

31th Newsletter – May 2024

Welcome from the Chair

Dear MATH+ Community,

At the start of this semester, we are eagerly anticipating numerous MATH+ activities and events. We would like to highlight the upcoming **MATH+ Dissertation Award Ceremony**, followed by a **Summer Party on 12 July** and the **MATH+ Day on 18 October**, which will include the **General Assembly with the Election of the new MATH+ Chair**. Please save these dates!

Additionally, the **Zuse Institute will celebrate its 40th anniversary** in mid-June and on 13 September.

Looking back over the last weeks, we had two successful TES events: **the final conference of the Thematic Einstein Semester (TES)** "Small Data Analysis" in March and the **Kickoff Event of the new TES** on "[Mathematics for Quantum Technologies](#)" in April. There was also a well-attended **MathInside** event at ZIB on Pi Day, 14 March.

We are delighted to welcome **Anna Maria Hartkopf** as a **new Junior Research Group Leader**, specializing in "Science Communication on Mathematics." Congratulations also to **BMS PhD student Anasta-sija Pešić** on her **admission as a GAMM Junior**.

In this newsletter, we highlight **two outstanding publications by MATH+ members at FU Berlin** in "Science" relating to brain development by the research groups of Max von Kleist and Robin P. Hiesinger, and in "Nature Communications" on Quantum Algorithms by Jens Eisert's research group. We also introduce the three winners of the MATH+ Dissertation Awards.

We are pleased to announce **a new service offered by MATH+: an online Research Data Management consultation session** every Tuesday (2:00 PM to 3:00 PM).

As always, please share your research results, publications, prizes, or information about interesting guests with Beate Rogler at rogler@mathplus.de.

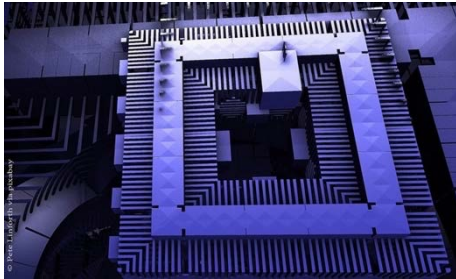
I wish everyone a successful start to the semester and look forward to the upcoming MATH+ events



MATH+ Chair Michael Hintermüller

MATH+ News

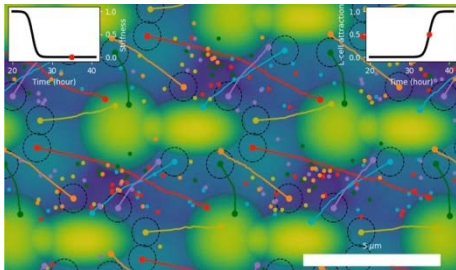
- + **Quantum Algorithms for Machine-Learning Models, in “Nature Communications”** by Jens Eisert et.al.



In the *Nature Communications* publication, an interdisciplinary team of mathematicians, computer scientists, and physicists from the University of Chicago, MIT, and FU Berlin investigated the potential of quantum computers in addressing machine learning problems. MATH+ member [Jens Eisert](#) contributed the central idea of how a quantum advantage could be created, originating from the [MATH+ project EF 1-11](#).

[Read more](#)

- + **“Science” Publication on “Self-Organization – Is That How You Build a Brain?”**



Brains are made up of complex connections between many different types of neurons. Ultimately, these connections allow to process incoming (e.g., visual) signals and respond to them appropriately. Most of the neuronal wiring takes place during development. However, up to now, it has been largely unclear which processes ensure that the adult brain is correctly wired (and thus functional).

An interdisciplinary research team involving neurobiologists and mathematicians of the research groups of MATH+ members [Max von Kleist](#) and [Peter Robin Hiesinger](#) at FU Berlin set out to investigate, both biologically and mathematically, the fundamental mechanisms that determine neuronal wiring. As a model system, they investigated the so-called “visual map formation” in fruit flies.

The work has emerged as a result of the [MATH+ project EF3-2](#).

