

The 2nd Workshop on Grand Unified Theories: Phenomenology and Cosmology (GUTPC 2025)

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Leptogenesis via symmetry non-restoration

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In this talk, we present a novel electron-assisted Baryogenesis mechanism that does not require explicit B-L violation, which is essential for the traditional Leptogenesis mechanism. This scenario is based on the assumption of high-scale electroweak symmetry restoration, which implies that the electron Yukawa interaction, crucial for the mechanism, does not reach thermal equilibrium before the electroweak sphaleron process is quenched in the early universe. Primordial charge asymmetries for chiral electrons, which can be generated through various mechanisms such as axion inflation, the evaporation of primordial black holes, or the CP-asymmetric decays of a heavy Higgs doublet, serve as the initial condition for the amplification of the baryon asymmetry through transport equations. Right-handed electron asymmetry is almost irrelevant to the baryon asymmetry due to high-scale electroweak symmetry restoration, leading to both a non-zero baryon asymmetry and the electron asymmetry. We dub this mechanism as the Eogenesis.

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