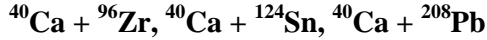


MULTINUCLEON TRANSFER IN REACTIONS



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Numerical solution of the time-dependent Schrödinger equation (TDSE) [1] is used for studying multi-neutron and multi-proton transfer processes in low-energy nucleus-nucleus collisions. The evolution of the wave functions for all nucleons is determined for reactions ${}^{40}\text{Ca} + {}^{96}\text{Zr}$, ${}^{40}\text{Ca} + {}^{124}\text{Sn}$, and ${}^{40}\text{Ca} + {}^{208}\text{Pb}$. An example of evolution of the probability density for all nucleons during the grazing collision of ${}^{40}\text{Ca} + {}^{124}\text{Sn}$ is shown in Fig. 1. The transfer probabilities are calculated for external and deeper nucleon shells of the colliding nuclei. For the ${}^{40}\text{Ca} + {}^{96}\text{Zr}$ reaction, the most probable transfer takes place for $2d_{5/2}$ neutron shell of the ${}^{96}\text{Zr}$ nucleus and $2d_{3/2}$ proton shell of the ${}^{40}\text{Ca}$ nucleus. The results of calculations of transfer cross sections are in satisfactory agreement with experimental data for reactions ${}^{40}\text{Ca} + {}^{124}\text{Sn}$ [3] and ${}^{40}\text{Ca} + {}^{208}\text{Pb}$ [4].

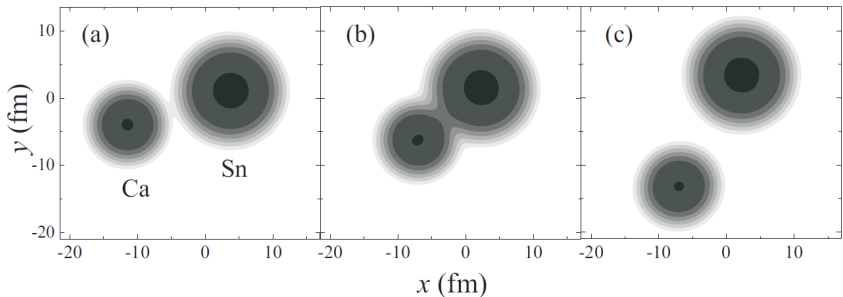


Fig. 1. Evolution of the probability density for all nucleons during the grazing collision of ${}^{40}\text{Ca} + {}^{124}\text{Sn}$ at the center-of-mass energy 128.5 MeV and impact parameter $b=4$ fm. The sequence of figures (a, b, c) follows the timeline.

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