Results from BNL E910

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NuFACT'00
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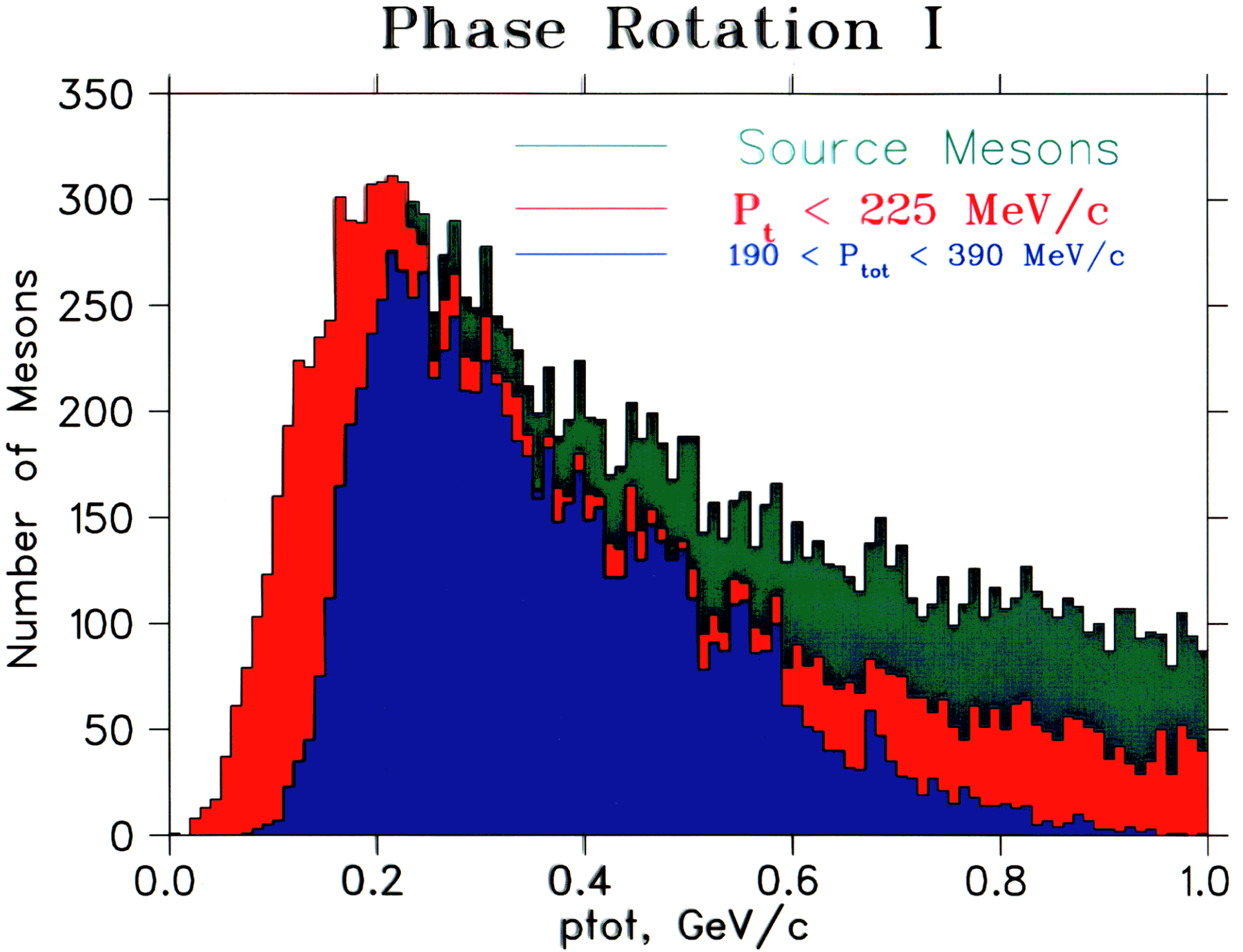
