

Microscopic Analysis of Elastic and Inelastic π -Nucleus Scattering at Energies of (3 3) Resonance

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The microscopic model of optical potential (OP) is applied for calculations of the π^\pm scattering on the nuclei ^{28}Si , ^{58}Ni , ^{40}Ca , ^{208}Pb at energies 160, 180, 230 and 291 MeV. Such OP [1] depends on the nuclear density distributions and parameters of the πN scattering amplitudes which are fitted to the pion-nucleus elastic cross sections. Also, calculations are made using the Kisslinger-type potentials [2], and they are found to be in well agreement to those obtained with a help of our OPs. Then the πN parameters are utilized for inelastic scattering with excitations of the 2+ and 3 collective states. The only adjusted parameters are the quadrupole β_2 or octupole β_3 deformations of nuclei [3]. The cross sections of elastic and inelastic scattering are calculated with help of computer code DWUCK4 [4] by solving the relativistic wave equation [5], and thus the relativistic and distortion effects in initial and final channels of the process are accounted for exactly. The calculated cross sections have been found to be in a fairly well agreement with the corresponding experimental data. The role of the nuclear in-medium effect on the πN -scattering amplitude is discussed.

References

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