

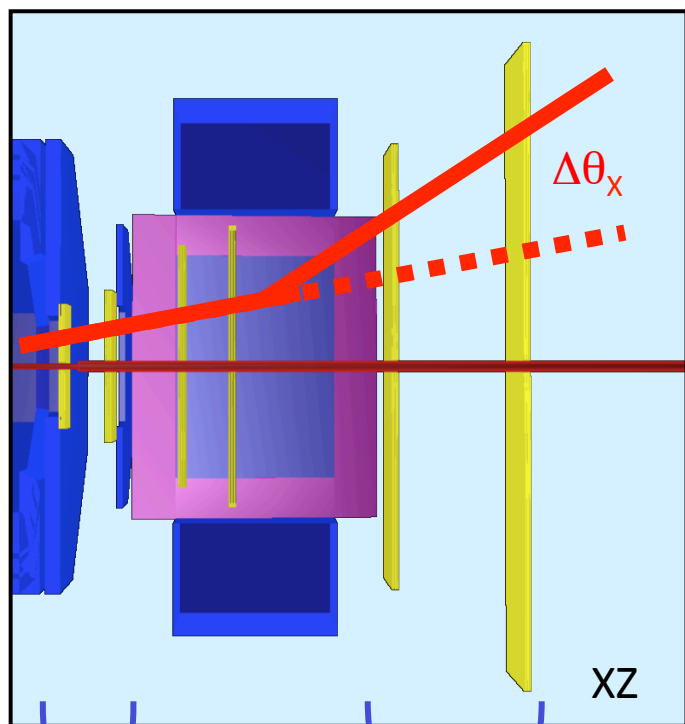
Momentum Resolution Study by Kick Plane Analysis

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Kick Plane Analysis

Momentum reconstruction: 4 drift chambers



Inner segment

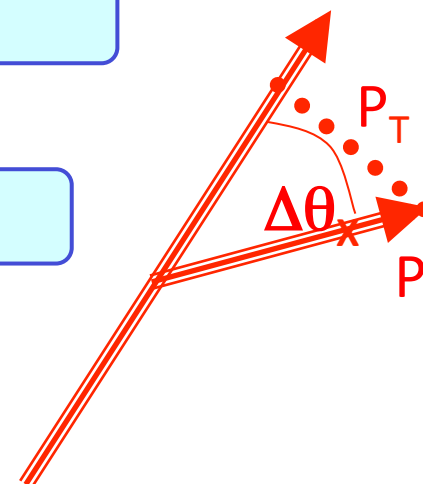
Outer segment

From deflection angle $\Delta\theta_x$



Kick parametrization P_T

$$\frac{P}{Z} = \frac{P_T}{2 \sin\left(\frac{\Delta\theta_x}{2}\right)}$$



Momentum reconstruction

$$\frac{P}{Z} = \frac{A}{2 \sin\left(\frac{\Delta\theta_x}{2}\right)} + B \cdot 2 \sin\left(\frac{\Delta\theta_x}{2}\right) + C$$

