

$\pi^+$ ,  $K^+$  and proton production  
in ( $p - p$ ) interactions at 27 GeV/c with SPD

6.06.2023

# Generation

- ◆ Pythia 8; (p+p) at 27 GeV; Soft QCD (wo elastic); ~ 5 000 000 events
- ◆ SPDRoot from 1/02/2023; ITS: 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

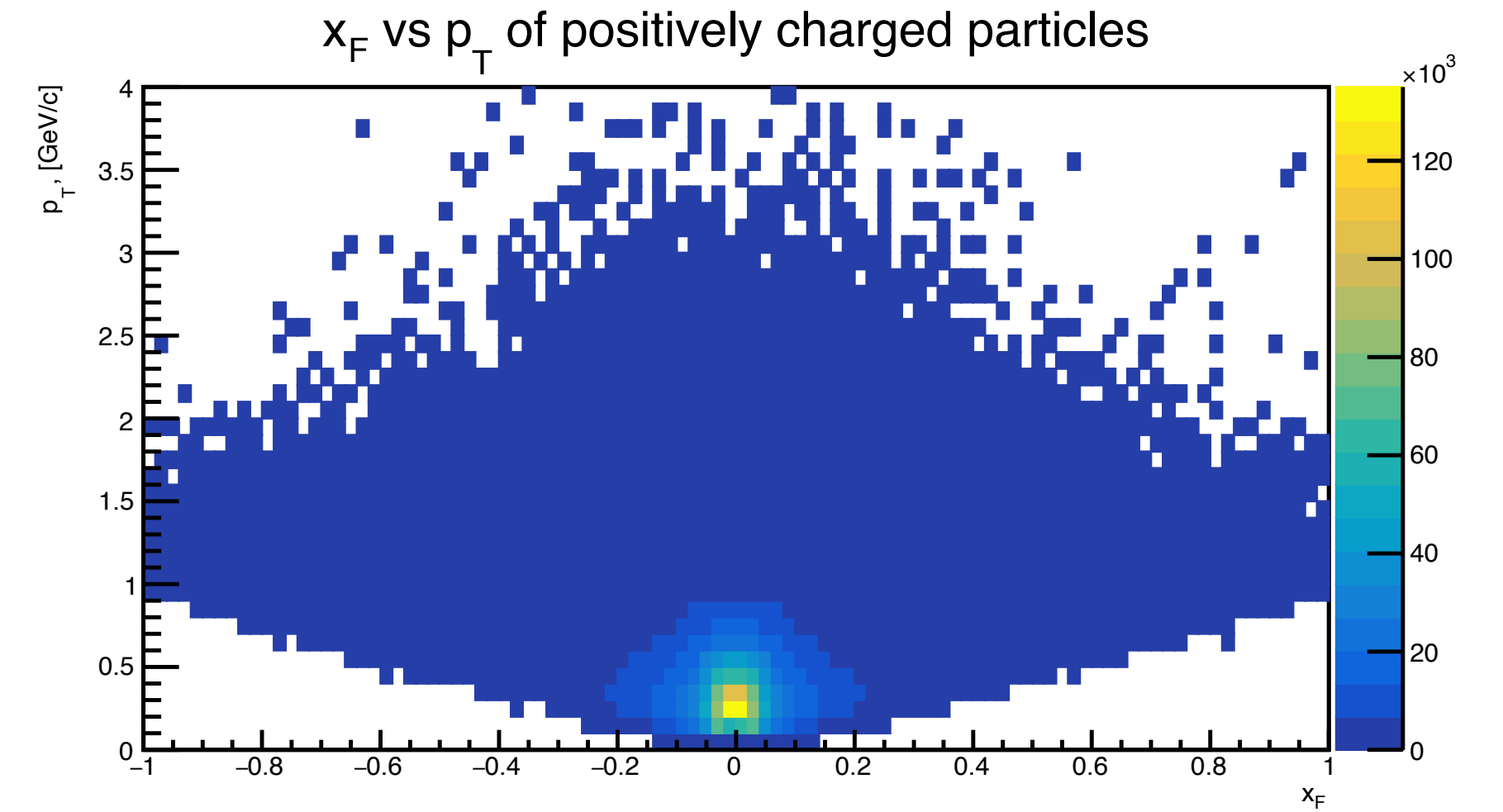
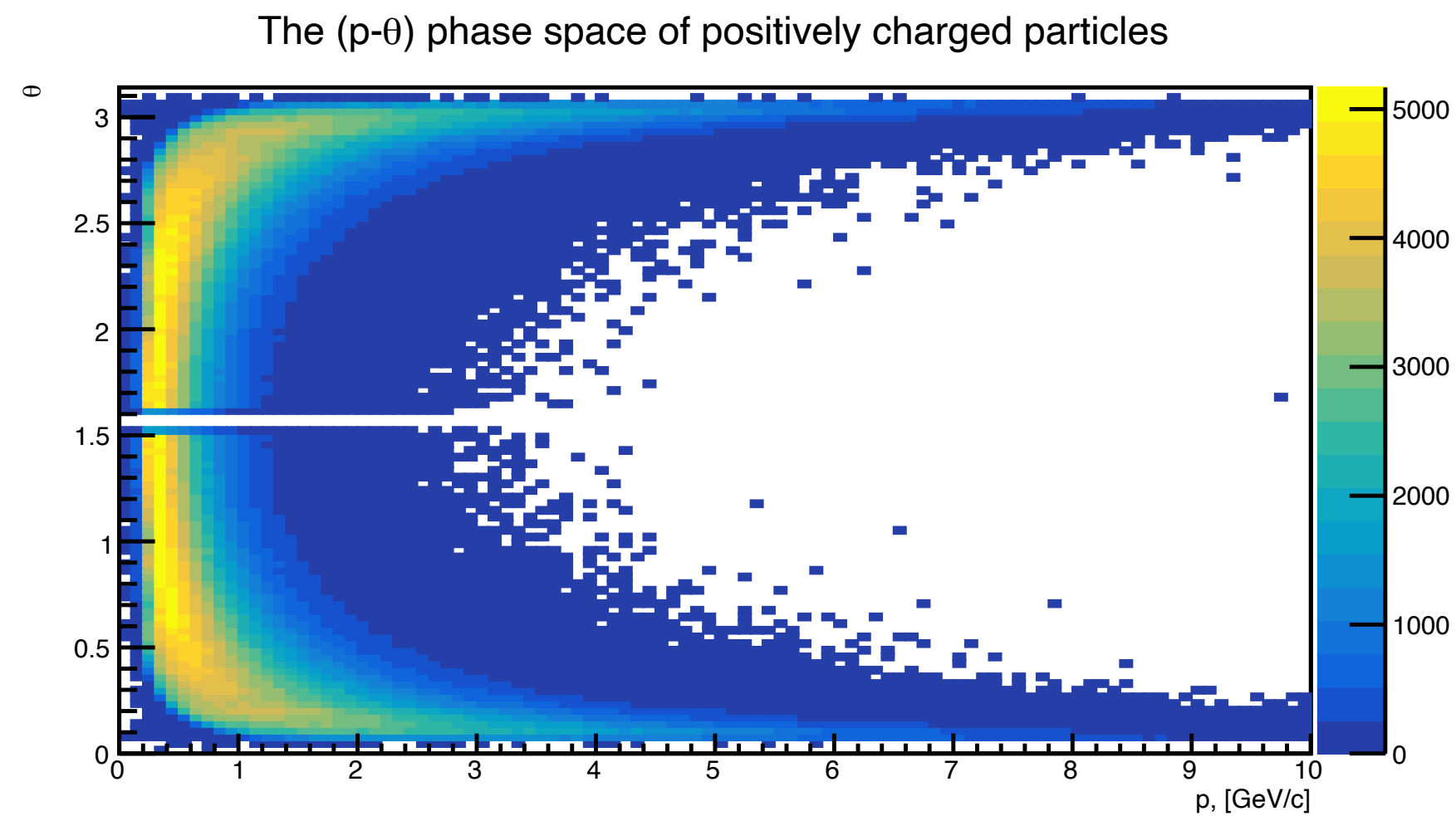
primGen->SetTarget(0., 30.); //Z0, Zwidth, 30 cm std. dev.
primGen->SmearGausVertexZ(kTRUE);
//Important : for uniform smearing or SmearVertexZ(kTRUE), give twice the width you want
//uniform smearing is done from -width/2 to width/2
//for Gaussian smearing or SmearGausVertexZ(kTRUE), give sigma or standard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

