

INSTITUT MITTAG-LEFFLER

THE ROYAL SWEDISH ACADEMY OF SCIENCES

Annual Report 2023

Institut Mittag-Leffler

Institut Mittag-Leffler is an international center for research and postdoctoral training in the mathematical sciences. It was founded in 1916 by professor Gösta Mittag-Leffler and is the oldest mathematics research institute in the world. It operates under the auspices of the Royal Swedish Academy of Sciences and is governed by a board with representatives from all Nordic countries.

The premises of the institute encompass several buildings: the main building with library, offices for the staff, and office and discussion spaces for researchers, a seminar room building, and five other buildings with housing facilities for visiting researchers.

The mission of Institut Mittag-Leffler is to support international top-level research in mathematics, with special attention to the development in the Nordic countries. The institute is a hub for the international mathematical research community and for mathematicians in the Nordic countries. The main activities include research programs, conferences, workshops, seminars, and summer schools, that all aim to conduct and develop current mathematical research. Research programs and conferences have organizing committees approved by the IML board. Based on the recommendations of the organizing committees, senior and junior mathematicians are invited to stay and work at the institute. Junior program participants (postdocs or advanced PhD students) are offered fellowships to finance their stays. There are yearly calls, and fellowship recipients are chosen by the organizing committee together with the director. Although senior and junior mathematicians from the Nordic countries are given some priority, the institute works actively to ensure diversity among program participants.

The institute also publishes two mathematical journals, Acta Mathematica (founded by Gösta Mittag-Leffler in 1882) and Arkiv för matematik (founded in 1903). Acta Mathematica is one of a small number of exclusive world-leading international mathematics research journals and one of the highest rated journals in the mathematical world. All volumes of these journals are freely available online.

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The founder of Institut Mittag-Leffler, Prof. Gösta Mittag-Leffler (1846–1927) Photo: Institut Mittag-Leffler

Annual Report 2023



The Director of Institut Mittag-Leffler,

A BRIEF REVIEW OF 2023

During 2023, the institute has continued its efforts to attract world leading mathematicians to programs, as well as the dialogue with Nordic mathematics departments, other international mathematics research institutes, the Swedish Research Council, the scientific council for Natural and Engineering Sciences visited the institute in March, the Wallenberg Foundations and the Verg Foundation. Editorial work with Acta Mathematica and Arkiv för Matematik during the year has been successful, both journals perform well and continue to attract very good submissions. The cooperation with International Press continues.

During 2023, the institute organized two research programs: Two Dimensional Maps and Order and Randomness in Partial Differential Equations.

The year 2023 is the first year after the pandemic that the institute has operated without interruptions. Both programs and conferences have been very well attended and have run smoothly.

During 2023 several projects improving the institute have been completed. Our new website, with better design, new features for streaming and recording talks, and MathJax for TeX-integration was launched. The heating systems in both the apartments and the main building were replaced with more efficient and better systems that can be surveilled and managed remotely. Solar cells on the roofs of the apartment buildings that help reduce energy costs were installed.

In 2023, the first International Congress of Basic Science was held in Beijing with its Frontiers of Science Award, an award for best papers during the last five years in several fields covering all of mathematics. Among the papers awarded there were nine Acta papers to be compared with 34 in Annals of Mathematics and ten each in the Journal of the American Mathematical Society and Inventions. The total number of award-eligible Acta papers in the five-year period was 51 which means that nearly 20% of the papers published in Acta won the award, a clear sign of the very high quality and world leading character of the journal.

After serving successfully for several years, Michel Brion and Eero Saksman left the Acta editorial board on July 1. We thank them cordially for all their work over the years. We also welcomed two new editorial board members, Hélène Esnault (Copenhagen) and Tuomas Hytönen (Aalto).

The institute works in close cooperation with The Royal Swedish Academy of Sciences and is involved in different Nordic and international collaborations. In March, the institute participated in the yearly meeting of ERCOM, a committee of the European Mathematical Society including around 30 European research institutes in mathematics, in Prague.

Institut Mittag-Leffler is very grateful to all those who have contributed during 2023. First and foremost, to all mathematicians who choose to conduct their research at the institute and to contribute to its scientific environment, especially to our colleagues in Sweden and other Nordic countries. We also thank all organizations that have contributed to us financially: The Academy of Finland, The Acta Mathematica Foundation, The Anna-Greta and Holger Crafoord Foundation, Brummer & Partners, Chalmers/ Gothenburg University, The Danish Mathematical Society, The GS Magnuson Foundation, The Knut and Alice Wallenberg Foundation, Linköping University, Luleå University of Technology, Lund University, The Research Council of Norway, KTH Royal Institute of Technology, The Jacob and Marcus Wallenberg's memorial foundation, Stockholm University, The Swedish Research Council, The Verg Foundation, Umeå University and Uppsala University.

ZUL lotia

Tobias Ekholm, Director



The board of Institut Mittag-Leffler 2023.

THE BOARD OF INSTITUT MITTAG-LEFFLER

The board of Institut Mittag-Leffler consists of representatives of the Nordic countries and members appointed by the class of mathematics of the Royal Swedish Academy of Sciences.

MEMBERS OF THE BOARD 2023:

ANDERS KARL CLAESSON, University of Iceland, Reykjavík, Iceland

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MEETING OF MATHEMATICS DEPARTMENT CHAIRS AT INSTITUT MITTAG-LEFFLER

Institut Mittag-Leffler hosts a Nordic chair meeting yearly, inviting the heads of mathematical departments and the chairs of mathematical associations from the Nordic countries. The 2023 meeting was held on May 15–16 and attended by mathematics department chairs from seven Swedish, two Danish, two Norwegian, one Finnish, and one Icelandic universities.

PUBLICATIONS

Acta Mathematica

2 volumes/year (4 issues, totally around 800 pages). The issues 230:1, 230:2, 231:1 and 231:2 were published including 10 articles in total.

EDITORIAL COMMITTEE

Editor-in-Chief: Tobias Ekholm Institut Mittag-Leffler, Djursholm and Uppsala University

Technical Editor: International Press of Boston, Inc.

EDITORS:

Hélène Esnault University of Copenhagen

Jesper Grodal University of Copenhagen

Tobias Holck Colding Massachusetts Institute of Technology, Cambridge

Helge Holden NTNU - Norwegian University of Science and Technology, Trondheim

Tuomas Hytönen Aalto University

Kurt Johansson KTH Royal Institute of Technology, Stockholm

Arkiv för matematik

1 volume/year (2 issues, around 400 pages) The issues 61:1 and 61:2 were published including 20 articles in total.

EDITORIAL COMMITTEE

Editor-in-Chief: Hans Ringström Institut Mittag-Leffler, Djursholm and KTH Royal Institute of Technology, Stockholm

Editorial Assistant: International Press of Boston Inc.

EDITORS:

Carel Faber Utrecht University

Pär Kurlberg KTH Royal Institute of Technology, Stockholm

Volodymyr Mazorchuk Uppsala University

Dan Petersen Stockholm University

Luydmila Turowskaya Chalmers University of Technology, Gothenburg

Fredrik Viklund KTH Royal Institute of Technology, Stockholm

Erik Wahlén Lund University

Genkai Zhang Chalmers University of Technology, Gothenburg

FINANCIAL SUPPORT 2023

Supporting organizations

THE ACADEMY OF FINLAND

THE ACTA MATHEMATICA FOUNDATION

THE ANNA-GRETA AND HOLGER CRAFOORD FOUNDATION

BRUMMER & PARTNERS

GOTHENBURG UNIVERSITY/CHALMERS UNIVERSITY OF TECHNOLOGY

THE DANISH MATHEMATICAL SOCIETY (INSTITUT FOR MATEMATIK/AARHUS UNIVERSITET)

THE G S MAGNUSON FOUNDATION

THE KNUT AND ALICE WALLENBERG FOUNDATION

LINKÖPING UNIVERSITY LULEÅ UNIVERSITY OF TECHNOLOGY LUND UNIVERSITY THE JACOB AND MARCUS WALLENBERG FOUNDATION STOCKHOLM UNIVERSITY THE RESEARCH COUNCIL OF NORWAY KTH ROYAL INSTITUTE OF TECHNOLOGY THE SWEDISH RESEARCH COUNCIL THE VERG FOUNDATION UMEÅ UNIVERSITY UPPSALA UNIVERSITY

Programs

Two Dimensional Maps

January 18-April 28, 2023

SCIENTIFIC REPORT

Important developments in one-dimensional real dynamics include substantial progress in our understanding of circle maps, quadratic maps of the interval, polynomial maps of an interval, unimodal and multimodal maps. Some of the highlights are the work by Herman and Yoccoz on circle maps, Swiatek-Graczyk and Lyubich on density of hyperbolicity for quadratic maps, Lyubich's work on stochasticity versus periodicity, as well as work by de Melo, van Strien, Shen, Avila and others. The area has been extremely successful, but less progress has been made in higher dimension. The present program is mainly emphasizing the theory of twodimensional maps where there are many open problems, but we may also consider dimension > 3 and even infinite dimension (PDE:s). The subjects investigated include area preserving maps, dissipative maps, Anosov systems, quasi periodic skew products, hyperbolic skew products, maps of entropy zero, and piecewise isometries.

