

NEWSLETTER

No. 411 February 2012

Society Meetings and Events

2012

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LMS Invited Lectures, Glasgow [page 11]

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Saturday 19 May Poincaré Meeting, London

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Friday 29 June Meeting and Hardy Lecture, London

Monday 3 September Midlands Regional Meeting, Aberystwyth

NEWSLETTER ONLINE:

Go to www.lms.ac.uk/ newsletter

NEW YEAR HONOURS LIST 2012

Congratulations to the following who have been recognised in the New Year Honours list:

Knight Bachelor (KB)

Simon Donaldson, FRS, Professor of Mathematics, Imperial College London, for services to mathematics.

Commander of the Order of the British Empire (CBE)

Ursula Martin, Professor of Computer Science and Vice-Principal of Science and Engineering, Queen Mary, University of London, for services to computer science.

FRENCH HONOUR FOR SIR MICHAEL ATIYAH

Former LMS President Sir Michael Atiyah, OM, FRS, FRSE has been presented with the insignia of the Grand Officier de la Légion d'Honneur by His Excellency Bernard Emié, French Ambassador to the UK. This is the highest recognition awarded by the French Republic.

At a ceremony in London the French Ambassador referred to Atiyah's international activities including his presidency of Pugwash from 1997 to 2000 (www.pugwash.org/) and 'his role from the 1960s onward in rebuilding the mathematical ties between European countries, particularly via the European Mathematical Society (EMS)'. The ambassador went on to say, '[and] many people remember the care you took when you were President of the Royal Society, to cultivate closer ties with [our] Académie des Sciences'.

MATHEMATICS POLICY ROUND-UP

January 2012

RESEARCH

CMS registers ongoing concerns over EPSRC Fellowships

The Council for the Mathematical Sciences (CMS) has written to EPSRC to register its major continuing concerns about the scope and operation of EPSRC Fellowships and other schemes to support early-career researchers in the mathematical sciences. The letter is available at http:// tinyurl.com/6qsalub.

Response to EPSRC action plan on IRM 2010

The CMS has responded to the EPSRC action plan on the International Review of Mathematical Sciences 2010 (http://tinyurl. com/c8zd3ag). The full response is available at http://tinyurl. com/7yvrt6v.

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HIGHER EDUCATION

Higher Education in STEM subjects

The CMS has responded to the House of Lords Science and Technology sub-committee inquiry into Higher Education in STEM subjects. The inquiry in particular asked 'how the UK builds the educational foundations it needs to face the challenges of the future'. The CMS evidence will be publicly available once it has been considered by the sub-committee.

SCHOOLS AND COLLEGES

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LMS responds to consultation on Study Programmes for 16–19 year olds

The LMS responded to the consultation in early January 2012. The consultation was seeking views on how to implement key recommendations from Professor Alison Wolf's report on vocational education (http://tinyurl.com/6qf2tqs); in particular, how to ensure that all 16–19 year olds study coherent, well thought-out programmes that offer breadth and depth and do not limit their options for future study or work. The LMS response will be publicly available once it has been considered by the Education Select Committee.

LMS responds to consultation on the 16–19 Funding Formula Review

The LMS also responded to the above consultation in early January 2012. Proposals in the consultation included moving away from the current complex system of funding on the basis of 'payment per qualification' to introduce a much simpler system of funding at the level of the learner. Such a change is essential to realise the proposals in Professor Alison Wolf's report on vocational education. The LMS response will be publicly available once it has been considered by the Education Select Committee.

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Charity registration number: 252660.

National Curriculum Review update

An update on the National Curriculum review has been released by the Department for Education together with a set of reports on the work undertaken so far. An update of the review is available at http://tinyurl.com/6mxl8sf.

Michael Gove's statement on the update is available at http://tinyurl.com/7nld7n6. The final report from the Expert Panel is available at http://tinyurl.com/7j7ezap.

A set of related reports has also been published:

- A summary of the call for evidence is available at http://tinyurl.com/7ns62q8.
- A report on what we can learn about science, English and mathematics from other jurisdictions is available at http://tinyurl. com/829fgzw.
- A report on subject breadth in other jurisdictions is available at http://tinyurl.com/ 83q6pze.

ACME announces new chair

Professor Stephen Sparks CBE FRS, Professor of Geology at the University of Bristol, has been appointed as the new chair of ACME. Professor Sparks began his three-year term as chair on 13 January 2012 and takes over from Professor Dame Julia Higgins FRS.

Supporting STEM in schools and colleges in England: The role of research

This report, researched and written by the Institute of Education, University of London, demonstrates the role of social science research – and specifically education research – in sustaining and developing the STEM skills base in England. It presents case studies of research undertaken within education departments, schools and faculties in English higher-education institutions, and offers a number of recommendations for future progress. The full report is available at http://tinyurl.com/843uzfm.

End for GCSE modules

Under new proposals, students starting

two-year GCSE courses in September 2012 will have to sit their exams at the end of the course in summer 2014. Students will no longer be able to re-sit individual unit exams to boost their marks – although they may retake the whole GCSE exam. However, students will be given an early opportunity to re-sit mathematics, English and English Language GCSEs every November because 'these are key subjects needed to progress to further study or employment'.

