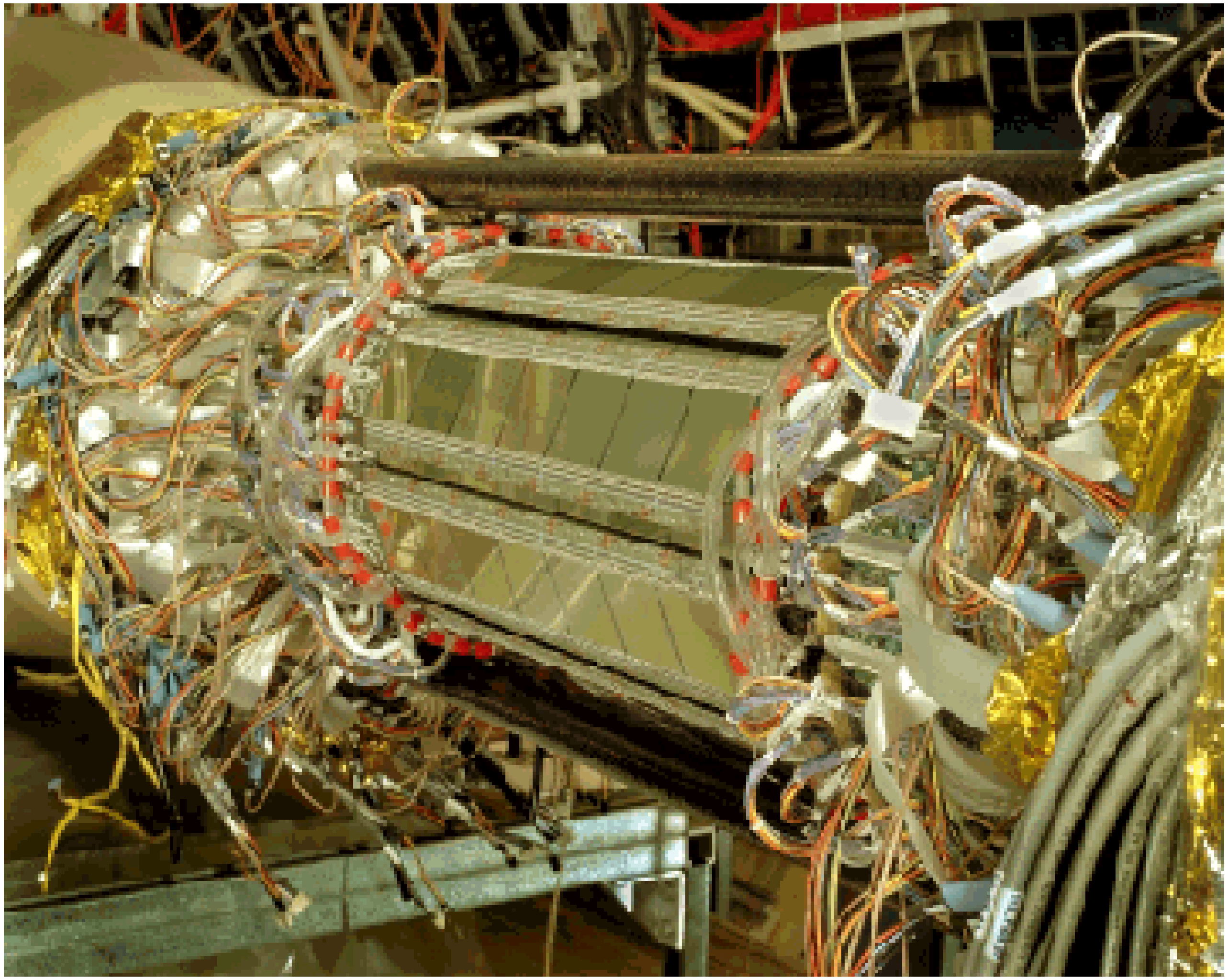
SVT Analysis/Status Update

Jun Takahashi – University of Sao Paulo



SVT STAR

STAR Collaboration Meeting, Nantes, July2002

SVT Hardware Status

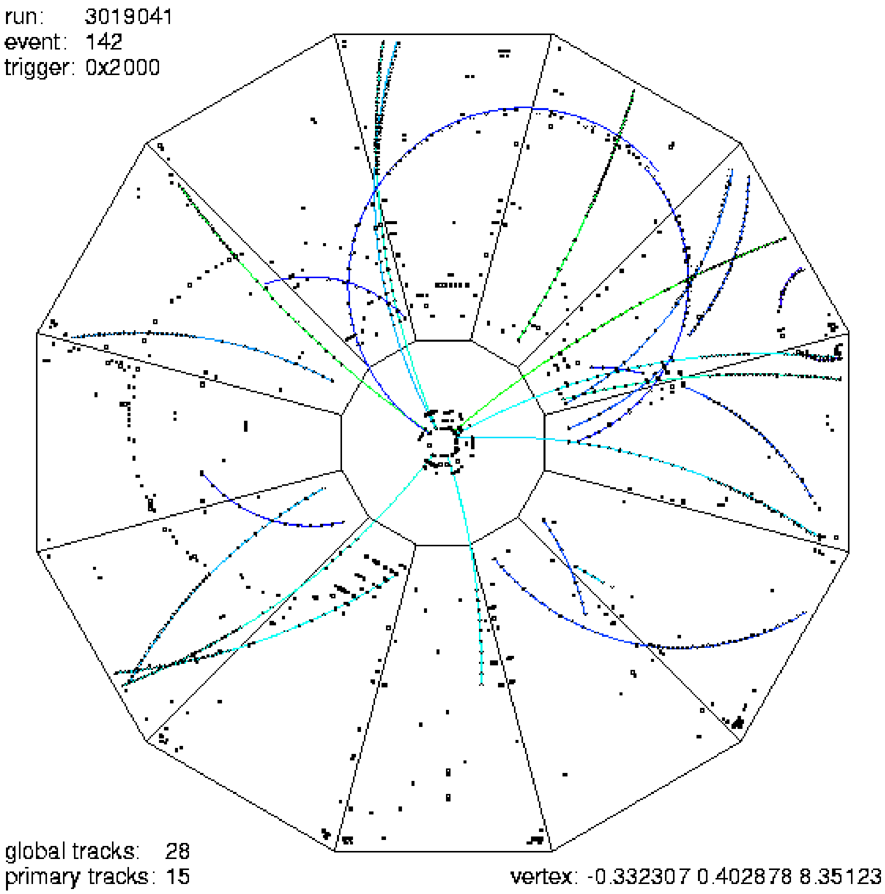
In the 2001 run:

- *Full SVT was installed.*
- *90% of the readout channels were operational.*
- *During Au+Au run, we had ~1800e- rms noise.*
- *Fixed the HV Power Supply ground.*
- *During p+p, we had ~1200e- rms noise.*

For next RHIC run:

- *SVT is being repaired at the moment to increase active area.*
- *Expect installation in STAR by mid-August.*
- *Water system being modified to improve temperature control.*
- *New thermal switch in RDO box to avoid magnetic field effects.*
- *New RDO code being loaded which includes Level2 abort/accept.*

SVT – EST, Track to hit matching


run: 3019041
event: 142
trigger: 0x2000
global tracks: 28
primary tracks: 15
vertex: -0.332307 0.402878 8.35123

Projects TPC track to the outer barrel in the SVT and searches for a hit.

Refits the track with the found hit to project and search next SVT barrel hit.

Performs gradual search from high pt -> low pt tracks, eliminating hits.

Performs a final track kalman fit considering TPC+SVT hits.

In p+p, there is a maximum 70% matching efficiency.

Primary Matching “efficiency”

