



LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 406 September 2011

Society Meetings and Events

2011

Saturday

17 September

De Morgan House
Open Day, London

Thursday

29 September

LMS Popular Lecture,
Birmingham [page 17]

Friday 7 and

Saturday 8 October

SW & South Wales
Regional Meeting,
Exeter [page 5]

Tuesday 11 October

Computer Science Day,
London

Friday 18 November

Annual General
Meeting, London

2012

26–30 March

LMS Invited Lectures,
Glasgow [page 2]

NEWSLETTER ONLINE:

Go to www.lms.ac.uk/newsletter

LMS COUNCIL DIARY

1 July 2011

A personal view

The Council Meeting on 1 July preceded the Society Meeting at which Robert McCann and Cédric Villani spoke, and thus we were under even more time pressure than usual. Nevertheless, by imposing a tight discipline on discussion, and on the length of our lunch-break, the President, Angus Macintyre, steered us through the full agenda. The first substantial item was setting the budget for 2011–12, and planning figures for 2012–14. This is too important to be rushed, so the Treasurer, Brian Stewart, took us through the figures in some detail to enable us to approve the budget with full knowledge of what we were doing. The point was well made that if we approve a certain item of expenditure then *ipso facto* we approve the activity which this pays for, and therefore careful scrutiny is essential. As far as this year's income and expenditure is concerned, there is likely to be a significant underspend on grants, not because the Programme Committee is being mean, but because the number of grant applications has been lower than usual. Also, the budget for publications is conservative, and the actual figures are likely to be better than the estimates. However, later in the meeting, Susan Hezlet, the LMS

Publisher, warned us of the serious risk of complete collapse of publications income in the next few years if Government-mandated open access policies have the impact that many in publishing fear they will. Of course, LMS Trustees feel only too keenly the conflict of interest between the LMS making money from publications to plough back into mathematics, and our own institutions wanting to reduce library budgets.

As usual, we spent a lot of time discussing external relations, beginning with an update on the National Curriculum Review. John Greenlees (Vice-President) had attended the speech by Michael Gove, Secretary of State for Education, at The Royal Society on 29 June, and reported back some of the relevant headlines, such as 'mathematics to 18' and 'calculus for everyone'. He also reported on preparations by the mathematics subpanel for the REF, including input from the LMS blog. Guidance on submissions will have been published by the time this *Newsletter* appears, as will a consultation on subpanel working methods.

Next came a report from a meeting of the Council for Mathematical Sciences (CMS) with the EPSRC Mathematical Sciences Strategic Advisory Team (SAT). There was a view, strongly expressed in the International Review of Mathematics, that our attempts to get the

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opinions of mathematicians across to EPSRC have not been very successful in recent years. The report of this meeting did not encourage the view that this situation has significantly changed.

Some more positive news came in the form of the first-time involvement of mathematics (through the CMS) in a Parliamentary Links Day held on 28 June, and in next year's National Science and Engineering Week Seminar for the Parliamentary and Scientific Committee.

In the last few minutes of the meeting, Council must have decided that writing the Council Diary is too small a job for one person, and added the newly invented job of Council Webmaster to my responsibilities. We also approved the Website Control Policy which had been drawn up by the Website Working Group over three meetings and a great deal of homework, and noted that security of the website was likely to be a growing issue. This was therefore added to the official Risk Register, along with the increased risk to publications income from open access policies.

Robert Wilson

LMS INVITED LECTURER 2012

Professor Alexei Borodin (MIT)

**26–30 March 2012
Glasgow University**

Professor Borodin will give a series of lectures on *Determinantal Point Processes and Representation Theory*.

For further information email Misha Feigin (Misha.Feigin@glasgow.ac.uk) or visit the website at www.lms.ac.uk/content/2012-lms-invited-lecturer.

LMS Newsletter

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HONORARY MEMBERSHIP 2011

The London Mathematical Society has elected **Professor Nancy Kopell**, of Boston University, USA and **Professor Yuri Manin**, of Northwestern University, USA, to Honorary Membership of the Society.

Professor Nancy Kopell is recognised for her development of methods of dynamical systems, for applications to diverse important problems concerning the self-organization of physical and biological systems. Of particular importance is her work on pattern formation in oscillating chemical systems, on the neural networks governing rhythmic motor activities in animals, and her ongoing work on the brain dynamics underlying various cognitive functions.

Professor Yuri Manin, of Northwestern University, USA, is recognised for his many distinguished contributions to algebraic geometry, non-commutative geometry, number theory, and mathematical physics.

Full citations for Professor Kopell and Professor Manin will appear in the *LMS Bulletin*.

ZEEMAN MEDAL 2011

The London Mathematical Society (LMS) and the Institute of Mathematics and its Applications (IMA) are delighted to announce that **Professor John Barrow**, FRS, Department of Applied Mathematics and Theoretical Physics, University of Cambridge will receive the Christopher Zeeman Medal for the Promotion of Mathematics to the Public.

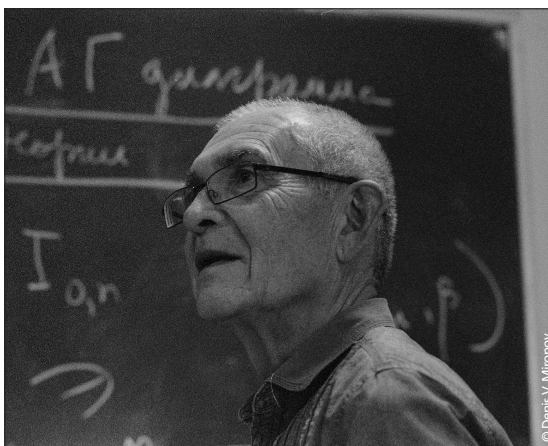
Professor Barrow has made enormous contributions to the public understanding of mathematics, particularly in his role as Director of the Millennium Mathematics Project (MMP) at Cambridge. The MMP has done a huge amount to develop mathematical interest and ability among school students with activities such as NRICH and the online magazine *Plus*.

Professor Barrow will give a lecture and will receive his award at a ceremony to be held at The Royal Society on Wednesday 21 March 2012.

Editor's note: Professor Barrow's photograph appears on page 13.



Nancy Kopell



Yuri Manin

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Formal Aspects of Computing
Science Specialist Group

The London
Mathematical
Society



BCS-FACS EVENING SEMINAR
Joint event with the London Mathematical Society
Wednesday 30 November 2011 at 6:00 pm
De Morgan House, 57-58 Russell Square, London WC1B 4HS.
Nearest tube: Russell Square.



Picture courtesy of Andrew Ireland

From l-r: Andrew Ireland, Maria Teresa Llano, Gudmund Grov and Alison Pease (on screen)

Reasoned Modelling: Towards Decision Support for System Designers Professor Andrew Ireland (Heriot-Watt University)

Formal modelling and reasoning are closely related activities. In particular, modelling decisions are typically informed by the analysis of failed proofs. While such analysis is not intellectually challenging from the perspective of mathematical reasoning, it does represent a major barrier to the uptake of formal design methods by mainstream software engineers - whose intuitions lie in modelling and not proof. This problem is exacerbated by the huge number of proof obligations that arise during industrial scale developments.

Overcoming this barrier would increase the accessibility and productivity of formal design methods, and ultimately the dependability and security of software intensive systems. Andrew Ireland's talk will describe a programme of research called reasoned modelling which aims to reduce this barrier. In essence he and his collaborators are focused on the development of techniques that abstract away from the complexities of low-level proof obligations, in particular proof-failures, and provide designers with high-level modelling guidance. Their approach is based upon a classification of common modelling patterns. Combined with automatic proof-failure analysis, they use these patterns to automatically generate modelling guidance. Complementing this top-down process, they are experimenting with bottom-up AI theory formation techniques. Specifically, they are exploring how the HR automated theory formation system can be used to increase the flexibility of our modelling patterns. He will report on progress within the context of Event-B, a refinement based modelling formalism. Their longer-term vision for reasoned modelling will also be outlined. This talk is based upon joint work with Gudmund Grov, Maria Teresa Llano and Alison Pease.

Refreshments will be available from 5.30 pm.

The seminar is free of charge and open to everyone.

*If you would like to attend, please email computerscience@lms.ac.uk by **25 November**.*

NORRIE EVERITT

Professor William Norrie Everitt, FRSE, who was elected a member of the LMS on 19 December 1957, died on 17 July 2011, aged 87.

Desmond Evans, Tomas Johansson and Lance Littlejohn write: Norrie Everitt will be remembered as a leading British mathematical analyst who contributed extensively to differential equations, linear operators, spectral theory, inequalities and special functions.

Norrie was born in Birmingham on 10 June

1924. In 1944, he graduated with first class honours in electrical engineering from the University of Birmingham. While serving in the UK armed forces, he suffered a fractured spine in 1947; after being told he might never walk again, he climbed the Matterhorn at age 25. He entered Oxford (Balliol College) in 1949 to study mathematics and, in 1955, he received his DPhil under the supervision of E.C. Titchmarsh.

Norrie was an eminent authority on the spectral theory of differential equations. He

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SOUTH WEST & SOUTH WALES REGIONAL MEETING

Saturday 8 October 2011

Exeter University

The LMS Regional Meeting is part of a two-day workshop on Iwasawa theory, starting on Friday 7 October. An introductory lecture (intended for a general mathematical audience) will be given by John Coates; there will also be several more specialised talks.

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

For further details or to register, email the organisers (Nigel Byott, N.P.Byott@exeter.ac.uk). More information can be found on the web page <http://emps.exeter.ac.uk/mathematics-computer-science/research/pure/events/workshop/>.

