Pion-Nucleus Microscopic Optical Potential at Intermediate Energies and In-Medium Effect on the Elementary πN Scattering Amplitude

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Analysis is performed of calculations of the elastic scattering differential cross sections of pions on the ^{28}Si, ^{40}Ca, ^{58}Ni and ^{208}Pb nuclei at energies from 130 to 290 MeV basing on the microscopic optical potential (OP) constructed as an optical limit of a Glauber theory. Such an OP is defined by the corresponding target nucleus density distribution function and by the elementary πN amplitude of scattering. The three (say, "in-medium") parameters of the πN scattering amplitude: total cross section, the ratio of real to imaginary part of the forward πN amplitude, and the slope parameter, were obtained by fitting them to the data on the respective pion-nucleus cross sections calculated by means of the corresponding relativistic wave equation with the above OP. A difference is discussed between the best-fit "in-medium" parameters and the "free" parameters of the πN scattering amplitudes known from the experimental data on scattering of pions on free nucleons.