

Newsletter

BELGIAN MATHEMATICAL
SOCIETY

121, January 15, 2019

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**

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The next edition of this newsletter will appear on March 15th, so from now till March 10th all content is welcomed very much at wendy.goemans@kuleuven.be.

The President's Foreword

Dear members of the BMS,

On behalf of the BMS board, I wish all our members a happy 2019. May it be a wonderful and successful year for all of you!

The new year brings a change in the Society's board, with some members having decided to step down after several years (and, in some cases, decades!) of faithful service. In the name of the Society I wish to thank them for their diligent and voluntary service to our Society! I also welcome and thank the new Board members who have accepted to fill the vacant spots. There has also been a permutation of roles at the head of the Board: I, Yvik Swan (ULiège), have now the honour of serving a 3-year term as the BMS President while our previous President, Philippe Cara (VUB) has accepted to continue taking part in guiding the society as its Vice-President. I am happy to write that Peter De Maesschalck (UHasselt) has also agreed to remain a member of the BMS triumvirate as the society's Secretary and Treasurer. I warmly thank Peter, Philippe and all the members of the BMS board, for generously offering their wisdom, knowledge, energy and time to the pursuit of the BMS' mission of serving the interests of Belgium's mathematical community.

With the new year, there are also three important news items to which I wish to draw the attention of our members. The first news is a sad one: unfortunately, as you most certainly all know, 2018 ended with the loss of one of Belgium's mathematical icons, namely professor Jean Bourgain. To commemorate this great mathematician, a "Bourgain day" will be organized later this year. As soon as more information on this is available, it will be posted on the BMS website¹. The next news is more mundane: as many of you are aware of, the BMS is on the brink of changing its status from an informal unincorporated association to an official ASBL/VZW. The completion of the change will be notified to you in a future bulletin and on the BMS website, where the new statutes will be made available. Our final news is festive: the BMS is soon to become a centenary association, and we are looking for ideas on how to celebrate this with appropriate pomp and circumstance. Please do not hesitate to send us your input!

To conclude, I take the opportunity to remind you that the Society is what you, Belgian's mathematical community, make of it. Therefore do not hesitate to take part in our different activities, and to suggest new initiatives that we, the BMS, could sponsor or help organize. Also do not hesitate to make publicity for our Society, by inviting anyone who is interested in mathematics to become members and follow us (via the website, the newsletter and also on Facebook).

I wish you all a very happy year, and look forward to seeing you soon at one of our future events.

Yvik Swan,
BMS President

Jean Bourgain

Jean Bourgain passed away on 22 December 2018 in Bonheiden at the age of 64, after losing his fight against cancer. Born in Ostend on 28 February 1954, he got a PhD from the VUB in 1977 under the supervision of Freddy Delbaen. He was a professor at the University of Illinois, Urbana-Champaign and, at the Institut des Hautes Études Scientifiques at Bures-sur-Yvette in France, and since 1994 at the Institute for Advanced Study in Princeton until 2018. He contributed to several areas of mathematics

¹bms.ulb.ac.be

such as harmonic analysis, number theory, and partial differential equations. His work was awarded some of the most prestigious prizes available, most notably the Fields Medal in 1994, the Shaw Prize in 2010 and the Breakthrough Prize in Mathematics in 2016. He became a baron in 2015.

Communicated by Adhemar Bultheel

1 News from the BMS & NCM

1.1 Bulletin of the Belgian Mathematical Society - Simon Stevin

In December 2018 Volume 25, Number 4 of the Bulletin of the Belgian Mathematical Society - Simon Stevin appeared with the following table of contents:

