5.3.2pre1 Lyr00 (Mis)Alignment

June 03, 2004

Stephen Levy, UChicago

Motivation

- Up until now, Simulation places Lyr00 & beampipe at center of COT instead of actual position ~(-1,1) mm
- Also, local Lyr00 alignment ideal in simulation
- Can we move Lyr00 & beampipe center and apply known alignment?
  - Potential Geant material overlap problem with “rail-thingy” (official nomenclature)
  - See Elena's talk last week

http://www-cdf.fnal.gov/internal/WebTalks/0405/040520_simulation_mtg.html

Method

- Manfred created 20k samples with 5.3.2pre1 (Pass 13) of Herwig ttbar with QQ for
  - Lyr00 Alignment Off, Rails On (Default)
  - Lyr00 Alignment On, Rails On
  - Lyr00 Alignment Off, Rails Off
  - Lyr00 Alignment On, Rails Off

    Just to be clear, “Alignment On” means

    SiliconGeometryMenu

    L00Alignment set true
- Compare various Lyr00 & basic track quantities in samples
  - Alignment On vs Alignment Off
  - Rails On vs Rails Off

Track Yield Comparison

	Al. Off & Rail On	Al. Off & Rail Off	% Change
Algo(3)	35925	35795	+0.36
Algo(4)	42629	42180	+1.05
Algo(11)	383772	382624	+0.30
Algo(16)	137970	138141	-0.12
Algo(17)	27197	26720	+1.75
Algo(22)	156856	157086	-0.15
Algo(23)	31626	31624	+0.01
Algo(24)	10339	10210	+1.25

	Al. On & Rail On	Al. On & Rail Off	% Change
Algo(3)	35789	35999	-0.59
Algo(4)	42677	42232	+1.04
Algo(11)	384122	382313	+0.47
Algo(16)	137840	137820	-0.01
Algo(17)	27123	26869	+0.94
Algo(22)	156603	157370	-0.49
Algo(23)	31658	31757	-0.31
Algo(24)	10183	10216	+0.56

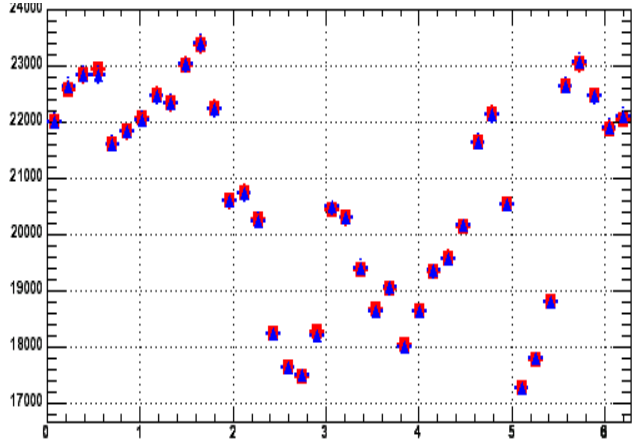
Track Algorithm Meaning
Algo(11) : 3D OI
Algo(16) : Si standalone
Algo(22) : OI rphi & SAS

Net Excess of Rail On – Rail Off
+1934 (0.23%) Align Off
+1509 (0.18%) Align On

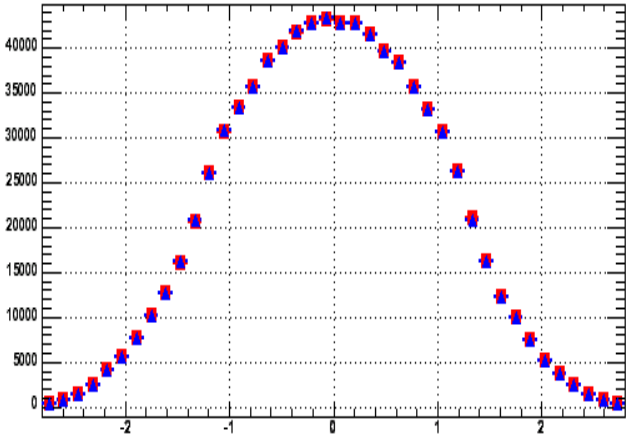
Net Excess of Al. On - Al. Off
-319 (0.04%) Rail On
106 (0.01%) Rail Off

