

LEPTON FLAVOR VIOLATION

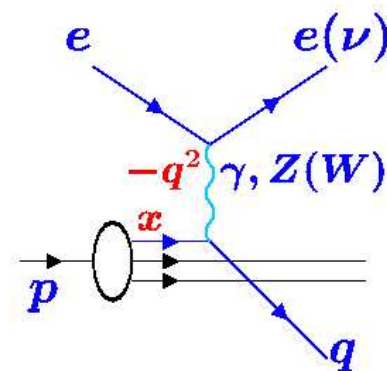
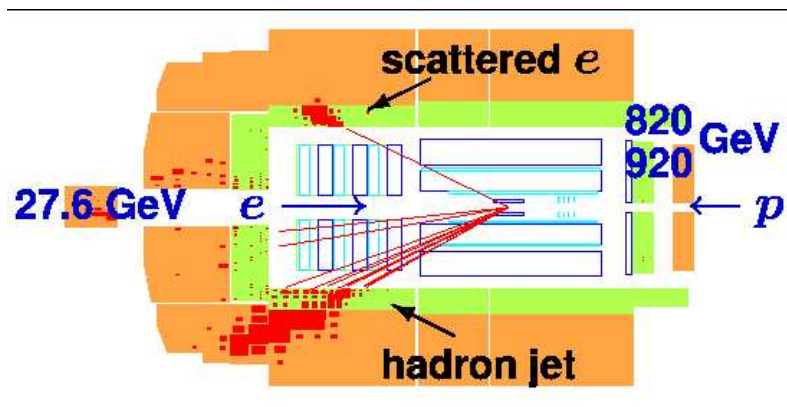


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Talk content:

Control Plots;
Final selections
Limit plots.

HERA Physics



$$\begin{array}{ccc}
 \text{CoM Energy} & = & 320 \text{ GeV} \\
 e^+(e^-) & & p \\
 \Rightarrow & & \Leftarrow \\
 \sim 27.6 \text{ GeV} & & 920 \text{ (820) GeV}
 \end{array}$$

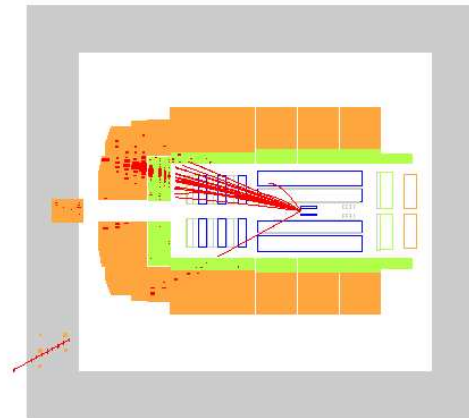
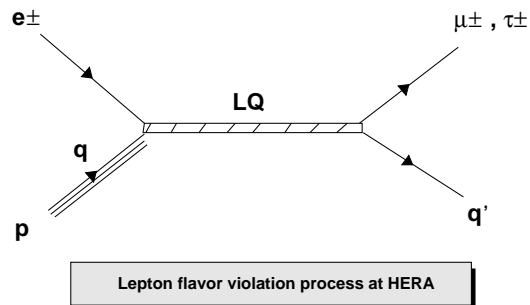
- $Q^2 = -q^2$: four momentum transfer.
- x : momentum fraction of proton carried by the struck quark.
- y : energy fraction of incoming electron transferred to the hadronic system \Rightarrow inelasticity.

Leptoquarks

- An **extension** of SM is leptoquark;
 - carry $B, L \neq 0$ & couples to both leptons and quarks.
 - explains clear **symmetry** between leptons and quarks.
- **Buchmüller-Rückel-Wyler (BRW) model:**
 - 7 scalar & 7 vector leptoquarks with
 - * Fermion numbers:
 - $F = (3B + L) = 0.$
 - $F = (3B + L) = 2.$
- Branching ratios: $\beta_{eq} = 1, \frac{1}{2}$ & $\beta_{\nu q} = 0, \frac{1}{2}.$

Lepton Flavour Violation- μ channel

- One extension to SM is lepton flavour violation where there is an isolated muon or tau with high P_t instead of an electron.
- One way to LFV is a leptoquark decaying to μ or τ .



H1

Generated background events were compared to 99-00 data for e^+p collision using V_0^L LQ type in mass range 100-250 GeV.

