EHM, pion DFs and J/ψ production

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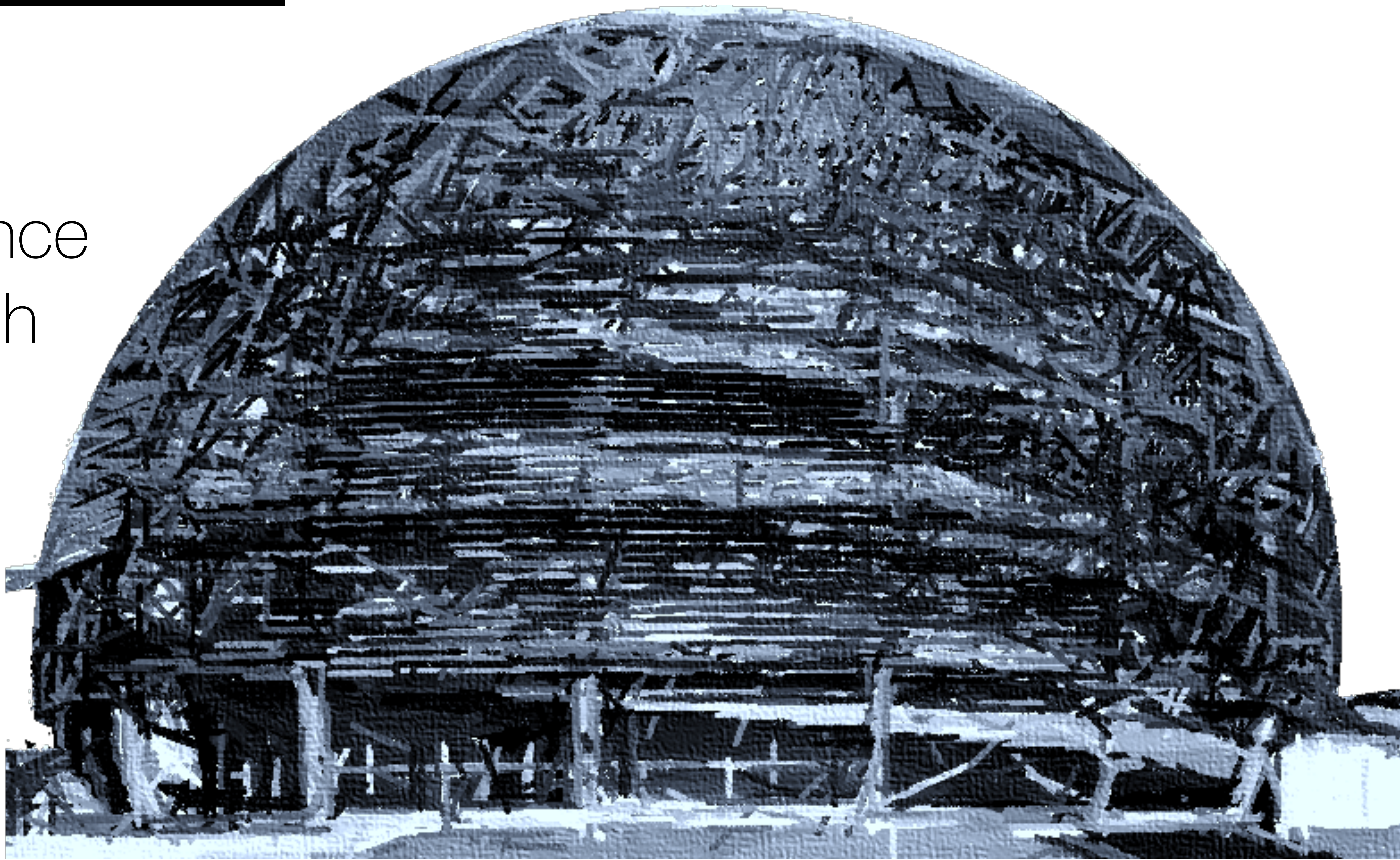

Perceiving the Emergence of Hadron Mass through AMBER@CERN 7

MAY 10 - MAY 13

ECT*
EUROPEAN CENTRE
FOR THEORETICAL STUDIES
IN NUCLEAR PHYSICS AND RELATED AREAS
FONDAZIONE BRUNO KESSLER

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$$\mathcal{L}_{\rm QCD} = \sum_{j=u,s,d,\dots} \bar{q}_j \left[\gamma_\mu D_\mu + m_j\right] q_j + \frac{1}{4} G^a_{\mu\nu} G^a_{\mu\nu} + \frac{1}{2\xi}(\partial_\mu A^a_\mu)^2 + \partial_\mu \bar{c}^a \partial_\mu c^a + g f^{abc}(\partial_\mu \bar{c}^a) A^b_\mu c^c$$

(linear) gauge fixing

Faddeev-Popov ghost term

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$$m_g \sim 0.5 \text{ GeV}$$

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40 years+ non-perturbative methods uncover the size of the gluon mass

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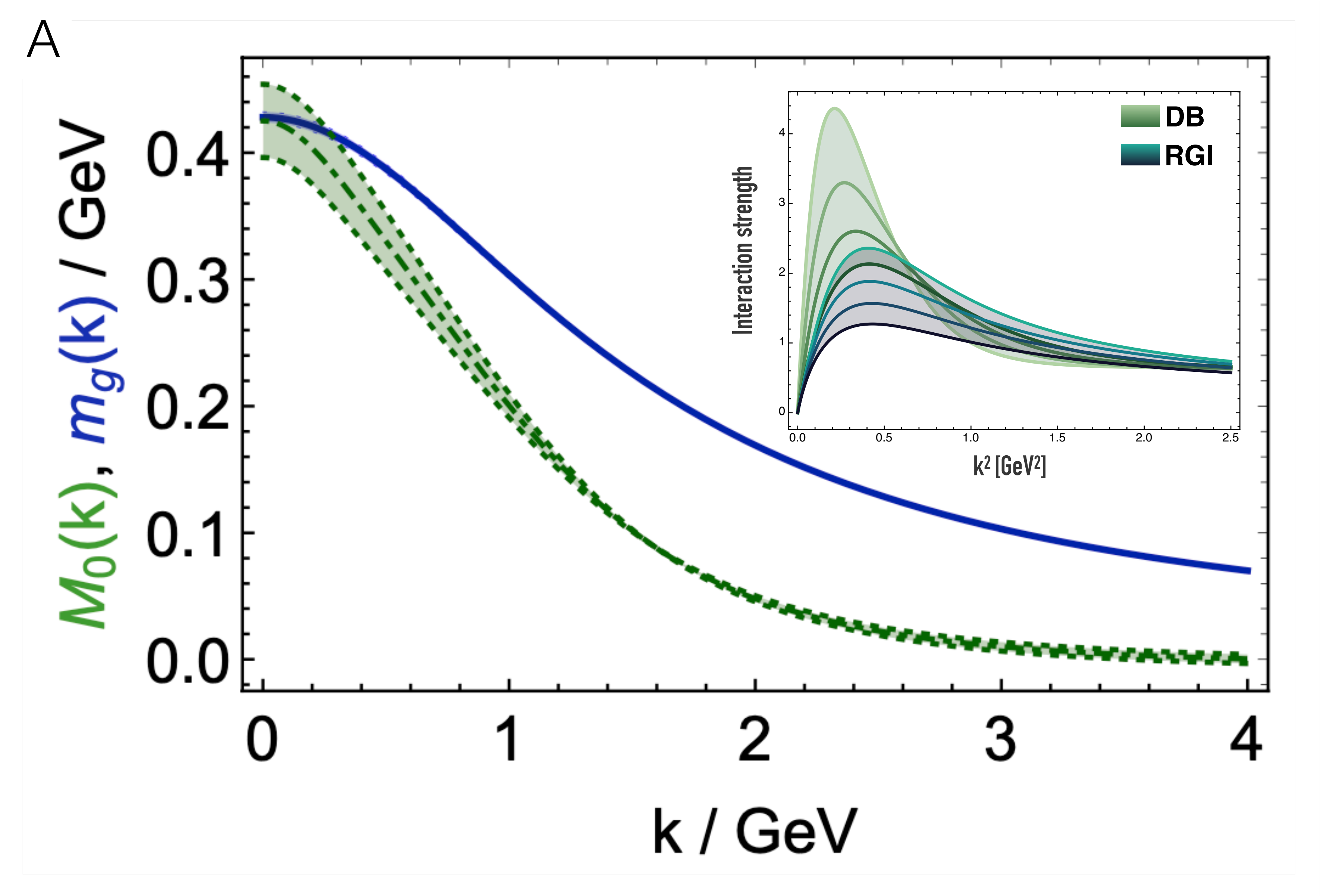

