STEFANO
BURRELLO

TOWARDS A UNIFIED EQUATION OF STATE FOR ASTROPHYSICAL SIMULATIONS

The modelization of compact stellar objects requires to investigate the behavior of dense nuclear matter in a wide range of its phase diagram, thus extracting its Equation of State (EoS) which plays a key role in many astrophysical simulations. Tight links also exist between the properties of the EoS and those of finite nuclei, concerning both their structure and reaction dynamics. However, a multi-purposes EoS to be employed either in the astrophysical context or to describe nuclear processes is still far from being identified. Phenomenological models, based on Energy Density Functional theory and making use of effective interactions, offer a convenient approach to the EoS problem. Indeed, these models provide a reliable description of many-body correlations and clustering phenomena, which are of crucial importance for a realistic modelization of the EoS. The aim of the Seminar is to review recent developments proposed to embed these features within a unified scheme, which still represents a challenge from the theoretical point of view. The general purpose is to provide a global EoS to be applied for the widest scope of astrophysical simulations, in light of the recent multi-messenger constraints coming from LIGO and VIRGO collaboration and in view of the forthcoming observations expected from the Einstein telescope, while accounting for the information coming from nuclear physics esperiments as well.

ESPRESSO SEMINARS

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