



Newsletter

BELGIAN MATHEMATICAL
SOCIETY

146, January 15, 2024

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

Newsletter: wendy.goemans@kuleuven.be



By Andreas Weiermann

Contents

1	News from the BMS & NCM	3
2	(Online) Meetings, Conferences, Lectures, ...	6
3	News from the universities and other societies	11
4	History, maths and art, fiction, jokes, quotations ...	12

The next edition of this newsletter will appear on March 14th, hence, till March 8th all content can be sent to 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

Dear fellow mathematicians,

First of all let me take the opportunity to wish you all a happy New Year and a fruitful 2024. Let us hope that the year will bring exciting new Mathematics and as Belgian Mathematical Society we will do our best to bring these closer to you.

At the end of 2023, we had a very successful edition of our first “Young Scholar Day”. You find a report and some pictures of the day further in this Newsletter. Let me thank everyone who contributed to this event: speakers, session organizers, board members and participants. During the Young Scholar Day, also the winner of the “Young Scholar Award” was announced. This is a prize that was established by the BMS in 2021 to commemorate the centenary of our society and that is awarded yearly since then to an outstanding early-career mathematician having a strong link with Belgium. We received 12 nominations (two of which for the same candidate), from BMS board members and from heads of departments or research groups in Belgium, covering as well a wide variety of research topics. During the voting process, several board members expressed that they were very pleased about the high quality of the candidates. Certainly, several of them would have deserved to win the prize. However, there could only one winner, and we are very proud to announce that the BMS 2023 Young Scholar Award is attributed to *Sam Mattheus*.

Sam successfully defended his PhD thesis entitled “Finite geometry and friends: tilings in abelian groups and combinatorics in spherical buildings” at the Vrije Universiteit Brussel in 2022, under the supervision of Philippe Cara and Jan De Beule. Since 2022, he is an FWO junior postdoc at the VUB. During the academic year 2022-2023, he was a visiting scholar at the University of California, San Diego, thanks to a BAEF-Hoover Foundation Fellowship and a Fulbright Visiting Fellowship. During this period, he collaborated with Prof. dr. Jacques Verstraëte and together they found a solution to a longstanding open problem suggested by the famous and prolific mathematician Paul Erdős (1913-1996). Originally using ideas from finite geometry, they were able to prove an asymptotic lower bound for the Ramsey numbers $r(4, t)$. This fresh look at the problem greatly improves the previous best lower bound which dated from the 1970s. *Ramsey numbers* measure the number of vertices and/or edges that a graph can have before inevitably containing a certain pattern or structure as a subgraph. The Ramsey number $r(s, t)$ is the minimum number of vertices a graph must have so that the graph either contains a “clique” of size s or a “coclique” of size t . If you are curious to know more about the work of Sam, you are invited to attend our PhD day in Antwerp on May 24, where Sam will give a lecture. The registration for the PhD day will open soon, keep an eye on our website or the next Newsletter for more information.

Finally, I want to point your attention to another new initiative of the Belgian Mathematical Society: the *Jacques Tits chair*, established in honor of the late Jacques Tits (1930-2021). The aim of this chair is to attract an internationally recognized mathematician for a stay of one month at a Belgian university. The call is now officially open. You can find the rules for the prize attached to our newsletter, as well as on our website.

Enjoy reading the newsletter and hopefully see you at the PhD Day in Antwerp!
Joost.

1 News from the BMS & NCM

1.1 Call for Jacques Tits chair

See all information at the end of this newsletter.

1.2 Membership dues for 2024

The basic BMS membership fee is 20€ per year or 100€ for 5 years. See Section 1.2.1 for reciprocity membership.

You can either pay via bank transfer (BIC: GEBABEBB / IBAN: BE70 0011 7447 8525) or via PayPal (see <http://bms.ulb.ac.be/membership/paypal.php>).

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.

1.2.1 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 for details.

1.3 An impression of the BMS's first Young Scholar Day



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 electronically 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.

