

# Comparison of QGS with Different String Fragmentations

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Fermilab

Geant4 Hadronic Meeting

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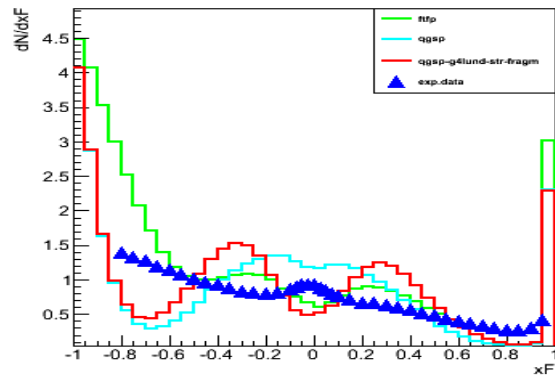


## General Remarks

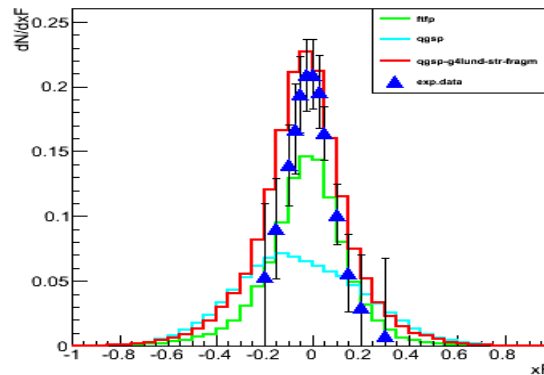
- Done within test19
- QGS is paired with
  - G4QGSMStringFragmentation (older code)
  - G4LundStringFragmentation (newer version)
- Compared vs FTF - always paired with
  - G4LundStringFragmentation
- Compared vs NA49, NA61 data

