Tensor correlations in nuclear matter and finite nuclei

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The Landau parameters of Skyrme interactions in the spin and spin-isospin channels are studied by using various Skyrme effective interactions with and without tensor correlations. The role of the tensor terms is examined on the stability conditions of the spin and spin-isospin modes in nuclear matter above saturation densities. We point out that the spin and/or the spin-isospin instabilities are realized in the nuclear matter at the critical density of about 2 times more than the saturation density for all the adopted parameter sets. The critical density is shown very much depending not only on the choice of the Skyrme parameter set, but also on the inclusion of the tensor terms[1]. We present a thorough analysis of the effects of the tensor interaction on the multipole response of magic nuclei, using the fully self-consistent Random Phase Approximation (RPA) model with Skyrme interactions. We disentangle the modifications to the static mean field induced by the tensor terms, and the specific features of the residual particle-hole (p-h) tensor interaction, for quadrupole (2^+), octupole (3^-), and also magnetic dipole (1^+) responses. It is pointed out that the tensor force has a larger effect on the magnetic dipole states than on the natural parity states 2^+ and 3^-, especially at the mean field level. Perspectives for a better assessment of the tensor force parameters are eventually discussed[2,3].

References

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