

Compton Amplitude and the Nucleon Structure Functions on the Lattice via the Feynman-Hellmann Theorem

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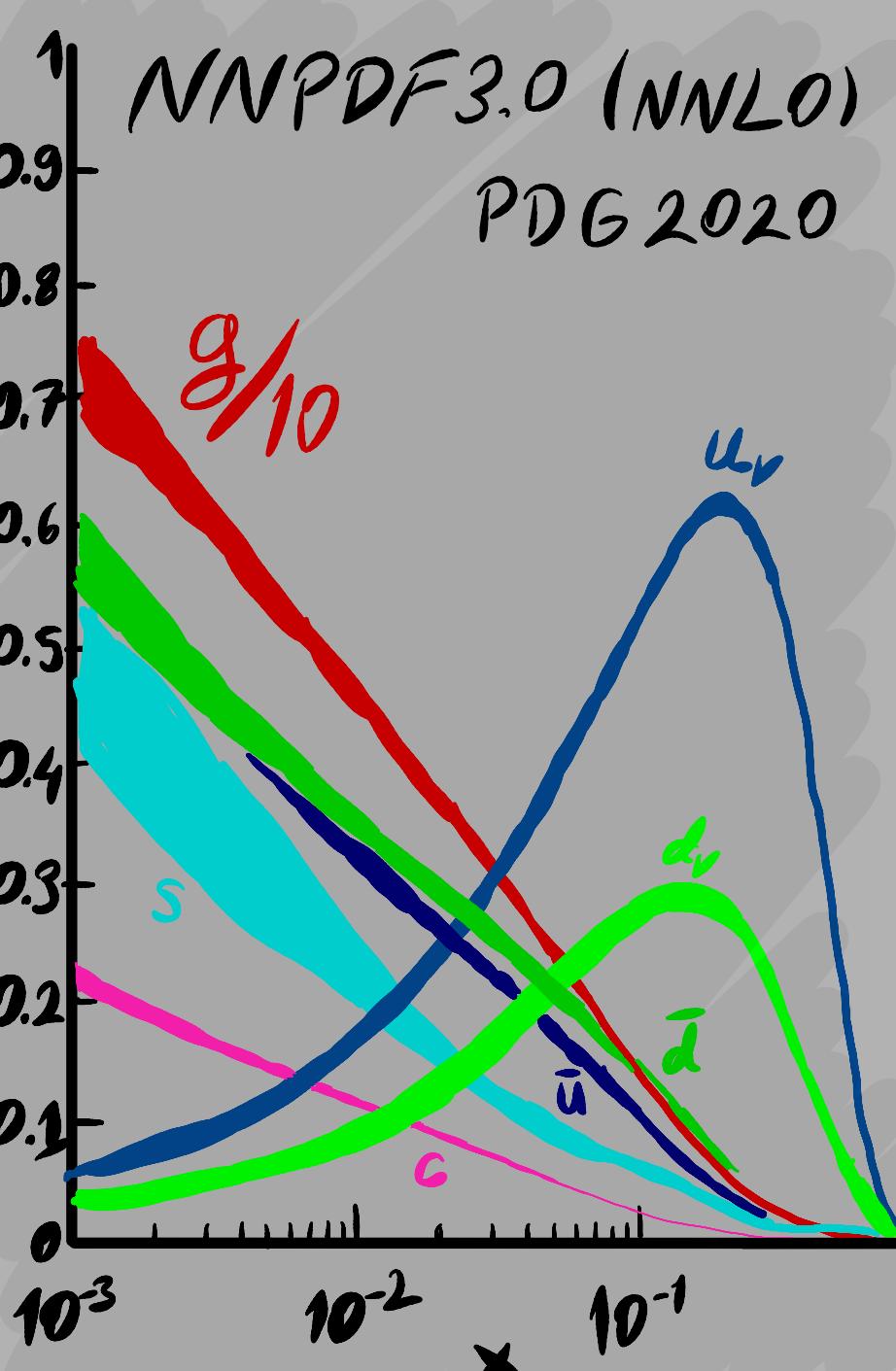
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arXiv:2007.01523

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Bit of a Motivation

Leading Twist



- An alternative way to access the structure functions from first principles
- Ultimately, we want a better understanding of high- and low- x regions

Higher Twist

- Where does the scaling region start?
 - Important to decide on Q^2 -cuts for global QCD analysis
- L_4 -pt functions are costly
- FH approach needs 2-pt functions only
- How much are the higher-twist effects?
- Can we disentangle the kinematic effects?

Technical Issues

- Operator mixing/renormalisation issues in OPE approach in LQCD

$$\mu(Q^2) = C_2(a^2 Q^2) \frac{L_2(a)}{Q^2} + \frac{C_4(a^2 Q^2)}{Q^2} \frac{L_4(a)}{Q^{2+4}}$$

Vadisiose Neat

- L_4 -pt functions are costly

- FH approach needs 2-pt functions only

only

map w -dep.

varies P

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4

• $w = 2P \cdot q / Q^2$, fix q^2 map w -dep.

varies P

\rightarrow

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where,

$$F_{1n}(Q^2) = \sum_{n=1}^{\infty} 2w^{2n} M_{2n}^{(1)}(Q^2)$$

$$M_{2n}^{(1)}(Q^2) = \int dx 2x^{2n-1} F_1(x, Q^2)$$

from \star

• Moments decrease monotonically

in Bayesian Approach

$$M_2^{(1)}(Q^2) \sim \mathcal{U}(0, 1)$$

$$M_4^{(1)}(Q^2) \sim \mathcal{U}(0, M_2^{(1)}(Q^2))$$

sample from "Uniform" priors

bound from above & below

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• $M_{2n}^{(1)}(Q^2) \geq \dots \geq M_{2n+2}^{(1)}(Q^2) \geq \dots \geq 0$

and they are positive-definite

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