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Exclusive Photoproduction of Rho Meson with Leading Neutron at HERA

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The first measurement of exclusive photoproduction of rho meson associated with the leading neutron at HERA is presented. The data are taken with the H1 detector in the years 2006-2007 and correspond to an integrated luminosity of 1.16 pb⁻¹. The rho mesons are reconstructed from decay pions in the central tracking chamber, while the leading neutrons, carrying a large fraction of the incoming proton momentum $x_L > 0.4$, are detected in the Forward Neutron Calorimeter. The phase space of the measurement is restricted to by photon virtualities $Q^2 < 2 \text{ GeV}^2$, total energies of the gamma-p system $20 < W_{gp} < 100 \text{ GeV}$ and polar angles of the leading neutrons, $\theta_n < 0.75 \text{ mrad}$. The cross section of the reaction $\gamma + p \rightarrow \rho + n + Y$, where Y is a small mass system escaping undetected in the proton direction, is measured as a function of the neutron energy, the invariant mass of the pi+pi- system and the transverse momentum and the pseudorapidity of the rho meson. The data are interpreted in terms of a double peripheral process, involving a pion exchange at the proton vertex followed by elastic photoproduction of a rho meson on a virtual pion.

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