Measurement of the Polarised Charged Current Total Cross Section at HERA-II

H1 Collaboration

Abstract

The first measurement of the charged current polarised cross section, σ^{CC}, in positron-proton collisions for $Q^2>400$ GeV^2 and $y<0.9$ is presented. The measurement is based on a luminosity of 15.3 pb^{-1} collected between 2003-2004. The longitudinally polarised positrons are predominantly right-handed leading to a polarisation of 33%. The data are compared to previous measurements of high Q^2 unpolarised cross sections. The data are found to be consistent with standard model expectations.

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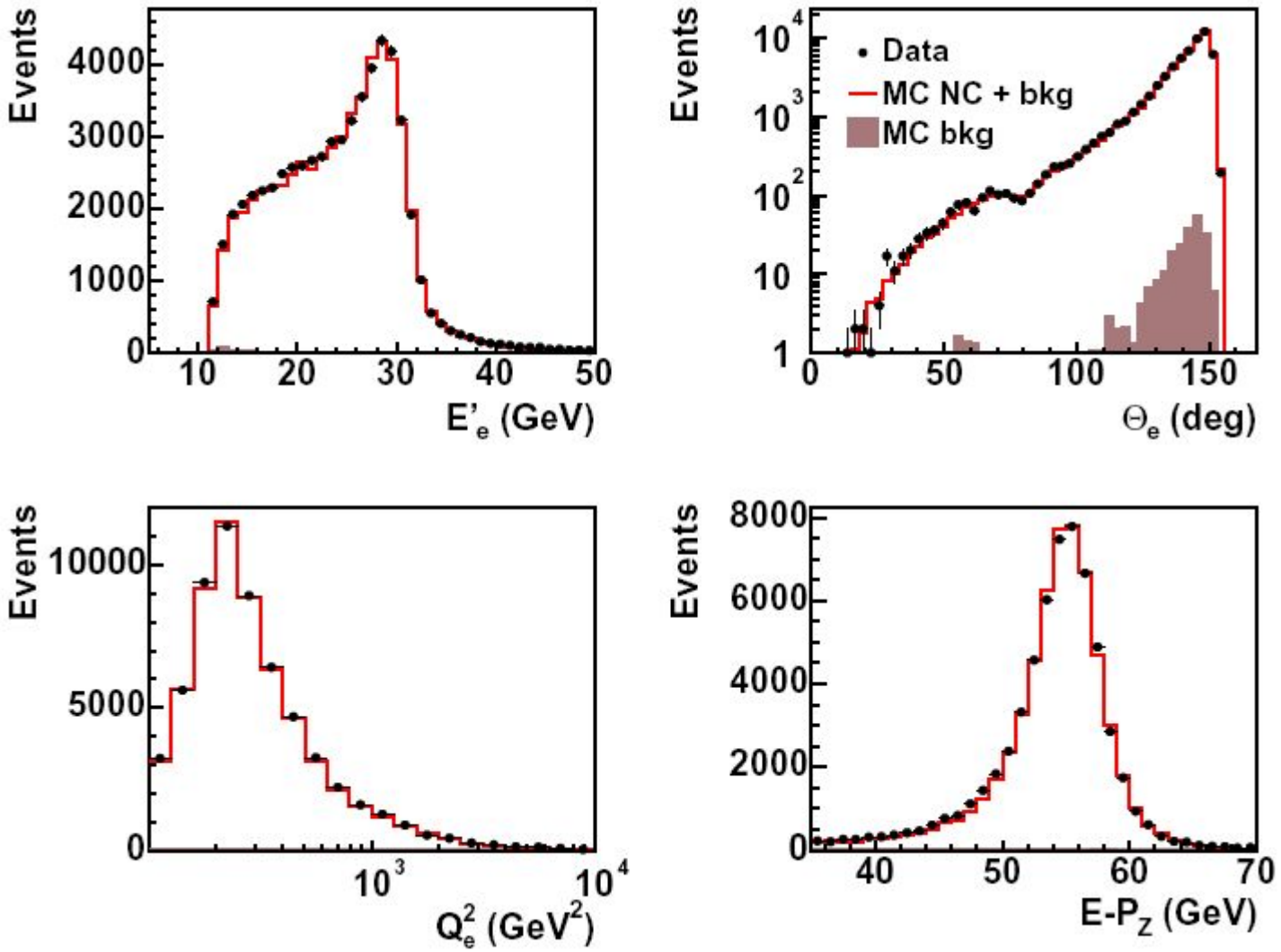
σ^{CC} = 34.67 pb +/- 5.6% (stat) +/- 4.8% (syst)
Polarisation = 33 +/- 2%