Taylor expansion

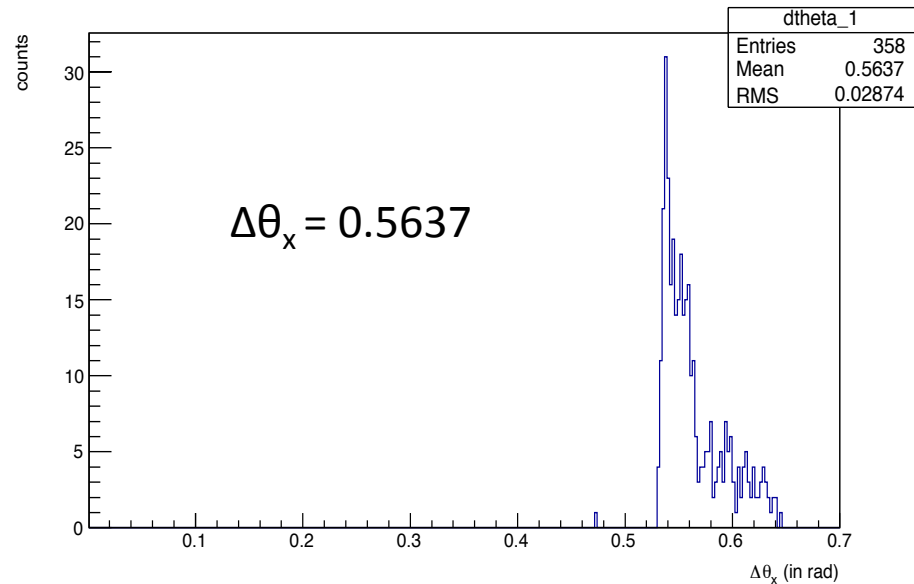
Parametrization of A B C

Simulation details

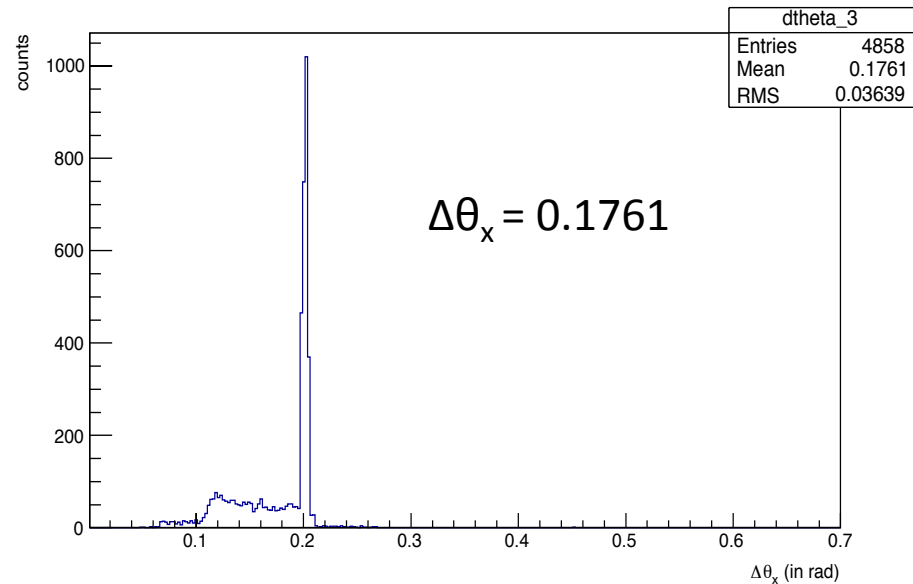
- BoxGenerator is used
- 10,000 Muons simulated with momentums:
1 GeV, 2 GeV, 3 GeV, ... 15 GeV
- Uniform phi: [0, 360°]
- Fixed theta: [3, 3°]
- Only primary tracks
- Detectors included are FTS and RICH:
For this simulation macro from fts folder used
- Simulated for two set ups
 - i. RICH in between fts5 and fts6
 - ii. RICH after fts6
- MC points used for this study

fts5richfts6: $\Delta\theta_x$

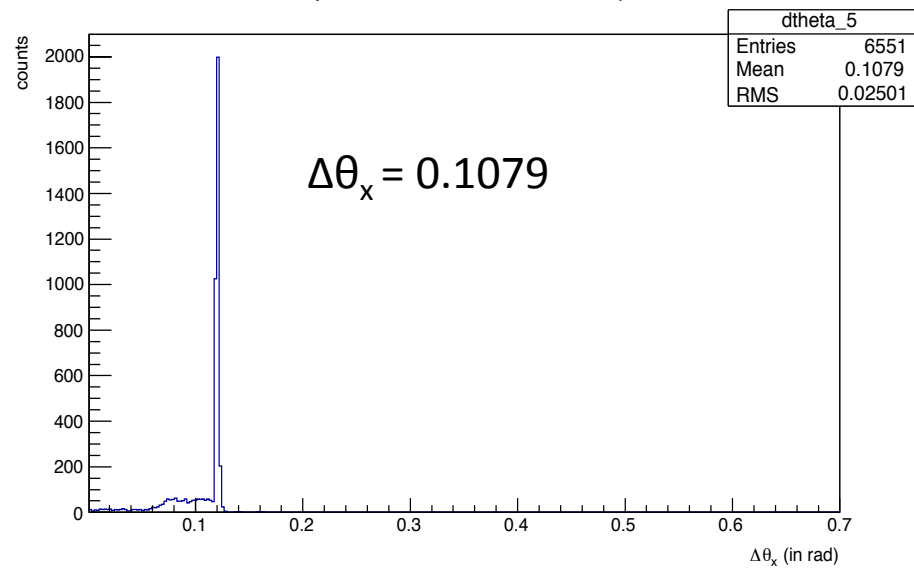
Theta determined by difference in track after and before dipole for P = 1GeV/c



