ABSTRACTS

ALLAN ADAMS
Harvard University

Towards $(0, 2)$ *Mirror Symmetry*

DENIS AUROUX
Massachusetts Institute of Technology

Homological mirror symmetry for Fano surfaces

VICTOR BATYREV
Universitat Tubingen

Cohomology groups in mirror symmetry

We discuss various statements and conjectures concerning cohomology groups of mirror symmetric Calabi-Yau varieties. In particular we will be interested to understand the behavior of the cohomology groups with coeffiecients in Z.

ANDREI CALDARARU
University of Pennsylvania

Hochschild structures: an algebraic geometer's point of view

Although Hochschild homology and cohomology for algebraic varieties and complex manifolds have been studied for some time now, they rose to prominence primarily through the work of Kontsevich on Mirror Symmetry and Deformation Quantization. The techniques he used were primarily differential-geometric. In my talk I will attempt to give a mild introduction to the subject, from an algebraic geometric point of view, hoping to touch on some of the recent results on the Mukai pairing, formality of the Hochschild complex, and connections with topological string theory (the Cardy condition). I will only assume knowledge of standard results in algebraic geometry and homological algebra.

XENIA DE LA OSSA
University of Oxford

The Arithmetic of Calabi-Yau Manifolds

ABSTRACTS

KENJI FUKAYA
Kyoto University

Counting open Riemann surface with Lagrangian boundary condition and Perturvative Chern-Simons Gauge theory

MARK GROSS
University of Warwick

Affine structures, mirror symmetry, and K3 surfaces

I will give an introduction to my ongoing program with Bernd Siebert to use log geometry as a way of passing between affine geometry and complex geometry. In particular, I shall explain in detail how this works for K3 surfaces.

MARCO GUALTIERI
Fields Institute

Generalized Kahler geometry and T-duality

I will explain Kahler geometry and its equivalence with the general N=(2,2) sigma model target geometry. I will exhibit the classical supersymmetry operators and describe how this structure varies under T-duality transformations.

ANTON KAPUSTIN
California Institute of Technology

Topological sigma-models and generalized complex geometry

SHELDON KATZ
University of Illinois at Urbana-Champaign

(0,2) correlation functions

A mathematical theory is developed to define certain (0,2) correlation functions. If the target is a toric variety, a linearized version is also defined which can be readily computed. This can be viewed mathematically as a generalization of Gromov-Witten theory and the associated linear sigma model. Computations corraborate the mirror symmetry predictions of Adams, Basu and Sethi. This is joint work with Eric Sharpe.

ABSTRACTS

ALBRECHT KLEMM
University of Wisconsin-Madison

Higher Genus Amplitudes on Compact Calabi-Yau and Threshold Corrections

NAICHUNG CONAN LEUNG
University of Minnesota

G_2 *geometry and mirror triality*

GRIGORY MIKHALKIN
University of Toronto

Complex, real and tropical curves

DAVID MORRISON
Duke University

Strominger-Yau-Zaslow revisited

YONG-GEUN OH
University of Wisconsin at Madison

The [FOOO]-obstruction cycle and Landau-Ginzburg potential

In this lecture, I will illustrate the mirror correspondence between the obstruction cycle to the deformation theory of Floer homology and the Landau-Ginzburg superpotential, for the case of Fano toric manifolds. This in particular confirms Hori's predition on the Floer homology group of Lagrangian torus fibers. This is based on the joint works with Fukaya-Ohta-Ono, and with Cho respectively.

TONY PANTEV

T-duality for holomorphic non-commutative tori

We study the most general deformations of Fourier-Mukai transforms on families of complex tori. We investigate the relationship between Fourier-Mukai duality and the representation theory of motives and use this to motivate the necessity of considering non-commutative deformations. We prove that the formal gerby deformations of a torus are Fourier-Mukai dual to formal non-commutative deformations of the dual torus, thus verifying on the formal level a conjecture of Kapustin and Orlov.

ABSTRACTS

ROLF SCHIMMRIGK
Kennesaw State University

Arithmetic Varieties from String Theory and D-branes

The main focus of this talk will be on some recent results concerning a relation between arithmetic geometry and affine Kac-Moody algebras. These mathematical results are part of a program to understand the physics of string theory in terms of the arithmetic properties of spacetime. Some open problems pointing to interesting applications of arithmetic geometry in the context of (exactly solvable) D-branes will be also described.

BERND SIEBERT
Universitaet Freiburg

Affine geometry of degeneration limits and mirror symmetry

JAN STIENSTRA
University of Utrecht

Motives and Strings

In this expository talk I want to point at some striking connections and analogies that may exist between the theory of motives and string theory.

HELENA VERRILL
Louisiana State University

The Picard-Fuchs equation of the A_n family of Calabi-Yau varieties

By an A_n family of Calabi-Yau varieties I mean the family given by the resolution of a variety defined in projective n space by $(x_1 + x_2 + ... + x_{n+1})(a_1/x_1 + a_2/x_2 + ... + a_{n+1}/x_{n+1}) = t$, where a_i are fixed and t varies. Recently Klaus Hulek and I have looked at modular members of the A_4 family of Calabi-Yau threefolds. I will discuss the problem of determining the Picard-Fuchs equation of these families, and how this is related to the question of modularity.

ABSTRACTS

JOHANNES WALCHER
IAS Princeton

Matrix Factorizations: Stability and Mirror Symmetry

Let $W \in \mathbf{C}[x_1, ..., x_n]$ be a polynomial. A pair of matrices $f, g \in \mathrm{Mat}(N, \mathbf{C}[x_1, ..., x_n])$ satisfying $fg = gf = W\mathrm{id}_N$ is called a matrix factorization of W. I will review how matrix factorizations provide a model for D-brane categories. I will then discuss how matrix factorizations can be graded and equipped with a natural stability conditions. Finally, I will explain a prediction concerning the Floer cohomology of the real quintic.

NORIKO YUI
Queen's University

Certain non-rigid Calabi–Yau threefolds over $\mathbf{Q}$ *and their modularity*

We will construct explicit examples of non-rigid Calabi–Yau threefolds fibered over $\mathbf{P}^1$ by non-constant semi-stable $K3$ surfaces and reaching the Arakelov–Yau upper bound. We prove that the "interesting" part of their L-series is attached to modular forms. This is a joint work with Ron Livné, appended by Hulek and Verrill.

ILIA ZHARKOV
Harvard University

Kahler affine structures and the affine Calabi conjecture

Integral Kahler affine structures arise as metric limits of maximally degenerate Calabi-Yau families. The Calabi conjecture says that for a fixed monodromy representation and a fixed metric class there is a unique such structure on a sphere (with singularities) which is Monge-Ampere. Mostly, I will discuss the two dimensional example.