

# ITTF Residuals

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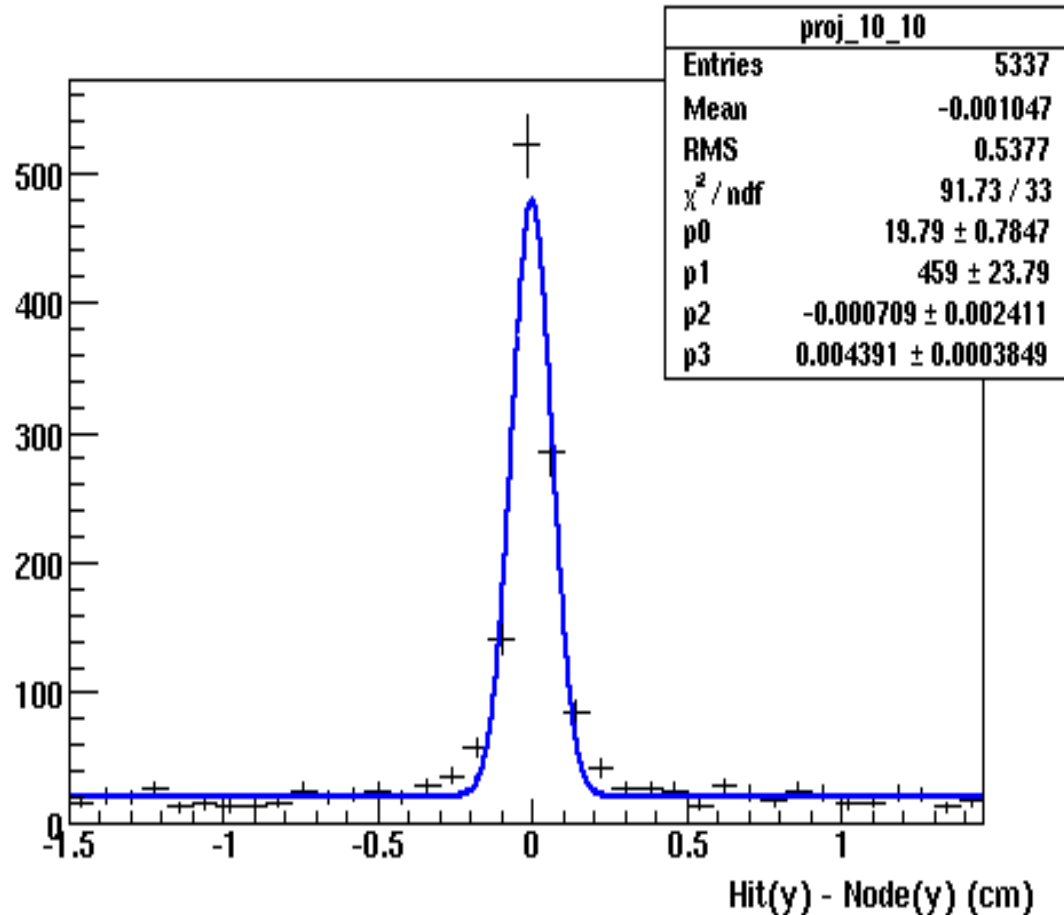
# StiResidualCalculator

- Operates on StiTrackContainer
  - Loops over StiKalmanTrackNodes, StiHits
- Same method for all detectors
- Easy to study different detectors
- Extensible to include/use other methods

# Method

- $dX = \text{Hit}(X) - \text{Node}(X)$ , where the node position is the track extrapolation to the detector
- $X$  can be either  $Y$  (along padrow) or  $Z$  (along drift direction)
- $dX$  calculated for all hits within 20cm of track intersection
  - Results in gaussian + linear background