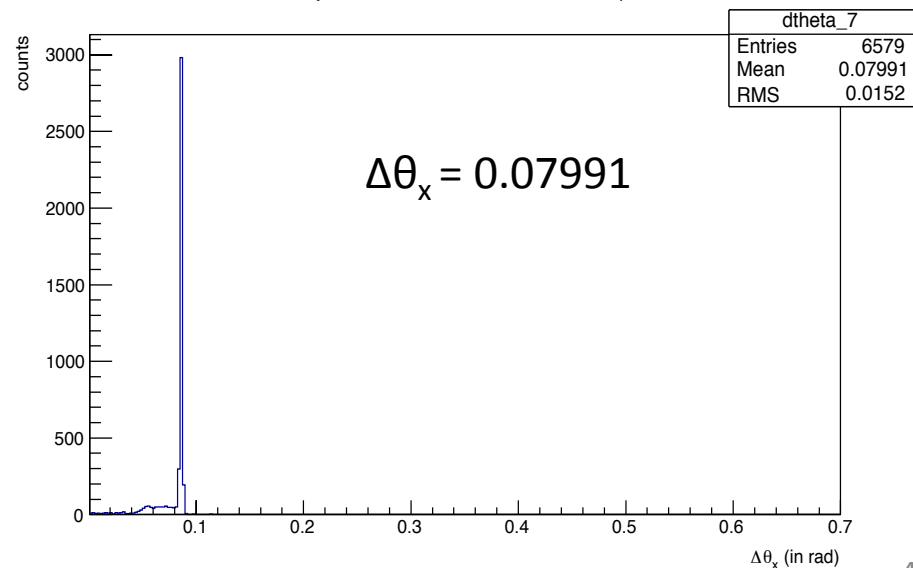
Theta determined by difference in track after and before dipole for P = 3GeV/c



