

High Q^2 & exotics

1.12.00

M. Kuze

(E. Perez
K. Long)

Topics studied:

• Leptoquarks (anatomy)

LHC (discovery)
TESLA

• Higgs ($\sim 115\text{GeV}$)

TeV, LHC
TESLA

• Contact Int. (L. Extra Dim.)

LHC

• SUSY ($\tilde{t}, \tilde{b}$)

LHC

• e^*, ν^*

LHC (?)
TESLA

• LFV $e \leftrightarrow \mu \leftrightarrow \tau$

HERA-2

• FCNC $t - \{u, c\} - \{b, s\}$
(single-top)[†]
W (WW δ)

LHC

HERA-2
& others

• NC high- Q^2 $\times F_3$ DGLAP test (?)
 $t\text{-}Z, Z \dots$

• CC high- x d/u
high- Q^2 M_W, W'
 $b(x, Q^2) \rightarrow t$ $\sim 1\text{pb}$
 $\downarrow$
W

HERA-2

~ 4

"

Status:

didn't have time to make
final decision on the topics to
select among 3. (sorry.)

My personal opinion:

Along the spirit of A. Wagner:

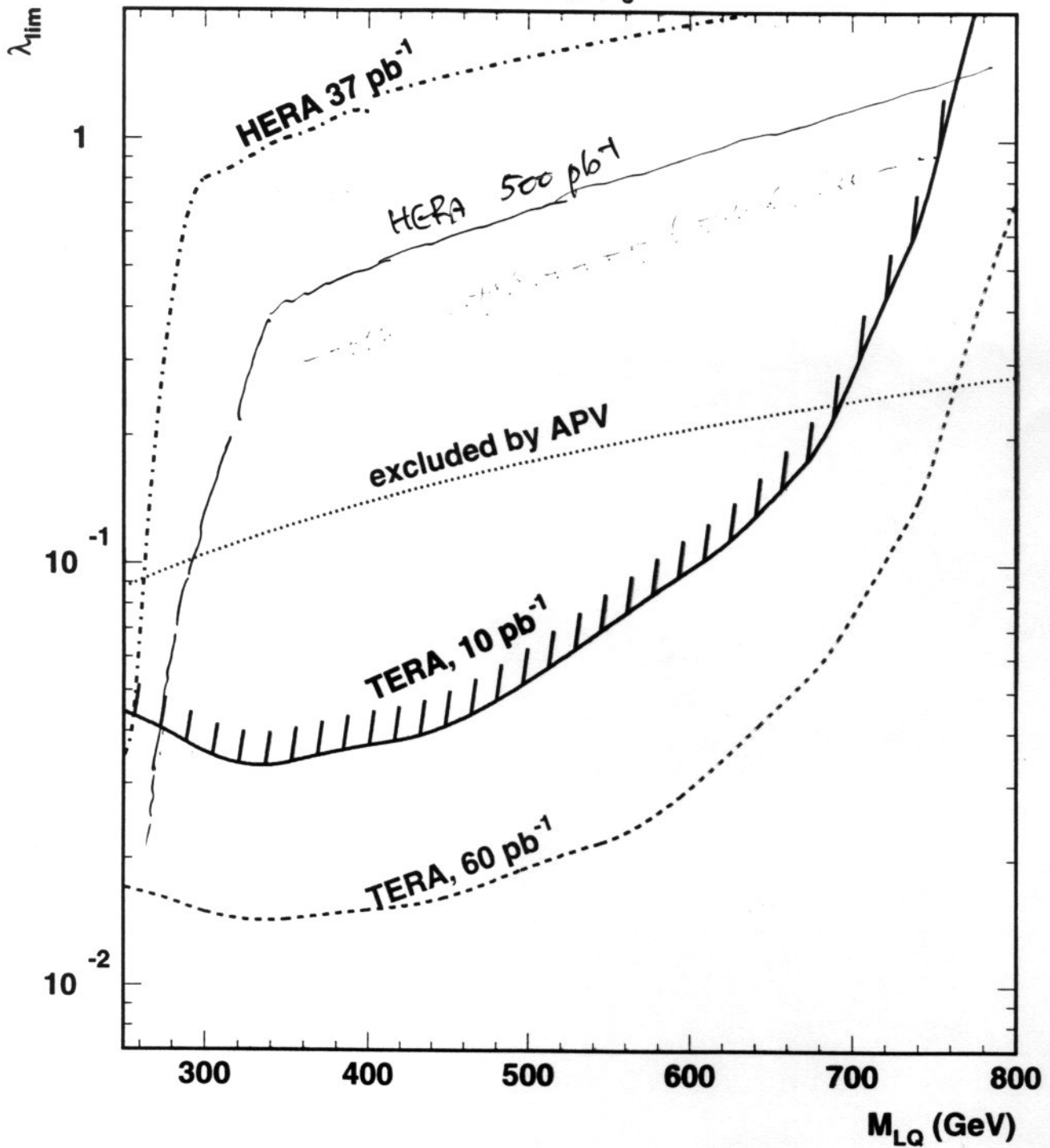
"only really strong physics cases"

