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Cosmic perturbations with running G and Lambda

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Cosmologies with running cosmological term (Lambda) and gravitational Newton's coupling (G) may naturally be expected if the evolution of the universe can ultimately be derived from the first principles of Quantum Field Theory or String Theory. In this paper, we derive the general cosmological perturbation equations for models with variable G and Lambda in which the fluctuations in both variables are explicitly included. We demonstrate that, if matter is covariantly conserved, the late growth of matter density perturbations is independent of the wavenumber. Furthermore, if Lambda is negligible at high redshifts and G varies slowly, we find that these cosmologies produce a matter power spectrum with the same shape as that of the concordance LCDM model, thus predicting the same basic features on structure formation. Despite this shape indistinguishability, the free parameters of the variable G and Lambda models can still be effectively constrained from the observational bounds on the spectrum amplitude.

Comments:	Accepted in Classical and Quantum Gravity. One appendix on perturbations in the Newtonian gauge added. Extended discussion and new references.
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