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

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generalized the Hardy, Littlewood, Pólya inequality to yield the HELP inequality (E for Everitt), which is intimately connected with spectral theory. Norrie helped set up the SLEIGN2 program, a computer code to calculate eigenvalues of Sturm–Liouville problems. He also edited the translation of Naimark's *Linear Differential Operators*, a book that has had a profound influence on western mathematical analysis. These are only glimpses of his manifold contribution.

Norrie began his mathematical career at the Royal Military College of Science in Shrivenham (1954–1963). From 1963 to 1982, he was the Baxter Professor of Mathematics in the Department of Mathematical Sciences at the University of Dundee, serving twice as Head of the Department (1963–67, 1977–80). It was during the Dundee years that he demonstrated his organizational skills in running the Dundee Conferences on Differential Equations.

In 1982, Norrie returned home as Mason Chair and Head of the Department of Mathematics at the University of Birmingham. He remained Head until his retirement in 1989 and stayed as an honorary Senior Research Fellow until September 2009. Norrie was an excellent mentor during his career; he supervised 13 PhD students and guided many young mathematicians throughout the world.

Norrie served on the LMS Council from 1957 to 1962, was elected a Fellow of the Royal Society of Edinburgh (1966), served as President of the Edinburgh Mathematical Society (1970), and as Vice President of the Royal Society of Edinburgh from 1970 to 1973. In 1978, he was part of the UK delegation to the International Mathematical Union in Helsinki. He made several trips to countries behind the Iron Curtain to ensure that the flow of mathematical ideas continued between the East and West.

Norrie is survived by his wife, Kit, two

sons Charles (Father Gabriel, OSB) and Timothy, and two granddaughters, Sophie and Lucy.

Norrie was a dear friend who will be greatly missed by all who knew him.

ANNUAL LMS SUBSCRIPTION 2011–12

Members are reminded that their annual subscription, including payment for publications, for the period November 2011 – October 2012 is due on **1 November 2011**. By the second week of October Members will be sent reminders via email or letter, detailing how to pay their subscription. In the case of Members who already have a Direct Debit set up and do not wish to alter their subscription, no action need be taken.

Rates

The annual subscription to the London Mathematical Society for 2011–12 is:

- Ordinary membership £54.00
- Concessions on Ordinary membership:
 - Reciprocity £27.00
 - Career break or part-time working £14.00
- Associate membership £14.00

Members also have the option to pay their European Mathematical Society subscription via the LMS (£23) and subscribe to the *Journal of the EMS* (£80).

The member prices of the Society's journals for 2012 are:

	Print	Online*	Print+Online*
<i>Bulletin</i>	£57.00	£45.00	£69.00
<i>Journal</i>	£105.00	£85.00	£126.00
<i>Proceedings</i>	£112.00	£90.00	£134.00
<i>Nonlinearity</i>	(except N. America) £75.00		(N. America) £97.00
<i>JCM</i> (electronic)	—	free	—

(*inclusive of VAT)

Please note that for online subscriptions it is essential that we have an up-to-date email address.

Elizabeth Fisher
Grants and Activities Administrator

EMS INVITES NEW MEMBERS



Please join! With a membership of about 3,000 individual members, 60 national mathematical societies and 20 research centres, the European Mathematical Society (EMS) represents mathematicians throughout Europe. This is more than an optimistic statement. It is a real status achieved thanks to the devoted co-operative work of many colleagues, and to the support of all our members. But in order to increase the size, the strength and the influence of our network, we need the involvement of still more people.

The EMS strives to serve all mathematicians in universities, research centres, and other institutions of higher education. Its aims include to promote mathematical research and education, to foster interaction between mathematicians of different countries, to establish a sense of identity amongst European mathematicians, and to represent the mathematical community in European institutions.

The opportunity to contribute towards these objectives is an appealing and convincing reason to collaborate with the EMS. Becoming an individual member of the EMS is very easy, and economical! Just a click at www.euro-math-soc.eu/membership.html, and make a contribution of €23 (if you are a member of the LMS, of other EMS member societies, or of societies with a reciprocity agreement). You may also pay through your national society.

In addition to supporting the work of the EMS, you will also receive some tangible and concrete benefits. For example, you will receive the *EMS Newsletter* – the quarterly journal of record of the Society – you will benefit from a 20% discount on books published by the EMS Publishing House, from reduced fees for the European Congress of Mathematics (a large quadrennial scientific

congress) and for EMS co-sponsored meetings, you will have free access to *Zentralblatt Math.*, etc.

It would be too long to list here the very many projects, activities and services that the EMS is leading, coordinating and offering. But, I very much hope that this short note has raised your motivation to become an EMS member, and your curiosity to know much more about us. Please take a tour through the webpage of the Society at www.euro-math-soc.eu and explore our present and our past. I will be also very pleased to answer any questions you might have.

Marta Sanz-Solé
EMS President

TIER 2 IMMIGRATION RULES

Wellcome Trust Survey

As part of its advocacy work in the area of science and immigration, the Wellcome Trust has developed a short survey on organisations' experiences with the Resident Labour Market Test (RLMT). Employers are usually required to complete a RLMT before sponsoring a non-EEA employee through Tier 2 of the points-based immigration system.

The findings of the survey will be used to consider whether there are any alternatives to the current RLMT requirement to advertise for four weeks in the *JobCentrePlus*, that would be more suitable for organisations recruiting non-EEA researchers.

The Wellcome Trust would like to hear from organisations that directly employ PhD-level research staff, and who would be interested in participating in this survey. In most cases a Human Resources Manager would be the most appropriate person to complete the survey. Please contact Annie Colgan for further information (a.colgan@wellcome.ac.uk).

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LMS GRANT SCHEMES

Next Closing Date for Applications: 15 September 2011

Applications are invited for the following grants:

- Conferences and postgraduate research conferences held in the UK (Schemes 1 and 8)
- Celebrating new appointments (Scheme 1)
- Visitors to the UK (Scheme 2)
- Joint Research Groups (Scheme 3 – see below about renewal of Scheme 3 grants)
- Research in Pairs (Scheme 4)
- International short visits with the main focus on Africa (Scheme 5)

For full details of these grant schemes, and to download application forms, visit the LMS website (www.lms.ac.uk/content/research-grants).

- Applications received by **15 September 2011** will be considered at a meeting in October.
- Applications should be submitted well in advance of the date of the event for which funding is requested.
- Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

Queries regarding applications can be addressed to the Grants Administrators or the Programme Secretary (see below) who will be pleased to discuss proposals informally with potential applicants and give advice on the submission of an application.

- Grants Administrators: Sylvia Daly and Elizabeth Fisher (tel: 020 7291 9971/3, email: grants@lms.ac.uk) who both work Wednesday–Friday.
- Programme Secretary: Stephen Huggett (tel: 01752 586869, email: s.huggett@plymouth.ac.uk).

Computer Science Small Grants (Scheme 7)

Funding for grants up to £500 is available to support a visit for collaborative research at the interface of Mathematics and Computer

Science either by the grant holder to another institution within the UK or abroad, or by a named mathematician from within the UK or abroad to the home base of the grant holder. The next deadline for applications is **15 September 2011** – please see the website for further details: www.lms.ac.uk/content/computer-science-small-grants-scheme-7.

Grants News

We would like to draw your attention to the following:

Joint Research Groups – Renewal grants (Scheme 3)

ALL renewal applications **MUST** be accompanied by a financial and academic report for the previous year's activities. Please note that full reports should always be submitted ('light touch' refers to the application procedure only).

Grant holders wishing to renew their application may use the Light Touch Application Form if

the original or last full renewal application was made in the last TWO years, and NONE of the following have changed:

- the grant holder,
- the supporters, and the
- amount requested

Grant holders **MUST** use the Full Renewal Application Form if

the original or last full renewal application was made **THREE** years ago, and/or ANY of the following have changed:

- the grant holder,
- the supporters or
- the amount requested

If a renewal application is unsuccessful, normally the grant will be terminated at the end of the calendar year. A supplementary grant will be available to cover actual expenditure for a meeting held during the autumn term. This will normally be the equivalent of the grant awarded for one meeting, e.g. £350,

and will not usually exceed one third of the previous year's grant.

Childcare Grants

The Society believes that all parents working in mathematics should be able to attend conferences and research meetings without being hindered by childcare costs. Institutions are expected to make provision for childcare costs and parents are encouraged to make enquiries. However, where this is not available, the Society administers a Childcare Supplementary Grants Scheme. Further details can be found on the LMS website: www.lms.ac.uk/content/childcare-supplementary-grants.

Young British and Russian Mathematicians Scheme

Visits to Russia

Applications are invited from young British postdoctoral mathematicians who wish to spend a few weeks in Russia giving a series of survey lectures on the work of their school.

The LMS is offering grants of up to £500 to meet the travel costs, while the host should apply to the Russian Academy of Sciences for funding towards local expenses for accommodation and subsistence.

Applications to the LMS should include the following:

1. A brief academic case for the visit, including a description of your current research interests, and an outline of your planned work during the visit (no more than one side of A4).
2. A brief CV (no more than one side of A4).
3. A brief budget.
4. An invitation from the host in Russia, which must state explicitly that your accommodation and subsistence expenses will be met by them. This should include provisional dates for the visit.

You will be required to provide financial and academic reports after the visit.

In exceptional circumstances, applications may be considered from strong research students who are close to finishing their doctorates. Applications should include a strong case and a recommendation from your supervisor.

