



# Newsletter

BELGIAN MATHEMATICAL  
SOCIETY

# 151, January 15, 2025

Comité National de Mathématique CNM

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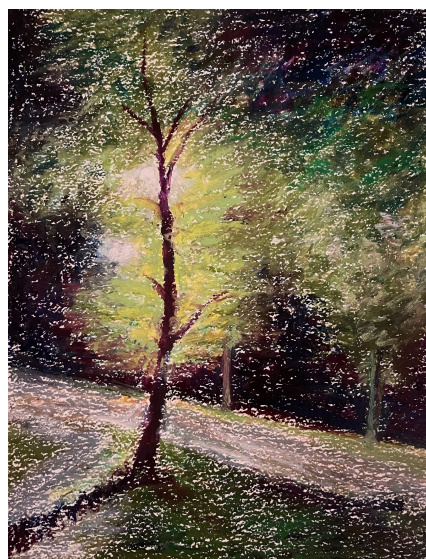
NCW Nationaal Comité voor Wiskunde

**Newsletter of the Belgian Mathematical Society  
and the National Committee for Mathematics**

Belgian Mathematical Society ASBL/VZW  
ULB Campus Plaine, C.P. 218/01,  
Bld du Triomphe, B-1050 Brussels, Belgium

Website: [bms.ulb.ac.be](http://bms.ulb.ac.be)

Newsletter: [wendy.goemans@kuleuven.be](mailto:wendy.goemans@kuleuven.be)



By Andreas Weiermann

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The next edition of this newsletter will appear on March 14th, hence, till March 10th all content can be sent to [wendy.goemans@kuleuven.be](mailto:wendy.goemans@kuleuven.be).

Any information that you qualify as interesting to be spread among the Belgian Maths community is very much welcomed! Examples of such information are: PhD defenses, seminars, conferences, workshops, meetings, interaction with other sciences or business companies, popular lectures, school initiatives, math exhibitions, job opportunities, ...

## Foreword by the president of the BMS

Dear BMS members,

In name of the BMS board I wish all of you a Happy New Year. We ended the BMS year 2024 with a successful "recent breakthroughs in Mathematics" meeting, which was combined with our general assembly, and we started the new year with the inaugural lecture of our first Jacques Tits Chair, Emmanuel Breuillard. Also further in 2025 we will have several BMS activities, starting with Young Scholar Day in Leuven and we look forward to receiving your nominations for the second Jacques Tits Chair. More information about all these and much more, you can find in this newsletter. Furthermore, don't hesitate to inform the Belgian mathematical community via this newsletter about the events you organize.

Best wishes,  
Joost

## 1 News from the BMS & NCM

### 1.1 Jacques Tits Chair 2025

The call for applications for the second Jacques Tits Chair of the BMS is now open. The deadline for applications is March 31, 2025. See all information at the end of this newsletter.

### 1.2 A memory of the "Recent breakthroughs in Mathematics 2024"



### 1.3 Membership dues for 2025

The basic BMS membership fee is 20€ per year or 100€ for 5 years. See Section 1.3.1 for reciprocity membership.

You can pay via bank transfer (BIC: GEBABEBB / IBAN: BE70 0011 7447 8525) or through the following QR codes (please mention your name as communication)



Left: 20 euros - basic membership fee. Middle: 45 euros - BMS + EMS fee. Right: 100 euros - 5 year basic membership fee

Our address is:

Belgian Mathematical Society  
Campus de la Plaine, C.P. 218/01  
Boulevard du Triomphe  
B-1050 Brussels, BELGIUM

The new Project Euclid system for electronic access to our journal, the Bulletin of the Belgian Mathematical Society, is stricter than before and asks the Society to update our subscriber's list yearly in January. So please pay your dues as soon as possible in order to keep uninterrupted access to the Bulletin.

### 1.3.1 Reciprocity and combined membership

The BMS has reciprocity agreements with the AMS, EMS, DMV, LMS, RSME, SMF, SBPMef, VVWL and KWG. In case you are already member of one of these societies, your membership fee for the BMS is reduced to 18€. Details can be found on [this webpage](#).

We summarize the most common combined memberships:

BMS	20,00€
BMS for 5 years	100,00€
BMS with reciprocity	18,00€
BMS + EMS	45,00€

Note that the EMS (European Mathematical Society) membership fee of 25,00€ is allowed only to persons belonging to an EMS corporate member society, such as the BMS. The individual EMS membership fee is 50,00€ otherwise.

