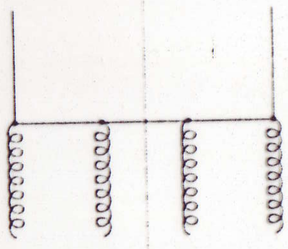
LO Pomeron-to-parton splitting functions



- LO Pomeron-to-parton splitting functions calculated in Eur. Phys. J. C **44** (2005) 69.
- **Notation:** '$\mathbb{P} = G$' means gluonic Pomeron, '$\mathbb{P} = S$' means sea-quark Pomeron, '$\mathbb{P} = GS$' means interference between these.

$$z\Sigma^{\mathbb{P}=G}(z,\mu^2;\mu^2) = P_{q,\mathbb{P}=G}(z) = z^3\,(1-z),$$

$$zg^{\mathbb{P}=G}(z,\mu^2;\mu^2) = P_{g,\mathbb{P}=G}(z) = \frac{9}{16}\,(1+z)^2\,(1-z)^2,$$

$$z\Sigma^{\mathbb{P}=S}(z,\mu^2;\mu^2) = P_{q,\mathbb{P}=S}(z) = \frac{4}{81}\,z\,(1-z),$$

$$zg^{\mathbb{P}=S}(z,\mu^2;\mu^2) = P_{g,\mathbb{P}=S}(z) = \frac{1}{9}\,(1-z)^2,$$

$$z\Sigma^{\mathbb{P}=GS}(z,\mu^2;\mu^2) = P_{q,\mathbb{P}=GS}(z) = \frac{2}{9}\,z^2\,(1-z),$$

$$zg^{\mathbb{P}=GS}(z,\mu^2;\mu^2) = P_{g,\mathbb{P}=GS}(z) = \frac{1}{4}\,(1+2z)\,(1-z)^2\,.$$

Evolve these input Pomeron PDFs from μ^2 up to Q^2 using NLO DGLAP evolution.

$$F_2^D = \sum_{a=g,q} C_{2,a}\cdot a^D + \underbrace{C_{2,\mathbb{P}}}_{\text{direct } \mathbb{P}}$$

$$\frac{\partial a^D}{\partial \ln Q^2} = \underbrace{\sum_{a} P_{a,a'}\cdot a'^D}_{\text{DGLAP}} + \underbrace{P_{a\mathbb{P}}(z)\, f_{\mathbb{P}}(x_{\mathbb{P}}, Q^2)}_{\text{inhomogeneous term}}$$

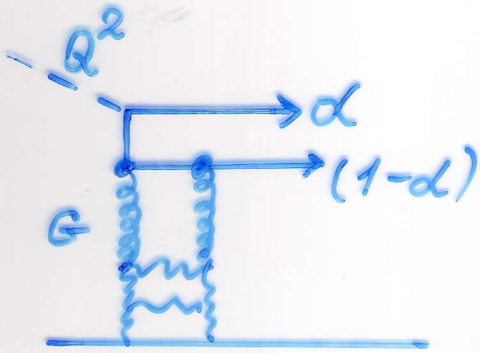
- No free parameters,

↳ less g at $\beta > 0.4$

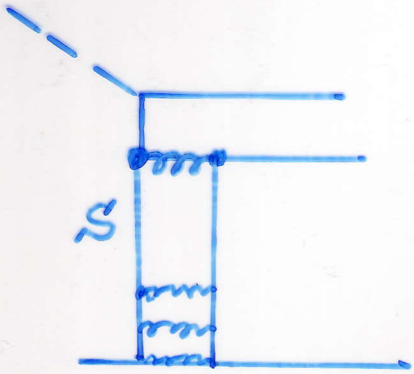
$\mathbb{P} = G + \underbrace{S}_{\text{sea quarks in } t\text{-channel}}$

- $\dfrac{d\sigma}{dk_t^2} = \dfrac{(k_t^2)^{2\gamma}}{k_t^4} \Rightarrow$ large $k_{t,\,intr.}$ in $\mathbb{P}$-fragment.

