DIS2006
Diffraction and Vector Mesons WG

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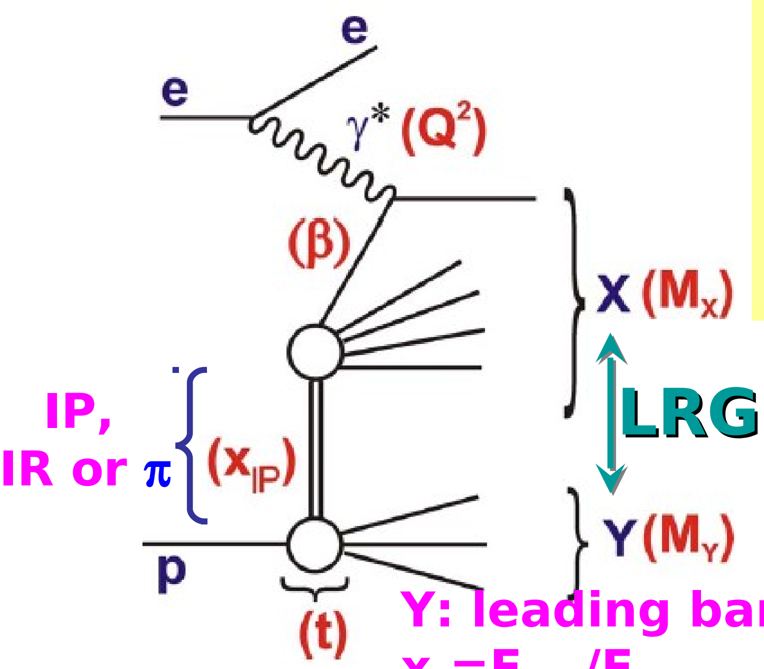
- **Diffraction and factorisation** — **H. Lim**
- **Exclusive final state** — **L. Schoeffel**
- **Saturation** — **M. Strkman**
- **Diffractive higgs and LHC**



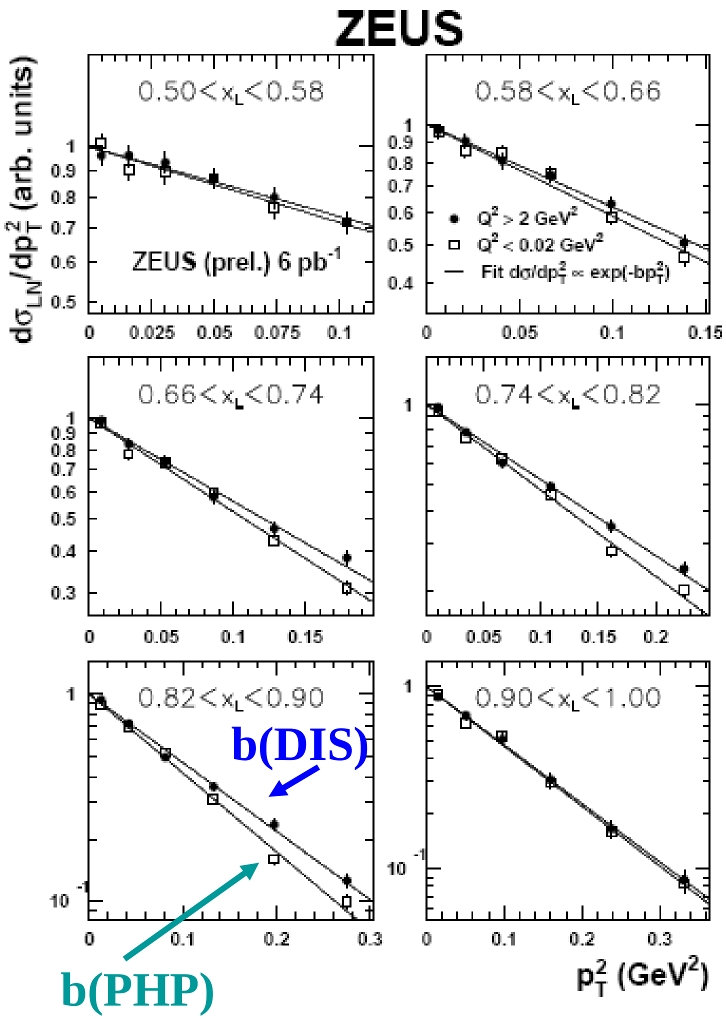
Y: leading baryon(p' or n) or proton dissociative system
$x_L = E_{p',n}/E_p$

Diffraction and factorisation session

- **Leading baryons production**
  - ✓ **ZEUS leading neutron measurement** — **Mara Soares**
    (ep→eXn, γp→Xn, γp→jjXn)
- **Inclusive diffractive measurements (ep →eXp)**
  - ✓ **H1 FPS (99-00) and LRG (97, 99-00)** — **Paul Newman**
  - ✓ **H1 LRG(99-00, 04) and M_X method(99-00)** — **Emmanuel Sauvan**
- **Hard diffractive measurements**
  - ✓ **H1 diffractive D* and F2(cc)** — **Olaf Behnke**
    diffractive dijet — **Matthias Mozer**
  - ✓ **ZEUS diffractive D* and dijet** — **Alessio Bonato**
  - ✓ **CDF diffractive measurement** — **Michele Gallinaro**
- **Theory of diffractive structure functions** — **Graeme Watt**
- **Discussion** — **All**

Leading Neutron Measurement

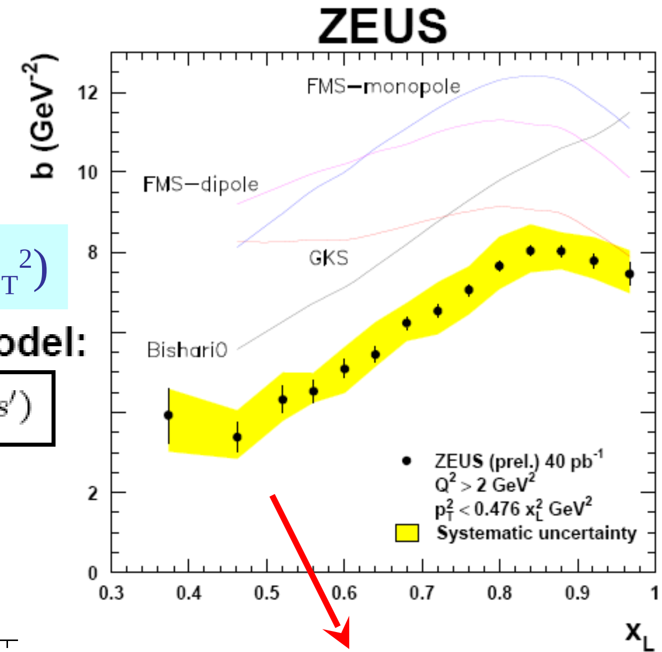
(M. Soares)



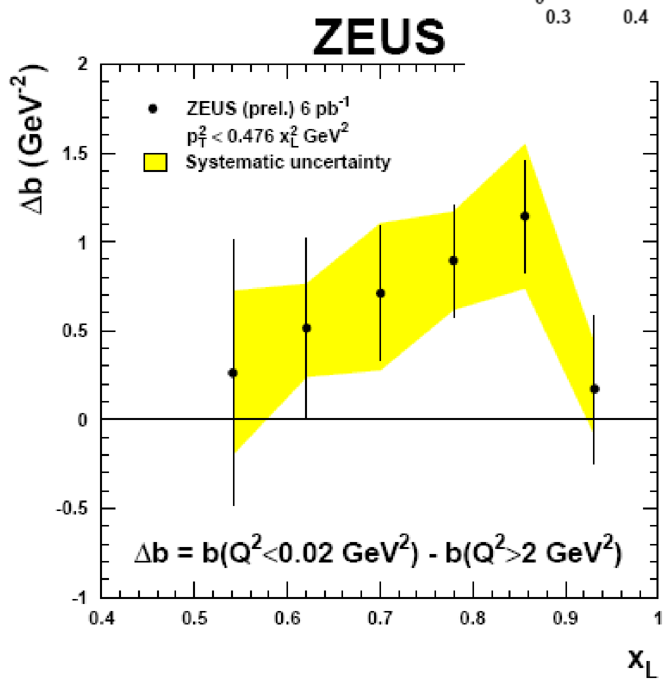
Fit $d\sigma/dp_T^2 \sim \exp(-b\, p_T^2)$

