Feynman Diagrams

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When the American physicist   wanted to calculate the probability of   occurring, he drew a set of diagrams to show all possible outcome. These apparently simple diagrams allow very complex calculations to be solved easily.

Feynman diagrams represent   – the   between the particle lines are not significant, only the   . The force is shown via an   particle.

β^- decay

A neutron decays into a proton (a down quark changes into an up quark), emitting a   and an antielectron neutrino:
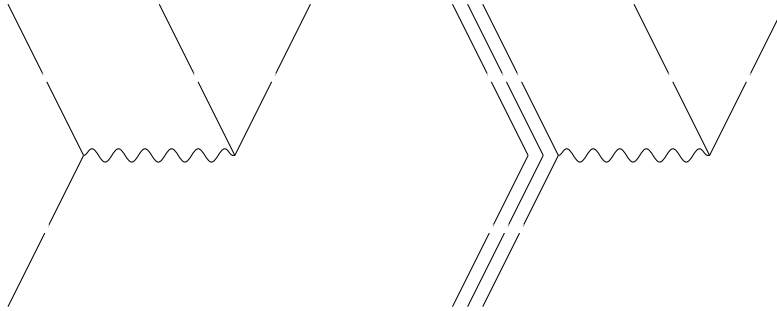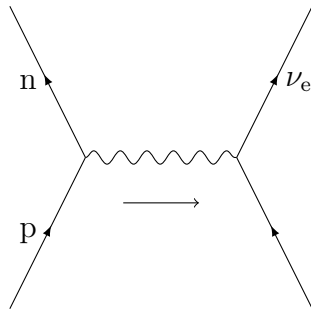
$$n \longrightarrow pe^- \bar{\nu}_e$$
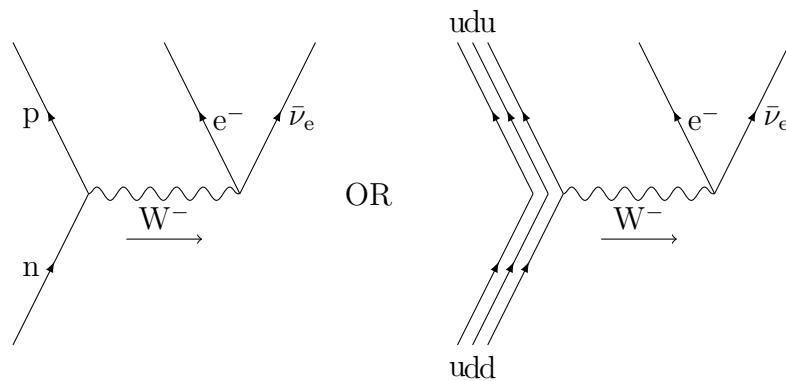
β^+ decay

A proton decays into a neutron, emitting a neutrino and positron:

$$\mathrm{p} \longrightarrow \mathrm{n e^+} \nu_\mathrm{e}$$
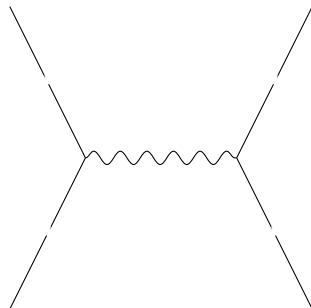
Electron capture

An orbiting electron can be absorbed by a proton in the nucleus:
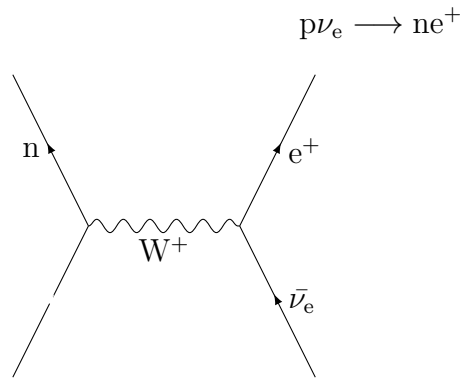
Neutrino–neutron collisions

A neutron can absorb a neutrino, turning into a proton and electron:
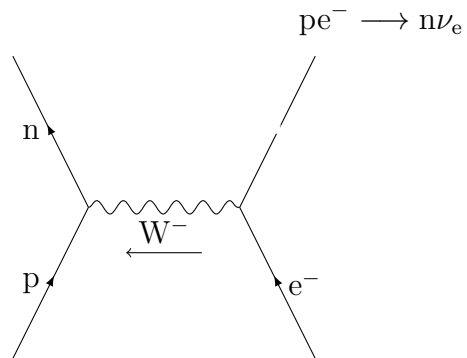
$$\mathrm{n}\nu_\mathrm{e} \longrightarrow \mathrm{p e^-}$$

Antineutrino–proton collisions

A proton can absorb an anti electron neutrino, becoming a neutron and emitting a positron:

$$p\nu_e \longrightarrow ne^+$$

Electron–proton collisions

An electron can collide with a proton, emitting a neutron and a neutrino:

$$pe^- \longrightarrow n\nu_e$$

All of the above interactions involve the   interaction, and they have all been experimentally   .