# HEAT CAPACITY OF THE TIN NEUTRON-RICH ISOTOPES, INCLUDING QUANTAL AND STATISTICAL FLUCTUATIONS

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Properties of the nuclei at extreme conditions are important in various astrophysical scenarios such as in late stage of a supernova collapse and explosion. During this phenomenon, neutron-rich hot heavy nuclei can be produced. So, the study of properties of these exotic nuclei is essential for understanding processes in nuclear astrophysics. The fact that these nuclei present an important N/Z ratio induces a fundamental change either in the nuclear density or in the effective interactions. At finite temperature, very limited information exists on nuclear level density and thermodynamic properties particularly for such nuclei.

So, one proposes in this present paper to study the phenomenon of pairing phase transition, by studying the heat capacity, in the case of Sn neutron-rich isotopes such as $66 \leq N \leq 79$ (even-even and even-odd systems). Theoretically, we use the modified Lipkin-Nogami method (MLN) [1] to eliminate the quantal and statistical fluctuations inherent in the FTBCS approach [2].

The obtained results are compared to the conventional FTBCS results and to the MBCS [1] predictions as well as to the experimental data when available [3], after deducting the heat capacity within the framework of the canonical ensemble from the experimental level density [4]. The inclusion of quantal and statistical fluctuations induces S-shape in the heat capacity curves, which is in a good agreement with experimental data.

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