Geometry, Topology, and Physics Seminar

K3 surfaces from Seiberg–Witten curves

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Room 6635 South Hall

Abstract: Sen gave a description of the compactification of F-theory on a K3 surface in the orbifold limit where the surface appears as an orbifold of a four-torus. The corresponding picture in M-theory is a self-dual string from an intersecting M2 and M5-brane, and such a configuration corresponds to the lift of Seiberg–Witten theory to M-theory. This picture also provides an embedding of Seiberg–Witten theory into F-theory, by identifying the gauge coupling of gauge theory with the axion-dilaton modulus of string theory.

In my talk I will generalize Sen's procedure by constructing all 2-parameter families of lattice-polarized K3 surfaces that can be obtained from extremal rational elliptic surfaces through a quadratic twist. I will show that for all of these families the Picard–Fuchs system governing the K3-periods are obtained by an integral transform of a differential equation of hypergeometric or Heun type, and that in fact the K3-periods have an interpretation as modular forms. If time permits I will also explain how further generalization of this procedure naturally leads to K3 surfaces admitting double covers onto P^2 branched along a plane sextic curve. (This is joint work with Chuck Doran, University of Alberta)

This seminar is part of the NSF/UCSB 'Research Training Group' in Topology and Geometry. Information about future meetings can be found at http://www.math.ucsb.edu/~drm/GTPseminar/