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# NEWSLETTER

No. 373 September 2008

# Society Meetings and Events

#### 2008

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Thursday 25 September Popular Lectures Birmingham [page 21]

Friday 21 November AGM, London

**12–13 December** Joint Meeting with the Edinburgh Mathematical Society Edinburgh [*page* 29]

#### 2009

February Mary Cartwright Lecture, London

31 March – 4 April LMS Invited Lectures Edinburgh

# HONORARY MEMBERS

The London Mathematical Society has elected **Professor Mikhael Gromov** of the IHÉS, France, and **Professor Karen Uhlenbeck** of the University of Texas in Austin, USA, to Honorary Membership of the Society.

Mikhael Gromov is one of the most important mathematicians of our time. His influence goes far beyond the boundaries of his own field, and he brings a profoundly original approach to the subjects he works on. In algebra he is well known for his work on hyperbolic groups and polynomial growth which has inspired an entire generation of aeometric aroup theorists. In analysis his *h*-principle on differential relations has laid the foundations for a geometric theory of PDEs.

Karen Uhlenbeck is a distinquished mathematician at the highest international level, specialising in differential geometry, non-linear partial differential equations and mathematical physics. Her foundational work on the analytic aspects of mathematical gauge theory is recognised as providing the analytic foundation underlying the applications of gauge theory to geometry and topology that are among the more striking developments in twentieth century mathematics

Full citations for Professor Gromov and Professor Uhlenbeck will appear in the LMS *Bulletin*.

# PROPOSAL FOR A SINGLE SOCIETY

Shortly after this issue, members will receive a Report proposing the creation of a new, unified society for mathematics, replacing both the LMS and the IMA. The Councils of the two bodies, at their meetings in late June and early July, adopted the draft Report of their Joint Planning Group and resolved to commend it to their members. The proposal for a new society. merging the IMA and the LMS, is thus out for consultation with vou, the members. Please read the Report. Please at least read the Prologue, by the two Presidents, and Chapter 1!

Over the summer, mechanisms for feedback and discussion have been put in place. details of which are included with the Report. Starting soon and continuing through the early autumn, both Presidents - Brian Davies for the LMS and David Abrahams for the IMA - will embark on a 'roadshow', meeting as many members as possible of both bodies to discuss the proposal with them. Elected officers, members of the Councils, and staff will also be available to act as channels of

communication. Do take the opportunity to hear what your President, and the President of the IMA, have to say, and give them your reactions!

In November, both Councils will review the results of the consultation and decide whether to proceed to a ballot of both memberships in 2009.

Charles Goldie

# PRESIDENCY

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The President has proposed that Professor Angus Macintyre FRS be nominated to serve as President of the London Mathematical Society from November 2009. Receiving the news with acclamation, Council has agreed that Professor Macintyre should be accorded the title President-Designate from the 2008 AGM and invited to attend Council and the Finance & General Purpos-

# 4 July 2008

In the phrase used several times by the President Professor Brian Davies, the 4 July 2008 Council meeting was a historic occasion in the life of the London Mathematical Society in that the deliberations regarding the future of the LMS and the Institute of Mathematics and its Applications (IMA), which have been ongoing over more than eight years in joint working groups of the two societies, came to something of a head in this meeting. The meeting was also full with normal Council business, including discussions on the draft budget and planning figures for the coming years.

Under President's business, Brian reported that the procedure for nominating a new President had selected Prof Angus Macintyre FRS of Queen Mary as

# **LMS Newsletter**

es Committee from that date.

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Typeset by the London Mathematical Society at De Morgan House; printed by Holbrooks Printers Ltd.

Publication dates and deadlines: published monthly, except August. Items and advertisements by the first day of the month prior to publication, or the closest preceding working day.

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Charity registration number: 252660.

#### his proposed successor. We moved on to arguably the major item, the consideration of the Next Steps Initiative, the report of the Joint LMS-IMA Planning Group to the Councils of the IMA and LMS on the prospects for a single, unified Society. As I reported previously, this report came already to the Council meeting on 20 March. And since then, the Council, augmented by a few other LMS staff members and key individuals, has met on 6-7 June for a Council Retreat, to consider the various sections of the Next Steps report in more detail. (Subsequent to that Retreat, the Next Steps report has had some minor amendments and additions, not least a new Prologue, authored by the two presidents, David Abrahams and Brian Davies.) Given these opportunities members of Council have had to discuss and come to an opinion one way or the other, it was maybe not surprising that discussion was reasonably short, and recommendations were passed rather rapidly by a large majority to 'accept and adopt the Next Steps report as a Report of Council' and to 'commend the report to members'. There was discussion as to what these words meant (one would expect no less from a gathering of mathematicians). The gist was that Council was voting to accept that the philosophical and practical case has been made for unification of the LMS and IMA in a single UK mathematics society. Furthermore we wished our President to go out in the coming months to advocate the case presented in the Next Steps report to the membership, through written communication and an ambitious tour of the country. There were, it needs to be reported, a few members who argued their dissent cogently and voted against these recommendations or abstained. Indeed the Council agreed procedures, including a dedicated part

of the LMS web-site, to enable dissenting (and other) views from all the membership to be clearly expressed, as befits such a large decision for the future of the LMS.

The main other item, also very important, was a discussion of the budget for 2008-9 and subsequent years, considering proposals from the Finance and General Purposes Committee. A first item which generated discussion was the recommendation to increase the subscription by £4, this prompted by a charity law requirement to bring the cost of member benefits in line with subscriptions. Council accepted this recommendation and the argument that we need to include the costs of producing the LMS Newsletter that you have in your hands as a significant member benefit. However, Council also agreed that the costs versus benefit of membership would be reconsidered in the course of thinking about future subscriptions over the coming year. We also looked briefly at the good ideas from the various LMS committees for new expenditure, including a new postgraduate research conferences grant scheme, a scheme to support (usually) women staff returning after a career break, and new public engagement schemes, but a definitive decision on committing new expenditure was delaved to the next council meeting.

The meeting finished with an impressive presentation on recent activities and new directions for the Computer Science Committee from its retiring chairman Rick Thomas, who also distributed copies of a Knowledge Transfer Report, prepared by the committee and the KTN for Industrial Mathematics, on 'Managing Risk in the Modern World', surely very appropriate bedtime reading as we think about the future of the LMS!

Simon Chandler-Wilde

#### No. 373 September 2008

# ANNUAL LMS SUBSCRIPTION 2008–09

The LMS annual subscription, including payment for publications, for the session November 2008 – October 2009 is due on **1 November 2008**. Together with this *Newsletter* is a renewal form to be completed and returned with your remittance in the enclosed envelope.

#### Rates

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The annual subscription to the London Mathematical Society for the 2008-09 session is:

- Ordinary Members £47.50
- Associate Members  $\pounds 12.00$
- Reciprocity Members £23.75

The prices of the Society's periodicals to Ordinary, Associate and Reciprocity Members for 2009 are:

- Bulletin £51
- Journal £97
- Proceedings £97
- Nonlinearity £66 (except N America); £85 (N America)
- Journal of Computation and Mathematics remains free

#### Payment

No action is required if you are already paying by direct debit, and do not wish to change your choice of publications. Fully complete and return the form if you are paving by direct debit but wish to change your choice of publications or add/delete a subscription to the European Mathematical Society. Bank accounts of members paying by direct debit will be debited with the appropriate amount on 15 January 2009. Other members should either enclose a cheque (£ Sterling or US\$) with their form or, if they have a UK bank account and wish to take advantage of this convenient form of payment, request a direct debit mandate. Although the facility to pay by credit card is open to all members of the Society, it is our

preference that members continue to pay by direct debit.

#### **Publications Pricing Policy**

The LMS has a pricing structure that allows individual members to purchase its journals, for personal use only, at a substantial discount. In common with other mathematical societies, the Society regards a subscription as for personal use only if:

(a) issues are either destroyed or held on a continuing basis among the member's personal belongings, and are not deposited even temporarily in a library, common room or other public room, and

(b) are accessible to other mathematicians (or to students) only with the member's permission, given individually in each case.

Issues are the personal property of members, who would be able, without negotiation with authorities, to take the issues with them if they left their present institution or to give them to another individual who is willing to abide by these terms.

# **ICMI ELECTION RESULTS**

The results of the election of the 2010–12 Executive Committee of the International Commission on Mathematical Instruction (ICMI) which took place during the General Assembly of ICMI, held on 7 July in Monterey, Mexico, are as follows.

President: William (Bill) Barton (New Zealand)

Secretary-General: Jaime Carvalho e Silva (Portugal)

Vice-Presidents: Mina Teicher (Israel), Angel Ruiz (Costa Rica)

Members at Large: Mariolina Bartolini Bussi (Italy), Sung Je Cho (Korea), Roger Howe (USA), Renuka Vithal (South Africa), Zhang Yingbo (China)

The term of this next Executive Committee will start on 1 January 2010.

# 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).

#### NEWSLETTER

# University of BRISTOL

# **Three Chairs in Mathematics**

#### Professorial grade salary

www.bristol.ac.uk

The University of Bristol is seeking applications for the following three newly established chairs:

| • Chair in Algebraic/Arithmetic |                    |
|---------------------------------|--------------------|
| Geometry                        | Ref. 14132         |
| • Chair in Combinatorics        | <b>Ref. 1413</b> 3 |
| • Chair in Probability Theory   | <b>Ref. 1413</b> 4 |

These positions form part of the University's strategic expansion in research areas that complement existing strengths in Pure Mathematics at Bristol. The successful candidates will be expected to build up and lead a research group of the highest international level.

The Department of Mathematics is one of the leading centres for research and teaching in mathematics in the UK. There are groups working in Applied Mathematics, Pure Mathematics and Statistics. In the 2001 Research Assessment Exercise (RAE), Applied Mathematics was graded 5\*A (one of only three groups in the UK given the highest rating), Pure Mathematics was graded 5B (denoting excellence at an international level) and Statistics was graded 5\*A (the only group in the UK given the highest rating). Furthermore, the Department has close links with the Heilbronn Institute for Mathematical Research, which is based in Bristol and runs a co-ordinated series of research programmes, conferences and workshops. (See http://www.maths.bris.ac.uk/research/labs/heilbronn/).

Informal enquiries are welcome and should be addressed to the Head of Pure Mathematics, Professor Marklof, at j.marklof@bristol.ac.uk

Further details and an application form can be found at www.bristol.ac.uk/vacancies Alternatively you can telephone (0117) 954 6947 or e-mail recruitment@bristol.ac.uk quoting the relevant reference number.

In order to receive full attention, applications should be received by 9.00am on Friday 17 October 2008.

EXCELLENCE THROUGH DIVERSITY



# springer.com

# **New Textbooks from Springer**

#### **Plane and Solid Geometry**

J. Aarts, Delft University of Technology, Mediamatics, The Netherlands

This is a book on Euclidean geometry that covers the standard material in a completely new way. The author does not begin in the traditional manner with abstract geometric axioms. Instead, he assumes the real numbers, and begins his treatment by introducing such modern concepts as a metric space, vector space notation, and groups.

