STUDY OF HADRON SCATTERING ON BORON ISOTOPES WITHIN THE GLAUBER THEORY

Wednesday 14 October 2020 17:00 (25 minutes)

Hadron scattering on light nuclei at intermediate energies is a good test of investigation of both the structure of nuclei and the mechanisms of interaction. From the scattering of various hadrons, both experimentally and theoretically, proton scattering has been studied in more detail. At the same time, the study of the scattering of other particles, for example, mesons with the same kinematics, in the same nuclei, provides additional interesting information. In the same approach, we previously studied carbon and nitrogen nuclei [1].

In this work, we study the scattering of $\pi\pm$- and K+-mesons at intermediate energies at 9,10B nuclei in the framework of Glauber's theory. In our calculations, we used the wave function of the 9B nucleus in the 2αN-model [2], calculated with paired $\alpha\alpha$- and αN-interactions with states forbidden by the Pauli principle. In calculating the wave function, two versions of the $\alpha\alpha$ interaction were used: the l-dependent $\alpha\alpha$-Ali-Bodmer potential and the deep attractive $\alpha\alpha$-potential of Buck. In both models, the αN potential with the exchange Majorana component was chosen, which leads to even-odd splitting of the phase shifts, which reproduces phases well with l = 0, 1, and 2.

To describe the state of the 10B nucleus, the wave function was used in the model of shells with an intermediate coupling [3] with the following components: − 0.418 [42] 13D1 + 0.679 [42] 13D2 − 0.481 [42] 13F .

The reaction matrix element is calculated based on the Glauber diffraction theory of multiple scattering. The Glauber operator takes into account all the multiplicities of collisions on α particles and a proton on the 9B nucleus and one- and two-fold collisions on the 10B nucleus. The differential cross section on the 9B nucleus was calculated with two variants of the wave function and it was shown how sensitive the cross section to the structure of the nucleus.

Differential scattering cross sections of $\pi\pm$- and K+-mesons were calculated at several energies: 135, 180, and 220 MeV. The choice of data for the energy value is related to comparing our calculations with the available calculations and experimental data on proton scattering on the same nuclei.

This work was carried out as part of the scientific project AP05132620.

1. O.Imambekov, E.T.Ibraeva, Zh.A.Toksaba // Phys. of Atom.Nucl., V.82, N3,P.1-7,(2019)

2. V.I. Kukulin et al. // Few Body Syst V.18, P.191 (1995) 3 A.N. Boyarkina // Structure of the nuclei of the 1p shell. MSU, Moscow 1973 (in rus.)

Author: IMAMBEKOV, Onlassyn (Kazakh National University named al Farabi)

Co-author: ABDRAMANOVA, Gulbanu (Kazakh National University named al-Farabi)

Presenter: IMAMBEKOV, Onlassyn (Kazakh National University named al Farabi)

Session Classification: Section 2. Experimental and theoretical studies of nuclear reactions

Track Classification: Section 2. Experimental and theoretical studies of nuclear reactions.