of $x$, as measured at Stanford Linear

rametrize all large $Q^2$ data
tions and extract the quark structure functions and extract the quark
9,31). The result of such an
distribution, which has been
$\mu(x) = u_\mu(x) + u_\nu(x)$, ap-
plies the general shape of
$\mu(x)$ to scenarios 3 and 4
compared to their valence

must reconstruct the total

$= p - p_g$, 

(9.37)

$1 - \epsilon_g$. 

ons is not directly exposed

by the photon probe (since gluons carry no electric charge) and is therefore subtracted from the right-hand side. Integrating over the experimental data on $F_2^{p', e'\nu}(x)$ gives us the following information:

$$\int dx\ F_2^{p', e'\nu}(x) = \frac{2}{3}\epsilon_u + \frac{1}{3}\epsilon_d = 0.18,$$

$$\int dx\ F_2^{e'\nu}(x) = \frac{1}{3}\epsilon_u + \frac{2}{3}\epsilon_d = 0.12,$$

(9.38)

where

$$\epsilon_u = \int_0^1 dx\ x(u + \bar{u})$$

is the momentum carried by $u$ quarks and antiquarks, and similarly for $\epsilon_d$. Equation (9.38) follows from (9.27) and (9.28) after neglecting the strange quarks which carry a small fraction of the nucleon's momentum. From (9.37), we have

$$\epsilon_g = 1 - \epsilon_u - \epsilon_d,$$

and on solving (9.38), we obtain

$$\epsilon_u = 0.36, \quad \epsilon_d = 0.18, \quad \epsilon_g = 0.46.$$  

(9.39)

Hence, the gluons carry about 50% of the momentum, which was unaccounted for by the charged quarks.