



Newsletter

BELGIAN MATHEMATICAL
SOCIETY

136, January 15, 2022

Comité National de Mathématique CNM

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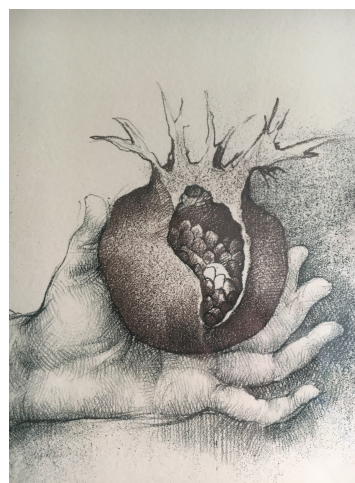
NCW Nationaal Comité voor Wiskunde

**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



Marina Richter

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The next edition of this newsletter will appear on March 14th, hence, till March 9th all content can be sent to wendy.goemans@kuleuven.be. Any information that you qualify as interesting to be spread among the Belgian Maths community is very much welcomed! Examples of such information are: PhD defenses, seminars, conferences, workshops, meetings, interaction with other sciences or business companies, popular lectures, school initiatives, math exhibitions, job opportunities, ...

Foreword

Dear BMS members,
Dear fellow mathematicians,

Together with the renewed BMS board, we wish you all a happy, creative, cheerful and joyous 2022.

As you may have noticed, the BMS board has been renewed during our last General Assembly. We sincerely thank those who have left the board for their investment and (sometimes many) years of service. We also welcome in the new board members, who will bring fresh energy into our honorable Society. We also welcome a new VP (Joost Verduyck, ULB) and Treasurer (Céline Esser, ULiège). Philippe Cara stays on as webmaster, and Yvik Swan stays on as President (+ Secretary) for one last year. We invite you to consult our website <https://bms.ulb.ac.be/> for an updated list of board members.

Last year ended in a rush of positivity, with a successful “GA + Breakthroughs” event which was held online on December 15th and to which there were more than 130 registered participants. During that event, we also awarded the first “BMS Young Scholar Award”. Again we invite you to consult our website for more information on this joyous occasion.

There are several events to look forward to for 2022, starting with the PhD day to be held in Liège University on May 13th. More information is given below in the Newsletter. Please already mark that day in your agendas!

Thanks again to all of you for your support, participation in our activities, and fidelity to our Society. Stay tuned to our webpage for more announcements of mathematical events.

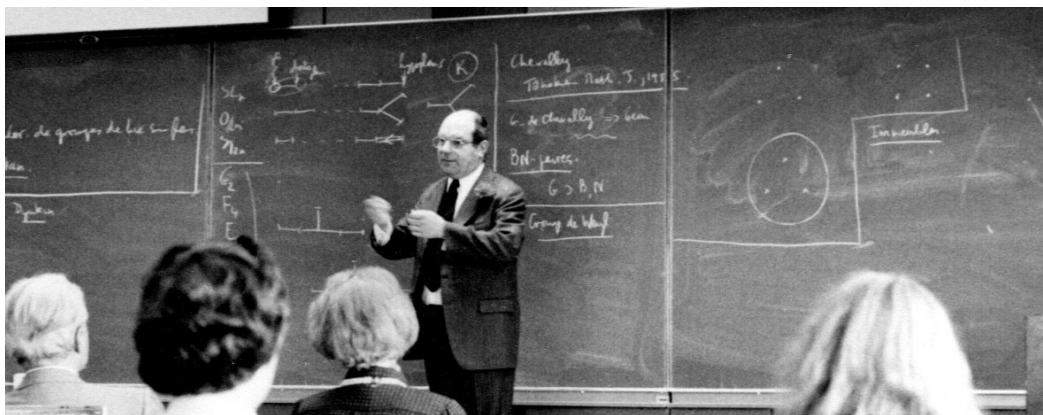
Stay safe, and see you soon, be it in real life or through a computer screen.

Céline, Joost, Wendy, and Yvik

Jacques Tits

Jacques Tits passed away on December 5 2021, at the age of 91. He entered the ULB at the age of 14 and obtained his PhD six years later. He was successively a professor at the ULB, at the University of Bonn and at the Collège de France. His numerous contributions to algebra and geometry are fundamental. He is particularly known for the creation of new spaces called “Tits buildings”. Among the many distinctions he received, are the Wolf Prize in 1993 and the Abel Prize in 2008.

(Thanks to Luc Lemaire for providing this text and to Philippe Cara for the nice picture, taken in 1981 by Alain Valette.)



1 News from the BMS & NCM

1.1 Membership dues for 2022

The basic BMS membership fee is 20€ per year. See Section 1.1.1 for reciprocity membership.

