DIFFRACTION – HERA + E665

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INCLUSIVE "DIFFRACTION"

BRISKIN:	ZEUS	PHOTON DIFFRACTIVE DISSOCIATION IN γp & DIS.
DIRKMANN:	H1	MEASUREMENT & INTERPRETATION OF F_2^D.
NEWMAN:	H1	DIFFRACTIVE DISSOCIATION IN γp.
GROTHE:	ZEUS	LEADING PROTON F_2^D, METHOD COMPARISONS.

LEADING PROTONS / NEUTRONS

CARTIGLIA:	ZEUS	LEADING BARYONS AT LOW x_L, γp & DIS.
LIST:	H1	LEADING PROTON SPECTROMETER MEASUREMENTS.
JANSEN:	H1	LEADING NEUTRON MEASUREMENTS.

FINAL STATES

MARAGE:	H1	DIJETS IN γp AND DIS.
TERRON:	ZEUS	CHARM & JET PRODUCTION, γp & DIS.
CORMACK:	H1	ENERGY FLOW, THRUST, CHARM, DIS.
HERNANDEZ:	ZEUS	EVENT SHAPES IN DIS.
VAN MECHELEN:	H1	MULTIPLICITY CORRELATIONS IN DIS.

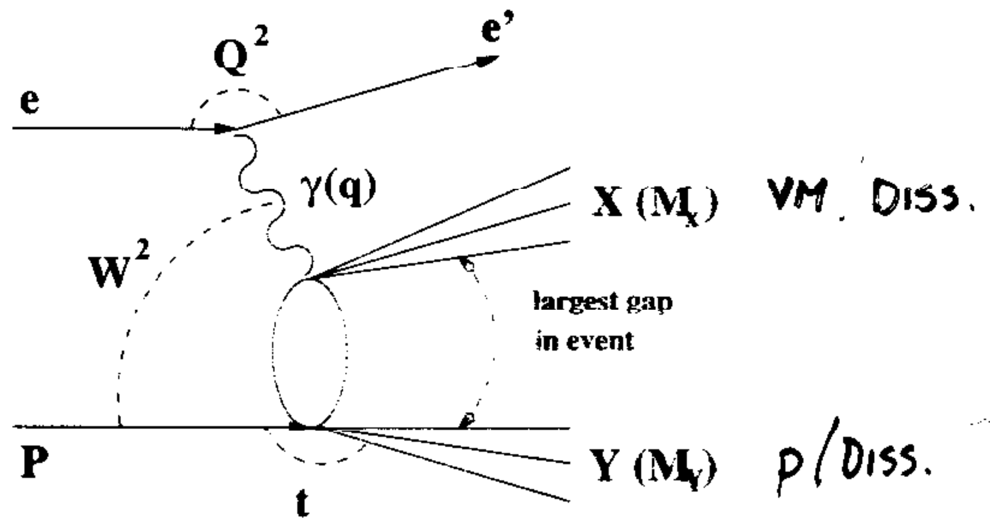
VECTOR MESONS

SCHELLMAN:	E665	ρ ELECTROPRODUCTION.
ADAMCZYK:	ZEUS	VECTOR MESON PHOTOPRODUCTION.
MONTEIRO:	ZEUS	VECTOR MESON ELECTROPRODUCTION.
GAEDE:	H1	VECTOR MESONS.
BELLAGAMBA:	ZEUS	J/ψ PRODUCTION.
TAPPROGGE:	H1	MULTI-PHOTON FINAL STATES.

Diffraction at HERA

"standard" kinematic variables for DIS:

$$Q^2 = -q^2 \;\; ; \;\; x_{Bj} = \frac{Q^2}{2 P \cdot q} \;\; ; \;\; y = \frac{q \cdot P}{e \cdot P} \;\; ; \;\; W^2 = (q+P)^2$$



additional variables in terms of systems X and Y:

$$\beta = \frac{Q^2}{2q\cdot(P-Y)} \approx \frac{Q^2}{Q^2+M_X^2}$$

$$\Rightarrow x_{Bj} = \beta \cdot x_{I\!P}$$

$$x_{I\!P} = \frac{q\cdot(P-Y)}{q\cdot P} \approx \frac{Q^2+W^2}{Q^2+M_X^2}$$

definitions are applicable to ANY type of process

interpretation in terms of exchange :

$x_{I\!P}$ momentum fraction of exchange particle

β momentum fraction of parton

Diffractive Structurefunction $F_2^{D(3)}(x_{I\!P}, \beta, Q^2)$

following Ingelman and Schlein

$$\frac{d^4\sigma^D_{ep\to e\prime XY}}{d\beta dQ^2 dx_{I\!P} dt} = \frac{4\pi\alpha^2}{\beta Q^4}(1 - y + \frac{y^2}{2(1+R)}) \cdot F_2^{D(4)}(Q^2, \beta, x_{I\!P}, t)$$

- integration over $|t_{min}| < |t| < 1\ \mathrm{GeV}^2$
- set $R = 0$

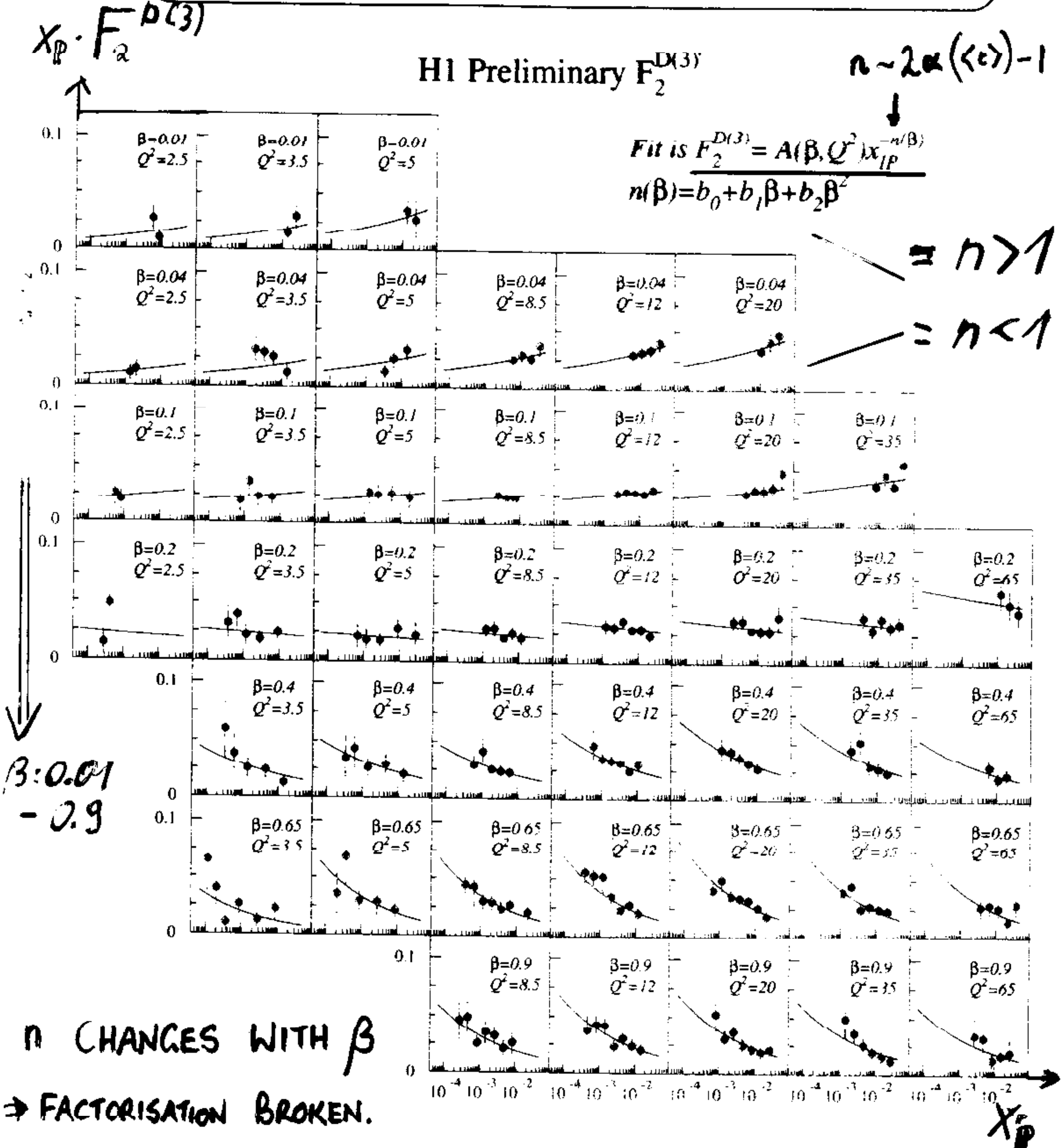
MEASURED AT HADRON LEVEL.

$$\frac{d^3\sigma^D_{ep\to e\prime XY}}{d\beta dQ^2 dx_{I\!P}} = \frac{4\pi\alpha^2}{\beta Q^4}(1 - y + \frac{y^2}{2}) \cdot F_2^{D(3)}(Q^2, \beta, x_{I\!P})$$

kinematic range:

$2.5 <$	Q^2	$< 65\ \mathrm{GeV}^2$
$0.01 <$	β	< 0.9
$0.0001 <$	$x_{I\!P}$	< 0.05

Measurement of $F_2^{D(3)}(x_{I\!P}, \beta, Q^2)$



n CHANGES WITH β

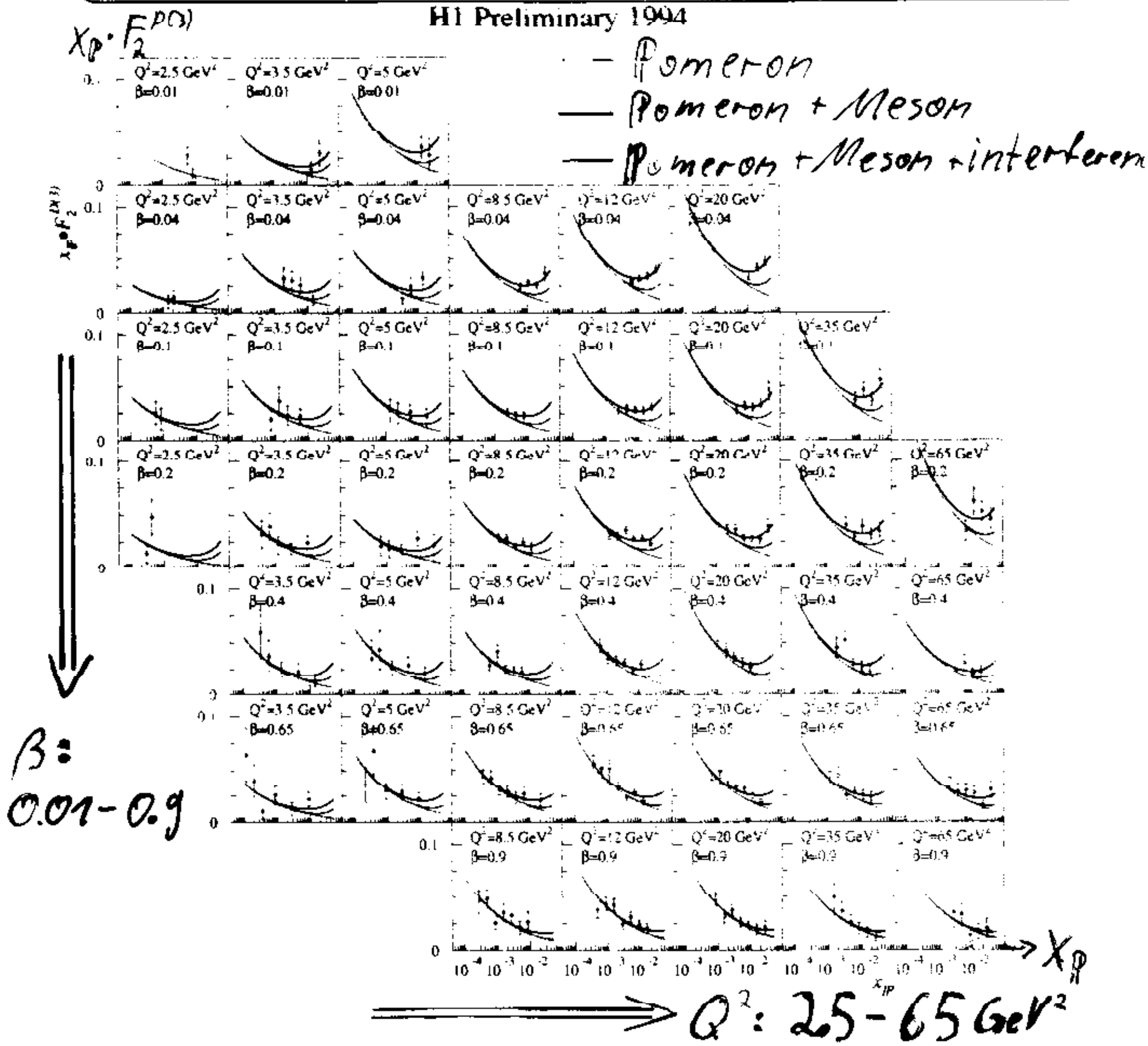
→ FACTORISATION BROKEN.

NO EVIDENCE FOR $n(Q^2)$.

Q^2: 2.5 - 65 GeV^2

2 SEPARATELY FACTORISABLE EXCHANGES.

Pomeron + Meson: Phenomenological Fit



$$F_2^{D(3)}(x_{I\!P},\beta,Q^2) \;=\; F_2^{I\!P}(\beta,Q^2)\cdot x_{I\!P}^{-n_1}+C_M\cdot F_2^{M}\cdot x_{I\!P}^{-n_2}+\underline{int_{45^\circ}}$$

fit of $F_2^{I\!P}(\beta,Q^2)$, n_1 , C_M , n_2

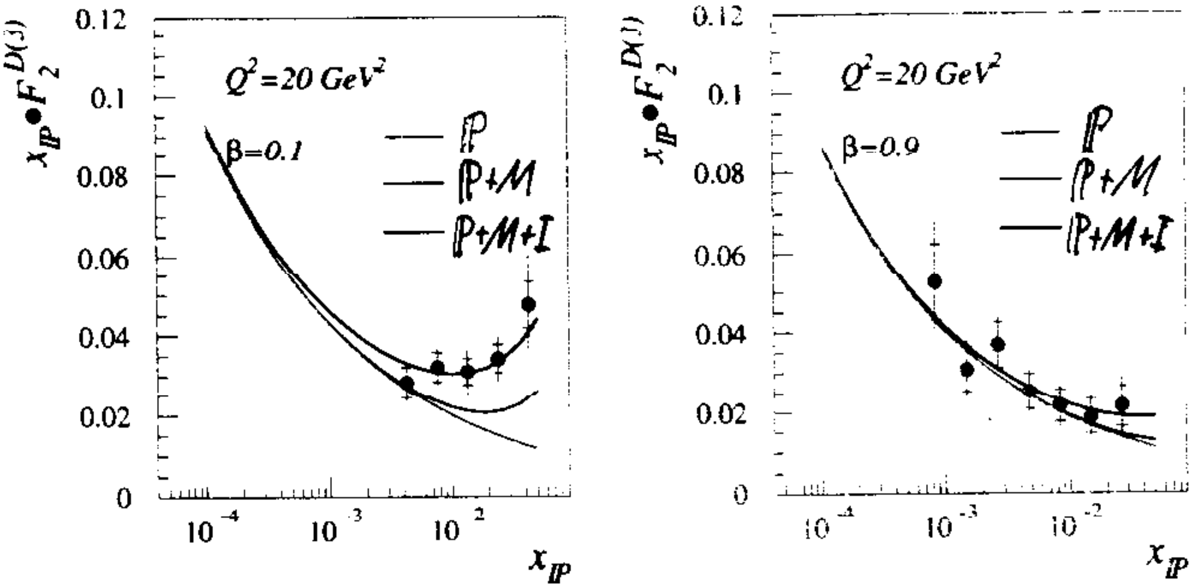
Result: $n_1 = 1.29 \pm 0.03 \quad \chi^2/ndf = 170/156$