Align On vs Align Off (Rails On)

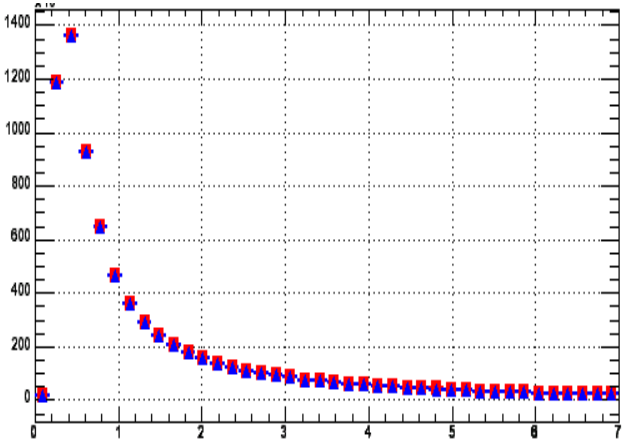
DefTrack Phi



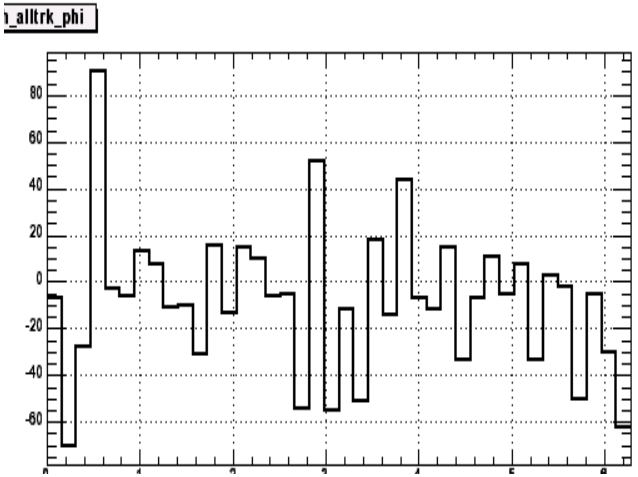
DefTrack Eta



DefTrack Pt

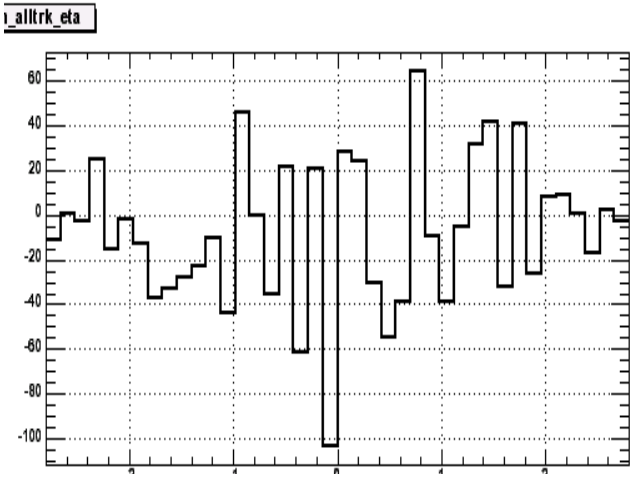


GeV