## Test19: 158GeV p on C -> p, pbar, n, pi+, pi- dN/dxF

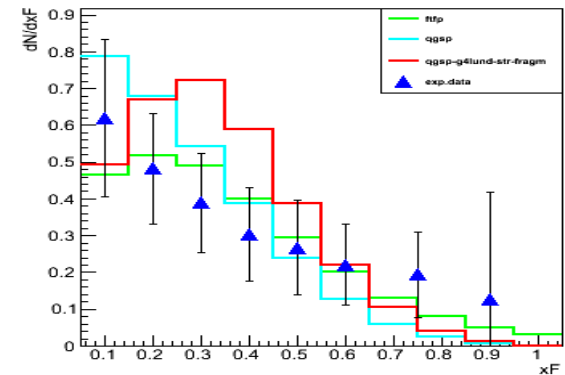
proton + C -> X + proton



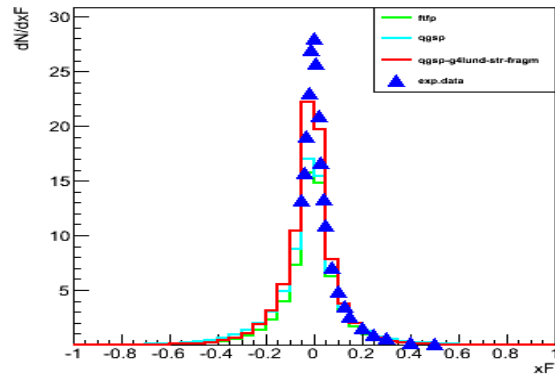
proton + C -> X + antiproton



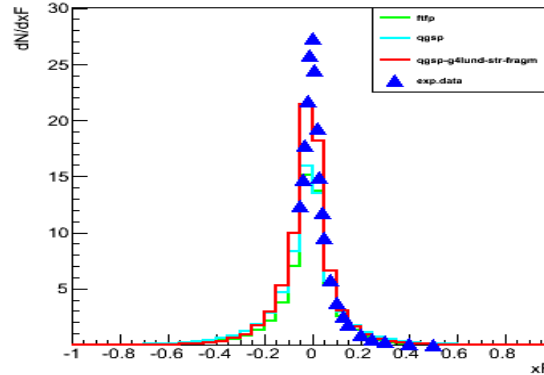
proton + C -> X + neutron



proton + C -> X + pi+



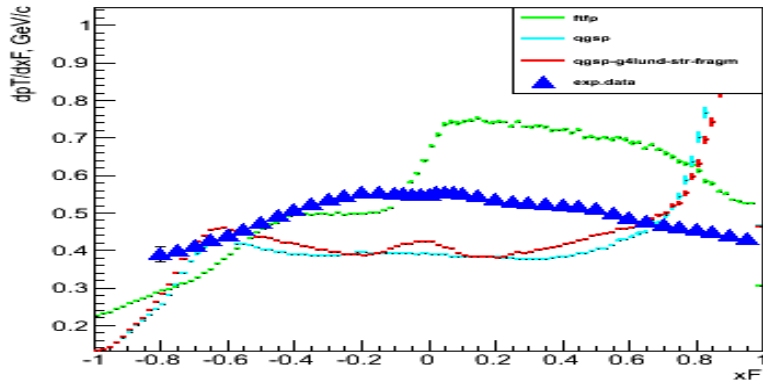
proton + C -> X + pi-



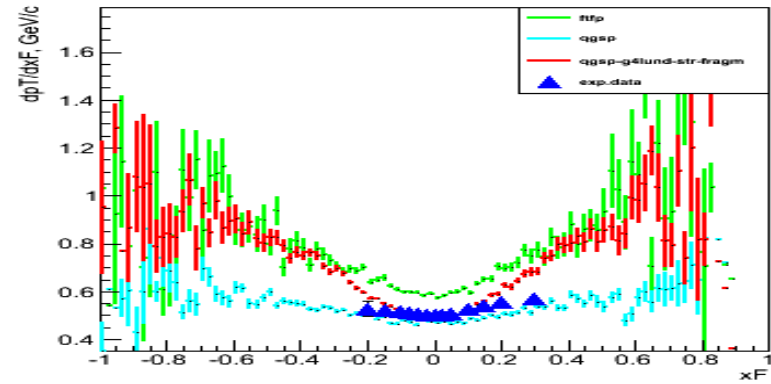
**QGS+G4LundStringFragm  
shows good results at  
high energy for  
secondary pbar, pions**

