THE LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 370 May 2008

Society Meetings and Events

2008

Monday 9 June
Midlands Regional Meeting, Birmingham [*page* 3]

Friday 4 July
Hardy Lecture [*page* 5] and Meeting, London

Thursday 17 July
LMS Meeting, 5ECM Amsterdam [*page* 13]

Monday 15 September
SW & South Wales Regional Meeting Swansea

Monday 15 September
Computer Science Day London

Friday 21 November
AGM, London

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

COUNCIL DIARY

20 March 2008

This second Council meeting of the year was a lively affair, with the report of the LMS–IMA Next Steps Initiative Joint Planning Group arriving at Council (having been to the IMA Council last week), of which more later below.

As usual, the meeting began with President's Business. Brian Davies returned, under this heading, to the topic of EPSRC funding for research under the Mathematics Programme. He noted that the allocation had fallen from over £21 million three years ago to £16 million for this financial year (starting April), and that he had raised this fall in funding at the EPSRC Open Meeting on 10 March with Dave Delpy, EPSRC Chief Executive, and John Armitt, EPSRC Chair (Brian's questions and the EPSRC response can be viewed at www.epsrc.ac.uk, 'Watch the EPSRC Open Meeting online'). Whilst the EPSRC response mentioned that mathematics achieves significant funding through other EPSRC mechanisms, e.g. Strategy and Innovation awards and Doctoral Training Centres, Brian expressed his concern at this large fall in core funding, which concern was shared by his opposite number at the IMA, and by other Council members, not least those with a responsive mode application currently under consideration. Brian, and other members of the executive, would continue to raise these concerns, in particular through CMS.

Under 'Policy Issues', the Council agreed a new 'Women in Mathematics Policy Statement', proposed by the Women in Mathematics Committee. This, among other things, commits the LMS to 'seek to ensure an appropriate gender balance on its committees and working groups' and puts a general requirement on those applying to the LMS for grant funding for meetings to 'invite both male and female speakers or explain why this is not appropriate or possible'. This new policy should have a significant impact in assisting LMS Members and others to think carefully about appropriate gender balance, e.g. when organising conferences and workshops.

As at the January meeting, longer items on the agenda had been reserved for discussion after lunch. Brian Davies began by making a presentation on the history of the LMS–IMA Next Steps Initiative, and we then launched into discussion of the report of the Joint Planning Group (JPG) of the IMA and LMS. This report lays out, to quote its introduction, 'the philosophical and practical case for a single unified society', and describes in some detail, this detail generated through a process of many joint meetings,

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discussions, and drafts, a proposed structure for a new, joint society of mathematics. Brian outlined some of the benefits of a single society suggested in the joint report, including increased external influence for mathematics; removal of duplication of effort across the mathematics community; improved communication between mathematicians; facilitation of interactions with users of mathematics. The discussion around the table provided a taster for the longer discussions that will take place on 6 and 7 June at the LMS Retreat, in which the Council will focus on this key issue for the future of the LMS. Issues raised included: would the proposed new society be able to attract a much larger membership than the combined membership of the LMS and IMA, and what was the experience from other similar mergers (e.g. that creating the RSS)? Were the mechanisms indicated in the report sufficient to ensure that the amount that the LMS spends annually on grants would continue to hit broadly the same target? The Council resolved to move forward with discussion of this issue, inviting the JPG to finalise its report, and agreeing to inform the Privy Council and Charity Commissioners of the possibility of a merger.

Simon Chandler-Wilde

ANNUAL ELECTIONS TO LMS COUNCIL

The normal way in which nominations to Council are made is via the Nominating Committee, but there is also provision for all members of the Society to make nominations direct. Anyone who wishes to propose someone for a position as an Officer of the Society or as a member of Council is invited to inform P.J. Giblin, who is the current chair of the Nominating Committee (pjgiblin@liv.ac.uk), or one of the other members of the Committee (M.R. Bridson, A.G. Chetwynd, C.A. Hobbs, M.A.H. MacCallum, M. Reid, C.M. Series, B.J. Totaro) by **31 May 2008**.

Any direct nominations should be sent to the Executive Secretary (peter.cooper@lms.ac.uk) to arrive before noon on **1 September 2008**. Such nominations must bear the signatures of the Nominator and three Seconders and of the Nominee.

LMS Newsletter

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LONDON MATHEMATICAL SOCIETY

MIDLANDS REGIONAL MEETING

School of Mathematics, University of Birmingham

Monday 9 June 2008

2.00 Opening of the meeting

F. Ricci (Pisa)
Commutative Fourier analysis on nilpotent Lie groups

3.00 E.B. Davies (King's College London)
Spectral properties of matrices associated with some directed graphs

4.00 Tea

4.45 L. Vega (Bilbao)
Convexity and uniqueness for some evolution equations

Dinner

These lectures are all aimed at a general mathematical audience. All interested, whether LMS members or not, are most welcome to attend this event. Supervisors are asked to encourage their students to attend.

There will be a dinner in the evening on the University campus. Please email Neal Bez (n.bez@bham.ac.uk) if you wish to attend the dinner.

The meeting will be followed by a more specialised workshop entitled *Harmonic Analysis and Partial Differential Equations* from 10 to 12 June. This will be an open meeting and there is no registration fee (although guests are asked to register their intention to attend using the online registration system on the website http://maths.bham.ac.uk/lmsmeeting). Postgraduate students are particularly encouraged to attend.

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 should be made to Neal Bez.

For further details visit the website http://maths.bham.ac.uk/lmsmeeting.

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MATHEMATICS POLICY ROUND-UP

In mid-March, Sir Peter Williams published his interim report on his review of mathematics at primary school level. He noted that primary school teachers are required only to have a grade 'C' in GCSE mathematics and is concerned that, with no requirement for continuing professional development, their mathematics teaching could suffer. He gave a boost to the proposals for two GSCEs in mathematics by calling for all future primary school teachers to have at least a grade 'C' in both. He said there is a pressing need for more specialist mathematics teachers in primary schools, calling for one in each school within five years. He added that social attitudes to the subject must change, with even young children affected by negativity. He added, "The United Kingdom remains one of the few advanced nations where it is socially acceptable to profess an inability to cope with mathematics. That is hardly conducive to a home environment in which mathematics is seen by children as an essential and rewarding part of their everyday lives."

Professor Marcus du Sautoy gave a talk to the Mathematics Promotion Network in March. About 20 people attended the presentation *Mathematics for the Masses*, in which he shared his experiences of working with the media. He passed on many useful tips for those interested in getting articles with mathematical content published in the UK media as well as explaining what had made him realise the importance of getting the spotlight on mathematics. Professor du Sautoy holds a Senior Media Fellowship from the EPSRC, which has enabled him to spend time communicating mathematics whilst carrying on with his research at the University of Oxford.

The Mathematics Promotion Unit handled publicity in the UK for the announcement of this year's Abel prize. Working with the Norwegian Academy of Science and Letters, the MPU was able to publicise the news of the winners Professors John Thompson and Jacques Tits to the UK press and secure coverage on the *Guardian* and *Nature* websites.

Jill Merrett, a final year Mathematics and Physics undergraduate at the University of Manchester, worked in the MPU over her Easter vacation. Jill helped to collate and analyse the responses so far to the annual *Health of Departments of Mathematical Sciences* survey, run by the MPU in conjunction with the Heads of Departments of Mathematical Sciences and the Council for the Mathematical Sciences.

The Economist published an article on 19 March on the general state of mathematics internationally. It explains that the distinction between pure and applied mathematics is shrinking as applications for the purest research are increasingly found and that having plenty of mathematically qualified workers is now key to a country's economic success – something that America and the UK now worry about. It also mentions the changes in the publishing of mathematics papers, in particular the creation of the new *Journal of Topology* by the London Mathematical Society.

The Council for the Mathematical Sciences was pleased to see that its submission to a House of Commons consultation *Withdrawal of funding for equivalent or lower level qualifications* (ELQs) had had impact. The report, by the House of Commons Innovation, Universities, Science and Skills Committee, concerns Government plans to focus its spending on first-time students and to withdraw funding from those embarking on second (or more) degrees. The Select Committee concluded the plans were "insufficiently justified" adding that nearly all submissions it had received were "hostile". The CMS argued that the plans would discourage people retraining as teachers in shortage subjects such as mathematics.

Caroline Davis
Mathematics Policy and Promotion Officer

LMS HARDY LECTURER 2008

The 2008 LMS Hardy Lecturer is Professor Shmuel Weinberger (University of Chicago and Hebrew University). During his visit to the UK he will give talks at Edinburgh, Liverpool and Durham followed by the Hardy Lecture at the Society meeting in London on Friday 4 July. Professor Weinberger will give the following lectures.

Playing the Novikov game
Edinburgh: 23 June at 4.30 pm. Venue: Lecture Theatre A, James Clerk Maxwell Building
Organiser Tom Lenagan (T.Lenagan@ed.ac.uk)

The Novikov conjecture is a statement restricting the tangent bundles of homotopy equivalent manifolds. Over the past thirty years, a number of variants and analogues have been suggested, and many special cases have been proved. Last year, Jonathan Rosenberg suggested an algebraic geometric version, but it turns out to be true unconditionally. This talk will explain how to 'play the Novikov game' and when the conjecture one thus obtains should be conjectural, and when it should be (conjecturally!) a theorem. (Joint work with J. Block.)

Applications of quantitative topology
Liverpool: 25 June at 2.00 pm. Venue: Mathematical Sciences Building
Organiser Peter Giblin (pjgiblin@liverpool.ac.uk)

Topology is ordinarily conceived of as a qualitative part of mathematics. In this talk, I will try to show how some problems ranging from the topology of singular spaces to differential geometry and algebraic *K*-theory to the analysis of large data sets can be approached using quantitative variants of the ideas of ordinary topology.

The Liverpool meeting is in collaboration with Manchester (Nige.Ray@manchester.ac.uk).

