Rho Subtraction

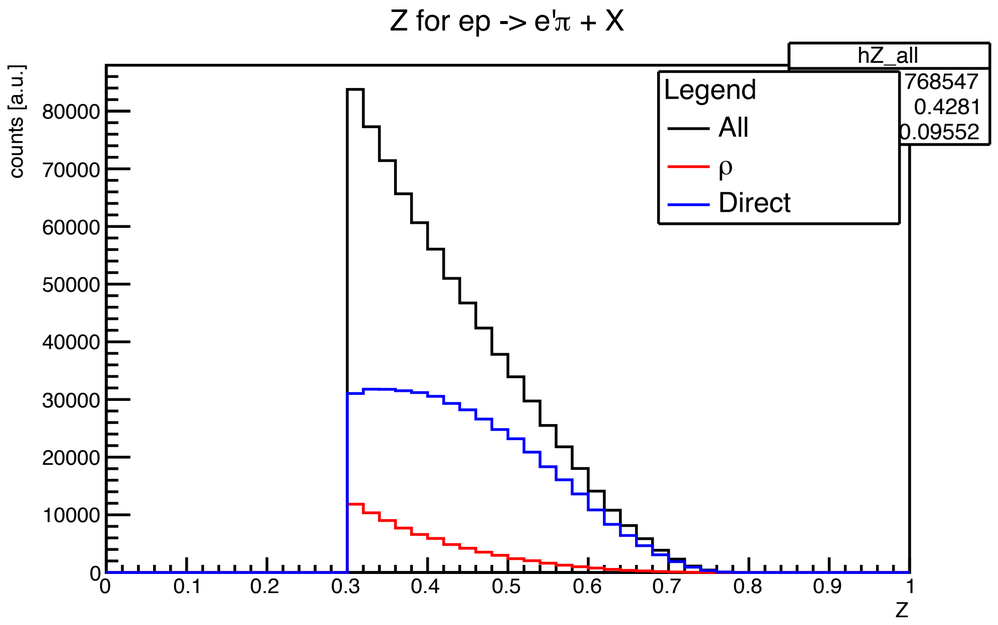
Jason Phelan

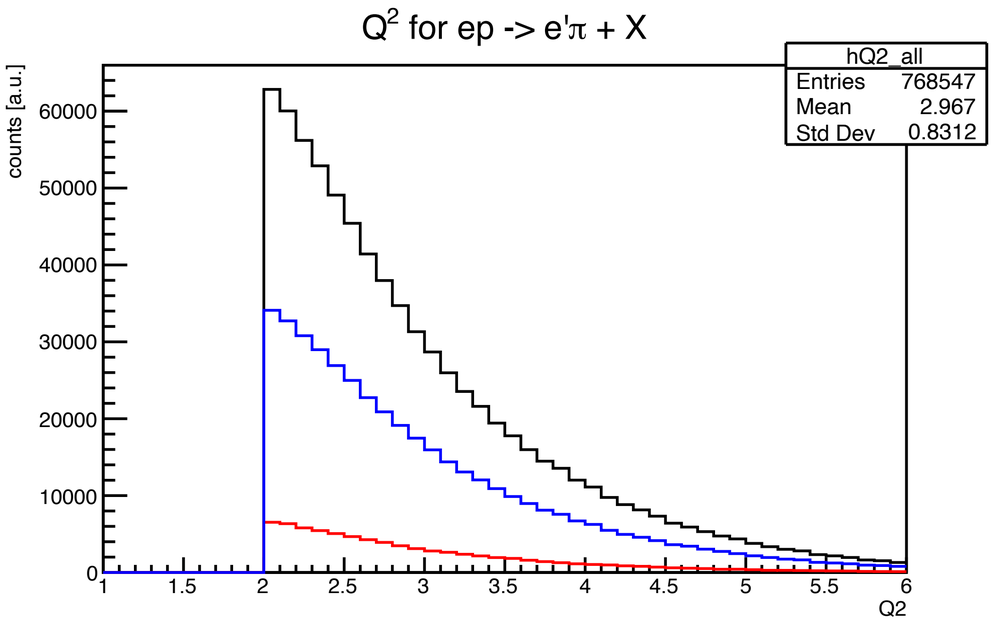
Cut List

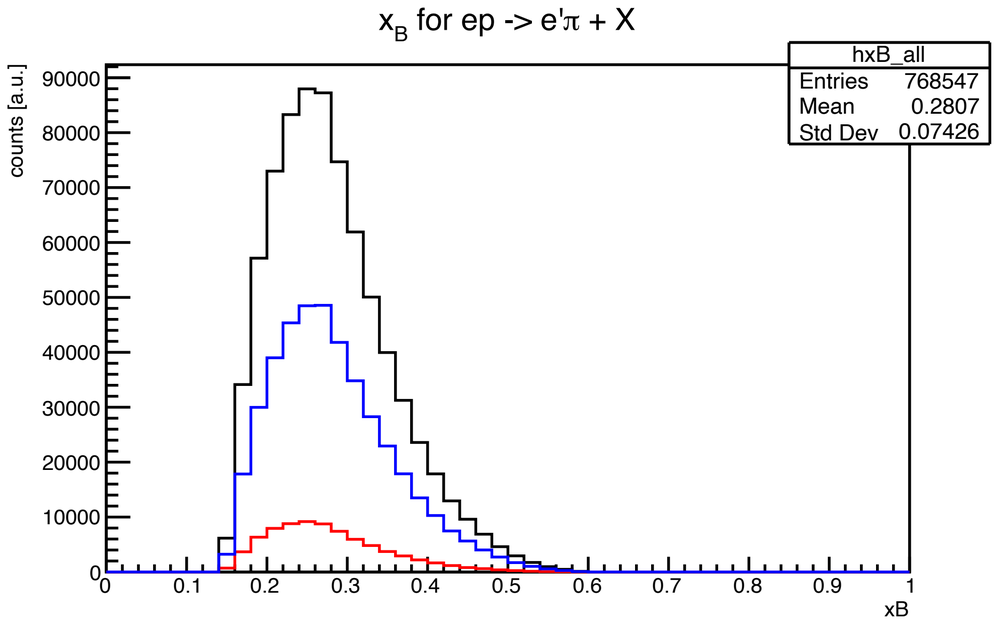
- Cut List
  - $W > 2.5$
  - $y < 0.75$
  - $p_e > 3$ and $1.25 < p_\pi < 5$
  - $5 < \theta_e < 35$ and $5 < \theta_\pi < 35$
  - $1.7 < M_x < 5$

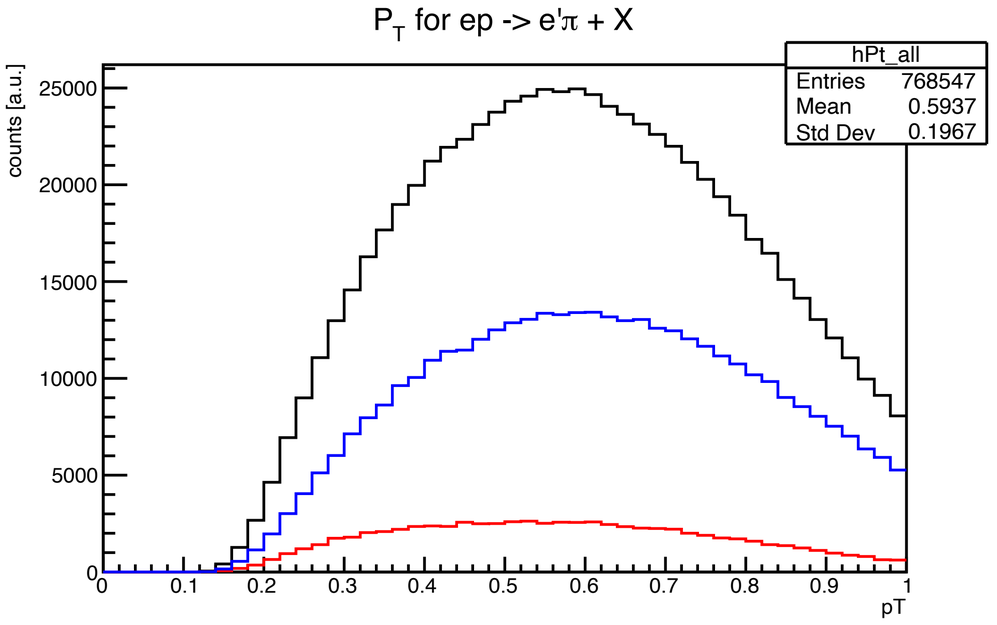
Note:
"All" refers to all pions passing cuts
"ρ" refers to all pions passing cuts with a parent PID of 113
"Direct" refers to al pions passing cuts with a parent PID of 91 or 92 (u or d quark)