I would think only LQ anatomy
deserves the criteria. →

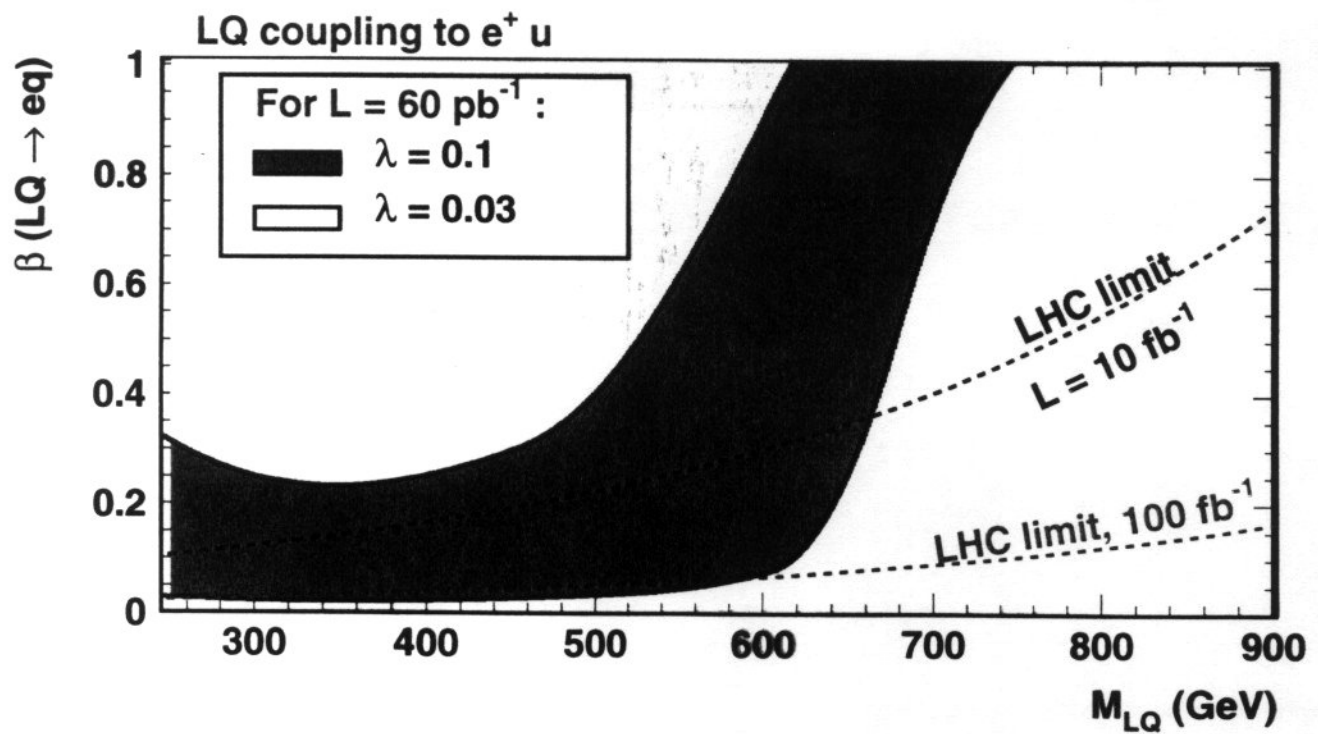
