

## NEWSLETTER

#### No. 410 January 2012

## Society Meetings and Events

#### 2012

**Monday 9 January** Spitalfields Day, INI, Cambridge

Friday 24 February Mary Cartwright Lecture, London [page 3]

26–30 March LMS Invited Lectures, Glasgow [page 28]

Friday 27 April Women in Mathematics Day, London [*page* 22]

Saturday 19 May Poincaré Meeting, London

Wednesday 6 June Northern Regional Meeting, Newcastle

Friday 29 June Meeting and Hardy Lecture, London

### NEWSLETTER ONLINE:

Go to www.lms.ac.uk/ newsletter

## LMS COUNCIL DIARY 18 November 2011

#### A personal view

The November Council meeting is a relatively short one, as it is immediately followed by the AGM. Once the routine but essential business is dealt with, there is not much time to devote to matters of serious debate or controversy.

As usual, a fair proportion of the time available was devoted to policy matters, including a revised discussion document on Masters Degrees prepared by Marco Marletta for the Research Policy Committee. While the funding of Masters Degrees in mathematical sciences has been unsatisfactory for many years, our current focus cannot be on improving matters, but rather on trying to ensure that they do not get catastrophically worse.

The LMS is also preparing a response to the House of Lords Science and Technology Committee inquiry on HE in STEM subjects, which we hope will be endorsed by the CMS (Council for Mathematical Sciences). The CMS will also respond to EPSRC's 'Action Plan' in response to the International Review of Mathematics. (An update on CMS activities can be found on page 14.) It remains to be seen whether this 'Action Plan', or its implementation, will do anything to dispel

the widespread perception that EPSRC is simply not listening to the mathematical community.

There are three standing committees of Council which are chaired by people who are not currently members of Council (the Women in Mathematics Committee, the Computer Science Committee, and the Research Meetings Committee). This can lead to a certain feeling of disconnection, which we are seeking to reduce by re-introducing a system of annual reports from committees to Council. At this meeting, Gwyneth Stallard, Chair of WiMC, reported on the work of that committee. This led to a discussion of the future of the Good Practice Award/Scheme for mathematics departments in HE. Likely changes in the external environment suggest that it makes more sense for the LMS to encourage take-up of the Athena Swan Award (run under the auspices of the Roval Society), rather than implement our own award. Council agreed an increased budget for the WiMC for the current financial year, to enable them to prepare background materials for the scheme.

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There was also a written report from the Computer Science Committee, which had been asked to review its role and activities. Changes recommended were some widening of the remit of the committee, and small changes to its constitution.

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The outgoing President, Angus Macintyre, thanked the outgoing Officers, Brian Stewart (Treasurer), Stephen Huggett (Programme Secretary) and Chris Budd (Education Secretary) for their enormous contributions to the Society over many years, and wrapped up the meeting in good time to prepare for the AGM.

Robert Wilson

## SOCIETY PRIZES DEADLINE

Readers are reminded that the deadline for receipt of nominations for the 2012 Society Prizes is **Friday 13 January 2012**. Prizes available in 2012 include the *Pólya Prize*, *Fröhlich Prize*, *Senior Berwick Prize* and up to four *Whitehead Prizes*. A nomination form can be downloaded from www.lms.ac.uk/content/ nominations-lms-prizes. For full details of all these prizes please see the Society's November *Newsletter* (No. 408) or email prizes@lms.ac.uk.

## SIXTH EUROPEAN CONGRESS OF MATHEMATICS

The London Mathematical Society has set aside funds to be used for making grants to support the attendance of UK-based mathematicians at the *Sixth European Congress* of *Mathematics*, Kraków, 2–7 July 2012 (www.6ecm.pl). The Society would particularly like to support those mathematicians at an early stage in their career, including postdocs. You do not need to be an LMS member to apply.

Please contact Elizabeth Fisher for an application form (Imsmeetings@Ims.ac.uk, tel. 020 7291 9973) or download one from the LMS website (www.Ims.ac.uk). Applications should be submitted by **16 March 2012** and applicants will be informed of the outcome by early April.

## **LMS Newsletter**

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# LONDON MATHEMATICAL SOCIETY

## MARY CARTWRIGHT LECTURE AND SOCIETY MEETING

### Friday 24 February 2012

Black Suite, BMA House, Tavistock Square, London WC1H 9JP

#### **Programme:**

**3.30** Opening of the meeting

Tom Lenagan (Edinburgh) Totally nonnegative matrices

#### 4.30 Tea

5.00 Mary Cartwright Lecture

Agata Smoktunowicz (Edinburgh) Old and new questions in noncommutative algebra



Mary Cartwright giving a lecture at Swansea University

A reception will be held after the meeting at BMA House followed by a dinner at the Number Twelve Restaurant, Ambassador Hotel, at a cost of £32 per person, inclusive of wine. If you would like to attend the dinner, please contact Elizabeth Fisher (Imsmeetings@Ims.ac.uk) by **17 February**.

There are limited funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting. Contact Duncan Turton/Elizabeth Fisher (womeninmaths@lms.ac.uk) for further information.

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## 2011–12 COUNCIL

As a result of the annua	al election, membership of the Council is the following:
President	Professor G.B Segal, FRS (University of Oxford)
/ice-Presidents	Professor K.A. Brown, FRSE (University of Glasgow)
	Professor J.P.C. Greenlees (University of Sheffield)
Freasurer	Professor R.T. Curtis (University of Birmingham)
General Secretary	Professor J.M.E. Hyland (University of Cambridge)
Programme Secretary	Professor R.A. Wilson (Queen Mary, University of London)
Publications Secretary	Professor J.D.S. Jones (University of Warwick)
Education Secretary	Dr A.D. Gardiner (University of Birmingham)
Vembers-at-Large	Dr J.E. Barrow-Green (Open University) – current LMS Librarian
-	* Professor A.V. Borovik (University of Manchester)
	* Dr D.E. Buck (Imperial College London)
	Professor Sir S.K. Donaldson, FRS (Imperial College London)
	Professor J.R. Hunton (University of Leicester)
	* Professor W.S. Kendall (University of Warwick)
	Professor A. Laptev (Imperial College London)
	Professor E.L. Mansfield (University of Kent)
	* Professor M. Marletta (Cardiff University)
	* Dr C.M. Roney-Dougal (University of St Andrews)
	* Professor U.L. Tillmann, FRS (University of Oxford)
	Professor B.J. Totaro, FRS (University of Cambridge)

\* Members continuing the second year of their two-year election in 2010

#### **Nominating Committee**

Also at the AGM, Frances Kirwan, FRS (University of Oxford) and Michael Prest (University of Manchester) were elected to the Nominating Committee for three-year terms of office.

Continuing members of the Nominating Committee are Alison M. Etheridge, Martin Liebeck, Caroline Series (Chair), Michael A. Singer and Andrew M. Stuart. Council will also appoint a representative.

### **RETIRING OFFICERS**

#### PROFESSOR ANGUS MACINTYRE (President)

After two years in office Professor Angus Macintyre handed over the LMS Presidency at the AGM in November 2011. Professor Macintyre has had a long and distinguished academic career and his broad vision of mathematics has been enormously valuable to the Society. During his tenure as LMS President he has been committed to increasing openness and greater involvement of the membership, and a number of new initiatives have resulted: the development of the Society's new website providing invaluable means of communication for LMS members and the wider mathematics community; the funding of independent activities by young researchers in mathematics, and moves towards a new membership initiative to help ensure the Society's future. The past two years have been a time of challenge for the mathematical sciences in the UK. Professor Macintyre has led the Society in dealing with a range of very important issues - including the International Review of the Mathematical Sciences to which the Society made significant submissions, the issue of impact and the 2014 REF, the consequences of cuts in science funding announced in the 2010 comprehensive spending review, the position of mathematics within the National Curriculum Review and the recent changes in EPSRC funding policy. He has had a busy Presidency. Professor Macintyre has represented the Society with enormous distinction not only in the UK and but also abroad. He led the LMS delegation to the 2010 International Congress and has been very active internationally. He has actively promoted all areas of interest to the Society and provided inspiring leadership to the Society in a difficult period. The LMS would like to thank him for his tireless service and wish him well in his future endeavours.

#### PROFESSOR CHRIS BUDD (Education Secretary)

newsletter@lms.ac.uk

Professor Chris Budd stood down as Education Secretary at the 2011 AGM. He served the LMS as Education Secretary since 2006 and during that time he has been instrumental in making education one of the most important activities within the LMS. Professor Budd personally has been a passionate and enthusiastic advocate for mathematics education, and also the popularisation of mathematics.

At Professor Budd's last Education Committee meeting, Professor Martin Hyland, the LMS General Secretary, placed on record the LMS's gratitude to Professor Budd for his considerable efforts and enormous commitment, not only to the LMS but also to the mathematics community as a whole.

In early 2012, Professor Budd will take up a new post as the Vice-President of the Institute of Mathematics and its Applications with responsibility for communications and outreach. He will also serve on the REF panel.

#### DR STEPHEN HUGGETT (Programme Secretary)

The LMS regulations mandate that no-one may serve more than ten consecutive years on Council, and for that reason Dr Huggett did not stand for re-election in the November elections.

For almost twenty years Dr Huggett has served the LMS in an exceptionally broad range of positions. These include:

1992–2001 Member of Education Committee 1996–2001 Secretary of Education Committee 2001–2011 Member of Council and F&GPC 2001–2011 Meetings and Membership Secre-

- tary, renamed Programme Secretary 2004–2011 Chair of International Affairs Committee
- 2010– Chair of Website Working Group 2011– Chair of 2015 Celebration

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Committee In addition. Dr Huggett is very active in the

European Mathematical Society, as Secretary and Member of the Executive Committee.

At the October meeting of Programme Committee, the LMS President, Angus Macintyre, paid tribute to Dr Huggett's work for the LMS and for the national and international communities of mathematicians. Dr Huggett has travelled more than anyone on behalf of the Society, to Regional Meetings, to BMCs and BAMCs and to ICMs and ECMs. Because of this and because of his meticulous work on the Society's Research Grants Schemes (more and more important these days, and more and more appreciated) he has probably had more direct contact with the membership than any other Officer. He has been deeply involved with the Society's solidarity efforts, in particular with African mathematicians.

#### DR BRIAN STEWART (Treasurer)

Dr Brian Stewart served as Education Secretary from 2002 to 2005. In the summer of 2009 he

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agreed to take on the position of Treasurer at a particularly difficult time.

Over the last two years Dr Stewart has guided Council with a pragmatic and prudent approach. He exemplifies virtues of social responsibility, unsparing honesty, dry humour, hard work and commitment to the mathematical community, and has steered the finances of the Society in a sound and secure manner.

#### **Chair of Research Meetings Committee**

Council would also like to recognise the work of Professor Nick Manton, FRS. Nick has been chair of the LMS Research Meetings Committee since 2008 and is now stepping down to due to other commitments. The Society would like to thank Nick for the time and effort he has committed to the Society and its charitable aims. In addition to the foregoing the Society thanks all those who have served as members of its various committees and who are now standing down. Without such dedicated volunteers the Society would be unable to support and represent mathematics and the mathematical community as it does.