World Maths Day

World Maths Day takes place on Wednesday 7 March 2012. Students play at home and at school against other students around the world in live games of mental arithmetic. For more information visit www.worldmathsday. com.

> Dr John Johnston Mathematics Promotion Unit

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GIVING MATHEMATICS A VOICE

Cornell University Library has acquired a collection of interviews of mathematicians conducted by Eugene Dynkin, Cornell's Emeritus A.R. Bullis Professor of Mathematics.

Dynkin worked with the Library's Division of Rare and Manuscript Collections (RMC) and Digital Scholarship Services to organize and digitize his revolutionary conversations, many of which are interviews with Russian mathematicians. They are now available online at http://dynkincollection.library.cornell.edu.

The interviews, which Dynkin recorded for more than half a century, serve as a rich source of information not only about mathematics but history as well, providing insight into academic life under the Soviet regime. The collection contains nearly 150 audio and video recordings, plus biographical information about each mathematician and a select group of photographs.

Professor Dynkin was the LMS Hardy Lecturer in 1979.

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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**.

LONDON MATHEMATICAL SOCIETY

NORTHERN REGIONAL MEETING

Wednesday 6 June 2012

CCE-1 002 Lecture Theatre, Business School Building, Northumbria University

Programme:

2.00 Opening of the Meeting

Michael Mackey (McGill University) A mathematical modeling study of neutrophil dynamics in response to chemotherapy and G-CSF

- **3.15** Anthony Shannon (University of Technology, Sydney) Empirical approaches to the application of mathematical techniques in health technologies
- 4.30 Tea/Coffee
- **5.00 Eytan Domany** (Weizmann Institute of Science) Complex dynamics of cellular transcriptional response: how do cells get on the fast lane?
- 7.00 Dinner at The Assembly Rooms

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

For further details, to register or to reserve a place at the dinner, email the organisers (maia.angelova@northumbria.ac.uk). The cost of the dinner will be approximately £30, including drinks.

The meeting forms part of a workshop on *Mathematics of Human Biology* from 6 to 8 June. For further details visit

http://group28.northumbria.ac.uk/biomath or contact the organisers.

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

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ALEXANDER LOSKUTOV

Professor Alexander Yu. Loskutov died on 5 November 2011, aged 52. All his life Alexander Loskutov was closely related to the Moscow (M.V. Lomonosov) State University. He graduated from the Department of Physics in 1982 and received a PhD in the area of Nonlinear Dynamics in 1987. He became a Lecturer in 1987, then an Associate Professor, and finally was promoted to a full professorship in 1998. Since 2000 he was the leader of the Nonlinear Dynamics and Chaos Group at the Department of Physics of Moscow State University. The results on Nonlinear Dynamics developed in his group found applications in medicine, biology, economics and astrophysics.

In recognition of his research achievements, Alexander was awarded the prestigious Shuvalov medal for outstanding results in Mathematical Physics. He was among the first recipients of this award.

Alexander worked hard to make modern science more accessible to a wider audience. His reviews and books were clearly written and manifested a wide spectrum of the latest topics in Nonlinear Dynamics. His monograph *Foundations of Synergetics II* (co-authored with Professor A.S. Mikhailov) became a handbook for many researchers.

Alexander always liked new challenging topics and encouraged his students to approach difficult problems. During the last 15 years Alexander supervised more than 40 diploma projects and 13 PhD students. Many of his former students continued their research at universities and research centers all around the world. Supervising students, Alexander was always happy to share his ideas and to stimulate their independent research. He always helped them with their further scientific career.

Beyond science, Alexander had many interests: music, photography, sport, travelling and ancient history – in each of these subjects he tried to reach the level of an expert, which made him a very bright and attractive person. We will keep fond memories of Alexander Yu. Loskutov in our hearts.

> Alexey Ryabov University of Oldenburg

JOHN DERRICK

John Derrick, former Lecturer in the Department of Pure Mathematics at the University of Leeds, died on 8 December 2011. John was born in Paris in 1935, left for England at the outbreak of war with his family on 'the last boat out of Biarritz', and later attended Caterham School in Surrey as a boarder. He read Mathematics at University College London, and, after graduating in 1956, completed teacher-training at the London University Institute of Education. He taught at Ottershaw School, where he was given responsibility for the whole of mathematics teaching in the Sixth Form.

At the beginning of 1963, John took up a lectureship at Leeds. He was a lively member of the growing group of mathematical logicians led by M.H. Löb. His interest in Set Theory led him into fruitful collaboration with colleagues in mathematics and in philosophy. Later, his interests focused on computerassisted proof, and he became Deputy Director of the Leeds Centre for Theoretical Computer Science in 1992. John was a dedicated teacher, spending much time with students.

John was involved in a wide range of extramural activities, serving as President of the Yorkshire Branch of the Mathematical Association 1968–69. He travelled extensively to logic conferences and made many friends, revelling especially in 'adventures' to Eastern Europe during the 1960s and 1970s. Between October 1970 and March 1972 he was an Associate Professor at the University of Orléans.

