

Berlin Mathematics Research Center



## 29<sup>th</sup> Newsletter – December 2023

### Welcome from the Chair

Dear MATH+ Community,

The final 2023 newsletter summarizes the activities that have unfolded over the past months: In August, we hosted a visit from the [Berlin Senator for Science, Dr. Ina Czyborra](#). September brought the **MATH+ Cluster Days**, showcasing promising research proposals. As the semester kicked off, a flurry of outreach activities took place: the new [Thematic Einstein Semester \(TES\) on “Small Data Analysis”](#) was launched, October featured the annual [MATH+ Day](#) with our Scientific Advisory Board also in attendance and the [BMS Orientation Days](#) for new students and postdocs. Our first [MATH+ YAM Fellows](#) (YAM stands for Young African Mathematicians) for the academic year 2023/24 also started in October as did the two new [Junior Research Group Leaders at TU, Franziska Eberle and Tim Jahn](#). We warmly welcome Samantha Glory Guiate Simo (FU Berlin) and Wilson Tsuata (HU Berlin) for their stay in Berlin. In November, MATH+ representative Guillermo Olicón Méndez secured 2<sup>nd</sup> place at the [Science Slam](#) during the Berlin Science Week and a [workshop on “Mathematics and Industry”](#) was offered. Our traditional [MATH+ Advent Calendar](#) started on 01 December. On the same day “Die digitale Mathenacht aus Berlin, Bonn und Münster” took place and the MATH+ episode of the [Podcast “Exzellent erklärt”](#) came out.

This newsletter also shines light on **two interesting articles**: One on battery research in *Spektrum der Wissenschaft* by Manuel Landstorfer and Martin Heida (WIAS), and another on “New Insights in HIV Prevention for Women” published in *Nature Medicine* by a team around Max von Kleist (FU Berlin).

If you haven’t had the chance to visit our [MATH+ YouTube channel](#), we invite you to subscribe. Explore three newly published videos covering the MATH+ introduction at the [Humboldt Forum](#) with presentations by MATH+ members (2021), the talk “[Pandemie und Wahrscheinlichkeitsrechnung](#)” by ZIB researcher [Stefanie Winkelmann](#), and the recording of the [Science Slam](#) at the Berlin Science Week.

Amidst all of the good news, we also have some sad news to share. MATH+ mourns the loss of two highly esteemed colleagues and friends: [Martin Aigner](#) passed away in October and [Frank H. Lutz](#) in November.

As always, at the end, please share your research results, publications, prizes, or information about interesting guests with Beate Rogler at [rogler@mathplus.de](mailto:rogler@mathplus.de).

I wish everyone restful holidays and look forward to our MATH+ activities in 2024!

A handwritten signature in blue ink, appearing to read "A. Humboldt".

MATH+ Chair

## MATH+ News

### + Berlin Senator for Science, Dr. Ina Czyborra, Visited MATH+ in August



Dr. Ina Czyborra (SPD), the Berlin Senator for Science, Health and Care, has embarked on visits to acquaint herself with [all seven Berlin Clusters of Excellence](#) in the past months. On 11 August 2023, she came by to learn more about MATH+.

MATH+ Chair Michael Hintermüller provided an overview of the background, structure, and setup of MATH+. Junior research group leader Sarah Wolf presented how she is using Decision Theatres to communicate her work to the public. The presentation initiated a lively discussion with the Senator and the entire MATH+ delegation. The visit concluded with Martin Skutella providing an overview of the plans for the second round of the Excellence Strategy, highlighting the challenges ahead and areas where support from the Senate could be beneficial.

[Read more](#)

### + MATH+ Cluster Days on 11 and 12 September @HU

During the MATH+ Cluster Days on 11 and 12 September, 35 project proposals were introduced, showcasing new ideas for promising interdisciplinary projects. After thorough reviews by the Research Program Committee, the MATH+ Board approved 20 projects. We extend our best wishes for success to all the approved projects! This number of projects has been made possible by MATH+ funding being complemented by additional funds generously provided by the five MATH+ partners ("Trägerinstitutionen"). We want to thank the Humboldt-Universität for hosting the MATH+ Cluster Days.

### + MATH+ Day on 20 October @HU Campus in Adlershof



The annual MATH+ Day with more than 100 participants took place at the Humboldt-Universität on 20 October 2023. The poster session was also attended by members of the Scientific Advisory Board (SAB), who actively participated in discussions about the research results presented by the projects. The MATH+ Day concluded with the General Assembly (GA) meeting.

