Large Angle Radiative Scattering at HERA [1)]

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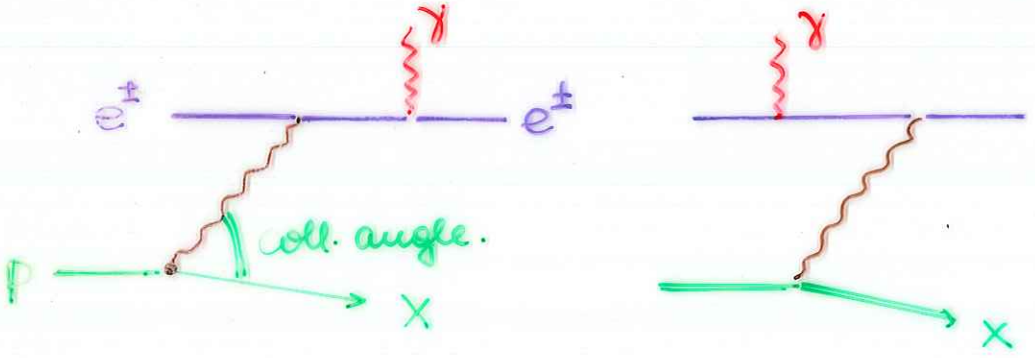
CONSIDER : RADIATIVE CORRECTIONS IN LLA
FOR NC γ^* - EXCHANGE

3 COLLINEAR SITUATIONS : ISR, FSR, COMPTON
(~ MO & TSAI's 3rd PEAK)



IF Q^2 IS MEASURED AS $Q^2 = -(\ell - \ell')^2$
⟶ LARGE CONTRIBUTION TO RC AT SMALL x & HIGH y.

· BEENAKKER, BERENDS, VAN NEERVEN
· JB 1989

1) PROPOSED : SNOWMASS '90

THE CROSS SECTION

$$\frac{d^3\sigma}{dx\,dy\,dQ^{*2}} = \frac{\alpha^3}{xS}\,\frac{1}{Q^{*2}}\,\frac{1+(1-y)^2}{1-y}\int_x^1 dz\left\{\frac{1+(1-z)^2}{z^2}F_2(x/z,Q^2_*) + F_L(x/z,Q^2_*)\right\}$$

→ CHANGE IN S WILL NOT HELP TO DISENTANGLE F_2 & F_L !

→ $d^3\sigma$ PEAKS AT:

- SMALL x
- SMALL Q^2
- SMALL W^2
- HIGH y

→ GOOD STATISTICS FOR $F_i(x,Q^2)$ FOR:

SMALL x
SMALL Q^2

→ ELASTIC & RESONANT EVENTS

→ INELASTIC EVENTS : $W^2 > 4\ \text{GeV}^2$

W^2 - RESOLUTION ?!

TWO POINTS OF VIEW:

- RC's : HOW CAN WE GET RID OF THAT?
- CONSIDER IT AS A PROCESS IN ITSELF :
  DOES IT CONTAIN PHYSICS INFORMATION?

SIGNATURE:

- γ & e BACK-TO-BACK IN φ
- RATHER CENTRAL IN θ
- LOW (IF ANY) HADRON ACTIVITY

↳ HARDLY OVERLOOKED AT HERA
ALMOST NOT CONSIDERED AS DIS EVENTS!

