



Newsletter

BELGIAN MATHEMATICAL
SOCIETY

138, May 15, 2022

Comité National de Mathématique CNM

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NCW Nationaal Comité voor Wiskunde



Andreas Weiermann

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

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The next edition of this newsletter will appear on September 15th, hence, till September 9th all content can be sent to wendy.goemans@kuleuven.be.

Foreword

Dear BMS members,
Dear fellow mathematicians,

We wish you all a cheerful final lap towards the summer.

The BMS hosted its PhD day on May 13th in Liège and, by all accounts, the day was a great success. Aside from a brilliant Godeaux lecture delivered by Tim Gowers, we also had the immense pleasure of listening to Mitia Duerinckx (winner of the BMS Young Scholar Award 2021) talk about his recent work, as well as to 12 talks and 18 posters presented by PhD students in an impressively professional manner. The day concluded with the BMS “Best poster award”, which went to Sam Adriaensen (VUB), for his poster on «Intersecting Circles ». In total there were more than 110 participants as well as a job fair, and it seems that everyone present enjoyed the experience very much. The whole day went perfectly smoothly, and I thank and congratulate Céline on the impeccable organization! Details of the day, along with some photos, are available on our webpage.

Stay safe, stay cheerful, and keep writing nice theorems with our friends from all over the world.

Yvik, on behalf of the BMS board

PS. Aside from BMS sponsorship, the PhD day was possible thanks to the financial contribution of Mathematics Department of ULiège, along with the companies *Acsonne*, *Business & Decision*, *Ethias*, and *Gevers* whom we thank for their support!



1 News from the BMS & NCM

1.1 Bulletin of the Belgian Mathematical Society - Simon Stevin

New articles from the Bulletin of the Belgian Mathematical Society - Simon Stevin

- **A non Ricci-flat Einstein pseudo-Riemannian metric on a 7-dimensional nilmanifold** Marisa Fernández, Marco Freibert, Jonatan Sánchez [doi:10.36045/j.bbms.210210](https://doi.org/10.36045/j.bbms.210210)
- **Rewriting the elements in the intersection of the kernels of two morphisms between free groups** François Renaud [doi:10.36045/j.bbms.210310](https://doi.org/10.36045/j.bbms.210310)
- **Backward Touchard congruence** Grzegorz Serafin [doi:10.36045/j.bbms.210412a](https://doi.org/10.36045/j.bbms.210412a)
- **Colorful Carathéodory, Helly and Sierksma numbers of convexity spaces** Krzysztof Kołodziejczyk [doi:10.36045/j.bbms.210414](https://doi.org/10.36045/j.bbms.210414)
- **Completeness in topological vector spaces and filters on \mathbb{N}** Vladimir Kadets, Dmytro Seliutin [doi:10.36045/j.bbms.210512](https://doi.org/10.36045/j.bbms.210512)
- **Optimality conditions for robust nonsmooth multiobjective optimization problems in Asplund spaces** Maryam Saadati, Oveisihā Morteza [doi:10.36045/j.bbms.210705](https://doi.org/10.36045/j.bbms.210705)
- **Uniformities and a quantale structure on localic groups** Jorge Picado, Aleš Pultr [doi:10.36045/j.bbms.210823](https://doi.org/10.36045/j.bbms.210823)

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.

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

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

2.1 May 2022

The Foundations of Mathematics and the contributions of Harvey Friedman

May 17 2022, UGent

Lecture by Prof. dr. Andreas Weiermann - Dept. of Mathematics: Analysis, Logic and Discrete Mathematics.

What is a number? What is a function? What is a set? What is a definition? What is an axiom? What is a proof? What are appropriate axioms for numbers? What are appropriate axioms for foundations? What can be proven and what cannot?

Questions like these are investigated in the foundations of mathematics. In this talk we will provide a glimpse of some basic directions in the foundations of mathematics like logicism, formalism, intuitionism and predicativism.

Next we turn to some modern developments in the foundations of mathematics. Particular

emphasis will be given to the achievements of the 2013 UGent institutional honorary doctor Harvey M. Friedman.

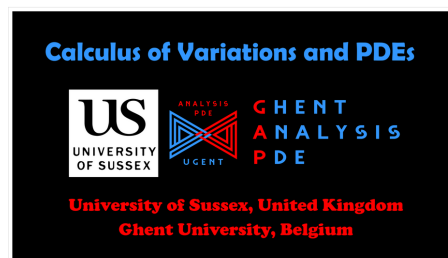
This informal talk is addressed in particular to non mathematicians. See all information on

<https://www.ugent.be/we/en/services/ICES/courses/researchsciences/harveyfriedman>.

