Nederlands Mathematisch Congres 2025

Lennart Meier
Utrecht University

Jacob Tsimerman
University of Toronto

Corina Tarnita
Princeton University

Benjamin Gess
TU Berlin
MPI Leipzig

60th edition

Kontakt der Kontinenten
Soesterberg

22 & 23 April

Information & Registration
Mathematischcongres.nl

KWG

NWO

platform wiskunde nederland

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Programme Booklet

Welcome to the 60th Netherlands Mathematical Congress 2025

This year we are happy to welcome all participants to the celebratory 60th edition of the Netherlands Mathematical Congress. We have planned for a varied and well-filled program with plenary lectures by Benjamin Gess, Corina Tarnita and Jacob Tsimerman, and by Lennart Meier, who will present his work that was awarded the triennial N.G. de Bruijn Prize. We invite you to be inspired by parallel sessions organized by the mathematics clusters DIAMANT, GQT, NDNS+ and STAR, the NWO Gravitation programs *Challenges in Cyber Security* and *Quantum Software Consortium*, 4TU.AMI and AIM, where they will present the latest developments in their field. Further sessions include one organized by Young KWG regarding science communication, a strategy session, the Indagationes Mathematicae Best Paper Award session, and a session that hosts the winners of last year's Stieltjes Prize. You may also engage in networking opportunities to connect with fellow mathematicians, participate in workshops and attend, speed dates and award ceremonies. Lastly, the NMC will host the KWG PhD prize presentations and a PhD poster competition.

The general assembly of the Royal Dutch Mathematical Society will be held at the end the first day.

In this booklet you will find further information about the congress itself and the contents of the sessions.

We hope that you will enjoy the program, as well as the opportunities for talking and working with colleagues and friends, and wish you an interesting conference and a pleasant stay in Soesterberg.

The Local organizing committee:

Ivar Dilweg (NWO)
Mathisca de Gunst (VU Amsterdam, president Koninklijk Wiskundig Genootschap)
Charlene Kalle (Leiden University, secretary Koninklijk Wiskundig Genootschap)
Martijn Kool (Utrecht University, chair Scientific Committee)
Marieke Kranenburg (TU Eindhoven, chair)
Wil Schilders (director Platform Wiskunde Nederland)

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Scientific committee:

- Karen Aardal (TU Delft)
- Martijn Caspers (TU Delft)
- Sonja Cox (University of Amsterdam)
- Rianne de Heide (University of Twente)
- Martijn Kool (Utrecht University, chair)
- Bob Rink (Vrije Universiteit Amsterdam)

N.G. de Bruijn prize 2025 jury:

- Jeanine Duistermaat-Houwing (Radboud University)
- Jan van Neerven (TU Delft)
- Jasper Stokman (University of Amsterdam, chair)

Indagationes Mathematicae Best Paper prize jury:

- Gunther Cornelissen (Utrecht University)
- Monique Laurent (CWI & Tilburg University)
- Jan Maas (IST Austria)
- Jan van Neerven (TU Delft, chair)
- Bert Zwart (TU Eindhoven & CWI)

Stieltjes prize jury:

- Erik van den Ban (Utrecht University)
- Odo Diekmann (Utrecht University)
- Aernout van Enter (Rijksuniversiteit Groningen)
- Frans Oort (Utrecht University)
- Marc Uetz (University of Twente)
- Aad van der Vaart (TU Delft)
- Kees Vuik (TU Delft, chair)

KWG PhD prize jury:

- Francesca Arici (Leiden University, GQT)
- Johan Commelin (Utrecht University, DIAMANT)
- Oliver Fabert (Vrije Universiteit Amsterdam, chair)
- Richard Kraaij (TU Delft, STAR)
- Lisa Kusch (TU Eindhoven, NDNS+)

KWG Poster prize jury:

- Sharmila Gunasekaran (Radboud Unversity)
- Janusz Meylahn (University of Twente)
- Ronald de Wolf (CWI & University of Amsterdam)

Pythagorasprijs jury:

- Maarten de Boeck
- Matthijs Coster
- Enno Diekema
- Niels Kolenbrander
- Klaas Pieter Hart
- Lars Pos

General information

Venue: Conference hotel Kontakt Der Kontinenten, Soesterberg

Amersfoortsestraat 20, 3769 AS Soesterberg

By car:
For use with a navigation system, we recommend entering Richelleweg 1, 3769 AZ Soesterberg. You will then arrive at the conference hotel registration.

From the A28 from Amersfoort, take exit 4 (Soest-Soesterberg) and turn right at the end of the exit. From Utrecht, also take exit 4 (Soest-Soesterberg) but turn left at the end of the exit.

You will then be on the Richelleweg. Go straight ahead twice at the traffic lights, after 100 meters the entrance is on the left.

Public transport:
Bus stop Soesterberg-Oost / Kontakt der Kontinenten is a stone's throw from the hotel. We advise you to travel to Amersfoort CS and from there transfer to line 56 or 34. The bus ride takes approximately 10 minutes.

Food and beverages:
Lunches are included in the registration fee. If you registered for the conference dinner on Tuesday, you are welcome at the dinner on Tuesday, 22 April at 19:00 h. Coffee and tea are available at the foyer.

Registration desk
Should you have any questions or encounter any problems, please contact our registration desk or find any of the organizers. The hotel registration desk is open for non-conference-related questions (+31 346351755).

Stands
In the foyer there will be stands of the following organizations:

- PWN
- KWG
- Epsilon
- Vierkant
- Optische Fenomenen
- Math4NL

Main floor map of Kontakt der Kontinenten

Programme NMC 2025

Tuesday 22 April 2025

9:00 – 10:00	Registration and Reception/Coffee			
	Plenary sessions			
10:00 – 10:10	Opening session by KWG			
10:10 – 11:00	Plenary lecture: Jacob Tsimerman			
11:00 – 11:30	Break			
11:30 – 12:30	Young KWG session			
12:30 – 13:45	Lunch			
	Parallel sessions			
13:45 – 15:15	GQT *Angola*	NDNS *Botswana*	Cybersecurity *St Jan*	4TU.AMI *Congo*
15:15 – 15:45	Coffee break			
	Plenary sessions			
15:45 – 16:30	Indagationes Mathematicae Best Paper Award session			
16:30 – 17:30	De Bruijn lecture: Lennart Meier			
	Parallel sessions			
17:30 – 18:30	General Assembly of the Royal Dutch Mathematical Society *Angola*		Speed dates session *Congo*	
17:30 – 19:00	Drinks			
19:00 – 21:30	Dinner			
21:30 – 23:00	Bar open			

