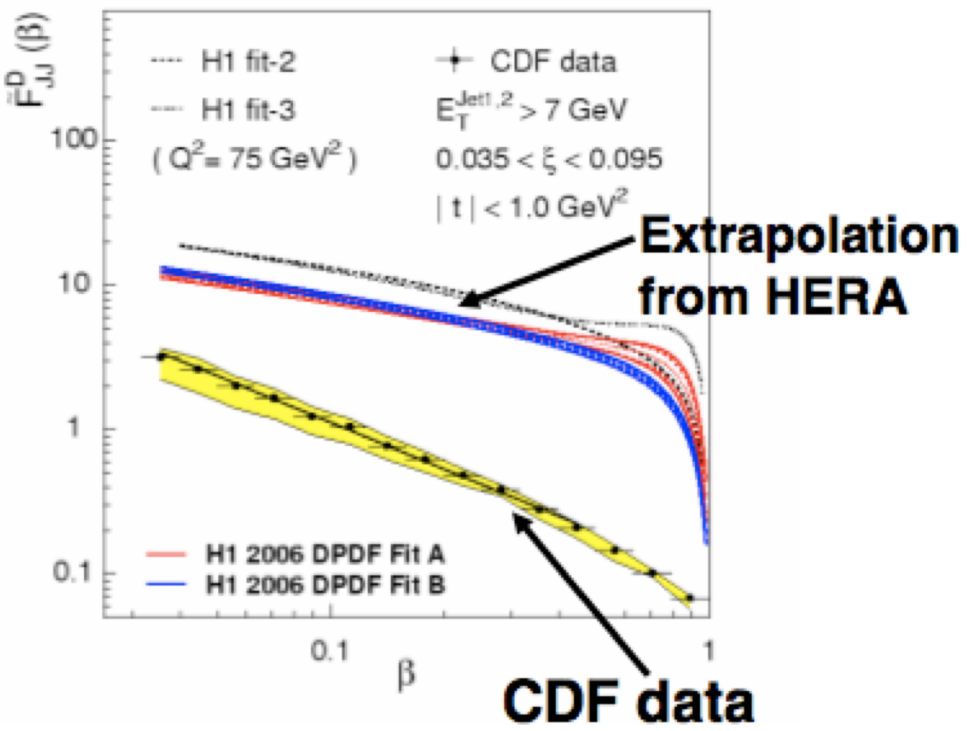
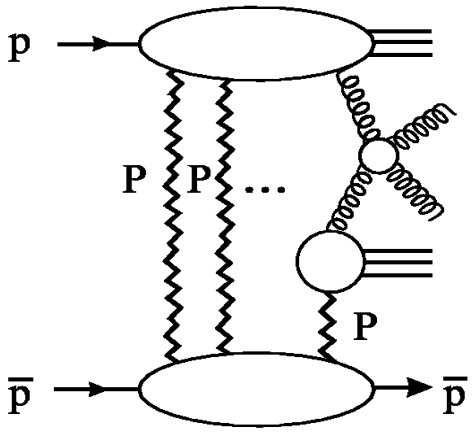
# Critical issues: factorization breaking

# Factorisation breaking at Tevatron

**QCD factorisation not expected to hold in ppbar, pp: indeed it does not!**

- **Factor 10 normalisation difference** between extrapolation from HERA data and CDF measurement



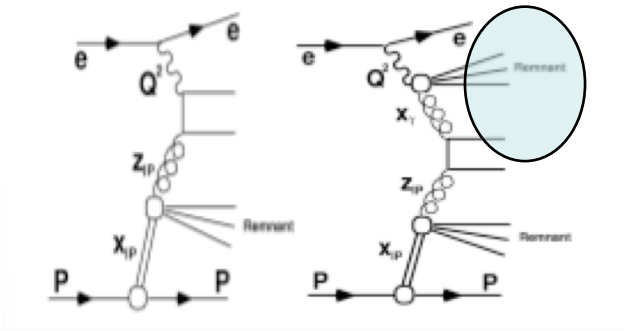

- Understood in terms of (soft) **rescattering among spectator partons** [Kaidalov, Khoze, Martin, Ryskin] PRL 84 (2000) 5043
- Lots of different theoretical approaches [Goulianos, Gotsman, Levin, Maor, Ingelman, Enberg, Cox, Forshaw, Lonnblad…]
- Quantified by **"rapidity gap survival probability", $\langle |S|^2 \rangle$**

**Can we learn something from HERA data?**

# Rescattering effects at HERA?

- **Diffractive dijet photoproduction:**
  direct vs resolved events
  → switch photon remnant on/off:

$$x_\gamma = \frac{\sum_{jets} E - p_z}{\sum_{HFS} E - p_z}$$




$x_\gamma < 0.75$

Rescatter

?

