

Comparison:

12 GeV e- 8 mm, 20mm Graphyte target

20 GeV e-, 8 mm

between GEANT 10.4 and GEANT10.5

11/9/18

- Sample:
 - Data: $\sim 10^6$ evts of e^- @12, 20 GeV 8, 20mm; e^+ @20 GeV 20mm
 - MC “convoluted”= $T \otimes A * C$
 - $T=10^8$ evts of e^- at a given energy impinging in normal direction target simulated with geant 10.4 opt4
 - A =Apparatus with No target= : data at a given energy without target
 - C =“energy loss correction” computed as "simulated detector+target"/“convolution detector $\otimes$ target WITH FULL SIMULATION” from GEANT 10.4
 - Fiducial cuts applied on data (5mm on position on 2° Si layer+ cut in angle of 1mrad)
 - Hits smeared in MC
- Selection cuts:
 - $|\text{thetha_in_x,y}| < 1\text{mrad}$ $|x_1+2.5| < 5 \text{ mm} \ \&\& \ |y_1| < 10\text{mm}$ for dth_x $|y_1| < 5 \text{ mm} \ \&\& \ |x_1+2.5| < 10\text{mm}$ for dth_y where cut for hits on nearest plane before target for MC and data: it is angle defined by first 2 planes after target - angle defined by 2 planes before target + i 6.9e-3mm hit resolution per plane.
 - The only cut for MC is that track pass all planes.

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GEANT V10.4 g44_opt4 RangeFactor= 0.2,
stepLimitType: 2, latDisplacement: 1

G4_GRAPHITE rescaled density ($\rho=1.83$)

===== EM models for the G4Region

DefaultRegionForTheWorld =====

GoudsmitSaunderson : Emin= 0 eV Emax= 100 MeV

Table with 120 bins Emin= 100 eV Emax= 100 MeV

WentzelVIUni : Emin= 100 MeV Emax= 10 TeV Table
with 100 bins Emin= 100 MeV Emax= 10 TeV

A new version of geant4 (10.5) became available in June

RE: MSC results at 12 GeV, 20 GeV 8mm, 20 mm from conv method

Messaggio 1 di 7



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Data 2018-07-10 13:56

Dear all,

At the end of June a new version of Geant4 10.5beta become public. In this version multiple scattering models were improved. Now Mott corrections for e^+ are taken into account in all Physics Lists. I would suggest to try this out.

The bremsstrahlung is planned to be improved a bit (smaller difference with Seltzer-Berger model)) but is not yet done, hope we will manage to improve before the December release.

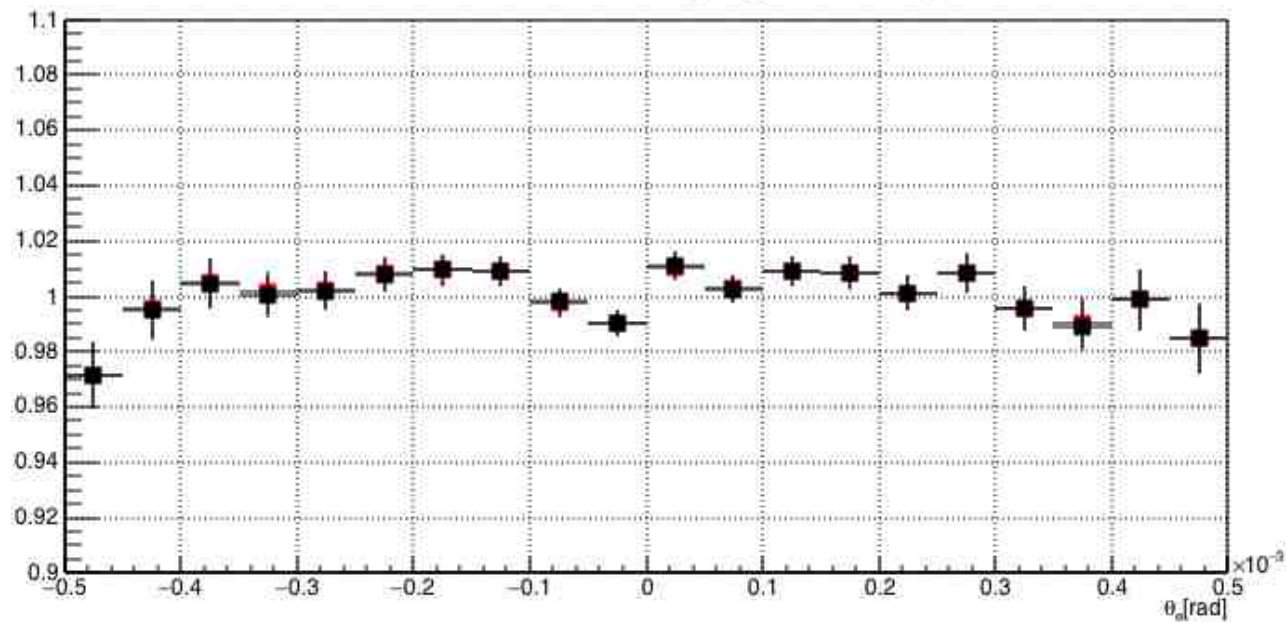
Cheers,
Vladimir

So we tried!

