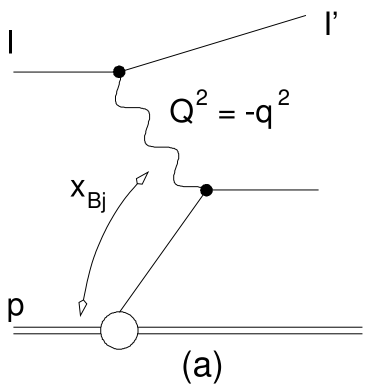
Preview of H1 Results Summer 2001

DESY, July 10, 2001

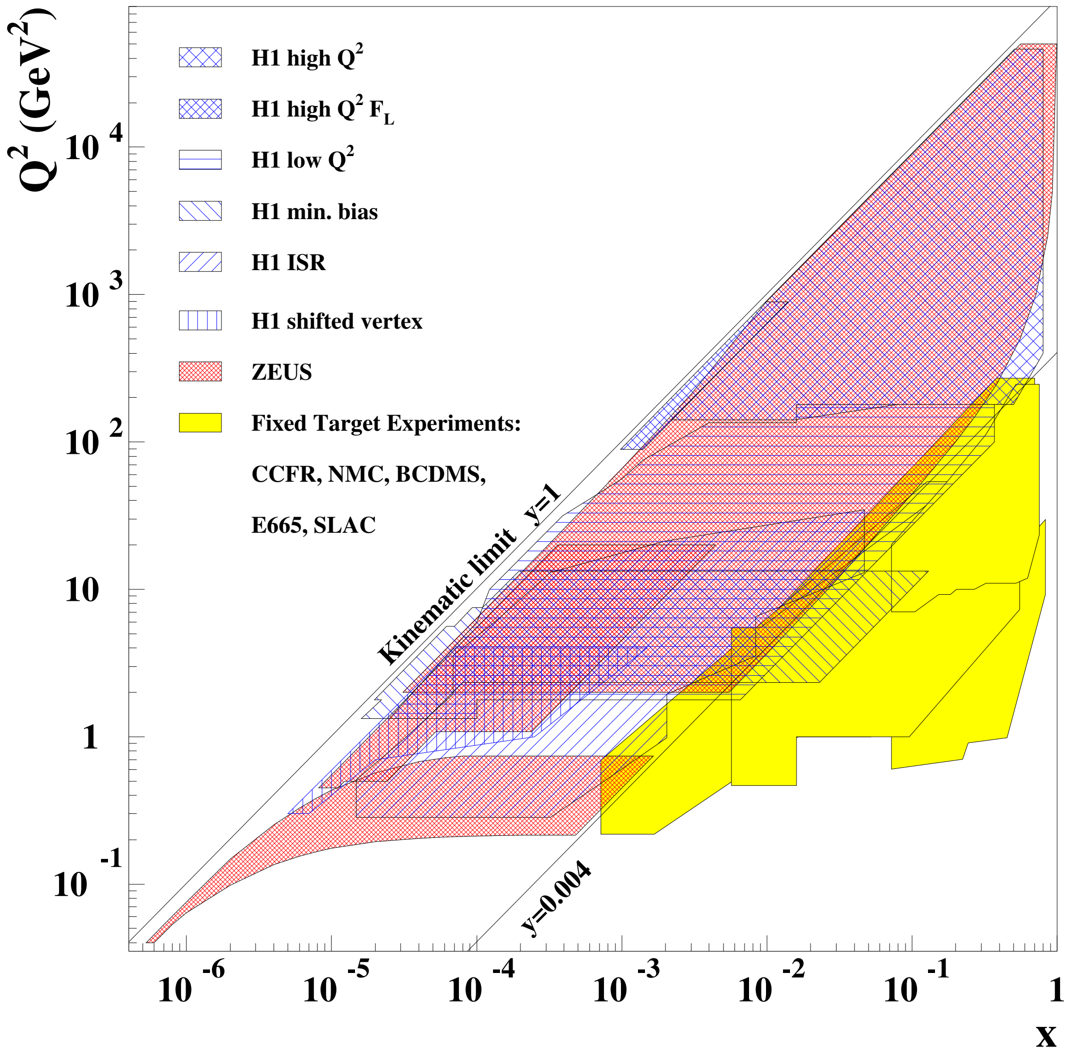
Peter Schleper

DESY

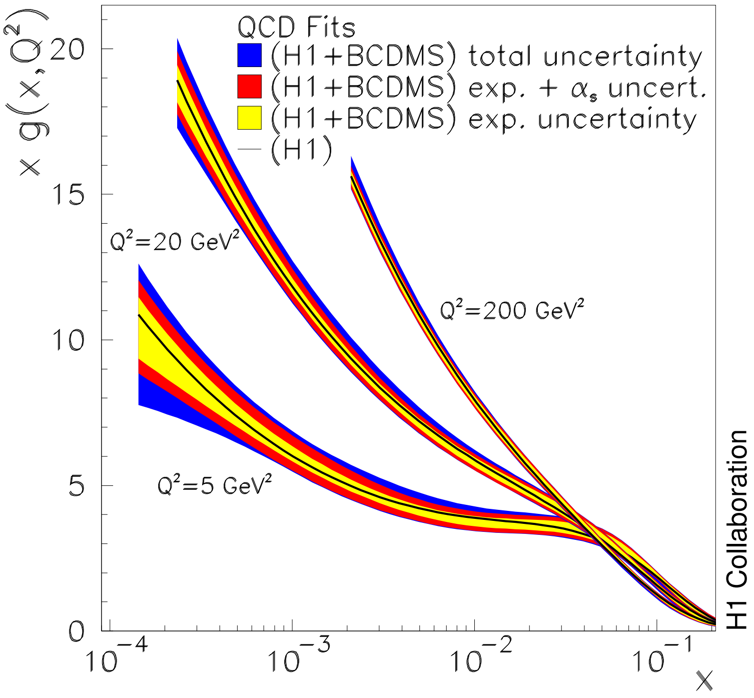
Inclusive DIS



$$Q^2 = xys$$
$$W^2 = Q^2\,\frac{1-x}{x}$$
$$\sigma \approx F_2 - \frac{y^2}{Y_+}F_L$$
$$Y_+ = 1 + (1-y)^2$$