- **Xinjian Zhang, Long Miao, Jia Zhang** New criteria for p -nilpotency of finite groups. 481–493.
- **Xiaohong Zhang, Shenglin Zhou** Sporadic finite simple groups and block designs. 495–506.
- **Thibaut Dumont** Norm growth for the Busemann cocycle. 507–526.
- **Rosihan M. Ali, See Keong Lee, Saiful R. Mondal** Starlikeness of a generalized Bessel function. 527–540.
- **Yu Zhou, Zihou Zhang, Chunyan Liu** A note on the Vestfrid theorem. 541–544.
- **E. Jiménez Fernández, M. A. Juan, E. A. Sánchez Pérez** Regular methods of summability and the weak σ -Fatou property in abstract Banach lattices of integrable functions. 545–553.
- **Lixu Zhang, Yanhua Zhang** A new characterization of differences of weighted composition operators on weighted type spaces. 555–563.
- **Bang-Yen Chen** Two-numbers and their applications - A survey. 565–596.
- **Lili Chi, Jiancai Sun, Hengyun Yang** Super-biderivations and super-commuting maps on the topological $N = 2$ superconformal algebra. 597–609.
- **Daniel Pasca, Bogdan Mircea Tataru** Periodic orbits of the three dimensional logarithm galactic potential. 611–627.
- **Rainer Löwen** Compactness of the automorphism group of a topological parallelism on real projective 3-space: The disconnected case. 629–640.

For table of contents of previous issues, see <https://projecteuclid.org/euclid.bbms/1536631228>.

1.2 Membership dues for 2019

For members who haven't renewed their membership yet here again all information to do so is listed.

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

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

Our address is:

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

1.2.1 Reciprocity and combined membership

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

We summarize the most common combined memberships:

BMS	20,00€
BMS with reciprocity	18,00€
BMS + EMS	45,00€
BMS + EMS with reciprocity	43,00€

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.

For your convenience however, it is still possible to pay for a combined EMS+BMS membership (i.e. 45,00€) by bank transfer (BIC: GEBABEBB / IBAN: BE70 0011 7447 8525) or PayPal. We will then forward your EMS membership fee to the European Mathematical Society.

1.2.2 Checking your membership status

To check whether we have received your dues, go to our [online database](#).

Try typing your family name in the search box. If you agreed to have your institution and e-mail in our public database at the time you became a member, you will see your institution and e-mail address. You will also see the year in which you last paid your dues.

If you forgot to pay for more than one year, you will get no response from our database as you are not a member anymore! In this case we suggest you to re-apply for membership by filling out the online form at <http://bms.ulb.ac.be/membership/appliform.php> and transfer your membership fee asap.

2 News from the IMU

Dear colleagues,

The 7th Heidelberg Laureate Forum (HLF), see <http://www.heidelberg-laureate-forum.org>, will take place in Heidelberg, Germany during September 22-27, 2019.

At HLF all winners of the Fields Medal, the Abel Prize, the ACM A.M. Turing Award, the Nevanlinna Prize, and the ACM Prize in Computing are invited to attend. In addition, young and talented computer scientists and mathematicians are invited to apply for participation. The previous HLFs have been an exceptional success. The HLF serves as a great platform for interaction between the masters in the fields of mathematics and computer science and young talents.

Applications for participation at the 7th HLF are open in three categories: Undergraduates, PhD Candidates, and PostDocs. See the webpage

https://application.heidelberg-laureate-forum.org/intern/reg_nom_registration_for.php

for the online nomination form. Please note that in compliance with German data protection law all previous login information and nominator accounts were deleted.

The IMU Adhering Organizations and national mathematical societies can nominate young researchers. Nominated persons get “priority treatment”, but, since there may be too many nominations, they have no acceptance guarantee. During the nomination process you will be asked for an Org-ID, which is IMU39514 for the IMU. **The deadline for application is February 15, 2019.**

IMU asks its Adhering Organizations to distribute this information among their national mathematical communities, if possible, through the newsletters of the national mathematical societies.

The HLF was initiated by the late German entrepreneur Klaus Tschira, and is supported by the Klaus Tschira Foundation, The Norwegian Academy of Science and Letters, The Association for Computing Machinery, as well as The International Mathematical Union.

