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Symplectic no-core configuration interaction framework for *ab initio* nuclear structure. I. Convergence behavior in p-shell nuclei[1]

ANNA E MCCOY, MARK A CAPRIO, Univ of Notre Dame, TOMAS DYTRYCH, Academy of Sciences of the Czech Republic — A major challenge in quantitatively predicting nuclear structure *ab initio*, directly from realistic nucleon-nucleon interactions, arises due to an explosion in the dimension of the traditional configuration interaction basis as the number of nucleons and included shells increases. The need for including highly excited configurations exists, in large part, because the kinetic energy induces strong coupling across shells. However, the kinetic energy conserves symplectic symmetry. Combining symplectic symmetry with the no-core configuration interaction (NCCI) framework provides a means of identifying and restricting the basis to include only the highly excited configurations which dominantly contribute to the nuclear wavefunction, thereby reducing the size of basis necessary to obtain accurate results. We present a framework for *ab initio* symplectic no-core configuration interaction (SpNCCI) calculations of the nuclear problem and explore convergence behavior of calculations of p-shell nuclei in this framework.

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