H1-prelim-02-053
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NLO QCD Fits to H1 Inclusive Neutral and Charged Current Data

H1 Collaboration

Abstract

Using for the first time both Neutral and Charged Current preliminary structure function data of the H1 experiment obtained in the years 1994 - 2000, a study of the uncertainties of NLO QCD fits for the extraction of parton densities of the proton is presented. The fit fully takes into acount the experimental uncorrelated and correlated errors as well as model uncertainties such as α_s and the charm quark mass. In addition we present an estimate of the uncertainties arrising from the form of the parameterisation of the parton distribution functions at the starting scale of the QCD evolution. In a fit to H1 data alone this uncertainty is found to be sizeable.

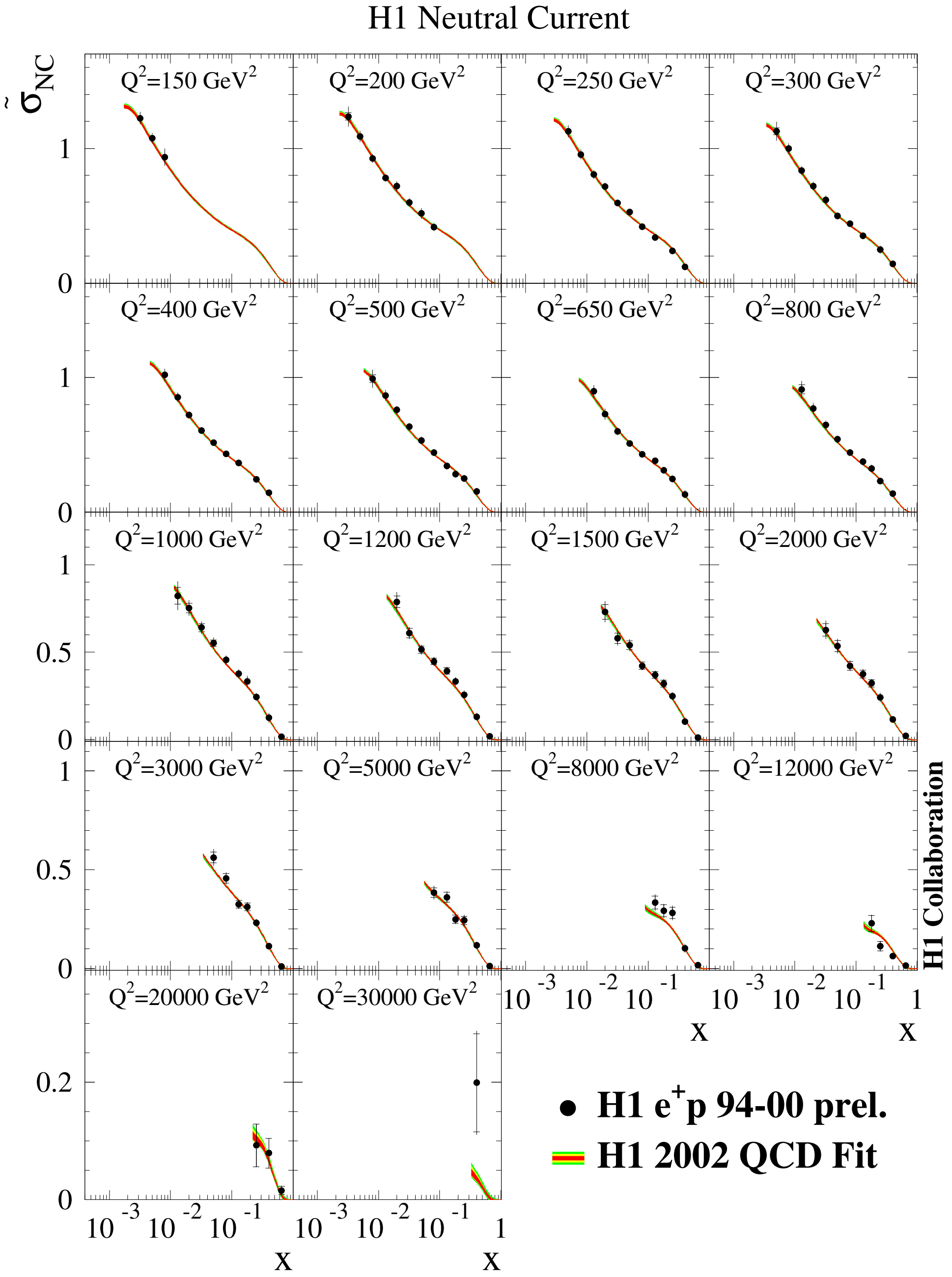

Figure 1: The preliminary NC reduced cross section $\tilde{\sigma}_{NC}$ from the 1994-2000 e^+p data in comparison to a QCD fit to H1 data only. The inner error bars of the data represent the statistical error, and the outer error bars show the total error. The normalisation uncertainty is not included in the errors. For the fit the red error band shows the experimental uncertainty, the yellow band the model uncertainty and the green band the uncertainty due to variations of the parametric form for the parton density functions.

