2. Title and Abstract

Zbigniew Blocki (Jagiellonian Univ.)
Title: Suita Conjecture and the Ohsawa-Takegoshi Extension Theorem
Abstract: Suita conjecture asked for the optimal lower bound for the Bergman kernel in terms of logarithmic capacity for domains on the plane. It turns out that it has some higher dimension analogues, one of them being the Ohsawa-Takegoshi extension theorem. Another one is a lower bound for the Bergman kernel in terms of the reciprocal of the volume of Azukawa indicatrix. Espacially interesting here seems the case of convex domains.

Junyan Cao (KIAS)
Title: Positivity of direct image and Iitaka's conjecture
Abstract: Let $f: X\rightarrow Y$ be a fibration between two projective manifolds. The Iitaka's conjecture states that the Kodaira dimension of X is larger than the sum of the Kodaira dimension of X and the Kodaira dimension of the generic fiber. By using some deep results in mixed Hodge theory, Kollar proved that the Iitaka's conjecture is true if the generic fiber is of general type. By using some recent analytic methods, we give an alternative proof of Kollar's result.
The advantage of our methods is that we can generalise it easily to the log canonical model case

Xiuxiong Chen(Stony Brook)
Title: On the Kaehler ricci flow.
Abstract: : This is a joint work with B. Wang and is based on the compactness of the moduli space of non-collapse Calabi Yau space with mild singularities. Our theory is a generalization of the well known theory of non-collapsed Kähler Einstein manifolds. As an application, we prove the Hamilton — Tian conjecture on the Kaehler Ricci flow, as well as the complete partial C^0 estimate of Tian for Kaehler metrics with Ricci bounded from below. Donaldson-Sun proved the partial C^0 estimate for Kahler Einstein metrics.

Young-Jun Choi (KIAS)

Title: Variations of Kähler-Einstein metrics on strongly pseudoconvex domains

Abstract: Let D be a smooth domain in $\mathbb{C}^{n+m}$ which satisfies that for each $s \in \pi(D)$, the fiber $D_s := \pi^{-1}(s)$ is a bounded strongly pseudoconvex domain with smooth boundary. A celebrated theorem of Cheng and Yau implies that on each fiber D_s there exists a unique complete Kähler metric $h_{\alpha\bar{\beta}}(z,s) := h^s_{\alpha\bar{\beta}}(z)$ which satisfies:

$$-(n+1)h_{\alpha\bar{\beta}}(z,s) = -\frac{\partial^2}{\partial z^\alpha z^{\bar{\beta}}} \log \det \left(h_{\gamma\bar{\delta}}(z,s) \right)_{1 \le \gamma, \delta \le n},$$

namely, the Ricci curvature is negative constant $-(n+1)$. This unique complete Kähler metric is called *Kähler-Einstein metric*. Hence on each fiber D_s,

$$\frac{1}{n+1} \log \det \left(h_{\gamma\bar{\delta}}(z,s) \right)_{1 \le \gamma, \delta \le n}$$

is a potential function of the Kähler-Einstein metric $h_{\alpha\bar{\beta}}$. Denote it by $h(z,s)$. Consider the function $h(z,s)$ on D. It is an immediate consequence of the Kähler-Einstein condition is that the restriction of H to each fiber D_s is strictly plurisubharmonic. But it is not obvious that it is also plurisubharmonic or strictly plurisubharmonic in base direction (s-direction).

In this talk, we discuss the plurisubharmonicity of $h(z,s)$ with respect to s-variable when the total space D is pseudoconvex.

Philippe Eyssidieux (Grenoble)

Title: Viscosity solutions for Complex Monge Ampère flows

Abstract: I will present my recent joint work with V. Guedj and A. Zeriahi math.CV:1407.2494, math.CV:1407.2504 which gives among other things a new approach to the results of Song and Tian on the Kahler-Ricci flow with singularities.

Kota Hattori (Keio University)

Title: A generalization of Taub-NUT deformations

Abstract: Taub-NUT metric on C^2 is a complete Ricci-flat Kaehler metric which is not flat. It is obtained by the Taub-NUT deformations of the Euclidean metric on C^2 using an S^1 action.

Taub-NUT deformations are known to be defined for toric hyperKaehler manifolds, and deform ALE metrics to non-ALE metrics.

In this talk, I explain a generalization of Taub-NUT deformations to the Hilbert schemes of points on C^2.

Hisashi Kasuya (Tokyo Institute of Technology)

Title: Hodge decomposition on solvmanifolds

Abstract: The purpose of this talk is to study cohomological Hodge decomposition on non-K"ahler complex manifolds. For this purpose, solvmanifolds (i.e. homogenous spaces of solvable Lie groups) are important objects. Computing de Rham, Dolbeault and Bott-Chern cohomologies, we study the Hodge decomposition on solvmanifolds.

By this study we will see some remarkable phenomena on Hodge decompositions on non-K"ahler complex manifolds.

In particular, we give non-KW"ahler solvmanifolds admitting the Hodge decomposition on the cohomology with normal coefficients but not admitting the Hodge decomposition on the cohomology with local coefficients."