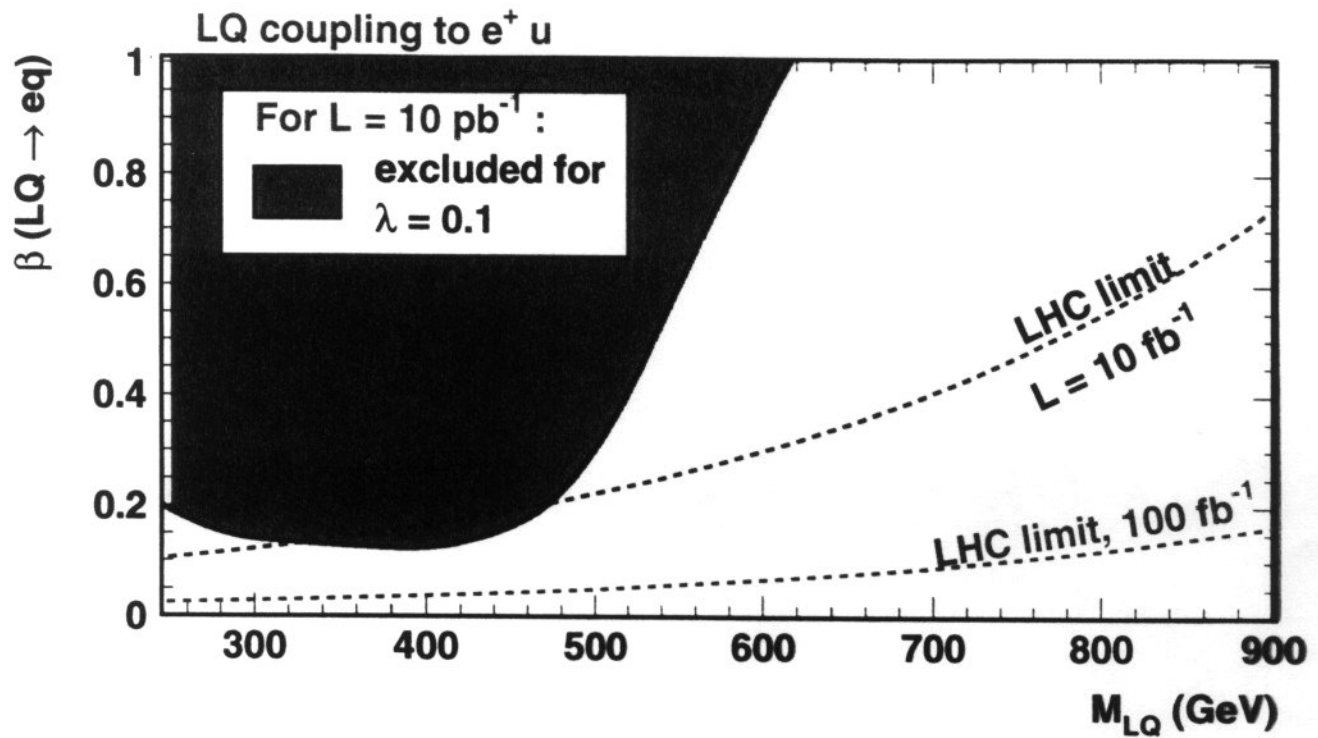
measure λ
spin
F
Chirality
flavor

