

# THE LONDON MATHEMATICAL SOCIETY



NEWSLETTER

No. 361 July 2007

## Forthcoming Society Meetings

**2007**

**Wednesday 24**

**October**

Northern Regional  
Meeting  
Sheffield

L. Breen

A. Cattaneo

[page 3]

**Friday 23 November**

AGM, London

M. Struwe

J.F. Toland

Presidential Address

**2008**

**Friday 8 February**

Mary Cartwright

Lecture

Oxford

**Monday 31 March**

Northern Regional

Meeting

Manchester

## LMS PRIZES 2007

**PROFESSOR BRYAN BIRCH** of the University of Oxford is awarded the De Morgan Medal in recognition of his influential contributions to modern number theory. His joint work with Peter Swinnerton-Dyer on elliptic curves created an exciting new area of arithmetic algebraic geometry: the Birch-Swinnerton-Dyer conjecture remains after 40 years one of the most tantalising problems in modern mathematics. Birch's work on Heegner points has led to huge advances in the arithmetic of elliptic curves.

**PROFESSOR BÉLA BOLLOBÁS** of the University of Cambridge is awarded the Senior Whitehead Prize. Béla Bollobás is a world leader in combinatorics and has made fundamental contributions to almost every aspect of this huge area of mathematics. As well as all his papers, he has written a string of extraordinarily influential textbooks, many of which have had the effect of defining (or in some cases redefining) whole areas of research.

**PROFESSOR MICHAEL GREEN** of the University of Cambridge is awarded the Naylor Prize and Lectureship in Applied Mathematics for his discovery

of superstring theory and many subsequent significant contributions to the subject.

**DR NIKOLAY NIKOLOV** of the University of Oxford and Imperial College London is awarded a Whitehead Prize for several important advances in group theory, especially in profinite groups and asymptotic aspects of arithmetic groups and finite simple groups.

**DR OLIVER RIORDAN** of the University of Cambridge is awarded a Whitehead Prize for his major contributions to graph polynomials, random graphs, extremal combinatorics, models of large-scale real-world graphs, and percolation theory.

**DR IVAN SMITH** of the University of Cambridge is awarded a Whitehead Prize for his work on symplectic topology. Smith's work is notable for the breadth of techniques employed, often blending ideas from algebraic geometry and topology in novel ways.

**DR CATHARINA STROPPEL** of the University of Glasgow is awarded a Whitehead Prize for her contributions to representation theory, in particular in the framework of categorifications, and its applications to low-dimensional topology.

## FORDER LECTURER

Council has agreed that Professor Peter Cameron (QMUL) is to be the Forder Lecturer in 2008. The Forder Lectureship is named after H.G. Forder, formerly of the University of Auckland, New Zealand, and a benefactor of the London Mathematical Society. The Forder Lecturer visits New Zealand for about four weeks, and gives lectures in most of the universities in that country. The arrangements are made jointly by the London Mathematical Society and the New Zealand Mathematical Society. Previous Forder Lecturers include Sir Christopher Zeeman, Michael Atiyah and Roger Penrose.

to arrive before noon on **1 September 2007**. Such nominations must bear the signatures of the Nominator and three Seconders and of the Nominee.

## EPSRC

### New Chief Executive

Professor David Delpy FRS (Vice Provost (Research), University College London) will take up the position at the Engineering and Physical Sciences Research Council on 1 September, replacing Interim Chief Executive Professor Randal Richards.

## BERNARD THORP

Dr Bernard L.D. Thorp, who was elected a member of the London Mathematical Society on 21 December 1961, died on 11 December 2006, aged 69.

## HARRY BURKILL

Dr Harry Burkill, who was elected a member of the London Mathematical Society on 18 March 1948, died on 9 April, aged 81.

## ANNUAL ELECTIONS TO LMS COUNCIL

The normal way in which nominations to Council are made is via the Nominating Committee, but there is also provision for all members of the Society to make nominations directly. Any direct nominations for a position as an Officer of the Society or as a member of Council should be sent to the Executive Secretary (peter.cooper@lms.ac.uk)

# LONDON MATHEMATICAL SOCIETY

## NORTHERN REGIONAL MEETING

### Hicks Lecture Theatre 7, University of Sheffield Wednesday 24 October 2007

**Larry Breen** (University of Paris, XIII)  
*Differential forms: an intrinsic perspective*

#### Tea

**Alberto Cattaneo** (University of Zürich)  
*The Poisson sigma model*

Dinner in the Rutland Arms Hotel, Bakewell

For further details or to reserve a place at the dinner, which costs £28.50, including wine, email [K.Mackenzie@sheffield.ac.uk](mailto:K.Mackenzie@sheffield.ac.uk).

The meeting will be followed by a workshop from 25–27 October on *Lie algebroids and Lie groupoids in differential geometry*. For further detail, see <http://kchmackenzie.staff.shef.ac.uk/october07/> or email Kirill Mackenzie ([K.Mackenzie@sheffield.ac.uk](mailto:K.Mackenzie@sheffield.ac.uk)) or Ieke Moerdijk ([moerdijk@math.uu.nl](mailto:moerdijk@math.uu.nl)).

There are funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting and workshop. Requests for support, including an estimate of expenses, may be addressed to Kirill Mackenzie (email above).

## LMS Newsletter

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## LMS AND IMA DISCUSSIONS Comments sought

The NSI group is developing a model that, if implemented, would lead to the replacement of both the Institute of Mathematics and its Applications and the London Mathematical Society by a new society.

As this work progresses, members are invited to send views directly to the NSI group and can be assured that all comments received will be brought to the attention of the group at its next meeting. Although the NSI group does not guarantee to reply to all messages it may on occasion choose to do so. The email address to use is nsicontact@btinternet.com.

Enquiries about the Invited Lectures should be directed to the Programme Secretary at the Society (grants@lms.ac.uk). The deadline for the submission of a proposal is **Friday 21 September**. Programme Committee hopes to make a decision on 18 October.

Previous lecturers:

- D. Zagier (1998)
- A. Mielke (1999)
- B. Dubrovin (2000)
- T. Goodwillie (2001)
- P. van Moerbeke (2002)
- M. Fukushima (2003)
- M.W. Davis (2004)
- M.F. Singer (2006)
- D. Ben-Zvi (2007)

The 2008 Invited Lectures will be given by Andrew Okounkov (Princeton) from 7–11 April 2008 at the Institute for Mathematical Sciences, Imperial College London. For further information contact Richard Thomas (richard.thomas@imperial.ac.uk). A report on the 2007 Invited Lectures is on page 18.

## LMS INVITED LECTURES SERIES

Programme Committee has decided to plan further ahead for the Invited Lectures series, and will therefore be considering proposals for the 2009 Invited Lectures at its meeting in October 2007. For the 2009 meeting, proposals are now invited from any member who, in addition to suggesting a topic and lecturer, would be prepared to organize the meeting at the member's own institution or a suitable conference centre. A grant is given to the host department to support attendance at the lectures.

The Society's Invited Lectures series consists of meetings at which a single speaker gives a course of about ten expository lectures, examining some subject in depth, over a five day period (Monday to Friday) during a University vacation. The meetings are residential and open to all interested. It is intended that the texts of the lectures given in the series shall be published. In addition to full expenses, the lecturer is offered a fee of £1,250 for giving the course and a further fee of £1,500 on delivery of the text in a form suitable for publication.

## NATIONAL ACADEMY OF SCIENCES

Sir John Kingman, FRS, has been elected a foreign associate of the US National Academy of Sciences in recognition of his distinguished and continuing achievements in original research.

## DANGEROUS KNOWLEDGE

BBC4 will screen a documentary about mathematics called *Dangerous Knowledge* on Wednesday 8 August at 9 pm. A significant part of the programme is about the work of Alan Turing and it features excerpts from his 1936-37 paper *Computable Numbers* which is held in the LMS archive. The LMS has been promised a DVD of the programme for its library after the screening and which will be available for members to view.



springer.com

## Applied Mathematics in Focus



### Numerical Simulation in Molecular Dynamics

Numerics, Algorithms,  
Parallelization, Applications

M. Griebel, University of Bonn,  
Germany; S. Knapek, TWS  
Partners, Munich, Germany;  
G. Zumbusch, University of Jena,  
Germany

With its description of the algorithms and the presentation of the results of various simulations from the areas of material science, nanotechnology, biochemistry and astrophysics, this book will enable readers to write their own programs for molecular dynamics step by step and run successful experiments.

2007. XII, 470 p. 180 illus. (Texts in Computational Science and Engineering, Volume 5) Hardcover  
ISBN 978-3-540-68094-9 ► € 39,95 | £30.50

### Computer Algebra Recipes

An Advanced Guide to Scientific Modeling

R. H. Enns, Simon Fraser University, Burnaby, BC,  
Canada; G. C. McGuire, University College of the Fraser  
Valley, Abbotsford, BC, Canada

This book presents a large number of computer algebra worksheets or "recipes" that have been designed using MAPLE to provide tools for problem solving and to stimulate critical thinking.

2007. X, 374 p. With CD-ROM. Softcover  
ISBN 978-0-387-25768-6 ► € 46,95 | £36.00



### Binary Quadratic Forms

An Algorithmic Approach

J. Buchmann, U. Vollmer,  
Technical University, Darmstadt,  
Germany

The book deals with algorithmic problems related to binary quadratic forms. It focuses on the algorithmic aspects of the theory. The book introduces the reader to important areas of number theory such as diophantine equations, reduction theory of quadratic forms, geometry of numbers and algebraic number theory.

