The Large Hadron Collider (LHC), the proton accelerator and collider located in Geneva, Switzerland, entered in 2015 a new phase of its operation. With Run-2 it started to collide protons at an unprecedented energy of 13 TeV. This is more than 60% increase compared to previous years when during collisions at the energy of 8 TeV the Higgs boson was discovered. The Higgs boson was predicted in 1960s to be a part of the Standard Model, the theory which is nowadays the best description of the smallest constituents of the Universe. However successful the Standard Model, it has several shortcomings, for example it does not predict a candidate for dark matter particle that seems to be abundant in the Universe, nor it does incorporate gravity. This is why particle physicists think that there has to be something else and the expectation is that this 'something' is within reach of the experiments at the LHC. So with the new Run 2 scientists' expectations are very high, as they hope to see what lies beyond the Standard Model.

Yet, finding or seeing something at the LHC is like finding a needle in a haystack. Due to a huge number of interactions occurring at every moment of its operation, hundreds or even thousands of particles are produced. Most of them is just a manifestation of what we know now, and they can be accurately described by the Standard Model. This was exactly the case with the Higgs boson discovery which was produced once in a while and had to be correctly identified in an overwhelming noise (background). For this success physicists had, long before the LHC started, studied possible signatures of the Higgs boson. Thanks to that, once the machine was in operation, we roughly knew what to look for. However, when looking beyond the Standard Model the situation is much more difficult: we do not exactly know what to look for. There is a plethora of possible models out there giving plenty of possible signals. All of them have to be checked so that no stone is left unturned.

So far all the searches for physics beyond the Standard Model at the LHC have been unsuccessful. However, we have several puzzling LHC results that does not entirely fit within the framework of the Standard Model. There is also a long-standing discrepancy in the measurement of properties of muon. Finally we have a convincing evidence for dark matter in the universe. The aim of this project is to analyze simultaneously all such signals and try to figure out what is the new physics model behind them.

Therefore, there is a good case to expect that the LHC will eventually start observing a compelling evidence of the physics beyond the standard model. So when the things will start to be really exciting and the LHC will see deviations from the Standard Model predictions, we will try to pin down the correct interpretation from the plethora of possibilities. If this is indeed the case we will join the hunt for finding the correct model explaining new measurements, hopefully leading to a major breakthrough in particle physics and our understanding of the Universe.