Calabi-Yau Manifolds and Calabi-Yau Algebra
Variétés et algèbre de Calabi-Yau Algebra

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PEDRO LUIS DEL ANGEL, CIMAT

Variations of Hodge structures associated to some equisingular families of Calaby-Yau varieties.

We study the variations of Hodge structures associated to an equisingular family of Calabi-Yau varieties when the singular locus of every fiber consist of a finite number of nodes.

CHARLES DORAN, University of Alberta and ICERM

Calabi-Yau Threefolds Fibered by High Rank Lattice Polarized K3 Surfaces

We study threefolds fibered by K3 surfaces admitting a lattice polarization by a certain class of rank 19 lattices. We begin by showing that any family of such K3 surfaces is completely determined by a map from the base of the family to the appropriate K3 moduli space, which we call the generalized functional invariant. Then we show that if the threefold total space is a smooth Calabi-Yau, there are only finitely many possibilities for the polarizing lattice and the form of the generalized functional invariant. Finally, we construct explicit examples of Calabi-Yau threefolds realizing each case and compute their Hodge numbers. The resulting geometric classification provides strong evidence in favor of the Doran-Harder-Thompson mirror symmetry conjecture in the threefold case.

RADU LAZU, Stony Brook

(Talk Cancelled)

Talk Cancelled

STEVEN LU, UQAM

Projective Kahler Manifolds with semi-negative holomorphic sectional curvature

S. Kobayashi coined the term hyperbolic for a compact complex manifold M without nontrivial holomorphic images of C and conjectured the positivity of the canonical bundle of M. In particular M would be projective if true. But the conjecture is still wide open for projective manifolds beyond dimension two.

A spectacular advance in this direction is the resolution in the projective case by D. Wu-S.T. Yau (Invent. 2016) of the differential geometric analog of the conjecture, due to S.T. Yau. The analog pertains to compact Kahler manifolds with negative holomorphic curvature and the said advance resolves in particular the abundance conjecture, a key conjecture for the classification of algebraic varieties, for such a manifold.

In this talk, I will mainly focus on a recent joint paper with G. Heier, B. Wong and F.Y. Zheng that offers a structure theorem for projective Kahler manifolds with negative holomorphic curvature, assuming the abundance conjecture. The analysis involves a careful study of the rank of the said curvature, and offers relationships to the global abundance problem.

MIKE ROTH, Queen's University

Some diophantine applications of local positivity

This talk is a survey of some recent results connecting measures of local positivity to diophantine statements. We will focus on relations between four different invariants, two of which are diophantine, and two of which are geometric.

ANDREA SOLOTAR, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires
Hochschild cohomology of 3-dimensional Sridharan algebras

A Sridharan enveloping algebra of a finite dimensional Lie algebra is a cocycle deformation of a cocommutative Hopf algebra or a Poincaré-Birkhoff-Witt deformation of a polynomial algebra. The class of Sridharan algebras contains many interesting algebras, such as Weyl algebras. In [Nus91], Nuss listed all non isomorphic Sridharan enveloping algebras of 3-dimensional Lie algebras. Some of the homological properties of Sridharan enveloping algebras have already been studied (see [HVOZ10] and references therein). In this talk I will describe the algebra structure of the Hochschild cohomology of these algebras. This is joint work with Sergio Chouhy and Sofia D'Alesio.

References

[HVOZ10] J.-W. He, F. Van Oystaeyen, and Y. Zhang, Cocommutative Calabi-Yau Hopf algebras and deformations, J. Algebra 324 (2010), no. 8, 1921–1939, DOI 10.1016/j.jalgebra.2010.06.010.

[Nus91] P. Nuss, L'homologie cyclique des algébres enveloppantes des algébres de Lie de dimension trois, J. Pure Appl. Algebra 73 (1991), no. 1, 39–71, DOI 10.1016/0022-4049(91)90105-B.

YURI TSCHINKEL, NYU

KATRIN WENDLAND, Albert-Ludwigs-Universität Freiburg
Hodge-elliptic genera and how they govern K3 theories

In this talk, we review the complex elliptic genus of Calabi-Yau manifolds, along with a number of refinements, called Hodge-elliptic genera, some of which were introduced recently by Kachru and Tripathy. We discuss some properties of these new invariants, in particular for K3 surfaces. Moreover, without assuming background knowledge from conformal field theory, we explain the role of these invariants for a certain type of superconformal field theories, called K3 theories.