2007. XIV, 318 p. 17 illus. (Algorithms and Computation in Mathematics, Volume 20) Hardcover  
ISBN 978-3-540-46367-2 ► € 59,95 | £46.00

### Geometry and Topology in Hamiltonian Dynamics and Statistical Mechanics

M. Pettini, Osservat. Astrofisico Arcetri, Firenze, Italy

This book covers a new explanation of the origin of Hamiltonian chaos and its quantitative characterization. The subject of the book, which contains numerous illustrations throughout, is very original and nothing similar has been written hitherto.

2007. Approx. 331 p. (Interdisciplinary Applied Mathematics, Volume 33) Hardcover  
ISBN 978-0-387-30892-0 ► € 59,95 | £46.00

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## MENTORING AFRICAN RESEARCH IN MATHEMATICS

### Second call for prospective mentors

The Nuffield Foundation and Leverhulme Trust recently awarded grants for pilot projects to support mathematics and its teaching in sub-Saharan Africa. These grants have been awarded jointly to the London Mathematical Society (LMS), the International Centre for Mathematical Sciences, Edinburgh (ICMS), the International Mathematical Union (IMU) ([www.mathunion.org](http://www.mathunion.org)), and the African Mathematics Millennium Science Initiative (AMMSI) ([www.ammsi-maths.org](http://www.ammsi-maths.org)).

This project is designed to counter the mathematics 'brain-drain' from sub-Saharan Africa by supporting qualified mathematics professionals in situ. Continuing professional links to a centre in the developed world, professional mentoring, and the opportunity for periodic research travel will contribute to the possibility and relative attractiveness of contributing one's mathematical expertise at home rather than moving permanently to the developed world.

AMMSI focuses on building infrastructure and networking in mathematics in sub-Saharan Africa. It offers postgraduate scholarships, visiting lectureships, and conference support for the benefit of advanced students and young researchers in the mathematical sciences.

This project proposes to pilot a mentoring relationship between mathematicians in countries with a strong mathematical infrastructure and their African colleagues, together with their students. Its sharpest focus is on cultivating longer-term mentoring relations between individual mathematicians and students.

Three mentoring partnerships have now been set up, in Cameroon, Ethiopia, and Ghana, and this is second call for prospective mentors.

We are looking for mathematicians interested in being part of these mentoring collaborations. We welcome applications from those with no prior experience of collaborating with research workers in Africa, as well as from those with existing links with African research.

Our current priority, however, is to establish mentoring relationships with mathematicians in the list of African Departments at the end of this article. Details of these Departments are accessible on the LMS web site.

Prospective mentors are requested to indicate the three African institutions from this list, in at least two different regions, with which they would most like to collaborate, although we cannot make any guarantees, of course. Alternatively, applicants should make a strong case for support for an existing link.

We will expect a willingness to make at least one short visit to Africa and to host a short visit from Africa, as well as a commitment to a continuing mentoring responsibility.

The success of the collaborations will be evaluated by asking the following questions. Has the research collaboration resulted in a mathematical publication in a research mathematics journal of international standing? Or has the collaboration produced an MSc or PhD thesis?

The deadline for the receipt of these applications is the **31 August 2007**. Forms can be downloaded from the LMS website ([www.lms.ac.uk](http://www.lms.ac.uk)) and they should be sent to: Dr Stephen Huggett, The London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HS to whom queries may also be addressed.

#### a) Central Africa

1. Mathematics Department, National University of Rwanda, Butare, Rwanda

#### b) Eastern Africa

2. Department of Mathematics, University of Asmara, Asmara, Eritrea
3. Department of Mathematics, Bahir Dar University, Bahir Dar, Ethiopia
4. Department of Statistics and Actuarial Science, Jomo Kenyatta University of Agriculture and Technology, Nairobi, Kenya
5. Department of Mathematics, Kenyatta University, Nairobi, Kenya
6. Department of Mathematics and Applied Statistics, Maseno University, Maseno, Kenya
7. Department of Mathematics, Mbarara University of Science and Technology, Mbarara, Uganda
8. Department of Mathematics, Makerere University, Kampala, Uganda

#### c) Western Africa

9. Laboratory of Applied Mathematics and Computer Science, Universite de Cocody, Abidjan, Ivory Coast
10. Department of Mathematics and Computer Sciences, National Polytechnic Institute, Yamoussoukro, Ivory Coast
11. Department of Mathematics, University of Ilorin, Ilorin, Nigeria

## NCETM

### New Director

Professor Celia Hoyles has been appointed as the new Director of the National Centre for Excellence in Teaching Mathematics (NCETM). The centre was established by the government following a recommendation in the 2004 Smith report *Making Mathematics Count*. Its aim is to enhance the professional development of mathematics teachers. Professor Hoyles will develop the Centre's programme to 'improve the capacity, capability and quality of mathematics teaching, irrespective of age or stage, by promoting and supporting the professional development of teachers and bringing coherence to the mathematics sector'.

Celia will combine this part-time role with her other work in the mathematics community. She will continue her research as Professor of Mathematics Education at the Institute of Education, University of London and she will remain working at the Department of Education and Skills as Chief Adviser for Mathematics until November 2007.

## FELLOWS OF THE ROYAL SOCIETY

Amongst those elected to Fellowship of the Royal Society in May 2006 were

- George Ellis, Emeritus Professor of Applied Mathematics and Honorary Research Associate, Department of Mathematics, University of Cape Town
- Nicholas Higham, Richardson Professor of Applied Mathematics, School of Mathematics, University of Manchester
- Edwin Perkins, Canada Research Chair, Department of Mathematics, University of British Columbia
- Terrance Tao, Professor of Mathematics, Department of Mathematics, University of California, Los Angeles
- Trevor Wooley, Professor of Pure Mathematics, School of Mathematics, University of Bristol

Michael Oser Rabin, Thomas J. Watson Sr. Professor of Computer Science, School of Engineering and Applied Science, Harvard University, was elected a Foreign Member.

## PREMIO PEANO AWARD

Professor Ian Stewart (Mathematics Institute, University of Warwick) has been awarded the 2006 Premio Peano from the Associazione Subalpina Mathesis in Turin, for the Italian translation of his book *Letters to a Young Mathematician*. Further information: [www.dm.unito.it/mathesis/premiopeano.html](http://www.dm.unito.it/mathesis/premiopeano.html).

## COLLINGWOOD MEMORIAL PRIZE

The 2007 Collingwood Memorial Prize has been awarded to Claire M. Fairbairn, St Aidan's College, University of Durham. The Collingwood Memorial Prize, established in memory of Sir Edward Collingwood FRS, President of the Society 1969-1970, is awarded to a final-year mathematics student at the University of Durham who intends to continue to a higher degree in mathematics at Durham or any other university.

## JOHN ROBINSON The Sculptor

The sculptor John Robinson died from lung cancer on 6 April after a recently diagnosed illness. Friends will know his work from the websites [www.bradshawfoundation.com](http://www.bradshawfoundation.com) and [www.popmath.org.uk](http://www.popmath.org.uk) as someone who bridged art and science through a passionate interest in humanity and the world. He told me images came to him to express these links. He was able to ensure great craftsmanship and artistic feeling to realise them.

In the popmath site, search for 'Fibre Bundles' where you see John and his plasterer making a plaster cast for a bronze sculpture of a fibre bundle over a circle with a twisting triangle as fibre. He knew no mathematics, but was surely an intuitive geometer!



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Other topological themes John exploited and on which you can search in the popmath site are Borromean Circles and the Möbius Band. For an overall discussion of his work see also [www.bangor.ac.uk/r.brown/thrsarticle.html](http://www.bangor.ac.uk/r.brown/thrsarticle.html).

The last donation of a Symbolic Sculpture was 'Prometheus' Hearth' to the new Prometheus Mathematics Centre at the Frome Community College near his home. John had written for the popmath site: "I wanted to build a symbolic cave fire, where the precious flame of knowledge could be nursed, so it could lighten the darkness of superstition that surrounds us." John was very proud of this placement and aware of what it was implying on the contribution of mathematics.

Ronnie Brown  
University of Wales, Bangor

## MSJ PRIZES

Prizes were awarded at the Annual Meeting of the Mathematical Society of Japan (MSJ) in Saitama University in March 2007 as follows.

**The Spring Prize** (for a mathematician who is not older than forty and has made an outstanding contribution to mathematics) has been awarded to Professor Kenji Nakanishi of Kyoto University for his distinguished and fundamental contributions to the study of nonlinear dispersive equations.

**The Seki-Takakazu Prize** (to honour people and organizations who have supported and encouraged the development of Mathematics in Japan over many years) has been awarded to Institut des Hautes Études Scientifiques (IHES).

**The Publication Prize** (for distinguished contributions to the mathematical literature) has been awarded to the following:

- Kaoru Aoki who has contributed to making mathematics more readily available to the public by translating into Japanese interesting books such as *Fermat's Last Theorem* by Simon Singh and *Kepler's Conjecture* by George G. Szpiro.

- Hideo Arai who has greatly contributed to the development of mathematics in Japan. He has been working for the mathematics branch of the publisher Iwanami Shoten over a long period of time.
- *Foundations of Differential Geometry* by Shoshichi Kobayashi and Katsumi Nomizu. These volumes are mathematical classics written by Japanese mathematicians. They have drastically changed the idea of differential geometry by putting the concept of *connection* at the core of the theory.
- The Oka-Kiyoshi electronic library based at the Library of Nara Women's University. The Oka-Kiyoshi electronic library makes public a variety of works by the Japanese mathematician Kiyoshi Oka.
- Akihiro Nozaki whose books are full of humour and clear writing which fascinate a wide range of readers, including mathematicians. His books for children are so enlightening and outstanding that adults also enjoy them.

The Algebra Prize was awarded to Eiichi Bannai of Kyushu University for his contribution to the study of algebraic combinatorics and to Kouta Yoshioka of Kobe University for his contribution to the theory of moduli spaces of vector bundles.

