Study of COT Track Covariance Scaling (and L00)

Stan Lai and the SecVtx Track Selection Task Team

Tracking Meeting, May 5, 2004

Outline:

- Effect of COT Track Covariance Scaling
- Impact on SecVtx When Adding L00 Hits

Corrections to COT Covariance, dE/dx, Material Map

E. Gerchtein: Calibrating COT momentum scale using $J\psi$ Mass(CDF 6905)

Covariance Scaling	No Correction	4.9.1hpt3 (Old)	5.3.0 (New)
Curvature	1	5.33	21.72
d_0	1	3.01	11.57
ϕ_0	1	3.7	14.64
z_0	1	0.653	1.71
Λ	1	0.58	1.544

Numbers are much different due to smaller COT intrinsic resolution

Also:

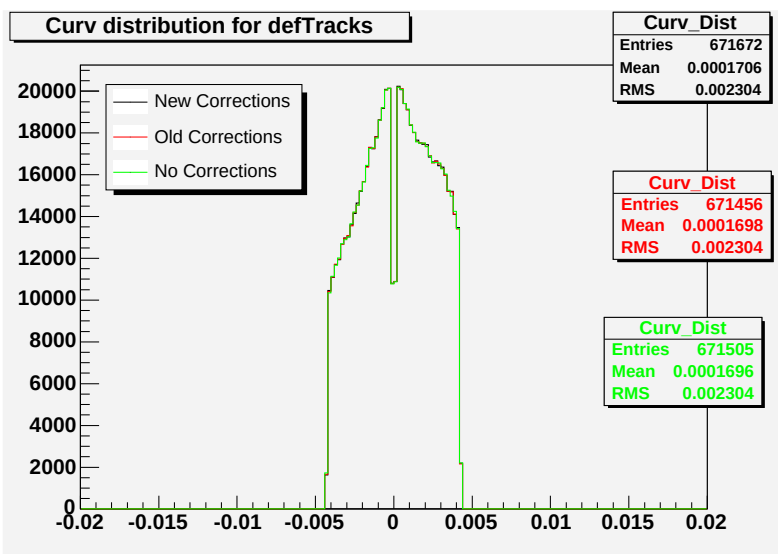
- new material phantom layer recommendation (not included)
- B-field determination (not included)
- dE/dx correction (included)

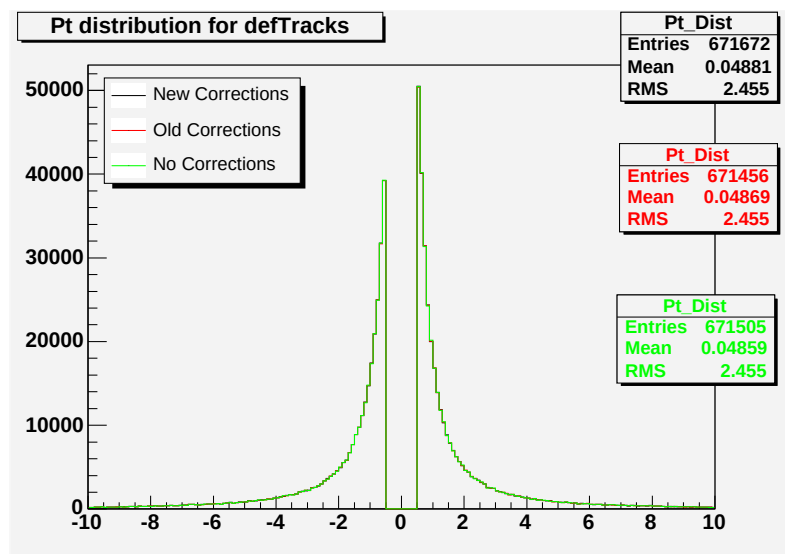
COT Track Covariance Scaling - Validation

Validation on:

- Track Curvature - COT dominated, but not interesting for b-tags
- Track d_0 - SVX dominated, but interesting for b-tags

Unfortunately, Track Covariance scaling does not work yet on COT StandAlone

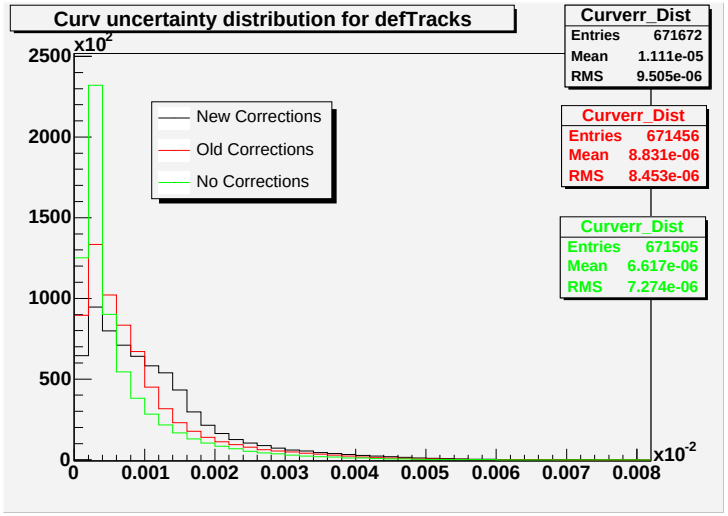


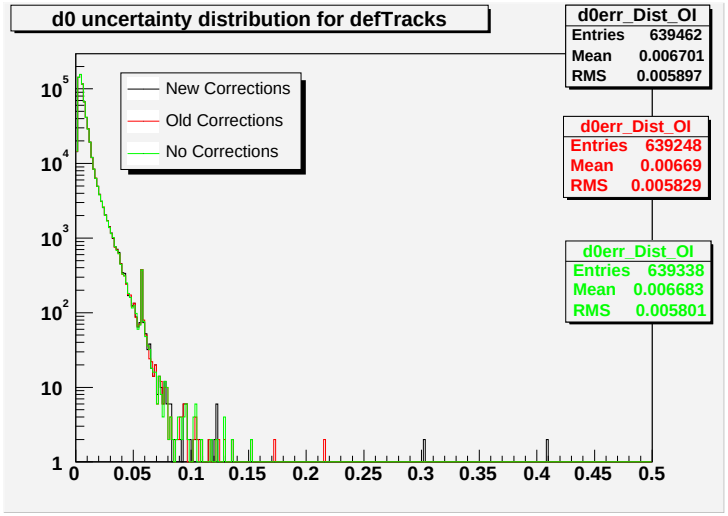


Does asymmetry concern anyone?