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

Our address is:

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

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

1.1.1 Reciprocity and combined membership

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

We summarize the most common combined memberships:

BMS	20,00€
BMS with reciprocity	18,00€
BMS + EMS	45,00€

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

Note that it is now preferred that you pay your EMS membership fee directly to the EMS. See http://www.euro-math-soc.eu/ems_payment_new/ems_payment_new.html for details.

1.2 PhD day May 13th

The Belgian Mathematical Society invites all PhD students linked to mathematics to showcase their research, meet each other and exchange ideas at the PhD-Day on May 13 2022 in Liège. We offer the possibility to present a poster or a short contributed talk. A best poster prize will be awarded at the end of the PhD-Day. More information will be available soon but if you wish to give a talk, you can already contact Céline Esser (celine.esser@uliege.be).

Two plenary talks are planned. The Godeaux lecture will be given (online) by Timothy Gowers (Collège de France). The second plenary lecture will be given by Mitia Duerinckx (Université Libre de Bruxelles), who has received the first BMS Young Scholar Award of the BMS in 2021.

1.3 General Assembly

The slides of the General Assembly that took place online on December 15th 2021 are available on the website of the BMS, <http://dwispc8.vub.ac.be/nieuwBMS/index.php?id=ga>.

1.4 Bulletin of the Belgian Mathematical Society - Simon Stevin

In December 2021, Volume 28, Number 2, of the Bulletin of the Belgian Mathematical Society - Simon Stevin appeared with the following table of contents:

- **Mario Hernández, Josué Meléndez** Parabolic hypersurfaces with constant mean curvature in Euclidean space
- **Kamal Boussaf, Alain Escassut** Growth of analytic functions in an ultrametric open disk and branched values
- **Khelifa Chadi, Mohamed Selmani** Dynamic frictional thermoviscoelastic contact problem with normal compliance and damage
- **Sh. Kalantari** Asymptotic resemblance relations on Groups
- **Hongying Lin, Bo Zhou** Extremal results on distance Laplacian spectral radius of graphs
- **R. I. Hadjigeorgiou** Relative Choquet boundaries of restriction algebras
- **Farid Kourki, Rachid Tribak** On Bass Modules and Semi-V-Modules
- **Ece Yetkin Celikel** 2-nil ideals of commutative rings
- **Rainer Löwen, Günter F. Steinke** Regular parallelisms on $PG(3, \mathbb{R})$ admitting a 2-torus action

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 February 2022

Doctoral school FNRS - Introduction to dynamical systems on complex networks

Université de Namur

February 1-3, 2022, 9.30am-12.30pm

The next FNRS Doctoral School on Nonlinear phenomena, complex systems and statistical mechanics, will take place at Université de Namur on the days 1-2-3 February 2022 at 9h30-12h30. The theme is

Introduction to dynamical systems on complex networks and lectures will be given by Mattia Frasca, Professor of Engineering at Università di Catania (Italy), and Timoteo Carletti, Professor of Mathematics at Université de Namur. This doctoral course is interdisciplinary and is aimed at PhDs and Master Students of nonlinear dynamics and complex systems of different backgrounds, such as mathematics, physics, biology, chemistry, economics, engineering and more. The course is funded by the Doctoral school on nonlinear phenomena, complex systems and statistical mechanics of the FNRS.

For more information on the course programme, please check the announcement at the end of this newsletter.

Registration is free of charge but mandatory for organizational reasons and can be done by writing to riccardo.muolo@unamur.be with your full name and affiliation before 23 January 2022.

Ecole Doctorale Thématique: L'enseignement-apprentissage de la géométrie

Université de Mons, UMONS

February 7, 2022, 18pm-21pm

An evening meeting dedicated to the problematic of the teaching and learning of Geometry will take place at UMONS, Monday February 7, 2022. The speakers are Sophie Soury-Lavergne (Institut français de l'Éducation, Ecole Normale Supérieure de Lyon) and Céline Nihoul (Université de Mons).

See the poster at the end of this newsletter for details and registration.

2.2 Seminars and colloquia

Antwerp Algebra Colloquium

The **Antwerp Algebra Colloquium** is a monthly event at the University of Antwerp. Each session consists of two one-hour-long colloquia, with a focus on learning the basics on different research topics. The colloquia are meant to be accessible for researchers from all domains of algebra.

The lectures take place in **room M.G.016** in building G on Campus Middelheim, but we stream the talks for those of us who want to **follow online**.

If you want to be informed about the upcoming sessions of the colloquium and get the corresponding links to the talks on Blackboard Collaborate, you can subscribe to our **mailing list** at:

<http://sympa.ua.ac.be/sympa/subscribe/antwerp-algebra-seminar>

Sessions are also announced on our **website**:

<https://www.uantwerpen.be/en/research-groups/fundamental-mathematics/research/ongoing-scientific-events/antwerp-algebra-colloquium/>

The website includes a list of previous talks. Some of the talks can be rewatched on our YouTube channel "Antwerp Algebra Colloquium".