## NEWTON INSTITUTE Call for Proposals

The Isaac Newton Institute for Mathematical Sciences is a national research institute based in Cambridge. It aims to bring together mathematical scientists from UK universities and leading experts from overseas for concentrated research on specialised topics in all branches of the mathematical sciences from pure mathematics, applied mathematics and statistics, to theoretical aspects of any discipline.

At any time there are two visitor programmes in progress, each with about twenty scientists in residence. Included within these

programmes are periods of particularly intense activity including instructional courses and workshops. Sixty-nine programmes have now been completed, the most recent being *Noncommutative Geometry, The Painlevé Equations and Monodromy Problems* and *Stochastic Computation in the Biological Sciences*. The programmes currently taking place are *Analysis on Graphs and its Applications* and *Highly Oscillatory Problems: Computation, Theory and Application*.

The Institute invites proposals for research programmes in any branch of mathematics or the mathematical sciences. The Scientific Steering Committee usually meets twice each year to consider proposals for programmes (of 4-week, 4-month or 6-month duration) to run two or three years later. Proposals to be considered at these meetings should be submitted by **31 January** or **31 July** respectively. For information on making proposals see [www.newton.cam.ac.uk/callprop.html](http://www.newton.cam.ac.uk/callprop.html).



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## IMU NEWS

### Abel Prize 2007 awarded

On 22 May 2007, the King of Norway presented the Abel Prize for 2007 to Srinivasa S.R. Varadhan, Courant Institute of Mathematical Sciences, New York. S.S.R. Varadhan presented his Abel lecture on 23 May, followed by lectures by G. Papanicolaou, O. Zeitouni and T. Lyons. See: [www.abelprisen.no/en](http://www.abelprisen.no/en).

### Centennial of the International Commission on Mathematical Instruction

First Century of the International Commission on Mathematical Instruction (1908–2008): Reflecting and Shaping the World of Mathematics Education, Roma (Italy), 5–8 March 2008, Accademia dei Lincei and Istituto dell Enciclopedia Italiana. More information: [www.unige.ch/math/EnsMath/Rome2008](http://www.unige.ch/math/EnsMath/Rome2008).

If you are interested in participating in a working group, please contact one of its chairs. It will also be possible to attend the symposium as a participant, without making a presentation. In that case, apply to [marta.menghini@uniroma1.it](mailto:marta.menghini@uniroma1.it) after September 2007. Ferdinando Arzarello is the Chair of the International Program Committee.

### African Mathematical Union Commission on the History of Mathematics in Africa

Two new books are published by the African Mathematical Union Commission on the History of Mathematics in Africa:

#### 1. *African Doctorates in Mathematics: A Catalogue.*

This volume presents a catalogue of over 2000 doctoral theses (in historical order since 1923) by Africans in all fields of mathematics, including applied mathematics, mathematics education and history of mathematics.

#### 2. *Mathematics in African History and Cultures: An Annotated Bibliography* by Paulus Gerdes and Ahmed Djebbar (new edition).

This volume constitutes an updated and extended version of the bibliography published under the same name in 2004 by the African Mathematical Union.

These books are available (both in print and as download) from [www.lulu.com](http://www.lulu.com) by going to <http://stores.lulu.com/pgerdes>. The books (print) will also become soon available from [amazon.com](http://amazon.com) and other retailers/bookshops.

The above items are taken from the 23rd issue of the IMU electronic newsletter IMU Net (see [www.mathunion.org/Publications/Newsletter](http://www.mathunion.org/Publications/Newsletter)).

## NEWS FROM ACME

### Committee membership

The Advisory Committee on Mathematics Education (ACME) is pleased to announce the appointment of two new members to the Committee starting from 1 September 2007. Fiona Allan, the South East Regional Coordinator (Further Education) for the National Centre for Excellence in the Teaching of Mathematics (NCETM) will bring experience from the further education sector and Wendy Hoskin, County Inspector/Adviser for Mathematics for Hampshire Local Authority will bring experience from a Local Authority to the Committee.

### Post-14 Mathematics

A report of the ACME conference on The Mathematical Needs of 14–19 Pathways has now been published. An e-version is available on the ACME website at the link below. Hard copies of the report will be available at the NCETM Conference on 20 June 2007.

### A network for teachers of mathematics

As announced at the ACME conference in February 2007, ACME has set up a teacher

network on the NCETM web portal to extend our consultation with teachers. Discussion items on the network currently include the ACME change management project and the 'Making Good Progress' and Secondary Curriculum Review consultations. Members

of the network will be able to view and comment on ACME papers relevant to discussion topics. Information on how to join the teacher network is available on the ACME website. For more information visit [www.royalsoc.ac.uk/acme](http://www.royalsoc.ac.uk/acme).

## LTCC

### The London Taught Course Centre invites suggestions for its Intensive Courses for 2007–2008 onwards

The LTCC runs courses for PhD students in the Mathematical Sciences and is supported by EPSRC 2007–2011 and by departments at QMUL, Imperial, UCL, KCL, LSE, City, Brunel, Kent. These courses are either regular annual courses or intensive courses on 'hot topics'. The intensive courses are freely open to all students in the UK and outside, subject to suitable space being available.

The aim of the intensive courses is to focus on particular topics of current interest. The format is that intensive courses normally run over the space of 24 hours at De Morgan House in Russell Square, from noon to noon. Intensive courses planned for 2007–2008 are as follows.

- *Combinatorics and Statistical Mechanics*  
Alan Sokal (UCL)
- *Mathematics of Insurance & Finance*  
Ragnar Norberg (LSE)
- *The Riemann-Hilbert method and the Painlevé equations*,  
Alexander Its (Purdue, visiting Brunel)
- *Theory of Bayesian Statistics*  
Phil Brown and Stephen Walker (Kent at Canterbury)

One further slot is still available, in summer 2008, while the succeeding years will each have five slots. To propose an intensive course please use the template at the LTCC website <http://www.ltcc.ac.uk> or contact Frank Smith, Sofia Olhede or Shaun Bullett. (For the summer 2008 slot the deadline for proposals is 30 July 2007 or soon thereafter.) We welcome full proposals or even the merest suggestions from external sources on suitable hot topics and would be happy to discuss any matters arising.

Frank Smith ([frank@math.ucl.ac.uk](mailto:frank@math.ucl.ac.uk))  
Sofia Olhede ([s.olhede@imperial.ac.uk](mailto:s.olhede@imperial.ac.uk))  
Shaun Bullett ([s.r.bullett@qmul.ac.uk](mailto:s.r.bullett@qmul.ac.uk))

## PROGRAMME COMMITTEE

Members are reminded that the Society's Programme Committee operates schemes to provide conference grants (Scheme 1), grants to visitors to the UK (Scheme 2), grants to support joint research groups (Scheme 3), collaborative small grants (Scheme 4) and international short visits (Scheme 5).

For full details of all the Schemes please see the Society's website ([www.lms.ac.uk/grants/index.html](http://www.lms.ac.uk/grants/index.html)). Queries regarding applications can be addressed to the Programme Secretary, Stephen Huggett (tel: 01752 232710, email: [s.huggett@plymouth.ac.uk](mailto:s.huggett@plymouth.ac.uk)) or the Secretary to Programme Committee,

Sylvia Daly (tel: 020 7291 9971, email: [sylvia.daly@lms.ac.uk](mailto:sylvia.daly@lms.ac.uk), Wednesday-Friday) who will be pleased to discuss proposals informally with potential applicants and give advice on the submission of an application.

Please note that grant applications will not be considered between mid-June and mid-October. The next deadline for receipt of applications is **20 September** and these will be considered at a meeting on 18 October. Applications should be submitted well in advance of the date of the event for which funding is requested. Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

### Grants awarded between January and March 2007

#### Scheme 1

Applicant	Title	Grant
M. Groves	Dynamic Days Europe 2007	£3,000
R. Craster	Dynamics and Stability of Thin Liquid Films and Slender Jets: EUROMECH Colloquium 490	£3,000
R. Bearon, D. Lewis	The Influence of Fluid Dynamics on the Behaviour and Distribution of Plankton	£3,000
B. Zegarlinski	Hypoellipticity: Analysis & Stochastic Analysis	£560
F. Kirwan, U. Tillmann	<i>Journal of Topology</i> Launch Meeting	£1,900
A. Scott	One-Day Meeting in Combinatorics	£1,950
J. Billingham	59th European Study Group with Industry	£500
S.J. Hogan	49th British Applied Mathematics Colloquium	£4,000
M. Pollicott, P. Walters	Ergodic Theory – Topics arising from the Work of William Parry, FRS	£2,500
G.M.T. Watts	11th Annual UK Meeting on Integrable Models, Conformal Field Theory and Related Topics	£2,120
G. Brightwell	Two linked one-day Combinatorics Colloquia in Honour of Norman Biggs	£1,500
M.R.E. Proctor	Magnetic Fields in the Sun and Stars: A Conference in Honour of N.O. Weiss' 70th Birthday	£1,500
C. Gilson	ISLAND III: Algebraic Aspects of Integrability	£2,200