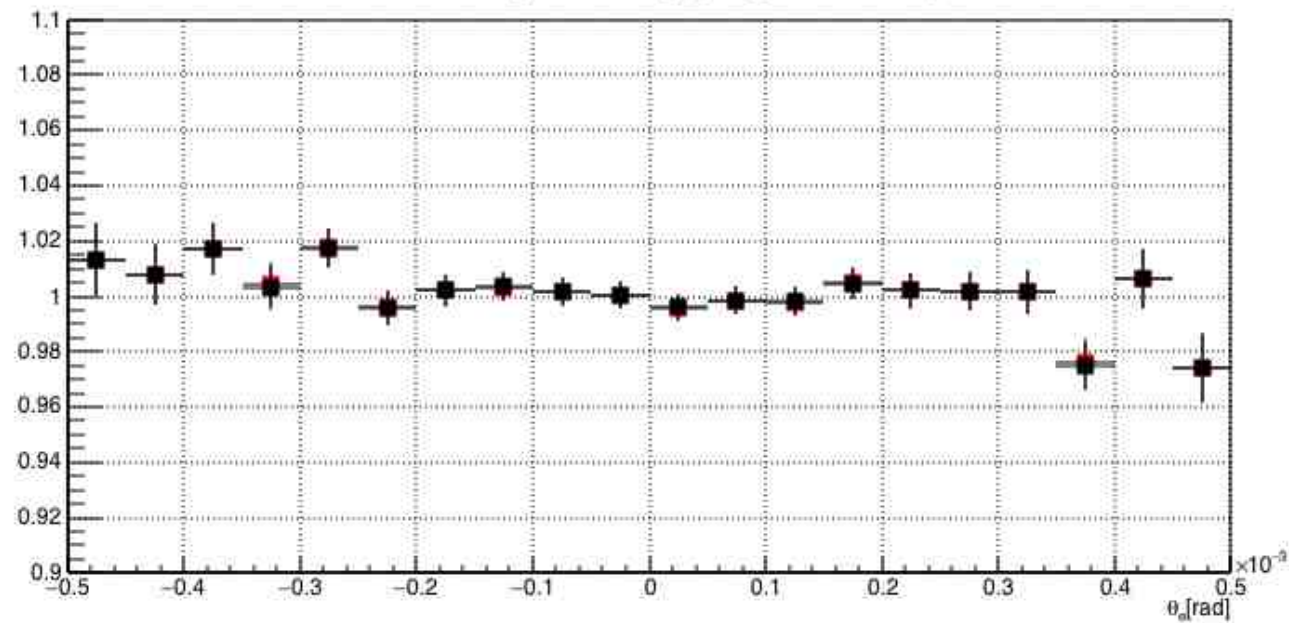
Comparison 12GeV, 8 mm

MC/Data ratios are shown

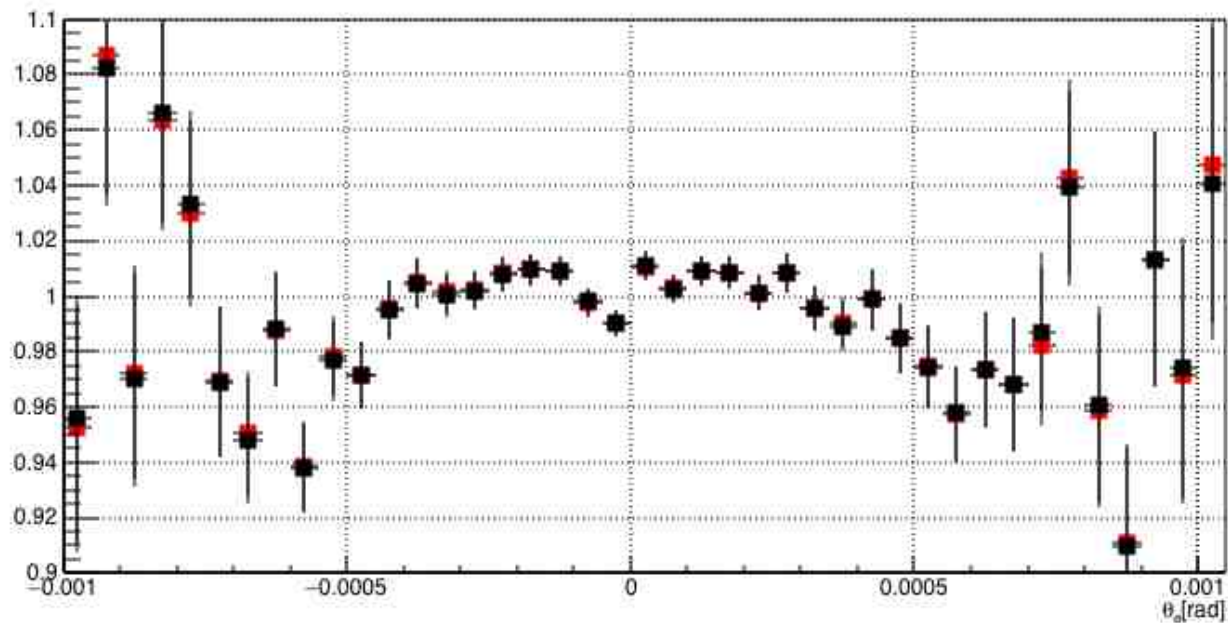
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ThetaOut_y-thetaIn_y {SingleTrack==1}



