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Time - Odd Mean Fields in Covariant Density Functional Theory

ANATOLI AFANASJEV, Mississippi State University — The role of the time-odd mean fields, their evidence in experiment, and an accurate description of these fields are subjects of current interest. In the covariant density functional theory they are related to nuclear magnetism: time-odd mean fields arise from the space-like parts of the vector mesons and Lorentz invariance requires that their coupling strength is identical to that of the time-like parts. The role of time-odd fields and their impact on physical observables will be presented. It will be shown that these fields modify the moments of inertia, effective alignments, alignment gains at the band crossings and other physical observables in rotating nuclei. In particular, the question whether the time-odd mean fields are related to the isoscalar proton-neutron pairing will be discussed. The time-odd mean fields also reveal themselves in non-rotating odd and odd-odd nuclei (nuclei with broken time-reversal symmetry). Their impact on the binding energies, odd -even mass differences, the structure of such nuclei along the neutron and proton-drip lines will be discussed. Magnetic properties of deformed nuclei and the impact of time-odd mean fields on such properties, the study of which is in progress, will be covered. Whenever it is possible, the results will be compared with the ones obtained in the nonrelativistic Skyrme density functionals.

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