## Test19: 158GeV p on C -> p, pbar, pi+, pi- d<pT>/dxF

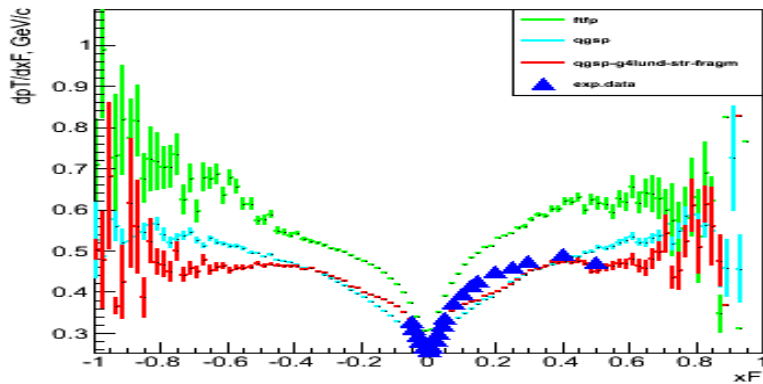
proton + C -> X + proton



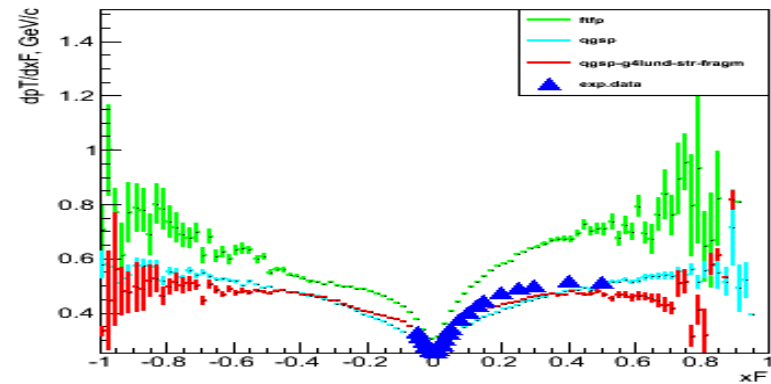
proton + C -> X + antiproton



proton + C -> X + pi+

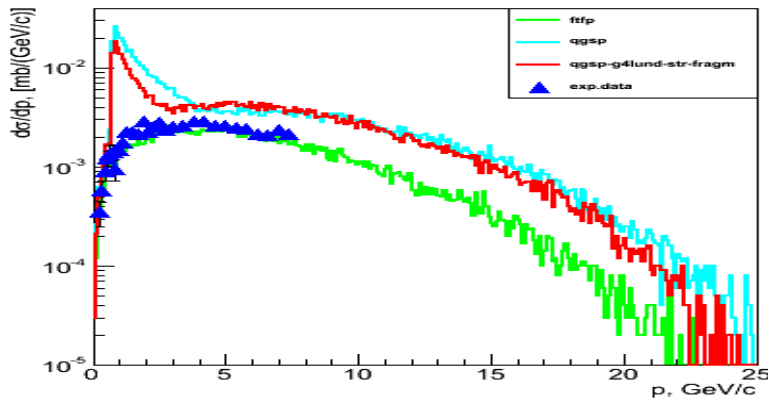


proton + C -> X + pi-

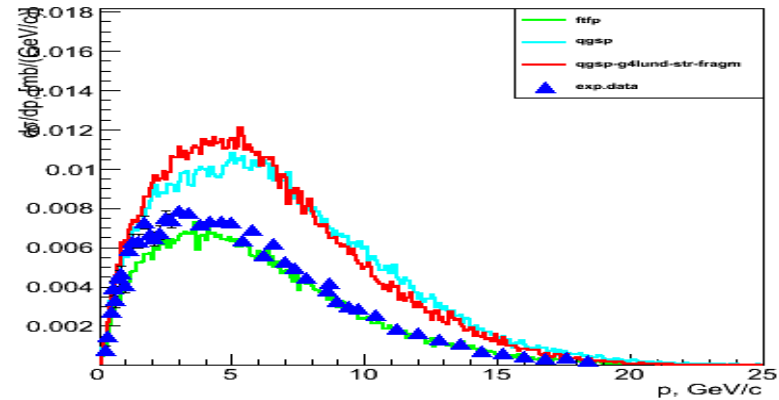


## Test19: 31 GeV p on C -> pi- + X (different theta bins)

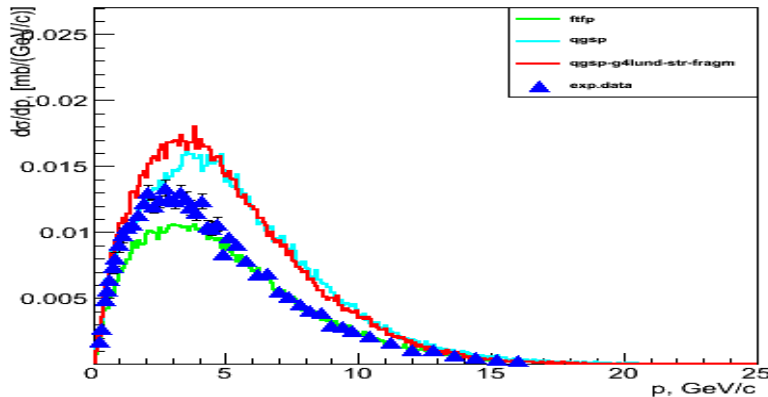
proton + C -> X + pi- (0<theta<20 (mrad))



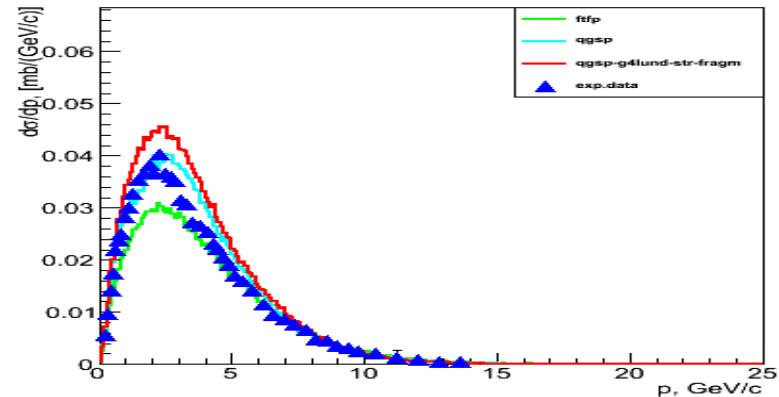
proton + C -> X + pi- (20<theta<40 (mrad))



proton + C -> X + pi- (40<theta<60 (mrad))

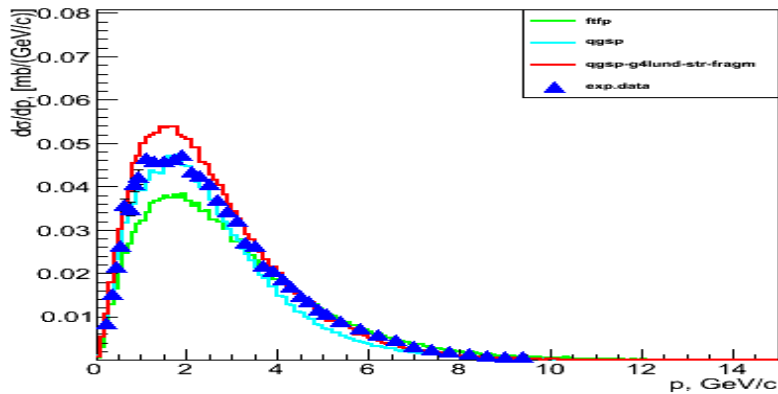


proton + C -> X + pi- (60<theta<100 (mrad))

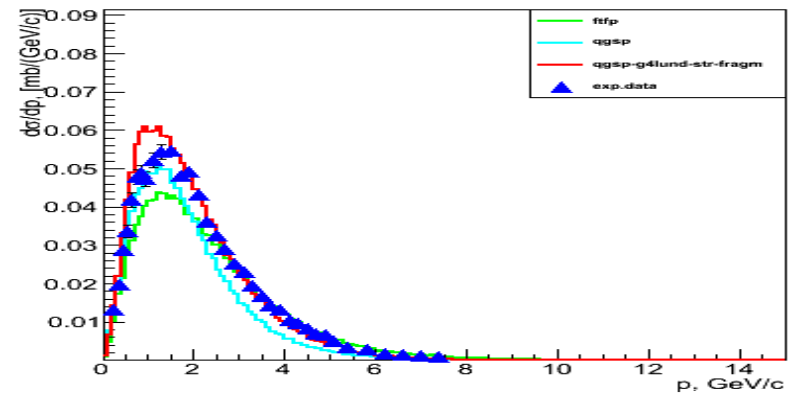


## Test19: 31 GeV p on C -> pi- + X (different theta bins)

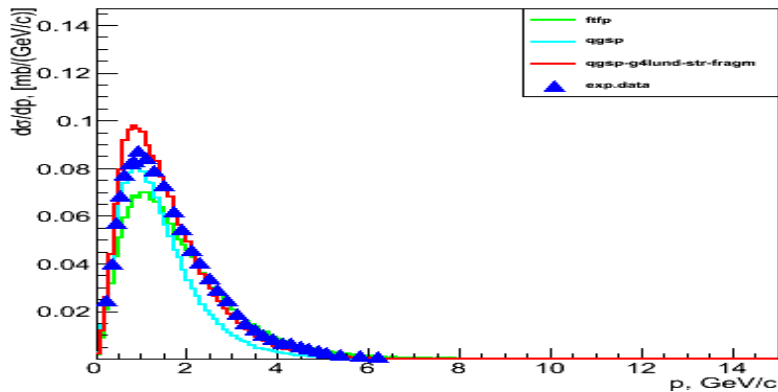
proton + C -> X + pi- (100<theta<140 (mrad))



