

Comparison between the old (v. 4.1.5.1)  
and new SPDRoot

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# Generation

- ◆ Pythia 8; (p+p) at 27 GeV; Soft QCD (wo elastic);
- ◆ SPDRoot v. 4.1.5.1 vs new updates
- ◆ ITS: — (1) MAPS 4 layers, no EndCap;

- ◆ Beam:

```
primGen->SetBeam(0., 0., 0.025, 0.025); //X0,Y0,Xwidth,Ywidth : 250 microns std. dev.  
primGen->SmearGausVertexXY(kTRUE);  
//Important : for uniform smearing or SmearVertexXY(kTRUE), give twice the width you want  
//uniform smearing is done from -width/2 to width/2  
//for Gaussian smearing or SmearGausVertexXY(kTRUE), give sigma or standard deviation you want  
  
primGen->SetTarget(0., 30.); //Z0,Zwidth, 30 cm std. dev.  
primGen->SmearGausVertexZ(kTRUE);  
//Important : for uniform smearing or SmearVertexZ(kTRUE), give twice the width you want  
//uniform smearing is done from -width/2 to width/2  
//for Gaussian smearing or SmearGausVertexZ(kTRUE), give sigma or standard deviation you want
```



# Reconstruction

- ◆ SpdMCTacksFinder (mc-tracks + track-fit-parameters (optionally))
- ◆ SpdRCVerticesFinder (rc-vertices + vertices-fit-parameters)



