

Tracking Validation

David Brown, LBNL

SuperB Computing Workshop
17 December 2008

Tracking Studies

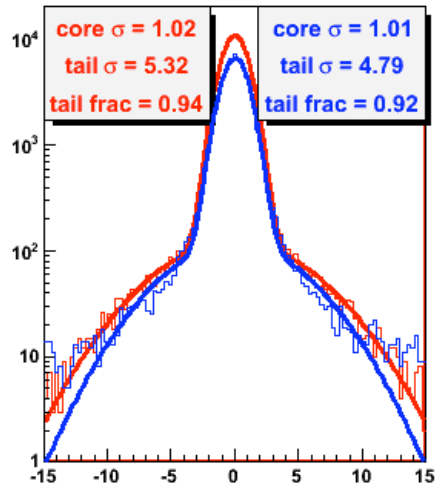
- Release FastSim/V0.0.1
- BaBar configuration (pacrat_BaBar.xml)
- Tuples produced by KalTest module
 - linked in with PacMCApp, PacQAApp
 - see PacMC/KalTest_pacrat.tcl for example

Compare Fastsim, Fullsim

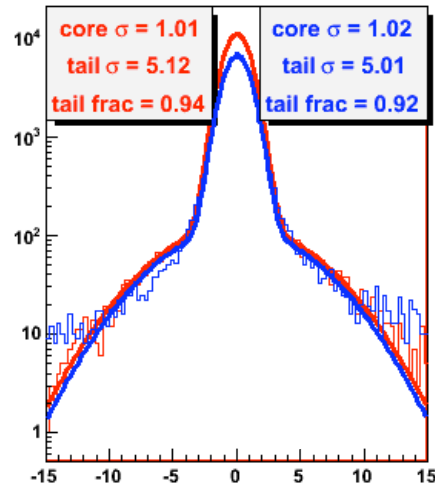
- Simulate 20K $\Upsilon \rightarrow B^0 B^0$ generic events in both
- Look at track parameters, properties
- Just a few interesting results

