

The generation of matter–antimatter asymmetries and hypermagnetic fields by the chiral vortical effect of transient fluctuations

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Generation of matter-antimatter asymmetry and large-scale magnetic fields in the Universe are two seemingly unrelated problems in particle physics and cosmology which are highly intertwined in the symmetric phase of the early Universe, due to the Abelian anomalous effects. The chiral vortical effect (CVE) is the generation of the electric current parallel to the vorticity field in the plasma. We show that due to the temperature-dependent chiral vortical effect, small overlapping transient fluctuations in the vorticity field in the plasma and temperature of matter degrees of freedom can lead to the generation of strong hypermagnetic fields and matter-antimatter asymmetries, all starting from zero initial values.

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