

Particle Builder

Fundamental Particle Card

Strange Quark

Electric Charge: $-1/3$
Spin: $1/2$
Mass: 95 MeV
Half Life: 0.1 nanoseconds

Colour Charge: Yes
Baryon Number: $1/3$
2nd generation (2 points)



Strange Quark

Electric Charge: $-1/3$
Spin: $1/2$
Mass: 95 MeV
Half Life: 0.1 nanoseconds

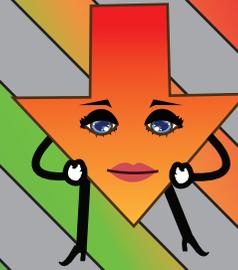
Colour Charge: Yes
Baryon Number: $1/3$
2nd generation (2 points)



Anti-Down Quark

Electric Charge: $+1/3$
Spin: $1/2$
Mass: 4.8 MeV
Half Life: Stable

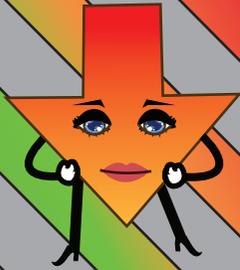
Colour Charge: Yes
Baryon Number: $-1/3$
1st generation (1 point)



Anti-Down Quark

Electric Charge: $+1/3$
Spin: $1/2$
Mass: 4.8 MeV
Half Life: Stable

Colour Charge: Yes
Baryon Number: $-1/3$
1st generation (1 point)



Anti-Strange Quark

Electric Charge: $+1/3$
Spin: $1/2$
Mass: 95 MeV
Half Life: 0.1 nanoseconds

Colour Charge: Yes
Baryon Number: $-1/3$
2nd generation (2 points)



Anti-Charm Quark

Electric Charge: $-2/3$
Spin: $1/2$
Mass: 1.29 GeV
Half Life: 1.1 picoseconds

Colour Charge: Yes
Baryon Number: $-1/3$
2nd generation (2 points)



Charm Quark

Electric Charge: $+2/3$
Spin: $1/2$
Mass: 1.29 GeV
Half Life: 1.1 picoseconds

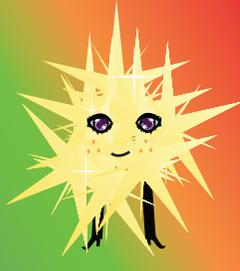
Colour Charge: Yes
Baryon Number: $1/3$
2nd generation (2 points)



Charm Quark

Electric Charge: $+2/3$
Spin: $1/2$
Mass: 1.29 GeV
Half Life: 1.1 picoseconds

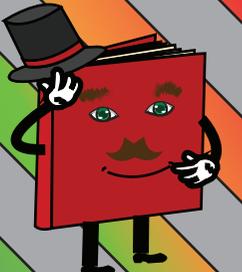
Colour Charge: Yes
Baryon Number: $1/3$
2nd generation (2 points)



Anti-Top Quark

Electric Charge: $-2/3$
Spin: $1/2$
Mass: 173.07 GeV
Half Life: 4.2×10^{-25} s

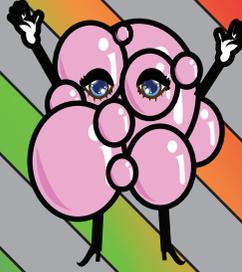
Colour Charge: Yes
Baryon Number: $-1/3$
3rd generation (3 points)



Anti-Bottom Quark

Electric Charge: $+1/3$
Spin: $1/2$
Mass: 4.18 GeV
Half Life: 1.3 picoseconds

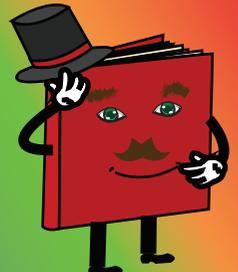
Colour Charge: Yes
Baryon Number: $-1/3$
3rd generation (3 points)



Top Quark

Electric Charge: $+2/3$
Spin: $1/2$
Mass: 173.07 GeV
Half Life: 4.2×10^{-25} s

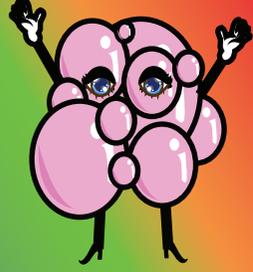
Colour Charge: Yes
Baryon Number: $1/3$
3rd generation (3 points)