Wednesday 23 April 2025

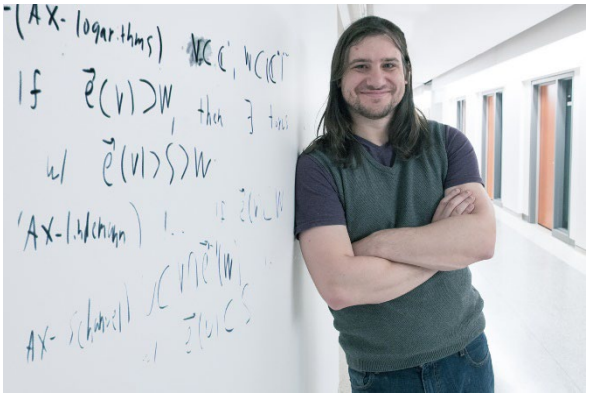
8:30 – 9:00	Registration and coffee				
	Parallel sessions				
9:00 – 10.00	Strategy session *St Jan*	Workshop- Start your career! *Angola*	Workshop- Funding possibilities for early career researchers *Botswana*	Workshop- Research funding for mathematicians *Congo*	
	Plenary sessions				
10:00 – 10:50	Plenary lecture: Corina Tarnita				
10:50 – 11:15	Break				
11:15 – 12:15	KWG PhD Prize				
12:15 – 13:30	Lunch		Poster session (foyer)		
	Parallel sessions				
13:30 – 15:00	DIAMANT *Angola*	STAR *Botswana*	AIM *Congo*	QSC *Ghana*	Mathematics Education *St Jan*
15:00 – 15:30	Break				
15:30 – 16:10	Stieltjes Prize Award session *St Jan*		Pythagoras Prize (until 16:30) *Congo*		
16:15 – 17:05	Plenary lecture: Benjamin Gess				
	Plenary sessions				
17:05 – 17:15	Prize giving ceremony: KWG PhD Prize, Poster Prize, Pythagoras Prize				
17:15 – 18:00	Drinks				

Plenary lecture

Tuesday 22 April 2025, 10:10 – 11:00

Jacob Tsimerman (University of Toronto)

Exceptional Integrability and Primitives of Differential Forms



Transcendence theory is one of the oldest subjects in mathematics, with some of the most basic questions (such as the transcendence of π+e) still being open. A natural place of study for this field is that of integrals like $\log(2) = \int_1^2 dx/x$. There is a fascinating conjectural theory, much of it described by the Period Conjecture, describing exactly when these "period integrals" ought to have algebraic relations.

We consider indefinite period integrals such as $\log(t) = \int_1^t dx/x$ which we refer to as primitives, and go beyond transcendence. Specifically, we consider the question of when certain primitives can be `expressed' in terms of others. This study was initiated by Liouville who classified those differential forms whose integrals can be expressed using iterated operations of logarithms, exponents, and algebra. We answer the question of when an arbitrary primitive can be expressed using finitely many others, both in a theoretical sense and by giving a decision procedure. Even though the question we study is purely complex-theoretic, it turns out to involve finiteness results in number theory. We also explain that the logarithm function is canonical, in that it is the minimal transcendental primitive you can obtain with a logarithmic residue! Everything here is joint with Jonathan Pila.

Biography

Jacob Tsimerman is professor at the University of Toronto specialised in number theory and related areas. He studied at the University of Toronto, graduating in 2006 with a bachelor's degree in math. He obtained his PhD from Princeton in 2011 under the guidance of Peter Sarnak.

Together with Jonathan Pila, Tsimerman demonstrated the André–Oort conjecture for Siegel modular varieties. Later, he completed the proof of the full André-Oort conjecture for all moduli spaces of abelian varieties by reducing the problem to the averaged Colmez conjecture which was proved by Xinyi Yuan and Shou-Wu Zhang as well as independently by Andreatta, Goren, Howard and Madapusi-Pera.

In 2018, Tsimerman was an invited speaker at the International Congress of Mathematicians. In 2019, he was awarded the Coxeter–James Prize by the Canadian Mathematical Society. He is also one of winners of the 2022 New Horizons in Mathematics Prize, associated with the Breakthrough Prize in Mathematics. He was awarded for "outstanding work in analytic number theory and arithmetic geometry, including breakthroughs on the André-Oort and Griffiths conjectures". In 2023, Tsimerman received the Ostrowski Prize.

Young KWG session

Tuesday 22 April 2025, 11:30 – 12:30

Communicating mathematics beyond research: how (and why) to reach out to a broader audience

In this session, we explore how mathematicians can engage in science communication and why they should do so. Mathematics is a field full of interesting people, theories, and results. All this should be part of the public image of mathematics. Mathematicians Raf Bocklandt (Associate Professor at the UvA), Martijn Gösgens (Postdoc at CWI), and Raffaella Mulas, or Graphaella as her mathematical nickname sounds, (Assistant Professor at the VU) will share their experiences with us. From demonstrating the practical relevance of mathematics to making abstract concepts accessible and showcasing the beauty of mathematics. We will discuss different opportunities and hope to inspire you to do some science communication on your own!

This session is organized by Young KWG, the section which aims to attract and support young mathematicians in the early stages of their careers.

Parallel sessions

Tuesday 22 April 2025, 13:45 – 15:15

GQT (Room Angola)

Peter Hochs (Radboud University)

Equivariant analytic torsion and an equivariant Ruelle dynamical zeta function

Photocredits: Bert Beelen

Analytic torsion was introduced by Ray and Singer as a way to realise Reidemeister-Franz torsion analytically. (The equality was independently proved by Cheeger and Müller.) The Ruelle dynamical zeta function is a topological way to count closed curves of flows on compact manifolds. The Fried conjecture states that, for a suitable class of flows, the Ruelle dynamical zeta function has a well-defined value at zero, and that the absolute value of this value equals analytic torsion. With Hemanth Saratchandran, we define equivariant versions of analytic torsion and of the Ruelle dynamical zeta function, which incorporate group actions. This leads to the question under what conditions the resulting equivariant version of Fried's conjecture is true. With Chris Pirie, we have recently obtained positive results on a basic class of flows: suspension flows of isometries.

Marta Pieropan (Utrecht University)

Rational points and Campana points on Fano varieties

Diophantine geometry is the study of integer and rational solutions of polynomial equations. On its geometric side, the equations define algebraic varieties and the solutions correspond to integer or rational points on the variety. Geometric properties such as hyperbolicity conjecturally determine how many rational points a variety can have. Fano varieties form the class of varieties with the highest density of rational points. On Fano varieties rational points and integer points coincide. Campana points are rational points whose integer coordinates satisfy certain arithmetic conditions, such as being divisible by a sufficiently high power of their radical. Campana points are important to study images of rational points under morphisms of algebraic varieties. This talk will introduce the main conjectures in the field of rational points and of Campana points on Fano varieties, including joint work with Smeets, Tanimoto, and Várilly-Alvarado, and then discuss the state of the art and future directions.

