Berlin Mathematics Research Center

MATH+

Season's Greetings 2024
FROM THE MATH+ OFFICE

These Christmas snow flakes represent the eight Research Training Areas (RTA) of the BMS.

WE WISH YOU A JOYFUL HOLIDAY SEASON

34ᵗʰ Newsletter – December 2024

Welcome from the Chair

Dear MATH+ Community,

At the MATH+ Day on 18 October 2024, the General Assembly elected a new Board and a **new Chairs Team** **for our Cluster of Excellence, MATH+**. It has been my pleasure to serve as Chair for the past two years alongside my Co-Chairs, Martin Skutella and Christof Schütte. I wish our successors—Sebastian Pokutta, Claudia Schillings, and Andrea Walther — all the best in carrying out this important role.

Michael Hintermüller

Thank you very much, Michael, for the great job you and your Co-Chairs have done for MATH+ over the past six years. We look forward to serving the Berlin mathematics community as the new Chairs Team, hopefully continuing on into 2026. Preparations for the review of our extension proposal in Bonn on 6 February 2025 are in full swing, and we would like to thank everyone involved for their tremendous commitment!

In this newsletter, you will find information on media comments made by Max von Kleist regarding innovative HIV therapy and modeling during the COVID-19 crisis, the announcement of our three new YAM Fellows, and the application numbers for the BMS PhD Program and the Dirichlet Postdoc Fellowship.

We also extend our congratulations to Jürg Kramer on being elected President of the German Mathematical Society (DMV), Frank Noé on being named a Fellow of the American Physical Society (APS), and BMS alumna Alexandra Quitmann on receiving the "Marthe Vogt Award" for outstanding dissertation.

Additionally, the newsletter includes reports on the TES final workshop on "Applied Mathematics for Simulation of Semiconductor Devices," the NHS workshop "Scaling Complexity," and the outreach events "Science Slam" and "Math Night" (Mathenacht aus Berlin, Bonn und Münster).

As always, we encourage you to share your research results, publications, awards, or news about interesting guests with Beate Rogler at rogler@mathplus.de.

We wish everyone a restful holiday period and an excellent start in the new year!

Sebastian Pokutta   Claudia Schillings   Andrea Walther

MATH+ News

+ MATH+ Day with General Assembly and Election of the New MATH+ Chairs

On 18 October 2024, the MATH+ Day with the election of new Chairs and Board took place at Urania Berlin. Before the elections, the General Assembly (GA) updated the MATH+ by-laws (Ordnung) to change the leadership structure from a "Chair with two Co-Chairs" to a team of three Chairs. From now on, MATH+ will be presented by Sebastian Pokutta (TU Berlin/ZIB), Claudia Schillings (FU Berlin), and Andrea Walther (HU Berlin). Congratulations!

The General Assembly gave an official send-off to the former Chairs, Michael Hintermüller, Christof Schütte, and Martin Skutella, and thanked them for their outstanding work since January 2019. The Berlin Mathematical School (BMS) will also be represented by a team of three Chairs: Gavril Farkas, Holger Reich, and John M. Sullivan.

After the lunch break, the poster session was held in the Urania Loft, showcasing current and recently completed MATH+ projects. As always, the MATH+ Day was a fantastic opportunity for the MATH+ community to come together for exchange, discussions, and inspiration – sparking interdisciplinary collaboration and innovative projects.

Read more

+ Max von Kleist in the Media on Innovative HIV Therapy and AI-Supported Pandemic Modeling

Max von Kleist, Professor of "Mathematics for Data Sciences" at FU Berlin, researcher at the Robert Koch Institute (RKI), and MATH+ Professor, has commented in the media such as DER SPIEGEL, ZEIT ONLINE, Süddeutsche Zeitung, and Berliner Tagesspiegel on two highly topical subjects: the groundbreaking new HIV drug Lenacapavir and the use of artificial intelligence (AI) in combating pandemics.

Max von Kleist combines AI and mathematical modeling with practical research to develop therapeutic measures for global health problems through interdisciplinary approaches. As part of MATH+, the mathematical foundations for this research are supported within the MATH+ Emerging Field "Decision Support in the Public Sector" (EF6).

