LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 416 July 2012

Society Meetings and Events

2012

Monday 3 September
Midlands Regional Meeting, Aberystwyth [*page* 7]

Wednesday 26 September
LMS Popular Lectures, Birmingham [*page* 14]

Monday 1 October
SW & South Wales Regional Meeting, Bristol

Friday 16 November
Annual General Meeting, London

2013

Friday 1 March
Mary Cartwright Lecture, London

Monday 18 March
Northern Regional Meeting, Newcastle

Friday 5 July
LMS Meeting London

NEWSLETTER ONLINE:

Go to www.lms.ac.uk/newsletter

LMS COUNCIL DIARY

25 May 2012

A personal view

One of the delights of attending Council meetings is hearing first-hand from the President about the many and diverse mathematical events that he attends on behalf of the Society. Hot off the press this month was Graeme's report of the Abel prize award ceremony – the prize being awarded to Endre Szemerédi – which had taken place in Oslo only three days before the Council meeting. Amongst other events Graeme had attended was the opening of *Intersections: Henry Moore and Stringed Surfaces*, an exhibition being held at the Royal Society as part of the 20th anniversary celebrations of the Isaac Newton Institute (and I thoroughly recommend the catalogue which can be found on the INI website www.newton.ac.uk/events/2012/anniversary/). Graeme also reported on two very successful LMS meetings. In April he had been at the Women in Mathematics Day, a meeting he had found full of exciting mathematics and good spirit. And last week he had been at the Poincaré anniversary meeting. The latter had played to a full house and had received a message of support from Cédric Villani, who is *inter alia* Director of the Institut Henri Poincaré in Paris. In addition, Graeme told us the very good news that at the end of June the Clay Mathematics Institute will move the office of its president from Cambridge, Massachusetts, to Oxford, and that Nicholas Woodhouse, our former Treasurer, will be the Institute's new president.

Under financial matters, the Treasurer brought us up to date with the recent deliberations of the Investment Sub-Committee. The on-going volatility of the stock-market has given the Committee good cause to think more broadly about the type of investments the Society should hold, and the possibility of investing in property is currently being cautiously explored.

The main item of the day was a presentation on Open Access given by Steven Hall, Managing Director of IoP Publishing. The drive towards Open Access is a subject very much in the forefront of all our minds at the moment (see, for example, the article in the *Times Higher Education* of 17 May, http://tinyurl.com/butvdee), but beyond its significance for ourselves as individuals it is of course of very particular significance for the LMS as a whole due to the income stream the Society derives from its journals. Personally, I found the presentation extremely

informative. Broadly speaking, it covered four main areas: journal pricing, peer review, the two different models of open access ('green' and 'gold'), and profitability. While we all have a sense of the growth in academic publishing over the last twenty or so years, it was very helpful to see some actual figures – e.g. that the median number of serials purchased by the ARL libraries (125 or so of the top academic research libraries in the US) more than trebled from 16,162 in 1985/86 to 55,108 in 2008/09 – which set the issue into context. It was helpful too to get a sense of the way in which academic libraries had interacted with publishers in the past in order to set up the 'Big Deal' which is what lies behind some of the pricing structures currently in place. As far as the LMS itself is concerned, Steven drew attention to the fact that one risk for the LMS is that our income per article is relatively high, and that we are particularly vulnerable to Open Access mandates as 45% of our authors are from the UK, USA and Germany. Finally, we were alerted to the fact that new government policy on Open Access is going to be announced in the autumn. I suspect it won't be long before I have more to say on this topic.

Last month I reported on the introduction of an LMS Undergraduate Research Bursaries Scheme (URBS) to succeed the Nuffield scheme. Since then we have had confirmation that Nuffield will jointly fund only for 2013 (and not for 2014 as we had originally hoped). We therefore agreed to fund 20 bursaries in 2014 (rather than 15 as previously agreed). I also reported that it had been agreed to hold a consultation on membership criteria, and I can now confirm that from mid-July members will be invited to complete a survey, which will be open until 30 September, and that the results of the survey will be made known at the AGM in November.

June Barrow-Green

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

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QUEEN'S BIRTHDAY HONOURS 2012

The London Mathematical Society (LMS) would like to extend its congratulations to Professor Timothy Gowers FRS (University of Cambridge) on receiving a knighthood in the Queen's Birthday Honours list. The honour is richly deserved for Professor Gowers' outstanding contribution to mathematics. Having received both his undergraduate and postgraduate degrees from the University of Cambridge, Professor Gowers continues to work at the university making substantial contributions in combinatorics. He received the prestigious Fields Medal in 1998 for his research 'connecting the fields of functional analysis and combinatorics', and was elected a Fellow of the Royal Society in 1999.

Professor Gowers, along with Sir Roger Penrose, presented this year's first LMS Popular Lecture on 26 June in London, and the second lecture will be on 26 September in Birmingham. This year marks the 30th anniversary of the LMS Popular Lectures.

LMS PRIZES 2012

The winners of the LMS prizes for 2012 were announced at the Society Meeting on 29 June. The Society extends its congratulations to these winners, and its thanks to all the nominators, referees and members of the Prizes Committee for their contributions to the Committee's work this year.

PROFESSOR DAN SEGAL, of the University of Oxford, is awarded the **Pólya Prize** for his major contributions to group theory.

PROFESSOR TREVOR WOOLEY, FRS, of the University of Bristol, is awarded the **Fröhlich Prize** for his work in analytic number theory, and in particular his spectacular advances in the study of Waring's problem on representing integers as a sum of kth powers.

PROFESSOR IAN AGOL, of University of California, Berkeley, is awarded the **Senior Berwick Prize** in recognition of the paper *Criteria for virtual fibering* published in volume 2 of the *Journal of Topology*, 2008.

DR TOBY GEE, of Imperial College London, is awarded a **Whitehead Prize** for his work in number theory, and in particular his many contributions to the theory of automorphic forms.

DR EUGEN VĂRVĂRUCĂ, of Reading University, is awarded a **Whitehead Prize** for ground-breaking analysis of free boundary problems for linear and nonlinear elliptic equations, with important applications, in arbitrary dimensions.

DR SARAH WATERS, of the University of Oxford, is awarded a **Whitehead Prize** for her contributions to the fields of physiological fluid mechanics and the biomechanics of artificially engineered tissues.

DR ANDREAS WINTER, of the University of Bristol, is awarded a **Whitehead Prize** for his major contributions to key areas of quantum information theory.

THE CLAY MATHEMATICS INSTITUTE

As of 30 June 2012, the office of its president moved from Cambridge, Massachusetts, to Oxford, UK. Professor Nicholas Woodhouse of Oxford University has assumed the position of president. He has succeeded Professor James Carlson, formerly of the University of Utah. Carlson who held the position of president since 2003, completed two terms as president.

The Clay Mathematics Institute was founded in 1998 by Mr Landon T. Clay, for the purpose of increasing and disseminating mathematical knowledge. Among its programs are the Clay Research Fellowships, the Clay Research Awards, the Millennium Prize Problems, and the Summer School held every second year. For further information visit the website at www.claymath.org.

Professor Nick Woodhouse was LMS Treasurer from 2002 to 2009.

LMS GRANT SCHEMES

Next Closing Dates for Applications

31 August 2012

Small Grants for Education

Funding for grants **up to £800** is available to stimulate interest and enable involvement in mathematics from Key Stage 1 (age 5+) to Postgraduate level and beyond. Anyone working/based in the UK is eligible to apply for a grant. If the applicant is not a member then the application must be countersigned by an LMS member or another suitable person such as a Head teacher or senior colleague. The next deadline for applications is **31 August 2012.** Please see the website for further details: www.lms.ac.uk/content/small-grants-education.

15 September 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)
- Joint Research Groups (Scheme 3) (see below about renewal of Scheme 3 grants)
- Research in Pairs (Scheme 4)
- International short visits with the main focus on Africa (Scheme 5)
- 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 September 2012** will be considered at a meeting in October.
- Applications should be submitted well in advance of the date of the event for which funding is requested.
- Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

Queries regarding applications can be addressed to the Grants Administrators (Sylvia Daly and Elizabeth Fisher, tel: 020 7291 9971/3, email: grants@lms.ac.uk).

