THE LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 372 July 2008

Society Meetings and Events

2008

Wednesday 9 July
Popular Lectures
London [*page* 21]

Thursday 17 July
LMS Meeting
5ECM Amsterdam
[*page* 2]

Monday 15 September
SW & South Wales
Regional Meeting
Swansea [*page* 3]

Monday 15 September
Computer Science Day
London

Thursday 25 September
Popular Lectures
Birmingham [page 21]

Friday 21 November
AGM, London

12–13 December
Joint Meeting with
the Edinburgh
Mathematical Society
Edinburgh

LMS PRIZES 2008

The winners of the LMS prizes for 2008 were announced at the Society Meeting on 4 July. The Society extends its congratulations to these winners, and its thanks to all to nominators, referees and members of the Prizes Committee for their contributions to the Committee's work this year.

PROFESSOR DAVID PREISS, FRS, of the University of Warwick is awarded the **Pólya Prize** in recognition of his outstanding contributions to analysis and geometric measure theory.

PROFESSOR NICHOLAS HIGHAM, FRS, of the University of Manchester is awarded the **Fröhlich Prize** in recognition of his leading contributions to numerical linear algebra and numerical stability analysis.

PROFESSOR KEVIN BUZZARD of Imperial College London is awarded the **Senior Berwick Prize** for the paper 'Eigenvarieties', published in volume 320 of the LMS Lecture Note Series, *L-functions and Galois Representations*, 2007.

DR TIMOTHY BROWNING of the University of Bristol is awarded a **Whitehead Prize** for his significant contributions on the interface of analytic number theory and arithmetic geometry concerning the number and distribution of rational and integral solutions to Diophantine equations.

DR TAMÁS HAUSEL of the University of Oxford is awarded a **Whitehead Prize** for his investigations into hyperkähler geometry which have led him to prove deep results in fields as diverse as the representation theory of quivers, mirror symmetry and Yang–Mills instantons.

DR MARTIN HAIRER of the University of Warwick is awarded a **Whitehead Prize** for his contributions to the theory of stochastic differential equations.

DR NINA SNAITH of the University of Bristol is awarded a **Whitehead Prize** for her work at the interface of random matrix theory and number theory.

LMS AND IMA DISCUSSIONS

This *Newsletter* has often reported that the LMS and IMA joint planning group was developing a model that if implemented would lead to the replacement of both societies by a new one. As further reported in the Council Diary in the May issue, Council was to

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discuss the matter at length at its Retreat on 6 and 7 June. It will then decide at its meeting on 4 July whether or not to proceed further. If it does so the next phase is likely to be a full consultation with members. Watch this space!

Charles Goldie
General Secretary

LMS MEETING AND RECEPTION AT 5ECM

The London Mathematical Society will be holding a meeting and reception during the 5th European Congress of Mathematics (5ECM) in Amsterdam from 14 to 18 July 2008. The Society meeting and reception will be held from 6:30 pm to 8.00 pm on Thursday 17 July. LMS members who have not already done so will have the opportunity to sign the Membership Book which dates back to 1865.

Members who wish to attend the meeting and reception should apply for their free ticket to Susan Oakes, the Administrator of the Society (susan.oakes@lms.ac.uk) no later than **Wednesday 9 July**. The Society hopes to entertain as many as possible of its members, but numbers are limited by the capacity of the room.

FELLOWS OF THE ROYAL SOCIETY

Amongst those elected to Fellowship of the Royal Society in 2008 were:

- Mark Kisin, Professor of Mathematics, Department of Mathematics, University of Chicago
- Evgeny Konstantinovich Sklyanin, Reader, Department of Mathematics, University of York
- Ulrike Louise Tillmann, Professor of Mathematics, Mathematical Institute and Tutorial Fellow, Merton College, University of Oxford

Professor David Mumford (University Professor Emeritus, Division of Applied Mathematics, Brown University) was elected a Foreign Member.

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LONDON MATHEMATICAL SOCIETY

SOUTH WEST & SOUTH WALES REGIONAL MEETING

Civil and Computational Lecture Theatre, Talbot Building, Swansea University

Monday 15 September 2008

2.00 Opening of the meeting

Nicola Fusco (Naples)
Equilibrium configurations of strained films: Existence, regularity and qualitative properties

3.00 István Gyöngy (Edinburgh)
Numerical solutions of optimal stopping and control problems

4.00 Tea

4.45 Bert Peletier (Leiden)
Dynamical systems in pharmaceutical sciences

There will be a reception and dinner afterwards. For registration, further details and to reserve a place at the dinner, see the webpage www-maths.swan.ac.uk/staff/vm/LMS-regional or contact V. Moroz (V.Moroz@swansea.ac.uk).

The meeting will be followed by a workshop from 16 to 18 September on *The Calculus of Variations and Nonlinear Partial Differential Equations*. The workshop will address new trends in the modern theory and applications of nonlinear partial differential equations and the calculus of variations. Particular areas will include quantitative and qualitative analysis of nonlinear elliptic and parabolic partial differential equations, existence and regularity problems, variational and PDE-related numerical methods in material microstructures.

There are funds available to contribute to the expenses of members of the LMS or research students to attend the meeting and workshop. Requests for support can be expressed on the on-line registration form.

For information on scientific questions or for information on organisational matters contact V.A. Liskevich (v.a.liskevich@swansea.ac.uk) or K. Zhang (k.zhang@swansea.ac.uk).

July08-NL-with-grey-page-18.indd3 3 29/06/2008 22:16:49

SPITALFIELDS DAYS

In 1987, the London Mathematical Society instituted a series of occasional meetings called *Spitalfields Days.* The name honours our predecessor, the Spitalfields Mathematical Society, which flourished from 1717 to 1845.

A Spitalfields Day is usually associated with a long-term symposium on some specialist topic at a UK university. One of the symposium organizers is asked to arrange a one-day meeting at which selected participants, often distinguished experts from overseas, will give survey lectures on topics in the field of the symposium or other types of lecture accessible to a general mathematical audience. These meetings are publicized in the *Newsletter* and all members are invited to attend.

The standard grant for a Spitalfields Day is £500 and is intended to meet actual supplementary costs associated with the event (for example, cost of a subsidy for a lunch for participants and administrative costs). We also encourage grant holders to make some of it available in the form of small (£50) travel grants to enable LMS members and research students to attend the event.

Anyone involved in running a symposium who would be interested in organizing a Spitalfields Day is invited to write to Dr S.A. Huggett, Programme Secretary at the Society (grants@lms.ac.uk). The format need not be precisely as described, but should be in a similar spirit. For examples of previous Spitalfields Days visit www.lms.ac.uk/meetings/spitalfields.html.

INTERNATIONAL SHORT VISITS

The objective of Scheme 5 (International Short Visits) is to provide a grant to a mathematician within the UK to support a visit for collaborative research either to or from a country in Africa, or countries in which mathematics is in a similar position. Any mathematician working in the UK is eligible to apply for a grant, but if the applicant is not a member of the Society then the application must be countersigned by a member who is prepared to support the application. This applies both to outgoing and to incoming visits. The value of an award is maximum £2,100 for visits to Britain; for visits from Britain the maximum is £1,300. For further information visit www.lms.ac.uk/grants/scheme5.html.

The LMS occasionally gets enquiries from mathematicians in Africa (or elsewhere) hoping to make use of Scheme 5 and seeking a UK mathematician to make the application. If you are a UK mathematician interested in helping, please contact Dr S.A. Huggett, Programme Secretary at the Society (grants@lms.ac.uk).

EPSRC FUNDING FOR KNOWLEDGE TRANSFER

In October 2009, EPSRC will start funding its new Knowledge Transfer Accounts (KTAs). These are the successor to the existing Collaborative Training Account (CTA) scheme and will have a different focus. They will provide funding to help ensure that the research that EPSRC funds is fully exploited, as well as contribute to the creation of a culture of Knowledge Transfer. They will be open to all institutions eligible to hold EPSRC grants. The initial KTA call for proposals will be issued this summer, but institutions are being encouraged to start developing bids now. As well as inviting 'core' bids on an institutional basis, the call is open to 'plus' bids which can operate across several centres and address strategic issues that cannot be tackled by a single institution. 'Plus' bids could be based on industrial sectors, disciplines or specific aspects of knowledge transfer. Each 'plus' bid will be accompanied by a single case for support covering all the institutions involved. To maximise the impact of the scheme, the minimum KTA bid will be £2m. It is possible that this figure could increase in light of the recommendations of this summer's review of existing CTAs. Contact: Alex Hulkes (alex.hulkes@epsrc.ac.uk).

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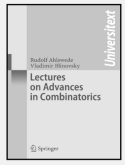

Lectures on Advances in Combinatorics

R. Ahlswede, University of Bielefeld, Germany;
V. Blinovsky, Russian Academy of Sciences, Moscow, Russua

This volume features lectures that focus on basis extremal problems and inequalities–-two sides of the same coin. Additionally, the lectures help prepare approaches and methods useful and applicable in a broader mathematical context.

2008. XIII, 314 p. 3 illus. (Universitext) Softcover
ISBN 978-3-540-78601-6 ► **€ 39,95 | £30.50**

An Introduction to Mathematical Cryptography

J. Hoffstein, **J. Pipher**, **J. Silverman**, Brown University, Providence, RI, USA

An Introduction to Mathematical Cryptography provides an introduction to public key cryptography and underlying mathematics that is required for the subject.

2008. XVI, 524 p. 29 illus. (Undergraduate Texts in Mathematics) Hardcover
ISBN 978-0-387-77993-5 ► **€ 34,95 | £26.50**

Braid Groups

C. Kassel, Université Louis Pasteur - CNRS, Strasbourg, France; **V. Turaev**, Indiana University, Indiana, US

In this well-written presentation, motivated by numerous examples and problems, the authors introduce the basic theory of braid groups, highlighting several definitions that show their equivalence; this is followed by a treatment of the relationship between braids, knots and links.

2008. XII, 340 p. 60 illus. (Graduate Texts in Mathematics, Volume 247) Hardcover
ISBN 978-0-387-33841-5 ► **€ 42,95 | £32.50**

Catalan's Conjecture

R. Schoof, Università di Roma, Italia

In 1844, Eugène Charles Catalan conjectured that 8 and 9 are the only two consecutive perfect powers of natural numbers, and it was proved more than 150 years later. This book presents this spectacular result in a highly accessible way.

2008. Approx. 150 p. 10 illus. (Universitext) Softcover
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LMS INVITED LECTURES SERIES

Programme Committee will be considering proposals for the 2010 Invited Lectures at its meeting in October 2008. Proposals are now invited from anyone who, in addition to suggesting a topic and lecturer, would be prepared to organize the meeting at their 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.

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 **Monday 22 September**. Programme Committee hopes to make a decision on 9 October.

Previous lecturers:

- B. Dubrovin *The geometry of isomonodromic deformations*
- T. Goodwillie *Calculus of functors*
- P. van Moerbeke *Random matrices, random permutations and integrable lattices*
- M. Fukushima *Dirichlet forms and related stochastic analysis*
- M.W. Davis *The geometry and topology of Coxeter groups*
- D. Ben-Zvi *Geometric Langlands correspondence*
- M.F. Singer *Introduction to the Galois theory of differential and difference equations*
- A. Okounkov *Random surfaces*

The 2009 Invited Lectures will be given by Alexandru Ionescu (University of Wisconsin at Madison) on the theory of black holes in general relativity. The lectures will take place at the University of Edinburgh from 14 to 18 April 2009. For further information contact Jim Wright (J.R.Wright@ed.ac.uk).

A report on the 2008 Invited Lectures is on page 25.

NOT SINCE 1657

Professor John D. Barrow, FRS, has been appointed the new Professor of Geometry at Gresham College. Having delivered his massively popular free public lectures as the Professor of Astronomy between 2003 and 2007, John Barrow is now to continue his association, in this new role, with the oldest higher-education institution in London – a feat previously achieved only by the founding member of the Royal Society, Lawrence Rooke.

As Professor of Geometry at Gresham College, John Barrow will continue the 411-year-old tradition of delivering free public lectures aimed to be of interest and use to a wide range of people. His series of lectures will focus on the applications of mathematics to familiar things, explaining how mathematics is all around us and tells us many things about the world that we couldn't otherwise learn. He will investigate how mathematics finds its application in areas such as sport, art, architecture and design, and how it can explain the everyday problems that arise – such as how to win on the horses, how to pack cases efficiently, or how to hold (and rig!) an election. His first series of lectures will take place in the academic year 2008–2009.

For further information about the Gresham Lectures, visit the website at www.gresham.ac.uk.

