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Application of Nuclear Structure Theories to Nuclear Data Evaluation/核構造理論の核データへの応用

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Reliable nuclear data are essential for both basic research and practical applications in nuclear science and technology. Recent advances in microscopic nuclear reaction theories have enabled a more unified and consistent description of nuclear structure and reaction dynamics. In this work, we present applications of such theoretical frameworks to nuclear data evaluation. In particular, we focus on the use of the subtracted second random-phase approximation (SSRPA) and pre-equilibrium reaction models to describe particle-emission spectra and transition strengths in compound and pre-equilibrium processes [1,2]. These approaches allow a microscopic treatment of two-particle–two-hole configurations and two-body external fields, providing deeper insight into complex nuclear responses.
Furthermore, we introduce recent developments in the study of the antisymmetric spin–orbit components of three-nucleon forces and their impact on nuclear structure [3]. This approach offers a path toward more accurate and physically grounded nuclear data evaluations. Prospects for incorporating such microscopic insights into next-generation evaluated nuclear data libraries will also be discussed.

References
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