② PI EFFECTIVE CHARGE

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$$\widehat{\alpha}(s) = \frac{4\pi}{(11 - 2n_f/3)\log[\mathcal{K}^2(s)/\Lambda^2]}, \quad \mathcal{K}^2(s) = \frac{a_0^2 + a_1 s + s^2}{b_0 + s}$$

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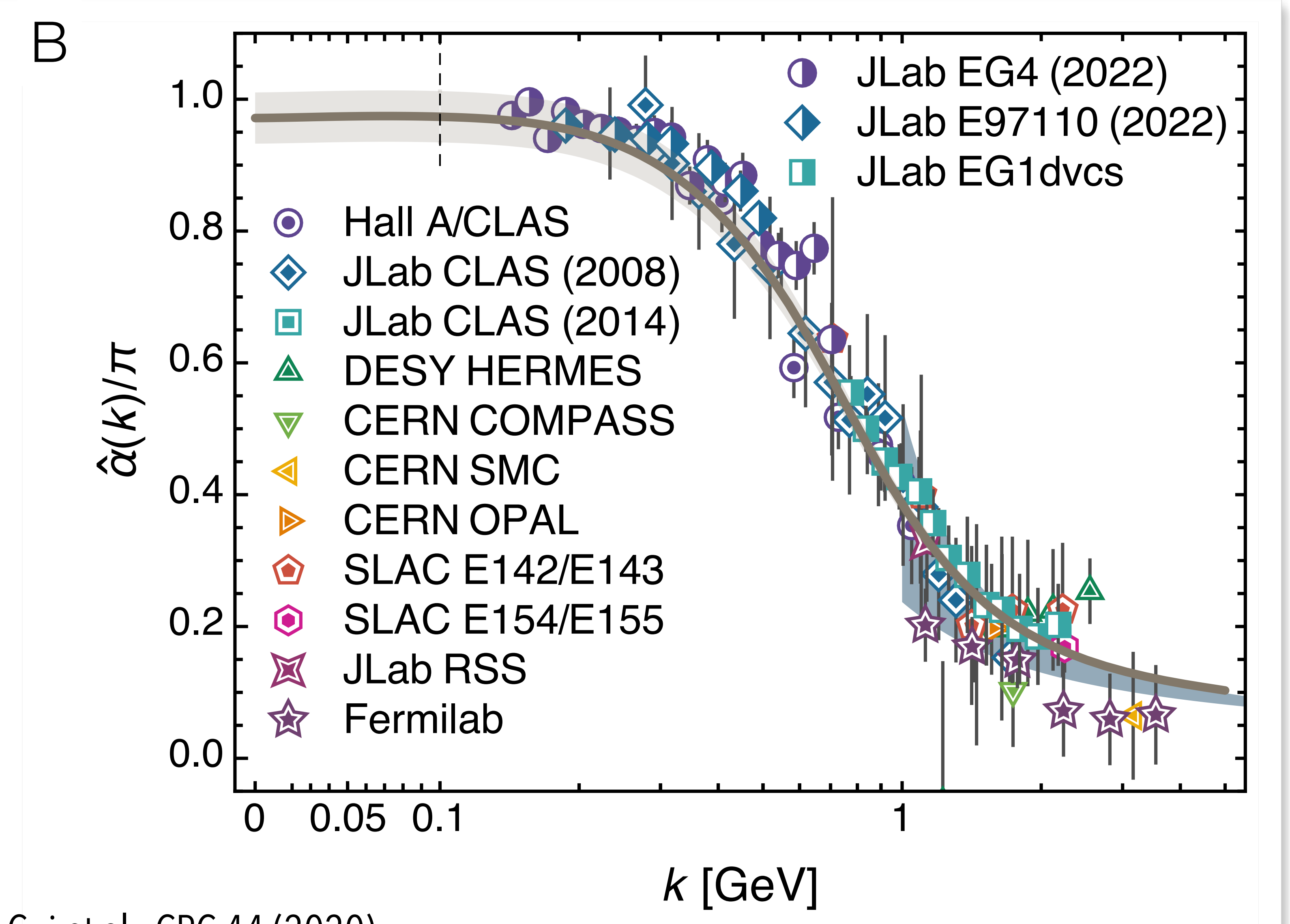

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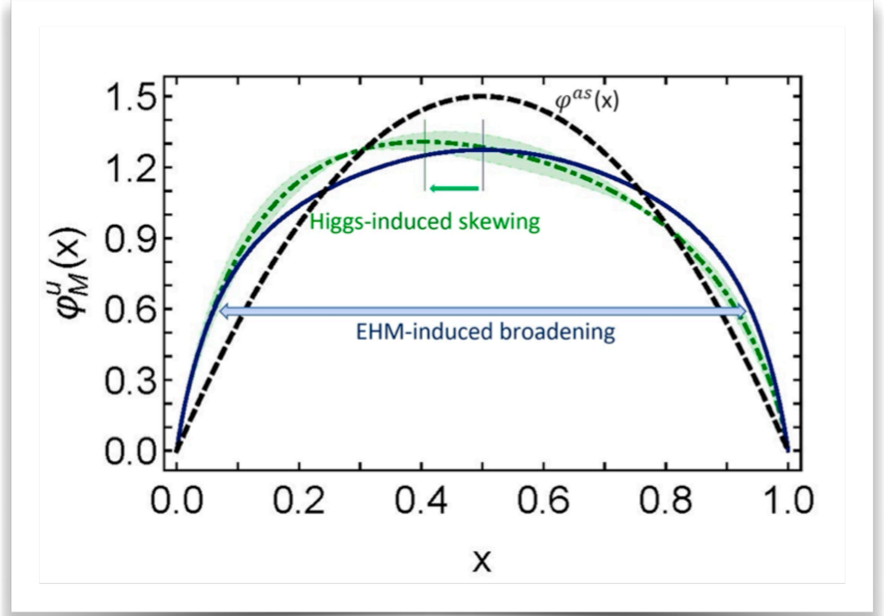
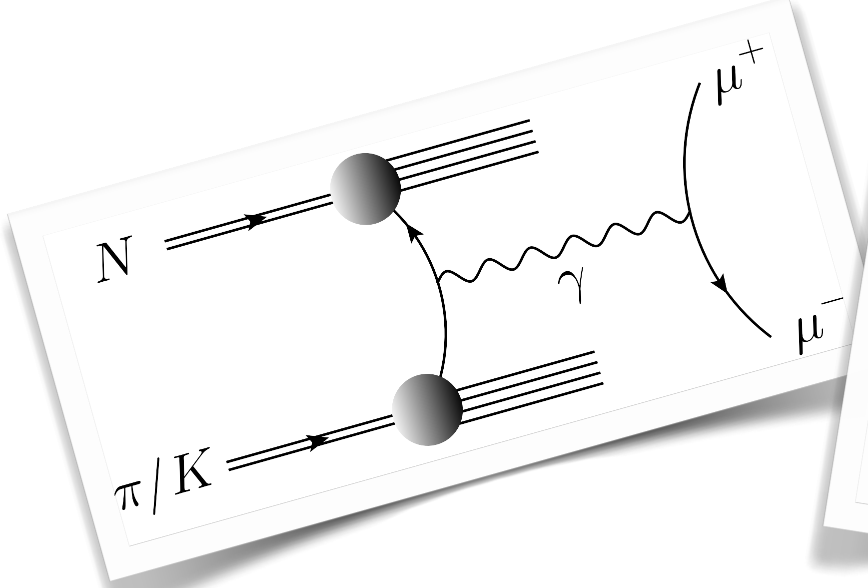
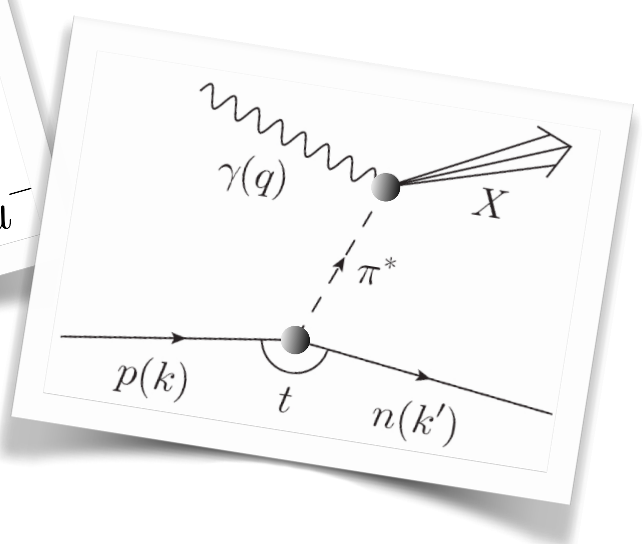


