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Searching for η-mesic ^{3}He with WASA-at-COSY facility

Saturday, 4 June 2016 16:00 (1:30)

Collaboration

WASA-at-COSY

Abstract content

The existence of η-mesic nuclei in which the η meson is bound with nucleus with the strong interaction was postulated by Haider and Liu already in 1986, however till now no experiment confirmed it empirically. Recent theoretical studies of hadronic- and photoproduction of η meson, revealing posibility of existence for η-mesic bound states for light nuclei like ^{3}He, give the hope of their observation in proton-deuteron fusion reactions. Our research group has developed a method giving a chances to discover the $\eta-^3$He bound state. In 2014 we performed measurements using proton beam from COSY synchrotron and the WASA detector installed in the Research Center Jülich in Germany. The main advantage of the used experimental setup is a possibility of continuous changing of beam energy and simultaneous registration of all particles taking part in the reaction. Moreover, we have collected significantly higher statistics in comparison to previous experiments. The data analysis is in progress. The target process of analysis that is $pd \rightarrow bound(^3\mathrm{He}\eta)$. It will be searched in $pd \rightarrow ^3\mathrm{He}2\gamma$, $pd \rightarrow ^3\mathrm{He}6\gamma$, $pd \rightarrow ppp\pi^-$ and $pd \rightarrow pnn\pi^+$ reactions. The luminosity can be obtained from $pd \rightarrow ^3\mathrm{He}\eta$, $pd \rightarrow ^3\mathrm{He}\pi^0$ and $pd \rightarrow ppn_{spec}$ reactions. The poster will include description of the experimental method used at WASA and the preliminary results of the data analysis.

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