

# XXV International Baldin Seminar on High Energy Physics Problems "Relativistic Nuclear Physics and Quantum Chromodynamics"



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## Hyperonic interactions in neutron stars

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Neutron stars have the density of the nuclear one, so the methods from the nuclear and particles physics can be used to describe them. However at high densities reached inside neutron stars an additional sensitivity to the certain properties of the baryonic interaction can appear. Therefore studying of neutron stars may be of great importance for understanding the properties of baryonic interactions. At the same time, progress in nuclear physics may be important for the development of neutron stars physics. In the present work we focus on studying of the  $\Lambda N$  interaction.

We consider the neutron stars consisting of nucleons, leptons and  $\Lambda$ -hyperons. The matter of neutron star is modeled based on the Skyrme interaction. Such characteristics as masses, radii and tidal deformabilities of neutron stars are calculated.

We study the influence of the properties of the hyperon-nucleon interaction on characteristics of neutron stars, in particular the difference in description of many-body effects with three-body ( $\Lambda NN$ ) forces and  $\Lambda N$  forces dependent on the nucleon density to the power of  $\gamma$ . We also study the dependence of neutron star characteristics on the value of  $\gamma$ . Using the restrictions on tidal deformability coefficient obtained from neutron stars merger GW170817 we choose some combinations of Skyrme parameterizations, which are more suitable for describing neutron stars. Finally we consider the charge symmetry breaking effect in neutron stars. This work was supported by the Theoretical Physics and Mathematics Advancement Foundation "BASIS".

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