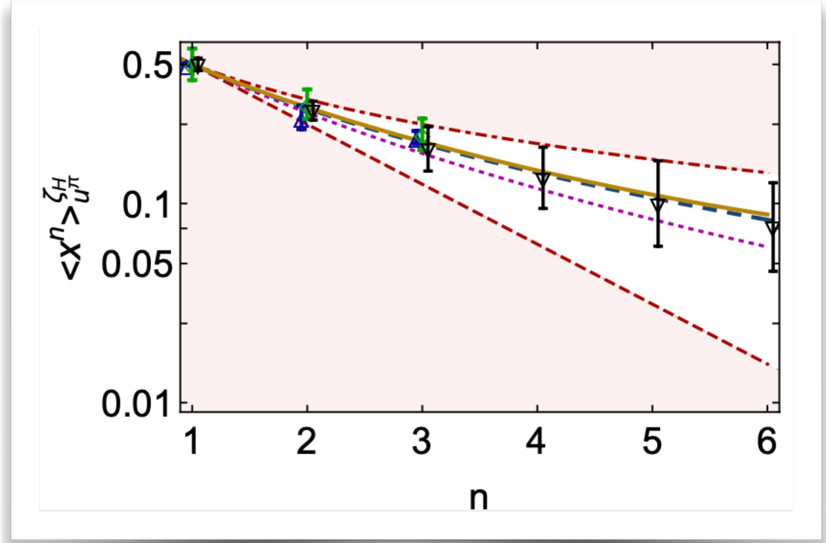




② α + DGLAP

$$\langle x^n \rangle^{\zeta}_{u_\pi} = \langle x^n \rangle^{\zeta_H}_{u_\pi} \left(\langle 2x \rangle^{\zeta}_{u_\pi} \right)^{\gamma_0^n/\gamma_0^1}$$

$$\frac{1}{2^n} \leq \langle x^n \rangle^{\zeta_H}_{u_\pi} \leq \frac{1}{1+n}$$



DISTRIBUTION AMPLITUDES

$$f_M \varphi^u_M(x;\zeta_H) = \frac{1}{16\pi^3} \int d^2k_\perp \, \psi^{\uparrow\downarrow}_{M_u}(x,k^2_\perp;\zeta_H)$$

DISTRIBUTION FUNCTIONS

$$u^M(x;\zeta_H) = \int d^2k_\perp \, |\psi^{\uparrow\downarrow}_{M_u}(x,k^2_\perp;\zeta_H)|^2$$

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FACTORIZED APPROXIMATION

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❶ Pion

	$\langle x \rangle^\pi_u$	$\langle x^2 \rangle^\pi_u$	$\langle x^3 \rangle^\pi_u$
ζ_2	0.24(2)	0.094(13)	0.047(08)
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$\langle x \rangle^\pi_g = 0.41(2)$ $\langle x \rangle^\pi_{sea} = 0.11(2)$

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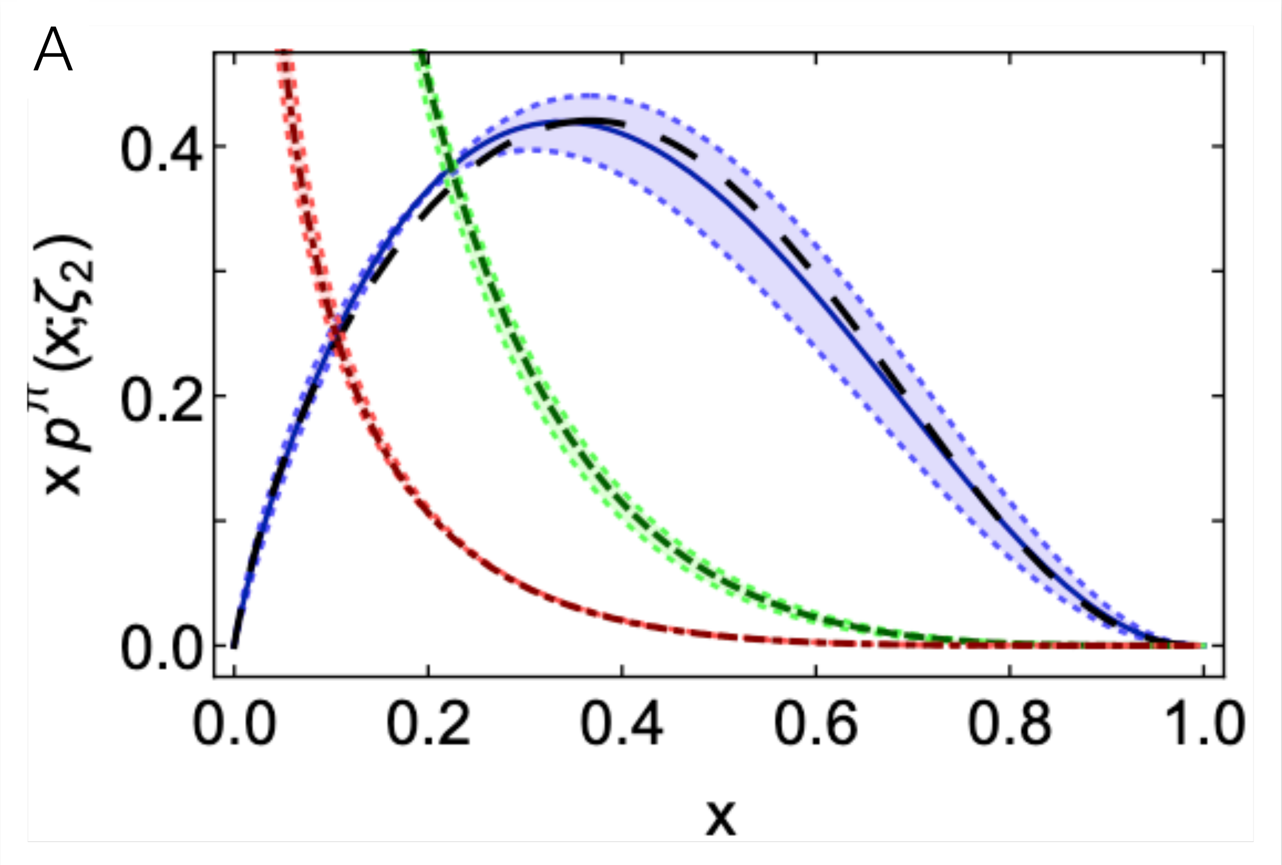

