

Run 12 π^0 A_N Preview

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Progress has been made in calibration of data based on Day 58 of Run 12. Data from days 56-62 have been analyzed using this calibration set. These data, from this period, were corrected for LED pulser variations but not yet for “daily” LED drift over this 7 day running period.

There are 171 runs considered here are:

set056z	13057026	13059009	13061030
13056004	13057027	set059y	13061031
13056005	13057028	13059010	13061035
13056007	set057k	13059011	set061x
13056008	13057042	13059012	13061053
13056011	13057044	13059013	13061054
13056012	13057045	13059014	13061055
set056y	13057046	set059x	13061056
13056017	13057047	13059015	13061059
13056020	set057l	13059016	13061060
13056021	13057048	13059017	13061061
13056022	13057049	13059018	set062z
13056023	13057050	13059020	13062001
13056024	13057051	set059w	13062002
set056x	13057052	13059021	13062004
13056025	13057053	13059022	set062y
13056026	set057m	13059023	13062005
13056027	13057055	13059025	13062006
13056028	13057056	13059027	13062007
13056029	13057057	set059v	set062x
set056w	13057058	13059033	13062013
13056030	set058z	13059035	set062w
13056031	13058001	13059037	13062023
13056032	13058002	13059038	13062025
13056033	13058003	13059039	13062026
13056034	set058y	set059u	13062027
set056v	13058007	13059074	13062028
13056035	13058008	13059076	13062029
13056037	13058012	13059077	set062v
13056038	13058013	13059078	13062031
13056039	13058014	13059079	13062036
set057h	set058x	13059080	13062042
13057005	13058023	13059082	13062044
13057006	13058025	set060z	13062045
13057007	13058026	13060001	13062046
13057008	13058028	13060002	set062u
13057009	13058029	13060003	13062047
13057010	13058031	set060y	13062049
set057i	13058032	13060005	13062050
13057011	set058v	13060007	13062052
13057014	13058015	13060008	13062053
13057015	13058016	13060009	13062057
13057016	13058017	13060010	set062t
13057017	13058018	13060011	13062059
13057018	13058019	13060012	13062060
13057019	13058020	set061z	13062061
set057j	set059z	13061017	13062062
13057021	13059002	13061019	13062063
13057022	13059005	13061024	
13057023	13059006	13061025	
13057024	13059007	set061y	
13057025	13059008	13061029	

About First Pass Analysis of 171 runs (1 week).

This analysis is preliminary. The areas that need more work are:

- Daily Mass corrections for each cell to account for LED drift.
- Energy dependent corrections for mass reconstruction must be studied.
- Calibration may not be final.

The mass distributions for energy and rapidity cuts are posted [here](#).

Event selection requires:

- 2 track clusters (1 radian cone)
- $Z < .7$
- Eta and Energy bins of width (0.1 and 10 GeV)

A_N vs P_T for fixed π^0 Energy Bins

In this analysis, we will select based on a mass cut: $0.035 \text{ GeV} < M_{12} < 0.235 \text{ GeV}$

Note that for largest energy and smallest rapidity, this selection will cut into the π^0 peak on the high mass side.

We analyze A_N after further selection of events with 2 photons clusters and with a given range of Energy and P_T .

For example, if the bin is: $35 \text{ GeV} < E_{12} < 45 \text{ GeV}$, we will further select data in 6 P_T bins from 1 GeV/c to 7 GeV/c. For each P_T , we plot the up down asymmetry as a function of the cosine of the azimuthal angle $\cos(\phi)$. The result for $35 \text{ GeV} < E_{12} < 45 \text{ GeV}$ is shown below in Figure 1.

Assuming blue beam polarization of 55%, the P_T dependence of A_N is shown in Figure 2 for that energy region.

