Diffractive Parton Densities from Combined QCD-Analysis of Dijets and F_2^D

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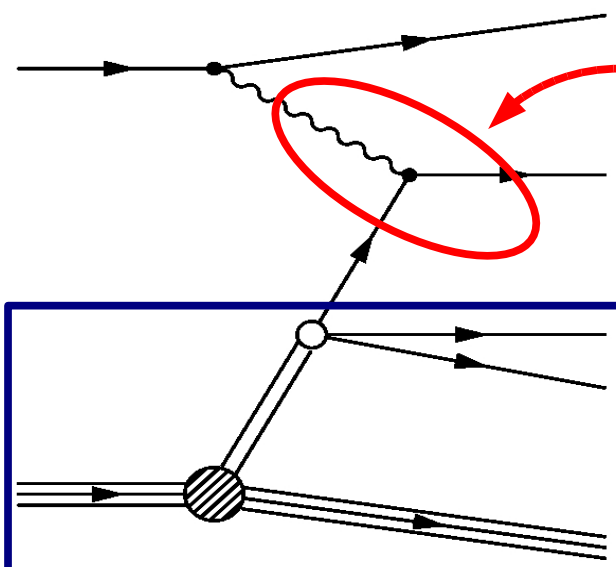
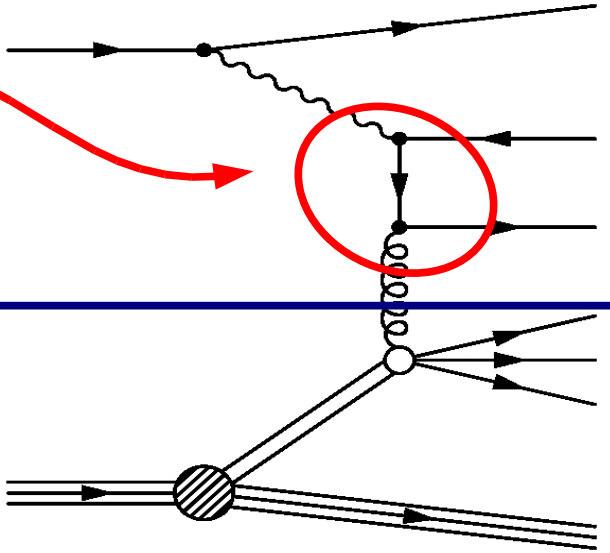
Introduction



hard scattering
QCD-matrix element
perturbatively calculated
process-dependent

universal diffractive
parton densities
identical for all
processes



Measurement: F_2^D

quark dominates

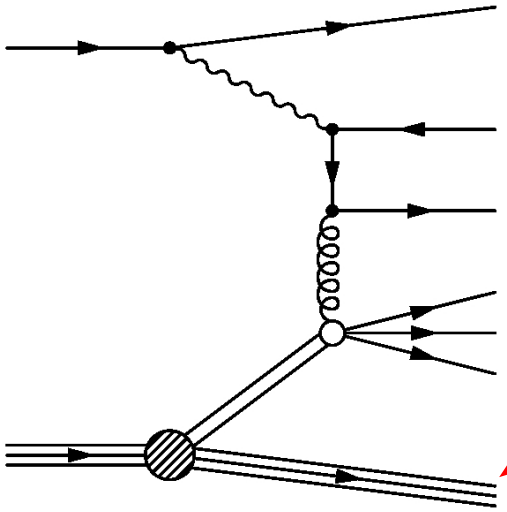
Measurement: $\frac{d\sigma(dijet)}{dz_{IP}}$

gluon dominates

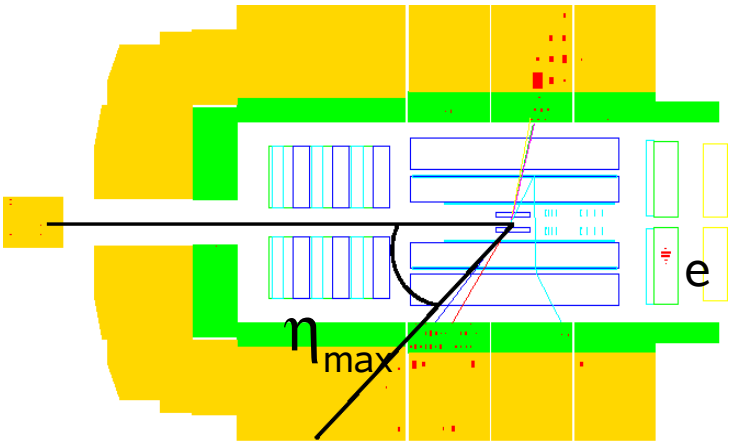
Find one set of parton densities
that describes both processes

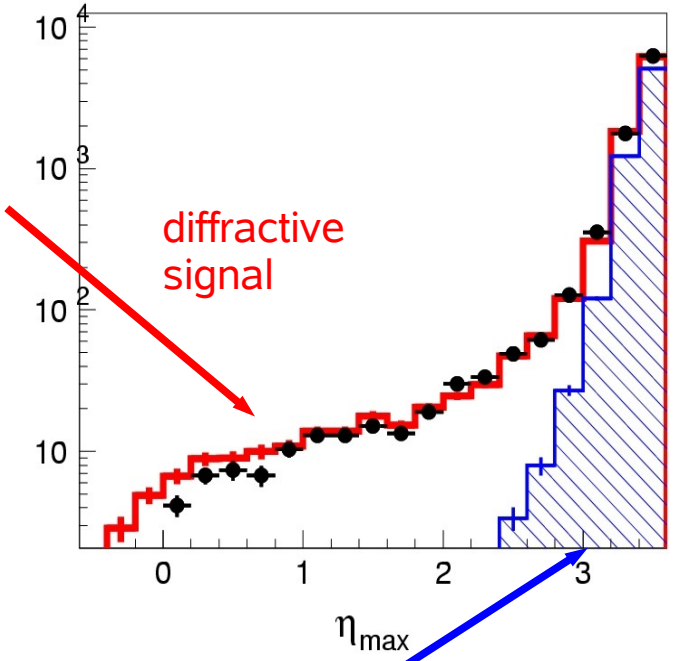
Diffractive Event Selection
(rapidity gap)

