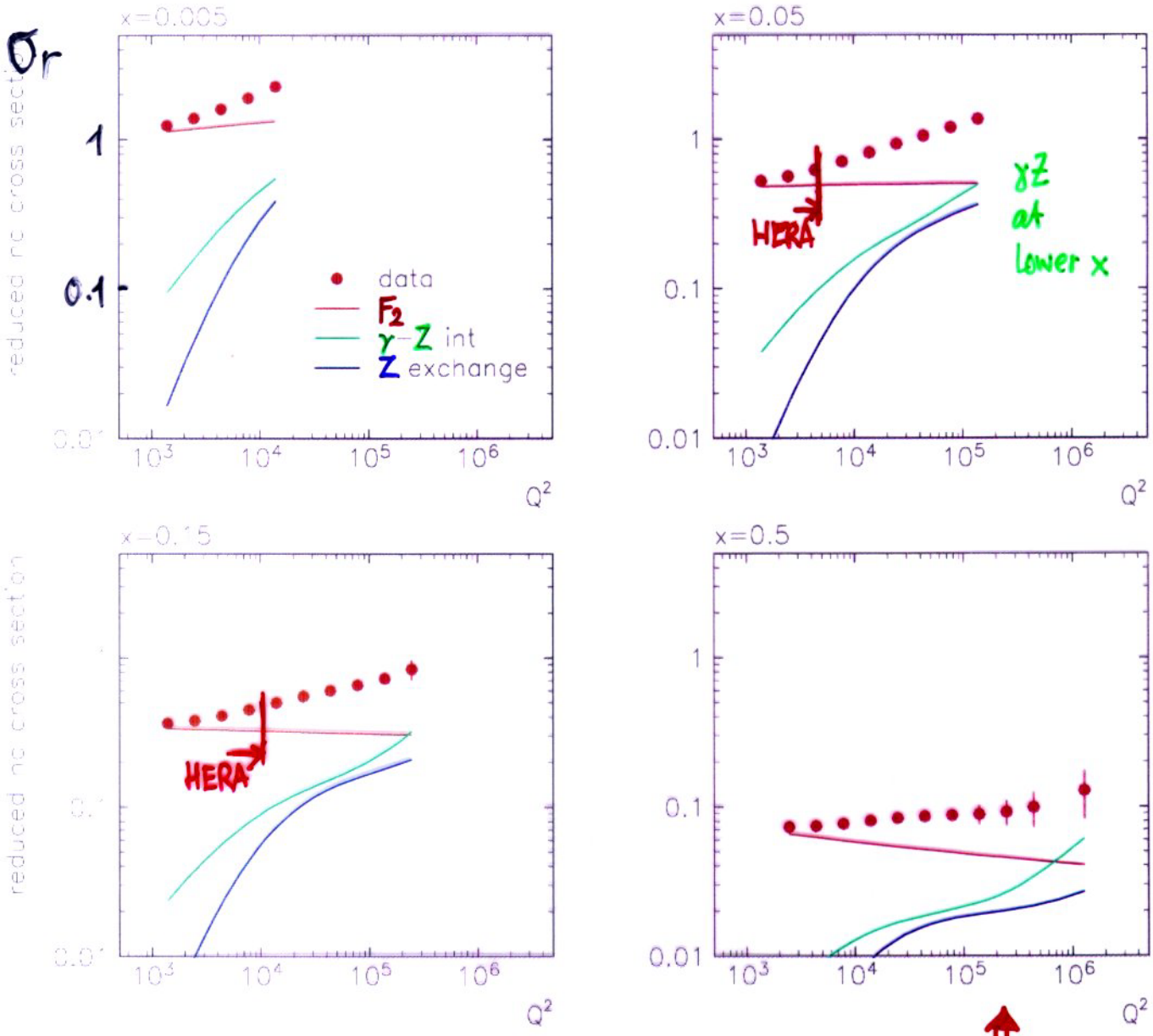
5. High Q^2

$ep \to eX$. NC.