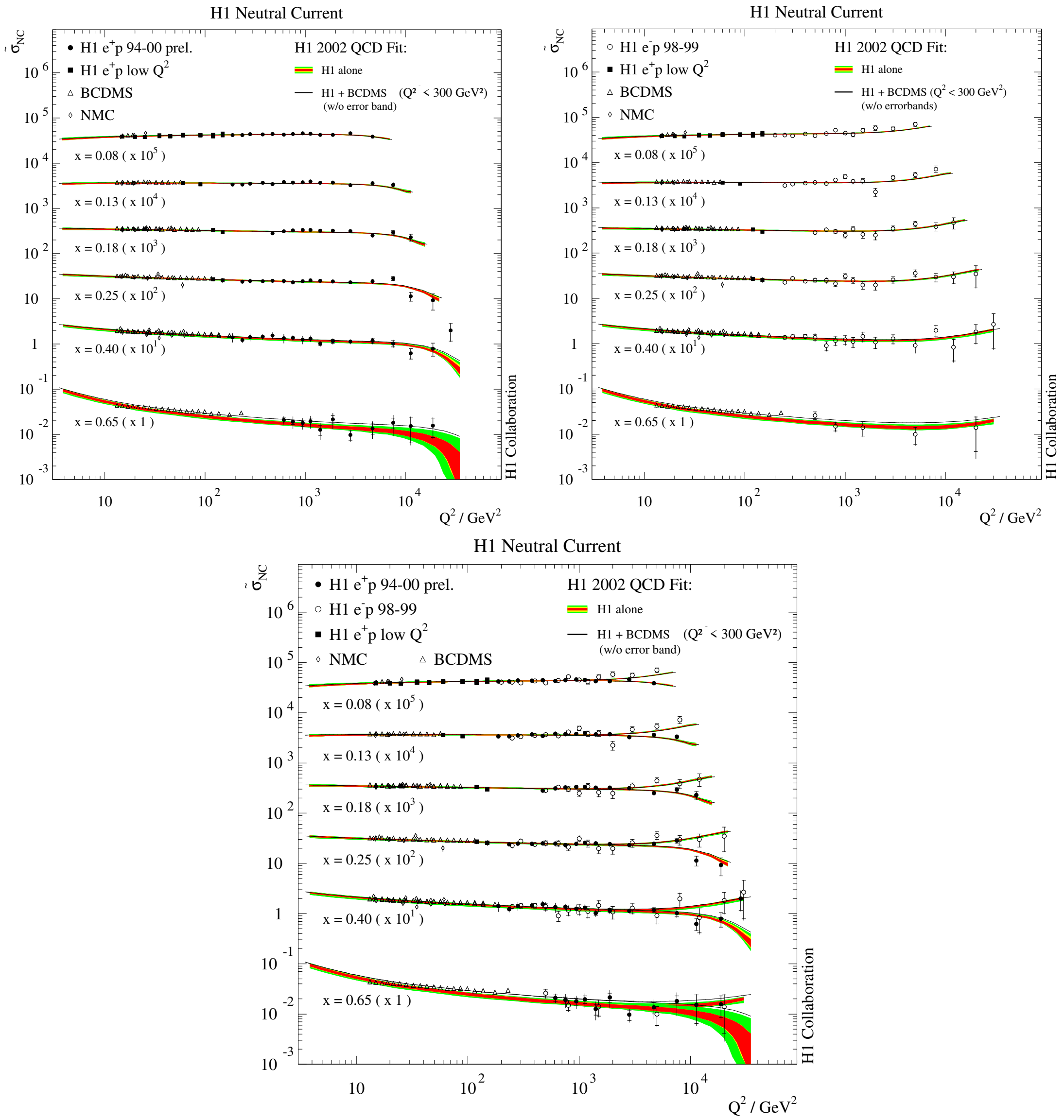

Figure 2: The NC reduced cross sections $\tilde{\sigma}_{NC}$ from the preliminary e^+p $94-00$ data (a), from the e^-p $98-99$ data (b) and from both e^+p and e^-p data (c) at high x in comparison to a QCD fit to H1 data only. Also shown are data from the fixed-target experiments BCDMS and NMC. The inner error bars of the data represent the statistical error, and the outer error bars show the total error. The normalisation uncertainties are not included in the errors. The red error band of the fit shows the experimental uncertainty, the yellow band the model uncertainty and the green band the uncertainty due to variations of the parametric form for the parton density functions. The full line represents the central result of a fit to H1 and BCDMS data for $Q^2 < 300$ GeV.