July08-NL-with-grey-page-18.indd6 6 29/06/2008 22:16:52

MATHEMATICS POLICY ROUND-UP

For the second year, the Mathematics Promotion Unit worked with scientists who are showcasing their work at the Royal Society Summer Exhibition. The *Maths Inside* project aims to draw out some of the mathematics used in the research both to highlight how fundamental mathematics is to science, but also to entertain and inform visitors. This year, the Maths Inside created factsheets to accompany the stands of: a team which used hydrostatics to look at how crabs sense the depth of water, nanotechnologists who are packing spherical fullerene molecules into cylindrical nanotubes and computer scientists who use information theory to create secure passwords using graphics. The factsheets are available on the new Mathematics Promotion Unit website at www.mathspromotion.org.uk.

The Council for the Mathematical Sciences (CMS) responded to a consultation on a proposed Framework for Higher Education Qualifications (FHEQ) by the Quality Assurance Agency. Roughly speaking, the framework aims to ensure that higher education qualifications in England, Wales and Northern Ireland are compliant with the Bologna Process, which aspires to harmonise all European university qualifications. A key difficulty raised for mathematics, statistics and operational research (MSOR) is that the technical nature of these subjects makes the proposed requirement to study and critically appreciate research at the 'forefront of the discipline' inappropriate. The CMS endorsed the response by the Heads of Departments of Mathematical Sciences, which proposed adoption of an alternative framework of qualification specifications known as the Dublin Descriptors, which are felt to be more suitable for MSOR. The CMS also supported a submission by the Group originally convened to prepare the Benchmark Statement for Mathematics, Statistics and Operational Research degrees. For more information, see www.cms.ac.uk/submissions.html.

The independent think tank Reform released a report *The Value of Mathematics* at the beginning of June. Co-written by Professor John Marks, educationalist and emeritus professor at the University of Buckingham, the report made headlines in the newspapers and led to leader columns lamenting deterioration in standards. It said the UK was not producing enough quality mathematicians, highlighting demotivation in teachers, less enjoyable mathematics for pupils and exclusion of universities and employers from education policy. The authors also analysed O-level/GCSE examination papers over time, concluding that between "1951 and 1970 these were a rigorous test of thought and initiative in algebra, arithmetic and geometry". By 1980, questions were becoming simpler, and since the introduction of GCSE in 1988, there has been "a sharp drop in difficulty". It said that a lack of mathematical skills had cost the UK economy £9 billion since 1990 and called for radical measures to move mathematics "from geek to chic".

Ironically, after the report was published, the methodology and mathematics used by the researchers to reach these conclusions received significant criticism. See the report at www.reform.co.uk/thevalueofmathematics_214.php.

Fewer than half of mathematics teachers in England's secondary schools have a mathematics degree, according to new research commissioned by the government. The National Foundation for Education Research found that despite a £40 million pound recruitment campaign, mathematics graduates were still not moving into teaching, estimating that just 47% of mathematics teachers had a relevant degree. This compares poorly with other subjects, such as biology with an equivalent figure of 85%; and overall, the proportion of teachers with a relevant degree has been increasing since 2002.

Caroline Davis
Mathematics Policy and Promotion Officer

July08-NL-with-grey-page-18.indd7 7 29/06/2008 22:16:52

Science from Oxford

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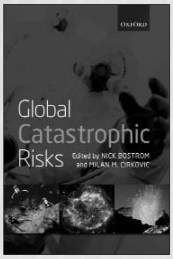
Global Catastrophic Risks

Edited by Nick Bostrom and Milan M. Ćirković

'We should welcome this fascinating and provocative book.'
Martin J Rees (from foreword)

June 2008 | 978-0-19-857050-9 | Hardback | £25.00



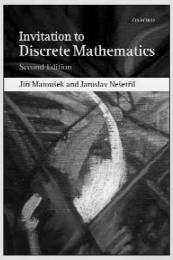
Invitation to Discrete Mathematics

Second Edition

Jiří Matoušek and Jaroslav Nešetřil

A clear and self-contained introduction to discrete mathematics for undergraduates and early graduates.

July 2008 | 978-0-19-857042-4 | Paperback | £35.00
July 2008 | 978-0-19-857043-1 | Hardback | £75.00

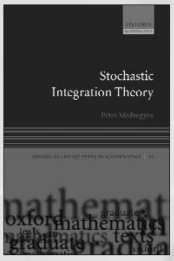


Stochastic Integration Theory

Péter Medvegyev

This graduate level text covers the theory of stochastic integration, an important area of Mathematics with a wide range of applications, including financial mathematics and signal processing.

Oxford Graduate Texts in Mathematics
July 2007 | 978-0-19-921525-6 | Hardback | £45.00



Credit Risk Management

Basic Concepts: Financial Risk Components, Rating Analysis, Models, Economic and Regulatory Capital

Tony Van Gestel and Bart Baesens

This first of three volumes on credit risk management, providing a thorough introduction to financial risk management and modelling.

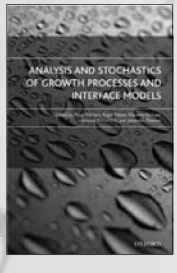
August 2008 | 978-0-19-954511-7 | Hardback | £75.00

Analysis and Stochastics of Growth Processes and Interface Models

Edited by Peter Mörters, Roger Moser, Mathew Penrose, Hartmut Schwetlick, and Johannes Zimmer

The combination of articles from the two fields of analysis and probability is highly unusual and makes this book an important resource for researchers working in all areas close to the interface of these fields.

July 2008 | 978-0-19-923925-2 | Hardback | £39.50



For more information and ordering details, please visit www.oup.co.uk/academic/science

MATHEMATICAL SOCIETY OF JAPAN

Prizes

The 2008 Spring Prize has been awarded to Professor Hideo Takaoka of Kobe University for his outstanding contribution to the global theory of nonlinear dispersive equations. The Spring Prize is the most prestigious prize awarded to a mathematician who is a member of the Society and who is under 40 years of age. Professor Takaoka, working with J. Colliander, M. Keel, G. Staffilani and T. Tao, has proved the existence and uniqueness of the time global solutions of the Cauchy problem for nonlinear Schrödinger equation with critical nonlinearities, which had been a long-standing unsolved problem, and constructed the dynamical system associated with the KdV equation in the widest conceivable function space and proved the non-squeezing property in the sense of Gromov, which substantially deepened the geometric understanding of the KdV flow. The analytical method which was invented and used by them for solving these problems is now widely applied by many authors under the name 'I-method'.

The 2008 Publication Prize has been awarded to two individuals Susumu Otake and Takashi Kitano and to the monograph *An introduction to theory of continuous groups* by Takahiko Yamaguchi and Mitsuo Sugiura.

The 2008 Algebra Prize laureates are: Professor Osamu Iyama (Nagoya University) for his research on higher-dimensional Auslander–Reiten theory; Professor Yoshinori Namikawa (Osaka University) for his works on Calabi–Yau threefolds and holomorphic symplectic geometry; and Professor Toshiyuki Tanisaki (Osaka City University) for his contributions to the representation theory of Lie algebras and quantum groups. Since its inception in 1998, the Algebra Prize has been awarded to mathematicians who made outstanding scholarly contributions to algebra.

COLLINGWOOD MEMORIAL PRIZE

The 2008 Collingwood Memorial Prize has been awarded to Ruth M. Wilbourne, Collingwood 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.

BRIAN GRIFFITHS

Brian Griffiths, who was elected a member of the London Mathematical Society on 19 November 1964, died suddenly at home on 4 June 2008, aged 80. He served on the LMS Council in the 1970s.

A student at Manchester University, Brian obtained an MSc and PhD under Max Newman, before taking academic posts at Aberdeen, Bristol and Birmingham as well as visiting positions at the Institute for Advanced Study, Princeton, and the Courant Institute, New York. In 1964 he moved to the University of Southampton as Professor of Pure Mathematics, where he remained until retirement in 1992. His earlier work was in topology, although he went on to pursue research on geometry of harmonic functions, Morse Theory and dynamical systems. He was passionately interested in Mathematics Education, on which he held strong views, working closely with Geoffrey Howson, former secretary of ICMI (International Commission on Mathematical Instruction) and also a Professor at Southampton. He was an inspirational teacher, a much-loved colleague and an accomplished violinist. After retirement Brian and his wife Catherine continued to have many University contacts, especially through the Turner Sims Concert Hall.

July08-NL-with-grey-page-18.indd9 9 29/06/2008 22:16:54

TONY SPENCER

Tony Spencer, FRS, Emeritus Professor of Theoretical Mechanics at Nottingham University since 1994, who was elected a member of the London Mathematical Society on 4 March 2000, died suddenly at home on 26 January 2008, aged 78.

Arthur England writes: Tony Spencer was born in Edgbaston in 1929. He attended Queen Mary's Grammar School, Walsall, and then did his National Service in the West Yorkshire Regiment. In 1949 he became a student at Queens' College, Cambridge, graduating in mathematics. His PhD was on the fracture of elastic-plastic materials. In 1955 a two-year Fulbright Travel Grant enabled him to study at Brown University in the United States. There he worked with Ronald Rivlin and Albert Green on finite elasticity and initiated an important collaboration with Rivlin on the theory of algebraic invariants. He continued to work actively in these fields throughout his career. In 1957 he returned to Britain as a Senior Scientific Officer at Aldermaston.

In 1960, Nottingham University set up the Department of Theoretical Mechanics with the remit to teach mathematics to the engineering students. Tony Spencer joined the Department at its inception, and was appointed Professor and Head of Department in 1965. Under his leadership Theoretical Mechanics grew and achieved wide recognition for research in solid mechanics. Teaching also had a high priority and the two-volume text *Engineering Mathematics*, written in the mid-seventies by Tony Spencer and his colleagues, and Tony's highly-regarded monograph *Continuum Mechanics* (1980) stem from undergraduate courses there. He remained at Nottingham until his retirement in 1994, giving unstinting service to the University and nationally on the mathematics committees of the SERC and the UGC and elsewhere.

Tony Spencer's research interests were unusually wide-ranging and he made outstanding contributions to several branches in solid mechanics, including those mentioned above. He devised the double-shearing flow theory for granular materials, which gave a new direction to the subject. In collaboration with his colleague Tryfan Rogers, he initiated major developments in the modelling of an-isotropic and inhomogeneous materials and composites. He was elected an FRS in 1987 and a Fellow of the American Academy of Arts and Sciences in 2004. Nottingham University established the Spencer Institute of Theoretical and Computational Mechanics in 2007. A measure of his abiding interest in solid mechanics is that in his retirement he published almost forty research papers.

Tony was very well known and will be greatly missed.

PAULINE COOLEN-SCHRIJNER

Pauline Coolen-Schrijner, who was elected a member of the London Mathematical Society on 10 February 2001, died on 23 April 2008, aged 40.

Thomas Augustin (*Munich*) *writes:* Pauline was born in Arnhem, The Netherlands. She received an MSc degree in Econometrics from the Catholic University of Brabant, and then joined the University of Twente as a PhD student. Her thesis entitled *Quasi-stationarity of discrete-time Markov chains* was the start of an intensive and enduring collaboration with Erik A. van Doorn.

She continued her career in England, where she worked briefly in Newcastle and then as Lecturer and Reader in the Department of Mathematical Sciences at Durham University. Her well-recognized research includes contributions to the theory and application of Markov chains, in particular on quasi-stationary and limiting conditional distributions. In recent years she was also intensively engaged, together with her husband and colleague Frank Coolen, in the development of nonparametric predictive inference (NPI) – a new exciting methodology for predictive inference under low structure assumptions leading to interval-valued probabilities. Pauline's favourite areas of application were operational research and reliability.

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Far beyond her scientific achievements, we will keep Pauline in our mind, and our heart, as a wonderful, simply loveable person, with a bright and open mind and a heart of gold. She was always full of optimism, mental strength and energy, with a special sense of the 'small things in life', being well aware that – quoting the last line of her web page – "breathing is not something we can take for granted".

HARRY FISHER

Harry L. Fisher, who was elected a member of the London Mathematical Society on 20 January 1989, died on 12 February 2008, aged 84.

MAURICE ROTHMAN

Maurice Rothman, who was elected a member of the London Mathematical Society on 25 April 1946, died in December 2007, aged 86.

HOWARD SEALEY

Howard C.J. Sealey, who was elected a member of the London Mathematical Society on 20 January 1984, died on 7 June 2008.

