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Measurement of lepton flavour universality ratio at Belle II

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Decays mediated by the flavour-changing neutral current transition $b \to s\ell^+\ell^-$ are not allowed at tree level in the standard model (SM) and can only proceed via higher-order loop diagrams. Such suppressed decays provide an excellent avenue to search for physics beyond the SM. The $B \to K\ell^+\ell^-$ ($ell = e, \mu$) decays have recently sparked a lot of interest in a measurement related to the lepton-flavour-universality ratio R_K, which is the ratio of the muon to electron channel branching fraction. LHCb found a 3.1 standard deviation difference between its R_K measurement and the SM prediction. Belle II, which has been recording e^+e^- collision data since 2019, provides a complementary experimental setup to confirm this discrepancy. The $B \to J/\psi(\ell^+\ell^-)K$ decays, in contrast to suppressed, charmless $B \to K\ell^+\ell^-$ decays, involve the favoured $b \to c$ tree-level transition, where beyond-the-SM contributions are expected to be negligible. Thus, a measurement of $R_{J/\psi}$ and its consistency with unity would be a strong validation of the future R_K measurement in the charmless counterpart. We present our recent findings from Belle II data on $R_{J/\psi}$, isospin asymmetry, and the branching fraction of $B \to J/\psi K$ decays. The talk also covers a simulation-based sensitivity study on the upcoming Belle II measurement of R_K.

Session

Quark and Lepton Flavour Physics

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