



HEP 2013
Stockholm
18-24 July 2013



Contribution ID: 58

Type: **Talk presentation**

Inclusive Deep Inelastic Scattering at High Q^2 with Longitudinally Polarised Lepton Beams at HERA

Thursday 18 July 2013 14:30 (17 minutes)

Inclusive e -pmp single and double differential cross sections for neutral and charged current deep inelastic scattering processes are measured with the H1 detector at HERA. The data were taken at a centre-of-mass energy of $\sqrt{s} = 319\text{ GeV}$ with a total integrated luminosity of 333.7 pb^{-1} shared between two lepton beam charges and two longitudinal lepton polarisation modes. The differential cross sections are measured in the range of negative four-momentum transfer squared, Q^2 , between 60 and $50\,000\text{ GeV}^2$, and Bjorken x between 0.0008 and 0.65. The measurements are combined with earlier published unpolarised H1 data to improve statistical precision and used to determine the structure function $xF_3^{\gamma Z}$. A measurement of the neutral current parity violating structure function $F_2^{\gamma Z}$ is presented for the first time. The polarisation dependence of the charged current total cross section is also measured. The new measurements are well described by a next-to-leading order QCD fit based on all published H1 inclusive cross section data which are used to extract the parton distribution functions of the proton.

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Session Classification: QCD

Track Classification: QCD