

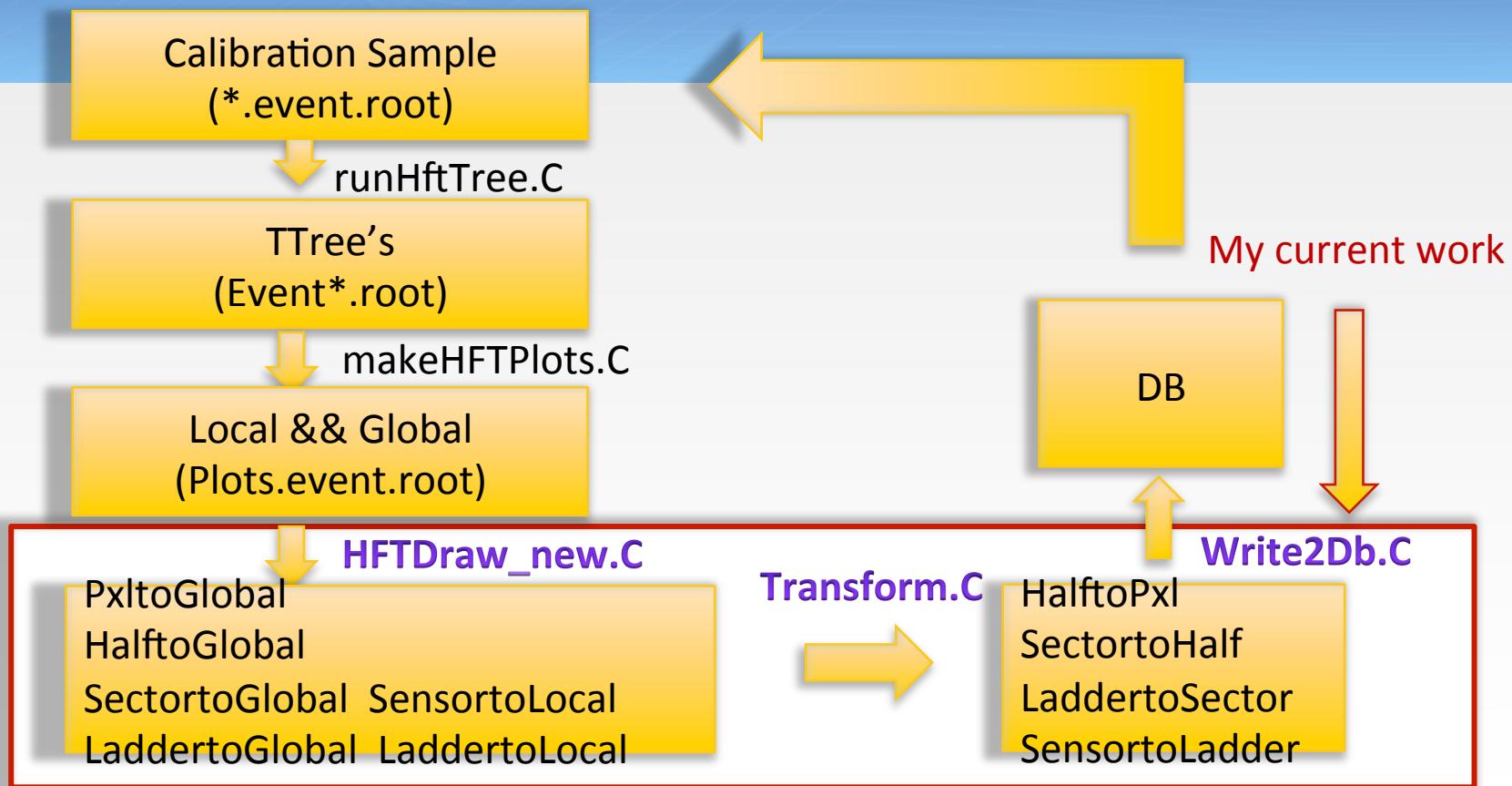


Alignment test with simulation data test1 and test2

Long@LBNL



Alignment Procedures





Simulation Data samples

Test samples can be found at jonathan's directory:

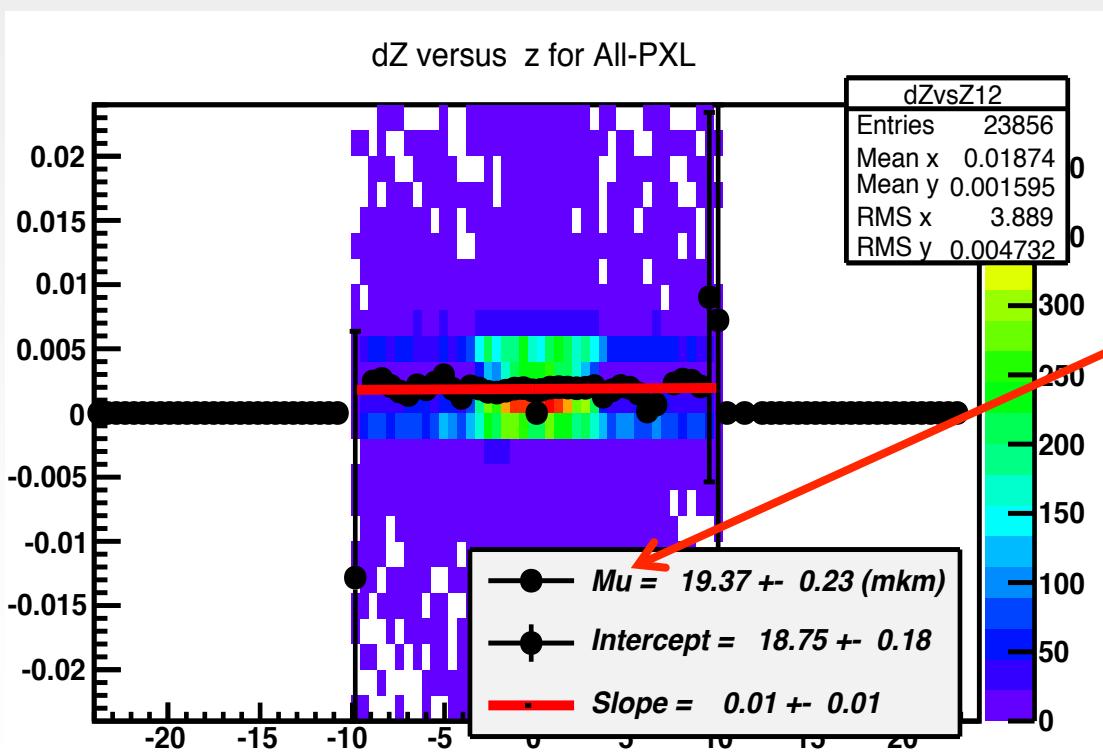
```
/star/institutions/ksu/bouchet/TEST_PXLDBMAKER/test1  
/star/institutions/ksu/bouchet/TEST_PXLDBMAKER/test2
```

