Title & Abstract

Garrett Alston

Title: Floer cohomology of real Lagrangians in the quintic

Abstract: The Fermat quintic 3-fold is a Calabi-Yau manifold and the set of real points forms a Lagrangian submanifold. Multiplying the coordinates by various fifth roots of unity leads to a family of 625 different Lagrangian submanifolds. I will show how to calculate the Floer cohomology between certain pairs of these Lagrangians.

Bo Berndtsson

Title: A generalization of the Bando-Mabuchi theorem to twisted Kahler-Einstein equations

Abstract: We use the method of geodesics in the space of Kahler metrics and our previous work on positivity of direct image bundles to give a new proof of the Bando-Mabuchi uniqueness theorem. This proof also gives a generalization stating uniqueness in the context of klt pairs.

Marco Brunella

Title: Foliations and non-Kählerian surfaces

Abstract: I will discuss the general problem of classifying non-Kählerian compact complex surfaces admitting a holomorphic (singular) foliation. I will sketch such a classification when the second Betti number of the surface is equal to 2, which is the first open case due to previous works by Inoue, Nakamura, Teleman and others.

Young-Jun Choi

Title : Differential geometric models in almost complex manifolds

Abstract : In 2005, families of new examples of homogeneous domains were presented by K. H. Lee---homogeneous in the sense that the action by their J-holomorphic automorphism group is transitive. To a surprise to many experts, such examples are almost-complex but not complex. They are complete Kobayashi hyperbolic, in the sense that the Kobayashi-Royden metric is well-defined, positive-definite and its integrated distance is Cauchy complete. Such examples were formerly expected to be non-existent, or if exist, they should be very rare, such as finitely many. But not only are there infinitely many such examples, but they form a continuous family when the dimension (of the manifold) is 6 or higher. We call such homogeneous domain model. In this talk, we introduce the models and discuss the differential geometry of the models. First we construct an invariant hermitian metric, which is turned out to be the Kobayashi-Royden metric. Next, we discuss the geometric invariants, such as holomorphic sectional curvature, torsion invariants, etc. Finally we discuss the characterization of the models with the invariants, as we mentioned.

Tien-Cuong Dinh

Title : Entropy and dynamical degrees for meromorphic maps **Abstract** : To each meromorphic self-map of a compact Kaehler manifold, we can associate a sequence of dynamical degrees which are bi-meromorphic invariants. A mixed version of the Hodge-Riemann theorem implies that this sequence is logconcave. We show that the topological entropy of the map is bounded by the logarithm of the maximal degree. We also study the maps preserving a fibration. As a consequence, we obtain that some class of "interesting" maps exists only on manifolds of Kodaira dimension 0 or minus infinity. A key point of the proof is a theorem on the regularization of positive closed (p,p)-currents. This talk is based on the works in collaboration with V.-A. Nguyen, N. Sibony and T.T. Truong.

Urs Frauenfelder

Title: Contacting the moon

Abstract: In joint work with Peter Albers, Gabriel Paternain and Otto van Koert we constructed a contact form for the restricted three body problem for energy values up to slightly above the first critical value. I explain the construction. Next I address the question of dynamical convexity of the problem and how holomorphic curve techniques can be used to obtain global surfaces of section.

Pak Tung Ho

Title: Results related to Yamabe problem and CR Yamabe problem **Abstract**: In this talk, I will talk about the Yamabe problem and CR Yamabe problem. I will mention the results about Yamabe flow and CR Yamabe flow, and the uniqueness of the Yamabe problem and the CR Yamabe problem.

Kang-Hyurk Lee

Title: On the bounded realization of unbounded models

Abstract: For the analysis and geometry of bounded domains in the complex Euclidean spaces, various types of models appear as unbounded domains. Two problems on the bounded realization of these unbounded models will be discussed in this talk. Especially, I will introduce my current result on the smoothly bounded realization of model domains defined by a weighted homogeneous polynomial.

An-Min Li

Title: The Extremal Kahler Metrics on Toric Surfaces

Abstract: The extremal metrics, introduced by E. Calabi, has been studied intensively in the past 20 years. We study this problem on toric varieties following the works of Donaldson. In particular, we prove the existence of the extremal metric when relative *K*-stability is assumed.

Toshiki Mabuchi

Title: Precompactness of the moduli space of test configurations **Abstract**: Precompactness of the moduli space of test configurations will be discussed. This in particular gives us a useful tool in studying the existence problem of extremal Kähler metrics.