Trends in Calculus of Variations and PDEs (An Online Conference On Zoom)

May 18-20 2022

Jointly organised by University of Sussex, UK and Ghent Analysis & PDE Centre, UGent, Belgium



Description

The past decade has witnessed enormous advances and progress in the fields of Calculus of Variations and Partial Differential Equations. The new research, along with the developments of novel tools, techniques and ideas, at the same time has led to the formation of many challenging and fundamental open problems, that as ever, point at interesting and deep connections inside and outside mathematics. These range from real and harmonic analysis, algebraic and differential topology on the one hand to geometric analysis, regularity theory for elliptic systems, geometric measure theory, nonlinear elasticity and fluid mechanics on the other. The aim of this conference is to address some of these developments through a series of lectures and talks by some of the leading researchers in the fields.

Official website <https://sites.google.com/view/tcvpde-2022/home>

Registration

One can register for the conference using the following link: <https://sites.google.com/view/tcvpde-2022/registration>

More than 230 participants from 28+ countries have already registered.

Poster presentation

There will be allocated time for presentation of posters during one of the breaks in the conference. If you would like to submit and have your poster presented at the conference, please do so by emailing the organisers. We will collate and arrange them for display in the poster presentation slot and will also post them on the conference website. (Email kvmaths7@gmail.com).

Confirmed Speakers

- Jonathan Bennett (University of Birmingham, UK)
- Matteo Bonforte (Universidad Autónoma de Madrid, Spain)
- Nicolas Burq (Universite Paris-Sud, France)
- Gui-Qiang G. Chen (University of Oxford, UK)
- Serena Dipierro (The University of Western Australia, Australia)
- Piotr Hajłasz (University of Pittsburgh, USA)
- Emmanuel Hebey (Université de Cergy-Pontoise, France)
- Jan Kristensen (University of Oxford, UK)
- Jens Marklof (University of Bristol, UK)
- Govind Menon (Brown University, USA)
- Giuseppe Mingione (University of Parma, Italy)
- Clément Mouhot (University of Cambridge, UK)
- Tadahiro Oh (University of Edinburgh, UK)
- Fraydoun Rezakhanlou (University of California, Berkeley, USA)
- Gigliola Staffilani (Massachusetts Institute of Technology, USA)
- Mitsuru Sugimoto (Nagoya University, Japan)
- Enrico Valdinoci (The University of Western Australia, Australia)
- Neshan Wickramasekera (University of Cambridge, UK)

Scientific Organisers

- Vishvesh Kumar (Ghent Analysis & PDE Centre, UGent, Belgium)
- Michael Ruzhansky (Ghent analysis & PDE Centre, UGent, Belgium and School of Mathematical Science, QMUL, UK)
- Ali Taheri (Department of Mathematics, University of Sussex, UK)



Support

This conference is supported by EPSRC grants, FWO Odysseus grant, and by the Ghent University Methusalem Programme “Analysis & PDE”.



Mini workshop on Geometry and Mechanics
May 30-31 (UAntwerpen)

This 2-day miniworkshop aims at bringing together junior and senior researchers working in differential geometry, geometric mechanics and related topics.

In the afternoon of Monday May 30, there will be the public PhD defense of Sándor Hajdú, to which all speakers and participants are wholeheartedly invited.

Invited speakers include David Martin de Diego (ICMAT, Spain), Geoff Prince (LaTrobe University, Australia), Zoltan Muzsnay (University of Debrecen, Hungary), David Saunders (University of Ostrava, Czech Republic), Marco Zambon (KULeuven, Belgium) and Marta Farré Puiggali (University of Antwerp, Belgium).

Participation is free. But, we ask you to register before May 23. All information is available on <https://www.uantwerpen.be/en/staff/tom-mestdag/my-website/workshop/>.

2.2 June 2022

One-day workshop Numérations et combinatoire des mots

June 8 2022, Université de Liège

- Date et lieu : mercredi 8 juin 2022 de 9h à 15h30 à l'institut de mathématique de l'université de Liège.
- Orateurs:

09:00 Karma Dajani (Universiteit Utrecht)
09:30 Charlene Kalle (Universiteit Leiden)
10:00 Cor Kraaikaamp (Technische Universiteit Delft)
11:00 Savinien Kreczman (Université de Liège)
11:30 Zuzana Masáková (Czech Technical University)
12:00 Edita Pelantová (Czech Technical University)
14:00 Michel Rigo (Université de Liège)
14:30 Pierre Stas (Université de Liège)
15:00 Markus Whiteland (Université de Liège)

Functional Analysis in Lille
a conference in honor of Gilles Godefroy
June 27 - July 1st 2022

The aim of the conference is to bring together experts in various topics in functional analysis (geometry of Banach spaces, descriptive set theory, topological groups, non-linear aspects of Banach spaces, geometric measure theory, operator theory, probability in Banach spaces ...). It will be the occasion to honour our friend and colleague Gilles Godefroy.

See all information on <https://www.mathconf.org/falille2022>.