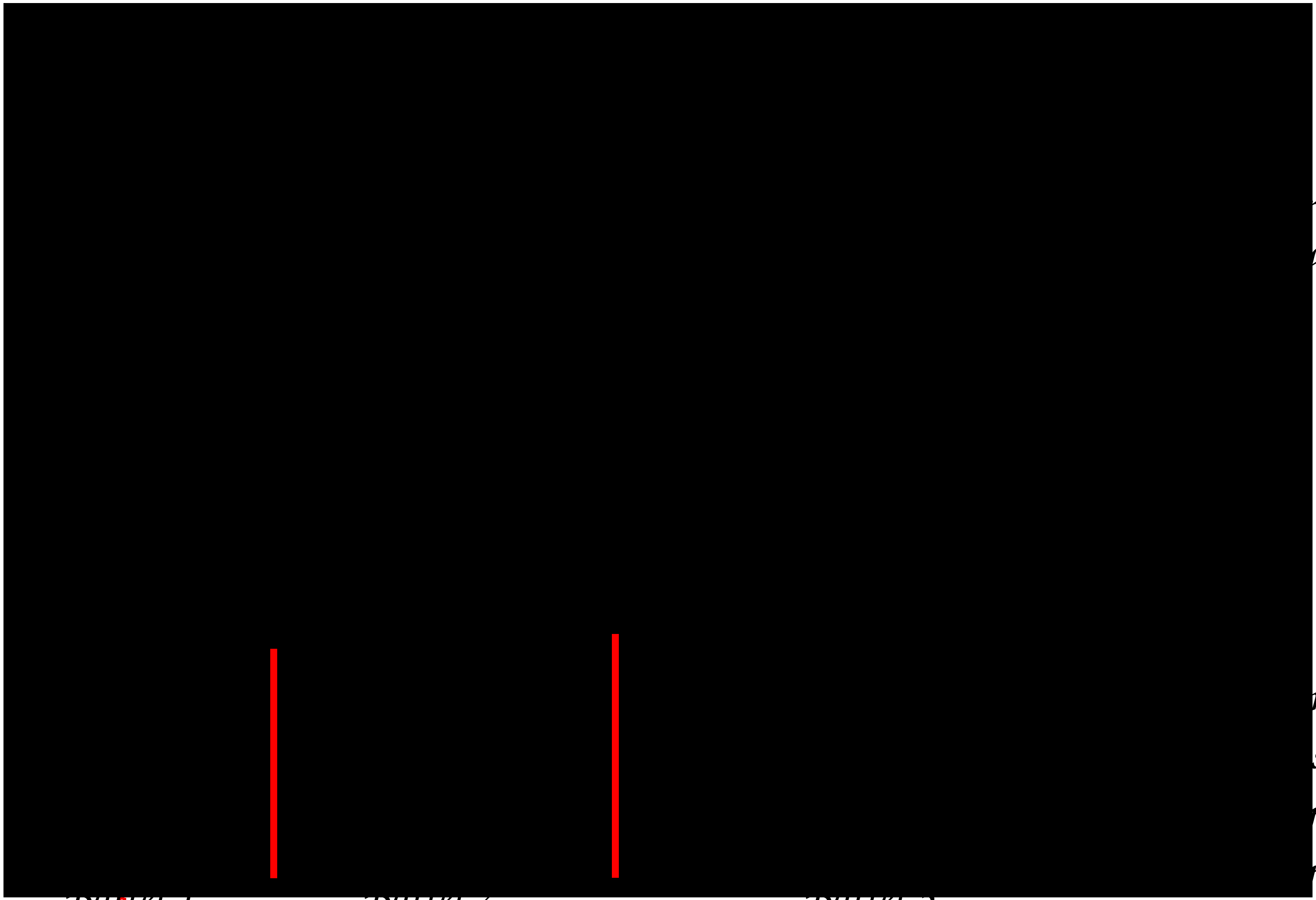
Efficiency is defined as the number of tracks with SVT hits added (2 or more)

Flat in p_t

Peaked around center of SVT

If you go to ±30cm average effi

Simulating mis-alignments



residual

hift

residual

shift

n, y=0.8mm,

nm)

