

Standard Model of Elementary Particles

three generations of matter (elementary fermions)						three generations of antimatter (elementary antifermions)						interactions / force carriers (elementary bosons)	
		I	II	III			I	II	III				
mass charge spin	QUARKS	$\approx 2.2 \text{ MeV/c}^2$ $\frac{2}{3}$ $\frac{1}{2}$ u up	$\approx 1.28 \text{ GeV/c}^2$ $\frac{2}{3}$ $\frac{1}{2}$ c charm	$\approx 173.1 \text{ GeV/c}^2$ $\frac{2}{3}$ $\frac{1}{2}$ t top	$\approx 2.2 \text{ MeV/c}^2$ $-\frac{2}{3}$ $\frac{1}{2}$ \bar{u} antiup	$\approx 1.28 \text{ GeV/c}^2$ $-\frac{2}{3}$ $\frac{1}{2}$ \bar{c} anticharm	$\approx 173.1 \text{ GeV/c}^2$ $-\frac{2}{3}$ $\frac{1}{2}$ \bar{t} antitop			0 0 1 g gluon	$\approx 124.97 \text{ GeV/c}^2$ 0 0 0 H higgs		
		$\approx 4.7 \text{ MeV/c}^2$ $-\frac{1}{3}$ $\frac{1}{2}$ d down	$\approx 96 \text{ MeV/c}^2$ $-\frac{1}{3}$ $\frac{1}{2}$ s strange	$\approx 4.18 \text{ GeV/c}^2$ $-\frac{1}{3}$ $\frac{1}{2}$ b bottom	$\approx 4.7 \text{ MeV/c}^2$ $\frac{1}{3}$ $\frac{1}{2}$ \bar{d} antidown	$\approx 96 \text{ MeV/c}^2$ $\frac{1}{3}$ $\frac{1}{2}$ \bar{s} antistrange	$\approx 4.18 \text{ GeV/c}^2$ $\frac{1}{3}$ $\frac{1}{2}$ \bar{b} antibottom			0 0 1 γ photon	GAUGE BOSONS VECTOR BOSONS	SCALAR BOSONS	
		$\approx 0.511 \text{ MeV/c}^2$ -1 $\frac{1}{2}$ e electron	$\approx 105.66 \text{ MeV/c}^2$ -1 $\frac{1}{2}$ μ muon	$\approx 1.7768 \text{ GeV/c}^2$ -1 $\frac{1}{2}$ τ tau	$\approx 0.511 \text{ MeV/c}^2$ 1 $\frac{1}{2}$ e^+ positron	$\approx 105.66 \text{ MeV/c}^2$ 1 $\frac{1}{2}$ $\bar{\mu}$ antimuon	$\approx 1.7768 \text{ GeV/c}^2$ 1 $\frac{1}{2}$ $\bar{\tau}$ antitau			$\approx 91.19 \text{ GeV/c}^2$ 0 1 Z Z ⁰ boson			
LEPTONS		$<2.2 \text{ eV/c}^2$ 0 $\frac{1}{2}$ ν_e electron neutrino	$<0.17 \text{ MeV/c}^2$ 0 $\frac{1}{2}$ ν_μ muon neutrino	$<18.2 \text{ MeV/c}^2$ 0 $\frac{1}{2}$ ν_τ tau neutrino	$<2.2 \text{ eV/c}^2$ 0 $\frac{1}{2}$ $\bar{\nu}_e$ electron antineutrino	$<0.17 \text{ MeV/c}^2$ 0 $\frac{1}{2}$ $\bar{\nu}_\mu$ muon antineutrino	$<18.2 \text{ MeV/c}^2$ 0 $\frac{1}{2}$ $\bar{\nu}_\tau$ tau antineutrino			$\approx 80.39 \text{ GeV/c}^2$ 1 1 W⁺ W ⁺ boson	$\approx 80.39 \text{ GeV/c}^2$ -1 1 W⁻ W ⁻ boson		

QUARKS

LEPTONS

GAUGE BOSONS
VECTOR BOSONS

SCALAR BOSONS