Bottom Quark

Electric Charge: $-1/3$
Spin: $1/2$
Mass: 4.18 GeV
Half Life: 1.3 picoseconds

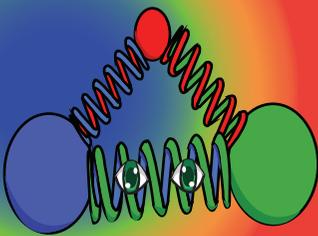
Colour Charge: Yes
Baryon Number: $1/3$
3rd generation (3 points)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

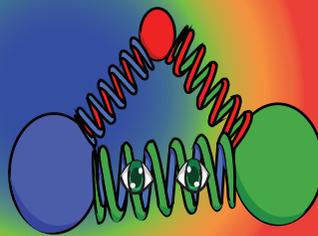
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

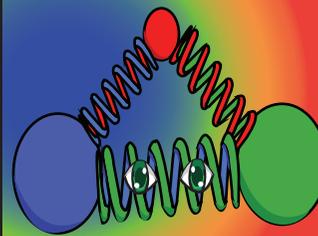
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

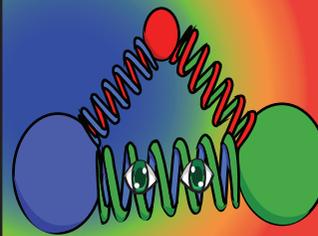
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

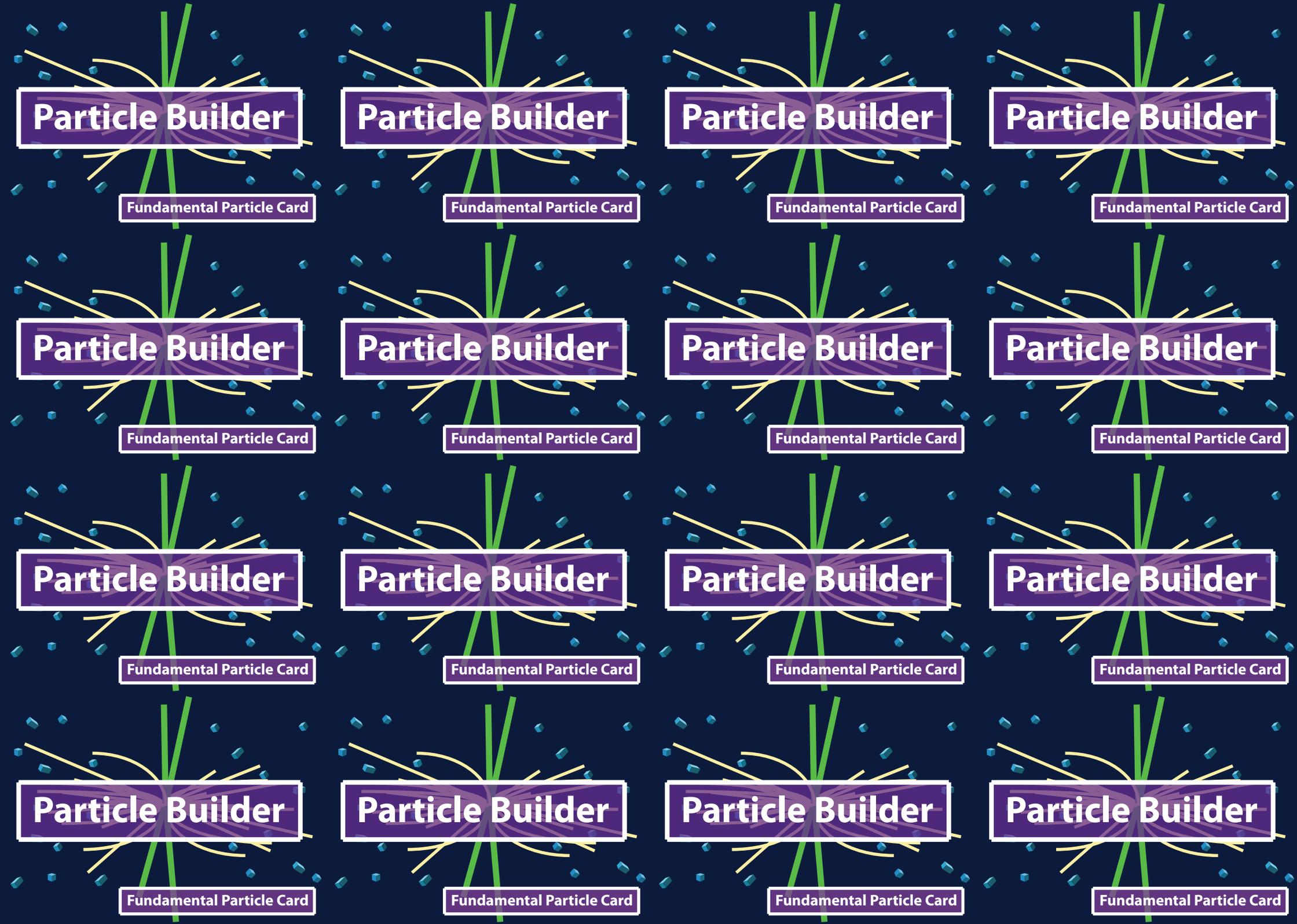
Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

