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Relativistic chiral magnetohydrodynamics and evolution of cosmological magnetic fields

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If chiral (left-right) asymmetry is present in the plasma, the electric current, parallel to the magnetic field, appears. This is known as “*chiral magnetic effect*”. We demonstrate that this effect changes the dynamics of the magnetized relativistic plasma and present the proper equations of chiral relativistic magnetohydrodynamics, containing a new, axion-like, degree of freedom. These results are relevant for generation and evolution of cosmological magnetic fields in the electroweak epoch and are applicable to other relativistic plasmas.

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