

Strangeness predates quark model

Σ took a long time to decay
"strangeness of -1"

$$S = -(n_{s \text{ quarks}} - n_{\bar{s} \text{ quarks}})$$

Feynman Diagrams

vertex interaction btw fermions & a boson



$\rightarrow z$



ant. particle is a particle travelling backwards in time, as far as Feynman diagrams are concerned



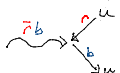
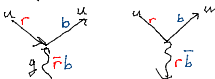
Annihilation



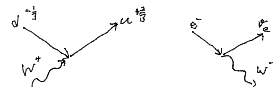
for creation

Photons change energy, momentum (a big one) but that's it - only interact w/ charged particles

Gluons can change color as well - only interact with quarks



Weak bosons W^\pm can change "flavor" of quark or type to another of opposite sign
 all change charged leptons to its neutrino & v.v.
 $e \leftrightarrow \nu_e$ $\tau \leftrightarrow \nu_\tau$ $\mu \leftrightarrow \nu_\mu$



All interactions conserve charge

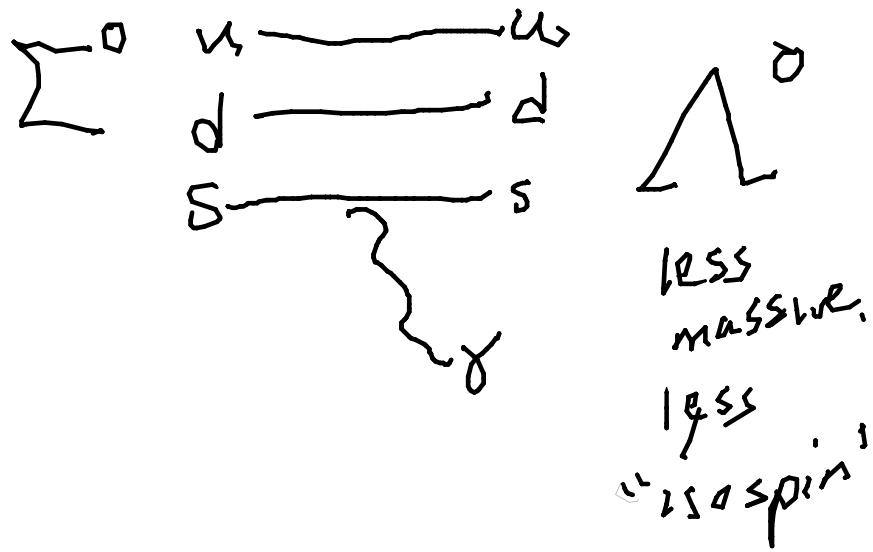


Baryon Number: quark $B = +\frac{1}{3}$
 antiquark $B = -\frac{1}{3}$
 leptons $B = 0$
 (conserved)

$p \rightarrow n + e^+ + \bar{\nu}_e$
 $B=1$ $B=1$ $B=0$ $B=0$
 $L_e=0$ $L_e=0$ $L_e=-1$ $L_e=+1$

electron lepton number
 muon
 tauon
 (might not be neutrino oscillations)

EM decay



Strong Decay

