

Random critical points and vacua of string/ M theory

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Abstract

The vacuum selection problem of string/ M theory is the problem of determining which Calabi–Yau manifold models the extra dimensions of the universe. Mathematically, a vacuum is a critical point of a holomorphic function called a superpotential. Because there are many possible superpotentials and each has many critical points, M. R. Douglas has proposed to study the statistics of critical points of random holomorphic functions. This talk describes our results with M. R. Douglas and B. Shiffman on the number and most likely configurations of critical points of random analytic functions of one or several variables. The results involve random matrix integrals and extremal metrics on Kahler manifolds.