Questions and comments are welcome at jens.hemelaer@uantwerpen.be.

Antwerp Analysis & Geometry Seminar

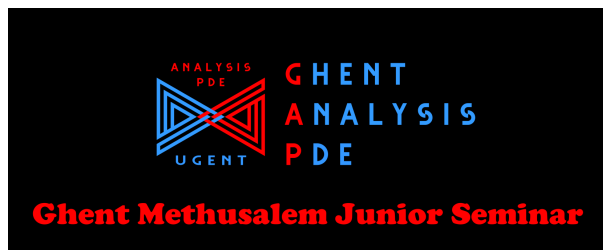
This is the weekly research seminar of the analysis & geometry-interested people in Antwerpen. During the semester, we'll have once per week a research talk in analysis and/or geometry and/or related topics. The list of speakers comprises researchers from Antwerpen as well as other universities.

To be added/deleted from the mailing list, please send an email to sonja.hohloch@uantwerpen.be.

See all information on

<https://www.uantwerpen.be/nl/personeel/sonja-hohloch/private-webpage/seminars/analysis—geometry-/>.

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/>.

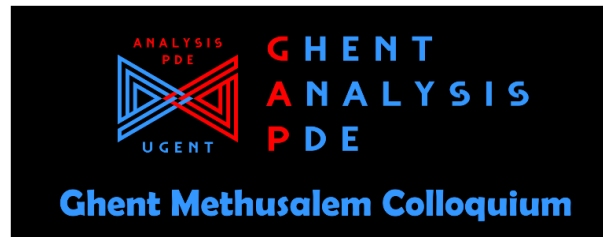
If you would like to give a talk or to invite someone to give a talk, please contact:

- 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):

- 18 January 2022. To be updated.
- 25 January 2022. To be updated.
- 1 February 2022. To be updated.

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/>.

Scheduled talks are (to be updated):

- 16 December 2021, Philippe Souplet, Université Sorbonne (Paris Nord, France), (postponed).

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”.



3 PhD theses

Split extensions, Actions and crossed modules in categories of Hopf algebras

Florence Sterck

Université catholique de Louvain and Université Libre de Bruxelles

October 14th, 2021

Thesis advisors: Prof. Dr. Marino Gran (UCLouvain) and Prof. Dr. Joost Vercauteren (ULB)

Summary: This thesis develops and strengthens the interactions between two active research fields of mathematics: the theory of semi-abelian categories and the theory of Hopf algebras.

In the first part, we study the exactness properties of the category of cocommutative Hopf algebras over any field, and prove that this category is semi-abelian. Thanks to this result, we obtain a description of internal categorical structures in the world of Hopf algebras: in particular we investigate crossed modules and crossed squares of cocommutative Hopf algebras and prove the equivalence of these categories with the ones of internal groupoids and double groupoids, respectively. We describe the Huq commutator of Hopf subalgebras, and also extend some classical results in group theory, such as the Zassenhaus Lemma, to the context of cocommutative Hopf algebras.

In the second part of the thesis we focus on the category of general Hopf algebras in any symmetric monoidal category. We introduce a suitable notion of split extensions of Hopf algebras (and bialgebras). This notion is adequate for several reasons: in particular, the Split Short Five Lemma holds true when restricted to these extensions. Moreover, the split extensions of Hopf algebras (and bialgebras) are actually equivalent to the actions of Hopf algebras (and bialgebras). This equivalence allows us to obtain an equivalence between precrossed modules and an important class of reflexive graphs for general Hopf algebras.

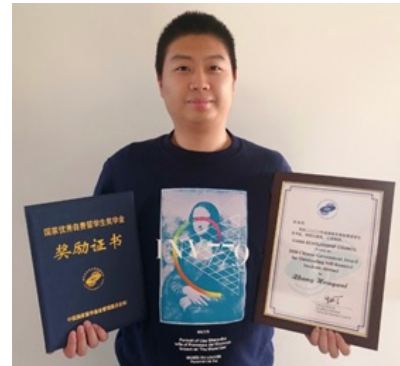
This thesis strengthens the links between Hopf algebras and category theory, providing a thorough study of the notions of actions, precrossed modules, and crossed modules of Hopf algebras in various contexts.

4 News from the universities

4.1 UGent

The Chinese Government Award for Outstanding Self-financed Students Abroad

A member of the Ghent Analysis & PDE centre (<https://analysis-pde.org>), Hong-Wei Zhang, was presented “The Chinese Government Award for Outstanding Self-financed Students Abroad” which is given by the Chinese government to graduate students studying abroad who are not funded by the China Scholarship Council (CSC). Recipients are chosen worldwide each year for their outstanding accomplishments in academia. Only 500 are awarded annually among all Chinese overseas graduate students in all disciplines. Because of this highly competitive selection, this prestigious award is considered the highest award the Chinese government gives to overseas graduate students.