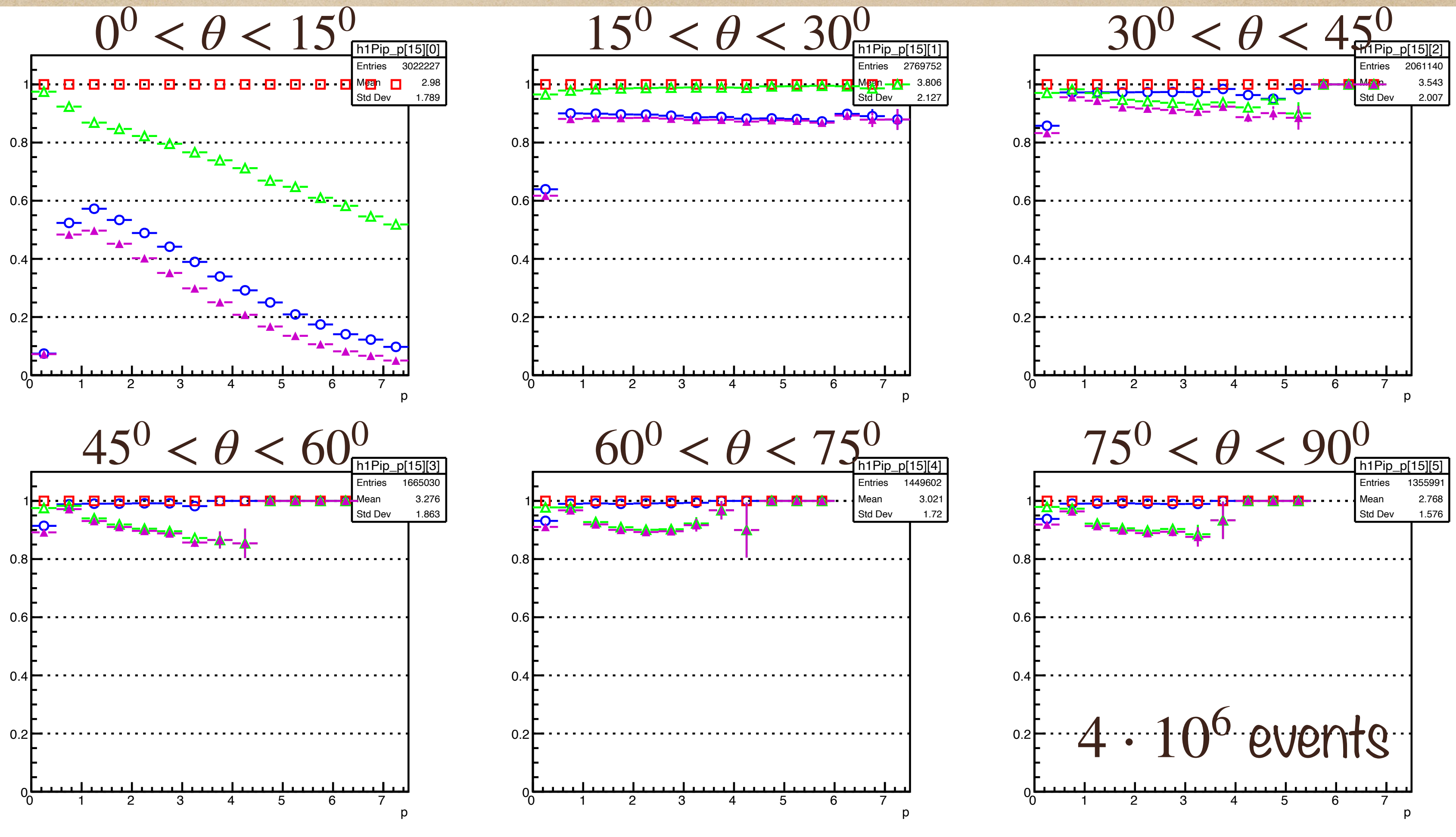
# Selection

- ◆ Reconstructed Primary Vertex ( $-35 \text{ cm} < Z_{PV} < 35 \text{ cm}$ )
- ◆ At least 1 hit in ITS and 8 or more hits in STRAW
- ◆ Track fit convergency  $\neq 0$