π^+

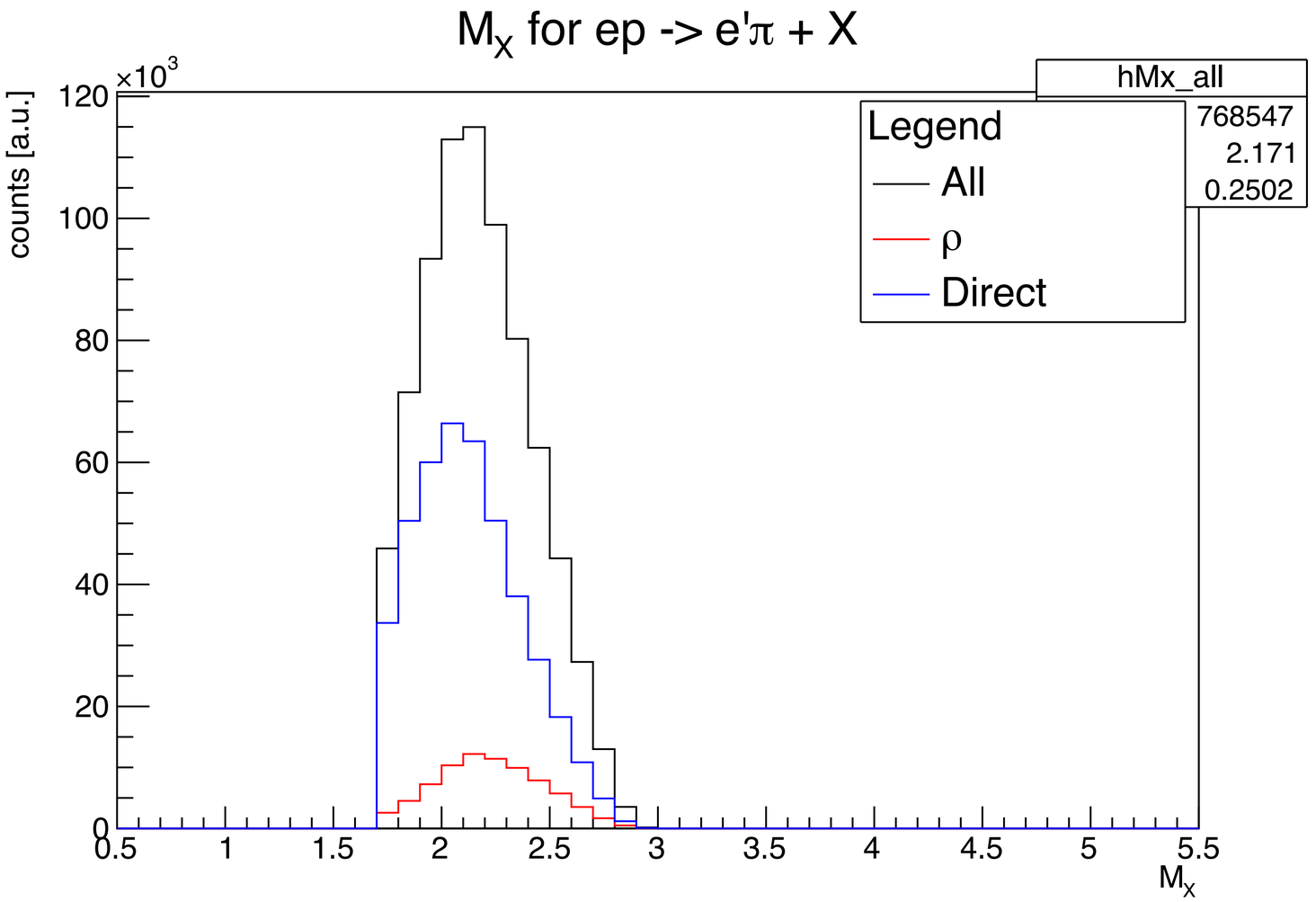

Z for ep -> e'π + X
hZ_all
768547
0.4281
0.09552
Legend
All
ρ
Direct
counts [a.u.]
Z


Q² for ep -> e'π + X
hQ2_all
Entries 768547
Mean 2.967
Std Dev 0.8312
counts [a.u.]
Q2

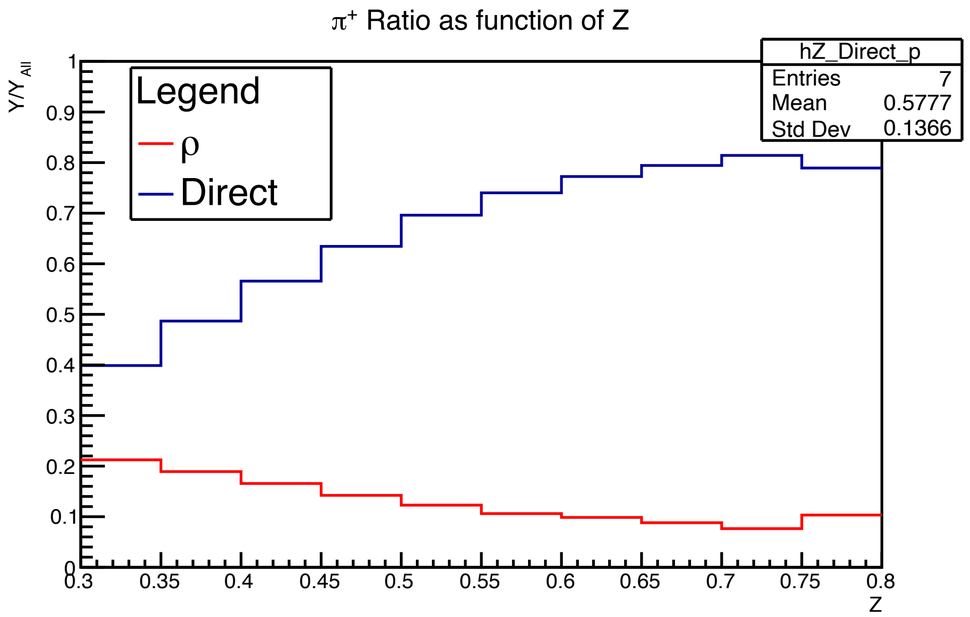

x_B for ep -> e'π + X
hxB_all
Entries 768547
Mean 0.2807
Std Dev 0.07426
counts [a.u.]
xB

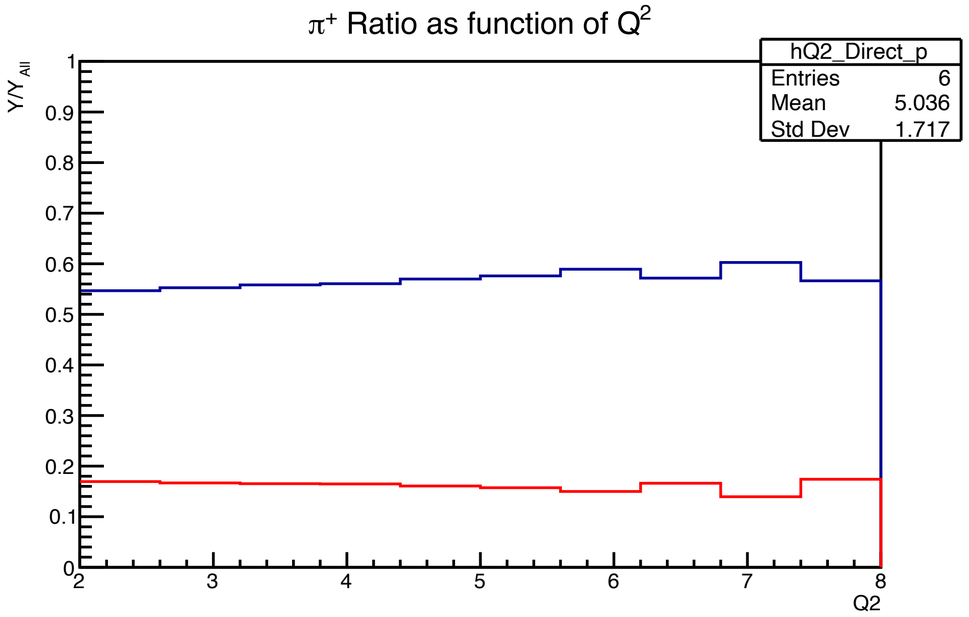

P_T for ep -> e'π + X
hPt_all
Entries 768547
Mean 0.5937
Std Dev 0.1967
counts [a.u.]
pT

