Berlin Mathematics Research Center

MATH+

27th Newsletter – April 2023

Welcome from the Chair

Dear MATH+ Community,

We hope everyone has had an enjoyable semester break, and we're looking forward to the upcoming summer semester with the new Thematic Einstein Semester (TES) on "Mathematical Optimization for Machine Learning".

But first things first: Congratulations to Jens Eisert (FU Berlin) for being awarded an **ERC Advanced Grant** for his research project "DebuQC" on quantum computing!

We celebrated Pi Day on 14 March by releasing the **short MATH+ film "About us"**. MATH+ researchers describe their research topics and what MATH+ means to them. Their contributions are very much appreciated! We thank all of them. Please take a look and visit the MATH+ YouTube channel.

The Winter Semester's Thematic Einstein Forum (TEF) "Scales of Temporality" ended with a **Spring School and the Final Conference "Zeitenwende(n) – Tipping points of our times?"**. It was our first cooperation with the Cluster of Excellence "Temporal Communities" and we're happy to see another facet added to our cooperation endeavors with the humanities.

Together with the clusters in Bonn, Heidelberg, and Münster, MATH+ has recently become an official partner of the **Young African Mathematicians (YAM) Fellowship Program**. More on this below.

On 10 May, a special **Spotlight Talk** will feature our sociological project: Heike Solga will report on their recent paper "Gender bias in W1 and W3 professor recruitment: Does discipline matter?"

A significant anniversary is coming on 12 May: We celebrate the **30th Kovalevskaya Colloquium** together with Women in Math Day. Anja Schlömerkemper will give the invited lecture. As usual there'll be a preceding lunch for young female mathematicians.

Another occasion to celebrate is the **birthday of BMS and MATH+ founding member Günter M. Ziegler**, Leibniz Laureate and President of FU Berlin, on 19 May. His colleagues, companions, former and current students are hosting a 2-day celebration event for him. More in this newsletter.

If you have any news you would like to share regarding your research, publications, prizes, or interesting guests, please contact Beate Rogler at rogler@mathplus.de.

Best wishes for the summer semester, and I hope to see you soon,

MATH+ Chair

MATH+ Partner in the Young African Mathematicians (YAM) Program with AIMS

The Young African Mathematicians (YAM) Fellowship Program is a collaboration between five of the African Institutes for Mathematical Science (AIMS) and four German Clusters of Excellence: Hausdorff Center for Mathematics (Universität Bonn), Münster Mathematics (Universität Münster), STRUCTURES (Universität Heidelberg), and MATH+.

The YAM program welcomes talented African mathematics students to join one of the four clusters for nine months. They can take courses and seminars and gain experience in working on research projects. The first cohort will be arriving in Germany in October, and we look forward to welcoming our African fellows!

Thematic Einstein Semester (TES) "Mathematical Optimization for Machine Learning"

In the summer semester, the TES "Mathematical Optimization for Machine Learning" aims at unlocking the potential of mathematics within the vast and diverse fields that constitute modern Computer Science and Data Science.

The **TES semester schedule** is as follows:

- April 26-28:   Workshop on "Machine Learning" at ZIB
- June 14-16:   Workshop on "Optimization" at HU Berlin
- July 12-14:   Joint TES/GAMM CoMinds Workshop at TU Berlin
- Sept 11-13:   Summer School at ZIB
- Sept 13-15:   Final Conference at ZIB

Applications for the BMS Doctoral Program Closed on 01 April 2023

The application period for admission to the BMS doctoral program in 2023 closed on 01 April 2023. The BMS received 330 applications (256 in the first and 74 in the second round) from 54 countries.

Unfortunately, the BMS again saw declining numbers in applications from female and non-binary mathematicians, which only made up 20% of the total number of applications.

30th Kovalevskaya Colloquium and Lunch on 12 May, Women in Mathematics Day (FU Berlin)

MATH+ and the BMS will celebrate the 30th Kovalevskaya Lunch and Colloquium, held by Anja Schlömerkemper (Universität Würzburg) and the Women in Mathematics Day on 12 May. The events will take place at FU Berlin, jointly organized with the CRC 1114.

The great luncheon tradition preceding the Kovalevskaya Colloquium brings together young female mathematicians with a female professor who will share her experiences during her career as a woman mathematician. The "Women in Mathematics Day" was established in 2019 to honor the first female Fields Medal winner Maryam Mirzakhani (1977-2017), who was born on 12 May.