Following some years of ill-health, John took early retirement in July 1998. He is survived by his wife Margaret, daughter Cathy, son John (now Professor of Computer Science in Sheffield), and three grandchildren.

> Garth Dales University of Leeds

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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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 on *Determinantal point processes and representation theory*. Participants will explore recently discovered remarkable interactions between probability theory and algebra as well as connections to analysis and combinatorics. Despite the novelty and the variety of methods the level of the lecture course is suitable to postgraduate students and other mathematicians interested in the topic.

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The following topics will be covered at different level of details:

- The Young graph and classification of characters of the infinite symmetric group.
- The Gelfand–Tsetlin graph and classification of characters of the infinitedimensional unitary group.
- Other examples of branching graphs. Connections to random matrices and Macdonald polynomials.
- Non-ergodic Gibbs measures and the problem of noncommutative harmonic analysis.
- Determinantal point processes. Determinantal structure of the ergodic measures on the Gelfand–Tsetlin graph and of the Schur measures.
- Examples of asymptotic analysis of determinantal processes. Applications to random matrices and last passage percolation.
- Markov dynamics on Gibbs measures. Applications to one-dimensional exclusion processes and random directed polymers.

There will also be supplementary lectures by:

- Ivan Corwin (Microsoft Research and MIT)
- Patrik Ferrari (Bonn)
- Neil O'Connell (Warwick)

Local B&B accommodation will be available. Limited financial support is available with preference given to UK research students. The registration deadline is **18 February 2012**.

For further details contact Misha Feigin at LMSlectures2012@gmail.com or visit www.maths.gla.ac.uk/~mf/LMSLectures2012/index.htm.

YOUNG RESEARCHERS IN MATHEMATICS

The third Young Researchers in Mathematics conference will be held at the University of Bristol from 2 to 4 April 2012. This conference is aimed at all postgraduate students and postdoctoral researchers in mathematics, and hosts over 200 participants. A unique opportunity is provided to meet potential collaborators and other graduate students, and learn about the latest research in other branches of mathematics. All participants are encouraged to give a talk about their research, whether partial or complete. The conference is divided into thirteen broad subject tracks, and participants are encouraged to attend talks from a variety of tracks. Each track will be led by a keynote talk given by a leading researcher in that area.

- Algebra Jan Saxl (University of Cambridge)
- Analysis and PDEs Gui-Qiang Chen (University of Oxford)
- Applied Mathematics Dimitris Drikakis (Cranfield University)
- Combinatorics Julia Wolf (École Polytechnique)
- Cryptography and Quantum Information Renato Renner (ETH Zürich)
- Dynamical Systems Viviane Baladi (École Normale Supérieure)
- Financial Mathematics TBC
- Geometry and Topology Frances Kirwan (University of Oxford)
- Logic and Set Theory Angus Macintyre (Queen Mary, University of London)
- Mathematical Biology Reidun Twarock (University of York)
- Number Theory Henryk Iwaniec (Rutgers University)
- Probability and Statistics Wilfrid Kendall (University of Warwick)
- Quantum Physics Jon Keating (University of Bristol) The conference fee is £30, and subsidies for

accommodation are available. For further information and to register, visit the website at www.maths.bris.ac.uk/~maxsb/yrm or email yrm2012@gmail.com. Thanks to the generous support of an LMS Postgraduate Research Conference Scheme 8 grant the organizers are able to further subsidise graduate students who also attend the British Mathematical Colloquium.

YOUNG FUNCTIONAL ANALYSTS' WORKSHOP

The next Young Functional Analysts' Workshop (YFAW) will be held at the University of Oxford from 21 to 22 March 2012. The event is aimed at postgraduate and postdoctoral researchers in functional analysis and related areas, but anybody interested in participating is welcome. The programme on each of the two days will consist of talks given by participants as well as our four invited speakers:

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- Charles Batty (Oxford, UK)
- Matthew Daws (Leeds, UK)
- Olga Maleva (Birmingham, UK)
- Wilhelm Winter (Münster, Germany)

There will be a registration fee of £20. For further information, and in order to register, visit the YFAW website at https://sites.google. com/site/yfawuk. The event is supported by an LMS Postgraduate Research Conference Scheme 8 grant.

NBFAS Seminar

The workshop will be followed by a meeting of the North British Functional Analysis Seminar (NBFAS) in Oxford from 23 to 24 March 2012, with Gilles Pisier (Université Paris VI, France, and Texas A&M University, USA) and Mikael Rørdam (University of Copenhagen, Denmark) as speakers. For further information visit the website at www1.maths.leeds. ac.uk/nbfas.

