Theory Predictions for PDF fitting

Parton Distribution Functions (PDF) are the theoretical object describing the colliding hadron structure, arising from the factorization property of perturbative Quantum Chromodynamics (QCD).

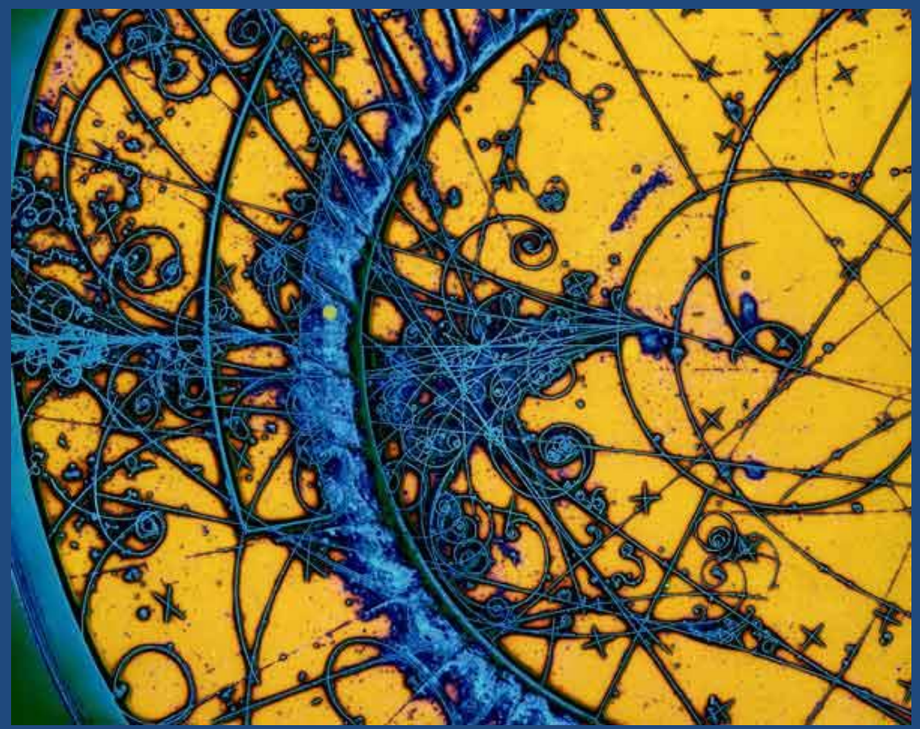
However, these objects encode the content of the non-perturbative dynamics of large scale QCD, and it is not currently possible to compute them from first principles with the available techinques.
But their universality, that is a direct consequence of factorization, allows to determine PDFs from experimental data, and use the extracted value to make predictions even for any kind of processes.

The main part of this thesis is dedicated to provide fast and reliable theory predictions to be used in a global PDF determination, developing a set of essential tools to make this process scalable and reproducible.

Furthermore, some specific early applications of the tool set are presented, leading to remarkable results regarding proton properties.

A final part is dedicated to some methodological improvements in the PDFs extraction techniques, following a novel theoretical analysis, that lead to new insights, or taking into account an alternative statistical framework.

Candido Theory Predictions for PDF fitting



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