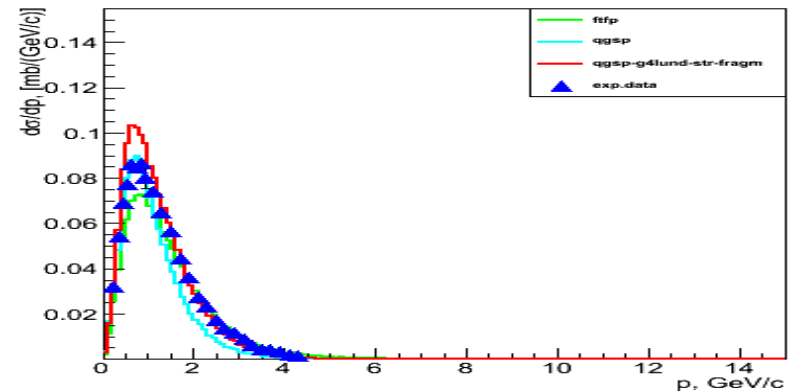
proton + C -> X + pi- (140<theta<180 (mrad))



proton + C -> X + pi- (180<theta<240 (mrad))

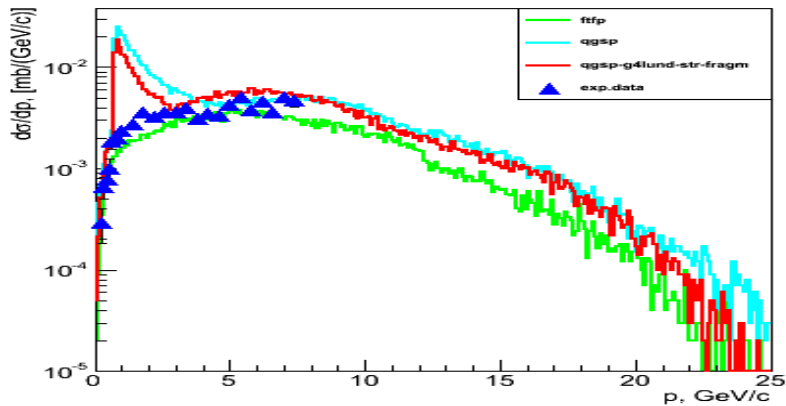


proton + C -> X + pi- (240<theta<300 (mrad))

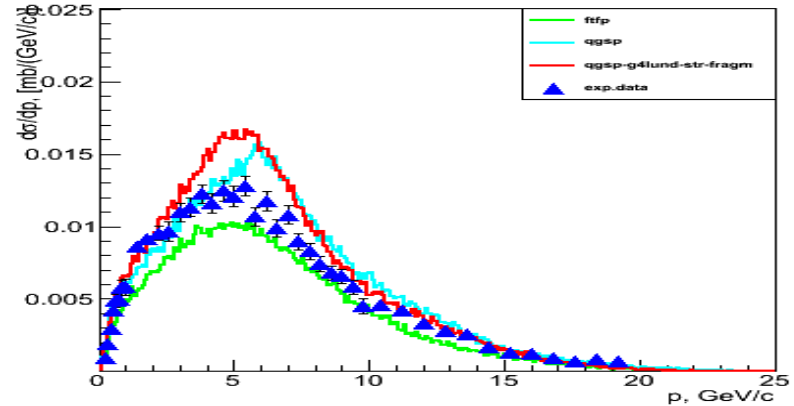


## Test19: 31GeV p on C -> pi+ +X (different theta bins)

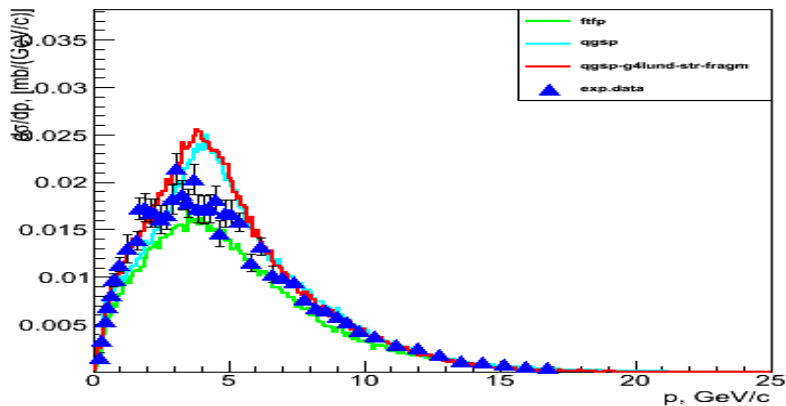
proton + C -> X + pi+ (0<theta<20 (mrad))



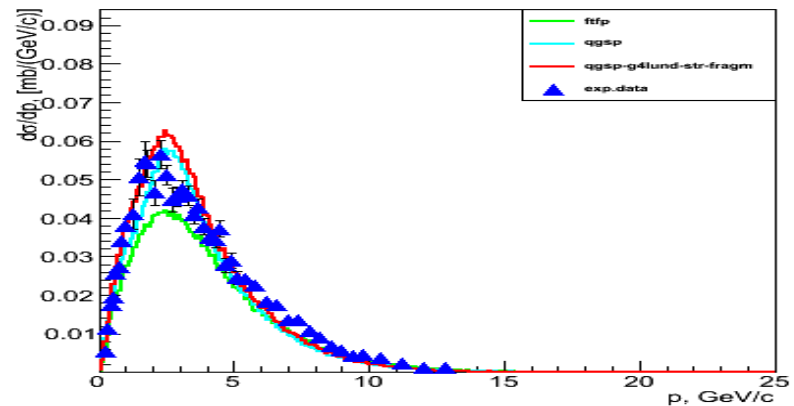
proton + C -> X + pi+ (20<theta<40 (mrad))



proton + C -> X + pi+ (40<theta<60 (mrad))