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me and I need more space." © ScienceCartoonsPlus.com

¹⁰ ISCHIA GROUP THEORY 2012

A conference on Group Theory will be held in Ischia, Naples, Italy from 26 to 29 March 2012. The meeting will consist of talks given by invited speakers and a permanent poster session. The scientific programme will be dedicated to the memory of Narain D. Gupta and James Wiegold. The main speakers are:

- A. Abdollahi (Iran)
- M. Dixon (USA)
- M. Evans (USA)
- A. Giambruno (Italy)
- C.K. Gupta (Canada)
- M. Herzog (Israel)
- A. Jaikin-Zapirain (Spain)
- M. Kuzucuoglu (Turkey)
- L-C. Kappe (USA)
- A. Lucchini (Italy)
- A. Mann (Israel)
- A. Moreto (Spain)
- A. Ol'shanskii (USA)
- D.J.S. Robinson (USA)
- P. Shumyatsky (Brazil)
- G. Trastauson (UK)
- N. Vavilov (Russia)
- A. Zalesski (UK)

The social programme will include a welcome cocktail on Monday late afternoon, a recital of Classical Neapolitan songs on Tuesday evening, a social trip on Wednesday morning and the conference dinner on Thursday evening. For information visit the website at www.dipmat.unisa. it/ischiagrouptheory.

MODERN MATHEMATICAL METHODS IN SCIENCE AND TECHNOLOGY

A conference on *Modern Mathematical Methods in Science and Technology* (M3ST) will take place from 26 to 28 August 2012 in Kalamata, Greece. This international conference organised by the Department of Mathematics, University of Athens takes place every three years in various locations in

- Greece. The conference themes are: • Differential equations and mathematical
- models
- Numerical analysis
- Applications of mathematics in finance
- Stochastic analysis, Modelling
- Optimization, Control theory
- Image and Signal processing
- Mathematics of computation

The Invited Speakers are:

- José Arrieta (Universidad Complutense de Madrid)
- Giorgio Fusco (Università dell'Aquila)
- Gerhard Kristensson (Lund University)
- Charalambos Makridakis (University of Crete)
- Rainer Picard (University of Dresden)
- Athanasios Tzavaras (University of Crete)
- Glenn Vinnicombe (University of Cambridge)

Presentations are welcome on any of the conference themes. Potential speakers should submit an extended abstract, not exceeding two pages in PDF format by **31 March 2012**. For further information visit the website at http://noether.math.uoa.gr/m3st.

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.

LMS PUBLICATIONS CATALOGUE

Correction

The *Publications Catalogue* for 2012, which was distributed to readers with the January *Newsletter*, contains an error: the year appears as '2011' on the front cover of the printed copies. We apologize for this mistake.

The catalogue with the blue-grey cover is indeed the 2012 catalogue, and contains the latest information and prices. The corrected catalogue can be viewed online via www.lms. ac.uk/content/pubcat. 11

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Kannan Soundararajan Professor of Mathematics, Stanford University

What are L-functions and what are they good for? Colloquium Lecture 16 April 2012 | 4-5pm | Chemistry Building | LT2 Wine reception to follow

> Lecture 1: Moments and the distribution of values of L-functions 17 April 2012 | 3-4.30pm | Mathematics Building | SM1

Lecture 2: Moments and the distribution of values of L-functions continued 18 April 2012 | 3-4.30pm | Mathematics Building | SM1

Lecture 3: Additive problems for multiplicative sets 19 April 2012 | 3-4.30pm | Mathematics Building | SM1

School of Mathematics Distinguished Lecture Series

http://www.maths.bris.ac.uk/events/seminars/series

An annual event, in collaboration with the Heilbronn Institute, in which a distinguished scholar is invited to give a series of three lectures and a colloquium. There is a small amount of travel funding available for PhD students wishing to attend this series, for further information please contact: heilbronn-coordinator@bristol.ac.uk



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 £50 book token will be awarded for the poster that is judged to be the best Women in Mathematics Day Poster 2012.

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 ± 5 for all others – payable on the day.

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ASYMPTOTIC GROUP THEORY AND MODEL THEORY

A two day workshop on Asymptotic Group Theory and Model Theory will be held from 26 to 27 March 2012 at Royal Holloway, University of London. The speakers will include: • R. Cluckers (Université de Lille and K.U. Leuven)

- H. Helfgott (CNRS/École Normale Supérieure, Paris)
- J. Howie (Heriot-Watt University, Edinburgh)
- I. Kazachkov (University of Oxford)
- F. Loeser (Université Pierre et Marie Curie, Paris)
- H.D. Macpherson (University of Leeds)
- U. Onn (Ben Gurion University of the Negev)
- A. Ould Houcine (Universités de Lyon and de Mons)

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The workshop forms part of the 'South England Profinite Groups Meetings' which are supported by an LMS Scheme 3 grant. The workshop is also funded by Royal Holloway, University of London. Applications for financial support can be made on the registration form. For more details see www.ma.rhul.ac.uk/ model-theory or contact Benjamin Klopsch and Christopher Voll at rhulworkshop2012@ googlemail.com.

INTEGRABLE MODELS, CONFORMAL FIELD THEORY

The 16th UK meeting on Integrable Models, Conformal Field Theory and Related Topics will take place at the University of York from 13 to 14 April 2012. The main aims of the meeting are:

- the dissemination, explanation and discussion of recent exciting results in this field
- · to promote communication and collaboration within the UK Integrable Models and Conformal Field Theory community, and to bring together mathematicians and physicists working in this area

- to act as a forum for young researchers to present their work and to become known and integrated into the community. Speakers are:
- James Drummond (Annecy/CERN)
- Benoit Vicedo (DESY, Hamburg/York)
- Christian Hagendorf (Geneva)
- Ben Hoare (student; Imperial)
- Adam Nahum (student; Oxford)

There will be an informal poster session. All participants, especially students and postdocs, are encouraged to present a poster. For further information contact Niall MacKay (niall.mackay@york.ac.uk). The meeting is supported by an LMS Conference grant and the Institute of Physics.