## SPITALFIELDS DAYS

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

A Spitalfields Day is usually associated with a long-term symposium on some specialist topic at a UK university. One of the symposium organizers is asked to arrange a one-day



meeting at which selected participants, often distinguished experts from overseas, will give survey lectures on topics in the field of the symposium or other types of lecture accessible to a general mathematical audience. These meetings are publicized in the *Newsletter* and all members are invited to attend.

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

Anyone involved in running a symposium who would be interested in organizing a Spitalfields Day is invited to write to Dr R.A. Wilson, Programme Secretary at the Society (grants@lms.ac.uk). The format need not be precisely as described, but should be in a similar spirit.

## Cecil King Travel Scholarship

LONDON MATHEMATICAL SOCIETY

The London Mathematical Society annually awards a £5,000 Cecil King Travel Scholarship in Mathematics to a young mathematician of outstanding promise. The Scholarship is awarded to support a period of study or research abroad, typically for a period of three months. Study or research in all areas of mathematics is eligible for the award.

The award is competitive and based on a written proposal describing the intended programme of study or research abroad and the benefits to be gained from such a visit. A shortlist of applicants will be selected for an interview during which they will be expected to make a short presentation on their proposal.

Applicants should normally be nationals of the UK or Republic of Ireland, either registered for or having recently completed a doctoral degree at a UK University.

Applications should be made using the form available on the Society's website (www.lms.ac.uk/content/cecil-king-travel-scholarship) or by contacting education@lms.ac.uk. The closing date for applications is **Friday 2 March 2012.** It is expected that interviews will take place in London in late April or early May.

The Cecil King Travel Scholarship was established in 2001 by the Cecil King Memorial Fund. The award is made by the Council of the London Mathematical Society on the recommendation of the Cecil King Prize Committee, nominated by the Society's Education Committee.

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Isaac Newton Institute for Mathematical Sciences

### LOGICAL APPROACHES TO BARRIERS IN COMPLEXITY II

#### 26–30 March 2012

in association with the Newton Institute programme Semantics and Syntax: A Legacy of Alan Turing (9 January – 6 July 2012)

**Organisers:** Arnold Beckmann (University of Swansea) and Anuj Dawar (University of Cambridge).

Computational complexity theory has its origin in logic. The fundamental goal of this area is to understand the limits of efficient computation (that is, understanding the class of problems which can be solved quickly and with restricted resources) and the sources of intractability (that is, what takes some problems inherently beyond the reach of such efficient solutions). The most famous open problem in the area is the P=NP problem, listed among the seven Clay Millenium Prize problems. Logic provides a multifarious toolbox of techniques to analyse questions like this, some of which promise to provide deep insights in the nature and limits of efficient computation.

In our workshop, we shall focus on logical descriptions of complexity, i.e. descriptive complexity, propositional proof complexity and bounded arithmetic. Despite considerable progress by research communities in each of these areas, the main open problems remain. In finite model theory the major open problem is whether there is a logic capturing on all structures the complexity class P of polynomial-time decidable languages. In bounded arithmetic the major open problem is to prove strong independence results that would separate its levels. In propositional proof complexity the major open problem is to prove strong lower bounds for expressive propositional proof systems.

The workshop will bring together leading researchers covering all research areas within the scope of the workshop. We will especially focus on work that draws on methods from the different areas which appeal to the whole community.

Deadline for applications is 26 January 2012.

For more information visit the website at www.newton.ac.uk/programmes/SAS/sasw01.html.

# LMS INVITED LECTURES 2013

Proposals for the 2013 lectures are sought from any member who, in addition to suggesting a topic and lecturer, would be prepared to organise the meeting at their own institution or a suitable conference centre.

The annual Invited Lectures series consists of meetings at which a single speaker gives a course of about ten expository lectures, examining some subject in depth, over a five-day period (Monday to Friday) during a University vacation. The meetings are residential and open to all interested. It is intended that the texts of the lectures given in the series shall be published. In addition to full expenses, the lecturer is offered an honorarium for giving the course. A grant is also given to the host department to support attendance at the lectures.

Enquiries about the Invited Lectures should be directed to the Programme Secretary at the Society (grants@lms.ac.uk). The deadline for the submission of proposals is **13 February 2012**.

Recent previous lecturers have been: 2008 A. Okounkov (Princeton)

Random Surfaces

- 2009 A.D. Ionescu (University of Wisconsin-Madison) Black holes in vacuum: examples & uniqueness properties
- 2010 M. Bramson (University of Minnesota) Stability of Queuing Networks
- 2011 E. Candes (Stanford) Compressed Sensing
- 2012 A. Borodin (MIT) Determinantal point processes and representation theory See poster on page 28 of this Newsletter.

## ISAAC NEWTON INSTITUTE

#### **Call for Proposals**

The Isaac Newton Institute for Mathematical Sciences is a national research facility based in Cambridge which attracts scientists from all over the world to conduct research in the mathematical sciences broadly understood. It aims to bring together researchers from UK universities and leading experts from overseas for concentrated research on specialised topics including pure and applied mathematics and statistics, and crossdisciplinary research with significant and innovative mathematical content.

Typically two visitor programmes are running at any one time, each with about thirty scientists in residence. Included within these programmes are periods of particularly intense activity involving, for example, instructional courses and workshops. Participants in Institute programmes are encouraged to visit other institutes and universities in the UK. During a programme the Institute may also support satellite meetings at other UK institutions and often holds follow-up events some years after a programme has finished to review its impact and look to the future.

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Ninety-two programmes have now been completed, the most recent being *Discrete Analysis* and *Moduli Spaces*. The current programmes are *Inverse Problems*, and *Design and Analysis of Experiments*. The former includes the discussion of mathematics related to clinical medicine, finance, geology and biology while the latter relates to statistical issues arising, for example, in IT, healthcare and physics, and both have contributions from industry and academia.

The Institute invites proposals for research programmes in all areas of the mathematical sciences and their applications. 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.

Further information is available at www. newton.cam.ac.uk/callprop.html.



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## LMS GRANT SCHEMES

#### **Call for Applications**

Closing Date: 31 January 2012

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)
- Research in Pairs (Scheme 4)
- International short visits with the main focus on Africa (Scheme 5)
- Volunteer Lecturer Programme (Scheme 5
   see further details below)
- Young British and Russian Mathematicians Scheme (see further details below)

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- For full details of these grant schemes, and to download application forms, visit the LMS website (www.lms.ac.uk/content/ research-grants).
- Applications for the above grant schemes which are received by 31 January 2012 will be considered at a meeting in February.
- Applications should be submitted well in advance of the date of the 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 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)

#### Volunteer Lecturer Programme (Scheme 5)

Applications are invited from mathematicians who would like to participate in the IMU's Volunteer Lecturer Programme. The goal of this programme is to offer universities in the developing world lecturers for intensive 3–4 week courses in mathematics at the advanced undergraduate or master's level to build up local capacity.

The hosting university has no financial obligations (all expenses of the lecturer will be covered by the IMU CDC or one of its partners) but is expected to provide a local assistant who prepares the students beforehand, helps the volunteer lecturer when necessary during the course, and takes care of any necessary follow-up. These courses should have a student audience of 15–20 or more, include examinations, and be part of a regular degree programme at the hosting university.

The LMS is offering grants of up to £1,300, with matching funding from the IMU, to meet the travel, accommodation and subsistence costs of the Volunteer Lecturer. Applications may be made through the LMS or IMU, and further details and application forms are available from the following websites: www. Ims.ac.uk/content/research-grants and www. mathunion.org/cdc/volunteer-lecturer.

Enquiries should be made to the Grants Administrators: Sylvia Daly and Elizabeth Fisher (tel: 020 7291 9971/3, email: grants@ Ims.ac.uk).

#### 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.

Financial and academic reports will be required 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 the student should obtain a letter of recommendation from his/her supervisor.

#### Visits to Britain

Under this Scheme, applications may 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 £1,500**. 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@ Ims.ac.uk).

#### Grants News

We would like to draw your attention to the following:

#### 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 **31 January 2012** – please see the website for further details: www.lms.ac.uk/content/ computer-science-small-grants-scheme-7.

#### Small Grants for Education

Funding for grants **up to £600** is available from the LMS Education Committee to stimulate interest and enable involvement in mathematics from Key Stage 1 (age 5+) to Postgraduate level and beyond. Anyone working/based in the UK is eligible to apply for a grant. If the applicant is not a member then the application must be countersigned by an LMS member or another suitable person such as a head teacher or senior colleague. The next deadline for applications is **31 January 2012**. Please see the website for further details: www. Ims.ac.uk/content/small-grants-education

#### **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. Ims.ac.uk/content/childcare-supplementarygrants. NEWSLETTER

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## LONG-STANDING MEMBERS

The following is a list of mathematicians who have completed fifty years or more of membership of the London Mathematical Society, with their date of election.

17 Mar 1943	Dyson, F.J.	12 May 1955	Wall, G.E.	
15 Jun 1944	Williams, A.E.	15 Dec 1955	Armitage, J.V.	
25 Jan 1945	Ollerenshaw, K.	15 Dec 1955	Butler, M.C.R.	
23 May 1946	Huppert, E.L.	19 Jan 1956	Bowers, J.F.	
23 May 1946	Rees, D.	15 Mar 1956	Edmunds, D.E.	
16 Jan 1947	Macbeath, A.M.	15 Mar 1956	Horrocks, G.	
20 Mar 1947	Hayman, W.K.	19 Apr 1956	Penrose, R.	
22 May 1947	Ghaffari, A.	14 Jun 1956	Collins, W.D.	
19 Jun 1947	Cassels, J.W.S.	14 Jun 1956	Noble, M.E.	
18 Mar 1948	Isaacs, G.L.	14 Jun 1956	Perry, R.L.	
18 Mar 1948	Reade, M.O.	15 Nov 1956	Edwards, D.A.	
17 Jun 1948	Bateman, P.T.	14 Mar 1957	Brown, R.	
18 Nov 1948	Mullender, P.	14 Mar 1957	Dunnage, J.E.A.	
13 Dec 1948	Fishel, B.	13 Jun 1957	Brown, A.L.	
20 Jan 1949	Borwein, D.	18 Jun 1957	Russell, D.C.	
19 Jan 1950	Shepherdson, J.C.	21 Nov 1957	Wallington, J.E.	
16 Feb 1950	Lehner, J.	19 Dec 1957	Divinsky, N.J.	
23 Mar 1950	Ponting, F.W.	19 Dec 1957	Longdon, L.W.	
14 Dec 1950	Patterson, E.M.	19 Dec 1957	Mohamed, I.J.	
19 Apr 1951	Chen, D.L.C.	19 Dec 1957	Monk. D.	
17 May 1951	Roth, K.F.	19 Dec 1957	Moran S	
14 Jun 1951	Jackson, M.	19 Dec 1957	Newman M F	
20 Dec 1951	Dowker, Y.N.	19 Dec 1957	Schneider H	
20 Dec 1951	Herszberg, J.	16 Jan 1958	Flanders H	
17 Jan 1952	Wilson, D.H.	20 Feb 1958	Clunie I G	
15 Feb 1952	Shephard, G.C.	20 Mar 1958	Keedwell A D	
20 Mar 1952	Bonsall, F.F.	20 Mar 1958	Wallace D A R	
20 Mar 1952	Swinnerton-Dyer, H.P.F.	17 Apr 1958	Mardonald I.G	
20 Nov 1952	Knight, A.J.	15 May 1958	Foster D M F	
18 Dec 1952	Reeve, J.E.	19 Jun 1958	Green LA	
18 Jun 1953	Rayner, M.E.	20 Nov 1958	Righy J.F.	
18 Jun 1953	Marstrand, J.M.	17 Dec 1958	De Barra G	
17 Dec 1953	Ringrose, J.R.	17 Dec 1958	De barra, G. Birch B I	
17 Dec 1953	Samet, P.A.	18 Dec 1958	Hallott IT	
21 Jan 1954	Zeeman, E.C.	18 Dec 1958	Higging Pl	
18 Feb 1954	Cohen, D.E.	10 Dec 1950	McLood LP	
18 Feb 1954	James, I.M.	10 Dec 1950	Millor J.P.	
17 Jun 1954	Taylor, S.J.	16 Dec 1956	Niller, J.D.	
25 Nov 1954	Amson, J.C.	15 Jan 1959	BIACKDUITI, N.	
25 Nov 1954	Halberstam, H.	16 Apr 1959	Burgess, D.A.	
16 Dec 1954	Preston, G.B.	16 Apr 1959	Manogue, J.F.	
27 Jan 1955	Atiyah, M.F.	21 IVIAY 1959	ingram, G.	
24 Feb 1955	Kayner, F.J.	18 Jun 1959	Carter, W.	
24 Mar 1955	Faranat, H.K.	17 Dec 1959	Eames, VV.P.	
12 May 1955	Harrop, R.	1 / Dec 1959	Hoskins, R.F.	
12 May 1955	Murdoch, B.H.	17 Dec 1959	West, A.	

