm

Residuals without field, X и X', Z_{best}







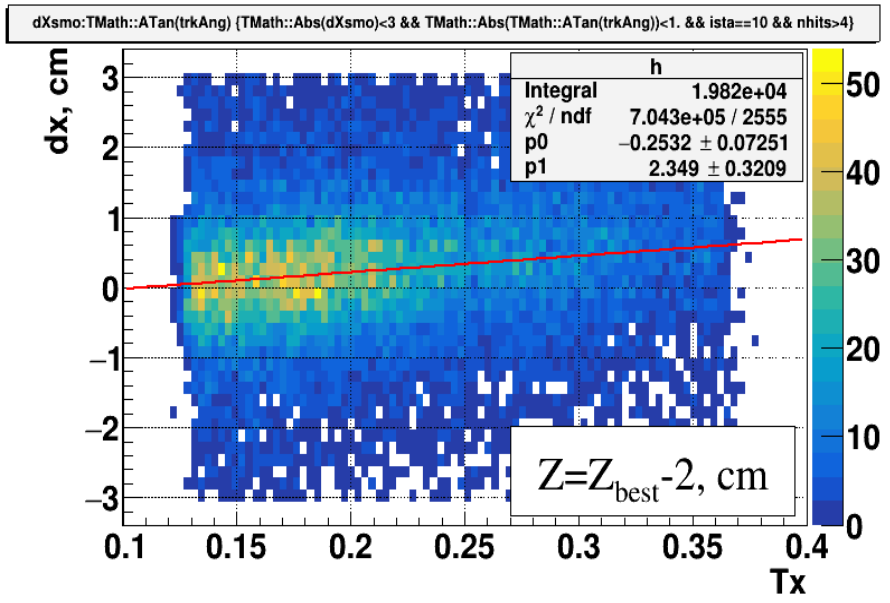


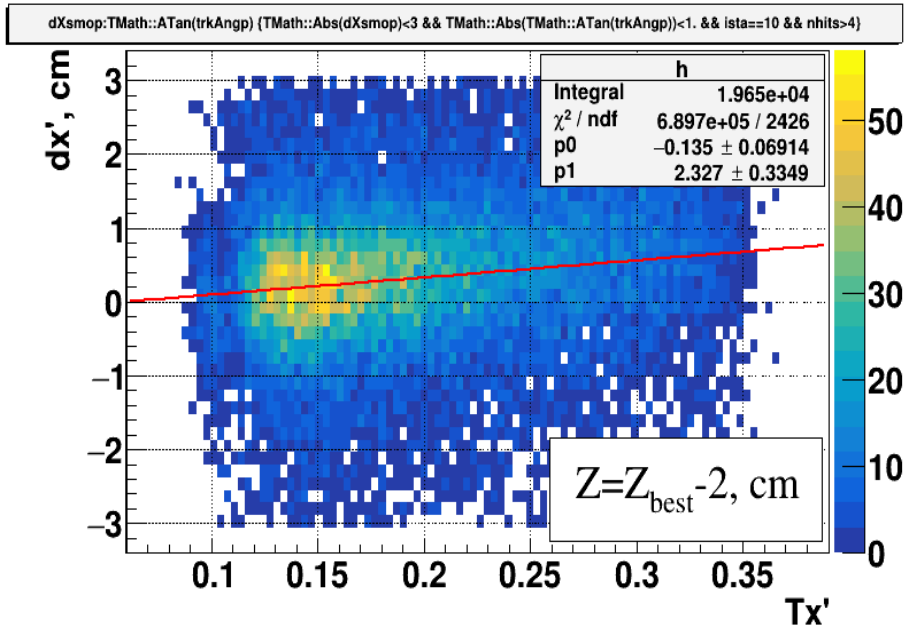
Residuals without field, X и X’, Z_{best}

- Residuals were calculated by discarding the CSC hit and extrapolating the track from GEM
- Sigma of residuals about 4 mm
- Zef planes X and X ’are separated by several millimeters in different directions relative to Zcsc (X’ is closer to the target in Z)
- Zcsc, implemented in reconstruction, in the middle between X and X '

