

Cosmological and Dynamical Aspects of Quantum Gravity with Torsion

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In the context of concrete models of torsionful geometries of quantum gravity, in particular the ones inspired from string theory, I discuss the role of torsionful backgrounds in the early Universe in providing scenarios for the observed matter/antimatter asymmetry. In particular, within the context of Kalb-Ramond torsion that arises due to the antisymmetric tensor field in the spectrum of string-inspired models, which in four space-time dimensions is equivalent to a sort of axion field, I discuss the role of constant (Lorentz-violating) backgrounds of the torsion for Leptogenesis and subsequent Baryogenesis. The effective field theory corresponding to such situations has the form of some terms in the so called Standard Model Extension of Kostelecky and collaborators. I also discuss the role of quantum fluctuations of the torsion, and argue that, under certain circumstances, it may also be held responsible for dynamical generation of chiral Majorana neutrino masses in novel mechanisms beyond seesaw, proceeding through chiral anomalous graphs in the pertinent field theory.

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