

Study of Dynamics of External Neutrons in Reactions $^{7,9,11}\text{Li} + ^{28}\text{Si}$

V.V. Samarin^{1,2}, M.A. Naumenko¹

¹Joint Institute for Nuclear Research, 141980 Dubna, Russia

²Dubna State University, 141982 Dubna, Russia

The present work is devoted to studying light nuclei $^{7,9,11}\text{Li}$. The probability density for the ^{11}Li nucleus calculated using Feynman's continual integrals method [1] is shown in Figure 1a. The dynamical approach based on the numeric solution of the time-dependent Schrödinger equation [2] is applied to the description of adiabatic and diabatic rearrangement of neutrons in reactions $^{7,9,11}\text{Li} + ^{28}\text{Si}$ (see Figure 1b, c) and to the calculation of total reaction cross sections [3].

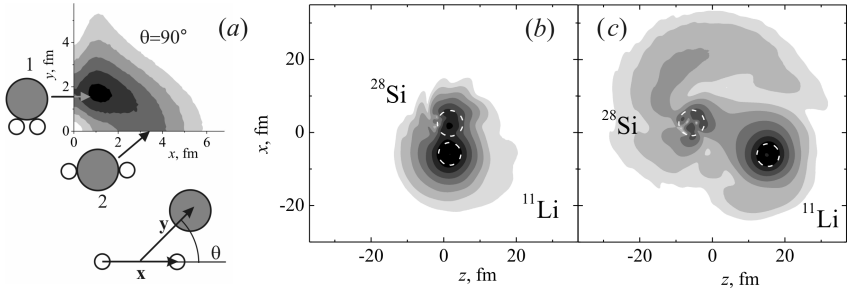


Figure 1: (a) The probability density for the ^{11}Li nucleus (configuration $^9\text{Li} + n + n$) and the vectors in the Jacobi coordinates; neutrons and ^9Li -core are denoted as small empty circles and large filled circles, respectively. The most probable configurations are $^9\text{Li} + \text{di-neutron}$ (1) and the cigar configuration (2). (b, c) An example of the time evolution of the probability density for the external neutrons of ^{11}Li nucleus in the collision with ^{28}Si for $E_{cm} = 100$ MeV and impact parameter $b = 8$ fm. The radii of circumferences equal the effective radii of nuclei. The course of time corresponds to the panel locations (b, c).

The work was supported by the Russian Science Foundation (RSF), research project 17-12-01170.

References

- [1] V.V. Samarin, *Nuclear Theory* **36** (Heron Press, Sofia, 2017) 233-243.
- [2] V.V. Samarin, *Phys. Atom. Nucl.* **78** (2015) 128-141.
- [3] Yu.E. Penionzhkevich *et al.*, *Phys. Atom. Nucl.* **80** (2017) 928-941.