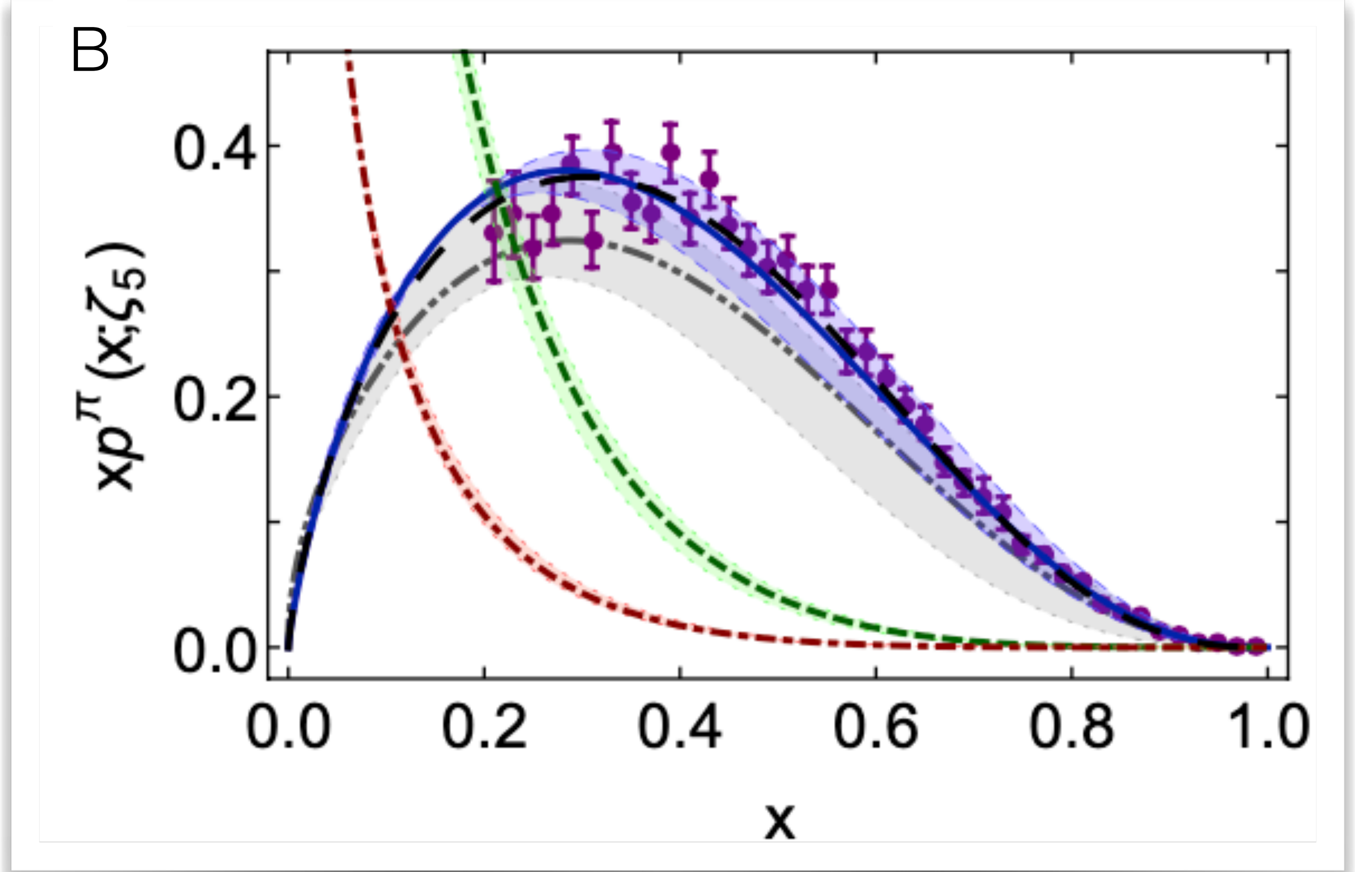

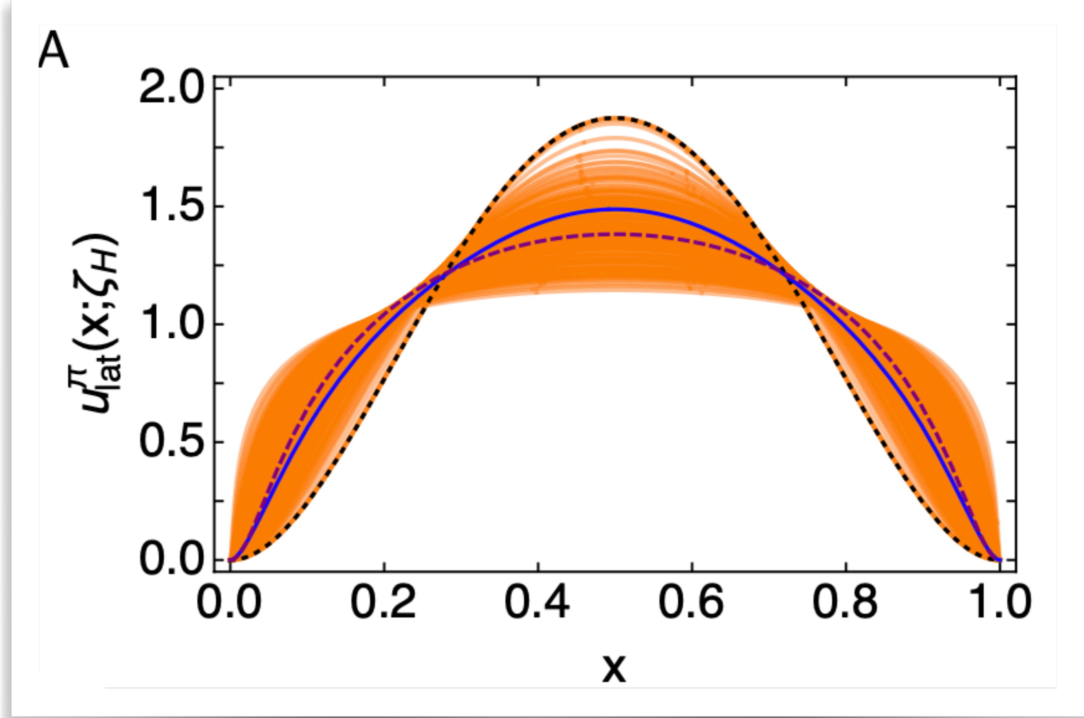

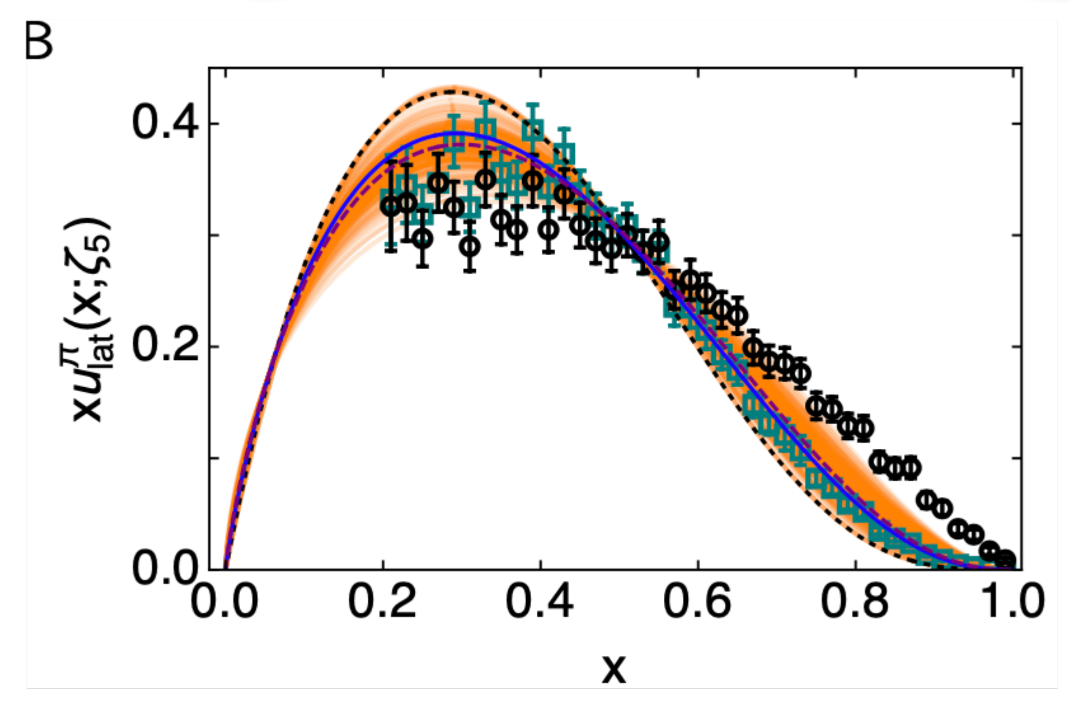

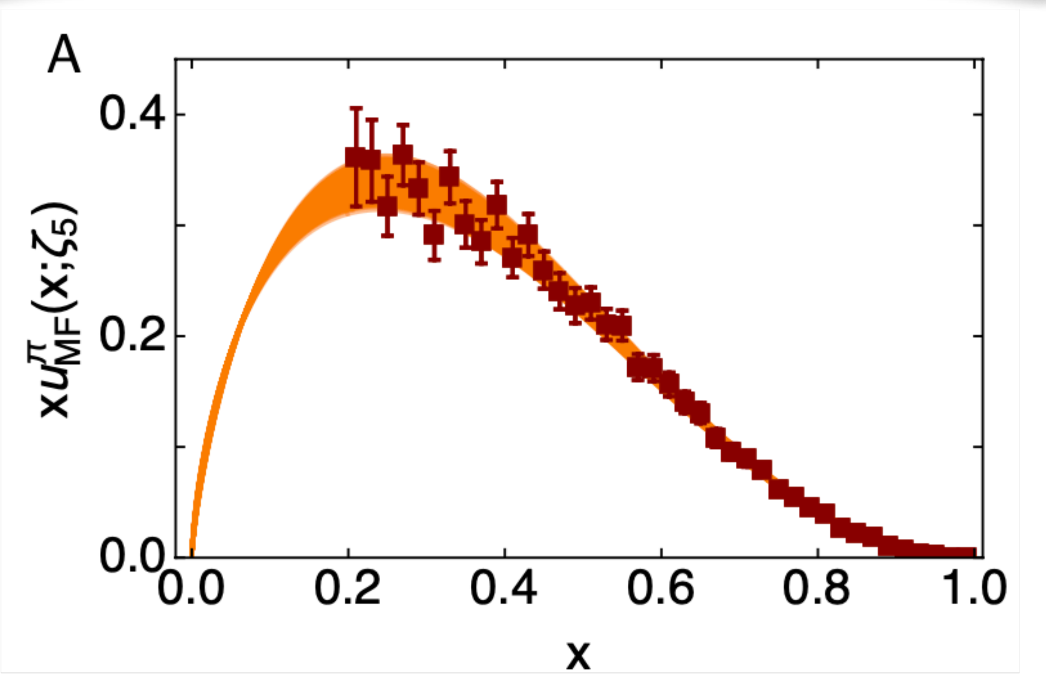

