A closer look at mirrors and quotients of Calabi-Yau threefolds

GILBERTO BINI AND FILIPPO F. FAVALE

Abstract. Let X be the toric variety $(\mathbb{P}^1)^4$ associated with its four-dimensional polytope Δ. Denote by $\tilde{X}$ the resolution of the singular Fano variety X^o associated with the dual polytope Δ^o. Generically, anticanonical sections Y of X and anticanonical sections $\tilde{Y}$ of $\tilde{X}$ are mirror partners in the sense of Batyrev. Our main result is the following: the Hodge-theoretic mirror of the quotient Z associated to a maximal admissible pair (Y, G) in X is not a quotient $\tilde{Z}$ associated to an admissible pair in $\tilde{X}$. Nevertheless, it is possible to construct a mirror orbifold for Z by means of a quotient of a suitable $\tilde{Y}$. Its crepant resolution is a Calabi-Yau threefold with Hodge numbers $(8, 4)$. Instead, if we start from a non-maximal admissible pair, in the same case, its mirror is the quotient associated to an admissible pair.

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