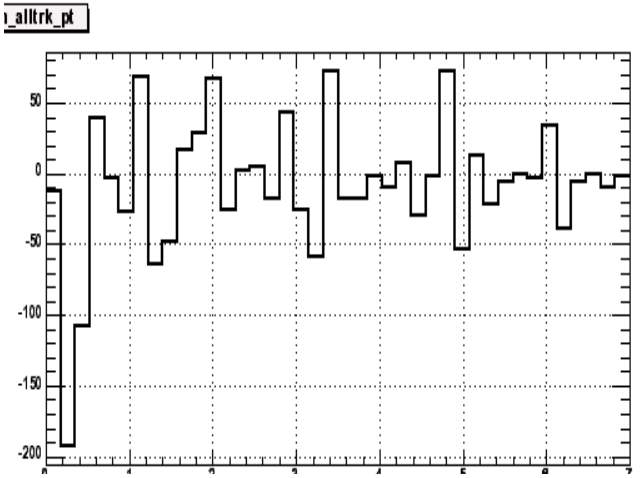
Phi difference

red - blue



Eta difference

red - blue



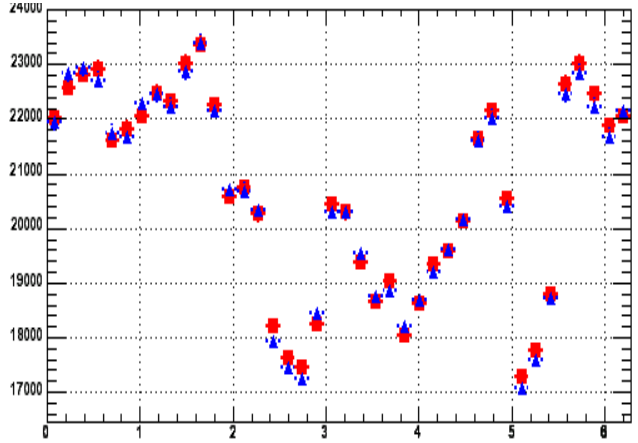
GeV

Pt difference

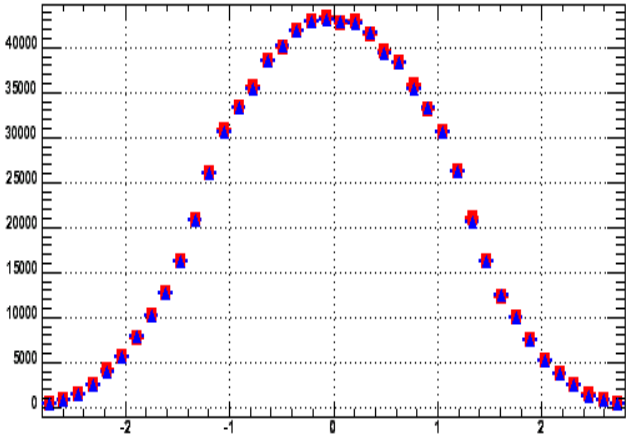
red - blue

Rails On vs Rails Off (Align On)

