Charged pion analysis

Single Spin Asymmetry

-Bunch Shuffling, Sys_uncertainty

Korea Univ.
Jaehee Yoo

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Calculation (Formula)

Geometric Weighting

$$A_N = \frac{1}{\langle |\, cos\phi \,| \rangle} \frac{1}{P} A_N^{raw}$$

$$\sigma_{A_N} = |A_N| \sqrt{\left(\frac{\sigma_{A_N^{raw}}}{A_N^{raw}}\right)^2 + \left(\frac{\sigma_P}{P}\right)^2}$$

Square Root Formula

$$A_N^{raw} = \frac{\sqrt{N_L^{\uparrow} N_R^{\downarrow}} - \sqrt{N_L^{\downarrow} N_R^{\uparrow}}}{\sqrt{N_L^{\uparrow} N_R^{\downarrow}} + \sqrt{N_L^{\downarrow} N_R^{\uparrow}}}$$

$$\sigma_{A_N^{raw}} = \frac{\sqrt{N_L^{\uparrow} N_R^{\downarrow} N_L^{\downarrow} N_R^{\uparrow}}}{(\sqrt{N_L^{\uparrow} N_R^{\downarrow}} + \sqrt{N_L^{\downarrow} N_R^{\uparrow}})^2} \sqrt{\frac{1}{N_L^{\uparrow}} + \frac{1}{N_L^{\downarrow}} + \frac{1}{N_R^{\uparrow}} + \frac{1}{N_R^{\downarrow}}}$$

Averaging Over Fills (The Weighted Mean Formula)

$$A_{N,average} = \frac{\sum_{i=Fill} A_{N,i} / \sigma^2_{A_{N,i}}}{\sum_{i=Fill} 1 / \sigma^2_{A_{N,i}}}$$

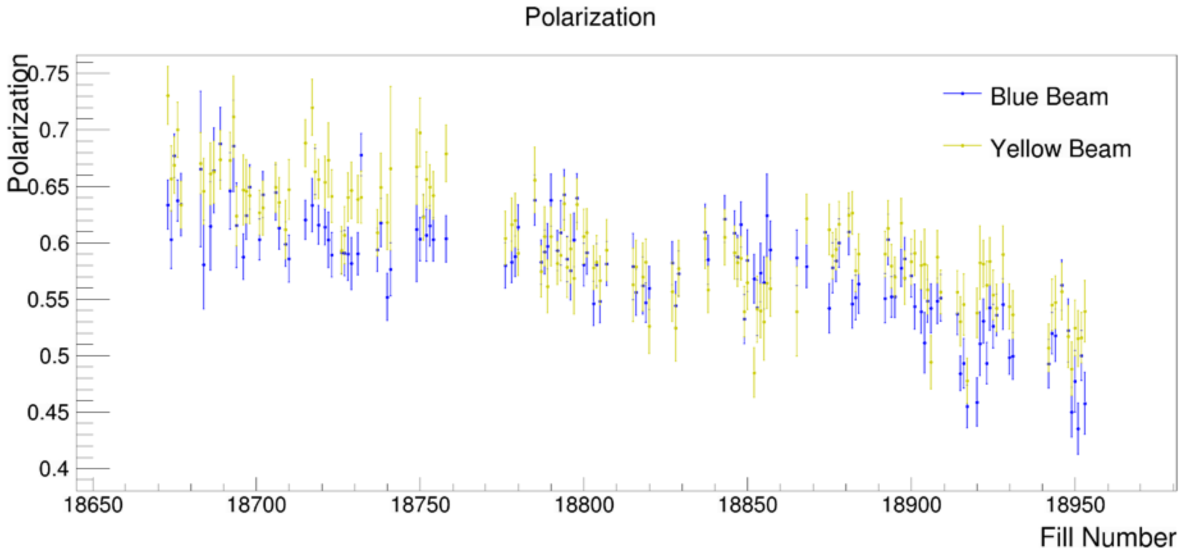
$$\sigma^2_{A_{N,average}} = \frac{1}{\sum_{i=Fill} 1 / \sigma^2_{A_{N,i}}}$$

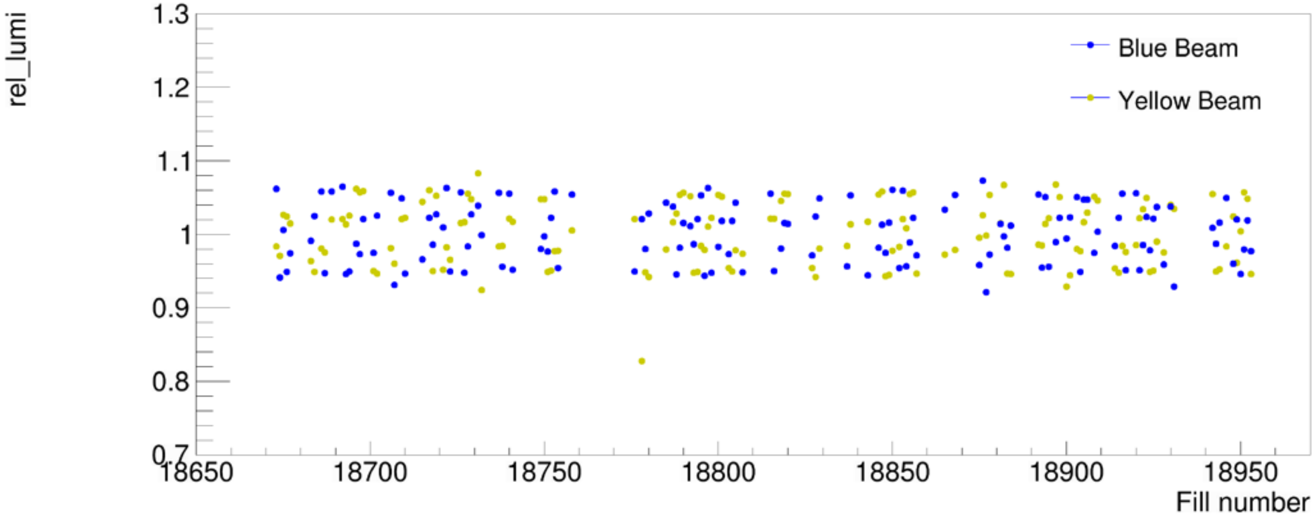
Relative Luminosity Formula

$$A_N^{raw} = \frac{N_L^{\uparrow} - \mathcal{R}\, N_L^{\downarrow}}{N_L^{\uparrow} + \mathcal{R}\, N_L^{\downarrow}}$$

$$\sigma_{A_N^{raw}} = \frac{2\,\mathcal{R}\, N_L^{\uparrow} N_L^{\downarrow}}{(N_L^{\uparrow} + \mathcal{R}\, N_L^{\downarrow})^2} \sqrt{\frac{1}{N_L^{\uparrow}} + \frac{1}{N_L^{\downarrow}}}$$

Polarization and Rel_lumi





$$A_N = \frac{1}{\langle | cos\phi | \rangle} \frac{1}{P} A_N^{raw}$$

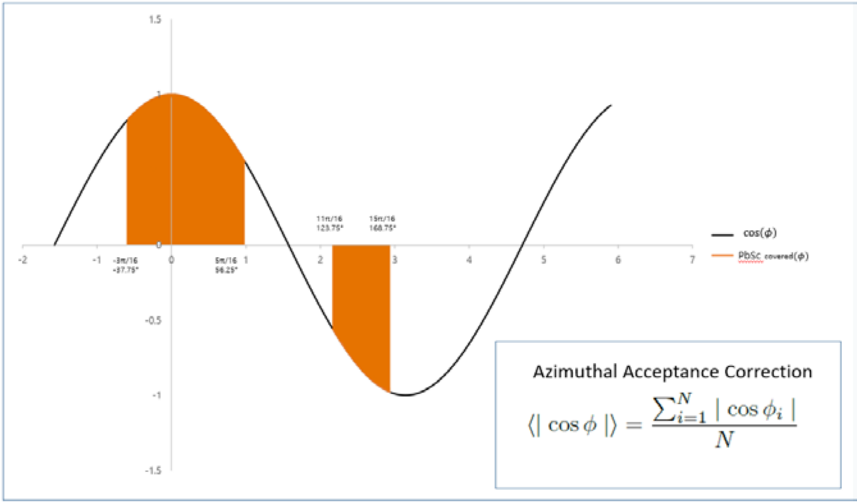
$$\sigma_{A_N} = |A_N| \sqrt{\left(\frac{\sigma_{A_N^{raw}}}{A_N^{raw}}\right)^2 + \left(\frac{\sigma_P}{P}\right)^2}$$

$$R = L_{\uparrow}/L_{\downarrow}$$

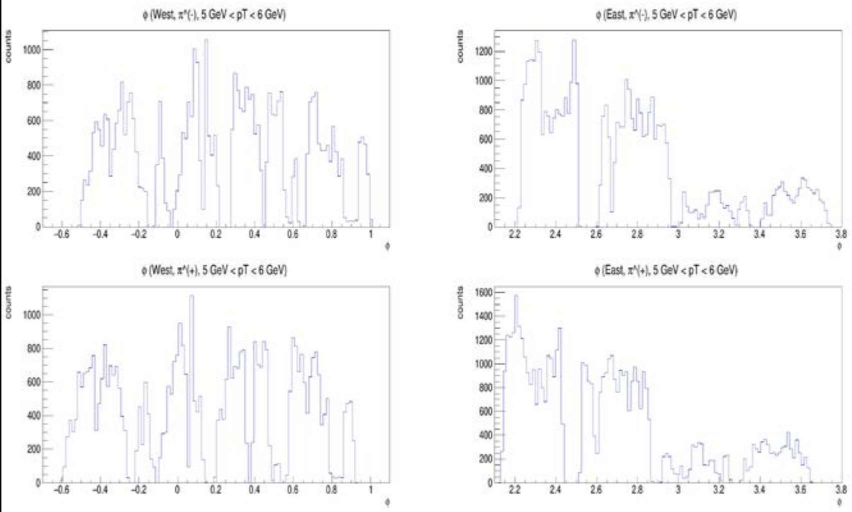
- The proton beam is never 100% polarized and collisions between unpolarized protons dilute the A_N measurement.

The relative luminosity asymmetry formula uses counts that are only on one side of the detector at a time and then calculates the asymmetry for when the beam was spin up versus spin down.

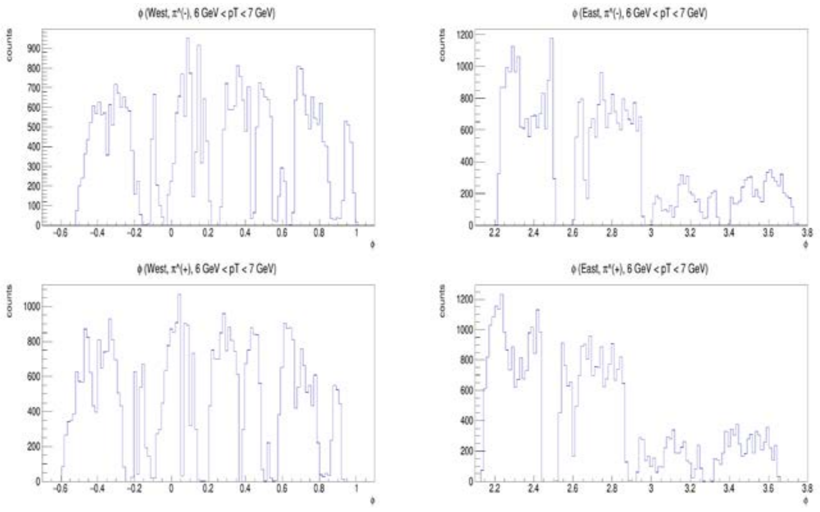
Phi distribution 5 GeV < pT < 6 GeV Acceptance Correction