The prize comes with a certificate and 6000 USD award.

Laureate of the State Youth Prize “Daryn-2021”

A member of our Analysis & PDE Centre, Nurgissa Yessirkegenov, became the Laureate of the State Youth Prize “Daryn-2021” in the nomination Science. The State Youth Prize “Daryn” of the Republic of Kazakhstan is awarded annually in order to support talented youth for fruitful scientific, creative, social activities, as well as for high sporting achievements.

<https://analysis-pde.org/2021/11/24/congratulations-to-nurgissa-yessirkegenov/>

The Best Scientist

Berikbol Torebek from the Analysis & PDE Centre, became “The Best Scientist” in 2021 in nomination of Natural Science. This prize by the Ministry of Education and Science of the Republic of Kazakhstan

is awarded to 50 scientists from research institutes and universities in Kazakhstan. Each of them will receive a certificate and an award in the amount of 12 000 euros.

<https://analysis-pde.org/2021/12/30/congratulations-to-berikbol-torebek/>

Ghent Analysis & PDE Center: Summary for 2021



2021 was the year of recovering from the coronavirus outbreak from 2020. But it was still a fruitful year for our Analysis & PDE Center at Ghent University. Here, we summarise the main highlights from this year. More info at <https://analysis-pde.org/summary-for-2021/>.

Some statistics:

- Michael Ruzhansky, our Director of the Ghent Analysis & PDE Center, has been elected member of the ISAAC Board. Visit the website of the International Society for Analysis, its Applications and Computation (ISAAC) at <http://www.isaacmath.org/home/>.
- Our website analysis-pde.org had more than 68,000 views since 2019.
- We had 33 speakers in our Ghent Methusalem Junior Seminar for 2021.
- We had more than 170 presentations by our members in our Analysis & PDE group seminar in 2021.
- Members of our Analysis & PDE Centre in 2021 attracted more than €6,250,000 in research funding, as well as received a number of prestigious awards and prizes for their research.
- Publications for 2021 (published papers and preprints) available at <https://analysis-pde.org/articles-2021/> and <https://analysis-pde.org/published-accepted-papers/>.

Prizes/Awards, Grants, and Highlights of 2021:

- Methusalem Laureate by BOF, UGent, Belgium, to Michael Ruzhansky (€4,502,000).

- FWO Senior Research Grant “Pseudo-differential operators on homogeneous manifolds” to Michael Ruzhansky (€463,500) grant starts in 2022.
- FWO Senior Research Grant “Non-commutative wavelet analysis” to Michael Ruzhansky started in 2021 (€446,968).
- EPSRC Grant “Hyperbolic problems with discontinuous coefficients” to Claudia Garetto and Michael Ruzhansky (full economic costing £719,738) grant starts in 2022.
- The Chinese Government Award for Outstanding Self-financed Students Abroad by the Chinese Government to Hong-Wei Zhang (\$6,000).
- IMU-Simons African Fellowship awarded to Narciso Gomes (University of Capo Verde) for the research stay at our Analysis & PDE Centre of Ghent University (\$5,000).
- Laureate of the State Youth Prize Daryn-2021 by the Kazakhstan Government to Nurgissa Yessirkegenov.
- The Best Scientist by the Kazakhstan Government to Berikbol Torebek (€12,000).
- Kovalevskaya Travel Grant for attending ICM 2022 to Andrea Vanessa Hurtado Quiceno
- Travel Grant by the Isaac Newton Institute for Mathematical Sciences for attending Sir Michael Atiyah Conference in Cambridge to Bolys Sabitbek
- Early career researcher conference grant, IWOTA, Lancaster University, UK, to Duvan Cardona Sanchez.
- Heidelberg Laureate Forum Grant for young researchers to Duvan Cardona Sanchez.

6 new PhD students are starting at UGent in 2021, supervised by Michael Ruzhansky; see here <https://ruzhansky.org/curriculum-vitae/> for the complete list.

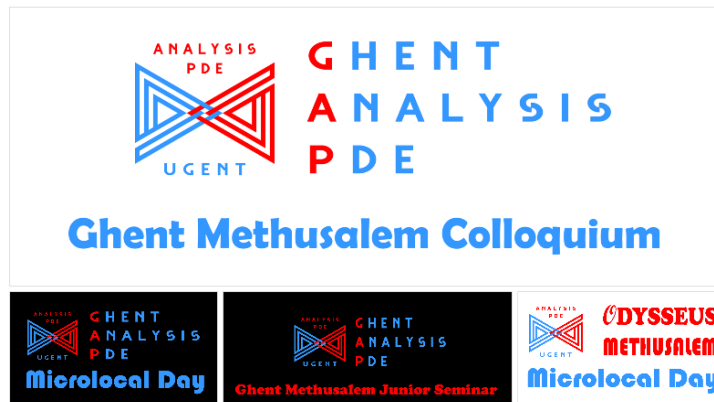
- Xuechao Wang, Ghent University.
- Karlygash Dosmagulova (Ghent University and Kazakh National University).
- Bakhodirjon Toshtemirov (Ghent University and Institute of Mathematics, Uzbekistan).
- Andrea Vanessa Hurtado Quiceno, Ghent University.
- David Santiago Gómez Cobos, Ghent University
- Irfan Ali, Ghent University.