One-Pion-Exchange Model:

$$\frac{d\sigma_{ep\to e'nX}}{dx_L t} = f_{\pi/p}(x_L,t)\sigma^{e\pi}(s')$$

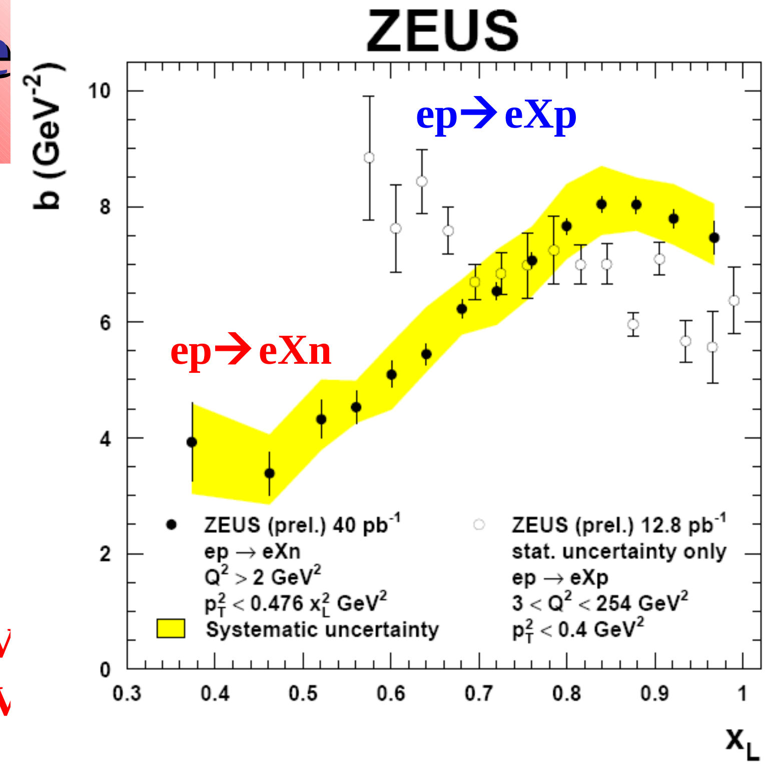


Any models doesn't describe the data.

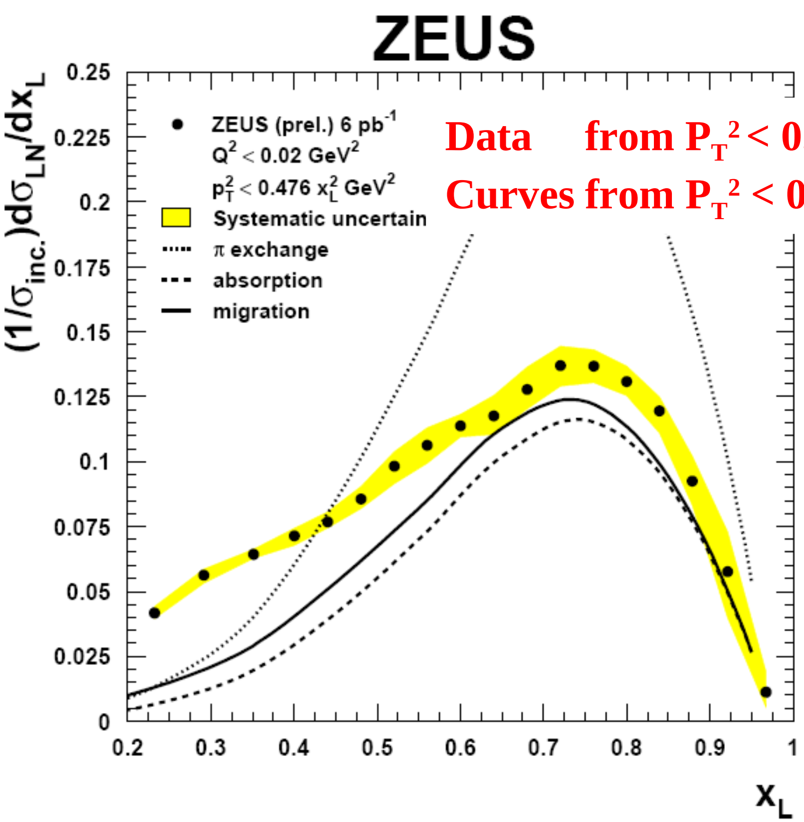


Δb = b(PHP)/b(DIS)
➔ ep → eXN suppressed for PHP

Leading Neutron Measureme
(M. Soares)



- At x_L~0.6-0.8,
  b (ep→eXp)~b(ep→eXn,
  π exchange)
- b(ep→eXn) is dominant for $x_L > 0.8$



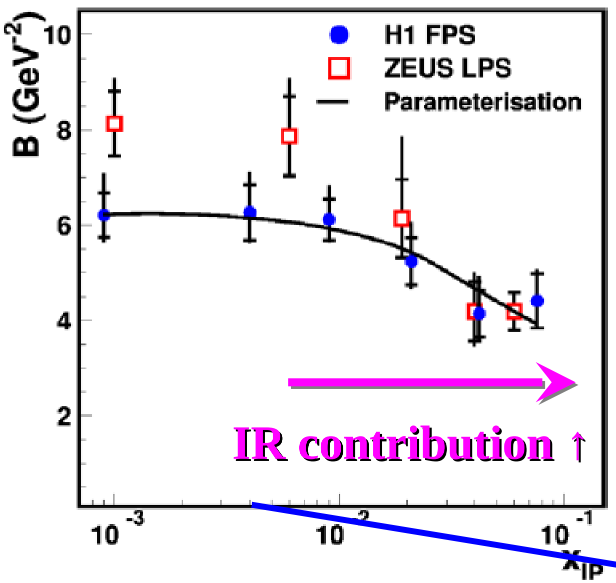
➔ Neutron energy spectra in PHP is compatible with effects of absorption (gap survival probability) and migration as predicted by Kaidalov, Khoze, Martin, Ryskin.

H1 FPS(99-00) and LRG (97, 99-00) (P. Newman)

For ep→eXp (p: tagged by FPS)

