

## High Energy Physics - Phenomenology

# Parton distributions: HERA-Tevatron-LHC

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*(Submitted on 22 Jan 2010)*

The parton distribution functions (PDFs) are a non-negotiable input to almost all theory predictions at hadron colliders. In this talk, I introduce PDF determination by global analysis and discuss selected topics concerning recent relevant data from HERA and the Tevatron, before giving some prospects for the LHC. The combination of H1 and ZEUS cross sections reduces uncertainties and will be an important input to future global PDF analyses. The theoretical description of the heavy-quark contribution to structure functions at HERA has a significant influence on predictions at the LHC. New W and Z data from the Tevatron Run II provide important PDF constraints, but there are currently problems describing the latest data on the lepton charge asymmetry from  $W \rightarrow l \nu$  decays. The Tevatron Run II jet production data prefer a smaller high-x gluon than the previous Run I data, which impacts on predictions for Higgs cross sections at the Tevatron. It is now possible to consistently calculate a combined "PDF+ $\alpha_S$ " uncertainty on hadronic cross sections, which is around 2-3% for the W and Z total cross sections at the LHC, reflecting their potential as a "standard candle" to measure machine luminosity. Parton luminosity functions are useful quantities for studying properties of hadronic cross sections. Precision measurements at the LHC will provide further constraints on PDFs as data accumulates in the early running period.

Comments: 6 pages. Invited talk at the XXth Hadron Collider Physics Symposium (HCP 2009), Evian, France, 16-20 November 2009

Subjects: **High Energy Physics - Phenomenology (hep-ph)**; High Energy Physics - Experiment (hep-ex)

Report number: CERN-PH-TH/2010-013

Cite as: [arXiv:1001.3954v1](https://arxiv.org/abs/1001.3954v1) [hep-ph]

## Submission history

From: Graeme Watt [[view email](#)]

[v1] Fri, 22 Jan 2010 10:32:14 GMT (53kb)

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