Newsletter

BELGIAN MATHEMATICAL SOCIETY

153, May 15, 2025

Comité National de Mathématique CNM

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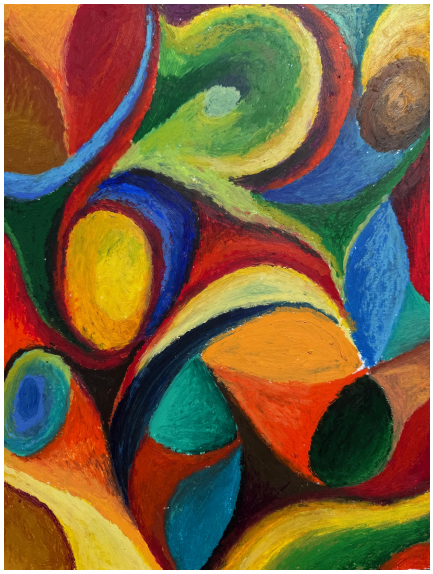
NCW Nationaal Comité voor Wiskunde

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
Newsletter: wendy.goemans@kuleuven.be



By Andreas Weiermann

Contents

Young Scholar Day — 3 June

On June 3, 2025, the Belgian Mathematical Society will host its second Young Scholar Day in Leuven, following the success of the 2023 edition. During this event, 27 postdoctoral researchers will present their work in 9 specialized sessions covering a broad range of topics in mathematics.

We are also pleased to announce that Ivan Nourdin (University of Luxembourg) will deliver the Godeaux Lecture, titled "Quantitative CLT for Deep Neural Networks".

The day will begin at 9:00 AM and conclude at 5:00 PM with a reception for all participants. As usual, registration is mandatory and free for all BMS members, including new members. Non-members who which to participate in the event are requested to join the BMS by paying the BMS membership fee of 20 euro, see further info on our website. The registration deadline is May 27, 2025, one week before the event. A registration form, along with program details, is available on our website:

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

Program updates will be published there as they become available. Please feel free to share this announcement with anyone who might be interested. We hope to welcome many of you at this exciting event.

Program:

- 09h00 - 09h30: welcome and coffee
- 09h30 - 10h30: Godeaux lecture, Ivan Nourdin
  Title: Quantitative CLT for deep neural networks
  Abstract: I will discuss the asymptotic behavior at initialization of fully connected deep neural networks with Gaussian weights and biases when the widths of the hidden layers go to infinity. The focus of the talk will be on the one-dimensional case and optimal bounds for the total variation distance obtained by means of Stein's method.
  This is based on a joint work with S. Favaro, B. Hanin, D. Marinucci and G. Peccati.
- 10h30 - 11h00: coffee break
- 11h00 - 12h15: parallel session 1
  - 1a. Category Theory (Tim Van Der Linden VUB/UCLouvain, Marino Gran UCLouvain)
    Speakers: Julia Ramos González (KU Leuven), Federico Campanini (UCLouvain), William Hautekiet (ULB)
  - 1b. Mathematical Physics (Nicolas Wijsen, KULak, Maxime Fays ULiège)
  - 1c. Analysis and Representation Theory (Hendrik De Bie UGent, David Eelbode UA)
- 12h15 - 14h00: Lunch break
- 14h00 - 15h15: parallel session 2
  - 2a. Number theory (Jasson Vindas UGent, Maja Volkov UMons)
    Speakers: Giovanni BOSCO (UMons), Frederik BROUCKE (UGent), Justin VAST (UCLouvain)
  - 2b. Optimisation (Masoud Ahookhosh UA, Geovani Nunes Grapiglia UCLouvain)
  - 2c. Global Analysis and Differential Geometry (Tom Mestdag UA, David Tewodrose VUB)
    Speakers: Charlotte Kirchhoff-Lukat (KULeuven), Susovan Pal (VUB), Jose Torrente Teruel (UA and University of Cordoba)
- 15h15 - 15h45: coffee break
- 15h45 - 17h00: parallel session 3
  - 3a. Topological groups (François Thilmany UCL/KUL, Jonas Deré KUL)

Speakers: Mario Klisse (KU Leuven), Lam Pham (UGent), Gonzalo Ruiz (UCL)
  - 3b. Graph Theory (Jan Goedgebeur KULak, Gwenael Joret ULB)
    Speakers: Jorik Jooken (KU Leuven), Carol Zamfirescu (Ghent University),Yelena Yuditsky (ULB)
  - 3c. Wavelets and Approximation Methods (Quentin Menet UMons, Samuel Nicolay ULiège)
    Speakers: Gregory Debruyne (UGent), Athanasios Kouroupis (KU Leuven), Thomas Lamby (ULiège).
- 17h00 - 18h00: Drink!