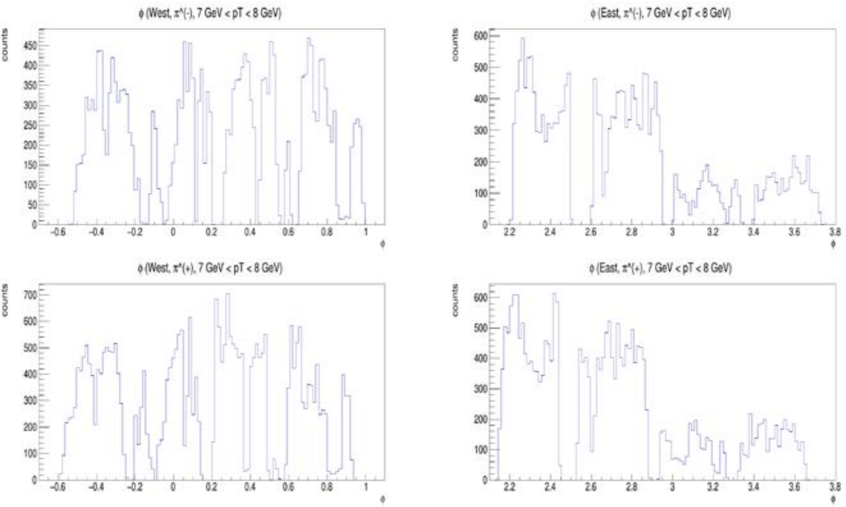
5 GeV < pT < 6 GeV



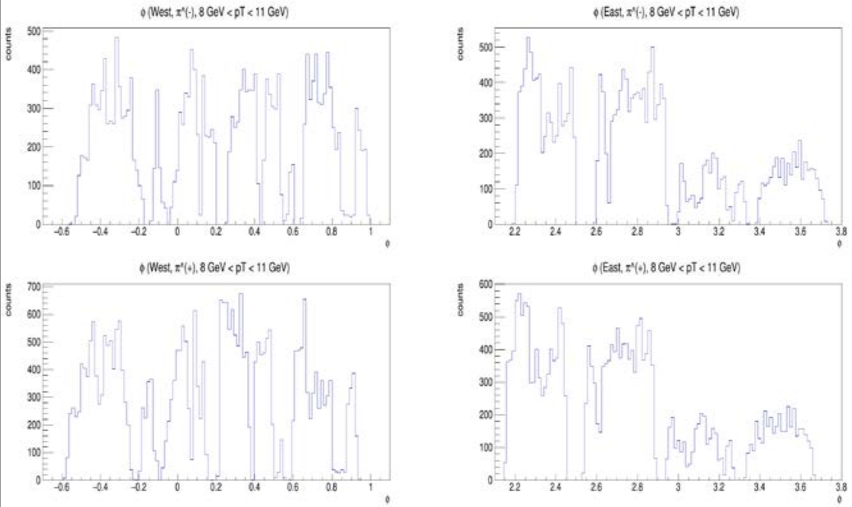
6 GeV < pT < 7 GeV



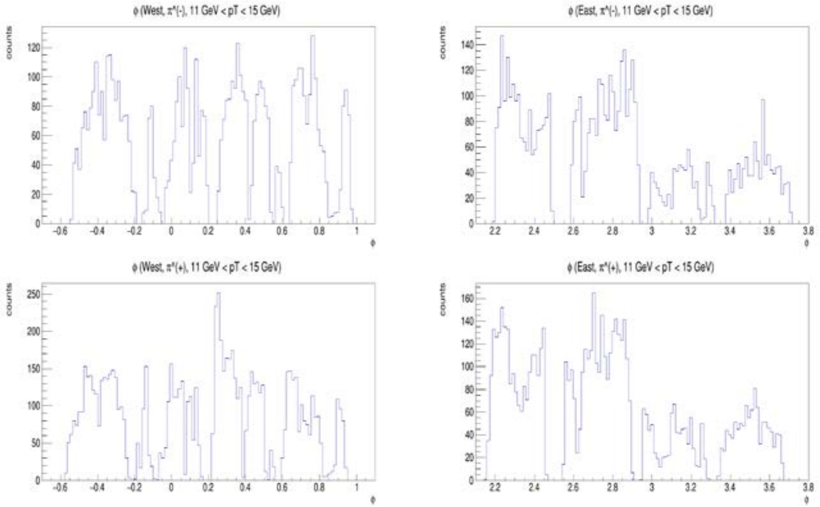
7 GeV < pT < 8 GeV



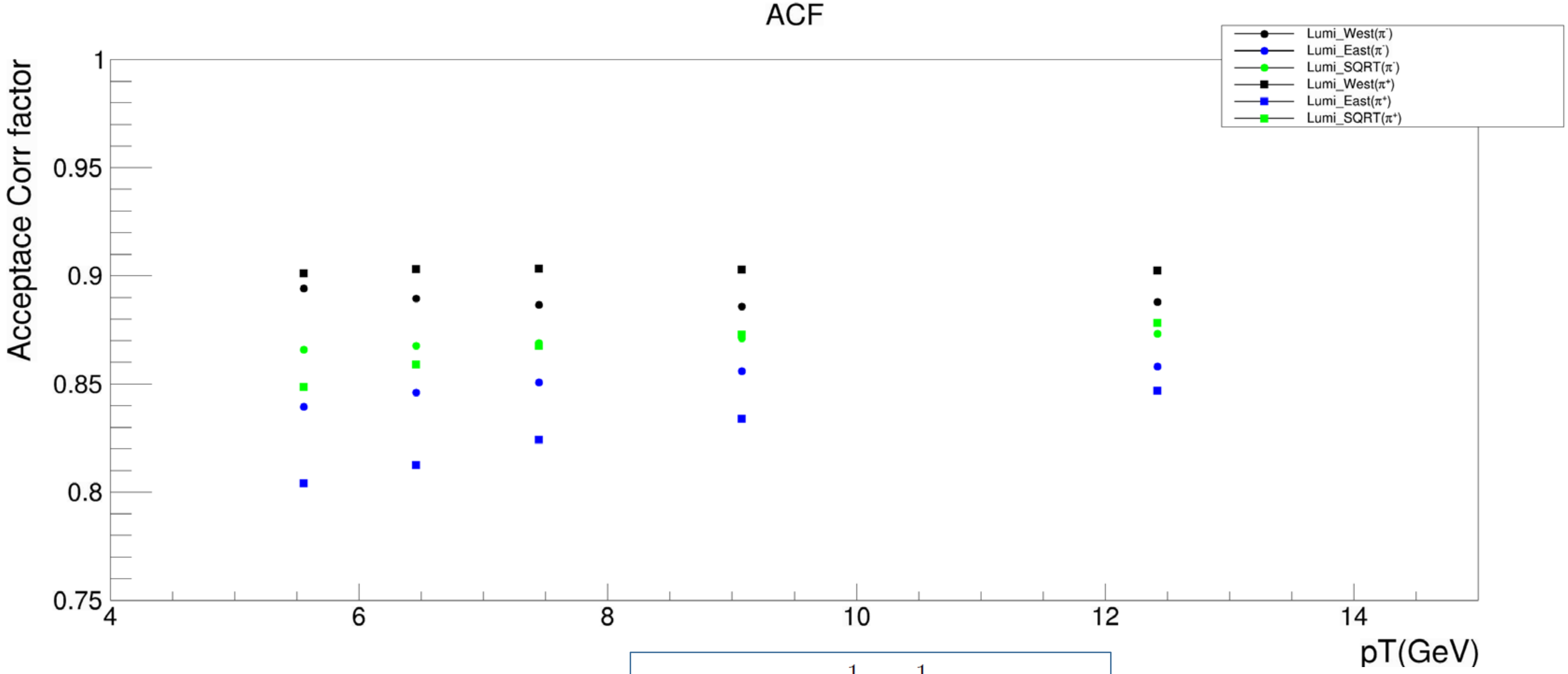
8 GeV < pT < 11 GeV



11 GeV < pT < 15 GeV



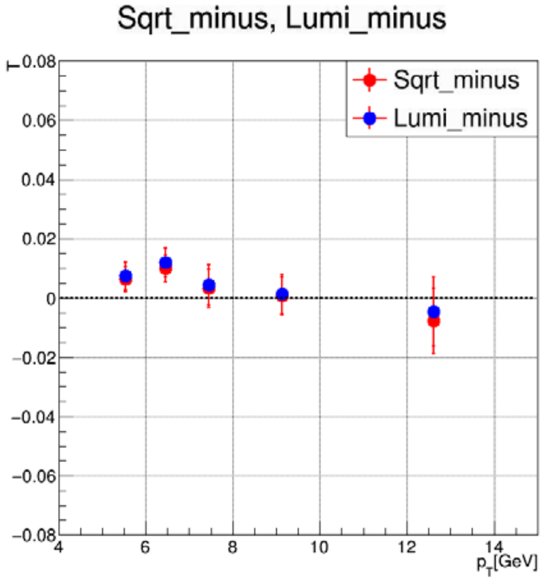
ACF

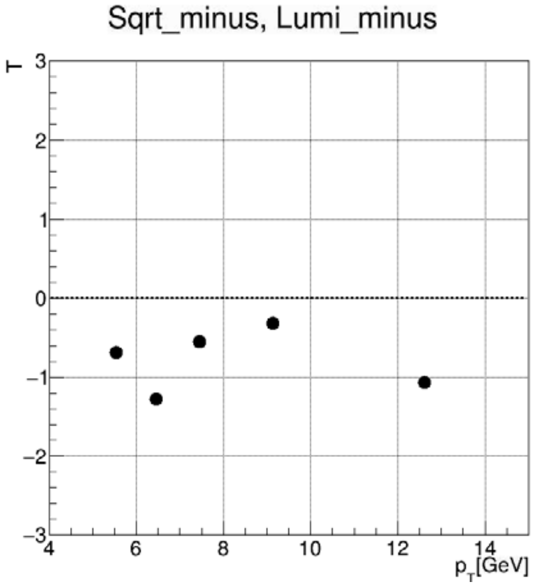


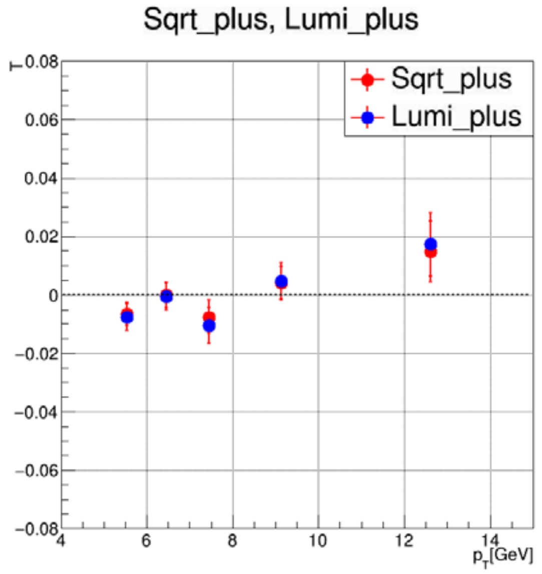
$$A_N = \frac{1}{\langle |\, cos\phi \,| \rangle} \frac{1}{P} A_N^{raw}$$

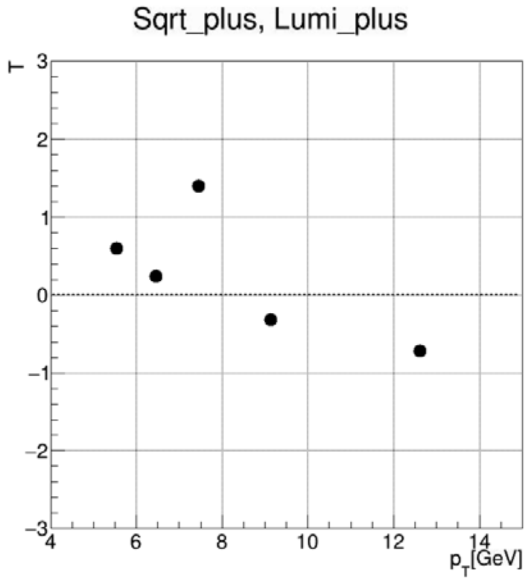
$$\sigma_{A_N} = |A_N| \sqrt{\left(\frac{\sigma_{A_N^{raw}}}{A_N^{raw}}\right)^2 + \left(\frac{\sigma_P}{P}\right)^2}$$

A_N - Formula Comparison (Averaged)







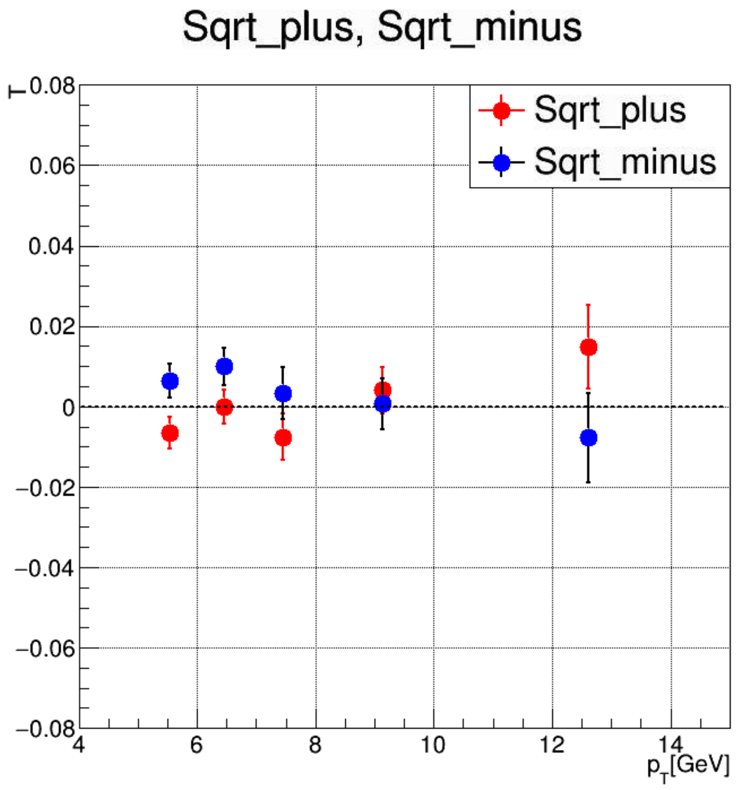


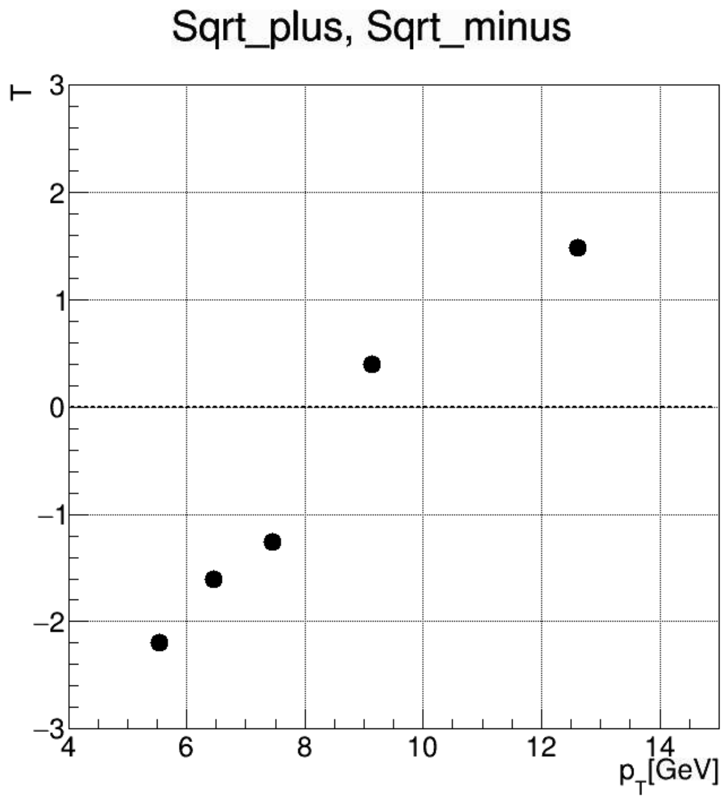
$$T(p_T) = \frac{A_N^{Sqrt} - A_N^{Lumi}}{\sqrt{|(\sigma^{Sqrt})^2 - (\sigma^{Lumi})^2|}}$$

No systematic error

Before background correction

A_N - Charge Comparison





$$T(p_T) = \frac{A_N^{\pi^-} - A_N^{\pi^+}}{\sqrt{\left|(\sigma^{\pi^-})^2 + (\sigma^{\pi^+})^2\right|}}$$