ThetaOut_x-thetaIn_x {SingleTrack==1}

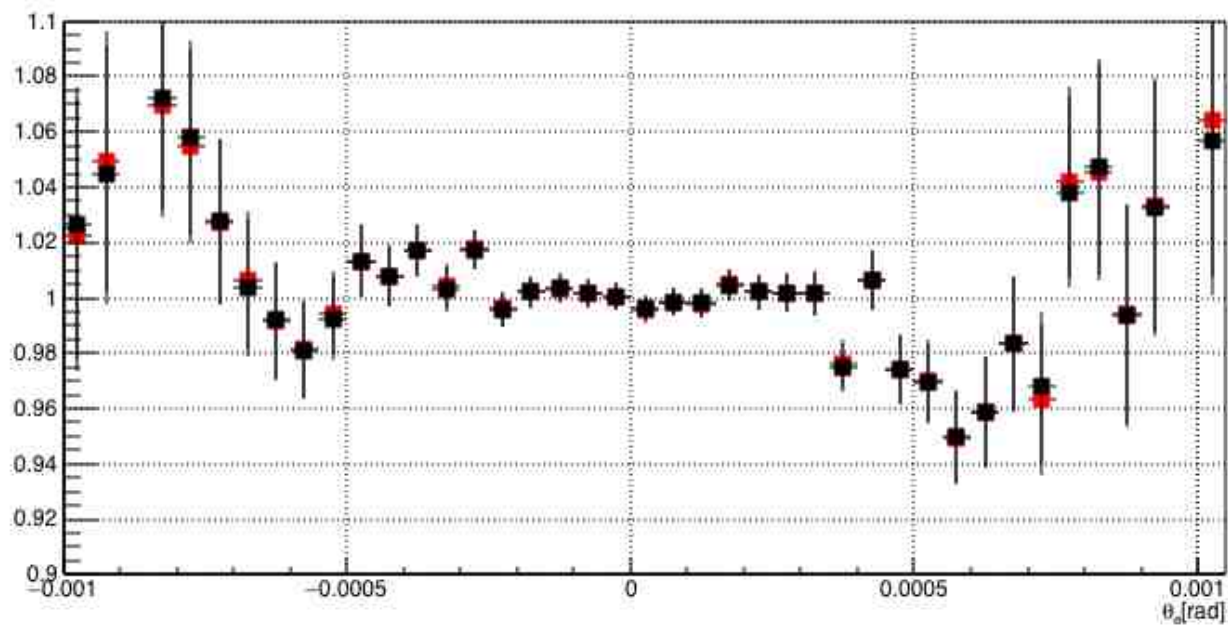


12 GeV, 8mm

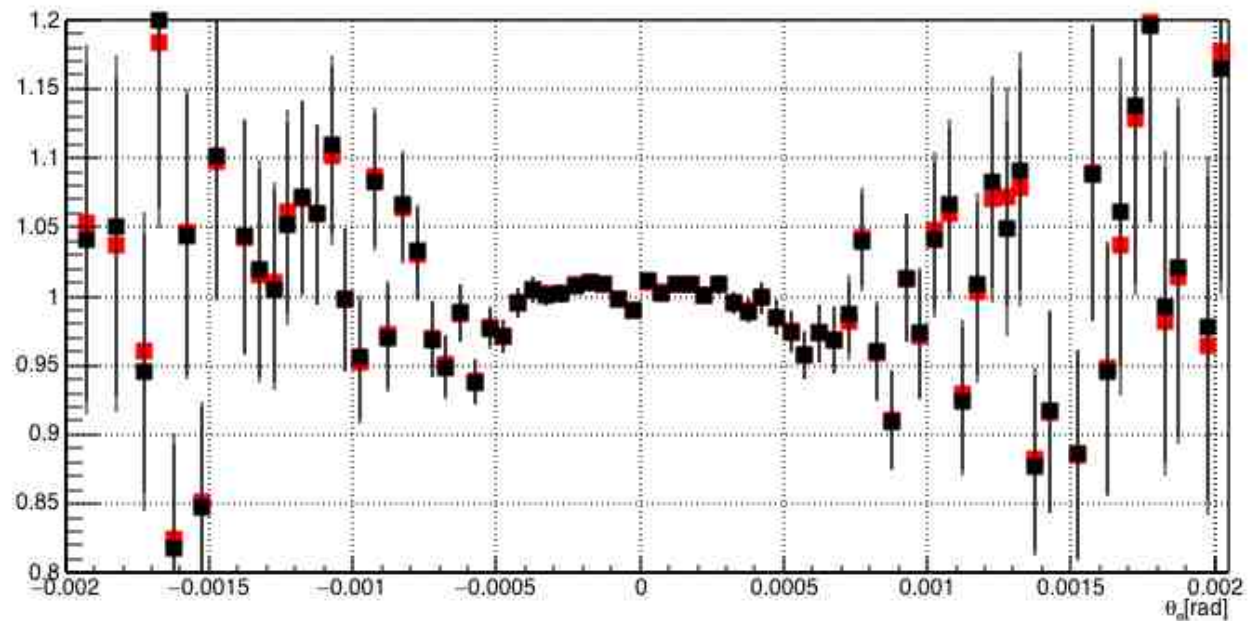
Black= 10.4

Red= 10.5

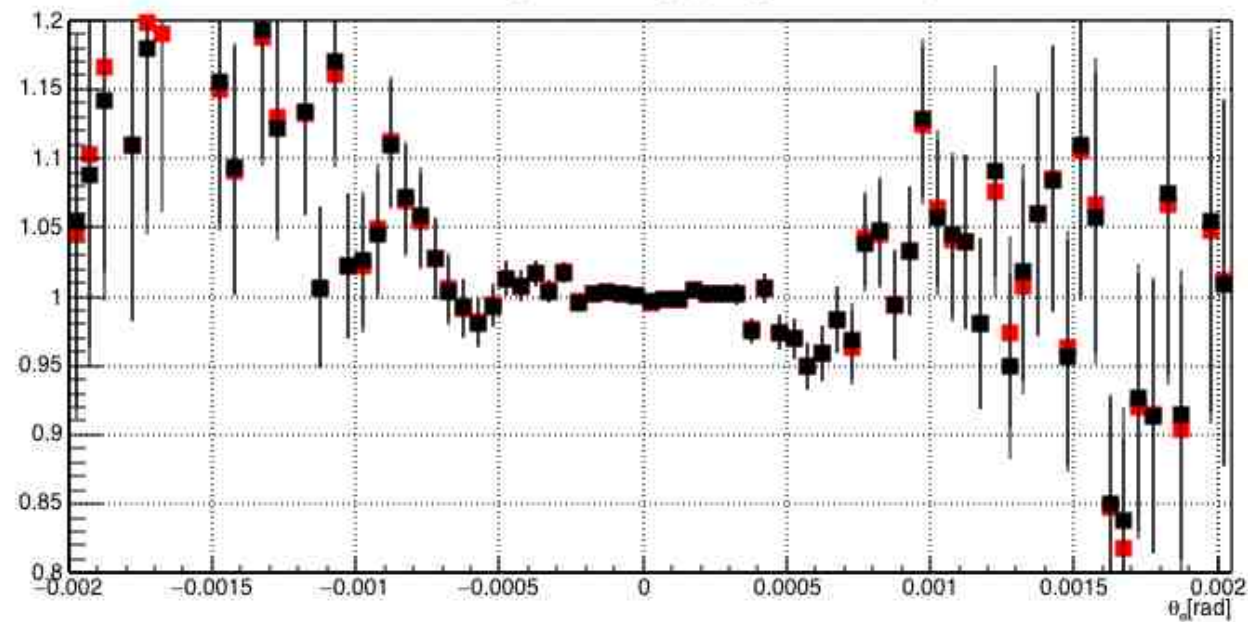
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ThetaOut_x-thetaIn_x {SingleTrack==1}



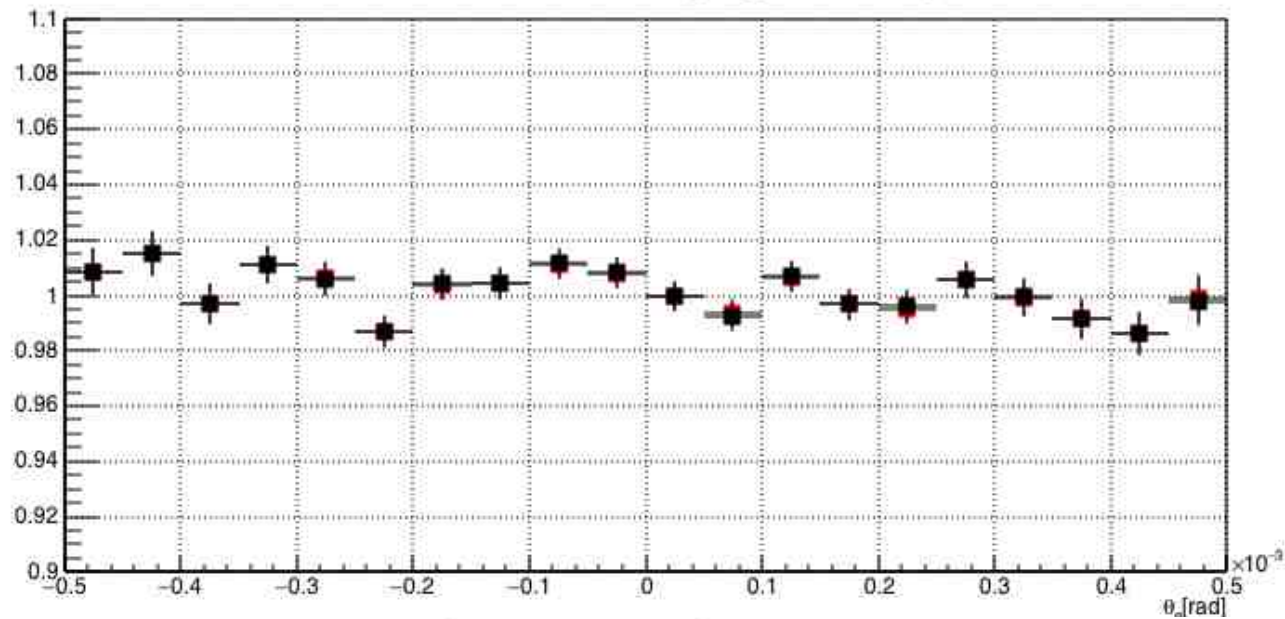
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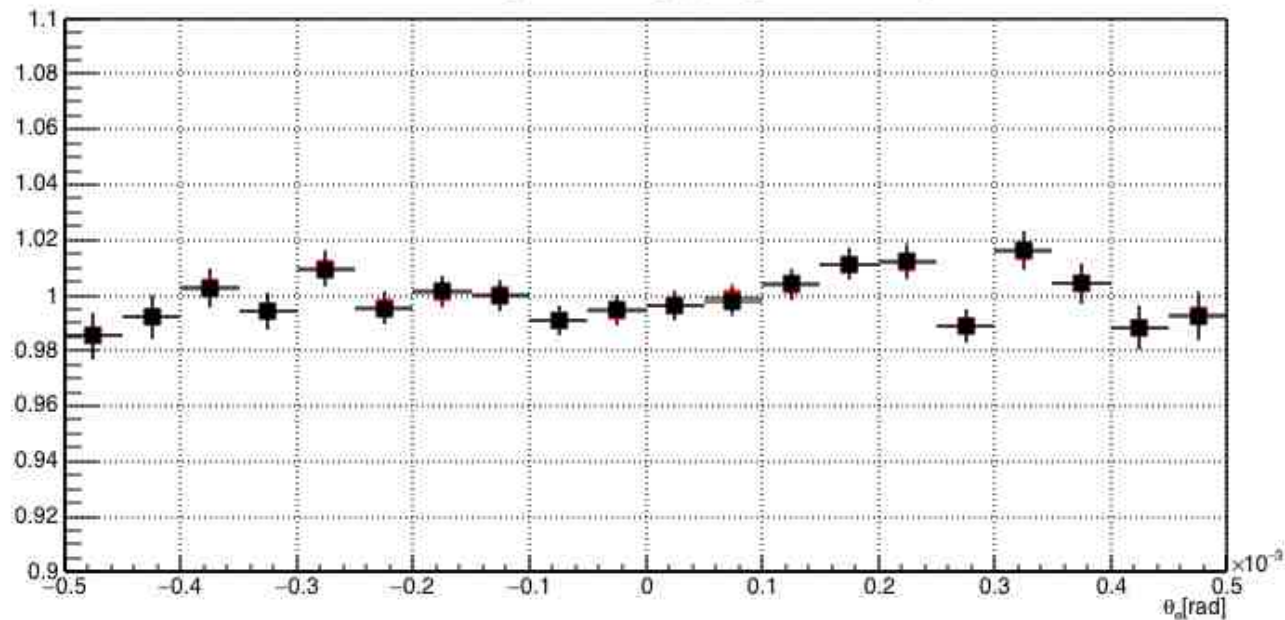
Comparison 12GeV 20 mm