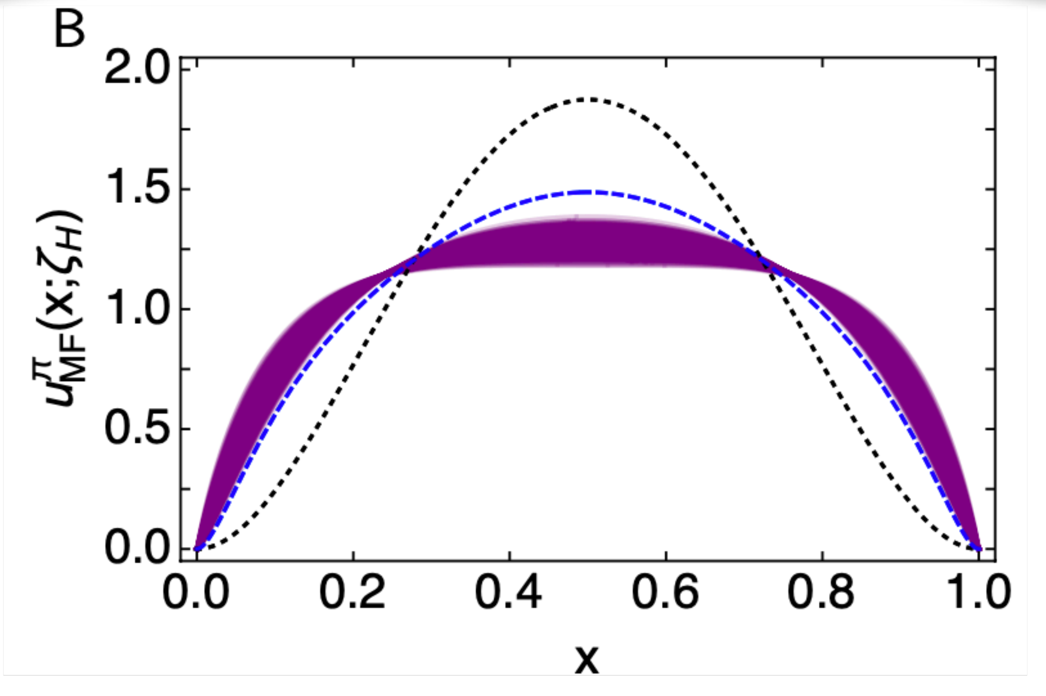

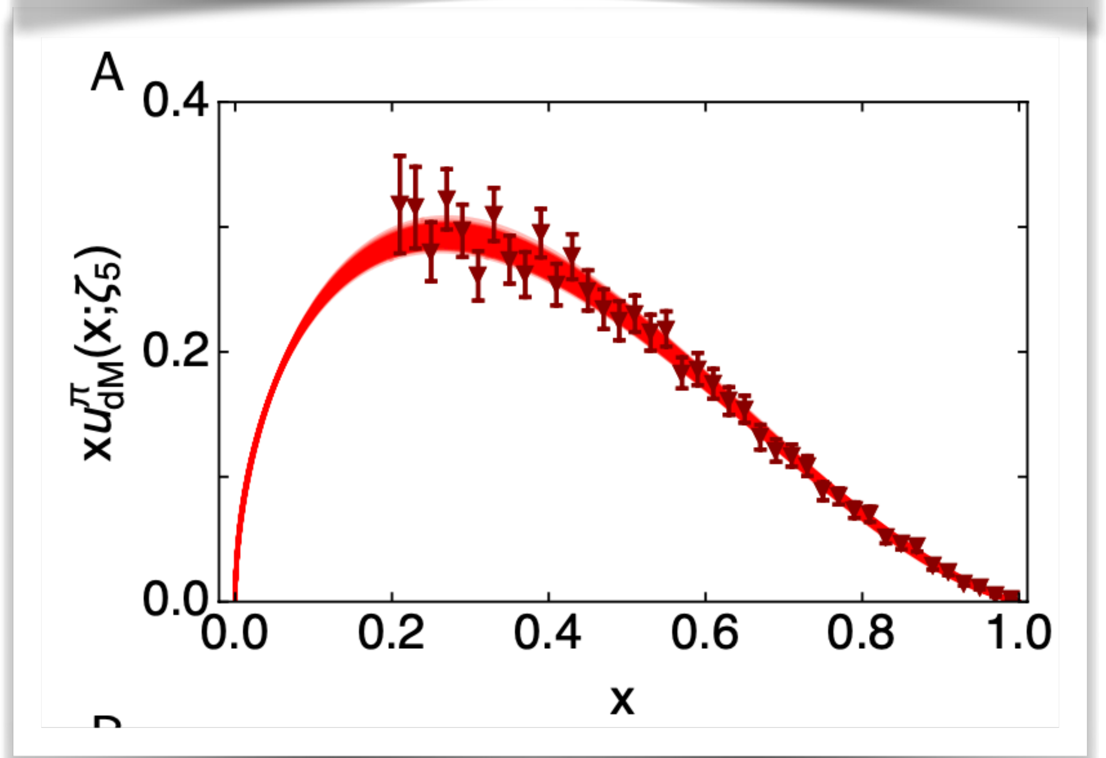

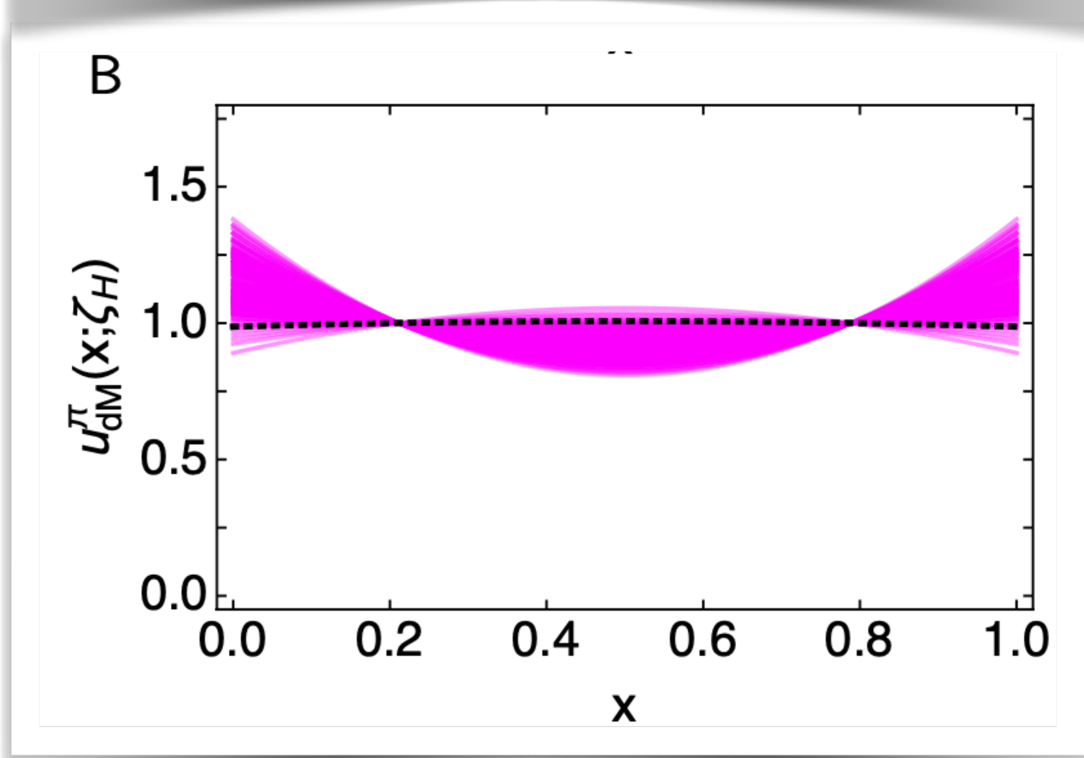