- direct diffr. dijets



LO $\Rightarrow G/S \propto \left(\dfrac{Q^2\alpha(1-\alpha)}{E_T^2}\right)^2$



$$x_{I\!P} f_{I\!P}^{G} = \frac{1}{B_D}\left[R_g \frac{\alpha_s(\mu^2)}{\mu} xg(x,\mu^2)\right]^2$$

$$xg \propto (\mu^2)^{\gamma}$$

$$x_{I\!P} f_{I\!P}(x) \propto (\mu^2)^{2\gamma(x_{I\!P})-1}$$

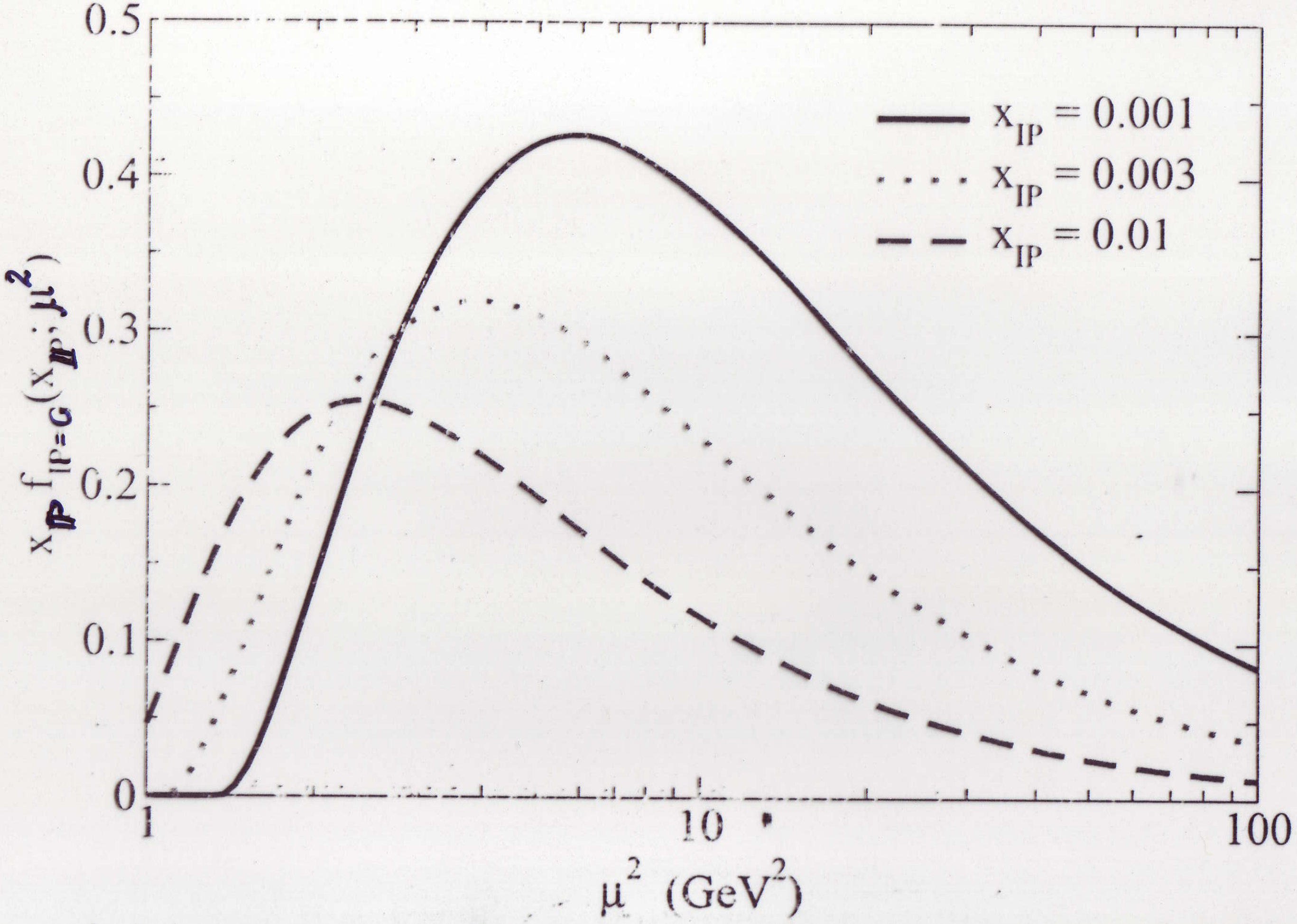


Figure 4: The μ^2 dependence of the flux factor $f_{I\!P}$, given by (7) with $N = 1$, for three different values of $x_{I\!P}$ and using the MRST2001 NLO gluon distribution of the proton [16].

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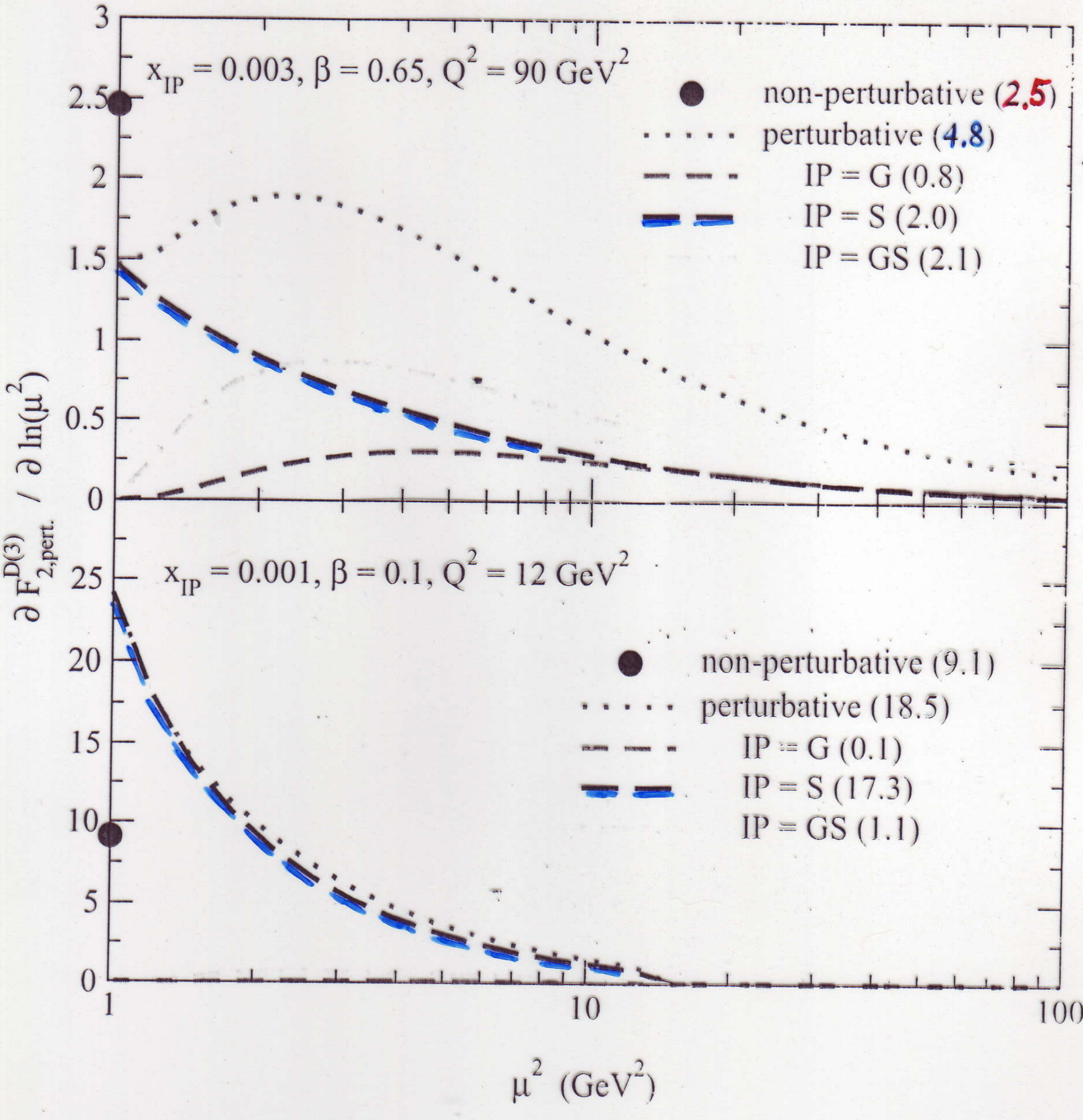