17 Mar 1960	Andreadakis, S.	15 Jun 1961	Dey, I.M.S.
17 Mar 1960	Guy, R.K.	15 Jun 1961	Dlab, V.
17 Mar 1960	Harris, D.J.	15 Jun 1961	Robertson, S.A.
18 Mar 1960	Scourfield, E.J.	15 Jun 1961	Stein, B.
18 Mar 1960	Strauss, D.	16 Nov 1961	Croft, H.T.
19 May 1960	Hoare, A.H.M.	21 Dec 1961	Baker, J.W.
17 Nov 1960	Morris, A.O.	21 Dec 1961	Barry, P.D.
15 Dec 1960	Turner-Smith, R.F.	21 Dec 1961	Davies, R.O.
16 Mar 1961	Rhodes, F.	21 Dec 1961	Linden, C.N.
18 May 1961	Cuninghame-Green, R.A.	21 Dec 1961	Rutter, J.W.
18 May 1961	Sklar, A.	21 Dec 1961	Sands, A.D.
15 Jun 1961	Button, L.G.	21 Dec 1961	Wall, C.T.C.

### **ELEANOR JAMES**

Dr Eleanor Mary James, who was elected a member of the LMS on 21 May 1976, died on 15 June 2011, aged 75.

Alun Morris writes: Eleanor James was one of those people that any university department would feel fortunate to have on its staff. A wonderful colleague who was dedicated to the well being of her students.

Eleanor was an Aberystwythian through and through. She was born in the town, went to the local grammar school, proceeded to UCW Aberystwyth (now Aberystwyth University) where she graduated with a double first in Pure Mathematics and Applied Mathematics. After a year as a temporary assistant lecturer in Pure Mathematics, in 1959 she became an assistant lecturer in the Pure and Applied departments and promoted to lecturer in 1962. In 1966, with T.V. Davies, she wrote the well-regarded book *Nonlinear Differential Equations* and later completed her PhD under his supervision.

As she held a position in both departments, she did more than her share of the service courses in Mathematics and also of administrative duties – these were performed with charm and great efficiency.

She was heavily involved in the Women's Institute taking a leading role both locally and nationally. This led to her appointment as Welsh representative on the Committee of Inquiry into Local Government Finance which led to the 1976 Layfield Report. She was pivotal in the work of the Aberystwyth OSA having completed over 25 years as its Treasurer.

In the early nineties she took early retirement. Although she had been indisposed for some years, her death in June was unexpected.

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## **VISIT OF R. MKRTCHYAN**

Professor Ruben Mkrtchyan (Yerevan Physics Institute, Armenia) will be visiting the UK from 16 February to 2 March 2012. His research area is Quantum Field Theory and Mathematical Physics. Professor Mkrtchyan will give lectures at:

- Imperial College London, Department of Physics, Friday 17 February at 4 pm: n→-n duality and universality; contact Arkadij Tseytlin (a.tseytlin@imperial.ac.uk)
- Loughborough University, School of Mathematics, Wednesday 22 February at 4 pm: Universal Lie algebra, duality and applications; contact Alexander Veselov (A.P.Veselov@lboro.ac.uk)
- University of Manchester, School of Mathematics, Thursday 1 March at 4 pm: SO(n)~Sp(-n), SU(n)~SU(-n) dualities, their applications and generalization; contact Hovhannes Khudaverdian (khudian@manchester.ac.uk)

For further information about the visit of Professor Mkrtchyan contact Dr Hovhannes Khudaverdian. The visit is supported by an LMS Scheme 2 grant.

#### NEWSLETTER

www.lms.ac.uk/newsletter

9 December 2011

To:

Chief Executives of CMS constituent societies

#### Future of the Mathematical Sciences in the UK Many members of our Societies will be aware of the 'Shaping Capability' initiative of the Engineering and Physical Sciences Research Council (EPSRC). Under this initiative the EPSRC has mapped the disciplines that it funds into 111 research areas<sup>1</sup> and plans to align funding with its assessment of UK strength and national importance. There has been considerable anxiety among members of the EPSRC's research community about the rationale for this approach, the lack of consultation, and the threat to research excellence as the key criterion for EPSRC funding.

In October, the Royal Society<sup>2</sup> brought together the CMS with four other bodies (the Institute of Physics, the Royal Society of Chemistry, the Royal Academy of Engineering and the Institution of Engineering and Technology) to discuss these concerns with John Armitt and David Delpy, the EPSRC Chair and Chief Executive respectively. Following the meeting, the letter<sup>3</sup> from John Armitt and David Delpy to *Nature* on 7 November offered a clear statement that research excellence remains pre-eminent in assessing applications; but on other areas of concern there has been less progress.

An essential recommendation of the EPSRC's 2010 International Review of Mathematical Sciences<sup>4</sup> was the creation of a new structure, designed together by EPSRC and the mathematical sciences research community, to allow communication, in advance rather than after the fact, about the most effective structures for funding, the nature of initiatives and other key issues. During 2011 there has been a score of meetings between CMS and EPSRC at a variety of levels, but little real progress with this recommendation



has been made. EPSRC's decision to offer no postdoctoral fellowships over most of its mathematical sciences portfolio was taken with no consultation, and EPSRC recently reaffirmed this decision despite the clearly expressed views of the community, the learned societies, the International Review panel, and EPSRC's Strategic Advisory Team.

Both issues, the pre-eminence of research excellence and postdoctoral fellowships in the mathematical sciences, were discussed during the appearance of EPSRC's Chair and Chief Executive before the House of Lords Science and Technology Committee on 29 November. The recording of the session<sup>5</sup> is illuminating, but not encouraging.

CMS will continue to do its best to work constructively with the mathematical sciences programme team at EPSRC, and we are helping to identify members of the community who can offer informed views. At the same time we shall be pressing the case for the mathematical sciences in wider groupings, in parliament and elsewhere.<sup>6</sup>

Mathematics underpins our 21<sup>st</sup> century technology, economy and society, and this is recognised in the employment market, where the prospects for our graduates and postgraduates are amongst the best. The flow of trained mathematical scientists into other disciplines and into the industries of the future relies upon our universities' research and teaching excellence. The case for the mathematical sciences is strong, and we must make it.

If you would like to make this letter available to your members please feel free to do so. Yours sincerely Professor Frank Kelly FRS, Chair Council for the Mathematical Sciences The Council for the Mathematical Sciences comprises the Institute of Mathematics and its Applications, the London Mathematical Society, the Royal Statistical Society, the Edinburgh Mathematical Society and the Operational Research Society, which are all registered charities.

#### Footnotes

1. EPSRC's 111 research areas: http://gow.epsrc. ac.uk/NGBOListResearchAreas.aspx.

2. The meeting between EPSRC and the learned societies followed a joint letter: http://royalsociety. org/news/epsrc-funding-strategy/.

3. The *Nature* letter: www.epsrc.ac.uk/SiteCollection-Documents/press-release-documents/LetterRef9442-Nature.pdf.

4. The International Review of Mathematical Sciences: www.epsrc.ac.uk/newsevents/pubs/corporate/ intrevs/2010maths/Pages/default.aspx

5. The House of Lords Science and Technology Committee session: www.parliamentlive.tv/Main/Player. aspx?meetingId=9580

6. Details of other CMS activity can be found on its website: www.cms.ac.uk

## MATHEMATICS AT THE HIGHER EDUCATION ACADEMY

#### **Discipline Lead**

Following a recent restructuring at the Higher Education Academy (HEA), discipline specific work within the HEA is now concentrated in four subject clusters namely: Arts & Humanities, Health Sciences, Social Sciences and STEM, with Mathematics being located in STEM. Every discipline within the clusters has a designated Discipline Lead who is responsible for co-ordinating the HEA activities in their discipline area. In September 2011, I took up the position of Discipline Lead for Mathematics, Statistics and Operational Research (MSOR) on a fractional secondment (0.8) from Oxford Brookes University, where I continue to teach undergraduate Mathematics students.

Since July 2011 the subject centres in some disciplines have closed. Mathematics is

extremely fortunate in having the very active MSOR Network which has taken full advantage of HEA transition funding and has been continuing to deliver a busy programme of activities. Since taking up my new role I have been working collaboratively with staff in the MSOR Network to familiarise myself with the wide range of work in which the Network has been engaged.

#### Community priorities

Following consultations undertaken last year, the Mathematical Sciences community identified several key priority areas of the MSOR Network's activities which it wished to see continuing into the future. One of these was maintaining the publication *Connections* in hard copy format. Another was the continuation of the course for new lecturers and the teaching workshops for postgraduates in their current form, in which they are delivered by subject specialists in MSOR disciplines. Indeed, this matter formed a topic for

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Mary McAlinden, MSOR Discipline Lead, HEA

No. 410 January 2012

n<u>ewsletter@lms.ac.uk</u>

### NEWSLETTER

www.lms.ac.uk/newsletter

discussion at the LMS Education Day in May 2011, as was reported in this Newsletter (LMS *Newsletter* 406, September 2011, p. 25). In the autumn I attended the course for new lecturers and one of the postgraduate workshops. This enabled me to appreciate the learning experience these events offer to those new to teaching and to see the full extent of their subject specificity. I listened to the views of those attending the events and have had the opportunity to hear directly from academics about how highly these events are valued by the Mathematics community.

Since taking up the role of Discipline Lead, I have taken steps to communicate these priorities in various ways within the HEA and will continue to do so in the run up to the next planning cycle.

#### Funding for Mathematics

Designated HEA resources have been allocated for work in each discipline area and as such resources are available for activities in Mathematics. These resources will be used to fund research and development work in teaching and learning and to run a series of workshops and seminars.