$n_2 = 0.3 \pm 0.3$

→ $\alpha_{I\!P}(0) = 1.18 \pm 0.02\,(stat) \pm 0.05\,(sys)$

Pomeron + Meson

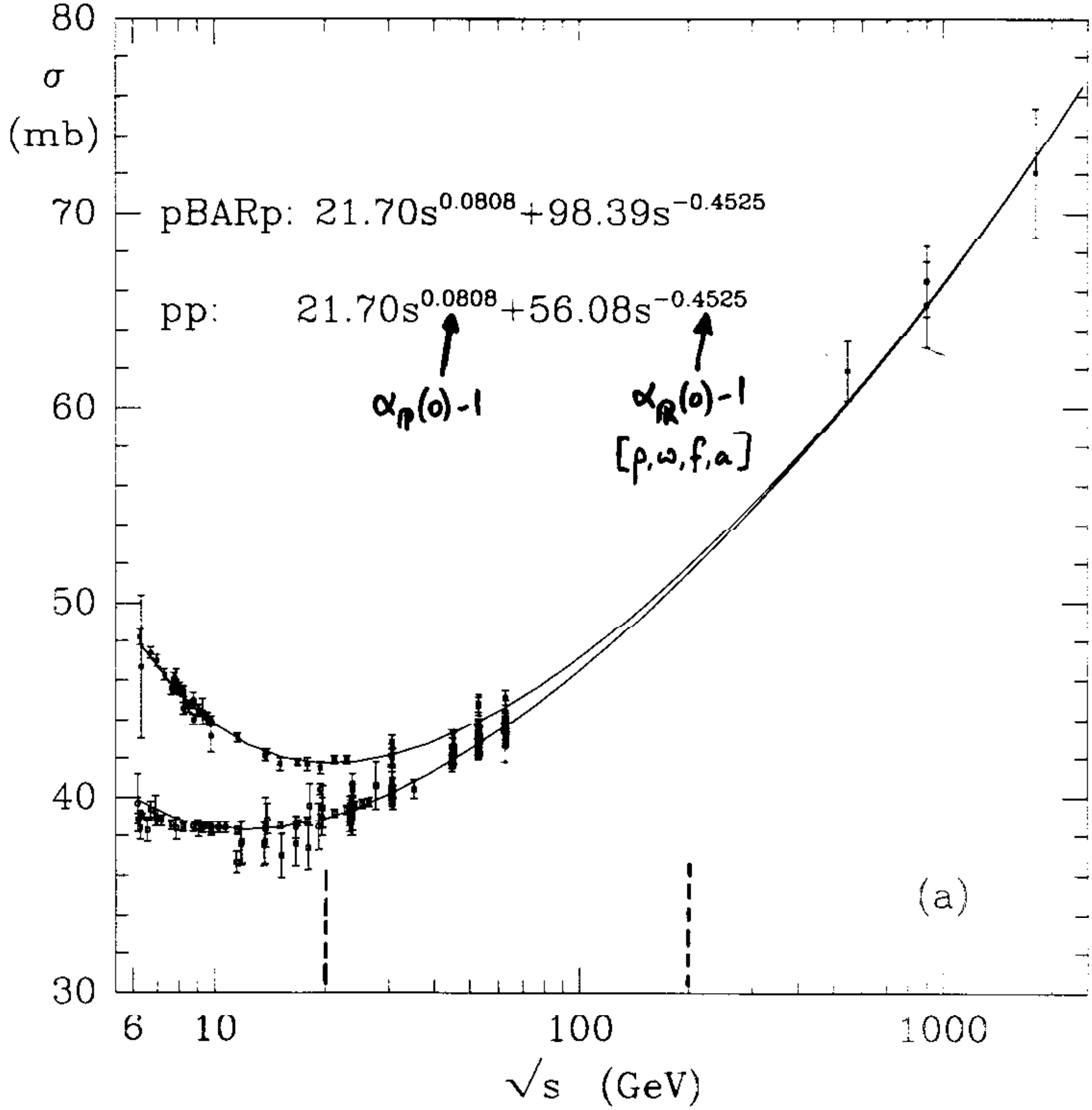
H1 Preliminary 1994



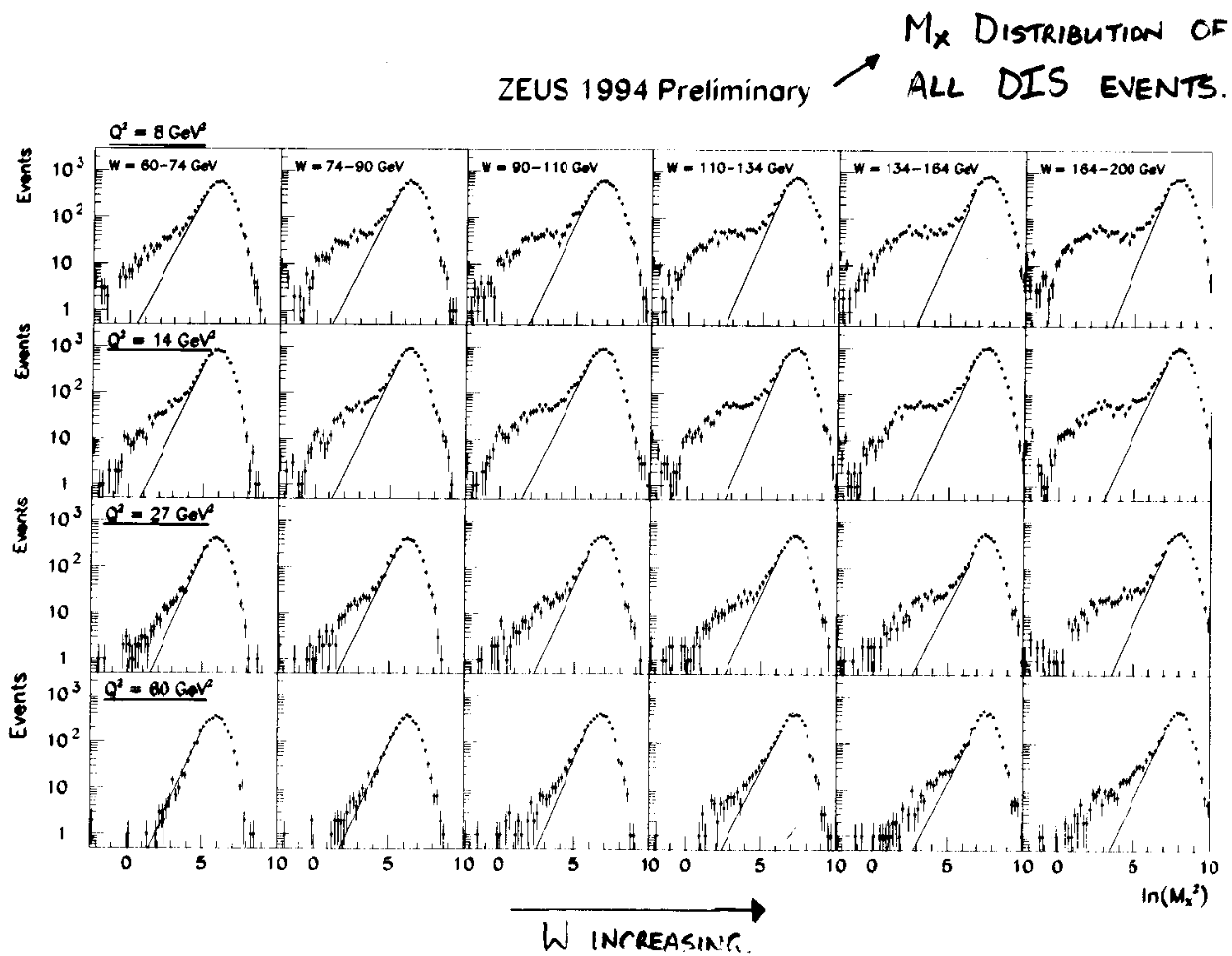
- large meson contribution at small β and high $x_{I\!P}$
- 50% meson intensity at low β and $x_{I\!P} = 0.05$
- few % meson intensity for $x_{I\!P} < 0.01$ or high β
- large contribution of interference

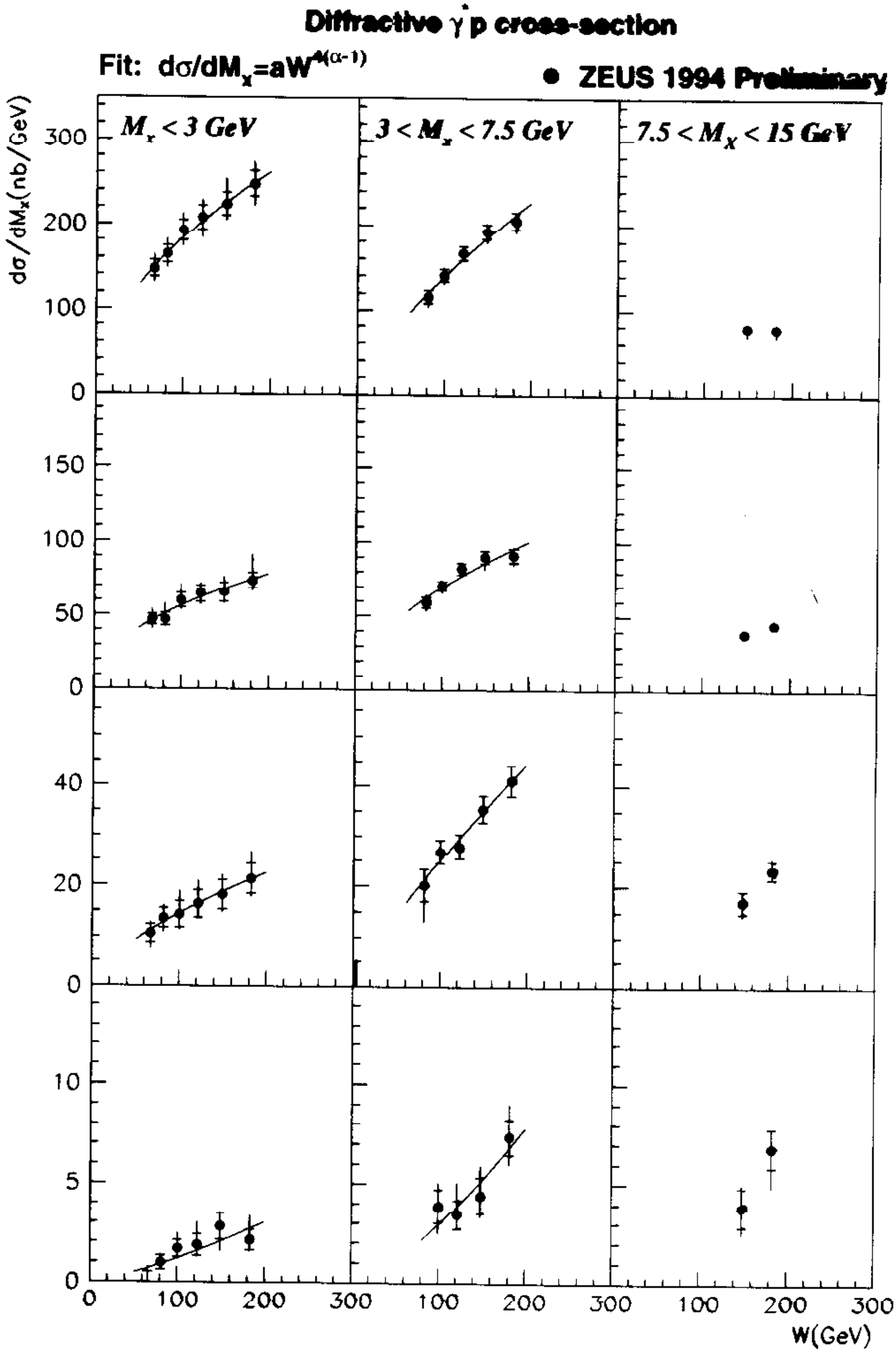
here it becomes clear that it is important to measure a model independent cross section; we cannot make ad hoc assumptions on how the subleading contribution and the interference behave

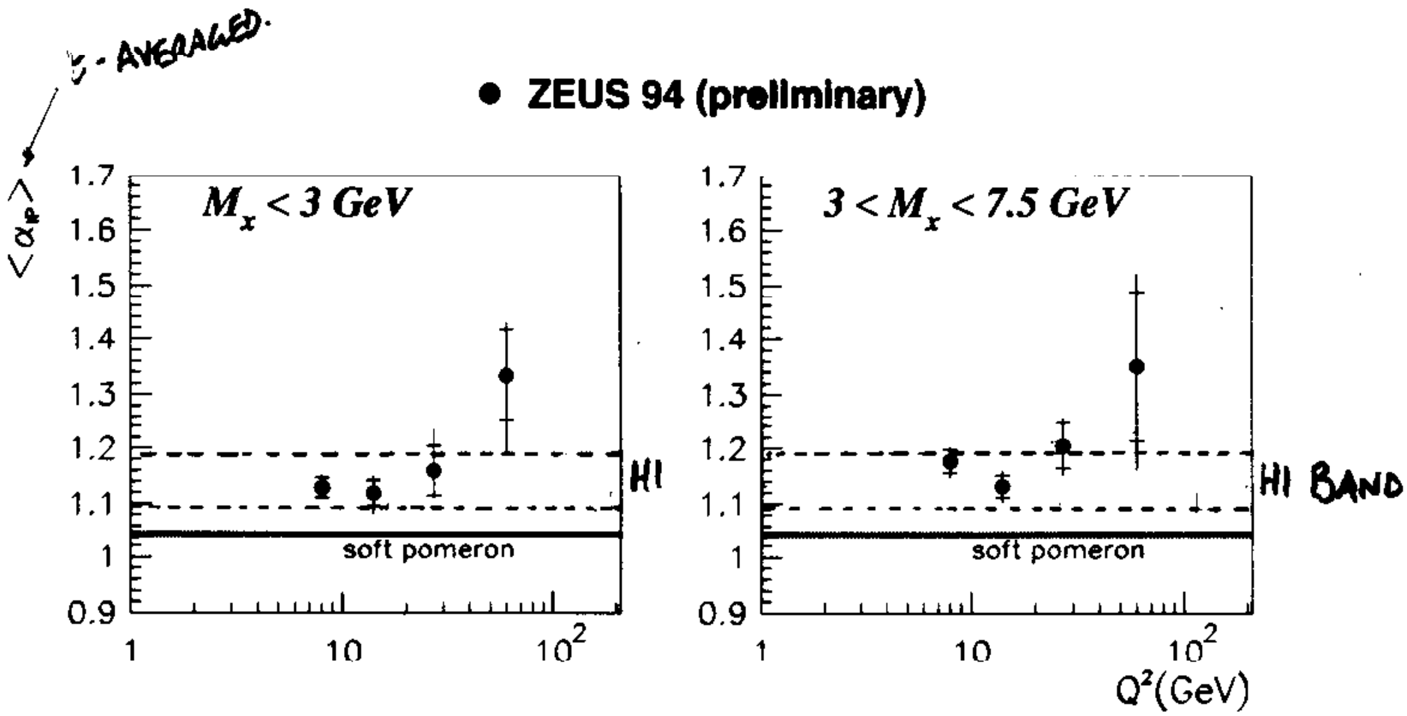
DONNACHIE - LANDSHOFF RESULTS FOR $\sigma_{pp}^{TOT}(s)$



- HERA MEASUREMENTS HAVE TYPICALLY $20 < W < 200$ GeV
- THE NON-DIFFRACTIVE CONTRIBUTION IS GENERALLY NOT NEGLIGIBLE IN THIS REGION.


ZEUS 1994 Preliminary
M_x DISTRIBUTION OF ALL DIS EVENTS.
Q^2 = 8 GeV^2
Q^2 = 14 GeV^2
Q^2 = 27 GeV^2
Q^2 = 60 GeV^2
W = 60–74 GeV
W = 74–90 GeV
W = 90–110 GeV
W = 110–134 GeV
W = 134–164 GeV
W = 164–200 GeV
Events
$\ln(M_x^2)$
W INCREASING


Diffractive γ*p cross-section
Fit: dσ/dM_x=aW^{4(α-1)}
● ZEUS 1994 Preliminary
dσ/dM_x(nb/GeV)
M_x < 3 GeV
3 < M_x < 7.5 GeV
7.5 < M_X < 15 GeV
Q² = 8 GeV²
Q² = 14 GeV²
Q² = 27 GeV²
Q² = 60 GeV²
W(GeV)

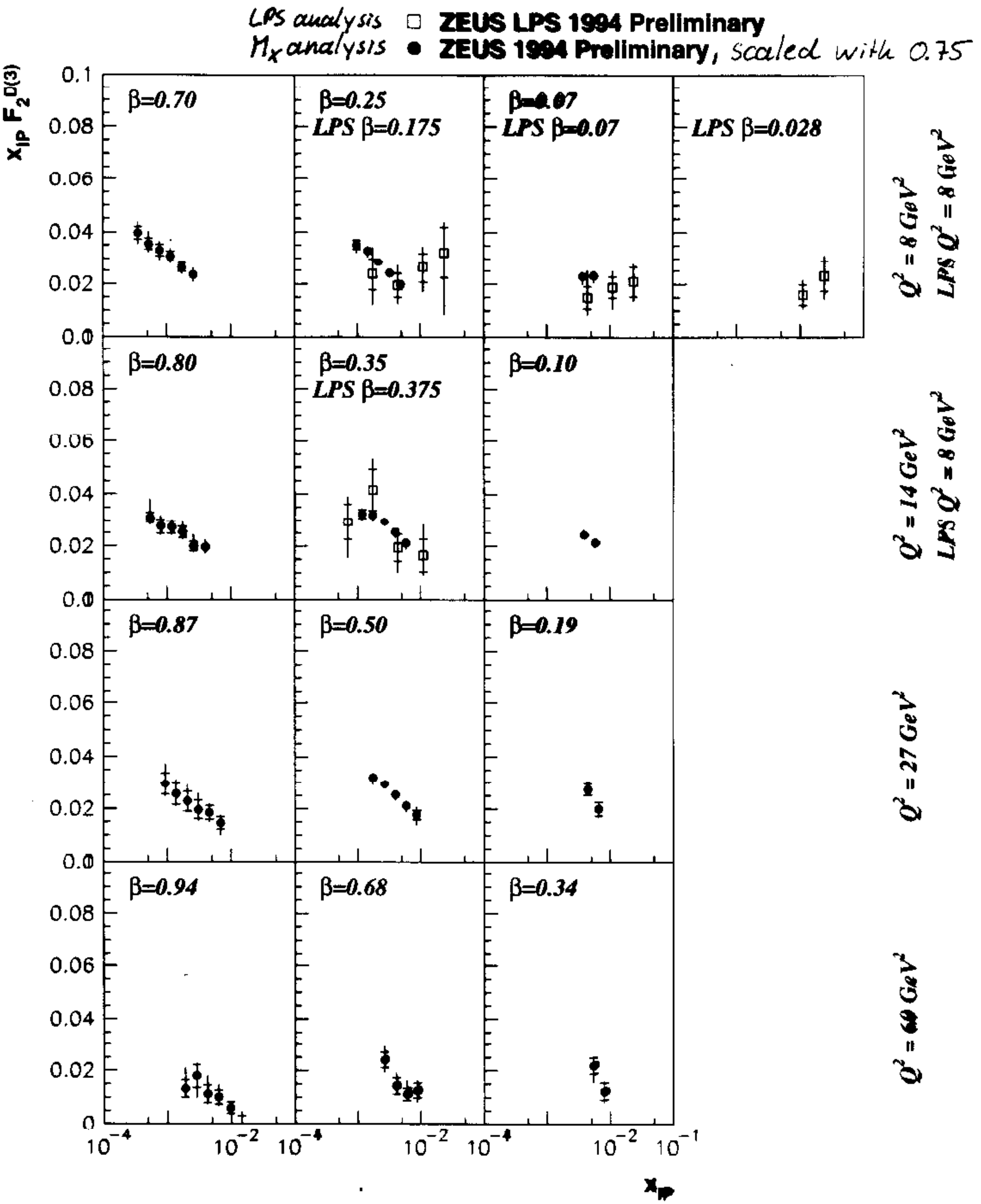


ZEUS diffractive cross sections are not compatible with the Donnachie-Landshoff Soft Pomeron

