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# Density functional approaches to nuclear response and reaction/密度汎関数計算による原子核応答・反応計算へのアプローチ

*Wednesday, 19 November 2025 15:30 (40 minutes)*

It is not trivial to quantitatively reproduce nuclear saturation, the most fundamental property of atomic nuclei, which is often discussed together with the necessity of three-body forces. The density functional theory is known to reproduce the saturation property and gives quantitative descriptions from light to heavy nuclei with a single universal energy density functional. For instance, it is able to provide quantitative descriptions of physical quantities of the ground states, such as mass and charge radius. The nuclear masses are reproduced with mean errors below 3 MeV. Methods based on time-dependent density functional theory are adequate for describing excited states. Using the linear responses around the ground state, information about excited states can be obtained. Furthermore, it can be applied to the microscopic derivation of the collective Hamiltonian. Extending these methods enables applications to nuclear reactions, which leads to calculations of transition densities for direct reactions and the microscopic derivation of low-energy nuclear reaction models.

This presentation briefly reviews recent developments in nuclear density functional theory and introduces approaches and computational results concerning nuclear structure and reactions.

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