# Reconstruction

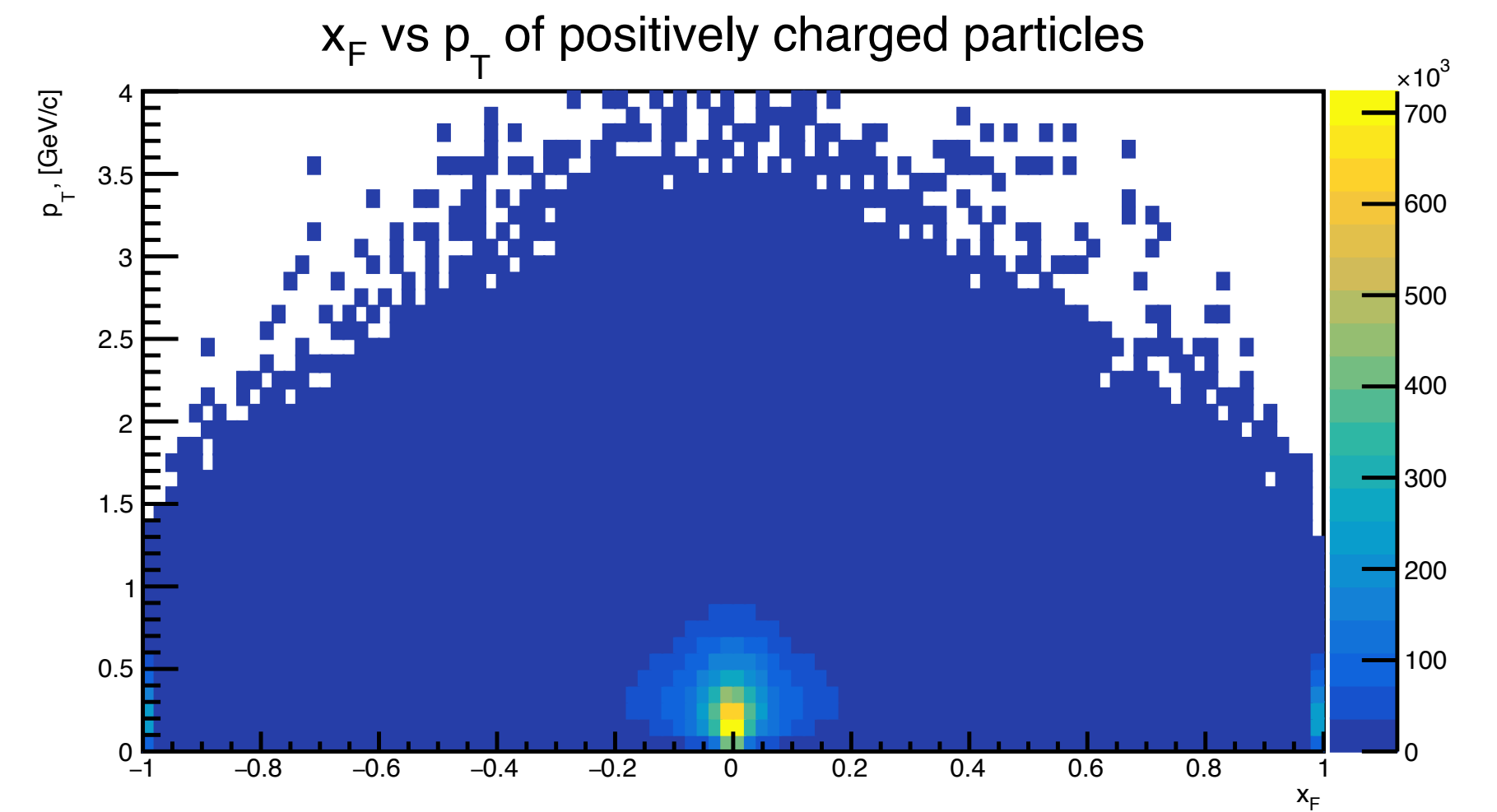
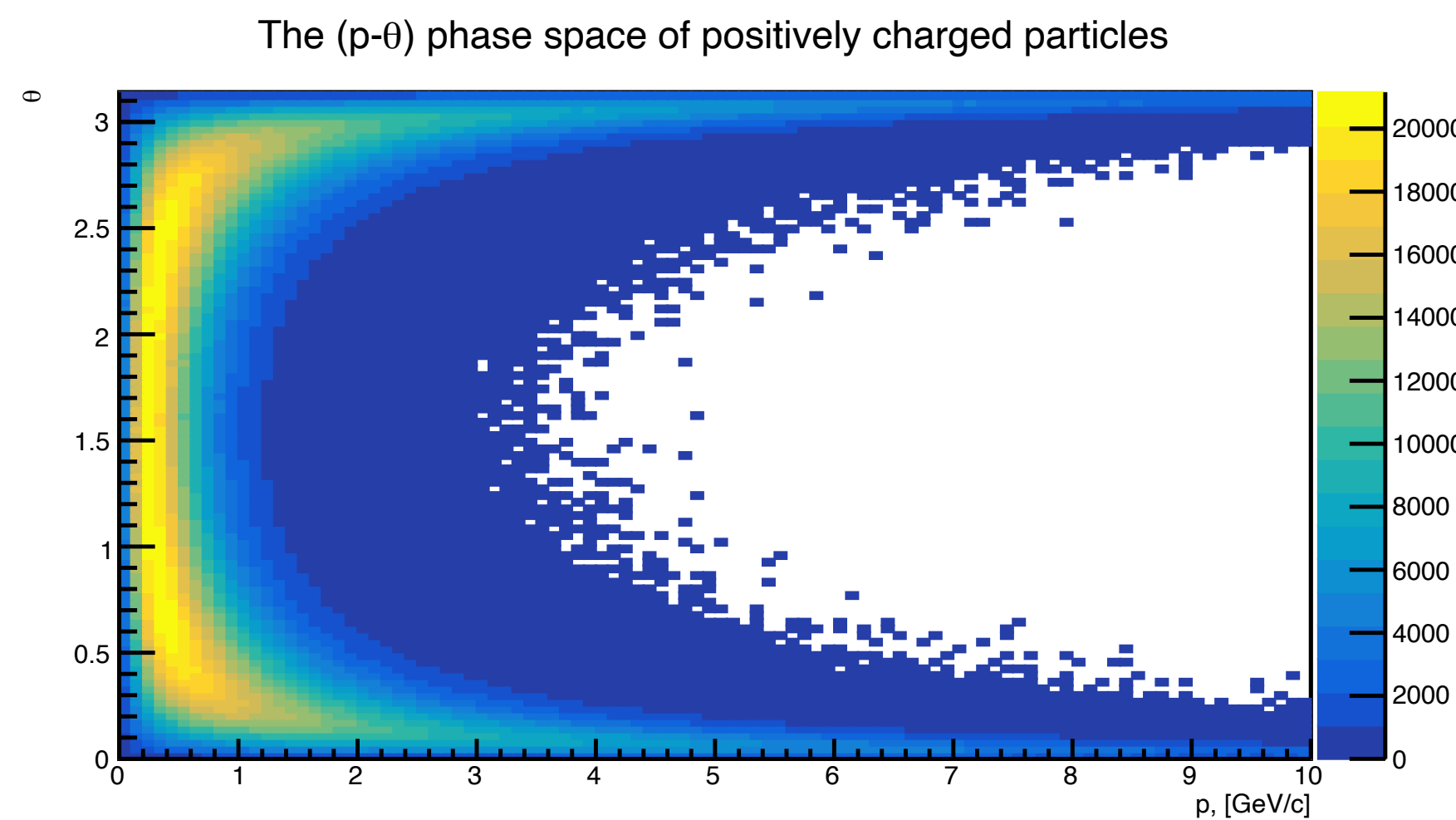
- ◆ SpdMCTracksFinder (mc-tracks + track-fit-parameters (optionally))
- ◆ SpdMCVerticesFitter (vertices-fit-parameters -> mc-vertices)
- ◆ SpdRCVerticesFinder (rc-vertices + vertices-fit-parameters)

# Charged Hadrons: 2D distributions

Reconstructed  
in SPDRoot

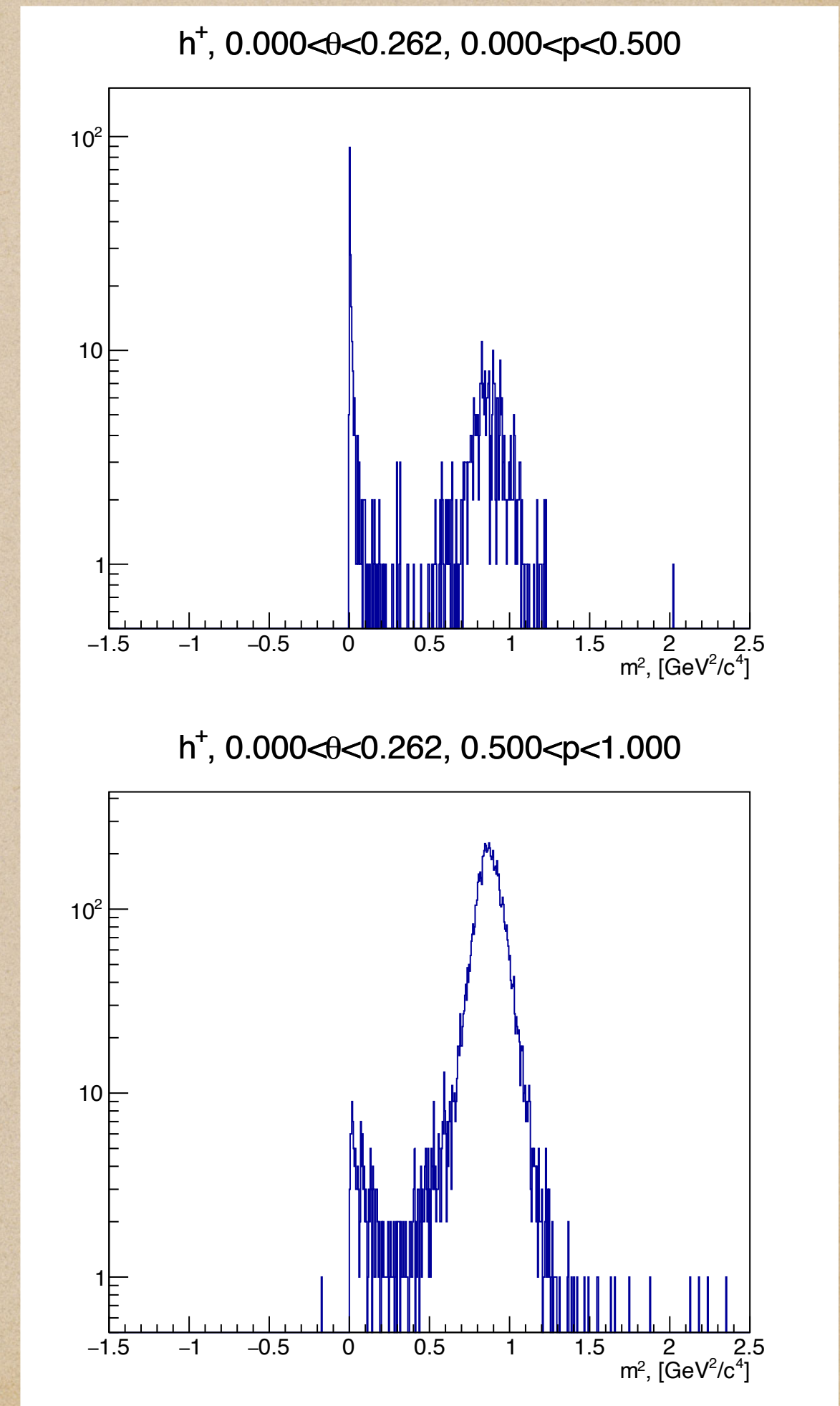


pure Pythia8



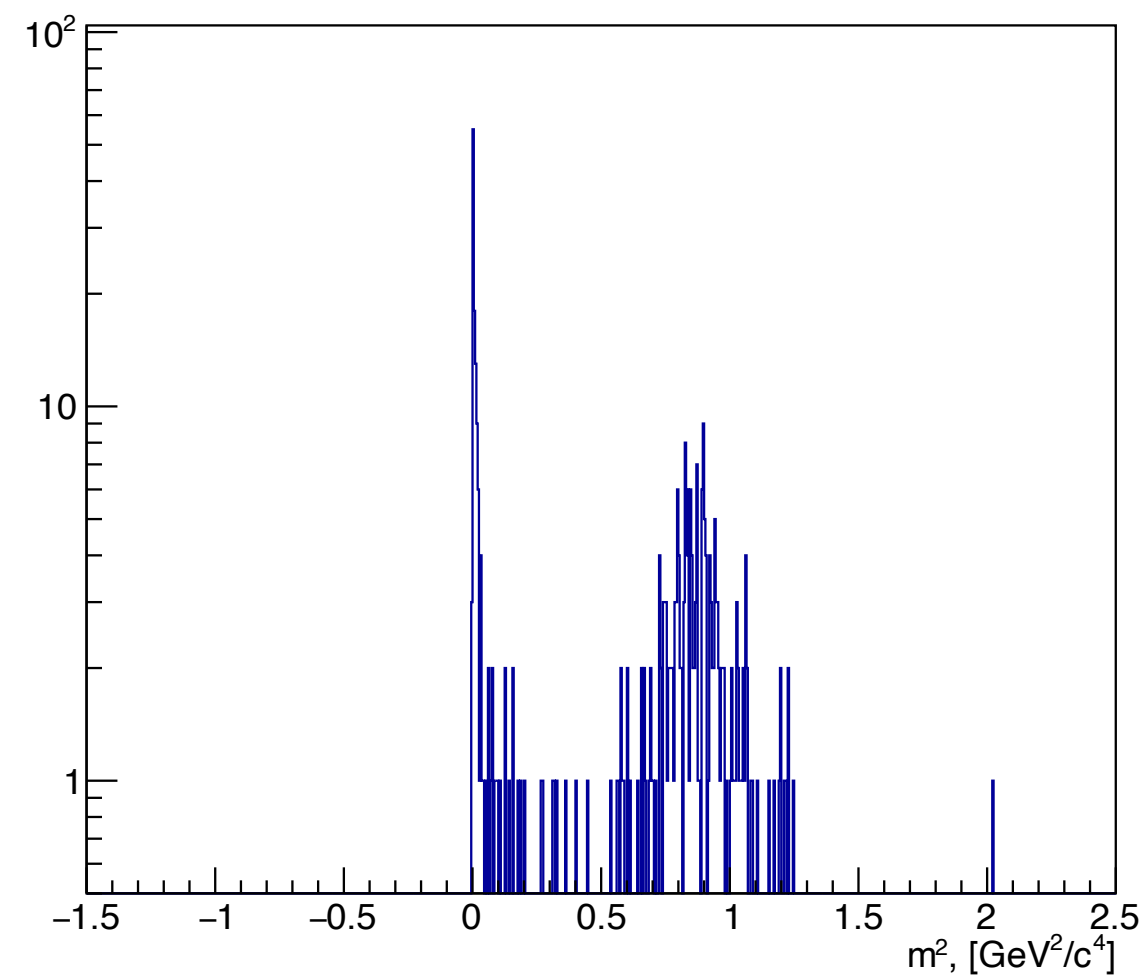
# Selection

- ◆ Reconstructed Primary Vertex
- ◆ Protons: PID = 2212, ( $p_{rec} < 1 \text{ GeV}/c$  &  $\theta_{rec} < 15^\circ$ )
- ◆ Good tracks:  $m_{TOF}^2 > 0.7 (\text{GeV}/c^2)^2$
- ◆ Bad tracks:  $m_{TOF}^2 < 0.2 (\text{GeV}/c^2)^2$  — 50% of tracks with  $p < 0.5 \text{ GeV}/c$

