DISTRIBUTION OF DENSITY AND POTENTIAL OF NUCLEAR INTERACTION

V.Yu. Denisov, V.A. Nesterov

Institute for Nuclear Researches,
Nat. Acad. Sci. of Ukraine
(47, Nauky Prosp., Kyiv 03028, Ukraine;
e-mail: denisov@kinr.kiev.ua)

S u m m a r y

Interaction potentials between nuclei evaluated with the help of the Skyrme force in the frameworks of the extended Thomas—Fermi (ETF) approximation and the Hartree—Fock—BCS (HF+BCS) theory have been studied in detail. The amplitude of the nuclear part of the interaction potential between nuclei has been shown to grow as the neutron number in colliding isotopes and the parameter of density distribution diffuseness in interacting nuclei increase. The growth of the diffuseness parameter leads to the reduction of the height of the barrier between nuclei, the deepening of the capture well, and the increase of the fusion cross-section. The diffuseness of the nuclear part of the potential evaluated making use of the Skyrme forces has been demonstrated to exceed that of the nucleon density in interacting nuclei by approximately a factor of 1.5 at large internuclear distances. Reasonable values of the diffuseness parameter of the interaction between medium and heavy nuclei lie in the range $a \approx 0.75 - 0.90$ fm.