

Building Asymmetries From Structure Functions

Analysis for d_2^n

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Outline

1 Building Asymmetries From Models

DSSV, NMC95 and F1F209 Fits

2 Summary

Asymmetries From Models (1)

Code and Description

- Classes: [AsymmetriesFromStructureFunctions](#), [DSSVPolarizedPDFs](#), [NMC95StructureFunctions](#) and [F1F209StructureFunctions](#)
- Can compute various quantities
 - A_1 , A_2 , g_1 , g_2 , etc.
- Code utilizes [InSANE](#) and [NucDB](#) [[link](#)] libraries from Whit
 - Abstraction so one can try different models with minimal effort
 - Easy to compute various moments of polarized and unpolarized SFs
 - A lot of functionality for use with ROOT (especially TF1, TF2 objects)
 - [NucDB](#): Plot various world data for various physics quantities

Asymmetries From Models (2)

Description

- To build A_1 and A_2 :

$$A_1 = \frac{g_1 - \gamma^2 g_2}{F_1}$$

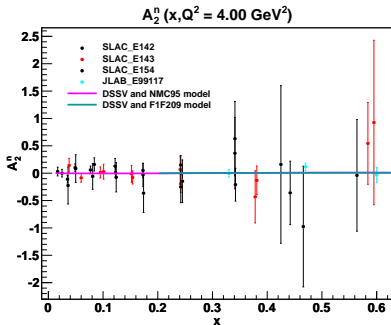
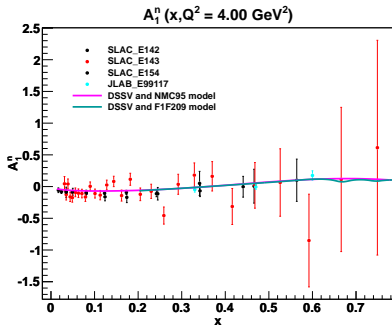
$$A_2 = \gamma \frac{g_1 + g_2}{F_1}$$

$$\gamma = \frac{2Mx}{\sqrt{Q^2}}$$

- Note:** $g_2 = g_2^{WW}$ here
- Utilize DSSV for models of polarized PDFs
- Utilize NMC95, F1F209 for unpolarized SFs

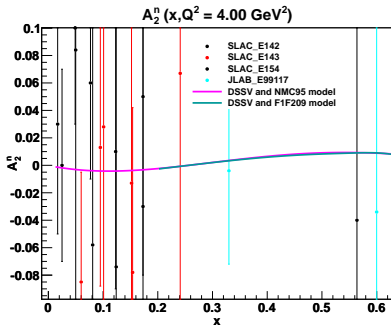
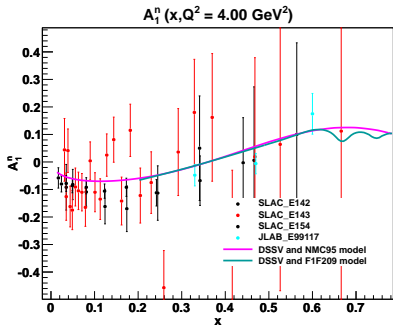
Asymmetries From Models (3)

A_1^n and A_2^n



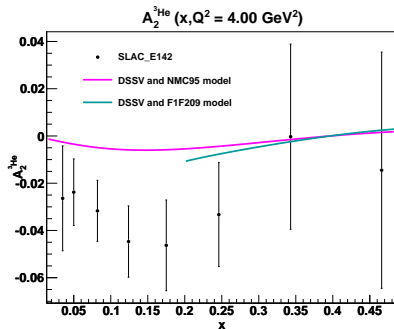
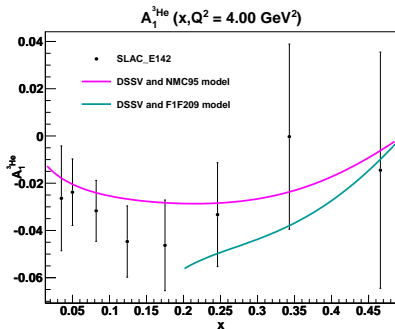
Asymmetries From Models (4)

A_1^n and A_2^n (Zoomed)



Asymmetries From Models (5)

$A_1^{3\text{He}}$ and $A_2^{3\text{He}}$



Summary

- Using DSSV and NMC95/F1F209, we have built A_1 and A_2
- Code utilizes InSANE libraries
- 'Transparent' classes so that one can try different models for physics quantities
- Code has been written to generate $\Delta\sigma_{\parallel,\perp}$
 - Model limitations: DSSV is valid for $1 < Q^2 < 10^5 \text{ GeV}^2$
 - Required phase space for integrals goes down to $Q^2 \sim 0.5 \text{ GeV}^2$
 - See plots in appendix for how this looks in the phase space

What's Next?

- Prepare for DNP talk
 - Please send comments and suggestions ASAP
- Radiative Corrections of Asymmetries
 - Use models of A_1 and A_2 to obtain $\Delta\sigma_{\parallel,\perp}$ to fill in phase space
 - Do RCs using RADCOR

Appendix

Phase Space for Radiative Corrections

- If we use DSSV as the basis for A_1 and A_2 , the reach in (E_s, E_p) is constrained

