

# Standard Model of Particle Physics

Izaak Neutelings

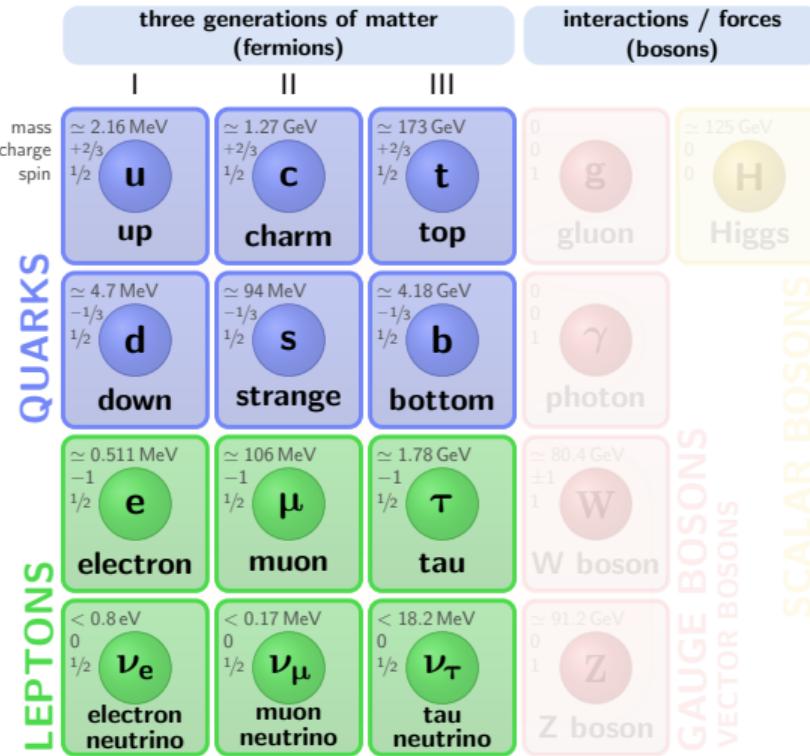
University of Zurich

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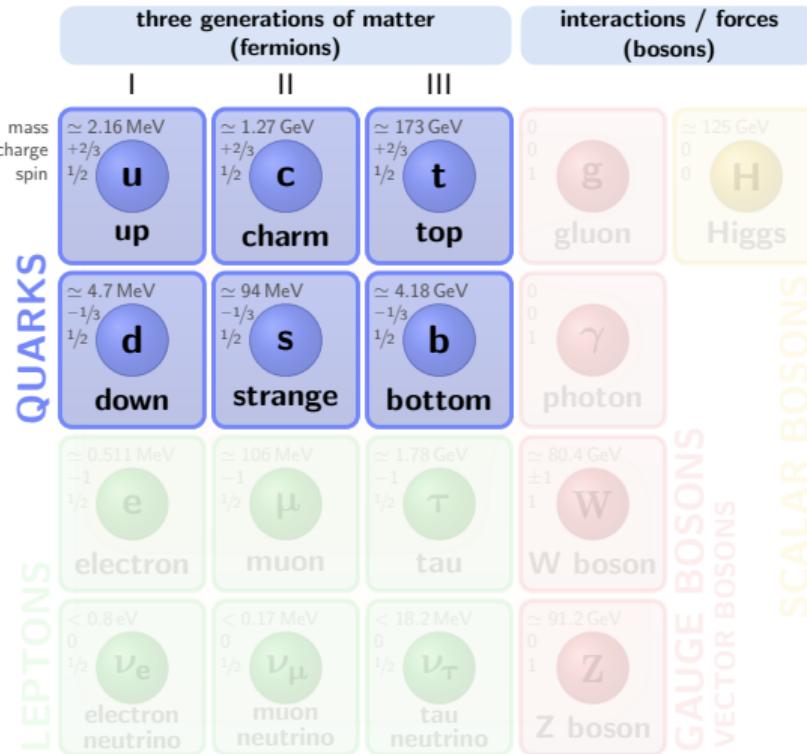
three generations of matter (fermions)			interactions / forces (bosons)	
I	II	III		
mass charge spin	$\simeq 2.16 \text{ MeV}$ $+2/3$ $1/2$ <b>u</b> up	$\simeq 