Diffraction

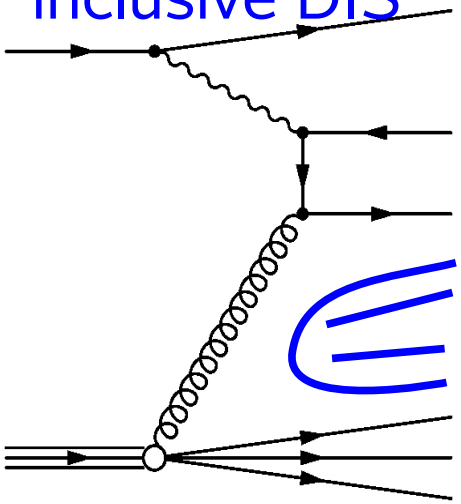


no
color-string

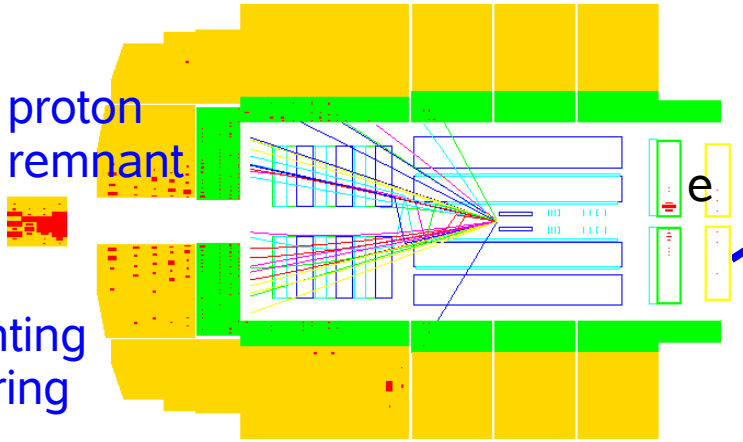




inclusive DIS



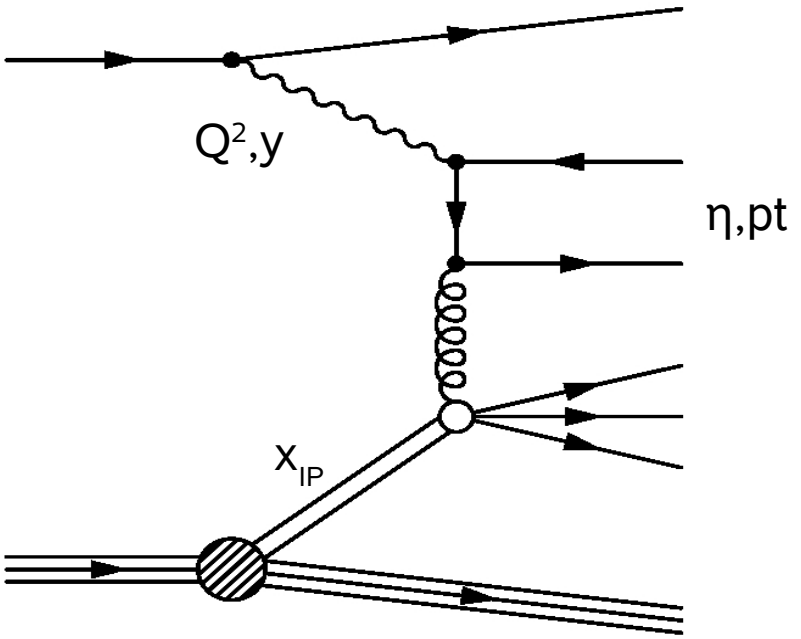
fragmenting
color-string



non
diffractive
background

Data Selection: Dijets

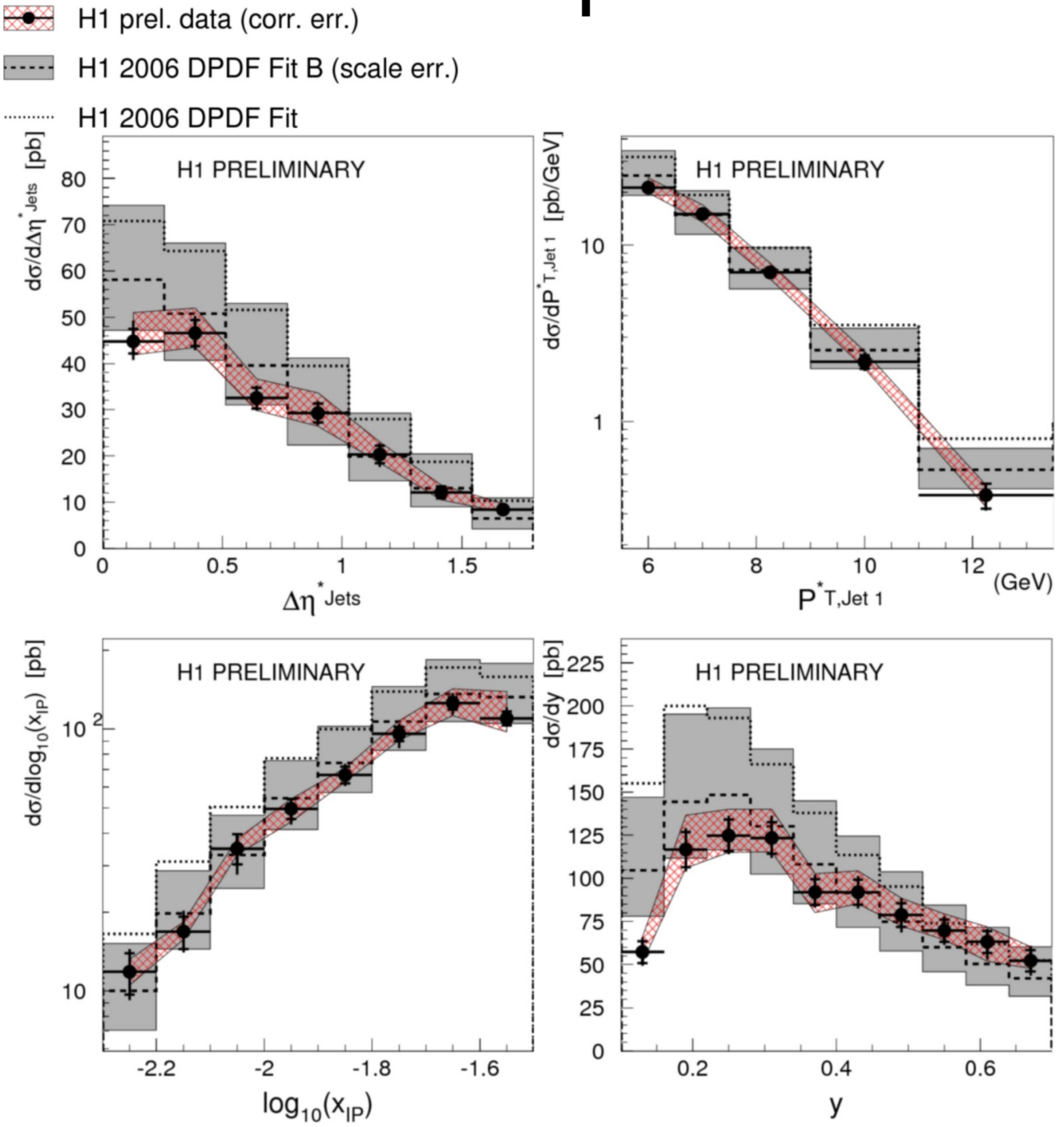
- 1999 + 2000 e^+ Data (50 pb^{-1})
- $4 < Q^2 < 80\ GeV^2$
- $0.1 < y < 0.7$ (larger than previous H1 analysis)
- $x_{IP} < 0.03$
- Dijet selection
  - $-1. < \eta_{jet}^{lab} < 2.$
  - $p^*_{t,jet\ 1} > 5.5\ GeV$
  - $p^*_{t,jet\ 2} > 4\ GeV$