#### Scheme 1 (cont'd)

Applicant	Title	Grant
J.K. Truss	Combinatorics of Arc-Transitive Graphs and Partial Orders	£2,000
H.A. Priestley	Topological and Algebraic Methods in Non-classical Logics III	£3,500
D. Needham (organiser J. Sprittles)	European Postgraduate Fluid Dynamics Conference 2007	£1,500
A. Gorban	Mathematics of Model Reduction	£2,000
C. Hobbs	European Women in Mathematics 2007	£3,500
I. Graham	Numerical Analysis: Multiscale Methods, Adaptivity and Complexity	£500
R. Hirsch, M. Zakharyashev	British Logic Colloquium BLC2007	£3,500
A. Hill	Geometric Integration: Where Are We Heading Next?	£2,500
J. Sigurdsson	22nd British Topology Meeting	£2,500
S. Huczynska (organiser F. Brunk)	18th Postgraduate Combinatorial Conference	£2,000
A.D. Gilbert	Vortex Dynamics from Quantum to Geophysical Scales	£2,000
M. Weiss	Homotopy Theory and Lie Groups	£2,000
K. Cherednichenko	Perturbed Periodic PDEs: Problems with Singular Boundaries and their Numerical Aspects	£2,500
M. Mathieu	Belfast Functional Analysis Day 2007	£1,330
M. Mathieu	Instructional Workshop on Subfactors and Planar Algebras	£800

#### Scheme 2

Applicant	Visitor	To Visit	Grant
C.M. Edwards	W. Kaup	QMUL, Oxford, Aberdeen	£710
N. Peyerimhoff	O. Baues	Durham, Royal Holloway, Southampton	£1,200
J. Dold	J.B. Greenberg	Manchester, Leeds, Cranfield, Brighton	£1,200
A. Wathen	G.H. Golub	Birmingham/Leicester, Strathclyde, Manchester	£1,200
E. Gasparim	T. Pantev	Oxford, Glasgow, Edinburgh	£1,020
F. Neumann	J. Scherer	Leicester, Sheffield, Manchester	£700
C.J. Read	G.A. Willis	Leeds, Warwick, Lancaster	£1,100
G. Everest	P. Ingram	East Anglia, Warwick, Nottingham	£1,200

Scheme 2 (cont'd)

Applicant	Visitor	To Visit	Grant
X. Mao	A. Rodkina	Strathclyde, Edinburgh, Glasgow	£1,200
S. Foss	A. Rybko	QMUL, Edinburgh/Heriot-Watt and one other	£900
R. Grimshaw	V.M. Rothos	Loughborough, Surrey, Bristol	£1,100
A. Movchan	A. Piccolroaz	Liverpool, Manchester, Keele	£765
D. Holt	E. O'Brien	QMUL, Warwick, Imperial College	£1,200
I. Korchagina	J. Ramagge	Warwick, East Anglia, Newcastle	£1,200
T. O'Neil	O. Zindulka	Open University, Glasgow, St Andrews	£600
S. Rees	L.M. Epstein	Heriot-Watt/Edinburgh, Newcastle, Manchester	£1,200
L. Bogachev	N. Ratanov	Leeds, Cambridge, Swansea	£1,200

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Scheme 3

Applicant	Institution	Title	Grant
A. Scott	Oxford	OWL Research Group in Combinatorics and Statistical Mechanics	£700
J. Bennett	Birmingham	The UK Harmonic Analysis and PDE's Research Network	£1,050
A. Sevastyanov	Aberdeen	Algebra and Representation Theory in the North (ARTIN)	£1,400
T. Brzezinski	Swansea	Quantum Geometry of Hopf Algebras and Hopf Algebroids	£700
B. Schroers	Heriot-Watt	North British Mathematical Physics Seminar	£900
D. Mond	Warwick	Singularity Theory and Applications	£1,200
H.R. Dullin	Loughborough	East Midlands Mathematical Physics Seminar	£1,400
M. Dzamonja	East Anglia	CAMELEON	£1,050

Scheme 4

Applicant	Institution	Collaborator	Institution	Grant
C.F. Barenghi	Newcastle	P-E. Roche	Grenoble	£492
A. Camina	East Anglia	N. Gill		£300

Scheme 4 (cont'd)

Applicant	Institution	Collaborator	Institution	Grant
G. Roehrle	Southampton	G. Pfeiffer	Galway	£600
S. Shpectorov	Birmingham	B. De Bruyn	Ghent (Belgium)	£600
M. Pollicott	Warwick	C. Liverani	Rome II	£600
R. Weidmann	Heriot Watt	I. Kapovich	Illinois	£600
C. Cobbold	Glasgow	J. Powell	Utah	£600
J.R. Partington	Leeds	I. Chalendar	Lyon	£300
M. Nazarov	York	P. Papi	Rome	£450
S. Stevens	East Anglia	P. Kutzko	Iowa	£600
P. Turner	Heriot-Watt	B. Everitt	Adelaide	£600
S. Weigert	York	M. Wilkinson	Open University	£300
J.C. Wood	Leeds	M-J. Ferreira	Lisbon	£500
I.G. Wood	Aberystwyth	B.M. Brown, M. Marletta	Cardiff	£268
S.B. Cooper	Leeds	G. Wu	Nayang (Singapore)	£600

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TWO-DAY PDES WORKSHOP IN CARDIFF

A two-day workshop on *Perturbed periodic PDEs, problems with singular boundaries, and their numerical aspects* will take place at Cardiff School of Mathematics, Cardiff University from 25–26 September. The workshop will bring together established experts and exciting new talent from analysis, applied mathematics, asymptotics and numerics. The purpose of this meeting is to study three classes of problems in the analysis of partial differential equations and in their applications:

- Problems possessing band-gap spectrum with eigenvalues in the gaps due to a relatively compact perturbation of a periodic operator
- Sequences of approximations of problems on singular domains
- Singular perturbation problems exhibiting multi-scale behaviour

Confirmed speakers are:

- G. Allaire (Ecole Polytechnique)
- D. Borisov (Bashkir State University)
- L. Boulton (Heriot-Watt University)
- V. Burenkov (Cardiff University)
- E.B. Davies (King's College London)
- S. Guenneau (University of Liverpool)
- J. Hinchcliffe (King's College London)
- I. Kamotski (University of Bath)
- V. Maz'ya (University of Liverpool)
- A. Movchan (University of Liverpool)
- V. Smyshlyayev (University of Bath)

A limited amount of support is available to UK-based PhD students. The meeting is supported an LMS conference grant and Cardiff University. For further information visit the website [www.cf.ac.uk/math/pde-workshop2007](http://www.cf.ac.uk/math/pde-workshop2007) or email [CherednichenkoKD@cardiff.ac.uk](mailto:CherednichenkoKD@cardiff.ac.uk).



## HEILBRONN INSTITUTE

The Heilbronn Institute for Mathematical Research, Bristol Institute, will hold its Annual Conference at the University of Bristol on 21 and 22 September starting at lunchtime on Friday. The lectures, which will be of general interest, will be given by:

- Daniel Goldston (San José)
- Marc Lackenby (Oxford)
- Joseph Landsberg (Texas A & M)
- Marie-Francoise Roy (Rennes)
- Caroline Series (Warwick)
- Martin Taylor (Manchester)
- Trevor Wooley (Bristol)

Further details about attendance can be obtained by contacting Rebecca Ireland (R.E.A.Ireland@bristol.ac.uk). UK graduate students and postdocs who would like to attend and need support should contact Rebecca before 31 July detailing their requirements, enclosing a brief CV and explaining why they cannot obtain other support.

## QUANTUM GROUPS AND NONCOMMUTATIVE GEOMETRY

A workshop on *Quantum groups and non-commutative geometry* will take place at the Max Planck Institut für Mathematik, Bonn from 6–8 August. The workshop aims to present latest developments in the theory of quantum groups and related areas of noncommutative geometry. In particular, the following topics will be addressed: quantum group theory, Hopf algebras, representation theory, operator algebraic methods, and other aspects of noncommutative geometry. Several experts in the field will deliver talks and foster interaction with young researchers. A preliminary list of speakers includes:

- T. Brzezinski (Swansea)
- V. Chari (Riverside)
- L. Dabrowski (Trieste)

- F. Gavarini (Rome)
- D. Goswami (Kolkata)
- C. Kassel (Strasbourg)
- E. Koelink (Delft)
- S. Kolb (Edinburgh)
- G. Landi (Trieste)
- Y. Manin (Bonn)
- A. Mukherjee (Kolkata)
- F. Nichita (Bucharest)
- V. Sunder (Chennai)
- L. Tuset (Oslo)
- A. Van Daele (Leuven)
- B. Westbury (Warwick)
- S. Woronowicz (Warsaw)

The organisers are Matilde Marcolli (Bonn) and Deepak Parashar (Warwick/Bonn). For further information email [qg@mpim-bonn.mpg.de](mailto:qg@mpim-bonn.mpg.de) or visit the website [www.mpim-bonn.mpg.de](http://www.mpim-bonn.mpg.de).

## MATHEMATICS OF MODEL REDUCTION

A joint research workshop with SIAM on *Mathematics of model reduction* will be held at the University of Leicester from 28–30 August. The thematic structure of the workshop is deliberately broad in its scope and organized around the following list of topics:

- Theoretical Approaches (deterministic and stochastic): Invariant manifolds, inertial manifolds, perturbation theory, approximation theory, normal form theory
- Computational Approaches: Legacy codes and timesteppers, numerical computation of invariant manifolds, invariant grids, coarse-graining approaches
- Fields of Applications: Non-equilibrium statistical mechanics, kinetic theory, hydrodynamics and mechanics of continuous media, (bio)chemical kinetics, particulate systems, nonlinear dynamics, nonlinear control, nonlinear estimation.

For further information visit the webpage [www.2007.model-engineering.org](http://www.2007.model-engineering.org). The workshop is supported by an LMS conference grant.

## Just published

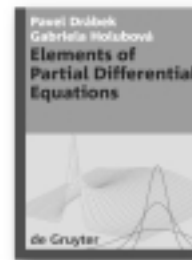


Gilbert Helmbert

### ■ Getting Acquainted with Fractals

2007. vi, 177 pages. Cloth. € [D] 78.00 / \*US\$ 98.00  
ISBN 978-3-11-019092-2

A mathematically oriented introduction to fractals: fractals of curves, attractors for iterative function systems in the plane, and Julia sets. The presentation is on an undergraduate level, with an ample presentation of the corresponding mathematical background, e.g., linear algebra, calculus, algebra, geometry, topology, measure theory and complex analysis.



