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Puzzles in the $B_s^0 \to D_s^\mp K^\pm$ system: Do they indicate New Physics?

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Non-leptonic B decays offer a powerful probe for testing the Standard Model description of CP violation. Particularly interesting are the $B_s^0 \to D_s^\mp K^\pm$ decays, originating from pure tree topologies, which allow a theoretically clean determination of the angle γ of the Unitarity Triangle. Intrigued by an LHCb analysis, showing tension with other extractions of γ, we shed more light on this situation. Extracting the individual branching ratios of the $B_s^0 \to D_s^\mp K^\pm$ channels and combining them with information from semileptonic $B_{(s)}^0$ decays, we arrive at yet another puzzling situation, which actually agrees with decays that have similar dynamics. In view of these puzzles, we extend our analysis in order to allow for New Physics. We develop a model-independent formalism to include New Physics effects and apply it to the current experimental data. We find that New Physics contributions as small as about 30% of the Standard Model amplitudes could accommodate the data. The proposed strategy sets the stage for future analyses, making it exciting to see whether in the high-precision era of B physics ahead of us new sources of CP violation will finally be established.

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