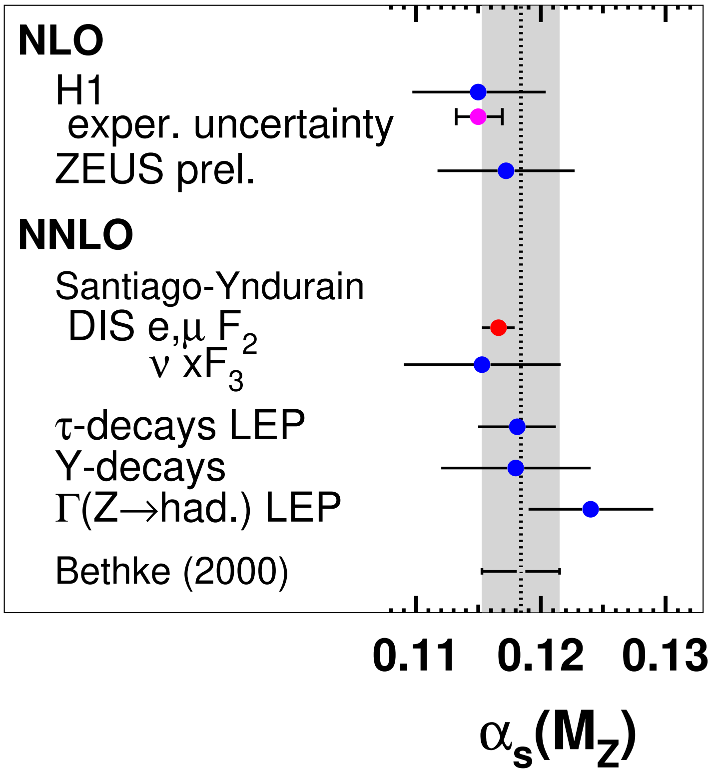
Gluon density and α_s



$$\alpha_s(M_Z) = 0.1150 \pm 0.0017^{+0.0009}_{-0.0005}$$

scale error NLO: $\pm$ 0.005

scale error NNLO: $\pm$ 0.002 (expected)

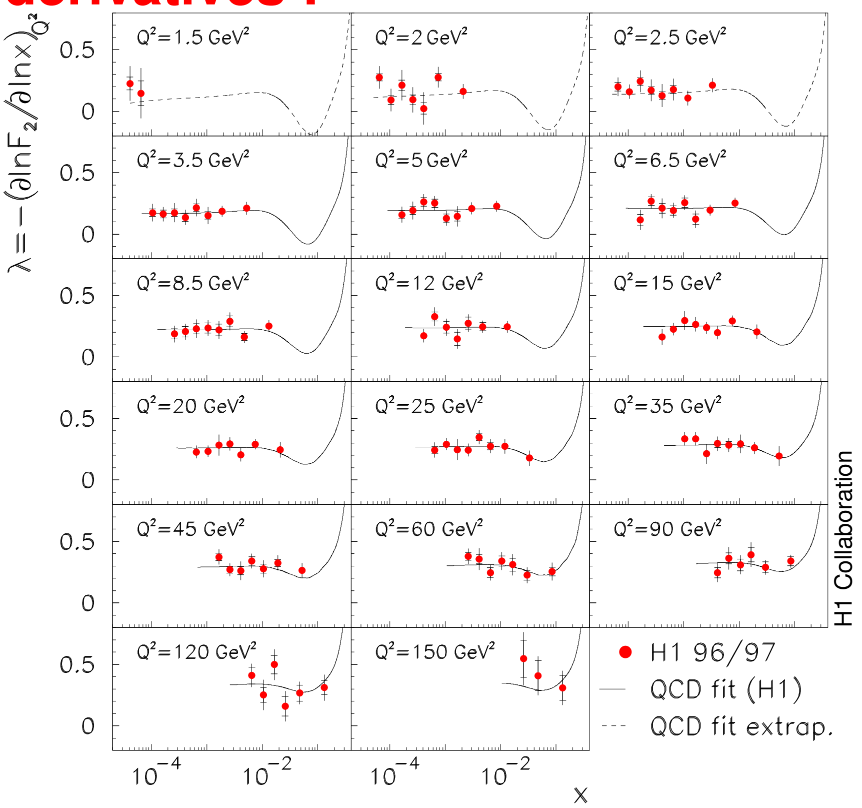


Low-x rise of F_2

$$(\partial \ln F_2/\partial \ln x)_{Q^2} \equiv -\lambda(x, Q^2)$$

gluon $\sim x^{-\lambda}$ at low-x: $g \to gg$ $g \to q\bar{q}$

First 2-dim determination in x, Q^2 from local derivatives !

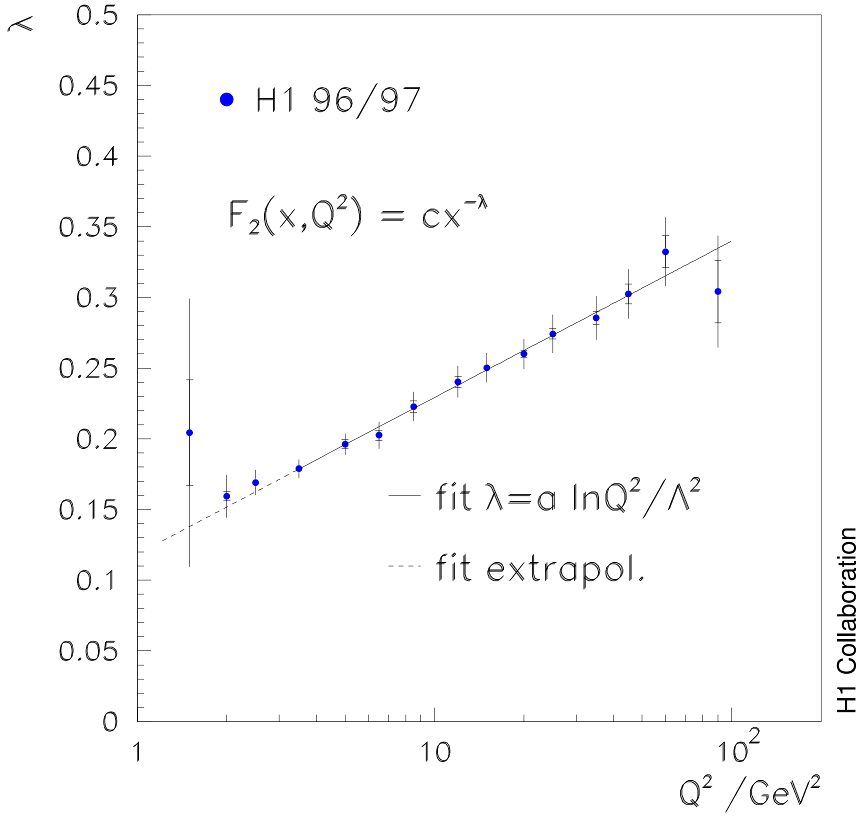


- **rise of F_2 continues towards very low-x**
- **$\lambda \approx$ independent of x for $x < 0.01$**
- **QCD fit fine, saturation ??**

Low-x rise of F_2

$$(\partial \ln F_2 / \partial \ln x)_{Q^2} \equiv -\lambda(x, Q^2)$$

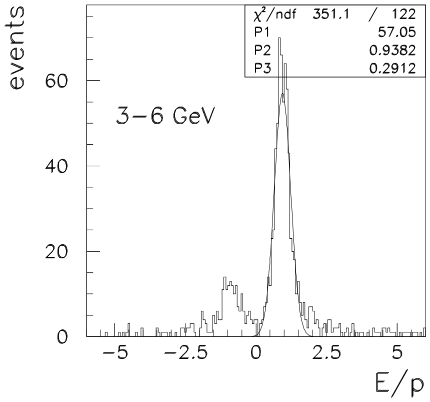
Fit to $\lambda(x, Q^2)$ for $x < 0.01$!



