



Nuclear Theory

Quasiparticle light elements and quantum condensates in nuclear matter

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Nuclei in dense matter are influenced by the medium. In the cluster mean field approximation, an effective Schrödinger equation for the A -particle cluster is obtained accounting for the effects of the surrounding medium, such as self-energy and Pauli blocking. Similar to the single-baryon states (free neutrons and protons), the light elements ($2 \leq A \leq 4$, internal quantum state ν) are treated as quasiparticles with energies $E_{\{A,\nu\}}(P; T, n_n, n_p)$ that depend on the center of mass momentum \vec{P} , the temperature T , and the total densities n_n, n_p of neutrons and protons, respectively. We consider the composition and thermodynamic properties of nuclear matter at low densities. At low temperatures, quartetting is expected to occur. Consequences for different physical properties of nuclear matter and finite nuclei are discussed.

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