#### HEA workshop and seminar series

If you would like to host a workshop or seminar in your institution on an aspect of teaching and learning in Mathematics, there is currently an open call for bids. Successful applicants will receive £1000 for hosting an event and additional funds will be provided to support speakers' travel. Full details of the application process can be accessed at www. heacademy.ac.uk/seminar-series.

#### Other funding opportunities

Other more general funding opportunities are also available which are open to staff in any discipline. These are summarised below.

(i) *HEA teaching development grants*. Early in 2012, there will be calls for both individual grants and collaborative grants which may be cross institutional and/or interdisciplinary. Further details can be found at www.heacademy.ac.uk/funding.

(ii) *HEA travel funds.* The HEA's UK travel fund can be used for UK travel to enable the exchange and dissemination of good practice in learning, teaching and assessment. Further details can be found at www.heacademy. ac.uk/travel-fund.

#### Conferences

HEA resources have already been allocated to the next CETL-MSOR conference and the new HEA STEM conference, both of which will contain sessions relevant to HE Mathematics. Information about the CETL-MSOR conference can be found at the MSOR Network's website at mathstore.ac.uk and full details of the HEA STEM conference are available at www.heacademy.ac.uk/events/detail/2012/ academyevents/STEM annual conf.

#### Communication

To ensure that the HEA resources which have been allocated for discipline specific work in Mathematics, Statistics and Operational Research are used most effectively, I would like to invite staff working in these subject areas to contact me directly with their suggestions for future work. I am happy to visit institutions to meet with groups of staff who would like to share their experiences and discuss ways in which positive developments within teaching and learning can be achieved.

Finally, I would like to encourage the Mathematics community to take full advantage of the HEA funding opportunities and invite you to participate in the events we will be running in the future. Details of future events will be posted at www.heacademy.ac.uk/ disciplines/maths-stats-or. I am more than happy to answer any queries you may have and can be contacted by email at the address below.

Mary McAlinden mary.mcalinden@heacademy.ac.uk

## MATHEMATICS POLICY ROUND-UP

December 2011

#### RESEARCH

#### LMS engagement with EPSRC

The LMS, principally through CMS, is vigorously representing the views of the membership and the mathematical community, and is seeking to influence EPSRC to minimise the damage to mathematical research and to make constructive changes in response to the International Review of the Mathematical Sciences (IRMS).

#### EPSRC Fellowships

EPSRC has outlined additional areas where fellowship applications in the mathematical sciences can be submitted. These are 'interdisciplinary fellowships' (early and established career) to encourage connections across the mathematical sciences, and fellowships at the interface of the mathematical sciences and ICT (early career). Further details are available at http://tinyurl.com/cwph6q4.

Changes have also been made to the Doctoral Prize Scheme. Some individuals will be supported for up to two years beyond the end of their PhD. More details are available at http:// tinyurl.com/bnxcbxn.

## Response to the International Review of Mathematics

EPSRC has produced an action plan in response to the broad recommendations of the International Review of Mathematics. This has been shared with the Council for Mathematical Sciences, the International Review panel and the Mathematical Sciences Strategic Advisory Team and reviewed by EPSRC Council. The action plan is available at http://tinyurl.com/c8zd3ag.

#### EPSRC letter to Nature

EPRSC wrote to Nature in November welcoming the offer of help from the National Academies and Learned Societies and confirming that research excellence remains pre-eminent. The letter is available at http://tinyurl.com/cd6j77g.

#### SCHOOLS AND COLLEGES

#### Mathematics in A-level science exams

Science Community Representing Education (SCORE) has commissioned research to investigate the assessment of mathematics in A-level science examination papers. SCORE will present the preliminary findings on 6 January 2012 at the Association for Science Education Annual Conference, University of Liverpool.

#### How young learners master mathematics

According to a recent Ofsted report, providing the best grounding in mathematics at primary school is of fundamental importance to children's future success in education, life and at work. The report – Good practice in primary mathematics: evidence from 20 successful schools is available at http://tinyurl.com/6m4c4ks.

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#### DfE publishes data on Early Entry to GCSE Mathematics

The Department for Education has published a report presenting data on the difference in final grades between those who enter GCSE mathematics and English early and those who do not. Key headlines from the report include:

 'In both English and mathematics, early entrants overall perform worse than pupils who do not enter early' (http://tinyurl. com/cj9kkxx).

#### Specialist mathematics free schools

The Chancellor, George Osborne, announced in his Autumn Statement that, 'the government will invest an extra £600 million to fund 100 additional Free Schools by the end of this Parliament. This will include new specialist mathematics Free Schools for 16–18 year olds, supported by strong university mathematics departments and academics.

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#### New teacher training strategy

The government's Initial Teacher Training (ITT) Strategy Implementation Plan was published in November 2011. The proposals cover:

• Encouraging more primary specialist teachers to be trained. For 2013/14 the government expects to introduce additional financial incentives for trainees who undertake a mathematics, science or language specialism as part of their primary ITT course, and who have a good A-level in mathematics, a science or a language.

• Offering graduates with first-class degrees in physics, chemistry, mathematics and modern foreign languages significantly better financial incentives to train as teachers. Trainees will receive a bursary of up to £20,000 in their training year – more than double the current maximum of £9,000.

• Requiring all trainees to have high standards of mathematics and English by requiring trainees to pass tougher literacy and numeracy tests before they start training.

More information is available at http:// tinyurl.com/d28xldn.

## New physics with mathematics teacher training

The Institute of Physics (IOP), the Royal Academy of Engineering and the Training and Development Agency for Schools (TDA) are joining forces to pilot a new teacher training programme, which combines physics with mathematics. The courses are designed to appeal to engineering graduates, who have specialist subject knowledge in physics and mathematics.

#### STEM qualifications bring higher wages

The Royal Academy of Engineering has published two reports resulting from a programme of work between the Science, Technology, Engineering and Mathematics (STEM) community and government. Both relate to the wide range of STEM qualifications gained by people studying in the Further Education and Skills sector. The reports – FE STEM Data Project – July 2011 and The labour market value of STEM qualifications and occupations are available at http://tinyurl. com/cqm9ukp

> Dr John Johnston Mathematics Promotion Unit

### **NEUMANN PRIZE 2011**

The British Society for the History of Mathematics (BSHM) has announced the winner of the 2011 Neumann Prize as Cliff Pickover's *The Math Book: From Pythagoras to the 57th Dimension* (Sterling Publishing).

The prize, which is awarded every two years, is for the best book in the history of mathematics aimed at a broad audience. *The Math Book*, which gives a wide-ranging tour through 250 intriguing milestones in mathematical history, covers each historical episode in a single page with each entry accompanied by a full-page colour illustration. The 'coffee-table' format gives the reader snapshots of the vast breadth of mathematics, showing both its elegance as a discipline and also its perennial importance in science and engineering.

Accepting the Prize, Cliff Pickover, who is based at the IBM Thomas J. Watson Research Center in Yorktown Heights, New York stated, "I believe that placing science and mathematics in their historical context has profound value for students and anyone curious about the evolution of thought and the wonders of human ingenuity. Thus, I am happy and honored that the BSHM has awarded me the 2011 Neumann Prize."

The Neumann Prize is named in honour of the Oxford mathematician, and past President of the BSHM, Dr Peter Neumann OBE. The BSHM also carried out a unique e-interview with Cliff Pickover which can be found at www.bshm.org/NeumannPrize2011.html.



New books published by the European Mathematical Society

Individual members of the LMS are entitled to a discount of 20% on any book purchases, if ordered directly at the EMS Publishing House.



#### Jacqueline Stedall (University of Oxford, UK) From Cardano's great art to Lagrange's reflections: filling a gap in the history of algebra (Heritage of European Mathematics)

ISBN 978-3-03719-092-0. 2011. 236 pages. Hardcover. 17 x 24 cm. 68.00 Euro

This book is an exploration of a claim made by Lagrange in the autumn of 1771 as he embarked upon his lengthy *Réflexions sur la résolution algébrique des équations*: that there had been few advances in the algebraic solution of equations since the time of Cardano in the mid sixteenth century. That opinion has been shared by many later historians. The present study attempts to redress that view and to examine the intertwined developments in the theory of equations from Cardano to Lagrange. A similar historical exploration led Lagrange himself to insights that were to transform the entire nature

and scope of algebra.

The book is written in three parts. Part I offers an overview of the period from Cardano to Newton (1545–1707) and is arranged chronologically. Part II covers the period from Newton to Lagrange (1707–1770) and treats the material according to key themes. Part III is a brief account of the aftermath of the discoveries made in the 1770s. The book attempts throughout to capture the reality of mathematical discovery by inviting the reader to follow in the footsteps of the authors themselves.



Peter M. Neumann (University of Oxford, UK) **The mathematical writings of Évariste Galois** (Heritage of European Mathematics)

ISBN 978-3-03719-104-0. 2011. 421 pages. Hardcover. 17 x 24 cm. 78.00 Euro

Although Évariste Galois was only 20 years old when he died, his ideas, when they were published 14 years later, changed the course of algebra. He invented what is now called Galois Theory, the modern form of what was classically the Theory of Equations. For that purpose, and in particular to formulate a precise condition for solubility of equations by radicals, he also invented groups and began investigating their theory. His main writings were published in French in 1846. Very few items have been available in English up to now.

The present work contains English translations of almost all the Galois material. They

are presented alongside a new transcription of the original French, and are enhanced by three levels of commentary. An introduction explains the context of Galois' work, the various publications in which it appears, and the vagaries of his manuscripts. Then there is a chapter in which the five mathematical articles published in his lifetime are reprinted. After that come the Testamentary Letter and the First Memoir (in which Galois expounded the ideas now called Galois Theory), which are the most famous of the manuscripts. There follow the less well known manuscripts, namely the Second Memoir and the many fragments. A short epilogue devoted to myths and mysteries concludes the text. This work will be a resource for research in the history of mathematics, especially algebra, as well as a sourcebook for those many mathematicians who enliven their student lectures with reliable historical background.

European Mathematical Society Publishing House Seminar for Applied Mathematics, ETH-Zentrum FLI C4 Fliederstrasse 23 CH-8092 Zürich, Switzerland

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## MATHEMATICS: A BEAUTIFUL ELSEWHERE

Exhibition, 21 October 2011 – 18 March 2012 Fondation Cartier pour l'art contemporain Paris

How can one communicate the 'beautiful elsewhere' of abstract mathematics? If one is willing to accept Cédric Villani's explanation, in the series of interviews created by filmmakers Raymond Depardon and Claudine Nougaret, the answer to this recurrent question for every working mathematician is right in front of us: there is nothing as effective as a blackboard! However, when trving to reach a general audience a more visual beauty often comes to the rescue. With this idea in mind, the Fondation Cartier pour l'Art Contemporain conceived the nearly impossible dream of establishing a fertile dialogue between many mathematicians and artists with whom it has worked closely in the past. The project came true thanks to the enthusiastic dedication of curators Jean-

Pierre Bourguignon, Michel Cassé and Hervé



Chandès, who relied on the patronage of the Institut des Hautes Études Scientifiques and UNESCO. The exhibition *Mathematics: a Beautiful Elsewhere* is on in Paris until 18 March 2012.

