LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 413 April 2012

Society Meetings and Events

2012

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Meeting and Hardy Lecture, London

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Midlands Regional Meeting, Aberystwyth

Wednesday 26 September
LMS Popular Lectures, Birmingham

NEWSLETTER ONLINE:

Go to www.lms.ac.uk/newsletter

LMS ANNUAL REVIEW 2010–2011

The LMS *Annual Review 2010–2011* is now available and contains highlights of LMS activities during 2010–2011, principally in Funding the Advancement of Mathematical Knowledge, Celebrating Mathematical Achievements, Publishing and Disseminating Mathematical Knowledge, and Advancing and Promoting Mathematics.

The Society has continued to develop areas of strategic priority with the beginnings of a new membership drive, funding to encourage independent activities by young researchers, and a major investment to develop the Society's new website, which provides an invaluable communication tool for LMS members and the wider mathematics community.

Several major issues have affected both research and higher education in 2010–2011 including the International Review of the Mathematical Sciences 2010, Impact and the 2014 REF, cuts in science funding and changes to EPSRC policy. The Society has been prominent in engaging with the relevant organisations on these issues both in its own right and as part of the Council for the Mathematical Sciences (CMS).

The *Annual Review* will also be available via the LMS website (www.lms.ac.uk).

ANNUAL ELECTIONS TO LMS COUNCIL

The normal way in which nominations to Council are made is via the Nominating Committee, but there is also provision for all members of the Society to make nominations directly. Anyone who wishes to suggest someone for a position as an Officer of the Society or as a Member of Council is invited to inform Professor Caroline Series, who is the current Chair of the Nominating Committee (c.m.series@warwick.ac.uk). Nominations should be received by **Friday 25 May 2012** in order to be considered by the Nominating Committee.

Direct nominations, together with standard biographies, should be sent to the Executive Secretary's office (nominations@lms.ac.uk) to arrive before noon on **1 September 2012**. Such nominations must bear the signatures of the nominator and three seconders and of the nominee. A letter with the relevant names and signatures is sufficient, alternatively a form on which to make such nominations is available from the office on request.

Nominating Committee seeks

to maintain a balance in gender, subject area and geographical location when drawing up its list of prospective nominees, and LMS members should bear in mind that it is to the benefit of Council if a wide spread of subject areas are represented.

The slate proposed by Nominating Committee together with other direct nominations received up to that time will be posted on the LMS website in early August for members to see before deciding whether they wish to make any further direct nominations. Further nominations will be posted as they are received.

LMS GRANT SCHEMES

Call for Applications

Applications are invited for the following grants – next closing date **15 May 2012**.

- 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)
- Young British and Russian Mathematicians Scheme (see further details below)

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 **15 May 2012** will be considered at a meeting in June.
- Applications should be submitted well in advance of the date of the event for which funding is requested.
- Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

Queries regarding applications can be addressed to the Grants Administrators 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).

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@lms.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 **15 May 2012** – please see the website for further details: www.lms.ac.uk/content/computer-science-small-grants-scheme-7.

(Continued on the next page)

LMS Newsletter **www.lms.ac.uk/newsletter**

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Events calendar: please send updates and corrections to **calendar@lms.ac.uk**

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Charity registration number: 252660.

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 **30 April 2012**. Please see the website for further details: www.lms.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.lms.ac.uk/content/childcare-supplementary-grants.

LMS DURHAM RESEARCH SYMPOSIA 2012

In 2012 there will be two LMS Durham Research Symposia, both supported by EPSRC:

- 2–7 July *Interactions of birational geometry with other fields*
  Caucher Birkar (Cambridge), Ivan Cheltsov (Edinburgh), Tim Browning (Bristol)
  For further information visit: www.maths.dur.ac.uk/events/Meetings/LMS/2012/IBG12.
- 9–17 July *Grand Biological Challenges for Mathematicians*
  Kasper Peeters (Durham), Anne Taormina (Durham), Reidun Twarock (York)
  For further information visit www.maths.dur.ac.uk/lmsbio.

LMS Durham Research Symposia have been held at the University of Durham each year in July and August since 1974. The Symposia cover a wide range of mathematical disciplines and recent symposia include:

2011
- *Mathematics of Data Assimilation*, I. Roulstone, P.-J. Leeuwen, N. Nichols
- *Automorphic Forms and Galois Representations*, F. Diamond, P. Kassaei, M. Kim
- *Geometry and Arithmetic of Lattices*, M. Belolipetsky, M. Bridson, M. Lackenby, J. Parker

2010
- *Non-Perturbative Techniques in Field Theory*, P. Mansfield, D. Tong, W. Zakrzewski, M. Zamaklar
- *Numerical Analysis of Multiscale Problems*, I. Graham, T. Hou, R. Scheichl

The Durham website www.maths.dur.ac.uk/events/Meetings/LMS contains information on all previous and forthcoming symposia including, in many cases, a list of participants, abstracts of talks, a symposium photograph (the earliest surviving photograph is from 1976), lecture notes and, for more recent symposia, videos of the talks.

Proposals for Future Durham Symposia – deadline 1 September 2012

The LMS Research Meetings Committee (RMC), which is responsible for planning the LMS Durham Symposia, welcomes ideas for symposia for 2013 and later, from potential organisers and others. (EPSRC support has yet to be secured for 2014 and later.)

Outline proposals for 2013 should be submitted to John Parker, Principal Investigator, (j.r.parker@durham.ac.uk) by **1 September 2012**. For further information regarding preparing and submitting proposals for Durham Symposia, please visit the LMS website (www.lms.ac.uk/content/durham-symposia).

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. All mathematicians are invited to attend, but women are especially welcome.

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.

AN UNEXPECTED HONOUR

Ursula Martin, Professor of Computer Science and until recently a Vice-Principal at Queen Mary, University of London, has received a CBE in the New Year Honours list 'for services to computer science'. The award came as a 'complete surprise' to Professor Martin who described it as a 'very nice feeling'.

Professor Martin graduated in mathematics from the University of Cambridge and went on to study for a PhD at the University of Warwick. It was during her PhD – working on Group Theory – that she became interested in computer science. As she points out, 'It was around this time that people were beginning to become aware of what mathematics could do for computer science. New areas were opening up where mathematics could make a significant contribution'.

Professor Martin has had a distinguished career working in the UK and abroad – including becoming the first female professor in the history of St Andrews University. Her work has been influenced by her time at Cambridge, which gave her the 'broad mathematics education' and at Warwick where her colleagues were 'open to thinking about new ideas'. As she says, 'It was exciting to be part of a new enterprise'. Professor Martin was also keen to highlight the pioneering work of Alan Turing in computer science. 'Turing's contribution was extremely broad. He was involved not only in the fundamental mathematics but also the practical aspects of building machines and his ideas were incredibly novel and very advanced. He had an insight into what computation might achieve'.

As well as her support for higher education and research, Professor Martin is a keen advocate for developing a relevant and stimulating ICT curriculum in schools, and supports the Secretary of State for Education Michael Gove's assertion that the ICT curriculum in schools needs a 'radical revamp'. 'Rather than complaining, the computer science community did something about it. It spoke with teachers on the ground in a concerted campaign that also sought to get the ear of government, and it has been tremendously effective.'

Ursula Martin

Professor Martin has been actively involved with the LMS for a number of years. She has served both on the LMS Council and the Women in Mathematics Committee, and she has also chaired the LMS Computer Science Committee. She has seen significant progress relating to women in mathematics although there is still some way to go. 'There is much greater recognition for women and there is a new generation of young female mathematicians coming along. Universities and other organisations are certainly working to do the right thing'.

There have been many challenges during Professor Martin's career and her contribution to mathematics and computer science has been considerable. Professor Martin sees some significant challenges ahead. 'There is a problem with skilled mathematicians and funding is not good for early career researchers and postgraduates. Mathematicians are in high demand and it is vital to sustain mathematics research and the flow of highly qualified individuals, especially through supporting early career researchers and postgraduates. We need to get beyond politics and do the best we can for mathematics'.

UNIVERSITY OF CAMBRIDGE

FACULTY OF MATHEMATICS

ADAMS PRIZE

Topology

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

The Chairman of the Adjudicators for the Adams Prize invites applications for the 2012-13 Prize which will be awarded this year for achievements in research on Topology.

The prize is open to any person who, on 31st October 2012, will hold an appointment in the UK, either in a university or in some other institution; and who is under 40 (in exceptional circumstances the Adjudicators may relax this age limit). The value of the prize is expected to be approximately £14,000, of which one third is awarded to the prize-winner on announcement of the prize, one third is provided to the prize-winner's institution (for research expenses of the prize-winner) and one third is awarded to the prize-winner on acceptance for publication in an internationally recognised journal of a substantial (normally at least 25 printed pages) original article, of which the prize-winner is an author, surveying a significant part of the winner's field.

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

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

(email: faculty-office@maths.cam.ac.uk)

The deadline for receipt of applications is 31 October 2012.

