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Elastic ρ' Electroproduction at High Q^2

H1 Collaboration

Abstract

In data collected in 1994 by the H1 detector at HERA, an enhancement is reported in the $\pi^+\pi^-\pi^+\pi^-$ invariant mass ($M_{4\pi}$) spectrum of the elastic electroproduction reaction $ep \to \pi^+\pi^-\pi^+\pi^- p$ at $M_{4\pi} \sim 1.550$ GeV. When interpreted in terms of the production of a single resonance ρ', a measurement is made of the ratio of the cross sections $ep \to e\rho' p$ to $ep \to e\rho p$ using $2.2\,\mathrm{pb}^{-1}$ of e^+p interaction data for the kinematic ranges $4 < Q^2 < 50$ GeV^2 and $40 < W < 140$ GeV. Significant $\rho(770)$ production is observed in the $\rho' \to \pi^+\pi^-\pi^+\pi^-$ decay products. Kinematical dependencies of the ρ' production cross section are presented. The data are also analysed in terms of the production of the vector meson resonances $\rho'(1450)$ and $\rho'(1700)$, which have been shown to provide an interpretation of e^+e^- annihilation to and elastic photoproduction of 4π. The results are discussed in terms of the production of $^3S_1$ and $^3D_1$ quark-antiquark radial recurrences with $I^G J^{PC} = 1^+1^{--}$ and in terms of models of their production at high Q^2.

Plenary Sessions:
1. New Results in Spectroscopy - R. Landua
2. Soft Interactions and diffraction Phenomena - S. Levonian
4. QCD and Low x Physics - H. Abramowicz, R. Brock
Parallel Session: I Strong Interaction Physics
1. Hadron Spectroscopy
2. Soft Interactions
3. Structure Functions and Low x Physics
4. Hard Processes and Perturbative QCD