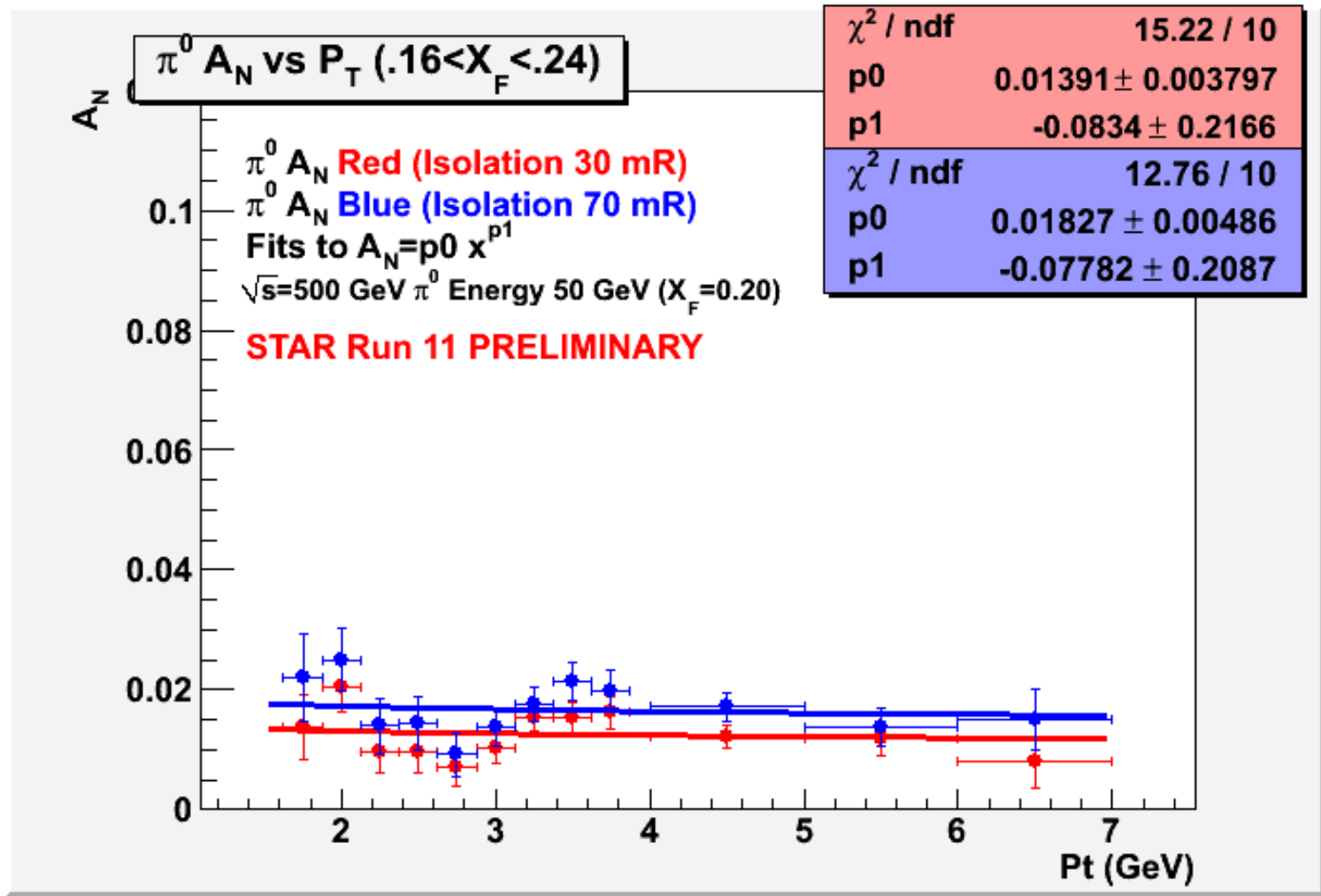


Extra

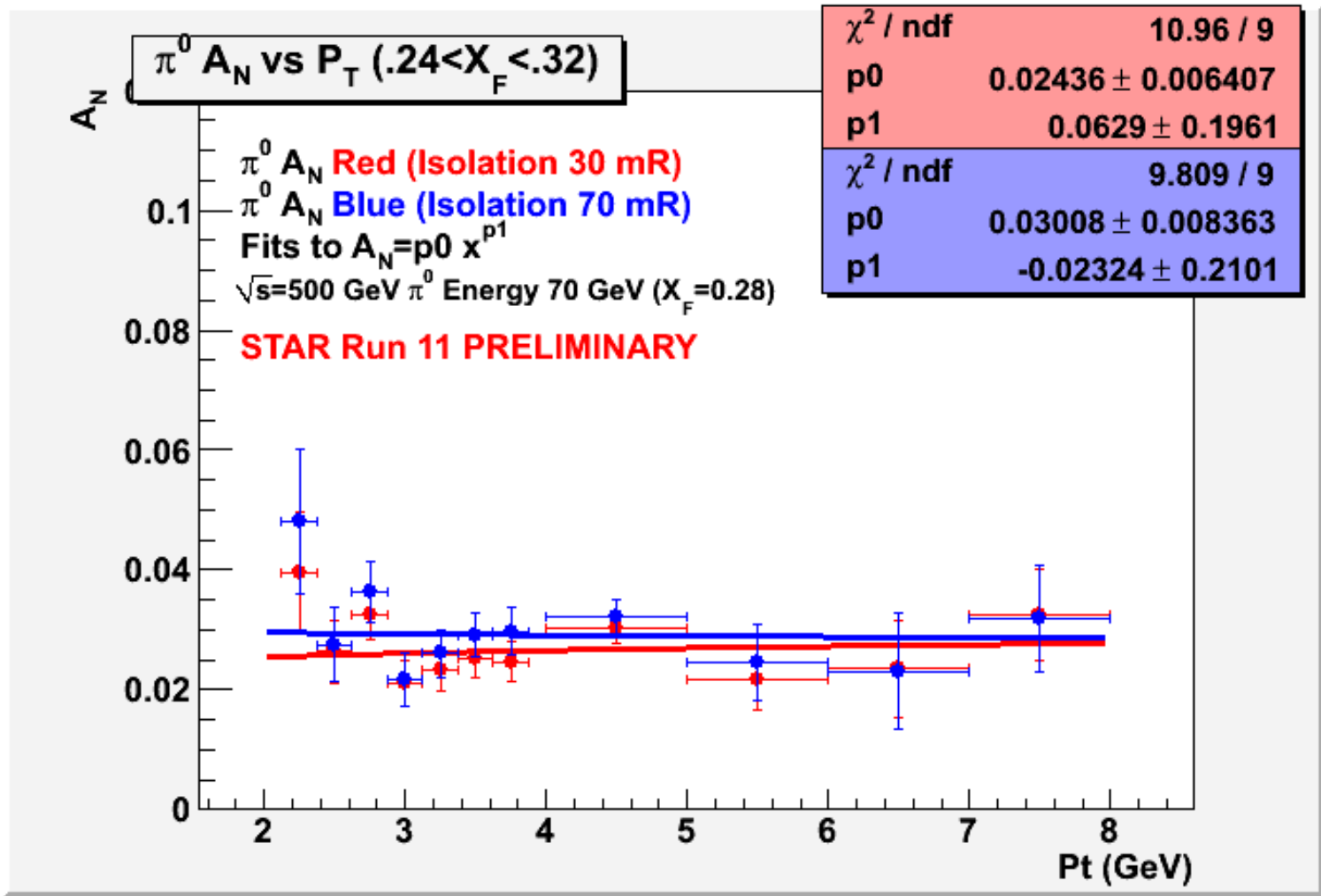
Transverse Single Spin π^0 Asymmetry vs P_T for small and large π^0 isolation cones.

