Niccolò Laurenti

Research Statement

Starting with my master thesis and during my Ph.D. my studies focused on phenomenological aspects of high energy physics and in particular on the theory describing strong interactions, i.e./ Quantum Chromodynamics (QCD). Computational tools??

Construction of an N^{3}LO DIS scheme

During my Master Thesis, under the supervision of Dr. Marco Bonvini and in collaboration with another Master student, I worked on the development of a so-called variable flavor number scheme (VFNS) for deep-inelasic-scattering (DIS) predictions at next-to-next-to-next-to-leading order (N^{3}LO) in perturbation theory. This is needed to correctly consider the heavy quarks mass effects when computing the electron-proton scattering, whose understanding is crucial in PDFs fit. Different proposal exist in the literature and they are all equivalent at all order in perturbation theory but differ at any given order. Moreover, in contrast with the available schemes, our construction takes into account the fact that the heavy quark PDFs are generated perturbatively.
Currently, the ingredients needed for such a construction are completely known up to NNLO in perturbation theory, while at N^{3}LO there are still some missing informations. The bulk of the work I did during my Master thesis was to construct an approximation of the unknown terms of the N^{3}LO partonic cross section for DIS (the so-called coefficient functions) by combining some known limits. In this way it was possible to construct a VFNS at approximate N^{3}LO.
During this work I

PDFs fit

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