Topological methods for the analysis of large data sets
Durham: 30 June at 5.00 pm. Venue: CG93 (the Scarborough Lecture Theatre)
Organiser Michael Farber (Michael.Farber@durham.ac.uk)

During the past several years a number of researchers have been using basic topological ideas to try to detect non-linear structure in large data sets, as a supplement to the more traditional statistical tools that are usually employed. I will try to explain an example due to G. Carlsson *et al.* regarding spaces of visual images, and then discuss some stochastic-geometrical-topological problems related to this. (Based on joint work with P. Niyogi and S. Smale, and with Y. Baryshnikov.)

Complexity, entropy, and variational problems
London: 4 July at 5.00 pm. Venue: University College London.
Organiser: Susan Oakes (susan.oakes@lms.ac.uk)

This talk will explain an approach based on mathematical logic to certain variational problems. The theme is that algorithmic complexity begets geometric complexity, which, in turn, causes the existence of many critical points for functionals. Examples will be drawn from theory of periodic geodesics, embedded hypersurfaces in Euclidean space, and the existence of extremal metrics on smooth manifolds. (Joint work with A. Nabutovsky.)

Professor Béla Bollobás (Cambridge), the 2007 LMS Whitehead Prize Winner, is the second speaker at the London meeting. There will also be a programme of events that day especially for graduate students.

Further information can be obtained from the local organisers. For general enquiries contact Stephen Huggett, LMS Programme Secretary.

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ABEL PRIZE

The most important international prize for mathematics has this year been awarded jointly to two outstanding mathematicians – even though one of them was originally unable to find a publisher for his groundbreaking work.

Professor John Griggs Thompson, of Cambridge and Florida universities, and Professor Jacques Tits, of the Collège de France, have been awarded the 2008 Abel Prize by the Norwegian Academy of Science and Letters "for their profound achievements in algebra and in particular for shaping modern group theory".

Together, the work of Thompson and Tits forms a sort of 'periodic table' of groups known as the Atlas, which enables mathematicians to understand the building blocks of symmetry and break them down into the mathematical equivalent of atoms.

Professor Marcus du Sautoy, a Group Theorist at the University of Oxford who has written popular books on this area of mathematics, presented the prizes on behalf of the Norwegian Academy. He said, "This award is a celebration of the many people who have contributed to the project. Thompson and Tits are key figures in a very creative period in mathematics and without their contributions, this work would neither have begun nor been finished."

In 1963, Thompson and colleague Walter Feit proved that all nonabelian finite simple groups were of even order – in other words, that all objects with an odd number of symmetries can be broken down into objects with a prime number of symmetries.

They wrote a seminal paper called *Solvability of Groups of Odd Order*, which at 250 pages was possibly the longest mathematics paper in history. Consequently, it was rejected by many prestigious journals. Fortunately for modern mathematics, the *Pacific Journal of Mathematics* published it later that year, recognising its importance by dedicating a whole issue to it. Their results stunned the world of mathematics. This was a problem that no-one had even attempted to tackle. It then led mathematicians to believe that a classification of finite simple groups might prove possible. There ensued a frenzied period of activity to classify all groups, with its almost incredible conclusion that all finite simple groups belong to certain standard families, except for 26 'sporadic' groups. Thompson also played a key role in finding these sporadic groups and proving that there are no more.

Tits' work is complementary to that of Thompson, creating a new and highly influential vision of groups as geometric objects. This geometric approach was essential in the study and realisation of the sporadic groups.

Professor Brian Davies, President of the London Mathematical Society, said "On behalf of the LMS, we would like to congratulate the winners. Their work has been enormously important to the world of mathematics, in particular, helping the UK to establish itself as an important centre for Group Theory."

This area of Group Theory finds applications in coding, where data which have been encoded digitally can be scanned and checked for errors by analysing aspects of their symmetry. In particular, it has been used in checking the integrity of data beamed down from outer space.

The Abel Prize is worth about €750,000 (or £580,000) to the winners. It was established in 2002 by the Norwegian Academy of Science and Letters for outstanding scientific work in the field of mathematics, giving mathematics for the first time an international prize of the same scale and importance as the Nobel Prize. The award is named after Norwegian mathematician Niels Henrik Abel, the 19th-century mathematician who in his short life of 26 years was himself a pioneer of Group Theory.

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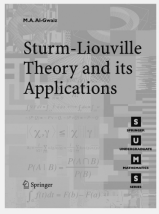

Sturm-Liouville Theory and its Applications

M. Al-Gwaiz, King Saud University, Riyadh, Saudi Arabia

Developed from a course taught to senior undergraduates, this book provides a unified introduction to Fourier analysis and special functions based on the Sturm-Liouville theory in L^2. The text's presentation follows a clear, rigorous mathematical style that is highly readable.

2008. X, 266 p. 25 illus. (Springer Undergraduate Mathematics Series) Softcover
ISBN 978-1-84628-971-2 ► **€ 32,95 | £19.95**

Linear Functional Analysis

B. P. Rynne, **M. A. Youngson**, Heriot-Watt University, Edinburgh, UK

From the reviews ► *The authors write with a strong narrative thrust and a sensitive appreciation of the needs of the average student so that, by the final chapter, there is a real feeling of having gotten somewhere worth getting by a sensibly paced, clearly signposted route.*
► Mathematical Gazette, 2000

2nd ed. 2008. X, 324 p. 6 illus. (Springer Undergraduate Mathematics Series) Softcover
ISBN 978-1-84800-004-9 ► **€ 32,95 | £19.95**

Worlds Out of Nothing

A Course in the History of Geometry in the 19th Century

J. Gray, The Open University, Buckinghamshire, UK

From the reviews ► *Gray's new book will become both a classic reference and a model on how to write a useful course text. With original source material woven in with historical context, this book is a fun read as it examines geometry historically as a connected sequence of diverse ideas … If you enjoy mathematics, buy this and read it! Summing Up: Highly recommended...*
► **J. Johnson**, CHOICE, Vol. 44 (11), July, 2007

2007. XXIV, 376 p. 68 illus. (Springer Undergraduate Mathematics Series) Softcover
ISBN 978-1-84628-632-2 ► **€ 32,95 | £19.95**

Game Theory

Decisions, Interaction and Evolution

J. N. Webb, Nottingham, UK

This book offers an informal introduction to game theory intended as a first course for undergraduate students of mathematics. Uniquely, it covers optimal decisions, classical games and evolutionary game theory in one volume.

2007. X, 242 p. (Springer Undergraduate Mathematics Series) Softcover
ISBN 978-1-84628-423-6 ► **€ 32,95 | £19.95**

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ADAMS PRIZE

The University of Cambridge has announced the winner of one of its oldest and most prestigious prizes. The Adams Prize is awarded jointly each year by the Faculty of Mathematics and St John's College to a young (normally under 40 years of age) UK-based researcher doing first class international research in the Mathematical Sciences.

This year's topic was *Quantum Fields and Strings*, and the Prize has been awarded jointly to Professor Tom Bridgeland of the Department of Pure Mathematics, University of Sheffield, and Dr David Tong of the Department of Applied Mathematics and Theoretical Physics, University of Cambridge.

Professor Timothy Pedley, Chairman of the Adams Prize Adjudicators, said: "This year's topic was purposely set at the interface between pure mathematics and theoretical physics, and it is entirely appropriate that the joint prizewinners come from the two sides of this interface. The idea of studying algebraic varieties through their categories of coherent sheaves has become ever more central in algebraic geometry, stimulated most recently by developments in string theory which have led to a new synthesis of classical and noncommutative geometry. Tom Bridgeland's contributions to this field have been highly original, deep, and wide-ranging. Motivated by work of Michael Douglas in string theory, he isolated and correctly formulated the definition of a stability condition on the category of sheaves, finding for it its natural home in the context of triangulated categories, and giving a very concrete local description of the space of stability conditions.

Dr David Tong has been awarded the prize for his strikingly original work in quantum field theory and string theory. One topic of his research has been the quantized dynamics of various supersymmetric solitons, especially vortices. Dr Tong's particular contribution has been to use the D-branes of string theory to understand these solitons. He has also used D-branes to find a novel model of cosmic inflation leading to a strong non-Gaussian signal in the microwave sky. In other work on the physics of low-dimensional field theories, he has established new results in the geometry of Calabi–Yau manifolds – curved spaces believed to describe the curled-up extra dimensions of string theory. His recent work has extended our understanding of 'Berry connections' in theories of quantum fields and their dual gravitational description.

The Adams Prize is named after the mathematician John Couch Adams and was endowed by members of St John's College. It is currently worth approximately £13,500. It commemorates Adams's discovery of the planet Neptune, through calculation of the discrepancies in the orbit of Uranus.

ICMI 2007 AWARDS

The International Commission on Mathematical Instruction (ICMI) of the International Mathematical Union has announced recipients of its 2007 awards. The official presentation of the 2007 medals will be made during the opening ceremony at ICME-11 in Monterey, Mexico, on Monday 7 July 2008.

The Felix Klein Medal for 2007 has been awarded to Professor Jeremy Kilpatrick (University of Georgia, Athens, GA, USA) in recognition of his more than forty years of sustained and distinguished lifetime achievement in mathematics education research and development. Jeremy Kilpatrick's numerous contributions and services to mathematics education as a field of theory and practice, as he prefers to call it, are centred around his extraordinary ability to reflect on, critically analyse, and unify essential aspects of our field as it has developed since the early 20th century, while always insisting on the need for reconciliation and balance among the points of view taken, the approaches undertaken, and the methodologies adopted for research. It is

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a characteristic feature of Jeremy Kilpatrick that he has always embraced a very cosmopolitan perspective on mathematics education. Thus he has worked in Brazil, Colombia, El Salvador, Italy, New Zealand, Singapore, South Africa, Spain, Sweden, and Thailand, in addition to being, of course, extraordinarily knowledgeable about the international literature. Throughout his academic career, Jeremy Kilpatrick has published groundbreaking papers, book chapters and books – many of which are now standard references in the literature – on problem solving, on the history of research in mathematics education, on teachers' proficiency, on curriculum change and its history, and on assessment.

