Berlin Mathematics Research Center

MATH+

30ᵗʰ Newsletter – February 2024

Welcome from the Chair

Dear MATH+ Community,

With the end of the winter semester approaching, it's time for an update on recent developments: We submitted the **Letter of Intent** for the extension proposal of our cluster in the 2ⁿᵈ round of the Excellence Strategy. Consequently, we need everyone to report all publications from MATH+ projects to <rdm@mathplus.de> by 29 February.

The **MATH+ office has to move again: As of March, you can find them** in the "Erweiterungsbau" (EB 410-413) at TU Berlin. We anticipate staying there until the final move to the new IMoS building, which is expected in early 2025.

The application round for the BMS and the Dirichlet Postdoctoral Fellowships was highly successful, with **361 applications for the BMS** and **203 applicants for the Dirichlet Fellowships.** For more details about the selected two postdocs, see below. The BMS Days will take place from 19-20 February, followed by the BMS Student Conference from 21-23 February.

Over the last months, several MATH+ **scientists have received awards or enriched our community as visiting scholars**: Kai Nagel from TU Berlin was elected to *acatech*, and Vikram Sunkara from ZIB became the New Liaison Group Leader at the DRFZ. Congratulations to both! We also warmly welcomed three MATH+ Visiting Scholars: Vijay Natarajan at ZIB, José Verschae at TU, and Annette Werner at HU.

In a joint press release with the MPI MiS, we announced a PNAS publication **by the team around Michael Joswig** (TU Berlin) that presented a new mathematical language for biological networks. We are also delighted to introduce Michal Joswig in an interview as new MATH+ Distinguished Fellow.

As part of the ongoing **MATH+ "Thematic Einstein Semester,"** the "Hackathon on Small Data Analysis" took place at the end of January, organized by scientists from FU Berlin, TU Berlin, and ZIB.

We were excited that the Math Advents Calendar award ceremony at FU could take place despite the train strike, attended by more than 700 beaming winners and a video greeting from the Federal Minister of Education and Research, Bettina Stark-Watzinger, as a special highlight!

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

Have a restful semester break, and see you all soon at one of our MATH+ activities!

MATH+ Chair

✚ "Hackathon" of the Thematic Einstein Semester on "Small Data Analysis" (Winter Semester 2023/24)

The "Hackathon on Small Data Analysis" took place from 22-24 January 2024. Florian Beier (TUB), Robert Beinert (TUB), Luca Donati (FUB/ZIB), Martin Hanik (TUB/ZIB), Elodie Maignant (ZIB), and Christoph von Tycowicz (ZIB) organized it as part of the ongoing MATH+ Thematic Einstein Semester on "Small Data Analysis."

Within this "Hackathon," 30 participants from various research institutions gathered at Villa Engler at Freie Universität Berlin to learn and apply mathematical methods to address several challenging data sets. The projects covered a wide spectrum, ranging from determining rare transitions in the configuration of a molecule to modeling entire hunter-gatherer societies. Apart from a methodological understanding, participants were also introduced to software design and management of code repositories.

Read more

✚ Applications for the BMS and the Dirichlet Postdoctoral Fellowship Program

We are thrilled to announce that the application round for the BMS and Dirichlet Postdoctoral positions was once again successful this winter. The BMS received 361 applications from 67 countries, marking a significant increase of 100 from last year. The applicant pool consisted of 74% men and 26% women. For admission rates and other interesting statistics, please refer to the link here. Of all the 50 invited applicants, 25 will be attending the BMS Days on 19-20 February in Berlin.

For the Dirichlet Postdoctoral Fellowship, we received 203 applicants from 50 countries, representing an increase of 60 compared to last year. 74% of the applicants were male, and 26% were female. Two top candidates were selected: starting in July this year, Martin Winter (currently at U Warwick, UK) will join the Discrete Geometry group of Martin Henk at TU Berlin, and in January next year, Lucía Martín Merchán (currently at U Waterloo, Canada) will join the Differential Geometry and Topology group of Thomas Walpuski at HU Berlin. They will be introduced in more detail when they take up their postdoctoral position in Berlin.