[Read more](#)

### + Thematic Einstein Semester (Winter Semester 2023/24) on "Small Data Analysis"

The [Thematic Einstein Semester on "Small Data Analysis"](#) aims to intensify the collaboration between mathematicians and researchers from other disciplines who develop research methods for small data sets. Such data sets are common when the events of interest are hard to observe, such as certain diseases, meteorological phenomena, or (pre-)historic findings. The TES was launched with an [Interdisciplinary workshop on knowledge-driven analytics](#) from 01 to 03 November.

[Read more](#)

### + BMS/MATH+ Orientation Week 2023 for New Students and Postdocs



As an introduction to Berlin and the BMS program for new students, the BMS Orientation Week took place from 06 to 12 October. Additionally, the afternoon session began as a joint meeting for new Phase II students and postdocs, before continuing with other relevant topics in a dedicated Postdoc Orientation session.

[Read more](#)

### + “Spektrum” Article on Battery Research by WIAS Scientists



MATH+ members and WIAS researchers Martin Heida and Manuel Landstorfer published an article titled “Energie effizienter speichern” (Saving Energy More Efficiently) in the well-known German science publication [Spektrum der Wissenschaft](#) in its [August issue](#) (in German). In the article, they utilize mathematical models to simulate batteries in detail, thereby improving features such as lifespan and capacity.

### + MATH+ Team Provides New Insights Into HIV Prevention For Cisgender Women

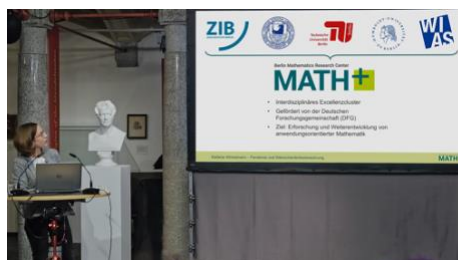


An international and interdisciplinary team led by MATH+ Professor Max von Kleist has published new findings on HIV prevention in cisgender women in "Nature Medicine."

The study focuses on self-protection using Pre-Exposure Prophylaxis (PrEP), which constitutes a major pillar of HIV prevention.

[Read more](#)

### + New MATH+ YouTube Videos: MATH+ at the Humboldt Forum and Stefanie Winkelmann’s Lecture



Two new videos have been published on our [YouTube Channel](#) (with German/English subtitles). The first, “[Pandemie und Wahrscheinlichkeitsrechnung](#),” is a presentation by MATH+ member and ZIB researcher [Stefanie Winkelmann](#) at the Mendelssohn’s Remise in Berlin. The talk was part of an evening of lectures “About the Mendelssohn’s, the Cholera, and Higher Mathematics.”

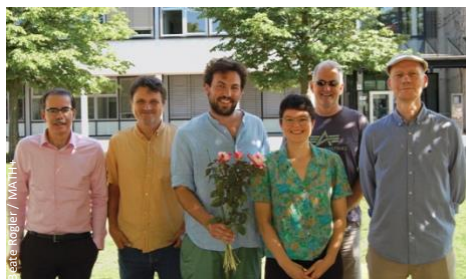


The second video, “[Humboldt Forum: MATH+ Vorstellung](#),” is a recording of the MATH+ event at the [Humboldt Forum](#) in the context of the series “[MitWissenschaft](#)” (10/2021). It features presentations from seven MATH+ scientists and a conversation with the MATH+ Chairs, Christof Schütte and Martin Skutella, and Managing Director Nadja Wisniewski.

[Watch more](#)

## MATH+ People

### + MATH+ Dissertation Award Winners 2022



In cooperation with the [Einstein Foundation Berlin](#), the [Berlin Mathematical School \(BMS\)](#) of MATH+ awards up to three annual prizes to BMS graduates for outstanding dissertations. We are delighted to announce that the [MATH+ Dissertation Awards](#) 2022 have been presented to Dr. [Luzie Helfmann](#), Dr. [Patrick Morris](#), and Dr. [Yizheng Yuan](#) for their remarkable and exemplary theses. Congratulations!

The awardees were celebrated at a ceremony that took place after the last MATH+ Friday of the summer semester, shortly before the start of the MATH+ summer party on 07 July.

[Read more about the awardees](#)

### + “SIAG/GD Early Career Prize” for BMS Alumnus Martin Skrodzki



BMS Alumnus [Martin Skrodzki](#) received the 2023 SIAG/GD Early Career Prize at the [2023 SIAM Conference on Computational Geometric Design \(GD23\)](#) on 05 July 2023 in Genoa (Italy). The conference is part of the [International Geometry Summit 2023](#). Congratulations from the BMS and MATH+! The [Early Career Prize](#) is awarded to outstanding early career researchers in the field of geometric design and processing for distinguished contributions to the field in the five calendar years before the year of the award.

