Ab initio results for intermediate-mass, open-shell nuclei\textsuperscript{1}

ROBERT B. BAKER, Louisiana State University, TOMAS DYTRYCH, Louisiana State University and Nuclear Physics Institute, Czech Republic, KRISTINA D. LAUNEY, JERRY P. DRAAYER, Louisiana State University — A theoretical understanding of nuclei in the intermediate-mass region is vital to astrophysical models, especially for nucleosynthesis. Here, we employ the \textit{ab initio} symmetry-adapted no-core shell model (SA-NCSM) in an effort to push first-principle calculations across the \textit{sd}-shell region. The \textit{ab initio} SA-NCSM’s advantages come from its ability to control the growth of model spaces by including only physically relevant subspaces, which allows us to explore ultra-large model spaces beyond the reach of other methods. We report on calculations for $^{19}\text{Ne}$ and $^{20}\text{Ne}$ up through 13 harmonic oscillator shells using realistic interactions and discuss the underlying structure as well as implications for various astrophysical reactions.

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