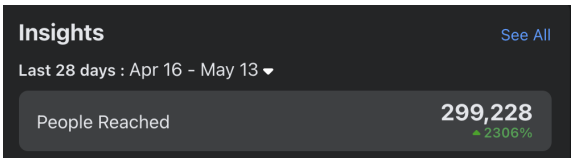
Newsletter

BELGIAN MATHEMATICAL SOCIETY

133, May 15, 2021

Comité National de Mathématique CNM

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

Contents

Contributions for the next edition can be sent to wendy.goemans@kuleuven.be until September 8th.

Foreword

Dear BMS members,

As life goes on and normalcy seems to return, slowly but surely, we at the BMS wish you all the best for the end of academic year.

We take the liberty to draw your attention to our social media activity, particularly on Facebook where BMS posts have reached nearly 300 thousand people over the last four weeks. As you can see, this is an increase of 2306%, whatever that means. Feel free to join and interact. Seems to be fun, and why should math not be about that as well?

Take care,

Philippe, Wendy and Yvik

1 News from the BMS & NCM

1.1 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 anymore. As a member of the BMS you will have electronic access to all electronically available issues of the bulletin, free of charge. You will soon receive instructions for this by e-mail. For the table of contents of previous issues, see https://projecteuclid.org/all/euclid.bbms.

2 Announcements

2.1 Awards and prizes

Kevin Coulembier received the 2021 Christopher Heyde Medal awarded by the Australian Academy of Science for "discovering a way to detect the presence of the classical type of symmetry known as an affine group scheme in a more exotic setting known as a tensor category; this problem had defied the efforts of some of the world's top mathematicians for almost thirty years. He has also solved several other important problems in infinite-dimensional representation theory, and has discovered new unified proofs of major theorems concerning the invariants of groups and supergroups".

The official announcement of the prize is here:

https://www.science.org.au/supporting-science/awards-and-opportunities/honorific-awardees/2021-awardees#heyde

A short interview with the winner can be found here: https://vimeo.com/504220067

Kevin Coulembier held an FWO PhD fellowship and received his PhD in mathematics at Ghent University, under supervision of Hendrik De Bie and Franciscus Sommen. During an FWO postdoctoral fellowship he visited UC Berkeley and Uppsala University. He is now senior lecturer at University of Sydney.

Congratulations!

2.2 Platform Wiskunde Vlaanderen - The competition: How has math changed your life?

After many months of preparation in musty meeting rooms and on digital platforms, Platform Wiskunde Vlaanderen finally saw full daylight on 14 March 2021. This was not one day too early, because the more our society relies on mathematics, the more difficult it is for young people (and older people) to see or understand its impact, let alone to be fascinated by it. Just think of computers, the internet, the mobility hub, climate change, or the transition to green energy. Everyone is taught mathematics, both for its general educational nature and for its practical relevance. Yet the stubborn myth persists that math is a playground for geeks out of touch with reality. If we want to turn the tide, there is an urgent need for a coordinated approach that unites all actors: educators, researchers, people from industry and government. And hence: www.platformwiskunde.be!

For our mission we call on your simple help: take part in our competition:

What impact has math had on you? How has math changed your life?

What we are looking for: Insights or stories about the impact of math on your life and work. We welcome submissions in the form of text, images or a combination of both - in both cases: as specific as possible, well-substantiated and presented in an appealing way.

What we are not looking for: Refutations about the usefulness of math. We are not looking for the best prose or visual artwork, although presenting your ideas clearly and to-the-point will help get your message across.

What we offer: The jury - which consists of the founders of the Platform Wiskunde Vlaanderen - will decide to award a maximum of three cash prizes, each between 100 and 500 euros.

- An annual subscription to EOS.
- A super interesting book about math.
- A public forum for the selected ideas in consultation with the laureates. This can be in the form of a presentation or publication on π-day 2022.

Who can participate: Anyone, regardless of age, nationality, affiliation or career stage.