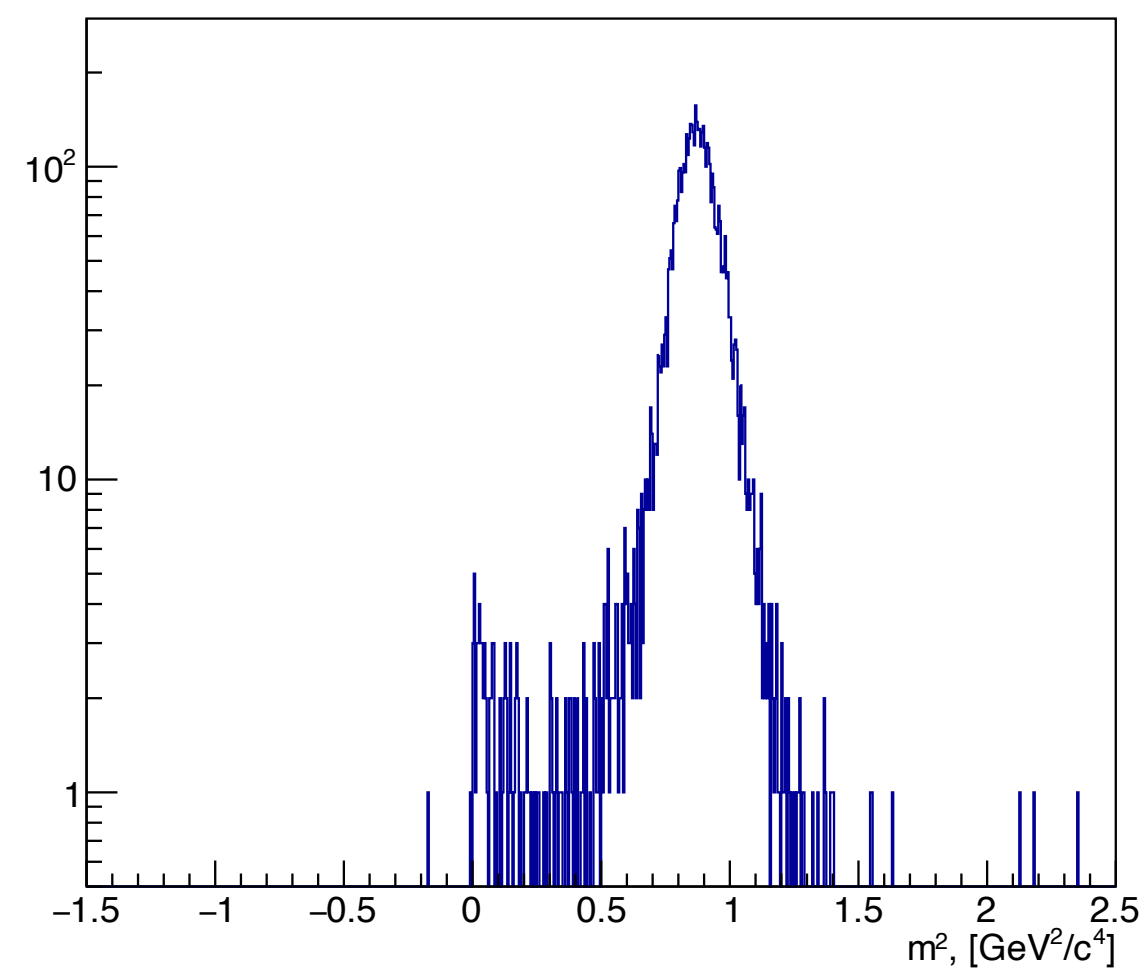


+ Convergency! $\neq$ 0

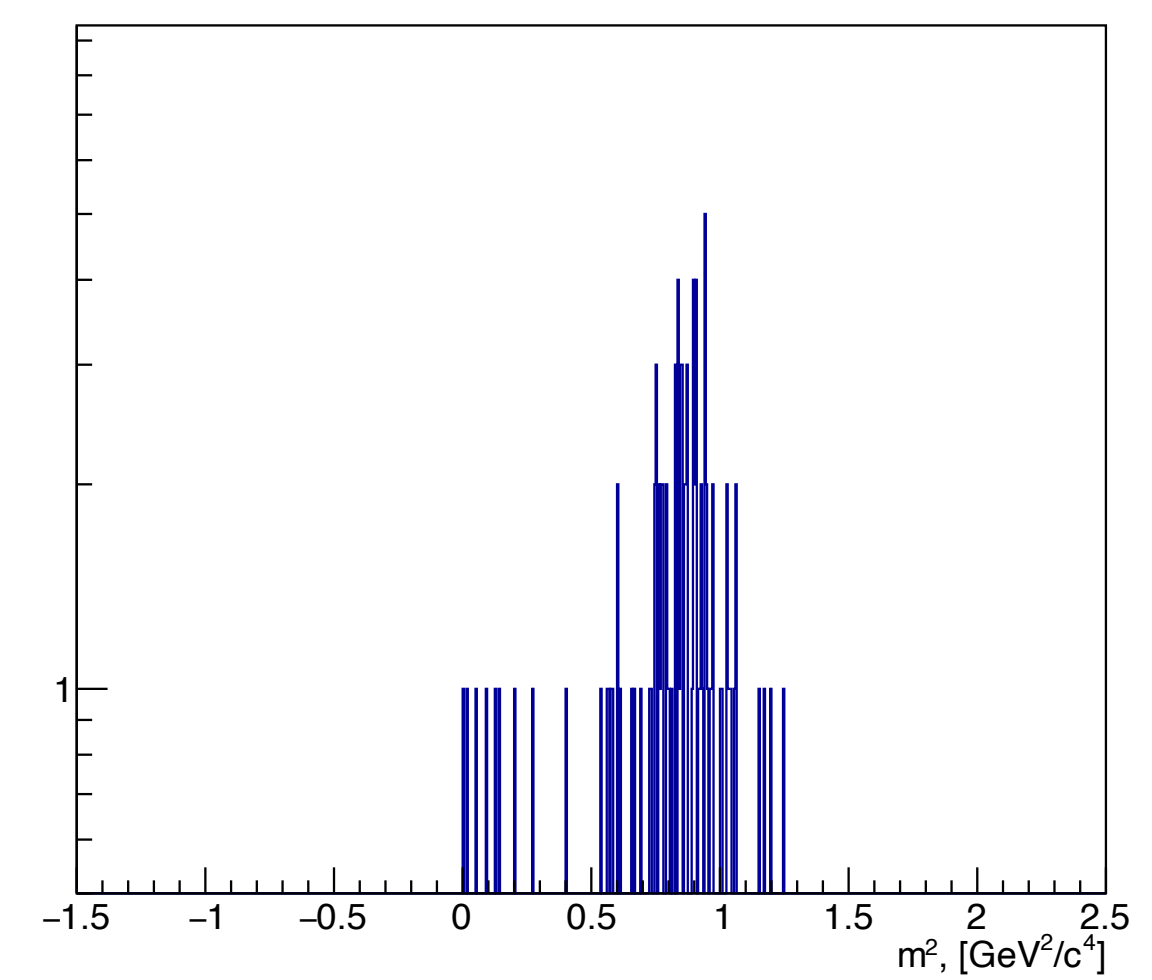
$h^+$ ,  $0.000 < p < 0.500$



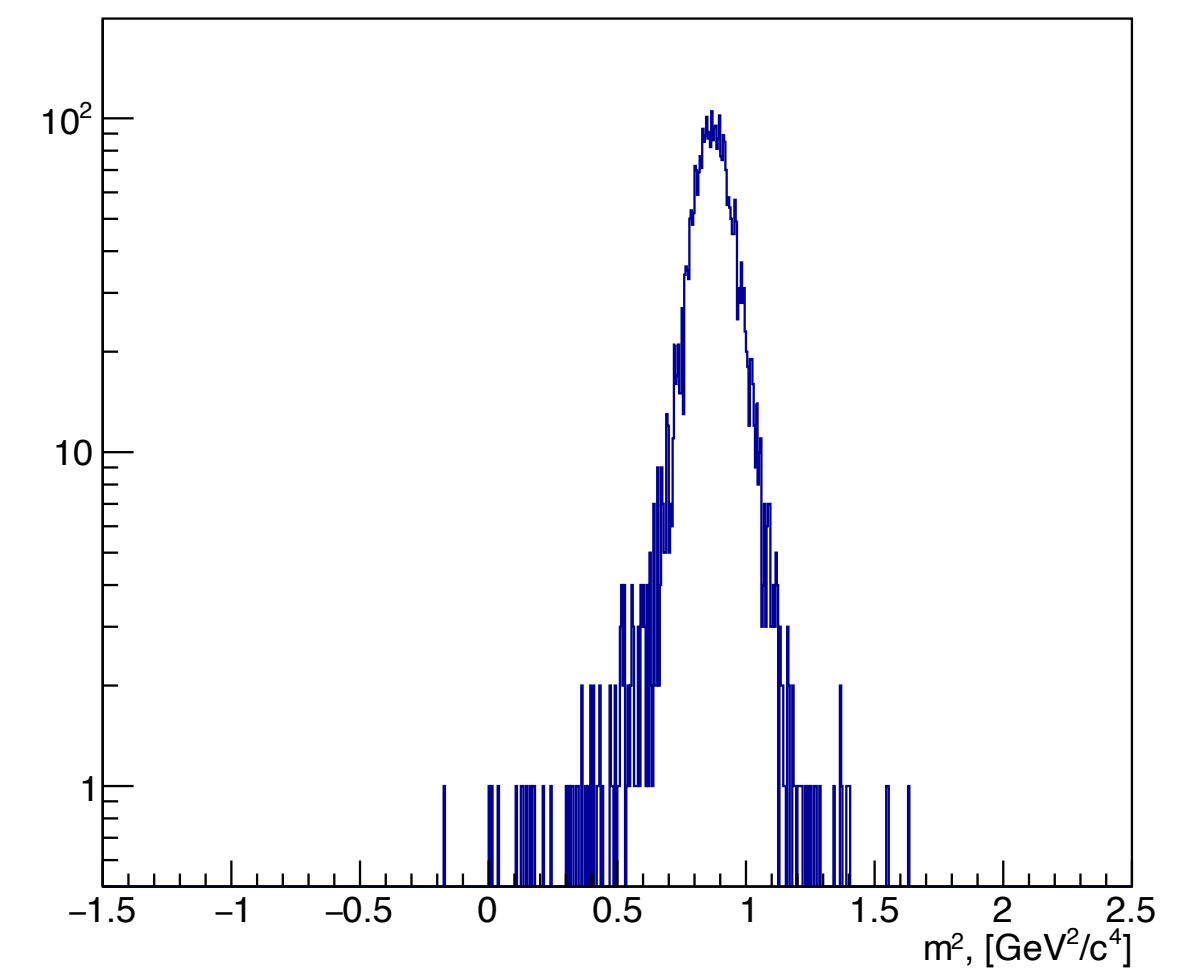
$h^+$ ,  $0.500 < p < 1.000$



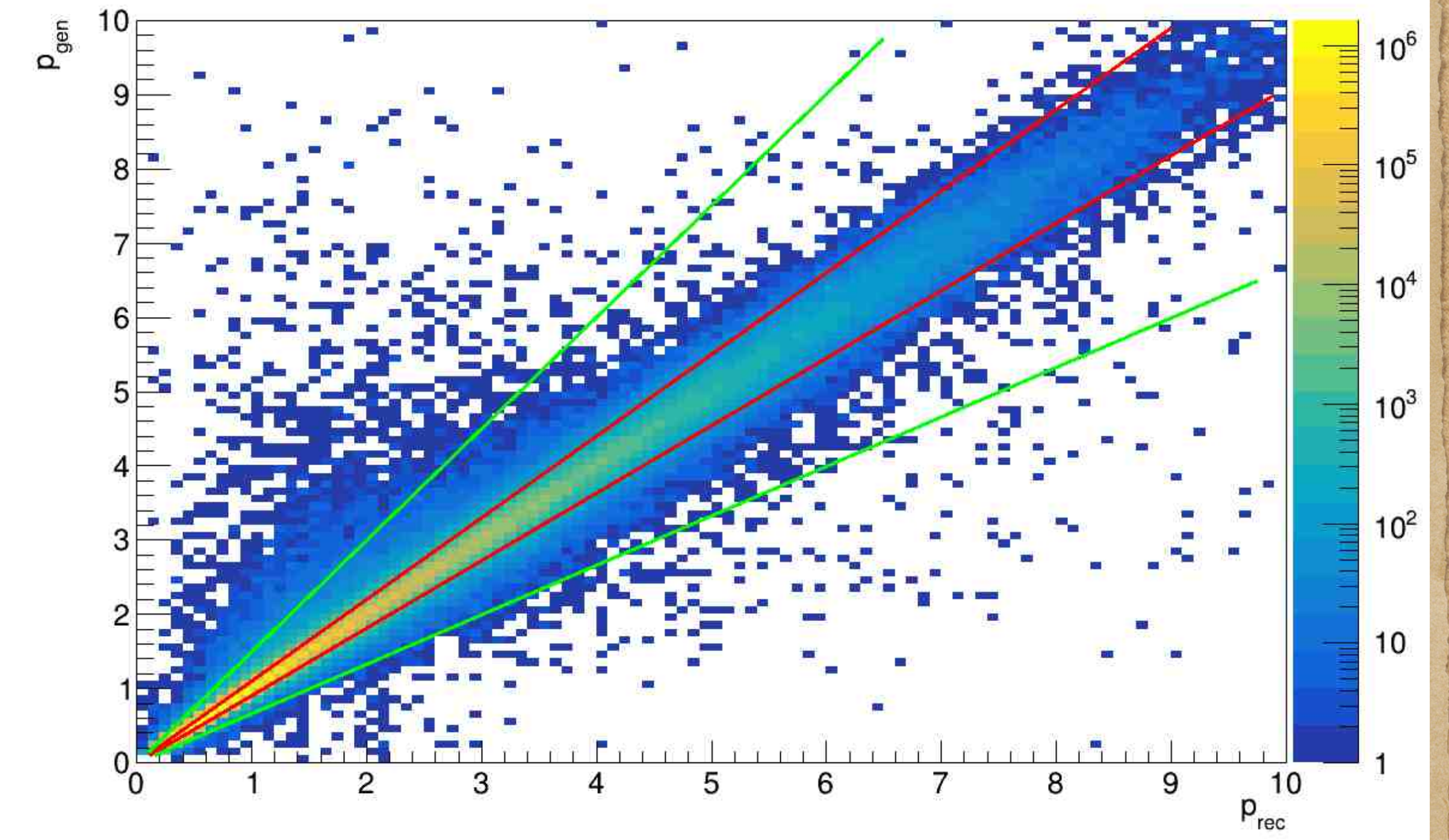
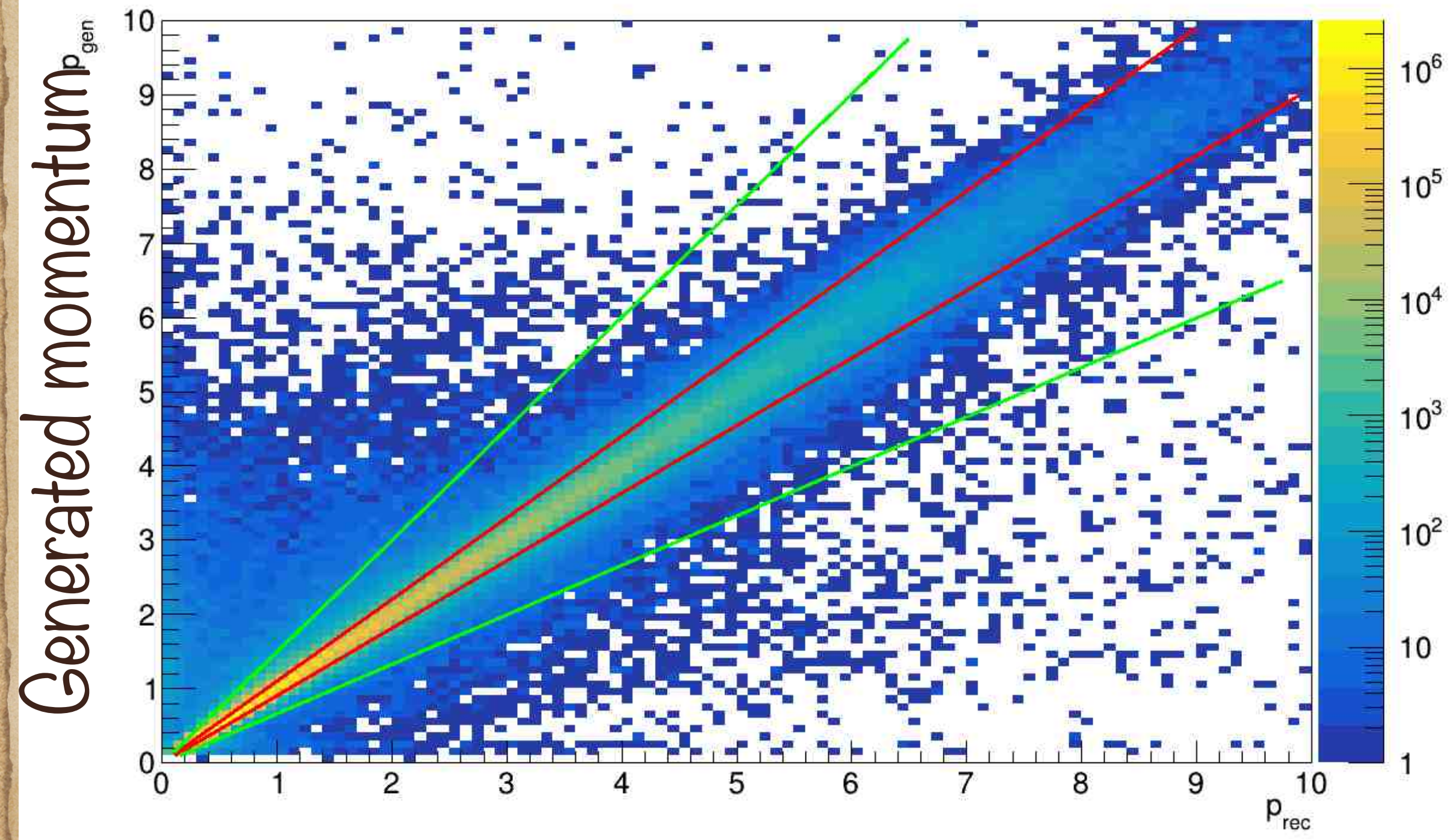
$h^+$ ,  $0.000 < p < 0.500$



$h^+$ ,  $0.500 < p < 1.000$



+ Convergency  $\neq 0$



Reconstructed momentum

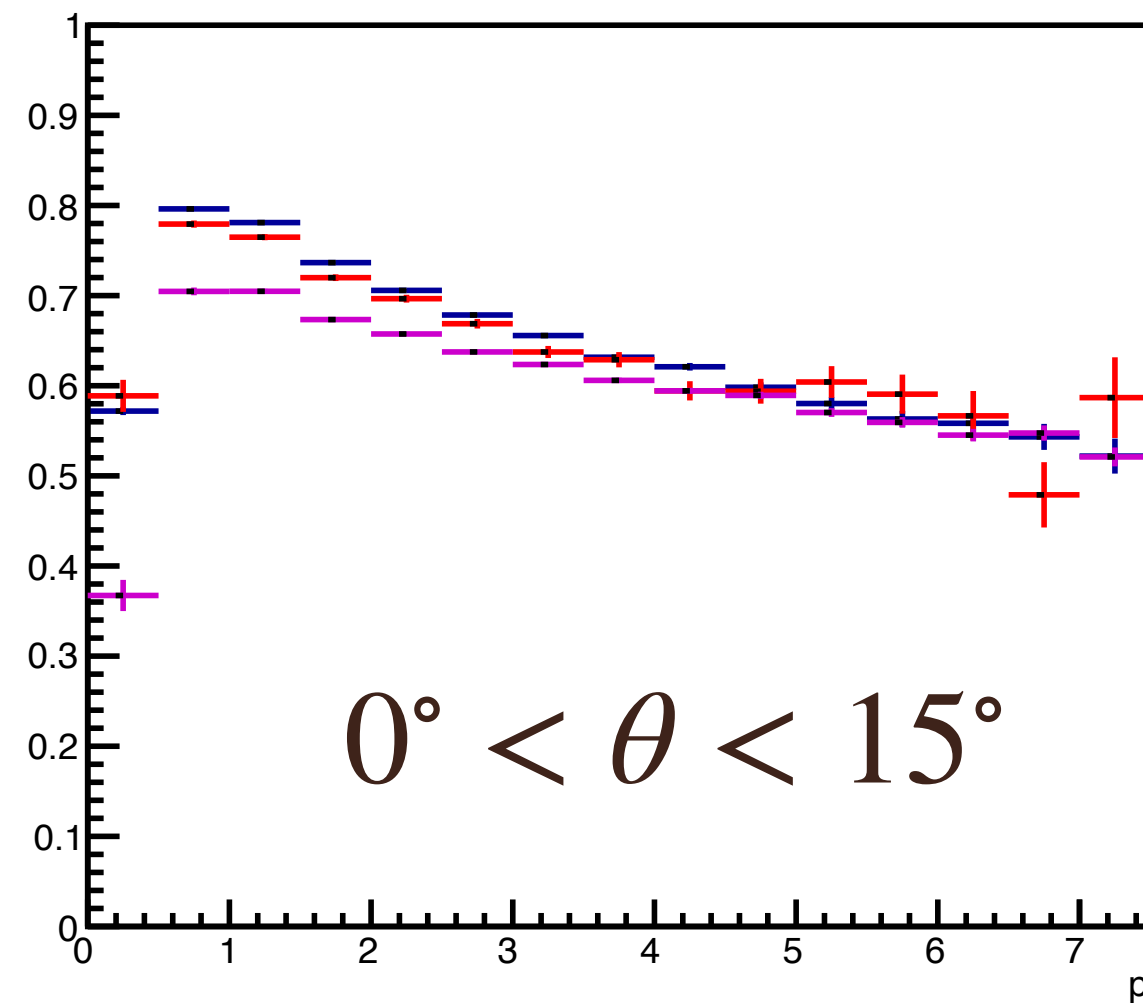
Soft QCD

(Convergency! $\neq$ 0) only!