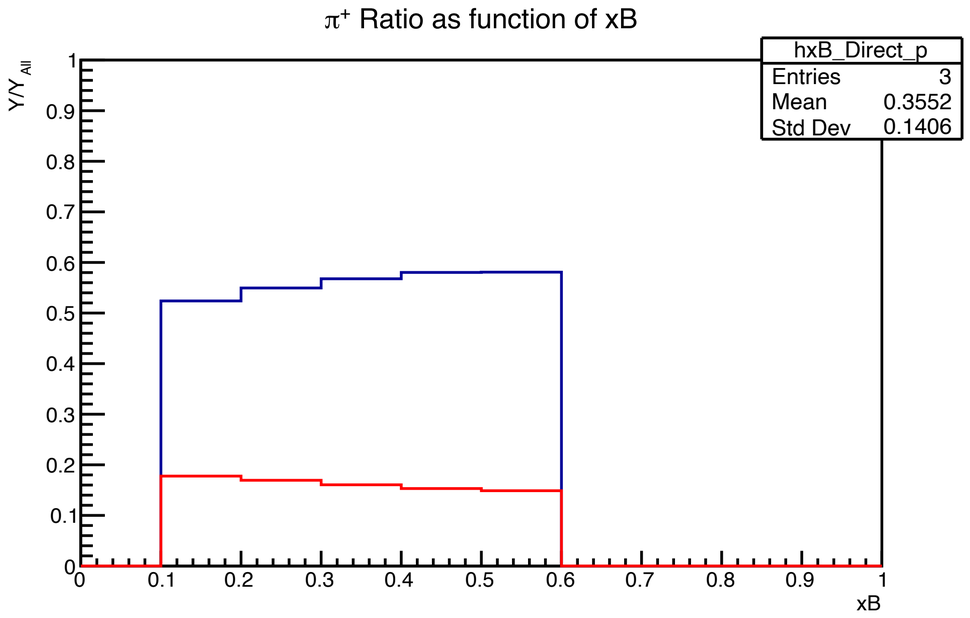
π^+

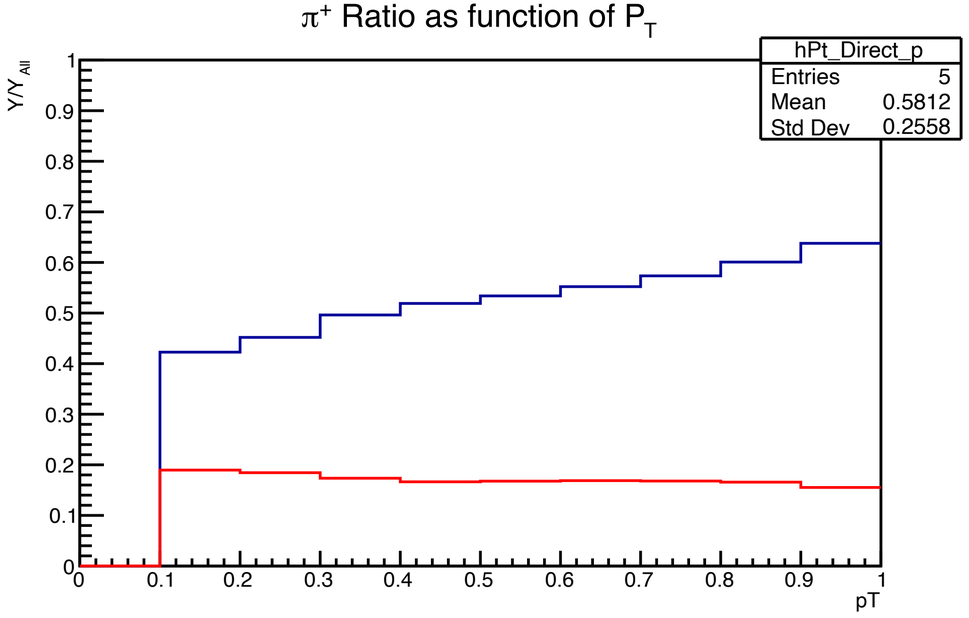

M_X for ep -> e'π + X
×10^3
counts [a.u.]
120
100
80
60
40
20
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
M_X
hMx_all
768547
2.171
0.2502
Legend
All
ρ
Direct

π^+

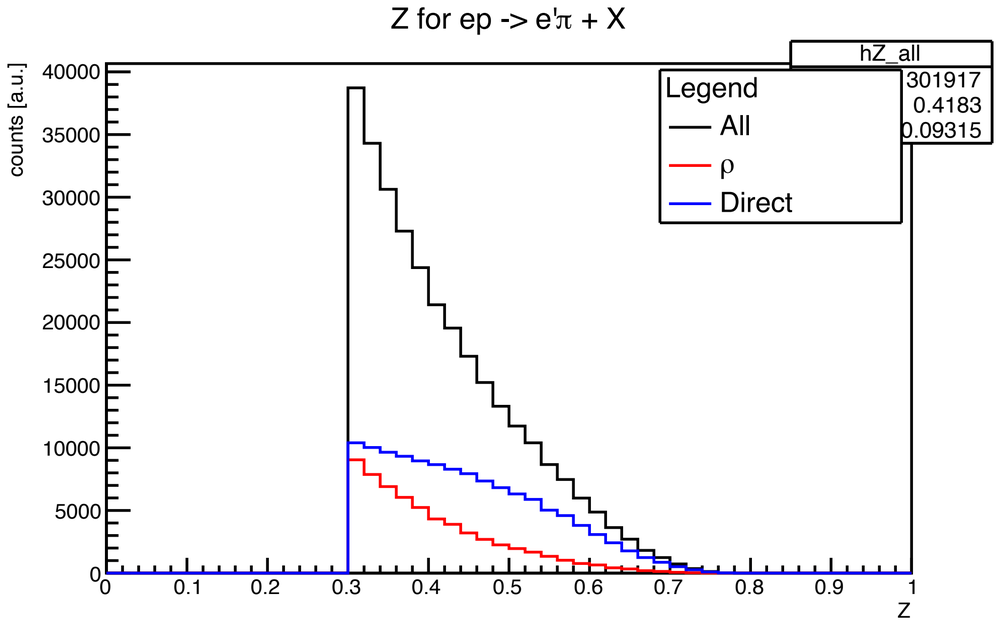

π+ Ratio as function of Z
Legend
ρ
Direct
hZ_Direct_p
Entries 7
Mean 0.5777
Std Dev 0.1366
Y/Y All
Z

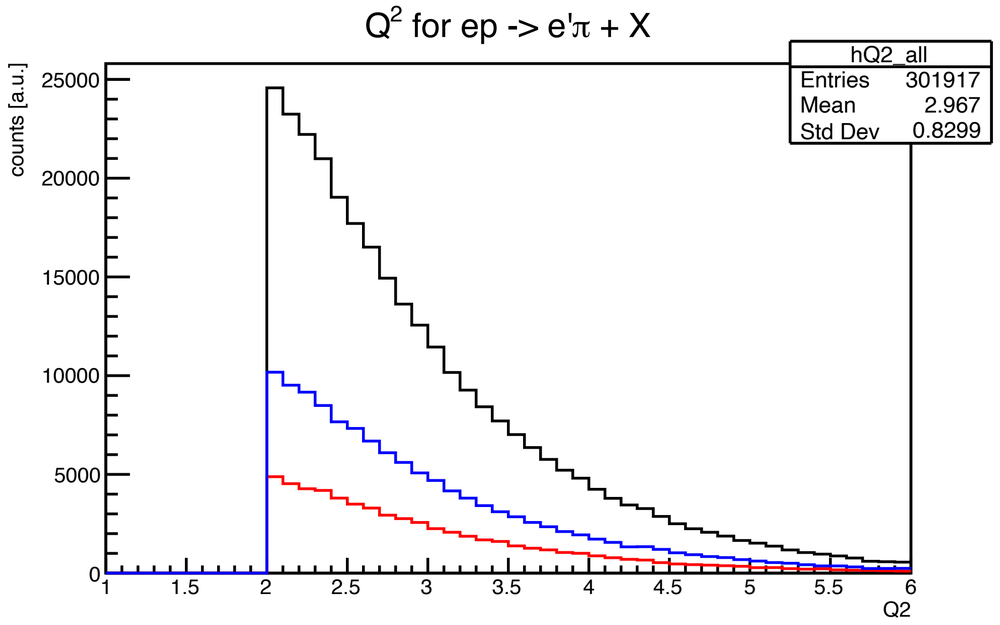

π+ Ratio as function of Q2
hQ2_Direct_p
Entries 6
Mean 5.036
Std Dev 1.717
Y/Y All
Q2

