MC studies for asymmetry

Mher Aghasyan
INFN-LNF

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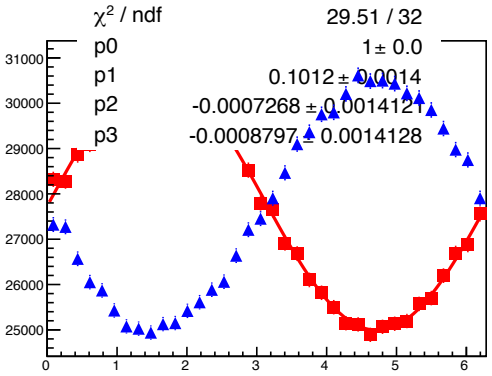
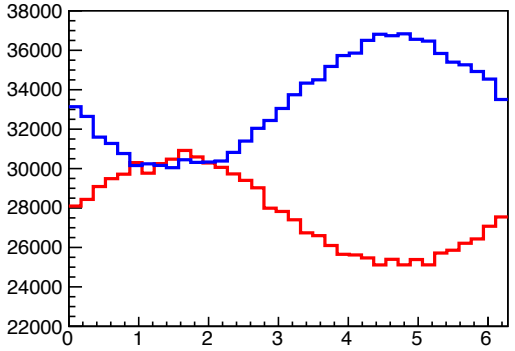
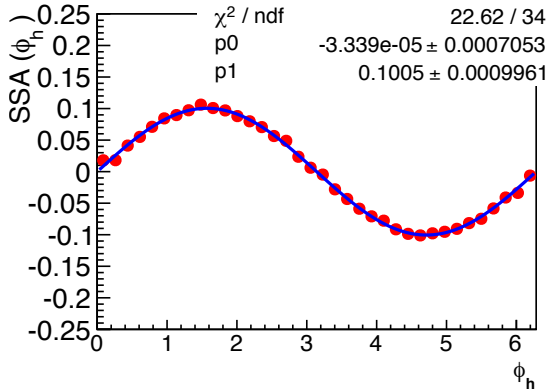
Outline

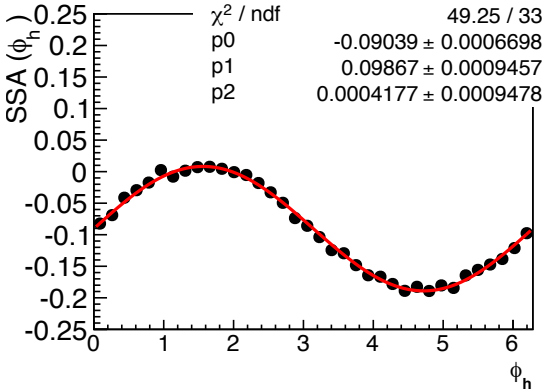
- Fitting
- Generated sin(x) amplitudes reconstruction
- Generated sin(x), cos(x) and cos(2x) reconstruction.
- Binning
- Conclusions/discussions

Simple sin(x)





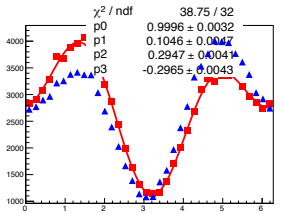


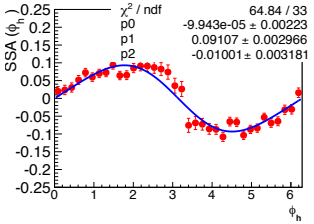


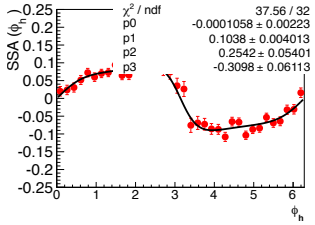
Offset (which could come like from luminosity normalization) doesn't affect asymmetries.