- **precision !**
- **λ drops steadily towards low Q^2**
- **reaches "soft" pomeron value 0.08 at $Q^2 \approx 0.5$ GeV^2**

Longitudinal SF F_L

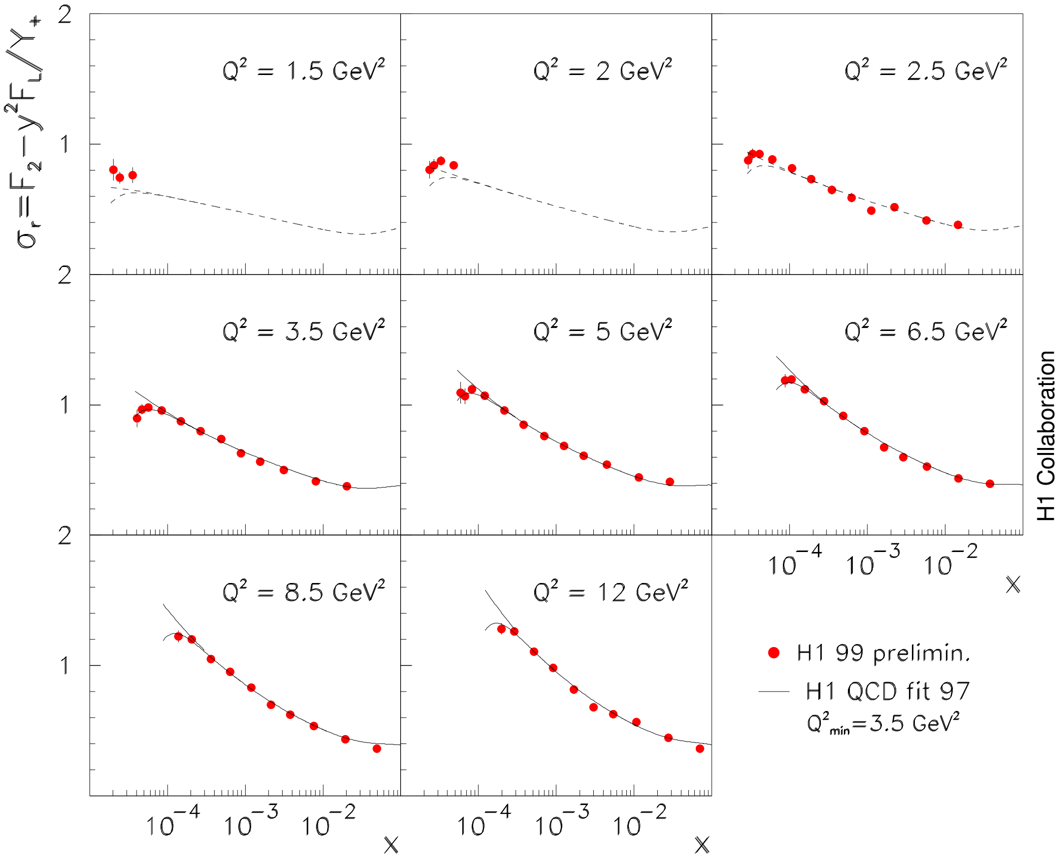
$F_L \sim$ **gluon at low-x** $\longrightarrow$ **check of QCD fit**



high $y \longrightarrow$ **low** E_e

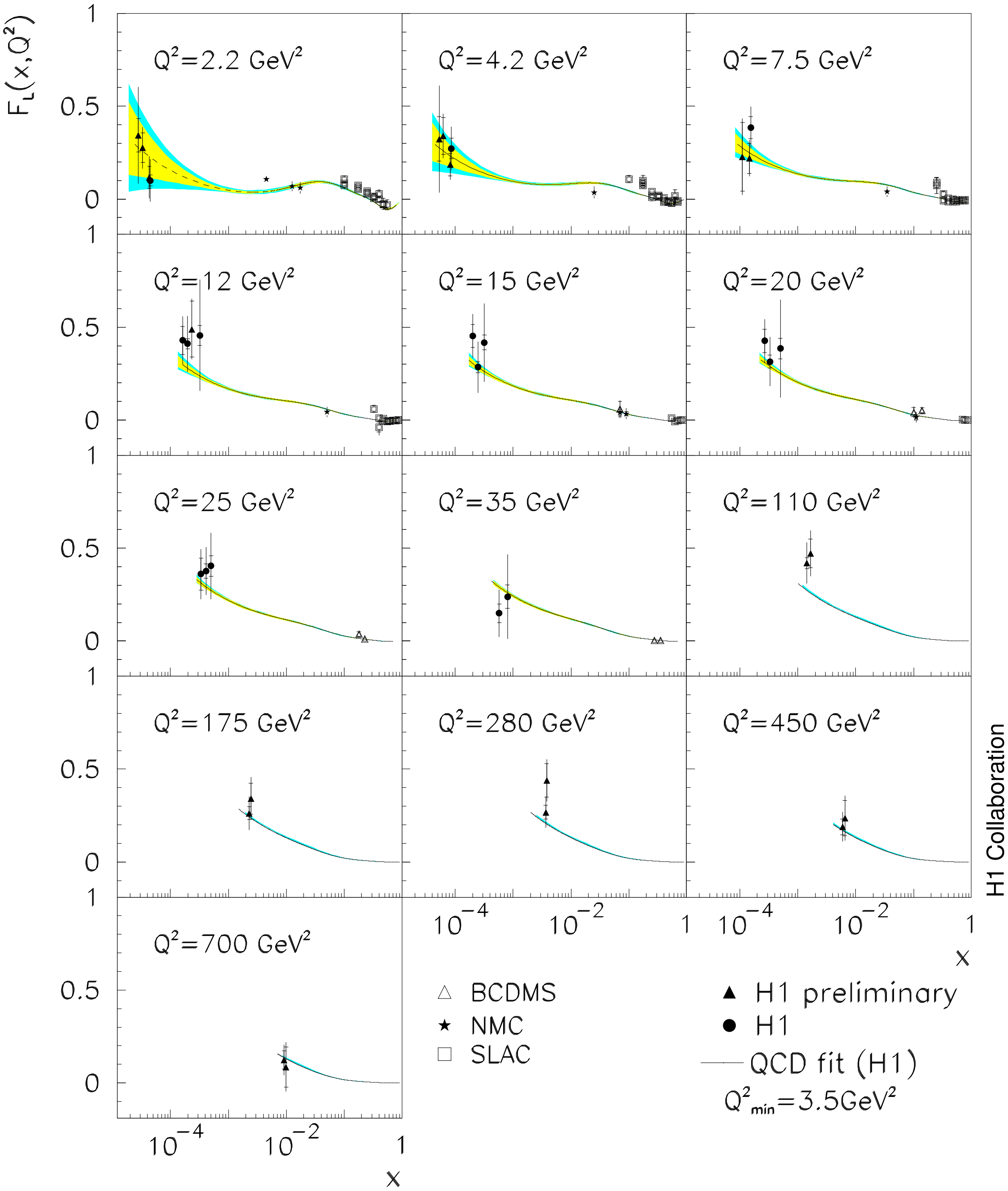
BKG supression with H1 backward silicon tracking $\longrightarrow y < 0.89$