Regards

Helge Holden

Prof. Helge Holden

Secretary General of the International Mathematical Union

<http://www.mathunion.org>

Phone:+47-92038625

3 Meetings, Conferences, Lectures, ...

3.1 Conferences

3.1.1 June 2019

Nielsen Theory and Related Topics

June 3-7, 2019

Kortrijk (Belgium)

The research group “Algebraic Topology and Group Theory” of the KU Leuven Campus Kulak Kortrijk is organizing the next “Nielsen Theory and Related Topics” conference.

At the first day of this meeting there will be special colloquium style lectures, aimed at non-specialists, by

- Iván Sadofschi Costa (Universidad de Buenos Aires, Argentina)
- Tatiana Fomenko (Moscow State University, Russia)
- John Guaschi (Université de Caen Normandie, France)
- Kate Ponto (University of Kentucky, United States of America)

Everybody is cordially invited to participate in the whole conference or to come over for the first day only.

More information can be found on the website <https://www.kuleuven-kulak.be/nielsen>.

Groups, Rings and Associated structures

June 9-15, 2019

Spa, Belgium

This is a first announcement of the International Conference on “Groups, Rings and Associated structures”, June 9 -15, 2019, Spa, Belgium.

Registration is open and should be done online via the conference website:

<http://homepages.vub.ac.be/~abachle/gras2019/>

Email contact address: Doryan Temmerman Doryan.Temmerman@gmail.com

The international conference concentrates on recent developments in the areas of ring theory and group theory, with a focus on the interplay between these fields of mathematics, the methods involved in their study and applications to other areas. Some topics of interest are representations of groups and algebras, finitely presented algebras, group rings, unit groups and algebraic structures related to solutions of the Yang-Baxter equation.

Organising Committee:

- Ferran Cedó (Universitat Autònoma de Barcelona, Spain),
- Eric Jespers (Vrije Universiteit Brussel, Belgium),
- Jan Okninski (Uniwersytet Warszawski, Poland),
- Michel Van den Bergh (FWO, Universiteit Hasselt, Belgium).

Scientific Committee:

- Eli Aljadeff (Technion, Israel),
- Ferran Cedó (Universitat Autònoma de Barcelona, Spain),
- Eric Jespers (Vrije Universiteit Brussel, Belgium),
- Jan Okninski (Uniwersytet Warszawski, Poland),
- Angel del Río (Universidad de Murcia, Spain),
- Spela Spenko (Vrije Universiteit Brussel and Université Libre de Bruxelles, Belgium),
- Michel Van den Bergh (FWO, Universiteit Hasselt, Belgium).

Local Organising Committee: Andreas Bächle, Mauricio Caicedo, Geoffrey Janssens, Ann Kiefer, Lukasz Kubat, Leo Margolis, Doryan Temmerman, Arne Van Antwerpen, Charlotte Verwimp.

Keynote Speakers (all confirmed):

- Florian Eisele (City, University of London, UK),
- Andrei Jaikin-Zaipirain (Autonomous University of Madrid, Spain),
- Radha Kessar (City, University of London, UK),
- Gunter Malle (Technische Universität Kaiserslautern, Germany),
- Volodymyr Mazorchuk (Uppsala University, Sweden),
- Claudio Procesi (Universita degli Studi di Roma, Italy),
- Wolfgang Rump (University of Stuttgart, Germany),
- Agata Smoktunowicz (Univeristy of Edinburgh, UK),
- Britta Späth (Bergische Universität Wuppertal, Germany),
- Leandro Vendramin (University of Buenos Aires, Argentina).

