Overview & Summary

- Consistent many-body approach for light nuclei. Single-particle basis using two Gaussians allows description of nuclei with shell model, clustering and halo structures.
- Same effective NN interaction derived from realistic interaction by inclusion of short-ranged central and tensor correlations used for all nuclei.
- Duality and angular momentum projection is done to restore symmetries of the Hamiltonian. Projection effects can be large, especially for halo and exotic nuclei.
- Residual after Projection is implemented by calculating intrinsic configurations under constraints on collective degrees of freedom.
- Multiconfiguration calculations with state of intrinsic configurations give an improved description of the ground-state and excited states.
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- In nuclei with neutron halo a zero-point vibration of the core against the halo neutrons is found to be essential.
- Detailed studies for exotic and non-exotic nuclei in the p- and n-shell are on the way.