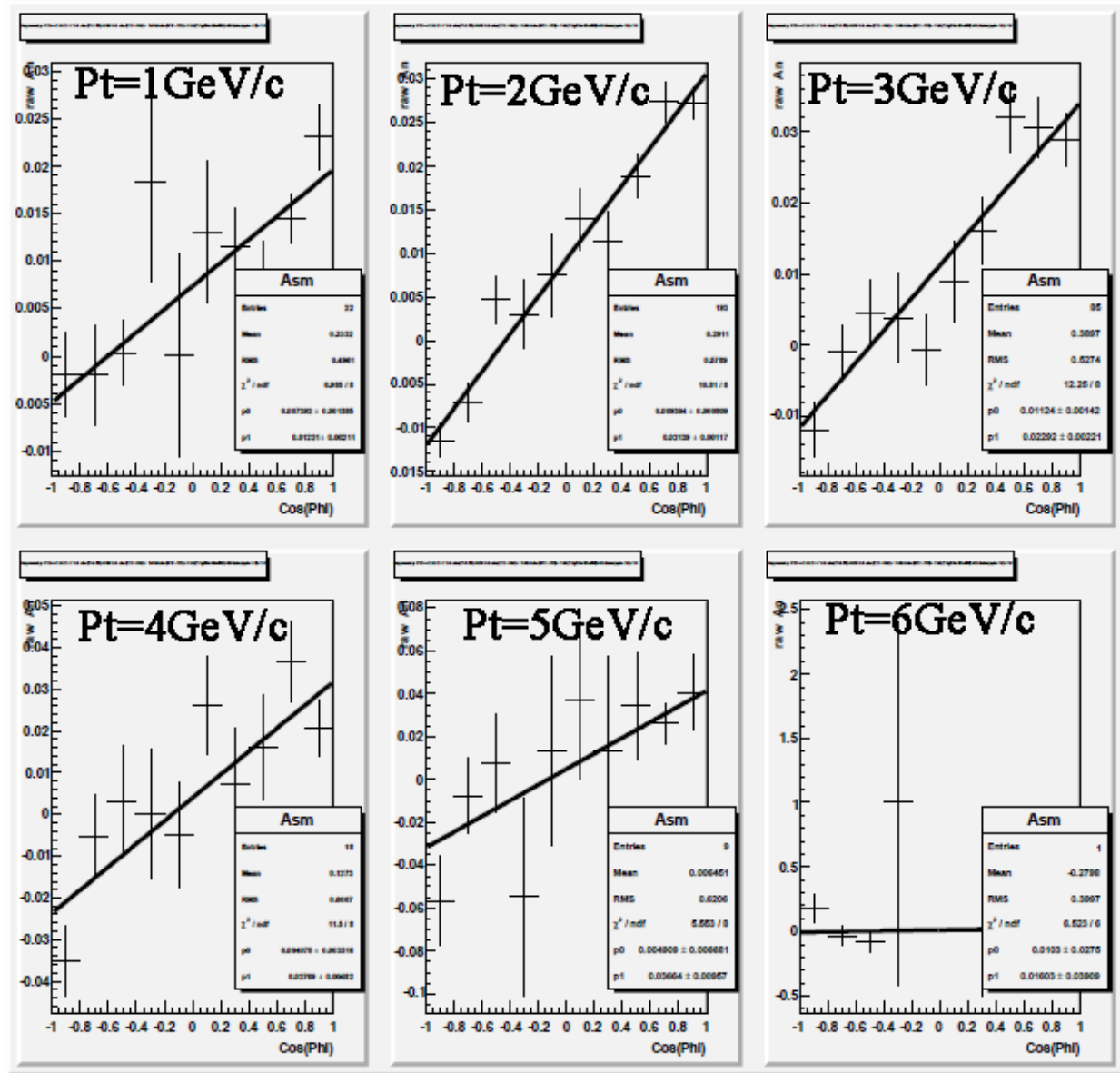


Figure 1: Plot of raw up/down asymmetry vs $\cos(\phi)$ for $35 \text{ GeV} < E_{12} < 45 \text{ GeV}$ for π^0 events. Each plot represents a P_T range. (see page 4 of [ANplots0.pdf](#)).