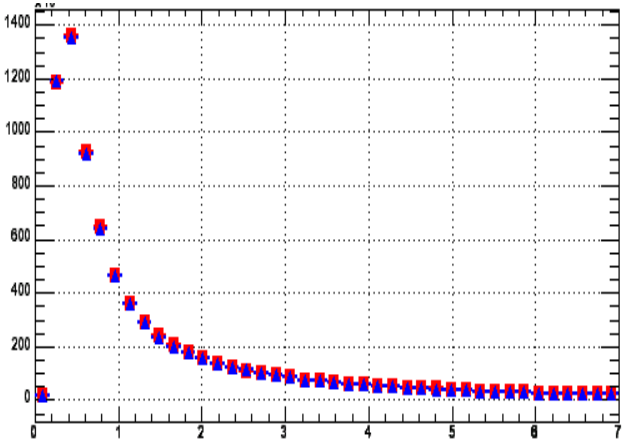
DefTrack Phi



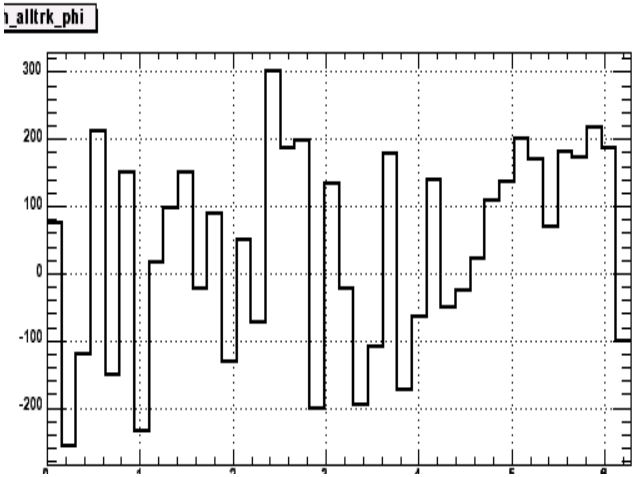
DefTrack Eta



DefTrack Pt

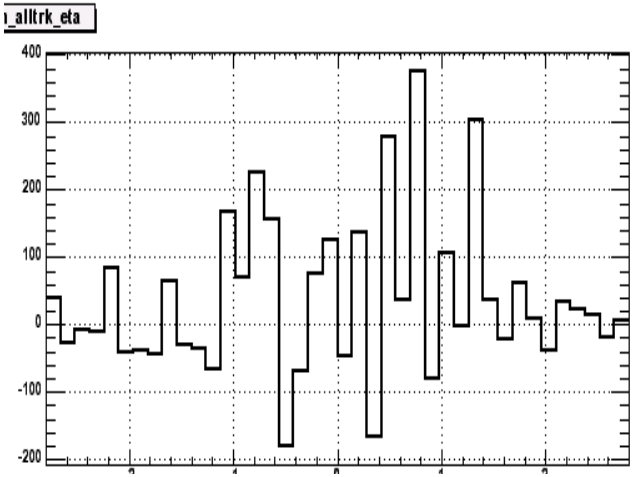


GeV



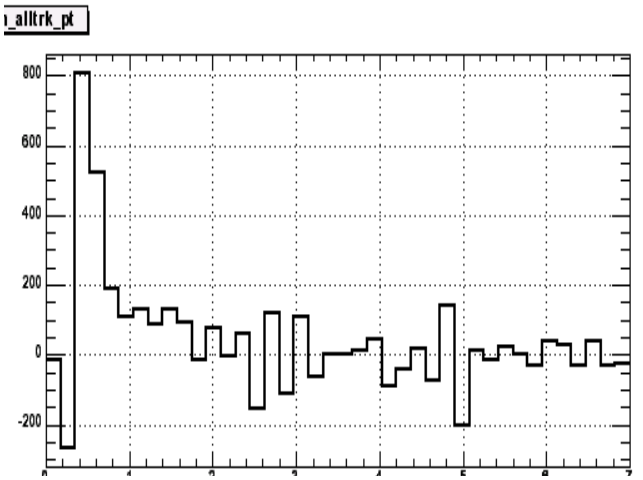
Phi difference

red - blue



Eta difference

red - blue



GeV

Pt difference

red - blue

Lyr00 Comparison

- Compare percentage of “good” tracks with exactly 1 (2) Lyr00 clusters added for all configurations
  - Good means Pt > 500 MeV, 3 ax. SVX hits, 15 COT st. & ax. Hits, |z0| < 60 cm, chi2/dof < 50

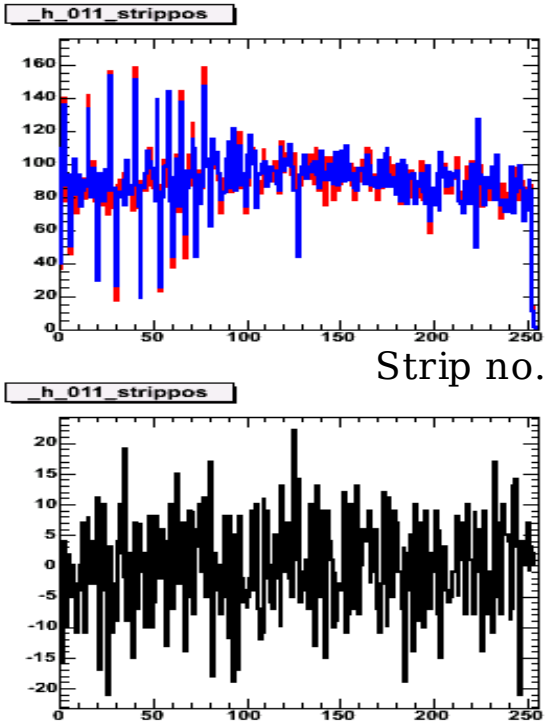
	Align Off	Align On
Rails On	48.6 (5.4)	49.9 (3.9)
Rails Off	48.6 (5.4)	50.0 (3.9)

Ratio of one / two cluster Lyr00 tracks in jet 50 data is 0.067. We get 0.078 with Alignment On compared to 0.11 for Alignment Off.

