

## BELGIAN MATHEMATICAL SOCIETY

Comité National de Mathématique CNM

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NCW Nationaal Comité voor Wiskunde



### **BMS-NCM NEWS: the Newsletter of the Belgian Mathematical Society and the National Committee for Mathematics**

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**BMS-NCM NEWS**

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No 45, November 15, 2003



## 1 BMS membership dues for 2004

For details on membership fees and reciprocity agreements, see the leaflet included at the end of this Newsletter.

## 2 News from the BMS

During the last meeting of the BMS Committee (September 27, 2003), the following items were discussed.

- The final version of a letter expressing the concern of the BMS and the NCM about the use of the Science Citation Index and Impact Factors for the evaluation of mathematical research was discussed. The letter can be found at the end of this Newsletter. It is also available on the BMS website <http://bms.ulb.be/> or directly via <http://bms.ulb.be/documents/scieng.pdf>.

The letter was mailed to all the persons in charge of the evaluation of mathematical research in Belgium.

- It has been suggested that at the joint Benelux-France meeting (Gent, 20-21 May 2005) the suggestions would be as follows
  1. Geometry (Differential Geometry, Algebraic Geometry)
  2. Applied Mathematics (Mathematical Statistics, Coding Theory)
  3. Analysis (Harmonic Analysis, PDE)
  4. Foundations of mathematics (Mathematical Education, Computer Science)
  5. Algebra (Non-Commutative Algebra, Model Theory)
- In view of the joint meeting planned for 2005, a short history of the SMF was published in our previous Newsletter. In return, the short history of the BMS by Luc Lemaire that was originally published in the EMS Newsletter (see <http://bms.ulb.be/cgi/history.php>) will be translated and sent to the other participating societies for publication in their respective newsletters.

The next meeting of the Executive Committee is scheduled on January 10, 2004.

## 3 Other news

- The EMS launches a new call for proposals for three activities<sup>1</sup>: EMS lectures, mathematical joint weekends, and summer schools. Those who are interested in taking initiatives are invited to contact Luc Lemaire (ULB, e-mail: [llemaire@ulb.ac.be](mailto:llemaire@ulb.ac.be), téléphone: +32 2 650 5837). There is a (provisional) deadline: February 20 2004. For more details see EMS Newsletter 49, EMS News, page 4, and the URL: <http://www.emis.de/newsletter/current/index.html>.

The members of the BMS are urged to think about using these initiatives for the 2006 BMS meeting. This matter will be discussed further during the next meeting of the Committee in January.

- The study day on Genomics (October 18, 2003) was very successful. There were more than 55 participants. The speakers presented an interesting and useful survey of a number of relationships that exist between the study of mathematics (dynamical systems, statistics, bioinformatics, genotypes, codon bias, ...)

Some of the transparencies and more details can be found on the web site:

<http://www.cs.kuleuven.ac.be/conference/genomics/>

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<sup>1</sup>also see another item in this Newsletter

## 4 Meetings, seminars, conferences

### 4.1 November 2003

#### Hopf Algebra Workshop

November 13, 2003

Vrije Universiteit Brussel



- 10.00-10.50 Constantin Nastasescu (University of Bucharest)  
*Localization in coalgebras. Applications to finiteness conditions.*
- 11.10-12.00 Artur Ruuge (Universiteit Antwerpen)  
*Semiclassical Approximation and the Problem of Hidden Variables in Quantum Statistics*
- 12.00-14.00 lunch
- 14.00-14.50 Daniel Bulacu (University of Bucharest)  
*Factorizable quasi-Hopf algebras. Applications.*
- 15.20-16.00 Stefaan Caenepeel (Vrije Universiteit Brussel)  
*Monoidal Categories and Turaev group coalgebras*

The morning lectures will take place at auditorium D007 (building D).  
The afternoon lectures take place at K3 (building K, second floor).

This workshop is supported by the bilateral project "Hopf algebras in Algebra, Topology, Geometry and Physics" of the Flemish and Romanian Governments.

Everybody interested is cordially invited. Lunch will be offered to participants who register in advance at scaenepe@vub.ac.be.

### Groups and Geometries: a tribute to Francis Buekenhout

Université Libre de Bruxelles, November 21-22, 2003

The invited speakers are

Arjeh Cohen : Filtration in geometry

Dan Hughes : Fifty years of our mathematics

Antonio Pasini : Flag-transitive linear-dual linear geometries: a survey

Ernie Shult : The axiomatic nature of geometry: what Francis Buekenhout taught me

Jef Thas : Generalized polygons in finite projective spaces

Jacques Tits : Automorphism groups of unitals

More details, including the schedule of the lectures, is available at the following WWW address:  
<http://cso.ulb.ac.be/dleemans/conf/>

On the evening of Friday 21, there will be a conference dinner. The fee should be around 40 euros per person.

If you wish to participate to the conference, please send an email to Dimitri Leemans (dleemans@ulb.ac.be) before October 31st, 2003. In case you intend to come to the conference dinner, please inform us explicitly in your email.

Hoping to see you then,

The organizers,  
J.-P. Doignon, J. Doyen, M. Dehon,  
D. Leemans, B. Mühlherr, J.-P. Tignol.