Content Volume 30 (3) November 2023

- Existence and multiplicity of solutions for a weighted (p, q) -Laplacian problem on the Heisenberg Lie groups **Abdolrahman Razani, Farzaneh Safari, Giovany M. Figueiredo**
DOI: 10.36045/j.bbms.220219
- Universal Taylor series on specific compact sets **Nikolaos Tsirivas** DOI: 10.36045/j.bbms.221026
- Remarks on the minimalities of two-bridge knots in the ribbon concordance poset **Keiji Tagami**
DOI: 10.36045/j.bbms.230312
- Parametric Arakawa-Kaneko zeta function and Kaneko-Tsumura η -function **Wenxuan Zheng, Ying Yang** DOI: 10.36045/j.bbms.230326
- A formula for the categorical magnitude in terms of the Moore-Penrose pseudoinverse **Stephanie Chen, Juan Pablo Vigneaux** DOI: 10.36045/j.bbms.230331

- Ricci soliton on (κ, μ) -almost cosymplectic manifold **Savita Rani, Ram Shankar Gupta**
- The Selmer groups of elliptic Curves $E_n : y^2 = x^3 + nx$ **Guilin Li, Teng Cheng**
DOI: 10.36045/j.bbms.230504
- Schur- and Baer-type theorems for Lie and Leibniz algebras **Guram Donadze, Tim Van der Linden** DOI: 10.36045/j.bbms.230609
- A characterization of Nichols algebras of diagonal type which are free algebras **István Heckenberger, Ying Zheng** DOI: 10.36045/j.bbms.230713

Content Volume 30 (3) November 2023

- New examples of G_2 -structures with divergence-free torsion **Agustín Garrone**
DOI: 10.36045/j.bbms.220626
- A module structure on Hochschild cohomology of coideal subalgebras **Liyu Liu, Lingchao Meng**
DOI: 10.36045/j.bbms.220829
- An almost strong relation **Shimon Garti, Andrés Villaveces** DOI: 10.36045/j.bbms.230308
- Locally biHölder continuous maps and their induced embeddings between Besov spaces **Manzi Huang, Xiantao Wang, Zhuang Wang, Zhihao Xu** DOI: 10.36045/j.bbms.230314
- A note on the string topology BV-algebra for S^2 with \mathbb{Z}_2 coefficients **Kate Poirier, Thomas Tradler**
DOI: 10.36045/j.bbms.230322
- Implicative-orthomodular algebras **Lavinia Corina Ciungu** DOI: 10.36045/j.bbms.230508
- Monotonicity of three kinds of functions involving the Gaussian hypergeometric function **Zhong-Xuan Mao, Jing-Feng Tian** DOI: 10.36045/j.bbms.230913

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

1.5 Annual meeting of the National Committee for Mathematics - April 15, 2024



Program

14.00 h: Meeting of the national committee (only for members of the committee)

14.30 h: Coffee break (for everybody)

15.00 h: Welcome, followed by a tribute to Prof. Em. Piet Wuyts (+2023) by Bob Lowen and Eva Colebunders

15.30 h: Lecture by Sam Mattheus; tentative title: The asymptotics of $r(4, t)$

16.30 h: Tribute to Prof. Em. Lieven Vanhecke (+2023) by Eric Boeckx and Joeri Vanderveken

17.00 h: Reception

Date: April 15, 2024, 2-6 pm

Location (to be confirmed): Palace of the academies, Hertogstraat 1, 1000 Brussel.

Everybody is cordially invited.

Preliminary registration is strongly recommended; details will appear soon.

Organizers: Françoise Bastin (ULiège) and Stefaan Caenepeel (VUB)

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

2.1 January 2024

Spectrumlezingen

January - May 2024 - Universiteit Antwerpen

Op 25 januari start een nieuwe reeks Spectrumlezingen. Wetenschappers van de Universiteit Antwerpen zullen weer tien namiddagen op een toegankelijke manier over hun onderzoek vertellen.

De reeks wordt geopend door em. prof. Freddy Van Oystaeyen.

Een nieuw model voor 'tijd' en 'bestaan' levert nieuwe inzichten in wetenschap en filosofie

Donderdag 25 januari, 14.15 - 16.30 uur

Geen voorkennis nodig – Gratis – Inschrijven verplicht

Locatie, bereikbaarheid, inschrijvingsformulier en alle andere praktische informatie: zie website

<https://www.uantwerpen.be/nl/evenementen/spectrum/programma-spectrum/>

International conference on Pseudo-Differential Operators and Related Topics

29 January - 2 February 2024

We would like to announce our forthcoming international conference on “Pseudo-Differential Operators and Related Topics” that will take place at the Ghent Analysis & PDE Center from 29 January to 2 February, 2024:

<https://analysis-pde.org/pseudo-differential-operators-and-related-topics/>

This is an international conference with a special focus on the latest developments in the field of pseudo-differential operators and a broad range of related topics. Following a tradition of conferences on pseudo-differential operators before the pandemic, the conference will take place in person.

If you would like to participate, please contact Vishvesh Kumar (vishvesh.kumar@ugent.be) or David Rottensteiner (david.rottensteiner@ugent.be).

