


# Reduced Particle Chart

## Quarks

**UP QUARK**  
DISCOVERED: 1969



**MATTER PARTICLE**

Mass:  $2 \text{ MeV}/c^2$   
 Electric Charge:  $+\frac{2}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $+\frac{1}{2}$

Lifetime: unlimited

**CHARM QUARK**  
DISCOVERED: 1974




**MATTER PARTICLE**

Mass:  $1300 \text{ MeV}/c^2$   
 Electric Charge:  $+\frac{2}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $+\frac{1}{2}$

Lifetime:  $10^{-12} \text{ s}$

**TOP QUARK**  
DISCOVERED: 1995




**MATTER PARTICLE**

Mass:  $173 \cdot 10^3 \text{ MeV}/c^2$   
 Electric Charge:  $+\frac{2}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $+\frac{1}{2}$

Lifetime:  $6 \cdot 10^{-25} \text{ s}$

**DOWN QUARK**  
DISCOVERED: 1969




**MATTER PARTICLE**

Mass:  $5 \text{ MeV}/c^2$   
 Electric Charge:  $-\frac{1}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $-\frac{1}{2}$

Lifetime: 900s

**STRANGE QUARK**  
DISCOVERED: 1969




**MATTER PARTICLE**

Mass:  $100 \text{ MeV}/c^2$   
 Electric Charge:  $-\frac{1}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $-\frac{1}{2}$

Lifetime:  $5 \cdot 10^{-8} \text{ s}$

**BOTTOM QUARK**  
DISCOVERED: 1977




**MATTER PARTICLE**

Mass:  $4200 \text{ MeV}/c^2$   
 Electric Charge:  $-\frac{1}{3}$   
 Strong Charges: blue, red, green  
 Weak Charge:  $-\frac{1}{2}$

Lifetime:  $2 \cdot 10^{-12} \text{ s}$

## Leptons

**ELECTRON**  
DISCOVERED: 1897




**MATTER PARTICLE**

Mass:  $0.511 \text{ MeV}/c^2$   
 Electric Charge: -1  
 Strong Charges: -  
 Weak Charge:  $-\frac{1}{2}$

Lifetime: unlimited

**MUON**  
DISCOVERED: 1937




**MATTER PARTICLE**

Mass:  $106 \text{ MeV}/c^2$   
 Electric Charge: -1  
 Strong Charges: -  
 Weak Charge:  $-\frac{1}{2}$

Lifetime:  $2.2 \cdot 10^{-6} \text{ s}$

**TAU**  
DISCOVERED: 1975



**MATTER PARTICLE**

Mass:  $1777 \text{ MeV}/c^2$   
 Electric Charge: -1  
 Strong Charges: -  
 Weak Charge:  $-\frac{1}{2}$

Lifetime:  $2.9 \cdot 10^{-13} \text{ s}$