

1st RCM on Updating and Improving Nuclear Level Densities for Applications

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Microscopic investigation on the nuclear level densities of medium and heavy nuclei with shell model

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Abstract: Nuclear level densities (NLD) are fundamental input parameters in nuclear reaction cross-section calculations and evaluations. Those for medium and heavy nuclei are significant to nuclear energy and non-energy applications. At present, investigations on NLD are mostly performed through empirical formulas. Many important properties are based on simple assumptions like parity and angular momentum distribution. This talk will introduce how to use the configuration-interaction shell model (CISM) to evaluate the NLD. I will introduce a unified nucleon-nucleon interaction for medium and heavy nuclei and a truncation method, which are crucial for NLD investigations with CISM. The model is tested specifically in two nuclear regions, around $A=100$ and 150 , by comparison with standard databases. The spin and parity distributions will be analyzed to give a microscopic view. The contribution of different interaction components, such as central, spin-orbit, and tensor parts, will be derived to understand the underlying physics deeply. The cluster-related level-density problem will also be expected using the spectroscopic factors of one-, two-, three-, and four-nucleon.

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Session Classification: Theory (45' talks, 15' coffee)