Si-GEM-CSC extended tracking

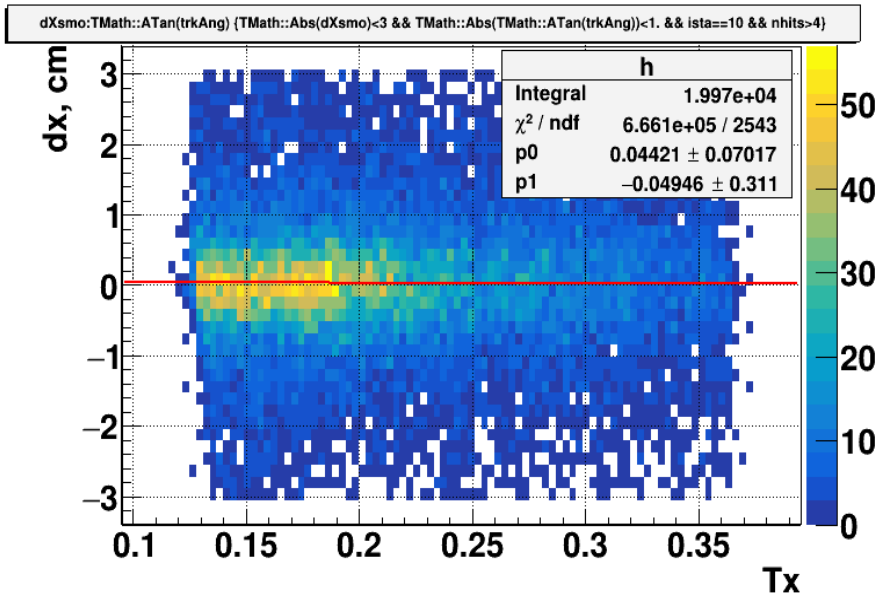
Residuals w/o field, X and X’, Z_{best}-2 cm