During the program there were weakly seminars on Tuesdays and Thursdays. There were also two focused workshops weeks in March and April with several talks every day.

Progress was made in all area listed, with contributions from several participants. Some of the seminar highlights were the series of talks by Pujals and Crovisier on mildly dissipative maps of the disk and that by Krikorian on local integrability of real analytic conservative diffeomorphisms.

Organizers:

Michael Benedicks KTH Royal Institute of Technology

Håkan Eliasson Université Paris-Cité Raphael Krikorian The University of Cergy-Pontoise Ana Rodrigues

Ana Rodrigues University of Exeter

SEMINARS

WORKSHOP

JANUARY 19, 2023

Raul Ures

Southern University of Science and Technology Partial hyperbolicity in dimension 3: the ergodicity conjecture

JANUARY 19, 2023

Jana Rodriguez-Herz Southern University of Science and Technology Unique SRB measure maximizing entropy for a family of non-conservative diffeomorphisms

JANUARY 24, 2023

Federico Rodrigues-Herz Penn State University *Rigidity for Anosov in low dimensions*

JANUARY 26, 2023

Reza Mohammadpour Uppsala University SRB measures for partially hyperbolic systems

JANUARY 26, 2023

Magnus Aspenberg Lund University Perturbations of slowly recurrent Collet-Eckmann maps JANUARY 31, 2023 Raluca Tanase Institute of Mathematics of the Romanian Academy *On the dynamics of the complex Hénon map I*

JANUARY 31, 2023 Mats Bylund Lund University Critical recurrence in the real quadratic family

FEBRUARY 2, 2023 Remus Rado Institute of Mathematics of the Romanian Academy On the dynamics of the complex Hénon map II

FEBRUARY 2, 2023 Weiwei Cui Lund University Speiser meets Misiurewicz

FEBRUARY 9, 2023 Boris Petkovic KTH Royal Institute of Technology KAM method in non-abelian setting

FEBRUARY 9, 2023 Kevin Smith University of Exeter *Almost-periodicity of zeta functions*

FEBRUARY 14, 2023 Jonguk Yang University of Zurich A priori bounds for unimodal diffeomorphisms in dimension two

FEBRUARY 16, 2023 David Marti-Pete University of Liverpool Wandering domains in transcendental dynamics: topology and dynamics

FEBRUARY 16, 2023 Carlangelo Liverani University of Rome Tor Vergata *CLT with error terms for sequential Dynamical systems* FEBRUARY 21, 2023

Michal Rams Mathematical Institute of the Polish Academy of Sciences *Cocycles of circle diffeomorphisms*

FEBRUARY 23, 2023 Noah Cockram University of Exeter *Renormalizability of Translated Cone Exchanges*

FEBRUARY 23, 2023 Sven Sandfeldt KTH Royal Institute of Technology Centralizer rigidity for partially hyperbolic toral automorphisms

MARCH 2, 2023 Anders Öberg Uppsala University Continuous eigenfunctions of the transfer operator, and uniqueness and mixing properties of Doeblin measures

MARCH 2, 2023 Raphael Krikorian The University of Cergy-Pontoise On local integrability of real analytic conservative diffeomorphisms in dimension 2

MARCH 7, 2023 Raphael Krikorian École Polytechnique On local integrability of real analytic conservative diffeomorphisms in dimension 2, II

MARCH 7, 2023 Alexander Bufetov CNRS Marseille *The spectral co-cycle for translation flows* Photo:Markus Marcetic



MARCH 13, 2023

Davit Karagulyan KTH Royal Institute of Technology Criteria for recurrence and transience for random walks with general internal states

MARCH 13, 2023

Kristian Bjerklöv KTH Royal Institute of Technology Monotone families of circle diffeomorphisms driven by expanding circle maps

MARCH 13, 2023 Michal Misiurewicz

Indiana University-Purdue University Indianapolis The Real Teapot

W

W

W

MARCH 14, 2023 Remus Radu Institute of Mathematics of the Romanian Academy *The critical locus of a Hénon map*

MARCH 14, 2023 (W) Danijela Damjanovic KTH Royal Institute of Technology A dichotomy for commuting parabolic linear maps on the torus

MARCH 14, 2023 Tomas Persson Lund University A parameter almost sure invariance principle for the quadratic family W

W

MARCH 15, 2023

Pedro Peres University of Exeter Nontrivial embeddings of interval exchange transformations into piecewise isometries (Online)

MARCH 15, 2023

Peter Ashwin University of Exeter Planar piecewise isometries: some examples and open problems

MARCH 15, 2023

Noah Cockram University of Exeter Renormalizability of Translated Cone Exchanges

(W)MARCH 16, 2023 Jonguk Yang University of Zurich Proof of A Priori Bounds for Unimodal Diffeomorphisms in Dimension Two

MARCH 16, 2023 Viviane Baladi University Sorbonne 2D-Sinai billiards maps and flows via transfer operators

MARCH 16, 2023

Jörg Schmeling Lund University Thermodynamics of potentials with logarithmic singularities

MARCH 21, 2023 Peter Ashwin University of Exeter Relating measure and statistical notions of nonautonomous attraction

MARCH 21, 2023 **Michal Misiurewicz** Indiana University-Purdue University Indianapolis Topological entropy of generalized Bunimovich stadium billiards

MARCH 23, 2023

W

(W)

(W)

Sandro Vaienti

University of Toulon and Center of Theoretical Physics Thermodynamic formalism of random open systems

MARCH 23, 2023

Jacopo de Simoi University of Toronto Length spectrum determination of billiards

MARCH 28, 2023

Tere M-Seara Universitat Politècnica de Catalunya Chaotic dynamics and oscillatory motions in the three body problem

MARCH 28, 2023

Sandro Vaienti

University of Toulon and Center of Theoretical Physics Perturbation of unimodal maps with application to synchronisation

MARCH 30, 2023

Arek Goetz

San Francisco State University Global and local behavior of orbits in the two halfplane map. Computer aided renormalization techniques

MARCH 30, 2023

Jacopo de Simoi University of Toronto Length spectrum determination of billiards II

APRIL 4, 2023

Paulo Varandas Universidade Federal da Bahia Thermodynamic formalism for expanding measures

APRIL 4, 2023 Warwick Tucker Monash University Relative equilibria for the n-body problem

(W)

W

APRIL 11, 2023 Vadim Kaloshin University of Maryland Marked Length Spectral determination of analytic chaotic billiards W

(W)

W

W

W

W

(W)

APRIL 11, 2023 Frank Trujillo University of Zûrich *Ergodicity of skew-products over IETs*

APRIL 11, 2023 Stefano Marmi Scuola Normale Superiore A dynamical system model of systemic risk in finance

APRIL 11, 2023 Zhiyuan Zhang CNRS and Université Sorbonne Paris Nord Newhouse phenomenon in the complex Hénon family

APRIL 12, 2023 Konstantin Khanin University of Toronto *Typical rotation number for families of circle maps with singularities.*

APRIL 12, 2023 Corinna Ulcigrai ETH Zürich On regularity of conjugacies of generalized IETs

APRIL 12, 2023 (W) Pedro Duarte Universidade de Lisboa Positivity and Continuity of the Lyapunov Exponents of 2d cocycles

APRIL 12, 2023 Patrice le Calvez Sorbonne Université The Calabi invariant of an irrational pseudo rotation; a finite dimensional approach

APRIL 13, 2023	W
Ricardo Perez Marco	
Centre national de la recherche scientifique	
Omega Functions	
APRIL 13, 2023	W
Andrès Navas	
University of Santiago	
On Takens-Yoccoz' theorem in finite regularity	
APRIL 14, 2023	W
Helene Eynard-Bontemps	
University of Georgia	
Deformations of Z^2-actions in dimension 1	
(joint with Andrés Navas)	
APRIL 14, 2023	(W)
Silvius Klein	
Pontifical Catholic University of Rio de Janeiro	
Stability of the Lyapunov exponents under	
random noise	
APRIL 14, 2023	(w)
Mikhail Lyubich	
Stony Brook University	
Structure of Feigenbaum Henon maps	
APRIL 14, 2023	W
Dmitry Turaev	
Imperial College London	
4-winged Lorenz attractor in the 3-dimensional	
Henon map.	
APRIL 15, 2023Q	W
Anton Gorodetski	
University of California Irvine	
Furstenberg Theorem and its generalizations	
APRIL 15, 2023	W
Marie-Claude Arnaud	
University de Paris	
The dynamics of conformally Hamiltonian flows:	
dissipativity and conservativity	