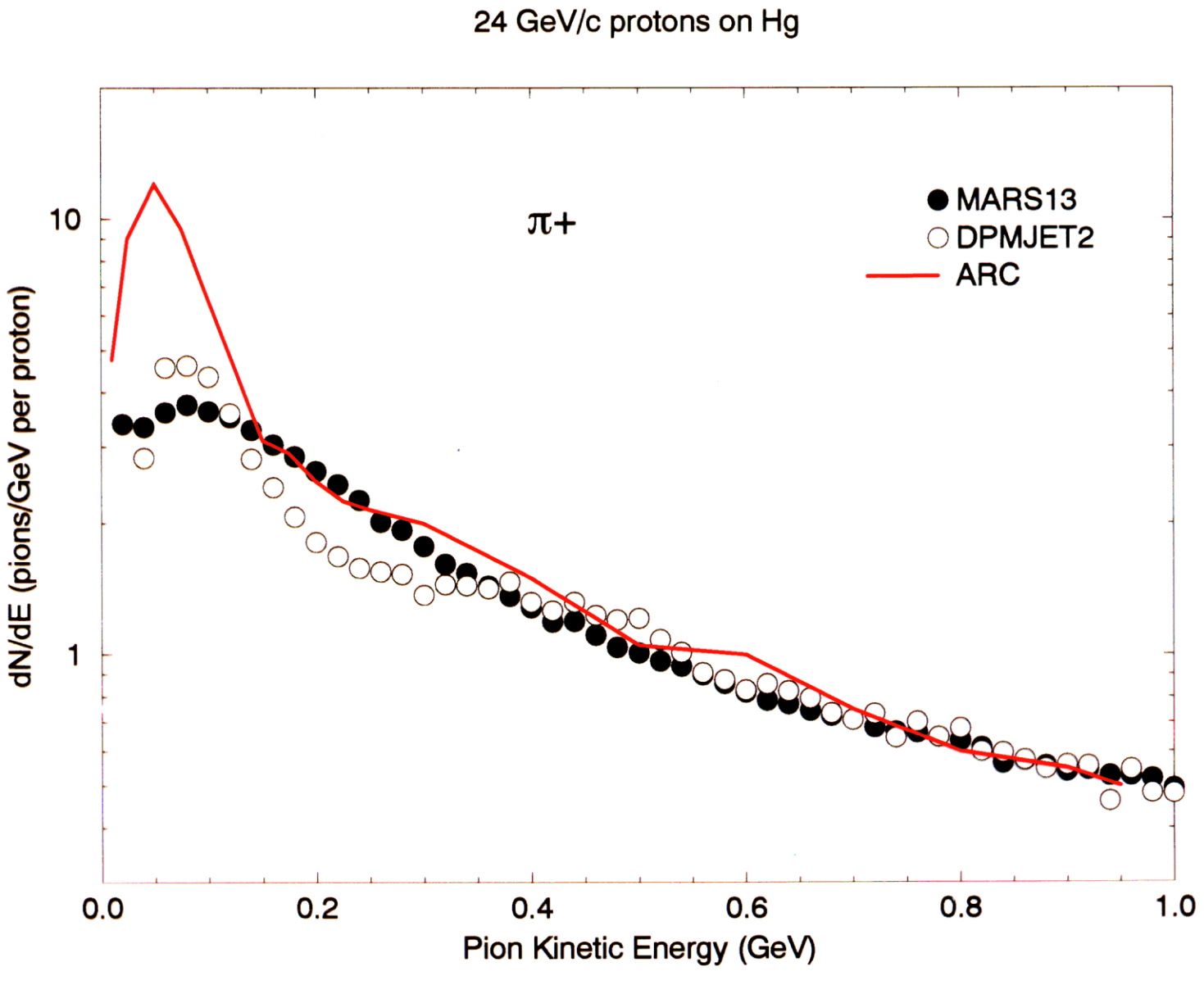
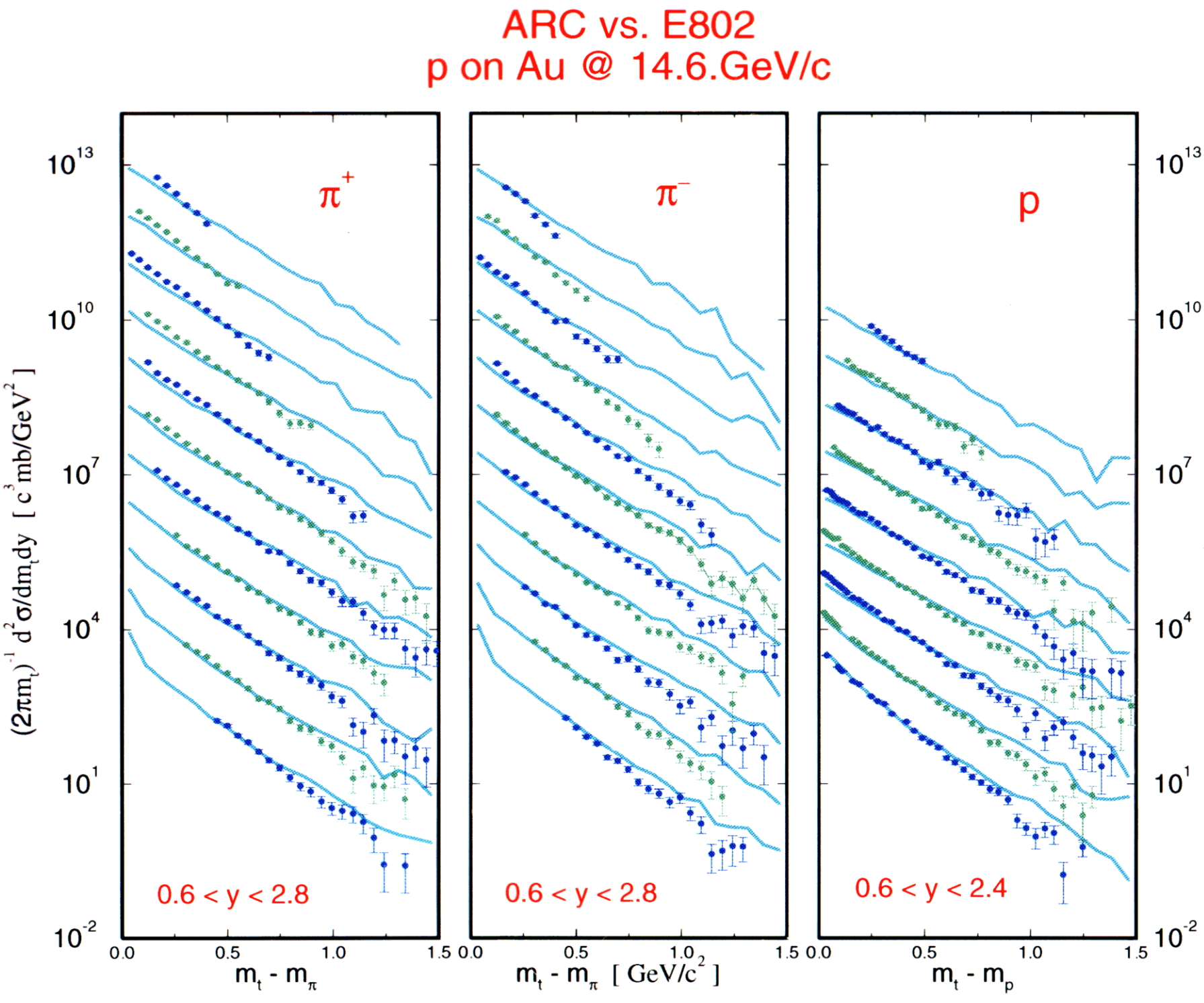
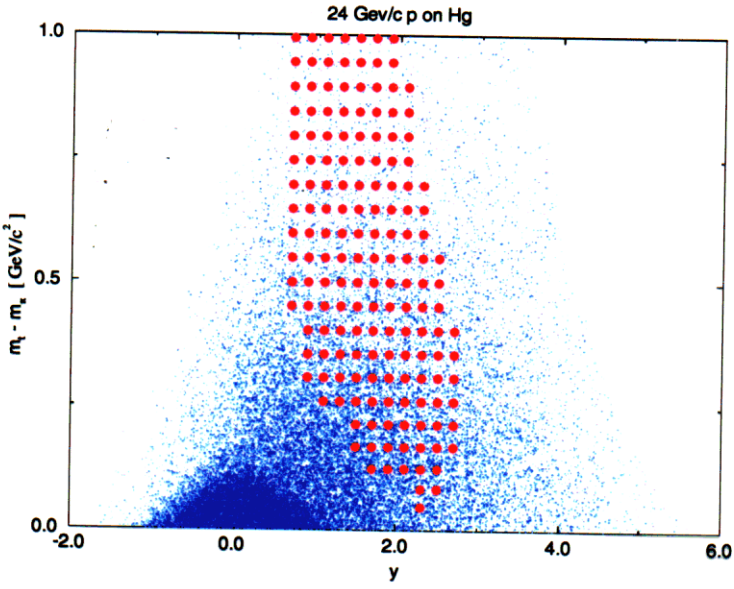
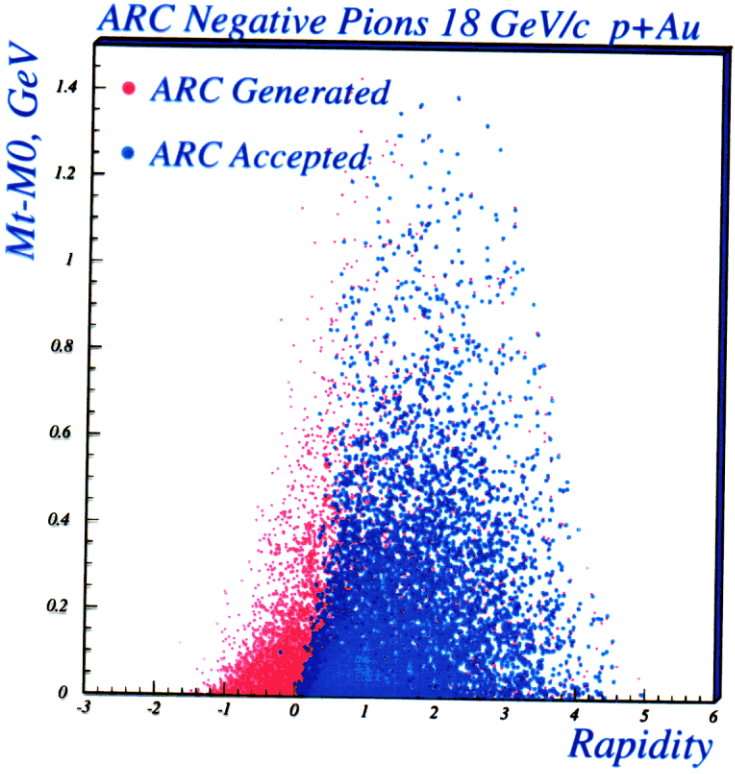

