

Polarization effects in the charged lepton pair production by a neutrino (an antineutrino) in a magnetic field

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The probability of the process of the charged lepton pair production by a neutrino (an antineutrino) with allowance for the longitudinal and transverse polarizations of the charged leptons in a magnetic field is presented.

The dependence of the probability of the process on the spin variables of the charged leptons and on the azimuthal and polar angles of the initial and final neutrinos (antineutrinos) are investigated. It is shown that the probability of the process is sensitive to the spin variables of the charged leptons and to the direction of the neutrino (antineutrino) momentum.

That the probability involves the spin variables of the charged leptons in an asymmetric way is explained not only by P and C nonconservation in weak interactions but also by special kinematical features.

It is determined that the neutrino (antineutrino) energy and momentum loss through the production of a charged lepton pair happens asymmetrically.

The obtained results can be used in explanation of asymmetries and anisotropies arising in cataclysms like a supernova explosion or a coalescence of neutron stars.