No systematic error

Before background correction

Hadron Background

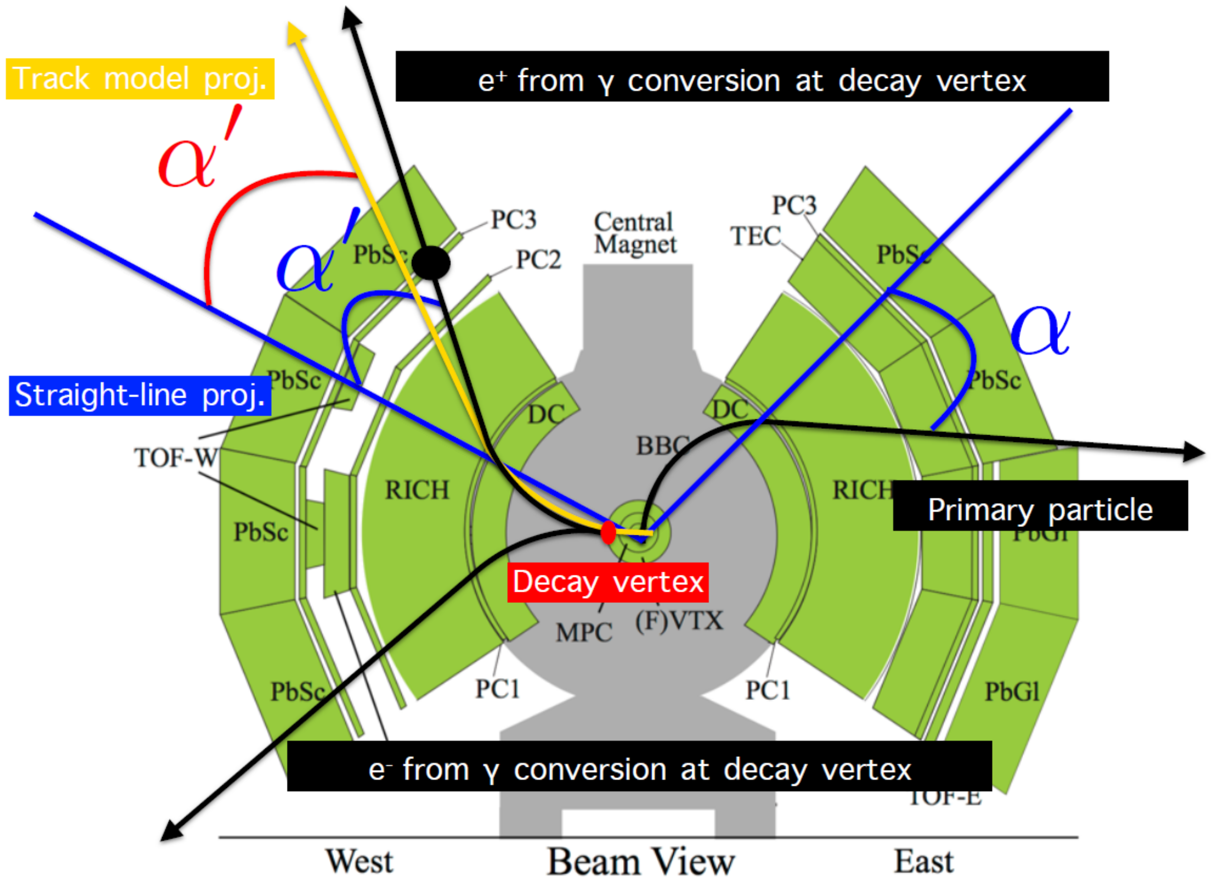
Tracks can be divided according to RICH response at 5 to 15 GeV/c.
Only electrons and pions can leave hits on the RICH PMT plane at 5 to 15 GeV/c but not for kaons and protons.
Pions below 5GeV/c do not create Cherenkov light and are therefore suppressed in the spectra.

Particle	Electron	Pion	Proton	Kaon
Threshold [GeV/c]	0.03	4.7	16	30

The energy threshold for the emission of Cherenkov radiation for each particle in the PHENIX RICH.

Electron Background

Electron deposits most of their energy in the EM shower and the EMCal can be used to determine the probability that the shape of cluster associated with the track is electro-magnetic.
So primary electron can easily be distinguished with the deposited energy/momentum and shower shape cuts from π±. (e/p < 0.8 cut)
The other background is secondary electron from photon conversion. (e/p < 0.2)



Background Subtraction

$$A_N^{\pi} = \frac{A_N^{\pi,\mathrm{Sig}}\frac{N^{\pi,\mathrm{Sig}}+N^{\pi,Bg}}{N^{\pi,Sig}} - A_N^{e,\mathrm{Sig}}\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,\mathrm{Sig}}+N^{e,Bg}}{N^{e,Sig}}}{1-\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Bg}}{N^{e,Sig}}}$$

$$\Delta A_N^{\pi} = \frac{\sqrt{[\Delta A_N^{\pi,\mathrm{Sig}}\frac{N^{\pi,\mathrm{Sig}}+N^{\pi,Bg}}{N^{\pi,Sig}}]^2 - [\Delta A_N^{e,\mathrm{Sig}}\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,\mathrm{Sig}}+N^{e,Bg}}{N^{e,Sig}}]^2}}{1-\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Bg}}{N^{e,Sig}}}$$

$A_N^{\pi,\mathrm{Sig}}$: Asymmetry in the pion enhanced sample

$A_N^{e,\mathrm{Sig}}$: Asymmetry in the electrons enhanced sample

$N^{\pi,\mathrm{Sig}}$: Signal (pions) yields in the pion enhanced sample

$N^{\pi,Bg}$: background (electrons) yields in the pion enhanced sample

$N^{e,\mathrm{Sig}}$: Signal (electrons) yields in the electrons enhanced sample

$N^{e,Bg}$: background (pions) yields in the electrons enhanced sample

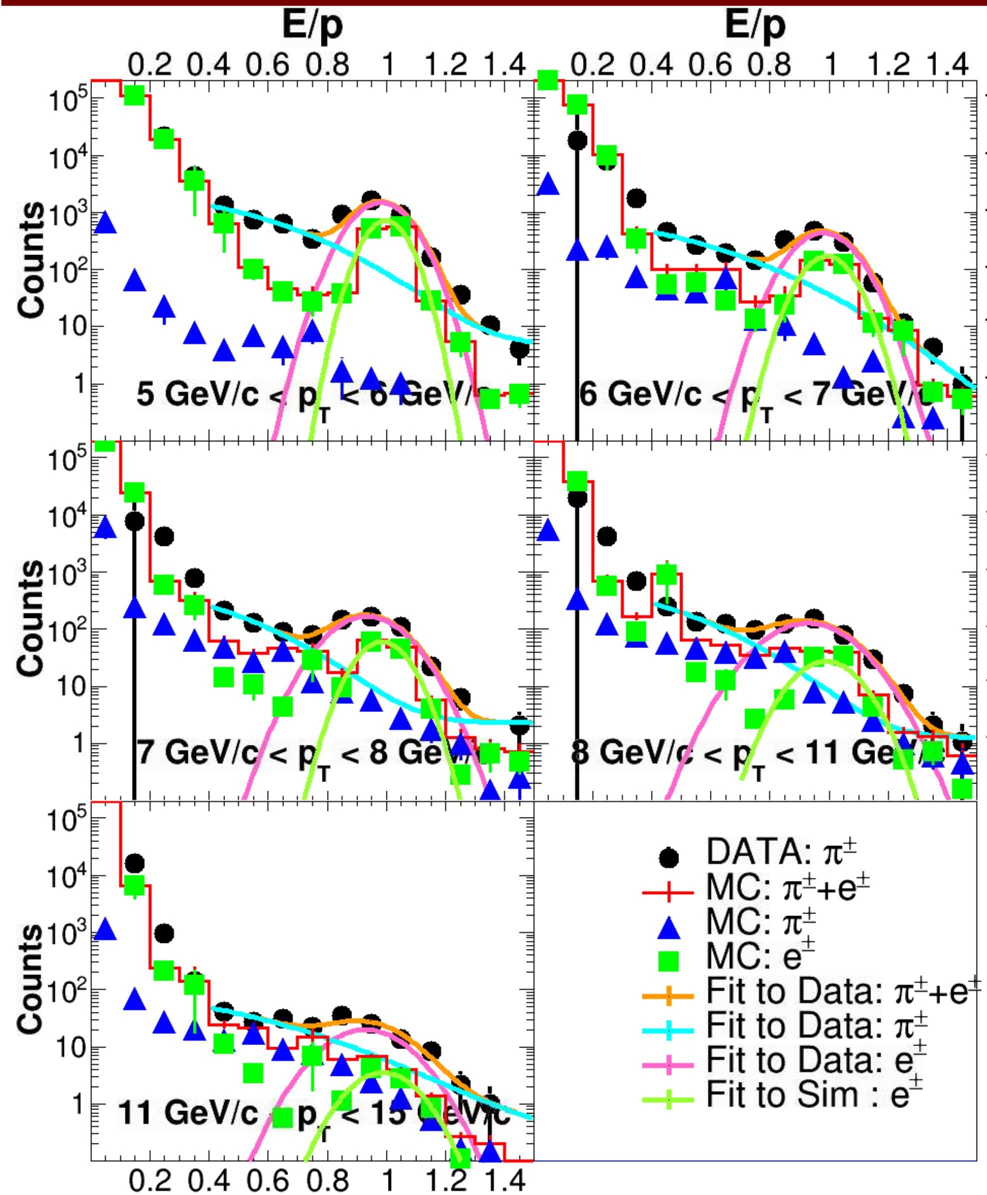
$\frac{N^{\pi,Bg}}{N^{\pi,Sig}}$: Background Fraction in the pions enhanced sample

from $$BF_{pion-sample} = \frac{A^e_{DATA(E/p\sim 1)}}{A^e_{MC_{lumi\_scaled}(E/p\sim 1)}} \times \frac{N^e_{MC_{lumi\_scaled}}}{N^{\pi+e}_{DATA}}$$

$\frac{N^{e,Bg}}{N^{e,Sig}}$: Background Fraction in the electrons enhanced sample

from $$BF_{electron-sample} = \frac{A^e_{DATA(E/p\sim 1)}}{A^e_{MC_{lumi\_scaled}(E/p\sim 1)}} \times \frac{N^{\pi}_{MC_{lumi\_scaled}}}{N^{e+\pi}_{DATA}}$$

electron enhanced sample



$$BF_{electron-sample} = \frac{A^{e}_{DATA(E/p\sim1)}}{A^{e}_{MC_{lumi\_scaled}(E/p\sim1)}} \times \frac{N^{\pi}_{MC_{lumi\_scaled}}}{N^{e+\pi}_{DATA}}$$

A^{e}_{DATA} , A^{e}_{MC} = Amplitude of the Gaussian centered at around one in the data and the luminosity scaled MC simulation, respectively.

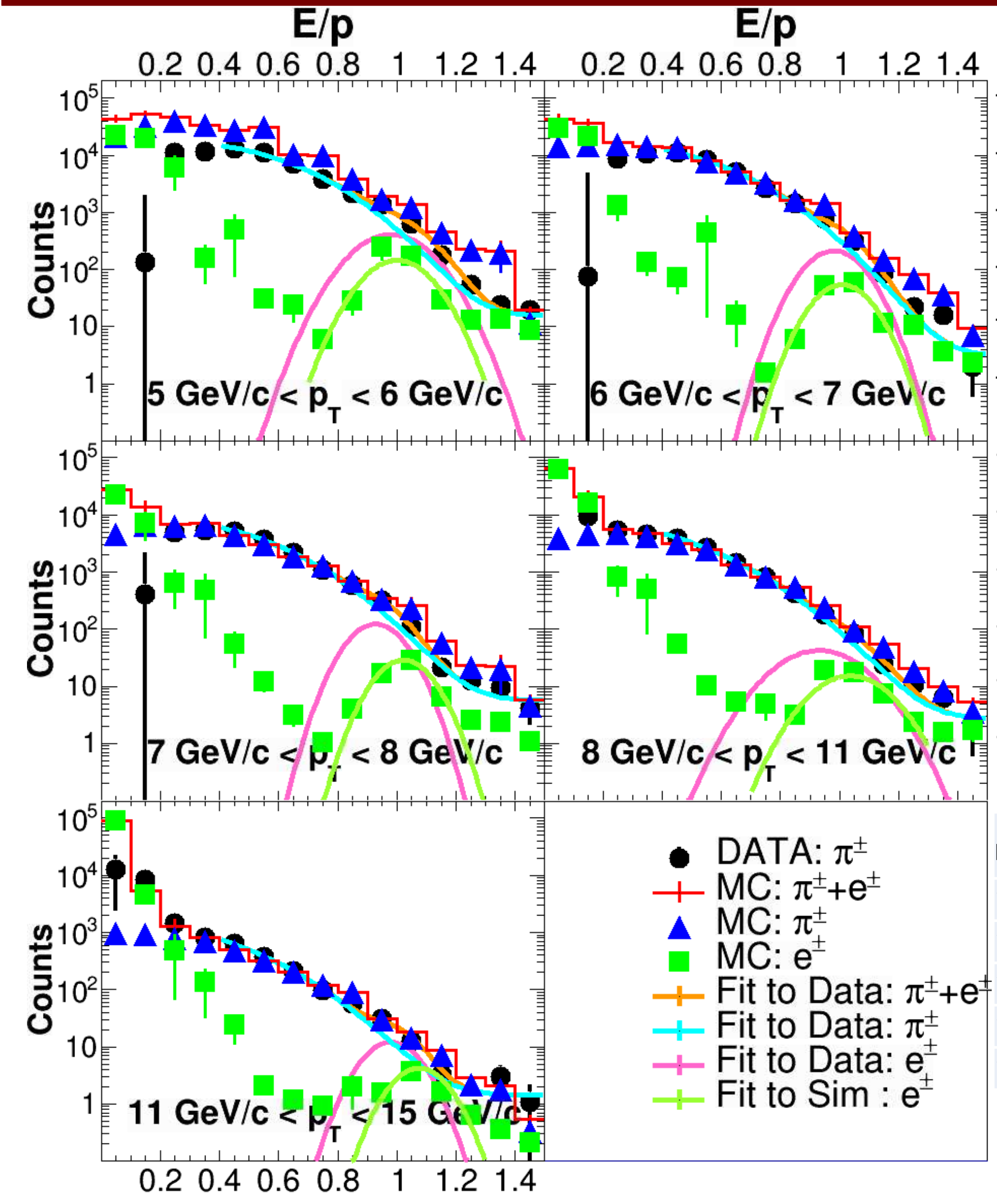
N^{π}_{MC} , $N^{e+\pi}_{Data}$ = Number of entries in the E/p distributions for the data and the luminosity scaled MC simulation in electron enhanced sample, respectively.

