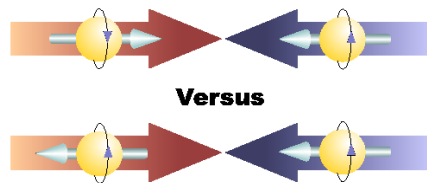


Updates on Run12 π^0 -jet A_{LL}

Yaping Wang (CCNU)
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Outline

- Updates on large background false asymmetries check
- Systematics updates

Deviation from zero in the constant fit

| BKG False Asymmetry | $\pi^0 p_T$ | Jet p_T | x_1 | x_2 | Inv. mass |
|---------------------|-------------|-----------|-------|-------|-----------|
| A_L^B | 2.99 | 3.03 | 2.95 | 3.13 | 3.01 |
| A_L^Y | 4.81 | 4.73 | 4.70 | 4.69 | 4.76 |
| A_{LL}^{LS} | 0.54 | 0.51 | 0.67 | 0.35 | 0.51 |
| A_{LL}^{US} | 4.99 | 5.00 | 4.90 | 5.02 | 4.97 |
| | | | | | |

Combined triggers (JP0 + JP1 + JP2), Anti-Kt R=0.6, 359 runs

- Large false asymmetries of background were found in A_L^B , A_L^Y , and A_{LL}^{US} .

Asymmetry Results – Check large false asymmetries in background

- Then we try to check the large background false asymmetry dependence on the anti-kt cone size ($R = 0.6 \rightarrow R = 0.5$)

Issues: (1) the π^0 pico trees (pp200 DBs were used for EEMC) reconstructed for the π^0 -jet analysis were gone from /star/data05 disk in couple of months ago.

(2) Couple of weeks were spent after the Collaboration meeting to transferred MuDst trees of 100 runs (Run 12 pp500) from HPSS to RCF for π^0 pico tree reproduction. This is about one fourth statistics of the pi0-jet analysis ([this reproduction uses the latest updated pp510 EEMC DBs](#)).

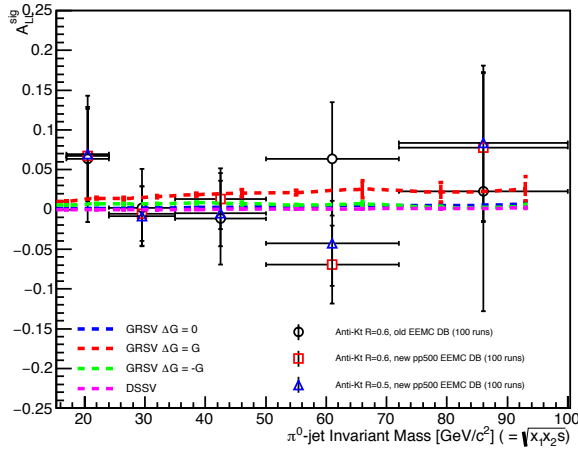
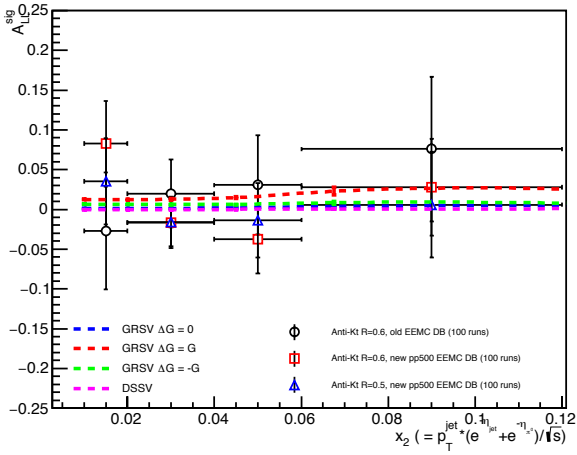
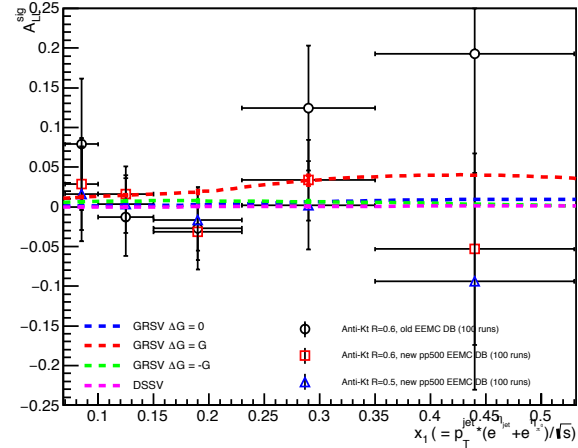
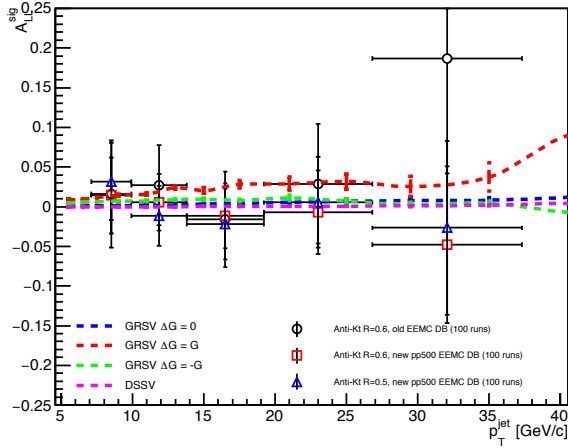
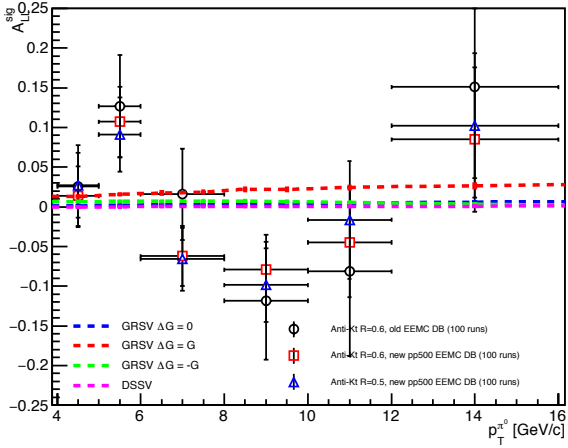
The reproduced π^0 pico trees can be found (run 13077067 ~ 13085047):

RCF: [/star/u/ypwang/disk01/pi0Trees3/output](#)

- 100 test runs (13077067 ~ 13085047) were used to check the large background false asymmetry for following three cases:
 - (1) Anti-Kt $R=0.6$ using old EEMC DB
 - (2) Anti-Kt $R=0.6$ using new EEMC DB
 - (3) Anti-Kt $R=0.5$ using new EEMC DB

Asymmetry Results – Longitudinal double spin asymmetries , signal A_{LL}

- Signal A_{LL}^{sig} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).



- The signal A_{LL} agrees with each case within one sigma.
- No strong dependences on EEMC DB and Anti-Kt cone size were found.

Asymmetry Results – Longitudinal double spin asymmetries, background A_{LL}

- Background A_{LL}^{bkg} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| background A_{LL}^{bkg} | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|------------------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.01702 ± 0.01004 | 1.70 | 0.008204 ± 0.009984 | 0.82 | 0.01007 ± 0.0105 | 0.96 |
| jet p_T | 0.01685 ± 0.0101 | 1.69 | 0.007744 ± 0.009975 | 0.78 | 0.01017 ± 0.01049 | 1.00 |
| x_1 | 0.01714 ± 0.01015 | 1.69 | 0.006568 ± 0.01006 | 0.65 | 0.01027 ± 0.01059 | 0.97 |
| x_2 | 0.0169 ± 0.01007 | 1.68 | 0.007721 ± 0.009933 | 0.78 | 0.01000 ± 0.01045 | 0.96 |
| Inv. mass | 0.01687 ± 0.0101 | 1.67 | 0.007372 ± 0.009997 | 0.74 | 0.009348 ± 0.01052 | 0.89 |

Asymmetry Results – Blue beam single spin asymmetries, A_L^B

- Signal A_L^B dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| signal A_L^B | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|----------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | -0.008443 ± 0.01584 | 0.53 | -0.00297 ± 0.0108 | 0.28 | -0.002416 ± 0.01147 | 0.21 |
| jet p_T | -0.0005603 ± 0.01678 | 0.03 | -0.004886 ± 0.01185 | 0.41 | -0.005555 ± 0.01267 | 0.44 |
| x_1 | -0.0008879 ± 0.0168 | 0.05 | -0.00719 ± 0.0117 | 0.61 | -0.008128 ± 0.0125 | 0.65 |
| x_2 | -0.002095 ± 0.01692 | 0.12 | -0.005243 ± 0.01194 | 0.44 | -0.006333 ± 0.01274 | 0.50 |
| Inv. mass | -0.0009838 ± 0.01678 | 0.06 | -0.005395 ± 0.01177 | 0.46 | -0.005872 ± 0.01255 | 0.47 |

Asymmetry Results – Blue beam single spin asymmetries, A_L^B

- Background A_L^B dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| background A_L^B | R=0.6, old EEMC DB (100runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|-----------------------|---------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | -0.002055 ± 0.005691 | 0.36 | 0.01161 ± 0.005667 | 2.05 | 0.008663 ± 0.005961 | 1.45 |
| jet p_T | -0.002402 ± 0.00572 | 0.42 | 0.01135 ± 0.005663 | 2.00 | 0.008690 ± 0.00595 | 1.46 |
| x_1 | -0.001859 ± 0.005752 | 0.32 | 0.01231 ± 0.005713 | 2.15 | 0.009936 ± 0.006007 | 1.65 |
| x_2 | -0.002482 ± 0.005708 | 0.43 | 0.01134 ± 0.005637 | 2.01 | 0.008747 ± 0.005929 | 1.48 |
| Inv. mass | -0.002175 ± 0.005725 | 0.38 | 0.01161 ± 0.005676 | 2.05 | 0.008934 ± 0.005968 | 1.50 |

