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Study of the $B^0 \rightarrow \gamma\gamma$ decay at Belle and Belle II

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In recent years, several measurements of B-decays with flavor-changing neutral currents, i.e., $b \rightarrow d$ transitions, hint at deviations from the Standard Model (SM) predictions. The $B^0 \rightarrow \gamma\gamma$ decays are forbidden at tree-level in the SM and can only proceed via suppressed loop level diagrams. Such decays are an ideal probe to search for phenomena beyond the SM since contributions from new particles can affect the decays on the same level as SM particles. The Belle II experiment is a substantial upgrade of the Belle detector and operates at the SuperKEKB energy-asymmetric e^+e^- collider. This is the first Belle+Belle II measurement using the data set of $711 fb^{-1}$ from the Belle and pre-LS1 data from Belle II. A combined measurement will significantly improve precision than that of Belle II alone. This decay mode is yet to be observed with an expected branching fraction of 3.1×10^{-8} in the SM. The best previous experimental upper limit on the branching fraction of this mode is 3.3×10^{-7} at a 90% confidence level (CL) set by BaBar using $426 fb^{-1}$ of data. We expect to make the first observation of this decay by considering the SM expectation or put the most stringent limit on its branching fraction so far.

Session

Quark and Lepton Flavour Physics

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