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Time-dependent description of reactions with weakly bound nuclei ^{11}Li, ^{11}Be

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Numerical solution of the time-dependent Schrödinger equation [1-3] is used for studying the dynamics of breakup reaction and nucleon transfer at energies above the Coulomb barrier. The spin-orbit interaction is taken into account [2]. The evolution of the wave functions for an outer weakly bound two neutrons of ^{11}Li nucleus and one neutron of ^{11}Be in collisions with ^{28}Si and ^{48}Ti [3] nuclei is studied (see Fig. 1). The cross sections for the stripping of the outer nucleon due to transfer and breakup are calculated.

Fig. 1. Evolution of the probability density for the outer neutrons of 11Li with initial state $1p_{1/2}$ in collision ^{11}Li + ^{28}Si for $E_{\text{c.m.}}$= 79 MeV, along with impact parameter $b = 7$ fm in a reference system moving relative to the laboratory system with a constant velocity equal to that of a projectile at a fairly large distance from the target nucleus. The course of time corresponds to the panel locations (a), (b), (c), (d). Greyscale gradation in the logarithmic scale is used. The radii of the circles correspond to those of nuclear cores of 2.4 fm and 3.8 fm respectively.

Referances

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