Pavel Drábek / Gabriela Holubová

### ■ Elements of Partial Differential Equations

2007. ix, 245 pages. Paperback. € [D] 34.95 / \*US\$ 45.00  
ISBN 978-3-11-019124-0  
(de Gruyter Textbook)

This textbook presents a first introduction to PDEs on an elementary level. The intention is that the reader understands the basic principles which are valid for particular types of PDEs, and to acquire some classical methods to solve them. Only basic facts from calculus and linear ordinary differential equations of first and second order are needed as a prerequisite.

### ■ Combinatorial Number Theory

**Proceedings of the 'Integers Conference 2005'  
in Celebration of the 70th Birthday of Ronald Graham, Carrollton,  
Georgia, October 27-30, 2005**

Edited by Bruce Landman, Melvyn Nathanson, Jaroslav Nešetřil,  
Richard Nowakowski, and Carl Pomerance

2007. ix, 489 pages. Cloth. € [D] 168.00 / \*US\$ 186.00 ISBN 978-3-11-019029-8  
[de Gruyter Proceedings in Mathematics]



[www.degruyter.com](http://www.degruyter.com)

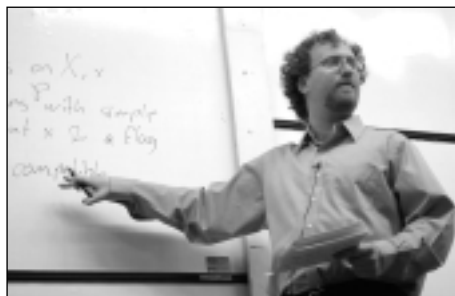
\* for orders placed in North America.  
Prices are subject to change.

## LMS INVITED LECTURES 2007

The 2007 LMS Invited Lectures were held in Oxford between 10–14 April, consisting of 10 lectures given by Professor David Ben-Zvi of the University of Texas at Austin on the Geometric Langlands correspondence.

The topic attracted a large audience, consisting of about 40 UK-based mathematicians and physicists including 15 graduate students, a further 20 Europeans, as well as participants from as far afield as Jerusalem, Seoul and Seattle. The speaker broke down the subject into five parts, respectively on geometric function theory, moduli of bundles on algebraic curves and the Hitchin fibration, geometric Hecke operators, the topological field theory approach of Kapustin and Witten, and applications to representation theory following Bezrukavnikov's work on the tamely ramified case and his own recent work with Nadler on representations of real algebraic groups. Highlights included a formulation of the geometric Langlands story, including the action of Hecke operators, as a three-tier quantum field theory (though time luckily ran out just before we got to the headache involved in contemplating 4-tier quantum field theories), and an explanation how the Springer resolution arises as a derived loop space.

The lectures were generally thought to be very well structured, clear and inspiring;



© Photo by Amber Novak

they were recorded on video, and will soon be available for download from David's NSF-funded resource webpage GRASP. There were additional lectures by Dmitriy Rumynin on the finite characteristic case; by Constantin Teleman on some constructions and computations supporting and fine-tuning the expected Langlands equivalence; and by Alexander Schmitt and Luis Alvarez-Consul on aspects of moduli spaces of sheaves on algebraic varieties. The Oxford weather was at its best, contributing in its small way to the success of an enjoyable and thought-provoking week.

Balázs Szendrői  
Oxford

## FUNCTIONAL AND DELAY DIFFERENTIAL EQUATIONS

A joint AARMS-CRM Workshop on *Recent advances in functional and delay differential equations* will be held at Dalhousie University, Halifax, Nova Scotia, Canada from 1–5 November. The plenary speakers will be:

- Nicola Guglielmi (L'Aquila)
- Tibor Krisztin (Szeged)
- Gerard Looss (Nice)
- Sjoerd Verduyn Lunel (Leiden)
- Cesar Palencia (Valladolid)
- Jianhong Wu (York, Canada)

Recent advances across the field of DDEs will be covered, with particular concentrations in non-constant and state-dependent delay equations, advance-delay differential equations and Volterra functional equations, including problems with 'differential-algebraic' structure. The workshop will bring together specialists in analysis and numerical computations of the functional and delay equations, with particular applications in biological problems and travelling waves in non-linear lattices. The deadline for abstract submission is **15 September**. Further information can be found at [www.crm.math.ca/AARMS07/index\\_e.shtml](http://www.crm.math.ca/AARMS07/index_e.shtml).

## LONDON MATHEMATICAL SOCIETY

### POPULAR LECTURES 2007

Institute of Education, London University – Thursday 12 July  
University of Birmingham – Tuesday 18 September

Dr Hinke Osinga

#### *Chaos and Crochet*

'Maths predicts things – so why is the weather forecast often wrong? The intricacies of chaos theory can be explained with a surface that you can make by crochet.'



Dr Stephen Huggett

#### *Knots*

'The mathematical theory of knots is a weird and wonderful world. It is easy to enter, but surprisingly difficult to answer some of its most obvious questions!'



**LONDON** Commences at 7.00 pm, refreshments at 8 pm, ends at 9.30 pm. Admission is free, with ticket. Apply by **4 July** to Lee-Anne Parker, London Mathematical Society, De Morgan House, 57–58 Russell Square, London WC1B 4HS ([leeanne.parker@lms.ac.uk](mailto:leeanne.parker@lms.ac.uk)). A stamped addressed envelope would be appreciated.

**BIRMINGHAM** Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9 pm. Admission is free. Enquiries to Dr Simon Goodwin, School of Mathematics, University of Birmingham, Birmingham B15 2TT ([goodwin@maths.bham.ac.uk](mailto:goodwin@maths.bham.ac.uk)).

The lectures are intended to be suitable for a general audience and no specific mathematical knowledge will be assumed. Although the talks are not primarily intended for professional mathematicians, everyone is welcome and some members may wish to apply for tickets for friends and relatives.

## RECORDS OF PROCEEDINGS AT MEETINGS

### REGIONAL ORDINARY MEETING

held on *Wednesday 30 May 2007* at the University of Cardiff. At least 40 members and visitors were present for all or part of the meeting.

The meeting began at 3 pm, with the President, Professor J.F. TOLAND, FRS, FRSE, in the Chair. Eight people were elected to Ordinary Membership: M.P. Holland, B. Klopsch, A. Laptev, J.P.T. Meyer, R. Moser, A.O. Philips, D. Schley, A. Vishik; and two were elected to Associate Membership: H.D. Burton, S.A. Munday.

Four members signed the book and were admitted to the Society.

PROFESSOR D.E. EVANS introduced a lecture given by Professor M. Aizenman on *The curious effects of disorder on spectra of random operators*.

After tea, Professor Evans introduced a lecture given by Professor T. Sunada on *The  $K_4$  crystal – a new crystal structure similar to the diamond lattice*.

Professor Toland expressed the thanks of the Society to the local organiser and the speakers for putting on such an excellent meeting.

After the meeting there was a recital given by Nicole Lamartine (soprano) and Matthias Langer (piano) at Aberdare Hall followed by a dinner.

### LMS SW&SW REGIONAL MEETING 2007

A South West and South Wales Meeting of the LMS was held in Cardiff University on 30 May 2007. This was part of a 4-day workshop in Cardiff on *Analysis on graphs and fractals* which was a satellite meeting of the programme *Analysis on graphs and its applications* in progress at the Newton Institute between January and July 2007. There were about 40 LMS members and visitors present. The President, Professor John Toland, opened the meeting and then formally invited Society members to come forward to sign the precious Members' Book dating back to

the Society's foundation in 1865. This was followed by lectures given by two very distinguished speakers who were introduced by Professor Des Evans, one of the organisers of the meeting.

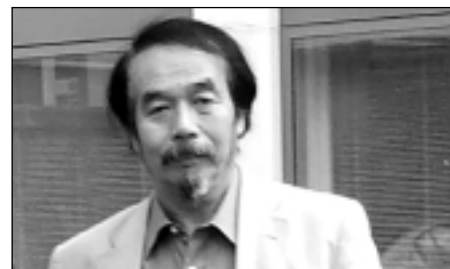
The first talk was given by Professor Michael Aizenman (Princeton) and had the intriguing title *The curious effects of disorder on spectra of random operators*. Michael started with an introduction on the Anderson model of mathematical physics and went on to survey the current state of knowledge on the rigorous justification of Anderson localisation for random Schrödinger operators and the related area of spectral level statistics. While a number of results are known con-



cerning the appearance of pure point spectra and localised states, there are few results on the survival of delocalised states and the existence of the mobility edge, except in the case of operators on trees. Related conjectures were formulated and a surprising recent result for Bethe lattices given.

During the break for tea and coffee between the two lectures, a display of LMS books and periodicals was organised by Susan Oakes. Some non-members were persuaded of the great benefits of joining the Society!

Professor Toshikazu Sunada (Meiji University, Tokyo) then gave his talk on *The  $K_4$  crystal – a new crystal structure similar to the diamond lattice*. Toshi initially described the abstract notion of a crystal lattice as a graph



with a free action of a free abelian finitely generated group. The so-called maximal abelian coverings of finite regular graphs were presented: among these, the diamond lattice and  $K_4$  lattice are particularly interesting. These share many important properties: they have extensive symmetry groups; have isometric realisations in 3-dimensional space such that their automorphisms can be realised as rigid bodies; and they minimise some natural variational functional. They are in fact the only 3-dimensional lattices with such properties. The natural question raised was whether carbon atoms could form the  $K_4$  lattice, and if so, what would be its properties?