How to submit: Send us your contribution before February 22, 2022 (22-2-22) at
http://www.platformwiskunde.be/prijsvraag/.

You can enter text directly in the form. For visual material we ask you for a (possibly secret) link to a location where the material remains available (website, YouTube, TikTok,...).

2.3 AMS in dedication to Jean Bourgain

Volume 58, number 2, April 2021 of the Bulletin of the American Mathematical Society (available electronically at https://www.ams.org/publications/journals/journalsframework/bull) is dedicated almost entirely to Jean Bourgain and his mathematical legacy. One finds contributions of amongst others Peter Sarnak and Terence Tao as well as a selection of reviews which appeared in MathReviews. Also, in Volume 67, number 11, December 2020, pages 1716-1733, of the Notices of the AMS, there is a wonderful paper entitled "Singular Adventures of Baron Bourgain in the Labyrinth of the Continuum" by Alexander Gamburd, containing in particular eight very nice colour pictures of Jean Bourgain (this paper is available electronically at https://www.ams.org/notices/202011/rnoti-p1716.pdf).

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

3.1 June 2021

Online Workshop on Integrability and Dynamics

June 9-10, 2021 (UAntwerpen)

This 2-day online workshop consists of several talks on recent results in integrable systems and will take place on June 9-10, 2021.

https://www.uantwerpen.be/nl/personeel/sonja-hohloch/private-webpage/conference-workshop/workshop-integrabilitydynamics/.

Online Miniworkshop on Hamiltonian Systems and Group actions

June 30, 2021 (UAntwerpen)

This online miniworkshop consists of several talks on recent results in Hamiltonian group actions and related fields and will take place on June 30, 2021.

https://www.uantwerpen.be/nl/personeel/sonja-hohloch/private-webpage/conference-workshop/miniworkshop-hamsysgroup/.

3.2 Seminars and colloquia

Ghent Methusalem Junior Seminar

The Ghent Methusalem Junior Analysis & PDE Seminar is run by PhD students and postdocs at the Ghent Analysis & PDE Center. It provides an opportunity for young researchers in various areas of analysis and PDEs to share their ideas and to learn new exciting things related to the topics of Analysis & PDEs as well as broader mathematical subjects.

The seminar currently takes place on ZOOM. For titles and all information, see:

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

It is a great opportunity to learn new things in an informal atmosphere, and to find new ideas and possible collaborations.

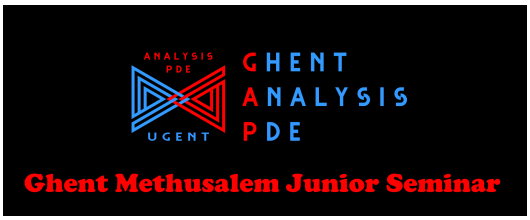
If you would like to give a talk, or to invite someone to give a talk, please contact:

- Duvan Cardona Sanchez (Duvan.CardonaSanchez@UGent.be)
- Serena Federico (Serena.Federico@UGent.be)
- Vishvesh Kumar (Kumar.Vishvesh@UGent.be)
- David Rottensteiner (David.Rottensteiner@UGent.be)

- Bolys Sabitbek (b.sabitbek@qmul.ac.uk).

Scheduled talks are:

- 18 May 2021, Marcello Malagutti, (University of Bologna, Italy).
- 25 May 2021, Andreas Debrouwere, (Ghent University, Belgium).
- 1 June 2021, David Beltran, (University of Wisconsin-Madison, USA).
- 15 June 2021, Ujue Etayo, (University of Cantabria, Spain).



4 PhD theses

Homotopy comomentum maps in multisymplectic geometry

Antonio Michele Miti
Università Cattolica del Sacro Cuore and KU Leuven
April 1, 2021

Thesis advisors: Prof. Dr. Mauro Spera (Università Cattolica del Sacro Cuore) and Prof. Dr. Marco Zambon (KU Leuven)

Summary: Homotopy comomentum maps are a higher generalization of the notion of moment map introduced to extend the concept of Hamiltonian actions to the framework of multisymplectic geometry. Loosely speaking, higher means passing from considering symplectic 2-form to consider differential forms in higher degrees. The goal of this thesis is to provide new explicit constructions and concrete examples related to group actions on multisymplectic manifolds admitting homotopy comomentum maps.