With different misalignments(location and amplitude)

It uses Y2013 geometry (3sectors) and each sample is made of 400 events
(each event has 20 pions)



Shift along Z directions of PIXEL-ALL

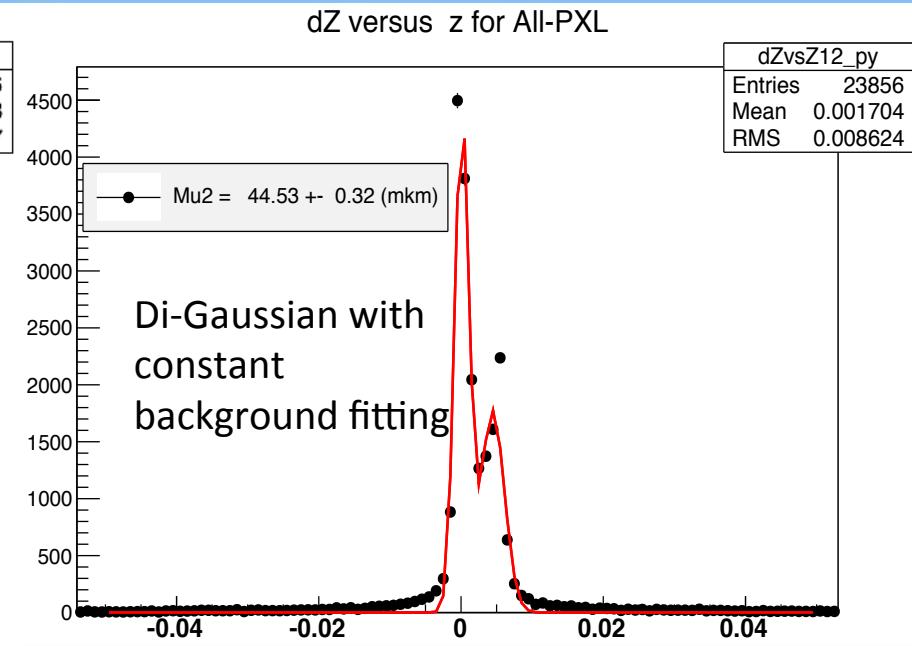
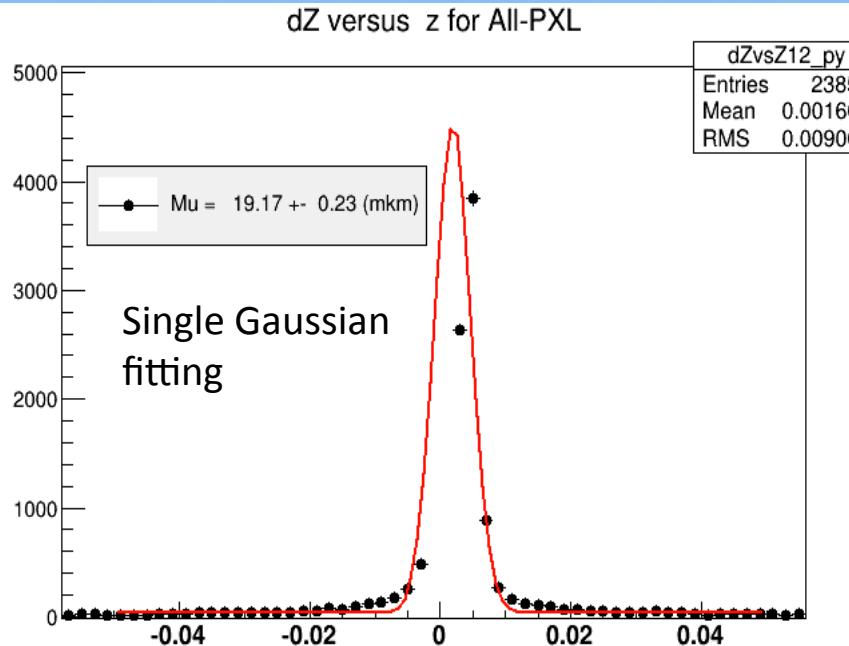


Global misalignment along global Coordinate Z direction of pixel as a whole

The value is 19.37mkm plus error which is not equal to ideal value (given by intercept of the fitting function)