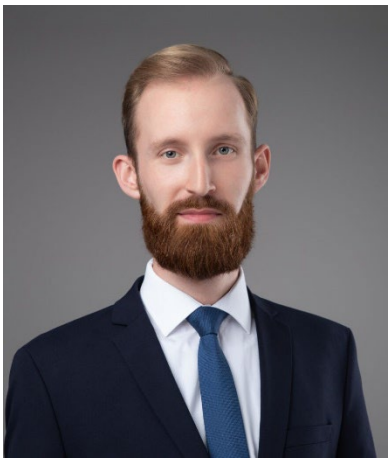
Michal Wrochna (Utrecht University)

Lorentzian Dirac operators and geometric invariants

Dirac operators on Riemannian manifolds play a fundamental role in linking differential geometry, topology, and analysis through index theory. They are also essential in developments at the interface of non-commutative geometry and high energy physics. Establishing a theory with similar features on Lorentzian manifolds has been a long-term challenge, it has however undergone major progress in the last few years thanks to incorporating tools from microlocal analysis. The talk will present the current state of the art and new perspectives, discussing in particular an index theorem due to Christian Bär and Alexander Strohmaier as well as recent results in non-compact settings obtained in collaboration with Nguyen Viet Dang, Dawei Shen and András Vasy.

NDNS+ (Room Botswana)

Julian Köllermeier (University of Groningen)



Beyond Shallow Water Equations: A Hierarchical Approach to Free-Surface Flows via Moment Models

Modeling geophysical free-surface flows is challenging due to the interplay of multiscale dynamics and accuracy requirements. Traditional approaches like the Shallow Water Equations (SWE) are computationally fast but often insufficient for applications demanding greater physical fidelity. Hierarchical moment models offer a promising alternative, deriving an extended PDE system based on a polynomial expansion of the velocity profile. This approach retains the SWE as a base case while enabling enhanced accuracy by incorporating additional equations in a hierarchical way.

In this talk, we present this framework for hierarchical moment models, highlighting their flexibility, structural similarity, and capacity for model adaptivity. We discuss key aspects including (1) the hierarchical nature of the models, (2) the analysis of hyperbolicity and physical properties, and (3) efficient numerical schemes that preserve asymptotic properties. Using numerical examples, we showcase runtime and accuracy improvements in predicting free-surface flows. Additionally, we outline future extensions of the models to account for complex fluids with the aim to bridge the gap between computational efficiency and physical accuracy in free-surface flow simulations.

Karoline Disser (Universität Kassel)

Global solutions and non-trivial long-time behaviour for fluid-elastic interaction

We look at a non-linear system modelling the dynamics of a linearly elastic body immersed in an incompressible viscous fluid in 3d. Assuming no other damping but fluid viscosity, in the case of small initial data, the system admits a unique global strong solution that converges either to a steady state or a “pressure wave”-solution. However, it depends on the geometry of the elastic structure, whether non-trivial pressure waves exist.

Koondanibha Mitra (Eindhoven University of Technology)

Degenerate & singular mixed dimensional diffusion systems: A journey from modelling, and numerical methods, to well-posedness

Photocredits: Angeline Swinkels

Nonlinear, degenerate, and coupled (mixed-dimensionally) systems arise in various applications of societal relevance such as biofilm growth, reactive transport in fractured porous media, and cellular biology. For such problems, the biomass or the main-substrate is restricted to a lower dimensional manifold embedded in a domain in, and the evolution of the biomass density/substrate concentration exhibits degenerate and singular diffusion behaviour. The other equations (for nutrients/reagents) are defined on the bulk, and are of linear advection-reaction-diffusion type.

In our analysis, we first propose a backward Euler time-discretisation of the problem where the reactive terms coupling the equations are estimated semi-implicitly, and thus, the equations are dimensionally decoupled and can be solved sequentially. A bulk-surface finite element method is used to discretise the system in space. Then, an iterative linearisation algorithm is proposed to solve the fully-discrete nonlinear problem on discretised. It is proven that the iterations converge unconditionally even for degenerate/singular cases and for curved, thus, showing existence of solution of the fully-discrete nonlinear problem. Then, for flat the convergence of the fully-discrete solutions to the time-discrete solution is shown and order of convergence with respect to mesh-size is estimated. Properties such as well-posedness, boundedness, and positivity of the time-discrete solutions are proven, and the existence of the time-continuous solutions is shown by passing the time-step size to zero. Uniqueness is shown using a contraction argument. Additional properties such as regularity and finite-time blow-up are investigated. Numerical results validate the theoretical predictions. They demonstrate that the iterative solver and the discretization are extremely robust and efficient compared to existing alternatives.

References

- K. Mitra, & S. Sonner (2023). Well-posedness and properties of nonlinear coupled evolution problems modelling biofilm growth. arXiv:2304.00175.

- R.K.H. Smeets, K. Mitra, S. Sonner, & I.S. Pop (2024). Robust time-discretisation and linearisation schemes for singular and degenerate evolution systems modelling biofilm growth. arXiv:2404.00391v2.

Challenges in Cyber Security (Room St. Jan)

Edoardo Persichetti (Florida Atlantic University)

On Practical Post-Quantum Signatures from the Code Equivalence Problem

The design of secure post-quantum digital signatures is a particularly important and current topic, especially considering the presence of initiatives such as NIST's call for proposals. While lattice-based designs offer intriguing solutions (some of which were recently standardised) NIST itself expressed the desire for alternatives, based on different security assumptions. Code-based signatures are historically challenging to design, due to the intrinsic nature of the Hamming metric, and the syndrome decoding problem; however, a recent approach exploiting the notion of code equivalence offers an interesting alternative. In this talk, we briefly summarise the state of the art, introduce the LESS signature scheme, and then present recent developments which greatly contribute to making it one of the most promising code-based signature schemes in literature.

Lejla Batina (Radboud University)

Side channels strike back: All AI you need for side-channel analysis and vice versa

Cryptography is considered to be the cornerstone of secure systems, but its implementations are often vulnerable to side-channel analysis (SCA).

Side-channel analysis has become one of the most common causes for security failures in the real world today. In this talk, I will first survey side-channel analysis attacks on implementations of cryptography and countermeasures. Second, we will see how machine learning and AI have changed the practical cryptography landscape and attackers' capabilities in particular. In the end, I will discuss the other direction in this AI-SCA interplay i.e. the way side-channel analysis threatens AI implementations on embedded devices.

