Gluon GPDs in the UPC production of heavy mesons

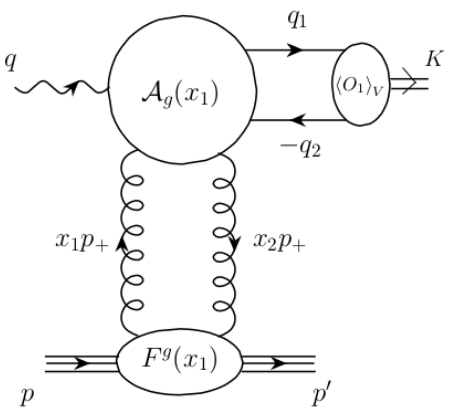


Figure 1: Kinematics of heavy vector meson photoproduction.

D. Yu. Ivanov , A. Schafer , L. Szymanowski and G. Krasnikov - **Eur.Phys.J. C34 (2004) 297-316**

The amplitude $\mathcal{M}$ is given by factorization formula:

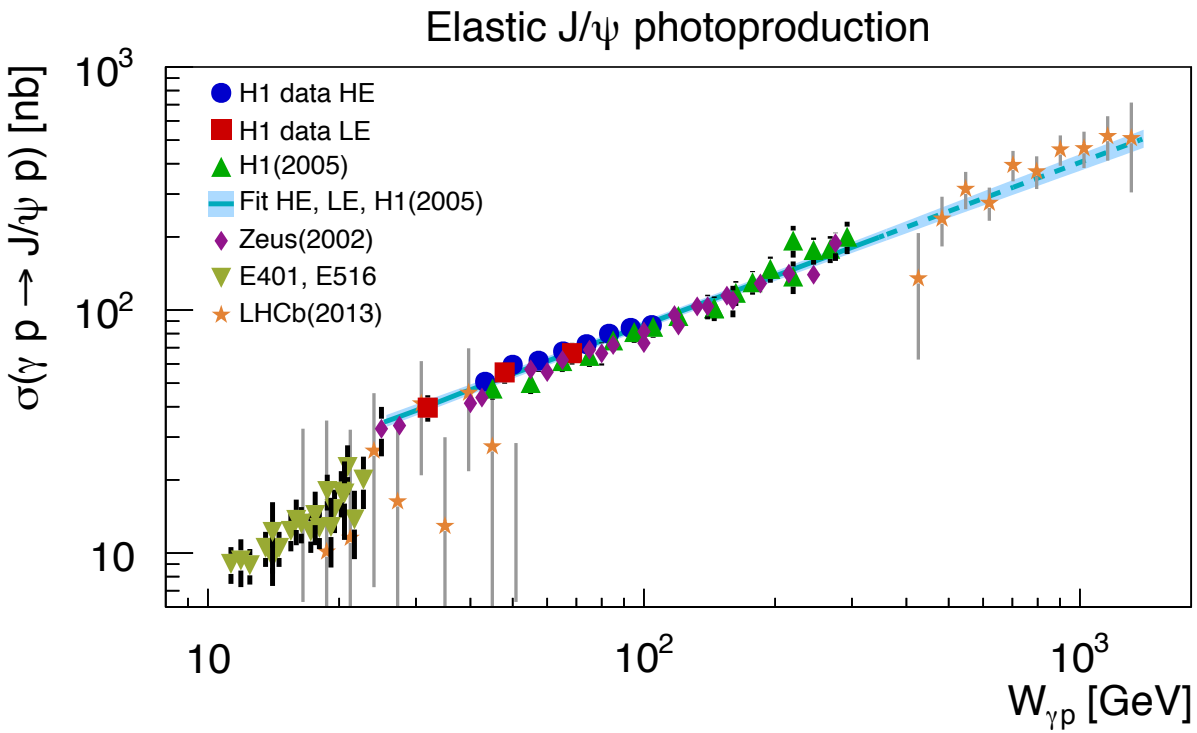
$$\mathcal{M} \sim \left(\frac{\langle O_1 \rangle_V}{m^3}\right)^{1/2} \int_{-1}^{1} dx \left[T_g(x,\xi)\, F^g(x,\xi,t) + T_q(x,\xi) F^{q,S}(x,\xi,t) \right] ,$$

$$F^{q,S}(x,\xi,t) = \sum_{q=u,d,s} F^q(x,\xi,t) .$$

where m is a pole mass of heavy quark, $\langle O_1 \rangle_V$ is given by NRQCD through leptonic meson decay rate.