DOMAINS IX

The workshop on *Domains* will take place from 22 to 24 September 2008 at the University of Sussex, Brighton. The workshop is aimed at computer scientists and mathematicians alike who share an interest in the mathematical foundations of computation. The workshop will focus on domains, their applications and related topics. Previous meetings were held in Darmstadt (1994, 1999, 2004), Braunschweig (1996), Munich (1997), Siegen (1998), Birmingham (2002) and Novosibirsk (2007). The emphasis is on the exchange of ideas between

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The book is a self-contained comprehensive exposition of the equivariant degree theory and its applications to a variety of problems arising in physics, chemistry, biology and engineering. It presents the theoretical foundations, construction, and the fundamental properties of the equivariant degree and its practical variations, which are applied to a series of examples from (functional) differential equations.

ISBN: 9781601330017
£36.50
American Institute of Mathematical Sciences

The Symmetries of Things

John H. Conway, Heidi Burgiel, Chaim Goodman-Strauss

Symmetry is a fundamental phenomenon in art, science, and nature that has been captured, described, and analyzed using mathematical concepts for a long time. Inspired by the geometric intuition of Bill Thurston and empowered by his own analytical skills, John Conway, with his co-authors, has developed a comprehensive mathematical theory of symmetry that allows the description and classification of symmetries in numerous geometric environments

ISBN: 9781568812205
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A K Peters

Mathematical People
Profiles and Interviews

Donald J. Albers, Gerald L. Alexanderson

This unique collection contains extensive and in-depth interviews with mathematicians who have shaped the field of mathematics in the twentieth century. Collected by two mathematicians respected in the community for their skill in communicating mathematical topics to a broader audience, the book is also rich with photographs and includes an introduction by Philip J. Davis.

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Differential Calculus in Normed Linear Spaces
Second Edition

Kalyan Mukherjea

This book presents Advanced Calculus from a geometric point of view: instead of dealing with partial derivatives of functions of several variables, the derivative of the function is treated as a linear transformation between normed linear spaces. This leads to a simplified and transparent exposition of "difficult" results like the Inverse and Implicit Function Theorems but also permits a discussion of the Differential Calculus of functions defined on infinite dimensional Hilbert or Banach spaces.

ISBN: 9788185931760
£23.50
Hindustan Book Agency

participants similar in style to Dagstuhl seminars. In particular, talks on subjects presented at other conferences and workshops are acceptable. The confirmed invited speakers are:

- Andrew Pitts (Cambridge University)
- John Longley (University of Edinburgh)
- Martin Hyland (Cambridge University)
- Jean Goubault-Larrecq (LSV/ENS Cachan & CNRS)

More speakers will be announced nearer to the time. Domain theory has had applications to programming language semantics and logics (lambda-calculus, PCF, LCF), recursion theory (Kleene–Kreisel countable functionals), general topology (injective spaces, function spaces, locally compact spaces, Stone duality), topological algebra (compact Hausdorff semilattices) and analysis (measure, integration, dynamical systems). Moreover, these applications are related – for example, Stone duality gives rise to a logic of observable properties of computational processes. As such, domain theory is highly interdisciplinary. Topics of interaction with domain theory for this workshop include, but are not limited to:

- program semantics
- program logics
- probabilistic computation
- exact computation over the real numbers
- lambda calculus
- games
- models of sequential computation
- constructive mathematics
- recursion theory
- realizability
- real analysis and computability
- topology, metric spaces and domains
- locale theory
- category theory
- topos theory
- type theory

PhD students or participants from Eastern Europe who think they need financial support to be able to attend should contact the programme committee. Depending on the funding, subsistence costs might be (partially) covered for those participants. For further information visit the website at www.informatics.sussex.ac.uk/events/domains9. The workshop is partially funded by an LMS conference grant.

CITATION STATISTICS

In July 2007 the International Mathematical Union (IMU), the International Council for Industrial and Applied Mathematics (ICIAM) and the Institute of Mathematical Statistics (IMS) announced the creation of a committee on *Quantitative assessment of research* to investigate various aspects of impact factors and similar statistics based on citations. This effort was triggered by numerous requests from IMU member countries, mathematical societies, important mathematical institutions, and individuals who reported the increasing use (and misuse) of impact factors and similarly of other citation-based indicators to measure the quality of research of individuals, departments, or whole institutions. The committee comprised:

- John Ewing (Providence, USA) *chair*, appointed by IMU
- Robert Adler (Haifa, Israel) appointed by IMS
- Peter Taylor (Melbourne, Australia) appointed by ICIAM

The committee has addressed this charge by reviewing and discussing current practices along with an extensive literature on the use of citations to evaluate research. Its report, written from the perspective of mathematical scientists, was submitted to the Executive Committees of IMU, ICIAM, and IMS, and published on 11 June. The report can be found at the website www.mathunion.org/Publications/Report/CitationStatistics.

All three organizations, representing the world community of pure, applied and industrial mathematics and statistics, hope that the careful analysis and recommendations in this report will be considered by decision-makers who are making use of citation data in research assessment.

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NEWS FROM IMU

IMU Prizes: Chairs and Nomination

The International Mathematical Union will award the following prizes during the Opening Ceremony of the International Congress of Mathematicians on 19 August 2010. The IMU Executive Committee has now appointed the selection committees for these prizes. The Prize Committee Chairs are

- Fields Medals: László Lovász (lovasz@cs.elte.hu)
- Rolf Nevanlinna Prize: Ravindran Kannan (kannan@microsoft.com)
- Carl Friedrich Gauss Prize: Wolfgang Dahmen (dahmen@igpm.rwth-aachen.de)

The names of the other committee members will be made public at ICM 2010. Information about the prizes is at www.mathunion.org/general/prizes. Nomination guidelines can be found at www.mathunion.org/general/prizes/nomination-guidelines. Nominations should ideally be sent by **15 December 2008** to the Prize Committee Chairs.

ICMI Awards

The 2007 ICMI Felix Klein Medal is awarded to Professor Jeremy Kilpatrick (USA).

The 2007 ICMI Hans Freudenthal Medal is awarded to Professor Anna Sfard (Israel).

The official presentation of the 2007 medals will be made during the opening ceremony at ICME-11 in Monterrey, Mexico, on Monday 7 July 2008, jointly with the presentation of the two 2005 ICMI Medals. For further information visit the website at: www.mathunion.org/icmi/Awards/

Database of ICM Speakers

A database of ICM plenary and invited speakers since 1950 can be found on the IMU website: www.mathunion.org/o/ICM/Speakers/Search.php.

This list, which now consists of 2084 entries, has been a work in progress and has been compiled from the proceedings volumes of the ICMs. It is searchable by name, section, and year of the congress. However, this database does not include those invitees who, for whatever reason, did not participate in ICM and consequently were not included in the table of contents of ICM proceedings. It has been pointed out to the IMU Executive Committee (EC) that a number of mathematicians were invited speakers but were prevented by their local governments from attending ICM and giving their talks. Most of these mathematicians were from the former Soviet Union.

The IMU has consistently supported the freedom of circulation of scientists around the world and has continued to endorse the principle of universality expressed by the International Council for Science. In particular, the 15th IMU General Assembly (Santiago de Compostela, 2006) reaffirmed this position and passed a resolution (Resolution 10) in this regard. For further information see www.mathunion.org/Organization/GA/GA-Santiago/15thGAReportfinal070520Santiago.pdf.

At its meeting in Budapest in April 2008, the EC approved a proposal by A. Vershik, Russia, to include on its website a list of mathematicians who were invited to speak at one of the previous ICMs and who, for political reasons, were unable to participate in the congress. (This list will not include those invitees who either declined the invitation or were unable to attend for personal reasons.) The names of these mathematicians will not be added to the already existing database mentioned above, but will rather be posted as a separate list. It is not an easy task to compile such a list from IMU records spanning several ICMs. Therefore this will be a work in progress, and it is hoped that inaccuracies and omissions are reported to IMU and can be corrected accordingly. If you can help with this, please send your information to sbaouendi@ucsd.edu or ragnip@math.uio.no.

The above items are taken from the 29th issue of the IMU electronic newsletter *IMU Net* (see www.mathunion.org/Publications/Newsletter).

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THE LMS LIBRARY

The Society's Library consists of a substantial collection of periodicals obtained in exchange for the Society's publications, copies of books and journals published by the Society and items acquired by the Society as review copies or gifts.

The LMS Library is integrated with the Mathematics section of the UCL (University College London) Library, a short walk from De Morgan House and within easy reach of both Euston and King's Cross stations. It is housed on the third floor of the UCL Science Library, which is on the Main UCL Campus (see map at http://crf.casa.ucl.ac.uk/exploreMap.aspx). Members of the London Mathematical Society thus have access to the combined resources of UCL and the LMS, and may use all the material available in the reading rooms and stores of the UCL family of libraries. The UCL Library Services online catalogue – eUCLid – can be found at http://library.ucl.ac.uk. Older material may be held in Store and can be reserved via the catalogue with 24 hours' notice.

UCL Library refurbishment 2008

The ground floor of the UCL Science Library (DMS Watson Building) is being refurbished this summer with the generous support of the Wolfson Foundation:

- The entrance lobby will be widened and improved with a new Membership desk and a separate security office.
- Wheelchair users will benefit from a new gate to access the library and wider doorways into the main space.
- From the entrance lobby, two sets of glazed double doors will invite users into the new area.
- To facilitate group study, there will be new soft seating clusters and a group study area, enabled with 'RoamNet' wireless network, for up to 44 users.
- Five self-service terminals will be installed for book issue and return, based on RFID (radio-frequency) technology.
- New issue and enquiry desk

The impact of construction work during summer 2008 will be:

- The main entrance will be closed for the duration of the works. Access will be through the deliveries door on Malet Place.
- The Science Issue Desk will be relocated to the 2nd floor for the duration of the works.

To create the necessary space, the older low-usage journals (pre-1991) currently accommodated on the ground floor will be moved to the off-site Store and will be accessible, on request, with 24 hours' notice through the UCL Library Stores service. Electronic access to the backfiles of many of these volumes is now available as well. These stock moves will have taken place by the end of May 2008.

The building works are scheduled to start in June and be completed in mid-September in time for the new academic year. The Science Library will remain open throughout this period.

How to use the library

Members wishing to use the Library must register with UCL Library to obtain a Library card. Library cards require a passport-size photograph and can be provided on the spot at the Membership Desk of the Science Library, but require **proof of identity and address** – members should read the information at www.ucl.ac.uk/Library/soc.shtml before making a special journey to the Library to register. Alternatively, members may register by post and avoid the need to produce identification: a registration form can be downloaded from www.ucl.ac.uk/Library/borapp.shtml and should be sent with your photograph to the Head of Membership at the address below. Whether registering by post or in person, users should state that they are joining as members of the London Mathematical Society.

UCL Library cards are issued for 12 months from the date of registration. Members with expired cards may renew their cards at the

Science Library Issue Desk or by post. Cards for postal renewal should be sent to the UCL Library Services Head of Membership, accompanied by the member's current contact details and an indication as to whether the updated cards should be returned by post or retained for collection in person. Unregistered members will not be refused postal photocopying services (see below), but registration is essential before items can be borrowed.

Services available to registered members

1. Any item normally available for borrowing by staff of UCL may be borrowed. In addition, members may borrow bound volumes of mathematical periodicals provided they are at least five years old. Members may have up to TEN items on loan at any one time, and may place up to 3 concurrent reservations for material which is already out on loan. Loans may be renewed online or by telephone (provided that they have not been reserved by another Library user and are not overdue).

2. MathSciNet and certain electronic journals can be accessed from a terminal in the Science Library designated for use by LMS members and other non-members of UCL. Single copies of articles (no more than one article per journal issue) may be printed or saved for the member's personal use. Printing is charged for at the same scale of charges as applies to members of UCL (currently 5p per page). MathSciNet can also be accessed from the Members' Room at De Morgan House.

3. Photocopying is available on a do-it-yourself basis on the same scale of charges as applies to staff of University College. Members who are unable to meet the normal printout costs due to financial difficulties should apply to the LMS Librarian (librarian@lms.ac.uk).

4. UCL Library also provides a rapid photocopying service by post. A copyright declaration form (available from www.lms.ac.uk/contact/copyright.pdf) must be signed and sent to the Library for each item requested before dispatch (a faxed copy is acceptable, provided an original is sent subsequently). For extra speed, copies may be ordered in advance by e-mail for dispatch as soon as the declaration form arrives. The cost of this service is currently 15p per page.

5. Books may be borrowed by post by registered members of the Library. Requests for this may be made by post, e-mail or fax. There is no service charge; the user is responsible only for the cost of returning books borrowed in this way, and any fines accrued by late return.