Asymmetry Results – Yellow beam single spin asymmetries, A_L^Y

- Signal A_L^Y dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| signal A_L^Y | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|----------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.001942 ± 0.01559 | 0.12 | -0.01198 ± 0.01054 | 1.14 | -0.009909 ± 0.01119 | 0.89 |
| jet p_T | 0.002631 ± 0.01652 | 0.16 | -0.01487 ± 0.01156 | 1.29 | -0.01108 ± 0.01235 | 0.90 |
| x_1 | 0.007476 ± 0.01654 | 0.45 | -0.01221 ± 0.01142 | 1.07 | -0.008838 ± 0.0122 | 0.72 |
| x_2 | 0.005527 ± 0.01665 | 0.33 | -0.01509 ± 0.01164 | 1.30 | -0.01116 ± 0.01242 | 0.90 |
| Inv. mass | 0.00409 ± 0.01652 | 0.25 | -0.01456 ± 0.01148 | 1.27 | -0.01087 ± 0.01225 | 0.87 |

Asymmetry Results – Yellow beam single spin asymmetries, A_L^Y

- Background A_L^Y dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| background A_L^Y | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|-----------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.007759 ± 0.005595 | 1.39 | 0.01347 ± 0.005546 | 2.43 | 0.01169 ± 0.005833 | 2.00 |
| jet p_T | 0.007632 ± 0.005624 | 1.36 | 0.01317 ± 0.005541 | 2.38 | 0.0112 ± 0.005825 | 1.92 |
| x_1 | 0.007342 ± 0.005656 | 1.30 | 0.01334 ± 0.00559 | 2.39 | 0.0116 ± 0.005881 | 1.97 |
| x_2 | 0.007119 ± 0.005615 | 1.27 | 0.01293 ± 0.005516 | 2.34 | 0.01101 ± 0.005805 | 1.90 |
| Inv. mass | 0.007446 ± 0.005631 | 1.32 | 0.01313 ± 0.005554 | 2.36 | 0.01067 ± 0.005843 | 1.83 |

Asymmetry Results – Like-sign single spin asymmetries, A_{LL}^{LS}

- Signal A_{LL}^{LS} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| signal A_{LL}^{LS} | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|----------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | -0.00874 ± 0.03995 | 0.22 | -0.02711 ± 0.02722 | 1.00 | -0.02344 ± 0.02894 | 0.81 |
| jet p_T | 0.002034 ± 0.04206 | 0.05 | -0.04005 ± 0.02967 | 1.35 | -0.03344 ± 0.03174 | 1.05 |
| x_1 | 0.003312 ± 0.04302 | 0.08 | -0.03881 ± 0.02927 | 1.33 | -0.03419 ± 0.03135 | 1.09 |
| x_2 | 0.005747 ± 0.04241 | 0.14 | -0.04015 ± 0.02989 | 1.34 | -0.0352 ± 0.03191 | 1.10 |
| Inv. mass | 0.004927 ± 0.04204 | 0.12 | -0.04011 ± 0.02944 | 1.36 | -0.03381 ± 0.03142 | 1.08 |

Asymmetry Results – Like-sign single spin asymmetries, A_{LL}^{LS}

- Background A_{LL}^{LS} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| background A_{LL}^{LS} | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|-----------------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.007717 ± 0.0143 | 0.54 | 0.04368 ± 0.01425 | 3.07 | 0.03511 ± 0.01499 | 2.34 |
| jet p_T | 0.007719 ± 0.01435 | 0.54 | 0.04368 ± 0.01422 | 3.07 | 0.03483 ± 0.01494 | 2.33 |
| x_1 | 0.006589 ± 0.01467 | 0.45 | 0.04568 ± 0.01434 | 3.19 | 0.03804 ± 0.01508 | 2.52 |
| x_2 | 0.005705 ± 0.01431 | 0.40 | 0.04284 ± 0.01415 | 3.03 | 0.03471 ± 0.01488 | 2.33 |
| Inv. mass | 0.006771 ± 0.01435 | 0.47 | 0.04394 ± 0.01425 | 3.08 | 0.03456 ± 0.01498 | 2.31 |

Asymmetry Results – Unlike-sign single spin asymmetries, A_{LL}^{US}

- Signal A_{LL}^{US} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| signal A_{LL}^{US} | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|----------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.00593 ± 0.0397 | 0.15 | -0.02507 ± 0.02656 | 0.94 | -0.02434 ± 0.02829 | 0.86 |
| jet p_T | -0.006984 ± 0.04181 | 0.17 | -0.02805 ± 0.02918 | 0.96 | -0.02041 ± 0.03112 | 0.66 |
| x_1 | -0.004997 ± 0.04253 | 0.12 | -0.01819 ± 0.02881 | 0.63 | -0.01189 ± 0.0307 | 0.39 |
| x_2 | -0.000371 ± 0.04213 | 0.01 | -0.02721 ± 0.02935 | 0.93 | -0.01931 ± 0.03127 | 0.62 |
| Inv. mass | -0.005084 ± 0.04177 | 0.12 | -0.02507 ± 0.02895 | 0.87 | -0.01797 ± 0.03085 | 0.58 |

Asymmetry Results – Unlike-sign single spin asymmetries, A_{LL}^{US}

- Background A_{LL}^{US} dependence on Anti-Kt cone size (R=0.6 and 0.5) and EEMC DB (pp200 and run12 pp510).

| background A_{LL}^{US} | R=0.6, old EEMC DB (100 runs) | | R=0.6, new EEMC DB (100 runs) | | R=0.5, new EEMC DB (100 runs) | |
|-----------------------------|----------------------------------|------------------------|----------------------------------|------------------------|----------------------------------|------------------------|
| | value | Deviation from zero | value | Deviation from zero | value | Deviation from zero |
| $\pi^0 p_T$ | 0.01291 ± 0.01418 | 0.91 | -0.005464 ± 0.01405 | 0.39 | -0.003366 ± 0.0148 | 0.23 |
| jet p_T | 0.01247 ± 0.01425 | 0.88 | -0.00509 ± 0.01404 | 0.36 | -0.004278 ± 0.01476 | 0.29 |
| x_1 | 0.0106 ± 0.01431 | 0.74 | -0.007112 ± 0.01415 | 0.50 | -0.00583 ± 0.0149 | 0.39 |
| x_2 | 0.01156 ± 0.01421 | 0.81 | -0.005844 ± 0.01397 | 0.42 | -0.004838 ± 0.0147 | 0.33 |
| Inv. mass | 0.01163 ± 0.01425 | 0.82 | -0.006026 ± 0.01406 | 0.43 | -0.005827 ± 0.0148 | 0.39 |