Read more

**+ MATH+ Welcomes New Cohort of YAM Fellows for 2024/25 with an Interview**

We are delighted to introduce Sintia Laura Nyaffi Achikwoue, Gil Wilfried Laken Kouatche, and Sergio Germain Tinaharimanjaka as the second cohort of MATH+ YAM Fellows in the Young African Mathematicians (YAM) Fellowship Program for the academic year 2024/25.

Welcome to the MATH+ community!

The fellows were excited to participate in the BMS Orientation Week immediately after their arrival. They will remain in Berlin until the summer of 2025. As YAM fellows, they are also part of the Berlin Mathematical School (BMS). In an interview with MATH+, they shared their thoughts on the YAM Fellowship, their study plans in Berlin, and their aspirations, which are summarized in their direct comments below.

Read more

+ A Day of Arithmetic Geometry on the Occasion of Jürg Kramer's Retirement
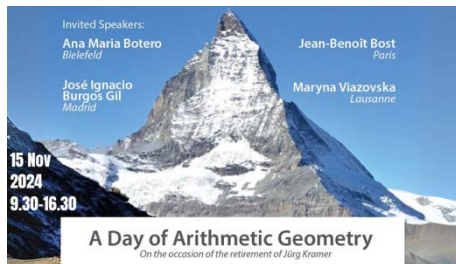
The MATH+ Friday event on 15 November 2024, held at the Erwin-Schrödinger-Zentrum of Humboldt Universität zu Berlin, was a special occasion honoring Jürg Kramer, former BMS chair, on the occasion of his retirement.

Rather than the usual two-hour MATH+ Friday format, this was a full-day event, running from 9:30 to 16:30 and titled "A Day of Arithmetic Geometry." Outstanding international guest speakers gathered to celebrate Jürg Kramer's achievements: Ana Maria Botero (Bielefeld), José Ignacio Burgos Gil (Madrid), Jean-Benoît Bost (Orsay), and Maryna Viazovska (Lausanne); the 2022 Fields Medal winner and former postdoc of Jürg Kramer.

While we thought this event would mark his retirement, it seems he'll have to postpone it after all: just a few days later, he was appointed President of the German Mathematical Society (DMV), effective 1 January 2025. Congratulations!

Read more

+ Berlin Mathematical School: Applications for the PhD Program 2024

The BMS received 310 applications for admission to its PhD program in 2025 by the deadline of 1 December 2024: 204 applications for Phase I and 106 for Phase II.

The applicants came from across the globe, totaling 60 countries. Among them, 30% are women, which marks a significant increase compared to last year's applications, where the percentage of female applicants was between 22-25%.

+ Applications for the BMS Dirichlet Postdoc Fellowship – Starting in Fall 2025

The Dirichlet Postdoc Fellowships, starting in Fall 2025, received 200 applications by the deadline of 1 December 2024. Among the 200 applicants, 38 were female (19% compared to 14% last year), two identified as non-binary, and one did not state their gender. This two-year position is open to promising young mathematicians who will have completed their PhD by 30 September 2025 and wish to pursue their own research in one of the eight broad research areas of mathematics covered by the Berlin Mathematical School.

Read more

+ Jürg Kramer Appointed President of the German Mathematical Society (DMV)

The German Mathematical Society (DMV – Deutsche Mathematiker Vereinigung) has appointed MATH+ member and former BMS Chair Jürg Kramer as its President for the second term, effective 1 January 2025. Congratulations!

Jürg Kramer, who previously served as DMV Treasurer (2003–2012) and President (2013-2014), will succeed Joachim Escher of Leibniz Universität Hannover. Kramer's outstanding commitment to Berlin's mathematics community and his ongoing support for young mathematicians through the DFG research center MATHEON, the Berlin Mathematical School (BMS), German Centre for Mathematics Teacher Education (DZLM), and MATH+ make him one of our most esteemed members.

Read more

+ MATH+ Member Frank Noé Named Fellow of the American Physical Society (APS)

Frank Noé, professor of Mathematical Modeling in the Life Sciences at Freie Universität Berlin, and partner at Microsoft Research AI for Science, has been elected as a Fellow of the American Physical Society (APS) for his contributions to Machine Learning in the Physical Sciences. Congratulations!