APRIL 18, 2023

Enrique Pujals The City University of New York *Mildly dissipative maps of the disk with zero entropy I* (Online)

APRIL 18, 2023

Enrique Pujals The City University of New York *Mildly dissipative maps of the disk with zero entropy II* (Online)

APRIL 20, 2023 Sylvain Crovisier Centre national de la recherche scientifique Mildly dissipative maps of the disk with zero entropy III

APRIL 20, 2023 Sylvain Crovisier Centre national de la recherche scientifique *Mildly dissipative maps of the disk with zero entropy IV*

APRIL 25, 2023 Sébastien Biebler University Paris-Cité Blenders and almost blenders

APRIL 25, 2023 Pierre Berger Institute of Mathematics of Jussieu Analytic pseudo-rotations

APRIL 27, 2023 Anton Gorodetski University of California Irvine Dynamical Methods in Spectral Theory of Ergodic Schrodinger Operators

APRIL 27, 2023 Pablo Gutiérrez Barrientos The Fluminense Federal University Minimal Strong Foliations in Skew-products of Iterated Function Systems APRIL 27, 2023 Jacek Graczyk University Paris Sud Mandelbrot set viewed from smooth traversing curves



Statue of Ann Charlotte Leffler (1849–1892).

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Programs

Order and Randomness in Partial Differential Equations

August 30-December 08, 2023

Organizers:

Helge Holden NTNU – Norwegian University of Science and Technology Jonatan Lenells KTH Royal Institute of Technology Catherine Sulem University of Toronto Erik Wahlén Lund University

SCIENTIFIC REPORT

The program focused on three different connected areas: fluid flow, completely integrable systems, and stochastic partial differential equations. All these areas currently undergo rapid development, and their interplay leads to new research directions.

Completely integrable systems share many properties with linear equations and often have interesting explicit solutions with intricate behavior, some of which appear in fluid flow. A different characteristics of fluid flow is turbulence with chaotic behavior. To understand this aspect, we consider statistical properties and naturally associated stochastic partial differential equations. One of the aims of the program was to bring these three areas together. As a concrete example we mention the Camassa–Holm equation, a nonlinear partial differential equation which is completely integrable, appears in certain regimes in fluid flow, and allows for interesting stochastic perturbations.

There were four weekly talks throughout the program. Junior participants gave short talks to start the program off and had their own weekly seminars during the whole semester. Several papers were completed or substantially advanced as part of already existing collaborations between program participants, but also new collaborations were initiated. A number of new directions related to the themes of the program were discussed in the seminars and mini courses. In integrable systems theory, this included recently developed Hardy-space methods, leading to explicit solution formulas for certain equations such as the Benjamin-Ono equation for internal water waves, and Riemann-Hilbert methods for Boussinesq's equation for shallow water waves. Other very active areas of research which were represented were fluid flows in irregular domains (for example with corners), singularity formation of fluid flows and water waves, water waves with vorticity, and Hamiltonian methods for quasilinear wave equations. In relation to stochastics, the pathwise well-posedness of stochastic wave equations, numerical methods for stochastic transport equations, and SDE models of grid cells (the brain's position system) are examples of novel topics that were represented. The program will likely have an impact on the field in coming years.

Apart from weekly seminars there were two workshops and a total of four mini-courses.

The program started with two intense and busy weeks. The first week was devoted to a mini school preparing the participants for the workshop `Water Waves and Integrable Systems' that took place the following week. There were two courses, each composed of three lectures of 90 minutes. The first was given by Patrick Gérard (Université Paris-Saclay) on `Hardy spaces and the zero-dispersion limit for the Benjamin–Ono (BO) equation'. The BO equation is a canonical model for propagation of internal waves in deep fluids, which has the special property of being integrable by inverse scattering. The course started with an introduction to well-posedness properties of the BO equation followed by basic tools of integrable systems with specific application to BO (Hardy spaces, Lax-pair structure, Toeplitz operators) both for the problem on the real line and on the torus. P. Gérard then presented recent results on the zero-dispersion limit of a solution of BO based on an explicit formula and a calculation in the special case of rational initial data.

The second course was given by Massimiliano Berti (SISSA) on `Hamiltonian methods for the water wave problem'. The course started with an introduction and overview of well-posedness results for the water wave system for irrotational fluids and also in the presence of a constant vorticity. Both problems are known to have a Hamiltonian formulation. The second lecture focused on basic elements of Hamiltonian theory first for finite dimensional systems, with special emphasis on Birkhoff normal forms, transformation theory, and then on applications to semi-linear PDEs. M. Berti then introduced paradifferential calculus, an important tool in harmonic analysis, designed to treat guasilinear PDEs. He also presented recent results on long-time existence of solutions for the water wave problem in the presence of constant vorticity with periodic boundary conditions.

The first workshop of the program took place the following week. The talks covered questions of long-time behavior, stability and instability of waves, singularity formation and existence of travelling waves for various nonlinear PDEs, including the water wave problem, Euler and Navier–Stokes equations, and integrable PDEs.

The week after the first workshop, Daniel Peralta-Salas (ICMAT) gave a mini-course on `Complexity in Beltrami flows: deterministic and probabilistic aspects. Beltrami flows are a special type of steady ideal fluid flows with non-zero vorticity, including the famous ABC flow. In recent years there have been significant advances in understanding the often very complex dynamics of these flows and in quantifying how likely complex behavior is for a randomly chosen flow. Peralta-Salas gave an introduction to the mathematical tools used to study such questions.

The second workshop `Stochastic Flows' took place in November. In preparation for the workshop, Peter Pang (University of Oslo) gave a mini-course on `The stochastic compactness method in SPDEs'. Here he presented some of the very recent tools that allow one to analyze stochastic partial differential equations with transport noise. In addition, José A. Carrillo (University of Oxford) gave a double-seminar on `Nonlocal Aggregation-Diffusion Equations: fast diffusion and particle concentration'. The workshop had talks on different aspects of stochastic partial differential equations with applications in fluid mechanics, interacting particle systems and neuroscience.



SEMINARS

WORKSHOP	
SEPTEMBER 4, 2023 Patrick Gérard Université Paris-Saclay <i>Mini course: Hardy spaces and the zero-dispersion limit for</i> <i>the Benjamin-Ono equation</i>	SEPTEMBER 11, 2023 Dario Bambusi University of Milan A Nekhoroshev theorem for some (smoothing) perturbations of the Benjamin-Ono equation with initial data close to finite gap tori
SEPTEMBER 5, 2023 Patrick Gérard Université Paris-Saclay Mini course: Hardy spaces and the zero-dispersion limit for the Benjamin-Ono equation	SEPTEMBER 11, 2023 (V) Alberto Enciso ICMAT Finite-time singularity formation for angled-crested water waves
SEPTEMBER 5, 2023 Jörg Weber Lund University Daniel Eriksson KTH Royal Institute of Technology	SEPTEMBER 11, 2023 (W) Boris Khesin University of Toronto Geometry of singular vorticities in the Euler hydrodynamics
Bastian Hilder Lund University <i>Talks by junior participants</i>	SEPTEMBER 11, 2023 (W) Peter Topalov Northeastern University
Patrick Gérard Université Paris-Saclay Mini course: Hardy spaces and the zero-dispersion limit for the Benjamin-Ono equation	SEPTEMBER 12, 2023 (W) Patrick Gérard
SEPTEMBER 7, 2023 Massimiliano Berti	University of Paris-Saclay Global rational solutions of the one-dimensional Half-Wave Maps equation
Mini course: Hamiltonian methods for the water wave problem SEPTEMBER 8, 2023 Massimiliano Berti	SEPTEMBER 12, 2023 (**) Mariana Haragus University of Franche-Comté Modulational and uniform subharmonic dynamics of spectrally stable periodic waves
SISSA Mini course: Hamiltonian methods for the water wave problem	SEPTEMBER 12, 2023 (W) Thomas Alazard
SEPTEMBER 8, 2023 Massimiliano Berti	The virial theorem for water waves
SISSA Mini course: Hamiltonian methods for the water wave problem	SEPTEMBER 12, 2023 (W) Alberto Maspero SISSA Full description of Benjamin-Feir instability of Stokes waves

