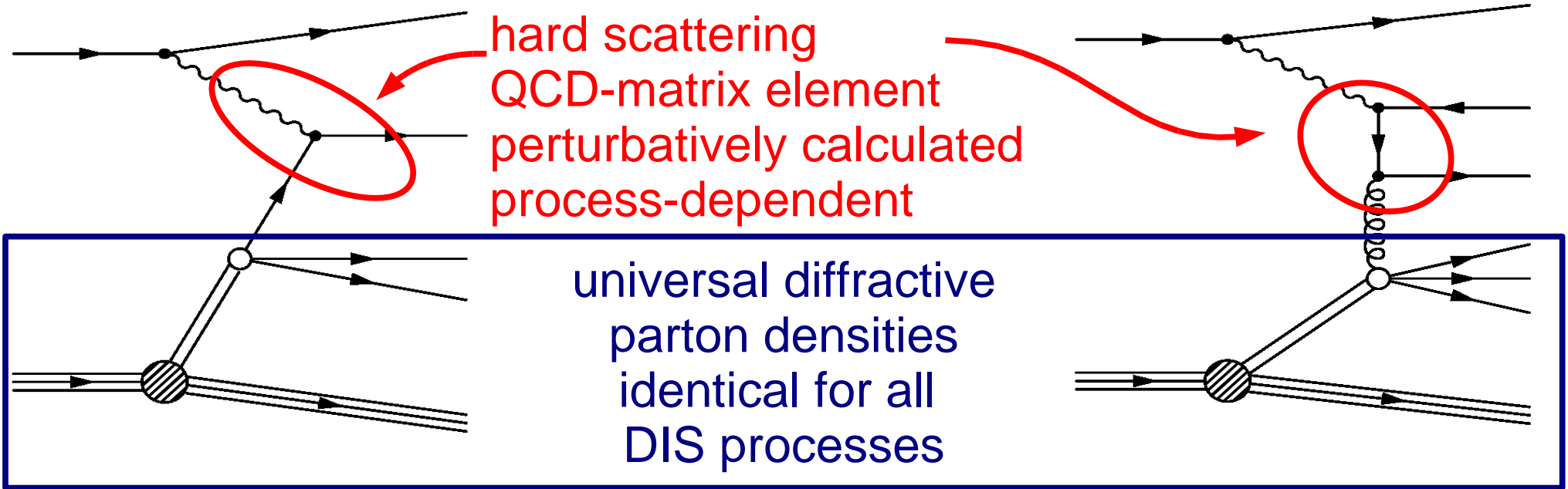


Jets in Diffraction



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Introduction



Measurement: F_2^D
quark measured
directly

Measurement: $\frac{d\sigma(\text{dijet} / \text{charm})}{dz_{IP}}$

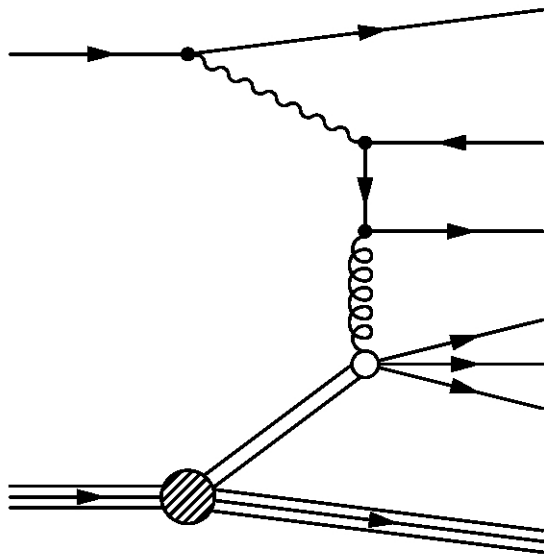
gluon measured
directly

- Factorization valid for DIS, fails in p-p (salvagable?)
- Test factorization: measure PDF's with one process, compare to others
- Improve precision by combining data sets

Factorization

$$\sigma_{diffraction} = \int pdf \cdot \sigma_{parton}$$

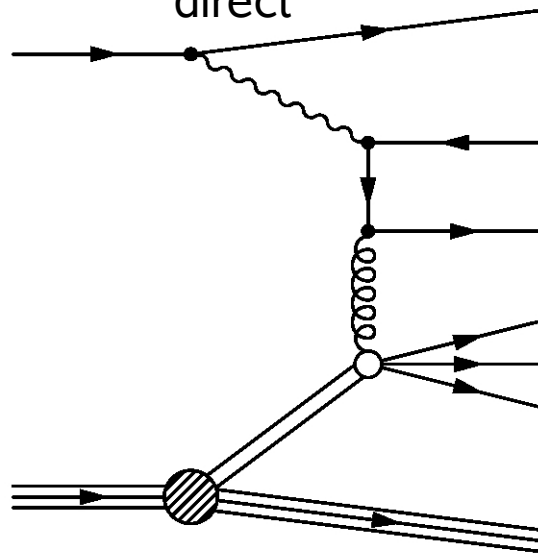
DIS



expected to hold
(proof by collins)

