SPIN 2023 Conference

Some EIC-relevant talks

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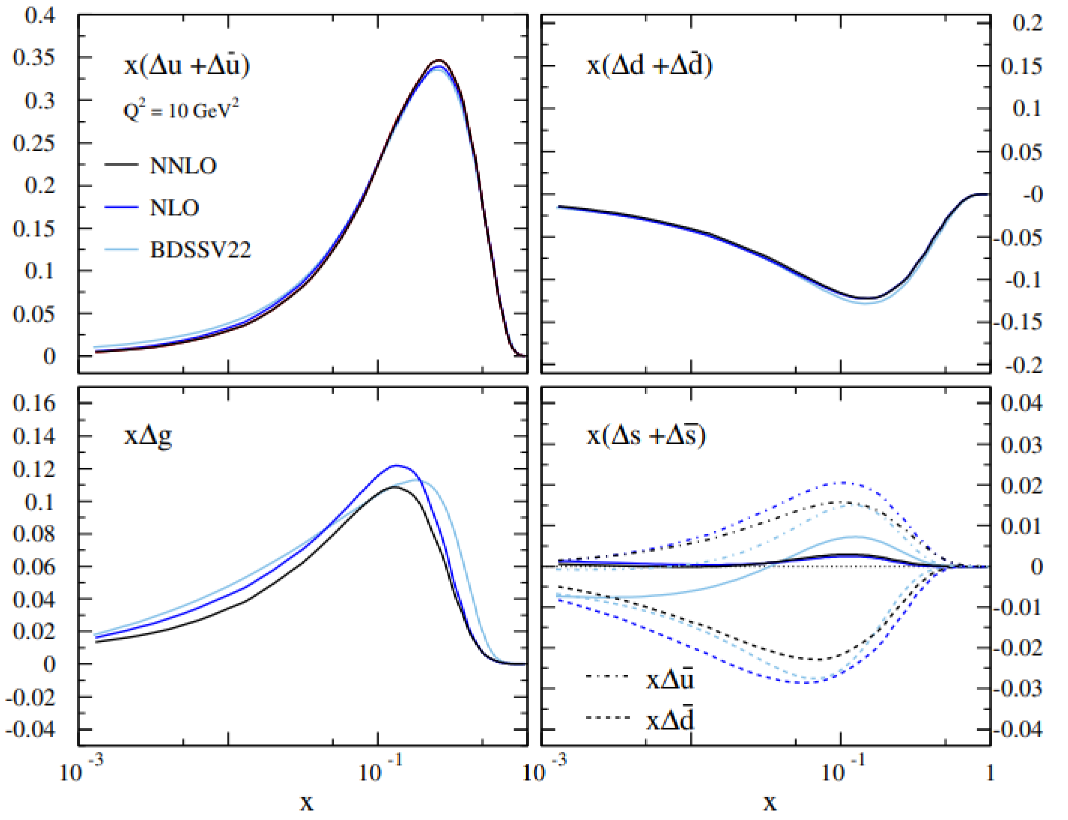
DSSV: Global fit of helicity PDFs at NNLO

Data:		
DIS:	EMC,SMC,E142,E143,E154,E155, HERMES, COMPASS, HALL-A,CLAS (p,n,d,He)	**378**
SIDIS:	HERMES, COMPASS (p-$\pi^{\pm}$,d-$\pi^{\pm}$)	**80**
PP-JETS:	STAR run 5,6,9,12,13,15 $(\sqrt{s} = 200, 510\, GeV)$ (no dijets yet)	**91**
PP-$\pi^0/\pi^{\pm}$:	PHENIX, STAR	**82**
PP $W^{\pm}$:	PHENIX, STAR	**22**
Total:		**653**



https://indico.jlab.org/event/663/contributions/13423/attachments/10404/15618/Spin-2023-Vogelsang.pdf

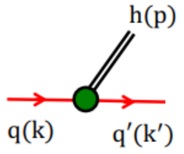
Quark spin effects in simulation

Modeling hadronization: the string+$^3P_0$ model

- We have developed a model for the simulation of the fragmentation polarized quarks

→ **string+$^3P_0$ model:** extension of the Lund string fragmentation model to include the quark spin

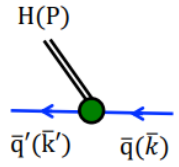
AK, Artru, Belghobsi, Bradamante, Martin, PRD 97, 074010 (2018)	2018	PS mesons
AK, Artru, Belghobsi, Martin, PRD 100, 014003 (2019)	2019	PS mesons
AK, Artru, Martin, PRD 104, 114038 (2021)	2021	PS mesons + VM