MC/Data ratio are shown

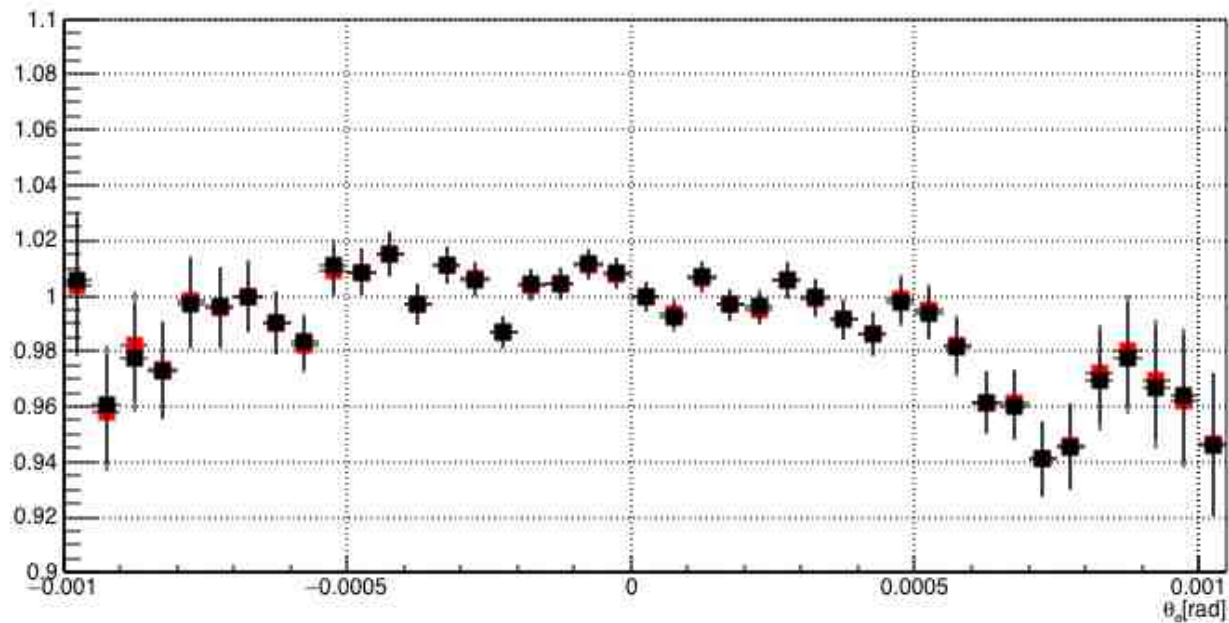
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ThetaOut_y-thetaIn_y {SingleTrack==1}



ThetaOut_x-thetaIn_x {SingleTrack==1}

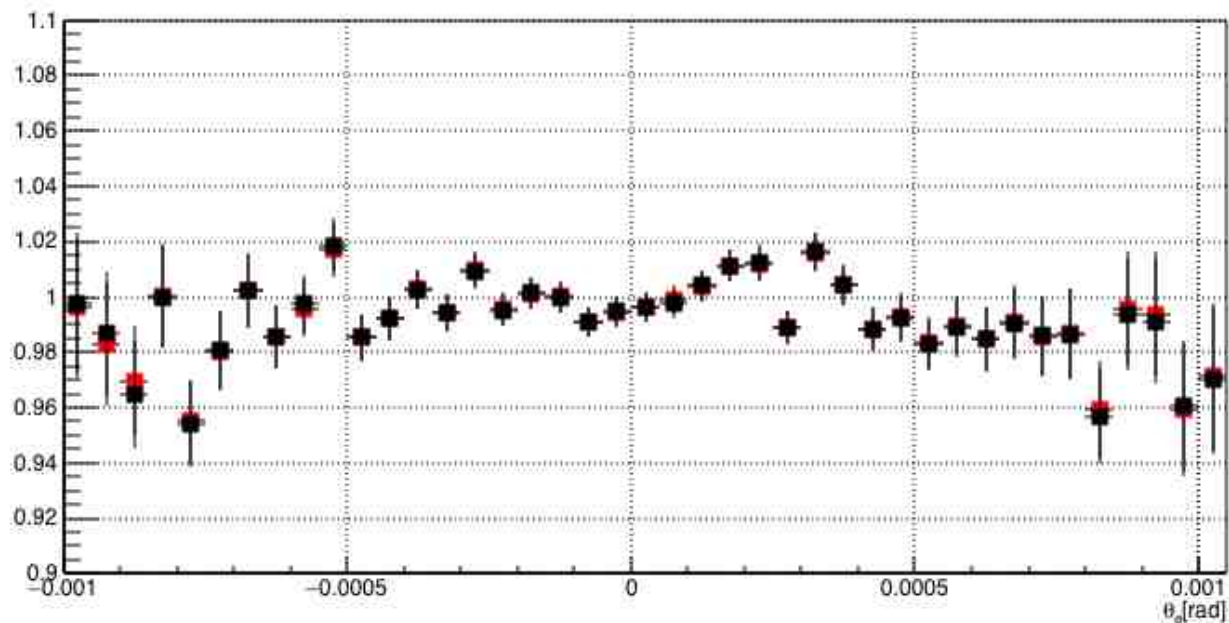


12 GeV, 20mm

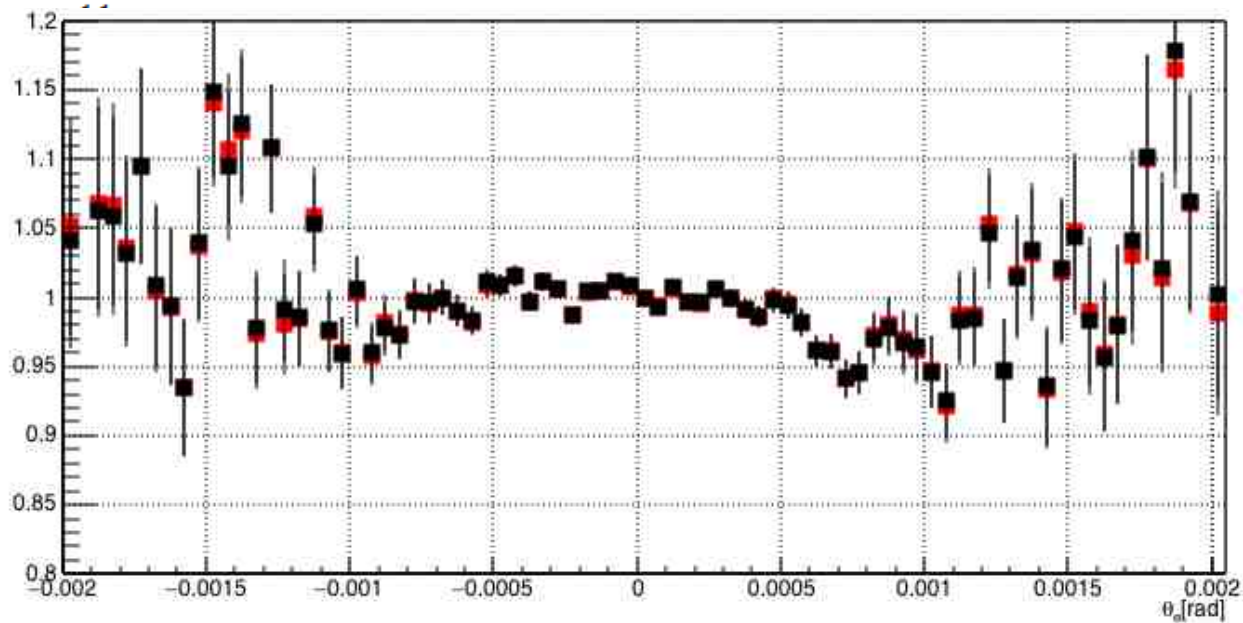
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ThetaOut_x-thetaIn_x {SingleTrack==1}