COT Track Covariance Scaling - Validation

Effect of COT Covariance Scaling on Track curvature and d_0 uncertainties



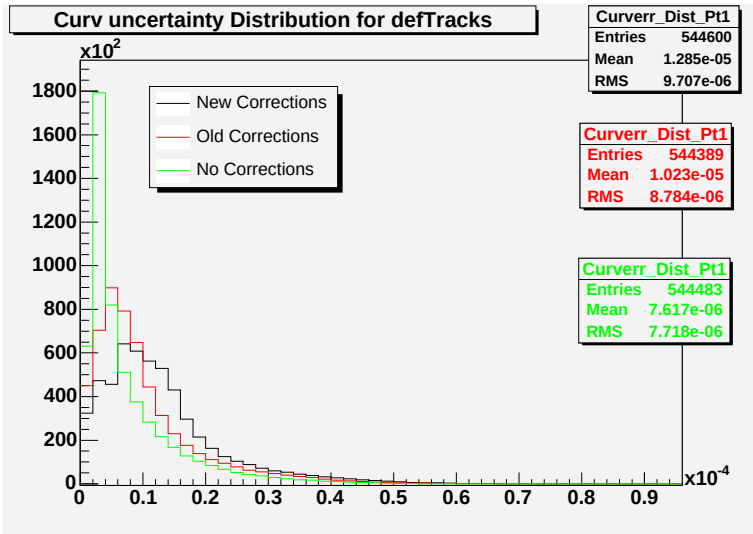


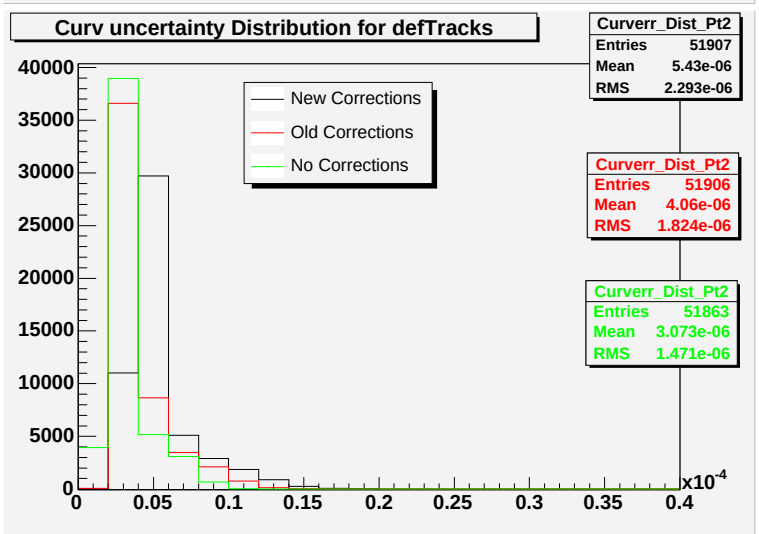
Large effect on Track Curvature but hardly any effect on Track d_0

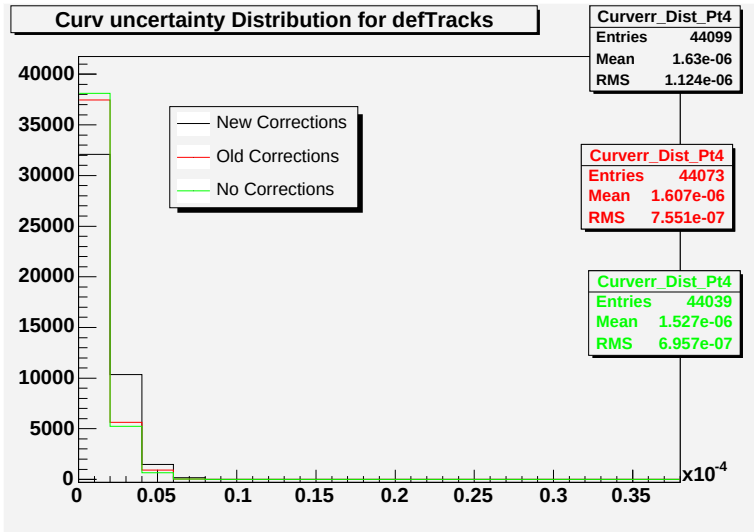
Also split up plots in p_T ranges:

- Range 1: 0.5 to 1.5
- Range 2: 1.5 to 2.5
- Range 3: 2.5 to 4.0
- Range 4: above 4.0

