Charged pion analysis

Single Spin Asymmetry

Korea Univ.
Jaehee Yoo

2020. 06. 10

Alternate Averaging Methods (Square Root Formula)

inverse polarization weighted sum of the yields

$$N^{hybrid} = \sum_{Fill} N_{Fill}/P_{Fill}$$

luminosity weighted polarization

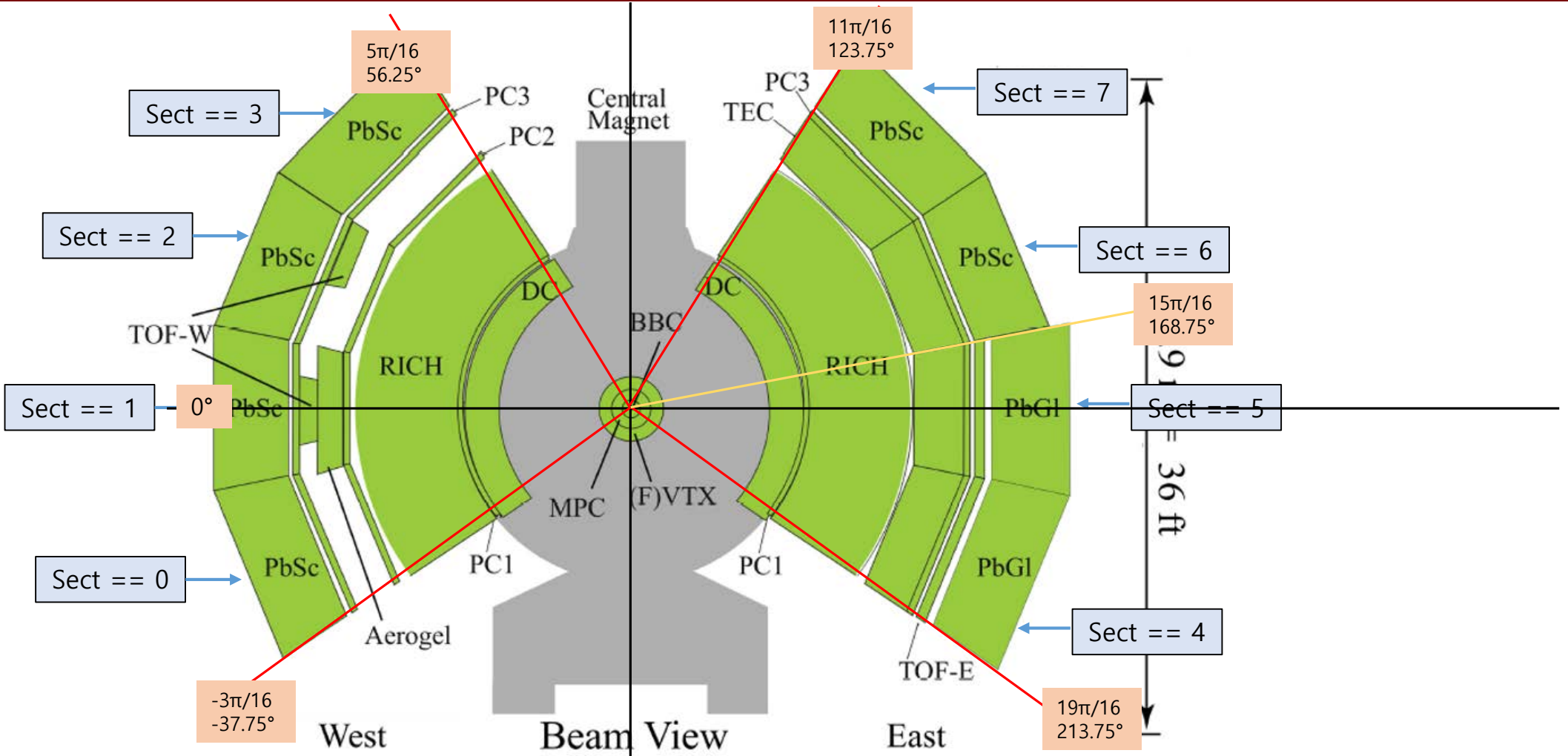
$$\langle P \rangle_L = \sum_{Fill} \mathcal{L}_{Fill} P_{Fill} / \sum_{Fill} \mathcal{L}_{Fill}$$

$$A_N^{hybrid} = \frac{\sqrt{N_L^{\uparrow,hybrid} N_R^{\downarrow,hybrid}} - \sqrt{N_R^{\uparrow,hybrid} N_L^{\downarrow,hybrid}}}{\sqrt{N_L^{\uparrow,simple} N_R^{\downarrow,simple}} + \sqrt{N_R^{\uparrow,simple} N_L^{\downarrow,simple}}}$$

