乞掲示

理化学研究所原子核グループコロキウム　*2002. 12. 16*

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題目 ： Fusion-Fission Dynamics of Heavy Nuclear Systems and Perspectives of Superheavy Element Formation

∗ The seminar will be given in *English.*

日時 ： 2002年 12月 16日 (Mon.)　14:00 –

場所 ： RIKEN Main Bldg. 1F Seminar Room

Abstract

The talk will focus on reaction dynamics of superheavy nucleus formation and decay at beam energies near the Coulomb barrier. The aim will be to review the things we have learned from recent experiments on fusion-fission reactions leading to the formation of compound nuclei with Z≥102 and from their extensive theoretical analysis.

Experimental regularities of superheavy element formation and quasi- fission processes will be briefly reviewed. Principal physics factors determining formation and survival probabilities of low-excited easily fissile heavy compound nuclei will be discussed. Main attention will be paid to the dynamics of formation of very heavy compound nuclei taking place in strong competition with the process of fast fission (quasi-fission). The choice of collective degrees of freedom playing a principal role, finding the multi- dimensional driving potential and the corresponding dynamic equation regulating the whole process are extensively discussed along with a new approach proposed to description of fusion-fission dynamics of heavy nuclear systems. For the first time a common driving potential is defined in the whole configuration space and used for simultaneous description of the whole evolution process starting from approaching of two heavy nuclei and ending in compound nucleus configuration of the system and/or in fission channels (normal and fast) with formation of fission fragments. A possibility of deriving the fission barriers of superheavy nuclei directly from analysis of experimental data on the fusion-fission cross sections and on the survival probability of those nuclei is proposed. The detailed theoretical analysis of available experimental data on the "cold" and "hot" fusion-fission reactions was performed and the corresponding cross sections of superheavy element formation were calculated up to Z_{CN}=120 as well as the mass and charge distributions of quasi-fission fragments obtained in these reactions. Perspectives of future experiments will be discussed along with additional theoretical studies in this field needed for deeper understanding of the fusion-fission processes of very heavy nuclear systems.

∗ Host researcher : K. Morita(RIKEN)

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