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### 1.1 Formalism

Using the form of the double-differential Cross-section for single-pion Electroproduction(2 d.o.f.), we can formalize the following for double-charged-pion Electroproduction:

$$\left(\frac{d\sigma}{dX^{ij}d\phi^j}\right)^h = A^{ij} + B^{ij} \cos \phi^j + C^{ij} \cos 2\phi^j + hPD^{ij} \sin \phi^j \quad (1.1.1)$$

where

- ij = index over Varset,Variable (3x5 matrix)
- $R2_{\alpha}^{ij} \doteq [A^{ij}, B^{ij}, C^{ij}, D^{ij}] \equiv [R_T + \epsilon_L R_L, R_{LT}, R_{TT}, R_{LT'}]$
- $R2_{\alpha}^{ij} = f(Q^2, W, X^{ij})$

For convenience, I define the following:

$$f^h(X^{ij}, \phi^j) \doteq \left(\frac{d\sigma}{dX^{ij}d\phi^j}\right)^h \quad (1.1.2)$$

### 1.2 Event selection

1. eid
2. efid
3. momcorr
4. MM Cuts

### 1.3 R2 Extraction method

Of the methods listed earlier:

1. Fit  $f^h(X^{ij}, \phi^j)$  to extract ‘R2’
2. Calculate Asymmetry  $\doteq f^{h=+} - f^{h=-}$  and then extract  $D^{ij}$

3.  $\int f^h(X^{ij}, \phi^j) * (\cos \phi / \cos 2\phi / \sin \phi) d\phi$  to extract  $B^{ij}/C^{ij}/D^{ij}$

Method 3. is used, which even at the level of algorithmic detail is listed below.

**NOTE** that when multiplying by  $\sin \phi$ , the sign of the polarization is explicitly used

For every q2wbin:

1.  $h5[pol]$  where  $pol \in \{POS, NEG, UNP, AVG\}$ ;  $pol \neq AVG$
2.  $h5m[pol, pob] = h5[pol] \cdot h5f[pob]$ 
  - $pob \in \{A, B, C, D\}$ ;  $pol \neq AVG$
  - $h5f[pob]$ :
    - For every bin  $i$ ,  $h5f[pob](i) = f[pob](i)$
    - $f[pob] \in \{N.A., \cos \phi, \cos 2\phi, \text{sign}(pol) \sin \phi\}$
3.  $hR2\_Xij[pol, pob] = h5m[pol, pob]$  Project on to  $X^{ij}$ ;  $pol \neq AVG$
4.  $hR2\_Xij[pol=AVG, pob] = (hR2\_Xij[pol=POS, pob] + hR2\_Xij[pol=NEG, pob])/2$

## 1.4 Observations

Focussed only on  $\langle B/C/D \rangle_{1THETA}$

1. Consistencies
  - 1.1. test1
  - 1.2. test2
2. Inconsistencies
  - 2.1. test