2008. Approx. 365 p. 258 illus. (Universitext) Softcover

ISBN 978-0-387-78240-9 ► € 34,95 | £26.50

#### **Proof Theory**

#### The First Step into Impredicativity

**W. Pohlers**, Westfälische Wilhelms-University, Münster, Germany

Avoiding the cryptic terminology of proof as far as possible, the book starts at an elementary level and displays the connections between infinitary proof theory and generalized recursion theory.

1st ed. 1989. 2nd printing 2008. Approx. 385 p. (Universitext) Softcover ISBN 978-3-540-69318-5 ► € **39,95 | £30.50** 

#### **Mathematics and Technology**

**C. Rousseau**, **Y. Saint-Aubin**, Université de Montréal, QC, Canada

This book introduces the student to numerous modern applications of mathematics in technology. The authors write with clarity and present the mathematics in a clear and straightforward way making it an interesting and easy book to read.

2008. Approx. 600 p. 214 illus. (Springer Undergraduate Texts in Mathematics and Technology) Hardcover ISBN 978-0-387-69215-9 ► € 42,95 | £33.99

### Naive Lie Theory

J. Stillwell, University of San Francisco, CA, USA

In this new textbook, acclaimed author John Stillwell presents a lucid introduction to Lie theory suitable for junior and senior level undergraduates. In order to achieve this, he focuses on the so-called "classical groups" that capture the symmetries of real, complex, and quaternion spaces.

2008. XII, 230 p. 25 illus. (Undergraduate Texts in Mathematics) Hardcover ISBN 978-0-387-78214-0 ► € 34,95 | £26.50

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#### NEWSLETTER

# **RETIREMENT OF IVOR GODDARD FROM THE ROYAL** STATISTICAL SOCIETY

In October, the Royal Statistical Society says farewell to its Director General, Ivor Goddard, who retires after 16 years of service. Serving under nine RSS presidents, lvor's term in office saw significant changes to the Society.

After just a few months in position, he oversaw the merger of the RSS with the Institute of Statisticians, changing the RSS from being a wholly learned society to being both a learned and professional organisation. This led to a massive expansion

in the society's activities, including ac- of policy issues. creditation programmes and introduction of a code of professional conduct.

By 1995, the Society needed larger offices, and lvor managed the move to its current Errol Street location. When Ivor ioined the RSS in 1992, its income was £340k; in 2007 it was £1.73m. Over the same period, the RSS's fixed assets have arown from £0.77m to just over £3m. During this time, the permanent staff more than doubled.

Other legacies that Ivor leaves are in outreach. The RSS is now regularly consulted by Parliament and government in the formulation of policy involving interpretation of statistical evidence. It now has annual awards for statistical excellence in journalism and publishes a glossy magazine Significance for readers interested in the use of statistics.

In 2001, Ivor led the RSS into the Council for the Mathematical Sciences alongside the LMS and Institute of Mathematics and its Applications, with the aim of joining up the mathematical science community to work together to speak out on a range

Ivor's successor is Martin Dougherty, who is now the Executive Director of the

RSS. Dr Dougherty is a former research fellow in tropical medicine, and has been a medical writer and director of a medical communications company. He joins the RSS from the National Collaborating Centre for Women's and Children's Health. based in the Royal College of Obstetricians and Gynaecologists.

M. Dougherty

The LMS wishes Mr Goddard a long and happy retirement.

# **EUROPEAN** MATHEMATICAL SOCIETY

The European Mathematical Society is increasing its activities and its membership. We are working harder than ever to make sure that mathematics is represented properly when funding decisions are taken at a European level, and this is beginning to bear fruit. An example is the recent call by the European Science Foundation for proposals for research

conferences in mathematics (www.esf. org/index.php?id=4602). Also, we now have 56 national member societies from all over Europe, which brings huge opportunities for collaborative work of all kinds.

We would like to increase our individual membership, which now comes with free access to Zentralblatt (www. zentralblatt-math.org/portal/en) as well as our superb Newsletter (www.emsph.org/journals/journal.php?jrn=news) and many other benefits, as you can see from our new website (www.euro-mathsoc.eu).

Membership is not expensive, and joining is easy: you can do it either through the London Mathematical Society or on the EMS web page.

> Ari Laptev, President Pavel Exner, Vice-President Helge Holden, Vice-President Stephen Huggett, Secretary

## **ECM PRIZE WINNERS 2008**

The EMS 2008 prize winners were announced at the 5ECM in Amsterdam. The prize of €5,000 each is awarded to mathematicians under 35 years of age working in Europe or born in Europe. The ten winners were:

- Artur Avila (CMI, Paris)
- Alexei Borodin (Russia)
- Ben Green (Cambridge)
- Olga Holtz (TUB, Germany)
- Bo'az Klartag (Israel)
- Alexander Kuznetsov (Russia)
- Assaf Na'or (Czech Republic/Israel)
- Laure Saint-Raymond (ÉNS, Paris)
- Agata Smoktunowicz (Edinburgh/Poland)
- Cedric Villani (ÉNS, Lvon) The Felix Klein Prize was awarded to Josse-

lin Garnier (Université Paris 7). Full citations are at www.5ecm.nl/prizewinnersbook.pdf.

# **THE ABEL PRIZE 2009 Call for nominations**

The Norwegian Academy of Science and Letters hereby calls for nominations of candidates for the Abel Prize 2009. The Abel Prize, which was awarded for the first time in 2003, amounts to NOK 6 million (approximately €750 000 or US\$1.2 million). It is an international prize for outstanding scientific work in the field of mathematics, including mathematical aspects of computer science, mathematical physics, probability numerical analysis and scientific computing, statistics, and also applications of mathematics in the sciences. The prize is to recognize contributions to mathematics and its applications of extraordinary depth and influence. Such work may have resolved fundamental problems, created powerful new techniques, introduced unifying principles or opened up major new areas. The intent is to award prizes over the course of time in a wide range of areas of mathematics and its applications.

The Abel Committee will submit a recommendation of a candidate for the Abel Prize to the Norwegian Academy of Science and Letters, which will select the Abel Laureate on the basis of this recommendation. The name of the Abel Laureate will be announced in March 2009. The nomination letter should contain a CV and a description of the candidate's works, together with names of distinguished specialists in the field of the nominee who can be contacted for an independent opinion. The letter should be sent no later than 15 September 2008 to The Norwegian Academy of Science and Letters, Drammensveien 78, NO-0271 Oslo, Norway. It will also be possible to nominate candidates by using the online submission form. For further information consult www. abelprisen.no.

> Ole Didrik Lærum President

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#### No. 373 September 2008



# UNIVERSITY OF CAMBRIDGE

FACULTY OF MATHEMATICS

# **ADAMS PRIZE**

The University of Cambridge has announced the subject for one of its oldest and most prestigious prizes. The Adams Prize is named after the mathematician John Couch Adams and was endowed by members of St John's College. It commemorates Adams's discovery of the planet Neptune, through calculation of the discrepancies in the orbit of Uranus.

The Chairman of the Adjudicators for the Adams Prize invites applications for the 2008 Prize, which will be awarded this year for achievements in research on Representation Theory.

The prize is open to any person who, on 31st October 2008, will hold an appointment in the UK, either in a university or in some other institution; and who is under 40 (in exceptional circumstances the Adjudicators may relax this age limit). The value of the prize is expected to be approximately £13,000; of which one third is awarded to the prize-winner on announcement of the prize, one third is provided to the prize-winner's institution (for research expenses of the prize-winner) and one third is awarded to the prize-winner on acceptance for publication in an internationally recognised journal of a substantial (normally at least 25 printed pages) original article, of which the prize-winner is an author, surveying a significant part of the winner's field.

Applications (seven copies), comprising a CV, a list of publications, the work or works (published or unpublished) to be considered, and a brief non-technical summary of the most significant new results of these works (designed for mathematicians not working in the subject area) should be sent to:

The Secretary of the Adams Prize Adjudicators, Faculty Office, Centre for Mathematical Sciences, Wilberforce Road, Cambridge, CB3 0WA

(enquiries may be emailed to: faculty@maths.cam.ac.uk).

The deadline for receipt of applications is 31 October 2008.

# THE CMS DIARY

#### **Summer 2008**

The Council for the Mathematical Sciences met most recently on 28 May 2008. This issue of the CMS Diary reflects business discussed at several recent meetings and provides updates on some recent developments in policy issues of interest to the CMS.

Funding for Equivalent or Lower Qualifications

The CMS was pleased to note that its evidence to the House of Commons Innovation. Universities, Science and Skills Select Committee inquiry into the withdrawal of funding for Equivalent or Lower Oualifications (ELOs) had been referred to in the Committee's report. The CMS had argued that the ELQ policy worked against government targets to increase the number of specialist mathematics teachers by introducing financial barriers to upskilling those who had already completed a PhD in a different subject. However, the Government's response to the report has affirmed that the policy will be implemented. The CMS remains concerned that the attractiveness of integrated masters courses (and even a university's willingness to promote them) will be threatened by the policy, given that universities would not be entitled to claim HEFCE funding for students with this qualification who subsequently wished to study for an MSc course. Further information on the implementation of the policy and the exemptions and 'targeted allocations' for Strategically Important and Vulnerable Subjects is available from www.hefce.ac.uk/ pubs/circlets/2008/cl07\_08; the Select Committee's report is available to view at www. publications.parliament.uk/pa/cm/cmdius. htm.

Seeking meetings with Chief Scientific Advisors For some time the CMS has intended to pursue arranging informal meetings with the Government's Chief Scientific Advisors (CSAs). A key recommendation of the Cross-Cutting Review of Science and Research produced for the Treasury in the run up to the Spending Review in 2002 was that Departments that use science should appoint a Departmental CSA, with this network headed by the Government Chief Scientific Advisor (currently John Beddington). CSAs have been appointed in 17 Departments and the CMS hopes to establish a relationship with key players on this list to reinforce the importance of mathematical sciences to evidence-based policy making and the economy in general. A working group is being assembled to discuss the best strategy and schedule for this and to 'tune' our mes-

#### EPSRC Mathematical Sciences Programme

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sage to the role of each Department.

The CMS learnt in January of the EPSRC Council's decision to reduce Programme budgets as part of a restructuring of the budgets which will see money directed towards research relating to four multidisciplinary 'themes' that EPSRC is leading on: Energy, Nanoscience, The Digital Economy and Next Generation Healthcare. Themes led by other Councils include Living with Environmental Change and Global Threats to Security. The Mathematical Sciences Programme budget had been reduced to £16m, from £18.5 in 2007/08 and more than £20m in previous years. The CMS has been working with the Mathematical Sciences Programme team to understand the impact of these figures, and has written to David Delpy (Chief Executive, EPSRC) to express concerns at the apparent shift away from funding fundamental research. However, it should be noted that the headline figures for the Programme do not convey the whole picture. Notwithstanding the overall reductions in budget, the Programme has maintained funding for responsive mode at the 2007/08 level - in the recognition that Responsive Mode is the highest priority for the community. The Mathematical Sciences Programme is striving to maintain and protect

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the core element of the Programme, and we are grateful to David Harman and his team for their efforts to achieve this. In addition to Responsive Mode funding, it is important to appreciate the opportunities that the multidisciplinary themes offer and take advantage of these where possible. The CMS-EPSRC Liaison Group has been discussing what kinds of event can be organised to disseminate this message and provide useful advice to the community on how mathematical sciences research can obtain funding through these themes. It is appreciated that encouraging researchers to look outside the Programme will require a degree of 'culture change' by some – look out for further announcements in society newsletters and of course EPSRC's Connect bulletins.

