NORDAN 26

Nordic Complex Analysis Meeting

Hella, Iceland – May 23-25, 2025

Nice text in a box

Organizers:

- Benedikt Steinar Magnússon, University of Iceland
- Álfheiður Edda Sigurðardóttir, IMFM, Ljubljana
- Bergur Snorrason, University of Iceland
- Gianmarco Brocchi, University of Iceland

Mats Andersson

Singular metrics on holomorphic vector bundles

Let $E \to X$ be a holomorphic vector bundle over a complex manifold X. I will discuss how one can define Chern form, Segre form and curvature tensor, associated with a class of singular metrics on E. I will also present some recent results in joint works in progress with Kalm, Lärkäng, and Sera.

Daniel Barlet

Geometric flatness: from the proper case to the non proper case

After recalling the case of proper maps, I shall discuss the non proper case giving a survey of our recent work with Jon Magnusson on the use of finite type cycles in complex geometry.

Gianmarco Brocchi

Progress on the Kate square root estimate

The Kato square root estimate is a L^2 inequality concerning perturbations of the Laplacian. While the one-dimensional case was established in the 1980s by Coifman, McIntosh, and Meyer, the higher-dimensional extension — where the perturbation takes the form of a matrix-valued function A in the divergence-form operator $-\mathrm{div}(A\nabla)$ — remained open for two more decades.

In this talk, I will introduce the Kato square root estimate and describe the *first-order method*, a technique that reduces the second-order operator $-\mathrm{div}(A\nabla)$ to a first-order, bisectorial operator DB. This method exploits a connection between harmonic and holomorphic extensions and allows us to rewrite the original estimate as a question about the boundedness of the holomorphic functional calculus for DB.

I will also present recent results in the theory, including extensions to Riemannian manifolds and to operators with *degenerate coefficients*, where the matrix $A(x)$ may lack uniform bounds or accretivity and can exhibit singular behaviour. What types of singularities can be handled? On which classes of manifolds? And in Euclidean space, can one treat anisotropic singularities, namely those that vary with direction?

New results are part of ongoing joint work with Andreas Rosén.

Finnur Lárusson

Holomorphic and algebraic immersed curves directed by a flexible cone

I will describe recent joint work with Antonio Alarcón (Crelle 2025) and Alarcón and Franc Forstnerrič (arXiv 2024). We investigate immersed complex curves in complex affine space, directed by a cone A satisfying one of the flexibility properties that are studied in Oka theory. When A is the so-called null quadric, such curves play a fundamental role in the theory of minimal surfaces. There are other important examples. We are interested in approximation and interpolation theory for such curves, as well as the "rough shape" of the space of all curves. I will review results from 5-10 years ago in the holomorphic case and then describe our recent results in the algebraic setting, where obstacles not present in the holomorphic case arise.

Arkadiusz Lewandowski

Exposing type results for smoothly bounded (strictly) pseudoconvex domains

It is well known that every boundary point of a strictly pseudoconvex domain admits an exposing mapping. We shall discuss the difficulties, possibilities, and tools that appear when trying to extend this kind of result beyond the class of strictly pseudoconvex smoothly bounded domains.

Jouni Rättyä

Carleson measures for Bergman spaces

A positive Borel measure μ on the unit disc is called the q-Carleson measure for the Bergman space A^p_ω if the idenity mapping from A^p_ω to the Lebesgue space L^q_μ is bounded. In this talk we give an overview of these measures in the case when ω is a radial doubling weight in the unit disc and show a number of applications of these measures. At the end of the talk we pose a few open problems related to the less understood case of non-radial weights.

Tyson Ritter

A Rudin-Carleson theorem with Runge approximation for maps into Oka manifolds

Given a closed set $E \subset \partial\mathbb{D}$ of measure zero and a continuous function $\varphi : E \to \mathbb{C}$, the classical Rudin-Carleson theorem states that there exists a continuous function $F : \overline{\mathbb{D}} \to \mathbb{C}$ that is holomorphic on $\mathbb{D}$ and satisfies $F|_E = \varphi$. In this talk I will present a generalisation of the Rudin-Carleson theorem for maps into Oka manifolds that additionally includes approximation on compact subsets $K \subset \mathbb{D}$ without any holes

and interpolation at a point $c \in \mathbb{D}$. This is joint work in progress with Benedikt Magnússon (University of Iceland).

