New physics searches with LHCb and SHiP experiments

Prof. Dr. Lesya Shchutska
(EPFL École polytechnique fédérale de Lausanne)

The standard model of particle physics has been complete for more than a decade, but it still cannot answer the fundamental questions, such as the nature of dark matter and the origin of neutrino masses. These puzzles motivate a broad experimental program searching for new physics through both precision measurements and direct searches.

In this talk, I will discuss recent developments in flavor physics at LHCb and their implications for physics beyond the Standard Model, including tests of lepton flavor universality and rare decay studies. I will then focus on searches for feebly interacting particles and heavy neutral leptons, highlighting novel techniques for detecting long-lived particles at the LHC. Finally, I will present the prospects of dedicated future experiments such as SHiP, which aim to explore large regions of currently unconstrained dark-sector parameter space. Together, these efforts provide complementary paths toward discovering the next layer of fundamental physics.