SEPTEMBER 12, 2023	W	SEPTEMBER 14, 2023
Andreia Chapouto		Tadahiro Oh
UCLA/University of Edinburgh		University of Edinburgh
Disproving the Deift conjecture: the loss of almost		Deep-water and shallow-water limits of statistical
periodicity		equilibria for the intermediate long wave equation
SEPTEMBER 13, 2023	W	SEPTEMBER 15, 2023
Patrik Nabelek		Katrin Grunert
Oregon State University		NTNU - Norwegian University of Science and Technology
Water Waves and Hamiltonian Mechanics		The HunterSaxton equation - stability and its
		consequences
SEPTEMBER 13, 2023	W	
Massimiliano Berti		SEPTEMBER 15, 2023 🛞
SISSA		Evgeniy Lokharu
Almost global existence of periodic water waves		Lund University
		On the vorticity threshold for water waves with a non-
SEPTEMBER 13, 2023	W	favorable constant vorticity
Vera Hur		
University of Illinois at Urbana-Champaign		SEPTEMBER 15, 2023
Stable undular bores: rigorous analysis and validated		Didier Pilod
numerics		University of Bergen
		On the collision of nearly equal solitary waves for the
SEPTEMBER 14, 2023	W	Zakharov-Kuznetsov equation
David Lannes		
Université de Bordeaux		SEPTEMBER 19, 2023
The 2D nonlinear shallow water equations with a partia	lly	Daniel Peralta-Salas
immersed obstacle		ICMAT
		Mini course: Complexity in Beltrami flows: deterministic
SEPTEMBER 14, 2023	W	and probabilistic aspects
Henrik Kalisch		
University of Bergen		SEPTEMBER 19, 2023
The KdV equation as a tool in nearshore wave modeling	1	Samuel Walsh
· · · · ·		University of Missouri
SEPTEMBER 14, 2023	W	Desingularization of hollow vortices
Mark Groves		-
Saarland University		SEPTEMBER 20, 2023
Three-dimensional gravity-capillary solitary waves on		Daniel Peralta-Salas
Beltrami flows		ICMAT
		Mini course: Complexity in Beltrami flows: deterministic
SEPTEMBER 14, 2023	W	and probabilistic aspects
Mats Ehrnström		
NTNU - Norwegian University of Science and Techno	ology	SEPTEMBER 21, 2023
Equations with very low order of dispersion – an overvie	ew	Daniel Peralta-Salas
and description of new results		ICMAT
· · · · · · · · · · · · · · · · · · ·		Mini course: Complexity in Beltrami flows: deterministic
		and probabilistic aspects

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SEPTEMBER 21, 2023 Stefano Pasquali Université Paris-Saclay Asymmetrical three-dimensional Water Waves on Beltrami flows

SEPTEMBER 26, 2023 Gassot Gassot University of Rennes Cauchy Problem in Low Regularity for Schrödinger-Type Equations

SEPTEMBER 26, 2023 Jörg Weber Lund University/University of Vienna New results on global bifurcation of traveling periodic water waves

SEPTEMBER 28, 2023 Boris Buffoni EPFL Heteroclinic orbits describing convective patterns with orthogonal walls

SEPTEMBER 28, 2023 Dag Nilsson Lund University Existence and decay of lump solutions of the fractional KP equation

SEPTEMBER 29, 2023 Giang To Lund University Postdoc/PhD seminar

SEPTEMBER 29, 2023 Stefano Pasquali University of Paris-Saclay Postdoc/PhD seminar

SEPTEMBER 29, 2023 Susanna Haziot Brown University Desingularization and long-term dynamics of solutions to fluid models OCTOBER 3, 2023 Christophe Charlier Lund University On Boussinesq's equation for water waves

OCTOBER 3, 2023 Nicolas Camps Université de Nantes *Towards the invariance of the Gibbs measure for NLS on the sphere*

OCTOBER 4, 2023 Dan J. Hill Saarland University Going around in circles: Developing a functional analytic framework for radial solutions to PDEs

OCTOBER 4, 2023 Louise Gassot Basel University Postdoc/PhD seminar

OCTOBER 6, 2023 Jörg Weber Lund University Postdoc/PhD seminar

OCTOBER 6, 2023 Jonas Jansen Lund University Thermocapillary Thin Film Flows: Periodic Steady States and Film Rupture

OCTOBER 10, 2023 Bastian Hilder Lund University Postdoc/PhD seminar

OCTOBER 10, 2023 SUSANNE SOLEM Norwegian University of Life Sciences On a PDE model for noisy grid cells

OCTOBER 10, 2023 Jean-Claude Saut University of Paris-Saclay On Boussinesq and Boussinesq like systems Photo: Markus Marcetic



OCTOBER 12, 2023 Vladimir Kozlov Linköping University Subharmonic bifurcations of Stokes waves on vorticity flow

OCTOBER 12, 2023 Evan Miller University of British Columbia Postdoc/PhD seminar

OCTOBER 13, 2023 Nicolas Camps Université de Nantes Postdoc/PhD seminar

OCTOBER 13, 2023 Kristoffer Varholm

NTNU - Norwegian University of Science and Technology Symmetric doubly periodic gravity-capillary waves with small vorticity OCTOBER 17, 2023 Christian Klein University of Burgundy Numerical study of fractional Korteweg-de Vries and nonlinear Schrödinger equations

OCTOBER 19, 2023 Svetlana Roudenko Florida International University An angle between past and future: from soliton stability in Zakharov-Kuznetsov equation to fractional gKdV and beyond

OCTOBER 19, 2023 Douglas Svensson Seth NTNU - Norwegian University of Science and Technology *Non-symmetric Solutions to the Capillary-Gravity Whitham Equation*

OCTOBER 20, 2023 Bastian Hilder Lund University Postdoc/PhD seminar

OCTOBER 20, 2023 Jonas Jansen

Lund University Postdoc/PhD seminar

OCTOBER 24, 2023 Slim Ibrahim University of Victoria Phase Transition threshold and stability of magnetic skyrmions

OCTOBER 24, 2023 Pietro Baldi

University of Naples Federico II Nearly toroidal, periodic and quasi-periodic motions of fluid particles driven by the Gavrilov solutions of the Euler equations

OCTOBER 26, 2023 Thierry Gallay Université Grenoble Alpes Axisymmetric Vortex Rings at High Reynolds Number

OCTOBER 26, 2023 Evan Miller University of British Columbia Finite-time blowup for an Euler and hypodissipative Navier-Stokes model equation on a restricted constraint space

OCTOBER 27, 2023 Sondre Tesdal Galtung NTNU – Norwegian University of Science and Technology Postdoc/PhD seminar

OCTOBER 27, 2023 Wei Lian Lund University Postdoc/PhD seminar

OCTOBER 31, 2023 Piotr Gwiazda

Institute of Mathematics, Polish Academy of Sciences Asymptotic analysis: from high friction gas dynamics to diffusion models

OCTOBER 31, 2023 Herbert Koch University of Bonn *The Korteweg-de Vries hierarchy at low regularity*

NOVEMBER 1, 2023 Magnus C. Ørke University of Oslo Highest waves for fractional Korteweg–De Vries and Degasperis–Procesi equations

NOVEMBER 1, 2023 Halvard Storbugt NTNU – Norwegian University of Science and Technology The 1D Hughes model for pedestrian evacuation, and its deterministic particle approximation

NOVEMBER 7, 2023 Sondre Tesdal Galtung

NTNU – Norwegian University of Science and Technology A variational discretization of the Camassa–Holm equation vs. the stumpon

NOVEMBER 7, 2023 Daniel Sánchez-Simón del Pino University of Bonn Well posedness of boundary value problems for the Magnetohydrostatic equations

NOVEMBER 9, 2023 Juan Velázquez University of Bonn Oscillatory behavior and anomalous self-similarity in coagulation models

NOVEMBER 9, 2023 Nastasia Grubic ICMAT On the angle-crested water waves and singularity formation

NOVEMBER 14, 2023 Christophe Lacave Université Savoie Mont-Blanc Modeling inviscid water waves

NOVEMBER 14, 2023

Siddhant Agrawal ICMAT Uniqueness of the 2D Euler equation on rough domains

NOVEMBER 16, 2023

Matthieu Ménard Université Grenoble-Alpes Spectral gaps for linearized water waves over a periodic bottom

NOVEMBER 16, 2023

Thomas Christiansen

NTNU – Norwegian University of Science and Technology A convergent numerical method for the Hunter–Saxton equation

NOVEMBER 20, 2023 Peter HC Pang University of Oslo *Mini course: The stochastic compactness method in SPDEs*

NOVEMBER 20, 2023 Peter HC Pang University of Oslo *Mini course: The stochastic compactness method in SPDEs*

NOVEMBER 21, 2023 Ola Mæhlen University of Oslo The particle paths of hyperbolic conservation laws

NOVEMBER 22, 2023 Peter Pang University of Oslo *Mini course: The stochastic compactness method in SPDEs*

NOVEMBER 22, 2023 Peter HC Pang University of Oslo *Mini course: The stochastic compactness method in SPDEs*

NOVEMBER 24, 2023 Jose Carrillo

University of Oxford Nonlocal Aggregation-Diffusion Equations: fast diffusion and partial concentration

NOVEMBER 24, 2023 Jose A. Carrillo University of Oxford Nonlocal Aggregation-Diffusion Equations: fast diffusion and partial concentration

