

Linear models for flux vacua

Allan Adams^{1,2}, Morten Ernebjerg² and Joshua M. Lapan²

¹Center for Theoretical Physics, Massachusetts Institute of Technology,
Cambridge, MA 02139, USA
awa@mit.edu

²Jefferson Physical Laboratory, Harvard University, Cambridge, MA
02138, USA
morten_ernebjerg@hms.harvard.edu, jlapan@alum.mit.edu

Abstract

We construct worldsheet descriptions of heterotic flux vacua as the IR limits of $\mathcal{N} = 2$ gauge theories. Spacetime torsion is incorporated via a 2d Green–Schwarz mechanism in which a doublet of axions cancels a one-loop gauge anomaly. Manifest $(0, 2)$ supersymmetry and the compactness of the gauge theory instanton moduli space suggest that these models, which include Fu–Yau models, are stable against worldsheet instantons, implying that they, like Calabi–Yaus, may be smoothly extended to solutions of the exact beta functions. Since Fu–Yau compactifications are dual to KST-type flux compactifications, this provides a microscopic description of these IIB RR-flux vacua.

1 Introduction

It is a beautiful and frustrating fact of life that Calabi–Yaus have interesting moduli spaces. On the one hand, the topology and geometry of their moduli spaces govern the low-energy physics of string theory compactified on a Calabi–Yau (CY), so understanding their structure teaches us about 4d (4-dimensional) stringy physics. On the other hand, the resulting massless scalars are a phenomenological disaster.