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New distinguishing feature of a matter and an antimatter: asymmetry in the cooling of charged leptons and antileptons by means of neutrino pairs emission in a magnetic field

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We present analytic formulae for the differential probability of the neutrino pairs emission by charged lepton (antilepton) gas and for the energy loss by charged leptons (antileptons) by means of neutrino pairs emission in hot stellar magnetic fields with allowance for the longitudinal polarizations of the initial and final charged leptons (antileptons). In general, the gas consisting of only the charged leptons having a left-hand (right-hand) circular polarization and the gas consisting of only the charged antileptons having a left-hand (right-hand) circular polarization are cooled at the expense of neutrino pairs emission by the charged leptons (antileptons) in hot stellar magnetic fields asymmetrically. The obtained result for the asymmetry of the cooling of charged lepton gas and charged antilepton gas by neutrino pairs emission shows that a matter and an antimatter are cooled at the expense of neutrino pairs emission asymmetrically. It is a new distinguishing feature of a matter and antimatter. The analyses of the asymmetry of cooling of electron gas and positron gas at the expense of neutrino pairs emission in stellar medium show that dominant contribution to the asymmetry of the cooling of the collapsing stellar core is determined with the electron neutrino pairs emission by the electrons having a left-hand circular polarization and with the electron neutrino pairs emission by the positrons having a right-hand circular polarization. When electron neutrino pairs are emitted by the electrons and positrons having a left-hand circular polarization, the process of electron neutrino pairs emission by electrons can contribute to the cooling of the collapsing stellar core more essentially than the process of electron neutrino pairs emission by positrons. When electron neutrino pairs are emitted by the electrons and positrons having a right-hand circular polarization, the process of electron neutrino pairs emission by positrons can contribute to the cooling of collapsing stellar core more essentially than the process of electron neutrino pairs emission by electrons. All these effects could contribute to asymmetry of the cooling of the collapsing stellar core.

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