COT Track Covariance Scaling - Track Curvature



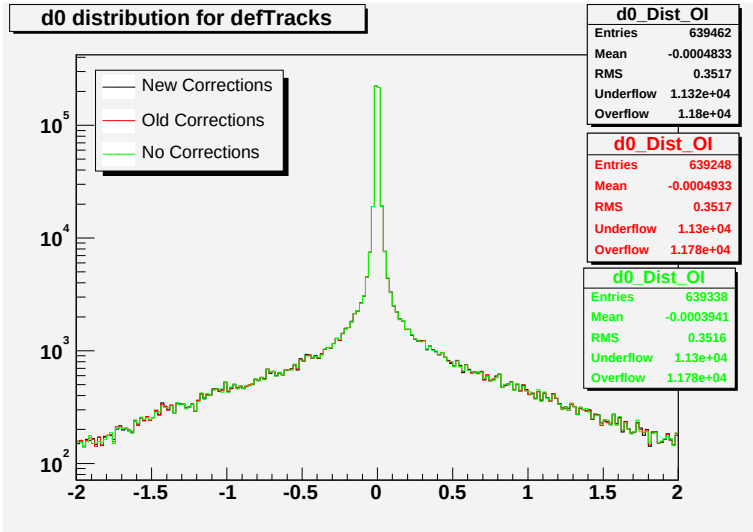


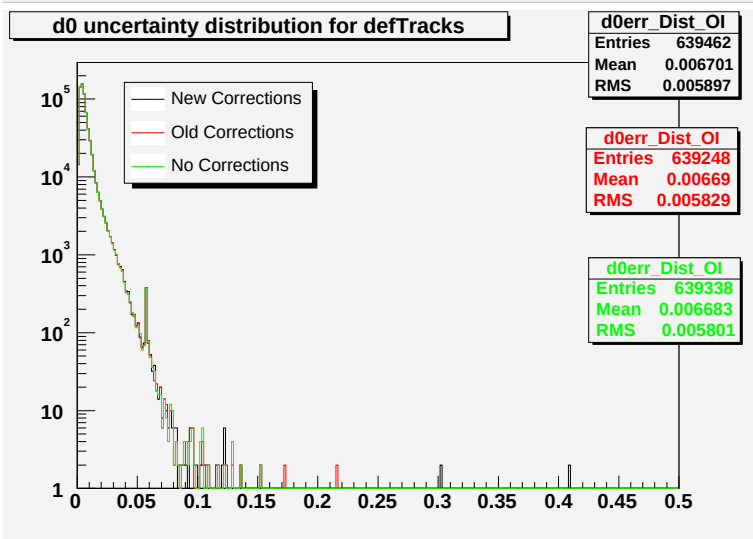


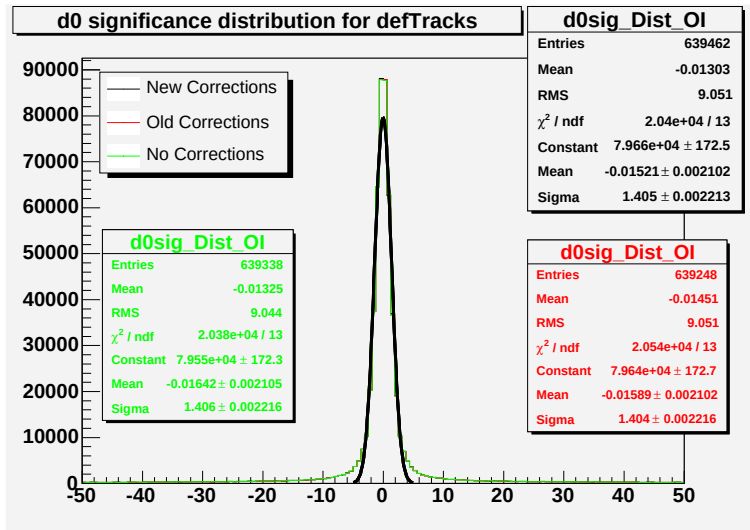
Corrections make a big difference for low p_T tracks