Wouter Castryck (KU Leuven)

Hash functions from superspecial principally polarized abelian surfaces (probably) require a trusted set-up

Charles, Goren and Lauter in 2006 proposed a cryptographic hash function, based on walks in the ℓ-isogeny graph of supersingular elliptic curves in large characteristic p. In 2016 Eisenträger et al. showed that such hash functions allow for an efficient computation of second pre-images as soon as the endomorphism ring of the starting vertex is known. Since all known methods for constructing supersingular elliptic curves implicitly leak the endomorphism ring, secure instantiations of the CGL hash function should be set up by a trusted party, who does not reveal how the starting vertex was generated. In this talk I will present a similar result for hash functions from (ℓ, ℓ)-isogenies between superspecial principally polarized abelian surfaces in characteristic p: if the principal polarization on the starting surface is sufficiently well-understood, then collisions can be produced in polynomial time. It is likely that all known methods for generating such a starting surface implicitly reveal this information, so it seems that, here again, a trusted set-up is needed. This is joint work with Thomas Decru, Péter Kutas, Abel Laval, Christophe Petit and Yan Bo Ti.

4TU.AMI (Room Congo)

Aida Abiad (Eindhoven University of Technology & Vrije Universiteit Brussel)

Spectral approach to Kemeny's constant

Kemeny's constant, a fundamental parameter in the theory of Markov chains, has recently received significant attention within the graph theory community. Originally defined for a discrete, finite, time-homogeneous, and irreducible Markov chain based on its stationary vector and mean first passage times, Kemeny's constant finds special relevance in the study of random walks on graphs. Kemeny's constant gives a measure of how quickly a random walker can move around a graph and is thus a good measure of the connectivity of a graph. Kemeny's constant has many useful interpretations, including the spread of infectious diseases (how quickly a disease will reach epidemic levels), molecular conformation dynamics (presence or absence of metastable sets), and urban road networks (how well connected a network is). For these and other applications, the main question is: how do changes in the network lead to changes in Kemeny's constant? In this talk we investigate the effect of the network structure on Kemeny's constant. We do so by showing several new approximations for Kemeny's constant, which we derive using spectral techniques.

Biography

Aida Abiad is an associate professor at the Department of Mathematics and Computer Science at Eindhoven University of Technology, The Netherlands. She received her PhD from Tilburg University in 2015, and had appointments at Maastricht University, Ghent University and Vrije Universiteit Brussel. Her main research interests are in algebraic combinatorics and its application to other fields such as coding theory or quantum information theory. She serves on the editorial board of the open access journals The Electronic Journal of Combinatorics and The Electronic Journal of Linear Algebra. She is a recipient, among other awards, of a FWO research fellowship and a NWO Vidi fellowship. Since 2024, she has been also appointed part-time associate professor at the Vrije Universiteit Brussel.

Christoph Brune (University of Twente)

The Indagationes Mathematicae Best Paper Prize

Tuesday 22 April 2025, 15:45 – 16:30

The Indagationes Mathematicae Best Paper Prize is the award for the best paper the journal Indagationes Mathematicae (IM), published by Elsevier under the auspices of KWG.

The *IM Best Paper Award 2024* has been awarded to Robbert Fokkink, Dan Rust and Ville Salo for the article **Automorphism groups of random substitution subshifts,** *Indagationes Mathematicae* 34(5), 931 – 958 (2024).

Dan Rust

Dynamics of random substitution

Substitutions are rules for mapping letters in an alphabet to words over that alphabet, with the goal of iterating such a map to generate interesting infinite words. A random substitution is a generalisation of a substitution, where one has a finite set of possible image words that are independently chosen each time the random substitution is applied to each of the letters in a word. This gives rise to infinite words that share similar long-range order properties with substitutive words, but which differ in their local order because they exhibit positive entropy. I will give an overview of this class of systems from a dynamical perspective and some of the aspects that have recently been studied.

N.G. De Bruijn lecture

Tuesday 22 April 2025, 16:30 – 17:30

Lennart Meier (Utrecht University)

During NMC 2025), the triennial N.G. de Bruijn Prize will be awarded to Markus Land, Akhil Mathew, Lennart Meier, and Georg Tamme for their outstanding mathematical work published in a peer-reviewed journal between 2022 and 2024. Their paper, "*Purity in chromatically localized algebraic K-theory*" (J. Amer. Math. Soc. 37 (2024), no. 4, 1011-1040), has already led to spectacular applications, including the resolution of two major, long-standing conjectures. The work includes significant Dutch contributions from Lennart Meier (Utrecht University). Lennart Meier will give a plenary lecture about the work performed.

Algebraic K-theory and higher-algebraic localizations

Algebraic K-theory is a fundamental invariant of rings. While seemingly a classical algebraic invariant, its construction involves ***higher algebra***, a form of algebra where sets get replaced by spaces and equalities are replaced by coherent homotopies. Thus, algebraic K-theory is most naturally seen as an invariant of higher-algebraic rings producing higher-algebraic abelian groups as output. While it has long been known how algebraic K-theory behaves for p-local equivalences for a prime p, higher algebra allows for higher versions of primes and the corresponding localizations.

In my paper "Purity in chromatically localized algebraic K-theory" with M. Land, A. Mathew and G. Tamme, I have shown a general statement how algebraic K-theory behaves with respect to such higher-algebraic localizations. The goal of the talk is to explain this theorem and, if time remains, say how it has helped in proving Rognes's redshift conjecture and disproving Ravenel's telescope conjecture.

Biography

Lennart Meier studied Mathematics and Philosophy in Bielefeld and Bonn and graduated in 2009 with a Diplom thesis about string topology under the supervision of Matthias Kreck. He stayed in Bonn to obtain his PhD in stable homotopy theory under the supervision of Stefan Schwede in 2012. Subsequently he became Whyburn Instructor at the University of Virginia, where he worked for two years. After a two-months stay at the Hausdorff Institute, he returned 2015 with a grant from the DFG (German Research Foundation) to Bonn as a postdoctoral researcher, until joining the Mathematical Institute at Utrecht University as Assistant Professor in 2018 and obtaining tenure in 2020.

Speed dates session (Room Congo)

Tuesday 22 April 2025, 17:30 – 18:50

During the first day of the NMC all PhD students, postdocs, academic staff and also master students in the final stage of their studies are invited to have speed dates with possible employers like CBS, CQM, and InControl.

This event will offer you an invaluable opportunity to gain a better understanding of the variety of career paths. You are encouraged to talk about job opportunities and, traineeships, and to explore opportunities for collaboration.

More information about the participating companies and organizations can be found below. In case you are interested in a speed date, please indicate on the registration form with which companies you would like to talk or send an email with the preferred companies/organizations to contact@mathematischcongres.nl.

Statistics Netherlands (CBS)

In a society where the amount of information is growing explosively, free access to reliable and integral data is crucial. As the national statistical office, CBS produces reliable statistical information and data that provide insight into social issues, thus supporting the public debate, policy development and decision-making while contributing to prosperity, well-being and democracy.