$\mathbf{k}_T = \mathbf{p}_T + \mathbf{k}'_T$
$Z_+ = p^+/k^+$

Quark splitting described by a 2x2 splitting amplitude

$$T_{q',h,q} \propto \left[F^{\rm Lund}_{q',h,q}(Z_+, \mathbf{p}_T; \mathbf{k}_T)\right]^{1/2} [\mu + \sigma_z \boldsymbol{\sigma}_T \cdot \mathbf{k}'_T] \; \Gamma_{h,s_h}$$



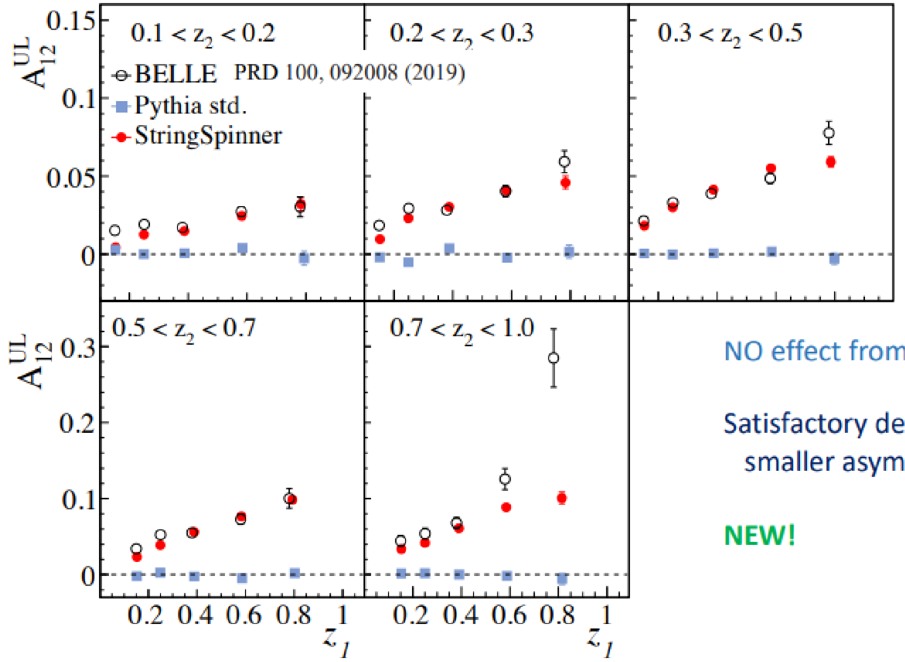
$\bar{\mathbf{k}}_T = \mathbf{P}_T + \bar{\mathbf{k}}'_T$
$Z_- = P^-/\bar{k}^-$

For anti-quark splitting

$$\{q, h, q'\} \to \{\bar{q}, H, \bar{q}'\}, \;\; Z_+ \to Z_-, \;\; \{\mathbf{k}_T, \mathbf{p}_T, \mathbf{k}'_T\} \to \{\bar{\mathbf{k}}_T, \mathbf{P}_T, \bar{\mathbf{k}}'_T\}$$

A_{12}^{UL} asymmetry for back-to-back $\pi^\pm - \pi^\mp$

$z_1 \times z_2$ - dependence



Asymmetries w.r.t thrust axis (not $q\bar{q}$ axis)

$T > 0.8$
$z > 0.1, P_T < 3.0$ GeV/c
$\alpha_0 < 0.3$

NO effect from Pythia

Satisfactory description from StringSpinner
smaller asymmetries at large z

NEW!

https://indico.jlab.org/event/663/contributions/13018/attachments/10309/15416/Kerbizi_SPIN2023.pdf

Fixed target at the EIC

Heracles parameters vs. HERMES

EIC beam energy: E:	18 GeV vs. 27.5 GeV
EIC beam intensity, I_b:	2500 mA (at 10 GeV) vs. 50 mA
	227 mA (at 18 GeV)
EIC beam polarization, P_b:	80% vs. 40%
Target thickness, t_t :	25 larger than at HERA (thanks to pol. e- injection)
Target polarization, P_t:	the same high as at HERMES

Internal target will have luminosity $L_{at\ EIC} \sim 10^{35}\ /cm^2/s$

https://indico.jlab.org/event/663/contributions/12964/attachments/10264/15542/Heracles-BW.pdf

The experiment FOM gain: $(I_b \times t_t \times P_b{}^2 \times P_t{}^2)$: ~ (5-50) x 25 x 4 x 1

A factor of 500+ larger FOM opens a field for many advances in hadron physics