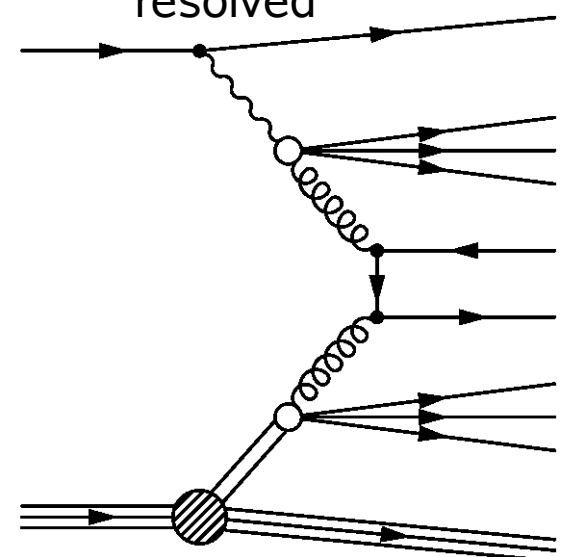
γp

direct



holds maybe

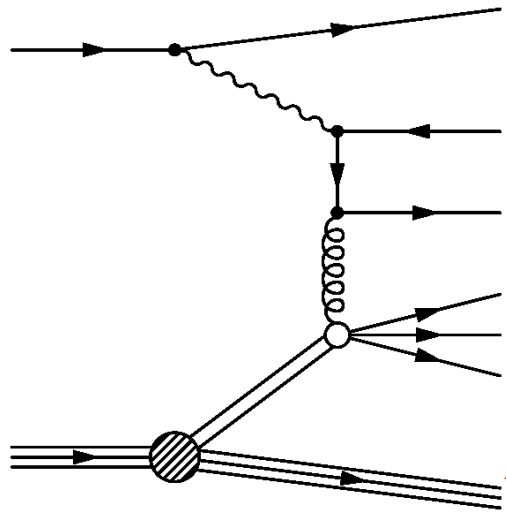
resolved



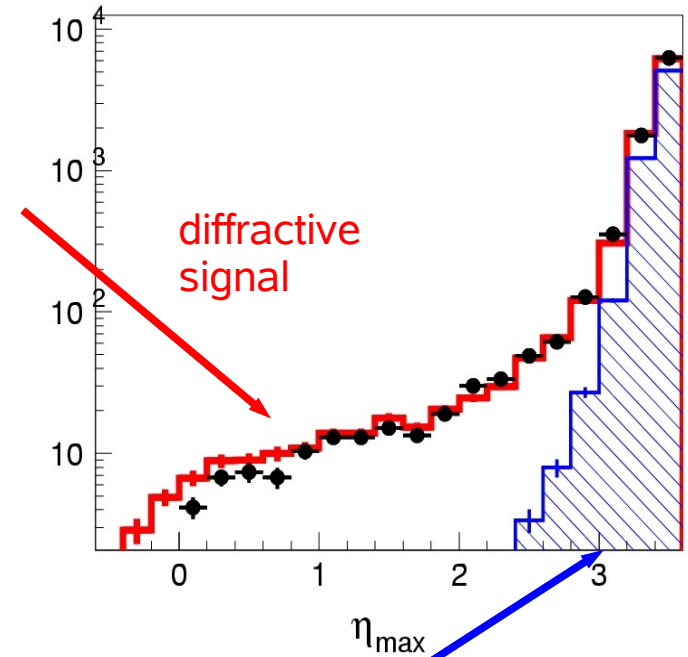
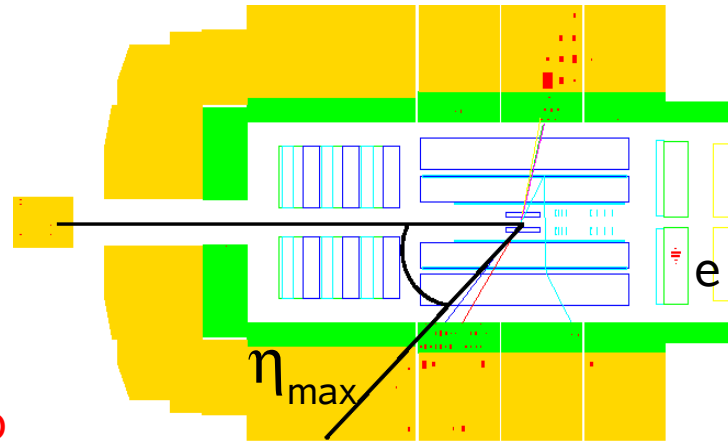
modification essential
to account for
additional hadronic
interactions
(similar to p-p)

Diffractive Event Selection (rapidity gap)

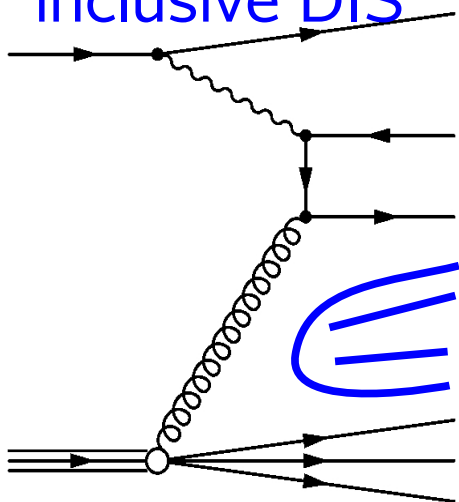
Diffraction



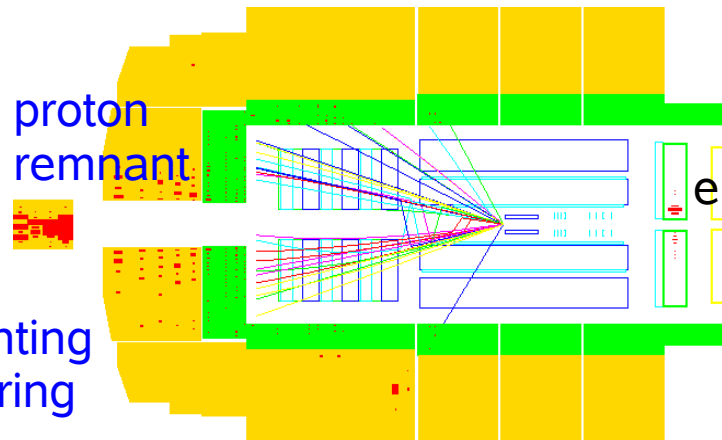
no color-string



inclusive DIS

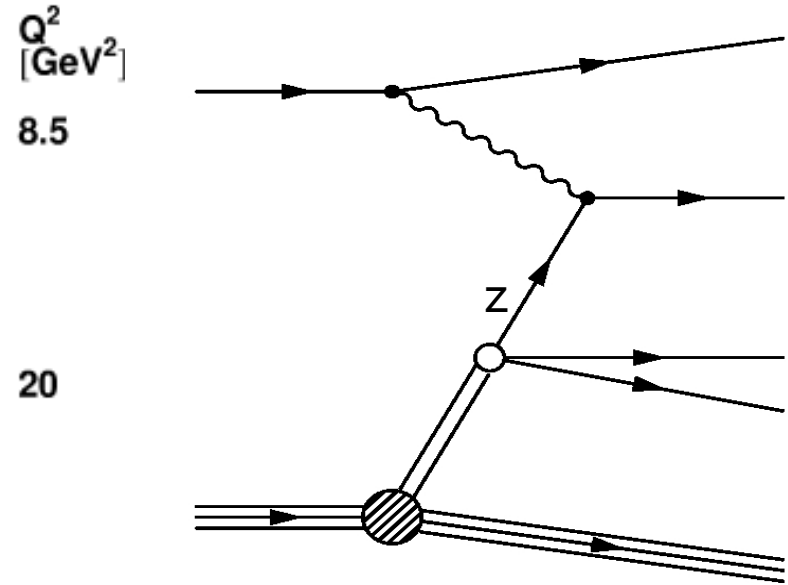
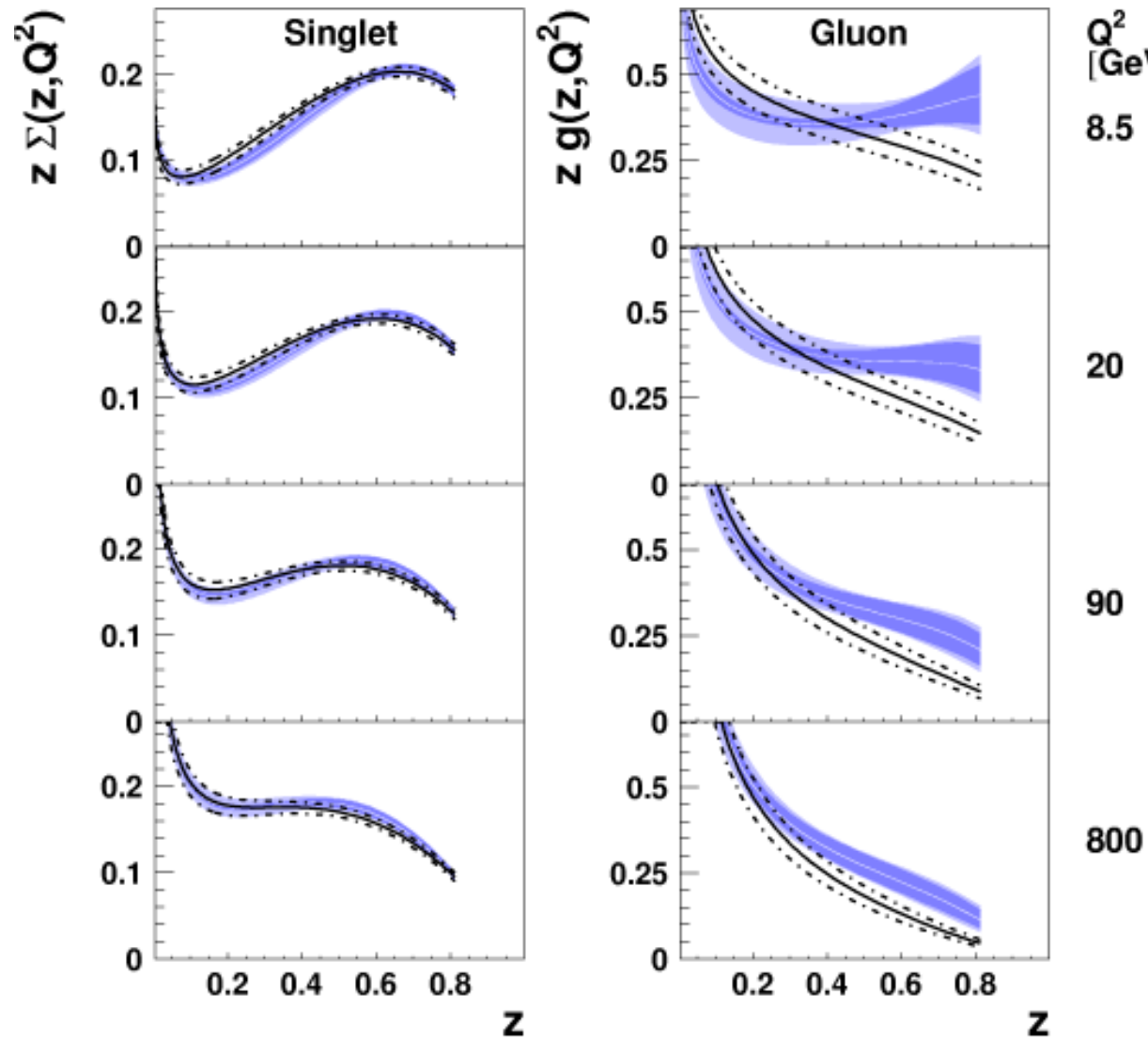