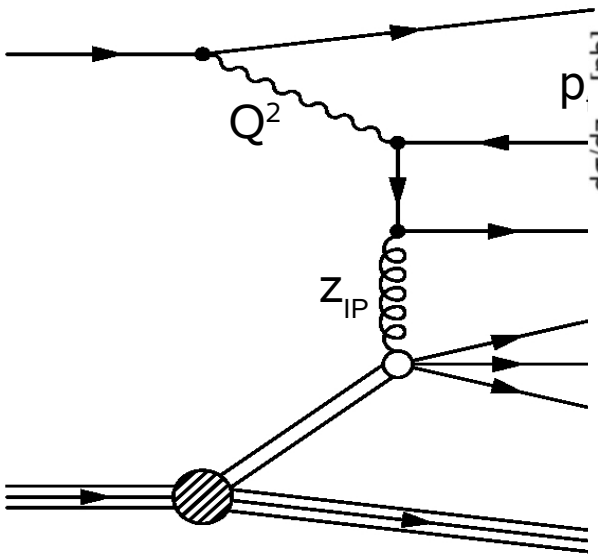
total: 2700 diffractive dijet event
(nearly 6 times as previous H1 analysis ('97 data))

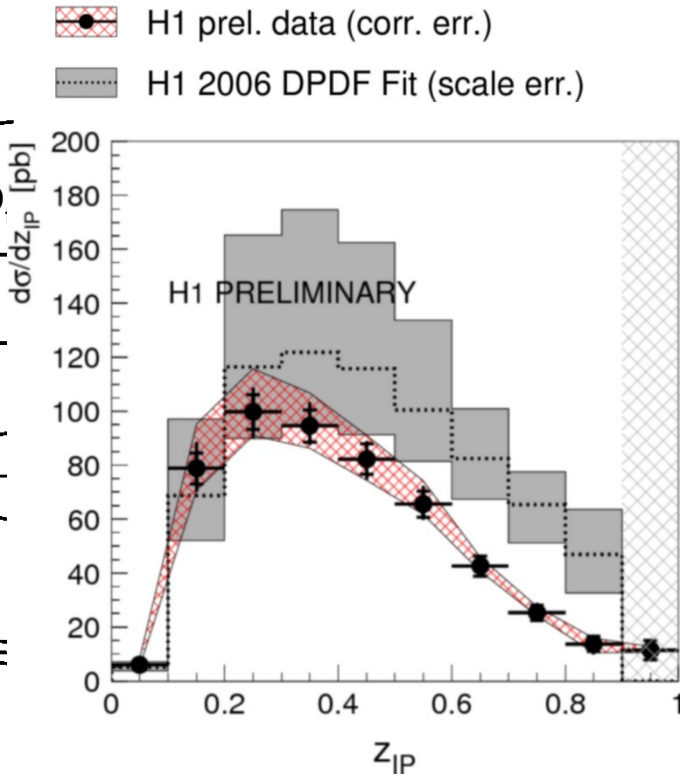
H1 2006 DPDF Fit Comparison

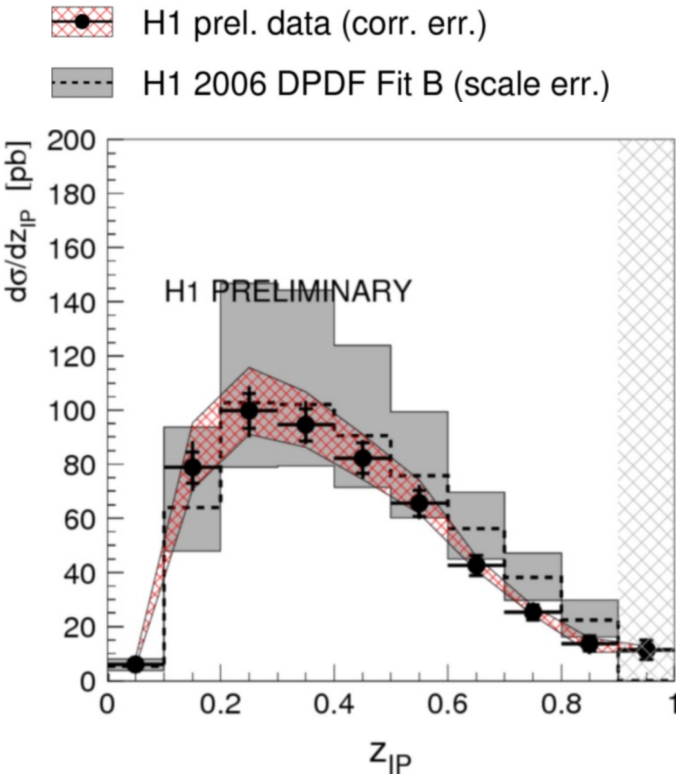
- H12006 DPDF fit: cross section too high
- H12006 DPDF fit B: reasonable agreement



Dijet Cross Section







- Parton densities from H1 F_2^D analysis (see talk P. Newman)
- nlojet++ (μ_r,μ_f=Q^2+p_t^{*2})
- z_{IP}-distribution most sensitive to gluon-density

gluon-density from pure F_2^D analysis has large uncertainty at high z_{IP}

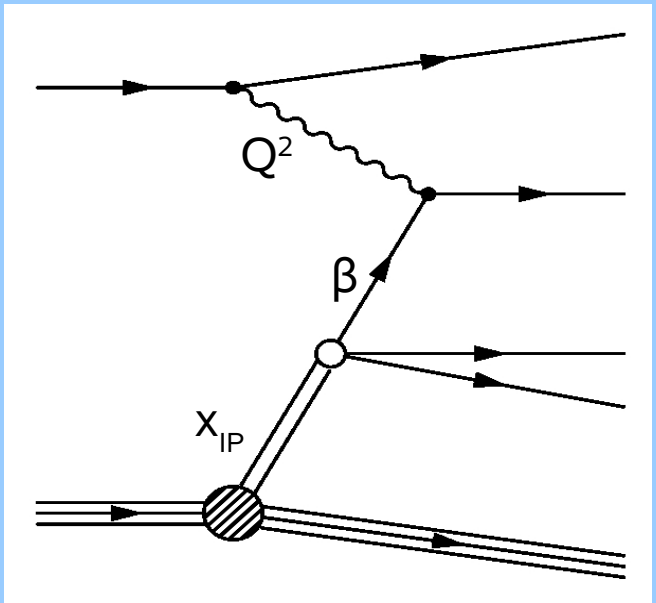
improved determination necessary

Datasets for the QCD-Fit

inclusive F_2^D data

(H1 results
see talk P. Newman)