## 4.2 December 2003

### Meta-modelling and related topics

University of Antwerp, December 4, 2003

In the framework of the Scientific Research Network “Advanced Numerical Methods for Mathematical Modelling”, we are pleased to announce a one-day seminar on *Meta-modelling and related topics*.

When? December 4, 2003

Where? University of Antwerp, Campus Middelheim, Building G

For the list of speakers, abstracts and additional information, please visit

<http://win-www.ruca.ua.ac.be/u/cant/wog/>

Everyone is cordially invited! If you plan to attend, we kindly ask you to register at the above website before December 1, 2003. This enables us to make the required lunch reservations.

Hope to see you on December, 4!

Annie Cuyt, Brigitte Verdonk, Tom Dhaene

### Aspects of contemporary topology

Universities of Antwerp (UA) and Brussels (VUB), December 14-19, 2003

The workshop Aspects of contemporary topology will be organized at the universities of Antwerp (UA) and Brussels (VUB) from December 14-th to December 19-th, 2003

The workshop is supported by the Bilateral Scientific and Technological Cooperation research project of the Flemish and South African governments (BIL02/SA/37) and by the FWO Research Network WO.001.96N. Part of the scientific event also fits into the doctoral program Categorical Methods in Algebra and in Topology, organized between the universities of Antwerp and Brussels.

Local Organizing committee: Mark Sioen (VUB), Eva Colebunders (VUB), Bob Lowen (UA) Advisory committee: Hans-Peter K<sub>n</sub>zi (UCT), David Holgate (USt), Guillaume Br<sub>m</sub>mer (UCT)

Main Topics are:

- Non Symmetric Topology
- Closure Operators
- Pointfree Topology
- Choice Principles
- Approach Theory
- Categorical Methods in Algebra, Topology and Functional Analysis

During the workshop some specific and selected topics will be treated in more detail through several lectures and will be oriented to a broader audience of young researchers. The invited speakers for these lectures are:

- Walter Tholen:
  - Lax algebraic methods in general topology
  - Intrinsic categorical topology
- Horst Herrlich:
  - Some thoughts about the axiom of choice I and II
- Bernhard Banaschewski:
  - Uniformity in pointfree topology
  - Function rings in pointfree topology

For further information please contact one of the local organizers Mark Sioen (VUB) at msioen@vub.ac.be, Eva Colebunders (VUB) at evacoleb@vub.ac.be, Bob Lowen (UA) at rlow@ruca.ua.ac.be

Participants (as presently known)

Banaschewski Bernhard, Bentley Lamar, Blasco Nieves, Borceux Francis, Brummer Guillaume, Clementino Maria Manuel, Claes Veerle, Deses Didier, Desmet Lieven, Gerlo An, Gilmour Chris, Giuli Eraldo, Ghosh Partha P., Heikyung Lee, Hendrickx Geert, Herrlich Horst, Holgate David, Hoffmann Dirk, Husek Mirek, Kuzni Hans-Peter, Marcus Nizar, Matutu Phethiwe P., Naidoo Inderasan, Peeters Werner, Picado Jorge, Porst Hans-E, Preuss Gerhard, Pultr Ales, Pumpeln Dieter, Richter Gunter, Tholen Walter, Vitale Enrico, Van Olmen Christophe, Verwulgen Stijn, Vroegrijk Tom.

### 4.3 April 2004

#### Joint Conference: BMS with Koninklijk Wiskundig Genootschap (The Netherlands)

Tilburg, April 16-17, 2004

On April 16 and 17, 2004 there will be a conference organized jointly by the *Belgian Mathematical Society* and the Dutch *Koninklijk Wiskundig Genootschap*. It will take place at the University of Tilburg. For the Dutch, it will count as the 40th *Dutch Mathematical Congress*.

The main speakers will be

- \* **Neil Sloane** (AT & T), in the area of *Integral Sequences*;
- \* **Bernard De Baets** (Ghent University), in the area of *Fuzzy Mathematics*;
- \* **Stef Tijs** (University of Tilburg), in the area of *Game Theory*.

There will also be three special lectures:

- \* The so-called *Beegerlezing* will be given by **Manjul Bhargava** (Princeton University), about *Number Theory*;
- \* **Casper de Vries** (Erasmus University Rotterdam) will give a *Mathematical Auction Lecture*;
- \* **Ben van der Genugten** (University of Tilburg) will lecture on *Gambling*.

Furthermore there are fourteen Mini Symposia (Optimization, System Theory, Statistics, Social Choice Theory, Discrete Mathematics, Mathematics Applied, Computer Algebra and Computer Geometry, Partial Differential Equations, Game Theory, Cryptography, Numerical Mathematics, Didactics, Incidence Geometry, Number Theory).

There will also be a number of short communications, and an organized session for Ph.D.-students to present their work.

For more and up-to-date information, we refer to the Web Site <http://www.uvt.nl/nmc2004>.

### 4.4 June 2004

#### Functional Analysis, FNRS Contact Group

Han/Lesse, June 7-8 2004

The next Han-sur-Lesse meeting on “Functional Analysis and Partial Differential Equation” is foreseen on June 7–8 2004 (contact: F.Bastin@ulg.ac.be, jpschneiders@ulg.ac.be, J.Schmets@ulg.ac.be).