fragmenting color-string



non diffractive background

Diffractive Parton Densities

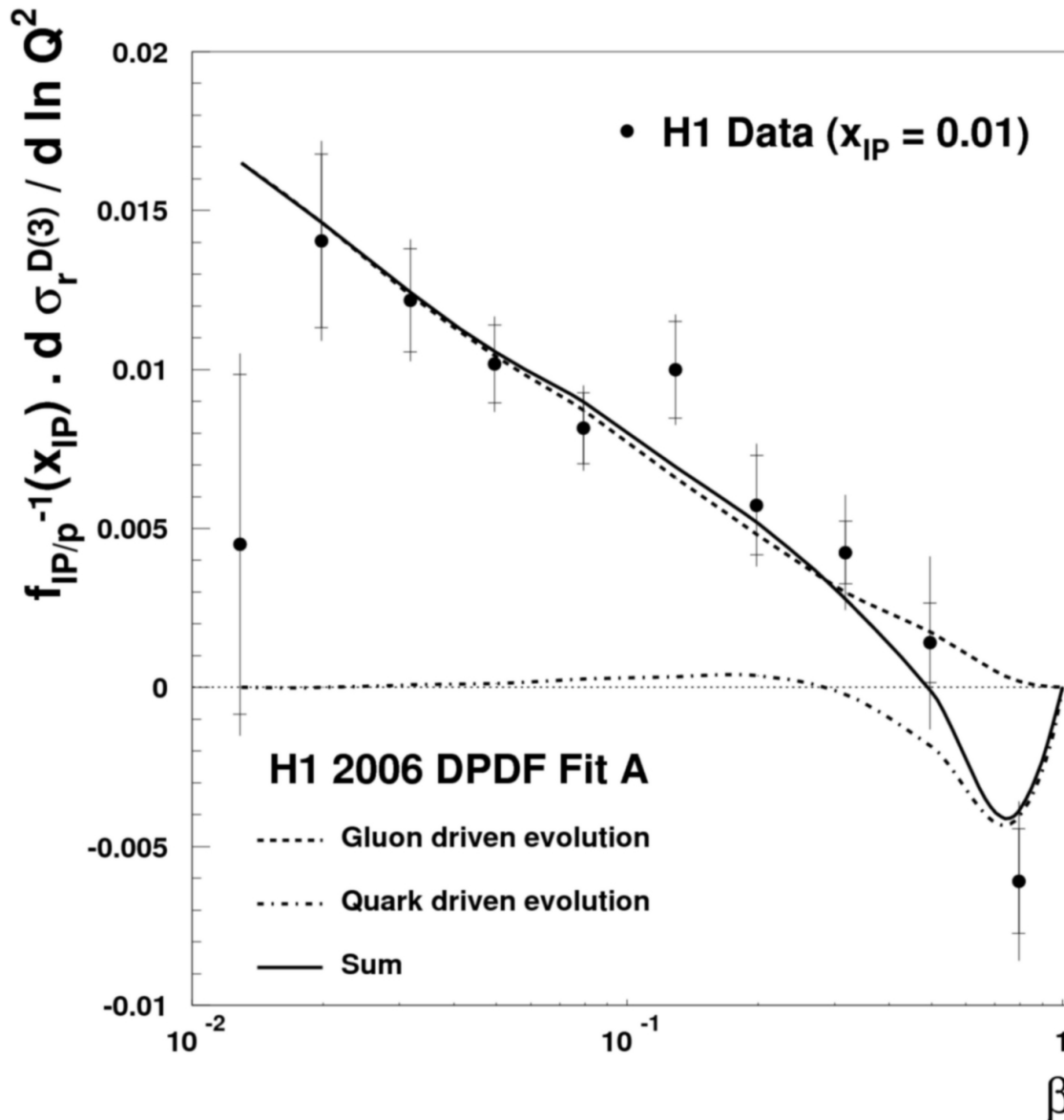


- H1 DPDF fit A/B extracted from inclusive diffractive scattering
- Quark density well constrained
- Gluon less well determined, especially at high z
- Large systematic uncertainties at high z

H1 2006 DPDF Fit A
 (exp. error)
 (exp.+theor. error)

H1 2006 DPDF Fit B
 (exp.+theor. error)