Theta determined by difference in track after and before dipole for P = 5GeV/c

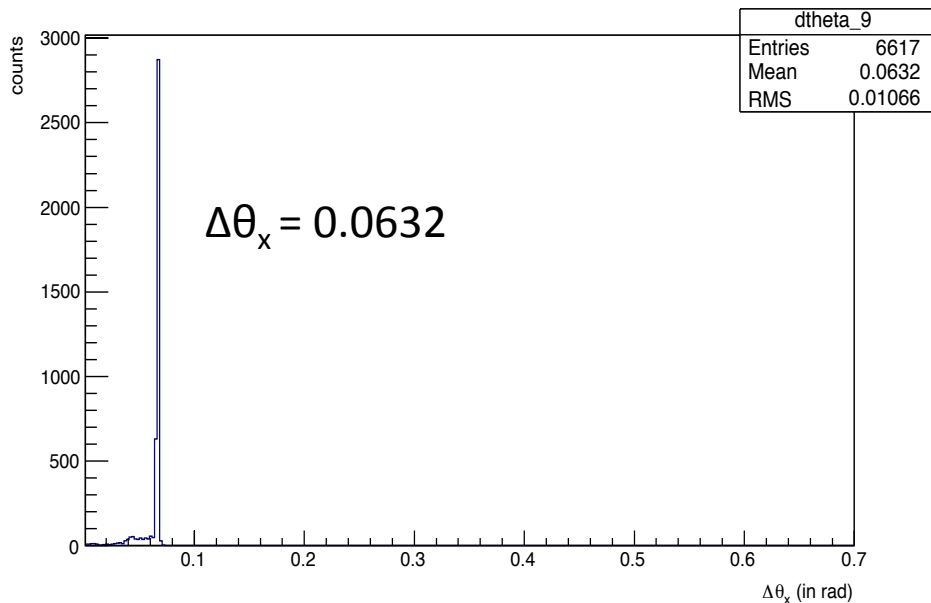


Theta determined by difference in track after and before dipole for P = 7GeV/c

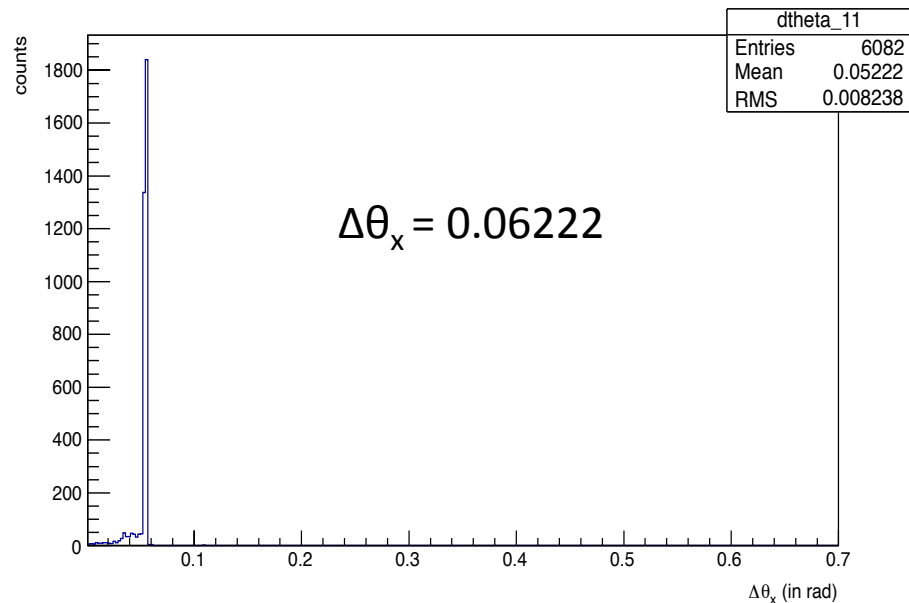


fts5richfts6: $\Delta\theta_x$

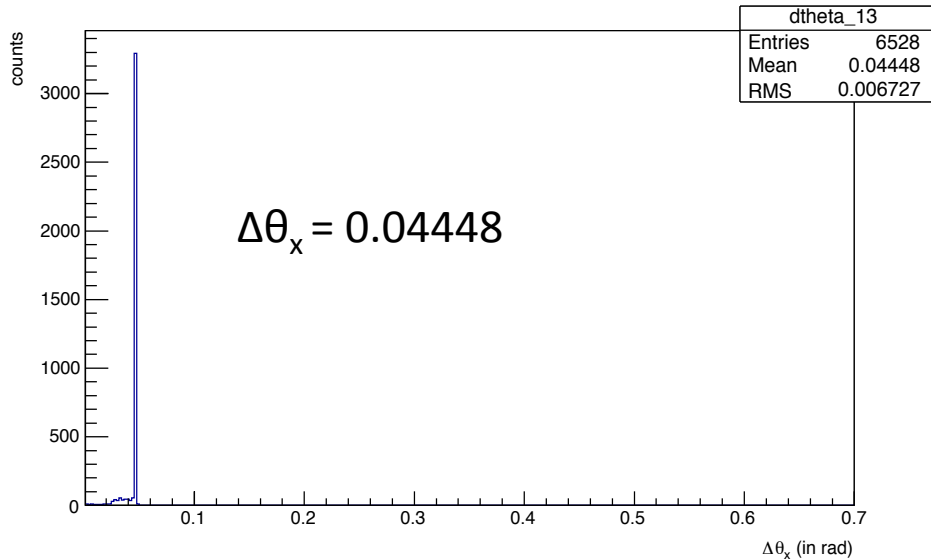
Theta determined by difference in track after and before dipole for P = 9GeV/c



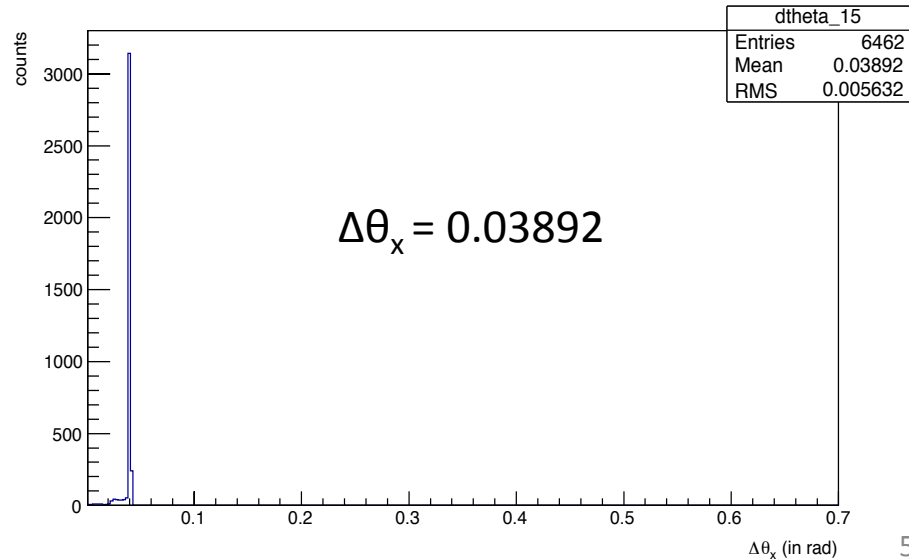
Theta determined by difference in track after and before dipole for P = 11GeV/c