SPORoot v. 4.1.5.1

$$\pi^+ : C1 = C2 * C3 * C4$$



C2 = N of tracks / N of particles

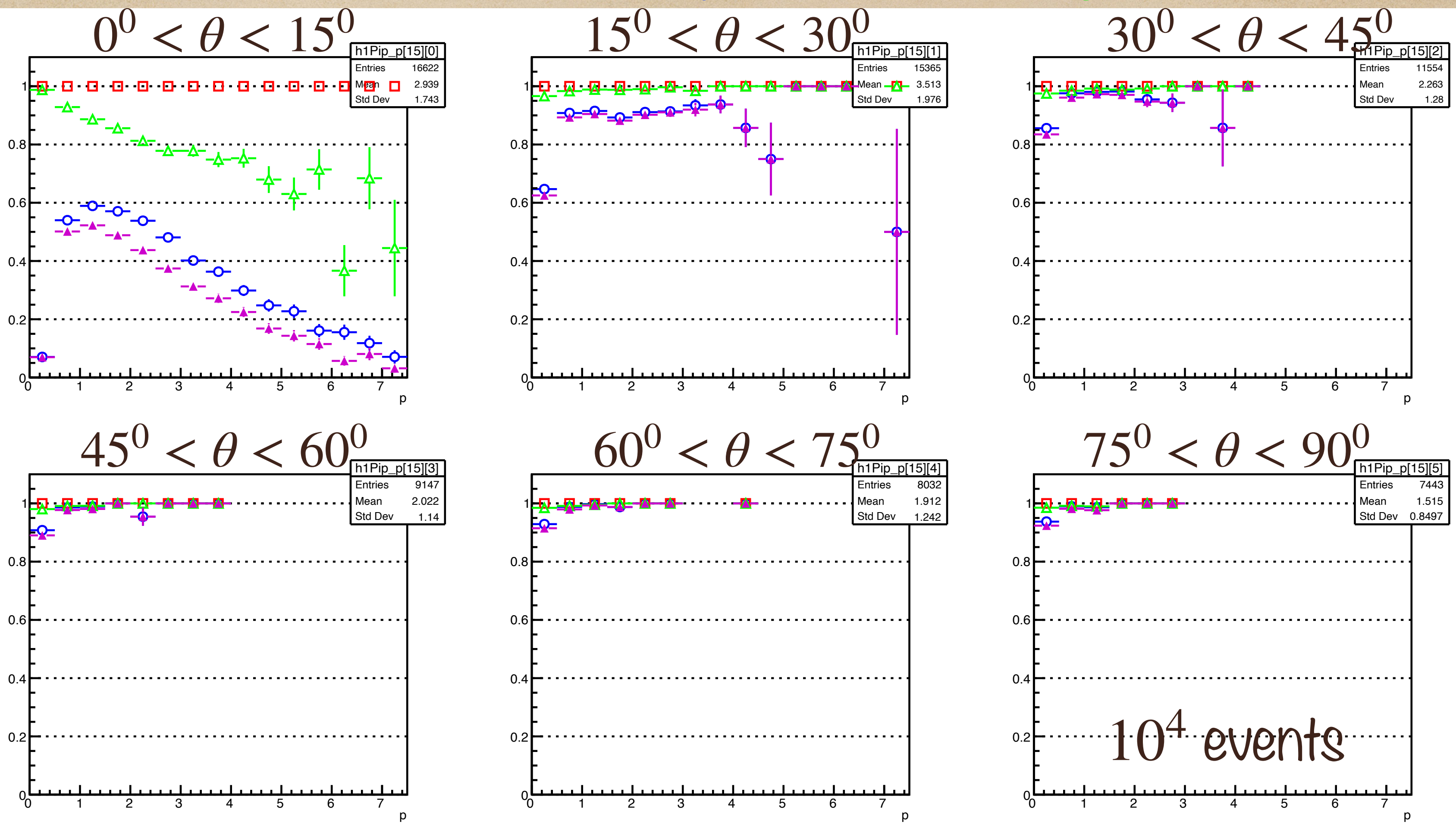
C3 = at least 1 hit in ITS — default reconstruction requirement

