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Theory prediction in PDF fitting

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Continuously comparing theory predictions to experimental data is a common task in analysis of particle physics such as fitting parton distribution functions (PDFs). However, typically, both the computation of scattering amplitudes and the evolution of candidate PDFs from the fitting scale to the process scale are non-trivial, computing intesive tasks. We develop a new stack of software tools that aim to facilitate the theory predictions by computing FastKernel (FK) tables that reduce the theory computation to a linear algebra operation. Specifically, I present PineAPPL, our workhorse for grid operations, EKO, a new DGLAP solver, and yadism, a new DIS library. Alongside, I review several projects that become available with the new tools.

Significance

The tools presented in this talk are all open-source and although developed in the context of the NNPDF PDF fitting collaboration they are completely general purpose and can be leveraged to benefit other common tasks in particle physics. We apply modern best-practice software development tools to ensure a flexible and extensible framework.

References

https://arxiv.org/abs/2202.02338
https://arxiv.org/abs/2008.12789

Experiment context, if any

Primary author: HEKHORN, Felix

Presenter: HEKHORN, Felix

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