TASCA 23
April 25 - 27, 2023
20th Workshop on Recoil Separator for Superheavy Element Chemistry & Physics

Effect of neutron evaporations in fission process with dynamical model and mass distribution of fission fragments of Superheavy nuclei

Y. Aritomo[1], R. Yamasaki[1], S. Amano[1], S. Takagi[1], K. Nishio[2], S. Tanaka[3], M. Ohta[4]

[1]*Faculty of Science and Engineering, Kindai University, Higashiosaka, Osaka, Japan*
[2]*Advanced Science Research Center, Japan Atomic Energy Agency, Tokai, Ibaraki, Japan*
[3]*RIKEN Nishina Center for Accelerator-Based Science2-1 Hirosawa, Wako, Saitama, Japan*
[4] *Konan University, 8-9-1 Okamoto, Higashinada, Kobe, Japan*

Through joint research by the Japan Atomic Energy Agency (JAEA) [1,2] and Kindai University, it has revealed that the yield distribution of fission products (fission fragments) changes significantly depending on the neutrons emitted from the compound nucleus. This multi-chance fission (MCF) effect is particularly important to treat high energy fissions [1,3]. In this work, we have introduced the neutron evaporation during fission process in the Langevin model [4] and aimed to describe the entire reaction process in a unified manner. Fission fragment mass distribution of $^{234-240}$U, $^{236-242}$Np, and $^{238-244}$Pu were calculated in the initial excitation energy range of the excitation energy E =15-55 MeV. The results show that the double-peak structure is maintained even at the highest excitation energies and successfully reproduced the experimental data taken at the JAEA tandem facility. Moreover, recently we have developed the calculation code to investigate the mass distribution of fission fragments of Superheavy nuclei. In this talk, we present new results using the code.

References

[1] K. Hirose, K. Nishio, S. Tanaka, et al., Phys. Rev. Lett. 119, 222501 (2017)
[2] R. Leguillon, K. Nishio, K. Hirose, et al., Phys. Lett. B 761, 125 (2016)
[3] S. Tanaka, Y. Aritomo, Y. Miyamoto, et al., Phys. Rev. C 100, 064605 (2019)
[4] Y. Miyamoto, Y. Aritomo, S. Tanaka, et al., Phys. Rev. C99, 051601 (2019)