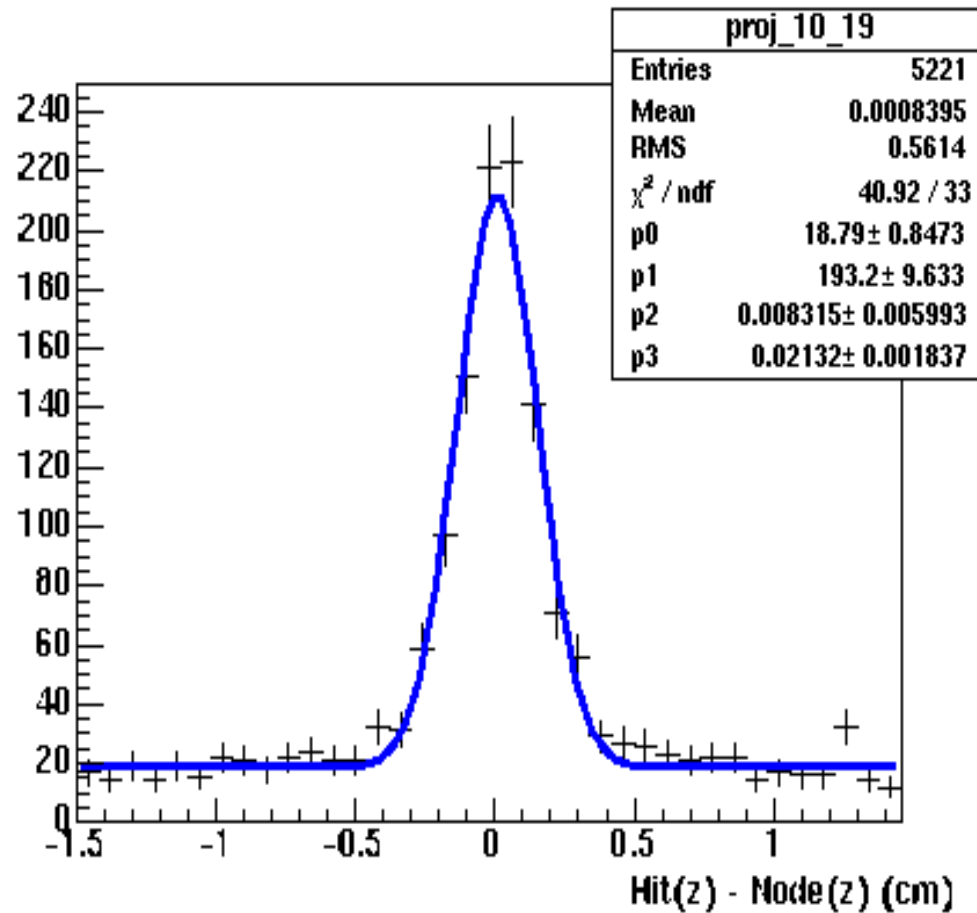
# Residual Along Pad



## Parameters:

- P[0] = background (linear) fit
- P[1] = amplitude
- P[2] = mean
- P[3] =  $\sigma^2$