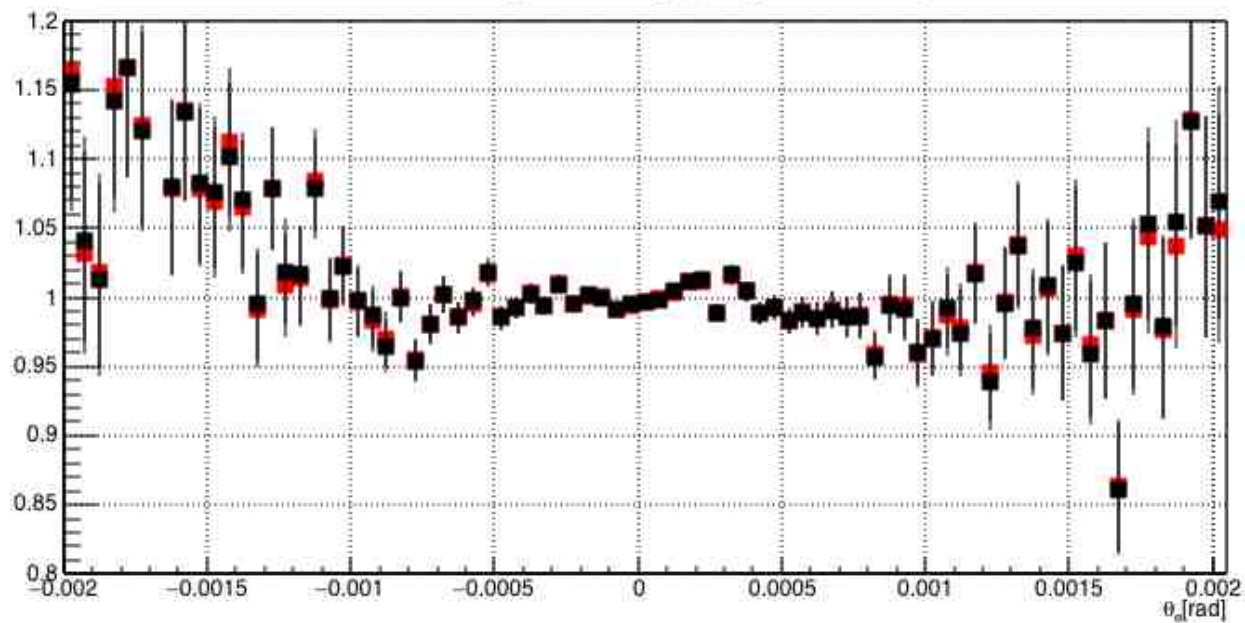


12 GeV, 20mm

Black= 10.4

Red= 10.5

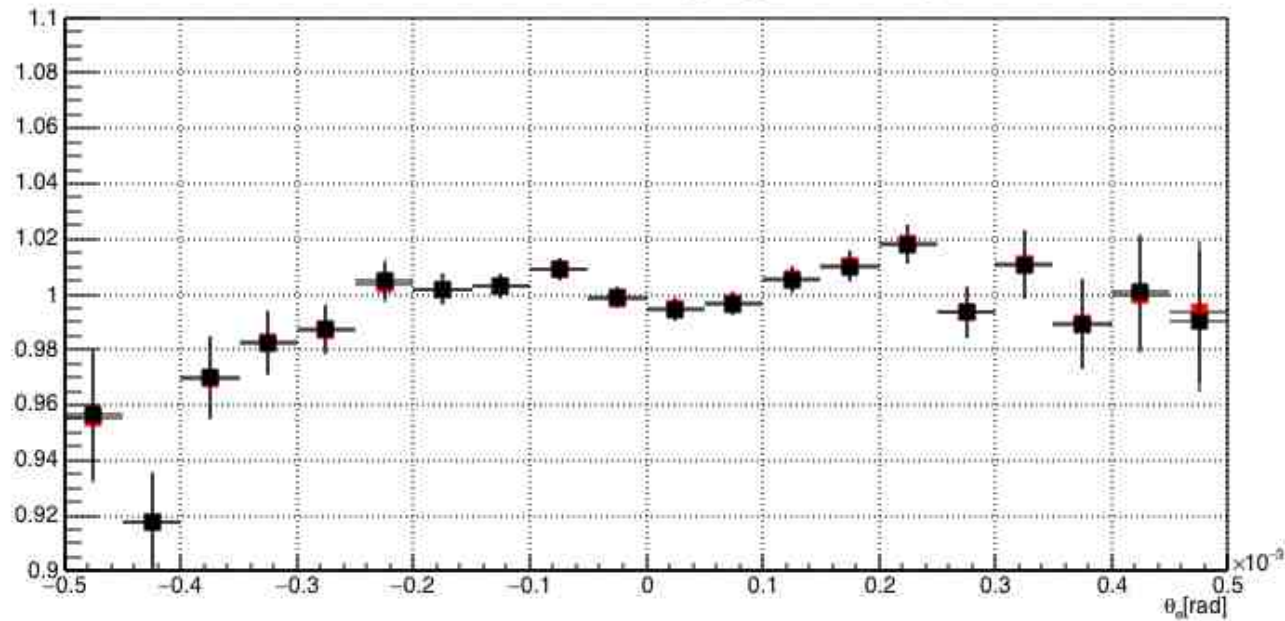
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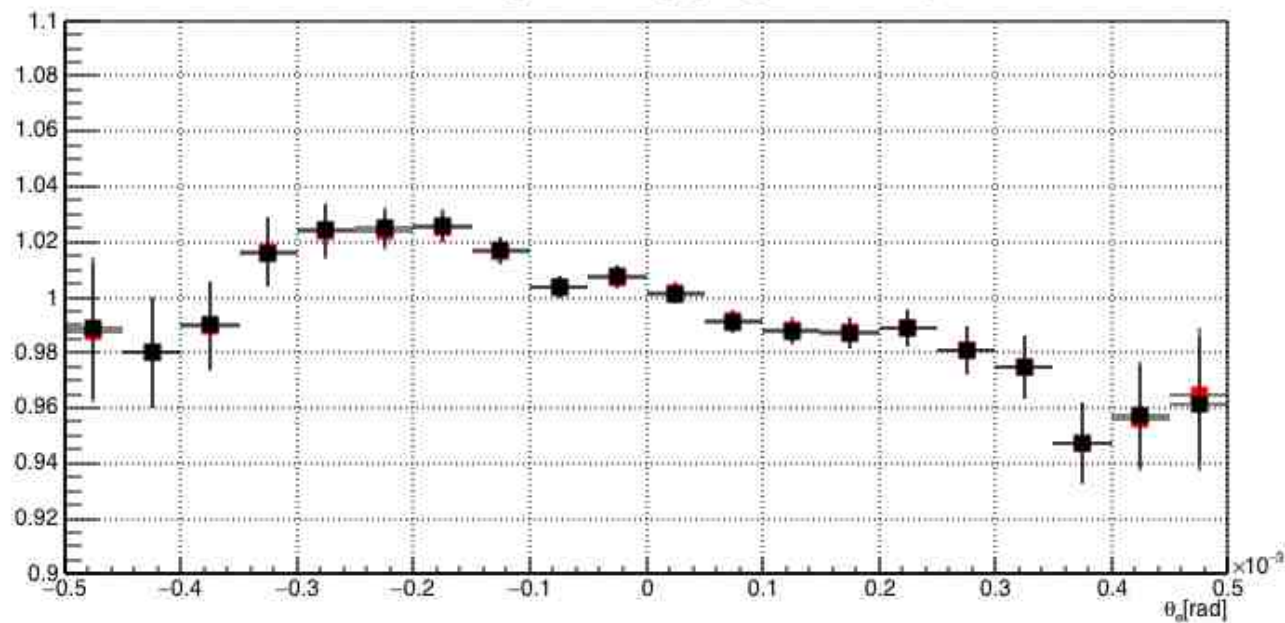
Comparison 20GeV, 8 mm

MC/Data ratio are shown

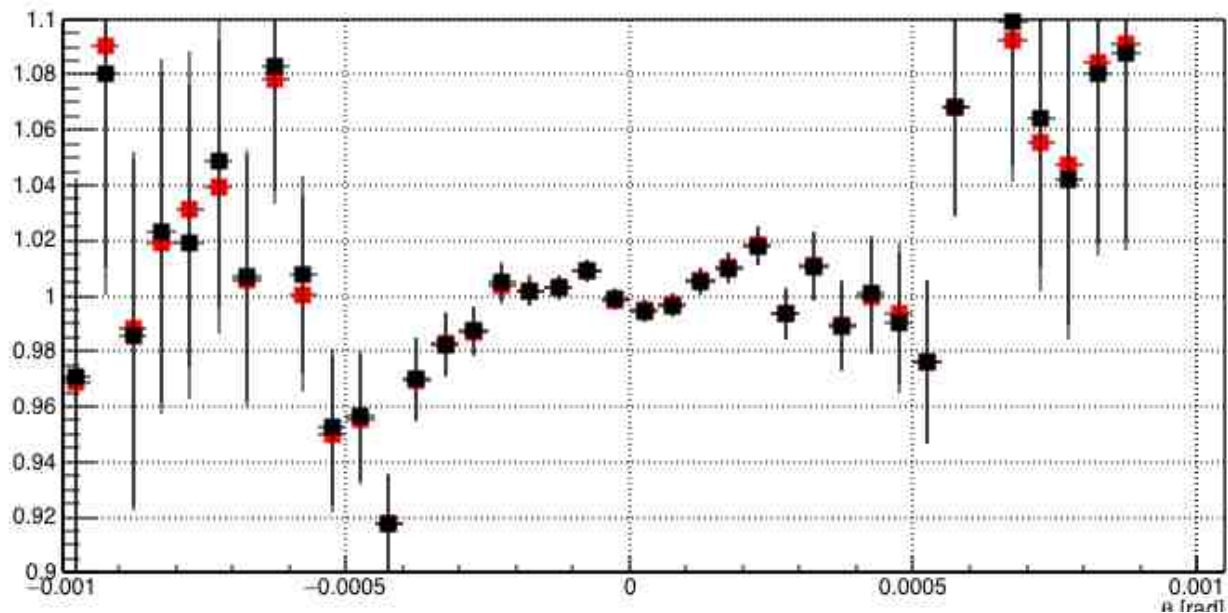
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ThetaOut_y-thetaIn_y {SingleTrack==1}