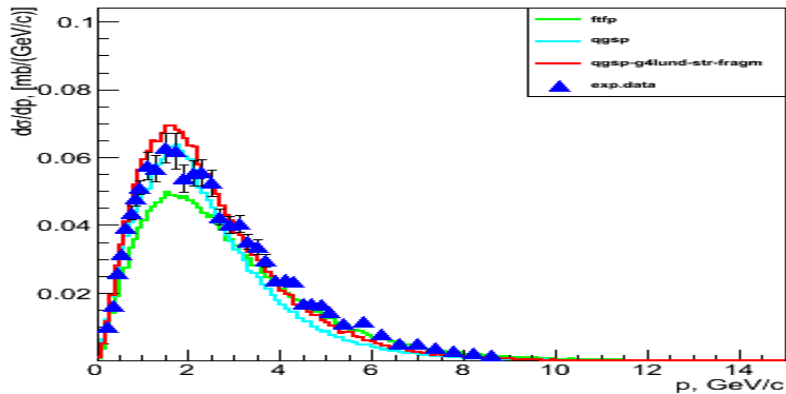


proton + C -> X + pi+ (60<theta<100 (mrad))

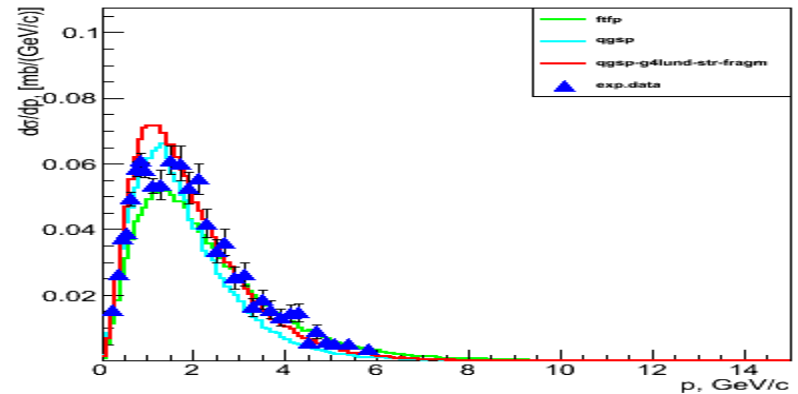


## Test19: 31GeV p on C -> pi+ +X (different theta bins)

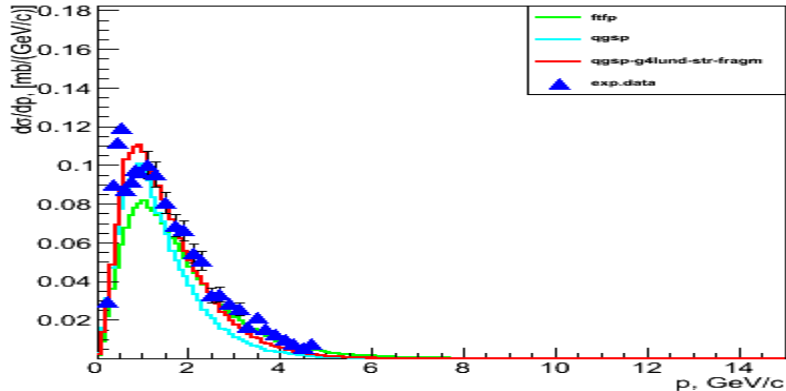
proton + C -> X + pi+ (100<theta<140 (mrad))



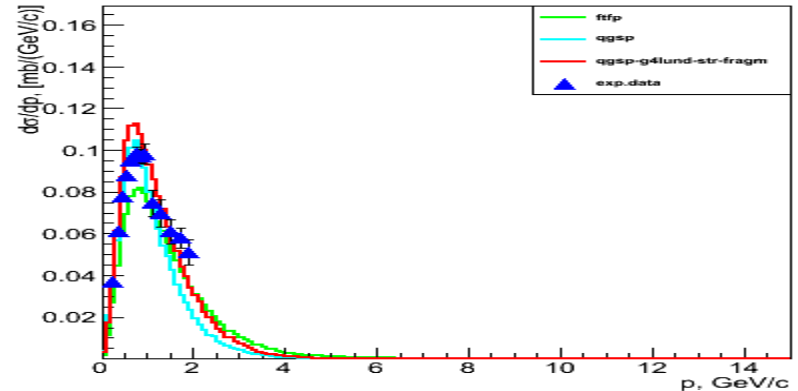
proton + C -> X + pi+ (140<theta<180 (mrad))



proton + C -> X + pi+ (180<theta<240 (mrad))