Invited Speakers (all confirmed)

- Silvio Dolfi (Universita degli Studi di Firenze, Italy),
- Be'eri Greenfeld (Bar Ilan University, Israel),
- Urban Jezernik (University of the Basque Country, Spain),
- Wolfgang Kimmerle (University of Stuttgart, Germany),
- Frieder Ladisch (University of Rostock, Germany),
- Victoria Lebed (University of Caen, France),
- Markus Linckelmann (City, University of London, UK),
- Sugandha Maheshwary (IISER, Mohali, India),
- Ofir Schnabel (Haifa University, Israel),
- Johan Öinert (University West, Sweden),
- Doryan Temmermann (VUB, Brussels, Belgium),
- Joan Tent (University of Valencia, Spain),
- Jacques Thevenaz (EPFL, Switzerland),
- Arne Van Antwerpen (VUB, Brussels, Belgium),
- Carolina Vallejo (ICMAT, Madrid, Spain),
- Thomas Weigel (Universita di Milano-Bicocca, Italy),
- Pavel Zalesskii (Universidade de Brasilia, Brazil).

There will be the opportunity for Ph.D. students and Post-Doctoral Fellows to present a fascinating aspect of their research in a short freestyle lecture in the 10 MINUTS section: This stands for 10 Minutes of Interesting, New, UnTechnical Science. There will also be a poster session to which everybody can contribute.

The conference will take place in the thermal resort "Domaine Sol Cress" in Spa, Belgium. There will be on site full board accommodation.

The price per person per day is (except for the keynote speakers)

- 90 Euro (single room),
- 84 Euro (double use of room),
- 70 Euro (triple use of room),
- 60 Euro (quadruple room).

The arrival date is Sunday June 9 and the departure day is Saturday June 15, 2019. Lectures will finish late Friday June 14.

For more information we refer to the website <http://homepages.vub.ac.be/~abachle/gras2019/>

A poster of the conference can be downloaded from the webpage: http://homepages.vub.ac.be/~abachle/gras2019/poster_GRAS2019.pdf

Email contact address: Doryan Temmerman Doryan.Temmerman@gmail.com

Please feel free to forward this information to anyone interested.

Sincerely,
Eric Jaspers (for all organisers)

Finite Geometry and Friends

June 17-21, 2019

Brussels, Belgium

We are happy to officially announce the summer school “Finite Geometry and Friends”, to be held in Brussels, 17-21 June, 2019.

This summer school will be centered around lectures given by

- Aida Abiad (University of Maastricht, The Netherlands)
- Nicola Durante (Universita degli Studi di Napoli, Federico II, Italy)
- Francesco Pavese (Politecnico di Bari, Italy)
- Geertrui Van de Voorde (University of Canterbury, Christchurch, New Zealand)

Each of these will deliver four hours of lectures on topics in their domain of expertise. Attending students and researchers will encounter a variety of topics, including algebraic graph theory and applications, blocking sets, linear sets, subspace and MRD codes and groups acting on geometries.

Complementary to the lectures, the schedule will include exercises on the lecture material, open problem sessions, introductory GAP sessions and room for contributed talks.

The official registration for the summerschool will be opened in February 2019. We expect that the registration fee will be about 150 euro. More practical information can be found on the website <http://summerschool.fining.org>.

We hope to see you in Brussels this summer,

Jan De Beule
Sam Mattheus

Supported by FWO and the NSE Doctoral School.



3.1.2 July 2019



Equadiff 2019

July 8-12, 2019

Leiden (The Netherlands)

Leiden is proud to host Equadiff 2019 in its historic town center.

Equadiff is a series of major international conferences on dynamical systems, ordinary and partial differential equations, and applications, which are held every second year in various countries of Western and Eastern Europe. Recent locations include **Bratislava** (2017), **Lyon** (2015), **Prague** (2013), **Loughborough** (2011), **Brno** (2009), **Vienna** (2007), **Bratislava** (2005), and **Hasselt** (2003).

The next Equadiff conference will take place from **July 8 to 12, 2019 at Leiden University**, the Netherlands. Please consult the website

<https://www.universiteitleiden.nl/equadiff2019>

for the plenary speakers, the invited minisymposia and further information. Registration is open.