[Read more](#)

- + **The Final Conference of the Thematic Einstein Semester on “Small Data Analysis”, 11-12 March 2024**



The Thematic Einstein Semester on “Small Data Analysis” ended with a final conference about “**Interpretation, Explanation, and Knowledge**



Gain” from 11 to 12 March 2024. On the first day, held at ZIB, mathematicians mainly from Berlin and all MATH+ institutions (FU, HU, TU, WIAS, ZIB) summarized and presented their own points of view regarding possible approaches towards small data analysis. The focus was knowledge gain and how to explain and represent possible interpretations of data. It was an “offline” conference. On the second day, a total of 37 participants were able to partake in intensive discussions on various key topics in small working groups. The last three international keynote speakers controversially addressed the question of the benefits of interdisciplinary cooperation in data analysis.

[Read more](#)

+ **Thematic Einstein Semester “Mathematics for Quantum Technologies” Kickoff Event on “Quantum Computing in Academia and Industry” on 16 April 2024**



The Thematic Einstein Semester (TES) on "Mathematics for Quantum Technologies" started with a **Kickoff Event on "Quantum Computing in Academia and Industry"** at TU Berlin on 16 April 2024.

The opening symposium covered recent developments in quantum information theory and variational quantum algorithms for near-term devices, using cases for quantum computation with currently existing hardware as well as error mitigation strategies and performance-enhancing infrastructure software for noisy intermediate-scale quantum computers. Inspiring **keynote presentations** were given by Jens Eisert (FU Berlin) and Karl Jansen (DESY Zeuthen), representing the academic side, and by the industry speakers Almudena Carrera Vazquez (IBM Quantum, Zürich), André Carvalho (QCTRL, Berlin) and Cristina Cirstoiu (Quantinuum, Cambridge).

The Kickoff Event garnered great interest from MATH+ and non-MATH+ members and attracted more than 100 participants in total. **The event was organized** by Sven Burger (ZIB), Patrick Gelß (ZIB), Markus Kantner (WIAS), Thomas Koprucki (WIAS), and Nathan Walk (FU Berlin). Information on **upcoming events of the TES** can be found on the [MATH+ website](#).

[Read more](#)

+ **Weekly MATH+ Advice for Research Data Management (RDM) Online**

Starting on 30 April there will be a weekly opportunity to talk to the **Research Data Management (RDM) Consultant** of MATH+ online.

Chances are that you will develop some questions or need advice regarding RDM in your research process or daily work. Be it general questions about the reasoning behind RDM or tool-related inquiries concerning versioning software, maybe just some second opinion on the trustworthiness of an open access journal. Most of these questions are easier to talk about in a smaller framework than the plenary after a presentation.

Every Tuesday from 14:00-15:00, someone will be available via the following **Zoom link**:

- <https://zib-de.zoom.us/j/81992544541>
- Meeting-ID: 819 9254 4541

+ **Save the Dates**

- **12 July:** Dissertation Award Ceremony at the PTB Campus (next to TU Berlin)
in combination with the MATH+ Friday and followed by the MATH+/BMS Summer Party
- **11-13 June and 13 September:**
[40th Anniversary of the Zuse Institute Berlin](#)
- **18 October:** MATH+ Day
with General Assembly and Election of the new MATH+ Chairs

MATH+ People

+ Anna Maria Hartkopf – New MATH+ Independent Junior Research Group Leader



Anna Maria Hartkopf assumed her position as the Independent Junior Research Group Leader (JRGL) for “**Science Communication on Mathematics**” at FU Berlin in March 2024. Congratulations and welcome!

She also leads the [MIP.labor](#), an ideas workshop for science journalism at FU Berlin, which was founded in 2020 and has been affiliated with MATH+ since March 2024. The MIP.labor provides funding and resources to develop innovative media formats covering complex topics from mathematics, computer science, and physics.

Anna Maria Hartkopf completed her doctorate on the topic of “Mathematical Science Communication” as a graduate of the [BMS](#) at Freie Universität in 2020. She is also the editor of the “[Handbook of Mathematical Science Communication](#).”

