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Resummed Higgs boson cross section at next-to SV to NNLO+NNLL

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We present the resummed predictions for inclusive cross-section for the production of Higgs boson at next-to-next-to leading logarithmic (NNLL) accuracy taking into account both soft-virtual (SV) and next-to SV (NSV) threshold logarithms. We derive the N -dependent coefficients and the N -independent constants in Mellin- N space for our study. We match the resummed result through the framework of minimal prescription with the fixed order results. We report in detail the numerical impact of N -independent part of resummed result and explore the ambiguity involved in exponentiating them. By studying the K factors at different logarithmic accuracy from resummed SV + NSV logarithms we find that the perturbative expansion shows better convergence improving the reliability of the prediction at NNLO + NNLL accuracy. We also observe that the resummed SV + NSV result improves the renormalisation scale uncertainty at every order in perturbation theory. The uncertainty from the renormalisation scale μ_R ranges between (+8.85%, -10.12%) at NNLO whereas it goes down to (+6.54%, -8.32%) at NNLO + NNLL accuracy. However, the factorisation scale uncertainty is worsened by the inclusion of these NSV logarithms hinting the importance of resumming beyond NSV terms. We also present our predictions for SV + NSV resummed result at different collider energies.

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