Fig-TP-4.12

$$\frac{d^2\sigma/(dE'd\Omega)}{(d\sigma/d\Omega)_{Mott}}$$

○ ——	$W = 2$ GeV	
□ – – –	$W = 3$ GeV	
△	$W = 3.5$ GeV	

Dipol-FormF.

$$\left|F(Q^2)\right|^2 \sim \frac{1}{Q^8}$$

Elastische Streuung

Q^2 (GeV/c)²

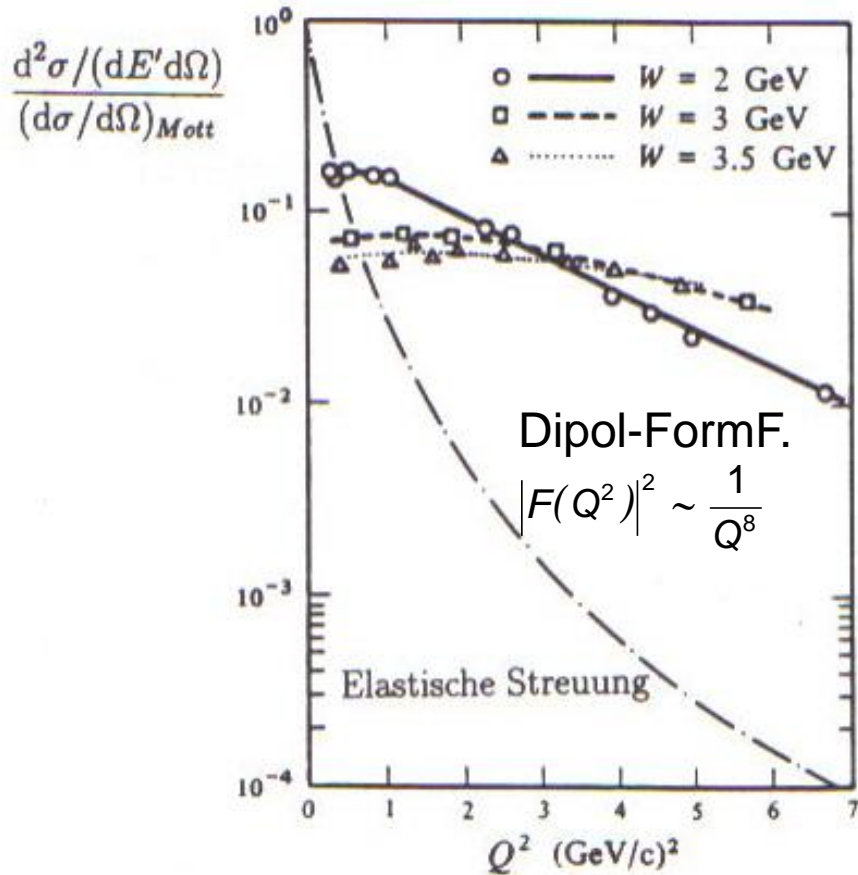+ 6°   □ 18°
× 10°   △ 26°

νW_2

$x = 0.25$

q^2, GeV/c²

Structure function νW_2 does not depend explicitly on Q^2 but depends only on the dimensionless variable x_{Bj}:

Bjorkensche
Skalenvariable $$x_{Bj} = \frac{Q^2}{2M\nu}$$

→ **Q² Scale invariance: "scaling"**

Fig-TP-4.13

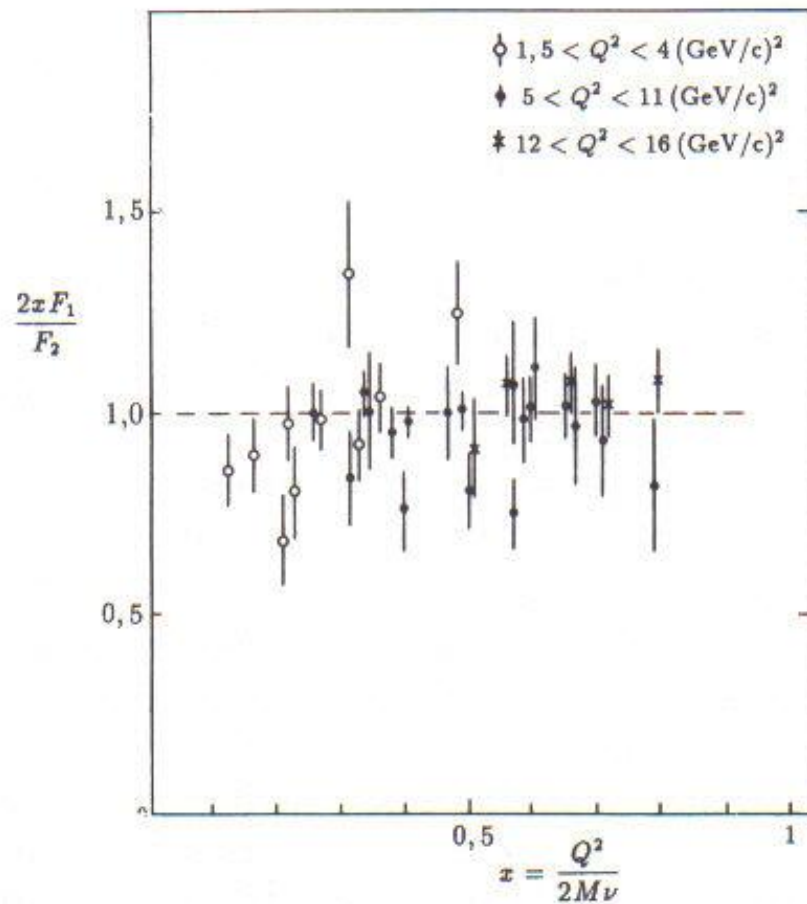# Callan-Gross Relation: Spin-1/2 Partonen
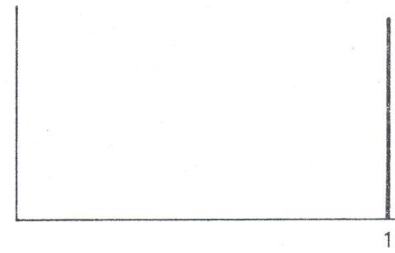
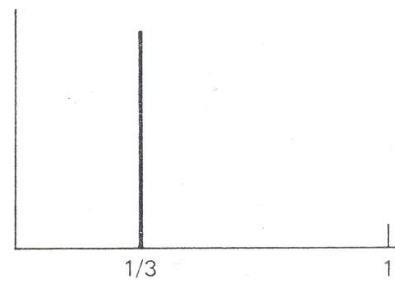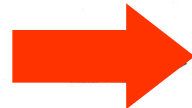$$\frac{2xF_1}{F_2}$$

Fig-TP-4.14

Proton Modell

Partonverteilung (Partondichte) f(x)
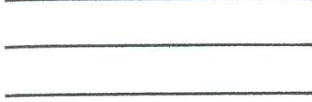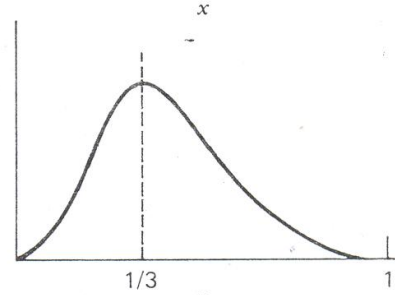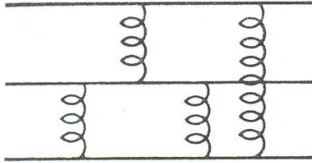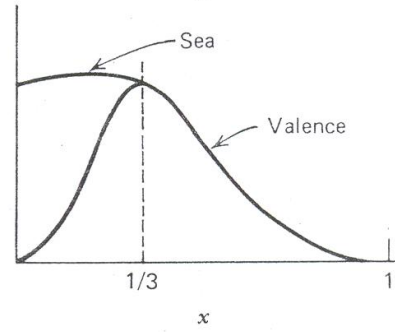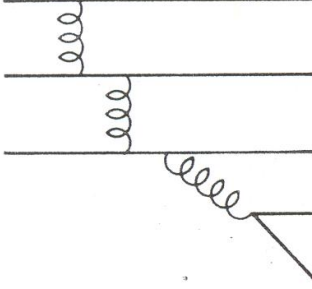
Fig-TP-4.15

