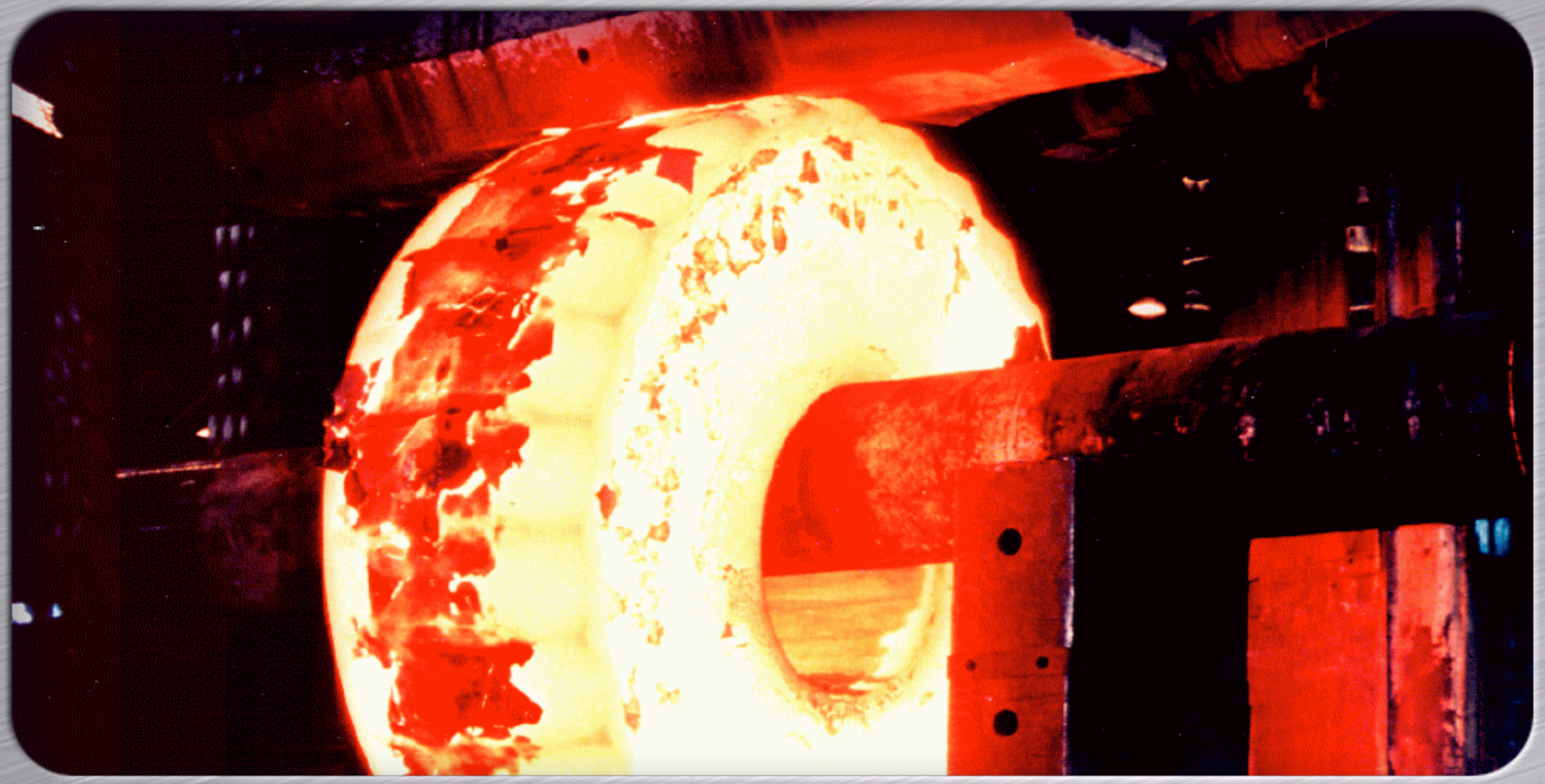
STAR Collaboration Meeting
CalTech - Feb. 20, 2004

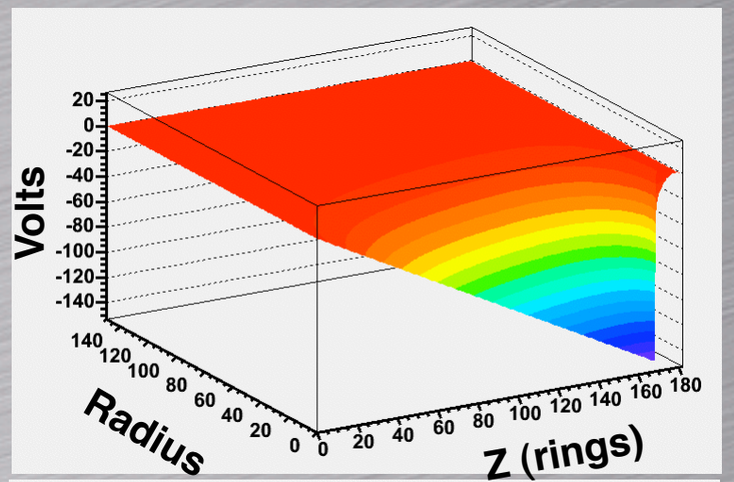
Gene Van Buren
Brookhaven National Lab

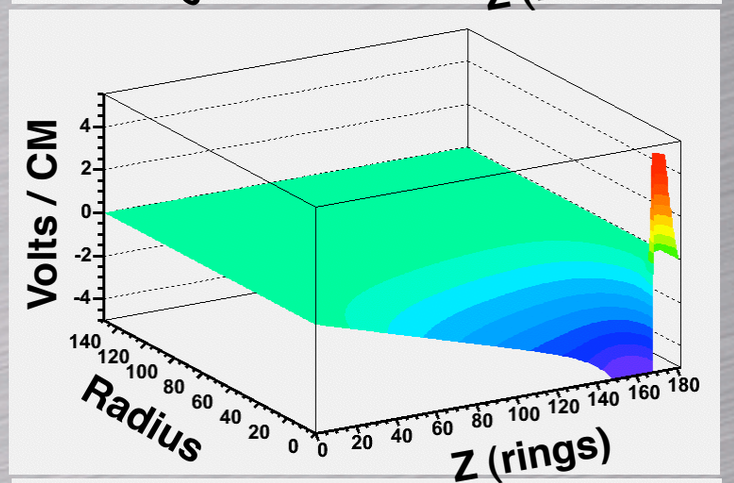


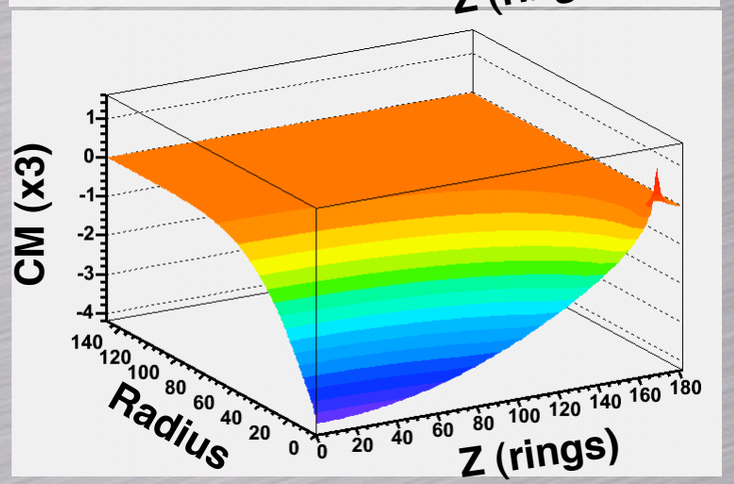
STAR Calibrations

TPC: a short in the IFC

- Short causes extensive field distortions
- Worst field distortions at lower radius, near endcap
- But drift integrates, so worst cluster distortions near central membrane
- Many millions of events recorded with this!

