Contribution ID: **29** Type: **not specified**

Description of inclusive (d,d'x) reaction with the semiclassical distorted wave model

Tuesday 13 June 2023 12:00 (20 minutes)

Deuteron is expected to be an effective particle for nuclear transmutation. One of the key nuclear reactions to be studied is the inclusive $(d, d'x)$ reaction, in which only the energy and angle of the emitted deuteron are specified. In general, the description of the inclusive reaction is very difficult because of the vast number of nuclear states involved. Although phenomenological calculations can be performed using the exciton model [1] or its improved model [2], these models cannot incorporate the effect of the changes in the kinematics of incident particle due to the distortion by the target nucleus.
In this study, the double differential cross section (DDX) of the inclusive $(d, d'x)$ reaction is described with the semiclassical distorted wave model (SCDW) [3-6], which contains no free adjustable parameters. SCDW achieves a description of the inclusive reaction, by representing the nuclear response in a simple local Fermi gas model. As a remarkable feature, SCDW can incorporate the effect of the refraction of the incoming and outgoing particles caused by the nuclear distortion.
In this presentation, we will explain the description of the $(d, d'x)$ reaction with SCDW and clarify the importance of the refraction effect for reproducing DDX data of the $(d, d'x)$ reaction.
[1] J. J. Griffin, Phys. Rev. Lett. **17** (1966) 478.
[2] C. Kalbach, Phys. Rev. C **32**, 1157 (1985).
[3] Y. L. Luo and M. Kawai, Phys. Rev. C **43**, 2367 (1991).
[4] Y. Watanabe *et al.*, Phys. Rev. C **59**, 2136 (1999).
[5] K. Ogata *et al.*, Phys. Rev. C **60**, 054605 (1999).
[6] S. Weili *et al.*, Phys. Rev. C **60**, 064605 (1999).

Authors: Mr NAKADA, Hibiki (RCNP); Dr YOSHIDA, Kazuki (JAEA); Prof. OGATA, Kazuyuki (Kyushu Univ./ RCNP)

Presenter: Mr NAKADA, Hibiki (RCNP)

Session Classification: Deuteron and nucleon induced reactions

Track Classification: Nuclear reactions: Nucleons and light ions