Dano Kim (SNU)

Title: On the singularity of plurisubharmonic functions and their multiplier ideal sheaves

Abstract: A plurisubharmonic (psh) function plays an important role in the study of compact complex (projective) manifolds, appearing as a local weight function of a singular hermitian metric of a line bundle. In general, the singularity of a psh function f can be highly 'transcendental', but the multiplier ideal sheaves of positive multiples of f contain substantial algebraic information of the singularity, in particular the Demailly approximation of f by algebraic singularities.

We will first discuss recent results concerning monotone decreasing subsequences of this approximation. Then we will turn to the question about whether the data of all the multiplier ideal sheaves of positive multiples of f determines the singularity of f. This is answered negatively in a nontrivial sense using the example of Siu-type singular hermitian metrics of a line bundle. For this, the strong openness conjecture (recently proved by Guan-Zhou) is also used.

Kyounghee Kim (Florida State Univ.)

Title: Pseudo-automorphisms with no invariant foliation

Abstract: We will discuss an example of a birational transformation of a rational three fold for which the first and second dynamical degrees coincide and are >1, but which does not preserve any holomorphic (singular) foliation. This example provides a negative answer to the question of Guedj.

Long Li (Stony Brook)

Title: On the Uniqueness of singular Kaehler-Einstein equations

Abstract: Bando and Mabuchi proved the uniqueness of Kaehler-Einstein metrics on Fano manifolds up to a holomorphic automorphism in 1987. Then recently Berndtsson generalized the uniqueness result of Kaehler-Einstein metrics to bounded potentials. We give a new proof of Bando-Mabuch-Berndtsson's uniqueness theorem in a different aspect, based on a new technique developed from Chen's $C^{1,1}$ geodesic and Futaki's spectral formula. Finally, the uniqueness of the conical Kaehler-Einstein metrics will be discussed under the assumption of properness of twisted Ding-functional.

Yuji Odaka (Kyoto Univ.)

Title: Compactifications of Moduli of Kahler-Einstein manifolds via Gromov-Hausdorff limits.

Abstract: I have been imagining projective (coarse) moduli varieties of K-(semi)stable varieties ("K-moduli") but it looks rather hard to execute the construction in purely algebraic way. In this talk, via Gromov-Hausdorff limits, we compactify various moduli varieties. As a part, it includes the K-moduli construction of del Pezzo surfaces, studied together with C.Spotti and S.Sun. Modifying the idea crucially, I also introduce "Tropical Geometric compactification" of M_g, and A_g. They are NOT the K-moduli, as they are not even schemes. (Simply, the Deligne-Mumford compactification is the K-moduli). Some essential relations with the Minimal Model Program, tropical geometry (and Berkovich geometry) will be observed.

Sean Paul (Univ. Wisconsin)

Title: Semistable pairs and Applications.

Abstract: This talk will focus on the algebraic geometry and invariant theory that lies behind the finite dimensional restriction of Mabuchi's K-energy map.

Justin Sawon (Univ. North Carolina)

Title: Holomorphic Lagrangian fibrations.

Abstract: : In this talk we survey Lagrangian fibrations on holomorphic symplectic manifolds. We describe examples, existence of Lagrangian fibrations, the structure of singular fibres, the relation between dual fibrations, and finiteness results for Lagrangian fibrations.

Nessim Sibony (Orsay)

Title: Some recent results on (p,p) positive closed currents in compact Kähler manifolds.

Abstract: I will discuss various questions involving (p,p) positive closed currents.

1. Approximation of positive closed currents by appropriate smooth ones with mass control.

2. Moderate measures (they satisfy exponential estimates for p.s.h functions)

3. Super Potentials which permit to compute with (p,p) positive closed currents.

This is an example of analysis in an infinite dimensional space. The talk is based on joint work with T.C Dinh. Our motivation was frequently to solve a natural question in complex dynamics. It turned out that some developments in the theory of currents were needed. I will focus on the theory of currents.

Valentino Tosatti (Columbia Univ.)

Title: Kahler currents, null loci and the formation of singularities in complex geometry

Abstract: A result of Nakamaye states that the augmented base locus of a nef and big line bundle on a smooth projective variety over the complex numbers equals its null locus, i.e. the union of all irreducible subvarieties where the restriction of the bundle has volume zero. This was later extended to R-divisors by Ein-Lazarsfeld-Mustata-Nakamaye-Popa, and more recently there has been renewed interest in this theorem, especially in positive characteristic.

I will discuss a different extension of this theorem, to all nef real (1,1) classes on compact complex manifolds. I will also mention some of the consequences of this theorem, including a solution of a conjecture of Feldman-Ilmanen-Knopf which says that finite-time singularities of the Kahler-Ricci flow form along analytic subvarieties. This is joint work with Tristan Collins.

Kazushi Ueda (Osaka Univ.)

Title: Mirror symmetry and K3 surfaces

Abstract: Mirror symmetry is a mysterious relationship between complex geometry and symplectic geometry originating from string theory.

In the talk, we will discuss various results centered around mirror symmetry for K3 surfaces and mirror symmetry for singularities.

Bin Zhou (Beijing University)

Title: The Sobolev inequality for complex Hessian equations

Abstract: In this talk, we study the complex Hessian equations by an gradient flow method.

We prove a Sobolev inequality for k-plurisubharmonic functions analogous to that for real Hessian equations (Wang in Indiana Univ Math J 43:25–54, 1994; Lecture Notes in Mathematics, vol. 1977, 2009).