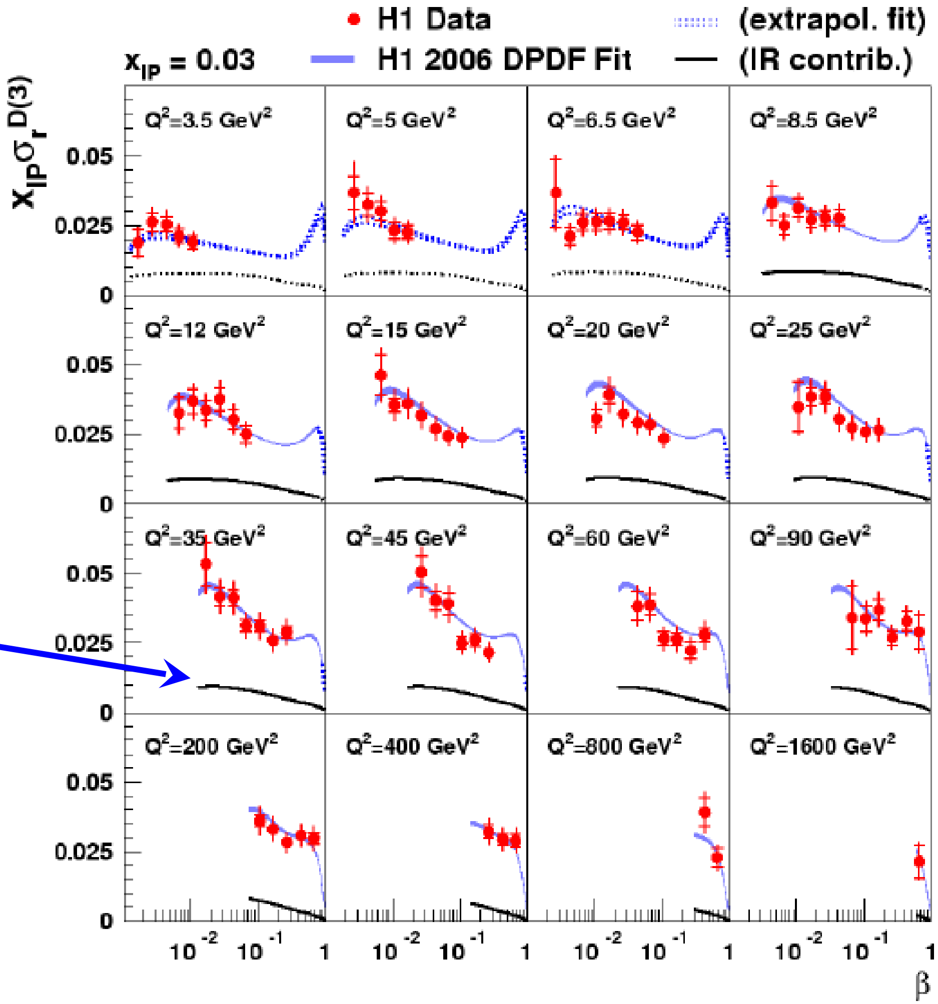
$2.7 \leq Q^2 \leq 24$ GeV^2

➔ Fit $x_{IP} d^2\sigma/dx_{IP}dt \sim \exp(Bt)$



For ep→eXY (M_Y <1.6 GeV) using LRG

$3.5 \leq Q^2 \leq 1600$ GeV^2

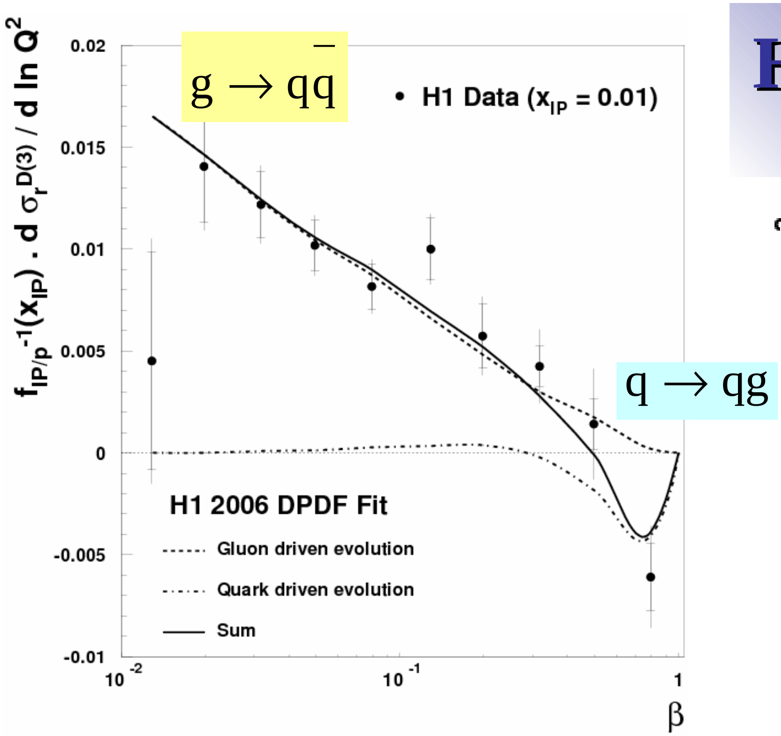


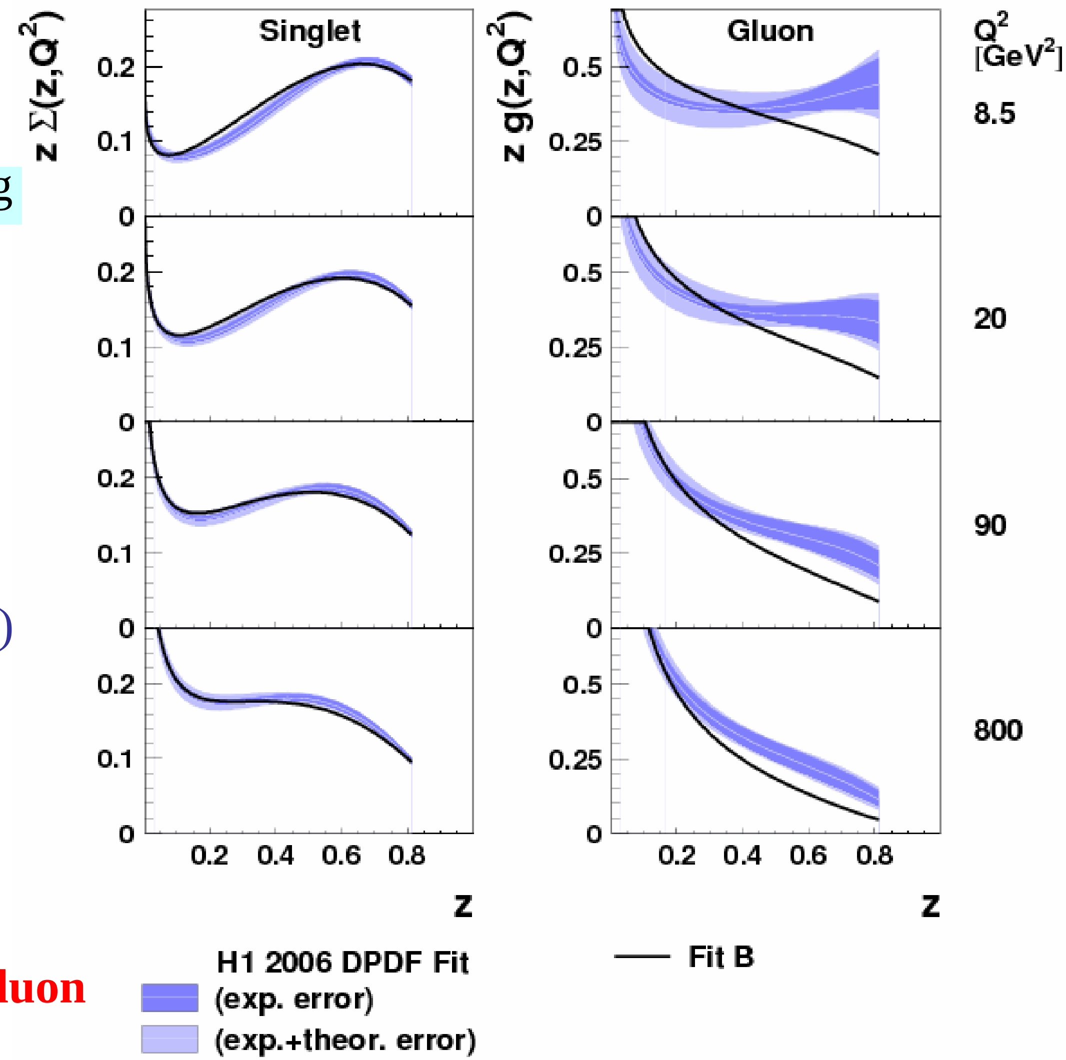
Fitting $B \sim B_{IP} + 2\alpha'_{IP} \ln(1/x_{IP})$

- $\alpha'_{IP} = 0.06^{+0.19}_{-0.06}$ GeV-2
- $B_{IP} = 5.5^{-2.0}_{+0.7}$ GeV-2

➔ $\sigma(M_Y < 1.6$ GeV$)/\sigma(Y=p)$ = 1.23 ±0.03(stat.)±0.16(syst.)