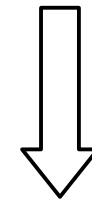
Scaling Violations



gluon density derived from scaling violations

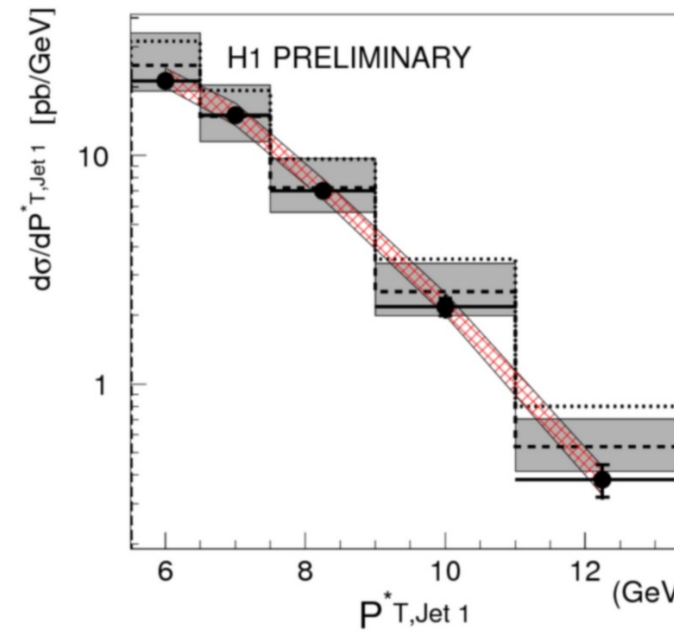
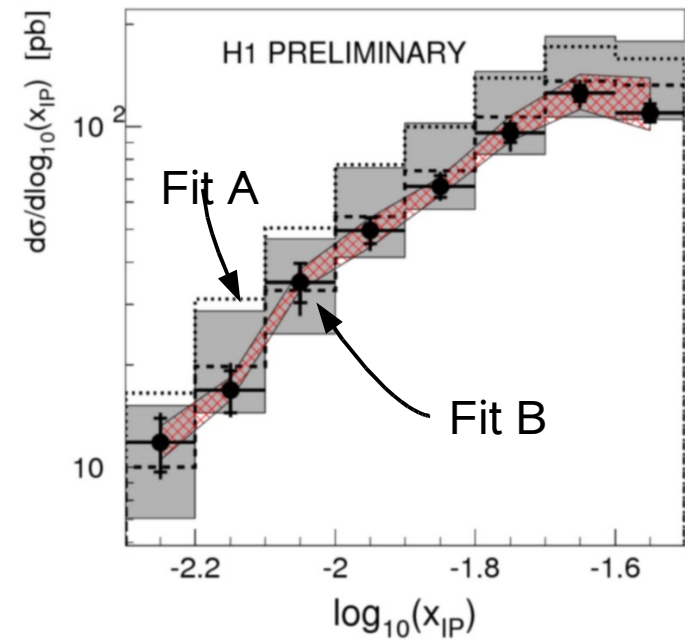
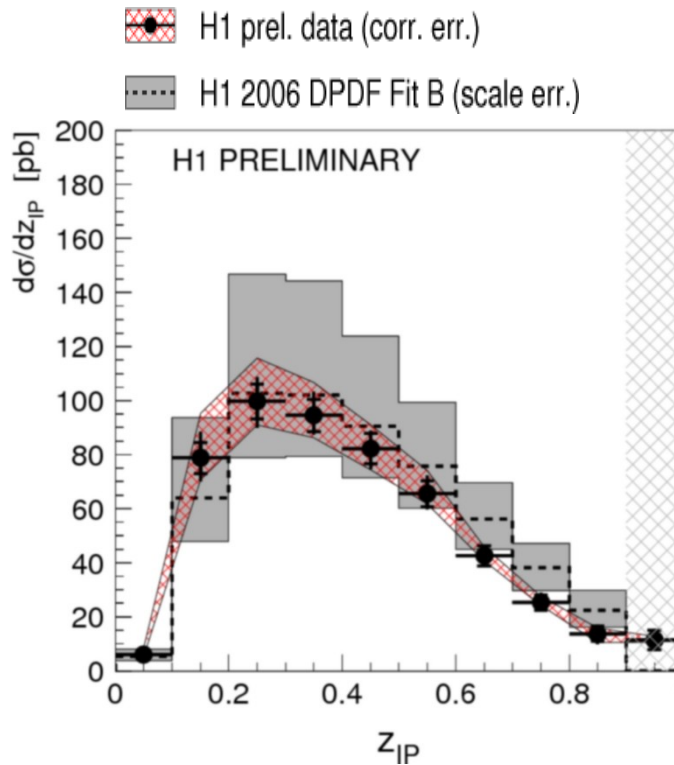
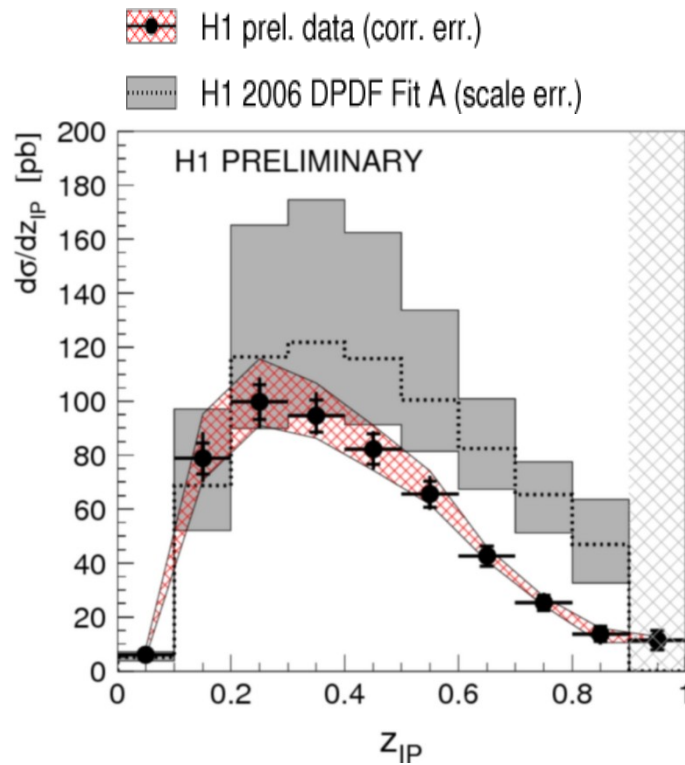


scaling violations at high z dominated by quark contribution



little sensitivity for $z < 0.4$

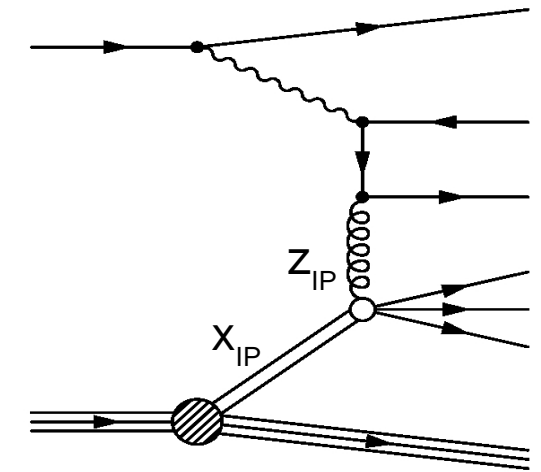
Dijets in Diffractive DIS



Selection:

- incl k_t in γp cms
- $4 < Q^2 < 80 \text{ GeV}^2$
- $0.1 < y < 0.7$
- $p_{t1} > 5.5, p_{t2} > 4.5 \text{ GeV}$

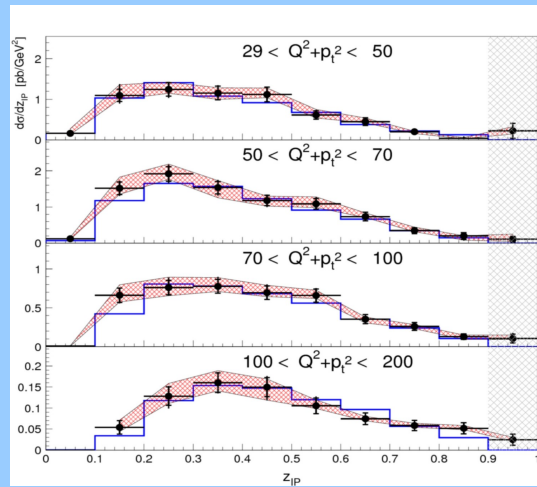
- nlojet++ (Z. Nagy)
- DPDFs H1 2006 Fit A&B
- $\mu^2 = Q^2 + p_t^2$



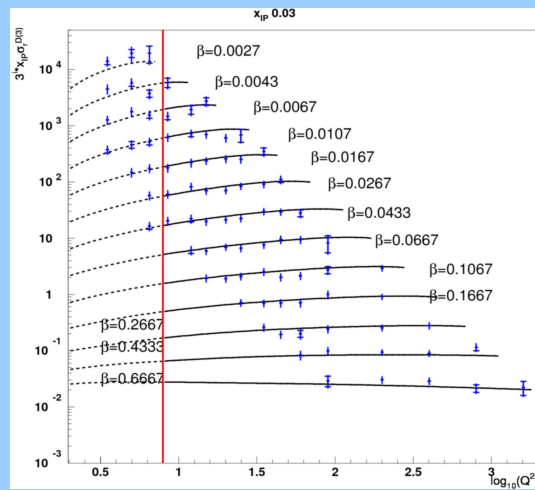
- Problematic at high z_{IP}
- Fit B better than Fit A

Extraction of Parton-Densities

Data (dijets)
(new H1 results)



Data (F_2^D)
(published H1 results)



fixed parameters

- $\alpha_s(M_Z)=0.118$
- reggeon-structure

free parameters

- parton-densities (6)
- $Ax^B(1-x)^C$
- pomeron-Flux (1)
- reggeon-norm. (1)