- $e^{\pm}$ Identication Cuts

I. $|BBCZ| < 30\ (cm)$
II. 5 < pT < 15 (GeV/c)
III. quality == 31 or 63
IV. $|DCZed| < 70\ (cm)$
V. $0.2 < emce/p < 0.8$
VI. $Shower\ shape\ (prob) < 0.1$
VII. RICH n1 >0
VIII. RICH n1 >0
IX. χ^2/npe0 < 7

pt	# of (e+pion) from DATA	# of pion from MC	Scale Factor (A^{e}_{DATA} / A^{e}_{MC})	Yield Ratio (N^{π}_{MC} / $N^{e+\pi}_{Data}$)	Background Fraction (SF * YR)
ipt = 0	4019.03	12.7689	2.05193	0.00317711	0.00651921
ipt = 1	1337.77	34.2026	2.56915	0.0255669	0.0656852
ipt = 2	533.019	31.5627	2.7807	0.0592149	0.164659
ipt = 3	490.187	90.5127	4.63595	0.184649	0.856026
ipt = 4	107.262	17.3898	5.66107	0.162125	0.917798

pion enhanced sample



$$BF_{pion-sample} = \frac{A^{e}_{DATA(E/p\sim1)}}{A^{e}_{MC_{lumi\_scaled}(E/p\sim1)}} \times \frac{N^{e}_{MC_{lumi\_scaled}}}{N^{\pi+e}_{DATA}}$$

A^e_{DATA} , A^e_{MC} = Amplitude of the Gaussian centered at around one in the data and the luminosity scaled MC simulation, respectively.

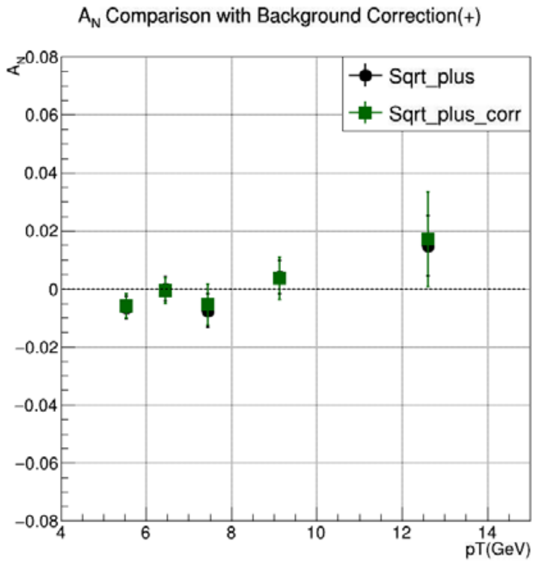
N^e_{MC} , $N^{\pi+e}_{Data}$ = Number of entries in the E/p distributions for the data and the luminosity scaled MC simulation in pion enhanced sample, respectively.

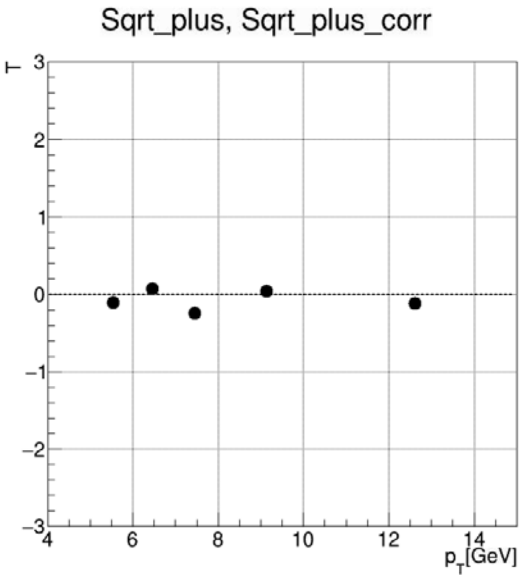
- $\pi^{\pm}$ Identication Cuts

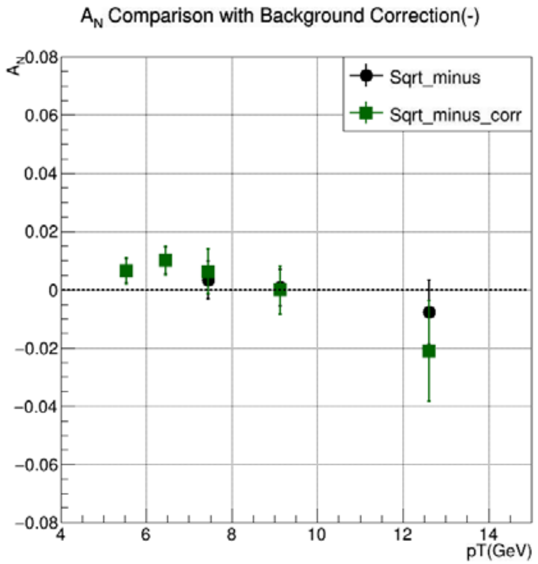
I. 2 < pT < 25 (GeV/c)
II. quality == 31 or 63
III. n1 >0
IV. $|BBCZ|<30\ (cm)$
V. $|DCZed| < 70\ (cm)$
VI. $Shower\ shape\ (prob) < 0.1$
VII. 0.2 < $emce/p$ < 0.8 sect > -9000

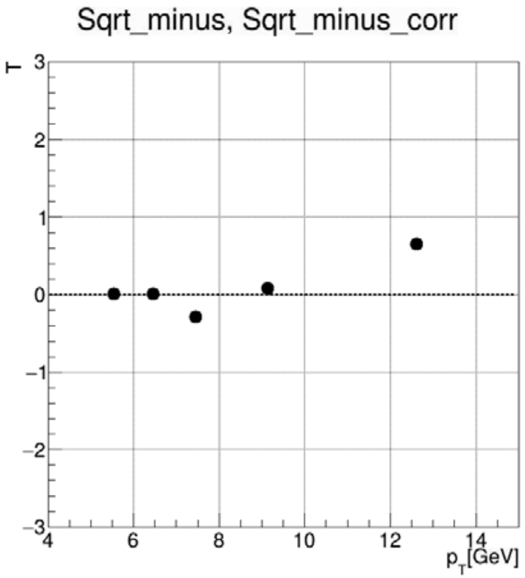
pt	# of (pion+e) from DATA	# of e from MC	Scale Factor (A^e_{DATA} / A^e_{MC})	Yield Ratio (N^e_{MC} / $N^{\pi+e}_{Data}$)	Background Fraction (SF * YR)
ipt = 0	46616.1	719.182	2.82673	0.0154278	0.0436101
ipt = 1	37940.2	663.398	3.93669	0.0174854	0.0688345
ipt = 2	17478.8	561.302	4.28138	0.0321134	0.13749
ipt = 3	13375	573.414	2.77953	0.0428722	0.119165
ipt = 4	2135.54	160.411	2.86723	0.0751151	0.215372

Compare before/after background correction







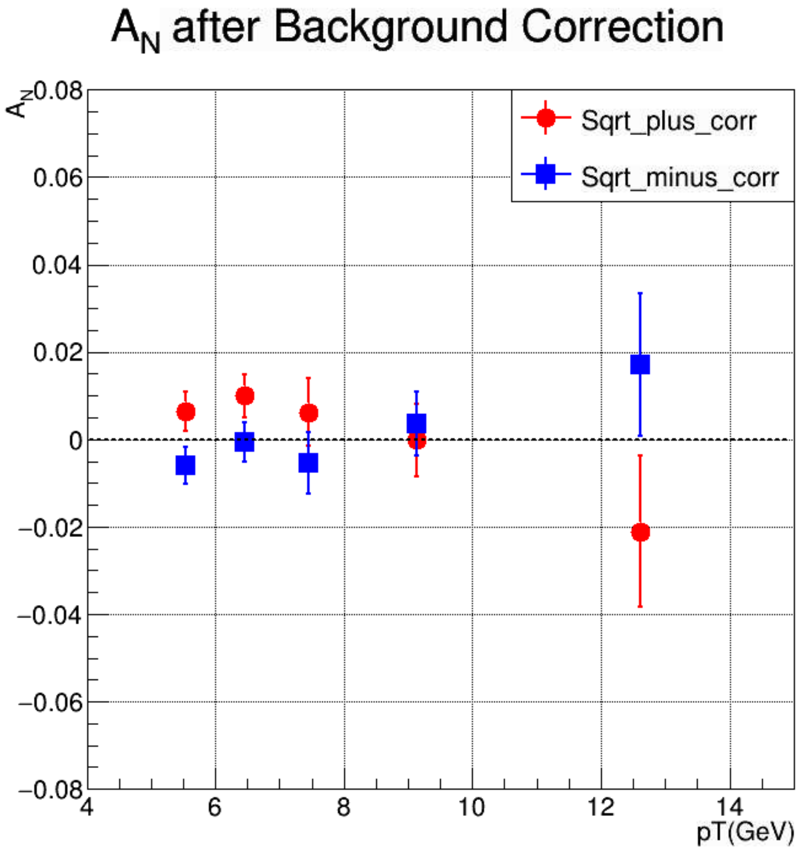


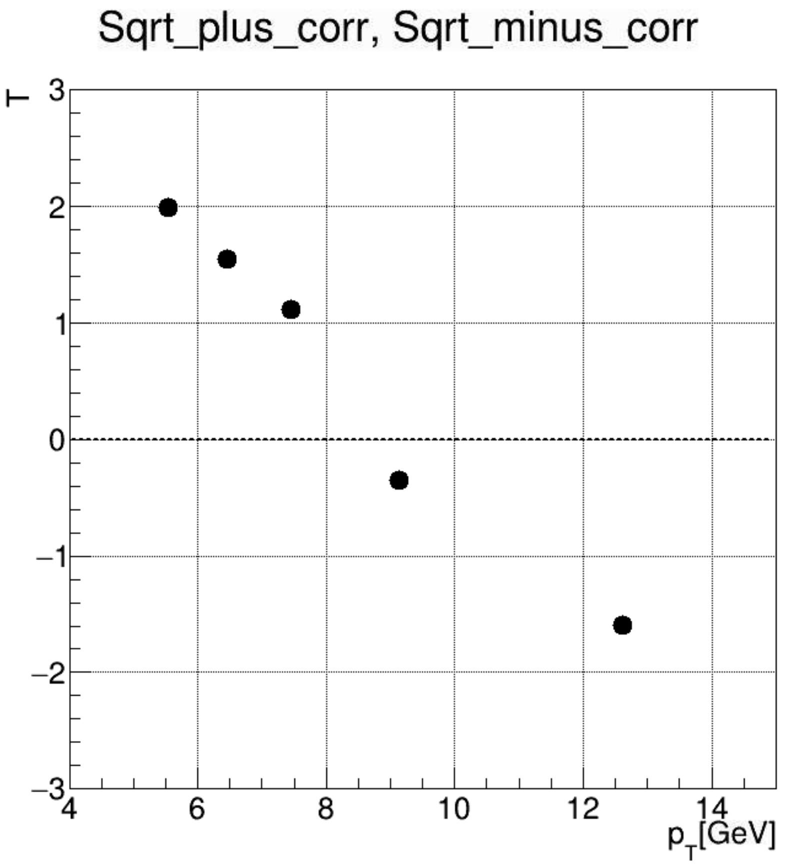
$$T(p_T) = \frac{A_N^{Sqrt} - A_N^{Lumi}}{\sqrt{|(\sigma^{Sqrt})^2 - (\sigma^{Lumi})^2|}}$$

No systematic error

After background correction

T-test for charge after background correction



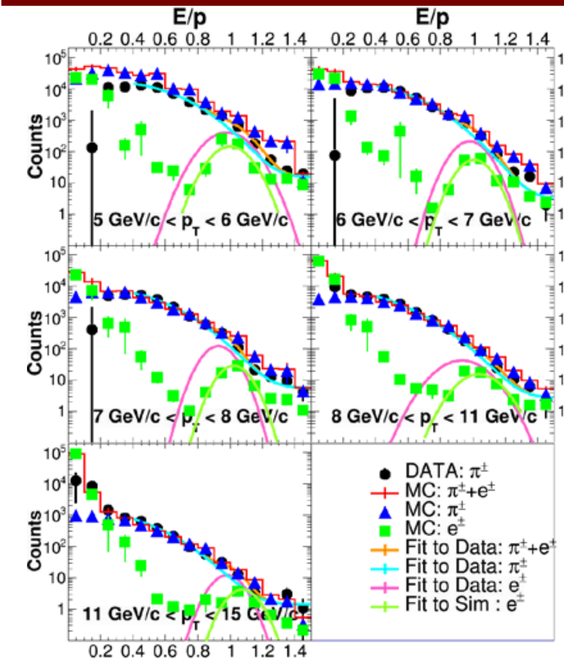


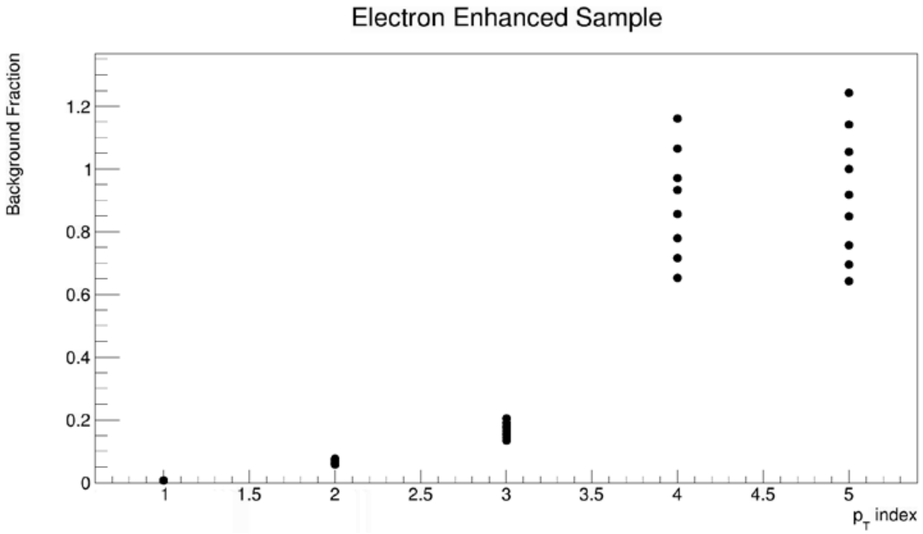
$$T(p_T) = \frac{A_N^{\pi^-} - A_N^{\pi^+}}{\sqrt{\left|(\sigma^{\pi^-})^2 + (\sigma^{\pi^+})^2\right|}}$$