1.27 \text{ GeV}$ $+2/3$ $1/2$ <b>c</b> charm	$\simeq 173 \text{ GeV}$ $+2/3$ $1/2$ <b>t</b> top	$0$ $0$ $1$ <b>g</b> gluon
QUARKS				$\simeq 125 \text{ GeV}$ $0$ $0$ $0$ <b>H</b> Higgs
	$\simeq 4.7 \text{ MeV}$ $-1/3$ $1/2$ <b>d</b> down	$\simeq 94 \text{ MeV}$ $-1/3$ $1/2$ <b>s</b> strange	$\simeq 4.18 \text{ GeV}$ $-1/3$ $1/2$ <b>b</b> bottom	$0$ $0$ $1$ <b><math>\gamma</math></b> photon
LEPTONS				<b>GAUGE BOSONS</b> VECTOR BOSONS
	$\simeq 0.511 \text{ MeV}$ $-1$ $1/2$ <b>e</b> electron	$\simeq 106 \text{ MeV}$ $-1$ $1/2$ <b><math>\mu</math></b> muon	$\simeq 1.78 \text{ GeV}$ $-1$ $1/2$ <b><math>\tau</math></b> tau	$\simeq 80.4 \text{ GeV}$ $\pm 1$ $1$ <b>W</b> W boson
	$< 0.8 \text{ eV}$ $0$ $1/2$ <b><math>\nu_e</math></b> electron