Japanese mathematicians of the Edo period



The Room of the Four Mysteries

already understood the preeminent role that art can play in the popularization of science, as they initiated the tradition of Sangaku: wooden tablets representing puzzles in Euclidian geometry that were placed as offerings at the entrances to temples. Using the latest technology in computer animation, BUF Compagnie has given life to them in a sequence of videos. which also show how Chinese people were

able to perform quite complicated calculations with sticks. It is not the only homage to Sangaku: inspired by them, artist Beatriz Milhazes has composed a collage in which equations ruling phenomena such as irisation, morphogenesis or electromagnetism invite visitors to open the Book of Nature, where "numbers govern even fire". Joseph Fourier could hardly imagine that the quotation opening his monumental treatise on heat would be used two centuries later to design a fireplace next to Misha Gromov's Librarv of Mysteries!

largest galaxies.



Hiroshi Sugimoto Conceptual Form 011, 2008 The Russian mathematics and human thought, from the fragments of Heraclitus to Grothendieck's *Récoltes* et al.

Semailles. But how to actually exhibit them? To that end, David Lynch has created a structure in the shape of a zero, in which an audiovisual installation presents extracts from the books, in a journey from the smallest particles to the

Everybody agrees that infinity is one of the hardest concepts to comprehend. What about trying to learn it by looking at Hiroshi Sugimoto's three metre high Surface of revolution with constant negative curvature, whose tip is only two millimetres in diameter? Henri Poincaré would have been fascinated by this modern representation of the pseudosphere because, as painter Jean-Michel Alberola shows, hyperbolic geometry had a central place in his mathematical world. What about the mathematical worlds of today's researchers? Eight mathematicians coming from different fields have given eight beautifully framed answers. While Michael Atiyah thinks of mathematics as a "reflection of what people dream", for Don Zagier they form an open world in which the only way to get surprising results is to let oneself go by ideas. That is probably the best metaphor of the whole exhibition. As one visitor put it, "if I had known mathematics was like that..."

Javier Fresán Université Paris 13

### NEWSLETTER

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## WOMEN IN MATHEMATICS DAY 2012

The next Women in Mathematics Day will be held on Friday 27 April 2012 at De Morgan House, 57–58 Russell Square, London, Sessions will include talks by women mathematicians in a variety of appointments and at different career stages. The organisers would be very grateful if all members could encourage women mathematicians, particularly students (including final-year undergraduates) and those at an early stage in their career, to attend this meeting. The Women in Mathematics Day provides a valuable opportunity to meet and talk with women who are active and successful in mathematics. Participants from previous meetings have found this opportunity useful and beneficial. While women are especially encouraged to attend this day, men are certainly not excluded.

Any postgraduates, postdocs or research assistants wishing to give a talk during the afternoon session or present a poster should contact Susan Pitts (s.pitts@statslab.cam.ac.uk) by 9 March 2012.

To encourage high-quality posters, a  $\pm 50$  book token will be awarded for the poster that is judged to be the best Women in Mathematics Day Poster 2012.

#### 22 Programme

10.30–11.00 Registration and Coffee 11.00–13.00 Morning Session

> Jennifer Scott (Rutherford Appleton Laboratory) Challenges from a large sparse world Rachel Camina (Cambridge) The influence of conjugacy class sizes Christina Goldschmidt (Oxford) The scaling limit of the critical random graph

13.00–14.00 Lunch and Poster Session

14.15–16.00 Afternoon Session

Postgraduate/Postdoc speakers 16.00-16.30 Tea

2011 Poster Competition Winner: Ndifreke Udosen, Reading University

Participants are invited to join us for dinner at a local restaurant after the event. If you would like to attend, please email Elizabeth Fisher (womeninmaths@lms.ac.uk). Please note that the dinner will *not* be paid for by the Society.

Limited funds are available to help with the travel costs of students attending the event. Further details are available from Elizabeth Fisher at the Society (contact details below).

To register contact Elizabeth Fisher (womeninmaths@lms.ac.uk) by Friday 20 April. Late registrations for places may still be accepted, subject to availability.

The day is free for students and  $\pounds 5$  for all others – payable on the day.

## **BRITISH COLLOQUIUM** FOR THEORETICAL **COMPUTER SCIENCE**

The 28th British Colloquium for Theoretical Computer Science (BCTCS) will be hosted by the School of Computer Science, University of Manchester from 2 to 5 April 2012. The purpose of BCTCS is to provide a forum in which researchers in theoretical computer science can meet, present research findings, and discuss developments in the field. It also aims to provide an environment in which PhD students can gain experience in presenting their work, and benefit from contact with established researchers.

The scope of the colloquium includes all aspects of theoretical computer science, including automata theory, algorithms, complexity theory, semantics, formal methods, concurrency, types, languages and logics. Both computer scientists and mathematicians are welcome to attend, as are participants from outside of the UK. The colloquium features both invited and contributed talks. This year's invited speakers are:

- Rod Downey (School of Mathematics, Statistics and Operations Research, Victoria University of Wellington) LMS Keynote Speaker in Discrete Mathematics
- Mike Edmunds (School of Physics and Astronomy, University of Cardiff)
- Reiner Hähnle (Fachbereich Informatik, Technische Universität Darmstadt)
- Nicole Schweikardt (Institut f
  ür Informatik. Goethe-Universität, Frankfurt am Main)

Registration and accommodation bookings open on 16 January. Participants wishing to give 30-minute contributed talks may simply submit a title and abstract (100 to 300 words) by 19 March.

This year, BCTCS is part of the Alan Turing Year, and will be collocated with the Automated Reasoning Workshop ARW (http:// arw2012.cs.man.ac.uk/). Further BCTCS details are available from the Colloquium website http://bctcs2012.cs.manchester.ac.uk.

## **KNOWLEDGE TRANSFER** PAPER ON GRAPHICS PROCESSING UNITS

The LMS-KTN Knowledge Transfer Reports are an initiative coordinated jointly by the IM-KTN and the Computer Science Committee of the LMS. The latest report The GPU Computing Revolution: From Multi-Core CPUs to Many-Core Graphics Processors was launched at the recent computer science colloquium hosted by the Computer Science Committee of the LMS.

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This report, written by Simon McIntosh-Smith, was distributed at the Innovate '11 conference and has already attracted some interest from industry. The paper itself is available at www.lms.ac.uk/sites/default/files/ files/reports/GPU-KT-report-screen.pdf. The Computer Science Committee hopes that members with an interest in the interface of computer science and mathematics will look at the paper and pass it to others with an interest in the technology.

The reports are produced as an occasional series, each one addressing an area where mathematics and computing have come together to provide high-impact significant new capability, ready for mainstream industrial uptake. They are written by senior researchers in each area, for a mixed audience in business and government. The Computer Science Committee looks forward to developing the series of KTPs, producing more papers for publication in the near future.

> Tom Melham Chair, Computer Science Committee



### NEWSLETTER

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LONDON

SOCIETY

ONFORD CENTREFOR COLLANDRATIVE APPLIED MATHEMATIC

MATHEMATICAL

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Stochastic Modelling in Biological Systems



Short Course Oxford University, 18-23 March 2012 Organiser: Professor Philip Maini

LMS-EPSRC



The importance of stochasticity in biological systems is becoming increasingly recognised. Given the rapid advances in experimental techniques such as single particle tracking, two photon microscopy and gene chip technology, data are being generated on refined spatial scales. This has enabled modellers to complement the "traditional" mean-field, coarse-grained deterministic models with stochastic models that account for small particle numbers (intrinsic noise) and extrinsic noise sources. Biological examples include Brownian dynamics simulations of ion channels, noise in gene regulation at the single-cell level, motor-driven intracellular transport, biochemical reaction kinetics within cells, and noise-mediated detection of weak signals in neuroscience (stochastic resonance), to name but a few.

The course will provide students with a biological overview before going on to present a number of modelling approaches and methods of analysis, and give students experience in coding up stochastic simulations. At the end of the course the students will have familiarised themselves with: the Gillespie stochastic simulation algorithm, the chemical master equation, stochastic differential equations, the Fokker-Planck equation and Stochastic spatio-temporal models.

The three main lecture course topics are:

- Transport processes in cells (Paul Bressloff, University of Utah)
- Stochastic reaction-diffusion models (Radek Erban, University of Oxford)
- Basic concepts and applications (Andre Longtin, University of Ottawa)

These lecture courses will be supplemented by tutorial sessions.

Guest lectures will be given by Dan Gillespie (Dan T Gillespie Consulting) & Hans Othmer (University of Minnesota).

For further information please visit: www.maths.ox.ac.uk/groups/mathematical-biology/events

Pre-requisites: Students should have some familiarity with stochastic systems.

Applications: Applications should be made using the registration form available via the Society's website at: <a href="http://www.lms.ac.uk/content/short-instructional-courses">www.lms.ac.uk/content/short-instructional-courses</a>.

The closing date for applications is **Monday 6 February 2012**. Numbers will be limited and those interested are advised to make an early application.

\*Applicants will be contacted within two weeks after the deadline; information about individual applications will not be available before then\* \*In the event of over-subscription preference will be given to UK-based research students\*

#### Fees

- All research students registered at a UK university will be charged a registration fee of £100. There will be no charge for subsistence costs.
- UK-based postdocs will be charged a registration fee of £250, plus half the subsistence costs (£200) £450 in total.
- All others (overseas students and postdocs, those working in industry) will be charged a registration fee of £250 plus the full subsistence costs (£400) £650 in total.

All participants must pay their own travel costs (for EPSRC funded students, this should be covered by their DTA). Fees are not payable until a place on the course is offered but will be due by Friday 9 March. Institute of mathematics & its applications





## The 2012 Christopher Zeeman Lecture

Professor John Barrow FRS

Wednesday 21 March 2012 at 6.00 pm followed by a reception at The Royal Society, Carlton House Terrace, London, SW1

#### Maths, Sport, and the Olympics

**Abstract** We will reveal some of the many ways in which simple mathematics helps us understand and improve sporting performance. Running, throwing, cycling, jumping, and weightlifting are among the examples we will take a look at from a new perspective. Along the way we will also see how Usain Bolt can break his world 100m record and investigate some odd scoring systems.

Before the lecture, Professor John Barrow will be presented with the Christopher Zeeman award. This medal is awarded triennially to recognize and reward the contributions of mathematicians involved in promoting mathematics to the public, with a view to encouraging others by demonstrating that such activities are valued as part of the role and responsibilities of a mathematician. It is jointly awarded by the Institute of Mathematics and its Applications and the London Mathematical Society.

#### Admission

To the lecture is by ticket only. For tickets please contact Mrs Lynn Webster at the IMA (email lynn.webster@ima.org.uk or Catherine Richards House, 16 Nelson Street, Southend-on-Sea, SS1 1EF) by 28 February 2012. Tickets are free of charge and will be allocated on a first come, first served basis.



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#### No. 410 January 2012

## New from Princeton



The Ambient Metric

Charles Fefferman

C. Robin Graham

# apping Benson Farb & Dan Margalit The study of the mapping class group Mod(S) is a classical topic that is experiencing a repaissance

(PMS-49)

a classical topic that is experiencing a renaissance. It lies at the juncture of geometry, topology, and group theory. This book explains as many important theorems, examples, and techniques as possible, quickly and directly, while at the same time giving full details and keeping the text nearly self-contained. The book is suitable for graduate students.

