DESCRIPTION FOR THE GENERAL PUBLIC

The Standard Model is currently the best model describing all the rules of interactions of aforementioned particles. All fundamental particles can be divided into two main groups. The first group contains of integer spin particles called bosons - the Higgs boson and 4 force carriers known as gauge bosons. The second group contains of half integer particles called fermions, which can be divided into two sub groups of quarks and leptons. Quarks are subject to all fundamental interactions - strong (mediated by gluon), electromagnetic (mediated by photon), and weak (mediated by $W^{\pm}$ and Z^0 bosons). Leptons do not interact with gluons, moreover neutral leptons (neutrinos) do not interact electromagnetically. The last but not least, the Higgs boson, is responsible for masses of particles .

The Standard Model model achieved many successes in the past, for example the recent discovery of the predicted fundamental particle that explains the origin of mass of subatomic particles. Although, during the last few years, physicists from the LHCb experiment showed multiple significant measurements, deviating on the level of 3-4σ from the Standard Model predictions. Two of the most interesting ones are the angular analysis of the $B^0 \to K^{*0}\mu\mu$ decay (which showed $3.7\sigma/3.4\sigma$local/global deviations with respect to the Standard Model predictions) and the measurement of the ratio R_K (which showed inconsistency with Standard Model predictions on the 2.6σ level).

The aim of this project is the continuation of the search of the beyond Standard Model physics, through the analysis of the experimental data collected by the LHCb experiment, operating at the Large Hadron Collider at CERN, Geneva. The aforementioned analyses will concern:

- the first lepton universality test based on the angular observables of $B^+ \to K^+\mu\mu$ and $B^+ \to K^+ee$ decays,
- the search for the lepton flavor violating decay $B^+ \to K^+e\mu$.