For higher p_T tracks the difference is smaller

COT Track Covariance Scaling - Track d_0 for OI Tracks

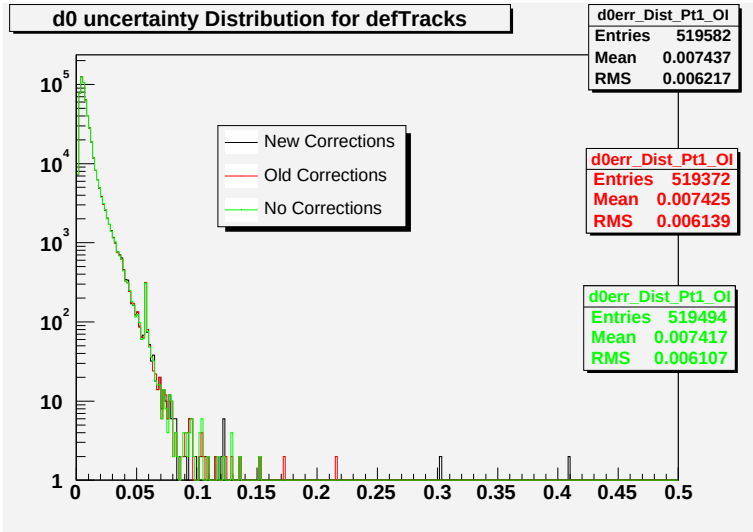


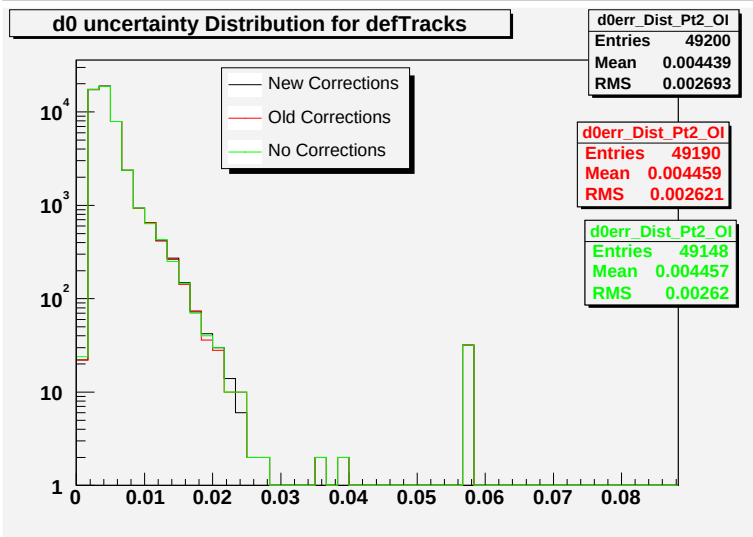


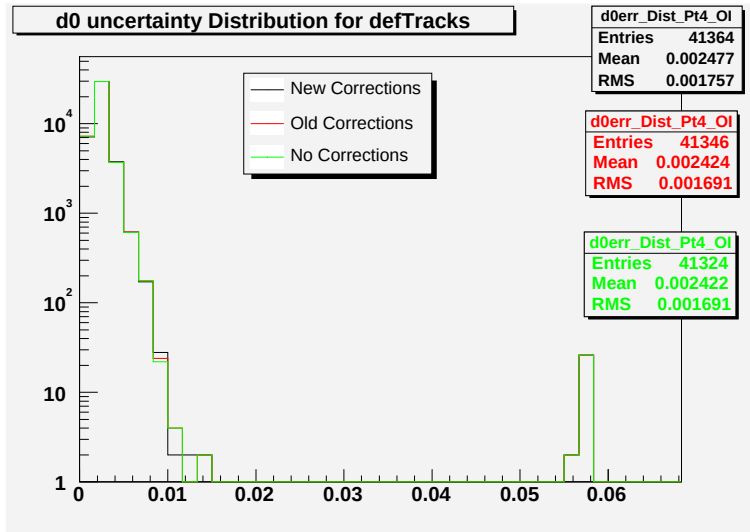


Hardly any effect - pulls don't necessarily shrink

COT Track Covariance Scaling - Track d_0 errors for OI Tracks

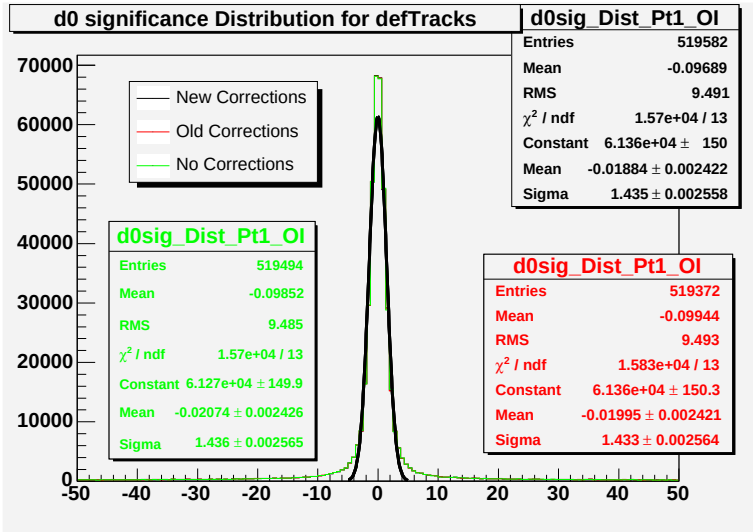


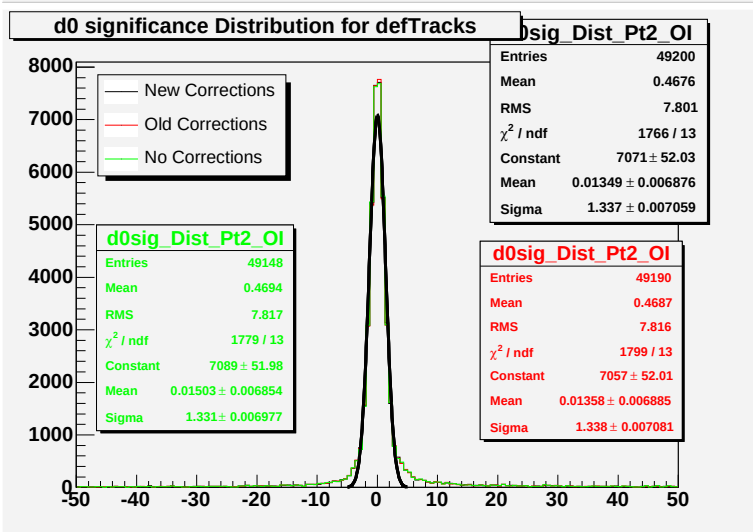


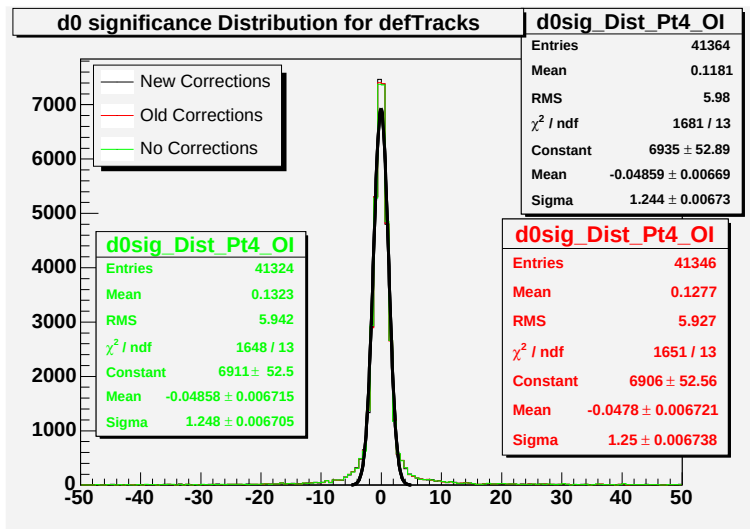


Hardly any effect - even at lower p_T

COT Track Covariance Scaling - Track d_0 sig. for OI Tracks







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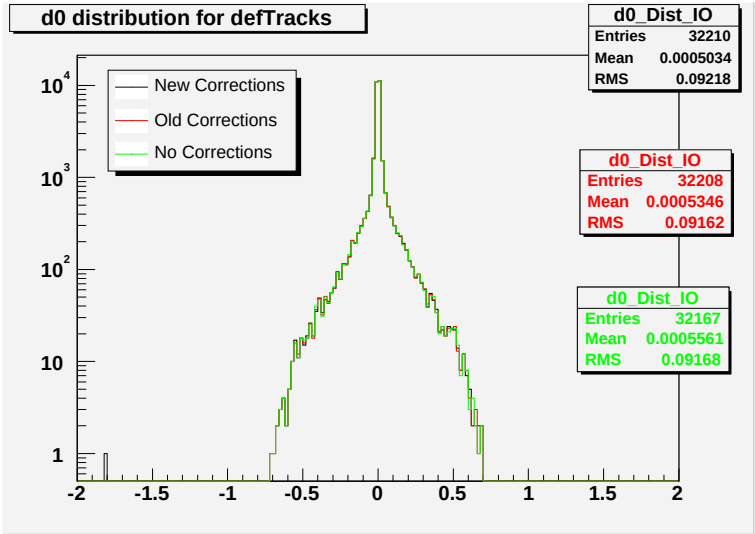
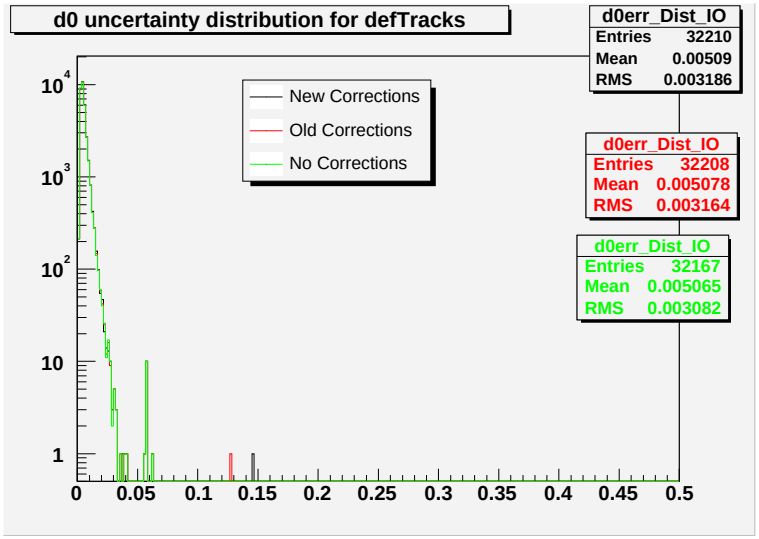
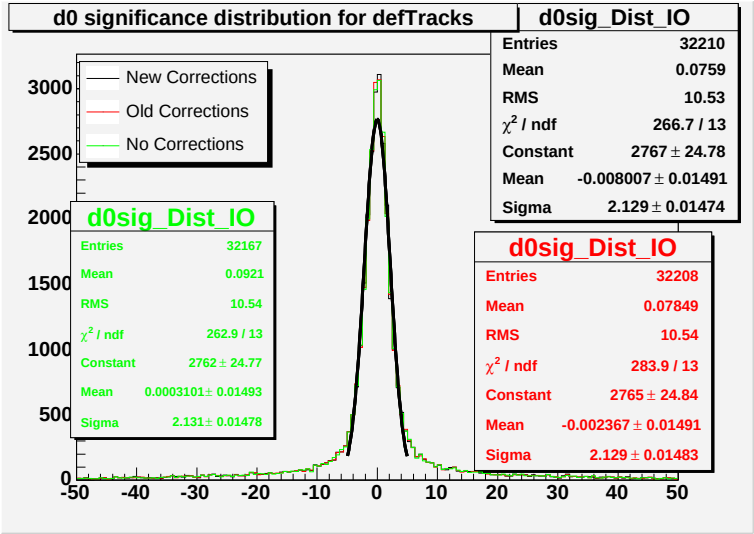
COT Track Covariance Scaling - Track d_0 for IO Tracks







