## Limited table of particles

|  | Name | Symbol | Electric Charge | Lepton <br> No. | Electron No. | Muon No. | Tau No. | Generation | Mass (MeV) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Quarks | up | $\mathbf{u}$ | +2/3 | 0 | 0 | 0 | 0 | 1 | 2 |
|  | down | d | $-1 / 3$ | 0 | 0 | 0 | 0 | 1 | 5 |
|  | charm | C | +2/3 | 0 | 0 | 0 | 0 | 11 | 1300 |
|  | strange | S | $-1 / 3$ | 0 | 0 | 0 | 0 | 11 | 100 |
|  | top | t | +2/3 | 0 | 0 | 0 | 0 | III | 173000 |
|  | bottom | b | $-1 / 3$ | 0 | 0 | 0 | 0 | III | 4200 |
|  | anti-up | $\bar{u}$ | $-2 / 3$ | 0 | 0 | 0 | 0 | 1 | 2 |
|  | anti-down | $\bar{d}$ | +1/3 | 0 | 0 | 0 | 0 | 1 | 5 |
|  | anti-charm | C | -2/3 | 0 | 0 | 0 | 0 | 11 | 1300 |
|  | anti-strange | $\bar{S}$ | +1/3 | 0 | 0 | 0 | 0 | 11 | 100 |
|  | anti-top | $t$ | -2/3 | 0 | 0 | 0 | 0 | III | 173000 |
|  | anti-bottom | $\bar{b}$ | +1/3 | 0 | 0 | 0 | 0 | III | 4200 |
| Leptons | electron | $\mathbf{e}^{-}$ | -1 | +1 | +1 | 0 | 0 | 1 | 0.511 |


|  | Name | Symbol | Electric Charge | Lepton No. | Electron No. | Muon No. | Tau No. | Generation | Mass <br> (MeV) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | muon | $\mu^{-}$ | -1 | +1 | 0 | +1 | 0 | II | 106 |
|  | tau | $\tau^{-}$ | -1 | +1 | 0 | 0 | +1 | III | 1777 |
|  | positron | $\mathbf{e}^{+}$ | +1 | -1 | -1 | 0 | 0 | I | 0.511 |
|  | anti-muon | $\mu^{+}$ | +1 | -1 | 0 | -1 | 0 | II | 106 |
|  | anti-tau | $\tau^{+}$ | +1 | -1 | 0 | 0 | -1 | III | 1777 |
|  | electron neutrino | Ve | 0 | +1 | +1 | 0 | 0 | 1 | near-0 |
|  | muon neutrino | $\nu_{\mu}$ | 0 | +1 | 0 | +1 | 0 | 11 | near-0 |
|  | tau neutrino | $\boldsymbol{V}_{\tau}$ | 0 | +1 | 0 | 0 | +1 | III | near-0 |
|  | electron antineutrino | $\overline{\boldsymbol{v}}_{\mathrm{e}}$ | 0 | -1 | -1 | 0 | 0 | ! | near-0 |
|  | muon anti-neutrino | $\overline{\boldsymbol{v}}_{\mu}$ | 0 | -1 | 0 | -1 | 0 | 11 | near-0 |
|  | tau anti-neutrino | $\overline{\boldsymbol{v}}_{\tau}$ | 0 | -1 | 0 | 0 | -1 | III | near-0 |
| Gauge <br> Bosons | photon | $\gamma$ | 0 | 0 | 0 | 0 | 0 | N/A | 0 |
|  | W+ | W+ | +1 | 0 | 0 | 0 | 0 | N/A | 80400 |
|  | W- | W- | -1 | 0 | 0 | 0 | 0 | N/A | 80400 |
|  | Z | $Z^{0}$ | 0 | 0 | 0 | 0 | 0 | N/A | 91200 |


|  | Name | Symbol | Electric Charge | Lepton No. | Electron No. | Muon No. | Tau No. | Generation | $\begin{aligned} & \text { Mass } \\ & \text { (MeV) } \end{aligned}$ |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
|  | gluon | 9 | 0 | 0 | 0 | 0 | 0 | N/A | 0 |
|  | Higgs |  | 0 | 0 | 0 | 0 | 0 | N/A | 125000 |
| Mesons | J/Psi | $J / \Psi$ | 0 | 0 | 0 | 0 | 0 | N/A | 3096 |
|  | Upsilon | $\mathbf{Y}$ | 0 | 0 | 0 | 0 | 0 | N/A | 9460 |
|  | Positive pion | $\pi^{+}$ | +1 | 0 | 0 | 0 | 0 | N/A | 140 |
|  | Negative pion- | $\pi$ | -1 | 0 | 0 | 0 | 0 | N/A | 140 |
|  | Neutral pion | $\pi^{0}$ | 0 | 0 | 0 | 0 | 0 | N/A | 135 |
|  | phi | $\phi$ | 0 | 0 | 0 | 0 | 0 | N/A | 1019 |
|  | omega | $\Omega$ | 0 | 0 | 0 | 0 | 0 | N/A | 782 |
| Baryons | proton | $p$ | +1 | 0 | 0 | 0 | 0 | N/A | 938 |
|  | neutron | n | 0 | 0 | 0 | 0 | 0 | N/A | 940 |
|  | anti-proton |  | -1 | 0 | 0 | 0 | 0 | N/A | 938 |
|  | anti-neutron | П | 0 | 0 | 0 | 0 | 0 | N/A | 940 |

