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High-Performance Algorithm for Calculating Non-Spurious Nuclear Level Densities ROMAN SENKOV, MIHAI HOROI, JAGJEET KAUR, Central Michigan University, VLADIMIR ZELEVINSKY, Michigan State University — A new high-performance algorithm was recently proposed for calculating spin- and parity-dependent shell model nuclear level densities using methods of statistical spectroscopy in the proton-neutron formalism. When used in valence spaces that cover more than one major harmonic oscillator shell, this algorithm mixes the genuine intrinsic states with spurious center-of-mass excitations. We construct an advanced algorithm based on the method of statistical moments that eliminates the spurious states. Results for states of unnatural parity in several *sd*-shell nuclei are presented and compared with exact shell model calculations and experimental data. The new algorithm is applied to calculation of reaction rates for nuclei on the *rp*-process path.

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