

ELASTIC ( $^{16}\text{O}$ p) SCATTERING  
AND THE SITENKO–GLAUBER  
APPROACH WITH CONSIDERATION  
OF INTERMEDIATE EXCITATIONS

*V. V. Pilipenko, V. I. Kuprikov*

National Science Center  
"Kharkiv Institute of Physics and Technology"  
(1, Academichna Str., Kharkiv 61108, Ukraine)

S u m m a r y

The differential cross-section and spin observables for the ( $^{16}\text{O}$ p) elastic scattering have been studied on the basis of the Sitenko–Glauber multiple diffraction scattering theory with taking account of two-nucleon correlations. In the approach used, the long-range correlations are taken into account by means of including a large number of intermediate excitations of the target nucleus into consideration, whereas the short-range correlations of the type of repulsion between nucleons are considered in a model way. To ensure a realistic description of the nuclear structure and nucleon-nucleon forces, the calculation have been performed using the Hartree – Fock proton and neutron densities calculated with various effective Skyrme forces, the nucleon-nucleon amplitudes found from phase-shift analysis solutions, and experimental data on the intermediate excitations under consideration taken from the literature. It has been shown that the two-nucleon correlations taken into account make a considerable contribution into observables at sufficiently large scattering angles. The results of calculations in the framework of the above-described approach have been compared with the results of calculations of the observables under consideration obtained earlier on the basis of the theory of multiple diffraction scattering by  $\alpha$ -clusters and of the  $\alpha$ -cluster model with dispersion which describes the  $^{16}\text{O}$  nucleus as a system of four  $\alpha$ -particles. This comparison has shown that the  $\alpha$ -cluster approach yields a better description of experimental data except for the region of large momenta transferred ( $q \geq 3 \text{ fm}^{-1}$ ) where the simple  $\alpha$ -cluster model cannot be used.