Status of Single Spin Asymmetry

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Synopsis

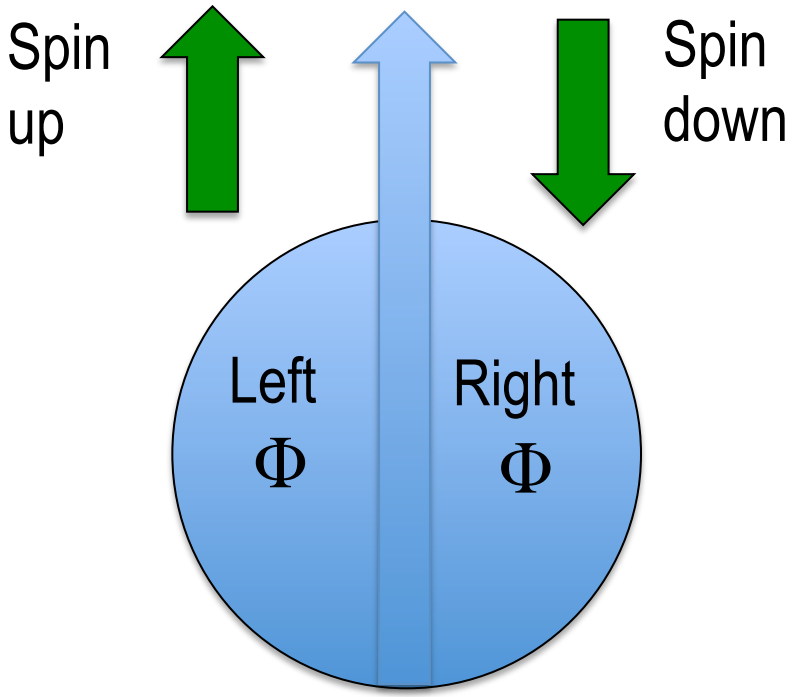
- According to all discussions we have had so far, we think that the 1D P_T unfolding is satisfactory enough for calculations of A_N versus true P_T.

- To take care of the asymmetry dilution, we simply need to modify our already unfolded 1-Dim P_T spectrum so that it is unfolded in 2 Φ bins. More on this 1-D unfolding approach on the next slides.

- Thus we will not be needing 2-D unfolding approach for now until this modified 1-D P_T unfolding approach has been applied to reconstruct true P_T - dependence of A_N. We believe that this approach should work just fine.

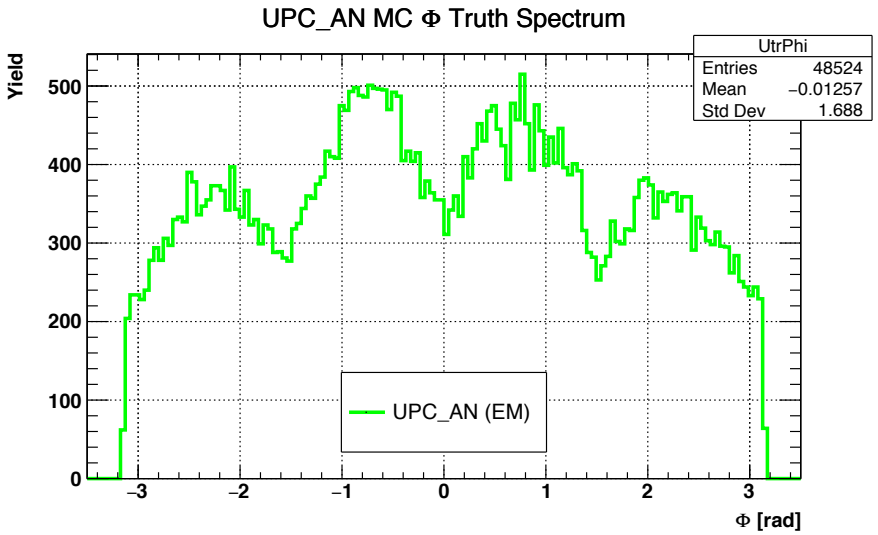
Single Spin Asymmetry – Way Forward

⌘ Using this approach, we will calculate the single spin asymmetry by applying this 1-D P_T spectrum unfolded in 2 Φ bins. That is, the left and the right Φ bins as schematically depicted below.



Single Spin Asymmetry – Way Forward

◎ Since we know from MC that even after smearing, we still reconstruct the sine modulation,



◎ We can calculate asymmetries by simply measuring yields on the left and yields on the right after proper scaling with 1/<sin>. That is:

$$A_N \cong \frac{1}{<\sin>} * \left(\frac{N_\Phi^{left} - N_\Phi^{right}}{N_\Phi^{left} + N_\Phi^{right}} \right)$$

N_Φ^{left} : left yield

N_Φ^{right} : right yield

Single Spin Asymmetry – Way Forward

- In this case, we reconstruct P_T in N bins. And the smearing in P_T is studied in 2*N bins, which can be viewed as N bins for the hits on the left and N bins for the hits on the right.

- Thus, events in any true P_T bin can be smeared to any 2*N bins. So this case, we believe, is supposed to properly care about the asymmetry dilution.

- This way, we do not have to worry about the asymmetry dilution in the distribution of the true P_T – dependence of A_N.

Single Spin Asymmetry – Next Tasks

Immediate Tasks

⌘ Reconstruct P_T spectrum in 2 Φ bins. That is left and right Φ bins.

⌘ Apply previously used SVD unfold method to unfold the P_T spectrum.

Later Tasks

⌘ Reconstruct P_T - dependence of A_N distribution.

⌘ Compute errors associated with the P_T - dependence of A_N.