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Parton Distributions for the LHC Run II

I present NNPDF3.0, the first set of parton distribution functions (PDFs) determined with a methodology validated by a closure test. NNPDF3.0 uses a global dataset including HERA-II deep-inelastic inclusive cross-sections, the combined HERA charm data, jet production from ATLAS and CMS, vector boson rapidity and transverse momentum distributions from ATLAS, CMS and LHCb, $W+c$ data from CMS and top quark pair production total cross sections from ATLAS and CMS. Results are based on LO, NLO and NNLO QCD theory and also include electroweak corrections. To validate our methodology, we show that PDFs determined from pseudo-data generated from a known underlying law correctly reproduce the statistical distributions expected on the basis of the assumed experimental uncertainties. This enables us to determine with confidence PDFs at different perturbative orders and using a variety of experimental datasets ranging from HERA-only up to a global set including the latest LHC results, all using precisely the same validated methodology. I explore some of the phenomenological implications of our results for the upcoming 13 TeV Run of the LHC, in particular for Higgs production cross-sections.

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