χ^2

DGLAP-evolution
 χ^2 -Minimization

New
Parton-Densities

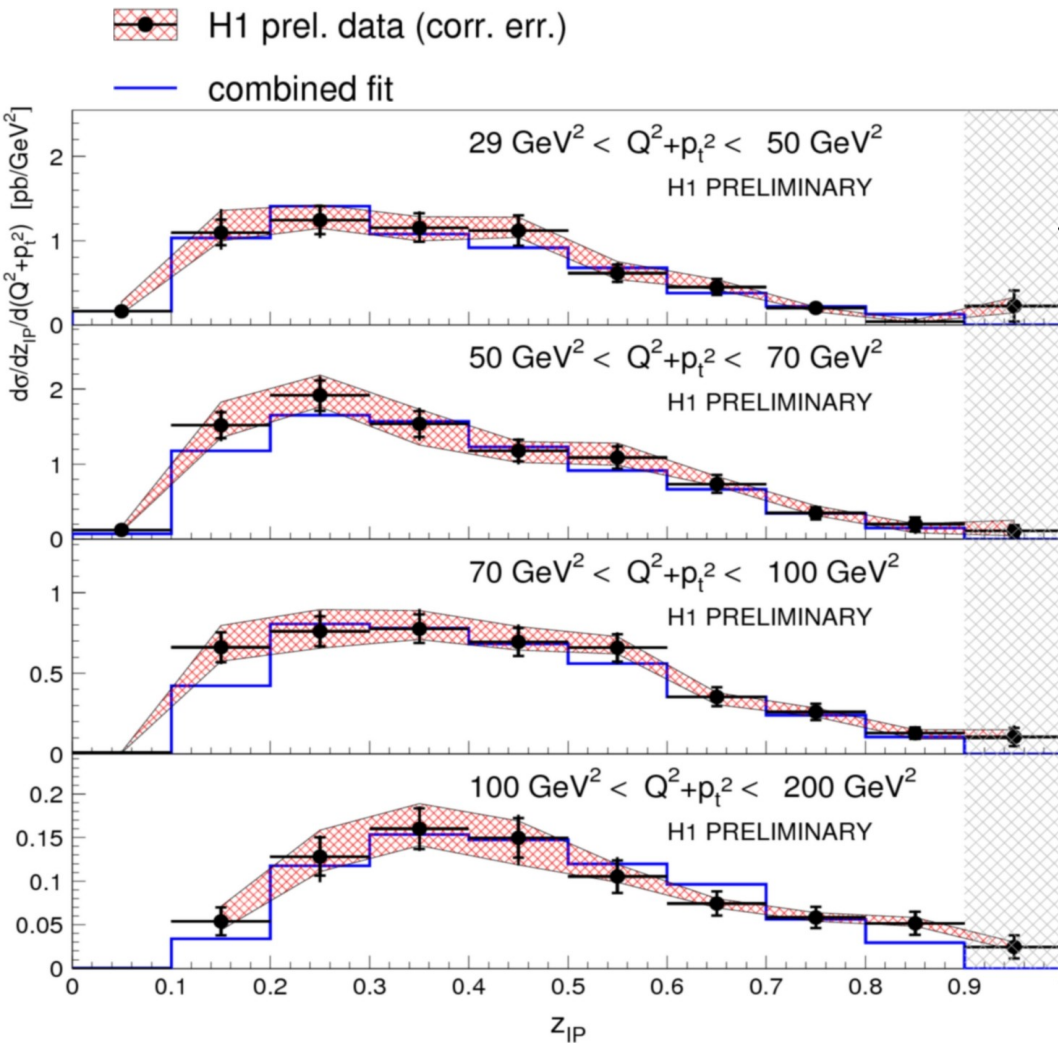
NLO prediction

compute F_2^D in NLO

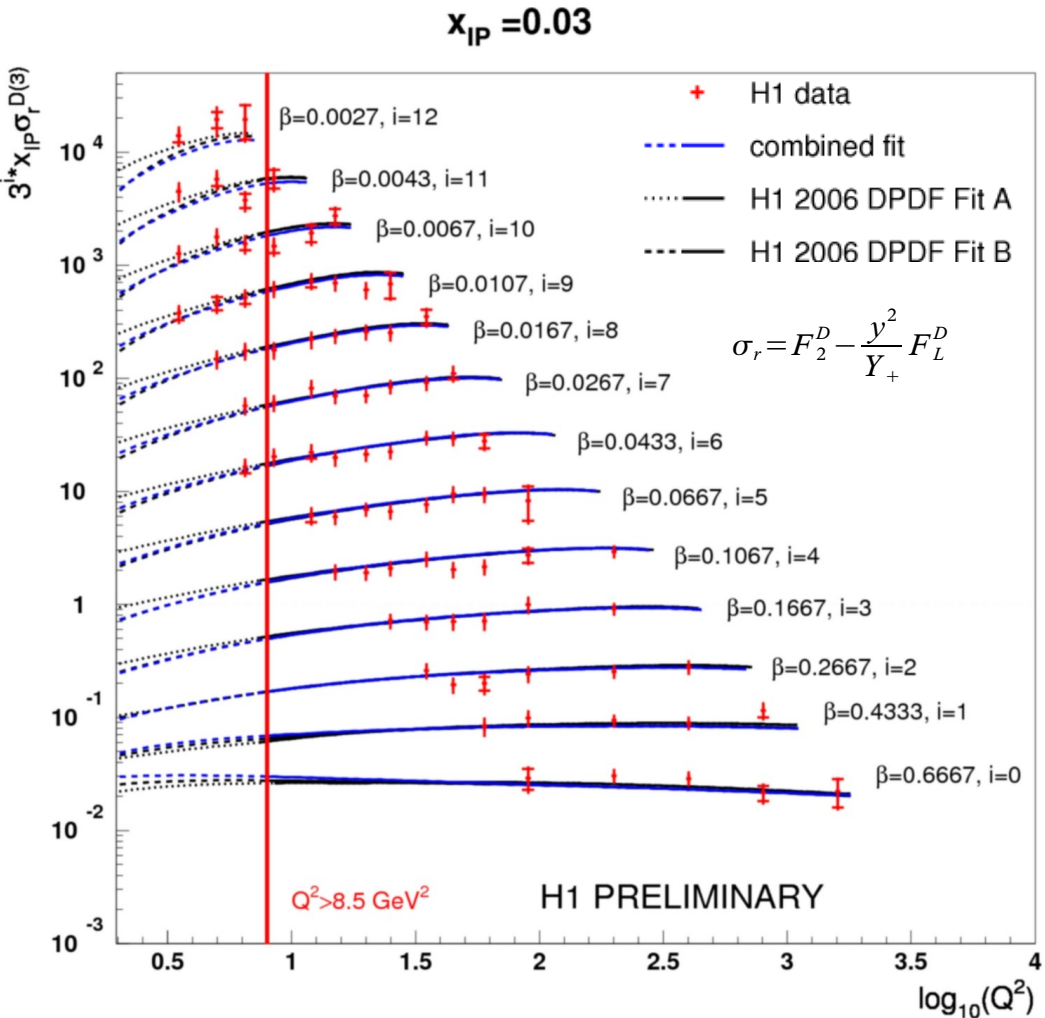
NLO dijet prediction
(parameterized like ZEUS)

DGLAP evolved
parton-densities

Combined Fit (Incl. + Dijets)



