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Search for dibaryon resonances in the reactions dd $\rightarrow$ dd$\pi\pi$ and pd $\rightarrow$ pd$\pi\pi$

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The resonance peak observed by WASA@COSY in the total cross section of the reaction of two-pion production in the isoscalar channel of the reaction $pn \rightarrow d\pi^0\pi^0$ [1] at invariant mass 2380 MeV with the width of 70 MeV, is considered as one of the most realistic candidate to the dibaryon resonance [2]. The isospin of this resonance is I=0 and spin-parity $J^P = 3^+$. A 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 [3]. In this case the kinematic conditions differ considerably from that in Ref. [1] and two final pions were not detected and, therefore, the isoscalar channel was not separated. Nevertheless, in the distribution over the invariant mass M_d of the final $d\pi\pi$ system of the reaction $pd \rightarrow pd\pi\pi$ the resonance peak was also observed at M_d 2.38 GeV [3]. In order to explain these data, the two-resonance model [5] of the reactionpn $\rightarrow d\pi^0\pi^0$ was applied in Refs. [4] by inclusion of the t-channel σ-meson exchange between the proton and deuteron in the reaction $pd \rightarrow pd\pi\pi$. Recently in Ref. [6] the reaction $\gamma d \rightarrow d\pi^0\pi^0$ was studied and an indication to excitation of isoscalar dibaryon resonance $D_{03}(2380)$ and more heavier dibaryons d*(2470) and d*(2630) was found. These resonances can be excited also in the reaction dd$\rightarrow$ dd* at SPD NICA collider. In this work we estimated the differential cross sections of the reactions $pd \rightarrow pd\pi\pi$ and $dd \rightarrow dd\pi\pi$ assuming excitaion of the $D_{03}(2380)$ dibaryon by σ- meson exchange in t-channel as in Refs. [4] and calculated distributions over the invariant mass of the final $d\pi\pi$ system for these reactions. The extended model [7] for decay channels of the $D_{03}(2380)$ was used in this calculations.

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