1 News from the BMS & NCM

1.1 BeNeLux Mathematical Congress: Call for Parallel Sessions

See the call at the end of this newsletter.

1.2 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.

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- Cluster parking functions **Theo Douvropoulos, Matthieu Josuat-Vergès** doi:10.36045/j.bbms.240208
- Melnikov method for perturbed completely integrable systems **Francisco Crespo, Uribe Uribe, Elisa Martínez** doi:10.36045/j.bbms.240419
- Poésie Aristotélienne **Shimon Garti, Saharon Shelah** doi:10.36045/j.bbms.240523
- A note on star-cellular-Lindelöf spaces **Wei-Feng Xuan, Dongfang Xie, Yan-Kui Song** doi:10.36045/j.bbms.240707
- Cominimaxness of generalized local cohomology modules **Hajar Roshan-Shekalgourabi, Dawood Hassanzadeh-lelekaami** doi:10.36045/j.bbms.240923
- Commutators on some nuclear Fréchet spaces over non-Archimedean fields **Wiesław Śliwa, Agnieszka Ziemkowska-Siwek** doi:10.36045/j.bbms.241009
- A note on semiprime skew left braces and related semidirect products **Marco Castelli** doi:10.36045/j.bbms.241106
- I-multipliers on semi-Heyting algebras **Shokoofeh Ghorbani** doi:10.36045/j.bbms.250309

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

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

2.1 June 2025

Young Scholar Day

3 June 2025, KU Leuven

See the information earlier in this newsletter and on https://bms.ulb.ac.be/conferences/young-scholar-day-2025/.

Summer School "Homological Methods in Group Theory and Topology"

10-13 June 2025, UGent

On June 10-13 will be held at UGent (Campus Sterre) the Summer School "Homological Methods in Group Theory and Topology".

The summer school is aimed at young researchers in pure mathematics who wish to learn about (co)homological methods in group theory, and comprises three research-level mini-courses (plus exercise sessions) given by international experts:

- Dawid Kielak (University of Oxford): Fibring over the circle and L^2-homology
- Steffen Kionke (FernUniversität in Hagen): "Cohomology of arithmetic groups"
- Conchita Martinez-Perez (Universidad de Zaragoza): "Cohomological properties of right-angled Artin groups"

For more practical information, and registration, please consult the webpage of the summer school: https://algebra.ugent.be/hom2025/

The Spring Meeting of the Dutch-Flemish Scientific Computing Society

13 June 2025, Hasselt University

The Dutch-Flemish Scientific Computing Society is organising yearly a spring meeting, alternating in the Netherlands and Belgium. Young and senior researchers from the Netherlands and Flanders present their recent results. The 2025 Spring Meeting of the Dutch-Flemish Scientific Computing Society will take place on Friday, June 13th, at
Hasselt University, Campus Diepenbeek
Agoralaan, Building D
3590 Diepenbeek

For more information and how to register (free), please, check
https://wsc.project.cwi.nl/spring-symposium/2025-meeting.

2.2 August 2025

8th International Conference on Mathematical Modelling, Applied Analysis and Computation-2025 (ICMMAAC-25)

1-3 August 2025, Department of Mathematics, JECRC University, Jaipur, India

https://conference.jecrcuniversity.edu.in/icmmaac2025

2nd International Conference on Nonlinear Analysis and Computational Techniques (ICNACT-2025)

6-8 August, 2025, Mathematics Division, VIT Bhopal University, Bhopal, India

https://vitbhopal.ac.in/icnact-speakers-2025/

2.3 September 2025

ACOMEN2025

15 - 19 September 2025, Gent

Conference on "Advanced Computational Methods in ENgineering and Applied Mathematics": registration open and call for mini-symposia.

