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Shell Model Nuclear Level Densities using the Methods of Statistical Spectroscopy[1] SOFIA KARAMPAGIA, National Superconducting Cyclotron Laboratory, MSU, ROMAN SEN'KOV, Department of Natural Sciences, LaGuardia Community College, CUNY, VLADIMIR ZELEVINSKY, ALEX B. BROWN, Department of Physics and Astronomy and National Superconducting Cyclotron Laboratory, MSU — An algorithm has been developed[1] for the calculation of spin- and parity-dependent nuclear level densities, based on a two-body shell-model Hamiltonian. Instead of diagonalizing the full shell-model Hamiltonian, the algorithm uses methods of statistical spectroscopy in order to derive nuclear level densities. This method allows one to calculate the exact level densities (coinciding with the shell model densities) very fast and for model spaces that the shell model cannot reach. In this work we study the evolution of the level density under variation of specific matrix elements of the shell-model Hamiltonian. We also study the impact on the calculated level density as a result the expansion of single-particle model space. As an application of the method, whenever it is possible and experimental information exists, we make a comparison of the nuclear level densities calculated within our method with experimental level densities.
R. A. Sen'kov, M. Horoi, V. G. Zelevinsky, A high-performance Fortran code to calculate spin- and parity-dependent nuclear level densities, *Com. Phys. Comm.* **184 (2013) 215.**

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