

WHAT IS DUALITY?

INTRIGUING DATA

WANT TO SEE MORE

WANT TO UNDERSTAND

WHAT IS THE VARIABLE?

HOW TO ACCOMMODATE  $Q^2 \rightarrow 0$  ?

PECULIAR  $g_1$

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WHAT IS THE VARIABLE ?

$x, w$ ; NACHTMANN, SABINE

PROBLEMS :

OFF-SHELLNESS OF INITIAL QUARK  
EFFECT OF FINAL HADRONS

EMC :  $F_2^{cc}$

MASS EFFECTS MAGNIFIED

$$\xi = x \left( 1 + \frac{a^2}{Q^2} \right)$$

FIT DATA TO  $(1 - \xi)^m$   $m = 5$  to  $7$

$$1 - \xi = \frac{W^2 - W_0^2}{Q^2}$$

FIT WANTS  $W_0 = m_D + m_{\Lambda_c}$

i.e. HADRONIC THRESHOLD

$$Q^2 \rightarrow 0$$

VECTOR CURRENT

$$F_2 \sim Q^2$$

AXIAL CURRENT

$$F_2 \sim \text{CONST}$$

$$\text{SO } F_2^{\text{ep}} \neq F_2^{\nu\text{p}}$$

$$F_2^{\text{ep}} \sim \frac{Q^2}{4\pi^2 \alpha_{\text{EM}}} \sigma^{\text{ep}}$$

$$F_2^{\nu\text{p}} = \text{const. } \sigma^{\pi\text{p}} \\ (\text{PCAC})$$

SIMPLEST CRUDE FIT TO  $F_2^{\text{ep}}$ :  $(0 \leq Q^2 \leq 10)$

$$A \left( \frac{Q^2}{Q^2+a} \right)^{1.08} x^{-0.08} (1-x)^7$$

$$+ B \left( \frac{Q^2}{Q^2+b} \right)^{0.5} x^{0.5} (1-x)^{3 \text{ or } 4}$$

$$a \approx 0.8$$

$b$  RATHER SMALLER

SHOULD INCLUDE  $Q^2=0$  DATA IN FITS

# HIGHER TWISTS

$$\left( \frac{Q^2}{Q^2 + Q_0^2} \right)^{1+\epsilon}$$

CAN NOT BE

EXPANDED IN POWERS OF

$$\frac{Q_0^2}{Q^2}$$

UNTIL  $Q^2$  IS RATHER

GREATER THAN  $Q_0^2$

$g_i$

$g_i^p$  AND  $g_i^n$  OPPOSITE IN SIGN

NON SINGLET DOMINATES EVEN FOR  
 $x$  AS SMALL AS 0.01

ARE THE RESONANCES IN  $g_i$  UPSIDE-DOWN?

$g_i^p$  HAS THE SAME  $Q^2$  DEPENDENCE AS  $F_1^p$   
(DIFFERENT EXCHANGES DOMINATE)