MARVIN KNOPP

Professor Marvin I. Knopp, who was elected a member of the London Mathematical Society on 20 January 1984, died on 24 December 2011, aged 78.

John Paulos writes: John received his PhD under Paul T. Bateman at the University of Illinois in 1958. While serving on the faculty at the University of Wisconsin, the University of Illinois-Chicago and Temple University sequentially, he made significant contributions to number theory, particularly to the theory of modular forms about which he wrote more than 70 papers and two books. As a leading expert on modular forms, he twice gave invited addresses to meetings of the American Mathematical Society. He was closely associated with the mathematicians Gene Golub and Emil Grosswald among others and over the course of his career advised twenty PhD students.

Beloved by his students as well as his many friends and colleagues, he was known as a kind and supportive teacher with a warm ever-present sense of humor. He was also rather idiosyncratically averse to technology and wrote the first of his handful of emails less than a year ago. And it was brief: 'Knopp sends email'. Professor Knopp was the father of pianist Seth Knopp, and of Abby, Elana and Yehudah (deceased). He was married to Dr Josephine Zadovsky Knopp for 25 years but the marriage ended in divorce. He met his cherished companion Phyllis Zemble in 1982 and resided with her until his death. He will be dearly missed by many.

NIMISH SHAH

Mr Nimish Shah, who was elected a member of the London Mathematical Society on 23 June 2000, died on 16 November 2011, aged 45.

Simon O'Keefe writes: I met Nimish Shah when he came to York in 2006 hoping to gain a PhD in Computer Science. I became his supervisor for his studies in computer science, but I think it is true to say that his real interests lay in mathematics, and in particular the mathematics used to describe computation. It was clear from the start that Nimish was a very intelligent person, amiable and eager to do well in all spheres of intellectual pursuit. He had very clear ideas about what he wanted to achieve, and once started down a particular track he was not easily deflected from his chosen course. He had flashes of brilliance and certainly had the potential to complete a PhD, but unfortunately a recurrence of health problems that had dogged him for some years meant that he had to interrupt his work a number of times. The productive work on his thesis slowed, and he died whilst writing up. Although his research output was not great in volume, what he did publish will continue to have an influence on other researchers in the field.

VISIT OF J. COSSEY

Dr John Cossey (Australian National University, Canberra) will visit the UK from 1 May to 16 June 2012, when he will be based at Warwick. His current research concerns factorised groups, particularly nilpotent groups, with reference to derived length, class, coclass, breadth and rank. During his visit Dr Cossey will give seminars on these topics at:

- Birmingham University, Thursday 10 May
- Warwick University, Thursday 24 May
- University of East Anglia, Monday 11 June

For further information contact Stewart Stonehewer (S.E.Stonehewer@warwick.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF W. MÜLLER

Professor Werner Müller (Bonn University) will be visiting the UK from 22 to 28 April. His research areas are global analysis, automorphic forms and harmonic analysis on locally symmetric spaces. Professor Müller will give lectures at:

- Loughborough University, 24 April at the Analysis Seminar
- King's College London, 25 April at the Number Theory Seminar
- University College London, 27 April at the Pure Mathematics Seminar

For further information please contact Alex Strohmaier (A.Strohmaier@lboro.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF D. SAVITT

Professor David Savitt (University of Arizona) will be visiting the UK from 1 to 31 May 2012. Professor Savitt's research area is number theory, with a focus on p-adic Hodge theory and its applications to the Langlands programme. During his visit he will give seminars at:

- King's College London, Wednesday 9 May
- University of Cambridge, Tuesday 15 May
- University of Sheffield, Wednesday 23 May

Professor Savitt will be based at King's College London and Imperial College during his stay. For more information contact Fred Diamond (Fred.Diamond@kcl.ac.uk). The visit is supported by an LMS Scheme 2 grant.

GEOMETRY, REPRESENTATION THEORY AND CLUSTERS

A workshop on *Geometry, Representation Theory and Clusters* will take place at the University of Leicester from 21 to 23 June 2012. It will include topics in the geometry and combinatorics related to cluster algebras and cluster categories as well as more general representation theory and adjacent fields. Speakers will include:

- Karin Baur (Universität Graz)
- Aslak Buan (NTNU Trondheim)
- Anna Felikson (Jacobs University Bremen)
- Thorsten Holm (Universität Hannover)
- Peter Jørgensen (University of Newcastle)
- Robert Marsh (University of Leeds)
- Nicole Snashall (University of Leicester)
- Pavel Tumarkin (Durham University)

For further information visit the website at http://tinyurl.com/LeicesterClusterGeometry2012. The workshop is supported by an LMS Conference grant.

LONDON MATHEMATICAL SOCIETY

MEETING AT THE BMC

Wednesday 18 April 2012 at 11.30 am

Keynes Lecture Theatre 1, University of Kent

Idun Reiten (Trondheim)

Quivers in representation theory

For further information email Elizabeth Fisher (meetings@lms.ac.uk).

The 2012 British Mathematical Colloquium (BMC) will take place at the Canterbury campus of the University of Kent from 16 to 19 April.

Joint Mathematical Council of the United Kingdom

LONDON MATHEMATICAL SOCIETY

Institute of mathematics & its applications

ICME 12 Seoul, Korea

The 12th International Congress on Mathematical Education, July 8th – 15th, 2012

Bursaries for anyone involved with mathematics education at any level in the UK

JMC is pleased to announce that due to the generosity of sponsors we are able to offer bursaries to a maximum of £600 to support participation in ICME 12.

We wish to award bursaries to teachers and researchers working in any phase of mathematics education and from any part of the UK. Application forms may be downloaded from http://www.lms.ac.uk/content/icme12-bursaries

Applications should be submitted no later than noon Monday April 23rd 2012

Applicants will be notified of the result of their application during May.

ISAAC NEWTON INSTITUTE

Call for Proposals

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. Details on submitting proposals are available on our website at www.newton.ac.uk/callprop.html.

Anyone interested in making a proposal is encouraged to contact the Director, by telephone or email, for advice and informal feedback. Contact: John Toland (tel: 01223 335980, email: director@newton.ac.uk).

The Isaac Newton Institute is a national research institute based in Cambridge, UK. It attracts scientists from all over the world to research programmes in all areas of the mathematical sciences. At any time there are two visitor programmes at the Institute, each with about thirty participants. For more information see www.newton.ac.uk.

LONDON MATHEMATICAL SOCIETY MEETING

Poincaré Anniversary

Saturday 19 May 2012; 10.00 am – 5.30 pm

De Morgan House, 57-58 Russell Square, London WC1B 4HS

To mark the 100th anniversary of Henri Poincaré's death, join us for a day of talks which look at the mathematician and the man:

10.00 ***Arrival and Coffee***

10.15 ***Opening of the Meeting***

10.30 **Jeremy Gray** (OU)
Poincaré and the Idea of a Group

11.15 **Gerhard Heinzmann** (Poincaré Archives, University of Nancy)
Poincaré, a Philosopher of Analytic Tradition?

12.00 **June Barrow-Green** (OU)
Poincaré's Last Geometric Theorem and its Legacy

12.45 ***Lunch***

2.00 **Scott Walter** (Poincaré Archives, University of Nancy)
Poincaré's Discovery of the Lorentz Group and its Upshot for 20th Century Physics

3.00 **John Stillwell** (San Francisco)
Poincaré and Topology

4.00 ***Tea***

4.30 **Marc Lackenby** (Oxford)
The Poincaré Conjecture

5.30 ***Reception***

An exhibition from the Poincaré Archives by Philippe Nabonnand (Poincaré Archives, University of Nancy) will be on display during lunch.

The reception will be followed by a dinner at The Blue Door Bistro, Montague on the Gardens Hotel, at a cost of £35 per person, inclusive of wine. If you would like to attend the dinner, please contact Elizabeth Fisher (meetings@lms.ac.uk) by **11 May**.

There are limited funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting. Please contact Elizabeth Fisher (meetings@lms.ac.uk) for further information.

MATHEMATICS POLICY ROUND-UP

March 2012

RESEARCH

Academics write to EPSRC
Twenty academics who attended an EPSRC Pure Mathematics Workshop (Bath, 19–20 January 2012) have written to the EPSRC to register their disappointment in the event. The letter is available at http://tinyurl.com/6qksjcj.

EPSRC research portfolio updated
EPSRC made decisions on the relative funding trajectory for a further 31 research areas in mid-February. This did not include the mathematical sciences. EPSRC then published decisions on all the research areas within the EPSRC portfolio on 31 March. More information is available at http://tinyurl.com/7vpkcx3.

National Science and Engineering Week (NSEW) Seminar
For the first time the Council for the Mathematical Sciences (CMS) collaborated with the Parliamentary and Scientific Committee (P&SC) to hold a successful seminar, *Mathematics Matters: A Crucial Contribution to the Country's Economy*, at the House of Commons on 15 March. The meeting was supported by the Department for Business, Innovation and Skills (BIS), and was chaired by Andrew Miller MP (Science and Technology Committee) and Professor Paul Glendinning (CMS) and provided an excellent opportunity to hear from leaders in the field about the major contribution that mathematics makes to our society.