Shift along Z directions of PIXEL-ALL

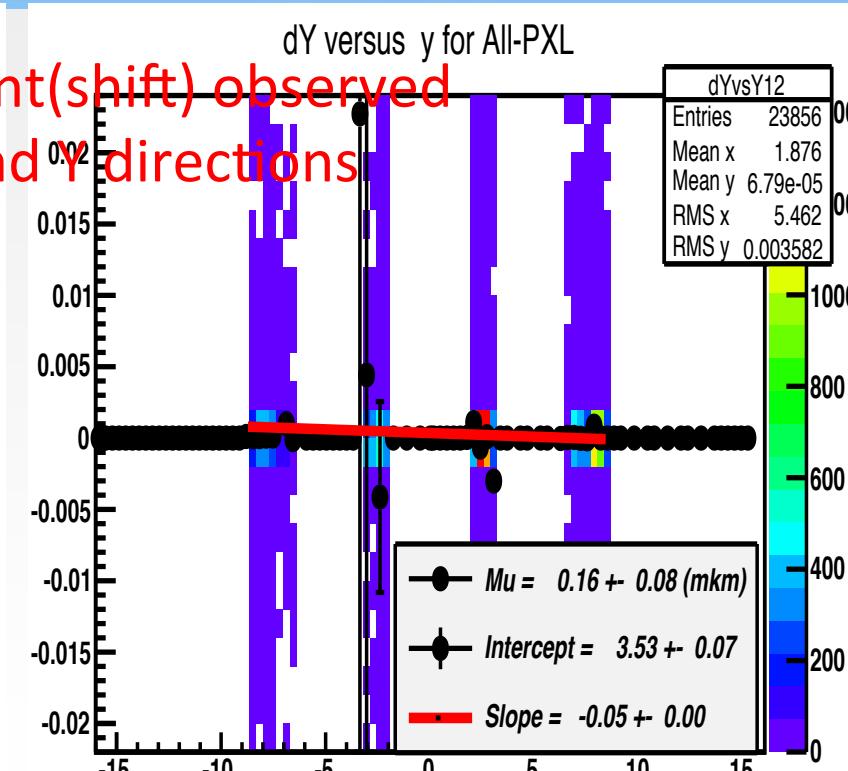
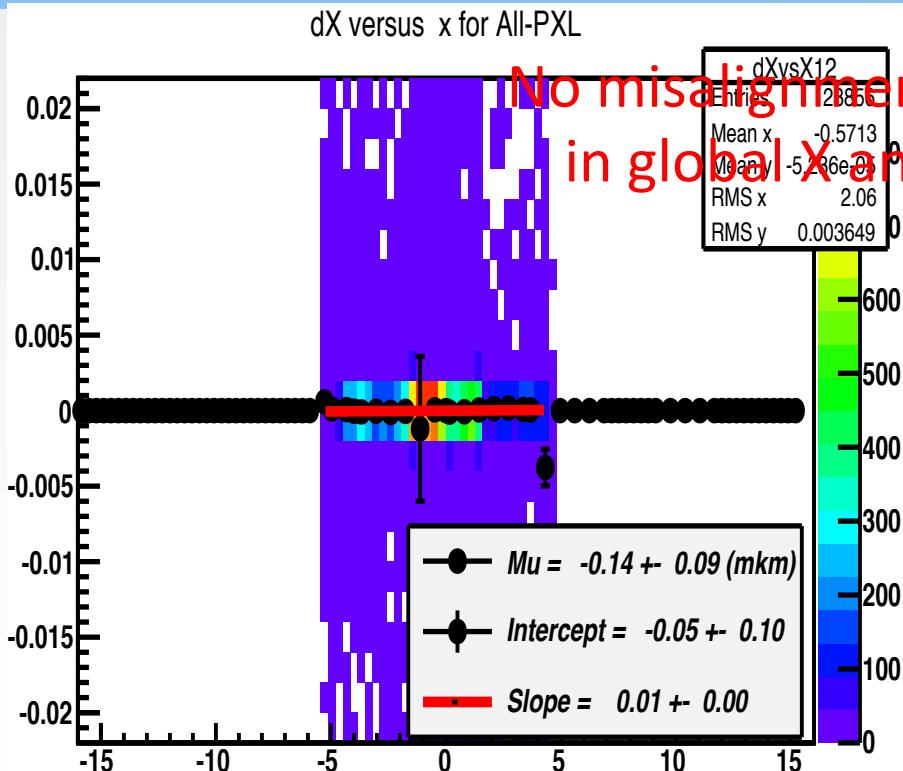


Right figure Fitted with:

function = A*TMath::Exp(-0.5*dev1*dev1) +B*TMath::Exp(-0.5*dev2*dev2) + constant variable



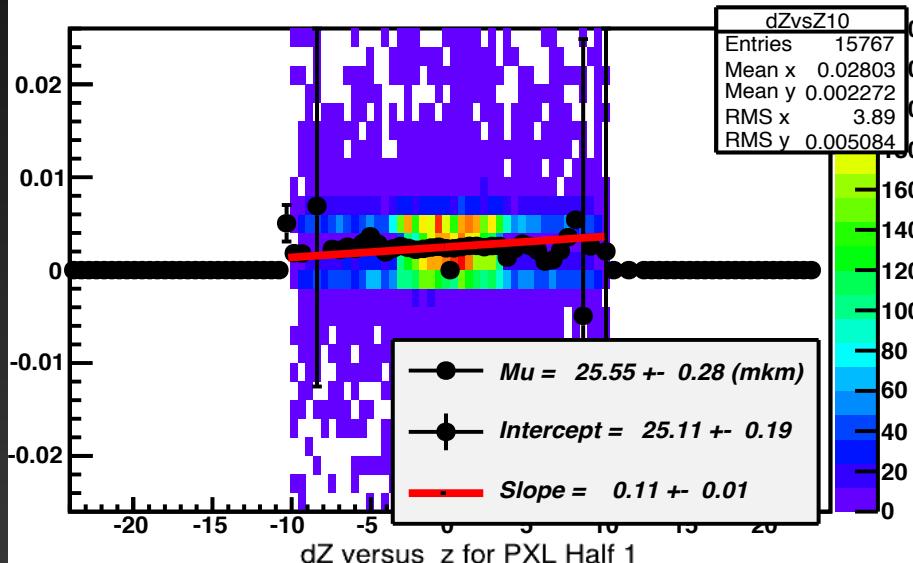
Shift along X and Y directions of PIXEL-ALL