We also plan to publish a book of extended abstracts with Birkhäuser.

2.2 February 2024

Understanding the Time Hybrids book by Fred Van Oystaeyen programmatically talk by Luc Duponcheel

5 February 2024 - VUB

Abstract

The talk is about the “Time Hybrids” book by Fred Van Oystaeyen. Various phenomena of quantum theory and relativity theory, which, until now, have been considered counter-intuitive, can, within the generic theory of reality of the book, be viewed in a more intuitive way.

The talk shows that trying to understand the book by encoding its concepts using a programming language with a sufficiently powerful type system can help gaining progressive insight into those concepts.

About the speaker

Luc Duponcheel has been an assistant professor of mathematics at the VUB. He has also been a docent in computer science at the University of Utrecht. The main part of his career he worked as programmer and/or programming instructor in industry. He is retired now, cycling and gardening, but still addicted to mathematics and programming.

Date: February 5, 2024, 3 pm

Location: VUB Campus Etterbeek, Building G, 6th floor, Room G.6.60

Everybody is cordially invited.

15th Actuarial and Financial Mathematics Conference Interplay between Finance and Insurance

5-6 February 2024 - AG Campus, Brussels

This conference is open to both researchers and practitioners in the area of mathematics and data science in finance and insurance. The main objective of this event is to encourage the cooperation between all delegates, by presenting cutting-edge research and discussing the challenges faced in practice.

Invited speakers: Séverine Arnold, Anne Balter, Fang Fang, Paolo Giudici, Manuel Rach, Christian Robert, Thorsten Schmidt, Peter Tankov

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, Ernst Eberlein, Monique Jeanblanc, Ludger Rüschendorf, Steven Vanduffel, Michel Vellekoop

The full programme with invited talks, contributed talks and poster presentations is available at

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

Online registration at <https://afmathconf.ugent.be/> is required. The registration fee includes access to the conference, sandwich lunches and conference dinner.

International Conference on Noncommutative Geometry, Analysis on Groups, and Mathematical Physics

26-27 February 2024, Zoom

Venue: Zoom

Webpage:

<https://analysis-pde.org/noncommutative-analysis-conference/>

Confirmed speakers: Shahn Majid, Stefaan Vaes, Quanhua Xu, Tao Mei, Christian Voigt, Xiao Xiong.

2.3 March-April 2024

Altair: modified programme

ALTAÏR

Centre d'Histoire des Sciences et des Techniques reconnu par le Conseil de la Recherche de l'ULB

PROGRAMME DES CONFERENCES DE L'ANNEE ACADEMIQUE 2023-2024 :

10 février 2024 : Cette conférence est remise à une date ultérieure

23 mars 2024 : Olivier Hamant (ENS Lyon) La troisième voie du vivant
Cette conférence aura lieu en ligne

20 avril 2024 : Sébastien de Valeriola (ULB) De la théorie des graphes à l'analyse des réseaux, une approche quantitative de l'histoire

Horaire : le samedi matin de 10h à 11h30

Lieu : ULB Campus Plaine, Boulevard du Triomphe, Forum, auditoire E – un changement de local éventuel sera communiqué aux auditeurs inscrits

Inscription requise sur <https://forms.gle/uiWzwp6JLUZvDiB7>

Tout public : 5 € par séance

Étudiants : entrée gratuite

Membres d'Altair : entrée gratuite (cotisation annuelle 12,50 € à l'entrée ou à verser sur le compte d'Altair BE45 0012 3409 1489)



Renseignements : Alain Jorissen (Alain.Jorissen@ulb.be) ou 02 650 28 34 et Luc Lemaire (Luc.Lemaire@ulb.be) ou sur les sites : <http://altair.ulb.be> et <https://www.facebook.com/Altair4ULB/>

2.4 May 2024

Workshop “Women in Mathematics”

13 May 2024 - Ghent Analysis & PDE Center, Ghent University, Belgium

Venue: Building S8, Sterre Campus, UGent.

Visit the confirmed Speakers and participants on the website:

<https://analysis-pde.org/2023/11/21/women-in-mathematics-2024/>

Organising Committee: Marianna Chatzakou, Jozefien D'haeseleer, Jan de Beule, Michael Ruzhansky.

Scientific Committee: Jan de Beule, Claudia Garetto, Sylvie Paycha, Michael Ruzhansky, Leo Storme.

PhD Day 2024 of the Belgian Mathematical society

24 May 2024 - UAntwerpen

Welcome everybody! The next PhD day of the BMS will take place on 24 May 2024 at the University of Antwerp (on campus Middelheim in building G, more details tba.).