Recipients of previous Felix Klein Medals: 2003 Guy Brouseau, 2005 Ubiratan D'Ambrosio.

The Hans Freudenthal Medal for 2007 has been awarded to Anna Sfard (University of Haifa, Israel, and the Institute of Education, University of London, UK) in recognition of her highly significant and scientifically deep accomplishments within a consistent, long-term research programme focused on objectification and discourse in mathematics education, which has had a major impact on many strands of research in mathematics education and on numerous young researchers. In addition to publications related to the above-mentioned research programme, Anna Sfard has published numerous other papers and book chapters within a broad range of topics. It is a characteristic feature of Anna Sfard's scientific achievements that they are always very thorough, original and intellectually sharp. She often uncovers the tacit if not hidden assumptions behind notions, approaches, and conventional wisdom, and by turning things upside down she usually succeeds in generating new fundamental and striking insights into complex issues and problématiques.

Recipients of previous Hans Freudenthal Medals: 2003 Celia Hoyles, 2005 Paul Cobb.

LMS–EPSRC SHORT INSTRUCTIONAL COURSES FOR POSTGRADUATES

This is a short note to encourage academics to submit proposals to run courses in 2009 and beyond. If you ever thought that there is a course you would like your graduate students to attend and you would be happy to organise one, this is the opportunity.

The LMS and EPSRC jointly fund the short courses for research students and any research student attending a British HEI need only pay the £100 registration fee in order to attend. The short courses usually last five days and should attract somewhere between 25 and 45 students. One of the major functions of the courses is to enable students to meet others from around Britain, as well as to meet leading experts in their field. The funding enables lecturers from around the world to speak. Both the organiser(s) and speakers receive an honorarium.

The scheme has been running since 1999 and so far 38 courses have been run, with five more planned for this year:

- *Nonlinear parabolic equations and applications*
- *Stochastic partial differential equations*
- *Advanced methods in linear and nonlinear elasticity*
- *Topics in geometric group theory*
- *Algebraic groups, finite groups of Lie type and Hecke algebras*

If you are interested in submitting a proposal, there are further details about what is required on the LMS website: www.lms.ac.uk/activities/rmc.

Proposals and queries should be directed to the Short Course Facilitator Alan Camina (a.camina@uea.ac.uk). Proposals are considered by the Society's Research Meetings Committee.

Alan Camina
Short Course Facilitator

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GENERAL MEETING

There will be a General Meeting of the Society at 3.30 pm on Friday 4 July, to be held at University College, London. The business shall be:

(i) the appointment of Scrutineers;

(ii) announcement of Council's recommendation for Honorary Membership;

(iii) announcement of Prize winners for 2008.

I hope that as many members as possible will be able to attend.

Peter Cooper
Executive Secretary

CAYLEY'S DOCUMENTS

The Lehigh University library has a collection of documents by Arthur Cayley. These are of two sorts: a collection of letters and an unfinished manuscript. Professor Steven H. Weintraub of the Lehigh University Mathematics Department researched the mathematical, historical, and biographical significance of the materials from Arthur Cayley in this collection. The library has posted this material, with commentary by Steven, on its website: http://digital.lib.lehigh.edu/remain/con/cayley.html. This material is expected to become a part of the library's *History of Mathematics and Astronomy* at the Lehigh website.

SYMMETRY AND THE MONSTER

On 28, 29, 30 April and 1 May, Mark Ronan will broadcast four 15-minute programmes as *The Essay* on Radio 3 at 23:00. The programmes will start with the life and work of Galois, who died in a duel in 1832, and go on to describe subsequent developments in group theory, leading to the Monster in the late 20th century. The focus will be on some of the mathematicians who engaged in the quest to find all the finite simple groups. Use the 'Listen Again' facility if you miss some of the programmes.

BMC ONLINE ARCHIVE

The British Mathematical Colloquium (BMC) now has a new version of its online archive available at www-history.mcs.st-and.ac.uk/Societies/BMC.html.

ISAAC NEWTON INSTITUTE

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

At any time there are two visitor programmes in progress, each with about twenty scientists in residence. Included within these programmes are periods of particularly intense activity including instructional courses and workshops. Seventy-four programmes have now been completed, the most recent being *Strong Fields, Integrability and Strings* and *Phylogenetics*. The programmes currently taking place are *Statistical Theory and Methods for Complex, High-Dimensional Data* and *Combinatorics and Statistical Mechanics*.

Call for Proposals

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

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ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

ANDERSON LOCALIZATION AND RELATED PHENOMENA

18–22 August 2008

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

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

This is a one-week workshop bringing together mathematicians and theoretical physicists who are leaders in the study of various mathematical and physical aspects of the theory of random Schrödinger operators, Anderson localization phenomena, and related topics. Presentations are selected with the intent to review the current state of the art of the field in theoretical and mathematical physics.

Among the topics that will be addressed during the workshop are:

- The nature of critical phenomena associated with localization-delocalization transitions;
- The existence and statistical properties of extended states for $D>2$ and the behaviour in the critical dimension $D=2$;
- Supersymmetric methods and nonlinear σ-model techniques;
- The localization-delocalization phenomena associated with the Integer Quantum Hall effect and localization in the presence of a random magnetic field;
- Asymptotic behaviour of products of random matrices and associated Lyapunov exponents;
- Spectra, localization and delocalization in disordered systems described by non-selfadjoint operators;
- Localization in systems with nonlinearities, and localization-delocalization phenomena in disordered systems of interacting quantum particles.

Invited speakers include: M. Aizenman, A. Altland, B. Altshuler, P. Brouwer*, J. Bourgain, J. Chalker, M. Disertori, K. Efetov, J. Fröhlich, H. Furstenberg, M. Gershenson, I. Goldsheid, G.M. Graf, D. Khmelnitsky, A. Klein, S. Kotani, H. Leschke, A. Ludwig*, A. Mirlin, V. Oganesyan, L. Pastur, J. Schenker, H. Schulz-Baldes, D. Thouless, S. Warzel, F. Wegner, H.T. Yau, M.R. Zirnbauer.

* to be confirmed

Further information and application forms are available from the web at: www.newton.cam.ac.uk/programmes/MPA/mpaw02.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 **16 May 2008.**

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New opportunities for research at ICMS

New Programme – Research-in-Groups (RiGs)

- 2 to 3 researchers collaborate at ICMS
- connections with workshops optional
- promotes international collaboration
- flexible periods of residence

Mathematical Workshops

- organised by ICMS in Edinburgh
- normally five days' duration
- attended by leading academics from around the world
- encourage participation of young researchers
- interdisciplinary – covering all areas of sciences with significant mathematical content
- keen to promote adventurous research
- can offer knowledge transfer advice
- closing dates for proposals at the **end of March, August** and **December**

Successful applicants will be offered a funding package to contribute to travel and subsistence of participants in workshops and RiGs. ICMS staff will undertake all non-scientific administration. ICMS will organise living accommodation and office space for RiGs participants.

The ICMS Knowledge Transfer Officer (KTO) will be responsible for building links between the scientific programme and the industrial/commercial sector. The KTO will be available to advise workshop organisers and Researchers in Groups.

For further details about RiGs and workshop proposals please visit www.icms.org.uk/proposals.php or contact Irene Moore,
telephone: 0131 220 1777
email: irene.moore@icms.org.uk
address: ICMS, 14 India Street, Edinburgh EH3 6EZ

Funded by EPSRC, SFC, LMS and EMS.

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LMS MEETING AND RECEPTION AT 5ECM

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

Members who wish to attend the meeting and reception should apply for their free ticket to Susan Oakes, the Administrator of the Society (susan.oakes@lms.ac.uk) no later than **Monday 7 July**. The Society hopes to entertain as many as possible of its members, but numbers are limited by the capacity of the room.

5TH EUROPEAN CONGRESS OF MATHEMATICS

The 5th European Congress of Mathematics will be held this summer in Amsterdam from 14 to 18 July, under the auspices of the European Mathematical Society. Incorporated in this Congress is the yearly Dutch Mathematical Congress of the Royal Dutch Mathematical Society (KWG). The Scientific Committee has put together a wonderful programme of plenary lectures, invited lectures, science lectures, minisymposia and other activities. The preliminary programme with time schedule, and many titles and abstracts are available already on the congress website at www.5ecm.nl, which is updated almost daily.

The Prize Committee has selected 10 young rising stars from all over the field of mathematics. They all have agreed to come. So join us, meet your colleagues and learn about the latest developments and the hot new issues in mathematics.

The registration and hotel booking procedure can be found on the congress website. This is your meeting, so your attendance is the basis for the success of the congress. From our side, we will do our utmost to be a good host. Together we will make this a splendid congress. So, prepare for Amsterdam this summer: the city awaits you!

On behalf of the 5ECM Organizing Committee

Andre C.M. Ran
Herman J.J. te Riele
Jan J.O.O. Wiegerinck

LTCC INTENSIVE COURSES

Five intensive courses are to be run by the London Taught Course Centre in Spring/Summer 2008. These 'one-day' courses start at 1 pm on the first day, finish at 1 pm the next day and are open to PhD students throughout the UK and outside. The venue is De Morgan House, Russell Square, London. The courses are as follows:

- *Set theory* (led by M. Dzamonja, B. Velickovic) 15–16 May
- *Mathematics of insurance and finance* (led by R. Norberg) 22–23 May
- *The Riemann–Hilbert method and the Painlevé equations* (led by A. Its) 29–30 May
- *Statistical mechanics for mathematicians* (led by A. Sokal) 3–4 June
- *High-dimensional Bayesian inference* (led by P. Brown, S. Walker) 17–18 June

Supported by EPSRC, the LTCC's aim here is that as many PhD students as possible attend. Further details are available at www.ltcc.ac.uk/courses/list.php.