H1 LRG (97, 99-00) and DPDF
(P. Newman)





- Fit LRG data with $Q^2 \geq 8.5$ GeV^2, $M_X < 2$ GeV, $\beta \leq 0.8$)
- Parameterise the parton density

$$z\,\Sigma(z, Q_0^2) = A_q z^{B_q} (1-z)^{C_q}$$

$$z\,g(z, Q_0^2) = A_g (1-z)^{C_g}$$

$\chi^2 \sim 158/183$ d.o.f., $Q_0^2 = 1.75$ GeV^2

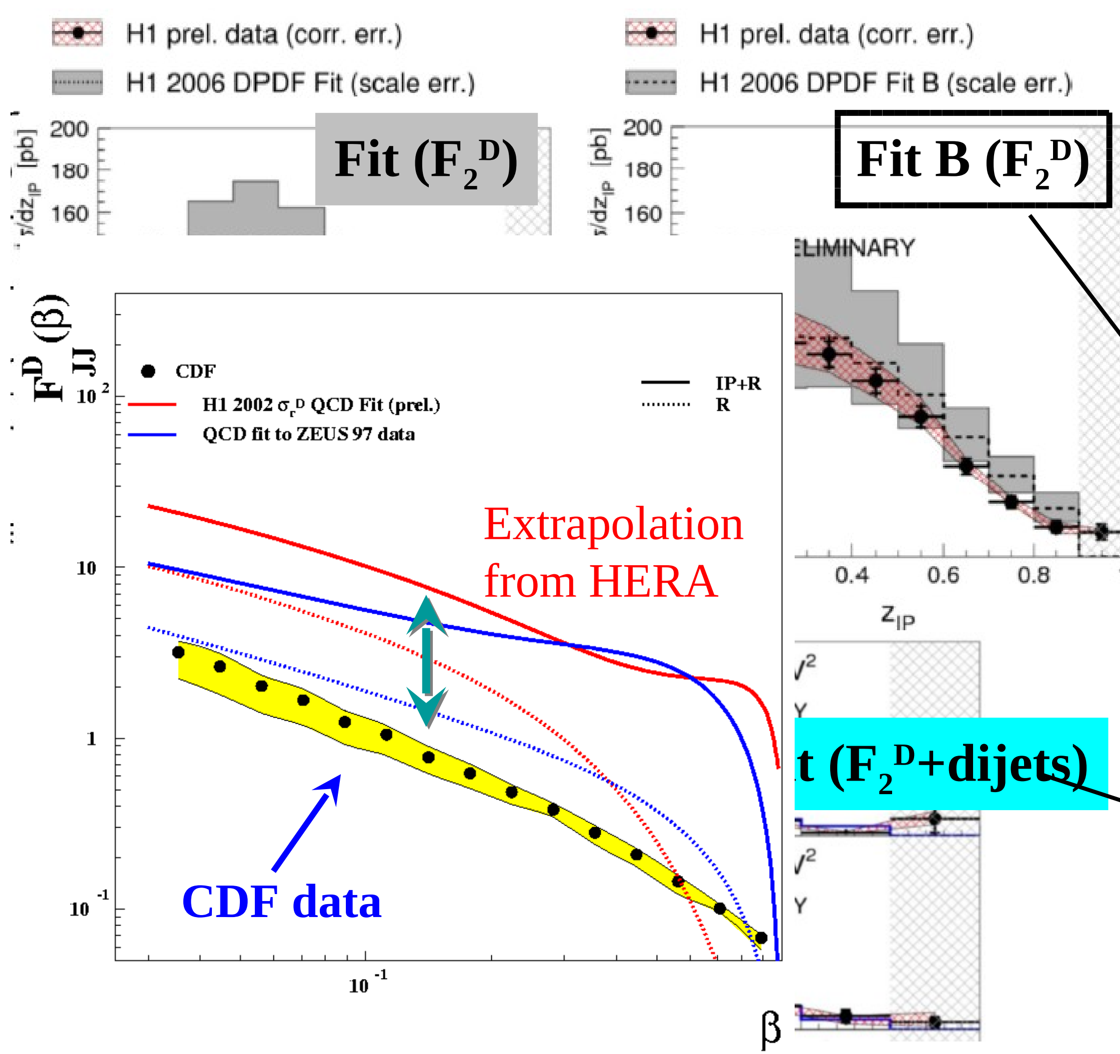
Due to lack of sensitivity to high z gluon

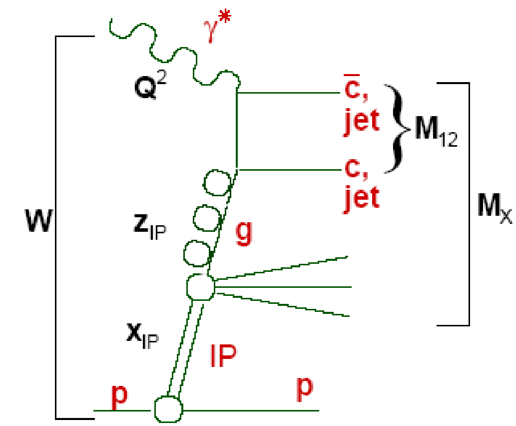
➔ Fit B : using $zg(z,Q_0^2)=A_g$

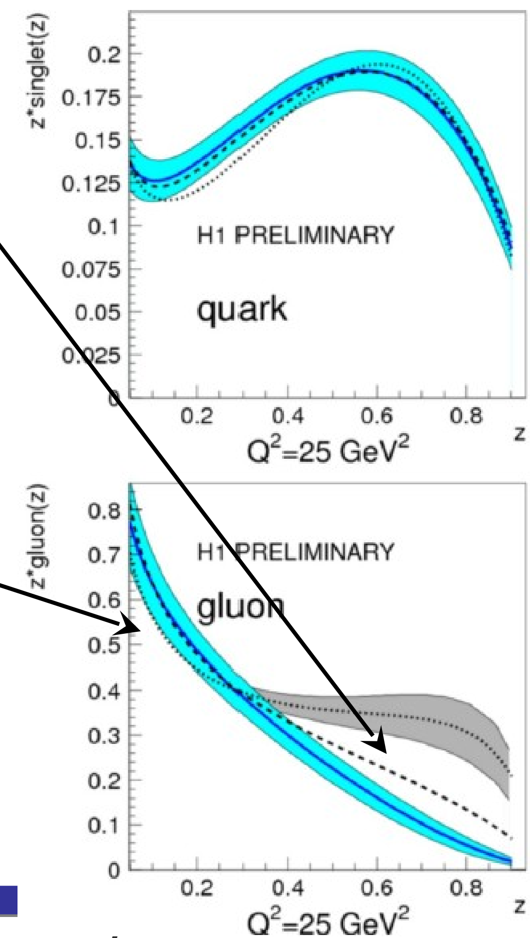
$\chi^2 \sim 164/184$ d.o.f., $Q_0^2 = 2.5$ GeV^2

$\alpha_{IP}(0) = 1.118 \pm 0.008 (\text{exp.})\ ^{+0.029}_{-0.010}\ (\text{theory})$

Diffractive dijet in DIS from H1
(M. Mozer)

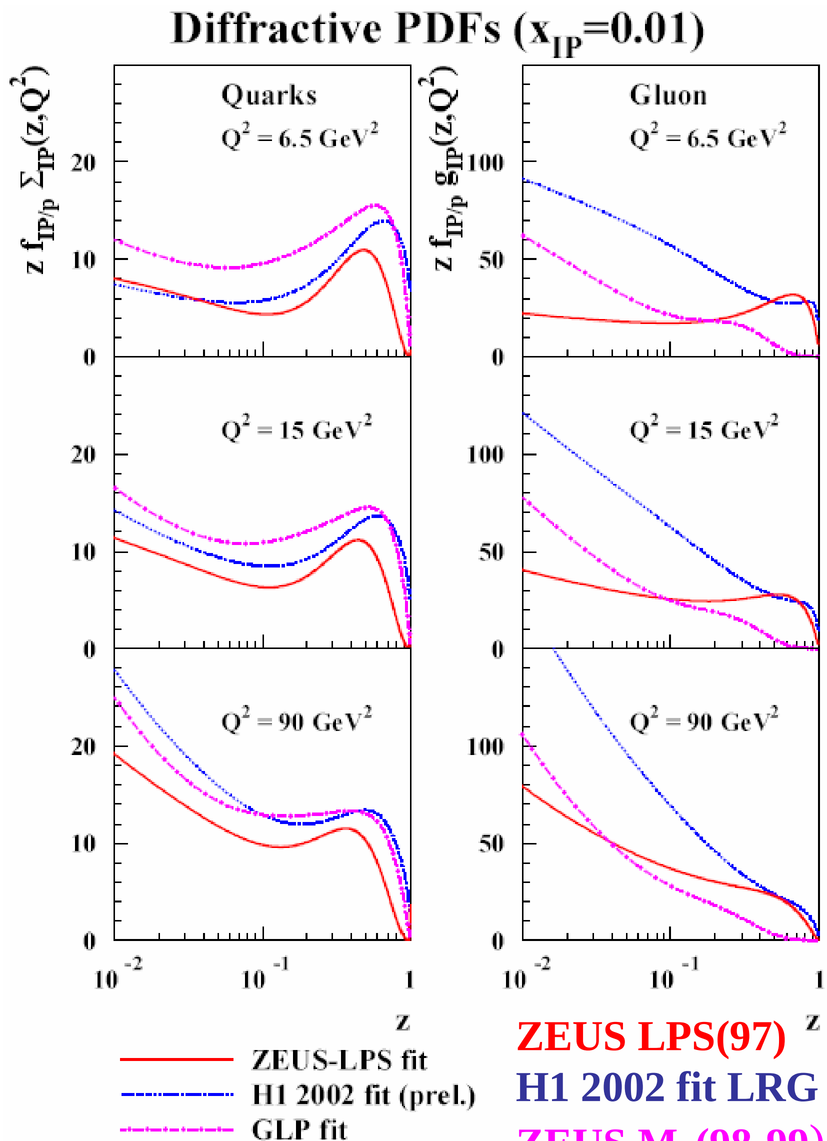






If comparing with dijet from CDF, it will be interesting!