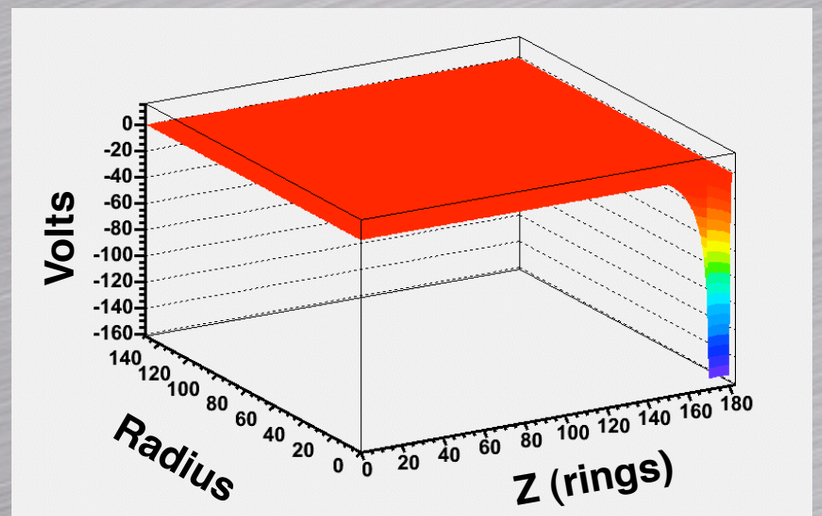


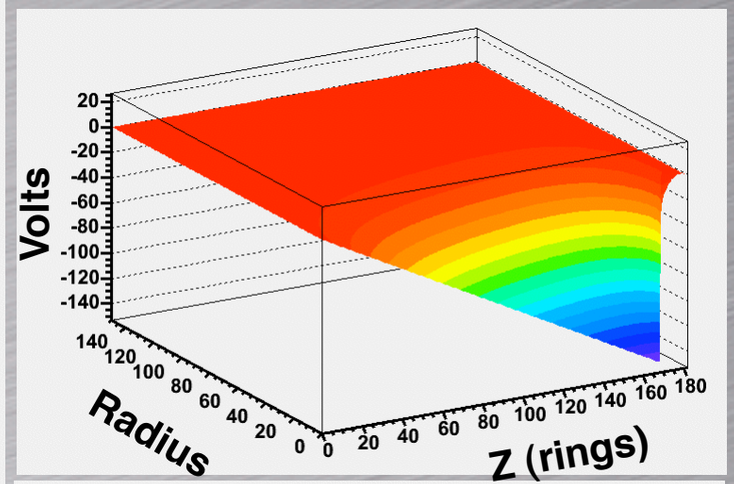


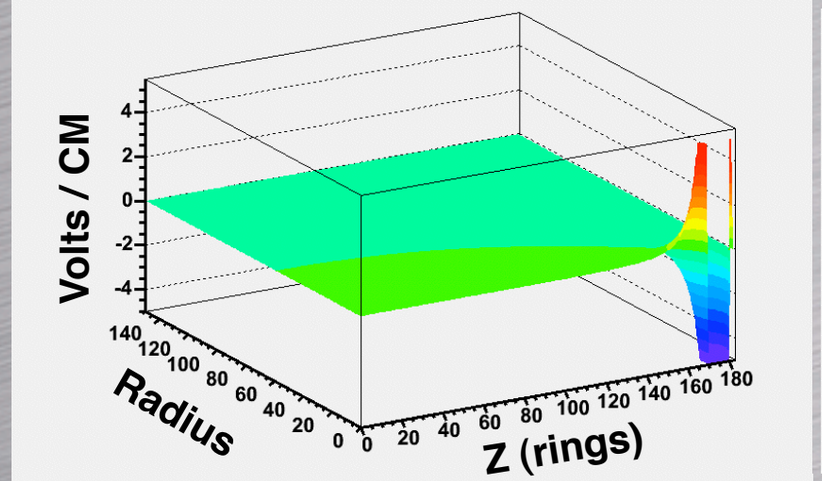


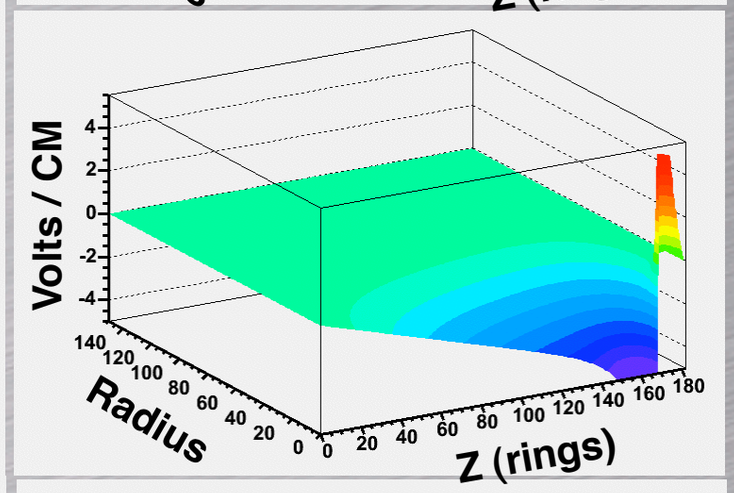
TPC: a *better* short in the IFC

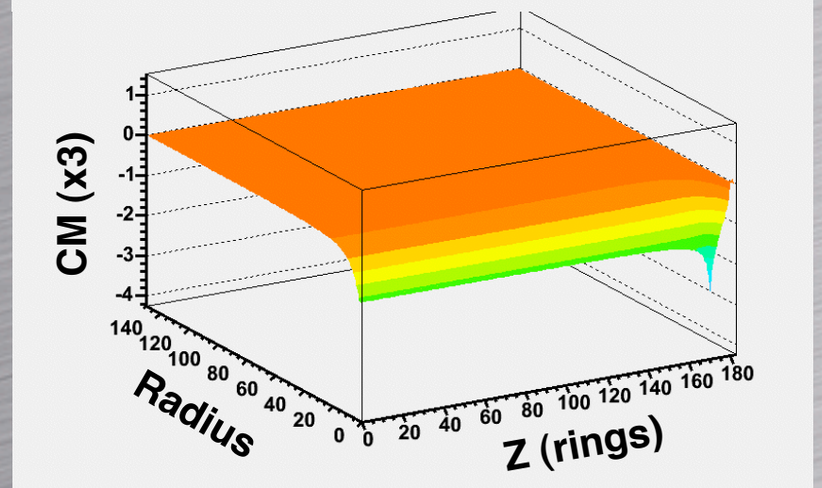
- External resistor restores IFC current
- Distortions stay at small radii
- Clusters much less sensitive

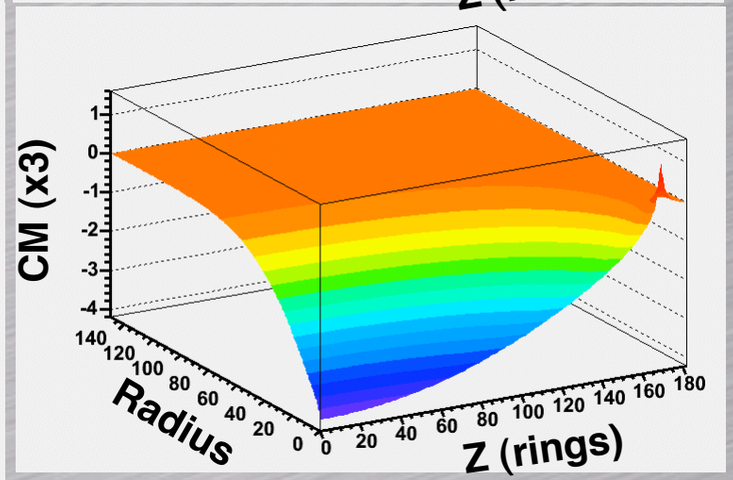






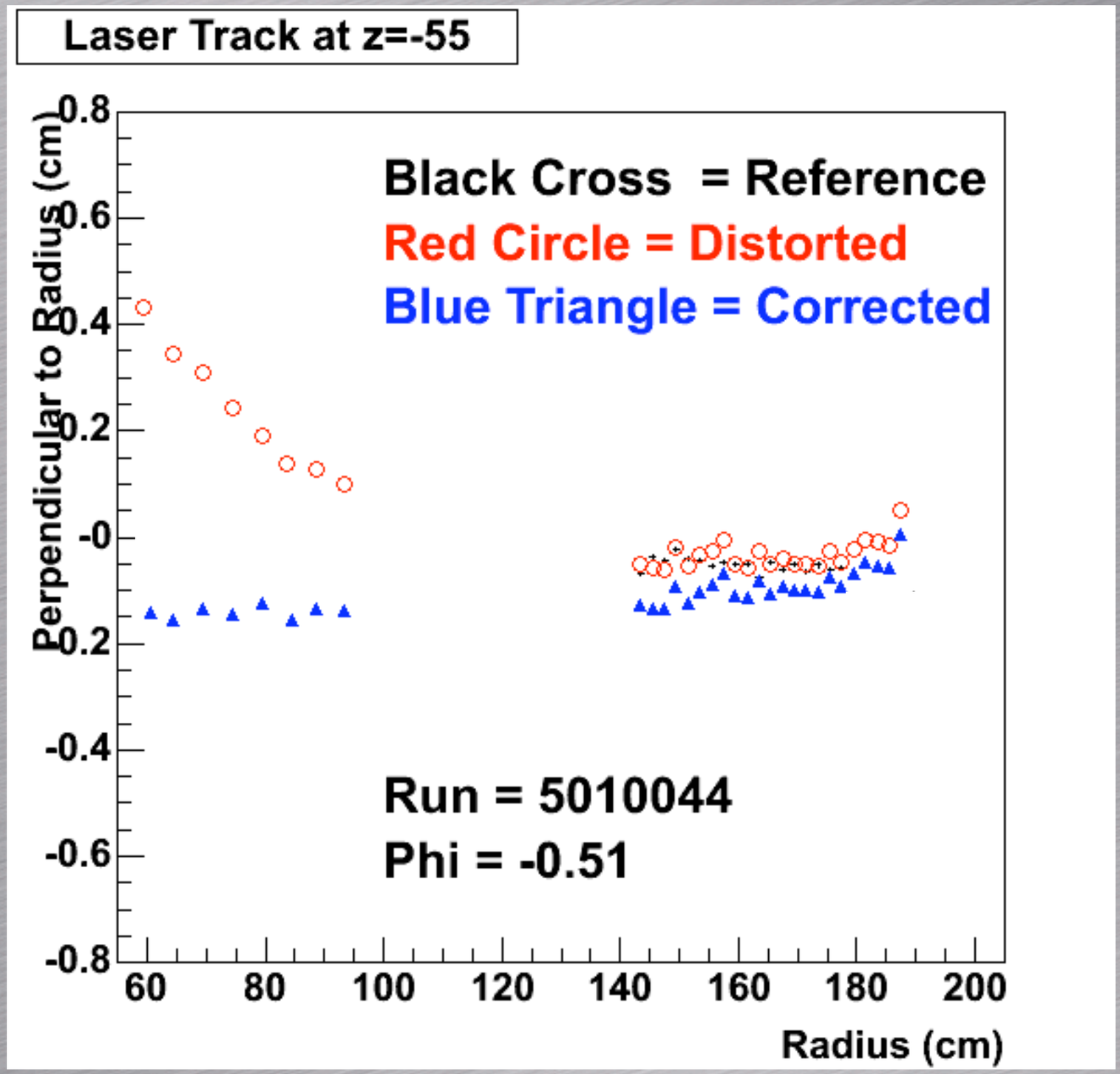






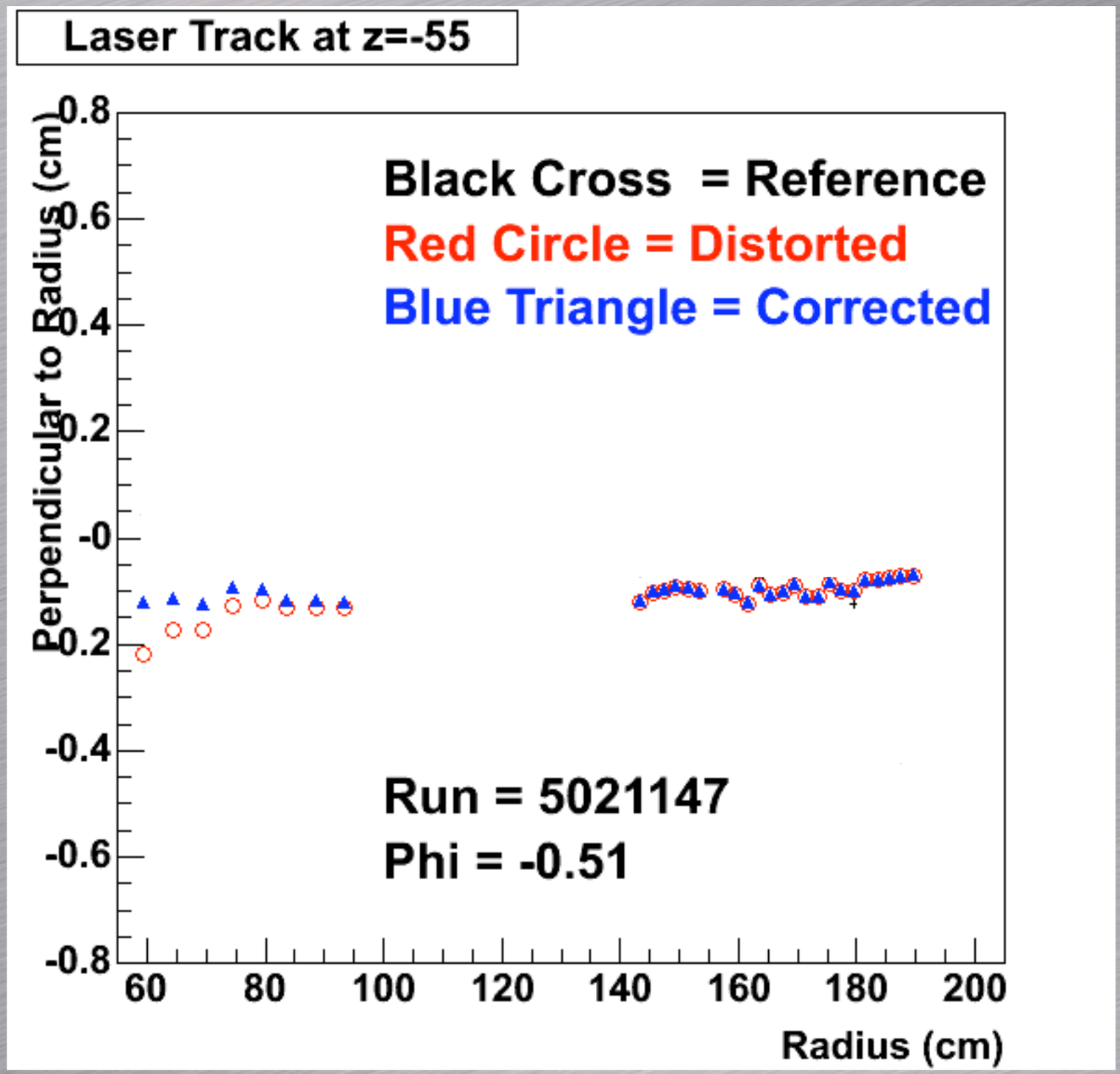
TPC: before & after

- LASERS:
  - Distortion at the level of several mm in the heart of the TPC
  - Down to ~1mm after resistor insertion



