ICM 1998, Berlin, Aug. 18–27

Abstracts of Plenary and Invited Lectures

Section:

11. Mathematical Physics

1991 MS Classification: 81T30
Dijkgraaf, Robbert, University of Amsterdam, The Netherlands
The Mathematics of Fivebranes

Fivebranes are one of the richest but puzzling objects in string theory. They are quantum systems associated to real six-dimensional manifolds that involve a two-form with a three-form field strength that satisfies a self-duality condition. Through recent developments such as the eleven-dimenional origin of string theory (also known as M-theory) and the existence of extended objects and their relation to gauge theory, much has become known about the quantization of fivebranes. Fivebranes relate such diverse subjects as the geometry of Calabi-Yau threefolds, moduli spaces of vector bundles on complex surfaces, generalized Kac-Moody algebras, automorphic forms for the group $O(3,2,\mathbf{Z})$ and the theory of elliptic genera. There is also a close analogy between fivebranes and the study of two-dimensional conformal field theory and its application to three-manifold invariants. Finally there are interesting relations with the formalism of non-commutative geometry.