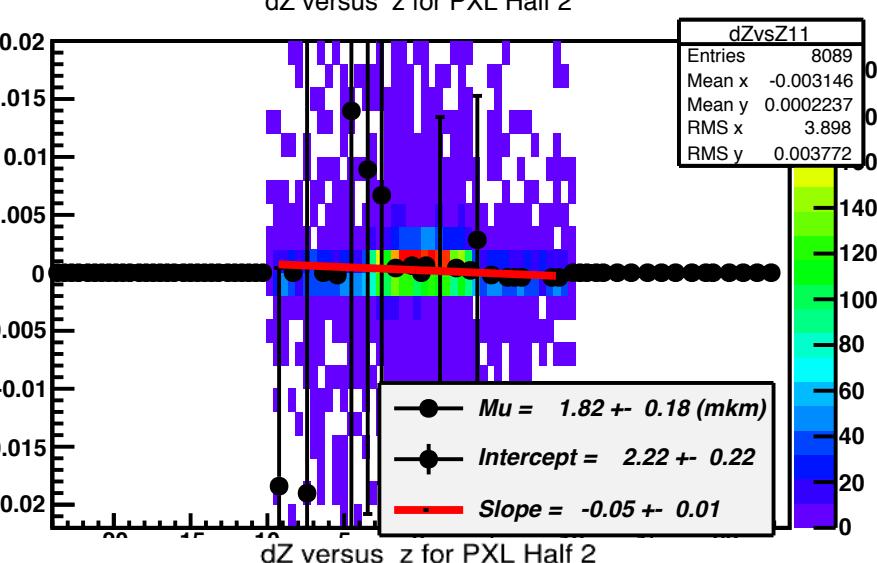


For two halves of PIXEL

dZ versus z for PXL Half 1



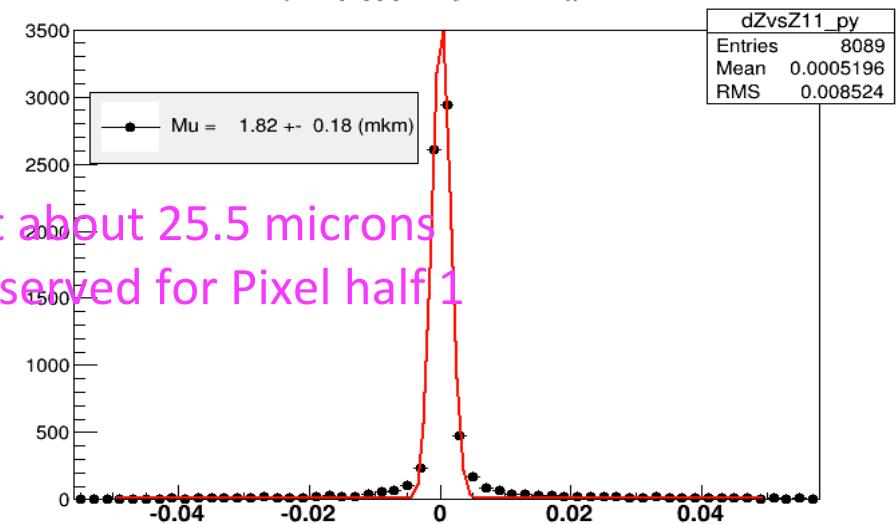
dZ versus z for PXL Half 2



dZ versus z for PXL Half 1



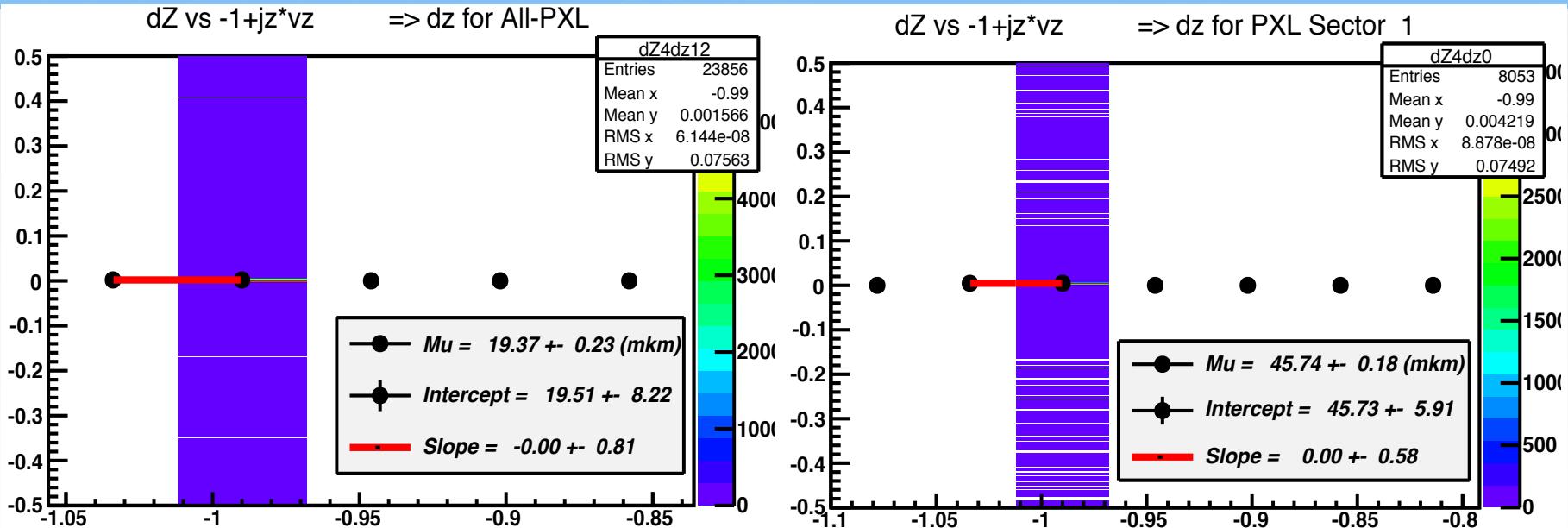
dZ versus z for PXL Half 2



A shift Misalignment about 25.5 microns along z direction is observed for Pixel half 1



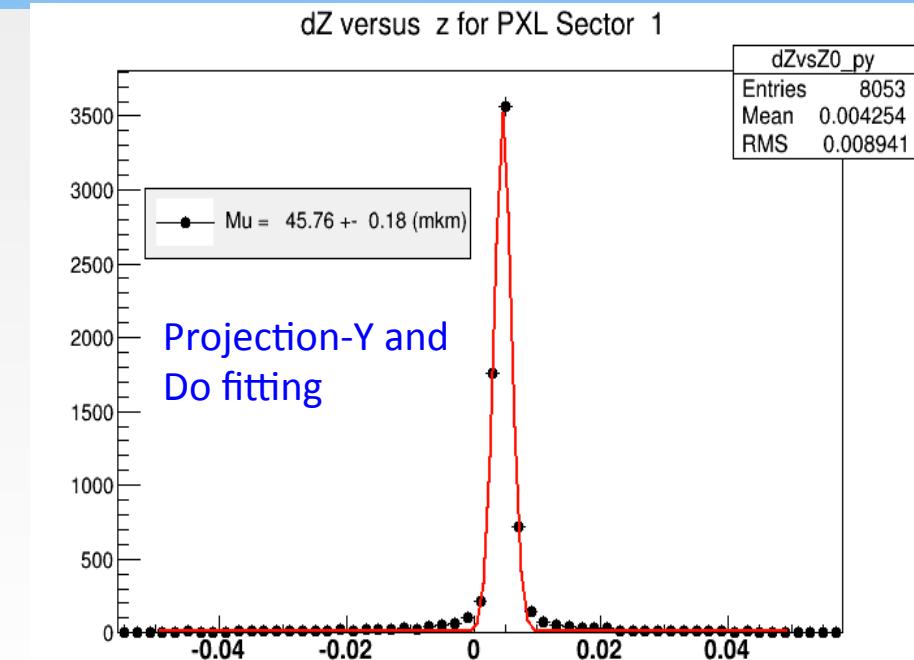
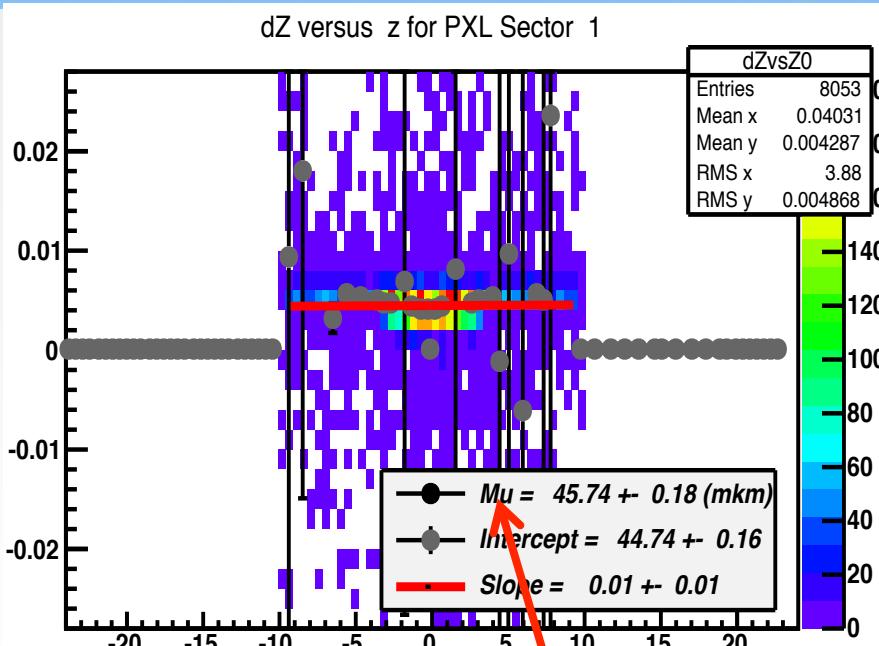
Shift along Z directions of Sector1