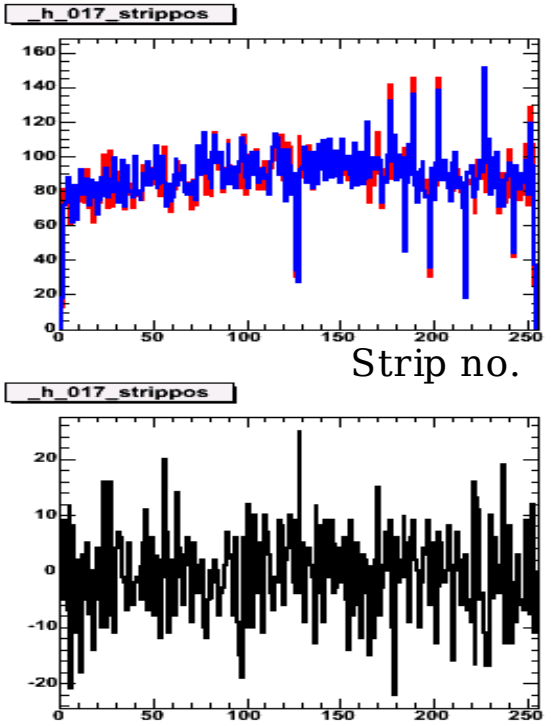
What happens to Lyr00 clusters when we remove the rails?

- Compare position of clusters (independent of tracks) for Lyr00 wafer (0,1,1) (barrel, ladder, phi) and (0,1,7)
  - We expect both of these to be affected by rails