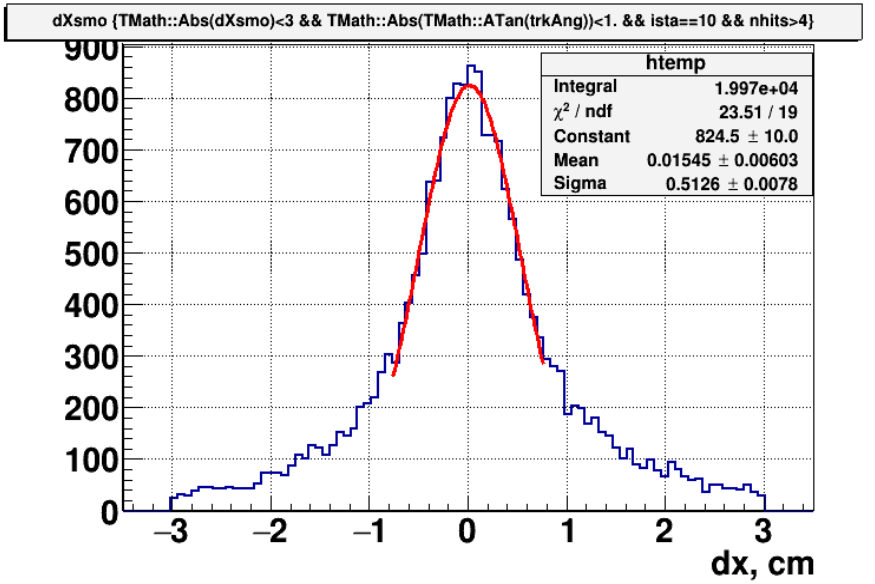


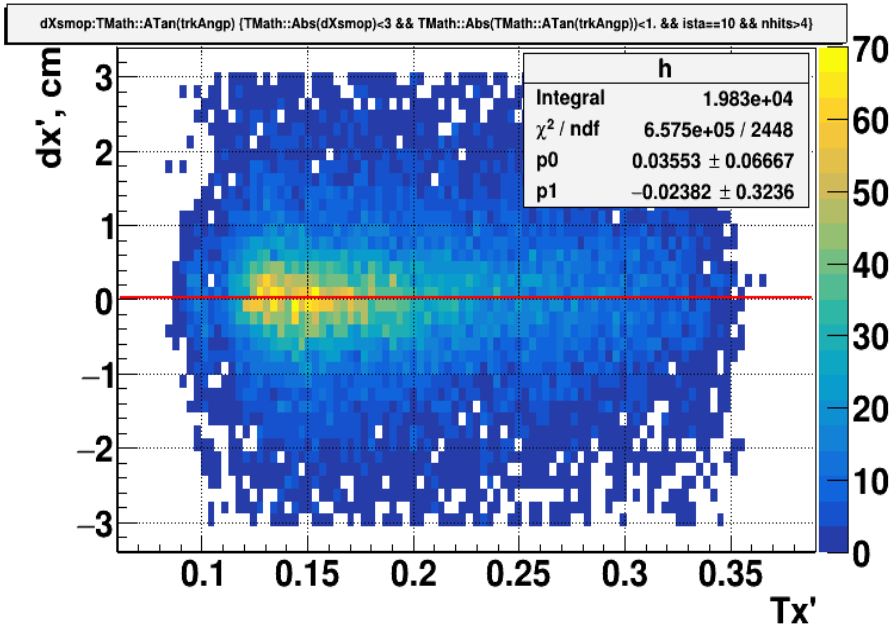


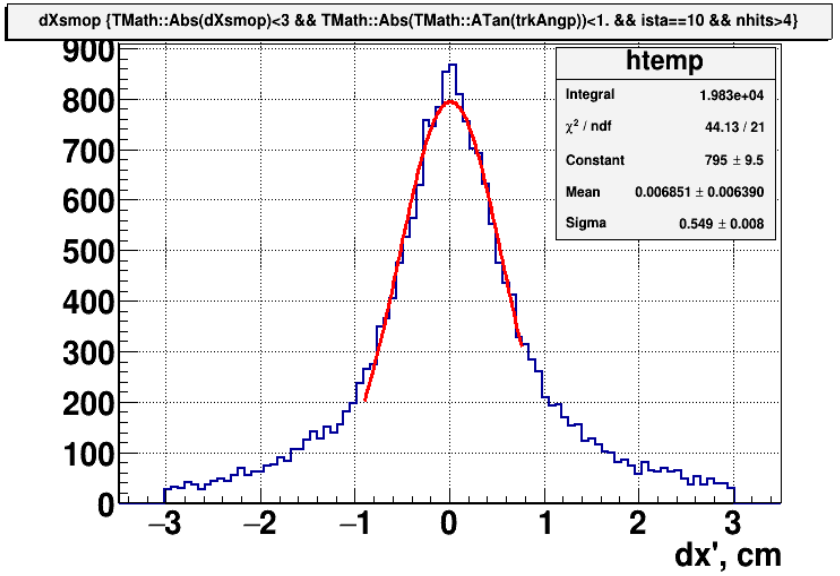
- Residuals for Z, shifted by 2 cm relative to the "optimal" Z
- Positive slope is visible for X and X '
- The slopes are close to each other

Residuals w/o field, X and X', Z_{best}









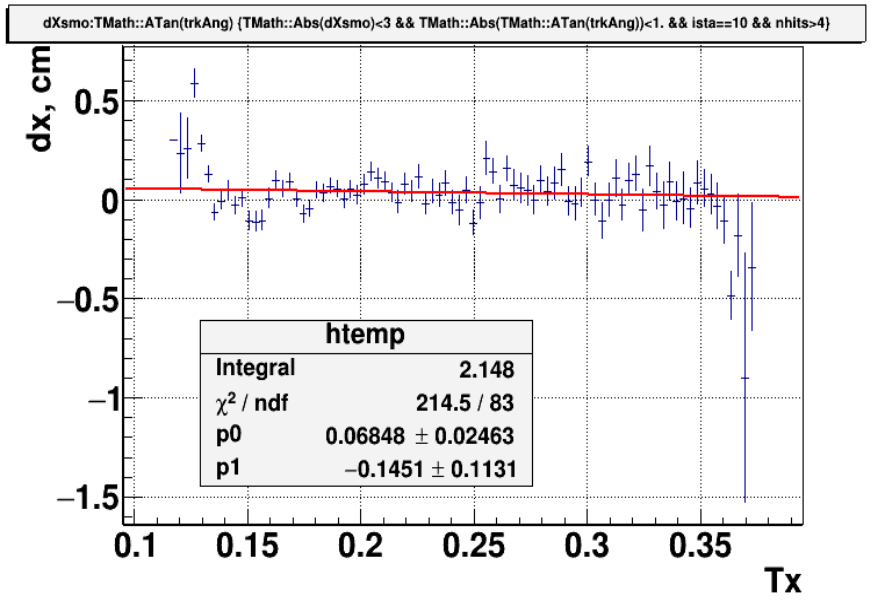
Residuals without field, X и X', Z_{best}