For vz is constant zero ,only one bin with data ,thus unable for **Polynomial Fitting**



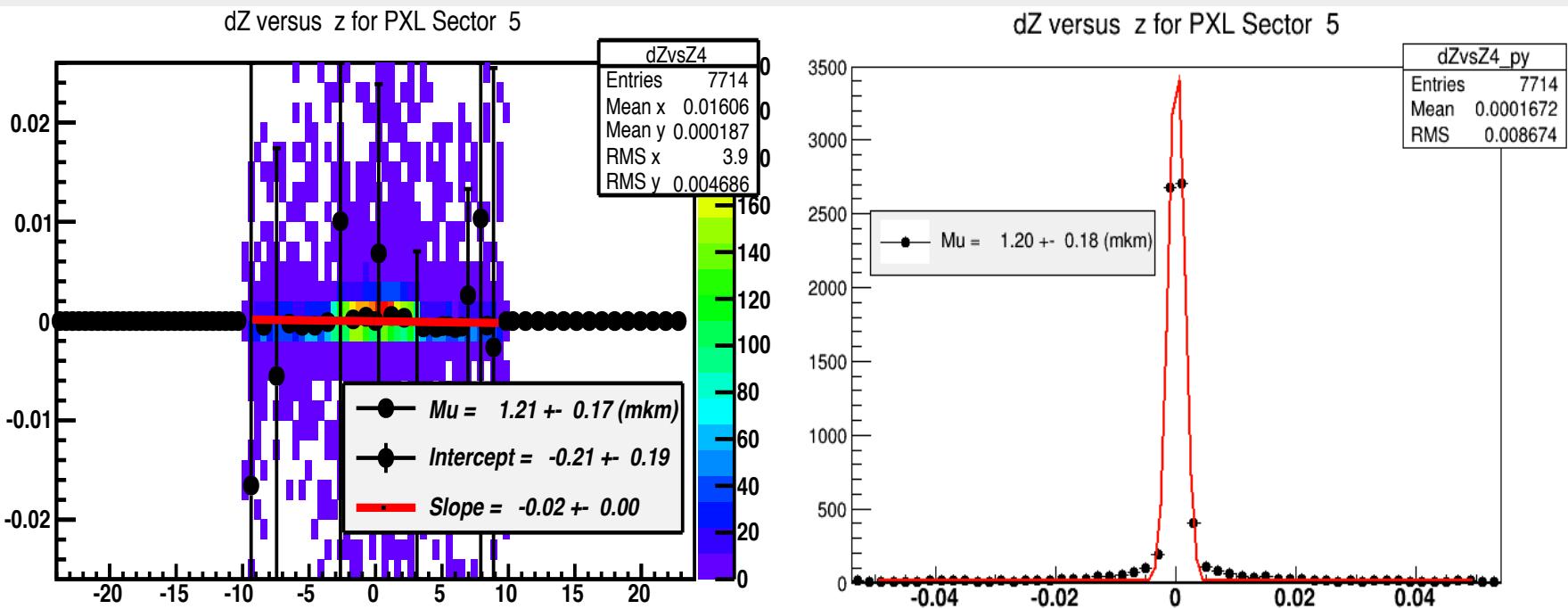
Shift along Z directions of sector1



For sector1 a shift Misalignment about 46 microns along z direction is observed



Sector 5



For other sectors (for example sector5) ,no misalignment along z direction is observed.