Joint Research Groups – Renewal grants (Scheme 3)

ALL renewal applications MUST be accompanied by a Financial and Academic Report for the previous year's activities. Please note that full reports should always be submitted ('light touch' refers to the application procedure only). Grant holders wishing to renew their application may use the Light Touch Application Form if

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

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

Grant holders MUST use the Full Renewal Application Form if

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

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

If a renewal application is unsuccessful, normally the grant will be terminated at the end of the calendar year. A supplementary grant will be available to cover actual expenditure for a meeting held during the autumn term. This will normally be the equivalent of the grant awarded for one meeting, e.g. £350, and will not usually exceed one third of the previous year's grant.

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. Please contact Sylvia Daly (grants@lms.ac.uk) for information before contacting the Russian Academy of Sciences for funding. 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 also be made by any mathematician in Britain wishing to host a visit by a young Russian postdoctoral mathematician who wishes to spend a few weeks in Britain giving a series of survey lectures on the work of their Russian seminar.

The LMS is offering grants to the host institution to meet the visitor's actual travel and accommodation costs of **up to £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 September 2012**. Further details can be found on the LMS website: www.lms.ac.uk/content/computer-science-small-grants-scheme-7.

Childcare Supplementary Grants

Grants of **up to £200** are available to parents working in mathematics to help with the cost of childcare when attending a conference or research meeting. 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.

Spitalfields Days

Grants of **up to £500** are available to support an LMS Spitalfields Day, which have been run since 1987 and are in honour of the Society's predecessor, the Spitalfields Mathematical Society (1717–1845). A Spitalfields Day is a one-day meeting, which is usually associated with a long-term symposium on a specialist topic at a UK university. Selected participants, often distinguished experts from overseas, give survey lectures (or other types of lecture accessible to a general mathematical audience) on topics in the field of the symposium. Further details can be found on the LMS website: www.lms.ac.uk/content/spitalfields-days#applications.

Sylvia Daly and Elizabeth Fisher
Grants Administrators

COLLINGWOOD MEMORIAL PRIZE

The 2012 Collingwood Memorial Prize has been awarded to Steven Paul Charlton, St Cuthbert's Society, Durham University. The Collingwood Memorial Prize, established in memory of Sir Edward Collingwood FRS, President of the Society 1969-1970, is awarded to a final-year mathematics student at the University of Durham who intends to continue to a higher degree in mathematics at Durham or any other university.

FERRAN SUNYER I BALAGUER PRIZE

The prize is awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in Mathematics, in which the author has made important contributions. The prize, amounting to €15,000, is provided by the Ferran Sunyer i Balaguer Foundation.

Monographs should preferably be typeset in TeX. Authors should send all documents in digital format, a pdf file of the manuscript to ffsb@iec.cat, and a hard copy of the manuscript together with a letter to the Foundation. Submissions should be sent by **3 December 2012** to: Fundació Ferran Sunyer i Balaguer, Carrer del Carme 47, E-08001 Barcelona, Spain.

Recent past winners were:

2012 Angel Cano (Universidad Nacional Autónoma de México), Juan Pablo Navarrete (Universidad Autónoma de Yucatán) and Jose Seade (Universidad Nacional Autónoma de México) *Complex Kleinian Groups*

2011 Jayce Getz (McGill University) and Mark Goresky (Princeton), *Hilbert Modular Forms with Coefficients in Intersection Homology and Quadratic Base Change*

2010 Carlo Mantegazza (Scuola Normale Superiore di Pisa),:*Lectures Notes on Mean Curvature Flow*

2009 Tim Browning (University of Bristol): *Quantitative Arithmetic of Projective Varieties*

For further information visit the website at http://ffsb.iec.cat.

NEXT MSRI DIRECTOR

Dr David Eisenbud will be the next director of the Mathematical Sciences Research Institute at Berkeley. David Eisenbud's four-year term at MSRI is effective 1 August 2013. Currently, Dr Eisenbud is a professor in the Department of Mathematics at the University of California at Berkeley, and the director for Mathematics and the Physical Sciences at the Simons Foundation in New York. He is returning to helm MSRI, where he previously served as director for a 10-year tenure from 1997 to 2007.

Dr Eisenbud is the fifth director in the Institute's 30-year history. He succeeds Robert Bryant, who has served as MSRI director since 2007 and is also a full professor at UC Berkeley. For further information about the MSRI visit the website at www.msri.org.

London Mathematical Society (LMS)

MIDLANDS REGIONAL MEETING

Monday 3 September 2012

Physics Main Lecture Theatre, Physical Sciences Building
Penglais Campus, Aberystwyth University, Aberystwyth SY23 3BZ

Scientific Advisory Committee
David Evans (Cardiff) ◦ Martin Lindsay (Lancaster) ◦ Gilles Pisier (Texas A&M) ◦ Dan Voiculescu (UC Berkeley)

Local Organisers
Rolf Gohm (Aberystwyth) ◦ John Gough (Aberystwyth) ◦ Claus Köstler (Aberystwyth)

Programme

13:45	Opening of the meeting
14:00	**Roland Speicher** (Saarland University) *Quantum symmetries in free probability*
15:00	**Dan-Virgil Voiculescu** (UC Berkeley) *Noncommutative probability aspects of trace-class commutators*
16:00	Tea/Coffee
16:30	**Masaki Izumi** (Kyoto University) *Group actions on operator algebras*
17:30	**Matthias Christandl** (ETH Zurich) *The quantum marginal problem*
18:30	Closing of the meeting
19:30	Dinner at MedRus Conference Centre Penbryn Building, Penglais Campus Aberystwyth University, SY23 3BY

Online Programme and Registration
http://users.aber.ac.uk/cck/2012LMS/

Principal Organiser Contact
Claus Köstler (cck@aber.ac.uk)
Institute of Mathematics and Physics (IMAPS)
Physical Sciences Building, Penglais Campus
Aberystwyth University, Aberystwyth SY23 3BZ

The lectures of this meeting 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, visit the online-registration website or contact the principal organiser. The cost of the dinner will be approximately £30, including drinks.

The meeting is embedded into a workshop on ***Quantum Probabilistic Symmetries*** **from 3 to 7 September 2012**. For further details and online-registration for the workshop visit the website at http://users.aber.ac.uk/cck/2012LMS/.