Voice of the Future 2012
The Council for the Mathematical Sciences (CMS) was invited for the first time to submit names of young mathematicians to join an audience of other young scientists and mathematicians in a science question time with members of the House of Commons-Select Committee on Science and Technology. The event took place on 14 March at Portcullis House. More information is available at http://tinyurl.com/6rccc6n.

Inquiry into postgraduate education
The Higher Education Commission has launched an independent inquiry examining the future of postgraduate education.

There is an opportunity for interested parties to submit written evidence to the Commission. The Commission is particularly interested in receiving evidence on:

- demand for and utilisation of postgraduate skills;
- postgraduates' role in R&D;
- the response of higher education institutions to emerging industries;
- frameworks for dialogue between businesses and HE on postgraduate issues;
- the role of government; and
- professional qualifications.

The deadline for submission is **Monday 2 April 2012**. A final report will be published before the 2012 summer recess. All inquiry documents are available from the Commission's website (see http://tinyurl.com/73khg2y). The CMS will be submitting a response.

SCHOOLS AND COLLEGES

Bridging the Mathematics Gap
The Advisory Committee on Mathematics Education (ACME) launched a call for advice in February on the development of a course for students who do not currently take A-level mathematics but will still need to continue with mathematics. ACME wanted to engage with the widest possible community on this issue. The deadline for views was 23 March 2012 and LMS has responded to ACME. Information on this initiative is available at http://tinyurl.com/7ehb5ue.

HIGHER EDUCATION

HEFCE funding for higher education 2012–13
The Higher Education Funding Council for England (HEFCE) has announced its funding decisions for higher education in England following the annual grant letter from the Department for Business Innovation and Skills (BIS) and subsequent decisions by the HEFCE Board. This announcement covers HEFCE funding for the academic year 2012–13. More information is available at http://tinyurl.com/7req5ro.

Dr John Johnston
Mathematics Promotion Unit

HEA EVENTS

The Higher Education Academy (HEA) will be running an Induction Course for New Lecturers in Maths, Stats and OR in September 2012. This course will be a continuation of the highly-valued course which has been run by the HEA MSOR Network in previous years. It will be delivered by experienced academics in Mathematics, Statistics and Operational Research and the content will continue to be discipline specific.

In the autumn of 2012, the HEA will also be running a series of one-day workshops to support postgraduate students who teach in Maths, Stats and OR. Again these events will be a continuation of the workshops which have been run in the past by the MSOR Network. The workshops will be held in university departments regionally distributed throughout the UK, and will be delivered by experienced academics in Mathematics, Statistics and Operational Research. The content of these workshops will also continue to be discipline specific.

Queries regarding these events should be directed to Dr Mary McAlinden, the HEA Discipline Lead for Mathematics, Statistics and Operational Research (mary.mcalinden@heacademy.ac.uk). The dates of the events will be announced in the summer term.

EARLY CAREER MATHEMATICIANS

The IMA will be holding the sixteenth in a series of conferences for *Early Career Mathematicians* (ECM). The conference will take place on Saturday 19 May 2012 at the Chancellors Hotel and Conference Centre, University of Manchester. The ECM conferences attract mathematicians from around the UK, studying and working in universities, schools and in many sectors of industry. The conferences are held twice a year, giving delegates the opportunity to hear talks and participate in workshops on all aspects of Mathematics, as well as socialising with other like-minded Early Career Mathematicians and quizzing the speakers in more depth on their topics. Confirmed speakers and topics for the conference include:

- Sandy Black (University of Leeds)
  Life as a PhD student: experience and an introduction to combustion CFD
- Richard Crawford (AMEC)
  The LEWIS method of nuclear reactor channel functionality assessment
- Sharon Evans (Rolls Royce)
  Inspiring future generations
- Valentin Fadeev (Maersk Line)
  Design of a method. Building bricks of analysis
- Steve Humble (freelance mathematics consultant)
  Maths on the Streets: A journey from school to learning maths beyond the classroom with a sprinkle of magic along the way
- Katie Steckles (University of Manchester)
  Maths outreach

For further information on this conference including registration details and abstracts, visit the conference webpage http://tinyurl.com/IMASpringECM12 or contact the Conference Office at conferences@ima.org.uk or 01702 354020.

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

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.

LONDON MATHEMATICAL SOCIETY

POPULAR LECTURES 2012

Celebrating 30 years

Institute of Education, London – Tuesday 26 June

David Hilbert

Professor Tim Gowers FRS
University of Cambridge

Can anything be salvaged from the wreckage of Hilbert's dream?

Could we program a computer to do maths at least as well as we do it? This is a formidable challenge, for reasons that Tim Gowers will discuss, but despite the difficulties he will try to persuade you that the answer is yes

Professor Sir Roger Penrose FRS
University of Oxford

On Attempting to Model the Mathematical Mind

In this talk, Roger Penrose introduces the idea of a 'cautious oracle' as a more human version of Turing's oracles (a way of modelling the mathematical mind). He reports on some startling new experiments, which appear to point to new insights into brain activity, and he speculates on how this might relate to the power of human understanding.

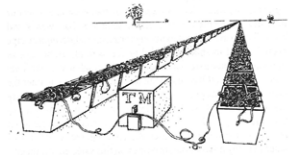


Fig. 2.1. A strict Turing machine requires an infinite tape!

Full abstracts are available on the LMS website at http://www.lms.ac.uk/content/popular-lectures

TIME: Commences at 7.00 pm, refreshments at 8.00 pm, ends at 9.30 pm
TICKETS: Admission is free, with ticket. To register for tickets, please email Lee-Anne Parker (popular.lectures@lms.ac.uk) or visit the LMS website for a registration form (http://www.lms.ac.uk/content/popular-lectures). **Register by Friday 22 June.**

NEWS FROM OBERWOLFACH

Oberwolfach Seminars for graduate students 2012

Oberwolfach Seminars are not regular workshops, but – like summer schools – address graduate students and postdocs. In 2012, six Oberwolfach Seminars will take place at the Mathematisches Forschungsinstitut Oberwolfach (MFO). More information on the seminars and how to apply is available on our homepage at www.mfo.de/www/schedule/2012/seminar.

If you know a graduate student or postdoc who might be interested, please draw their attention to these Oberwolfach Seminars. Participation in these seminars is by application. As usual, the institute offers board and lodging free of charge. By the support of the Carl Friedrich von Siemens Foundation, travel expenses can be reimbursed up to €200 on average per person. Participants can ask for travel support during their stay in Oberwolfach at the guest office against a copy of their travel receipts. The participation of young Japanese mathematicians can be sponsored by the Heizaemon Honda Scholars grant. For more information on grants, please see www.mfo.de/for-guest-researchers.

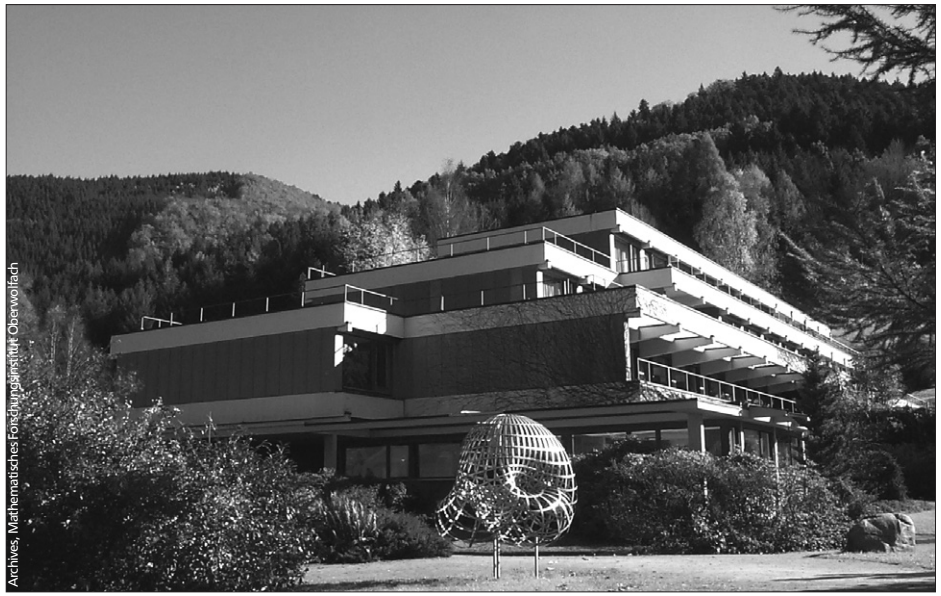
Oberwolfach Digital Archive

We are pleased to announce the Oberwolfach Digital Archive (ODA) as a new service to the mathematics community: http://oda.mfo.de. The ODA comprises digitised documents and results of the Oberwolfach Workshops dating as far back as 1944. Three types of documents are in this archive:

- Tagungsberichte/Workshop Reports: typed abstracts of talks given at the institute
- Vortragsbücher/Books of Abstracts: hand-written abstracts of talks given at the institute
- Gästebücher/Guest Books: lists of workshop participants with their signatures

You may either browse through the material to get an overview or use the Basic Search or the Advanced Search for more detailed research. For example, it is possible to search all meetings in which some specific mathematician has participated.