$\delta_C = \frac{\text{Compton contribution}}{\text{Born Ksection}}$

D°q1q1

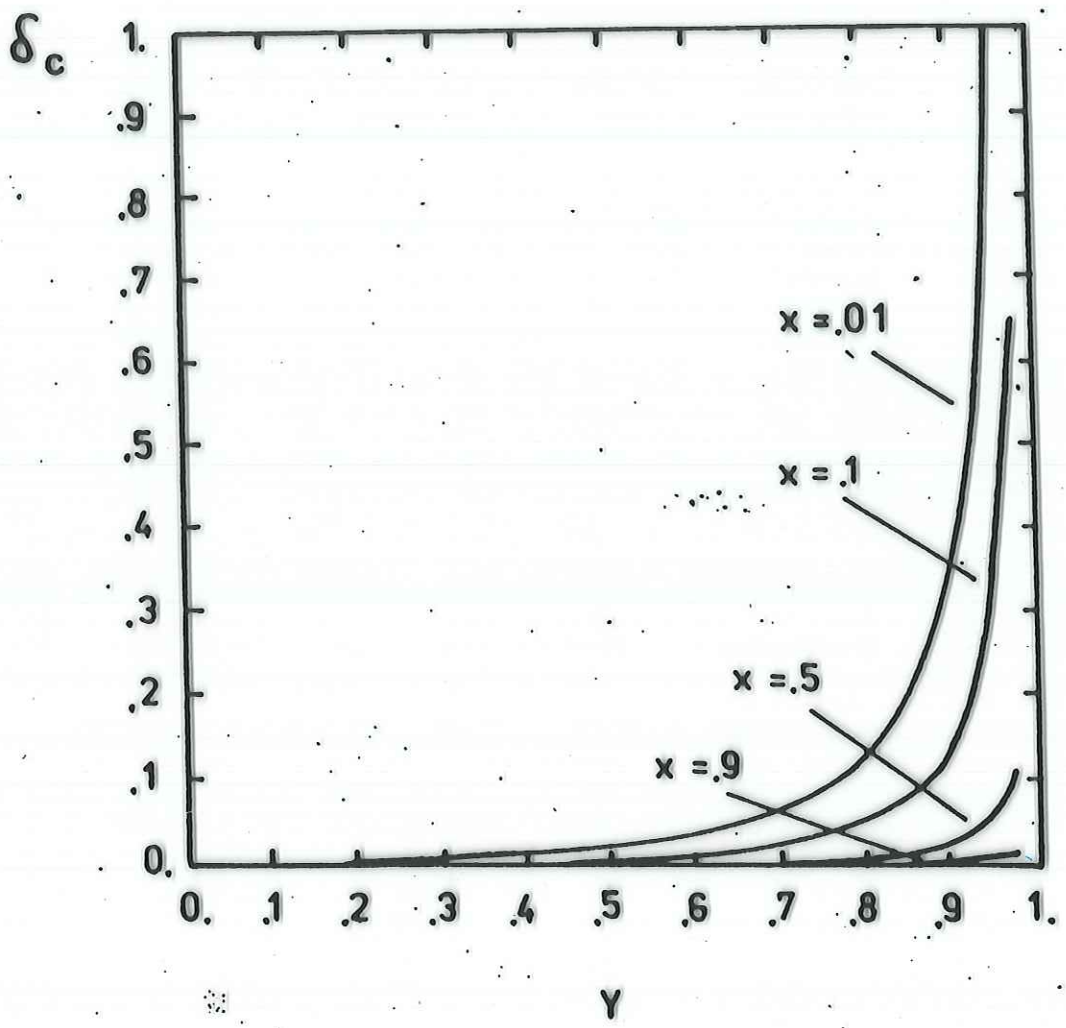