Also, in anticipation of next year's session and subsequent ones, the LTCC would be particularly interested in receiving your suggestions for suitable topics ('hot topics') and lecturers for future intensive courses. Suggestions for next year's session in particular would be best sent to Kajsa Magnusson (k.magnusson@ucl.ac.uk) or Frank Smith (frank@math.ucl.ac.uk) within the next three months, please. Funding, available both for organisers and for student participants, can be discussed via the email addresses above.

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VISIT OF PROFESSOR L. RONDONI

Professor Lamberto Rondoni (Polytechnic University of Turin) will be visiting King's College London from Monday 7 to Friday 18 July 2008. He will give four lectures entitled *Boltzmann methods in the dynamics of biological systems*. For further information contact Professor Ray Streater (email: raymond.streater@kcl.ac.uk, tel: 020 7848 2220).

VISIT OF PROFESSOR J. BONA

Professor Jerry Bona (University of Illinois at Chicago, USA) is visiting the UK from 3 to 14 May 2008. His research interests include fluid mechanics, partial differential equations and numerical analysis. Lectures will take place on:

- *Solitons and other nonlinear wave phenomena* University of Bath, 7 May
- *Model equations for internal waves* University of Reading, 9 May
- *Initial-boundary-value problems for nonlinear wave equations* University of Cambridge, 13 May

For further information contact Thanasis Fokas (tf227@cam.ac.uk). The visit is supported by an LMS Scheme 2 grant.

INTERNATIONAL CONGRESS OF MATHEMATICIANS 2010

Nomination of invited plenary and sectional speakers

The Programme Committee for the International Congress of Mathematicians (ICM) 2010, to be held in Hyderabad, India, from 19 to 27 August, has been set up. At this moment in time the Adhering Organizations of IMU and the mathematical societies the world over are invited to nominate invited plenary and sectional speakers.

When you make nominations for speakers please specify whether you suggest them as plenary speakers or section speakers. In the case of proposals of section speakers indicate to which sections you would like the persons to be invited. All communication concerning the scientific programme of ICM 2010 is handled by the Chair of the Programme Committee. Direct all your mail with proposals for invited plenary and sectional speakers to Professor Hendrik W. Lenstra, using the special email address for this purpose (hwlicm@math.leidenuniv.nl).

The list of sections was published in the December 2007 LMS *Newsletter* (No. 365).

JORDAN STRUCTURES: NONASSOCIATIVE ANALYSIS AND GEOMETRY

The fourth London/Dublin two-day meeting on Jordan structures and applications will be held from 5 to 6 September 2008 at Queen Mary, University of London. The focus of the meeting will be on the interplay between Jordan algebraic structures, analysis and differential geometry. Speakers include:

- C. Boyd (University College Dublin)
- L.J. Bunce (Reading)
- S. Dineen (University College Dublin)
- T. Honda (Hiroshima)
- R. Hugli (University College Dublin)
- M. Mathieu (Queen's University Belfast)
- R. Timoney (Trinity College Dublin)
- N.C. Wong (NSYSU, Taiwan)
- J.D.M. Wright (Aberdeen)

Intended participants, especially research students, are invited to contact the organisers Cho-Ho Chu (c.chu@qmul.ac.uk) or Michael Mackey (michael.mackey@ucd.ie). Further information can be found at http://banach.ucd.ie/www.maths.qmul.ac.uk/MRC. This conference is supported by an LMS conference grant.

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GEOMETRIC AND ANALYTIC METHODS IN GROUP THEORY

A meeting on *Geometric and Analytic Methods in Group Theory* will be held at the University of Bristol on 12 May 2008. The main speakers will be:

- Frédéric Haglund (Paris-Sud) *Groups acting on* CAT(0) *cube complexes*
- Anne Thomas (Cornell) *Lattices acting on Platonic polygonal complexes and Fuchsian buildings*
- Richard Weidmann (Heriot–Watt) *Maps onto hyperbolic groups*

There will also be two introductory talks. Applications for financial support for attendance by PhD students are warmly welcomed. Contact Graham Niblo (G.A.Niblo@soton.ac.uk) or Tim Riley (tim.riley@bris.ac.uk) for details. Further information can be found at www.maths.bris.ac.uk/~matrr/BOS/May_2008_Bristol. The meeting is funded by an LMS Scheme 3 grant.

WALES MATHEMATICS COLLOQUIUM

The Wales Mathematics Colloquium is a forum for the promotion and discussion of current research in Mathematics in Wales. The meeting will be held at Gregynog Hall, Tregynon, near Newtown, Powys, beginning with tea at 4 pm on 19 May finishing after lunch on the 21 May 2008.

Invited speakers are:

- R. Penrose (Oxford) *Conformal space-time geometry: a new cosmological proposal* and *Some recent developments in twistor theory*
- A. Movchan (Liverpool) *Modelling of waves in structured media and localized defect modes*.

Mini-courses for postgraduates, given by recent appointments to the Wales Institute of Mathematical and Computational Sciences, include:

- G. Mishuris (Aberystwyth) *The Wiener–Hopf method*
- E. Crooks (Swansea) *Maximum principles for elliptic and parabolic PDEs*

The meeting is organised by mathematics departments of universities in Wales, and most of the participants will be from those departments. Any others who would like to attend will be very welcome. The registration fee is £207, to include all meals and accommodation. Please note that the organisers are unable to give financial support to outside participants. Owing to limited accommodation, places will be allocated on a first come, first served basis. If you are interested contact S.J. Cox (tel: 01970 622764, email: sxc@aber.ac.uk) or visit the website at http://users.aber.ac.uk/sxc/gregynog08.html. The organisers would like to thank the LMS and the Gregynog Fund for financial support.

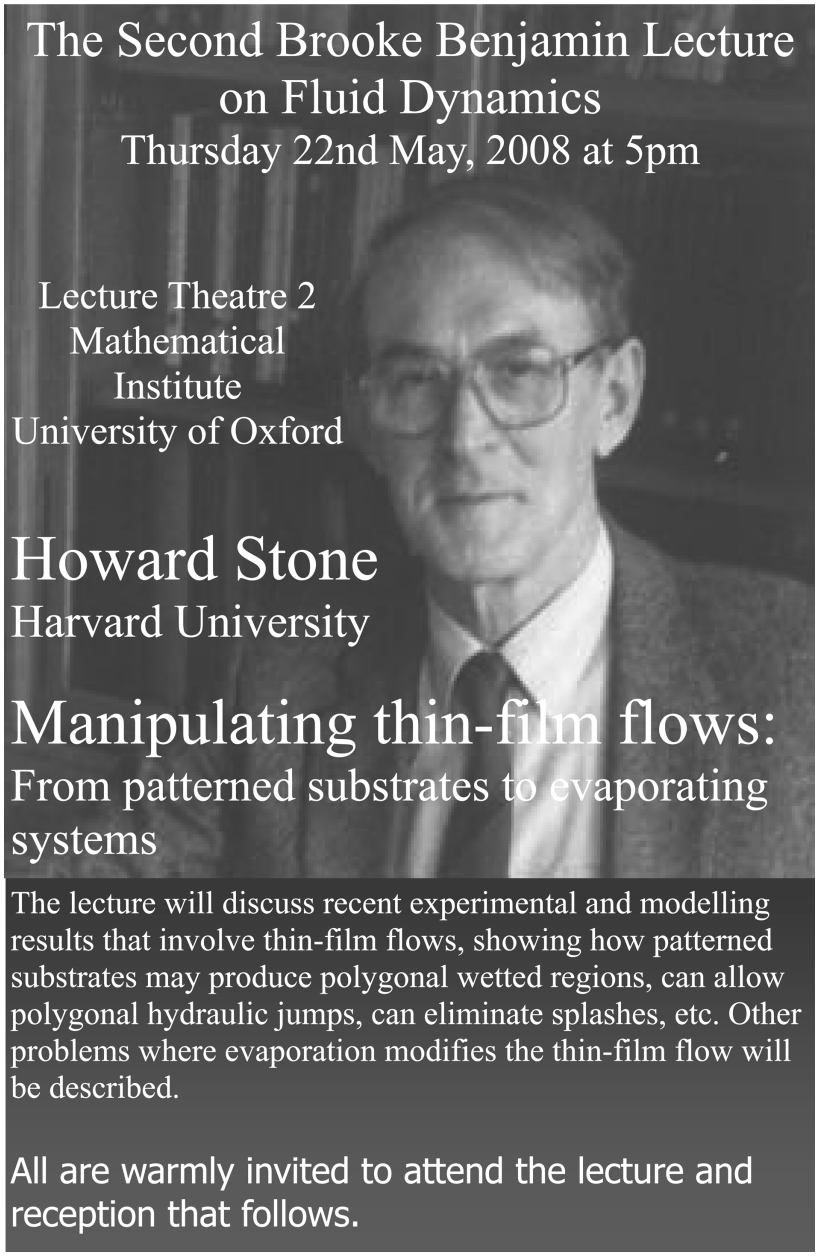
IPMC 2008

The 9th International Pure Mathematical Conference 2008 (9th IPMC 2008) will take place from 24 to 26 August 2008 in Islamabad. It is a thematic conference on Algebra, Geometry and Analysis held under the auspices of the Pakistan Mathematical Society (www.pakms.org.pk). There will be free housing for foreign participants. Some travel grants are available for foreign speakers.

The conference is convened by Professor Dr Qaiser Mushtaq (Department of Mathematics, Quaid-i-Azam University, Islamabad, Pakistan) in collaboration with Mathematics Division, Institute of Basic Research (Florida, USA), Higher Education Commission, Pakistan Science Foundation, Preston University and Quaid-i-Azam University, Islamabad. For further information, complete the on-line registration form at www.pmc.org.pk.

BAMC 2009

The 2009 British Applied Mathematics Colloquium (BAMC) will be held at the University of Nottingham from 7 to 9 April 2009. For further information visit the website at www.bamc2009.org.uk.