NOVEMBER 27, 2023

Tadahiro Oh University of Edinburgh Pathwise well-posedness of singular stochastic dispersive PDEs

NOVEMBER 27, 2023 Ulrik Fjordholm University of Oslo A convergent numerical method for rough stochastic transport equations

NOVEMBER 27, 2023 Quentin Cormier

Inria Saclay Centre Stability and metastability in mean-field equations

NOVEMBER 27, 2023

Pierre Roux

École CeNTNU – Norwegian University of Science and Technologyntrale de Lyon, Institut Camille Jordan Representing large numbers of noisy integrate and fire neurons with a nonlinear non-local Fokker-Planck equation

NOVEMBER 28, 2023 Espen Jakobsen

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NTNU – Norwegian University of Science and Technology A convergent discretisation of the porous medium equation with fractional pressure

NOVEMBER 28, 2023	W
Hao Tang	
University of Oslo	
Stochastic Fluid PDEs with Non-local Noise	

NOVEMBER 28, 2023 Shuchen Guo University of Oxford

Scaling limit of moderately interacting particle systems with environmental noise

NOVEMBER 29, 2023

Alexandra Holzinger TU Wien *Quantitative mean-field convergence by relative entropy methods for a moderate model*

NOVEMBER 29, 2023

Andrea Clini University of Oxford Analysis of an SDE system modelling grid cells

NOVEMBER 30, 2023

Peter Pang University of Oslo Convergence of stochastic integrals with weakly convergent integrands: applications to SPDEs

NOVEMBER 30, 2023

Luca Galimberti King's College London Well-posedness of stochastic continuity equations on Riemannian manifolds

NOVEMBER 30, 2023

Milica Tomasevic École Polytechnique Particle approximation of the doubly parabolic Keller-Segel equation in the plane

NOVEMBER 30, 2023

Georg Chechelnizk ELSC, Hebrew University of Jerusalem Noise resilience of memory stored in low-dimensional neural manifolds through multiple synaptic timescales

DECEMBER 1, 2023 Stefan Engblom

Uppsala University The single cell and the cell population: stochastic modeling and attempts at analysis

DECEMBER 1, 2023

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Anders Szepessy KTH Royal Institute of Technology Randomness in partial differential equations from first principles?

DECEMBER 5, 2023 Irina Markina University of Bergen Group of diffeomorphisms of the unit circle and sub-Riemannian geometry

DECEMBER 7, 2023

René Langøen University of Bergen Stokes graph of a quadratic differential related to a Rabi model



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Conferences



Moduli and Algebraic Cycles

MAY 29-JUNE 02, 2023

Organizers: John Christian Ottem University of Oslo Dan Petersen Stockholm University

David Rydh KTH Royal Institute of Technology

SCIENTIFIC REPORT

The workshop was a continuation of the semester program with the same title in the fall of 2021, exploring central questions related to moduli spaces and algebraic cycles. Both these notions are very classical topics in algebraic geometry dating back to the 19th century but still at the forefront of current research. The workshop focused particularly on moduli of curves and logarithmic geometry but also included many other topics. The workshop was greatly appreciated. Most of the participants also took part of the earier program and were happy to be back. They also mentioned how important the program had been as the first in-person meeting since the start of the pandemic. We were successful in recreating the same positive atmosphere that was present during the program. Hannah Larson, who is a rising star in moduli of curves and their tautological rings, was particularly happy to meet many other leading researchers in the field for the first time. She gave a very well-appreciated talk with breakthrough results.

Several of the talks reported on recent progress in rapidly developing areas, such as Chow rings of moduli stacks and double ramification cycles. The workshop consisted of eighteen one-hour talks. Besides the earlier mentioned talk of Hannah Larson, other highlights include:

Nicola Pagani and Sam Molcho gave two talks on their joint work on compactification of the double ramification locus, a topic of intense interest for the past few years. This represented a continuation of a topic that was central in the second workshop of the program.

Gavril Farkas presented recent progress on the Kodaira dimensions of moduli spaces of curves, in joint work with Jensen and Payne. Their work brings an entirely new technique to this old problem by means of tropical geometry.

Andrew Putman, who had not participated in the original program (and is closer to geometric group theory) presented remarkable work, proving that congruence subgroups of the mapping class group have the same stable rational homology as the mapping class group itself.

Dan Abramovich, Siddarth Mathur and Jochen Heinloth talked about work carried out during the program.

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Sandra Di Rocco KTH Royal Institute of Technology, Stockholm, Sweden

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Klaus Hulek Leibniz Universität Hannover, Hannover, Germany

Andrew Kresch University of Zürich, Zürich, Switzerland

Nikolas Kuhn University of Oslo, Oslo, Norway

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Radu Laza Stony Brook University, Stony Brook, United states

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Siddharth Mathur Universidad Católica de Chile, Santiago, Chile

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Summer School: Analysis, Arithmetics and Geometry: Zeta-Functions, Trace Formulas, and Around

JUNE 05-09, 2023

Organizers:

Håkan Hedenmalm KTH Royal Institute of Technology

> Pavel Kurasov Stockholm University

Delio Mugnolo University of Hagen

Jonathan Rohleder Stockholm University

Matthew de Courcy-Ireland Stockholm University

SCIENTIFIC REPORT

The aim of this summer school was to introduce interested master and PhD students to the theory of spectral zeta-functions and corresponding trace formulas. The theme of the school was intrinsically crossdisciplinary connecting algebra, analysis, geometry and number theory. Special focus was on the role played by the geometry and understanding arithmetic properties of the spectrum. Zeta functions appear in many areas of mathematics and studies of their analytic and numbertheoretic properties can often be explained using different types of trace formulas. The courses at the school were outstanding and given by world leading mathematicians: *Arithmetics of trace formulas* by Jitomirskaya, *Singular continuous spectra* by Kirsten and *Spectral zeta-functions* by Sarnak. Although the summer school was primarily intended for students it also contained new directions. For example, Sarnak's lectures introduced the "bass note spectrum", which unifies many problems that had seemed unrelated, Jitomirskaya lectured on her recent work involving singular continuous spectrum and the Hofstadter butterfly, and Kirsten also presented some new directions on the connection between topology and asymptotics of zeta-functions.

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Alex Bergman Lund University, Lund, Sweden

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Sjoerd de Vries Stockholm University, Stockholm, Sweden



Noncommutative Harmonic Analysis and Quantum Information

JUNE 12-16, 2023

Organizers: Martijn Caspers Delft University of Technology Adam Skalski

The Polish Academy of Sciences Lyudmila Turowska, Chalmers/University of Gothenburg

SCIENTIFIC REPORT

Harmonic analysis has been a central theme of mathematics from the beginning of 19th century and information theory has been established as an important mathematical field with rich interactions with computer science. Quantum theory requires to develop both harmonic analysis and information theory in the language of operator algebras. Recent years have seen spectacular and unexpected examples of interactions between these fields. For example, the announced solution of the famous Connes Embedding Problem, a central question in the theory of operator algebras that was approached with quantum information techniques.

The results presented during the conference included very important recent discoveries. As an example we

mention two talks related to the work contained in the article *Schur multipliers in Schatten-von Neumann classes* of J.M. Conde-Alonso, A.M. González-Pérez, J. Parcet and E. Tablate and the two lectures on the notion and examples of quantum graphs by M. Daws and M.Wasilewski.

Some of the new directions of the conference concerned quantum games and quantum graphs. The first of these concepts is already relatively well-established among computer scientists and quantum information theorists with recent connections to operator algebras, whereas the second is at a very different development stage with competing definitions and approaches only beginning to converge.

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Simeng Wang Harbin Institute of Technology, Harbin, China

Mateusz Wasilewski Institute of Mathematics of the Polish Academy of Sciences, Warsaw, Poland

Melchior Wirth Institute of Science and Technology Austria, Klosterneuburg, Austria

Makoto Yamashita University of Oslo, Oslo, Norway

Sang-Gyun Youn Seoul National University, Seoul, South Korea

Haonan Zhang University of California, Riverside, United States





The seminar room in Kuskvillan, Wallenbergsalen.



Topology and Real Algebraic Geometry in Low Dimension

Organizers: Tobias Ekholm Uppsala University

JUNE 26-JUNE 30, 2023

llia Itenberg Institut de Mathématiques de Jussieu – Paris Rive Gauche

> Grigory Mikhalkin University of Geneva

SCIENTIFIC REPORT

The mathematical domains of the workshop are directly related to the research interests of Oleg Viro, in particular the following.