neutrino	$< 0.17 \text{ MeV}$ $0$ $1/2$ <b><math>\nu_\mu</math></b> muon neutrino	$< 18.2 \text{ MeV}$ $0$ $1/2$ <b><math>\nu_\tau</math></b> tau neutrino	$\simeq 91.2 \text{ GeV}$ $0$ $1$ <b>Z</b> Z boson
				SCALAR BOSONS

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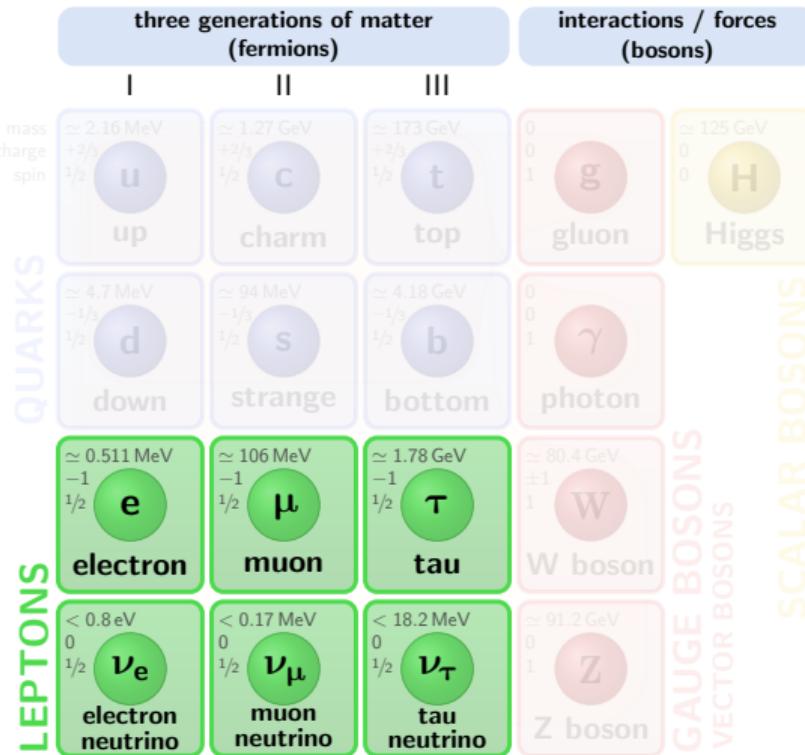
► **Fermions** of spin  $1/2$ , which make up matter

