

# XXIV International Workshop on Deep-Inelastic Scattering and Related Subjects (DIS16)



Contribution ID: 28

Type: **not specified**

## Exclusive $\rho^0$ Meson Photoproduction with a Leading Neutron at HERA

*Tuesday, April 12, 2016 12:00 PM (15 minutes)*

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  $\sqrt{s}=319$  GeV and correspond to an integrated luminosity of  $1.16 \text{ pb}^{-1}$ .

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  $Q^2 < 2 \text{ GeV}^2$ , 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  $\gamma p \rightarrow \rho^0 n \pi^+$  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,  $\sigma_{\text{el}}(\gamma \pi^+ \rightarrow \rho^0 \pi^+)$ , is extracted. The value of this cross section indicates significant absorptive corrections for the exclusive reaction studied.

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**Session Classification:** WG5 Small-x and Diffraction

**Track Classification:** Small-x, Diffraction and Vector Mesons