0.1sin(x)+0.3cos(x)-0.3cos(2x)

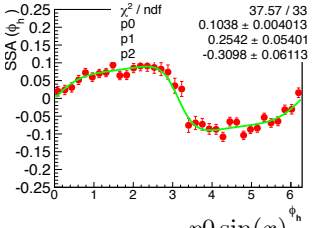
$$f = p0 + p1\sin(x) + p2\sin(2x)$$





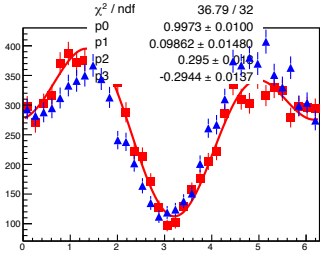


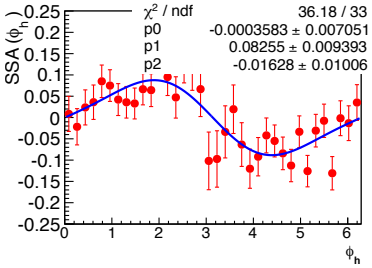
$$f = p0 + \frac{p1\sin(x)}{1 + p2\cos(x) + p3\sin(2x)}$$

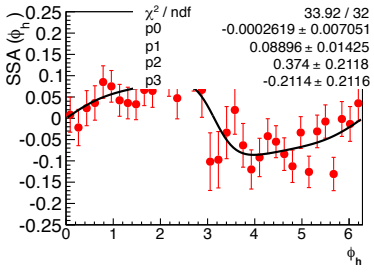


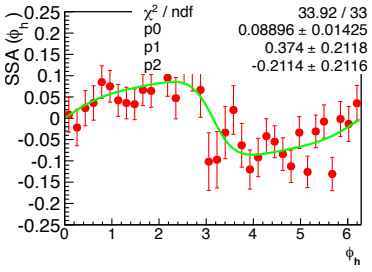
$$f = \frac{p0\sin(x)}{1 + p1\cos(x) + p2\sin(2x)}$$

