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Temperature effect on nuclear statistical quantities in the isovector plus isoscalar neutron-proton pairing case.

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Due to fast progress in Radioactive Ion Beam programs, the study of neutron-proton (n-p) pairing effects has known a renewal of interest during the last decade (cf. e.g. [1-3]).

N-p pairing effects may exist in two forms: the isovector ($T=1$) and the isoscalar ($T=0$) pairing, where T is the isospin quantum number.

On the other hand, the study of the temperature effect on pairing correlations at finite temperature have been the subject of many efforts since the sixties and is still a relevant subject [3- 5].

In the present work, expressions of the various statistical quantities, i. e. , the energy, the entropy and the heat capacity are established using a path integral approach in the $T=1$ plus $T=0$ n-p pairing case [6]. A numerical study is then performed using the schematic one level model.

It's shown that the inclusion of the isoscalar pairing in addition to the isovector one leads to a lowering of the energy as well as a change of the shapes of energy, entropy and heat capacity curves as a function of the temperature.

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