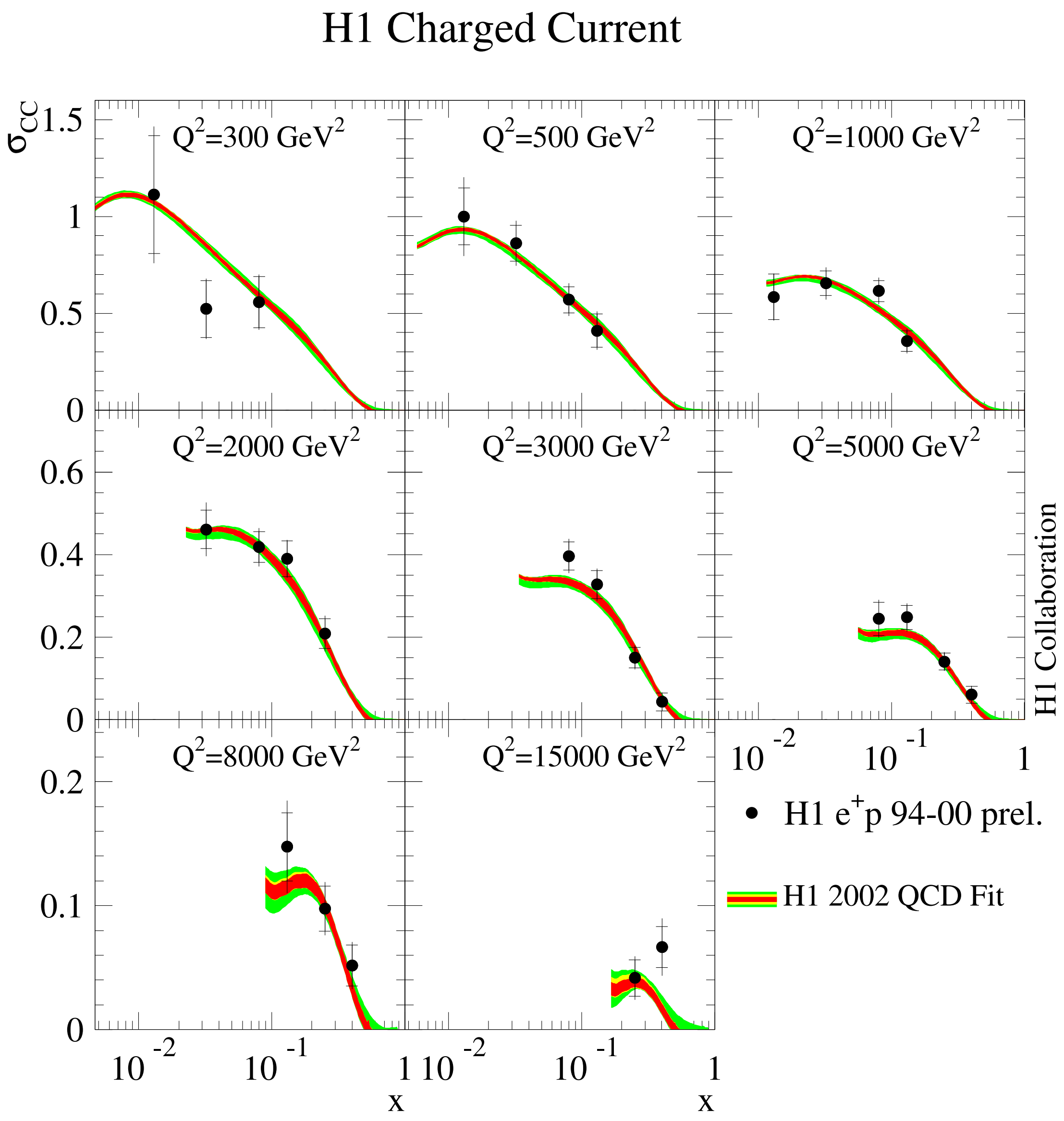

Figure 3: The CC reduced cross section $\tilde{\sigma}_{CC}(x, Q^2)$ for the preliminary $94-00$ e^+p data. The inner error bars represent the statistical error, and the outer error bars show the total error. The normalisation uncertainty is not included in the errors. The error bands show the result of a QCD fit to H1 data only. The red error band shows the experimental uncertainty, the yellow band the model uncertainty and the green band the uncertainty due to variations of the parametric form of the parton density functions.

