

SIDIS Implementation

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- 28 combined data sets from HERMES, COMPASS, and SMC
 - Total of ~ 288 data points will be fit
- Targets include ^3He , deuteron, and proton
- Kinematic x-range $0.005 < x_B < 0.5$ and momentum transfer $1 < Q^2(\text{GeV}^2) < 60$
 - Majority of data fall between 1 and 10 GeV^2
- Kinematic z-range $0.3 < z_h < 0.8$

Strange Quark Polarization

- JAM SIDIS analysis will aim to constrain strange quark polarization and address the discrepancy between inclusive and semi-inclusive results
- Leader, et al (LSS) determined that fragmentation functions (FFs) play a major role in determining strange quark polarization

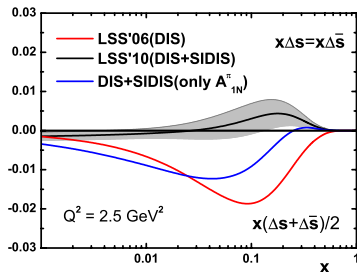


Figure: Taken from Leader, et al [arXiv:1103.5979v2]

Hadron Mass Corrections

- Finite- Q^2 corrections in SIDIS processes arise from both the target mass and the produced hadron mass (generally combined and referred to as "hadron mass corrections")
- Hadron mass corrections in polarized SIDIS are currently being studied and will be used in JAM SIDIS analysis

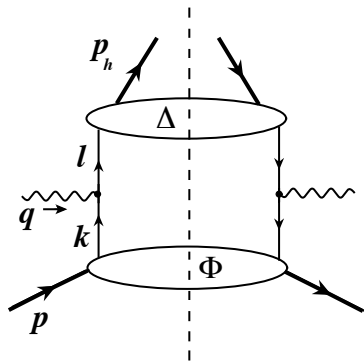


Figure: A. Accardi, T. Hobbs, and W. Melnitchouk [arXiv:0907.2395v3]

Hadron Mass Corrections

In the collinear factorization framework, the polarized SIDIS cross section with hadron mass corrections can be written as

$$\sigma \equiv \frac{d\sigma}{dx_B dQ^2 dz_h} = \frac{2\pi\alpha^2 y^2 \lambda_e S_L}{Q^4} \frac{\sqrt{1-\varepsilon^2}}{1-\varepsilon} \frac{d\zeta_h}{dz_h} \sum_q e_q^2 \Delta q(\xi_h, Q^2) D_q^h(\zeta_h, Q^2)$$

where the polarized PDFs Δq are dependent on the scaling variable

$$\xi_h = \xi \left(1 + \frac{m_h}{Q}\right)$$

and fragmentation functions D_q depend on the scaling fragmentation variable

$$\zeta_h = \frac{z_h}{2} \frac{\xi}{x_B} \left(1 + \sqrt{1 - \frac{4x_B^2 M^2 m_h^2}{z_h^2 Q^4}}\right)$$

Hadron Mass Corrections

- To determine the effects of HMCs directly, we calculate the ratio of the full SIDIS cross section to the cross section $\sigma^{(0)}$
 - Defined by taking the massless limit for the scaling variables

$$\sigma^{(0)} \equiv \sigma(\xi_h \rightarrow x_B, \zeta_h \rightarrow z_h) \text{ and setting } d\zeta_h/dz_h = 1$$

- The ratio is then

$$\sigma/\sigma^{(0)} = \frac{\frac{d\zeta_h}{dz_h} \sum_q e_q^2 \Delta q(\xi_h, Q^2) D_q^h(\zeta_h, Q^2)}{\sum_q e_q^2 \Delta q(x_B, Q^2) D_q^h(z_h, Q^2)}$$

$$\frac{d\zeta_h}{dz_h} = \frac{(1 - M^2 \xi^2 / Q^2)}{(1 - \xi^2 M^2 m_h^2 / \zeta_h^2 Q^4)}$$

Preliminary Results