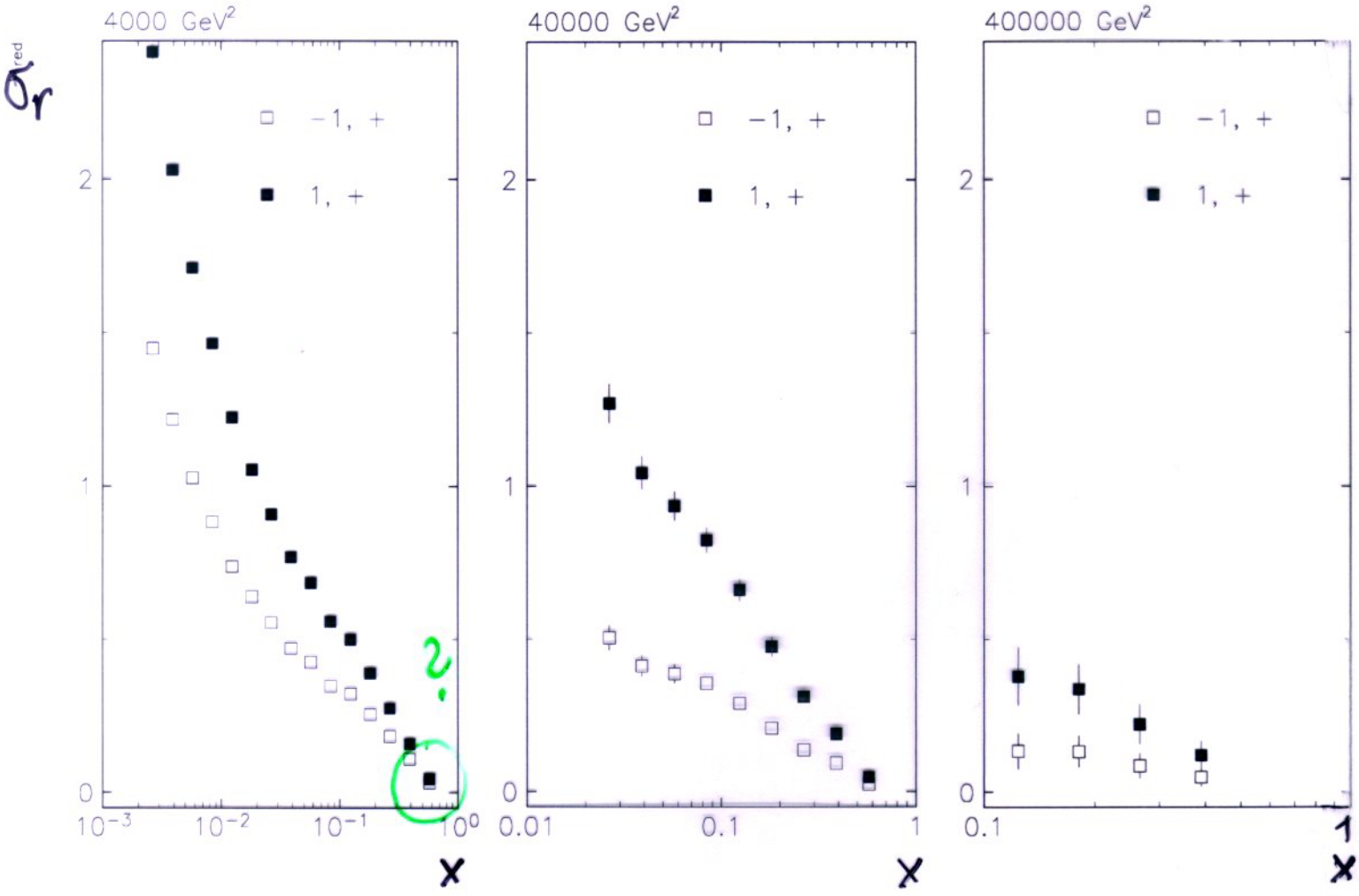
huge electroweak effects !



$200 pb^{-1}$. stat ⊕ syst. errors.

- $\sigma^+(\lambda_e)$ strong λ effects, due to Z exchange.