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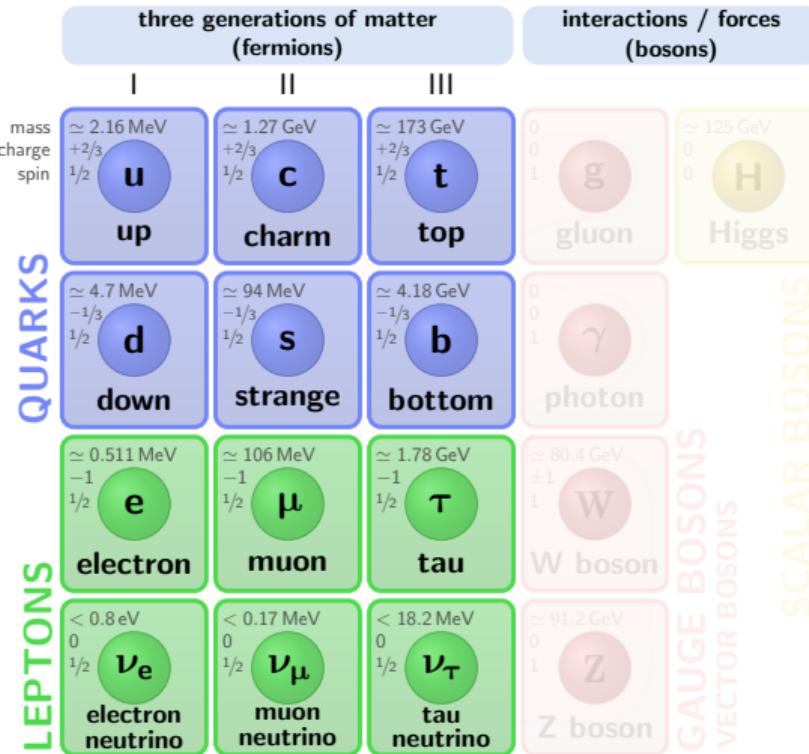
- ▶ **Fermions** of spin  $1/2$ , which make up matter
  - ▶ **Quarks**

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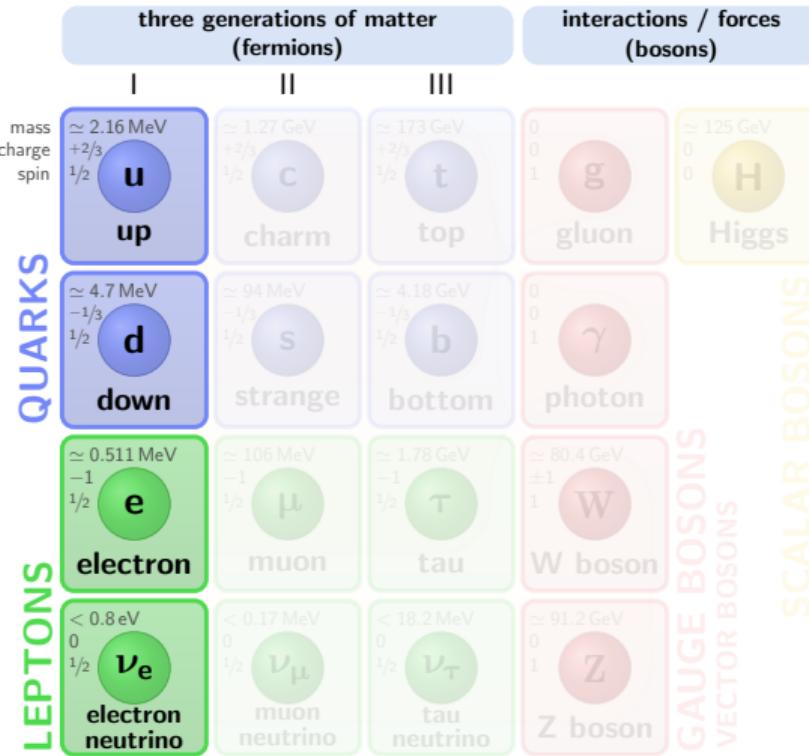
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- **Quarks**
- **Leptons**
- Three generations

