

Discussion topics

SIDIS meeting
May 25

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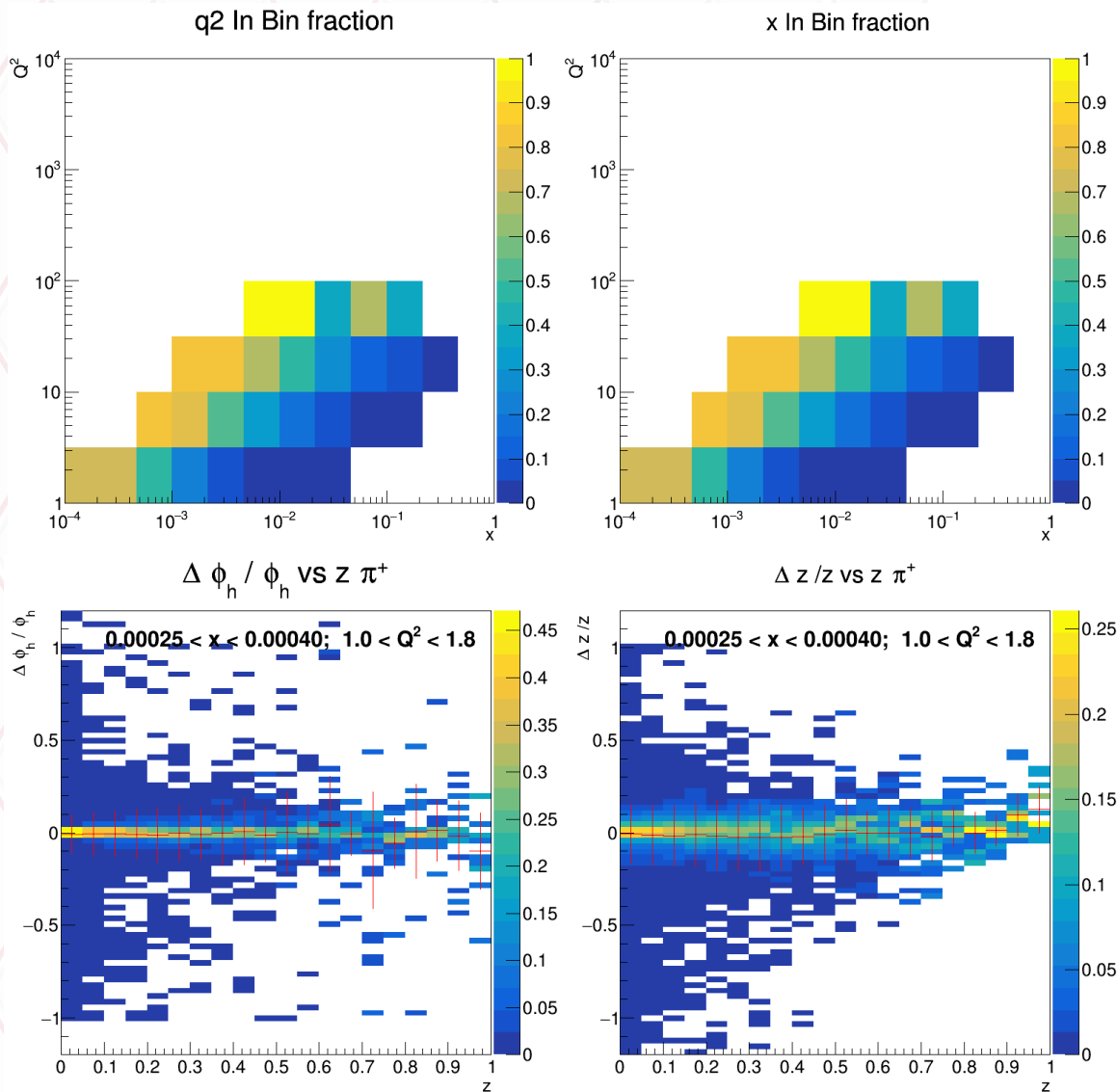
- Tracking group requests input about tracking requirements from physics groups:
 - How to address this?
 - x , Q^2 , ϕ_s and z , P_{hT} , ϕ_h resolutions for different tracking assumptions ?
 - Could be done via eic-smear studies rapidly.
- require momentum resolutions as a function of rapidity from tracking group and feed it into eic-smear
- Would minimum momentum ranges for detector options affect measurements?
 - Check 4D plots for different min possibilities