The first result is a complete classification of compact group actions on multisymplectic spheres.

The existence of a homotopy comomentum map pertaining to the latter depends on the dimension of the sphere and the transitivity of the group action. Several concrete examples of such actions are also provided.

The second novel result is the explicit construction of the higher analogue of the embedding of the Poisson algebra of a given symplectic manifold into the corresponding twisted Lie algebroid.

It is also proved a compatibility condition for such embedding for gauge-related multisymplectic manifolds in presence of a compatible Hamiltonian group action. The latter construction could play a role in determining the multisymplectic analogue of the geometric quantization procedure.

Finally, a concrete construction of a homotopy comomentum map for the action of the group of volume-preserving diffeomorphisms on the multisymplectic 3-dimensional Euclidean space is proposed. This

map can be naturally related to hydrodynamics. For instance, it transgresses to the standard hydrodynamical co-momentum map of Arnol'd, Marsden and Weinstein and others. A slight generalization of this construction to a special class of Riemannian manifolds is also provided. The explicitly constructed homotopy comomentum map can be also related to knot theory by virtue of the aforementioned hydrodynamical interpretation. Namely, it allows for a reinterpretation of (higher-order) linking numbers in terms of multisymplectic conserved quantities. As an aside, it also paves the road for a semiclassical interpretation of the HOMFLYPT polynomial in the language of geometric quantization.

On Submanifolds and Deformations in Poisson Geometry

Stephane Geudens
KU Leuven
April 27, 2021

Thesis advisor: Prof. Dr. Marco Zambon (KU Leuven) and Prof. Dr. Ioan Mărcuţ (Radboud Universiteit Nijmegen)

Summary: This thesis concerns specific classes of submanifolds in Poisson geometry. The emphasis lies on normal form statements, and we present an application in deformation theory. The results are divided into three themes.

We first study coisotropic submanifolds in log-symplectic manifolds. We provide a normal form around coisotropic submanifolds transverse to the degeneracy locus, and we prove a reduction statement for coisotropic submanifolds transverse to the symplectic leaves.

Next, we address Lagrangian submanifolds contained in the singular locus of a log-symplectic manifold. We establish a normal form around such Lagrangians, which we use to study their deformations. On the algebraic side, we show that the deformations correspond with Maurer-Cartan elements of a suitable DGLA. On the geometric side, we discuss when small deformations of the Lagrangian are constrained to the singular locus, and we find criteria for unobstructedness of first order deformations. We also address equivalences of deformations and we prove a rigidity result.

At last, we consider a class of submanifolds in arbitrary Poisson manifolds, which are defined by imposing a suitable constant rank condition. We show that their local Poisson saturation is smooth, and we give a normal form for the induced Poisson structure. This result extends some normal form theorems around distinguished types of submanifolds in symplectic and Poisson geometry. As an application, we prove a uniqueness statement concerning coisotropic embeddings of Dirac manifolds into Poisson manifolds.

Tame pairs of integers

Quentin Lambotte
UMons
July 12, 2021, 1pm, auditoire La Fontaine, 4 avenue du Champ de Mars, Mons

Thesis advisors: Prof. Dr. Françoise Point (UMons)

Summary: Le groupe des entiers $(\mathbf{Z}, +, 0)$ et le groupe ordonné des entiers $(\mathbf{Z}, +, 0, <)$ sont des exemples de structures modérées, c'est-à-dire avec de bonnes propriétés au sens de la théorie des modèles. Elles ont toutes les deux l'élimination des quantificateurs (après avoir ajouté dans leur langage un symbole de relation pour chaque sous-groupe non trivial de $\mathbf{Z}$) et ont une théorie décidable. De plus, $(\mathbf{Z}, +, 0)$ a une théorie superstable et $(\mathbf{Z}, +, 0, <)$ a une théorie dépendante.

