

NORDAN 26

Nordic Complex Analysis Meeting

Hella, Iceland – May 23-25, 2025



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Nice text in a box

Program

Friday, May 23rd

18:00 - 20:00 *Bus trio to Hella*

Saturday

09:00 - 09:50 FINNUR LÁRUSSON

09:50 - 10:20 *Break*

10:20 - 11:10 DANIEL BARLET

11:10 - 12:00 ARKADIUSZ LEWANDOWSKI

12:00 - 13:00 *Lunch*

13:00 - 13:50 MATS ANDERSSON

15:00 *Excursion*

Sunday

09:00 - 09:50 OLOF RUBIN

09:50 - 10:20 *Break*

10:20 - 11:10 GIANMARCO BROCCHI

11:10 - 12:00 SIBEL ŞAHİN

12:00 - 13:00 *Lunch*

13:00 - 13:50 TYSON RITTER

13:50 - 14:40 JOUNI RÄTTYÄ

16:00 - 18:00 *Bus trip to Reykjavík*

Organizers:

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

GIANMARCO BROCCHI

Progress on the Kato 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 $-\operatorname{div}(A\nabla)$ — 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 $-\operatorname{div}(A\nabla)$ 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.

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_ω^p if the identity mapping from A_ω^p to the Lebesgue space L_μ^q 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 $\varphi : E \rightarrow \mathbb{C}$, the classical Rudin-Carleson theorem states that there exists a continuous function $F : \overline{\mathbb{D}} \rightarrow \mathbb{C}$ 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).

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.

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.

SIBEL ŞAHİN

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-Ampère 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)

MATS ANDERSSON

Singular metrics on holomorphic vector bundles

Let $E \rightarrow X$ 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.

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.

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 Forstnerič (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.

Participants

Alexander Rashkovskii - *Universitetet i Stavanger*
Ai My Aleksandra Le - *Lund University*
Álfheiður Edda Sigurðardóttir - *IMFM, Ljubljana*
Andreas Lind - *Mittuniversitetet*
Antti Perälä - *Umeå University*
Arkadiusz Lewandowski - *Jagiellonian University*
Atte Pennanen - *University of Eastern Finland*
Aurélio Menegon Neto - *Mittuniversitetet*
Benedikt Steinar Magnússon - *Háskóli Íslands*
Benjamin Marim de Moura - *Mittuniversitetet*
Beno Učakar - *University of Ljubljana*
Bergur Snorrason - *Háskóli Íslands*
Breki Pálsson - *Háskóli Íslands*
Daniel Barlet - *Institut Élie Cartan De Lorraine*
Eggert Karl Hafsteinsson - *Menntaskólinn í Reykjavík*
Erik Avelin - *Stockholm University*
Fani Xerakia - *University of Vienna*
Finnur Lárusson - *University of Adelaide*
Gaofeng Huang - *University of Berne*
Gianmarco Brocchi - *Háskóli Íslands*
Håkan Samuelsson Kalm - *Chalmers and Gothenburg University*
João Fontinha - *University of Lisbon*
Johannes Testorf - *NTNU*
Jón Ingólfur Magnússon - *Háskóli Íslands*
Jouni Paavo Sammeli Rättyä - *University of Eastern Finland*
Ludvig Svensson - *Chalmers and Gothenburg University*
Mar Saiz Aparicio - *Universitetet i Stavanger*
Margaret Stawiska-Friedland - *AMS/Mathematical Reviews*
Mårten Nilsson - *Stockholm university*
Mats Andersson - *Chalmers and Gothenburg University*
Michał Kudra - *Jagiellonian University*
Olof Rubin - *Lund University*
Przemysław Sprus - *Jagiellonian University*
Ragnar Sigurðsson - *Háskóli Íslands*
Rahim Nkuzimana - *Chalmers and Gothenburg University*
Risto Korhonen - *University of Eastern Finland*
Rolf Andreasson - *Gothenburg University*
Setareh Eskandari - *Umeå University*
Sibel Sahin - *Mimar Sinan Güzel Sanatlar Üniversitesi*
Suproakash Hazra - *Mittuniversitetet*
Tryggvi Kalman Jónsson - *Háskóli Íslands*
Tyson Ritter - *Universitetet i Stavanger*
Wills Ton Minh Nguyen - *IMFM, Ljubljana*

| 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 |