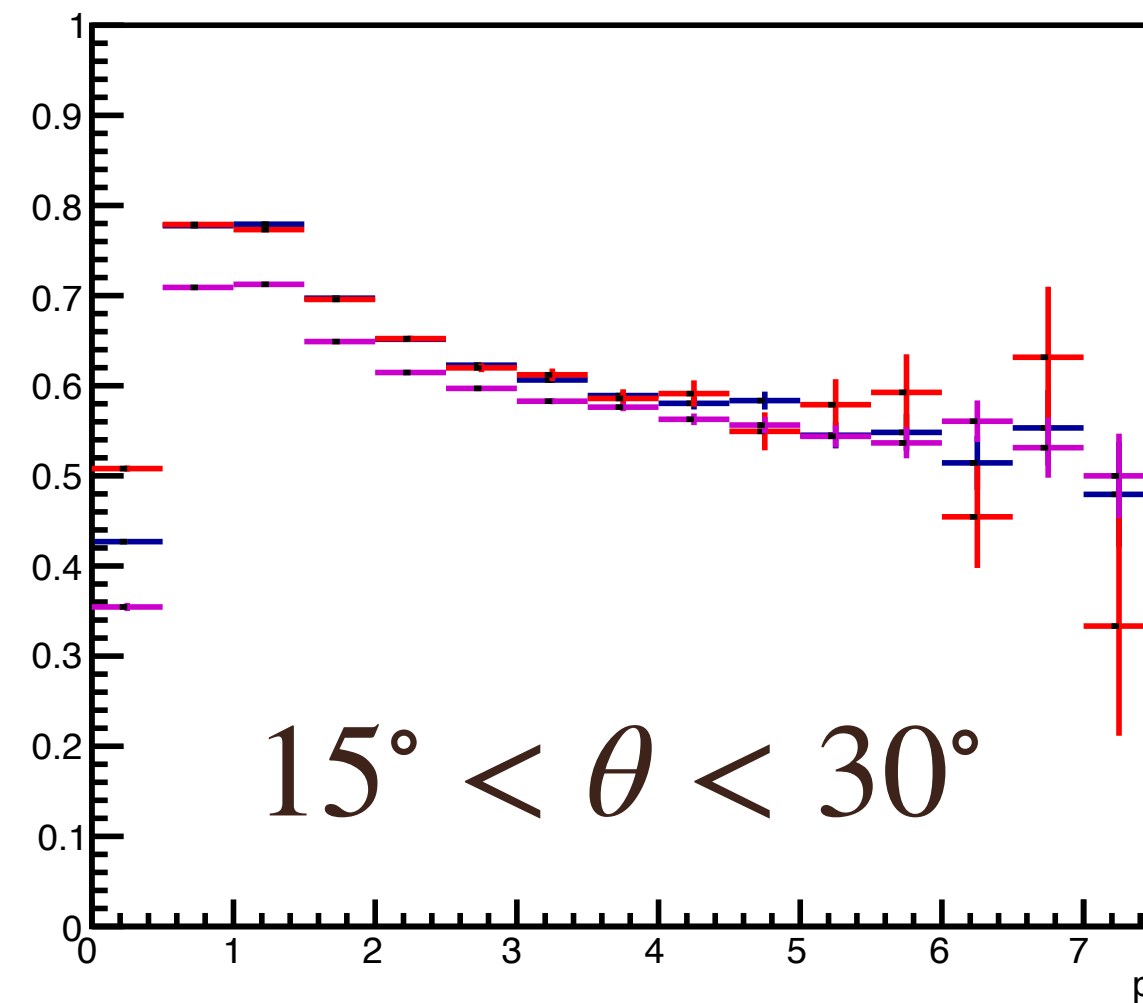
◆ ITS: MAPS 4 layers, no EndCap;