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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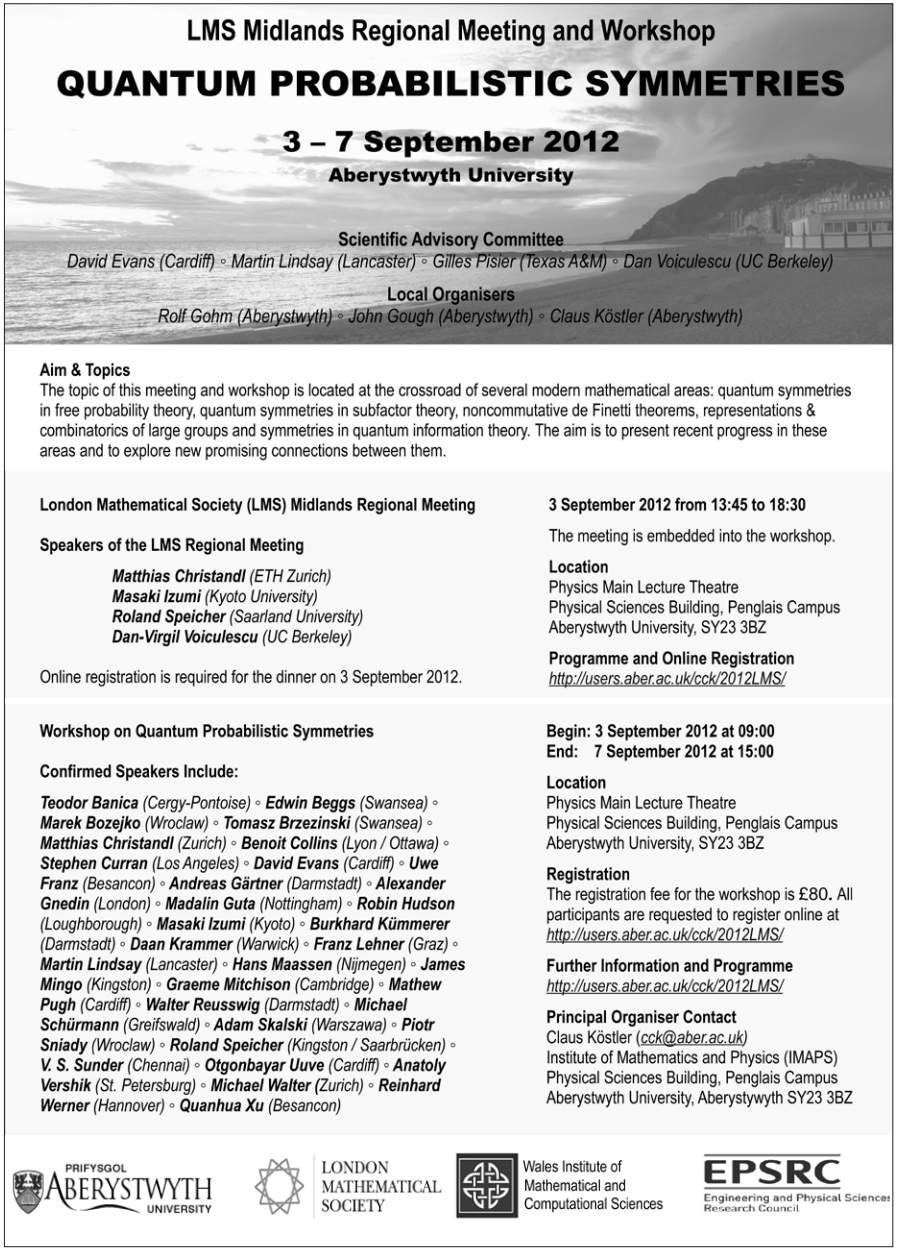

LMS Midlands Regional Meeting and Workshop

QUANTUM PROBABILISTIC SYMMETRIES

3 – 7 September 2012

Aberystwyth University

Scientific Advisory Committee

David Evans (Cardiff) ◦ Martin Lindsay (Lancaster) ◦ Gilles Pisier (Texas A&M) ◦ Dan Voiculescu (UC Berkeley)

Local Organisers

Rolf Gohm (Aberystwyth) ◦ John Gough (Aberystwyth) ◦ Claus Köstler (Aberystwyth)

Aim & Topics

The topic of this meeting and workshop is located at the crossroad of several modern mathematical areas: quantum symmetries in free probability theory, quantum symmetries in subfactor theory, noncommutative de Finetti theorems, representations & combinatorics of large groups and symmetries in quantum information theory. The aim is to present recent progress in these areas and to explore new promising connections between them.

London Mathematical Society (LMS) Midlands Regional Meeting

Speakers of the LMS Regional Meeting

Matthias Christandl *(ETH Zurich)*
Masaki Izumi *(Kyoto University)*
Roland Speicher *(Saarland University)*
Dan-Virgil Voiculescu *(UC Berkeley)*

Online registration is required for the dinner on 3 September 2012.

3 September 2012 from 13:45 to 18:30

The meeting is embedded into the workshop.

Location
Physics Main Lecture Theatre
Physical Sciences Building, Penglais Campus
Aberystwyth University, SY23 3BZ

Programme and Online Registration
http://users.aber.ac.uk/cck/2012LMS/

Workshop on Quantum Probabilistic Symmetries

Confirmed Speakers Include:

Teodor Banica *(Cergy-Pontoise)* ◦ ***Edwin Beggs*** *(Swansea)* ◦ ***Marek Bozejko*** *(Wroclaw)* ◦ ***Tomasz Brzezinski*** *(Swansea)* ◦ ***Matthias Christandl*** *(Zurich)* ◦ ***Benoit Collins*** *(Lyon / Ottawa)* ◦ ***Stephen Curran*** *(Los Angeles)* ◦ ***David Evans*** *(Cardiff)* ◦ ***Uwe Franz*** *(Besancon)* ◦ ***Andreas Gärtner*** *(Darmstadt)* ◦ ***Alexander Gnedin*** *(London)* ◦ ***Madalin Guta*** *(Nottingham)* ◦ ***Robin Hudson*** *(Loughborough)* ◦ ***Masaki Izumi*** *(Kyoto)* ◦ ***Burkhard Kümmerer*** *(Darmstadt)* ◦ ***Daan Krammer*** *(Warwick)* ◦ ***Franz Lehner*** *(Graz)* ◦ ***Martin Lindsay*** *(Lancaster)* ◦ ***Hans Maassen*** *(Nijmegen)* ◦ ***James Mingo*** *(Kingston)* ◦ ***Graeme Mitchison*** *(Cambridge)* ◦ ***Mathew Pugh*** *(Cardiff)* ◦ ***Walter Reusswig*** *(Darmstadt)* ◦ ***Michael Schürmann*** *(Greifswald)* ◦ ***Adam Skalski*** *(Warszawa)* ◦ ***Piotr Sniady*** *(Wroclaw)* ◦ ***Roland Speicher*** *(Kingston / Saarbrücken)* ◦ ***V. S. Sunder*** *(Chennai)* ◦ ***Otgonbayar Uuve*** *(Cardiff)* ◦ ***Anatoly Vershik*** *(St. Petersburg)* ◦ ***Michael Walter*** *(Zurich)* ◦ ***Reinhard Werner*** *(Hannover)* ◦ ***Quanhua Xu*** *(Besancon)*

Begin: 3 September 2012 at 09:00
End: 7 September 2012 at 15:00

Location
Physics Main Lecture Theatre
Physical Sciences Building, Penglais Campus
Aberystwyth University, SY23 3BZ

Registration
The registration fee for the workshop is £80. All participants are requested to register online at
http://users.aber.ac.uk/cck/2012LMS/

Further Information and Programme
http://users.aber.ac.uk/cck/2012LMS/

Principal Organiser Contact
Claus Köstler (cck@aber.ac.uk)
Institute of Mathematics and Physics (IMAPS)
Physical Sciences Building, Penglais Campus
Aberystwyth University, Aberystywyth SY23 3BZ

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OPEN HOUSE LONDON 2012

After the success of last year's event, which attracted over 300 visitors to De Morgan House, the LMS is once again taking part in Open House London. De Morgan House will be open from 11 am till 4 pm on Saturday 22 September 2012. Visitors will be able to enjoy a guided tour of De Morgan House and there will also be an exhibition celebrating the life and work of Alan Turing on the centenary of his birth.

GOOD PRACTICE SCHEME

Benchmarking Survey

The London Mathematical Society (LMS) has developed a Good Practice Scheme with the aim of helping departments of mathematics to take practical actions to improve the participation of women and to share examples of good practice with other departments. The Scheme will also offer support in applying for an Athena SWAN award for those departments seeking recognition for their work in this area. Further information is available at www.lms.ac.uk/content/good-practice-scheme.

As part of the Scheme the LMS has commissioned Oxford Research and Policy to run a survey of UK mathematics departments. The survey began in early June 2012. The purpose of this survey is to collect examples of good practice in mathematics and to benchmark departments on their working practices, processes and procedures. This exercise will identify the current strengths and weaknesses across the UK and will enable departments to assess themselves in relation to the national picture.

To enable the resulting report to be as comprehensive and useful as possible it is important that most mathematics departments submit a return. There is currently no information of this kind either being collected or in existence for mathematics in the UK and the LMS is pleased to both manage and fund such an important exercise on behalf of the community. This has the support of the Heads of Departments of Mathematical Sciences (HoDoMS) and the Council for the Mathematical Sciences.

Readers are asked to encourage their departments to submit a return by the deadline of **16 July 2012**.

CLASSIFIED IMPACT CASES IN REF

The Heilbronn Institute wishes to facilitate the preparation of impact cases based on classified work for the Institute or for GCHQ and intended for presentation to the Research Excellence Framework (REF) mathematics panel. It believes that the submission of good cases showing the relevance of mathematical sciences to GCHQ's work will be of benefit to both mathematicians and GCHQ.

