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Anisotropic Cosmological Perturbations in LRS Bianchi Type I Spacetimes

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In this work, we investigate the dynamics of density perturbations in anisotropic Bianchi Type I cosmologies with a positive cosmological constant. While the standard Λ CDM model, based on the homogeneous and isotropic FLRW metric, provides a successful framework for large-scale cosmology, persistent observational discrepancies and theoretical challenges motivate the exploration of alternative background geometries. Anisotropic Bianchi Type I cosmologies offer a well-defined deviation from isotropy, and this work aims to understand how density perturbations evolve within such backgrounds. We specifically focus on scenarios where the Universe isotropizes, thereby providing crucial insights into the potential role of early universe anisotropies and the robustness of the standard cosmological picture. This analysis is conducted using the 1+3 and 1+1+2 covariant formalisms.

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