(0,1,1) cluster position



(0,1,7) cluster position



BLUE: Rails Off
RED: Rails On

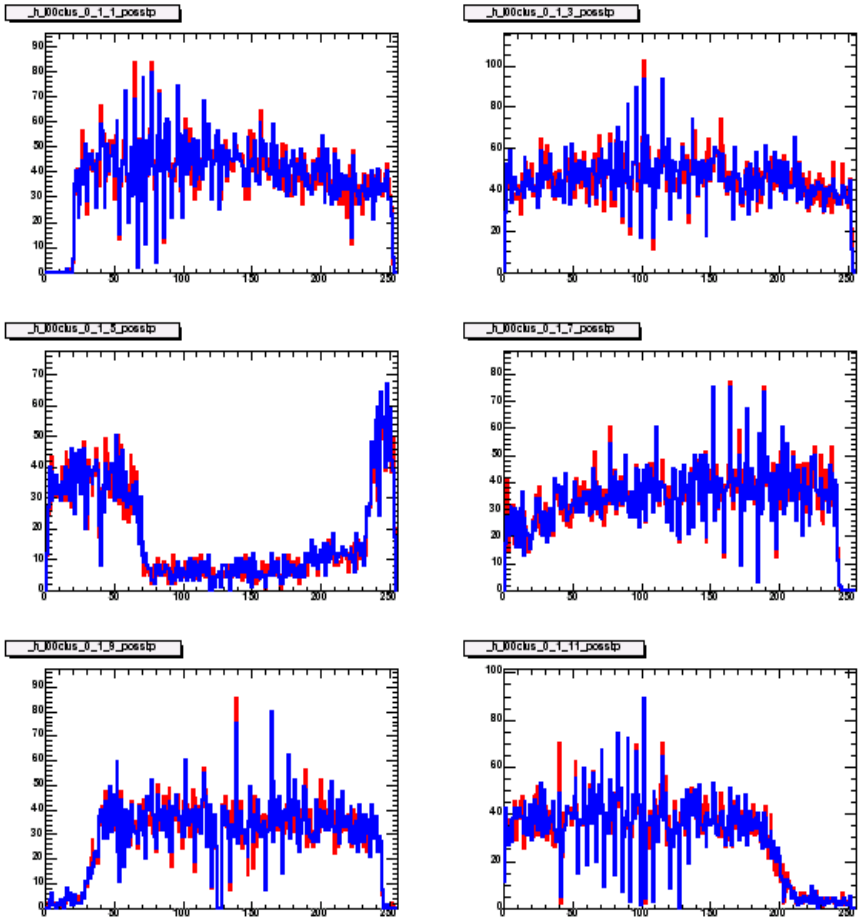
Difference wrt to above hist
red - blue

No “holes” from rail removal

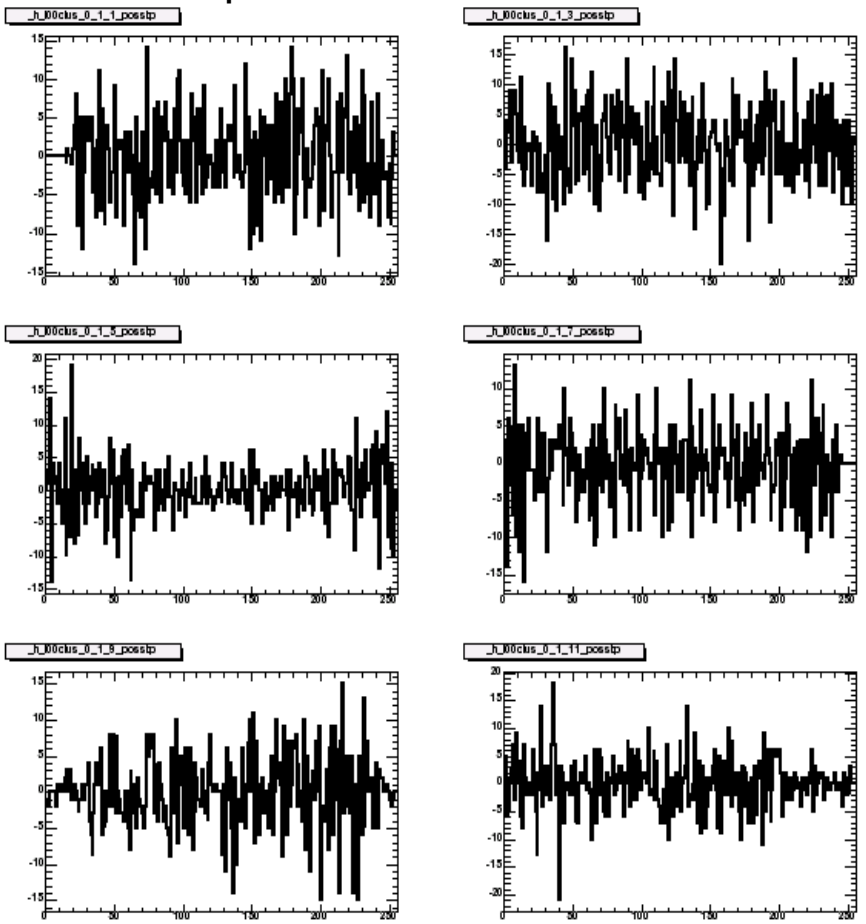
More Lyr00 Rails / No Rails

Compare number of clusters added to tracks vs strip position for wafer (0,1,1) for Rails Off & Rails On

(0,1,1) cluster position for outer phi wedges



Delta for plots on left = Red - Blue



Conclusions

- No obvious problems in track yields, pt, phi, eta distributions for Lyr00 Align On (with or without rails) for 5.3.1pre2 MC
- Difference between rails on & rails off seems statistical (not what we expected but...)
  - By eye comparison of a handful events verifies clusters simulated at same positions with different charge deposited (sampling from landau not in sync)
  - Might as well remove the rails since they are “known to be wrong” anyway