

# Lepton Universality Violation in Semileptonic and Leptonic Decays in BSM theories

Description for the general public

With the discovery of the Higgs boson at the Large Hadron Collider (LHC) experiment, the final chapter of the Standard Model of particle physics has been closed. The Standard Model describes all known particles and their interactions. However, just as a picture can be worth a thousand words, the rarest processes at the LHC can sometimes tell physicists the most. The LHCb experiment counted the decays of  $B$  mesons to a  $D$  meson and two leptons to test the main assumption of the Standard Model - lepton universality. This idea is that leptons - electrons, muons and taus - should be produced equally often and should behave in a similar fashion. Along with other experiments, the LHCb data shows that this may be not the case.

In this project I will study the mechanisms for lepton universality violation. I will use the methods of Quantum Field Theory to explain this difference from the Standard Model. I will introduce new particles such as additional Higgs bosons, to alter the rate of the electron and muon production to explain it. The results obtained in this project will broaden our knowledge of elementary particles and their rare interactions.