Why is this the case (see also Wong appendix A2)

Antiparticles are particles propagating backward in time

Isodoublet is given by \( \left( \begin{array}{c} 1 \ 1 \end{array} \right) \)

Time reversal operator

For spin \( \frac{1}{2} \), \( T = -i \sigma_y K \)

Complex conjugation

For isospin \( \frac{1}{2} \), \( \overline{T} = -i \sigma_y K = \left( \begin{array}{cc} 0 & -1 \\ 1 & 0 \end{array} \right) K \)

\( K \) acts in isospace

\[
\left( \begin{array}{c} u \\ d \end{array} \right) T \left( \begin{array}{c} -d^* \\ u^* \end{array} \right)
\]

Lowering operator \( d^* \rightarrow -u^* \)

or \( \overline{d} \rightarrow -\overline{u} \)

36) Baryons: protons and neutrons u\(\bar{d}\)

Baryon state transforms as

\( u u d \), \( u \bar{d} d \), \( u \bar{u} d \), \( u \bar{d} \bar{d} \)

under vector symmetry

For \( N = 3 \), there are \( 3 \times 3 \times 3 = 27 \) different combinations