

Resonance mechanism of the reaction $pd \rightarrow pd\pi\pi$ in the GeV region

At present as one of the most realistic candidate to dibaryon resonance is considered the resonance $D_{IJ} = D_{03}$ observed by the WASA@COSY [1] in the total cross section of the reaction of two-pion production $pn \rightarrow d\pi^0\pi^0$, here I is the isospin and J is the total angular momentum of this resonance.

Very similar resonance structure was observed by ANKE@COSY in the differential cross section of the two-pion production reaction $pd \rightarrow pd\pi\pi$ at beam energies 0.8-2.0-GeV with high transferred momentum to the deuteron at small scattering angles of the final proton and deuteron [2].

In the distribution over the invariant mass $M_{d\pi\pi}$ of the final $d\pi\pi$ system the resonance peaks were observed at $M_{d\pi\pi} \approx 2.38$ -GeV [2]

that is the mass of the isoscalar two-baryon resonance $D_{IJ} = D_{03}$, while the kinematic conditions differ considerably from that in Ref. [1]. This data we analyzed in Ref. [3]

assuming excitation of the D_{03} resonance via t-channel σ -meson exchange between the proton and deuteron and using the two-resonance mechanism of the D_{03} resonance decay [4]. The shapes of the distributions over the invariant masses of the final $d\pi\pi$ and $\pi\pi$ systems were explained qualitatively in [3] assuming the lowest values of the orbital angular momenta in the vertices $\sigma d \rightarrow D_{03}$ ($L = 2$), $D_{03} \rightarrow D_{12} + \pi$ ($l_1 = 1$), $D_{12} \rightarrow d + \pi$ ($l_2 = 1$).

In this work we study the role of higher orbital momenta in those vertices ($L = 2, 4$, $l_1 = 1, 3, 5$, $l_2 = 1, 3$). Furthermore, a possible contribution of the D_{03} excitation to the pd -backward elastic scattering is studied in the 1 GeV region.

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[4] M.N. Platonova, V.I. Kukulin, Phys. Rev. C 87, 025202 (2013).

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