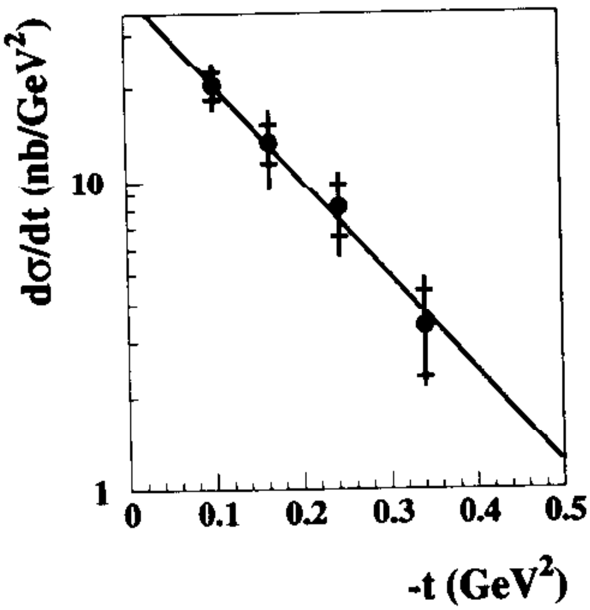
there is a tendency for α_{IP} to grow with Q^2(GeV) (more data needed) - NOT OBSERVED BY H1

THE INTERCEPTS EXTRACTED BY THE TWO EXPERIMENTS LOOK CONSISTENT.

Comparison of ZEUS $F_2^{D(3)}$ results



Measurement of the t slope in diffractive DIS



t measured as

$$t = \frac{-p_t^2}{x_L}$$

Resolution $\Delta p_t \approx 100$ MeV limited by beam characteristics

Kinematic range: (changed with respect to Warsaw to make compatible to kin. range for F_2^D)

$0.97 < x_L < 1.02$

$5\,GeV^2 < Q^2 < 20\,GeV^2$

$0.03 < y < 0.8$

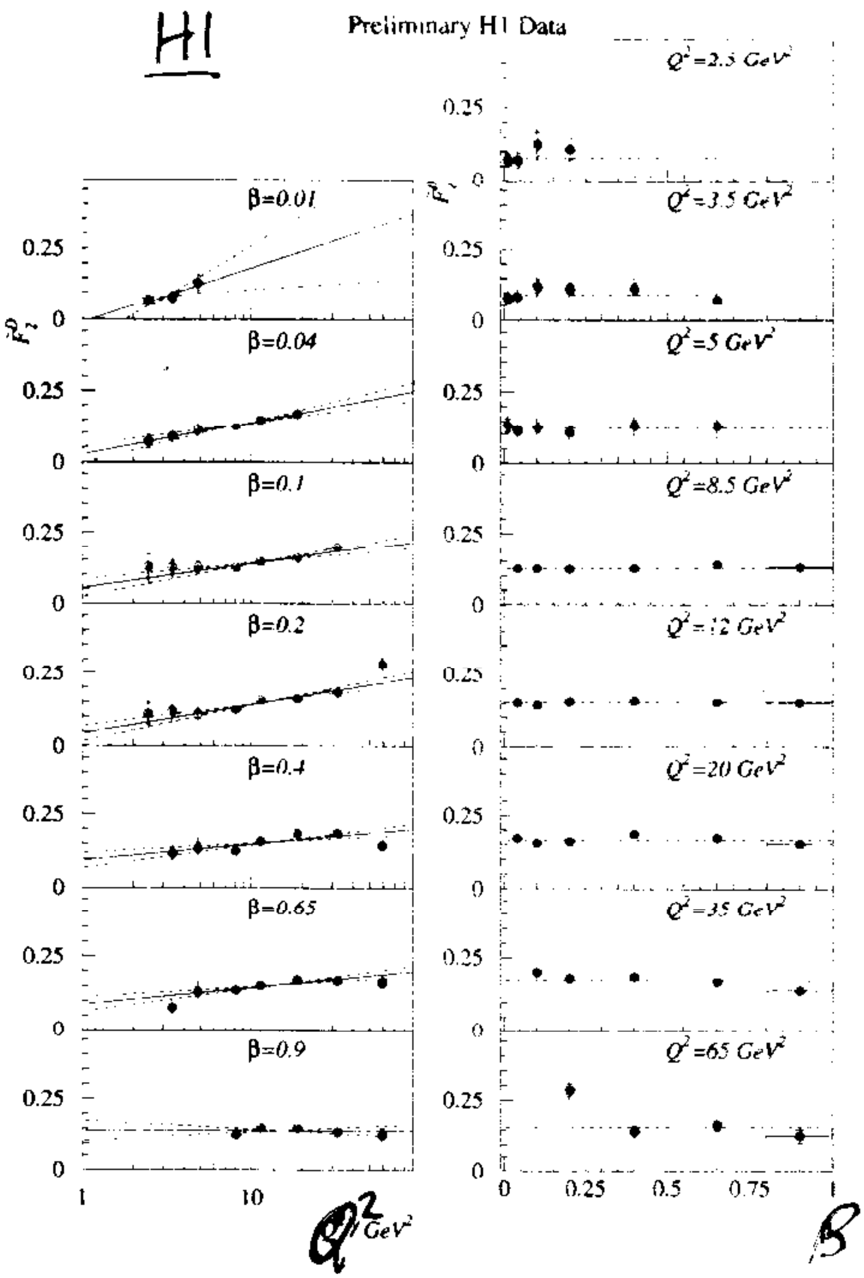
$0.015 < \beta < 0.5$

Fit to: $\frac{d\sigma}{d|t|} = A \exp(bt)$

$$b = (7.1 \pm 1.1 {}^{+0.7}_{-1.0})\ GeV^{-2}$$

Compatible to $b = b_0 + 2\alpha' \ln \frac{1}{x_{I\!P}}$ with $\alpha' = 0.25\ GeV^{-2}$ und $b_0 = 4.5\ GeV^{-2}$

$$\tilde{F}_2^D = \int_{x_{I\!P}^{min}}^{x_{I\!P}^{max}} F_2^{D(3)}\, dx_{I\!P}$$

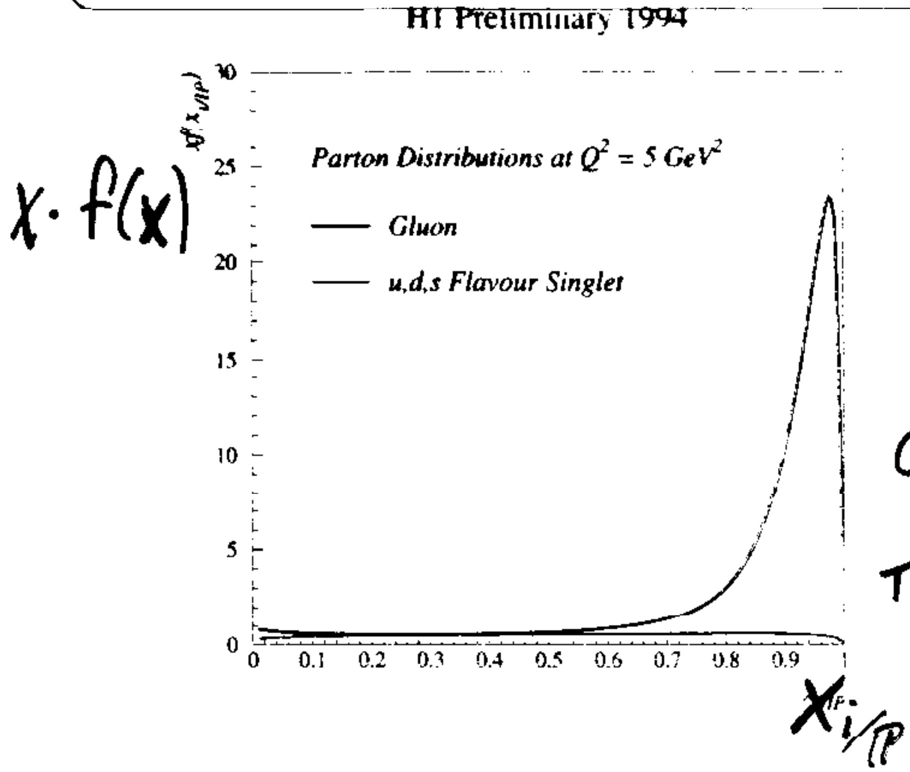


- rise in $\log(Q^2)$ even to high β ;
  not seen in F_2^{Proton} $\rightarrow$ evidence for gluons at high β?

- approximately flat in β

- calculation with $\tilde{F}_2^D(\beta, Q^2)_{x_{I\!P}<0.01}$ and $F_2^{I\!P}(\beta, Q^2)$ (Pomeron part of fit) give consistent result

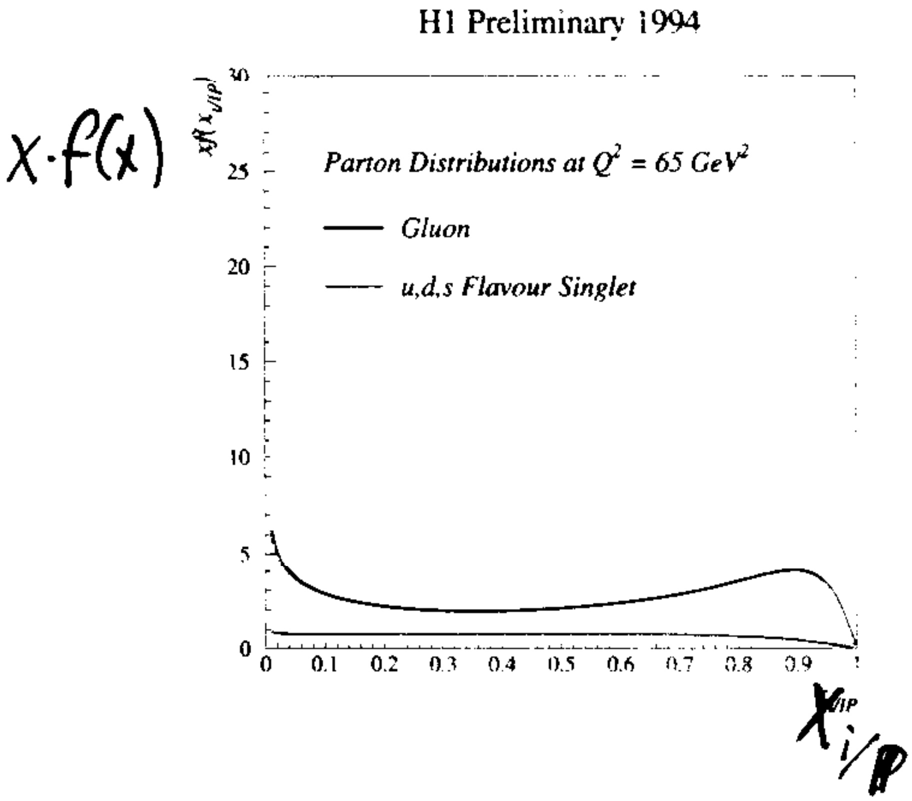
Parton Distribution Functions



FROM QUARK + GLUON FIT

GLUON DOMINANCE.

TENDING TOWARDS SINGULARITY AT LOW Q^2.

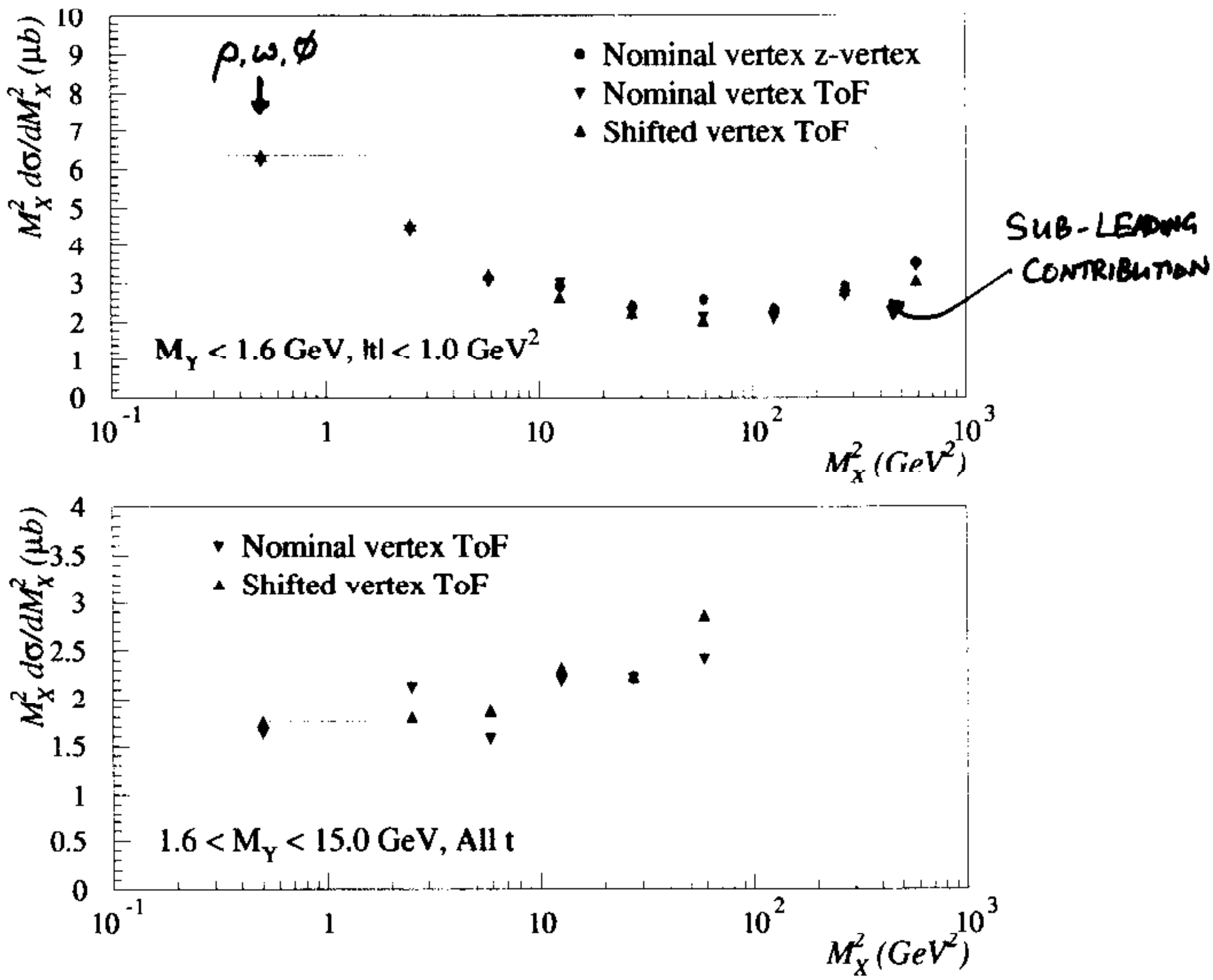


THESE PARTON DISTRIBUTIONS ARE INSERTED INTO MONTE CARLOS (RAPGAP, POMPYT) AND USED TO PREDICT PROPERTIES OF THE FINAL STATE.

