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Determination of proton parton distribution functions using ATLAS data

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We present fits to determine parton distribution functions (PDFs) using top-antitop, inclusive W/Z-boson, as well as W⁺ and W⁻ boson production measurements in association with jets from ATLAS, in combination with deep-inelastic scattering data from HERA. The ATLAS W and Z boson data exhibit sensitivity to the valence quark distributions and the light quark sea composition, whereas the top-quark pair production data have sensitivity to the gluon distribution. The impact of the top-antitop production data is increased by fitting several distributions simultaneously, with the full information on the systematic and statistical correlations between data points. The parton distribution functions extracted using W+jets data show an improved determination of the high-x sea-quark densities, while confirming the unsuppressed strange-quark density at lower $x < 0.02$ found by previous ATLAS analyses.

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