Contact details
Head of Membership, UCL Library Services,
University College London, Gower Street,
London WC1E 6BT
Tel: 020 7679 7953, Fax: 020 7679 7373,
Email: lib-membership@ucl.ac.uk

Loan and photocopy requests
Email: interloans@ucl.ac.uk;
Fax: 020 7679 2815

Book renewals
Online: http://library.ucl.ac.uk;
Tel: 020 7679 7754

Enquiries
UCL Science Library, DMS Watson Building
Tel: 020 7679 7789, Email: lmsinf@ucl.ac.uk

FUNCTION THEORY MEETING

The annual one-day *Function Theory Meeting* will be held on 8 September 2008. The main speaker will be Tom Carroll (University College Cork) who will talk on *The univalent Bloch–Landau constant, harmonic symmetry and conformal glueing*. Anyone interested in receiving further details about the meeting should contact Gwyneth Stallard (G.M.Stallard@open.ac.uk). The meeting is funded by an LMS conference grant.

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BRITISH ASSOCIATION FESTIVAL OF SCIENCE

This year's British Association Festival of Science will take place in Liverpool, European Capital of Culture 2008, from 6 to 11 September. The festival attracts around 400 speakers, from science, technology, engineering and mathematics, who come to communicate their work to the public at venues across the city and university. This year, the Mathematical Sciences programme is particularly rich. Provisionally scheduled events include:

Monday 8 September

- *Mathematics and maritime trade*
  Mary Croaken (University of Warwick)
- *Chaos and fractals*
  Lasse Rempe (University of Liverpool)

Tuesday 9 September

- *Mathemagics: geometric transforms and invisibility*
  Sébastien Guenneau
  (University of Liverpool)
- *One hundred not out - the t-test reaches its centenary* (Presidential lecture), Stephen Senn
  (University of Glasgow)
- *Evidence informed law*
  Harvey Goldstein
  (Royal Statistical Society)

Wednesday 10 September

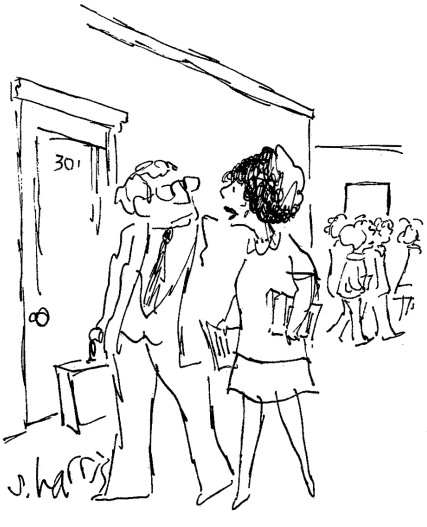
- *Sustainability through statistics*
  David Viner (Natural England),
  Sari Kovats (London School of Hygiene and Tropical Medicine),
  Peter Roderick
  (Climate Justice Programme)

The Festival also begins with an interactive Family Weekend, which will have several stands of mathematical interest.

To book tickets for a session or to find out times and venues, check on the BA Festival website (www.the-ba.net/the-ba/FestivalofScience/).

WHAT WORKS IN THE CLASSROOM

A one day conference *What works in the classroom – collaborative teaching practice and the history of mathematics* will take place on 26 September at De Morgan House, 57–58 Russell Square, London WC1 4HS. It is planned as a workshop-based experience and a discussion forum for all teachers, teacher advisers and trainers interested in the uses of the history of mathematics in the mathematics classroom. It is based on a work developed by a group of teachers who collaborated over the past few years on trialling, developing, and using history of mathematics resources in primary and secondary settings; it will aim to equip delegates with some useful tools and resources ready to use in a classroom. From September 2008, learning about the historical and cultural roots of mathematics will be an entitlement of every child being educated in England and Wales. The conference includes



"Compulsory education is a myth. We may be compelled to teach, but very few of them are compelled to learn."

© Sidney Harris

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the following presentations:

- Teacher panel from the *What works* project, supported by the NCETM and the British Society for the History of Mathematics
- Sue Pope, QCA *Mathematics' rich historical and cultural heritage – making the entitlement a reality for all learners*
- Snezana Lawrence *The garden of knowledge that mathematics is – the hidden garden of motivation and the history of maths in the classroom*
- Leo Rogers *Similar triangles in the classroom: historical problems in a modern context*
- Elizabeth Boag *Alpha and Omega of mathematics - Greek and some other numerals*

The cost of the conference is £40, including lunch and refreshments. To reserve a place, by **5 September**, send a cheque payable to 'Simon Langton Grammar School for Boys' to the organiser Dr Snezana Lawrence, Simon Langton Grammar School for Boys, Langton Lane, Nackington Road, Canterbury CT4 7AS, or alternatively email snezana@mathsisgoodforyou.com.

GROUPS ST ANDREWS 2009

Groups St Andrews 2009 will take place from 1 to 15 August 2009 at the University of Bath. This conference, the eighth in the series of *Groups St Andrews* conferences, will be organised along similar lines to previous events in this series. The principal speakers are:

- Gerhard Hiss (RWTH, Aachen, Germany)
- Volodymyr Nekrashevych (Texas A&M, USA)
- Nikolay Nikolov (Imperial College, London)
- Eamonn O'Brien (Auckland, New Zealand)
- Mark Sapir (Vanderbilt, Nashville, USA)

These speakers have agreed to give short courses of lectures in the first week. In addition there will be a programme of one-hour invited lectures and short research presentations. There will be three theme days in the second week: a 'B.H. Neumann day', a day to celebrate birthdays of John Cannon and Derek Holt, and an 'Engel groups day'. The conference aims to cover all aspects of group theory. The short lecture courses are intended to be accessible to postgraduate students, postdoctoral fellows, and researchers in all areas of group theory.

The members of the Scientific Organising Committee are: Colin Campbell, Martyn Quick, Edmund Robertson and Colva Roney-Dougal (St Andrews); Geoff Smith and Gunnar Traustason (Bath).

For further information contact *Groups St Andrews 2009*, Mathematical Institute, North Haugh, St Andrews, Fife KY16 9SS, email: gps2009@mcs.st-and.ac.uk or visit the website at: http://groupsstandrews.org.

SEMIGROUPS AND GROUPS IN ESSEX

Semigroups and Groups in Essex (SAGE) is a workshop taking place at the University of Essex from 28 to 29 August 2008. The theme of the conference is semigroup and group theory and related topics. Confirmed plenary speakers so far are:

- John Fountain (York)
- Peter Higgins (Essex)
- Jim Howie (Heriot Watt)
- Mark Kambites (Manchester)
- Rick Thomas (Leicester)
- Claas Roever (Galway)
- Nik Ruškuc (St Andrews)

In addition to these plenary talks, the organizers invite participants to give talks. Prospective participants should register their intention to attend by contacting Gerald Williams (gwill@essex.ac.uk) or Alexei Vernitski (asvern@essex.ac.uk), indicating if they would like to give a talk.

There is limited funding available for PhD students. The workshop is sponsored by the London Mathematical Society and is being organized by Gerald Williams, Alexei Vernitski and Peter Higgins. Further information will be posted on the conference website (www.essex.ac.uk/maths/SAGE08) as it becomes available.

GCHQ

Careers in British Intelligence

DIRECTOR

Heilbronn Institute for Mathematical Research

Bristol

Applications are invited for the Directorship of the Institute. The main duties are to recruit and lead a team of about 30 high calibre postdoctoral and senior academics carrying out research in pure mathematics. The Institute is a partnership between GCHQ and the University of Bristol with vigorous classified and unclassified research programmes. The Institute has administrative staff and the Director and a Deputy Director who has the primary responsibility for leading the government related classified research.

The appointee will be a pure mathematician with a world leading reputation in some aspect of the subject and will have a proven ability to lead and inspire groups of researchers. The appointment will be for a period of three years commencing in Autumn 2009. It is expected that the Director will also be appointed to a visiting professorship at the University of Bristol.

Salary will be attractive and in the upper range for senior academics; a relocation package will be available.
Applicants must be of British nationality.

For further details contact Melanie Kisby, Administrator, HIMR, PO Box 2495, Bristol BS8 9AG or call 0117 980 6300.

For information about the unclassified research see
www.maths.bris.ac.uk/research/labs/heilbronn

Expressions of interest should reach Mrs Kisby by 31 August 2008.

GCHQ values diversity and welcomes applicants from all sections of the community.

POSITIVE ABOUT DISABLED PEOPLE

INVESTOR IN PEOPLE

University of BRISTOL

PARTIAL DIFFERENTIAL EQUATIONS AND APPLICATIONS

An international conference on *Partial Differential Equations and Applications* in honour of Professor Philippe G. Ciarlet's 70th birthday will be held from 5 to 12 December 2008 at the City University of Hong Kong, Kowloon, Hong Kong. The objectives of the conference are to review and discuss some of the latest trends in the field of partial differential equations and applications. The conference is dedicated to Professor Philippe G. Ciarlet, Professor emeritus, Université Pierre et Marie Curie, and Chair Professor, City University of Hong Kong, on the occasion of his 70th birthday, in recognition of his mathematical achievements and of his dedication to the mathematical community.

For further information visit the website at www6.cityu.edu.hk/rcms/ICPDEA2008 or email mclbj@cityu.edu.hk.

CARDIFF NUMBER THEORY DAY

Cardiff Number Theory Day will take place on Friday 25 July 2008 at the Cardiff School of Mathematics – a symposium in celebration of Christopher Hooley's 80th birthday. The programme is as follows:

- Registration and buffet lunch (Room M/1.02)
- Hugh Montgomery (University of Michigan) *The ideal sieve*
- Trevor Wooley, FRS (University of Bristol) *Higher order asymptotic formulae in diagonal diophantine problems*
- Glyn Harman (Royal Holloway, University of London) *Primes with pre-assigned digits – An unusual application of the circle method*
- Jörg Brüdern (Universität Stuttgart) *On Weyl sums*
- Richard Hall (University of York) *Irregularities in distribution of sets of multiples*
- Roger Heath-Brown, FRS (University of Oxford) *Representing integers as sums and differences of k-th powers*
- Dinner in Aberdare Hall

The talks will take place in Room M/0.40 of the Cardiff School of Mathematics (located quite near the southern end of Senghennydd Road, eight minutes' walk from Cathays railway station).

Registration is free. Register by emailing Nigel Watt to state whether or not you will require the buffet lunch (which will be provided free of charge), and whether or not you will attend the dinner afterwards (£29.00). Those wishing to attend the dinner should reserve their places by **Monday 14 July**. For more information contact the organiser Nigel Watt (tel. 029 208 75670, email: wattn@cf.ac.uk) or visit the website at www.cardiff.ac.uk/maths/newsandevents/news/stories/hooley.html.

EUROMECH FLUID MECHANICS

The 7th *EUROMECH Fluid Mechanics Conference* (EFMC7) will be held at the University of Manchester, organised by the School of Mathematics and the Manchester Institute of Mathematical Sciences from 14 to 18 September 2008. The invited speakers are:

- A. Dowling (UK) *Aeroacoustics*
- J. Eggers (UK) *The role of singularities in hydrodynamics*
- E. Guazzelli (France) *Particulate flows*
- D. Henningson (Sweden) *Flow control applied to transitional flows*
- P. Hosoi (USA) *Low Reynolds number locomotion*
- A. Thess (Germany) *Electromagnetic flow measurement*
- R. Verzicco (Italy) *Numerical simulations of high Rayleigh number thermal convection*

For further information visit the website at www.mims.manchester.ac.uk/EFMC or email efmc@maths.manchester.ac.uk.

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The Rankin Lectures 2008

JOHN BAEZ

University of California, Riverside

My Favorite Numbers

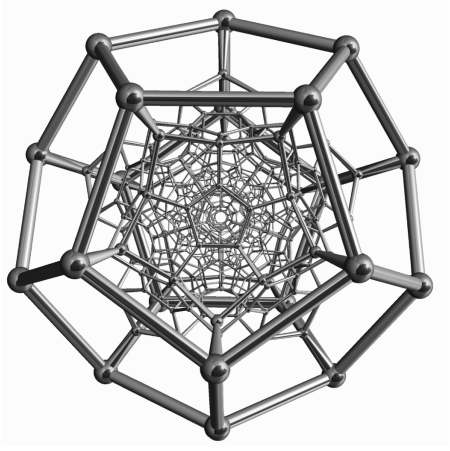

Image © Robert Webb's Great Stella Software, http://www.software3d.com/Stella.php

5	8	24
Monday	**Wednesday**	**Friday**
15 Sept, 4pm	**17 Sept, 4pm**	**19 Sept, 4pm**

Information: www.maths.gla.ac.uk/∼tl/rankin

Supported by the Glasgow Mathematical Journal Trust

Department of Mathematics, University of Glasgow

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LONDON MATHEMATICAL SOCIETY

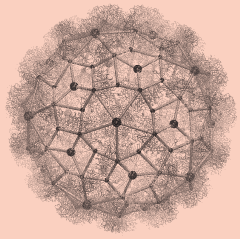
POPULAR LECTURES 2008

University of London, Institute of Education – Wednesday 9 July
University of Birmingham – Thursday 25 September

Dr Tadashi Tokieda, Trinity Hall, University of Cambridge

Toy models

'Come and see many toys that can be made in 10 minutes but, if played with imaginatively, can inspire research for 10 months and pose problems in mathematics and mechanics, some still unsolved.'