Phase Rotation I
Source Mesons
P_t < 225 MeV/c
190 < P_{tot} < 390 MeV/c
Number of Mesons
ptot, GeV/c
0
50
100
150
200
250
300
350
0.0
0.2
0.4
0.6
0.8
1.0


24 GeV/c protons on Hg
π+
MARS13
DPMJET2
ARC
dN/dE (pions/GeV per proton)
10
1
0.0
0.2
0.4
0.6
0.8
1.0
Pion Kinetic Energy (GeV)


ARC vs. E802
p on Au @ 14.6.GeV/c
π+
π−
p
0.6 < y < 2.8
0.6 < y < 2.8
0.6 < y < 2.4
(2πm_t)^-1 d^2σ/dm_t dy [c^3 mb/GeV^2]
m_t - m_π
m_t - m_π [GeV/c^2]
m_t - m_p

π^+ SPECTRUM: ARC vs E802





The E910 Collaboration

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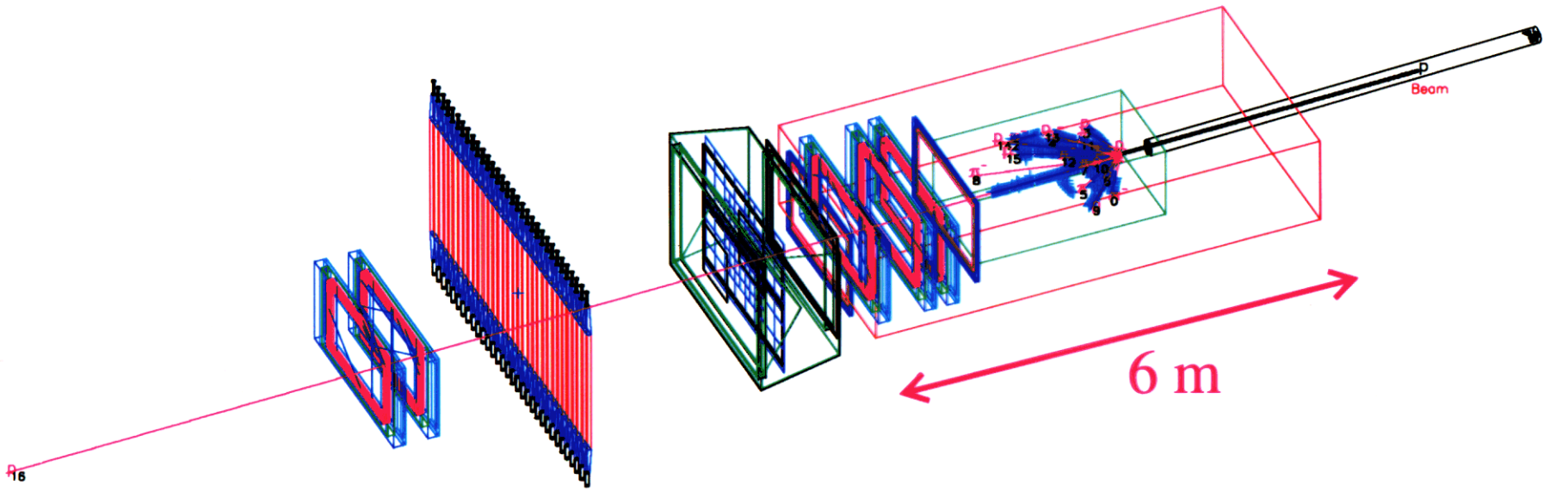
E910 Spectrometer
at the
MPS Facility of the AGS



- MPS Magnet
- EOS TPC
- Downstream tracking:
  - MPS Drift Chambers, Wire Chambers
- PID:
  - TPC dE/dx, TOF, Segmented Cherenkov

- Spring 96 Proton Run at AGS
- Be, Cu, Au, U targets
- 6, 12.5, 18 GeV/c Beam Momenta
- O(15) Million Central and MinBias Triggers

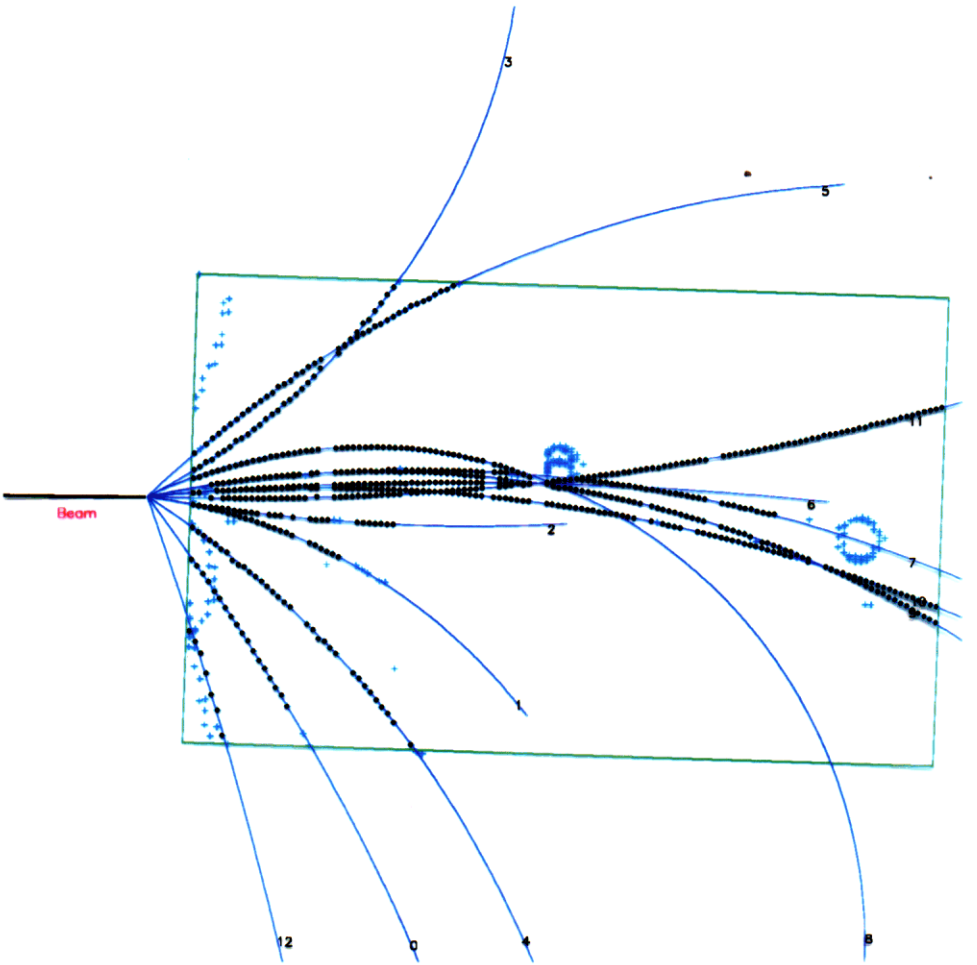
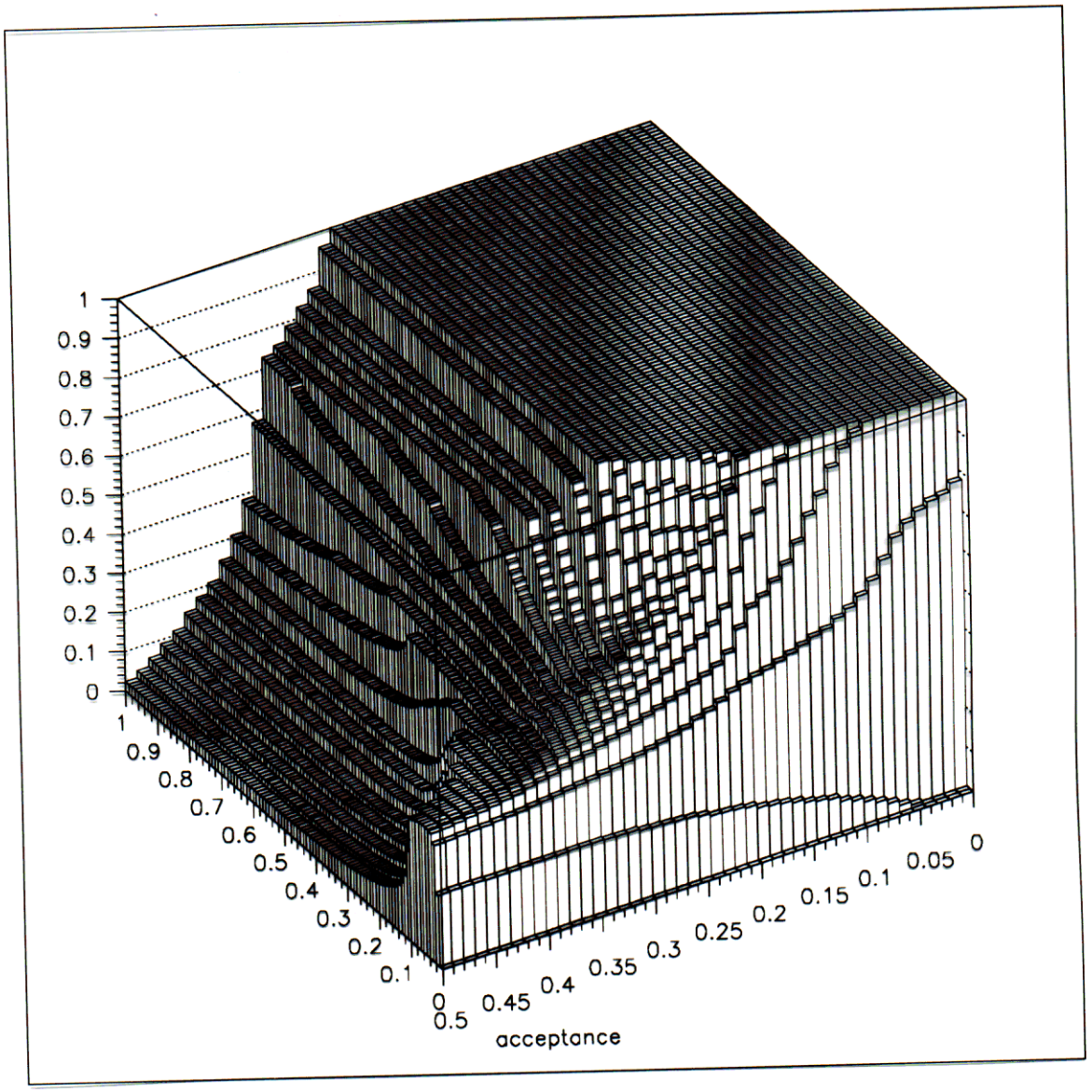
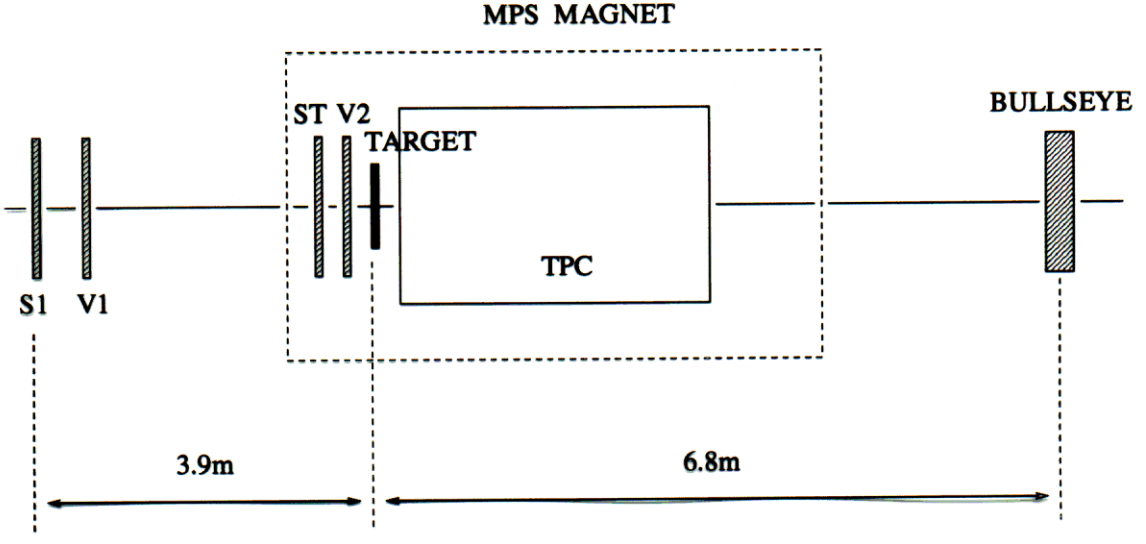