Heavy Vector Mesons Photoproduction

We have good data! See H1 2013 paper:



Photoproduction cross section - LO and NLO

Work with D.Yu.Ivanov and J. Wagner

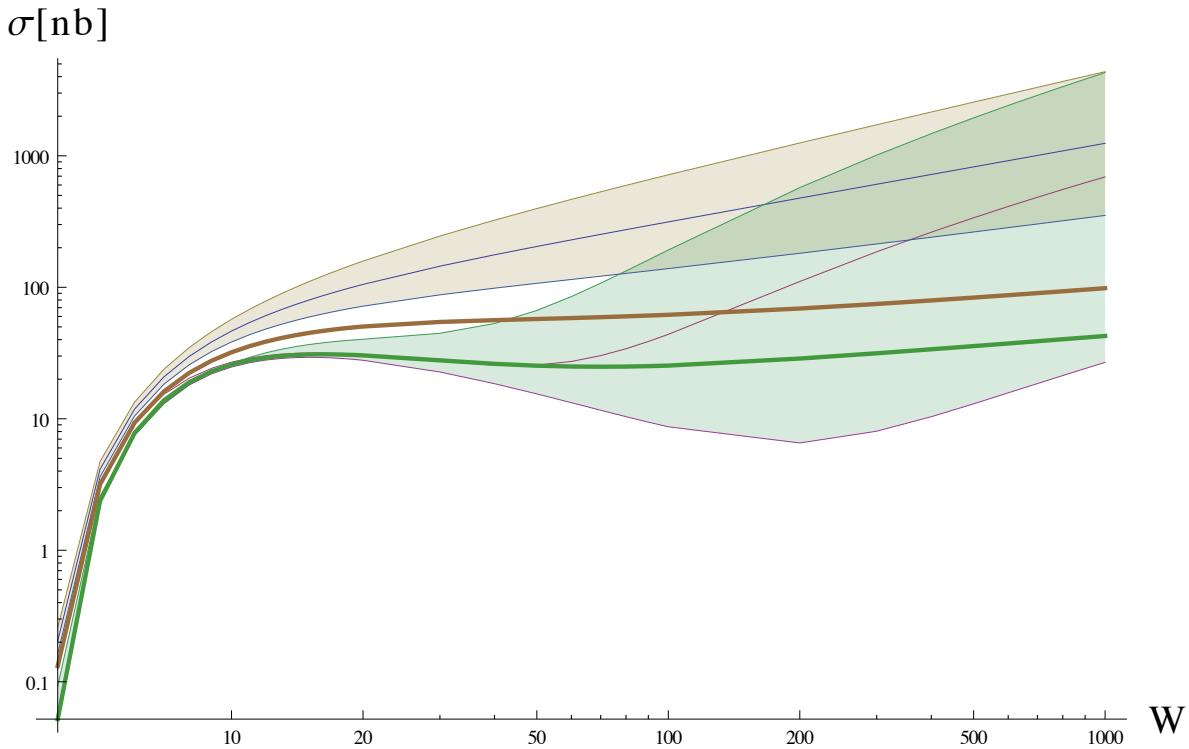
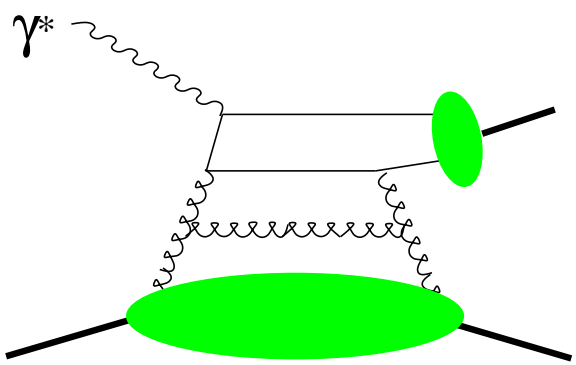


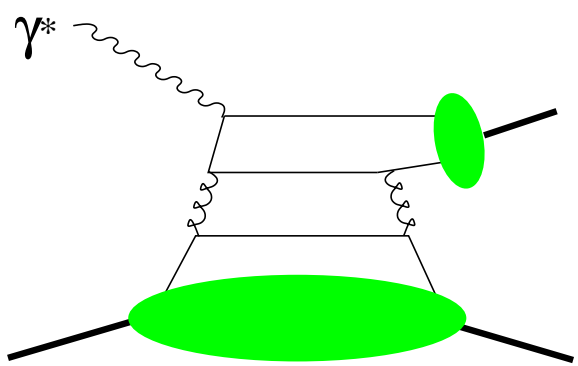
Figure: Photoproduction cross section as a function of $W = \sqrt{s_{\gamma p}}$ for $\mu_F^2 = M_{J/\psi}^2 \times \{0.5, 1, 2\}$- LO and NLO. Thick lines for LO and NLO for $\mu_F^2 = 1/4 M_{J/\psi}^2$.