Details of cases can only be released to people with the appropriate national security clearance. Subject to that limitation, the Institute expects to be able to provide, for example, facilities for the preparation of cases in secure premises, copies of relevant research outputs, and advice to departments or individuals about the level of impact actually achieved.

The Director has written to current and former members of the Institute and to heads of departments of mathematical sciences about the submission of such classified impact cases to REF. Requests for further information should be sent to Professor Malcolm MacCallum, Director, Heilbronn Institute for Mathematical Research, School of Mathematics, University of Bristol, Bristol BS8 1TW. Email: m.a.h.maccallum@bristol.ac.uk.

FRIEDRICH HIRZEBRUCH

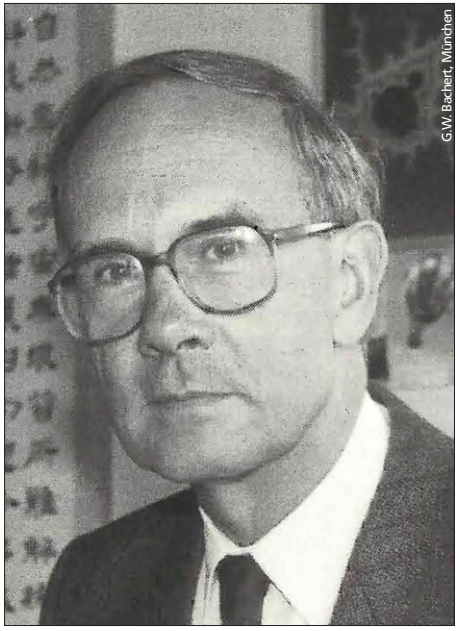
Professor Fritz Hirzebruch, who was elected an Honorary Member of the London Mathematical Society on 16 June 1975, died on 17 May 2012, aged 84.

Sir Michael Atiyah writes: Fritz Hirzebruch was the outstanding German mathematician of the post-war years and was responsible for rebuilding German mathematics after the havoc of the Nazi regime. He was born in Hamm in 1927 and educated at the University of Münster, where his teacher was Heinrich Behnke. Conscripted briefly towards the end of the war he was taken prisoner by the Americans, before returning to his studies. After a year in Zürich with Heinz Hopf he spent a few years in Princeton before being appointed at a very young age to a full Professorship at Bonn, where he stayed till the end of his life.

He first made his name with his formula for the signature of a $4k$-dimensional manifold. This led on to his famous generalization of the Riemann-Roch theorem in algebraic geometry, one of the main achievements of the revolution in the subject brought about by sheaf theory. It rested heavily on the theory of Chern classes which, with Borel, he had done much to clarify.

Over the years Fritz built up mathematics in Bonn, ending eventually with his own Max Planck Institute. This served as a major international centre attracting active mathematicians from all over the world. It played a particularly important role in countries such as Japan and the (former) Soviet Union.

A key annual event was the Arbeitstagung, which grew from a handful of visitors in 1957 (including Grothendieck and myself) to several hundred a few years later. These meetings were flexible, with no pre-set programme, and covered whatever was most topical at the time. The areas were diverse and reflected Fritz's own wide interests, but they ranged from all kinds of geometry to number theory and in due course theoretical physics. Many



Friedrich Hirzebruch

graduate students had their first taste of serious mathematics at these meetings.

I myself first met Fritz in 1954 and we became close friends and collaborators. One of our joint enterprises was the development of topological K-theory, which evolved naturally from the Arbeitstagung, and which led on to many other things.

Fritz had a great love of algebraic number theory and was fascinated by the connections between that subject and geometry. One of his most beautiful results was the resolution he found for the cusps of Hilbert modular surfaces, relating it to the periodic continued fraction of quadratic irrationals. Much of his work in this direction was joint with his former student Don Zagier, who in due course succeeded him as a director of the MPI.

He was a lucid thinker, speaker and writer. Clarity both of content and of style was important. This, as well as his personal qualities, no doubt explains his remarkable and apparently effortless success in administration.

Fritz was the first President of the European Mathematical Society, a member of the German order Pour le Mérite and a Wolf Prize laureate. Among his many honours were a degree from Oxford, Foreign Membership of the Royal Society and an Honorary Fellowship of the Royal Society of Edinburgh.

I and the hundreds of visitors who came to Bonn every year have fond memories of the friendly hospitality provided by Fritz and his wife Inge.

Isaac Newton Institute
for Mathematical Sciences

QUANTIZED FLUX IN TIGHTLY KNOTTED AND LINKED SYSTEMS

3–7 December 2012

in association with the Newton Institute programme
Topological Dynamics in the Physical and Biological Sciences
(16 July – 21 December 2012)

International Scientific Committee: Natalia G. Berloff (DAMTP, Cambridge), Jason Cantarella (University of Georgia), Anne-Christine Davis (DAMTP, Cambridge), Thomas W. Kephart (Vanderbilt University), Paul Sutcliffe (Durham University) and Tanmay Vachaspati (Arizona State University).

Many systems contain flux tubes which tighten due to their own tension. This workshop will study all aspects of tightly knotted and linked systems which support quantized flux tubes. The systems studied will range over, but not be limited to, superconductors, cosmic strings, and gauge theories, such as quantum chromodynamics. Some topics to be considered will be:

- the energy spectrum of knots and links;
- mathematical and physical aspects of tightening;
- relaxation to local and global minima;
- topological aspects of stability related to helicity, quantized helicity and their generalizations;
- curvature corrections, distortion and other physical corrections;
- topology change and the dynamics of flux tube decay, from quantum reconnection and tunneling to monopole-anti-monopole pair production;
- universality aspects of tightly knotted/linked systems of quantized flux, from knotted flux tubes in superconductors to glueballs in QCD.

Further information and application forms are available from the website at www.newton.ac.uk/programmes/TOD/todw04.html. Closing date of the receipt of applications is **31 July 2012**.

FRITZ URSELL

Professor Fritz Joseph Ursell, FRS, who was elected a member of the London Mathematical Society on 12 October 1979, died on 11 May 2012, aged 89.

David Abrahams and Paul Martin write: Fritz Joseph Ursell was a leading applied mathematician noted internationally for his contributions to fluid mechanics, especially in the area of wave mechanics. He held the Beyer Chair of Applied Mathematics at the University of Manchester during 1961–90, was elected Fellow of the Royal Society in 1972 and retired in 1990.

Fritz came to England as a refugee from Nazi Germany in 1937, was educated at Marlborough School and studied at Cambridge University from 1941 to 1943. Fellow students at Cambridge included Sir James Lighthill, Freeman Dyson and Tony Skyrme. Following graduation, Fritz joined the Admiralty as part of a waves group, headed by George Deacon, tasked with wave forecasting for allied-forces landings in Japan. This initiation into the mathematical modelling of waves set his research direction for the rest of his career.

In 1947, Fritz was appointed to an ICI fellowship in applied mathematics at Manchester University, but in 1950 he returned to Cambridge. In 1957 he spent a year at Massachusetts Institute of Technology, and in 1961 he moved back to Manchester where he remained for the rest of his career.

Fritz made seminal contributions to research in the mathematical analysis of linear water waves. This required the development of new techniques for the asymptotic evaluation of integrals, especially uniformly valid approximations. He made numerous contributions to the field, for example, he constructed a family of solutions for edge waves on a sloping beach, extending Stokes' original result; he gave a detailed analysis of the Kelvin ship wave patter; and he was the first to prove the existence of trapped modes in water-wave problems, here for the case of a submerged circular cylinder. His papers, collected and published by World Scientific in 1994, are exceptional for their clarity and precision.

Fritz will be remembered for his humanity, for his wit, and for the time he was prepared to spend with colleagues, especially young researchers. "All this is well known to those to whom it is well known", as Fritz was fond of remarking in lectures.

Fritz Ursell is survived by his wife Renate, two daughters Susie and Ruth, and two grandchildren.