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fit to data

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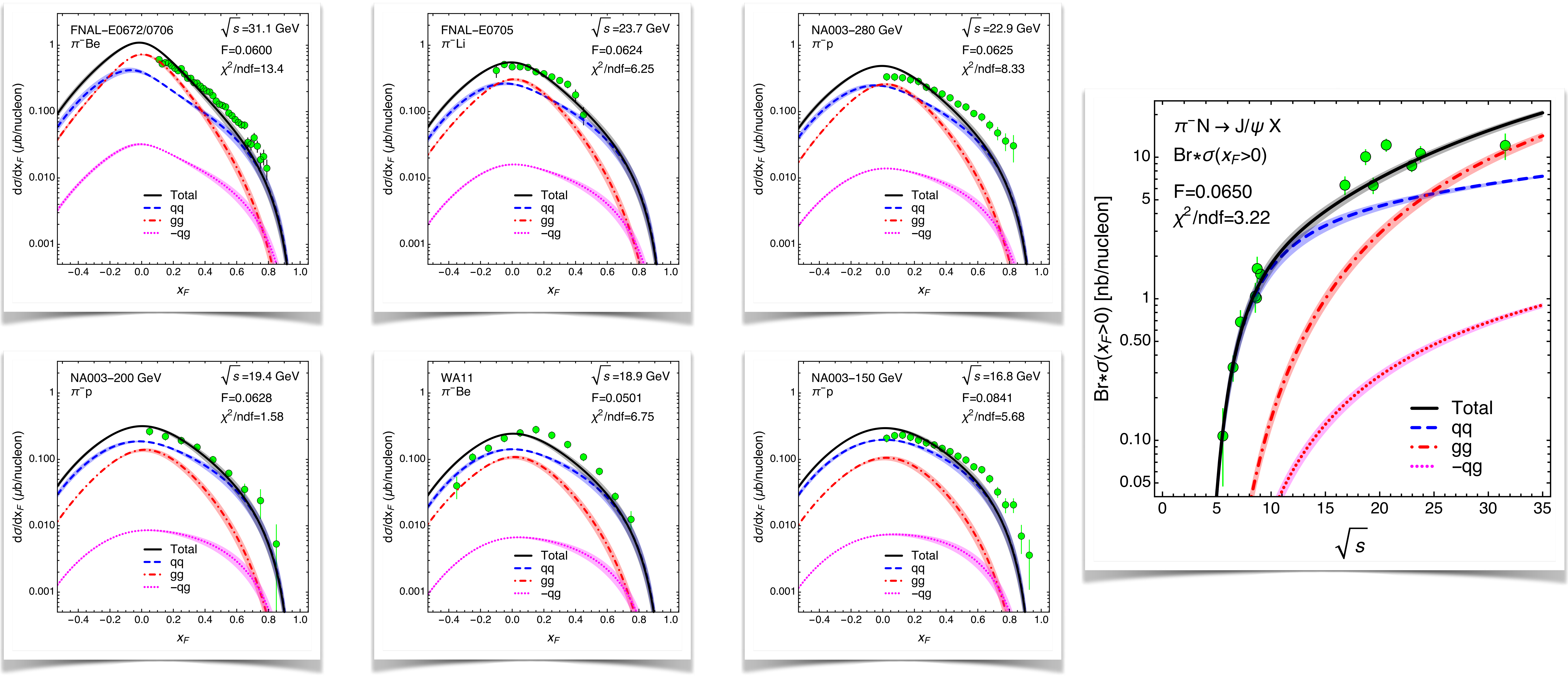