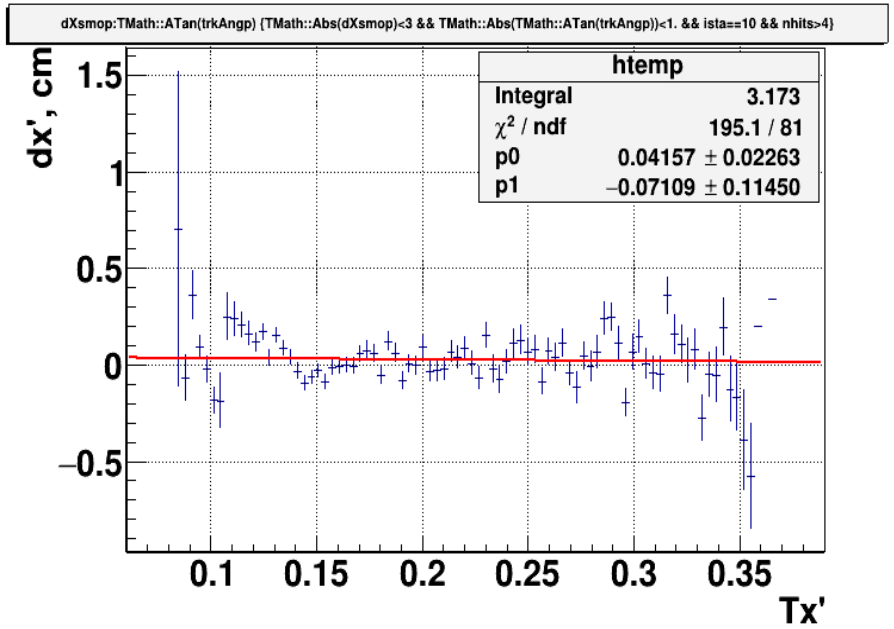
- To get new aligned CSC position following shifts are implemented:
  - $Z_{new}=Z_{old}$-1.01, cm
  - $X_{new}=X_{old}$-0.213, cm
  - $Y_{new}=Y_{old}$+0.085, cm
- Sigma of residuals about 5.3 mm (about 1 mm more than before)
- The slopes for the X and X' planes are close to each other
- The difference in slopes corresponds to a displacement along Z about 200 μm

Displacement of X and X’ planes

- X and X’ plane displacement issue not reproduced
- The possible reasons are following:
  - New tracking
  - More accurate track selection (≥2 Si hits, ≥3 GEM hits)
  - Smaller binning
  - Using the same X^X’ angle in ResidOk as in the reconstruction (influence <100 μm)

