

# Measurement of the cross-section ratio $\sigma(\psi(2S))/\sigma(J/\psi(1S))$ in exclusive deep inelastic ep scattering and in photoproduction at HERA

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## Collaboration

ZEUS

## Abstract content

The exclusive deep inelastic electroproduction of  $\psi(2S)$  and  $J/\psi(1S)$  at an ep centre-of-mass energy of 317 GeV have been studied with the ZEUS detector at HERA in the kinematic range  $2 < Q^2 < 80$  GeV<sup>2</sup>,  $30 < W < 210$  GeV and  $|t| < 1$  GeV<sup>2</sup>, where  $Q^2$  is the photon virtuality,  $W$  is the photon-proton centre-of-mass energy and  $t$  is the squared four-momentum transfer at the proton vertex. The data for  $2 < Q^2 < 5$  GeV<sup>2</sup> were taken in the HERA I running period and correspond to an integrated luminosity of 114 pb<sup>-1</sup>. The data for  $5 < Q^2 < 80$  GeV<sup>2</sup> are from both HERA I and HERA II periods and correspond to an integrated luminosity of 468 pb<sup>-1</sup>. Also, the exclusive photoproduction reaction  $\gamma p \rightarrow \Psi(2S)p$  has been studied using an integrated luminosity of 350 pb<sup>-1</sup>. The measurement has been performed in the kinematic range  $30 < W < 180$  GeV,  $Q^2 < 1$  GeV<sup>2</sup>,  $|t| < 5$  GeV<sup>2</sup>. The decay modes analysed were  $\mu^+\mu^-$  and  $J/\psi(1S)\pi^+\pi^-$  for the  $\psi(2S)$  and  $\mu^+\mu^-$  for the  $J/\psi(1S)$ . The cross-section ratio  $\sigma(\psi(2S))/\sigma(J/\psi(1S))$  has been measured as a function of  $Q^2$ ,  $W$ , and  $t$ . The results are compared to predictions of QCD-inspired models of exclusive vector-meson production.

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