Note that it is now preferred that you pay your EMS membership fee directly to the EMS. See [http://www.euro-math-soc.eu/ems\\_payment\\_new/ems\\_payment\\_new.html](http://www.euro-math-soc.eu/ems_payment_new/ems_payment_new.html) for details.

## 1.4 Bulletin of the Belgian Mathematical Society - Simon Stevin

Starting from Volume 28 the Bulletin of the Belgian Mathematical Society - Simon Stevin only appears online and is not printed any more. As a member of the BMS you have electronic access to all electron-

ically available issues of the bulletin, free of charge. If you have any trouble logging in or accessing the journal, please contact [customer\\_support@projecteuclid.org](mailto:customer_support@projecteuclid.org).

### Content Volume 31 (4) November 2024

- Groups, Lie rings and braces **Aner Shalev, Agata Smoktunowicz** DOI: 10.36045/j.bbms.230929
- Amenability of group actions characterized by configuration equations **Mahdi Meisami, Ali Rejali, Meisam Soleimani Malekan, Akram Yousofzadeh** DOI: 10.36045/j.bbms.231115a
- Subgeometries isomorphic to residues in exceptional Lie incidence geometries **Bruce N. Cooperstein, Hendrik Van Maldeghem** DOI: 10.36045/j.bbms.231129
- Kähler manifold with second order divergence-free Weyl tensor **Amalendu Ghosh** DOI: 10.36045/j.bbms.231206
- Flat epimorphisms and Nagata rings **Gabriel Picavet, Martine Picavet-L'Hermitte** DOI: 10.36045/j.bbms.240122
- Rings in which elements are the sum of a unit and a non-unit **Sait Halicioglu, Burcu Ungor** DOI: 10.36045/j.bbms.240318a
- Integral non-group-theoretical modular categories of dimension  $p^2q^2$  **César Galindo, Julia Plavnik, Eric C. Rowell** DOI: 10.36045/j.bbms.240415
- Abstract Cesáro sum of normed spaces **Mohamed Ahmed Ould Sidaty** DOI: 10.36045/j.bbms.240415a
- A new version of Boole's formula type inequalities in multiplicative calculus with application to quadrature formula **Abdul Mateen, Zhiyue Zhang, Muhammad Toseef, Muhammad Aamir Ali** DOI: 10.36045/j.bbms.240612

### Content Volume 31 (5) December 2024

- A study on the existence of solutions for the class of nonlinear partial differential-difference equations in several complex variables **Rana Mondal, Imrul Kaish** DOI: 10.36045/j.bbms.230928
- Coproducts for non-unital algebras **Alfons Van Daele** DOI: 10.36045/j.bbms.240207
- Uniformly convergent method for two coupled nonlinear singularly perturbed systems arising in chemical kinetics **Erkan Cimen, Sevet Uncu** DOI: 10.36045/j.bbms.240706
- Infinite Series involving skew harmonic numbers **Chunli Li, Wenchang Chu** DOI: 10.36045/j.bbms.240714
- Spectra of composition operators acting on weighted Dirichlet spaces **Li He, Xiaoxin Zhou** DOI: 10.36045/j.bbms.240726
- Fredholm operators on little Lipschitz algebras **Azin Golbaharan, Sasan Amiri** DOI: 10.36045/j.bbms.240731
- A decomposition problem for involutive solutions to the Yang-Baxter equation **Arpan Kanrar, Wolfgang Rump** DOI: 10.36045/j.bbms.240803

For the table of contents of previous issues, see <https://projecteuclid.org/all/euclid.bbms>.



## 2 (Online) Meetings, Conferences, Lectures, ...

### 2.1 January 2025

#### The Interplay Between Skew Braces and Hopf-Galois Theory

20 January 2025, Vrije Universiteit Brussel

Organizers: I. Colazzo, P. Truman, A. Van Antwerpen, L. Vendramin

<https://interplaysbhg.github.io>

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#### Meet the expert: Andreas Defant on Dirichlet series and Harald Bohr's legacy

27-30 January 2025, UGent

In the week of January 27, Prof. Andreas Defant from the University of Oldenburg will visit Ghent University. He will give four one hour lectures, from Monday 27/01 until Thursday 30/01. The first lecture is intended for a broad mathematical audience and is about the legacy of Harald Bohr in contemporary analysis. The next three lectures form a mini series on summation of Dirichlet series, and are of a more specialized nature. The lectures will be followed by a sandwich lunch.