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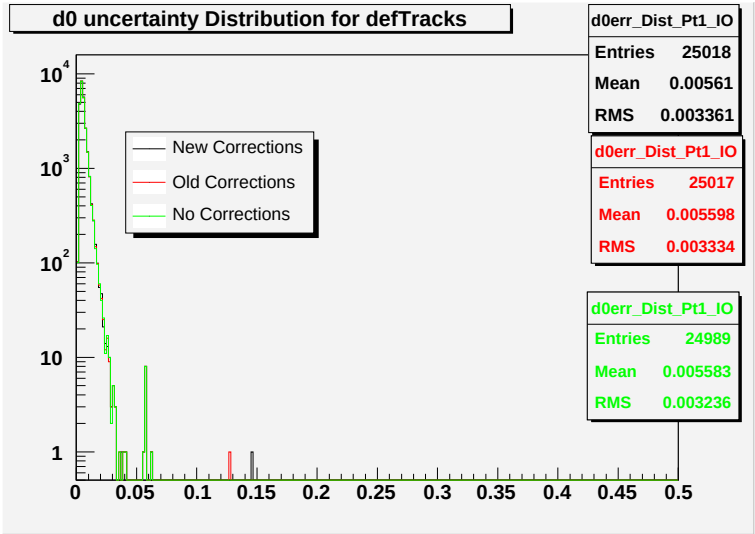

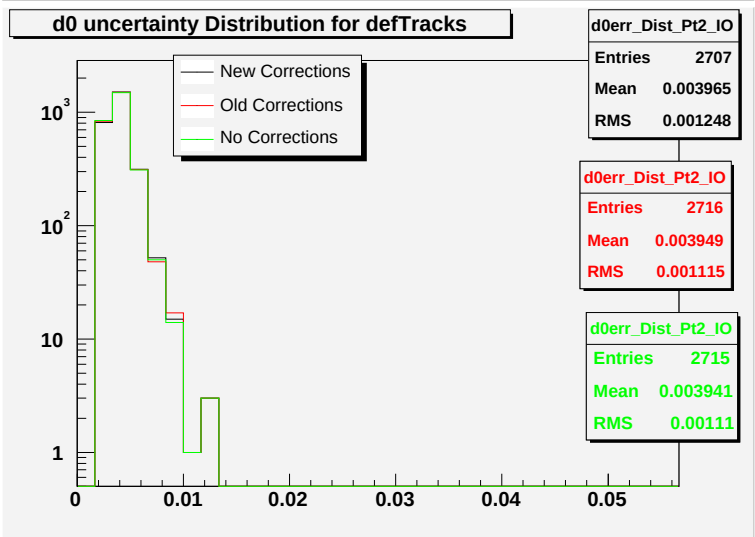

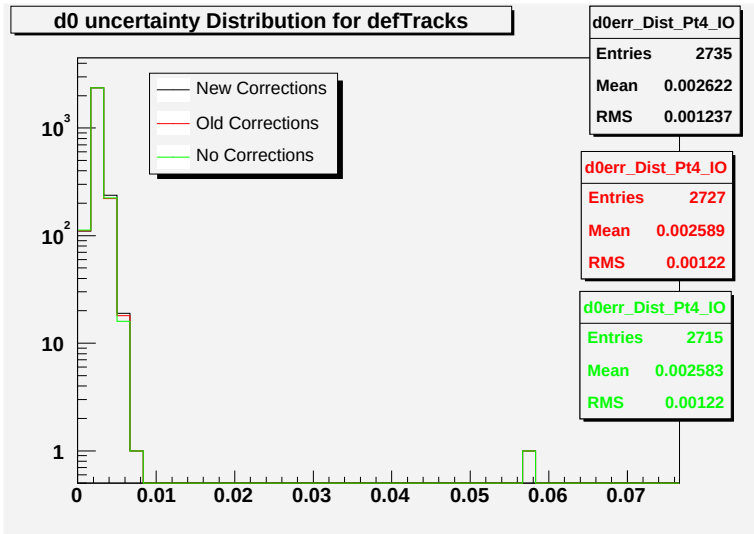

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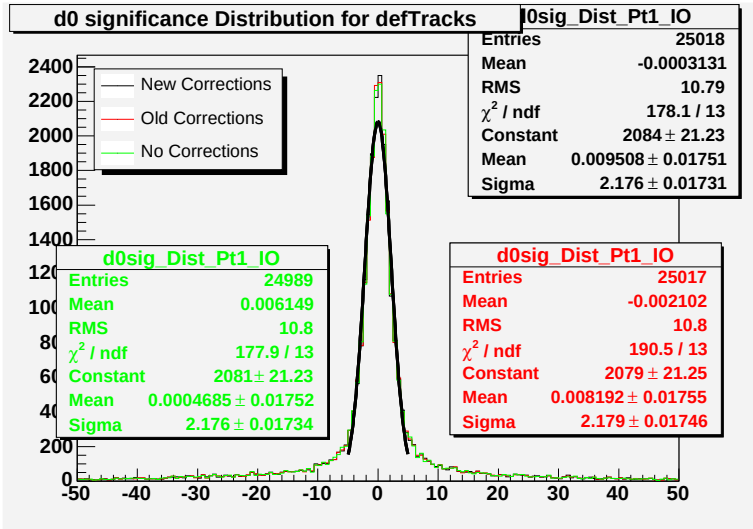
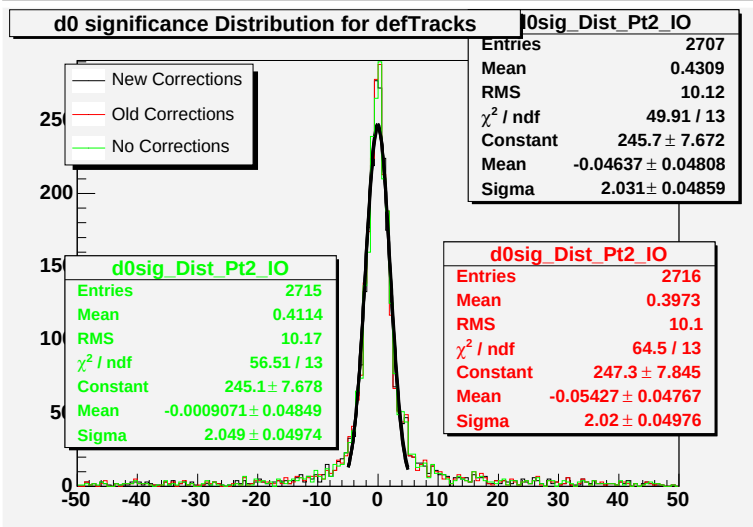
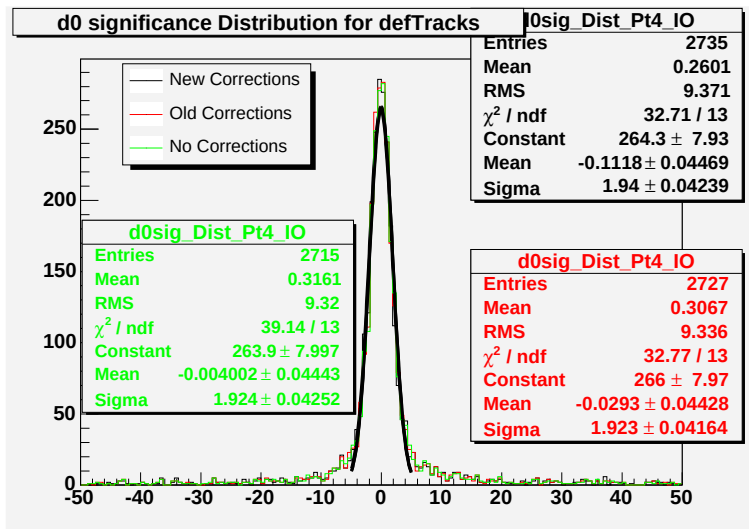
COT Track Covariance Scaling - Track d_0 sig. for IO Tracks