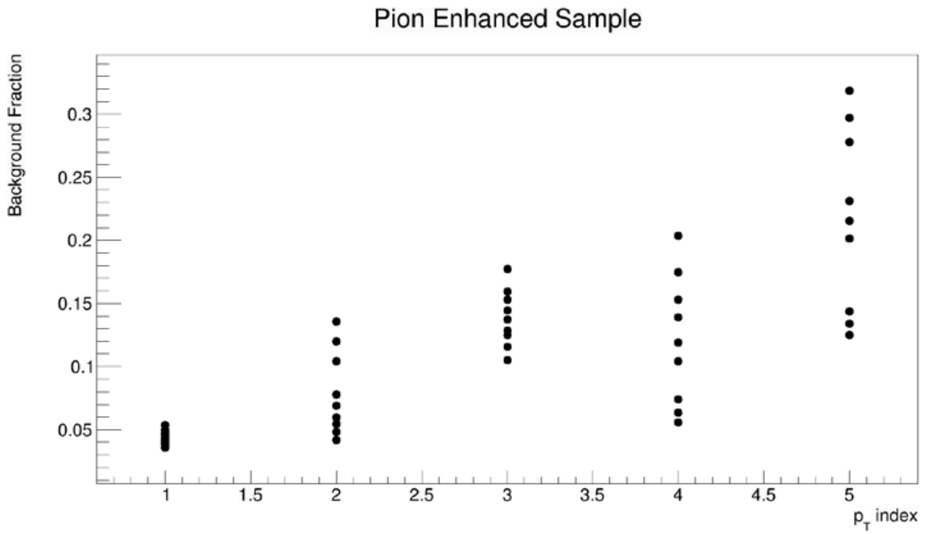
No systematic error

Before background correction

Background_Fraction calculation







$$BF_{pion-sample} = \frac{A^e_{DATA(E/p\sim1)}}{A^e_{MC_{lumi\_scaled}(E/p\sim1)}} \times \frac{N^e_{MC_{lumi\_scaled}}}{N^{\pi+e}_{DATA}}$$

ScaleFactor for sys_unc.

$$\text{ScaleFactor}=\frac{Gaus\_amp_{data}+C\times Gaus\_amp\_err_{data}}{Gaus\_amp_{MC}+D\times Gaus\_amp\_err_{MC}}$$

where C, D = {-1,0,1}

BgkFrac = ScaleFactor * YieldRatio;

Background Fraction

$\frac{N^{\pi,Bg}}{N^{\pi,Sig}}$: Background Fraction in the pions enhanced sample

$\frac{N^{e,Bg}}{N^{e,Sig}}$: Background Fraction in the electrons enhanced sample

Background Subtraction

$$A_N^\pi = \frac{A_N^{\pi,Sig}\frac{N^{\pi,Sig}+N^{\pi,Bg}}{N^{\pi,Sig}} - A_N^{e,Sig}\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Sig}+N^{e,Bg}}{N^{e,Sig}}}{1-\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Bg}}{N^{e,Sig}}}$$

$$\Delta A_N^\pi = \frac{\sqrt{[\Delta A_N^{\pi,Sig}\frac{N^{\pi,Sig}+N^{\pi,Bg}}{N^{\pi,Sig}}]^2 - [\Delta A_N^{e,Sig}\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Sig}+N^{e,Bg}}{N^{e,Sig}}]^2}}{1-\frac{N^{\pi,Bg}}{N^{\pi,Sig}}\frac{N^{e,Bg}}{N^{e,Sig}}}$$

Sys_Background_Fraction

pion_min

	pt	pion_bgkfrac	elec_bgkfrac	A_N	A_N_error
-	0	3.583.E-02	6.519.E-03	6.356.E-03	4.494.E-03
	1	4.189.E-02	6.569.E-02	9.972.E-03	4.841.E-03
	2	1.049.E-01	1.647.E-01	5.538.E-03	7.394.E-03
	3	5.568.E-02	8.560.E-01	2.882.E-04	7.161.E-03
	4	1.252.E-01	9.178.E-01	-1.473.E-02	1.430.E-02
+	0	3.583.E-02	6.519.E-03	-6.065.E-03	4.174.E-03
	1	4.189.E-02	6.569.E-02	-3.943.E-04	4.450.E-03
	2	1.049.E-01	1.647.E-01	-5.880.E-03	6.632.E-03
	3	5.568.E-02	8.560.E-01	3.893.E-03	6.338.E-03
	4	1.252.E-01	9.178.E-01	1.604.E-02	1.343.E-02

pion_max

	pt	pion_bgkfrac	elec_bgkfrac	A_N	A_N_error
-	0	5.358.E-02	6.519.E-03	6.326.E-03	4.581.E-03
	1	1.358.E-01	6.569.E-02	9.934.E-03	5.464.E-03
	2	1.775.E-01	1.647.E-01	7.100.E-03	8.188.E-03
	3	2.037.E-01	8.560.E-01	-9.079.E-04	9.989.E-03
	4	3.187.E-01	9.178.E-01	-3.012.E-02	2.192.E-02
+	0	5.358.E-02	6.519.E-03	-5.818.E-03	4.255.E-03
	1	1.358.E-01	6.569.E-02	-1.052.E-03	5.040.E-03
	2	1.775.E-01	1.647.E-01	-4.702.E-03	7.376.E-03
	3	2.037.E-01	8.560.E-01	3.384.E-03	8.985.E-03
	4	3.187.E-01	9.178.E-01	1.864.E-02	2.079.E-02

$$\varepsilon_\pi = (A_N^{\pi^{max}} - A_N^{\pi^{min}})/2$$
$$\varepsilon_e = (A_N^{e^{max}} - A_N^{e^{min}})/2$$
$$\sigma_{syst,bg\_frac} = \sqrt{(\varepsilon_\pi)^2+(\varepsilon_e)^2}$$

elec_min

	pt	pion_bgkfrac	elec_bgkfrac	A_N	A_N_error
-	0	4.361.E-02	5.710.E-03	6.343.E-03	4.532.E-03
	1	6.883.E-02	5.732.E-02	9.961.E-03	5.001.E-03
	2	1.375.E-01	1.350.E-01	6.150.E-03	7.694.E-03
	3	1.192.E-01	6.518.E-01	-7.106.E-05	7.956.E-03
	4	2.154.E-01	6.421.E-01	-1.834.E-02	1.603.E-02
+	0	4.361.E-02	5.710.E-03	-5.957.E-03	4.209.E-03
	1	6.883.E-02	5.732.E-02	-5.782.E-04	4.600.E-03
	2	1.375.E-01	1.350.E-01	-5.419.E-03	6.913.E-03
	3	1.192.E-01	6.518.E-01	3.740.E-03	7.071.E-03
	4	2.154.E-01	6.421.E-01	1.665.E-02	1.510.E-02

elec_max

	pt	pion_bgkfrac	elec_bgkfrac	A_N	A_N_error
-	0	4.361.E-02	7.535.E-03	6.343.E-03	4.532.E-03
	1	6.883.E-02	7.579.E-02	9.961.E-03	5.009.E-03
	2	1.375.E-01	2.037.E-01	6.348.E-03	7.795.E-03
	3	1.192.E-01	1.160.E+00	-3.630.E-04	8.641.E-03
	4	2.154.E-01	1.243.E+00	-2.481.E-02	1.923.E-02
+	0	4.361.E-02	7.535.E-03	-5.956.E-03	4.209.E-03
	1	6.883.E-02	7.579.E-02	-5.871.E-04	4.607.E-03
	2	1.375.E-01	2.037.E-01	-5.269.E-03	7.007.E-03
	3	1.192.E-01	1.160.E+00	3.616.E-03	7.712.E-03
	4	2.154.E-01	1.243.E+00	1.775.E-02	1.819.E-02

	pt	σ_{syst,bg_frac}
-	0	1.509.E-05
	1	1.871.E-05
	2	7.875.E-04
	3	6.156.E-04
	4	8.349.E-03
+	0	1.236.E-04
	1	3.289.E-04
	2	5.937.E-04
	3	2.622.E-04
	4	1.412.E-03

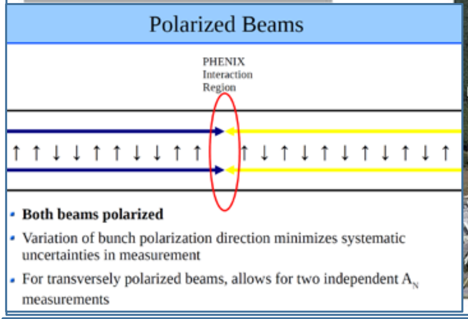
$$\text{ScaleFactor} = \frac{Gaus\_amp_{data} + C \times Gaus\_amp\_err_{data}}{Gaus\_amp_{MC} + D \times Gaus\_amp\_err_{MC}}$$ where C, D = {-1,0,1}

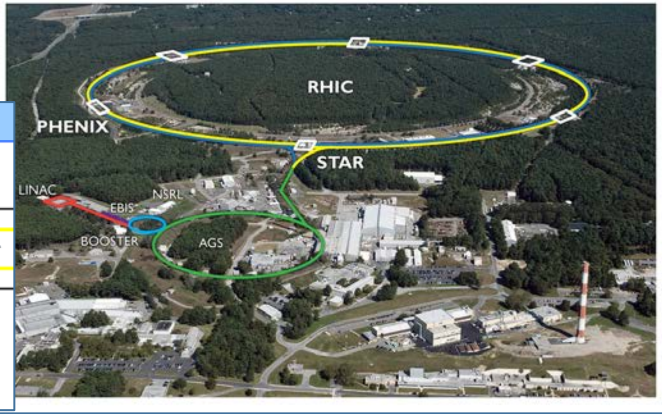
Where C =1 and D = -1 ---> max
Where C =-1 and D = 1 ---> max

Bunch shuffling

```
spin_blue[ cross ] ==  1 && spin_yellow[ cross ] ==  1 ) { //B down, Y down }
else if ( spin_blue[ cross ] ==  1 && spin_yellow[ cross ] == -1 ) { //B down, Y up   }
else if ( spin_blue[ cross ] == -1 && spin_yellow[ cross ] ==  1 ) { //B up,   Y down }
else if ( spin_blue[ cross ] == -1 && spin_yellow[ cross ] == -1 ) { //B up,   Y up   }
```

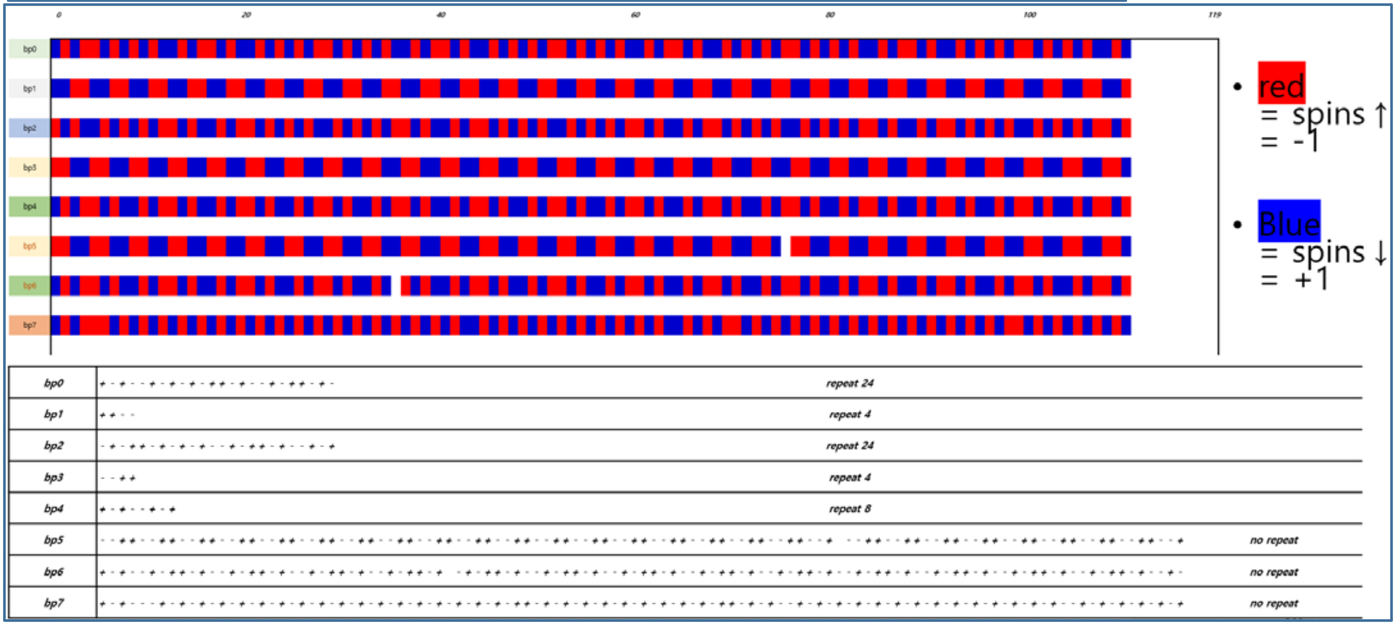
Blue = Clockwise
Yellow = Anti - Clockwise





Bunch shuffling : For each fill, the polarization directions of each crossing are randomized, and the asymmetry is calculated using the fill group method.