The new service ODA was financed by the Deutsche Forschungsgemeinschaft (DFG) and is a joint project of the MFO with Professor Volker Remmert (Wuppertal). The technical support is provided by the Bibliotheksservice-Zentrum Baden-Württemberg (BSZ). Please note that ODA is still a *beta* version and that we are working on the correction of some data and of the historical background information at the moment.



The Guest House at Oberwolfach

Oberwolfach Workshops 2014: deadlines for proposals

The deadline for proposals of Oberwolfach Workshops in 2014 is the **end of July 2012**. The decision on the proposals by the Oberwolfach Scientific Committee is scheduled for the end of October 2012. Please see www.mfo.de/scientific-programme/meetings/proposal-guidelines.

The fixed weeks and deadlines to apply for an Oberwolfach Mini-Workshop in 2012–2013 can be found at: www.mfo.de/scientific-programme/meetings/mini-workshop.

Applications for a Research-in-Pairs stay at Oberwolfach can be made any time, preferably around six months before the planned stay: www.mfo.de/scientific-programme/long-term/research-in-pairs.

Stephan Klaus
MFO Scientific Administrator

MATHSWORLD UK

A vision for the future

MathsWorld UK will be the first major exploratorium/museum in the UK dedicated to mathematics. Several countries, including the US (where Google and other sponsors have recently provided funding to the tune of $22m) and Germany have museums that highlight the excitement and benefits of mathematics, but as Professor Margaret Brown, King's College London, points out, 'At the moment there is nothing like this in the UK, and mathematics is not well represented in other museums. There seems to be a hole in the market, which we hope MathsWorld UK can fill'.

The project has grown from ideas that were originally used on the Pop Maths Roadshow, organised by the Joint Mathematical Council and The Royal Society, and those involved in the MathsWorld UK project are currently writing the business plan and working on ideas for exhibits. The vision is to 'produce a major collection of exhibits and activities so that visitors can appreciate and experience what mathematics is and how exciting it can be, to understand the enormous diversity of the subject, to discover something of its history and the way in which the subject has been built over many years, and how important the subject is in the modern world'. Some initial funding has been received, including a grant from the London Mathematical Society.

The plan is to have themed zones and both temporary and permanent displays. There will also be a shop with books, DVDs, games and puzzles and a lecture theatre/cinema. There will be child-friendly and student-friendly activities alongside material to stimulate and interest parents, the general public and mathematics professionals.

Professor Brown is very enthusiastic about the project as she explains, 'We want it to be a showcase for the applications and history of mathematics and we are very keen that exhibits cater for all needs. We envisage that the museum will be used mainly by school students during the week and that families will visit at weekends. This is a very exciting opportunity for mathematics'.

More information about the project is available at www.mathsworlduk.com.

Attendees at the Spitalfields Day

THE MATHEMATICAL LEGACY OF ALAN TURING

Spitalfields Day Report

The year 2012 marks the centenary of the birth of Alan M. Turing, one of the fathers of the modern computer, a key figure in the decryption of the secret codes of the Nazis in the second world war, and a contributor of key ideas to many areas of modern science, in particular in the mathematical sciences. In addition to the central contributions to so many research fields, Turing became iconic not least due to the events surrounding his suicide; the public apology of Prime Minister Gordon Brown on 10 September 2009 for the 'utterly unfair treatment' created a general public interest in Turing as a person that went well beyond those who normally deal with models of computation, encryption algorithms, artificial intelligence, and the mathematical theory of pattern formation in nature.

It thus does not come as a surprise that the various research communities resting on Turing's research contributions decided to celebrate his life and work during the year 2012 in a series of events and activities as the *Alan Turing Year* (ATY). Scores of academic and non-academic events will take place during 2012 in many countries of the world, but with a natural focus on the United Kingdom. A list of all of the events can be found on the ATY webpage at www.turingcentenary.eu. One of the most prominent research activities of the ATY is the six-month programme entitled *Semantics & Syntax – A legacy of Alan Turing* at the Isaac Newton Institute for the Mathematical Sciences in Cambridge (www.newton.ac.uk/programmes/SAS). This programme aims at bridging the gaps that exist between the syntax-oriented symbolic approaches and the semantic approaches dealing with the manipulation and study of mathematical structures in fields such as logic, computability and cryptography.

The Spitalfields Day *The mathematical legacy of Alan Turing* held at the Isaac Newton Institute in Cambridge on 9 January 2012 marked the beginning of both this semester research programme in Cambridge and the British activities of the ATY. Four speakers covered the areas of computability theory, cryptography and logic in computer science in survey lectures, ranging from technical accounts of a concrete open problem that could and should be tackled during the course of the semester programme at the Newton Institute, to tutorials for the non-initiated. In addition to the visiting fellows of the programme *Semantics & Syntax*, numerous researchers from the local community as well as some researchers from further afield attended the lectures. The LMS grant provided funding for post-graduate students to attend the lectures which were used by students from Amsterdam, Bath, Norwich and Southampton. The four lectures provided a glimpse of the various research areas that will be covered by *Semantics & Syntax*.

(Continued on page 20)

SPITALFIELDS DAY SPEAKERS:

- George Barmpalias (Beijing)
  Measures of relative complexity
- Anuj Dawar (Cambridge)
  On syntactic and semantic complexity classes
- Nigel Smart (Bristol)
  Modern cryptography for non-cryptographers
- Hugh Woodin (Berkeley, CA)
  The global structure of the Turing degrees and the bi-interpretability conjecture

Organizer: Professor Benedikt Löwe (Amsterdam & Hamburg)

(Continued from page 19)

Further opportunities to interact with the programme will be given through a number of workshops on morphogenesis (Oxford 14–16 March), logic (Cambridge 26–30 March), cryptography (Cambridge 10–13 April), 'The Incomputable' (Chicheley Hall 12–15 June), and randomness (Cambridge 2–6 July).

Benedikt Löwe
Amsterdam & Hamburg

THE ALAN TURING YEAR 2012

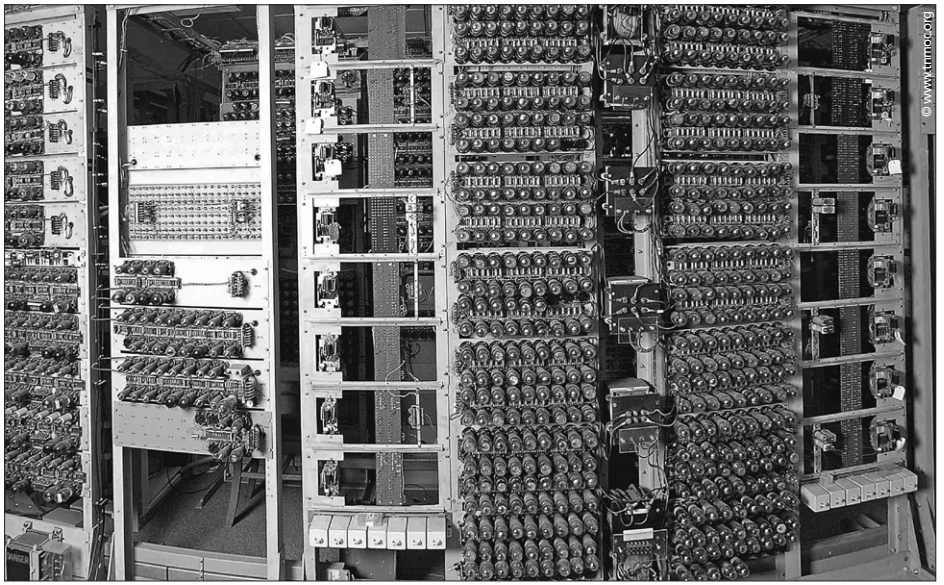
This year is the centenary of the birth of Alan Turing and will be a celebration of Turing's life and scientific impact. A number of events will be taking place during 2012 mostly linked to those places where Turing made significant contributions. There is an Alan Turing webpage on the LMS website (www.lms.ac.uk) with a link to his seminal paper and related links to meetings.

NEW GALLERY FOR THE REBUILD OF COLOSSUS

How to play your part

The National Museum of Computing (TNMOC) located in Bletchley Park is creating a completely new gallery for its most famous exhibit: the rebuild of Colossus, the world's first electronic, programmable computer. Anyone can play a part in helping to build the new gallery by sponsoring a valve on a virtual Colossus at www.colossusonline.org.

The new TNMOC gallery in historic Block H is on the spot where Colossus No. 9 stood during the war and where the rebuild took place. It is designed to be a fitting tribute to the wartime code-breakers and an inspiration to future generations of computer scientists and engineers. It will provide much more space for TNMOC's growing number of visitors and tell the extraordinary



Picture of the rarely-seen rear view of Colossus

Colossus story through dynamic new displays.

