

Search for the exotic nuclear matter with WASA-at-COSY

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The negatively charged pions and kaons can be trapped in the Coulomb potential of atomic nucleus forming so called mesonic atoms. It is also conceivable that a neutral meson could be bound to a nucleus. In this case the binding is exclusively due to the strong interaction and hence such object can be referred to as a mesic nucleus. Here the most promising candidate is the η -mesic nucleus since the η -nucleon interaction is strongly attractive. The existence of mesic nuclear matter was postulated thirty years ago [1], however, until now it has not been confirmed experimentally.

Such system in the form of the η -mesic helium may be created for example in the deuteron-deuteron or proton-deuteron fusions [2].

Detector system WASA-at-COSY has been operated at the Cooler Synchrotron COSY at the Forschungszentrum Jülich (Germany) in the years from 2006 till 2015. Three experiments dedicated to the search for η -mesic helium were conducted up to now using this detector [2-7].

The poster will be focused on the status and perspectives of the search for the new kind of nuclear matter in the form of η -mesic helium.

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