POSTERS

There will be a poster session on Tuesday evening, 9 July.

CONTRIBUTED TALKS

A limited number of slots are available for contributed talks. People interested to present a poster or give a contributed talk should submit their abstract on the conference's website before February 15, 2019. Acceptance letters will be sent before April 15, 2019.

EARLY BIRD FEES

For all participants, early bird registration fees are available until May 31, 2019.

We are looking forward to seeing you in Leiden!

The local organizing committee,
Martina Chirilus-Bruckner
Arjen Doelman
Hermen Jan Hupkes
Vivi Rottschäfer

4 PhD theses

A study of topological properties in approach theory using monoidal topology

Karen Van Opdenbosch, joint PhD Vrije Universiteit Brussel and Universiteit Antwerpen

February 1, 2019, at 15:00

Auditorium D.2.01 at the Campus Humanities, Sciences and Engineering

Vrije Universiteit Brussel, Pleinlaan 2, 1050 Elsene

Thesis advisors: Eva Colebunders (Vrije Universiteit Brussel), Bob Lowen (Universiteit Antwerpen) and Mark Sioen (Vrije Universiteit Brussel)

Summary

Mathematical models involving metric spaces are used in many branches of science. Metric spaces (X, d) with X a set and d a metric, provide the possibility of expressing convergence of a sequence $(x_n)_n \rightarrow x$ in X , while at the same time having the power to express numerical data such as calculating how far a point y is from being a convergence point of $(x_n)_n$. The most important example is the real line \mathbb{R} endowed with the Euclidean metric d_E .

When also realvalued functions $f : Z \rightarrow \mathbb{R}$ have to be modeled, with convergence of sequences $(f_n)_n \rightarrow f$ in $X = \mathbb{R}^Z$, like for instance pointwise convergence, function spaces are needed. One can express pointwise convergence by using an appropriate topology on \mathbb{R}^Z but there is no canonical metric describing this convergence. While the topology describes the right convergence notion, all numerical data is lost, so one drops from the numerical setup of (\mathbb{R}, d_E) to a non-numerical topological setup in \mathbb{R}^Z .

Approach theory completely solves this. Instead of axiomatizing the distance $d(x, y)$ between points of X (like in a metric space), approach theory provides axioms for a distance $\delta(x, A)$ between points x and subsets A of X . Starting with the Euclidean metric d_E on \mathbb{R} and its associated distance $\delta_E(x, A) = \inf_{a \in A} d_E(x, a)$, a canonical distance $\delta(f, \mathcal{A})$ from a function f to a subset \mathcal{A} of \mathbb{R}^Z does exist, having the capacity to describe pointwise convergence $(f_n)_n \rightarrow f$ in $X = \mathbb{R}^Z$ and having the power to express numerical data, such as calculating how far a function g is from being a convergence point of $(f_n)_n$.

Similar principles have proved useful in such diverse areas as functional analysis, probability theory and theoretical computer science, meriting a deeper study of the theoretical foundations of the theory.

As such the thesis studies possible links between approach theory and monoidal topology, a research area providing a unifying framework on how to axiomatize “spaces” in terms of convergence. We look for appropriate monads and quantales to describe the category of approach spaces and its subcategory of non-Archimedean spaces and investigate convergence of functional ideals, which is the key to our description of approach spaces as relational algebras for the functional ideal monad. This description is the main instrument for an in depth study of new approach invariants.

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

5.1 Why did we live almost 200 years with the wrong face of Legendre?

Why did we live almost 200 years with the wrong face of Legendre?

Alphonse Magnus,
Institut de Mathématique Pure et Appliquée,
Université catholique de Louvain,
Chemin du Cyclotron,2,
B-1348 Louvain-la-Neuve
(Belgium)
alphonse.magnus@uclouvain.be ,

<http://perso.uclouvain.be/alphonse.magnus>

This version: January 15, 2019 (incomplete and unfinished)

Legendre hated posing for pictures and we have (almost) no image of him. Many historians thought to have a valid portrait, but it shows Louis Legendre, a political boss of the French revolutionary period. All is explained in [1].