Track parameter pulls

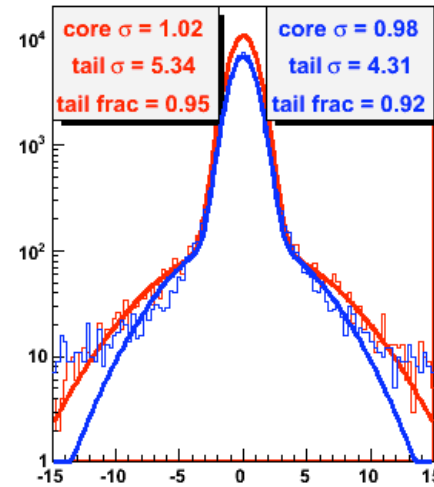
d0 pull



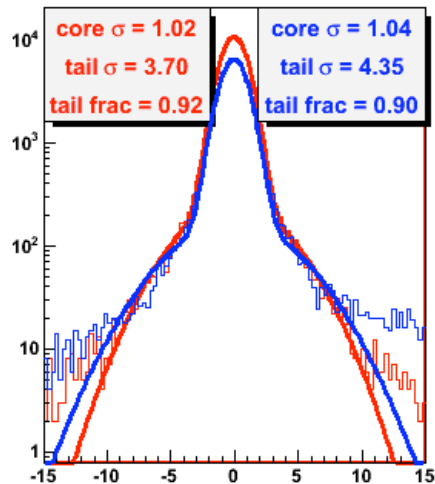
z0 pull



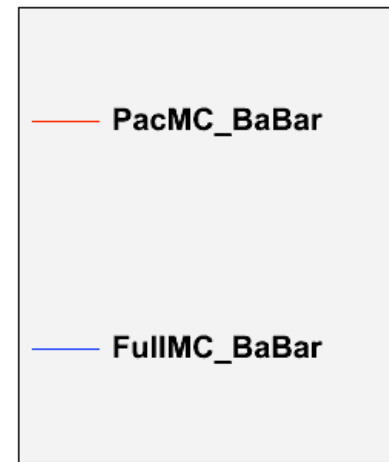
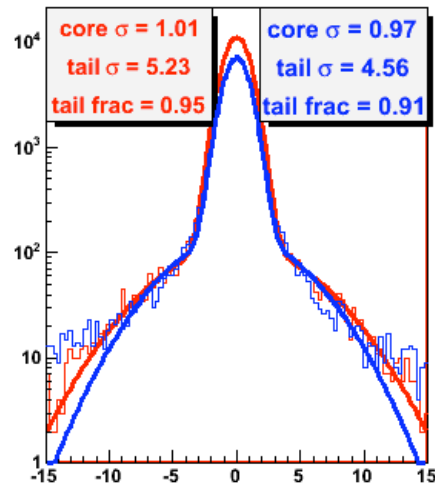
phi0 pull