A Primer on Mapping Class Groups

Princeton Mathematical Series Phillip A. Griffiths, John N. Mather, and Elias M. Stein, Series Editors Cloth \$75.00 £52.00 978-0-691-14794-9

### The Ambient Metric

Charles Fefferman & C. Robin Graham

This book develops and applies a theory of the ambient metric in conformal geometry. This is a Lorentz metric in n+2 dimensions that encodes a conformal class of metrics in n dimensions. The ambient metric has an alternate incarnation as the Poincaré metric, a metric in n+1 dimensions having the conformal manifold as its conformal infinity. In this realization, the construction has played a central role in the AdS/CFT correspondence in physics.

Annals of Mathematics Studies, 178 Phillip A. Griffiths, John N. Mather, and Elias M. Stein, Series Editors Paper \$55.00 £37.95 978-0-691-15314-8 Cloth \$80.00 £55.00 978-0-691-15313-1

## HOMOTOPY AND GEOMETRY OF LOOP SPACES

The Fourth Sheffield Homotopy Mini Conference on *Homotopy and Geometry of Loop Spaces* will take place from Friday 20 to Sunday 22 January 2012 at the University of Sheffield. In recent years, the study of loop spaces has seen rapid progress and also brought about new interactions between different areas of mathematics. This meeting aims to inform participants of the latest developments as well as some of the future directions in this exciting area of research. The speakers include:

- Ralph Cohen (Stanford)
- David Gepner (Regensburg)
- Jelena Grbić (Manchester)
- Richard Hepworth (Aberdeen)
- Kathryn Hess (Lausanne)
- John Jones (Warwick)
- Sadok Kallel (Lille)
- Birgit Richter (Hamburg)
- Andrew Stacey (Trondheim)
- Ulrike Tillmann (Oxford)
- Nathalie Wahl (Copenhagen)
- Konrad Waldorf (Regensburg)

Financial support will be available for UKbased students. For more information, visit the website www.pokman-cheung.staff.shef. ac.uk/SHM4 or write to SHM4@sheffield. ac.uk. The meeting is supported by an LMS Conference grant and the University of Sheffield Mathematics and Statistics Research Centre.

## NONCOMMUTATIVE GEOMETRY

In April 2012, the Isaac Newton Institute for Mathematical Sciences (INI), Cambridge, and the Wales Institute of Mathematical and Computational Sciences (WIMCS) will jointly organise a meeting on *Noncommutative Geometry*. The meeting will be held at Cardiff University and will start on Monday 16 April and end on Friday 20 April. This will be a follow-up meeting which, hopefully, will build upon the success of the six-month research programme, of the same name, that was held at the INI in 2006. Financial support for the meeting has been provided by the INI, WIMCS and Oxford University Press. The following have agreed to participate and make presentations:

- t J. Block (UPenn)
  - R. Bocklandt (Newcastle)
  - M. Bojowald (Penn State)
  - A.H. Chamseddine (Beirut and IHÉS)
  - A. Connes\* (Collège de France, IHÉS & Vanderbilt)
  - L. Evans (LHC, CERN)
  - T. Gannon (Alberta)
  - V. Ginzburg\* (Chicago)
  - Y. Kawahigashi (Tokyo)
- R. Longo (Rome)
  - R. Meyer (Göttingen)
  - E. Meinrenken (Toronto)
  - J. Mickelson (Helsinki)
  - D. Nadler\* (Northwestern)
  - R. Nest (Copenhagen)
  - M. Piai (Swansea)
- T. Stafford (Manchester)
- D. Stevenson (Glasgow)
- C. Teleman (Berkeley)
- D. Voiculescu (Berkeley)
- P. Xu (Penn State)
- D. Ben-Zvi\* (Austin)

\* to be confirmed

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The meeting will consist of nine sessions, each concentrating on a particular research area that is currently attracting significant interest within the community:

- Noncommutative algebraic geometry
- Representation theory aspects of Baum-Connes
- Noncommutative geometry and symplectic geometry
- Free aspects of noncommutative geometry
- Noncommutative geometry and conformal field theory
- Nonommutative geometry and categorification

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- Noncommutative geometry and quantum field theory
- Noncommutative spacetime and cosmology
- The standard model and beyond

The scientific organisers of the meeting are: David E. Evans (Cardiff University), Nigel Higson (Penn State University) and

Shahn Majid (Queen Mary, University of London)

For further information regarding the scientific programme email EvansDE@cardiff. ac.uk, and for accommodation email EmeryJL4@Cardiff.ac.uk. Full details are given at http://mathsevents.cf.ac.uk/iniwimcs2012/ index.html.

## LMS INVITED LECTURER 2012

## **Professor Alexei Borodin (MIT)**

Determinantal point processes and representation theory

## 26–30 March 2012 University of Glasgow

Alexei Borodin will give a ten-lecture minicourse, at a level suitable for graduate students, on *Determinantal point processes and representation theory*. The lectures will explore the interactions between probability theory and algebra, which is a new fast-developing area.

There will also be supplementary lectures by:

- Neil O'Connell (Warwick)
- Patrik Ferrari (Bonn)

Local B&B accommodation will be available.

Limited financial support is available with preference given to UK research students. Please contact the organisers for further details (LMSlectures2012@gmail.com).

For further details on the 2012 Invited Lectures please visit www.maths.gla.ac.uk/~mf/LMSLectures2012/index.htm.

## **GROUPS ST ANDREWS 2013**

Groups St Andrews 2013 is organised by the University of St Andrews and will take place in St Andrews (Scotland). It will run from Saturday 3 August (arrival day) to Sunday 11 August 2013 (departure day). The talks will take place from 4 to 10 August 2013 (inclusive). The conference aims to cover all aspects of group theory. The short lecture courses are intended to be accessible to postgraduate students, postdoctoral fellows, and researchers in all areas of group theory. The principal speakers will each deliver a short lecture course on a topic of their choice. They are:

- Emmanuel Breuillard (Université Paris-Sud 11)
- Martin Liebeck (Imperial College, London)
- Alan Reid (University of Texas)
- Karen Vogtmann (Cornell University) One hour speakers are:
- Inna Capdeboscq (University of Warwick)
- Radha Kessar (University of Aberdeen)
- Markus Lohrey (Universität Leipzig)
- Derek Robinson (University of Illinois at Urbana-Champaign)
- Christopher Voll (University of Bielefeld) Those interested in attending the conference are encouraged to sign up for conference updates on the following webpage: www.groupsstandrews.org/2013/form.shtml. Further details will be posted when available on the conference website at www.groupsstandrews.org/2013/index.shtml, or email gps2013@mcs.st-andrews.ac.uk. This conference, the ninth in the series of Groups St Andrews conferences, will be organised along similar lines to previous events in this series.

## PANDA

#### 10 years on

The next Patterns, Nonlinear Dynamics and Applications (PANDA) meeting will be held on Friday 20 January 2012 in the School of Mathematics, University of Leeds. There is a broad

'theme', combining a retrospective on the last ten years (the first PANDA meeting was in December 2001) and a perspective on the next. There will be two review/pedagogical talks:

- Rebecca Hoyle (University of Surrey) Natural history of a PANDA, and nonlinear dynamics in biology and sociology
- Jonathan Dawes (University of Bath) Nonlinear dynamics in continuum mechanics: current challenges and future opportunities

We invite contributed half-hour research talks on any topic within the PANDA remit, and particularly welcome offers of talks by postdocs and PhD students. A limited amount of funding is available for the reimbursement of travel expenses. We may also be able to make a contribution towards childcare expenses incurred specifically for the purpose of attending the meeting. Please contact Alastair Rucklidge (A.M.Rucklidge@leeds.ac.uk) if you would like to speak at the meeting.

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## **CONFERENCE FACILITIES**

Rebecca Hoyle (Surrey), Jon Dawes (Bath),

Paul Matthews (Nottingham) and Alastair

Rucklidge (Leeds), and is supported by an

LMS Scheme 3 grant.

De Morgan House offers 40% discount on room hire to all Mathematical charities and 20% to all not-for-profit organisations. Support the LMS by booking the next London event at De Morgan House.

Call us now on 020 7927 0800 or email roombookings@demorganhouse.co.uk to check availability, receive a quote or arrange a viewing of the venue.

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## Nominations are invited for the 2012 David Crighton Medal

The David Crighton Medal was established by the Councils of the Institute of Mathematics and its Applications (IMA) and the London Mathematical Society (LMS) in 2002 to pay tribute to the memory of Professor David George Crighton, FRS.

The medal is awarded every three years to an eminent mathematician for services both to mathematics and to the mathematical community. The medal winner is normally presented with the award at a joint meeting of the IMA and LMS, and will also be invited to give a lecture.

Previous winners of the Medal are Professor Keith Moffat, FRS (2009), Sir Christopher Zeeman, FRS (2006) and Sir John Ball, FRS (2003).

Nominations can be made using the form available on both Societies' websites (www.lms.ac.uk/content/ima-lms-prizes) or from the Secretary to the David Crighton Committee (prizes@lms.ac.uk). Nominees should normally be resident in the mathematical community represented by the two organisations on 1 January of the year of the award and nominations must be received by **Tuesday 28 February 2012**.

## ALGEBRA, COMBINATORICS, DYNAMICS AND APPLICATIONS

This workshop will take place from 27 to 30 August 2012 at Queen's University, Belfast. It will focus on recent developments and classical ideas in the interplay between structural properties of algebras, properties of their representations and combinatorics and dynamics. The organizers are particularly interested to discuss problems where combinatorial methods appear as a main ingredient in the solution of an algebraic problem or where arguments of dynamical nature help to understand better some algebraic phenomenon. More general structures appearing in various applications, in particular in physics, analysis, geometry, topology, homotopy theory, and coding theory will also be considered. Topics include, but are not limited to the following:

- Algebras given by relations (including quadratic algebras)
- Combinatorics of defining relations, particularly combinatorics and dynamics of words; semigroups and semigroup algebras



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- Properties of various generating series associated to rings, Hilbert series, growth,
- combinatorics of primes – Representation spaces, dynamics of GI<sub>n</sub> action: Deformation theory
- Homological properties, properties of the Koszul complex
- Structures originated in physics, geometry, topology, homotopy theory
- Operads, props
- Novikov structures and pre-Lie algebras, Leibnitz algebras, ternary algebras, etc.
- Poisson structures
- Cluster algebras
- Actions of groups over rings, lower K-groups over noncommutative rings
- Operator algebras and semigroup actions on Banach spaces, their (infinite-dimensional) dynamics

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- Computational aspects of the above, in particular, related to the Gröbner bases theory Speakers include:
- Vladimir Bavula (Sheffield)
- Peter Cameron (London)
- Grigori Garkusha (Swansea)
- David Jordan (Sheffield)
- Peter Jørgensen (Newcastle)
  - Arnfinn Laudal (Oslo)
    - Tom Lenagan (Edinburgh)
    - Abdenacer Makhlouf (Mulhouse)
    - Sergei Silvestrov (Lund)
    - Agata Smoktunowicz (Edinburgh)

• Robert Wisbauer (Düsseldorf) Anyone interested is welcome to attend. Some funds may be available to contribute to the expenses of research students who wish to attend the meeting. For further details and registration visit http://sites.google.com/site/ algebrabelfast2010/2011 or contact Natalia lyudu at n.iyudu@qub. ac.uk. The workshop is supported by an LMS Conference grant.