Mathematical Sciences throughout the UK Readers will be aware that the enhanced CMS membership helps us to ensure that the CMS is effective in its role of pursuing issues relating to mathematical sciences in research, business and industry throughout the UK. The Edinburgh Mathematical Society keeps us in touch with issues north of the border, but as there is no national mathematical society for Wales, the Chair has written to heads of departments in Welsh HEIs to invite them to let CMS know direct if there are issues of which CMS should be aware. There are several areas where the separation between England, Scotland, Northern Ireland and Wales has an impact on the CMS: it is interesting to note, for instance, that the Scottish and Welsh Funding Councils (SFC and HEFCW respectively) are not bound by HEFCE's development of the 'Research Excellence Framework' and will be making their own decisions on whether to participate and (if so) the timetable for using this to inform funding. Both ran their own consultations on the issue in late 2007 and fed responses back to HEFCE; the CMS sent its response to all of these last year.

#### Liaison with HEFCE

The CMS held its annual liaison with the Higher Education Funding Council for England (HEFCE) on 25 June. Sir David Wallace, Peter Cooper and I met with Professor David Eastwood (Chief Executive) and Dr John Selby (Director of Education and Participation) for a relatively informal discussion and exchange of ideas, providing CMS with an opportunity to give HEFCE a 'heads-up' on current issues that were important to the mathematical sciences community and to understand some of the pressures that HEFCE itself faced. Issues such as the development of the Research Excellence Framework and the ELQ policy were high on the agenda, along with the evolution of the Full Economic Costing model and the extent to which this shifted the balance of the Dual Support System towards Research Council funding. It will be important for the CMS to have a clear statement on the importance of Quality-Related funding to subjects that are not 'project-rich' to feed into the next Spending Review. The meeting also referred to data collected through the CMS-HoDoMS annual survey of mathematical sciences departments: the response rate by departments is still lower than in 2007; if they have not already done so. I encourage any head of department to complete a form for this year, so that we can get an accurate picture of trends in students, staff and the overall 'health' of departments to inform CMS policy statements and interactions at meetings such as this.

Professor Eastwood was receptive to points that were raised and willing to engage with the CMS on these issues. It is encouraging that the CMS is establishing itself as a contact point for issues such as these and it is hoped that the relationship will be maintained with Professor Eastwood's successor in April 2009, when he becomes the Vice-Chancellor at the University of Birmingham. Liaison in this form is very helpful in raising the level of awareness of mathematical sciences within important organisations.

> Martin Smith CMS Secretariat

# Science from Oxford



# OXFORD UNIVERSITY PRESS

#### Wavelet Methods for Elliptic Partial Differential Equations

#### Karsten Urban

A text based on the author's course that introduces graduates to the basics of wavelet methods for partial differential equations and describes the construction and analysis of adaptive wavelet methods.

NUMERICAL MATHEMATICS AND SCIENTIFIC COMPUTATION Oct 2008 | 978-0-19-852605-6 | Hardback | £65.00

#### General Relativity and the Einstein Equations Yvonne Choquet-Bruhat

Aimed at researchers in mathematics and physics, this monograph, in which the author overviews the basic ideas in General Relativity, introduces the necessary mathematics and discusses some of the key open questions in the field.

Oxford Mathematical Monographs Sept 2008 | 978-0-19-923072-3 | Hardback | £65.00



#### A Primer for Mathematics Competitions Alexander Zawaira and Gavin Hitchcock

A comprehensive resource containing an entertaining selection of problems in mathematics. Including numerous exercises, illustrations, hints, and solutions, it is aimed at students of mathematics looking for an introduction to problem

solving in mathematics, as well as Mathematical Olympiad competitors and other recreational mathematicians. Sept 2008 | 978-0-19-953988-8 | Paperback | £22.50

Sept 2008 | 978-0-19-953987-1 | Hardback | £50.00

### 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. Aug 2008 | 978-0-19-954511-7 | Hardback | £75.00



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

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# MATHEMATICS POLICY ROUND-UP

In June, Sir Peter Williams published his Review of Mathematics Teaching in Early Years Settings and Primary Schools. The government immediately responded, saying it would implement all ten of the report's recommendations. These included ensuring there is at least one mathematics specialist in each primary school by upskilling 1,000 existing teachers per year for the next 10 years to reach a total (including existing specialists) of 13,000 specialist mathematics teachers, for which the government has now pledged £24 million. Sir Peter also recommended working with parents alongside teachers to spark children's interest in mathematics, and called for all children to be competent in basic maths by the age of seven. Sir Peter said, "The United Kingdom is still one of the few advanced nations where it is socially acceptable to profess an inability to cope with mathematics. We urgently need to reverse this trend so every pupil leaves primary school without a fear of mathematics. To do that we need to get young graduates to see that joining the teaching profession is valued by the people of this country and that it's a great career choice."

The report and the government response can be viewed at www.teachernet. gov.uk/teachingandlearning/primary/ primarystrategy/mathsreview.

Also in June, Mathematics in Education and Industry (MEI) published an encouraging report looking into an increase in the number of candidates sitting the first module of AS and A Level mathematics. All three English examining boards reported an increase in candidate numbers (of 10– 15%) in January 2008 compared with January 2007. The MEI carried out an on-line survey and from the 171 responses found a substantial increase in numbers taking AS mathematics and further mathematics. Respondents told the MEI that mathematics, along with other STEM subjects, is now enjoying a much better profile and more students are appreciating its value to them and that the present AS/A Level syllabus, introduced in 2004, is working well. To read the report, see www.mei. org.uk/files/pdf/C1NumbersSurvey.

The Oualifications and Curriculum Authority (QCA, with the Welsh and Northern Irish equivalents) has launched a consultation on the subject criteria for GCSE Mathematics, English and Information and Communications Technology, Subject criteria set out the knowledge, understanding, skills and assessment objectives for specifications in each subject. In addition, the Advisory Committee on Mathematics Education (ACME) has drafted criteria for the proposed two mathematics GCSEs and is hoping to submit a mathematics community response to the criteria over the summer period, led by the Joint Mathematical Council. To see the QCA consultation, view www.gca.org. uk/gca 18259.aspx, and to see the ACME plans, go to www.acme-uk.org/news. asp?id=102.

A report published in Science in May found that boys and girls perform equally well in mathematics in countries where there is a culture of gender equality. Based on research by the European University Institute and Chicago and Northwestern Universities, the report said that in more gender-equal cultures the maths gender gap disappears, suggesting that there is no biological basis for suggestions that boys have traditionally outperformed girls in mathematics. However, the researchers also found that in gender-equal countries, the gender gap increases in reading, with girls significantly outperforming boys. The report, called

Culture, Gender and Math, appeared in ence report summary is now available the 30 May 2008 issue of *Science*. (http://newsletters.royalsociety.org/c/

The British Association Festival of Science in Liverpool this month (6-13 September) will see the launch of the national STEM Directories. Covering each of Science, Mathematics, Engineering and Technology, the directories list over 270 schemes of enhancement and enrichment activities. They are aimed at providing teachers and lecturers in schools and colleges with the best models of how to excite young people about STEM subjects in an easily accessible form so that they can identify the initiatives and support that are likely to meet their needs. These include the LMS itself and the mathscareers.org.uk website.

To find out more, see www.stemdirectories.org.uk

*Plus*, the online mathematics magazine run by the Millennium Mathematics Project, is polling readers for their favourite fictional mathematician. Currently, Charlie Eppes, a mathematician who helps his FBI-agent brother solve crimes in the US drama *Numb3rs* is way ahead in the lead, followed some distance behind by Square from the 1884 mathematical satire *Flatland*. See the poll and vote at http:// plus.maths.org/blog/2008/07/who-is-yourfavourite-fictional.html

Caroline Davis Mathematics Policy and Promotion Officer

# **NEWS FROM ACME**

The Advisory Committee on Mathematics Education (ACME) annual conference was held on 27 February 2008 at the Royal Society in London. The conference, entitled *Mathematics within STEM – a policy perspective*, attracted almost 250 delegates, including over 100 practitioners, and generated key messages for policy makers. The conference report summary is now available (http://newsletters.royalsociety.org/c/ 1xW8xS9k1BtxQ). This report is a brief summary of the key messages from the conference and of the main points raised by the speakers.

ACME has appointed a new Head of Secretariat, Nick Bowes, who came into post at the end of July. This new position should increase the capacity and expertise of the Secretariat and build on the sound working relationship with Government, thus helping to deliver even greater success for ACME over the next three years.

In response to the publication of Sir Peter William's report on primary mathematics, Professor Adrian Smith, Chair of ACME, said: "We fully support Sir Peter's recommendation for a maths specialist in every primary school. There is a real need for a larger pool of knowledgeable and enthusiastic teachers of the subject at this level, with the freedom to support the teaching of maths in their schools...."

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ACME's funding for the next three years has been confirmed by both the Department for Children, Schools and Families (DCSF) and the Gatsby Charitable Foundation (until 2011). ACME has now entered Phase 3 of its work. Following an evaluation by Gatsby Charitable Foundation completed in September 2007, it was deemed necessary to modify ACME's aim in order to focus more on proactive, high-level strategy for advice on a future mathematics education policy landscape.

ACME's working practices will therefore be proactive and forward looking, trying to understand and influence policies before they are set in stone. For example, ACME is now working on a project on Level 3 Mathematics and recently held a workshop to gather some views and evidence from the mathematics community.

# THE SCOTTISH MATHEMATICAL SCIENCES TRAINING CENTRE

#### **Background and aims**

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The Scottish mathematical sciences departments have a history of collaborative graduate training going back to the first Edinburgh Mathematical Society postgraduate conference in 1995 (these popular events at The Burn, near Edzell, are now held annually). Since then we have also initiated a comprehensive joint programme of mathematically relevant generic skills, paid for by institutional Roberts' funds. But we still did not realise exactly what we had let ourselves in for when we were awarded an EPSRC grant to set up the Scottish Mathematical Sciences Training Centre (SMSTC)! It is one of the six Taught Course Centres funded by EPSRC's Mathematical Sciences Programme (a full list is available at www. epsrc.ac.uk/ResearchFunding/Programmes/ Maths/Training/Courses.htm) to address the issue raised in the 2004 International Review of UK Research in Mathematics that "New PhDs from the UK usually have less breadth and experience than their peers from other countries." The SMSTC's remit is to address this by providing broad courses for first-year PhD students in fundamental areas of mathematics and statistics. It is a collaborative ven-

#### Teaching and topics

of our first year of operation.