2.3 July 2022

Azat Miftakhov Days

July 5-6 2022

The Azat Miftakhov Days will be a two-part event. The first part, conducted in virtual format on July 5, will include an introductory presentation and three mathematical talks. The second part, on July 6, conducted in hybrid format, in person at ENS Paris and also broadcast online, will feature a panel on the human rights situation for academics in Russia. This portion will include participation by representatives of Memorial, a premier Russian human rights organization recently banned by Putin's government. The event will address, in particular, the persecution by the Russian government of Russian academics and students opposed to Putin's invasion of Ukraine.

Mandatory registration for the Azat Miftakhov Days is currently open, see all information on

https://docs.google.com/forms/d/e/1FAIpQLSd4AcrhO5WaeQcEe__I5RjagfRhW5R6jGC8OK75L83cfMPp-g/viewform.

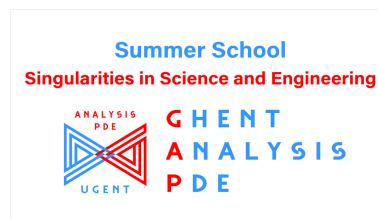
2.4 August 2022

Summer School "Singularities in Science and Engineering"

August 22-31, 2022

Ghent Analysis & PDE Center

Ghent University



The study topic for this school concerns methods in mathematical analysis for integro-partial differential equations which arise in physical modelling and include irregular coefficients and initial data, i.e. include singularities. The topics also span a range of mathematical tools used in such analysis. The topic of the school is of fundamental importance from both the theoretical perspective and the wide range of concrete applications in problems with strong singularities.

The main objective of the school is to significantly enrich student's knowledge in both well-known and very new mathematical tools for modelling and treating strong singularities in evolutionary systems of equations which arise in modelling physical phenomena. The aim of the school is also to bring together experts in both theory and applications, to initiate and deepen the cooperation between different fields on important concrete problems, using latest theoretical developments in the field.

List of Lecturers: (in progress)

Maria Alessandra Ragusa (University of Catania, Italy),
Ljubica Oparnica (University of Novi Sad, Serbia) TBC.

Information for participants:

For attending the school, the charge is 10 euro per day to cover organisational expenses. The participation of PhD candidates from Doctoral Schools at UGent, colleagues from UGent, and Lecturers is free of charge.

If you need administrative support (visa, accommodation, etc.) for your attendance, please let us know in advance.

Public Lecture:

In the framework of the school, a public lecture is planned for a wide audience. The details will be announced shortly.

Organisers (Ghent Analysis & PDE Center)

Scientific Committee

- Michael Ruzhansky,
- Ljubica Oparnica,
- Joel Restrepo,
- Berikbol Torebek
- Irfan Ali,
- Karel Van Bockstal,
- Andrea Vanessa Hurtado Quiceno,
- David Santiago Gómez Cobos
- Conference secretary: Ms Kim Verbeeck

- Prof. Michael Ruzhansky,
- Dr. Ljubica Oparnica,
- Prof. Marian Slodicka,
- Prof. Hans Vernaeve,
- Dr. Joel Restrepo,
- Dr. Berikbol Torebek,
- Dr. Niyaz Tokmagambetov.

More information on the website:

<https://analysis-pde.org/summer-school-singularities-in-science-and-engineering/>

The summer school will be supported by FWO Odysseus 1 Project: Analysis and Partial Differential Equations, and by the Ghent University Methusalem Programme “Analysis & PDE”.

2.5 September 2022

Noncommutative harmonic analysis and quantum groups

September 11-16 2022, Bedlewo (Poland)

The theory of quantum groups was initiated in the second half of the 20th century, allowing for a vast generalization of harmonic analysis. It has now become a broad, mature field lying at the intersection of algebra, category theory and analysis, with roots in mathematical physics, representation theory, (noncommutative) differential geometry and operator algebras.

The meeting will be devoted to discussing the recent discoveries joining various strands of quantum group theory and further perspectives of the field. We focus especially on the developments which are connected to noncommutative harmonic analysis, connecting quantum groups with the theory of operator algebras, operator spaces and subfactors, and with the theory of tensor C^* -categories.

The conference is organized as the final meeting of the Flemish-Polish grant ‘von Neumann algebras arising from quantum symmetries’, which is jointly run by the two main organisers (Kenny De Commer and Adam Skalski). We thank FWO and PAN for the financial support allowing to organize this conference.

Further informations are available on the website

<https://www.impan.pl/en/activities/banach-center/conferences/22-noncommutative>.

2.6 October 2022

International Conference: Multidisciplinary Aspects in Mathematics and its Applications (ICMAM) 24-28 October 2022

Cooperation between members of the Ghent Analysis and PDE Center with Latin-American Mathematicians. Jointly organised by Universidad de Pamplona (Colombia), Universidad de Sao Paulo (Brazil), Freie Universität Berlin (Germany), and Ghent Analysis & PDE Centre, UGent, Belgium.