#### Third Croatian Congress of Mathematics

Split, Croatia, June 16-18 2004

I am glad to inform you that the Third Croatian Congress of Mathematics will held in Split, Croatia, June 16-18 (<http://www.pmfst.hr/congress/>). We would like to have our Congress with a strong international component.

Nikica Uglesic  
President of the Scientific Committee.

## 5th International Conference on Functional Analysis and Approximation Theory

Maratea, June 16-23, 2004

Organizing Committee: F. Altomare, A. Attalienti, L. D'Ambrosio, M. Campiti, S. Diomedede, G. Mastroianni, D. Occorsio, M. G. Russo.

The meeting will be devoted to some significant aspects of contemporary mathematical research on Functional Analysis, Operator Theory and Approximation Theory including the applications of these fields in other areas such as partial differential equations, integral equations, numerical analysis and stochastic analysis.

See the pages <http://www.dm.uniba.it/faat2004> and <http://www.dm.unile.it/faat2004>

### Colloque d'analyse non linéaire

En l'honneur de Haim Brezis, à l'occasion de son soixantième anniversaire.

Paris, du 21 au 25 juin 2004

Dates et lieu: du 21 au 25 juin 2004. Le Carre des Sciences, rue de la Montagne Sainte Genevieve, 75005 Paris.

Conférenciers: A. Aftalion, L. Ambrosio, G.I. Barenblatt, F. Bethuel, J. Bourgain, X. Cabre, L. Caffarelli, A. Chang, Y. Choquet-Bruhat, P. Constantin, L.C. Evans, F. Hamel, S. Klainerman, J.-F. Le Gall, Y.Y. Li, E.H. Lieb, F.-H. Lin, P.-L. Lions, H. Matano, Y. Meyer, M. Mimura, S. Muller, N. Nadirashvili, F. Otto, S. Serfaty, G. Sivashinsky, E. Stein.

Renseignements: <http://www.ann.jussieu.fr/HB2004/> Contact : [hb2004@ann.jussieu.fr](mailto:hb2004@ann.jussieu.fr)

Inscription gratuite mais souhaitée (via adresse internet ci-dessus).

Comité d'organisation: H. Berestycki, M. Bertsch, M. Chipot, M. Comte, J.-M. Coron, I. Diaz, Y. Maday, I. Shafrir, D. Smets, L. Veron.

Comité scientifique: A. Ambrosetti, A. Bahri, H. Berestycki, J.-P. Bourguignon, F. Browder, J.-M. Coron, G. Da Prato, M. Giaquinta, D. Kinderlehrer, L. Nirenberg, B. Peletier, J. Serrin, R. Temam.

## 4.5 September 2004

### Tenth Mons theoretical computer science days

University of Liège, 8-11 September 2004

Theme: Some aspects of theoretical computer science and discrete mathematics related to combinatorics on words (in the broad sense).

Scopes: This conference is widely open to young researchers. Notice that English and French are the two official languages of the meeting.

Topics: combinatorics on words (including algebraic and algorithmic aspects), all aspects of formal languages theory, variable length codes, automata theory and verification.

Main Speakers: J. Cassaigne, D. Caucal, C. Frougny, T. Helleseth, S. Langerman, F. Neven, M.-F. Sagot.

Call for papers: please check the webpage.

Organisers: J. Berstel, V. Bruyère, P. Lecomte, M. Rigo.

Location: Institute of Mathematics, University of Liège (Belgium).

Grants: Some financial support for young scientists is expected, see the conference website for updated information.

Deadline: 1st June for submission of a paper, 1st Augustus for registration.

Information: e-mail : [M.Rigo@ulg.ac.be](mailto:M.Rigo@ulg.ac.be) , website : <http://www.jm2004.ulg.ac.be>

## 5 Mathematical Olympiad

### 5.1 Solution to the first problem of the previous Newsletter

David Eelbode, from Ghent University, sent us the solution to the first problem proposed in the previous Newsletter, i.e.

Let  $A$  be a subset of the set  $S = \{1, 2, \dots, 1000000\}$  containing exactly 101 elements. Prove that there exist numbers  $t_1, t_2, \dots, t_{100}$  in  $S$  such that the sets

$$A_j = \{x + t_j \mid x \in A\} \quad \text{for } j = 1, 2, \dots, 100$$

are pairwise disjoint.

The solution he sent can be found at the end of this issue.

## 5.2 New problems

IMO 2003 Japan — Second Day

4. Let  $ABCD$  be a cyclic quadrilateral. Let  $P, Q$  and  $R$  be the feet of the perpendiculars from  $D$  to the lines  $BC, CA$  and  $AB$  respectively. Show that  $PQ = QR$  if and only if the bisectors of  $\angle ABC$  and  $\angle ADC$  meet on  $AC$ .
5. Let  $n$  be a positive integer and  $x_1, x_2, \dots, x_n$  be real numbers with  $x_1 \leq \dots \leq x_n$ .
  - (a) Prove that
 
$$\left( \sum_{i=1}^n \sum_{j=1}^n |x_i - x_j| \right)^2 \leq \frac{2(n^2 - 1)}{3} \sum_{i=1}^n \sum_{j=1}^n (x_i - x_j)^2.$$
  - (b) Show that equality holds if and only if  $x_1, x_2, \dots, x_n$  is an arithmetic sequence.
6. Let  $p$  be a prime number. Prove that there exists a prime number  $q$  such that for every integer  $n$ , the number  $n^p - p$  is not divisible by  $q$ .

