乞掲示

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題目 ： Nucleus-Nucleus Potential and Superheavy Element Production

∗ The seminar will be given in *English.*

日時 ： 2005 年 5 月 10 日 (Tue.)　15:00 –

場所 ： RIKEN Main Bldg. 2F Seminar Room

Abstract

The accurate evaluation of the potential barrier and capture well is especially important for the production of superheavy elements (SHEs) in nucleus-nucleus fusion reaction. The interaction potentials for the distances around the touching point is systematically studied in the frozen-density approximation for heavy-ion reactions leading to SHEs. The potential energy is evaluated in the Thomas-Fermi approximation extended to second-order gradient contributions. The (frozen) nucleonic densities of projectile and target nuclei are obtained from Hartree-Fock-BCS calculations for various Skyrme forces. The resulting semi-microscopic potentials (SMPs) between the nuclei for different reactions leading to SHEs are considered in detail.

The entrance-channel SMPs between the light- and medium-weight nuclei are also discussed. Unfortunately, the semi-microscopic approach is not so convenient for various practical applications due to cumbersome numerical calculations. Therefore we choose 119 spherical or near spherical nuclei along the beta-stability line from ^{16}O to ^{212}Po and evaluate the SMPs between various nuclei. Using these SMPs data we find expression for nucleus-nucleus potential.

Proton and neutron shell corrections are calculated for nuclei with proton numbers in the range $76 < Z < 400$ along the beta-stability line described by Green's approximation. The shell corrections are evaluated for Woods-Saxon nucleon mean field with spin-orbit, Coulomb and pairing interactions. Proton and neutron magic numbers are determined for ultraheavy nuclear region. Alpha-decay half-lifes and fission barriers of ultraheavy double-magic nuclei are estimated.

The critical discussion of other approach of SHE production is presented.

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