If we look at the pictures² shown in [1], Louis L. seems rather gullible, well, not so smart. Perhaps he was, but the mistake of assigning this face to the mathematician was so obvious, considering the number of blunders fathered by (our own) Legendre in history:

1. Poor insight in his treatment of elliptic integrals almost immediately nullified by Abel and Jacobi innovations.
2. Inappropriate reception of Abel precisely (other French demigods, such as Cauchy and Poisson, performed not better).
3. Work on proof of the parallel postulate when non Euclidean geometry was taking full speed.
4. Pathetic priority quarrels with Gauss about quadratic residues theory and least squares method.
5. Least squares, precisely: a not very inspired fit to the number of prime numbers $\leq x$ led Legendre to the estimate

$$\frac{x}{\log x - 1.08366}, \text{ for large } x.$$

With much deeper insight, Gauss had already understood the importance of the integral $\int_2^x \frac{dt}{\log t}$, easily expanded as $\frac{x}{\log x} + \frac{x}{\log^2 x} + \frac{2x}{\log^3 x} + \dots = \frac{x}{\log x - 1} + O(x/\log^3 x)$, enough to make fun of this preposterous 1.08 etc. [3, pp. 4-8 and 37-41].

²Also p.571 of D.M. Burton's *The history of mathematics, an introduction*, McGraw-Hill 2006, quoting D. Struik's *A concise history of mathematics*, Dover 1967. The wrong face is also in p. 488 of D.E. Smith's *History of mathematics vol.1*, Ginn 1923 = Dover 1958.

It is so unfair, there is not a single mistake in the published Legendre writings which are of first rank. For instance, his textbook on geometry is a landmark in the teaching of the subject, despite his trials (honestly stated) to prove the parallel postulate. He had a friendly correspondence with Jacobi. Gauss published few and late, and could be unfair.

Finally, WE were the gullible not so smart people involved here!

By a kind of strange symmetry, many works of Blaise Pascal are shown with the face of ... L. Lemaistre de Sacy painted by Philippe de Champaigne. No mistake, and no fraud here, but we have almost no true portraits of Pascal (same reason [4]), and Champaigne's masterpiece is so telling! Pascal, Sacy, and Champaigne were friends at Port-Royal [2], maybe Pascal agreed to the confusion?

And we just hear of a similar glitch about T. and V. van Gogh! (29 Nov. 2018)

<https://www.nytimes.com/topic/person/vincent-van-gogh>

Acknowledgments.

Many thanks to Thierry De Pauw for kind words, and critical reading of the manuscript.

References

- [1] Peter Duren, Changing Faces: The Mistaken Portrait of Legendre, Notices of the AMS Volume 56, Number 11 (2009) 1440-1443 and 1455,
<https://www.ams.org/journals/notices/200911/200911-about-the-cover.pdf>
<https://www.ams.org/journals/notices/200911/noti-dec09-cov1.pdf>
<https://www.ams.org/journals/notices/200911/rtx091101440p.pdf>
- [2] Kelson *et al.* Louis-Isaac Lemaistre (ou Lemaître), sieur de Sacy,
https://wikimonde.com/article/Louis-Isaac_Lemaistre_de_Sacy
- [3] E. Landau, Handbuch der Lehre von der Verteilung der Primzahlen, vol. 1, Teubner 1909.
- [4] Yves Morvan, Images anciennes et nouvelles de Blaise Pascal, *Courrier du Centre international Blaise Pascal* [En ligne], 13 , 1991
<http://ccibp.revues.org/628>

5.2 Universiteit Vlaanderen

An interesting recommendation Joost Vercruyse: recently some videos (in dutch) of David Eelbode, Isar Goyvaerts, Giovanni Samaey, Thomas Neyens, Rudi Penne and Paul Levrie popularizing mathematics appeared on "Universiteit Vlaanderen".

