Abstract 377
Parallel sessions: 2,3,4
Plenary sessions: 1,2,3,4

A Measurement of the Diffractive Structure Function $F_2^{D(3)}$ for Q^2 between 1 and 65 GeV^2

H1 Collaboration

The cross section for deep–inelastic diffractive scattering $ep \to eXY$, where the mass of system Y is less than $1.6\,\mathrm{GeV/c^2}$, is measured in terms of a diffractive structure function $F_2^{D(3)}(\beta, Q^2, x_{I\!P})$. The kinematic range of the measurement is $\sim 1 < Q^2 < 65$ GeV$^2/c^2$, $0.01 < \beta < 0.9$ and $0.0001 < x_{I\!P} < 0.05$. The data were taken with the H1 experiment at HERA in 1994 (integrated luminosity $\sim 2\,\mathrm{pb}^{-1}$ $8.5 < Q^2 < 65$ GeV$^2/c^2$, and integrated luminosity $\sim 60\,\mathrm{nb}^{-1}$ $2.5 < Q^2 < 5$ GeV$^2/c^2$), and in 1995 (integrated luminosity 115 nb^{-1} $\sim 1 < Q^2 < 8.5$ GeV$^2/c^2$). For the lower Q^2 ranges, the data were taken from running periods with the vertex shifted by 70 cm in the direction of the proton beam. The dependence of $F_2^{D(3)}$ on $x_{I\!P}$ is found to depend on β consistent with an interpretation in which two components contribute to $F_2^{D(3)}$. They are identified with a leading diffractive exchange (pomeron) and a sub–leading reggeon. The dependence of the pomeron intercept $\alpha_{I\!P}(0)$ on Q^2 is quantified. At fixed $x_{I\!P}$ violations of scale invariance are observed in the form of rising dependences at different β of $F_2^{D(3)}$ on $\log Q^2$. When confronted with the DGLAP evolution equations in perturbative QCD, the data yield estimates of the partonic content of the diffractive exchange in which gluons carry about 80% of the momentum at $Q^2 \sim Q_0^2 = 2.5\,\mathrm{GeV^2/c^2}$ and are concentrated near fractional momentum $x_{g/I\!P} = 1$.