omega pull

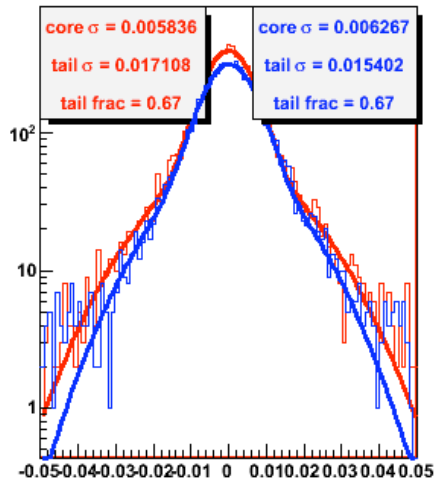


tandip pull

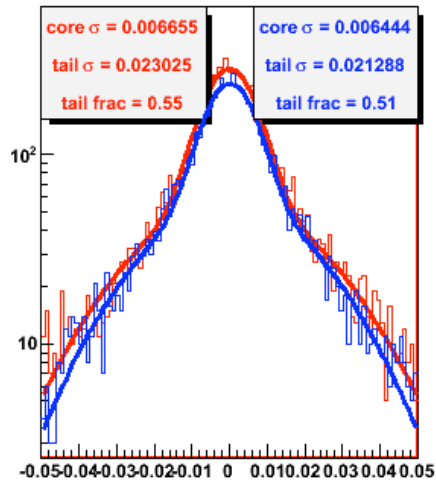


Parameter Resolution

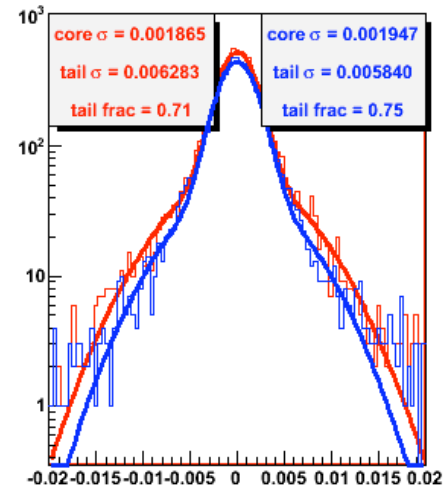
d0 res



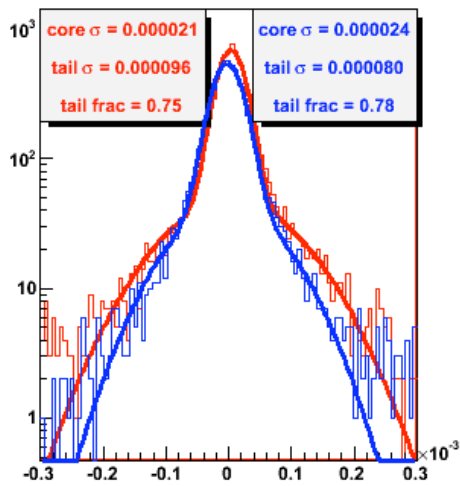
z0 res



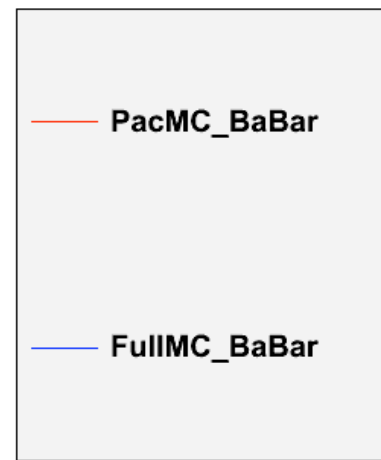
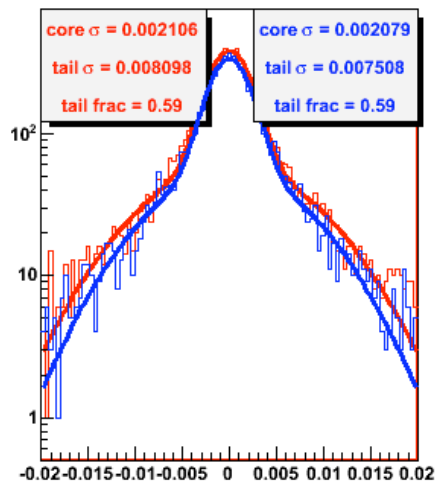
phi0 res