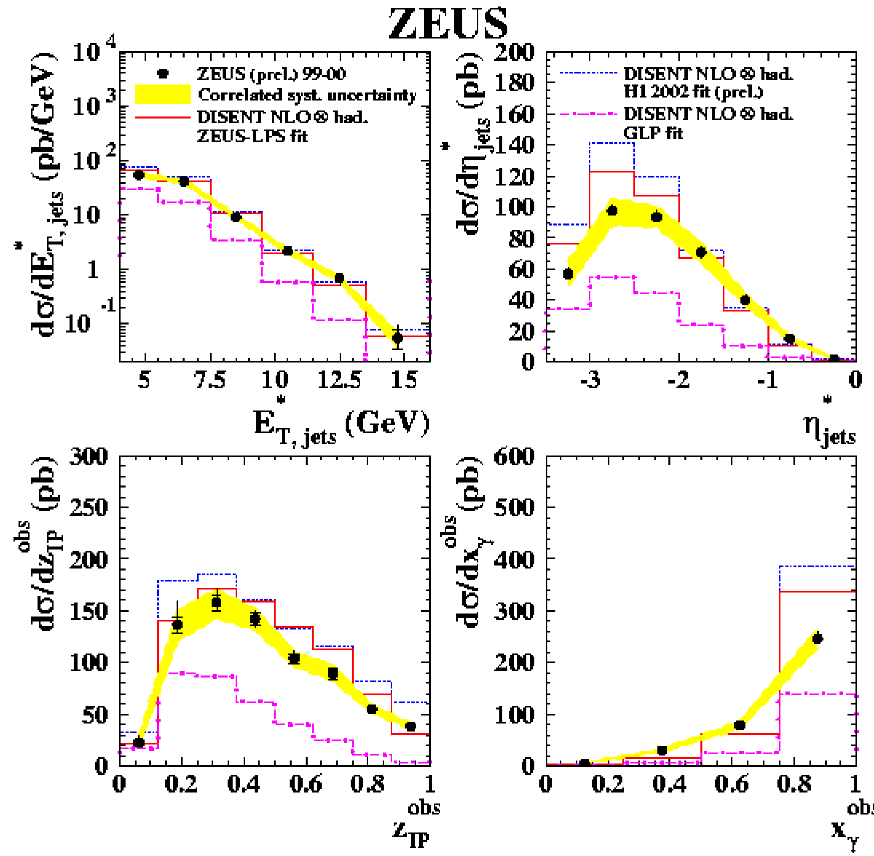
Diffractive dijet in DIS from ZEUS (A. Bonato)



ZEUS LPS(97)

H1 2002 fit LRG

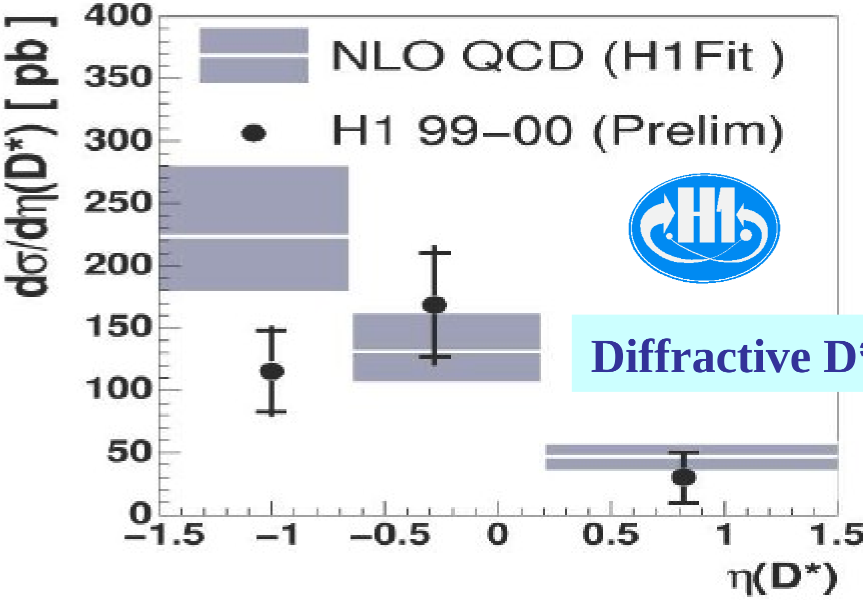
ZEUS M_X(98-99)

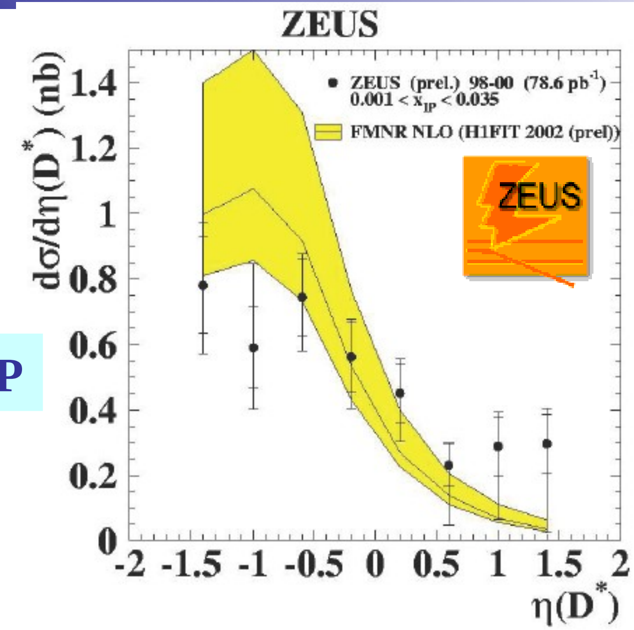


- Reasonable description of data H1 fit2002 and ZEUS-LPS
- Significant underestimation by GLP fit.

➔ Need to understand the difference from inclusive data sets. (discussion about it later!)

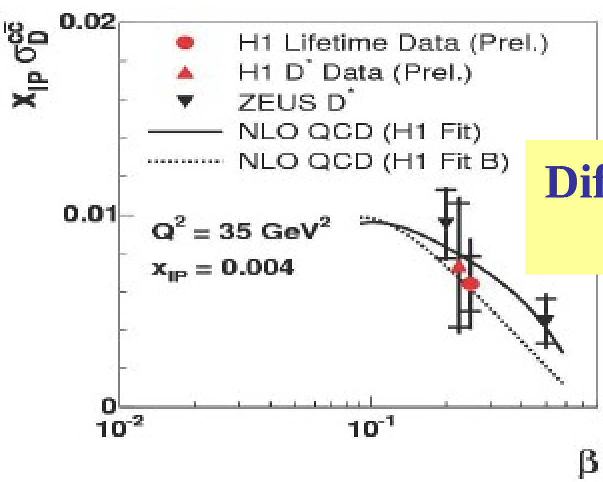
Diffractive D* from H1 (O. Behnke) and ZEUS (A. Bonato)



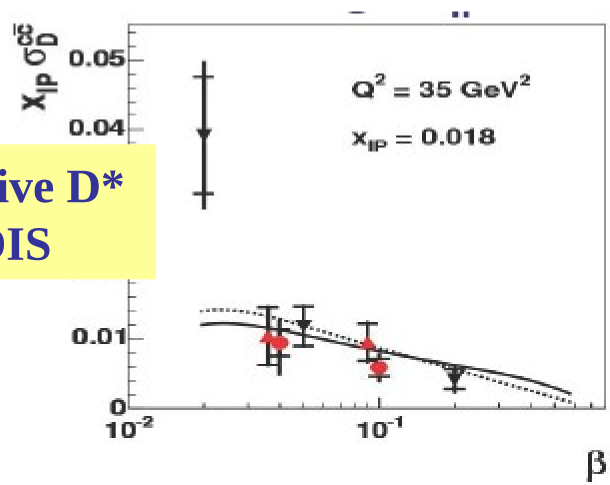


Diffractive D* in PHP

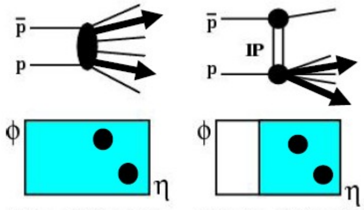
NLO consistent with D* within large error.



