

The effects of non-helical component of hypermagnetic field on the evolution of the matter-antimatter asymmetry, vorticity, and hypermagnetic field

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The large-scale magnetic fields and the baryon asymmetry in the Universe are two important puzzles in particle physics and cosmology. In the symmetric phase of the early Universe before the electroweak phase transition (EWPT), these two seemingly unrelated problems are intertwined via the Abelian anomalous effect, $\nabla_{\mu} j^{\mu} \sim \vec{E}_Y \cdot \vec{B}_Y$. Moreover, in imbalanced chiral plasma the magnetic and vorticity field lead to generation of electric current, which are known as the Chiral Magnetic Effect (CME) and Chiral Vortical Effect (CVE), respectively. In this talk we will show that the CVE and CME can lead to the generation and evolution of the hypermagnetic field and matter-antimatter asymmetries in the symmetric phase of the early Universe in the temperature range $100 \text{ GeV} \leq T \leq 10 \text{ TeV}$.

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