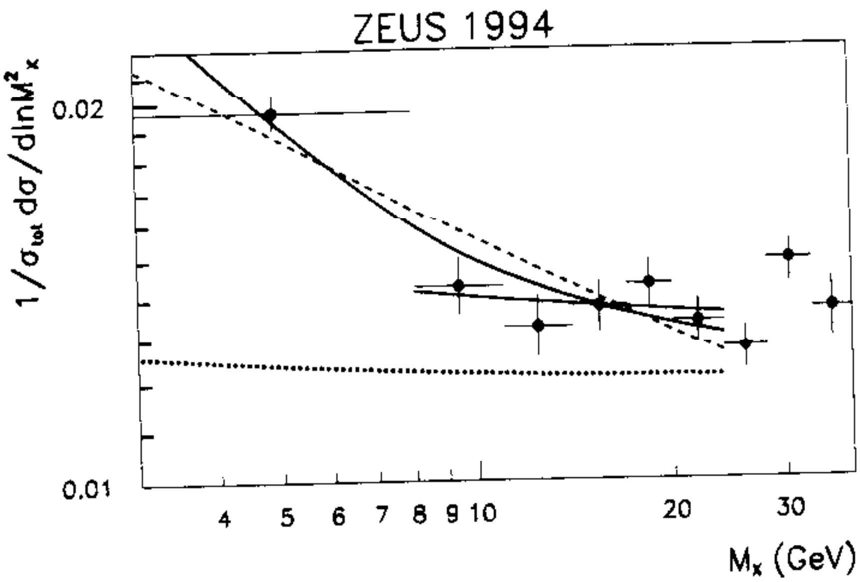
HADRON LEVEL PHOTOPRODUCTION CROSS SECTIONS.

Comparison of Measurements of $M_X^2 \frac{d\sigma}{dM_X^2}$ Using Different Data Samples, $164 < W < 212$ GeV.

H1:- $\gamma p \rightarrow XY$, $Q^2 = 0$, $M_Y < 1.6$ GeV



The two ToF samples are combined to produce the final cross sections.



MONTE CARLO USED TO SUBTRACT NON-DIFFRACTIVE CONTRIBUTIONS.

Fit $I\!P I\!P I\!P$ term only:

- $3 < M_X < 24$ GeV $\rightarrow \alpha_{I\!P}(0) = 1.20 \pm 0.02(stat)$ poor fit
- $8 < M_X < 24$ GeV $\rightarrow \alpha_{I\!P}(0) = 1.12 \pm 0.04(stat) \pm 0.08(syst)$
- $\alpha_{I\!P}(0)$ depends on M_X interval $\rightarrow$ effective $\alpha_{I\!P}(0)$.

Try fitting $I\!P I\!P I\!P$+ $I\!P I\!P I\!R$ terms:

- Insufficient lever arm to determine relative contribution and intercepts of the two components.
- Assume $\alpha_{I\!P}(0) = 1.08$ and $\alpha_{I\!R}(0) = 0.45$, and fit their relative contributions.
- Fraction of the diffractive cross section in $3 < M_X < 24$ GeV from $I\!P I\!P I\!R$:

$$f_{I\!P I\!P I\!R} = 26 \pm 3(stat) \pm 12(syst)\%$$

CROSS CHECK PERFORMED USING M_x SUBTRACTION METHOD.

INCLUSIVE DIFFRACTIVE PHOTOPRODUCTION

BOTH EXPERIMENTS HAVE MEASURED $\frac{d\sigma}{dM_X^2}$ FOR $W \sim 200$ GeV.

H1 :- $\alpha_{IP}(0) = 1.068 \pm 0.016(st) \pm 0.022(sys) \pm 0.041(mod)$

[AVERAGE OF 3 FITS WITH DIFFERENT ASSUMPTIONS FOR SUB-LEADING TERMS]

ZEUS :- $\alpha_{IP}(0) = 1.12 \pm 0.04(st) \pm 0.08(sys)$

[FIT IN REGION $8 < M_X < 24$ GeV, IPIPIP TERM]

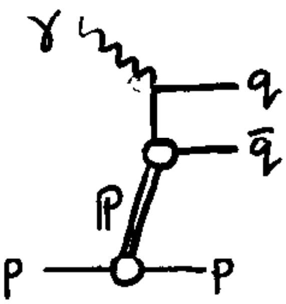
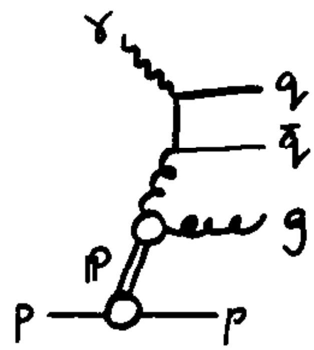
H1 :- $\frac{\sigma^D(\gamma p \to X p)}{\sigma^{tot}_{\gamma p}} = 22.2 \pm 0.6(st) \pm 2.6(sys) \pm 1.7(mod)\%$

$[0 < M_X^2/W^2 < 0.05]$

ZEUS :- $\frac{\sigma^D(\gamma p \to X p)}{\sigma^{tot}_{\gamma p}} = 13.3 \pm 0.5(st) \pm 3.6(sys)\%$

$[M_\phi^2/W^2 < M_X^2/W^2 < 0.05]$

FINAL STATE MEASUREMENTS. ($\gamma^* \mathbb{P}$ FRAME)

QUARK DOMINATED $\mathbb{P}$	GLUON DOMINATED $\mathbb{P}$
 2 PARTON FINAL STATES.	 3 PARTON FINAL STATES.
$q\bar{q}$ HIGHLY ALIGNED ALONG $\gamma^* p$ AXIS	$q\bar{q}$ CAN HAVE SIGNIFICANT p_T^2 WITH RESPECT TO $\gamma^* \mathbb{P}$ AXI[S]
[L]ARGE E_T FROM QCD-COMPTON ONLY - (SUPPRESSED $\mathcal{O}(\alpha_s)$)	INTRINSIC LARGE E_T.
- LITTLE E_T FLOW AT $\eta^* \sim 0$	- SIGNIFICANT E_T FLOW AT $\eta^* \sim$ [0]
- CHARM ONLY FROM INTRINSIC $\mathbb{P}$ CHARM CONTENT	- CHARM FROM $\gamma g \to q\bar{q}$ BOX

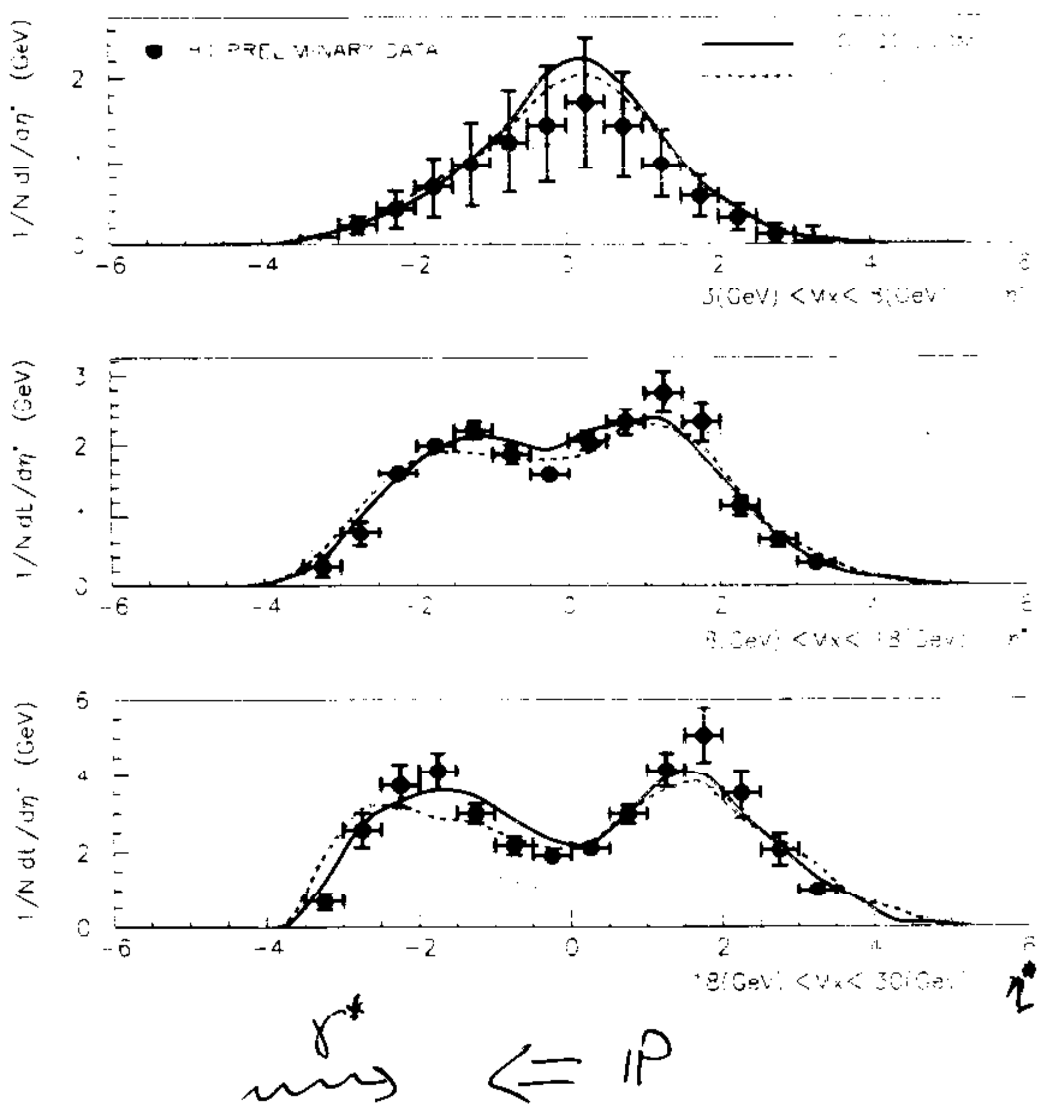
X_F SPECTRA / SEAGULL PLOTS.
\+ JET RATES / DISTRIBUTIONS.
EVENT SHAPE VARIABLES.
MULTIPLICITY CORRELATIONS.

[+ JET RATES, W PRODUCTION AT THE TEVATRON]

CONSENSUS BETWEEN ALL OBSERVABLES IN ALL EXPERIMENTS :-

THE GLUONIC $\mathbb{P}$ IS STRONGLY FAVOURED.

Energy–Flow in $\gamma^* I\!\!P$ C.M.S.



- E–flow distributions rather symmetric about $\eta^* = 0$
  → Indicative of leading 2–body process
- High level of E–Flow at $\eta^* \approx 0$
  → Cannot be reproduced by quark only Pomeron
  → Well described by "leading" gluon Pomeron

ZEUS COMBINED QCD FIT TO $\tilde{F}_2^D$ [1993 DATA] AND PHOTOPRODUCTION DIJETS

→ SIMILAR IDEA TO PARTON DISTRIBUTION EXTRACTION FROM $\tilde{F}_2^D$, BUT $d\sigma/d\eta^{jet}$ ALSO INCLUDED FROM γp.

$Q_0^2 = 4\,GeV^2$:- VARYING PARTON DISTRIBUTION PARAMETERISATIONS.

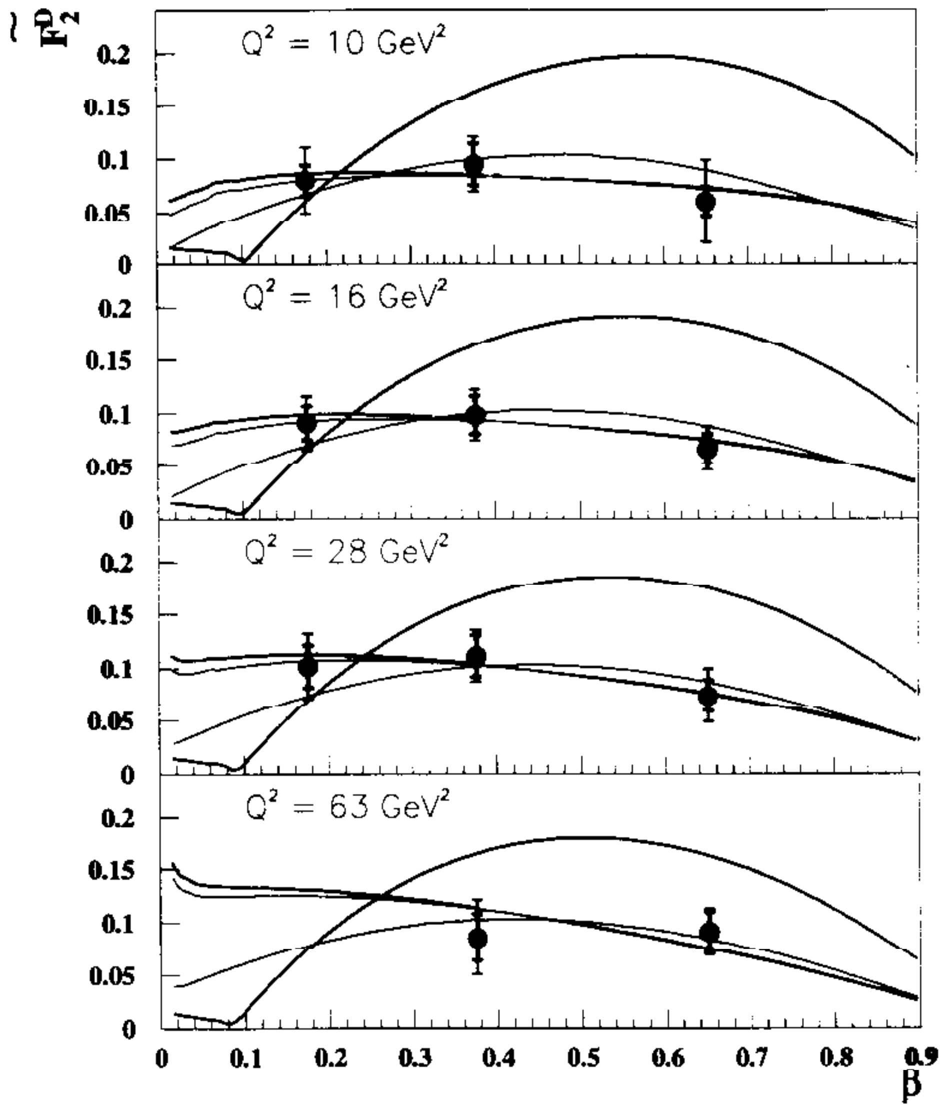
C_g = FRACTION OF $\mathbb{P}$ MOMENTUM CARRIED BY GLUONS.

→ QUARKS ONLY.

→ QUARKS & GLUONS $\sim \beta(1-\beta) + a(1-\beta)^2$

→ QUARKS $\sim \beta(1-\beta)$, GLUONS $\sim \beta^8(1-\beta)^{0.3}$

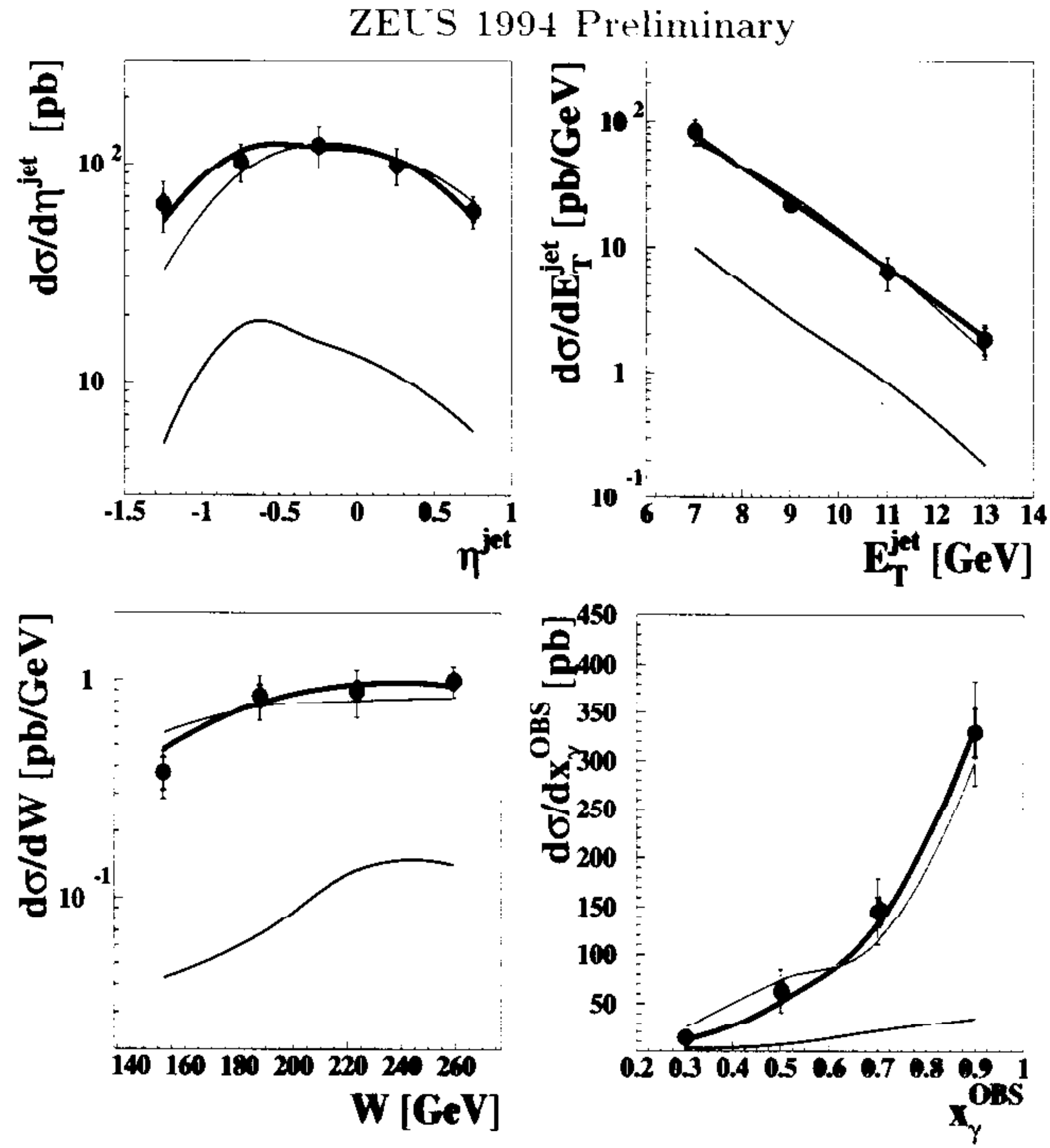
Comparison of the fits with ZEUS $\tilde{F}_2^D$ data