Partondichten im Proton

Gluonen

See-Quarks

H1 and ZEUS HERA I+II PDF Fit

$Q^2 = 10 \text{ GeV}^2$

HERAPDF1.5 NNLO (prel.)

exp. uncert.

model uncert.

parametrization uncert.

xg

xS

xu_v

xd_v

March 2011

HERAPDF Structure Function Working Group
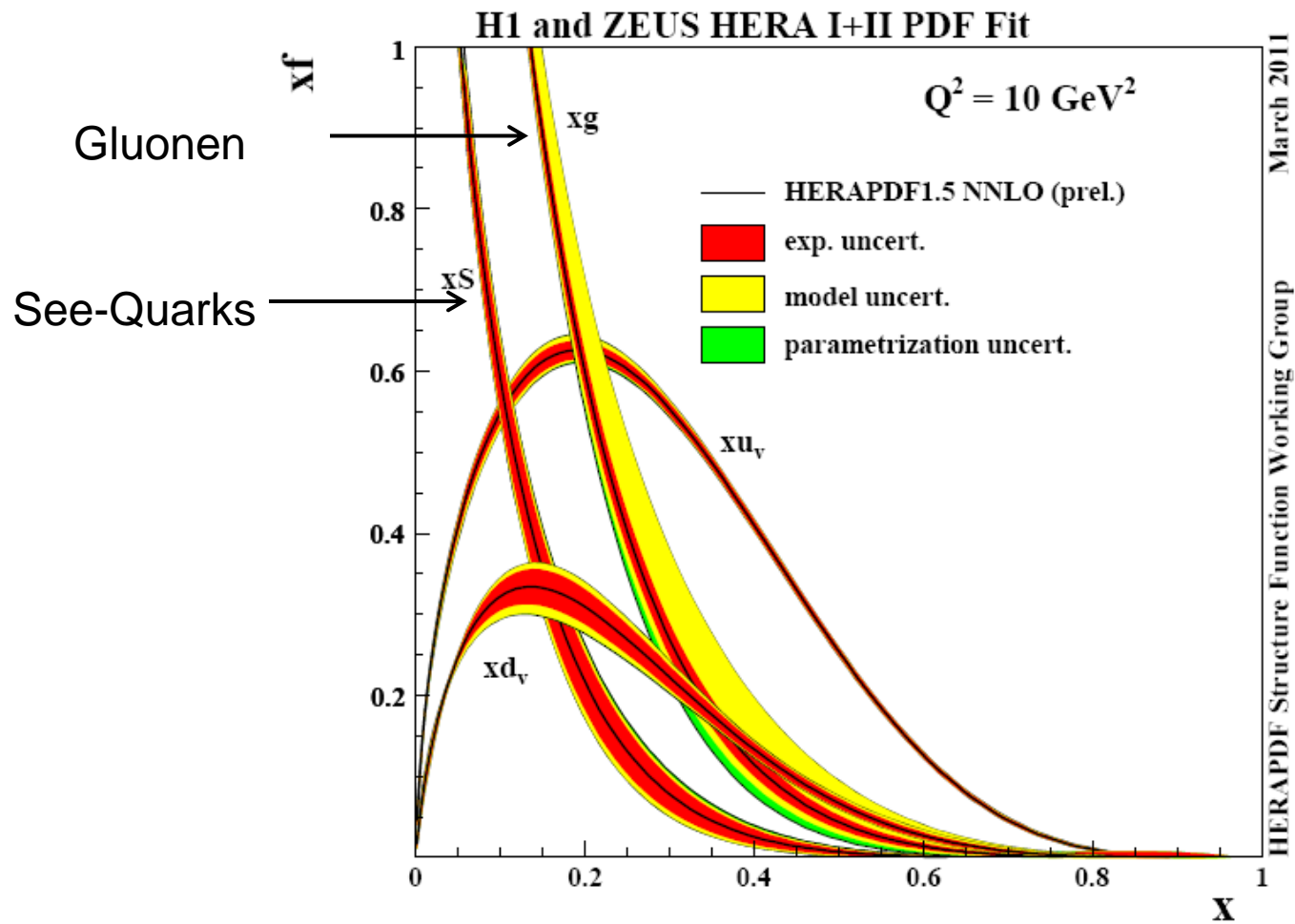
Fig-TP-4.16