International and national conferences organised by our group in 2021:

- Ghent Methusalem Junior Seminar via ZOOM (every Tuesday).
- Ghent Methusalem Colloquium via ZOOM.
- Microlocal Day: 22 Nov 2021, visit the website at <https://analysis-pde.org/microlocal-day-22-november-2022/>.
- LMS Hyperbolic Network Meeting: 9 December 2021, visit the website at <https://ruzhansky.org/lms-hyperbolic-network/>.

Our academic visitors during 2021:

- Kassymov Aidyn, Kazakh National University, March 9 - March 8, 2023.
- Qing Hong, Jiangxi Normal University, China, January 11 - January 10, 2022.
- Hu Guorong, Jiangxi Normal University, China, January 11 - January 10, 2022.
- Van Velthoven Jordy Timo, University of Vienna, Austria, February 1 - July 31.
- Wang Xuechao, Beihang University, China, July 15 - July 14, 2022.
- Zhang Hongwei, Université d'Orléans, France, April 1 - March 31, 2022.
- Borikhanov Meiirkhan, Institute of Mathematics and Mathematical Modeling, Kazakhstan, April 4 - March 21, 2022.



- Cardona Alexander, Universidad de los Andes, Colombia, September 20 - December 15, 2021.
- Delgado Julio, Queen Mary University of London & Universidad del Valle, Cali-Colombia, October 4 - December 4, 2021.
- Mahesar Sara, Mehran University of Engineering and Technology, Pakistan, September 6 - February 4, 2022.
- Safarov Akbar, Institute of Mathematics, Uzbekistan, October 1 - November 30, 2021.
- Abderrazak Nabti, University of Tebessa, Algeria, December 1 - February 15, 2022.
- Ghosh Sekhar, National Institute of Technology Rourkela, India, January 3 - March 31, 2022.

4.2 News from members

Prof. Mohammad Sajid became Editor-in-Chief of Far East Journal of Dynamical Systems

<http://www.pphmj.com/journals/fjds.htm>.

See also <https://publons.com/researcher/1353646/mohammad-sajid/>.

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

5.1 Mathematics is the second favourite subject of flemish pupils

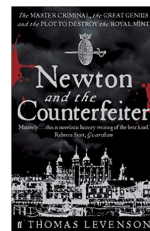
See the article (in Dutch) on https://www.nieuwsblad.be/cnt/dmf20211216_97184490.

5.2 Adhemar's corner

This edition of the newsletter we end with two reviews of Adhemar on books which handle about some less known aspects of Newton's biography. *Newton and the Counterfeiter* of Thomas Stevenson is a well documented thriller about the titanic clash between Newton as Warden of the Royal Mint and the master counterfeiter William Chaloner. The second book describes some less known aspects of Newton's biography, especially the quarrels he had with several of his contemporaries, *Isaac Newton The asshole who reinvented the universe* of Florian Freistetter.

Newton and the Counterfeiter, Faber and Faber, 2009 (330 p.) by *Thomas Levenson*

In this well documented account, some less known episodes of Newton's life are portrayed by Levenson. The biography of Newton is summarized up until he published his *Principia* in 1687 and became famous. Newton got also heavily involved in alchemy research for more than twenty years. He was not alone. Also Robert Boyle was a passionate explorer of that domain. When Boyle died, Newton was eager to obtain "Mr. Boyle's Red Earth" through John Locke. According to Levenson, in this search to transform mercury in gold, Newton saw the demystification of God, and so it became almost a religious quest, but he stuck to his scientific method carefully noting down the quantities, temperatures, times, etc. It was also kept mostly a secret because the clergy was not happy with that, but also Newton thought that the creation of gold was a divine power and exposing it to the people was dangerous. It came to a climax in 1693 when he seems to have found something, but we shall never know what. It is also in the period of approximately 1692-1693 that Newton had some period of a depression or burn-out.



Thomas Levenson

Nicholas Fatio de Duillier, born in Basel was working with Huygens in Holland but when Mary and her husband Willem of Orange inherited the throne, Fatio got introduced to the Royal Society, where he met Newton in 1689, and he became a kind of sorcerer's apprentice in Newton's intense alchemy research. Levenson only suggests that Newton, who had a reputation of having a cold sulky character, seemed to enjoy Fatio's company in an unfamiliar way. When Fatio declines Newton's help when he was sick and when he preferred to work with a "new friend" instead of Newton, their relation stops abruptly. Could it be that this contributed to Newton's breakdown? Probably not says Levenson. There is no proof or evidence that this friendship was more than strictly scientific.

