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Diffractive Charmonium Production in Deep Inelastic Scattering at HERA

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We present results for the exclusive production of J/ψ and $\psi(2S)$ mesons in deep inelastic ep scattering at HERA in the kinematic region of the virtuality $2 < Q^2 < 80$ GeV^2 and the photon proton centre-of-mass energy $40 < W_{\gamma^* p} < 160$ GeV. J/ψ mesons are detected via their leptonic decays into two muons or electrons. The cross section for the reaction $\gamma^* p \rightarrow J/\psi p$ is evaluated as a function of Q^2, W and t, and the results are compared to phenomenological models. Decay angular distributions are shown. The first observation of $\psi(2S)$ mesons in deep inelastic scattering at HERA is reported, using the decay mode $\psi(2S) \rightarrow J/\psi\, \pi^+\pi^-$. The ratio of the quasi-elastic production cross sections for $\psi(2S)$ and J/ψ is extracted as a function of Q^2.