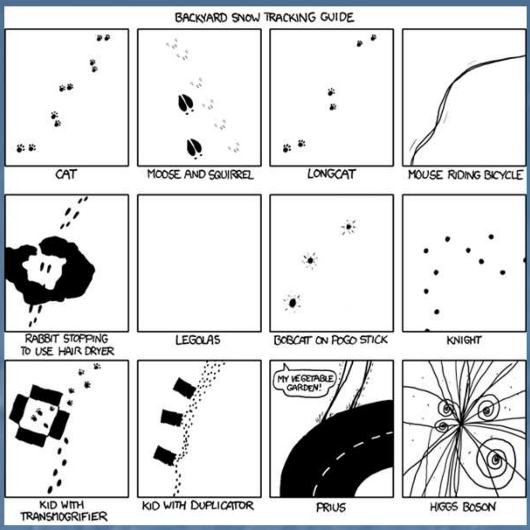
Why bother ?



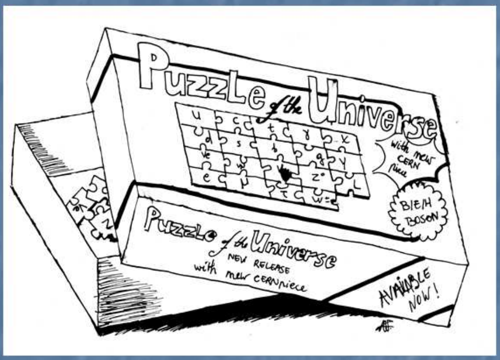
It happened before

Since the dawn of humanity, we have observed Nature and tried to understand the world in which we live. The knowledge of matter was acquired slowly, with work ranging from everyday experience for the prehistoric people to dedicated experiments in today's high-tech laboratories.

Explaining the world thanks to a unique principle is an ancient philosopher's quest : for example, in Greek Antiquity, Thales thought that everything comes from water, whereas Democritus used atoms to this aim and Pythagoras thought that numbers are the bases of reality. Science has made big advances whenever a unique theory was found to explain apparently different phenomena, e.g. when Newton imagined that the same force explained the fall of apples from a tree and the Moon motion around the Earth. The discovery of the boson at CERN is the latest event in this (scientific) adventure.

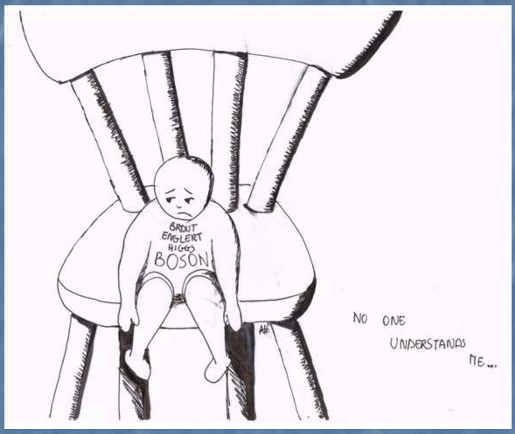
What it really means

Physicists now think that it is possible to describe the world using four forces: gravity, electromagnetism, strong and weak interactions. They have elaborated a "standard model" that is a step towards the unification of those forces. This model, as all scientific theories, must be confronted to reality. Indeed, it is not a pure mathematical idea : it should be able to explain all past observations, and it needs to make predictions, which can then be checked. The "standard model" in particle physics led to a very specific prediction : the existence of the Brout-Englert-Higgs boson. The detection of this particle is thus a direct check of the standard model... In fact, if it hadn't been detected with LHC, we would have a very good reason to reconsider our understanding of the basic workings of the universe.



Who cares ?

It is difficult to imagine that this discovery in fundamental physics has any impact on our everyday life. This is not true, for several reasons. First, finding this particle required a large amount of new instruments and softwares - some of which will be used in a different context. A famous example : the world-wide web was created at CERN for the exchange of data between scientists... then it became the network everybody uses today ! Second, one can never imagine what will be useful in the future. Examples : computers wouldn't have existed without fundamental research on matter at the beginning of the 20th century, notably the detection of particles such as the electron and the development of quantum physics ; the laser was imagined in fundamental physics decades before becoming an essential tool in many instruments; the positioning systems such as GPS, Glonass, Beidou or Galileo wouldn't work without corrections calculated from general relativity. Finally, even if there is no direct or indirect outcome, now or in the future, fundamental science, as art, constitutes a way to understand the world we live in as well as a fascinating adventure.



What's next ?

Finding the boson doesn't mean there is no more work for particle physicists. First, the detection needs to be refined, so that the boson properties will be constrained and compared to what is expected. Second, there remain big mysteries in today's science, notably darkness... If our models are correct, the "normal" matter constitutes only 5% of the cosmos, the rest is dark matter (23%) and dark energy (72%), two key ingredients of unknown nature. Solving this riddle is the next step : should we add new ingredients to the current model (new particles,...), or do we need to change it ?

Yaël Nazé & Laurence Bouquiaux (University of Liège)