Description

The aim of this conference is to exchange the recent progress and ideas in different fields of pure mathematics and its applications. The conference will be a video conference and will take place on the 24th-28th of October, 2022

Official website <https://sites.google.com/view/matematicasunivalleicmam2022/home>

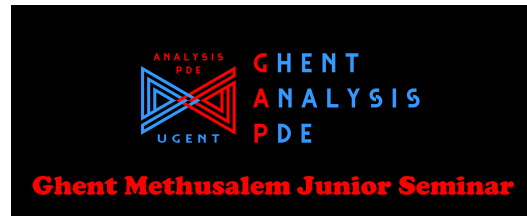
The international cooperation between the members of the Ghent Analysis and PDE Center with Latin-American mathematicians has been very active during 2022. The London-Ghent Microlocal Analysis Workshop that was organised via zoom on 23-24 March 2022 (jointly organised by Ghent University, Belgium and Imperial College, UK), invited two young Latin-American mathematicians that now will be taking part of the organising committee for the *International Conference: Multidisciplinary Aspects in Mathematics and its Applications (ICMAM)*. They are, Karina Navarro Gonzalez (Universidad de Sao Paulo, Brazil) and Prof. Dr. Brian Grajales (Universidad de Pamplona, Colombia). This conference, organised by the Department of Mathematics at the Universidad Del Valle in Colombia, invites young Latin-American mathematicians that have shown leadership in their fields of research to give a talk. The organising committee has elected to the member of the Ghent Analysis and PDE Center, Duvan Cardona Sanchez, as the President of the scientific committee.

Organisers

- President of the conference: Prof. Dr. Brian Grajales Triana, (Universidad de Pamplona, Colombia).
- Karina Navarro Gonzalez (Universidad de São Paulo, Brazil).
- Milton Manuel Aguirre (Universidad São Paulo, Brazil).
- Jessica Gonzalez Hurtado (Freie Universität Berlin, Germany).
- President of the Scientific Committee: Duván Cardona (Universiteit Gent, Belgium).

2.7 Seminars and colloquia

Ghent Methusalem Junior Seminar



The Ghent Methusalem Junior Seminar is run by PhD students and postdocs at the **Ghent Analysis & PDE Center** (<https://analysis-pde.org>).

It provides an ideal opportunity for young researchers in mathematics to share their ideas and to learn about new trends in a wide range of fields. Targeting a mainly (though not exclusively) young audience has meant for the organizers to ensure a relaxed atmosphere and to encourage the audience to engage in stimulating discussions with the speakers, ideally leading to new collaborations.

The seminar currently takes place every Tuesday at 4.30 PM (CET) on ZOOM. For more information about our activity and about past and future talks, please visit the dedicated webpage:

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

If you would like to give a talk or to invite someone to give a talk, please contact:

- Duvan Cardona Sanchez, Ghent University, (Duvan.CardonaSanchez@UGent.be)
- Serena Federico, Università di Bologna, (serena.federico2@unibo.it)
- Vishvesh Kumar, Ghent University, (Vishvesh.Kumar@UGent.be)
- David Rottensteiner, Ghent University, (David.Rottensteiner@UGent.be)
- Bolys Sabitbek, Queen Mary University of London, (b.sabitbek@qmul.ac.uk)

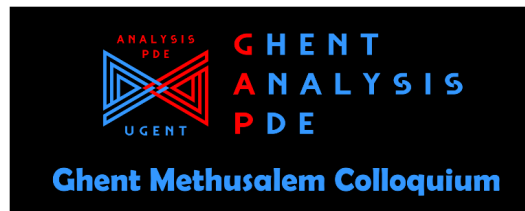
Scheduled talks are (to be updated):

- 10 May 2022, José Ramón Madrid Padilla (University of California, Los Angeles, US)
- 31 May 2022, Ricardo Grande Izquierdo (University of Michigan - Ann Arbor, US)
- 14 June 2022, Daniel Campos (Universidad de Costa Rica, Costa Rica)

Ghent Methusalem Colloquium

The Ghent Methusalem Colloquium is intended for a broad audience of PhD students, postdocs and professors at the Ghent Analysis & PDE Center and beyond. The series includes colloquia from visiting and invited guests. Visit the website of our new Ghent Methusalem Colloquium at

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



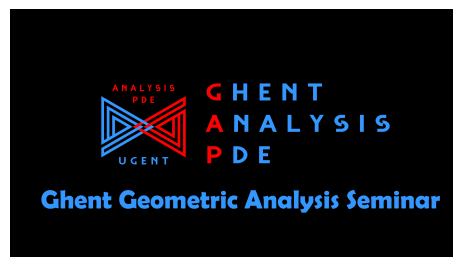
Visit the webpage of the colloquium to have a look of the scheduled talks by:

- Prof. Andreas Seeger, University of Wisconsin-Madison, US.
- Prof. Eugene Shargorodsky, King's College London, UK.
- Prof. Roland Duduchava, University of Georgia Tbilisi, Georgia.

