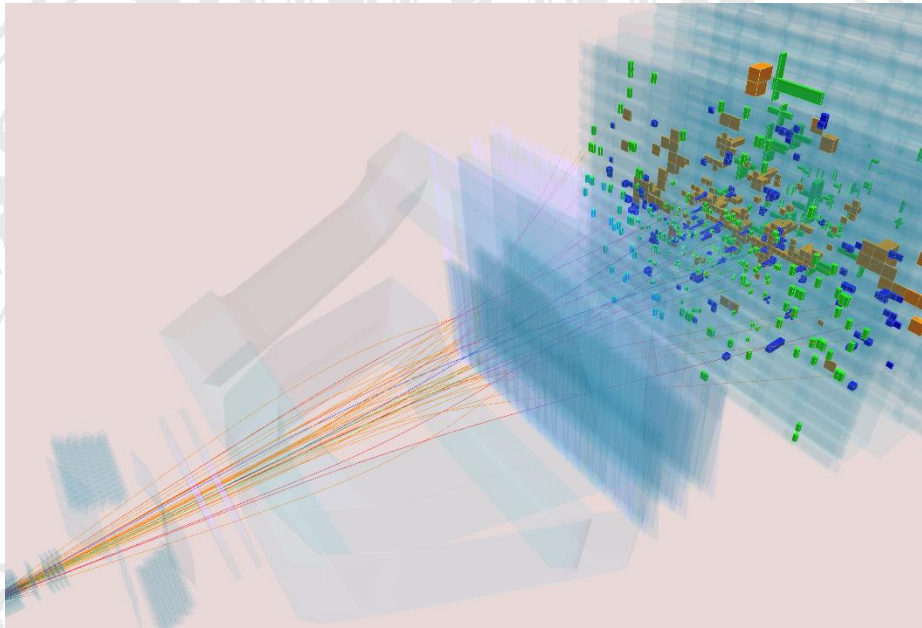


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*Rare B decays at LHCb:
probing New Physics beyond the TeV scale*

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Despite the success of the Standard Model (SM) of particle physics, it fails to explain certain cosmological observations, such as the evidence for Dark Matter. This points to the existence of “New Physics” (NP), beyond the SM, generally expected to manifest in the form of new fundamental particles. Precision measurements of beauty-hadron (B) decays can probe NP energy scales significantly larger than the available collision energy at the Large Hadron Collider (LHC). This is particularly true of rare B decays, as their suppression in the SM makes them more sensitive to NP effects. Many world-leading measurements in this sector are achieved with data collected using the LHCb detector, one of the four main experiments at the LHC. Of particular interest are $b \rightarrow s\mu+\mu^-$ transitions, which have demonstrated significant tensions with the SM over the last decade. This talk will summarise the current status of rare B decays at LHCb, the implications of these measurements on the NP landscape and their future prospects within the High-Lumi (HL) LHC era. I will also discuss the technological challenges and opportunities associated with operating an ultimate precision flavour detector at the HL-LHC, and how these will pave the way to the next generation of beyond-LHC detectors.