Hilbert's 16th problem is one of the few problems in Hilbert's famous list that still remains open. In its modern interpretation, it asks for a topological classification of smooth algebraic curves of given degree d in the real projective plane. There are two complementary approaches to this problem: prohibition and construction. The first interesting construction techniques were introduced already in the end of the nineteenth century by Harnack and Hilbert. By the time of Hilbert, the classification was known as d \leq 5. The striking example of a new sextic by Gudkov and the use of 4-dimensional topological techniques on the prohibition side in the beginning of 70s by Arnold and Rokhlin have advanced the classification to d \leq 6. Viro has introduced a spectacular new technique on the construction side that became known as *Viro's patchworking* and extended the classification to d \leq 7. Gelfand, Kapranov and Zelevinsky attribute their introduction of *amoebas* in the context of several complex variables to Viro's patchworking. Also Viro's patchworking became one of the sources of *tropical geometry*. Together with Mikhail Goussarov and Michael Polyak, Oleg Viro is responsible for introduction of Gauss diagram calculus in the context of Vassiliev and other finite-type invariants. Together with Sergey Finashin and Matthias Kreck, Oleg Viro has constructed exotic (non-diffeomorphic but homeomorphic) 2-knots in the 4-sphere. In his work with Vladimir Turaev, Oleg Viro has constructed state-sum invariants of 3-manifolds based on 6j-symbols.

Numerous geometric structures in real algebraic geometry were discovered by Oleg Viro. This includes complex orientation of real algebraic surfaces, as well as the completely unexpected structure of real algebraic knots that Oleg called *encomplexed writhe*, and which can be considered as the lowest degree Vassiliev invariant of real algebraic knots. This invariant can be defined in several equivalent ways and has recently reappeared in a new approach to open Gromov-Witten theory in symplectic geometry. The workshop included presentation of state-of-theart in several areas. In low-dimensional topology, Shumakovich, Fiedler and Orevkov presented results in topology of 3-manifolds, knots and links. Kharlamov presented unexpected results on Hilbert schemes of real M-varieties. Lang reported on characterizations of the monodromy group in enumerative problems and Dimitroglu-Rizell presented new findings in quantative contact topology. Except for this, a large number of talks were devoted to tropical and real algebraic geometry, including talks by Georgieva, Shaw, Bertrand, and Finashin.

A number of important new directions also emerged. They included the behavior of tropical homology with torsion coefficients, links between cluster integrable systems and tropical geometry as well as potential applications of tropical geometry to symplectic questions, and tropical wave front evolution and study of the resulting caustic.





PARTICIPANTS

Benoît Bertrand Institut de mathématiques de Toulouse, Toulouse, France

Johan Björklund University of Gävle, Gävle, Sweden

Thomas Blomme Université de Genève, Genève, Switzerland

Erwan Brugallé Université de Nantes, Nantes, France

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Alex Degtyarev Bilkent University, Ankara, Türkiye

Sandra Di Rocco KTH Royal Institute of Technology, Stockholm, Sweden

Georgios Dimitroglou Rizell Uppsala University, Uppsala, Sweden

Tobias Ekholm Uppsala University, Uppsala, Sweden

Thomas Fiedler Université Paul Sabatier, Toulouse, France

Sergey Finashin Middle East Technical University, Ankara, Türkiye

Vladimir Fock Université de Strasbourg, Strasbourg, France

Penka Georgieva Sorbonne Université, Paris, France

Ilia Itenberg Sorbonne Université, Paris, France

Magnus Jacobsson Uppsala University, Uppsala, Sweden

Andrés Jaramillo-Puentes Universität Duisburg Essen, Essen, Germany

Viatcheslav Kharlamov Université de Strasbourg, Strasbourg, France

Matthias Kreck Universität Bonn, Bonn, Germany

Lionel Lang University of Gävle, Gävle, Sweden

Antonio Lerario The International School for Advanced Studies (SISSA), Trieste, Italy

Matilde Manzaroli Universität Tübingen, Tübingen, Germany

Grigory Mikhalkin Université de Genève, Genève, Switzerland

Stepan Orevkov University Toulouse-3, Toulouse, France

Ragni Piene University of Oslo, Oslo, Norway

Michael Polyak Technion, Haifa, Israel Johannes Rau Universidad de los Andes, Bogotá, Colombia

Arthur Renaudineau Université de Lille, Lille, Frence

Ryszard Rubinsztein Uppsala University, Uppsala, Sweden

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Kris Shaw University of Oslo, Oslo, Norway

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Eugenii Shustin Tel Aviv University, Tel Aviv, Israel

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Victor Vassiliev Steklov Institute, Moscow, Russia

Oleg Viro Stony Brook University, Stony Brook, United States

Julia Viro Stony Brook University, Stony Brook, United States

Peter Zograf St. Petersburg Department of Steklov Mathematical Institute, St. Petersburg, Russia



Learning from Both Sides Linear and Nonlinear Mixed-Integer Optimization

Organizers: Gabriele Eichfelder Ilmenau University of Technology Jan Krongvist

KTH Royal Institute of Technology

Andrea Lodi Cornell University

Fabricio Oliveira Aalto University

Elina Rönnberg Linköping University

SCIENTIFIC REPORT

Optimization problems are typically categorized based on the types of variables and functions in their mathematical description, where mixed-integer linear programming (MILP) and mixed-integer nonlinear programming (MINLP) are two of the most general classes. MINLP problems combine the numerical challenges of solving large nonlinear systems with combinatorial challenges, resulting in problems that are truly complex to solve. Research in MINLP is driven both by a strong need to solve important real-world problems and by the fascinating mathematical aspects that cover classical combinatorics and numerical computations. Historically, MILP and MINLP have been developed from different perspectives and the goal was to bring them together. The workshop started with longer overview seminar talks to allow participants to learn about recent developments and current challenges. During the week we had two types of seminar talks; longer one-hour talks intended to give a more thorough overview of an area, and shorter 30-minute talks that were focused on a more specific topic. The talks covered the main areas in MINLP, ranging from computational to theoretical aspects, and provided a good background for many continued discussions during the week. The quality of the presentations was very high.

The conference also included an "offer and needs market" where participants presented mainly requests for help with their current research projects or open research questions they would be interested in collaborating on. This led to many intense discussions, gave valuable input, and established new connections.

There were many successful seminars examples include Optimization for ML and ML for optimization by Misener and Discrete nonlinear optimization: Modeling and solutions via novel hardware and decomposition algorithms by Bernal.

In summary, the conference was very successful and useful to all participants.

PARTICIPANTS

Nikita Belyak Aalto University, Aalto, Finland

David Bernal Purdue University, West Lafayette, United States

Timo Berthold FICO/The Zuse Institute Berlin, Berlin, Germany

Margarida Carvalho University of Montreal, Montreal, Canada

Hadi Charkhgard University of South Florida, Tampa, United States

Stefano Coniglio University of Bergamo, Bergamo, United Kingdom

Claudia D'Ambrosio CNRS & Ecole Polytechnique, Palaiseau, France

Santanu S. Dey Georgia Institute of Technology, Atlanta, United States

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Sourour Elloumi ENSTA ParisTech, Paris, France

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Olli Herrala Aalto University, Aalto, Finland

Christopher Hojny Eindhoven University of Technology, Eindhoven, The Netherlands

Aida Khajavirad Lehigh University, Bethlehem, United States

Jan Kronqvist KTH Royal Institute of Technology, Stockholm, Sweden

Sven Leyffer Argonne National Laboratory, Lemont, United States Jeffrey Linderoth University of Wisconsin-Madison, Madison ,United States

Moritz Link University of Konstanz, Konstanz ,Germany

Andrea Lodi Cornell Tech/Technion, New York City/Haifa, United States/Israel

Johan Löfberg Linköping University, Linköping, Sweden

Andreas Lundell Åbo Akademi, Åbo, Finland

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Ivo Nowak HAW-Hamburg, Hamburg, Germany

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Ann-Brith Strömberg University of Gothenburg, Gothenburg, Sweden

Erik Tamm KTH Royal Institute of Technology, Stockholm, Sweden

Shudian Zhao KTH Royal Institute of Technology, Stockholm, Sweden



Einstein Spaces and Special Geometry

JULY 10-JULY 14, 2023

Lars Andersson Beijing Institute of Mathematical Sciences and Applications (BIMSA)

> Mattias Dahl KTH Royal Institute of Technology

Organizers:

Klaus Kröncke KTH Royal Institute of Technology

SCIENTIFIC REPORT

Einstein manifolds have played a central role in Riemannian geometry and mathematical physics over the last 100 years. Examples of Einstein manifolds are found in special geometry, for example Hermitian, algebraically special or special holonomy metrics (hyperkähler and G2). They appear naturally as final states and singularity models for the Ricci flow, and, in mathematical physics, Riemannian Einstein manifolds appear as gravitational instantons in quantum theories of gravity. In spite of classical results in the field and much recent progress, many important questions about construction, classification, existence and uniqueness of Einstein manifolds remain open. For example, there is no known obstruction to the existence of Einstein metrics on compact manifolds of dimension larger than five. A classical open question is whether all compact Ricci-flat manifold have special holonomy. There are also many open problems

concerning the geometry of complete Ricci-flat metrics with specific asymptotic geometries. Other important open problems concern the stability of Einstein manifolds, as well as concentration and bubbling phenomena at boundaries of moduli spaces of Einstein metrics.