William Chaloner was, like Newton, born in the countryside, but he grew up skilled in criminal activity that he performed with a lot of bravoure. He learned to work with metal as a nail maker in Birmingham, but later used it to counterfeit coins. In those days money was worth the gold or silver that it contained. Mixing the alloy with iron or other cheaper material made a great profit. The image was originally applied with a stamp and a hammer. Later inscriptions were added on the rim, but also this could be attained by counterfeiters who built their own machines. Chaloner's criminal career in London includes prostitution, quack doctor, and double agent to turn in Jacobite conspirators, but most of all he was known among counterfeiters as a master coiner delivering high quality work. He left the circulation of his coins to others who were often arrested but he always stayed out of prosecution or could talk himself out of trouble.

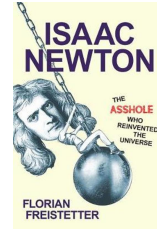
There was also an arbitrage problem between England and the continent. The silver that was used in the English coins could be traded for gold at a better exchange rate on the continent, and that gold was used to obtain more silver in England causing a massive silver drain. So the Royal Mint decided to recoin all their money, which was actually useless without a devaluation. Newton had been looking for a position that would bring him to London where all the important things were happening. The occasion came in 1696 when he was appointed Warden of the Mint. Also Chaloner tried to have his pawn inside the Mint, but failed. Newton supervised the recoinning efficiently and also had to prosecute all counterfeiters and financial criminals. His strategy was often to release some smaller cogs in the criminal machine and hire them as informants. Once released however, they used their position often to blackmail their companions for their own benefit. Chaloner still trying to infiltrate the Mint criticized its functioning and even accused Newton of incompetence. Some plates had disappeared and that was supposed to be counterfeiting activity from inside the Mint. Nevertheless Chaloner got arrested under loud protest and about half the book is about the clash of the masterminds: Chaloner versus Newton. Chaloner trying all the trick he had up his sleeve and that had worked before, but that were not successful with Newton as an opponent. Chaloner was hanged on March 22nd 1699 at the Tyburn tree, the execution place outside 17th century London, close to where now Marble Arch is.

This book in an entertaining read that fills some gaps not covered by other biographies about Newton. It is historically well documented by an anonymous biography of Chaloner and Newton's notes, but it reads like a modern thriller. It is also informative about 17th century society, its monetary system, the political squabbling, and the emergence of paper money in England.

Adhemar Bultheel

Isaac Newton. The asshole who reinvented the universe, Prometheus Books, 2018 (224 p.) by *Florian Freistetter* (original in German, Carl Hanser Verlag, 2017)

Freistetter is an astronomer who is now a blogger and science writer. The title he chose for this book is certainly a catchy one, but after all, he is not depicting Newton as a really brutal monster. The cover design of the book is clearly a reference to the Wrecking Ball clip of Miley Cyrus but the message behind it, if there is one, is not completely clear to me. He does reflect on what these disputes would mean and whether they would have happened if Newton had lived in our time of scientific research.



Florian Freistetter

Newton did not have a happy childhood and being a genius at school, he had a heightened sense of isolation. Even today a genius scientist is often captured as a nerdy loner, but most research today is the result of research teams which requires intense collaboration. Newton was certainly a workaholic who found his pleasure in solving problems, but he was very reluctant in publishing or sharing it. It might be because he could not stand any criticism. He was interested in anything that helped him to understand the world: from astrology to alchemy to optics, physics, history and theology. Mathematics was almost just like a tool he developed to support his other research. In our modern world, Newton's unconventional way of thinking might be appreciated, but since today we are sponsored by the taxpayers, it requires to communicate our results to a general public. For example the dispute between Newton and Flamsteed, the Astronomer Royal was about data that Flamsteed had collected over many years and that he wanted to publish in a magnum opus. However Newton wanted to have these data to check his theory in a second edition of his *Principia*. Freistetter reports extensively on this quarrel and its importance for the determination of the longitude, a major nautical problem. He also draws a parallel to data that were collected during the Rosetta mission of ESA, and whose publication was retarded to give precedence to its own scientists.

When Newton constructed his revolutionary telescope with mirrors, he presented it to the Royal Society and only after being pressured he provided the necessary information to publish it but insisted on anonymity like he had done before with some mathematical results. He considered it as a tool he made for personal interest. However when he submitted a paper on light and colour, Robert Hooke claimed to have an earlier theory to explain the phenomena that Newton described. This made him a lifelong enemy of Newton. Newton also disagreed with Huygens when he criticized some of Newton's result. These experiences may explain why Newton was very restrictive in publishing his results on whatever subject. Here Freistetter explains today's peer reviewing process to publish a paper and why criticism of your peers is so important. Even Einstein when he got a bad referee report answered that he had submitted to paper for publication, and not to be submitted for refereeing. He submitted the paper to another journal, but nevertheless he took the referee's critique into account.

