Particle physics deals with the description of elementary matter building blocks and their fundamental interactions. It belongs, in the cleanest form, to the sector of basic research. This branch of physics witnessed in the last decades an overwhelming, quantitative progress. Its main feature was the formulation of description of three fundamental forces of nature (electromagnetic, strong and weak) acting between particles which, at the current level of knowledge, comprise elementary building blocks of matter (quarks and leptons). This description, labelled as "the Standard Model" allows to specify the predictions of behaviour of matter in subatomic scales with the precision reaching for some of observables over a dozen decimal numbers. Thus the Standard Model comprises a very precise theory, in which equations almost all features of physical world are engraved, starting e.g. from electric phenomena in our everyday world, through the properties of atoms and nuclei, reaching acts of elementary interactions of quarks and leptons. The copestone of successes of this model was the experimental evidence of Higgs boson, which took place at CERN's LHC collider in 2012. The Higgs particle plays a crucial role in the Standard Model, being responsible, in particular, for giving masses to quarks, leptons and carriers of fundamental forces.

As every scientific theory, the Standard Model exhibits a certain, limited range of applicability. It is then reasonable to expect that it will be extended, "absorbed" by the other, more general description of physics reality. The former, commonly named as "New Physics" encompasses a very broad class of physical models. Many of them predict the existence of new particles of defined properties. The other models of New Physics assume that fundamental objects are not pointlike or that they exist in space with more than three dimensions. Each of these theories aims at elimination of at least some of weak points of the Standard Model. The former, in particular, does not shed some light on the biggest enigma of modern physics. Currently there are convincing proofs that matter described in the framework of the Standard Model contributes to only 5% of mass of the Universe. Most probably the Universe contains two new components, so called dark matter and dark energy. Also the Standard Model does not provide a quantitative explanation how in the primordial Universe the surplus of matter over antimatter was created (so-called baryogenesis), and does not solve the puzzle why fundamental building blocks of matter occur in three sets, exhibiting similar properties and differing in mass (so-called generation problem).

The project aims at performing a search for New Physics phenomena that is not described within the Standard Model. Proposed searched expands over wide range of New Physics theories maximizing the chances of success. This kind of searches are nowadays the main goal nowadays in LHC experiments.

The studies proposed in the project would be carried on in two main directions.

The goal of the first one would be the determination of the angular distribution in rare decays of beauty mesons. Nowadays it is one of the most promising way to search for New Physics phenomena. In those decay LHCb already noticed a couple of discrepancies that seem to form a common pattern. The proposed measurement in this task will shine more light on this discrepancies.

The second goal aims at performing a global fit to all measurements form LHC experiments, astrophysics measurements and cosmology. Taking more measurements into account maximizes the chance of finding New Physics. Furthermore, this kind of fit have crucial role in planning for future experiments and measurements.