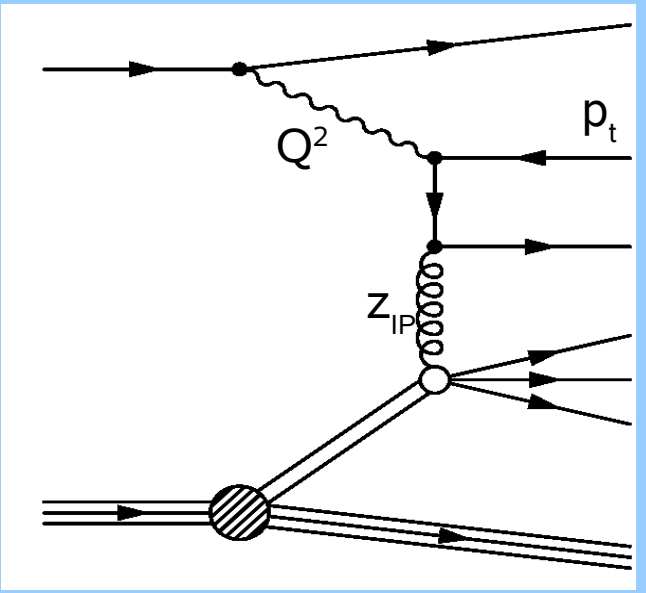
- Measure $F_2^D(ß,Q^2>8.5GeV^2)$ in bins of x_{IP}
- directly sensitive to quark-density



dijet data

(new H1 results)

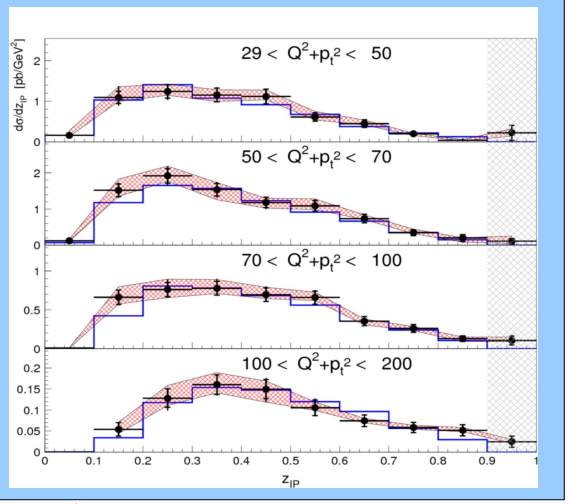
- Measure $\frac{d\sigma(dijet)}{dz_{IP}}$ in bins of $Q^2+p_t^2$
- directly sensitive to gluon-density



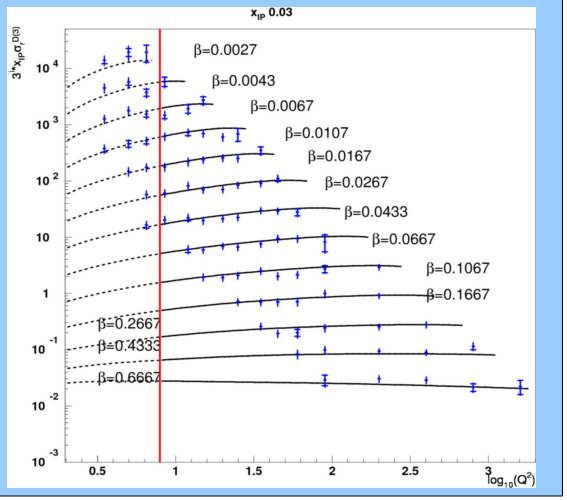
combine datasets for best parton-densities

Extraction of Parton-Densities

Data (dijets)
(new H1 results)



Data (F_2^D)
(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

DGLAP evolved
parton-densities

compute F_2^D in NLO

NLO prediction

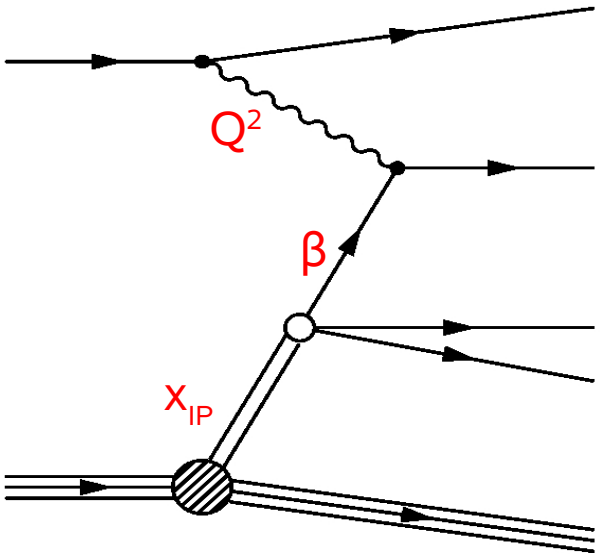
NLO dijet prediction
(parameterized like ZEUS)

