

Quarks

$2.2^{+0.5}_{-0.4} \text{ MeV}$



up

$+\frac{2}{3}e$

1964 - GIM mechanism

$1.28 \pm 0.03 \text{ GeV}/c^2$



charm

$+\frac{2}{3}e$

1974 - J/ψ meson

$172.76 \text{ GeV}/c^2$



top

$+\frac{2}{3}e$

1995 - Tevatron

$4.7^{+0.5}_{-0.4} \text{ MeV}/c^2$



down

$-\frac{1}{3}e$

1964 - GIM mechanism

$4.7^{+0.5}_{-0.4} \text{ MeV}/c^2$



strange

$-\frac{1}{3}e$

1964 - kaon decay

$4.7^{+0.5}_{-0.4} \text{ MeV}/c^2$



bottom

$-\frac{1}{3}e$

1977 - Upsilon meson

Leptons

$0.511 \text{ MeV}/c^2$



electron

$-1e$

1895 - X-rays

$105.66 \text{ MeV}/c^2$



muon

$-1e$

1936 - cosmic ray

$1.77686 \text{ GeV}/c^2$



tau

$-1e$

1975 - SLAC

$< 2.2 \text{ eV}/c^2$



electron neutrino

0

1956 - nuclear reactor

$< 0.17 \text{ MeV}/c^2$



muon neutrino

0

1962 - Brookhaven

$< 18.2 \text{ MeV}/c^2$



tau neutrino

0

2000 - Fermilab

Gauge Bosons

0



photon

0

1900 - Max Planck's quanta

0



gluon

0

1979 - PETRA

$80.379 \text{ GeV}/c^2$



W^\pm

$\pm 1e$

1983 - UA1, UA2

$91.1876 \text{ GeV}/c^2$



Z^0

0

1983 - UA1, UA2

$125.10 \text{ GeV}/c^2$



Higgs

0

2012 - ATLAS, CMS