EPS-HEP99
Abstract # 000
Parallel sessions: 3
Plenary sessions: 3

Measurements of Inclusive Cross Sections in Diffractive Processes at HERA

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Measurements are presented of the cross section of the process $\gamma^{(*)}p \rightarrow XY$, where there is a large rapidity gap between the systems X and Y, for photoproduction and deep inelastic scattering. The differential photoproduction cross section is studied in the range of centre-of-mass energies $60 < W < 270$ GeV as a function of the invariant masses M_X and M_Y of the systems produced at, respectively, the photon and proton vertex. The results are interpreted in the framework of a triple-Regge model. The diffractive structure function of the proton, $F_2^{D(3)}(\beta, Q^2, x_{I\!P})$ is studied for the kinematic region $0.4 \leq Q^2 \leq 800$ GeV^2, $0.001 \leq \beta \leq 0.9$ with $x_{I\!P} < 0.05$. Regge factorisation is tested through an analysis of the $x_{I\!P}$ dependence. Diffractive parton distributions are extracted through an analysis of the β and Q^2 dependence. Further perturbative QCD models based on the diffractive scattering of partonic fluctuations of the photon are also confronted with the data.