Analysis Meet

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Kinematic 4 analysis

- Discovered a sign change, new asymmetry:
  - 0.03736 +/- 0.00195
  - Cuts used: q_perp<.15, |t|<2, |invar-.95|<.15
- Background determination using Time of Flight and Total QE hits = 1.
- New Dilution factor method.
  - Two calculation methods (I haven't used one yet).

Background

- Look at events with 1 quasi-elastic region hit.
- Look elsewhere in time.
- Look at same region in q_perp.
- Scale background to quasi-elastic selection.

Dilution Factor

Assuming you have two detectors, A and B, and they are correlated. The NO accidental probability would look like the following (where BA is the correlated effect).

$$e^{-(r\tau)_A} e^{-(r\tau)_B} e^{-(r\tau)_{BA}}$$

If we assume the behavior is the same (it isn't), we get:

$$e^{-(r\tau)_A} e^{-(r\tau)_B} e^{\frac{\alpha}{2}(-(r\tau)_A - (r\tau)_B)}$$

In this definition of A and B, the total observed rate is actually A+B, so correcting for that gives (this alpha is gives us the correlation):

$$e^{-(r\tau)_A} e^{-(r\tau)_B} e^{-\frac{\alpha}{2}(-(r\tau)_A - (r\tau)_B)} = (e^{-\sum r\tau})^{1-\frac{\alpha}{2}}$$

Dilution Factor

This modifies our formula by adding a parameter. This allows us to fit the data sets together (or to calculate them together).

$$R = \frac{R_0 (e^{-r\tau})^{\beta}}{R_0 (T - (e^{-r\tau})^{\beta}) + T}$$

All these quantities can be measured for different runs for the three targets, and then fitted or solved for independently. Here T is the total number of hadrons.

Dilution Factor

- Minuit provides:
- FCN=12.2308 FROM MIGRAD STATUS=CONVERGED 195 CALLS 196 TOTAL
- EDM=3.0707e-05 STRATEGY= 1 ERROR MATRIX ACCURATE
- EXT PARAMETER STEP FIRST
- NO. NAME VALUE ERROR SIZE DERIVATIVE
- 1 a1 7.86245e-02 1.62621e-02 9.90201e-05 3.67580e-02
- 2 a2 1.49679e-01 3.59173e-02 3.77083e-05 -1.72373e-01
- 3 a3 2.38536e-01 6.01149e-02 5.53202e-05 1.12776e-01
- 4 a4 1.04011e+00 2.33445e-02 2.09995e-06 -6.95475e-01

Dilution Factor

- Further considerations:
  - Analytic determination (to use or to compare with Minuit).
  - This gives the incident rate, the asymmetry we actually have is at a small range of rates which are non-zero. This needs to be corrected for somehow.
  - Bogdan developed a good argument for form of correlation.