BIOLOGICAL FLOW

A conference to celebrate the 70th birthday of Professor T.J. Pedley, FRS, will take place at the Centre for Mathematical Sciences, University of Cambridge from 2 to 3 April 2012. Professor Pedley, Emeritus G.I. Taylor Professor of Fluid Mechanics at the University of Cambridge, has played a leading role in the development of biological fluid mechanics. His 70th birthday provides an excellent opportunity to bring leading figures in biological and biomedical fluid mechanics to the UK as participants in this two-day conference. The conference will address recent research across the discipline including:

- Cardiovascular and Respiratory Dynamics
- Cellular and Micro-Organism Dynamics
- Flow-Structure Interaction
- Swimming, Flying and Other Locomotion Contributed talks and posters are very welcome. Potential participants are strongly encouraged to pre-register for the conference and dinner at http://biofluids.info/pre-register. Enquiries should be directed to TJP-Fest@ biofluids.info. More information is available on the conference website www.biofluids. info. The conference is supported by an LMS Conference grant.



Natural Shocks and Theatre503 present: **MATHEMATICS** of the **HEART BY KEFI CHADWICK**

7th February - 3rd March 2012

LMS MEMBERS: see page 23

020 7978 7040 • www.theatre503.com

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Isaac Newton Institute

for Mathematical Sciences

STRING PHENOMENOLOGY

25–29 June 2012

in association with the Newton Institute programme Mathematics and Applications of Branes in Strong and M-Theory (3 January – 29 June 2012)

Organisers: Joseph Conlon (University of Oxford), Fernando Quevedo (Cambridge/ ICTP, Trieste), Daniel Baumann (University of Cambridge) and Steve Abel (Durham).

There exist two Standard Models in physics, both of which are known to be inadequate. The Standard Model of particle physics is accommodated but not explained by the formalism of quantum field theory. A deeper theoretical toolkit is needed to understand *inter alia* the quantum instability in the Higgs field, the apparent unification of gauge couplings at high energies, the presence of multiple generations and the hierarchical structure of fermionic masses.

The Standard Model of cosmology provides a beautiful fit to precision data but is built around the idea of inflation, with no detailed microscopic understanding of the physics responsible for inflation. Cosmology furthermore tells us that a quarter of the Universe's energy density is in an unknown form of dark matter.

String theory is a consistent theory of quantum gravity and provides a candidate theory of fundamental interactions. String phenomenology is the branch of string theory that aims to connect this subject to particle physics and cosmology. The ultraviolet consistency of string theory motivates new ideas for low-energy physics and provides a rich structure of constraints on low-energy theories, going beyond the requirements of low-energy effective field theory. *String Phenomenology 2012* will be the 11th annual *String Phenomenology* conference, following on from the successful 2011 conference in Madison, Wisconsin. It also marks ten years since the original *String Phenomenology Conference* in Oxford in 2002. The conference brings together researchers aiming to connect fundamental and observable physics, through the study of string compactifications, effective actions, supersymmetry breaking, model building, Standard Model constructions, cosmology and inflation.

Deadline for applications is **7 April 2012**. Applications received before **5 March 2012** will be given priority.

For more information visit the website at www.newton.ac.uk/programmes/BSM/bsmw05. html.

LMS GRADUATE STUDENT MEETING

newsletter@lms.ac.uk

Report

An LMS Graduate Student Meeting took place at Birkbeck College, Malet Street, London on Friday 18 November 2011. The meeting was attended by approximately 20 graduate students and members.

The first lecture was *An introduction to o-minimality* by Dr Gareth Jones from the University of Manchester who is conducting research on Pfaffian functions and o-minimality.

After a brief coffee break, five PhD students from universities all over the country presented their research, as follows:

- Jakub Sliacan (London School of Economics) Some motivations for perfect exponentiation
- Karin Valencia (Imperial College) An application of topology: investigating programmed genome-wide rearrangements in ciliates
- Stuart Murray (University of Edinburgh) Quasimodes in a dispersive Lamb model
- Rachel Newton (University of Cambridge) Concrete cup product
- Soma Purkait (University of Warwick) On Shimura decomposition and Tunnell-like formulae

For their outstanding talks, Jakub Sliacan and Soma Purkait received prizes in recognition and encouragement of their efforts.

The LMS Publisher, Susan Hezlet, gave a short talk on *How to get your papers published*.

Vincenzo Mantova from Scuola Normale Superiore di Pisa, who was visiting the University of Oxford at the time of the meeting, gave a lecture on *Some motivations for perfect expansions*.