Drift Residuals vs Wafer

Before Alignment

Shifted to x=-0.276cm
y=-0.82cm
z=-0.192cm

After Alignment

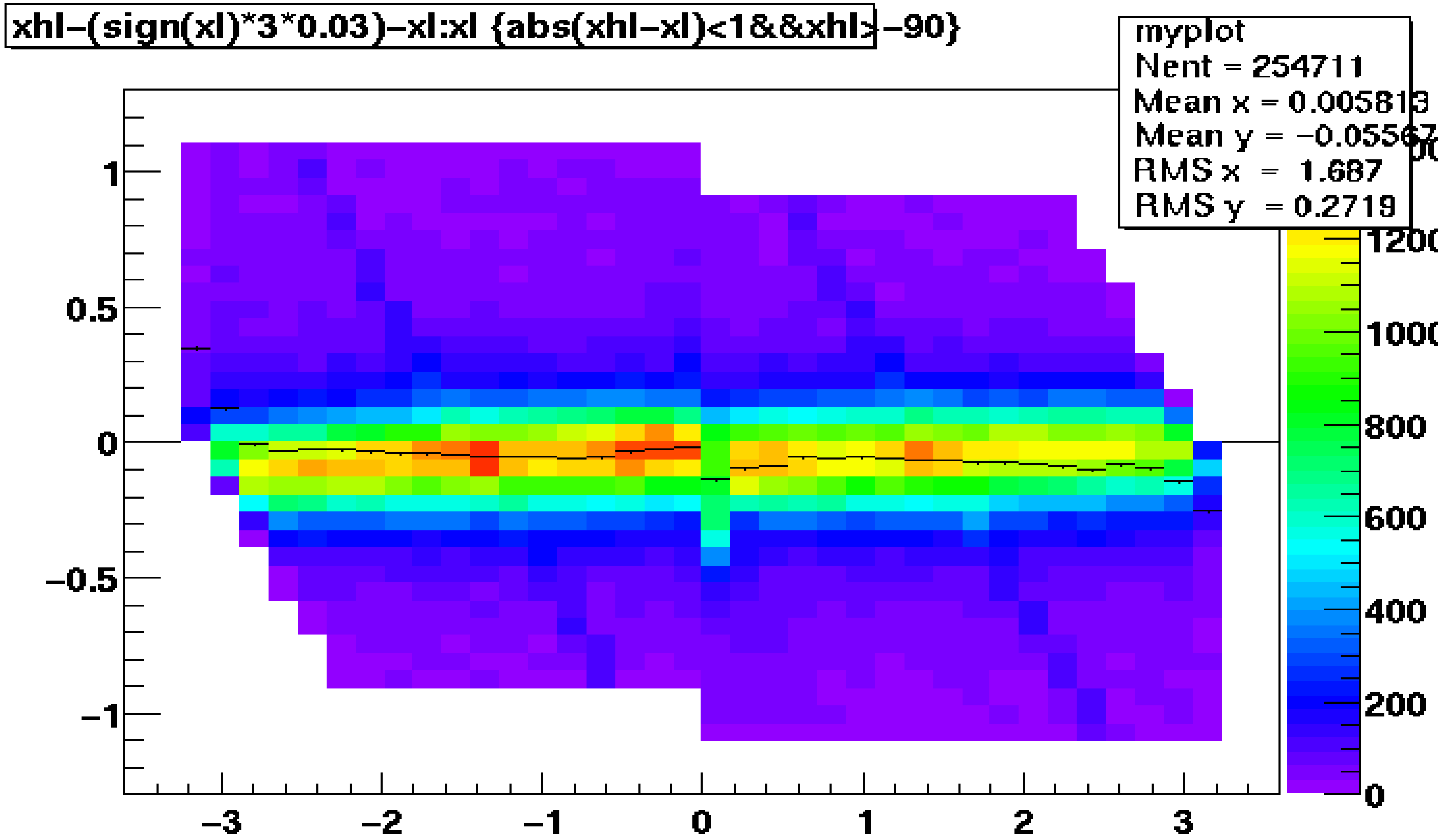
Magnitudes agree with survey results

SVT
STAR

Hit Residuals with respect to projection in the drift direction

T0 v

~3 t



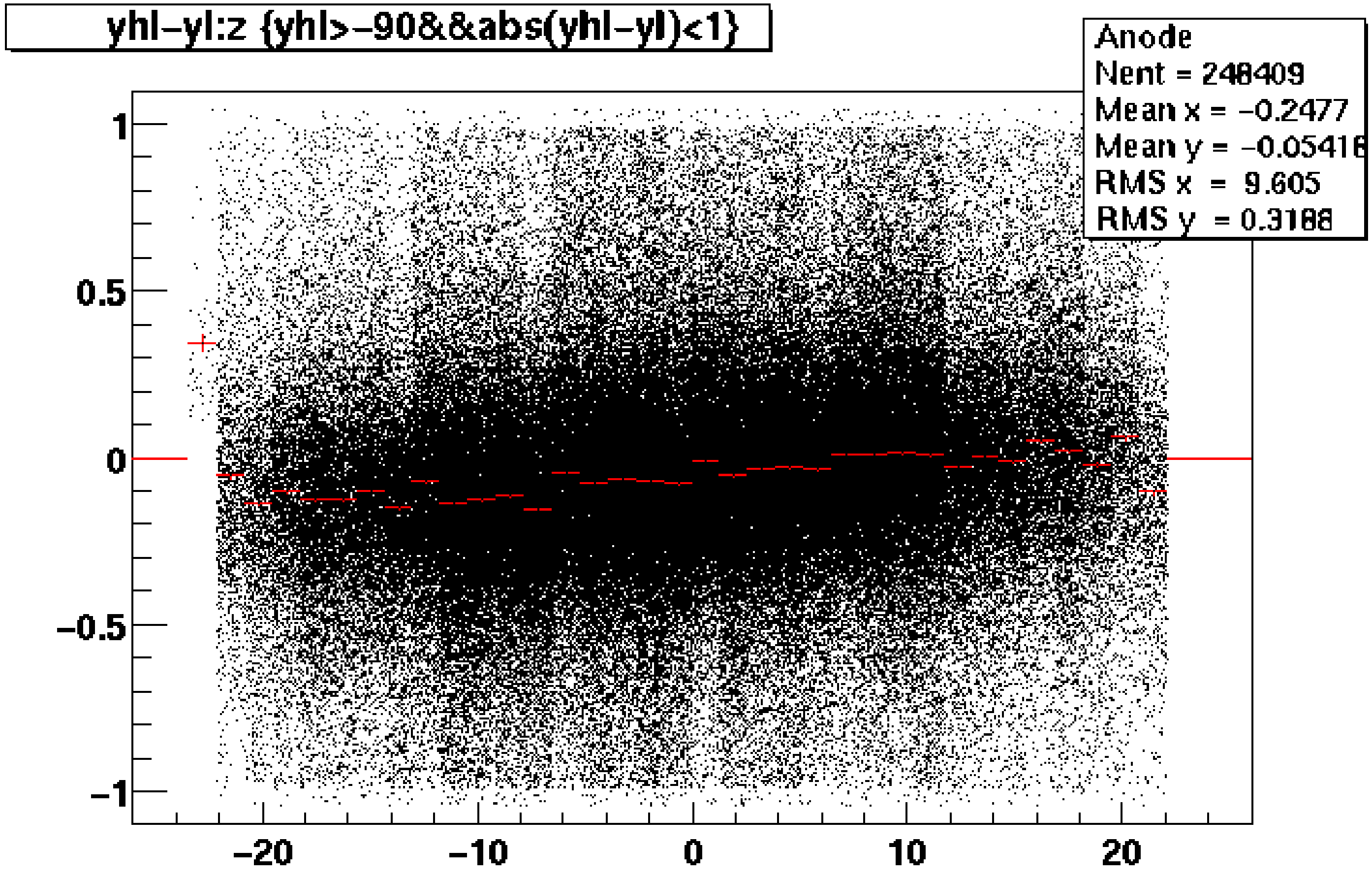
Anode Residuals vs pt

Remember!!!

This residual includes the projection momentum resolution too!!!

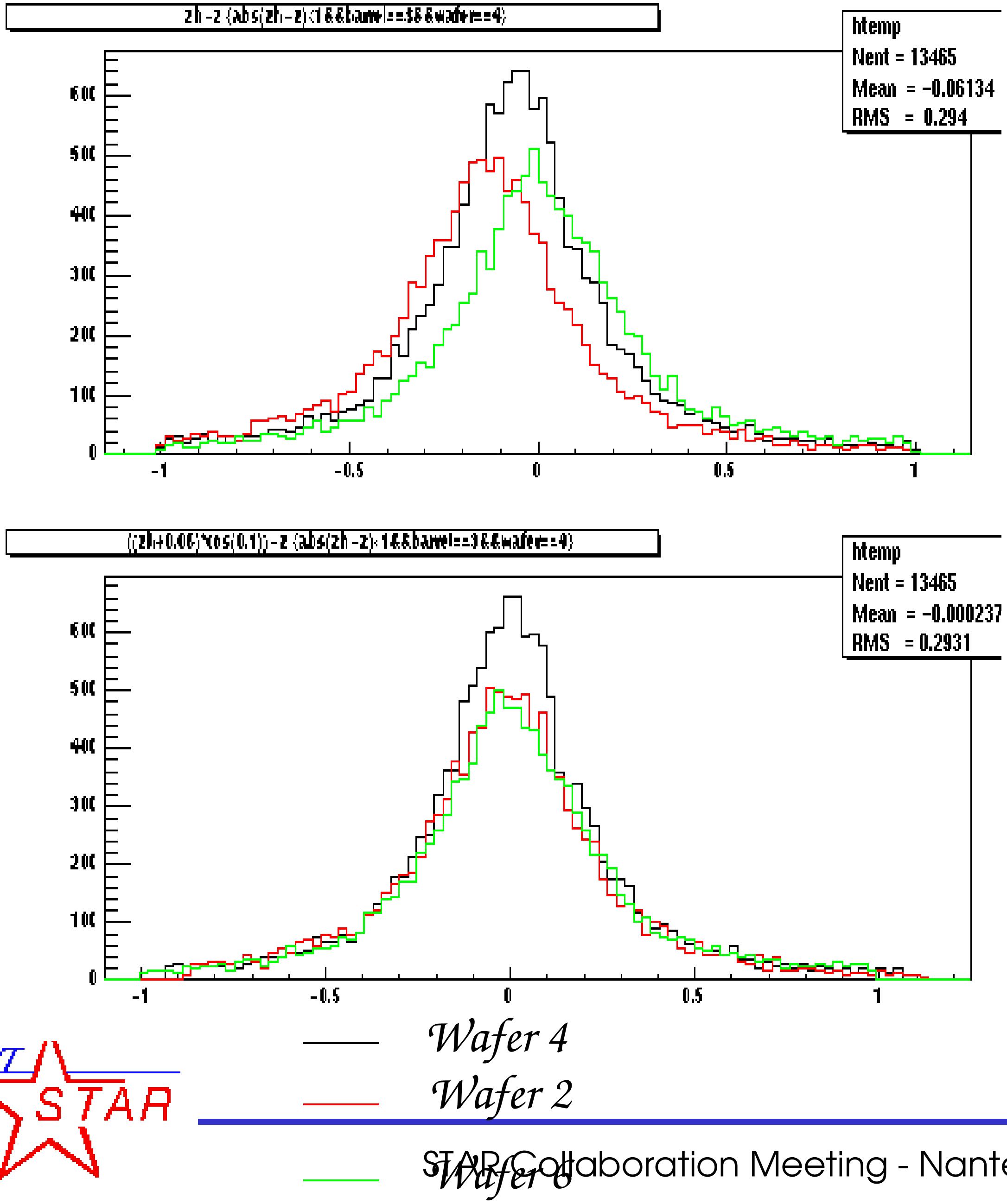
Au-Au
After correction

More anode residuals



Appears to be a tilt along z

More anode residuals



BUT!!!

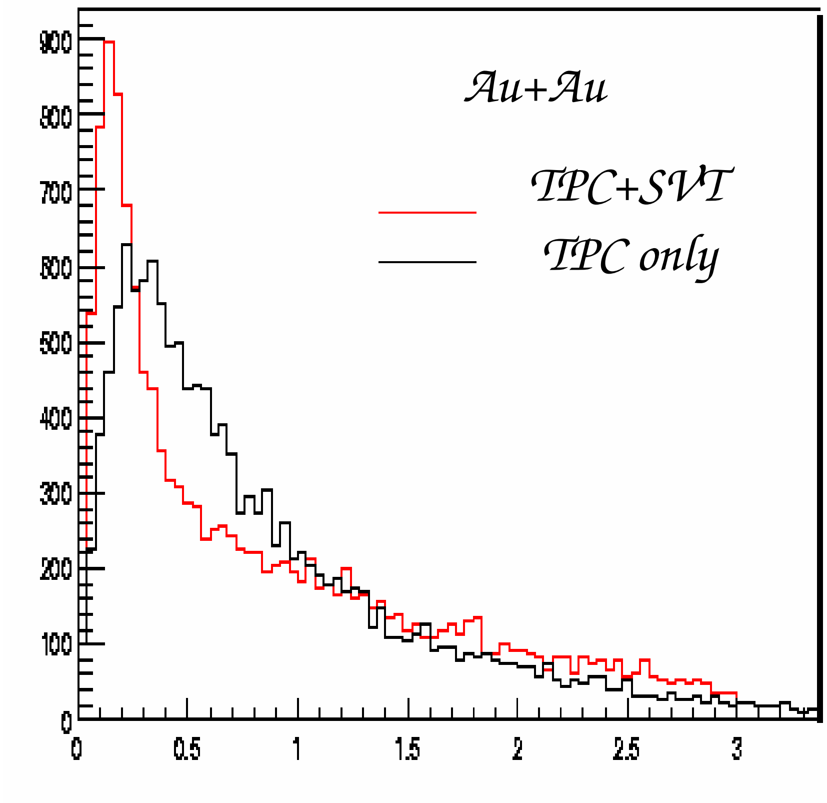
Tilt would have to be 0.1 radians!

Could be that separation of wafers is not correct but that requires a squeezing of 300 microns!!

Still investigating why!!!