The Ghent Methusalem Junior Seminar and the Ghent Methusalem Colloquium are supported by FWO Odysseus 1 Project: Analysis and Partial Differential Equations, and by the Ghent University Methusalem Programme "Analysis & PDE".



Ghent Geometric Analysis Seminar



The Ghent Geometric Analysis seminar is dedicated to studying the modern techniques of elliptic and subelliptic partial differential equations (PDEs) that are used to establish new results in differential geometry and differential topology. We are planning to invite several of the leaders in the fields of microlocal analysis, geometric analysis, and harmonic analysis abroad. The use of linear elliptic PDE dates at least as far back as Hodge theory. These techniques can be applied to the problem of computing the index of operators that have shown to have relevant geometric information for different applications in mathematical physics and other problems of classification.

On the other hand, geometric and topological properties of spaces, such as submanifolds of the Euclidean space, Riemannian manifolds, symplectic manifolds, and vector bundles can be computed using these techniques. This approach dates back to the work by Tibor Radó and Jesse Douglas on minimal surfaces, John Nash Jr. on isometric embeddings of Riemannian manifolds into the Euclidean space, Louis Nirenberg on the Minkowski problem and the Weyl problem, Aleksandr Danilovich Aleksandrov and Aleksei Pogorelov on convex hypersurfaces. In particular, the fundamental contributions

by Uhlenbeck, Shing-Tung Yau, Richard Schoen, and Richard Hamilton launched a particularly exciting and productive era of geometric analysis that continues to this day. A celebrated achievement was the solution to the Poincaré conjecture by Grigori Perelman, completing a program initiated and largely carried out by Richard Hamilton.

Going to the recent developments on the field, the Seminar of Geometric Analysis at the Ghent Analysis and PDE center will present the aforementioned works as well as the fundamental works on Index theory, K-theory and their applications to non-commutative geometry, and K-theory, in view of the Atiyah and Singer solution of the Gelfand conjecture (their celebrated Atiyah-Singer Index theorem).

In view of the recent activities and investigations undertaken by the members of the Ghent Analysis and PDE center and the works in the interplay of geometric analysis and harmonic analysis of our group, our seminar also will be a scenario for presenting the recent developments in the field and their applications to other branches in mathematics. Visit the website of our new Ghent Geometric Analysis Seminar at <https://analysis-pde.org/seminars/ghent-on-geometric-analysis/>

Scheduled talks are (to be updated):

- 30 May 2022, Jonathan Rohleder, (Stockholms Universitet, Sweden).
- (Date TBA), Victor Nistor, (Institut Élie Cartan de Lorraine, France).
- 8 August 2022, Durvudkhan Suragan, (Nazarbayev University, Kazakhstan).

Organisers:

- Duvan Cardona Sanchez (Duvan.CardonaSanchez@UGent.be)
- David Santiago Gómez Cóbos (davidsantiago.gomezcobos@ugent.be)
- Andrea Vanessa Hurtado Quiceno (andreavanessa.hurtadoquiceno@ugent.be)

Visit also the website of the seminar to be informed of the scheduled intensive minicourses about geometric analysis.

Symposium ter nagedachtenis van Aïda Paalman - de Miranda

June 18 2022, Universiteit van Amsterdam

Op 18 juni 2022 organiseert de Universiteit van Amsterdam (UvA) een eendaags symposium in de Aula ter nagedachtenis van prof. dr. Aïda Paalman - de Miranda. U bent van harte uitgenodigd om dit bijzondere eerbetoon bij te wonen.

Gedurende haar carrière was prof. dr. Aïda Paalman - de Miranda een inspirerende wetenschapper met een hart voor onderwijs en een grote betrokkenheid bij de begeleiding van haar studenten. Zij overleed in 2020 op 84-jarige leeftijd. Tijdens het symposium zal onder andere aandacht zijn voor haar opmerkelijke verhaal, waarin zij de wiskundige en Surinaamse gemeenschap met elkaar wist te verbinden.

Het symposium wordt geopend door Karen Maex (rector magnificus van de Universiteit van Amsterdam). Jörgen Raymann (cabaretier, acteur en presentator) zal als moderator de middag begeleiden. Hij geeft daarbij het woord aan Margriet van der Heijden; zij schrijft momenteel een biografie over prof.

dr. Aïda Paalman - de Miranda, aansluitend wordt een portret van haar aangeboden aan het College van Bestuur van de Universiteit van Amsterdam door Jan van Mill (emeritus hoogleraar). Daarnaast vertelt Shanti Venetiaan (wiskundige en voorzitter van het Bestuur van de Anton de Kom Universiteit van Suriname) tijdens de middag over het onderwijs in Suriname van toen en nu. Ter ere van de lancering van het Aïda Paalman - de Miranda Fonds gaat Drona Kandhai (professor aan Faculteit der Natuurwetenschappen, Wiskunde en Informatica van de Universiteit van Amsterdam) in gesprek met Surinaamse studenten, die hun ervaringen delen over hoe het is om vanuit Suriname in Nederland te studeren. Verder zet Raf Bocklandt topologie op de kaart. Ronald Venetiaan (wiskundige en voormalig president van Suriname) en Robbert Dijkgraaf (Minister van Onderwijs, Cultuur en Wetenschap) leveren een digitale bijdrage.