$\frac{pert}{tot} = 0.7$

Figure 6: The perturbative ($IP = G,S$, and the GS interference) and non-perturbative contributions to $F_2^{D(3)}$, for two sets of x_{IP}, β, and Q^2 values, found in the analysis of HERA DDIS data in Ref. [7]. The plots show the μ^2 dependence of the perturbative contributions: their integral over μ^2 is shown by the numbers in parentheses in the legend.

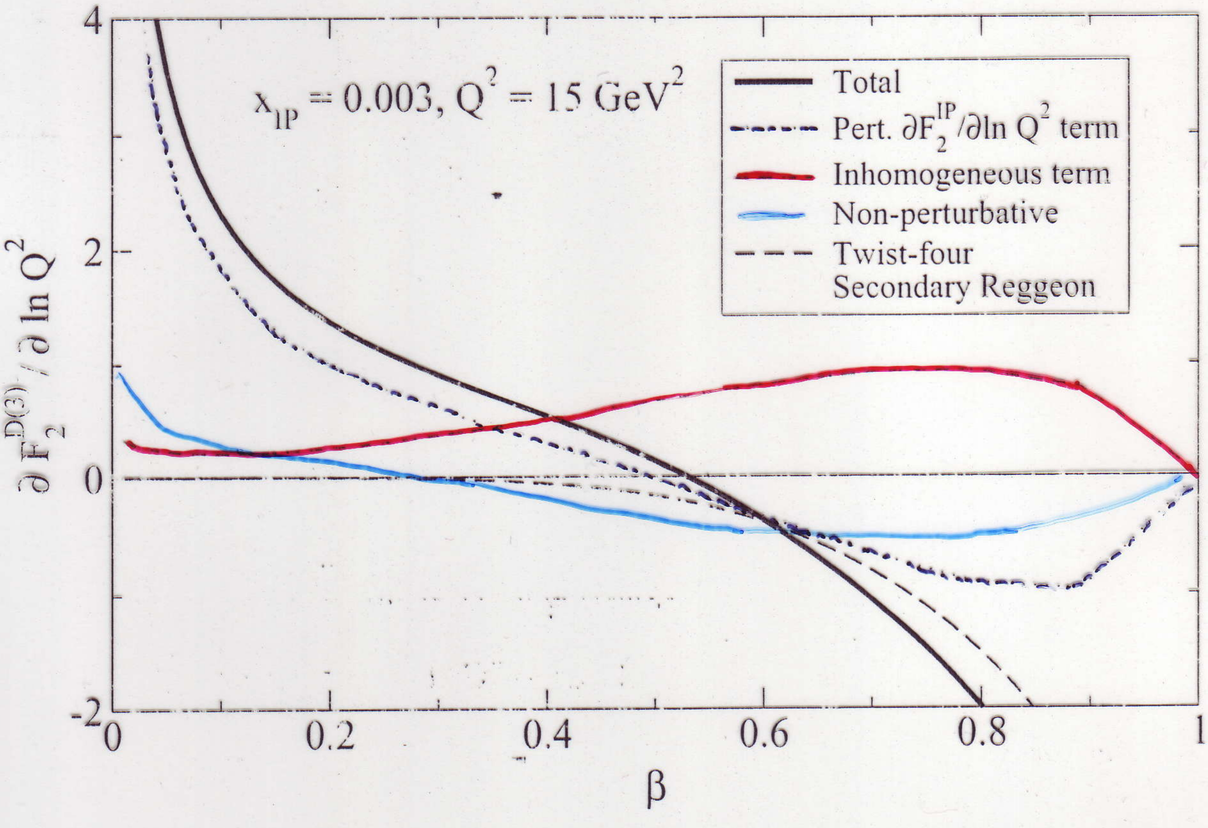

Figure 7: The breakdown of the contributions to the description of the slope $\partial F_2^{D(3)}/\partial \ln Q^2$ as a function of β, for $Q^2 = 15$ GeV^2 and $x_{I\!P} = 0.003$ obtained in the MRW analysis [7] of the combined ZEUS and H1 DDIS data, which uses MRST2001 NLO partons [16] to calculate the perturbative Pomeron flux.