Working at CBS

The office environment at CBS – with offices located in The Hague, Heerlen and on Bonaire – is a pleasant mix of government and business. You will find a very diverse group of employees who range widely in age, nationality, discipline and career. One thing all our employees have in common is their focus on the quality of our research results. Would you like to learn more and/or apply? Check out our current vacancies and/or current internships (in Dutch) on www.werkenbijhetcbs.nl

CQM

CQM (Consultants in Quantitative Methods), a leading consultancy based in Eindhoven, specializes in using data science and mathematical modeling to improve supply networks, innovate products, and enhance manufacturing processes. With over 40 years of proven experience, CQM has consistently applied quantitative methods to solve complex challenges in various industries.

Our dynamic team of around 40 highly skilled consultants, all with an academic background in mathematics or a related field, is dedicated to clarifying complex processes, enabling our clients to

make informed, fact-based decisions that significantly enhance their organizational effectiveness and operational outcomes. We immerse ourselves in their business situation, we empathize and collaborate with them; determined to tackle problems together as one team.

CQM's portfolio showcases we are at the forefront of data science to offer the best, practically applicable solution for clients such as Agrico, Ahold, ASML, CARU, FrieslandCampina, NS, Philips, ProRail and Transvision.

InControl Enterprise Dynamics

InControl Enterprise Dynamics has been a leading developer of simulation software for over 35 years. We mainly focus on customers with highly complex processes in Material Handling & Intralogistics, Transportation & Supply Chains, and Crowded Places. That is where our software also distinguishes itself from alternatives. Our software platform is used worldwide for the analysis and optimization of infrastructures, industrial processes, and crowd management.

Our customers use our software to test, plan and control large-scale systems and infrastructures, such as baggage handling systems, container terminals, assembly lines, railway infrastructure and train stations, sports stadiums, and large-scale events.

Our mission is to deliver software solutions that contribute to a safe and sustainable planet. InControl is a company that strongly believes in growth and offers its employees room for development. As an employee, you are part of a growing, international company with room for employees' input and ideas.

We look forward to connecting with talented and motivated students who are interested in pursuing a career in simulation and software development.

Parallel sessions

Wednesday 23 April 2025, 9:00 – 10:00

Strategy session PWN & Round Table Mathematics (Room St. Jan)

Jan Bouwe van den Berg and Walter van Suijlekom

In the first part of the strategy session, we will discuss the current status of the development of a new strategic document for Dutch mathematics, commissioned by the Wiskunderaad and PWN. The document will build on the 2015 Delta Plan and will focus in particular on what mathematics can contribute to and mean for Dutch society.

In the second part The Tafel Wiskunde will give a brief update on NWO related matters and also explain how we are connecting with PWN. During the session at the NMC, there will be plenty of room for your input, including questions and ideas on how to represent mathematics even better within NWO. There will also be an opportunity to highlight any issues you encounter with NWO, for example in application procedures. We will gather your input on the first day of the NMC to help streamline the discussion.

Workshops

Workshop – Start you career! (Room Angola)

Margret Schmitter, Vrije Universiteit Amsterdam

Are you thinking about what you want to do after your PhD graduation, but have you lost track of what options you have? What will be the next step in your career? Do you stay in academia or are you going to give it a try in industry or maybe something completely different? Career coach Margret Smitters lets you know what career options are available to you after your PhD and helps you figure out what you really want to do.

Workshop – Funding possibilities for early career researchers (Room Botswana)

Sam Woldringh, NWO

Your academic career is about to start and you want to know what funding options you have? Then this workshop is for you. NWO policy officers will give you an overview about the most important funding instruments for young researchers and let you know which points are important when submitting your proposal.

Workshop – Research funding for mathematicians (Room Congo)

Joost Gabriels, Eindhoven University of Technology

In this presentation, I will pull back the curtain a bit and show you what funders want (hint: they are not a charity organization) and how they use the “Theory of change and impact pathway” model to get there. We feel that understanding the “why” behind funding calls can help you write better proposals. I will showcase some popular bottom-up and top-down grants, show how to really read a EU call text, and give tips on proposal writing.

Plenary lecture

Wednesday 23 April 2025, 10:00 – 10:50

Corina Tarnita (Princeton University)

A delicate tango: the mathematics of spatial self-organization in biology

Sixty-five years ago, Eugene Wigner reflected on the "unreasonable effectiveness of mathematics in the natural sciences". Wigner writes that two main points are the subject of his discourse:

"The first point is that mathematical concepts turn up in entirely unexpected connections. Moreover, they often permit an unexpectedly close and accurate description of the phenomena in these connections. Secondly, just because of this circumstance, and because we do not understand the reasons of their usefulness, we cannot know whether a theory formulated in terms of mathematical concepts is uniquely appropriate."[1]

In this talk I will engage with these two points as they pertain to the applications of mathematics to biology, and I will focus the discussion on the long history of mathematical modeling of self-organized pattern formation across biological scales. Mathematical models have a rich but complicated history across fields, from the study of animal coat patterns in developmental biology to landscape-scale vegetation patterns in ecology. I will survey and probe their effectiveness and the intricate process that can allow us to evaluate whether a mathematical theory is "uniquely appropriate" in biology.

1. https://onlinelibrary.wiley.com/doi/10.1002/cpa.3160130102

Biography

Corina Tarnita joined the Princeton Ecology and Evolutionary Biology faculty in February 2013 after completing her term with the Harvard Society of Fellows as a Junior Fellow in Mathematical Biology (2010–2012). She earned her BA ('06), MA ('08) and PhD ('09) in Mathematics from Harvard University and has been recognized with numerous prestigious awards, including the Guggenheim Fellowship, the Alfred P. Sloan Research Fellowship, and the Kavli Frontiers of Science Fellowship from the National Academy of Sciences. Corina's research focuses on the comparative understanding of complex adaptive systems, from single cells to entire ecosystems and from human social behavior to cultural evolution. She explores how these systems originate, assemble, interact with their environment, and evolve over time. Central to her research is the development of general theoretical frameworks. She combines these frameworks with empirical data to identify and catalog natural patterns and to develop models whose predictions can be tested experimentally.

KWG PhD Prize

Wednesday 23 April 2025, 11:15 – 12:15

for the best presentation of PhD research in mathematics

Each year the Royal Dutch Mathematical Society (KWG) organizes the KWG PhD prize for the best presentation of PhD research in mathematics. The PhD prize competition is open to PhD candidates in mathematics from all universities in the Netherlands and CWI, provided their thesis defense date is after 28 February 2025.

A jury of mathematicians from various fields chooses a winner, who receives besides the prestige of winning, an exchange trophy and a monetary reward made available by the Foundation Compositio Mathematica.

