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Renormalization-group improved Higgs to two gluons decay rate

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We investigate the renormalization-group scale and scheme dependence of the $H \to gg$ decay rate at the order N^4LO in the renormalization-group summed perturbative theory, which employs the summation of all renormalization-group accessible logarithms including the leading and subsequent four sub-leading logarithmic contributions to the full perturbative series expansion. Moreover, we study the higher-order behaviour of the $H \to gg$ decay width using the asymptotic Pad\'e approximant method in four different renormalization schemes. Furthermore, the higher-order behaviour is independently investigated in the framework of the asymptotic Pad\'e-Borel approximant method where generalized Borel-transform is used as an analytic continuation of the original perturbative expansion. The predictions of the asymptotic Pad\'e-Borel approximant method are found to be in agreement with that of the asymptotic Pad\'e approximant method. Finally, we provide the $H \to gg$ decay rate at the order N^5LO using the asymptotic Pad\'e approximant and the asymptotic Pad\'e-Borel approximant methods in the fixed-order as well as in the renormalization-group summed perturbative theories.

Track type

SM and Higgs Physics

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