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## Measurement of exclusive $\pi^+\pi^-$ and $\rho^0$ meson photoproduction at HERA

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Exclusive photoproduction of  $\rho^0(770)$  mesons is studied using the H1 detector at the ep collider HERA. A sample of about 900000 events is used to measure single- and double-differential cross sections for the reaction  $\gamma p \rightarrow \pi^+\pi^-Y$ . Reactions where the proton stays intact ( $m_Y = m_p$ ) are statistically separated from those where the proton dissociates to a low-mass hadronic system ( $m_p < m_Y < 10$  GeV). The double-differential cross sections are measured as a function of the invariant mass  $m_{\pi\pi}$  of the decay pions and the squared 4-momentum transfer  $t$  at the proton vertex. The measurements are presented in various bins of the photon-proton collision energy  $W_{\gamma p}$ . The phase space restrictions are  $0.5 < m_{\pi\pi} < 2.2$  GeV,  $|t| < 1.5$  GeV<sup>2</sup>, and  $20 < W_{\gamma p} < 80$  GeV. Cross section measurements are presented for both elastic and proton-dissociative scattering. The observed cross section dependencies are described by analytic functions. Parametrising the  $m_{\pi\pi}$  dependence with resonant and non-resonant contributions added at the amplitude level leads to a measurement of the  $\rho^0(770)$  meson mass and width at  $m_\rho = 770.8^{+2.6}_{-2.7}$  (tot.) MeV and  $\Gamma_\rho = 151.3^{+2.7}_{-3.6}$  (tot.) MeV, respectively. The model is used to extract the  $\rho^0(770)$  contribution to the  $\pi^+\pi^-$  cross sections and measure it as a function of  $t$  and  $W_{\gamma p}$ . In a Regge asymptotic limit in which one Regge trajectory  $\alpha(t)$  dominates, the intercept  $\alpha(t=0) = 1.0654^{+0.0098}_{-0.0067}$  (tot.) and the slope  $\alpha'(t=0) = 0.233^{+0.067}_{-0.074}$  (tot.) GeV<sup>-2</sup> of the  $t$  dependence are extracted for the case  $m_Y = m_p$ .

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