Detailed information and how to register will be posted on the webpage of the BMS PhD day 2024: <https://bms.ulb.ac.be/conferences/phd-day-2024/>

Overview of the activities during the BMS PhD Day 2024:

- Godeaux lecture by Mirna Džamonja (Paris),
- Talk by Sam Mattheus (University of California, San Diego), the BMS Young Scholar Award winner 2023,
- Several parallel sessions of contributed 20-30min talks by PhD students,
- Poster pitch talks,
- Poster session,
- Best Poster Award,
- Job fair,
- ...

2.5 September 2024

Hopf Algebras and Monoidal Categories

3-6 September 2024 - University of Ferrara, Italy



All talks will be onsite even though we will allow participation in hybrid form.

We cordially invite you to attend the meeting and to contribute to the scientific program. For organizing reasons, we ask you to fill the following preliminary form. The deadline is Wednesday December 13, 2023.

<https://forms.gle/FyFbsAqbGCmcqXES6>

We plan to have roughly 30 half-hour contributions.

Organizing Committee: Alessandro Ardizzoni, Daniel Bulacu, Stefaan Caenepeel, Alan Cigoli, Claudia Menini, Blas Torrecillas

Conference website: <https://sites.google.com/unife.it/ferrara2024>

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

Ghent Geometric Analysis Seminar

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

Ghent Methusalem Junior Seminar

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

Seminar of Analysis and PDE

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

Ghent Methusalem Colloquium

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

Methusalem Colloquium talks

KU Leuven

Speaker: Marco Radeschi (Università di Torino)

Title: Invariant theory, without groups

Date: Thursday, 22 February 2024 from 16:15-17:15

Where: auditorium 200L.00.06

Speaker: Sasha Viktorova (KU Leuven)

Title: An introduction to hypersurface singularities

Date: Tuesday, 12 March 2024 from 16:15-17:15

Where: auditorium 200K.00.06

Speaker: Simon Telen (Max Planck Institute, Leipzig)

Title: TBA

Date: Thursday, 18 April 2024 from 16:15-17:15

Where: auditorium 200K.00.07

3 News from the universities and other societies

3.1 FWO Grant: Prof. Uwe Kähler's Visit to the Ghent Analysis & PDE Center

We are glad to announce that Prof. Uwe Kähler has been awarded a prestigious FWO grant for a long-term visit to the Ghent Analysis & PDE Center in Belgium. This exciting opportunity will foster collaboration and knowledge exchange within the field of analysis and PDEs.

His research interests revolve around various aspects of this field, including approximation of harmonic and monogenic functions. He delves into discrete function theories in higher dimensions and develops numerical methods based on these theories. Prof. Kähler also studies higher-dimensional analytic signals, specifically monogenic signals, and explores their applications. In addition, he conducts research on harmonic analysis over non-commutative structures. Through his work, Prof. Kähler significantly contributes to advancing our understanding of this complex mathematical realm. He is currently serving as the President of the International Society for Analysis, its Applications, and Computation (ISAAC).

3.2 Hong Kong Laureate Forum

Congratulations to Kanat Tulenov for obtaining a grant for participation in the 1st Hong Kong Laureate Forum, which took place during 13-18 November 2023 at the Hong Kong Science Park, Hong Kong.

<https://hklaureateforum.org/en/inaugural-forum/forum-overview>

This event will be held annually like the Heidelberg Laureate Forum and the selection process is similar to that of the HLF.

4 History, maths and art, fiction, jokes, quotations ...

Ali Imad Raad (ali.imadraad@kuleuven.be) runs a "Problem of the week", see below the solution of the problem in newsletter 145 and instructions on how to be put on the mailing list to receive this weekly during the semester in your mailbox.

Problem of the Week

abc Problem SOLUTION

Week 46 2023

To subscribe to the mailing list, send an email to listserv@ls.kuleuven.be with the message (in place of Your Name you put your actual name):

SUBSCRIBE ProblemOfTheWeek Your Name

By the arithmetic mean-geometric mean inequality we have that

$$\frac{a+b}{2} \geq \sqrt{ab}, \quad \frac{b+c}{2} \geq \sqrt{bc}, \quad \frac{c+a}{2} \geq \sqrt{ca},$$

and hence by multiplying together

$$\frac{(a+b)(b+c)(c+a)}{8} \geq abc$$

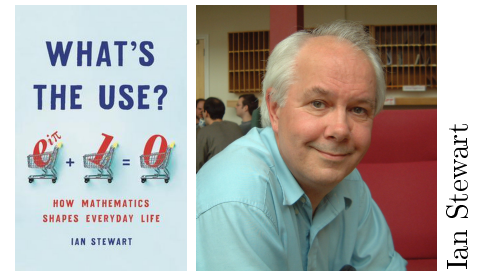
from which the result follows.