The very successful meeting ended with a reception and a delightful recital by Nicole Sheldon (soprano) accompanied by Matthias Langer. This was followed by a dinner in the University's Aberdare Hall.

Peter Kuchment  
(Texas A&M)  
Scientific Organiser

### GRESHAM COLLEGE LMS LECTURE 2007

Delivered at Gresham College on 22 May, this lecture, a free public lecture in the tradition of the college, was the second in a series of joint lectures of the College and the London Mathematical Society. Professor Timothy Gowers, FRS, began his lecture on *Multiplying and dividing whole numbers: why it is more difficult than you might think* with some general comments on the difficulty of describing to non-mathematicians what mathematicians do, particularly explaining that this does not simply consist of such things as multiplying larger and larger numbers together. He then continued by saying 'I want to give some idea of what research in maths is like, so I have decided to talk about multiplying larger and larger numbers together', explaining that the emphasis would be on how to go about such a task.

Leading into this he carried out long multiplication of two four digit numbers, showing that essentially this involved 16 multiplications of single digit numbers, together with some addition. He then explained that when multiplying very much larger numbers (as is necessary in some encryption methods) an approach which reduces the enormous number of multiplications involved is worthwhile, and began by describing a method giving a 25% reduction. This was achieved by splitting each of the two strings of digits into two parts, so that for instance two thousand-digit numbers would each consist of a pair of 500 digit strings. Labelling these strings as  $A$  and  $B$  for the first number,  $C$  and  $D$  for the second, the trick was then to notice that the final answer could be obtained from the three numbers  $AC$ ,  $CD$  and  $AD + BC$ , and this could be done by three rather than four multiplications of 500 digit numbers (since  $AD + BC = (A + B)(C + D) - AC - BD$ ), so that 750,000 rather than a million individual single digit multiplications were required to obtain the final product. This process of subdivision could then be repeated, with further savings.

This approach was then used to suggest the idea of seeking a method where the convolution aspect of multiplying two sums  $(\sum_m a_m)(\sum_n b_n) = \sum_{m,n} a_m b_n$  might be replaced by some pointwise process  $\sum_n a'_n b'_n$  explaining that a procedure known as fast

Fourier transform constructs the required sequences  $a'_n, b'_n$  from the given sequences  $a_n, b_n$ . While it is not known if this is the fastest possible technique for multiplication, an open and difficult problem in mathematics, fast Fourier



transformations have certainly revolutionised algorithms.

The second part of the talk concentrated on factorisation, beginning with a specific example, expressing the number 437 as a product of prime numbers by the direct method of explicitly testing each possible prime factor. It was then shown that using this method to factorise a thousand digit number could be estimated to take  $10^{485}$  years.

Having thus established that efficient factorisation of large numbers is a difficult problem, and remarked that the fact that there is no fast algorithm for factorising a large number which is the product of two large primes is a basis for everyday digital security, Professor Gowers ended by describing a method for showing that an integer is not prime without actually finding any non-trivial factors. The method uses Fermat's little theorem, which states that if a number  $p$  is a prime number then (for any natural number  $a$ )  $a^{p-1}$  is always equal to  $1 \pmod p$ . He illustrated the method by calculating  $2^{90} \pmod{91}$ , by hand on the board, achieving the answer 64, and thus showing that 91 is not prime.

Professor Gowers engaged his audience throughout, carrying out many calculations on the board as he proceeded and developing his arguments in a clear and entertaining way. He conveyed complex ideas using carefully constructed examples and considerable expository skill. The lecture hall was packed, and a further room with video link also overflowing. This second lecture in the series again shows that there is a public appetite for mathematics, particularly when delivered with the verve and accomplishment shown by this lecturer.

The lecture may be found in video and audio format on the Gresham College web pages at [www.gresham.ac.uk](http://www.gresham.ac.uk).

F.A. Rogers  
King's College London

## LONDON MATHEMATICAL SOCIETY

### SPITALFIELDS DAY

in association with the Isaac Newton Institute for Mathematical Sciences programme entitled *Strong Fields, Integrability and Strings*

#### Gauge Theory, String Theory and Unification

Monday 8 October 2007, Isaac Newton Institute, Cambridge

- 13:30–14:30** Professor Nick Evans (Southampton University)  
*LHC – The greatest experiment on earth and the search for the origin of mass*
- 14:30–15:30** Professor Mikhail Shifman (University of Minnesota)  
*Supersymmetry and how it helps us to understand our world*
- 15:30–16:00** Tea
- 16:00–17:00** Professor Alexander Gorsky (ITEP, Moscow)  
*The different faces of integrability in Gauge theories*
- 17:00–18:00** Professor David Gross (KITP, Santa Barbara)  
*The coming revolutions in fundamental physics*
- 18:00–18:45** Wine and beer reception

The talks are aimed at final year undergraduate/beginning postgraduate students in particle physics or mathematics, and will review prospects for learning more about fundamental physics at the smallest scales, via both collider experiments at LHC, and recent dramatic progress in gauge field theory and string theory which promises to unify our understanding of particle physics and gravity.

Anyone interested is welcome to attend; talks will be aimed at a general mathematical audience. Please let Tracey Andrew at the Institute know by **Friday 28 September** if you intend to come: telephone (01223) 760992; fax: (01223) 330508; email: [t.andrew@newton.cam.ac.uk](mailto:t.andrew@newton.cam.ac.uk).

There are limited funds available to assist research students to attend, please apply by Friday 28 September to Tracey Andrew by email ([t.andrew@newton.cam.ac.uk](mailto:t.andrew@newton.cam.ac.uk)) or post at the Newton Institute, 20 Clarkson Road, Cambridge CB3 0EH. Scientific enquiries may be addressed to Simon Hands ([s.hands@swansea.ac.uk](mailto:s.hands@swansea.ac.uk)).

REVIEWS

**The Triumph of Numbers: How Counting Shaped Modern Life** by I Bernard Cohen, Norton & Co Ltd, 2006, Paperback, 209pp, £9.99, ISBN 0-393-32870-8

This is a modest, attractive, and readable introduction to the history of political statistics: it is, as the cover promises, ‘brief, lively, and highly entertaining’. The author, I Bernard Cohen, was one of the greatest of twentieth-century historians of science, and this is the final book on which he worked before his death in 2003. Aiming well away from exhaustiveness, the book uses a series of extremely well-chosen mini-case-studies to illuminate ‘how quantitative considerations have entered the conduct of government’ (pp. 48–50) from about the middle of the seventeenth century to the beginning of the twentieth, from the work on mortality statistics by John Graunt and William Petty in Restoration England, through Jefferson’s and Franklin’s uses of numbers in politics, the introductions of national censuses around 1800, and Quetelet’s work in nineteenth-century Belgium, up to Florence Nightingale’s statistics-driven reforms of hospital practice in the later nineteenth century.

*The Triumph of Numbers* also seems to be the incomplete relic of a rather different book, one which would have dealt with uses of numbers in general throughout (modern) history. This would have been an extraordinarily ambitious project: even in the book as we have it ‘numbers’ include both discrete and continuous quantities in cultures from ancient Egypt to nineteenth-century France. They may be natural numbers, integers, rationals, reals, or even ratios; they may be abstract concepts, the physical objects or collections which those concepts count or measure, or the written symbols used to record those counts and measures. I am not sure that even Cohen could have drawn coherence from such a protean concept. This book’s two examples of ‘numbers’ from ancient Egypt and the Old Testament serve

only to highlight how very different number concepts can be in different cultures, and what very different work they can do; and a similar point could be made about the short chapter on early modern numerology.

As it is, the opening two chapters, and certain passages elsewhere, which extend the scope of the book beyond a history of political statistics from 1650 to 1900, strike me as something of a distraction. Even the very brief consideration of the role of numbers in the Scientific Revolution feels as though it has been fitted to the ‘numbers’ theme only with difficulty. For example, it is not obvious that ‘an exact statement that leads to prediction and test’ (p.36) need be numerical, nor why the law of reflection of light (p.37) should be considered a ‘numerical law’.

Any good book, especially one so brief, inevitably raises more questions than it answers: why did the rise of political statistics happen when and how it did? Who desired it, and who benefited from it? What were its effects, in general, on the practice of government? I could also have wished for the consideration of its critics to be more fully integrated into the narrative.

A foreword notes that the subtitle is not one of which Cohen would have approved, but tells us nothing else about the state which the text had reached at his death, or about the level of editorial intervention which it has received. The epilogue and the chapter on the critics of statistics both end so abruptly as to feel, to me, unfinished. I have the impression that what I believe to be problems in the book are probably not the result of Cohen’s intentions: it is therefore uncomfortable and perhaps unfair to draw attention to them.

*The Triumph of Numbers* is a welcome and immensely able account of its subject. It is neither the vast survey implied by the title nor, perhaps, the monument to Cohen’s gifts that one might wish it to be.

Benjamin Wardhaugh  
University of Oxford

**Nonplussed! Mathematical Proof of Implausible Ideas** by Julian Havil, Princeton University Press, 2007, \$24.95, ISBN 0-691-12056-0

This book describes surprising, even paradoxical, results for readers who have a sound understanding of A level mathematics; a second volume is promised. Here fourteen chapters alternate between ideas from probability, and from the rest of mathematics, with a steady increase in depth and complexity. Some of the later manipulations may be rather daunting to the faint-hearted.

The general style is well illustrated by the account of Buffon’s Needle. Some historical background, a side-track to the fairground game of rolling a coin to land within a ruled square, consideration of needles of length  $l$  tossed at random onto a surface ruled with parallel lines distance  $d$  apart, with the cases  $l < d$  and  $l > d$  both considered, and a neat finish: if the needle is replaced by a convex polygon, all of whose sides are shorter than  $d$ , then the chance this lamina crosses a line is simply the ratio of the length of its perimeter to that of the perimeter of a circle of diameter  $d$ , *irrespective of its shape!* (But one vital condition has been overlooked – the diameter of the lamina must also be less than  $d$ .)