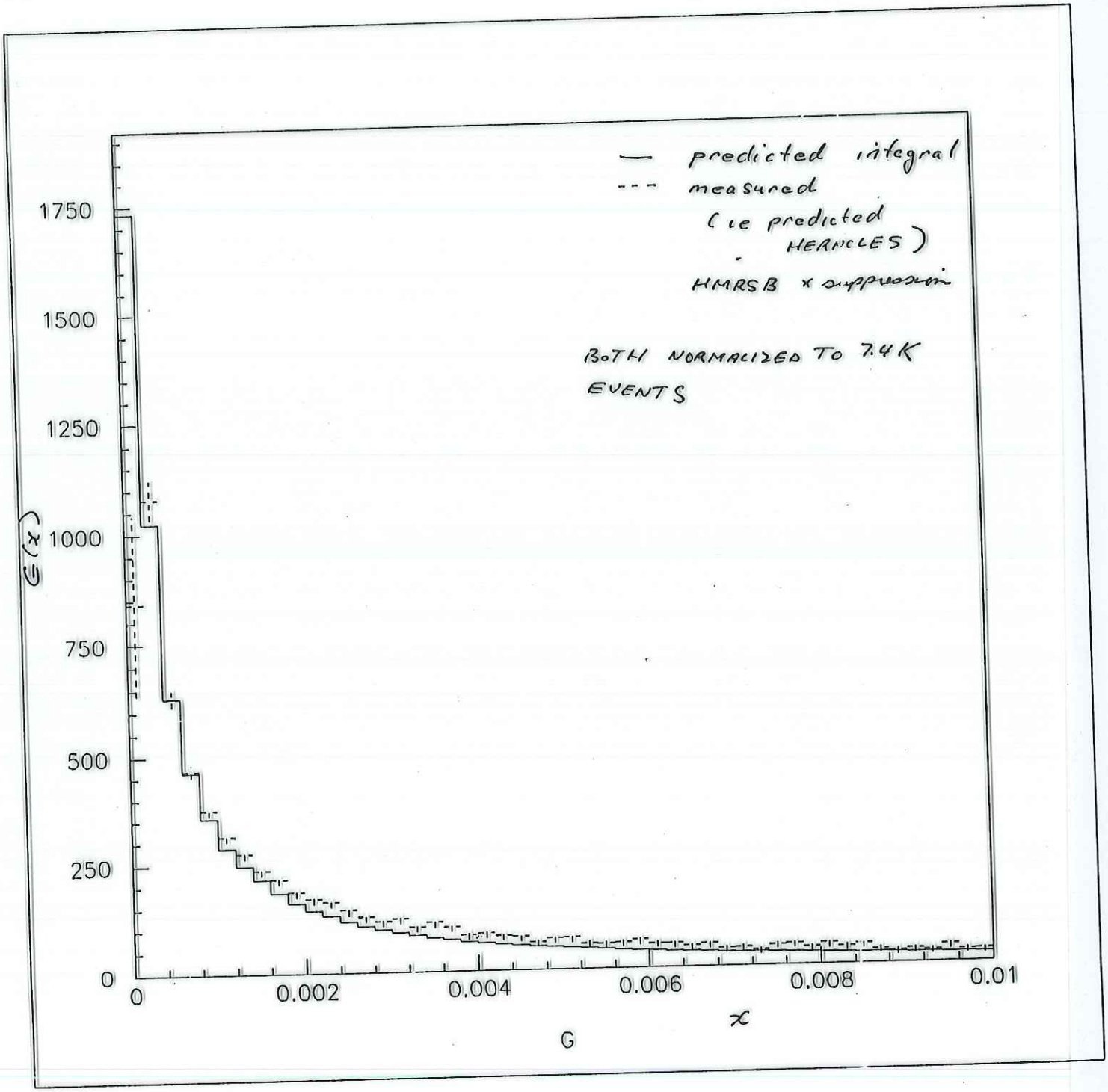
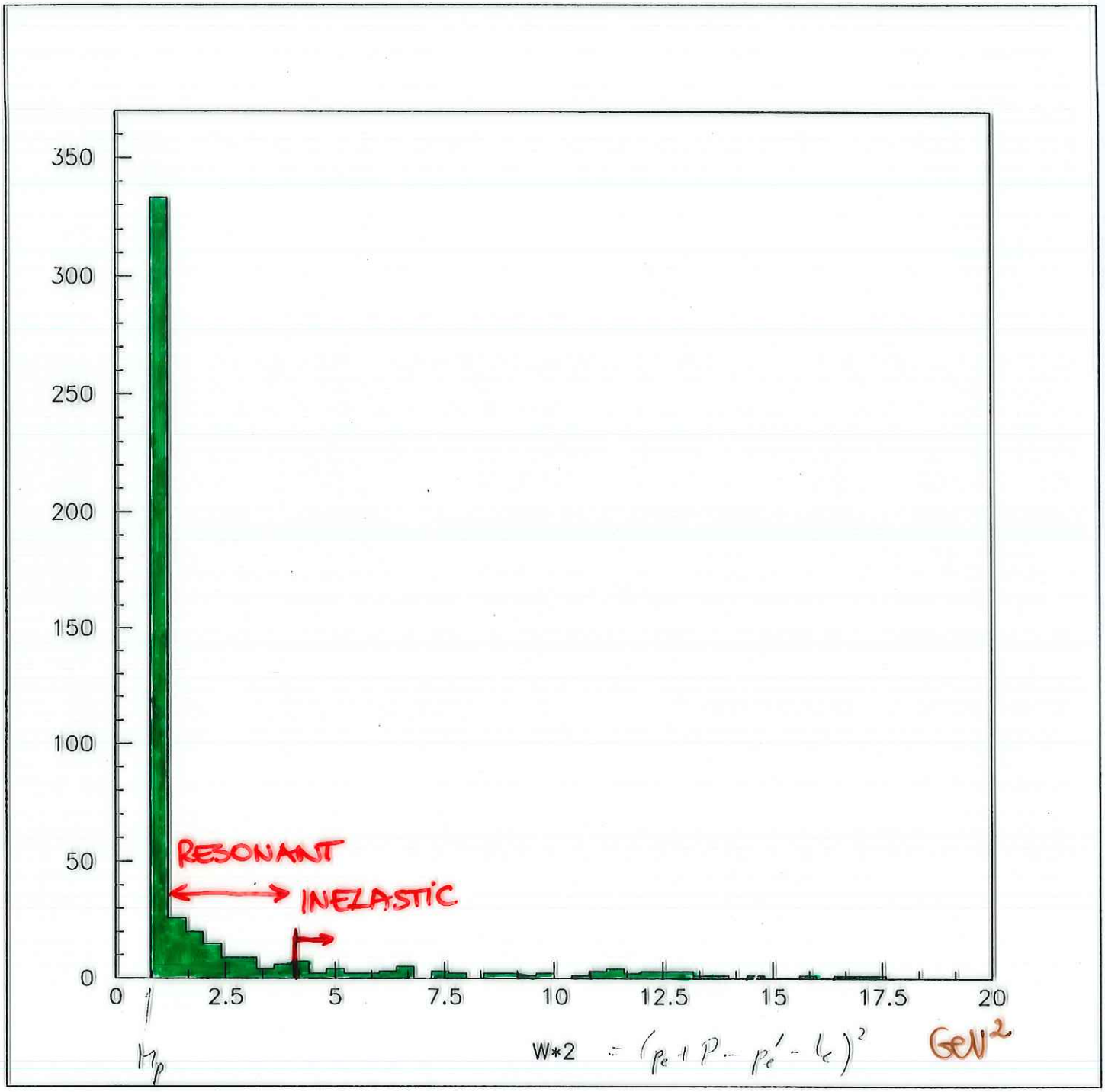