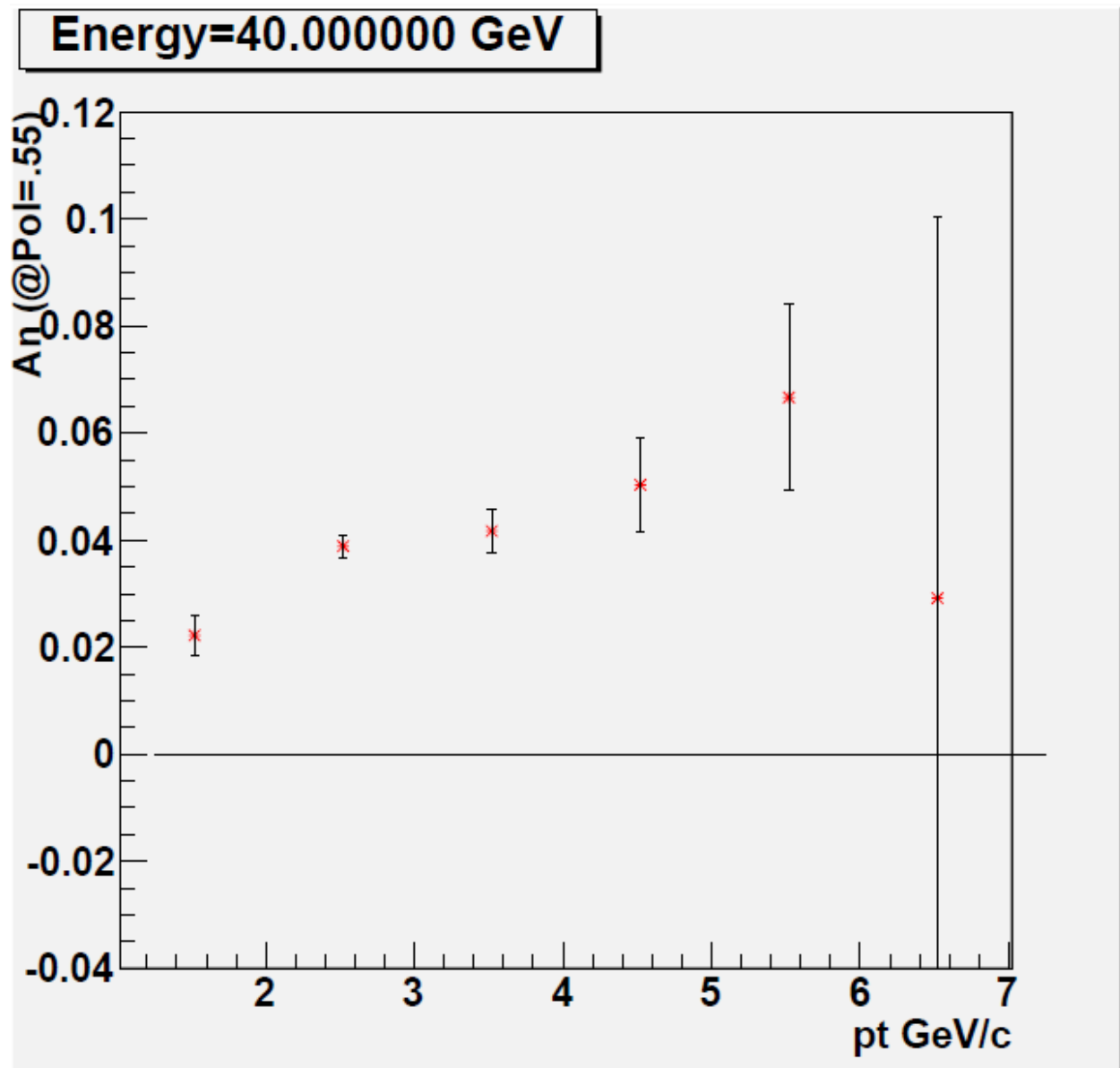


Figure 2: The Pt dependence of $\pi^0 A_N$ based on assumption of blue beam polarization of 55%. Data are for energy in the region of $35 \text{ GeV} < E_{12} < 45 \text{ GeV}$ (this plot taken from page 5 of [ANplots0.pdf](#)).