Visits to Britain

Under this Scheme, applications may also be made by any mathematician in Britain wishing to host a visit by a young Russian postdoctoral mathematician who wishes to spend a few weeks in Britain giving a series of survey lectures on the work of their Russian seminar.

The LMS is offering grants to the host institution to meet the visitor's actual travel and accommodation costs of up to £1500.

Applications should include the following:

1. Name and brief CV of the visitor.
2. A brief description of the course of lectures.
3. A letter or email of agreement from the head of the host department, including the proposed dates of the visit.

Financial and academic reports will be required after the visit.

Further details of the Scheme can be found on the LMS website: www.lms.ac.uk/content/international-grants#YBR

Enquiries should be made to the Grants Administrators: Sylvia Daly and Elizabeth Fisher (tel: 020 7291 9971/3, email: grants@lms.ac.uk) who both work Wednesday–Friday.

SAMS–AMS CONGRESS 2011

Travel Bursaries

The London Mathematical Society has donated funds to support research students in mathematics from Africa (excluding South Africa) to enable them to attend the Joint International Congress of the South African and American Mathematical Societies, which is taking place from 29 November to 3 December 2011 in Port Elizabeth, South Africa. For more information on the Congress see www.nmmu.ac.za/sams-ams2011 or contact Margot Collett (margot.collett@nmmu.ac.za).

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COLLINGWOOD MEMORIAL PRIZE

The 2011 Collingwood Memorial Prize has been awarded to Iain R.N. Smears, Collingwood College, Durham University. The Collingwood Memorial Prize, established in memory of Sir Edward Collingwood FRS, President of the Society 1969–70, is awarded to a final-year mathematics student at the University of Durham who intends to continue to a higher degree in mathematics at Durham or any other university.

ROLLO DAVIDSON PRIZE

The Rollo Davidson Prize for 2011 has been awarded jointly to Dr Christophe Garban (École Normale Supérieure de Lyon) and Professor Gábor Pete (University of Toronto) for “striking and important new results for planar random processes, particularly in establishing a theory of noise sensitivity for critical percolation and the application of this theory to dynamical percolation”.

The Trust was founded in 1975 in memory of Rollo Davidson, an accomplished mathematician of remarkable potential, and Fellow-elect of Churchill College, Cambridge, who died on the Piz Bernina in 1970. Initial funding from the Trust came from the royalties of two collections of papers published in 1973/74 by friends and colleagues of Rollo. The Trust awards an annual prize for young probabilists and has benefited from the continuing association with the Davidson family. For further information visit the website at www.statslab.cam.ac.uk/Rollo/index.html.

OTTO NEUGEBAUER PRIZE

The European Mathematical Society (EMS) has decided to award a prize for work in the history of mathematics. It is to be named after the distinguished historian of mathematics Otto Neugebauer, and it carries a cash award of €5,000

generously provided by Springer-Verlag. The Prize will be awarded every four years by the EMS President during the prize ceremony of the European Congress of Mathematics, and will be given for the first time at the 6ECM in Kraków (Poland) in 2012. The recipient will be invited to present his or her work at the Congress.

For the purposes of the prize, history of mathematics is to be understood in a very broad sense. It reaches from the study of mathematics in ancient civilisations to the development of modern branches of mathematical research, and it embraces mathematics wherever it has been studied in the world. In terms of Mathematics Subject Classification it covers the whole spectrum of item 01Axx (History of mathematics and mathematicians). Similarly, there are no geographical restrictions on the origin or place of work of the prize recipient. All methodological approaches to the subject are acceptable.

The Prize is to be awarded for highly original and influential work in the field of history of mathematics that enhances our understanding of either the development of mathematics or a particular mathematical subject in any period and in any geographical region. The prize may be shared by two or more researchers if the work justifying it is the fruit of collaboration between them.

The right to nominate one or several laureates is open to anyone. Nominations are confidential; a nomination should not be made known to the nominee(s). Self-nominations are not acceptable.

Nominations for the prize should be addressed to the Chairman of the Prize Committee, Professor Jeremy Gray (Open University). The nomination letter must reach the EMS office at the following address by **31 December 2011**: EMS Secretariat, Ms Terhi Hautala, Department of Mathematics & Statistics, PO Box 68 (Gustaf Hållströmink. 2b), 00014 University of Helsinki, Finland. It should contain a CV and a description of the candidate's work motivating the nomination, together with names of specialists who may be contacted.

FELIX KLEIN PRIZE

The Felix Klein Prize is to be awarded to a young scientist or a small group of young scientists (normally under the age of 38) for using sophisticated methods to give an outstanding solution, which meets with the complete satisfaction of industry, to a concrete and difficult industrial problem.

The award comprises a certificate including the citation and a cash prize of €5,000. The money for the prize fund is offered by the Fraunhofer Institute for Industrial Mathematics in Kaiserslautern. The Prize will be presented at the 6th European Congress of Mathematics in Kraków. The recipient will be invited to present his or her work at the Congress.

The Prize Committee is responsible for solicitation and the evaluation of nominations. Nominations can be made by anyone, including members of the Prize Committee and

candidates themselves. It is the responsibility of the nominator to provide all relevant information to the Prize Committee, including a résumé and documentation of the benefit to industry and the mathematical method used. The nomination for the award must be accompanied by a written justification and a citation of about 100 words that can be read at the award date. The prize is awarded to a single person or to a small group and cannot be split.

Nominations for the prize should be addressed to the Chairman of the Prize Committee, Professor Wil Schilders, Technical University (w.h.a.schilders@tue.nl). The nomination letter must reach the EMS office at the following address by **31 December 2011**: EMS Secretariat, Ms Terhi Hautala, Department of Mathematics & Statistics, PO Box 68 (Gustaf Hållströmink. 2b), 00014 University of Helsinki, Finland.

CAMBRIDGE

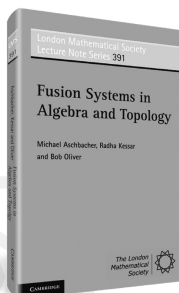
Fusion Systems in Algebra and Topology

Michael Aschbacher,
California Institute of Technology
Radha Kessar, *University of Aberdeen*
Bob Oliver, *Université de Paris XIII*

- Surveys ongoing research in this emerging area of mathematics
- Assembles various results, terminology, notation and definitions that are currently scattered across the literature

Beginning with a detailed exposition of the foundational material, the authors then proceed to discuss the role of fusion systems in local finite group theory, homotopy theory and modular representation theory. The book serves as a basic reference and as an introduction to the field, particularly for students and other young mathematicians.

London Mathematical Society Lecture Note Series, No. 391
August 2011 | Paperback | 978-1-10760100-0 | £40.00



Models and Games

Jouko Väänänen, *University of Helsinki and University of Amsterdam*

This gentle introduction to logic and model theory is based on a systematic use of three important games in logic: the semantic game; the Ehrenfeucht–Fraïssé game; and the model existence game. The third game has not been isolated in the literature before but it underlies the concepts of Beth tableaux and consistency properties.

Jouko Väänänen shows that these games are closely related and in turn govern the three interrelated concepts of logic: truth, elementary equivalence, and proof. All three methods are developed not only for first order logic but also for infinitary logic and generalized quantifiers. Along the way, the author also proves completeness theorems for many logics, including the cofinality quantifier logic of Shelah, a fully compact extension of first order logic. With over 500 exercises this book is ideal for graduate courses, covering the basic material as well as more advanced applications.

Cambridge Studies in Advanced Mathematics, No. 132
May 2011 | Hardback | 978-0-52151812-3 | £40.00



For all of our titles, visit www.cambridge.org/mathematics



FERRAN SUNYER I BALAGUER PRIZE

The prize is awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in Mathematics, in which the author has made important contributions. The prize, amounting to €15,000, is provided by the Ferran Sunyer i Balaguer Foundation. It is named after the disabled Catalan mathematician Ferran Sunyer i Balaguer (1912–1967).

Monographs should preferably be typeset in TeX. Authors should send all documents in digital format, a pdf file of the manuscript to ffsb@iec.cat, and a hard copy of the manuscript together with a letter to the Foundation. Submissions should be sent by **2 December 2011** to: Fundació Ferran Sunyer i Balaguer, Carrer del Carme 47, E-08001 Barcelona, Spain.

Recent past winners were:

- 2011** Jayce Getz (McGill University) and Mark Goresky (Princeton): *Hilbert Modular Forms with Coefficients in Intersection Homology and Quadratic Base Change*
- 2010** Carlo Mantegazza (Scuola Normale Superiore di Pisa): *Lectures Notes on Mean Curvature Flow*
- 2009** Tim Browning (Bristol University): *Quantitative Arithmetic of Projective Varieties*

For further information visit the website at <http://ffsb.iec.cat/EN/premi.htm>.

RAMANUJAN PRIZE

Call for Nominations

Nominations for the 2011 award of the Ramanujan Prize for Young Mathematicians are now sought.

The Prize is awarded annually to a researcher from a developing country less than 45 years of age on 31 December of

the year of the award, who has conducted outstanding research in a developing country. Researchers working in any branch of the mathematical sciences are eligible. The prize carries a \$15,000 cash award and travel and subsistence allowance to visit ICTP (International Centre for Theoretical Physics) for a meeting where the prize winner will be required to deliver a lecture. The prize is usually awarded to one person, but may be shared equally among recipients who have contributed to the same body of work.

ICTP awards the prize through a selection committee of five eminent mathematicians appointed in conjunction with the International Mathematical Union (IMU). Send nominations to director@ictp.it describing the work of the nominee in adequate detail. Two supporting letters should also be arranged. The deadline for receipt of nominations for the 2011 Prize is **30 October 2011**. Full details are available at <http://prizes.ictp.it/Ramanujan>.

