

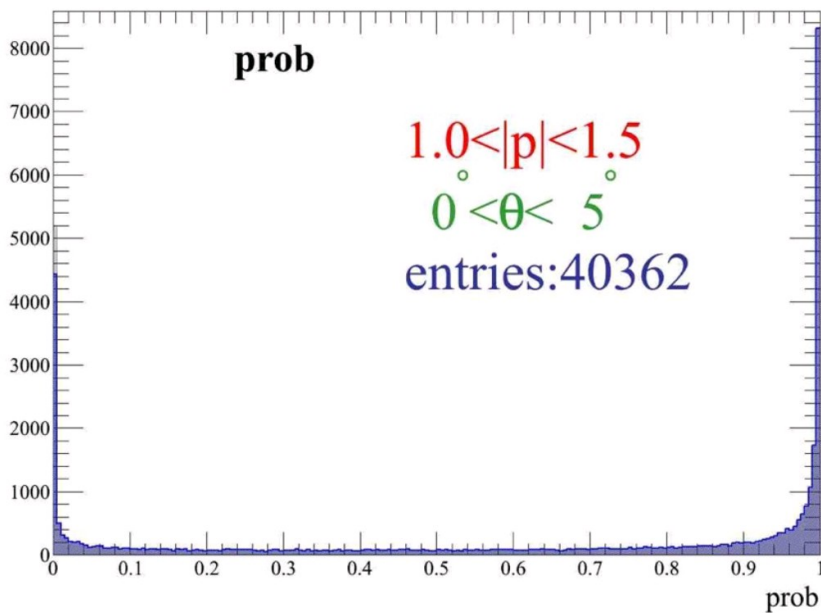
Tracking Issues

Simon Taylor/JLab

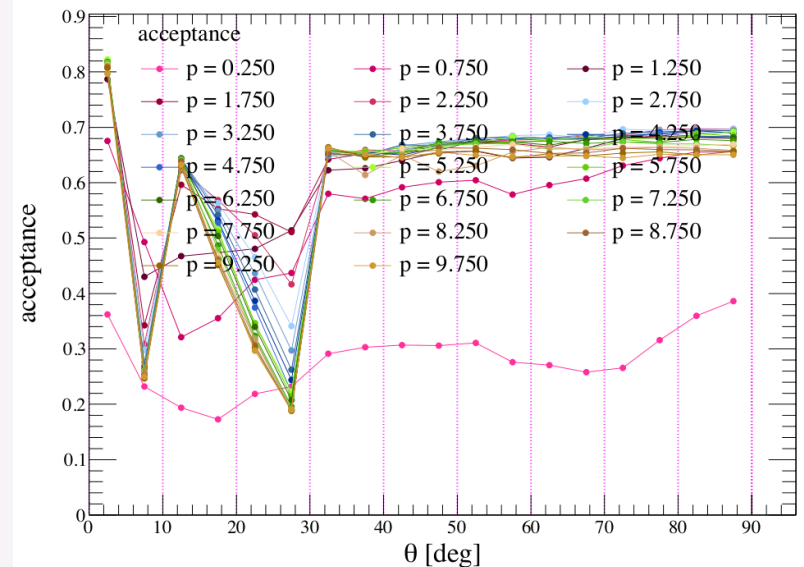
- Recent changes to repository to address or study origins of bad χ^2 fits brought to our attention by Kei Moriya
 - Alternate approach to fitting in forward direction to address speed
- Problems with Cascade events brought to our attention by Nathan Sparks

Problems found by Kei

prob for each track (1/4)



acceptance for each bin
($CL > 0.10$)

