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A Neural Network parametrisation for Parton Distribution Functions in xFitter

The knowledge of the proton structure, embedded in the parton distribution functions (PDFs) is of fundamental importance to make predictions for proton-proton collisions at the Large Hadron Collider. PDFs are determined through fits to experimental data, and the functional form assumed plays an important role. Using too few PDF parameters, or a constrained parametrisation, can lead to artificially small PDF uncertainties in certain regions of the phase-space, or to difficulties in minimising the PDF parameters.

Aim of this project is to interface the Neural Networks Analytic Derivatives (NNAD) package to the xFitter code. This will allow for a PDF parametrisation based on NN, thus with minimal assumptions on their functional behavior, and, thanks to the implementation of analytic derivatives, for a fast and efficient minimisation using the CERES non-linear least squares solver. The NN parametrisation will be tested using an ongoing extraction of PDFs using measurements from the CMS experiment.

Field

B6: Computing

DESY Place

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Special Qualifications:

- knowledge of C++

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