CULTURE OF BEING A MATHEMATICIAN

Tony Mann (University of Greenwich) and Chris Good (University of Birmingham) are working on a project to produce teaching materials on “the culture of being a mathematician”. The project is supported by the Mathematical Sciences HE Curriculum Innovation Project as part of the National HE STEM Programme, acting on a recommendation from the HE Mathematics Curriculum Summit (*LMS Newsletter* 401, March 2011, p.9). We would like to interview a small number of mathematicians on this subject, with a view to making the results available as a teaching resource. If you might be interested in taking part, please contact Tony Mann (A.Mann@gre.ac.uk) for more information.



GRESHAM COLLEGE



Maths and Sport

Free Public Mathematics Lectures

by John D Barrow FRS, Gresham Professor of Geometry

How Fast Can Usain Bolt Run?

Tuesday, 15 November 2011 – 1pm – Museum of London, EC2

David and Goliath: Strength and Power in Sport

Tuesday, 13 December 2011 – 1pm – Museum of London, EC2

Citius, Altius, Fortius: Records, Medals and Drug Taking

Tuesday, 17 January 2012 – 1pm – Museum of London, EC2

Let's Twist Again: Throwing, Jumping, and Spinning

Tuesday, 21 February 2012 – 1pm – Museum of London, EC2

On the Waterfront

Tuesday, 27 March 2012 – 6pm – Museum of London, EC2

Final Score

Tuesday, 24 April 2012 – 1pm – Museum of London, EC2



These lectures are free and open to the public.

No reservations are required.

Gresham College was founded in 1597 to provide free public lectures in London.

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NEWSLETTER

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MATHEMATICS POLICY ROUND-UP

August 2011

RESEARCH

Shaping Capability: EPSRC's Research Portfolio 2011

EPSRC released a map of its full research portfolio with further information on how it will implement the Shaping Capability strand of its delivery plan for 2011 onward. Details of the strategy and approach to shaping capability within research themes, along with more information about individual research areas and diagrams is available at www.epsrc.ac.uk/ourportfolio/Pages/default.aspx.

The LMS is actively working with its partner organisations through the Council for the Mathematical Sciences (CMS) to attempt to engage with EPSRC on its Shaping Capability agenda and to discuss the serious concerns raised by the manner in which EPSRC is approaching this matter.

EPSRC Fellowships

EPSRC has announced a new approach to fellowships, which it states has arisen following a major review of support for people carried out in 2009 and subsequent discussions with fellows. The EPSRC intends this to be a faster, more streamlined and flexible process. This was introduced in July 2011 and merges several existing schemes. EPSRC's financial commitment to support fellowships is broadly similar to recent years. <http://tinyurl.com/3dbgy8h>.

The two major concerns for the LMS are the withdrawal of an explicit stream for postdoctoral fellowships and the recent EPSRC announcement that, for the next year at least, the only fellowships to be awarded across the mathematical sciences will be in statistics and applied probability. Again, the LMS is working through CMS to make the strongest representation to both the EPSRC and government ministers about the catastrophic impact this will have on the future of mathematical

sciences and the need to keep mathematical fellowships on a general basis at least until the shaping agenda has been further developed. Further updates will be available on both the LMS and CMS websites.

EPSRC Chief Executive

Professor David Delpy will remain as Chief Executive and Deputy Chair of EPSRC for a second term. Professor Delpy's re-appointment is for two years and seven months ending on 31 March 2014.

Comprehensive Spending Review (CSR): Oral evidence

The Science and Technology Select Committee has announced that it will take further evidence from the Research Councils and government minister on 14 September 2011. The Council for the Mathematical Sciences (CMS) written response is available at www.cms.ac.uk/reports/2011/CSRfinal.pdf.

Peer Review report

The Science and Technology Select Committee published its report on Peer Review in Scientific Publications on Thursday 28 July 2011. More information is available at <http://tinyurl.com/4yk78m7>.

HIGHER EDUCATION

Higher Education White Paper

The government has published its White Paper on plans to reform higher education in England – *Students at the Heart of the System*. Universities Minister, David Willetts, said: "The Government will reform the financing of higher education, promote a better student experience and foster social mobility. Our overall goal is a sector that is freed to respond in new ways to the needs of students." The White Paper is available at <http://tinyurl.com/3ffpuva>.

OFFA announces decisions on 2012–13 access agreements

The Office for Fair Access (OFFA) has announced that English universities and colleges charging above £6,000 for their courses plan to boost their spending on access measures to £602 million a year by 2015–16. Details are available at <http://tinyurl.com/3ww874f>.

The Hughes Report

Simon Hughes MP, the Government Advocate for Access to Education, has published his report on improving access to further and higher education. The full report is available at <http://tinyurl.com/3o2gaxe>.

More UK first degree graduates entering employment

The Higher Education Statistics Agency (HESA) has published *Destinations of Leavers from Higher Education Institutions 2009/10*. The publication provides detailed results of the *Destinations of Leavers from HE* survey, which asks graduates what they are doing six months after graduation. When compared with last year's statistics, the publication shows that a higher proportion of graduates entered employment, fewer went into further study, and a lower proportion were unemployed. The data are available at <http://tinyurl.com/3svcvuu>.

SCHOOLS AND COLLEGES**Vorderman publishes report on mathematics education**

Major alterations in mathematics education are critical or we risk our future economic prosperity; and mathematics in some form should be compulsory until the age of 18. These are among the key conclusions of an independent report commissioned by the Conservative Party in 2009 and carried out by a task force assembled and led by Carol Vorderman. The full report is available at <http://tinyurl.com/3usonpg>.

National Curriculum update – recent review of activity

The latest update to the National Curriculum Review website is available at <http://tinyurl.com/3b95pfy>.

Michael Gove speech to The Royal Society

The Secretary of State for Education, Michael Gove MP, gave a speech at The Royal Society highlighting the importance of science and maths and stating that the government “unequivocally believe that maths and science education are at the heart of improving our society and our economy”. The speech is available at <http://tinyurl.com/3vjgkz>.

Evaluating Mathematics Pathways project

The final report of the Evaluating Mathematics Pathways (EMP) project has been published by the Department for Education (see <http://tinyurl.com/3mhesls>).

The EMP project was an independent evaluation of the manageability and impact of a range of proposed new 14–19 mathematics qualifications or ‘mathematics pathways’. The project was led by the School of Education at the University of Nottingham in collaboration with the Universities of Manchester and Sussex, on behalf of the Qualifications and Curriculum Development Authority (QCDA).

Report into English Baccalaureate

The Education Select Committee completed its inquiry into the English Baccalaureate by publishing a report on Thursday 28 July 2011. More information is available at <http://tinyurl.com/4yk78m7>.

New Teaching Agency

The Teaching Agency is a new executive agency that will be responsible for ensuring the supply of high quality teachers and training, and for teacher regulation. It will open in April 2012 and take on some key

functions of the Training and Development Agency for Schools, General Teaching Council for England, Children's Workforce Development Council and the Qualifications and Curriculum Development Agency (QCDA). More information about the new agency is available at <http://tinyurl.com/43f6mro>.

Dr John Johnston
Mathematics Promotion Unit

ICMS WORKSHOP PROPOSALS 2013

October Deadline

Proposals are now invited for workshops to be held at the International Centre for Mathematical Sciences (ICMS) in Edinburgh during 2013. ICMS particularly welcomes proposals for workshops in rapidly developing and newly emerging areas where there is a need to evaluate new developments quickly. However, as a participating institution in Mathematics of Planet Earth 2013, we will be interested to receive proposals pertaining to relevant subject areas for that year (see www.mpe2013.org).

Proposals are sent for review and organisers are invited to respond to comments from reviewers before the programme committee's decision is made. Therefore normally one should submit at least 12–18 months in advance of the workshop time. To be reviewed and considered by the programme committee in February–March 2012 proposals should be received by **31 October 2011**.

Potential organisers should contact ICMS as early as possible to discuss ideas before submitting a firm proposal. The proposal document should not normally exceed five pages and should be submitted electronically (PDF, PS, Word or DVI). Full instructions on how to submit a proposal, together with details of the refereeing process and criteria for selection, can be

found on the webpage at www.icms.org.uk/proposals.php.

Successful applicants will be offered a funding package to contribute to the travel and subsistence of a proportion of the participants. ICMS staff will undertake all non-scientific administration and financial management connected with the workshop. One of the Scientific Organisers (often an author of the initial proposal) will be appointed Principal Organiser and be the main point of contact with ICMS.

For all enquiries about ICMS or to discuss the procedures for submitting a workshop proposal, please contact Jane Walker, Executive Secretary & Centre Manager, ICMS (jane.walker@icms.org.uk).

VISIT OF M. G. BRIN

Professor Matthew G. Brin (Binghamton University, New York) will visit the UK from 11 to 24 October 2011. Professor Brin's research ranges from geometric group theory to low-dimensional topology. He is an expert on the properties of the family of R. Thompson's groups, and has introduced for study the braided Thompson group BV and the family of higher-dimensional Higman–Thompson groups $\{sV\}$. Professor Brin will give seminars at:

- St Andrews, Pure Mathematics Colloquium, 13 October; contact Collin Bleak (collin@mcs.st-and.ac.uk)
- Newcastle, Pure Mathematics Colloquium, 20 October; contact Sarah Rees (sarah.rees@ncl.ac.uk)
- Southampton, Pure Mathematics Colloquium, 21 October; contact Brita Nucinkis (B.E.A.Nucinkis@soton.ac.uk)

For further details consult seminar webpages. Professor Brin will be based primarily at St Andrews, but will visit each institution for a time. The visit will be coordinated by Collin Bleak and is supported by an LMS Scheme 2 grant.