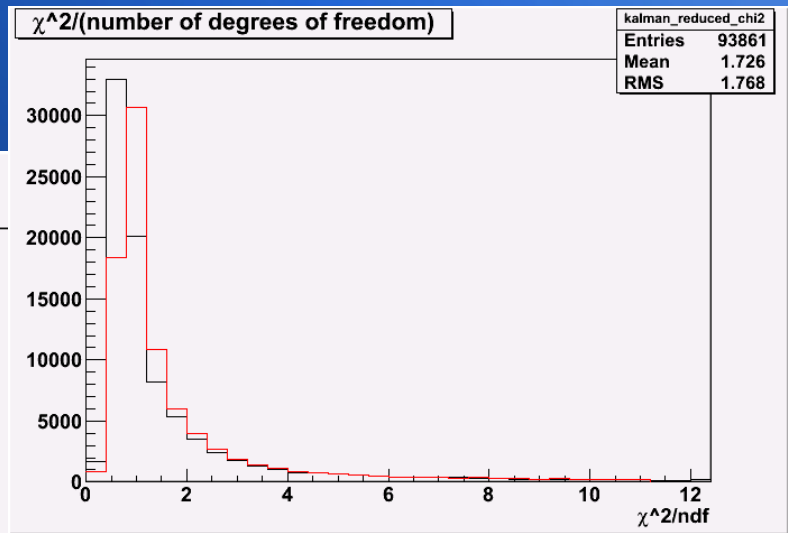
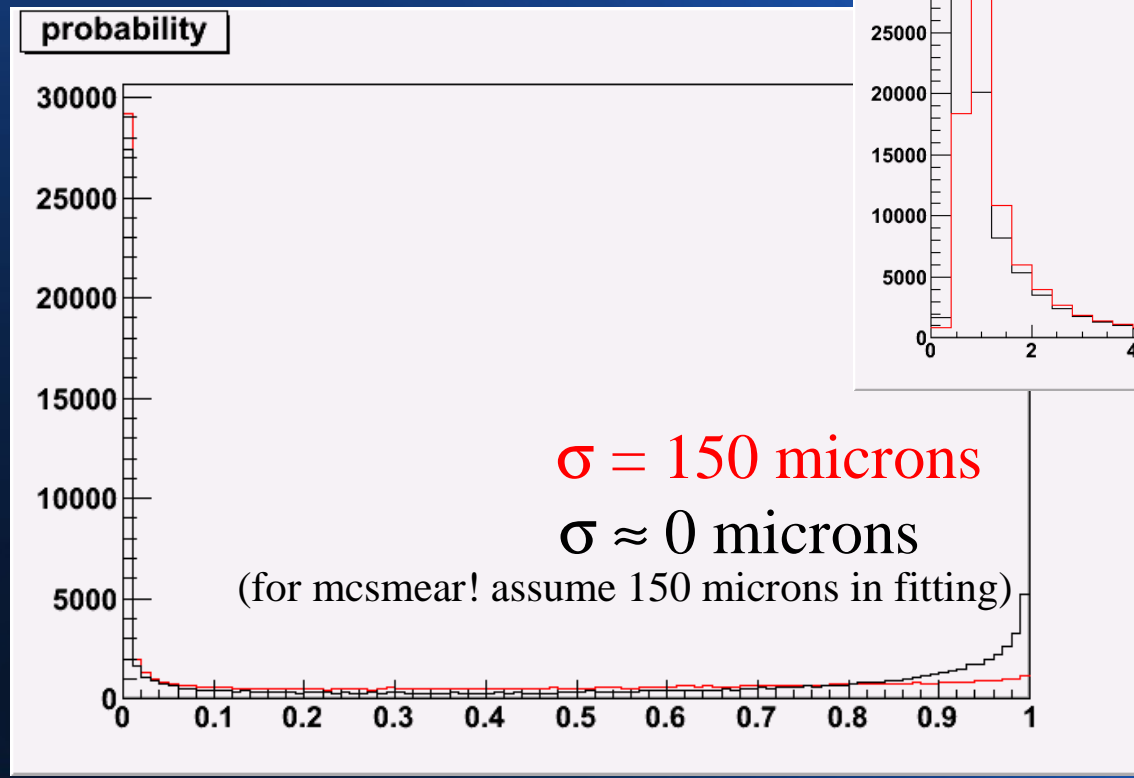


Recent changes to tracking code

- Fixed default setting for FDC cathode pedestal smearing in *calib/*
- Account for energy deposition dependence in FDC cathode errors
- Added **TRKFIT:USE_MULS_COVARIANCE** parameter to Kalman filter for turning on/off inclusion of the process noise covariance
- Added **TRKFIT:CORRECT_FOR_ELOSS** parameter for turning on/off energy loss correction in the filter
- Introduced alternate version of Kalman Filter (*KalmanSIMD_ALT1*) that does not use drift times from FDC anodes in fit
 - Can bypass Time-based stage for tracks with no (or few) CDC hits...