Fit describes dijets well



Little difference in description of inclusive data

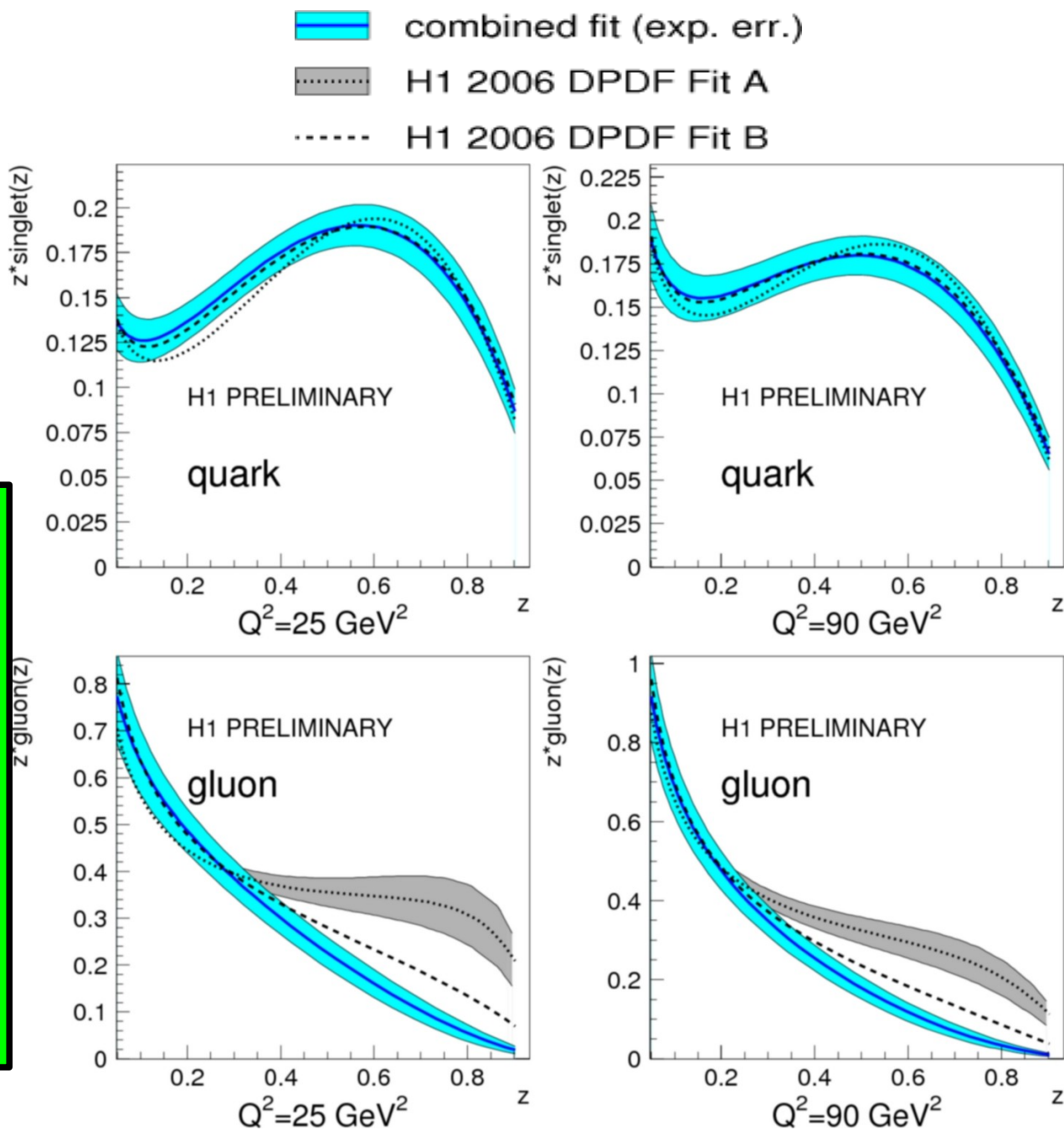
Simultaneous description of Dijets and Inclusive results: Factorization

Improved parton densities

- $\chi^2/\text{ndf}=196/217$
- χ^2/ndf (dijets)=27/36
- χ^2/ndf (F_2^D)=169/190

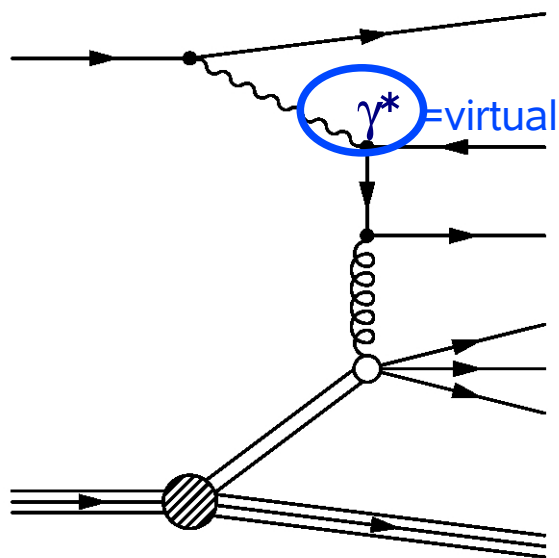
- χ^2 (Fit A)=158
- χ^2 (Fit B)=164

- good agreement for singlet and low z_{IP} gluon
- improved measurement of high z_{IP} gluon
- soon to be published



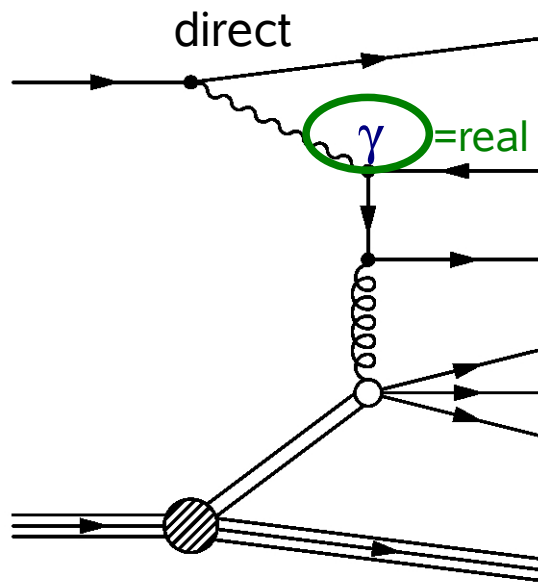
γp : the Transition to Hadron-Hadron

DIS



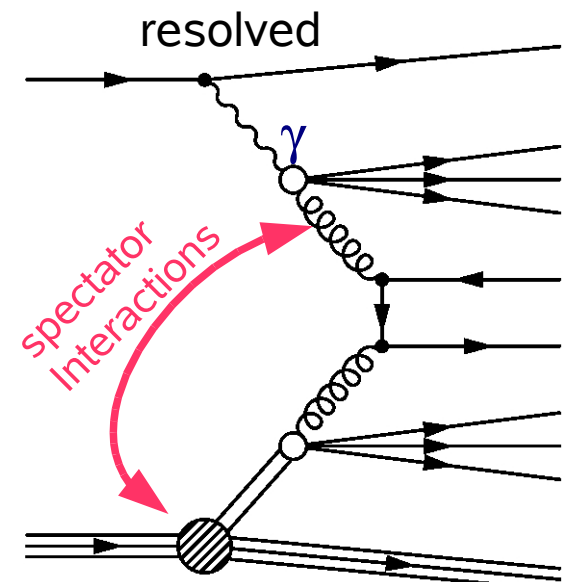
Lepton-Hadron

Photoproduction (γp)



Photon-Hadron

resolved

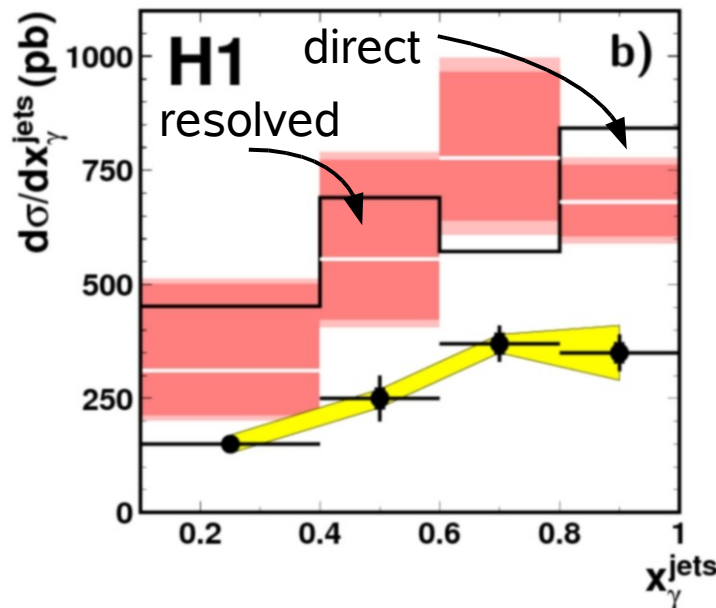
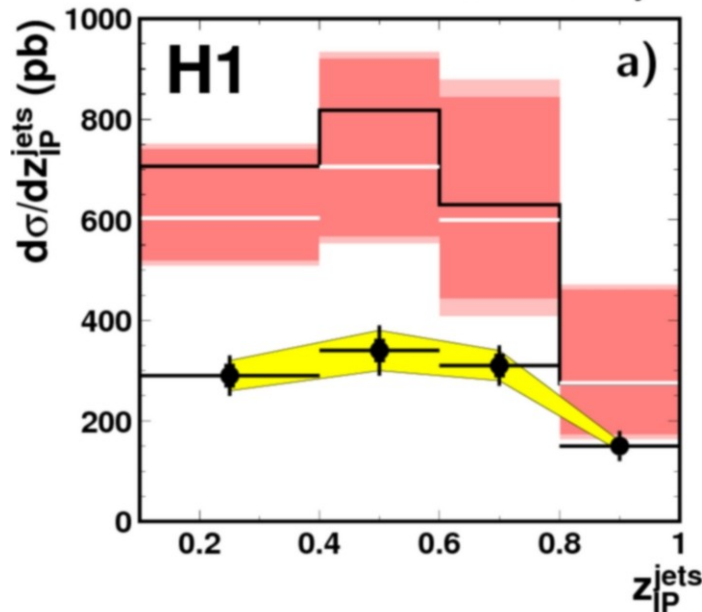