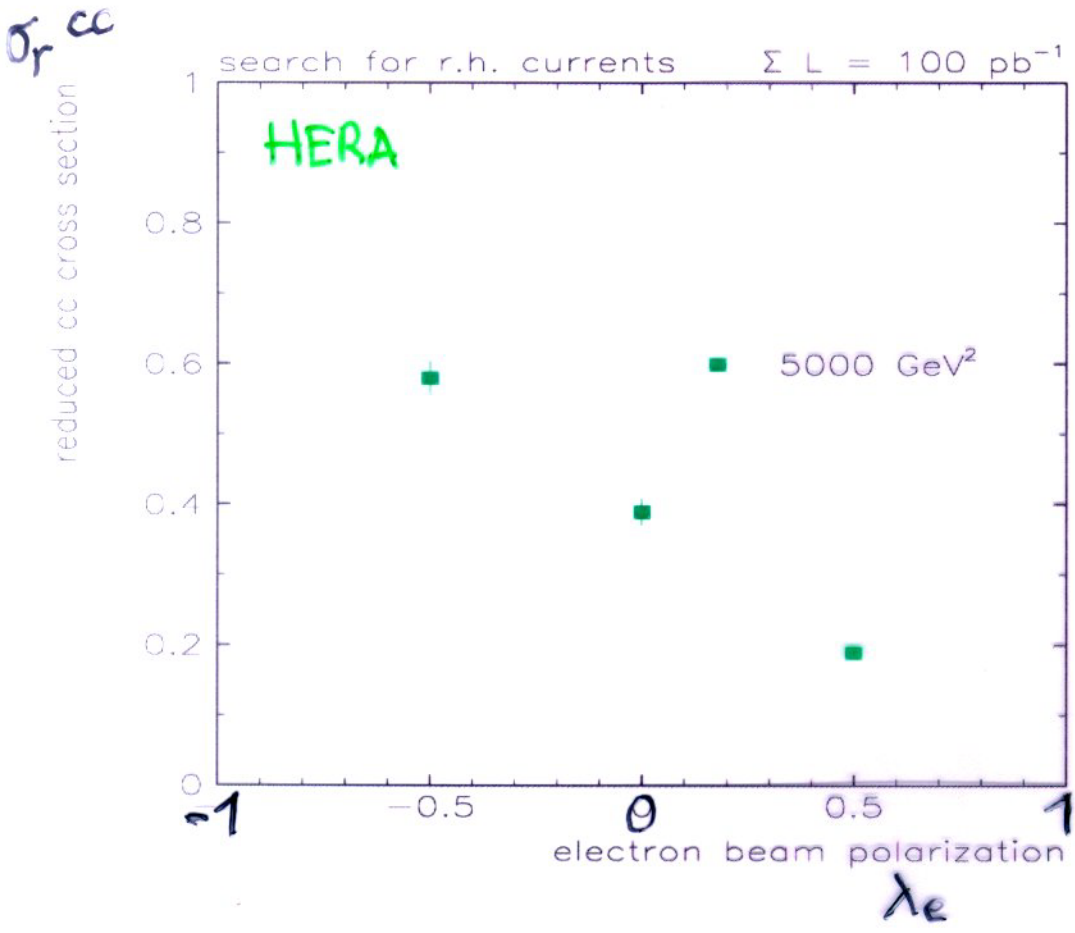
Q^2 = 4000 40000 400.000 GeV²

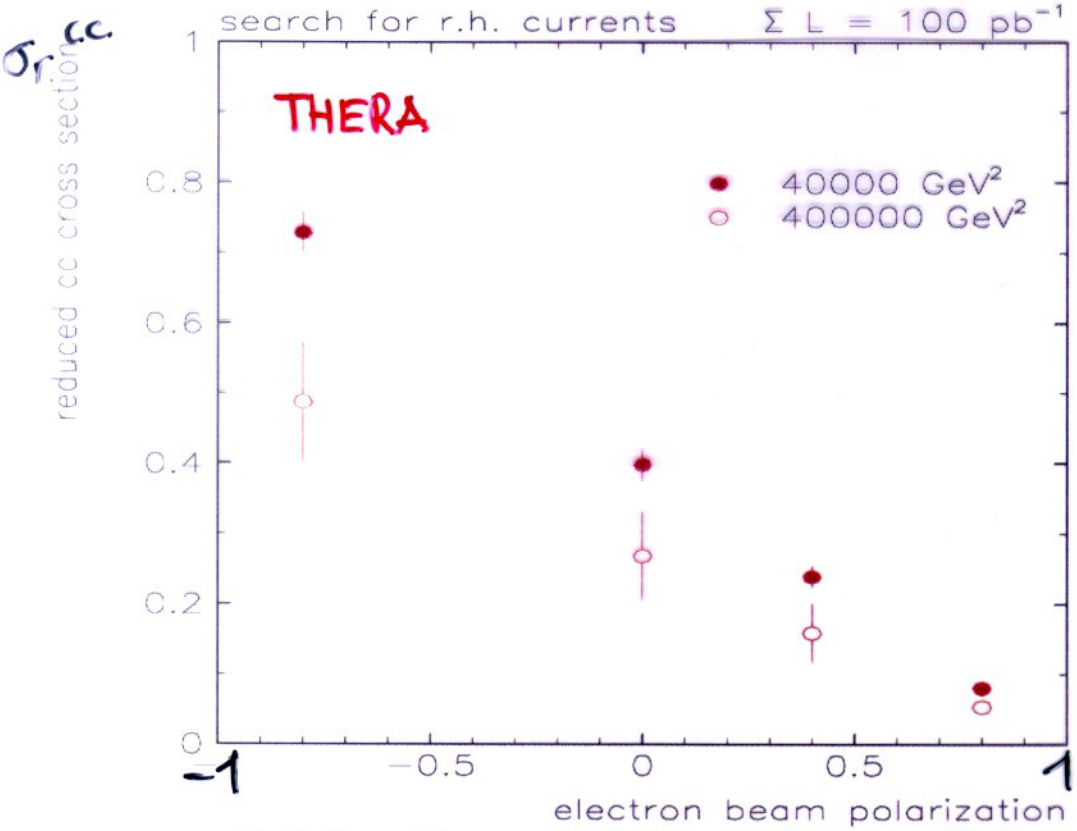


▶ parton distributions measured at $Q^2 * 10$ & large x

Use NC + CC with precision

