KASS 2011

November 23, 10.00

Jacob Sznajdman (Göteborg): *Invariants of analytic curves and the Briancon-Skoda theorem.*

Abstract: The Briancon-Skoda number of an analytic curve at a point p, is the smallest integer k such that for any holomorphic function g on the curve, $|f| \leq C|g|^k$ implies that $f \in (g)$, where f, g are viewed as elements of $\mathcal{O}/I(C)$. We present a formula for the Briancon-Skoda number in terms of Puiseux's invariants.

November 16, 10.00

Richard Lärkäng (Göteborg): *A homotopy formula for Andersson-Wulcan currents, and the transformation law.*

Abstract: Given a tuple f of holomorphic functions, there is a current associated to f called the Coleff-Herrera product. If f and g are two tuples of holomorphic functions defining complete intersections, and the ideal generated by f is included in the ideal generated by g, this gives a relation between the Coleff-Herrera products of f and g known as the 'transformation law'.

Andersson and Wulcan introduced a generalization of the Coleff-Herrera product, which are certain currents associated to generically exact complexes of vector bundles. By considering morphisms of such complexes, one gets a homotopy formula involving the currents associated to the complexes.

I will start by describing the transformation law for Coleff-Herrera products, and then discuss how the homotopy formula gives a generalization of this to certain Andersson-Wulcan currents. I will also briefly mention other applications of the homotopy formula.

October 11, 13.15

Jean Ruppenthal (University of Wuppertal): *A canonical sheaf on singular complex spaces.*

Abstract: Our general purpose is to understand the L2 Dolbeault cohomology of a singular Hermitian complex space X in the following sense: use a resolution of singularities to find a "smooth representation" of the L2 cohomology. More precisely, find a resolution p: M ->

X and a holomorphic line bundle L on M such that the L2 Dolbeault cohomology on X is canonically isomorphic to the the L2 Dolbeault cohomology on M with values in the line bundle L.

In this talk, I will present a central tool which is quite useful for this problem, namely the canonical sheaf of square-integrable holomorphic n-forms with some (Dirichlet) boundary condition at the singular set of X (let X be of pure dimension n). This coherent sheaf differs from the usual notions of canonical sheaves on singular spaces. It has a nice representation in terms of a resolution of singularities and a nice resolution by a complex of fine L2 sheaves (if we restrict our attention to spaces with only isolated singularities). I will point out how we can use this canonical sheaf to treat the problem stated above on Hermitian spaces with isolated singularities.

June 1, 10.00

Rodrigo Parra (University of Michigan / KTH): *Equidistribution towards the Green current.*

Abstract: A classic problem in complex dynamics, in the context of the Fatou-Julia theory, is to find conditions for the convergence towards the Green current of pullbacks of positive closed (1,1)-currents. More precisely, given a holomorphic self-map f of complex projective space of degree d larger than one, and given any positive closed (1,1)-current S of mass 1, when does the sequence $d^{-n}(f^n)^*S$ converges to the Green current?

This problem was completely solved in dimension one by Lyubich and Freire-Lopes-Mañe in '83 and in dimension two by Favre-Jonsson in '03. The higher dimensional case is still open but a great deal of progress has been made, particularly by Dinh, Fornaess and Sibony. In this work, we prove that there exists a finite collection of totally invariant algebraic sets with the following property: given any positive closed (1,1)-current of mass 1 with no mass on any element of this family, the sequence of normalized pull-backs of the current converges to the Green current, improving all known results by the author. Under suitable geometric conditions on the collection of totally invariant algebraic sets, we prove an even sharper equidistribution result.

May 25, 10.00

Florian Pokorny: *Toric Bergman Kernels with vanishing.*

Abstract: Let $(L, h) \to (X, \omega)$ be a toric polarization of a toric Kähler manifold X of complex dimension n. For each $k \in N$, the fibre-wise Hermitian metric h^k on L^k induces a natural inner product on the

vector space of smooth global sections of L^k by integration with respect to the volume form $\frac{\omega^n}{n!}$. The orthogonal projection from smooth to holomorphic sections of L^k is represented by the Bergman kernel B_k whose asymptotics as $k \to \infty$ are of interest in Kähler geometry. Let $Y \subset X$ be a toric submanifold. We study a generalization of the Bergman kernel on toric Kähler manifolds by considering the kernel representing the projection which maps smooth sections of L^k onto holomorphic sections of L^k with vanishing to order lk along Y (for some fixed parameter $l \in N$) and motivate how the asymptotics of such kernels are related to a notion of slope stability defined by Ross-Thomas.