Election to the APS fellowship is considered one of the highest honors for a physicist, recognizing exceptional contributions to physics through original research, innovative applications, teaching, and leadership. Each year, no more than 0.5 percent of APS members, excluding student members, are awarded Fellow status. Noé was selected "for the development of machine learning methods for advancing the physical sciences, in particular for the many-body sampling problem and the electronic structure problem."

Read more

+ BMS Alumna Alexandra Quitmann Receives "Marthe Vogt Award" for Outstanding Dissertation

The Forschungsverbund Berlin (FVB) annually presents the "Marthe Vogt Award" to young female scientists who have completed outstanding dissertations in scientific fields represented by FVB within the Berlin and Brandenburg region. This year, Alexandra Quitmann, an alumna of the Berlin Mathematical School (BMS), who graduated in 2023, was honored for her exceptional thesis during a festive ceremony at the Leibniz Headquarters in Berlin. Congratulations!

Alexandra Quitmann completed her bachelor's and master's studies at Universität Münster before moving to Berlin to pursue her research as a BMS student at Weierstrass Institute (WIAS) under the supervision of Wolfgang König. She was also part of the International Research Training Group Berlin-

[Oxford (IRTG) 2544](#) "Stochastic Analysis in Interaction", and earned her PhD from TU Berlin in October 2023 with her award-winning thesis on "Phase Transitions in Random Loop Models." Alexandra Quitmann is currently working as a postdoctoral researcher at La Sapienza University in Rome.

Read more

✚ The Following BMS Students Have Successfully Completed Their Doctorates

Thomas Vincent Boelens (FU Berlin)
"The geometric fixed points of real topological cyclic homology revisited"

Leon Dorian Eifler (TU Berlin)
"Algorithms and Certificates for Exact Mixed Integer Programming"

Shah Faisal (HU Berlin)
"Extremal Lagrangian tori in toric domains"

Marco Antonio Flores Martinez (HU Berlin)
"Modularity of formal Fourier-Jacobi series from a cohomological point of view"

Heide Langhammer (TU Berlin)
"Spatial particle processes with coagulation"

Marvin Lücke (FU Berlin)
"Concentration effects and collective variables in dynamical systems on networks"

Alexander Kurt Merkel (TU Berlin)
"Stochastic Control with Controlled Information"

Gari Yamel Peralta Alvarez (HU Berlin)
"Heights on toric varities for singular metrics"

Juan Martin Pérez Bernal (FU Berlin)
"Donaldson-Uhlenbeck type moduli spaces for principal bundles over higher dimensional manifolds"

Konstantins Starovoitovs (HU Berlin)
"Approximation of Stochastic Partial Differential Equations with Applications to Order Book Modelling"

Frederik Laszlo Wieder (FU Berlin)
"Flux cones of metabolic networks"

Congratulations!

MATH+ Events

Review

✚ The Research Workshop "Applied Mathematics for Simulation of Semiconductor Devices"

The [research workshop „Applied Mathematics for Simulation of Semiconductor Devices"](#) (AMaSiS 2024) was held on 10–13 September 2024 at the Leibniz Association headquarters in Berlin. The event was organized by Patricio Farrell, Annegret Glitzky, Markus Kantner, Matthias Liero, Michael O'Donovan (all WIAS), and Josef Weinbub (Silvaco, Inc.), and marked the

conclusion of the MATH+ Thematic Einstein Semester (TES) on "Mathematics for Quantum Technologies."

The workshop numbered 55 participants from mathematics, physics, and electrical engineering, all working on semiconductor modeling, analysis, and simulation, with applications in spin-qubit devices, solar cells, tunnel diodes, and memristors.

The program featured 28 talks, ten posters, and a tutorial day on machine-learning-assisted modeling and software tools for quantum transport simulations. Key topics included electronic structure computation, quantum and semiclassical transport theory, and numerical methods.