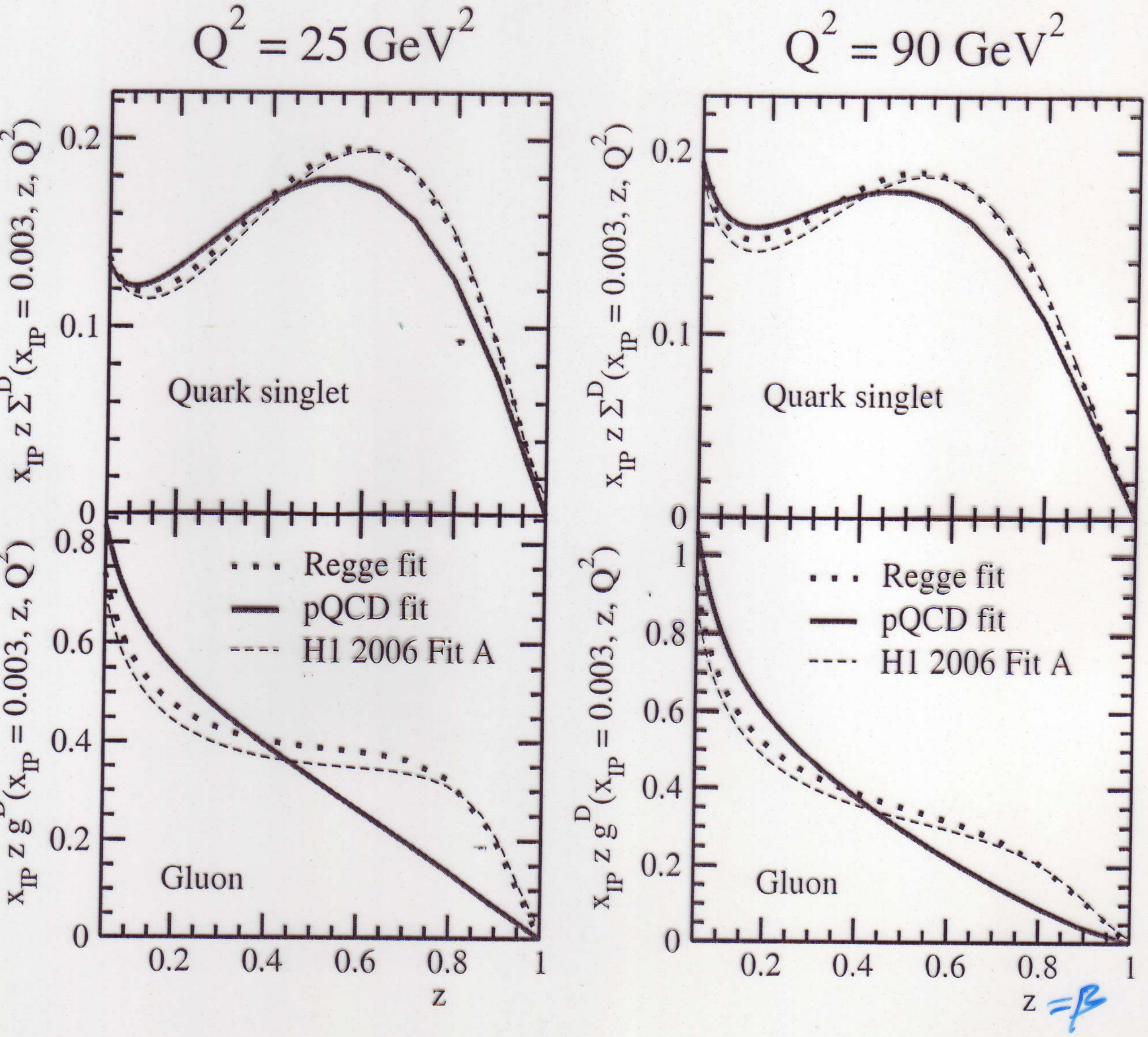

Figure 8: The "Regge" and "pQCD" DPDFs with $Q^2_{\text{min}} = 8.5\ \text{GeV}^2$ compared to the H1 2006 Fit A.

