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Impact of magnetic field on beta-processes in partially transparent medium

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An influence of a magnetic field on beta-processes is investigated in a partially transparent medium of the inner part of a supernova envelope. Inside this part, an electron-positron plasma is ultra-relativistic. As for neutrinos, they are not in the thermodynamic equilibrium with the medium. We obtain simple analytical expressions for reaction rates of beta-processes as well as energy and momentum transferred from (anti)neutrinos to the medium. In numerical estimations we use results from the spherically-symmetric supernova simulations with the progenitor mass of $27 M_{\odot}$. We show that the effect of the magnetic field on the macroscopic quantities mentioned above is relatively small. Therefore, neutrino-transport calculations of the supernova explosion can be performed ignoring the magnetic field.

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