Philippe Niederkorn  
co-leader of the belgian team, IMO 2003

And now, we are waiting for your solutions...

 Do not forget to send them to [F.Bastin@ulb.ac.be](mailto:F.Bastin@ulb.ac.be) for the next issue of our Newsletter, i. e. before January 5, 2004. Thanks!

## 6 Miscellaneous

### EMS Call for Proposals

The European Mathematical Society is launching a new call for proposals for three activities : EMS lectures, mathematical joint week ends and summer schools.

EMS Lectures  
EMS Joint Mathematical Weekends  
EMS Summer Schools

The deadline for this call is February 20, 2004, by e-mail at the address:

[llemaire@ulb.ac.be](mailto:llemaire@ulb.ac.be)

However, proposals will be welcome at any time. They need not be in final form, but should include ideas of subject, location, date, main speakers. The proposals will be examined by the "General meetings committee" and the scientific panel of the EMS. The deadline will allow the EMS to present a coherent proposal of activities for EU funding, thereby allowing organisers of single meetings to be part of a series of events. EMS direct support being limited, the result of this application will bear on the funding for the meetings selected by EMS. There will be similar calls each year in the future.

Here is a description of these three activities. For any question or tentative project, please contact [llemaire@ulb.ac.be](mailto:llemaire@ulb.ac.be) at any time.

EMS Lectures. The EMS is calling for proposals of EMS lectures, in the following new format. The idea of the EMS lectureship is to allow an institution inside the EMS area to invite a distinguished mathematician (in pure or applied mathematics) to give a series of lectures, and build a small conference around his presence. Typically, she or he would give between 4 and 8 lectures, complemented by talks of the participants to the meeting. The lectures of the main speaker should lead to a publication in an EMS Lecture Notes Series. An application should be introduced by a European institution, with agreement of the main lecturer, and include some plan of the meeting built around the course. The EMS will cover the travel expenses of the main speaker, and a lecture fee upon submission of a manuscript. It will help to obtain support for the meeting, provided it has an European dimension in participation. The preceding EMS lecturers (in a somewhat different format) have been professors H.W. Lenstra (Berkeley), M.J. Cutland (Hull), M. Lyubich (Stony Brook), G. Papanicolau (Stanford), M. Vergne (Palaiseau) and G. Dal Maso (SISSA, Trieste). The aim is to maintain the rhythm of one such course per year, and to help dissemination and development of cutting edge subjects.

EMS Joint Mathematical Weekends. Joint meetings of the EMS with regional or national societies. The EMS has launched a new format of joint meetings with its corporate member societies, following the model set out by the Portuguese Mathematical Society in the meeting that took place in Lisbon from September 12 to 14, 2003 (see <http://www.math.ist.utl.pt/ems/>). These “EMS- joint mathematical week-ends” will start on a Friday, and finish on the Sunday, both at lunchtime, so that they can be easily attended during term-time. Each would cover around 4 subjects, chosen by the local organisers to fit the research strengths of the local mathematicians, or new subjects they would want to develop. For each subject, a plenary lecture and two half-days of parallel sessions will be organised. Past experience shows that such an internationalisation of the meetings of national societies helps to substantially increase participation. The EMS will help with scientific organisation, publicity and funding applications. With more than fifty corporate members, the EMS hopes to see regular meetings of this format. Note that mathematics departments or individual members can also plan such meetings.

EMS Summer Schools in Fundamental and Interdisciplinary Mathematics. The EMS will pursue its programme of Summer schools, aiming at running such schools in pure and applied mathematics. This call for proposals concerns all schools that any group of mathematicians would like to run in 2005 or later years. The guidelines for such events are that there must be a very strong component of training of young researchers (in the first 10 years of their career) by means of integrated courses and lectures at advanced level. This can be supplemented by conference type research lectures, but the training component is needed. The courses should aim at an international audience (no more than 30% of participants should come from a single state). The EMS will help with advertisement and organisation, as well as the applications for financial support.

Luc LEMAIRE  
Phone: (+32) 2 6505837  
e-mail: llemaire@ulb.ac.be

### **Call for Nominations of Candidates for ten EMS Prizes**

Principal Guidelines. Any European mathematician who has not reached his or her 35th birthday on 30 June, 2004, and who has not previously received the prize, is eligible for an EMS Prize at 4ECM. A total of 10 prizes will be awarded.

The maximum age may be increased by up to three years in the case of an individual with a corresponding “broken career pattern”. Mathematicians are defined to be “European” if they are of European nationality or their normal place of work is within Europe. “Europe” is defined to be the union of any country part of which is geographically within Europe or that has a corporate member of the EMS based in that country.

Prizes are to be awarded for the best work published before the 31 December, 2003.

The Prize Committee shall interpret the word “best” using its judgement: e.g., it may refer to innate quality or impressiveness, influence, etc.

