

Resonances in forward $\pi^+\pi^-$ photoproduction on hydrogen

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Collaboration

Abstract content

The production amplitude is known to be dominated by mechanisms related to singularities which are closest to the physical region of the reaction. Thus the forward $\pi^+\pi^-$ photoproduction on hydrogen is dominated by one-pion exchange in the t channel. The 3-particle final state in this reaction has a complicated dynamics both in the $\pi\pi$ and πp subsystems, with a rich spectrum of resonances emerging in the latter. To account for this we use the SAID parametrisation of the πp scattering amplitudes and embed them in a gauge invariant $\gamma p \rightarrow \pi^+\pi^-p$ amplitude. As a check of our approach we have calculated the cross sections and beam asymmetries for $\gamma p \rightarrow \pi^-\Delta^{++}$ reaction at various photon energies. In order to describe the resonance spectrum in the $\pi^+\pi^-$ system we have made the partial wave expansion of the photoproduction amplitude in the $\pi^+\pi^-$ center of mass system and included the final state interaction effects. With this approach we have obtained a very good agreement with the S- and D-wave $\pi\pi$ mass distributions which are dominated by the $f_0(980)$ and $f_2(1270)$ signals, respectively.

1. R.L.Workman, R.A.Arndt, W.J.Briscoe, M.W.Paris, I.I.Strakovsky, Phys. Rev. C 86, 035202 (2012); <http://gwdac.phys.gwu.edu/>

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