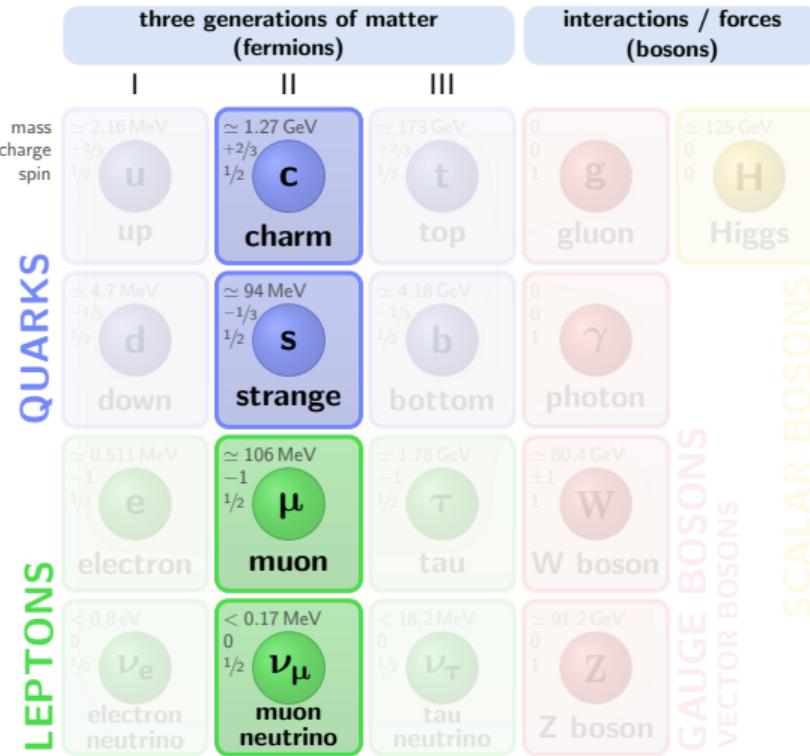
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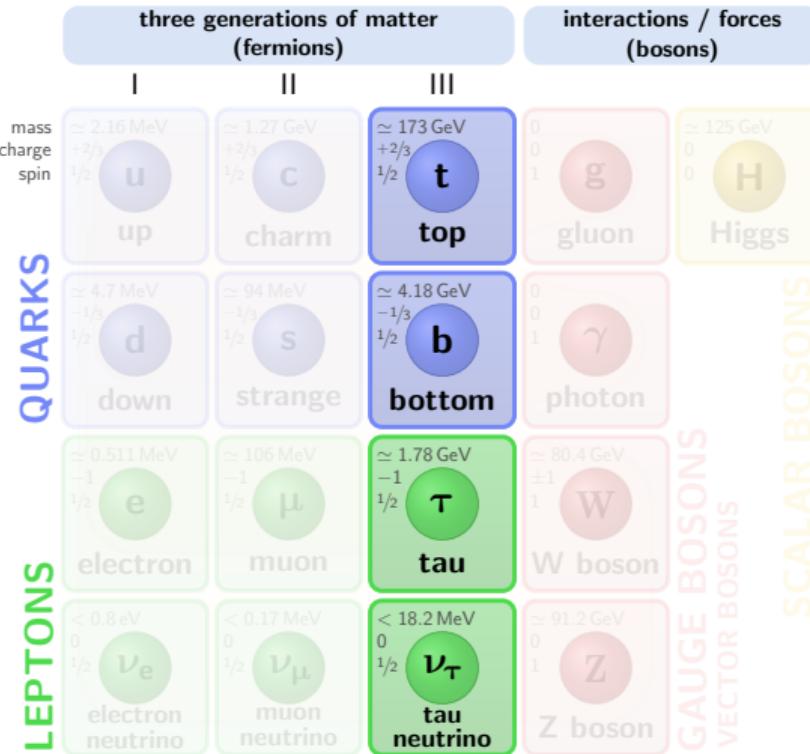
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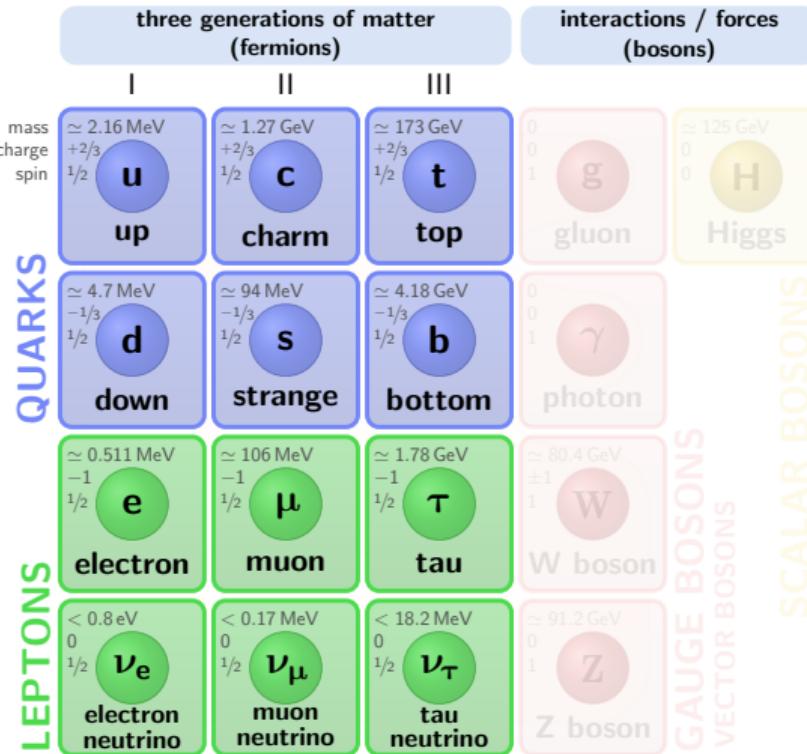
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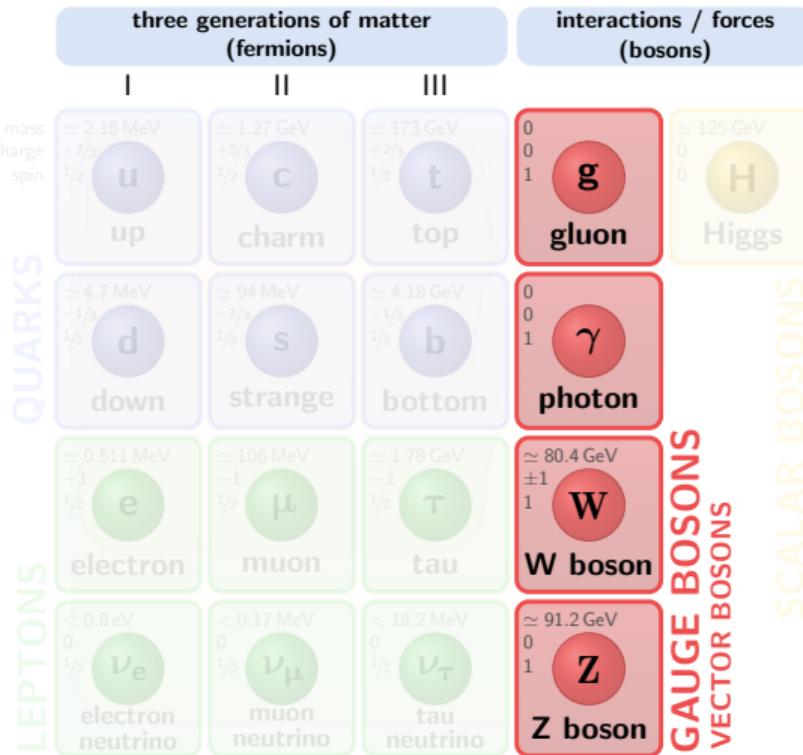
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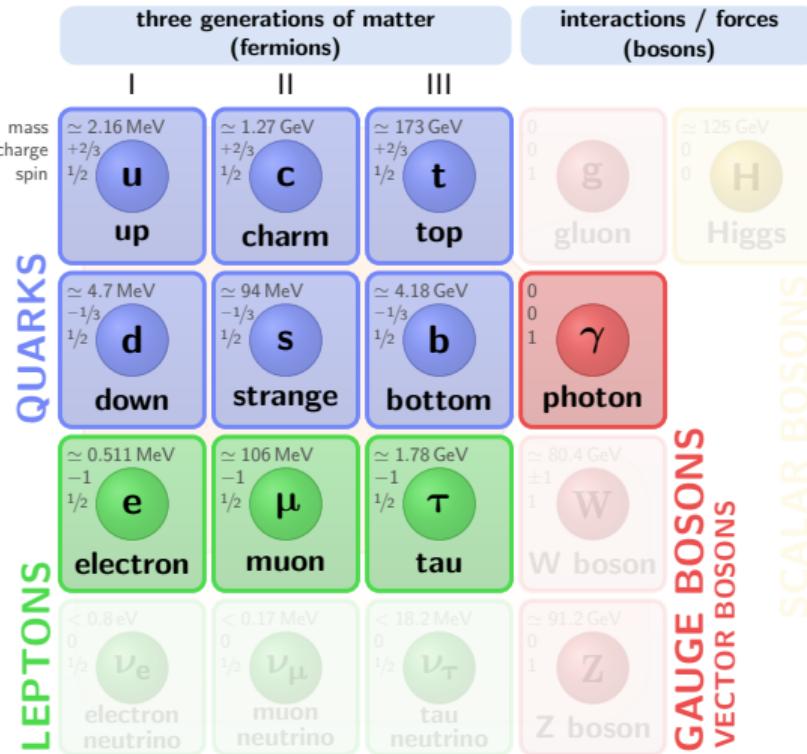
