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Shifted-contour Shell Model Monte Carlo Application to fp Shell Nuclei GERGANA STOITCHEVA, DAVID DEAN, ORNL — The formalism of the auxiliary-field Monte Carlo method as applied to the nuclear shell-model is one of the most powerful approaches for nuclear structure studies. The method is based on a representation of the imaginary-time many-body propagator as a superposition of one-body propagators describing non-interactive fermions moving in auxiliary fields. It allows exact calculations in spaces far larger than those accessible for conventional methods. However, the applicability of the shell model Monte Carlo method has been limited by the sign problem associated with the Monte Carlo weight function when using realistic two-body interactions. We propose a new approach for alleviating the sign problem. We show that this method, which is based on using mean-field, yield significant improvement and delay of the sign problem. Based on that, we study thermal properties of nuclei using realistic interactions in fp-shell, including ^{54}Fe.

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