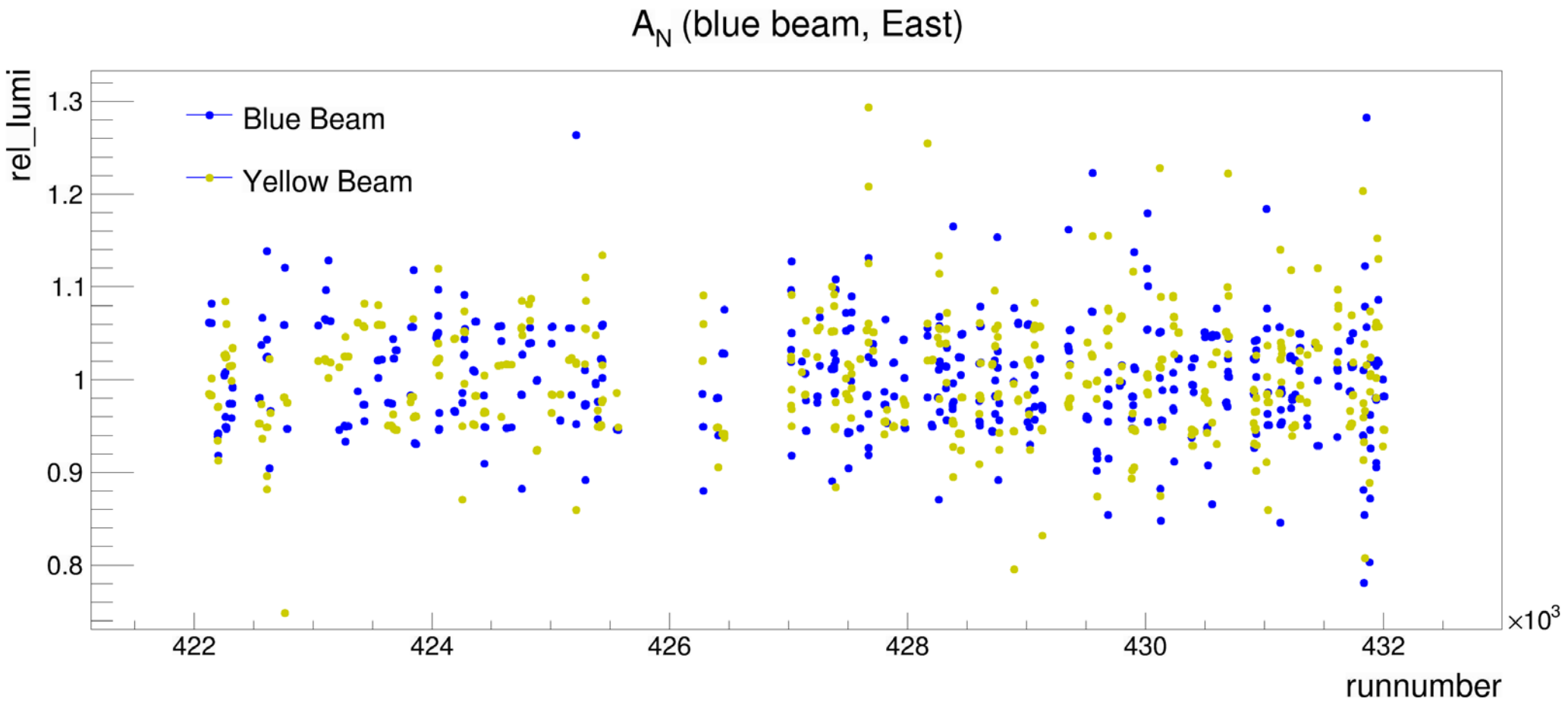
error bars

$$\delta A_N = \frac{1}{\sqrt{N}\langle P \rangle_L}$$

$$A_N = \frac{\epsilon}{P_y \langle |cos(\phi)| \rangle}$$

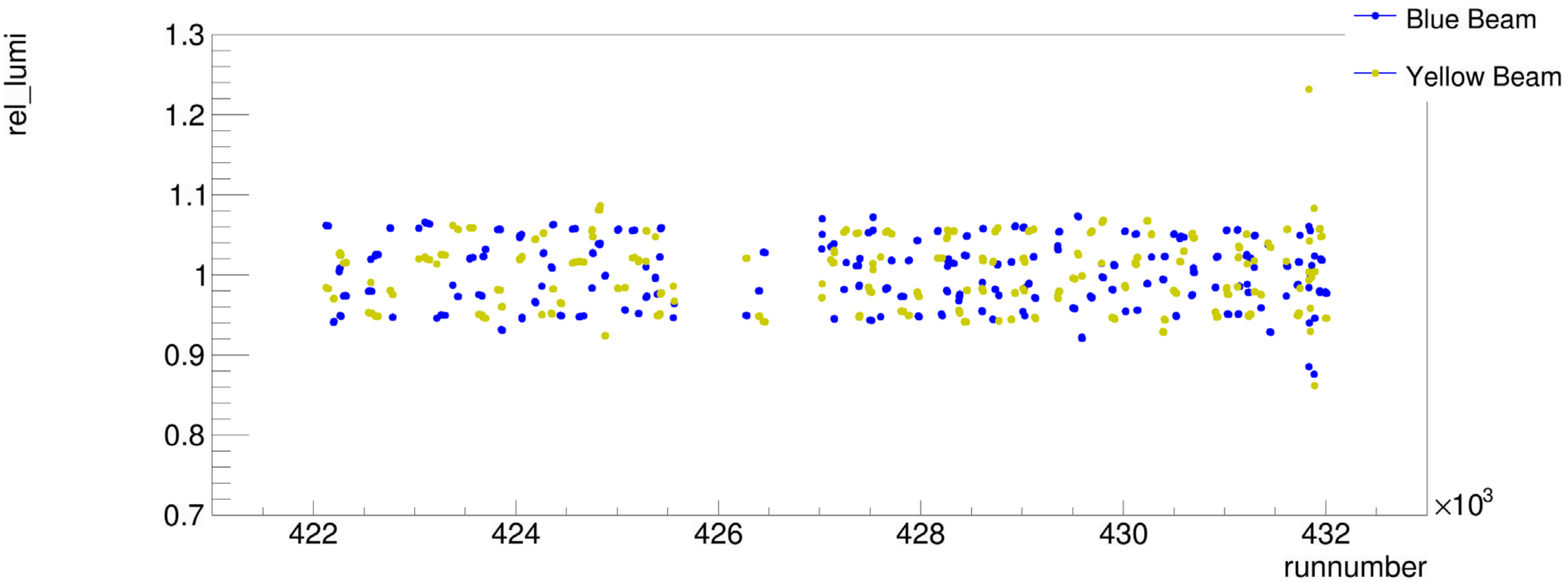

5π/16
56.25°
11π/16
123.75°
Sect == 3
Sect == 7
Sect == 2
Sect == 6
15π/16
168.75°
Sect == 1
0°
Sect == 5
Sect == 0
Sect == 4
-3π/16
-37.75°
19π/16
213.75°
PbSc
PC3
PC2
Central Magnet
TEC
DC
BBC
TOF-W
RICH