LONDON MATHEMATICAL SOCIETY

POPULAR LECTURES 2011

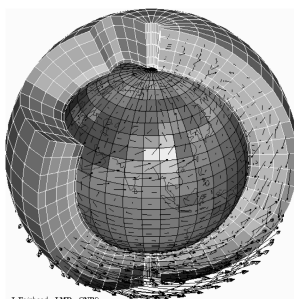
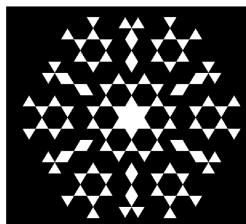
University of Birmingham – Thursday 29 September

Dr Colva Roney-Dougall

St Andrew's University

Symmetry, Chance & Determinism

By playing some games with symmetries, we'll discover the surprising fact that choosing randomly can give the same answer (almost) every time!



L.Parkland - LMD - CNRS

Dr Hilary Weller

University of Reading

How Climate Models Work and Could They Be Better?

Hilary Weller will describe some of the physics behind how the real climate works, some of the mathematics involved in creating a computer model of the climate to make climate predictions and how climate data is gathered in order to test the models.

We will see that, although climate models are far from perfect, some predictions can be made with confidence.

BIRMINGHAM: Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 pm. Admission is free, with ticket. **Register by Friday 23 September.**

To register for tickets, please email Lee-Anne Parker (leeanne.parker@lms.ac.uk) or visit the LMS website for a registration form (www.lms.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.

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VISIT OF E. O'BRIEN

Professor Eamonn O'Brien (University of Auckland) will be visiting the Mathematics Departments at Warwick (18–23 September), QMUL (24 September – 2 October) and Cambridge (2–8 October). His research area is computational group theory. Professor O'Brien will give seminars at:

- Warwick, 22 September, *Constructive recognition for classical groups*
- QMUL, 29 September, *A new model for computation with matrix groups*
- Cambridge, 5 October, *Algorithms for matrix groups over infinite fields*

For further details contact Derek Holt (D.F.Holt@warwick.ac.uk), Charles Leedham-Green (C.R.Leedham-Green@qmul.ac.uk), or Jan Saxl (J.Saxl@dpmms.cam.ac.uk). This visit is supported by an LMS Scheme 2 grant.

VISIT OF M. BICKIS

Professor Mikelis Bickis (University of Saskatchewan, Canada) will be visiting Durham University from 10 October to 16 December 2011. The focus of the research during this visit will be on study of the mathematical structure of various imprecise probability models, using tools derived from information geometry. During his visit, Professor Bickis will present three lectures (exact details will be advertised via Allstat and will be available from the contact persons):

- Oxford Brookes University, 7 November, *The geometry of imprecise inference* (date provisional; contact Fabio Cuzzolin: fabio.cuzzolin@brookes.ac.uk)
- Newcastle University, 2 December, *Calibration of p-values via the Dirichlet process* (contact Malcolm Farrow: malcolm.farrow@newcastle.ac.uk)
- Durham University, 5 December, *Imprecise predictive inference for logistic regression*
A workshop on Geometry of imprecise probability and related statistical methods will take

place at Durham University; the provisional dates are 1–2 November. All researchers who are interested to participate are most welcome. For further details contact Frank Coolen (frank.coolen@durham.ac.uk). The visit is supported in part by an LMS Scheme 2 grant.

VISIT OF T. ARAKAWA

Professor Tomoyuki Arakawa (Research Institute for Mathematical Sciences, Kyoto University) will be visiting the UK from 9 to 29 October 2011. His research areas include Mathematical Physics (CFT and vertex operator algebras) and Representation Theory (Yangians, W-algebras and Kac-Moody algebras). During his visit he will give talks at:

- University of Manchester, Tuesday 11 Oct
- University of Birmingham, Thursday 13 Oct
- University of Edinburgh, Tuesday 18 Oct
- University of Lancaster, Friday 21 Oct
- University of York, Monday 24 Oct

For further information contact Alexander Premet (alexander.premet@manchester.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF A. LOSKUTOV

Professor Alexander Loskutov (Moscow State University, Russia) will visit the UK from 2 to 23 October 2011. Professor Loskutov is head of the Dynamical Systems and Chaos Research Group at Moscow State University. His research interests are in the field related to applications of dynamical systems theory including chaos control, biomedical applications, financial mathematics, celestial mechanics and especially in billiard systems and time-dependent billiards. During his visit he will be based at the University of Warwick. He will give lectures at:

- University of Bristol, 3 October
- University of Warwick, 11 October
- Imperial College London, 13 October

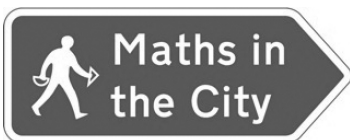
For more information contact Vassili Gelfreich (V.Gelfreich@warwick.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF M. SCHWEIZER

Professor Martin Schweizer (ETH Zürich, Switzerland) will be visiting Imperial College London from 9 to 15 October 2011, University of Warwick and University of Manchester from 26 October to 11 November. Professor Schweizer's research covers areas ranging from stochastic analysis and BSDE to utility maximization and pricing and hedging in incomplete market. He will give seminars at:

- Imperial College London, 12 October; contact Harry Zheng (h.zheng@imperial.ac.uk)
- University of Warwick, 1 November; contact Alex Mijatovic (a.mijatovic@warwick.ac.uk)
- University of Manchester, 9 November; contact Goran Peskir (goran@maths.manchester.ac.uk)

Further information about the visit can be obtained from Harry Zheng (h.zheng@imperial.ac.uk). The visit is supported by an LMS Scheme 2 grant.



SHINING A MATHEMATICAL SPOTLIGHT ON THE CITY

The sun shone, briefly, on the inaugural *Maths in the City* tour on Saturday 18 June 2011 in Oxford. Marcus du Sautoy, principal investigator on this EPSRC funded project, lead a group of competition winners and their families on a journey through central Oxford to explore the mathematics behind the engineering, technology and art that has created our urban environments.

Maths in the City, based at the Department for Continuing Education at the

University of Oxford, is developing mathematical walking tours of London and Oxford. The project was launched this Spring with a competition asking people to highlight the maths in their own cities. People from all over the world entered the competition including school students, teachers, researchers and interested members of the public. Winning and commended entries included the beautiful tessellations in the Tiled Hall in Leeds Central Library, wall paper and frieze groups decorating Real Street, Segovia, topology of metro lines and the structural strength of triangles. The overall winner was Nick Simmonds, a mathematics teacher from Reading, who applied graph theory to planning the perfect tourist route through Windsor.

All of the entries to the competition are now part of a virtual mathscape of the world at the *Maths in the City* website www.mathsinthecity.com. You can still add your own suggestions to this online tour guide and the site will keep growing as we develop the walking tours of London and Oxford. As well as supporting the walking tours the project will lead in 2012, the website will also allow anyone to take their own mathematical tours in many cities around the UK and across the world.

We are now working hard finessing our walking tour of Oxford and developing our tour of London. Marcus and his team of mathematicians (undergraduate and postgraduate students from University of Oxford) will lead both tours throughout Spring and Summer 2012. We hope to give the general public a mathematician's perspective of the city, so please do let us know your suggestions through the website and help us shine a mathematical spotlight on the city.

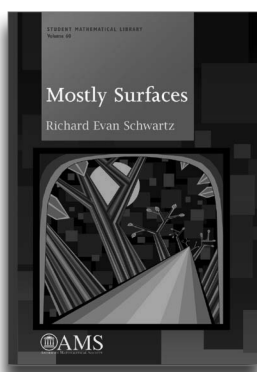
Rachel Thomas
Technology-Assisted Lifelong Learning (TALL)
Department for Continuing Education
University of Oxford

LONDON MATHEMATICAL SOCIETY

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AMERICAN MATHEMATICAL SOCIETY



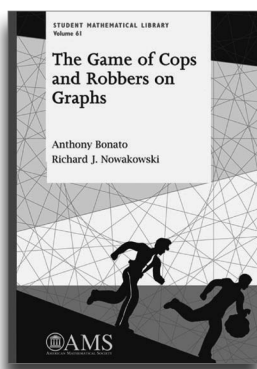
MOSTLY SURFACES

Richard Evan Schwartz, *Brown University*

Presents a number of topics related to surfaces, such as Euclidean, spherical and hyperbolic geometry, the fundamental group, universal covering surfaces, the Riemannian manifolds, the Gauss-Bonnet Theorem, and the Riemann mapping theorem. It also includes some material only tangentially related to surfaces, such as the Cauchy Rigidity Theorem, the Dehn Dissection Theorem, and the Banach-Tarski Theorem. The goal is to present a tapestry of ideas in a clear and rigorous yet informal way.

Student Mathematical Library, Vol. 60

Aug 2011 312pp 978-0-8218-5368-9 Paperback £34.50



THE GAME OF COPS AND ROBBERS ON GRAPHS

Anthony Bonato, *Ryerson University* &
Richard J. Nowakowski, *Dalhousie University*

This is the first book to examine the topic of Cops and Robbers games, and more generally, the field of vertex pursuit games on graphs. One of its main goals is to bring together the key results in the field; as such, it presents structural, probabilistic, and algorithmic results on Cops and Robbers games. Several recent and new results are discussed, along with a comprehensive set of references. The reader will gain insight into all the main directions of research in the field and will be exposed to a number of open problems.

