χ2 Test g2p 5T Asymmetries

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χ^2 test of 2.2 GeV, 5T LHRS and RHRS data

In general, a χ^2 test is calculated as:

$$\chi^2 = \frac{1}{N}\sum_{j=0}^{N}\frac{(x_{meas} - x_{theory})^2}{{\sigma_{meas}}^2}$$

Because the right arm data has better statistics, the right arm asymmetry was used as the "theory":

$$\chi^2 = \frac{1}{N}\sum_{j=0}^{N}\frac{(A_{left} - A_{right})^2}{{\sigma_{left}}^2}$$

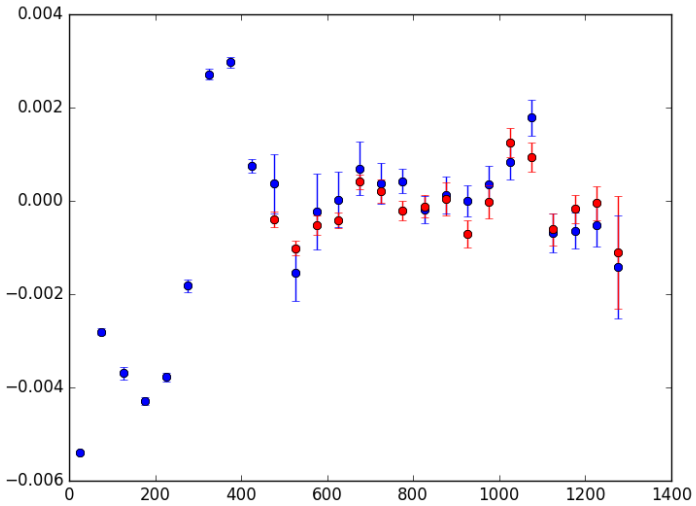
And compared to the average χ^2 value for a series of random perturbations around the right arm asymmetries:

$${\chi^2}_{rand} = \frac{1}{N}\sum_{j=0}^{N}\frac{([A_{right} + R] - A_{right})^2}{{\sigma_{right}}^2} = \frac{1}{N}\sum_{j=0}^{N}\frac{R^2}{{\sigma_{right}}^2}$$

With R running randomly from $-2\sigma_{right}$ to $2\sigma_{right}$, and ${\chi^2}_{rand}$ being averaged over 500 such random runs.

Results for Longitudinal & Transverse Data Set

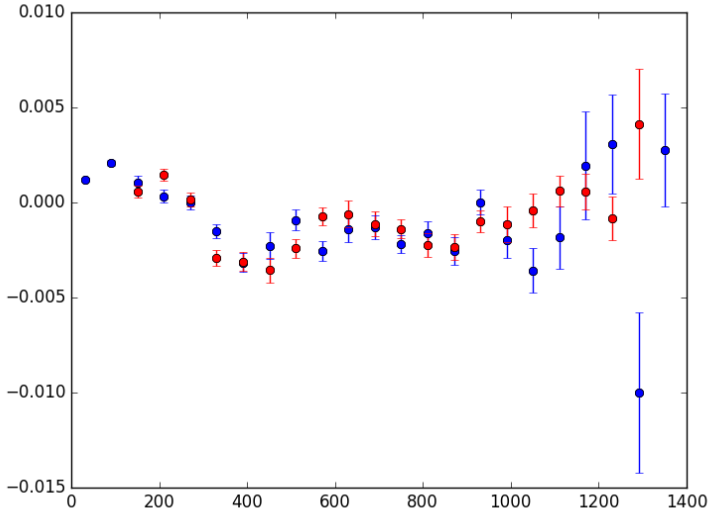
Longitudinal:
$\chi^2 = 1.384$
$\chi^2_{rand} = 1.333$
Difference: 0.0509



Longitudinal

Transverse:
$\chi^2 = 4.241$
$\chi^2_{rand} = 1.342$
Difference: 2.899

The χ^2 if the left arm was taken as theory were significantly higher due to the larger error bars on the right arm data: ~4.38 for the longitudinal data and ~6.28 for the transverse.



Transverse