PbGl
MPC
(F)VTX
PC1
Aerogel
TOF-E
West
Beam View
East
36 ft

Rel_lumi



I didn't add trigger count if that crossing doesn't make pion.
-> It make Rel_luminosity wrong.

Rel_lumi


Blue Beam
Yellow Beam
rel_lumi
1.3
1.2
1.1
1
0.9
0.8
0.7
422
424
426
428
430
432
×10^3
runnumber

Rel. luminosity

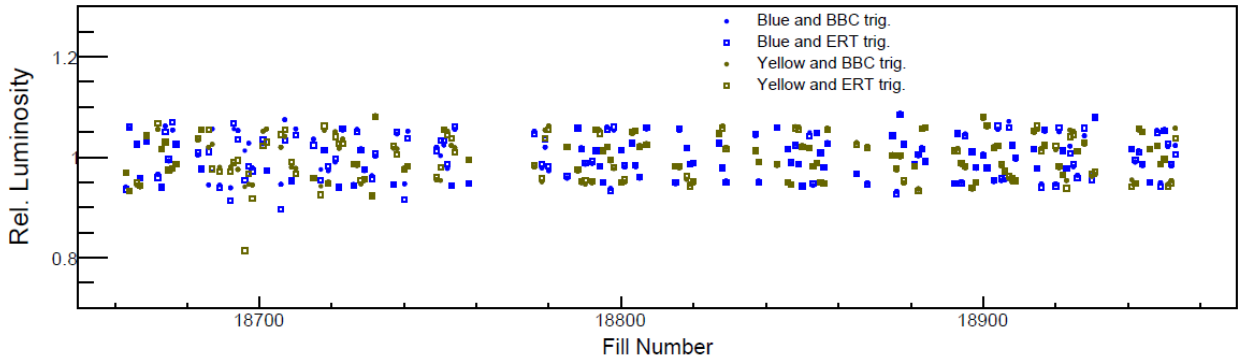


Figure 41: Relative luminosity factor calculated for each fill in Run-15 $p+p$.