Asymmetry Results – Check large false asymmetries in background

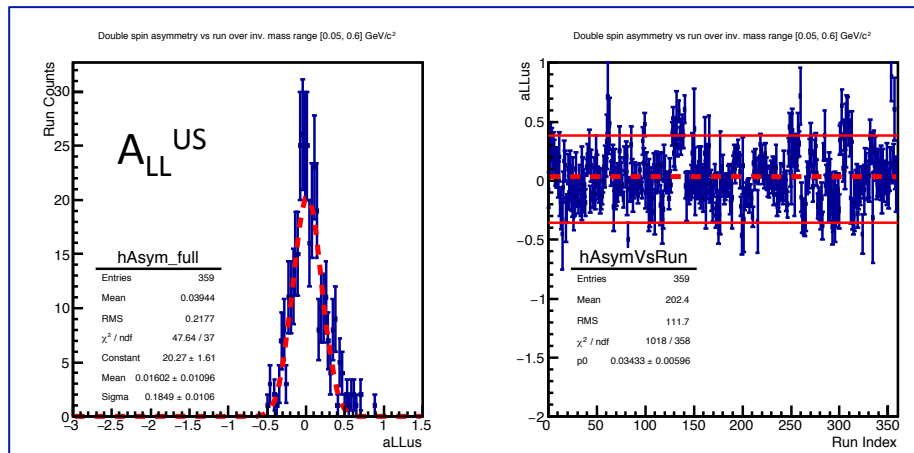
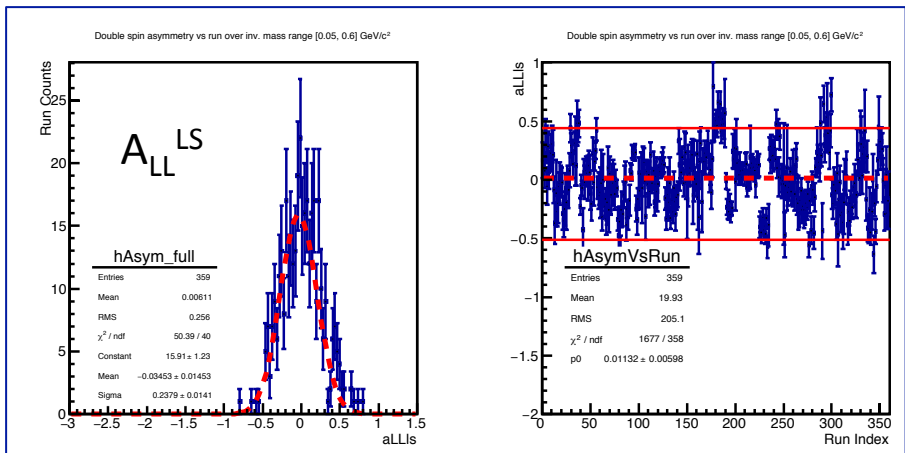
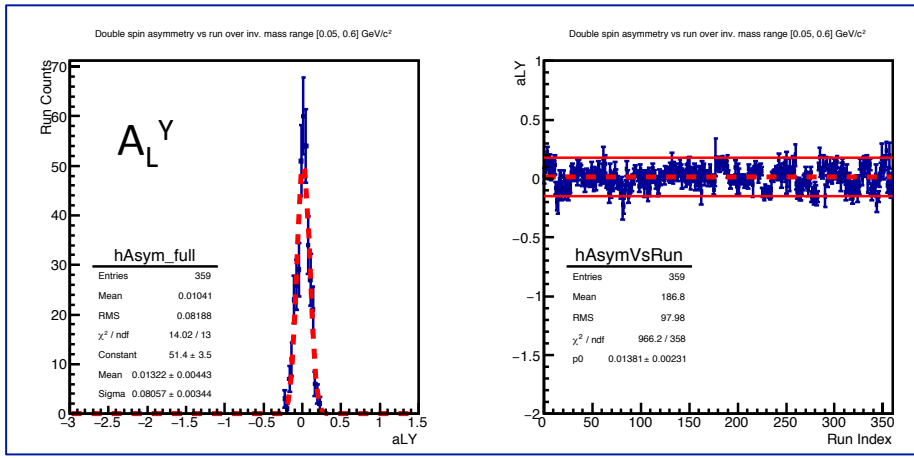
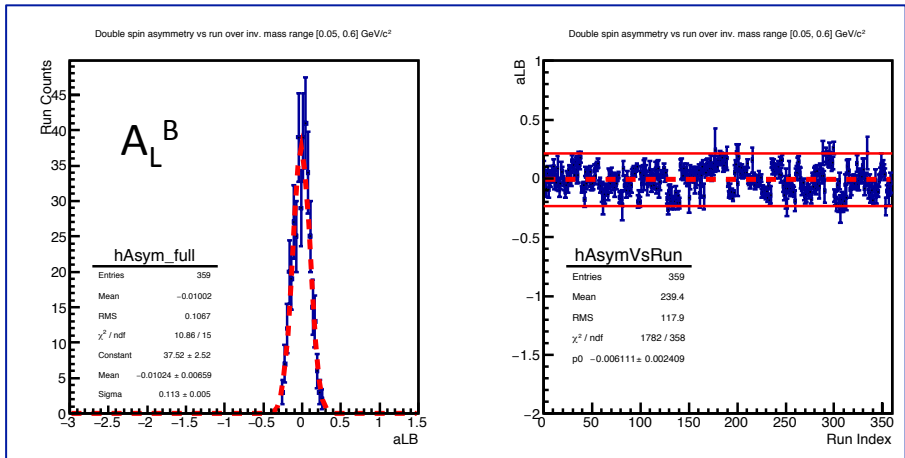
- **100 test runs (13077067 ~ 13085047) were used to check the large background false asymmetry for following three cases:**
 - (1) Anti-Kt R=0.6 using old EEMC DB
 - (2) Anti-Kt R=0.6 using new EEMC DB
 - (3) Anti-Kt R=0.5 using new EEMC DB

The false asymmetry offset from zero looks reasonable in above three cases, and did not find strong dependence on Anti-Kt cone size and EEMC DB.

- The investigation hints the large background asymmetry could be caused by certain runs

Asymmetry Results – Check large false asymmetries in background

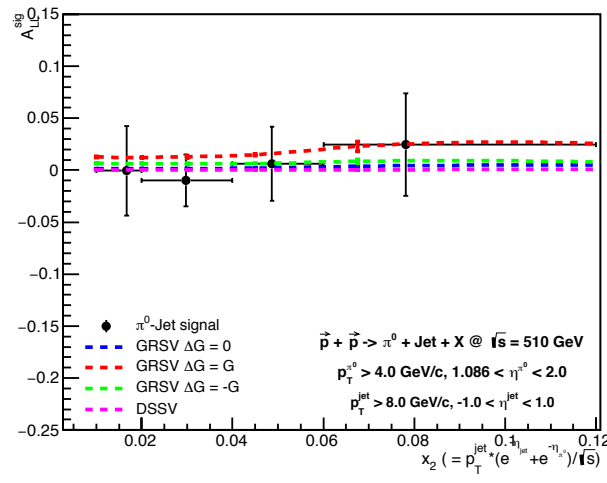
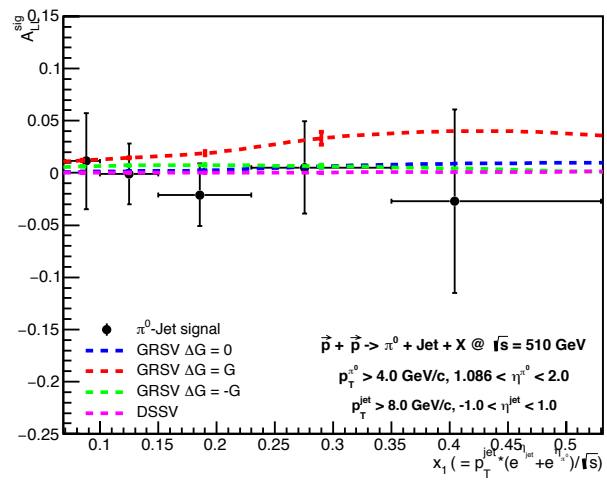
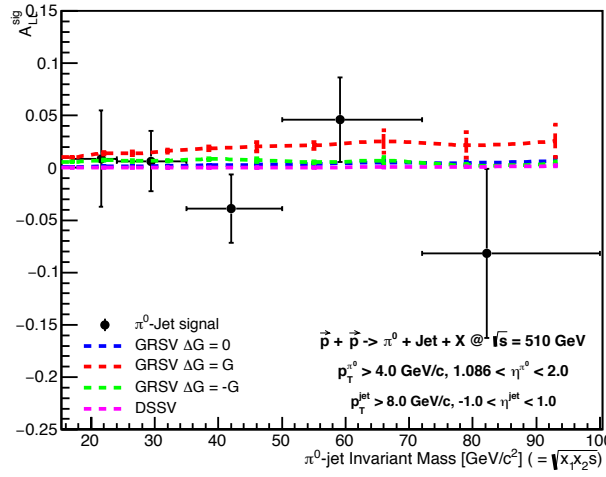
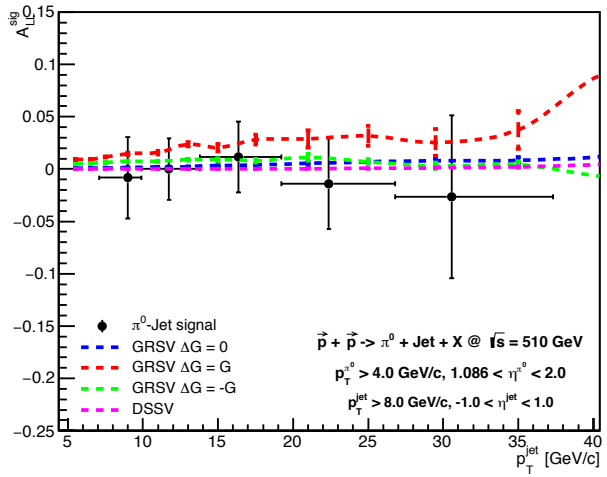
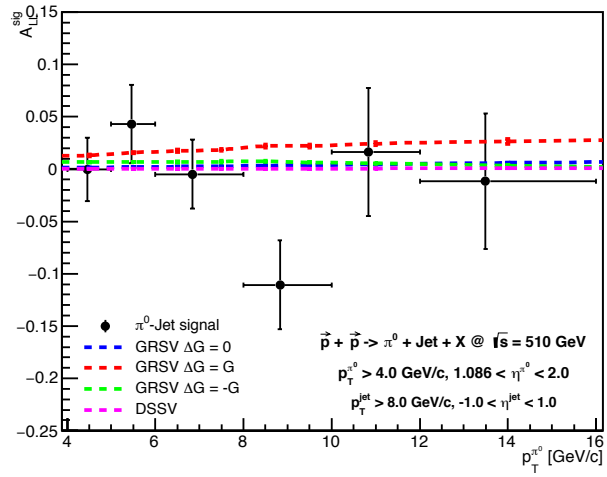
- Check the runs which have large raw false asymmetries (larger than mean + 2 * sigma)



- 62 of 359 runs were found which have large raw false asymmetries, and finally they are excluded from the run list.