Colour Charge: Yes
Exchange boson
(1 point)



Particle Builder

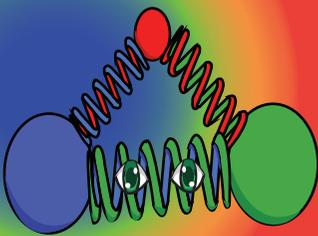
Fundamental Particle Card



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

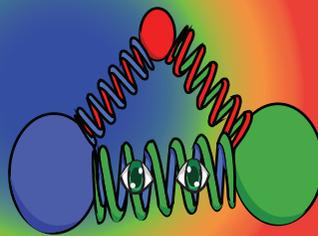
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

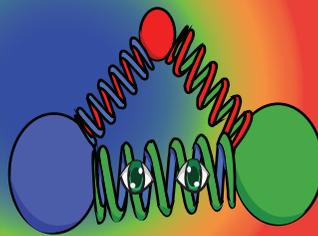
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

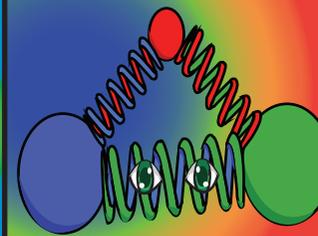
Colour Charge: Yes
Exchange boson
(1 point)



Gluon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable

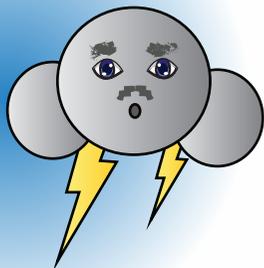
Colour Charge: Yes
Exchange boson
(1 point)



Electron

Electric Charge: -1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

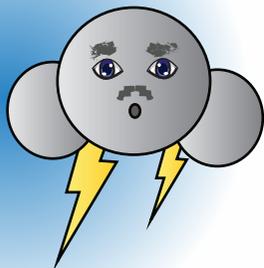
Colour Charge: No
Lepton Number (e): 1
1st generation (1 point)



Electron

Electric Charge: -1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

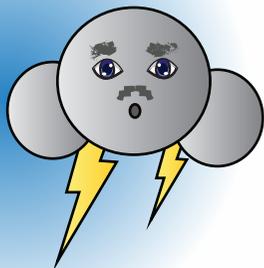
Colour Charge: No
Lepton Number (e): 1
1st generation (1 point)



Electron

Electric Charge: -1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

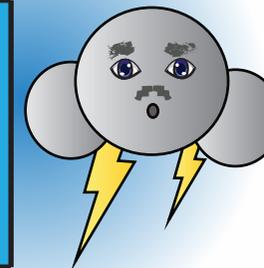
Colour Charge: No
Lepton Number (e): 1
1st generation (1 point)



Electron

Electric Charge: -1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

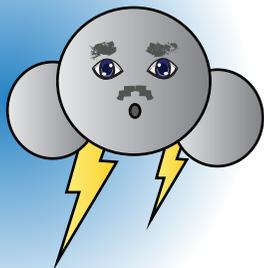
Colour Charge: No
Lepton Number (e): 1
1st generation (1 point)