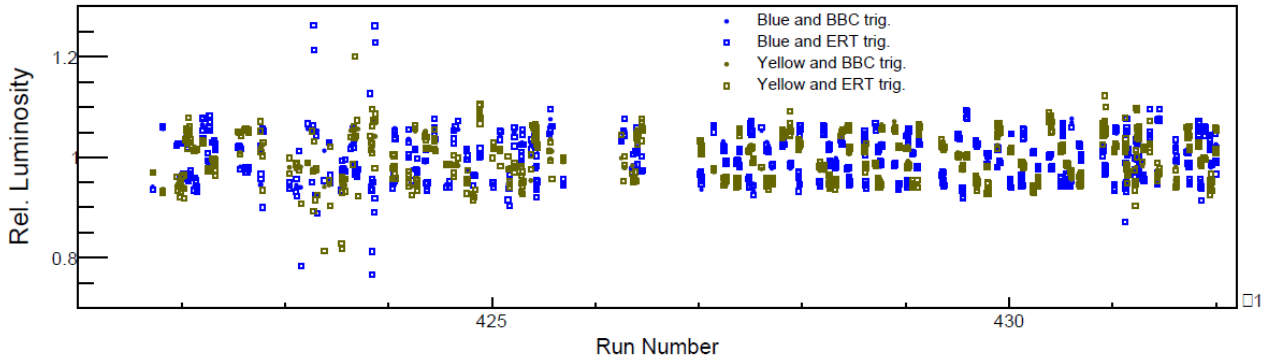
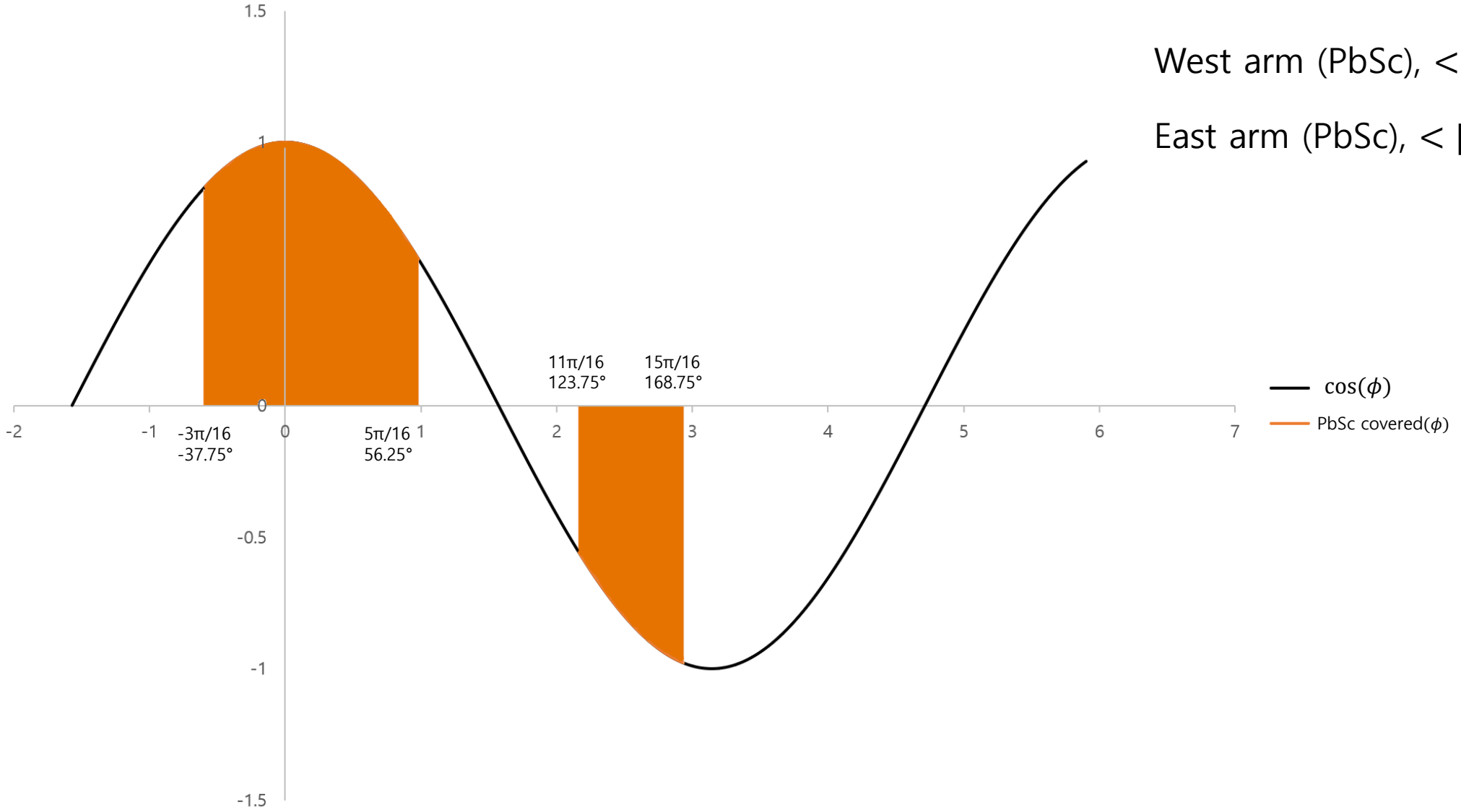


Figure 42: Relative luminosity factor calculated for each run in Run-15 $p+p$.