The conference brought together reserachers with different perspectives on Riemannian Einstein manifolds and the mixure of approaches turned out to be very fruitful and inspiring. Each day started with a longer overview talk by a senior researcher. For example, LeBrun and Gauduchon gave talks about Einstein metrics and conformal Kähler geometry, Biquard about desingularizations of singular Einstein manifolds, and Tod gave a talk from the physics perspective about the twistor construction of black holes and gravitational instantons.

PARTICIPANTS

Bernd Ammann University of Regensburg, Regensburg, Germany

Lars Andersson Beijing Institute of Mathematical Sciences and Applications, Beijing, China

Bernardo Araneda AEI Potsdam, Potsdam, Germany

Hugues Auvray Paris-Sud University, Paris, Frankrike

Olivier Biquard Sorbonne Université, Paris, France

Christoph Böhm University of Münster, Münster, Germany

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Vicente Cortés University of Hamburg, Hamburg, Germany

Mattias Dahl KTH Royal Institute of Technology, Stockholm, Sweden

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Paul Gauduchon École Polytechnique, Palaiseau, France

Jonathan Glöckle University of Regensburg, Regensburg, Germany

Ashwin Rod Gover University of Auckland, Auckland, New Zealand

Matt Gursky University of Notre Dame, Notre Dame, United States

Mark Haskins Duke University, Durham, United States

Hans-Joachim Hein University of Münster, Münster, Germany

Marc Herzlich University of Montpellier, Montpellier, France

Nicos Kapouleas Brown University, Providence, United States

Klaus Kröncke KTH Royal Institute of Technology, Stockholm, Sweden Claude LeBrun Stony Brook University, Stony Brook, United States

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Lars Martin Sektnan Chalmers University of Technology, Gothenburg, Sweden

Uwe Semmelmann University of Stuttgart, Stuttgart, Germany

Walter Simon University of Vienna, Vienna, Austria

Paul Tod University of Oxford, Oxford, United Kingdom

Jeff Viaclovsky University of California, Irvine, Irvine, United States

Bernard Whiting University of Florida, Gainesville, United States

Louis Yudowitz KTH Royal Institute of Technology, Stockholm, Sweden

Other Events



Kleindagarna

For three days, high school teachers of mathematics were invited to Institut Mittag-Leffler together with mathematics professors and university teachers. They inspire each other and develop tomorrow's mathematics lessons for high school students, by combining the pedagogical expertise of high school teachers with the advanced subject knowledge of higher mathematics.

The purpose of Kleindagarna is to fill the gap between the knowledge and learning within mathematics in upper secondary schools in Sweden and the university level of mathematics by giving insight into the respective mathematical approaches and teaching situations.

Kleindagarna is an appreciated learning and development opportunity aiming to create lessons in mathematics with an instant impact on high school students all around Sweden.

Organizer:

Mats Boij

Chair of The Swedish National Committee for Mathematics and professor in mathematics at KTH Royal Institute of Technology, Stockholm

Supporting organization: Brummer & Partners



Kleindagarna I

JANUARY 11-13, 2023

LECTURERS AND LESSON PILOTS

Seidon Alsaody Uppsala universitet, Uppsala

Kristian Bjerklöv KTH Royal Institute of Technology, Stockholm

Mats Boij KTH Royal Institute of Technology, Stockholm

Klara Stokes Umeå universitet, Umeå

PARTICIPANTS

Cecilia Christensen Cecilia matematik, Stockholm

Mikael Fernström Torsta Naturbruksgymnasiet, Krokom

Axel Hambraeus Stiftelsen Bladins Gymnasium, Malmö

Marie Hammaräng Katedralskolan, Växjö

Fredrik Havglim Bladins gymnasium, Malmö

Frida Hjort LBS, Lund

Karl Jacobson Hersby gymnasium, Lidingö Filip Jonsson Kling Stockholms universitet, Stockholm

Alexander Karlsson Jensen Gymnasium, Jönköping

Jonas Karlsson Mora gymnasium, Mora

Sara Karlsson Arbetarrörelsens folkhögskola, Göteborg

Carl-Joar Karlsson Chalmers/Göteborgs universitet, Göteborg

Ellen Krusell KTH Royal Institute of Technology, Stockholm

Yali Larsson Eolf Lindälvs Gymnasium, Kungsbacka

Lars-Erik Larsson Lugnetgymnasiet, Falun

Jacob Linder Arlandagymnasiet, Sigtuna

Erik Nelsson Malmö Latinskola, Malmö

<mark>Mårten Nilsson</mark> Lunds tekniska högskola, Lund

Anders Randler Wisbygymnasiet, Visby

Marge Sundström Viskastrandsgymnasiet, Borås

Wilhelm Tunemyr International School of the Stockholm Region, Stockholm

Anna Vaez ESS gymnasiet, Stockholm

<mark>Myra Windahl</mark> Karlfelftsgymnasie, Avesta



Kleindagarna II

JUNE 19-JUNE 21, 2023

LECTURERS

Tilman Bauer KTH Royal Institute of Technology, Stockholm

Anders Forsgren KTH Royal Institute of Technology, Stockholm

Maria Saprykina KTH Royal Institute of Technology, Stockholm

Stephan Wagner Uppsala universitet, Uppsala

LESSON PILOTS

Ludvig Svensson Chalmers/Göteborgs universitet, Göteborg

Wilhelm Treschow Lunds tekniska högskola, Lund

PARTICIPANTS

Watheq Al-Berijia Klara teoretiska gymnasium, Stockholm

Zeina Al-Shakarji Arlanda gymnasiet, Sigtuna

Mats Boij KTH Royal Institute of Technology, Stockholm

Gabriella David Blackebergs gymnasium, Stockholm Håkan Deleskog Göteborgs tekniska gymnasium, Göteborg

<mark>Stefan Eriksson</mark> SigtunaStiftelsens Humanistiska Läroverk, Sigtuna

Anna Fagrell Värmdö Gymnasium, Värmdö

Per-Ola Fredriksson Finnvedens Gymnasium, Värnamo

Johan Haglund Rudbeck, Sollentuna

Lars-Ola Hahlin Rudbeck, Sollentuna

Shadi Khatibi Värmdö Gymnasium, Värmdö

Henrik Landén Kunskapsgymnasiet, Göteborg

Mathias Nilsson Täby enskilda gymnasium, Täby

Niklas Schilke Rudbeck, Sollentuna

Helen Setoodeh Tibble gymnasium, Täby

Anders Söderberg Malmö latinskola, Malmö

Carina Ståhl Alsop Nösnäs gymnasium/Chalmers, Stenungsund/Göteborg

Per Svensson Karlfeldtgymnasiet, Avesta

Johanna Tholén Kunskapsförbundet Väst Vuxenutbildningen, Vänersborg



Kleindagarna III

AUGUST 16-AUGUST 18, 2023

LECTURERS

Mats Boij KTH Royal Institute of Technology, Stockholm

Martin Herschend Uppsala universitet, Stockholm

Maria Saprykina KTH Royal Institute of Technology, Stockholm

Alan Sola Stockholms universitet, Stockholm

LESSON PILOTS

Jon-Magnus Rosenblad KTH Royal Institute of Technology, Stockholm

Emanuel Ström KTH Royal Institute of Technology, Stockholm

PARTICIPANTS

Jenny Archer Stockholm Science & Innovation School, Stockholm

Süleyman Arslan Jällagymnasiet, Uppsala

Sanna Bodemyr Tullinge gymnasium, Tullinge David Delgado Bernadottegymnasiet, Stockholm

Sheida Delgoshaei Sigtunaskolan humanistiska läroverket, Sigtuna

Suheyla Demir Mörbyskolan, Danderyd

Mattias Eklund SKF Tekniska gymnasium, Göteborg

Staffan Frid Klara Norra teoretiska gymnasium, Stockholm

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Batol Hasan Ystadgymnasiet, Ystad

Alice Kozakevicius Bernadottegymnasiet, Stockholm

Miklos Långvik Nacka Gymnasium, Nacka

Per Lundström Baldergymnasiet, Skellefteå

Baris Ölcer Rudbecks gymnasium, Sollentuna

Teresa Opasic Grillska gymnasiet, Stockholm

Nikke Palmberg Vasa övningsskolas gymnasium, Vasa

Pernilla Stake Solbergagymnasiet, Arvika

Måns Svensson BLS Industriesgymnasium, Ystad

Tomas Westman Stockholm Science & Innovation School, Stockholm

Financial Report



Förvaltningsberättelse

MAKARNA MITTAG-LEFFLERS MATEMATISKA STIFTELSE Org.nr 802408-0890

VERKSAMHETEN

Allmänt om verksamheten

Makarna Mittag-Lefflers matematiska stiftelse har sitt säte i Stockholm. Stiftelsens ändamål är att inom de fyra nordiska länderna, Sverige, Danmark, Finland och Norge, och alldeles särskilt Sverige, för framtiden uppehålla och ytterligare utveckla den ställning, vilken den rena matematiken i dessa länder numera intager, samt att härvid även bereda aktning och rättvist uppskattande utom Nordens gränser för dessa länders insats inom tankelivets högsta område. Makarna Mittag-Lefflers matematiska stiftelse bedriver verksamhet bl.a., i form av tidskriftsutgivning varför alla uttag redovisas över resultaträkningen som kostnader för drift av stiftelsen. KVA förvaltar ett kapital med ett marknadsvärde som per 2023-12-31 uppgår till 2 548 mkr via sina anknutna stiftelser. KVA och dess anknutna stiftelsers kapital (exklusive Stiftelsen Anna-Greta och Holger Crafoords fond) förvaltas av Carnegie enligt av akademistyrelsen fastställda riktlinjer.