Dr Reidun Twarock, University of York

Know your enemy – viruses under the mathematical microscope

'Mathematics can help us understand the structure of viruses and the principles responsible for their formation. Can this knowledge be used to find their Achilles' heel and develop new strategies for anti-viral drug design?'

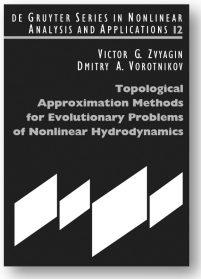
LONDON Commences at 7.00 pm, refreshments at 8.00 pm, ends at 9.30 pm. Admission is free, with ticket. Apply by **4 July** to Lee-Anne Parker, London Mathematical Society, De Morgan House, 57–58 Russell Square, London, WC1B 4HS (email: leeanne.parker@lms.ac.uk). A stamped addressed envelope would be appreciated.

BIRMINGHAM Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 pm. Admission is free. Enquiries to Dr Chris Sangwin, School of Mathematics, University of Birmingham, Birmingham, B15 2TT (email: C.J.Sangwin@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.

DE GRUYTER

Just published / Coming soon



Victor Zvyagin / Dmitry Vorotnikov

■ **Topological Approximation Methods for Evolutionary Problems of Nonlinear Hydrodynamics**

June 2008. XII, 230 pages. Hardcover.
RRP € [D] 98.00 / * US$ 128.00.
ISBN 978-3-11-020222-9
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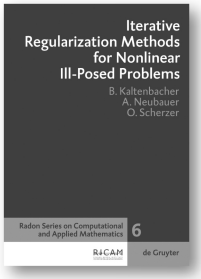
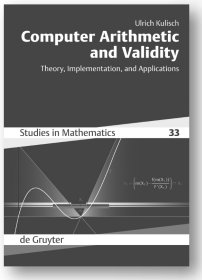


Barbara Kaltenbacher / Andreas Neubauer / Otmar Scherzer

■ **Iterative Regularization Methods for Nonlinear Ill-Posed Problems**

May 2008. Approx. VIII, 196 pages. Hardcover.
RRP € [D] 78.00 / * US$ 115.00.
ISBN 978-3-11-020420-9
Radon Series on Computational and Applied Mathematics 6



Ulrich Kulisch

■ **Computer Arithmetic and Validity**
Theory, Implementation, and Applications

May 2008. Approx. XVIII, 410 pages. Hardcover.
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ISBN 978-3-11-020318-9
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ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

CLASSICAL AND QUANTUM TRANSPORT IN THE PRESENCE OF DISORDER

15–19 December 2008

in association with the Newton Institute programme entitled
Mathematics and Physics of Anderson Localization: 50 Years After
(14 July to 19 December 2008)

Organisers: Y.V. Fyodorov (Nottingham), I. Goldsheid (London), T. Spencer (Princeton) and M.R. Zirnbauer (Cologne).

Theme: This is the concluding conference of the programme on localization theory. In addition to describing recent results in localization, the conference will explore some emerging connections between classical and quantum transport. The topics will include quantum localization and diffusion, random walks in a random environments, Fourier's law and the effects of nonlinearity on wave propagation.

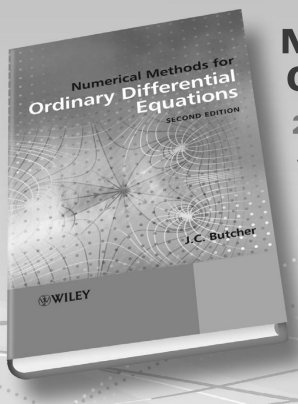
Invited speakers include:
A. Aizenman*, E. Bolthausen, J. Cardy*, J-M. Combes, L. Erdos, S. Fishman*, F. Germinet, M. Goldstein*, M. Hairer, P. Hislop, D. Hundertmark, D. Huse, S. Jitomirskaya*, W. Kirsch, F. Klopp*, T. Komorowski, A. Kupiainen*, Y. Last*, F. Merkl, N. Minami*, S. Molchanov, M. Mueller, S. Nazarenko, L. Pastur, S. Rolles, B. Simon*, B. Simons*, Ya. Sinai, U. Smilansky, T. Spencer, H. Spohn*, A-S. Sznitman, V. Tchoulaevski, W-M. Wang, O. Zeitouni.

* to be confirmed

Further information and application forms are available from the web at: www.newton.cam.ac.uk/programmes/MPA/mpaw04.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.

Closing date for the receipt of applications is **31 July 2008.**

An update of one of the standard references on numerical analysis



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John Butcher

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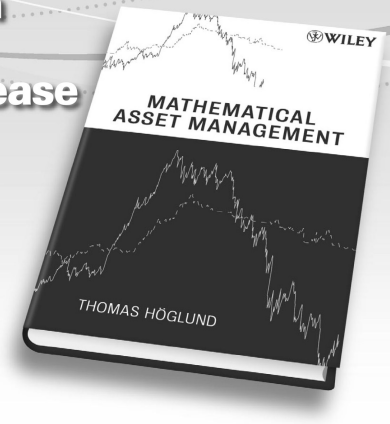

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NUMERICAL LINEAR AND NONLINEAR STOCHASTIC PROGRAMMING

A Cariplo Foundation workshop on *Numerical Linear and Nonlinear Stochastic Programming*, an ICMS associated meeting, will take place from 3 to 5 September 2008 at the University of Edinburgh. The workshop aims to bring together, for training and networking purposes, PhD students, young researchers and experts in the diverse aspects of numerical linear and nonlinear stochastic programming. This is the second workshop in a series of events supported by the Cariplo foundation. A first meeting was held at the University of Bergamo in April 2007 (Spring School in Stochastic Programming). Presentations in all areas of numerical linear and nonlinear stochastic programming are invited.

The programme of the workshop consists of plenary lectures that give an overview of the various aspects of numerical linear and nonlinear stochastic programming, discussion sessions and contributed talks by conference participants. Keynote plenary lectures will be given by:

- Giorgio Consigli (University of Bergamo)
- Michael Dempster (University of Cambridge)
- Alex McNeil (Heriot-Watt University)
- Gautam Mitra (Brunel University)
- Georg Pflug (University of Vienna)
- Marc Steinbach (University of Hannover)

For the latest information regarding the application procedure for scholarships and the conference, visit the conference website at www.icms.org.uk/workshops/cariplo.

MEDICINE AND HEALTH SCIENCE

The centenary symposium on *Mathematical and Statistical Modelling in Medicine and Health Science* will take place from 9.00 am to 5.00 pm on 28 October 2008 at the Centre for Cancer Research and Cell Biology, Basement Lecture Theatre, Queen's University Belfast. The meeting is aimed at bringing together established and young mathematicians working in Mathematical Medicine and Health Science to share new ideas and discuss future directions in this rapidly growing discipline. A wide variety of topics including Cancer Modelling and Treatment, Infectious Diseases and Immunity and Applied Statistics in Health Science will be represented. Invited speakers are:

- Michael Li (University of Alberta)
- Jiafen Gong (University of Alberta)
- Helen Byrne (University of Nottingham)
- Mark Chaplain (University of Dundee)
- Guiseppe Schettino (Queen's University Belfast)
- Karen Cairns (Queen's University Belfast)

The registration fee is £15 and payable on the day. Limited funds provided by the LMS are available to help with the travel costs of students attending the event. Research students and post-docs in particular are encouraged to contribute talks and should contact Dr Francesca O'Rourke (s.orourke@qub.ac.uk) for information. More details can be found at www.am.qub.ac.uk/mshs08.

LMS INVITED LECTURES 2008

The 2008 LMS Invited Lectures were held at the new Institute for Mathematical Sciences, Imperial College London, during the week of 7–11 April. The 2006 Fields Medalist Andrei Okounkov of Princeton University gave 10 lectures on *Random surfaces*, with four more lectures given by Simon Donaldson, Nikita Nekrasov and Balázs Szendrői on related topics.

The lectures were an amazing mix of probability, asymptotics, physics and algebraic geometry. This led to a wonderfully varied international audience of researchers in areas from representation theory to string theory. There was plenty of time for discussion and

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interaction with a relaxed timetable of three lectures a day. By the end of the week the algebraic geometers had learnt the surprising importance of logs, Gaussians and Laplace's method (the method of steepest descent, or stationary phase approximation), while probabilists got to hear about the Deligne–Mumford compactification of the moduli space of algebraic curves.

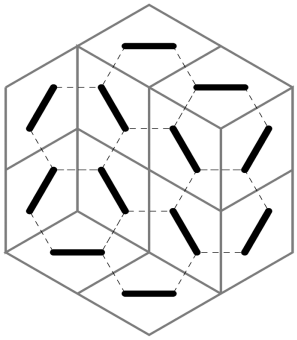

Figure 1

We describe a small part of a now famous example. Consider the hexagonal graph drawn in dotted lines in Figure 1. A dimer, or perfect matching, on it is a subset of the edges covering the vertices exactly once (the bold lines in the figure give one example). There is a corresponding dual tiling with 60° rhombi, shown in thin unbroken lines in the figure. In turn this is a two-dimensional drawing (i.e. the projection to the plane $x+y+z=0$) of a stepped surface in $\mathbb{R}^3$ – the boundary of a collection of cubical boxes with vertices in $\mathbb{Z}^3$. In this way dimers and stepped (or random) surfaces are in one-to-one correspondence.

Consider the scaling limit as we send the lattice size to zero while keeping the boundary fixed. The dimers on the graph, or stepped surfaces spanning the fixed boundary, can now vary randomly over a set whose size goes to infinity. Yet almost surely they converge to a certain limit shape described by algebraic geometry. An example is drawn in Figure 2. There is a frozen region at the edges on which the limit shape is linear, and whose boundary is algebraic (in this case a cardioid). The rest of the limit shape inherits a natural conformal (and so, complex) structure. The results go much further than can be described here; the proofs, due to Kenyon, Okounkov, Sheffield and others, go via an incredible mix of mathematics, including tropical geometry and the Legendre transform.

There are further links to algebraic geometry through considering the collection of boxes under a stepped surface to define an ideal in the polynomial ring in three variables, generated by $x^p.y^q.z^r$ for each vertex (p, q, r) of a face of the stepped surface. Therefore random surfaces relate to counting subschemes in three-dimensional algebraic varieties ($\mathbb{C}^3$ in this example). The case where the subscheme is one-dimensional counts algebraic curves, and so is related (in a precise yet mysterious way) to Gromov–Witten theory and the moduli space of curves. In turn this relates back to Witten's conjecture relating integrals over the moduli space of curves ('two-dimensional gravity') to triangulations of curves (which also define a canonical conformal structure). The latter can be described by random matrix integrals and so probability again.

I hope this gives some indication of the incredible breadth of mathematics that was covered. To see how it was done, visit www.ma.ic.ac.uk/~rpwt/LMS.html for links

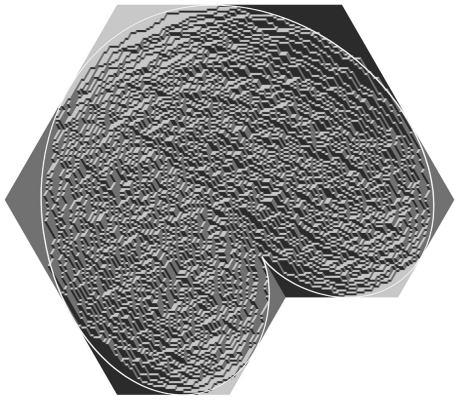

Figure 2

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to the videos of the lectures, whose making and editing was generously paid for by the European Mathematical Society and Imperial College Mathematics Department. The only disappointment was that Imperial College administrators wanted to charge over £1500 for a large lecture hall, so numbers had to be limited to 70.