Electron

Electric Charge: -1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

Colour Charge: No
Lepton Number (e): 1
1st generation (1 point)



Electron Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <2.2 eV
Half Life: Stable

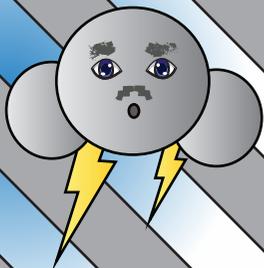
Colour Charge: No
Lepton Number (e): 1
1st generation (0 points)



Positron (Anti-Electron)

Electric Charge: +1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

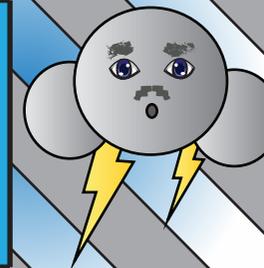
Colour Charge: No
Lepton Number (e): -1
1st generation (1 point)



Positron (Anti-Electron)

Electric Charge: +1
Spin: 1/2
Mass: 0.511 MeV
Half Life: Stable

Colour Charge: No
Lepton Number (e): -1
1st generation (1 point)



Anti-Muon

Electric Charge: +1
Spin: 1/2
Mass: 105.7 MeV
Half Life: 2.2μs

Colour Charge: No
Lepton Number (μ): -1
2nd generation (2 points)



Muon Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <0.17 MeV
Half Life: Stable

Colour Charge: No
Lepton Number (μ): 1
2nd generation (0 points)



Muon

Electric Charge: -1
Spin: 1/2
Mass: 105.7 MeV
Half Life: 2.2μs

Colour Charge: No
Lepton Number (μ): 1
2nd generation (2 points)



Anti-Electron Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <2.2 eV
Half Life: Stable

Colour Charge: No
Lepton Number (e): -1
1st generation (0 points)



Particle Builder

Fundamental Particle Card

Tau Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <15.5 MeV
Half Life: Stable



Colour Charge: No
Lepton Number (τ): 1
3rd generation (0 points)

Anti-Tau Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <15.5 MeV
Half Life: Stable



Colour Charge: No
Lepton Number (τ): -1
3rd generation (0 points)

Tau

Electric Charge: -1
Spin: 1/2
Mass: 1.777 GeV
Half Life: 0.3 picoseconds



Colour Charge: No
Lepton Number (τ): 1
3rd generation (3 points)

Anti-Tau

Electric Charge: +1
Spin: 1/2
Mass: 1.777 GeV
Half Life: 0.3 picoseconds



Colour Charge: No
Lepton Number (τ): -1
3rd generation (3 points)

Anti-Muon Neutrino

Electric Charge: 0
Spin: 1/2
Mass: <0.17 MeV
Half Life: Stable



Colour Charge: No
Lepton Number (μ): -1
2nd generation (0 points)

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Photon

Electric Charge: 0
Spin: 1
Mass: 0.0 eV
Half Life: Stable



Colour Charge: No
Exchange boson (1 point)
Note: the photon is its own antiparticle.

Higgs Boson

Electric Charge: 0
Spin: 0
Mass: 126 GeV
Half Life: $\sim 10^{-22}$ s



Colour Charge: No
(5 points)
The Higgs Boson is an excitation of the Higgs's field which gives particles their mass.

W⁺ Boson

Electric Charge: +1
Spin: 1
Mass: 80.4 GeV
Half Life: 3×10^{-25} s



Colour Charge: No
Exchange boson (1 point)

W⁻ Boson

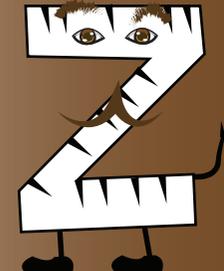
Electric Charge: -1
Spin: 1
Mass: 80.4 GeV
Half Life: 3×10^{-25} s



Colour Charge: No
Exchange boson (1 point)

Z Boson

Electric Charge: 0
Spin: 1
Mass: 91.2 GeV
Half Life: 3×10^{-25} s



Colour Charge: No
Exchange boson (1 point)
Note: the Z boson is its own antiparticle.

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