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Some Aspects of the Neutron Star Cooling Mechanism

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One of the key challenges in the theory of neutron star cooling is to explain the observed existence of compact relativistic objects of the same age but with different surface temperatures. To address this issue, we investigate the dependence of the neutrino cooling rate on the average density, mass, and internal structure of a neutron star. This study focuses on the medium modification of beta-decay processes in strongly interacting nuclear matter and their sensitivity to changes in density. Special attention is given to the softening of pions in nucleon-nucleon interactions, which affects the intensity of beta processes. The obtained results show good agreement with existing observational data.

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