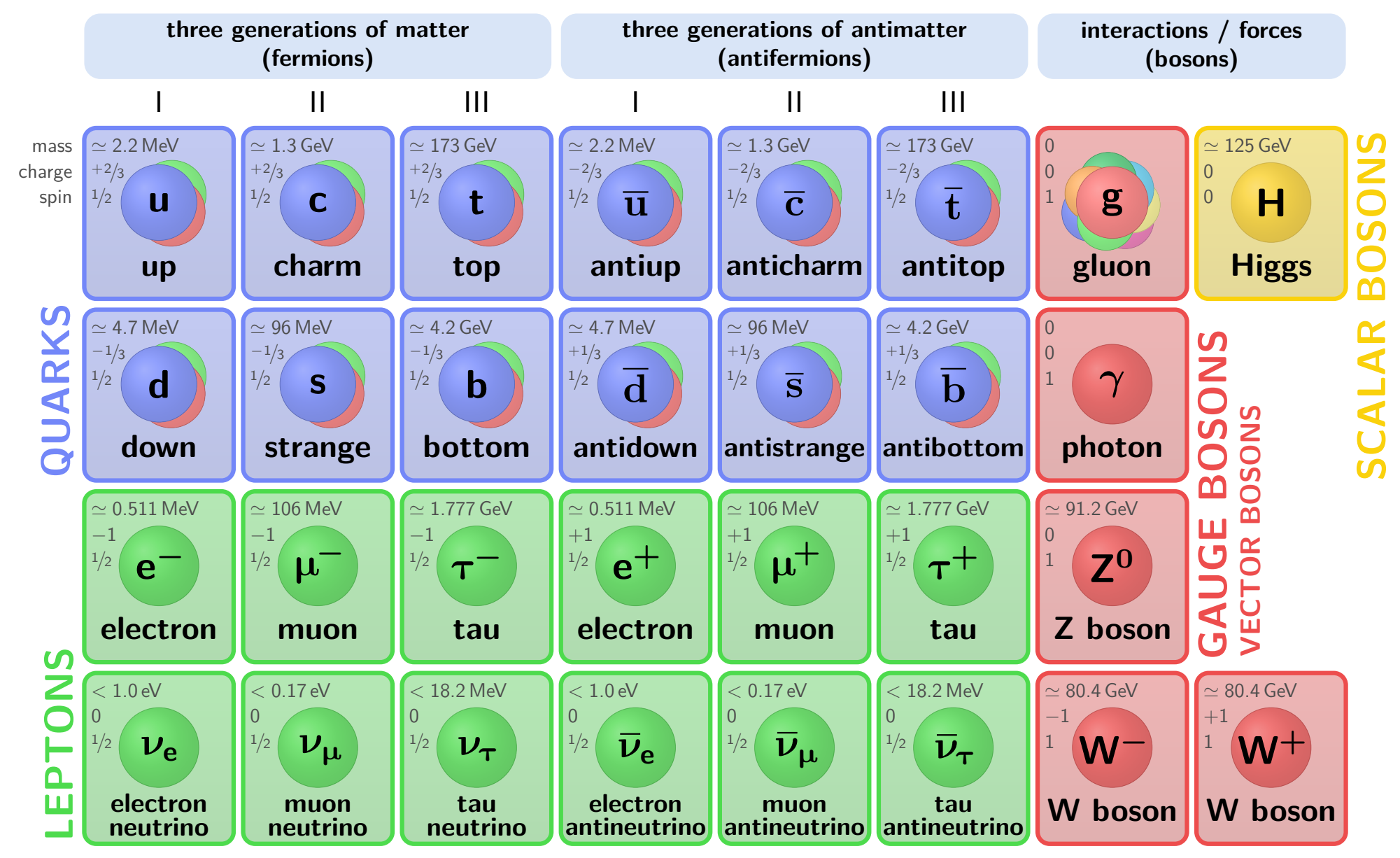
three generations of matter (fermions)
three generations of antimatter (antifermions)
interactions / forces (bosons)
I
II
III
I
II
III
mass
charge
spin
QUARKS
LEPTONS
GAUGE BOSONS
VECTOR BOSONS
SCALAR BOSONS
≃ 2.2 MeV
+2/3
1/2
u
up
≃ 1.3 GeV
+2/3
1/2
c
charm
≃ 173 GeV
+2/3
1/2
t
top
≃ 2.2 MeV
−2/3
1/2
ū
antiup
≃ 1.3 GeV
−2/3
1/2
c̄
anticharm
≃ 173 GeV
−2/3
1/2
t̄
antitop
0
0
1
g
gluon
≃ 125 GeV
0
0
H
Higgs
≃ 4.7 MeV
−1/3
1/2
d
down
≃ 96 MeV
−1/3
1/2
s
strange
≃ 4.2 GeV
−1/3
1/2
b
bottom
≃ 4.7 MeV
+1/3
1/2
d̄
antidown
≃ 96 MeV
+1/3
1/2
s̄
antistrange
≃ 4.2 GeV
+1/3
1/2
b̄
antibottom
0
0
1
γ
photon
≃ 0.511 MeV
−1
1/2
e−
electron
≃ 106 MeV
−1
1/2
μ−
muon
≃ 1.777 GeV
−1
1/2
τ−
tau
≃ 0.511 MeV
+1
1/2
e+
electron
≃ 106 MeV
+1
1/2
μ+
muon
≃ 1.777 GeV
+1
1/2
τ+
tau
≃ 91.2 GeV
0
1
Z0
Z boson
< 1.0 eV
0
1/2
νe
electron neutrino
< 0.17 eV
0
1/2
νμ
muon neutrino
< 18.2 MeV
0
1/2
ντ
tau neutrino
< 1.0 eV
0
1/2
ν̄e
electron antineutrino
< 0.17 eV
0
1/2
ν̄μ
muon antineutrino
< 18.2 MeV
0
1/2
ν̄τ
tau antineutrino
≃ 80.4 GeV
−1
1
W−
W boson
≃ 80.4 GeV
+1
1
W+
W boson