$$\sigma \approx F_2 - \frac{y^2}{Y_+} F_L$$



F_L and QCD fit

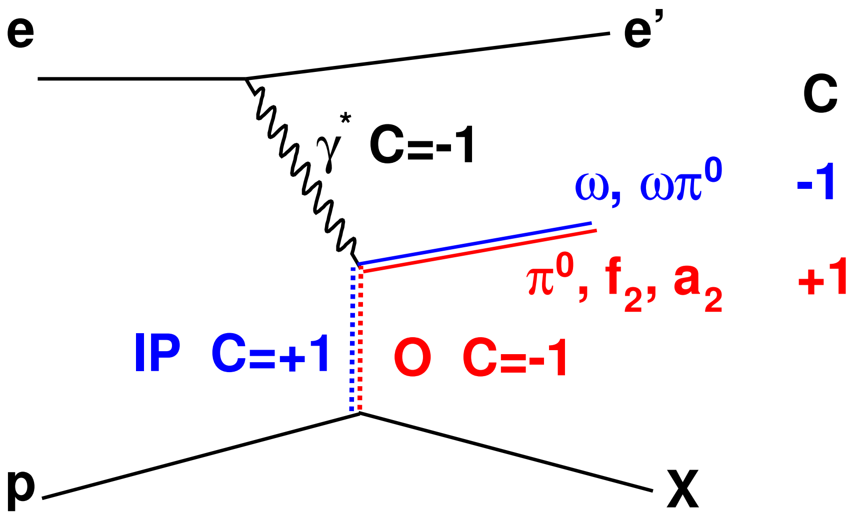
F_L also from high Q^2 data !



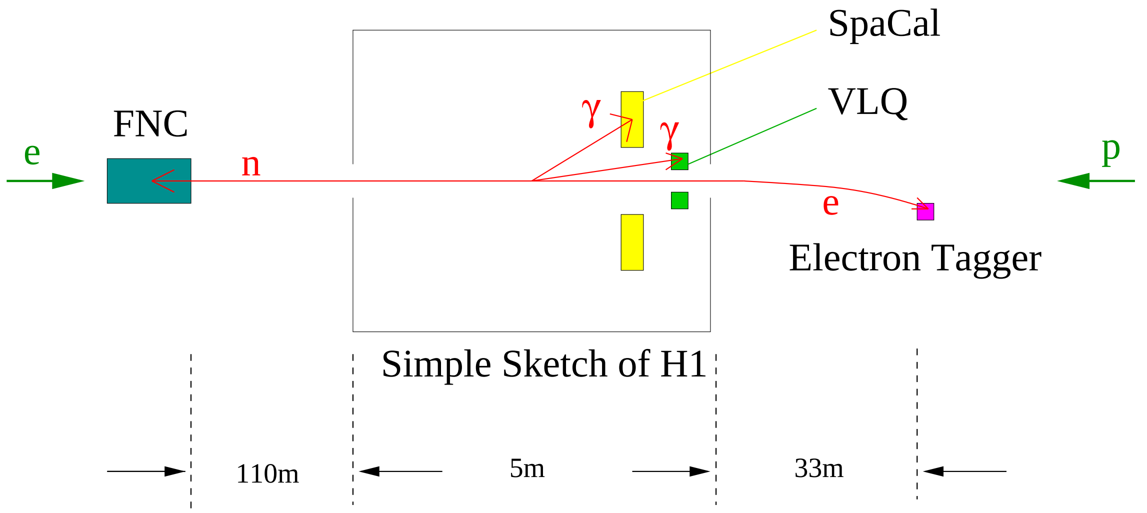
- F_L and gluon from F_2 QCD fit consistent