Background is the normal SM events:

- **Photoproduction:** Pythia(1739 pb^{-1}), Aroma (7527 pb^{-1}).
- **Lepton pair:** Grape
 - muon (50000 pb^{-1}),
 - tau (100000 pb^{-1}).
- **Neutral current:** Rapgap (2037 pb^{-1})
- **W production:** EpVec (100069 pb^{-1})
- **Charged current:** Django (7631.8 pb^{-1})
- **Jpsi:** EPJPsi
 - muon (975 pb^{-1}),
 - tau (5940 pb^{-1}).

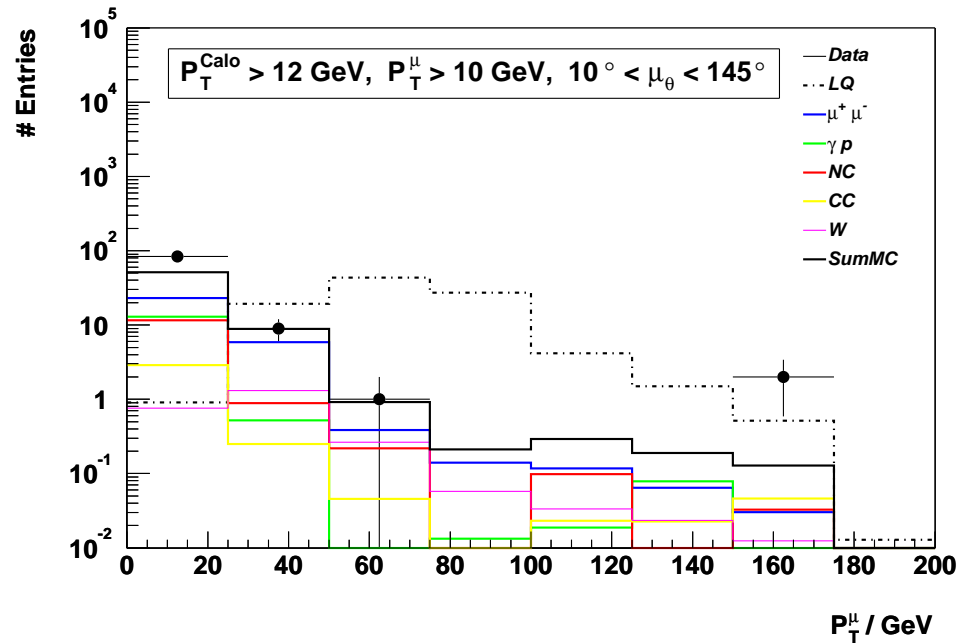
Selections in the phase space selector:

Muon Theta $10^\circ - 145^\circ$

Pt Calo(GeV) > 12

Pt Muon(GeV) > 10

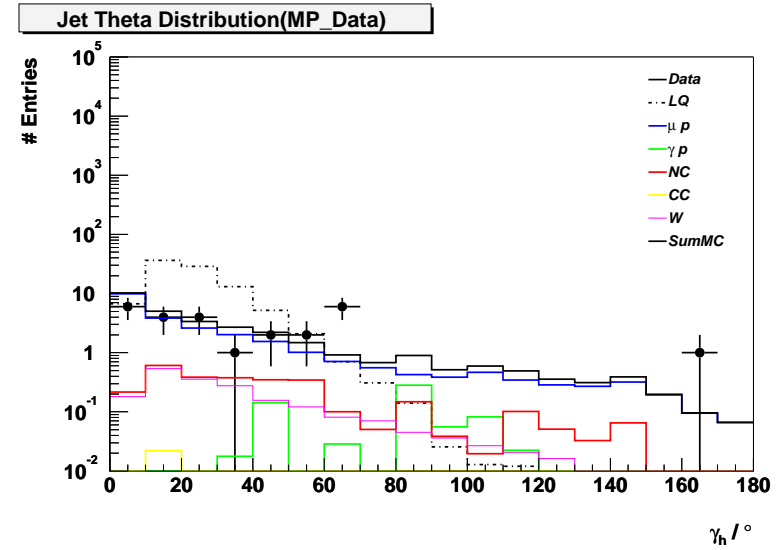
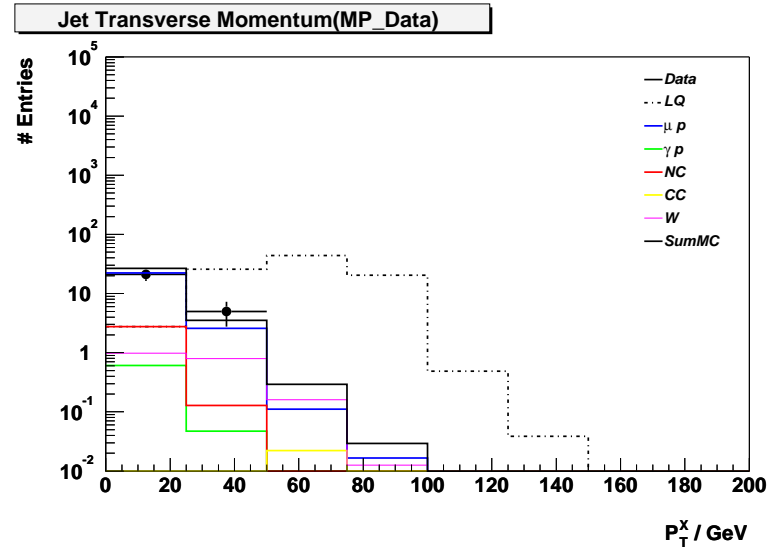
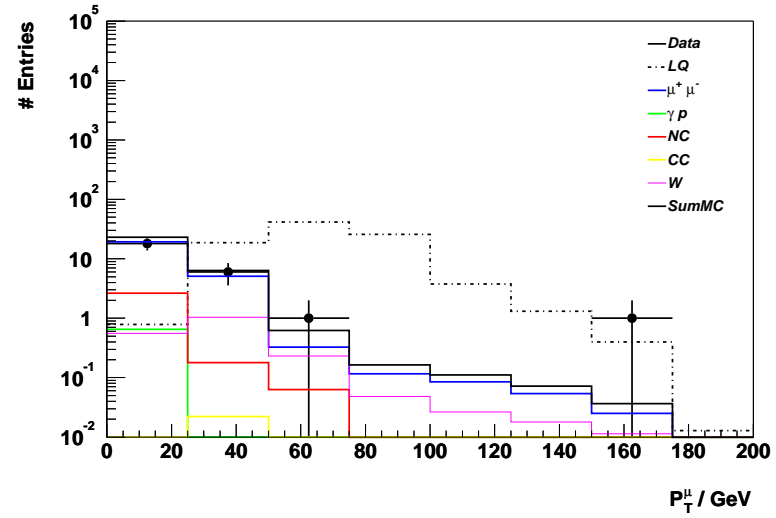
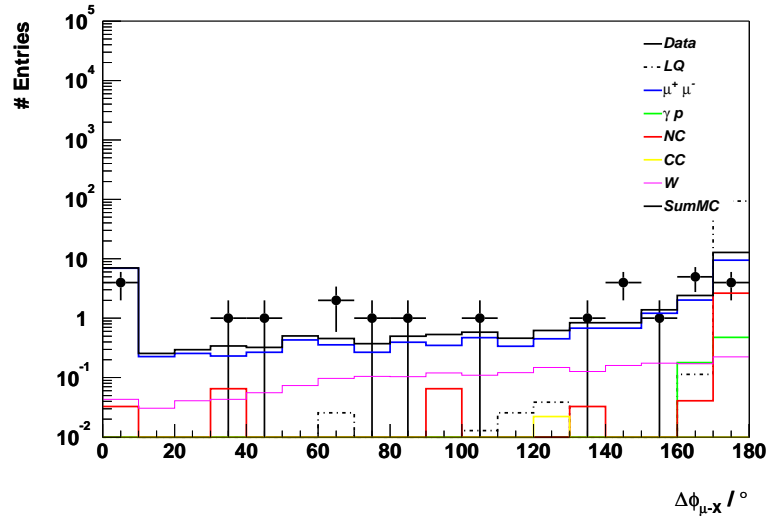
LQ generated at 175 GeV.