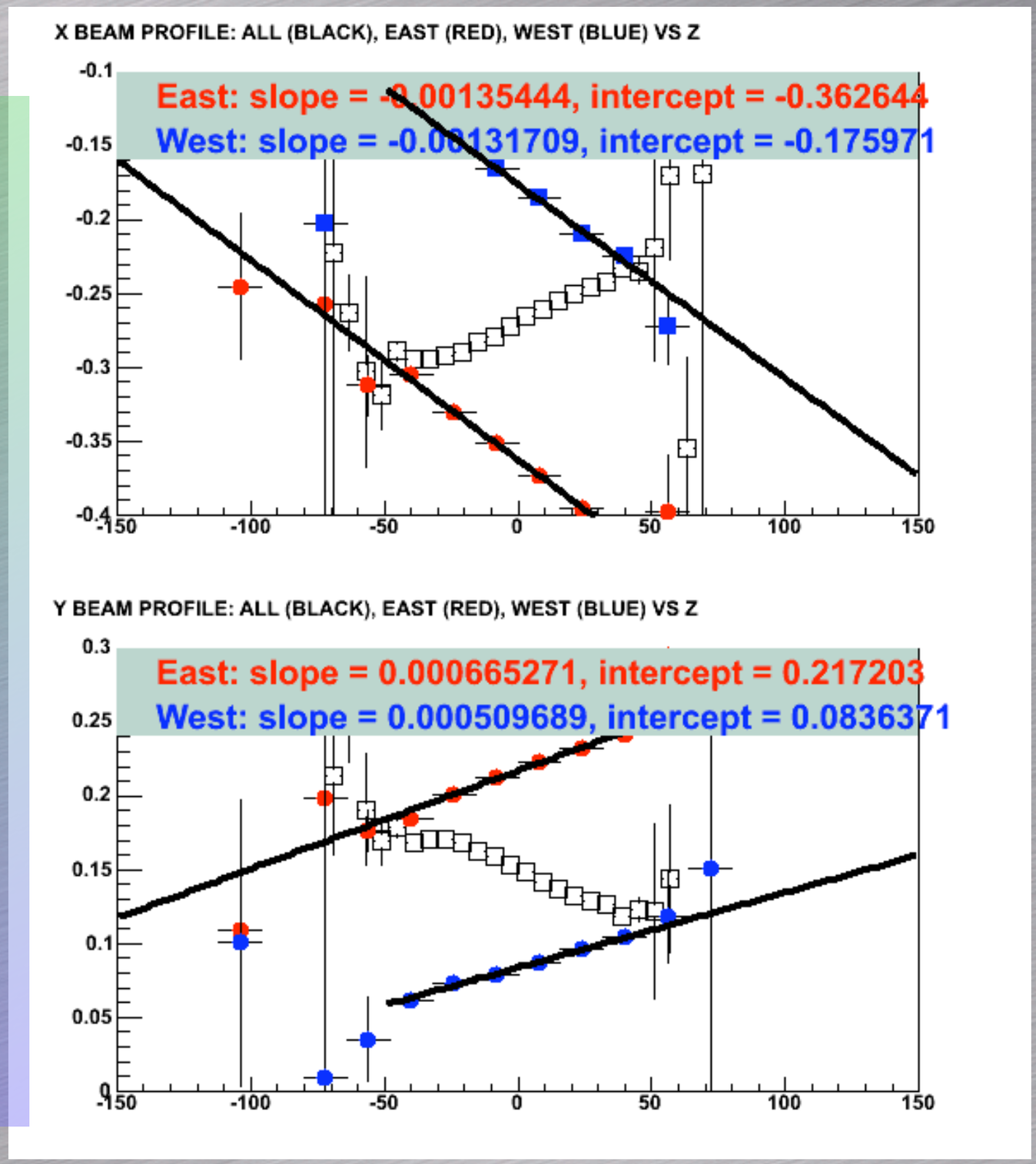
TPC: before & after

- LASERS:
  - Distortion at the level of several mm in the heart of the TPC
  - Down to ~1mm after resistor insertion