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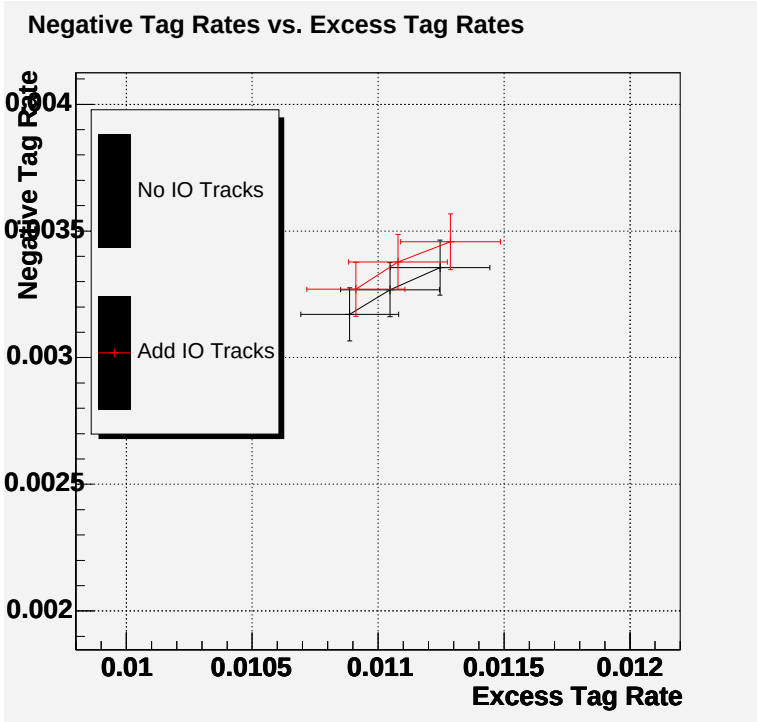
Pulls do not necessarily shrink

COT Track Covariance Scaling - Tag Rates



Tag Rates actually increase (Jet50)

Fiducial jets change slightly - affects denominator

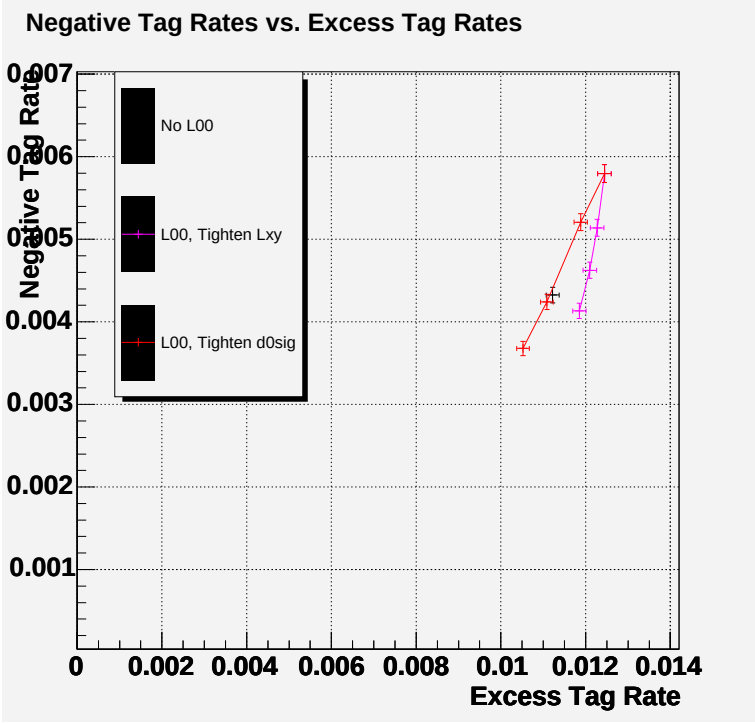
OI Tracks

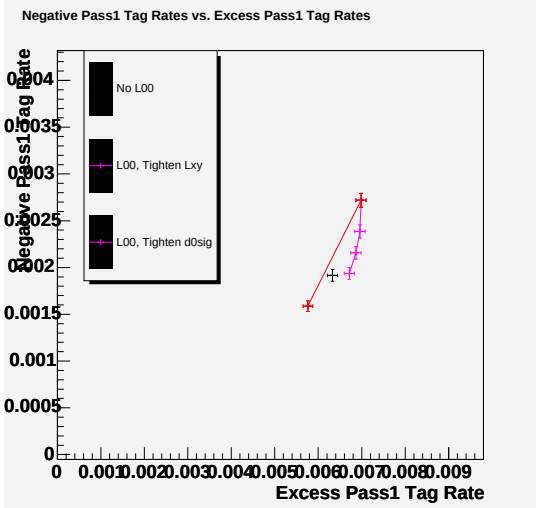
Corr	Fiducial	Neg Tags	Ex Tags
New	287305	964	3231
Old	287309	939	3174
None	287313	911	3128