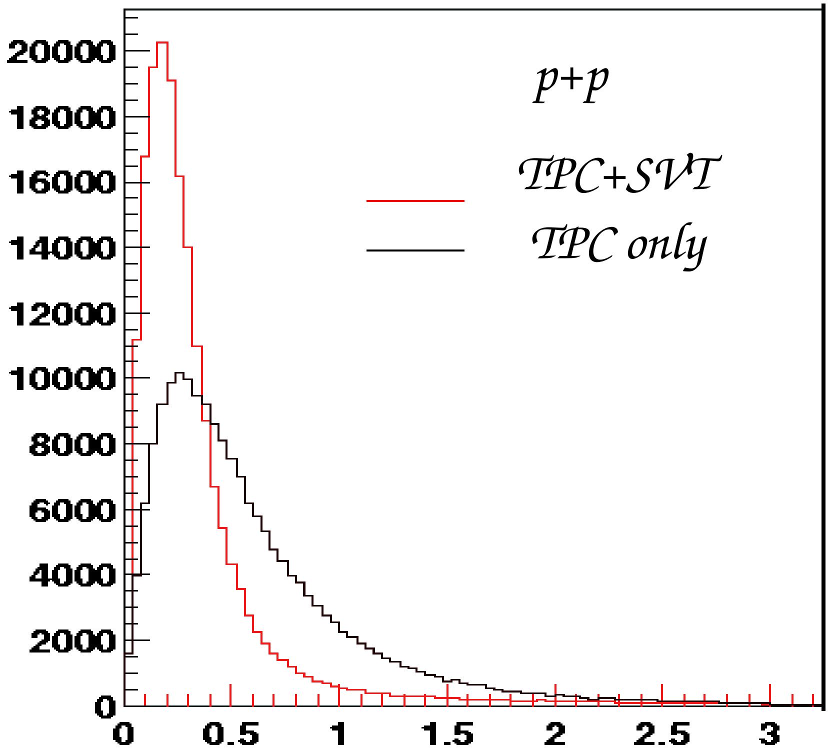
Impact Parameter Improvement

3D impact parameters global track associated to primary



Mean 0.89->0.86 cm

RMS 0.77->0.76 cm



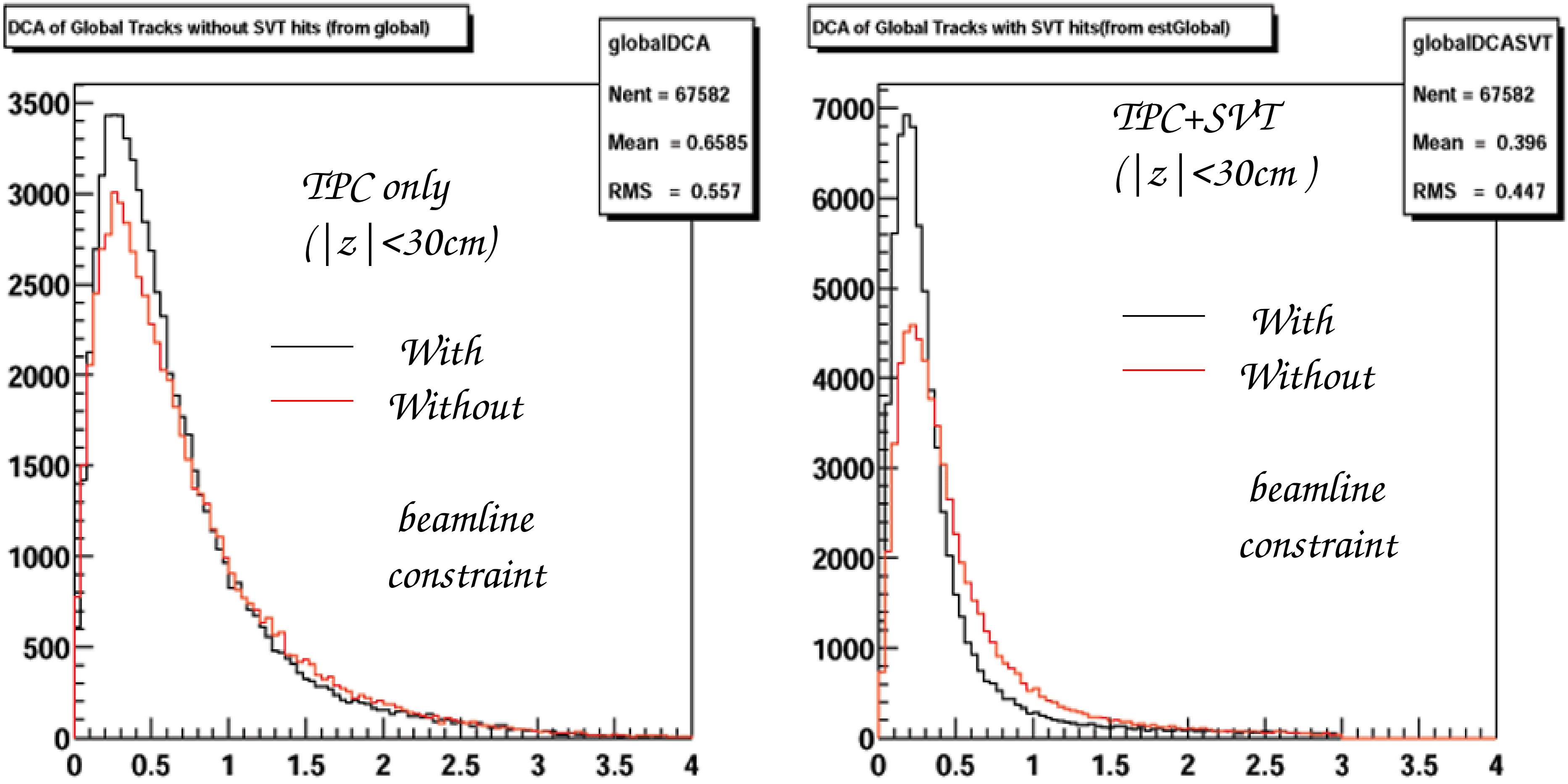
Mean 0.7->0.51 cm

RMS 0.59->0.48 cm

Better DCA resolution for primaries !!!

