Contribution ID: **741** Type: **Oral**

Probabilities of neutron transfer to free single-particle levels in the reaction ^{181}Ta(^{18}O,^{19}O) at near-barrier energies

Friday, 13 November 2020 15:30 (15 minutes)

Numerical solution of the time-dependent Schrodinger equation (TDSE) 1 is used for studying neutron transfer processes at near-barrier energies. The evolution of the wave functions for outer neutron is determined for reactions ^{181}Ta(^{18}O,^{19}O). TDSE allows us to visualize the dynamics of taking place processes [1-3]. The probabilities are calculated for neutrons transfer from outer shells of the target ^{181}Ta. The results of calculations of transfer cross sections are in satisfactory agreement with experimental data [4] for reaction ^{181}Ta(^{18}O,^{19}O). High probability of neutron transfer from the ^{181}Ta nucleus to the $2s$ orbital of ^{18}O nucleus at near-barrier energies has been yielded (see Figure 1).

In our previous work [4], differential cross sections for the formation of oxygen isotopes in the reaction ^{18}O+^{181}Ta have been measured at projectile nucleus energy 10A MeV on the high-resolution magnetic spectrometer MAVR. Theoretical analysis has been performed in the DWBA formalism using the FRESCO code under the assumption of sequential neutron transfer mechanism.

Fihure 1. Evolution of probability density for for the outer neutrons of ^{181}Ta in collision with the projectile-nucleus ^{18}O at energy of 5A MeV.

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Session Classification: Nuclear Physics

Track Classification: Nuclear Physics