

FORMATION OF HEAVY HELIUM ISOTOPE ${}^9\text{He}$ IN ${}^{11}\text{B}(\pi^-, pp)X$ REACTION

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The unbound heavy helium isotope ${}^9\text{He}$ was discovered in pion double charge exchange reaction ${}^9\text{Be}(\pi^-, \pi^+){}^9\text{He}$ at $E_\pi = 194$ MeV [1]. Despite a significant number of experiments performed to date, the problem of the level structure of ${}^9\text{He}$ remains open [2, 3]. In particular, the energy and quantum numbers of the ground state are undefined. The studied range of excitation energies is limited to 5 MeV, while the parameters of states lying above 3 MeV do not agree in different works. In this situation, new experimental information is needed to resolve existing contradictions and discover new levels.

In this work a search for ${}^9\text{He}$ was performed in the reaction of stopped pion absorption ${}^{11}\text{B}(\pi^-, pp)X$. The experiment was taken at low energy pion channel of LANL with two-arm multilayer semiconductor spectrometer. In these measurements missing mass resolution was 1 MeV and error of absolute energy calibration did not exceed 0.1 MeV. These values were determined from measurements of the reaction ${}^{10}\text{B}(\pi^-, pp){}^8\text{He}$ carried out in the same experimental run. The studied excitation energy ranges up to about 50 MeV.

In these measurements we do not observed *s*-wave resonance just above threshold in ${}^9\text{He}$. The lowest lying state in our measurements has the following resonant parameters: $E_r = 1.3(3)$ MeV and $\Gamma \leq 0.5$ MeV, which are in agreement with a number of experiments [2, 3]. Highly excited state with $E_r = 10.5(2)$ MeV and $\Gamma = 1.5(5)$ MeV has been observed for the first time.

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