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Theory of cooling neutron stars

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Cooling neutron stars may serve as natural laboratories of superdense matter in their interiors. We discuss current theories of neutron star cooling. We outline the main regulators of the cooling such as the equation of state, neutrino emission mechanisms, heat capacity and superfluidity in superdense stellar cores as well as the properties of heat-blanketing envelopes of neutron stars. Next we describe which information on neutron star parameters and physical properties of superdense matter can be inferred from observations of cooling neutron stars, and summarize the results and perspectives of such investigations.

Author: Prof. YAKOVLEV, Dmitry (IOFFE Institute)

Co-author: Dr SHTERNIN, Petr (IOFFE Institute)

Presenter: Prof. YAKOVLEV, Dmitry (IOFFE Institute)

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