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Direct CP asymmetry in Z' models

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We consider Z' models that can generate the two '1D' new physics scenarios with Wilson coefficients $C_9^{\text{NP}} < 0$ and $C_9^{\text{NP}} = -C_{10}^{\text{NP}}$, to account for the anomalies in $b \rightarrow s\ell\ell$ decays. We present the 1σ favored parameter space of these two classes of models using updated constraints from CP -conserving and CP -violating observables, B_s -mixing and neutrino trident. We show that the predictions of direct CP asymmetry A_{CP} in $B \rightarrow K^+ \mu\mu$ decays close to the $c\bar{c}$ resonance region can be used to detect the presence of new CP violating phases in the couplings. The preferred parameter space of Z' models generating scenario $C_9^{\text{NP}} < 0$ allows for an enhancement in the integrated A_{CP} in $q^2 = [8, 9]\text{GeV}^2$ and $q^2 = [6, 7]\text{GeV}^2$ up to $\pm 10\%$ and $\pm 5\%$ respectively. While such an enhancement is possible in Z' models generating the scenario $C_9^{\text{NP}} = -C_{10}^{\text{NP}}$, the favored parameter space prefers only positive values. Hence, a future more precise measurement of A_{CP} near the $c\bar{c}$ resonance can help in distinguishing between the two classes of Z' models.

Session

Quark and Lepton Flavour Physics

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