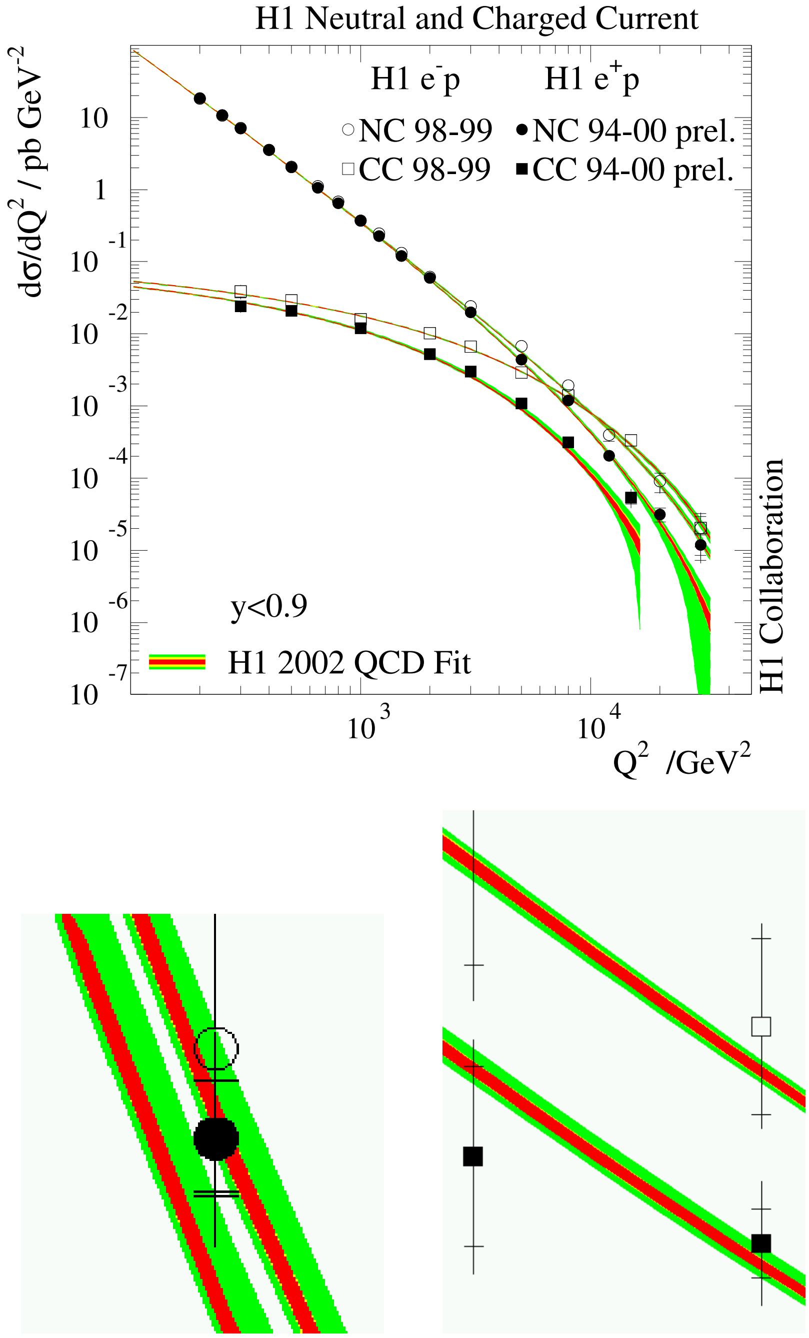

Figure 4: The Q^2 dependences of the NC (circles) and CC (squares) cross sections $d\sigma/dQ^2$ for the preliminary $94-00$ e^+p data (solid points) and e^-p data (open points) (a). The inner error bars represent the statistical error, and the outer error bars show the total error. The normalisation uncertainties are not included in the errors. The data are compared to the result of a QCD fit to H1 data only. The red error band corresponds to the experimental uncertainty, the yellow band to the model uncertainty and the green band to the uncertainty due to variations of the parametric form for the parton density functions. Also shown are zoomed regions showing the error bands for NC at $Q^2 \approx 1000$ GeV^2 (b) and CC at $Q^2 \approx 200$ GeV^2 (c) data on a linear scale demonstrating the contributions of the various error sources.