Similar plots are found in the pdf file [ANplots0.pdf](#). The pages are

pages 2-3: $25 < E_{12} < 35 \text{ GeV}$

pages 4-5: $35 < E_{12} < 45 \text{ GeV}$

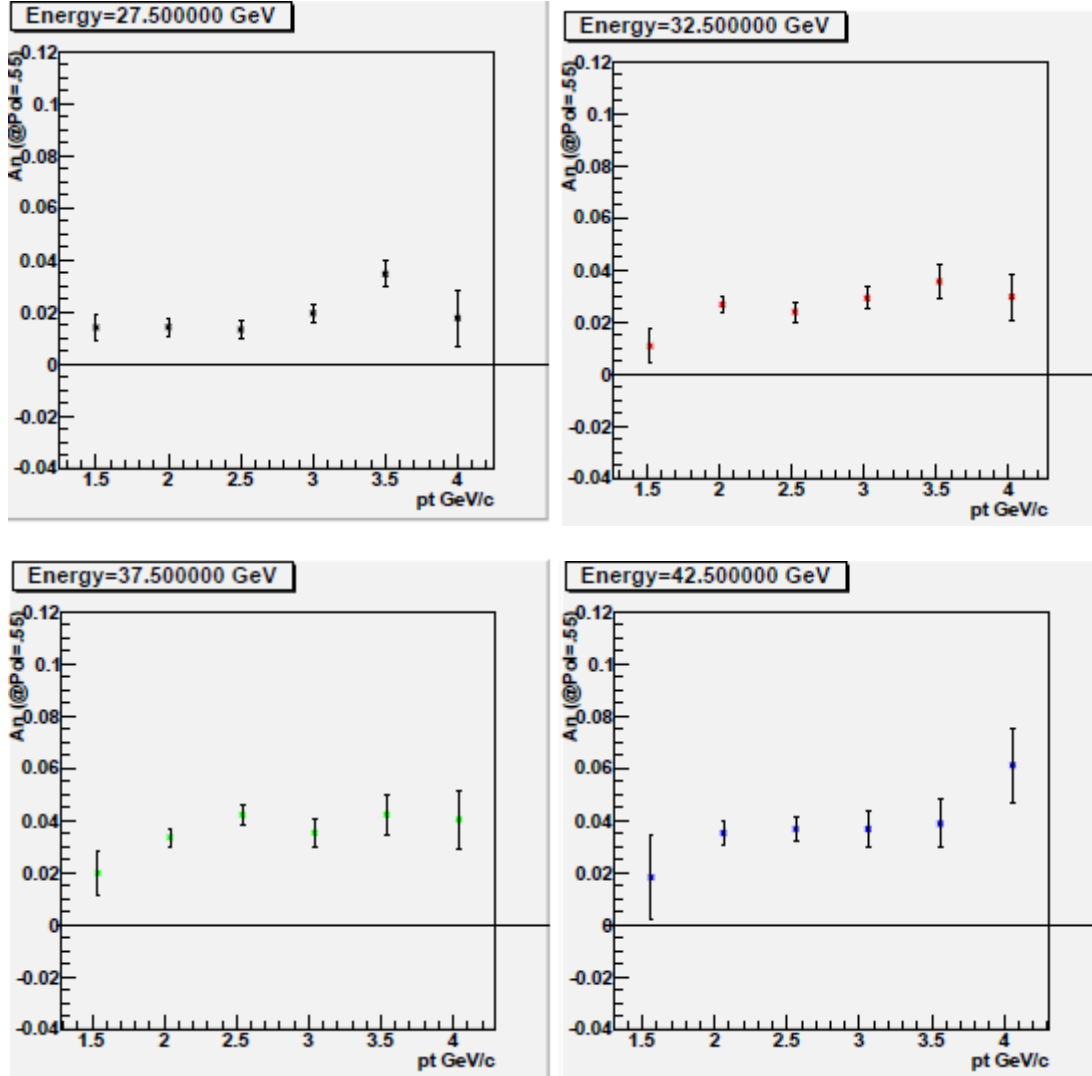
pages 6-7: $45 < E_{12} < 55 \text{ GeV}$