$$A = \frac{N(\text{Conv!} = 0)}{N}$$

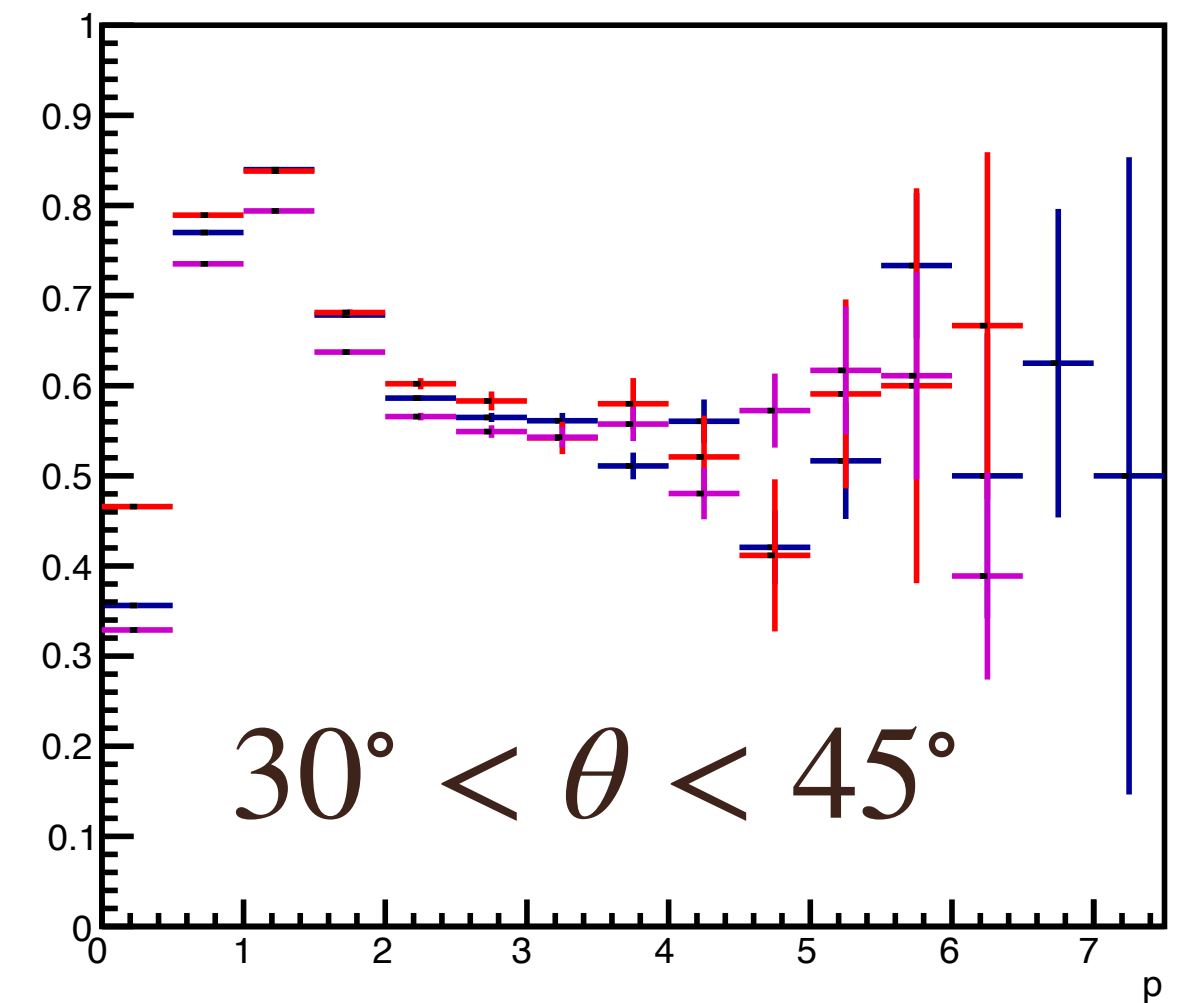
$\pi$ ,  $0.000 < \theta < 0.262$



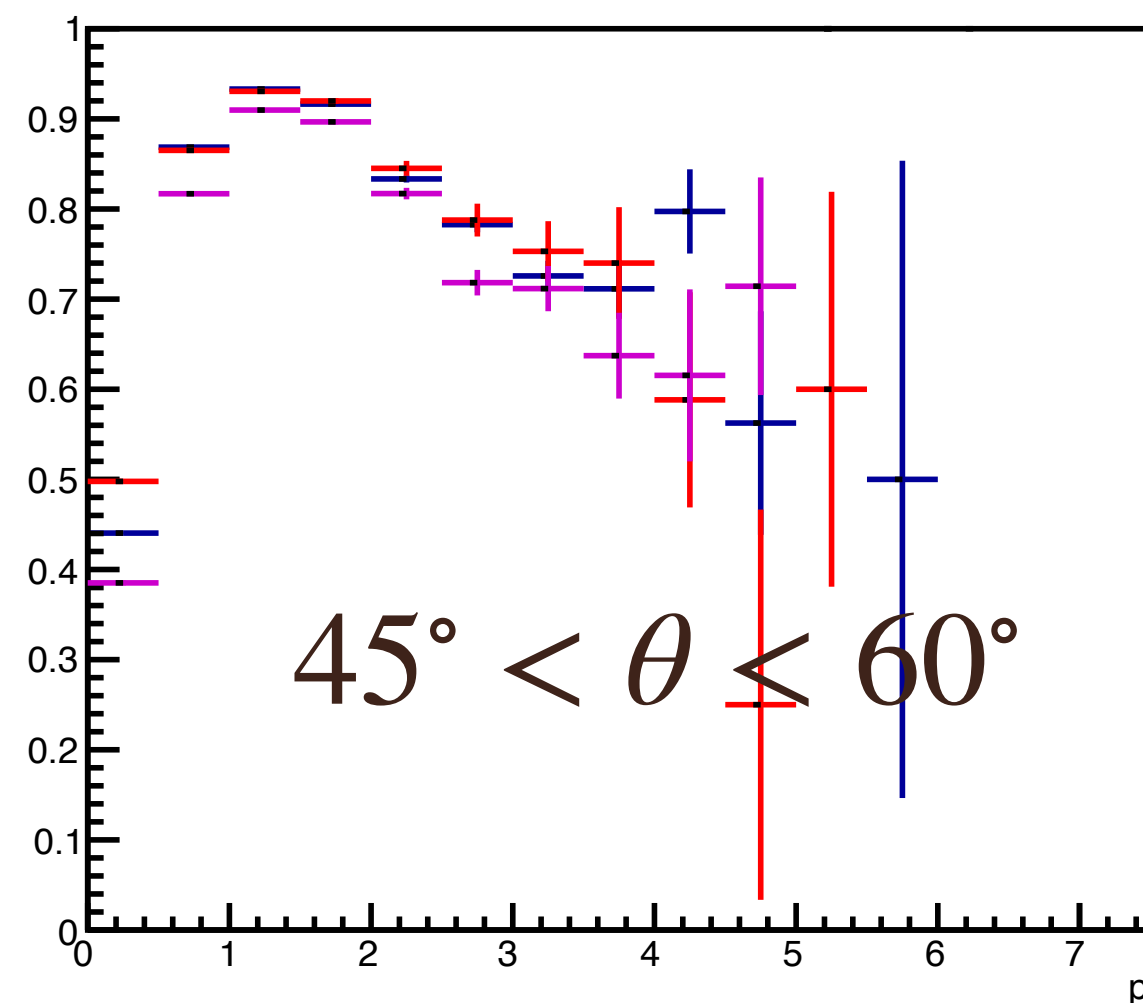
$\pi$ ,  $0.262 < \theta < 0.524$



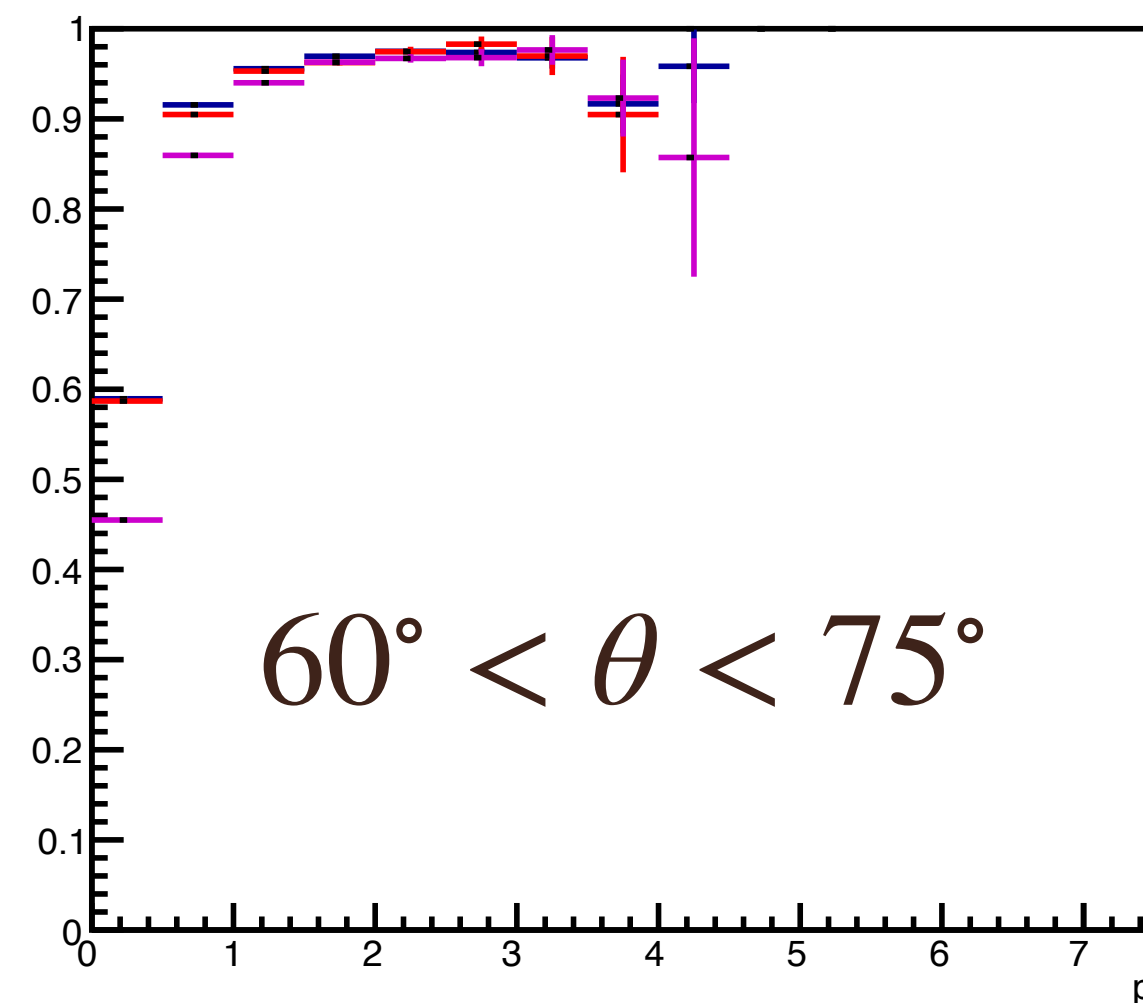
