Abstract Submitted
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Microscopic Calculations of Nuclear Level Densities with the Extrapolated Lanczos Method[1] WILLIAM ORMAND, Lawrence Livermore National Laboratory, ALEX BROWN, Michigan State University — A new method for computing the density of states in nuclei making use of an extrapolated form of the tri-diagonal matrix obtained from the Lanczos method is presented. It will be shown that the global, average properties of the entire Lanczos matrix can be predicted from just four Lanczos iterations. The extrapolated Lanczos matrix (ELM) approach provides for an accurate computation of the density of states described within the configuration space. In many cases, this is sufficient to accurately calculate the density of states at, or near, the neutron separation energy, which is the region needed for Hauser-Feshbach calculations of radiative capture reactions. We will outline a procedure to analytically continue the extrapolated Lanczos matrix to the ground-state region. Validation with exact shell-model calculations will be shown and applications of the method will be demonstrated for ^{57}Fe and ^{76}Ge where comparison with experiment will be shown. We also demonstrate the J-dependence of the level density with the method and outline a procedure to extract the spin cutoff parameter.

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