

$SU(3) \times \overline{SU(3)}$

$\Rightarrow$ Octet + singlet

π^0

$\frac{1}{\sqrt{2}}(u\bar{u} - d\bar{d})$

$m = 134.977$

$C\,q\# = +1$

$\pi^+ = |u\bar{d}\rangle \left|\frac{u\bar{u}-d\bar{d}}{\sqrt{2}}\right\rangle$ $I=1, I_3=+1, Q=+1, S=0$

mass = 139.57 MeV

$\pi^- = C\pi^+$

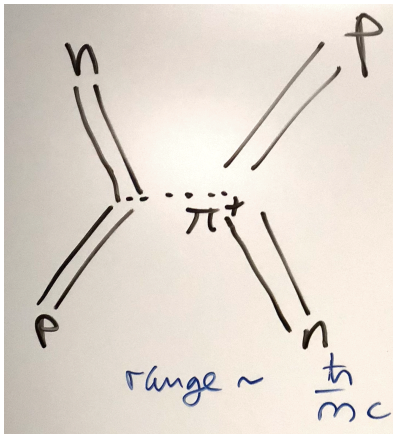
$J = 0 \quad P = -1$

$u \xrightarrow{e^{i\pi I_3}} d \xrightarrow{C} \bar{d}$

$d \to -\bar{u} \to -u$

$I^G(J^P) = 1^-(0^-)$

"pseudo scalar"



"Goldstone bosons of spontaneously broken chiral symmetry"

$P(\psi(\vec{r})) = \psi(-\vec{r})$

$u\bar{s} = K^+$

$d\bar{s} = K^0$

$\bar{d}s = \bar{K}^0$

$\bar{u}s = K^-$

$P|q\rangle = +1|q\rangle$

$P|\bar{q}\rangle = -1|\bar{q}\rangle$

$P(\text{vector}) = -1 \quad J^P = 1^-$, scalar 0^+

$P|\gamma\rangle = -1|\gamma\rangle$

$C|u\rangle = |\bar{u}\rangle$

$G = C \cdot e^{i\pi I_3}$

$K_S^0 = \frac{1}{\sqrt{2}}|d\bar{s} + \bar{d}s\rangle \to CP = +1$

$K_L^0 = \frac{1}{\sqrt{2}}|d\bar{s} - \bar{d}s\rangle \to CP = -1$