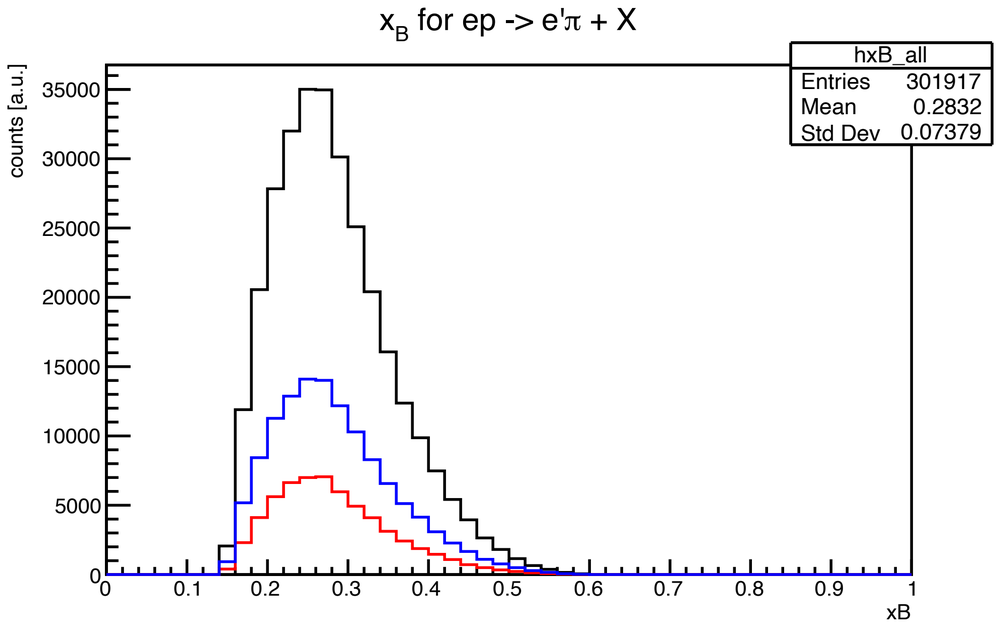

π+ Ratio as function of xB
hxB_Direct_p
Entries 3
Mean 0.3552
Std Dev 0.1406
Y/Y All
xB

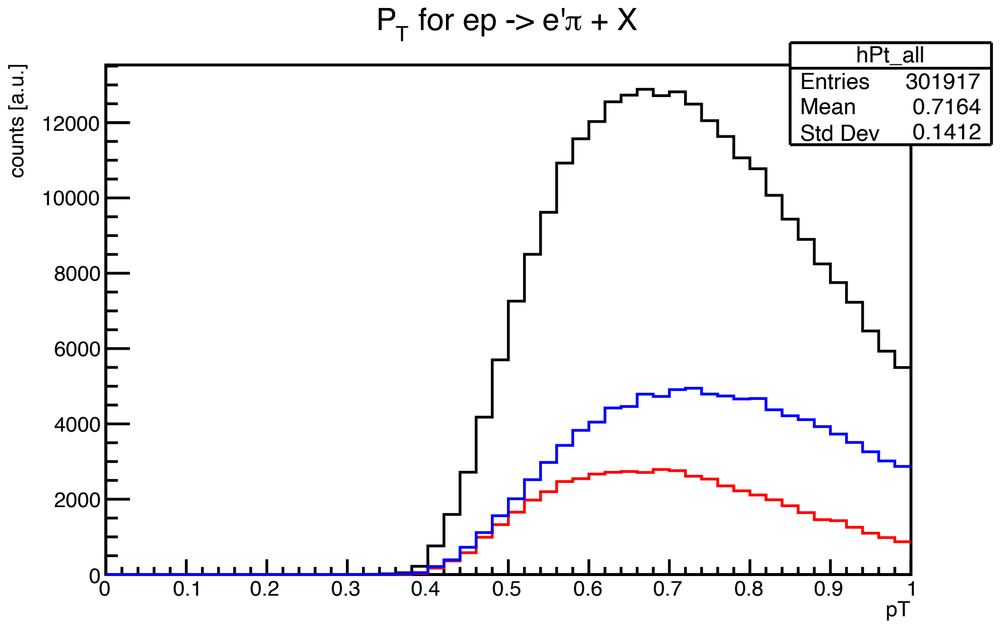

π+ Ratio as function of PT
hPt_Direct_p
Entries 5
Mean 0.5812
Std Dev 0.2558
Y/Y All
pT

π^-

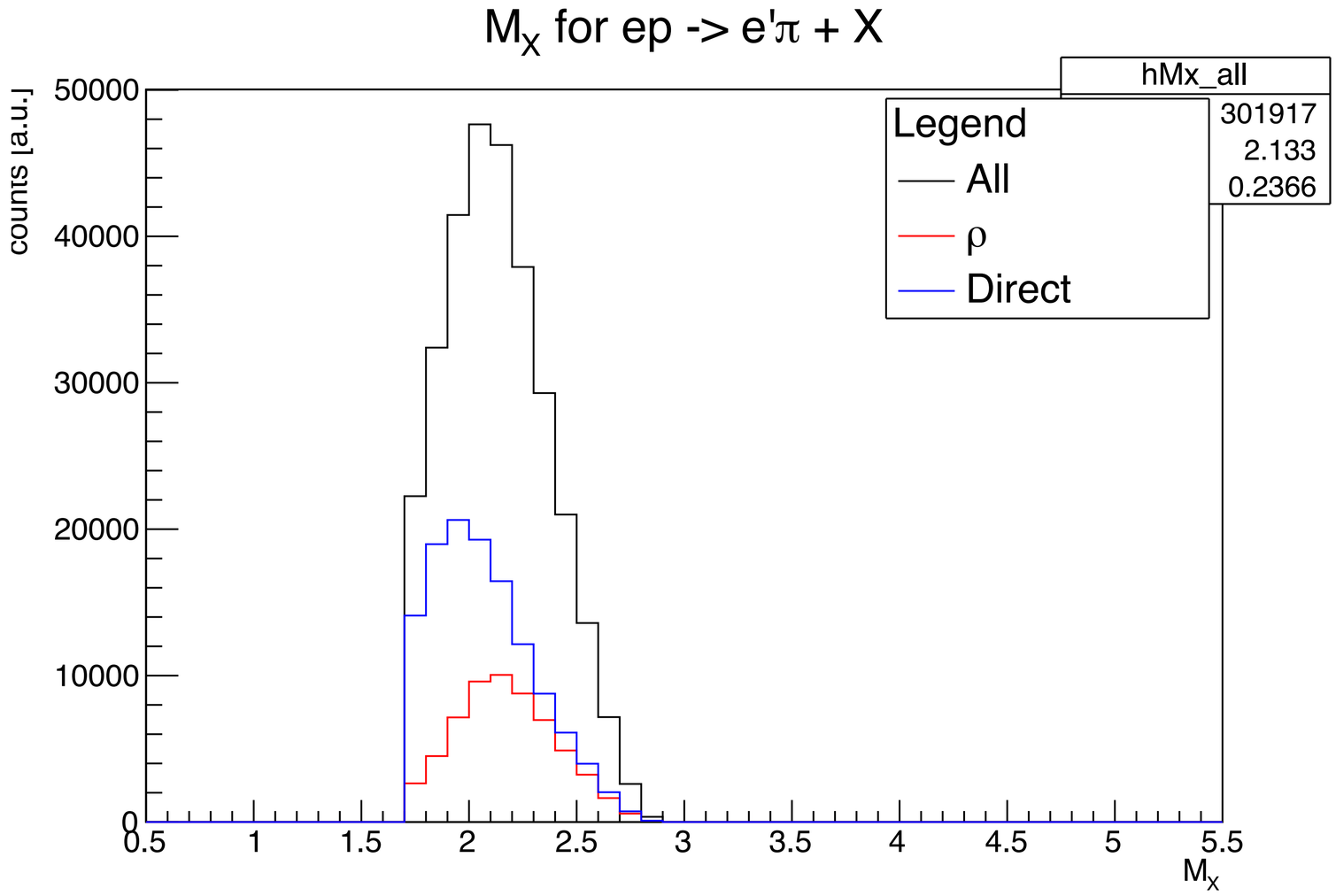

Z for ep -> e'π + X
hZ_all
301917
0.4183
0.09315
Legend
All
ρ
Direct
counts [a.u.]
Z


Q² for ep -> e'π + X
hQ2_all
Entries 301917
Mean 2.967
Std Dev 0.8299
counts [a.u.]
Q2

