

KASS 2012

October 17, 2012, 13.15

Julius Ross (University of Cambridge): *Balanced metrics on Higgs bundles.*

October 11, 2012, 14.15

Tomoyuki Hisamoto (University of Tokyo): *On the limit of spectral measures associated to a test configuration.*

Abstract: For a given polarized manifold, it is known that a kind of special degeneration with a compatible torus action can be seen as an weak geodesic ray in the space of Kähler metrics. It is now called a test configuration. We show that taking high powers of the line bundle on the the central fiber, the normalized spectral measure of the induced action converges to the norm of the tangent vector of the weak geodesic ray.

October 11, 2012, 13.00

Robert Berman (Göteborg): *A primer on K-stability and test configurations.*

Abstract: In this talk I will give an introduction to the notion of K-stability of a polarized projective algebraic variety X . This is an algebro-geometric notion which is conjecturally equivalent to the existence of a constant scalar curvature Kähler metric on X in the class of the given polarization). In a nut shell, X is K-stable if for any (non-trivial) algebraic deformation Y of X called a "test configuration", the corresponding Donaldson-Futaki invariant $DF(Y)$ is negative. The invariant $DF(Y)$ was originally defined as a weight, in the spirit of Geometric Invariant Theory, but it has recently been given a purely intersection theoretic formulation that I will explain. I will also recall how a test configuration gives rise to a (weak) geodesic in the space of Kähler metrics.

October 10, 2012, 10.00

Jean Ruppenthal (University of Wuppertal): *L^2 -extension of cohomology classes from a non-regular divisor.*

Abstract: I will report on a joint project with Elizabeth Wulcan and Håkan Samuelsson-Kalm. Recently, Bo Berndtsson generalized the Ohsawa-Takegoshi-Manivel L2-extension theorem for holomorphic functions to the case of dbar-closed forms of higher degree. He proved an L2-extension theorem for dbar-closed forms from a smooth divisor in a compact manifold with good (i.e. universal) L2-estimates under very mild natural positivity assumptions.

We are interested in the extension of L2-cohomology classes also from a non-regular divisor Y (in a compact manifold X). In that case, one first needs to address the question what kind of forms shall be extended and how forms on X shall be linked to the given form on Y . For this purpose, we prove an adjunction formula for the Grauert-Riemenschneider canonical sheaf of the singular variety Y . This formula can be used to set up a bimeromorphically invariant form of the extension problem. By a resolution of singularities, we can thus reduce the problem to the smooth case (treated by Berndtsson), and obtain an L2-extension theorem under quite mild positivity assumptions (but without universal estimates).

September 26, 2012, 14.00

Henri Guenancia (Paris VI)

Abstract: Let X be a projective manifold, and D a simple normal crossing divisor. If we assume that $K_X + D$ is ample, then there exists a unique complete Kähler metric on $X \setminus D$ with Ricci curvature equal to -1 , and moreover this metric has "Poincaré-type" growth at infinity (Kobayashi '84, Tian-Yau '87).

We will explain this theorem and give a generalization to negatively curved Kähler-Einstein metrics with so-called mixed cone and Poincaré growth at infinity.

September 19, 2012, 10.00

Richard Lärkäng (Göteborg): *Residue currents with prescribed annihilator ideals on singular varieties.*

Abstract: The duality theorem for Coleff-Herrera products states that the annihilator of the Coleff-Herrera product of a complete intersection f on a complex manifold equals the ideal generated by f . This was proven independently by Passare and by Dickenstein and Sessa.

Given an arbitrary ideal J on a complex manifold, Andersson and Wulcan constructed a current R^J such that its annihilator equals J , generalizing the duality theorem. I will describe how one can construct

such a current also on a singular variety, mainly by focusing on special cases.

June 7, 2012, 10.00

Doung Hong Phong (Columbia): *Maximum Rank Properties for Degenerate Fully Non-Linear Equations.*

Abstract: Structure conditions for solutions of elliptic equations to have constant rank are now well-known. However, the situation for degenerate, fully non-linear equations is still obscure. We discuss some low-dimensional cases for two equations of interest in geometry, namely the real Monge-Ampère equation and the Donaldson equation.

