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Investigating non-leptonic two body B-decays in and beyond the Standard Model

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In the light of the observed discrepancy between theoretical predictions and experimental measurements of the branching ratios of the non-leptonic decays $\bar{B}^0 \rightarrow D^+ K^-$ and $\bar{B}_s^0 \rightarrow D_s^+ \pi^-$, we investigate possible beyond Standard Model interpretations.

To this end, we revisit the calculation of the one-loop hard-scattering kernels and present the subleading three-particle contributions to those decays for the full basis of beyond Standard Model operators.

Our calculation makes use of the QCD factorization framework. We find that we can reproduce the one-loop hard scattering kernels for all possible operators.

For the three-particle Fock states we are able to reproduce the result for the Standard Model operator up to a constant factor, which, however, does not change the fact that these contributions can be neglected.

For the other operators we find that the contributions either vanish up to twist-4 or are highly suppressed as in the Standard Model case, so that we need not consider them at the required accuracy.

Furthermore, the results obtained have been implemented in the EOS software to facilitate a variety of pheno-analyses.

Our results are an important cross check for published pheno-analyses and will extend the scope of previously published analyses.

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