

THE STANDARD MODEL

Bernd De winter
Thomas Deprez
Victor De Jaeghere
Viola Goni
Francesco Marri

The Standard Model of particle physics is the theory describing three of the four known fundamental forces in the universe. It can be used to predict properties of weak neutral currents and the W and Z bosons.

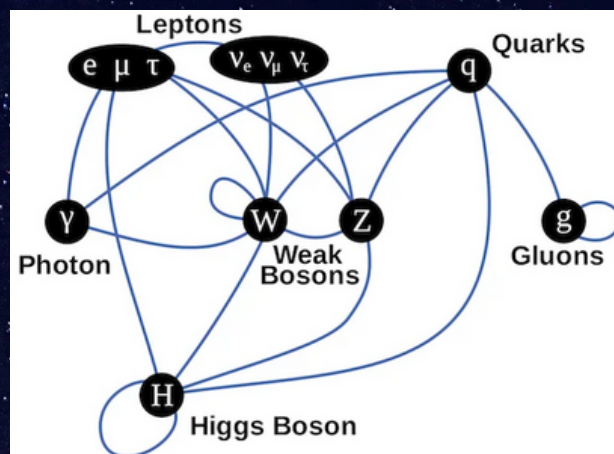


fig 1: <https://blogs.scientificamerican.com/observations/the-standard-model-of-physics-at-5>

THE ELEMENTARY PARTICLES

All matter around us is made of elementary particles, the building blocks of matter. These particles occur in two basic types called quarks and leptons. Each group consists of six particles, which are related in pairs, or “generations”.

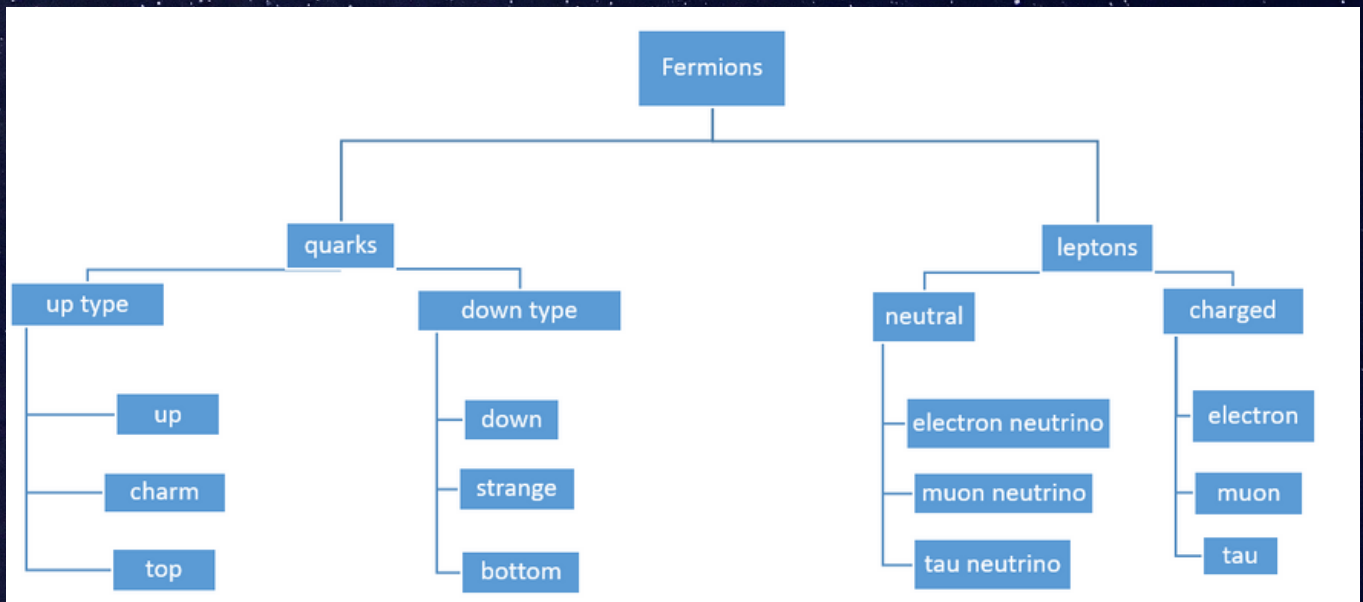


fig 2: <https://medium.com/@deepali.saxenas/the-invisible-particle-neutrino-simplified-a2072d0e48e4>

PETER HIGGS

In the 1960s, Higgs proposed that broken symmetry in electroweak theory could explain the origin of mass of elementary particles in general and of the W and Z bosons in particular.