The last lecture was from Adam Harris of the University of Oxford on *Model theory as a guide in number theory*. He used model-theoretic notions as a guide in mathematics and introduced numerous examples of 'perfect' theory and structures (where 'perfect' is defined as categorical in all uncountable powers).

The meeting was followed by the LMS Annual General Meeting in the Institute of Education, London, with a reception at De Morgan House afterwards. (See LMS *News/etter* no. 410, January 2012, for a report.)

Shitao Wang University of York

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LMS PROSPECTS OF MATHEMATICS

Report

How sexy is a PhD in Mathematics? Sixty final-year undergraduates from across the UK dropped their Christmas shopping and came to Bristol to find out. The event, which took place from 16 to 17 December 2011, fully funded by the London Mathematical Society, comprised introductory lectures by senior academics in pure and applied mathematics, presentations by the doctoral training centres in Bristol, Cambridge, Lancaster and Warwick and, most importantly, ample opportunity for the students to mingle with the professionals. The programme was packed with stimulating, brilliantly presented lectures. Each lecturer gave an overview of her/his research field, discussed a few specific open questions and concluded with a survey of the relevant research groups in the UK.

The most exciting breakthroughs in science often occur at the interface of different areas, or by the transfer of techniques from one field to another. The meeting kicked off with a striking illustration of this fact in Tom Ward's (UEA) lecture: from the analogy between prime numbers and the lengths of periodic orbits in chaotic systems, to the recent Fields medalwinning work of Lindenstrauss, the interaction between number theory and dynamical systems has seen much fertile ground. A change of gear to the second lecture; from the dynamics of numbers to dynamics of micro-swimmers: Tannie Liverpool (Bristol) introduced us to the exciting world of soft matter theory. After

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tea, Tom Coates (Imperial) explained how to make hard problems easy: the classification of basic building blocks in complex geometry can be attacked by translating it to the world of symplectic geometry by means of mirror symmetry. Jim Wright (Edinburgh) demonstrated the fundamental role harmonic analysis plays in many areas in pure and applied mathematics, illuminating the many cross-connections in the case of the Fourier restriction problem. The Friday session was concluded by a journey from Biology to Mathematics and back: Carmen Molina Paris (Leeds) told us about the real impact mathematical modelling can make in immunology. Dinner was set in the rooms of the mathematics department with each table chaired by one of the speakers; the students cherished the opportunity to get to know some of the leaders in their research area in this informal setting.

'How do things look from far away?' could

on Saturday morning. Richard Craster (Imperial) illustrated how surprising macroscopic effects (such as invisibility) can be achieved by the clever use of metamaterials, and the impact that applied mathematicians can make in this highly promising research field. Another subject where the view from afar is crucial is geometric group theory. Cornelia Drutu (Oxford) showed us how to deduce algebraic properties of a group by studying its Cayley graphs, which in turn encode the group's geometric structure. The stimulating lecture by Nadia Sidorova (UCL) featured scaling laws in probability, leading from the classical central limit theorem for sums of random variables to current research on random sorting networks and the parabolic Anderson model.

Ben Green (Cambridge) gave a beautiful introduction to approximate groups and their relevance in additive combinatorics, including his groundbreaking work with Terry Tao on arithmetic progressions in the primes.



Slurs, muds, emulsions and foams are only a few examples of complex fluids that show a distinctly different behaviour from the classical Newtonian fluids. Helen Wilson (UCL) gave a brilliant overview of the techniques used in this field and their many applications in industry. Marta Mazzocco (Loughborough) rounded off the meeting with a gentle introduction to Riemann surfaces and Teichmüller spaces and their application in the study of Poisson brackets and quantization – an amazing bridge between pure mathematics and physics.

We were impressed with the quality of all lectures, perfectly pitched, and the active participation of the audience in and between the talks. A big thank you to all who made this meeting a success!

For further information on the talks see www.maths.bris.ac.uk/~maxcu/Prospects2011. html. A photograph can be found on the back cover of this *News/etter*.

Jens Marklof and Corinna Ulcigrai University of Bristol

14TH GALWAY TOPOLOGY COLLOQUIUM

Report

Despite the name, the Galway Topology Colloquium series is held at varying locations around Ireland and the UK. The 14th session was held in Queen's University Belfast (QUB) from 15 to 17 August 2011. It served a dual purpose by also marking the retirement from QUB of Brian McMaster who has been active in this series since its inception. The event was supported by the Irish Mathematical Society, the Pure Mathematics Research Centre at QUB, and a generous Conference grant from the London Mathematical Society.

The conference was attended by a total of 25 participants including eight postgraduate students, which was very gratifying as one of the features of the Galway talks has been involving students. It was, indeed, pleasing to

see the level of interaction between the invited speakers and the younger participants. In fact, one of the student participants, Shari Levine from Oxford, is currently organising the 15th colloquium in the series.

There were 18 talks in total over the three days. We limit ourselves here to describing the talks given by the invited speakers.

Alexander Arhangel'skii (Ohio and Moscow) talked on *Remainders of Various Kinds of Spaces in Compactifications*, mainly about the remainders of non-locally compact topological groups in Hausdorff compactifications.