Theta determined by difference in track after and before dipole for P = 13GeV/c

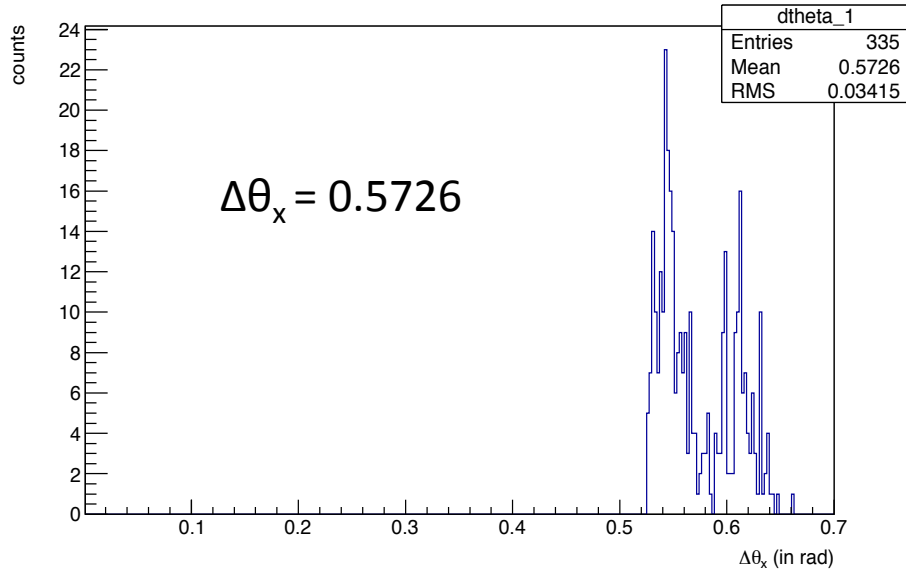


Theta determined by difference in track after and before dipole for P = 15GeV/c

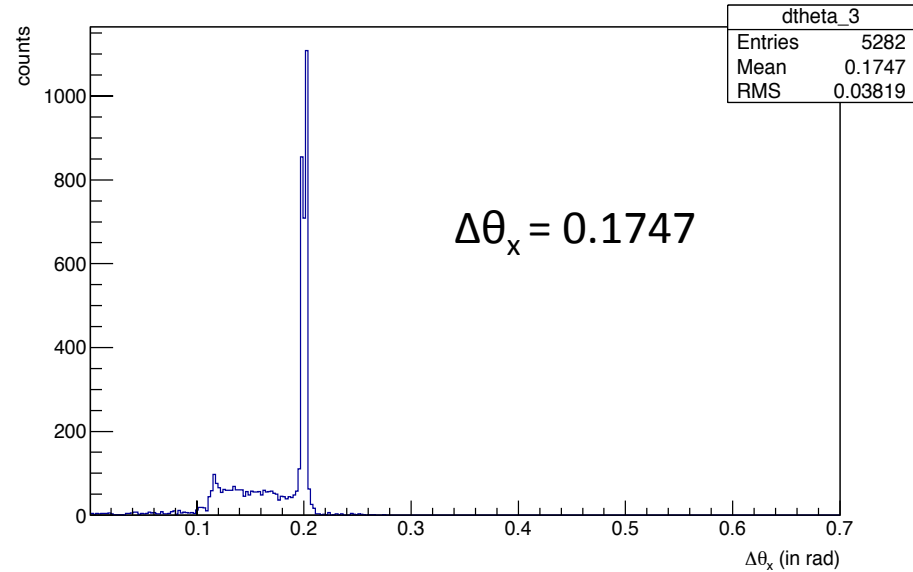


fts5fts6rich: $\Delta\theta_x$

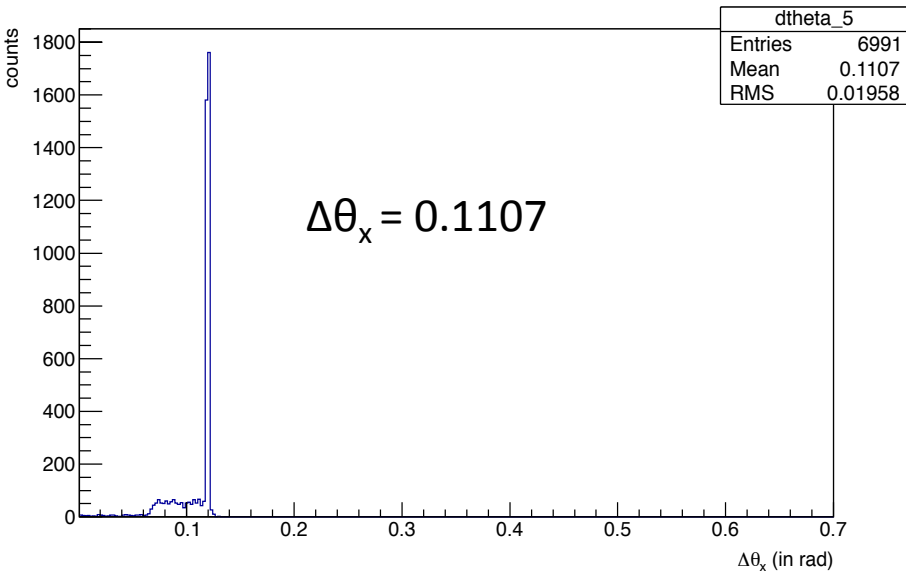
Theta determined by difference in track after and before dipole for P = 1GeV/c