C4 = at least 8 STRAW hits — gaps between octants (5 cm)



New software!

$$\pi^+ : C1 = C2 * C3 * C4$$

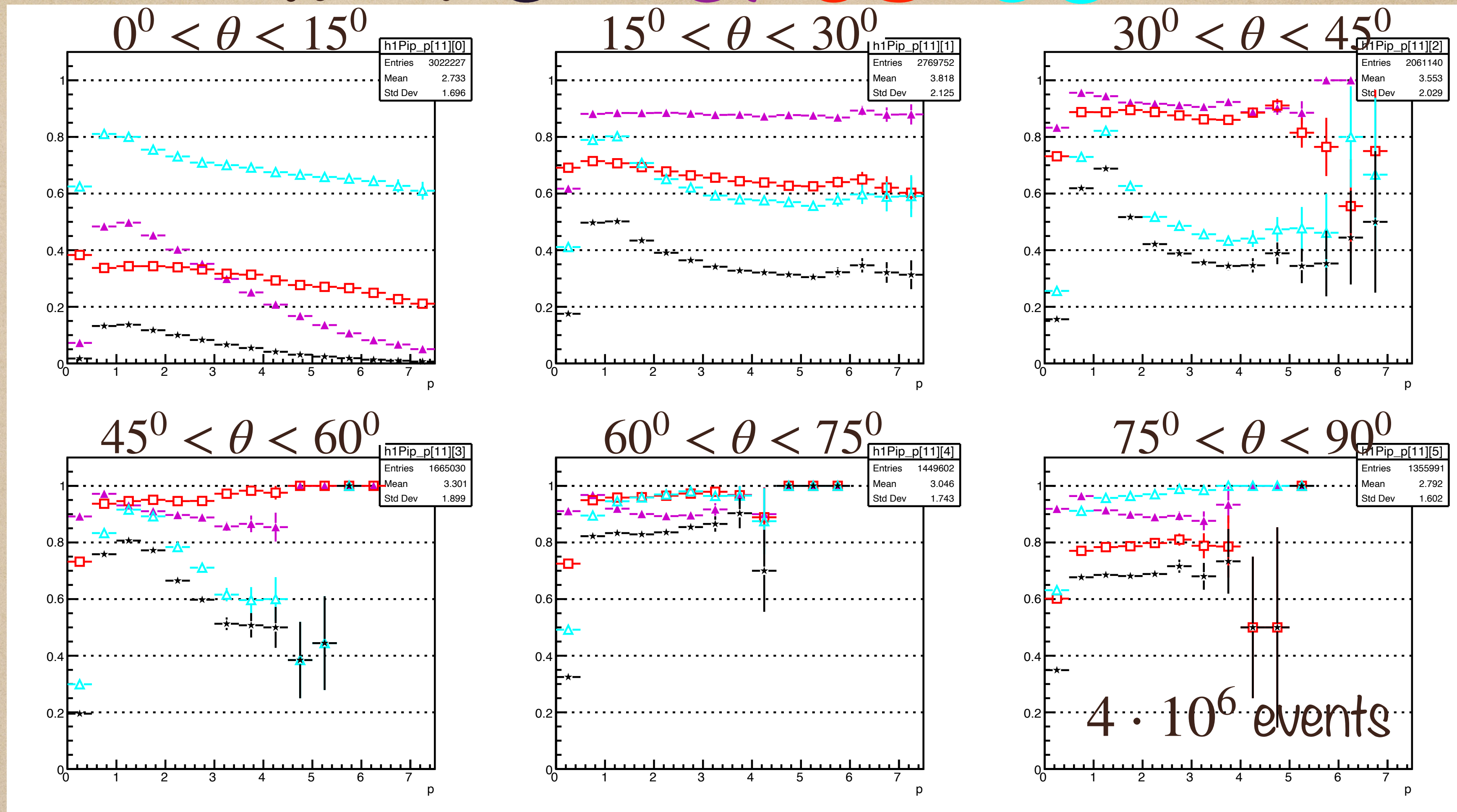


C2 = N of tracks / N of particles  
C3 = at least 1 hit in ITS — default reconstruction requirement  
C4 = at least 8 STRAW hits — gaps between octants (0.4 cm)



