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Improving Nuclear Level Densities within the combinatorial and QRPA plus boson expansion method

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The determination of the nuclear level densities is of particular importance in a large number of nuclear applications. Most of existing theoretical estimates of nuclear level densities rely on empirical or phenomenological models essentially fitted to experimental data. Although such adjustments respond to the high accuracy needs of some nuclear applications, their predictive power remains poor due to the large number of free parameters and often non-physical approximations considered. Nowadays microscopic models can provide nuclear level densities with a degree of accuracy comparable with the best phenomenological models. In the present contribution, we propose to estimate nuclear level densities on the basis of two distinct sound and reliable models, namely the combinatorial model and the QRPA plus Boson Expansion model. Both models make use of nuclear ingredients estimated within the non-relativistic Hartree-Fock-Bogolyubov model (HFB), the first one is based on triaxial-deformed HFB model with the Skyrme effective interaction and the second one on the axially deformed HFB+QRPA approach with the Gogny effective interaction.

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