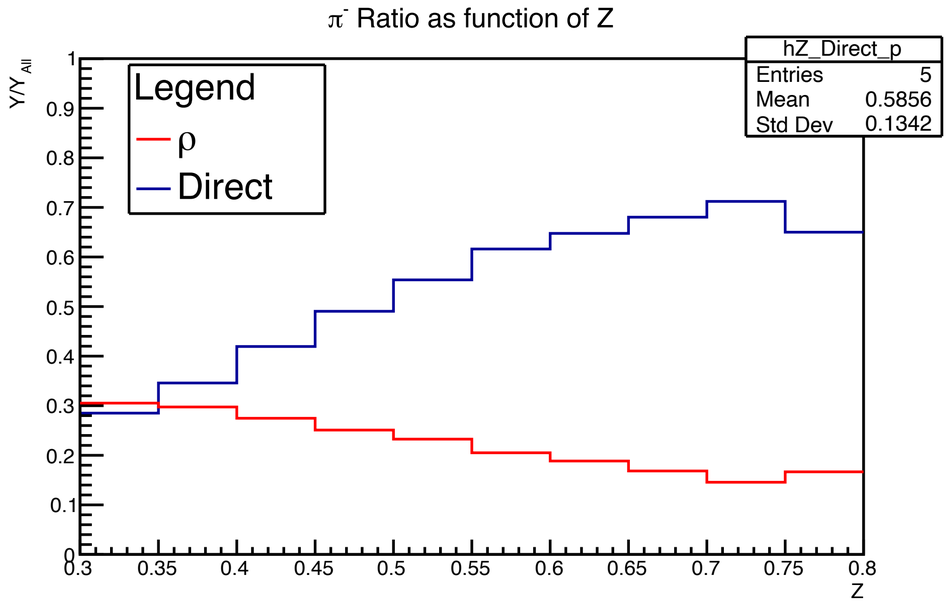

x_B for ep -> e'π + X
hxB_all
Entries 301917
Mean 0.2832
Std Dev 0.07379
counts [a.u.]
xB

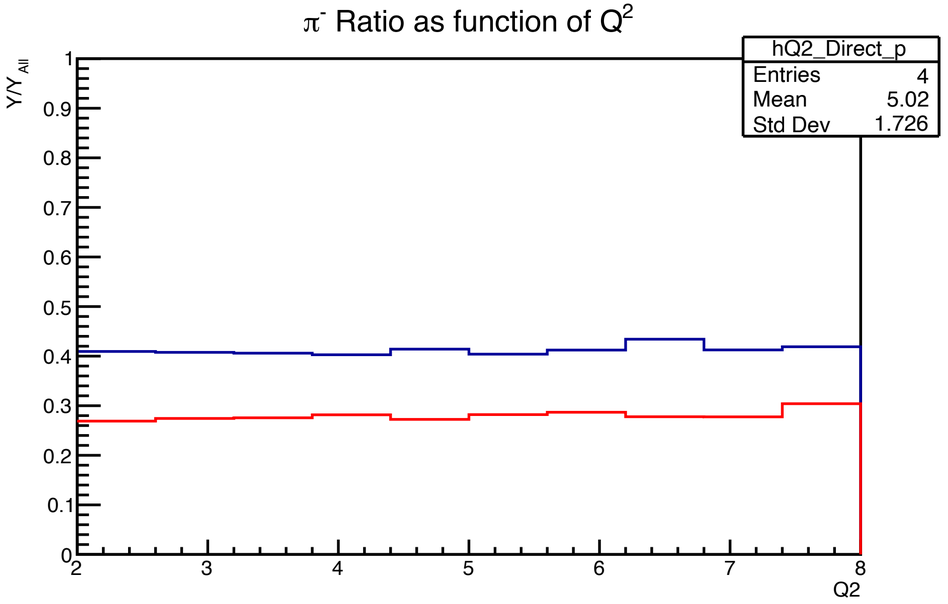

P_T for ep -> e'π + X
hPt_all
Entries 301917
Mean 0.7164
Std Dev 0.1412
counts [a.u.]
pT

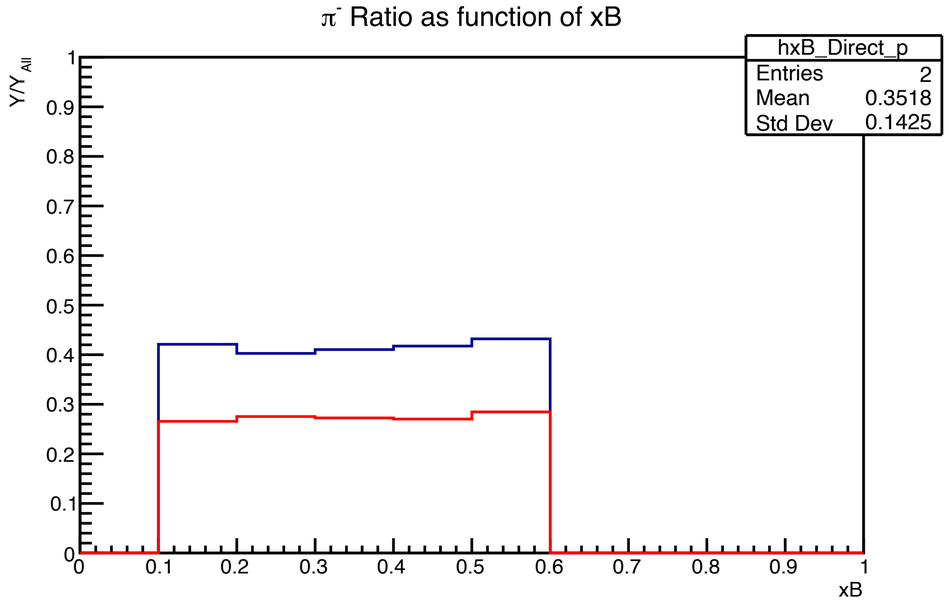
π^-

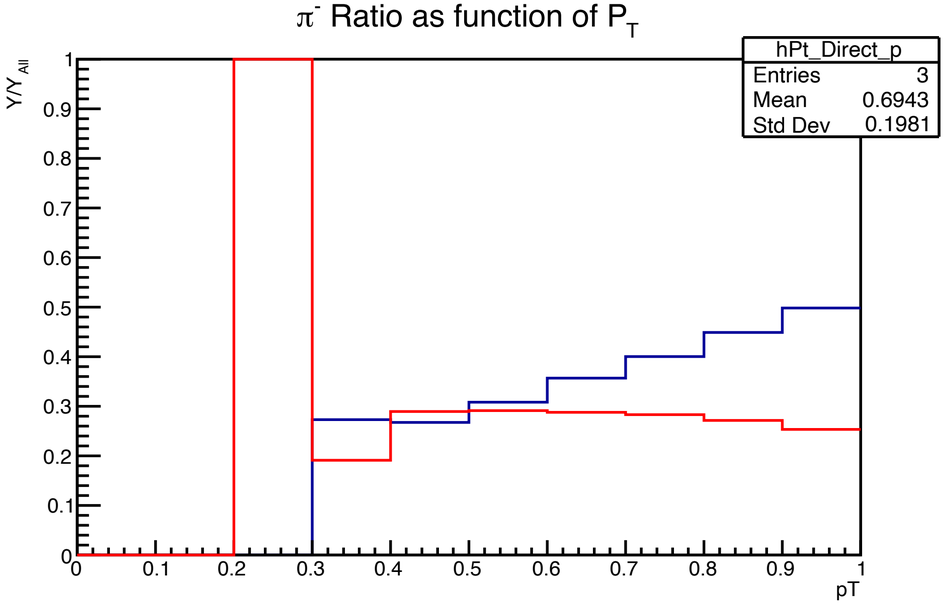

M_X for ep -> e'π + X
hMx_all
301917
2.133
0.2366
Legend
All
ρ
Direct
counts [a.u.]
50000
40000
30000
20000
10000
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
5.5
M_X

π^-


π⁻ Ratio as function of Z
Legend
ρ
Direct
hZ_Direct_p
Entries 5
Mean 0.5856
Std Dev 0.1342
Y/Y All
Z


π⁻ Ratio as function of Q²
hQ2_Direct_p
Entries 4
Mean 5.02
Std Dev 1.726
Y/Y All
Q2


π⁻ Ratio as function of xB
hxB_Direct_p
Entries 2
Mean 0.3518
Std Dev 0.1425
Y/Y All
xB


π⁻ Ratio as function of P_T
hPt_Direct_p
Entries 3
Mean 0.6943
Std Dev 0.1981
Y/Y All
pT

$$Y^{rad}_{rec\ kin,acc\ event}\left[\frac{Y^{born}_{rec\ kin,acc\ event}}{Y^{rad}_{rec\ kin,acc\ event}}\right]\left[\frac{Y^{born}_{gen\ kin,acc\ event}}{Y^{born}_{rec\ kin,acc\ event}}\right]\left[\frac{Y^{born}_{gen\ kin,gen\ event}}{Y^{born}_{gen\ kin,acc\ event}}\right] = Y^{born}_{gen\ kin,gen\ event}$$