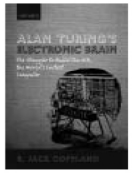
FUNCTION THEORY MEETING

The one-day *Function Theory Meeting* will take place at De Morgan House in London on 3 September 2012. The meeting is a well-established annual event which focuses on function theory and related topics such as dynamics and differential equations. The main invited speaker is Professor David Drasin from Purdue University, USA. Professor Drasin is an eminent mathematician in the field of function theory and is a popular speaker all over the globe. The list of speakers is:

- David Drasin (Purdue)
- Rob Fryer (Warwick)
- Thomas Kecker (UCL)
- Myrto Manolaki (UCD)
- Dan Nicks (Nottingham)
- Phil Rippon (Open)
- Corinna Ulcigrai (Bristol)

There is no need to register in advance for the meeting. There is a £10 registration fee payable on the day, which is waived for those who are retired or unemployed. For further information, the meeting website is https://sites.google.com/site/functiontheorymeeting/ and the organiser is Alastair Fletcher, who can be contacted at odftm.mail@gmail.com. The meeting is supported by an LMS Conference grant.

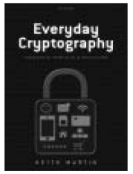
New from Oxford



Alan Turing's Electronic Brain
The Struggle to Build the ACE, the World's Fastest Computer
B. Jack Copeland and others

Chronicles Turing's struggle to build the modern computer. Includes first hand accounts by Turing and the pioneers of computing who worked with him. This text is essential reading for anyone interested in the history of the computer and the history of mathematics.

592 pages
Paperback | 978-0-19-960915-4 | £14.99



Everyday Cryptography
Fundamental Principles and Applications
Keith M. Martin

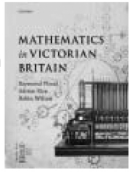
Presents a comprehensive introduction to the role that cryptography plays in providing information security for technologies such as the Internet, mobile phones, payment cards, and wireless local area networks.

560 pages
Paperback | 978-0-19-969559-1 | £29.99

Taking Sudoku Seriously
The Math Behind the World's Most Popular Pencil Puzzle
Jason Rosenhouse and Laura Taalman

Gives readers a deeper understanding of the inner workings of Sudoku and how it connects to the larger world of mathematics.

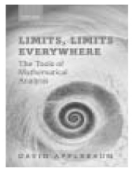
226 pages
Hardback | 978-0-19-975656-8 | £13.99



Mathematics in Victorian Britain
Edited by Raymond Flood, Adrian Rice, and Robin Wilson

Constitutes perhaps the first general survey of the mathematics of the Victorian period.

480 pages
Hardback | 978-0-19-960139-4 | £29.99



Limits, Limits Everywhere
The Tools of Mathematical Analysis
David Applebaum

This book doesn't assume knowledge of calculus and, instead, the emphasis is on the application of analysis to number theory.

224 pages
Paperback | 978-0-19-964008-9 | £19.99

The Emperor's New Mathematics
Western Learning and Imperial Authority During the Kangxi Reign (1662-1722)
Catherine Jami

Details not only the history of mathematical ideas, but also their political and cultural impact.

452 pages
Hardback | 978-0-19-960140-0 | £60.00

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LONDON MATHEMATICAL SOCIETY

POPULAR LECTURES 2012

Celebrating 30 years

King Edward School, Birmingham
Wednesday 26 September

David Hilbert

Professor Sir 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.

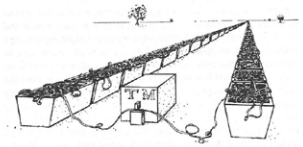


Fig. 2.1. A strict Turing machine requires an infinite tape!

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

TIME: Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 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 21 September.**

The lectures are intended to be suitable for a general audience and no specific mathematical knowledge will be assumed. Although the talks are not primarily intended for professional mathematicians, everyone is welcome and some members may wish to apply for tickets for friends and relatives.

BRITISH SCIENCE FESTIVAL 2012

This is organized by the British Science Association (a.k.a. the British Association for the Advancement of Science) and takes place this year in Aberdeen from Tuesday 4 to Sunday 9 September 2012 with the theme *Energise Your Mind.* Mathematical Sciences events in the main programme are as follows:

Wednesday 5 September, 13.00–15.00
Fishy Figure, organized by Malcolm Hall, Royal Statistical Society, Highlands Local Group: Research and advice relevant to the marine environment.

Friday 7 September 15.30–16.30
Expanding Minds and Universes: Presidential Lecture by John Barrow (How Einstein made it possible for cosmologists to study whole universes.) followed by a wine reception 16:30–17:30 sponsored by the Edinburgh Mathematical Society.

Saturday 8 September 10:00–12:00
How to Solve Crimes with Mathematics? Marco Thiel (Physics Department, University of Aberdeen). A presentation, experiments, finger-print recognition software, potentially face recognition, pursuit and evasion patterns etc.

Saturday 8 September 15.00–17.00
In Tune with Mathematics, Kevin Houston, Rob Sturman and Ben Sparks. Auto-Tune, spectral analysis of the opening chord of 'A Hard Day's Night', the mathematics of musical tunings and more.

Sunday 9 September 15.30–17.30
Turing: The Human vs the Machine, Robin Whitty and Bob Lockhart. Alan Turing invites you to speed date ... with a computer!

Sunday 9 September 18.00–20.00
The Maths and Computing Magic Show, Peter McOwan and Matt Parker. Magic tricks, maths, computing, enquiry based learing, entertainment and fun.

Any queries should be directed to Peter Giblin, pjgiblin@liv.ac.uk (Chair of the Mathematical Sciences Section). For full details of the Festival visit www.abdn.ac.uk/science/public/2012.

2013 Festival

For the 2013 Festival in Newcastle (7–12 September), the Mathematical Sciences Section is keen to hear from anyone with a possible idea for a mathematics, statistics or computing based event. The mission of the British Science Association is to communicate the excitement and relevance of science, including mathematics, to the wider public. Thus the 'unexpected usefulness of mathematics' is a strong theme. The programme for 2013 will be fixed around the end of October 2012. Any ideas or offers of help should be sent to Peter Giblin (pjgiblin@liv.ac.uk).

HEIDELBERG LAUREATE FORUM

The Klaus Tschira Stiftung has established the *Heidelberg Laureate Forum* as an annual meeting bringing together winners of the most prestigious scientific awards in Mathematics (Abel Prize and Fields Medal) and Computer Science (Turing Award) with a select group of highly-talented young researchers. The Forum has been initiated by the Heidelberg Institute for Theoretical Studies (HITS), the research institute of the Klaus Tschira Stiftung (KTS) – a German foundation which promotes Natural Sciences, Mathematics and Computer Science. *The Heidelberg Laureate Forum* is modelled after the annual Lindau Nobel Laureate Meetings, established more than 60 years ago to bring forward new ideas. The first meeting will take place from 23 to 27 September 2013 in Heidelberg.

The agreement on collaborating in the *Heidelberg Laureate Forum* between the organizers and the award-granting institutions (Norwegian Academy of Science and Letters, International Mathematical Union and Association for Computing Machinery) was signed in Oslo on 22 May 2012 on the occasion of the 10th Abel Prize Ceremony.

IMU NEWS

Nominations for IMU Awards 2014

The President of the IMU, Ingrid Daubechies, has written to the Adhering Organizations, asking them to submit nominations for the IMU awards listed below.

Fields Medals are awarded every four years on the occasion of the International Congress of Mathematicians to recognize outstanding mathematical achievement for existing work and for the promise of future achievement (fields14-chair@mathunion.org).

The **Rolf Nevanlinna Prize** is awarded once every four years at the International Congress of Mathematicians, for outstanding contributions in mathematical aspects of information sciences (nevanlinna14-chair@mathunion.org).

The **Carl Friedrich Gauss Prize** is awarded once every four years to honor a scientist whose mathematical research has had an impact outside mathematics – either in technology, in business, or simply in people's everyday lives (gauss14-chair@mathunion.org).

The **Chern Medal** is awarded every four years on the occasion of the International Congress of Mathematicians to an individual whose accomplishments warrant the highest level of recognition for outstanding achievements in the field of mathematics (chern14-chair@mathunion.org).

The **Leelavati Prize** is intended to accord high recognition and great appreciation of the IMU and Infosys of outstanding contributions for increasing public awareness of mathematics as an intellectual discipline and the crucial role it plays in diverse human endeavors. The prize is sponsored by Infosys. (leelavati14-chair@mathunion.org).