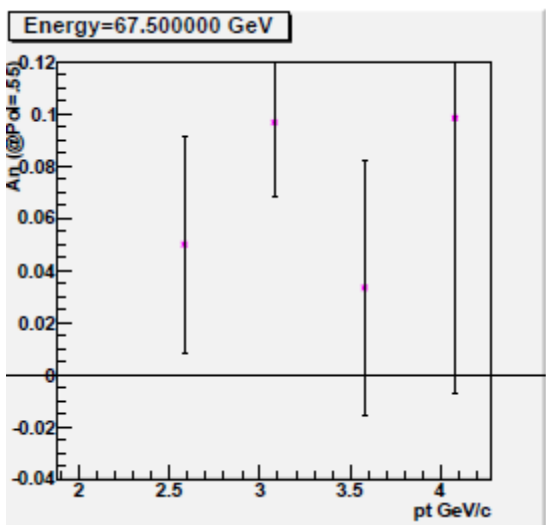
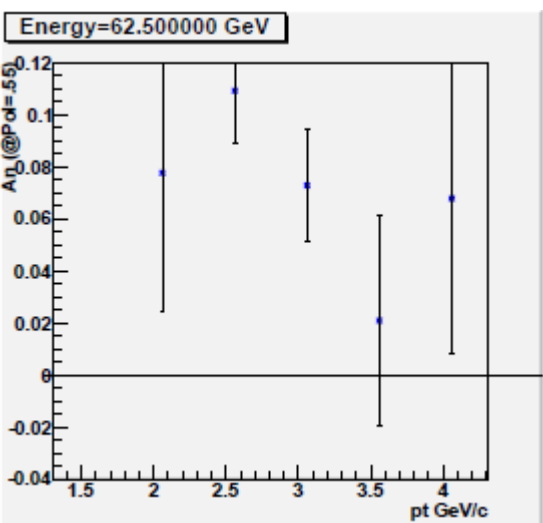
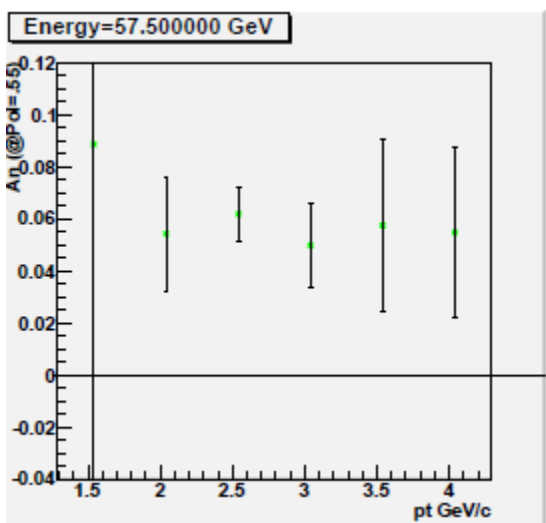
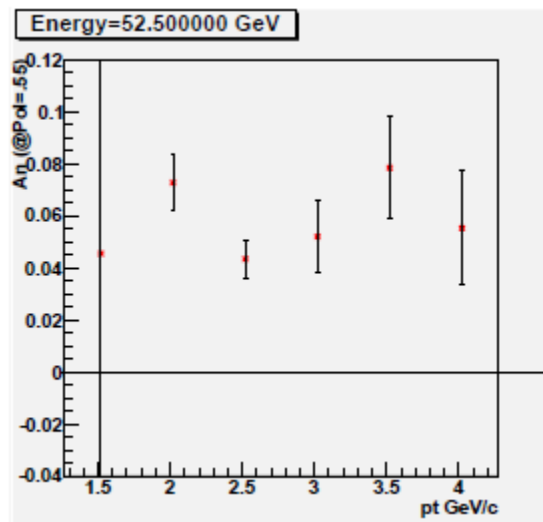
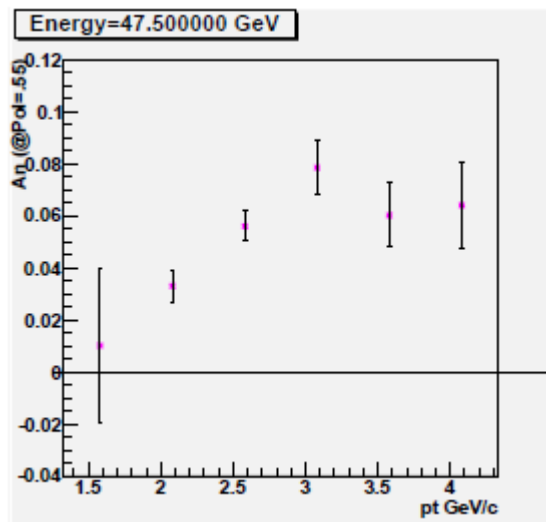
pages 8-9: $55 < E_{12} < 65 \text{ GeV}$

pages 11-12: $65 < E_{12} < 75 \text{ GeV}$

Plots [ANplots2.pdf](#) and [ANplots3.pdf](#), are similar to the above plots but with P_T and Energy bins of $\frac{1}{2}$ the size.

A summary of these plots is included below:





Preliminary Conclusion

The lower energy data (<40 GeV) shows a gentle increase in A_N with Pt up to $Pt \sim 5$ GeV. The higher energy data (>60 GeV) there may be some evidence of A_N falling with larger Pt ($Pt > 2.5$ GeV/c).