Fits to power of P_T . (Errors shown are statistical)



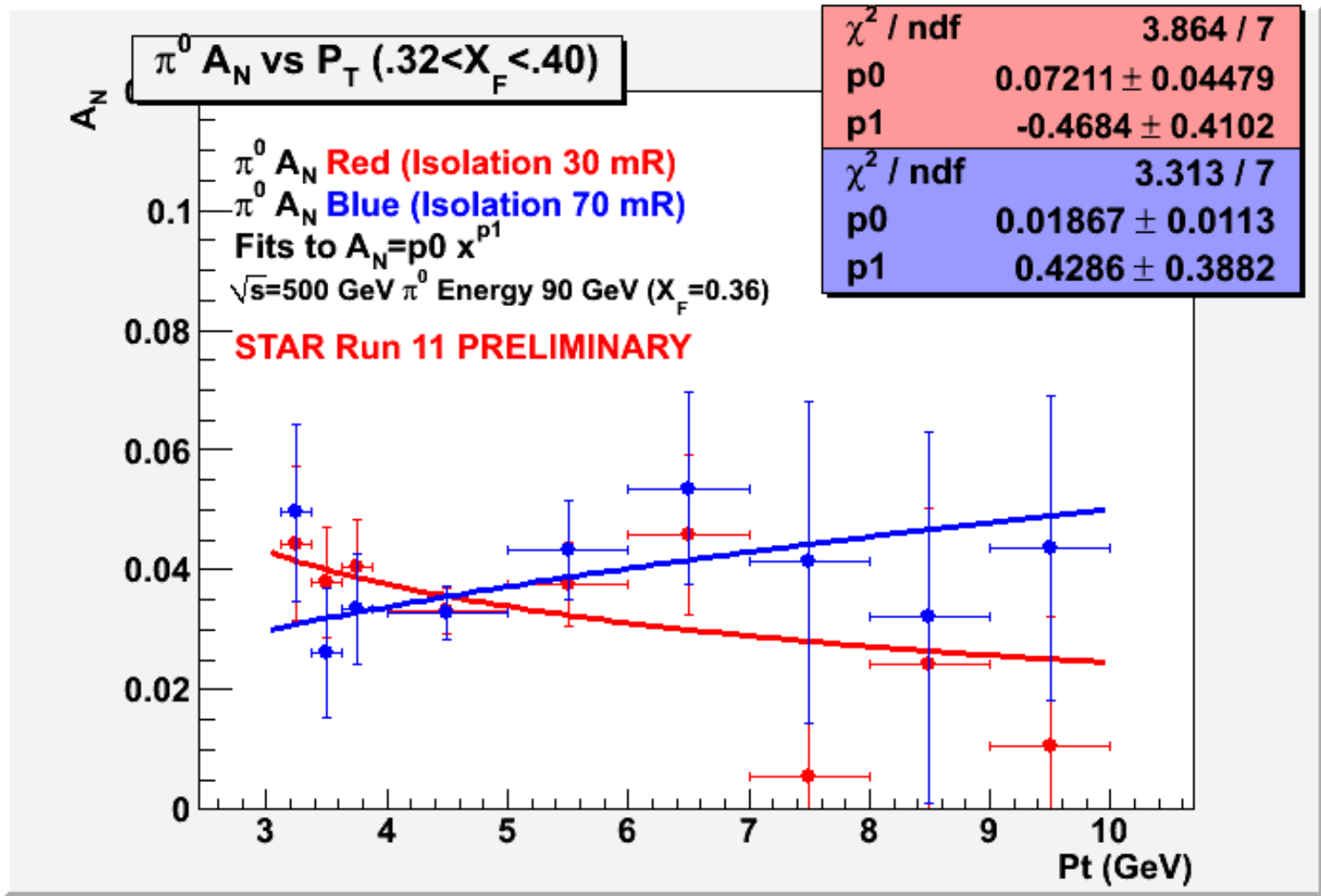
Transverse Single Spin π^0 Asymmetry vs P_T for small and large π^0 isolation cones.

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Transverse Single Spin π^0 Asymmetry vs P_T for small and large π^0 isolation cones.

Fits to power of P_T . (Errors shown are statistical)