+ MATH+ Seminar for Math Students at TU Berlin by Konstantin Fackeldey

[Konstantin Fackeldey](#) gave a [MATH+ seminar in the WS 2022/23 at TU Berlin](#). The eleven students had to present one of the current MATH+ projects thus learning about the state of current application-driven mathematical research at the Cluster of Excellence.

The last MATH+ Day on 19 November 2023, with its poster sessions, provided an excellent opportunity for the students to ask questions and get relevant information. The seminar's focus on the application-oriented research at MATH+ was so fascinating that at least four students plan to write their master's theses on one of the presented projects.

MATH+ People

## + ERC Advanced Grant for Jens Eisert (FU Berlin)

Jens Eisert, physics professor at the [Dahlem Center for Complex Quantum Systems](#) of Freie Universität Berlin, has been awarded the prestigious [ERC Advanced Grant by the European Research Council (ERC)](#) for his research project "DebuQC." The project will be funded with more than 1.8 million euros for five years. Congratulations!

The research project "DebuQC" is an interdisciplinary project in which scientists from the fields of physics, mathematics, and IT are involved. It has very close connections to MATH+. Eisert, professor of theoretical quantum physics, and his team seek to answer essential research questions on quantum technology and explore their limits. Stakes and the expectations are high for creating the "computers of the future".

Together with Jan Hermann and Frank Noé, Eisert is one of the PIs in the project [AA2-8 "Deep Backflow for Accurate Solution of the Electronic Schrödinger Equation](#)", in which doctoral researcher Zeno Schätzle is working. The project is part of the MATH+ Application Area AA2 "[Nano and Quantum Technologies](#)**".**

Read more

+ Celebrating Günter M. Ziegler 60th Birthday with a Workshop at ZIB
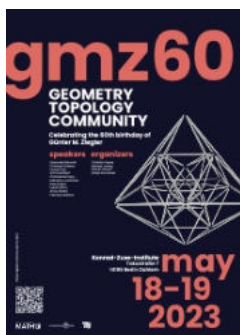
On **18-19 May 2023**, long-term collaborators, former postdocs, and students will be celebrating Günter M. Ziegler's 60th birthday with a [workshop at Zuse Institute Berlin (ZIB)](#).

In 2006, Ziegler played a leading role in establishing the Berlin Mathematical School (BMS) as a joint graduate school of the three Berlin universities. He was also one of the founding fathers of the Cluster of Excellence MATH+ in 2018 before he became president of FU Berlin in July 2018. He was re-elected for a second term in August 2022.

For his contributions to mathematics research, he received the Leibniz Prize in 2001 and an ERC Advanced Grant in 2010. In 2008, the DFG awarded him the Communicator Prize.

✚ New "Junior Research Group Leader" for "Mathematics of Data Science" at TU Berlin: Leon Bungert

Leon Bungert took up his position as MATH+ Junior Research Group Leader for "Mathematics of Data Science" at TU Berlin on 01 March 2023. He joined the MATH+ community, coming from the Hausdorff Center of Mathematics (Bonn), where he was a postdoctoral fellow from 2021-2023. During his time at MATH+, he will, inter alia, work on the adversarial robustness of machine learning and consensus-based optimization.

His research interests lie in applied analysis and numerics, focusing on applications in data science, machine learning, and imaging. In his research, he investigates PDEs and variational models (on graphs), variational regularization of inverse problems and neural networks, and nonlinear optimization.

Leon Bungert studied Mathematics and received his B.Sc. in 2016 and his M.Sc. in 2017, both from the Friedrich-Alexander-Universität Erlangen-Nürnberg. Afterwards, he did his doctoral studies and obtained his PhD (summa cum laude) in 2020 with a thesis on "Nonlinear Spectral Analysis with Variational Methods" under the supervision of Martin Burger. He continued his postdoctoral studies with Martin Burger from 2020 to 2021 before he moved to the Hausdorff Center of Mathematics in Bonn.

Read more (personal homepage)

✚ The Following BMS Student Has Successfully Completed His Doctorate

Niklas Christoph Affolter (TU Berlin)
"Discrete Differential Geometry and Cluster Algebra via TCD maps"

Helena Katharina Kremp (FU Berlin)
"Topics in particle systems and singular SDEs"

Congratulations!

