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CONDITIONS OF HYPERON APPEARANCE IN NEUTRON STARS

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Experimental justification of the equation of state of nuclear matter at extreme densities is rather difficult under terrestrial conditions, and therefore studying of neutron stars remains valuable. For a long time, the main testable quantity was the maximum mass of a neutron star. In 2017, the gravitational signal from the merger of neutron stars was detected and a new characteristic, tidal deformability, was measured. The tidal deformability coefficient is defined as the proportionality coefficient between the external tidal field and the quadrupole moment of the star.
In this work, we calculated the dependence of mass on radius of neutron star and the tidal deformability for various equations of state of nuclear matter, taking into account the presence of hyperons Y in matter in addition to neutrons, protons, electrons and muons.
Particular attention in our calculations is paid to the description of many-body effects. Using Skyrme interaction we show that in the case of neutron stars, three-body YNN forces are not equivalent to YN density-dependent forces. And since these forces play a key role at high densities, they strongly influence the maximum mass of neutron stars and, in particular, the density at which hyperons appear. Thus, we consider the dependence of the hyperon appearance point on properties of baryonic interactions and its influence on the different characteristics of neutron stars.

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