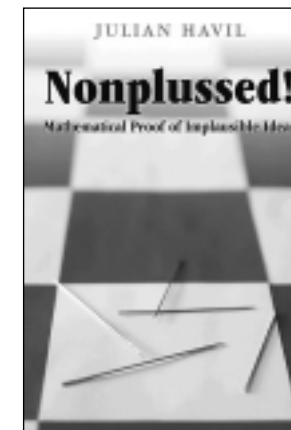
The mechanically minded reader, who wishes to build a device where-by a double cone can roll *uphill* along a pair of inclined rails will find a full recipe here. Readers of Mark Haddon’s *The Curious Incident of the Dog in the Night-Time* will recall the invocation of Conway’s Soldiers: a lucid exposition of John Conway’s proof that no soldier can advance more than four ranks is given. Edwin Abbott’s *Flatland* is the inspiration for the chap-

ter that looks at the calculation of volumes in spaces with a large number (not necessarily an integer) of dimensions, giving an excuse to introduce the Gamma, Digamma and Error functions, and to sum (tricky) infinite series. Parrondo’s paradox is beautifully presented. The variety and general quality of the material covered are both admirable.

I do have quibbles. Always placing figures and tables at the top of a page disrupts the flow of the text, and puts some material in the wrong section. There are a few minor slips and omissions. One is noted above, another is in the very first problem considered, where the number of matches to be played needs to be specified. Most of the time, an explanation as to why the apparent paradox should not really be a surprise is offered, but more opportunities to offer this enlightenment could have been taken.

This is a splendid collection of articles, inspired by Martin Gardner’s writings. Old conundrums are given new twists and applications, newer perplexing ideas are described with panache. The forthcoming companion book has a high standard to maintain.

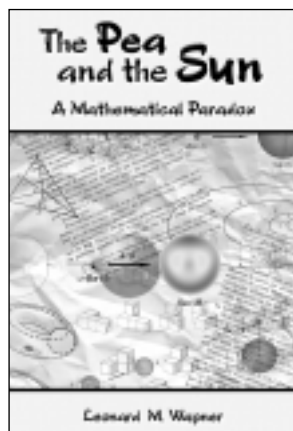
John Haigh  
University of Sussex



**The Pea and the Sun: a Mathematical Paradox** by Leonard M. Wapner, A K Peters, 232 pp, 2005 hardback £21, ISBN 1-56881-213-2, 2007 paperback £11.00, ISBN 978-1-56881-327-1.

The Banach-Tarski paradox is one of the strangest statements in mathematics, and it is one of my personal favorites. One formulation of the statement of the paradox is that a ball of radius  $R$  in Euclidean 3-space can be decomposed into finitely many disjoint pieces, which can then be moved by Euclidean motions to be reassembled into a ball of radius  $2R$ . The Banach-Tarski paradox is equivalent to the Axiom of Choice, and the heart of the paradox lies in the existence of non-measurable sets.

The book under review is written to explain the Banach-Tarski paradox to a general audience. It is a noble and difficult ambition, and it is one that the author succeeds at. He begins slowly, by introducing the main characters (Stefan Banach and Alfred Tarski, of course, but also Georg Cantor, Kurt Gödel and Paul Cohen), giving short biographies and discussing their work in Set Theory in basic terms. He then goes on to discuss the notion of paradox and then presents and discusses several jigsaw fallacies from the past century and a bit. The discussion of jigsaw fallacies is particularly good, I think, as it gets the reader in the right frame of mind for what is to come next.



In Chapter 3, he starts getting to the heart of the matter,

discussing scissors congruences and equidecomposibility, and the difference between them. In Chapter 4, he brings in what he refers to as 'baby BTs', or baby versions of the Banach-Tarski paradox. These two chapters are the most difficult, and the most interesting, because they form the bridge between the general discussion in the first two chapters, and the Banach-Tarski paradox itself which awaits in Chapter 5.

These third and fourth chapters are written well and do a good job of conveying the interested reader along. Necessary topics such as matrix multiplication and Lebesgue measure are defined and discussed briefly, but in such a way that the general reader should not get bogged down.

Largely because of the care that the author has taken in setting the stage, the Banach-Tarski paradox itself comes almost as an anticlimax. But only almost. The proof is given in Chapter 5 and is broken down into pieces that are individually relatively straightforward. There is an air of magic to the proof, but I find it a pleasing air of magic and it is an air that many good proofs have.

The book closes with a discussion of the possible relevance of the Banach-Tarski to the world we live in, and in particular I found the discussion of possible connections between the Banach-Tarski paradox and physics to be fascinating. I would find it remarkable if the Banach-Tarski did indeed arise there.

The Banach-Tarski paradox, particularly in its details, is hard to get a hold of. This is especially true for a non-mathematician, who isn't used to the basic axiomatic approach that mathematics takes to its universe. As is often the case of a book on a hard mathematical topic written for a general audience, there are places where the mathematician might quibble with details of the presentation, but I do not view these as serious. Rather, they are necessary if the flavour of the idea is to be presented without losing it in a forest of

detail. For the general reader, this book is an excellent introduction to a fascinating mathematical idea, and it is a book that I am tempted to buy a few people for Christmas.

Jim Anderson  
University of Southampton

**John Dee: Interdisciplinary Studies in English Renaissance Thought** edited by Stephen Clucas, International Archives of the History of Ideas, Vol. 193. Dordrecht: Springer Verlag, 2006, 366 pp, £111.00, €144, ISBN 978-1-4020-4245-4.

As Stephen Clucas (the editor of the volume under review) notes, more than any other figure in the English Renaissance, John Dee has been 'fragmented and dispersed across numerous disciplines' (p.1), and attempts to present a coherent image of his multifaceted persona have relied on assertive, but ultimately misleading, exercises in moulding his career to the model of a particular world view. One of this volume's great strengths lies in its determination to present the 'problematic multiplicity' of Dee's activities in a non-synthetic manner. Thus, the volume is divided into six sections: *Astronomy and Astrology*, *Dee and Maritime Affairs*, *Dee and the Occult Sciences*, *Dee's Conversations with Angels*, *Dee and Kelley*, and *Library Catalogue and Bibliography* (this last section containing Julian Roberts' valuable additions and corrections to 'John Dee's Library Catalogue' and a bibliography of recent works on Dee by Clucas). This arrangement inevitably leads to conflicting (sometimes even contrary) presentations of Dee's outlook and significance, but this is a virtue in itself, for it lays bare the complex historiography with which scholarship on Dee must now contend.

The divisive heritage of Dee studies is ably examined in Clucas' detailed and instructive introduction, in which the volume's editor navigates expertly through a historiographical minefield, charting as he travels Dee's for-

*tuna* within intellectual history. At the heart of the 'historiographical tension' evident in Dee studies is the (continuing) debate over the relationship between magic and science at the beginning of the so-called Scientific Revolution. Indeed, one of the most illuminating aspects of Clucas' *Introduction* is the extent to which Dee has been at the centre of several decades of passionate argument about the foundations of modern science, from E.G.R. Taylor's and Francis Johnson's attempts to revive the 'mathematical' Dee, through I.R.F. Calder's 'Neoplatonic' Dee and (most controversially) Frances Yates' and Peter French's 'Elizabethan Magus', to the vituperative rebuttal of the Yates thesis by Robert S. Westman and John Heilbron, leading (eventually) to a more nuanced account of the relationship between the 'occult' and the 'scientific', amply evident in this volume. It is to be hoped, despite the obvious (and very serious) deficiencies of the Yates thesis, that this volume might prompt a more balanced, reflective evaluation of Yates' overall contribution to intellectual history.

It is impossible to do justice to the fourteen essays that constitute this volume, but historians of mathematics will be most interested in the lucid, erudite, and compelling contributions by Robert Goulding and Stephen Johnston on, respectively *The Parallaxic Treatises of John Dee and Thomas Digges and John Dee, Thomas Digges and the Identity of the Mathematician* as well as by Robert Baldwin's study of *Dee's Interest in the Application of Nautical Science, Mathematics and Law to English Naval Affairs*. Despite its long gestation, this volume is a timely and welcome contribution not only to Dee studies, but to Renaissance intellectual history as a whole. There remains much work to be done on Dee and his milieu; this book offers an inviting springboard for future research.

Alexander Marr  
Lecturer in Art History  
University of St Andrews

**EPSRC**

The London  
Mathematical  
Society



## Hydrodynamic Stability Theory

### LMS-EPSRC Short Course

Keele University, 2–7 September 2007

Organiser: Dr Jonathan Healey

The study of the stability of fluid flows is fundamental to many areas of research, and this course aims to provide an introduction to the basic concepts and techniques and also to more advanced methods used by researchers. While primarily aimed at PhD students in applied mathematics, the course should also be of interest to engineers and physicists and anyone expecting to encounter fluid flows in their work.

The course will be made up of three 5-lecture mini-courses on:

- (i) *Shear layer instabilities* (J.J. Healey, Keele)
- (ii) *Geophysical fluid dynamics* (R.E. Hewitt, Manchester)
- (iii) *Pattern formation in fluid flows* (A. Juel, Manchester);

and three guest lectures:

- (i) *Overview of hydrodynamic stability* (P. Hall, Imperial)
- (ii) *Transient growth mechanisms* (S.J. Chapman, Oxford)
- (iii) *Bioconvection of suspensions of swimming micro-organisms* (T.J. Pedley, Cambridge).