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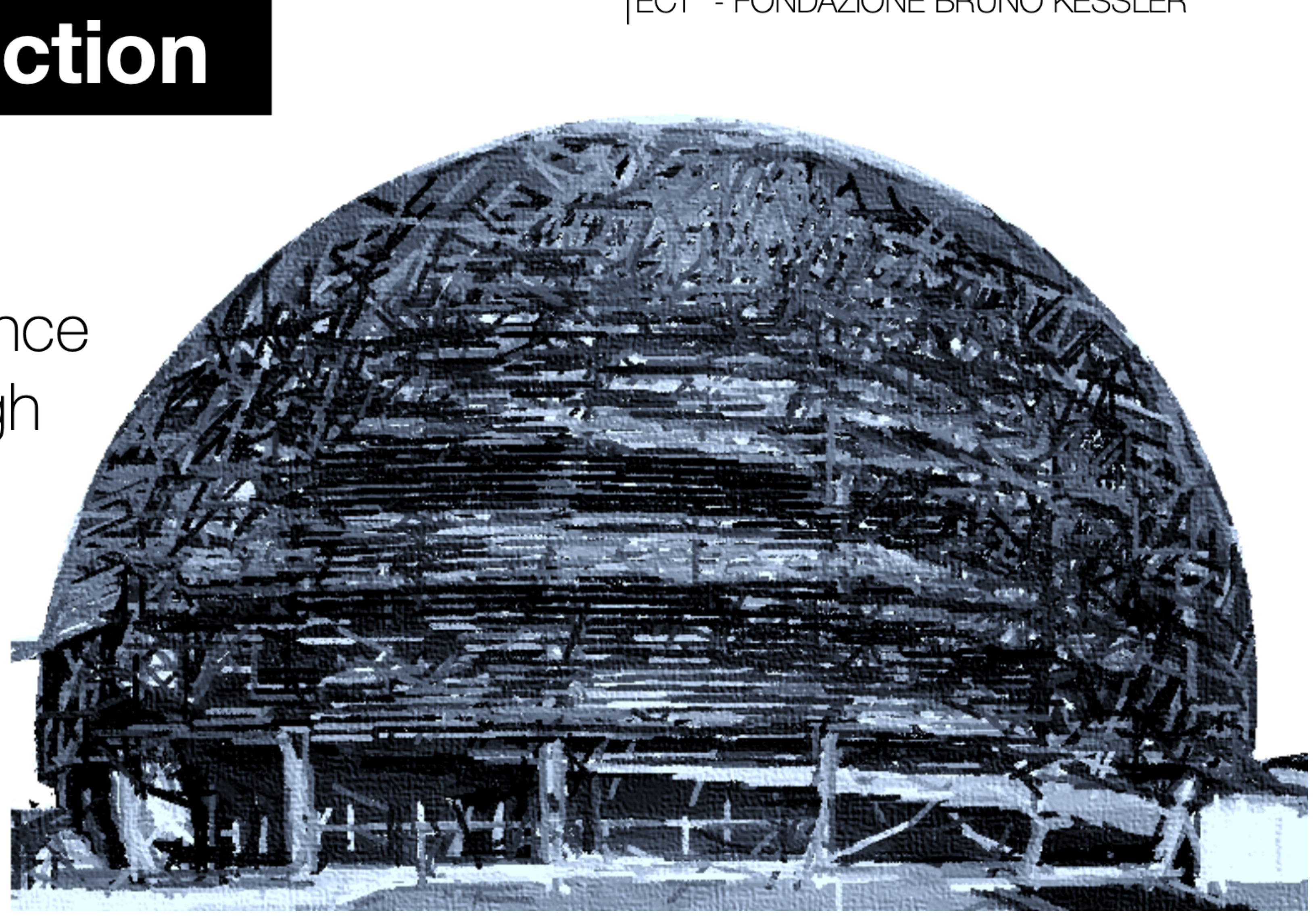

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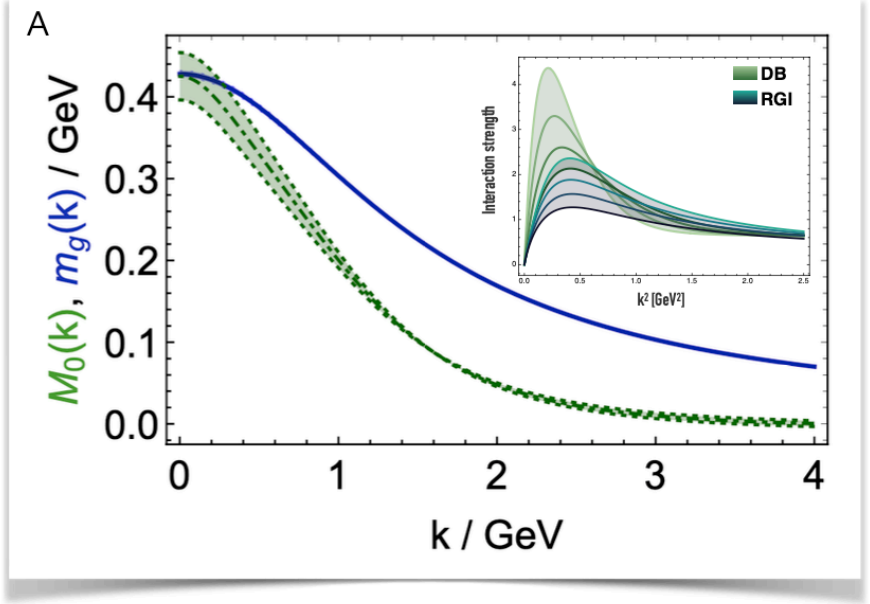

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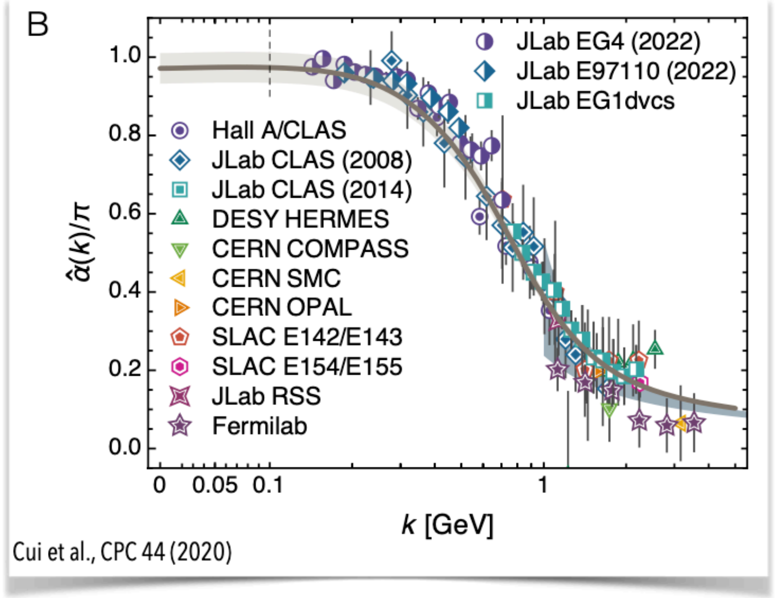