Partant de ce constat, une question se pose naturellement: est-ce que les bonnes propriétés de $(\mathbf{Z}, +, 0)$ et $(\mathbf{Z}, +, 0, <)$ sont préservées lorsqu'on leur ajoute de la structure? Dans sa forme la plus simple, cette question devient: étant donné R un sous-ensemble de $\mathbf{Z}$, quand peut-on dire que la paire $(\mathbf{Z}, +, 0, R)$ a une théorie superstable et quand peut-on dire que la paire $(\mathbf{Z}, +, 0, <, R)$ a une théorie dépendante? On appellera de telles paires des paires modérées d'entiers. Cette question a fait récemment l'objet d'intenses recherches depuis les travaux indépendants de B. Poizat d'une part et D. Palaín et R. Sklinos d'autre part.

L'objectif de cette thèse est de contribuer à cette question en fournissant divers exemples de paires modérées d'entiers. Une caractéristique commune à nos exemples est la croissance rapide des éléments de R. Plus précisément, nous dirons qu'un ensemble de naturels R est régulier s'il est énuméré par une suite dont les quotients successifs ont une limite strictement plus grande que 1 ou infinie et si cette limite est algébrique sur $\mathbf{Q}$, alors la suite doit suivre une relation de récurrence dont le polynôme minimal est le polynôme minimal de la limite. Les puissances de 2, les nombres de Fibonacci et l'ensemble des parties entières des puissances de π sont des exemples d'ensembles réguliers. Nous démontrons que pour un ensemble régulier R, la paire $(\mathbf{Z}, +, 0, R)$ a une théorie et a l'élimination des quantificateurs dans un langage naturel. Nous montrons aussi que la paire $(\mathbf{Z}, +, 0, <, R)$ a l'élimination des quantificateurs dans un langage naturel et qu'elle a une théorie dépendante si R est de plus ultimement périodique modulo n pour tout $n > 1$. Ce dernier résultat répond à une question posée dans la littérature. Des résultats similaires sont obtenus lorsque $(\mathbf{Z}, +, 0)$ est é par $(\mathbf{Q}, +, 0)$ ou $(\mathbf{R}, +, 0)$.

5 Job announcements

5.1 From KU Leuven

Doctoraatsbursaal KU Leuven campus Kortrijk. Sollicitatiedeadline 1 juni en startdatum 1 oktober.

For all information, see https://www.kuleuven.be/personeel/jobsite/jobs/60014196

5.2 From UAntwerpen

The Department of Mathematics of the University of Antwerp advertises currently **1 PhD position in Analysis** ("**Mandaatassistent Analyse/dynamische systemen/differentiaalmeetkunde/...**") starting Oct 1, 2021. The application deadline is May 24, 2021.

For all information, see

https://www.uantwerpen.be/nl/jobs/vacatures/ap/?q=1562&descr=Mandaatassistent-Analyse

as well as the online application system of the University of Antwerp at

https://www.uantwerpen.be/en/jobs/vacancies/academic-staff/?q=1562&descr=Graduate-teaching-&-research-assistant-Analysis

5.3 From UGent

Doctoraatsbursaal

Diploma: master of science in de wiskunde of vergelijkbaar (of bachelor gelijkwaardig door ervaring)

Functieomschrijving:

De doctoraatsbursaal zal werken aan de Universiteit van Gent, in de Odysseus/Methusalem-groep "Analyse en partiële differentiaalvergelijkingen" en zal onder supervisie staan van Professor Michael Ruzhansky. Het onderzoek waaraan hij/zij werkt zal zich wijden aan een thema binnen analyse en gerelateerd zijn aan partiële differentiaalvergelijkingen. Dit onderwerp zal worden vastgelegd op basis van de achtergrond van de kandidaat. Een masteropleiding waarvan gevorderde cursussen in analyse en partiële differentiaalvergelijkingen deel uitmaakten, is zeer wenselijk. Meer informatie over mogelijke onderzoeksthema's is te vinden op de website van de groep: https://analysis-pde.org/

Geïnteresseerde kandidaten kunnen hun aanvraag sturen naar mevrouw Verbeeck Kim via

kimpj.verbeeck@ugent.be.