Student Mathematical Library, Vol. 61

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GEOMETRY DAY

A one-day conference focusing on recent results in *Geometric Analysis* will take place on Friday 11 November 2011 at King's College London. Invited speakers include:

- Theodora Bourni (Freie Universität Berlin)
- Mark Haskins (Imperial College London)
- William Minicozzi (Johns Hopkins)
- Giuseppe Tinaglia (King's College London)
- Neshan Wickramasekera (Cambridge)

Everybody is welcome to attend the meeting as well as the dinner scheduled to take place afterwards. For updated information visit the website at www.kcl.ac.uk/nms/depts/mathematics/geometryday2.aspx. The meeting is supported by an LMS Conference grant.

FREE BOUNDARY PROBLEMS IN FLUID MECHANICS

A meeting focussing on the mathematics of free-boundary problems in viscous fluid mechanics (in particular Hele–Shaw and Stokes flows) and on related mathematical techniques is being held from 8 to 11 January 2012 at the University of Nottingham. The conference will seek to promote cross-fertilisation between different approaches and to honour the influential contributions of the late Dr Stan Richardson.

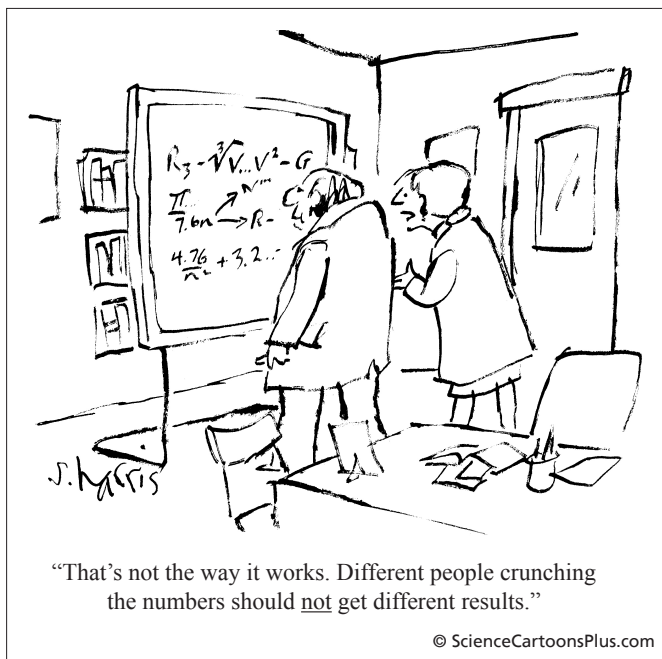
Enquiries should be addressed to John King (john.king@nottingham.ac.uk) or to Jane Mason (jane.mason@nottingham.ac.uk). The meeting is supported by an LMS Conference grant.

REPRESENTATION THEORY AND NUMBER THEORY

A meeting on the interactions between number theory, representation theory and ergodic theory will be held on Wednesday 23 November 2011 at the London campus of the University of East Anglia. Speakers include:

- Kevin Buzzard (Imperial College)
- Anish Ghosh (University of East Anglia)
- Jens Marklof (Bristol University)
- Vanessa Miemietz (University of East Anglia)
- Catharina Stroppel (University of Bonn)

For further information contact Anish Ghosh (a.ghosh@uea.ac.uk). Limited financial assistance is available for PhD students. The meeting is supported by an LMS Conference grant.



DAN QUILLEN MEMORIAL MEETING

There will be a memorial meeting for Dan Quillen in Oxford on the afternoon of Saturday 19 November 2011. He died on 30 April this year and was the Waynflete Professor from 1984 to 2006. The memorial meeting will include lectures by Sir Michael Atiyah and Mike Hopkins as well as musical contributions. In the evening there will be a dinner in his honour.

Further details will be made available at <http://tinyurl.com/3uouwa4>. For further information, email Ulrike Tillmann (tillmann@maths.ox.ac.uk).

An obituary was published in the June issue of the *LMS Newsletter* (No. 404).

- *Spatio-temporal evolution equations and neural fields*, 24–28 October, organizers: P. Bressloff, S. Coombes
- *Learning and plasticity*, 7–11 November, organizers: N. Brunel, W. Gerstner, J. Sjöström, H. Markram
- *Mathematical models of cognitive architectures*, 5–9 December, organizers: V. Jirsa, G. Deco

Registration is on a first-come first-served policy until all available slots are filled. For further information visit the website at www.sop.inria.fr/manifestations/SemesterCirm.

SYMMETRIES OF DISCRETE OBJECTS

A conference and MAGMA Workshop on *Symmetries of Discrete Objects* will be held at Rydges Lakeland Resort Hotel, Queenstown, New Zealand from 13 to 17 February 2012. This event will be a combination of a research conference on symmetries of discrete objects (such as graphs, maps/dessins, polytopes, Riemann surfaces and other complexes), and a MAGMA workshop, including some instructional courses (well suited for graduate students) on the MAGMA package and its capabilities (especially for handling discrete structures and their automorphisms).

The aim of the conference is to bring together researchers working in various inter-related fields, introduce their approaches and discoveries to one another, and to promote joint research in and between these fields. To achieve this we will have a small number of keynote talks, several contributed talks, at least one open problem session, and ample time for discussions and problem solving. Anyone with interest in automorphisms of discrete structures is welcome to consider attending.

For further information visit the website at www.math.auckland.ac.nz/~conder/SODO-2012/ or contact Marston Conder (m.conder@auckland.ac.nz) for further details.

THEORETICAL, MATHEMATICAL AND COMPUTATIONAL NEUROSCIENCE

A semester on *Theoretical, Mathematical and Computational Neuroscience* will take place at CIRM, Marseille from October – December 2011. Neuroscience and its applications are greatly developing world-wide and Europe is one of the important contributors to the advancement of this discipline. Because of the variety of topics that it has to address, it is characterized by a very broad inter-disciplinarity and requires the cooperation of actors in several fields of knowledge.

In this context, the need for developing new theoretical, mathematical, and computational tools can be clearly identified and must be addressed. The purpose of this semester is to present some of the relevant modern mathematical tools through short courses and to explore several facets of the current research through the following workshops.

- *Mean-field methods and multiscale analysis of neuronal populations*, 3–7 October, organizers: N. Brunel, O. Faugeras

RECORDS OF PROCEEDINGS AT LMS MEETINGS

REGIONAL ORDINARY MEETING

held on *Tuesday 14 June 2011* at the University of Birmingham. Over 50 members and visitors were present for all or part of the meeting.

The meeting began at 2.00 pm, with the President, Professor A.J. MACINTYRE, FRS, in the Chair.

Five people were elected to Ordinary Membership: G. Adesso, R.A.N. Emanuel, A. Neishtadt, O. Rath Spivack, T. Ward; and two people were elected to Associate Membership: S. Krumscheid, M. Tarawneh.

The Records of Proceedings of the Society Meeting held in Oxford on 25 February 2011 were signed as a correct record.

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

Before the talks began, the President read out the following statement:

"Finally, I come to what is a distressing first, certainly for me and probably for our Society, which is almost 150 years old. A local member of the Society has been excluded from this building and hence from our meeting. Neither I nor anyone here is in a position to assess or discuss any details. I deplore the action, taken against someone who has given selflessly of his time and intellect to advance mathematics in this country, both under the auspices of the LMS and independently."

Dr S. GOODWIN introduced a lecture given by Professor Miles Reid on *Rings and varieties*.

Dr Goodwin then introduced a lecture given by Professor Shaun Stevens on *Representations of p -adic groups and the local Langlands conjectures*.

After tea, Dr Goodwin introduced a lecture given by Professor Catharina Stroppel on *Algebraic categorification: ideas and examples*.

The Chair expressed the thanks of the Society to the local organisers and the speakers for putting on such an interesting meeting.

After the meeting a wine reception and poster competition were held, followed by dinner at the Staff House Restaurant on campus.

LMS MIDLANDS REGIONAL MEETING 2011

Report

The 2011 Midlands Regional Meeting of the LMS was held on Tuesday 14 June at the University of Birmingham. The title of the meeting was *Representation theory in modern mathematics*. The meeting began with the usual

formal business of the Society, which was chaired by the President, Angus Macintyre, after which Angus handed over to the local organiser Simon Goodwin.

The day consisted of three talks. Miles Reid

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spoke first and his talk was entitled *Rings and varieties*. The focus of his talk was the study of certain algebraic varieties of dimension 3, called Fano 3-folds. One can study a Fano 3-fold by associating to it a graded Gorenstein ring. Picking a basis for this ring provides an embedding of the 3-fold into a projective space. When the 3-fold has codimension less than or equal to three much is known (for example there is a classification of these objects), but the case of codimension greater than 4 is still unknown. His talk concerned some recent investigations into the case of codimension equal to 4.

The second speaker was Shaun Stevens whose talk was entitled *Representations of p -adic groups and the local Langlands conjectures*. Given a p -adic field, one can take the algebraic closure of this field and consider the Galois group of the resulting field extension. In the classical setting the local Langlands conjecture says that there is a natural bijection between the irreducible smooth representations

of the general linear group over the p -adic field and the so called Weil group associated to the p -adic field. The focus of this talk was the consideration of this conjecture in the context of other classical groups.

