Neutrino luminosity from the hadron burning to quark matter inside neutron stars

In this work, we study the neutrinos diffusion into the hybrid neutron star, after a phase transition from hadronic to quark matter in proto-neutron stars. We calculate the neutrino luminosity and signal features during the cooling of the hybrid neutron star. We use the MIT bag model for quark matter description, taking into account the effect of strong interactions in the perturbative regime to the order of QCD coupling constant and also the effect of finite temperature and strange quark mass. We show that the energy released by the emission of neutrinos considerably increases the event rate detected on earth after the phase transition of matter and during the cooling.

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