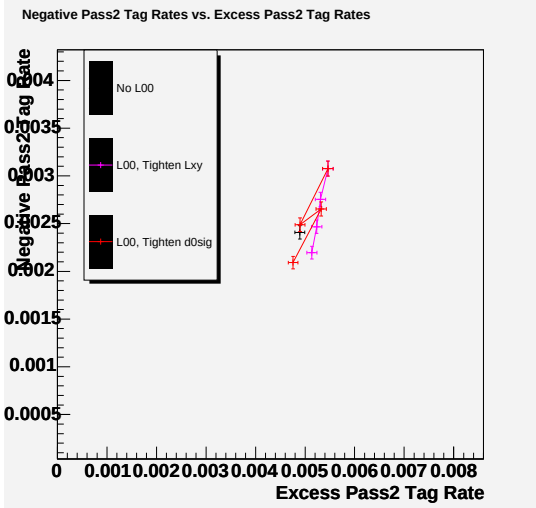
IO Tracks

Corr	Fiducial	Neg Tags	Ex Tags
New	287486	994	3245
Old	287489	971	3185
None	287493	940	3137

L00 Performance - Data



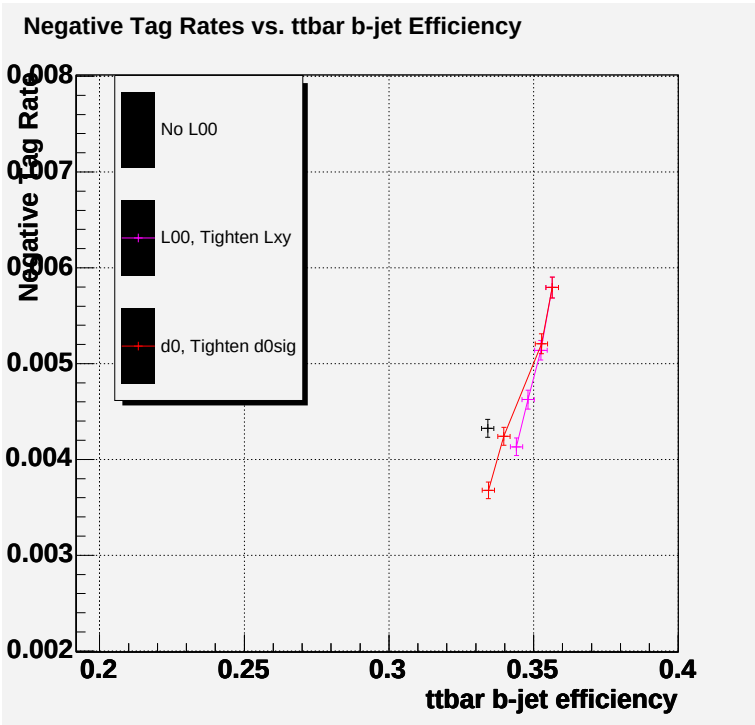


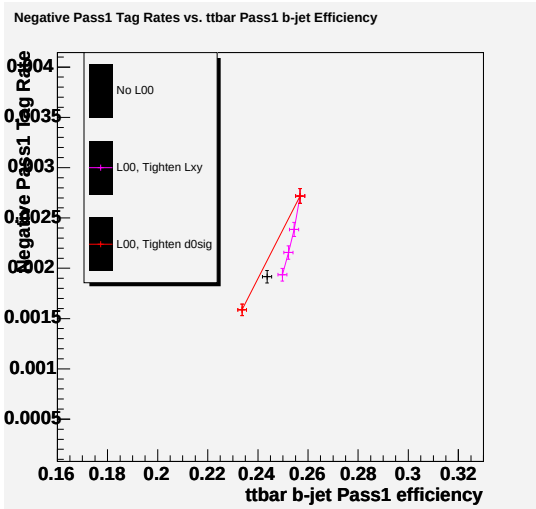


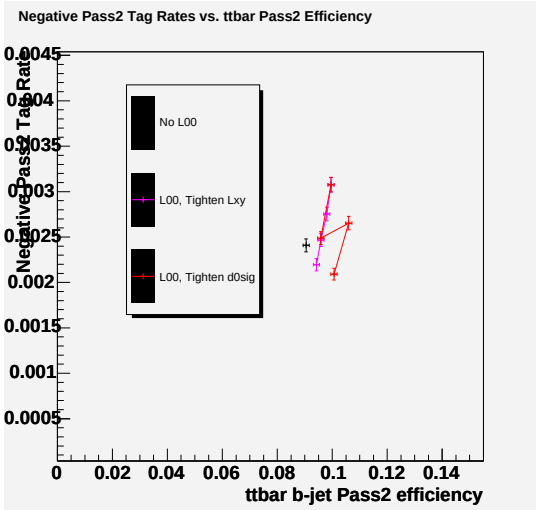
Tightening Lxy sig can increase efficiency without mistag sacrifice