De aanvraag dient onderstaande documenten te bevatten:

- Motivatiebrief
- Volledig CV
- Naam en e-mailadres van twee of drie referenties
- Transcriptie van bachelor- en mastercijfers
- Masterdiploma

Kandidaten die dit jaar afstuderen, kunnen reeds solliciteren en hun masterdiploma later bezorgen.

5.4 From ULB

Two full time research and teaching assistant positions in mathematics at the faculty of science. See at the end of this newsletter for more information.

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

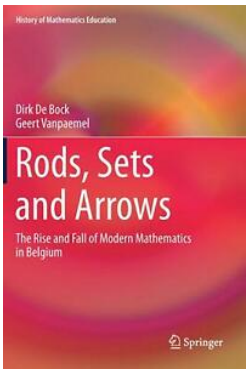
6.1 Rods, Sets and Arrows - Dirk De Bock and Geert Vanpaemel

Next you find a review of Philippe Cara on this book on the history of modern mathematics in Belgium.

6.2 Adhemar's corner

Next follows also a review of Adhemar on the proceedings of the last three MOVES meetings in the MOMA in New York.

Rods, Sets and Arrows, *Dirk De Bock and Geert Vanpaemel*, Springer, 2019 (293 p.) isbn: 978-3-030-20598-0.



The subtitle of this book is *The Rise and Fall of Modern Mathematics in Belgium* and it appeared in the Springer series on History of Mathematics Education.

As a 10 year old kid in school I remember playing with what the teacher called *logiblocks*. It was a lot of fun and no one was aware that what we were doing was mathematics. That was rather associated with "doing sums". Part of the game were Venn diagrams, sets, unions, intersections, ... and funny new symbols. Later I became a mathematician and I am convinced that having been trained the way I was in primary and high school has helped me a lot, especially in communicating and writing down mathematical thoughts. I have always been fascinated by this primary school episode of my life and thought that there would never be a better or more effective way to sow a foundation of mathematical thinking in a 10 year old's mind.

Rods, Sets and Arrows narrates the very interesting story of what became known as *Modern Mathematics* in mathematics education. The need for more well-trained scientists after the second world war gave an impulse for a reform of mathematics teaching. Belgium played an important role in this evolution from a system mainly based on 2000 year old Euclid's Elements to a more modern view inspired by more contemporary university mathematics. University professors and some inspired teachers thought that everyone could reach a higher level and a better scientific mind if methods were modernised. One of those professors was Papy (ULB). He is known for his many "teaching experiments" and school book series "Mathématique Moderne". These books were revolutionary but probably a nightmare for the printers. They contained many coloured drawings and lots of symbols, illustrating the new methodology proposed by Papy and his collaborators. By the end of the 1960s the high school programs in Belgium had been adapted to include modern mathematics. In the 1970s the modern wave also reached primary school programs. The Belgian example was also followed in some other countries but in a more attenuated form. Not everyone is aware of the important influence Belgium had in many of these reforms.

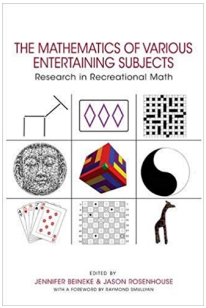
As with many reforms, people soon became aware that this one might have gone a bit too far. In the 1980s criticism became more intense and by the end of the century school programs had been revised once more to reinstate some of the older topics, lower the level of abstraction, include more everyday illustrations and problems from real life.