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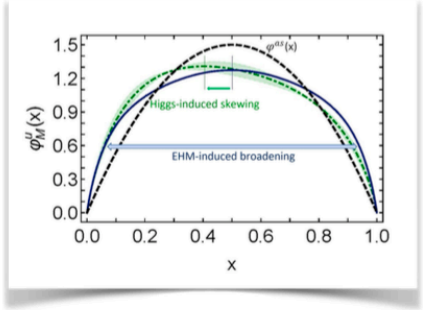

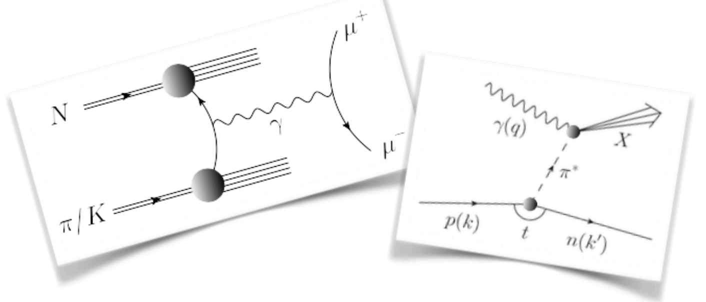

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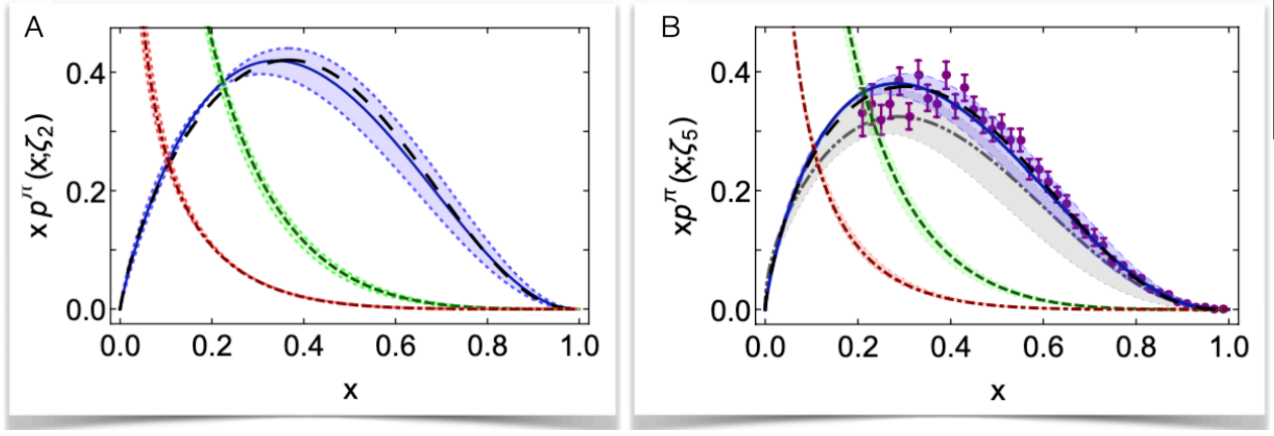

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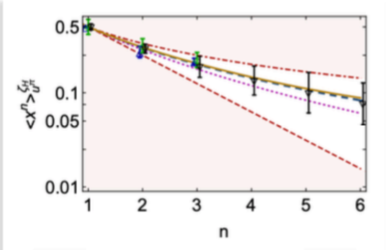

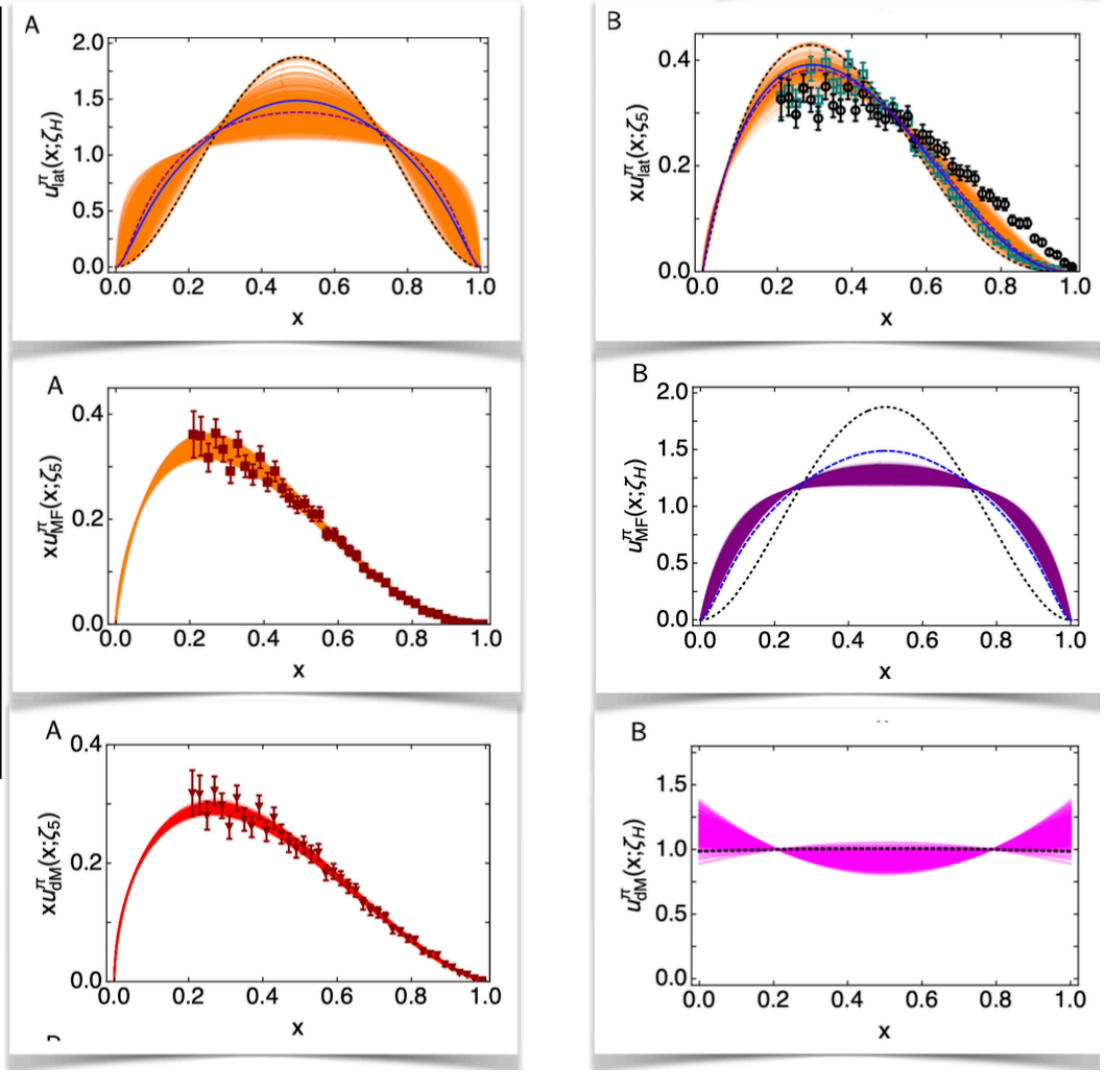

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