

## Inclusive e-p cross sections at HERA and determinations of $F_L$

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A combination of the inclusive cross sections measured by the H1 and ZEUS Collaborations in neutral and charged current deep-inelastic ep scattering at HERA is presented. The combination uses data from unpolarised ep scattering taken during the HERA-I phase as well as measurements with longitudinally polarised electron or positron beams from the HERA-II running period. The combination method takes the correlations of systematic uncertainties into account. The inclusion of the large HERA-II data set leads to an improved uncertainty especially at large four momentum transfer squared  $Q^2$ .

A combination is presented of the inclusive deep inelastic cross sections measured in neutral and charged current unpolarised  $e^\pm p$  scattering at HERA during the period 1994-2000. The combined data are the sole input in a NLO QCD analysis which determines a new set of parton distributions HERAPDF1.0 with small experimental uncertainties. This set includes an estimate of the model and parametrisation uncertainties of the fit result.

A combination of the inclusive deep inelastic cross sections measured by the H1 and ZEUS Collaborations for ep scattering with nominal and reduced proton-beam energies,  $E_p=920$  GeV,  $E_p=460$  GeV and 575 GeV, is presented. The combination method used takes the correlations of systematic uncertainties into account, resulting in improved accuracy. From the combined data the proton structure function,  $F_L$ , is extracted in the region of  $2.5 < 800$  GeV<sup>2</sup>.

Finally, a measurement is presented of the inclusive neutral current  $e^+p \rightarrow p$  scattering cross section using data collected by the H1 experiment at HERA during the years 2003 to 2007 with proton beam energies  $E_p$  of 920, 575, and 460 GeV. The kinematic range of the measurement covers low absolute four-momentum transfers squared,  $1.5 \text{ GeV}^2 < Q^2 < 120 \text{ GeV}^2$ , small values of Bjorken  $x$ ,  $2.9 \cdot 10^{-5} < x < 0.01$ , and extends to high inelasticity up to  $y = 0.85$ . The structure function  $F_L$  is measured by combining the new results with previously published H1 data at  $E_p = 920$  GeV and  $E_p = 820$  GeV. The new measurements are used to test several phenomenological and QCD models applicable in this low  $Q^2$  and low  $x$  kinematic domain.

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