FRACTION OF $I\!P$ MOMENTUM CARRIED BY GLUONS

	$\beta f_{q/I\!P}(\beta, Q_0^2)$	$\beta f_{g/I\!P}(\beta, Q_0^2)$	C_g
	$a\beta(1-\beta) + c(1-\beta)^2$		
	$a\beta(1-\beta) + c(1-\beta)^2$	$b\beta(1-\beta)$	0.87
	$a\beta(1-\beta)$	$b\beta(1-\beta)$	0.87
	$a\beta(1-\beta)$	$b\beta^8(1-\beta)^{0.3}$	0.69

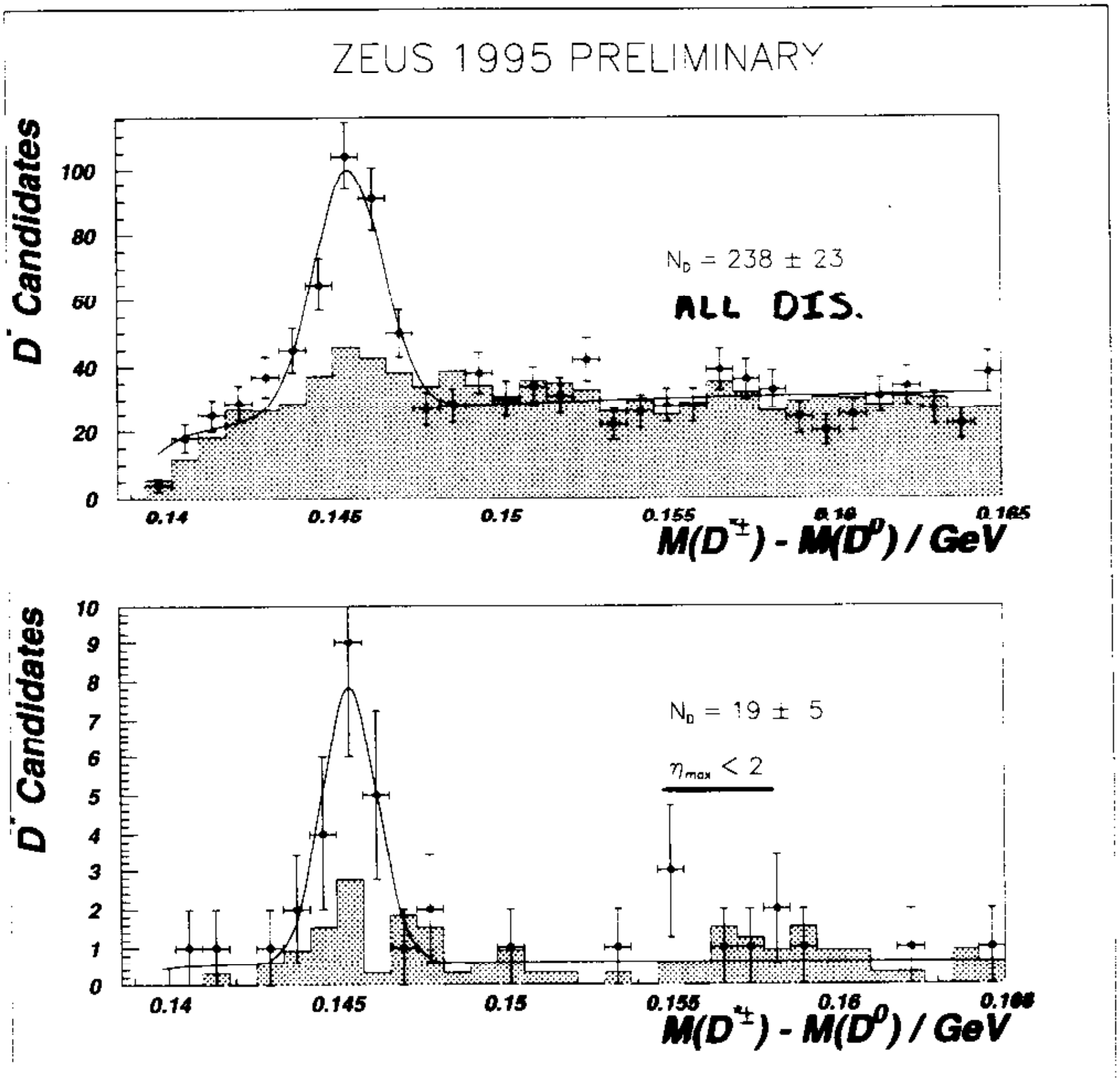
Comparison of the Fits with ZEUS Dijet Cross Sections in Diffractive Photoproduction



	$\beta f_{q/\mathbb{P}}(\beta, Q_0^2)$	$\beta f_{g/\mathbb{P}}(\beta, Q_0^2)$	C_g	Zeus Data
	$a\beta(1-\beta) + c(1-\beta)^2$			
	$a\beta(1-\beta) + c(1-\beta)^2$	$b\beta(1-\beta)$	0.87	E. Scale 3%
	$a\beta(1-\beta)$	$b\beta(1-\beta)$	0.87	Stat. errors
	$a\beta(1-\beta)$	$b\beta^8(1-\beta)^{0.3}$	0.69	Syst. errors

Mass Difference Distribution for Selected Samples

CHARM IN DIFFRACTION $D^{*+} \to D^0 \pi_s^+ \to (K^-\pi^+)\pi_s^+$



$M((K\pi)\pi_s) - M(K\pi)$

SEMI-INCLUSIVE DIFFRACTIVE D^* CROSS-SECTION

BOTH EXPERIMENTS OBSERVE A CLEAR CHARM SIGNAL

ZEUS	H1
$p_T(D^*) > 1$ GeV.	$p_T(D^*) > 1$ GeV.
$-1.5 < \eta(D^*) < 1.5.$	$-1.5 < \eta(D^*) < 1.5.$
$10 < Q^2 < 80\ \text{GeV}^2$	$10 < Q^2 < 100\ \text{GeV}^2$
$0.04 < y < 0.7$	$0.06 < y < 0.6$
$\eta_{max} < 2$	$x_{IP} < 0.05$

$$\sigma(D^*) = 875 \pm 248 {}^{+395}_{-199}\ \text{pb}$$

$$\sigma(D^*) = 380 {}^{+150}_{-120} {}^{+140}_{-110}\ \text{pb.}$$

- CONSISTENT WITH MONTE CARLO BASED ON QCD FIT
- INCONSISTENT WITH QUARK BASED IP UNLESS IT CONTAINS INTRINSIC CHARM.

EXCLUSIVE VECTOR MESON PRODUCTION

	γp	$\gamma^* p$
ρ^0	H1 ZEUS	H1 ZEUS E665
ϕ	H1 ZEUS	H1 ZEUS
J/ψ	H1 ZEUS	H1 ZEUS
ψ'	H1	
ρ'		H1

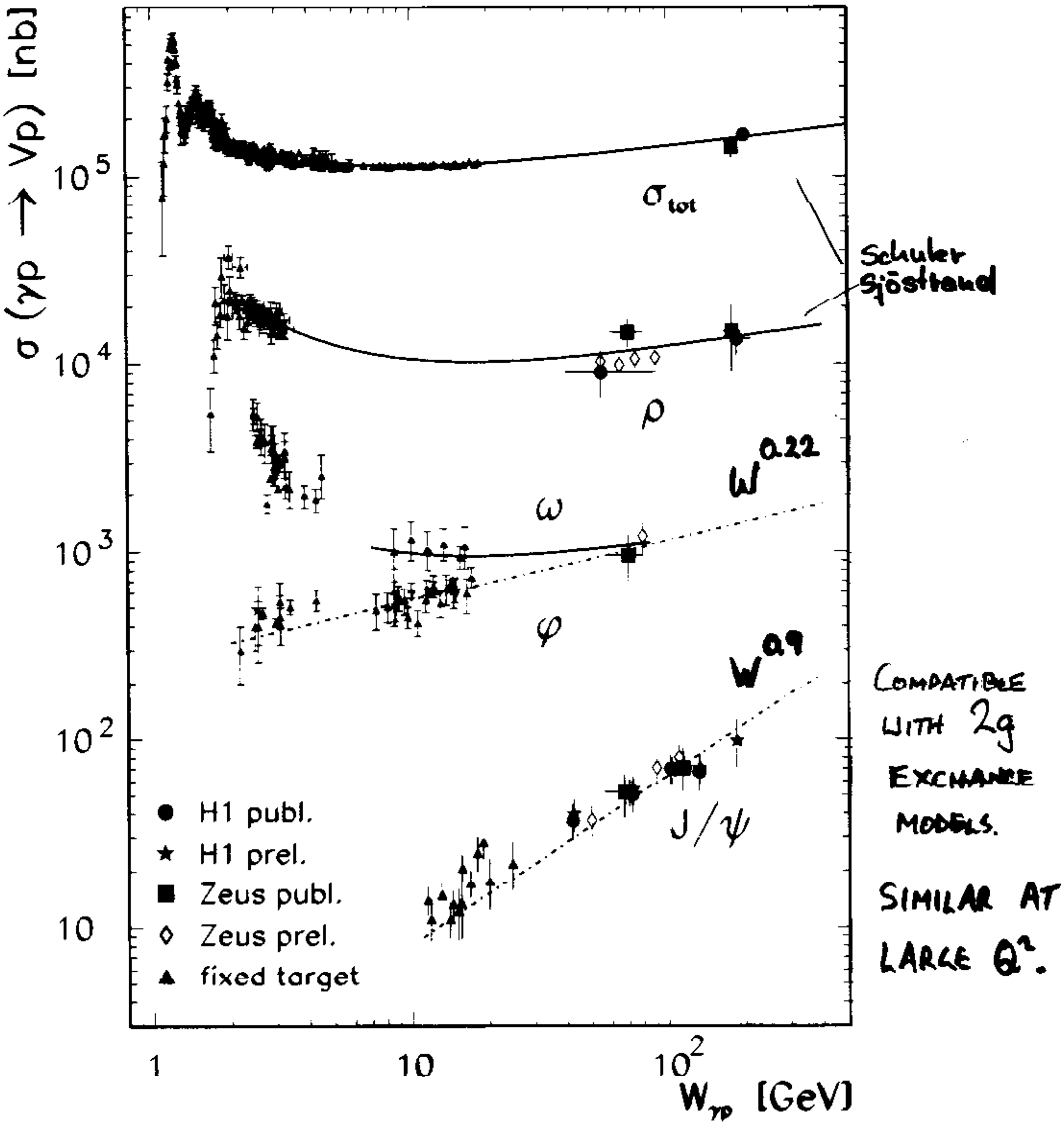
NEW KINEMATIC REGIONS :-

ZEUS :- $|t| < 4\,GeV^2$ FOR $\gamma p \rightarrow \rho p$
$0.25 < Q^2 < 0.85\,GeV^2$ (BPC)

E665 :- $0.15 < Q^2 < 20\,GeV^2$

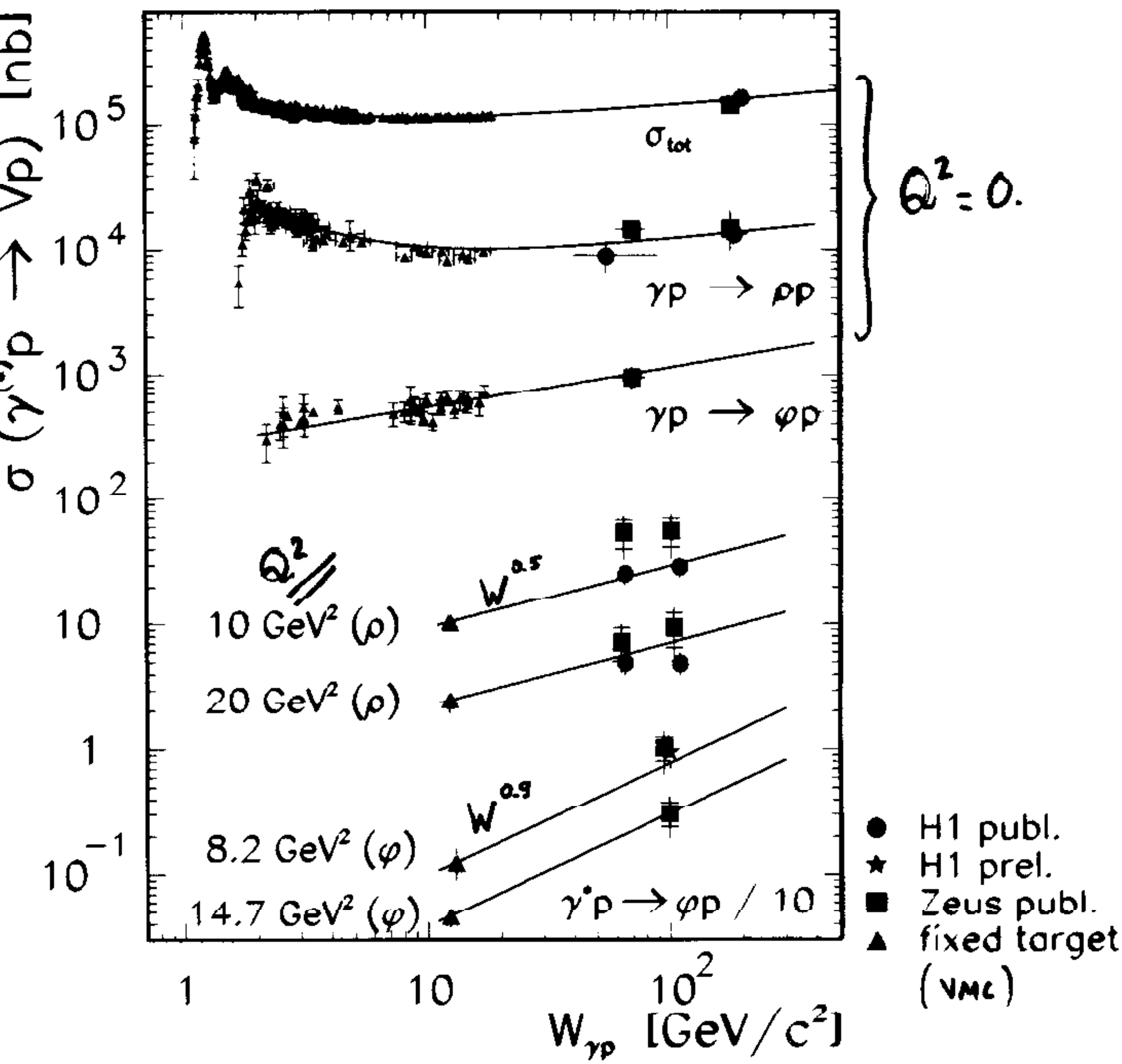
~ CONSENSUS BETWEEN EXPERIMENTS ON MOST POINTS.

photoproduction cross sections



- light vector mesons described by soft pomeron
- J/Ψ steeper rise $\rightarrow$ 'hard' pomeron

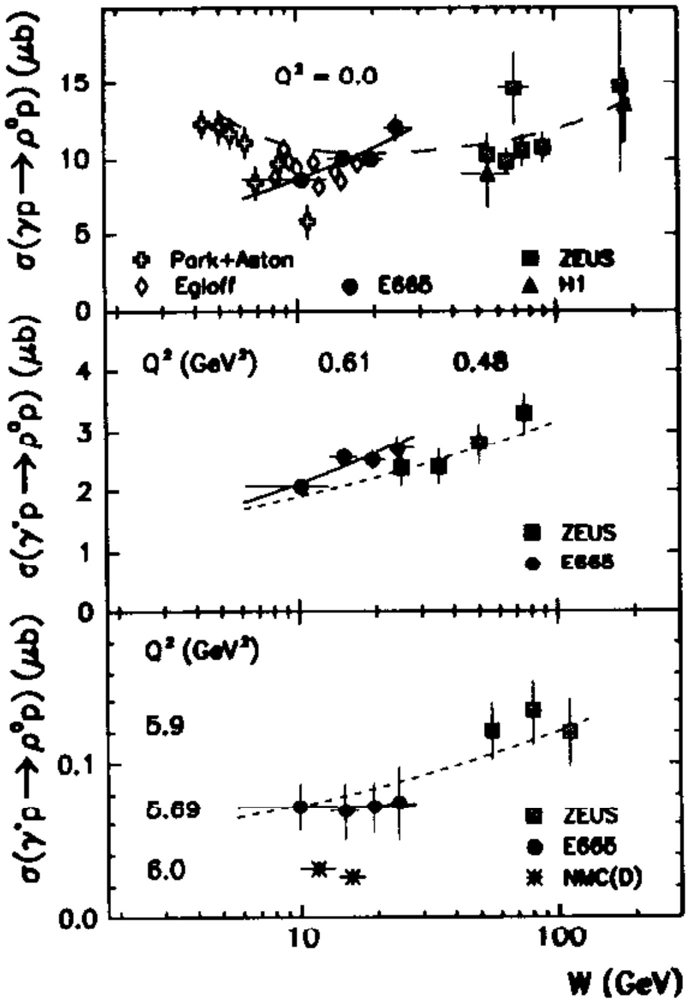
$W_{\gamma p}$ dependence ρ^0 vs. Φ



- Φ : steeper rise with $W_{\gamma p}$ than in photoproduction
- increase larger for Φ than for ρ^0
  harder scale due to larger mass

