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⁸He spectroscopy in stopped pion absorption by ⁹Be

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The ground state of the heavy helium isotope ⁸He ($J^P = 0^+$) has the highest ratio of number of neutrons to protons N/Z = 3 among nucleon-stable nuclear states. Excited levels ⁸He were observed in several experiments, however, statistics of the results is low.

In present work, studies of the level structure of ⁸He have been performed in the reaction of stopped pion absorption by ⁹Be nuclei. The experiment was carried out at the LAMPF meson factory with a two-arm semiconductor spectrometer of charged particles. The formation of the ⁸He was observed in the missing mass spectrum of the reaction ⁹Be (π^- , d)X. The advantage of inclusive approach is a high energy resolution (FWHM = 0.4 MeV) in comparison with correlation measurements. The missing mass spectrum in the range (0, 10 MeV) has been described using the superposition of distributions on the phase volumes and the three states of ⁸He with the following parameters (Ex, G): (0.1×0.1 MeV, 0.1×0.1 MeV), (3.8×0.2 MeV, 0.3×0.1 MeV) and (4.6×0.3 MeV, 0.3×0.1 MeV). These results have been compared with data of other experimental and theoretical works.

Primary author(s): LEONOVA, Tatiana (NRNU MEPhI)

Co-author(s) : Dr. CHERNYSHEV, Boris (National Research Nuclear University MEPhI); LAPUSHKIN, Sergei (NRNU "MEPhI"); Dr. GUROV, Yuri (NRNU "MEPhI")

Presenter(s): LEONOVA, Tatiana (NRNU MEPhI)

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