Odderon and Pomeron

Odderon: $C = -1$ partner of Pomeron

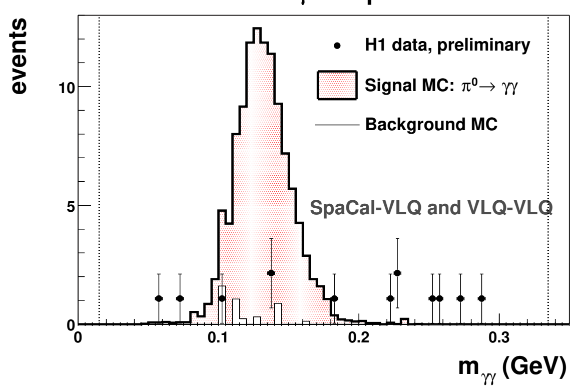


π^0 and γ detection

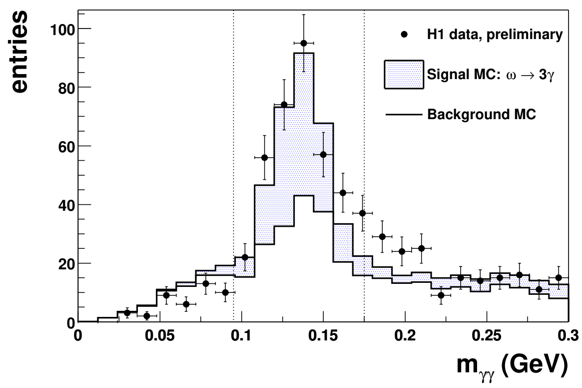


Odderon and Pomeron

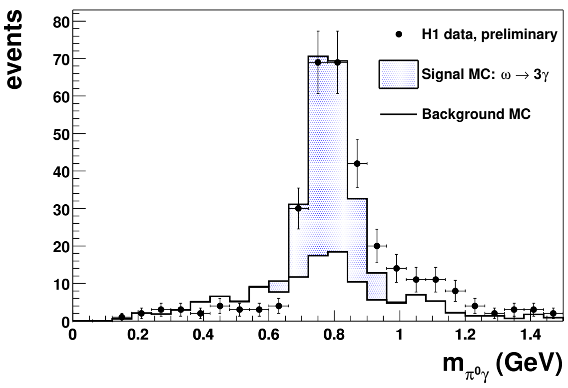
H1 Odderon Search - 2 γ sample



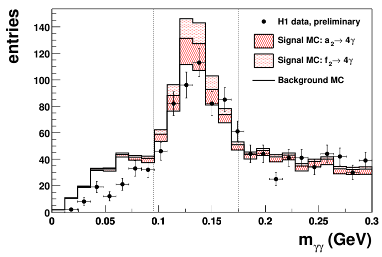
Pomeron Channel - 3 γ sample



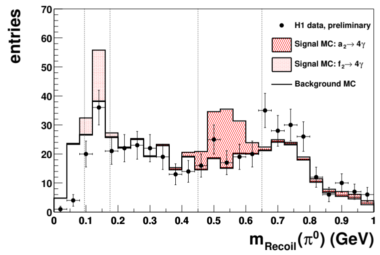
Pomeron Channel - 3 γ sample



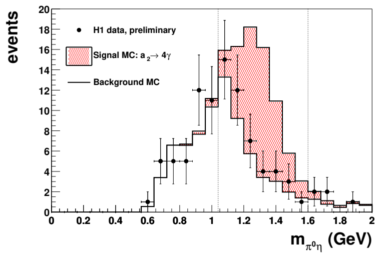
H1 Odderon Search - 4γ sample