Paul Bankston (Marquette) gave a talk titled A Framework for Characterising Topological Spaces which was about deciding whether or not a topological space can be characterised within a class of its 'peers' by a sentence of firstorder logic.

Paul Gartside (Pittsburgh) spoke on *Strongly Arcwise Connected Continua* which involved spaces where for every *n* points there is an arc connecting them, possibly with the order being specified. 19

Jan van Mill (Amsterdam) gave an interesting survey on *Topological Homogeneity*, including several examples of homogeneous spaces and discussing several open problems.

Ivan Relly (Auckland) gave the centrepiece talk of the conference entitled A *Topological Antihero*. This surveyed the topic of topological anti-properties, introduced by Paul Bankston in 1979, and highlighted the contribution to the field of Brian McMaster and his students.

Dona Strauss (Leeds) talked on *The Algebra* of $\beta\mathbb{N}$ and *Polynomial Returns* which harked back to problems dating back to the 19th century and work of Hardy and Littlewood.

On the Monday evening, the conference dinner was combined with a retirement dinner for Brian and was enjoyed by all. A photograph can be found on the back cover of this *News/etter* and at www.qub.ac.uk/puremaths/ Photos/Photograph_Album.html.

> Tony Wickstead Queen's University Belfast

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REVIEWS

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Number-crunching: Taming unruly computational problems from mathematical physics to science fiction by Paul J. Nahin, Princeton University Press, 2011, 400 pp, £20.95, \$29.95, ISBN 978-0-6911 4425-2.

If this book were a three-course meal in a posh restaurant, I'd know exactly what to write: dodgy starter, yummy main, a most peculiar dessert, and a waiter who drove me slightly bonkers but gave me a lovely cuddle as I left. Now to translate all that into a book review....

Number-Crunching is a book for people with a pretty high level of mathematical sophistication: Nahin expects the reader to manipulate equations, change variables in an integral, apply various rules of differentiation, and so on. It's not a relaxing read: there is a good level of rigour to the mathematics and one is expected to follow fairly subtle lines of argument carefully.

Which makes it all the more unfortunate that he spends half of the introduction discussing 'TUPA', an imaginary 'Universal Photo Album' containing all the images ever occurring in the universe. The punch line is that TUPA cannot exist because the number of such images is many orders of magnitude greater than any feasible storage device. It's a poor start: if you're writing a book for people who can integrate by parts, you shouldn't expect them to be impressed by the fact that 10^{100} is much bigger than 10^{10} .

So much for the dodgy starter. The main course, though, I enjoyed: Nahin discusses several important problems in mathematical physics; he uses sophisticated mathematical techniques to analyse them and then, when the mathematics hits its limits, he shows how computers can be used to uncover unexpected behaviour.

The first big example is the hotplate problem (solving the heat equation on a unit square with prescribed boundary conditions). I hadn't thought about such things since undergraduate days but Nahin drew me in and reminded me that the mathematics in this area is a delight. He solves different cases of the problem using different analytic methods, and then uses MATLAB to implement two different algorithms (one iterative, one probabilistic) which exhibit interesting behaviour.

This is followed up by an historically important piece of mathematical physics: the study of mixing in a one-dimensional crystal. The crystal is modeled as a string of particles linked by springs, and a complete analysis is given for the case where particle interaction is linear. The discussion is beautiful and the result entirely satisfactory. This is followed up by a numerical analysis (again using MATLAB) of the non-linear situation; this analysis is now known as the 'Fermi-Pasta-Ulam Computer Experiment' after the three physicists who first performed this analysis on MANIACI. The behaviour that MATLAB displays is unexpected and gives the reader a good sense of the excitement that Fermi and company must have felt. It is a splendid example of the power, and importance, of computers in the study of mathematical physics.

The dessert in *Number-Crunching* is a series of short science fiction stories probing the various possibilities for computers in modern life. The stories themselves are mildly enjoyable, although they represent a strange nonsequitur in the context of the book. They are also rather crude and, accompanied as they are by a discussion of the place of Sci-Fi in literature, I found them very limited in scope.

And, finally, that infuriating waiter. The book is littered with personal anecdote of the 'wudja believe it?!' variety, includes frequent reference (including lengthy quotes) to the author's other books, and periodically lapses into the tone of a fireside chat. Still, for all that, the self-effacing enthusiasm of the author carries the day: I might have been seriously annoyed by some of the hokum, but instead I ended up charmed by Nahin's obvious sincerity. This is a man who really believes in the value of computers to the work of a mathematical physicist and, after reading the book, I can see his point.

> Nick Gill Open University

The Great Mathematicians by Robin Wilson and Raymond Flood, Arcturus Publishing, 2011, 208 pp, £9.99, ISBN: 978-1-84837-902-2.

The Great Mathematicians is a largely chronological account of the development of mathematics from the Ancient Egyptians to the present day. Material is presented in a series of two-page spreads, most of which focus on the life and selected achievements of a single mathematician. In the words of the authors: 'This book aims to present mathematics with a human face.'