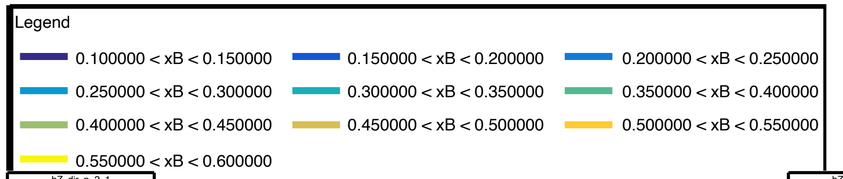
Radiation Correction

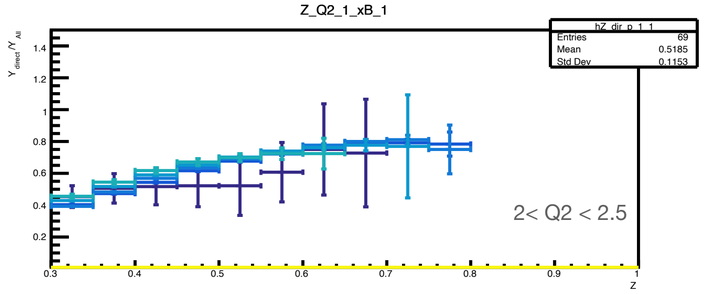
Bin Migration Correction

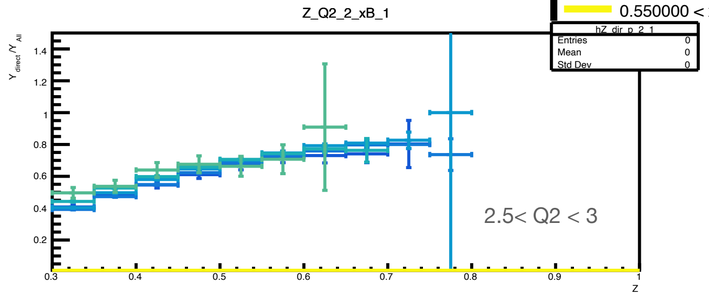
Acceptance correction

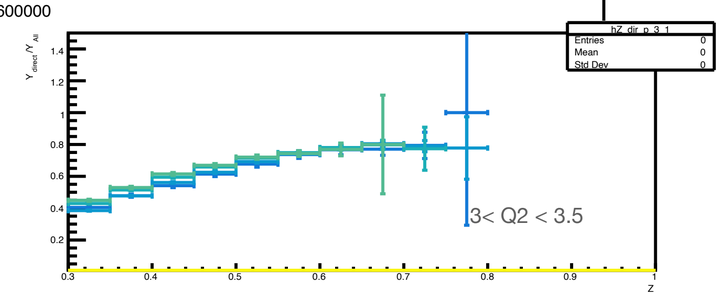
$$\text{Rho Correction} = Y^{born,\ direct\ \pi}_{rec\ kin,\ acc\ event} / Y^{born,\ all\ \pi}_{rec\ kin,\ acc\ event}$$