Impact studies and plots for proposal

- Concentrate on two energy combinations? Highest and lowest energies (5x41, 18x250 or only 10x250,)? Reasonable for simple asymmetry feasibility at low x/low Q² corner, high x/high Q² corner and low y corners
- What are the early physics goals that can be achieved in 1st year 5fb⁻¹?
- Apart from impact plots also show the explicit expected asymmetries, or both
 - Compare perfect detector, YR, 1-2 ECCE configurations?
 - How to discuss and estimate systematics?
- Sample asymmetry plots (fixed bin(s)), show asymmetries for different configurations and effect of smearing

Some example Output I

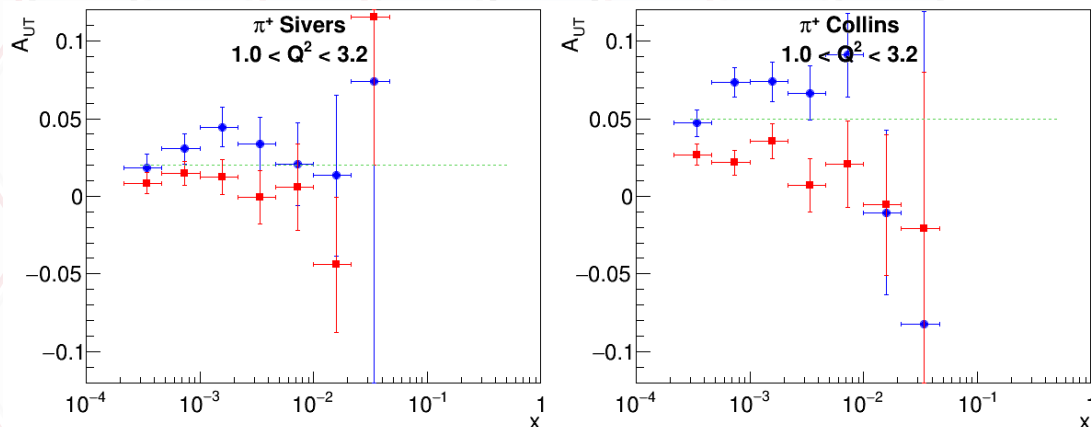
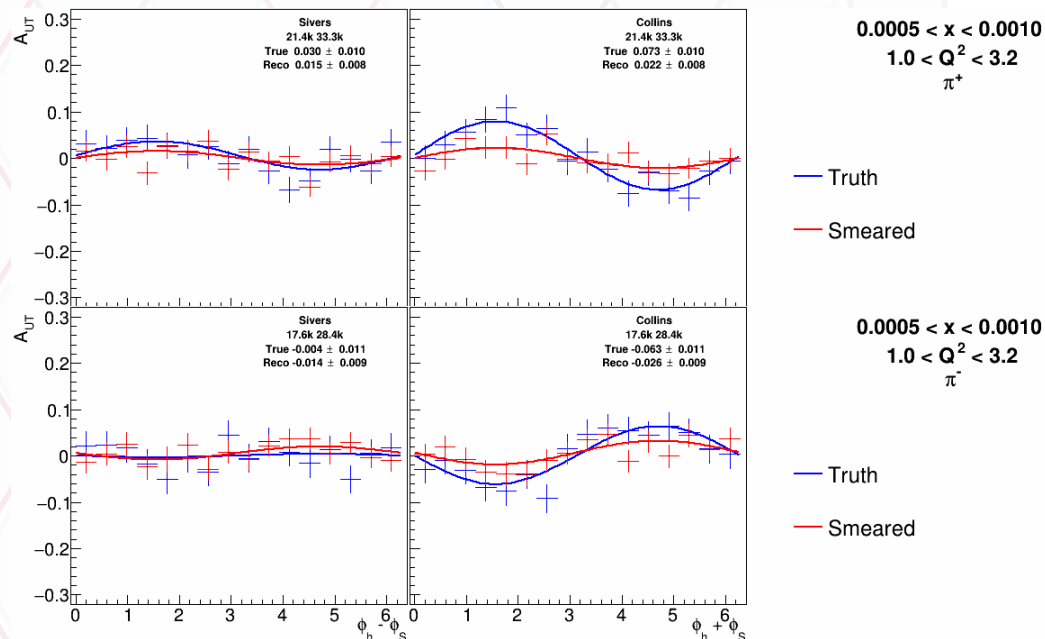
- Low level: DIS in-bin efficiencies (using scattered lepton only)
- Medium level: Some resolutions for hadron z , azimuthal angles in one particular z - Q^2 bin