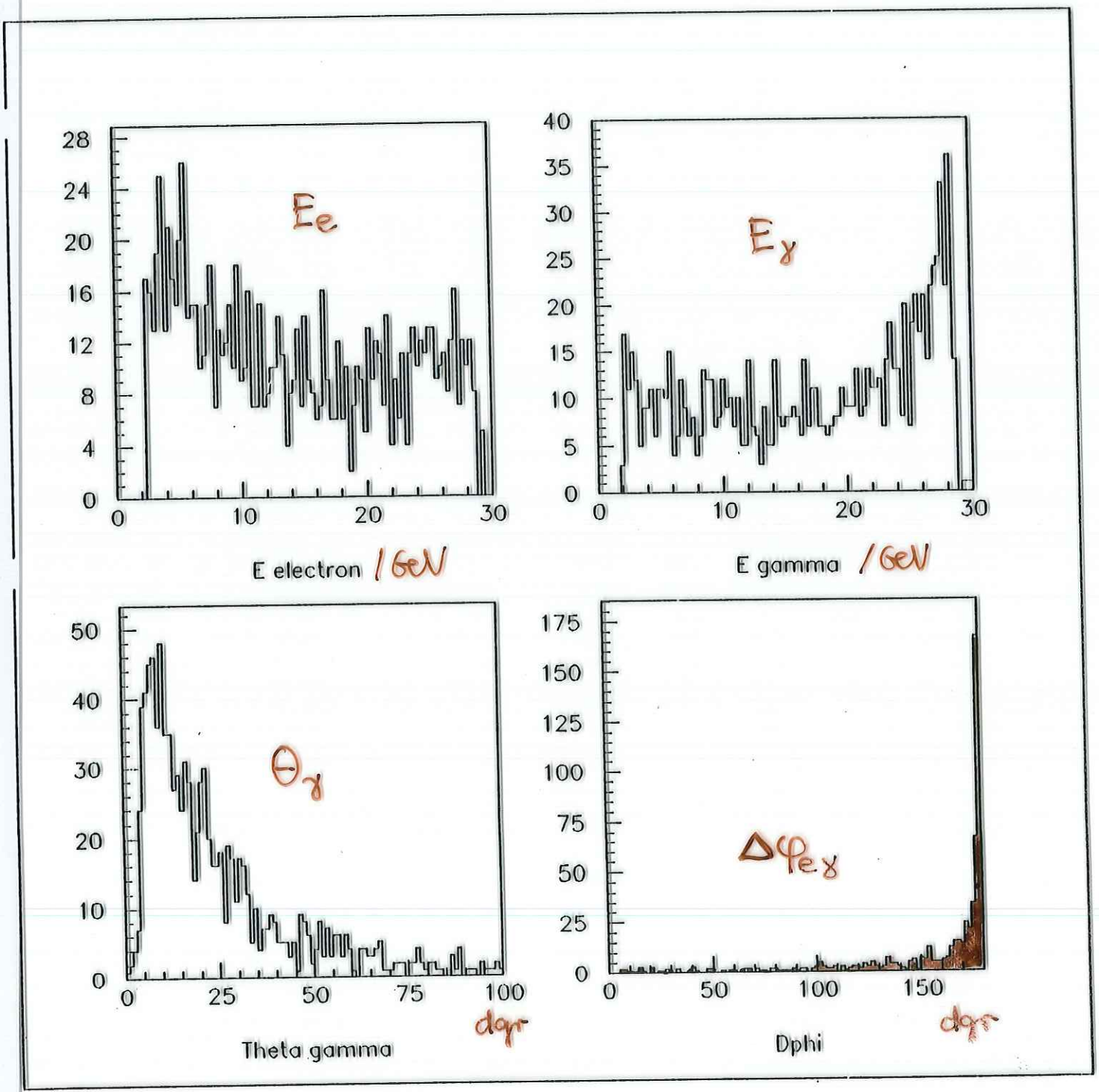


