# Deep Inelastic Scattering and the Gottfried Sum Rule (GS)

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$$I_{GS} = \int_0^1 (F_2^{\mu p} - F_2^{\mu n}) \frac{dx}{x}$$

$$F_2^{\mu N}(x) = \sum_i e_i^2 x q_i(x)$$

$$I_{GS} = \int_0^1 \left[ \sum_i e_i^2 \left(q_i^p - q_i^n\right) \right] dx$$

Assuming Charge Symmetry ($\bar{u}_p = \bar{d}_n, \ldots$)

$$I_{GS} = \frac{1}{3} \int_0^1 \left[ \left(u^p + \bar{u}^p\right) - \left(d^p + \bar{d}^p\right) \right] dx$$

$$= \frac{1}{3} + \frac{2}{3} \int_0^1 \left(\bar{u}^p - \bar{d}^p\right) dx$$

If $\bar{u}^p = \bar{d}^p$ then $I_{GS} = \frac{1}{3}$