SEMINAIRE DE LA DIVISION DE RECHERCHE

The nuclear matter equation of state in astrophysics and heavy ion collisions: Cluster formation and quantum condensates at subsaturation densities.

The nuclear matter equation of state in the temperature range T < 30 MeV and the baryon density range < 10^14.2 g/cm^3 became of high interest in astrophysics (supernova explosions, crust of neutron stars). Experimentally, nuclear matter is explored in heavy ion collisions. It is an important example for strongly interacting quantum systems featuring many-body effects.

The formation of few-body correlations, in particular bound clusters, will be considered. The medium modification of the clusters is described by self-energy and Pauli blocking effects. Due to the shift of in-medium binding energies, bound states will merge with the continuum of scattering states at increasing density and are dissolved (Mott effect). Results for the Mott effect for different nuclei embedded in nuclear matter are given. An interesting effect is the formation of a two-nucleon quantum condensate, showing the crossover from Cooper pairing to Bose-Einstein condensation. Correlations in the condensate such as quartetting is a new issue.

The resulting thermodynamic properties, incorporating the Mott effect, are of interest for heavy-ion collisions and astrophysical applications. Thermodynamic and transport properties are influenced by the formation and dissolution of bound states. Calculations of the composition for supernova explosions are shown. An interesting quantity is the symmetry energy. The Mott effect is also of relevance for the structure of finite nuclei, especially dilute excited states like the Hoyle state of ^{12}C.

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16H - IPN, Amphi Joliot-Curie (Bât. 100)
Café / Thé à partir de 15h45