[Read more](#)

### + MATH+ Welcomes the First YAM Fellows in Berlin



We are delighted to introduce Samantha Glory Guiate Simo (FU Berlin) and Wilson Tsuata (HU Berlin) as our first MATH+ YAM Fellows for the academic year 2023/24. The Young African Mathematicians (YAM) Fellowship Program is a collaboration of the African Institutes for Mathematical Science (AIMS) and the Hausdorff Center for Mathematics (Bonn), Münster

Mathematics, Structures (Heidelberg), and MATH+.

[Read more](#)

### + MATH+ Board Member Andrea Walther Elected to SIAM Council



MATH+ Board member [Andrea Walther](#) of Humboldt-Universität zu Berlin was recently elected to the Council of the Society for Industrial and Applied Mathematics (SIAM). She has been an active member of SIAM since 2011. The Council will serve from 01

January 2024 until 31 December 2026.

Congratulations!

[Read more](#)

### + MATH+ Mourns the Loss of Martin Aigner



On 11 October 2023, Professor Martin Aigner passed away at 82. Berlin mathematics has lost a highly respected colleague and wonderful person.

In 1973, he came to Freie Universität Berlin as Chair of Discrete Mathematics, significantly shaping the mathematical landscape of Berlin during his tenure.

[Read more](#)

### + MATH+ Mourns the Loss of Frank H. Lutz



On 10 November 2023, Priv.-Doz. Dr. Frank H. Lutz (TU Berlin) passed away unexpectedly at the age of 55. His research was dedicated to combinatorial topology and its applications.

With the passing of Frank Lutz, we have lost not only an excellent researcher but also a passionate educator, a loving individual, and for many of us, a very good friend.

[Read more](#)

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

#### **Mara Belotti**

“Tangency and point constraints in computational geometry”

#### **Felix Binkowski**

“Riesz-projection-based methods for the numerical simulation of resonance phenomena in nanophotonics”

#### **Siva Prasad Chakri Dhanakoti (FU Berlin)**

“Study of Intrinsically Curved Elastic Rods Under External Loads with Applications to Concentric Tube Continuum Robots and their Control”

#### **Alexander Yves Fairley (TU Berlin)**

“Q-Nets and Quadrics”

#### **Arturo Merino Figueroa (TU Berlin)**

“Combinatorial Generation: Greedy Approaches and Symmetry”

#### **Martin Hanik (FU Berlin)**

“Geometric Data Analysis: Advancements of the Statistical Methodology and Applications”

#### **Tatiana Levinson (FU Berlin)**

“Convex partitions of vector bundles and fibrewise configuration spaces”

#### **Alejandro López Nieto (FU Berlin)**

“Enharmonic Motion: Towards the Global Dynamics of Negative Delayed Feedback”

#### **Toyomu Matsuda (FU Berlin)**

“Fractional Stochastic Calculus via Stochastic Sewing”

**Cassandra Milbradt**

“Stochastic Modeling of Intraday Electricity Markets”

**Alexander Müller (FU Berlin)**

“Assembly and Norm Maps via Genuine Equivariant Homotopy Theory“

**Mathias Oster (TU Berlin)**

“On Semi-global Optimal Control Problems and Their Applications in Machine Learning“

**Marcel Padilla (TU Berlin)**

“The Solar Corona: Modelled, Discretized and Visualized“

**Alexandra Quitmann**

“Phase transitions in random loop models“

**Maximilian Julius Schade (HU Berlin)**

“Numerical Analysis und Simulation of Coupled Systems of Stochastic Partial Differential Equations with Algebraic Constraint“

**Leonie Schmeller (TU Berlin)**

“Multi-phase Dynamic Systems at Finite-strain Elasticity Mathematical Modeling, Existence Theory and Numerical Solutions“

**Frieder Smolny**

“Multiscale Algorithms in Discrete Optimization“

**Felix Schröder**

“Topological Drawings and the Structure of Crossings“

**Johannes Zonker**

“Coarse Graining of Agent-Based Models and Spatio-Temporal Modeling of Spreading Processes“

**Congratulations!**

## MATH+ Events

### Review

#### + Workshop “Mathematics and Industry” on 03 November 2023 @PTB Berlin

The workshop was particularly aimed at students because mathematics graduates have numerous career options and opportunities, which were presented at the PTB Berlin by guest speakers from industries and academic institutions. More information about the program can be found [here](#).