Both community and commerce are encouraged to play their part in helping tell the story of one of the great achievements of the twentieth century. Individuals and small companies can also make modest and publicly acknowledged donations by sponsoring virtual Colossus valves at www.colossusonline.org. Larger donations from corporates and benefactors will be acknowledged within the gallery. TNMOC is seeking to raise £150,000 to create the complete new gallery.

The original Colossus, designed by a team led by Tommy Flowers and first operational at Bletchley Park in 1944, was used to help decipher encrypted messages between Hitler and his generals during World War II. With the help of ten Colossus computers, the intelligence gained from these communications is generally acknowledged as having shortened the war by two years and to have saved countless thousands of lives.

Mathematician Bill Tutte also played an extraordinary role, sometimes claimed to be one of the great intellectual feats of the twentieth century. In a matter of weeks and using just a few decrypted messages, Tutte managed to work out how the German Lorenz machine actually worked and enabled the British to decipher what the Germans believed to be unbreakable codes.

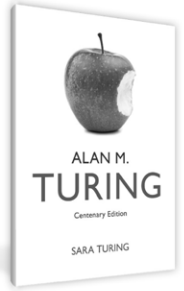
The full intercept-to-decryption process will soon be available for the public to see in two galleries at The National Museum of Computing. The Tunny Gallery was opened in May 2011 and Phase I of the new Colossus gallery opened on 5 March 2012. Phase II of the Colossus gallery with full interpretation panels will be completed later in the year.

Stephen Fleming
Palam Communications for TNMOC

CAMBRIDGE

Alan M. Turing
Centenary Edition
Sara Turing

To commemorate the centenary of Turing's birth, this republication of his mother's biography is enriched by a new foreword by Martin Davis and a never-before-published memoir by Alan's older brother. The contrast between this memoir and the original biography reveals tensions and sheds new light on Turing's relationship with his family, and on the man himself.



March 2012 | Paperback | 9781107020580 | 210 pages | £17.99
www.cambridge.org/turing

Algebraic Shift Register Sequences
Mark Goresky, *Institute for Advanced Study, Princeton, New Jersey*
Andrew Klapper, *University of Kentucky*

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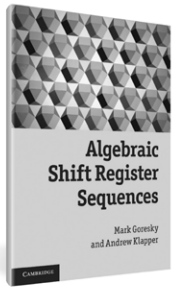
- Provides a unified approach to a wide range of pseudo-random sequences



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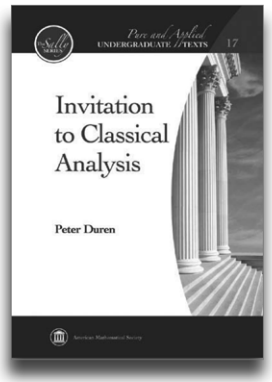


INVITATION TO CLASSICAL ANALYSIS

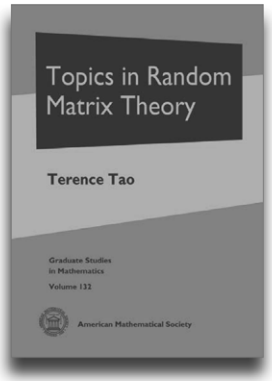
Peter Duren, *University of Michigan*

Gives a rigorous treatment of selected topics in classical analysis, with many applications and examples. The exposition is at the undergraduate level, building on basic principles of advanced calculus without appeal to more sophisticated techniques of complex analysis and Lebesgue integration.

Among the topics covered are Fourier series and integrals, approximation theory, Stirling's formula, the gamma function, Bernoulli numbers and polynomials, the Riemann zeta function, Tauberian theorems, elliptic integrals, ramifications of the Cantor set, and a theoretical discussion of differential equations including power series solutions at regular singular points, Bessel functions, hypergeometric functions, and Sturm comparison theory. Preliminary chapters offer rapid reviews of basic principles and further background material such as infinite products and commonly applied inequalities.

Pure and Applied Undergraduate Texts, Vol. 17

Mar 2012 388pp 978-0-8218-6932-1 Hardback £57.50



TOPICS IN RANDOM MATRIX THEORY

Terence Tao, *University of California*

The field of random matrix theory has seen an explosion of activity in recent years, with connections to many areas of mathematics and physics. However, this makes the current state of the field almost too large to survey in a single book. This text focuses on one specific sector of the field, namely the spectral distribution of random Wigner matrix ensembles (such as the Gaussian Unitary Ensemble), as well as iid matrix ensembles. The text is largely self-contained and starts with a review of relevant aspects of probability theory and linear algebra. With over 200 exercises, the book is suitable as an introductory text for beginning graduate students seeking to enter the field.

Graduate Studies in Mathematics, Vol. 132

May 2012 291pp 978-0-8218-7430-1 Hardback £49.95

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Tuesday 15th May 2012

6:00pm at Barnard's Inn Hall

Home Office Mathematics

Professor Bernard Silverman, FRS

Chief Scientific Adviser, Home Office

The Chief Scientific Adviser is the head of Home Office Science, which provides scientific advice and support to the whole range of the Home Office's work as the lead government department for immigration and passports, drugs policy, crime, counter-terrorism and police. Many aspects of our scientific work involve mathematics, and in this talk a selection will be presented. These show not only how mathematics is used by one particular government department, but also how wide the range of topics is where mathematical thinking and methods are important.

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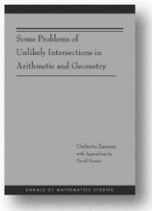
Joram Lindenstrauss, David Preiss & Jaroslav Tišer

This book makes a significant inroad into the unexpectedly difficult question of existence of Fréchet derivatives of Lipschitz maps of Banach spaces into higher dimensional spaces. Because the question turns out to be closely related to porous sets in Banach spaces, it provides a bridge between descriptive set theory and the classical topic of existence of derivatives of vector-valued Lipschitz functions.

Paper $75.00 978-0-691-15356-8 Cloth $165.00 978-0-691-15355-1



Some Problems of Unlikely Intersections in Arithmetic and Geometry

Umberto Zannier

With appendixes by David Masser

This book considers the so-called Unlikely Intersections, a topic that embraces well-known issues, such as Lang's and Manin-Mumford's, concerning torsion points in subvarieties of tori or abelian varieties. More generally, the book considers algebraic subgroups that meet a given subvariety in a set of "unlikely" dimension.

Paper $75.00 978-0-691-15371-1 Cloth $165.00 978-0-691-15370-4

The Decomposition of Global Conformal Invariants

Spyros Alexakis

This book addresses a basic question in differential geometry that was first considered by physicists Stanley Deser and Adam Schwimmer in 1993 in their study of conformal anomalies. The question concerns conformally invariant functionals on the space of Riemannian metrics over a given manifold.

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BANACH SPACES WORKSHOP 2012

The *Banach Spaces Workshop* will take place from 6 to 9 June 2012 at the University of Birmingham. The invited speakers include:

- Frédéric Bayart (Université Bordeaux)
- Pandelis Dodos (University of Athens)
- Vladimir Fonf (Ben-Gurion University)
- Petr Hájek (Academy of Science of the Czech Republic)
- Richard Haydon (University of Oxford)
- William Johnson (Texas A&M University)
- Gilles Lancien (Université de Franche-Comté)
- Maria Roginskaya (Göteborgs Universitet)
- Gideon Schechtman (Weizmann Institute)
- Thomas Schlumprecht (Texas A&M University)
- Jaroslav Tiser (Czech Technical University)
- Luděk Zajíček (Charles University)

Funds are available to support the attendance costs of participants at an early stage of their career (PhD students, postdocs); those interested in claiming should contact the organisers in advance.

The workshop is funded by the EPSRC, and organised by Olga Maleva (University of Birmingham) and David Preiss (University of Warwick). For further details visit the website at http://tinyurl.com/banach-workshop.

COMPETITION FOR AN OPEN SOURCE EXHIBITION OF VIRTUAL MODULES

This competition is part of the world initiative *Mathematics of Planet Earth 2013* (MPE2013). The modules submitted to the competition will be part of the Mathematics of Planet Earth Open Source Exhibition of Virtual Modules. They could be reproduced and utilized by many users around the world from science museums to schools under a Creative Commons licence. Examples of modules or themes to be covered are available on the website (www.mpe2013.org/competition). The competition is open until **15 September 2012**.

The above item is taken from the 51st issue of the IMU electronic newsletter *IMU Net* (see www.mathunion.org/IMU-Net).

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HINDUSTAN BOOK AGENCY

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Texts and Readings in Mathematics, Vol. 16

Notes of a series of lectures given at the Tata Institute of Fundamental Research, Mumbai. They cover some basic material on affine connections, locally or globally Riemannian and Hermitian symmetric spaces. A last chapter proves the basic theorems on maximal compact subgroups of Lie groups with finitely many connected components. Familiarity with differential manifolds and the elementary theory of Lie groups and Lie algebras is assumed.