Richard Thomas
Imperial College London

REVIEWS

BEYOND MEASURE: CONVERSATIONS ACROSS ART AND SCIENCE

"*We all want space – we are spatial beings*"
Jim Ede

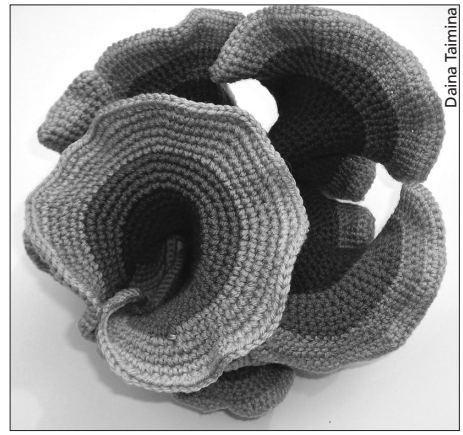
Kettle's Yard, 'a refuge of peace and order', a place to escape the pressures of daily life, was given to the University of Cambridge by Jim Ede some thirty-five years ago. Its gallery now houses the second exhibition curated by Barry Phipps: the previous one 'Lines of Enquiry' concerned drawing; the present one is about geometry.

How do mathematicians work, when we meet a new idea? We pick it up and play with it, look at it from different points of view, and try to relate it to more familiar things. Of course, we are not alone in this, and this exhibition explores how scientists, engineers, astronomers, architects and surgeons play with geometry to further the understanding of their problems.

Thus there is a pile of beautifully constructed, and very varied, models of virus structures, used by Aaron Klug on his way to a Nobel prize. Chemistry is now substantially three-dimensional, and this is but one of many exhibits exploring the chemical world (for more, go to www.3dchem.com). At the other extreme, Tariq Ahmed's preparatory drawings for plastic surgery bring to life the geometric complexity of the tasks that await him.

To what extent does the exhibition reveal the nature of geometry? Despite mention of space-time and non-Euclidean geometry, most of it concerns everyday problems of three-dimensional Euclidean geometry. Exceptions are some charmingly crocheted hyperbolic surfaces made by the mathematician Daina Taimina, which reminded me fondly of some of Miles Reid's youthful experimental knitting, and some drawings by Roger Penrose. There is little related to self-similarity and fractals: perhaps the four magnificent pots of *Aeonium* lent by the Botanic Garden say it all. D'Arcy Thompson's *On Growth and Form* introduced geometry vigorously into biology; his ideas about geometric transformations are however represented here only by an elegant set of models by the Specialist Modelling Group of the architects Foster and Partners.

But how does this relate to mathematics? And to Art? Mathematicians look at the underlying structures, finding explanations, and also new and unexpected relations and patterns. The artist, on the other hand, finds magic and inspiration in what has been revealed. This exhibition takes the artist's part; there is scant



Dr Daina Taimina: 'Model of a hyperbolic area'; crocheted wool

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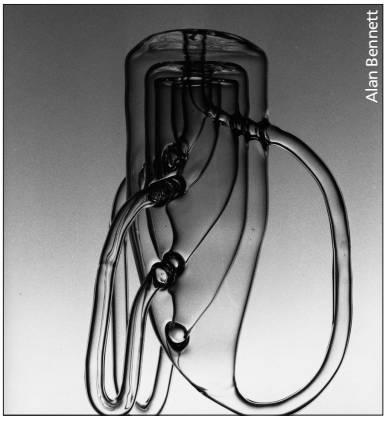
explanation of what is on display. Many of the objects therefore appear as toys or playthings that have been discarded, or put on one side. The models for nineteenth-century mathematics lent by the Department of Pure Mathematics are melancholy enough, but the case full of wooden blocks, each representing a possible crystal structure, but here scattered higgledy-piggledy, is quite piteous. For me, the artists' work lacks magic, although Alan Bennett's little blown-glass objects, inspired by Klein bottles, are full of charm. Thus I find that the artist Richard Deacon's leaden sculptures tell me less about space than does the engineer Simon Guest's rigid construction; Gaudier-Brzeska's sculptures in the permanent collection reveal far more. Nevertheless, Barry Phipps has once again given us much to think about.

Ben Garling
University of Cambridge



Alan Bennett: 'Glass Klein bottles' (1995)

THE OXFORD MURDERS

In many ways *The Oxford Murders* is a typical detective story. There is a series of murders with some sort of link connecting them. There are several suspects, with a variety of possible motives. A policeman is put on the case and gets nowhere. An outsider who just happens to be around when the first murder is discovered gets caught up in the story and we follow his attempts to solve the mystery. And at the end… well, I won't give away the ending but if you see the film you'll be able to complete the sentence with another bit of the formula.

What makes it different is that the scene is set in Oxford rather than in a country house or a snowbound train (though I suppose that, especially after Inspector Morse, Oxford isn't all that unusual) and the two leading characters are mathematicians, one old and eminent, and the other a graduate student newly arrived from America.

The film isn't about mathematics, but some mathematical ideas do appear, and they are made to fit in. They're not just bolt-on context, so to speak. When I went to see *The Oxford Murders*, I had just been reading an article which discussed, among other things, the question of a distinction between what is true and what can be proven, and then it turned up in the film as well. It did lead me to ask myself whether police officers and magistrates sometimes tend too much towards Platonism, which is not the sort of thing I usually think about after an evening in the cinema.

As for the mathematicians in the story, you may find them exaggerated in some ways, but no more so than what happens to other sorts of people you might encounter in a whodunit. This is surely a good sign – one of the ways you know you're accepted in a group is when people feel free to pull your leg a bit.

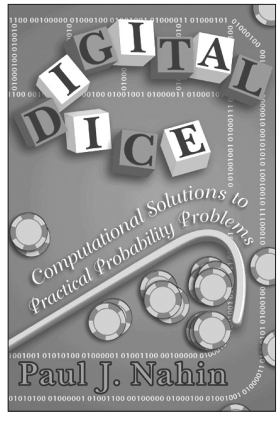
The Oxford Murders is not a very deep film, and one or two things may strike you as a bit implausible. That's not necessarily because of the mathematics, by the way. I did find myself wondering how likely it was that anyone could run out of Blackwell's carrying a stack of new books without getting chased by a member of staff. But it held my attention, and the mathematical references did make it more interesting. It's not one of those films you absolutely have to see, but if it's in your area and you fancy an evening out, I'd recommend it.

Peter Saunders
King's College London

Digital Dice. Computational Solutions to Practical Probability Problems by Paul J. Nahin, 2008, Princeton University Press, 263 pp, $27.95, ISBN 978-0-691-12698-2.

This book is not aimed at professional mathematicians. Its theme is the use of simulation to obtain solutions, good enough for practical purposes, for a range of problems involving probability. A few of these problems are quite easy, others have exact solutions that require some ingenuity, some have no closed-form solution. They are presented in 'fun' contexts, such as how many of *n* birds, perched at random on a wire, are mutual nearest neighbours; the chance that a lift will be going in the right direction as it stops on your floor; how many houses a burglar will rob before returning to a previous victim. Many of them have been discussed in the *Journal of Recreational Mathematics*, or *Mathematics Magazine*, and their histories are well told.

The typical reader is expected to have some intuitive notions of probability (enough to realise that tossing a fair coin twice does not guarantee that Heads must arise at least once, even though ½ + ½ = 1), but no grounding in formal theory. Familiarity with some popular scientific programming language is also expected. This is not a textbook, but teachers of probability will find problems that might intrigue students, or give ideas for projects. An initial chapter jollies the reader along, describing problems that are easy to state and often solvable analytically. Their solutions via simple simulations are also given, using MATLAB codes that avoid vector/matrix notation, and facilities such as its *sort* command. A range of problems are then described, with the reader invited to write his or her own codes to investigate them. The author gives full solutions, and the book ends with useful appendices that expand particular topics.



Despite its many merits, this book could have been much better. The author ought to have resolved his internal debate in favour of giving flow diagrams in his solutions, rather than MATLAB programmes: in that way, he could have avoided the repetitive descriptions and line-by-line explanations of those programmes. There are pointless distracting comments, such as that episode 189 of some TV comedy show will cure your lack of familiarity of malt shops, or that the Luxor casino in Las Vegas has unusual elevators. The solution given for Problem 1 actually solves a different problem, by overlooking the difference between "Will any one of five people do this?" and "Will a particular one of five people do this?". And because the whole basis of simulation methods rests on having a high-quality random number generator, some discussion of the desirable properties of such generators ought to have been made – merely having a long cycle is not enough.

But the book does a good job in demonstrating the power of Monte Carlo methods to obtain useful answers painlessly and in a relatively short time. One aspect of these methods is seriously underplayed: the pattern of answers to a series of numerical illustrations can sometimes suggest a general formula – and then, in short order, a mathematical proof of that formula can often be constructed. Simulation is not only a quick method to get an approximate but adequate answer, it is a vital part of the theoretician's armoury, leading to better understanding of randomness.

John Haigh
University of Sussex

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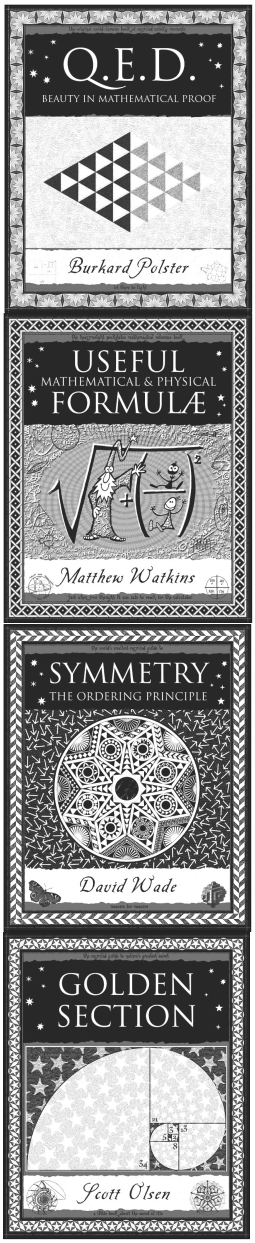
Q.E.D.: Beauty in Mathematical Proof by Burkard Polster, 2006, £4.99, ISBN 1-904-26350-X;
Useful Mathematical & Physical Formulae by Matthew Watkins, 2000, £4.99, ISBN 1-904-26300-3;
Symmetry: The Ordering Principle by David Wade, 2006, £4.99, ISBN 1-904-26351-8;
The Golden Section: Nature's Greatest Secret by Scott Olsen, 2006, £4.99, ISBN 1-904-26347-X, Wooden Books Ltd.

These four titles are part of the *Wooden Books* series; pocket-sized (6"×5", 58 pages), attractively produced and illustrated books on a range of subjects with a preponderance of New Age themes, of which these four are, presumably, the most mathematical. The UK editions (reviewed here) are paperbacks, printed on high-quality recycled paper, while the US editions are hardbacks. The lavish faux-woodcut illustrations and sepia tint give a luxurious feel to the series, despite occasional typos.

Of these four the best is undoubtedly *Q.E.D.: Beauty in Mathematical Proof* by Monash University Mathematics Professor Burkard Polster. As might be expected, the emphasis is on visually oriented proofs and constructions, which are admirably illustrated, but induction and regrouping get a look-in as well. Of course a partial proof is no proof at all, but excessive rigour is the enemy of terse exposition. Polster resolves this problem neatly by including an appendix that looks at how careless proofs can fail. This book would make an excellent stocking-filler for an inquisitive child.



I would dispute the title of *Useful Mathematical & Physical Formulae* by University of Exeter honorary research fellow Matthew Watkins. Formulae it has aplenty, but the usefulness of being able to find the surface area of a frustum is questionable. Indeed, if this book were truly intended to be useful it would have included one of the approximate formulae for the perimeter of an ellipse rather than just passing over the question in silence. Were it not for the cartoon wizard and the brief discussion of 'higher dimensions' (without formulae) this could be a 1920s formula book, not that that is necessarily a bad thing. It may be no more 'useful' than the books telling us how to survive encounters with sharks and crocodiles that my schoolmates and I carried around but, like them, it may still inspire the urge to learn more about the big beasts.

Symmetry: The Ordering Principle by architect David Wade is more discursive, and less mathematical. While there is a nod to classifications of symmetries it soon becomes clear that the author is more interested in patterns than in symmetry per se, and many of the objects under discussion, such as strange attractors and vortex streets, are not truly symmetrical. The somewhat ineffable concept of 'Li' is introduced (though not defined, to my satisfaction at least) – the

subject of another book by this author in the same series.