- shiftLog info for these 62 runs: http://www4.rcf.bnl.gov/~ypwang/pi0JetAna/runList_largeFalseAsymmetry_runLogInfo.txt

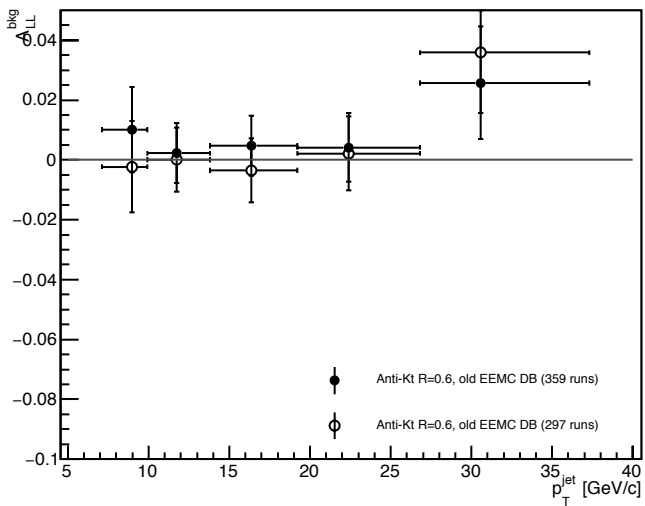
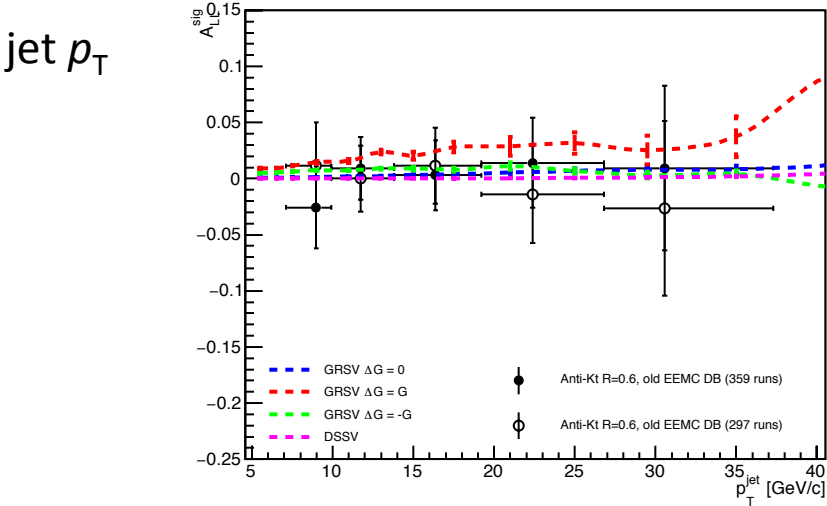
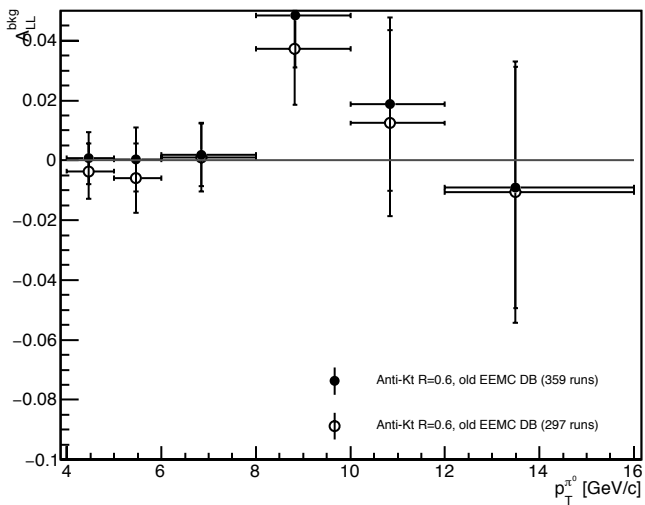
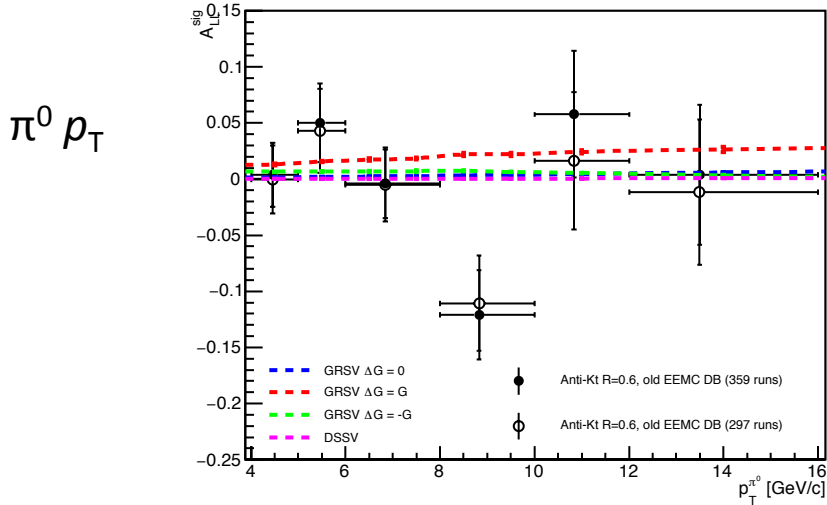
Asymmetry Results – Longitudinal double asymmetries, A_{LL}^{sig}



- Signal pi0-jet A_{LL}^{sig} with 297 runs (62 runs with large raw false asymmetry were excluded).
- Statistics only

Asymmetry Results – Longitudinal double asymmetries, A_{LL}

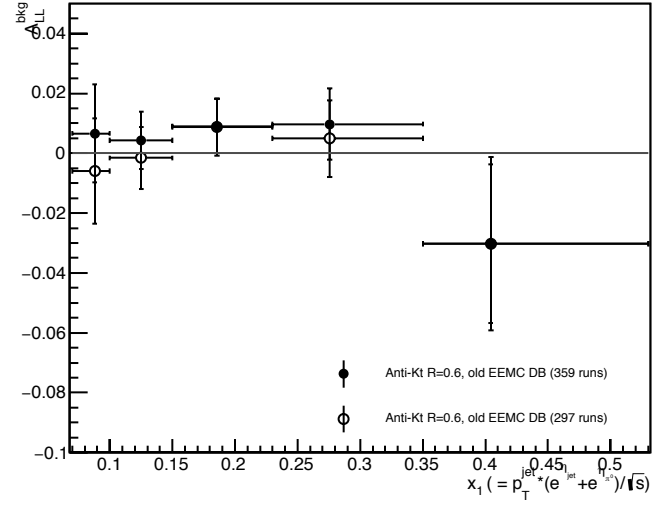
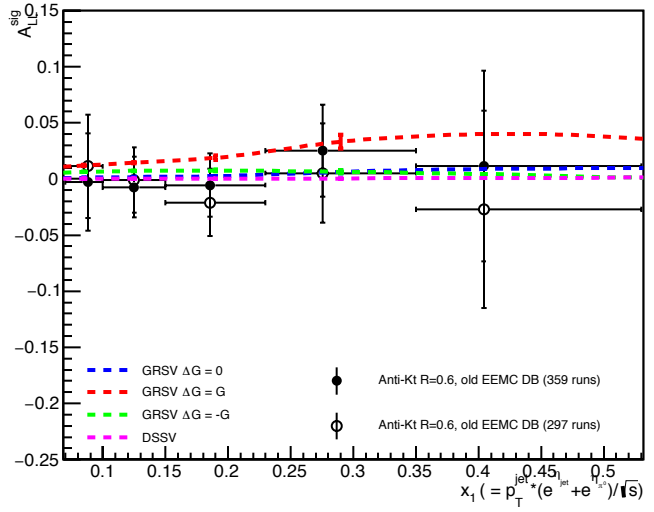
- Signal and background π^0 -jet A_{LL} comparison before and after the 62 runs removal



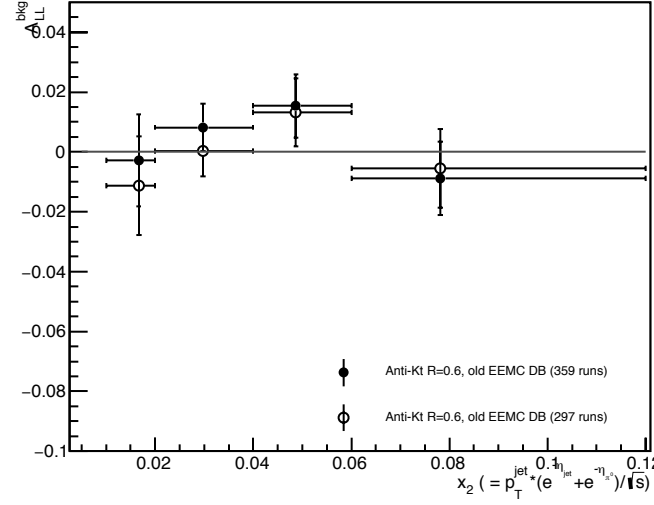
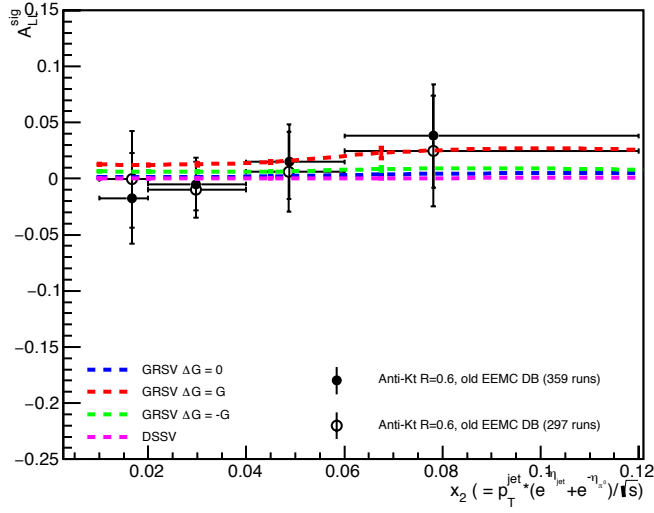
Asymmetry Results – Longitudinal double asymmetries, A_{LL}

- Signal and background π^0 -jet A_{LL} comparison before and after the 62 runs removal