4.1 Adhemar's corner

To start the new year well, here follow two reviews by Adhemar. In the first one, on *What's the use? How Mathematics Shapes Everyday Life*, Ian Stewart explains why mathematics is so 'unreasonably effective' in our everyday life. *Perelman's refusal: A novel* by Philippe Zaouati is a semi-biographical novel about John Ball, president of IMU meeting, trying to convince G. Perelman in 2006 to accept the Fields Medal.

What's the use? How Mathematics Shapes Everyday Life by *Ian Stewart*, Basic Books, 2021 (263 p.), isbn: 978-1541699489.

This is not the first book written about the use of mathematics in everyday's life. There are *Figuring it out* (N. Crato, 2010), *Raising public awareness of mathematics* (Berends et al, 2012), *The grapes of math* (P. Bellos, 2014), *A numerate life* (J.A. Paulos, 2015), *Mathematics in everyday life* (J. Haig, 2016), and *The mathematics that power our world* (J. Khoury et al, 2016), to name just a few. Sooner or later, Ian Stewart was bound to add a similar one on top of his pile of popularizing books on mathematics. In his usual witty entertaining style, he does again an excellent job in contradicting the sigh of resignation that is heard all too often: Why should I care about mathematics, I have no use for it in my life.



THE UNREASONABLE EFFECTIVENESS OF MATHEMATICS IN THE NATURAL SCIENCES

Eugene Wigner

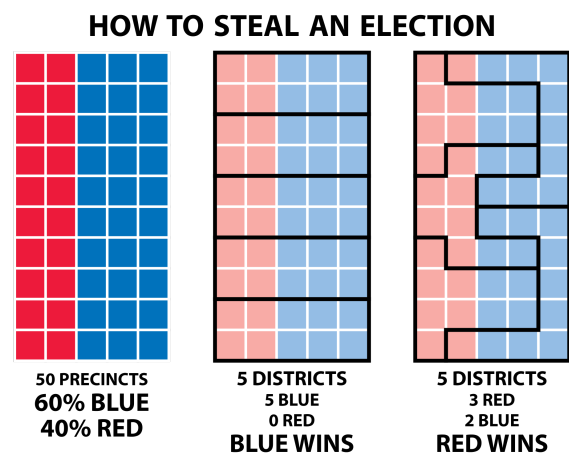
Mathematics, rightly viewed, possesses not only truth, but supreme beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as in poetry.

concept, shows up is so many formulas and applications that have not the slightest relation to geometry. But there are of course many other examples of this unreasonable effectivity, where some concepts in mathematics turn out to be applicable in totally different areas. Abstraction, so characteristic for mathematics, is of course an essential element in explaining why this is happening so often. But Stewart goes over six ingredients to answer *why* mathematics is so effective and he concludes his first chapter with the line: “Reality, beauty, generality, portability, unity, diversity. Which, together, lead to utility. It’s as simple as that.” This statement is amply illustrated in the thirteen subsequent chapters of the book.

Much of our current mathematics finds its origin in Greece, which is also the cradle of a democratic society. So chapter two starts with an appropriate application of mathematics for voting systems, in particular a discussion of how gerrymandering (a phenomenon where the voting district is designed in a particular way so that a political party optimizes the number of its elected representatives) can be recognized by using mathematical analysis about the shape of the district, the bias that it causes, etc. The discussion is a mixture of simple examples that illustrate the ideas and real cases from USA and UK to show that this is a realistic problem.