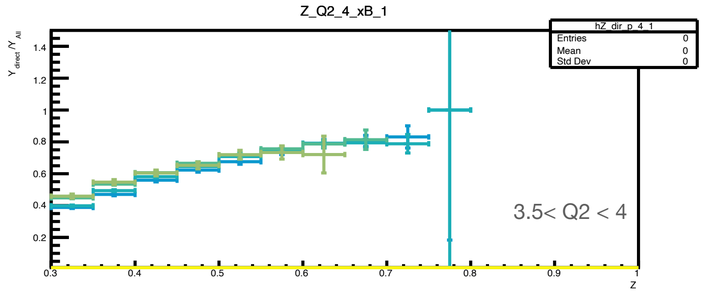
Rho Correction: π^+

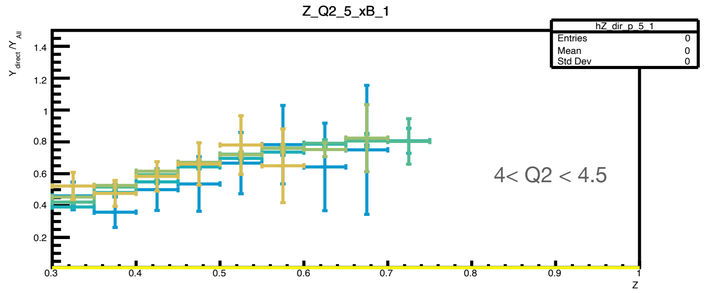


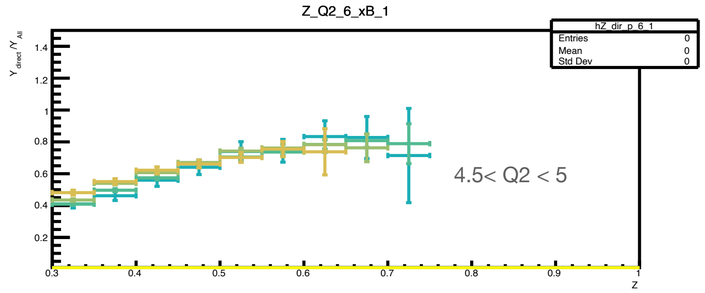


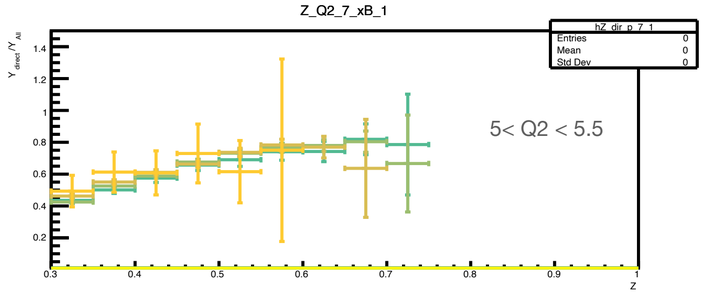


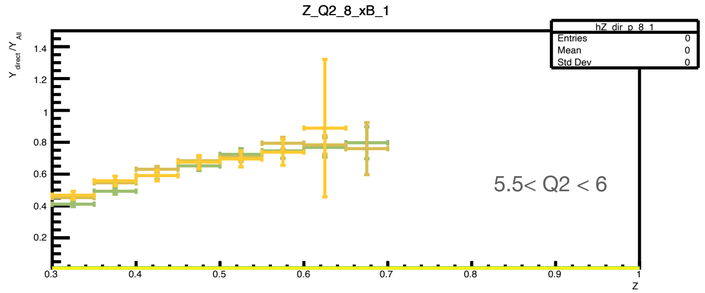


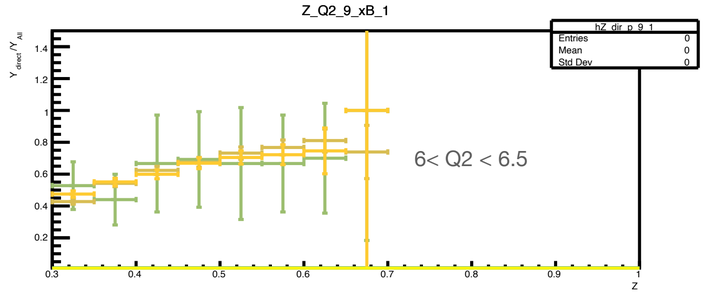


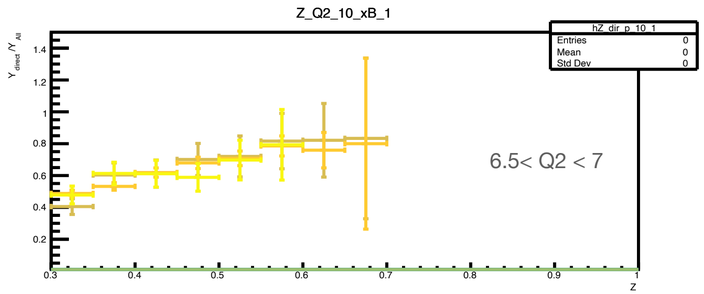


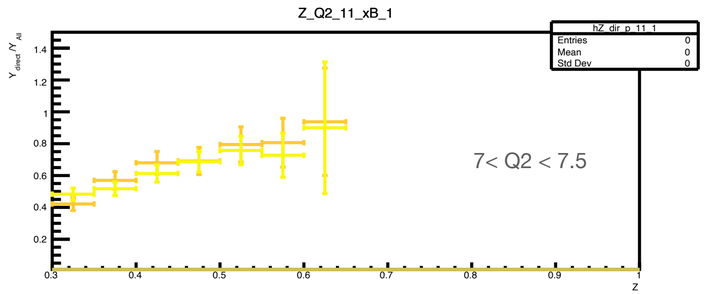


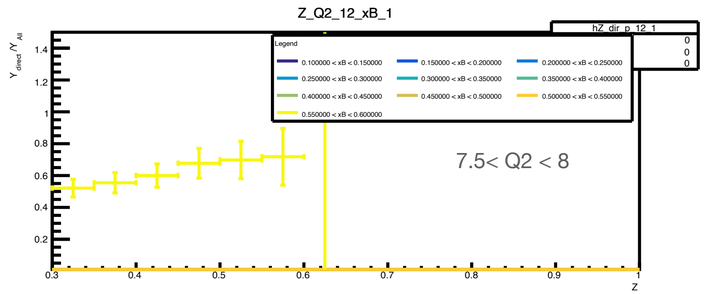




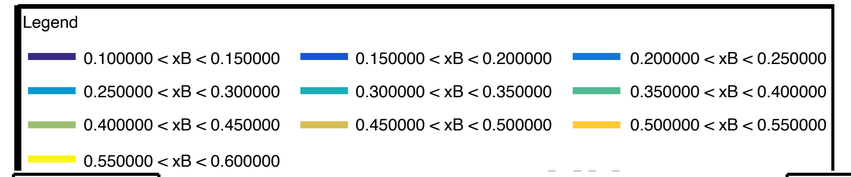


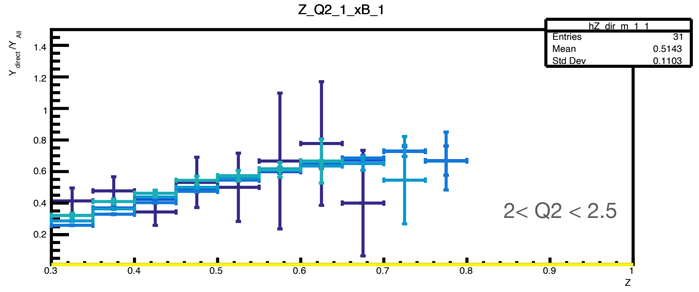


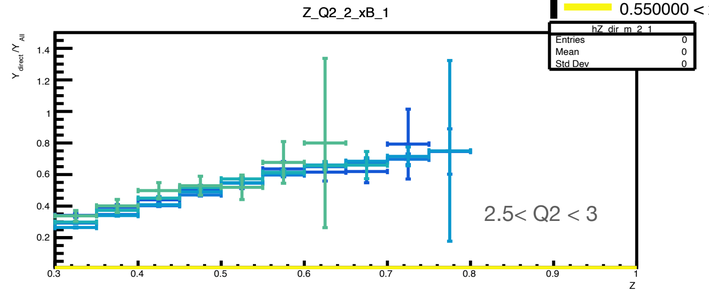


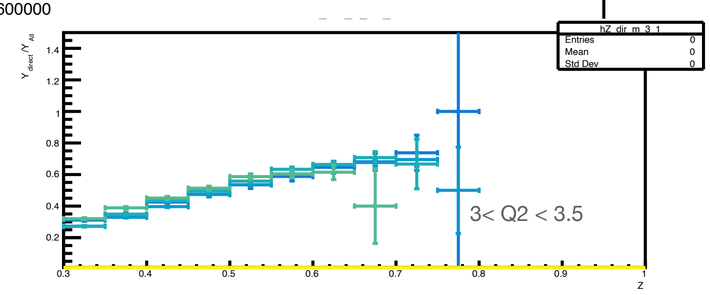


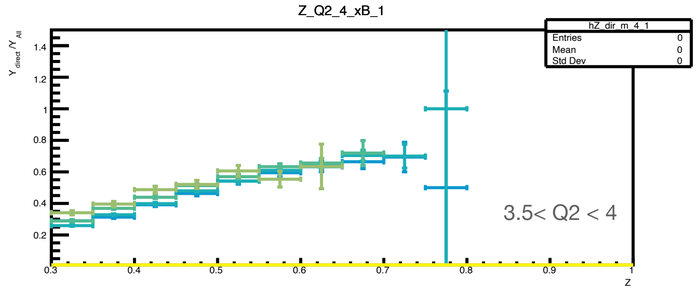
Rho Correction: π^-

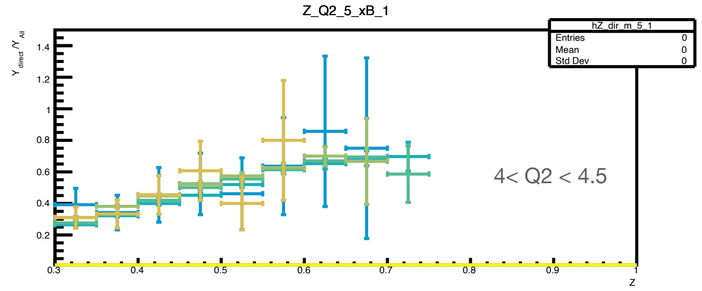


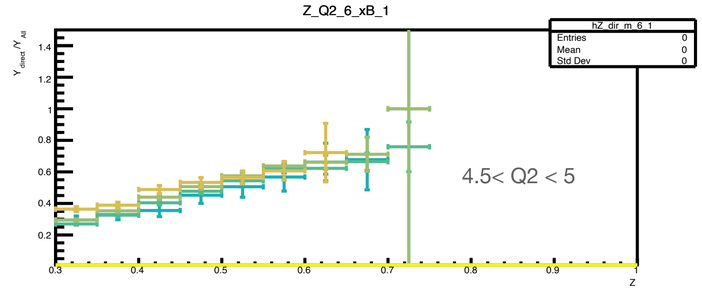


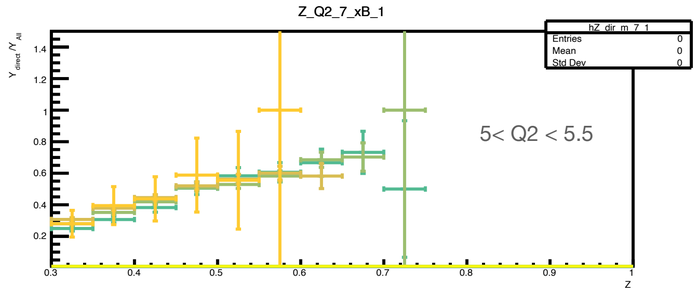