σ^{CC} = 28.44 pb +/- 2.7% (stat) +/- 4.3% (syst)
Polarisation = 0

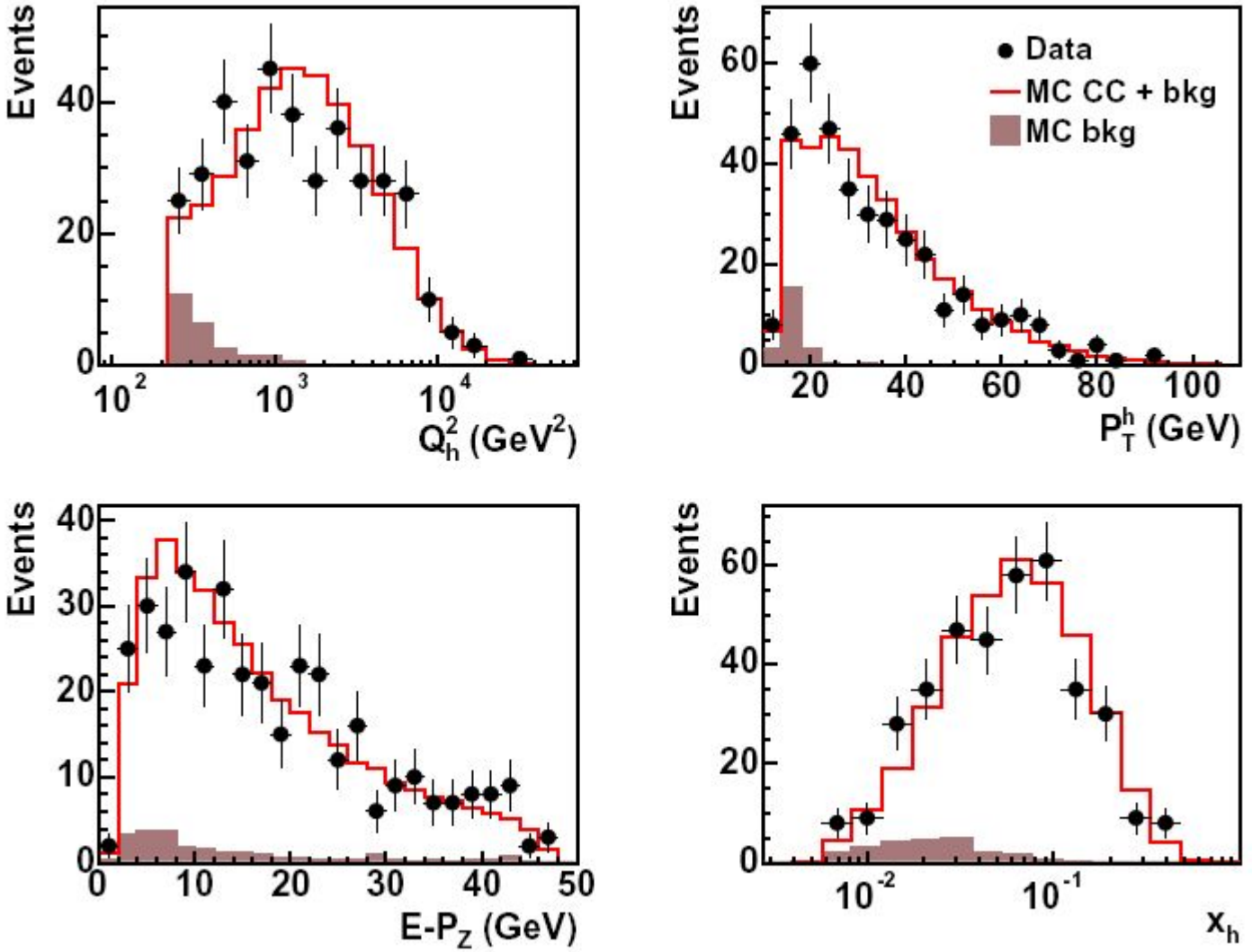
Both measurements are made for $Q^2>400$ GeV^2 and $y<0.9$

Luminosity uncertainties of 2.5% and 1.5% for polarised and unpolarised measurements are included in the systematic error.

