

Radiative three-body D -meson decays in and beyond the standard model

Content

We compute radiative three-body decays of charmed mesons $D \rightarrow PP\gamma$, $P = \pi, K$, in leading order QCDF, HH χ PT and the soft photon approximation. We work out decay distributions and asymmetries in the standard model and with new physics in the electromagnetic dipole operators. The forward-backward asymmetry is suitable to probe the QCD frameworks, in particular the s -channel dependent weak annihilation contributions in QCDF against the markedly different resonance structure in HH χ PT. These studies can be performed with Cabibbo-favored modes with $\mathcal{O}(10^{-4} - 10^{-3})$ -level branching ratio, which are standard model-like and induced by different hadronic dynamics. Understanding of the latter can therefore be improved in a data-driven way and sharpens the interpretation of standard model tests. Singly Cabibbo-suppressed modes such as with branching ratios within $\sim 10^{-5} - 10^{-4}$ are sensitive to new physics that can be signalled in the forward-backward asymmetry and in the CP-asymmetry of the rate, ideally in the Dalitz region but also in single differential distributions.

Summary

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