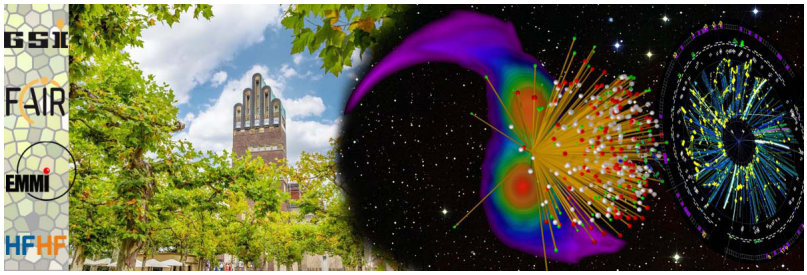

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The Symmetry Energy: Current Status of Ab Initio Predictions vs. Empirical Constraints

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Infinite nuclear matter is a suitable laboratory to learn about nuclear forces in many-body systems. Modern theoretical predictions of neutron-rich matter are particularly timely in view of recent and planned measurements of observables which are sensitive to the equation of state of isospin-asymmetric matter. For these reasons, over the past several years we have taken a broad look at the equation of state of neutron-rich matter and the closely related symmetry energy, which is the focal point of this article. Its density dependence is of paramount importance for a number of nuclear and astrophysical systems, ranging from neutron skins to the structure of neutron stars. We review and discuss ab initio predictions in relation to recent empirical constraints. We emphasize and demonstrate that free-space NN data pose stringent constraints on the density dependence of the neutron matter equation of state, which essentially determines the slope of the symmetry energy at saturation.

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