Voor meer informatie en inschrijven, zie

<https://kdvi.uva.nl/news-and-events/aida-paalman-2022/aida-paalman-2022.html>.

3 PhD theses

Asymptotic methods in number theory and analysis

Frederik Broucke

UGent

May 20 2022, 17:00, Auditorium A1, building S9, Campus De Sterre, Gent

Thesis advisors: prof. dr. Jasson Vindas Díaz (UGent), dr. Gregory Debruyne (UGent)

Summary:

This thesis is a collection of problems solved using methods from asymptotic analysis. It consists of two parts. The first part is on the theory of Beurling generalized primes. A system of Beurling generalized primes \mathcal{P} is a non-decreasing sequence of real numbers (p_1, p_2, p_3, \dots) , $p_1 > 1$, and the corresponding system of generalized integers $\mathcal{N} = (n_0 = 1, n_1, n_2, \dots)$ is the multiplicative semigroup generated by 1 and \mathcal{P} . One of the main aims of the theory is to investigate the relationship between the counting functions π and N of \mathcal{P} and \mathcal{N} , respectively. The main contribution of this part is the progress in Malliavin's problems, which is about the connection of the two asymptotic relations $\pi(x) = \mathbb{L}(x) + O(x \exp(-c \log^\alpha x))$ and $N(x) = \rho x + O(x \exp(-c' \log^\beta x))$, where ρ, c, c' are positive numbers, $\alpha, \beta \in (0, 1]$, and \mathbb{L} denotes the logarithmic integral.

The second part collects various problems from analysis. In the first chapter, we study the Fourier-Laplace transform of the family of oscillatory functions defined on $(0, \infty)$ by $t^\beta e^{it^\alpha}$, and where $\beta \in \mathbb{C}$, $\alpha > 1$. The next chapter is about the absence of remainders in the Wiener-Ikehara and Ingham-Karamata Tauberian theorems. By explicit construction, we show that the additional assumption of analytic continuation of the transform does not in general yield remainders in the asymptotic relation for the original function. Next we analyze the pointwise regularity properties of Riemann's function $f(x) = \sum_{n=1}^{\infty} \sin(n^2 \pi x) / n^2$. It is differentiable at x if and only if x is a rational of the form odd/odd. The Regularity of f at irrationals is closely related to Diophantine properties of the considered number. In the final chapter, we give a micro-local and qualitative analysis of the fractional Zener wave equation, which models wave propagation in viscoelastic materials.

Jacobi fields, conjugate points and nonlinear splittings in Finsler geometry and related fields**Sándor Hajdú**
UAntwerpen*May 30 2022, 16:00, M.G.010, Campus Middelheim, UAntwerpen*Thesis advisors: Prof. Dr. Tom Mestdag and Prof. Dr. Sonja Hohloch (UAntwerpen)Summary:

Similar to the case of Riemannian geodesics, one may define conjugate points for systems of second-order ordinary differential equations (SODEs). In this dissertation we provide a method to find such conjugate points and we apply our results to locally symmetric SODEs and to Lagrangian systems that admit a symmetry Lie group. Sprays are a specific type of SODEs. Two sprays are said to be projectively equivalent if they have the same geodesics, when viewed as point sets. We exploit the freedom in the choice of a representative of a projective class of sprays in the search for their conjugate points. In the context of Finsler geometry, we use the theory of cut points to draw a conclusion about the existence of conjugate points for a class of Randers-type Finsler metrics.

Next, we investigate nonlinear splittings on fibre bundles. These can be thought of as generalizations of Ehresmann connections. We investigate both the similarities and the differences between nonlinear splittings and Ehresmann connections. We show how certain structure-preserving submersions relate to nonlinear splittings. We also define a curvature map for nonlinear splittings and show how it can be used to investigate questions about the submersiveness of Lagrangian systems of magnetic type. Finally, we apply our results to the context of Finsler geometry, and we provide new, interesting examples of Finsler manifolds.