X_1



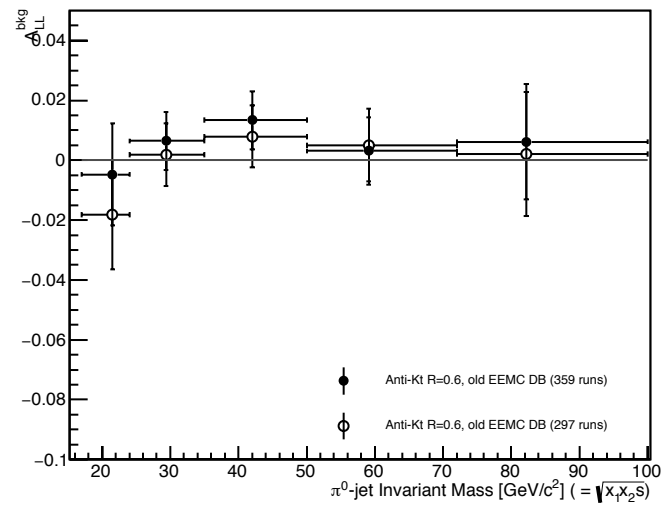
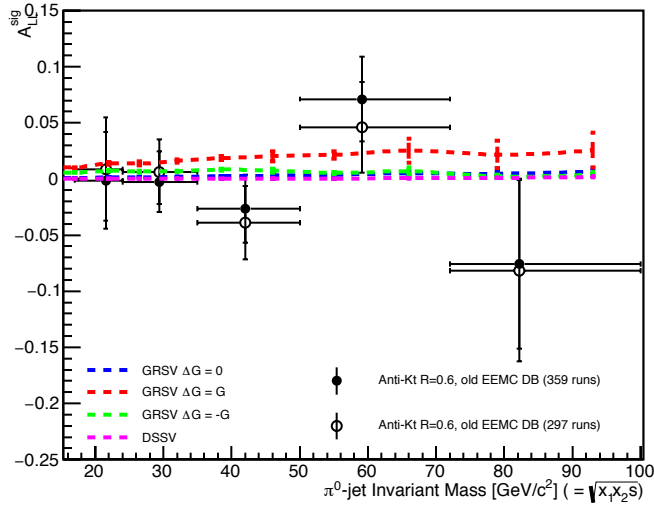
X_2



Asymmetry Results – Longitudinal double asymmetries, A_{LL}

- Signal and background π^0 -jet A_{LL} comparison before and after the 62 runs removal

Inv. mass



Deviation from zero in the constant fit

| Sig. False Asymmetry | $\pi^0 p_T$ | Jet p_T | x_1 | x_2 | Inv. mass |
|----------------------|-------------|-----------|-------|-------|-----------|
| A_L^B | 1.92 | 1.57 | 1.55 | 1.64 | 1.63 |
| A_L^Y | 0.47 | 0.44 | 0.65 | 0.50 | 0.45 |
| A_{LL}^{LS} | 1.13 | 0.90 | 0.90 | 0.90 | 0.92 |
| A_{LL}^{US} | 1.48 | 1.20 | 1.34 | 1.30 | 1.25 |
| | | | | | |

Combined triggers (JP0 + JP1 + JP2), Anti-Kt R=0.6, 297 runs

- Signal false asymmetries were consistent to zero within 2*sigma.

Deviation from zero in the constant fit

| Bkg. False Asymmetry | $\pi^0 p_T$ | Jet p_T | x_1 | x_2 | Inv. mass |
|----------------------|-------------|-----------|-------|-------|-----------|
| A_L^B | 1.53 | 1.58 | 1.48 | 1.68 | 1.55 |
| A_L^Y | 2.18 | 2.11 | 2.12 | 2.04 | 2.12 |
| A_{LL}^{LS} | 0.02 | 0.05 | 0.16 | 0.19 | 0.03 |
| A_{LL}^{US} | 2.27 | 2.24 | 2.21 | 2.27 | 2.22 |
| | | | | | |

Combined triggers (JP0 + JP1 + JP2), Anti-Kt R=0.6, 297 runs

- Background false asymmetries were consistent to zero within 2.3*sigma.

Systematics sources:

- Propagated uncertainty from relative luminosity, δR_3
- Propagated uncertainty from single spin asymmetries (SSA) offset (δA_L^Y , δA_L^B , δA_{LL}^{LS} , δA_{LL}^{US})
- Propagated uncertainty from fit function shape

$$A_{LL} = \frac{\sum P_Y P_B [(N^{++} + N^{--}) - R_3 (N^{+-} + N^{-+})]}{\sum P_Y^2 P_B^2 [(N^{++} + N^{--}) + R_3 (N^{+-} + N^{-+})]}$$

Asymmetry Results – systematics propagated from R_3

- Systematics due to relative luminosity uncertainty, δR_3
- The uncertainty of double spin asymmetry can be estimated as below way [1]

$$\delta A_{LL} \cong \frac{1}{P_B P_Y} \cdot \frac{\delta R_3}{2R_3}$$

Here we take the deduced systematic uncertainty of $\delta R/2R \approx \pm 0.0004$ [1], and assume $P_B=P_Y=0.55$. Then $\delta A_{LL} \approx \pm 0.0013$.

For a conservative estimate, we use ± 0.0015 in this result.

[1] James Hayes-Wehle, Joe Seele, Hal Spinka, Bernd Surrow, PSN0570: Relative Luminosity Analysis for run9 pp 200 GeV Running, Nov. 25, 2012. <http://drupal.star.bnl.gov/STAR/starnotes/private/psn0570>

Asymmetry Results – systematics propagated from SSA

- Systematics due to single spin asymmetries offset (δA_L^Y , or δA_L^B , or δA_{LL}^{LS} , or δA_{LL}^{US})

Following the same way as Suvarna's Dijet analysis to estimate systematics due to SSA offset from zero: https://drupal.star.bnl.gov/STAR/system/files/SSA_Systematics_0.pdf

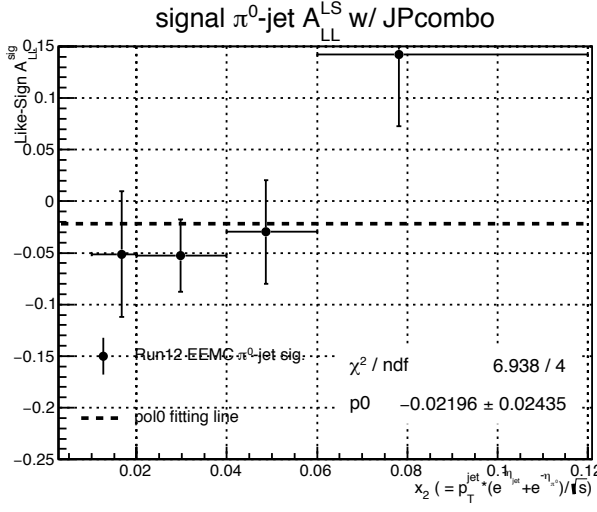
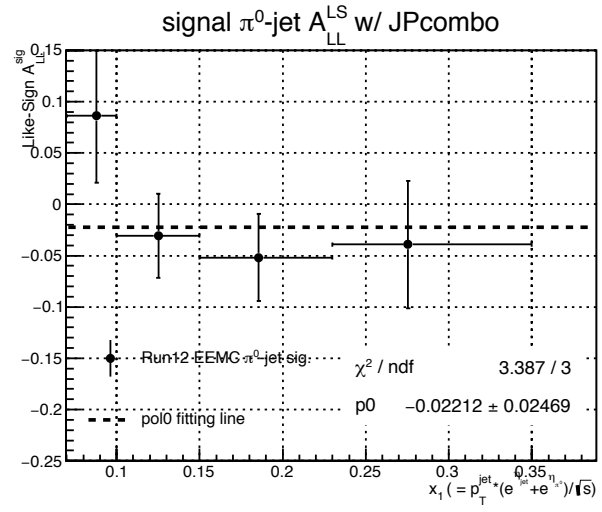
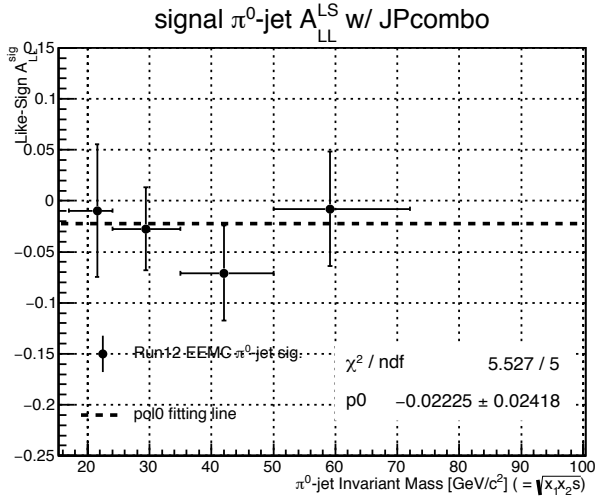
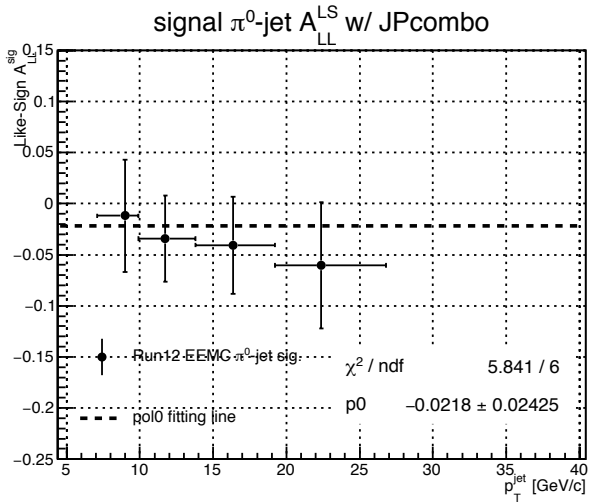
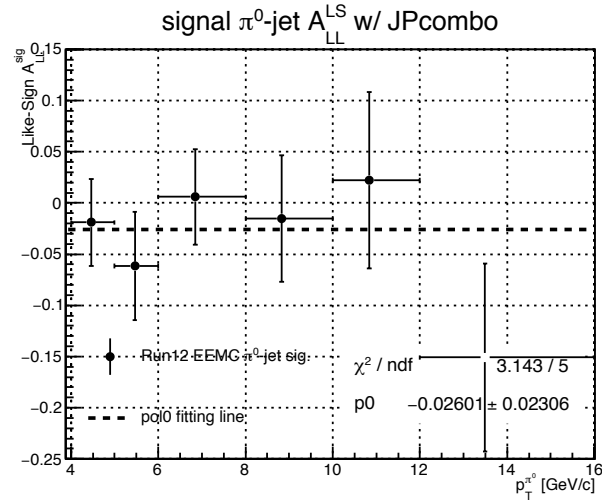
Suvarna's talk at SPIN PWG meeting on Jan. 18, 2016