The ninth international conference on "Advanced COmputational Methods in ENgineering and Applied Mathematics" (ACOMEN2025) will be held at the congress center Zebrastraat in Ghent, Belgium from September 15 till September 19, 2025. The conference aims to provide an international forum to present and discuss the latest developments in computational and applied mathematics in various emerging engineering and mathematical fields. The main topics of the ACOMEN2025 conference include but are not limited to:

The plenary speakers are

- Peter Bastian (Universität Heidelberg)
- Paul Bressloff (Imperial College London)
- Jerome Droniou (University of Montpellier)
- Jan S. Hesthaven (Karlsruhe Institute of Technology)
- Barbara Kaltenbacher (Alpen-Adria-Universität Klagenfurt)
- Michael Klibanov (University of North Carolina at Charlotte)
- Matti Lassas (University of Helsinki)
- Barbara Wohlmuth (Technical University of Munich)

It is a great pleasure to invite you to participate in the conference. Registration and abstract submission are open now. The template and submission form can be found here:

https://cage.ugent.be/acomen2025/abstract.html

Additionally, you may also submit a mini-symposium proposal. A mini-symposium is a session of at least four coordinated presentations on a single topic of substantial current interest in accordance with the scope of the conference. You may submit your proposal by e-mailing us the following details:
tentative title,
description,
contact coordinates of at least four speakers (regular participants may apply to participate in the mini-symposia).
We will let you know as soon as possible about the acceptance of your mini-symposium proposal.

A selection of abstracts will be asked to extend to a full research paper and submit for review and possible publication in a special issue of Computers and Mathematics with Applications (IF2023: 2.9). There will also be an extended abstract book in the book series Research Perspectives Ghent Analysis and PDE Center (Birkhäuser/Springer). You can find all further information (about abstract submission, registration, deadlines, location etc) on our conference website. We thank you for your attention and hope to see you at the ACOMEN2025 conference.

Michael Ruzhansky, Marián Slodička, Karel Van Bockstal (local organising committee)

2.4 November 2025

Symmetry and shape - Celebrating the 65th birthday of Prof. C. Olmos

3-7 November 2025, Santiago de Compostela (Spain)

The aim of this conference is to gather experts in the study of symmetry in Differential Geometry, whilst we celebrate Carlos E. Olmos' 65th birthday. The conference will revolve around the study of curvature, homogeneous and symmetric spaces, Riemannian submanifold geometry, holonomy, and other related topics in Differential Geometry and Geometric Analysis.

Web page: http://xtsunxet.usc.es/symmetry2025/

2.5 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/

SLAAG !

A new seminar is starting in Mons: le Séminaire de Logique, Algèbre, Arithmétique et Géométrie, SLAAG! It is organized by Quentin Brouette, Christian Michaux and Maja Volkov. The program is announced on https://web.umons.ac.be/mapa/SLAAG/. If you would like to join the mailing list, please write to quentin.brouette@umons.ac.be.

3 PhD theses

Equivariant W^*-correspondences

Joeri De Ro
VUB
23 April 2025, VUB

Thesis advisors: Prof. Dr. Kenny De Commer (VUB)

Summary: A correspondence over two given von Neumann algebras consists of a Hilbert space endowed with a particular bimodule structure over these von Neumann algebras. The theory of correspondences, pioneered by A. Connes, has led to many breakthroughs in von Neumann algebra theory. It is therefore desirable to extend the notion of a correspondence to the equivariant setting, where the

von Neumann algebras are upgraded with actions of a locally compact (quantum) group (= dynamical von Neumann algebras). This leads to a general framework in which questions about locally compact (quantum) groups and their associated dynamical von Neumann algebras can be formulated and solved.

In the first part of the thesis, the notion of an equivariant correspondence is introduced and many natural examples are discussed.

In the second part, we show that the collection of all equivariant correspondences can be endowed with a natural Fell topology, and we use this topology to define the notion of weak containment for equivariant correspondences.

In the third part, the notion of weak containment for equivariant correspondences is used to define natural approximation properties for dynamical von Neumann algebras, and the connections between these properties are investigated.

In the fourth and final part of the thesis, we develop the equivariant Morita theory. Roughly, two dynamical von Neumann algebras are called equivariantly Morita equivalent if there exists a particularly nice equivariant correspondence connecting them. We prove that several approximation properties introduced in the previous part of the thesis are preserved under equivariant Morita equivalence.

The PhD thesis is based on 2 articles written together with Prof. Kenny De Commer and 3 articles written by Joeri De Ro as sole author.