Participation is free (including lunch), but we ask you to register by 17/01 by sending an email to [fabrouck.broucke@ugent.be](mailto:fabrouck.broucke@ugent.be), indicating which lectures you will attend.

#### Lecture 1: The legacy of Harald Bohr in contemporary analysis

**Time and place:** Monday 27/01, 10:30, Leslokaal 3.1, S8, campus Sterre, Krijgslaan 281, Gent

**Abstract:** Over 110 years ago, Harald Bohr began systematically studying Dirichlet series with the primary goal of resolving the Riemann hypothesis. Although he did not succeed in this endeavor, his work paved the way for a resurgence of interest in the field. In recent years, this revival has led to a dynamic interplay between classical ideas and modern developments in functional analysis, harmonic analysis, infinite-dimensional holomorphy, probability theory, and analytic number theory.

This talk will offer a brief overview of key milestones in this evolving area of research, from Bohr's famous absolute convergence problem to contemporary topics like quantum information theory.

#### Lecture 2–4: Summation of Dirichlet series: past and present

**Time and place:** Tuesday 28/01–Thursday 30/01, 10:30, Leslokaal 3.1, S8, campus Sterre, Krijgslaan 281, Gent

**Abstract:** We plan three lectures on Bohr's theorem: Let  $\sum a_n n^{-s}$  be an ordinary Dirichlet series which converges pointwise on some half-plane, where its limit function extends to the entire right half-plane  $\operatorname{Re}(s) > 0$  as a bounded holomorphic function. Then  $\sum a_n n^{-s}$  also converges uniformly on any smaller half-plane  $\operatorname{Re}(s) > \epsilon$ , for  $\epsilon > 0$ .

Much of the abstract theory of ordinary Dirichlet series relies on Bohr's theorem. However, a similar phenomenon does not hold for  $\lambda$ -Dirichlet series of the form  $\sum a_n e^{-\lambda_n s}$ , where  $\lambda = (\lambda_n)$  represents an arbitrary frequency, i.e.,  $0 \leq \lambda_n \rightarrow \infty$  strictly. So moving from ordinary Dirichlet series  $\sum a_n n^{-s}$  to  $\lambda$ -Dirichlet series  $\sum a_n e^{-\lambda_n s}$  introduces significant complications. We define a frequency  $\lambda$  as satisfying Bohr's theorem if the result holds for all  $\lambda$ -Dirichlet series (instead of ordinary Dirichlet series).

In the first two lectures, we will explore the following meta-theorem: Given a frequency  $\lambda$ , any reasonable structure theory for  $\lambda$ -Dirichlet series is possible if and only if  $\lambda$  satisfies Bohr's theorem. In the third lecture, we will examine how Bohr's theorem can be scaled to handle unbounded  $\lambda$ -Dirichlet series, i.e., Dirichlet series whose limit functions have an unbounded extension to the right half-plane  $\operatorname{Re}(s) > 0$ .

All results are primarily based on the so-called Riesz summation of Dirichlet series, a technique dating back to Harald Bohr and Marcel Riesz at the beginning of the last century. We aim to revive this method within the framework of modern Fourier analysis.

Most results are joint work with Ingo Schoolmann.



This initiative is supported by Flanders: State of the Art via the doctoral schools program.

## 2.2 February 2025

### 16th Actuarial and Financial Mathematics Conference Interplay between Finance and Insurance

3-4 February 2025, AG Campus, Brussels

<https://afmathconf.ugent.be/>

We are pleased to invite you to the 16th Actuarial and Financial Mathematics Conference at the AG Campus in Brussels on 3 and 4 February 2025. This conference is open to both researchers and practitioners in the area of mathematics and data science in finance and insurance. We are delighted to have the Quant of the Year among the invited speakers.

Invited speakers

- **Fred Espen Benth** University of Oslo
- **Raffaella Calabrese** University of Edinburgh
- **Emmanuel Gobet** Institut Polytechnique de Paris
- **Julien Guyon** Institut Polytechnique de Paris - Quant of the Year
- **Fei Huang** UNSW Sydney
- **Emmanuel Lepinette** Université Paris Dauphine

- **Roberto Reno** ESSEC Business School
- **Elena Vigna** Università di Torino and Collegio Carlo Alberto

The [full programme](#) with invited talks, contributed talks and poster presentations is available at the conference website.

[Online registration](#) on the conference website is required. The registration fee includes access to the conference, sandwich lunches and conference dinner. Early bird registration ends 31 December 2024.