The SMSTC's portfolio consists of eight sixmonth streams (in algebra, geometry and topology, pure analysis, applied analysis and PDEs, applied mathematics methods, mathematical modelling, probability, and statistics), each equivalent to a workload of about 25% of a student's time. The aim is to provide a broad training which complements the more

ture with lectures taught 'live' by video-con-

ference, and this article is a brief description

specialised courses that are already available. A typical student registers for three streams, leaving about 25% of their time to work with a research supervisor during their first six months. Each stream is self-contained, and consists of a team of people who are responsible for producing comprehensive printed course notes, and delivering the lectures. These are two hours long and are held weekly by video conference. Individual departments are also expected to provide students with local tutorial sessions to help promote understanding and reinforce the lecture material. Each stream sets its own assessment: the aim is to ensure that the students actually learn something, and it typically involves a small number of assignments for the students to work on. Student performance was generally very good, with most scoring A or B grades.

#### Student meetings

The SMSTC was launched with a two-day student symposium in October 2007. The meeting featured a short 'taster' lecture from each of the eight streams, to provide information on the topics covered and allow the students to ask questions about prerequisites, content and assessment etc. (although, as was stressed at the time, some details were yet to be finalised). Interspersed with these were sessions covering introductory generic skills. The social highlight was an excellent dinner at a local restaurant, which both staff and students enjoyed. A second half-day symposium was held in February 2008 in Edinburgh, and consisted of generic skills talks and an SMSTC discussion forum. at which the students provided useful feedback on their experience so far. This was followed by a wonderful lecture by Simon Singh on Fermat's Last Theorem - Maths in the Media, and a wine reception. As well as being enjoyable and useful events in their own right, we hope that the symposia will help students to become (and feel) part of the mathematical sciences community.

#### **Technical equipment**

Delivery of lectures by video-conferencing (VC) was the only feasible option, since otherwise either staff or students would have needed to travel (possibly large distances) to give or attend lectures. The SMSTC departments have a large number of leading experts across the mathematical sciences, and teaching by VC allows this collective expertise to be available to all registered students. We chose to use standard (H.323-compliant) VC equipment because it is already in widespread use and allows free multi-site connection over the UK academic internet.

#### Management and administration

An Academic Steering and Management Group is responsible for the overall management of the SMSTC and ensuring academic quality. It is convened by the Director, Tony Carbery (University of Edinburgh), and has representation from each contributing university and broad subject area, and external advisors. Non-scientific organisation and administration for the SMSTC is undertaken by staff at the International Centre for Mathematical Sciences (ICMS), one of the two EPSRC-funded mathematical research institutes in the UK.

#### Website

The SMSTC's website (www.smstc.ac.uk) is an important communication channel. It is wiki-based and extremely easy to use, and has been popular with both staff and students. Students are given read-only logins and use the site to obtain general information (on symposia, assignments etc.) and to download PDFs of the comprehensive lecture notes before each lecture. Staff in 'stream teams' all have edit permission for their pages, which enables them to upload lecture notes and any other material themselves, without needing to go through a web administrator.

#### Future

Plans are already well underway for the next session. The SMSTC's academic year will again open with a symposium (8–9 October 2008), with lectures running for nine weeks from 13 October, and resuming after a Christmas break on 12 January. We welcome enquiries (to Johanna Kytöharju, johanna.kytoharju@icms.org.uk) from anyone outwith the partner departments who would be interested in finding out more about the SMSTC, or registering for the next or future academic years. We charge a registration fee to partially cover the staff costs of lectures and administration associated with the SMSTC, but would be happy to arrange a free sample lecture for anyone interested.

> Penny Davies Department of Mathematics University of Strathclyde (penny@maths.strath.ac.uk)

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Adrian Bowman (University of Glasgow and leader of the SMSTC Statistics stream) gives a VC lecture, with students from a remote site shown in the background.

# **NEWS FROM EPSRC**

#### **Mathematical Sciences Programme**

(Taken from the July issue of the EPSRC Mathematical Sciences Programme email newsletter.)

EPSRC plans to respond to the challenges facing society and the economy, and include encouraging ambitious programmes of research, a number of priority research themes and focusing on sustainability and greater economic impact. In the EPSRC Delivery Plan the research priorities for the period 2008–2011 are as follows.

- Energy bringing together all aspects of energy-related research and training, including working with the new Energy Technologies Institute (£220 million).
- Digital economy increasing the impact of ICT in transforming how business, government and society operate (£103 million).

- Nanoscience through engineering to application – exploiting previous investments to pull basic research through to application through a grand challenge approach (£39 million).
- Towards next-generation healthcare working with partners to improve the pull-through of research results to clinical products and practice (£36 million). There is significant investment being placed

in these research areas and we would encourage you to think about whether you can contribute to these themes and apply for the funding opportunities that will be available in the next three years within these mission programmes.

Why get involved?

1. These priority themes need the knowledge and expertise of mathematicians.

2. There are interesting and deep research challenges which are relevant to today's society.

3. Nearly £400 million is being invested in these areas over the next three years (and probably more money will be invested beyond 2011) so it is a good source of potential

### funding!

How to get involved:

1. Find out more about the priority themes – look at our delivery plan: www.epsrc.ac.uk/ Publications/Corporate/DeliveryPlan2008-11. htm. The Mathematics team is planning a workshop later in the year to provide the mathematics community with more information regarding the themes – further information will be available soon.

2. Look out for funding opportunities – see the EPSRC website and keep reading our email newsletters!

3. Think about how the mathematical sciences can contribute to the research themes.

4. Talk to colleagues – not just in the mathematics department, but in the computing, engineering and physical sciences departments too. Can you form consortia to help tackle the challenges in the priority themes?

You are, of course, still able to apply to EPSRC through responsive mode and for many of you this will be the most feasible funding opportunity. However, these research areas need mathematicians to get involved and we therefore urge you to think about whether you can contribute to them and make the most of the funding available to support research in these domains.

#### Leadership and Career Acceleration Fellowships

(Items taken from the EPRSC Calls.)

EPSRC intends to award up to 50 Fellowships this year across the Leadership Fellowships and Career Acceleration Fellowships schemes. The actual numbers of each type of fellowship awarded will depend on the quality of the proposals received and the level of resources requested. It anticipates strong competition for these fellowships.

#### Leadership Fellowships Outline Call

EPSRC is offering Leadership Fellowships to provide up to five years' funding to talented researchers with the most potential to develop into the UK's international research leaders of tomorrow. They provide an opportunity to concentrate on research for the period of the award, as well as supporting all the costs of the associated research for the full duration of the fellowship.

The expectation is that fellows will have established themselves as leading researchers of international standing in their area by the end of the award, as well as demonstrating leadership within their institution and research community. Closing date: **4.00 pm** on **Thursday 9 October 2009**.

#### Career Acceleration Fellowships Outline Call

Career Acceleration Fellowships provide up to five years' funding to talented researchers at an early stage of their career. They provide an opportunity to concentrate on research for the period of the award, as well as supporting all the costs of the associated research for the full duration of the fellowship. The expectation is that fellows will have established an independent career of international standing by the end of the award. Closing date: **4.00 pm on Tuesday 23 September 2008**.

#### **Call for Proposals**

Energy Challenges for Complexity Science The EPSRC Cross-Disciplinary Interfaces Programme and the cross-council Energy Programme invite adventurous, cross-disciplinary proposals for research projects which develop and apply the tools and techniques of complexity science to energy research challenges. Up to £4 million has been earmarked for this targeted activity and it is anticipated that up to four projects will be funded. Closing date: 29 October 2008.

#### **Postdoctoral Fellowships**

EPSRC is offering Postdoctoral Fellowships in theoretical physics, theoretical computer sciences, mathematical sciences and life sciences interface to enable the most talented new researchers to establish an independent research career, shortly or immediately after completing a PhD. The awards are for a period of up to three years and primarily cover the salary costs of the fellow, travel and subsistence.

# Postdoctoral Fellowships in Mathematical Sciences

At least seven Fellowships will be awarded to candidates who can demonstrate excellence and originality in research within the remit of Mathematical Sciences. The Mathematical Sciences Programme encompasses all areas of novel mathematics (pure and applied), probability & statistics and operational research. The mathematical sciences programme would particularly welcome applications in the areas of applied mathematics, probability & statistics and operational research. In addition applicants are encouraged to take the opportunity to gain a wider research experience by changing host organisations. For further information contact Mrs Janet Edwards (janet.edwards@epsrc.ac.uk), tel. 01793 444066.

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**Postdoctoral Fellowships at the Life Sciences Interface** (supported by the Cross-Disciplinary Interfaces Programme, C-DIP)

Up to 10 Fellowships will be on offer to enable talented new researchers with a PhD in a physical science (Chemistry, Physics, Mathematical Sciences. Materials Science. Information and Communication Technology) or any engineering discipline, to develop an independent career working at the interface with the life sciences. Both the Medical Research Council and the Biotechnology and Biological Sciences Research Council also offer postdoctoral fellowships, and applications deemed to be mainly or wholly within their remit will not be considered under this call. Some aspects of Medical Engineering also fall outside the scope of this call. Fellowship applications which

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include exposure to different research environments are strongly encouraged. However, this year it is not a mandatory requirement that fellows spend time working at a leading laboratory outside the UK during their fellowship. All applicants, in particular those not changing institution or seeking international research experience, must demonstrate an ability to conduct original and independent research. We particularly welcome applications in the following two research areas:

- Theoretical techniques for studying the complexity of biological systems
- The interface between Physics and the life sciences

If you have any queries regarding the remit of this component of the call it is strongly recommended that you contact Miss Samantha Madden(Samantha.madden@epsrc.ac.uk), tel. 01793 444463. Closing date: **4 pm** on **Tuesday 30 September 2008**.



"A wonderful square root. Let us hope it can be used for the good of mankind." © Sidney Harris

# VISIT OF PROFESSOR A. THOMAS

Professor Anne Thomas (Cornell, Ithaca, NY) is visiting the UK during October. She will speak at Glasgow on 15 October, Newcastle on 16 October and Oxford on 20 October. She will give a talk on *Lattices in automorphism groups of right-angled buildings* at Glasgow and Newcastle. The choice of talk at Oxford has yet to be determined. For further information contact Peter Kropholler (p.h.kropholler@maths.gla.ac.uk).DrThomas's visit is supported by an LMS Scheme 2 grant.

