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Skyrme-like Λ hyperonic interactions and neutron stars properties

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Neutron stars are hydrostatically equilibrium stars, the matter of which consists mainly of neutrons and has a density of the order of the nuclear one, therefore, methods used in the particle and nuclear physics are applicable for their description. However, at high densities that are achieved in neutron stars, there may be additional sensitivity to certain properties of the baryonic interaction. Renewed interest in neutron stars physics has been inspired by first registration of gravitational signal from the merger of two neutron stars, which has provided a new measurable characteristic of a neutron star called tidal deformability.

In the present work, we consider neutron stars consisting of nucleons, leptons, and Λ-hyperons with Skyrme baryonic force. We calculate different characteristics of neutron stars such as mass, radius and tidal deformability and investigate their dependence on the properties of the interactions. In particular we consider two alternative ways to describe nonlinear effects in ΛN-interaction: dependence on nucleon density ($\sim \rho^{\alpha}$) and three-body ΛNN force, and investigate the difference between them in neutron stars.

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