Organizing committee: Griselda Deelstra (co-chair), Ann De Schepper, Jan Dhaene, Karel In 't Hout, Wim Schoutens, Julien Trufin, Steven Vanduffel, Michèle Vanmaele, Frédéric Vrins, David Vyncke (co-chair)

Scientific committee: Hansjoerg Albrecher, Carole Bernard, Tahir Choulli, Griselda Deelstra (chair), Michel Denuit, Jan Dhaene, Thorsten Schmidt, Steven Vanduffel, Michel Vellekoop

### 2.3 April 2025

#### GAPdays 2025

7-11 April 2025, Vrije Universiteit Brussel

The Spring edition of the GAPdays 2025 will be organized at the Vrije Universiteit Brussel, April 7-11, 2025. GAP - Groups, Algorithms, Programming, is a system for computational discrete algebra. It is fully open source and it allows users to contribute through packages. During a GAPdays meeting, users and developers of GAP have the opportunity to meet, present and discuss issues, implementations, and obviously interesting mathematics to compute with. The Spring edition of the GAPdays 2025 will be the first one on Belgian soil. There will be the usual development meetings and code sprints, but we are happy to announce that also three minicourses will be organized, especially targeted at master and PhD students in mathematics who are interested to learn more about GAP and how to compute with particular mathematical structures in GAP. The invited lecturers for the minicourses are Ilaria Colazzo, Bettina Eick and Michel Lavrauw. Some topics covered by the lectures are finite  $p$ -groups and finite solvable groups, classification of finite groups, the Lazard correspondence and Lie  $p$ -rings, projective spaces over finite fields, finite classical polar spaces, incidence geometries and substructures. More information will be added soon online, please have a look at

<https://www.gapdays.de/gapdays2025-spring/>.

The organizers,  
Philippe Cara, Jan De Beule, Leandro Vendramin

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#### HOPF25

22-26 April 2025

From April 22 until April 26, an international conference on Hopf algebras, quantum groups, monoidal categories and related structures will be organized at the Université Libre de Bruxelles. Invited speakers are Nicolás Andruskiewitsch (Córdoba), Shahn Majid (London), Vanessa Miemietz (Norwich),

Dmitri Nikshych (Durham) and Chelsea Walton (Houston). Registration and a call for contributed talks is open until January 31, 2025. For more information and the registration form, please visit the website

<https://hopfalgb.ulb.be/Hopf2025/>.

The organizers,

Ana Agore, Stefaan Caenepeel, Kenny De Commer, Julia Plavnik, Paolo Saracco, Špela Špenko, Pedro Vaz, Leandro Vendramin, Joost Vercruysee, Yinhua Zhang

## 2.4 June 2025

### Young Scholar Day 2025

3 June 2025, KU Leuven

The BMS will organize its “Young Scholar Day” on Tuesday June 3 2025 on the KU Leuven campus, rooms ‘MSI’ (Mgr. Sencie Instituut). The aim of this event is to give the opportunity to early career researchers in Belgium to meet and present their results during short talks.

Furthermore, the 2025 Godeaux lecture will be given at the beginning of the event.

As usual, registration is free for BMS members. You can pay your registration fee as described earlier in this newsletter, Section 1.3 or on the [website](#).

#### Preliminary schedule

- 09h00 - 09h30: welcome and coffee
- 09h30 - 10h30: Godeaux lecture
- 10h30 - 11h00: coffee break
- 11h00 - 12h15: parallel sessions
- 12h15 - 14h00: Lunch break
- 14h00 - 15h15: parallel sessions
- 15h15 - 15h45: coffee break
- 15h45 - 17h00: parallel session
- 17h00 - 18h00: Drink!

Registration will open soon! Keep an eye on this newsletter and the website

<https://bms.ulb.ac.be/conferences/young-scholar-day-2025/>

## The Yang-Baxter equation and all that

15-21 June 2025, Będlewo, Poland

Organizers: I. Colazzo, T. Brzezinski, L. Vendramin

<https://sites.google.com/impan.pl/ybe/home-page>

## 2.5 September 2025

### The 12th Heidelberg Laureate Forum

14-19 September 2025, Heidelberg, Germany

At the HLF, all winners of the Fields Medal, the Abel Prize, the ACM A.M. Turing Award, the Nevanlinna Prize/IMU Abacus Medal, and the ACM Prize in Computing are invited to attend. In addition, young and talented computer scientists and mathematicians are invited to apply for participation. The previous HLFs have been an exceptional success. The HLF serves as a great platform for interaction in the fields of mathematics and computer science.

