Photoproduction of Heavy Quarkonia

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Abstract

The reaction $\gamma + p \to J/\Psi + p$ is investigated in the kinematic region of large energies and momentum transfers within the scope of perturbative QCD by treating the proton as quark-diquark system. The spatial extension of the diquark is accounted for by phenomenologically parameterized form factors at the gauge boson-diquark vertices, which are adopted from previous investigations of electromagnetic baryon-form factors. Hadron-mass effects are systematically included in the calculation of the hard-scattering amplitude. Taking the J/Ψ-meson distribution amplitude from the literature, we obtain predictions for differential cross sections which extrapolate the ZEUS and FNAL diffractive-scattering data ($|t| < 1.2\mathrm{GeV}^2$) in a reasonable way. Predictions will not only be presented for high, but also for intermediate photon energies, for which data from new dedicated facilities, such as CEBAF12 or ELFE, could be expected.