

The Standard Model

QUARKS

UP
mass $2,3 \text{ MeV}/c^2$
charge $\frac{2}{3}$
spin $\frac{1}{2}$
u

CHARM
 $1,275 \text{ GeV}/c^2$
 $\frac{2}{3}$
 $\frac{1}{2}$
c

TOP
 $173,07 \text{ GeV}/c^2$
 $\frac{2}{3}$
 $\frac{1}{2}$
t

DOWN
 $4,8 \text{ MeV}/c^2$
 $-\frac{1}{3}$
 $\frac{1}{2}$
d

STRANGE
 $95 \text{ MeV}/c^2$
 $-\frac{1}{3}$
 $\frac{1}{2}$
s

BOTTOM
 $4,18 \text{ GeV}/c^2$
 $-\frac{1}{3}$
 $\frac{1}{2}$
b

LEPTONS

ELECTRON
 $0,511 \text{ MeV}/c^2$
 -1
 $\frac{1}{2}$
e

MUON
 $105,7 \text{ MeV}/c^2$
 -1
 $\frac{1}{2}$
 μ

TAU
 $1,777 \text{ GeV}/c^2$
 -1
 $\frac{1}{2}$
 τ

ELECTRON NEUTRINO
 $<2,2 \text{ eV}/c^2$
 0
 $\frac{1}{2}$
 ν_e

MUON NEUTRINO
 $<0,17 \text{ MeV}/c^2$
 0
 $\frac{1}{2}$
 ν_μ

TAU NEUTRINO
 $<15,5 \text{ MeV}/c^2$
 0
 $\frac{1}{2}$
 ν_τ

GLUON
 0
 0
 1
g

HIGGS BOSON
 $126 \text{ GeV}/c^2$
 0
 0
H

PHOTON
 0
 0
 1
 γ

Z BOSON
 $91,2 \text{ GeV}/c^2$
 0
 1
Z

W BOSON
 $80,4 \text{ GeV}/c^2$
 ± 1
 1
W

GAUGE BOSONS

The elementary ① **Particles** & ② **Forces** that comprise the universe
... plus 3: **Techniques** (have to be able to calculate something!)