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How well does the chiral expansion converge in nuclear and neutron matter?

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The equations of state of nuclear and neutron matter (and, more generally, neutron-rich matter) play a fundamental role towards the understanding of a broad spectrum of systems, ranging from the skins of neutron-rich nuclei to the structure of compact stars.

After a brief introduction on different approaches to the properties of nuclear/neutron matter, we will focus on error quantification in effective field theory. The various sources of uncertainty and their impact in infinite matter will be explored.

We will report on recent calculations of the nuclear and neutron matter equations of state [1] at different orders of the chiral expansion as well as changing resolution scale. We will discuss the significance of such predictions as a foundation for future studies of convergence of the chiral perturbation series.

1. F. Sammarruca, L. Coraggio, J.W. Holt, N. Itaco, R. Machleidt, and L.E. Marcucci, Phys. Rev. C 91, 054311 (2015)

Presenter: SAMMARRUCA, Francesca (University of Idaho, Moscow)

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