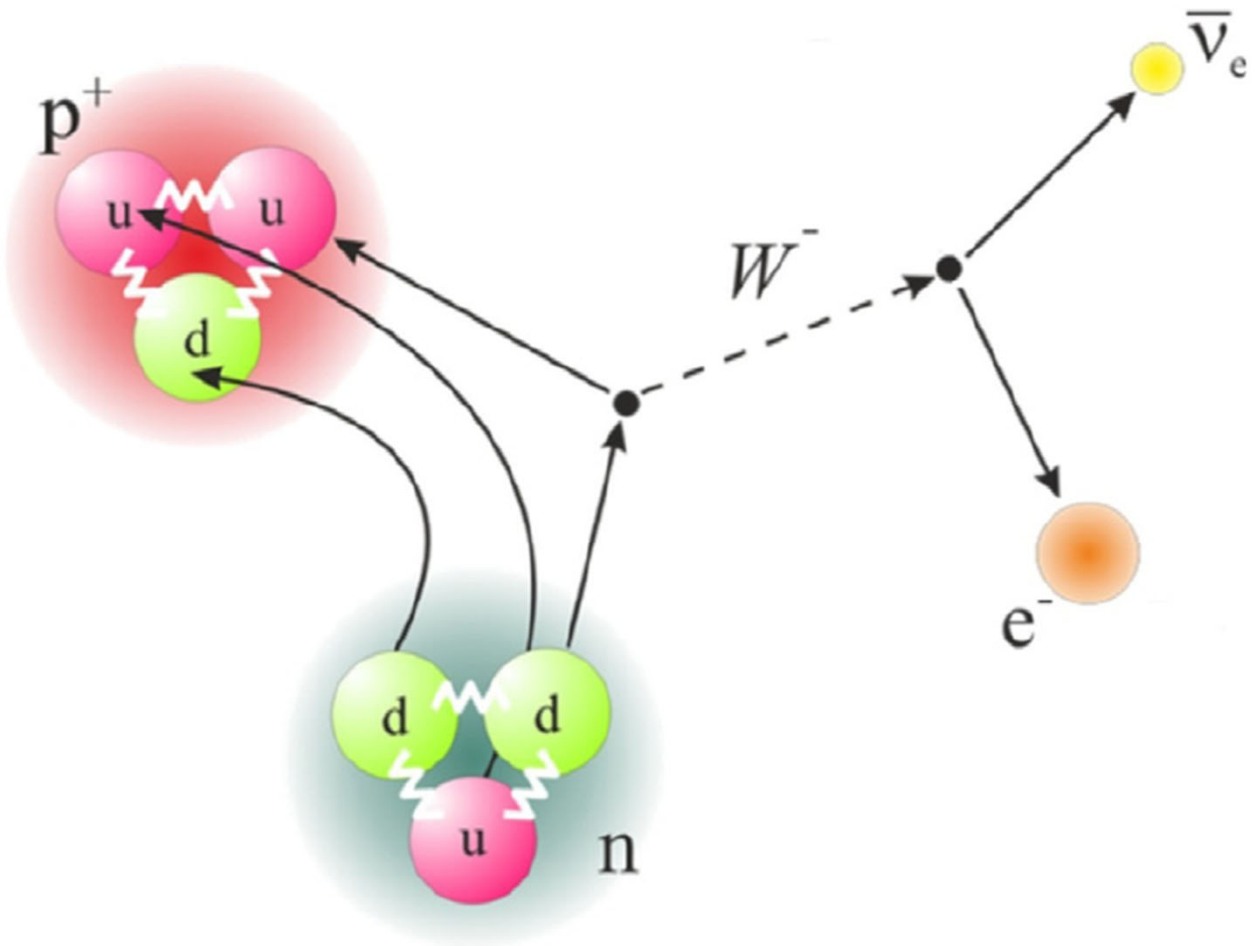
Force carriers

Interaction	Force carrier	Mass (GeV/c^2)	Spin ($\hbar$)	Source	Particles carrying charge	Range (m)	Interaction time (s)	Coupling constant
Strong	gluon	0	1	color charge	q, g	10^{-15}	10^{-23}	$\alpha_s \approx 1$
Electromagnetic	photon	0	1	electric charge	q, e, μ, τ, $W^{\pm}$	∞	10^{-18}	$\alpha = 1/137$
Weak	$W^{\pm}$, Z^0	80, 91	1, 1	weak charge	q, e, μ, τ, $W^{\pm}$, Z^0	10^{-18}	10^{-16} to 10^{-10}	$\alpha_w \approx 10^{-5}$
Gravity	graviton	0	2	mass	q, e, μ, τ, ν, $W^{\pm}$, Z^0	∞	?	$\alpha_g \approx 10^{-38}$

Neutron decay

$$udd \rightarrow uud + W^- \rightarrow uud + e^- + \bar{\nu}_e.$$



Standard model