ThetaOut_x-thetaIn_x {SingleTrack==1}

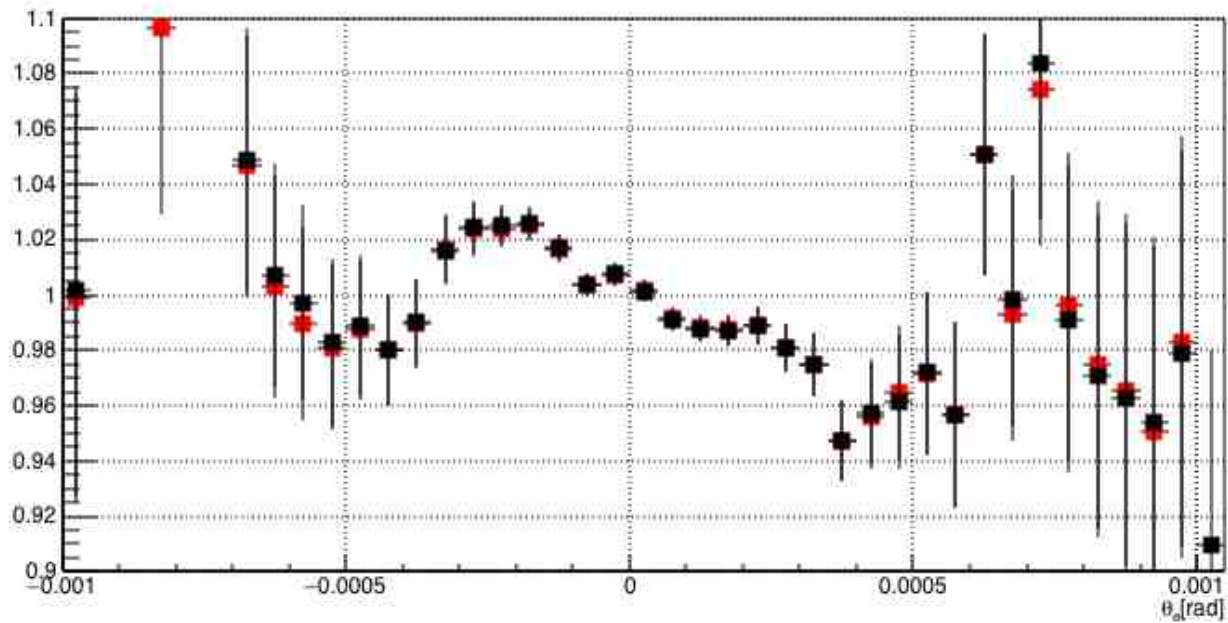


20 GeV, 8mm

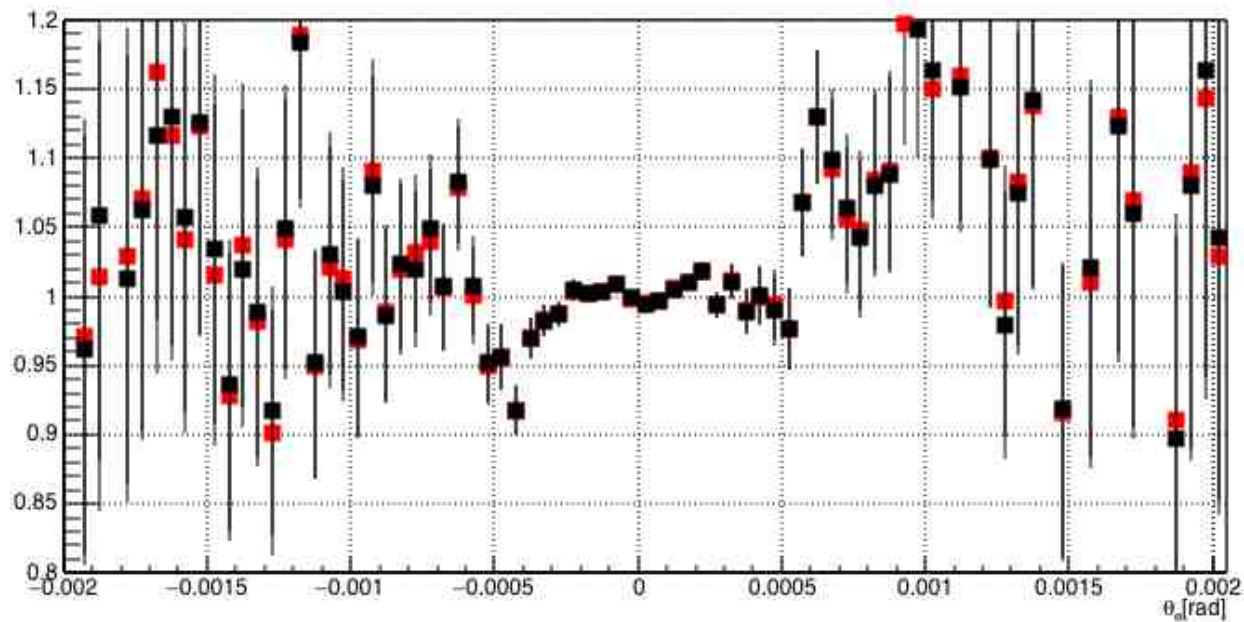
Black= 10.4

Red= 10.5

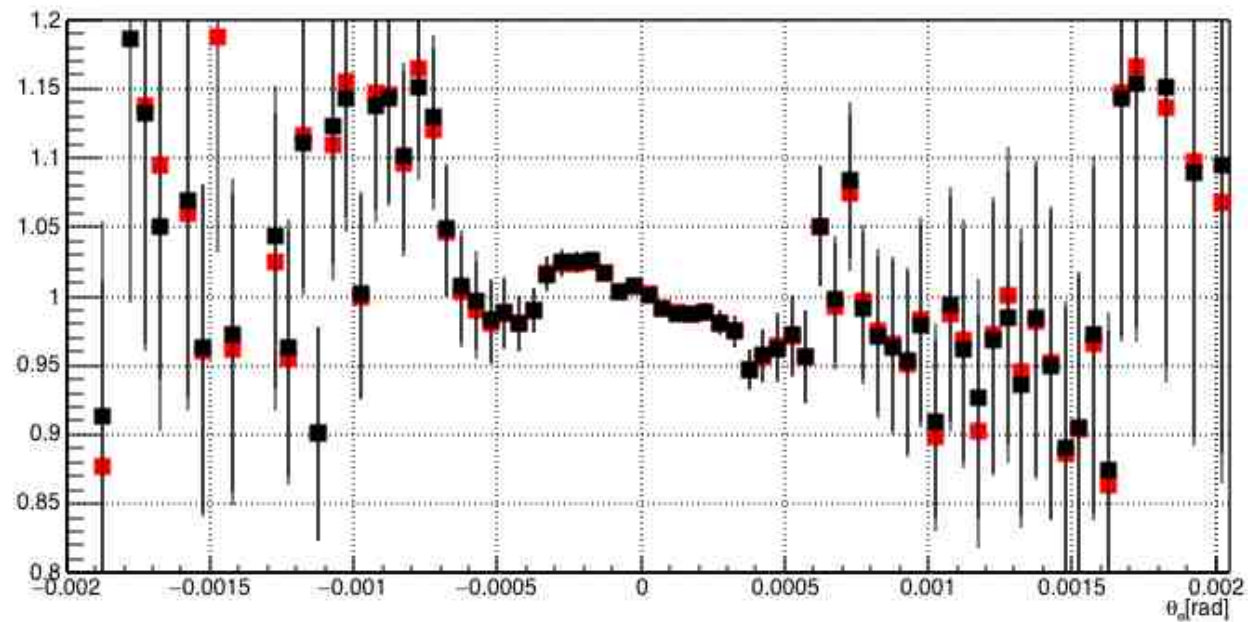
ThetaOut_y-thetaIn_y {SingleTrack==1}