omega res

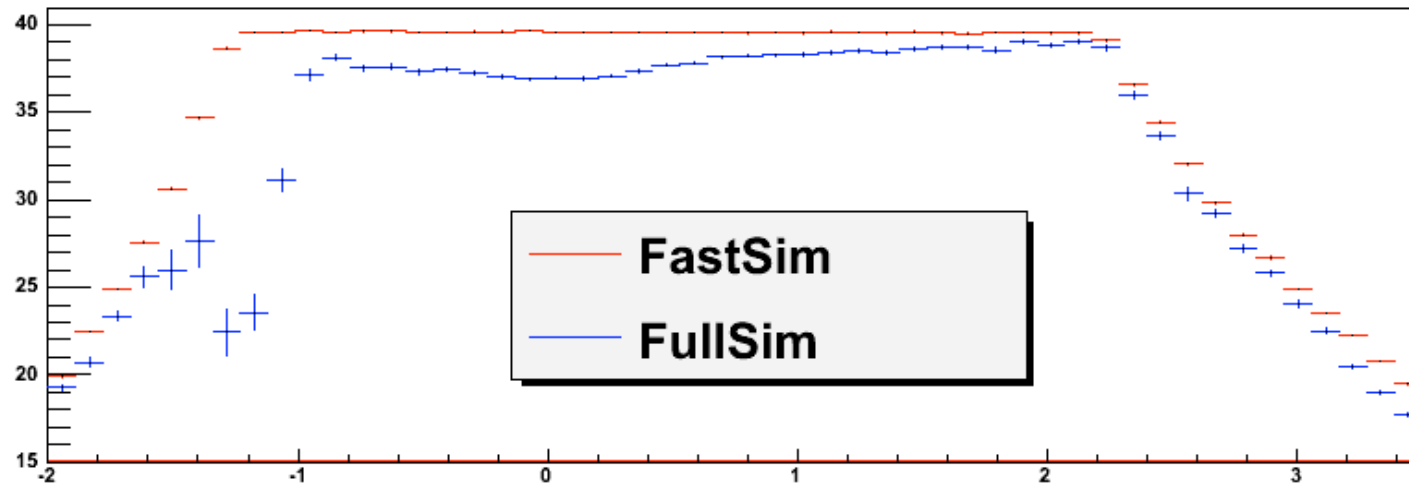


tandip res

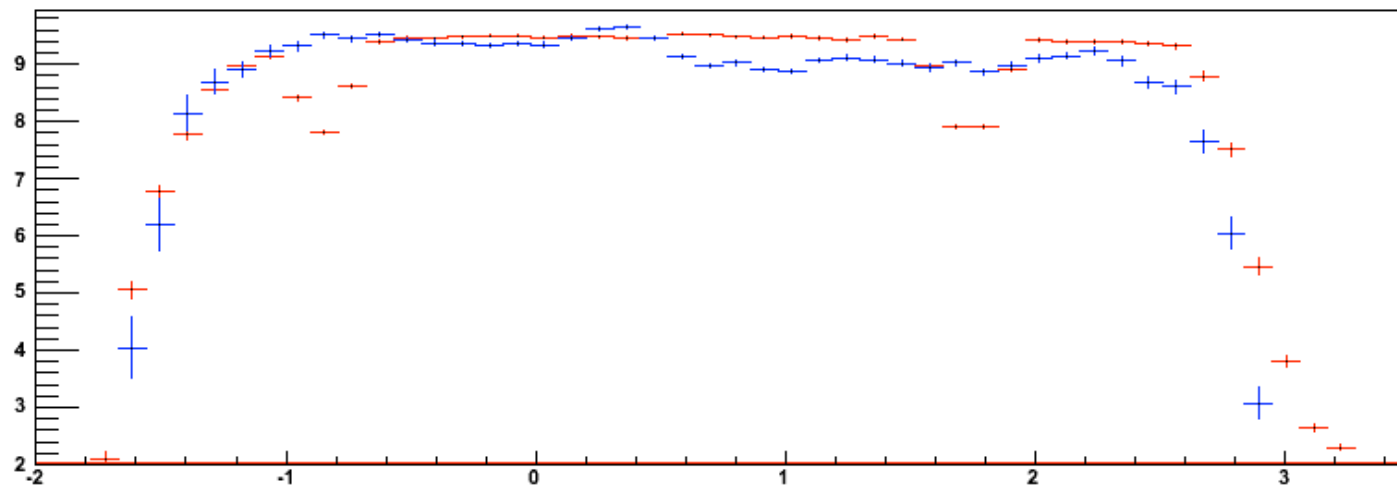


Hits/track in μ -pair events

NDch vs tandip



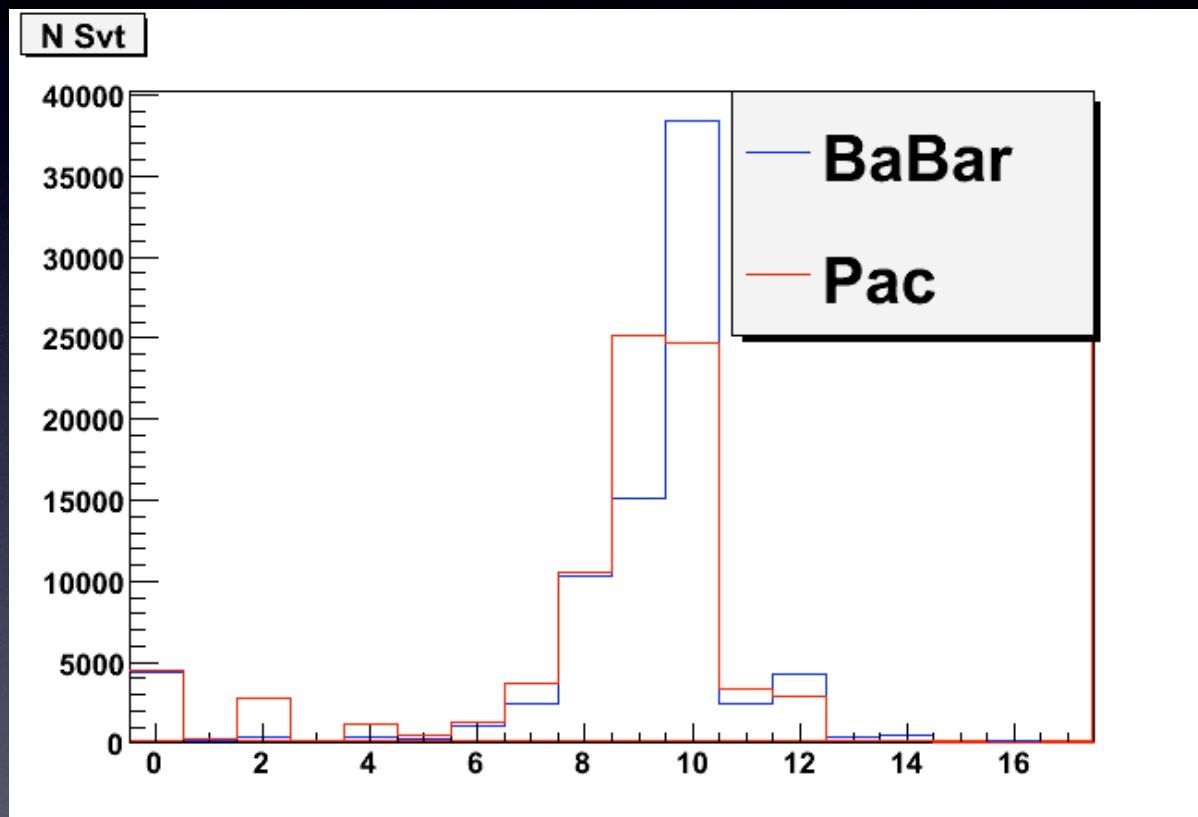
NSvt vs tandip



Svt Residual Study

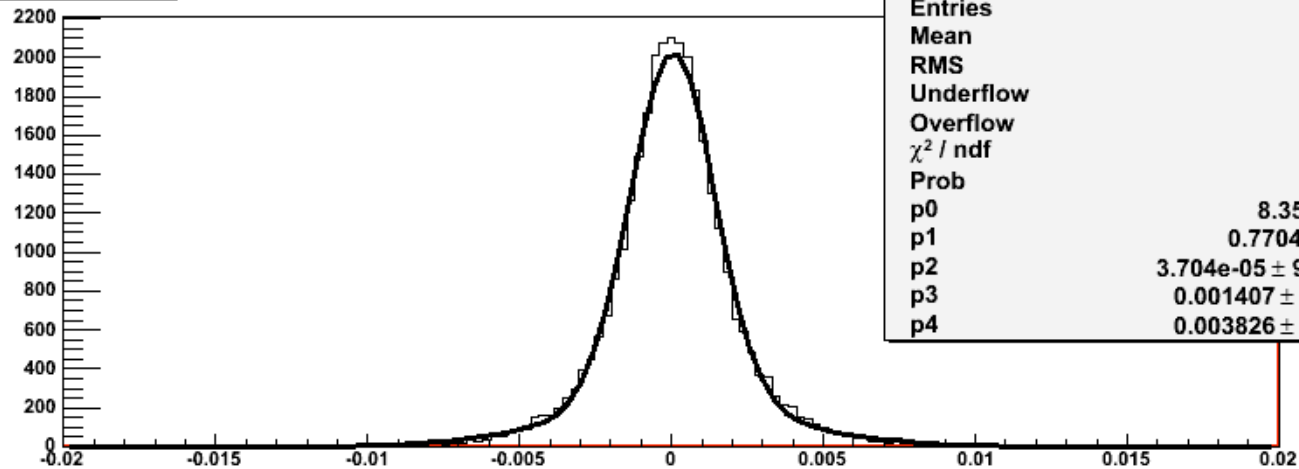
- Look at μ -pair events in BaBar data
 - BPC muons, 2-tracks, $P > 3\text{GeV}$, ≥ 10 Svt hits
- Look at reduced residual in Svt layers
 - Distribution is convolution of hit and track resolution
 - dominated by hit resolution
 - Uses POCA between hit and track trajectories
 - distance in space
 - naturally compensates for in-plane

