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Dark Radiation in Fibred LARGE Volume Compactifications

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Dark radiation is a compelling extension to ΛCDM: current experimental results hint at $\Delta N_{\rm eff} \simeq 0.5$, which is increased to $\Delta N_{\rm eff} \simeq 1$ if the recent BICEP2 results are included. In recent years dark radiation has been considered in the context of string theory models such as the LARGE Volume Scenario of type IIB string theory, forging a link between present-day cosmological observations and models of physics at the Planck scale.
In this talk I will consider fibred realisations of the LARGE Volume Scenario, in which the bulk volume is stabilised by two moduli instead of one. Consequently, the lightest modulus no longer corresponds to the compactification volume but instead to a transverse direction in the bulk geometry. I will focus on scenarios in which sequestering of soft masses is achieved by localising the Standard Model on D3 branes at a singularity. The fraction of dark radiation produced in such models vastly exceeds experimental bounds, ruling out the fibred sequestered LARGE Volume Scenario as a model of the early Universe.

Summary

I will begin with a brief overview of the experimental hints for dark radiation, and I will review how dark radiation is produced during reheating in the sequestered LARGE Volume Scenario. Following this, I will discuss key features of fibred compactifications and show that the lightest modulus no longer has any tree-level decay modes to visible matter, leading instead to a vast overproduction of dark radiation.

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