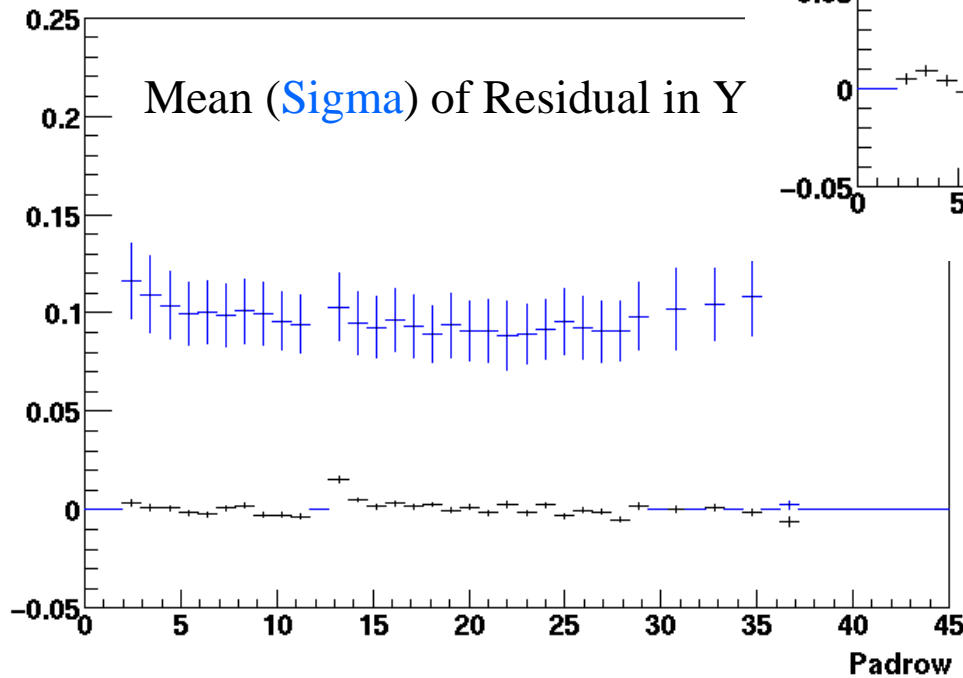
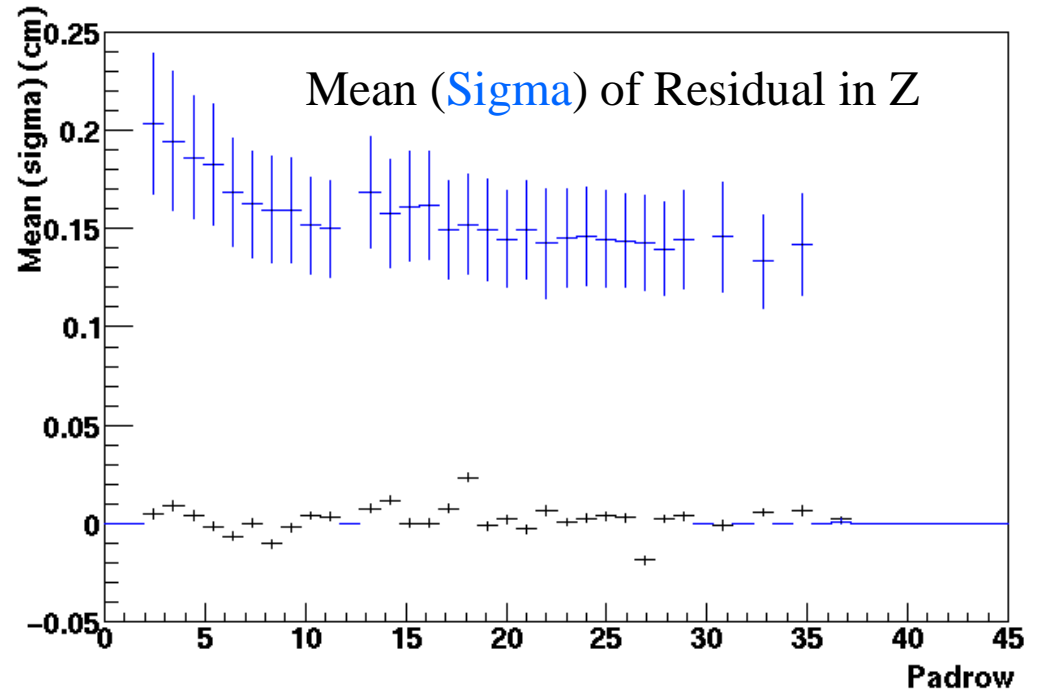
# Residual Along Z



# Means

The Means are small compared to residual sigma.

Padrow means randomly distributed along padrow direction, but small systematic shifts can be seen in Z – alignment?