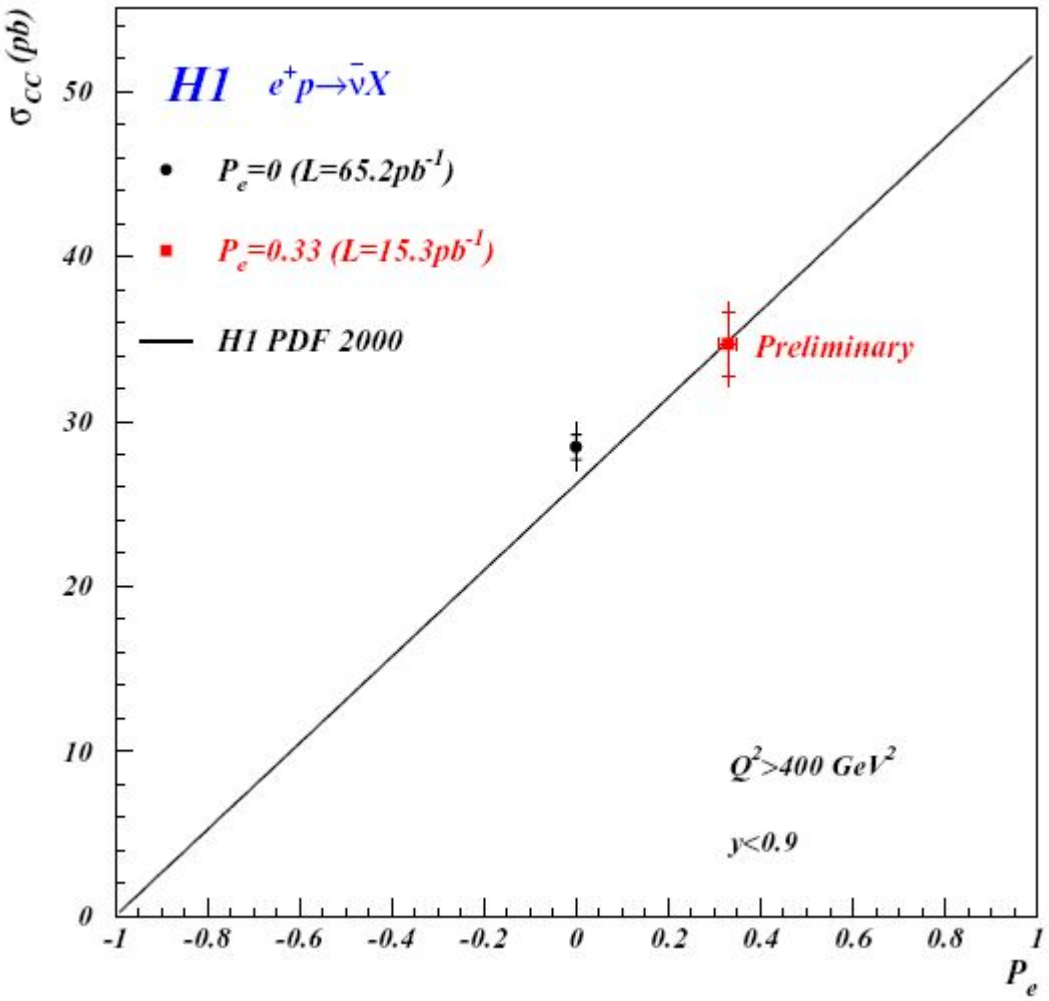
The difference between the two measurements is 2.3 standard deviations assuming a 2.5% common systematic uncertainty to both measurements.