$Q^2 = 25030 \text{ GeV}^2$, $y = 0.56$, $x = 0.50$

e$^+$

e$^+$

proton

jet

e^+

Q^2

x

proton

jet
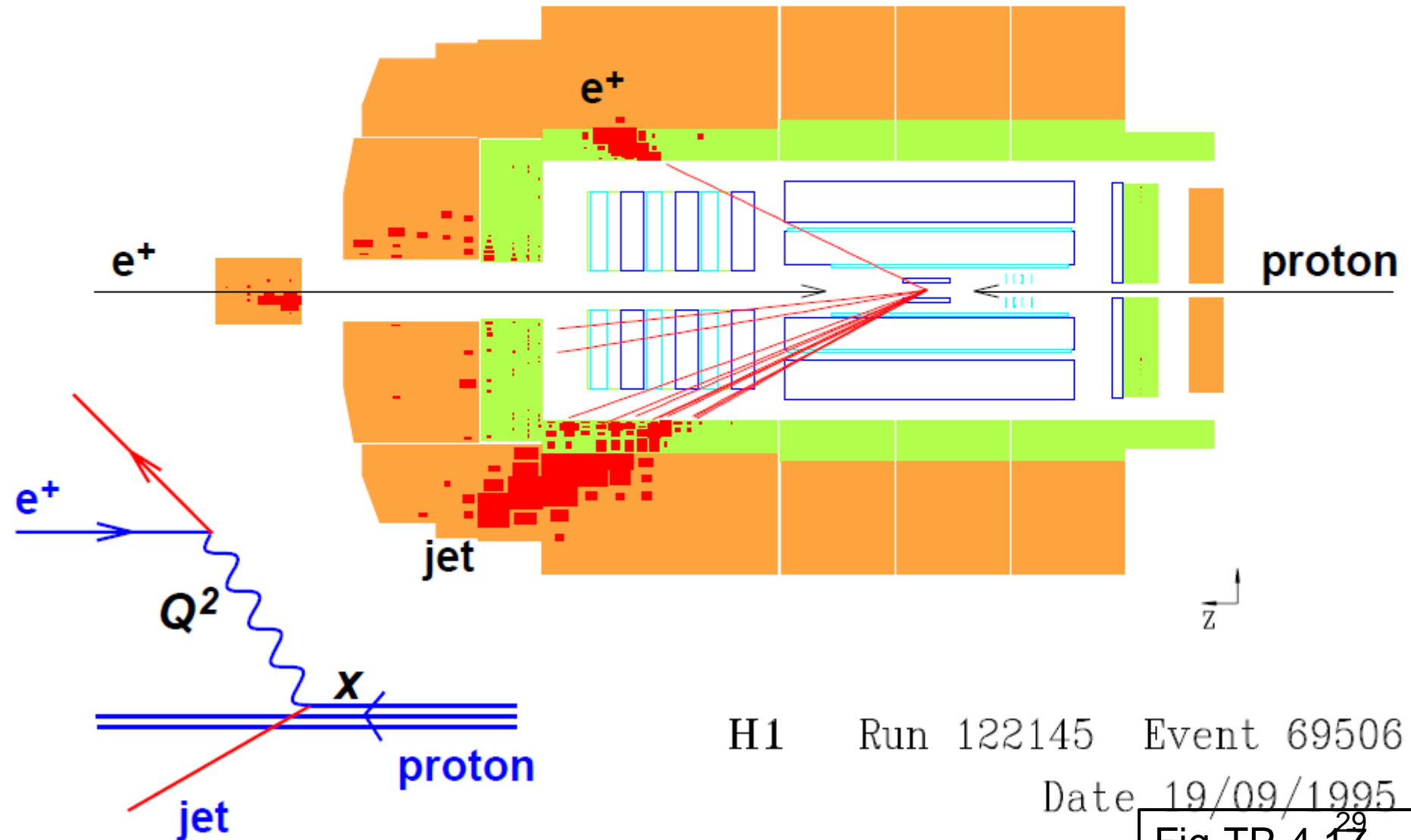
H1   Run 122145   Event 69506
Date 19/09/1995

29

Fig-TP-4.17