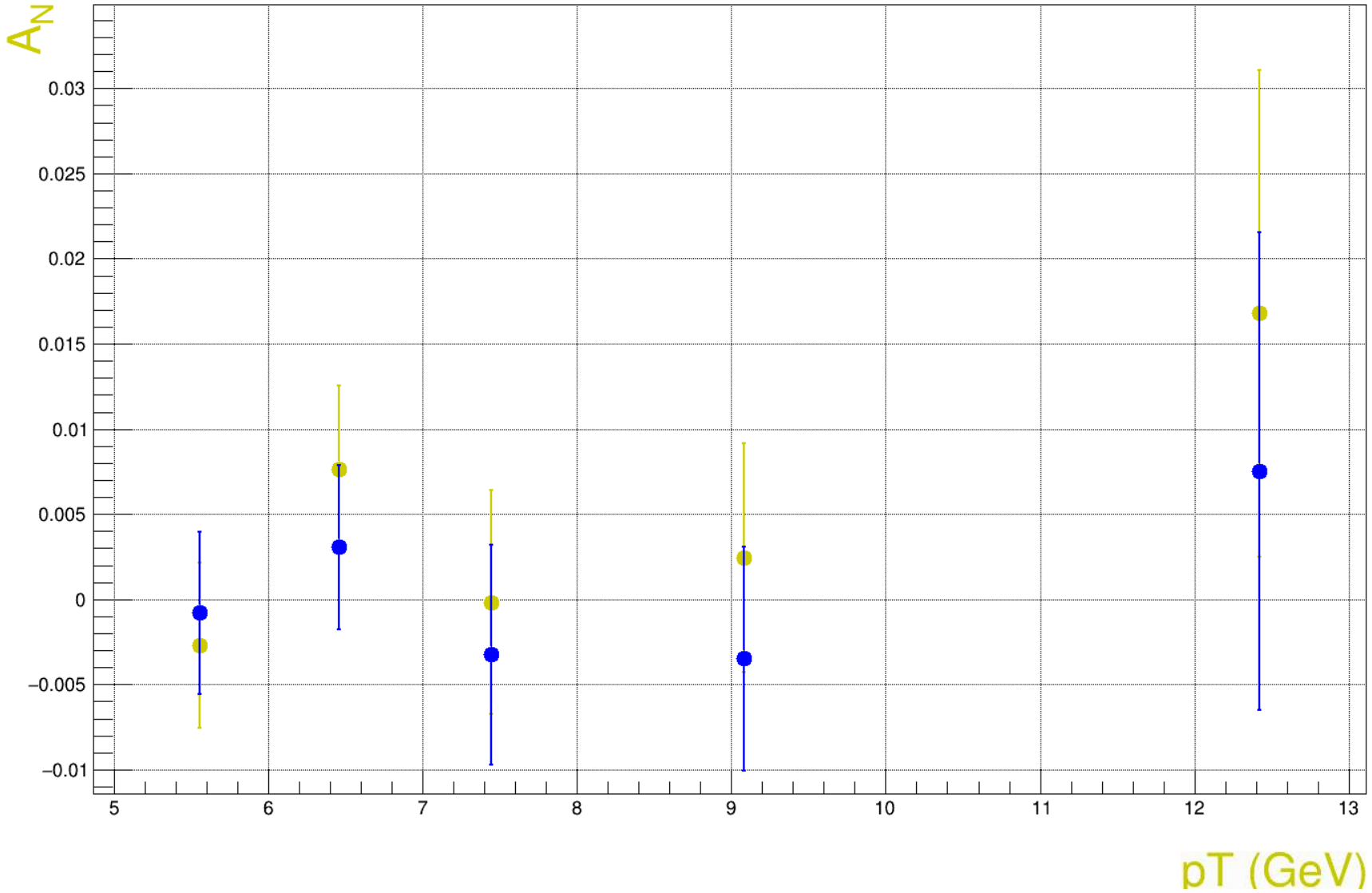
AN 1269(Norbert's)



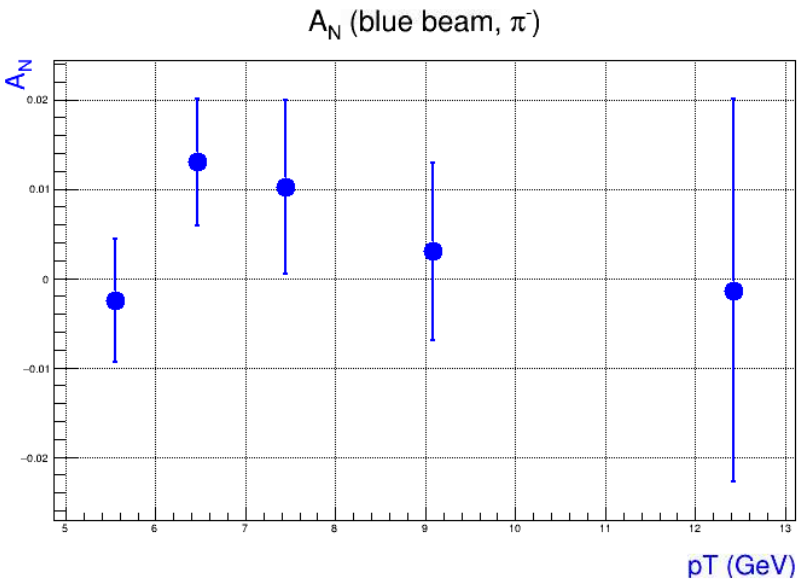
West arm (PbSc), $< |\cos(\phi_1)| > = 0.883017$

