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Updates on the relativistic nuclear field theory: refining dynamical kernels of the nuclear response

Content

I will present selected results on nuclear giant and pygmy resonances at zero and finite temperatures based on the recent advancements of the nuclear many-body theory [1-6]. The theory will be compactly introduced in the most general quantum field theory formalism with only the bare fermionic interaction input. A special focus will be placed on the emergent scale of the quasiparticle-vibration coupling (qPVC) with the order parameter associated with the qPVC vertex and an efficient treatment of the nuclear many-body problem organized around the qPVC hierarchy [1-3].

Self-consistent solutions of the relativistic Bethe-Salpeter-Dyson equation for the nuclear response function in medium-heavy nuclei will be presented and discussed. Low-multipole neutral and charge-exchange resonances in calcium, nickel, and tin mass regions will be analyzed in the context of the role of high-complexity configurations in reproducing spectral data [2,3,7]. Finite-temperature theory and implementations for astrophysically relevant low-energy dipole strength, beta decay rates, and electron capture rates will be overviewed in light of the temperature dependence of the nuclear spectral properties [4,5].

References

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Primary author: Prof. LITVINOVA, Elena (Western Michigan University)

Presenter: Prof. LITVINOVA, Elena (Western Michigan University)

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