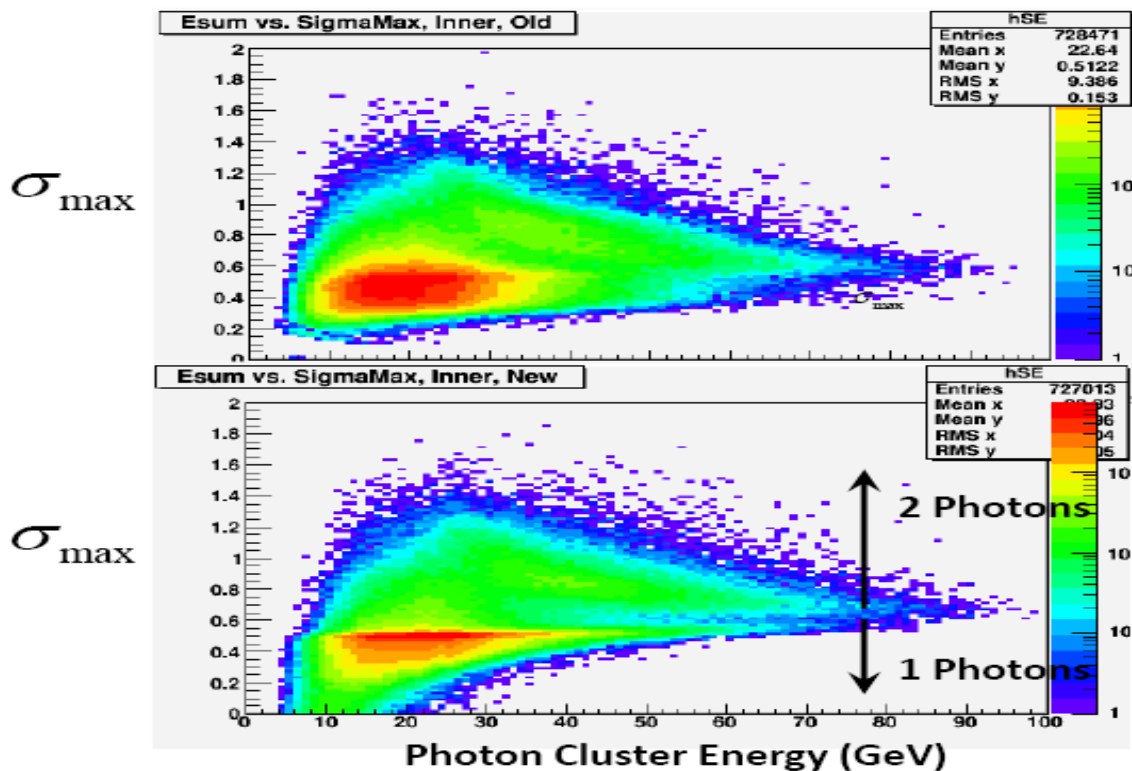


$$\Delta\sigma_x^2 = \frac{\sum_{i(e_i > e_0)} (x_i - x_0)^2 \ln(e_i / e_0)}{\sum_{i(e_i > e_0)} \ln(e_i / e_0)}$$

$$\Delta\sigma_x \Delta\sigma_y = \frac{\sum_{i(e_i > e_0)} (x_i - x_0)(y_i - y_0) \ln(e_i / e_0)}{\sum_{i(e_i > e_0)} \ln(e_i / e_0)}$$

Separation of single photon cluster from two photon cluster based upon distribution of shower energy along a preferred axis.

$$\sigma_{\max} \equiv \text{Max Eigenvalue of } \begin{bmatrix} \Delta\sigma_x^2 & \Delta\sigma_x \Delta\sigma_y \\ \Delta\sigma_y \Delta\sigma_x & \Delta\sigma_y^2 \end{bmatrix}$$



Old algorithm with Energy weighted moments

Improved algorithm with log energy weighted moments.

Provides clearer separation Between π^0 and single photon. Clusters up to ~ 80 GeV.

From Len's Analysis,

-Single Photon peak changes little with Energy
Single peak at SigmaMax~.5

-Two Photon peak moves toward the Single photon peak as energy increases
Double SigmaMax Peak

38 GeV $\langle \text{SigmaMax} \rangle \sim .85$

73 GeV $\langle \text{SigmaMax} \rangle \sim .75$

drupal.star.bnl.gov/STAR/blog/leun/2010/jan/11/sigmamax-data-mc-comparision-

heppel's blog | The ... Index of /protected/... Google Voice - Inbo... ScienceDirect - Phys...

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General information

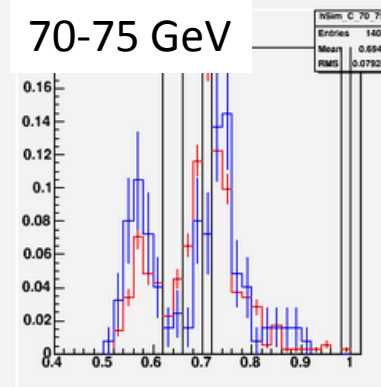
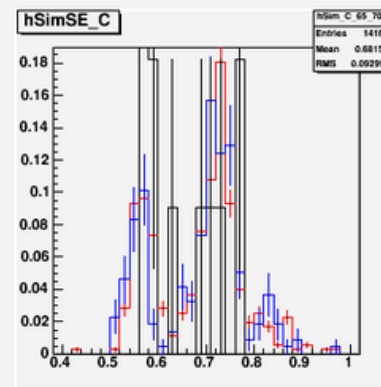
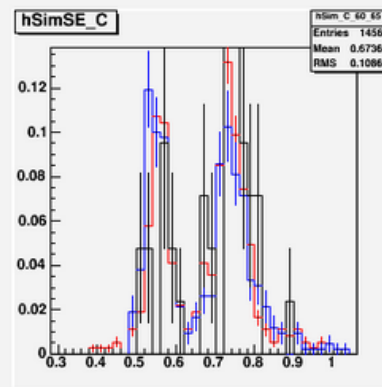
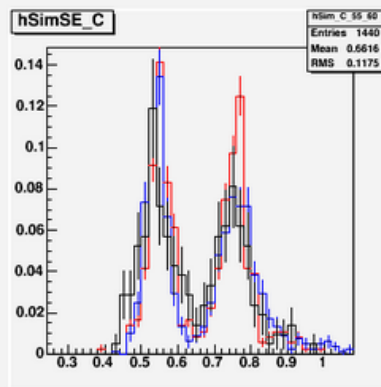
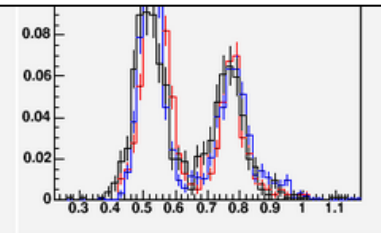
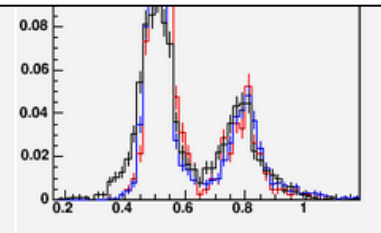
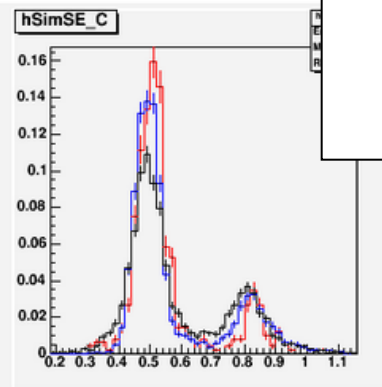
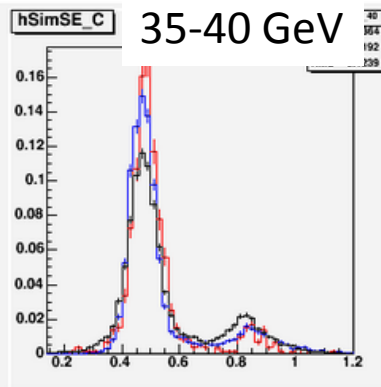
BLACK: Data (only set 61)

RED: flat-distribution pi0 toy events + GSTAR, with digitization and 1-count pedestals