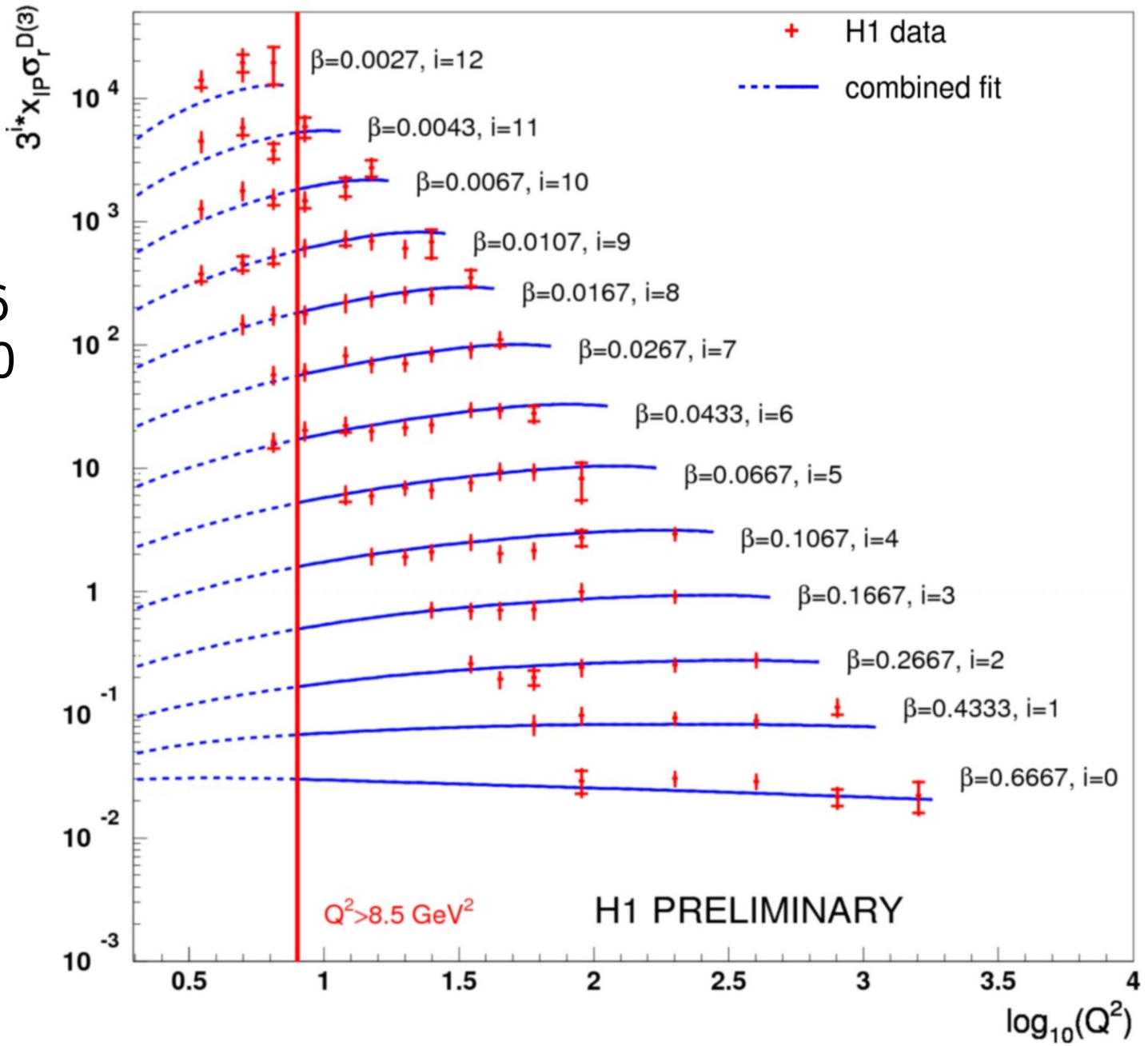
New
Parton-Densities

Fit Results F_2^D

fit is successful

- χ^2/ndf=196/217
- χ^2/ndf (dijets)=27/36
- χ^2/ndf (F_2^D)=169/190





