

An empirical Equation of State for nuclear physics and astrophysics

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In order to describe astrophysical phenomena such as glitches, X-ray bursts or oscillations in neutron stars, it is essential to understand the properties of its crust and core as well as their interface. In order to achieve this, it is crucial to develop a unified and consistent scheme to describe both the finite nuclei in the crust and homogeneous matter in the core within the same framework. We employ a recently developed metamodel, based on the density functional theory, in which the Equation-of-State (EoS) of homogeneous matter is described in terms of empirical parameters measured in nuclear experiments. The metamodel is extended to describe non-homogeneous matter in the crust and tested against nuclear observables. This empirical EoS is then employed to study the liquid-phase phase transition that determines the crust-core interface of neutron stars.

Summary

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