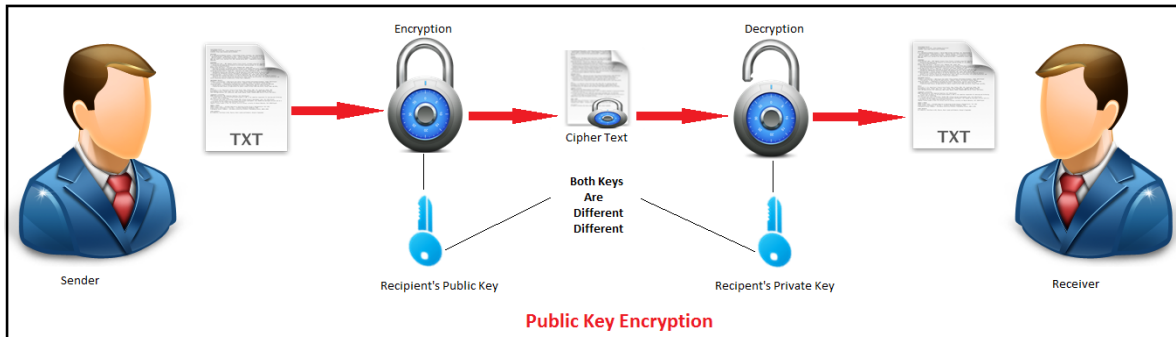
The next chapter deals with the traveling salesman problem (TSP) and related issues, including a discussion of complexity (e.g. the $P \neq NP$ millennial problem) and heuristic methods to find approximate solutions for TSP. But we are also

The way Stewart tackles it is to start his book with an introductory chapter, which explains very well the meaning of Wigner’s often cited quote about mathematics being so unreasonably effective. A typical example of this is the fact that the number π , which is the ratio of the circumference of the circle divided by its diameter, a purely geometric



simple gerrymandering examples

challenged to think about seemingly simple concepts such as the length of a curve (which is not trivial if it involves fractals), space filling curves (with the curious effect that every point in a square can be identified with one coordinate along the curve, so what is the dimension then?), Euclidean geometry (which is only valid in a flat space, and does not hold when relativity theory comes into play), the infinity concepts bringing along Peano, Cantor, Dedekind, and Hilbert (there are as many points on an interval as there are points in a square!), the influence of artificial intelligence (self-driving cars needing computer vision and image recognition, and error correcting codes to correctly understand road signs), and it's all mathematics!



Public key encryption

This idea of showing how many branches of mathematics are involved starting from a simple everyday problem is illustrated in all the other chapters too. The next one starts with a problem of kidney transplantation. Several patients may need a kidney and there may be several potential donors, but there is a problem of medical compatibility and a problem that some donors prefer to donate to a particular patient, for example because it is a relative. This matching problem can be cast into a graph theoretical problem, just like Euler solved the problem of the walking tour crossing all the bridges of Königsberg exactly once. Other chapters link number theory to cryptography and explain the RSA code, elliptic curves and quantum computing. More numbers are explaining the historical evolution of number systems to arrive at complex numbers and their unreasonable effectiveness in quantum mechanics, electrical engineering, optics, etc. Quaternions get their own chapter with applications in computer graphics.

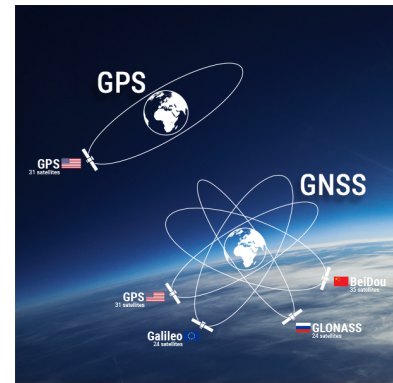


AI does not always distinguish between a puppy and a muffin.

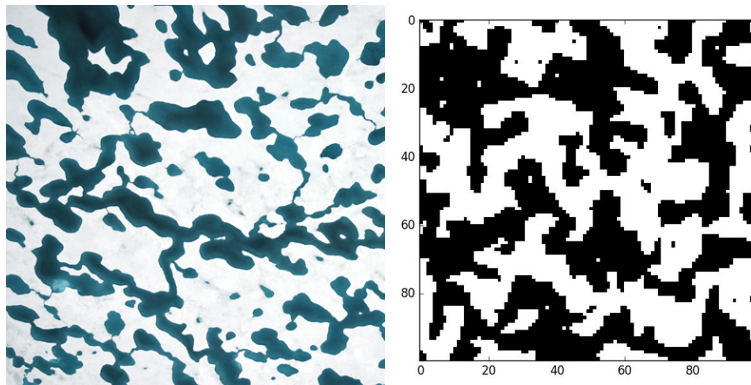
Chaotic systems and stochastic ones (a chaotic system is predictable over short periods, a random system isn't) is linked to quality control of the coiling process in spring production. Fourier and other transforms are essential to analyse the scans (X ray, CAT, PET, MRI, NMR...) that people are submitted to in the hospital. In this chapter we also meet functionals, calculus of variation, and computer tomography. And talking of images, digital pictures are nowadays only manageable because of compression techniques such as jpeg using the cosine transform and the associated ways of coding colour images. But there are other methods for compression like iterated function systems during the heydays of emerging fractal geometry, although that has now been largely abandoned for compression. Wavelets on the other hand were successfully incorporated in modern jpeg and they are now conquering several other applications as well.