# VISIT OF PROFESSOR R. SRZEDNICKI

Professor Roman Srzednicki (Jagellonian University, Kraków, Poland) will be visiting the UK from 13 to 20 October. Professor Srzednicki's research interests concern Dynamical Systems. He is one of the leading experts in the field of topological methods, especially the generalised Conley index. He will give talks entitled On geometric detection of periodic solutions and chaotic dynamics of ordinary differential equations at

- York, Monday 13 October at 14:15
- Warwick, Wednesday 15 October at 16:00
- (Seminar room B3.02)
- Imperial College, Friday15 October at 16:00

For more details see http://maths. york.ac.uk/www/MFandSAseminars or http://www.hairer.org/seminar.html or contact Professors Zdzislaw Brzezniak, Martin Hairer or Boguslaw Zegarlinski at respectively: zb500@york.ac.uk,m. hairer@warwick.ac.uk, b.zegarlinski@ imperial.ac.uk. Professor Srzednicki's visit is supported by an LMS Scheme 2 grant.

# LONDON MATHEMATICAL SOCIETY POPULAR LECTURES 2008

#### 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 antiviral drug design?'

**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.

# **PROGRAMME COMMITTEE**

#### LMS Grant Schemes 1-5

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

For full details of all the Schemes, please see the Society's website (www.lms.ac.uk/ grants/index.html). Queries regarding applications can be addressed to the Programme Secretary, Stephen Huggett (tel: 01752 586869, email: s.huggett@plymouth.ac.uk) or the Secretary to Programme Committee, Sylvia Daly (tel: 020 7291 9971, email: sylvia. daly@lms.ac.uk, Wednesday–Friday) who will be pleased to discuss proposals informally with potential applicants and give advice on the submission of an application.

The next deadline for receipt of applications is **15 September 2008** and these will be considered at a meeting on 9 October 2008. Applications should be submitted well in advance of the date of the event for which funding is requested. Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

#### Grants Awarded between November 2007 and June 2008

#### 22 Scheme 1

| Applicant                                | Title   | Grant  |
|--|---|--------|
| Y. Fu<br>(Organiser: S. Metcalfe)        | European Postgraduate Fluid Dynamics Conference 2008  | £2,062 |
| D. Croydon                               | Probability: New Scaling Limits and Other Recent<br>Developments                                  |        |
| X. Mao                                   | Stochastic Differential Delay Equations: Theory, Numerics and Applications                        | £6,000 |
| I.D. Abrahams                            | 50th British Applied Mathematics Colloquium (BAMC)  | £6,000 |
| A. Wathen                                | Oxford Golub-around-the-World Event   | £300   |
| P.J. Cameron                             | Karl Gruenberg: A Celebration   | £1,000 |
| B. Zegarlinski<br>(Organiser: J. Inglis) | Functional and Stochastic Analysis: Isoperimetry, Poincaré<br>Inequalities and SDEs               | £1,250 |
| J. Oakley                                | Subjective Bayesian Methods   | £1,500 |
| A. Lacey                                 | 64th European Study Group with Industry   | £1,500 |
| R. Weston                                | ICFT08: 12th Annual UK Meeting on Integrable Models,<br>Conformal Field Theory and Related Topics | £2,485 |
| S. Cox                                   | Wales Mathematics Colloquium  | £2,221 |
| G. Brightwell                            | Two linked one-day Combinatorics Colloquia  | £1,400 |
| W. Parnell                               | New Directions in Analytical and Numerical Methods for<br>Forward and Inverse Scattering          | £1,904 |
| H. Broersma                              | 34th International Workshop on Graph-Theoretic Concepts in Computer Science (WG'08)               | £3,800 |

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| Applicant                               | Title   | Grant  |  |
|---|---|--------|--|
| B. Schroers                             | Noncommutative Deformations of Special Relativity   | £6,000 |  |
| R. Plymen                               | New Directions in Noncommutative Geometry   |        |  |
| G. Williams                             | SAGE – Semigroups and Groups In Essex   |        |  |
| T. Huettemann                           | 23rd British Topology Meeting (BTM23)   |        |  |
| K. Cherednichenko                       | Non-Classical, Boundary and Localisation Phenomena in Mathematical Homogenisation                                       | £3,060 |  |
| D.W. Hoffmann                           | Quadratic Forms, Algebraic Groups and Algebraic<br>Cobordism  | £5,910 |  |
| S. Galbraith                            | 2nd International Conference on Pairing-Based<br>Cryptography (Pairing 2008)  | £390   |  |
| N. Alechina                             | British Logic Colloquium BLC2008  | £3,693 |  |
| C-H. Chu                                | Jordan Structures: Nonassociative Analysis and Geometry   | £1,821 |  |
| G.M. Stallard                           | One Day Function Theory Meeting   | £1,010 |  |
| B. Reus                                 | Workshop Domains IX   | £4,290 |  |
| F. O'Rourke                             | Centenary Symposium on Mathematical and Statistical<br>Modelling in Medicine and Health Science                         | £1,180 |  |
| P. Neumann<br>(Organiser: D. Craven)    | Postgraduate Group Theory Conference 2008   | £4,283 |  |
| A. Scott                                | One-Day Meeting in Combinatorics  | £2,000 |  |
| C.M. Roney-Dougal                       | Infinite Group Theory   | £4,940 |  |
| D. Kuhn                                 | Extremal Combinatorics  | £1,320 |  |
| G. Garkusha                             | Workshop on Triangulated Categories   | £3,500 |  |
| R. MacKay                               | From Nonlinear Dynamics to Systems Biology  | £4,300 |  |
| M. Mathieu                              | 3rd International Workshop on Elementary Operators and their Applications   | £4,400 |  |
| D. Duncan                               | Scottish Computational Mathematics Symposium  | £1,970 |  |
| I. Potapov                              | Workshop on Reachability Problems, RP2008   | £3,600 |  |
| S. Weigert                              | Quantum (Groups + Foundation + Information)<br>Symposium in Honour of the 65th Birthday of Professor<br>Anthony Sudbery | £4,872 |  |
| K. Cherednichenko                       | South-West UK Analysis Meeting  | £2,490 |  |
| K. Houston, M. Speight,<br>R. Bielawski | Variational Problems in Differential Geometry   | £5,000 |  |
| M. Hyland                               | A Conference for Young Researchers in Mathematics   | £3,124 |  |
| N.J. Cutland                            | Logic and Mathematics 09  | £3,500 |  |
| P. Welch                                | Mathematical Methods in Philosophy  | £3,334 |  |

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#### Scheme 2

| V.V. Kisil S<br>L. Parnovski Y.<br>M.V. Lawson D. | .A. Plaksa                            | Leeds, London, Cardiff  | £1 000 |
|---|---------------------------------------|---|--------|
| L. Parnovski Y.<br>M.V. Lawson D.                 |                                       |   | 21,090 |
| M.V. Lawson D.                                    | . Karpesnina                          | University College London, Cardiff, Bath  | £700   |
|   | .G. FitzGerald                        | St Andrews, Heriot-Watt, York   | £1,200 |
| A. Fokas J.                                       | okas J. Bona Cambridge, Reading, Bath |   | £1,000 |
| F. Coolen D.                                      | ). Skulj                              | Durham, Liverpool, Nottingham   | £560   |
| J. Kaplunov E.                                    | . Its                                 | Brunel, Keele, Imperial College   | £1,200 |
| P. Kropholler A                                   | . Thomas                              | Newcastle, Oxford, Glasgow  | £1,200 |
| A.W. Mason B.                                     | . Sury                                | Glasgow, Edinburgh, Manchester  | £1,200 |
| S. Coombes C.                                     | . Laing                               | Heriot-Watt, Leeds, Nottingham  | £1,200 |
| Z. Brzezniak R.                                   | . Srzednicki                          | York, Warwick, Imperial College, Kings<br>College London, University College London | £470   |
| S. White K.                                       | . Dykema                              | Oxford, Belfast, Glasgow  | £440   |
| J.A. Sherratt M                                   | 1. R. Myerscough                      | Heriot-Watt, Dundee, Glasgow and Strathclyde  | £700   |
| Z. Brzezniak L.                                   | . Tubaro                              | York, Warwick, Swansea  | £1,050 |
| I. Barany R.                                      | . Meshulam                            | UCL, Oxford, Cambridge  | £1,000 |
| S. Stonehewer P.                                  | J. Cossey                             | Manchester, Birmingham, Warwick   | £1,200 |

### Scheme 3

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| Applicant      | Institution | Title  | Grant  |
|----------------|-------------|--|--------|
| Applicant      | institution | litte  | Grant  |
| R. Klages      | QMUL        | London Dynamical Systems Group (LDSG)                            | £1,400 |
| D. Mond        | Warwick     | Singularity Theory and Applications                              | £618   |
| C.M. Wood      | York        | Yorkshire Durham Geometry Days                                   | £1,050 |
| J. Bennett     | Birmingham  | The UK Harmonic Analysis and PDEs Research Network               | £1,050 |
| B. Schroers    | Heriot-Watt | North British Mathematical Physics Seminar                       | £1,050 |
| A. Sevastyanov | Aberdeen    | Algebra and Representation Theory in the North (ARTIN)           | £1,400 |
| C. Parker      | Birmingham  | Group Theory and Applications                                    | £691   |
| D. Loghin      | Birmingham  | Midlands Numerical Analysis Group (MIDNAG)                       | £1,000 |
| L. Bogachev    | Leeds       | Stochastic Analysis on Configuration Spaces and its Applications | £300   |
| T. Forster     | Cambridge   | CAMELEON   | £350   |

#### Scheme 4

| Applicant            | Institution                  | Collaborator     | Institution                             | Grant |
|----------------------|------------------------------|------------------|---|-------|
| B. Nucinkis          | Southampton                  | D.H. Kochloukova | State University of<br>Campinas, Brazil | £600  |
| J. Einbeck           | Durham                       | L. Evers         | Bristol                                 | £250  |
| S. Guillas           | University<br>College London | M-J. Lai         | Georgia                                 | £600  |
| J. Chubbuck          | Aberdeen                     | N. Iwase         | Kyushuy, Japan                          | £400  |
| A. Bartels           | Imperial College             | A. Henriques     | Utrecht, Netherlands                    | £300  |
| P. Figueras          | Durham                       | B. Kol           | Hebrew, Jerusalem                       | £600  |
| M. Mathieu           | QUB                          | E. Ortega        | Southern Denmark                        | £575  |
| H. Touchette         | QMUL                         | E. Cohen         | Rockefeller, New York                   | £500  |
| N. Snashall          | Leicester                    | E.L. Green       | Virginia Tech                           | £600  |
| N. Dirr              | Bath                         | N.K. Yip         | Purdue, Indianapolis                    | £600  |
| K. Liu               | Liverpool                    | J. Li            | Yunnan, China                           | £600  |
| S. Scott             | King's College<br>London     | X. Dai           | California                              | £600  |
| A. Glass             | Cambridge                    | V. Bludov        | Irkutsk, Russia                         | £500  |
| T. Lenagan           | Edinburgh                    | K.R. Goodearl    | California at Santa<br>Barbara          | £600  |
| S. Kolb              | Edinburgh                    | J. Stokman       | Amsterdam                               | £600  |
| J. Bolton            | Durham                       | L. Fernandez     | New York                                | £600  |
| T.D.H. Hall          | Liverpool                    | A. de Carvalho   | Universidade de Sao<br>Paulo, Brazil    | £300  |
| J. Siemons           | East Anglia                  | F. Dalla Volta   | Universita La Bicocca,<br>Italy         | £400  |
| M. Blyth             | East Anglia                  | C. Pozrikidis    | California                              | £600  |
| D.R.J. Chillingworth | Southampton                  | P. Piiroinen     | NUI, Galway                             | £500  |
| A. Gorodnik          | Bristol                      | A. Nevo          | Israel Institute of<br>Technology       | £600  |
| A. Parry             | Imperial College             | C. Rascon        | Madrid                                  | £600  |
| T. Jordan            | Bristol                      | K. Simon         | Budapest                                | £300  |
| G. El                | Loughborough                 | V. Khodorovskii  | St Petersburg                           | £600  |
| A.V. Mikhailov       | Leeds                        | V.S. Gerdjikov   | Bulgaria                                | £380  |

