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The reactions $pd \rightarrow pd\pi\pi$ and $dd \rightarrow dd\pi\pi$ and dibaryon resonances

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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. 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 [2]. The kinematic of this reaction differ considerably from that in Ref. [1] and two final pions were not registered, nevertheless in the distribution over the invariant mass $M_{d\pi\pi}$ of the final $d\pi\pi$ system of the reaction $pd \rightarrow pd\pi\pi$ the resonance peak was also observed at $M_{d\pi\pi} \approx 2.38$ GeV [2]. In order to explain these data, in Refs. [3] the two-resonance model of the reaction $pn \rightarrow d\pi^0\pi^0$ [4] was applied by inclusion of the t-channel σ -meson exchange between the proton and deuteron in the reaction $pd \rightarrow pd\pi\pi$. Later, the reaction $\gamma d \rightarrow d\pi^0\pi^0$ was studied in Ref. [5] and an indication to excitation of isoscalar dibaryon resonance D03(2380) and more heavier dibaryons *dwith masses 2470 MeV and 2630 MeV was found. These resonances, if they do exist, can be excited also in the reactions $dd \rightarrow dd$ and $dd \rightarrow npd^*$ at SPD NICA collider.* We estimated [6] the differential cross sections of the reactions $pd \rightarrow pd\pi\pi$ and $dd \rightarrow dd\pi\pi$ assuming excitation of the D03(2380) dibaryon by σ -meson exchange in t-channel and calculated distributions over the invariant mass of the final $d\pi\pi$ system for these reactions.

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Primary author(s): UZIKOV, Yuriy (Joiny Institute for Nuclear Researches); TEMERBAYEV, Azamat (ENU); TURSUNBAYEV, Nurbek

Presenter(s): UZIKOV, Yuriy (Joiny Institute for Nuclear Researches)

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