Expansions in Cantor real bases and alternate bases: combinatorial, algebraic and ergodic properties**Célia Cisternino**
Université de Liège*June 7 2022, 15:00, l'ampithéâtre 01, Institut de mathématique, Université de Liège*Thesis advisors: Prof. Dr. Émilie Charlier (Université de Liège)Summary:

Mathematics is notably concerned with the study of numbers and the arithmetic properties of these numbers in relation with the syntactical properties of their representations by sequences of symbols. In order to approach such questions, we first need to know how to represent numbers since there are many ways to write them. In everyday life, the decimal representation is used, that is, the base elements are the powers of 10. In computer science, the binary base is preferred for some practical aspects. More generally, any integer $b \geq 2$ can be considered as a base. Towards a general study, mathematicians are interested in other various ways to represent numbers. Two well-known generalizations of integer base representations are Cantor and real base representations. Introduced by Cantor in 1869, the former uses a base sequence $(b_n)_{n \in \mathbb{N}}$ of integers greater than or equal to 2. Defined by Rényi in 1957 and well understood since the pioneering work of Parry in 1960, the latter uses

a real base $\beta > 1$. This thesis is dedicated to the investigation of series expansions of real numbers that are based on a sequence $\beta = (\beta_n)_{n \in \mathbb{N}}$ of real numbers greater than 1 such that $\prod_{n \in \mathbb{N}} \beta_n = +\infty$. We call such a base sequence β a *Cantor real base*. In doing so, we generalize both representations of real numbers through Cantor series and real bases. The goal of this thesis is to figure out if the properties of representations in real bases can be generalized while considering Cantor real bases. First, we prove fundamental combinatorial properties of Cantor real base representations. Second, we focus on the combinatorial properties of periodic Cantor real bases which we call *alternate bases*. Third, we deal with some algebraic properties of alternate base expansions. Fourth, we study some dynamical properties of alternate base expansions. Therefore, the framework of this thesis encompasses several related but distinct domains, namely, numeration systems, combinatorics on words, formal language theory, algebra, dynamical systems, ergodic theory and number theory.

Les mesures de risque de Haezendonck-Wang

Aline Goulard

Université de Mons

July 7 2022, 15:00, salle La Fontaine, Campus Plaine de Nimy, UMONS

Thesis advisors: Prof. Dr. Karl Grosse-Erdmann (Université de Mons)

Summary:

Dans le secteur financier, il existe un grand nombre de mesures de risque. Néanmoins, certaines sont plus attrayantes que d'autres suivant les propriétés qu'elles vérifient. Par exemple, les mesures de risque de Wang, qui sont définies à partir d'une certaine fonction de distorsion, peuvent être plus attrayantes pour un gestionnaire car celui-ci aura la possibilité de choisir la fonction de distorsion qui sera appropriée à la situation qu'il gère. De plus, suivant la fonction de distorsion choisie, la mesure de risque de Wang associée sera plus ou moins prudente que la Value at Risk ou Tail Value at Risk, qui sont des mesures de risque de référence actuellement dans les accords de Bâle III ou de Solvency II. En outre, si la fonction de distorsion est concave, cette mesure de risque est cohérente. De même, la mesure de risque de Haezendonck étant définie à partir d'une certaine fonction de Young, elle possède les mêmes propriétés attrayantes de liberté de choix d'une fonction de Young adaptée. Par ailleurs, cette mesure de risque est cohérente et plus prudente que la Value at Risk. Ce sont ainsi toutes ces qualités qui donnent de l'importance à ces deux mesures de risque. C'est pourquoi, le but de la thèse sera d'introduire une mesure de risque généralisant à la fois les mesures de risque de Wang et de Haezendonck, qu'on appellera la mesure de risque de Haezendonck-Wang, et qu'on définira sur un ensemble naturel contenant l'ensemble des variables aléatoires réelles essentiellement bornées. Il y sera notamment montré que pour des fonctions de distorsion et de Young bien particulières, cette mesure est en fait la mesure de risque de Haezendonck généralisée introduite par Goovaerts, Linders, Van Weert et Tank dans «On the interplay between Distorsion, Mean-Value and Haezendonck-Goovaerts risk measures »(2012). Une analyse approfondie permettra de discuter l'accommodation de cette mesure de risque aux propriétés remarquables. Plus précisément, le résultat principal permettra de conclure que pour une fonction de distorsion concave et une fonction de Young bien spécifique, la mesure de risque de Haezendonck-Wang est cohérente. Un estimateur pour cette nouvelle mesure sera également proposé, avec différentes applications.

4 Job announcements

4.1 From UGent

De vakgroep WE16 in Gent heeft een vacature voor een 20% praktijkassistent. Zie alle informatie op

https://career012.successfactors.eu/career?company=C0000956575P&career_job_req_id=23507&career_ns=job_listing&navBarLevel=JOB_SEARCH

5 News from the universities

5.1 Proclamatie van de Vlaamse Wiskundeolympiade

5.2 Imaginary

See the poster at the end of this newsletter.

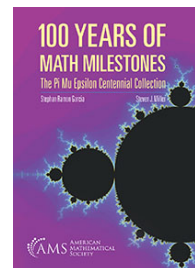
6 History, maths and art, fiction, jokes, quotations ...