r.h. currents ? $\sigma_{cc}^{\pm} \sim (1 \pm \lambda)$





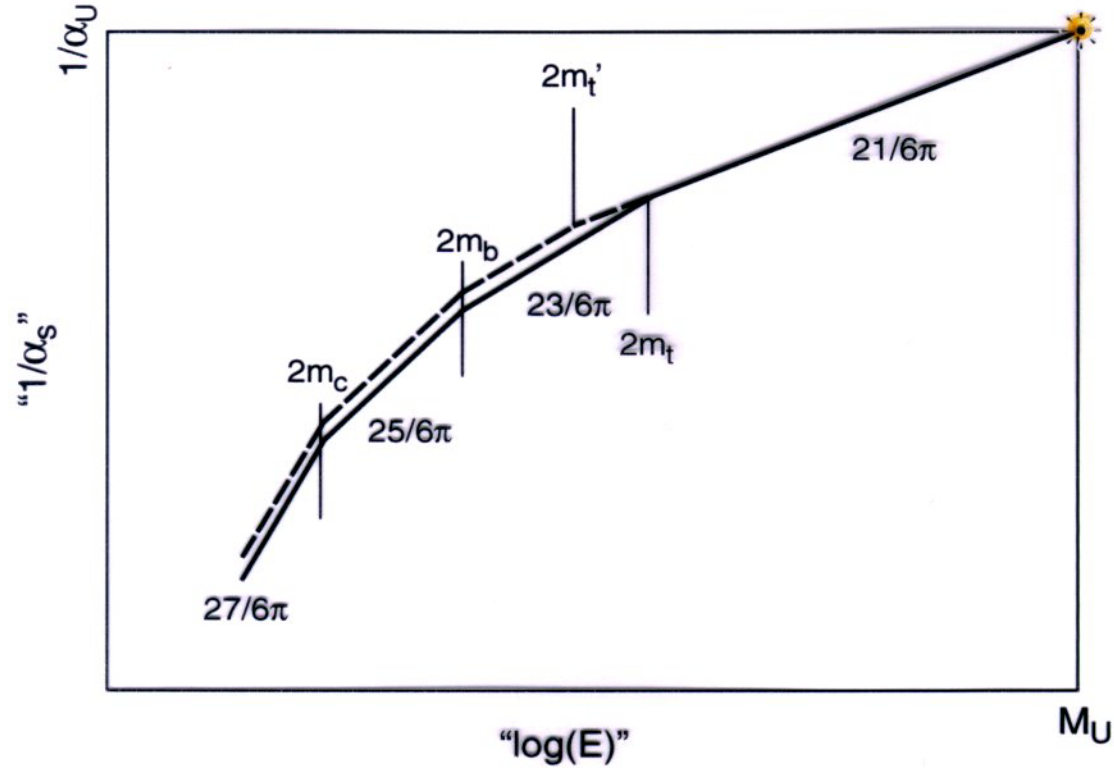
high polarization of e ! large Q^2

α_s

- large Q^2 . $\Delta\alpha_s(M_Z^2) \simeq 0.001$ 3loop