#### + BMS Practice Area: 2-Day Workshop “AI and Mathematics” on 11/12 October 2023

This 2-day workshop held at the Zuse Institute Berlin and online was tailored for 2nd-year Phase I and early Phase II students. It was designed to bridge the gap between traditional mathematical concepts and the rapidly evolving world of data science and artificial intelligence. More information about the workshop and the speakers can be found [here](#).

## Preview

### + MATH+ Fridays:

- 15 December:** [Ailsa Keating](#) (U Wien): [The symplectic topology of singularities](#) @TU (EW 201)  
**12 January:** [Diane Maclagan](#) (U Warwick): tba @TU (EW 201)  
**26 January:** [Thomas Nikolaus](#) (U Münster): tba @FU (T9)  
**9 February:** [Amandine Véber](#) (ENS - PSL): A stochastic model for the growth of a filamentous fungus @TU (EW 201)

### + Spotlight Talks:

- 20 December:** [Lutz Mertenskötter](#) (AA2-13): [Data-Driven Stochastic Modeling of Semiconductor Lasers](#)  
**10 January:** [Luisa Plato](#) (AA2-12): [Nonlinear Electrokinetics in Anisotropic Microfluids – Analysis, Simulation, and Optimal Control](#)  
**24 January:** [Luca Pelizzari](#) (AA4-2): [Optimal Control in Energy Markets Using Rough Analysis and Deep Networks](#)  
**07 February:** [Aldo Kiem](#) (EF1-21): [Scaling up Flag Algebras in Combinatorics](#)

## MATH+ Outreach

### + Second Place for MATH+ at the Science Slam of the Berlin Excellence Clusters (Berlin Science Week)



The [“Science Slam”](#) of the Berlin Excellence Clusters during the Berlin Science Week on 02 November was a huge success. More than 400 science enthusiasts joined us, and many had to be turned away due to location limitations. Our MATH+ representative [Guillermo Olicón Méndez](#) (Memo) received a lot of applause and laughter for his performance on dynamical systems, [“A Modern Story of Achilles and the Tortoise,”](#) dressed in leather as “Bad Bunny.”

[Read more](#) or watch the entire [recording of the Science Slam](#)

### + “Mathenacht” from Berlin, Bonn, and Münster of Three Mathematical German Excellence Clusters



The second joint [“Mathenacht”](#) (online) of the Excellence Clusters in Berlin (MATH+), Bonn (Hausdorff Center for Mathematics), and Münster (Mathematics Münster) with MATH+ contributions by Martin Weiser (ZIB), Margarita Kostre and Lukas Protz (Advent Calendar), Sarah Hiller (FU/PIK), and Max Klimm (TU) attracted many young students and math fans. We offered an afternoon with

workshops for young students, puzzle presentations by the two Advent Calendar teams, a panel discussion on “Math and Climate,” and three math lectures of each Cluster with fascinating topics.

[Read more](#)

## + Tune In to the MATH+ Episode of the Science Podcast “Exzellent erklärt”



On 01 December, the [MATH+ episode](#) “Improving the word with mathematics? Solutions for a complex world” of the [Podcast “Exzellent erklärt”](#) was released. Michael Hintermüller (MATH+ Chair/HU) and Sarah Wolf (FU) talked about application-oriented MATH+ research, including sustainable energy and mobility, traffic planning, and individualized medicine. The podcast was initiated by

the **57 German Clusters of Excellence in 2021 with support from the DFG** to present all Clusters’ research.

[Read more](#)

## + MATH+ Advent Calendar Started on 01 December



Our popular and well-known online [MATH+ Advent Calendar](#) started on 01 December with daily puzzles created by MATH+ researchers and their colleagues from the [Netherlands’ 4TU.AMI](#). Margarita Kostre (ZIB) and Lukas Protz (TU), along with their student assistants, are enormously busy managing all of the questions and submitting solutions in the following weeks.

The **award-winning ceremony** of both Advent Calendars from Mathe-im-Leben (for young students) and MATH+ (students from 10<sup>th</sup> grade upward) will take place in Berlin **on 26 January** at Freie Universität Berlin’s Max-Kade-Auditorium.

**We greatly thank all contributors of puzzles for supporting the MATH+ Advent Calendar:** Andrei Comaneci, EWM-NL, Wouter Fokkema, Dion Gijswijt, Lara Glessen, Christoph Graczyk, Svenja M. Griesbach, Felix Günther, Marieke Heidema, Felix und Nathanael Höfling, Max Klimm, Margarita Kostre, Matthew Maat, Jan-Hendrik Niemann, Olaf Parczyk, Tobias Paul, Lukas Protz, Silas Rathke, Martin Skrodzki, Ravi Snellenberg, and Lotte Weedage.