Incorporating the Single Spin Asymmetries offset as a systematic error

- + False Asymmetries : https://drupal.star.bnl.gov/STAR/system/files/Spin_Nov2_0.pdf
- + Trying to find a way to quantify the offset of Single Spin Asymmetries from zero as a systematic error into A_{LL}
 - + Systematic error due to R_3 is 0.0004
 - + Assume any systematic offset from zero in the SSA arises from contributions to the dijet yields in one and only one spin state
 - + Since the asymmetries in A_{LS} , A_B and A_Y are all negative, it is natural to assign the effect to the spin state with spin bit 10 (N_{10} or N^{++})
 - + Encapsulate the modification of N_{10} by a multiplicative factor f and then use this in the definition of A_{LS} , to extract f
 - + We make the assumption that the relative luminosities are "correct", since there is already an error associated with them, and so the multiplicative f is not included in the yields used to extract the relative luminosities

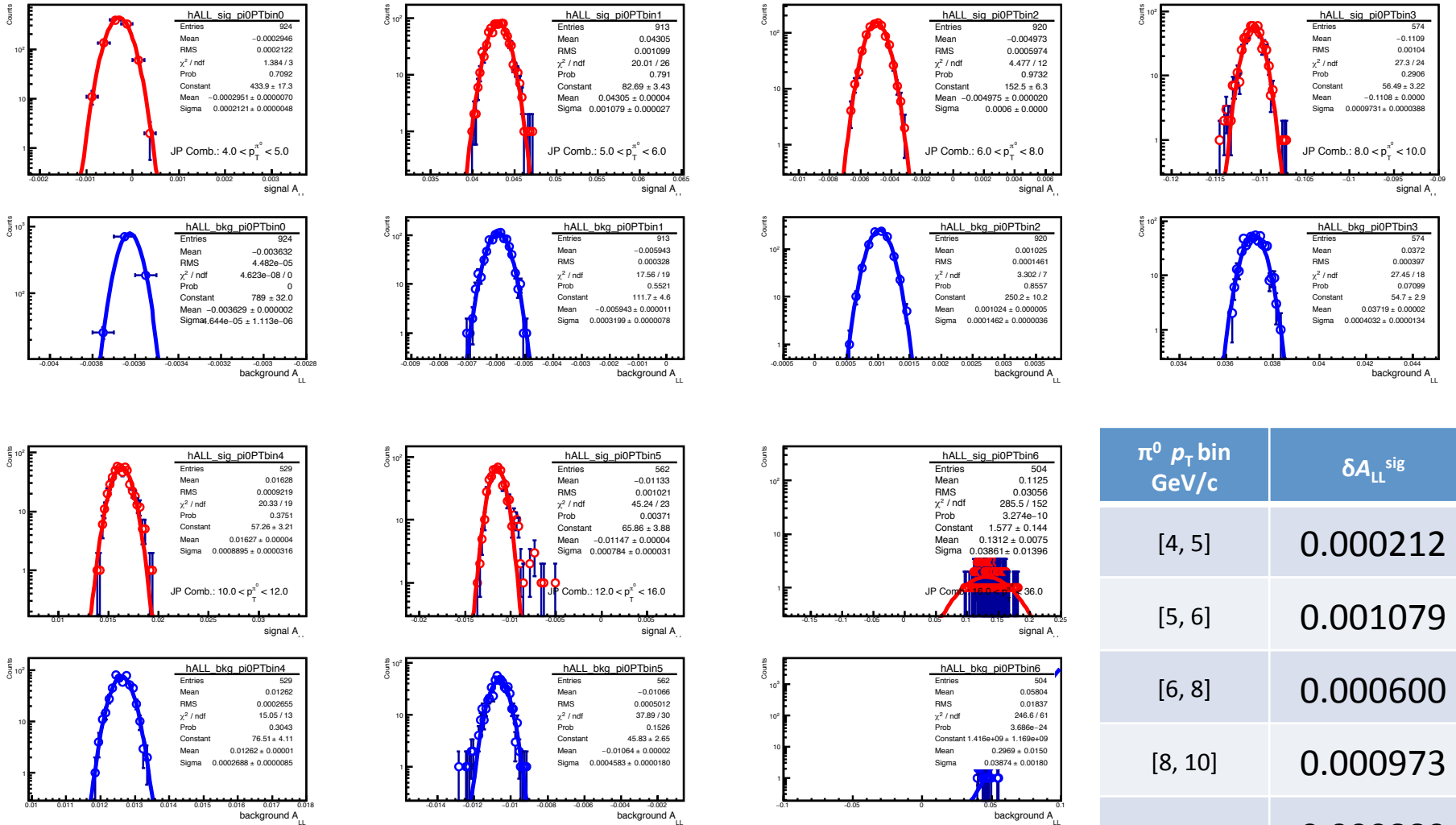
In this study, the uncertainties from SSA were calculated from A_{LL}^{LS} .

Asymmetry Results – systematics propagated from SSA



| variable | δA_{LL} from SSA |
|-------------|--------------------------|
| $\pi^0 p_T$ | 0.013108 |
| jet p_T | 0.010972 |
| x_1 | 0.011135 |
| x_2 | 0.011053 |
| inv. mass | 0.011200 |

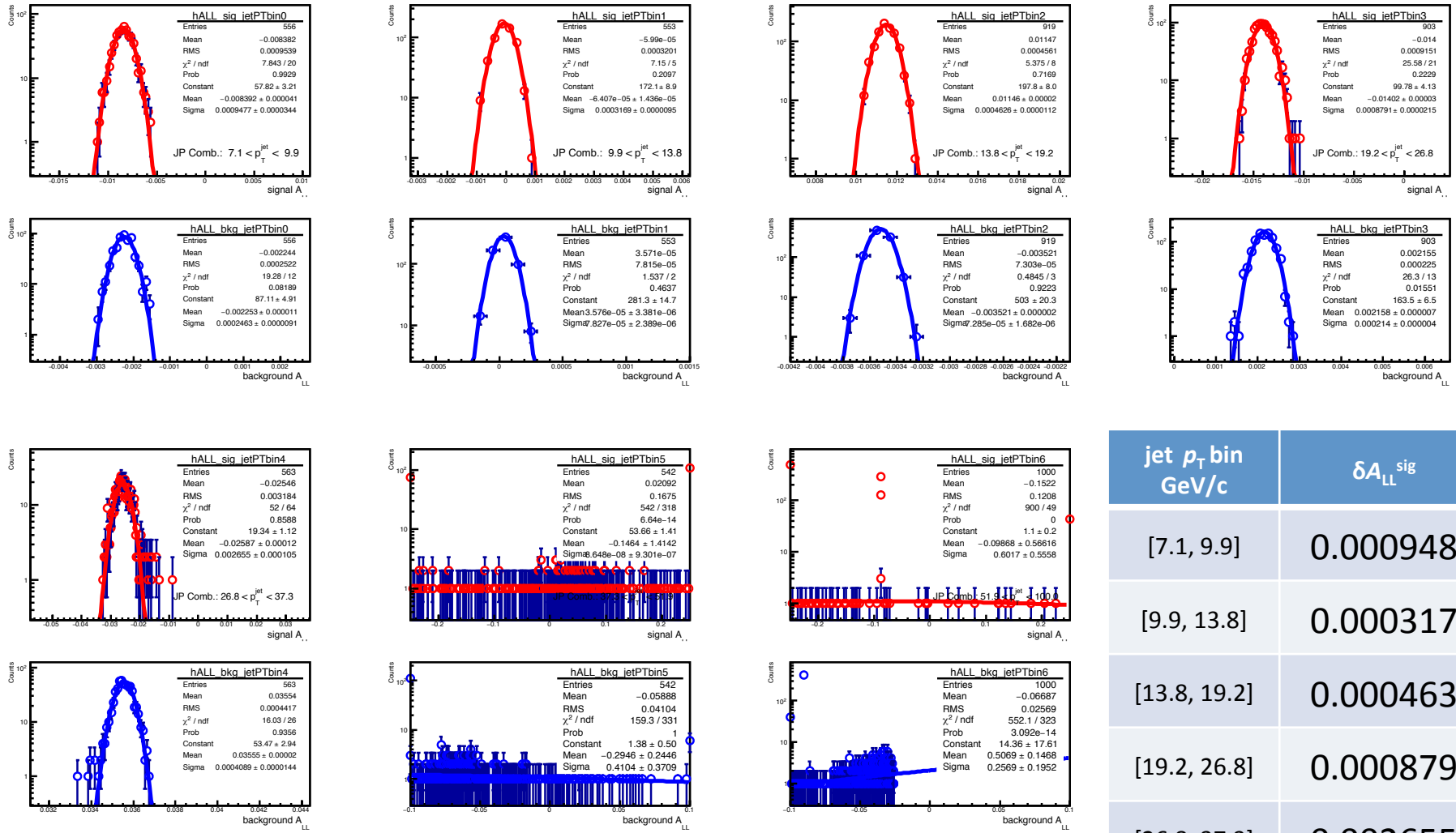
Asymmetry Results – systematics propagated from fit function shape



| $\pi^0 p_T$ bin GeV/c | $\delta A_{LL}^{\text{sig}}$ |
|--------------------------|------------------------------|
| [4, 5] | 0.000212 |
| [5, 6] | 0.001079 |
| [6, 8] | 0.000600 |
| [8, 10] | 0.000973 |
| [10, 12] | 0.000889 |
| [12, 16] | 0.000784 |

- Asymmetries distribution calculated by n_{sig} and n_{bkg} from fitting with slightly deviated function shape.

