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CP violation and Standard Model tests in charmless hadronic B decays

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We investigate the potential of QCD- and QED-penguin dominated non-leptonic $B \rightarrow K + \{\pi, \eta', \phi, \omega, \rho\}$ decays in the framework of QCD factorisation to constrain non-standard effects, especially in direct and mixing-induced CP asymmetries. Contrary to the conventional treatment of the model-dependent parameters associated with divergent weak annihilation (and hard-scattering) contributions at sub-leading order, we determine them from existing experimental data, instead of variation in a limited range. This allows us to provide Standard Model predictions for PP and PV light final states, reanalyze the $B \rightarrow K \pi$ puzzle, and study new physics scenarios, such as model-independent gluon- and Z-penguin contributions. In the case of the Z-penguin we take into account complementary data from semi-leptonic $b \rightarrow s$ -transitions. Further we discuss the impact of future experimental accuracy at LHCb and Super-Flavor factories.

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