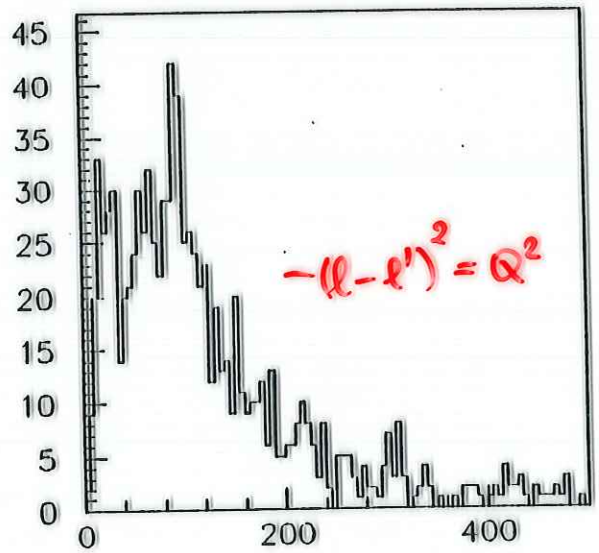
Figure 2

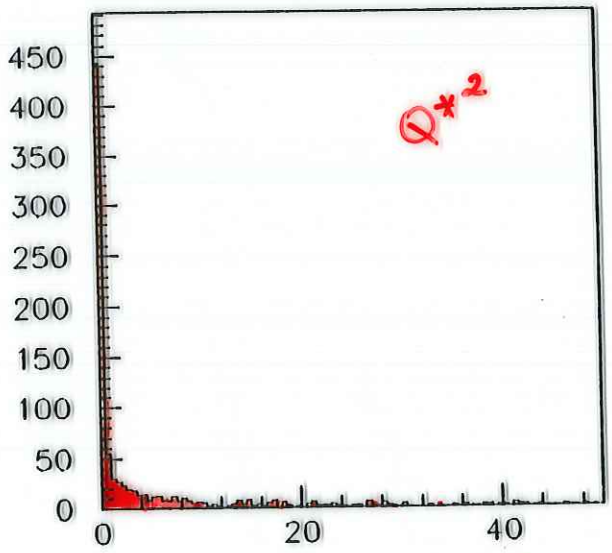

— predicted integral
--- measured
(ie predicted
HERACLES)
HMRSB × suppression
BOTH NORMALIZED TO 7.4K
EVENTS
1750
1500
1250
1000
750
500
250
0
G(x)
0
0.002
0.004
0.006
0.008
0.01
x
G

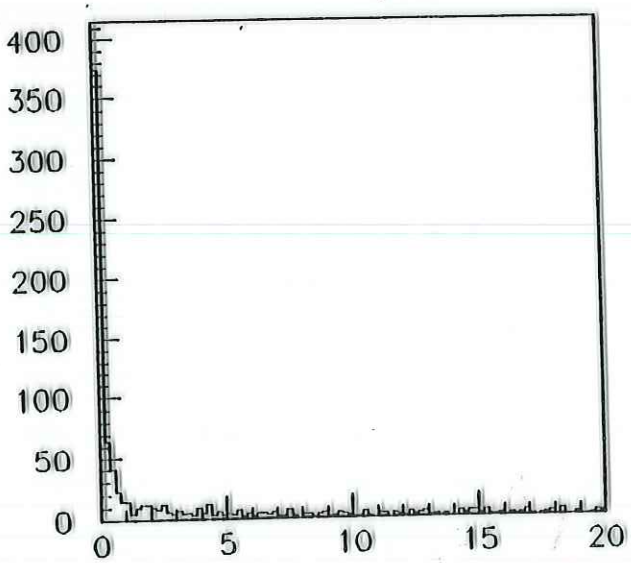

350
300
250
200
150
100
50
0
0
2.5
5
7.5
10
12.5
15
17.5
20
RESONANT
INELASTIC
M_p
W*2 = $(p_e + p - p_e' - k_e)^2$
GeV^{-2}

set1


28
24
20
16
12
8
4
0
0
10
20
30
E_e
E electron / GeV
40
35
30
25
20
15
10
5
0
0
10
20
30
E_γ
E gamma / GeV
50
40
30
20
10
0
0
25
50
75
100
Θ_γ
deg
Theta gamma
175
150
125
100
75
50
25
0
0
50
100
150
$\Delta\varphi_{e\gamma}$
deg
Dphi


45
40
35
30
25
20
15
10
5
0
0
200
400
$-(\ell-\ell')^2 = Q^2$
Q2 /GeV²


450
400
350
300
250
200
150
100
50
0
0
20
40
Q**2
Q**2 /GeV²


400
350
300
250
200
150
100
50
0
0
5
10
15
20
PT**2 missing /GeV²

SUMMARY

1) THE COMPTON PEAK MAY BE USED TO MEASURE A COMBINATION OF F_2 & F_L AT SMALL x & Q^2

2) $\mathcal{L} = 100\ \mu b^{-1}$ @ HERA $\Longrightarrow$ $\sim$ 8000 # $\sim$ 1/10 of that inelastic

DIRECT

3) MEASUREMENT OF AN IMPORTANT INPUT FOR R.C.s.

4) DIRECT ACCESS TO NONPERTURBATIVE QUANTITIES AT SMALL x.