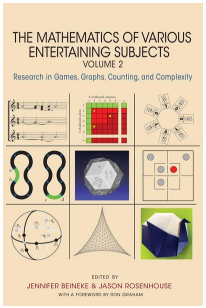
De Bock and Vanpaemel provide a very detailed account of all these reforms, with many citations from original texts (which are often not easy to translate accurately from French or Dutch). Both political and ideological background is given to help the reader understand the context in which those changes took place. By the "fall of modern mathematics" education was no longer a national matter. Belgium had become a federal state consisting of three Communities, each fully responsible for educational matters within its community. The authors very thoroughly discuss the paths taken in Flanders and in Wallonia to walk away from Modern Mathematics. Short biographical information is provided for most of the main protagonists in the "rise and fall of modern mathematics". Here is a (far from exhaustive) list of important names: Paul Libois, Caleb Gattegno, Georges Cuisenaire, Willy Servais, Georges Papy, Frédérique Lenger–Papy, Léon Derwidué, Raf Feys, Nicolas Rouche,...

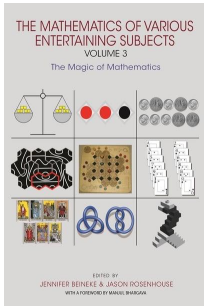
The book is a pleasure to read and warmly recommended for anyone interested in this important but not so well-known part of history of mathematics in Belgium. There are many nice anecdotes, illustrations and lots of context. An extensive reference list is provided as well as an author index.

Philippe Cara

The mathematics of various entertaining subjects,
Jennifer Beineke and Jason Rosenhouse (eds.), Princeton University Press,
vol. 1 Research in recreational mathematics: 2015 (288 p.) isbn: 9780691164038;
vol. 2 Research in games, graphs, counting, and complexity: 2017 (408 p.) isbn: 9780691171920;
vol. 3 The magic of mathematics: 2019 (352 p.) isbn: 9780691182582.





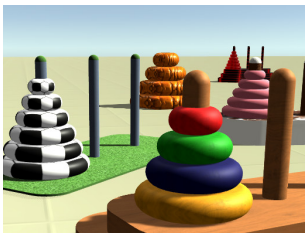
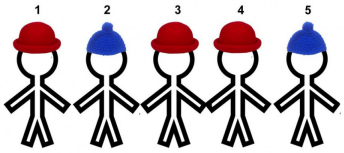



J. Beineke

J. Rosenhouse

Since 2013, every two years there is a MOVES (Mathematics Of Various Entertaining Subjects) conference organized in the MoMath museum in New York. These are conferences that bring together mathematicians, magicians, puzzlers, and mathematical gamers. The topics of the conference is not only the fun aspect, but most of all the mathematics that is behind the fun. It is the study of recreational mathematics as a mathematical subject. This topic has grown to maturity and there are some serious problems that can be formulated and solving them requires the use of many different mathematical tools: number theory, graphs, combinatorics, geometry, topology, probability, stochastic dynamical systems, complexity etc. It's recreational mathematics for mathematicians or at least math enthusiasts.

Jennifer Beineke and Jason Rosenhouse have collected texts as proceedings of these conferences that are published with a delay of about two years. It is obvious that the possible readership for the topics of the conference will be quite diverse and not all of them are professional mathematicians. So the texts are maintained at an accessible level for a broad audience.

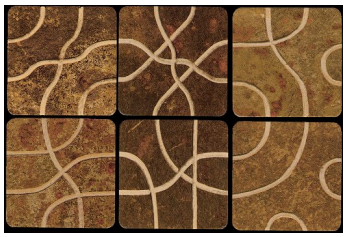



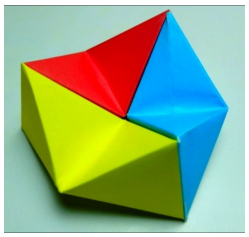
The subjects of the papers are very diverse in every volume but similar topics are recurrent over the successive volumes. For example *puzzles and brainteasers* are to be found in every volume. Take for example the classical problem *Towers of Hanoi*. Do you know the different strategies to solve the problem? How do you recognize a regular but random distribution of the disks over the pegs as a starting position that will or will not allow a solution? Suppose you are interrupted half way your moves, how do you know how to continue? How to solve an inverse problem: give disks perfectly arranged on one peg, can you rearrange them to obtain a prescribed (regular) distribution over the pegs?
Other classics are magic squares and 'prisoner's hat colour riddles' for which many variants exist. Volume 3 has a version of the latter in which the prisoners have to guess simultaneously the colour of their own hat (red or blue), which they have to deduce from the colours of the hats of all the other prisoners. They can pass, but not all of them are allowed to pass. This seems to be an impossible problem, but there is a solution that will allow to make a correct decision with high probability.

