

Double-Differential Cross Section of ^5He Emission

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Abstract: The probability of ^5He particle emission has been affirmed theoretically [J.S. Zhang, Science in China G47 (2004) 137]. In order to describe the ^5He emission, the theoretical formula of the double-differential cross section of emitted ^5He is to be established. Based on the pick-up mechanism, used for calculating the formula of d, t, ^3He , α emissions, the theoretical formula of double-differential cross section of ^5He is obtained, which is expressed in the form of Legendre coefficients. In the case of low incident energies, the configuration [J.S. Zhang, Science in China G47 (2004) 137; J.S. Zhang, Commun. Theor. Phys. (Beijing, China) 39 (2003) 83] is the dominant part in the reaction processes. The calculated result indicates that the forward peaked angular distribution of the composite particle emission is weaker than that of the emitted single nucleon due to pick-up nucleon from the Fermi sea. As an example, the reactions of $n+^{14}\text{N}$ have been calculated, and the Legendre coefficients of d, t, ^3He , α , ^5He emissions are obtained respectively. The results show that the forward tendency is decided by the average momentum per nucleon in the emitted composite particles. The larger the average momentum is, the stronger the forward tendency is.

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Key words: double-differential cross section, composite particle emission, nuclear reaction

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