The **ICM 2014 Emmy Noether Lecture** is a special lecture at an ICM which honors women who have made fundamental and sustained contributions to the mathematical sciences (noether14-chair@mathunion).

More details about each of these awards and the Noether lecture, as well as lists of past laureates, can be found on the IMU website at www.mathunion.org/general/prizes,

Deadline for nominations: **31 December 2012**.

The names of the chairs of the various prize committees and their contact information can be found at: www.mathunion.org/general/prizes/prize-committee-chairs/2014/.

The names of the other prize committee members remain confidential and will be announced at the Opening Ceremony of ICM 2014 only.

Volunteer Lecturer Program (VLP)

This program is developed and sponsored by the Commission for Developing Countries (CDC) of the International Mathematical Union, in cooperation with the Centre International de Mathématique Pures et Appliquées (CIMPA), the US National Committee for Mathematics, and the London Mathematical Society. The objectives are:

- Building capacity in mathematics and mathematics education in developing countries.
- Increasing mathematical interaction between the mathematical community in the developed world and the vast, mostly untapped reservoir of mathematical talent in the developing world.

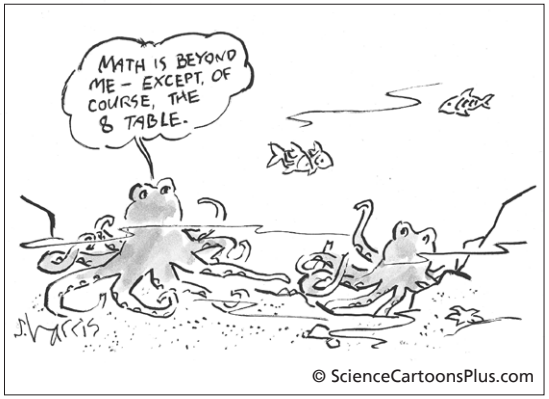
The program seeks mathematicians interested to lecture for intensive 3–4 week courses at universities in the developing world (see www.mathunion.org/cdc/volunteer-lecturer/). A Newsletter has been launched (http://tinyurl.com/csjy567).

The above items are taken from the 53rd issue of the IMU electronic newsletter *IMU Net* (see www.mathunion.org/IMU-Net).

LMS CONFERENCE FACILITIES

Organising a conference in central London? Meeting rooms and catering are available in De Morgan House. For terms and availability, please call 020 7927 0800 or email roombookings@demorganhouse.co.uk.

FINITE GROUPS AND REPRESENTATIONS



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A conference on *Finite Groups, Representations and Related Topics* will take place in the Mathematical Institute, Oxford from 20 to 24 August 2012. An important topic of the conference will be the recent directions in modular representation theory of finite groups and in local group theory. An outstanding issue is the relation between local representation theory and the theory of fusion systems and the conference will have experts in those two areas. This meeting will mark Michael Collins's fifty years at Oxford. The list of speakers includes:

- Michael Aschbacher (Caltech)
- Jon Carlson (U. Georgia)
- Joseph Chuang (City University)
- Paul Flavell (Birmingham)
- George Glauberman (U. Chicago)
- Simon Goodwin (Birmingham)
- Derek Holt (Warwick)
- Radha Kessar (Aberdeen)
- Markus Linckelmann (Aberdeen)
- Bob Oliver (Paris-Nord)
- Geoff Robinson (Aberdeen)
- Leonard Scott (U. Virginia)
- Peter Sin (U. Florida)
- Ron Solomon (Ohio State)

For further information visit the website www.maths.ox.ac.uk/events/conferences/finite-groups-representations-and-related-topics. Organisers: David Craven, Raphaël Rouquier. The meeting is supported by an LMS Conference grant.

IMA CONFERENCES

The following IMA conferences are taking place during 2012–2013:

2012

- *Numerical Linear Algebra and Optimisation 3rd IMA Conference*, University of Birmingham, 10–12 September
- *Mathematics of Medical Devices and Surgical Procedures IMA Conference*, University College London, 17–19 September
- *Early Career Mathematicians' IMA Autumn Conference,* University of Greenwich, 24 November
- *Mathematics in Signal Processing 9th IMA International Conference,* Austin Court, Birmingham, 17–20 December

2013

- *Quantitative Modelling in the Management of Health and Social Care 7th IMA Conference,* Central London, 25–27 March
- *Mathematics in Finance IMA Conference,* Edinburgh Conference Centre, Heriot-Watt University, 8–9 April
- *Dense Granular Flows 2nd IMA Conference*, Isaac Newton Institute for Mathematical Sciences, Cambridge, 1–4 July
- *Mathematics of Surfaces 14th IMA Conference,* University of Birmingham, 11–13 September

For further information or to register your interest in any of the conferences contact Lizzi Lake, Conference Officer (email: conferences@ima.org.uk tel: +44 (0) 1702 354020) or visit the IMA conferences calendar www.ima.org.uk/conferences/conferences_calendar.cfm.

MATHEMATICS POLICY ROUND-UP

June 2012

RESEARCH

Mathematical Science Intradisciplinary Research Fellowships
EPSRC has announced that it is extending the Mathematical Sciences Intradisciplinary Research fellowship priority area to include the postdoctoral careers stage. Further details are available on the EPSRC website at http://tinyurl.com/cwph6g4.

New members for EPSRC Strategic Advisory Team
Four new members have been invited to join the EPSRC Mathematical Sciences Strategic Advisory Team:

- Professor Patrick Dorey, University of Durham
- Dr Gavin Davies, Laing O'Rourke
- Sir John Ball, University of Oxford
- Professor David Abrahams, University of Oxford

EPSRC meeting with the mathematics community
Representatives of the mathematics community – nominated by the Council for Mathematical Sciences (CMS) and the Institute of Physics – met with the EPSRC earlier this year with the aim of providing information as input to the Mathematics Scientific Advisory Team before shaping decisions in the mathematical sciences area were made. A note of the key points from the meeting is now available on the CMS website at http://tinyurl.com/cjgumwb.

Number theory grant could lead to advances in wireless communications
The Engineering and Physical Sciences Research Council (EPSRC) has awarded a £1.6 million grant to two of the country's leading mathematics researchers, Professor Sanju Velani, Head of Pure Mathematics at the University of York and Professor Victor Beresnevich, also at the university. The grant will help Professor Velani and Professor Beresnevich establish new frameworks in number theory that could solve long-standing problems in mathematics and have potentially far-reaching benefits for the real world. More information is available at http://tinyurl.com/bt4zfna.

HIGHER EDUCATION

Statistical Report
The Institute of Physics has published a report entitled The Degree-Course Destinations of Accepted Applicants with Physics and Mathematics A-level or Scottish Higher 2006–11. The report is available at http://tinyurl.com/cb8q6lq.

Fair access to higher education
HEFCE and the Office for Fair Access (OFFA) have joined forces in welcoming a letter from Ministers (Tuesday 22 May 2012) on developing a shared strategy for widening participation and promoting fair access to higher education. The letter is available at http://tinyurl.com/cp9lw65.

Improving quality assurance in higher education
HEFCE has launched a consultation on the introduction of a more risk-based approach to quality assurance in higher education in England, in response to the government's White Paper, *Students at the Heart of the System*. The consultation document is available at http://tinyurl.com/c9q3j36 and the deadline for submissions is **31 July 2012.**

SCHOOLS AND COLLEGES

Mathematics: made to measure
This report was published by Ofsted in May and emphasises the importance for every school student to have the best possible mathematics education. The report highlights a dramatic increase in the take-up of A-level and further mathematics, and shows that the youngest children are doing better. GCSE and A level results continue to rise as a result of the sustained efforts of teachers and students. But the report finds three key areas in primary and secondary mathematics in schools in England which need to be improved. The full report is available at http://tinyurl.com/cogfngc.

The LMS and IMA produced a joint news release in response to the report. This news release is available at http://tinyurl.com/cl6fttu.

Comparison of A-levels with International Qualifications
The Office of Qualifications and Examinations Regulations (Ofqual) has published a summary report of key findings from an international comparability study of A-levels and equivalent qualifications. The project reviewed examinations covering a representative range of subjects including mathematics. The summary report is available at http://tinyurl.com/bps6ap5.