It divides the history of mathematics into five main areas. Ancient mathematics is focussed for the most part on Greek mathematics, but also includes material on Chinese, Indian, Mayan and Arabic mathematics. Early European mathematics stretches from Fibonacci to Desargues. Awakening and Enlightenment traces the development of mathematics in the seventeenth and eighteenth centuries. The Age of Revolutions begins with Gauss and ends with Klein. Finally, The Modern

Age is a selection of mathematician from the twentieth and twenty-first centuries, concluding with a discussion of Perelman and the Poincaré conjecture.

The book is attractively bound, and at £9.99, provides a competitively priced nontechnical overview of the development of mathematics. I found the exposition of the first two chapters particularly appealing, but as the book progresses the biographical sketches become thinner and the authors struggle occasionally to present more technical material in an accessible fashion. Thus the coverage of figures such as Gerbert (later Pope Sylvester II) and Recorde (who introduced the \times and = signs) appealed greatly to me. I was disappointed, however, by the coverage of Abel and Galois, who share a single spread with a description of the classical problems of doubling the cube, trisecting an angle and squaring the circle. Their stories are related in a telegraphic style, missing out on a golden opportunity to tell two of the more melodramatic stories from the history of mathematics.

While the book contains descriptions and illustrations of a great number and range of mathematical results, it contains relatively few formal proofs, with the notable exception of a presentation of Cantor's diagonal argument on page 165. This is a pity: without proofs it can be difficult to appreciate the elegance of the material that is being presented. These are minor reservations however; the lack of depth in the treatment is counterbalanced by the comprehensive bibliography provided for further reading.

The authors have been successful in providing a comprehensive and non-technical introduction to the great mathematicians of history.

> Padraig Ó Catháin NUI, Galway

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CALENDAR OF EVENTS

This calendar lists Society meetings and other mathematical events. Further information may be obtained from the appropriate LMS Newsletter whose number is given in brackets. A fuller list of meetings and events is given on the Society's website (www.lms. ac.uk/newsletter/calendar.html).

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

FEBRUARY 2012

1 Heilbronn Quantum Algorithms Day, Bristol (409) 7-3 Mar Mathematics of the Heart, Theatre503, London (411) 13-17 Symmetries of Discrete Objects Conference, Queenstown, New Zealand (406)21 Let's Twist Again, Gresham College

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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 (411)

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 (411) 21-22 Young Functional Analysts' Workshop, Oxford (411) 23-24 North British Functional Analysis Seminar, Oxford (411)

26-27 Asymptotic Group Theory and Model Theory Workshop, Royal Holloway, University of London (411)

26-29 Ischia Group Theory Conference 2012, Ischia, Naples, Italy (411)

26-30 LMS Invited Lectures, Alexei Borodin, Glasgow (411)

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 (411)

2-4 Young Researchers in Mathematics Conference, Bristol (411) 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)

13-14 Integrable Models, Conformal Field Theory and Related Topics Meeting, York (411)

16-19 BMC 2012, University of Kent, Canterbury (409) 16-19 Distinguished Lecture Series, Bristol

(411)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 (411)

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 (411) 6-8 Mathematics of Human Biology Workshop, Northumbria University, Newcastle (411)

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 (411) 29 LMS Meeting and Hardy Lecture,

London

JULY 2012

2-7 6th European Congress of Mathematics, Kraków, Poland (409) 9-11 15th Galway Topology Colloguium, Oxford 9-13 Additive Combinatorics in Paris 2012 Conference, Paris, France (409) 23-27 Topological Fluid Dynamics, INI

Workshop, Cambridge

AUGUST 2012

26-28 Modern Mathematical Methods in Science and Technology Conference, Kalamata, Greece (411) 27-30 Algebra, Combinatorics, Dynamics and Applications Workshop, Queen's University, Belfast (410)

SEPTEMBER 2012

3 LMS Midlands Regional Meeting, Aberystwyth 3-7 Topological Aspects of DNA Function and Protein Folding INI Workshop, Cambridge 4-9 British Science Festival, Aberdeen (408) 10-14 Stochastic Partial Differential Equations INI Workshop, Cambridge

OCTOBER 2012

1 LMS South-West and South Wales **Regional Meeting, Bristol** 3-6 International Conference on Applied and Computational Mathematics, Ankara, Turkev

MATHEMATICS OF THE HEART

Mathematics of the Heart is showing at Theatre503 (503 Battersea Park Road, London SW11) from 7 February to 3 March 2012. The play was developed with the help of Professor Ian Stewart (Warwick) and Professor David Acheson (Jesus College, Oxford) and uses ideas of chaos theory as a metaphor for love and the desire for prediction.

As it has a mathematical theme we thought your members might be interested in coming to see it. To this end we are offering full-price tickets at the **concessionary** rate of £9 for all LMS members. Please call the Theatre503 box office on 020 7978 7040 and quote 'Maths Offer' to secure this special rate.

> Amy Michaels Assistant Producer

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LMS-FUNDED MEETINGS



14th Galway Topology Colloquium held at Queen's University Belfast from 15 to 17 August 2011 (report on page 19)



Dr Helen Wilson (UCL) speaking at the *LMS Prospects of Mathematics* meeting held at the University of Bristol from 16 to 17 December 2011 (report on page 17)