✚ PNAS Publication "New Mathematical Language for Biological Networks" by Michael Joswig et. al.

A team of researchers around Michael Joswig (TU Berlin, MPI-MiS) is presenting a novel concept for the mathematical modeling of genetic interactions in biological systems.

Collaborating with biologists from ETH Zurich and Carnegie Science (USA), the team has successfully identified master regulators within the context of an entire genetic network. The research results provide a coherent theoretical framework for analyzing biological networks and have been published in the "Proceedings of the National Academy of Sciences" (PNAS).

Read more

MATH+ People

✛ Interview with MATH+ Distinguished Fellow Michael Joswig

Michael Joswig was honored with the MATH+ Distinguished Fellow award. Congratulations! In our interview, he discusses his journey into mathematics, the specific topics that fascinate him, and how, as a result of a MATH+ research project, NASA even reached out and expressed interest in the results.

Committed to the field of tropical geometry, he further plans to initiate innovative, interdisciplinary projects with other scientists in the field of "Topological Data Analysis," i.e., data analysis using topological methods.

Since 2013, Michael Joswig has held the position of Einstein Professor for "Discrete Mathematics/Geometry" at TU Berlin. In 2019, he became a Max Planck Fellow at the Max Planck Institute for Mathematics in the Sciences (MPI MiS).

Read the Interview

✛ Kai Nagel Elected to *acatech* – The National Academy of Science and Engineering

MATH+ member Kai Nagel (TU Berlin), Professor of "Transportation System Planning and Traffic Telematics," has recently been elected to *acatech* – The National Academy of Science and Engineering. Congratulations! *Acatech* is a platform for the science-based discussion of strategic technology issues.

This distinguished appointment and recognition are based on his scientific accomplishments and standing, symbolizing exceptional scientific excellence. Funded by the German Federal Government and the Länder, *acatech* is the voice of the technological sciences. At the General Assembly of *acatech* in October 2023, 39 new members, including Kai Nagel, were elected to the academy.

Read more

✛ Vikram Sunkara (ZIB) is a New Liaison Group Leader at the DRFZ

The German Rheumatism Research Centre Berlin (DRFZ), a Leibniz Institute, has a new liaison group in the Systems Rheumatology program area. MATH+ member Vikram Sunkara of Zuse Institute Berlin (ZIB) has been leading the "Explainable A.I. for Inflammation" research group at the DRFZ since December 2023. This group strengthens the collaboration between the DRFZ and ZIB. Congratulations!

Vikram Sunkara´s scientific focus is to combine pure mathematics and mathematical biology to solve deep fundamental problems in computational biology. He has already been collaborating with Mir-Farzin Mashreghi from the DRFZ for more than three years, contributing his mathematical expertise and experience in the field of artificial intelligence to combine modern mathematical biology with state-of-the-art high-throughput single-cell technologies.

Read more

✚ MATH+ Visiting Scholar Vijay Natarajan at Zuse Institute Berlin (ZIB)

MATH+ is pleased to welcome [Vijay Natarajan from the Indian Institute of Science (Bangalore)](#) as a MATH+ Visiting Scholar hosted by Christof Schütte at the Zuse Institute Berlin. Natarajan's research interests encompass scientific visualization, topological data analysis, and computational topology. Lately, he has focused on topological methods for time-varying and multi-field data visualization, applications in biology, material science, and climate science.

Vijay Natarajan has become a valuable member of the MATH+ community since the beginning of his [visiting scholar stay at the Zuse Institute Berlin](#) in Summer 2023, and he will continue to be part of the community until Summer 2024.