- scaling violations (HERA, THERA, fixed target)
  $\delta\alpha_s \simeq 0.0005$ $(exp)_{prel.}$

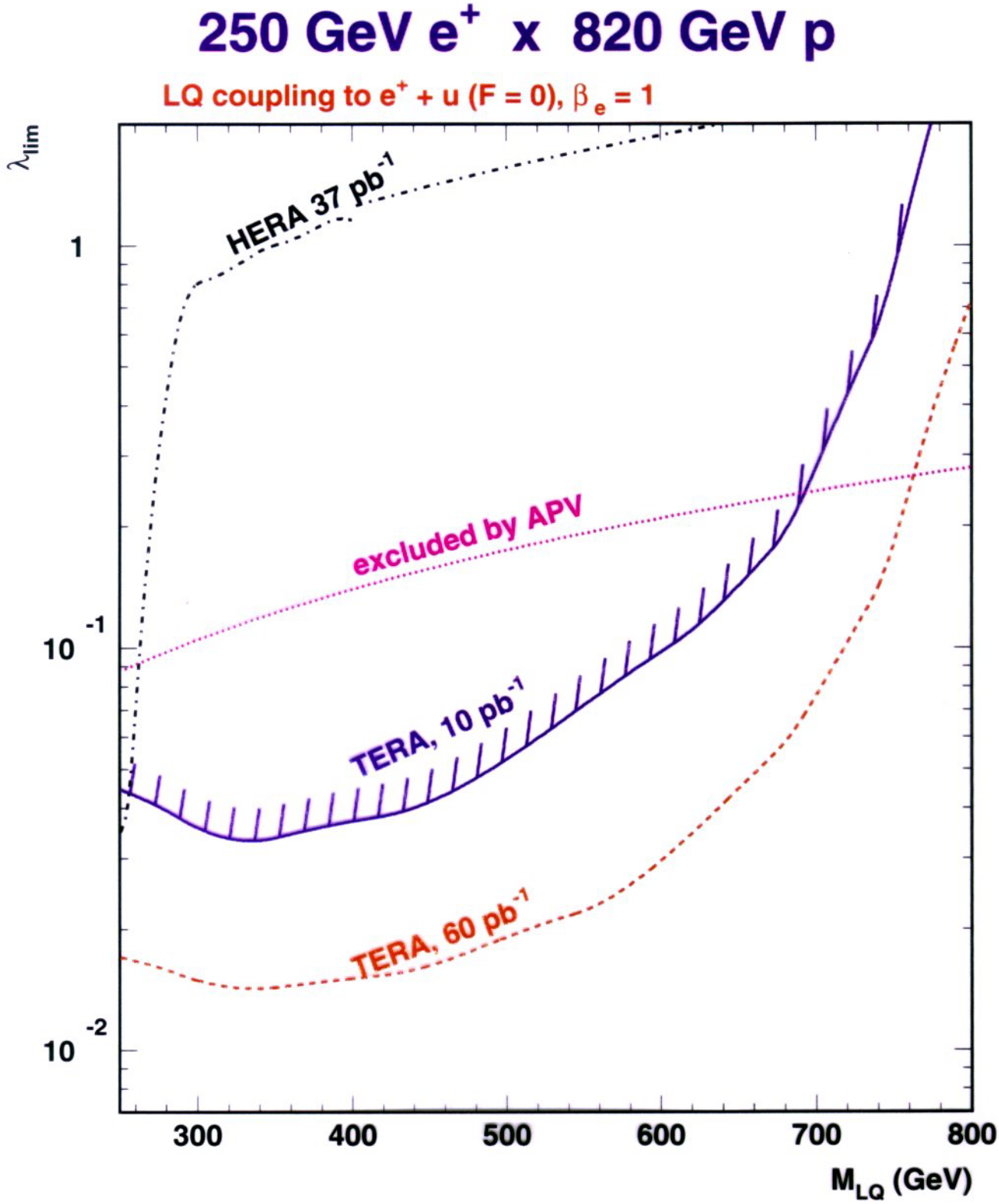
  precise α_s, free of final state effects
  low x $\leftrightarrow$ hi x.

