Extracting Target & Beam Polarization for RG-C

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Obtaining Polarization from Data

- Method useful for Elastics & DIS
- Elastics/Quasielastic
 - \succ Connect A_{\parallel} to eqn
 - > Use exclusive cuts for data
 - > Use form factor fit for "theory"
 - ➤ Low stats but very accurate

DIS

- \succ Use fits to calc A_{II}
- ➤ Use inclusive dat^a
- ➤ High stats but normalization issue

$$A_{||} = \frac{1}{P_b P_t f_{NH_3}} \frac{n^+ - n^-}{n^+ + n^-}$$

$$A_{||} = \frac{2\tau r_G \left[\frac{M}{E} + r_G (\tau \frac{M}{E} + (1+\tau) \tan^2(\frac{\theta}{2}))\right]}{1 + r_G^2 \tau/\epsilon}$$

$$A_{||} = D(A_1 + \eta A_2)$$

Obtaining Polarization from Data - Nuts & Bolts

- General Approach
 - > Get asym A_{\parallel} from data & theory
 - Calculate dilution factor f
 - > Solve for $P_b P_t$ from pieces

$$P_b \times P_t = \frac{\sum_{i=0}^{N_{bins}} f_i A_{th,i} (N_i^+ - N_i^-)}{\sum_{i=0}^{N_{bins}} f_i^2 A_{th,i}^2 (N_i^+ + N_i^-)}$$
$$\Delta_{P_b \times P_t}^2 = \frac{\sum_{i=0}^{N_{bins}} (f_i A_{th,i})^2 (\frac{N_i^+}{FC^+} + \frac{N_i^-}{FC^-})}{(\sum_{i=0}^{N_{bins}} (f_i A_{th,i})^2 (N_i^+ + N_i^-))^2}$$



Obtaining $P_b P_t$ from DIS for NH_3

- Using model Dilution Factor & fiducial cuts comparable to elastics
- Maybe a small-ish normalization disagreement with elastics
- Big disagreement with NMR



Obtaining P_bP_t from DIS for NH₃

- Part 2 -> After the solenoid flip
- Good agreement with elastics
- Inconsistent disagreement with NMR



Obtaining P_bP_t from DIS for ND₃

- Using model for Dilution Factor (accurate on average)
- Good agreement with elastics (within error bars)
- Sometimes disagreement with NMR but inconsistent



Obtaining P_bP_t from DIS for ND₃

- Part 2 -> After the solenoid flip
- Good agreement with elastics (within error bars)
- Sometimes disagreement with NMR but inconsistent



A Curious Note

✤ Avg ratio of DIS/NMR is 1/beam pol (1/0.84)



An Even More Curious Note

Avg ratio of DIS/NMR is 1



A Most Curious Note

- Various clusters for this period
- One around 0.84 & 1.2 but others



Questions/Comments