SPORoot v. 4.1.5.1

$$\pi^+ : C = C1 * C5 * C6$$



C1 = Total from previous page

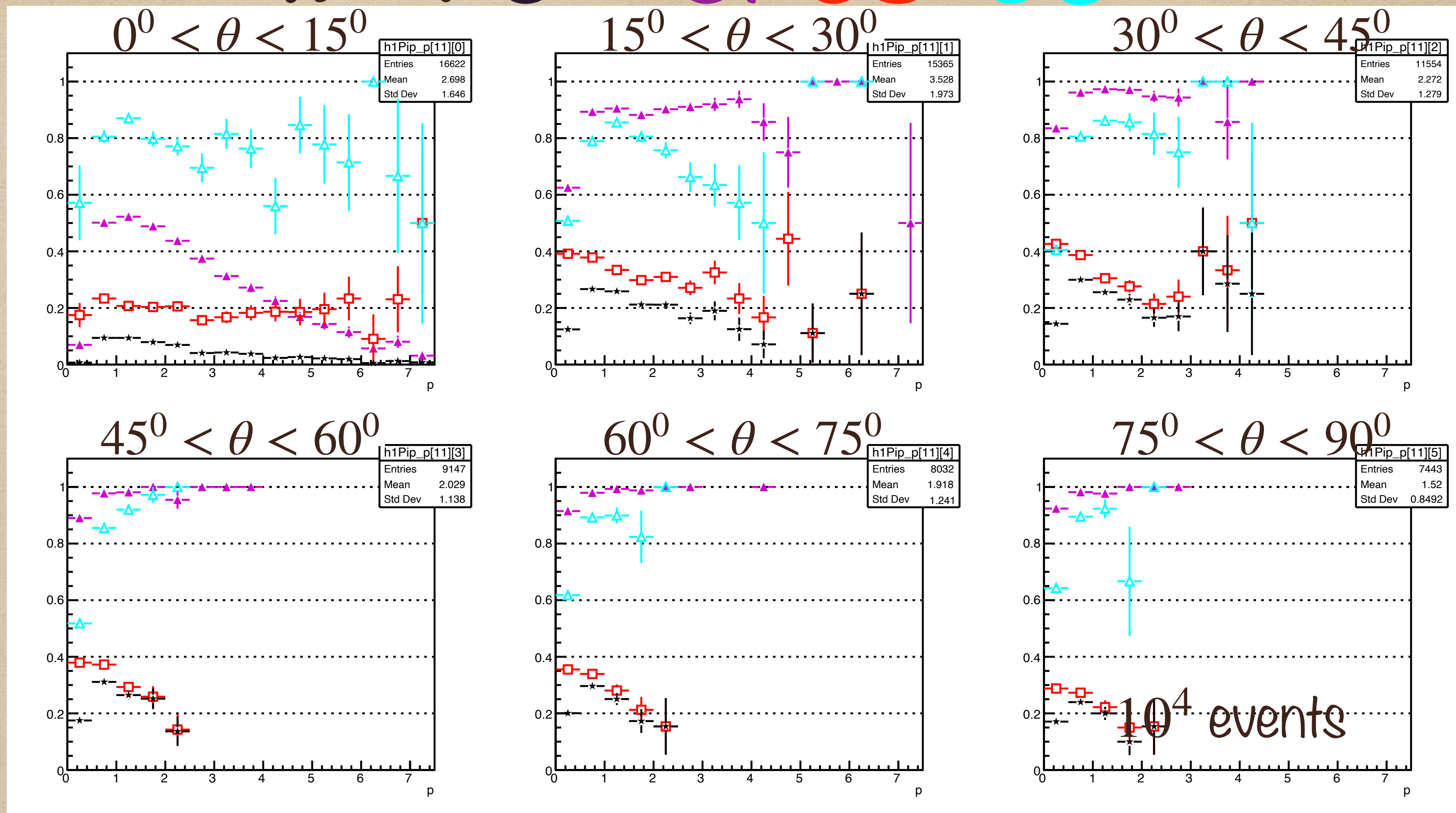
C5 = reconstructed PV — 87° <  $\theta$  < 93° excluded (hard coding), track is fitted

C6 = convergency cut — from 1 to 4 iterations (hard coding)



$$\pi^+ : C = C1 * C5 * C6$$

New software!