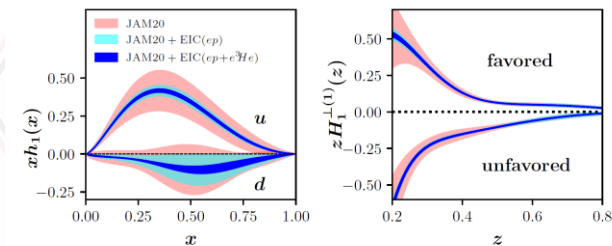
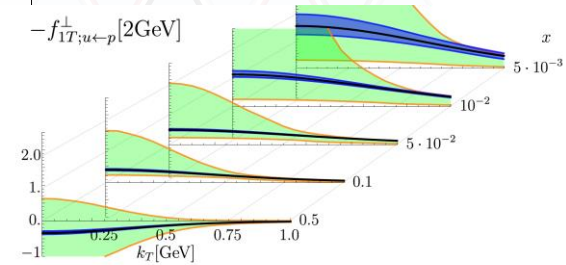
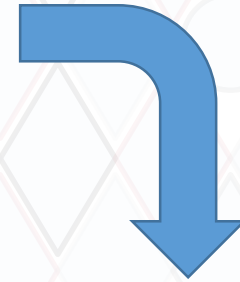
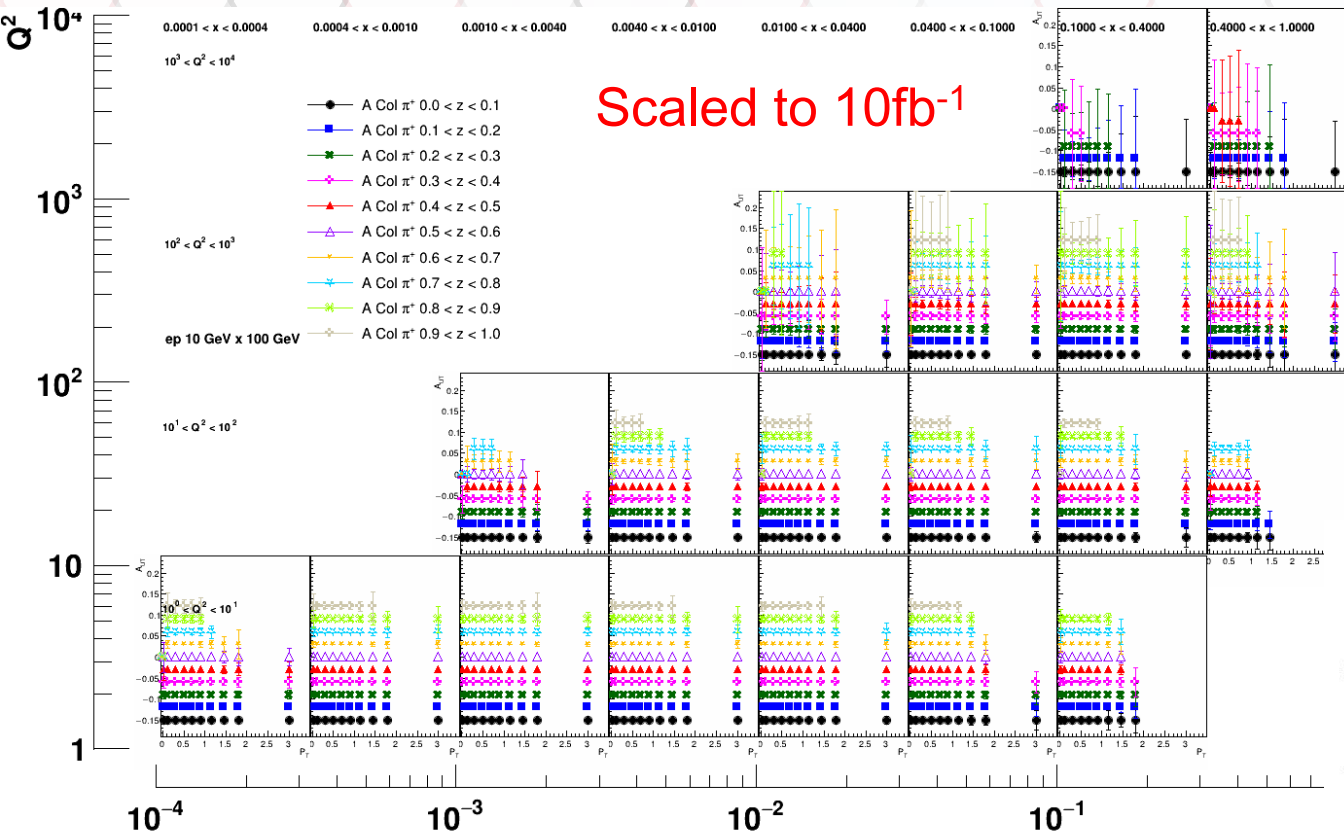
Some example Output II

