$\Sigma^- \to \Lambda e^- \overline{\nu}_e$ DECAY

The vector part of the hadronic amplitude for the decay $\Sigma^- \to \Lambda e^- \overline{\nu}_e$ is of special interest because the vector weak current is proportional to an isospin rotation of the isovector part of the electromagnetic current. This strong form of CVC predicts that

$$f_1(q^2) = 0 \quad \text{for} \quad 0 < q^2 \leq (m_{\Sigma^-} - m_\Lambda)^2 \ ,$$

and also relates $f_2(0)$ to the $\Sigma^0 \Lambda$ transition magnetic moment or to the amplitude for the decay $\Sigma^0 \to \Lambda\gamma$ by

$$\begin{aligned} f_2(0) &= -\sqrt{2}\ \mu_{\Sigma^0\Lambda}/e\hbar \\ &= -\sqrt{3/2}\ \mu_n/e\hbar \qquad \text{[by SU(3)]} \\ &= 1.17\ m_p^{-1}\ . \end{aligned}$$

No SU(3) symmetry is assumed here except in the relation of $\mu_{\Sigma^0\Lambda}$ to the magnetic moment of the neutron, μ_n.

The experimental data were analyzed on the assumption that $f_1(q^2) = 0$ and $f_2(q^2) = f_2(0)$ over the entire kinematical range of q^2 for $\Sigma^- \to \Lambda e^- \overline{\nu}_e$. The results are listed in the ratio of $g_{WM} = -m_{\Sigma^-}\ f_2(0)$ to $g_A = g_1(0)$.

See also the note on Baryon Decay Parameters in the neutron section of the Full Listings.