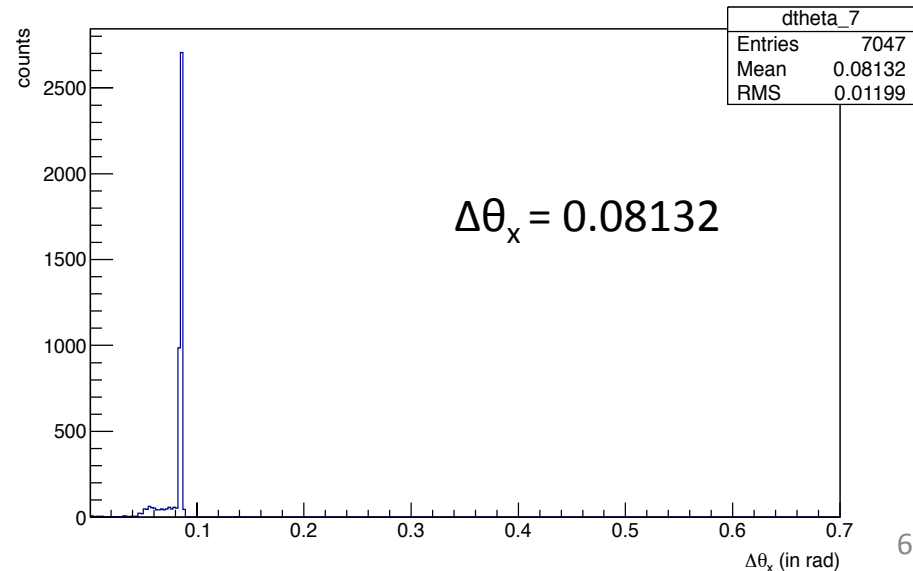
Theta determined by difference in track after and before dipole for P = 3GeV/c



