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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 ρ⁰ mesons associated with leading neutrons at HERA. The data were taken with the H1 detector at a centre-of-mass energy of sqrt(s)=319 GeV and correspond to an integrated luminosity of 1.16 pb^{−1}. The ρ mesons are reconstructed from their decays to charged pions, the neutrons are detected in the Forward Neutron Calorimeter. The photon virtuality is limited to Qsup2;<2 GeVsup2;, the total energy of the photon-proton system 20<W<100 GeV and the polar angle of the leading neutron θ<0.75 mrad. The cross section of the reaction γp⟶ρnπ is measured as a function of several variables. The data are interpreted in terms of a double peripheral process. In the framework of one-pion-exchange dominance the elastic cross section of photon-pion scattering is also extracted. The observed value indicates significant absorptive corrections for the exclusive reaction γp⟶ρ⁰nπ⁺.

Primary authors: SCHMITT, Stefan (Deutsches Elektronen-Synchrotron (DE)); H1 COLLABORATION

Presenter: OLSSON, jan (D)

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