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## Lecturer (Assistant Professor) in Pure Mathematics

#### £33,734 - £44,016

We seek an outstanding candidate for a Lectureship in Pure Mathematics. You will join the Pure Mathematics Group within the School of Mathematics at the University of Bristol and will be expected to demonstrate outstanding research potential in an area within pure mathematics.

The Pure Mathematics Group at the University of Bristol is internationally recognised with interests spanning pure mathematics, including number theory, arithmetic geometry, arithmetic combinatorics, ergodic theory, random matrix theory, representation theory, complex analysis, partial differential equations, set theory and logic. The Group has strong links with the Heilbronn Institute for Mathematical Research, which focuses on discrete mathematics and funds about 20 postdoctoral fellows in the School of Mathematics.

We seek applicants whose research further broadens and expands upon the strengths of the existing group. We particularly welcome suitably qualified female applicants, as women are currently under-represented in the School of Mathematics. You should arrange for three referees to send letters of recommendation to Joanne Malcolm at recruit-spr@bristol.ac.uk by the closing date. Please note that it is your responsibility to ensure that the reference letters are received by the closing date. Please also note that your referees do not have to include your current or most recent Head of Department or Line Manager as stated on the application form.

For informal enquiries please contact Dr Lynne Walling on (0117) 331 5245 or e-mail I.walling@bristol.ac.uk

For further details and an application form please visit www.bristol.ac.uk/jobs Alternatively you can e-mail recruitment@bristol.ac.uk or telephone (0117) 954 6947, quoting the reference number 16800.

The closing date for applications is 9.00am, 20 February 2012.

Interviews are expected to be held during March 2012.

**EXCELLENCE THROUGH DIVERSITY** 

## QP-NG-QI

A final meeting of the four-year UKIERI research network *Quantum Probability, Noncommutative Geometry and Quantum Information* will be held at the ICMS in Edinburgh from 16 to 18 January 2012. Non-UKIERI invited speakers include

- Philippe Biane (Université de Marne la Vallée)
- Uwe Franz (Université de Franche-Comté)
- Giovanni Lendi (Università di Trieste)
- Hans Maassen (Radboud University)
- Adam Skalski (Polish Academy of Sciences)
- Reinhard Werner (Leibniz Universität)
- Stephen Wills (University College Cork)

The meeting is organised by Alexander Belton, Michael Dritschel, Martin Lindsay and Kalyan Sinha. The number of participants will be limited to around 40 people, so if you wish to participate then please contact Martin Lindsay (j.m.lindsay@lancaster.ac.uk) or Alexander Belton (a.belton@lancaster. ac.uk). Up-to-date conference information may be viewed at www.maths.lancs.ac.uk/ ~belton/QPNGQI and at the ICMS website www.icms.org.uk.

The event is supported by the British Council's UK–India Education and Research Initiative (UKIERI).

## FUTURE DIRECTIONS IN TROPICAL MATHEMATICS

A two-day workshop on *Future Directions in Tropical Mathematics and its Applications* will be held in Manchester from 19 to 20 January 2012. The workshop will bring together those using and developing tropical and max-plus theory and methods, across both pure and applied mathematics. Research speakers include:

- Florian Block (Warwick)
- Alexander Guterman (Moscow)
- James Hook (Manchester)
- Katharina Huber (UEA)
- Zur Izhakian (Bremen)

Mini-courses will be given by Peter Butkovic (Birmingham) and Stephane Gaubert (INRIA). For further details visit the website at http://personalpages.manchester.ac.uk/staff/ Marianne.Johnson/tropicalworkshop.html

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The workshop is funded by the LMS (through a Birmingham–Manchester–Warwick Scheme 3 triangle) and EPSRC (through the CICADA project), and organised by Marianne Johnson, Mark Kambites and Mark Muldoon. Funds are available to support the attendance costs of UK-based graduate students; those interested in claiming should contact the organisers in advance.

## **RECORDS OF PROCEEDINGS AT LMS MEETINGS**

### **ANNUAL GENERAL MEETING**

held on *Friday 18 November 2011* at the the Institute of Education, London. About 80 members and visitors were present for all or part of the meeting.

The meeting began at 3.00 pm, with the President, Professor A.J. MACINTYRE, FRS, in the Chair. Members who had not yet voted were invited to hand their ballot papers to the Scrutineers, Professor P.T. Saunders and Dr D.J. Collins.

The Vice-President Professor J. GREENLEES presented a report on the Society's activities and the President invited questions.

The Treasurer, Professor W.B. STEWART, presented his report on the Society's finances during the 2010/11 financial year and the President invited questions.

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Copies of the *Report of the Trustees* for 2010/11 were made available and the President invited members to adopt the *Report of the Trustees* for 2010/11 by a show of hands. The *Report of the Trustees* for 2010/11 was adopted.

The President proposed Messrs Kingston Smith be re-appointed as auditors for 2011/12 and invited members to approve the re-appointment by a show of hands. Messrs Kingston Smith were re-appointed as auditors for 2011/12.

Seven people were elected to Ordinary Membership: E.A. Codling, A.C. Davis, E-M. Graefe, S.C.J. Kolb, A.J. Lobb, A.E. Mohamed, D. Todorov; three were elected to Associate Membership: J.C.G. Biniok, R.M. Friswell, S. Wang. Two members signed the book and were admitted to the Society.

The President announced that the next meeting of the Society would be in London on 24 February 2012 and would include the Mary Cartwright Lecture.

The President, on Council's behalf, presented certificates to the 2011 Society Prizewinners – Polya Prize: Professor E. Brian Davies, FRS; Senior Whitehead Prize: Dr Jonathan Pila; the Naylor Prize and Lectureship in Applied Mathematics: Professor J. Bryce McLeod, FRS; Whitehead Prizes: Dr Jonathan Bennett, Professor Barbara Niethammer and Dr Alexander Pushnitski. The winner of the fourth Whitehead Prize, Dr Alexander Gorodnik, was unable to attend.

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Professor Alex Wilkie, FRS, gave a lecture on *Polynomials, quasipolynomials and* o-minimality.

After tea, Dr Collins announced the results of the ballot. The following Officers and Members of the Council were elected.

President: G.B. Segal; Vice-Presidents: K. Brown, J. Greenlees; Treasurer: R.T. Curtis; General Secretary: J.M.E. Hyland; Publications Secretary: J.D.S. Jones; Programme Secretary: R.A. Wilson; Education Secretary: A.D. Gardiner; Members-at-Large of Council (for 2 year terms): J.E. Barrow-Green, S.K. Donaldson, J.R. Hunton, A. Laptev, E.L. Mansfield, B.J. Totaro. Six Members-at-Large who were elected for two years in 2010 have a year left to serve: A.V. Borovik, D.E. Buck, W.S. Kendall, M. Marletta, C.M. Roney-Dougal, U.L. Tillmann. The following were elected to the Nominating Committee: F.C. Kirwan, M. Prest

The newly-elected President, Professor G.B. SEGAL, FRS, took the Chair.

Professor Angus Macintyre, FRS, gave the Presidential Address on *The logic of the real, complex and perfect exponentials*.

After the meeting, a reception was held at De Morgan House, followed by the Annual Dinner, which was held at the Russell Hotel and attended by 75 people.

## AGM AND SOCIETY MEETING 2011

#### Report

The 2011 Annual General Meeting of the LMS took place at the Institute of Education, London, on Friday 18 November 2011, and was well attended. Formal business was conducted

by President Professor Angus Macintyre FRS (QMUL). It started with the presentation of the Trustees' Report by Vice-President Professor John Greenlees (Sheffield) and Treasurer Dr

Brian Stewart (Oxford). The report highlighted confident progress achieved by the Society over the last year; such points as the increase in publications income, the continuation of extensive grant programmes, important contributions to policy, and the increased intensity of dialogue on policy issues with the wider academic community and policymakers, deserve a special mention.

The first lecture of the LMS meeting, by Professor Alex Wilkie FRS (Manchester), was on *Polynomials, quasipolynomials and o-minimality.* It provided an outline of the model theory of exponential fields, a rapidly growing area of mathematics which combines classical concepts and canonical examples (such as fields of real and complex numbers with exponentiation) with remarkable connections to mathematical logic, number theory and analysis (including non-standard analysis).

After the lecture, the Meeting returned to the Society's business: announcement of the election results and inauguration of the new President, Professor Graeme Segal FRS (Oxford).

The second lecture, by Professor Angus Macintyre FRS, *The logic of the real, complex and perfect exponentials* developed the theme of exponential fields at a level of beautiful synthesis of mathematical, logical and philosophical ideas.

Dinner in the evening took place in the Hotel Russell. In his speech at dinner, Professor Angus Macintyre gave a retrospective view of the two turbulent but successful years in the life of the Society:

"Dear Guests and Fellow Mathematicians,

I finished my term as LMS President less than three hours ago, and right now I feel both gratitude and anxiety.

The gratitude comes not from being free and still, apparently, in possession of some mathematical capability (shaped over many years by the work of thousands of colleagues in our common endeavour). Rather it comes as I reflect on the survival of democracy and altruism in our Society. In my time as President I have marvelled at the cheerful demeanour (and subsequent efficiency) with which already heavily-burdened people took on, often at very short notice, tasks whose purpose was to safeguard our culture and independence, to stand up for reason against jargon, and to ensure that the young now emerging, and those who come after us, can take mathematics forward in freedom, to perspectives not imagined by us.

I think the LMS can be proud of its democratic structures, guaranteed by the Charter. That Charter has served us well, in the advancement. world-wide, of mathematics as understood by the open society of mathematicians. This Charter should guide us through our 150th Anniversary, and far beyond. I want to emphasise the moral nature of what we do, in trying to protect and nourish mathematics everywhere, in the face of increasingly uninformed managerialism. I believe that most of us feel humble at our good fortune in being chosen by mathematics. We live in a trusting community. Though tastes may differ, and we rely for guidance on those of proven excellence and wisdom, we are shocked by the inflexible jargon of 'reshaping'. And so, of course, my anxiety tonight is not due to being nervous about getting up here to speak, but because of the new climate of at once superficial and overly elaborate initiatives such as Impact and Reshaping.

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I no longer speak for the LMS, but I do intend to cooperate with others in defence of mathematics and of reason. One of the most heartening developments of the last year has been the appearance, both on blogs and in letters, of admirable, and admirably frank, analyses of just how insensitive to the reality of mathematics are recent policies. The letters have been signed by some of the most eminent of UK scientists, and by the IRMS team. I travel a lot, and am by now accustomed to sympathy from foreign mathematicians about the unnecessary pressures faced by us, distracting us from what we do best. We eagerly await some signs of trust in the accuracy of what has been so carefully written."

> Alexandre Borovik University of Manchester

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## LMS COMPUTER SCIENCE COLLOQUIUM

#### Report

The LMS Computer Science Committee hosted a colloquium at De Morgan House on *High Performance Scientific Computing at the Exascale* on Tuesday 11 October 2011. The meeting showcased state-of-the-art scientific computing applications, to identify some of the challenges posed by next-generation high-performance machines and indicate promising approaches to tackling problems. Forty-one people attended the colloquium, including twenty PhD students. The colloquium speakers were:

Marc Snir (Illinois)

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- Exascale Computing: The Last Rehearsal Before the Post-Moore Era
- Ulrich R\u00fcde (Erlangen) Towards Exascale Computing: Multilevel Methods and Flow Solvers for Millions of Cores
- Oubay Hassan (Swansea) Towards Fully Parallel Aerospace Simulations on Unstructured Meshes
- Paul Kelly (Imperial College London) Software Abstractions for Many-Core Software Engineering

The Computer Science Committee is very grateful to the Centre for Numerical Algorithms and Intelligent Software (NAIS) for providing financial support that made possible visits by high-quality speakers.

