

BigBite Analysis

HRS Bins, Positron Contamination and Asymmetries

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06/16/2011

Outline

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2 Positron Analysis

- Positron Contamination
- Positron Asymmetries

3 What's Next

LHRS X_{Bj} Bins in BigBite

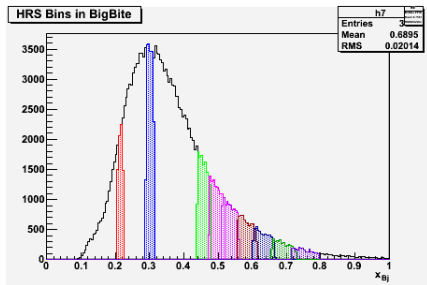


Figure: LHRS X bins in the BigBite

- A lot of gaps in the BigBite using the LHRS bins
- Are we going to fit The LHRS Cross-Sections and use fits to fill in BigBite gaps?

LHRS and BigBite Contamination Comparison

- To better understand our positron contamination ...
 - Plot ratio $y(x_{Bj}) = \frac{\sigma_{e^+}}{\sigma_{e^-}}$ in **BigBite** and **LHRS**
 - Cross-sections defined using **positive** and **negative polarities**
 - Fit ratios with $y(x_{Bj}) = Ae^{(-Bx_{Bj})}$ and compare

LHRS and BigBite Contamination Comparison

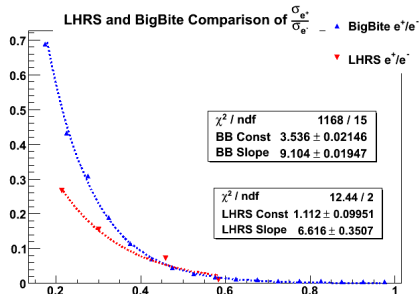


Figure: e^+/e^- in LHRS (red) and BigBite (blue) as a function of Bjorken x

x_{Bj}	BB(e^+/e^-)	LHRS(e^+/e^-)	(BB-LHRS)/(BB+LHRS)
0.2145	0.5017	0.2690	0.3019
0.3007	0.2289	0.1521	0.2015
0.4582	0.0546	0.0536	0.0084
0.5838	0.0174	0.0234	0.1468

Positron Contamination Summary

- BigBite has a larger e^+/e^- ratio than the LHRS
- e^+/e^- agrees with what transversity found from their data and simulations
- BigBite sees more of the target than the LHRS, so sees more contamination?

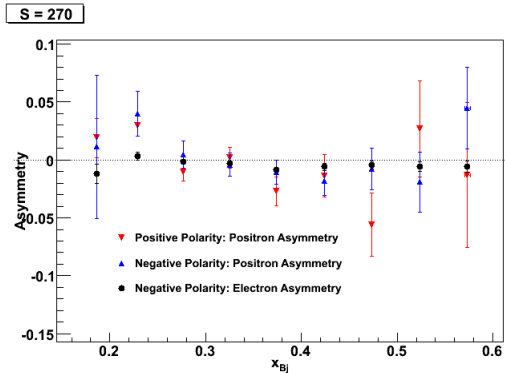
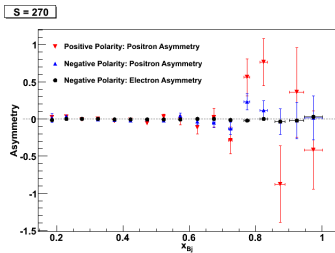
- I decided to look a bit more into the positron asymmetries for our various run sets
- Asymmetry definition that I used is as follows:

$$A_S^{phys} = \frac{1}{P_b P_t} A_S^{raw}$$

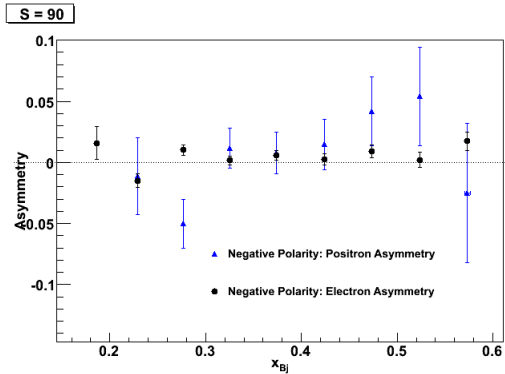
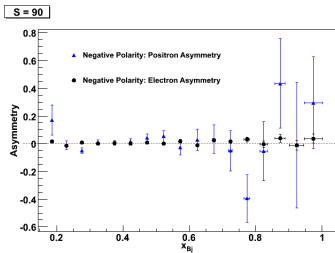
, where $S = 0,90,270$ degrees

- No N2 dilution factor correction here, but should not be a large effect since $\langle D_{N2} \rangle \sim 0.92$

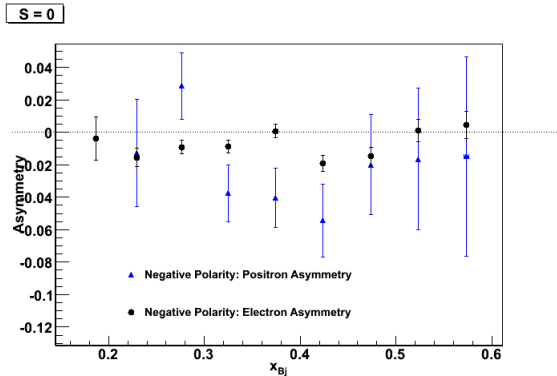
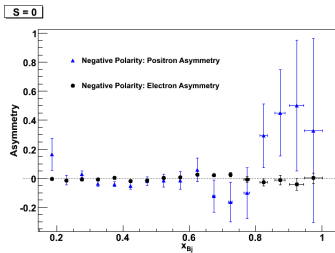
Positron Asymmetry Comparison: $S = 270$



Positron Asymmetry Comparison: $S = 90$



Positron Asymmetry Comparison: $S = 0$



Positron Asymmetry Summary

- Positron asymmetry seems large
- Could maybe due to pions?
 - Since pions have asymmetries, decay into e^+/e^- with asymmetry carried from the pion?

What's Next...

- Heading to NNPSS from June 19th to July 2nd
- Fit Dave's cross-sections he gave me with TSpline
- Extract cross-section at BigBite x center for each bin
- Form g_1 and g_2
- Start processing at 5.9GeV data in July
 - At least get data quality running
 - First half may be a little involved since a summing mod. was down
 - Pion asymmetry