Contribution ID: **61** Type: **not specified**

Dynamics of Nucleus-Nucleus Collisions and Neutron Rearrangement in Time-Dependent Approach

Thursday, 6 September 2018 16:05 (20 minutes)

The dynamical approach based on numeric solution of the time-dependent Schrödinger equation [1 ⊠ 3] was applied to the description of adiabatic and diabatic rearrangement of nucleons in reactions of light nuclei 3,6He, 9,11Li with heavy nuclei. For example, adiabatic and diabatic evolution of the probability density for the protons of the 3He nucleus in the collision with the 45Sc nucleus is shown in Figure. Experimental data on fusion, nucleon transfer and total reaction cross sections for reactions 3,6He + 197Au, 3He + 194Pt [4, 5], 3,6He + 45Sc [6, 7], 9Li + 28Si [8], and 11Li + 28Si were analyzed. The results of calculation of cross sections AXN(3,6He, ...)A+1XN+1 and ZXN(3He, ...)Z+1XN-1 taking into account neutron transfer and fusion-evaporation processes are in agreement with experimental data. The results of calculations of multinucleon transfer in reaction 40Ca + 128Sn are also in agreement with experimental data [9].

Figure. Evolution of the probability density for the protons of the 3He projectile nucleus in the collision with the 45Sc target nucleus at different values of the center-of-mass energy and the collision impact parameter b: adiabatic rearrangement of the probability density for the slow collision at = 6 MeV, b = 0 (a, b, c), diabatic rearrangement of the probability density for the fast collision at = 35 MeV, b = 7 fm (d, e, f). Radii of circumferences equal the effective radii of nuclei. The course of time corresponds to the panel locations from left to right (a-b-c), (d-e-f).

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

References

1. V.V. Samarin, Phys. Atom. Nucl. 78, 128 (2015).
2. V.V. Samarin, Phys. Atom. Nucl. 78, 861 (2015).
3. V.V. Samarin, EPJ Web of Conf. 86, 00040 (2015).
4. Yu.E. Penionzhkevich et al., Eur. Phys. J. A 31, 185 (2007).
5. N.K. Skobelev et al., Phys. Part. Nucl. Lett. 11, 114 (2014).
6. N.K. Skobelev et al., Phys. Part. Nucl. Lett. 10, 410 (2013).
7. N.K. Skobelev et al., J. Phys. G: Nucl. Part. Phys. 38, 035106 (2011).
8. Yu.E. Penionzhkevich et al., Phys. Atom. Nucl. 80, 928 (2017).
9. L. Corradi et al., Phys. Rev. C 54, 201 (1996).

Selected session

Nuclear Structure and Dynamics

Primary author: Prof. SAMARIN, Viacheslav (Flerov Laboratory of Nuclear Reactions, the Joint Institute for Nuclear Research)

Co-authors: Mr NAUMENKO, Mikhail (Joint Institute for Nuclear Research); Mr SKOBELEV, Nikolai (Joint Institute for Nuclear Research); Mr SOBOLEV, Yuri (Joint Institute for Nuclear Research); Prof. PENIONZHKEVICH,

yuri (joint institute for nuclear research)

Presenter: Prof. SAMARIN, Viacheslav (Flerov Laboratory of Nuclear Reactions, the Joint Institute for Nuclear Research)

Session Classification: Nuclear Structure and Dynamics (SALONE BOLOGNINI)