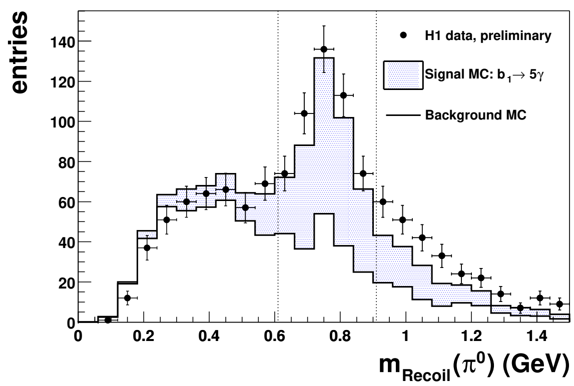
H1 Odderon Search - 4γ sample



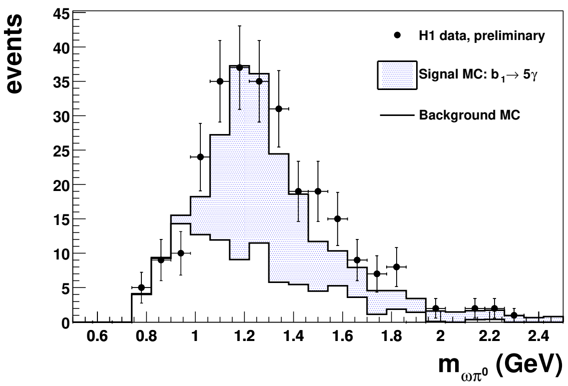
H1 Odderon Search - 4γ sample



Pomeron Channel - 5γ sample

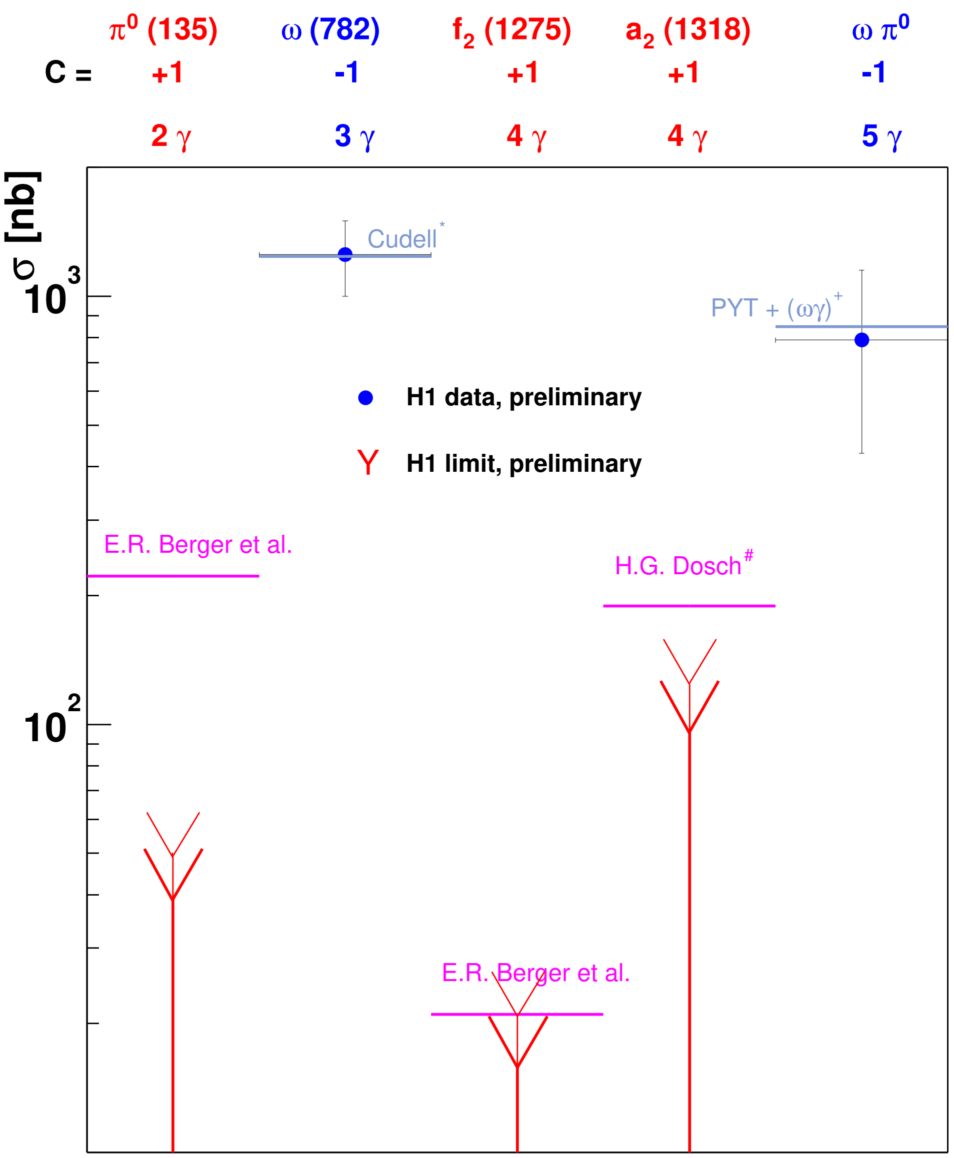


Pomeron Channel - 5γ sample



Odderon and Pomeron

measurements and limits



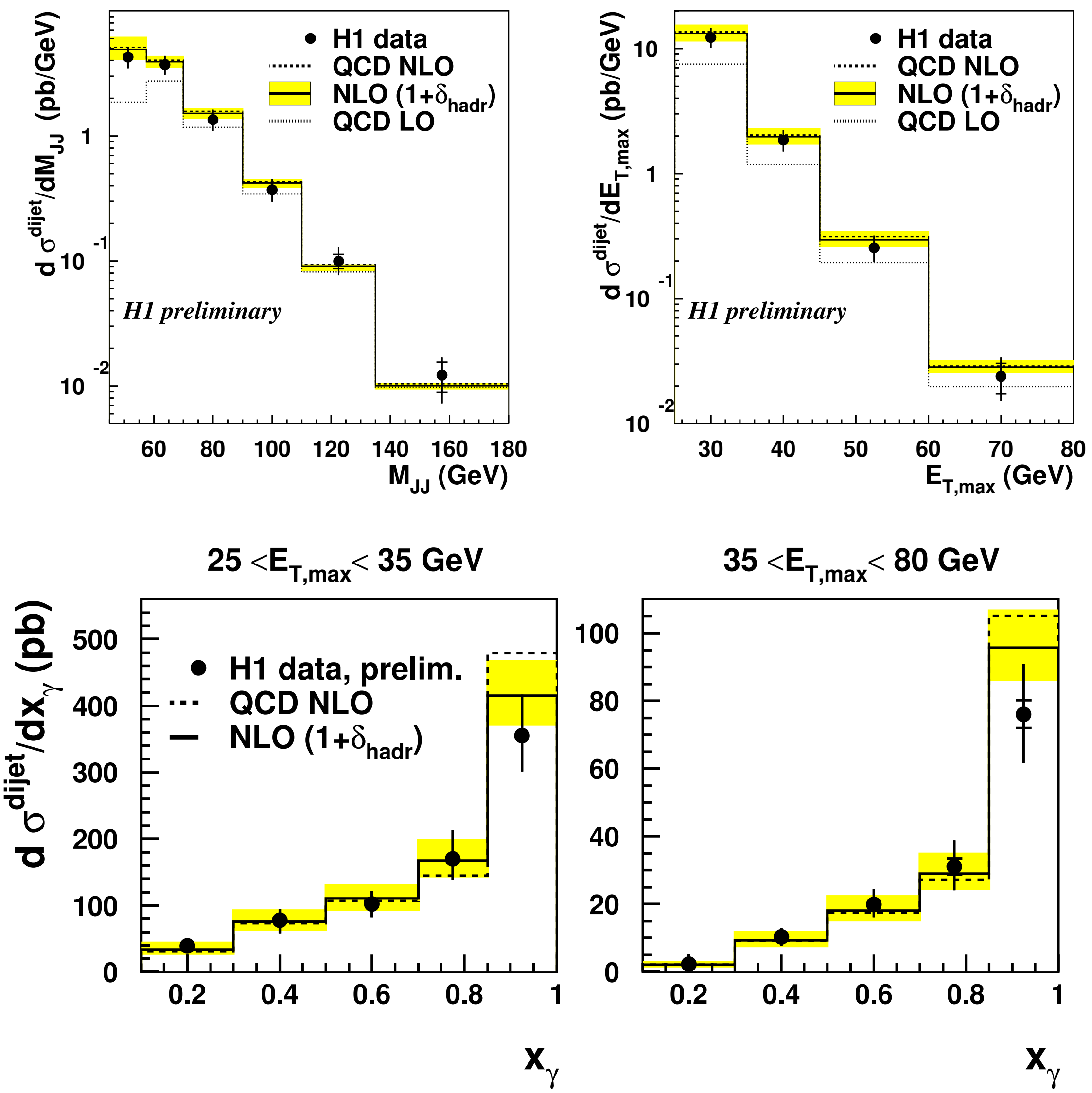
* Cudell et al.: Phys.Rev. D61 (00); Schuler, Sjoestrand: Nucl.Phys. B407 (93)
+ PYTHIA + (ωγ) Coll.: Nucl.Phys. B243 (84) extrapolated to HERA energies
# private communication

