Geometry of Calabi-Yau Moduli Space and Flux Vacua

Abstract

In type IIB string theory the formula by Ashok and Douglas expresses the distribution of flux vacua in terms of geometrical data of Calabi-Yau (CY) moduli space. In particular the density of vacua is concentrated around singular loci of CY moduli space where its curvature is peaked. We shall study various types of singular loci and show that the vacuum distribution has the universal form $\rho(z) \approx \frac{1}{|z|^2 \log |z|^2}$ near a singular locus z=0.

We study in detail the geometric-engineering (decoupling) limit of Calabi-Yau manifolds. In this limit Calabi-Yau manifolds with a K_3 fibration develop ADE singularities and gauge symmetry enhancement and decoupling of gravity take place. We see that a mass scale $g M_{pl}$ appears in this limit which agrees with the recent proposal of Arkani-Hamed et al of a weak gravity force.