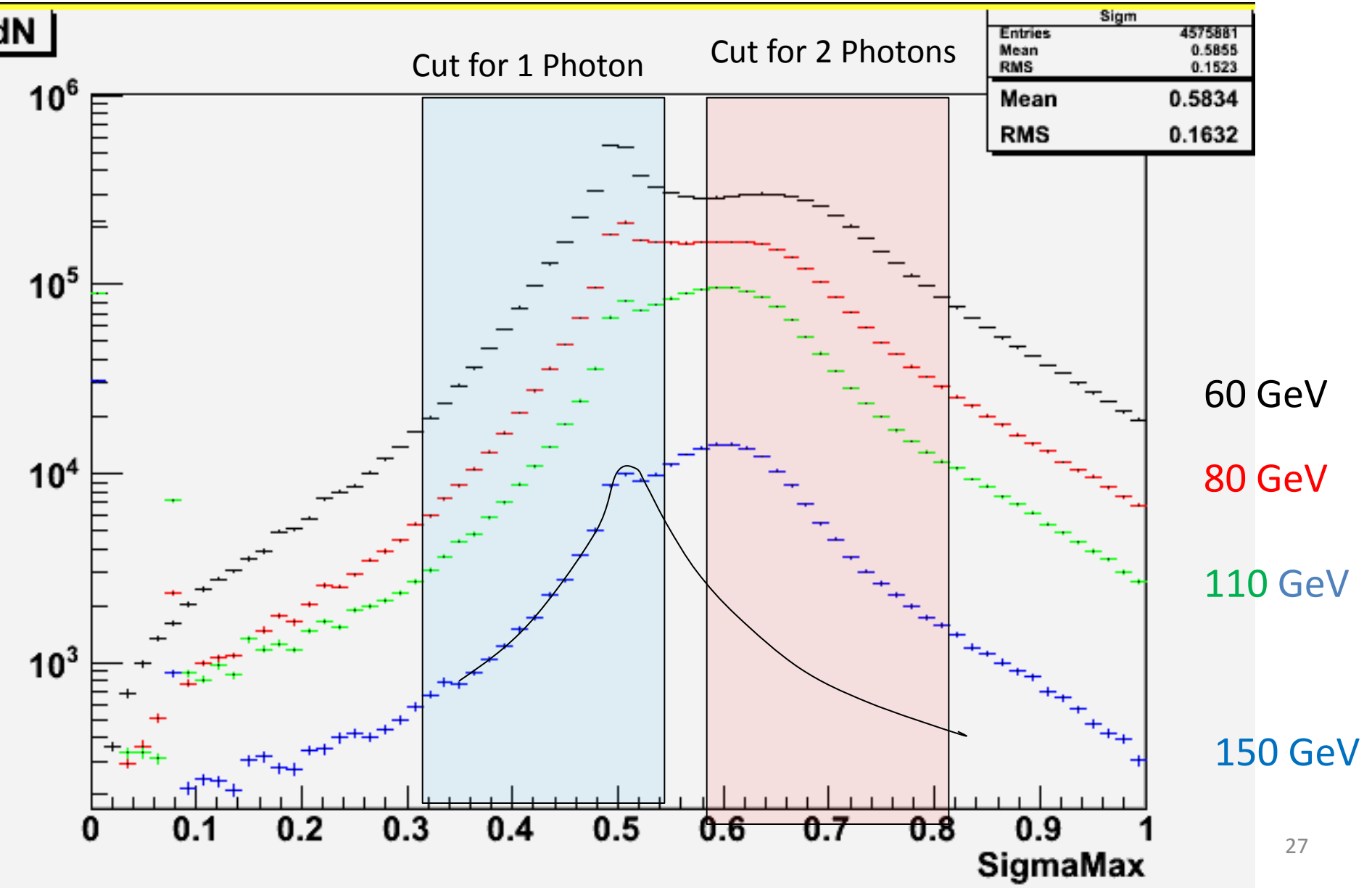
BLUE: Pythia 6.4 + GSTAR, with digitization and 1-count pedestal uncertainty

Clusters are divided into 4 categories, and for each category there are 8 plots for 8

1. Inner central

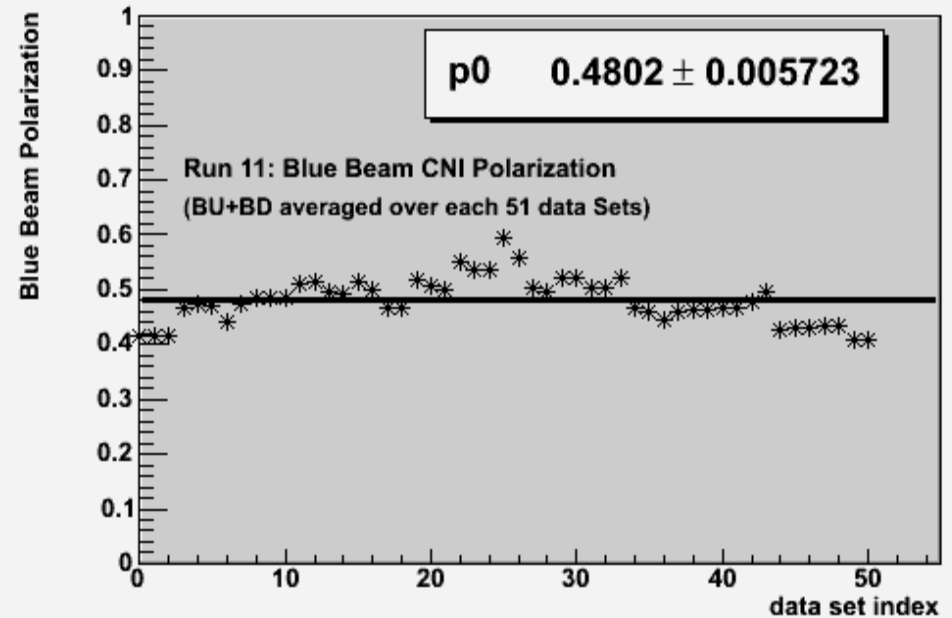


Run 11 distributions of SigmaMax as a indicator of single photon vs π^0 only slowly degrades with higher energy.



