Double longitudinal spin asymmetries with jets

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Jet/HF working group A_{LL} goals

Physics goals + channel	Money plots	Bonus plots	Detector requirements
Nucleon structure, helicity distributions Jet and dijet A _{LL}	A_{LL} vs jet p_T and for various η bins	Δq and Δg vs x and Q^2	Polarimetry Luminosity, Forward, central and backward acceptance, Calorimetry,Tracking

$$A_{LL} = \Delta \sigma / \sigma$$
$$\Delta \sigma = \sigma (++) - \sigma (+-)$$
$$f$$
helicities of
colliding particles

Why is jet A_{LL} interesting?

Sensitive to polarized parton distributions



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Different phase-space regions give access to different distributions

Boughezal, FP, Xing (2018)

Why is jet A_{LL} interesting?

Probes the transition from non-perturbative to perturbative QCD



Hinderer, Schlegel, Vogelsang (2017)

Poor agreement and large corrections for associated asymmetry in hadron production at E155; higher-twist? PDFs? Revisit this issue with larger kinematic lever arm at the EIC

Inclusive jets: framework



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Proton distributions at large Q^2 , photon distributions at low Q^2

Inclusive jets: results



Different phase-space regions give access to different distributions

Sensitivities greatest at large η ; need good coverage/resolution there

Dijets: framework



Photon structure directly at leading-order

$$X_{\gamma} = \frac{1}{2E_{e}y} \left(m_{T1}e^{-y_{1}} + m_{T2}e^{-y_{2}} \right)$$

Discriminates between resolved/direct processes

Dijets: results



Strong sensitivity to different models of polarized photon distributions in both p_T and η

Cut on x_{γ} here enhances sensitivity to resolved processes

Next steps and questions

- For the "money plots": bin more finely in p_T , η
- What is the impact of EIC jet pseudo-data in the context of a global PDF fits? Does it help understand polarized photon PDFs?
- Quantitatively what can we learn about the polarized photon PDFs?
- •How do power corrections for low-p_T jets behave?
- How well does pQCD behave for these observables? Known from HERA days that cuts can wreak havoc on the pQCD expansion for jet photo production Frixione, Ridolfi (1997)