May 18, 15.00

Yusuke Okuyama (Inst. Math. Jussieu (IMJ)): *The density problem on repelling periodic points of non-archimedean rational functions.*

Abstract: It is an open problem whether classical repelling periodic points are dense in the classical Julia set of a rational function over non-archimedean fields. In this talk, we give a partial positive answer to this question based on a study of "logarithmic equidistribution" on Berkovich projective line over non-archimedean fields.

May 18, 10.00

August Tsikh (Krasnoyarsk): *Amoebas of complex hypersurfaces and quantum thermodynamics.*

April 27, 10.00

Laszlo Lempert (Purdue): *Improper direct images.*

April 6, 10.00

David Witt Nyström (Göteborg): *Geodesic rays in the space of metrics on a line bundle.*

March 23, 10.15

Robert Berman (Göteborg): *On the existence of Kähler-Einstein metrics with conic singularities.*

Abstract: While the existence problem for Kähler-Einstein metrics with non-negative Ricci curvature was settled in the seventies (Yau, Aubin) the positive case has remained open. According to the Yau-Tian-Donaldson conjecture the existence of such a metric on a manifold X should be equivalent to X beeing a stable Fano manifold in a suitable algebro-geometric sense.

In a very recent program Donaldson suggested to attack this conjecture by first constructing Kähler-Einstein metrics with conic singularites along a given divisor D in X.

In particular, he conjectured the existence of such a metric on any Fano manifold. In this talk I will explain how to prove this latter conjecture using the alpha-invariant (log canonical threshold) of the pair (X,D).

March 16, 10.00

Håkan Samuelsson (Oslo): *Uniform algebras and approximation on manifolds.*

Abstract: Wermer's maximality theorem states that if f is a continuous function on the boundary of the disc $\Delta \subset \mathbb{C}$, then either f is the boundary values of a holomorphic function on Δ or the uniform algebra generated by f and the complex variable z on the boundary $\partial\Delta$ equals the algebra of all continuous on $\partial\Delta$. Closely related is following result of Chirca: If f is harmonic but not holomorphic on Δ and continuous up to the boundary, then the uniform algebra generated by f and z on $\overline{\Delta}$ equals $C^0(\overline{\Delta})$. I will discuss generalizations of these results to several complex variables. At the core of the proofs is an approximation result on polynomially convex stratified totally real sets in $\mathbb{C}^n$.

This is joint work with Erlend Fornaess Wold.

March 9, 10.00

Yuji Odaka: *Alpha invariant, Seshadri constant and K-stability of Fano manifold.*

Abstract: G.Tian introduced the "alpha invariant" of Fano manifold, whose lower bound gives a sufficient and effective condition of existence of "Einstein-Kahler metric". On the other hand, "K-stability" of Fano manifolds (or more generally for any polarized varieties) is introduced with an expectation to be the equivalent and algebraic condition of the existence of Einstein-Kahler metric.

In the talk, we will give a direct algebraic proof that the lower bound of alpha invariant implies the K-stability of Fano manifold, via taking a relation with "Seshadri constant" into account. Further results via Seshadri constants are expected, which I will also explain as a work in progress.

This is a joint work with Yuji Sano (Kyushu university).

February 23, 10.00

Nikolay Scherbina (Wuppertal): *On defining functions for unbounded pseudoconvex domains.*

Abstract: We discuss possible generalizations of the notion of a defining function to the case of unbounded strictly pseudoconvex domains. In some examples related to this problem so called Wermer type sets will play a role. A version of the Liouville theorem for such sets will be also established.

February 16, 10.00

Maria Roginskaya (Göteborg): *Flowability of planar homeomorphisms.*

Abstract: The talk is about a real phenomenon which has some similarities to the complex problem of foliations. I will discuss under which conditions a planar homeomorphism can be a time-1 state of a flow of homeomorphisms (i.e. a group parametrised by R).

January 26, 10.00

Dennis Eriksson (Göteborg): *Around the Quillen metric: monodromy and discriminants.*

Abstract: The Quillen metric is a natural metric on a certain determinant line bundle associated to smooth families of proper Kähler manifolds. This talk talks about what happens to the metric, in the case of families of curves, whenever the family degenerates into a non-smooth fiber. The metric will then have a certain singular part and a continuous part. Both of them have geometric interpretations in terms of geometric invariants of the singularities which I will explain. This generalizes and makes more precise results of Bismut-Bost and Yoshikawa.