Over the course of the week-long conference, young researchers will be given the possibility to connect with their scientific role models and find out how the laureates made it to the top of their fields.

Applications for participation at the 12th HLF are now open in three categories: Undergraduate/Pre-Master, Graduate PhD, and PostDocs.

**The deadline for application is 11 February 2025, 11:59 p.m. Berlin time (CET/UTC+1)**

The IMU Adhering Organizations and national mathematical societies can also nominate young researchers. Nominated persons get "priority treatment", but, since there may be too many nominations, they have no acceptance guarantee. Nominators need to register via the link

<https://application.heidelberg-laureate-forum.org>,

click on "Register as Nominator" and enter the organization code IMU69234 when registering. Please note that all previous login information and nominator accounts were deleted in accordance with German data protection regulations.

All applications are reviewed by an international committee of experts to ensure that only the most qualified candidates are invited. There are about 100 spaces available for each discipline of mathematics and computer science. All applicants will be notified by the end of April 2025 whether or not they are invited.

The IMU asks its Adhering Organizations to distribute this information among their national mathematical communities, if possible, through the newsletters of the national mathematical societies.



## 2.6 Seminars and colloquia

**Analysis & Geometry Seminar**  
UAntwerpen  
(usually Wednesdays 16-17h during term)

This is the weekly research seminar of the analysis & geometry-interested people in Antwerp. During the semester, we have once per week a research talk in analysis and/or geometry and/or related topics. The list of speakers comprises researchers from Antwerp as well as other universities. Details (schedule, speakers, titles, abstracts, seminar room/ online/ hybrid etc.) can be found on the seminar webpage <https://www.uantwerpen.be/nl/personeel/sonja-hohloch/private-webpage/seminars/analysis-geometry/>

To be added/deleted from the mailing list, please send an email to:  
sonja dot hohloch AT uantwerpen dot be

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### Ghent Geometric Analysis Seminar

<https://analysis-pde.org/seminars/ghent-on-geometric-analysis/>

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### Ghent Methusalem Junior Seminar

<https://analysis-pde.org/ghent-methusalem-junior-seminar/>

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### Seminar of Analysis and PDE

<https://analysis-pde.org/seminars/>

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### Ghent Methusalem Colloquium

<https://analysis-pde.org/ghent-methusalem-colloquium/>

## 3 History, maths and art, fiction, jokes, quotations ...

### 3.1 Adhemar's corner

Next follow two reviews by Adhemar, one on the annual anthology of papers dealing with topics of interest to mathematicians, M. Pitici (ed.), *Best writing on mathematics 2021* and another on Volume 12 of the *What's happening in the mathematical sciences* series explaining for the layman some trendy mathematical subjects by D. Mackenzie.

**The best writings on mathematics 2021** Mircea Pitici (ed.). Princeton University Press, 2022 (320 p.), isbn: 978-0691225708 (pbk).

Although somewhat hindered by the pandemic situation in 2021 (not all papers are available online, and not all libraries could be visited), Pitici has again collected a fine anthology of 26 papers published in 2021 dealing with mathematical topics from an outside perspective.

It is very appropriate that after a lock-down period, the opening article is about mathematicians that have been very creative during a period of isolation. Newton is of course the the best known example who created his best work when he left Cambridge because of the plague. There are however several other examples of mathematicians who, during a period of war or imprisonment, made some good work, which was sometimes triggered exactly because of the limitations of the situation. Examples are Ibn al-Haytham, Poncelet (geometry), Jakow Trachtenberg (mental calculation), and Jean Leray (PDE and algebraic topology). The next text is about another kind of viral spreading: what exactly is the design behind the creation of Bitcoin and a block chain. It is clearly illustrated that it is not a matter of just cryptography.

It is impossible to discuss each and every paper in this volume, so let me group them according to their main topic. Under the general topic *geometry* we can classify a paper on modular design in architecture where it can happen that when two identical modules meet in a corner, there can be logical accidents. Another one shows how the complex exponential transforms a rectangular grid into circular bands as in Cosmatesque design (named after the Roman Cosmati family). On a somewhat more playful note is the paper where an alphabet is designed using algebraic curves. Each letter consists of a set of curves, so that by simple translations, a text can be written as long algebraic equation in two variables. Professor Maria Trnkova has gathered some fame for her crocheting of hyperbolic geometrical objects. In an equilateral triangulation of the plane there will always be 6 triangles meeting in a corner. When less than 6 meet, the curvature is positive, when there are more than 6, we get negative curvature. So when at a corner more than 6 triangles (crocheted with yarn) are meeting, we get some curvy hyperbolic flowers.