Next Freistetter described Newton's marvelous work on gravity, the first step towards a theory of everything. Not a flash of insight because he saw an apple falling, but as a result of careful observation and seeing connections. This again resulted in a fierce discussion with Hooke concerning the trajectory of a falling ball. Hooke was right here. Newton's explanation for the trajectory of Halley's comet lead again to a dispute with Flamsteed. Newton's theory was backed up with his mathematics that he had kept for himself and that were difficult for his peers to understand.

Freistetter also devotes a chapter on Newton's search for the philosopher's stone and his biblical studies. But since this was even more delicate to publish, correspondence was using some alchemy coded language. It is some mystery whether Newton has thought he had solved the problem or just had a depression, since suddenly his work on the topic stopped. Nowadays science seems to be the new religion or at least independent from traditional religion.

The last chapter is of course about the row with Leibnitz about who was first to invented calculus. Here the fight was mainly started by third persons, but of course eventually the main antagonists got involved too. Newton was first to develop his theory, but Leibnitz was first to publish. The latter would be the criterion used today.

Doctoral School FNRS
Nonlinear phenomena, complex systems and statistical mechanics

1-2-3 February 2022 - 9h30-12h30 – Université de Namur

Introduction to dynamical systems on complex networks

Mattia Frasca (Università di Catania) & Timoteo Carletti (Université de Namur)

We live in an interconnected world, where “basic” units interact each other to produce unexpected emergent behaviors. Our society is for instance, the result of the interaction of many agents, we the human beings, that exchange information, news, opinions, etc., but also likes on Facebook or viruses. To a larger scale, the societies can be considered as agents interacting each other on a global stage, by exchanging goods to create the global economy, or fight each other and thus determine conflicts and wars.

Our brain is made of about 100 billions of cells, i.e., the neurons, connected through even more synapses (millions of billions) allowing the signals to pass from one neuron to the others, and thus allowing us to think, act, remember, ... Finally, our body is made by about 30 thousand billions of cells, basic blocks that determine our behavior, via synchronized processes, resulting from the exchanges among the cells. The cells are also organized into tissues and organs and so on to allow us to be alive.

The following questions emerge thus straightforwardly. Is it possible to understand the behavior of a society ? How to understand the brain functioning, to distinguish between its regular or irregular behavior (disease) and thus control it to reduce / remove the unwanted behavior ? Can we determine the behavior of (part of) the human body?

By using a *reductionist* approach we will divide the system into its constituting “elementary” parts, work hard to understand their behavior and then finally scale up the results to have a global picture. This approach has provided excellent results in many relevant cases (e.g., particle physics) but in other occasion it has shown its limits.

A complementary approach is based on the study of the evolution of some average quantities, i.e., the *mean field* approach; this approach has been largely used in these last months to study the spreading of the COVID-19, i.e., the epidemic models SIR, where you group together all the agents with the same feature, being S, I or R, and you no longer make a distinction among each single agent.

Modeling is always a matter of obtaining a reasonable trade-off between the details added to the model and its predictive or descriptive power; hence the level of details you add to a model depends on the research question you are dealing with.

It is clear that in the above examples, reductionist or mean field, may fail to sufficiently well describe the whole system, indeed the resulting global behavior is not easily ascribed / predicted from the behavior of each single unit. How would it be possible from the behavior of a single human to extract the behavior of a society? Or, does a neuron has memory? To cope with these issues, *network science* and *complex systems* offer a reliable alternative approach.

Let us observe that this is not a completely new research field. Physicists have been used it since long time but relying on regular couplings, e.g., the Ising model on square lattices. Nowadays the emphasis is on the use of coupling, i.e., networks, that better represent the reality; often such networks have been directly extracted from real data and thus the results better explain the empirical findings.

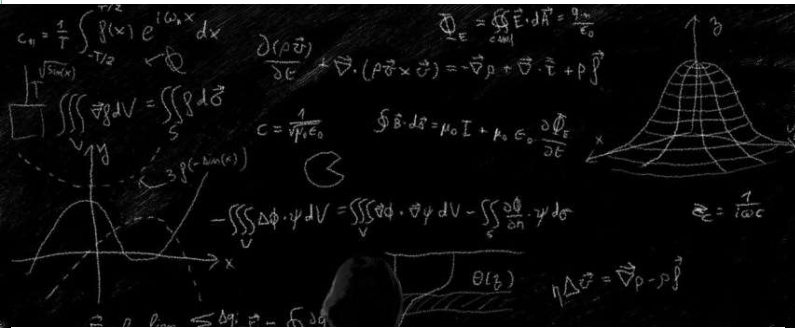
The goal of these lectures is to propose a (personal) view of some interesting research questions arising once dealing with interconnected systems; we will in particular be interested in the study of the *emergence* of *synchronous* behavior or on the other hand of *patchy*, i.e. *spatially heterogeneous*, solutions.