May 30, 2012, 10.00

Pascal Thomas (Toulouse): *Limits of multipole pluricomplex Green functions.*

Abstract: Let Ω be a bounded hyperconvex domain in \mathbb{C}^n , containing the origin. Let S_ε be a family of N poles in Ω . The pluricomplex Green function for S is the largest non positive plurisubharmonic function on Ω with logarithmic singularities at the points of S .

Suppose we have a family $(S_\varepsilon)_\varepsilon$ of sets of poles, all tending to the origin as ε tends to 0. To each S_ε we associate its vanishing ideal \mathcal{I}_ε .

Suppose that, as ε tends to 0, $(\mathcal{I}_\varepsilon)_\varepsilon$ converges to \mathcal{I} (local uniform convergence). Green functions can be associated to ideals in a natural way. Then $(G_\varepsilon)_\varepsilon$ converges to $G_{\mathcal{I}}$ if and only if \mathcal{I} is a complete intersection ideal (i.e. admitting n generators, or such that its Hilbert-Samuel multiplicity is equal to its codimension).

Working out the case of $N = 3$ points yields an interesting example about the computation of the Green function from analytic disks. We discuss further aspects of the case of non complete intersection.

May 9, 2012, 10.00

David Witt Nyström (Göteborg): *Short-time existence of Hele-Shaw flow in a medium with varying permeability.*

Abstract: The talk is based on joint work with Julius Ross.

Hele-Shaw flow models the propagation of a fluid confined between two parallel plates a small distance apart. In the classical setting one disregards surface tension, and one lets the continuous injection or suction of fluid at a fixed point be the driving force. Short-time existence of Hele-Shaw flow when the starting domain has real analytic

boundary was proved by Kufarev and Vinogradov in 1948, and the general smooth case was settled in the 90's.

Hedenmalm and Shimorin have studied the analog Hele-Shaw flow on a Riemann surface. This also goes under the name of elliptic growth of Beltrami type, and physically it corresponds to the fluid propagating through a medium with varying permeability. In their 2002 paper Hedenmalm-Shimorin proved the short-time existence of this flow for real analytic data.

I will present a proof of the short-time existence in the general smooth setting. In addition to classical complex analysis the proof relies on ideas coming from symplectic topology.

April 4, 2012, 10.00

David Witt Nyström (Göteborg): *Symmetries related to Okounkov bodies.*

Abstract: I will discuss some joint work with Julius Ross.

In toric geometry, line bundles are associated with polytopes. In 1996 Andrei Okounkov found a way to generalize this, so that any ample line bundle L gets an associated convex body, called the Okounkov body.

However, while the toric construction encodes the symplectic geometry of the variety, Okounkov's construction is of a purely algebro-geometric nature. We wonder if there is a corresponding symplectic interpretation of the Okounkov body, involving the symplectic form defined by the curvature form of a fixed metric on L , as there is in the toric case?

By setting up a certain homogeneous Monge-Ampère equation, we show that we can accomplish this, given some regularity assumptions on the solutions to the HMAE. In one dimension the problem is equivalent to finding a solution to the Hele-Shaw flow. Recall that this flow describes the propagation of a fluid being injected in between two plates close to each other.

March 14, 2012, 10.00

Johannes Lundqvist (Stockholm): *A cohomological residue and a local duality theorem for ideals of pure dimension.*

Abstract: In this talk we discuss a generalization of the classical Grothendieck residue, the cohomological residue of Passare and the local duality theorem. Remember that the local duality theorem says that the residue associated to an ideal is annihilated exactly by that ideal. The main point is that one can prove such a theorem with rather elementary methods, i.e., avoiding the desingularization theorem of Hironaka, even when the ideal is not a complete intersection. We will mainly focus on

the special case when the variety associated to the ideal is a point but also discuss what the difference is when one consider more general ideals.

March 7, 2012, 10.00

William Alexandre (Lille): *Extension of holomorphic functions defined on singular analytic sets.*

Abstract: During this talk we will discuss necessary conditions and sufficient conditions under which a holomorphic function defined on the intersection of a singular analytic set and the unit ball B of C^n admits a holomorphic extension to D which belongs to $L^q(D)$ or $BMO(D)$.
