

Search for the ${}^4\text{He-}\eta$ bound state in $dd \rightarrow ({}^4\text{He-}\eta)_{\text{bound}} \rightarrow {}^3\text{He}n\pi^0$ and $dd \rightarrow ({}^4\text{He-}\eta)_{\text{bound}} \rightarrow {}^3\text{He}p\pi^-$ reactions with the WASA-at-COSY facility

Monday, 2 June 2014 15:00 (0:20)

Collaboration

WASA-at-COSY

Abstract content

In 1986 Haider and Liu postulated a new kind of exotic nuclear matter - η -mesic nuclei in which the η meson is bound in a nucleus by means of the strong interaction [1]. However, till now there is no clear experimental evidence confirmed empirically its existence. In November 2010, the search for the ${}^4\text{He-}\eta$ bound state was performed with high statistics and high acceptance with the WASA-at-COSY detector [2]. The experimental method is based on the measurement of the excitation functions for the two reaction channels: $dd \rightarrow {}^3\text{He}n\pi^0$ and $dd \rightarrow {}^3\text{He}p\pi^-$ near the η production threshold. The measurement was carried out using a ramped beam technique. The beam momentum was varying continuously from 2.127 GeV/c to 2.422 GeV/c corresponding to the excess energy range $Q \in (-70, 30)$ MeV. The presentation will include description of the experimental method and next steps leading to determination of preliminary excitation functions from the 2010 data.

[1] Q. Haider, L.C. Liu, Phys. Lett. B 172 (1986) 257. [2] M. Skurzok, P. Moskal, W. Krzemien, Prog. Part. Nucl. Phys. (2012), arXiv:1112.2521.

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