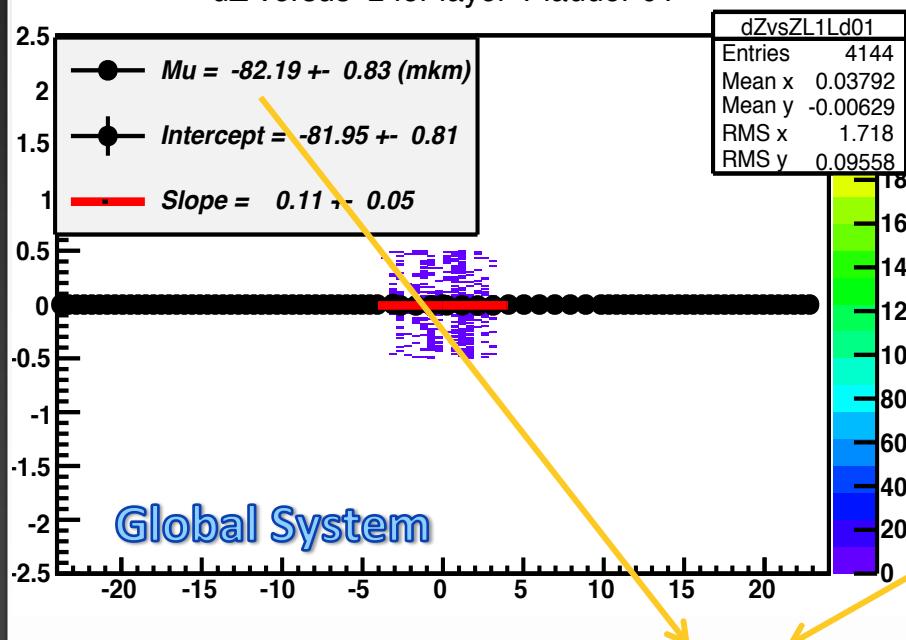
TEST SAMPLE 2

- /star/institutions/ksu/bouchet/TEST_PXLDBMAKER/test2

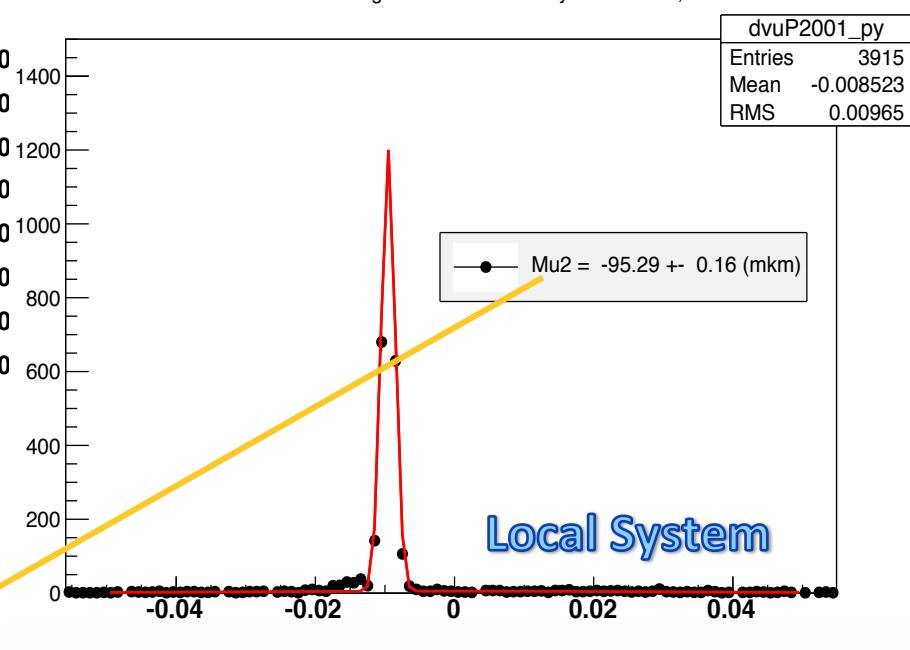


Global system && local system for ladders

dZ versus z for layer 1 ladder 01



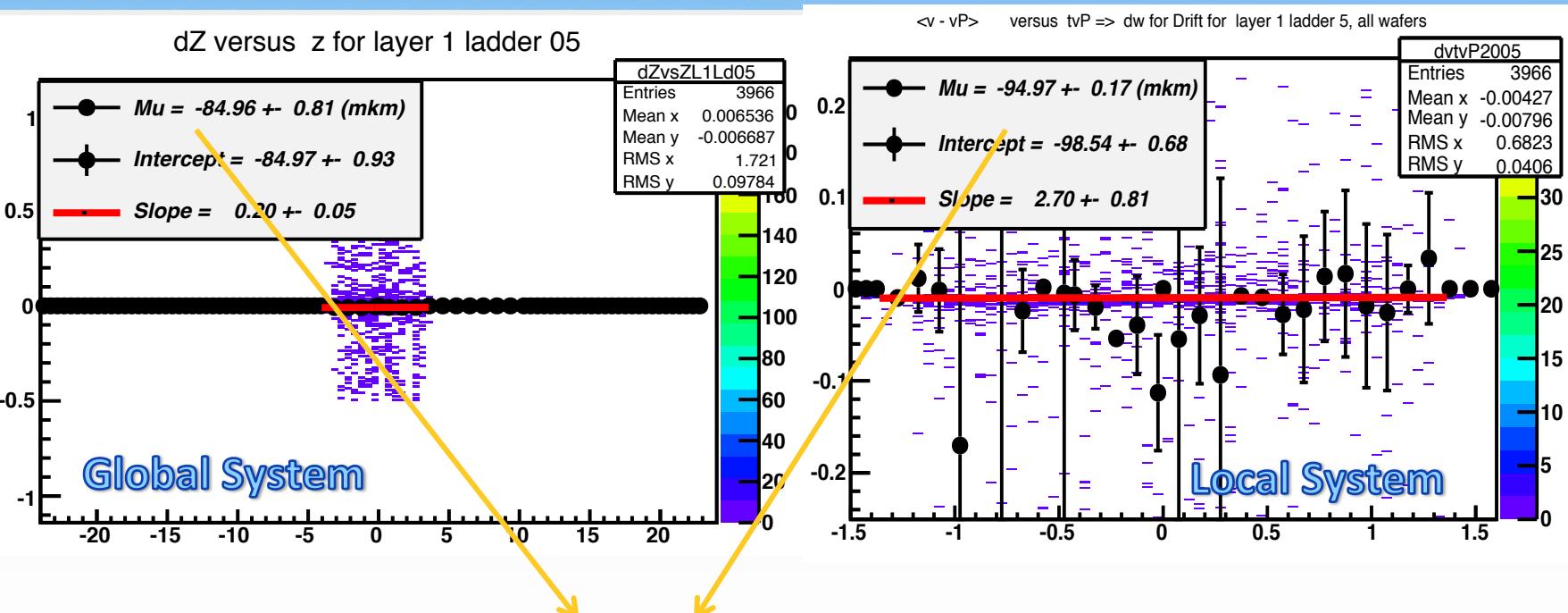
$\langle v - vP \rangle$ versus $u \Rightarrow -\gamma$ for Drift for layer 1 ladder 1, all wafers



Misalignment along global Z direction or local v direction been seen for layer1 sector1 ladder4