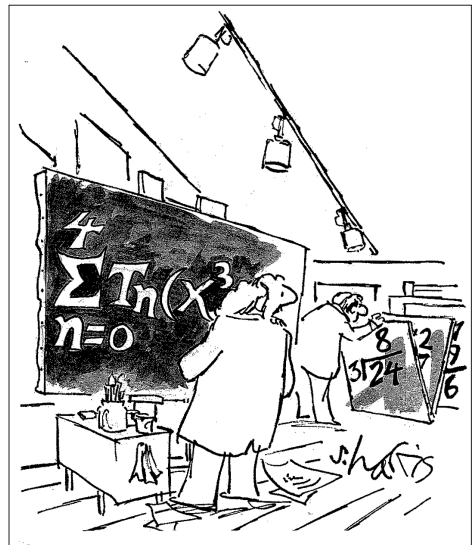

The Second Brooke Benjamin Lecture
on Fluid Dynamics
Thursday 22nd May, 2008 at 5pm
Lecture Theatre 2
Mathematical
Institute
University of Oxford
Howard Stone
Harvard University
Manipulating thin-film flows:
From patterned substrates to evaporating systems
The lecture will discuss recent experimental and modelling results that involve thin-film flows, showing how patterned substrates may produce polygonal wetted regions, can allow polygonal hydraulic jumps, can eliminate splashes, etc. Other problems where evaporation modifies the thin-film flow will be described.
All are warmly invited to attend the lecture and reception that follows.

PDE DAY

The Department of Mathematics at the University of Sussex will be hosting a PDE day on 28 May 2008. The meeting will consist of number of talks by some of the leading researchers in the field based in the UK and the focus will be on recent developments in the theory of Linear as well as Nonlinear Partial Differential Equations with applications to Mathematical Physics, Geometry and Elasticity. The speakers are:

- Alex Sobolev (UCL)
- Geoffrey Burton (Bath)
- Kewei Zhang (Swansea)
- Michel van den Berg (Bristol)
- Jan Kristensen (Oxford)
- Eugene Shargorodsky (KCL)
- Jey Sivaloganathan (Bath)
- Roger Moser (Bath)
- Yuri Safarov (KCL)
- Gregory Seregin (Oxford)

For more details and information contact the organiser Dr Ali Taheri (a.taheri@sussex.ac.uk) or the website: www.sussex.ac.uk/maths/1-1.php.



"That's some of my earlier work."

© Sidney Harris

EUROPEAN POSTGRADUATE FLUID DYNAMICS CONFERENCE

The European Postgraduate Fluid Dynamics Conference (EPFDC) will be held at the University of Keele from 21 to 23 July 2007. The conference is organised by, and aimed specifically at, postgraduate researchers in the field of fluid dynamics. The meeting provides a forum in which postgraduate students researching in the broad area of fluid dynamics are able to present and discuss their research within a group of their peers. The conference includes three plenary lectures by eminent researchers, which are designed to stimulate, inspire and provide some insight into the fascinating and varied subject of fluid dynamics.

- P. Huerre (École Polytechnique, France)
- H. Huppert (Cambridge, UK)
- O. Jensen (Nottingham, UK)

The conference also provides an amicable environment in which those new to speaking at conferences may present their work; all participants are encouraged to give a short oral presentation and/or present a poster. The event is open to all PhD and Masters students. The £80 registration fee includes the cost of all meals, and accommodation on Monday 21 and Tuesday 22 July. Further information can be found at www.epfdc.org.uk. The conference is funded by an LMS conference grant and Keele University through the Research Institute for the Environment, Physical Sciences and Applied Mathematics (EPSAM).

QUADRATIC FORMS, ALGEBRAIC GROUPS, ALGEBRAIC COBORDISM

A conference on *Quadratic Forms, Algebraic Groups, Algebraic Cobordism and Related Topics* will be held at the School of Mathematical Sciences, University of Nottingham, from 26 to 30 August 2008. The themes of the conference will centre on some of the most recent advances in the algebraic theory of quadratic forms, algebraic groups, algebraic cobordism and related topics such as, for example, algebraic *K*-theory, Galois cohomology, and algebras with involution. The scientific programme will consist of about 20 invited talks on topics of strong current interest, plus a number of shorter talks in which also early career researchers will be given an opportunity to present their contributions to the topics covered by this conference. The following have provisionally accepted to give an invited talk:

- Ricardo Baeza (Talca, Chile)
- Paul Balmer (Los Angeles, USA)
- Eva Bayer-Fluckiger (Lausanne, Switzerland)
- Karim Becher (Konstanz, Germany)
- Baptiste Calmès (Cambridge, USA)
- Vladimir Chernousov (Edmonton, Canada)
- Skip Garibaldi (Atlanta, USA)
- Stefan Gille (Munich, Germany)
- John Greenlees (Sheffield, UK)
- Nikita Karpenko (Paris, France)
- Max Knus (Zürich, Switzerland)
- Marc Levine (Boston, USA)
- Alexander Merkurjev (Los Angeles, USA)
- Fabien Morel (Munich, Germany)
- Ivan Panin (St Petersburg, Russia and Bielefeld, Germany)
- Raman Parimala (Atlanta, USA)
- Victor Snaith (Sheffield, UK)
- Jean-Pierre Tignol (Louvain-la-neuve, Belgium)
- Burt Totaro (Cambridge, UK)
- Kirill Zainoulline (Munich, Germany)

For further information on this conference, please go to the conference webpage www.maths.nottingham.ac.uk/personal/pmzdwh/Workshop2008/qfnott08.html or contact one of the local organizers: Detlev Hoffmann (Detlev.Hoffmann@nottingham.ac.uk), Susanne Pumplün (Susanne.Pumpluen@nottingham.ac.uk) or Alexander Vishik (Alexander.Vishik@nottingham.ac.uk).

This workshop is funded in part by an LMS conference grant and there are limited funds available to support the participation of residents of countries of the former Soviet Union or of Scheme 5 countries and of UK-based research students.

FIRST DE BRÚN WORKSHOP ON COMPUTATIONAL ALGEBRA

The de Brún Centre at the National University of Ireland, Galway, will run a series of workshops on computational algebra over the next few years. The first of these will be held in Galway from 21 July to 1 August 2008. The first workshop, at which we expect to have approximately 40 participants, will consist of four morning lecture courses by

- Gerhard Hiss (Aachen)
- John McKay (Concordia)
- Mike Stillman (Cornell)
- Bernd Sturmfels (Berkeley)

and a full programme of afternoon lectures on recent research in computational algebra. The organizers encourage workshop participants to submit abstracts for contributed talks. The workshop is supported by Science Foundation Ireland and there is some funding available to assist graduate students, postdocs (and possibly others).

For registration details see http://hamilton.nuigalway.ie/DeBrunCentre/ or contact the organizers by email: Graham Ellis (graham.ellis@nuigalway.ie) and Goetz Pfeiffer (goetz.pfeiffer@nuigalway.ie).

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ONE-DAY COLLOQUIA IN COMBINATORICS

Two linked one-day colloquia in combinatorics will be taking place in London. The first day will be held at Queen Mary, University of London, on Wednesday 21 May and the second will take place at the London School of Economics and Political Science on Thursday 22 May. The talks at Queen Mary will include several on Latin squares in honour of Donald Keedwell's 80th birthday. It is hoped that the talks will be of wide interest to all those working in combinatorics or related fields. The schedule is as follows:

Queen Mary, University of London (21 May)

- Anthony Hilton (QMUL) *Partial Latin squares, partial gerechte designs, list colouring and Hall's condition*
- Emil Vaughan (QMUL) *Completing partial gerechte designs*
- Peter Borg (Malta) *Extremal t-intersecting sub-families of hereditary families*
- Roland Häggkvist (Umeå) TBA
- Imre Leader (Cambridge) *Pursuit and evasion*
- Donald Keedwell (Surrey) *Something new* (*all Buchsteiner quasigroups are loops*) *and something old* (*a still-unsolved problem of integer sequences*)

London School of Economics (22 May)

- John Talbot (UCL) *Turán problems in the hypercube*
- David Wagner (Waterloo) *A combinatorial proof of an identity for spanning trees*
- Oliver Riordan (Oxford) TBA
- Reinhard Diestel (Hamburg) $\pi_1(|G|)$, *earrings, and limits of free groups*
- Petra Berenbrink (Simon Fraser) *Convergence issues of congestion games*
- Deryk Osthus (Birmingham) *Cycles in directed graphs*

Anyone interested is welcome to attend. Some funds are available to contribute to the expense of research students who wish to attend the meetings. Further details can be obtained from the web page www.cdam.lse.ac.uk/colloquia-in-combinatorics.html or from Graham Brightwell (g.r.brightwell@lse.ac.uk) and Robert Johnson (r.johnson@qmul.ac.uk). Support for this event by the London Mathematical Society and the British Combinatorial Committee is gratefully acknowledged by the organisers.

INTEGRAL METHODS IN SCIENCE AND ENGINEERING

A meeting on *Integral Methods in Science and Engineering* will take place at the University of Cantabria, Santander, Spain, from 7 to 10 July 2008. Participation is open to all scientists and engineers whose work makes use of analytic and numerical methods, integral equations, ordinary and partial differential equations, asymptotic and perturbation methods, boundary integral techniques, conservation laws, hybrid approaches, vortex methods, signal processing and image analysis. One of the aims of the meeting is to promote new research tools and procedures that help to link mathematics with applied sciences and technology. The tenth in a successful series of conferences, IMSE2008 will provide an international forum for communicating recent advances and an opportunity for direct information exchange between participants from both academia and industry. The invited speakers are:

- B. Engquist (University of Texas-Austin)
- G.A. Kriegsmann (New Jersey Institute of Technology)
- E. Sanchez-Palencia (Université Paris VI).
- E. Zuazua (Universidad Autónoma de Madrid)
- D. Cioranescu (Université Paris VI)
- R.R. Gadyl'shin (Bashkir State Pedagogical University)
- C. Lovadina (Università di Pavia)

Peer-reviewed proceedings will be published by Birkhäuser, Boston. For further information email imse08@unican.es or meperez@unican.es or visit the website www.imse08.unican.es.