Reduction of statistics effects extracted moments

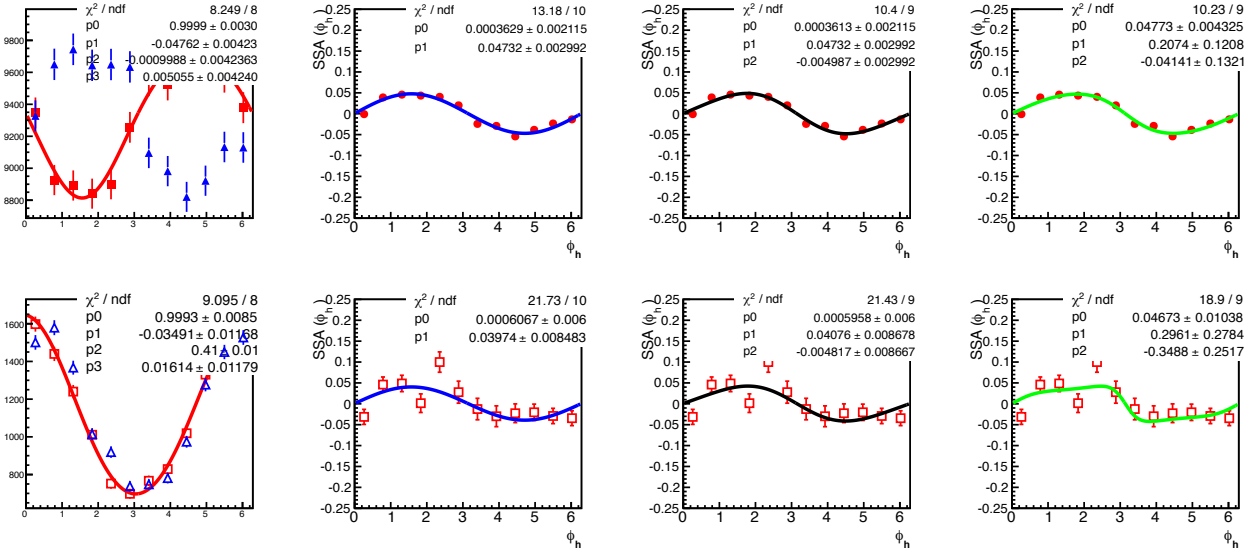








P_T dependence for given z bin

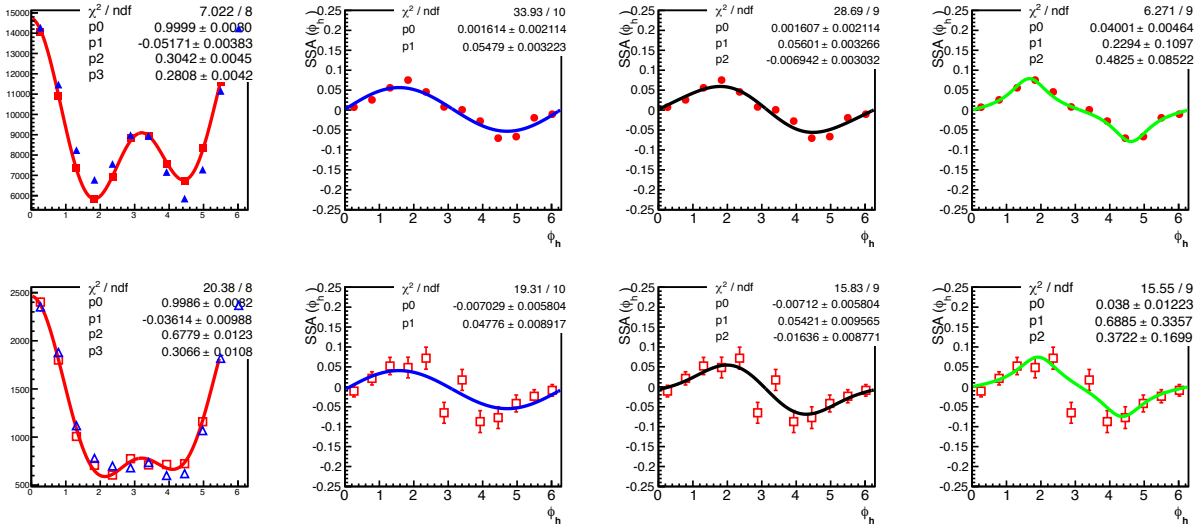


Acceptance can reduce or increase moments, even if we do not generate cos(x) and cos(2x)

