理論科學研究中心

Center for Advanced Study in Theoretical Sciences

A SUMMER DAY ON ALGEBRAIC GEOMETRY

時間: 2019年7月1日(星期一)

地點:國立臺灣大學數學研究中心103室

主持人:余正道教授(國立臺灣大學數學系)

時間	講者	講題
10:00 - 11:00	Ziming Ma (馬梓銘, CUHK)	The geometry of Maurer- Cartan equation near degenerate Calabi-Yau varieties
11:15 - 12:15	Kuan-Wen Lai (賴冠文, UMass Amherst)	Regular birational automorphisms of projective spaces
14:30 - 15:30	Tsung-Ju Lee (李宗儒, Harvard U.)	A-hypergeometric systems and relative cohomology
15:45 - 16:45	You-Cheng Chou (周祐正, U. Utah)	Intersection theory on weighted moduli space of curves and KdV hierarchy

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理論科學研究中心 Center for Advanced Study in Theoretical Sciences A Summer Day on Algebraic Geometry

Date: Monday, 7/1, 2019 Room: R103, Mathematics Research Center Building

I. 10:00 - 11:00

Ziming Ma (馬梓銘, CUHK)

Title: The geometry of Maurer-Cartan equation near degenerate Calabi-Yau varieties

Abstract: In this talk, we construct a dgBV algebra PV*,*(X) associated to a possibly degenerate Calabi-Yau variety X equipped with local thickening data. This gives a singular version of the (extended) Kodaira-Spencer dgLa which is applicable to both log smooth and maximally degenerated Calabi-Yau. We use this to prove an unobstructedness result about the smoothing of degenerated Log Calabi-Yau varieties X satisfying Hodge-deRham degeneracy property for cohomology of X, in the spirit of Kontsevich-Katzarkov-Pantev. We also demonstrate how our construction can be applied to produce a log Frobenius manifold structure on a formal neighborhood of the extended moduli space using Barannikov's technique. This is a joint work with Kwokwai Chan and Naichung Conan Leung.

II. 11:15 - 12:15

Kuan-Wen Lai (賴冠文, UMass Amherst)

Title: Regular birational automorphisms of projective spaces Abstract: On a projective space, we say a birational automorphism defined over a field k is regular if it induces a bijection on the set of k-rational points. When k is a finite field in particular, this induces a permutation on the finite set of krational points. --- Can we realize any abstract permutation on the k-rational points this way?

Based on a geometric construction by Segre Cantat in 2009, we give positive answers to the question in odd characteristics as well as the field of two elements. For the other cases, it is conjectured that one can only recover even permutations using such birational maps, and we provide evidences supporting it. This is a work in progress joint with S. Asgarli, M. Nakahara, and S. Zimmermann.

III. 2:30 - 3:30

Tsung-Ju Lee (李宗儒, Harvard U.) Title: A-hypergeometric systems and relative cohomology Abstract: The A-hypergemetric system (a.k.a. GKZ systems defined by Gelfand, Kapranov, and Zelevinskii) arises naturally in the study of the moduli theory of Calabi--Yau complete intersections in toric varieties. For the family of Calabi--Yau hypersurface in a smooth and Fano varieties, Huang--Lian--Yau--Zhu gave a geometric description of the solution space to such a system via the chain integrals. In a joint work with Dingxin Zhang, we relax both the smoothness assumptions and the Calabi--Yau conditions and generalize their results to Calabi--Yau complete intersections. In this talk, I will give a brief introduction to the A-hypergeometric systems and discuss our proof.

IV. 3:45 - 4:45

You-Cheng Chou (周祐正, U. Utah)

Title: Intersection theory on weighted moduli space of curves and KdV hierarchy

Abstract: Intersection number on moduli space of curves can be computed by the celebrated Witten conjecture. In this talk, I will explain how we generalize it to the weighted case and how it is related to KdV hierarchy. If time permitted, I will explain some possible applications. This is the joint work with Y.P. Lee.

Organizer: Jeng-Daw Yu