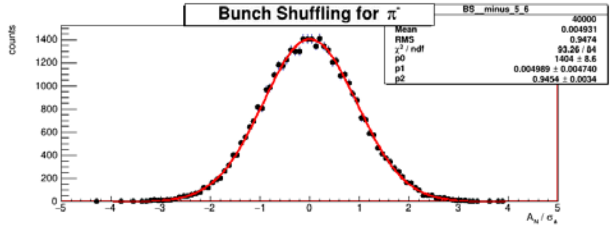
It involves randomizing the polarization directions of the beam such that the physics asymmetry disappears and all that is left are the statistical fluctuations present in the data.

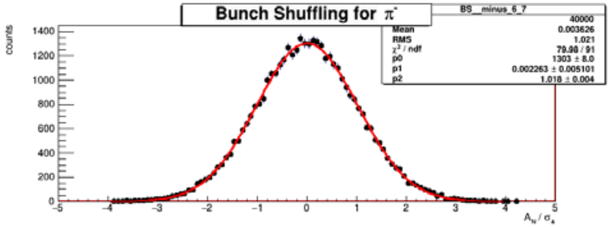


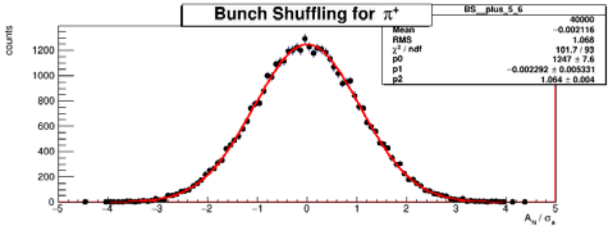
Pattern of each fillnumber (example)

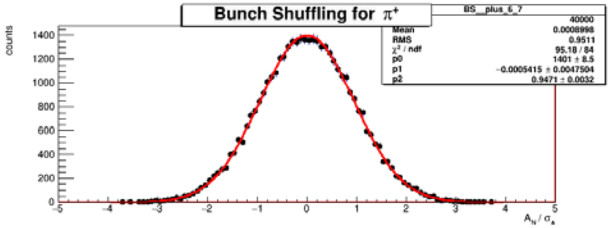
RunNumber	FillNumber	Crossing shift	# of pattern
430024	18893	5	1
430116	18894	5	7
430117	18894	5	7
430120	18894	5	7
430123	18894	5	7
430124	18894	5	7
430125	18894	5	7
430128	18894	5	7
430131	18894	5	7
430133	18895	5	3
430134	18895	5	3
430141	18895	5	3
430142	18895	5	3
430143	18895	5	3
430234	18897	5	8
430235	18897	5	8
430236	18897	5	8

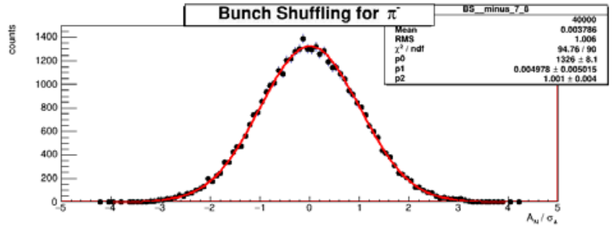
Sys. Unc. From Bunch shuffling

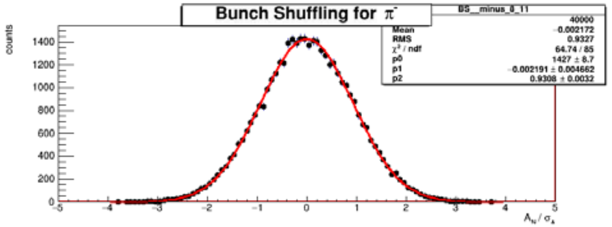


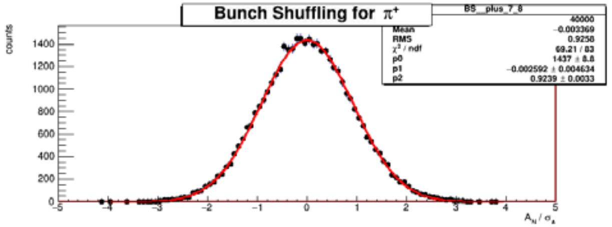


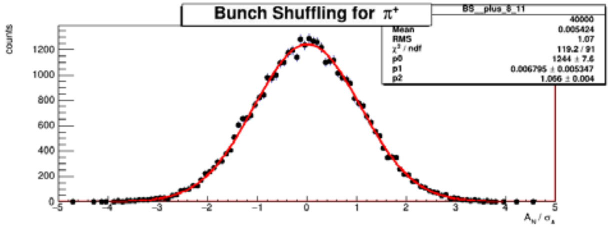


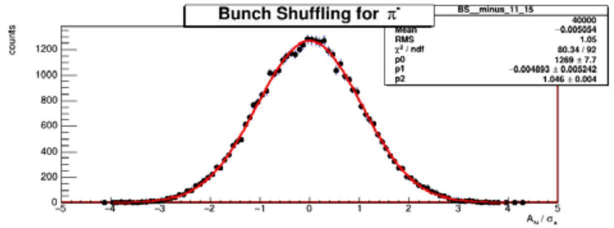




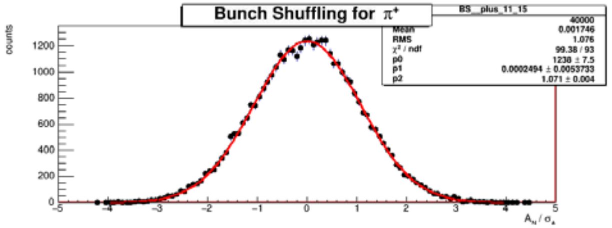








charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	4.99.E-03	0.945	0.0546
	6~7	2.26.E-03	1.018	-0.0183
	7~8	4.98.E-03	1.001	-0.0006
	8~11	-2.19.E-03	0.931	0.0692
	11~15	-4.89.E-03	1.046	-0.0459



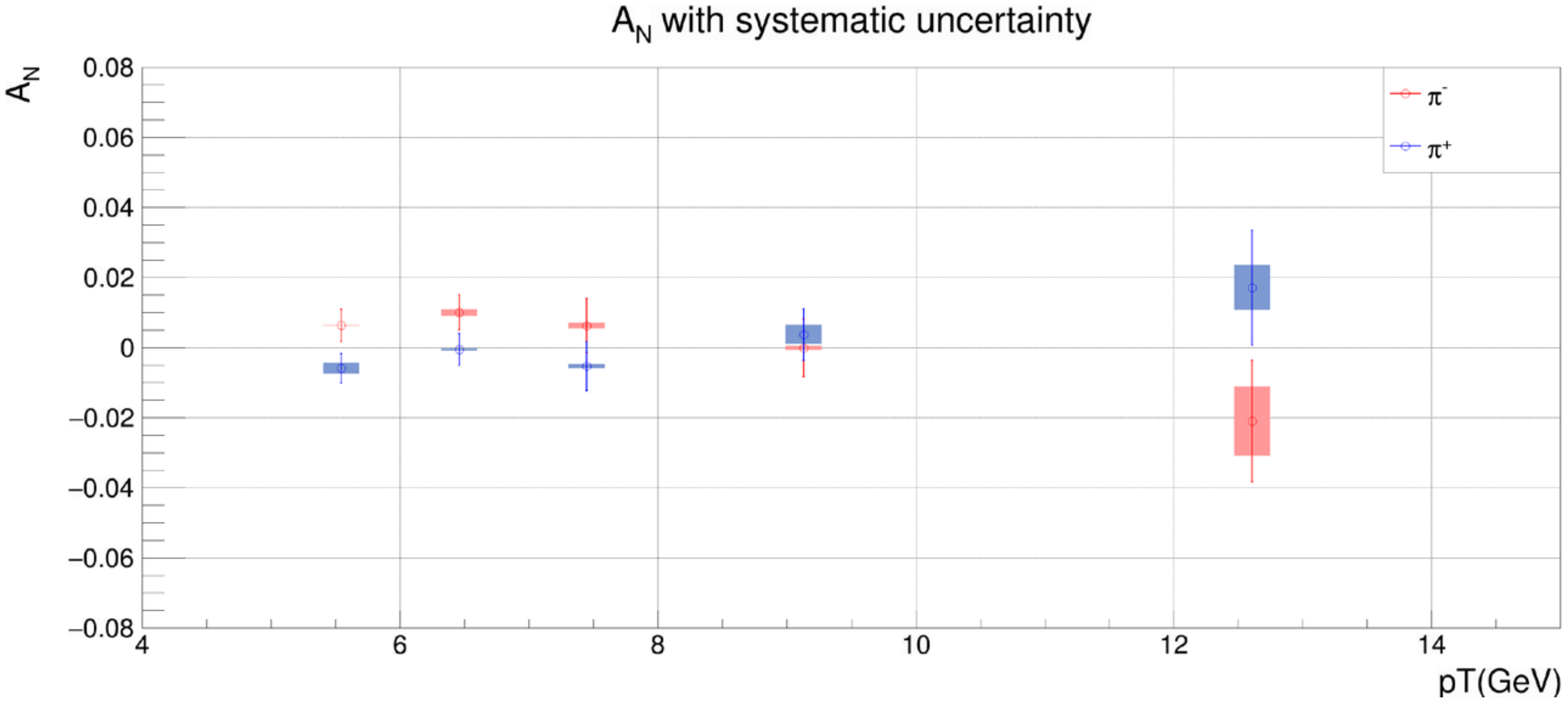
charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-2.29.E-03	1.064	-0.0635
	6~7	-5.41.E-04	0.947	0.0529
	7~8	-2.59.E-03	0.924	0.0761
	8~11	6.79.E-03	1.066	-0.0657
	11~15	2.49.E-04	1.071	-0.0713

Sys. Unc. From Bunch shuffling

Ex) $1.018\,\sigma_{stat} = \sqrt{(\sigma_{stat})^2+(\sigma_{syst})^2}$ for π^- 6~7 pt bin.

$$\sigma_{stat} = \sqrt{(1.018)^2-(1)^2} \approx 0.000954$$

A_N with Systematic Uncertainty

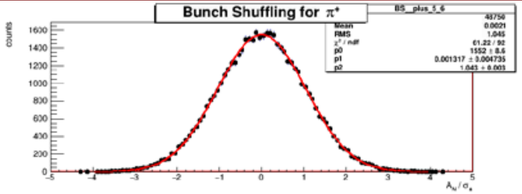


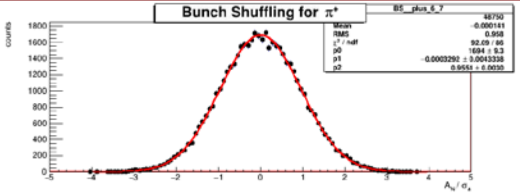
	pt	<pt> in GeV/c	A_N (10^{-3})	Stat. (10^{-3})	Syst. (bg frraction) (10^{-3})	Syst. (bunch shuffling) (10^{-3})	Syst. (total) (10^{-3})
-	5~6	5.56	6.34	4.53	0.015		0.015
	6~7	6.46	9.96	5	0.019	0.954	0.954
	7~8	7.45	6.23	7.74	0.788	0.346	0.860
	8~11	9.08	-0.18	8.22	0.616		0.616
	11~15	12.42	-21.05	17.36	8.349	5.326	9.903
+	5~6	5.56	-5.96	4.21	0.124	1.530	1.535
	6~7	6.46	-0.58	4.6	0.329		0.329
	7~8	7.45	-5.35	6.95	0.594		0.594
	8~11	9.08	3.69	7.31	0.262	2.701	2.714
	11~15	12.42	17.11	16.38	1.412	6.280	6.437

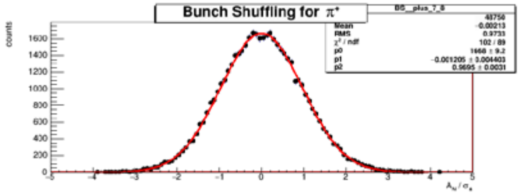
Back up

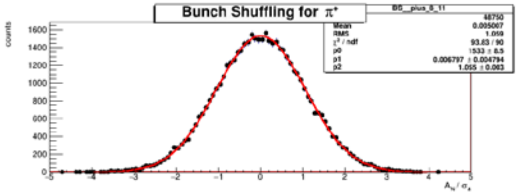
π^+

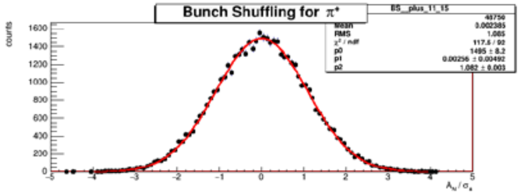
No e/p && scgl





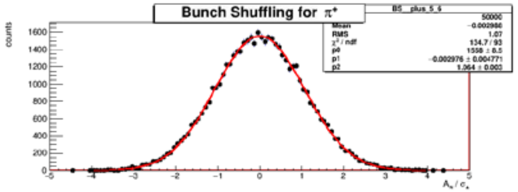


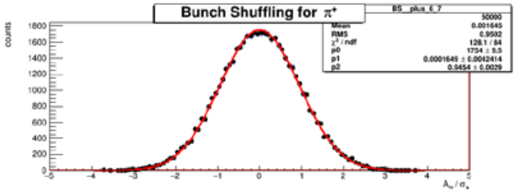


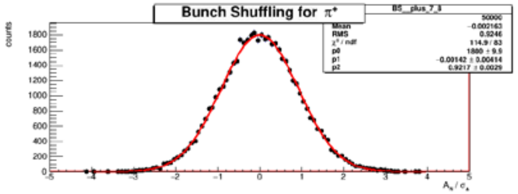


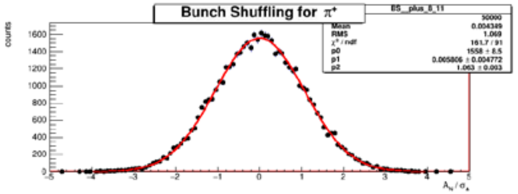
charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-5.54.E-04	1.043	-0.043
	6~7	1.60.E-03	0.955	0.045
	7~8	-5.22.E-03	0.969	0.031
	8~11	6.00.E-03	1.055	-0.055
	11~15	4.14.E-03	1.082	-0.082