E665

$\sigma(\gamma^* p \rightarrow \rho^0 p) = \sigma_T + \epsilon \cdot \sigma_L$ versus W
for different regions of Q^2



$\kappa = 0.31 \pm 0.20$

$\kappa = 0.31 \pm 0.20$

$\kappa = 0.02 \pm 0.75$

Dashed curve : Schuler and Sjöstrand. P.L. B300 (1993) 169; Nucl.Phys. B407 (1993) 539

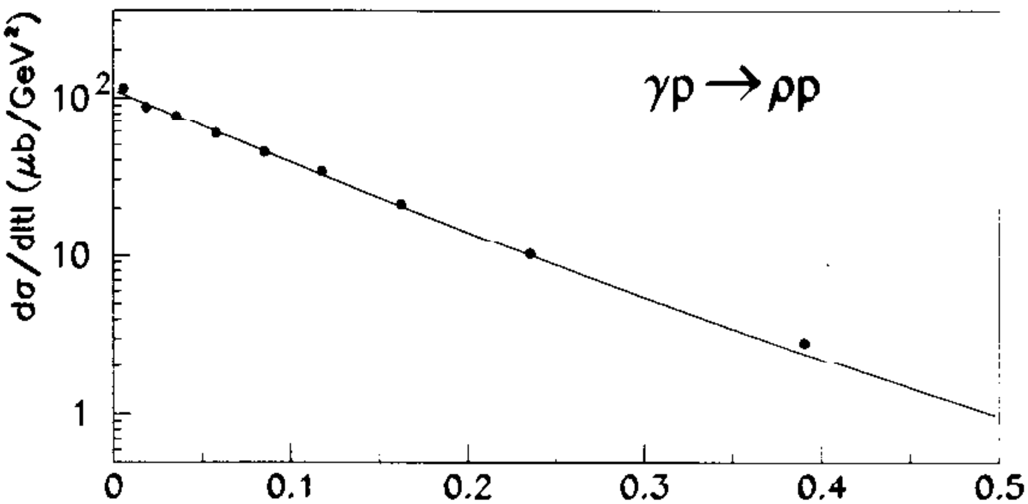
Dotted curve : $c \cdot (W/GeV)^{0.22}$

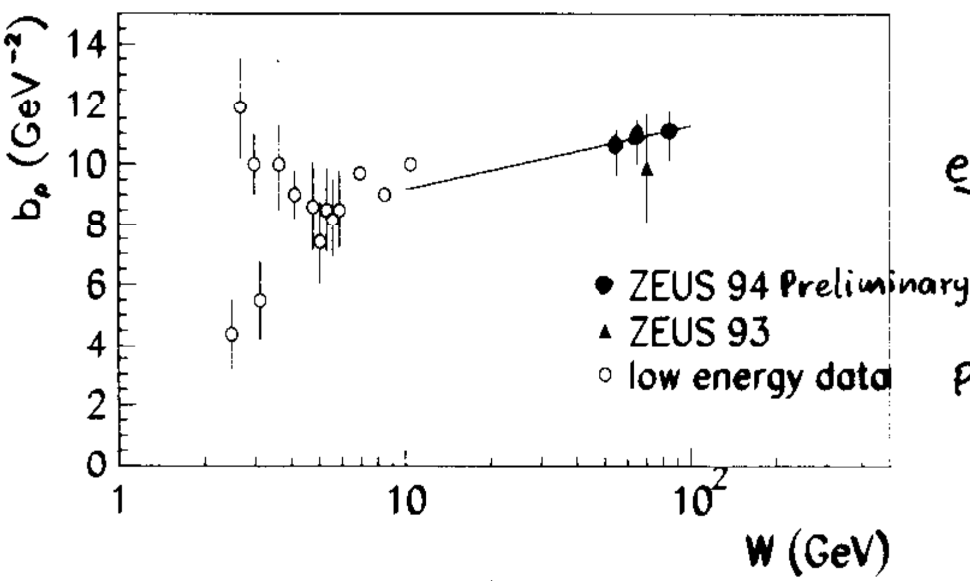
Solid curve : fits of $a \cdot (W/GeV)^{\kappa}$ to E665 data

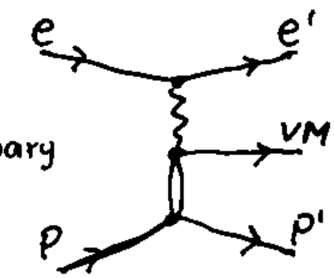
Elastic photoproduction of ρ^0 meson

fit to data with $\frac{d\sigma}{d|t|} = Ae^{-b_\rho|t|+c_\rho t^2}$

$b_\rho = 10.9 \pm 0.3$ (stat.) $^{+1.0}_{-0.5}$ (syst.) GeV^{-2}
$c_\rho = \ \ 2.7 \pm 0.9$ (stat.) $^{+1.9}_{-1.7}$ (syst.) GeV^{-4}





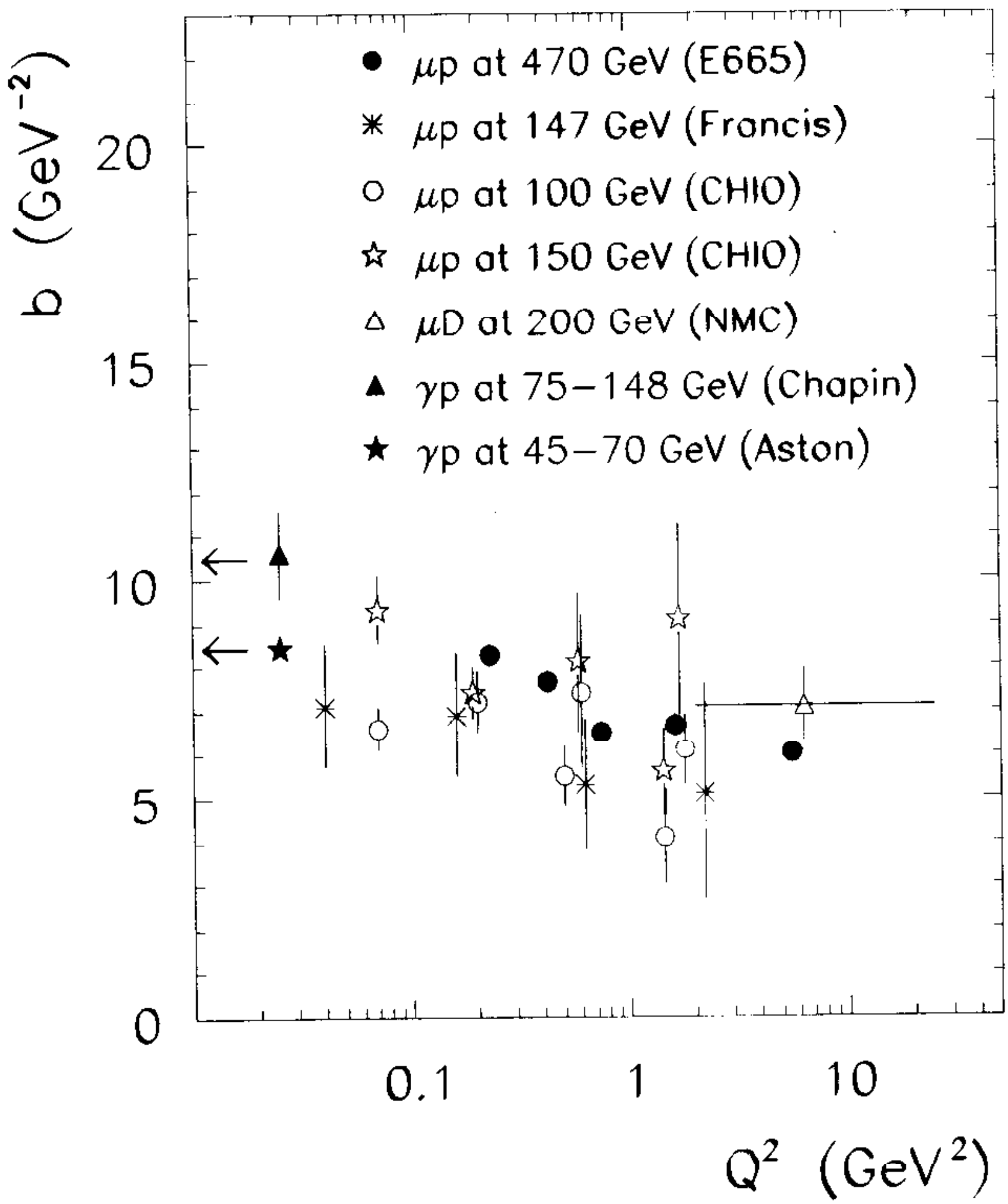


A fit of the form $b_\rho(W) = b(W_0) + 2\alpha'_{pom} \ln W^2$
$\alpha'_{pom} = 0.23 \ \pm 0.15$ (stat.) $^{+0.10}_{-0.07}$ (syst.) GeV^{-2}

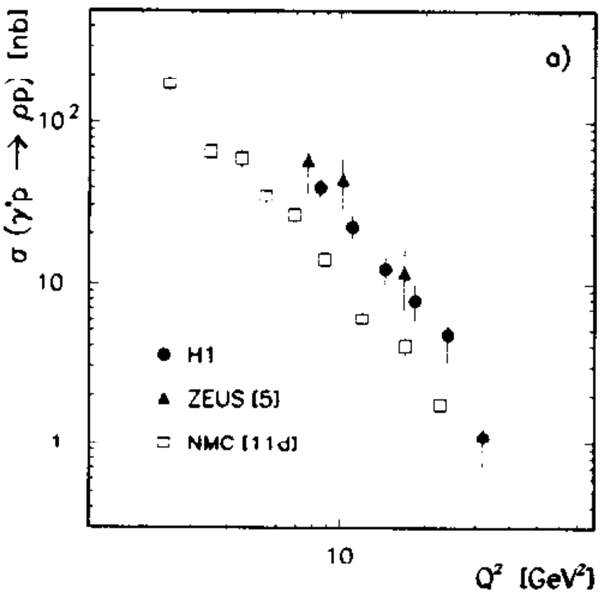
consistent with $\alpha'_{pom} = 0.25\ \text{GeV}^{-2}$ as obtained from fits to data on soft hadronic processes.

Q^2 Dependence of t' slopes

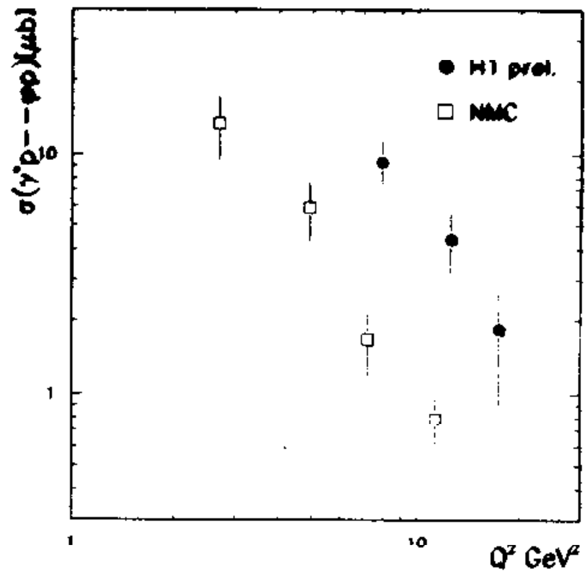
$$d\sigma/dt' = A\, e^{-bt'}$$



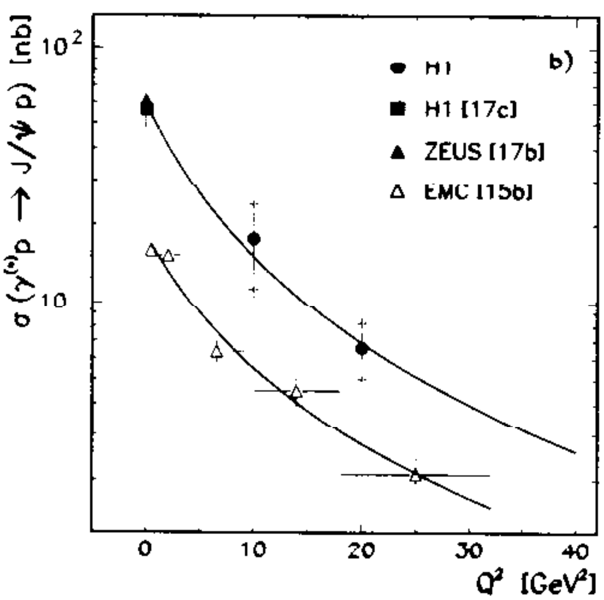
Q^2 dependence at high Q^2



$\rho^0 : \propto Q^{-2n}$



$\Phi : \propto Q^{-2n}$



$J/\Psi : \propto 1/(Q^2 + m_\Psi^2)^n$

$\rho^0 : n = 2.5 \pm 0.5 \pm 0.2$

$\Phi : n = 2.0 \pm 0.6 \pm 0.2$

$J/\Psi : n = 1.9 \pm 0.3$

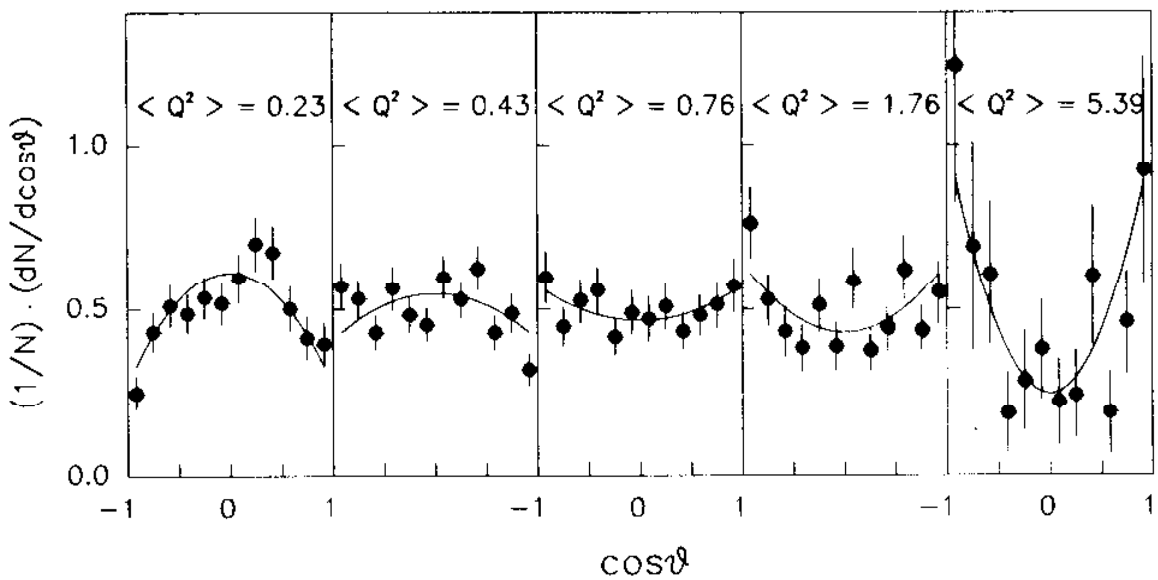
good agreement with low energy data

E665

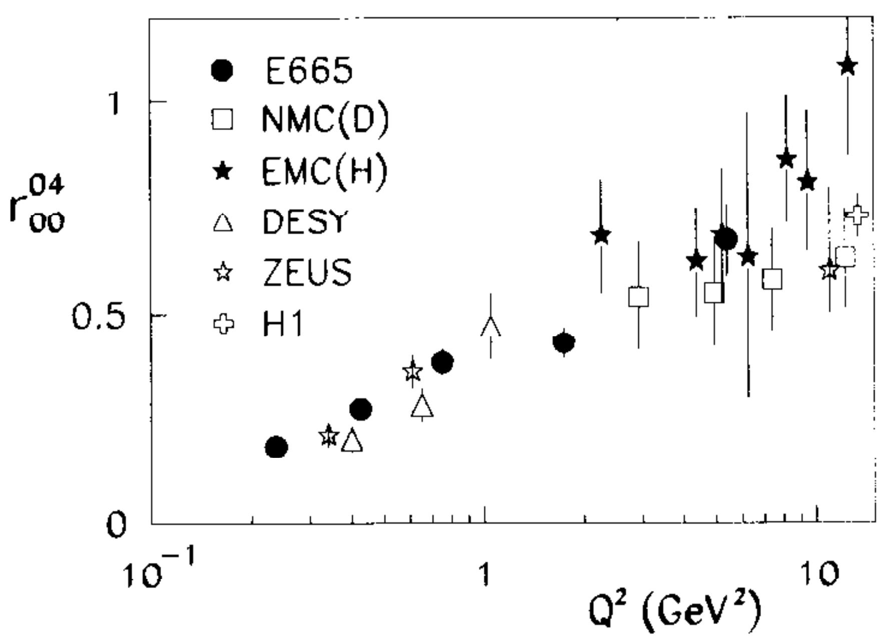
$\boldsymbol{\rho}^0$ decay in the helicity frame :

