Small F-term Vacua and Where to Find Them: a Geometric View of the Flux Landscape

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Abstract

Statistical analyses of the flux landscape have produced remarkably explicit vacuum-counting formulae. Although these formulae provide quantitative estimates of the number and distribution of vacua, they do not by themselves make the detailed structure of the landscape transparent. In this talk, I will present a geometrical interpretation of the Type IIB flux landscape by treating moduli and fluxes as coordinates of a single enlarged space. This perspective provides a unified language for describing both supersymmetric and non-supersymmetric vacua, and allows one to recover standard vacuum-counting formulae, such as the Denef–Douglas measure, from a geometric picture. I will then use this framework to address the following question: where do non-supersymmetric vacua with small F-terms lie, and in what sense are they close to supersymmetric vacua? I will argue that this proximity has a precise geometrical meaning. In particular, supersymmetric vacua define a submanifold of the enlarged space, and the flux choices leading to small F-term non-supersymmetric vacua lie near the boundary of its projection to flux space. I will finally illustrate this picture in simple Type IIB flux compactifications and present numerical evidence supporting this interpretation of near-supersymmetric vacuum statistics.

Keywords: flux landscape, Type IIB compactifications, supersymmetry breaking, vacuum statistics, moduli stabilization, F term uplift

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