Hit-on-track multiplicity



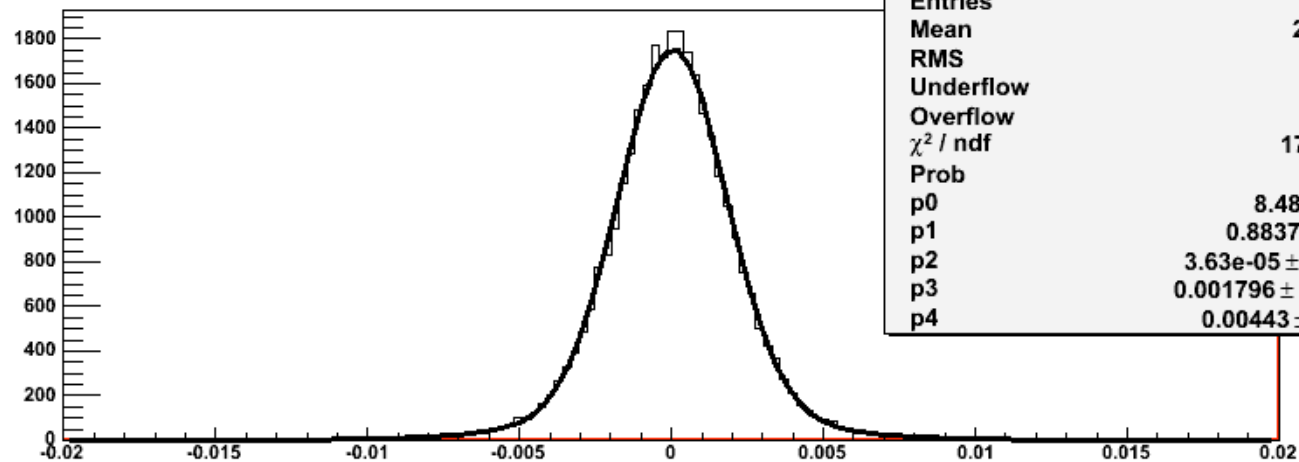
Layer 2 Residual Fits

Layer 2 ϕ residuals



presid	
Entries	31531
Mean	4.75e-05
RMS	0.00221
Underflow	2
Overflow	3
χ^2 / ndf	414 / 146
Prob	1.78e-27
p0	8.351 \pm 0.047
p1	0.7704 \pm 0.0092
p2	3.704e-05 \pm 9.977e-06
p3	0.001407 \pm 0.000016
p4	0.003826 \pm 0.000058