quantization axis = direction of $\boldsymbol{\rho}^0$ in $\gamma^* p$ cms

ϑ = angle between decay π^+ and quantization axis



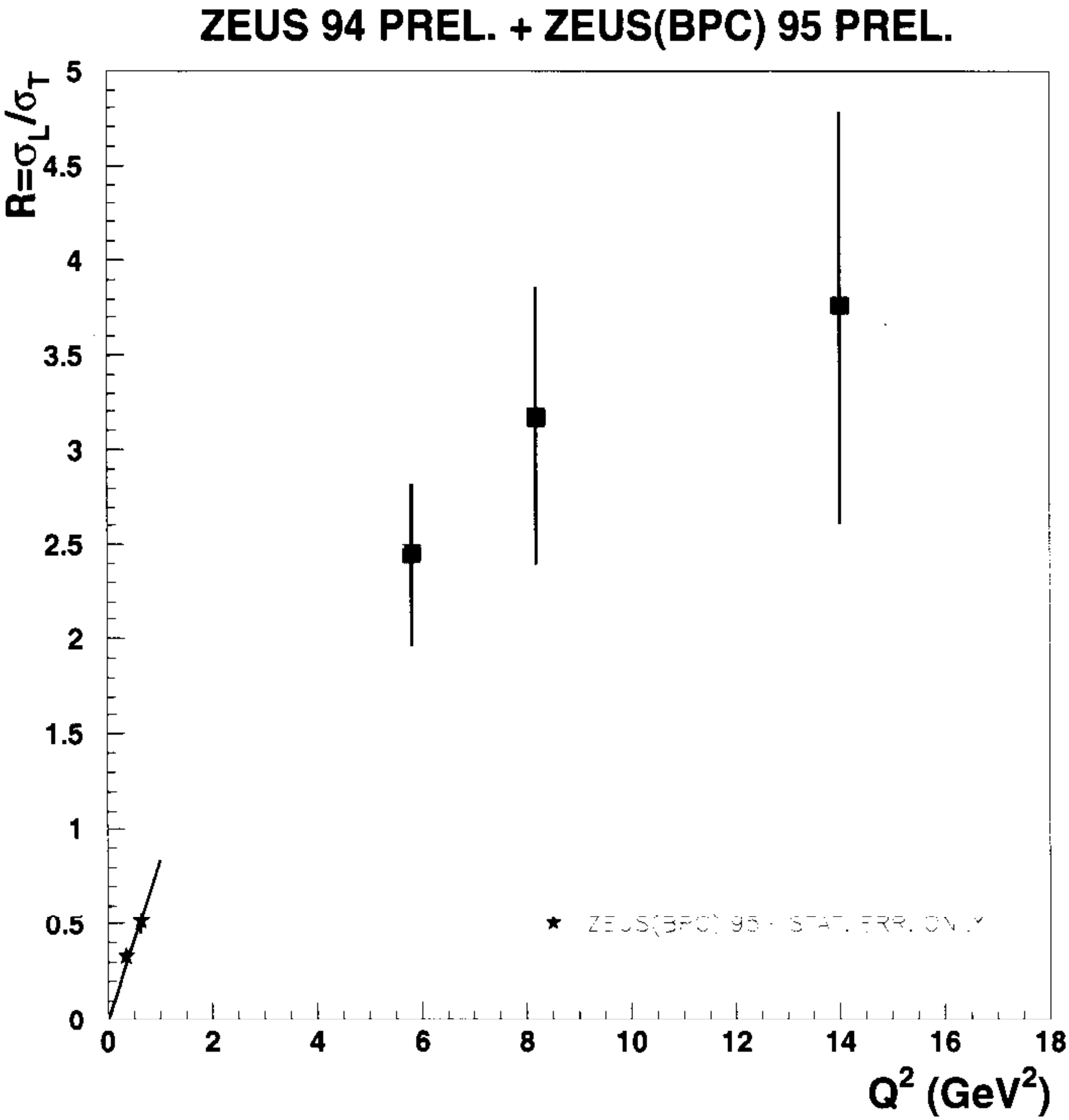
$$\frac{1}{N} \cdot \frac{dN}{dcos\vartheta} = \frac{3}{4} \cdot \left[1 - r^{04}_{00} + (3r^{04}_{00} - 1)\ cos^2\vartheta\right]$$



r^{04}_{00} is probability that $\boldsymbol{\rho}^0$ has helicity 0 (longitudinal)

R VS Q^2

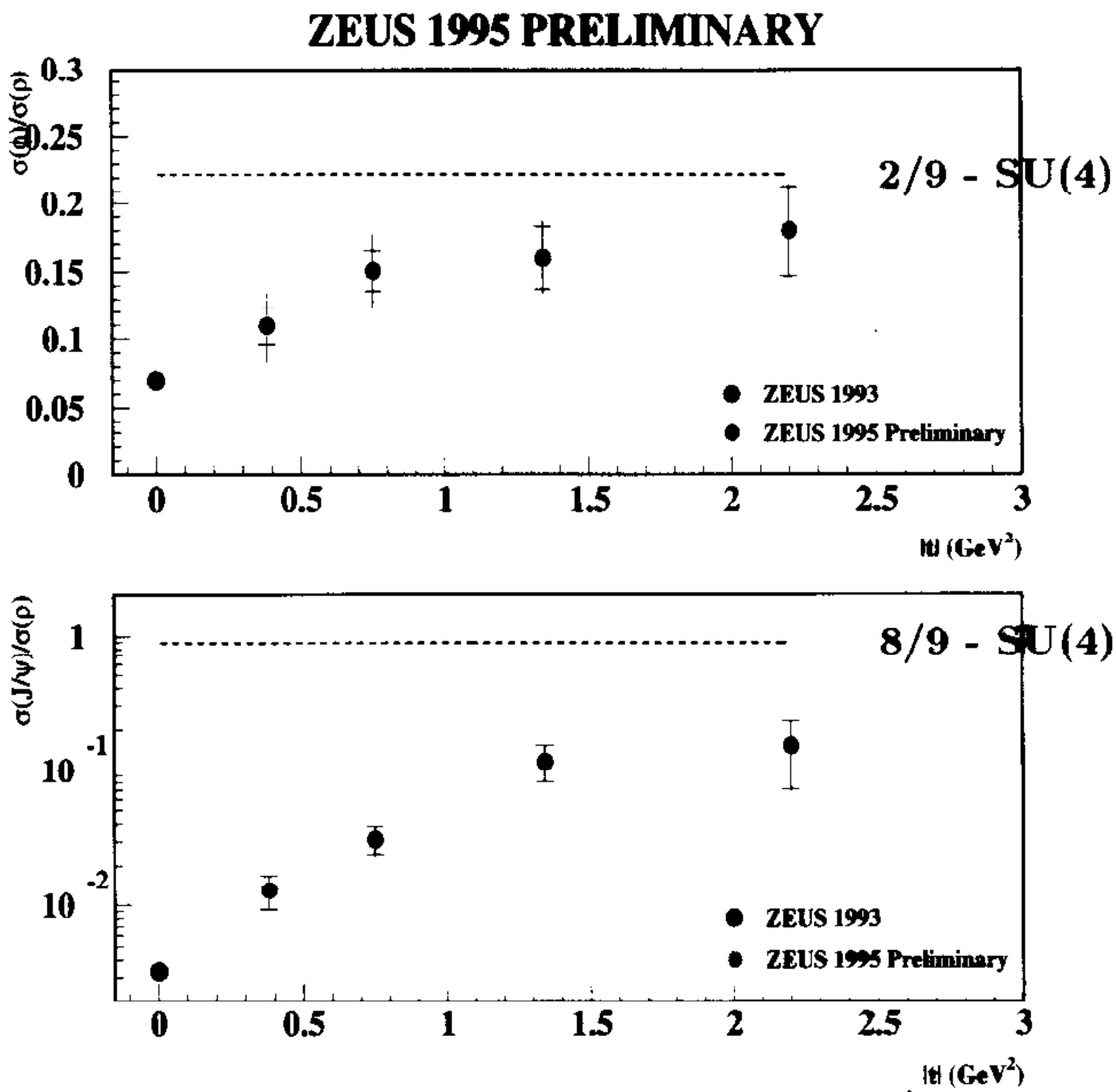
IF SCHC : $R = \sigma_L / \sigma_T = \frac{1}{\varepsilon} \cdot \frac{r^{04}_{00}}{1 - r^{04}_{00}}$

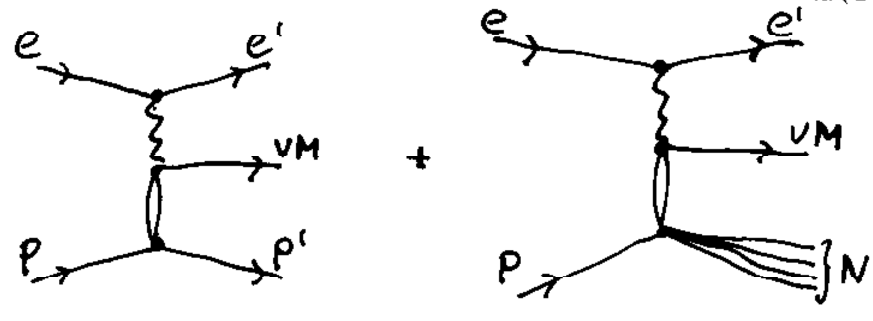


ε : RATIO OF LONGITUDINAL TO TRANSVERSE γ* FLUX

VM photoproduction at large $|t|$

Ratio of the cross sections $\sigma(\phi)/\sigma(\rho^0)$ and $\sigma(J/\psi)/\sigma(\rho^0)$ as a function of $|t|$.

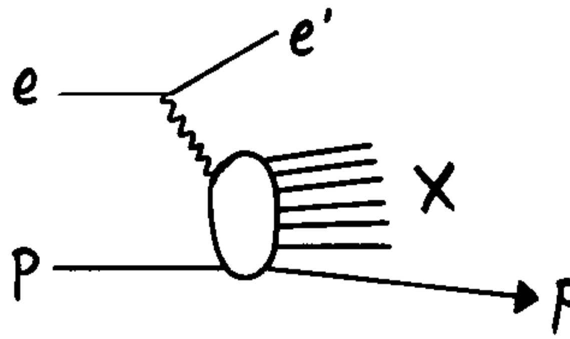




LEADING PROTONS AND NEUTRONS AT LARGE x_{IP} ($\equiv x_\pi \equiv 1 - x_L$)

- A COMPLETELY NEW FIELD SINCE LAST YEAR.

- SEMI-INCLUSIVE DISTRIBUTIONS WITH LEADING BARYONS :-

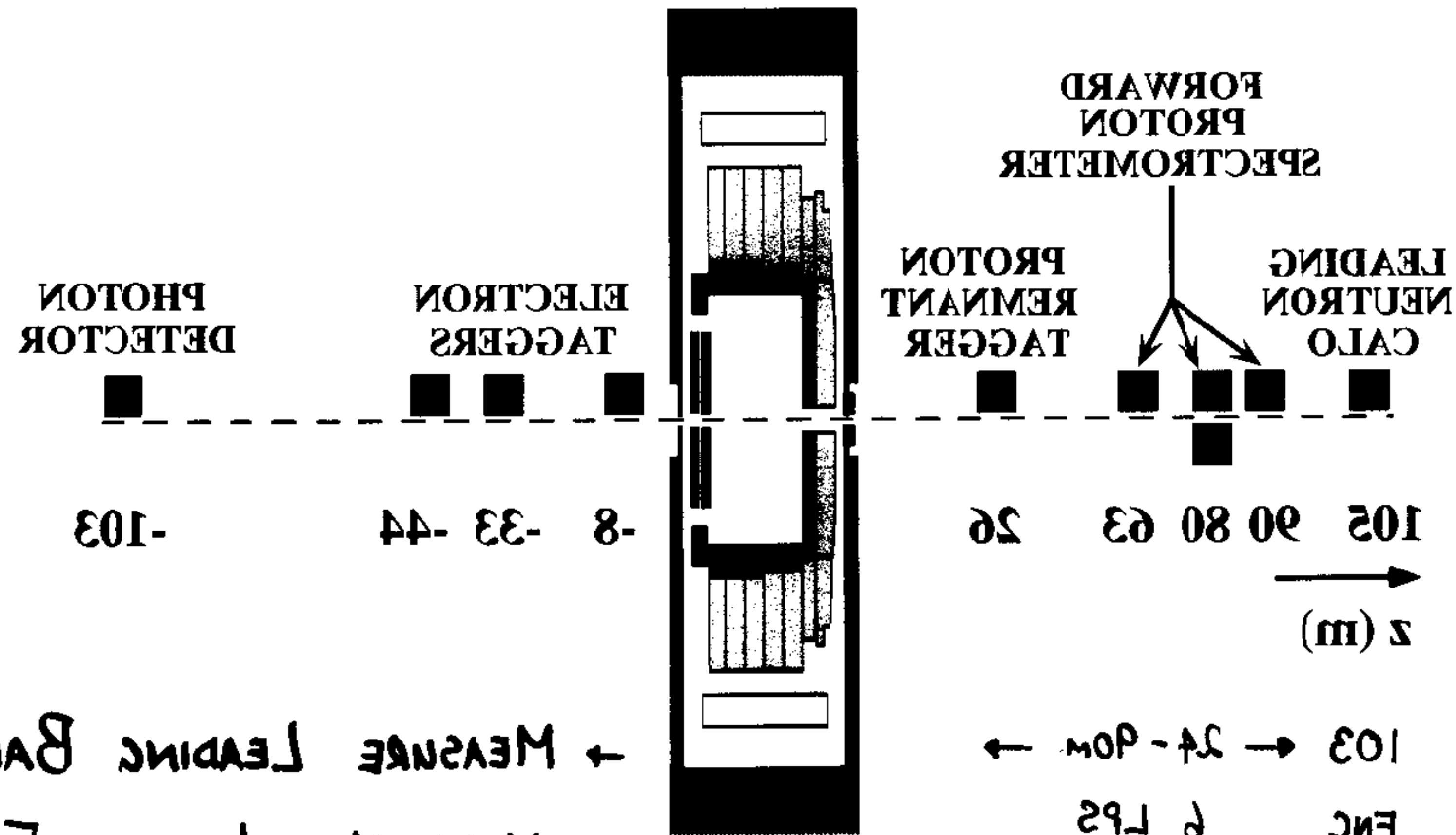


→ FPS/FNC. →

- FACTORISATION / UNIVERSALITY ?

  → DOES PROBABILITY OF OBSERVING A LEADING BARYON DEPEND ON ANY PROPERTY OF THE PHOTON VERTEX ?

BEAM-LINE INSTRUMENTATION



ZEUS:- 103 ← 24 - 90m → ← MEASURE LEADING BARYONS

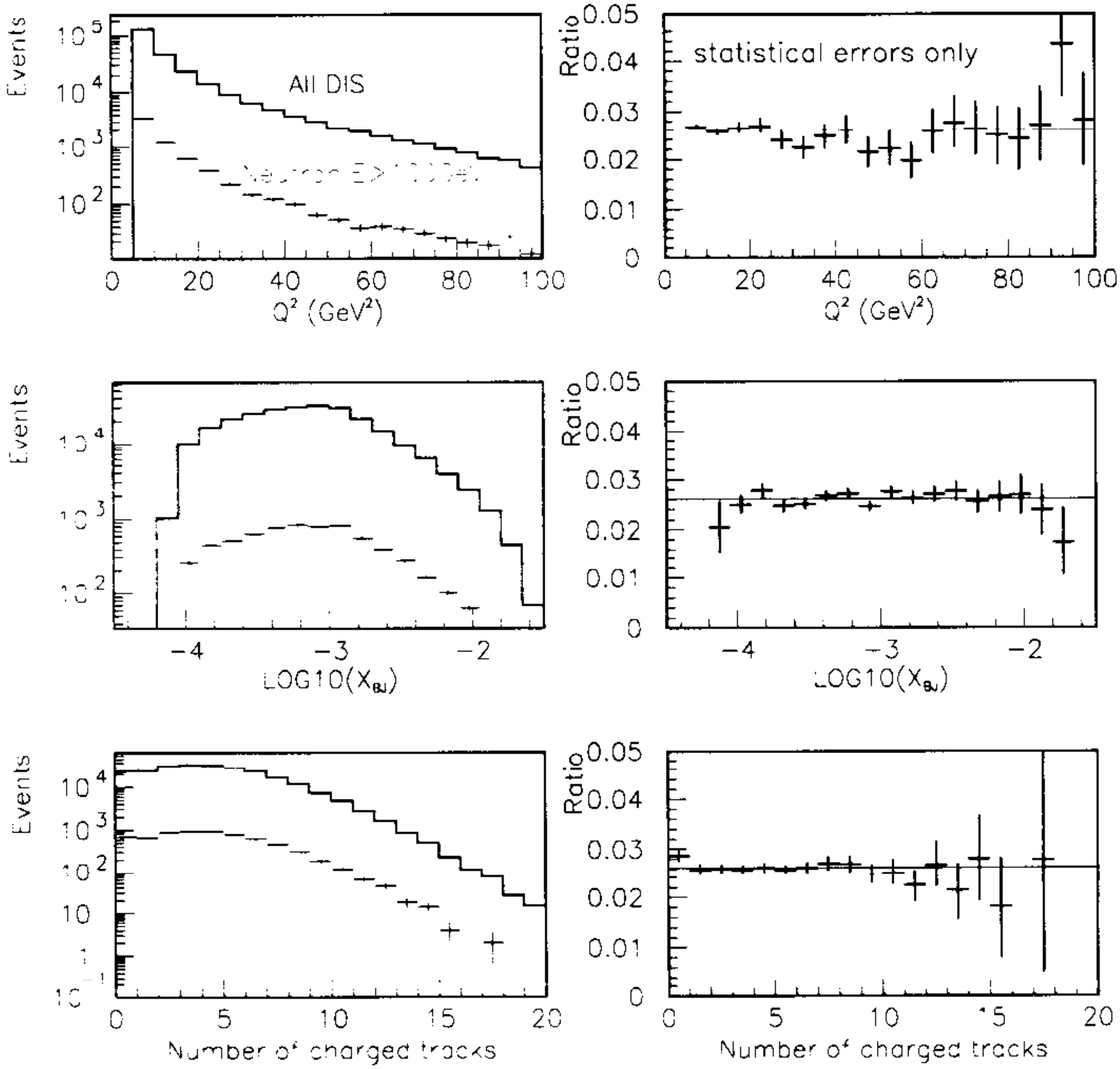
FNC 6 LPS STATIONS

WITH $x_L = 1 - x_n = \frac{E_{p/n}}{E_{BEAM}}$

SMALL.