Easily the worst of the four is *The Golden Section: Nature's Greatest Secret* by Scott Olsen, Professor of Philosophy and Religion at Central Florida Community College. Professor Olsen repeats all the popular fallacies about the golden ratio so ably demolished by Markowsky [1] (in fairness, Polster manages one too) and adds a few of his own. A short extract is enough to get the flavour:

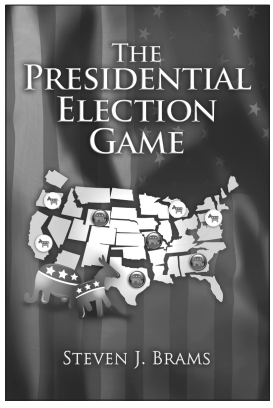
> "*Scripture with its symbolical and allegorical meaning can only be fully understood through a study of sacred number. By the science of gematria, the name Jesus* ΙΗΣΟΥΣ *sums to 888, Christ* ΧΡΙΣΤΟΣ *is* 1480*, and the two together* 2368*. These three names are in the golden proportion* 3 : 5 : 8*, with Christ the golden mean.*"

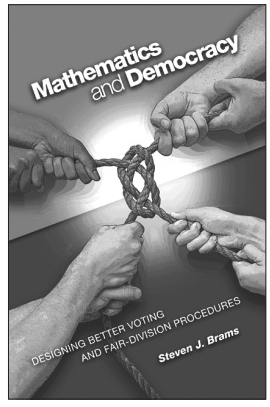
That 'only' should manage to offend the devout as much as the secular. The prose lives up to the series title, and while the pages might be in sepia there's an unmistakeable whiff of green ink here.

Matthew Wright
University of Southampton

Reference

1. G. Markowsky, 'Misconceptions about the Golden Ratio', *College Mathematics Journal* **23** (1992) 2–19.





The Presidential Election Game by Steven J. Brams, A.K. Peters, 2007, 224 pp, £17.50, $29.00, ISBN 978-1-56881-348-6. **Mathematics and Democracy** by Steven J. Brams, Princeton University Press, 2008, 390 pp, paper £16.95, ISBN 978-0-691-13321-8; cloth £38.95, ISBN 978-0-691-13320-1.

The *Presidential Election Game* is a republication of a book first published by Yale University Press in 1978. The author is a Professor of Politics at New York University. The book's focus is the development of simple mathematical models to help understand aspects of the American democratic process, particularly presidential campaigns and elections.

Other than a smattering of game theory and a few graphs, there is little actual mathematics in the book. Rather the author adopts a mathematical approach to add precision and clarity to a social-science investigation. As I have lived in the USA since 1987, with citizenship (and hence voting rights) for at least half that time, the studies have more interest for me than had I remained in my native Britain. I am less sure whether the book has sufficient appeal to a purely British audience, particularly as the examples date from the founding of the United States all the way up to the Carter presidency, but nothing more recent. Reading Brams' analysis of many presidential election campaigns of bygone days, I kept wishing he had brought the book up to date with more recent studies.

The models Brams develops are all explanatory, rather than predictive, and campaign managers looking for insights into planning election campaigns are unlikely to find any silver bullets. With contemporary relevance lacking, what the book really amounts to is an illustration – and an excellent one – of the use of mathematical models to analyze social

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phenomena. Accordingly, I can see a valuable potential use to raise awareness of the power of mathematical thinking and mathematical modeling among math-averse or math-unaware individuals whose interests are predominantly in the social, political, or historical arenas.

For instance, in the early chapters, the author uses what he calls 'spatial representations' – simple graphs – to visualize political positions, leading to a natural understanding of why candidates often behave the way they do in elections, such as adopting positions that appeal to centrist voters, even at risk of alienating their hard-core supporters.

To his credit, the author ends each chapter with a discussion of the limitations of his models.

Personally, I found of particular interest Brams' use of game theory – his second major focus after the illustrations of spatial representations – to analyze the way the various parties acted as they did during the Watergate crisis.

Towards the later parts of the book, Brams comes to his third topic area, and what I suspect was his main reason for writing the book in the first place: to argue, at some length, for the replacement of the current US presidential election system of Plurality Voting (one person, one vote) with his preferred alternative of Approval Voting, where voters may cast one vote for every candidate they approve of, with the one with the greatest total of votes being declared the winner.

The many problems with plurality voting are, as Brams points out, amplified by the US Electoral College system, as was made abundantly clear in the 2000 Presidential Election, where a president (George W. Bush) was elected having a minority of the popular vote, by a disputed (and subsequently discredited) faulty balloting procedure in one state (Florida). Oh how I wish Brams had revised his book to cover that example!

Instead, I suspect that the 2000 election (it was actually decided by a majority vote of the Supreme Court, dividing along party affiliations) was the primary motivator for Brams to begin a second, completely different book (rather than update his earlier book). That new book *Mathematics and Democracy* was published earlier this year by Princeton University Press. It is, first and foremost, an out-and-out argument, at length and in depth, for approval voting. Much of Brams' argument makes use of simple toy examples (elections with fewer than twenty candidates) to illustrate the pros and cons of various voting procedures.

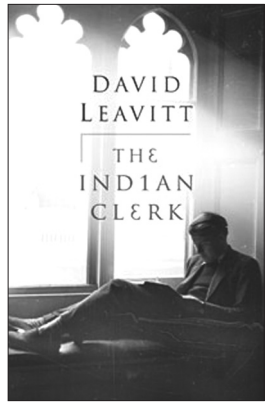
Interspersed among the toy examples, however, there are some fascinating real-world studies. Most likely to interest readers of this review, I imagine, is the author's discussion of how the AMS, the MAA, the ASA, TIMS, INFORMS, the IEEE, and the Game Theory Society all came to adopt approval voting for their elections.

In the second part of the book, Brams turns to the well-known problem of fair division, with examples varying from the familiar cake cutting problem to the 1978 Camp David peace accord between Israel and Egypt.

As with the first book, there is little by way of deep mathematics, but I suspect this second book will prove a greater challenge to non-mathematicians than the first. It also provides a rich source of topics for student mathematics projects, though there Brams will find himself in direct competition with the much more mathematical books on voting procedures by Donald Saari, *Chaotic Elections: A Mathematician Looks at Voting*, American Mathematical Society, 2001, *Decisions and Elections: Explaining the Unexpected*, Cambridge University Press, 2001, and *Basic Geometry of Voting*, Springer, 2003. Those books are not the focus of this review, but are definitely worth looking at.

Keith Devlin
Stanford University

The Indian Clerk by David Leavitt, Bloomsbury, 2007, 490pp, £16.99, ISBN 978-0-7475-8168-0.



Of all the figures in the history of mathematics, few seem to have excited the public imagination recently as much as Srinivasa Ramanujan. The last few years have seen books, plays and even films devoted to this fascinating man and his mathematics, or at least his obsession with mathematics. Robert Kanigel's 1991 biography, *The Man Who Knew Infinity*, has been followed by at least three plays – *Partition* by Ira Hauptman, Simon McBurney's *A Disappearing Number*, and *A First Class Man* by David Freeman – while no fewer than two film projects are apparently underway, one of them directed by the British actor Stephen Fry and India's Dev Benegal.

It was only a matter of time before some of the events of Ramanujan's short but eventful life served to inspire a novel based around them. The novel in question is David Leavitt's *The Indian Clerk*, a vividly imagined work of historical fiction in which ninety percent of the characters are (or rather, were) real people, and several of the events that occur apparently took place.

Of course, the question in which the majority of readers of this review will be interested is: how is the presentation of the mathematics? Well, on the whole the answer is: surprisingly good. Despite the daunting nature of much of Ramanujan's mathematics, Leavitt appears not to have been too intimidated by the technical details (see p. 322, for example). Furthermore, he manages to express them in a way that, while conveying the essence to the non-specialist, also gives the mathematically literate reader a reasonable idea of what was going on. There are brief but well-written explanatory passages on combinatorics, partition theory and, of course, the Riemann Hypothesis. Plus Leavitt is not shy of slipping in references to other mathematical subjects of interest to Ramanujan, such as definite integrals, Diophantine approximation and elliptic functions. In short, for a non-mathematician, Leavitt does a remarkably able job of conveying the fascination, excitement and beauty of mathematics to a lay audience.

This isn't to say that the book is error-free. Indeed, pages 21–24 are riddled with mistakes, both mathematical and historical. On page 21, Fermat's Last Theorem is stated incorrectly ("for the equation $x^n + y^n = z^n$, there could be no whole number solutions greater than 2"), on page 22 it is wrongly asserted that "on the continent it had long since been agreed that Leibniz had made the discovery [of calculus] first", and on pages 22–23, we are told that Cambridge students were still using Newton's fluxional notation at the beginning of the twentieth century, when in fact it had been replaced by the Leibnizian $^{d}/_{dx}$ notation in the first third of the nineteenth. Furthermore, we find on page 24 that the Battle of Hastings took place in 1064, whereas I am sure that the date I learnt at school was 1066. And, although most formulae are presented correctly, the mathematical typesetting is occasionally erratic (for example on pp. 12, 215 and 272). That said, this is the only novel I have come across that is brave enough to present a full (and correct) mathematical proof (p. 169) – Euclid's argument regarding the infinitude of primes – even if it is essentially lifted straight out of G. H. Hardy's *A Mathematician's Apology*.

Well written and thoroughly researched, it includes a very atmospheric evocation of life in Cambridge during the First World War. One passage which particularly made me smile also

July08-NL-with-grey-page-18.indd33 33 29/06/2008 22:17:16

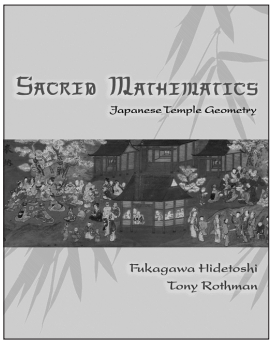
gives an indication of how frustrating it must have been to be a mathematician during that time. Ramanujan and Hardy are discussing a result by J.E. Littlewood: "This discovery is of vast importance to about twenty people. Unfortunately, half of those people are in Germany." (p. 177)

One last thought: the three main characters of this book, Ramanujan, Hardy and Littlewood, were all LMS members! In fact, references to the London Mathematical Society occur at least ten times throughout the book, including one scene set in an actual LMS meeting. It is, in a sense, both exciting and at the same time mildly disconcerting to have the everyday activities of our relatively recent predecessors portrayed in a novel, with certain aspects of their lives fictionalised so graphically. Indeed, it is tantalizing to imagine what they would have thought of such an idea, had something so utterly improbable as a novel based on the everyday lives of mathematicians ever occurred to them. One can only wonder whether any current LMS members will inspire a novel to be written about them a hundred years from now!

Adrian Rice
Randolph-Macon College, U.S.A.

(This is an abridged version of a full-length review that will appear in the November 2008 issue of the *Bulletin of the Canadian Society for History and Philosophy of Mathematics*.)

Sacred Mathematics: Japanese Temple Geometry by Fukagawa Hidetoshi and Tony Rothman, Princeton University Press, 2008, 348pp, £19.95, ISBN 978-0-691-12745-3.



For about 200 years, during the Tokugawa shogunate, Japan was a country deliberately isolated from outside influences. Only as recently as 1868 were trade barriers removed and rapid 'Westernisation' begun. During this period of isolation, Japanese mathematicians developed their own *wasan* (lit. Japanese mathematics), much influenced by Chinese rather than European precursors. This was mainly recreational, pursued as a refined cultural activity along with calligraphy and other traditional arts. Its practitioners were mostly from the samurai class, but some farmers and merchants are also known to have participated. Only arithmetic had wide practical application, and use of the *soroban* (Japanese abacus) reached a high level of sophistication.

Just one aspect of *wasan* was the hanging of votive wooden *sangaku* (lit. mathematical tablets) in shrines and temples. These announced new problems and solutions, rarely their demonstration. Most are on plane geometry, often with decorative coloured figures, but some are arithmetical, and some on three-dimensional geometry. Considerable algebraic manipulation is often required to find the solutions. The tablets were written in *kanbun*, a literary language close to Chinese, and now hard for most Japanese to read.

Only about 900 tablets are extant, and 1,738 others have been recorded in manuscripts and publications. There must have been thousands more. The oldest surviving *sangaku* dates from 1683, but the majority are much more recent, from the middle and late nineteenth century. The most recent discovery, in 2005, was of a *sangaku* from 1870, and more may yet be found. (Surprisingly, new ones are hung even today, but most are said to be plagiarisms.) As many *sangaku* contain several problems of varying difficulty, it is thought that these may represent the work of disciples or students of particular *wasan* teachers. Usually names and dates are given, and

sometimes the age of the originator, if young. Just a few are women.

