If the Sun is shining since several billions of years, this is first thanks to the masses of the W and Z bosons, the analogs for the nuclear interactions of the ubiquitous photons for the electromagnetic interactions. But the W and the Z are, to the best of our knowledge, elementary particles and thus their masses cannot be the sum of the masses of smaller pieces. In quantum field theory, every fundamental interaction among the elementary particles is associated to a symmetry that leaves the equation of movement invariant. However the masses of the W and the Z are not compatible with these symmetries at very high energy: we say that the symmetries are spontaneously broken. After 50 years of desperate hunt, the agent responsible for this breaking, who took his name after one of his "inventors", P. Higgs, has finally been experimentally observed last summer in the detectors of the biggest scientific instrument ever built, the Large Hadron Collider, at CERN near Geneva. This Higgs boson gives their masses to the elementary particle by interacting with them, i.e., by slowing them down. And we know, since Einstein, that the inertial mass of a particle, i.e. the quantity that gauges its response to an accelerating force, is identical to its gravitational mass that controls how this particle is falling in a gravitational field. As it will be explained during the talk, the discovery of this long-sought-after Higgs boson not only completes our views of the microscopic world described by the so-called Standard Model of particle physics but it also opens new paths towards a deeper understanding of Nature at even smaller distances and therefore it might bring answers to long-standing questions in high energy physics: how did matter take over antimatter? what is dark matter made of? how does our space-time look like at distances smaller than the ones that have been explored so far? can the four fundamental interactions be unified? is there a symmetry between bosons and fermions?

List of reference material and website addresses for further reading:

3. The particle adventure: http://www.particleadventure.org
4. Introduction to Particle Physics (for non particle physicists), CERN summer student lectures by F. Close: http://indico.cern.ch/conferenceDisplay.py?confId=57325