Impact Parameter Improvement

p-p   *"Official" difference Mean 0.66->0.4cm, RMS 0.56->0.45cm*

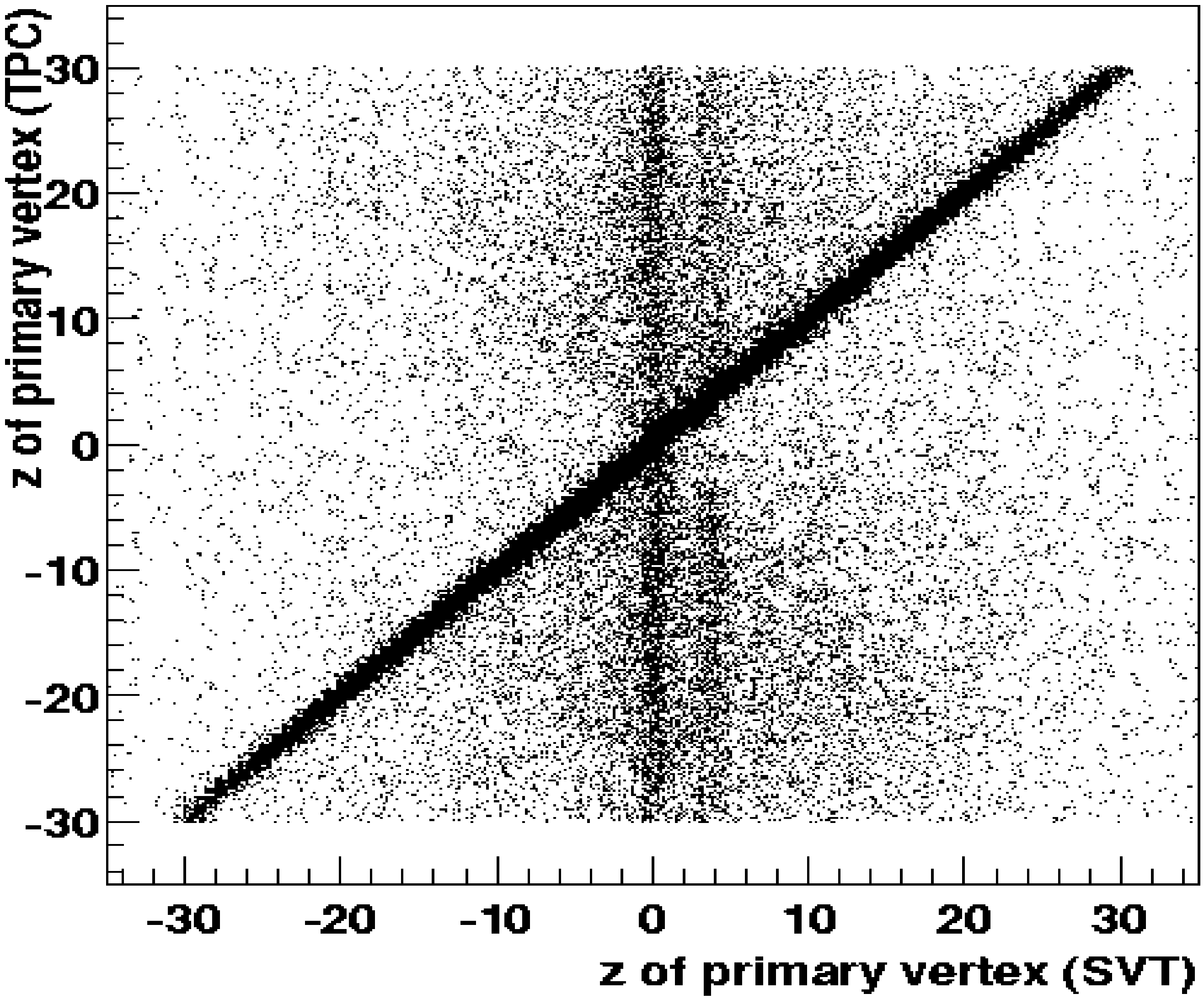


3D impact paramaters global track associated to primary

Vertex Finding - Data

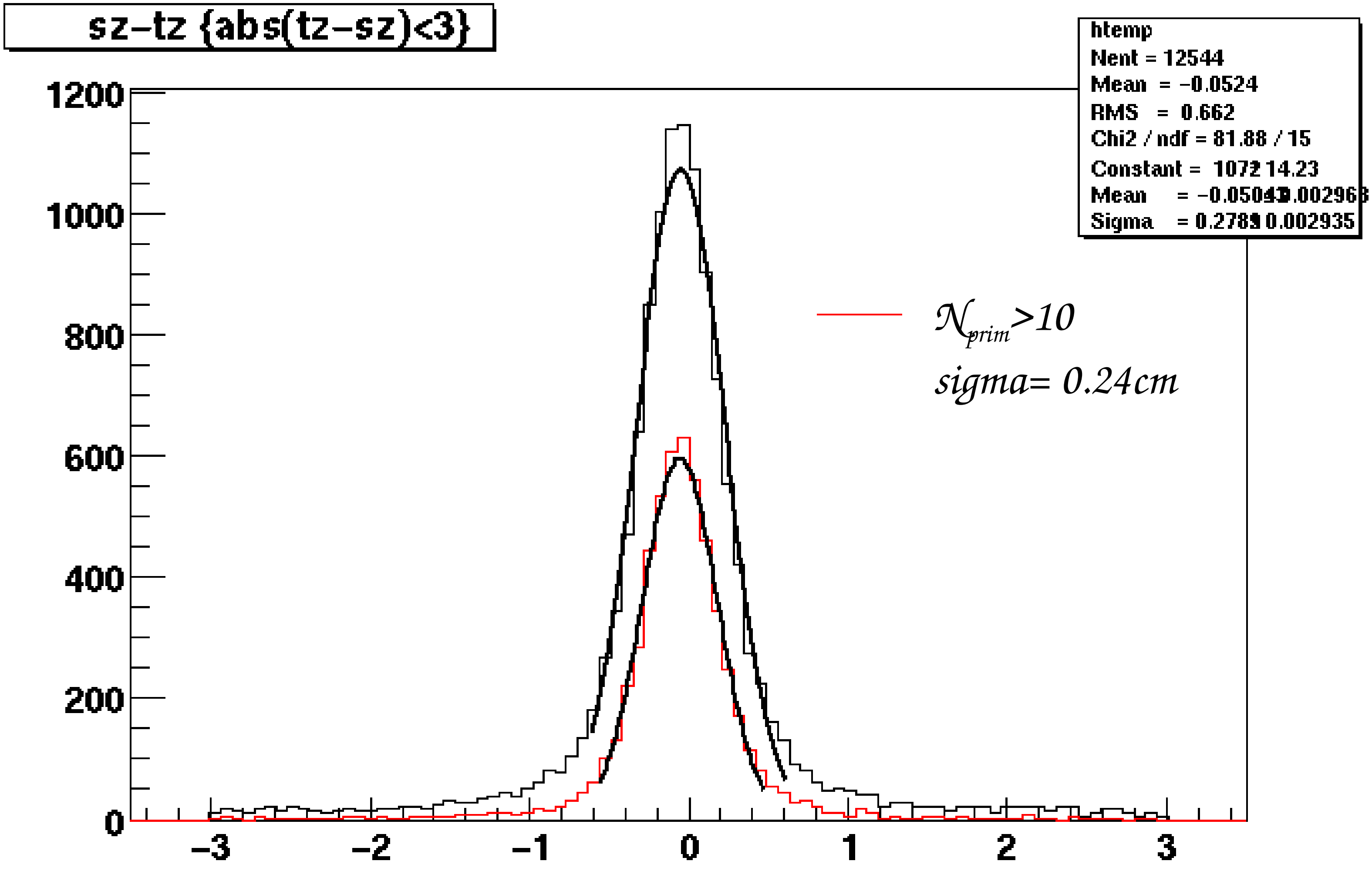
Stripes are
The very low
Mult. Events.

Still investigating
which measurement
is correct!!



Vertex Finding - Resolution

p-p



$N_{prim}>10$

sigma= 0.24cm

Still slight offset of 0.05cm (agrees with residuals)

dE/dx

SVT dE/dx (still some Calibrating to do!)

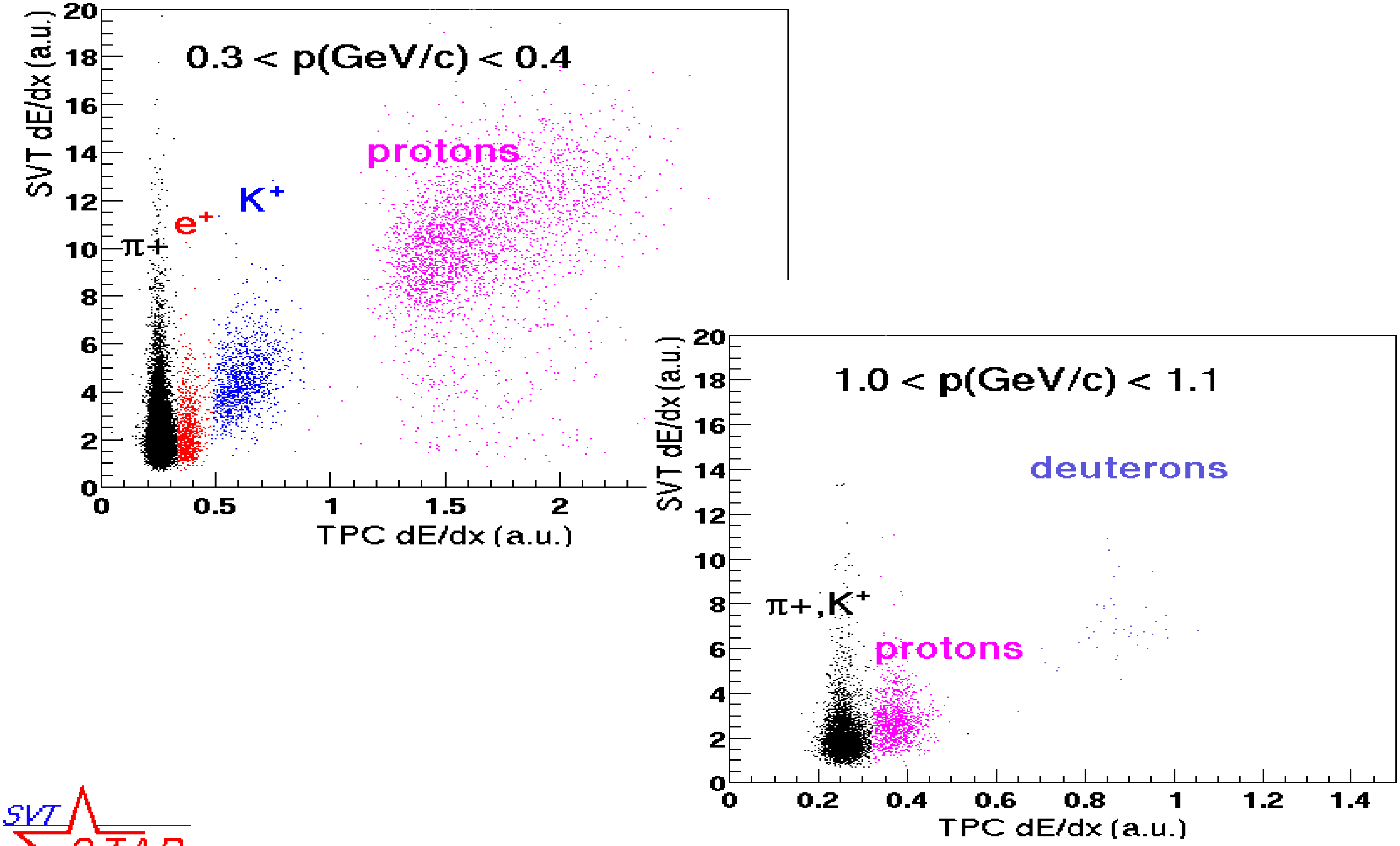
TPC dEdx

More dE/dx

Identified Primaries

Identified Secondaries

SVT vs TPC dE/dx – Mtm slices



Charge vs Drift

Probably trouble in clus
analysis.
We "correct" for this currently by scaling to make flat.
On ladder by ladder basi

