The Standard Model

Elementary particles and antiparticles

Charge	Fermions (spin 1/2)			Bosons	Antifermions (spin 1/2)			Charge
	Quarks (interact by strong force)			(spin 1)	Antiquarks (interact by strong force)			
$+\frac{2}{3}$	1968 2.0 MeV u up	1974 1.29 GeV c charm	1995 172.9 GeV t top	1905 0 eV γ photon EM force	172.9 GeV $\bar{t}$ antitop	1.29 GeV $\bar{c}$ anticharm	2.0 MeV $\bar{u}$ antiup	$-\frac{2}{3}$
$-\frac{1}{3}$	1968 4.8 MeV d down	1968 100 MeV s strange	1977 4.2 GeV b bottom	1978 0 eV g gluon strong force	4.2 GeV $\bar{b}$ antibottom	100 MeV $\bar{s}$ antistrange	4.8 MeV $\bar{d}$ antidown	$+\frac{1}{3}$
	Leptons				Antileptons			
0	1956 <2.2 eV ν_e electron neutrino	1962 <0.17 MeV ν_μ muon neutrino	2000 <15.5 MeV ν_τ tau neutrino	1983 91.2 GeV Z^0 Z boson weak force	<15.5 MeV $\bar{\nu}_\tau$ anti τ neutrino	<0.17 MeV $\bar{\nu}_\mu$ anti μ neutrino	<2.2 eV $\bar{\nu}_e$ anti e neutrino	0
−1	1897 0.511 MeV e electron	1936 105.7 MeV μ muon	1975 1.777 GeV τ tau	1983 80.4 GeV $W^\pm$ W boson weak force	1.777 GeV $\bar{\tau}$ antitau	105.7 MeV $\bar{\mu}$ antimuon	0.511 MeV $\bar{e}$ positron	+1
0	A new particle, consistent with the Higgs boson, was announced 4th of July 2012 Mass unit GeV is short for GeV/c^2 ≈ 1.783×10^{-24} g			2012 125.3 GeV H^0 Higgs boson	The graviton is another (hypothetical) particle that is postulated to mediate the force of gravitation The graviton, if it exists, would be a spin 2 boson			0

Compound particles and antiparticles

	Hadrons (held together by strong force)		Antihadrons (held together by strong force)		
	Baryons (spin 1/2) three quarks	Mesons (spin 1) quark-antiquark	Antimesons quark-antiquark	Antibaryons three antiquarks	
+1	1917 938.3 MeV p^+ proton uud	1947 139.6 MeV π^+ pion $u\bar{d}$	139.6 MeV π^- antipion $\bar{u}d$	938.3 MeV p^- antiproton $\bar{u}\bar{u}\bar{d}$	−1
0	1932 939.6 MeV n^0 neutron udd	1947 493.7 MeV K^0 kaon $d\bar{s}$	493.7 MeV $\bar{K}^0$ antikaon $\bar{d}s$	939.6 MeV $\bar{n}^0$ antineutron $\bar{u}\bar{d}\bar{d}$	0
	⋮ many more	⋮ many more	⋮ many more	⋮ many more	

Protons and neutrons each contain three quarks that are held together by the strong force
⟹ atomic nuclei also held together by the strong force; from atomic nuclei and electrons
⟹ atoms held together by the electro-magnetic force, absorb or emit photons
⟹ periodic table of elements ⟹ molecules held together by the electro-magnetic force
⟹ matter, planets, stars, solar systems and galaxies held together by gravitational force

Peter Jipsen, Chapman University, July 2012, information from Wikipedia, symbols by MathJax