Generalized Interpolation Methods and Pointwise Regularity through Continued Fractions and Diophantine Approximations

Thomas Lamby
ULiège
7 May 2025, ULiège

Thesis advisor: Prof. Dr. Samuel Nicolay (ULiège)

Summary: The study of function regularity has been extensively explored, with numerous tools developed to describe this property, such as continuity, differentiability, and Hölder conditions. One way to characterize regularity is by examining the functional spaces to which a function belongs, particularly those constructed through interpolation. A key objective of this work is to refine interpolation methods to define regularity spaces more precisely. A central idea is the use of Boyd functions, which replace the usual power functions in interpolation spaces. These functions, governed by specific continuity and growth conditions, provide a more precise means of capturing fine details in regularity, such as logarithmic effects, which appear, for instance, in Brownian motion. We divide this work into two main parts: the first one is about generalized interpolation spaces and the second one about pointwise regularity through continued fractions. In the first Chapter, Boyd functions are studied to establish a solid foundation for defining new spaces. They are decomposed into two germs, leading to a representation Theorem that clarifies their structure. This also provides an opportunity to deepen the understanding of the connections between these functions and the concept of admissible sequences, which are likewise employed in the generalization of spaces. In particular, we demonstrate how to construct an adapted Boyd function from a given admissible sequence. It is noteworthy that Boyd functions are well suited for uniform spaces, whereas admissible sequences are more appropriate for pointwise spaces.

Furthermore, an improved version of Merucci's Theorem is presented, facilitating work with generalized functional spaces involving parameter functions of higher regularity. Next, in the second Chapter, generalized real interpolation methods are examined from a functorial perspective. Classical methods, such as the K-method, are extended by incorporating function parameters defined via Boyd functions. It is shown that the K-method and the J-method remain equivalent in this extended framework, ensuring consistency. A reiteration Theorem is also established, reinforcing the structural robustness of these interpolation spaces. In the third Chapter, we investigate continuous interpolation spaces defined by function parameters, a construction central to trace theory and the analysis of boundary value problems for partial differential equations. Their functorial interpretation is explored, along with density results in specific cases. These spaces, characterized by asymptotic regularity properties, play a fundamental role in the analysis of operators in weighted functional spaces and in solving PDEs with precisely prescribed boundary behavior. We apply these results to several examples, including Hölder, Lebesgue or Besov spaces. The extreme cases ($\theta = 0$ and $\theta = 1$) are specifically examined, providing an additional reason to use Boyd functions. In the last Chapter of the first part, the scope is extended from interpolation between two spaces to the interpolation of multiple spaces. We attempt to generalize the results of the second Chapter to this context, emphasizing the usefulness of transitioning to multiple spaces. The second part focuses on pointwise regularity, examining functions that are not necessarily locally bounded via Calderón-Zygmund spaces. A key example is the Brjuno function, which arises in dynamical systems and Diophantine approximation. Generalized versions of this function, linked to α-continued fractions, are studied. In the fifth Chapter, we explore the metric properties of these continued fractions, such as the notion of cells in this context, with the aim of providing a solid foundation for studying the pointwise regularity of generalized versions of the Brjuno function. We observe that certain values of α lead to cell structures that are easier to describe. In the final Chapter, we study the pointwise regularity of the Brjuno-Yoccoz function, which corresponds to $\alpha = 1/2$, and we note that its regularity is identical to that of the standard Brjuno function: the behavior at each point is inversely proportional to the irrationality exponent at that point. Thomae's function is also investigated, an emblematic example of function that is discontinuous at rational points yet continuous elsewhere. This analysis offers a refined perspective on its irregularity, leveraging classical analytical tools to elucidate its fractal nature.

An algebraic and geometric approach to infinite Reidemeister numbers

Maarten Lathouwers
KU Leuven Kulak Kortrijk Campus
6 June 2025, Kortrijk

Thesis advisors: Prof. Dr. Karel Dekimpe (KU Leuven Kulak Kortrijk Campus)

Summary:

The central theme of this thesis is *twisted conjugacy*. If φ is a morphism of a group G, then two elements $a, b \in G$ are twisted conjugate if and only if there exists a third element $c \in G$ such that

$$a = cb\varphi(c)^{-1}.$$

This equivalence relation partitions the group G in its *twisted conjugacy classes*. The *Reidemeister number* $R(\varphi)$ is the number of those classes. If the Reidemeister number is infinite for all automorphisms of a group, then the group has the R_∞*-property*.