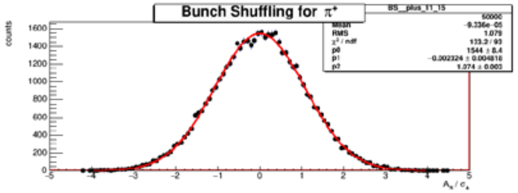
No e/p && sc





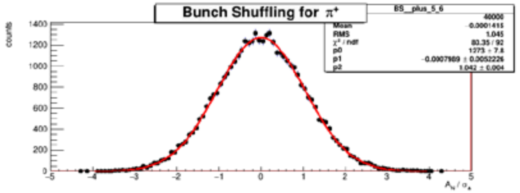


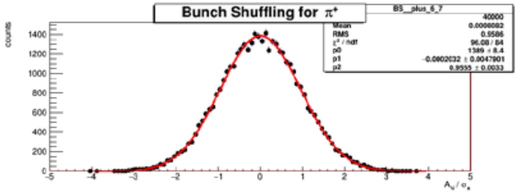


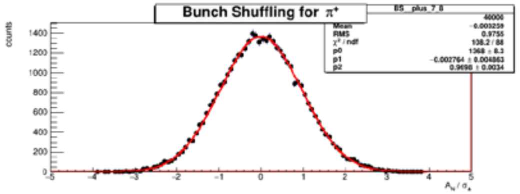


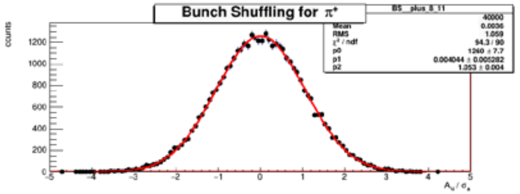
charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-2.98.E-03	1.064	-0.0639
	6~7	1.65.E-04	0.945	0.0546
	7~8	-1.42.E-03	0.922	0.0783
	8~11	5.81.E-03	1.063	-0.0634
	11~15	-2.32.E-03	1.074	-0.0735

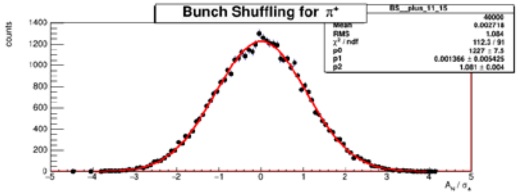
e/p && scgl





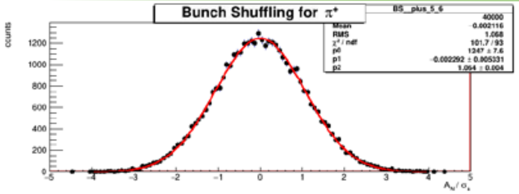


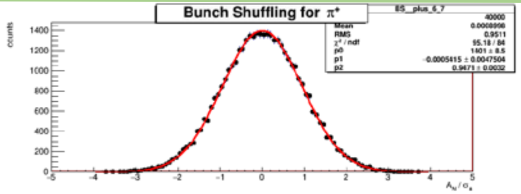


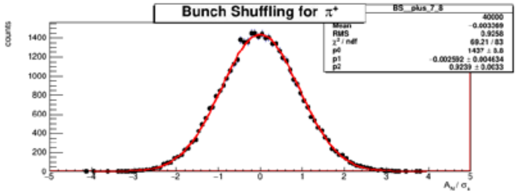


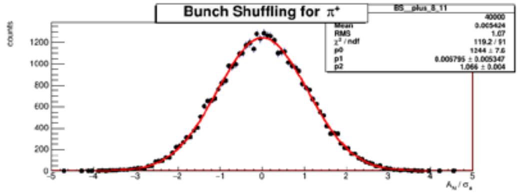
charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-7.99.E-04	1.042	-0.042
	6~7	-2.03.E-04	0.955	0.045
	7~8	-2.76.E-03	0.970	0.030
	8~11	4.04.E-03	1.053	-0.053
	11~15	1.37.E-03	1.081	-0.081

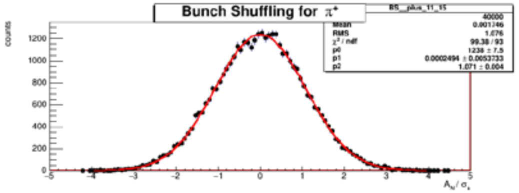
e/p && sc







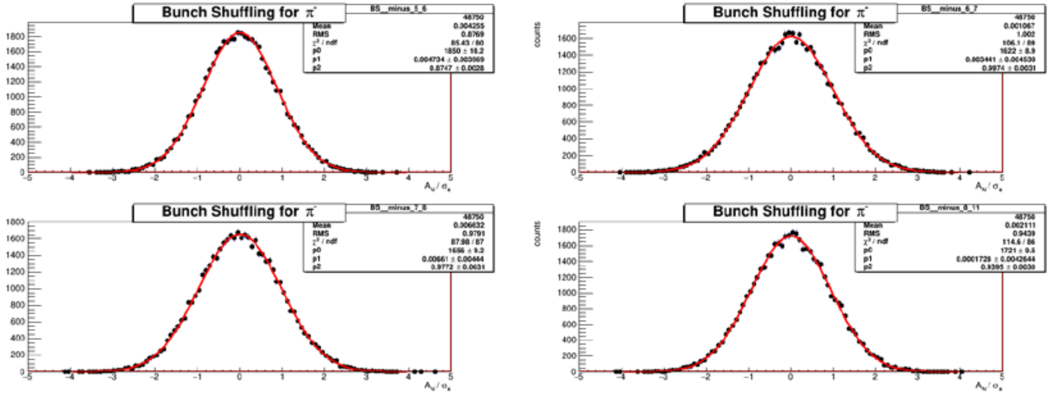


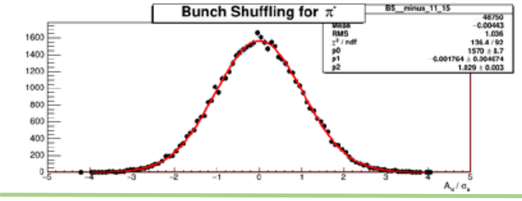


charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-2.29.E-03	1.064	-0.0635
	6~7	-5.41.E-04	0.947	0.0529
	7~8	-2.59.E-03	0.924	0.0761
	8~11	6.79.E-03	1.066	-0.0657
	11~15	2.49.E-04	1.071	-0.0713

π⁻

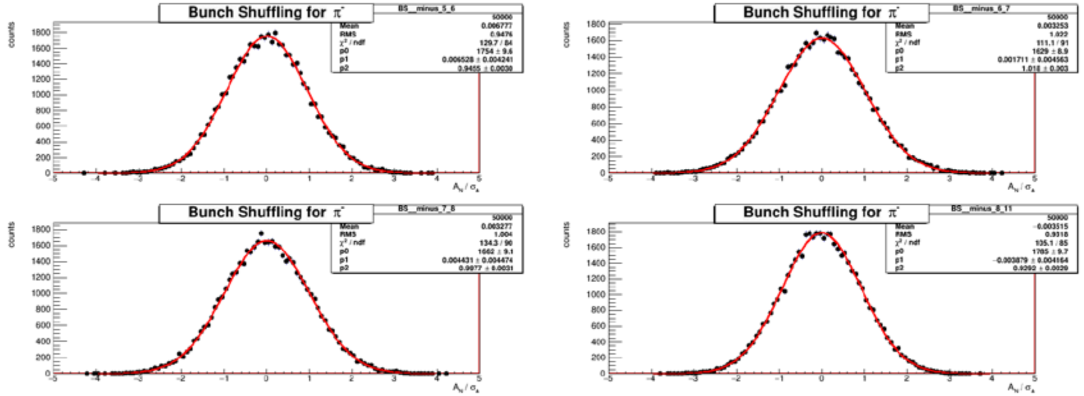
No e/p && scgl

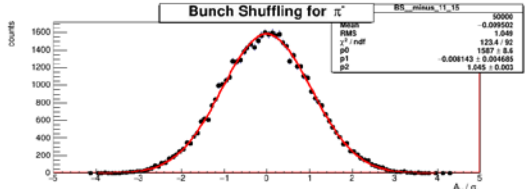




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	2.99.E-03	0.875	0.125
	6~7	3.47.E-03	0.997	0.003
	7~8	4.90.E-03	0.977	0.023
	8~11	-1.43.E-03	0.940	0.060
	11~15	-7.09.E-03	1.029	-0.029

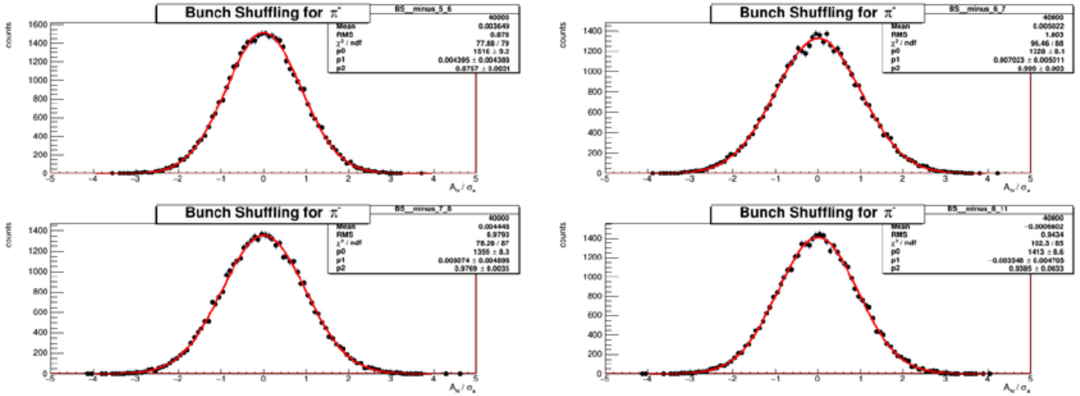
No e/p && sc

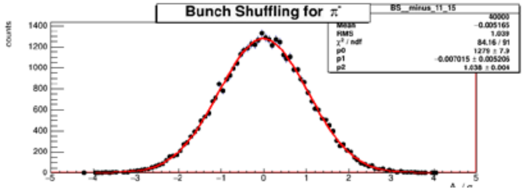




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	6.53.E-03	0.945	0.0545
	6~7	1.71.E-03	1.018	-0.0182
	7~8	4.43.E-03	0.998	0.0023
	8~11	-3.88.E-03	0.929	0.0708
	11~15	-8.14.E-03	1.045	-0.0448

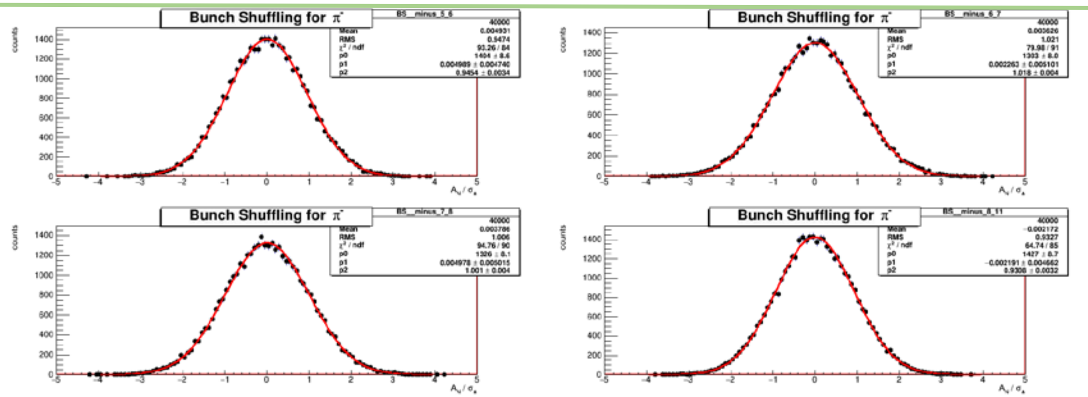
e/p && scgl

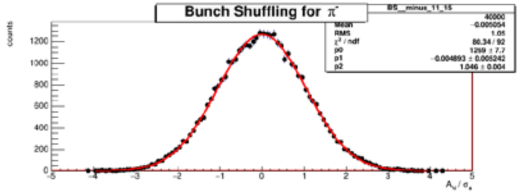




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	4.39.E-03	0.876	0.124
	6~7	7.02.E-03	0.999	0.001
	7~8	5.07.E-03	0.977	0.023
	8~11	-3.55.E-03	0.938	0.062
	11~15	-7.01.E-03	1.038	-0.038

e/p && sc

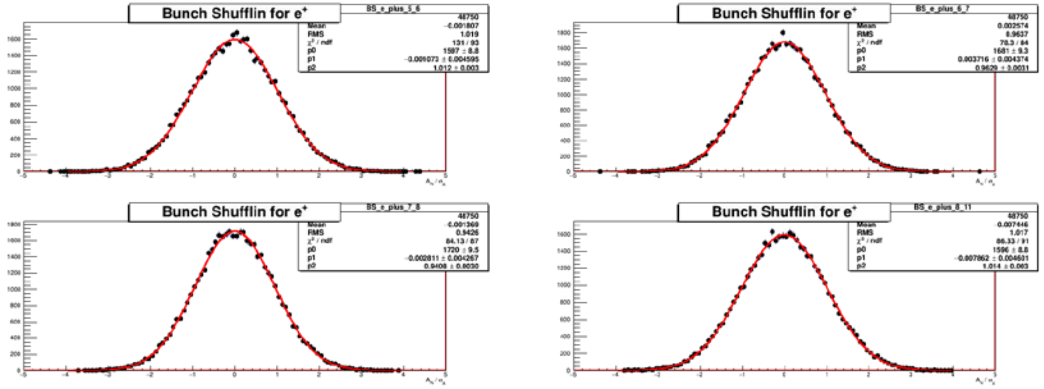


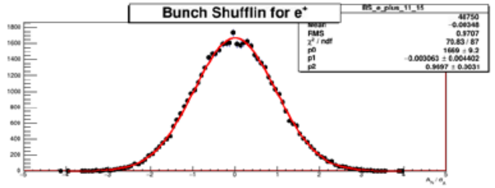


charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	4.99.E-03	0.945	0.0546
	6~7	2.26.E-03	1.018	-0.0183
	7~8	4.98.E-03	1.001	-0.0006
	8~11	-2.19.E-03	0.931	0.0692
	11~15	-4.89.E-03	1.046	-0.0459

e^+

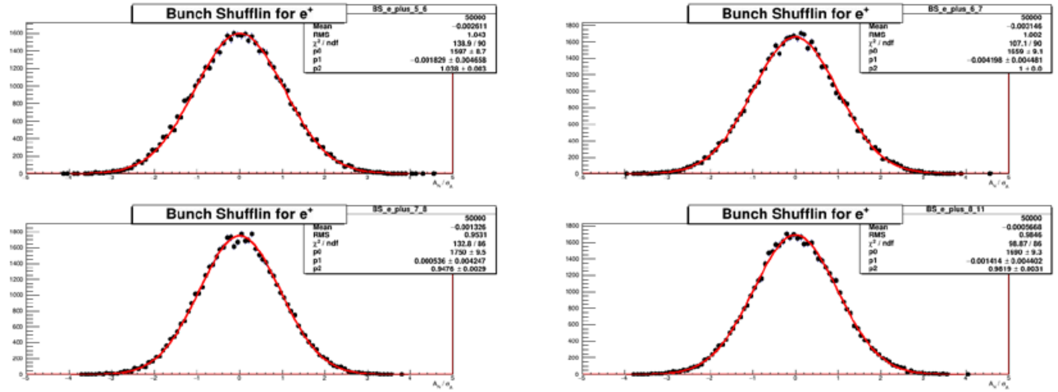
No e/p && scgl

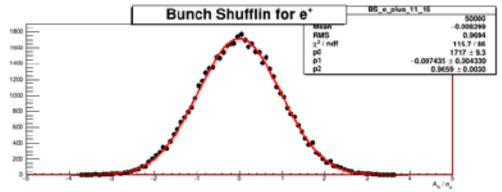




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-3.75.E-04	1.012	-0.012
	6~7	-4.27.E-04	0.963	0.037
	7~8	8.62.E-05	0.941	0.059
	8~11	-4.18.E-03	1.014	-0.014
	11~15	-3.43.E-03	0.970	0.030

