THEORETICAL ANALYSIS OF INELASTIC PION-NUCLEUS SCATTERING WITHIN THE MICROSCOPIC OPTICAL POTENTIAL

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The microscopic model of optical potential (OP) [1] was adapted in [2, 3] for calculations of the pion-nucleus elastic and inelastic scattering cross sections. At present we apply this OP (its direct and transition parts) for further calculations of the $\pi^{\pm}$ + ^{28}Si, ^{58}Ni,^{40}Ca, ^{208}Pb inelastic cross sections at energies 160, 180, 230, 290 MeV with excitations of the 2^{+} and 3^{-} collective states of nuclei. In so doing we use the known nuclear density distributions and the parameters of the πN-scattering amplitudes obtained in [4] by fitting the calculated pion-nucleus elastic cross sections to the data. Thus for inelastic scattering, the only adjusted parameters were the quadrupole β_2 and octupole β_3 deformations inherent in transitions to the 2^{+} and 3^{-} excited states of nuclei. The cross sections were obtained by solving the relativistic wave equation transformed to the non-relativistic form when one obeys the high-energy condition $T>>U_{\text{opt}}$. Then the equation was computed with a help of the DWUCK4 program [5], and thus the relativistic and distortion effects in initial and final channels of the process were accounted for automatically. The calculated cross sections were found to be in a fairly well agreement with the corresponding experimental data.

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