Read more

✚ MATH+ Visiting Scholar José Verschae at TU Berlin

MATH+ was delighted to welcome José Verschae as MATH+ Visiting Scholar at TU Berlin, hosted by Martin Skutella from November 2023 until January 2024. Verschae is an associate professor at the [Institute for Mathematical and Computational Engineering (IMC)](#) of the Pontificia Universidad Catolica de Chile in Santiago. Having obtained his doctorate from TU Berlin as a BMS student in 2013, he is quite familiar with Berlin's math community.

José Verschae's research interests encompass a variety of topics in discrete mathematics and algorithm design, including approximation and online algorithms for scheduling and network design problems. In his latest project, he has delved into algebraic methods in optimization, including the use of polynomial optimization for approximation algorithms and the consideration of symmetries in optimization.

During his stay, he gave the block course "A Primer on Submodular Functions, Approximation, and Gross-Substitutability" at TU Berlin, and primarily cooperated with the groups of [Martin Skutella](#) and [Max Klimm](#). In particular, he contributed to the recently started MATH+ project [AA3-17 "Efficient Algorithms for Quickest Transshipment Problems,"](#) and initiated a new research project on the computational complexity of optimal wastewater monitoring for epidemiological situation assessment.

✚ MATH+ Distinguished Visiting Scholar Annette Werner at HU Berlin

MATH+ welcomes [Annette Werner, a professor of mathematics at the Institute of Mathematics](#) of Goethe-Universität Frankfurt, as a MATH+ Distinguished Visiting Scholar, hosted by [Jürg Kramer at the Humboldt-Universität zu Berlin](#) from January to March 2024.

She investigates problems in arithmetic algebraic geometry, with a particular focus on exploring questions in p-adic Hodge Theory and p-adic Arakelov Geometry.

In Berlin, she collaborates with the research groups of [MATH+ Distinguished Fellow Bruno Klingler](#) and Jürg Kramer at Humboldt Universität.

Read more

✚ The Following BMS Students Have Successfully Completed Their Doctorate

Helena Bergold (FU Berlin)
"The leafage of chordal graphs"

Dennis Groh (HU Berlin)
"A Coupled System of Differential-Algebraic Equation and Hyperbolic Partial Differential Equation – Analysis and Optimal Control"

Riccardo Morandin (TU Berlin)
"Modeling and Numerical Treatment of Port-Hamiltonian Descriptor Systems"

Congratulations!

MATH+ Events

Preview

✚ BMS Days and BMS Student Conference from 19-23 February

The **BMS Days 2024** with invited BMS applicants from all over the world will take place from 19 to 20 February at the Magnus-Haus. The applicants will be introduced to the graduate school's program and will have the opportunity to get to know potential supervisors. The mathematical lectures will be given by Giulia Codenotti (FU Berlin), Ruming Zhang (TU Berlin), Ana Djurdjevac (FU Berlin), Thomas Krämer (HU Berlin), Carlos Amendola (TU Berlin), and Daniel Walter (HU Berlin).

The BMS Days are followed by the **BMS Student Conference** from 21 to 23 February at TU Berlin. The BMS Student Conference will welcome Mohan Swaminathan (U Stanford) and Marita Thomas (FU Berlin) as the invited speakers and several BMS students who will talk about their research.

✚ **MATH+ Fridays** for the summer semester 2024 will be announced soon.

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

MATH+ Outreach

✚ Math Advent Calendar Award Ceremony on 26 January at FU Berlin

We were thrilled that the **award-winning ceremony of both Advent Calendars** from Mathe-im-Leben (for young students) and MATH+ (students from 10th grade upward) took place despite the train strike on 26 January at FU Berlin. More than 700 beaming winners had lots of fun, enjoying the math bazaar and the stage program featuring music, math games, and a science slam by MATH+ member Felix Günther. Those who could not attend due to the strike could follow the program online via a live stream. A video greeting of the Federal Minister of Education and Research, Bettina Stark-Watzinger, was a special highlight! It was an excellent event for all young and older math enthusiasts.

Read the Press Release (in German)