250 GeV e^+ x 820 GeV p

LQ coupling to $e^+ + u$ ($F = 0$), $\beta_e = 1$

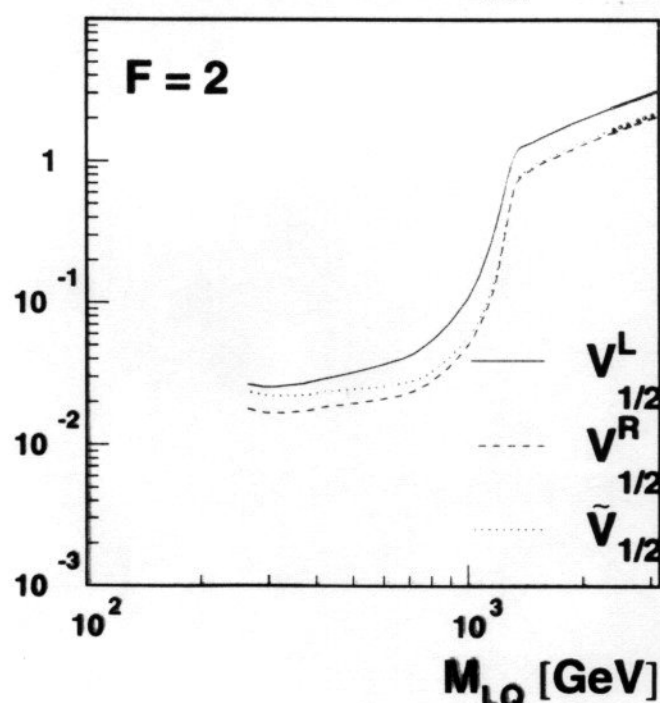