All new cars have standard GPS and satnav to bring you from point A to point B on our globe. We take this all for granted, but the mathematics involved is enormous: Bringing up satellites above in a geostationary position, the production of the gadget in the car, that has to find the satellites, compute their positions, regulate the communication between the car and the satellites, taking into account relativity theory, and solving a TSP-type problem to compute your route, estimate the time of arrival, track the car as it moves,... it's an unreal mathematical marvel.

Another excellent example of how mathematics connects completely different fields is the Ising model. Because of climate change the melting polar ice forms ponds that are irregularly connecting to form some random black-and-white patterns corresponding to melted-and-frozen ice. These patterns bear a remarkable similarity with patterns of electron spin orientation in a ferromagnetic material when simulated by the Ising model. In fact the Ising model is in a so called universality class, meaning that models at quite different scales all behave asymptotically the same near critical exponents where phase transitions take place. The formation of these Arctic melt ponds is important for climate change since they influence the amount of sunlight reflected, and hence the heat absorbed by the earth.



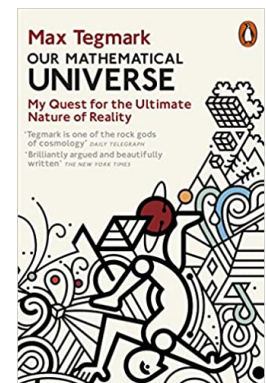
GPS is American
GNSS joins several systems



Left: melt ponds on the Arctic sea
Right: simulation of ferromagnetic Ising model.

In a penultimate chapter, the reader is introduced to topology. When it was used to study the working of our brains, unreal structures like Klein bottles have been observed. But topology is also applied to data mining to recognize clusters or 'big' holes using something called persistent homology. This connects isolated points at different scales and colours all the triangles that are formed. The holes remain as large blank spaces as one zooms out at larger scales.

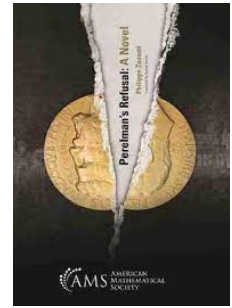
In a final chapter Stewart reflects on the subjects covered, which, he admits are only a small selection, leaving many other subjects untouched. He feeds back on his original six reasons that may explain the reason why mathematics is so effective and he refers for it to the previous chapters for their justification. Some scientists, like Max Tegmark, claim that our universe just consists of mathematics. Stewart thinks this is nonsense, but still admits that if some mathivore aliens conquer Earth and just 'eat' all our known mathematics, then our world would certainly look quite different. But does not Stewart make a logical mistake here? If everything is mathematics and the mathivores consume it, then there would be no Earth left at all.



This is a very readable book on not always simple mathematical topics. Most of the time only the idea is explained, not going into the technicalities. It sometimes requires the reader to go-with-the-flow and accept some handwaving justification. But Stewart always convinces with a pinch of humour and a sauce of seriousness, gently pushing the reader to corners of mathematics where he or she probably never went before..

Perelman's refusal: A novel by *Philippe Zaouati*, MAA/AMS, 2021 (x+133 p.), isbn: 978-1-4704-6304-5, translated by Rachel Zerner.

This is an English translation of the French original *Le refus de Grigori Perelman* (Pippa, 2017). Zaouati, is very active in the financial world at French and even European level focusing on sustainable investments. Besides technical books he also wrote some novels, the present one being his third. It is partially based on facts. The Russian mathematician Grigori Perelman who essentially solved a conjecture by Thurston which implied a proof of the Poincaré conjecture. John Ball, president of the IMU, travelled on June 10-12, 2006, to St Petersburg to meet Perelman, trying to convince him to accept his Fields Medal. Perelman refused like he previously refused the EMS Prize in 2001 and later the Clay Millennium Prize of one million in 2010. He retired from the Steklov Institute, broke with all public communication and lives with his mother. Although in 1991, he did accept the St Petersburg MS Prize.