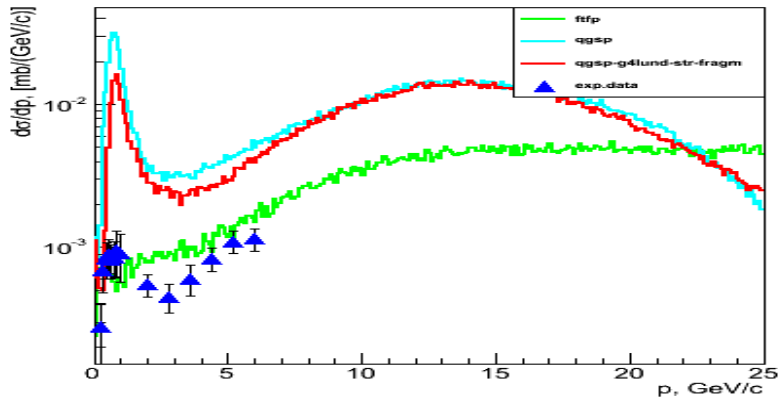
proton + C -> X + pi+ (240<theta<300 (mrad))



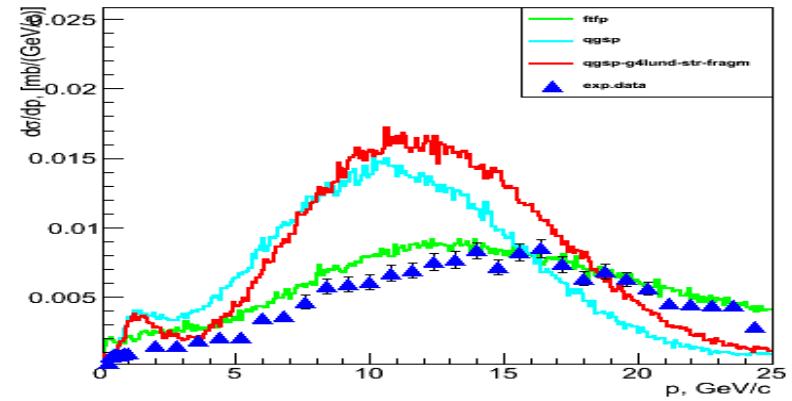


## Test19: 31 GeV p on C -> p + X (different theta bins)

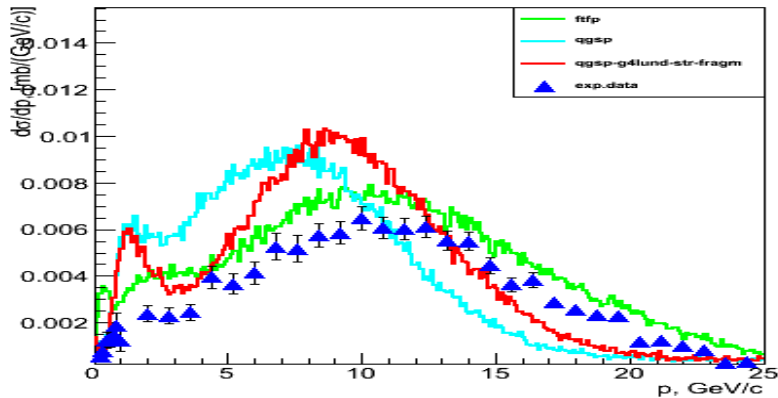
proton + C -> X + proton (0<theta<20 (mrad))



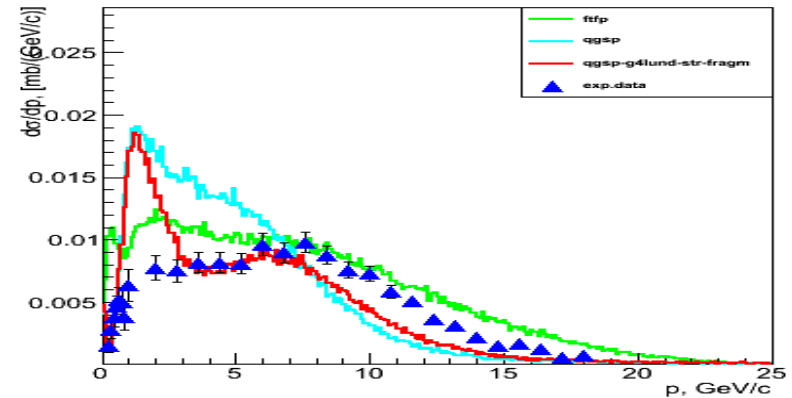
proton + C -> X + proton (20<theta<40 (mrad))



proton + C -> X + proton (40<theta<60 (mrad))



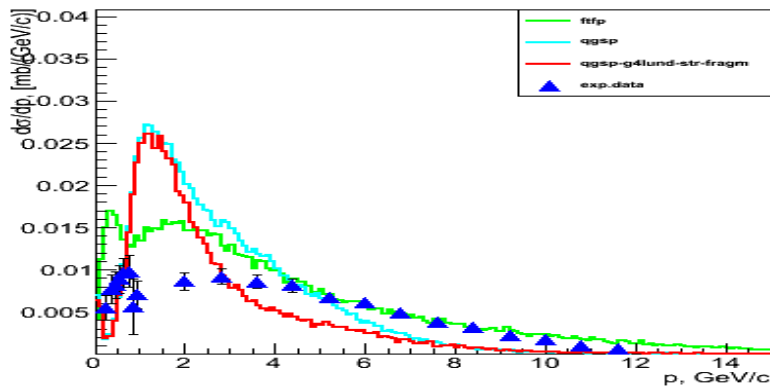
proton + C -> X + proton (60<theta<100 (mrad))