Santo Spirito  
Florence



Cosmati  
design



hyperbolic  
flower

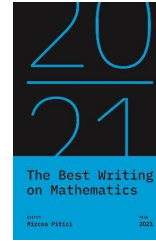


gömböc

More geometry appears in a play from the 17th century where the characters are abstract geometrical figures, like in Abbott's Flatland. A paper describing the 3D printing of chaotic attractors as produced by dynamical systems brings us back to modern times. Next is the story of Gábor Domokos, inventor of the mono-monostatic Gömböc, who teamed up with Douglas Jerolmack to show their theory that in geology things break up on average in roughly cubic shapes.

*Computer science* is presented with a number of papers drawing parallels between quantum algorithms and the physical world, complexity, dark data and erroneous data.

*Games, puzzles and paradoxes* are also standard topics in these anthologies. A hat-guessing game and the verification of a bicycle problem originally posed by V. Arnold. A coloring problem in a hexagonal pyramid turns out to be an excellent exercise in solving linear systems in  $\mathbb{F}_3$ .



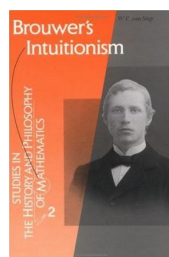
Mircea Pitici

One paper has particularly triggered my interest. It is related to the discussion of the very old question whether mathematics is invented or discovered. The discussion is about whether or not our universe is blocked or not. Some people are convinced that irrational numbers with an infinite number of non-repeating digits are inventions that do not exist in our universe. Each additional digit is extra information, and information requires energy. If we believe that, given enough information, the universe is predictable, excluding free will, then this infinite amount of information should have been present at the Big Bang, which is impossible. In fact, new information is created all the time. Many multiverses are possible as long as we do not observe, but by observing, we truncate the infinite sequence of information that is not yet complete. Observation destroys possible futures, it destroys information. Thus what we experience is a quantum universe where time is not continuous, and where “now” is an nonexistent vanishing instant of time. There are many related questions and problems. It resolves the philosophical question of free will, a blocked universe allows (at least in theory) wormholes, time travel, etc. This blocked universe excludes determinism and makes physics inherently uncertain. Physicist Nicolas Gisin recently picked up this theory again which follows the intuitionist views of Brouwer. It is a controversy that has not been settled yet.

The penultimate contribution of the book somehow relates to this: can one own a theorem? What about results about cryptography that the NSA wants to control or other research obtained by an employee of a company that wants to keep it secret? If mathematics is discovered, then nobody owns it, but of course you can keep your discovery secret if you want to.



Nicolas  
Gisin



Brouwer's  
intuitionism



Sophie  
Germain



dark data

This leads directly to the *history of mathematics*. Should we continue building mathematics starting from the latest layer added, or should we learn from history and study the old masters to progress? Another contribution explains the history of the *Notices of the AMS*, which started as a newsletter bringing info about the AMS and some letters bringing a political opinion about situations affecting mathematicians worldwide. Another paper highlights the importance of Sophie Germain as a mathematician.

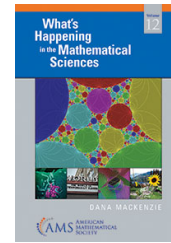
And there is also the usual section on *education and teaching of mathematics*. One paper is a rightful plea not to learn our students only the rules to solve a problem or a class of problems, but to learn the reasoning that is behind it, which is not an obvious thing to do since there are different ways of reasoning (inductive, abductive, analogy, relational). Very relevant is a report that revealed that the achievement of pupils is not reflecting the amount of mathematical training of their teachers. Mathematical training for teaching is not the same as training for research. What are the skills, do's and don'ts, of someone supervising undergraduates? The last contribution is by Terence Tao who confesses that he didn't work too hard as a student since studying was too easy so that he only spent time on the courses he liked, but after nearly failing an exam, he pulled himself together and became the well respected professional mathematician he is now.

So this is again a very interesting set of papers made public in 2021, that are presented here in a uniform way. As usual there is also a long list (9 pages) with more, similar, highly interesting, reading stuff.