Olof Rubin

Chebyshev polynomials on equipotential curves

Given a compact set $K \subset \mathbb{C}$, a Chebyshev polynomial is a monic polynomial that minimizes the supremum norm on K. When K is infinite such a polynomial exists uniquely for each degree. Although there are no explicit formulas for computing Chebyshev polynomials, they can be studied through families of near-minimal polynomials. One such family is that of Faber polynomials, which arise naturally from the conformal map of the complement of K onto the exterior of the unit disk. In this talk, I will present recent results establishing connections between Chebyshev and Faber polynomials on equipotential curves.

Sibel Şahin

Approximation Numbers: From Kolmogorov Numbers to Differences of Composition Operators

Joint work with Frédéric Bayart of Laboratoire de Mathématiques Blaise Pascal.

In this talk we will first consider various singular numbers of operators which happen to be equivalent in the Hilbert space setting. Through Kolmogorov numbers we will first see how these singular entities for composition operators relate to complex potential theory, namely Monge-Amp‘ere capacity. In the second part we will relate the component structure of bounded composition operators to the function theoretic properties of the symbols and for this we will focus on the approximation numbers of differences of composition operators. We will see how one can obtain optimal upper and lower bounds for approximation numbers of differences using classical singular invariants like Bernstein and Gelfand numbers and specific choices of Blaschke products from the underlying function space.

Literature

G. Lechner, D. Li, H. Queffélec, L. Rodriguez-Piazza
Approximation numbers of weighted composition operators
Journal of Functional Analysis 274, 1928–1958 (2018)

J. Moorhouse, C. Toews *Differences of composition operators*
Contemporary Mathematics 321, 207–213 (2003)

H. Queffélec, K. Seip *Decay rates for approximation numbers of composition operators*

Journal d'Analyse Mathématique 125, 371–399 (2015)

Nordan - Nordic Complex Analysis Meeting			
	Year	Location	Organizers
1	1997	Trosa	Stockholm University
2	1998	Marstrand	Chalmers University of Technology/ University of Gothenburg
3	1999	Saltsjöbaden	Stockholm University
4	2000	Örnköldsvik	Mid Sweden University/Umeå University
5	2001	Voksenåsen	University of Oslo
6	2002	Reykjavik	University of Iceland
7	2003	Visby	Stockholm University
8	2004	Nösund, Orust	Chalmers University of Technology/ University of Gothenburg
9	2005	Sigtuna	Uppsala University
10	2006	Sundsvall	Mid Sweden University/Umeå University
11	2007	Drøbak	University of Oslo
12	2008	Mariehamn, Åland	Stockholm University - Part of the Mittag-Leffler program
13	2009	Reykholt	University of Iceland
14	2010	Lökeberg	Chalmers University of Technology/ University of Gothenburg
15	2011	Röstånga	Lund University
16	2012	Kiruna	Mid Sweden University/Umeå University
17	2013	Svolvær	University of Oslo
18	2014	Luminy	CIRM - Nordan+Kawa
19	2015	Reykjavik	University of Iceland
20	2016	Stockholm	Part of the 27th Nordic Congress of Mathematics
21	2017	Tollered	Chalmers University of Technology/ University of Gothenburg
22	2018	Hjelmeland	University of Stavanger
23	2019	Lunteren	University of Amsterdam
24	2023	Rydebäck	Lund University
25	2024	Östanskär	Mid Sweden University/Umeå University
26	2025	Hella	University of Iceland

KAUS - Complex Analysis without Seniors			
	Year	Location	Organizers
1	2005	Umeå	Umeå University
2	2006	Göteborg	Chalmers University of Technology/ University of Gothenburg
3	2007	Sundsvall	Mid Sweden University
4	2007	Stockholm	Stockholm University
5	2009	Reykjavík	University of Iceland
6	2010	Umeå	Umeå University
7	2010	Göteborg	Chalmers University of Technology/ University of Gothenburg
8	2024	Östanskär	Mid Sweden University/Umeå University
9	2025	Reykjavík	University of Iceland