Selections in the Muon Pair selector (requiring isolated muon):

Muon Theta		$10^\circ - 145^\circ$	polar angle
Pt Calo(Gev)	>	12	P_t in liquid argon
Pt Muon(Gev)	>	10	
Dtrack	>	0.5	Isolated muon
Djet	>	1	Isolated muon
Number of electrons	=	0	
Number of muons	>	1	
V_{ap}/V_p		0 - 0.3	Isotropy of events.

Data=26, MC=25.51 ± 5.86



Final Selections:

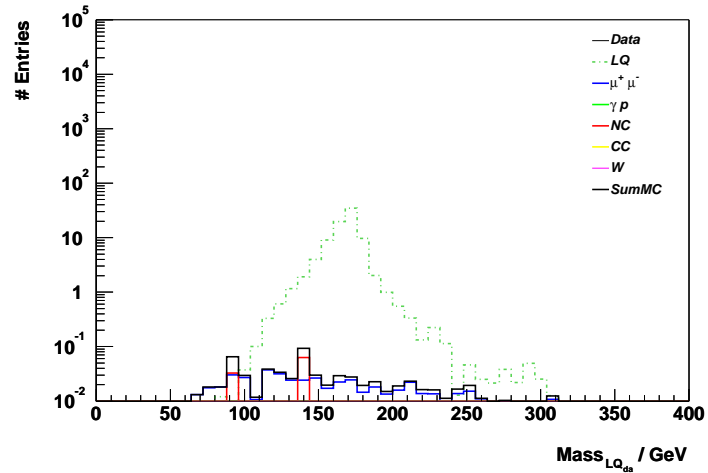
In addition to the phase space and Muon Pair selector cuts:

Jet Theta $7^\circ - 145^\circ$

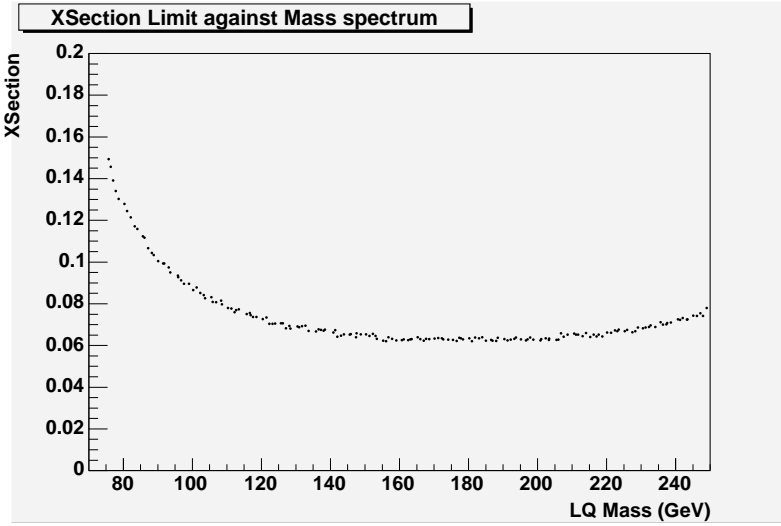
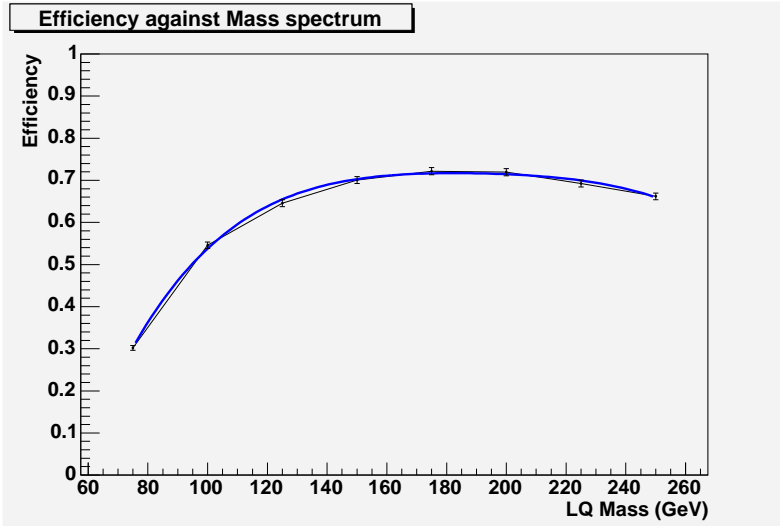
Jet $P_t > 15$ GeV

