

Abstract Submitted
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Effective Shell-Model Interactions from the Valence Cluster Expansion A.F. LISETSKIY, M.K.G. KRUSE, B.R. BARRETT¹, U. Arizona, P. NAVRATIL², LLNL, I. STETCU³, LANL, J.P. VARY⁴, Iowa State U. — The *ab initio* No-Core Shell Model (NCSM) has had considerable success in describing the binding energies, excitation spectra and other physical properties of light nuclei, $A \leq 12$ *e.g.* [1]. However, it becomes rather challenging to produce converged results for nuclei with $A > 12$. Following the idea of Ref. [2], we develop a valence cluster expansion to construct effective 2- and 3-body Hamiltonians for the $0p$ -shell by performing $12\hbar\Omega$ NCSM calculations for $A = 6$ and 7 nuclei and explicitly projecting the many-body Hamiltonians onto the $0\hbar\Omega$ space. We separate these effective Hamiltonians into 0-, 1- and 2-body contributions (also 3-body for $A = 7$) and analyze the systematic behavior of these different parts as a function of the mass number A and size of the NCSM basis space. The role of effective 3- and higher-body interactions for $A > 6$ will be discussed. [1] P. Navratil, J.P.Vary, B.R.Barrett, *Phys. Rev. C.* **62**, 054311 (2000). [2] P. Navratil, M. Thoresen, and B. R. Barrett, *Phys. Rev. C.* **55**, R573 (1997).

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