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Excited state energies in the shell model Monte Carlo approach¹

MARCO BONETT-MATIZ, CHRIS GILBRETH, YORAM ALHASSID, Yale University — The configuration-interaction shell model approach has been successful in describing the spectroscopic properties of nuclei. However, its application to medium-mass and heavy nuclei has been hampered by the combinatorial increase of the dimension of the many-particle model space as a function of the number of valence orbitals and the number of valence nucleons. The shell model Monte Carlo (SMMC) method is a powerful technique for calculating the ground state and thermal properties of nuclei in model spaces that are many orders of magnitude larger than those that can be treated by direct diagonalization methods [1,2]. However, it is generally difficult to access specific energy levels in SMMC. We are investigating a method within the SMMC approach to extract the excitation energy of certain states. We discuss preliminary applications of the method.

[1] Y. Alhassid, A. Mukherjee, H. Nakada and C. Özen, *Journal of Physics: Conference Series* **403**, 012012 (2012).

[2] Y. Alhassid, M. Bonett-Matiz, S. Liu, and H. Nakada, arXiv:1304.7258.

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