Effect of cathode pedestal noise

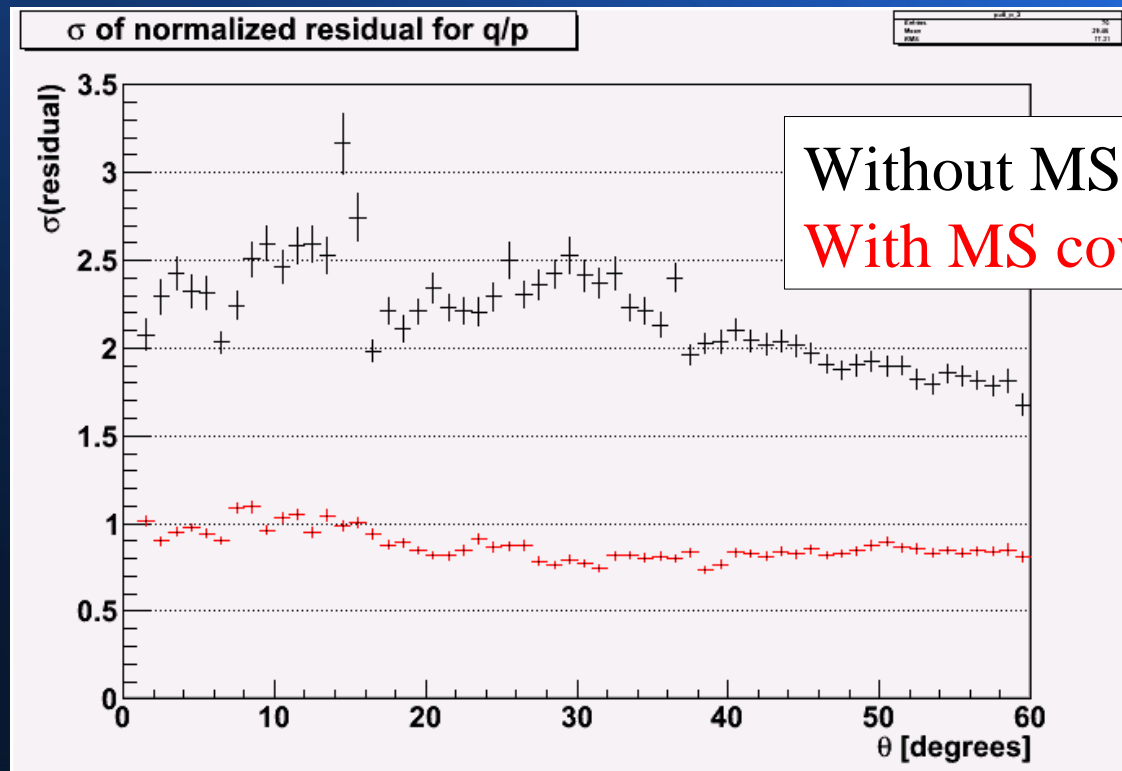
• π^- events, 0.1-10.1 GeV/c, 1-21 degrees



$\sigma = 150$ microns
 $\sigma \approx 0$ microns
(for mcsmeas! assume 150 microns in fitting)

