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# Diffraction processes in elastic scattering of 16-O by medium nuclei

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As one of the methods for the experimental detection of the multicluster structure of atomic nuclei, the authors proposed a method for expanding the experimental angular distributions of differential cross sections for elastic diffraction scattering into multicluster components [1-2]. Within the framework of the diffraction theory and under the assumption of total absorption inside the interaction sphere, the authors obtained expansions of the total amplitudes of the angular distributions of the differential cross sections for elastic scattering of 16-O, in particular, on 28-Si at energies of 20.83 MeV [3] and 240 MeV [4].
The experimental data are described within the framework of the theory of diffraction scattering as a superposition of wave functions on an absolutely black nucleus and on its absolutely black substructures (for example, alpha clusters) [2]. Figures 1 and 2 show the fitting results. Satisfactory agreement is seen between the theoretical curves and experimental data. In Figure 1, there is a discrepancy with theory in the range of back angles from 160 to 177 degrees. This is due to the limited applicability of this model, which, within the framework of this paradigm, does not take into account other nuclear phenomena. Thus, the interaction of 16-O ion beams with 28-Si revealed clumps of nuclear matter with characteristic radii of 1 fm and 0.5 fm. The analysis of the differential cross sections for elastic scattering of 16-O already at 40-Ca by this method has shown itself to be unsatisfactory, which speaks in favor of the "dissolution" of clusters in the mean nucleon field of the nucleus.
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