Blue Beam Polarization Measurements

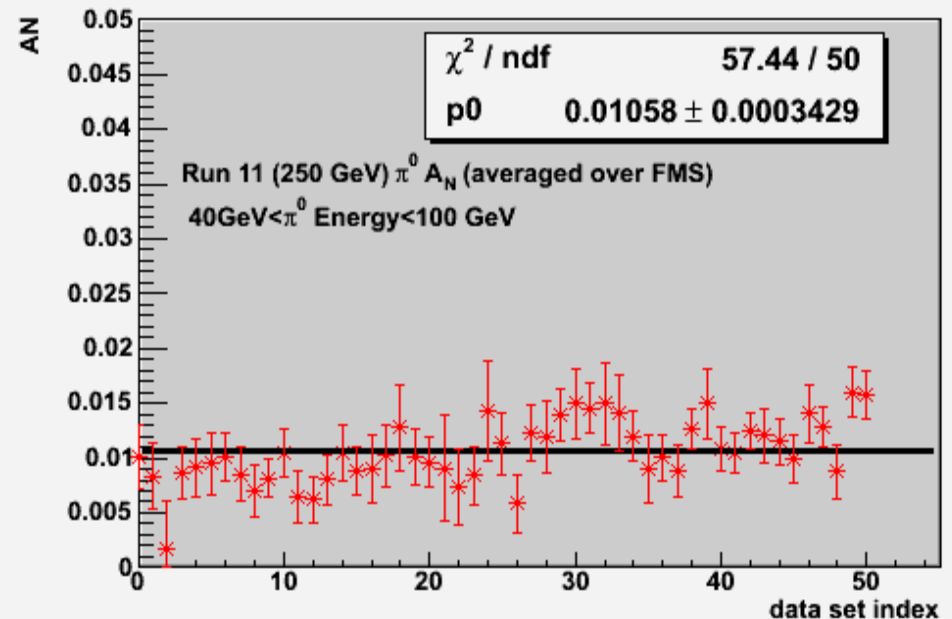
- CNI polarimeter data
- Average polarization for 51 consecutive time periods each data set represents $\sim \frac{1}{2}$ day of running.



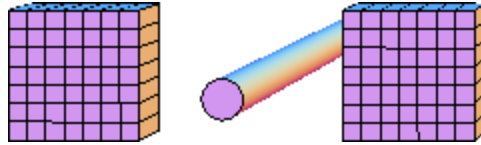
As from previous slide:

For the “ A_N vs $\cos(\phi)$ ” fits to all FMS data divided into the 51 consecutive time periods.

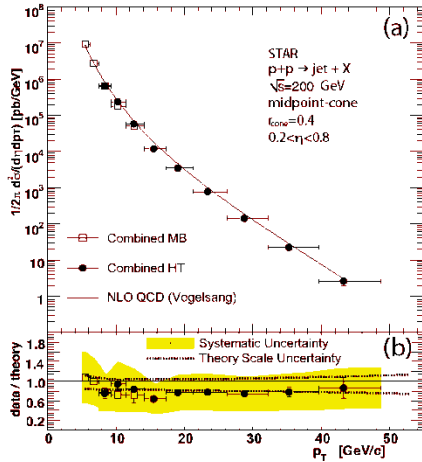
- 22.4 pb^{-1}
- $2.6 < \text{pseudorapidity} < 4.1$
- $40 \text{ GeV} < \text{Energy } \pi^0 < 100 \text{ GeV}$
- Average polarization 48%
- Corrected each of of 51 sets (each set $\sim \frac{1}{2}$ day of data)



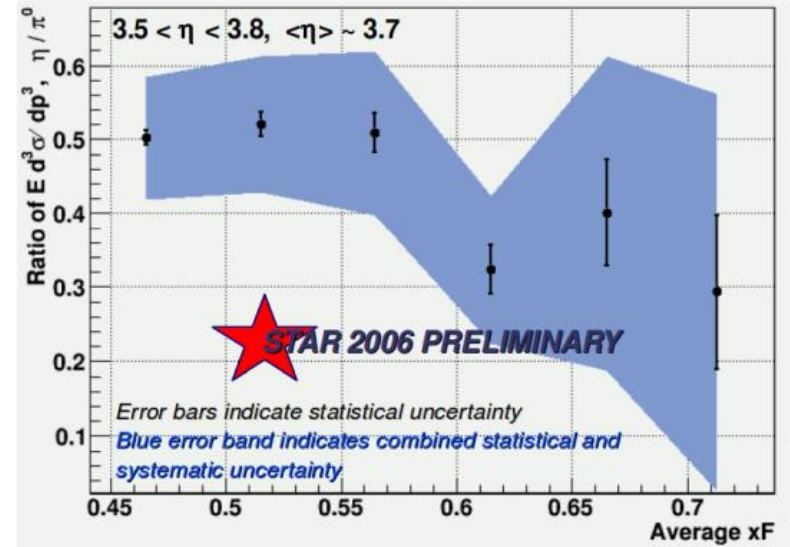
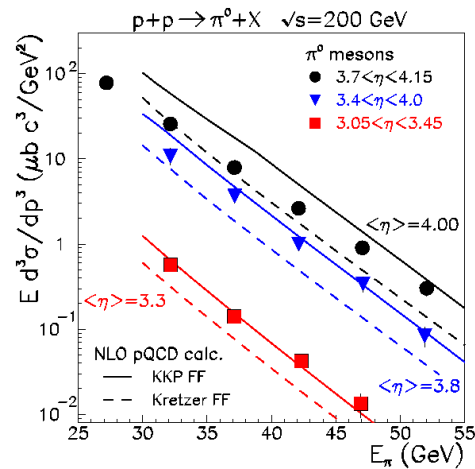
Unpolarized Cross Sections agree with Collinear Factorization PQCD