The motivation of the Reidemeister number lies in Nielsen fixed-point theory where they study the number of fixed points of self-maps on topological spaces. Moreover, this field of study emphasizes the great interest in whether or not a group has the R_∞-property.

In this thesis, we focus on multiple aspects of infinite Reidemeister numbers. On the one hand, we answer some classical questions regarding the R_∞-property in finitely generated torsion-free nilpotent groups. On the other hand, we explore some new and promising concepts to compare morphisms with an infinite Reidemeister number and illustrate these concepts for the class of finitely generated virtually abelian groups.

Harmonic covers of skeleta and wildly ramified curves

Art Waeterschoot
KU Leuven
20 June 2025, 16:00 Arenbergkasteel, KU Leuven

Thesis advisors: Prof. Dr. Johannes Nicaise (KU Leuven)

Summary:

Wild ramification is a phenomenon of algebraic geometry in positive residue characteristic p where intuition often breaks down. Roughly speaking it happens when derivatives of polynomials are divisible by too many factors of p. Contrary to the common belief that wild ramification is pathological behaviour, in some cases it can be controlled effectively via nonarchimedean geometry. Nonarchimedean geometry is the theory of analytic spaces over valued fields like the field of p-adic numbers $\mathbf{Q}_p$. In the 1980s Berkovich discovered a natural formulation of such a theory in which nonarchimedean analytic spaces are built from piecewise linear subspaces called *skeleta*. In this thesis we measure the wild ramification for maps from one skeleton to another and give applications to arithmetic curves and base change.

More precisely, let $f : X \to Y$ be a finite seperable cover of proper smooth varieties over a complete discretely valued field and let $\Sigma_X \to \Sigma_Y$ be a simultaneous skeleton of the Berkovich analytification $f^{an} : X^{an} \to Y^{an}$. Then complementing earlier work of Temkin e.a. we construct a real-valued *different* function $\delta_f : \Sigma_X \to \mathbb{R}_{ge0}$ measuring wild ramification along $\Sigma_X \to \Sigma_Y$. Our central result shows that the different is a piecewise linear function with integral slopes satisfying a Riemann-Hurwitz formula

$$\Delta(\delta) = K_{\Sigma_X/\Sigma_Y},$$

where $\Delta(\cdot)$ is the Laplacian and K_{Σ_X/Σ_Y} denotes the tropical canonical divisor. The proof uses ideas from logarithmic geometry, tropical geometry and potential theory.

In the applications we give new proofs of Theorems of Lorenzini and Obus-Wewers on modulo p reduction types of elliptic curves and ordinary curves, and we affirm a question of Lorenzini on 2-dimensional arithmetic quotient singularities by showing that the Poincaré-Euler characteristic of the resolution graph of such a singularity can be computed from the valuation theory of local rings.

4 News from the universities and other societies

4.1 Odysseus-1-grant for Lev Beklemishev

Lev Beklemishev received an Odysseus-1-grant and joins the Mathematics section WE16 at UGent, see https://www.fwo.be/nl/resultaten-outreach/nieuwe-wetenschappelijke-inzichten/vlaanderen-haalt-via-fwo-met-19-miljoen-euro-12-gerenommeerde-onderzoekers-terug-naar-vlaanderen/.

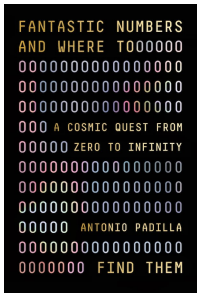
5 History, maths and art, fiction, jokes, quotations ...

5.1 Mathfest 2025

5.2 Adhemar's corner

In *Fantastic numbers and where to find them* of A. Padilla, very small and very large numbers are used to explain concepts of theoretical physics and cosmology. Enjoy reading Adhemar's review!

Fantastic numbers and where to find them, *Antonio Padilla*. Farrar, Strauss and Giroux, 2022 (352 p.), isbn: 978-0374600570. **Fabelachtige getallen en waar ze te vinden**, Ambo|Anthos, 2023 (392 p.), isbn: 978-9026353505.