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NEW DIRECTIONS IN ANALYTICAL AND NUMERICAL METHODS FOR FORWARD AND INVERSE SCATTERING

A two-day meeting on *New directions in analytical and numerical methods for forward and inverse scattering* will held from 23 to 24 June 2008 in the Alan Turing Building, the new home of the School of Mathematics in the University of Manchester. The meeting will focus on the latest developments in the following three areas of research relating to wave scattering:

- *Inverse scattering problems*
- *Numerical methods*
- *Analytical methods for multiple scattering*

One of the main aims of the conference is to encourage interaction between researchers in these fields. Participation of postgraduate students and postdoctoral researchers is particularly encouraged. Confirmed speakers include:

- Mark Ainsworth (Strathclyde, UK)
- Alex Barnett (Dartmouth, USA)
- Simon Chandler-Wilde (Reading, UK)
- Fatih Ecevit (Boğaziçi, Turkey)
- Bastien Gebauer (Mainz, Germany)
- Chris Linton (Loughborough, UK)
- Agnes Maurel (ESPCI, France)
- Peter Monk (Delaware, USA)
- Vincent Pagneux (Le Mans, France)
- Roland Potthast (Reading, UK)
- Gary Roach (Strathclyde, UK)
- Stefan Sauter (Zürich, Switzerland)
- Francesco Simonetti (Imperial, UK)
- Brian Sleeman (Leeds, UK)

For further details visit the website (www.mims.manchester.ac.uk/events/workshops/wave08) or contact one of the organizers: Timo Betcke (Timo.Betcke@manchester.ac.uk), Wagner Muniz (Wagner.Muniz@manchester.ac.uk), William Parnell (William.Parnell@manchester.ac. uk). The organisers acknowledge support for this meeting provided by the London Mathematical Society, the Manchester Institute for Mathematical Sciences and the Groupe de Recherche Ondes.

ANALYSIS AND DESIGN OF NONLINEAR CONTROL SYSTEMS

A four-day Control Event on *Analysis and design of nonlinear control systems* will take place from 13 to 16 May 2008 in London. The goal of the meeting is to clarify and highlight the role of mathematical tools such as differential geometry, dynamical systems theory, the theory of stochastic processes, non-smooth analysis etc., in the analysis and design of feedback control systems, and to present relevant control applications from different engineering areas.

13–14 May: Tutorials (EEE Department, Imperial College London)

- *Hybrid control systems* A.R. Teel (Univ. of California Santa Barbara)
- *Nonlinear output regulation* A. Isidori (University of Rome 'La Sapienza')
- *Some control theory problems in systems biology* E.D. Sontag (Rutgers University)
- *Feedback control of bipedal robot locomotion* J.W. Grizzle (University of Michigan)

15–16 May: Workshop (Royal Society, London)

Speakers: F. Allgower, K. Åström, T. Basar, R. Brockett, F. Delli Priscoli, C. De Persis, J. Grizzle, W. Kang, P. Kokotovic, A. Krener, A.B. Kurzhanski, I. Landau, W. Lin, R. Marino, S. Morse, K. Schlacher, A. Serrani, E. Sontag, H. Sussmann.

For further details and information on financial support visit the website: www.casy.deis.unibo.it/london2008 or contact M. Hammond (m.hammond@ic.ac.uk). The meeting is supported by the EPSRC and an LMS conference grant.

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EUROPEAN MATHEMATICAL SOCIETY

The European Mathematical Society (EMS) was founded in 1990. The purpose of the Society is to further the development of all aspects of mathematics in the countries of Europe. In particular, the Society aims to promote research in mathematics and its applications. It will assist and advise on problems of mathematical education. It concerns itself with the broader relation of mathematics to society. In short, it seeks to establish a sense of identity amongst European mathematicians.

The Society has 2,000 members who subscribe through national societies. A newsletter is sent out four times a year. It contains information about the Society, announcements of conferences, book reviews, and articles of general interest. Email membership@lms.ac.uk to join the EMS.

BRITISH LOGIC COLLOQUIUM

The British Logic Colloquium (BLC 2008) will be held at the University of Nottingham from 4 to 6 September 2008. The invited speakers include:

- Michael Benedikt (Oxford University)
- Ulrich Kohlenbach (Technische Universität Darmstadt)
- Dexter Kozen (Cornell University)
- Hannes Leitgeb (University of Bristol)
- Peter Milne (University of Stirling)
- Michael Moortgat (Utrecht Institute of Linguistics OTS),
- Alan Weir (University of Glasgow),
- Mikhail Zakharyaschev (Birkbeck College)

To offer a contributed talk on any aspect of logic contact Natasha Alechina (nza@cs.nott.ac.uk) by **31 July**. There is a limited number of grants available for students who wish to attend. A grant covers the conference fee and accommodation in London. Applications for grants, by **1 July**, should be accompanied by a CV, a letter of recommendation (normally from the student's supervisor) and will be allocated on the basis of proven ability in logic. For any enquiries contact the organiser Natasha Alechina (nza@cs.nott.ac.uk) or visit the website www.cs.nott.ac.uk/~nza/blc08. This colloquium is supported by an LMS conference grant and the British Logic Colloquium.

PERSPECTIVES IN ANALYSIS, GEOMETRY AND TOPOLOGY

A Marcus Wallenberg Symposium on *Perspectives in Analysis, Geometry and Topology* will be held from 19 to 25 May 2008 at the University of Stockholm. This conference invites distinguished speakers representing major directions in analysis, geometry and topology who, through their work, have contributed to establishing relations between these fields.

The encounters between the fields of analysis, geometry and topology are widespread and often provide major impetus for breakthroughs in these domains. Impressive examples include the exciting new developments in low-dimensional topology related to invariants of links and three- and four-manifolds; Perelman's spectacular proof of the Poincaré conjecture; and also the recent advances made in algebraic, complex, symplectic and tropical geometry.

It will also provide an opportunity to express admiration of the work and mathematical interests of Oleg Viro who will be celebrating his 60th birthday this year. Oleg Viro has made invaluable contributions to Swedish research by complementing the country's long standing strong tradition of analysis with his own renowned expertise in topology and areas of geometry: subjects not previously widely studied in Sweden.

For further information visit the website www2.math.su.se/pagt.

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Forthcoming IMA Events

24 May 2008 Cardiff University	**Eighth IMA Younger Mathematicians Conference** Main Speaker: Alex Balinsky (Cardiff University)
20 June 2008 The Royal Statistical Society, London	**3rd Maths Works** Speakers: David Spiegelhalter FRS (University of Cambridge), Celia Hoyles (Institute of Education, and Director, NCETM), Sue Pope (QCA) and John Threlfall (Leeds University), Garrod Musto (MEI Industry Committee, and Head of Mathematics, Kingswood School, Bath), G. Keith Still (Crowd Dynamics Ltd), Chris Budd (University of Bath).
30 June - 4 July 2008 University College, London	**ECMI 2008** Plenary Speakers: Nick Trefethen (University of Oxford), Andrea Bertozzi (University of California Los Angeles), Ioannis Karatzas (Columbia University), Benoit Desjardins (Ecole Normale Supérieure, Paris), Manuel Doblare (Universidad de Zaragoza), Jonathan Tawn (Lancaster University), Andreas Schuppert (Bayer Technology Services GmbH, Leverkusen), Yongji Tan (Fudan University, Shanghai), Miguel Moscoso (Universidad Carlos III de Madrid), Colin Please (University of Southampton). The Alan Tayler Lecture *Mathematical problems in oil pipelining* will be given by Mario Primicerio (Università degli Studi di Firenze).
18 November 2008 De Morgan House, Russell Square, London	**Second IMA Conference on Computational Finance - Modeling Under Severe Market Conditions**
16-18 December 2008 The Royal Agricultural College, Cirencester	**8th IMA Conference on Mathematics in Signal Processing** Main Speaker: Richard Baraniuk (Rice University, Houston, Texas, USA)
5-9 January 2009 Isaac Newton Institute, Cambridge	**Dense Granular Flows**
June 2009 University of Bradford	**Heat Mass and Fluid Transfer**
September 2009 York	**13th Mathematics of Surfaces**
September 2009 Leeds	**Modelling and Simulation in Chemical Engineering**
December 2009	**12th Cryptography and Coding**

Registration is open for 2008 conferences at http://online.ima.org.uk.

For further information contact Amy Marsh, Conference Officer (amy.marsh@ima.org.uk).

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YOUNGER MATHEMATICIANS CONFERENCE

The Eighth IMA Younger Mathematicians Conference will take place at Cardiff University on 24 May 2008. The speakers are:

- Alex Balinsky (Cardiff University) *Mathematical foundations of internet security*
- Alexandra Alecu (Loughborough University) *The k-error linear complexity of cryptographic sequences*
- Sarah Shepherd (editor of *iSquared Maths Magazine*) title tbc

There will also be a speaker from MathCymru and a demonstration of their maths kits used in school. Registration is now open at http://online.ima.org.uk/. Use 'try to find me' when registering for the online registration system; this will avoid duplicates on the database. Fees for the conference are: £15 for IMA Members, £25 for non-IMA members, £8 for any student – the student rate applies to any student aged 18+ currently or recently engaged in full-time education, including PhD students. This event is intended for younger mathematics professionals or for any younger person under 40 with a keen interest in Mathematics.

THE FIELDS INSTITUTE

The following major programmes are scheduled at the Fields Institute, Toronto:

- *Mathematical and Quantitative Oncology* July–August 2008
- *Arithmetic Geometry, Hyperbolic Geometry and Related Topics* September–December 2008
- *o-Minimal Structures and Real Analytic Geometry* January–June 2009
- *Foundations of Computational Mathematics* July–September 2009
- *Quantitative Finance: Foundations and Applications* January–June 2010

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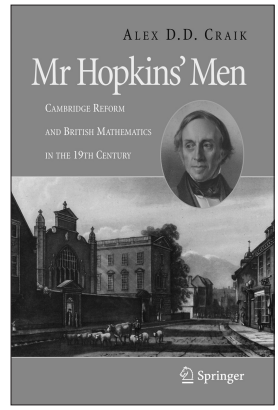
REVIEWS

Mr Hopkins' Men: Cambridge Reform and British Mathematics in the 19th Century by Alex D.D. Craik, Springer, London, 405 pp, £65 hardback, 2007, ISBN 978-1-84628-790-9; £25 paperback, 2008, ISBN 978-1-84800-132-9.