The jury received eleven submissions for the KWG PhD prize and selected the following four candidates to present their work during NMC 2025:

- Dieuwertje Alblas (University of Twente): Geometric Deep Learning for Spatio-Temporal Artery Analysis
- Alain Chavarri Villarello (Vrije Universiteit Amsterdam): Computer-checked number theory
- Alexander Van Werde: (TU Eindhoven): Stochastic processes and associated random matrices
- Matthijs Vernooij: (TU Delft): Playing games to certify quantum devices

From the four invited candidates the jury will select the prize winner. The main criterion for being invited is the quality of the PhD research, the main criterion for winning the prize is the capability to present the research to a broad mathematical audience.

This year the jury consists of:

- Francesca Arici (Leiden University, GQT)
- Johan Commelin (Utrecht University, DIAMANT)
- Oliver Fabert (Vrije Universiteit Amsterdam, chair)
- Richard Kraaij (TU Delft, STAR)
- Lisa Kusch (TU Eindhoven, NDNS+)

KWG PhD Poster prize competition

Wednesday 23 April 2025, 11:15 – 12:15

During the upcoming Netherlands Mathematical Congress, a poster session will be organized for all PhD students in Mathematics in The Netherlands.

The poster session will have a competitive character. A jury will assess the posters and award three prizes: € 300, € 200 and € 100. The prizes will be awarded during the closing ceremony of the NMC 2025.

The posters that will be presented are:

- Corijn Rudrum (University College London): Non-abelian Selmer group Chabauty for the S-unit equation
- Niek Mooij (Utrecht University): Coexistence in large systems of competing ODEs
- Boaz Moerman (Utrecht University): Special points on toric varieties
- Daniel Morris (TU Delft): On a class of nonlinear BGK-type kinetic equations with density dependent collision rates
- Riya Dogra (Vrije Universiteit Amsterdam) : Topology of Molecular Braids
- Alexander Van Werde (TU Eindhoven): Towards generalized spectral determinacy of random graphs

This year the jury consists of:

- Sharmila Gunasekaran (Radboud Unversity)
- Janusz Meylahn (University of Twente)
- Ronald de Wolf (CWI & University of Amsterdam)

Parallel sessions

Wednesday 23 April 2025, 13:30 – 15:00

Mathematics Education (Room St. Jan)

Brendan Kelly (Harvard University)

Proactive Student Supports to Smooth the Transition to University Mathematics

In recent years, the preperation of students entering university mathematics has declined due to educational disruptions from COVID-19 and an evolving cultural shift in learning accelerated by generative AI. As a result, mathematics educators face the challenge of actively supporting students during their transition to university mathematics. This presentation examines a mathematician's approach to implementing research-based support strategies designed to boost student success. These interventions require varying levels of financial and time investment and encompass a wide range of options, including summer bridge programs, structured peer tutoring, and the dissemination of explicit learning strategies to students.

Brendan Kelly is the Director of Introductory Mathematics at Harvard University, where he leads the design and implementation of curriculum and instructional strategies for first-year mathematics courses.In his capacity as Director of Introductory Math, Dr. Kelly collaborates with faculty to provide an ecosystem of student supports and modernize the math curriculum, emphasizing the application of mathematics in real-world contexts via mathematical modeling.

Tamás Görbe (University of Groningen)

Personalised learning as a means to bridge the VO-WO knowledge gap.

We provide a template designed for teachers looking to transform their courses from traditional to active or blended formats with built-in adaptiveness for varying skill levels. The relevant OER tools will be demonstrated through a first-year bachelor course on Calculus within the (Applied) Mathematics programmes at Groningen.

Tamás Görbe is an assistant professor in mathematics with a focus on education at the University of Groningen.

Martina Vittorietti (Delft University of Technology)

Exploring Student Behavioral Engagement Trajectories in Online Learning Platforms

Student behavioral engagement (BE) can be viewed as a complex dynamical system, with its evolution over time marked by variations both within and between students. Understanding the longitudinal trajectories of engagement—defined as the progression of similar engagement states over time, alongside distinct patterns—is crucial for effectively identifying different type of students. By analyzing data from 236 students enrolled in Linear Algebra courses, we aim to identify distinct BE states and trajectories, explore factors that may influence trajectory membership, and investigate potential relationships with course performance.

Martina Vittorietti is an assistant professor in the Statistics group at Delft Institute of Applied Mathematics (TU Delft). Her research interests are diverse: from methodological statistics to applied statistics to Materials Science, Social Sciences and Education. She is also part of the PRIME Research group at TU Delft.

Fulya Kula (University of Twente)

Student Engagement in the context of Statistical Inference

This presentation explores a new approach to teaching statistical inference by incorporating the construction steps of statistical inference, where students actively engage in creating statistical measures using their own data. This method helps students develop a deeper conceptual understanding of statistical reasoning. By focusing on building foundational knowledge before applying inference techniques, students gain a stronger ability to apply statistical concepts in real-world situations.

Fulya Kula is an assistant professor at the Applied Mathematics Department of the University of Twente. Her research interests and expertise focuses on the didactics of mathematics.

Quantum Software Consortium (Room Ghana)

Tim Coopmans (Delft University of Technology)

Simulating quantum circuits using classical reasoning

Simulating quantum circuits exactly is provably difficult with regular computers, but that should not stop us from identifying efficient subcases or finding methods which work well in practice. In this talk, I will show how one can perform quantum-circuit simulation using decision diagrams or weighted #SAT, two techniques from the well-developed branch of computer science called classical reasoning. In addition, we prove that our novel decision diagram asymptotically scales incomparably to other techniques such as a one-dimensional tensor decomposition (tensor trains).

Joon Hyung Lee (Leiden University)

Quantum Variants – From Satisfiability to Spin Glasses

In this talk, we discuss two quantum variants of well-known mathematical systems: quantum k-SAT, rooted in discrete random systems, and the quantum Sherrington-Kirkpatrick (QSK) model from spin-glass theory. A shared theme is the use of classical techniques to analyze these quantum problems, providing novel insights into their mathematical structure and behavior.

We first explore the k-QSAT problem, where satisfiability hinges on the geometric structure of random factor graphs, addressed using methods from algebra and analysis. We then shift focus to the QSK model, examining spin correlations and phase transitions under a transverse field through classical spin-glass approaches, such as the TAP equations.

This talk is based on a preprint, https://arxiv.org/abs/2404.18447 and an ongoing project.