ThetaOut_x-thetaIn_x {SingleTrack==1}



ThetaOut_y-thetaIn_y {SingleTrack==1}

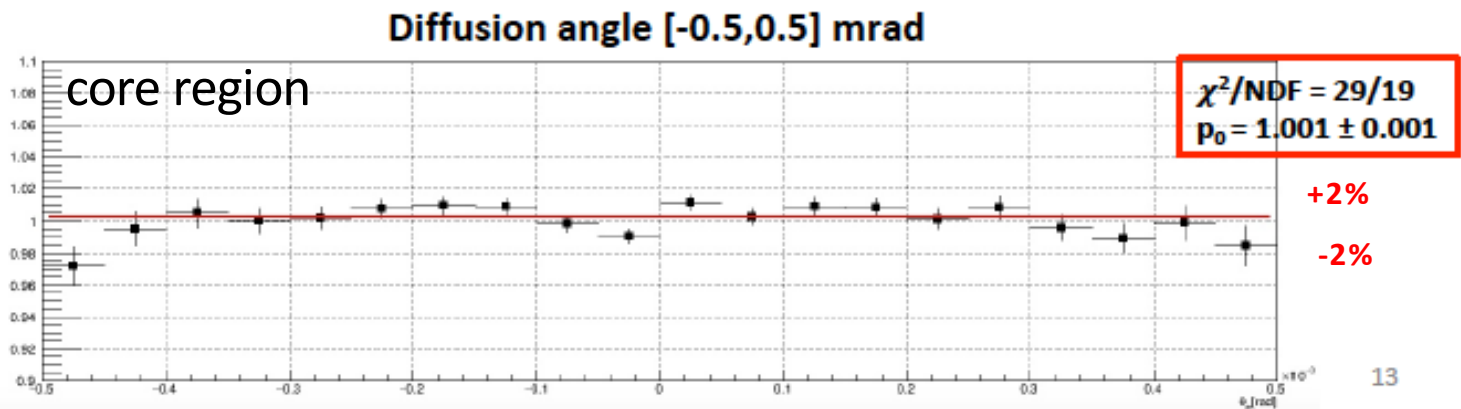
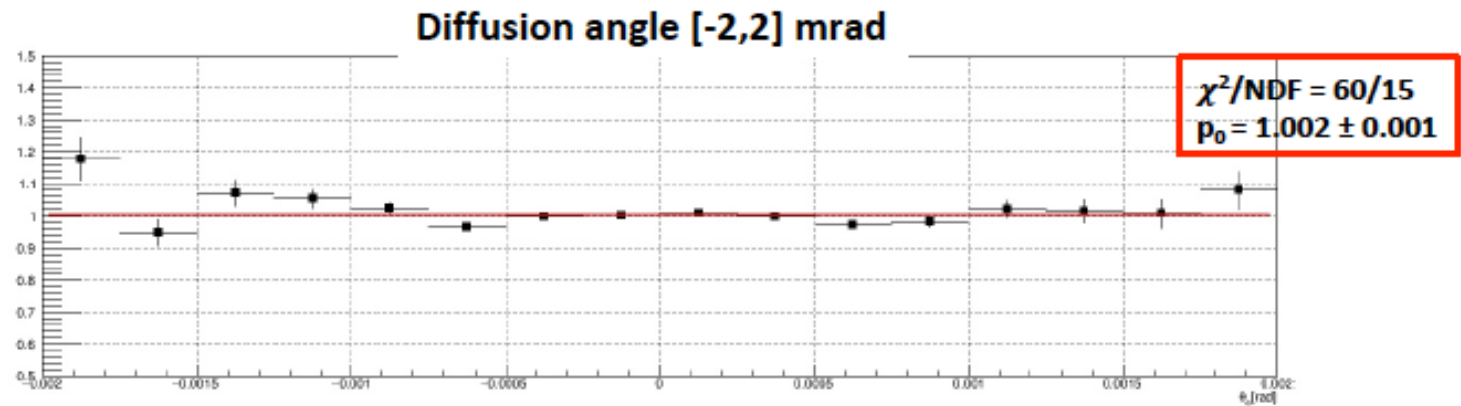
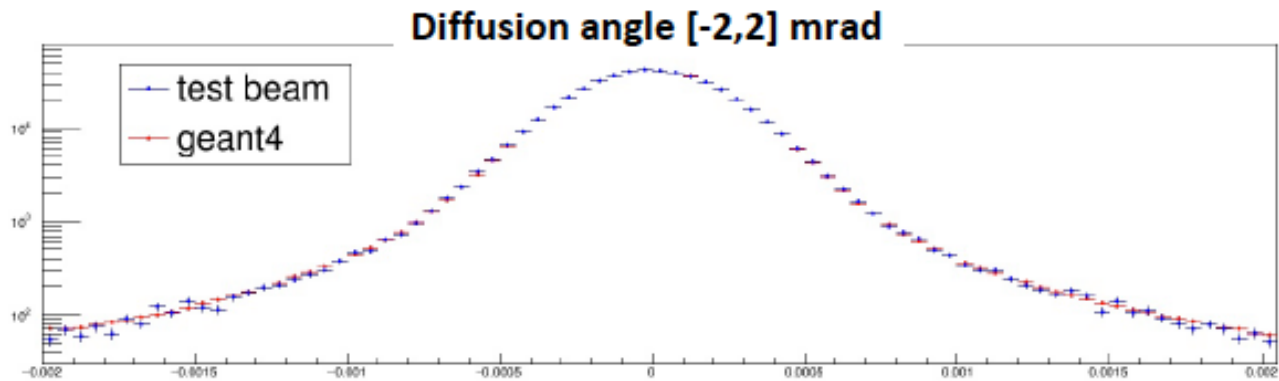