Acoplanarity $> 170^\circ$

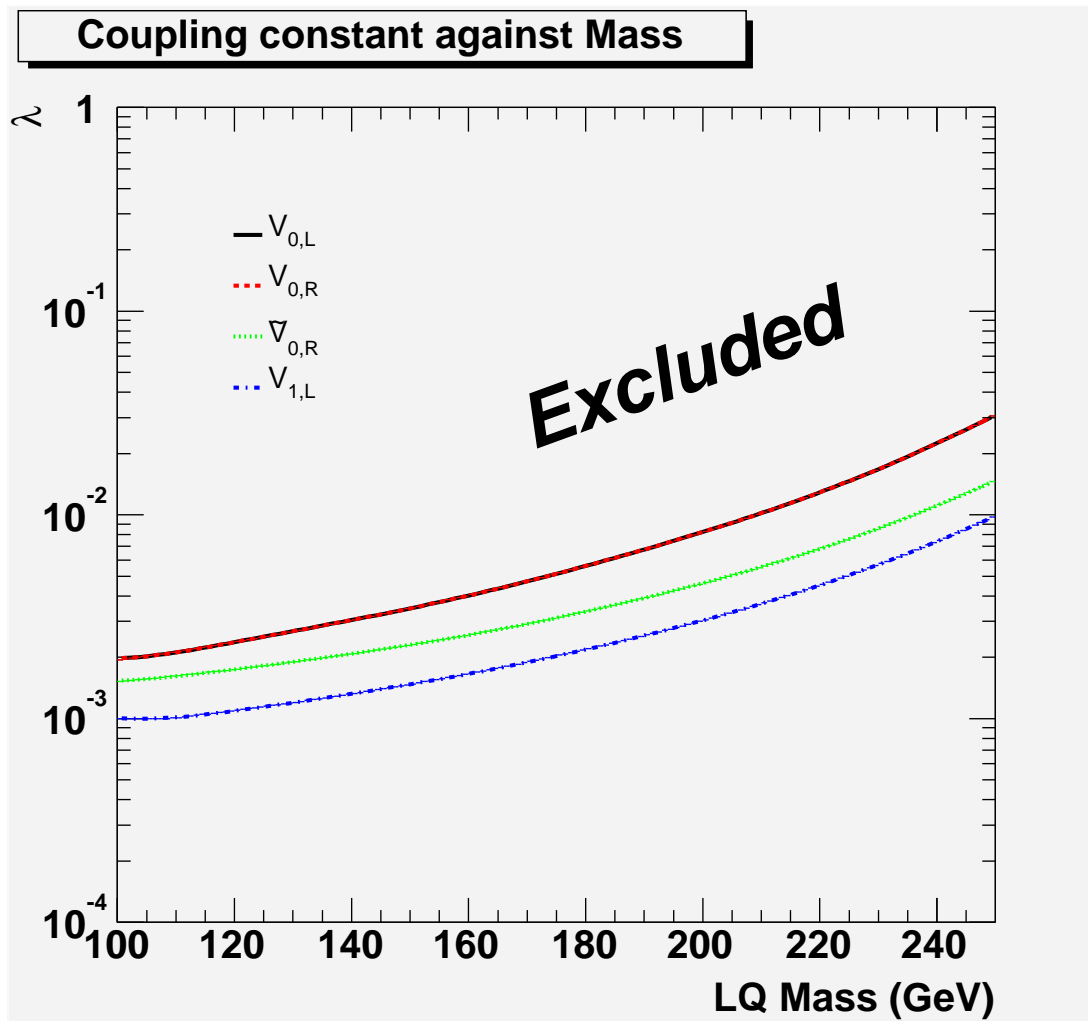
Z Vertex $< |35|$



	Space	MP	Final
Sum MC	70.48 ± 23.48	25.51 ± 5.86	0.546 ± 0.356
Data9900	96	26	0



- Efficiency of LQ masses in range 75-250 GeV.
- Fit with polynomial of degree 4.



exclusion limits for vector LQ's in 99-00 runs (e^+p)

Conclusions

- No candidates have been found for lepton flavour violation in the muon channel.
- This study can be extended to higher mass region ($\gg \sqrt{s}$).
- Scalar LQ's are still to be studied.
- Study 98-99 data (e^-p).