Yaroslav Herasymenko (CWI)

Quantum learning between the spin group orbit and the Hilbert space of n quantum bits

An interesting problem in quantum computing is to learn the state vector of n quantum bits, given a sample of the copies of this state. For a general state vector, the sample size and computational time required for such a learning procedure scales exponentially in n. However, for some sets of possible unknown states, this learning complexity can be brought down to poly(n). One such efficiently learnable class of state vectors, which is also important in physics, are the so-called matchgate states. Mathematically, they are defined as the orbit of the so-called spin group Spin(2n). In this talk, I would like to describe the computational learning theory we developed for the states produced by actions of Spin(2n) and a few elementary unitaries outside of the spin group. By increasing the number t of such non-Spin(2n) unitaries, one can interpolate between the matchgate states and the general state on n quantum bits. We prove that it is possible to learn the resulting states with poly(n, 2^t) resources. Furthermore, it is unlikely that the exponential scaling in t could be improved. In particular, we show that a better scaling would invalidate a conjecture in post-quantum cryptography, which is commonly believed to be true. Finally, I will outline how our approach allows efficiently testing whether an entirely unknown state belongs to the class of states for which our learning algorithm works.

This talk is based on the work done in collaboration with Antonio Anna Mele (FU Berlin), which can be accessed at https://arxiv.org/abs/2402.18665.

AI & Mathematics (Room Congo)

Gaurav Rattan (University of Twente)

Graph-Theoretic Principles for Graph Learning Models

Graph Neural Networks (GNNs) are deep learning models for machine learning tasks in the domain of graphs and networks. Despite the widespread popularity of GNNs in the practical setting, the mathematical principles underlying the design and analysis of these models are hardly well-understood. This naturally calls for a first-principles approach to machine learning on graphs, rooted in classical graph theory, instead of adapting existing learning models for other data domains such as vectors, text, and images.

In this talk, we describe our work towards establishing the mathematical foundations for GNNs in terms of the existing graph structure theory and algorithmic graph theory, in particular, the connection to the fundamental Graph Isomorphism problem. We show that a standard message-passing GNN is essentially a neuralized version of the Weisfeiler-Leman algorithm, a classic graph isomorphism testing algorithm. We highlight the key role played by mathematical logic in expanding this connection into a powerful framework for GNN design. Finally, we link together the beautiful theory of graph homomorphism numbers, enunciated by Lovasz and others, with the aforementioned Weisfeiler-Leman algorithm and GNNs: This forms a starting point for analyzing the generalization properties of GNNs.

Jemima Tabeart (Eindhoven University of Technology)

Machine learning challenges and opportunities in variational data assimilation

Data assimilation methods combine information from measurements and dynamical systems in order to obtain an improved state estimate of a system of interest. This is often used to find suitable initial conditions for forecasting e.g. in numerical weather prediction. Such methods can be very powerful, and are becoming more popular outside the geosciences. However, developing the necessary dynamic and error models can be difficult, particularly for novel and more data-driven applications. In this talk I will introduce variational data assimilation methods, and discuss some aspects of the problem which are challenging for standard mathematical and physics-based approaches. I will highlight some problems where machine learning is already being used successfully within data assimilation for weather prediction, and present some more general open problems for other applications where machine learning could provide a missing puzzle piece.

Maximilian Engel (University of Amsterdam)

Characterizing Dynamic Stability of Stochastic Gradient Descent

For overparameterized optimization tasks, such as the ones found in modern machine learning, global minima are generally not unique. In order to understand generalization in these settings, it is vital to study to which minimum an optimization algorithm converges. The possibility of having minima that are unstable under the dynamics imposed by the optimization algorithm limits the potential minima that the algorithm can find.

In our work, we characterize the global minima that are dynamically stable/unstable for both deterministic and stochastic gradient descent (SGD), introducing a characteristic Lyapunov exponent around a global minimum and rigorously proving that the sign of this Lyapunov exponent determines whether SGD can accumulate at the respective minimum.

This is joint work with Dennis Chemnitz (FU Berlin).

STAR (Room Botswana)

Moritz Otto (Leiden University)

Central limit theorems for linear eigenvalue statistics of random spatial networks

In this talk, I will discuss central limit theorems for linear eigenvalue statistics of adjacency and Laplacian matrices for different models of random geometric networks built on an underlying Poisson point process. The first model comprises a broad family of stabilizing networks that are of interest in computational geometry, such as Delaunay triangulations and Gabriel graphs. The second model is the random connection model, where edges are put independently between points with a distant-dependent probability. In the first part, I will consider polynomial test functions. If time permits, I will thereafter explain which additional difficulties occur when general test functions are considered.

The talk is based on joint work with Christian Hirsch (Aarhus) and Kyeongsik Nam (Seoul).

Bart van Parys (CWI)

Robust Mean Estimation for Optimization: The Impact of Heavy Tails

Most data-driven decisions formulations in the literature explicitly assume bounded or light-tailed distributions. However, many real-world phenomena exhibit heavy-tailed distributions, characterized by rare but extreme events with may have significant impact. In this work, we investigate the performance of sample average approximation and Wasserstein DRO and show that neither offer adequate protection when the associated losses are bounded from right but regularly varying heavy-tailed from the left. Surprisingly, if the data has finite variance, classical variance regularization does offer such protection but we show that it is generally conservative. Finally, we show that a judiciously scaled Kullback-Leibler DRO is statistically efficient. We do so by developing an upper bound on the probability that the KL DRO decision disappoints out-of-sample (of independent interest) and indicate that it matches a statistical lower bound asymptotically obtained through a change-of-measure argument.

Janusz Meylahn (University of Twente)

Can pricing algorithms learn to collude?

Pricing algorithms may be able to learn to work together to raise prices in ways that are legal under current antitrust law. This phenomenon is known as algorithmic collusion. Many simulation studies have shown that reinforcement learning algorithms may be capable of this feat, but the interpretation of these results is debated among economists, legal scholars, computer scientists and mathematicians. A central issue obscuring the debate is the lack of a common definition of what it means for algorithms to learn to collude. In this talk, I will propose such a definitions and presents results on the collusive capabilities of various algorithms in the light of the definition.

Based on joint work with Arnoud den Boer, Maarten Pieter Schinkel, Ibrahim Abada, Joe Harrington and Xavier Lambin.

DIAMANT (Room Angola)

Pieter Belmans (Utrecht University)

Algorithms for quivers and quiver moduli

The word quiver is nothing but a shorthand for a directed multigraph. In representation theory we study all the different ways of assigning vector spaces to the vertices and linear maps to the edges, and call them representations. This allows us to encode many interesting problems in linear algebra, and obtain great results in noncommutative algebra. Usually the classification of these different assignments involves continuous parameters, which an algebraic geometer organizes into moduli spaces, called quiver moduli. Their geometry reflects properties of the classification of representations.

Many questions about the representation theory of quivers and the algebraic geometry of quiver moduli can be reduced to explicit problems involving bilinear forms. I will give a gentle introduction to quiver representations, and discuss some of these algorithmic approaches to a priori hard questions, illustrating them using software.