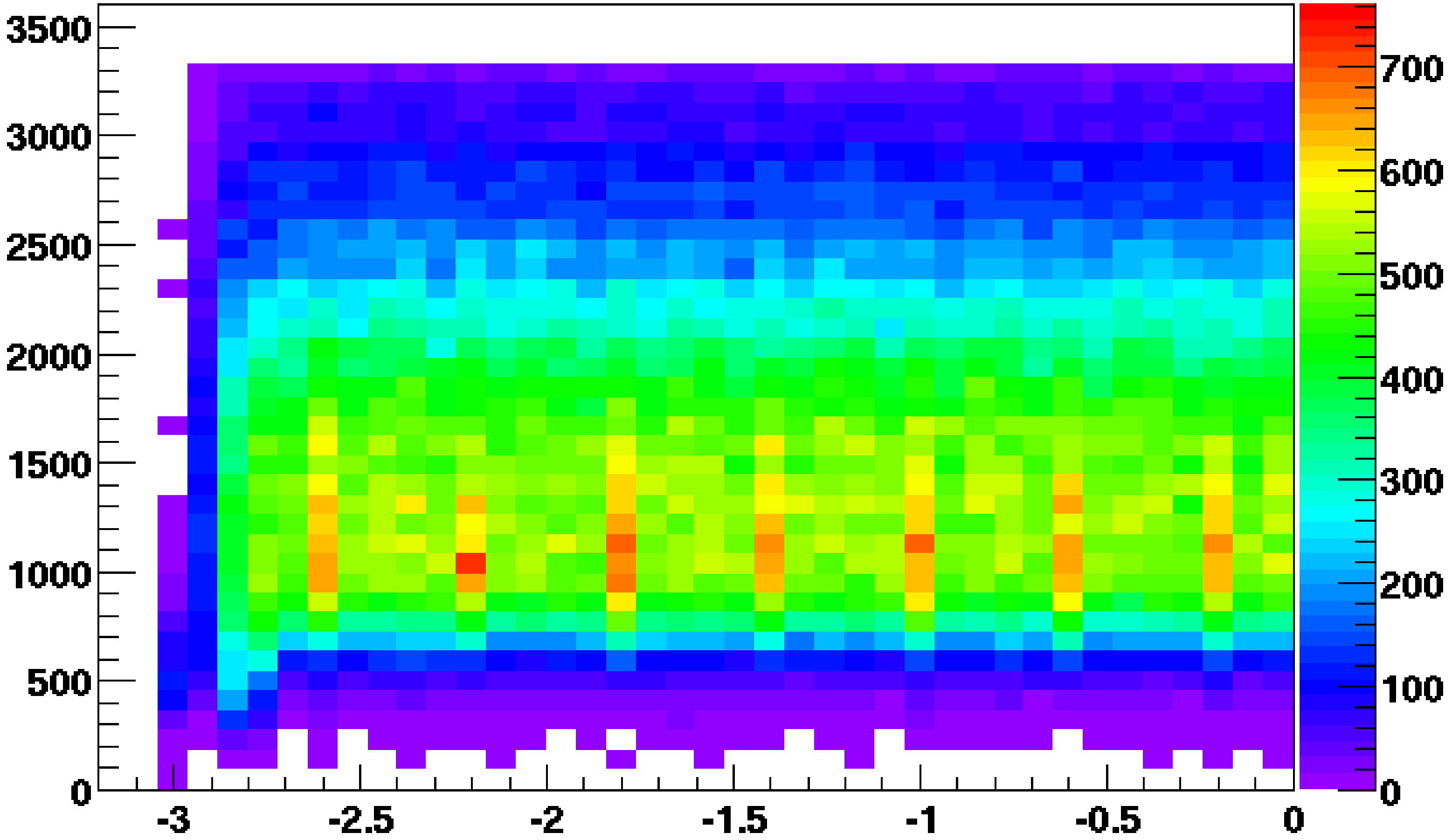
Should really do this detector by detector.