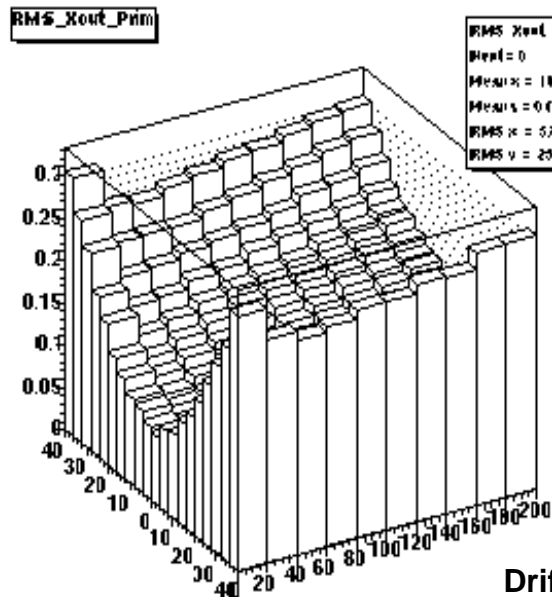
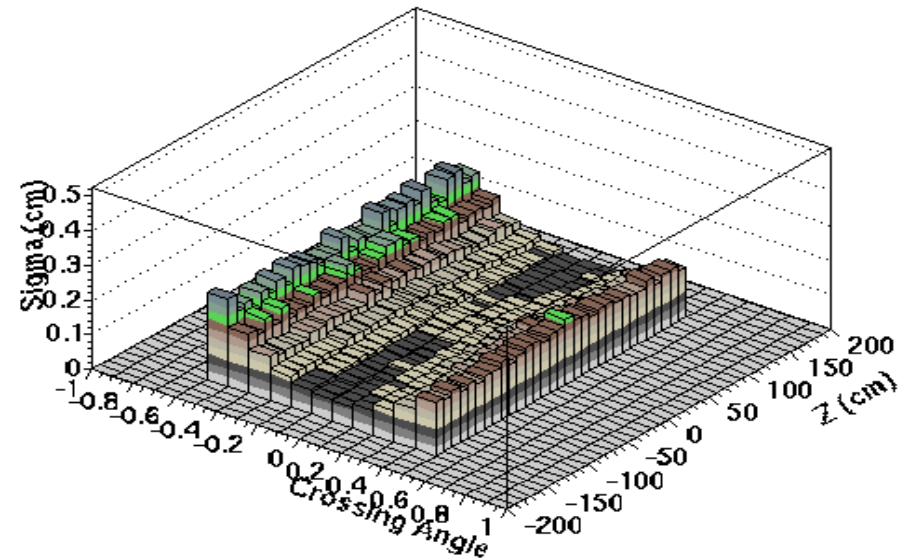
Bonus:  $\sigma$  R Dependence!

- Cuts:
- Primary
  - $n_{\text{FitPts}} > 15$
  - Cross & Dip  $> 60$  Degrees

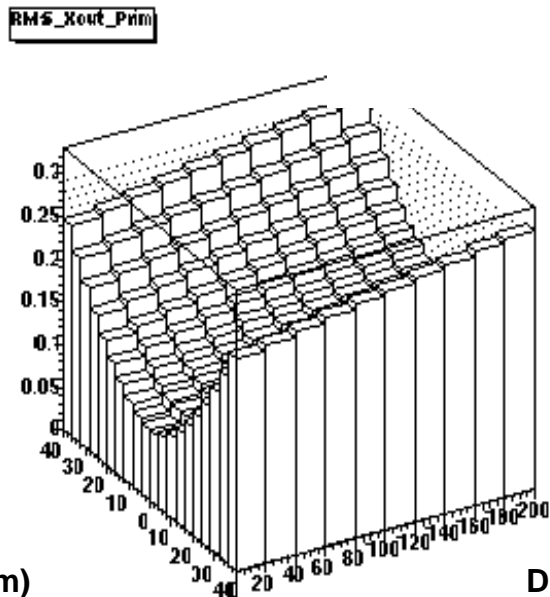
# Sigma Distribution - Pad

Sti Residuals in padrow are qualitatively similar to TPT-EGR.