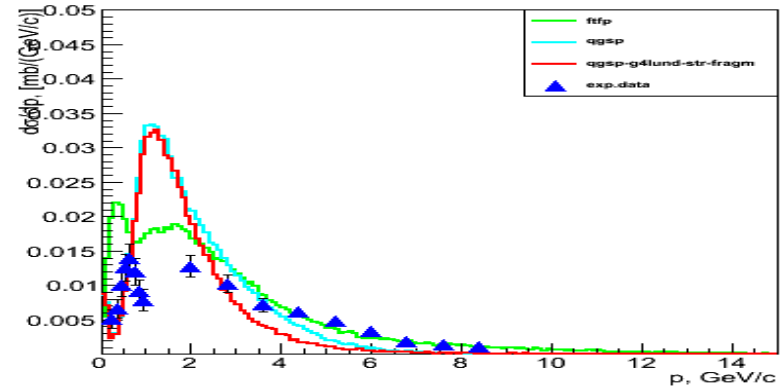


## Test19: 31 GeV p on C -> p + X (different theta bins)

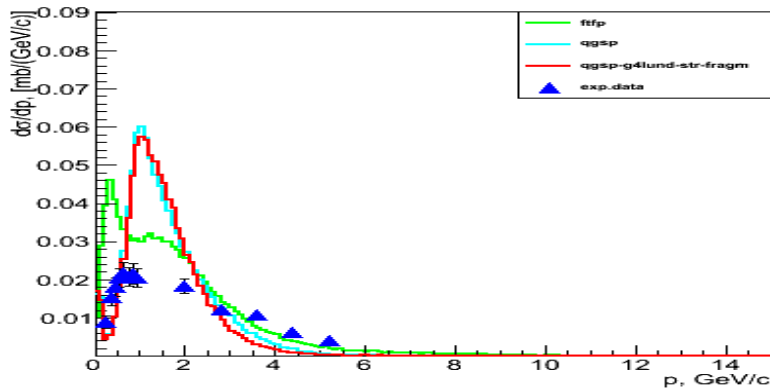
proton + C -> X + proton (100<theta<140 (mrad))



proton + C -> X + proton (140<theta<180 (mrad))

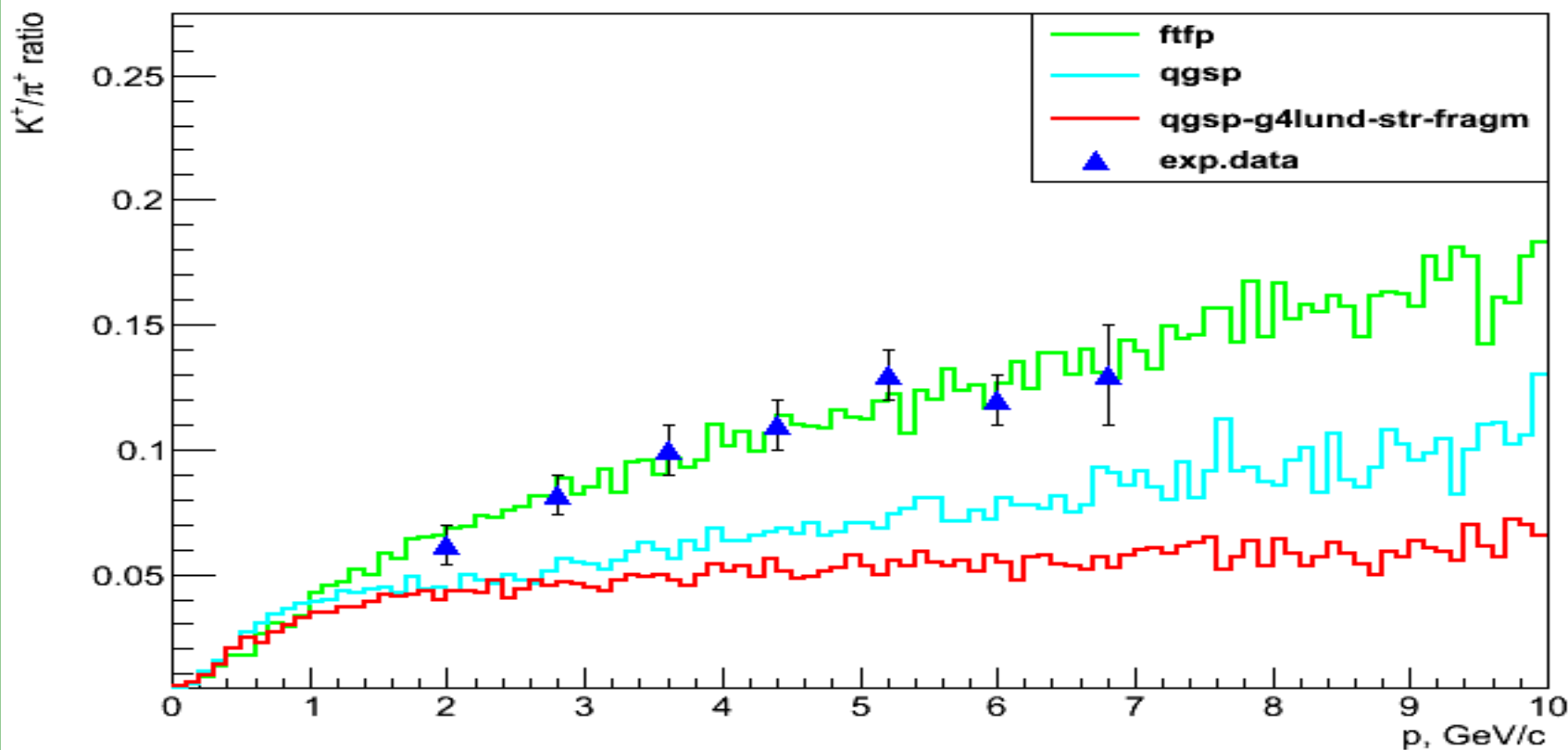


proton + C -> X + proton (180<theta<240 (mrad))



