

Three Generations  
of Matter (Fermions) spin  $\frac{1}{2}$

I

II

III

mass →

2.4 MeV

1.27 GeV

171.2 GeV

charge →

$\frac{2}{3}$

$\frac{2}{3}$

$\frac{2}{3}$

name →

Left

u

Right

up

Left

c

Right

charm

Left

t

Right

top

Quarks

4.8 MeV

104 MeV

4.2 GeV

$-\frac{1}{3}$

$-\frac{1}{3}$

$-\frac{1}{3}$

d

Right

down

Left

s

Right

strange

Left

b

Right

bottom

Leptons

0.511 MeV

105.7 MeV

1.777 GeV

Left

e

Right

electron

Left

$\mu$

Right

muon

Left

$\tau$

Right

tau

0

0

g

gluon

0

0

$\gamma$

photon

91.2 GeV

0

Z

weak  
force

80.4 GeV

$\pm 1$

W<sup>±</sup>

weak  
force

124.9 GeV

0

H

Higgs  
boson

spin 0

Bosons (Forces) spin 1