There will be printed lecture notes, problem sheets, tutorial sessions and demonstrations of laboratory experiments. Further information about the course will appear at [www.keele.ac.uk/depts/ma/lmscourse](http://www.keele.ac.uk/depts/ma/lmscourse).

All PhD students registered at a UK university will be charged a registration fee of £100 (in the case of EPSRC funded research students, this fee should be paid by their departments from their DTA). All others (overseas students, postdocs) must pay the full subsistence costs of £360, plus a registration fee of £250, making a total of £610 for this course.

Applications should be made using the registration form available on the Society's website at: [www.lms.ac.uk/activities/rmc/sc/37poster.html](http://www.lms.ac.uk/activities/rmc/sc/37poster.html)

Numbers will be limited and those interested are advised to make an early application. The closing date for applications is **Friday 13 July**. All applicants will be contacted by the London Mathematical Society approximately one week after this deadline; we will not be able to give information about individual applications before then.

**EPSRC**

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## Asymptotic Methods in Infinite Group Theory

### LMS-EPSRC Short Course

Mathematical Institute, Oxford, 9–14 September 2007

Organiser: Dan Segal

An introduction to recent developments in infinite group theory: structure of profinite groups and pro- $p$  groups, analytic and arithmetical objects that can be associated with infinite groups, the relations between infinite groups and their finite quotients. The lectures will provide enough of the necessary background so that participants are made aware of what is already known, can appreciate problems of current interest, and have some idea of the available tools. These tools cover a broad spectrum of contemporary mathematics and will be a valuable addition to the repertoire of research students who may find themselves working in the general area, not necessarily on the precise questions discussed in the course.

There will be three course lecturers:

- **Benjamin Klopsch** (Royal Holloway, University of London)  
*Analytic pro- $p$  groups (a meeting-ground between finite  $p$ -groups and Lie theory)*
- **Nikolay Nikolov** (Imperial College)  
*Strong approximation methods in infinite group theory (a meeting-ground between algebraic groups and number theory)*
- **Marcus du Sautoy** (Oxford)  
*Zeta functions associated to infinite groups (a meeting-ground between combinatorics, algebraic geometry and analysis).*

In addition, there will be tutorial sessions, with the organiser and other researchers active in these areas.

The course is intended for research students in group theory and related areas, e.g. 'unconventional' zeta functions. The only prerequisite is a basic grounding in algebra.

All PhD students registered at a UK university will be charged a registration fee of £100 (in the case of EPSRC funded research students, this fee should be paid by their departments from their DTA). All others (overseas students, postdocs) must pay the full subsistence costs of £336, plus a registration fee of £250, making a total of £586 for this course.

Applications should be made using the registration form available on the Society's website at: [www.lms.ac.uk/activities/rmc/sc/38poster.html](http://www.lms.ac.uk/activities/rmc/sc/38poster.html).

Numbers will be limited and those interested are advised to make an early application.

The closing date for applications is **Friday 13 July**. All applicants will be contacted by the London Mathematical Society approximately one week after this deadline; we will not be able to give information about individual applications before then.

#### About the Short Courses

The principal aim of the courses is to provide training for postgraduate students in core areas of mathematics. The courses are intended to provide high quality courses for graduate students from around the country in an effective and efficient manner. Part of their success is the opportunity for students to meet other students working in related areas as well as the chance to meet a number of leading experts in the topic.

ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

ZEROS OF GRAPH POLYNOMIALS

21 – 25 January 2008

in association with: Newton Institute programme entitled  
*Combinatorics and Statistical Mechanics* (14 January to 4 July 2008)

**Workshop organisers:** Bill Jackson (Queen Mary, London) and Alan Sokal (NYU and UCL).

**Theme of workshop:** The workshop will study the zero distribution of polynomials canonically associated to graphs. Examples include the chromatic polynomial, the reliability polynomial, the Tutte polynomial, the independent-set polynomial and the matching polynomial. From the point of view of statistical physics, these polynomials are nothing other than the partition functions of standard statistical-mechanical models (e.g. the Ising model, the Potts model, the lattice gas, the monomer-dimer model) living on the graph. Combinatorialists study the real and complex zeros of such polynomials to ascertain how they are related to the combinatorial properties of the underlying graph (planarity, chromatic number, maximum degree, connectivity, etc.). The questions being investigated thus arise naturally from combinatorics; but key elements of the intuition needed for their solution typically come from statistical physics, in particular from the theory of phase transitions and critical phenomena.

The workshop will bring together some of the principal researchers in this field to review recent advances and to brainstorm concerning the many unsolved problems. It will also feature tutorial seminars describing the main results and proof techniques, such as deletion/contraction, the multivariate approach, cluster expansion, and transfer matrices. The topics will be of interest to combinatorial mathematicians, mathematical physicists, theoretical physicists and computer scientists.

**Keynote speakers:** Norman Biggs (LSE), Christian Borgs (Microsoft Research, Seattle), Fengming Dong (Singapore), Roberto Fernandez (Rouen), Bill Jackson (Queen Mary, London), Jesper Jacobsen (Paris-Sud), Gordon Royle (Western Australia), Robert Shrock (SUNY-Stony Brook), Alex Scott (Oxford), Alan Sokal (NYU and UCL), Carsten Thomassen (Technical University of Denmark).

**Further information and application forms** are available from the web at: [www.newton.cam.ac.uk/programmes/CSM/csmw01.html](http://www.newton.cam.ac.uk/programmes/CSM/csmw01.html). Completed application forms should be sent to Tracey Andrew, Programme & Conference Secretary, Isaac Newton Institute, 20 Clarkson Road, Cambridge CB3 0EH or via email to: [t.andrew@newton.cam.ac.uk](mailto:t.andrew@newton.cam.ac.uk).

Closing date for the receipt of applications is **30 September 2007**.

CALENDAR OF EVENTS

This calendar lists Society meetings and other events publicised in the *Newsletter*. Further information can be obtained from the appropriate LMS Newsletter whose number is given in brackets. A fuller list of meetings and events is given on the Society's website ([www.lms.ac.uk/newsletter/calendar.html](http://www.lms.ac.uk/newsletter/calendar.html)).

JULY 2007

- 2-6 Journées Arithmétiques Meeting, Edinburgh (357)
- 2-6 Effective Computational Methods for Highly Oscillatory Problems Workshop, INI, Cambridge (353)
- 2-6 Applications of Multiscale Methods and Statistical Inference Course, London (357)
- 2-12 Recent Developments in Random Walks LMS Durham Symposium (359)
- 4-6 Singularity Theory Conference, Liverpool (358)
- 4-7 Game Theory Meeting, Madrid (359)
- 8-14 British Combinatorics Conference, Reading (360)
- 9-12 3-Manifold Geometry and Topology Symposium Workshop, Warwick (350)
- 9-12 Diophantine Equations via Analytic Number Theory Workshop, Bristol (357)
- 9-13 Homological Algebra and Equivariant Homology Theory LMS-EP SRC Short Course, Southampton (359)
- 9-13 Further Developments in Quantitative Finance ICMS Workshop, Edinburgh (358)
- 9-13 Dynamics Days Europe, Loughborough (356)
- 12 LMS Popular Lectures, London (361)
- 13-14 David Epstein 70th Birthday Celebration Symposium Workshop, Warwick (350)
- 15-10 Aug AARMS, Nova Scotia (358)
- 16-18 Pseudo Hermitian Hamiltonians in Quantum Physics Workshop, London (358)
- 16-20 ICIAM, Zürich, Switzerland (349)
- 16-20 Optimal Transportation and Applications to Geophysics and Geometry ICMS Workshop, Edinburgh (358)

- 16-21 Hyperbolic Structures on 3-Manifolds and Large Scale Geometry of Teichmüller Space Symposium Workshop, Warwick (350)
- 20 Higher Order Statistics in Cosmology Workshop, Portsmouth (360)
- 23-27 Positivity and its Applications Conference, Belfast (358)
- 23-27 Coloquio Latinoamericano de Algebra, Colombia (358)
- 30-3 Aug Fusion Systems LMS-EP SRC Short Course, Birmingham (359)

AUGUST 2007

- 2-3 Combinatorics of Arc-Transitive Graphs and Partial Orders Meeting, Leeds (359)
- 3-9 Mathematics Competition for University Students, Bulgaria (357)
- 5-9 Algebraic and Topological Methods in Non-Classical Logics Conference, Oxford (360)
- 6-8 Quantum Groups and Noncommutative Geometry Workshop, Bonn (361)
- 6-10 Construction and Properties of Bayesian Nonparametric Regression Models INI Workshop, Cambridge (356)
- 6-10 Mathematical Virology ICMS Workshop, Edinburgh (358)
- 8-10 Fluid Dynamics Conference, Birmingham (358)
- 17-19 Real Analysis, Geometric Measure Theory, PDE and Banach Spaces Meeting, Warwick (360)
- 19-25 Twisters, Strings and Scattering Amplitudes LMS Durham Symposium (359)
- 20-24 Analysis and Singularities Conference, Moscow (354)
- 20-24 Exploring QCD Workshop, INI, Cambridge (357)
- 23-26 From Higman-Sims to Urysohn Conference, Ambleside (355)
- 24-26 International Pure Mathematical Conference, Islamabad (360)
- 27-31 Motives, Quadratic Forms and Algebraic Groups Workshop, Belfast (358)
- 28-30 Mathematics of Model Reduction Workshop, Leicester (361)



**S. BRYANT**  
LMS member 1882-1896



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Sophie Bryant, DSc  
North London Collegiate 1875–1918  
Third female member of the Society  
First female member to publish a paper in the *LMS Proceedings*  
For further information see Newsletter 311, pp.14–15  
or visit [www.lms.ac.uk/newsletter/0301/articles.html](http://www.lms.ac.uk/newsletter/0301/articles.html)