Contents

1 Meeting minutes: 11-20-13

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:

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

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:

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

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`
- `Top 1:2:3:4` used

Consistencies(C):

1. `<B/C>[pos]`=`<B/C>[neg]`=`<B/C>[unp]`
2. `EF-C[unp]` $\approx$ `SF-C[unp]`

   Feedback To ensure that this consistency is not due to `Hole-Filling`, see how well `EC-C[unp]` agrees with `SF-C[unp]`

Inconsistencies(I):

1. `EF-D[unp]` $\neq 0$
   (a) `D[pos]` = `-D[neg]`
   (b) `D[unp]` = `D[pos]`

Feedback These inconsistencies may be resolved if there is an additional $\sin\phi$ dependence present:

$$f^h(X^{ij}, \phi^j) \to f^h(X^{ij}, \phi^j) + X \sin\phi$$

This external dependence could be due to:

- Detector
- Physics: SIDIS?

However, the fact that no such external $\sin\phi$ dependence is seen in the Simulation (`ST-D`=`SF-D`) and if we assume that the Detector is accurately described by GSIM, rules out any Detector based external $\sin\phi$ dependence.

Need to look into Physics causes of any such effect: SIDIS?s

2. `SF-D[unp]` $\neq 0$

   Feedback What does Viktor think?

3. `SF-D[unp]` $\neq$ `EF-D[unp]`

   Feedback Revisit post resolution for I.1

4. `SF-B[unp]` $\neq$ `EF-B[unp]`

   Feedback Not sure what to make of this yet. Since there were my first order observations, with very iteration and growing confidence in data analysis, maybe this will still be the case, which means that Simulation be need "tuning"to reproduce Experimental observations?