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String-inspired Running Vacuum Inflationary Cosmologies with gravitational anomalies

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I discuss a framework in which a low-energy effective Chern-Simons (CS) modification of General relativity emerges as a viable cosmological model from string theory. Condensation of CP-violating primordial gravitational waves can lead to non-trivial CS anomaly condensates, which drive inflation without external inflaton fields, of running vacuum model type.

The string-model independent axion field, which couples to the gravitational CS anomalies, is responsible for providing a slow-roll field during inflation, but, although at an effective action level, one obtains a linear axion potential in the condensate phase (similar to that obtained in string/brane-inspired axion-monodromy inflationary models), nonetheless the axion itself does not drive inflation in this model. Inflation is driven in this scenario by the dominant non-linear terms, quartic in the Hubble parameter, that characterise the vacuum energy density. It is worthy of stressing that the gravitational anomaly condensates lead to spontaneous violation of Lorentz and CPT symmetries, which may have important implications for unconventional leptogenesis at the early stages of the post-inflationary radiation epoch of this string-inspired Cosmology.

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