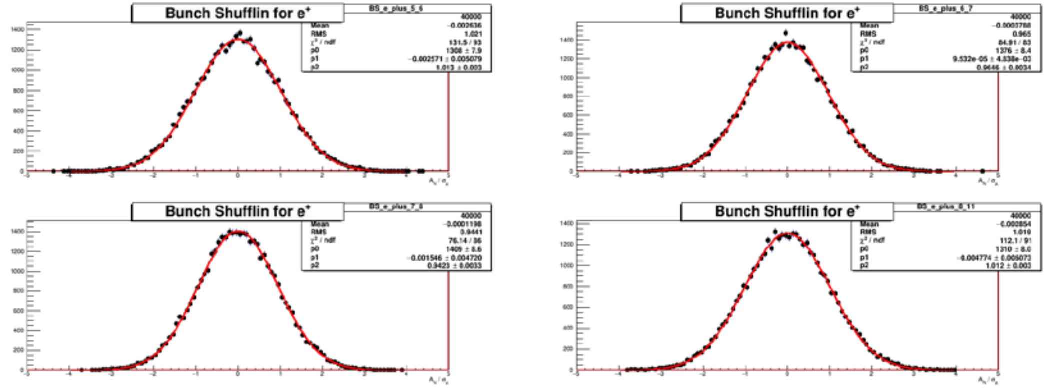
No e/p && sc

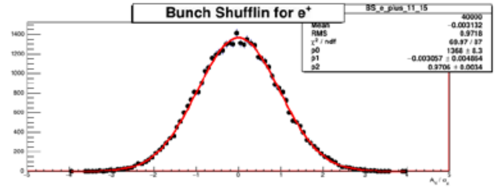




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-1.83.E-03	1.038	-0.0381
	6~7	-4.20.E-03	1.000	0.0000
	7~8	5.36.E-04	0.948	0.0524
	8~11	-1.41.E-03	0.982	0.0181
	11~15	-7.44.E-03	0.966	0.0341

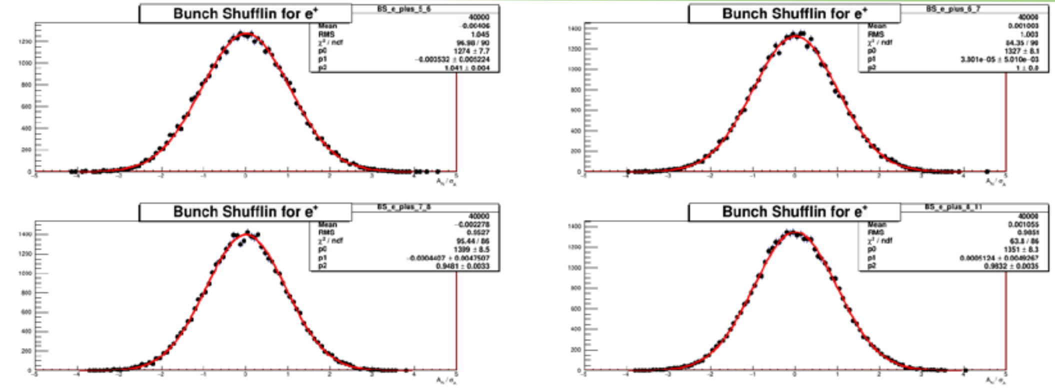
e/p && scgl

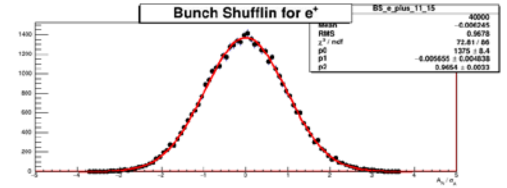




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-2.57.E-03	1.013	-0.013
	6~7	9.53.E-05	0.965	0.035
	7~8	-1.55.E-03	0.942	0.058
	8~11	-4.77.E-03	1.012	-0.012
	11~15	-3.06.E-03	0.971	0.029

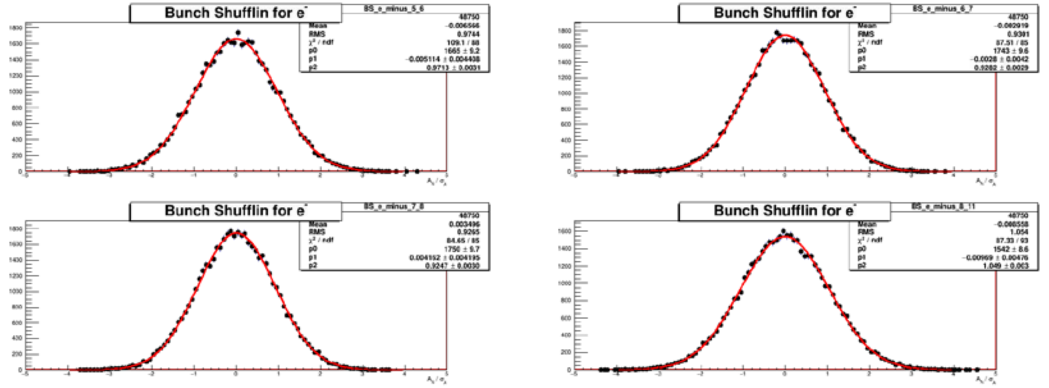
e/p && sc

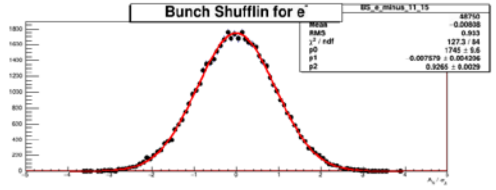




charge	pT (GeV)	mean	sigma	1-sigma
-	5~6	-3.53.E-03	1.041	-0.0412
	6~7	3.80.E-05	1.000	0.0000
	7~8	-4.41.E-04	0.948	0.0519
	8~11	5.12.E-04	0.983	0.0168
	11~15	-5.66.E-03	0.965	0.0346

e^-

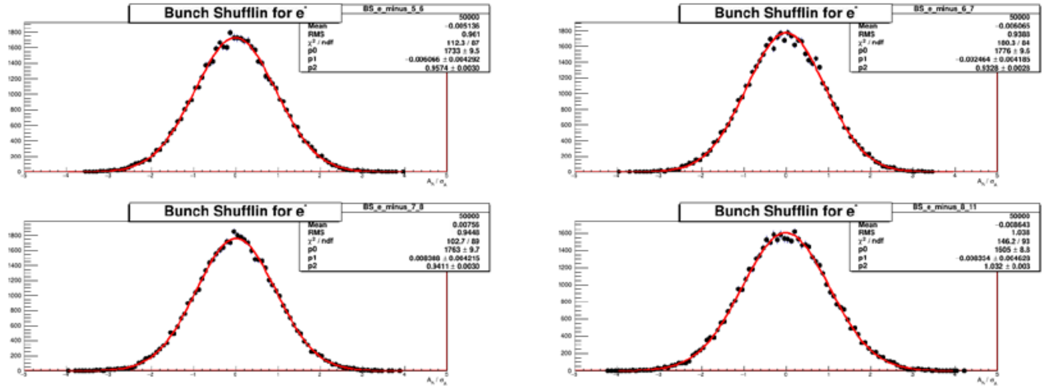


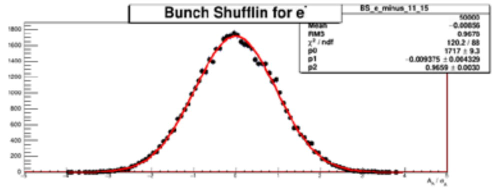


charge	pT (GeV)	mean	sigma	1-sigma
	5~6	-1.20.E-02	0.971	0.029
	6~7	-4.51.E-03	0.928	0.072
-	7~8	6.08.E-03	0.925	0.075
	8~11	-7.96.E-03	1.049	-0.049
	11~15	-6.05.E-03	0.926	0.074

No e/p && scgl

No e/p && sc

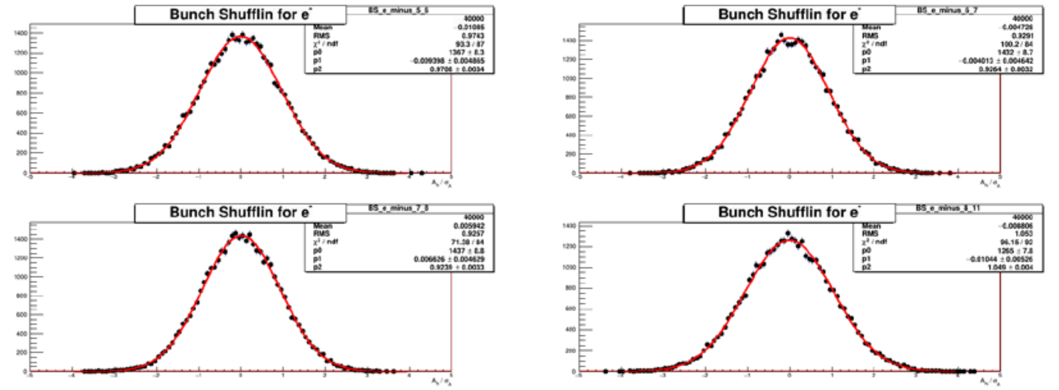


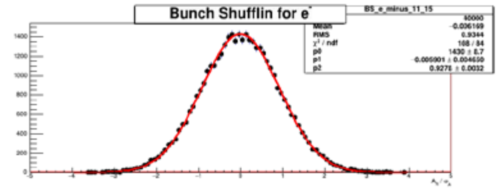


charge	pT (GeV)	mean	sigma	1-sigma
	5~6	-6.07.E-03	0.957	0.0426
	6~7	-2.46.E-03	0.933	0.0672
-	7~8	8.39.E-03	0.941	0.0589
	8~11	-8.33.E-03	1.032	-0.0323
	11~15	-9.37.E-03	0.966	0.0341

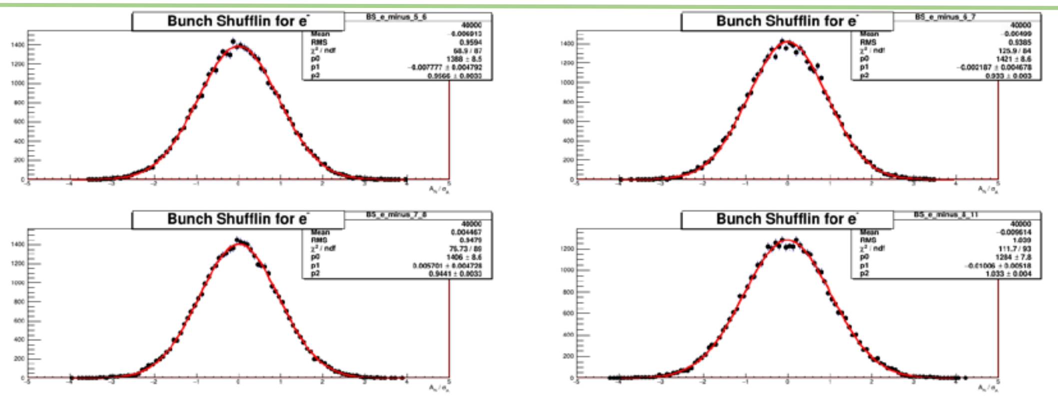
e/p && scgl

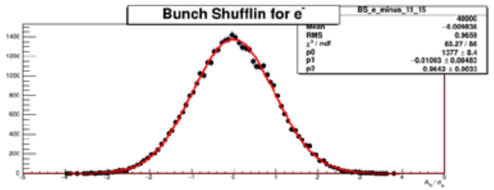
e/p && sc





charge	pT (GeV)	mean	sigma	1-sigma
	5~6	-9.40.E-03	0.971	0.029
	6~7	-4.01.E-03	0.926	0.074
-	7~8	6.63.E-03	0.924	0.076
	8~11	-1.04.E-02	1.049	-0.049
	11~15	-5.90.E-03	0.928	0.072





charge	pT (GeV)	mean	sigma	1-sigma
	5~6	-7.78.E-03	0.957	0.0434
	6~7	-2.19.E-03	0.933	0.0670
-	7~8	5.70.E-03	0.944	0.0559
	8~11	-1.01.E-02	1.033	-0.0329
	11~15	-1.09.E-02	0.964	0.0358