C1 = Total from previous page

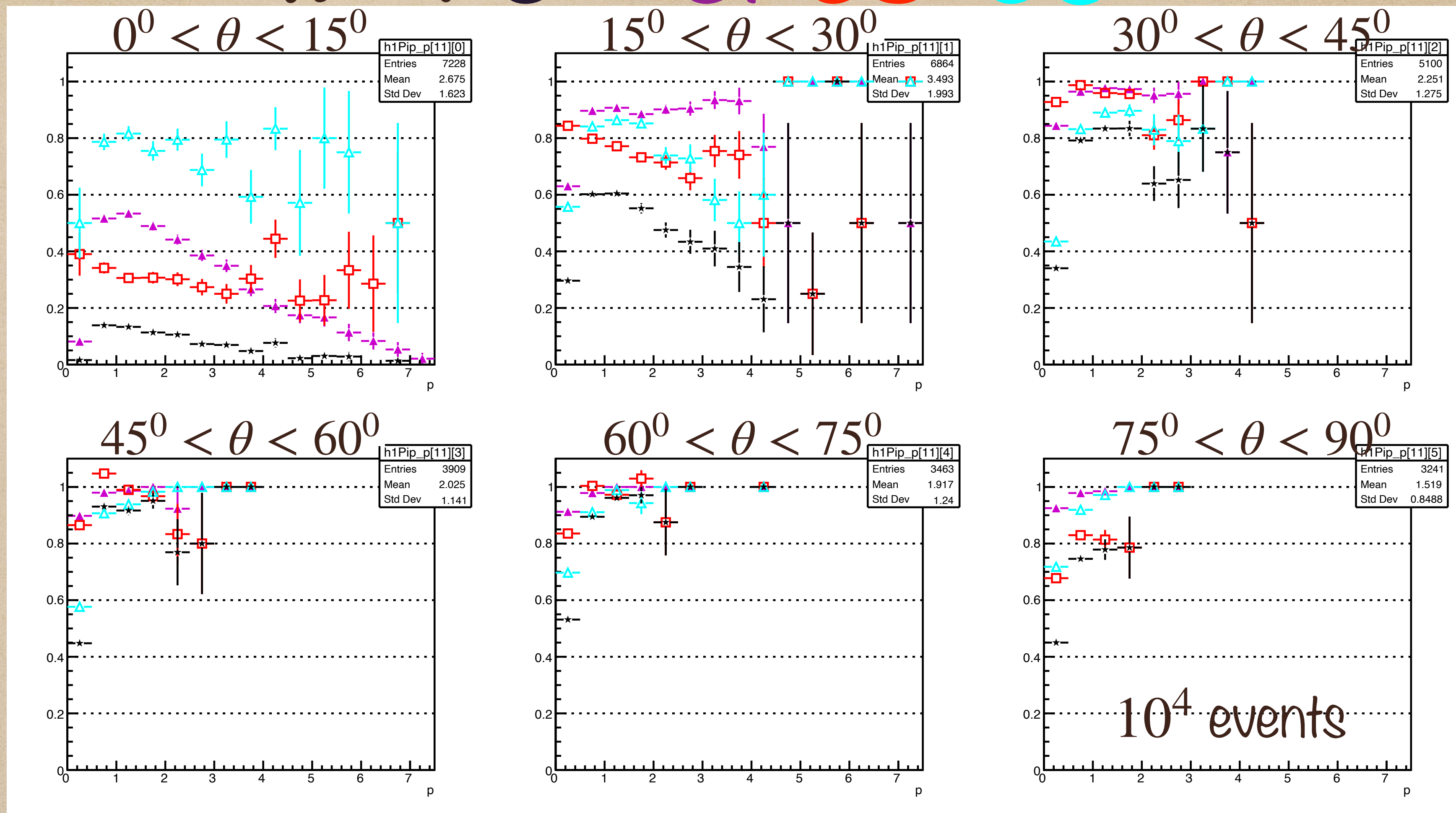
C5 = reconstructed PV —  $87^\circ < \theta < 93^\circ$  excluded (hard coding), track is fitted

C6 = convergency cut — from 1 to 4 iterations (hard coding)



New software!  
 But removed commit from 30.08.2024

$$\pi^+ : C = C1 * C5 * C6$$



C1 = Total from previous page

C5 = reconstructed PV —  $87^\circ < \theta < 93^\circ$  excluded (hard coding), track is fitted

C6 = convergency cut — from 1 to 4 iterations (hard coding)