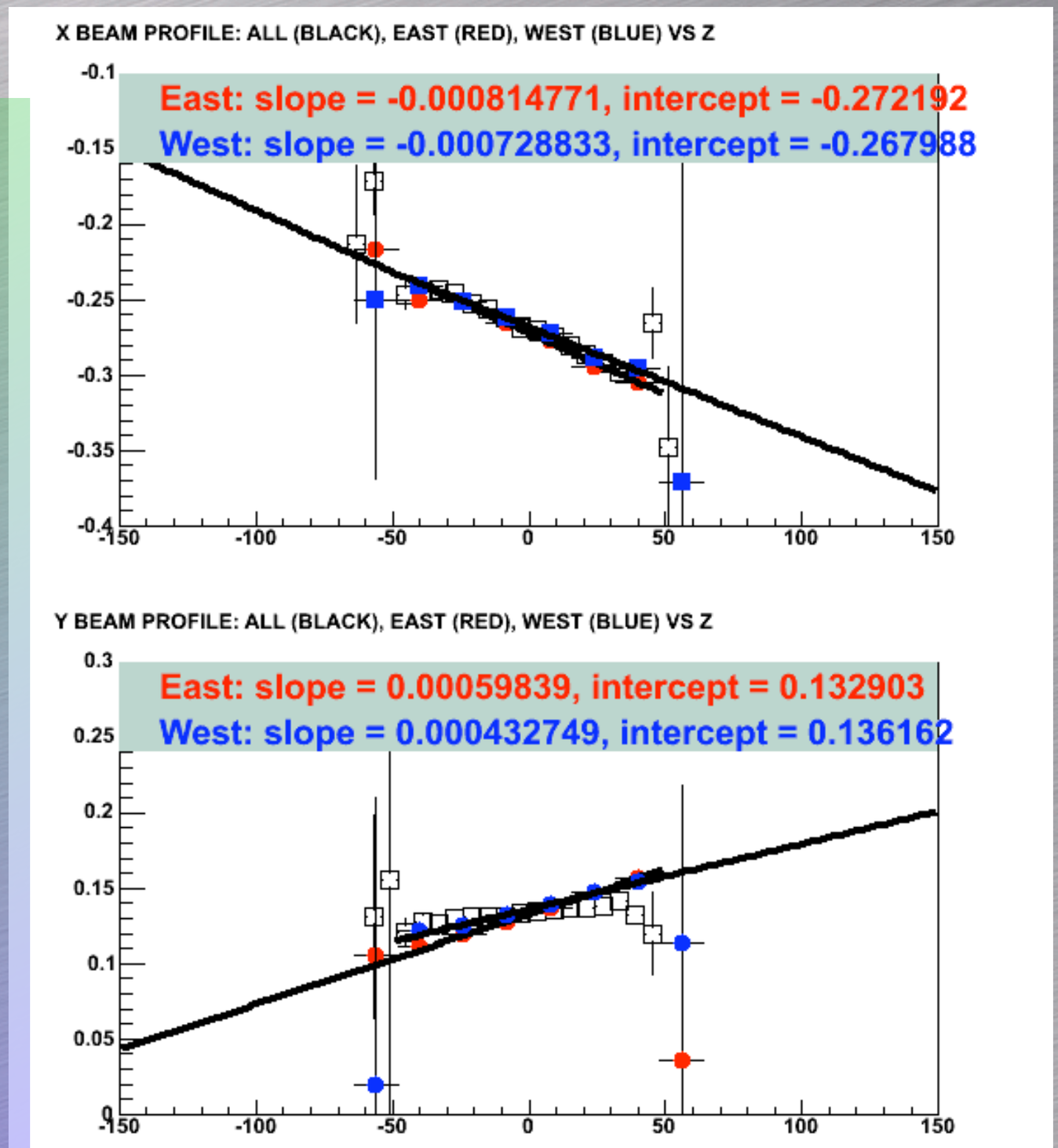
TPC: Field-related distortions

- TPC Twist, IFCShift, Clock, SpaceCharge



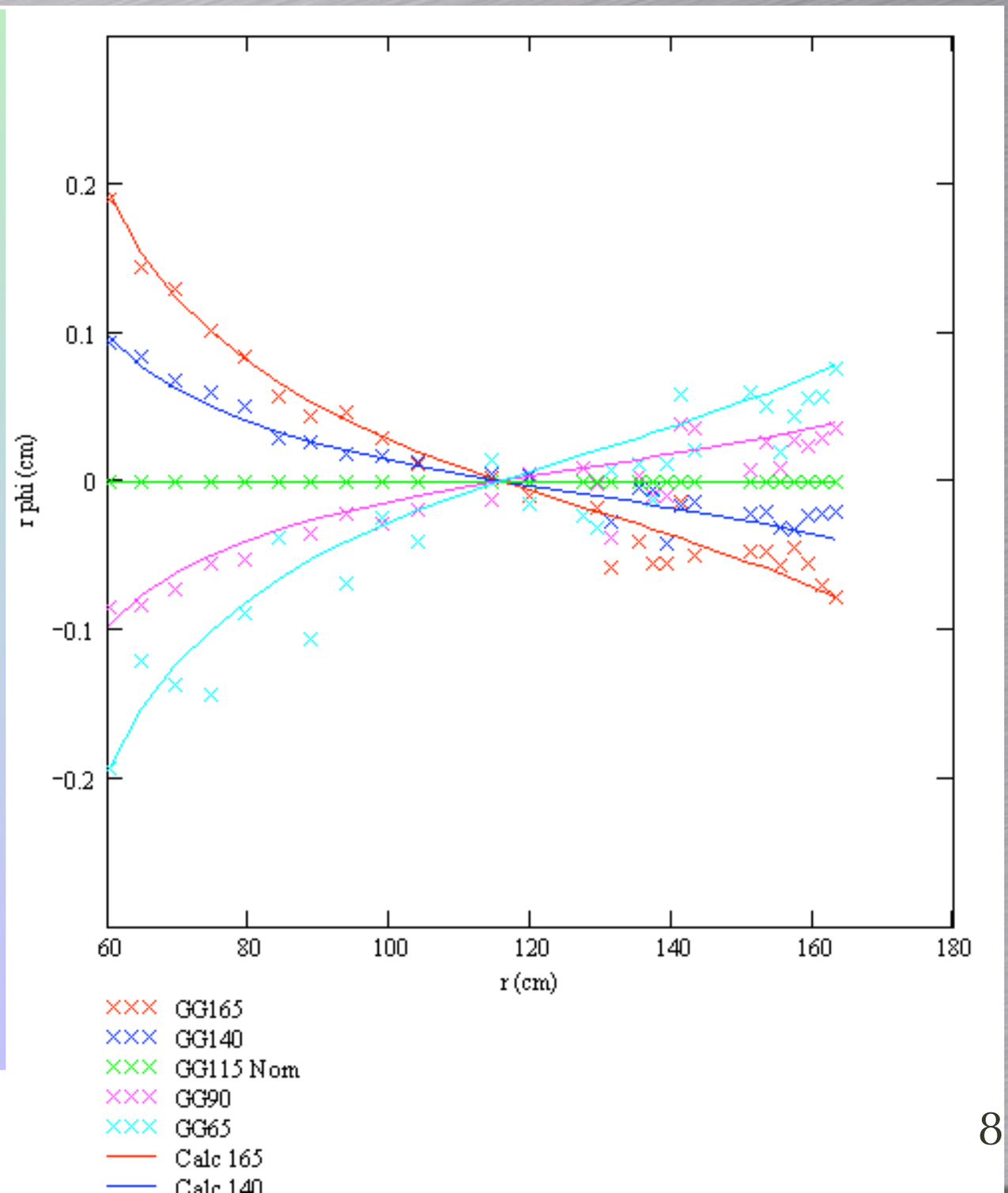
TPC: Field-related distortions

- TPC Twist, IFCShift, Clock, SpaceCharge



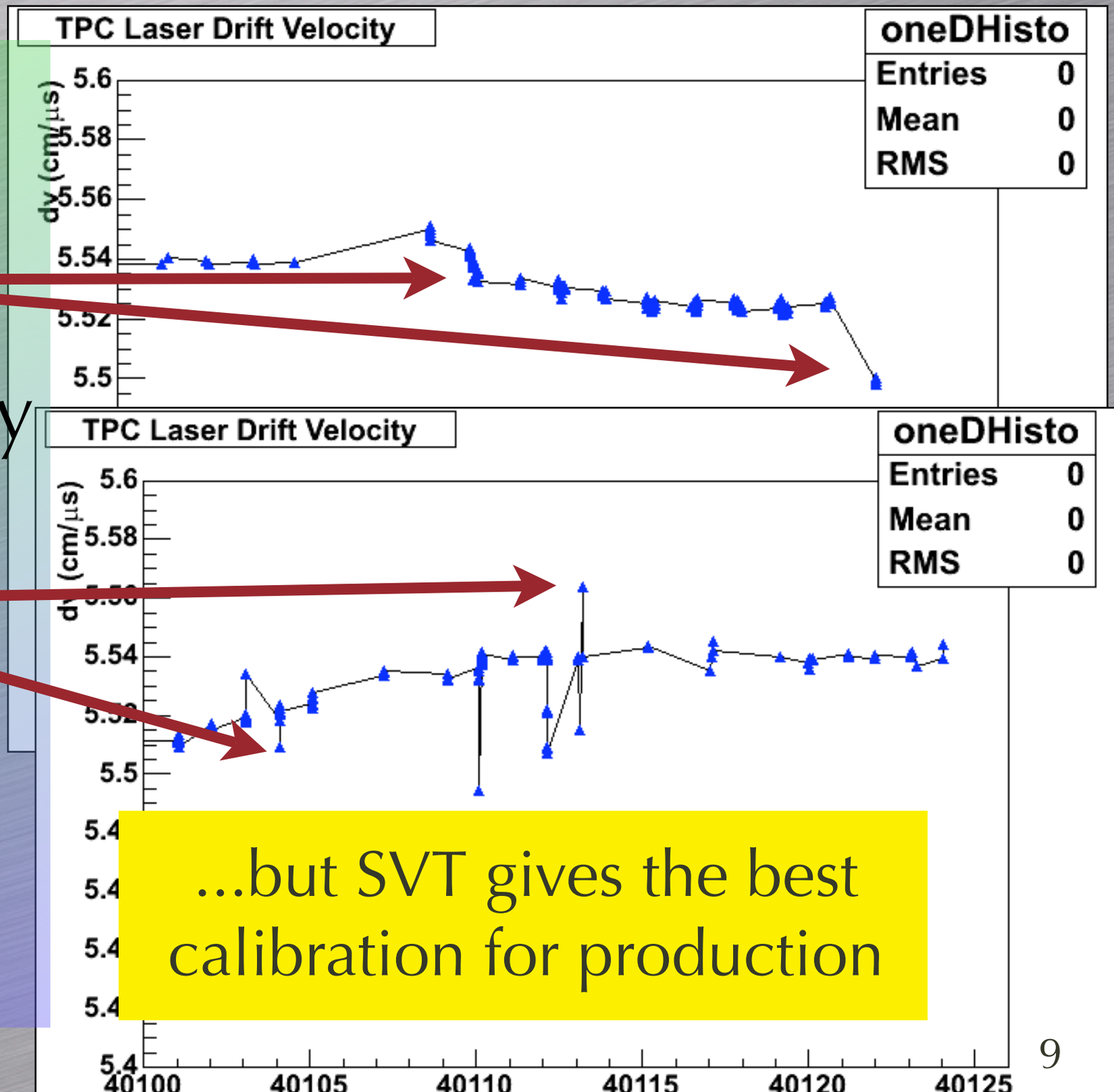
TPC: Field-related distortions

- TPC Twist, IFCShift, Clock, SpaceCharge
- Need to nail down omega-tau
  - Would be good to get measurements in r-phi and r directions
  - Have a couple techniques we're trying



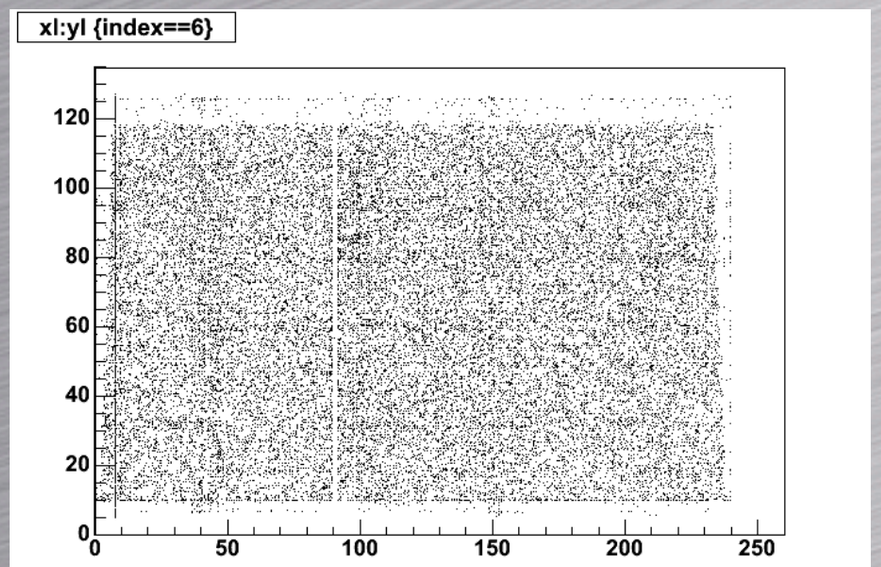
TPC: T0s & drift velocities

- Mutltiple purges of the TPC gas this year
- Still examined by a person for outliers
  - Would like to get this process automated from fast offline!



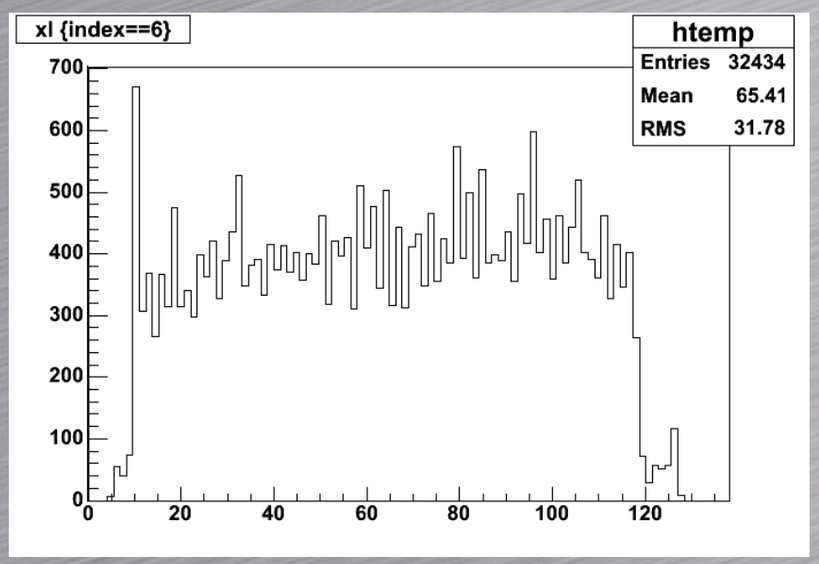
...but SVT gives the best calibration for production

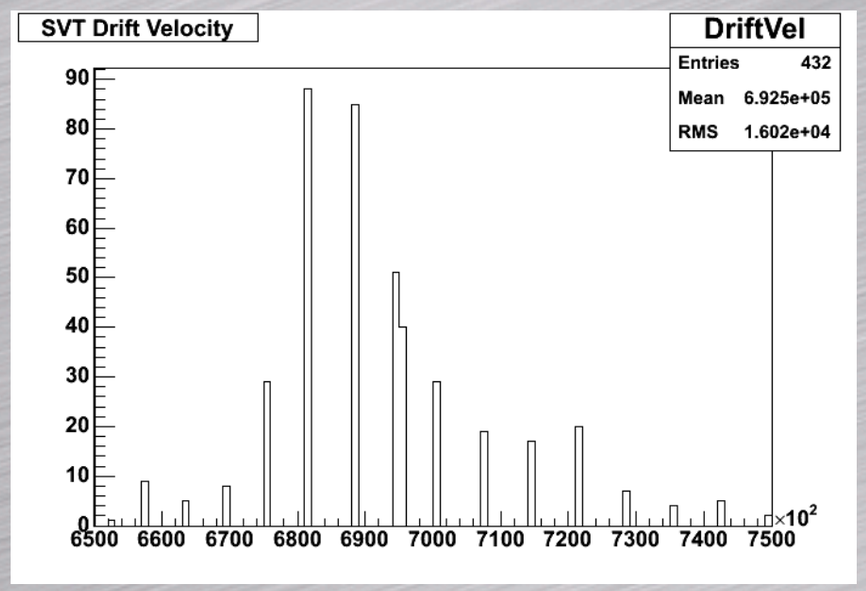
SVT: First Drift Velocity Calc.



Can see clearly the start and
end of the drift.
Good T0 and Drift Vel. estimate.

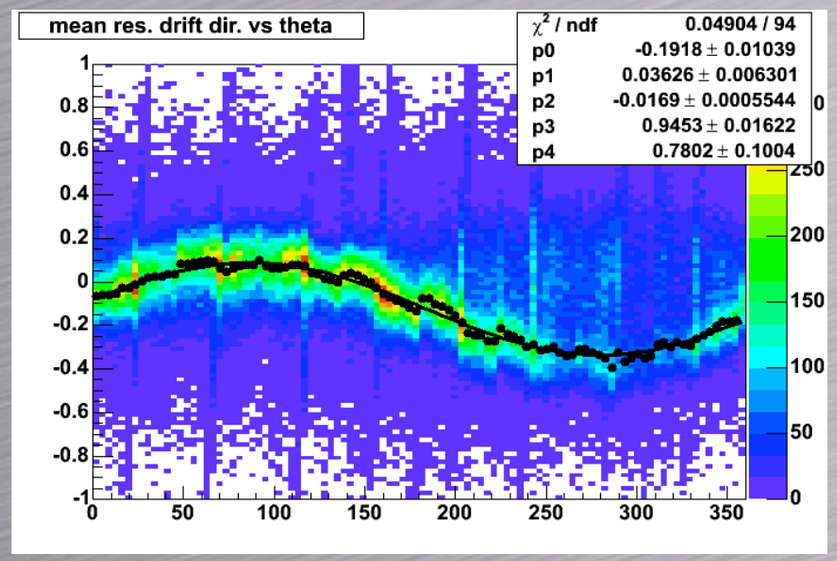
This calc. gives discrete value.
Most hybrids clustered at same value



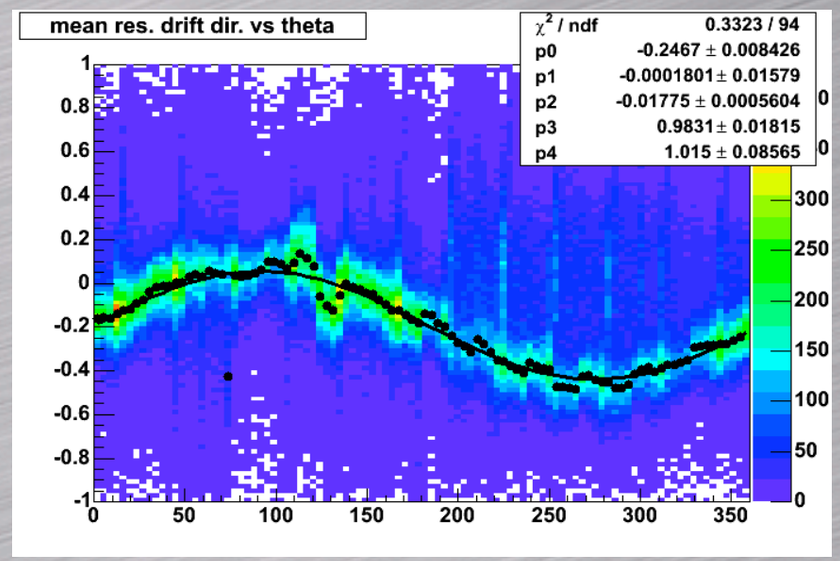


SVT: First Alignment

Barrel 1



Barrel 2



$\theta = \text{atan}(y/x)$

mean residual = $-\Delta x * \sin(\theta) + \Delta y * \cos(\theta) + \Delta\theta * \text{barrel\_radius}$

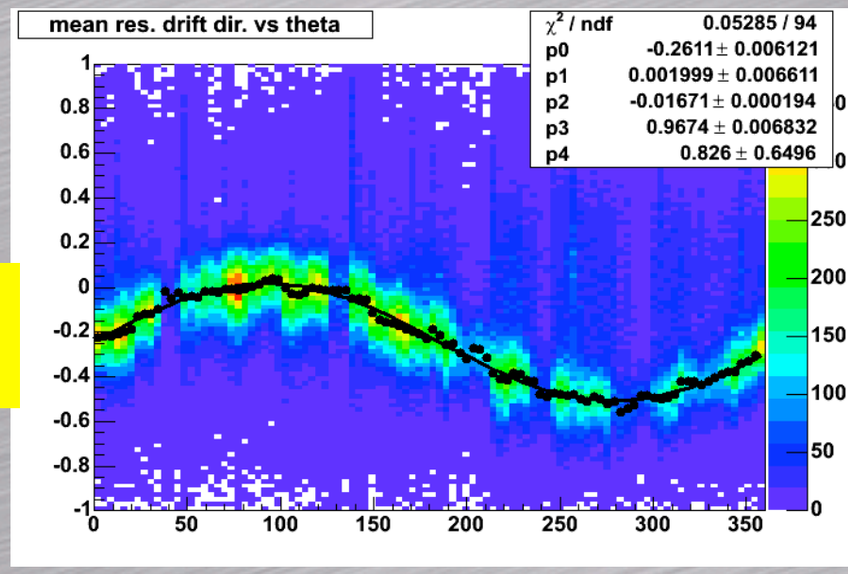
Δx and Δy are shifts in X and Y

$\Delta\theta$ is a rotation on the XY-plane.

