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Mathematica Toolbox for PDF Uncertainties and Application to New Physics Searches

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As the LHC begins Run 2 at an even higher energy, one of the top priorities will be to search for new particles (SUSY, ...) at the highest energy scales. In addition to direct production of new particles, they can mix with Standard Model (SM) particles to yield discrepancies from the usual predictions. To distinguish this new physics from old uncertainties, we need tools to easily quantify the uncertainties of the SM predictions. Here we present a versatile set of utility functions built with Mathematica that is capable of working with a variety of PDF formats including the recent LHAPDF6 format.

This software can perform PDF calculations within the Mathematica framework and compare results from different PDF collaborations. The package includes both the central PDF value as well as the full error sets needed for PDF uncertainty analysis; a variety of sample error definitions are implemented. We demonstrate this package for the case of a new heavy scalar particle production at the LHC.

Oral or Poster Presentation

Oral

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