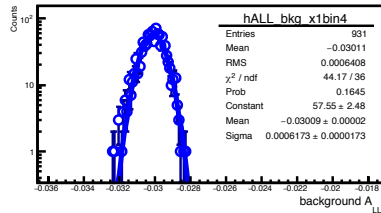
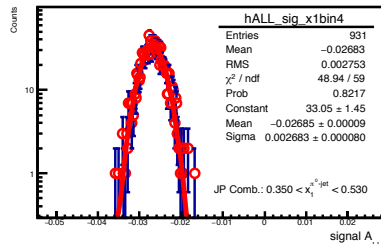
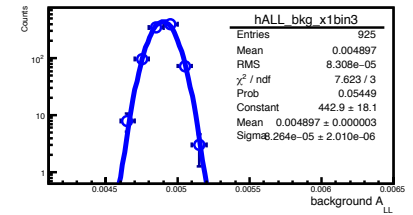
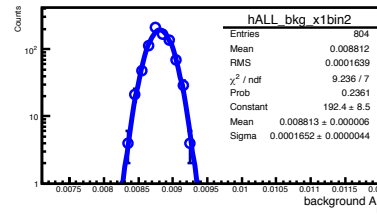
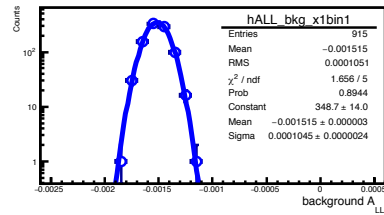
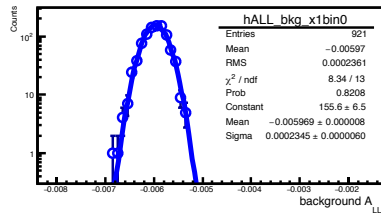
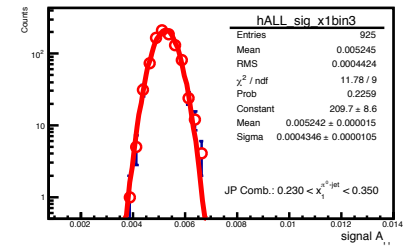
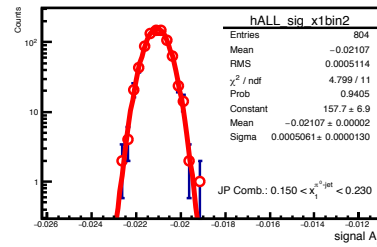
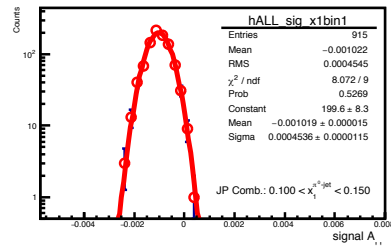
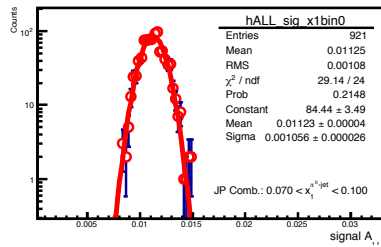
Asymmetry Results – systematics propagated from fit function shape



| jet p_T bin GeV/c | $\delta A_{LL}^{\text{sig}}$ |
|------------------------|------------------------------|
| [7.1, 9.9] | 0.000948 |
| [9.9, 13.8] | 0.000317 |
| [13.8, 19.2] | 0.000463 |
| [19.2, 26.8] | 0.000879 |
| [26.8, 37.3] | 0.002655 |

- Asymmetries distribution calculated by n_{sig} and n_{bkg} from fitting with slightly deviated function shape.

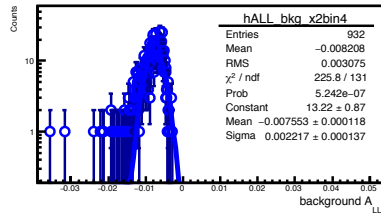
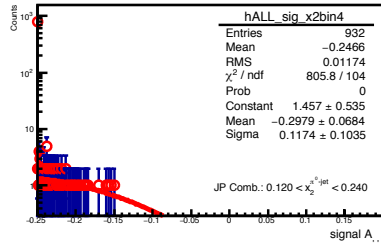
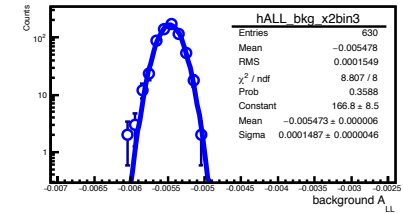
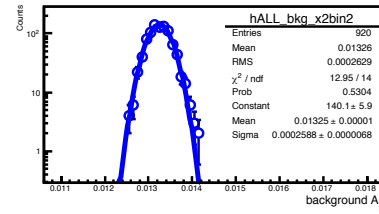
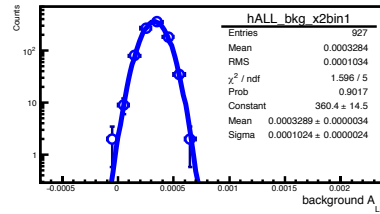
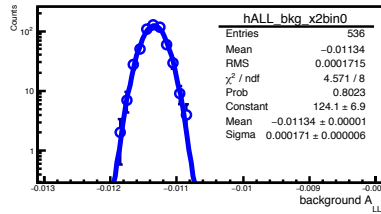
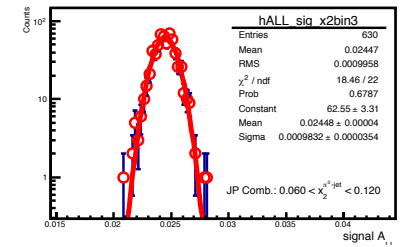
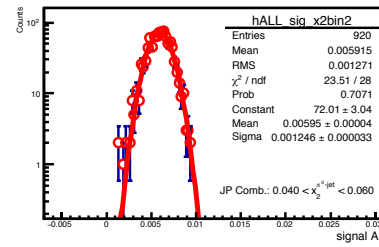
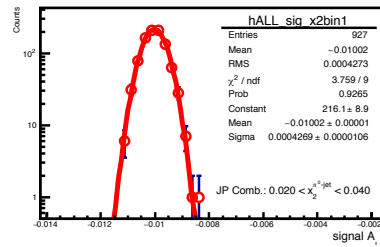
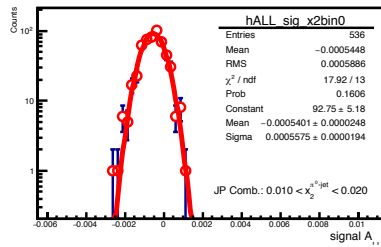
Asymmetry Results – systematics propagated from fit function shape



| x_1 bin | $\delta A_{LL}^{\text{sig}}$ |
|--------------|------------------------------|
| [0.07, 0.10] | 0.001056 |
| [0.10, 0.15] | 0.000454 |
| [0.15, 0.23] | 0.000506 |
| [0.23, 0.35] | 0.000435 |
| [0.35, 0.53] | 0.002683 |

- Asymmetries distribution calculated by n_{sig} and n_{bkg} from fitting with slightly deviated function shape.