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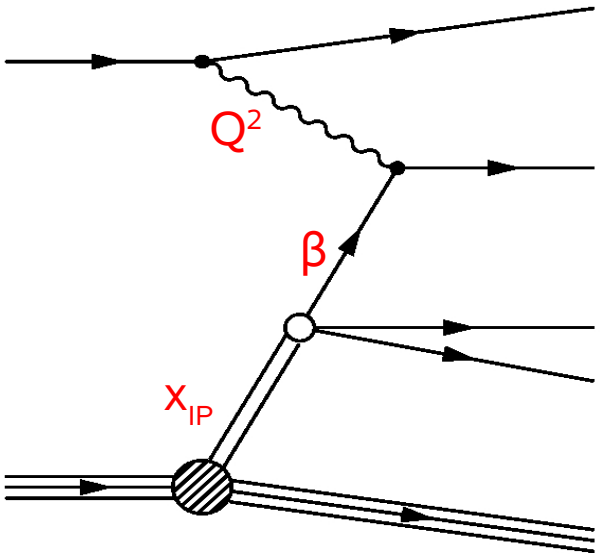
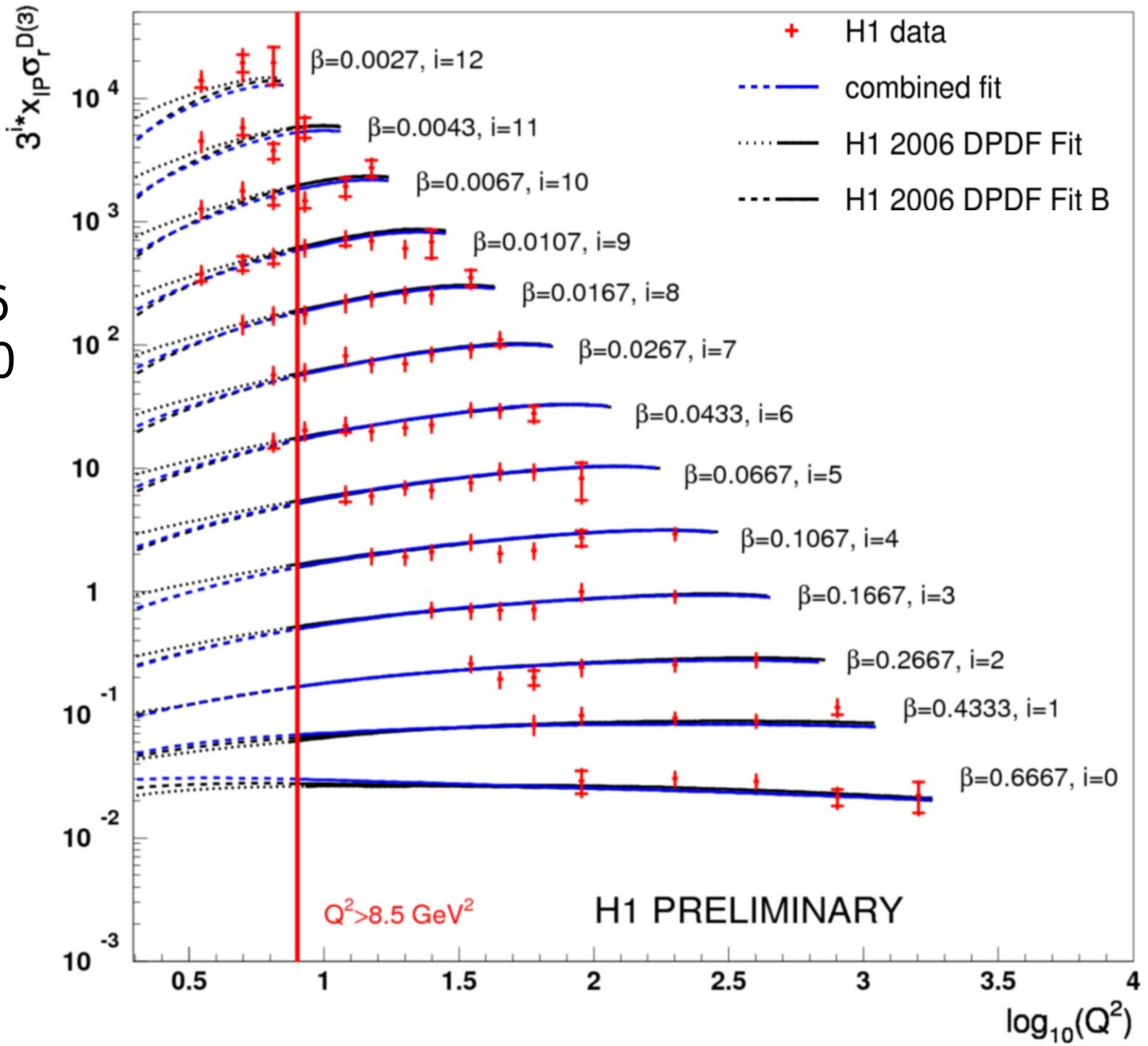
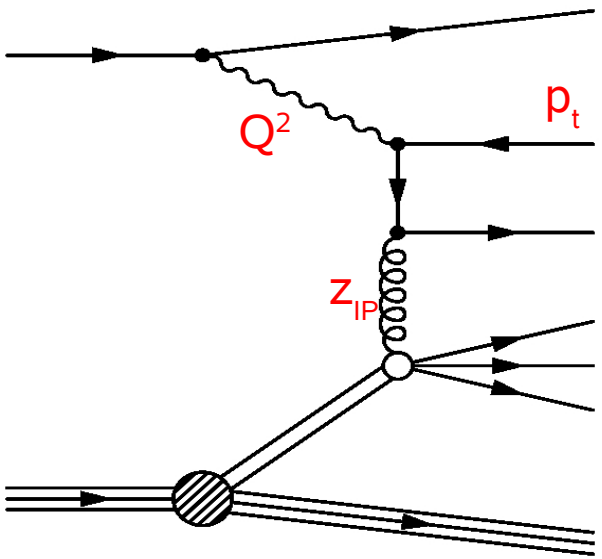
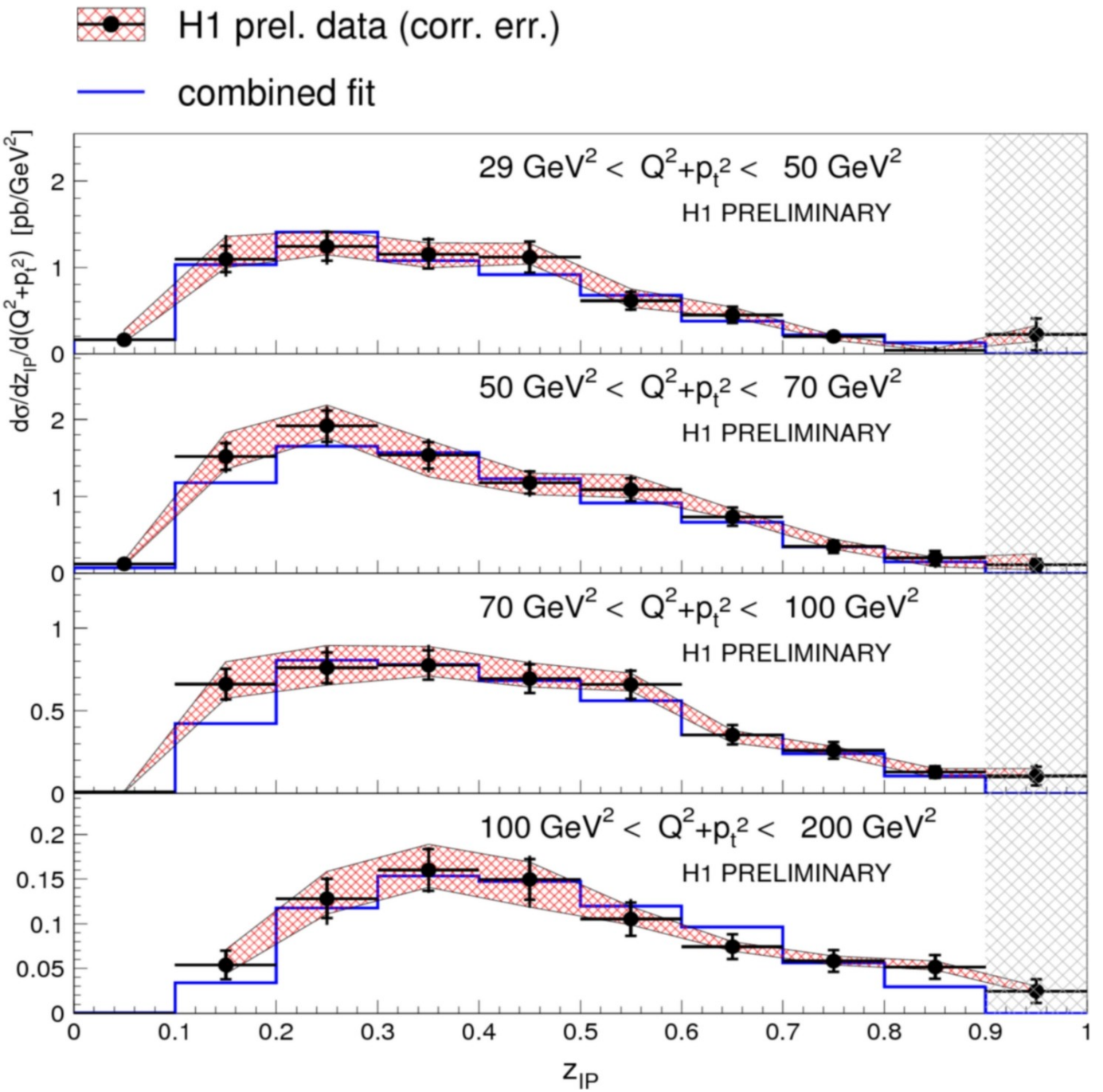