The Cambridge Mathematical Tripos examination of the mid-19th century and beyond was a fearsome ordeal, extending to forty-four and a half hours over eight days, and one's success (or otherwise) in it branded one for life. If, like Augustus De Morgan, George Green or G.H. Hardy, you were 'fourth wrangler' (that is, you appeared fourth in order on the class list), then everyone knew it and you had to live with it evermore: no wonder that Hardy was so bitterly opposed to the Mathematical Tripos and campaigned to have it abolished.

The standard way of improving one's chances in the examination was to be trained by one of the personal tutors who

offered their services, and two of these in particular (William Hopkins and his student Edward Routh) have gone down in history for the notable successes that they achieved over many years. This book tells the story of Mr Hopkins and of 'his men', the students whom he taught during his career, including such luminaries as Arthur Cayley, George Gabriel Stokes, Peter Guthrie Tait and William Thomson (later Lord Kelvin). In one year alone he achieved no fewer than seven of the top nine wranglers.

The book is in two parts. The first half describes with great clarity the Cambridge scene, with particular reference to the various reforms that took place in mathematics teaching and examining during the early- and mid-19th century; included here are descriptions of the 'student experience' over forty years, a full discussion of the Mathematical Tripos, and a detailed biography of Hopkins. This section of the book concludes with a remarkable gallery of photographic portraits, which the author discovered in Trinity College library, of Hopkins' wranglers over twenty-five years, including unusual images of those mentioned above in their student years. The second half of the book follows the later careers of these and other wranglers, and discusses a range of wider issues, such as the growth of a research community and the rapid expansion of universities and colleges in the British Isles and abroad. The book concludes with a lengthy reference section.

This is an unusual, well-written and well-researched book. So favourably has it been received that a paperback edition appeared within just a few months of the original publication. It can be warmly recommended.

Robin Wilson
The Open University

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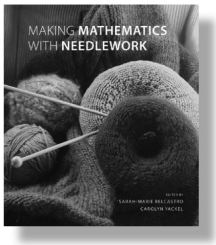
Making Mathematics with Needlework

EDITED BY SARAH-MARIE BELCASTRO AND CAROLYN YACKEL

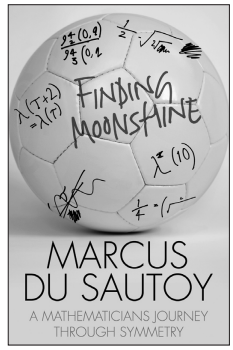


Hardcover; £18.50; 978-1-56881-331-8

"I encourage you to let the authors' passion for their projects speak for itself. It takes more than exclamation points to convey enthusiasm, and these authors have it leaping off the page throughout the book."
—*SIAM News*

"I hope this book will encourage mathematicians to develop more tactile ways to explore abstract ideas and to make them more accessible to their students. But even if you are just looking for "math craft" ideas, this book-with clear instructions and beautiful pictures-is for you. Have fun with it!"
—Daina Taimina, Cornell University

Finding Moonshine: A Mathematician's Journey Through Symmetry by Marcus du Sautoy, Fourth Estate, 2008, 376pp, £18.99, ISBN 0-007-214618.



As a young child Marcus wanted to be a spy and have his own gun. In order to fulfil his ambition, he set out to learn as many languages as possible, his goal being to join the Foreign Office. Mercifully, before he fulfilled his dream, his mathematics teacher singled him out and suggested certain books that revealed to him the beauty of the language of mathematics – a language of appreciable logic which immediately fascinated him.

In *Finding Moonshine* Marcus cleverly interweaves three strands; his own personal mathematical journey from a child to the present day, the historic journey of mathematical discoveries relating to symmetry and an account of his own struggles with the particular mathematical problem that is currently demanding much of his attention. The book begins on his 40th birthday in Israel and is written in monthly instalments with each strand being picked up and expanded upon in varying amounts each month.

The historic strand starts with Marcus and his young son searching in the British Museum for evidence of symmetry in Neolithic times. It contains a beautiful and in-depth look at the seventeen different tiling symmetries which are all found in the Alhambra and gives detailed accounts of the mathematics and lives of many mathematicians including Cardano, Tartaglia and Galois. Each of these is interspersed with quotations from their writings and other sources from the same period.

As ever with Marcus' books, it will appeal to a wide audience. There is enough mathematical content, both present-day and historical, to make it of interest to the mathematician who knows this area well, but yet it is written in a style simple enough to be understood and appreciated by the amateur mathematician, student or sixth-former. The insights into the way Marcus and other pure mathematicians work and think is of particular relevance and usefulness to students and other would-be mathematicians. Does music help you to think mathematically? What is the point of writing your jumbled thoughts down and does this indeed help to clarify them and make sense of your mathematical musings? Throughout the book Marcus explains various strategies that can be used when working through seemingly impossible problems and when progress seems to be painfully slow.

The reader is challenged by questions such as: What is symmetry? Where is it found? Where does it come from? Answers are contained in the many autobiographical accounts. The reader is moved by joy and delight as the young Marcus reads mathematical texts for the first time, understands the fear of another proving what you have been wrestling with for months and desperately want to prove yourself and agonises with the PhD student who wonders at the seeming futility of such research. One highlight is a particularly sensitive and humorous account of the role John Conway plays in the search for the Monster. Again, insights into the life of this brilliant yet eccentric mathematician must only inspire and excite the reader.

Marcus may not have fulfilled his ambition to be a spy in the traditional sense but one cannot help noticing the many similarities between mathematicians seeking to unravel deep mysteries such as these and those involved in various forms of espionage.

Noel-Ann Bradshaw
University of Greenwich

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How Round is your Circle? Where Engineering and Mathematics Meet by J. Bryant and C. Sangwin, Princeton University Press, 2008, cloth 352 pp, £17.95, $29.95, ISBN 978-0-691-13118-4.

If you want to know the answer to the title, or many other intriguing questions like "How do you make the first straightedge?", "How does a vernier work?" or "How do you measure an area using a coat hanger?" then you will be fascinated by this book. There are many aspects of engineering and mathematics covered, but it is also a book that will interest any mathematicians who like to get their hands dirty with real world problems. It is also for recreational mathematicians and historians of engineering and mathematics. The preface talks about why mathematicians should take the practical problems of engineering seriously since they present serious challenges when you leave the comfortable world of fictitious thin lines. They present such challenges in plenty with hands-on suggestions as well as theoretical back up. You could enjoy a good read, but you cannot fail to be drawn in to practical solutions and enjoy yourself. There are many popular mathematics books, on symmetry and groups for example, but most do not engage the reader as much as this one. There is some deep mathematics (Gröbner bases are not my field), but it is well written and you can skip this without a problem because before you know it you are in different territory.

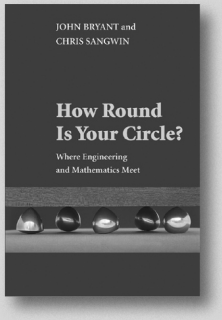
As I read through the book, I was reminded how nineteenth century mathematicians were encouraged to build models and how this ceased with the death of Felix Klein. Bryant and Sangwin point out that many of the advances in that century were a product of solving real world problems. This is particularly evident in the discussion of using linkages from James Watt's approximate method using a lemniscate type curve through other developments to Peaucellier's cell using the concept of inversion in a circle. Modelling in the computer is briefly touched upon, but the book's approach means that you also realise that problems like stopping such linkages from snagging can be the necessity that is the mother of invention. The recently reviewed novel *A Certain Ambiguity* (March 2008 *Newsletter* p. 25) has the Socratic teacher Nico pointing out that axioms about clouds and rain don't tell you about rainbows. This book has many gems and rainbows.

The book will appeal to all recreational mathematicians also, not just because of the way it is written, but also because of the way puzzles, plane dissections and packing and the odd paperfolding or origami task are used to bring a point home. There are some new slants on leaning towers of dominoes and a very interesting final chapter on equilibrium with unstable polyhedra and unusual rolling pairs of slotted disks. I have very few criticisms on content, but on the latter they have missed David Singmaster's analysis of this in *Eureka* and there is nothing on the Paul Schatz oloid. This has connections with mixing machinery and three dimensional linkages (otherwise covered admirably).

Space does not allow me to go into more detail, so I will just list a few topics: slide rules, Reuleaux's rotors and drilling square holes, Galileo's sector, the real-world need to trisect angles for sextants and quadrant marking (although they call Archimedes' neusis construction Pascal's trisector), how all approximations are rational, measuring areas with planimeters, scales and bridge curves. If you can't find something to interest you here, then I don't know what will.

More than one copy of this book should be in every school library too. It should help to inspire a new generation into mathematics or engineering as well as be accessible to the general reader to show how much mathematics has made the modern world.

John Sharp
London Knowledge Lab



How Round Is Your Circle?

Where Engineering and Mathematics Meet

John Bryant & Chris Sangwin

"The question posed by this book turns out to be a real toughie, but nevertheless the authors urge you to answer it. This gem of a book tackles several such questions, revealing why they are crucial to engineering and to our understanding of our everyday world. With a nice emphasis on practical experiments, the authors do a refreshing job of bringing out the mathematics you learned in school but sadly never knew why. And they show just how intuitive it can be." —Matthew Killeya, *New Scientist*

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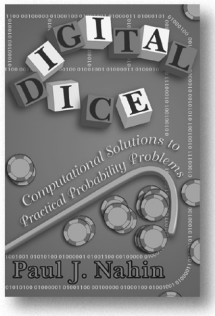

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Paul J. Nahin

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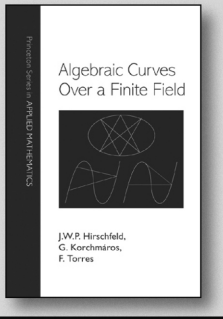

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EPSRC

The London Mathematical Society

Nonlinear Parabolic Equations and Applications

LMS–EPSRC Short Course

University of Wales, Swansea, 7–11 July 2008

Organisers: Professor Niels Jacob, Professor Vitali Liskevich, Dr Vitaly Moroz

The course will be organised around three mini-courses and three survey lectures. Each mini-course will be accompanied by tutorial(s), where practical exercises and open problems will be discussed. The course is primarily aimed at postgraduate students in Partial Differential Equations or related fields but much of it should be accessible to anyone with a reasonable background in Analysis. Postdocs and young researchers are welcome to attend.