In this novel, the meeting of Perelman and Ball in 2006 is the backbone. Although Zaouati met Ball, the conversations in this book are fantasy. This sounds like an exciting project, however, after reading the result, I am somewhat disappointed. I was expecting some accessible explanation for a general public, if not about the Poincaré conjecture, I was hoping to read somewhat about the motivation of Perelman, or a reasonable explanation of his behaviour. How come, that a brilliant mathematician, after several highly praised contributions, and a sketchy proof of his ultimate result (completed by others), he turned away from all public contacts and probably from mathematics too. The few pictures we have of Perelman are showing a dark bearded Rasputin-like man. He had the reputation of being an autistic character totally devoted to his mother and there are many rumors and legends circling the web about his occupation, whether he completely abandoned mathematics or not, or what his motivation was to refuse. It is said he did not want to be like 'an animal in a zoo' for the international press and that his work on Ricci flows was based on others like R. Hamilton, etc. None or little information feeds legends and stimulates the imagination. So Zaouati had plenty of room to create some acceptable realistic explanation or he could have invented some mythical science-fiction-like story. Unfortunately, he stuck to the few bits that are more or less generally accepted as facts and he describes a meek confrontation between two rather different characters: John Ball, the established president of a 'capitalist' IMU, and Perelman, the revolutionary non-conformist mathematical hermit, product of a totalitarian communist regime, not caring for money, who considers the IMU as a bunch of straightforward conformist mathematicians.

What is described is the meeting of the two, often while they're walking through St Petersburg at a fast pace, Perelman being tall. Perelman is not autistic, well civilized, with experience from research positions in the US. He gives his strong and frank opinion about the mathematics community and how he sees their international meetings as just a charade. His work, he says, is based on the fundamental work of others. They also visit the Steklov Institute showing the sometimes miserable circumstances that people had to work in and yet how they produced top notch results. Zaouati's only fantasy is that during the night of June 11, Perelman appears to Ball in a dream-like phantasm continuing his arguments of the daytime. Zaouati writes that in this dream Perelman is fluent and self-assured unlike the more stuttering submissive air during the day, but as he describes it, it seems to me that he is as confident during the day as he is during the night.

The book ends with two short chapters. One is dated September 1, 2006, where John Ball reflects on the meeting of the IMU in August and another dated June 9, 2010, when a meeting is taking place at the Poincaré Institute in Paris where Ball is also present with a speech by Valérie Pécresse, minister of education. There the ultimate opinion is raised that the institution of prizes attracts the brightest mathematicians to the subject, and that would prevent them for following their own ideas. Perhaps that is what moved Perelman when he refused.

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). The aim of the Jacques Tits chair is to attract an internationally recognized mathematician for a stay of one month at a Belgian university. The first prize will be awarded in the academic year 2024-25.

The rules of the prize are as follows:

- Each (academic) year, the BMS board decides on the calendar of the prize. For the chair of 2024-25 the calendar is as follows:
 - Call will be launched in January '24
 - Call closes March 31, '24
 - Decision made and announced by the BMS board in May-June '24.
- Any permanent member (or group of permanent members) of a department of Mathematics at a Belgian university can propose a candidate for the chair. Hereafter this person and his university are called the host and the host university. The BMS encourages departments to discuss this first internally and to propose only one candidate by university.
- The winner of the chair is invited by the host for a stay of 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 directed to a broad mathematical audience.
- The promotor/host department is responsible for organizing the mini-course and inaugural lecture. The BMS will use its communication channels to advertise the events. The events should be communicated to the BMS at least 3 months in advance. Participation at the events should be for free for BMS members.
- The BMS will cover the travel and accommodation expenses of the chair holder (for a maximum of 3000 eur). The host helps with finding suitable accommodation for the grant holder.
- The BMS will cover expenses for the organization of a reception following the inaugural lecture (up to 1500 eur)
- The chair holder will receive a prize of 2000 eur from the BMS

- The host university is supposed to offer the grant holder a working space and access to university facilities.
- In order to nominate a candidate, the promotor should send the following documents to the email address bms@ulb.be:
 - A (short) CV of the candidate, including a full publication list, positions, grants and awards and including contact information of the candidate.
 - A support letter of the promotor (max 2 pages), highlighting the merits of the candidate, explaining the possibilities for scientific collaboration during the stay, and including the subject of the mini-course and the inaugural lecture.

These documents should arrive at the above email address before the deadline of the call defined in the calendar of the relevant year.

- The decision on the winner is made by the board of the BMS, based on the scientific excellence of the candidate, the opportunities for scientific collaboration with the host and the relevance of the topics of the mini-course and inaugural lecture for the Belgian mathematical community. The board of the BMS does not need to communicate the reasons for its decision. The outcome cannot be disputed.
- The BMS has the right not to award the prize if there are no eligible candidates and/or if the BMS board considers that the eligible candidates do not reach the standards to be awarded with the prize.
- The prize cannot be won twice.