Theta determined by difference in track after and before dipole for P = 5GeV/c

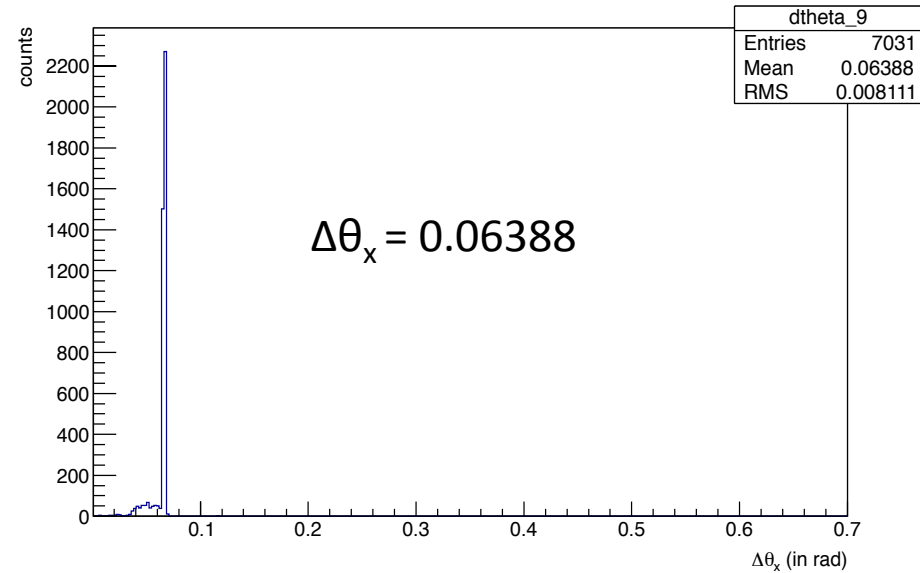


Theta determined by difference in track after and before dipole for P = 7GeV/c

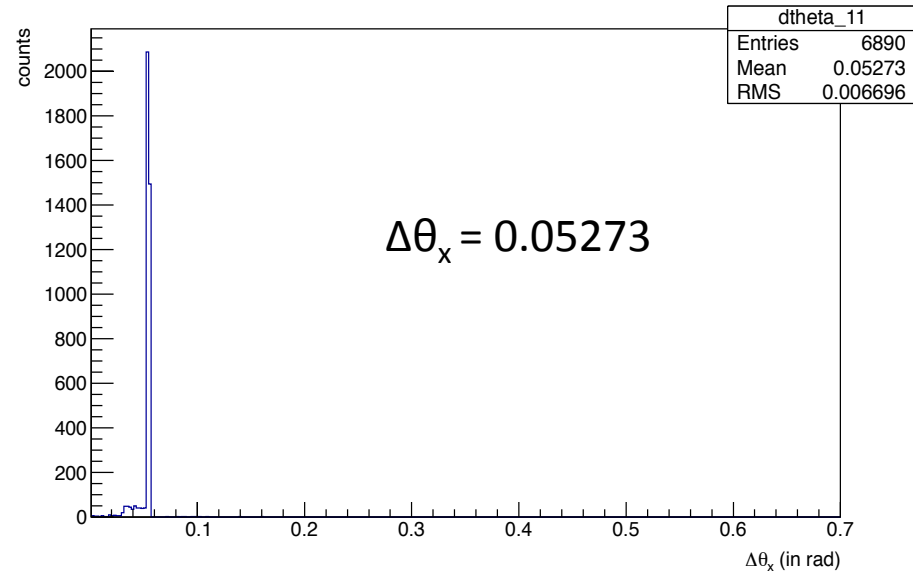


fts5fts6rich: $\Delta\theta_x$

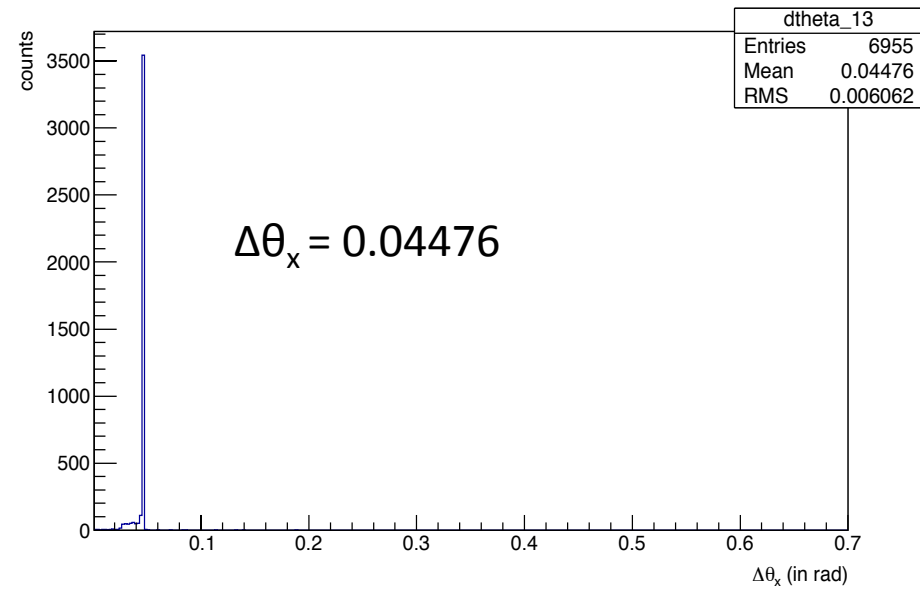
Theta determined by difference in track after and before dipole for P = 9GeV/c



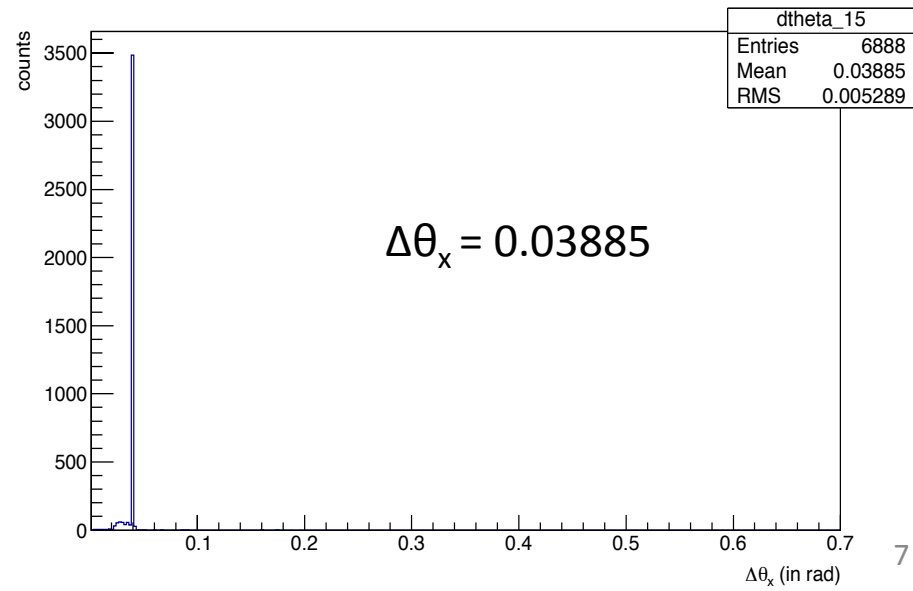
Theta determined by difference in track after and before dipole for P = 11GeV/c