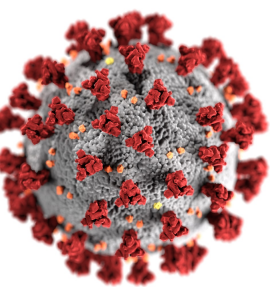
Adhemar Bultheel

**What’s happening in the mathematical sciences, vol. 12.** Dana MacKenzie. AMS, 2022 (126 p.), isbn: 978-1-4704-6498-1(pbk).

Here is another volume of the *What’s happening* series highlighting some trending subjects in mathematics in which some progress has been made. The idea is that the mathematics are explained to the layman, interviewing the mathematicians that worked on the subject, very much like the articles in the *Quanta Magazine* does for a broader scientific spectrum. This is definitely different from the annual anthology *The best writings on mathematics* collected by M. Pitici that is reproducing published papers that are about mathematics and mathematicians, and their impact and importance, but most often do not treat the mathematics itself.



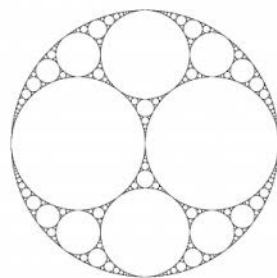
Dana MacKenzie



Like Pitici’s survey of 2021, also this issue has a strong signature of the 2020 pandemic where mathematics had a rather important contribution. Bending the curve, reproduction factors, exponential growth, were mathematical concepts that were mentioned in about every news bulletin in the high-days of the pandemic by the news anchor with a spiky sphere of the corona virus as a background. Hence, it should be no surprise that not less than three chapters are devoted to this global catastrophe. One deals with the epidemic modeling of how it was spreading and how these models had to be adapted as more information became available. A second is about how models tried to catch the influence of vaccination and lock-downs which were essential for politicians to make decisions. The third one is a study of the virus itself on a RNA scale: how it operates and spreads in a human body which is essential if one wants to develop a vaccine.

With covid-19 more or less under control, the other lurking global disaster of climate change that was pushed to the background, comes back to the foreground. So there is understandably also a long chapter dealing with this threat. It explains the shift in appearance of extreme events like heat domes or water bombs, the relation between weather and climate, and how to identify the change in global measurements. Also here, like in so many other applications, machine learning is of increasing importance. At the moment of writing this review, we are in the middle of an energy crisis. This is obviously triggered by the Russia-Ukraine war, but the transition to sustainable energy consumption, is of course related to global warming and climate change as well. It will probably be another major issue in the following volumes of this series.

The four remaining chapters are somewhat lighter. One is about Apollonian tiling. Three touching circles enclose a curvilinear triangle in which a circle can be fitted touching the 3 bounding circles, which generates 3 other triangular holes, that can be filled etc.



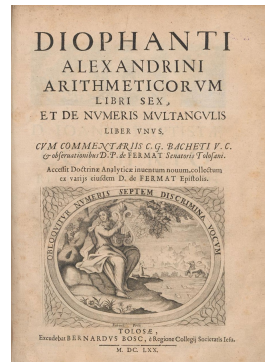
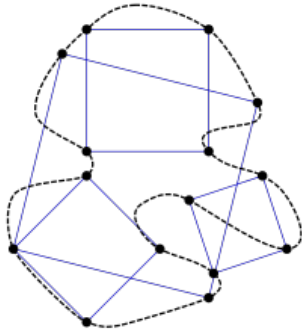
Apollonian tiling



Schmidt arrangement (K.E. Stange’s homepage)

If the radii of the 3 circles are of the form  $1/n_i$ , with  $n_i, i = 1, 2, 3$  integer, then the circle in the triangle will have a radius  $1/n_4$  with  $n_4$  integer. This can be generalized in various directions, using Gaussian integers or more generally using numbers in  $\mathbb{Z}[\sqrt{-p}]$  with  $p$  prime, or considering Apollonian sphere packing. There is an obvious connection with fractals and hyperbolic geometry. It is worth checking the Internet look-

ing for the beautiful Schmidt arrangements obtained by Katherine E. Stange by applying Moebius transforms, generating results with the open source software SageMath. The problem was originally proposed in 1643 by Descartes as a homework problem for Princess Elizabeth of Bohemia, until he realized that the problem was way to hard for her to solve.



Another chapter is a discussion of what is known as the four-peg problem. If one draws any (smooth) non-intersecting Jordan curve, then one can always find four points on this curve that are the vertices of a perfect square. A simple problem, but difficult to prove, and once it is solved, many other problems come to the surface. What if squares are replaced with polygons with vertices on a circle, what with non-smooth or with self-intersecting curves?

