

A new generation of simultaneous fits to LHC data using deep learning

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We present a new methodology that is able to yield a simultaneous determination of the Parton Distribution Functions (PDFs) of the proton alongside any set of parameters that determine the theory predictions; whether within the Standard Model (SM) or beyond it. The SIMUnet methodology is based on an extension of the NNPDF4.0 neural network architecture, which allows the addition of an extra layer to simultaneously determine PDFs alongside an arbitrary number of such parameters. We illustrate its capabilities by simultaneously fitting PDFs with a subset of Wilson coefficients within the Standard Model Effective Field Theory framework and show how the methodology extends naturally to larger subsets of Wilson coefficients and to other SM precision parameters, such as the strong coupling constant or the heavy quark masses.

Submitted on behalf of a Collaboration?

No

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