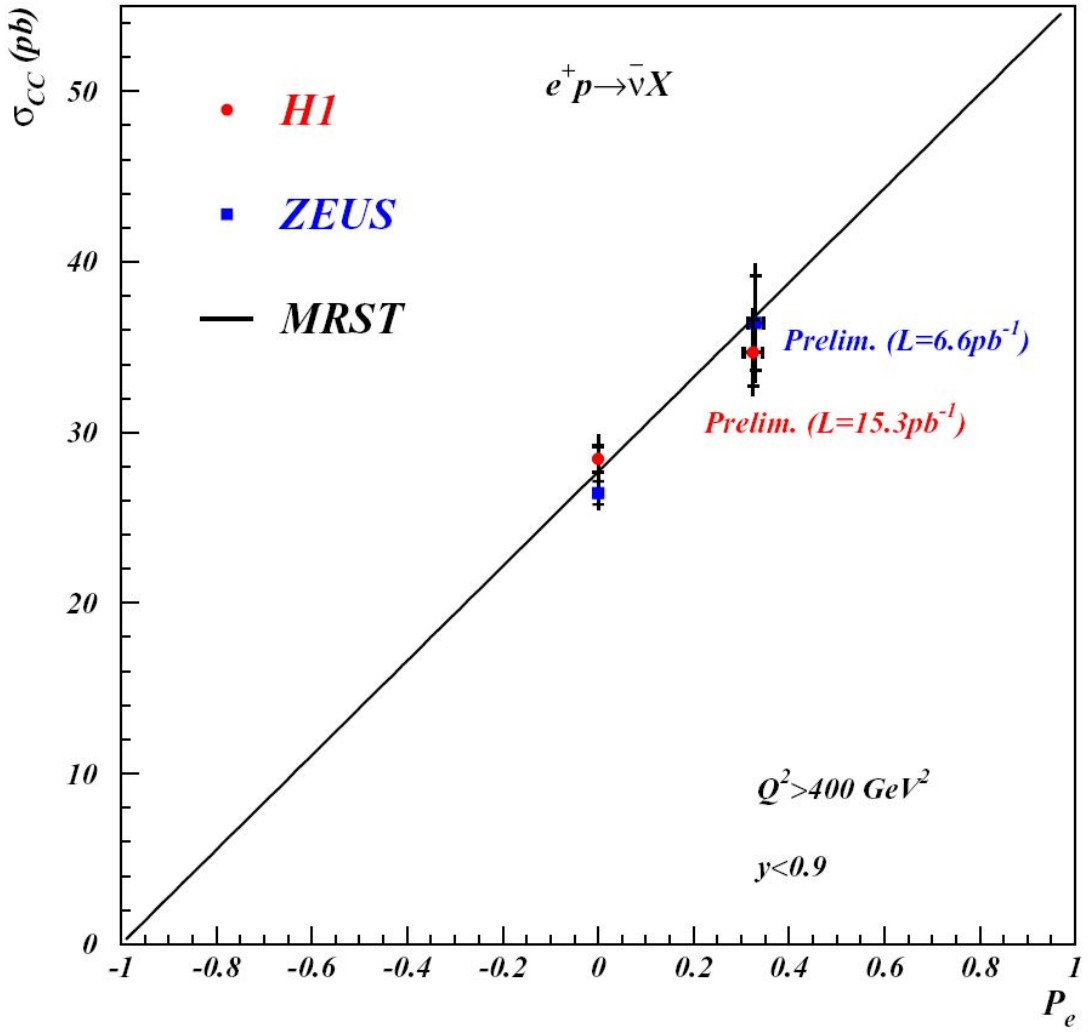
The CC measurement is cross checked with the NC control sample. The MC is able to describe the data well. New EM and Hadronic calibration factors are determined and applied to the HERA-II data. The MCs are weighted to describe the Zvtx distribution. The input PDFs to the Django MC are from the H1 2000 PDF Fit. The signal MCs are also reweighted to describe the polarisation distribution in the data.



The CC data are shown here for $Q^2 > 220$ GeV^2. The MC is treated in the same way as the NC samples described above. The pythia photo-production MC is included and gives a significant contribution at low Pt.



The CC measurements are shown here compared to the H1 PDF 2000 Fit. The unpolarised measurement is above the fit as already noted in the publication. The difference between the two data points is 2.3σ, taking into account correlated systematic uncertainties.



The comparison with ZEUS and MRST.