Fermat's last theorem is a problem formulated in terms of a Diophantine equation, i.e., an algebraic equation with integer coefficients. This type of equations has a very long history and are related to several aspects of number theory. Here the history of the problem of finding the algebraic solutions of a diophantine equation are discussed.

The last chapter from this volume starts from a simple graph problem which corresponds to computing the eigenvectors corresponding to the eigenvalue zero of a tridiagonal weighted adjacency matrix. Such problems are related to defining spins of a qubit network, but also to the stabilisation of buildings. The most famous example of the latter is the Taipei 101 skyscraper (once the world tallest building) that has a 660 ton pendulum hanging in its core to stabilise the building to survive an earthquake. However the tridiagonal structure of the matrix corresponds to a simple serial connection of the nodes in a graph. What can be said about more general graphs? The original problem was to find out for a general graph where the value of a node defines the values of its neighbors: what is the minimal set of nodes that one has to fix to fix the whole network. This corresponds to finding in the corresponding class of (adjacency) matrices, the minimal set of entries that will maximize the dimension of the null space. Finding these sets, which are called 'zero forcing sets', is computationally a very hard problem and that is where recently some progress has been made. Solving the problem is important when the graphs represent social or traffic networks, or power grids, or certain pursuit problems.



The Taipei 101 skyscraper and the damping pendulum inside

So this is again a very nice collection of items where mathematics plays an essential role and that can be read by anyone with only a very elementary knowledge about mathematics. Several of the subjects discussed are not only interesting from a mathematical point of view, but they are also very important from a social point of view. Dana Mackenzie once more succeeds in selecting these juicy topics and bring these in a pleasant and entertaining way. For example the 3 pandemic chapters are entitled '50 ways to kill a virus' referring probably to Paul Simon's 50 ways to leave your lover and the last chapter has the Shakespearian title 'Much ado about zero'. Whenever you finish reading a volume in this series, you long for the next one to read. Adhemar Bultheel





## BMS Jacques Tits Chair

The BMS Jacques Tits Chair is a yearly prize established by the BMS board in 2023 in honor of the late Jacques Tits (1930-2021). Its purpose is to invite an internationally recognized mathematician, working in any field of Mathematics, to spend one month at a Belgian university.

Rules of the prize:

- Each (academic) year, the BMS board decides on the timeline for the prize. For the 2025-26 chair, the schedule is as follows:
  - The call for applications is launched in January 2025.
  - The deadline for applications is March 31, 2025.
  - The decision will be made and announced by the BMS board in May-June 2025.
- Any permanent member (or group of permanent members) of a department of Mathematics at a Belgian university may propose a candidate for the chair. This individual is hereafter called the *host* and their institution the *host university*. The BMS encourages each department to discuss proposals internally and to nominate only one candidate per university.
- The winner of the chair will be invited by the host to spend one month at the host university. During this stay, the chair holder can collaborate scientifically with the host and will give an advanced mini-course. The first lecture of this mini-course, called the “inaugural lecture”, should be accessible to a broad mathematical audience.
- The host (or host department) is responsible for organizing the mini-course and the inaugural lecture. The BMS will use its communication channels to advertise these events. Details of the events must be communicated to the BMS at least three months in advance. Participation at the events should be for free of charge for BMS members.
- The BMS will cover travel and accommodation expenses of the chair holder, up to a maximum of 3500 EUR. The host will assist in finding suitable accommodation for the chair holder.

- The BMS will cover expenses for organizing a reception following the inaugural lecture, up to 2000 EUR.
- The chair holder will receive a prize of 2000 EUR from the BMS.
- The host university is expected to offer the chair holder a suitable workspace and access to university facilities.
- To nominate a candidate, the host must send the following documents to the email address [bms@ulb.be](mailto:bms@ulb.be) by the specified deadline:
  - A short CV of the candidate, including a full publication list, positions, grants, awards and the candidate's contact information.
  - A support letter of the host (maximum 2 pages), highlighting the candidate's merits, the potential for scientific collaboration during the visit, and the proposed topics for the mini-course and inaugural lecture.
- The decision on the winner is made by the BMS board based on the candidate's scientific excellence, the opportunities for scientific collaboration with the host, and the relevance of the proposed mini-course and inaugural lecture to the Belgian mathematical community. Researchers working in any field of mathematics are eligible. The BMS board is not obliged to justify its decision and the outcome cannot be contested.
- The BMS reserves the right not to award the prize if no eligible candidates are found or if none of the eligible candidates meet the expected standards.
- The prize cannot be awarded to the same person twice.