

1<sup>st</sup>2<sup>nd</sup>3<sup>rd</sup>

generation

fermions

gauge bosons

EWSB

quarks

2.3 MeV  
*u*  
up

charge:  $2/3$   
colors:  $3$   
mass:  $2.3$   
spin:  $1/2$

1.28 GeV  
*c*  
charm

charge:  $2/3$   
colors:  $3$   
mass:  $1.28$   
spin:  $1/2$

173.2 GeV  
*t*  
top

charge:  $2/3$   
colors:  $3$   
mass:  $173.2$   
spin:  $1/2$

← charge  
← colors  
← mass  
← spin

4.8 MeV  
*d*  
down

charge:  $-1/3$   
colors:  $3$   
mass:  $4.8$   
spin:  $1/2$

95 MeV  
*s*  
strange

charge:  $-1/3$   
colors:  $3$   
mass:  $95$   
spin:  $1/2$

4.7 GeV  
*b*  
bottom

charge:  $-1/3$   
colors:  $3$   
mass:  $4.7$   
spin:  $1/2$

*g*  
gluon

charge:  $0$   
spin:  $1$

strong interaction

511 keV  
*e*  
electron

charge:  $-1$   
spin:  $1/2$

105.7 MeV  
 $\mu$   
muon

charge:  $-1$   
spin:  $1/2$

1.777 GeV  
 $\tau$   
tau

charge:  $-1$   
spin:  $1/2$

$\gamma$   
photon

charge:  $0$   
spin:  $1$

electromagnetic interaction

leptons

< 2 eV  
 $\nu_e$   
*e* neutrino

spin:  $1/2$

< 190 keV  
 $\nu_\mu$   
 $\mu$  neutrino

spin:  $1/2$

< 18.2 MeV  
 $\nu_\tau$   
 $\tau$  neutrino

spin:  $1/2$

80.4 GeV  
 $W^\pm$

charge:  $\pm 1$   
spin:  $1$

91.2 GeV  
*Z*

spin:  $1$

weak interaction

125.1 GeV  
*H*  
Higgs

spin:  $0$