Tightening d0 sig brings you back to where you started

L00 Performance - MC



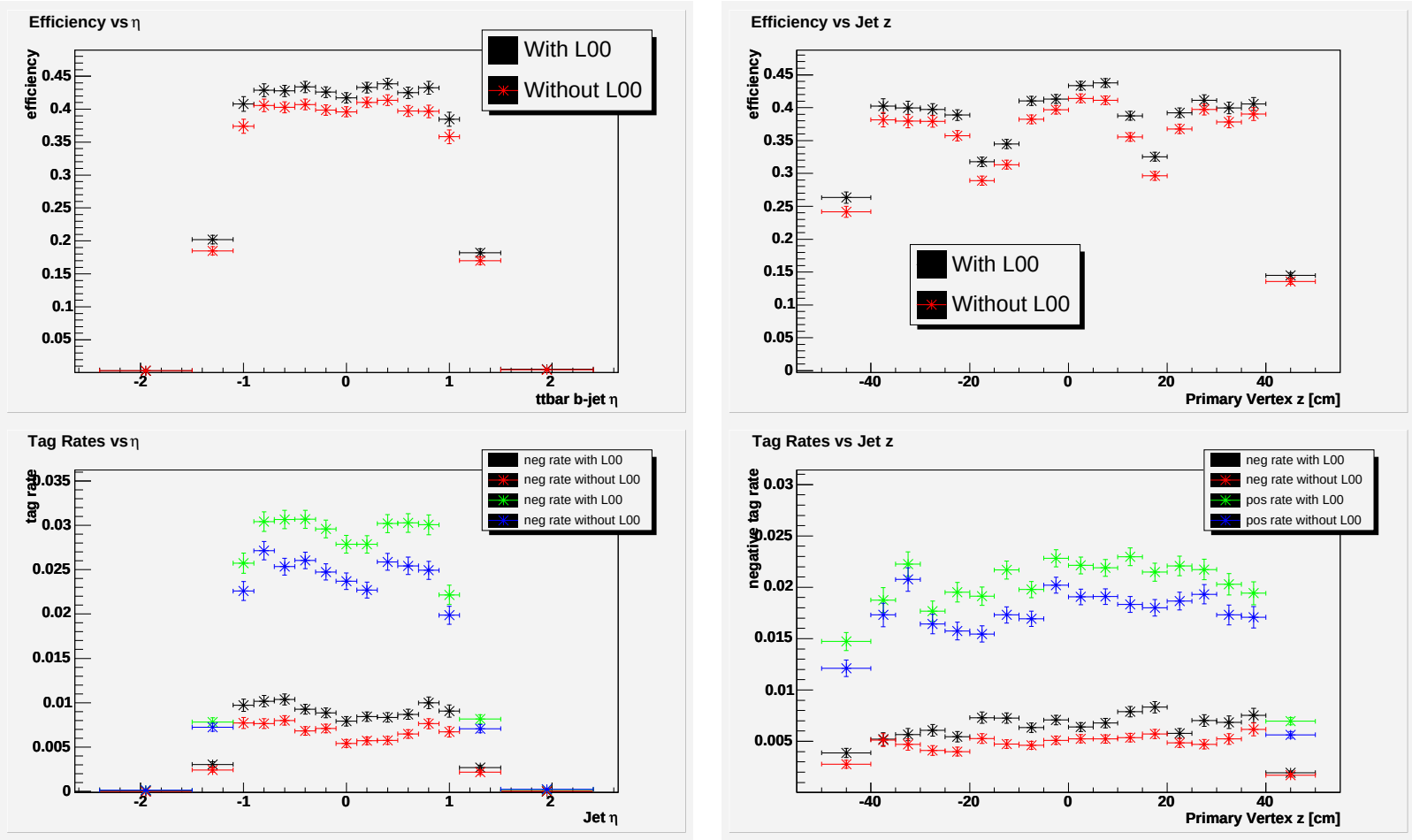


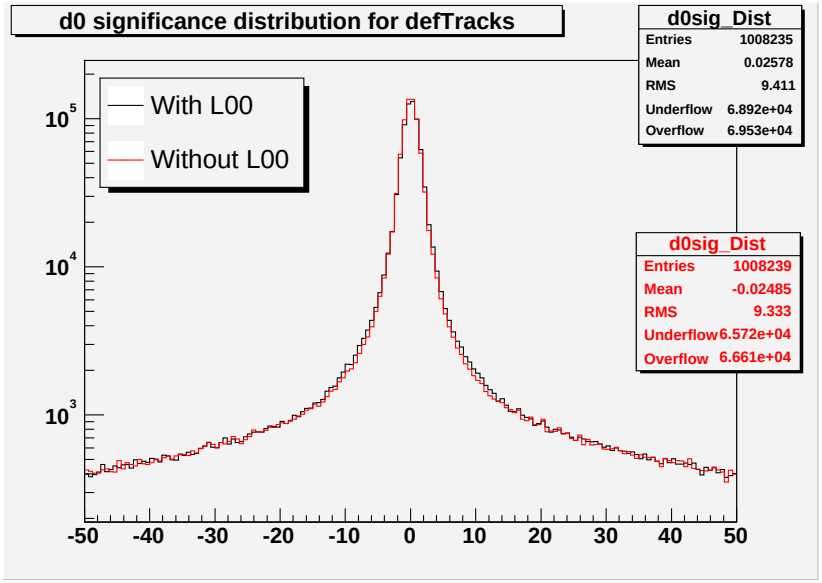
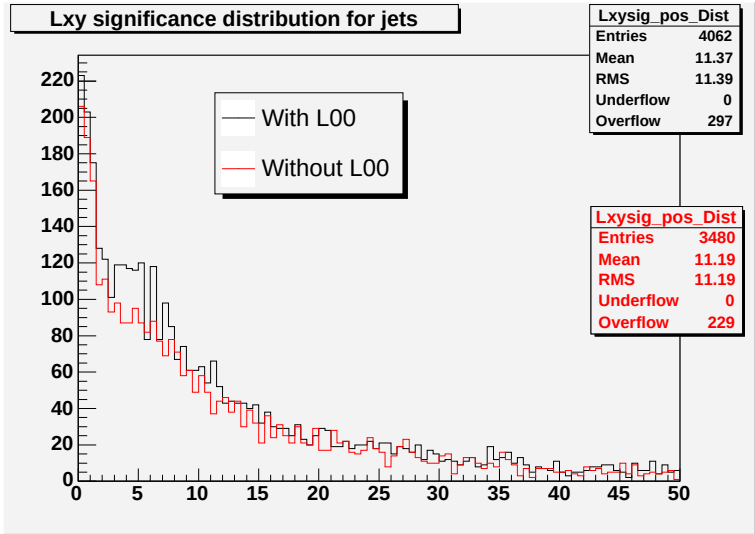
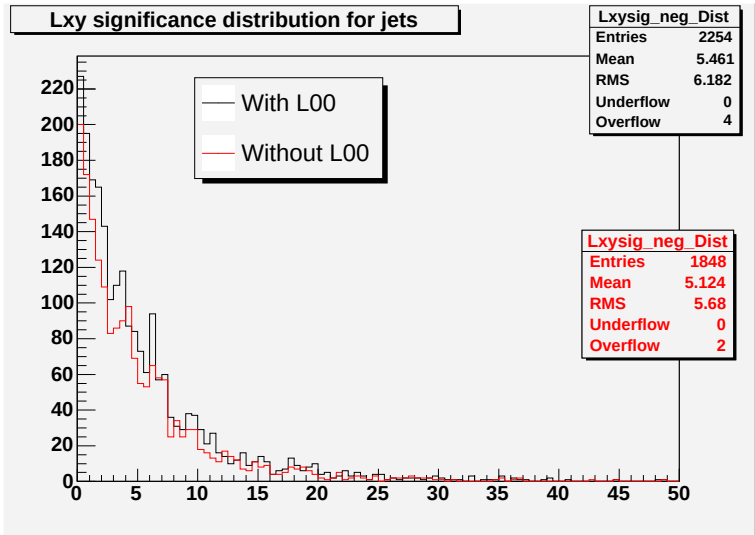


Tightening Lxy sig can increase efficiency without mistag sacrifice

Tightening d0 sig lets you gain, but less

L00 Performance - z and η dependence



L00 Performance - d_0 and L_{xy} Pulls

Jet 50 Data