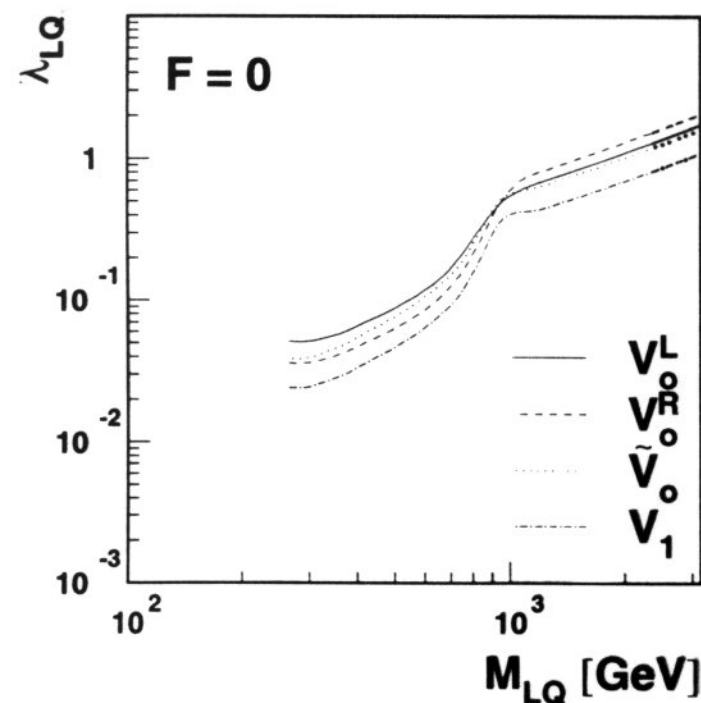
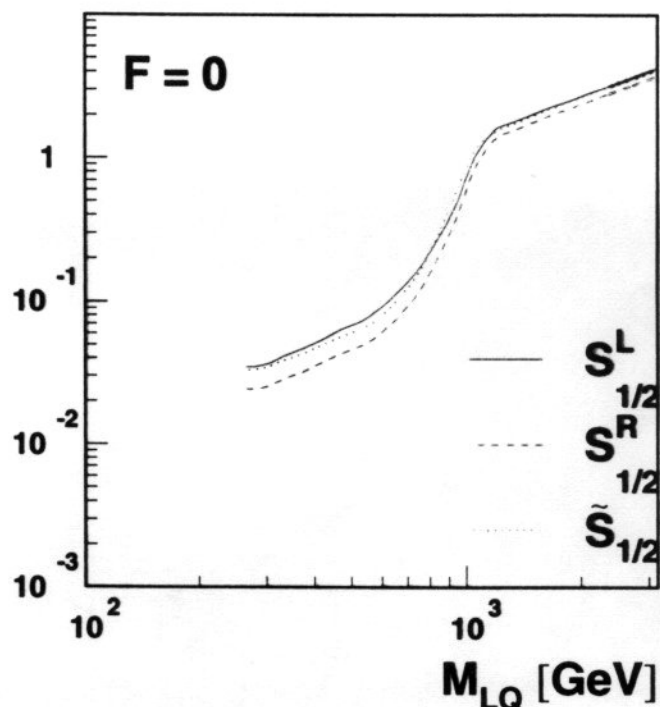
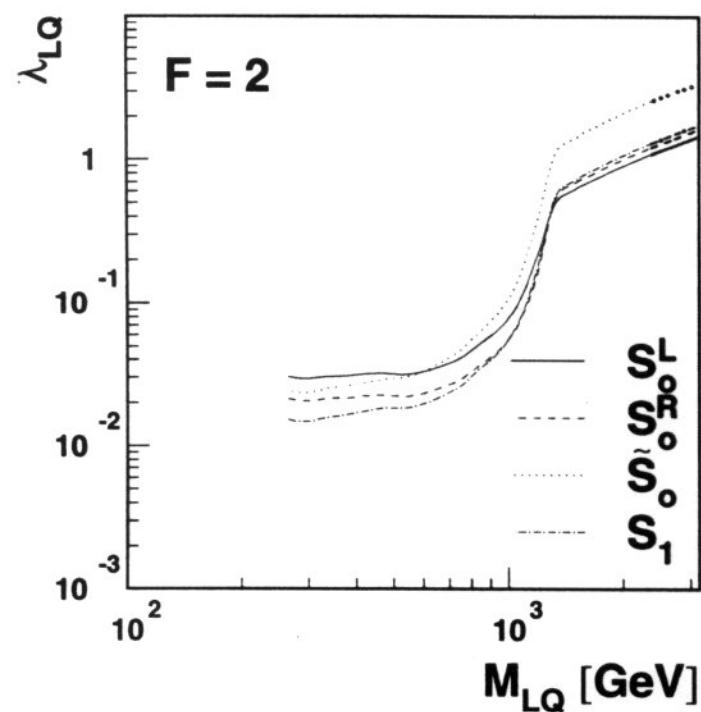


