BigBite Analysis:

Very Perlim. 4.7Gev Cross-Section Parametrization and Spin Structure Functions

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Very Perliminary 4.7GeV Cross-Section Parametrization

2 Very Preliminary 4.7GeV Spin Structure Functions

- Forming g_1 and g_2
- Preliminary 4.7GeV g_1 and g_2 Results

5.9GeV Data Processing

4 What's Next

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Fitting Very Preliminary LHRS Cross-Sections

- In order to compute spin structure functions g_1 and g_2 , we need the absolute cross-section
- Fits were made to the LHRS measured cross-sections using the function:

$$y = \frac{e^{(A+Bx)}}{x^2}$$

- Once parametrized with the fit function, cross-sections at the mean x-value of the BigBite bins can be extracted
- This allows the evaluation of the spin structure functions at each BigBite x-bin.

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Very Perliminary 4.7GeV Cross-Section Parametrization

Extracting Very Preliminary Cross-Sections at BigBite Bin Values

4.7GeV LHRS Cross-Section Parameterization on ³He with Fit Exp(A + B*x)/x²



Figure: Fits to the measured LHRS cross-sections and the extracted cross section that corresponds to the BigBite mean x-bin.

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g_1 and g_2 Definitions

Definition

$$\begin{split} g_1 &= (C_1^{g_1} \Delta_{\parallel} + C_2^{g_1} \Delta_{\perp}) \ast w \\ g_2 &= (C_1^{g_2} \Delta_{\parallel} + C_2^{g_2} \Delta_{\perp}) \ast w, \end{split}$$

• w converts nb to $[GeV^{-2}]$ units to make structure functions unitless

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$$w = nb = 2.5681E - 6GeV^{-2}$$

<u>Preliminary</u> g_1 and g_2 Kinematics (1)



Figure: Scattering angle, out of plane angle, Q² and momentum as a function of mean x-bin value >

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Preliminary g_1 and g_2 Kinematics (2)



Figure: Scattering angle dependent trig quantities as a function of mean x-bin value

Preliminary q_1 and q_2 Coefficients



Figure: Coefficients of $C_1^{g_1}$ (red), $C_2^{g_1}$ (blue) in left plot, and $C_1^{g_2}$ (red), $C_2^{g_2}$ (blue) in right plot as a function of mean x-bin value, \bigcirc Matthew Posik (Temple University) 8/16

Forming g_1 and g_2

Very Preliminary Polarized Cross-Section Differences



Figure: Polarized cross-section differences

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Very Preliminary 4.7GeV g_1 on ³He



Figure: g_1 Structure function at 4.7GeV on ³He

Very Preliminary 4.7GeV g_1 on ³He World Data



Figure: g1 structure function compared to ³He world data

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Very Preliminary 4.7GeV g_2 on ³He



Figure: g2 Structure function at 4.7GeV on ³He

Very Preliminary 4.7GeV g_1 on ³He World Data



Figure: g_2 structure function compared to ³He world data

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Very Preliminary 4.7GeV g1 and g2 Results

Very Preliminary 4.7GeV g_1 Compared g_2 on ³He



Figure: g_1 and g_2 structure functions on 3 He compared to each other

Disk Space for 5.9GeV Data

- A 5.9GeV run (run 1665) had a file size of 15 G
- There are about 302 5.9GeV production runs
- So the whole 5.9GeV production set should take up about 4.635 T
- /data1 has 842 G free and
- /w/halla/e06014/ has 763 G free
- So we currently have 1.605 T free
- We will need about 3 T more disk space to have our entire 5.9GeV data set replayed

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- Compute g_2^{WW} for 4.7GeV ³He
- Start processing at 5.9GeV data
 - At least get data quality running
 - First half may be a little involved since a summing mod. was down
 - Pion asymmetry
- Radiative Corrections on Asymmetries(A₁,A₂), using POLRAD
- Compute systematic errors on kinematic variables/factors

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