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A sufficient condition for de Sitter vacua in type IIB string theory

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We derive a sufficient condition for realizing meta-stable de Sitter vacua with small positive cosmological constant within type IIB string theory flux compactifications with spontaneously broken supersymmetry. There are a number of 'lamp post' constructions of de Sitter vacua in type IIB string theory and supergravity. We show that one of them – the method of 'Kahler uplifting' by F-terms from an interplay between non-perturbative effects and the leading α' -correction – allows for a more general parametric understanding of the existence of de Sitter vacua. The result is a condition on the values of the flux induced superpotential and the topological data of the Calabi-Yau compactification, which guarantees the existence of a meta-stable de Sitter vacuum if met. Our analysis explicitly includes the stabilization of all moduli, i.e. the Kahler, dilaton and complex structure moduli, by the interplay of the leading perturbative and non-perturbative effects at parametrically large volume.

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