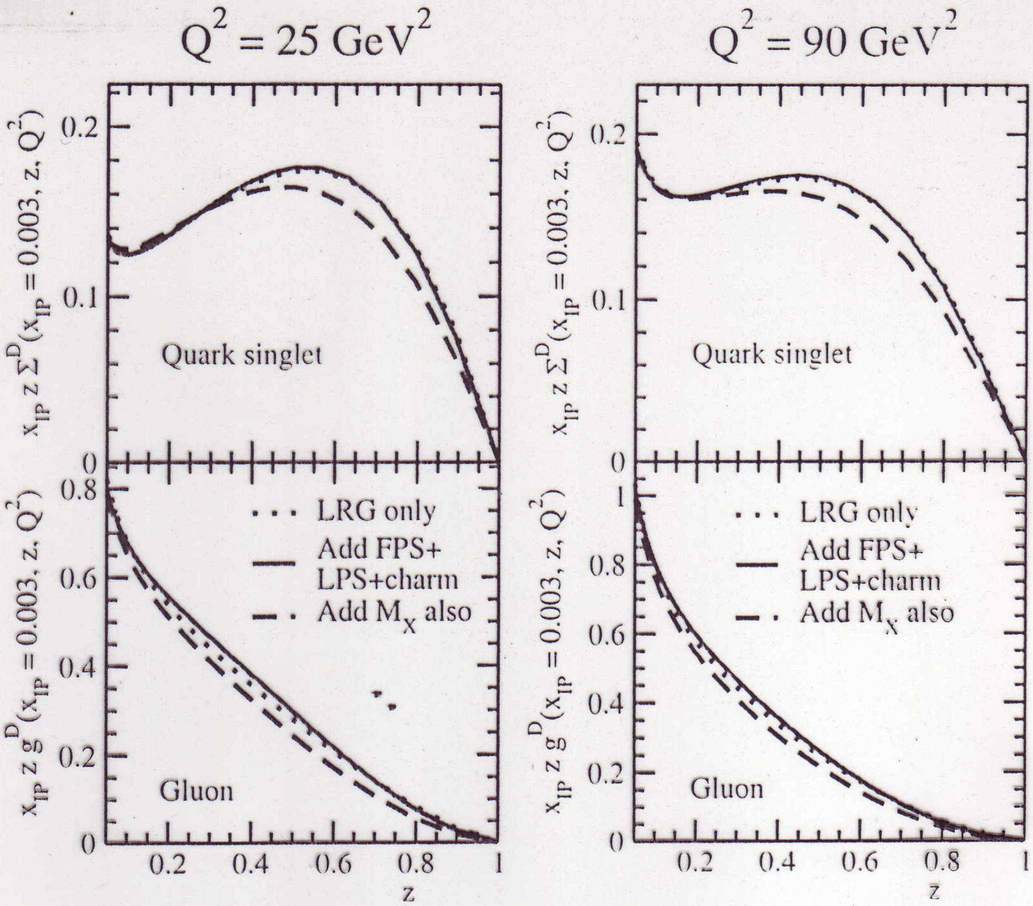

Figure 12: The effect of including additional data sets on the "pQCD" DPDFs.

