Projectors for fermion self energy form factors

Standard parametrization:

$$\Sigma(\not{p}) = \not{p} A + m_R B + \not{p}\gamma_5 C + i m_I \gamma_5 E$$

To extract A, B, C, E out of Σ:

$$\mathrm{Tr}[\Sigma \not{p}] = p^2 A \underbrace{\mathrm{Tr}[\mathbb{1}]}_{4} \Rightarrow A(p^2) = \frac{1}{4p^2}\mathrm{Tr}[\Sigma \not{p}]$$

$$\mathrm{Tr}[\Sigma] = m_R B \,\mathrm{Tr}[\mathbb{1}] \Rightarrow B(p^2) = \frac{1}{4m_R}\mathrm{Tr}[\Sigma]$$

$$\mathrm{Tr}[\Sigma \cdot \gamma_5 \not{p}] = p^2 C \,\mathrm{Tr}[\mathbb{1}] \Rightarrow C(p^2) = \frac{1}{4p^2}\mathrm{Tr}[\Sigma \gamma_5 \not{p}]$$

$$\mathrm{Tr}[\Sigma \gamma_5] = i m_I E \,\mathrm{Tr}[\mathbb{1}] \Rightarrow E(p^2) = \frac{1}{4 i m_I}\mathrm{Tr}[\Sigma \gamma_5]$$

Chiral parametrization:

$$\Sigma(\not{p}) = (A_L \not{p} + m B_L)\hat{P}_L + (A_R \not{p} + m B_R)\hat{P}_R$$

Projections:

$$A_L(p^2) = \frac{1}{2p^2}\mathrm{Tr}[\Sigma \hat{P}_L \not{p}] \qquad A_R(p^2) = \frac{1}{2p^2}\mathrm{Tr}[\Sigma \hat{P}_R \not{p}]$$

$$B_L(p^2) = \frac{1}{2m}\mathrm{Tr}[\Sigma \hat{P}_L] \qquad B_R(p^2) = \frac{1}{2m}\mathrm{Tr}[\Sigma \hat{P}_R]$$

Standard - Chiral connecting formulae

with $m_R = m_I = m$

$$A = \frac{1}{2}(A_L + A_R) \Rightarrow A_L = A - C$$

$$B = \frac{1}{2}(B_L + B_R) \qquad B_L = B - iE$$

$$C = \frac{-1}{2}(A_L - A_R) \Rightarrow A_R = A + C$$

$$E = \frac{i}{2}(B_L - B_R) \qquad B_R = B + iE$$