Figure 3.5: Top view of an example event where 13 tracks in the TPC have been fit through the primary vertex to meet the beam track

E910 Geometric Acceptance



The E910 Beam Veto Trigger



The E910 Data Set

Beam	Target	Beam	SciFib I	SciFib II	Bull's Eye	Total events
12.5	Be	200 K	2000 K		150 K	1446 K
	Cu	200 K	2000 K		100 K	1536 K
	Au	200 K	2500 K	2500 K	100 K	4544 K
18.0	Be	100 K			180 K	49 K
	Cu	50 K			100 K	49 K
	Au	500 K	2000 K	2000 K	200 K	3690 K
6.0	Be	10 K			30 K	8 K
	Cu	10 K			30 K	9 K
	Au	10 K			30 K	12 K

Momentum Resolution

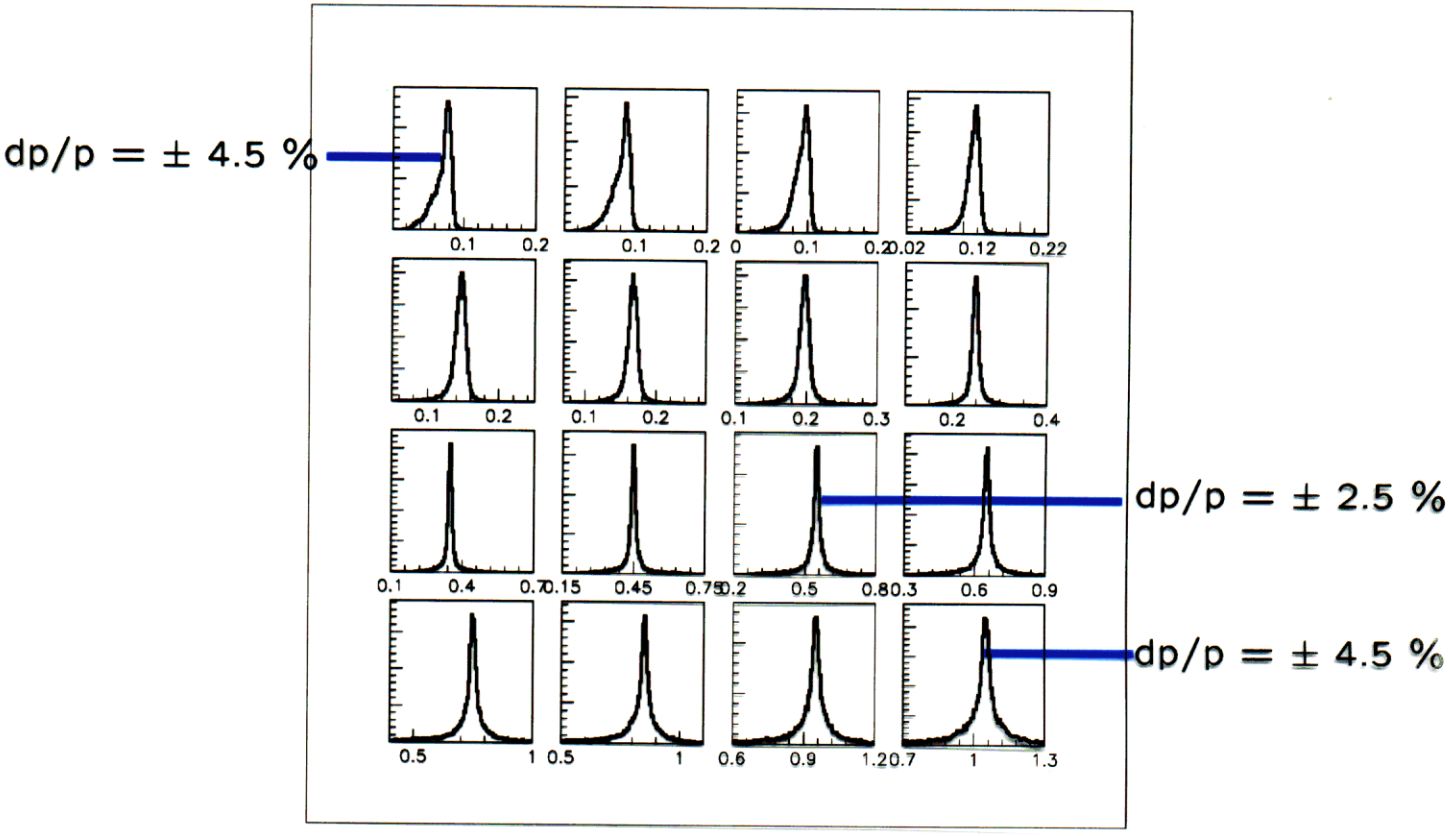


Figure 5.2: Point spread functions for total momentum. Input bin center momentum increases from 80 MeV/c at top left toward the right and top to bottom to 1050 MeV/c at bottom right

