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Strongly Interacting Matter at Extreme Conditions—the Role of Symmetry Energy in Nuclear Physics and Astrophysics

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Message from the Guest Editors

Dear Colleagues,

Good knowledge of the equations of state (EoS) in nuclear physics is extremely important for understanding the nuclear force and related structures, as well as for astrophysics. In this context, modeling the properties of nuclear matter to find a universal density functional, which is in agreement with the most current observational data, is a major objective. For this purpose, it is known that symmetry energy plays a fundamental role. A better knowledge of this quantity is in order for both scenarios, namely, by using its definition as (i) given by the difference between the energy of pure neutron matter and the energy of symmetric matter or (ii) given by the second derivative of the energy per particle at zero isospin asymmetry. This Special Issue aims to reveal various aspects of EoS provided by relativistic and non-relativistic hadronic models, as well as QCD phenomenological ones applied to describe strongly interacting matter in extreme conditions of temperature and/or density such as neutron stars, hybrid, and quark stars, i.e., systems in which the symmetry energy is a key quantity.

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Message from the Editor-in-Chief

Symmetry is ultimately the most important concept in natural sciences. It is not surprising then that very basic and fundamental research achievements are related to symmetry. For instance, the Nobel Prize in Physics 1979 (Glashow, Salam, Weinberg) was received for a unified symmetry description of electromagnetic and weak interactions, while the Nobel Prize in Physics 2008 (Nambu, Kobayashi, Maskawa) was received for the discovery of the mechanism of spontaneous breaking of symmetry, including CP symmetry. Our journal is named *Symmetry* and it manifests its fundamental role in nature.

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