250 GeV e^+ x 820 GeV p



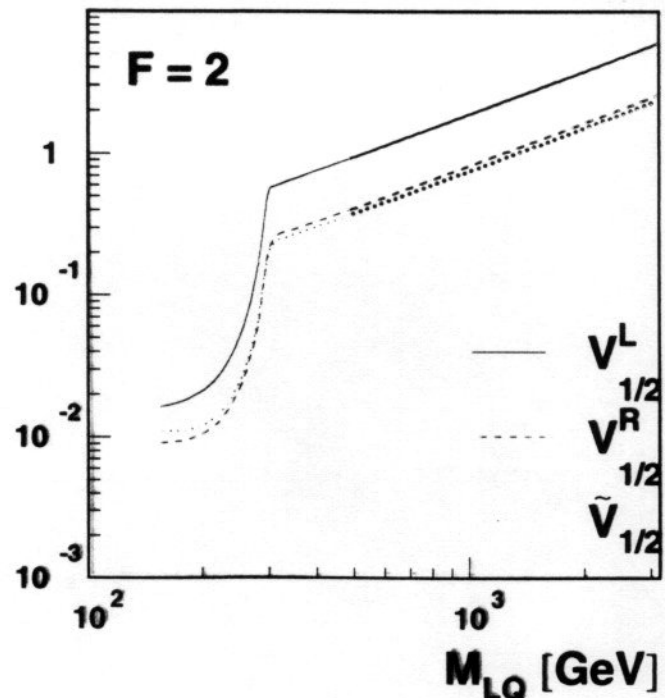
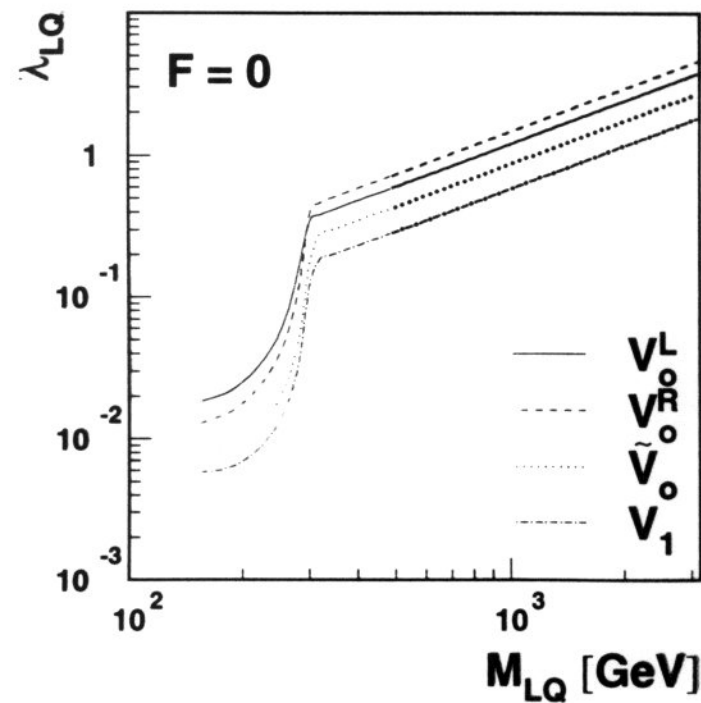
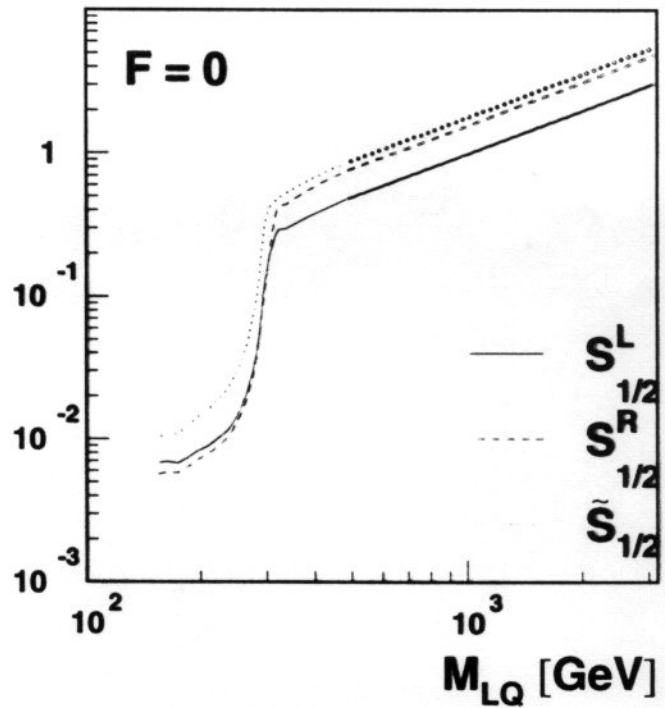
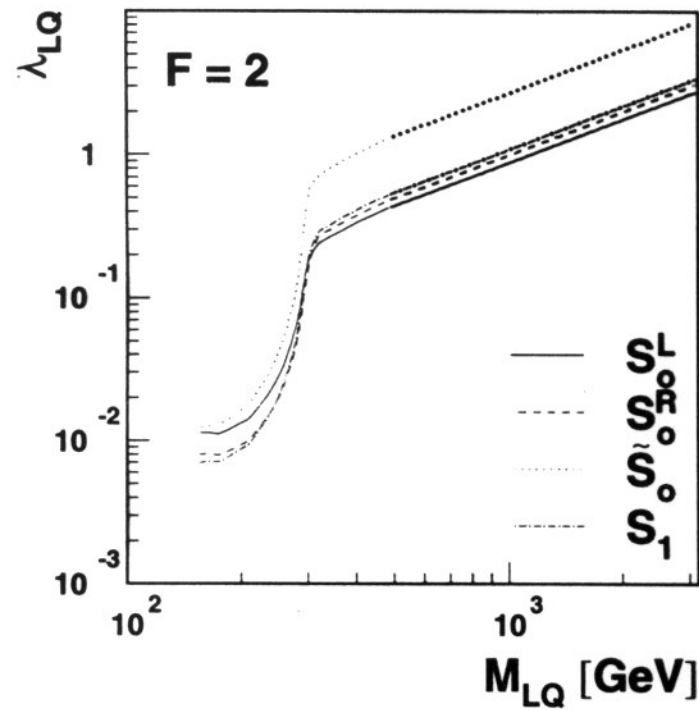
Leptoquarks : BRW Model