MATH+ Events

Review

✚ Spring School & Final Conference of the Thematic Einstein Forum (TEF) "Scales of Temporality: Modeling Time and Predictability in the Literary and the Mathematical Sciences"

The TEF collaboration of MATH+ and the Cluster of Excellence "Temporal Communities" aimed to explore common ground between the mathematical sciences and the humanities, particularly the philologies and literary studies. The semester ended with a Spring School and the Final Conference. The "Logic, Limits, Contingency: A Critical Digital

Spring School**"** was organized by MATH+ and EXC 2020 "Temporal Communities" in cooperation with the London Arts & Humanities Partnership, metalab@fu_berlin, and metalab@harvard at FU Berlin. The school took place from 27 to 30 March. It brought together doctoral students from Berlin, the UK, Ukraine, and Slovakia in morning lectures, critical labs, and case studies. The topics ranged from mathematical modeling of social systems to modeling text via data analysis and dealing with uncertainty in archives to exhibition and game design. Freie Universität is a highly suitable place to explore digital humanities because the humanities and mathematics/computer science are represented and well connected there, for example, in the »Ada Lovelace Center for Digital Humanities«.

The Final Conference, "Zeitenwende(n) - Tipping Points of our Time," followed on 31 March and took up threads, questions, and ideas from the whole semester in talks and general discussion. The topics were tipping points in mathematical modeling of social and/or climate phenomena and tipping/turning points in the theory of tragedy and, more generally, in literature and media/speeches. The scientists examined literature dealing with climate dystopias. They discussed scientific problems, potential solutions for the climate crisis, and the role of science and mathematics in the Anthropocene. In summary: There were many mutual interests, and learning each other's languages was fascinating. All the TEF activities have shown that there are many promising areas for further collaborative research between mathematics and literary sciences on scales of temporality.

Preview

✚ **MATH+ Fridays:**

28 April:	Celebrating the 200th Birthday of Gotthold Eisenstein (1823-1852) with Laurent Clozel (U Paris-Sud) and Stephen Kudla (U Toronto)
05 May:	Euler Lecture: Avi Wigderson (Princeton U): The Value of Errors in Proofs
12 May:	30th Kovalevskaya Collequium: Anja Schlömerkemper (U Würzburg)
26 May:	26 May: Anja Sturm (U Göttingen)

✚ **Spotlight Talks:**

19 April:	Fabian Altekrüger (EF3-7): The Power of Patches for Training Normalizing Flows
03 May:	Luca Donati (AA1-15): Math-Powered Drug-Design
10 May:	Heike Solga: Gender Bias in W1 and W3 Professor Recruitment: Does Discipline Matter?
17 May:	Omar Kebiri (EF4-6): Model Reduction and Uncertainty Quantification of Multiscale Diffusion with Parameter Uncertainties Using Nonlinear Expectations
31 May:	Maximilian J. Stahlberg (EF5-6): Evolution Models for Historical Networks
14 June:	Svenja M. Griesbach (AA3-9): Information Design for Bayesian Networks
28 June:	Olaf Parczyk (EF1-12): Learning Extremal Structures in Combinatorics
12 July:	Ilja Klebanov (EF1-10): Kernel Ensemble Kalman Filter and Inference

✚ MathInside Talks on Pi-Day @TU Berlin, the International Day of Mathematics, 14 March 2023

After an involuntarily long break due to the corona crisis, MATH+ was finally able to offer one of the popular MathInside talks again. In the popular lecture series MathInside, scientists from the Cluster of Excellence MATH+ give insights into their research and the application areas of mathematics. The lecture program is free of charge and primarily aimed at students of grades 10 and up. It also provides a great chance for an excellent field trip into the world of universities and sciences.

More than 230 school students of 10th grade and upwards followed the invitation to the Institute of Mathematics of TU Berlin on Pi Day, 14 March. Three lectures were given by MATH+ mathematicians:

- "The fifth state of matter: A short history of Bose-Einstein condensation" (Wolfgang König),
- "Protein simulations – For risks and side effects, ask your mathematician" (Konstantin Fackeldey),
- "Change trains without waiting? – Mathematical timetable optimization" (Niels Lindner and Berenike Masing).