

















# Standard Model of Elementary Particles

| Fermions  |   |  |   | Bosons   |   |   |
|---|---|--|---|--|---|---|
|   | 1st generation  | 2nd generation   | 3rd generation  | Gauge bosons   | Scalar bosons   | Tensor bosons   |
| QUARKS  | <div>mass<br/>charge<br/>spin</div> <div>2.2 MeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>up</div> | <div>1.28 GeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>charm</div>        | <div>173.1 GeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>top</div>          | <div>strong nuclear force (color)</div>  | <div>124.97 GeV/c<sup>2</sup><br/>0<br/>0<br/>0</div> <div></div> <div>higgs</div> | <div>0<br/>0<br/>2</div> <div></div> <div>graviton*</div>                    |
|   | <div>4.7 MeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>down</div>                                  | <div>96 MeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>strange</div>       | <div>4.18 GeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>bottom</div>       |  |   |   |
|   | LEPTONS   | <div>2.2 MeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>electron</div>      | <div>1.28 GeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>muon</div>          | <div>173.1 GeV/c<sup>2</sup><br/>2/3<br/>1/2</div> <div></div> <div>tau</div> | <div>electromagnetic force (charge)</div>   | <div>80.39 MeV/c<sup>2</sup><br/>±1<br/>1</div> <div></div> <div>W boson</div> |
| <div>4.7 MeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>electron neutrino</div> |   | <div>96 MeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>muon neutrino</div> | <div>4.18 GeV/c<sup>2</sup><br/>-1/3<br/>1/2</div> <div></div> <div>tau neutrino</div> | <div>0<br/>0<br/>1</div> <div></div> <div>photon</div>                       |   |   |
|   |   |  |   | <div>weak nuclear force (weak isospin)</div>   |   |   |

\*hypothetical

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