Hadron-Hadron

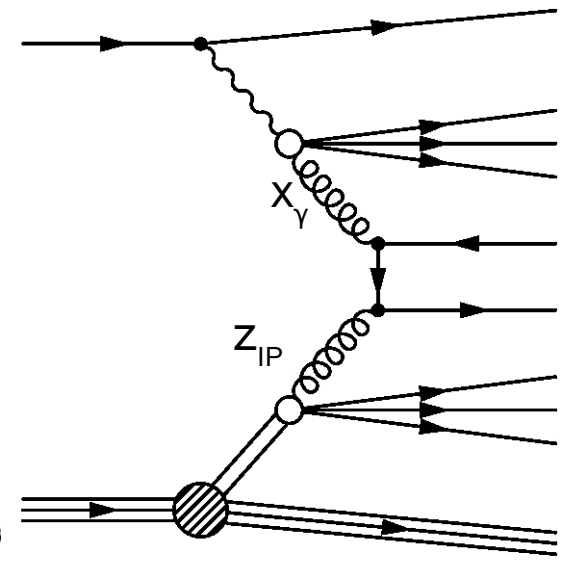
Dijets in γp

H1 Diffractive Dijet Photoproduction

\blacklozenge H1 Data
 correlated uncertainty
 H1 2006 Fit B DPDF
 FR NLO $\times (1 + \delta_{had})$
 — FR NLO



Frixione NLO code
+ hadronization correction



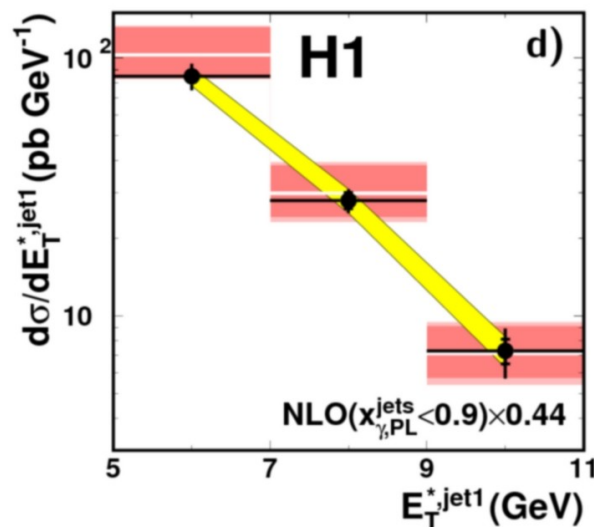
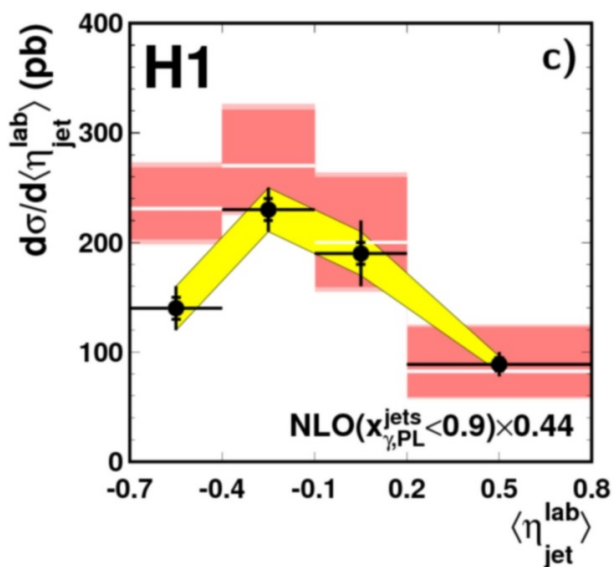
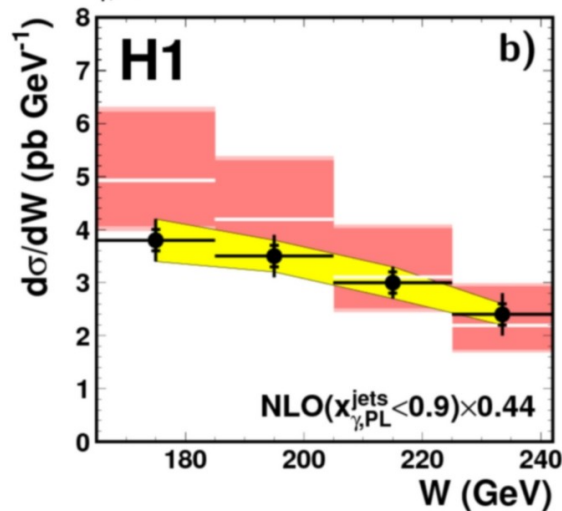
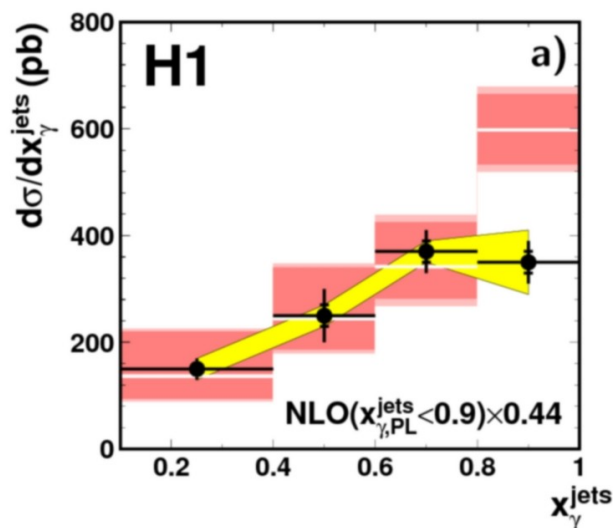
- large violation of naive factorization observed
- factorization breaking occurs in direct and resolved processes