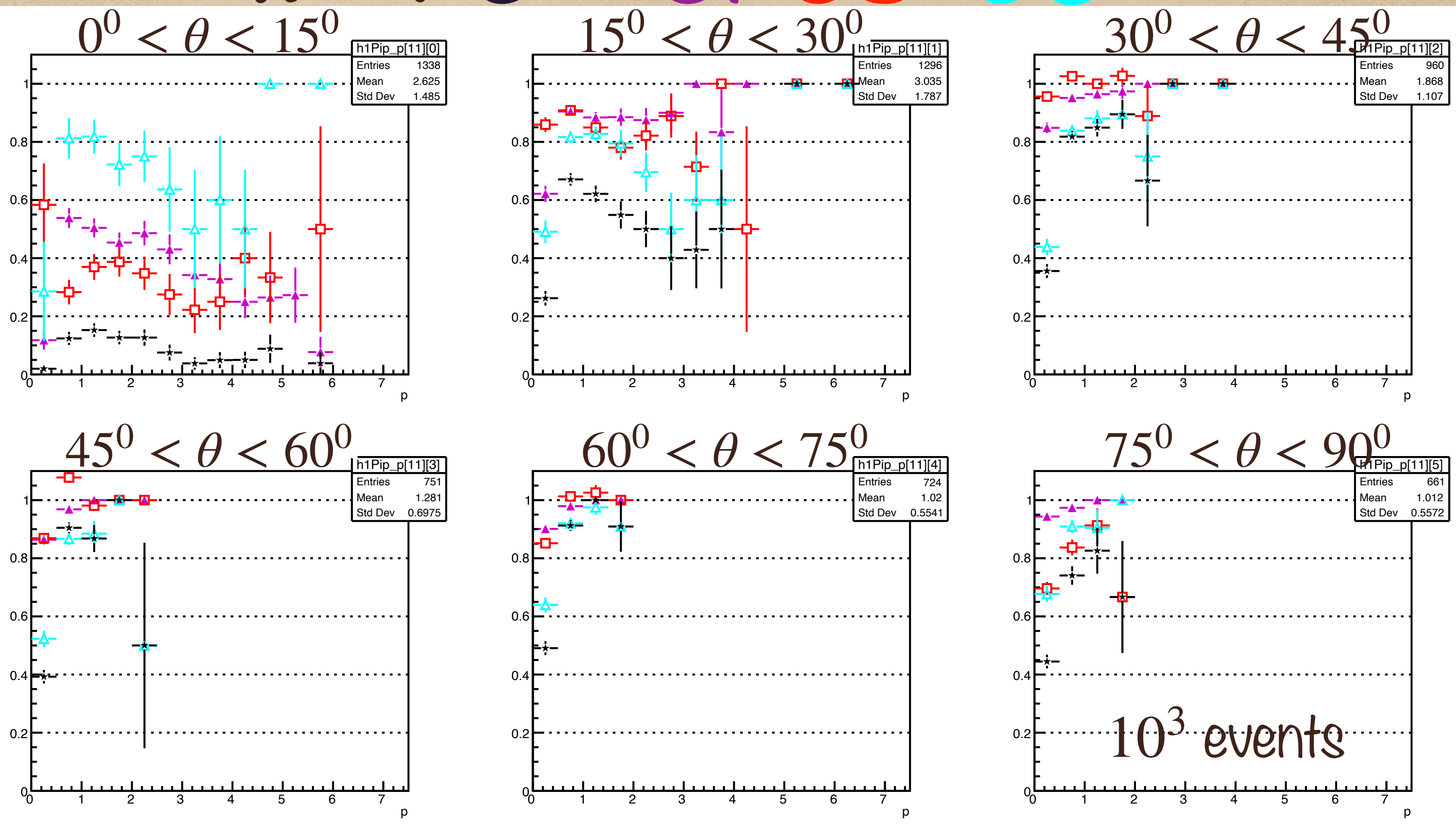


Low statistics

New software!

But removed commit from Aug.30,2024  
Added Russian's solution (Sept.19,2024)

$$\pi^+ : C = C1 * C5 * C6$$



C1 = Total from previous page

C5 = reconstructed PV — 87° <  $\theta$  < 93° excluded (hard coding), track is fitted

C6 = convergency cut — from 1 to 4 iterations (hard coding)



# Summary

- ◆ To have realised software once a year is not a good idea
- ◆ Commit by Igor (Fixed double hit creation when track crosses straw) from Aug 30, 2023 should be checked to understand the effect on RC PVs
- ◆ Ruslan's solution (see talk from Sept.19, 2024) do not affect RC PVs
- ◆ We need to think about an offline monitor and check distributions after a commit