- High level: Reweighted azimuthal single spin asymmetries

- Very simplified constant (in x , Q^2 , z , P_{hT}) weights in true variables
- Far from enough statistics, but demonstration of smeared asymmetry test



Expected Sivers/Collins asymmetries



- Note: This is still from YR work, based on eic-smear output only, **NOT YET GEANT** based!!

Key SIDIS physics measurements (must-do)

- Quark Sivers function as a function of x , k_t for valence and sea flavors: $A_{UT} \sin(\phi_S - \phi_h)$ moments for IDed pions and kaons (Golden channel)
- Tensor charges for valence and sea quarks $A_{UT} \sin(\phi_S + \phi_h)$ moments for IDed pions and kaons (silver channel)
- Unpolarized TMD PDFs and its QCD evolution (silver channel, implicit requirement for Sivers)
- Sea quark helicities via SIDIS A_1 (A_{LL}) measurements for IDed pions and kaons (golden channel)
- Gluon Sivers function via di-jet or HF pair A_{UT} s (Still open)

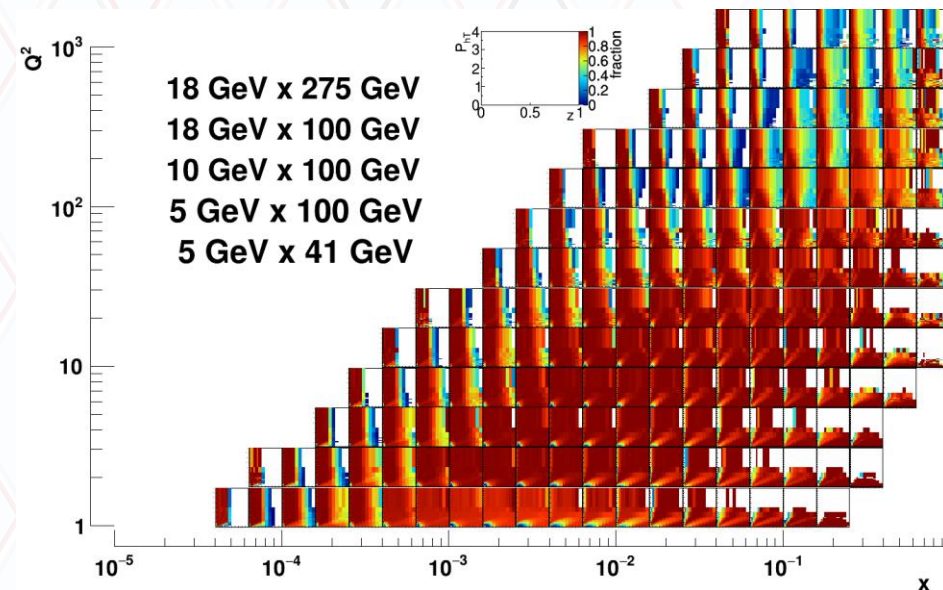
Other measurements (can-do)