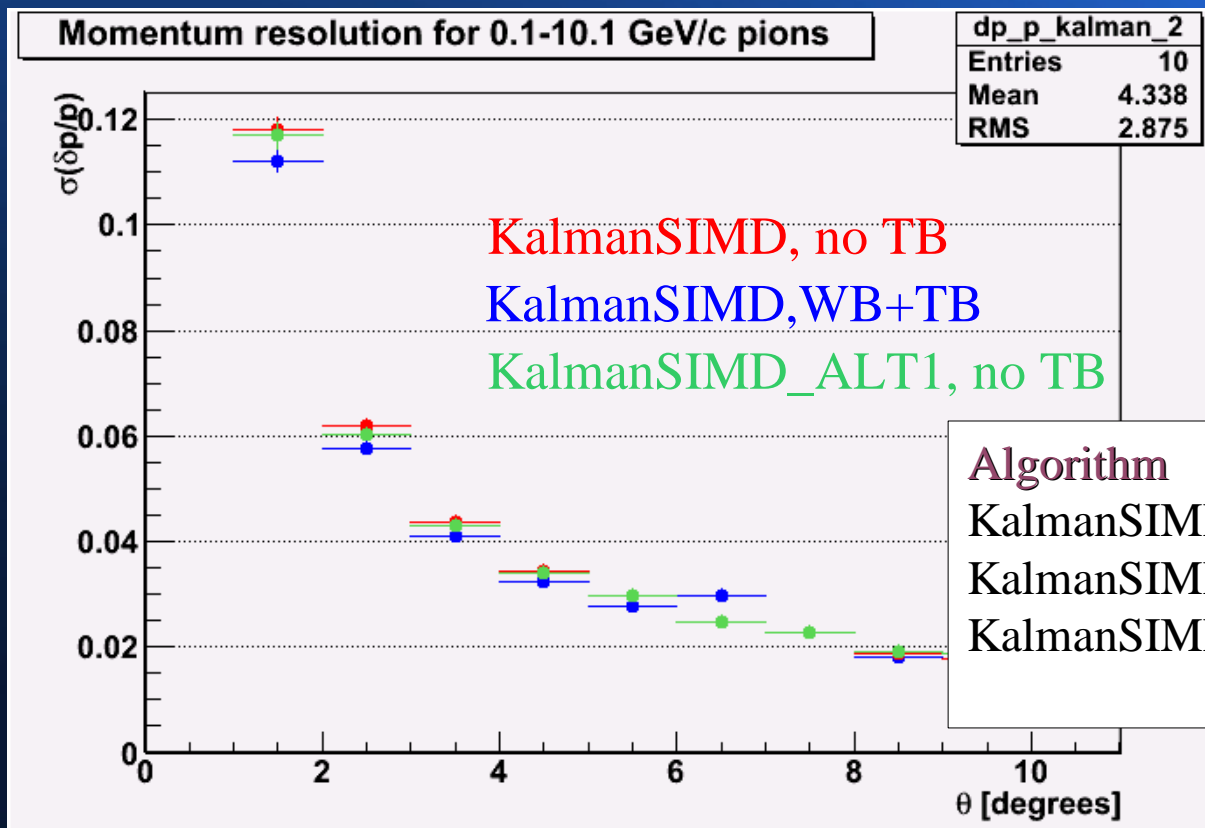
Impact on MS Covariance on residuals

- Proton events, 0.1-3.1 GeV/c, 1-141 degrees
- Normalized residual: $(v - v_{\text{true}}) / \sigma_v$



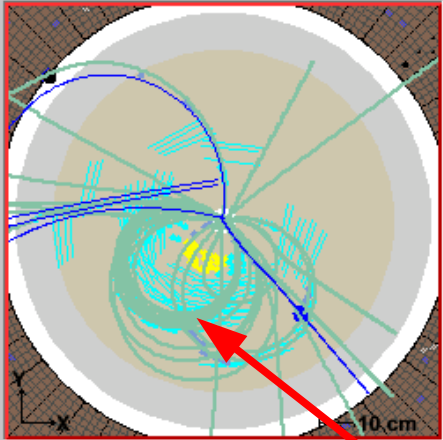
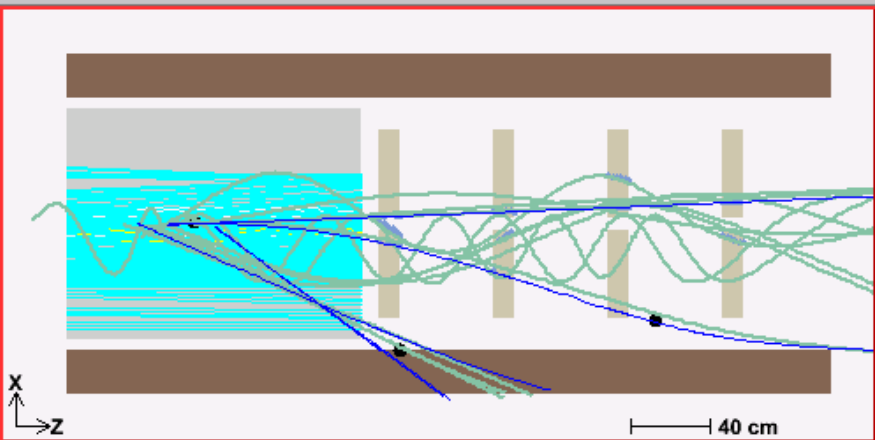
Alternate forward fitting