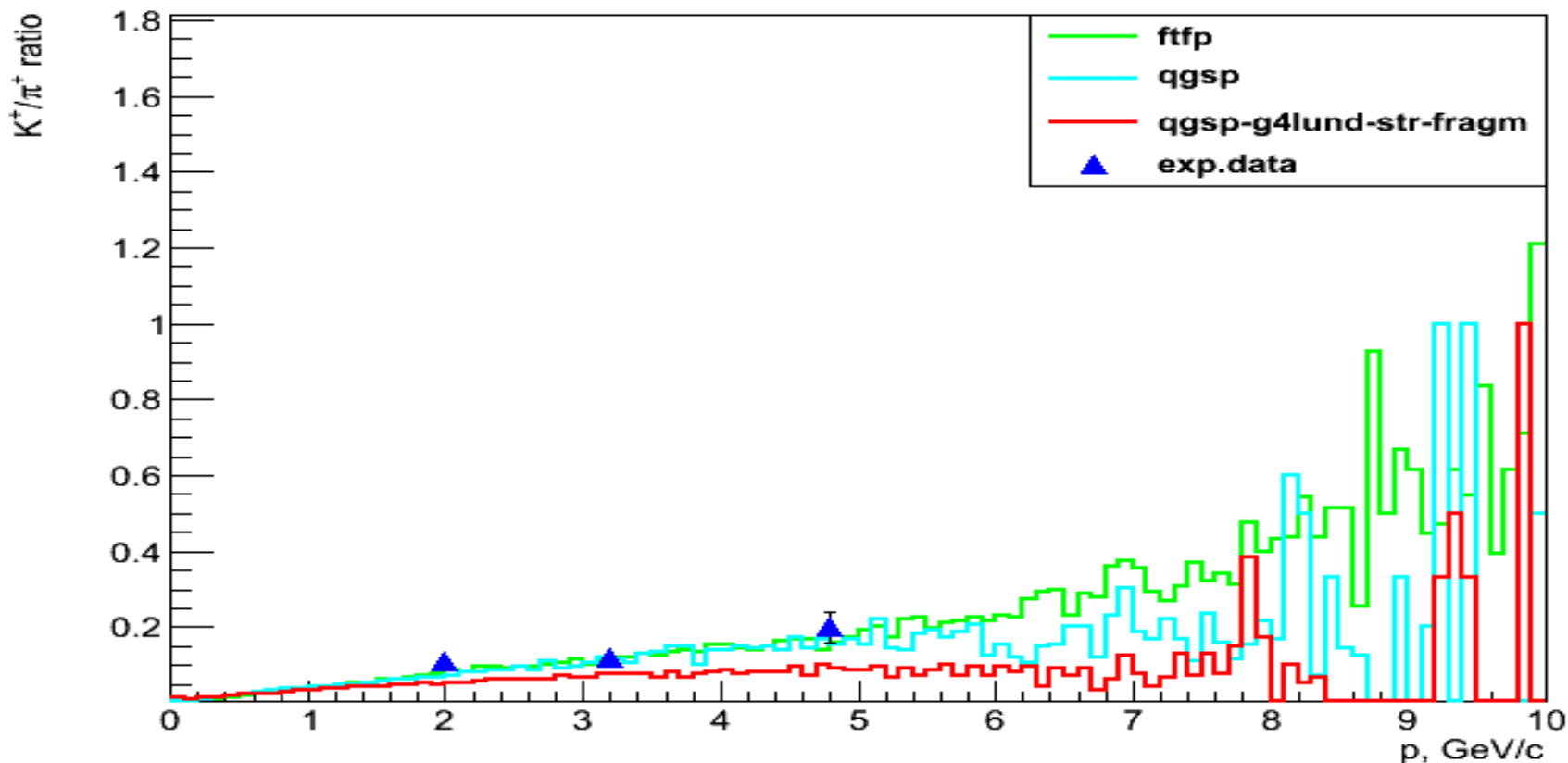
## Test19: 31GeV p on – K<sup>+</sup>/π<sup>+</sup> 20<theta<140mrad

proton + C, K<sup>+</sup>/π<sup>+</sup> (20<theta<140 (mrad))



## Test19: 31GeV p on – K<sup>+</sup>/π<sup>+</sup> 140<theta<240mrad

proton + C, K<sup>+</sup>/π<sup>+</sup> (140<theta<240 (mrad))





## Summary

- Is there a particular reason why not use `G4LundStringFragmentation` with `QGS` ???
- In my opinion, `QGS+G4LundStringFragmentation` gives good results at high energy (158GeV)
- In the range of several tens GeV (e.g. 31GeV) the “old” approach seems better (`FTF+G4Lund` or `QGS+G4QGSM`)
- I think potentials of `QGS` should be revisited