Particles 004 Forces and Exchange Particles

07 February 2020 17:06

Forces are caused by "exchange" particles - called "Gauge Bosons"

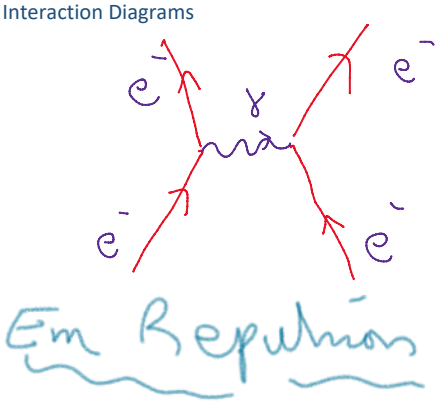
Type	Gauge Boson	Particles Effected
electromagnetic	Virtual photon	Charged particles only
Weak	W	all
Strong	Pions	hadrons

Pions : π^+, π^-, π^0

W : W^+, W^-

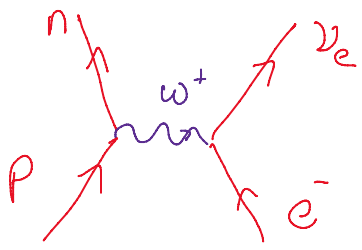
The larger the mass of the Gauge boson, the shorter of the range of the force. W particles are heavy., so the weak is short range. Ditto Strong. Since photons have zero mass the e/m force is effectively infinite.

Interaction Diagrams



Em Repulsion

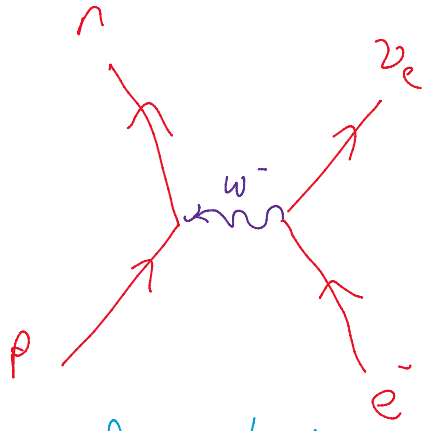
Two equally charged particles arrive from the bottom, get close when a virtual photon passes & they repel.



Electron Capture

Here a proton captures an e^-. A W^+ pass between them so a neutron and an "electron neutrino" is created

$p^+ + e^- \rightarrow n + \nu_e$



Electron/proton collision

This is electron/proton collision. Same formula:

$p^+ + e^- \rightarrow n + \nu_e$

note the W^- ....