$\pi$ ,  $0.524 < \theta < 0.785$



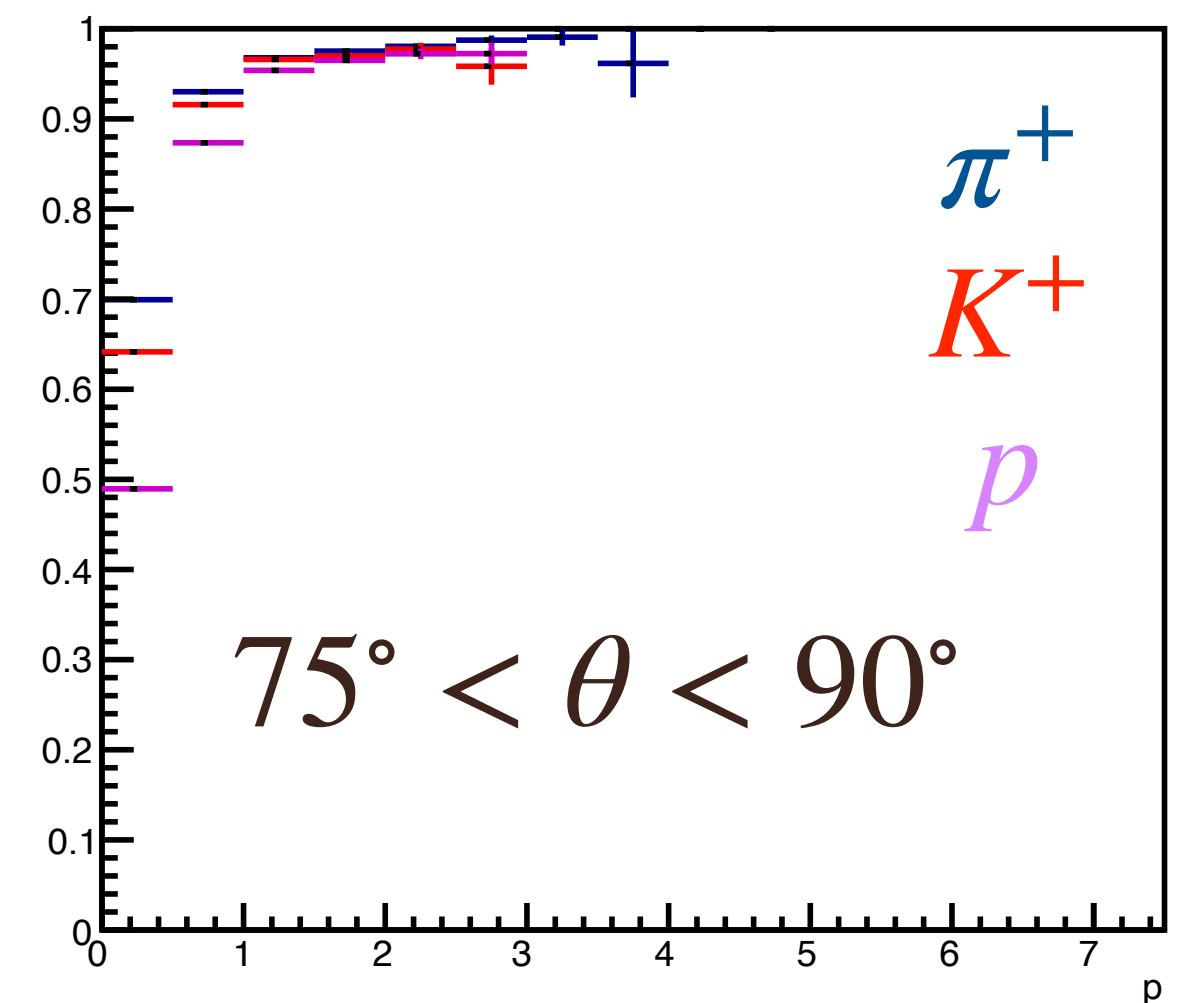
$\pi$ ,  $0.785 < \theta < 1.047$



$\pi$ ,  $1.047 < \theta < 1.309$



$\pi$ ,  $1.309 < \theta < 1.571$



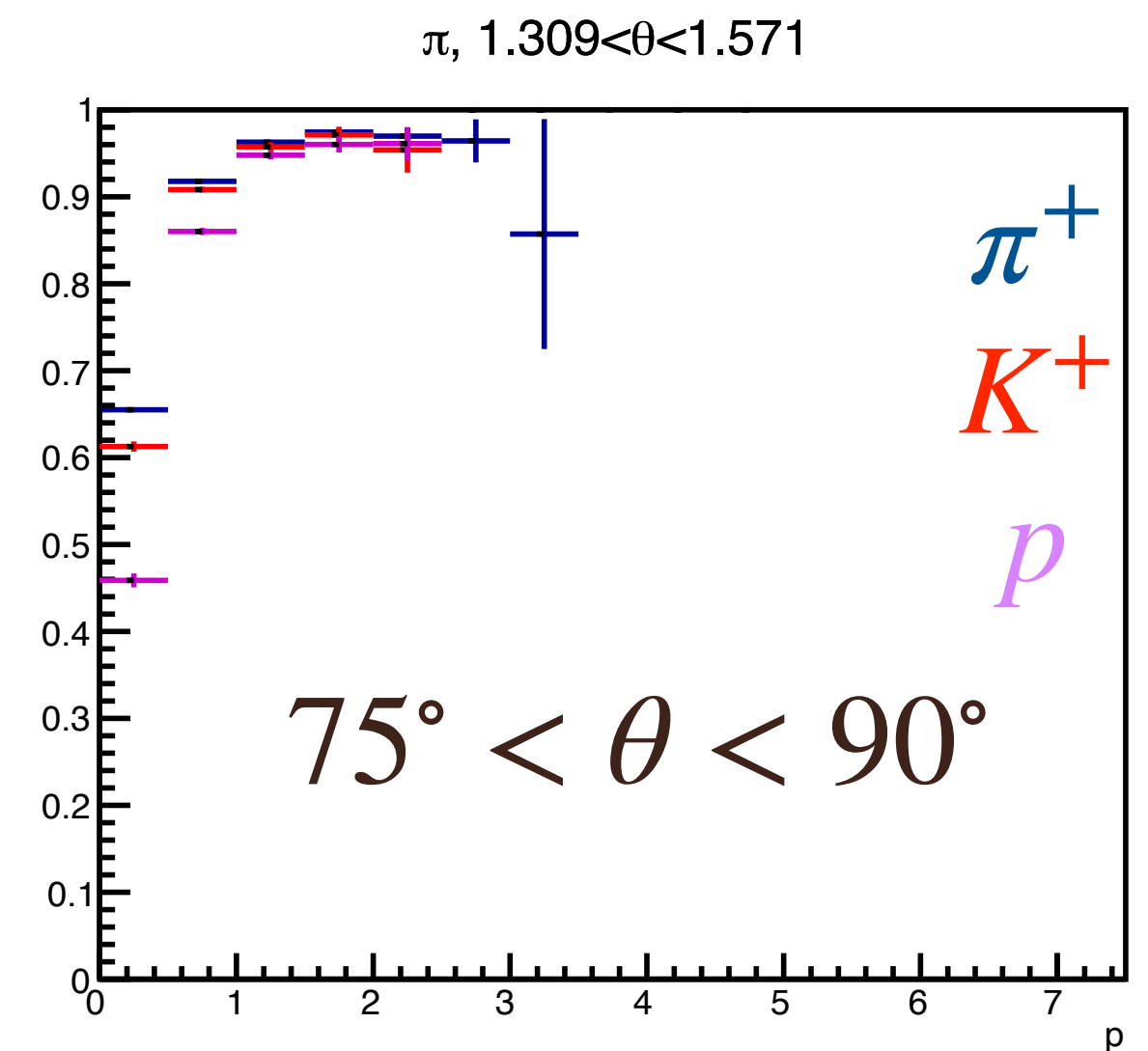
