CONTRIBUTION OF HIGHER MULTIPLICITY COLLISIONS IN ELASTIC p^6He, $p^{8,9}Li$ SCATTERING IN THE FRAMEWORK OF THE DIFFRACTION THEORY

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With the formation of radioactive beams the structure of unstable isotopes has been extensively studied experimentally in inverse kinematics. The isotopes of helium and lithium are unique and very interesting example for accurate microscopic theoretical studies. The easiest doubly-magic nucleus ^4He is the core of heavier isotope ^6He, the last two neutrons of which form a halo, related to the famous ^{11}Li; ^8Li and ^9Li are supposed to have one- and two-neutron skin.

Representing the Glauber operator of multiple scattering on nucleons in the alternative form of scattering series on clusters (and nucleons), we have calculated the contribution of single-, double- and triple- collisions at the energies E = 70, 700 and 1000 MeV/nucleon to the differential cross section of protons scattering on ^6He, ^8Li and ^9Li nuclei. The three-particle wave functions of nuclei in α−n−n- (for ^6He) [1], α−t−n- (for ^8Li) [2] and α−t−2n- (for ^9Li) [3] models were used in calculation. It is shown that the differential cross section of single scattering dominates in the area of small angles, where the contribution of two- and triple collisions is less by the order and two orders of magnitude. After the first interference minimum the contribution of double scattering becomes dominant, after the second minimum triple scattering begins to dominate.

The interference minima are partially filled by the contribution of higher order collisions. The calculation in single-scattering approximation (in so-called optical limit) overestimates data at small momentum transfers and quickly drops at larger ones. Contributions of higher order collisions reduce the cross section at small momentum transfers and make contributions at larger ones that lead to a better description of experimental data.

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