Ngaiming Mok

Title : Analytic continuation for germs of holomorphic maps between bounded symmetric domains

Abstract : Bounded symmetric domains are the Harish-Chandra realizations of Hermitian symmetric manifolds of the semisimple and noncompact type as bounded domains, e.g., the complex unit ball is the Harish-Chandra realization in the rank-1 case. We will examine various techniques for the analytic continuation of germs of holomorphic maps satisfying certain geometric constraints. These contraints may arise from Algebraic Geometry or from Complex Differential Geometry. The case of \$f: (D;0) \to (\Omega;0)\$ between bounded symmetric domains \$D \Subset \Bbb Cⁿ\$ and \$\Omega \Subset \Bbb C^N\$ in their Harish-Chandra realization is of particular interest because of applications to the study of finite-volume quotients of bounded symmetric domains, which are quasi-projective manifolds very often corresponding to moduli spaces of algebro-geometric objects, and because the dual compact case is a prototype for the study of holomorphic maps between Fano manifolds of Picard number 1 equipped with varieties of minimal rational tangents. We will discuss (a) the extension principle for germs of holomorphic maps respecting geometric structures, where in the Hermitian locally symmetric case the geometric structure, which is defined by a reduction of the frame bundle, is equivalently defined by varieties of special tangent vectors, (b) Alexander-type extension theorems for irreducible bounded symmetric domains of dimension \$\ge 2\$ and of arbitrary rank with applications to the problem of characterization of holomorphic germs of measure-preserving maps, and (c) extension theorems for holomorphic isometries with respect to the Bergman metric up to normalizing constants, revolving around functional equations given by Calabi's notion of the {\it diastasis} and the use of extremal functions

Stefan Nemirovski

Title: Global extension of local CR-diffeomorphisms

Abstract: I will discuss global extendability of germs of CR-diffeomorphisms between real-analytic Levi non-degenerate hypersurfaces and related problems in complex and CR-geometry.

Nessim Sibony

Title: Holomorphic foliations by Riemann Surfaces.

Abstract: I will discuss some global results on possibly singular holomorphic foliations by Riemann Surfaces in compact complex manifolds. The results are also valid for laminations. The main example to have in mind is the foliation in the projective space, induced by a polynomial vector field in the affine space. The first result is a geometric ergodic theorem for hyperbolic foliations: averages on leaves converge towards a harmonic current directed by the foliation a.e. The second result is around the notion of hyperbolic entropy for a foliation. Both are joint work with T.C Dinh and V.A Nguyen.

Jian Song

Title: Kahler-Ricci flow and analytic minimal model progoram

Abstract: We will introduce the Kahler-Ricci flow on projective varieties with log terminal singularities in relation to the minimal model program and show how the flow can be weakly continued through singularities. In particular, we show that the Kahler-Ricci flow perform canonical surgeries on Kahler surfaces in the sense of Gromov-Hausdorff.

Song Sun

Title: Uniqueness of constant scalar curvature Kaehler metrics.

Abstract: Given a Kaehler class, a metric of constant scalar curvature(cscK) is known to be unique up to isomorphism, by Donaldson, Chen-Tian, and Mabuchi. So if such a metric exists, it can be viewed as a ``canonical" representative of the Kaehler class. We extend the above theorem to the case when there is a cscK metric adjacent to the Kaehler class.

Key tools in the proof include the infinite dimensional moment map picture of Fujiki and Donaldson, the Mabuchi-Semmes-Donaldson geometry of a Kaehler class, and two interpretations of the Calabi flow.

Shigeharu Takayama

Title: On higher direct images of twisted sheaves of differential forms.

Abstract: We consider a proper holomorphic map of complex manifolds, a relatively positive line bundle, and then direct image sheaves of sheaves of differential forms twisted with the relatively positive line bundle. We will discuss the torsion freeness, local freeness, and positivity of the direct image sheaves.

Dima Tamarkin

Title : Contact non-squeezability via microlocal analysis

Abstract : Using microlocal analysis of sheaves on Re^n we prove a generalization of a theorem by Eliashberg-Kim-Polterovich on contact non-squezability of B \times S^1 \subset $Re^{2n} \$ times S^1 where B is a ball of radius more than 1 in Re^{2n} .

Andrei Teleman

Title: Towards the classifications of class VII surfaces. New approaches, new results. **Abstract:** We review the program developed by the author to prove existence of curves on class VII surfaces using instanton moduli spaces, and the results obtained for \$b_2\leq 2\$. We present partial results obtained for higher \$b_2\$ and the challenges which have to be overcome in order to apply successfully this program in the general case. We also discuss conjectured geometric properties of the known class VII surfaces, properties which, we believe, are essential for completing the classification.

Hajime Tsuji

Title: Relative Kaehler -Ricci flow and the Ricci iterations

Abstract: In this talk I would like to explain the fact that the Relative Kaehler -Ricci flow preserves the semipositivity on the total space beyond the Kaehler cone. The method uses the convergence of the certain Ricci iterations to the Kaehler -Ricci flow and the decomposition of the Ricci iteration in terms of the dynamical systems of Bergman kernels. The main aim to prove such a semipositivity theorem is to prove the invariance of plurigenera in the case of the Kaehler fibrations.

Dan Zaffran

Title: Foliations modelling nonrational toric varieties.

Abstract: Toric varieties are in one-to-one correspondence with rational fans. This establishes a useful bridge between algebraic geometry and convex geometry. Algebraic geometers can translate many problems into statements which are more aenable to computations. Conversely, and even more remarkably, some combinatorial questions can be successfully reformulated in algebraic geometric terms. I will describe a model of toric varieties associated to nonrational fans, with supporting evidence that the rich interplay between algebraic and convex geometries carries over. This is a joint work with F. Battaglia.