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Spin Tensor Decomposition: A tool to develop an effective shell model interaction

Spin-tensor decomposition (STD) is a useful tool to retrieve the basic two-body structure (central, spin-orbit and tensor force) of model-space dependent shell model effective interactions [1]. For last one and half decades, it has been used with the aim to understand the contribution of central, spin-orbit and tensor force to the angular momentum average two-body component called monopole component $\bar{V}$, and their effect in the shell evolution in neutron-rich nuclei [2.3]. With a new approach, STD can also be used as an impactful method to develop a reliable effective interaction. For example, for CK(8-16) interaction of p-shell [4], we observe that the π-ν central and tensor $\bar{V}$ do not follow the characteristic properties of central and tensor force [5]. This unusual feature in these forces is being corrected by evaluating their matrix elements with parameterized spin-dependent surface delta force and isospin dependent tensor force, respectively. The new CK(8-16) interaction, therefore, is expected to possess characterizing properties of its components, and to well predict the shell evolution for ^{8}He and ^{9}Li. As a further extension, STD is proposed to correct other effective interactions, *e.g.*, jj44b interaction, and to develop reliable effective interactions for the heavy mass region where they are required at high priority to understand the shell evolution. The results of the calculations will be presented during the conference.

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Primary authors: Mr KUMAR, Pawan (Indian Institute of Technology Ropar, Punjab-140001, India); Mr SARKAR, Shahariar (Indian Institute of Technology Ropar, Punjab-140001, India); Prof. RAINA, P. K. (Indian Institute of Technology Ropar, Punjab-140001, India); Dr SINGH, Pushpendra P. (Indian Institute of Technology Ropar, Punjab-140001, India)

Presenter: Mr KUMAR, Pawan (Indian Institute of Technology Ropar, Punjab-140001, India)

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