

EMISSION OF HIGH-ENERGY ^4He AND $^6,^7\text{Li}$ NUCLEI IN NUCLEAR REACTION OF ^{56}Fe IONS ON ^{238}U TARGET

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The energy spectra of alpha particles and $^6,^7\text{Li}$ nuclei emitted at an angle of 0° in the reaction induced by a ^{56}Fe beam (400 MeV) incident on a ^{238}U target were measured by means of the high-resolution magnetic analyzer (MAVR setup) [1]. The resulting spectra (Fig. 1) were found to contain fast alpha particles and $^6,^7\text{Li}$ nuclei with the energy corresponding to the two-body and three-body exit channels [2]; the energy of alpha particles was close to the two-body kinematical limit. In the region of lower and higher energies, the ratios of the cross sections for the emission of alpha particles to the cross sections for the emission of lithium nuclei are very different, which indicates different mechanisms for the formation of these nuclei. The obtained data were analyzed based on the model of moving sources. The emission of nonequilibrium alpha particles and $^6,^7\text{Li}$ nuclei in the forward direction is also considered within the quantum time-dependent approach [2, 3].

Fig. 1. Energy spectra of alpha particles (circles), ^6Li (squares), and ^7Li (triangles) measured at an angle of 0° in the reaction ^{56}Fe (400 MeV) + ^{238}U .

1. V.A. Maslov, V.I. Kazacha, I.V. KoIesov, S.M. Lukyanov, V.N. Melnikov, N.F. Osipov, Yu.E. Penionzhkevich, N.K. Skobelev, Yu.G. Sobolev, E.I. Voskoboinik. // J. Phys. Conf. Ser. 2016. V. 724. P. 012033.
2. Yu.E. Penionzhkevich, V.V. Samarin, S.M. Lukyanov, V.A. Maslov, M.A. Naumenko. // Chin. Phys. C. 2022. V. 46. P. 114002.
3. V.V. Samarin. // Phys. At. Nucl. 2018. V. 81. P. 486.

Section

Experimental and theoretical studies of nuclear reactions

Primary authors: MASLOV, Vladimir (JINR); LUKYANOV, Sergey (FLNR); SAMARIN, Viacheslav (Joint Institute for Nuclear Research, Flerov Laboratory of Nuclear Reactions); PENIONZHKEVICH, Yuri (Head of department, profesor); NAUMENKO, Mikhail (Joint Institute for Nuclear Research)

Presenter: MASLOV, Vladimir (JINR)

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