Diffractive D* in DIS

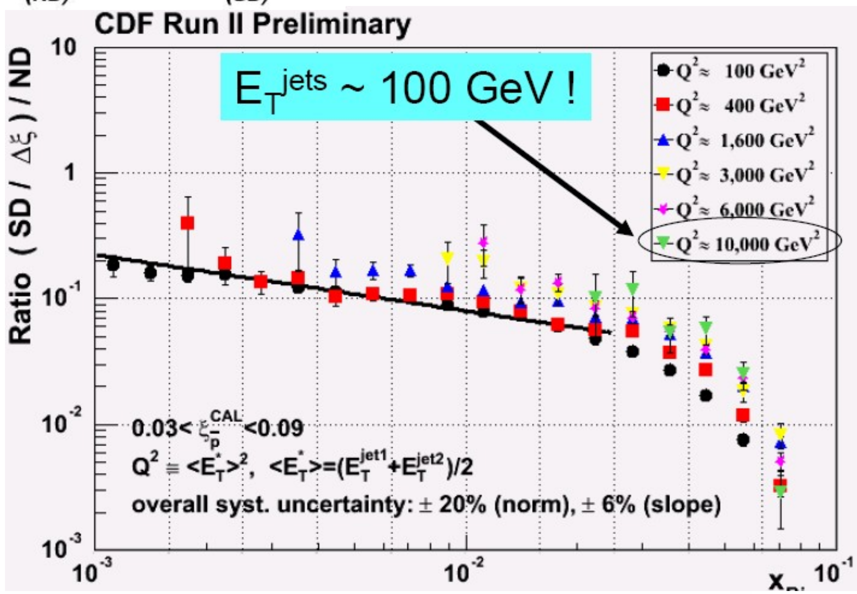


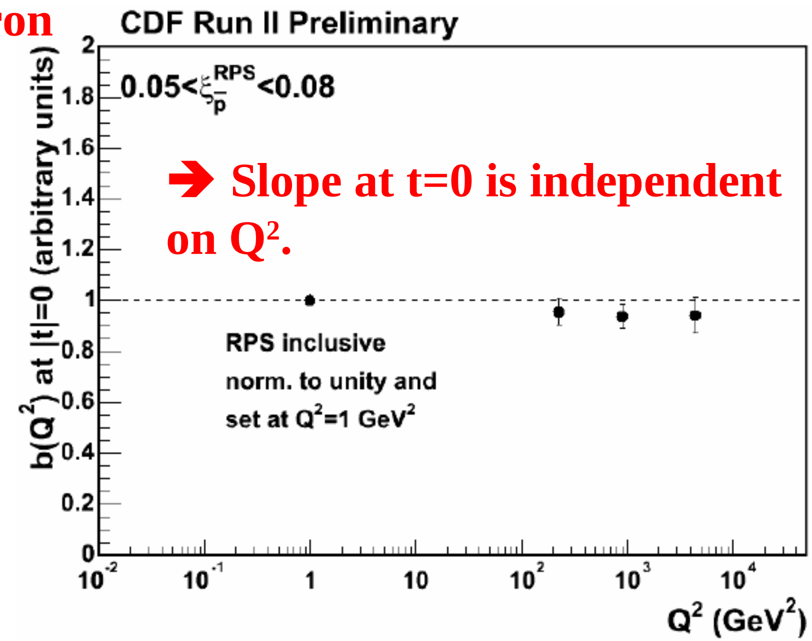
CDF diffractive measurement (M. Gallinaro)



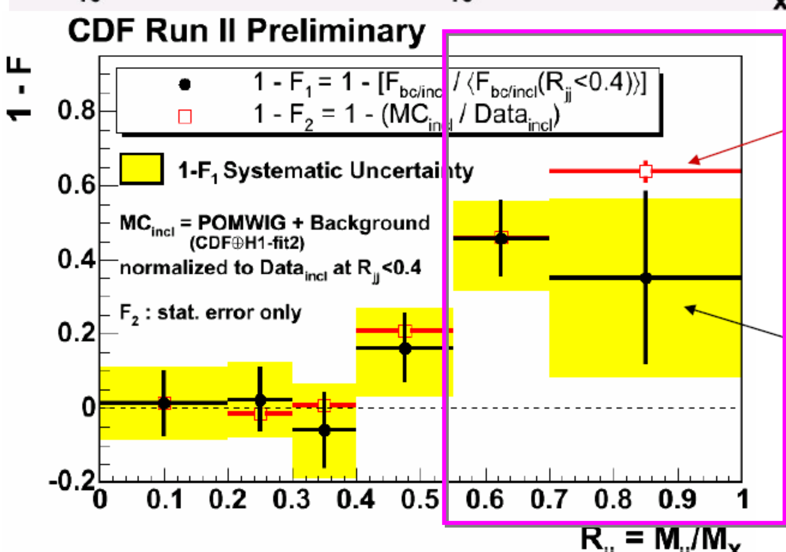
Non–Diffractive (ND)   *Single–Diffractive (SD)*

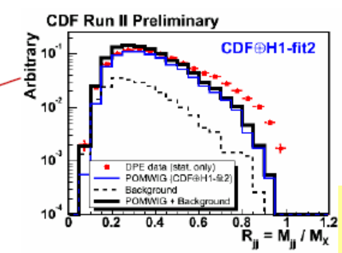
➔ Q^2 dependence of pomeron evolves like proton





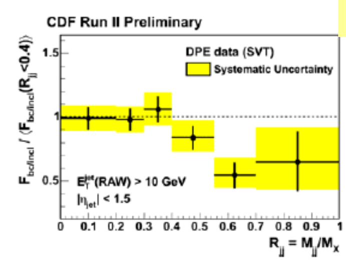
➔ Slope at t=0 is independent on Q^2.





F_2 ➔ **From Dijet MC(incl)/Data(incl)**

Events consistent with exclusive dijet production

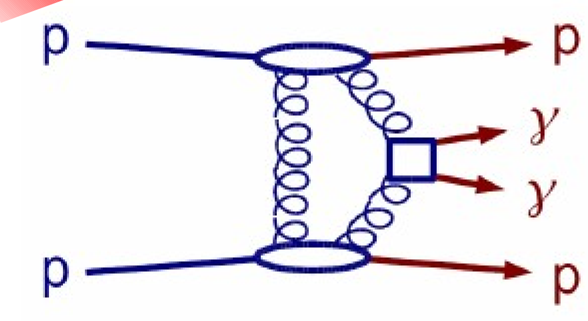


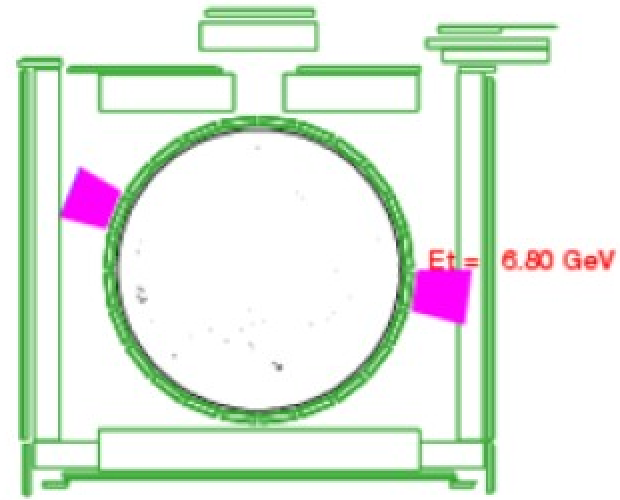
F_1 ➔ **From b-tagged jets $F_{bc/incl}/(F_{bc/incl}(Rjj<0.4))$**