Barrel 1: $\Delta(x) = 0.19$, $\Delta y = 0.036$

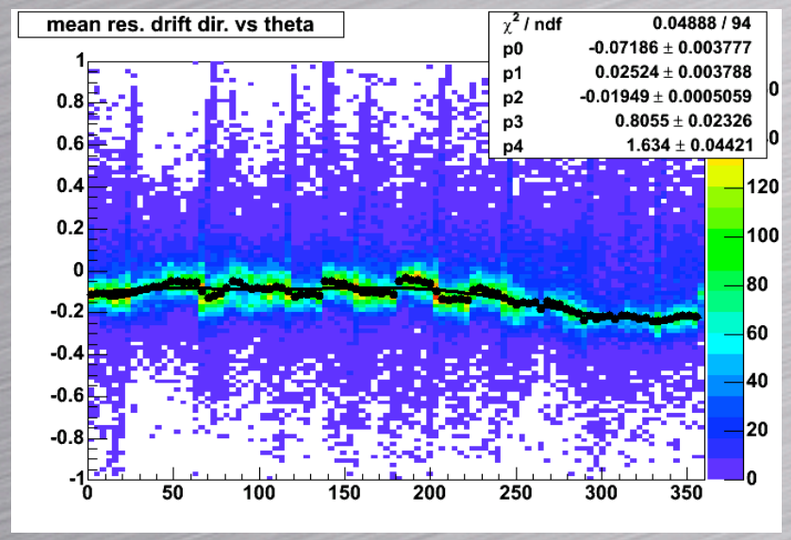
Barrel 2&3: $\Delta x = 0.25$ $\Delta y = 0.0$

Barrel 3

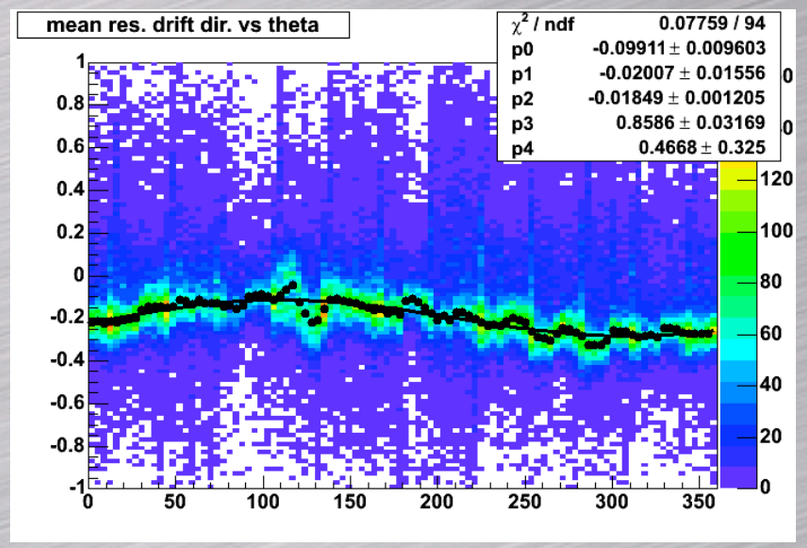


SVT: First Alignment II

Barrel 1



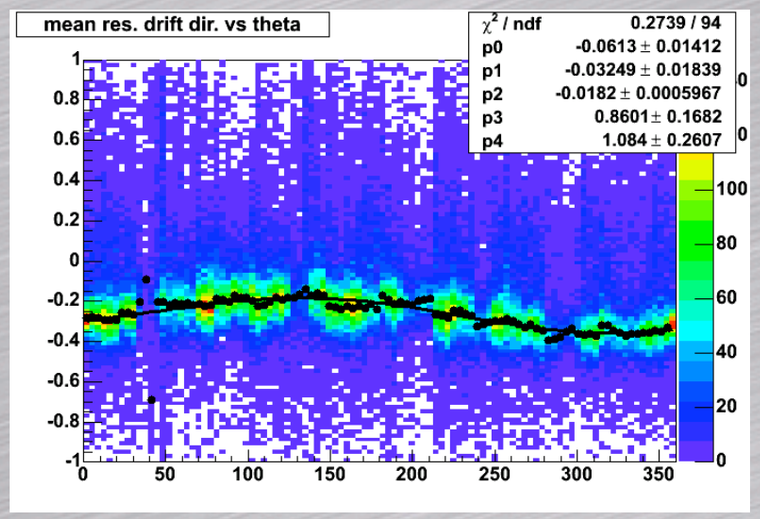
Barrel 2



After applying 2 mm shift in x

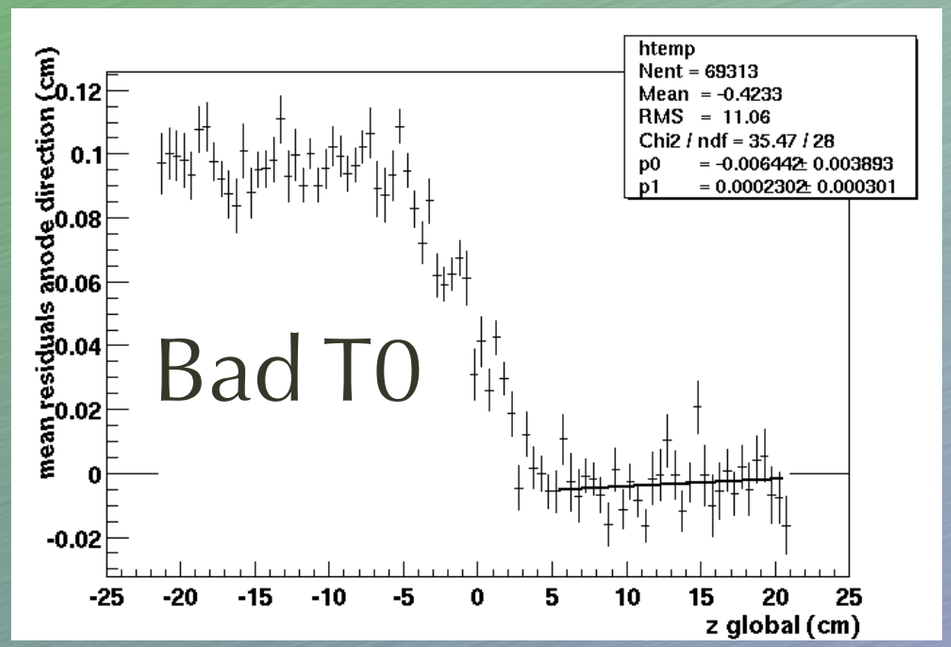
Seems to still be a 700 μm shift
Seems to be some ladder structure now apparent
Being looked at.

Barrel 3



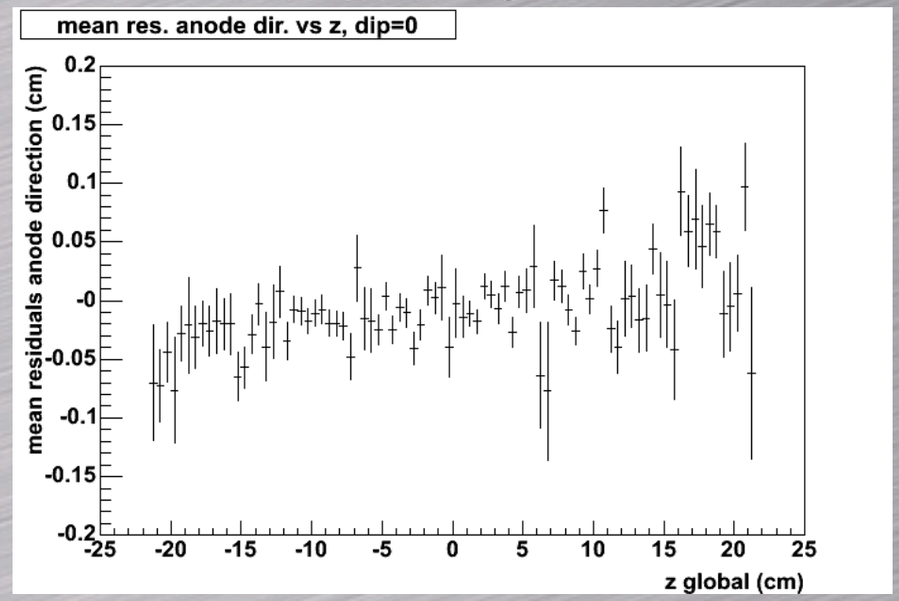
SVT: Z-direction

- Looks pretty good
  - Including TPC T0

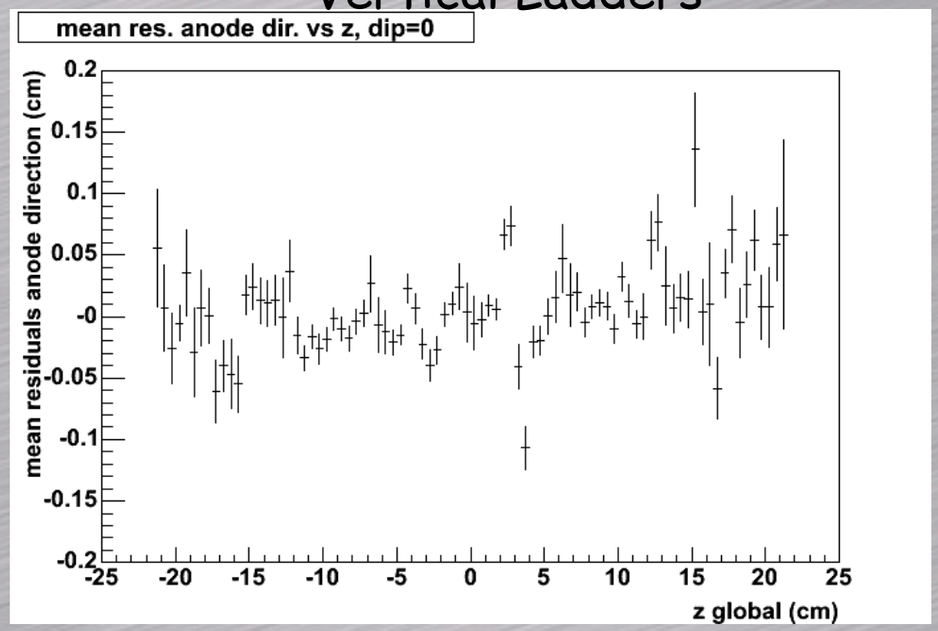


- Awaiting a less-distorted TPC...

