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Hyperons in hot neutron stars

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In this work, a temperature-dependent equation of state of nuclear and hyperonic matter suitable for use in relativistic simulations of neutron star mergers and supernovae is presented. We investigate the impact of the uncertainty in the hyperonic sector on the astrophysical observables. We show that these uncertainties have a significant effect on the global properties of the stars, such as mass, radius, tidal deformability, and moment of inertia. The effects are mostly visible for the most massive stars and at higher temperature, where the hyperon abundance is significant. The findings directly impact the results of relativistic simulations involving neutron star mergers and supernovae, as they underscore the importance of incorporating hyperonic uncertainties to guarantee the precision and dependability of these simulations in astrophysical scenarios.

Abstract

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