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Angular momentum distribution and mechanisms of evaporation residue produced in multi-nucleon transfer reaction/多核子移行反応で生成した蒸発残留核の角運動量分布とメカニズムの解明

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Recently, 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 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.

As a first step, to clarify the reaction mechanism, the angular momentum of the evaporation residue (ER) produced by MNT reaction and the emission angle of projectile-like nuclei were investigated. It is known that the fission process of ERs depends on their angular momentum, and the information of 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 is necessary information for angular momentum prediction. There is a correlation between angular momentum and the emission angle of projectile-like nuclei. The present study aims to deal with the production of neutron-rich nuclei in the heavy and superheavy elemental regions. In this work, MNT reaction in the ^{86}Kr + ^{166}Er system is calculated. The collision angles were then taken into account along with the deformed target nuclei.

The theoretical model we use 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 effect of the collision angle in the case of a deformed target nuclei and discuss its influence on the reaction mechanism. The effect of the angular momentum of ERs on the following fission process is also discussed.

References

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