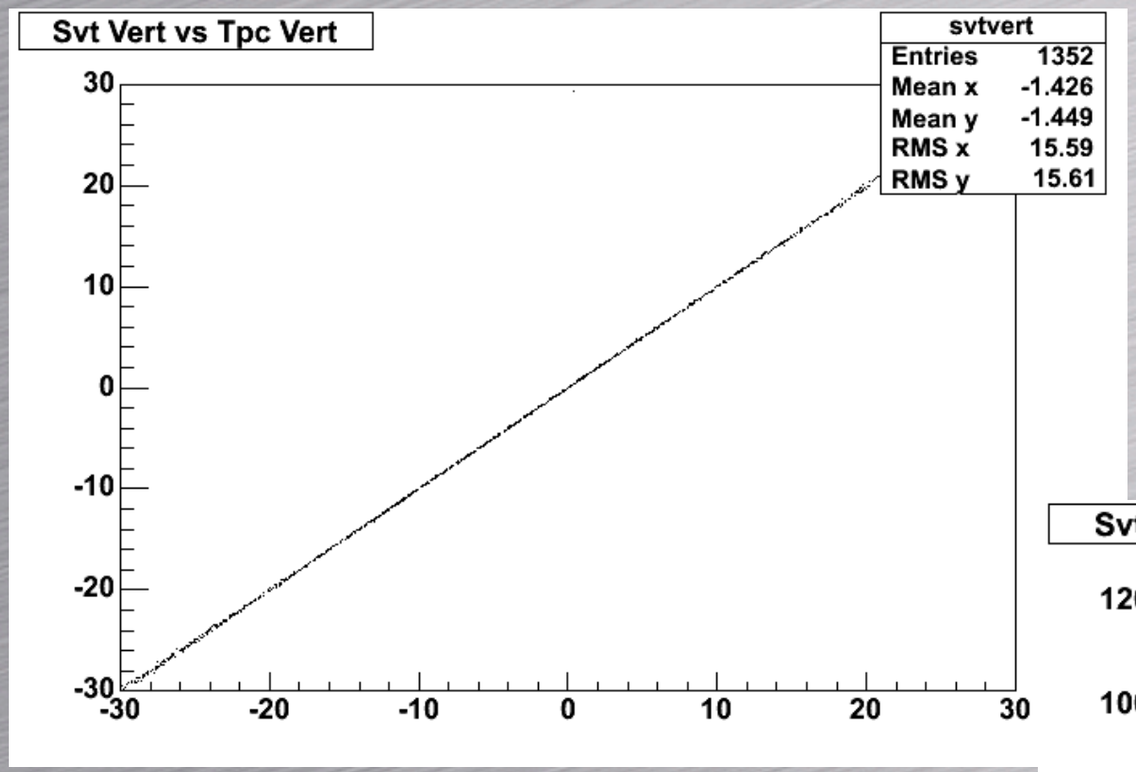
Horizontal Ladders



Vertical Ladders

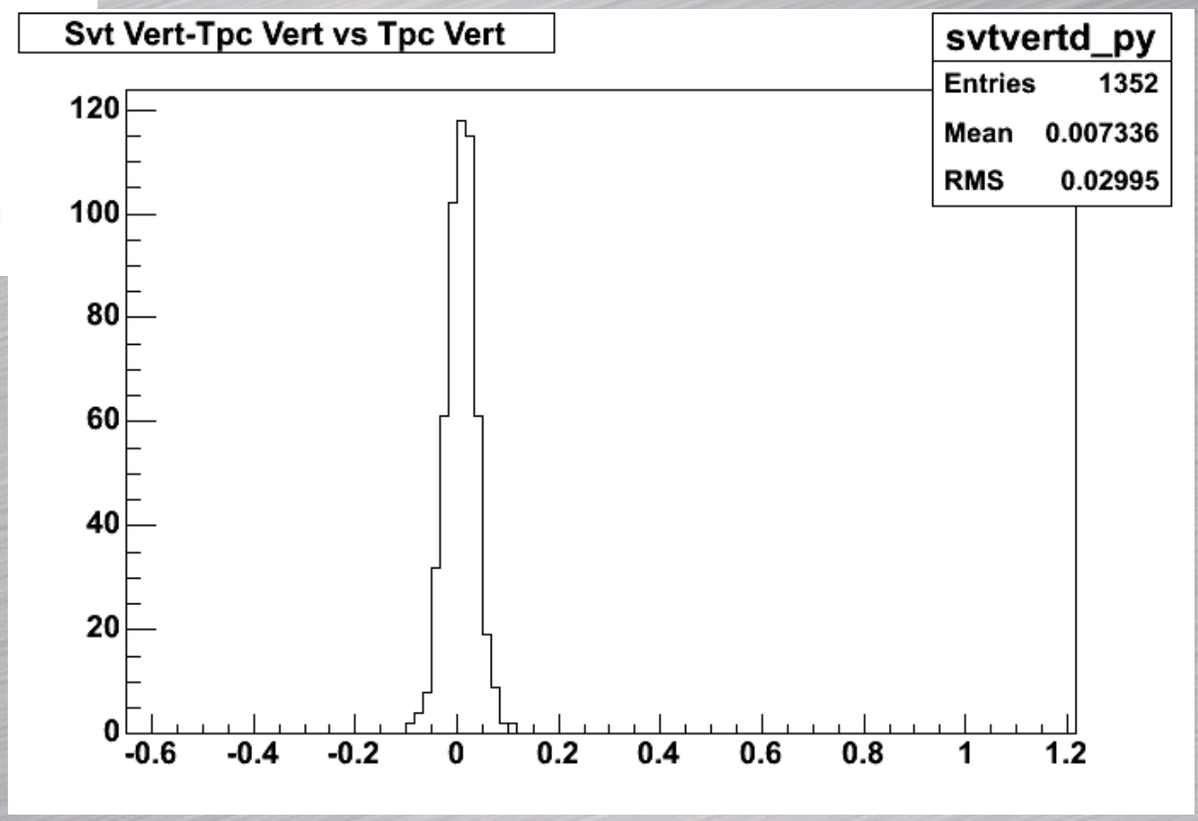


SVT and TPC Z Vertex Correlation

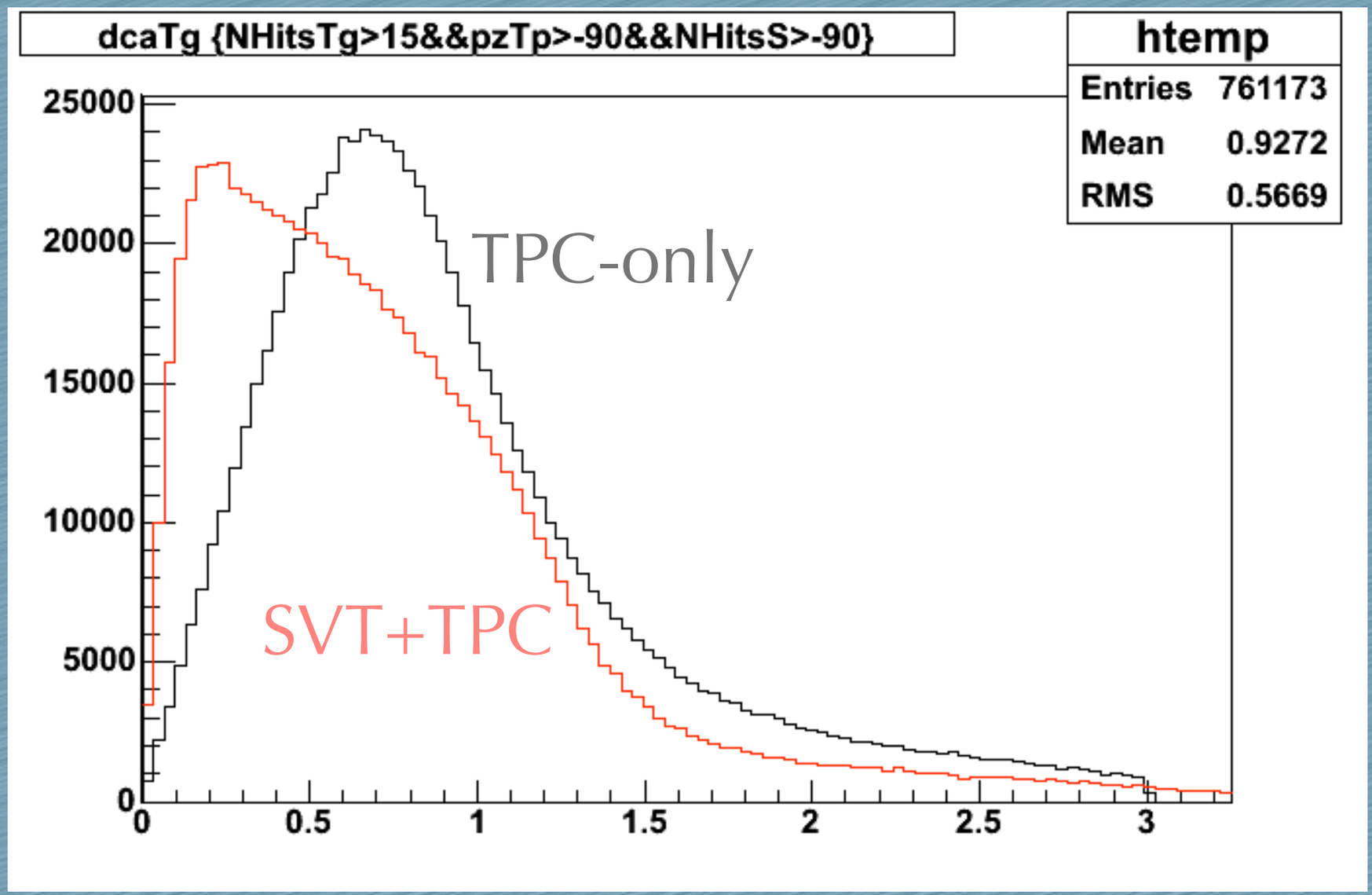


~1350 events run 5029093
(Central trigger)