6.1 Adhemar's corner

Next follows Adhemar's review of "100 Years of Math Milestones" of S.R. Garcia, S.J. Miller (eds.), on a collection of challenging problems for bright undergraduate students. Each problem is associated to a mathematical event from the years 1913-2012.

100 Years of Math Milestones. The Pi Mu Epsilon Centennial Collection, AMS/MAA, 2019 (581 p.) edited by *Stephan Ramon Garcia* and *Steven J. Miller*

Pi Mu Epsilon is an American society founded in 1914 to promote mathematics and encourage bright mathematics students to explore mathematics further and achieve a better understanding. Membership is restricted to the math honors students that have obtained sufficiently high scores for their math courses. The society publishes a journal with research papers focussing on papers by students, and this journal has also a problem section. In 2013, to celebrate their centennial anniversary, it was decided to collect for each of the past 100 years an important mathematical achievement and link a centennial problem to it. With some extra framing and context, each item is also introducing students to some recent history of mathematics. This collection was published in 4 parts of 25 years in their journal issues of 2015. The complete collection is now put together and reprinted in this book.



The entries for each year from 1913 to 2012 (on average of 5 to 6 pages) are organized in a similar format. With an introduction, the topic that is associated with the year is explained. Sometimes already here there are suggestions to think about some problem or to prove something. Then there is the centennial problem, sometimes the size of a research project. Its formulation can be short or long with several subproblems. In some way they are related to what has been explained in the introductory section, but the connection can be rather loose. Problems can be submitted by different people, but often the editors are the originators. The next section gives additional comments. In only few cases these comments contain the solution to the problem, but in most cases there are at best some hints, while the solution is left to the reader. In most cases, you find additional definitions and information, or a discussion of related problems, sometimes a bit of history or applications, etc. The end is a list of references.

**Über die Koeffizienten derjenigen Potenzreihen,
welche eine schlichte Abbildung des Einheits-
kreises vermitteln.**

VON Prof. Dr. LUDWIG BIEBERBACH
in Frankfurt a. M.

The topics covered include the topics that are often found in popular science books and that are accessible for good undergraduate math students. Clearly the latter is the target readership. This is not the kind of book that would easily sell to a public that has no advanced mathematical interest. The required mathematics are however only slightly over the edge of the undergrad's curriculum. There is a lot on number theory, some cryptography, some graph theory, analysis, statistics, and games. A year can be associated with a particular theorem, paradox, conjecture, equation, or constant (Gödel's theorems, Banach-Tarsky paradox, twin-prime conjecture, Schrödinger equation, Kinchin's constant,...), or it can be connected with a person (M. Gardner, P. Erdős, G. Cantor, and others), but also tools important for mathematicians (TeX, Mathematica, ArXiv, SageMath, GIMPS,...). Too many subject to discuss here, and it must have been difficult for the editors to select only one fact per year anyway.

I give just one example of a randomly selected year 1984 to illustrate the freewheeling stream of ideas. Obviously 1984 refers to the novel of George Orwell and the scene in which Winston Smith solves the "equation" $2 + 2 = 5$ (which is only correct if one works modulo 1). Also in a *Star Trek* episode there is a scene with captain Picard referring to this $2 + 2 = 5$. Then the problem is raised to finding integers that can be obtained using only 4's and the standard algebraic operations. The centennial problem is to solve this puzzle but minimizing the cost ($+$, $-$, \times cost 1 unit; exponentiation, factorial, and division is 2 units, etc. if you allow other operations). Classify the numbers representable with a cost at most C . Given n , what is the minimal cost to represent it. The comments refer to *The Hitchhiker's Guide to the Galaxy* trilogy where in book one there is the ultimate answer 42 to the ultimate question while in book two a possible question is found to be "What do you get if you multiply 9×6 ?". The answer is indeed 42 but only in base 13. This is also alluded to in an episode of *Doctor Who*. Then the 1984 comments move on to the Bieberbach conjecture and the proof by de Branges in 1984.

This is a rather unfair reflection of the contents because other items are much more mathematical and require much more advanced analysis. But any other selection of one or more years would have been unfair as well. It is just a marvelous but challenging collection of problems and it contains a lot of fun stuff that is often found in more popular science books.

Adhemar Bultheel

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met unieke 3D-objecten, bijzondere puzzels en
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KORTRIJK

Kulak,
12 september t.e.m.
7 oktober 2022

GENT

Campus Sterre,
17 oktober t.e.m.
10 november 2022

DIEPENBEEK

Agora, gebouw D,
17 november t.e.m.
22 december 2022

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Universiteitsbibliotheek,
23 januari t.e.m.
17 februari 2023

LEUVEN

Universiteitsbibliotheek,
27 februari t.e.m.
26 maart 2023

BRUSSEL

Pleinlaan 2,
15 april t.e.m.
13 mei 2023



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