Fundamental Particles

Matter: $s = 1/2$

LEPTONS			
$Q=-1$		$Q=0$	
e^-	$0.511\,MeV/c^2$	ν_e	$< 1\,eV/c^2$
μ^-	$106\,MeV/c^2$	ν_μ	$< 0.19\,MeV/c^2$
τ^-	$1777\,MeV/c^2$	ν_τ	$< 18.2\,MeV/c^2$

QUARKS			
$Q=2/3$		$Q=-1/3$	
u (up)	$0.3\,GeV/c^2$*	d (down)	$0.3\,GeV/c^2$
c (charm)	$1.6\,GeV/c^2$	s (strange)	$0.5\,GeV/c^2$
t (top)	$174\,GeV/c^2$	b (bottom)	$4.5\,GeV/c^2$

*Since quarks have never been seen in isolation it is not possible to measure their mass directly. The values quoted here are obtained by naively dividing up the masses of the hadrons that are made up of the quarks. Thus $m_u \approx m_d \approx m_p/3$.

Force particles: (s=1)

Photon γ		$< 2\times 10^{-16}\,eV/c^2$	$Q=0$
Gluons G		Massless	$Q=0$
Weak bosons	$W^\pm$	$80.4\,GeV/c^2$	$Q=\pm 1$
	Z^0	$91.2\,GeV/c^2$	$Q=0$

In addition to all of the particles above there is one more boson to add to the list, called the *Higgs boson*. It is essential for the internal consistency of our current understanding of particle physics. The Higgs boson has not yet been detected with any certainty but some of its expected physical properties are known and there is some information about its possible mass from existing experiments. Theory predicts that the Higgs boson should have spin $s = 0$ and charge $Q = 0$. The mass is not predicted by theory, but experiments to date imply that it is greater than $115\,GeV/c^2$ and probably less that $130\,GeV/c^2$, though various possibilities above this are not excluded. The majority opinion is that it will probably weigh in at about $125\,GeV/c^2$ but more definitive information is expected from the LHC in CERN later in 2012.