Antonio Padilla

Antonio (Tony) Padilla is a cosmologist and professor of theoretical physics at the University of Nottingham and an active contributor to the popular Numberphile YouTube channel.

The title of the book may be a bit misleading because it's not a popularizing book about number theory. It is a combination of popularizing mathematics, cosmology and particle physics as there are books doing that for mathematics like for example several books by Ian Stewart, and there are similar books about theoretical physics like *A beautiful question* by F. Wilczek or *Theories of everything* By F. Close. It is more similar to G. Farmelo's *The universe speaks in numbers*.

Padilla takes the numbers as a hook to tell about theoretical physics. There are three parts: large numbers, small numbers, and infinity (infinity is not a number).

The large numbers are 1,000000000000000858, googol, googolplex, Graham's number, and TREE(3) while the small numbers are zero, 10^{-16}, and 10^{-120}.

The first of the 'large' numbers is not large at all, but when Usain Bolt on 16 August 2009 ran 100 m in 9.58 sec in Berlin, according to relativity theory he slowed down his clock by that factor. This is how Padilla starts his exposition about Einstein's special relativity theory and how gravity deforms the Minkowski space-time fabric and that energy and mass are essentially the same.

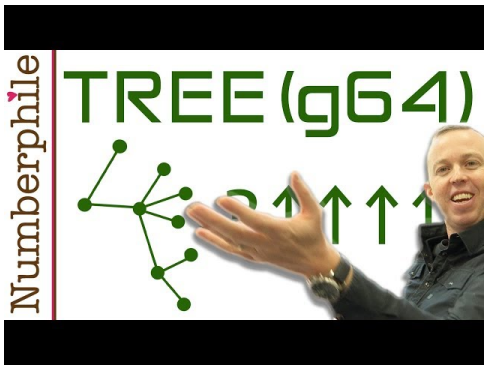
Googol (or 10^{100}, officially called ten sexdecilliard) is a name invented in 1920 by the 9-year old nephew of the American mathematician Edward Kasner. He also invented the name googolplex (10^{googol}) to indicate a fabulously larger number. Under the googol title Padilla introduces the reader to thermodynamics and entropy. When you pump more and more entropy, and thus energy, and thus mass, into a cubic meter, the gravity will create a black hole, which hides all the information it contains. All we can know is its mass, its electrical charge and its angular momentum. A black hole of a cubic meter would have an entropy of about 10^{69} which means that it can contain $10^{10^{68}}$ different microstates, a gigantic large number, but still finite. In the universe the number of microstates will be immensely larger, but still finite, meaning that there there can be at most one twin of yourself per googol but several per googolplex.

Googleplex, under this title we can read about quantum physics experimentally verified by Young's double slit experiment revealing that light behaves simultaneously a wave and as a particle. Schrödinger's probabilistic wave function puts an end to deterministic physics, at least on a microscopic scale and Heisenberg's uncertainty principle limited what can be measured.

To introduce the *Graham number*, some Ramsey theory needs to be introduced and Knuth's uparrow notation: $a \uparrow b = a^b$, $a \uparrow\uparrow b = a \uparrow (a \uparrow (\cdots \uparrow a))$ (b repetitions of $\uparrow$), $a \uparrow\uparrow\uparrow b = a \uparrow^3 b = a \uparrow\uparrow (a \uparrow\uparrow (\cdots \uparrow\uparrow a))$ (b repetitions of $\uparrow\uparrow$), etc. Then Graham's number is $2 \uparrow^{63} 3$. It is a perfectly computable number, but if you tried to remember all its digits, it would be so much information that even a black hole with the size of your head would not be large enough. Your head would simply explode. Even a black hole with the size of the de Sitter space (the largest space we could ever observe if we waited infinitely long) would not be large enough. This leads to a discussion of the entropy of a black hole.

And TREE(3) is even larger still. It is related to trees (from graph theory), hence the name TREE (although H. Friedman used the name TR). TREE(1) = 1, TREE(2) = 3, and then

suddenly TREE(3) explodes to a number that is so large that Graham's number is ridiculously small in comparison. Friedman estimated a lower bound for TREE(3) as $2 \uparrow^{187.195} 187.196$. Here Padilla takes a small excursion to Gödel and his incompleteness theorems. On a cosmological level, he leads us to the ultimate destiny of our universe and an introduction to the holographic principle and string theory. There is a curious observation made by Bekenstein and Hawking that the entropy of black holes is proportional to the area of its event horizon, and not to its volume. So G. 't Hooft and L. Susskind realized that all information must be stored at the surface and that this information should allow to recover the information of the inside like how a hologram is constructed. This gave rise to the theory of a high dimensional reality where some of the dimensions are curled up so small that we do not observe them and we have the illusion that we live in a 4-dimensional space-time. He concludes with a discussion of the correspondence between anti de Sitter (used in quantum gravity theory) vs. conformal field theory (like the Yang-Mills gauge theory used in particle physics).



