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Effective field theory for rotating neutron stars with genuine many-body forces

The aim of our contribution is to shed some light on open questions facing the high-density nuclear many-body problem. We focus our attention on the conceptual issue of naturalness and its role in the baryon-meson coupling for nuclear matter at high densities. As a guideline for the strengths of the various couplings, the concept of naturalness has been adopted. In order to encourage possible new directions of research, we discuss relevant aspects of a relativistic effective theory for nuclear matter with natural parametric couplings and genuine many-body forces. Among other topics, we discuss in this work the connection of this theory with other known effective Quantum Hadrodynamics (QHD) models found in the literature and how we can use our approach to describe a new physics for rotating neutron stars. We also show some results for the equation of state, population profiles and mass-radius relation for rotating neutron stars assuming local charge neutrality and beta equilibrium. Star rotation is implemented via the Lorene Code.

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