- **No sign of odderon ??**

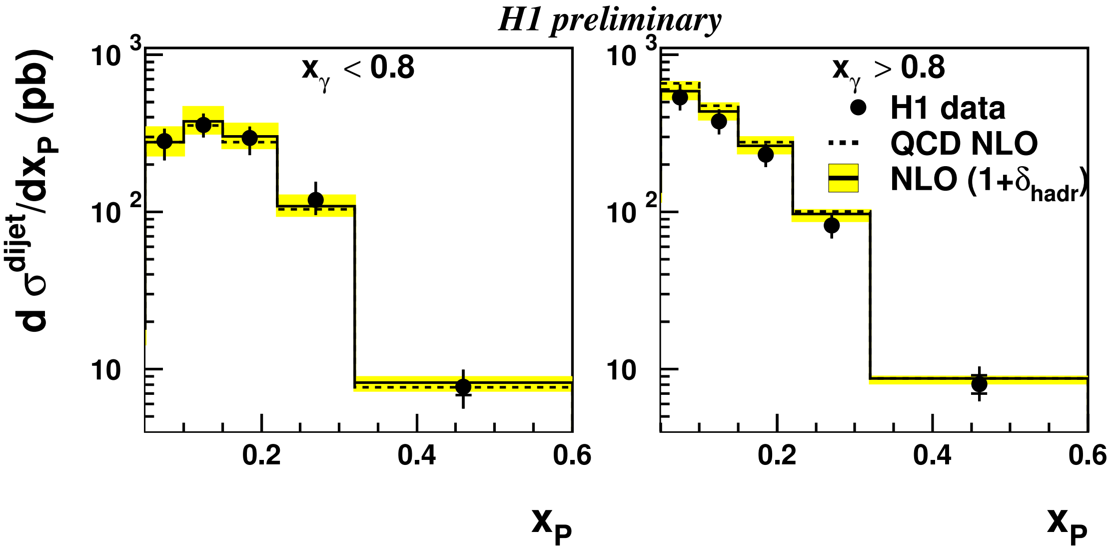
Photon-Structure from Jets

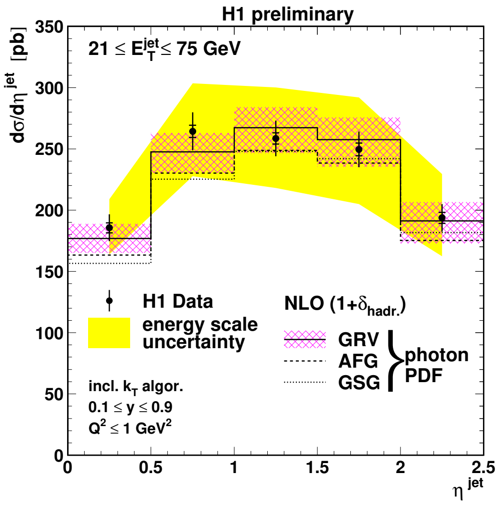
2-jet and single incl. jets at high E_T used to

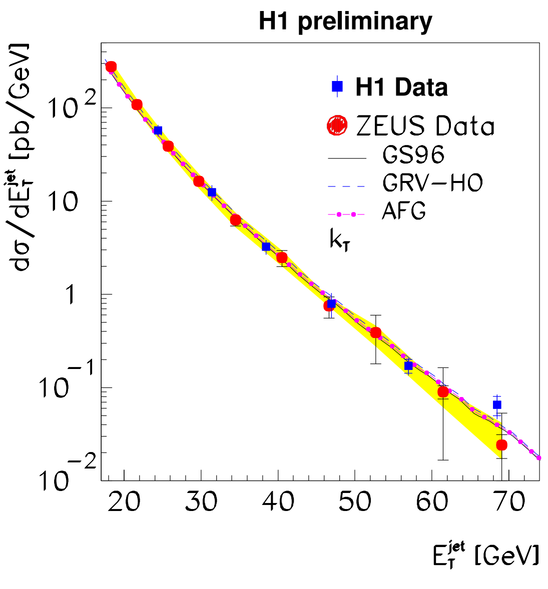
- probe γ structure
- probe proton structure
- search for new physics (c.f. Jets at Tevatron)



Photon-Structure from Jets

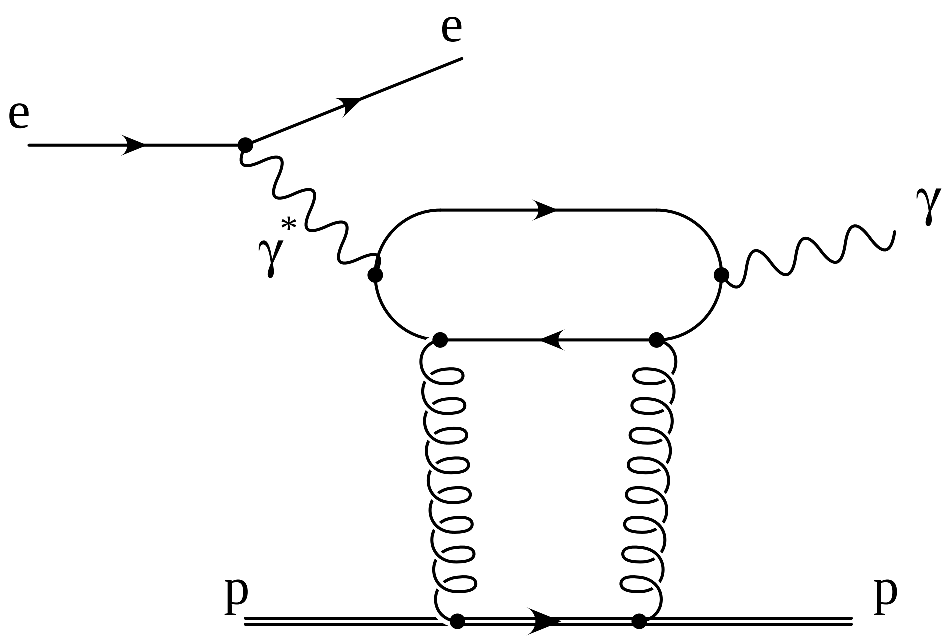


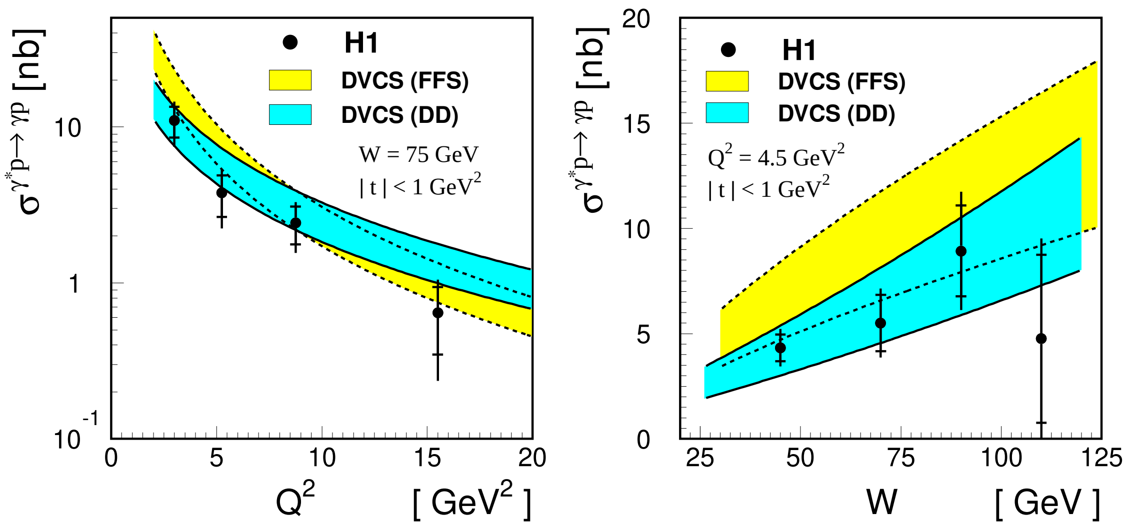




- NLO QCD fully describes data (Zeus ?)
- needs NNLO and more precise data
- access to proton structure at HIGH x
- no deviations at high M_{JJ}, E_T