HERA $e p$
 100 pb^{-1}

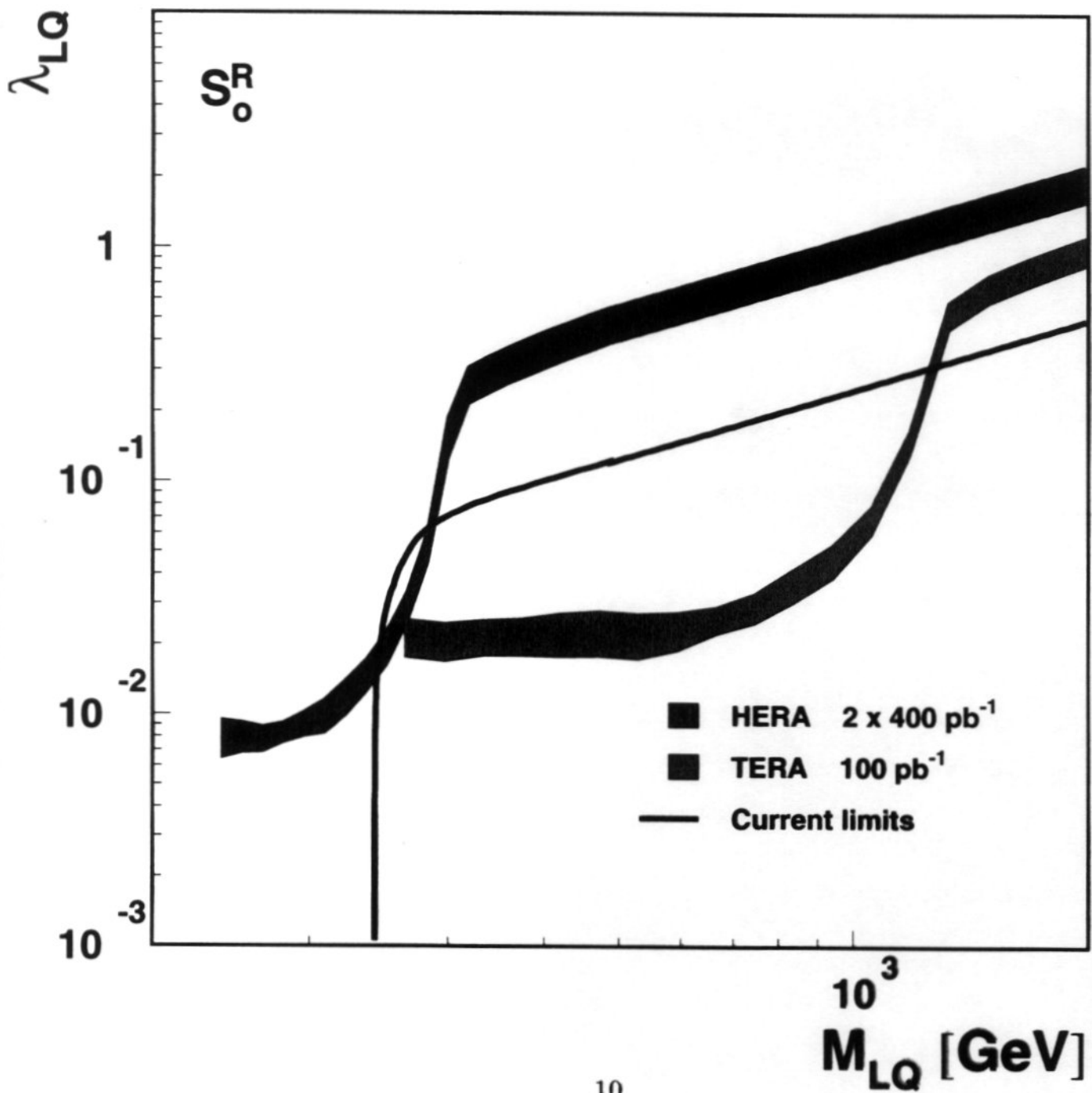


Leptoquarks : BRW Model

HERA 2

 $2 \times 400 \text{ pb}^{-1}$ 

Leptoquarks : BRW Model



STILL: IF AN e - q RESONANCE IS DISCOVERED BEFORE (e.g. @ LHC)
 THERA: IDEAL MACHINE TO DETERMINE THE QUANTUM
 NUMBERS OF THIS RESONANCE

• ANGULAR (γ) DISTRIBUTIONS $\rightarrow$ SCALAR / VECTOR

• $\bar{e}p / e^+p$ COLLISIONS $\rightarrow$ FERMION NUMBER F OF LQ
 ($F=0: e^- \bar{q}$ $F=2: e^- q$)

• e POLARISATION $\rightarrow$ CHIRAL STRUCTURE OF INTERACTION
 ($\bar{e}_L q$ OR $\bar{e}_R q$. could rule out $\bar{q}$ if e_R)

• p POLARISATION $\rightarrow$ FLAVOR STRUCTURE ($e^- u$ OR $e^- d$)
 SINCE $\Delta u > 0$
 $\Delta d < 0$

NOT FEASIBLE
 AT PP COLLIDER!

