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On the intrinsic heavy quark content of the nucleon and its impact on heavy new physics at the LHC

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Heavy quark parton distribution functions (PDFs) play an important role in several Standard Model and New Physics processes. Most analyses rely on the assumption that the charm and bottom PDFs are generated perturbatively by gluon splitting and do not involve any non-perturbative degrees of freedom. On the other hand, non-perturbative, intrinsic heavy quark parton distributions have been predicted in the literature. We demonstrate that to a very good approximation the scale-evolution of the intrinsic heavy quark content of the nucleon is governed by non-singlet evolution equations. This allows to analyze the intrinsic heavy quark distributions without having to resort to a full-fledged global analysis of parton distribution functions. We exploit this freedom to model intrinsic bottom distributions which are so far missing in the literature. We estimate the impact of the non-perturbative contribution to the charm and bottom-quark PDFs and on several important parton-parton luminosities at the LHC.

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