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Probing New Physics in Electroweak Penguins through B_d and B_s decays

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The large discrepancy between theory and experiment observed in $A_{\text{CP}}(B^- \rightarrow \pi^0 K^-) - A_{\text{CP}}(\bar{B}^0 \rightarrow \pi^+ K^-)$ can be solved with the introduction of a new electroweak penguin amplitude. Motivated by this result, we analyze the $\bar{B}_s \rightarrow \phi \rho^0$ and $\bar{B}_s \rightarrow \phi \pi^0$ decays which are dominated by the electroweak penguins, and show that in presence of a new electroweak penguin amplitude their branching ratio can be enhanced by up to an order of magnitude, without violating any constraints from other non-leptonic decays. This makes them interesting modes to be investigated at LHCb and future B factories. We perform both a model independent analysis and a study within realistic NP models such as a modified Z^0 penguin scenario, a model with an additional $U(1)$ and supersymmetry. In these cases the new amplitude can be correlated with other flavour phenomena such as the semileptonic B decays and B_s - $\bar{B}_s$ mixing, which yields more stringent constraints on the enhancement of the two B_s decays.

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