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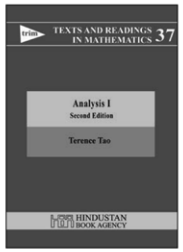

Terence Tao

2009 347pp

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Volume 2:
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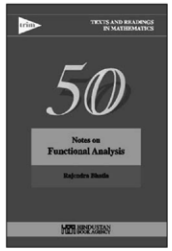
Texts and Readings in Mathematics, Vol. 38

This two-volume introduction to real analysis is intended for undergraduates, who have already been exposed to calculus. The emphasis is on rigour and foundations. The material starts at the very beginning, going onto the basics of analysis (limits, series, continuity, differentiation, Riemann integration), through to power series, several variable calculus and Fourier analysis, and finally to the Lebesgue integral.

NOTES ON FUNCTIONAL ANALYSIS
BESTSELLER



Rajendra Bhatia

2009 248pp
978-81-85931-89-0
Hardback £37.50

Texts and Readings in Mathematics, Vol. 50

A record of a one semester course on Functional Analysis given by the author to second year Master of Statistics students at the Indian Statistical Institute, New Delhi. Students taking this course have a strong background in real analysis, linear algebra, measure theory and probability, and the course proceeds rapidly from the definition of a normed linear space to the spectral theorem for bounded selfadjoint operators in a Hilbert space.

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INFINITE ERGODIC THEORY

A workshop on *Infinite Ergodic Theory* will be held from 28 May to 1 June 2012 in the Department of Mathematics, University of Surrey. The workshop is in conjunction with a Leverhulme Visiting Professorship awarded to Jon Aaronson who is spending six months at the University of Surrey during 2011–2012.

The format for the workshop will consist of four or five talks per day leaving plenty of time for mathematical discussions. Further details will be made available on the webpage at http://personal.maths.surrey.ac.uk/st/I.Melbourne/Meetings/IET.html. In the meantime, for further information contact Henk Bruin (H.Bruin@surrey.ac.uk, 01483 689253) or Ian Melbourne (I.Melbourne@surrey.ac.uk, 01483 689643. This workshop is supported in part by an LMS Conference grant.

DYNAMICS IN INFINITE DIMENSIONS: ERGODIC THEORY AND PDEs

A workshop on *Dynamics in infinite dimensions: ergodic theory and PDEs* will take place from 21 to 25 May 2012 at ICMS, Edinburgh.

The workshop will focus on the analysis of PDEs using techniques motivated by phenomena that occur in finite dimensions. In particular, the goal will be to develop the ergodic theory of infinite-dimensional dynamical systems. There are many examples, such as invariant manifolds and stability analysis, in which the rigorous analysis of the phenomenon in finite dimensions lead to the understanding of it also in infinite dimensions. One area in which this connection has not been extensively explored is ergodic theory, which in finite dimensions is reasonably mature. The aim of this workshop is to bring this accumulated knowledge to bear on the study of certain PDEs by fostering new collaborations between researchers working in these areas

The organizers are Margaret Beck (Heriot-Watt and Boston), Ian Melbourne (Surrey), and Will Ott (Houston). For further information visit the website at www.icms.org.uk/workshops/dynamics.

NUMERICAL ANALYSIS OF STOCHASTIC PDEs

A two-day workshop on *Numerical Analysis of Stochastic Partial Differential Equations* (NASPDE) will take place from 11 to 12 June 2012 at the University of Warwick. This is the fifth in a sequence of international two-day workshops on the numerical treatment of stochastic partial differential equations, with previous meetings having taken place in Manchester (2007), Zürich (2008), Edinburgh (2009) and Freiberg (2010).

There has been a huge worldwide growth in research at the interface between numerical analysis and applied probability and its interaction with important areas of applied mathematics in the last 10 years. This meeting will highlight the work of eminent overseas and UK groups working in this field. The following have accepted invitations to speak:

- A. Bespalov (Manchester)
- E. Buckwar (Linz)
- D. Crisan (Imperial)
- A. Debussche (ENS-Cachan)
- R. Ghanem (USC)
- C. Gittelson (Purdue)
- M. Hairer (Warwick)
- O. Lakkis (Sussex)
- E. Süli (Oxford)
- E. Ullmann (Bath)
- E. von Schwerin (KAUST)
- D. Vvedensky (Imperial)

To register your interest in this conference please email mrc@maths.warwick.ac.uk. For further information and registration visit the website at http://go.warwick.ac.uk/mathsevents.

The organizers are Andrew Cliffe (Nottingham), Ivan Graham and Robert Scheichl (Bath) and Andrew Stuart (Nottingham). The meeting is supported by an LMS Conference grant.

Isaac Newton Institute
for Mathematical Sciences

WEATHER AND CLIMATE PREDICTION ON NEXT GENERATION SUPERCOMPUTERS: NUMERICAL AND COMPUTATIONAL ASPECTS

(A satellite meeting at the Met Office)

22–25 October 2012

in association with the Newton Institute programme
Multiscale Numerics for the Atmosphere and Ocean
(22 August – 21 December 2012)

Organisers: Markus Gross (Met Office), David Ham (Imperial College London), Matthew Piggott (Imperial College London), Tom Ringler (Los Alamos), Hilary Weller (Reading), Nigel Wood (Met Office).

Theme of meeting: Ever increasing model complexity and more and more complex scientific questions are demanding higher resolution and wider process coverage. This leads to a seemingly insatiable appetite for computational resources amongst the weather and climate modelling community. This significant challenge is elevated to a new magnitude if combined with the pressures and requirements of operational centres with regard to reliability of the compute platforms, models and scientific quality of the results. This appetite can potentially be sated by the next generation of supercomputers with their step change in core counts and use of accelerators. But utilisation of these new machines demands a step change in the scalability of the code and in parts major rewrites of existing code and formulations.

This workshop aims at bringing together key players of the academic, operational NWP/climate and high-performance computing communities. This meeting will address the problems, challenges and predictions for the future in order to guide development and raise awareness for limits ahead and possible routes for their mitigation, enabling future collaborations and joint developments.

The main topics to be covered:

- State of the art in weather and climate modelling, where we came from and where we want to go
- Discretisations, equation-sets, grids and solvers for the resulting systems
- Operational aspects of weather and climate modelling
- Computational trends, limiters and opportunities

Further information and application forms are available from the website at www.newton.ac.uk/programmes/AMM/ammw03.html. Closing date of the receipt of applications is **26 August 2012**.

INTERNATIONAL MATHEMATICS COMPETITION

Preliminary Announcement

The 19*th International Mathematics Competition for University Students*, co-organized by University College London and hosted by the American University in Bulgaria, will take place in Blagoevgrad, Bulgaria from 26 July to 1 August 2012.

Every participating university is invited to send several students and one teacher. Individual students are welcome. The competition is planned for students completing their first, second, third or fourth year of university education and will consist of two sessions of five hours each. Problems will be from the fields of Algebra, Analysis (Real and Complex), Geometry and Combinatorics. The working language will be English. Over the previous eighteen competitions there have been participants from over one hundred and ninety-three institutions in forty-five countries.

Although this is an individual event, the universities traditionally divide their participants into groups of four each. The number of students in the teams is, however, not fixed. The professor who accompanies the students is expected to be a member of the Jury.

The problems will be chosen at the Meeting of the Jury on 27 July from those received in advance by the President of the Jury, Professor John Jayne. The problems proposed should be precisely formulated and accompanied by a detailed solution. The problems should be in fields of Algebra, Analysis (Real and Complex), Geometry and Combinatorics. The problems given at the previous competitions can give a general idea of the level expected. Additional topics may also be included.

The students' work will be evaluated by Team Leaders and other Professors and Assistant Professors using criteria provided by the Jury.

Participants are invited to confirm their intention to participate, either by on-line registration or by email, **by the end of May 2012**, providing the following information: University; City, Country; Leader of the team (name, email address); Students (number): Mailing address; Email address; Fax.

The participants from some countries will need a visa to enter Bulgaria. Contact your travel agent or the Bulgarian Consulate in your country for details. If necessary, the organizers will post formal invitations for participation in the competition. You must begin the visa process early as it requires time. The competition fee, which will include accommodation and meals from dinner on the 26 July to breakfast on the 1 August, has not yet been finalized.

Send all confirmations of participation and arrival details to John Jayne (j.jayne@ucl.ac.uk). If you would like a copy of the competition poster, send your request with postal address to John Jayne. For further information visit the website at www.imc-math.org.uk.

PANDA 10 YEARS ON

Report

The PANDA (Patterns, Nonlinear Dynamics and Applications) meeting held in Leeds on 20 January 2012 marked the tenth anniversary of this successful LMS-funded series of workshops. There have been three or four meetings each year since December 2001. This workshop had about 30 participants, a third of whom were postgraduate students.

