Several Complex Variables - The Nordic Covid Sessions II

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SPEAKERS:

- Mingchen Xia
- Lars Martin Sektnan
- Alan Sola
- Alexander Rashkovski
- Erik Løw
- Viktor Balch Barth
- Boris Kruglikov
- Andrea Santi
- Nicholas Aidoo

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The Nordic Covid Sessions II - FALL 2021			
	Thursday	**Friday**	**Saturday**
10:15-11:00		Xia	Aidoo
11:15-12:00		Sektnan	Løw
12:00-13:15		Lunch Break	Lunch Break
13:15-14:00		Rashkovski	
14:15-15:00	Kruglikov	Barth	
15:15-16:00	Santi		
16:15-17:00	Sola		

Xia

Title: Analytic Bertini theorem

Abstract: Consider a projective manifold X and a free linear system Lambda on X, the classical Bertini theorem tells us that a general divisor in Lambda is smooth. A natural pluripotential-theoretic analogue of this problem is to relate properties of a quasi-plurisubharmonic function on X and properties of its restriction to a general divisor in Lambda. In this talk, I will explain how to derive a Bertini type theorem for multiplier ideal sheaves based on the positivity of direct images.

Sektnan

Title: Blowing up extremal Kähler manifolds

Abstract: Extremal Kähler metrics were introduced by Calabi in the 1980's as a type of canonical Kähler metric on a Kähler manifold, and are a generalisation of constant scalar curvature Kähler metrics in the case when the manifold admits automorphisms. A natural question is when the blowup of a compact manifold in a point admits an extremal Kähler metric. We completely settle the question in terms of a finite dimensional moment map/GIT condition, generalising work of Arezzo-Pacard, Arezzo-Pacard-Singer and Szekelyhidi. Our methods also allow us to deal with a certain semistable case that has not been considered before, where the original manifold does not admit an extremal metric, but is infinitesimally close to doing so. As a consequence of this, we solve the first non-trivial special case of a conjecture of Donaldson. This is joint work with Ruadhaí Dervan.

Sola

Title: Local theory for stable polynomials and bounded rational functions of several variables

Abstract: Reporting on joint work with K. Bickel, G. Knese, and J.E. Pascoe, I will present a detailed local analysis of stable polynomials on product domains. This local theory can then be applied to the study of boundary regularity properties of bounded rational functions of several variables. I will discuss some sample results in this direction.

Rashkovski

Title: Residual plurisubharmonic functions

Abstract: For any negative psh function on a bounded domain of $\mathbb{C}^n$, we construct a psh function determined by the asymptotical behavior of the given function near its singularity points, both inside the domain and on its boundary. We study properties of such residual functions and their relations to asymptotic psh rooftops. The considerations are motivated by a problem on when two given psh functions can be connected by a psh geodesic.

Løw

Title: Factorization of Symplectic Matrices

Abstract: We prove various results on factorization of symplectic matrices with entries in a ring R in elementary factors. Of particular interest are rings of holomorphic functions on a Stein space. Joint work with B. Ivarsson and F. Kutzschebauch.

Barth

Title: Surjective algebraic maps onto algebraically subelliptic manifolds

Abstract: We consider the problem of whether there exist surjective (and strongly dominating) algebraic maps from $\mathbb{C}^n$ onto an algebraically subelliptic manifold X. Due to Forstnerič, this is true when restricting to compact manifolds X, as well as when considering the analogous problem in the holomorphic category. We obtain some partial results by constructing an algorithm for generating explicit examples of surjective algebraic maps from $\mathbb{C}^n$ to noncompact algebraically subelliptic manifolds X.

Kruglikov

Title: Blow up and infinitesimal automorphisms of CR-manifolds

Abstract: Let M be a real-analytic connected CR-hypersurface having points of Levi-nondegeneracy but not spherical everywhere. In the talk I will show effective bounds on infinitesimal symmetry dimension as well as dimension of the automorphism group G of M and exhibit examples realizing those.

Santi

Title: On homogeneous k-nondegenerate CR manifolds

Abstract: In this talk, I will report on a method for building homogeneous manifolds with an invariant k-nondegenerate CR structure of hypersurface type. I will explain how to combine the Tanaka and Freeman filtrations of a CR manifold $(M, \mathcal{D}, \mathcal{J})$ into a single filtration and construct an associated pointwise invariant $\mathfrak{m}_x = \mathfrak{m}_x^{-2} \oplus \mathfrak{m}_x^{-1} \oplus \mathfrak{m}_x^0 \oplus \cdots \oplus \mathfrak{m}_x^{k-2}$, called the core at the point $x \in M$. The collection of all Levi forms $\mathcal{L}^{p+1}$ of higher degree induces operators L^{p+1} on $\mathfrak{m}_x$ but, in sharp contrast with the Levi nondegenerate case, the core does not possess any Lie algebra structure and the problem of constructing homogeneous CR manifolds $M = G/H$ with a prescribed core is more subtle.

The method is a generalization of Tanaka's construction of homogeneous models via prolongation of negatively-graded Lie algebras. We will recognize the L^{p+1}'s as defining components of Weisfeiler infinite-dimensional contact algebra $\mathfrak{c}$ and endow $\mathfrak{c}$ with a natural structure of a CR algebra. The germ of $M = G/H$ is then obtained as an appropriate CR subalgebra $\mathfrak{g}$ of $\mathfrak{c}$ that prolongs $\mathfrak{m}_x$. In the second part of the talk, I will consider applications in dimension $\dim M = 7$. I will present the classification of the 2-nondegenerate cores up to isomorphism and obtain seven not locally CR diffeomorphic homogeneous CR manifolds with given cores. Finally, there exists a 7-dimensional $M = G/H$ corresponding to the unique 3-nondegenerate core.

Aidoo

Title: The Catlin Multitype of Sums of Squares Domains

Abstract: We describe the Kolar algorithm for the computation of the Catlin multitype when all its entries are finite and apply it to a class of manifolds given by sums of squares of holomorphic functions (boundaries of so-called special domains introduced by J.J. Kohn). We show that the polynomial model obtained from the computation of the multitype at the origin of such a domain is likewise a sum of squares domain. Next, we give an algebraic reformulation of the Kolar algorithm in terms of the corresponding ideals of holomorphic functions and also show that the multitype is an ideal invariant. Finally, an approach that explicitly construct the polynomial transformations needed in the Kolar algorithm to compute the multitype will be presented.