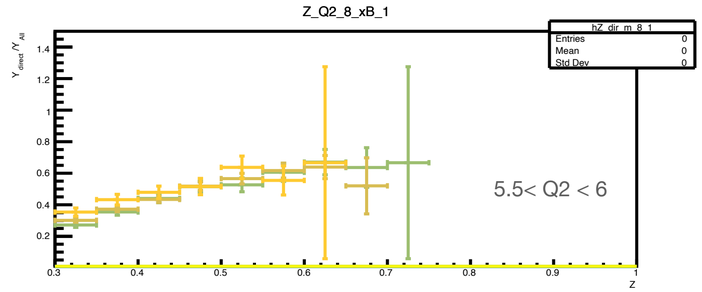


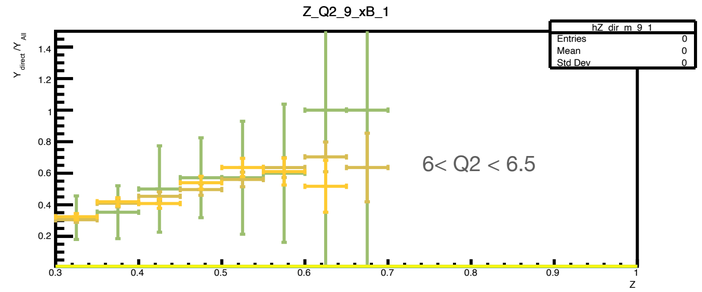


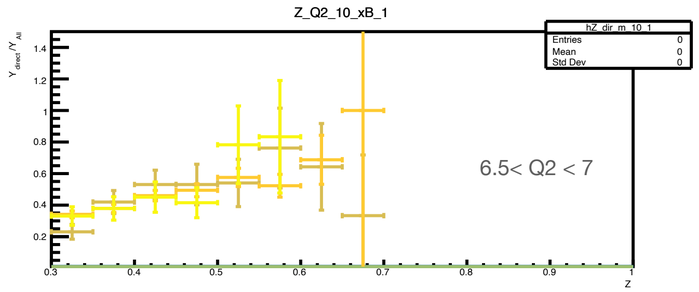


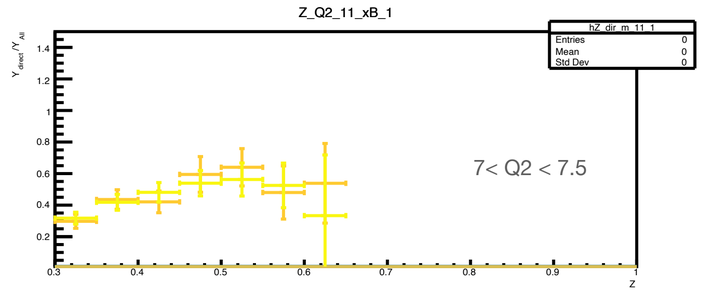


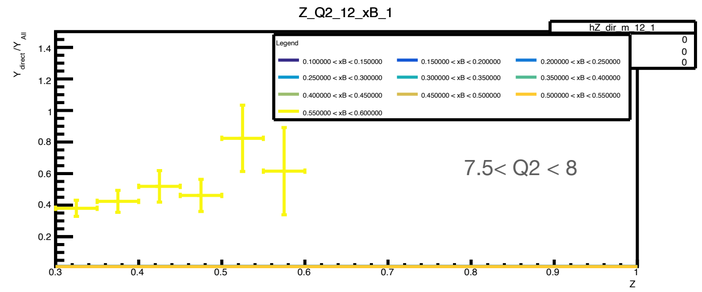
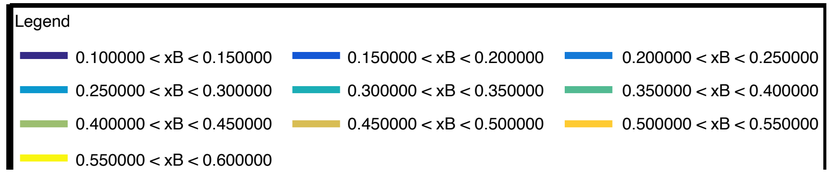
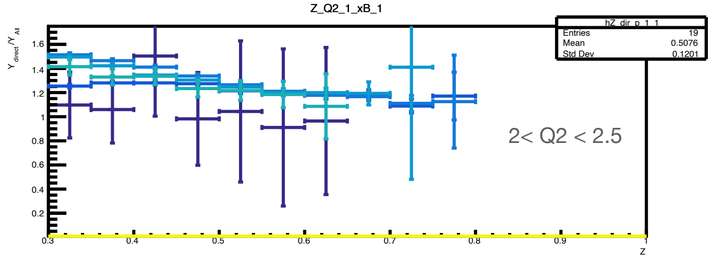
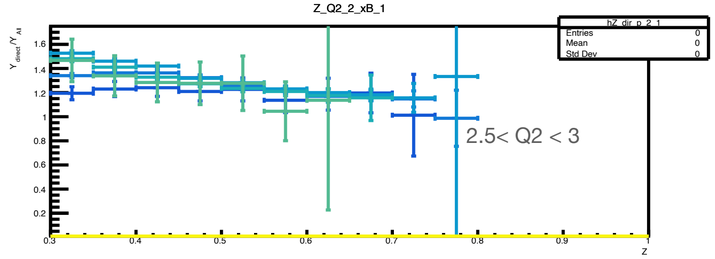
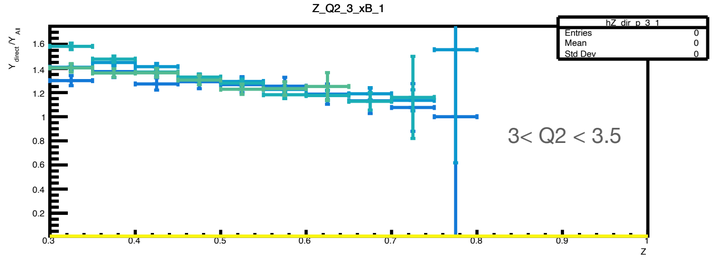
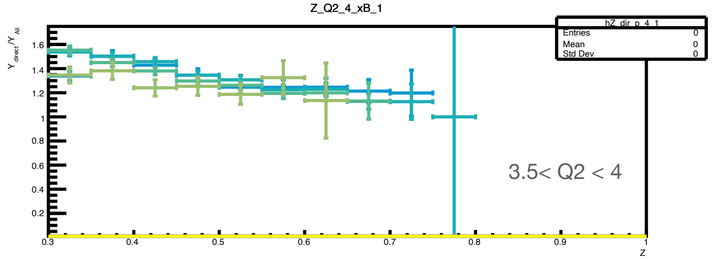
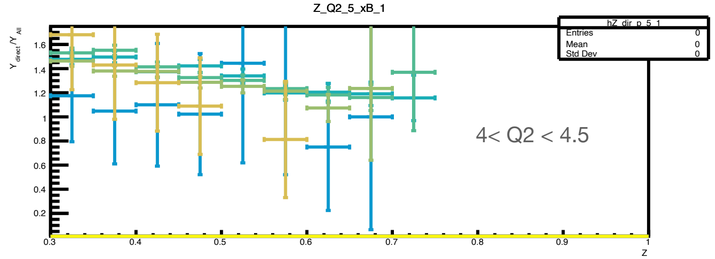
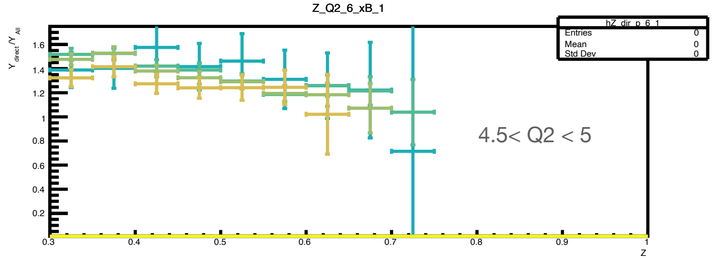
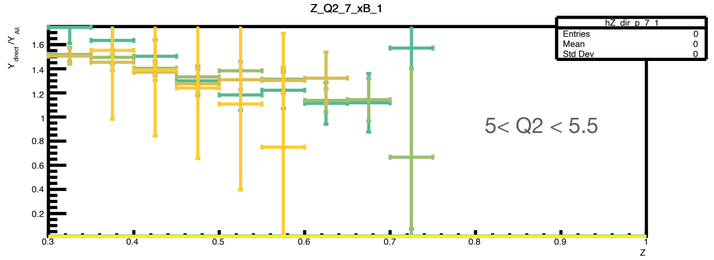
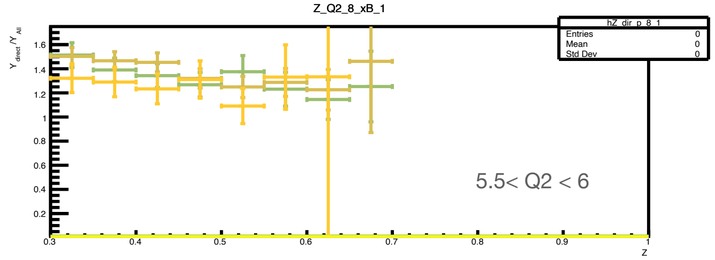
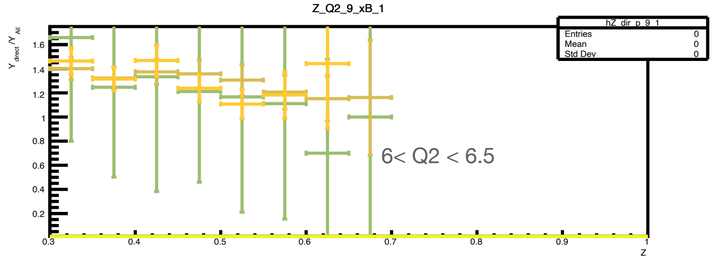
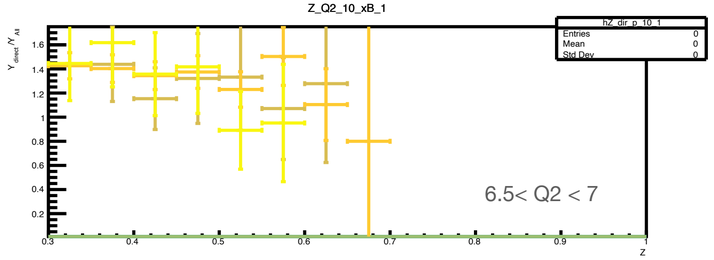
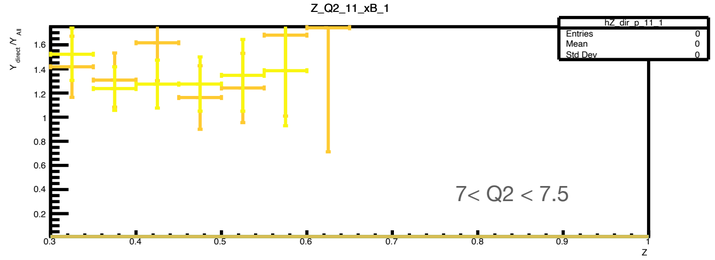
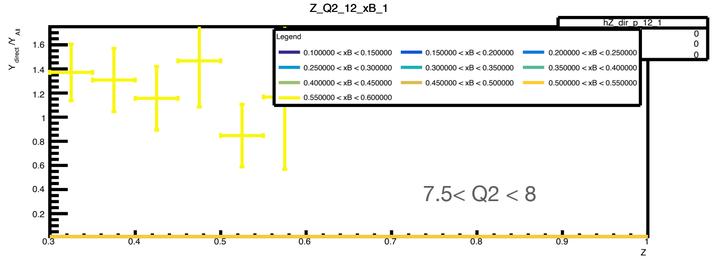












Correction Ratio: π^+/π^-