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Renormalization-group improved Higgs to two gluons decay rate

We investigate the renormalization group scale and scheme dependence of the $H \rightarrow gg$ decay rate at the order $N^4\text{LO}$ in 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. The main advantage of this approach is the closed-form analytic expressions, which represent the summation of all RG-accessible logarithms in the perturbative series that is known to a given order. The new renormalization-group summed expansion for the $H \rightarrow gg$ decay rate shows an improved behaviour by exhibiting a reduced sensitivity to the renormalization-group scale. Moreover, we study the higher order behaviour of the $H \rightarrow gg$ 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.

Secondary track

T08 - Higgs Physics

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