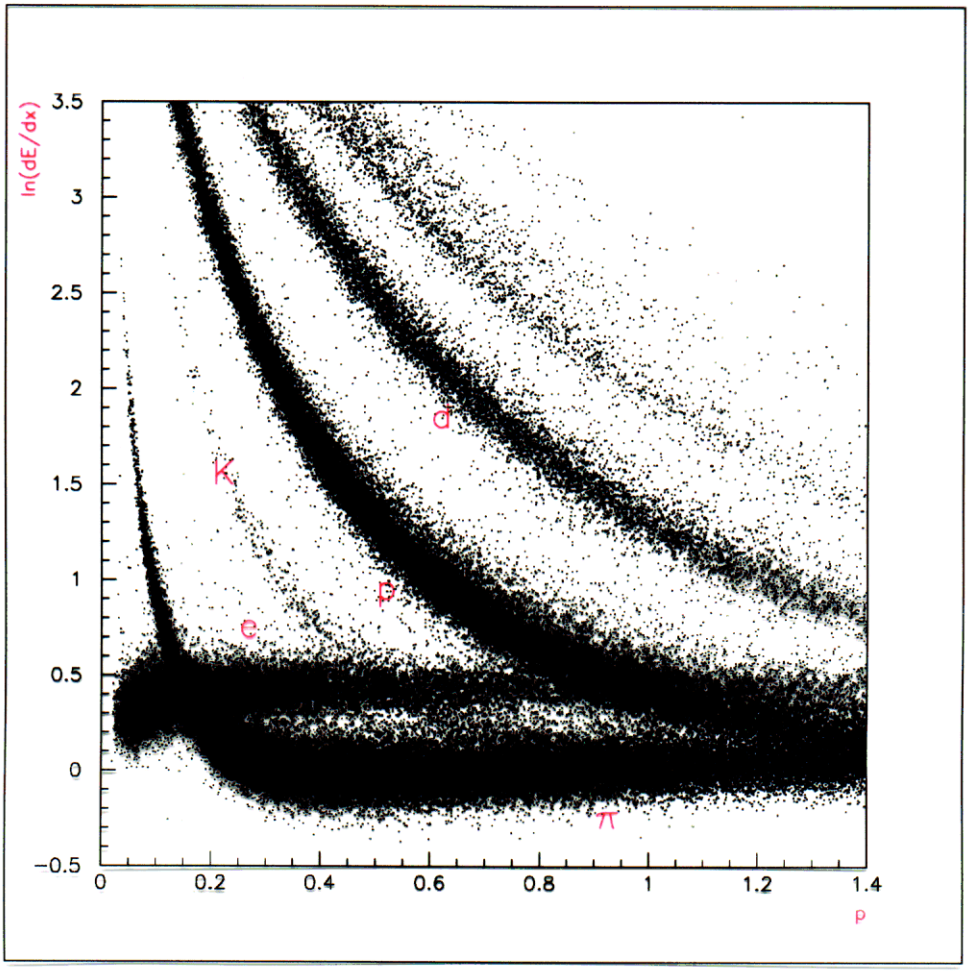
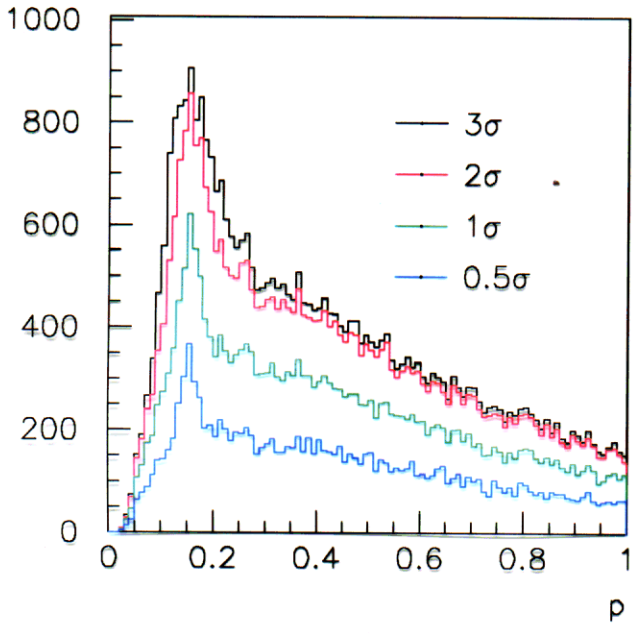
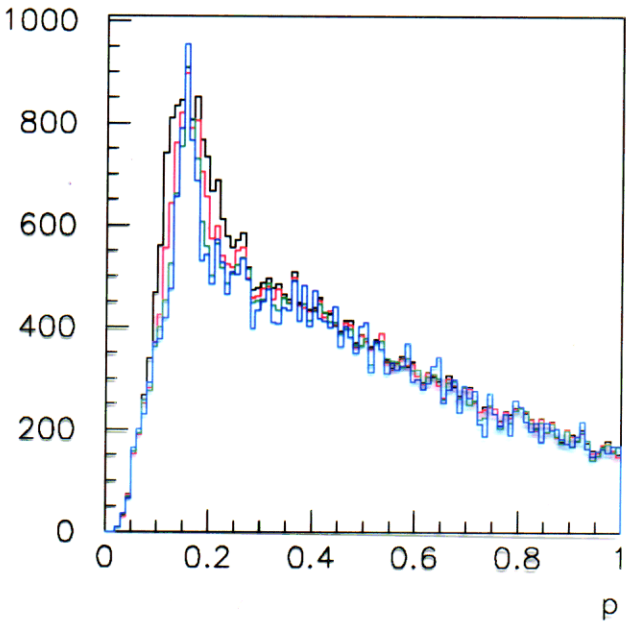
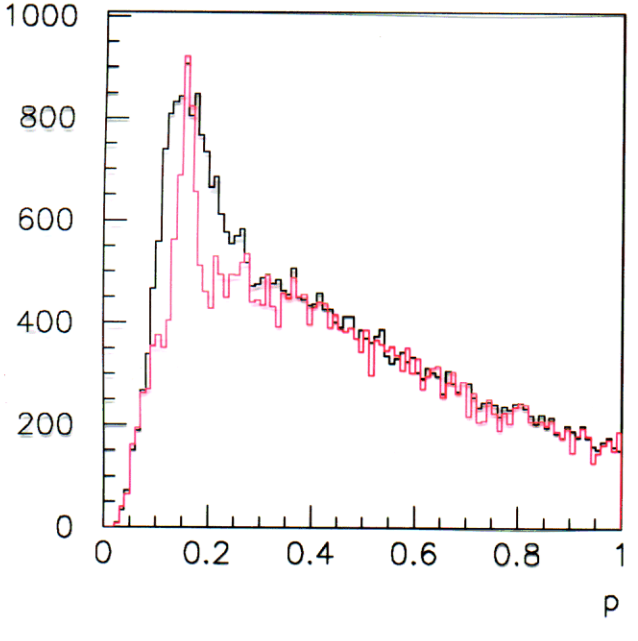
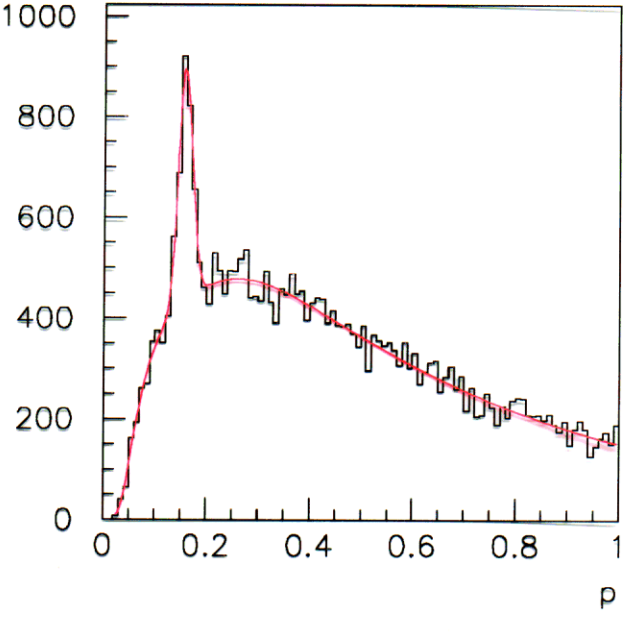