H1 LEADING NEUTRONS

RATIO: $\dfrac{\text{EVENTS WITH NEUTRON } E>100\,\text{GeV}}{\text{ALL DEEP-INELASTIC EVENTS}}$ (x, Q^2, n_c)



SIMILAR OBSERVATION BY BOTH EXPERIMENTS WITH LEADING PROTON'S.

LEADING PROTON STRUCTURE FUNCTION

DEFINE $F_2^{LP(3)}(x, Q^2, x_\pi)$ IN EXACTLY THE SAME WAY AS $F_2^{D(3)}(x, Q^2, x_{I\!P})$

MEASURED BY H1 FOR $0.1 \lesssim x_\pi \lesssim 0.3$

$(740 \gtrsim E_{p'} \gtrsim 580\ GeV)$

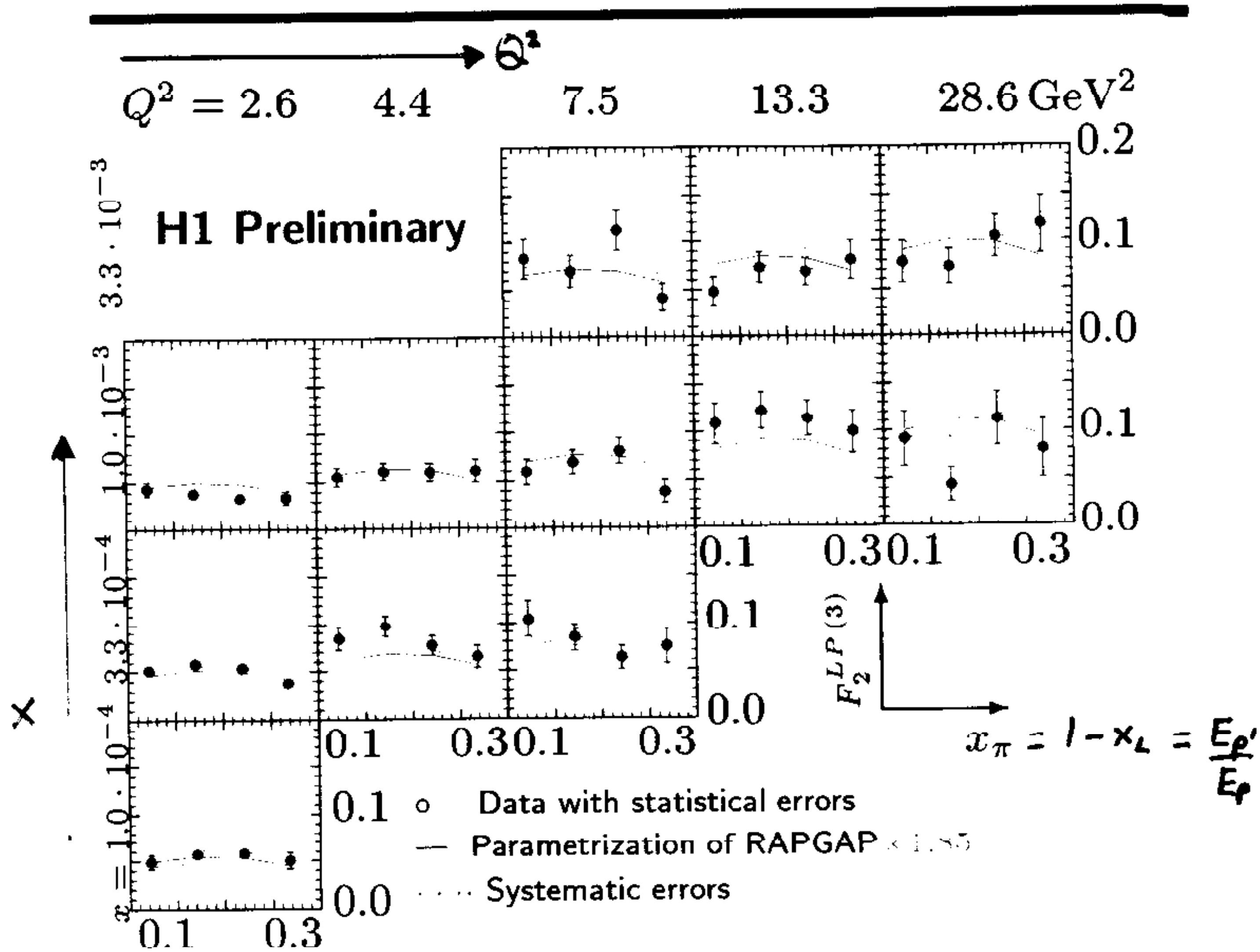
$p_T^{p'} < 200\ MeV.$

COMPARE TO MODELS :-

RAPGAP (& POMPYT) - REGGEISED ONE-PION EXCH.

LEPTO - REGGE FREE LEADING BARYONS VIA SOFT COLOUR INTERACTIONS

$F_2^{LP(3)}(x, Q^2, x_\pi)$ Comparison with RAPGAP (LEADING PROTONS)



RAPGAP: π^0 exchange

Pion structure function: Glück, Reya, and Vogt

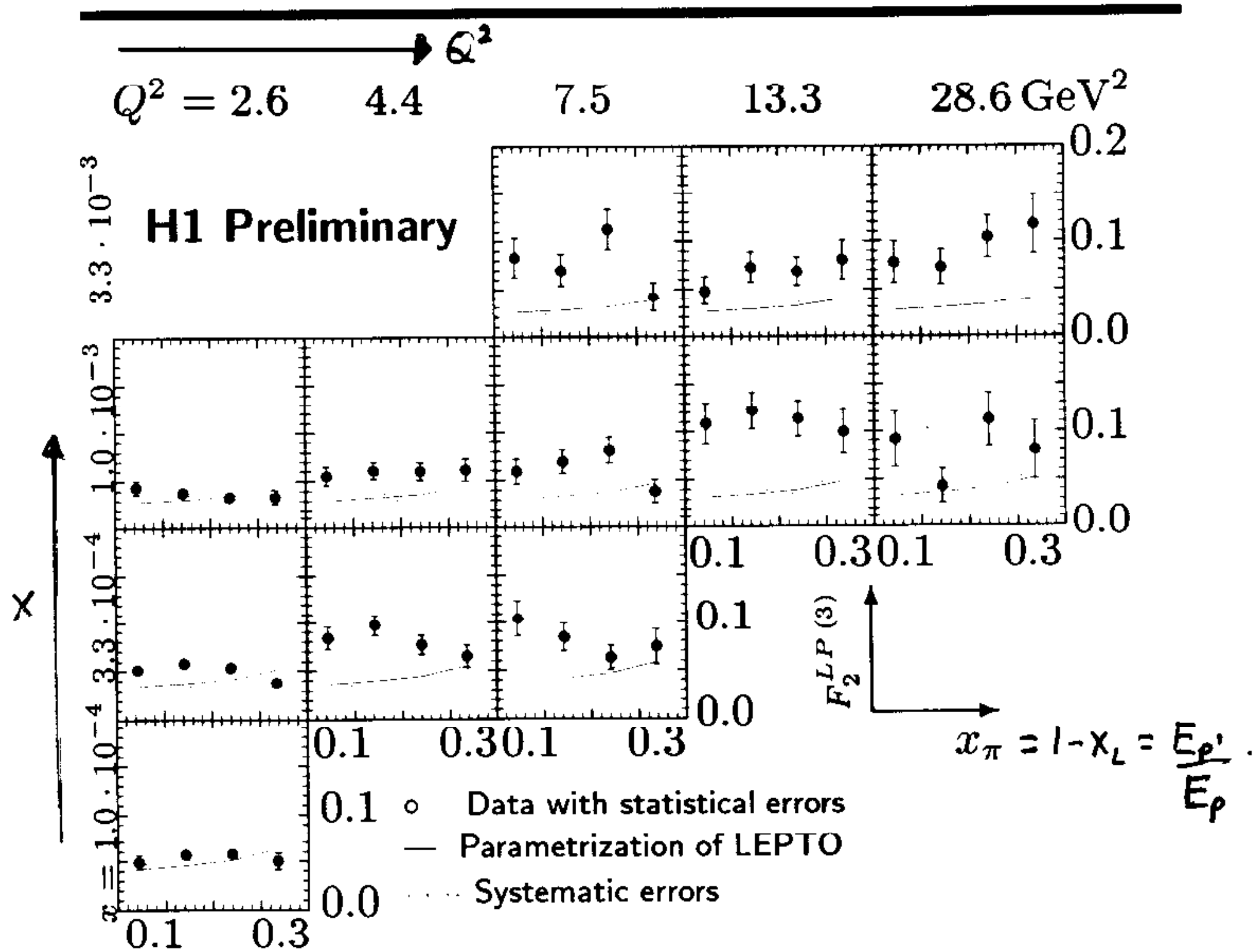
Cross section prediction factor 1.85 too low,

Shape of distributions well described

$\chi^2/df = 54.2/47$, $(CL = 21.9\,\%)$

$F_2^{LP(3)}(x, Q^2, x_\pi)$

Comparison with LEPTO (LEADING PROTONS)



LEPTO: Soft color interactions

Cross section at small Q^2 OK

x_π spectrum rises too steeply

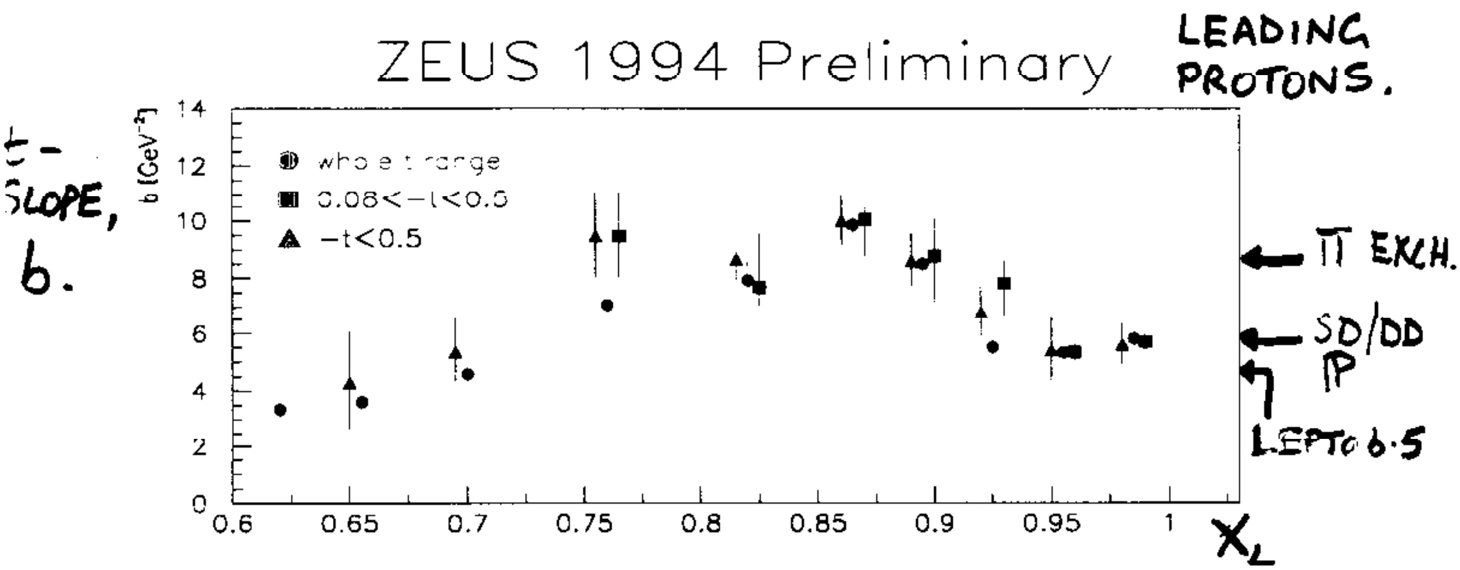
Q^2 rise of data not described

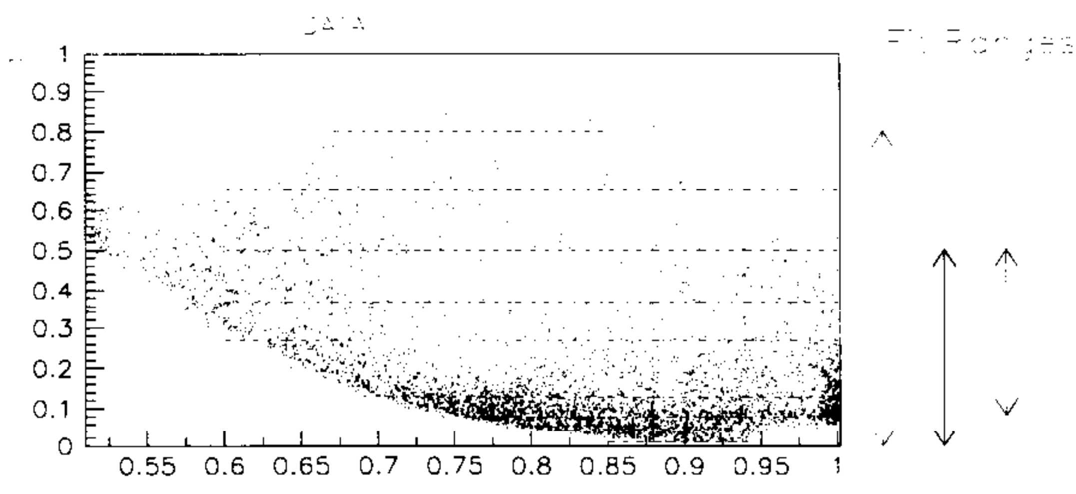
NO SINGLE MONTE CARLO DESCRIBES THE LEADING BARYON DATA.

Slope parameter ‘b’ as a function of x_L

Influence of different t ranges

If the data are a superposition of different effects, then selecting different t ranges might change the result.
No large effects are seen apart from $0.91 < x_L < 0.94$ where excluding the lower t interval increases the values of ’b’.





MAIN POINTS FROM THIS WORKSHOP

- A WEALTH OF DATA, MUCH OF IT VERY CHALLENGING TO THEORISTS.
- THERE IS NOW REASONABLE AGREEMENT BETWEEN H1 AND ZEUS ON $\alpha_{I\!P}(0)$ AT LARGE Q^2.
- GLUON DOMINANCE OF THE POMERON IS STRONGLY SUPPORTED BY FINAL STATE MEASUREMENTS.
- THERE IS CONSENSUS ON MOST ASPECTS OF VECTOR MESON PRODUCTION.

POINTS TO BE RESOLVED.

- DOES $\alpha_{\mathbb{P}}(0)$ HAVE A Q^2 DEPENDENCE?
- HOW COMPATIBLE ARE THE VARIOUS METHODS OF EXTRACTING "DIFFRACTIVE" CROSS SECTIONS?
- HOW DO NON-DIFFRACTIVE CONTRIBUTIONS BEHAVE?
- HOW SERIOUS IS THE HIGHER TWIST PROBLEM AT LARGE β?
- CAN WE DESCRIBE THE LEADING BARYONS AT SMALL X_L?
- THE W DEPENDENCE OF ρ^0 ELECTROPRODUCTION IS UNDER QUESTION.

To Come Soon....

'95, '96, '97 DATA - SUBSTANTIAL INCREAS IN STATISTICS.

- HIGHER Q^2 REGION.
- LOW Q^2, β FROM H1 (SPACAL)
  ZEUS (BPC)
- H1 - 2 NEW FPS STATIONS
  ZEUS - 3 NEW FPS STATIONS
  → IMPROVED KINEMATIC RANGE FOR LEADING PROTONS.
- W DEPENDENCE OF VECTOR MESONS FROM A SINGLE EXPERIMENT.