- Jones & Martin & Ryskin & Teubner, arXiv:1507.06942. Choice of the factorization scale.
- Why NLO corrections are large at small x_B?
  large contribution comes from

$$ImA^g \sim H^g(\xi,\xi) + \frac{3\alpha_s}{\pi}\left[\log\frac{M_V^2}{\mu_F^2} - \log 4\right]\int\limits_\xi^1 \frac{dx}{x} H^g(x,\xi)$$

$H^g(x,\xi) \sim xg(x) \sim const$, therefore $\int dx/x H^g(x,\xi) \sim \log(1/\xi) H^g(\xi,\xi)$

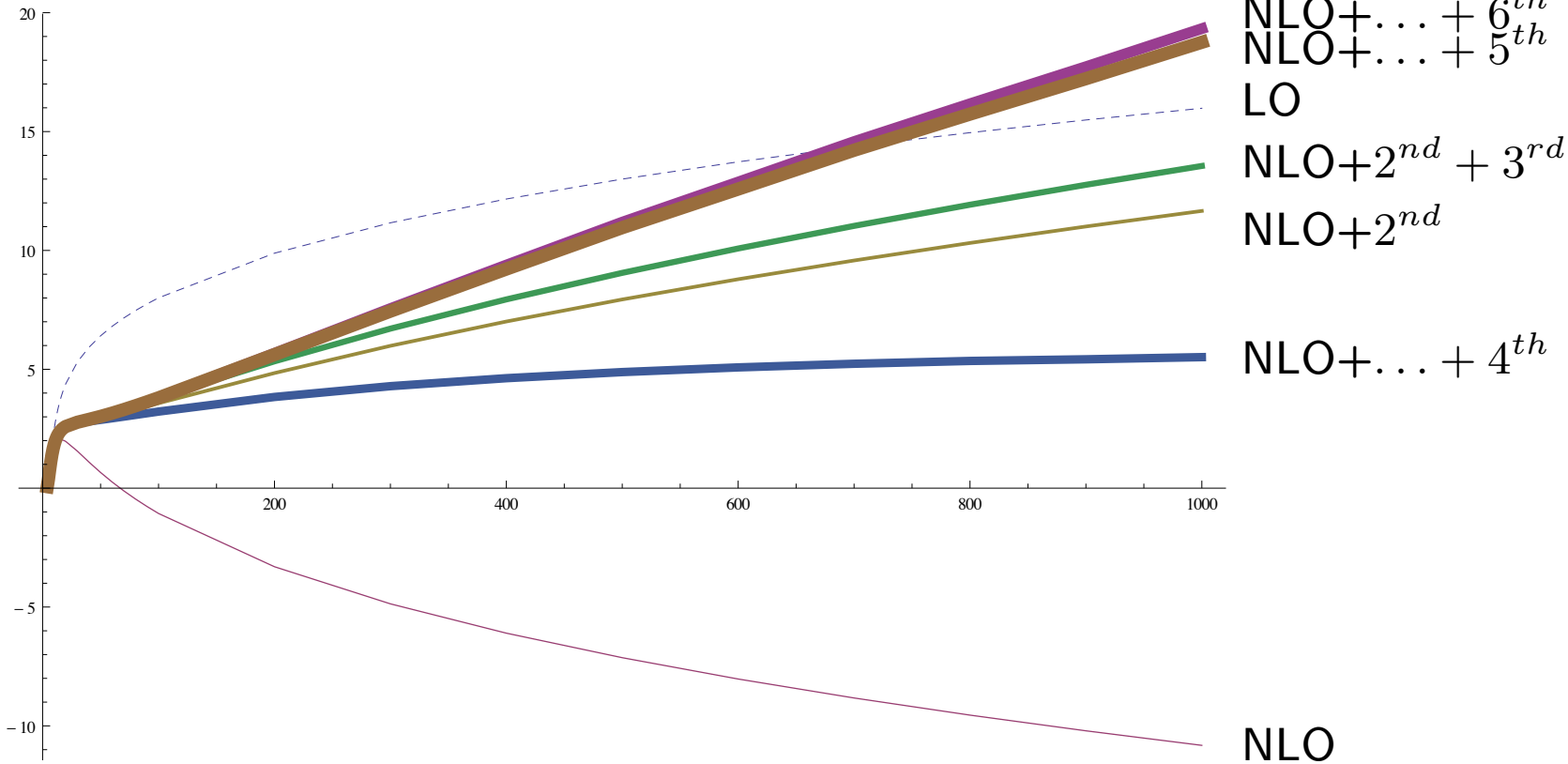




Resummed amplitude for J/ψ

S. Catani and F. Hautmann, Nucl. Phys. B 427 (1994) 475. for DIS

$$ImA^g \sim H^g(\xi,\xi) + \int_{2\xi}^1 \frac{dx}{x} H^g(x,\xi) \sum_{n=1} C_n(L) \frac{\bar{\alpha}_s^n}{(n-1)!} \log^{n-1} \frac{x}{\xi}$$



Imaginary part of the amplitude for photoproduction of heavy mesons as a function of $W = \sqrt{s_{\gamma p}}$ for $\mu_F^2 = M_{J/\psi}^2$