

FUNDAMENTAL PARTICLES

Fundamental Particles are the smallest things scientists have discovered.
So far, no-one has been able to split them into smaller pieces.
Everything else is made of combinations of these particles.

FERMIONS

Fermions are particles that cannot exist together if they have identical properties.

BOSONS

Bosons are particles that can group together even if they have exactly identical properties.

PARTICLES

Quarks there are 6 Flavors of Quarks:

Positive Electric Charge
LESS MASS



Up (u)



Charm (c)



Top (t)

Negative Electric Charge
LESS MASS



Down (d)



Strange (s)



Bottom (b)

Leptons there are 6 types of Leptons:

No Electric Charge



Electron-Neutrino
(ν_e)



Muon-Neutrino
(ν_μ)



Tau-Neutrino
(ν_τ)

Negative Electric Charge
LESS MASS



Electron (e)



Muon (μ)



Tau (τ)

ANTI-PARTICLES

Anti-quarks

Negative Electric Charge
LESS MASS



Anti-up ($\bar{u}$)



Anti-charm ($\bar{c}$)



Anti-top ($\bar{t}$)

Positive Electric Charge
LESS MASS



Anti-down ($\bar{d}$)



Anti-strange ($\bar{s}$)



Anti-bottom ($\bar{b}$)

Anti-leptons

No Electric Charge



Anti-electron-Neutrino
($\bar{\nu}_e$)



Anti-muon-Neutrino
($\bar{\nu}_\mu$)



Anti-tau-Neutrino
($\bar{\nu}_\tau$)

Negative Electric Charge
LESS MASS



Positron ($\bar{e}$)



Anti-muon ($\bar{\mu}$)

MORE MASS



Anti-tau ($\bar{\tau}$)

Force Carrier Particles

Electromagnetic Force:



Photons

Weak Force:



W's



Z's

Strong Force:



Gluons