

Problem 7

Consider an electron-like spin 0 particle $e_{s=0}^-$ and a muon-like spin 0 particle $\mu_{s=0}^-$

scattering: $e_{s=0}^-$ (A) + $\mu_{s=0}^-$ (B) \rightarrow $e_{s=0}^-$ (C) + $\mu_{s=0}^-$ (D). Show that the invariant

amplitude M may be written as

$$-iM = \left[ie(p_C + p_A)^\mu \right] \left[\frac{-ig_{\mu\nu}}{q^2} \right] \left[ie(p_D + p_B)^\nu \right]$$

with the transition amplitude

$$T_{fi} = -iM (N_A N_B N_C N_D) (2\pi)^4 \delta^4(p_D + p_C - p_A - p_B).$$

(The normalization constants are not included in the expression for M).

Hint: See § 4.2 of the book, Quarks and Leptons by Halzen and Martin, John Wiley & Sons © 1984.