- Pions, 1-11°, forward tracking with and without time-based (TB) tracking



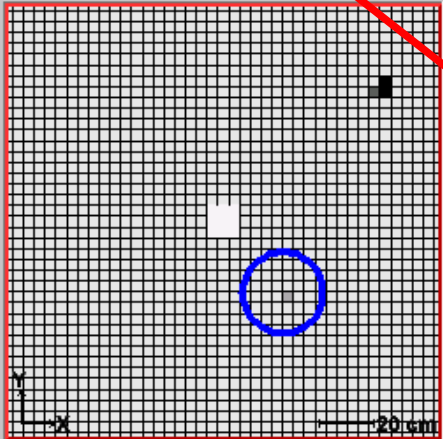
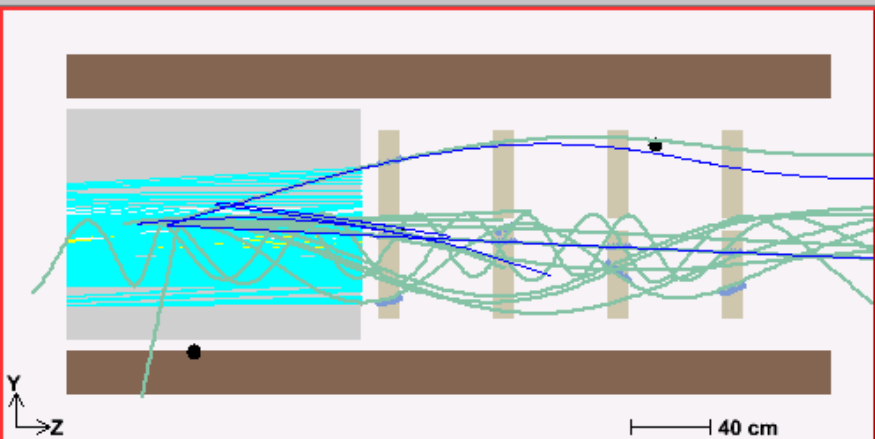
4 threads on ifarm1101

Cascade events



Track Draw Options

- DTrackCandidate: <default>
- DTrackWireBased: <default>
- DTrackTimeBased: <default>
- DParticleSet: <default>
- DPhoton
- DMCThrown
- DMCTrajectoryPoint



Hit Draw Options

- CDC
- CDC Drift Time

Multiple track candidates with no corresponding fitted tracks!

Problem: 2 low-momentum pions...

