

Altarelli and Maiani.¹⁶ Let us summarize the results of this analysis.

Neglecting the possibility¹⁷ of important contributions from scalar Higgs meson exchange and neglecting contributions from neutral currents (which have to be banished for $\Delta S \neq 0$ transition), they consider the short distance character of W boson exchange and write the effective Lagrangian in the form

$$\mathcal{L}_{\text{eff}} = \frac{G_F}{\sqrt{2}} \sum_K C_K \left(\ln \frac{M_W^2}{\mu} \right)^{\phi_K} \theta_K + \text{"small" corrections,}$$

where μ is a scale parameter and θ_K runs over locally gauge invariant operators of dimension five or six. The coefficients C_K and ϕ_K can be evaluated in a perturbation expansion in the strong interaction effective coupling constant, which is small at large momenta. The local operators that we encounter are formed out of quark and gluon fields. In particular, suppressing color and strong SU(3) and charm indices, we encounter the operators

$$\begin{aligned} \theta_{LR}^{(0)} &= \bar{\psi} \nabla^2 \psi \\ \theta_{LL}^{+-} &= (\bar{\psi}_L \gamma_\mu \psi_L \cdot \bar{\psi}_L \gamma^\mu \psi_L)^\pm \text{ and } L \rightarrow R \\ \theta_{LR}^{+-} &= (\bar{\psi}_L \gamma_\mu \psi_L \cdot \bar{\psi}_R \gamma_\mu \psi_R)^\pm. \end{aligned}$$

where the \pm symbol indicates that there are two possible color structures for the operators and ∇ is the covariant derivative; as usual, the subscripts L and R refer to left- and right-handed projections of the quark fields.