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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:

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

where

- ij = index over Varset,Variable (3x5 matrix)
- $R2^{ij}_{\alpha} \doteq [A^{ij}, B^{ij}, C^{ij}, D^{ij}] \equiv [R_T + \epsilon_L R_L, R_{LT}, R_{TT}, R_{LT'}]$
- $R2^{ij}_{\alpha} = f(Q^2, W, X^{ij})$

For convenience, I define the following:

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

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 explicity used

For every `q2wbin`:

1. `h5[pol]` where `pol` $\in$ {POS,NEG,UNP,AVG}; `pol` $\neq$ AVG
2. `h5m[pol,pob]` = `h5[pol]`·`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.,$\cos\phi$,$\cos 2\phi$,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 `<B/C/D>_1THETA`

- **Consistencies**:
  1. `<B/C>[pos]`=`<B/C>[neg]`=`<B/C>[unp]`
  2. `exp-C[unp]` $\approx$ `sim-C[unp]`
- **Inconsistencies**:
  1. `exp-D[unp]` $\neq 0$
     - `D[pos]` = `-D[neg]`
     - `D[unp]` = `D[pos]`
  2. `sim-D[unp]` $\neq 0$
     - `sim-D[unp]` $\neq$ `exp-D[unp]`
  3. `sim-D[unp]` $\neq$ `exp-D[unp]`