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Perturbative moduli stabilisation in type IIB/F-theory framework

We propose a new mechanism of (geometric) moduli stabilisation in type IIB/F-theory four-dimensional compactifications on Calabi-Yau manifolds, in the presence of 7-branes, that does not rely on non-perturbative effects. Complex structure moduli and the axion-dilaton system are stabilised in the standard way, without breaking supersymmetry, using 3-form internal fluxes. K"ahler class moduli stabilisation utilises perturbative string loop corrections, together with internal magnetic fields along the D7-branes world-volume leading to Fayet-Iliopoulos D-terms in the effective supergravity action. The main ingredient that makes the stabilisation possible at a de Sitter vacuum is the logarithmic dependence of the string loop corrections in the large two-dimensional transverse volume limit of the 7-branes.

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