After the tea break the final lecture was given by Catharina Stroppel, whose talk was entitled *Algebraic categorification: ideas and examples*. Categorification is a tool currently at the forefront of representation theory. One of the features of categorification is that it gives us a better understanding of induction and restriction as functors between the representation categories of a specific object. For example Chuang and Rouquier have used categorification to prove Broué's abelian group conjecture for symmetric groups. The focus of the final talk was categorification in more general settings, such as Brauer algebras.

The meeting ended with a dinner held in the Staff House at the University of Birmingham.

Jay Taylor
University of Aberdeen

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *Wednesday 20 April 2011* at the University of Leicester during the British Mathematical Colloquium. Over 80 members and visitors were present for all or part of the meeting.

The meeting began at 11.30 am with the Vice-President, Professor J. GREENLEES, in the Chair.

Five people were elected to Ordinary Membership: D. Bewsher, G-Q.G. Chen, I.L. Lopez Franco, C. Mouchot, M. Winkel; and four people were elected to Associate Membership: T.F. Bloom, A. El-mabrok, J. Grahl, Z. Zaidi.

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

Professor Greenlees introduced a lecture given by Professor Elon Lindenstrauss on *Entropy & Quantum Unique Ergodicity*

The Chair expressed the thanks of the Society to the speaker for giving such a fascinating lecture.

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *Tuesday 31 May 2011* at De Morgan House. 33 members and visitors were present for all or part of the meeting.

The meeting began at 10.50 am, with the Vice-President, Professor K. BROWN, FRSE, in the Chair.

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

Education Secretary Professor C.J. BUDD introduced the first session *The transition from school to university*. Short presentations were given by Dr Tony Gardiner on the *Current state of play of A-Level and future directions for A-Level* and Professor Jeremy Levesley on *How can HE be involved in challenging sixth form students?*, followed by discussion groups and feedback sessions.

After lunch Professor Budd introduced the second session *Training of lecturers*. Short presentations were given by Dr Neil Challis on *Content of HE courses* and Professor Alexandre Borovik on *Lecturer training*, followed by discussion groups and feedback sessions.

The Chair expressed the thanks of the Society to the organisers and the speakers.

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EDUCATION DAY

Report

The LMS Education Committee held an Education Day at De Morgan House on 31 May 2011. The day attracted 33 participants from a wide variety of Universities. The Education Day aimed to bring together educators from the full spectrum of mathematics departments to discuss the issues currently facing HE mathematics.

The Education Committee was aware that there was a range of opinion amongst academic mathematicians about educational issues, and the Education Day sought to hear views from a broad range of HE institutions. Four themes were discussed, all of which had been identified by the Education Committee as being of interest.

The morning focused on A-Level, looking

at the current state of play and future directions, with consideration given to how A-Level students who want to take mathematics (or cognate disciplines) at University level could be supported by HE.

The afternoon session looked at HE issues: advantages and disadvantages of a common HE syllabus and the training of new mathematics lecturers.

Tony Gardiner, Jeremy Levesley, Neil Challis and Alexandre Borovik (Professor Borovik is a Trustee and a member of the LMS Council but was speaking in his personal capacity) introduced these themes, and discussion groups then considered the issues in more detail. There was strong agreement that the sequential nature of mathematics did not lend itself well to modular courses and that there was a preference for a linear (or at least less-modular) A-Level. There was also a sense that

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university and school mathematics were not working together well, and that there should be more involvement in enrichment activity. Solving mathematical problems was mentioned as being of particular value by many participants.

There was also some discussion of whether HE mathematics should look to a common curriculum. There was no support for such a move, and it was felt that the current QAA Benchmark for mathematics was sufficient. Most participants felt that mathematics students are a diverse group, wishing to follow mathematics for different reasons and that HE mathematics should reflect this diversity in its courses.

With regard to lecturer training, there was regret about the likely closure of the MSOR programme, which was highly thought of by many. It was hoped that at least part of MSOR's work with new lecturers could be continued in some way. There was discussion of the balance to be struck between generic training and mathematics specific training. Professor Borovik suggested that the LMS could perhaps itself be a provider of mathematics specific lecturer training: high quality, reasonably priced and competitive.

The Education Committee will be considering the ideas that the participants suggested, and will look further at how the LMS can support educational activity. It was felt that the day was a success and the Committee looks forward to future events.

Chris Budd
Chair, Education Committee

SOCIETY MEETING

Report

The meeting opened at 3.30 pm on Friday 1 July 2011 at Goodenough College, Mecklenburgh Square, London WC1. The College was established in 1930, with building work commencing in 1935 under the direction

of the architect Sir Herbert Baker. Among Baker's other well known designs are Rhodes House in Oxford and the Union Buildings in Pretoria, South Africa. The list of many notable alumni includes F.W. de Clerk and Professor G.F.R. Ellis.

Following LMS business, the President, Professor Angus Macintyre, FRS, proceeded to the lecture programme, the first lecture being given by Professor Robert McCann, University of Toronto, on *Geometric Variational Problems in Economics*.

Professor McCann began by introducing the idea of multidimensional screening. A typical example would be a car manufacturer who wants to sell a range of models to a population of potential buyers. The preferences of the buyers are only known in the aggregate, and the valuation, or cost, of a particular model to a consumer is defined. If the distribution of different consumers (parameterized, say, by wealth) and the cost to the manufacturer of producing a particular model are known, the problem for the manufacturer is to decide how much to charge for each model so as to maximize their profits.

Realistic modelling of such problems involves optimization in multidimensional spaces, which represent, for example, the different types of vehicles (air conditioning, fuel efficiency, safety, styling, etc.) and the different populations of buyers, who vary in wealth, age, family size, commuting needs, etc. While sophisticated numerical algorithms can be devised for analysing such problems, convexity of the cost function is often crucial. Professor McCann's lecture was devoted to explaining how the presence of convexity may be determined when the dimension of the product and buyer spaces coincide.

The key condition is expressed in terms of the non-negative cross-curvature of the cost function. This concept arose in studies of optimal maps in the Monge–Kantorovich

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *Friday 1 July 2011* at Goodenough College London. About 40 members and visitors were present for all or part of the meeting. The meeting began at 3.30 pm, with the President, Professor A.J. MACINTYRE FRS, in the Chair.

Five people were elected to Ordinary Membership: T.E. Brendle, J. Bridgwater, M.S. Gate, S. Lyle, A.J. Walker; one was elected to Associate Membership: A. Theofanis; and one was elected to Reciprocity Membership: A.O. Egonmwan.

One member signed the book and was admitted to the Society.

On a recommendation from Council it was agreed to elect Dr D.J. Collins and Professor P.T. Saunders as scrutineers in the forthcoming Council elections.

The President, on Council's behalf, proposed that Professor Nancy Kopell of Boston University and Professor Yuri Manin of the Northwestern University be elected to Honorary Membership of the Society. The President read a short version of the citations, to be published in full in the Bulletin.

The President then announced the awards of the prizes for 2011:

Pólya Prize	Professor E. Brian Davies, FRS (King's College London)
Senior Whitehead Prize	Dr Jonathan Pila (University of Oxford)
Naylor Prize and Lectureship	Professor J. Bryce Mcleod, FRS (University of Oxford)
Whitehead Prizes	Dr Jonathan Bennett (University of Birmingham)
	Dr Alexander Gorodnik (University of Bristol)
	Professor Barbara Niethammer (University of Oxford)
	Dr Alexander Pushnitski (King's College London)

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

The President also announced the winner of the joint IMA–LMS Christopher Zeeman Medal to be Professor John Barrow, FRS.

The President introduced a lecture given by Professor Robert McCann on *Geometric Variational Problems in Economics*.

Following a break for tea, the President introduced a lecture by Professor Cédric Villani, the 2010 Fields Medallist, on *Economic Methods in Geometry*.

At the end of the meeting, the President thanked both speakers for their brilliant lectures.

After the meeting, a reception was held at De Morgan House, followed by a dinner at the Blue Door Bistro in the Montague Hotel.

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transportation problem, and it enables ideas and results from Riemannian geometry to be exploited in the formulation of optimal pricing strategies. Professor McCann described how the condition is used to establish convexity, uniqueness, and hence stability of the strategies.

The President thanked Professor McCann for a most interesting talk, and following well-deserved applause, the speaker enjoyed informal conversations with members over afternoon tea.

At 5.15 pm the meeting reconvened, and the President introduced Professor Cédric Villani from the University of Lyon, Director of the Institut Henri Poincaré, and 2010 Fields Medallist. The title of Professor Villani's talk was *Economic Methods in Geometry*.

Professor Villani introduced one of his heroes of mathematics, Leonid Kantorovich. Among Kantorovich's many contributions to our subject is his pioneering work on linear

programming. His seminal ideas and their applications to financial and production management were recognized in 1975 with the award of the Nobel Prize in economics. Professor Villani described the Kantorovich problem (1942) to find a probability measure on the product of two metric separable spaces that attains the infimum of a cost function. He went on to explain the link between the Kantorovich problem and the Monge mass transport problem, in which the transport map is described by the push forward of the probability measure from one space to the other. The map which attains the infimum is the optimal transport map.

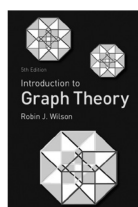
Monge's original paper, published in 1781 (Professor Villani pointed out that it appeared on page 666 of *Mémoires de l'Académie Royale*, indicating its devilish nature!), was concerned with the transportation of ore from mines to factories. In more recent years, the Monge–Kantorovich problem has been much studied and applied to a diverse range of problems, from the semi-geostrophic equations of meteorology to the reconstruction of the early universe.