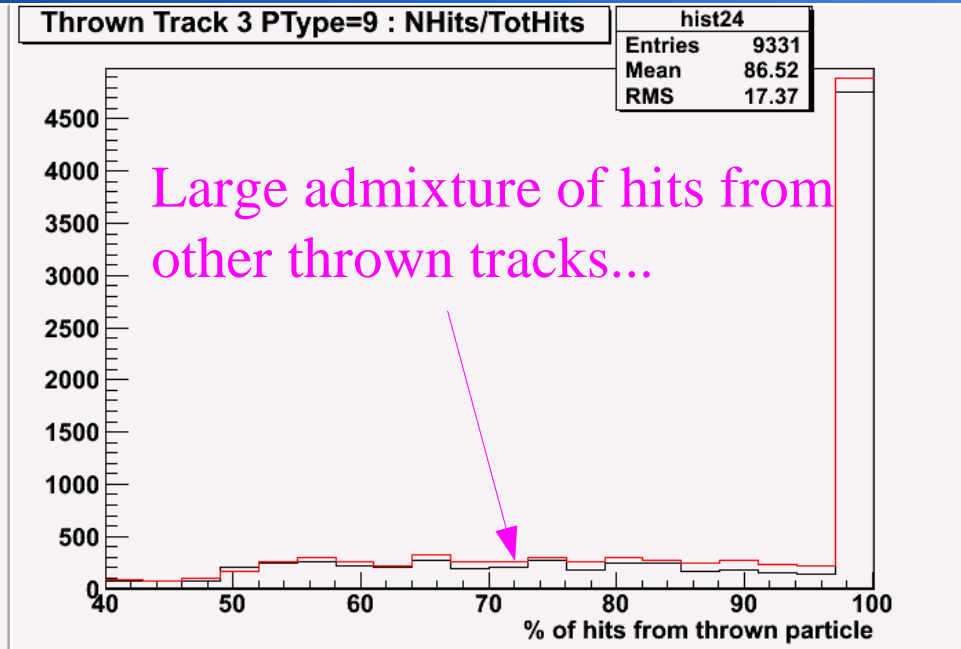
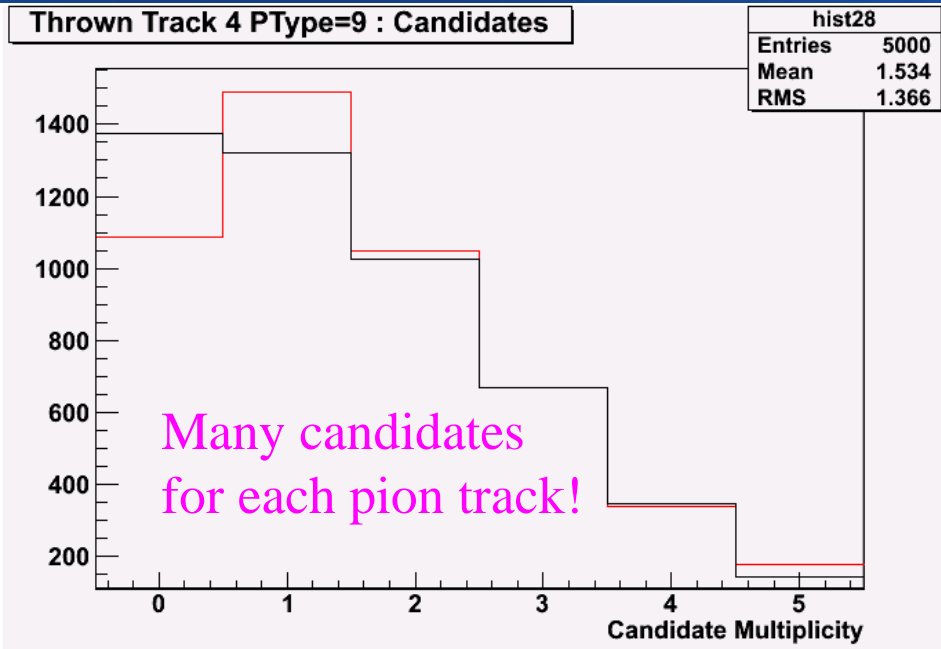
$$\gamma p \rightarrow K^+ Y^*(1960), Y^* \rightarrow K^+ \Xi^-, \Xi^- \rightarrow \Lambda \pi^-, \Lambda \rightarrow p \pi^-$$

Track Info

Thrown					
trk:	type:	p:	theta:	phi:	z:
1	k+	7.084	3.568	5.269	68.51
2	proton	0.8452	17.38	1.455	68.51
3	pi-	0.2316	31.89	0.2163	68.51
4	pi-	0.118	65.52	5.542	68.51
5	k+	1.006	29.23	2.789	68.51

Reconstructed										
trk:	type:	p:	theta:	phi:	z:	chisq/Ndof:	Ndof:	FOM:	cand:	DTrackTimeBased:
1	pi+	0.7741	17.14	1.405	67.84	6.255	15	6.33673e-13	1	<default>
2	pi+	7.55	3.571	5.274	68.29	1.011	37	0.770649	3	<default>
3	pi+	1.323	24.05	2.894	53.04	625.2	24	0.441489	6	<default>
4	pi+	10.68	36.89	3.293	92.9	188.8	10	6.70634e-123	7	<default>
5	pi+	6.527	37.25	3.288	92.34	121.1	11	0.867397	8	<default>

More on cascade events



- Track candidate multiplicity and “hit purity” are issues that need to be addressed...