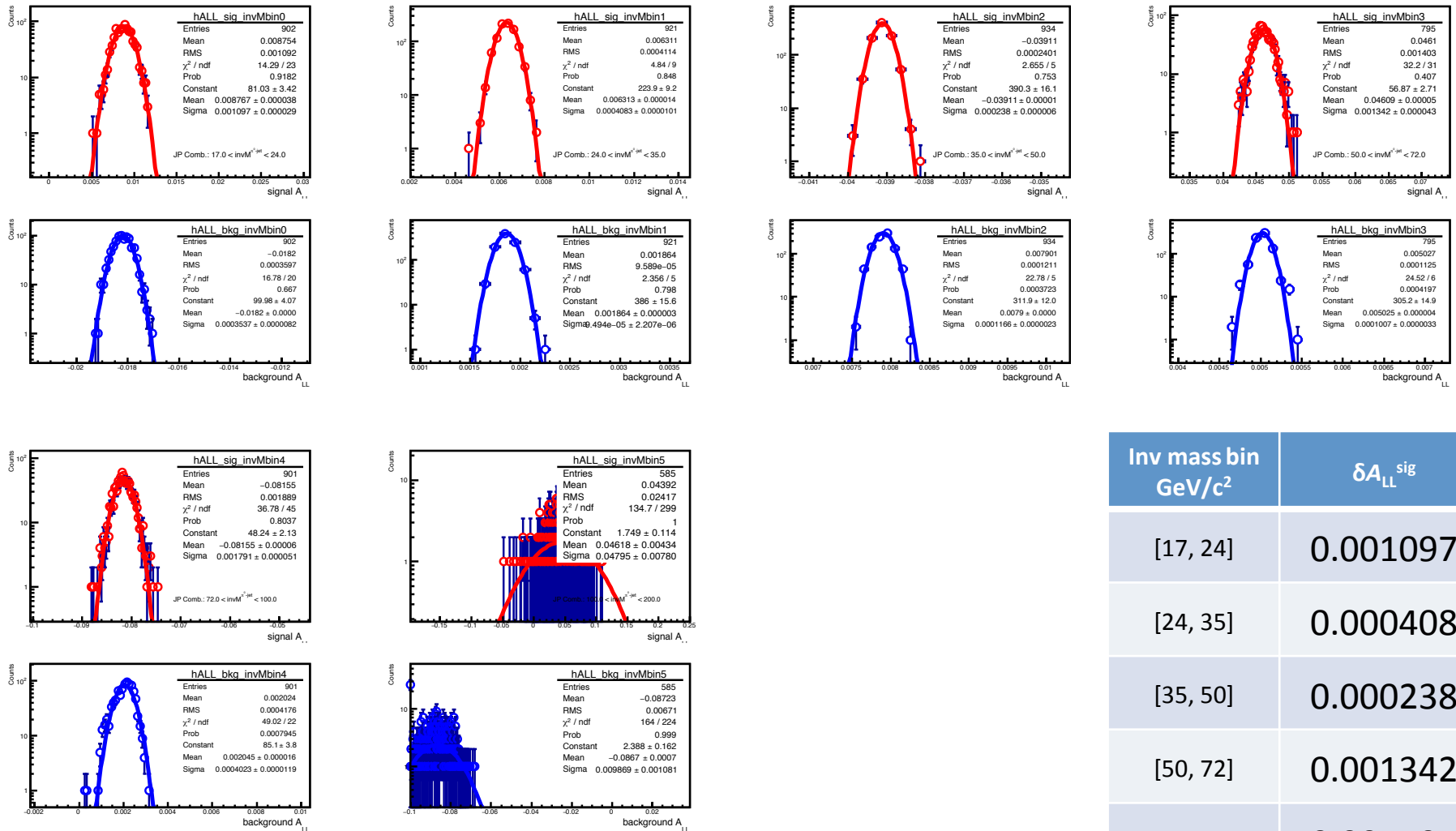
Asymmetry Results – systematics propagated from fit function shape



| x_2 bin | $\delta A_{LL}^{\text{sig}}$ |
|--------------|------------------------------|
| [0.01, 0.02] | 0.000558 |
| [0.02, 0.04] | 0.000427 |
| [0.04, 0.06] | 0.001246 |
| [0.06, 0.12] | 0.000983 |

- Asymmetries distribution calculated by n_{sig} and n_{bkg} from fitting with slightly deviated function shape.

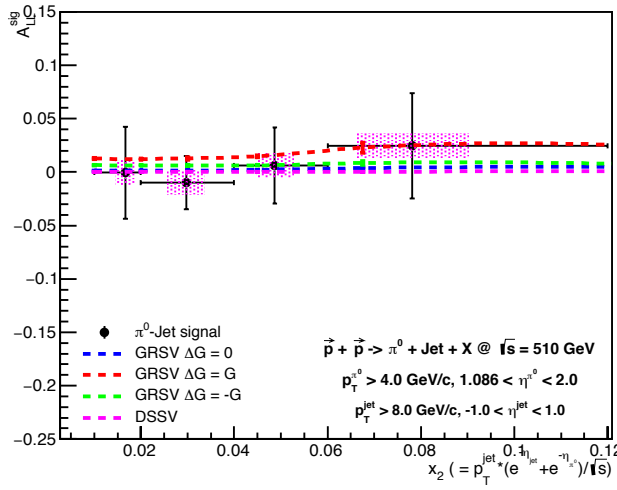
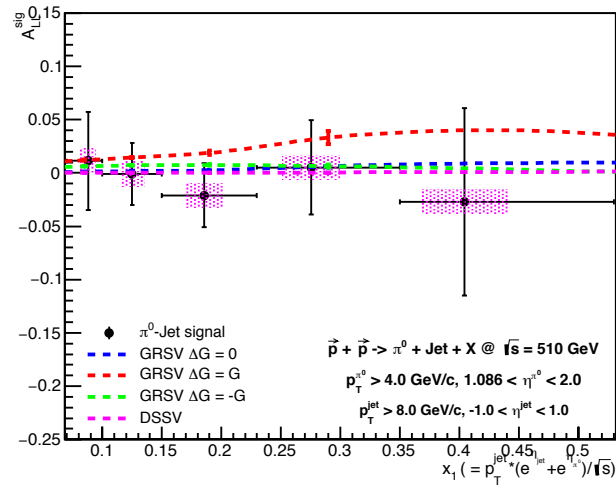
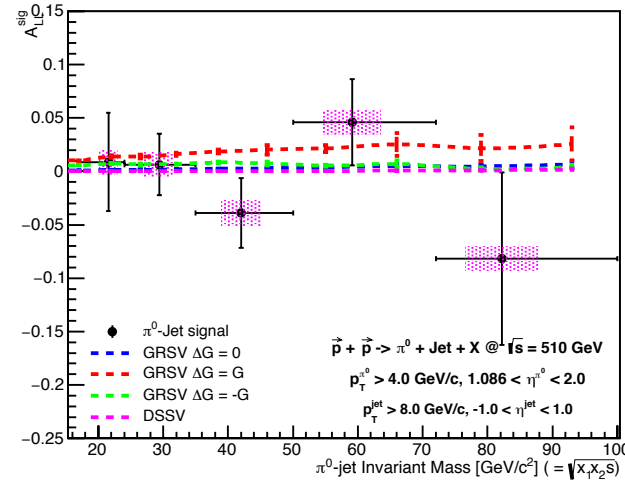
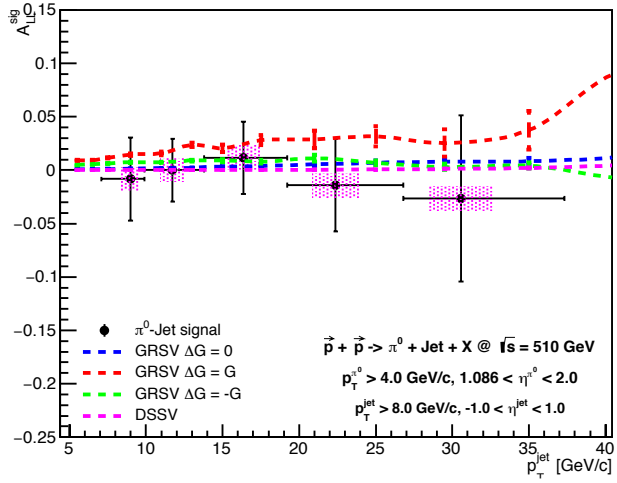
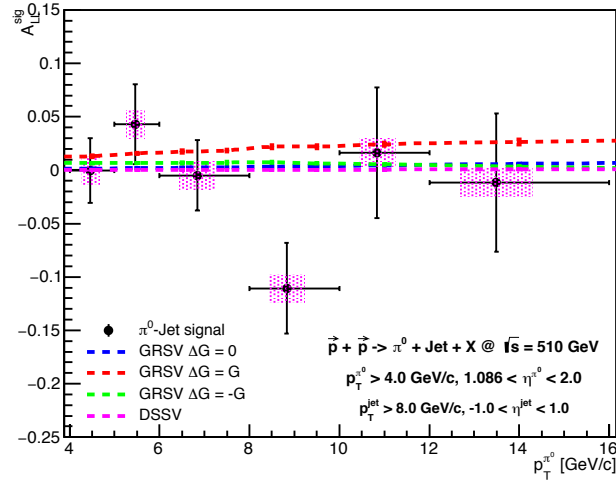
Asymmetry Results – systematics propagated from fit function shape



| Inv mass bin GeV/c ² | $\delta A_{LL}^{\text{sig}}$ |
|------------------------------------|------------------------------|
| [17, 24] | 0.001097 |
| [24, 35] | 0.000408 |
| [35, 50] | 0.000238 |
| [50, 72] | 0.001342 |
| [72, 100] | 0.001791 |

- Asymmetries distribution calculated by n_{sig} and n_{bkg} from fitting with slightly deviated function shape.

Figures requesting for release:



Error bar: statistics uncert.

Box: systematic uncert.

Summary

- The methods of systematics estimation were proposed;
- Large false asymmetries of background were investigated in more details. Based on 100 test runs, and we found:
 - The A_{LL} did not show strong dependences on Anti-Kt cone size and EEMC DB;
 - The large false asymmetry of background could be contributed by certain runs.
 - The false asymmetry offsets from zero become reasonable (within ~ 2.3) once we excluded the runs having large raw false asymmetries.
- Plots for signal π^0 -jet A_{LL} as function of $\pi^0 p_T$, jet p_T , x_1 , x_2 and invariant mass are requested for preliminary approval.

Thanks for your attention!