(continued on the next page)

#### Scheme 4 (continued)

| Applicant       | Institution | Collaborator  | Institution   | Grant |
|-----------------|-------------|---------------|---------------|-------|
| J.R. Partington | Leeds       | P. Gorkin     | Bucknell, USA | £600  |
| M. Nazarov      | York        | O. Ogievetsky | Marseille     | £450  |
| D. Davis        | Liverpool   | M. Ruas       | Brazil        | £600  |

#### Scheme 5

| sit  | Grant  |
|--|--|
| ersity of Witwatersrand and a conference on Mathematics in | £1,220   |
| ร<br>อ   | ersity of Witwatersrand and a conference on Mathematics in<br>ce 2008, Kruger Park, South Africa |

# EXTREMAL COMBINATORICS REACHABILITY PROBLEMS

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There will be a workshop on *Extremal Combinatorics* in Birmingham from 15 to 16 September 2008. The invited speakers are:

- David Conlon (University of Cambridge)
- Jan van den Heuvel (LSE, London)
- Peter Keevash (Queen Mary, University of London)
- Mathias Schacht (Humboldt-Universität, Berlin)
- Miklos Simonovits (Hungarian Academy of Sciences)
- Jozef Skokan (LSE, London)
- John Talbot (University College London)

Time for some shorter contributed talks has been reserved. If you would like to give one of these, email ecw08@maths.bham.ac.uk as soon as possible (with a title of the talk and a short abstract). There are limited funds from the London Mathematical Society to support the expenses of graduate students based in the UK.

To register ( $\pounds 20$ ), send an email to ecw08@maths.bham.ac.uk. The organizers are Demetres Christofides, Nikolaos Fountoulakis, Daniela Kuehn and Deryk Osthus. Details about the workshop can be found at http:// web.mat.bham.ac.uk/ecw08. The 2nd International Workshop on *Reachability Problems* (RP2008) will take place from 15 to 17 September 2008 at the University of Liverpool. RP2008 is specifically aimed at gathering scholars from diverse disciplines and backgrounds interested in reachability problems that appear in *Algebraic structures, Computational models, Hybrid systems, Verification.* 

The programme will consist of four invited and 14 contributed papers. Also one section of the workshop will be devoted to informal presentations. The invited speakers will include:

- Parosh Aziz Abdulla (Uppsala University)
- Juhani Karhumäki (University of Turku)
- Colin Stirling (University of Edinburgh)
- Wolfgang Thomas (RWTH Aachen University) This meeting is supported by an LMS con-

ference grant. Limited funds are available to students for attending the event. The actual programme of the workshop, registration forms and travel information can be found at www.csc.liv.ac.uk/~rp2008. Further details are available from RP2008 organizers Igor Potapov and Vesa Halava (rp2008@csc.liv. ac.uk).

# ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES ALGEBRAIC LIE STRUCTURES WITH ORIGINS IN PHYSICS

23-27 March 2009

in association with the Newton Institute programme entitled Algebraic Lie Theory (12 January – 26 June 2009)

**Workshop organisers:** P. Etingof (MIT), A. Kleshchev (University of Oregon), M. Nazarov (University of York) and A. Premet (University of Manchester).

Theme of conference: This conference will bring together mathematicians and mathematical physicists working in such (overlapping) areas as W-algebras, Yangians, vertex algebras, characteristic *p*, Lie theory, conformal algebras, chiral algebras, quantum groups, Hecke algebras, Cherednik algebras, infinite-dimensional Lie algebras, as well as related representation theory, geometry, combinatorics, and applications. We believe the meeting will provide rare and very important opportunities, especially for young researchers. It will bring together people working in different areas of Lie theory, mathematical physics, and representation theory.

**Speakers will include:** T. Arakawa (Nara Women's University), J. Brundan (University of Oregon), M. Finkelberg (Independent University of Moscow), V. Ginzburg (University of Chicago), I. Gordon (University of Edinburgh), D. Hernandez (Université de Versailles), A. Joseph (Weizmann Institute of Science), V. Kac (MIT), S. Khoroshkin (Institute of Theoretical and Experimental Physics), E. Ragoucy (Université de Savoie) and V. Serganova (University of California, Berkeley).

**Further information and application forms** are available from the web at: www.newton.cam.ac.uk/programmes/ALT/altw02.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 December 2008**.

#### NEWSLETTER



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#### Quantization and Arithmetic

**Unterberger, A.**, Université de Reims, France

The primary aim of this book is to create situations in which the zeta function, or other L-functions, will appear in spectral-theoretic questions. A secondary aim is to connect pseudo-differential analysis, or quantization theory, to analytic number theory, to analytic number thorugh the analysis of operators on functions on the line by means of their diagonal matrix elements against families of arithmetic coherent states: these are families of discretely supported measures on the line, transforming in specific ways under the part of the metaplectic representation or, more generally, representations from the discrete series of SL(2,R), lying above an arithmetic group such as SL(2,Z).

2008.147 p. Softcover GBP 30.50 / EUR 39.90 ISBN 978-3-7643-8790-7 PDO — Pseudo-Differential Operators, Vol. 1

### Patterns of Change

Linguistic Innovations in the Development of Classical Mathematics

Kvasz, L., Comenius University, Bratislava, Slovakia, and Charles University, Praha, Czech Republic

The book offers a reconstruction of linguistic innovations in the history of mathematics. It argues that there are at least three ways in which the language of mathematics can be changed. As illustration of changes of the first kind, called recodings, is the development along the line: synthetic

geometry, analytic geometry, fractal geometry, and set theory. In this development the mathematicians changed the very way of constructing geometric figures. As illustration of changes of the second kind, called relativization, is the development of synthetic geometry along the line: Euclid's geometry, projective geometry, non-Euclidean geometry, Erlanger program up to Hilbert's Grundlagen der Geometrie. Changes of the third kind, called re-formulations are for instance the changes that can be seen on the different editions of Euclid's Elements. Perhaps the best known among them is Playfair's change of the formulation of the fifth postulate.

2008. XVIII, 261 p. Hardcover GBP 74.50 / EUR 99.00 ISBN 978-3-7643-8839-3 SNHS — Science Networks. Historical Studies, Vol. 36

All prices are net prices subject to local VAT, recommended and subject to change without notice.

### www.birkhauser.ch

# GROUP THEORY MEETINGS IN EDINBURGH

#### **Preliminary Announcement**

Two related meetings on group theory will be held in Edinburgh in December 2008. This is a preliminary announcement and fuller details will be published in the October *Newsletter*.

#### Edinburgh Mathematical Society – London Mathematical Society meeting

There will be a joint meeting of the Edinburgh Mathematical Society and the London Mathematical Society on Friday and Saturday, 12–13 December. The meeting will take place on Friday afternoon and Saturday morning. The topic of the meeting is *Group Theory* and there are four speakers:

- Laurent Bartholdi (Göttingen) Automatically presented groups
- Martin Bridson (Oxford) Dimension, rigidity and fixed point theorems
- Alain Valette (Neuchâtel) The Haagerup property and its stability properties
- Efim Zelmanov (San Diego) Asymptotic properties of finite groups and finitedimensional algebras

For more information, contact Tom Lenagan (tom@maths.ed.ac.uk).

# Infinite group theory and related topics workshop

Immediately preceding the joint EMS–LMS meeting, a workshop on *Infinite group theory* and related topics will be held in Edinburgh from the morning of Wednesday 10 December until lunchtime on Friday 12 December. Invited speakers include:

- L. Bartholdi (Göttingen)
- T. Burness (Southampton)
- P. Dehornoy (Caen)
- B. Eick (Braunschweig)
- M. Geck (Aberdeen)

- D. Macpherson (Leeds)
- J. Mitchell (St Andrews)
- G. Pfeiffer (Galway)
- T. Riley (Bristol)

The invited talks will be accessible to postgraduate students, postdoctoral fellows and researchers in all areas of group theory. There will also be contributed postgraduate talks and a postgraduate poster session. We expect to have some financial support for postgraduate students.

Organising Committee: Kenny Brown (Glasgow), Iain Gordon (Edinburgh), Jim Howie (Heriot-Watt), Tom Lenagan (Edinburgh) and ColvaRoney-Dougal (St Andrews). For more information, email colva@mcs.st-and.ac.uk or go to www-groups.mcs.st-and.ac.uk/~colva/ edconf.html.

# SCOTTISH COMPUTATIONAL MATHEMATICS SYMPOSIUM

The 17th Scottish Computational Mathematics Symposium will take place on Wednesday 10 September 2008 at 10:00–17:00 at Heriot-Watt University, Riccarton Campus, Edinburgh. The speakers are:

- Rob Beardmore (Imperial College, London)
- Evelyn Buckwar (Heriot-Watt)
- Ping Lin (Dundee)
- Jared Tanner (Edinburgh)
- Françoise Tisseur (Manchester)

The Scottish Computational Mathematics Symposium (SCMS) one-day meetings are held every year in September with the aim of bringingtogethermathematicians and others who develop and/or use computer algorithms to solve mathematical problems. The meetings are open to everyone interested. Register by **1 September**. Registration and all other details are at www.ma.hw.ac.uk/ scms. The organisers are Dugald Duncan (Heriot-Watt) and John Mackenzie (Strathclyde). The meeting is supported by an LMS conference grant.

# FROM NONLINEAR DYNAMICS TO SYSTEMS BIOLOGY

In celebration of David Rand's 60th birthday, achievements and influence, an LMS supported workshop will be held in the Mathematics Institute, University of Warwick on 1–2 December, entitled *From Nonlinear Dynamics to Systems Biology*.

Areas to be covered include renormalisation of dynamical systems, singularities and bifurcations, time series analysis, game theory in economics, finance, epidemiology, ecology, biophysics, and biological regulation. Many of the talks will be of a survey nature. Confirmed speakers include:

• B.D. Mestel (Open University)

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- A. Pinto (University of Minho)
- T. Bohr (Technical University, Lyngby)
- A. Kirman (Université Aix-Marseille III)
- D.S. Broomhead (University of Manchester)
- M. van Baalen (Université Pierre et Marie Curie)
- A.J. Millar (University of Edinburgh)
- E.C. Zeeman (University of Oxford)
- C. Bauch (University of Guelph)
- P.J. Holmes (Princeton)
- D.R.J. Chillingworth (University of Southampton)
- H.B. Wilson (University of Queensland)

All are welcome to attend, including research students, for whom some financial assistance has been provided if your own institution is unable to meet the full cost.

