

three generations of matter  
(fermions)

interactions / forces  
(bosons)

I

II

III

mass  
charge  
spin

$\simeq 2.2 \text{ MeV}$   
 $+2/3$   
 $1/2$   
**u**  
up

$\simeq 1.3 \text{ GeV}$   
 $+2/3$   
 $1/2$   
**c**  
charm

$\simeq 173 \text{ GeV}$   
 $+2/3$   
 $1/2$   
**t**  
top

0  
0  
1  
**g**  
gluon

$\simeq 125 \text{ GeV}$   
0  
0  
**H**  
Higgs

QUARKS

$\simeq 4.7 \text{ MeV}$   
 $-1/3$   
 $1/2$   
**d**  
down

$\simeq 96 \text{ MeV}$   
 $-1/3$   
 $1/2$   
**s**  
strange

$\simeq 4.2 \text{ GeV}$   
 $-1/3$   
 $1/2$   
**b**  
bottom

0  
0  
1  
 $\gamma$   
photon

$\simeq 0.511 \text{ MeV}$   
 $-1$   
 $1/2$   
**e**  
electron

$\simeq 106 \text{ MeV}$   
 $-1$   
 $1/2$   
 $\mu$   
muon

$\simeq 1.777 \text{ GeV}$   
 $-1$   
 $1/2$   
 $\tau$   
tau

$\simeq 80.4 \text{ GeV}$   
 $\pm 1$   
1  
**W**  
W boson

$< 1.0 \text{ eV}$   
0  
 $1/2$   
 $\nu_e$   
electron neutrino

$< 0.17 \text{ eV}$   
0  
 $1/2$   
 $\nu_\mu$   
muon neutrino

$< 18.2 \text{ MeV}$   
0  
 $1/2$   
 $\nu_\tau$   
tau neutrino

$\simeq 91.2 \text{ GeV}$   
0  
1  
**Z**  
Z boson

LEPTONS

GAUGE BOSONS  
VECTOR BOSONS

SCALAR BOSONS