Jonathan Dawes, one of the originators of PANDA (and who coined the acronym) gave a talk that began by summarising the statistics of the series so far. Twenty-seven meetings have been held, featuring 162 talks given by 137 speakers, including 10 from overseas. He noted some recent successes within the field of nonlinear dynamics and discussed two particular areas of rapidly increasing interest: network problems, where subsystem dynamics

and connectivity combine to produce system-level responses, and climate modelling, where for example the concept of a 'tipping point' can be given substantial mathematical content. Future challenges in the nonlinear systems field include 'known unknowns', such as the behaviour of traffic and crowds, dry friction, and viscoelastic and liquid crystal continuum mechanics, as well as the 'unknown unknowns' which have so far received little attention from those in the field, for example spatial homogenisation, discrete event dynamics and viewing dynamical systems as information processing systems. He challenged the community to move beyond its 'comfort zone' of ordinary and partial differential equations and to address physical and biological applications more realistically, in order to improve the relatively low profile of the field, as indicated by the recent International Review of Mathematics.

The other talks covered a wide range of topics. Suzanne Fielding (Durham) addressed the dynamics of a fluid with rod-like swimming bacteria with extensile or contractile properties. Near a phase transition from isotropic to nematic behaviour, superfluid behaviour can occur, leading to spontaneous 'shear banding' flow. In two dimensions this shear flow can become unstable, leading to either regular circulating patterns or unsteady irregular patterns.

Gustav Delius (York) spoke on wave instabilities in size spectrum models. His starting point was the observation that the abundance of marine organisms exhibits a power law scaling with the organism size. Noting that traditional species-based predator-prey models may not be valid since predators are themselves prey when small, he proposed a model based entirely on organism size. In the continuum limit this yields a non-local model with integral terms representing the predation of larger organisms on smaller ones. This model is scale-invariant, leading to a steady-state power law solution. However, this state can be unstable, leading to travelling waves patterns in the organism abundance as a function of size.

Rachel Taylor (Heriot-Watt) spoke on seasonal forcing and multi-year cycles in predator–prey models. Her system was based on a standard ODE model, but included the feature that the prey growth rate fluctuates sinusoidally, representing seasonal effects. This leads to a wealth of complicated dynamics as the amplitude of this fluctuation is varied, including period-doubling bifurcations and Arnol'd tongues arising from resonance between the seasonal forcing and the natural oscillation period of the predator–prey system.

The final talk, given by Thomas Wagenknecht (Leeds), returned to more familiar PANDA territory – the currently trendy topic of 'homoclinic snaking' in the subcritical Swift–Hohenberg system. Strongly localised solutions can be found in the subcritical regime, representing a heteroclinic connection between the zero state and the periodic pattern (viewed as a periodic orbit in phase space). Different mechanisms can disrupt this snaking behaviour. One is the breaking of the left-right symmetry of the system, and another is a local bifurcation of the patterned state. In the presence of one of these mechanisms, the snaking structure can break up into isolas. This had previous been demonstrated numerically, but Thomas explained how this could be shown rigorously using the methods of spatial dynamics and geometric analysis.

The lectures were interesting and there was plenty of discussion after each talk and during the breaks. A photograph can be found on the back cover of this *Newsletter*. We are very grateful for the ongoing support of the LMS, which has allowed this series of workshops to provide a friendly atmosphere for postgraduate students to present their work, and to build a strong sense of community in this subject area over the last ten years.

Paul Matthews
Alastair Rucklidge

EPSRC
Pioneering research and skills

Continuum Mechanics in Biology and Medicine

LONDON MATHEMATICAL SOCIETY

UCL

LMS-EPSRC Short Course

University College London
17-22 June 2012

Organisers: Nick Ovenden & Frank Smith

Course outline

There is a continuing upsurge of research in the area of mathematical biology and medicine, principally due to technological advancements in imaging and treatment along with increased computational power. This upsurge, however, relies to some extent on a great deal of fascinating mathematics, some of which this course aims to present in a clear and concise manner for the benefit of postgraduate students and early-stage researchers.

The specific focus of the lectures is on continuum mechanics in biology and medicine, with mathematical modelling, problem construction and analysis together forming the main thrust of the course. A variety of problems from different areas will be discussed providing breadth of understanding for the students as well as increased depth of experience in medical modelling. The mathematical tools highlighted include both novel techniques within the lecturers' very own up-to-date hot research topics alongside broader subjects that are beneficial for the course attendees. The course aims to cater for applied mathematics, engineering and physical science students and researchers possessing a diverse range of biological and medical research interests involving continuum mechanics.

The three main lecture course topics are:

- *Modelling the Circulation* (**Nick Hill**, Glasgow)
- *Physiological Fluid Mechanics* (**Sarah Waters**, Oxford)
- *Cardiovascular Fluid-Mechanical Frameworks* (**Nic Smith**, King's College London)

These lecture courses will be supplemented by tutorial sessions.

An introductory module on *Principles of Fluid Dynamics* will be given by **Nick Ovenden** (UCL).

A guest lecture will be given by **Tim Pedley** (University of Cambridge).

For further information please visit: www.ucl.ac.uk/medical-modelling/shortcourse

Applications should be made using the registration form available via the Society's website at: www.lms.ac.uk/content/short-instructional-courses. Research students, post-docs and those working in industry are invited to apply.

The closing date for applications is **Monday 7 May 2012.** Numbers will be limited and those interested are advised to make an early application.

All 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 (£250) **£500** 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 (£500) **£750** 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 8 June.

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

FUTURE DIRECTIONS IN TROPICAL MATHEMATICS AND ITS APPLICATIONS

Report

A two-day workshop on *Future Directions in Tropical Mathematics and its Applications* was held at the University of Manchester from 19 to 20 January 2012. (For those not in the know, 'tropical mathematics' is the algebra and geometry arising from an idempotent semiring, such as the set of all real numbers together with the operations of maximisation and addition.) The workshop, supported by the LMS (through a Birmingham–Manchester–Warwick Scheme 3 triangle) and EPSRC (through the CICADA project), brought together 35 researchers (including 16 graduate students) using and developing tropical and max-plus theory and methods, across both pure and applied mathematics. A photograph can be found on the back cover of this *Newsletter*.

The meeting commenced with the first of three lectures by Peter Butkovic (Birmingham) on *Tropical linear algebra – Achievements and challenges*, providing an excellent introduction for the newcomer to tropical linear algebra. After giving the basic definitions and a brief history of the subject, Peter explained some of the tools of the tropical trade. Some basic problems, such as the tropical eigenproblem, were discussed. Peter's further talks included updates on current research in tropical linear algebra and the statement of several open problems. A second mini-course was given by Stéphane Gaubert (INRIA and CMAP, École Polytechnique) entitled *From tropical convexity to ergodic control and zero-sum games*. Stéphane gave a survey of the application of tropical methods to optimal control, and more generally, to zero-sum games with mean payoff.

In addition to the mini-courses, the schedule included a number of research talks (as well as some stimulating lunch and coffee breaks, during which the participants had the chance to discuss their research).

Katharina Huber (UEA), gave a lively talk on the (rather cryptic-sounding) topic of *Lassoing phylogenetic trees*. The talk concerned the problem of trying to reconstruct the 'tree of life' for a set of taxa, given an incomplete set of genetic data concerning their relationships. (The interest of this work to tropical mathematicians arises from a reformulation of the 'four-point condition', used to detect tree metrics, in tropical geometric terms.)

Florian Block (Warwick) presented some recent research on *Refined Tropical Enumerative Geometry and Applications*. His talk concerned the celebrated Correspondence Theorem of Grigory Mikhalkin, which states that complex degree-*d* algebraic plane curves of genus *g* (through sufficiently many points) are enumerated by tropical curves. Florian showed how to compute some other counts using the methods of tropical geometry.

James Hook (Manchester) spoke about *Products of random max-plus matrices*. Many queueing systems can be modelled by a system of stochastic tropical linear equations, with their dynamics controlled by the tropical analogue of the Lyapunov exponent. James described upper and lower bounds for this value, involving properties of the underlying support graph and the maximal expected waiting times.

Zur Izhakian (Bremen) talked about *Supertropical Algebra and Representations*. His talk concerned the representation theory of certain algebraic structures, including matroids and semigroups. Traditionally, mathematicians have attempted to represent matroids using matrices over a (finite) field. However, it is well known that not every matroid has such a representation. In his talk Zur showed that every matroid (and indeed every hereditary collection) has a matrix representation over the 'supertropical' semiring.

The meeting concluded with a talk by Alexander Guterman (Moscow State) on *Tropical matrix patterns and their applications*. There are many equivalent definitions of the rank of a matrix with entries in a field. In this talk Alexander explained to us how some of these definitions can be extended to give several different notions of the 'rank' of a matrix with entries in a semiring and presented several inequalities that can be shown to hold between them.

Information on the further meetings in this series can be accessed from the group home page: http://web.mat.bham.ac.uk/tropical/research.html.

