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The study of $B_s^* \to \eta_c \phi$ decay with the calculation of its branching ratio

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Abstract

In this paper, the decay of the B_s^* meson into two vector mesons η_c and ϕ is investigated.The first observation of the decay was reported in 2017 by LHCb collaboration, they have obtained the value of B ($B_s^* \to \eta_c \phi$) = (5. 01 ± 053 ± 0.27 ± 0.06)×10^{-4}. In this study, the Feynman diagram of $B_s^* \to \eta_c \phi$ decay is drawn based on the standard model. In particular this diagram shows that the decay consists of tree-exchange internal w-emission graph and penguin- suppressed graph. The coefficients of a_2, a_3, a_5 and a_7 are calculated in the NLO scale. The branching ratio is calculated using the QCD factorization method, numerical values in the NLO (at m_b scale) scheme is 5.33×10^{-4}, for which are in good agreement with the experimental results. The more calculations accuracy increases, the b quark mass scales come down corresponding to that. The best answer close to the experimental value is in NLO scheme at m_b scale of QCDF approach.

keywords: B meson decay, factorization method, Feynman diagram, form factor, decay rate, branching ratio

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