In the second part, the stage is for the small numbers. Here Padilla starts with zero, which a long discussion about the origin of our positional number system and the acceptance of the zero as a number, and not only as a place holder as it was originally. Eventually this leads to the set-theoretical definition of the natural numbers. For him the zero stands for symmetry, and symmetry plays an important role in physics as Emmy Noether showed.

The next small number is 10^{-16}. When the Higgs boson was observed, its mass was only 10^{-16} times the expected mass. To explain this, there is a long chapter on particle physics. The last small number is 10^{-120}. This chapter is about the cosmological constant. Why does our universe not implode when there is so much vacuum? The answer is gravity. This means that there must be an enormous amount of energy stored in vacuum to prevent this, since on the contrary, it is expanding in an ever increasing speed. It is a bubbling soup with energy appearing but immediately disappearing. However, quantum theory calculations, confirmed by several experiments, shows that the cosmological constant is 10^{-120} times the expected value. This triggers a discussion of why this is true, which results in a discussion of the multiverse and of the anthropic principle: fundamental constants have their values because that is the only way that life can exist.

The final part is about infinity. This has again a larger mathematical part with Cantor as the main contributor: ordinal and cardinal numbers, countable sets, ω, $\aleph_0$, and higher forms of infinity, and the continuum hypothesis. In physics infinite values appear as singularities. However, when they cancel out in computations and give a finite result, they do no harm. The book ends with some ideas about string theory and the Theory of Everything, which is the ultimate goal.

Padilla tells his story in an entertaining way. There are very few formulas, but about every concept is explained using analogies. There are some graphical illustrations, but not many. The mixture of mathematics and mathematical physics and cosmology is present in a way that I have not met in other books. Most of the focus is on the latter, but on the other hand, there is also the extensive exposition about the history of our number system. What is also interesting is that there are also many scientists and mathematicians that have contributed to the theory as we know it today, and Padilla sometimes gives some surprising details on the lives or the character of these people. Because there are so many topics covered and so many people are mentioned, it would have been very useful to have an index of topics and/or people at the end of the book so that they could be looked up easily. Since most of the book consists of compact prose, it is not always easy to find a particular idea that one has met before.

Adhemar Bultheel

BeNeLux Mathematical Congress: Call for Parallel Sessions

To all members of the KWG, the BMS, and the SML,

On 7–8 April 2026, our three societies will jointly organize the "BeNeLux Mathematical Congress" featuring four plenary talks, a poster session, and several parallel sessions on specialized topics. Each parallel session will last 90 minutes and consist of three short talks of 25 minutes each, followed by 5 minutes for questions and transitions.

We are now inviting proposals for parallel sessions. The deadline for submitting proposals is **September 30, 2025**. Submissions can be done by sending them to the email address bms@ulb.be. A proposal should include:

- A title and a brief description (up to 10 lines) of the session's topic, explaining the timeliness and interest for the members of our societies.
- The names of at least two organizers (who may be from the same or different societies).
- A preliminary list of potential speakers (a final list is not required at this stage).

The scientific committee will select the parallel sessions, ensuring a diverse range of topics and a balanced representation of organizers from the three societies. If multiple proposals on the same or closely related topics are submitted, the committee may suggest merging them.

Once a session is selected, its organizers will be responsible for inviting speakers. While we are unable to provide financial support for invited speakers, we encourage organizers to seek external funding if necessary. However, session organizers and speakers will be granted free attendance at the BeNeLux Mathematical Congress. We strongly encourage organizers to take into account various aspects of diversity (gender, minority groups, career level) when selecting co-organisers and speakers for a session.

We look forward to your proposals and to a stimulating joint meeting.

More information about the meeting can be found at the following address:

https://bms.ulb.ac.be/bms-kwg-sml-joint-meeting/