Some evidence of "charge loss"
~20%

Center of wafer

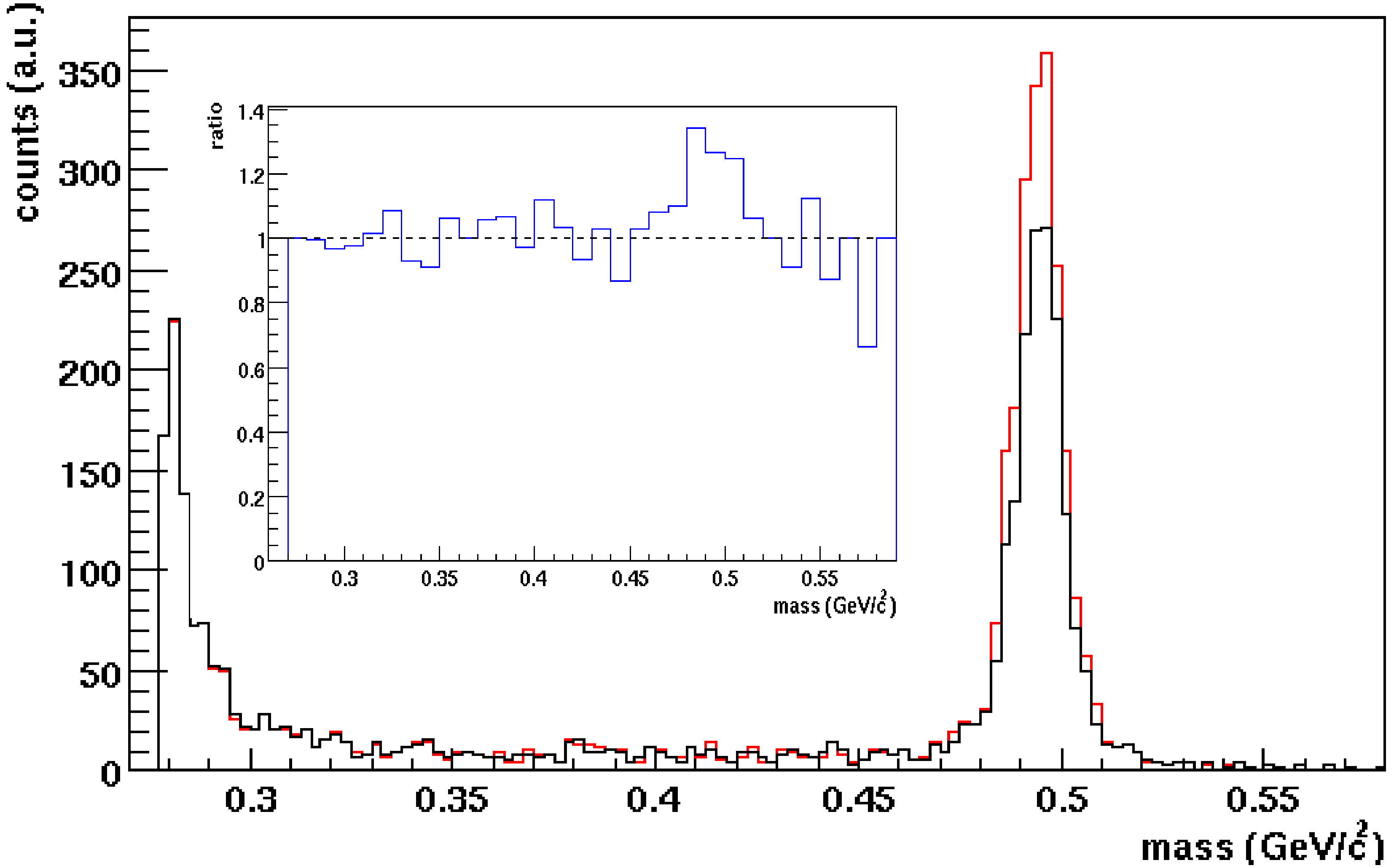
cm

Hit charge vs Anodes



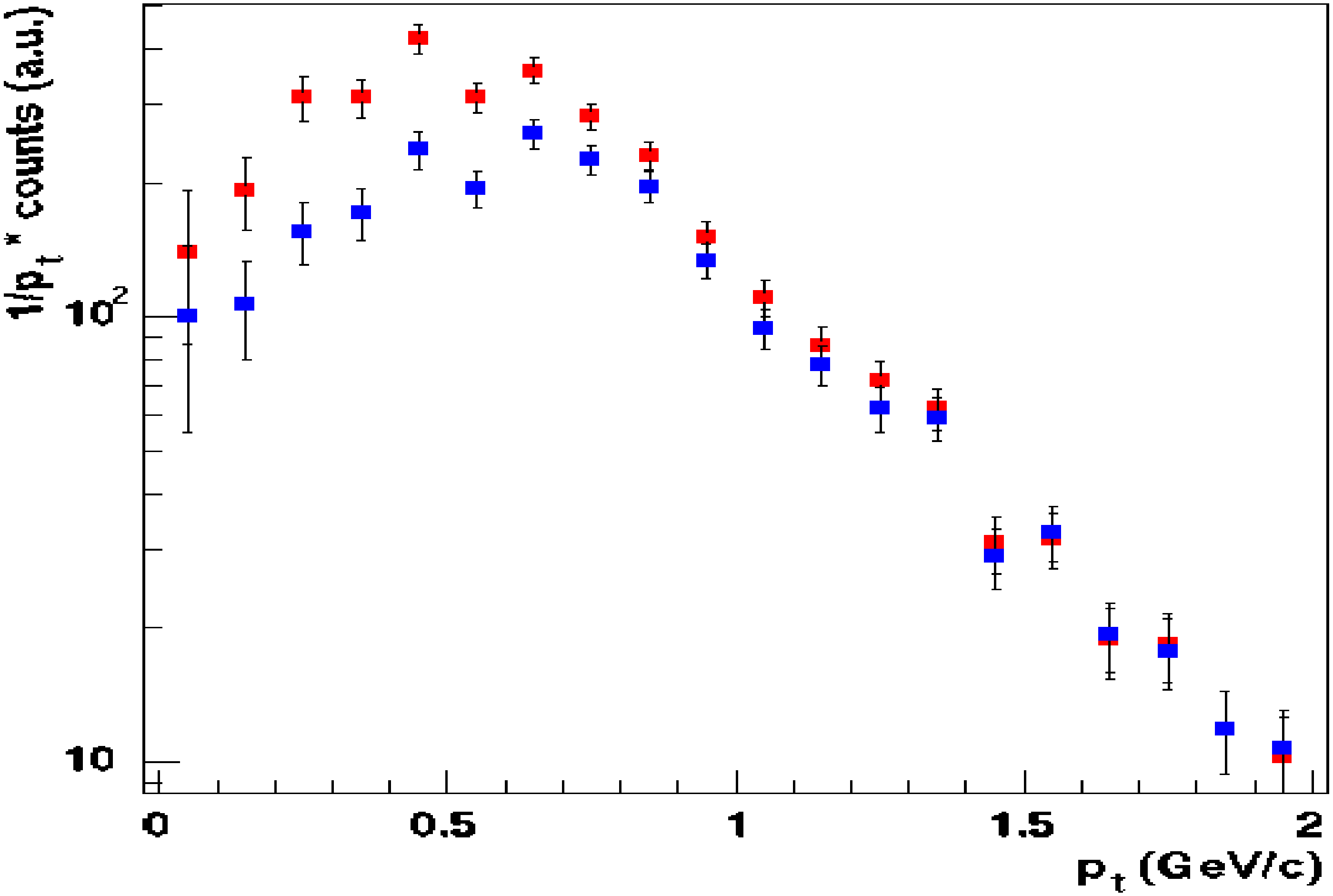
Still need charge gain correction on the anode basis!!

V_0's with the SVT



pp data. Red – SVT+TPC , Black – TPC only.

V_0's with the SVT, p_t distribution

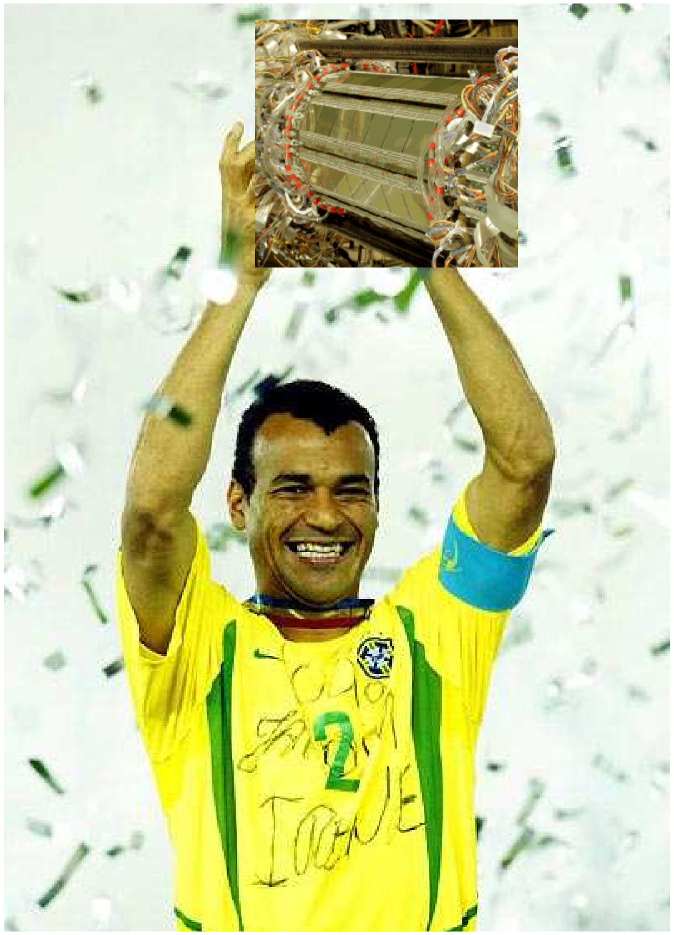


pp data. Red – SVT+TPC , Blue – TPC only.

Summary

- Initial detector parameters (alignment/calibration) determined.
- Preliminary analysis shows good detector performance.
  - Matching efficiency up to 70%.
  - Independent primary vertex determination.
  - dE/dx measurement.
- Results show overall improvements to STAR analysis such as:
  - Better resolution of Primary track impact parameter.
  - Higher efficiency for low p_t K^0_s detection.
- Still to be improved:
  - Fine tuning of alignment parameters.
  - Drift Velocity calibration using laser measurements.
  - Gain correction to improve dE/dx measurements.
  - Low pt tracking.

5 times champion!!!!!



Global Matching “efficiency” 2

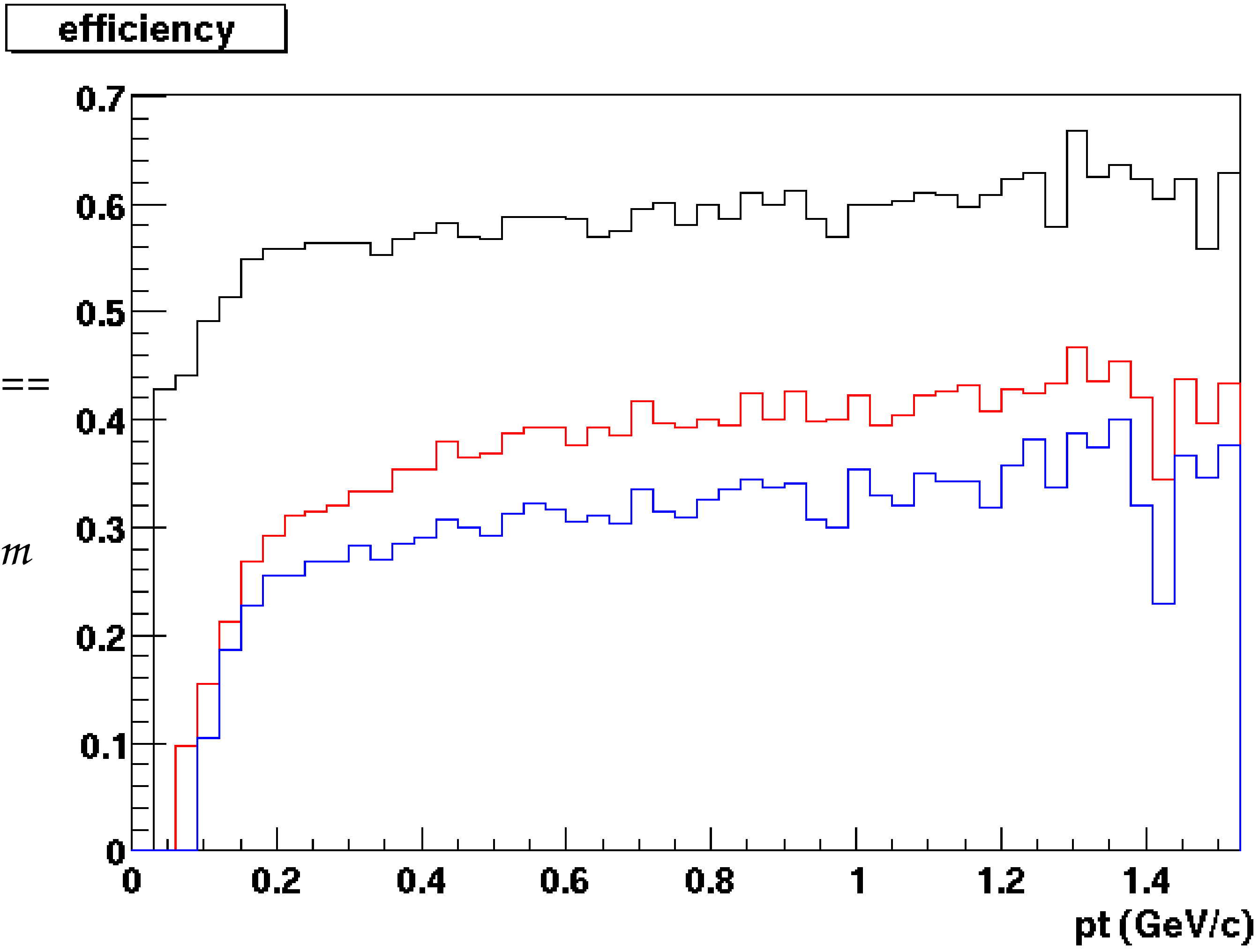
Effic now defined as:

