Orientifolds of Gepner models without Kähler moduli

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Abstract

One of the main challenges in string theory Calabi-Yau compactifications to four-dimensions is the stabilization of the massless complex structure and Kähler moduli. In type IIB string theory, complex structure moduli can be stabilized perturbatively by turning on fluxes on the internal space, while there is no perturbative mechanism for Kähler moduli stabilization. Since every Calabi-Yau manifold has at least one Kähler modulus (the overall volume), there is no hope to stabilize all moduli perturbatively. A way out is given by Landau-Ginzburg/Gepner models string vacua which can have no Kähler moduli. However, a further obstruction arises from the tadpole conjecture, which suggests that complex structure moduli stabilization by fluxes is not guaranteed: the number of moduli that can acquire a mass is bounded above by a quantity proportional to the O-plane tadpole charge. To identify the most promising candidates for fully stabilized perturbative string vacua, we provide an exhaustive list of Landau-Ginzburg orientifold models with no Kähler moduli, and compute for each model the number of complex structure moduli together with the tadpole charge. From this, we can identify which of these models are genuine candidates for phenomenologically relevant string vacua.

Keywords: Moduli stabilization, Gepner models, Landau, Ginzburg models, Tadpole conjecture

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