Are GCSEs fit for the 21st century?
A group set up by the CBI is considering whether scrapping GCSEs would give teachers greater freedom to provide a broader curriculum. More information is available at http://tinyurl.com/cgmnmd2.

OTHER

New IOP Chief Executive
The Institute of Physics (IOP) has announced the appointment of a new Chief Executive. Professor Paul Hardaker takes up the post on 3 September 2012. Professor Hardaker has been Chief Executive of the Royal Meteorological Society since October 2006. Prior to this, he worked at the Met Office for 14 years as both Programme Director for the Met Office's Development Programmes, and as the Met Office's Chief Advisor to Government.

Dr John Johnston
Mathematics Promotion Unit

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *18 April 2012* at the University of Kent during the British Mathematical Colloquium. Over 100 members and visitors were present for all or part of the meeting.

The meeting began at 11.30 am with the President, Dr G. SEGAL, FRS, in the Chair.

The Treasurer, PROFESSOR R.T. CURTIS, presented a report on the Society's activities.

Nine people were elected to Ordinary Membership: R. Albrecht, R. Alfaris, W. Bahsoun, G.R. Barrenchea, M.R. Gadouleau, B. Healy, K. Lord, J. Sixt and A.D. Zarnescu.

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

Dr Segal introduced a lecture given by Professor Idun Reiten on *Quivers in Representation Theory.*

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

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *19 May 2012* at De Morgan House, Russell Square, London to mark the hundredth anniversary of the death of Henri Poincaré. Over 70 members and visitors were present for all or part of the meeting.

The meeting began at 10.00 am with the President, Dr G. SEGAL, FRS, in the Chair.

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

Dr Segal then referred to an article written by Cédric Villani, Director of the Poincaré Institute, University of Lyon, which had been sent for the occasion.

DR JUNE BARROW-GREEN gave a brief introduction to the lectures with a brief description of Poincaré, his achievements and read an anecdote from a letter to Arthur Cayley from J.J. Sylvester about an impending visit from Poincaré to Oxford/Cambridge.

Dr Barrow-Green then introduced the first lecture given by Jeremy Gray on *Poincaré and the Idea of Group*.

A lecture by Gerhard Heinzmann on *Poincaré, A Philosopher of Analytic Tradition?* and a lecture given by June Barrow-Green on *Poincaré's Last Geometric Theorem and its Legacy* completed the morning session.

During lunch, there was an exhibition from the Poincaré Archives at the University of Nancy, which was curated by Philippe Nabonnand.

After lunch, Dr Barrow-Green introduced a lecture by Scott Walter on *Poincaré's Discovery of the Lorentz Group and its upshot for 20th Century Physics*. This was followed by a lecture given by John Stillwell on *Poincaré and Topology*.

After tea, Dr Barrow-Green introduced a lecture given by Marc Lackenby on *The Poincaré Conjecture.*

The Chair expressed the thanks of the Society to the speakers for giving such fascinating lectures.

The President thanked the organisers of the Meeting for arranging an excellent and well-attended event, and declared the Meeting closed.

After the meeting, a reception was held at De Morgan House, followed by a dinner at The Montague on the Gardens.

LMS POINCARÉ DAY MEETING

Report

The LMS Poincaré Day took place at De Morgan House on the 19 May 2012. A total of six lectures guided the audience through a journey of the intellectual life of Henri Poincaré. The lectures exposed the remarkable mixture of ideas and theories Poincaré dedicated his life to developing, from the idea of a group, to the fundamentals of Topology.

The day started with the comforting smell of coffee and a warm welcome by the president of the society, who quite rightly described Poincaré as The Last Universalist. The lecture theatre could not fit one more soul, so the journey began.

Professor Jeremy Gray, professor in the History of Mathematics and a world expert in the life and work of Poincaré, started the morning session by describing how Poincaré used the idea of a group. Groups are a concept which 'algebraically' captures the symmetry of geometric objects. A prototypical example is the set of orientation-preserving symmetries of the tetrahedron, the alternating group A_4. The formalization of a 'group' was cardinal for Poincaré's future mathematical offspring.

Next, Professor Gerhard Heinzmann, professor of Philosophy of Logic and Mathematics, exposed the thesis that Poincaré's writing give sufficient evidence to classify him as a philosopher belonging to the Analytic tradition. This is a philosophical tradition characterised by an emphasis on clarity of argument, specifically of scientific ideas, achieved via logical analysis of language.

The morning session concluded with June Barrow-Green's exposition of Poincaré's famous Last Geometric Theorem and its contribution to the Three Body Problem, a problem whose solution had eluded scientists since Newton's time. The problem goes as follows: given three particles moving in space under their mutual gravitational attraction and given their initial conditions, we want to determine their subsequent motion. Although Poincaré did not completely solve the problem, because he concentrated on a simpler version which considers one of the bodies to have no mass or gravitational influence on the other two, never the less, he was awarded the prize established by Oscar II, King of Sweden and Norway.

During lunch a splendid exhibition of the Poincaré Archives from the University of Nancy was displayed. This included portraits of Poincaré, of him with his family and friends and facsimiles of original manuscripts.

Professor Scott Walter began the afternoon session with a description of Poincaré's seminal contributions to what would eventually become the theory of Special Relativity. In particular, he was the first person to notice that the Lorentz transformations, a set of rules for relating length and time measurements performed by observers in different states of motion, have the structure of a group. This observation turns out to be crucial for our modern understanding of relativity, for this object can be interpreted as the isometry group of Minkowskian space-time. For this work, Poincaré was nominated for the Nobel prize in physics in 1910.

Professor John Stillwell described how several ingredients from Poincaré's previous work, and more specifically Poincaré's background on automorphic functions, proved useful for his later work in topology. One of his most important contributions was the introduction of the fundamental group of a manifold, which describes how a manifold may be reassembled from a fundamental region by identifying parts of its boundary. This is a refinement of the Betti number, and in particular, Poincaré showed that there are 3-manifolds, for example the 3-sphere and the projective plane, with the same Betti numbers but different fundamental group. From here, the sky became the limit on how to construct and identify distinct 3-manifolds and this new 'algebraic object' led to the Poincaré Conjecture, reviewed by Professor Lackenby in the concluding lecture of the day.

Professor Mark Lackenby explained that Poincaré established the method of studying a topological space by associating various algebraic quantities to it. He investigated two key algebraic structures, the fundamental group and homology groups. An important

question developed: Do the fundamental group and homology groups determine a 3-manifold? And Poincaré showed that the homology groups alone do not express the Poincaré conjecture: Consider a compact 3-dimensional manifold V without boundary. Is it possible that the fundamental group of V could be trivial, even though V is not equivalent (homeomorphic) to the 3-dimensional sphere? This became one of the most important unsolved problems in mathematics, until 2003.

A comprehensive combination of material and excellent explanations by all the speakers made the day a success. We would like to thank the LMS, all the lecturers and participants for the event.

Senja Barthel, Mauro Mauricio,
Matthew Rathbun, Karin Valencia
Imperial College London

A VISIT TO MOSCOW

Report

I have been offered the opportunity to write a report for the LMS *Newsletter* regarding my academic visit to Moscow last December. The visit, which lasted for ten days, was possible thanks to the generous support of the LMS Young British & Russian Mathematicians Scheme, which covered the trip and visa expenses, and the Laboratory of Algebraic Geometry and its Applications, based at the Higher School of Economics (HSE) in Moscow, which covered local expenses.

It turns out I chose, by accident, an interesting time to visit Moscow. During my stay there were peaceful protests in the streets pretty much every day regarding the legislative elections, as we could see in the news. There was also lots of snow, although the Russian winter is not as bad as I imagined.

The Laboratory of Algebraic Geometry is a research group with 27 fellows, all of them algebraic geometers of some sort, under the direction of Professor Fedor Bogomolov. The Laboratory is attached to the young (opened in 2008) Faculty of Mathematics of HSE and it is funded by one of the three mega-grants awarded by the Russian Government to mathematics departments in Russia.