See <https://www.universiteitvanvlaanderen.be/college/> (select as "thema" "alles is wiskunde").

5.3 Adhemar's corner

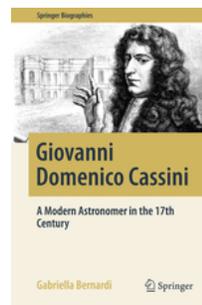
This issue's review of Adhemar is on a biography of the Italian mathematician who became astronomer of the Observatoire in Paris.

Giovanni Domenico Cassini by *Gabriella Bernardi*. Springer International Publishing, 2017, isbn 978-3-319-63467-8 (hbk) xi+186 p.

Gabriella Bernardi has a physics degree but is now a science writer, with some specialisation in astronomy. She wrote several books on this topic, among which *The Unforgotten Sisters. Female Astronomers and Scientists before Caroline Herschel* (Springer 2016) in which she gives 25 biographies of famous female scientists, mostly astronomers of the past 4000 years.

In the current biography she focusses on Giovanni Domenico Cassini, also known as Jean-Dominique Cassini, or Cassini I, since he was born Italian in 1625 in a small village Perinaldo in the North-West of Italy near the French border, not far from Nice, but later moved to France and he was naturalized with all the privileges of a French born citizen. He is the founder of a dynasty of French astronomers and scientists.

Cassini was educated by Jesuits and was first employed at the observatory of Marquis Malvasia. Simultaneously he became a professor of astronomy in the university of Bologna in 1650-51 where he replaced Cavalieri, who was a student of Galilei, and had died in 1647. He published his observations of the comet passing by in 1652-53 which brought him some fame. On the floor of the nearby Basilica of San Petronio in Bologna, Ignazio Danti had a meridian constructed in 1575-76 to compute the Earth's orbit around the sun for introduction of the Gregorian calendar. A pinhole was made in the roof and



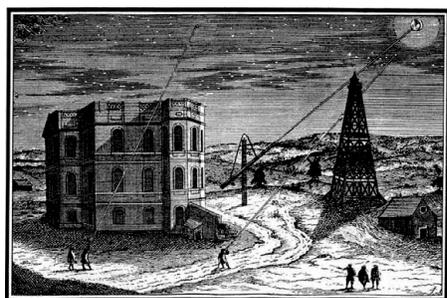
Gabriella Bernardi

an oval light spot was projected on the floor. The spot changed with the Earth moving on its planetary orbit. In 1655 Cassini was asked to build a new meridian. The improved results confirmed Kepler's second law. With Galileo's trial 23 years earlier, it was still dangerous in Italy to defend the heliocentric system and Cassini remained indecisive on the topic. Until today the meridian of 67.72 m is still to be seen in the Basilica (see picture).



Giovanni Cassini Meridian in San Petronio

The Pope appointed Cassini in 1657 as Superintendent of Public Waters for the region which involved to maintain the direction and flow of the waters and the maintenance of the bridges. That was highly time consuming but Cassini continued doing astronomical observations with improved telescopes. He investigated the moons of Jupiter, he coined the term zodiacal light (a faint glow visible at night caused by light from the Sun scattered by dust particles), and he worked on the important practical problem of defining the longitude of a place on Earth. His method relied on the fact that the time that a moon disappearing behind Jupiter depended on the longitude from where it was observed. The longitude problem was only solved at the end of the 17th century when John Harrison invented a portable clock¹.



Paris Observatory

In 1668 Cassini was invited by Louis XIV and his prime minister Colbert to supervise the construction of a new observatory for the newly founded *Académie Royale des Sciences* in Paris. Cassini immediately objected against the plans of Claude Perrault because three big towers jutting out of the building were hindering the astronomical observations, but because his French at his arrival was very poor his advise was ignored. The *Observatoire* marked also the Meridian of Paris. The building can be seen in the background of Cassini's portrait above and on the left we see also the Marly Tower which was an hydraulic machine to pump water from the Seine to deliver it to the Palais de Versailles, but Cassini had it moved so that he could attach lenses to it to obtain a long aerial telescope. The larger the instrument, the more precise the observations that it delivered.