Beautiful!
No Apparent shift in z between TPC and SVT

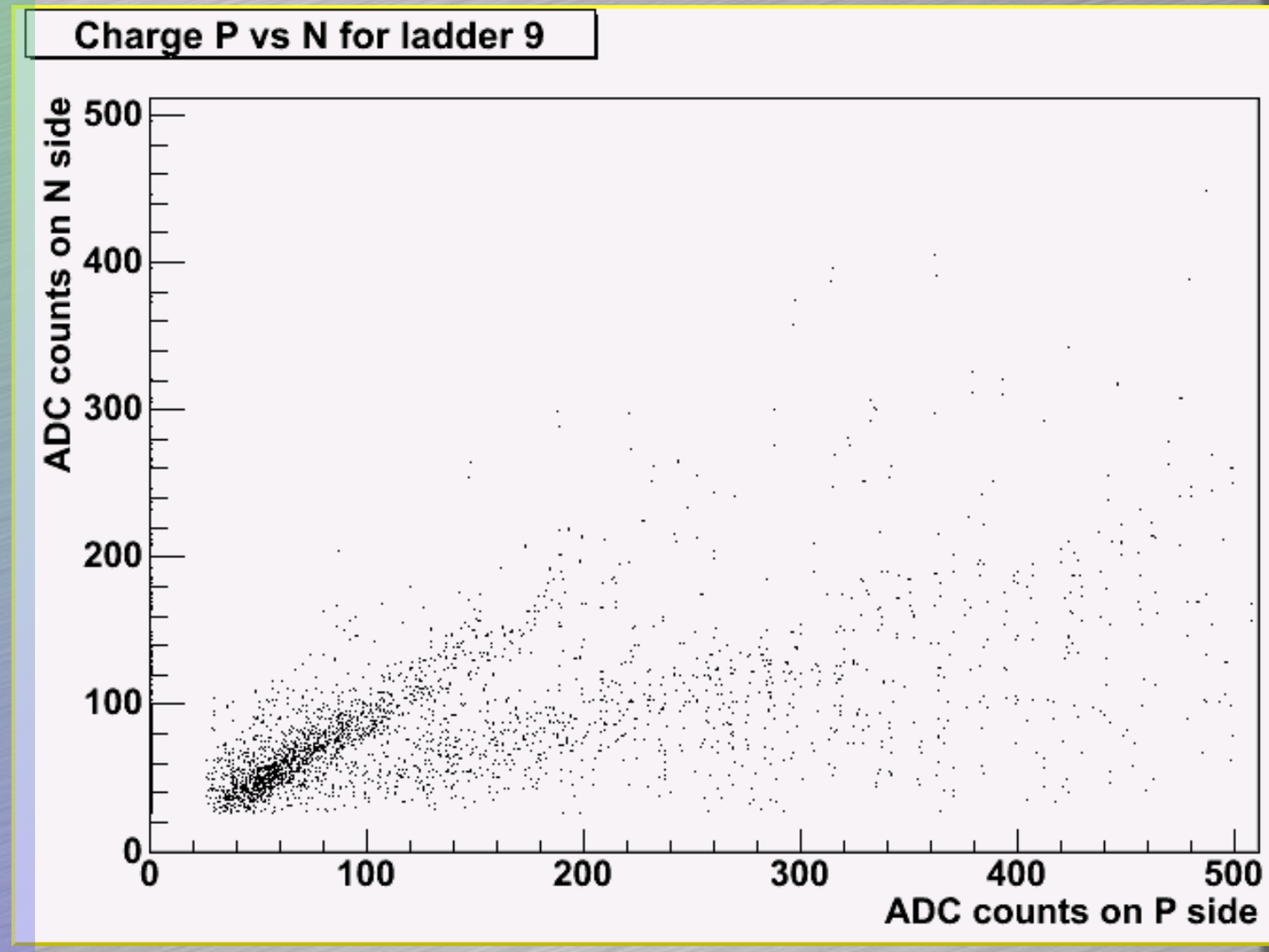


SVT and TPC Z Vertex Correlation



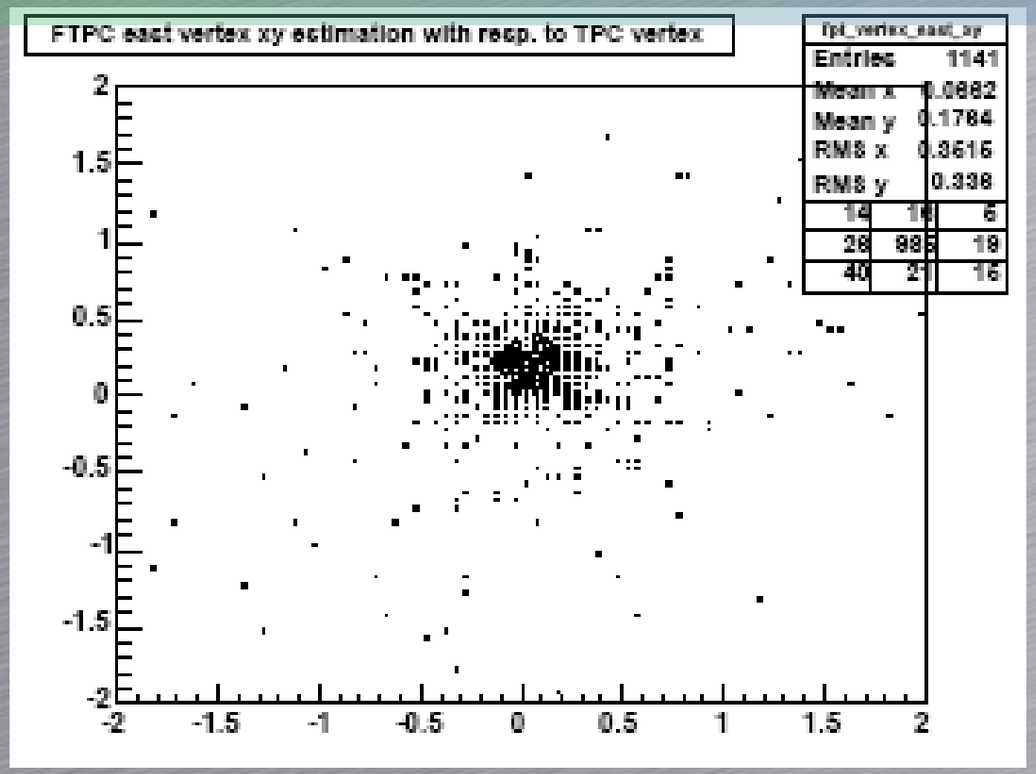
SSD

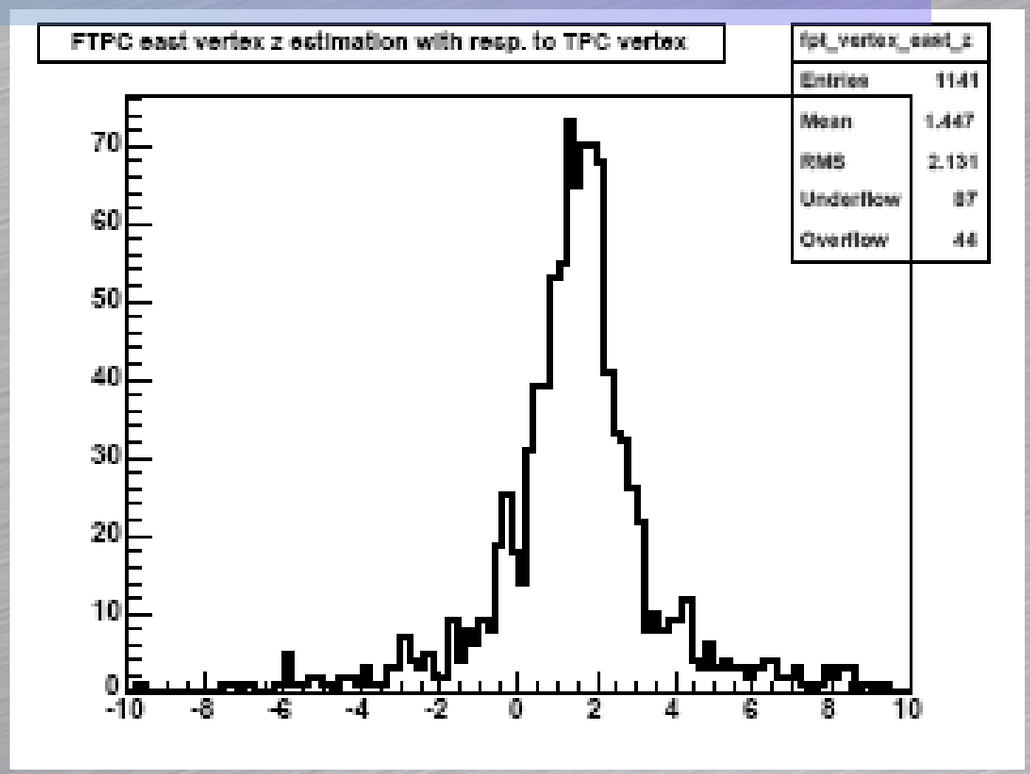
- working on cuts for cluster matching
- alignment
- dEdx
- need to get into chain (already set for ITTF inclusion)



FTPC

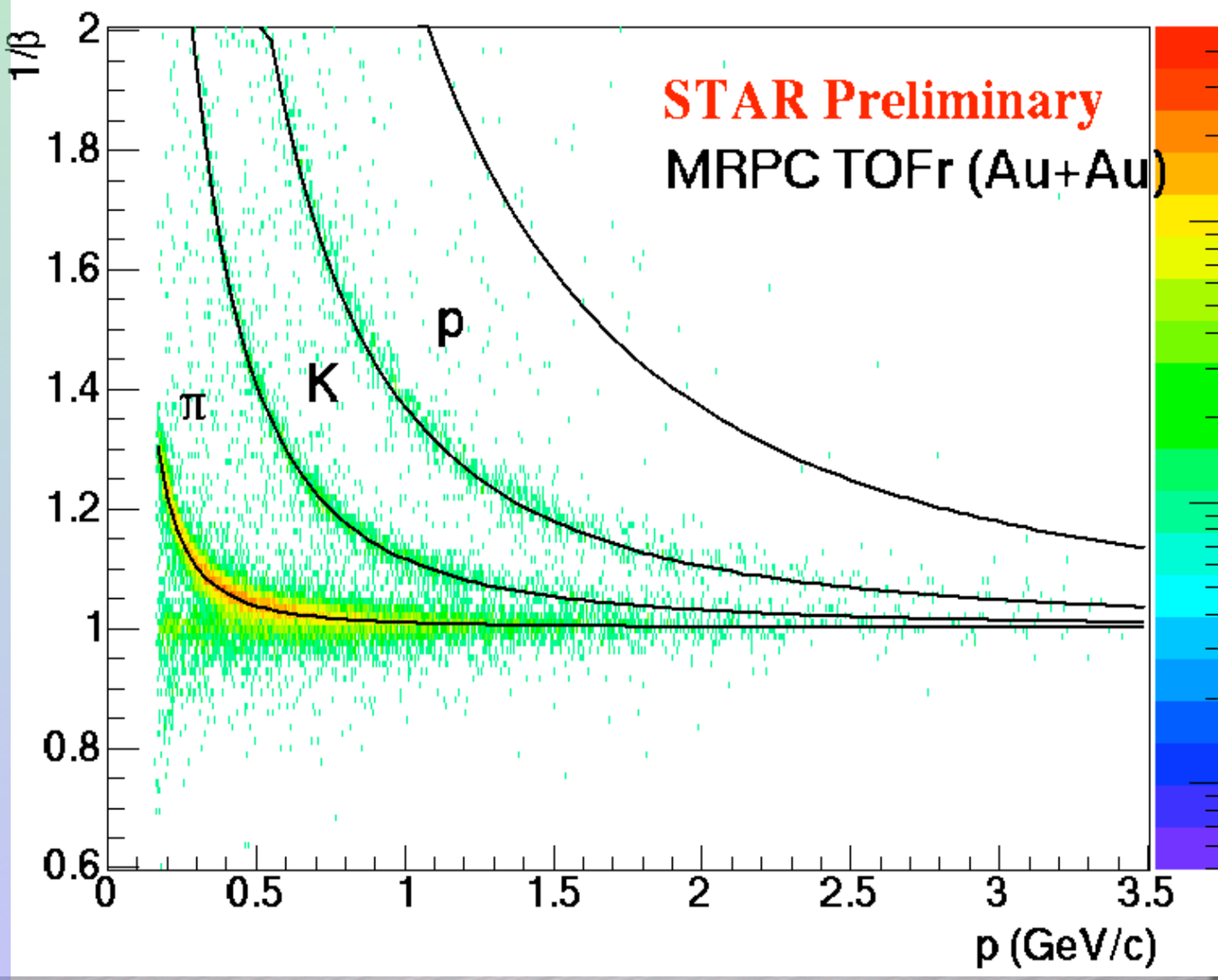
- Tuning of HVs done (again)
- Using 2003 calibrations (sufficient)
  - Awaiting a better-calibrated TPC to tune
  - Alignment, deflection angle, etc.





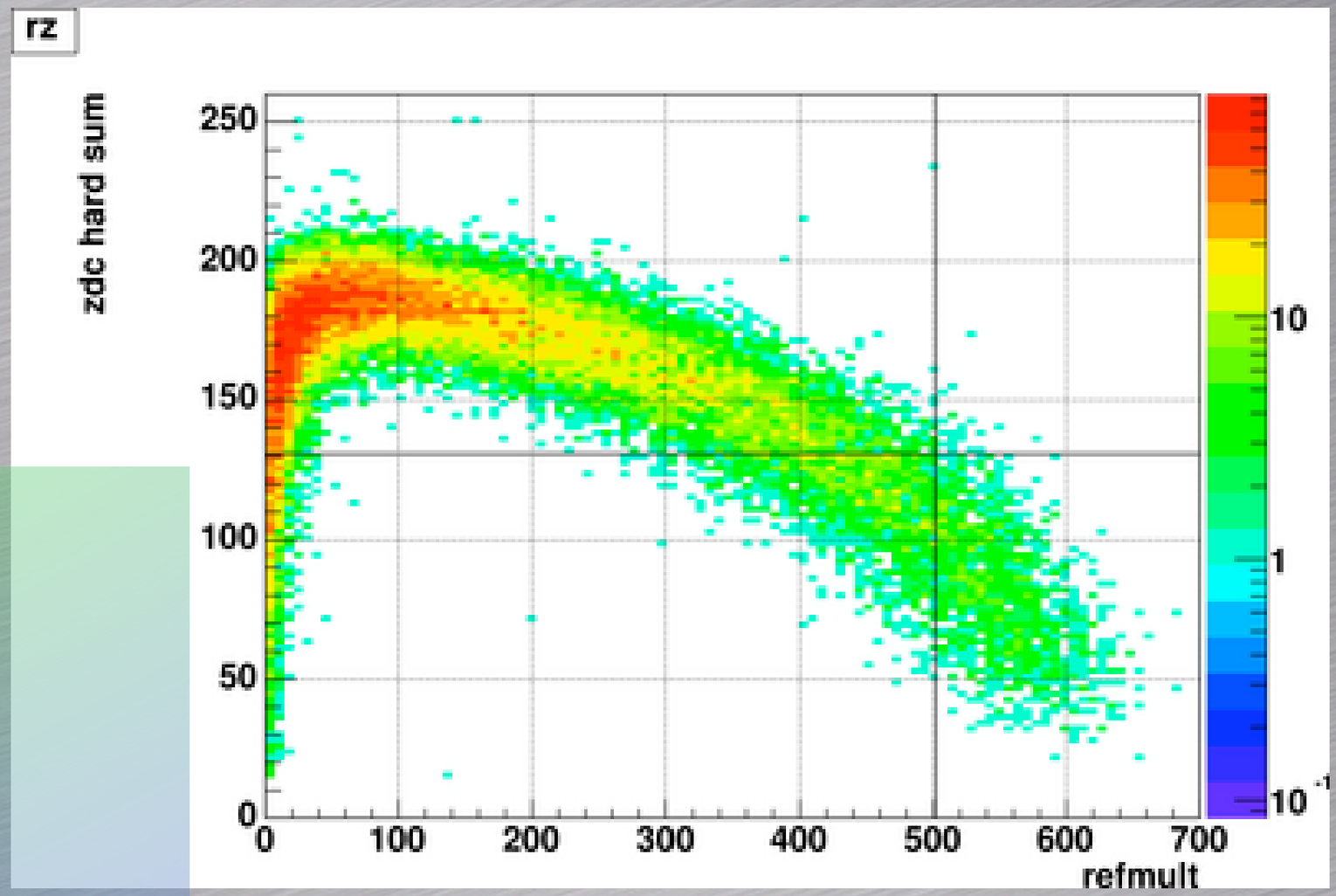
TOF

- Important slewing parameters
  - Number of calibration constants feasible this year...what about next?
  - ...and not just TOF...
- Achieving 122ps resolution (includes 30ps start time resolution)