The Computer Science Colloquium is part of a range of LMS activities at the interface of computing and mathematics, and the Computer Science Committee looks forward to strengthening the Society's interest in the interface between the disciplines and hosting future events.

> Mark Ainsworth Strathclyde University

Galileo's Muse by Mark A. Peterson, Harvard University Press, 2011, 352 pp, £21.95, ISBN 978-0-674-05972-6.

**REVIEWS** 

In this book, structured around Galileo but constituting a much wider discussion on Renaissance thought, Peterson argues that Renaissance art was a key motivating force behind the rediscovery of hellenistic science and the development of new scientific thought. With the science of the classical period having suffered a reversal over time (mathematics in particular having become an ossified logical system in an obscure branch of philosophy), Peterson argues that the arts provided the stimulus for new, 'living' mathematics and physics. He shows how problems arising in the arts led to the need for new mathematical techniques (e.g. perspective in painting inspired work in optics and gave geometry a new connection with describing space), while ways of thinking from the arts provided a fertile mental landscape for new scientific approaches (eq. considering multiple viewpoints, or the imprecision of observational data).

Peterson illustrates this cross-pollination between the arts and sciences through an analysis of the work of key figures, including Dante, Piero della Francesca and Kepler, as well as Galileo. In his final chapter, Peterson contends that an Oration delivered by one of Galileo's students was largely written by Galileo himself. While I cannot personally evaluate the likelihood of this claim, it provides an opportunity for Peterson to bring together various strands.

Peterson's scientific background (he is a professor of mathematics and physics) makes him well equipped to identify and elucidate mathematical ideas present in works which are often considered in purely artistic terms. I particularly enjoyed his essay on Dante, in which Peterson demonstrates that Dante's 'Paradiso' contains a construction of the 3-sphere and climaxes with an extended metaphor encapsulating Archimedes' proof of the area of a circle.

Peterson's writing style is very readable, and is effective in conveying his enthusiasm. Not only is the book itself self-contained, providing a comprehensive overview of all topics featured, but the sections can be read in any order, making it easy to 'dip into'. I found the book very thought-provoking; it gave me a new appreciation of how the Renaissance was not simply a 'flowering' of cultural activity, but represented a significant step-change in modes of thought. Overall, I would thoroughly recommend this lively and stimulating book to anyone interested in the history of ideas.

Sophie Huczynska University of St Andrews

Hidden Harmonies, The Life and Times of the Pythagorean Theorem by Robert and Ellen Kaplan, 2011, Bloomsbury Press, 304 pp, \$25.00, ISBN 978-1-596-915220.

I really enjoyed this book I had no idea that there was so much to say about Pythagoras' theorem. I have been fascinated, and have probably bored my colleagues to death. Still, everyone wants to borrow my copy now...

The book starts with some history. The proof of the theorem is of course attributed to the Pythagoreans in the middle of the sixth century BC. But were they really the first to notice it? Was it already known to the Egyptians, or even the Babylonians? Chapter 1 discusses the Egyptians. There's evidence in a Middle Kingdom (2500–1800 BC) papyrus that they knew about 3,4,5 triangles, then there are references by Democritus in the fifth century BC to the 'rope stretchers of Egypt', who were apparently constructing right angles two millennia earlier using ropes of lengths 3, 4, 5 units, and there is possibly (well, maybe) some evidence from megaliths.

But then Chapter 2 looks further back. Maybe the theorem actually originated even earlier in Mesopotamia. There are records of many gnomonic Pythagorean triples (those with two numbers consecutive) in records of old Babylonian mathematics. There's the evidence of a broken tablet (the 'Babylonian Shard') from around 1760 BC, and then there's the palmsized 'Yale tablet', showing a calculation of the digits of root 2 (computed in the Babylonian base of 60) alongside a sketch of a square with its diagonals. Surely it was knowledge of the theorem that motivated that calculation?

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But certainly the Pythagoreans knew the theorem. In Chapter 3 we learn about their society and style of proof, and the proof of irrationality of root 2 is attributed to the Pythagorean Hippasus.



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Chapter 4 continues with the Greeks, and especially Euclid. His Proposition 1.47 proves our theorem, with three squares and a tangle of five additional lines constructed around the right-angled triangle. This proof has been variously called the 'mouse trap', 'Dulcarnon' (meaning 'two-horned' in Persian), and 'the bride's chair'; there's a beautiful reproduction of a front cover from *La Vie Parisienne*, showing a soldier carrying his bride and all her chattels on his back, which really *does* seem to have been constructed on Euclid's diagram.

There have been a few published collections of proofs of the theorem, the largest apparently being Loomey's collection of 367 in Harvard library; Chapter 5 looks at a few. I've long liked the proof that places the hypotenuses of four a,b,c triangles against the inside edges of a square of edge c, revealing a square of length a-b in the middle; although somehow I feel it is cheating, since I need to do some algebra to see that the combined area of those four figures is really  $a^2+b^2$ . But I found a new favourite on p. 131: since the a,b,c triangle (with hypotenuse c) is the union of similar triangles with hypotenuses a,b, its area is the sum of theirs, but of course their areas are in the same

theirs, but of course their areas are in the same ratio as the squares of corresponding lengths. And I am amazed that Alvin Knoer could still find a new proof in 1924!

I thought that Chapter 5 would be the climax of the book. But it carries on. Chapter 6 is about consequences; we discuss Ptolemy, Pappus, Apollonius, Dijkstra, and more. Chapter 7 classifies all relatively prime Pythagorean triples. Chapter 8 moves beyond 2 dimensions, ultimately to infinite dimensions and Fourier series. Then in Chapter 9, we see the 'Deep Point of Dream', that Pythagoras' theorem is equivalent to Euclid's parallel postulate.

This book is about far more than Pythagoras' theorem. It's accessible, and fun. I recommend it!

Sarah Rees University of Newcastle

## **CALENDAR OF EVENTS**

This calendar lists Society meetings and other mathematical events. Further information may be obtained from the appropriate LMS *News/etter* 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.

#### **JANUARY 2012**

4-6 British Postgraduate Model Theory Conference, Oxford (409)
4-8 String Theory, Geometry, and Mathematical Physics UK–Japan Winter School, Oxford (407)

8-11 Free Boundary Problems in Fluid Mechanics Meeting, Nottingham (406)
9 Spitalfields Day, INI, Cambridge
16-18 Quantum Probability, Noncommutative Geometry and Quantum Information Meeting, ICMS, Edinburgh (410)
17 Citius, Altius, Fortius, Gresham College Lecture, Museum of London (409)
19-20 Future Directions in Tropical Mathematics and its Applications Workshop, Manchester (410)
20 PANDA, Leeds (410)

**20-22** Homotopy and Geometry of Loop Spaces Mini-Conference, Sheffield (410) **31-2 Feb** Cryptographic Theory INI Workshop, Cambridge (404)

#### FEBRUARY 2012

1 Heilbronn Quantum Algorithms Day, Bristol (409)

**13-17** Symmetries of Discrete Objects Conference, Queenstown, New Zealand (406)

**21** *Let's Twist Again*, Gresham College Lecture, Museum of London (409)

23-24 Rigidity of Periodic and Symmetric Structures Meeting, Kavli Royal Society International Centre, Newport Pagnell (409)
24 LMS Meeting and Mary Cartwright Lecture, London (410)

#### **MARCH 2012**

**4** Neurodynamics Workshop Tutorial Day, Edinburgh (409)

5-7 Neurodynamics Workshop, Edinburgh (409)

14 Combinatorics Meeting, Oxford 14-16 Pattern Formation: The Inspiration of Alan Turing INI Satellite Meeting, Oxford (408) 15-17 The Big Bang Science and Engineering Fair, NEC Birmingham (407)

**18-23** Stochastic Modelling in Biological Systems LMS–EPSRC Short Course, Oxford (410) **21** Zeeman Medal 2011 Award Ceremony, The Royal Society, London (410)

21-22 Young Functional Analysts' Workshop, Oxford

**26-29** Ischia Group Theory 2012 Conference, Ischia, Naples, Italy

26-30 LMS Invited Lectures, Alexei Borodin, Glasgow (410)

26-30 Logical Approaches to Barriers in Complexity II, INI Workshop, Cambridge (410)
27 On the Waterfront, Gresham College Lecture, Museum of London (409)
27-29 BAMC 2012, University College London (409)

#### **APRIL 2012**

2-3 Biological Flow Conference, Cambridge
2-4 Young Researchers in Mathematics
Conference, Bristol
2-4 Recent Advances in Scattering
Amplitudes INI Workshop, Cambridge
2-5 British Colloquium for Theoretical
Computer Science, Manchester (410)
10-13 Formal and Computational
Cryptographic Proofs INI Workshop,
Cambridge (408)
16-19 BMC 2012, University of Kent,
Canterbury (409)

16-20 Noncommutative Geometry INI–WIMCS Meeting, Cardiff (410)
16-20 Condensed Matter, Black Holes and Holography INI Workshop, Cambridge
17-19 Frontiers of Nevanlinna Theory 3: Applications of Nevanlinna Theory to Differential and Functional Equations, University College London (401)
20-21 Elmer Rees' 70th Birthday Celebration Conference, Bristol (409)
24 Final Score, Gresham College Lecture, Museum of London (409)
27 Women in Mathematics Day, De Morgan House, London (410)

#### MAY 2012

**19 LMS Poincaré Meeting, London 28-1 Jun** Boundary Value Problems for

Linear Elliptic and Integrable PDEs: Theory and Computation ICMS Workshop, Edinburgh (405) **28-1 Jun** Infinite Ergodic Theory Workshop, Surrey

#### JUNE 2012

2-3 Numerical Linear Algebra, Control Theory and Data Assimilation Conference, Reading 5-8 Higher Order Problems in Geometric Analysis Workshop, Bath (409) 6 LMS Northern Regional Meeting, Northumbria University, Newcastle 11-12 Numerical Analysis of Stochastic Partial Differential Equations, Warwick 12-15 The Incomputable Workshop, Chicheley Hall, North Buckinghamshire (407) 12-15 Chaotic Modeling and Simulation International Conference, Athens, Greece 18-20 Frontiers of Nevanlinna Theory 4: Nevanlinna Theory and Number Theory, University College London (401) 18-23 Turing Centenary Conference, Cambridge (407) 25-29 String Phenomenology INI Workshop, Cambridge 29 LMS Meeting and Hardy Lecture, London

## LMS AGM AND ANNUAL DINNER Friday 18 November 2011



Graeme Segal, incoming President

Angus Macintyre, outgoing President



#### **PRIZE WINNERS 2011**

(left to right) Alexander Pushnitski (Whitehead Prize), Jonathan Bennett (Whitehead Prize), Angus Macintyre (LMS President 2009–11), Graeme Segal (LMS President), Bryce McLeod (Naylor Prize), Jonathan Pila (Senior Whitehead Prize), Barbara Niethammer (Whitehead Prize), Brian Davies (Pólya Prize).