Marianne Johnson
University of Manchester

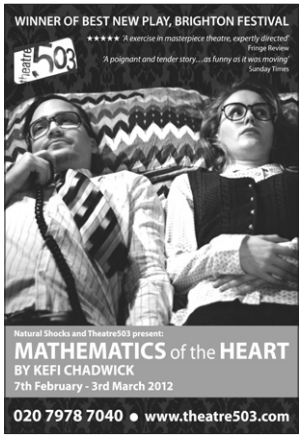
REVIEW

MATHEMATICS OF THE HEART

Theatre 502, London SW11, 7 February – 3 March 2012.

Paul MacMillan is a mathematician in mid career. He is neither successful nor especially unsuccessful, and he is still in the shadow of his late father, a domineering man who was widely respected in the world of mathematics. He is involved in the modelling of storm patterns, and his own work is concerned with North Utsire, a bleak area which we are not surprised to learn he has never visited. Not for him a trip to the beaches of Hawaii at some Research Council's expense.

Paul has all the negative characteristics that many people associate with mathematicians and, as if that weren't enough, a younger brother who is as outgoing as he is introverted, and who has moved in with him for an indefinite stay. Paul is also in a long-term relationship that is not going well.



As the play opens, a new graduate student, Zainab, arrives in Paul's shabby north London flat. She is keen about mathematics and about research, highlighting Paul's own diminishing enthusiasm. And in the space of a few minutes she inadvertently makes matters worse by saying how much she admires the work of Paul's father, by creating even more tension between Paul and his girlfriend, and by falling under the spell of his brother.

That's pretty bleak for Paul, and things are considerably worse by the end. It's not a bleak play, though, at least not most of the time. A lot of it is very funny and there are also some surrealist touches, some of which look like the results of the director, Donnacadh O'Briain, turning to advantage the limitations of the venue, currently the upstairs room of a pub in Battersea.

In Paul's first conversation with Zainab they are both obviously alluding to chaos (well, obviously if you're a mathematician). Neither of them actually mentions the word, though, and I didn't feel that the author, Kefi Chadwick, had attempted to work chaos into the plot, in the way that, say, Tom Stoppard brought concepts of quantum mechanics into *Hapgood*. I think she was right: the play is about how difficult someone like Paul can find it to cope with ordinary life, and it makes sense for events to flow more or less directly from his weaknesses rather than owing too much to chance and tiny perturbations.

I went to see *Mathematics of the Heart* with three friends, none of whom are mathematicians, and on the basis of that blatantly non-random sample, I'm happy to recommend it to mathematicians and non-mathematicians alike. Though it might not be such a good choice if you're with someone you're trying to reassure that we mathematicians are perfectly normal people.

Peter Saunders
King's College London

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.

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 Modern Perspectives in Homotopy Theory Mini-School: Infinity Categories, Infinity Operads and Homotopy Type Theory, Swansea
10-13 Formal and Computational Cryptographic Proofs INI Workshop, Cambridge (408)
10-16 European Girls' Mathematical Olympiad, Oxford (412)
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)
18 LMS Meeting at BMC, University of Kent (413)
20-21 Elmer Rees' 70th Birthday Celebration Conference, Bristol (409)
24 HE Curriculum Workshop on Media Enhanced Teaching and Learning, Nottingham
24 *Final Score*, Gresham College Lecture, Museum of London (409)
27 Women in Mathematics Day, London (413)

MAY 2012

3-5 Mathematics of String and Gauge Theory Workshop, London (412)
8 HE Curriculum Group Meeting on Group Work, Birmingham
14 HE Curriculum Workshop on Placements for Mathematics Undergraduates, Greenwich
15 HE Curriculum Workshop on Being a Professional Mathematician, Greenwich
15 *Home Office Mathematics,* LMS–Gresham Lecture, London (413)
16-17 Combinatorics Colloquia, London
19 LMS Poincaré Meeting, London (413)
19 Early Career Mathematicians' IMA Spring Conference 2012, Manchester (413)
21-23 Wales Mathematics Colloquium 2012, Tregynon, Wales
21-25 Dynamics in Infinite Dimensions: Ergodic Theory and PDEs Workshop, ICMS Edinburgh (413)
28-1 Jun Branes and Black Holes INI Satellite Meeting, King's College London (412)
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 (413)
30 Combinatorics Meeting, Oxford
31 Thomas Harriot Lecture, Oriel College, Oxford (412)

JUNE 2012

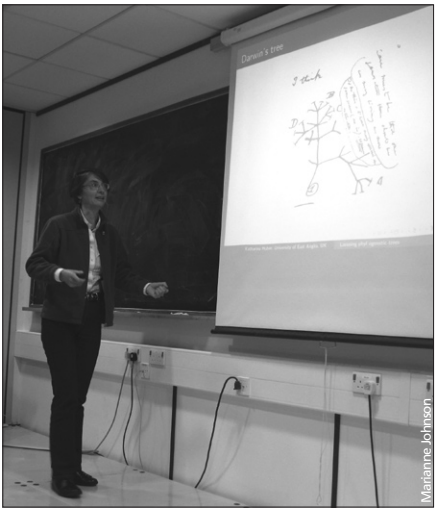
1 Yorkshire and Durham Geometry Day, Leeds
1-2 Recent Developments in Lie Theory, Manchester
2-3 Numerical Linear Algebra, Control Theory and Data Assimilation Conference, Reading
5-8 Higher Order Problems in Geometric Analysis Workshop, Bath (409)
6 LMS Northern Regional Meeting, Northumbria University, Newcastle (413)
6-8 Mathematics of Human Biology Workshop, Northumbria University, Newcastle (413)
6-9 Banach Spaces Workshop 2012, Birmingham (413)
6-9 Beauville Surfaces and Groups, Newcastle
10-16 SIDE10 International Conference on Symmetries and Integrability of Difference Equations, Ningbo, P.R. China
11-12 Stochastic Modelling in Ecosystems, Glasgow
11-12 Numerical Analysis of Stochastic PDEs Workshop, Warwick (413)
12-15 The Incomputable Workshop, Chicheley Hall, North Buckinghamshire (407)
12-15 Chaotic Modeling and Simulation International Conference, Athens, Greece
17-22 Continuum Mechanics in Biology and Medicine LMS–EPSRC Short Course, University College London (413)
18-19 2012 Clay Research Conference, Oxford
18-20 Frontiers of Nevanlinna Theory 4: Nevanlinna Theory and Number Theory, University College London (401)
18-22 Topology and Groups Summer School, Berlin, Germany (412)
18-22 Singularity Theory, Its Modern Applications and Future Prospects, Liverpool
18-23 Turing Centenary Conference, Cambridge (407)
21-23 Geometry, Representation Theory and Clusters Workshop, Leicester (413)
22 Alan Turing Centenary Satellite Workshop, Manchester
25-29 Topology and Groups Conference, Berlin, Germany (412)
25-29 String Phenomenology INI Workshop, Cambridge (411)
26 LMS Popular Lectures, London (413)
29 LMS Meeting and Hardy Lecture, London

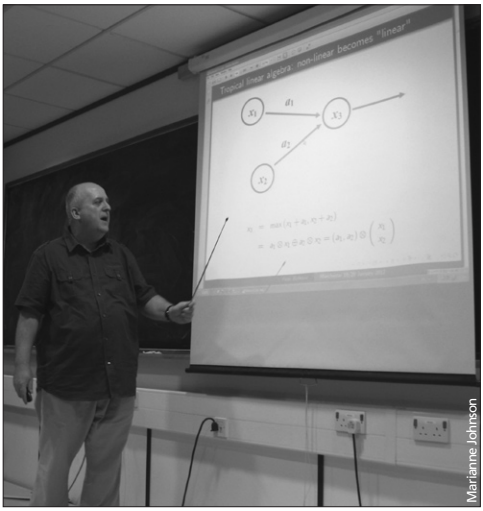
JULY 2012

2-7 6th European Congress of Mathematics, Kraków, Poland (409)
2-7 Interactions of Birational Geometry with Other Fields LMS Durham Symposium, Durham (413)
8-15 ICME12, Seoul, Korea
9-11 15th Galway Topology Colloquium, Oxford
9-13 Additive Combinatorics in Paris 2012 Conference, Paris, France (409)
9-17 Grand Biological Challenges for Mathematicians LMS Durham Symposium, Durham (413)
12-18 Logic Colloquium 2012, Manchester
23-27 Topological Fluid Dynamics, INI Workshop, Cambridge
23-27 Probability at Warwick Young Researchers Workshop, Warwick
26-1 Aug International Mathematics Competition for University Students, Blagoevgrad, Bulgaria (413)
30-3 Aug New Developments in Relativistic Quantum Mechanics and Applications INI Workshop, Cambridge (412)

AUGUST 2012

20-24 Finite Groups, Representations and Related Topics, Oxford
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)





Katharina Huber (UEA) and Peter Butkovic (Birmingham), two of the speakers at the *Future Directions in Tropical Mathematics* workshop held at the University of Manchester from 19 to 20 January 2012 (report on page 32)

Jon Dawes (Bath) and Suzanne Fielding (Durham) speaking at the *PANDA 10 Years On* meeting held at the University of Leeds on 20 January 2012 (report on page 29)