α-Cluster Optical Potential Model of 40Ca

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Abstract:

Elastic scattering of α+40Ca is analyzed in the framework of the optical model. We adopted an independent α-cluster model to generate the α-cluster and matter density of 40Ca. We proposed a parametrized form for the α-cluster density and fixed its parameters according to the available experimental data about the α-particle and 40Ca nuclei. The obtained α-cluster density of 40Ca is used to generate the real part of the optical potential. The single folding procedure is used to generate this real optical potential with two different effective α–α interactions. The real calculated potential supplied with an imaginary Woods–Saxon squared potential is used to analyze 20 sets of experimental data in the energy range between 18 and 166 MeV. We found that our model is successful in reproducing the data for energies above 40 MeV and still doubtful for lower energies.

Keywords:

optical potential model - single folding model - alpha cluster and matter density of 40 Ca - Wood-Saxon squared potential

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