Makarna Mittag-Lefflers matematiska stiftelses andel uppgår till 11,25%.

Stiftelsen har inte haft några anställda och inga löner och ersättningar har utbetalats under året.

Främjande av ändamålet

Resultatet från stiftelsens verksamhet exklusive de finansiella posterna uppgår till -5 957 172 kr som därmed tas från fonden för att driva Institut Mittag-Leffler.

Eftersom Makarna Mittag-Lefflers matematiska stiftelse bedriver verksamhet, och därmed är klassad som närings-drivande, redovisas alla uttag som kostnader för drift av stiftelsen.

Väsentliga händelser under räkenskapsåret Inga väsentliga händelser finns att rapportera.

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Flerårsöversikt

	2023	2022	2021	2020	2019
Huvudintäkter	24 420 895	20 217 859	7 817 711	25 525 568	25 529 537
Årets resultat	-1 902 172	-3 084 598	22 417 021	11 374 962	16 933 114
Ingående kapital	221 050 310	224 134 909	201 717 888	190 342 926	173 409 812
Utgående kapital	219 148 137	221 050 310	224 134 909	201 717 888	190 342 926
Årlig förändring i %	-0,86%	-1,38%	11,11%	5,98%	9,76%

Vad beträffar stiftelsens resultat och ställning i övrigt, hänvisas till efterföljande resultat- och balans-räkningar med tillhörande noter.

RESULTATRÄKNING

	Not	2023	2022
Stiftlesens intäkter			
Bidrag		23 958 280	19 506 945
Nettoomsättning		0	0
Övriga stiftelseintäkter		462 615	710 913
		24 420 895	20 217 859
Stiftelsens kostnader			
Övriga externa kostnader	2	-28 847 410	-27 727 537
Av- och nedskrivningar av materiella anläggninstillgångar		-627 542	-624 453
Övriga stiftelserkostnader		-903 115	-879 732
		-30 378 067	-29 231 722
Rörelseresultat		-5 957 172	-9 013 863
Finansiella poster			
Resultat från övriga finansiella anläggningstillgångar	3	3 469 503	5 479 719
Övriga ränteintäkter och liknande resultatposter	4	585 497	449 547
		4 055 000	5 929 266
Årets resultat		-1 902 172	-3 084 598

BALANSRÄKNING

Tillgångar		2023	2022
Materiella anläggningstillgångar			
Inventarier, verktyg och installationer	5	351 799	466 914
Förbättringsutgifter på annans fastighet	6	12 731 237	13 243 664
Finansiella anläggningstillgångar		13 083 036	13 710 578
Andra Långfristiga värdenannersinnehav	7	218 842 048	227 200 295
	/	218 842 068	224 600 575
Summa anläggningstillgångar		231 925 104	238 311 173
Umsattningstillgangar Kentfrieting fondringer			
Övriga fordringar			(000 0/7
Föruthat kastradar och unnt intäktor		-	4 820 967
Forutbet, köstnader och uppt. Intakter	<u> </u>	1 452 940	584 547
		1 432 940	5 405 514
Kassa och bank		5 529 973	3 086 435
Summa omsättningstillgångar		6 982 913	8 491 949
Summa tillgångar		238 908 016	246 803 121
Eget kapital och skulder			
Bundet eget kapital			
Bundet eget kapital vid räkenskapsårets början		209 932 384	211 177 213
Förändringar av bundet kapital		-4 197 855	-1 244 829
Bundet eget kapital vid räkenskapsårets slut		205 734 529	209 932 384
Fritt eget kapital			
Fritt eget kapital vid räkenskapsårets början		11 117 926	12 957 695
Överfört till och från bundet eget kapital		4 197 855	1 244 829
Lämnade och återförda anslag		-	-
Årets resultat		-1 902 172	-3 084 598
Fritt eget kapital vid räkenskapsårets slut		13 413 609	11 117 926
Summa eget kapital		219 148 138	221 050 310
Kortfristiga skulder			
Leverantörsskulder		1 653 336	1 640 071
Övriga skulder		1 535 077	-
Beviljade ej utbetalda anslag		16 349 526	23 524 099
Uppl. kostnader och förutbet. intäkter		221 940	588 642
		19 759 879	25 752 812
Summa skulder		19 759 879	25 752 812
Summa tillgångar		238 908 016	246 803 121

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NOTER

Not 1 - Redovisnings- och värderingsprinciper

Allmänna redovisningsprinciper

Årsredovisningen har upprättats i enlighet med Årsredovisningslagen och Bokföringsnämndens allmänna råd (BFNAR 2016:10) Årsredovisning i mindre företag.

Avskrivingsprinciper för anläggningstillgångar Följande avskrivningstider tillämpas

Materiella anläggningstillgångarInventarier, verktyg och installationer3–5 årFörbättringsutgifter på annans fastighet10–40 år

Eget kapital

Bundet eget kapital består dels av det ursprungliga donationskapitalet, dels av rearesultat som förs direkt mot bundet eget kapital. Utöver detta ingår även kapitaliseringar, årlig avsättning om 10 % på räntor och utdelningar. Fritt kapital avser den del av kapitalet som kan disponeras för ändamålet.

Not 2 – Övriga externa kostnader	2023	2022
Lokalkostnader	-6 526 376	-6 650 778
Projektkostnader	-14 857 712	-16 121 088
IT-kostnader	-1 395 913	-700 588
Personalkostnader	-2 309 691	-2 410 030
Övrigt	-3 757 720	-1 845 053
	-28 847 411	-27 727 537
Not 3 – Resultat från övriga finansiella anläggningstillgångar		
Utdelningar	7 623 547	6 982 002
Ränteintäkter	960 795	539 667
Realisationsresultat	-5 114 839	-2 041 950
	3 469 503	5 479 719
Not 4 – Övriga ränteintäkter och liknade resultatposter		
Fondrabatter	585 497	449 547
Kursvinst	0	0
	585 497	449 547
Not 5 – Inventarier, verktyg och installationer		
Ackumulerade anskaffningsvärden		
Vid årets början	2 066 173	1 822 833
Nyanskaffningar		243 340
Vid årets slut	2 066 173	2 066 173
Netto anskaffningsvärde	2 066 173	2 066 173
Ackumulerade avskrivningar enligt plan		
Vid årets början	-1 599 259	-1 484 144
Årets avskrivning på anskaffningsvärden	-115 115	-115 115
Vid årets slut	-1 714 374	-1 599 259
Redovisat värde vid årets slut	351 799	466 914
		>>

Not 6 - Förbättringsutgifter på annans fastighet	2023	2022
Ackumulerade anskaffningsvärden		
Vid årets början	17 103 740	17 038 061
Nyanskaffningar		65 679
Vid årets slut	17 103 740	17 103 740
Netto anskaffningsvärde	17 103 740	17 103 740
Ackumulerade avskrivningar enligt plan		
Vid årets början	-3 860 076	-3 350 738
Årets avskrivning på anskaffningsvärden	-512 427	-509 338
Vid årets slut	-4 372 503	-3 860 076
Redovisat värde vid årets slut	12 731 237	13 243 664
Not 7 – Andra långfristiga värdepappersinnehav		
Ackumulerade anskaffningsvärden		
Vid årets början	224 600 595	224 572 547
Кöр	55 209 955	31 707 295
Försäljning	-60 968 482	-31 679 247
Utgående anskaffningsvärden	218 842 068	224 600 595

218 842 068

286 631 206

224 600 595

267 874 253

Bokfört värde

Marknadsvärde

Stockholm den 30 maj 2024

Hans Ellegren Ständig sekreterare

Min revisionsberättelse har avgivits den

Magnus Prööm Auktoriserad revisor

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