¹See the book *Longitude* by Dava Sobel reviewed earlier in this Newsletter.

Christiaan Huygens who was president of the Académie worked also at the observatory. He was a solitary aristocrat, a theoretical genius which was almost the opposite of Cassini who was much more of a socializing man who spent much time in consistently making observations for several days in a row. Cassini made observations of sunspots and of Saturn along with Huygens. The latter is the reason why the Saturn probe launched in 1997 was called the Cassini-Huygens mission. The largest gap in the rings of Saturn is also called the Cassini gap.



Meridian of Paris at the observatoire today

While his original visit in 1669 was planned to last only for a short time, he stayed for the rest of his career. Cassini's French improved, also because the publications of the Académie had to be in French. He became a French citizen in 1673, and changed into Jean-Dominique. That same year he married the noble Geneviève de Laistre. Louis XIV himself attended the wedding. He had two sons, both mathematicians, Jean-Baptiste (who died in the battle of La Hogue in Normandy during the Spanish Succession War) and Jacques who became astronomer and was known as Cassini II. Although the observatory has no official director, it was Cassini who organized the observations. It was only in 1771 that his grandchild Cassini III became an official director.



Iconic picture of Jupiter's moon Io, taken by the Cassini probe in 2001

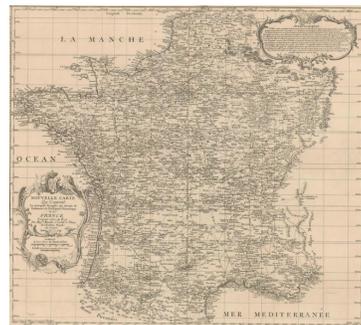
Immediately after his arrival in Paris, Giovanni Cassini also collaborated with Jean Picard who was compiling a topographical map of France. It took four generations of the Cassini family to finish the Cassini map in 1744 that consisted of 182 sheets that could be joined to form a big map of France. Together with Picard, Cassini was also involved in measuring the meridian of Paris and in so doing computing the meridian of the Earth. In 1671 Picard presented his *Mesure de la terre* to the Académie². Cassini also made a very detailed map of the Moon. Near the end of his life in 1711 Cassini was blind, he died in 1712 at the age of 87.

became associated with the Paris Observatory. Three Maraldis, (again numbered I-III) are also briefly discussed by Bernardi.

Bernardi continues to briefly describe the Cassini dynasty, all of them were astronomers conveniently numbered from Cassini I (Giovanni Domenico) up to Cassini V, although the latter became a botanist. Giovanni had a nephew Giacomo Filippo Maraldi who became involved and also the Maraldi family



The Moon



Cassini map of France

The book is a very readable account of the achievements of Cassini (and there are many more than what is mentioned in my brief summary). She gives many quotes in French from the letters and biographies that were written by the Cassini dynasty, many of them are from Giovanni Domenico. The English translations are immediately following the quote. In appendices also an Italian poem *Frammenti di Cosmographia* by Giovanni is found, which is apparently dedicated to Christina, Queen of Sweden.

Another appendix in French is about the construction of the Observatoire in Paris. Yet another French text is an obituary of Jean-Dominique Maraldi, also born in Perualdi, an astronomer of the Maraldi dynasty. The exhaustive time line with events from Cassini's life and his scientific achievements is most informative.

A peculiarity is that Bernardi gives the facts in every chapter, but always ends each chapter with a paragraph called "Curiosities" in which she gives some side remarks or an anecdote or some background information.

Adhemar Bultheel

²See *The Measure of the World* by Denis Guedj (2001) reviewed earlier in this Newsletter: issue 47, 2003.