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Geometric origin of the dark sector and matter antimatter asymmetry of the Universe

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I discuss the possibility that torsion in the early Universe, which is a feature of several cosmological models, also in the realm of string theory, can provide dark energy which is sufficient to lead to inflation, but also to matter-antimatter asymmetry in the post inflationary Universe, through the axion-like degrees of freedom associated with the torsion. Specifically, I discuss how such axions couple to chiral gravitational anomalies, which can then condense as a consequence of primordial chiral gravitational waves to lead to inflation of running vacuum type, and explain how such axions can acquire masses during the post inflationary epochs so as to provide dark matter candidates. I also speculate on a potential resolution of the current-era cosmological tensions in the context of this framework.

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