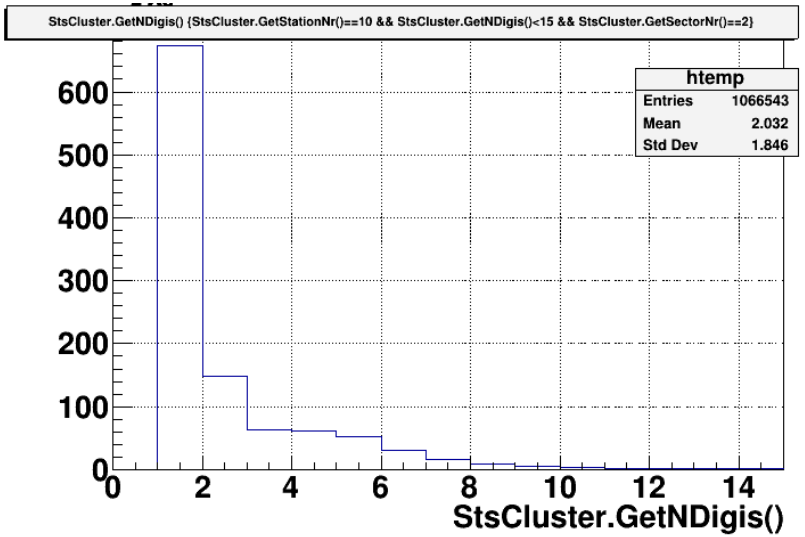
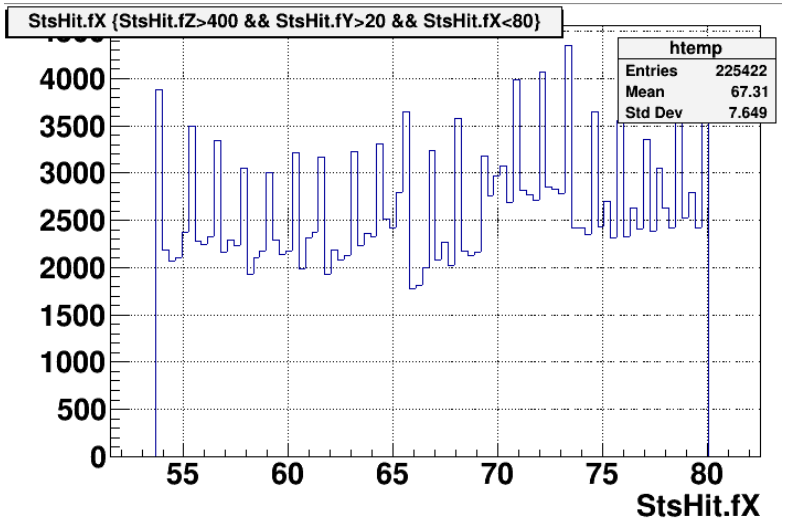
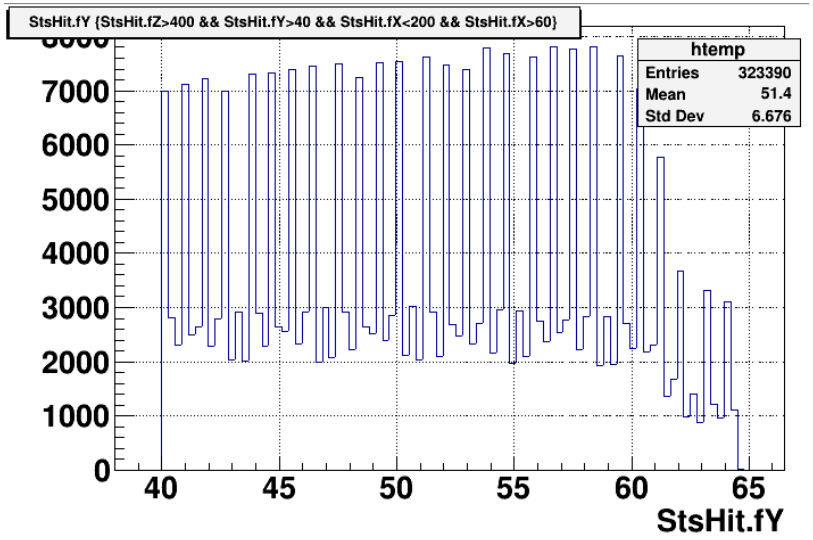
Residuals w/o field, X and X', Z_{best}





- Residuals vs tangent in XZ plane with “prof” option
- Errors are the errors of the mean
- The discrepancy with the alignment results using the “colz” option is about 1 mm

CSC Clusters and Hits



Each 4th strip fiered in *X* and *X'*