It is expected to start after lunch on Monday 1 December, with a buffet dinner that evening and ending around 5 pm on Tuesday 2 December. There will be a registration fee of £10 per day attended. Please notify mrc@maths. warwick.ac.uk by **1 November** if you would like assistance with reserving accommodation and in any case by 21 November so we can plan catering. The organisers are R.S. MacKay, S.J. van Strien, N.J. Burroughs and M.J. Keeling.

# VIBRATIONS IN ROTATING MACHINERY

The 9th international conference on Vibrations in Rotating Machinery will take place from 8 to 10 September 2008 at the University of Exeter. The LMS is co-sponsoring this event, whose primary focus is on the latest research and case studies of vibration in rotating machines and its influence on their commercial viability, life, reliability and environmental impact. The conference will be addressing the following key areas:

- Smart machines
- Blades
- Analytical Methods
- Experimental Methods
- Instabilities
- Electrical machines
- Case Studies from a variety of industries
- Faults
- Cracks
- Turbochargers
- Diagnostics
- Damping technologies
- Misalignment
- Fluid-film
- Balancing
- Rotordynamics

For further information visit www.imeche. org/events/virm9.

# QUANTUM (GROUPS + FOUNDATIONS + INFORMATION)

A symposium to celebrate the achievements of Professor Anthony Sudbery on the occasion of his 65th birthday will be held at the University of York on 29–30 September 2008, organised by the Department of Mathematics.

The symposium aims to reflect Professor Sudbery's diverse research achievements during his distinguished career. His research interests span many areas of pure and applied mathematics, ranging from quantum groups and exceptional Lie algebras to foundational questions in quantum mechanics and quantum information theory. Speakers will include:

- A. Beige (Leeds)
- I. Bengtsson (Stockholm)
- K. Brown (Glasgow)
- E. Corrigan (Durham)
- A.J. Macfarlane (Cambridge)
- S. Majid (London)
- C. Manogue (Oregon)
- S. Popescu (Bristol)
- J. Ryan (Arkansas)
- R. Tucker (Lancaster)

Most of them have collaborated with Tony Sudbery at some point of his career. The broad range of topics they represent will provide a stimulating background for the interaction of research communities often separated by discipline boundaries. The meeting will also give opportunities for graduate students to exchange ideas with well-established colleagues in their fields and to acquaint themselves with other mathematical topics. Financial support is available to help them attend the symposium.

Details about registration, poster and FestSchrift contributions, support for graduate students, accommodation and the conference dinner are available at http://maths.york.ac.uk/www/ TonySudberyFest. This meeting is supported by an LMS conference grant and by the Mathematical and Theoretical Physics Group of the Institute of Physics.

# MATHEMATICAL METHODS IN PHILOSOPHY

A meeting on Mathematical Methods in Philosophy will take place from 19 to 21 September 2008 at the School of Mathematics, University of Bristol. This is the fourth in a series of meetings exploring mathematical methods in epistemology, semantics, theories of truth, and philosophy of mathematics in a British Academy funded research project. This meeting is further supported by the London Mathematical Society and the British Logic Colloquium. Confirmed speakers are:

- Riccardo Bruni (Firenze)
- Martin Fischer (Leuven)
  - Harvey Friedman (Ohio State)
  - Dan Isaacson (Oxford)
  - Peter Koellner (Harvard)
  - Ofra Magidor (Oxford)
- Jeff Paris (Manchester)
- Richard Pettigrew (Bristol)
- Gabriel Uzquiano (Oxford)
- Jouko Väänänen (ILLC Amsterdam)
- Andreas Weiermann (Ghent)
- Alan Weir (Glasgow)

There is a registration fee of  $\pounds 20$  with a reduced fee of  $\pounds 10$  for students and postgraduates. There are some grants for postgraduates to cover the registration fees, travel and accommodation costs from the LMS funding. Apply early by email to Philip Welch (p.welch@bristol.ac.uk) to avoid disappointment.

Further timetabling and titles, etc., will be placed on the meeting webpage at http:// users.ox.ac.uk/~sfop0114/rg/meetings/ bristol08.html. Contact Helen Craven (tel: +44 117 928 7978, email: helen.craven@ bris.ac.uk) with technical and administrative questions or for help concerning the conference. Visitor information including maps can be found at www.maths.bris. ac.uk/events/info/. 31

# RECORDS OF PROCEEDINGS AT MEETINGS

#### **REGIONAL ORDINARY MEETING**

held on *Monday 9 June 2008* at the University of Birmingham. About 40 members and visitors were present for all or part of the meeting.

The meeting began at 2.00 pm, with the President, Professor E.B. DAVIES, FRS, in the Chair. Twelve people were elected to Ordinary Membership: A. Blanco, R. Bogni, K.D. Cherednichenko, T.M. Jordan, A.A. Korobkin, I.D. Marshall, K. McGerty, N. Mladenovic, C. Nehaniv, J. Ross, J.A. Valiente Kroon, J. Zhang; and two people were elected to Associate Membership: V.R. Neale, I. Papageorgiou.

The Records of the Proceedings of the Society Meetings held on 8 February and 31 March 2008 were signed as correct records.

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

Dr J. BENNETT introduced a lecture given by Fulvio Ricci on *Commutative Fourier* analysis on nilpotent Lie groups.

Dr Bennett introduced a lecture given by Brian Davies on *Spectral properties of matrices associated with some directed graphs*.

After tea, Dr Bennett introduced a lecture given by Luis Vega on *Convexity and uniqueness for some evolution equations.* 

Professor Davies expressed the thanks of the Society to the local organisers and the other speakers for putting on such an excellent meeting.

After the meeting a dinner was held at the Staff House, University of Birmingham.

# **MIDLANDS REGIONAL MEETING 2008**

#### 9 June 2008

The 2008 Midlands Regional Meeting of the London Mathematical Society was held on Monday 9 June in the Watson Building at the University of Birmingham. It was the opening event of a workshop on *Harmonic Analysis and Partial Differential Equations*. The President of the LMS, Professor E.B. Davies, opened the meeting and welcomed several new members of the LMS.

With the business taken care of, Fulvio Ricci (Scuola Normale Superiore di Pisa) gave the first talk of the afternoon, entitled *Commutative Fourier analysis on nilpotent Lie* groups. A fundamental fact of Euclidean Fourier analysis is that the Fourier transform maps the Schwartz space of rapidly decreasing functions onto itself. Professor Ricci explained how this result could be generalised to certain nilpotent Lie groups, and stated a positive result in the case of the Heisenberg aroup.

The second talk of the meeting was delivered by Brian Davies (King's College, London)

and was entitled Spectral properties of matrices associated with some directed graphs. He described the spectral behaviour of a class of highly non-selfadjoint square matrices as the size of these matrices becomes asymptotically large. In particular he considered a sparse perturbation of a certain Jordan matrix, and showed that a successful way of studying the eigenvalue problem is to consider a directed graph associated to the perturbed matrix.

The last speaker of the afternoon was Luis Vega (Universidad del País Vasco), who spoke on *Convexity and uniqueness forsome evolution equations*. Histalk was motivated by Hardy's uncertainty princi-

ple cast in the language of free solutions to the Schrödinger equation on the whole space, stating that if a solution behaves like a Gaussian initially and at some positive time, then the solution is identically zero if the decay of the Gaussians is large enough. Professor Vega described a variant of this result allowing for the inclusion of a class of potentials in the Schrödinger equation with a sharper bound on the decay. This can be used to deduce new comparison principles for nonlinear Schrödinger equations. F. Ricci E.B. Davies L. Vega Following the meeting, many members and guests enjoyed drinks and a dinner at Staff House at the University of Birmingham.

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The subsequent three days brought recognised experts from all over the world to discuss some of their current research in the areas of harmonic analysis and partial differential equations. Here is a selection of topics covered in the talks to give a flavour of the workshop: • recent progress on norm estimates for the extension operator for the Fourier transform and related work on Strichartz estimates;







# RECORDS OF PROCEEDINGS AT MEETINGS

#### **ORDINARY MEETING**

held on *Friday 4 July 2008* at University College London. About 100 members and visitors were present for all or part of the meeting. The meeting began at 3.30 pm, with the President, Professor E.B. DAVIES, FRS, in the Chair.

Three people were elected to Ordinary Membership: T.T. Berger, E. Gasparim, T.S. Wilde; and one was elected to Associate Membership: G. Clews.

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

On a recommendation from Council it was agreed to elect Professor A.R. Camina and Professor P.T. Saunders as scrutineers in the forthcoming Council elections.

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The President, on Council's behalf, proposed that Professor Mikhael Gromov of the IHÉS and Professor Karen Uhlenbeck of the University of Texas in Austin be elected to Honorary Membership of the Society. The President read short versions of the citations, to be published in full in the *Bulletin*.

The President then announced the awards of the prizes for 2008:

Pólya PrizeProfessor David Preiss, FRS (University of Warwick)Fröhlich PrizeProfessor Nicholas Higham, FRS (University of Manchester)Senior Berwick PrizeProfessor Kevin Buzzard (Imperial College London)Whitehead PrizesDr Timothy Browning (University of Bristol)Dr Tamás Hausel (University of Oxford)Dr Martin Hairer (University of Warwick)Dr Nina Snaith (University of Bristol)

The President read short versions of the citations, to be published in full in the *Bulletin*.

The President announced that Professor Angus Macintyre FRS was to be proposed for the Presidency from November 2009.

The President reported that the Council had agreed to commend to the membership a Report describing the creation of a new single society for mathematics and to institute a consultation with the members on the proposals.

The President introduced a lecture given by Professor Béla Bollobás on *Projections*, entropy and some applications.

After tea, the President introduced the 2008 Hardy Lecture given by Professor Shmuel Weinberger on *Complexity, entropy, and variational problems*.

After the meeting, a reception was held at De Morgan House, followed by a dinner at the Old Amalfi restaurant.

• analysis of multilinear operators;

• pointwise behaviour of the Green's function of an elliptic operator;

• norm estimates for the wave operator on Lie Groups;

• characterising the homomorphisms which map the absolutely convergent Fourier series

into uniformly convergent Fourier series.

This diverse collection of talks gave a fascinating snapshot of some of the most interesting and challenging problems being considered in analysis today.

> Ben Jaye University of Birmingham

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### LMS GRADUATE STUDENT AND SOCIETY MEETINGS 4 July 2008

A London Mathematical Society Meeting took place on the afternoon of Friday 4 July at University College London. It was preceded by a Graduate Student Meeting, which included introductory talks to the afternoon lectures. There was also an opportunity for graduate students working in topology and combinatorics to give short talks on their own research.