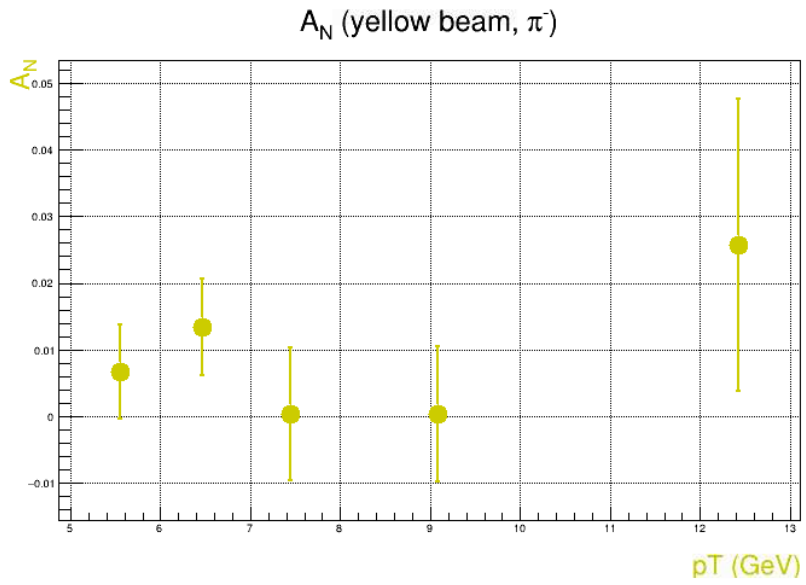
East arm (PbSc), $< |\cos(\phi_2)| > = 0.40513$

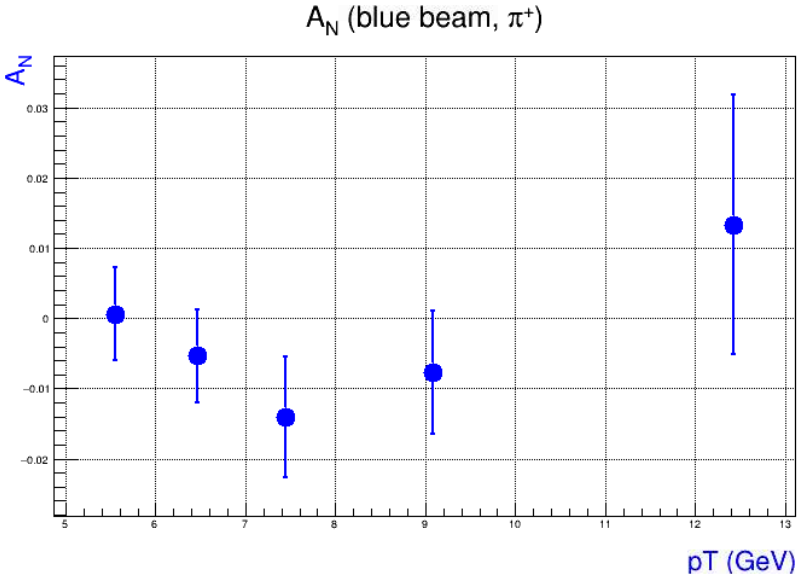
Single Spin Asymmetry(Beam)

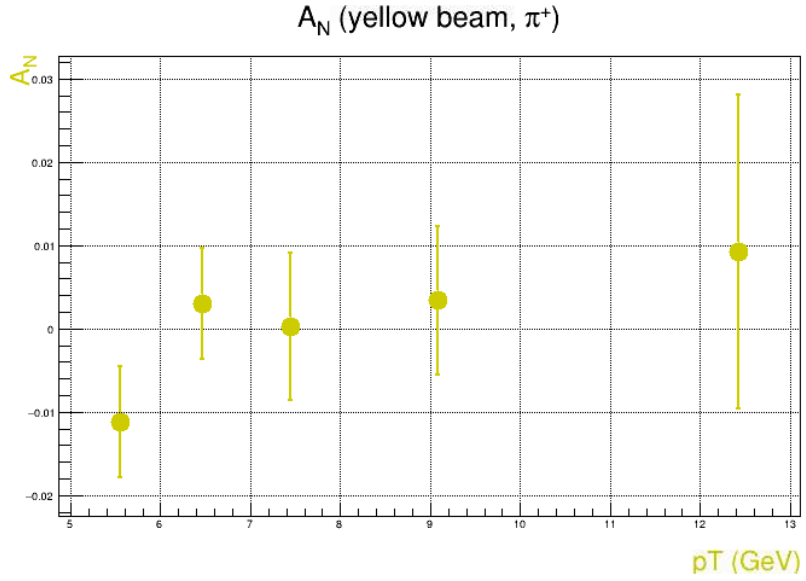


Single Spin Asymmetry(Beam, charge)