Fit Results Dijets

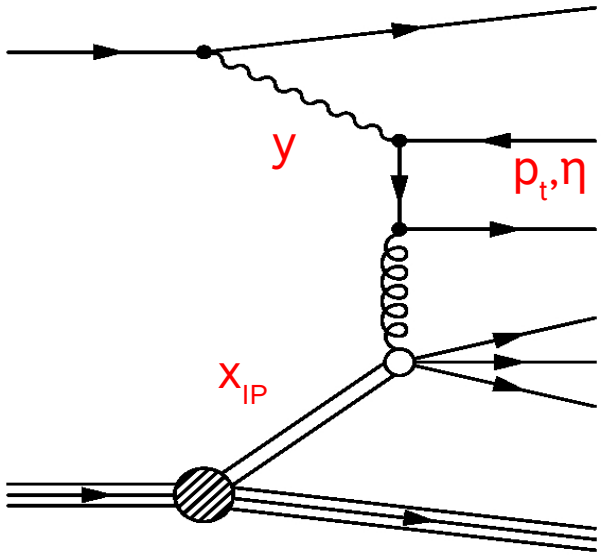


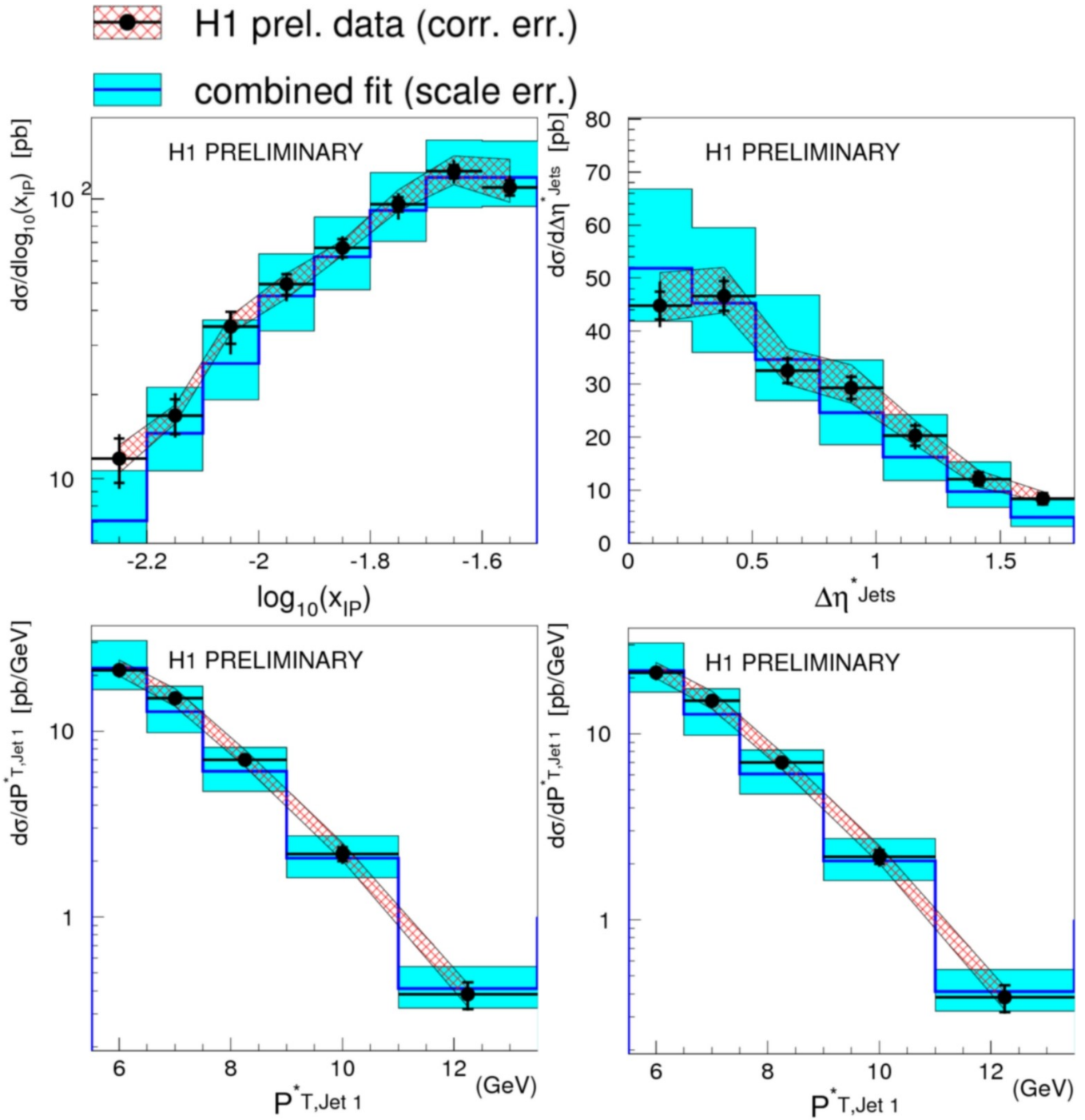
factorization confirmed



Fit Results: Other Variables

overall reasonable description in all variables

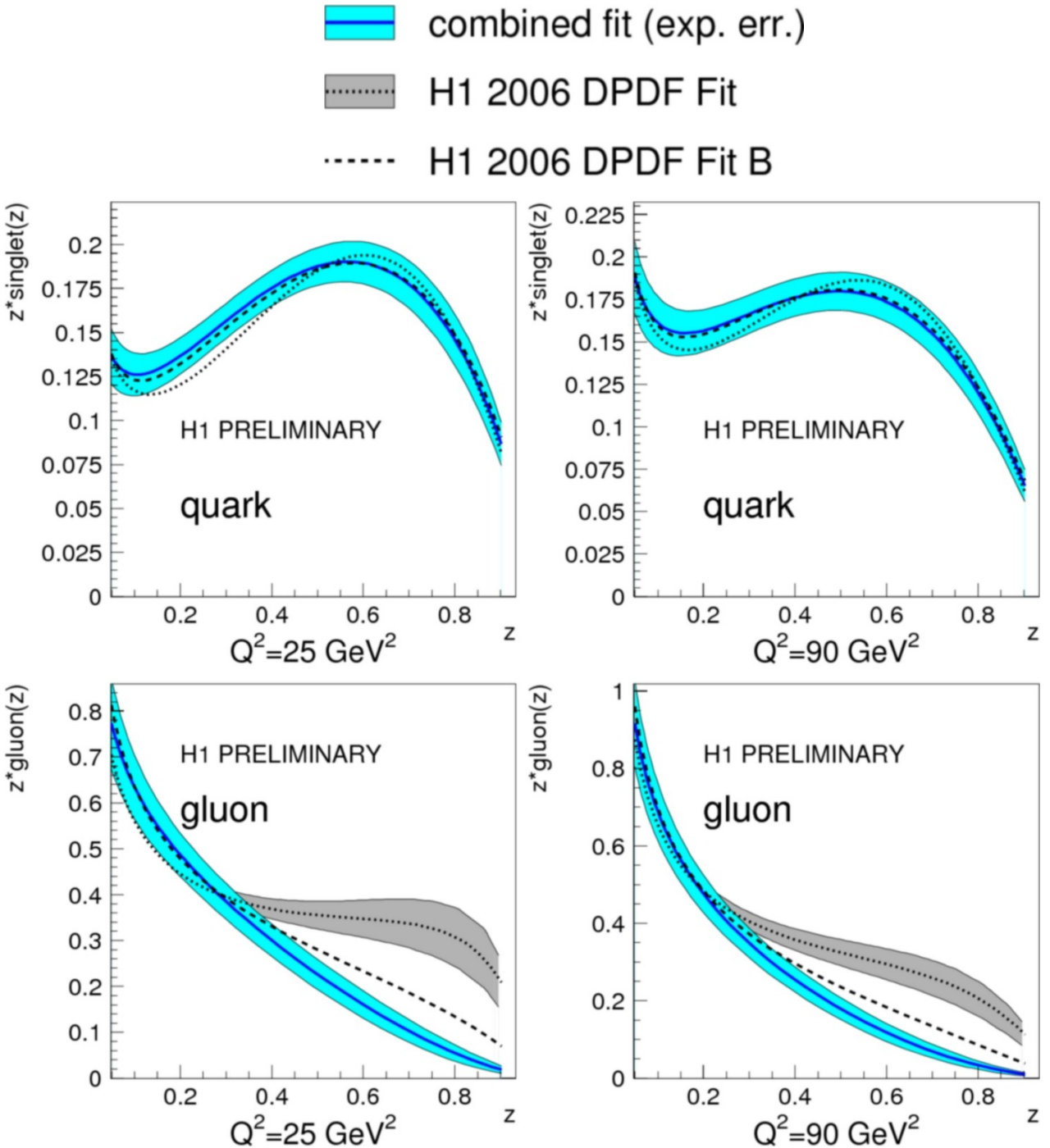




Parton Densities

systematic uncertainties still to be studied:

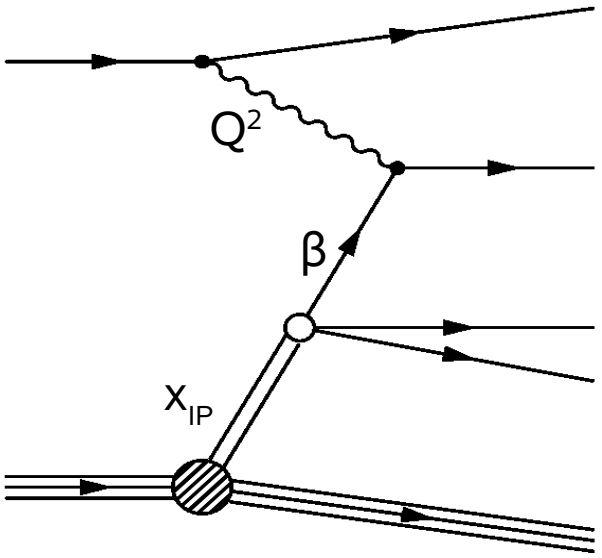
- scale dependence