Theta determined by difference in track after and before dipole for P = 13GeV/c



Theta determined by difference in track after and before dipole for P = 15GeV/c



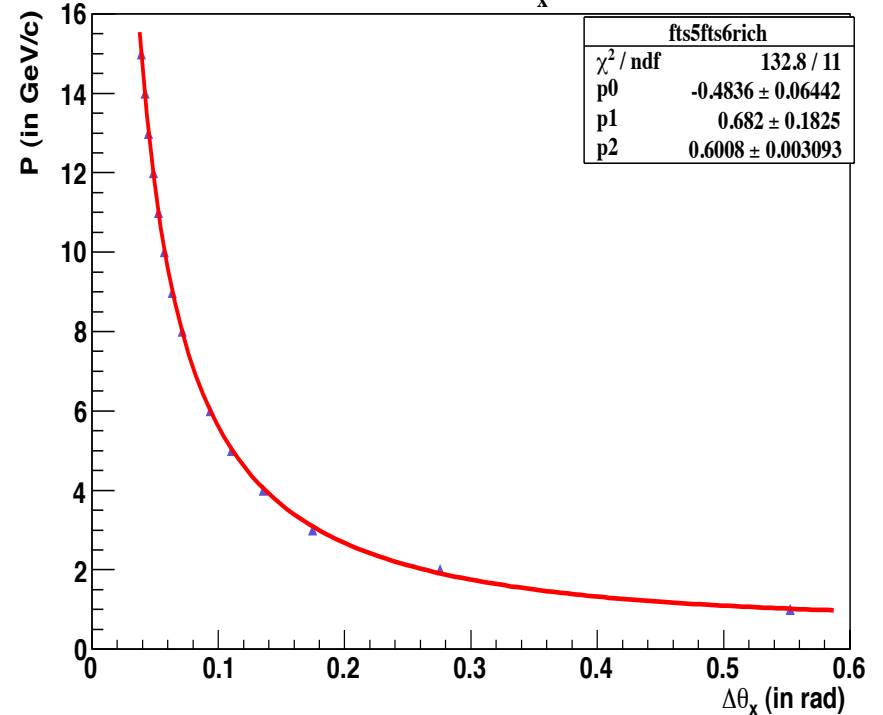
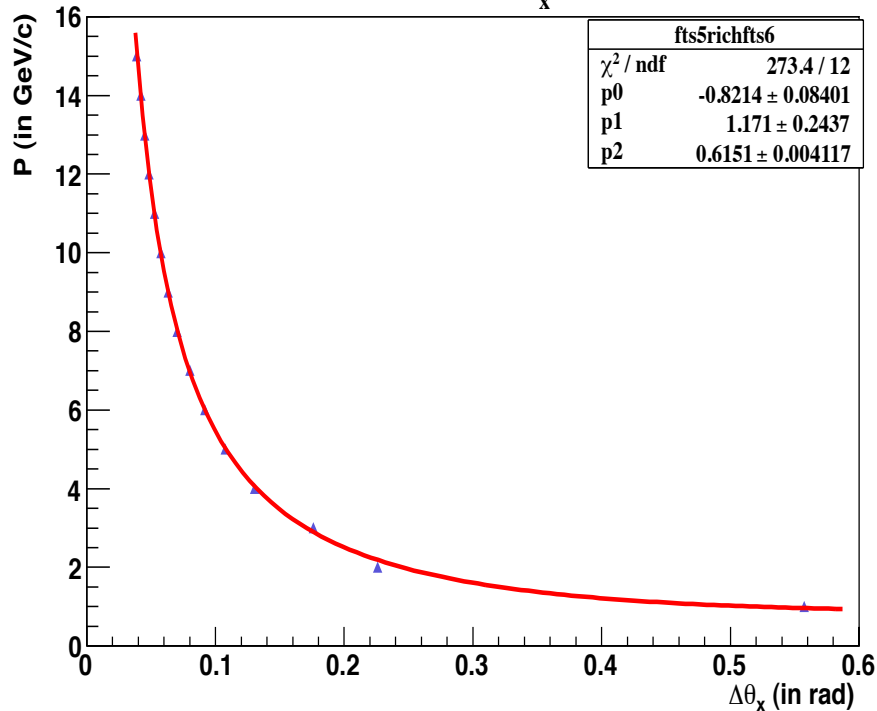
$\Delta\theta_x$ vs P : fitting parameters

fts5richfts6

fts5fts6rich

fts5richfts6: $\Delta\theta_x$ vs P

fts5fts6rich: $\Delta\theta_x$ vs P



Fitting parameters:

fts5richfts6

A: -0.8214 ± 0.08401
B: 1.171 ± 0.2437
C: 0.6151 ± 0.004117

fts5fts6rich

A: -0.4836 ± 0.06442
B: 0.682 ± 0.1825
C: 0.6008 ± 0.003093

summary

Calculated $\Delta\theta_x$ for momentum range 1 to 15 GeV/c.

$\Delta\theta_x$ vs p : fitted with equation to get A, B, C.

Next step

Put this parameters in momentum reconstruction study.

Using this reconstructed momentum measure momentum resolution for two setups of forward tracker.