$$1/\alpha_s(Q^2) = 1/\alpha_u + \frac{21}{6\pi} \cdot \ln(Q/M_u)$$ unification

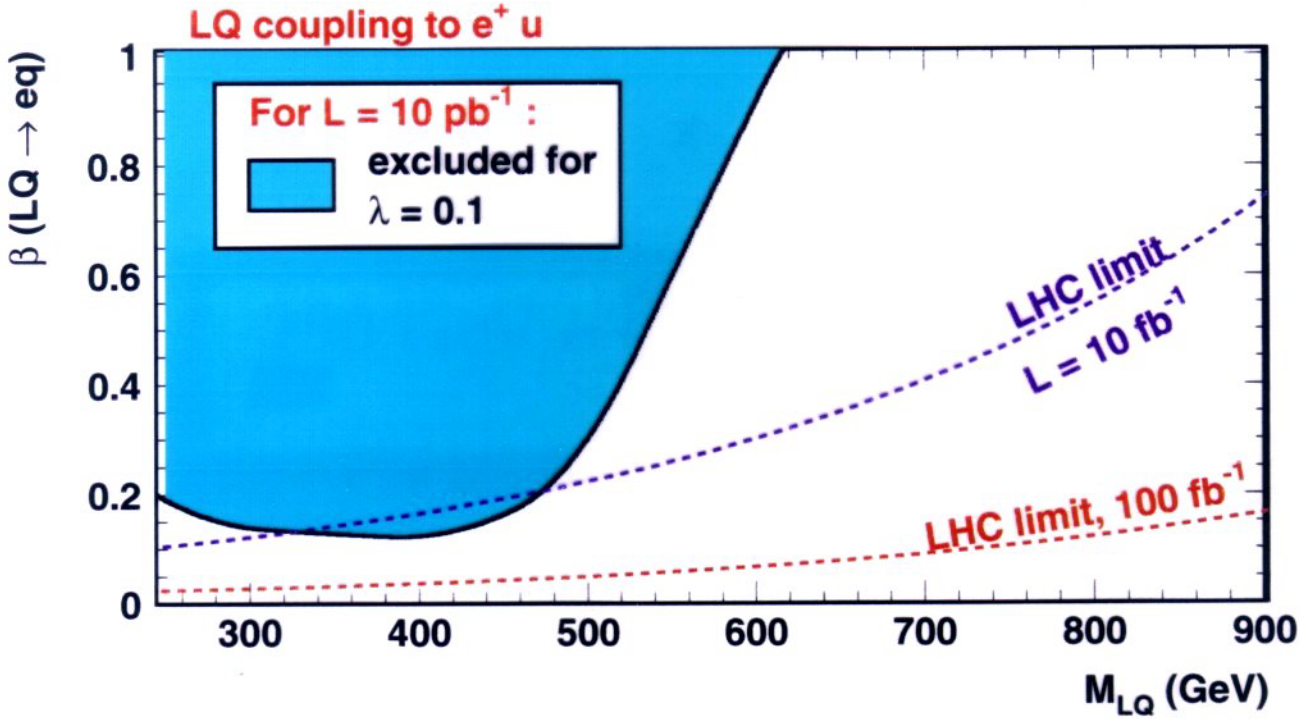


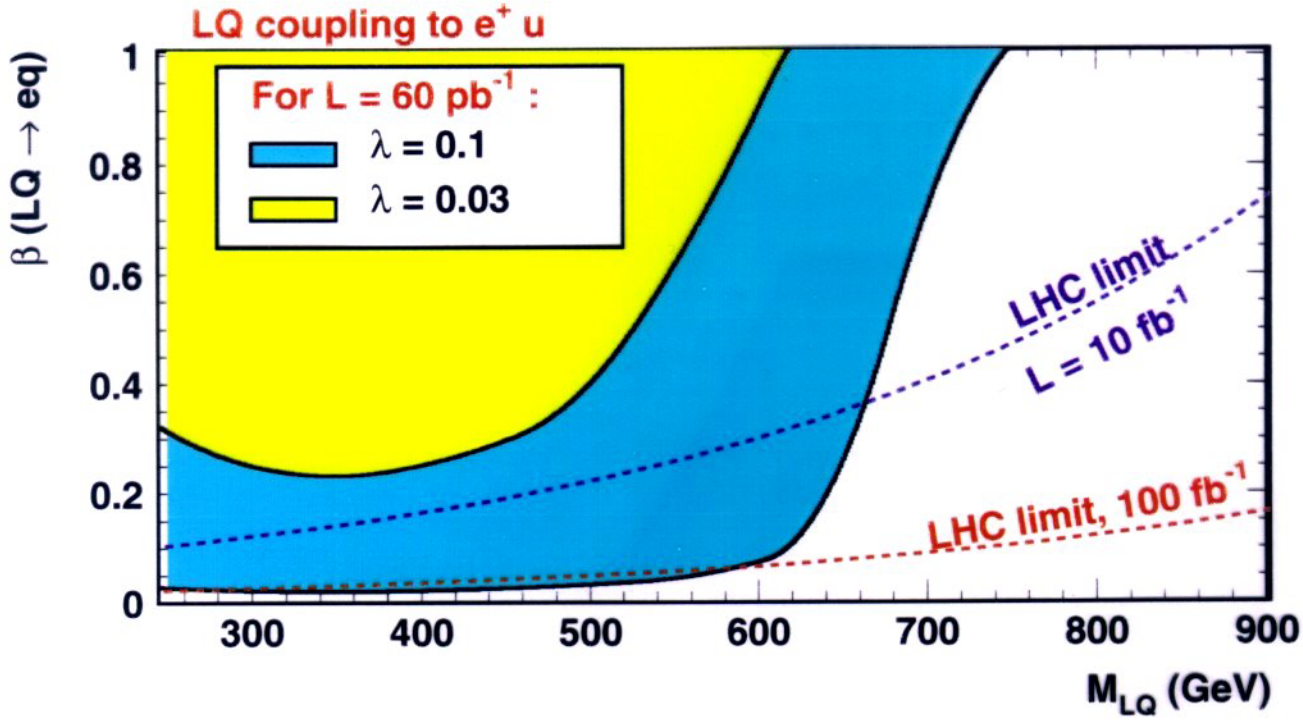
accuracy of α_s much worse than α, G_F, $\sin^2\theta_W$.

huge efforts for precision
g-2, $\sin^2\theta_W$ in particular!


250 GeV e+ x 820 GeV p
LQ coupling to e+ + u (F = 0), β e = 1
λlim
1
10 -1
10 -2
HERA 37 pb-1
excluded by APV
TERA, 10 pb-1
TERA, 60 pb-1
300
400
500
600
700
800
MLQ (GeV)

250 GeV e^+ x 820 GeV p





LQ's in THERA range : spectroscopy !