CDF diffractive measurement (M. Gallinaro)

First

Exclusive $\gamma\gamma$ search

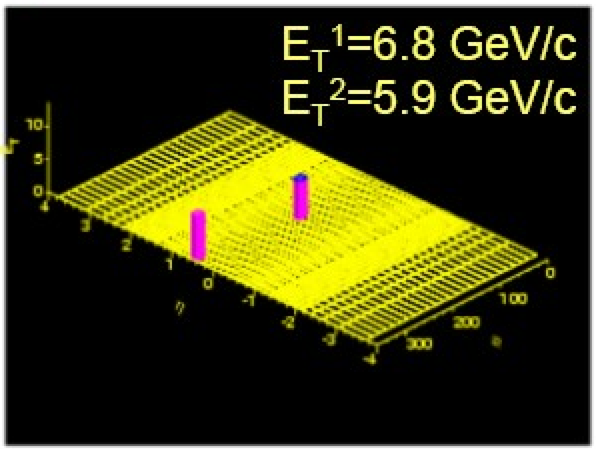




⇨ 3 candidate events found

background: $0.0^{+0.2}_{-0.0}$ events

$$\sigma_{MEASURED} = 0.14\ ^{+0.14}_{-0.04}\ (stat) \pm 0.03\ (sys)\ pb$$



good agreement with KMR:

$$\sigma_{KMR} = 0.04 \pm (\times 2 - 3)\ pb$$

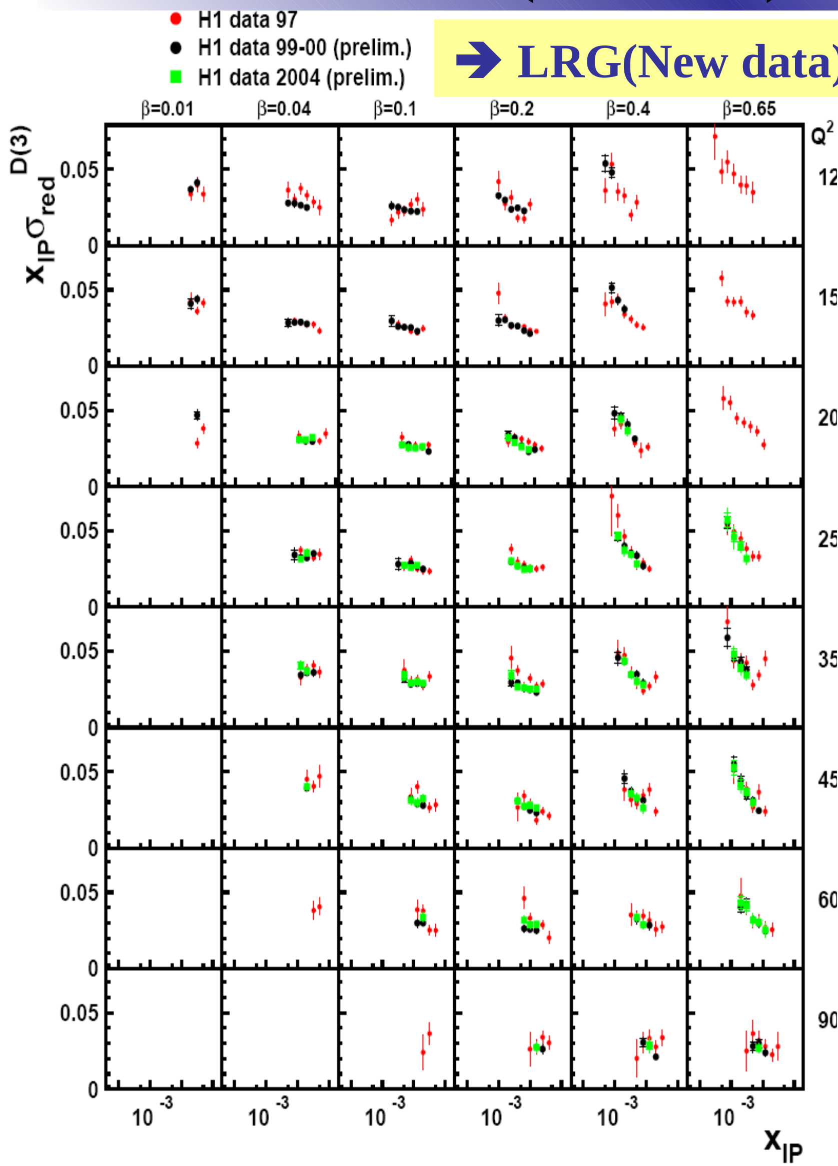
⇨ σ_H ~ 10 fb (if H exists)
within a factor ~ 2-3 , higher in MSSM

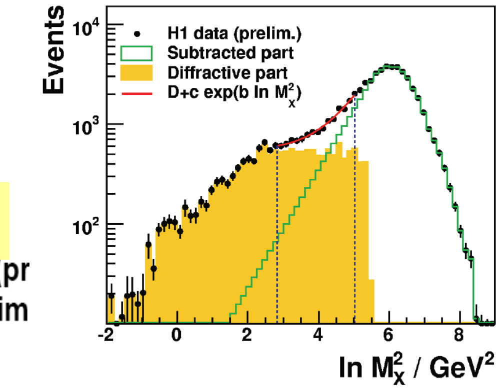
Michele Gallinaro - "New Results on Diffraction from CDF" - DIS 2006 - Apr. 2006 27

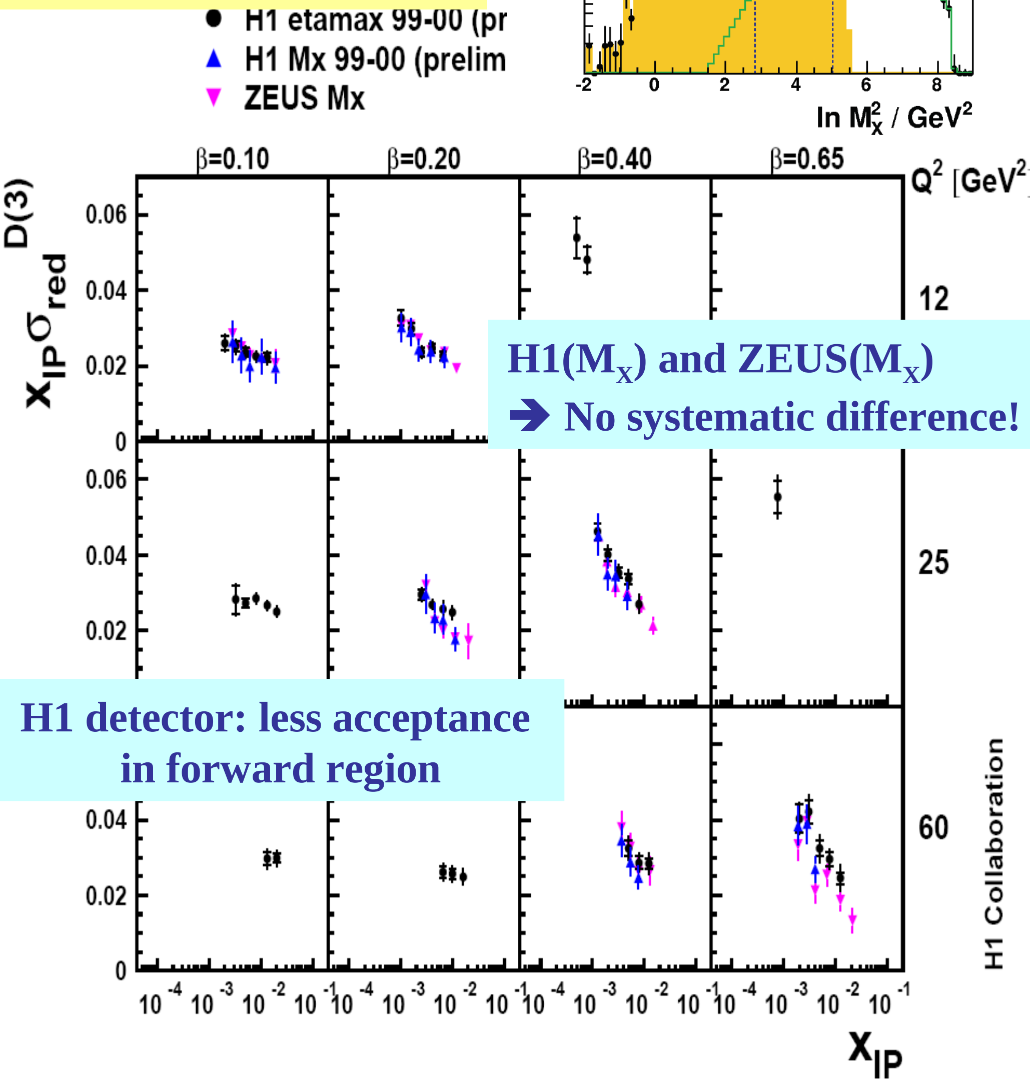
H1 LRG(99-00, 04) and M_X (99-00)

