$$p + n \rightarrow p + \mu^+ + \mu^-$$
$$B = 1 + 1 \neq 1 + 0 + 0$$

$$p + n \rightarrow p + n + p + \bar{p}$$
$$B = 1 + 1 = 1 + 1 + 1 - 1$$

$\pi^- \rightarrow \mu^- + \bar{\nu}_\mu$

$$n \not\rightarrow p^+ + e^-$$

$$n \rightarrow p^+ + e^- + \bar{\nu}$$

$\pi^- \rightarrow \mu^- + \bar{\nu}_\mu$

$\mu^- \rightarrow e^- + \bar{\nu}_e + \nu_\mu$

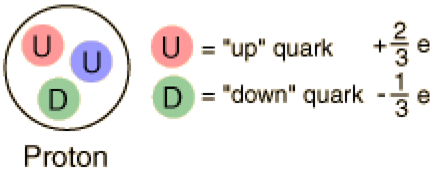
$$\frac{q}{e} = m_I + \frac{S + B}{2}$$

m_I = projection of isospin

S = strangeness

B = baryon number

$$\Sigma^+ \rightarrow p + \eta^0$$
$I = 1 \neq 1/2 + 0$ Isospin



$m_p = 1836.15\ m_e$

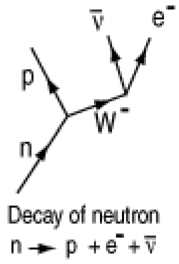
Mass = 1.6726×10^{-27} kg

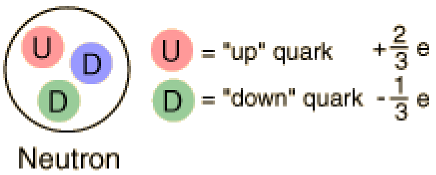
= 938.27231 MeV/c^2

= 1.00727647 u

composed of two down quarks and one up quark.

A free neutron will decay with a half-life of about 10.3 minutes but it is stable if combined into a nucleus. The decay of the neutron involves the weak interaction as indicated in the Feynman diagram to the right. This fact is important in models of the early universe. The neutron is about 0.2% more massive than a proton, which translates to an energy difference of 1.29 MeV.





$m_p = 1838.68\ m_e$

Mass = 1.6749×10^{-27} kg

= 939.5656 MeV/c^2

= 1.0086647 u