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Exclusive ρ0 Meson Photoproduction with a Leading Neutron at HERA

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A first measurement is presented of exclusive photoproduction of rho;0 mesons associated with leading neutrons at HERA.
The data were taken with the H1 detector in the years 2006 and 2007 at a centre-of-mass energy of radic;=319 GeV and correspond to an integrated luminosity of 1.16 pb-1.
The rho;0 mesons with transverse momenta p_T<1 GeV are reconstructed from their decays to charged pions, while leading neutrons carrying a large fraction of the incoming proton momentum, x_L>0.35, are detected in the Forward Neutron Calorimeter. The phase space of the measurement is defined by the photon virtuality Q2<2 GeV2, the total energy of the photon-proton system 20<W<100 GeV and the polar angle of the leading neutron theta;_n<0.75 mrad.
The cross section of the reaction gamma;p rarr; rho;0 n pi;+ is measured as a function of several variables. The data are interpreted in terms of a double peripheral process, involving pion exchange at the proton vertex followed by elastic photoproduction of a rho;0 meson on the virtual pion. In the framework of one-pion-exchange dominance the elastic cross section of photon-pion scattering, sigma;_el(gamma;pi;+ rarr; rho;0pi;+), is extracted. The value of this cross section indicates significant absorptive corrections for the exclusive reaction studied.

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