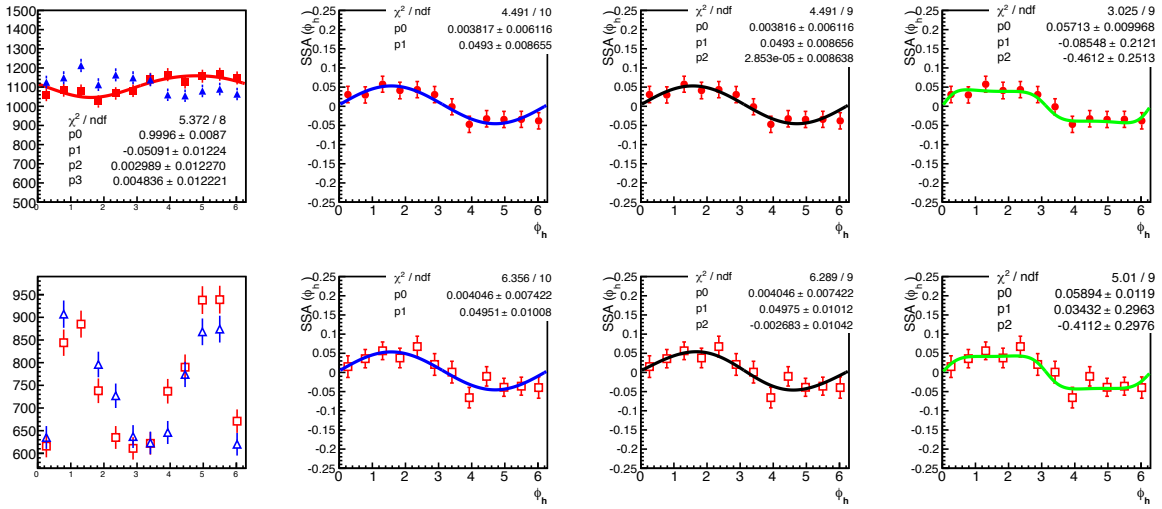
0.1<PT<0.2

0.4<PT<0.6

Fitting is more complicated when one has hole in fh



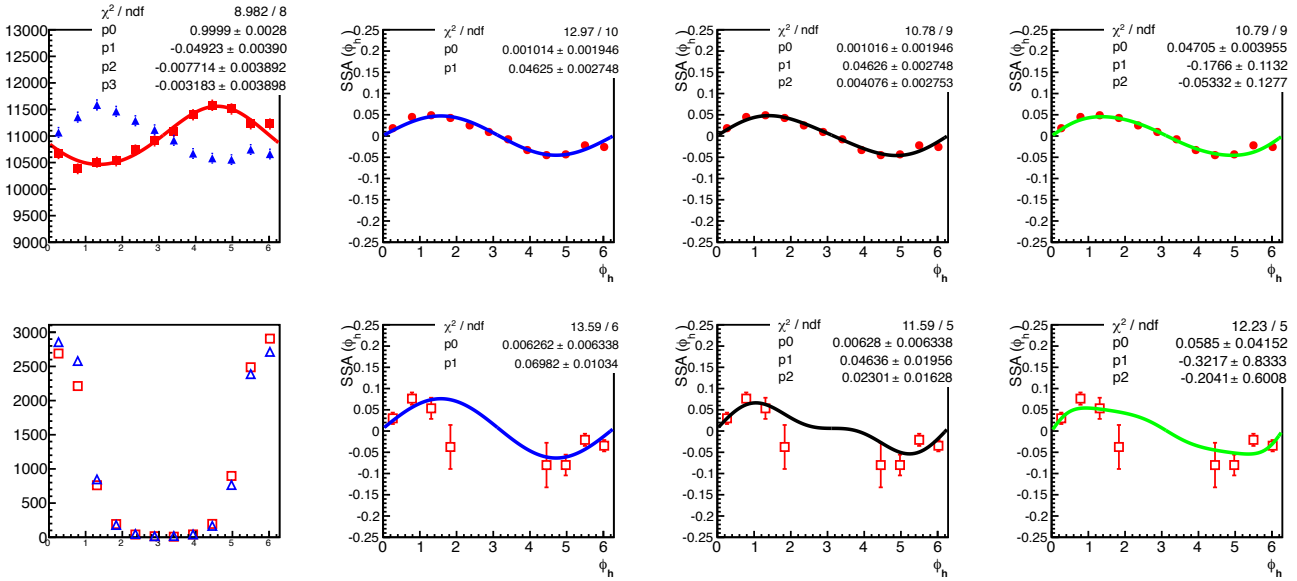
Statistics vs kinematic coverage



Generated 5M events
Reconstruction range
$7<\Theta_{\pi}<30$
$7<\Theta_{e'}<30$

$0.6<P_T<0.8$

Generated 50M events
Reconstruction range
$7<\Theta_{\pi}<14$
$7<\Theta_{e'}<30$



For discussion…

- Even if one can get 10 times more luminosity/ beamtime small acceptance ($7<\Theta<12$) will prevent to get proper amplitudes at high P_T.
- Sure if one increases acceptance one will spend more money on detector (for RICH like $1m^2$ or 4 m^2) lets say 4 times more, and in that case one could get more precise answer from data at 10 times less beamtime.
- So one could save on beamtime and build detector with better acceptance.

For discussion

- We publish our Asymmetry vs z, or P_T or x
- Can we extract from lets say precise measurements of f(z) or f(P_T) or f(x) distribution and fragmentation functions?

How many variables we need

- We detect 2 particles in final state: lepton and hadron
- Each of them needs 3 independent variables to identify them so: 2x3 = 6 variables.
- Since we have symmetry along beam axis 1 of them drops or in another words if we fix 5 of them the distribution on last one will be flat.
- That is why SIDIS cross section is 5 dimensional that is why we need / we have to provide our results in 5 dimensions!