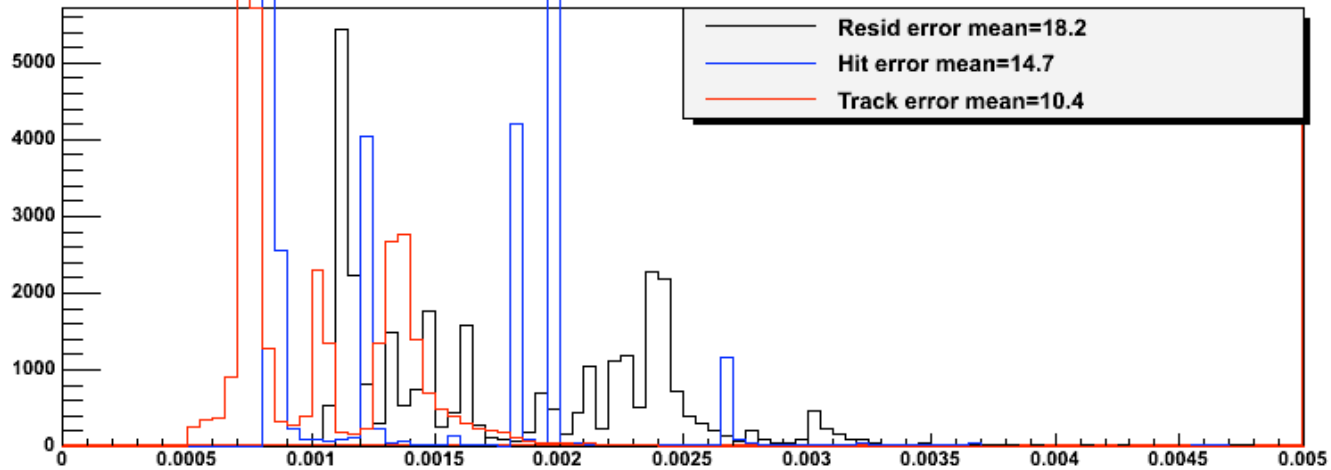
Layer 2 Z residuals



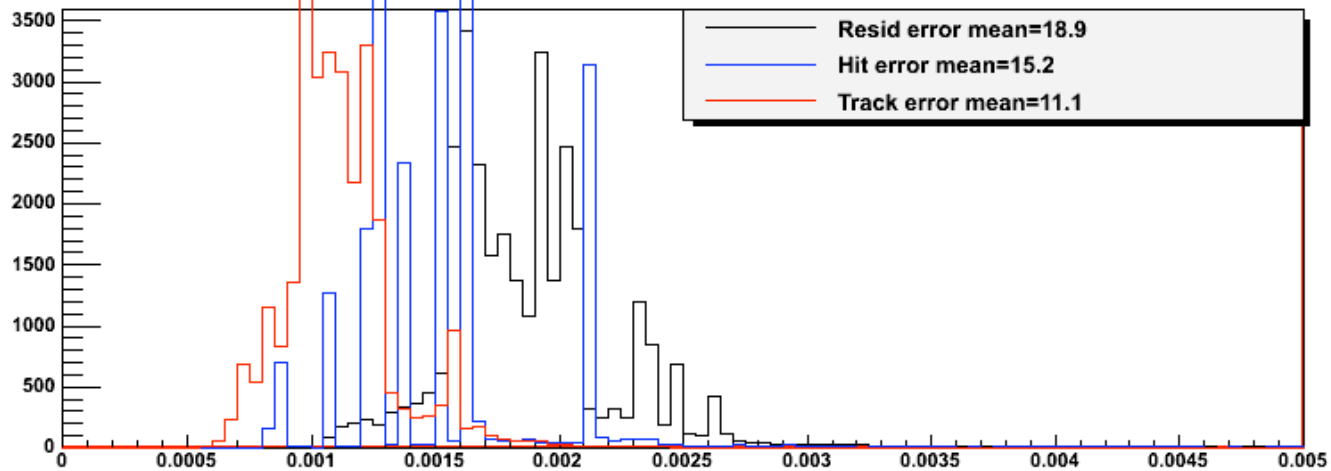
zresid	
Entries	32030
Mean	2.847e-05
RMS	0.002265
Underflow	5
Overflow	0
χ^2 / ndf	171.1 / 146
Prob	0.0765
p0	8.483 \pm 0.047
p1	0.8837 \pm 0.0077
p2	3.63e-05 \pm 1.14e-05
p3	0.001796 \pm 0.000014
p4	0.00443 \pm 0.00010