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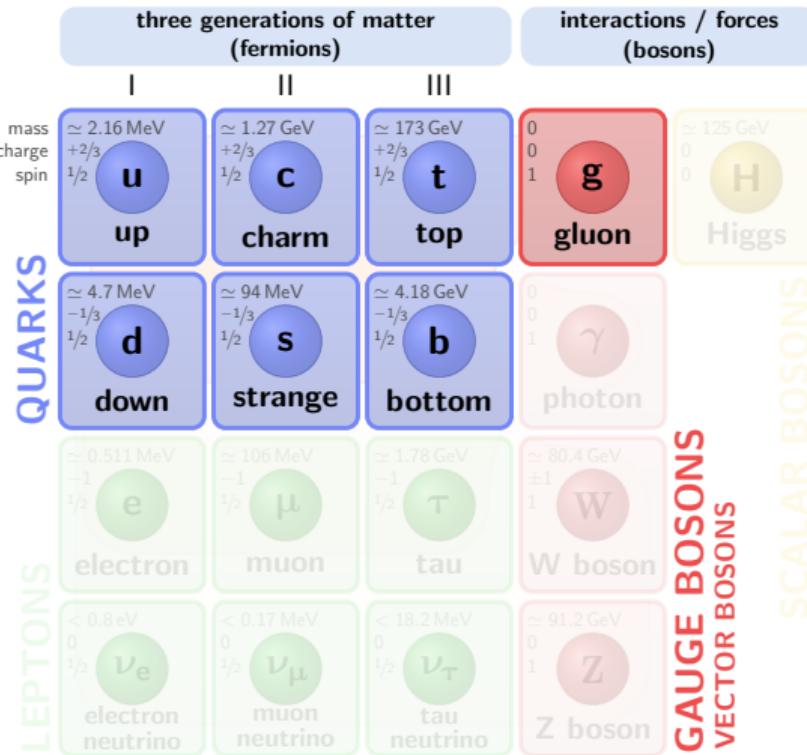
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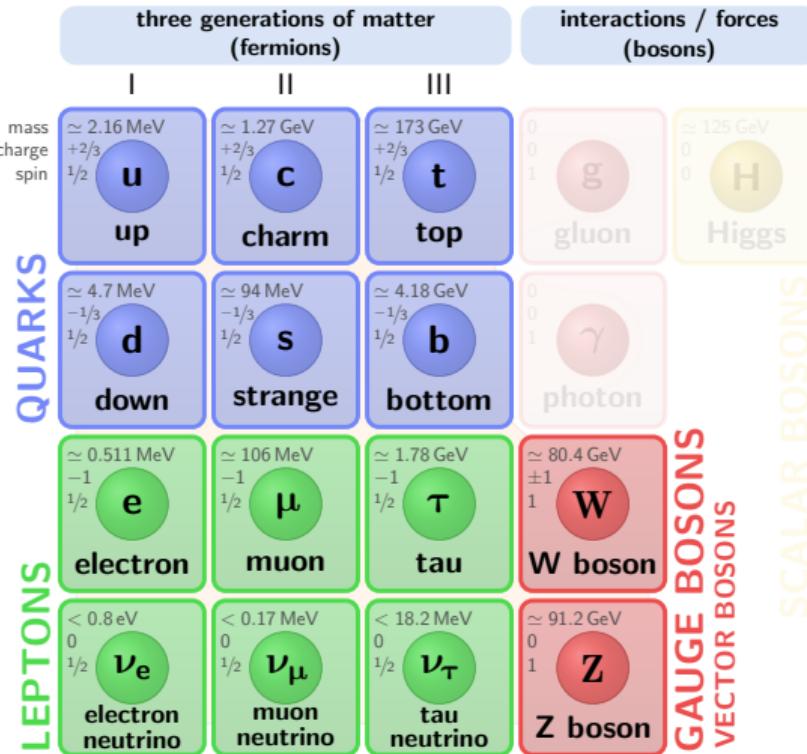
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- Electromagnetic interaction
- Strong interaction

