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The Mass Dependence of Inclusive Diffractive Photoproduction at HERA

H1 Collaboration

Abstract

Measurements of the differential cross-sections $\mathrm{d}\sigma/\mathrm{d}M_X^2$ are presented for diffractive real photon-proton (γp) interactions at average centre of mass energy $< W_{\gamma p} >=$ 187 GeV and for M_X between threshold and 27 GeV. For the reaction $\gamma p \rightarrow Xp$, the M_X^2 dependence of $\mathrm{d}\sigma/\mathrm{d}M_X^2$ for $M_X^2 > 10\,\mathrm{GeV}^2$ is well described by the form $\mathrm{d}\sigma/\mathrm{d}M_X^2 \propto 1/(M_X^2)^n$ with $n = 1.02 \pm 0.02\,(stat.) \pm 0.07\,(syst.)$. When interpreted in terms of a triple Regge amplitude, the value of n is consistent with the leading effective pomeron trajectory observed in diffractive hadron-hadron physics. Cross sections for the reactions $\gamma p \rightarrow XY$ in which the proton dissociates into the system Y with $M_Y < 10\,\mathrm{GeV}$ and the photon dissociates into the system X with $M_X <$ 5.8 GeV are presented. They are measured for X either to be any of the light vector mesons, ρ^0, ω and ϕ, or to be the M_X continuum. Using these results, a lower limit of 35% is obtained for the diffractive contribution to the total γp cross-section. After correcting to the full kinematic range, $M_X^2/W_{\gamma p}^2 < 0.05$ and $M_X^2/W_{\gamma p}^2 < 0.05$, the t-integrated single proton dissociation cross-section is found to be approximately half that for single photon dissociation.

Plenary Sessions:
2. Soft Interactions and diffraction Phenomena - S. Levonian
4. QCD and Low x Physics - H. Abramowicz, R. Brock

Parallel Session: I Strong Interaction Physics
2. Soft Interactions
3. Structure Functions and Low x Physics
4. Hard Processes and Perturbative QCD