Matthew Kwan (IST Austria)

Exponentially many graphs are determined by their spectrum

As a discrete analogue of Kac's celebrated question on "hearing the shape of a drum", and towards a practical graph isomorphism test, it is of interest to understand which graphs are determined up to isomorphism by their spectrum (of their adjacency matrix). In this talk I'll introduce the topic and briefly discuss some joint work with Ilya Koval.

Stieltjes Prize Award session (Room St Jan)

Wednesday 23 April 2025, 15:30 – 16:10

The jury for the Stieltjes Prize met on 18 December 2024 to award the prize for the best mathematical dissertation published in the academic year 2023-2024. A total of 87 dissertations were assessed. The jury was impressed by the high quality of the dissertations, the number of publications resulting from the PhD candidates' research, and the independence demonstrated by the PhD candidates. After an intensive discussion, two dissertations remained in entirely different fields of mathematics, both of impressive quality, great originality and extremely well written. The jury concluded that there were no distinguishing elements on which a winner could be decided, hence they decided on two winners:

- Pim Spelier from Leiden University for his thesis "Counting curves and their rational points"
- Leonardo Garcia-Heveling from Radboud University for his thesis entitled "Causality and Time in Non-smooth Lorentzian Geometry"

Pim Spelier

The thesis of Pim Spelier is marked by unusual breadth, depth, and originality. The contributions around moduli spaces address both foundational questions and questions of applications and computations. Similarly, the contributions around rational points both build new tools to control rational points and provide explicit computations. In his work two different topics related to algebraic curves are considered. The first topic is counting curves and intersection theory on moduli spaces of curves. The thesis takes a logarithmic geometry approach, focussing on log moduli spaces and their intersection theoretical properties. The second topic is on finding rational points on curves, using a general principle called Chabauty's method.

The chapter "Polynomiality of the double ramification cycle" provides a natural, and explicitly computable proof of the polynomiality property. What makes the proof very natural is that it relies inductively on the structure of the moduli spaces in question. In particular one proves polynomiality for all building blocks and all substructures of the underlying structures (the moduli spaces associated to specific graphs). Thus the proof of this particular result follows by putting it in a sufficiently general framework, where the general result follows because the general structure is so very rich.

Rational points on algebraic curves are the source of some of the most important challenges in number theory and algebraic geometry, and Pim's contributions are remarkable. The improvement on Chabauty-Coleman provided in Theorem 6 is a surprising result. The result of Theorem H which does the same for quadratic Chabauty is certain to find numerous computational applications.

Leonardo Garcia-Heveling

Leonardo's thesis is exceptionally broad in its scope, ranging from the analysis of concrete models of general relativity to questions of quantum gravity, and from low regularity space-time geometry to

full fledged synthetic Lorentzian geometry. This topical broadness is matched by the variety of techniques he has used including Lorentzian geometry, causality theory, cobordism, and the newly emerging field of synthetic Lorentzian geometry. Throughout, the exposition is excellent, with the main ideas always laid out very clearly at the beginning of the papers and a lucid and readable exposition even of the technically more involved aspects. The choice of topics and the highly original approaches Leonardo takes, combined with the expert use of mathematically sophisticated techniques show his impressive mastery of the subject matter.

The works included in his thesis have been published in leading journals, such as Annales Henri Poincare and Communications in Mathematical Physics. His papers have had a large influence on the highly active field of low regularity general relativity and a number of researchers are following up on the ideas laid out in his thesis.

Pythagoras Prize session (Room Congo)

Wednesday 23 April 2025, 15:30 – 16:30

The Pythagoras prize for the best high school final project in mathematics is annually awarded by Pythagoras. On April 23rd the nominated candidates will present their final project. *Note that this session will be in Dutch!*

Tijdens het NMC presenteren de genomineerde leerlingen het onderzoek uit zijn/haar profielwerkstuk, waarna er kort een mogelijkheid is voor het stellen van vragen. Om 17.05 uur vindt de ontknoping plaats tijdens de Prize Awarding session.

De beste inzendingen van een wiskundig profielwerkstuk zijn:

1. Elise van der Sanden en Janneke Bax : De Creatie van de Crazy Chroma Challenge
2. Femke Maat: SET!
3. Tobias Crommelin en Dylan Spence: Nooit meer een briefje halen

Plenary lecture

Wednesday 23 April 2025, 16:15 – 17:05

Benjamin Gess (TU Berlin and MPI Leipzig)

Fluctuations in Continuum

Fluctuations are ubiquitous in real world contexts and in key technological challenges, ranging from thermal fluctuations in physical systems to algorithmic stochasticity in machine learning and fluctuations driven by small-scale weather patterns in climate dynamics. At the same time, such complex systems are influenced by a multitude of factors, relying on a wide range of parameters and interactions. This motivates the exploration of scaling limits and continuum dynamics. A systematic understanding of such interplay of stochasticity, complex dynamical behaviour, and continuum limits seeks to reveal universal properties, irrespective of the specific details of the systems in question.

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In this presentation we will examine the importance of modelling fluctuations in large systems through several examples, ranging from nonequilibrium thermodynamics to stochastic fluid dynamics and machine learning. We will demonstrate how their analysis uncovers deep connections between probabilistic features, partial differential equations with irregular coefficients, and geometric structures in the form of gradient flows on infinite dimensional manifolds.

Biography

Benjamin Gess pursued studies in Mathematics and Computer Science at the University of Bonn, obtaining his Master's degree in Mathematics from the University of Warwick in 2008. He completed his doctorate in 2011 under the supervision of Michael Röckner at Bielefeld University, with a dissertation titled "Stochastic Flows Induced by Stochastic Partial Differential Equations", as part of the International Research Training Group 1132. Following his PhD, he worked for two years as a postdoctoral researcher at TU Berlin and HU Berlin. He then spent a further two years at the University of Chicago on a research fellowship awarded by the German Research Foundation (DFG).

In 2015, he was granted a Max Planck Research Group, which he established at the Max Planck Institute for Mathematics in the Sciences in Leipzig, where he has served as group leader ever since. Concurrently, he held positions at Bielefeld University, initially as an associate lecturer and later as a temporary professor. In 2019, he was appointed full professor at Bielefeld University. Since 2024, he has held a chair at TU Berlin.

Benjamin Gess's research focuses on stochastic partial differential equations, nonlinear partial differential equations, stochastic dynamics, interacting particle systems, machine learning, large deviation theory, and fluid dynamics.

In 2023, he was awarded an ERC Consolidator Grant, under which he is investigating fluctuations in the continuum and conservative stochastic partial differential equations. Since 2017, he has been a principal investigator in Collaborative Research Centre 1283, and since 2021, he has been a contributing scientist to the International Research Training Group 2235.