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Measurement of the cross-section ratio $\sigma_{\psi(2S)}/\sigma_{J/\psi(1S)}$ in exclusive photoproduction at HERA

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The exclusive photoproduction reactions $\gamma p \rightarrow J/\psi(1S)p$ and $\gamma p \rightarrow \psi(2S)p$ have been studied at an ep centre-of-mass energy of 318 GeV with the ZEUS detector at HERA using an integrated luminosity of 373 pb⁻¹. The measurement has been made in the kinematic range $30 < W < 180$ GeV, $Q^2 < 1$ GeV², $|t| < 1$ GeV², where W is the photon-proton centre-of-mass energy, Q^2 is the photon virtuality and t is the squared four-momentum transfer at the proton vertex. The decay channels used were $J/\psi(1S) \rightarrow \mu^+\mu^-$, $\psi(2S) \rightarrow \mu^+\mu^-$ and $\psi(2S) \rightarrow J/\psi(1S)\pi^+\pi^-$ with subsequent decay $J/\psi(1S) \rightarrow \mu^+\mu^-$. The ratio of the production cross sections $R = \sigma_{\psi(2S)}/\sigma_{J/\psi(1S)}$ has been measured as a function of W and t and compared to previous data in photoproduction and deep inelastic scattering and with predictions of QCD-inspired models of exclusive vector-meson production.

Collaboration / Activity

ZEUS

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