Suppressed Resolved Contribution

H1 Diffractive Dijet Photoproduction

\bullet H1 Data
 correlated uncertainty

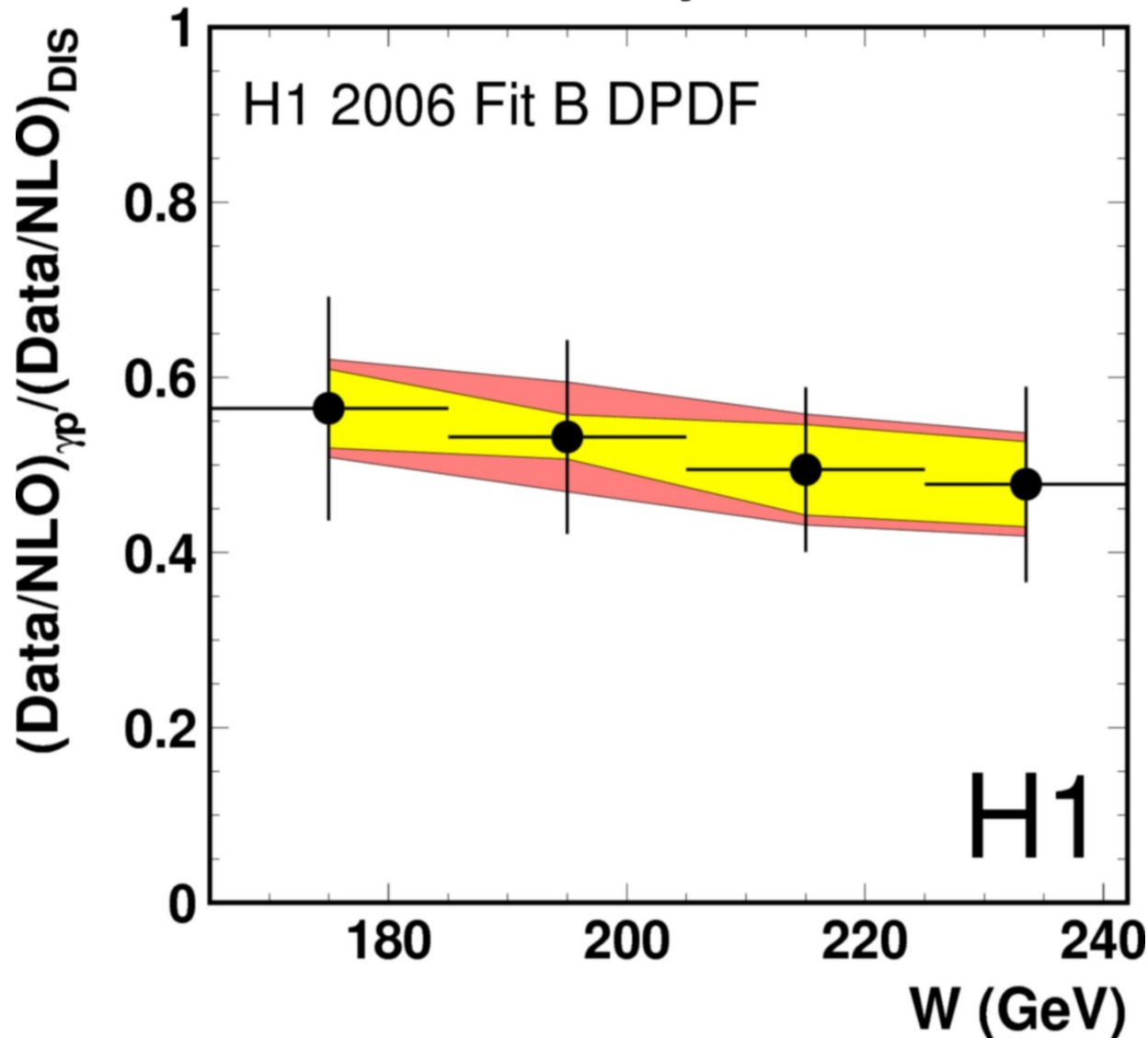
H1 2006 Fit B DPDF
 FR NLO $\times(1+\delta_{had})$,
 $(x_{\gamma,PL}^{jets} < 0.9) \times 0.44$



- resolved contribution scaled by 0.44
- description somewhat better than naive factorisation approach
- shapes not well described

Double Ratio

H1 Diffractive Dijet Production



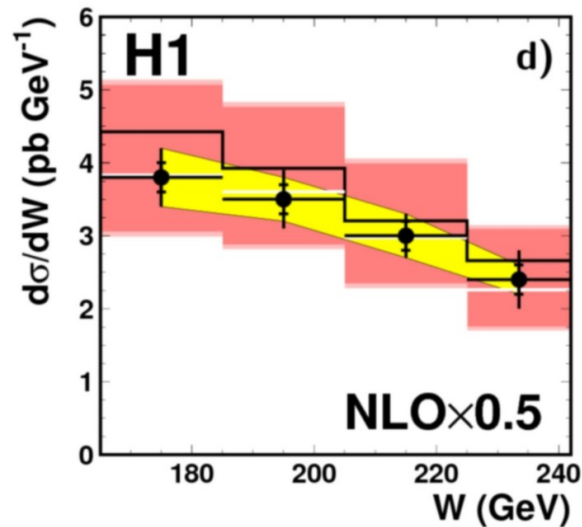
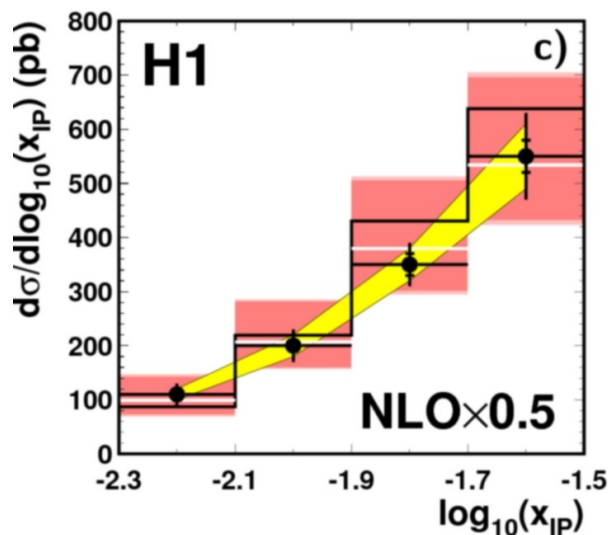
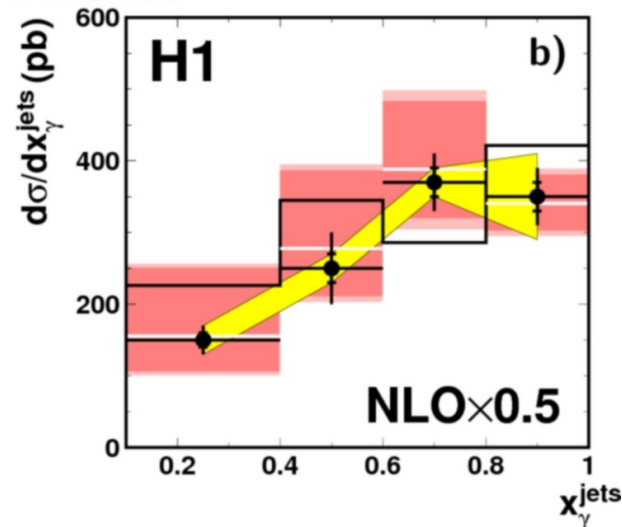
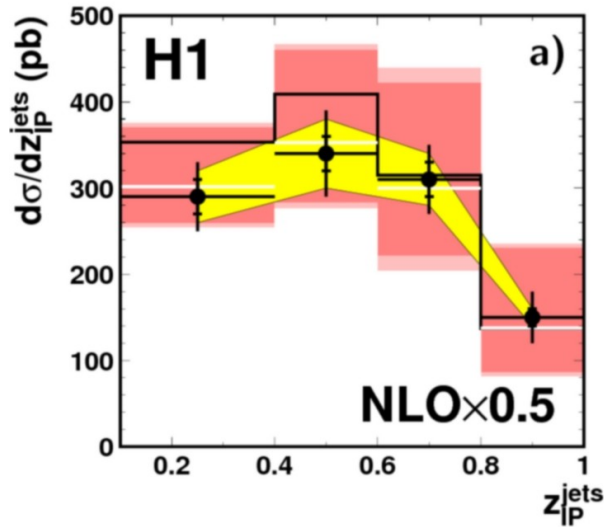
$$\frac{(Data/NLO)_{\gamma p}}{(Data/NLO)_{DIS}}$$

- shows differences in description of DIS and γp data
- reduced systematic uncertainties
- Gap-Survival in $\gamma p \approx 0.5$, independent of kinematics

Global Suppression

H1 Diffractive Dijet Photoproduction

 H1 Data H1 2006 Fit B DPDF
 correlated uncertainty  FR NLO $\times (1 + \delta_{had}) \times 0.5$
 FR NLO $\times 0.5$



• **direct** and resolved contribution scaled by 0.5

• excellent description of all relevant variables

Summary: Status of Factorization

- DIS:

- factorisation holds



- jet data improves sensitivity to diffractive gluon density



- Photoproduction

- naive factorisation not applicable



- resolved and direct, **both** contributions show suppression