- Little drift distance dependence



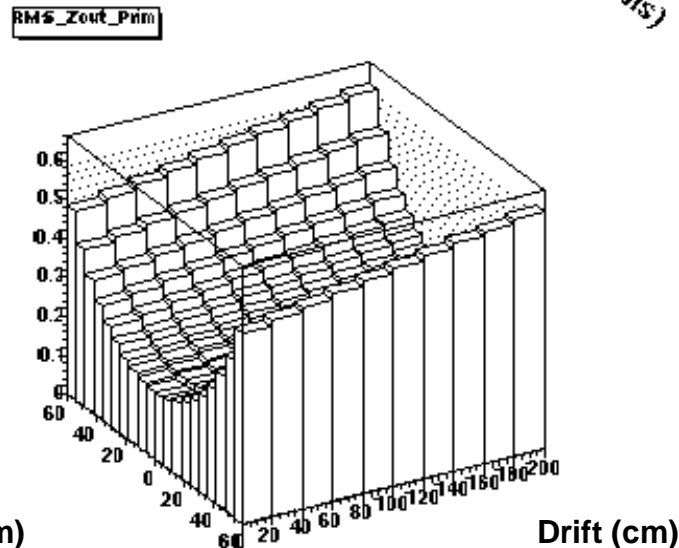
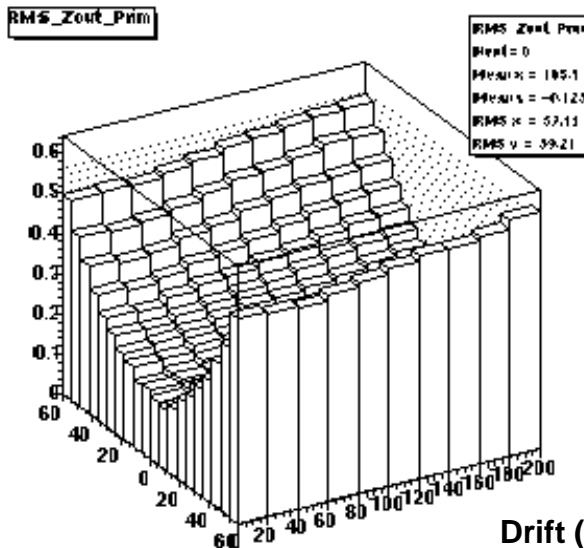
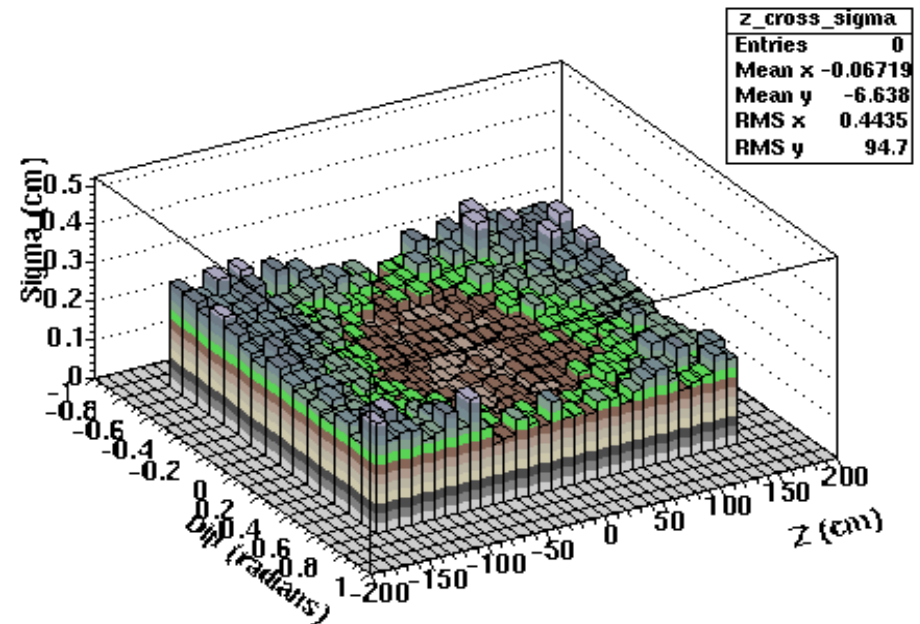
RMS\_Xout\_Prim  
Mean = 0  
Mean x = 106.1  
Mean y = 0.0333  
RMS x = 57.71  
RMS y = 20.63



# Sigma Distribution - Z

Sti Residuals have a different drift dependence than TPT-EGR.

- Increase with Z (*decrease* with drift)
- Little Dip angle dependence





# Hit Error Calculator

- Instance of Class for different parameterizations
  - Inner vs. Outer TPC, SVT
  - StiDetector class contains pointer to relevant StiHitErrorCalculator
- Action at Tracking level
  - Class operates on current node
  - Errors used to propagate track (Kalman filtering)

# Hit Error Parameters

	TPT			STI		
	<sup>2</sup> int	<sup>2</sup> diff	<sup>2</sup> cros	<sup>2</sup> int	<sup>2</sup> diff	<sup>2</sup> cros
<b>Padrow</b>	$5.60 \times 10^{-3}$	$1.04 \times 10^{-4}$	$8.89 \times 10^{-2}$	$1.4 \times 10^{-2}$		$0.26 \times 10^{-1}$
<b>Drift</b>	$2.68 \times 10^{-2}$	$2.18 \times 10^{-4}$	$8.52 \times 10^{-2}$	$7 \times 10^{-2}$	$1 \times 10^{-5}$	$2.6 \times 10^{-1}$

Values are a product of cuts and tuning (repository errors used in study).

# Conclusions

- Mechanism in place to measure residuals and calibrate tracker errors accordingly.
- A higher statistics study is needed
- Tuning still in progress; residuals will change