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Slow-roll inflaton potential through Kahler moduli stabilizations with two non-perturbative corrections in type IIB/F-theory

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Moduli stabilization in type-IIB string theory is an intriguing problem to arrive at an effective description of 4d cosmological inflationary paradigm as reflected by the recent experiments. At tree level with fluxes, dilaton and complex structure moduli are stabilized [1] by supersymmetric constraints leaving the Kahler moduli undetermined. In order to stabilize the latter, non-perturbative (arising from gaugino condensation/instantons effects) [2] and various perturbative corrections (ℓ' -correction/one-loop corrections) are introduced through branes and multi-graviton scattering amplitudes in the internal manifold [3,4]. In this paper, we have derived an F-term potential for three Kahler moduli ($1\ 2\ 3$) corresponding to three non-interacting and intersecting magnetized D7 branes in T^6/Z_N orbifold compactification of which one is stabilized through the overall by perturbative correction in Kahler potential and remaining two are stabilized by non-perturbative contributions on superpotential [5]. The F-term potential is uplifted by a D-term potential arising from D7 brane configuration. Then the effective potential (sum of F- and D-term potentials) is converted to inflaton potential by a canonical normalization procedure. The perturbatively stabilized Kahler modulus is identified as the inflaton field. The slow-roll potential is obtained by supersymmetrically fixing two Kahler moduli appearing in superpotential. In this way, the auxiliary field appearing in [6] is avoided without losing the slow-roll feature.

References:

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