



3-Loop heavy flavor corrections to DIS: single and two-mass contributions.

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The heavy flavor contributions to the deeply-inelastic structure functions form an essential part, in particular in the small x region. Their scaling violations are quite different from those of the pure massless corrections. Therefore it has become necessary to compute them to 3-loop order. A long project of about 16 years delivered now the complete results, which consists out of the single and two-mass heavy flavor corrections. In course of this various new mathematical computation technologies had to be developed. We have calculated both the corrections in the unpolarized and the polarized case. This allows for detailed analyses of the HERA data and predictions for the upcoming EIC and the data analysis there.

For the first time, a consistent QCD analysis at NNLO is now possible, taking into account the world precision data on deep inelastic scattering, which will supersede previous analyses, with impact on the value of the strong coupling constant and on the parton distribution functions. Furthermore, we lifted the variable flavor number scheme, often used for predictions at hadron colliders, from 2- to 3 loop order.