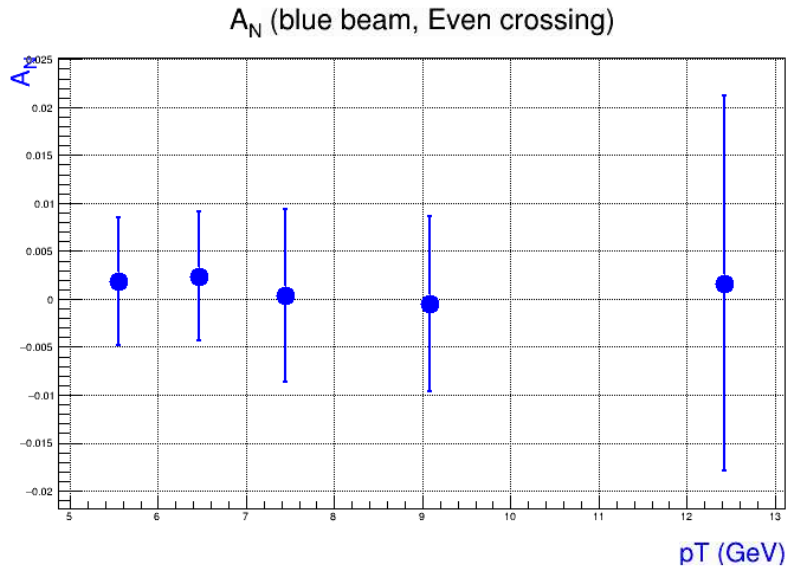


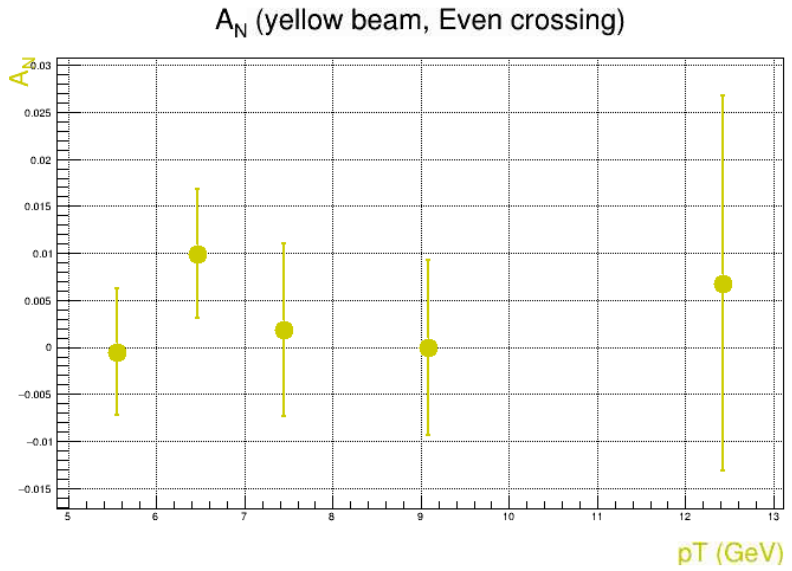


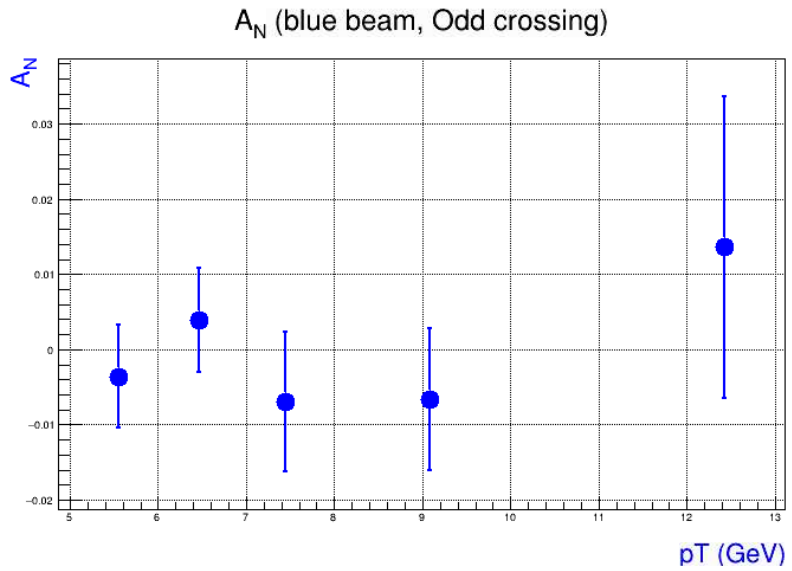


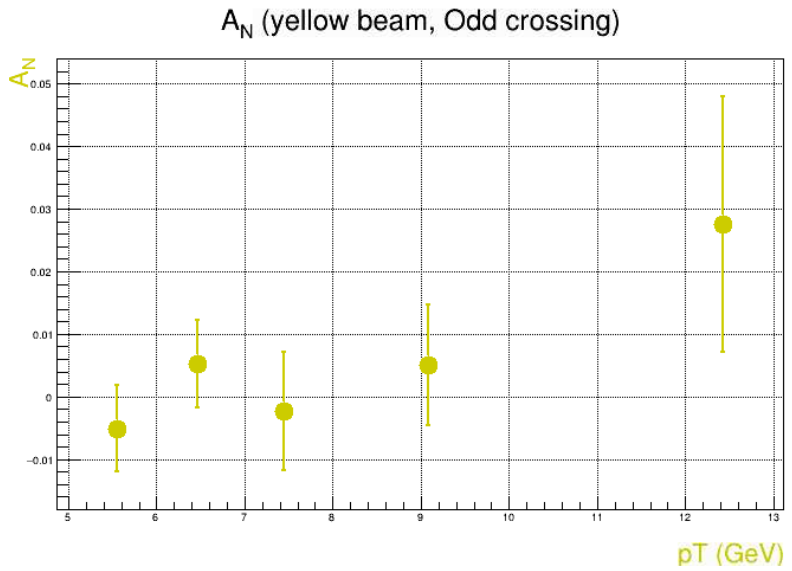


Single Spin Asymmetry(Beam, EO crossing)