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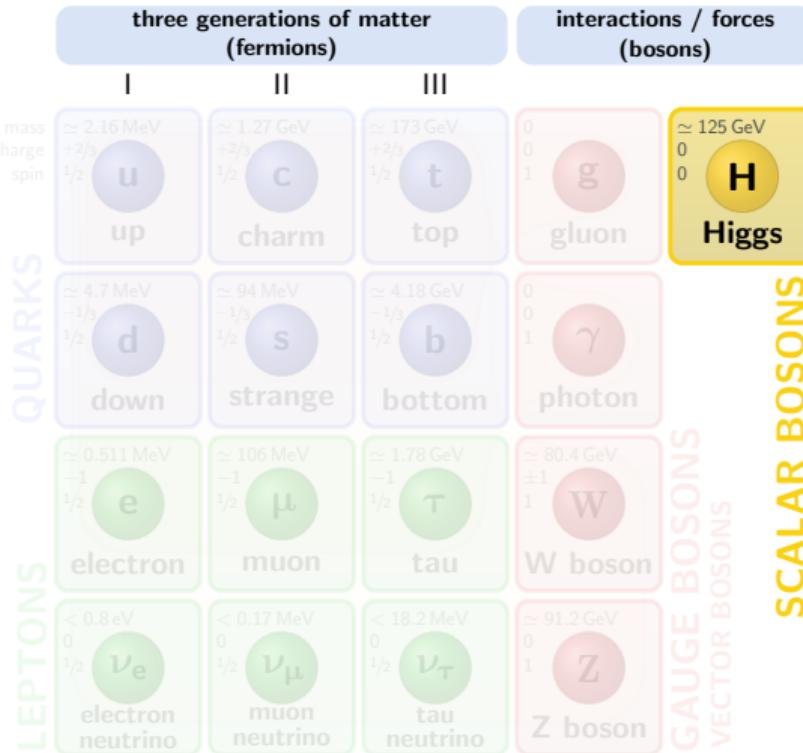
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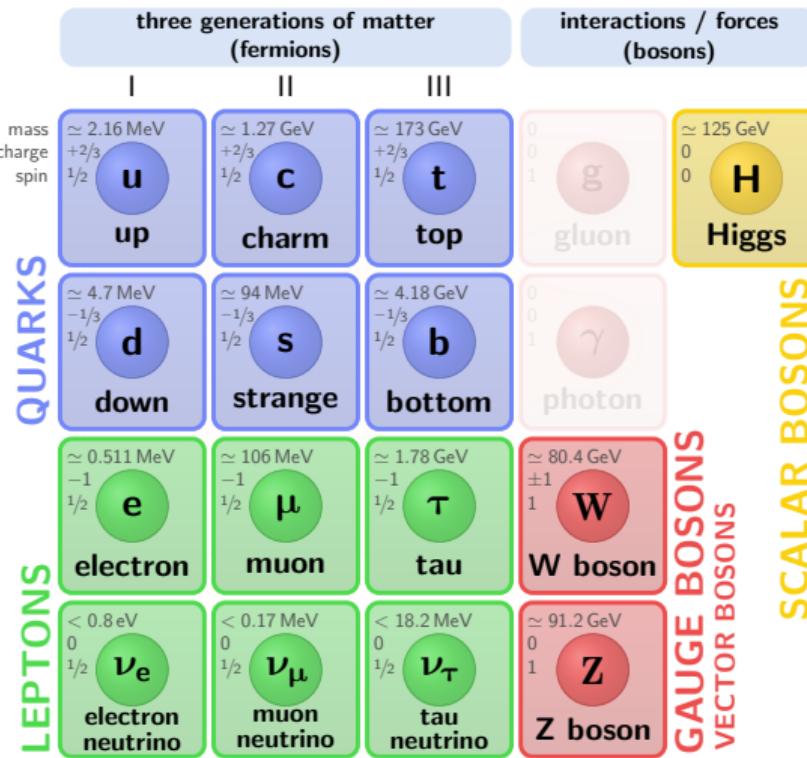
- Electromagnetic interaction
- Strong interaction
- Weak interaction

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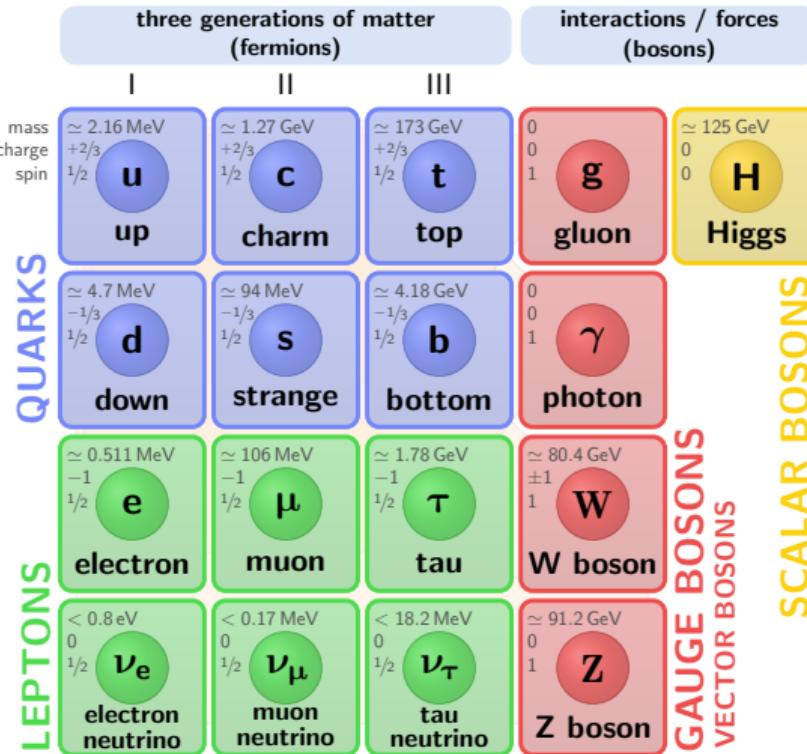
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