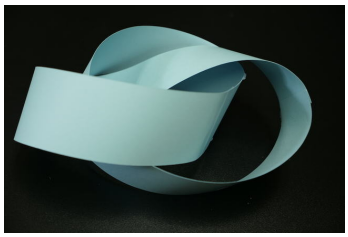
There is a huge number of different *games* that can be played with two or more players. Also this topic is recurrent in the proceedings. Suppose you are playing checkers with your daughter, and you want her to win, but you do not want to violate the rules of the game. What strategy should you follow to optimize the chance that you will loose? Classical dice have the convention that opposite sides of the cube sum to 7, but it is still possible to have different dice. You have to look at the vertex sums: the sum of the value of the three faces that have a common vertex. But for a d20 die (an icosahedron with 20 trangular faces), how should one number the faces, and how many ways are there to produce a "fair" die (supposing there is a slight deviation problem with the center of gravity of the die)?

Graphs is another recurrent subject. Here is an interesting problem. Suppose you have a regular triangular planar grid. On some of the grid points we have cities, and the problem is to design a railroad network that makes it possible to connect every city with every other city. What is the shortest possible set of railroad tracks that solves this problem when the tracks can only be along the grid lines? The problem originates from a game called TransAmerica, but it is a good approximation of a practical problem. Suppose one wants to fix lights on some of the grid points of the metal framework that shapes the geodesic dome of the Dalí museum in St. Petersburg, USA, and the electrical wiring is only allowed along the frame since it is filled with 1100 triangular glass windows that are all different but nearly of the same size.

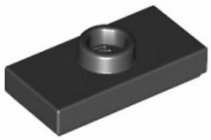
Magic cart tricks are often based on number theory. In volume 3, there is a long paper by P. Diaconis and R. Graham who explain step by step the number theoretical issues that are the backbone of what is sometimes called the most complicated cart trick ever. It was invented by Charles Sanders Peirce (1839-1914), an American logician and philosopher who is known as the father of pragmatism. He had however a soft spot for card tricks and the trick discussed consists in repeatedly laying out and dealing the cards and collecting them in different ways, seemingly reshuffling them, but it ends with two stacks where the value of the card at position j in the first stack indicates to position of the card with value j in the other stack. Peirce describes it in a publication, but like many of his publications it is nearly unreadable. The paper explains exactly the complicated modulo calculus and prime numbers that is making the trick work.







Geometry and topology, is a recurrent topic as well. The Tsuro game is definitely of this class. The players have square cards that have two entry points on each of its 4 sides and they are connected in pairs. There are many ways to do the latter pairing. How could you encode the topology of the square tiles and how many different tiles are there, taking symmetry into consideration?
Knots, origami, flexagons, Möbius bands, and their generalizations are obviously part of this section.



In many of the topics mentioned there is some complexity involved. The number of possible chess games is finite but quasi infinite for any realistic computation. So many of the strategies or the possibilities in any of the above mentioned problems quickly rise to an impractical number of possibilities which requires an analysis of the complexity, or defining the complexity class of the problem so that *computational complexity* is also one of the returning issues that are addressed in these proceedings. Take for example one of the simplest Lego blocks: a jumper plate which has only one notch at the top and 3 slots at the bottom. Only 8 of these can be connected in 393314 ways. One might ask what is the entropy, that is $\frac{1}{n}\log N(n)$ where $N(n)$ is the number of possibilities with n blocks as n becomes very large and if exact values are impossible. Ccan upper or lower bounds be given?