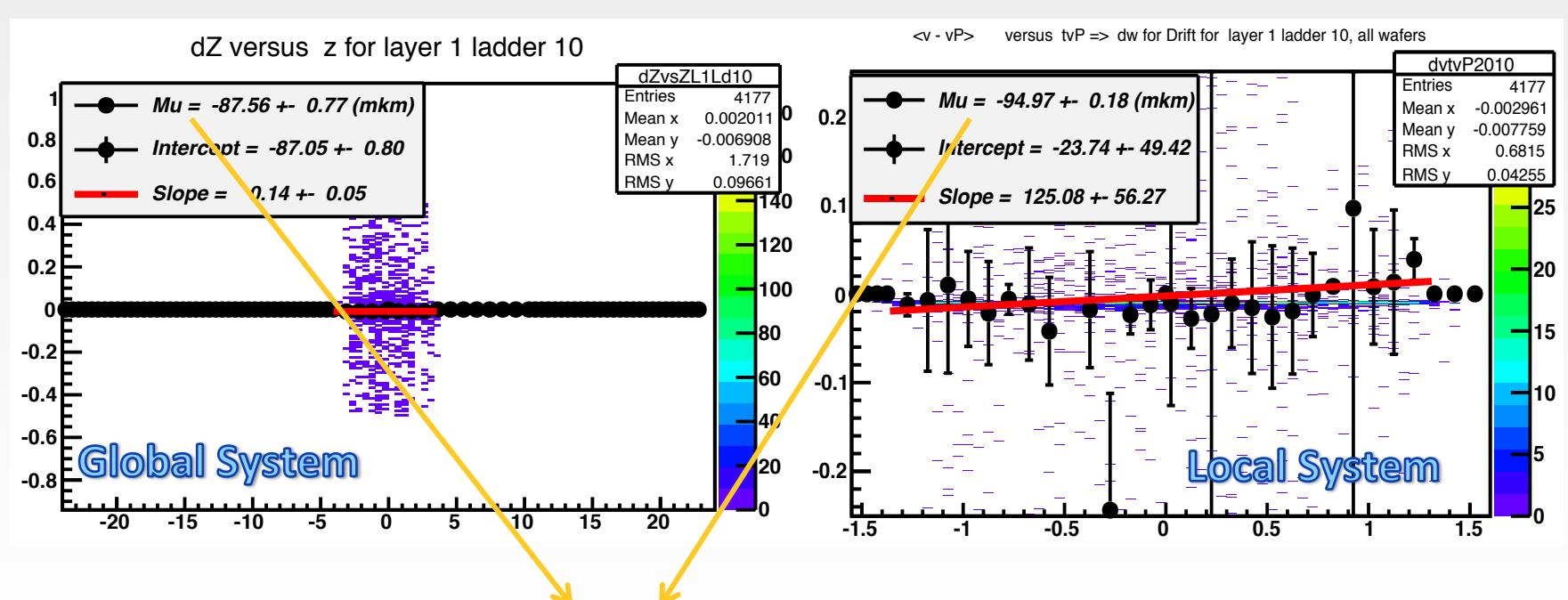
Global system && local system for ladders



Misalignment along global Z direction or local v direction been seen for layer1 sector5 ladder4



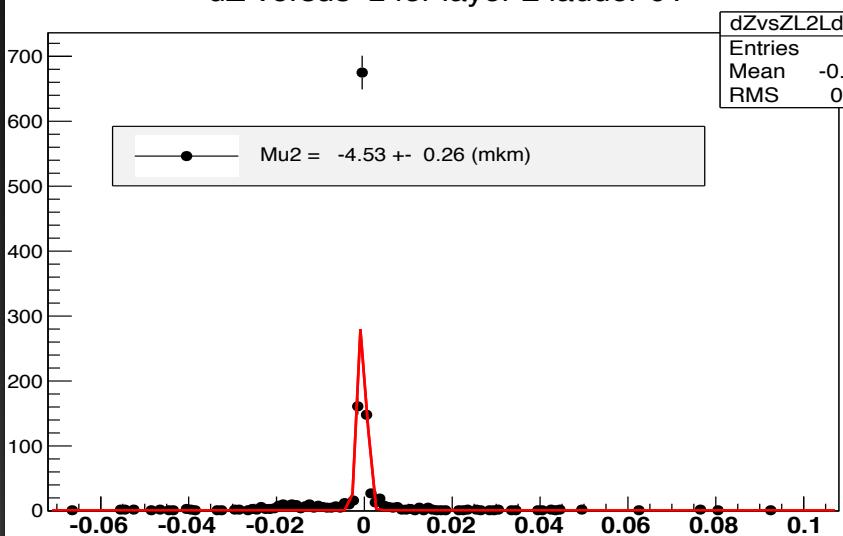
Global system && local system for ladders



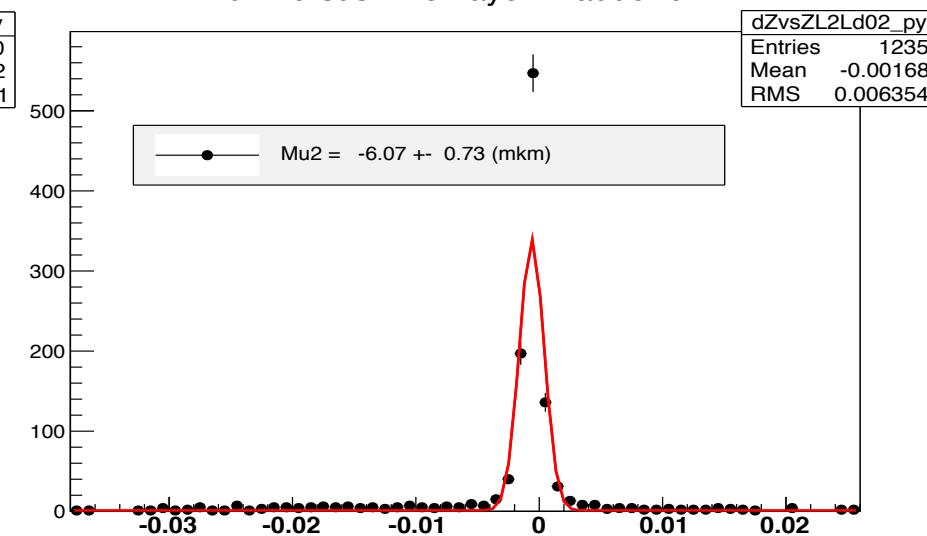
Misalignment along global Z direction or local v direction been seen for layer1 sector10 ladder4