Nomination for the Award. The Prize Committee, headed by Professor Nina Uraltseva (St. Petersburg), is responsible for solicitation and evaluation of nominations. Nominations may be made by anyone, including members of the Prize Committee or by the candidates themselves. It is the responsibility of the nominator to provide all relevant information to the Prize Committee, including a summary and documentation.

The nomination for the awards should be reported by the Prize Committee to the EMS President at least three months prior to the date of the awards. The nomination for each award must be accompanied by a written justification and a citation of about 100 words that can be read at the award ceremony.



The prizes cannot be shared.

Description of the Award. The award comprises a certificate including the citation and a cash prize of 5000 euro.

Award Presentation. The prizes will be presented at the Fourth European Congress of Mathematics by the President of the European Mathematical Society. The recipients will be invited to present their work at the conference.

Prize Fund. The money for the Prize Fund will be raised by the organizers of the Fourth European Congress of Mathematics in Stockholm.

Deadline for Submission. Nominations for the prize must reach the office in Stockholm at the following address no later than the 1 February, 2004:

4ECM Organizing Committee, Prof. Ari Laptev,

Department of Mathematics, Royal Institute of Technology, SE-100 44 Stockholm, Sweden.

E-mails: laptev@math.kth.se, uunur@nur.usr.pu.ru

<http://www.math.kth.se/4ecm/>

Fax: +46-8-723 17 88, Phone: +46-8-790 84 86

### IMU-Net

Dear Reader,

Welcome to the first issue of IMU-Net, the electronic newsletter of the International Mathematical Union (IMU). The newsletter aims to improve communication between IMU and the worldwide mathematical community, by reporting decisions and recommendations of IMU, and highlighting issues that are under discussion. In addition, IMU-Net will report on major international mathematical events and developments, and on other topics of general mathematical interest. Feedback from readers and mathematical societies is welcome.

IMU is very grateful to Mireille Chaleyat-Maurel for agreeing to act as Editor of the newsletter.

In order to receive further issues of IMU-News, which is free of charge, you need to subscribe to it using one of the simple methods described below. I warmly encourage you to do so.

John Ball  
President, International Mathematical Union  
<http://www.mathunion.org/IMU-Net/>

### Ouverture d'un poste académique, UCL

Ouverture d'un poste académique à temps plein au département de mathématique (UCL). La description du poste se trouve à l'adresse suivante:

[http://www.crct.ucl.ac.be/postes\\_vacants.html](http://www.crct.ucl.ac.be/postes_vacants.html) (version française)

<http://www.crct.ucl.ac.be/vacancies.html> (version anglaise)

La date-limite pour le dépôt des candidatures est le 15 janvier 2004.

Professor Jaspers asked to make the following message

Paul Wauters  
Prof. Limburgs Universitair Centrum  
Born: 25 december 1958, Died: 26 october 2003

## 7 Fiction

**Denis Guedj** *La Méridienne*, Robert Laffont, Paris, 1988/1999; *The Measure of the World*, The University of Chicago Press, 2001; *De medidiaan: het meten van de wereld*, Bert Bakker, 1999.



The metric system, as we know it today finds its origin in the French revolution. The “égalité” among people should also hold for the measures they use. A commission was installed consisting of Borda, Condorcet, Laplace, Legendre, and Lavoisier who wrote a report “Des poids et de mesures” that was presented in 1790. Romme, a mathematician had to design a new calendar (it was finally decided to keep 60 minutes in an hour, but weeks should have 10 days, and new names were invented for the months). Lavoisier was mainly concerned with the definition of the kilogram, the meter was defined to be the 40 millionth part of the meridian that passed through Paris. An effort to measure the length of this meridian had already been undertaken by Thury Cassini some 50 years earlier, but it was decided that a new commission would undertake this and measure the meridian between Dunkerque and Barcelona. The members were Méchain, Legendre and Dominique Cassini. The practical measurements should be done by two astronomers: Pierre Méchain and Jean-Baptiste Delambre. Delambre took the larger part from Dunkerque to Rodez, since that part had been prepared by Cassini and Méchain took the part from Barcelona to Rodez. So on June 24, 1792 they took off for what turned out to be an adventure of several years. They had to search for high buildings or towers, that should be the visual signals at the vertices of a triangulation of the area. To measure the angles, they used the repeating circle, an instrument invented by Borda.

This instrument consisted of two small telescopes each fixed to rings which could rotate independently against a scale. To measure the angle between two points  $A$  and  $B$ , one scope was pointed at  $A$ , the other at  $B$ . The angle  $\theta$  could be read off from the scale. Then the rotating circles were fixed together and rotated so that the second scope pointed at  $A$ . Detaching the circles again and turning the first scope to  $B$  now measured the angle  $2\theta$ . Repeating the process continued to double  $\theta$ , so that the angle  $\theta$  was finally computed as the last angle measured divided by the number of doublings. In theory this could make the error arbitrary small.

However, given the chaotic political situation, measuring a distance across the whole of France was a nontrivial task. They needed credibility letters from politicians that were changing all the time, not in the least because of the guillotine of Robespierre threatening almost everyone that had any power with the wrong political background or past (Lavoisier being one of the victims, Romme and several others took their own lives in prison when they had fallen from grace). Delambre was taken on and off the job, he was called to Paris but reinstalled after a while. Also the Northwestern region of France around Dunkerque was threatened by the English.