- Boer-Mulders function measurements via IDed pion and kaon $\cos(n\phi_h)$ moments (likely most acceptance sensitive)
- Fragmentation function FF measurements and nFF measurements for light hadrons
- Unpolarized sea quark PDF measurements using FFs
- Various other single and di-hadron azimuthal moments related to tensor charge, higher twist function e , and others
- XYZ production measurements (mostly photo-production, not SIDIS but part of SIDIS YR, could also be in HF group)
- Other Jet related TMD measurements → HF/Jet group?

Main figures for the report

- 4D (x - Q^2 - P_{hT} - z) kinematical + PID coverage figure similar to YR
 - Concentrate for the most part on certain x - Q^2 ranges due to simulation cost
- Closely related: z , P_{hT} and ϕ_s , ϕ_h smearing figure for different ECCE configurations
- Simulations can start from the YR Pythiaerhic/eic-smear files

Fig. 8.29



→ Already prepared for the most part

Sivers/Collins/unpol TMD figures

- Redo these YR analyses (AUTs require reweighting of events in truth kinematics+parton flavor)
- Need to take into account crossing angle and related acceptance/smearing effects
- Similar to YR guess systematics via variation between perfect and smeared options
- Extrapolate from some x-Q2 bins to all and give to Alexey Vladimirov (Sivers, unpol TMD) or Daniel Pitonyak (Tensor charge) for impact studies

Fig. 7.53: Sivers

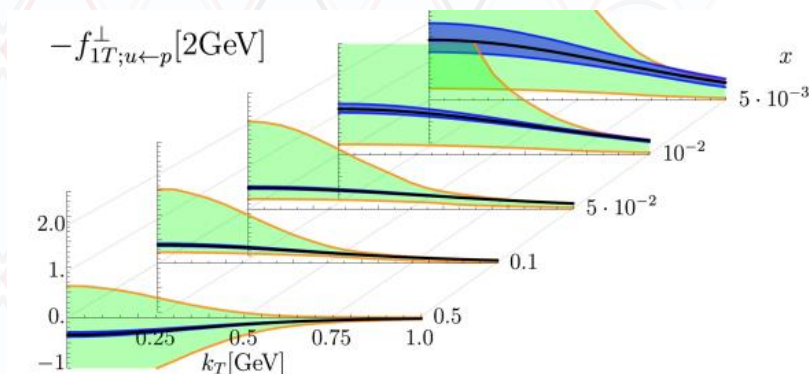
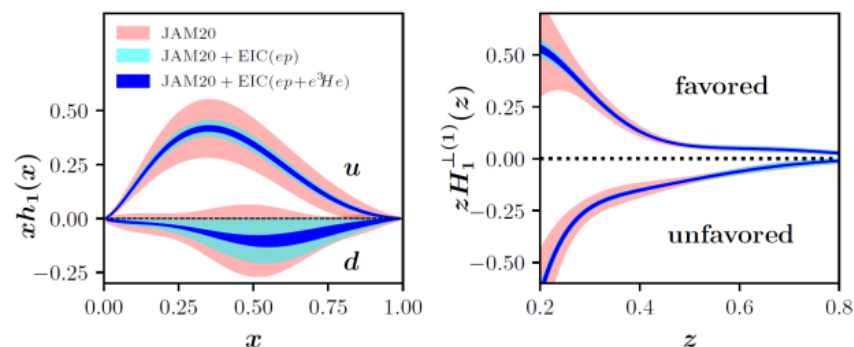


Fig. 7.54: Transversity



→ feasible using EventEvaluator, reweighting machinery still to be transferred from eic-smear based work