

SYMPLECTIC NO-CORE CONFIGURATION INTERACTION FRAMEWORK FOR *AB INITIO* NUCLEAR STRUCTURE

Anna E. McCOY*, Mark A. CAPRIO†, Tomáš DYTRYCH‡

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Abstract

We introduce a symplectic no-core configuration interaction (SpNCCI) framework for *ab initio* nuclear structure calculations, in a correlated many-body basis which encodes an approximate $\text{Sp}(3, \mathbb{R})$ symmetry of the nucleus. Such a scheme potentially provides a means of restricting the many-body space to include only those highly-excited configurations which dominantly contribute to the nuclear wave function. We examine the symplectic symmetry structure arising in an illustrative *ab initio* SpNCCI calculation for ${}^6\text{Li}$. We observe both the dominance of symplectic symmetry in individual wave functions and the emergence of families of states related by symplectic symmetry.

Keywords: *Ab initio* nuclear theory, symplectic group $[\text{Sp}(3, \mathbb{R})]$, no-core configuration interaction (NCCI).

*Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556-5670, USA; TRIUMF, Vancouver, British Columbia, V6T 2A3, Canada

†Department of Physics, University of Notre Dame, Notre Dame, Indiana 46556-5670, USA

‡Nuclear Physics Institute, Academy of Sciences of the Czech Republic, 250 68 Řež, Czech Republic