In the first part of these series of lectures, we will survey some basic results of dynamical systems theory, i.e., equilibria, their stability and bifurcation. The details provided in this first part will depend on the background of the students attending the lectures. Some notions of network theory will be provided and some of the most used models of network will be introduced and characterized (e.g., Erdős-Rényi, Small World, Scale Free). We will then introduce two interesting coupling among the basic units constituting the system, *long range interaction* and *diffusive-like interaction*. Starting from the behavior of the single isolated units we will study how the coupling will affect the global behavior and in particular the conditions ensuring the emergence of patchy solutions. We will conclude our lectures with some recent generalizations of network theory, where more complex structures have been considered to go beyond the pairwise interaction modeled by the network theory, e.g., multilayer networks, temporal networks and hypergraphs.

The second part of the course will focus on *synchronization of regular and chaotic dynamical systems* defined on top of complex networks and on graph-based methods for *multi-agent systems*. The major tool for the study of the stability of synchronization in complex networks (i.e., the master stability function) will be presented and then applied to paradigmatic examples. Then, synchronization in time-varying networks will be discussed. This is a particularly relevant case study where links may adapt in time as it occurs in many natural systems in response to different external conditions. The extension of the master stability function to such framework will be discussed and relevant examples of synchronization in adaptive networks and in networks of mobile agents will be dealt with. Finally, the course will discuss graph-based methods for multi-agent systems. In particular, typical multi-agent problems such as rendez-vous and formation control will be considered and solutions based on graph methods will be illustrated. Attention will be given to the communication protocols to set in order to reach the goals of the control, to the formalization of appropriate consensus methods to address these problems, and to simple models of interacting robots.

This interdisciplinary doctoral course is aimed at PhD and Master students of nonlinear dynamics and complex system; because of the presented subjects and of the possible applications, students from physics, biology, chemistry or economics are warmly invited to attend the lectures. Some basic mathematical knowledge is required, however the topics will be introduced such in a way that it can be understandable and enjoyable by every researcher interested in collective dynamics and complexity, with more focus on the bigger picture and less on technical details.

Registration is free of charge but mandatory for organizational reasons and can be done by writing to riccardo.muolo@unamur.be with your full name and affiliation **before 23 January 2022.*



Dans le cadre de l'Ecole Doctorale Thématique
« Didactique des disciplines » :
« **L'enseignement-apprentissage de
la géométrie** »

Lundi 7 février 2022, 18h-21h00

L'Ecole de Formation des Enseignants et la Faculté des Sciences de l'Université de Mons ont le plaisir de vous convier à une soirée de conférences proposée dans le cadre de l'Ecole Doctorale Thématique « Didactique des disciplines ». Destinée aux membres de l'école doctorale et ouverte à toutes autres personnes intéressées par l'évènement, l'objectif de cette soirée est notamment de proposer des pistes de travail concrètes permettant l'élaboration et l'analyse d'activités didactiques en géométrie.

Organisation en collaboration avec :

Conférencières



Sophie Soury-Lavergne
Institut français de l'Education,
Ecole normale supérieure de Lyon

Spécialité : Didactique des mathématiques et numérique en éducation



Céline Nihoul
Université de Mons

Département de logique mathématique
Spécialité : Didactique des mathématiques

Inscription gratuite mais obligatoire :

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En cas de question, vous pouvez envoyer un mail à l'adresse :
EFE-events@umons.ac.be

Cette soirée est proposée en présentiel (à l'UMONS) et via TEAMS. Plus d'informations vous parviendront, par courriel, la semaine précédant l'évènement.

Programme

En présentiel à l'Université de Mons (Campus de la Plaine de Nimy) ou en distanciel (lien fourni par courriel)

Dès 17.30h : Accueil

18h-18.10h : Introduction – **Natacha Duroisin (UMONS)**

18.10h : Intervention de **Sophie Soury-Lavergne (Ecole normale supérieure de Lyon)**

- Conférence intitulée "Ce que nous apprend la géométrie dynamique sur l'usage des technologies pour l'enseignement et l'apprentissage de la géométrie ».
- Questions -réponses

19.20h : Pause

19.40h : Conférence de **Céline Nihoul (UMONS)**

- Conférence intitulée "Les droites et les plans dans l'espace : quels impacts des pratiques enseignantes sur les apprentissages des élèves ? »
- Questions-réponses

20.50h : Conclusion et clôture

Comité d'organisation UMONS :

Stéphanie BRIDOUX, Faculté des Sciences
Natacha DUROISIN, Ecole de Formation des Enseignants
Patricia LAURENT, Ecole de Formation des Enseignants
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