(E. Sauvan)

➔ LRG(New data) 6 times more statistics





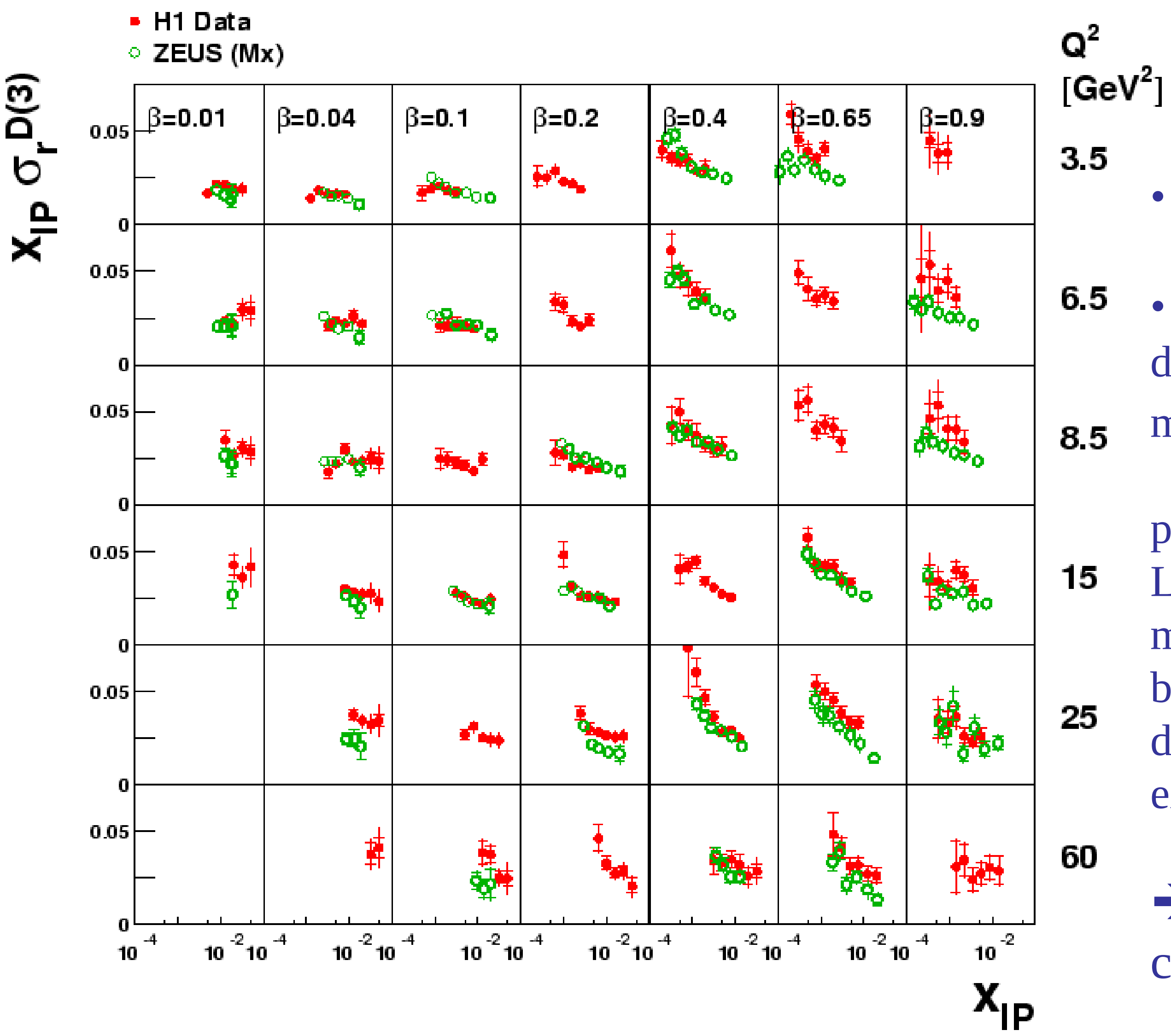


H1(M_X) and ZEUS(M_X)

➔ No systematic difference!

H1 detector: less acceptance in forward region

Discussion

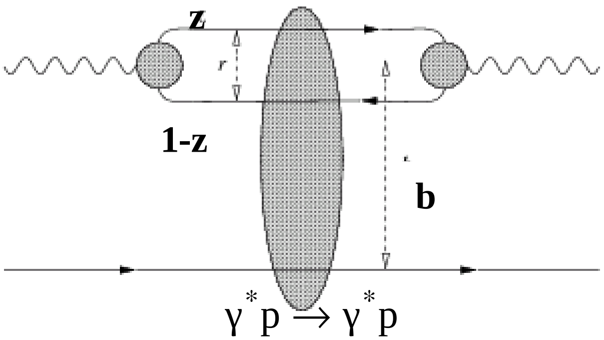


- Difference (LRG/M_X) for low β and high Q^2
- Saturation model (CGC..) describes the ZEUS M_X measurement, well.

→ If trying to compare the prediction of CGC with LRG measurement, it maybe gives us the answer because CGC only describes the pomeron exchange.

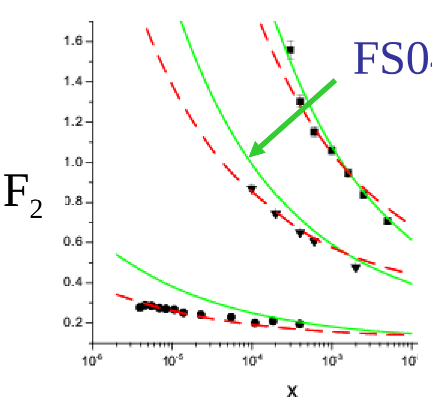
→ Due to **Reggeon** contribution?

Comparison with colour dipole model, saturation



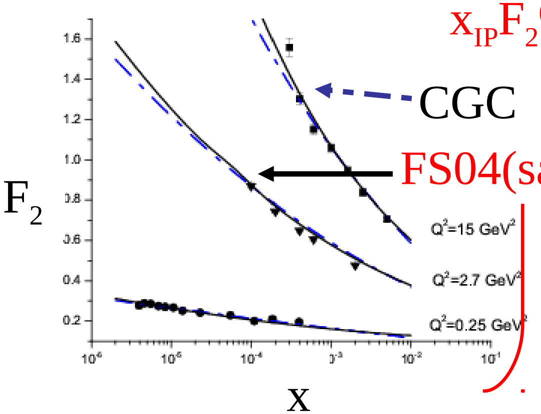
Comparison with Forshaw and Shaw (FS04) model with/without saturation (hep-ph/0411337) and Colour Glass Condensate (CGC) model from Iancu, Itakura, Munier (hep-ph/0310338).

➔ CGC and FS04(sat) are able simultaneously to describe F_2 and $x_{IP}F_2D^{(3)}$.



FS04(nosat)

Fit F_2 and then predict $x_{IP}F_2^{(3)}$



CGC

FS04(sat)