PRL 97, 252001



PRL 97, 152302

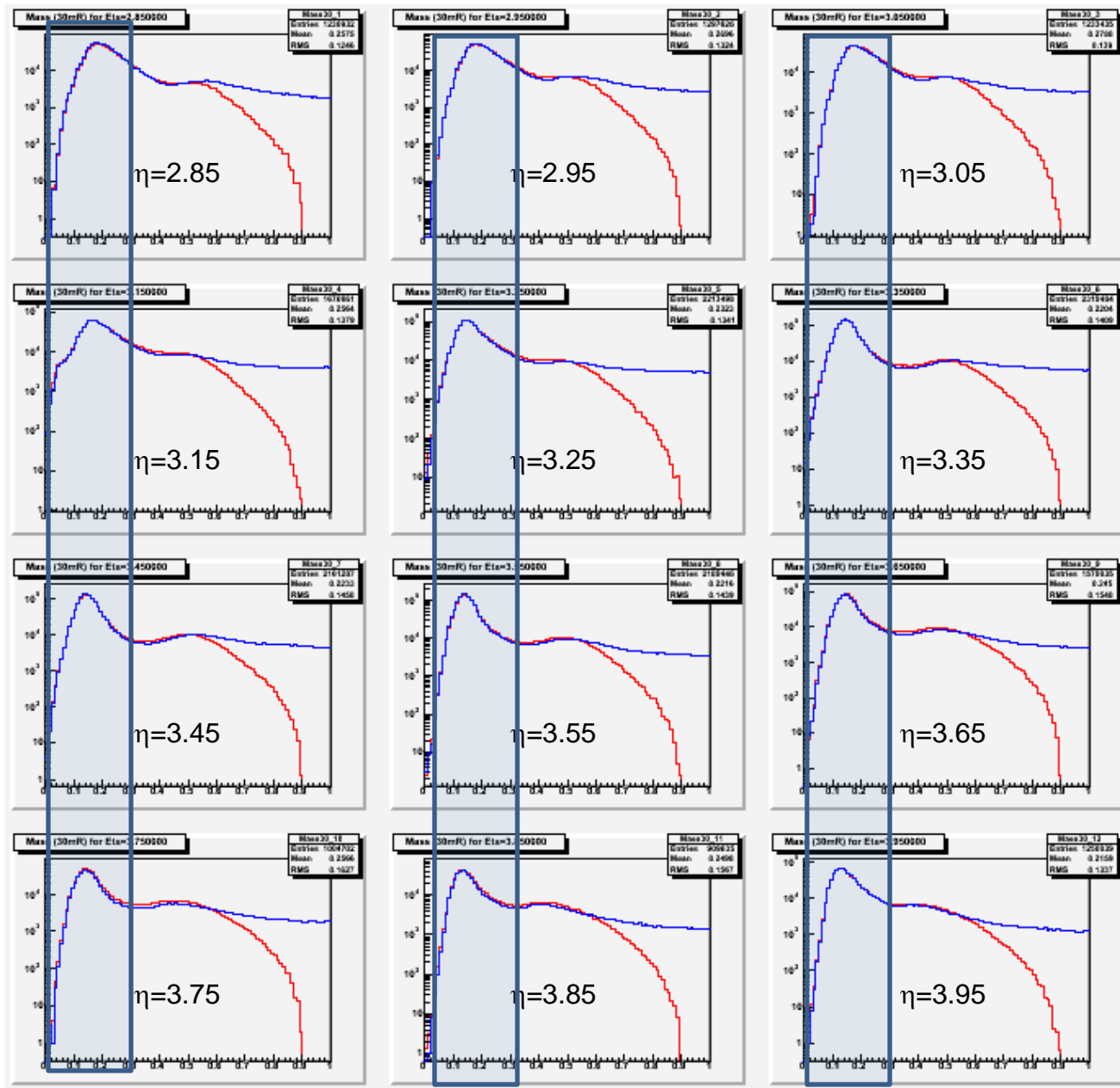


- Jet Mid-rapidity (Left) and Pi0 Forward Rapidity (right)
- Cross section for π^0 nominally consistent with NLO pQCD.
- Cross section for η (with nominal fragmentation) may also be consistent.



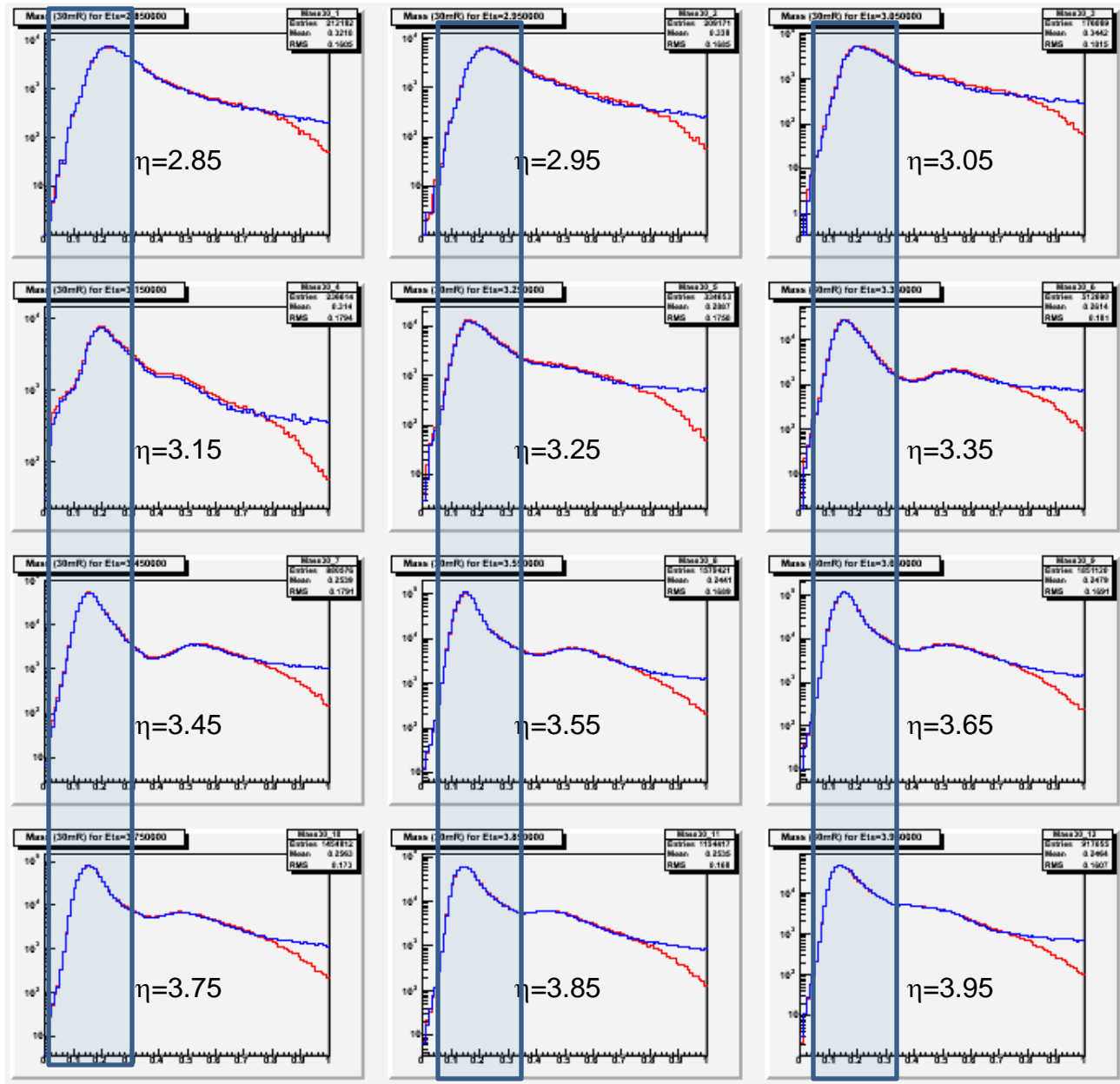
Mass Distribution in η bins ($40 < E < 60$ GeV) $r=1.53$

Red=(cone 30 mR) Blue=1.53 (cone 70 mR)