Figure 3.6: Momentum dependence of dE/dx showing separation of particle species


1000
800
600
400
200
0
0
0.2
0.4
0.6
0.8
1
p
3σ
2σ
1σ
0.5σ


1000
800
600
400
200
0
0
0.2
0.4
0.6
0.8
1
p


1000
800
600
400
200
0
0
0.2
0.4
0.6
0.8
1
p


1000
800
600
400
200
0
0
0.2
0.4
0.6
0.8
1
p

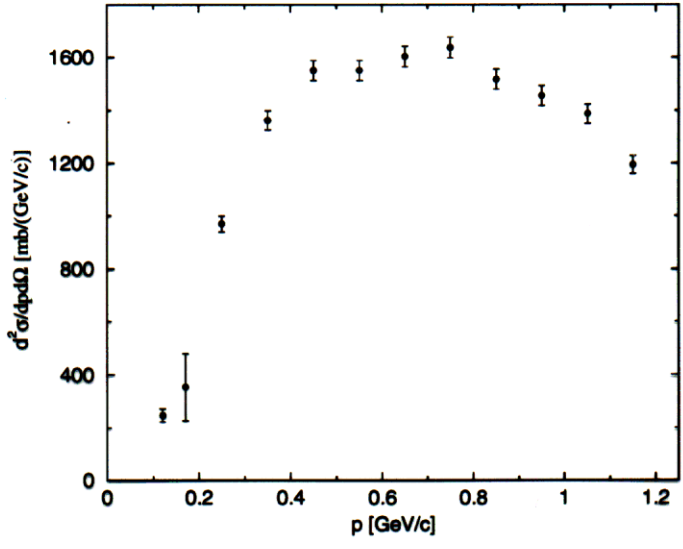


Figure 6.1: π^+ spectrum for $\cos\theta = 0.9 - 1$

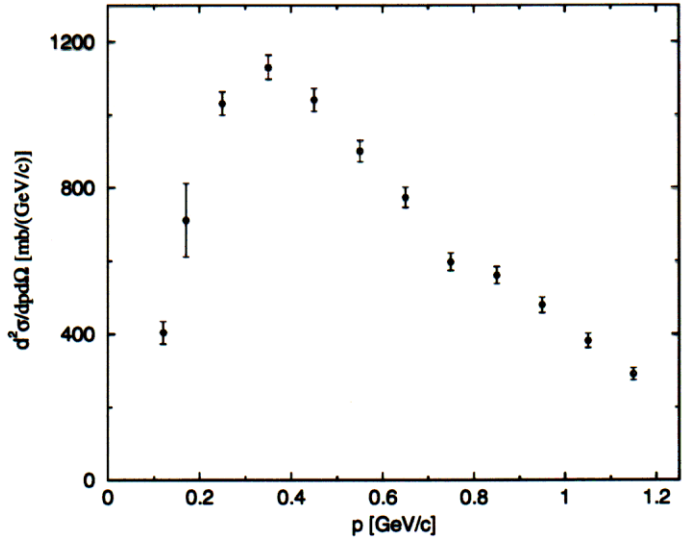
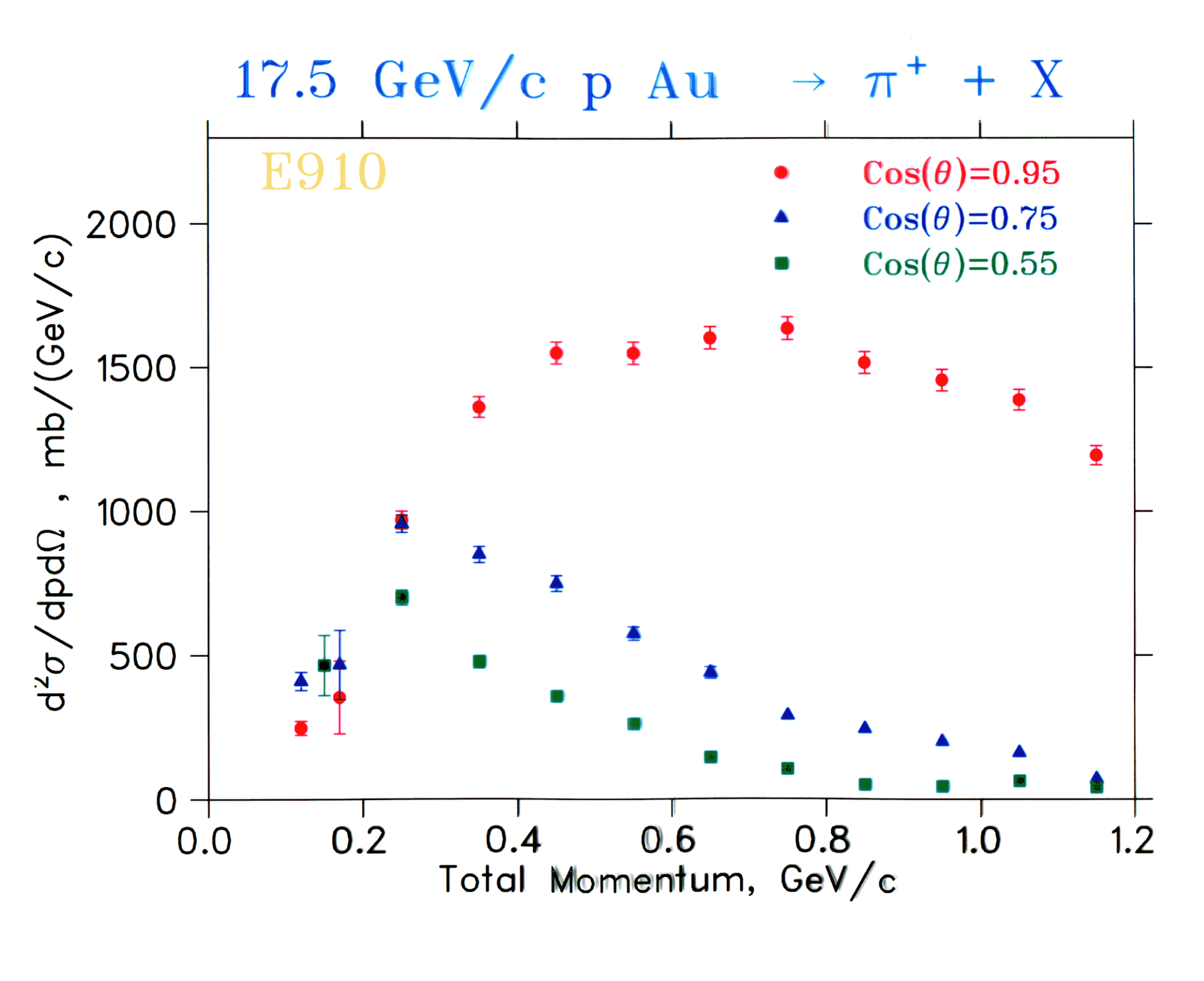
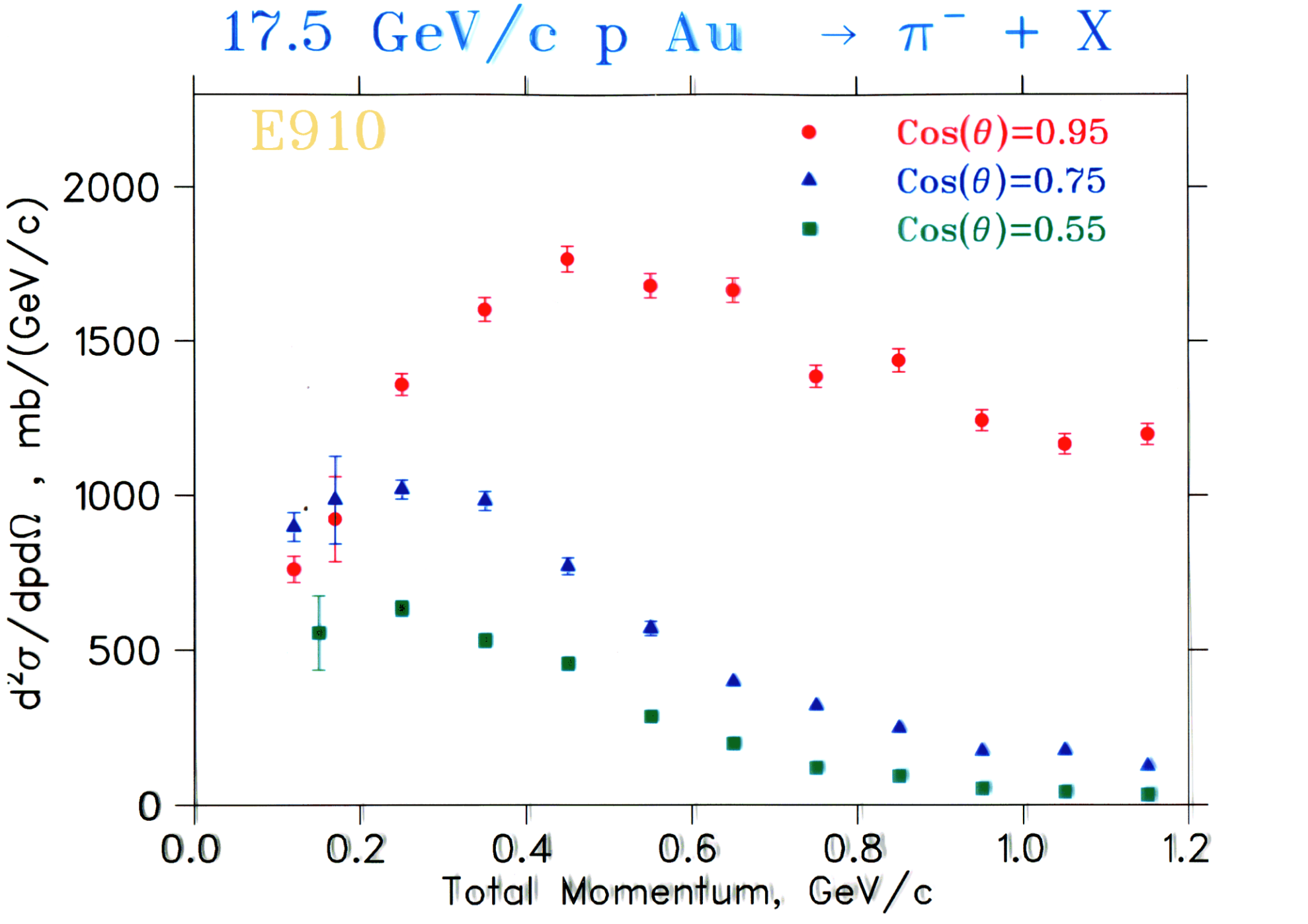
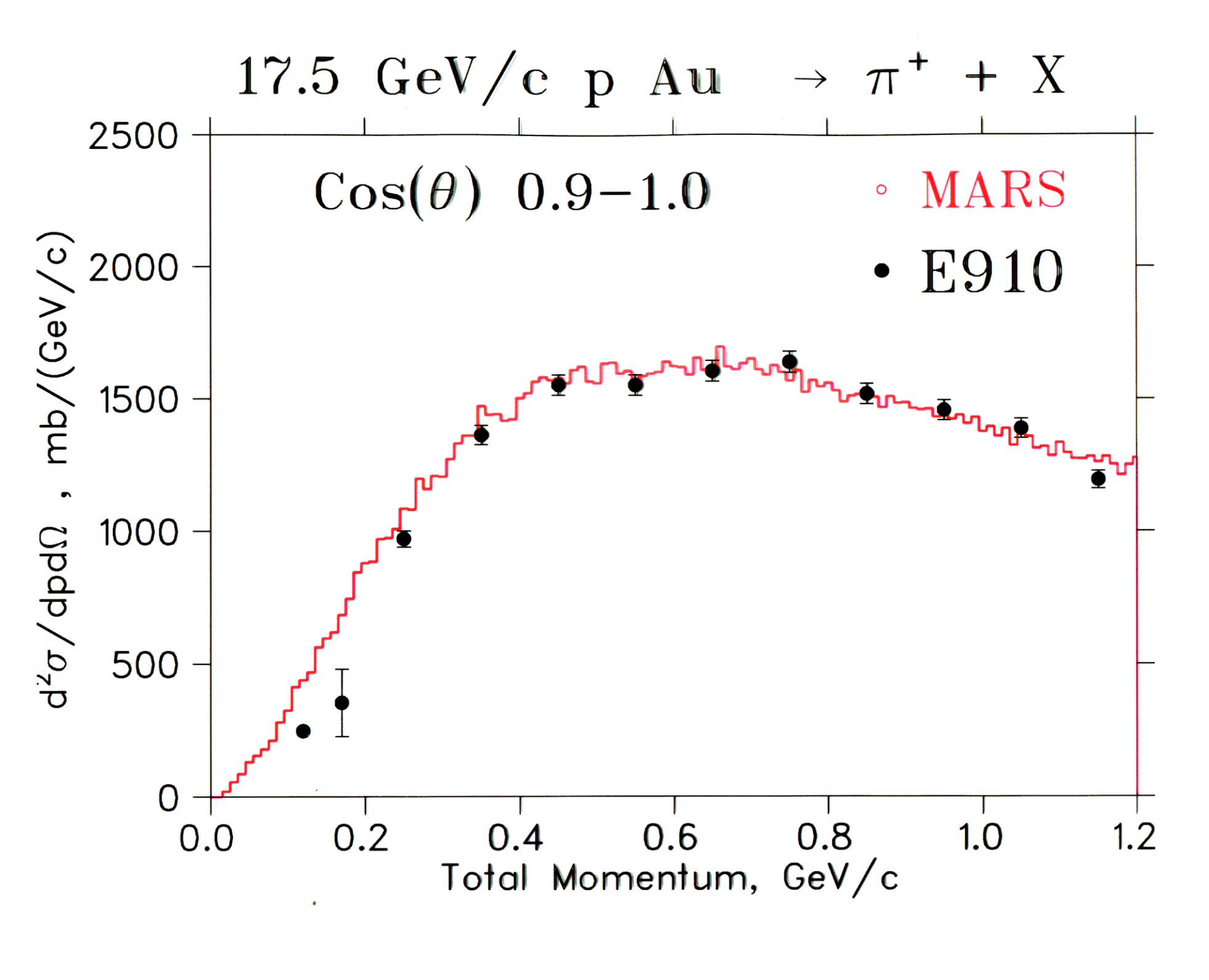
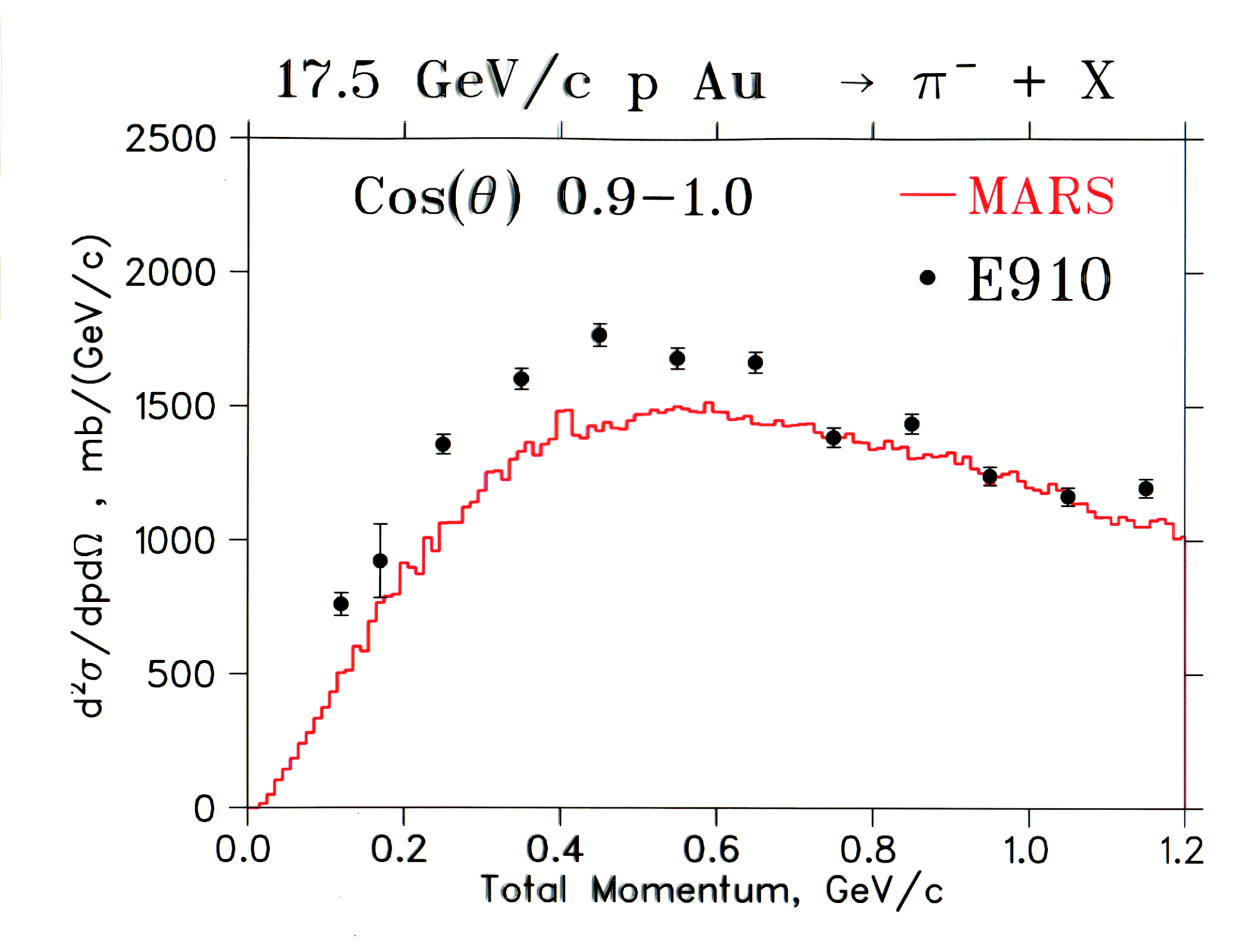