The physical circumstances for Méchain in the mountains between Spain and France were very hard. Moreover, when he tried to save a friend who got stuck in an hydraulic pump, he was hit himself and barely survived. He regained the use his right arm only after a long revalidation period. He was not allowed to return to France because of the Spanish-French war going on and he fled to Italy where he stayed for about a year. After his return he was summoned to Paris, but he refused to go, fearing for his life but he resumed his measurements instead. He became more and more detached from the world, living in a world of his own. He refused to send in his measurements for two years. When an international congress took place in 1798 to install the new measures, the measurement of the meridian was not finished. Even a visit of his wife, whom he hadn't seen for about six years, could not convince Méchain to hand over his numbers. Finally Delambre came over to help him measure the basis of his triangulations. This was another exercise in precision. Such a basis had already been measured near Dunkerque. Some sticks were placed one next to the other on some wooden traject. Thus took several days and not only the instruments had to be guarded during the night, they should also be protected against changing weather conditions.

The reason for Méchain's reluctance to collaborate was that he had made two measurements of the latitude of Barcelona, and he had found two different results. A disaster for someone like him, obsessed by precision. This would destroy all his work! He could not accept that he had made an error and decided not to report this difference, which was in fact a kind of fraud. He was afraid that when he gave his numbers, this fraud would be discovered. He finally returned to Paris and collaborated reluctantly.

It had always been a dream of him to extend these measurements even further South. So somewhat later, his project to extend his measurements from Barcelona to the Balears was approved, but he got stuck again because he could not get a passport. He finally died of malaria during that expedition. After his death Delambre discovers the different measurements, that could actually be explained by error analysis, but as his lifetime friend, Delambre presents this as a discovery of Méchain.

Napoleon said about the achievement of these two astronomers: “Conquests will come and go, but this work will endure”.

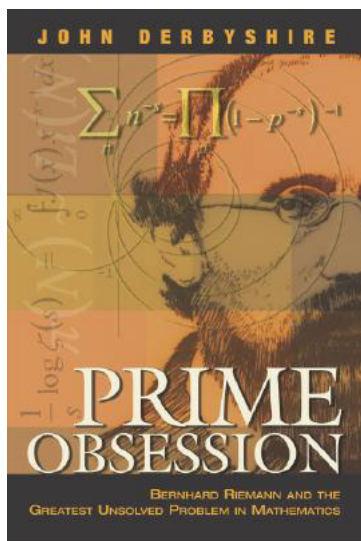
This novel by Denis Guedj, who is professor of Mathematics and Science History in Paris VIII, got the “Prix de l’Institut”. Guedj succeeds in evoking a real life painting of the quest of these scientists and the agony of a tormented Méchain against a background of political revolution in a very intriguing way.

A. Bultheel



Pierre Méchain and Jean-Baptiste Delambre

**John Derbyshire** *Prime Obsession. Bernhard Riemann and the Greatest Unsolved Problem in Mathematics*, Joseph Henry Press, Washington D.C. 2003 (422p.) ISBN 0-309-08549-7.



This is a book about the Riemann Hypothesis written for the nonmathematician. It is in two parts.

In the first part the author tells us about prime numbers and their distribution, the Prime Number Theorem and the relation between prime numbers and the Riemann Zeta function. We meet the harmonic series (and convergence/divergence of series in general) and the star role player in this book, Bernhard Riemann, who started it all with his paper *Über die Anzahl der Primzahlen unter einer gegebenen Grösse* in 1859. Then prime numbers are introduced, and the Prime Number Theorem is explained:

$$\pi(N) \sim \frac{N}{\log N}$$

(where  $\pi(N)$  is the number of primes up to  $N$ ). Enter Gauss, Legendre and Euler. Euler solves the Basel problem in 1735 and proves that

$$1 + \frac{1}{2^2} + \frac{1}{3^2} + \dots + \frac{1}{n^2} + \dots = \frac{\pi^2}{6}$$

Starting from this result it is easy(?) to introduce the Riemann Zeta function (replace the exponent 2 in the series by  $s$  to get  $\zeta(s)$ ). And easy to state the Riemann Hypothesis:

All non-trivial zeros of the zeta function have real part one-half.

But to explain what this means to someone not mathematically oriented, that will take some time. But what is the connection between the prime numbers and the zeta function? The connection is given by what is known as the Euler Product Formula:

$$\sum_n \frac{1}{n^s} = \prod_p \frac{1}{1 - \frac{1}{p^s}}$$

(sum over the naturals, product over the primes). Derbyshire calls this formula the Golden Key, all that remains to be done is turning it. Preparations are necessary, some calculus is needed. To take the next step towards understanding the Riemann Hypothesis, the domain of the zeta function is expanded to the set of real numbers. Some more mathematicians who play an important role in this story, are introduced: Dirichlet, Chebyshev, Stieltjes, Hadamard and de la Vallée Poussin. The last two both succeeded in proving the prime number theorem (1896). Essential here was Riemann’s 1859 paper that provided them with the tools to construct their

proof.