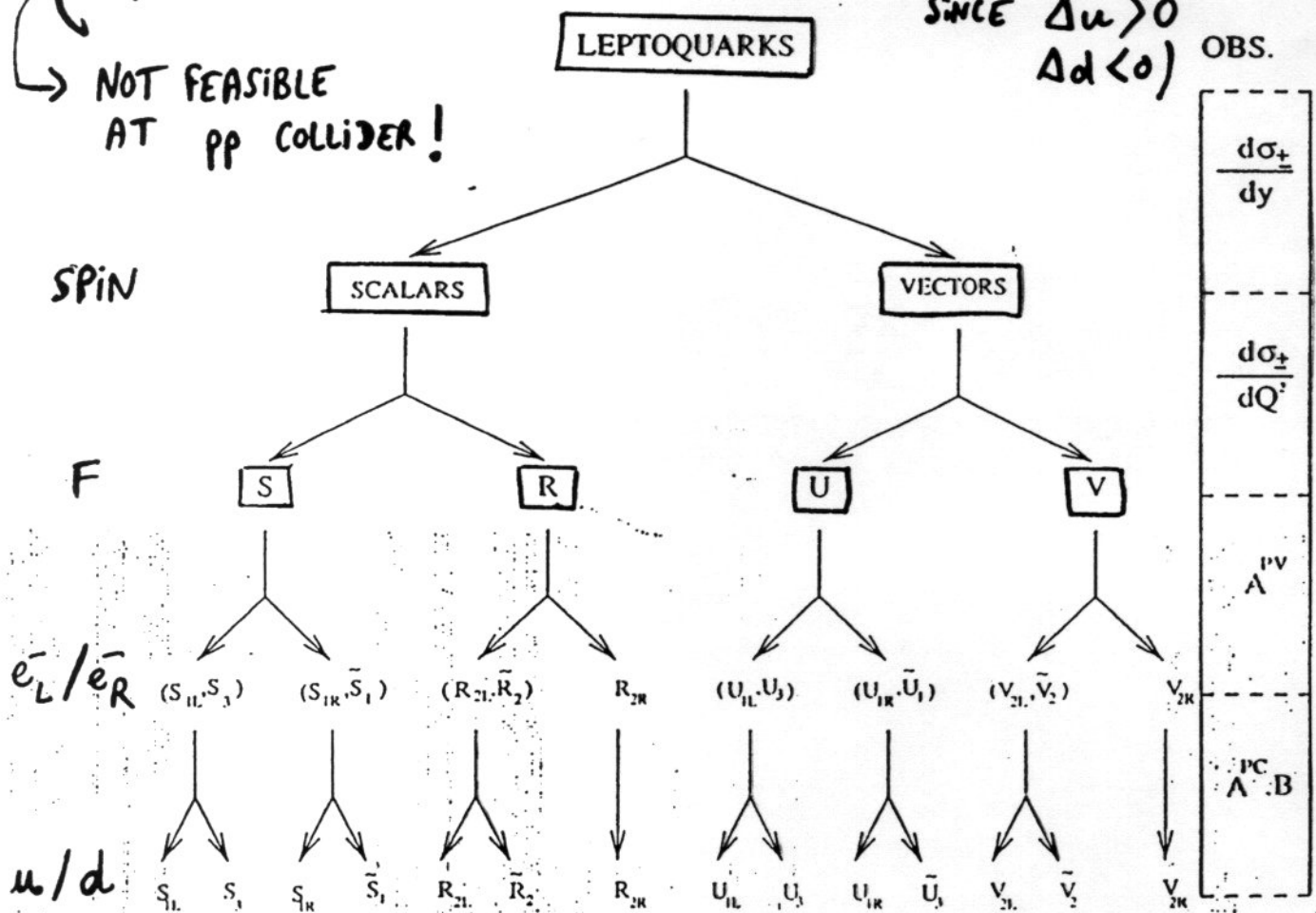


Figure 8: Schematic view for LQ identification.

$\rightarrow$ FROM J.M. VIREY et al
 hep-ph / 9912272