



Contribution ID: 41

Type: Poster

Mechanisms in production of evaporation residue for multinucleon transfer reactions with heavy nuclei

Tuesday, January 28, 2025 4:40 PM (1h 20m)

There is a limit to the production of neutron-rich nuclei by traditional fusion reactions. Therefore, in recent years, multi-nucleon transfer (MNT) reactions have attracted attention as a method of producing neutron-rich nuclei [1]. However, the reaction mechanism is not yet well understood due to its novelty and complexity. In the future, it will be necessary to estimate the physical quantity of evaporation residue (ER) in the production of neutron-rich isotopes in heavy and superheavy elements. In this study, we construct a dynamical model that describes the dynamics of the MNT reaction and verify the model by comparing it with experimental data to clarify the reaction mechanism.

This study aims to deal with the production of neutron-rich nuclei in heavy and superheavy elemental regions. As a first step, to clarify the reaction mechanism, we studied the angular momentum of the ER produced by MNT reaction and the emission angle of projectile-like nuclei. In the region of heavy and superheavy nuclei, it is known that the fission process of ERs depends on their angular momentum, and information about angular momentum is important to know the survival probability of the ER [2]. The emission angles of projectile-like nuclei are also experimentally observable data, which are necessary for angular momentum prediction. There is a correlation between angular momentum and the emission angle of projectile-like nuclei.

Our theoretical model is based on the two-center shell model to describe the configuration of nuclei [3]. The time evolution of the configuration is described by the multidimensional Langevin equation [4]. In this presentation, we show the dynamics of the MNT reaction using parameters fitted with preliminary experimental data. We will discuss the factors we need to know about in future reactions between heavy nuclei. The effect of the angular momentum of ERs on the following fission process is also discussed.

References

- [1] V. Zagrebaev, *et al.*, Phys Rev C **73**, (2006) 031602.
- [2] S. Tanaka, *et al.*, Phys. Rev. C **105**, (2022) L021602.
- [3] J. Maruhn and W. Greiner, Z. Phys **251**, (1972) 431.
- [4] V. Zagrebaev and W. Greiner, J. Phys. G **34**, (2007) 2265-2277.

Primary author: NAKAJIMA, Kohta (Kindai Univ.)

Co-author: ARITOMO, Yoshihiro (Kindai University)

Presenter: NAKAJIMA, Kohta (Kindai Univ.)

Session Classification: Poster Presentation