Mini-courses

- *Theory of fast diffusion* (Juan Louis Vázquez, Madrid, Spain)
- *Blow-up of solutions of semi-linear parabolic equations* (Marek Fila, Bratislava, Slovakia)
- *Cauchy problem for thin films and other nonlinear parabolic PDEs* (Victor Galaktionov, Bath, UK)

Survey Lectures

- *Parabolic problems with dynamic boundary conditions* (Catherine Bandle, Basel, Switzerland)
- *Evolutional problems in image processing* (Alexander Belyaev, Heriot-Watt, Edinburgh, UK)
- *Formal asymptotic methods for nonlinear parabolic equations* (John King, Nottingham, UK)

Further information on the course is available at www-maths.swan.ac.uk/staff/vm/LMS.

Application

Applications should be made using the registration form available on the Society's website at: www.lms.ac.uk/activities/rmc/sc/39poster.html. The closing date for applications is **Friday 9 May**. Numbers will be limited and those interested are advised to make an early application.

Fees

- All research students registered at a UK university will be charged a registration fee of £100.
- Students from countries participating in the European Science Foundation programme *Global and Geometric Aspects of Nonlinear Partial Differential Equations* will be charged £425 (registration fee of £100 plus subsistence costs of £325). There are a limited number of grants available from the programme for students from participating countries, which will pay the fees and subsistence costs. If you are interested in being considered, please tick the relevant box on the application form.
- All other overseas students, postdocs and those working in industry will be charged £575 (registration fee of £250 plus subsistence costs of £325).
- There is funding available from the Wales Institute of Mathematical and Computational Sciences to pay the fees and subsistence of two non-UK (and non-'*Global*') students. If you are interested in being considered, please tick the relevant box on the application form.

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

LMS–EPSRC Short Courses aim to provide training for postgraduate students in core areas of mathematics. Part of their success is the opportunity for students to meet other students working in related areas as well as the chance to meet a number of leading experts in the topic.

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EPSRC

The London Mathematical Society

Advanced Methods in Linear and Nonlinear Elasticity

LMS–EPSRC Short Course

University of Keele, 28 July – 1 August 2008

Organiser: Professor Yibin Fu

The proposed course is aimed at research students in applied mathematics who may need to use elasticity theory, in one way or another, in their research. It is motivated by the fact that most new research students in applied mathematics in the UK do not even have a basic knowledge of elasticity theory, let alone a good understanding of the more advanced methods that are usually only available in research papers or monographs. However, there is now an increasing demand for a good understanding of linear and nonlinear elasticity due to its applications in biomechanics, industrial mathematics, and material science. This course will seek to provide students with a unified derivation of nonlinear elasticity theory with the linear theory derived as a special case and to introduce, with minimal pre-requisites, a number of major methods and ideas that students may incorporate in their current or future research work. The attendees are expected to be familiar with the theory of partial differential equations, matrix algebra and tensor notation. Previous knowledge in elasticity and tensor algebra is useful but not essential.

The course is organised around the following three lecture courses, each course consisting of six lectures and two example classes:

1. *Introduction to nonlinear elasticity theory* (R.W. Ogden FRS, Glasgow University)
2. *Asymptotic models of solids with cracks and small inclusions* (A.B. Movchan, Liverpool University)
3. *Stroh/Hamiltonian formulation and its application to linear and nonlinear elasticity* (Y.B. Fu, Keele University)

More details about this Short Course may be found at the website www.keele.ac.uk/depts/ma/LMS.

All research students registered at a UK university will be charged a registration fee of £100 (in the case of EPSRC-funded research students, this fee should be paid by their departments from their DTA; for non-EPSRC research students, their department might be prepared to pay the fee). Overseas students, postdocs and those working in industry must pay the full subsistence costs of £358, plus a registration fee of £250, making a total of £608 for this course.

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

Applications should be made using the registration form available on the Society's website at: www.lms.ac.uk/activities/rmc/sc/42poster.html. The closing date for applications is **Friday 30 May**. Numbers will be limited and those interested are advised to make an early application. All applicants will be contacted by the London Mathematical Society approximately one week after this deadline; we will not be able to give information about individual applications before then.

LMS–EPSRC Short Courses aim to provide training for postgraduate students in core areas of mathematics. Part of their success is the opportunity for students to meet other students working in related areas as well as the chance to meet a number of leading experts in the topic.

EPSRC

The London Mathematical Society

Stochastic Partial Differential Equations

LMS–EPSRC Short Course

Imperial College London, 7–11 July 2008

Organiser: Dr Dan Crisan

The aim of the course is to provide a good starting point for future researchers in SPDEs. It will assume that the students are familiar with basic functional analysis and probability theory, Ito calculus and PDE theory and build on this knowledge so that, by the end of the course, the students will have an overall view of the main results, themes and techniques of the area.

The course will consist of three mini-lectures of five hours each on

1. *Wiener Chaos Approach to SPDEs*
   (Boris Rozovsky, Brown)
2. *Applications of Malliavin Calculus*
   (Marta Sanz-Solé, Barcelona)
3. *Long time behaviour of SPDEs*
   (Martin Hairer, Warwick)

and two guest lectures given by Terry Lyons (Oxford) and Istvan Gyongy (Edinburgh). In addition there will be tutorial sessions run by postdoctoral researchers working in the field.

The following topics are prerequisites for the course: Ito calculus, basic functional analysis and PDE theory.

Further information about the course will appear at www.ma.ic.ac.uk/~dcrisan/lmscourse.

Application
Applications should be made using the registration form available on the Society's website at: www.lms.ac.uk/activities/rmc/sc/40poster.html.

The closing date for applications is **Friday 9 May**. Numbers will be limited and those interested are advised to make an early application.

Fees
All research students registered at a UK university will be charged a registration fee of £100. (In the case of EPSRC-funded research students, this fee should be paid by their departments from their DTA; for non-EPSRC research students, their department might be prepared to pay the fee.) Overseas students, postdocs and those working in industry will be charged £575 (registration fee of £250 plus subsistence costs of £325).

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

LMS–EPSRC Short Courses aim to provide training for postgraduate students in core areas of mathematics. Part of their success is the opportunity for students to meet other students working in related areas as well as the chance to meet a number of leading experts in the topic.

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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).

MAY 2008

1 Cancer Can Give You Maths! LMS–Gresham College Lecture, London (369)
2 Yorkshire & Durham Geometry Day, Leeds (369)
4 400 Years of Geometry, Gresham College Lecture, London (362)
5-9 Effective Real Analytic Geometry ICMS Workshop, Edinburgh (369)
12-17 Motivic Integration and Its Interactions with Model Theory and Non-Archimedean Geometry ICMS Workshop, Edinburgh (369)
13-16 Analysis and Design of Nonlinear Control Systems, London (370)
15-16 New Directions in Functions of Matrices Workshop, Manchester (369)
15-16 Set Theory LTCC Intensive Course, London (370)
19 Wales Mathematics Colloquium, Tregynon (370)
19-25 Perspectives in Analysis, Geometry and Topology, Stockholm (370)
21 Breadth and Diversity of Mathematics, Sheffield (369)
21-22 Combinatorics One-Day Colloquia, London (370)
22 Manipulating Thin-film Flows, Brooke Benjamin Lecture, Oxford (370)
22-23 Mathematics of Insurance and Finance LTCC Intensive Course, London (370)
23 Edinburgh Mathematical Society Meeting, St Andrews (363)
24 Younger Mathematicians IMA Conference, Cardiff (370)
28 PDE day, University of Sussex (370)
29-30 The Riemann–Hilbert Method and the Painlevé Equations LTCC Intensive Course, London (370)
29-30 New Directions in Statistics and Biostatistics Workshop, Manchester (369)

JUNE 2008

3-4 Statistical Mechanics for Mathematicians LTCC Intensive Course, London (370)
3-6 Chaotic Modeling, Simulation and Applications Conference, Crete, Greece (369)
6 PANDA, Cambridge (369)
9 LMS Midlands Regional Meeting, Birmingham (370)
10-12 Harmonic Analysis and Partial Differential Equations Workshop, Birmingham (370)
16-19 Nordic Conference on Mathematical Statistics, Vilnius, Lithuania (369)
16-20 Gravitational Thermodynamics and the Quantum Nature of Space Time, ICMS Workshop, Edinburgh (369)
17-18 High-dimensional Bayesian Inference LTCC Intensive Course, London (370)
20 Maths Works, London (370)
23-24 New Directions in Analytical and Numerical Methods for Forward and Inverse Wave Scattering Meeting, Manchester (370)
23-27 Geometric Analysis, Elasticity and PDEs Workshop, Heriot–Watt University (367)
23-27 Future Directions in High-Dimensional Data Analysis, INI Workshop, Cambridge (366)
30-1 Jul New Directions in Tomographic Image Reconstruction Workshop, Manchester (369)
30-4 Jul European Consortium for Mathematics in Industry, University College London (364)
30-10 Jul Mathematical Aspects of Graphical Models, LMS Durham Research Symposium, Durham (368)

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A. FREEMAN

LMS member 1872–1896

Hennah & Kent, Brighton (April 1882)

Rev. Alexander Freeman, MA, FRAS, FCPS
Fellow of St John's College, Cambridge
Member of the Physical Society