The second part of the book begins with the introduction of complex numbers, so that the full meaning of the Riemann Hypothesis can finally be explained. Hilbert makes his entrée with his 23 problems in 1900, the eighth of which is the proof of the Hypothesis. The rest of the book concentrates on the work of 20-th century mathematicians on this problem: Hardy and Littlewood, Landau, Siegel, Gram, Polya, and many others. In the final chapters some ideas inspired by physics are explained, with people like Hugh Montgomery, Andrew Odlyzko and Alain Connes.

The book ends with a number of notes and with an appendix featuring a song about the Riemann Hypothesis written by Tom Apostol.

I like this book. Especially the first part. It is a nice mix of mathematics and biographical data. Did you know that Dirichlet was married to Rebecca Mendelssohn, one of the sisters of the composer Felix Mendelssohn-Bartholdy, and Kummer to Ottilie Mendelssohn, one of the composer's cousins? I know, this isn't very interesting to know. But facts like these play their part in the story. They make this book highly readable. I would recommend it to anybody, mathematicians and others interested in mathematics. It is difficult for me to say what you need to know about mathematics to be able to read this book. But an interested reader with a high school background in mathematics should be able to grasp most of the maths in the book.

And if you can't get enough of it, you can read two other books on the same subject that appeared recently: Karl Sabbagh's *The Riemann Hypothesis*, and Marcus du Sautoy's *The Music of the Primes*.

P. Levrie

## 8 The end . . .

A constant function and  $e^x$  are walking on Broadway. Then suddenly the constant function sees a differential operator approaching and runs away. So  $e^x$  follows him and asks why the hurry. "Well, you see, there's this differential operator coming this way, and when we meet, he'll differentiate me and nothing will be left of me...!" "Ah," says  $e^x$ , "he won't bother ME, I'm e to the x!" and he walks on. Of course he meets the differential operator after a short distance.


$e^x$ : "Hi, I'm  $e^x$ "

diff.op.: "Hi, I'm  $d/dy$ "

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## Solution to the First Problem of IMO 2003 Japan - First Day

Let  $A$  be a subset of the set  $S = \{1, 2, \dots, 1000000\}$  containing exactly 101 elements. Prove that there exist numbers  $t_1, t_2, \dots, t_{100}$  in  $S$  such that the sets

$$A_j = \{x + t_j \mid x \in A\} \text{ for } j = 1, 2, \dots, 100$$

are pairwise disjoint.

*Solution* : First of all, let us fix some notations. We label the elements of the set  $A$  as  $a_0, a_1, \dots, a_{100}$  in such a way that  $a_0 < a_1 < \dots < a_{100}$  (where it is assumed that all elements of  $A$  are different). Thus

$$A = \{a_0, a_1, \dots, a_{100}\} \text{ with } a_j < a_i \text{ for } j < i$$

Next we define the set  $D_A$  as

$$D_A = \{d_{ij} = a_i - a_j \mid 0 \leq j < i \leq 100\} .$$

This means that for two arbitrary elements in  $A$ , the absolute value of their difference is contained in the set  $D_A$ . We now show that  $|D_A| \leq 5051$ . For each element  $a_i$  we have  $i$  elements  $d_{ij}$ , with  $j < i$ , and

$$\sum_{j=i}^{100} i = 5050 .$$

Choosing  $i = j$  we get  $d_{ij} = 0$ , so  $|D_A| \leq 5051$ . Let us denote the highest possible cardinality for  $D_A$  as  $D_A^{max} = 5051$ .

We now want to construct a set  $T = \{t_1, t_2, \dots, t_{100}\}$  such that the sets  $A_i$  and  $A_j$  are pairwise disjoint for  $i \neq j$ . First of all, let us choose  $t_1 = 1$ . If we now construct  $t_2, \dots, t_{100}$  in such a way that the absolute value of the difference of two arbitrary elements  $t_i$  and  $t_j$  is *not* contained in the set  $D_A$ , the statement is proved.

Choose  $t_2 \notin (t_1 + D_A) \Rightarrow t_2 > t_1$  and  $t_2 - t_1 \notin D_A$ . There are at least  $1000000 - |D_A^{max}|$  ways to do this. Next, we choose an element  $t_3 \in S$  in such a way that  $t_3 \notin (t_1 + D_A)$  and  $t_3 \notin (t_2 \pm D_A)$ . There are at least  $1000000 - 3|D_A^{max}|$  ways to do this. This scheme repeats itself, and eventually we will find a  $t_{100}$  which is in none of the sets  $(t_1 + D_A), (t_2 \pm D_A), \dots, (t_{99} \pm D_A)$ . Since there are at least  $1000000 - 197|D_A^{max}| = 4953$  ways to do this, the set  $T$  is non-empty and the statement is proved.

The National Committee of Mathematics, the Belgian representative of the International Mathematical Union and appointed by the Koninklijke Vlaamse Academie van België voor Wetenschappen en Kunsten en de Académie Royale de Belgique (Royal Flemish Academy of Belgium for Sciences and Arts, and the Royal Academy of Belgium) on the one hand and the Belgian Mathematical Society on the other like to express their point of view in relation to the use and abuse of the SCI and the particular role which mathematics plays in all this.

In addition we want to emphasize the differences which exist in publishing policy between mathematics and many other scientific disciplines.