[Read more](#)

+ Martin Skutella in the Einstein Foundation Series "Elephants & Butterflies" – Science in a Nutshell



The Einstein Foundation presents Einstein Professor Martin Skutella in their series “Elephants and Butterflies – Science in a nutshell.” Here, Skutella introduces how he develops algorithms for faster and more efficient optimization of road traffic and other dynamic networks, which benefits both mathematics and transportation planning.

He is [Einstein Professor](#) of [Combinatorial Optimization and Graph Algorithms at TU Berlin](#) and MATH+ Co-Chair. Skutella’s main research interests are in combinatorial optimization. Practical applications include traffic planning and the design of efficient emergency exit routes at major events.

[Read more](#)

+ BMS PhD Student Anastasija Pešić Selected as GAMM Junior



BMS PhD student Anastasija Pešić has been selected as GAMM Junior for her research on “Variational models for pattern formation in biomembranes.” Congratulations! GAMM Juniors are young researchers and members of the [GAMM](#) who have distinguished themselves with an excellent diploma, master’s, and/or PhD thesis in the fields of Applied Mathematics or Mechanics.

Anastasija Pešić studied mathematics in Serbia and continued her studies as a BMS member at HU Berlin where she completed her M.Sc. in 2021. Currently, she is pursuing her PhD at HU Berlin, supervised by [Barbara Zwicknagl](#). Her research project is part of [RTG DAEDALUS](#).

[Read more](#)

+ **The Following BMS Students Have Successfully Completed Their Doctorate**

Dilara Abdel (FU Berlin)

"Modeling and simulation of vacancy-assisted charge transport in innovative semiconductor devices"

Simon Breneis (TU Berlin)

"Rough Paths and Rough Volatility"

Rhoslyn Anne Coles (TU Berlin)

"Experiments with Curves Inspired by the Morphometric Approach to Solvation"

Andrei Comănesci (TU Berlin)

"Tropical consensus trees"

Fabian Danecker (FU Berlin)

"A Discrete-Continuous Algorithm for Globally Optimal Free Flight Trajectory Optimization"

Hannes Lutz Kern (TU Berlin)

"Topics in rough Analysis"

Carl O. R. Lutz (TU Berlin)

"Decorated Discrete Conformal Equivalence, Canonical Tessellations, and Polyhedral Realization"

Kateryna Melnyk (FU Berlin)

"Unsupervised approaches for time-evolving graph embedding with application to human microbiome"

Weile Weng (TU Berlin)

"Quenched functional CLT for random walks in random environments admitting a bounded cycle representation"

Max J. Zahoransky von Worlik (TU Berlin)

"Periodic Knottings An algorithmic approach towards the classification of periodically embedded 1-dimensional manifolds in \mathbb{R}^3 "

Congratulations!

MATH+ Events

Review

+ **MATH+/BMS Phase II and Postdoc Orientation on 15 April**

On 15 April, the **MATH+/BMS Orientations for new Phase II students and postdocs** took place at TU Berlin. The event provided them with targeted information on opportunities and services for doctoral researchers and postdocs in MATH+. Topics that had been addressed included funding opportunities, networking, services for career planning strategies, information on mental health issues, and Research Data Management.

Preview

+ **"Berlin Mathematics Day" on 04 May at TU Berlin**

On 4 May, TU Berlin invites all schools in Berlin to participate in the [27th Berlin Mathematics Day](#). Up to 1000 students, teachers, and guests can immerse themselves in the world of mathematics. As every year, there will be a competition for grades 11-13, where teams of students compete for the amazing

grand prize: a trip to Oslo to the presentation of [the Abel Prize](#), an international award in the field of mathematics. MATH+ is involved with a presentation for teachers in the morning and an information booth, providing details about the research and school activities of MATH+. Additionally, there will be mathematical games available for the students.

[Read more](#)

+ **Euler Lecture on 24 May at Universität Potsdam in Potsdam-Sanssouci**

The 31st Euler Lecture will be held by Alessio Figalli (ETH Zurich) on the topic: "Exploring Stability in Geometric and Functional Inequalities" on 24 May at 14:30. The traditional historical lecture will be given by Clara Silvia Roero (University of Turin), presenting "Gottfried Wilhelm Leibniz and His Influence on Giuseppe Peano."