As can be seen from the few examples that I gave above, there are quite some problems that are worth investigating and some of these are quite challenging from a mathematical point of view involving many different areas of mathematics, from logic to computational complexity. Clearly recreational mathematics has become a proper research area.

Adhemar Bultheel

ULB UNIVERSITÉ LIBRE DE BRUXELLES

science4refugees

HR EXCELLENCE IN RESEARCH

TWO FULL TIME RESEARCH AND TEACHING ASSISTANT POSITION

IN MATHEMATICS

FACULTY OF SCIENCES

Reference : 2021/S159
Application deadline : 15/06/2021
Start date : 01/10/2021

Job Description

The duties of a teaching assistant include research, teaching (in French) and service to the community.

The research activities are mainly focused of the realization of a doctorate thesis in one of the research fields of the Mathematics Department. The candidate must have contacted a professor of the department in that respect.

The teaching activities are mainly focused on teaching exercise sessions for several courses in mathematics (maximum 300h/year) and other pedagogic tasks such as preparing, supervising and correcting exams. A Good knowledge of French is required.

Occasionally, a teaching assistant may be asked to participate to community services such as student fairs, participation in councils of departments, committees, etc.

A first term of two years is given, renewable maximum twice for two years each time after advices from the competent committees.

Degree required

Holder of a Master 120 credits in Mathematics or holder of a Licence in Mathematics (or recognised equivalent degree) and within the conditions of enrolling in a PhD.

Skills required

A licence or masters degree (120 ECTS) in mathematics, statistics or actuarial sciences, or a degree equivalent, and satisfy to the conditions of access to the doctorate degree.

- High scientific level in mathematics
- Excellent pedagogical skills
- Good capacity to fit in a team of teachers.

Courses covered

Exercise sessions and homeworks, including the making, supervising and correcting of exams.

Interested ?

For more information, please contact Mr Joel Fine (E-mail: jfine@ulb.ac.be).

Applications must be sent by e-mail to the rectorate of the Université libre de Bruxelles (rectrice@ulb.be) and to the faculty deanship (Aff.acad.sciences@ulb.be)

They must include the following :

- a motivation letter
- a Curriculum vitae including a list of publications :
  if you want you can complete a standard form via our website at https://www.ulb.be/fr/documents-officiels/completer-votre-cv-en-ligne. Once completed, it must be downloaded and attached to the application file.
- a note on the applicant's PhD research project (4 pages)
- two letters of reference

Equal opportunities policy

ULB's personnel management policy is geared towards diversity and equal opportunities.

We recruit candidates on the basis of their skills, irrespective of age, gender, sexual orientation, origin, nationality, beliefs, disability, etc.

Would you like to be provided with reasonable accommodation in the selection procedure because of a disability, disorder, or illness? Do not hesitate to contact Marie Botty, the Gender and Diversity resource person of the Human resources Department - SPES (marie.botty@ulb.be). Be assured of the confidentiality of this information.

More details on the ULB gender and diversity policy are available at https://www.ulb.be/en/about-ulb/gender-equality-at-ulb.

You will find all the regulations relating to research careers on our site at http://www.ulb.ac.be/emploi/academique.html.

FICHE ADMINISTRATIVE

qui doit impérativement accompagner la vacance

n° de vacance : 2021/S159

Domaine : Sciences

Discipline : Mathématique

Poste(s) au cadre : 21-B-ASS-037 (1 ETP) / Poste SAP : 45128701

21-B-ASS-123 (1 ETP) / postes SAP : 45669701

Références CoA : 26/04/21 pt. III. 02

Rattachement Enseignement : FS 010 Service d'enseignement Mathématique-Présidence

Rattachement Recherche : To be defined later

EURAXESS SPECIFIC INFORMATION

Type of contract : temporary

Hours per week : 38

Main Research Field : 27. Mathematics

Required educational level: Master level in mathematics, statistics or actuarial sciences

Required Languages :

Français excellent

English good

Required Research Experiences : Mathematics

Researcher profile : Early stage researcher (0-4 years)