- $\partial F_2^{D(3)}/\partial \ln Q^2$: Additional contributions to scaling violations apart from DGLAP contribution, important for $\beta \gtrsim 0.3$.
- $\partial F_2^{D(3)}/\partial \ln Q^2$: Peak due to threshold for $\gamma^* \mathbb{P} \to c\bar{c}$ at $\beta = Q^2/(Q^2 + 4m_c^2)$.

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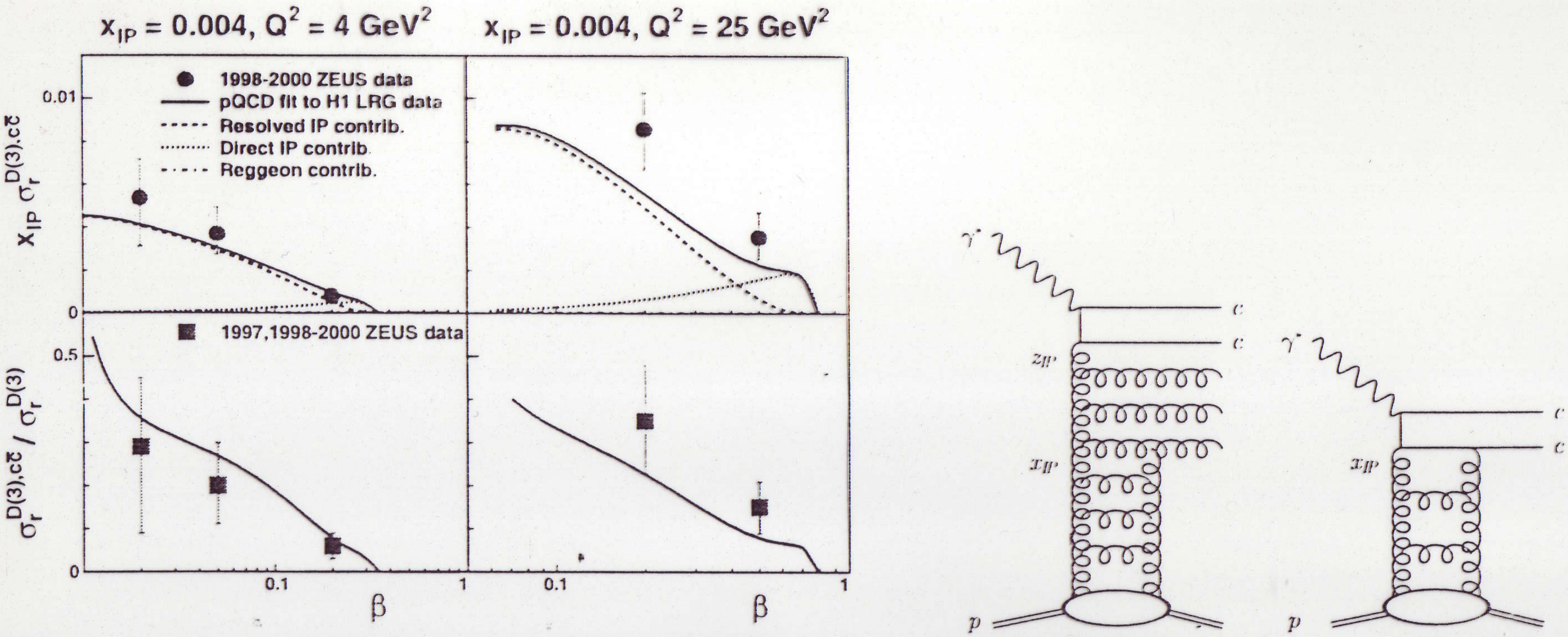

Figure 13: Description of ZEUS diffractive charm data using the "pQCD" DPDFs from a fit to H1 LRG data with $Q^2_{\min} = 8.5$ GeV^2.