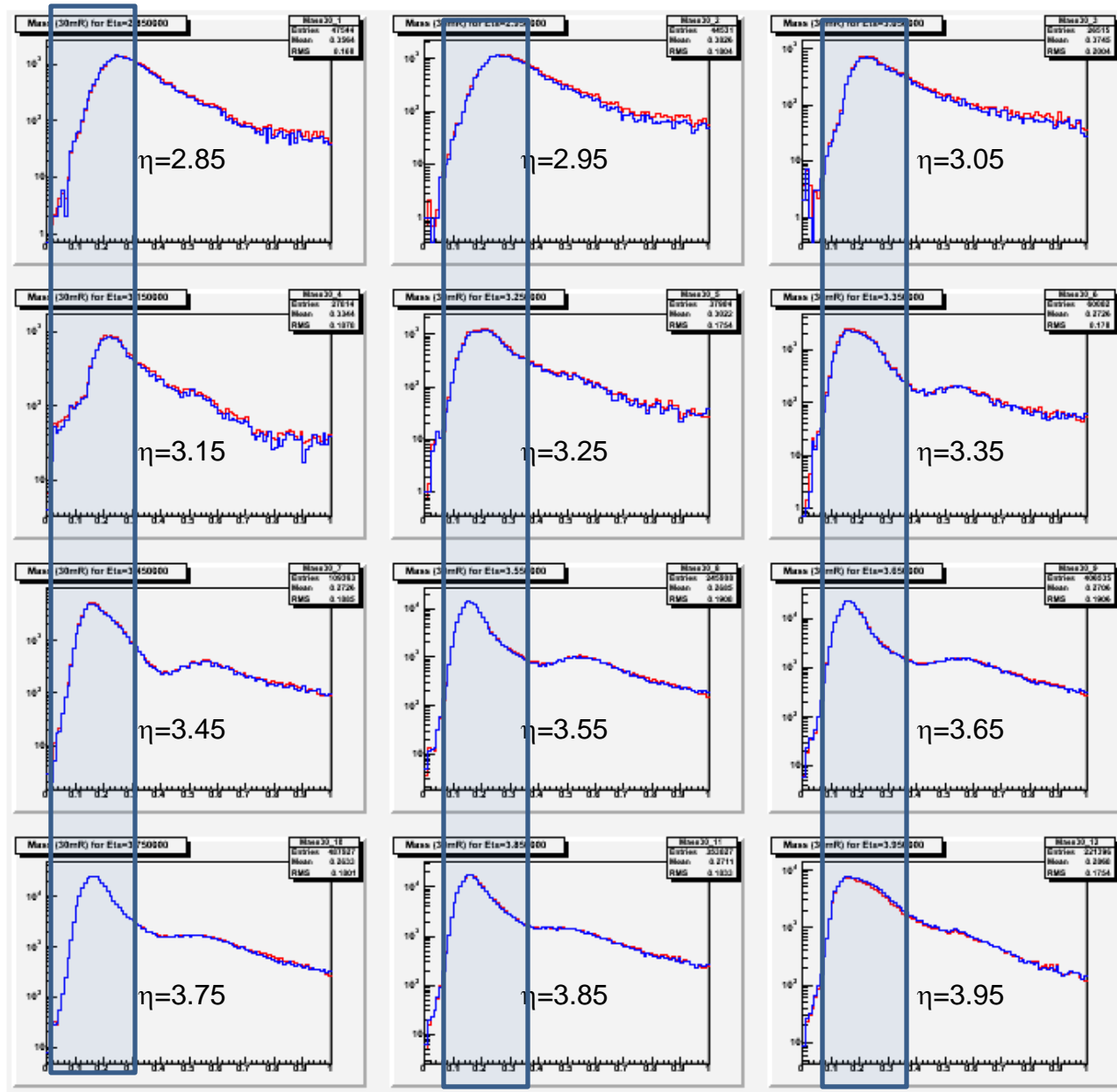
Mass Distribution in η bins ($60 < E < 80$ GeV) $r=1.41$

Red=(cone 30 mR) Blue=1.41(cone 70 mR)



Mass Distribution in η bins ($80 < E < 100$ GeV) $r=1.37$

Red=(cone 30 mR) Blue=1.37(cone 70 mR)



Calculate the **asymmetry** and **error** associated with the “Extra Events” that are included in the 30 mR cone but not the 70 mR Cone

Let p be the average “blue” beam polarization.

Let A_{N30} be the Asymmetry for the 30mR cone

Let A_{N70} be the Asymmetry for the 70mR cone

Let ΔA_{N30} and ΔA_{N70} be the Errors.

Let N_{30} and N_{70} be the numbers of events.

$$pA_{N30} = \frac{N_{u30} - N_{d30}}{N_{u30} + N_{d30}} = \frac{N_{u30} - N_{d30}}{N_{30}}$$

$$pA_{N70} = \frac{N_{u70} - N_{d70}}{N_{70}}$$

$$p\Delta A_{N30} \sim \frac{1}{\sqrt{N_{30}}}$$

$$p\Delta A_{N70} \sim \frac{1}{\sqrt{N_{70}}}$$

Assume

E=50 GeV: r=1.51

E=70 GeV: r=1.41

E=90 GeV: r=1.31

$$\frac{N_{30}}{N_{70}} = r$$

$$\frac{N_{30}}{N_{30} - N_{70}} = \frac{r}{r - 1}$$

$$\frac{N_{70}}{N_{30} - N_{70}} = \frac{1}{r - 1}$$

$$A_{ring} = \frac{r}{r - 1} A_{N30} - \frac{1}{r - 1} A_{N70}$$

$$\Delta A_{ring} = \frac{1}{\sqrt{N_{ring}}} = \frac{1}{\sqrt{N_{30} - N_{70}}}$$