Location: Neues Palais, Universität Potsdam, Auditorium Maximum (Haus F)

[Read more](#)

+ **Long Night of the Sciences (LNdW) 2024 on 22 Juni: "Excellent Pub Quiz" at 18:30 at TU Berlin**



Once again, it's time for the "Long Night of the Sciences" 2024. Invite friends to form a team (2-4 people), come up with a creative/funny team name, and participate in the "[Excellent Pub Quiz](#)" (in German) hosted by the seven Berlin Excellence Clusters at TU Berlin! Experience exciting, amusing, and surprising questions from the research areas of all clusters to solve and ponder, sparking curiosity, and win one of the great prizes provided by all clusters. Good vibes and fun are guaranteed!

[Read more](#)

+ **Long Night of the Sciences (LNdW) at HU Berlin (Adlershof Campus): Short Talks and Stations**

Short mathematical talks on various topics will be held that are accessible to everyone, even those without prior math knowledge. There will also be stations where you can solve problems and puzzles and engage in discussions.

Location: [Johann von Neumann-Haus, Rudower Chaussee 25](#), Room 1.023 (BMS Seminar Room)

Time: 22 June 2024; 17:00-24:00

+ **MATH+ Fridays**

03 May 2024: [Julian Sahasrabudhe \(U Cambridge\): A new lower bound for sphere packing @FU \(T9\)](#)

24 May 2024: [Euler Lecture: Alessio Figalli @Potsdam](#)

31 May 2024: [Anna Wienhard \(MPI Leipzig\) @TU \(EW 201\)](#)

14 June 2024: [Heather Harrington \(MPI Dresden\) @TU \(EW 201\)](#)

28 June 2024: [María Ángeles García Ferrero \(Universitat de Barcelona\) @ZIB](#)

05 July 2024: [Richard von Mises Lecture: Alexandre Ern \(U Paris-Est\) @HU \(ESZ\)](#)

12 July 2024: [BMS Certificate Ceremony + Summe Party @PTB](#)

+ **Spotlight Talks:** every two weeks during the lecture period from April to July.

08 May 2024: [Deborah Hendrych \(AA3-15\)](#): [Convex Solver Adaptivity for Mixed-Integer Optimization](#)

22 May 2024: [Olaf Müller](#): [What is a spacetime and what is it good for?](#)

05 June 2024: [Tim Jahn](#) (MATH+ Junior Research Group Leader), [\(AA5-11\)](#):
[Data-Adaptive Discretization of Inverse Problems](#)

19 June 2024: [Julius Mayer \(EF3-13\)](#): [A Soft-Correspondence Approach to Shape Analysis](#)

03 July 2024: [Robert Gruhlke \(AA5-5\)](#): [Wasserstein Gradient Flows for Generalised Transport in Bayesian Inversion](#)

17 July 2024: [Kamillo Ferry \(AA3-16\)](#): [Likelihood Geometry of Max-Linear Bayesian Networks](#)

MATH+ Outreach

+ **MathInside at Zuse Institute on “Pi-Day”, 14 March: The International Day of Mathematics**



On Pi Day, the International Day of Mathematics on 14 March, over 350 math enthusiasts visited us at the [Zuse Institute \(ZIB\)](#) for a morning with three lectures.

The speakers provided insights into the research work of mathematicians as well as the application areas of mathematics. The lecture program was aimed primarily at school students

from the 10th grade onwards and was also used as an excursion destination by many school classes and courses.

The lecture topics were: “**Mathematics and social networks**” ([Christof Schütte](#), FU Berlin/ZIB), “**How discrete optimization shapes our everyday life**” ([Antonia Chmiela](#), ZIB), and “**Searching for new active substances with mathematics and AI**” ([Konstantin Fackeldey](#), TU Berlin/ZIB).

Many thanks to all the speakers for their commitment!



[Read more](#)

+ **Decision Theatre at an Elementary School**



The project [School@DecisionTheatreLab](#), which usually targets students in grades 10 to 12, has now also introduced agent-based modeling on “sustainable mobility” to elementary school children.

The children were able to take on the role of agents themselves and simulate transportation choices using game figures and random events.

[Read more](#)