Conclusion

- NO difference (within our cuts) between GEANT10.4 and 10.5

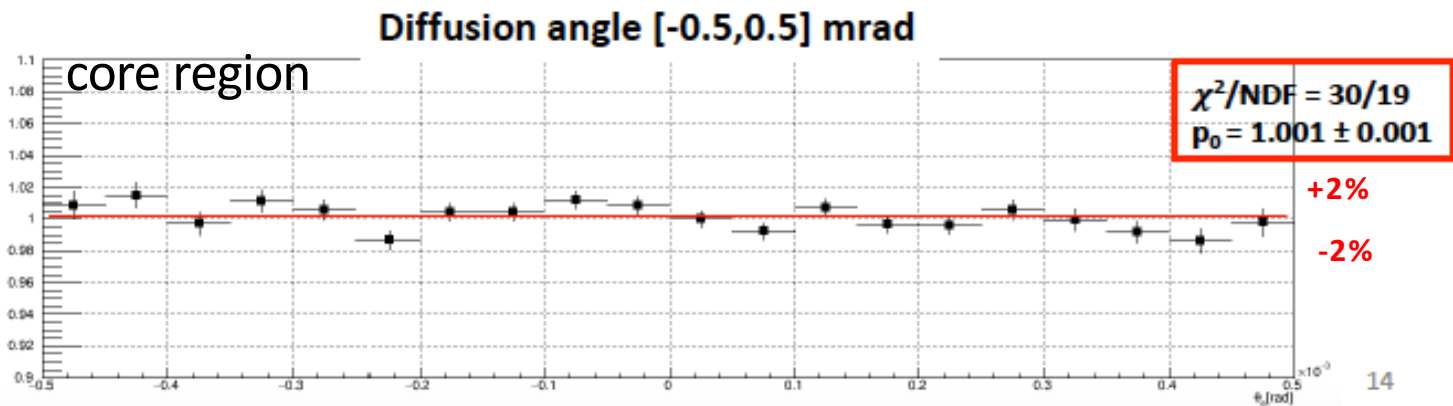
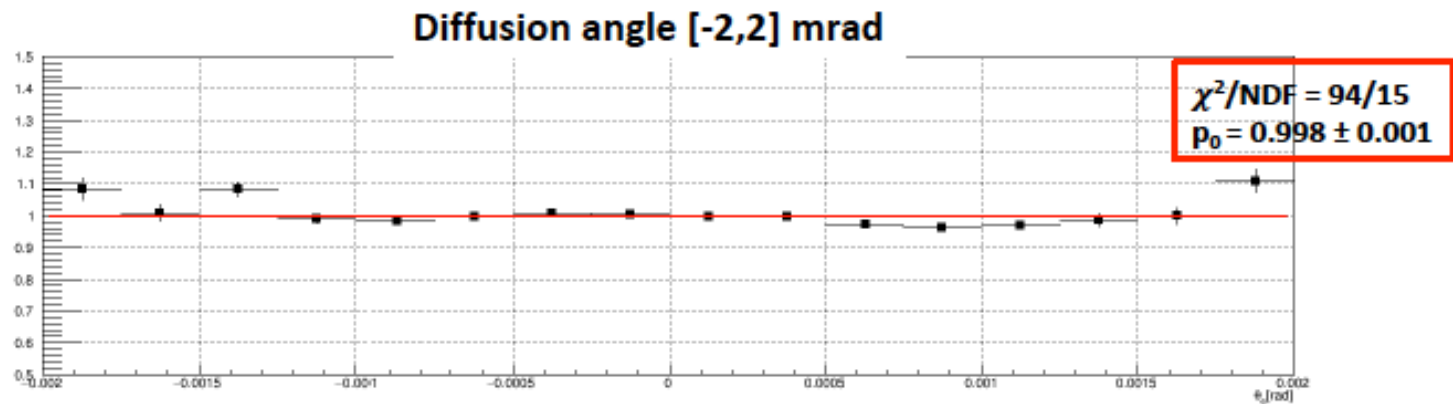
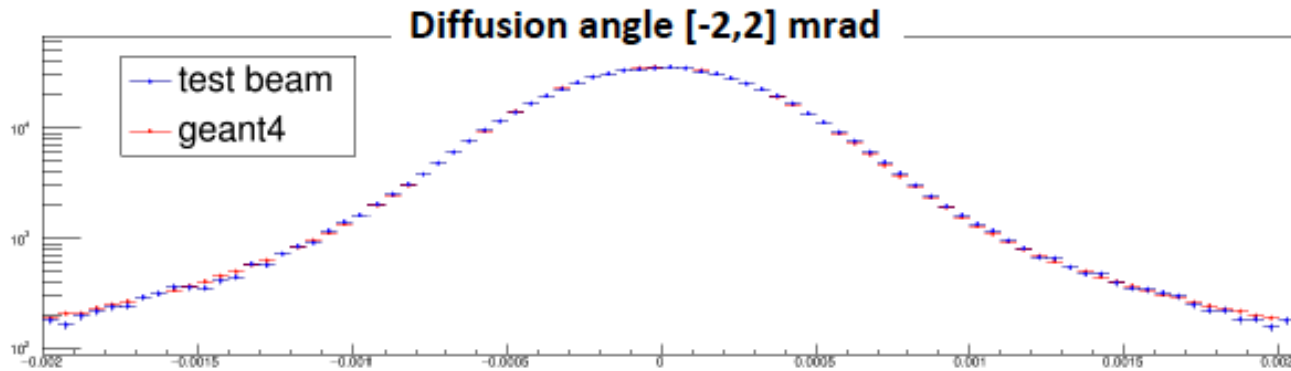
Plots data/MC geant10.4 for article

8mm, 12 GeV



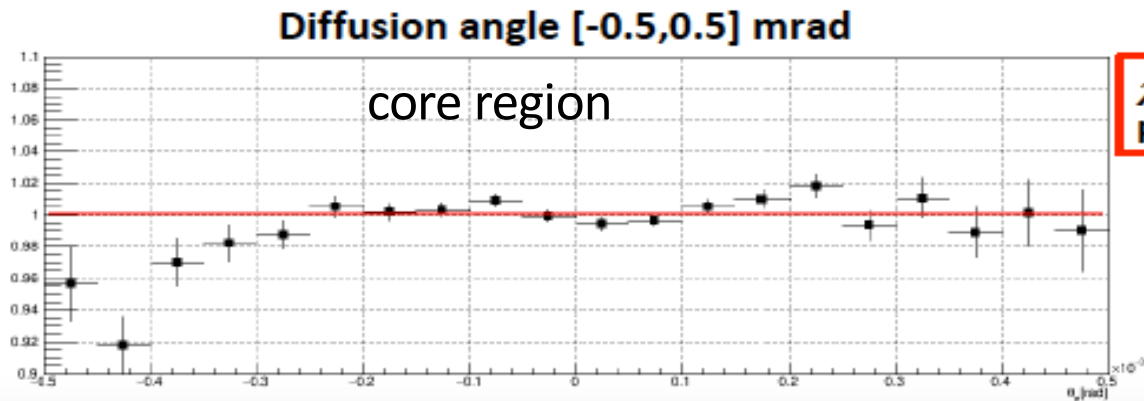
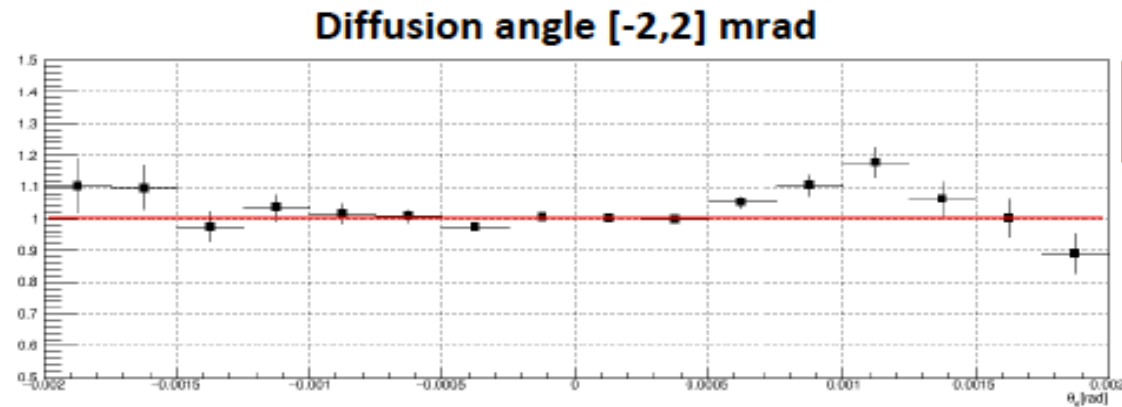
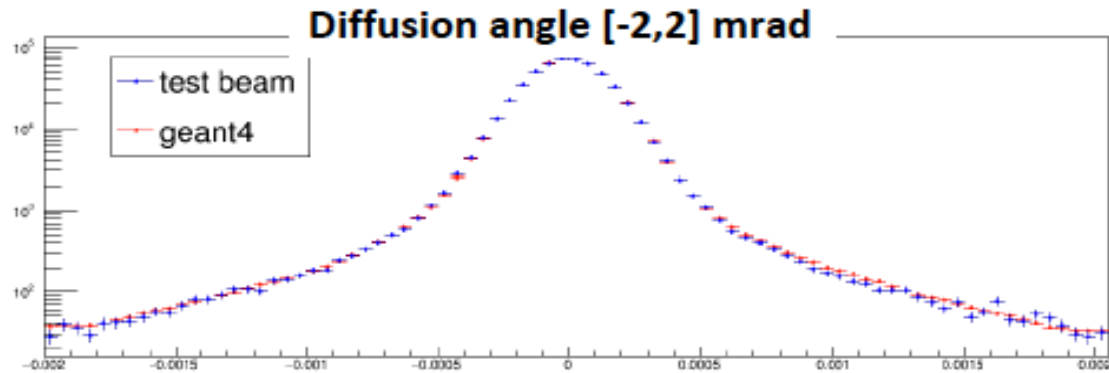
Agreement in the core region (90% of events) $\sim 1\%$; outside few %

20mm, 12 GeV



Agreement in the core region (90% of events) $\sim 1\%$; outside few %

8mm, 20 GeV



Agreement in the core region (90% of events) $\sim 1\%$; outside few %

Comments

- I will start writing the article where I plan to insert for the three data sets (12 GeV 8-20mm; 20 GeV 8mm):
 - Plots of scattering angle
 - Comparison of $\sigma(s)$ obtained by fit of data and MC (for ex. Fedor parametrization)
- I will contact the people for some help on the text