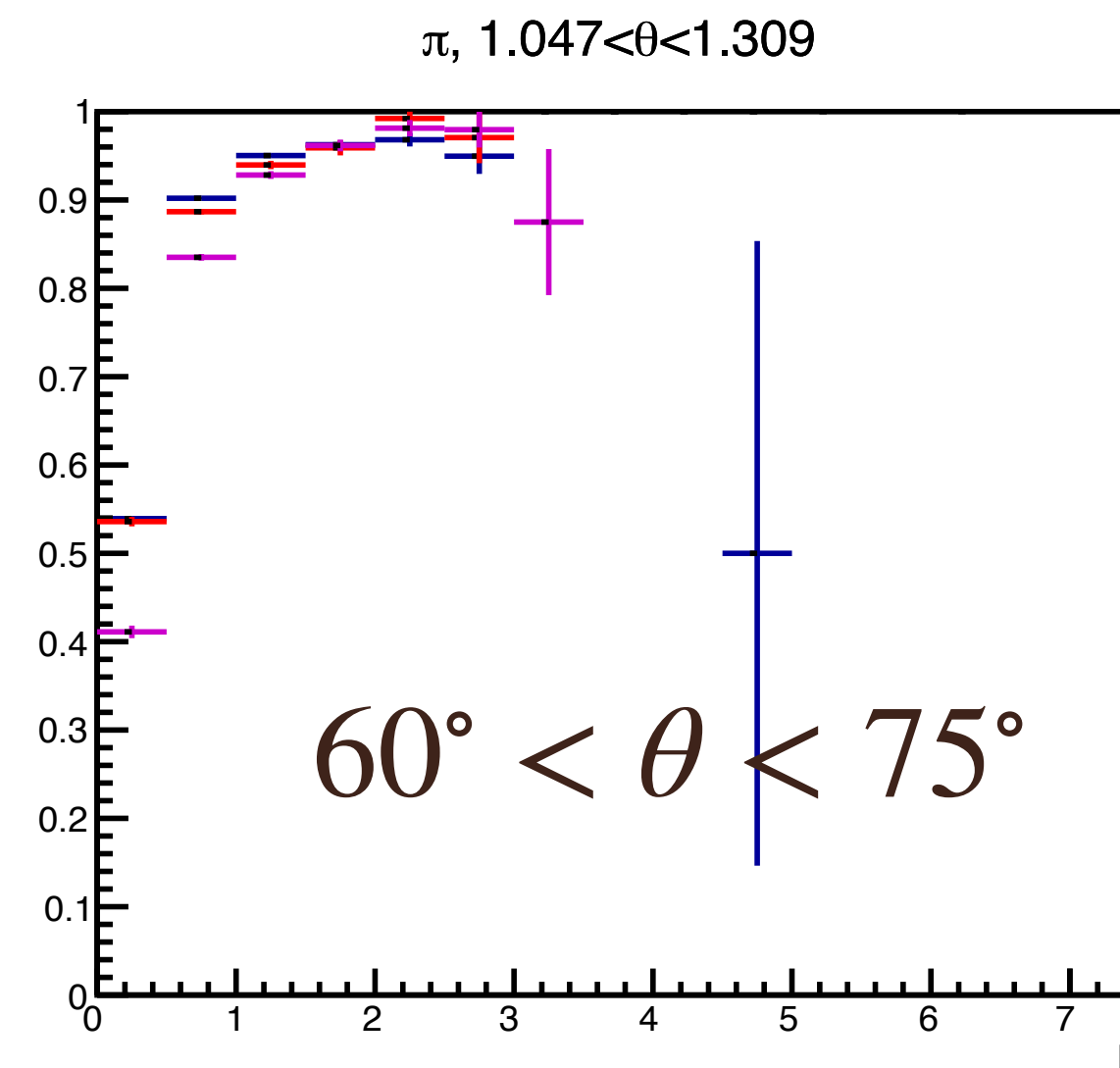
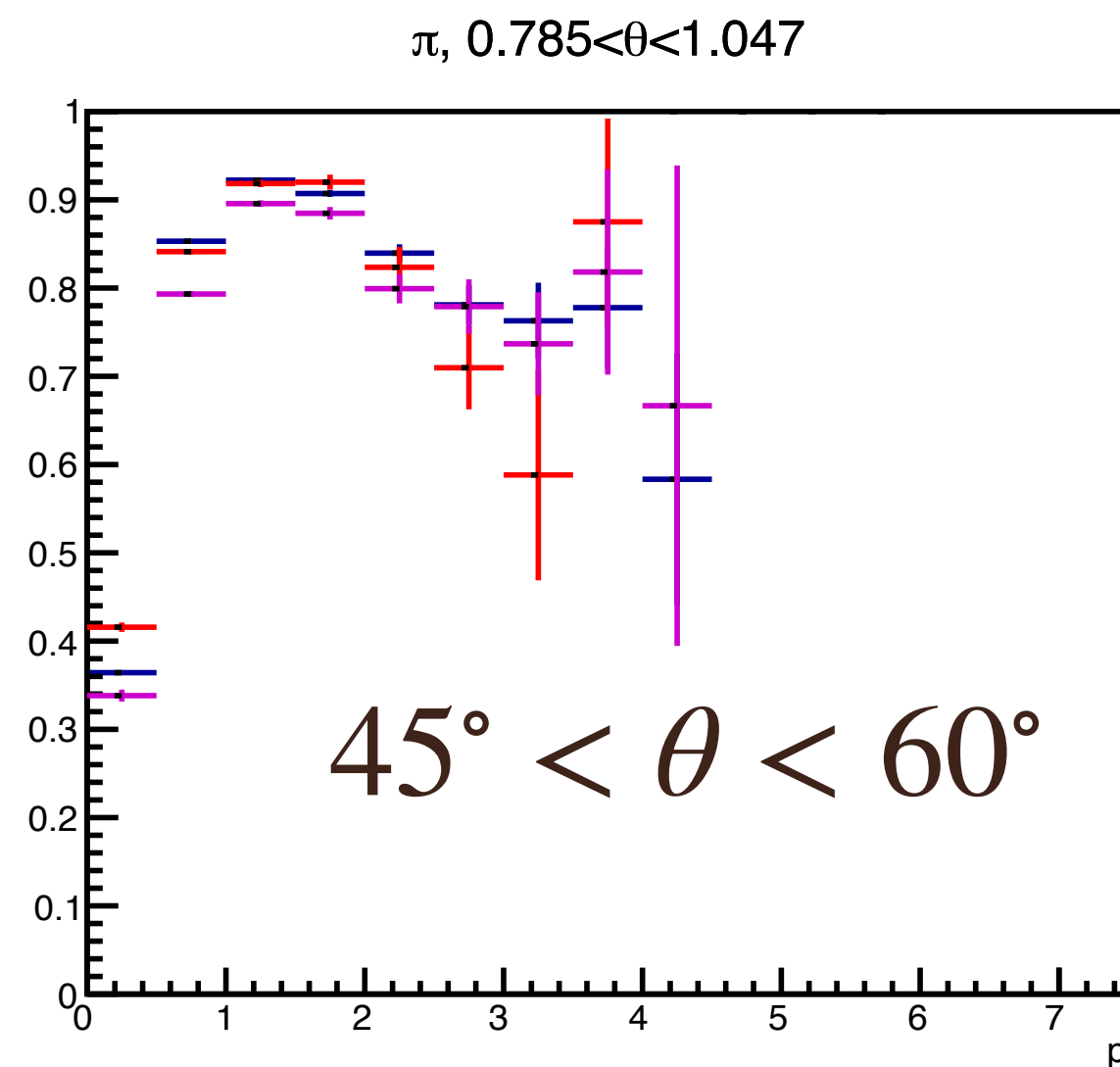
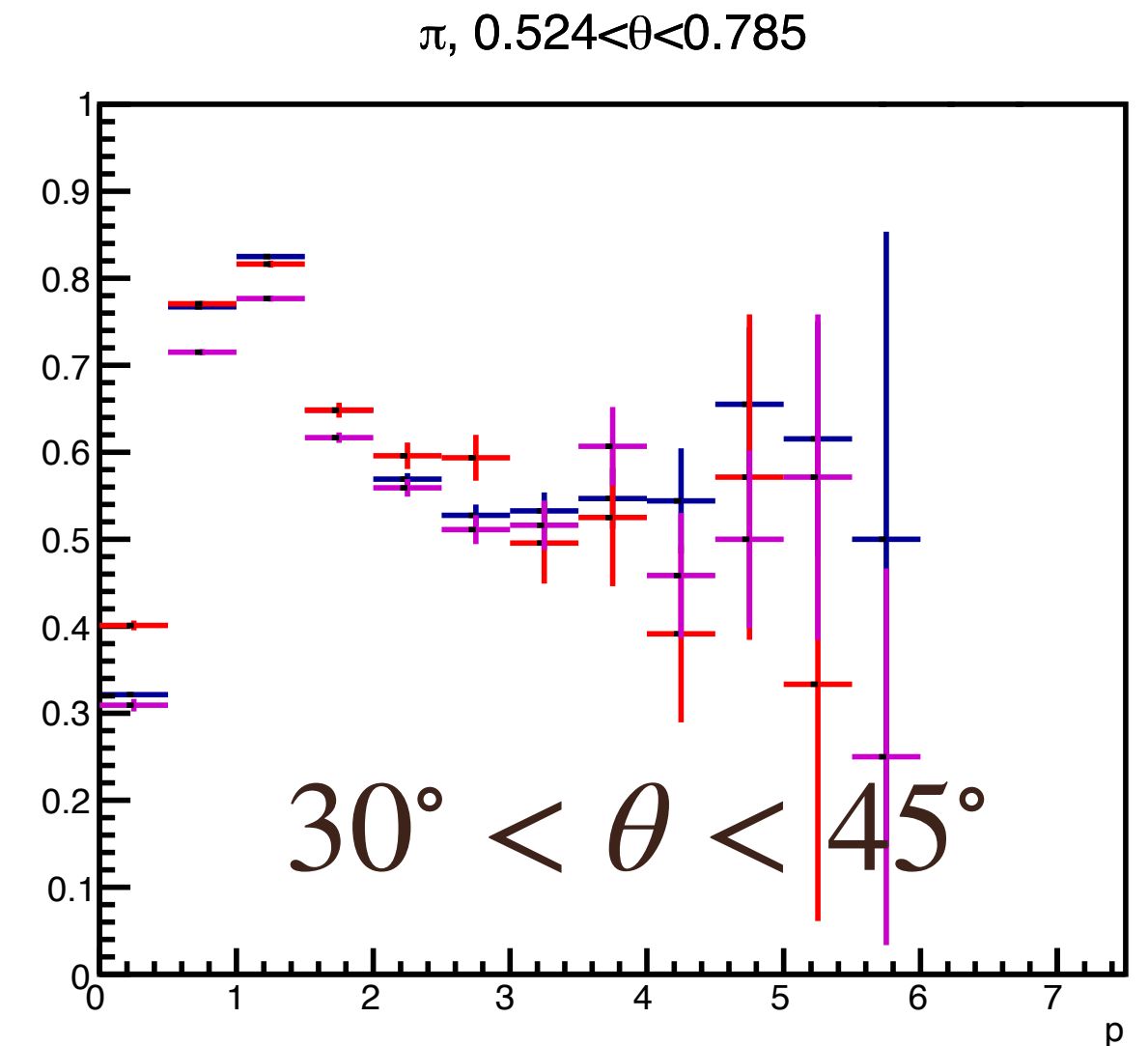
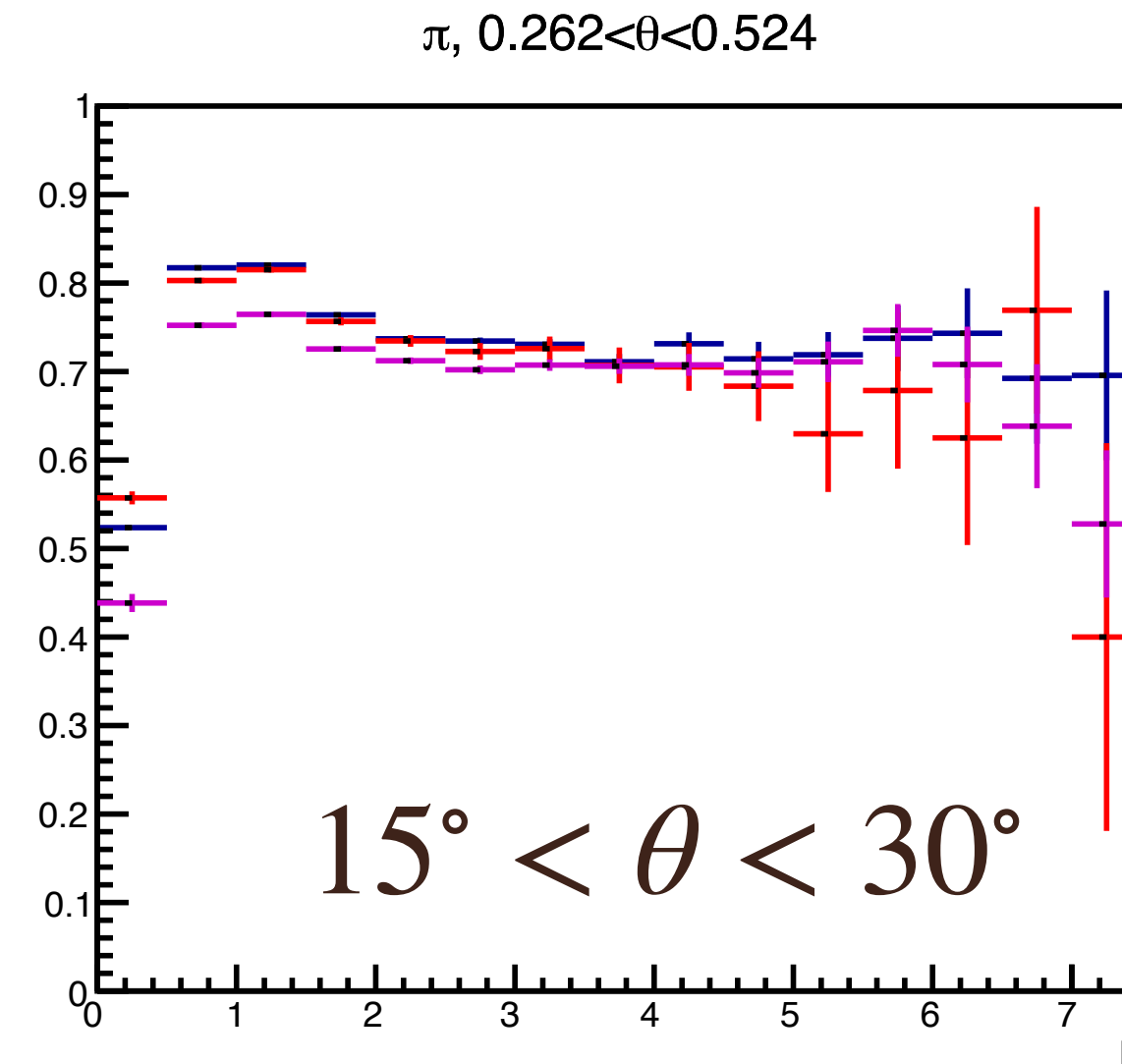
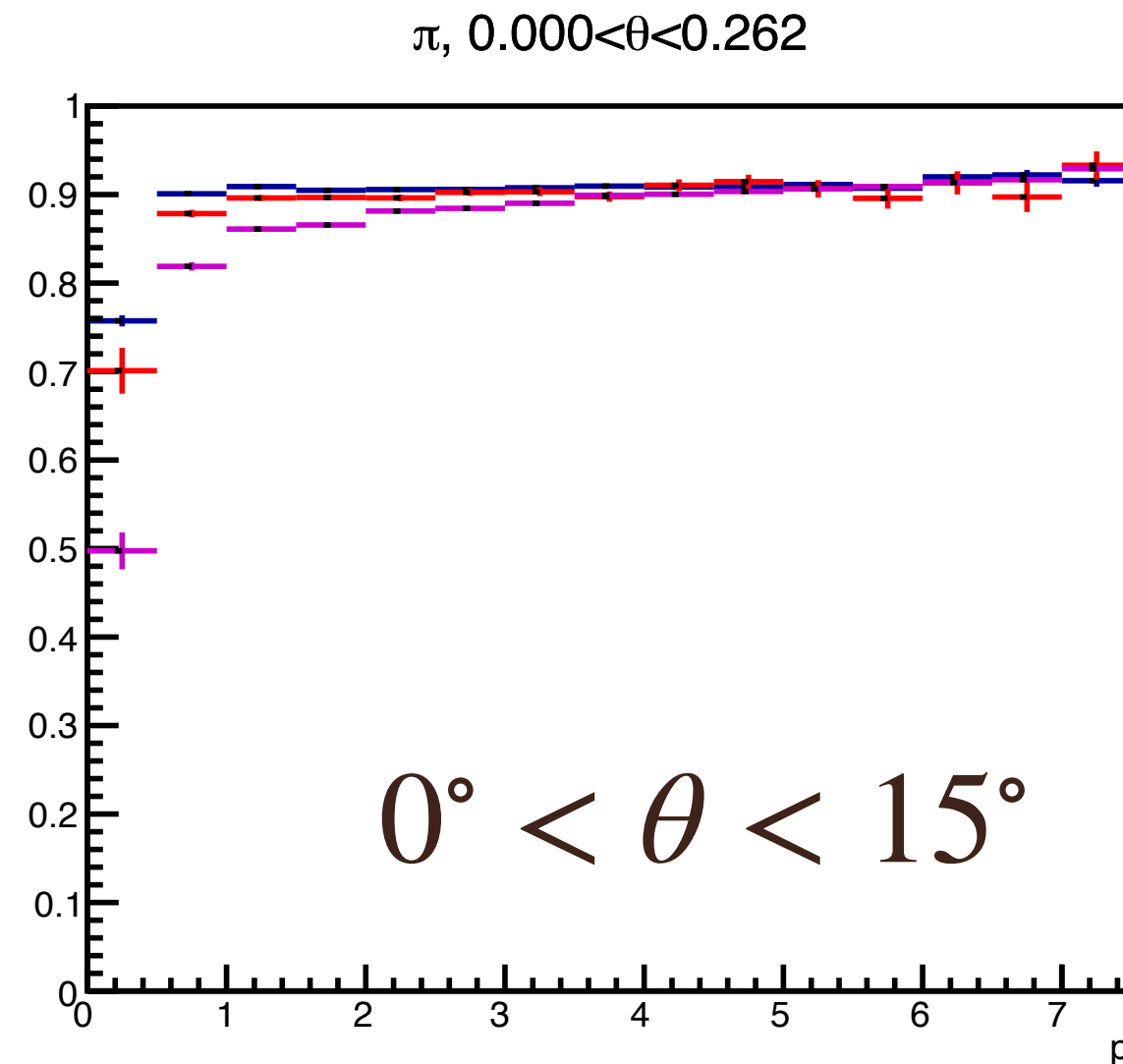