$e^{\pm}$, L, R polarization

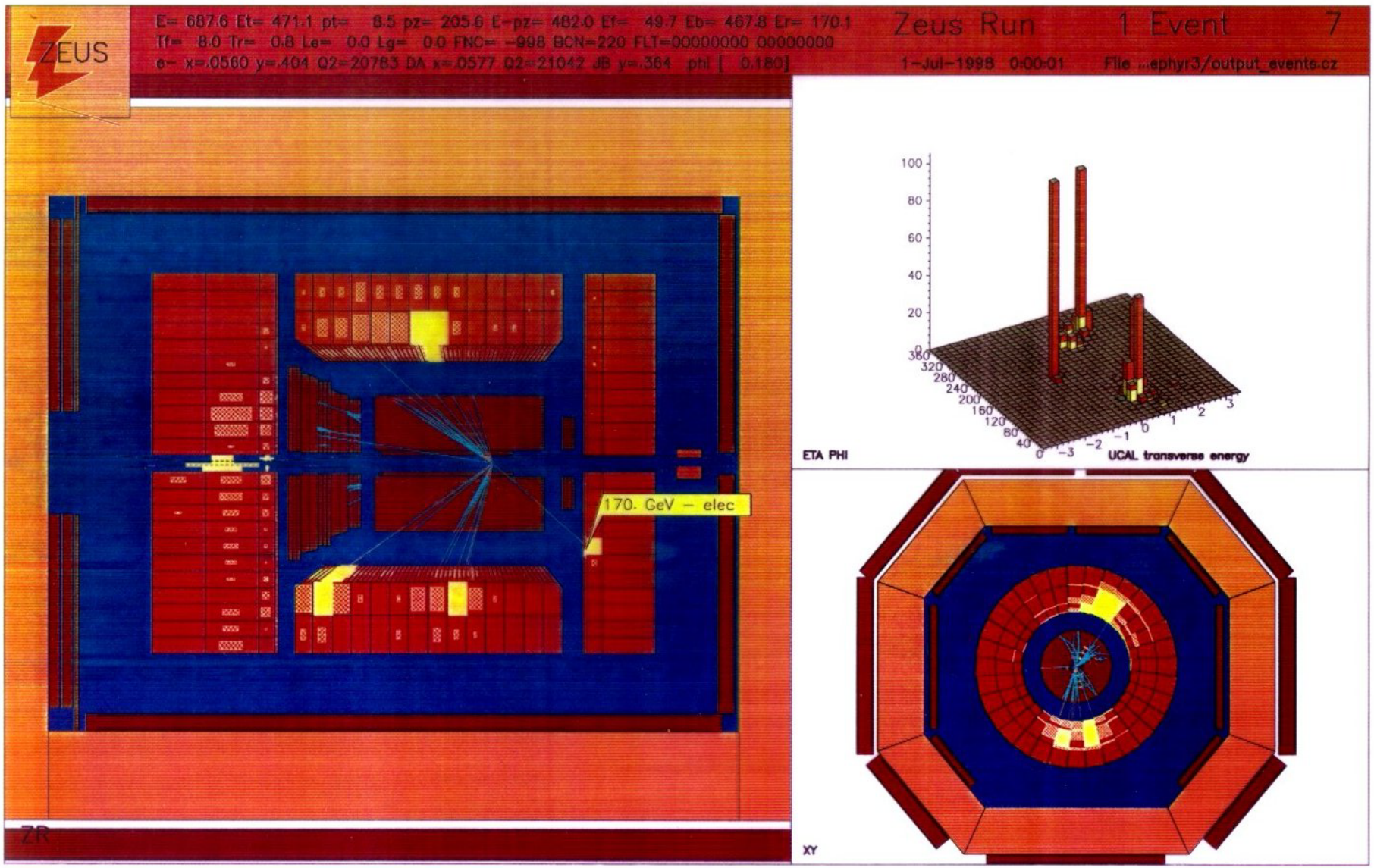
hep-ph/9912272.

$ep \to \nu^* X$

$\hookrightarrow eW \to eqq$ 3 jets.

$M(\nu^*) = 400\ GeV$

$\Sigma p_z = 482\ GeV.$



also considered / studied

- odderon 3g state, $\gamma p \to \pi^0, \eta, f_0 .. X$

  qh duality breaking charge asymmetries due to final state i.a's

  diffraction in dipole approach σ_D / σ

  higher twists in $F_{2,L,T}$

  ϱ production
  resolved b in γ^*

- MC programs need parton distributions below $x = 10^{-5}$

  event shapes reduced hadronization

  diffractive final states

  charm in CC at high Q^2 $es \to \nu c$

  light Higgs via WW fusion $\sigma \sim 0.1$ pb

  SUSY $m_{\tilde{b}}$ vs $m_{\tilde{t}}$ for light $\tilde{b}, \tilde{t}$

  top production $eb \to \nu t$ 1pb; large with anom. coupling

  substructure conserving parity $\Lambda \leq 14$ TeV

- extra dimensions exchange of KK excitations of gravitons

  ...

- polarized $\vec{p}$. polarized $\vec{e}$