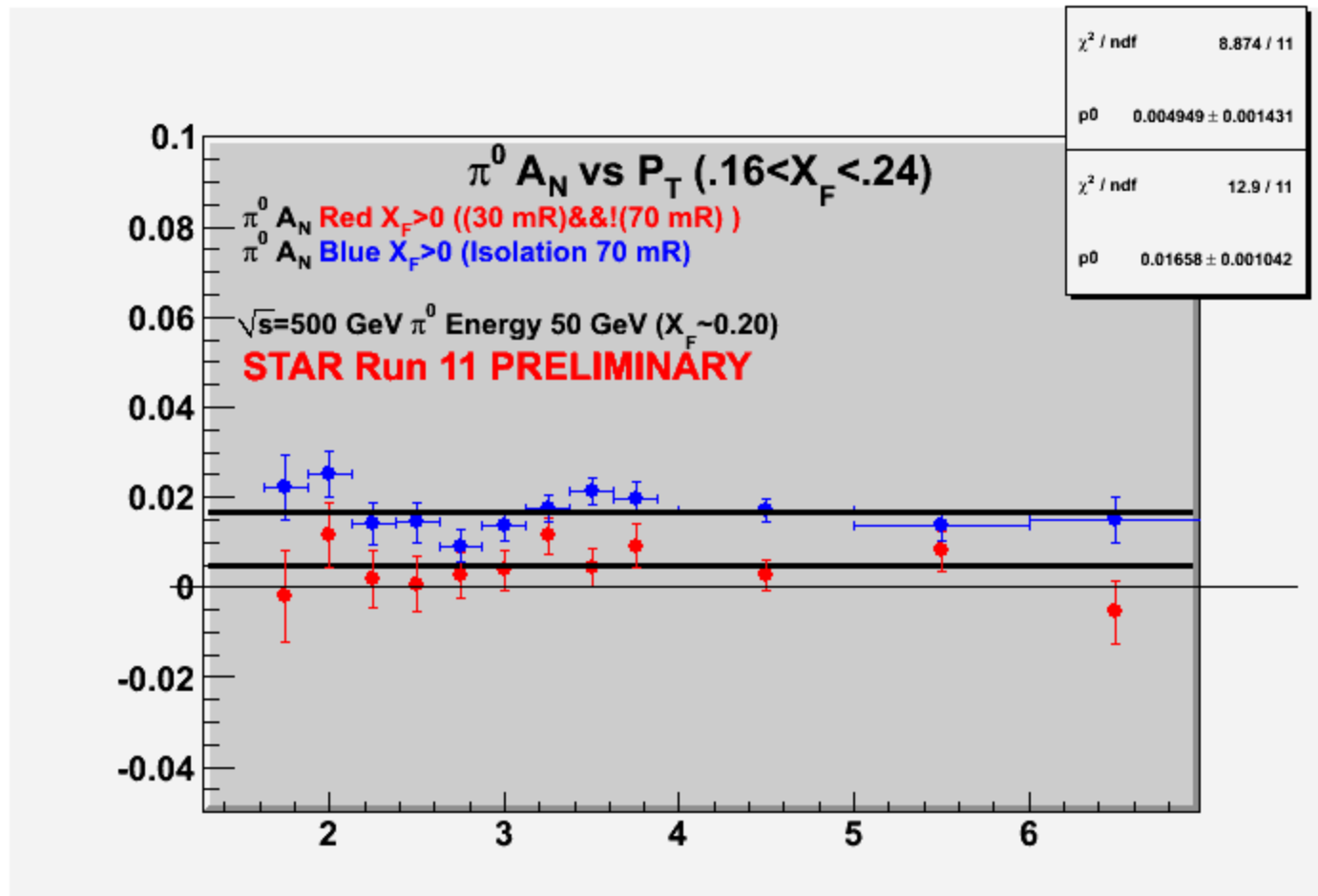
$$= \frac{1}{\sqrt{N_{70}}} \frac{1}{\sqrt{r - 1}} = \Delta A_{N70} \frac{1}{\sqrt{r - 1}}$$

Compare Fits to constant A_N

Red= 30mR cone but not 70 mR cont

Blue=70mR cone

Difference : (1.66% - .49%)=1.17% (8 sigma difference)

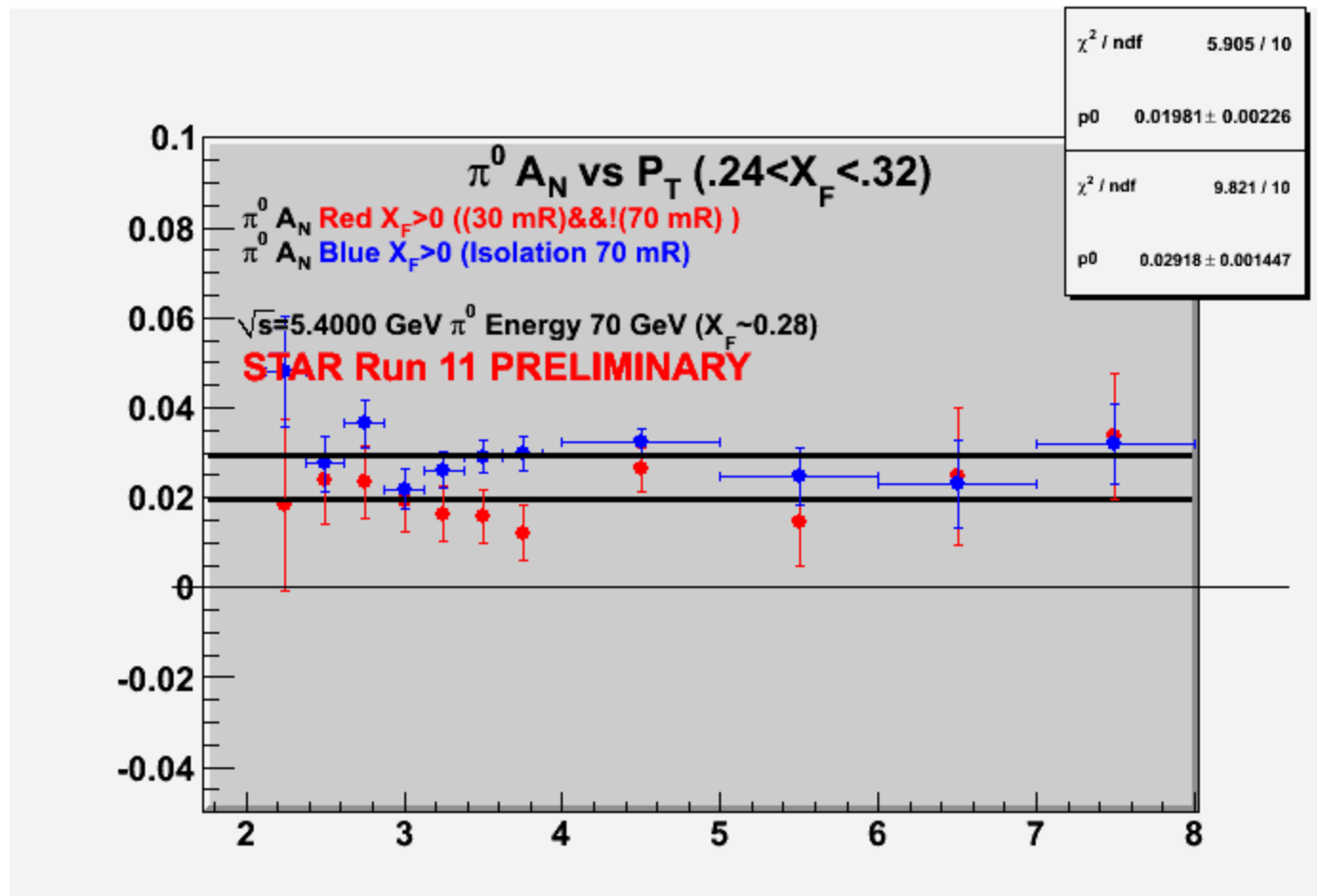


Compare Fits to constant A_N

Red= 30mR cone but not 70 mR cont

Blue=70mR cone

Difference 2.92% - 1.98%=0.94% (4 sigma difference)



Compare Fits to constant A_N

Red= 30mR cone but not 70 mR cont

Blue=70mR cone

Difference 3.57% - 3.44% = 0.13% (0.4 sigma difference)