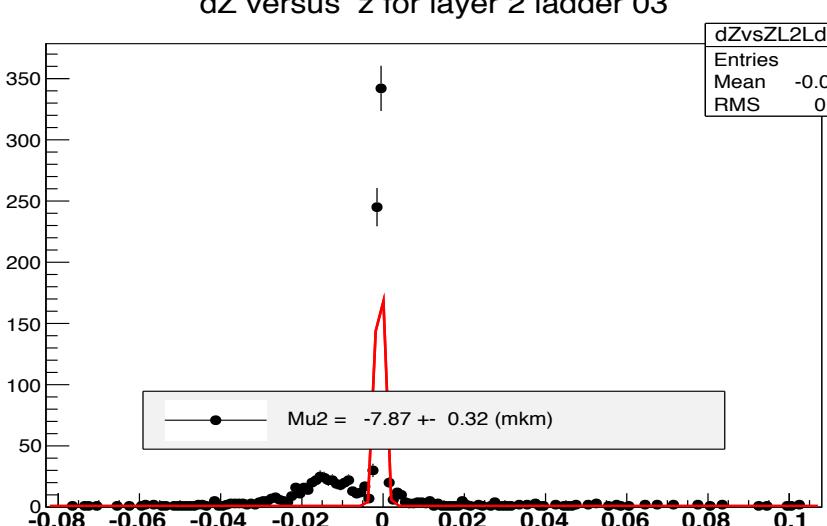
dZ versus z for layer 2 ladder 01



dZ versus z for layer 2 ladder 02



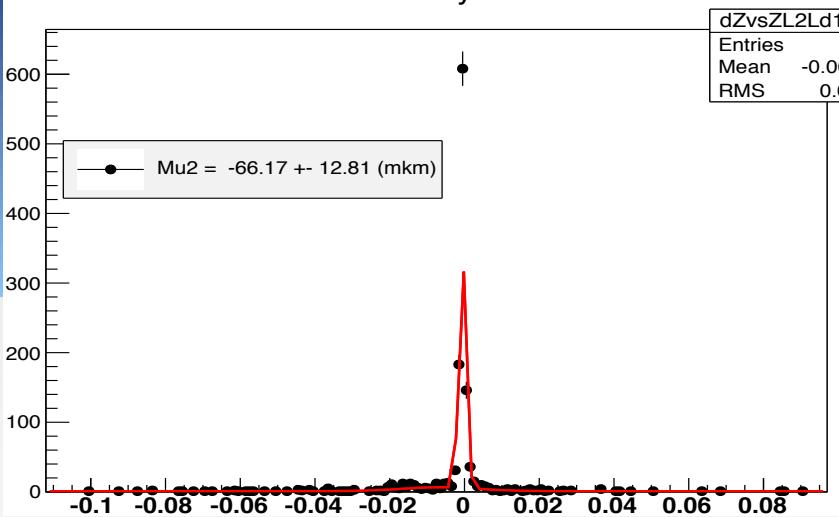
dZ versus z for layer 2 ladder 03



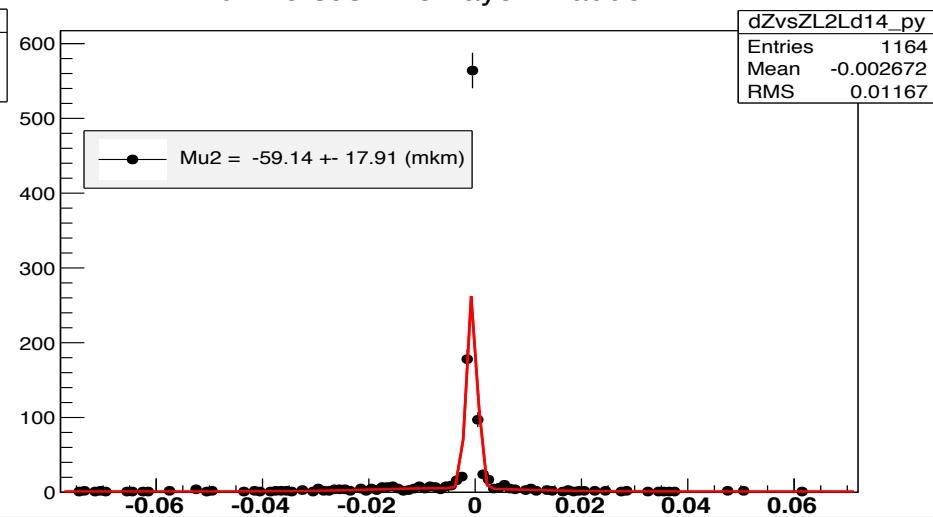
Example:
Global Z direction shift
misalignments in global
system for three ladders
in layer2 of sector1



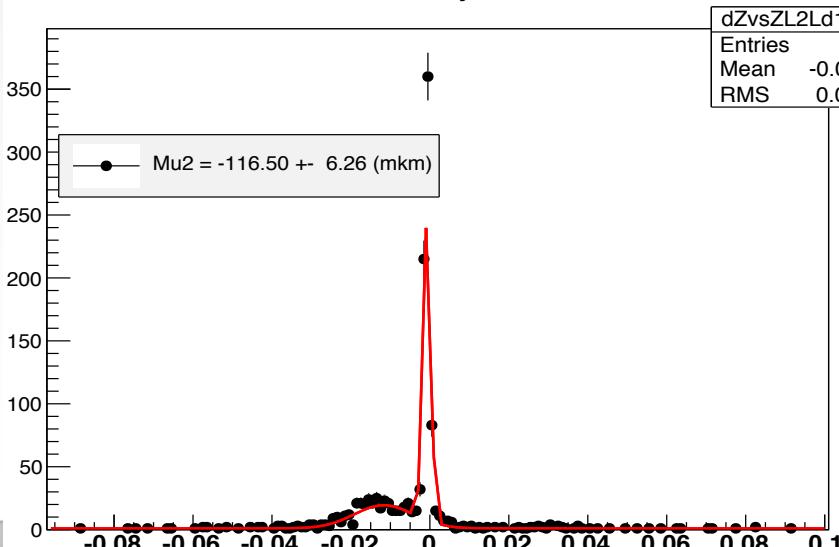
dZ versus z for layer 2 ladder 13



dZ versus z for layer 2 ladder 14



dZ versus z for layer 2 ladder 15



Example:
Global Z direction shift
misalignments in global
system for three ladders
in layer2 of sector5



Misalignment parameters accessing

Misalignment parameters

```
@ /star/u/malong/cali_new/pixel_global  
@ /star/u/malong/cali_new/sector_global  
@ /star/u/malong/cali_new/half_global  
@ /star/u/malong/cali_new/ladder_local  
@ /star/u/malong/cali_new/ladder_global
```



Conclusion

- Misalignment parameter for shift along global z directions cannot be obtained directly from linear fitting for vz is constant zero.
- For test1 data sample ,a shift of roughly 46 microns in sector 1 along global z direction is observed.
- For test2 data, a shift of about 85 to 95 microns in inner layer of pixel sector1,sector5,sector10 is observed. Shift along local v and global z directions are also observed for outer layer of pixel.
- Binning Problem: Fitting precision vs memory overflow.



Some Information

- All the information on the misalignment parameters can be accessed in files ***_global.txt and ***_local.txt . Also, all the histograms with fitting functions can be checked separately in output.root file.
- HFTDraw_new.C generates check_fitting.root which is mainly for checking histogram fitting.
- Abstraction of Local system alignment calibration results of ladders and sensors are also included.
- Code directory : /star/u/malong/cali_new/