Layer 2 residual errors

Layer 2 estimated ϕ error

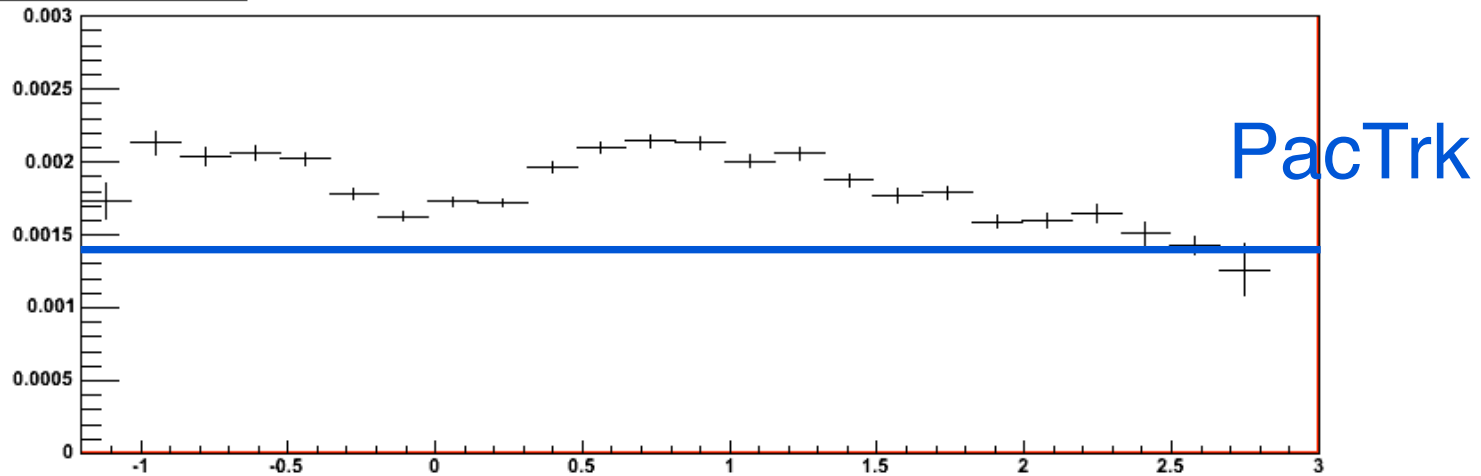


Layer 2 estimated Z error

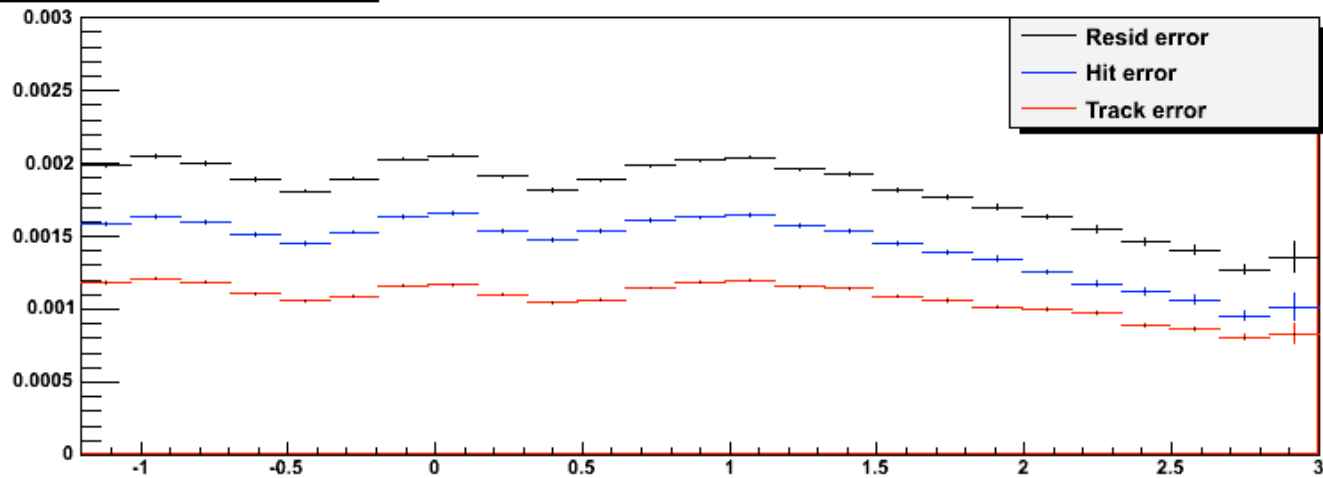


Angular Dependence

Z resid sigma vs tanDip



Layer 2 estimated Z error vs tanDip



Conclusions

- PacSim tracking is reasonable
 - Some problems with Dch, Svt configuration
 - Svt hit resolution could be improved
- Comparisons are straight-forward
 - Add to standard QA tests?