Contribution ID: **417** Type: **Plenary talk (30 min + 10 min questions)**

EFFECTIVE INTERACTIONS AND EFFECTIVE OPERATORS FROM THE NO-CORE SHELL MODEL

Thursday, 14 July 2022 12:00 (30 minutes)

The nuclear shell model is one of the oldest microscopic approaches to nuclear structure at low energies [1,2]. The basic idea of the method is to solve the many-body Schrodinger equation by diagonalizing the Hamiltonian, containing nucleon kinetic energies and internucleon interactions, in the many-body harmonic-oscillator basis. Because of the rapid increase of the model space with the number of nucleons, only for very light nuclei this problem can be solved exactly, starting from realistic nucleon-nucleon interactions. Such an approach is called the No-Core Shell Model (NCSM) [3]. For heavier nuclei, truncations have to be made and the eigenproblem is typically solved for valence nucleons moving in a model space comprised of one oscillator shell beyond a closed-shell core. Thus, effective interactions and effective operators must be exploited.
With well-adjusted phenomenological effective interactions, the shell model represents a powerful approach in nuclear structure [4], capable of providing very detailed information on nuclear spectra, static properties and transition rates. Derivation of microscopic effective valence-space interactions and effective electroweak operators is still a challenge.
In the present contribution we present new microscopic effective interactions for the traditional shell model derived from the NCSM [5,6]. This is done by application of Okubo-Lee-Suzuki transformation to the NCSM results. We will explain the formalism and demonstrate theoretical spectra for the sd shell nuclei in comparison with the phenomenological description and with experiment. Finally, we will present newly constructed electric quadrupole and magnetic dipole operators and show the agreement of valence-space calculations with the NCSM results.

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The speaker is a student or young scientist

No

Section

1. Nuclear structure: theory and experiment

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