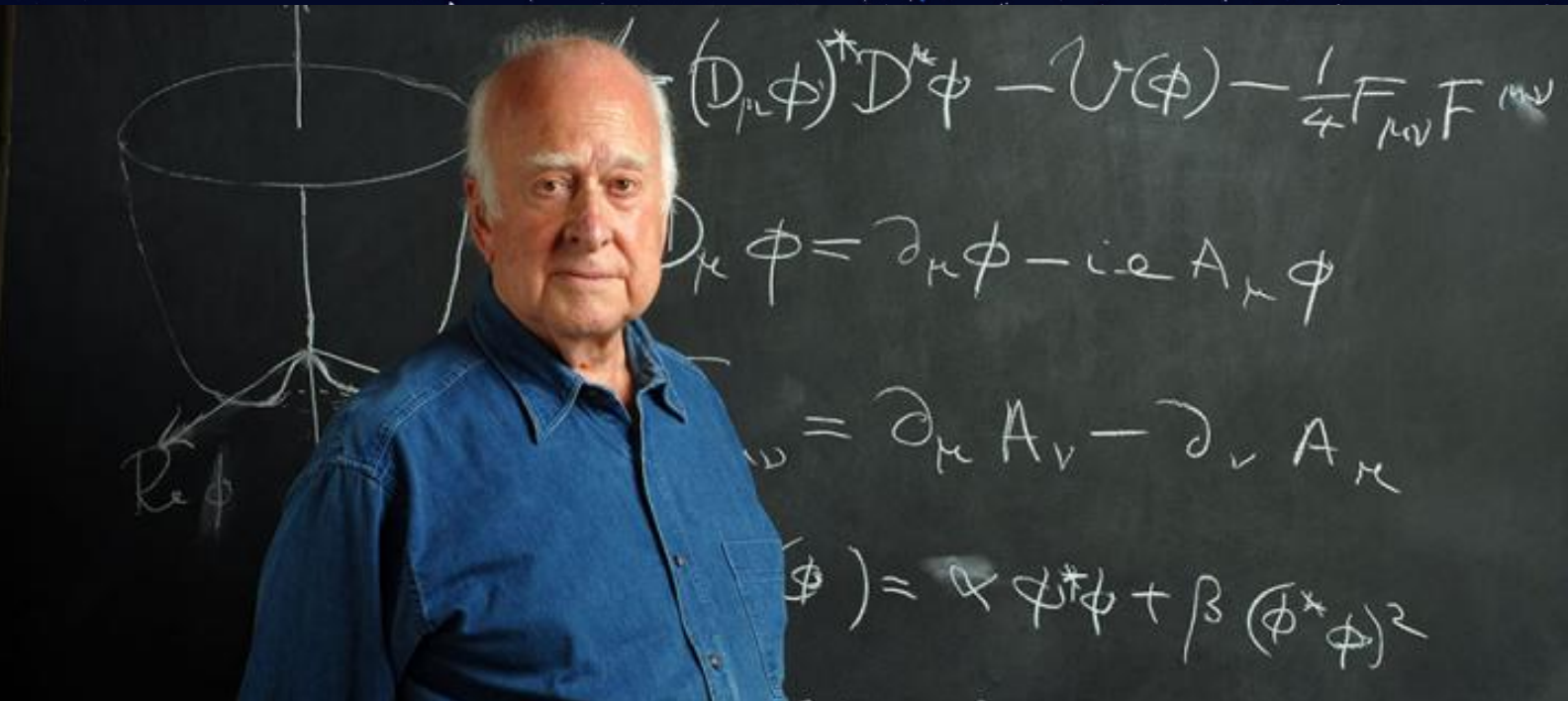


fig 3: <https://www.engineersonline.nl/nieuws/id20007-cern-experimenten-observeren-deeltje-dat-in-overeenstemming-is-met-langgezocht-higgs-boson.html>

PARTICLE INTERACTIONS

Each force included in the Standard Model acts between particles because of some property of that particle: charge for electromagnetism, color for the strong force, and flavor for the weak force.

PHYSICS BEYOND THE STANDARD MODEL

The standard model doesn't explain certain phenomena and new discoveries have brought some theoretical problems.

PHENOMENA

Dark Matter
Neutrino Masses
Gravity
Matter-Antimatter symmetry

THEORETICAL PROBLEMS

Number of parameters
Hierarchy problems