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ABSTRACT

Magnetic dipole gamma--ray strength functions in heavy odd-mass nuclei from shell-model Monte Carlo

D. DeMartini

Yale University

The gamma--ray strength functions (gSF) reveal information about collective phenomena in atomic nuclei and are necessary inputs for calculations of astrophysical neutron capture cross sections. We have computed the magnetic dipole gSFs for the odd-mass isotopes $^{143\text{-}151}$Nd and $^{147\text{-}153}$Sm using a combination of the shell-model Monte Carlo method, static path approximation, and maximum-entropy method. We quantify the uncertainties of the computed gSFs and find that they are well under control despite the existence of a Monte Carlo sign problem for the odd-mass nuclei at low temperatures. We find a low-energy enhancement in the magnetic dipole gSFs, which was also recently observed experimentally in the total gSFs of these nuclei.

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