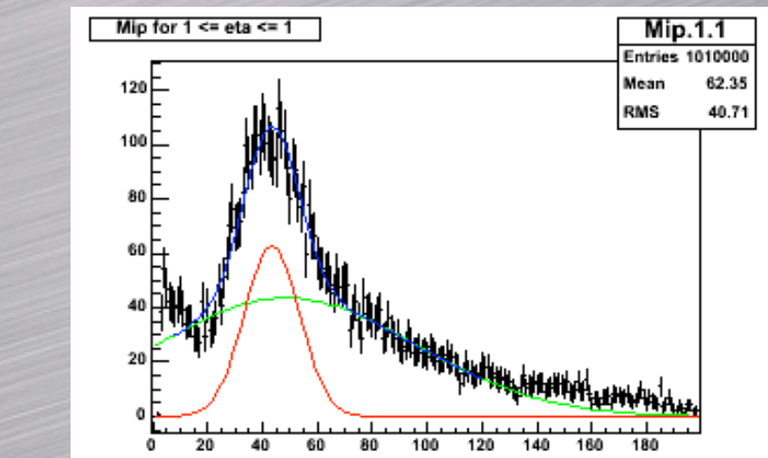
Trigger Detectors

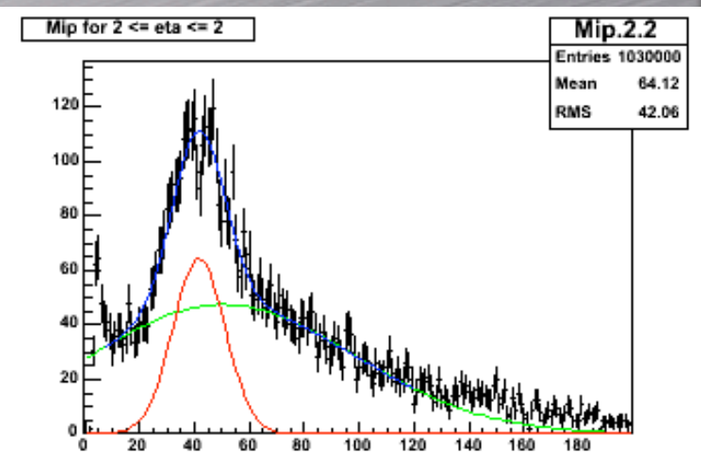
- CTB
- ZDC (+SMD)
- BBC
  - timing for Z-vertex

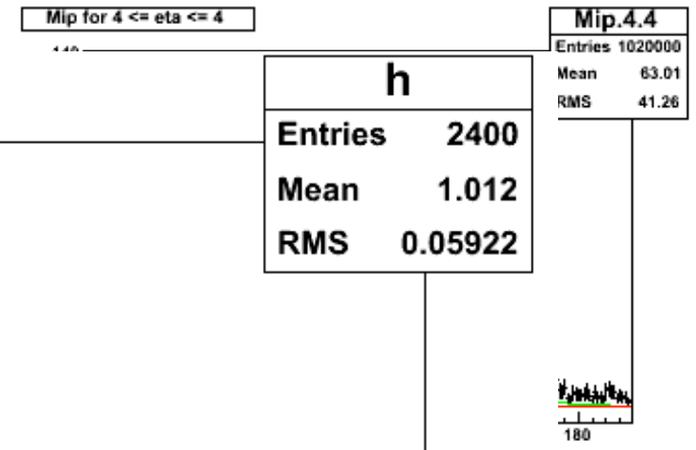


BEMC

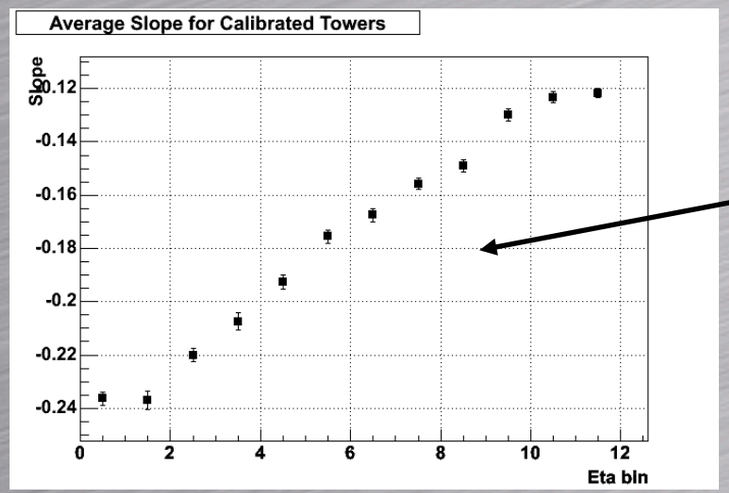
- Calibrations underway
  - Gain-matching between towers based on MIPs







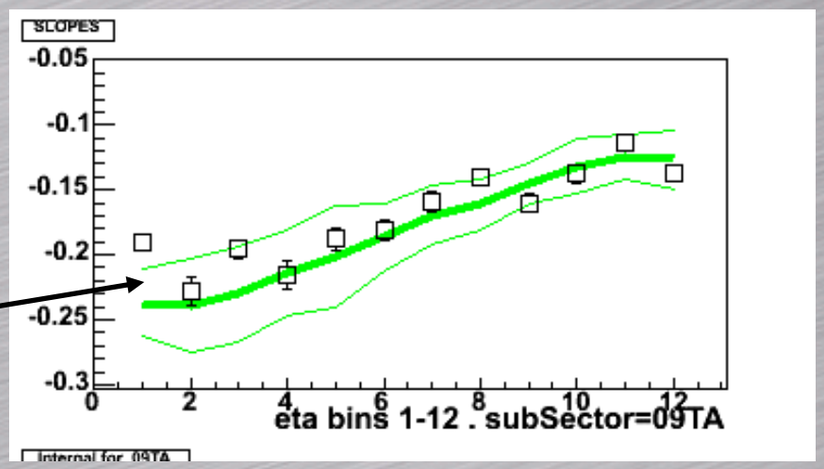
EEMC



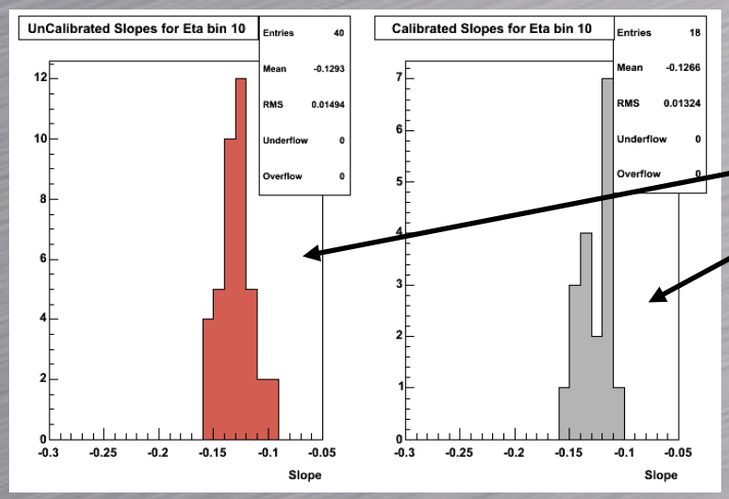
Sectors 5-8 HV changed from ’03 to give constant Et vs. h using LEDs.

Absolute scale from p^0s.

With ’04 data establish universal slope vs. h



New sectors matched to universal curve.



Slope

8 new sectors set HV to match slope of sectors 5-8 vs. h. 4 iterations

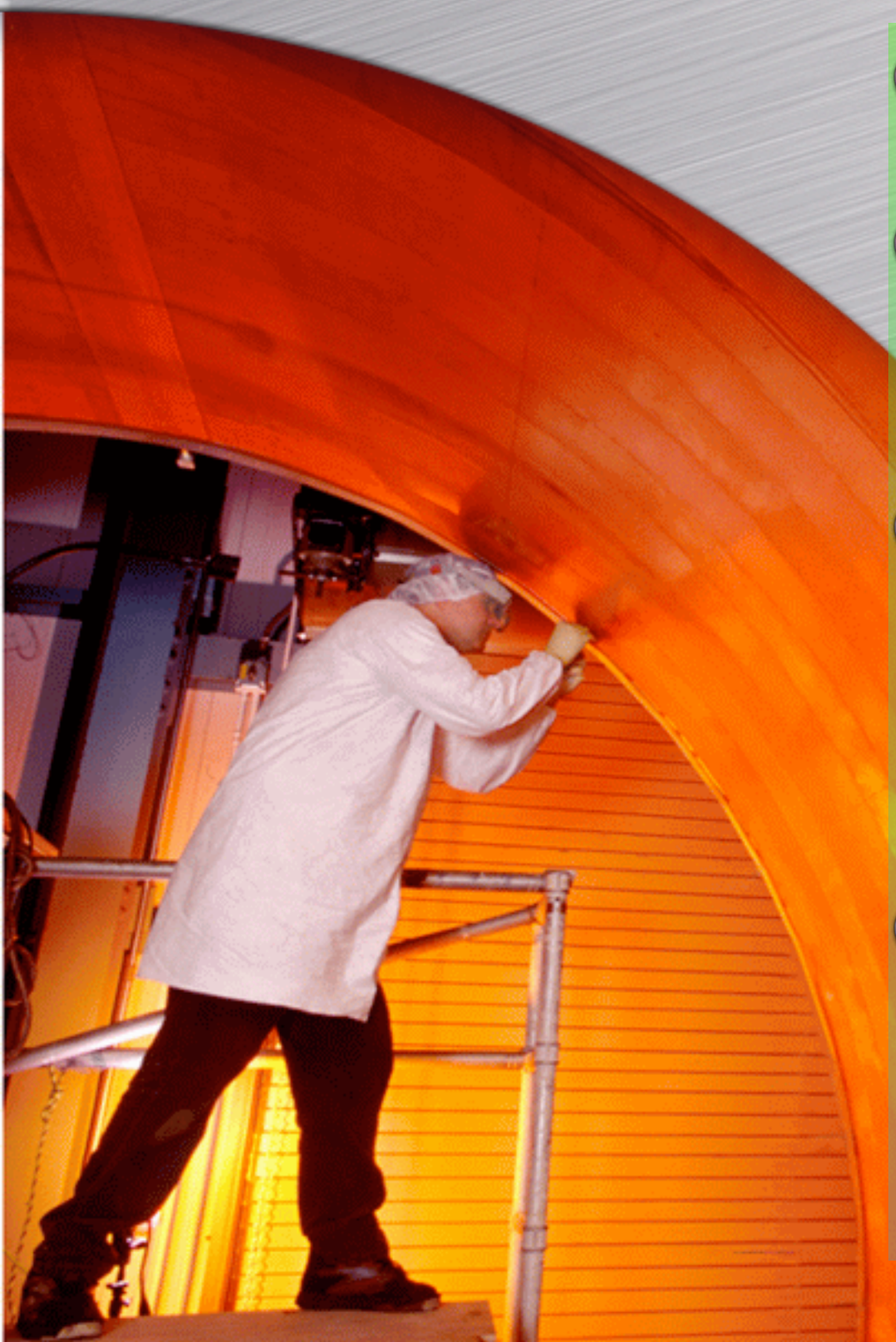
Hardware gains matched to +/-20%

Will repeat p^0’s, mips and electrons

Add p^0’s with SMD position and E sharing

Extend electrons in h

Summary



- Lots to do
- Dependencies on getting the TPC calibrated
- ...but we could end up with a better-calibrated TPC than ever!
- Patience is needed - we don't expect to be done next week