Professor Villani went on to describe some very beautiful connections between optimal transport and Riemannian geometry, focussing in particular on metric-measure spaces of positive Ricci curvature. He pointed out how variational methods originating in Kantorovich's work on economics have solved problems related to curvature and distortion.

It is impossible to capture in a few paragraphs the breadth and depth of the concepts presented by Professors McCann and Villani, and one can only recommend a visit to their websites to gain a greater appreciation of this exciting area of research, and the confluence of ideas – old and new.

The meeting thanked Professor Villani for his stimulating and most entertaining

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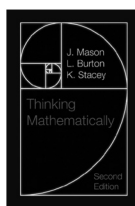


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talk, whereupon members and their guests returned to De Morgan House for a reception.

Ian Roulstone
University of Surrey

REVIEW

The Best Writing on Mathematics 2010 edited by Mircea Pitici, Princeton University Press, 2010, 440 pp, £13.95, \$19.95, ISBN 978-0-6911-4841-0.

The Best Writing on Mathematics 2010 is a diverse collection of thirty-five articles on and about mathematics appearing in 2009. Whilst a good number of them are taken from familiar publications such as *Mathematical Intelligencer* and *Notices of the AMS*, the majority appear in places I (for one) would not normally look, or even have heard of.

Initially approaching this book as something of a bag of sweets, I was a little disappointed not to find more articles of the kind found in the section called *Mathematics and Its Applications*, short pieces about some interesting bit of mathematics. For example 'Knowing When to Stop: How to Gamble If You Must – The Mathematics of Optimal Stopping' is a very nice exposition by Theodore Hill around the Marriage Problem (or Secretary Problem). However, one could reason that this sort of article is readily available and that we don't really need a guide to locate them.

In a similar vein to *Mathematics and Its Applications*, although about mathematics in general rather than specifics, are the sections entitled 'Mathematics Alive' and 'Mathematicians and the Practice of Mathematics'. These consist of articles which often defy classification, ranging from 'What is Financial

Mathematics' to the very promising sounding 'If Mathematics Is a Language, How Do You Swear in It?', and from a short description of Tim Gowers' recent 'Massively Collaborative Mathematics' project to the somewhat rambling 'Birds and Frogs'. These pieces really are varied, and contain some thought-provoking stuff together with the slightly disappointing.

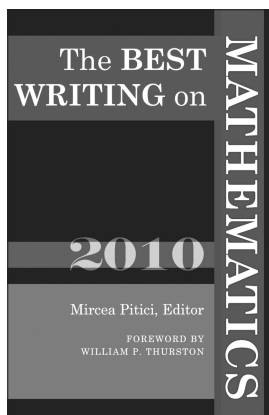
The bulk of the book lies in the sections on education, history and philosophy. This is where things get more serious, and is perhaps where the book is most useful. 'Mathematics

Education' contains well-chosen journal articles covering very diverse aspects of the area. I enjoyed all of these pieces and so am loathe to pick out one or two for mention, but they encompass adolescent learning, textbooks, special needs teaching, aesthetics, cognition, mathematical writing and the use of paper models in geometry. Six out of seven of these articles I would not otherwise have read or indeed have known about had they not been served up to me on a plate.

'History and Philosophy of Mathematics' also consists mostly of scholarly pieces, and includes articles on Kronecker, Rota, inconsistent mathematics and mathematical belief.

As a mathematician engrossed in my own area, but who will read *Mathematical Intelligencer* if it is on the table of a common room, I've been delighted to have this book in my house. One inevitably will not agree with every choice of work for inclusion, but it would be a dull book if it simply presented us with what we like. What is important is that it is varied and balanced, and contains the odd surprise.

Charles Eaton
University of Manchester



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CALENDAR OF EVENTS

This calendar lists Society meetings and other mathematical events. Further information may 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).

Please send updates and corrections to calendar@lms.ac.uk.

SEPTEMBER 2011

- 1-2 Harmonic Analysis and PDE Workshop, Madrid, Spain (405)
- 1-3 British Topology Meeting, Edinburgh (405)
- 1-3 British Logic Colloquium, Edinburgh (405)
- 5 Function Theory Meeting, London (405)
- 5-6 Preparing for Student Led Education CETL-MSOR Conference, Coventry (405)
- 5-7 Domains X Workshop, Swansea (405)
- 5-8 Partial Differential Equations and Spectral Theory Meeting, Imperial College London (404)
- 5-9 European Women in Mathematics General Meeting, Barcelona (396)
- 5-9 Accelerating Industrial Productivity via Deterministic Computer Experiments and Stochastic Simulation Experiments Workshop, INI, Cambridge (402)
- 5-9 Mathematical Imaging in Interaction with Biomedicine ICMS Workshop, Edinburgh (405)
- 5-9 ENUMATH Conference 2011, Leicester (404)
- 7-8 The Mathematics of Turbulent Diffusion Meeting, Sheffield (404)
- 8-9 Heilbronn Annual Conference, Bristol (404)
- 10-15 British Science Festival, Bradford (405)
- 11-17 Turning Dreams into Reality ICME, South Africa (388)
- 12-16 Networks: Stochastic Models for Populations and Epidemics ICMS Workshop, Edinburgh (405)

- 12-16 Perspectives in Algebraic Lie Theory Workshop, INI, Cambridge (403)
- 15-16 Induction Course for New Lecturers, Birmingham (405)
- 17 **De Morgan House Open Day, London (405)**
- 19-21 Mathematical & Theoretical Ecology Meeting, Essex (405)
- 19-23 Hyperbolic Conservation Laws and Related Analysis with Applications ICMS Workshop, Edinburgh (405)
- 22 Supporting Postgraduates Who Teach Workshop, Birmingham (405)
- 27 Supporting Postgraduates Who Teach Workshop, Nottingham (405)
- 28 Supporting Postgraduates Who Teach Workshop, Leeds (405)
- 29 **LMS Popular Lectures, Birmingham (406)**
- 30 Supporting Postgraduates Who Teach Workshop, London (405)

OCTOBER 2011

- 3 Supporting Postgraduates Who Teach Workshop, Southampton (405)
- 3-7 Mean-field Methods and Multiscale Analysis of Neuronal Populations Workshop, CIRM, Marseille (406)
- 3-7 Dynamical Systems and Classical Mechanics ICMS Workshop, Edinburgh (405)
- 5 Supporting Postgraduates Who Teach Workshop, Cardiff (405)
- 7-8 **LMS South-West and South Wales Regional Meeting, Exeter (406)**
- 10 Supporting Postgraduates Who Teach Workshop, Bristol (405)
- 11 **Computer Science Day, London**
- 20 Mathematics in Defence Conference, Shrivenham (401)
- 20 Supporting Postgraduates Who Teach Workshop, Sheffield (405)
- 24-28 Spatio-temporal Evolution Equations and Neural Fields Workshop, CIRM, Marseille (406)
- 28 Supporting Postgraduates Who Teach Workshop, Edinburgh (405)

NOVEMBER 2011

- 3 Supporting Postgraduates Who Teach Workshop, Manchester (405)
 7-11 Learning and Plasticity Workshop, CIRM, Marseille (406)
 11 Geometry Day, King's College London (406)
 12-13 MathsJam Weekend, Wychwood Park (405)
 15 *How Fast Can Usain Bolt Run?* Gresham College Lecture, Museum of London (406)
 18 **LMS AGM, London**
 19 Dan Quillen Memorial Meeting, Oxford (406)
 23 Representation Theory and Number Theory Meeting, London (406)
 29-3 Dec SAMS-AMS Joint International Congress, Port Elizabeth, South Africa (406)
 30 BCS-FACS Evening Seminar, London (406)

DECEMBER 2011

- 5-9 Mathematical Models of Cognitive Architectures Workshop, CIRM, Marseille (406)
 12-16 Inverse Problems in Science and Engineering INI Workshop, Cambridge (401)
 13 *David and Goliath*, Gresham College Lecture, Museum of London (406)

JANUARY 2012

- 8-11 Free Boundary Problems in Fluid Mechanics Meeting, Nottingham (406)
 17 *Citius, Altius, Fortius*, Gresham College Lecture, Museum of London (406)
 31-2 Feb Cryptographic Theory INI Workshop, Cambridge (404)

FEBRUARY 2012

- 13-17 Symmetries of Discrete Objects Conference, Queenstown, New Zealand (406)
 21 *Let's Twist Again*, Gresham College Lecture, Museum of London (406)

MARCH 2012

- 21 Zeeman Medal 2011 Award Ceremony, The Royal Society, London (406)
 27 *On the Waterfront*, Gresham College Lecture, Museum of London (406)
 26-30 **LMS Invited Lectures, Alexei Borodin, Glasgow (406)**

APRIL 2012

- 16-19 BMC 2012, Canterbury
 17-19 Frontiers of Nevanlinna Theory 3: Applications of Nevanlinna Theory to Differential and Functional Equations, University College London (401)
 24 *Final Score*, Gresham College Lecture, Museum of London (406)

MAY 2012

- 28-1 Jun Boundary Value Problems for Linear Elliptic and Integrable PDEs: Theory and Computation ICMS Workshop, Edinburgh (405)

JUNE 2012

- 18-20 Frontiers of Nevanlinna Theory 4: Nevanlinna Theory and Number Theory, University College London (401)

JULY 2012

- 2-7 6th European Congress of Mathematics, Kraków, Poland (397)

AUGUST 2014

- 13-21 ICM 2014, Seoul, Republic of Korea (403)

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J. WALMSLEY

LMS member 1869–1914



A.F. Lafosse, Manchester

John Walmsley, BA
Founder of Eccles Grammar School, Manchester