

Abstract

The diffractive photoproduction of ρ mesons with large momentum transfer, $\gamma p \rightarrow \rho Y$, where Y is the proton remnant, is studied with the H1 detector at HERA using an integrated luminosity of 20.1 pb^{-1} . The photon-proton centre of mass energy spans the range $75 < W < 95 \text{ GeV}$ and the photon has a virtuality $Q^2 < 0.01 \text{ GeV}^2$. The t dependence of the cross section is measured in the range $1.5 < |t| < 10.0 \text{ GeV}^2$, where t is the the four momentum transferred at the proton vertex. The t behaviour is well described by a power law, $d\sigma/dt \propto |t|^{-n}$, which yields $n = 4.26 \pm 0.06 \text{ (stat.) }^{+0.06}_{-0.04} \text{ (syst.)}$. The spin density matrix elements, which provide information on the helicity structure of the interaction, are extracted using measurements of the decay angular distributions. The data indicate a violation of s -channel helicity conservation, with contributions from both single and double helicity-flip observed. The results are compared to the expectation of a perturbative QCD model based on BFKL evolution.