In modern times, knowledge of *sangaku* is almost entirely due to the lifelong dedication of the first-named author, Fukagawa Hidetoshi, a high-school teacher in Aichi, who travelled the country to transcribe and photograph those that survive, and who collected rare tracts by previous scholars that record many that have been destroyed. He is joint author of two earlier books in English about these traditional mathematical problems, co-authored by Dan Pedoe and John Rigby, respectively, but both works are apparently now out of print and have little overlap with the present one in the choice of problems. The present volume by Fukagawa and Rothman is a somewhat similar collaboration, where Rothman (who has neither visited Japan nor met Fukagawa) was responsible for the English writing and arrangement, and for some of the proofs and other mathematical exposition. The result is a very satisfying, well-produced and well-illustrated publication.

Three introductory chapters cover the historical context, the Chinese origins of Japanese mathematics, and the work of the main *wasan* practitioners of the Edo period, most illustriously Seki and Takebe. Then follow three chapters devoted to 'easier' (47), 'harder' (24), and 'still harder' (19) *sangaku* problems, with solutions given to nearly all. The seventh chapter gives extracts from the diary of Yamaguchi Kanzan (c. 1781–1850), who travelled around Japan collecting *sangaku* problems, of which few originals now survive. This chapter includes eighteen more problems and solutions.

Chapter 8 compares 'East and West', giving instances where *sangaku* problems preceded their Western equivalents. These include Descartes Circles, Soddy Hexlets, Steiner Chains and the Malfatti Problem. Chapter 9 discusses *enri* (circle principle) which *wasan* practitioners employed (not having a well-developed theory of calculus) to approximate π and to compute areas and volumes. The final Chapter 9 outlines the theory of inversion, not known in *wasan*, but which can be applied to solve several of the *sangaku* problems (the solution of 'Hotta's problem' in this way is particularly elegant).

This book will be appreciated by all who enjoy solving geometrical problems. The many black-and-white figures and sixteen colour plates amply convey the distinctive æsthetic that permeates traditional Japanese mathematics, and the provision of solutions to the problems will alleviate frustration. This is an attractive volume on an appealing topic, highly recommended.

A few final observations. In his Foreword, Freeman Dyson comments on the scant recognition given in Japan to Fukagawa, and the lack of interest among Japanese academics, that first drove him to publish his work in English with help from Dan Pedoe. But, in more recent years, there has been a resurgence of interest in traditional Japanese mathematics. Many Japanese mathematicians are now knowledgeable about, and proud of, their distinctive heritage. Several books on *wasan* exist in Japanese, and a work by Fukagawa was published in 1997 that contains a full catalogue of the original locations of all known *sangaku* (also available on the Web). In addition to works cited in the bibliography, an English translation by Takenouchi of the famous *wasan* textbook *Jinkōki* was published in 2000 by the Wasan Institute of Tokyo; and in French there is Annick Horiuchi's *Les mathématiques japonaises à l'époque d'Edo* (Vrin, Paris, 1994). Given the present (over)simplification of Euclidean geometry in British schools, and its near-complete absence from university curricula, books such as that reviewed here may well prove challenging for many British mathematics graduates under the age of forty. Is it not now the British, rather than the Japanese, who neglect their cultural heritage?

Alex D.D. Craik
St Andrews University

July08-NL-with-grey-page-18.indd35 35 29/06/2008 22:17:17

EPSRC

The London Mathematical Society

Topics in Geometric Group Theory

LMS–EPSRC Short Course

Heriot-Watt University, 1–5 September 2008

Organiser: Dr Richard Weidmann

Course outline and prerequisites
The aim of this course is to expose research students to some important ideas and techniques of geometric group theory. While recent results in the field will be discussed, the courses will have an emphasis on engaging with the underlying techniques and understanding the basic examples.

The lecture courses will only assume some basic group theory, elementary graph theory and the concept of metric spaces.

The course will consist of three lecture courses of five lectures each:

- *Automorphisms of free groups* (Martin Lustig, Marseille)
- *Quasi-isometries of spaces and groups* (Panos Papasoglu, Athens)
- *Graphs of groups and foldings* (Richard Weidmann, Heriot-Watt)

There will further be two guest lectures given by Martin Dunwoody (Southampton) and Vincent Guirardel (Toulouse). In addition tutorial sessions will be run by postdoctoral researchers in the field.

Further information on the course is available at www.ma.hw.ac.uk/~richardw/lmscourse.html.

Application
Applications should be made using the registration form available on the Society's website at: www.lms.ac.uk/activities/rmc/sc/42bposter.html.

The closing date for applications is **Friday 4 July**. Numbers will be limited and those interested are advised to make an early application.

Fees
- All research 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; for non-EPSRC research students, their department might be prepared to pay the fee.)
- Overseas students, postdocs and those working in industry will be charged £525 (registration fee of £250 plus subsistence costs of £275).

All participants must pay their own travel costs (for EPSRC-funded students, this should be covered by their DTA).

LMS–EPSRC Short Courses aim to provide training for postgraduate students in core areas of mathematics. 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.

EPSRC

The London Mathematical Society

Algebraic Groups and related topics

LMS–EPSRC Short Course

University of Birmingham, 15–19 September 2008

Organiser: Dr Simon Goodwin

Course outline and prerequisites
The theory of algebraic groups, or more generally algebraic Lie theory, finds diverse applications in mathematics and physics. The aim of this course is to provide an introduction to some of the fundamental objects in algebraic Lie theory. The course will require few prerequisites and is intended primarily for UK-based postgraduate students; overseas students and postdocs are also welcome to attend and encouraged to contact the organiser for further information.

The course is centred around three five-hour lecture courses:

- *Finite groups of Lie type and Hecke algebras* (Meinolf Geck, Aberdeen)
- *Modular representations of Lie algebras* (James Humphreys, Massachusetts)
- *Introduction to algebraic groups* (Gerhard Röhrle, Bochum)

There will be additional exercise sessions, and two guest lectures (speakers TBC).

Further information on the course is available at
http://web.mat.bham.ac.uk/S.M.Goodwin/shortcourse.

Application
Applications should be made using the registration form available on the Society's website at:
www.lms.ac.uk/activities/rmc/sc/43poster.html.

The closing date for applications is **Friday 11 July**. Numbers will be limited and those interested are advised to make an early application.

Fees
- All research 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; for non-EPSRC research students, their department might be prepared to pay the fee.)
- Overseas students, postdocs and those working in industry will be charged £550 (registration fee of £250 plus subsistence costs of £300).

All participants must pay their own travel costs (for EPSRC-funded students, this should be covered by their DTA).

LMS–EPSRC Short Courses aim to provide training for postgraduate students in core areas of mathematics. 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.

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).

JULY 2008

2 History of Mathematics Day, Open University (371)
4 LMS Graduate Student and Society Meeting, London (371)
4-5 New Directions in Toric Topology Workshop, Manchester (369)
6-13 ICME 11, Monterrey, Mexico (368)
7-10 Integral Methods in Science and Engineering, Santander, Spain (370)
7-11 Nonlinear Parabolic Equations and Applications, LMS–EPSRC Short Course, Swansea (370)
7-11 Stochastic Partial Differential Equations, LMS–EPSRC Short Course, Imperial College London (370)
7-11 New Horizons in Toric Topology Conference, Manchester (367)
9 LMS Popular Lectures, London (372)
10-11 Legacy of John Crank Conference, Brunel University (366)
10-11 New Directions in Noncommutative Geometry Workshop, Manchester (371)
11 Finite *p*-Groups, Cambridge (371)
13 EWM/EMS Workshop, Amsterdam, The Netherlands (366)
14-18 Fifth European Congress of Mathematics, Amsterdam, The Netherlands (370)
14-24 Computational Linear Algebra for Partial Differential Equations, LMS Durham Research Symposium, Durham (368)
14-25 Anderson Localization Transition Introductory Training Course, INI, Cambridge (364)
14-19 Dec Mathematics and Physics of Anderson Localization: 50 Years After, INI, Cambridge (352)
15-19 Bachelier Finance Society Fifth World Congress, London (365)
16-18 60Miles, Warwick (371)
17 LMS Meeting, 5ECM, Amsterdam (372)
21-23 19th Postgraduate Combinatorial Conference, Warwick (368)
21-23 European Postgraduate Fluid Dynamics Conference, Keele (370)
21-25 Algebraic Structures in Geometry and Physics Workshop, Leicester (367)
21-25 Logic and Algorithms ICMS Workshop, Edinburgh (369)
21-1 Aug Computational Algebra De Brún Workshop, Galway (370)
25 Cardiff Number Theory Day, Cardiff (372)
25-31 International Mathematics Competition for University Students, Blagoevgrad, Bulgaria (368)
28-1 Aug Advanced Methods in Linear and Nonlinear Elasticity, LMS–EPSRC Short Course, Keele (370)

AUGUST 2008

4-8 Multiple Dirichlet Series and Applications to Automorphic Forms, ICMS Workshop, Edinburgh (369)
18-22 Anderson Localization and Related Phenomena, INI Workshop, Cambridge (370)
24-26 International Pure Mathematical Conference 2008, Islamabad (370)
25-27 British Topology Day, Belfast (371)
25-29 Semigroups and Groups, Essex (372)
25-29 Singularities, ICMS Workshop, Edinburgh (369)
26-27 Homogenisation Theory Workshop, Cardiff (371)
26-28 Subfactors and Planar Algebras Instructional Workshop, Belfast (368)
26-30 Quadratic Forms, Algebraic Groups, Algebraic Cobordism Conference, Nottingham (370)

July08-NL-with-grey-page-18.indd38 38 29/06/2008 22:17:17

SEPTEMBER 2008

1-3 Pairing 2008 Conference, Royal Holloway, University of London (368)
1-5 Topics in Geometric Group Theory, LMS–EPSRC Short Course, Heriot–Watt University (372)
3-5 Numerical Linear and Nonlinear Stochastic Programming Workshop, Edinburgh (372)
4-6 British Logic Colloquium, Nottingham (370)
5-6 Jordan Structures: Nonassociative Analysis and Geometry Meeting, Queen Mary, University of London (370)
8 Function Theory Meeting (372)
8-9 Shaping the Future of Maths & Stats in Higher Education, CETL-MSOR Conference, Lancaster (371)
8-12 Wall Bounded Shear Flows: Transition & Turbulence, INI Workshop (367)
8-12 Grothendieck–Teichmüller Theory of Dessins d'Enfants, ICMS Workshop, Edinburgh (369)
10-11 New Directions in Skew Product Dynamics Workshop, Manchester (369)
14-18 EUROMECH Fluid Mechanics Conference, Manchester (372)
14-19 Phenomena in High Dimensions Workshop, Lancaster University (364)
15 LMS SW & South Wales Regional Meeting, Swansea (372)
15 First Rankin Lecture by John Baez, Glasgow (372)
15-19 Algebraic Groups and Related Topics, LMS–EPSRC Short Course, Birmingham (372)
16-18 The Calculus of Variations and Nonlinear Partial Differential Equations Workshop, Swansea (372)
17 Second Rankin Lecture by John Baez, Glasgow (372)
19 Third Rankin Lecture by John Baez, Glasgow (372)
19-20 Heilbronn Institute Annual Conference, Bristol (371)
22-24 Domains IX Workshop, Sussex (372)
22-26 Higher Dimensional Algebraic Geometry, ICMS Workshop, Edinburgh (369)
25 LMS Popular Lectures, Birmingham (372)
26 What Works in the Classroom, London (372)
29-3 Oct Inertial-range Dynamics and Mixing, INI Workshop, Cambridge (368)

OCTOBER 2008

28 Mathematical and Statistical Modelling in Medicine and Health Science Symposium, Belfast (372)

NOVEMBER 2008

21 LMS AGM, London

DECEMBER 2008

1-5 Large Amplitude Internal Waves, ICMS Workshop, Edinburgh (369)
5-12 Partial Differential Equations and Applications Conference, Hong Kong (372)
8-12 Rotating Stratified Turbulence and Turbulence in the Atmosphere and Oceans, INI Workshop, Cambridge (371)
12-13 Joint Meeting with the Edinburgh Mathematical Society, Edinburgh
15-19 Classical and Quantum Transport in the Presence of Disorder, INI Conference, Cambridge (372)
16-18 Mathematics in Signal Processing IMA Conference, Cirencester (370)

JANUARY 2009

5-9 Dense Granular Flows, IMA Conference, INI Cambridge (370)

APRIL 2009

6-9 BMC, Galway
7-9 BAMC, Nottingham (370)

AUGUST 2009

1-15 Groups St Andrews 2009, Bath (372)

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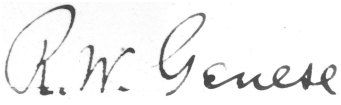
R.W. GENESE

LMS member 1872–1914

Norman May, Malvern

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