Deeply Virtual Compton Scattering

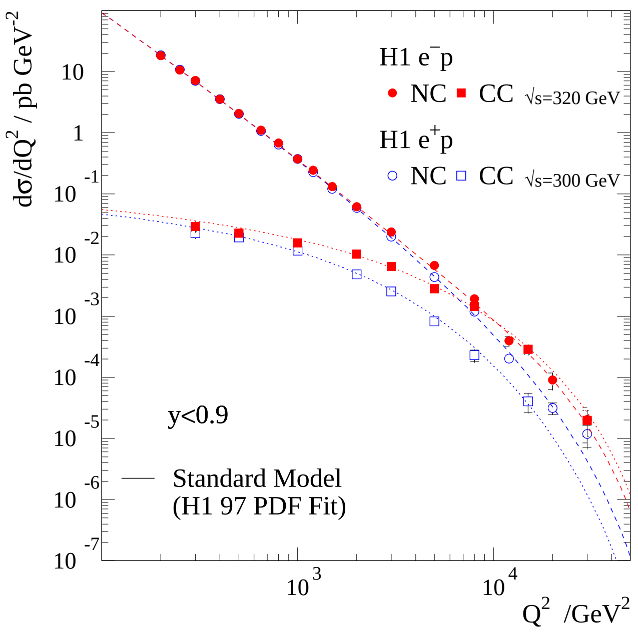




LO calculations agree

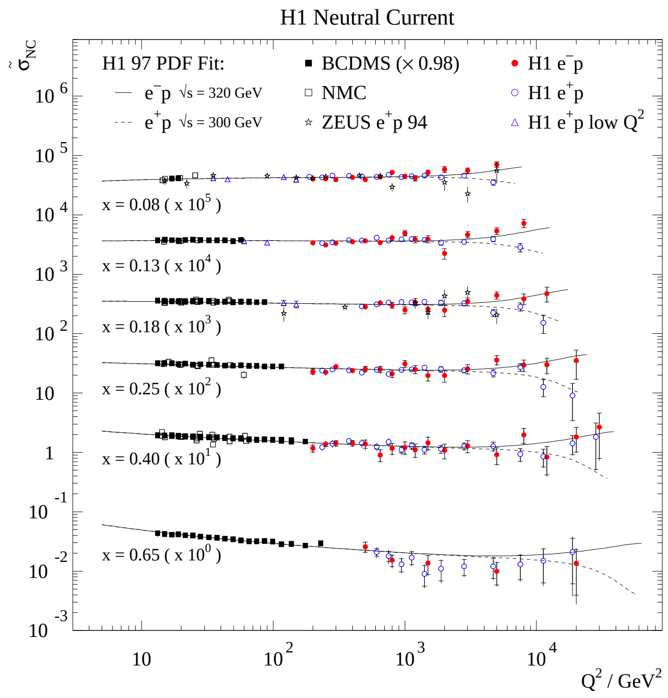
recent NLO calc. don't

Weak Interaction



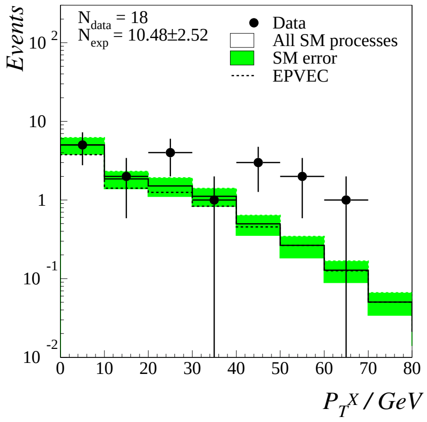
$\gamma/Z \approx W$

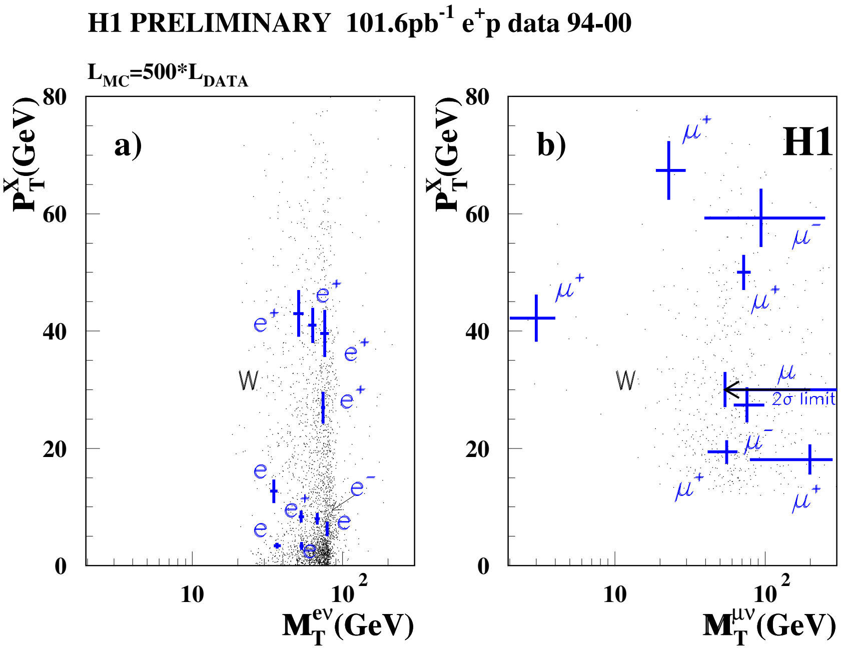
Unification



needs more data at large x, Q^2 !

Events with isolated lepton, large $P_{T,miss}$ and large $P_{T,X}$





Electron and Muon	Data	SM expectation	W	Other SM processes
$P_T^X > 0$ GeV	18	10.48 ± 2.53	8.19 ± 2.46	2.29 ± 0.59
$P_T^X > 12$ GeV	13	5.14 ± 1.31	4.22 ± 1.27	0.92 ± 0.33
$P_T^X > 25$ GeV	10	2.82 ± 0.73	2.34 ± 0.70	0.48 ± 0.18
$P_T^X > 40$ GeV	6	0.99 ± 0.28	0.93 ± 0.28	0.06 ± 0.04

Table 6: Observed and predicted event rates in the electron and muon channels combined for all e^+p data. Only the electron channel contributes for $P_T^X < 12$ GeV.

Leptoquarks

$e\,q \rightarrow LQ$ fusion