- starting scale
- flux parameterization
- ...

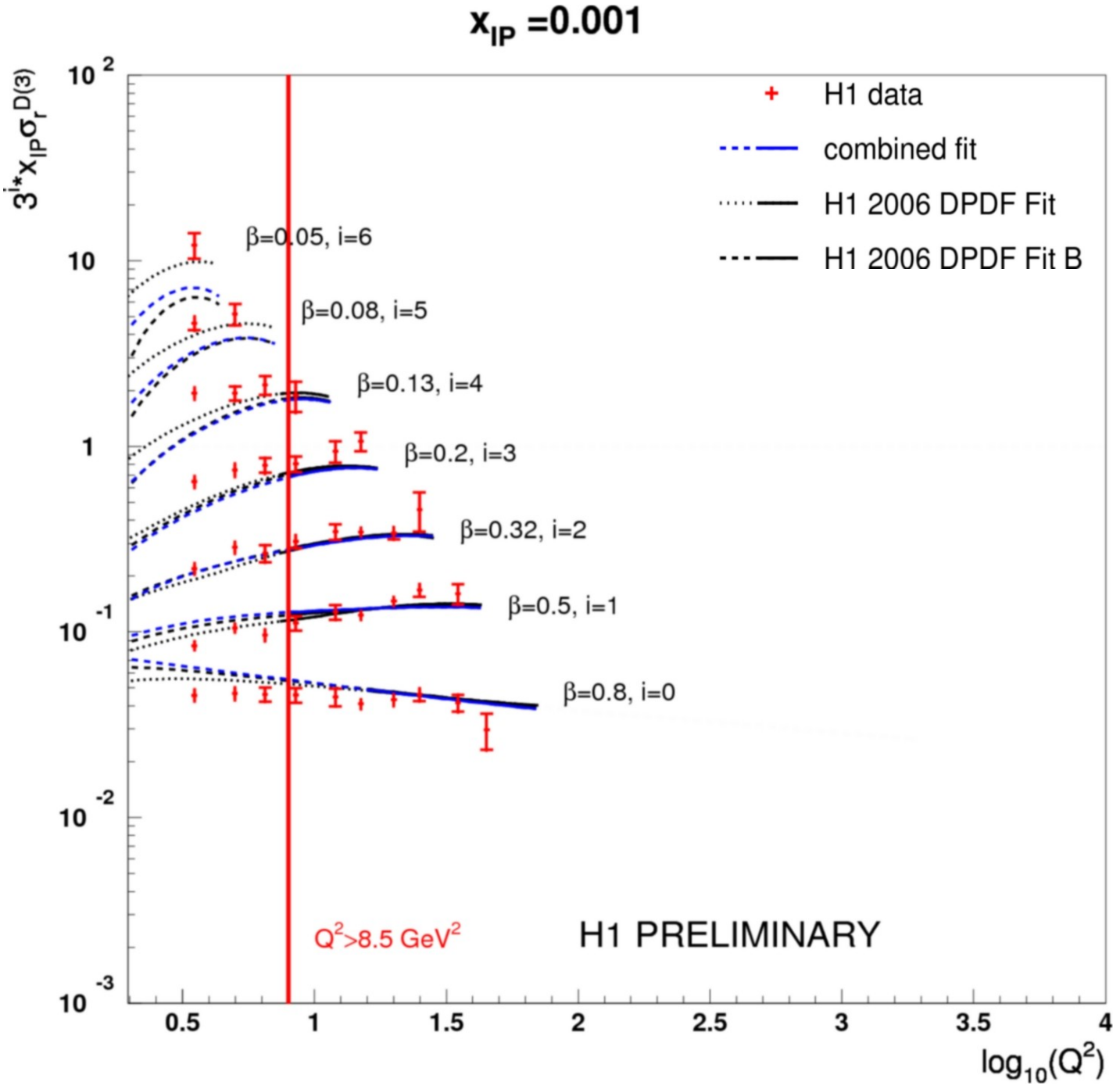


Summary

- New cross section measurement of dijets in diffractive DIS
- First combined QCD analysis of diffractive dijets and F_2^D
- QCD-factorization verified
- Combination of F_2^D and dijets allows similar accuracy for quark- and gluon-density

Fit Results: F_2^D





Fit Results F_2^D