Read more

+ The NHR Workshop: Scaling Complexity, 2-3 December 2024

The NHR Workshop: "Scaling Complexity" was successfully held on 2-3 December 2024 at ZIB, organized by Sarah Wolf, Steffen Fürst (FU Berlin), and Natasa Djurdjevac Conrad (ZIB), and sponsored by NHR (Nationales Hochleistungs Rechnen/National High Performance Computting). The event gathered over 30 participants to explore high-performance computing (HPC) in Agent-Based Modeling and Complex Networks.

The workshop featured five invited talks, a panel discussion, and nine poster presentations, fostering vibrant discussions on computational challenges and advanced methodologies for complex systems.

A hands-on session on Vahana.jl provided practical training in scalable ABM simulations, equipping researchers with essential tools to apply HPC effectively in their work.

Read more

MATH+ Fridays in the winter semester 2024/25

10 January 2025: Ilya Chevyrev (U Edinburgh): tba @FU
24 January 2025: Carla Cederbaum (U Tübingen): tba @Urania

Other BMS events

17-18 February 2025: BMS Days
19-21 February 2025: BMS Student Conference

Spotlight Talks: every two weeks during the lecture period from October to February.

18 December:	Jan Marten Sevenster: Computational Aspects of Quadratic Forms in Determining the Representation Type of Quiver Algebras
15 January:	Benedikt Jahnel (EF45-3): Data Transmission in Dynamical Random Networks
29 January:	Lasse Ermoneit (AA2-17): Coherent Transport of Semiconductor Spin-Qubits: Modeling, Simulation and Optimal Control
12 February:	Kristina Maier (EF45-4): Hybrid Models for Large Scale Infection Spread Simulations

MATH+ Outreach

✚ **Science Slam Hosted by Berlin's Excellence Clusters at the Berlin Science Week 2024**

For the third year in a row, Berlin's "Clusters of Excellence" hosted a "Science Slam" as part of Berlin Science Week, showcasing the brightest young minds from all seven participating clusters and sparking curiosity about their research.

Ten slammers from MATH+, Matters of Activity, NeuroCure, Science of Intelligence, SCRIPTS, UniSysCat, and Temporal Communities captivated the audience with engaging presentations on topics ranging from applied mathematics, new materials, neuroscience, intelligent systems to political scripts, green chemistry, and world literature. The diverse lineup ensured that there was something for everyone. Each participant had just six minutes to wow the audience, which ultimately voted for the best performance.

Representing MATH+, **BMS PhD student Hsueh Chun-Sheng** (HU Berlin) and **Postdoc and BMS graduate Gregor Pasemann** (PhD from TU Berlin, now Postdoc at HU Berlin) delivered their talks with creativity („Imagine your partner is cheating on you.") and flair, using costumes (with Star Treck Vulcan ears) to win over the crowd. Jochen Müller, as always, hosted the evening with humor and brilliance. It was a lively and entertaining event, and we were thrilled to see our two MATH+ members shine!

Find the recording of all performances on the **MATH+ YouTube channel**:

✚ **"Mathenacht 2024" Hosted by the Mathematical Excellence Cluster in Berlin, Bonn and Münster**

For the third time, the fascination of mathematics took center stage during "Mathenacht" on 29 November 2024 (held online)! The three mathematical Clusters of Excellence from Berlin, Bonn, and Münster offered a diverse program of workshops, games, fun, and insights into mathematics for all ages.

The afternoon featured **workshops for children and teens** on topics such as "The Cheese Maze – What Connects Chessboards and Mice," "Planning a Carnival Parade," and "A City Tour Through Berlin with Graphs." Special thanks here to Research Assistant Ekin Ergin from TU Berlin and her team for their contribution. This was followed by a **"Math Quiz"** hour with engaging puzzles and knowledge challenges based on research from the three clusters.

The evening began with a **panel discussion on "How Does Mathematics Contribute to AI Research?"** This kicked off the **math "NIGHT," where scientists from all three clusters shared insights into their research** from 8 p.m. late into the night. The topics included exploring "How generative neural networks create entirely new images" from existing ones, many thanks to Gabriele Steidl, MATH+ professor at TU Berlin), "Algorithms for solving network design problems", and the "Mathematics behind black holes."

With 600 participants across all activities, the event was a great success, receiving excellent feedback and being celebrated as a free learning opportunity.

Read more