# Rescattering effects at HERA?

## DIFF DIJET PHOTOPRODUCTION

ZEUS and H1 HERA I data (LRG method) in DIS and photoproduction
H1 HERA II data (proton tag) in DIS and photoproduction
H1 HERA II data (LRG method) in DIS

- **H1: ~0.6 suppression not dependending on $x_\gamma$**
  **ZEUS compatible with no suppression**
  BUT: issue of different proton dissociation contamination
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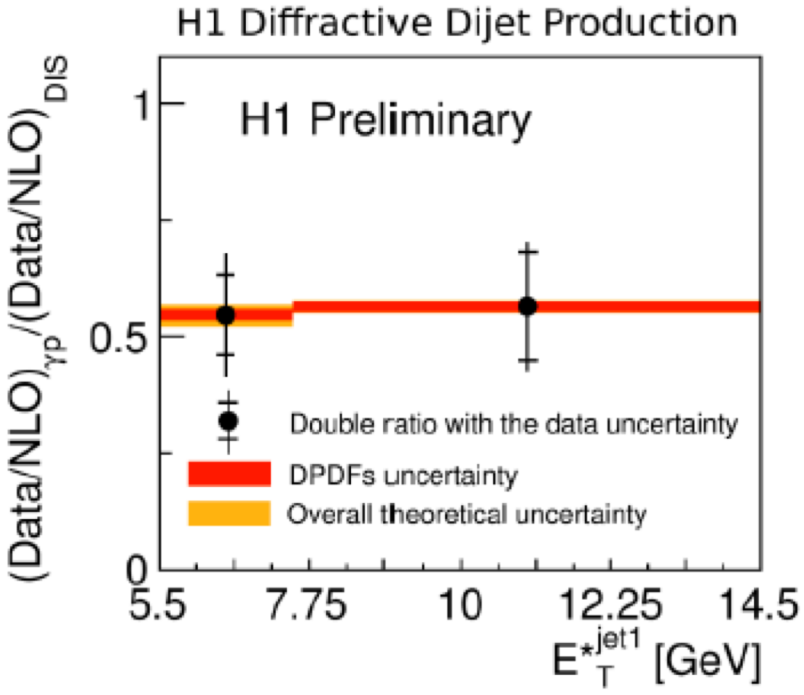
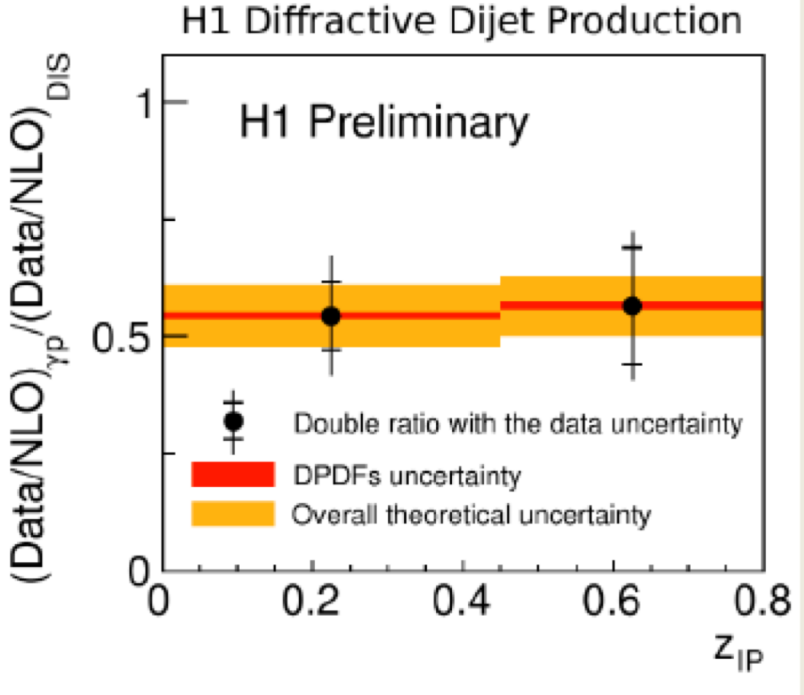


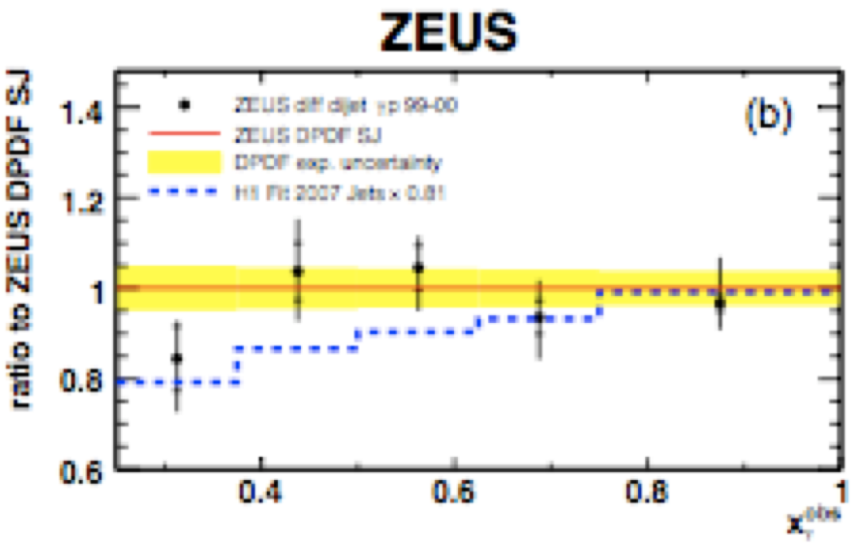




Alice Valkarova
HERA Symposium 201

Double ratio photoproduction/DI

Dependence of the suppression on
not observed!

$$\frac{(\mathrm{DATA/NLO})_{\gamma p}}{(\mathrm{DATA/NLO})_{\mathrm{DIS}}} = 0.55 \pm 0.10\,(\mathrm{da}$$



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data vs theory

- **Data seemed to show harder $E_T$ dependence than theory** **not any more ?**
- **Better description with global suppression** rather than with resolved suppressed by 0.34 or treated with ad hoc suppression
  [KKMR, PRL 84 (2000) 5043, KKMR, EPJ C66 (2010) 373]

**Not a clear picture...is there something else we can do?**