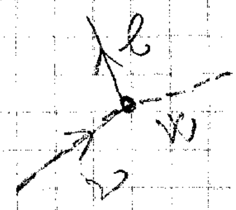
Il processo di interazione debole seleziona autostati ψ_L. $\gamma^\mu \frac{1}{2}(1-\gamma^5)$ V−A

Successivamente la propagazione libera mescola ψ_L e ψ_R se c'è massa.

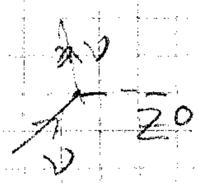
Conosciamo 3 sapori degli e, μ, τ

Termine di interazione di corrente   per neutrini

$$\frac{g}{\sqrt{2}}(\bar{\nu}_e,\bar{\nu}_\mu,\bar{\nu}_\tau)\gamma^\lambda\frac{1}{2}(1-\gamma^5)\begin{pmatrix}e\\ \mu\\ \tau\end{pmatrix}W^+_\lambda + h.c. \qquad (4)$$



$$\frac{g}{2\cos\vartheta_W}(\bar{\nu}_e,\bar{\nu}_\mu,\bar{\nu}_\tau)\gamma^\lambda\frac{1}{2}(1-\gamma^5)\begin{pmatrix}\nu_e\\ \nu_\mu\\ \nu_\tau\end{pmatrix}Z_\lambda + h.c. \qquad (5)$$



I termini di massa sono del tipo $\bar{\psi}m\psi$ e mescolano ψ_R e ψ_L

$$\bar{\psi}m\psi = m\bar{\psi}(P_LP_R + P_LP_L + P_RP_R + P_RP_L)\psi = \bar{\psi}(P_LP_L + P_RP_R)\psi m$$

$$= \bar{\psi}_R m\psi_L + \bar{\psi}_L m\psi_R \qquad (6)$$

$$\bar{\psi}_R = (\psi^\dagger P_R)\gamma^0 = \psi^\dagger\frac{1}{2}(1+\gamma^5)\gamma^0 = \psi^\dagger\gamma^0\frac{1}{2}(1-\gamma^5) = \bar{\psi}P_L$$

$\bar{\psi}_L = \bar{\psi}P_R$ $P_LP_R = P_RP_L = 0$

Termini di massa

$$(\bar{e},\bar{\mu},\bar{\tau})\,M_L\begin{pmatrix}e\\ \mu\\ \tau\end{pmatrix} \qquad (\bar{\nu}_e,\bar{\nu}_\mu,\bar{\nu}_\tau)\,M_\nu\begin{pmatrix}\nu_e\\ \nu_\mu\\ \nu_\tau\end{pmatrix} \qquad (7)$$

M_L e M_ν matrici 3×3