Inelastic Photoproduction of J/ψ Mesons at HERA

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Abstract

Inelastic charmonium production has been an active area of theoretical and experimental interest over the past decade. Experimental results for charmonium production at the Tevatron collider disagreed with the predictions of the existing model (known as the Colour Singlet model) by more than order of magnitude. This stimulated the development of a new model (known as the Colour Octet model) which included additional production mechanisms. Despite explaining the Tevatron results, doubts about the universality of the new model remain and it needs to be tested in different physics processes.

An analysis of the inelastic photoproduction of J/ψ mesons in electron-proton collisions at the HERA collider is presented in this thesis. The data was recorded using the H1 detector and correspond to an integrated luminosity of 20.81 pb^{-1}. Measurements of the cross-sections and differential cross-sections in the inelasticity variable, z, and transverse momentum of the J/ψ squared, $p_{t,J/\psi}^2$, are presented in two kinematic regions. Previous preliminary results are confirmed, the kinematic range covered is extended, and comparisons with the predictions of both the old and new models are made.