Soft QCD

(Convergency!=0) only!

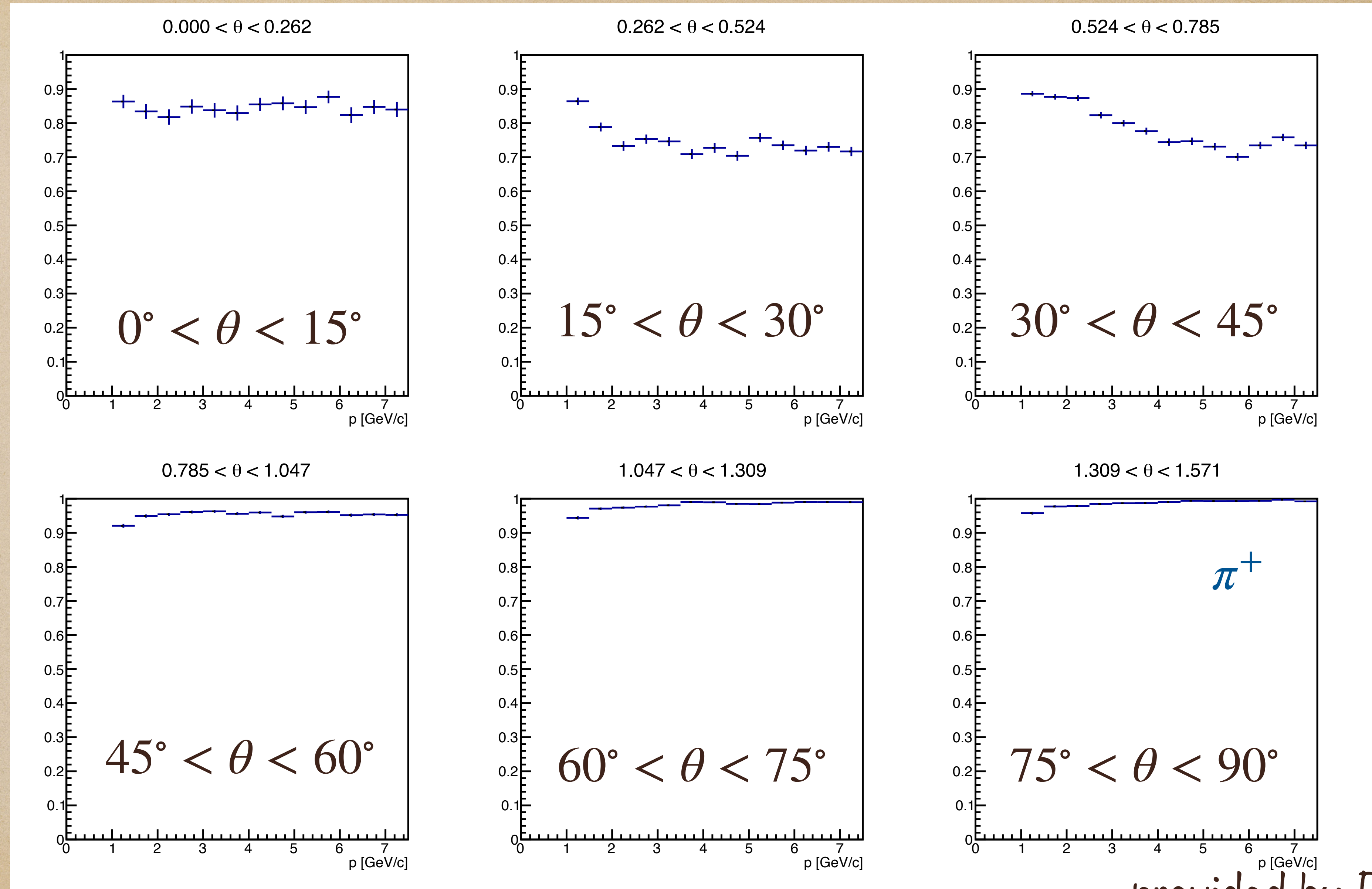
◆ ITS: DSSD 3 layers, with EndCaps;

$$A = \frac{N(\text{Conv}! = 0)}{N}$$



Pion artificial sample (Convergency! $\neq$ 0) only! ♦ ITS: DSSD 3 layers, with EndCaps;

$$A = \frac{N(\text{Conv!} = 0)}{N}$$



provided by Ruslan A.