The Graduate Student Meeting was attended by around 50 people, and began at 10.00 with a talk by Graham Brightwell (London School of Economics) entitled *An introduction to entropy*. The talk included a comprehensive introduction to discrete entropy, as well as an overview of the many ways in which the notion of entropy appears in mathematics. There were many worked examples, making the concepts easily accessible.

Then the student talks began. They were split into those that were combinatorial and those that were topological and were given concurrently in two separate rooms. The choice of areas was intended to reflect the nature of the talks at the Society Meeting. In each room, there were five talks, and a prize was on offer for the best graduate talk, as voted for by the audience.

In the 'combinatorics room' there were talks by Luke Kelly, Andrew Treglown and Simon Griffiths on properties of cycles in graphs, given conditions on the degrees of vertices. Viresh Patel gave a talk on simultaneous graph cuts, and Laurence Rackham outlined a proof of a conjecture in multidimensional sum-free sets.

In the 'topology room' Alex Coward gave a talk on knot theory and hyperbolic geometry, and Julia Collins described the problem of determining knots which bound discs in 4 dimensions. Stuart Hall gave a talk on the link between the homology of manifolds and the combinatorics of polytopes; Isidoros Strouthos described Wall's D(2) problem, a conjecture in algebraic topology, and Johannes Nordström explained a method used to deform compact 7-dimensional manifolds with  $G_2$  holonomy.

After a break for lunch, the prizes for the bestgraduatestudenttalkswere awarded to Laurence Rackham and Julia Collins. There was then a short, informative presentation on *How to get your papers published* by Susan Hezlet (LMS Publisher).

The Graduate Student Meeting ended with a talk by Richard Thomas (Imperial College London) which was *Introduction to Morse theory*. Professor Thomas described the main constructions of Morse Theory, using illuminating examples to illustrate how Morse theory can be used to pick out the underlying structure of manifolds.

After the Graduate Student Meeting, everyone moved to the J.Z. Young Lecture Theatre for the Society Meeting. The meeting began at 15.30 and was attended by around 100 LMS members, visitors and graduate students.

After official LMS business, which included the announcement of the Society

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Prizewinners for 2008, there was a talk by Béla Bollobás (Cambridge University), the 2007 Senior Whitehead Prize Winner, on *Projections, entropy and some applications*. The talk guided us through the development of projection inequalities for *n*-dimensional bodies, their connections with results on the entropy of random variables, and their use in other problems. Professor Bollobás gave a sense of the vibrant development of results in this area, and ended his talk by giving some current open problems.

The Society Meeting ended with the 2008 Hardy Lecture, given by Shmuel Weinberger (University of Chicago and Hebrew University), on the subject of *Complexity, entropy, and variational problems*. Professor Weinberger gave a description of his own research in topology, and a sense of the richness and interplay of the ideas used to study problems on manifolds, ranging from Morse theory to concepts in geometric group theory. Further, he described how a computational, variational approach could be used to investigate problems relating to the deformations of loops on spaces.

Overall, both meetings proved to be popular, and were conducted in a friendly and exciting atmosphere. As graduate students, it was especially helpful to have attended the Graduate Student Meeting, which was organised by John Talbot (University College London) and Andrew Lobb (Imperial College London). This provided an opportunity for graduate students to meet and learn about research done on various topics, and the introductory talks, by Graham Brightwell and Richard Thomas. familiarised us with the notions necessary in order to appreciate the talks at the Society Meeting. We hope that this format will continue for future LMS events.

> Rahil Baber and Isidoros Strouthos University College London

# REVIEWS

**The Wraparound Universe** by Jean-Pierre Luminet, A.K. Peters, 2008, 336 pp, £22.95, \$39.00, ISBN 978-1-56881-309-7.

All cosmologists agree that to lowest approximation, at any given ('cosmic') time, the geometry of three-dimensional space is given locally by one of the three congruence geometries: Hyperbolic space, Euclidean space, or Spherical space. The galaxies and clusters are at rest with respect to these spaces but the distances between them increase uniformly in proportion to a universal function of time called the scale factor. This basic and extremely well verified observational fact is referred to as the Hubble expansion, after the first person to discover it, some ten years after Einstein's formulation of General Relativity in terms of the pseudo-Riemannian geometry of four-dimensional spacetime. In this picture, due to Friedmann and Lemaître, spacetime is a product of time with spatial sections of constant time corresponding to our traditional notion of space. Thus were the epic labours of Lobachevsky, Bolyai, Gauss, Klein as well as Clifford and Cayley and many others on the foundations of geometry neatly incorporated into a fully relativistic and consistent dynamical theory of gravitation.

Among the many things that cosmologists disagree about is not only which of these three possibilities holds, i.e. whether the spatial curvature is negative, zero or positive respectively, but what is the global geometry of the spatial sections. Do we take the simply connected covering spaces or should we identify under some discrete subgroup of the isometry group? If the curvature turns out to be positive, for example, should we take it to be given by the three-sphere, by real projective space, or even some more exotic space such as Poincaré's famous dodecahedral space?

The author of this exciting and attractively written book, unlike many of his colleagues,

holds that observations indicate that the fundamental group of our universe is perhaps the binary dodecahedral group and so our space is a homology sphere. If true, then indeed Poincaré did not labour in vain.

What is perhaps more important than the disagreement is the agreement that what has hitherto been a purely metaphysical debate is now a matter for observation to decide. The fact that the universe is expanding means that it was hotter and denser in the past and among the relics of that hot early state are the 3-degree Kelvin Cosmic Microwave Background (CMB) photons. Satellite and balloon observations, with acronyms like COBE, BOOMERANG, MAXIMA and WMAP, have been used to place limits on the curvature and fundamental group of the universe. The so-called concordance models are consistent with a flat spatial geometry and place lower limits on any repeat distance but certainly do not definitively exclude what the author calls a "wraparound universe". Indeed certain puzzling features of the data, if real, cannot easily be explained on the concordance model. With the launch of the PLANCK satellite on 31 October of this year, we shall have even more accurate and precise observations and almost certainly will be able to check the dodecahedral hypothesis. Since anything but



zero curvature and no identifications is difficult to reconcile (but not absolutely impossible) with the fashionable theory of inflation, there is much at stake here.

These are indeed exciting times for those interested in the interface between physics and geometry. The author is to be thanked for providing a timely update of the first 2001 French edition, translated into English. The material, which is treated intuitively, is very well presented at a popular level, with many fascinating historical and sociological asides. It should be accessible to any first-year undergraduate or sixth-former. It would certainly be of interest as supplementary reading to anyone taking a first course in geometry or relativity and should appeal to any mathematically literate person in search of the 'Big Picture'.

> G.W. Gibbon Cambridge

Number Story: From counting to cryptography by Peter M. Higgins, Springer, 2008, 336 pp,  $\pm$ 13.00,  $\in$ 19.95, US\$25.00, ISBN 978-1-84800-000-1.

This is an excellent book which has, to use a cliché, something for everyone. It is an 'easy to read' account of the development of numbers. Furthermore, until the last chapter which is

'for the connoisseurs', it manages to avoid using complex mathematical notation which so frequently deters the uninitiated from exploring the subject.

In the preface there is an assertion that it is 'natural to try and understand them [numbers] as much as we can'. This book is a significant contribution to that noble objective.

The overall theme is a narrative that tells the story of the development of numbers from Pythagoras to the modern concept of public-key cryptography. However, in addition to the expected historical anecdotes

and facts, the narrative is full of 'magical' tricks that amuse, and intriguing puzzles of varying level of difficulty.

The author has the ability to take a series of complex issues and, without resorting to inaccuracies or sleight-of-hand, make them intelligible to a wide audience. He manages to avoid mathematical notation and still successfully explain such diverse and often potentially difficult topics as The Hilbert Hotel, the real number line and imaginary numbers.

Although much of the book adopts a pure mathematical approach and studies numbers as being a fascinating topic that is of interest in its own right, the author also considers a number of real-world applications. The two main fields here are probability, with its application to chance and gambling, and modular arithmetic, with its application to public -key cryptography.

The review so far is restricted to the first 12 chapters of a 13-chapter book. As has been stated they are easy to read and accessible to anyone with an interest in the subject. Most of them would make excellent reading for the enthusiastic sixth-former. However, the 13th chapter, 'For Connoisseurs', is somewhat different. Here the author reverts to use of standard mathematical notation and often assumes considerable mathematical maturity from the reader. It contains a number of proofs of claims that were made in the earlier chapters and explains some of the more difficult concepts in more detail.

This is a book that can be recommended to anyone with an interest in mathematics. They are likely to find it stimulating, possibly addictive, and may find themselves wanting to know more. The aim of the book can be summarised by the following quote from its dust jacket.

"As our understanding of numbers continues to evolve, this book invites us to rediscover the mystery and beauty of numbers and reminds us that the story of numbers is a tale with a long way to run...."

> Fred Piper Royal Holloway, University of London

# **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).

#### 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)
6-11 British Association Festival of Science.

Liverpool (372)

8 Function Theory Meeting (372)

**8-9** Shaping the Future of Maths & Stats in Higher Education, CETL-MSOR Conference, Lancaster (371)

8-10 Vibrations in Rotating Machinery, Exeter (373)

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** Scottish Computational Mathematics Symposium, Heriot–Watt University, Edinburgh (373)

**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 (373)

15 First Rankin Lecture by John Baez, Glasgow (372)

**15-16** Extremal Combinatorics Workshop, Birmingham (373)

**15-17** Reachability Problems, Liverpool (373)

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)

**19-21** Mathematical Methods in Philosophy, Bristol (373)

22-24 Domains IX Workshop, Sussex (372)
22-26 Higher Dimensional Algebraic
Geometry, ICMS Workshop, Edinburgh (369)
25 LMS Popular Lectures, Birmingham (373)
26 What Works in the Classroom, London (372)

29-30 QUANTUM Symposium, York (373)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

1-2 From Nonlinear Dynamics to Systems Biology Workshop, Warwick (373) 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) **10-12** Infinite Group Theory and Related Topics Workshop, Edinburgh (373) 12-13 Joint Meeting with the Edinburgh Mathematical Society, Edinburgh (373) 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)

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#### **MARCH 2009**

**23-27** Algebraic Lie Structures with Origins in Physics Workshop, INI, Cambridge (373)

#### **APRIL 2009**

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

#### **AUGUST 2009**

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

#### **AUGUST 2010**

**19-27** International Congress of Mathematicians 2010, Hyderabad, India (365)

# C.A. SCOTT LMS member 1881–1914



The first woman to join the London Mathematical Society was Charlotte Angas Scott, an outstanding mathematician who, despite having been placed "equivalent to eighth Wrangler" in the Cambridge Tripos exam of 1880, being a woman, was not included on the list of graduates. Scott's participation at LMS meetings was impaired by the difficulty she experienced in gaining college-level employment in Britain. In 1885, four years after her election to the Society, she accepted a post at Bryn Mawr College in Philadelphia, and soon became an active member of the American Mathematical Society, to whose *Bulletin* she contributed several papers.