Contribution ID : 27 Type : Poster presentation

Nuclear structure study using a hybrid approach of shell model and Gogny-type density functionals

Tuesday, 24 September 2024 17:30 (120)

The Gogny-type density functionals have finite-range and density-dependent terms. The parameters of the functionals are designed not only to reproduce the basic properties of finite nuclei but also to satisfy the saturation properties of nuclear matter. Consequently, calculations using a single density functionals can describe experimental data in various mass regions. However, the mean-field calculations using the functionals miss some corrections. In contrast, there are semi-empirical methods that construct a shell-model Hamiltonian by fitting experimental values. The shell-model (configuration interaction) calculations can take into account correlations beyond mean fields, but we have to determine the model space and then fit the effective interactions with experimental results.
In this study, a hybrid approach is attempted by applying a method using the Gogny-type density functionals to shell-model calculations. The resultant density-dependent interaction of the shell-model Hamiltonian is self-consistently determined. The goal of the present study is to extend a previous application to the sd-shell region to heavier regions.
In this presentation, we will present results for the pf-shell nuclei in comparison with the experimental results. In particular, we will focus on the calculation with the isospin-dependent tensor force, and show that the isospin dependence is necessary to describe characteristics in neutron-rich nuclei.

Primary author(s) : YOSHINAGA, Kota (Unversity of Tsukuba)

Co-author(s) : SHIMIZU, Noritaka (Center for Computational Sciences, University of Tsukuba); NAKATSUKASA, Takashi (University of Tsukuba)

Presenter(s) : YOSHINAGA, Kota (Unversity of Tsukuba)

Session Classification : Poster session