- De SCI has been created as a repertoire for bibliographic searches mainly for chemistry and biology, whilst since a long time mathematicians had at their disposal a German, an American and a Russian journal which are exclusively devoted to reviews of mathematical articles. Until recently many mathematicians were not even aware of the existence of the SCI, and consequently the publishing policy of mathematicians was (and is) not adjusted to the SCI.
- Most articles referred to in mathematics papers are more than 10 years old. For example in 2001 there were about 5000 citations in "Annals of Mathematics" of which about 80% were more than 10 years old. As compared to mathematics, the number of citations in other disciplines is enormous. The results obtained in journals of other disciplines are often short-term results that are not always lasting.

It is alarming that the VLIR (Flemish Inter-university Council) only takes a window of 10 years to establish its new key of allocating budgets for scientific research. In practice this means that almost all research groups in mathematics will "miss the boat".

- Compared to other scientific disciplines impact factors for mathematics journals are extremely low. The mathematics journal with the highest impact factor is 20 times lower than that of a biology journal with the highest impact factor. The inventor of the impact factor, E. Garfield advised strongly against the use of the Impact Factor for the evaluation of scientific research.
- There are several scientific journals of high level standards which are published by universities or scientific institutions. The non-commercial character of such institutions and universities entails that these journals do not necessarily appear on a regular basis, which means immediately differences in the IF. Not long ago this happened to the "Annali di Matematica" and the "Institut des Hautes Etudes Scientifiques : Publications Mathématiques", which contain several articles by Fields Medal winners, to be compared to the Nobel prize winners.
- There are a number of journals that can be placed in the category of mathematics as well as in another scientific discipline, which may make a very substantial difference in Impact Factor. For instance, the "Journal of Computational Neuroscience", accommodated in the bio-medical sciences, has impact factor is 2.6 (figure of 1999), but if it would be placed in applied mathematics, then such an impact factor would be extremely high.

- Taking the first 20 mathematical journals from the list with descending values of the Impact Factor, then we see hardly any fundamental (pure) mathematics, but rather journals which have a big overlap with biology, economy, . . . Journals which follow a trendy subject are present as well, but they are not always concerned with the more fundamental subjects.
- Two other examples of absurd situations are:
  1. Both the American Mathematical Society and the London Mathematical Society publish a series of journals. Publication of an article in one of these depends solely on its length, even though the same severe referee norms apply. Nevertheless the impact factors of these journals are very different.
  2. Some years ago the “Lancet” published a paper about the relationship between the weight of back packs of school children and the weight of the pupils; it had an impact factor of 11.79, whereas the proof by Wiles of the last theorem of Fermat, a problem that could not be solved by the most famous mathematicians for centuries, which appeared in the “Annals of Mathematics” with an impact factor of 1.7.
- Because math journals are often published by universities or scientific institutions and, not in the least, in many cases the refereeing process of papers in mathematics is very time consuming, it regularly happens that the factual publication of an article is years behind. This is obviated by the availability and distribution of (electronic) preprints. However, citations to preprints do not have any influence on the impact factor of a journal.
- Another difference in publishing policy is that, certainly in most pure mathematics papers, the authors are listed alphabetically. However, in many forms for evaluations, promotions, and applications for research projects it is required to mention the order of the authors.
- The average number of authors for a mathematics paper is considerably lower than in many (most) other disciplines. Whereas in some scientific disciplines it is not exceptional that there are e.g. 30 or more authors for an (often relatively short) contribution, in mathematics many articles are written by just 1 or 2 authors.

In several disciplines it is usual to include all members of a research group as co-authors of an article. In mathematics the head of a research group is not even mentioned, unless he or she really has made a scientific contribution to the paper.

- To compute an impact factor on the basis of citations within two years makes no sense for mathematics because this time span is very close to the reaction time needed to react to a published paper. Therefore the IF is computed as the quotient of two small numbers giving in a quite random result. For example in 1988 the *Journal of Differential Geometry* was ranked sixth with an IF of 1.231. In 2001 it was number 114 (without any change of its level) and in 2002, it was number 70.

All this shows that the SCI, and certainly the Impact Factor have little value for an evaluation of research (projects) in mathematics; this is even more so in comparison with

other disciplines. The use of these databases for the partitioning of money entails that mathematics is going to be negligible and a frustration for the researchers.

The previous arguments and the resulting point of view is supported at a European level by the EMS (European Mathematical Society). Their president (Sir John Kingman) confirms this in a letter (see attachment) and an official point of view of the EMS will be published shortly.

We hope that the authorities take into account the particular role played by mathematics, if they still intend to make use of these evaluation methods (SCI and IF).

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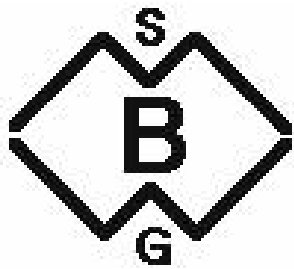
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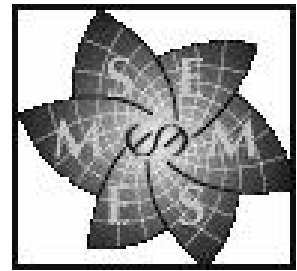
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