Num = Hit found
Den = Track hit wafer

— *Hit on wafer == Occupancy*

— *Hit within 1cm*

— *Hit found by EST*



p-p

Location of Noise hits

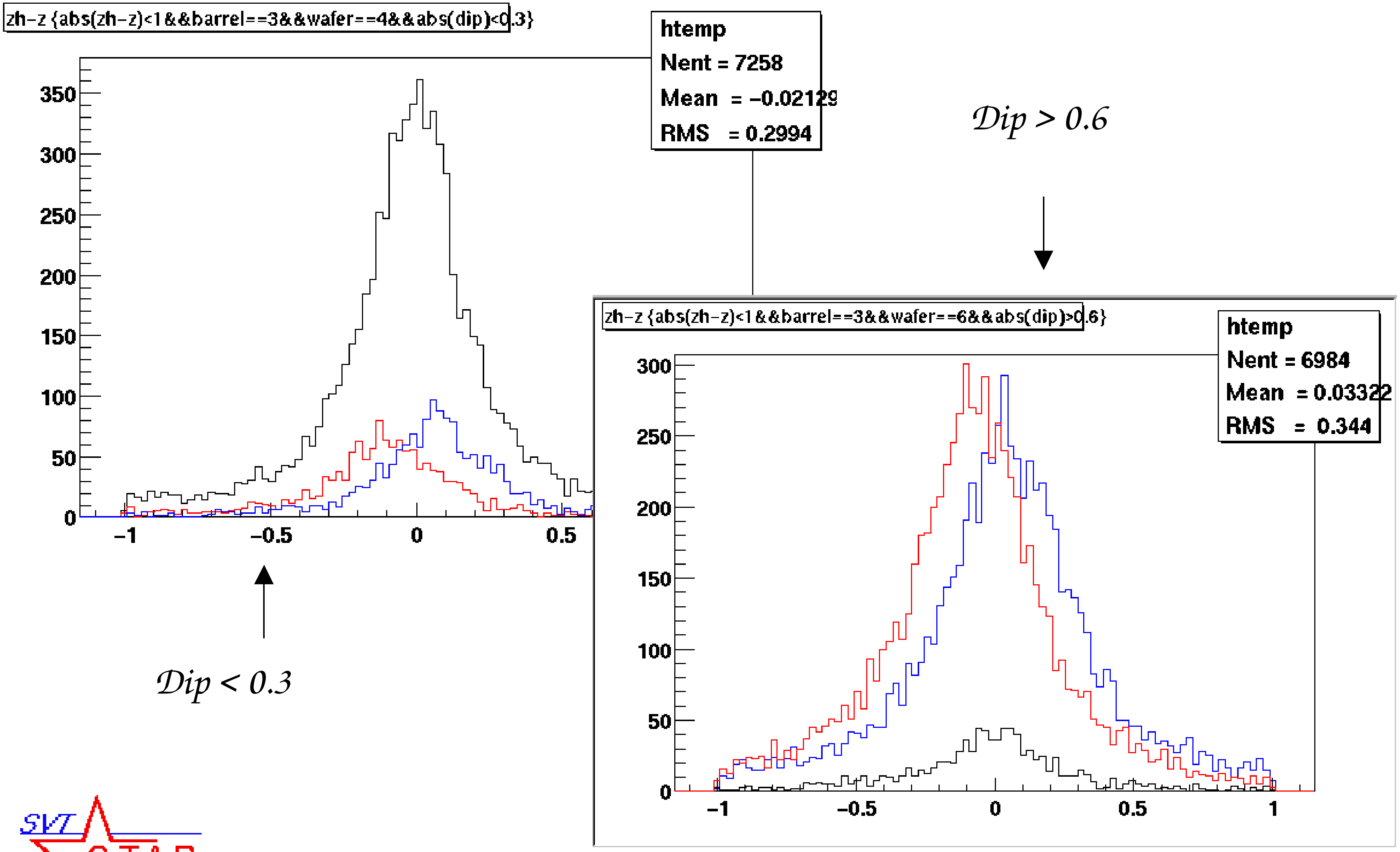
Noise defined as hits with $\Delta r > 1$cm from track

[redacted]

[redacted]

Clear ladders/Wafers
that are noisy and we should eliminate

Z res vs dip angle



Dip > 0.6

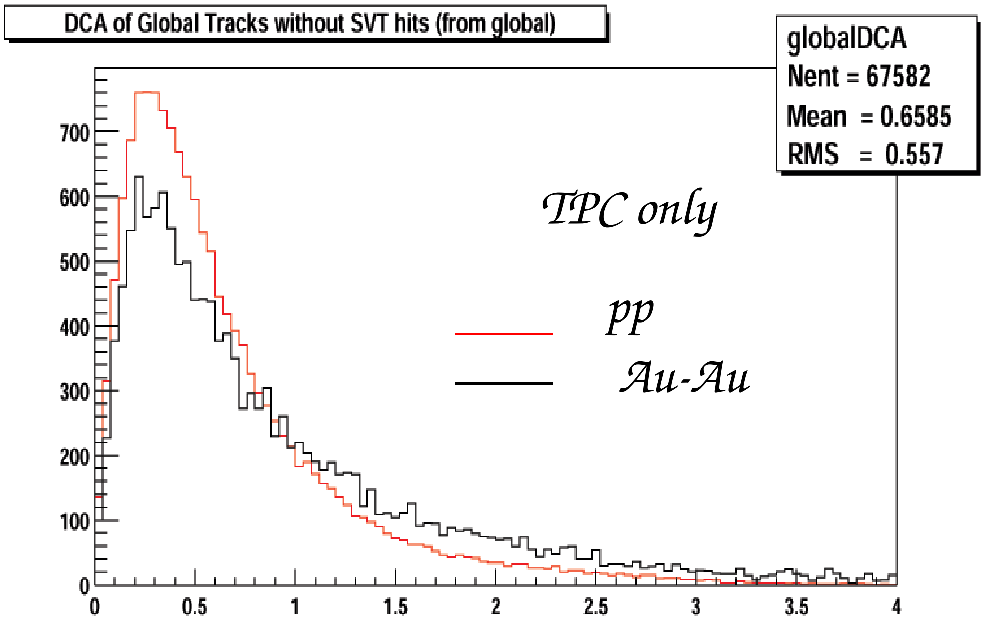
Dip < 0.3

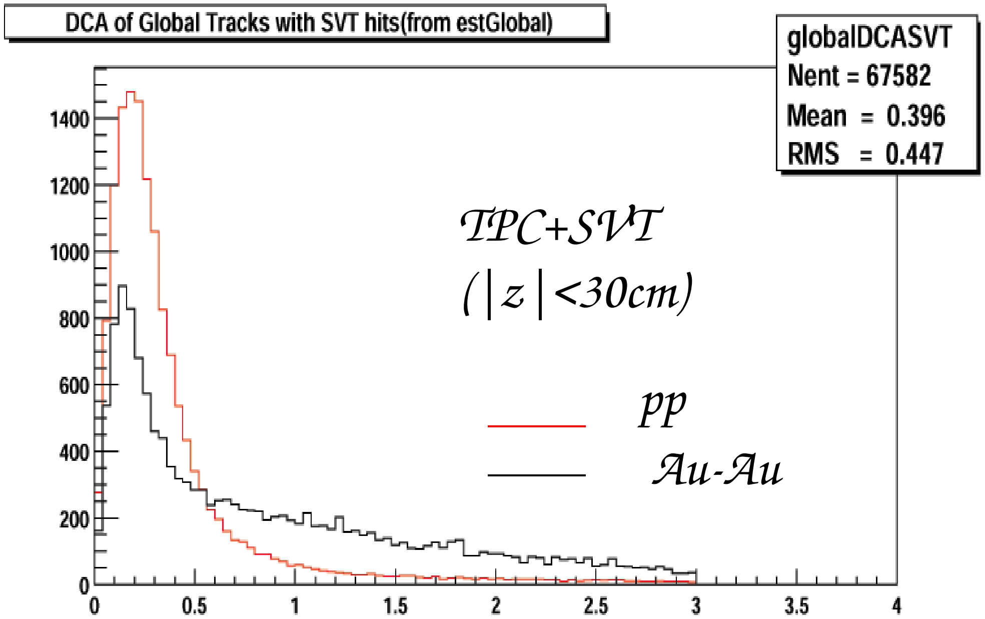
SVT vs TPC dedx

SVT dE/dx

TPC dE/dx

Impact Parameter Improvement





3D impact paramaters
global track associated
to primary

pp
Mean 0.7->0.51 cm
RMS 0.59->0.48 cm

Au-Au
Mean 0.89->0.86 cm
RMS 0.77->0.76 cm

However now have more
With DCA>1.5 cm