Chiralità legata all'operatore

$$\gamma^5 = i\gamma^0\gamma^1\gamma^2\gamma^3 \quad (\gamma^5)^2 = \mathbb{I} \quad (\gamma^5)^\dagger = \gamma^5 \quad \gamma^5\gamma^\mu = -\gamma^\mu\gamma^5 \qquad 9)$$

Proiettori di chiralità

$$P_R = \frac{1}{2}(1+\gamma^5) \qquad P_L = \frac{1}{2}(1-\gamma^5) \qquad 10)$$

$$\psi_R = P_R\,\psi \qquad \psi_L = P_L\,\psi$$

Sono autostati di γ^5

$$\gamma^5\psi_R = \gamma^5\frac{1}{2}(1+\gamma^5)\psi = \frac{1}{2}(\gamma^5+\mathbb{I})\psi = \psi_R \qquad 11a)$$

$$\gamma^5\psi_L = \gamma^5\frac{1}{2}(1-\gamma^5)\psi = \frac{1}{2}(\gamma^5-\mathbb{I})\psi = -\psi_L \qquad 11b)$$

ψ_R e ψ_L non sono autostati di massa.

$$i\gamma^\mu\frac{\partial}{\partial x_\mu}\psi_R = i\gamma^\mu\frac{\partial}{\partial x_\mu}\left[\frac{1}{2}(1+\gamma^5)\psi\right] = \frac{1}{2}\gamma^\mu\frac{\partial}{\partial x_\mu}\psi + \frac{1}{2}\gamma^\mu\gamma^5\frac{\partial}{\partial x_\mu}\psi$$

$$= \frac{1}{2}\gamma^\mu\frac{\partial\psi}{\partial x_\mu} - \frac{1}{2}\gamma^5\gamma^\mu\frac{\partial}{\partial x_\mu}\psi = \frac{1}{2}(1-\gamma^5)\gamma^\mu\frac{\partial}{\partial x_\mu}\psi =$$

$$= \frac{1}{2}(1-\gamma^5)\,m\psi = m\,\frac{1}{2}(1-\gamma^5)\psi = m\,\psi_L \qquad 12)$$

Viceversa per ψ_L

$$i\gamma^\mu\frac{\partial}{\partial x_\mu}\psi_L = m\psi_R \qquad 13)$$