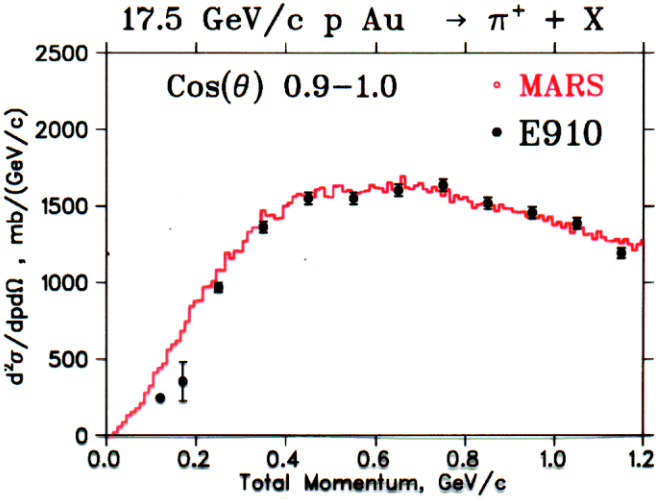
Figure 6.2: π^+ spectrum for $\cos\theta = 0.8 - 0.9$

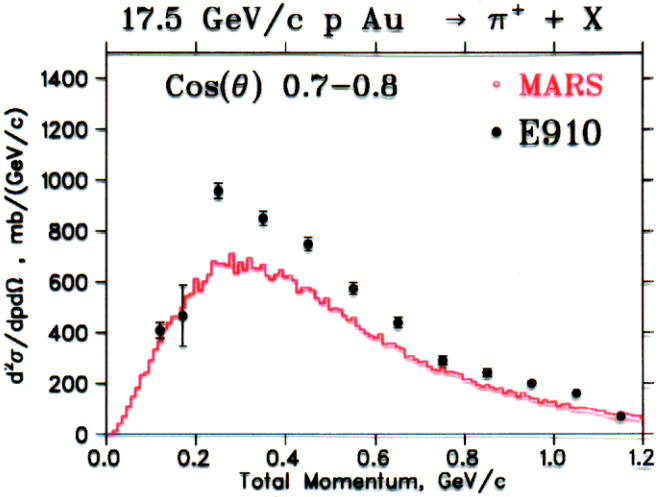

17.5 GeV/c p Au → π+ + X
E910
Cos(θ)=0.95
Cos(θ)=0.75
Cos(θ)=0.55
d²σ/dpdΩ , mb/(GeV/c)
2000
1500
1000
500
0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Total Momentum, GeV/c

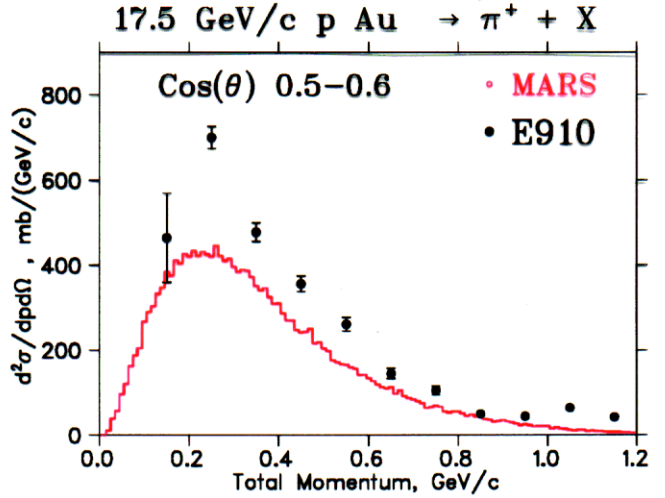

17.5 GeV/c p Au → π⁻ + X
E910
Cos(θ)=0.95
Cos(θ)=0.75
Cos(θ)=0.55
d²σ/dpdΩ , mb/(GeV/c)
2000
1500
1000
500
0
0.0
0.2
0.4
0.6
0.8
1.0
1.2
Total Momentum, GeV/c

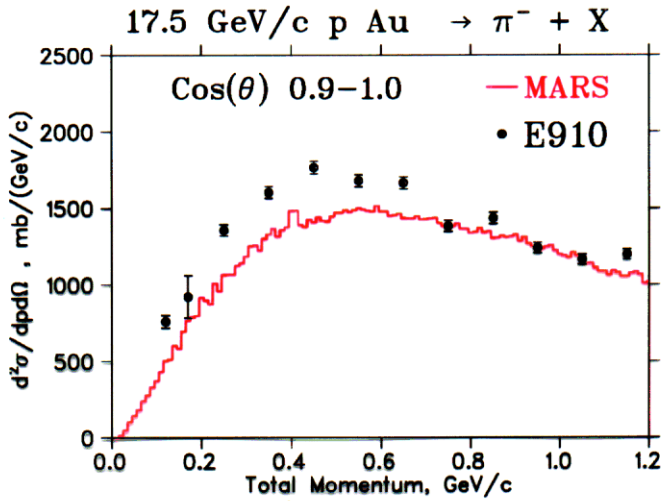

17.5 GeV/c p Au → π+ + X
Cos(θ) 0.9−1.0
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c
0
500
1000
1500
2000
2500
0.0
0.2
0.4
0.6
0.8
1.0
1.2

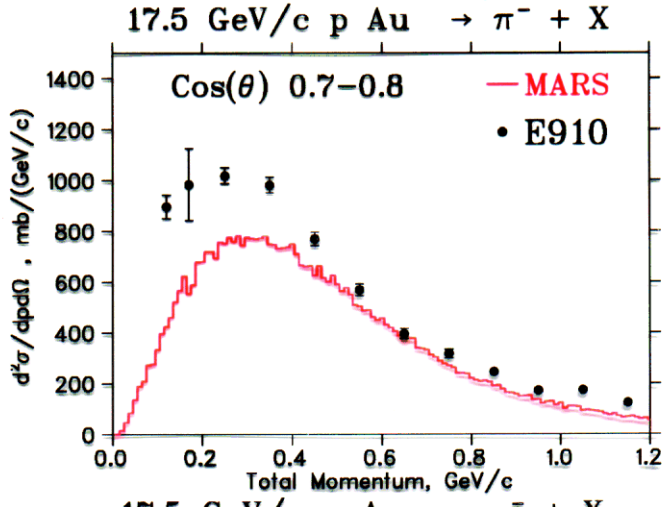

17.5 GeV/c p Au → π⁻ + X
Cos(θ) 0.9–1.0
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c
0
500
1000
1500
2000
2500
0.0
0.2
0.4
0.6
0.8
1.0
1.2

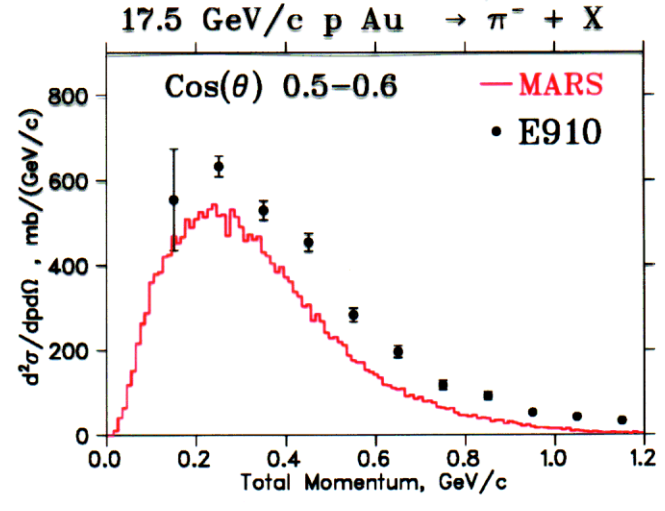

17.5 GeV/c p Au → π+ + X
Cos(θ) 0.9−1.0
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c


17.5 GeV/c p Au → π+ + X
Cos(θ) 0.7−0.8
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c


17.5 GeV/c p Au → π+ + X
Cos(θ) 0.5−0.6
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c


17.5 GeV/c p Au → π⁻ + X
Cos(θ) 0.9–1.0
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c


17.5 GeV/c p Au → π⁻ + X
Cos(θ) 0.7–0.8
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c


17.5 GeV/c p Au → π⁻ + X
Cos(θ) 0.5–0.6
MARS
E910
d²σ/dpdΩ , mb/(GeV/c)
Total Momentum, GeV/c

Summary

17 GeV p Au

E910 shows an excess of soft pion production compared to MARS.

- For π^+ expect $\approx +$ 10 % more than MARS
- For π^- expect $\approx +$ 30 % more than MARS

Still to come

- 17 GeV p : Be and Cu
- 12 GeV p : Be, Cu and Au