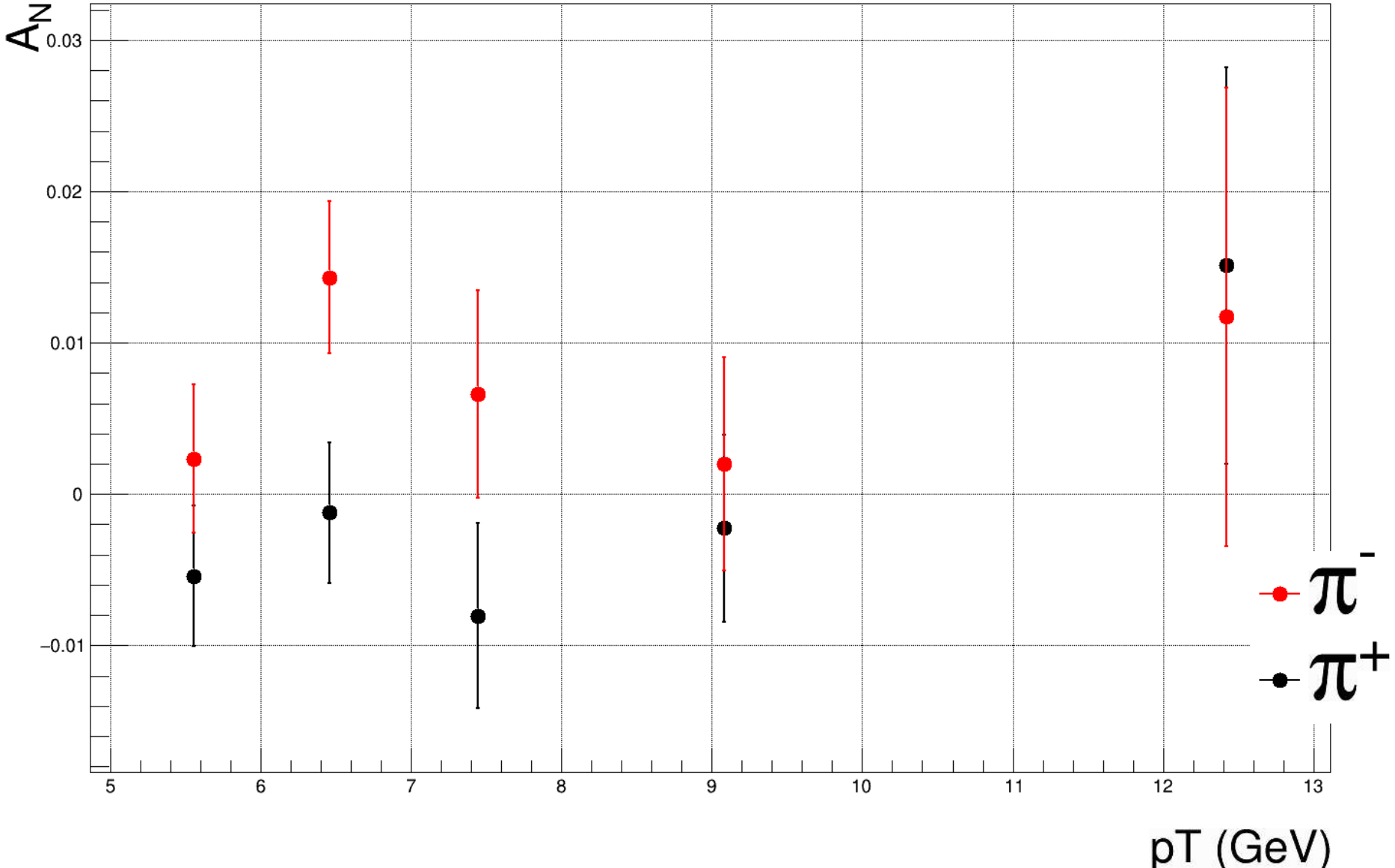








Single Spin Asymmetry(charge)



plan

- I will calculate by using weighted averaging method.

  -> run by run ⟹ fill by fill

  and compare with Square Root Formula.