During my stay I took part in the academic life of both the famous Steklov Mathematical Institute (20 minutes walking from the Laboratory) and the Laboratory, attending several lectures. I have never seen so much mathematical activity as in Moscow. Many mathematicians visit the city in the second half of December and there are around three seminars per week in geometric topics.

As part of my visit I gave a talk in invariants of Birational Geometry at the Iskovskikh Seminar, in Steklov. I also spent some time discussing my current research problem with Konstantin Shramov and Professor Yuri Prokhorov. We discussed a topic in birational rigidity of Del Pezzo fibrations (dimension 3). The question has been previously explored and partially answered by several people including I. Cheltsov, A. Corti and J. Park. We look for necessary and sufficient conditions to perform algebraic surgery (birational transformation) over a fibration of surfaces over a curve to get another non-isomorphic birational fibration.

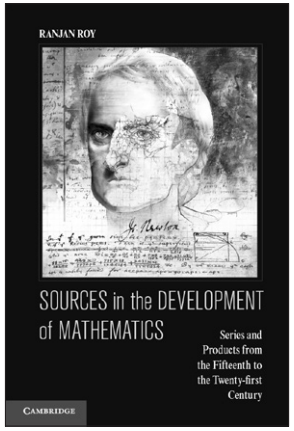
I would like to use this opportunity to thank the LMS and the Laboratory for their generous support and to recommend to any young mathematicians (late PhD students or post-docs, usually) to apply to visit some department in Russia using this scheme. This scheme was designed to facilitate visits in both directions, but until my visit it had only been used by Russians to visit the UK. In my opinion young mathematicians based in the UK can benefit as much by visiting Russia. I hope this short account encourages more young mathematicians to apply.

Jesús Martínez-García
University of Edinburgh

REVIEWS

Sources in the Development of Mathematics: Series and Products from the Fifteenth to the Twenty-First Century by Ranjan Roy, Cambridge University Press, 2011, 974 pp, US$99, £65.00, ISBN 978-0-521-11470-7.

Ranjan Roy's view, stated in the preface to this book, is that mathematicians should make a habit of studying the great mathematical works of the past. By doing this, he argues, they are sure to enrich their own thinking in the same way that writers of fiction can draw inspiration from classic literature. In particular, he encourages the use of historical texts in mathematics teaching: for example, he suggests that they can provide a rich resource for projects or seminar topics.



With this manifesto in mind, he has taken on the rather daunting task of providing a survey of sources on infinite series, products, and continued fractions from fifteenth century Kerala to twentieth century Europe. He presents a vast treasure trove of examples, several of which are only tangentially related to series and products: for example, the inclusion of a chapter on finite fields seemed to me rather surprising. Such chapters might easily have been cut during editing; however, the breadth of examples fits in fairly well with Roy's aim of encouraging original perspectives on modern mathematics through the study of its development, and it highlights the unexpected ways in which series and products can be used.

Contrary to what is suggested by the title *Sources in the Development of Mathematics,* Roy does not provide extracts directly from the primary sources themselves. Rather, he presents a collection of brief commentaries on the original texts; these are accompanied by some background information, sets of exercises for the reader, and suggestions for further reading. The examples are grouped by topic into 41 chapters, arranged in approximately chronological order. The close connections between the topics mean that the work would have benefitted from systematic cross-referencing between related chapters; however, the book is easy to dip in and out of, and for those looking for a particular topic, the table of contents is detailed enough to serve as a useful navigational aid.

Sadly, this book would not be a suitable text for a course in the history of mathematics. Though the author does seem to have some appreciation of the sensitivities of presenting historical mathematics for modern audiences, he is not always successful in avoiding anachronism, and there are a number of howlers. For example, Chapter 7, on 'Geometric Calculus', describes supposed attempts by mid-seventeenth century mathematicians such as Blaise Pascal, Isaac Barrow and James Gregory to calculate integrals, though the notion of an integral had not yet been articulated. Furthermore, Roy's commentaries in the same chapter imply that Pascal, Barrow, and Gregory were working with functions; this, too, is a concept that simply had not yet been invented. Such modernisations severely obscure the meaning of the source texts and the intentions of their authors, and it is not always made clear where Roy's notation or wording differs from the original.

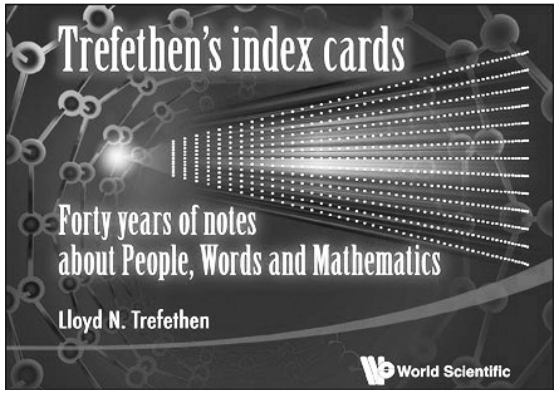
Due to these shortcomings, I cannot recommend this book as a reliable authority on the history of series and products. However, the wide range of examples it contains make it a good resource for mathematicians and mathematics students to dip into to light the touchpaper of inspiration.

Rosanna Cretney
The Open University

Trefethen's Index Cards: Forty Years of Notes About People, Words and Mathematics by L.N. Trefethen, World Scientific Publishing, 2011, 368 pp, £13, US$19.95, ISBN 978-9-814-360692.

This is an unusual book. Since the age of 14, Nick Trefethen, FRS, Professor of Numerical Analysis at Oxford and current president of SIAM, has been collecting his thoughts on index cards. The result is presented for us here, and is definitely not a diary: it's clear that these thoughts are meant for public consumption. Indeed, in a card dated from 1982, he fantasises that he will one day "find on my desk a book of *Trefethen's Duplicated Index Card Notes*". Instead, to compare this book to modern means of communication, each card is somewhere between a tweet and a blog post: a typical card contains around 900 characters, or 120 words.

The collection runs the gamut from religion, fatherhood, relationships, nuclear proliferation, mocking jokes about Oxford (Trefethen calculates that an undergraduate Oxford degree contains 1.37 bits of information), to, of course, mathematics. In addition, the benefits of touch typing play a surprisingly large role, mentioned no less than six separate times: "what a waste, to hunt and peck for a lifetime at 30 words per minute!" The end result is mixed, full of questions but with few answers.



Some of the most entertaining cards result when Trefethen considers the practical world. In this category, we have a prediction from 1987 that "dog toilets will appear on the market before too long" and a prediction from 1990 that we will soon see a "touch-of-a-button, cup-at-a-time coffee machine". Achieving a 50% success rate on such predictions is impressive - and perhaps dog toilets lie in our future. We also find a theory of why sleeping babies are so hard to wake, a silly but entertaining argument in favour of not wearing bike helmets, and a timely metaphor for corporate lawyers (bankers too?): "I think of money as a system of rivers and tributaries flowing through the population [...] even a mediocre corporate lawyer can expect the money to pour in by the tens of thousands of dollars, camped as he is by the Amazon".

Trefethen's thoughts on mathematics will probably be the highlight for most readers. One of my favourite cards considers the similarity between mathematical precision and literary ambiguity. I also, even as a pure mathematician, appreciated his analogy between classical/rock music and pure/applied maths: "classical music and pure mathematics get trapped in their own history, their own self-awareness, their own high standards", concluding "it is the rockers and rollers in both fields, looser and sloppier but with their heads properly attached, who do much of what's really important".

You will enjoy this book on your coffee table, so long as you understand beforehand what you are reading. Do not read it as an autobiography. Trefethen, at least as he presents himself, follows a geodesic from determined and high-performing adolescent (at the age of 14 he writes "I cannot bear the idea of going through life without being the most effective person who ever lived") to determined and high-performing academic. Also do not read this book intending to agree at every turn. Trefethen himself admits "I've never had a conversation with Nick Trefethen, but I'm guessing I might not like him so much". Whether you like him or not, most of his *Index Cards* will leave you with something to think about.

Vince Vatter
University of Florida

TENET

by Lorne Campbell and Sandy Grierson
directed by Lorne Campbell; Gate Theatre, Notting Hill, London, May 2012

The playwright Lorne Campbell had wanted to write a play about Évariste Galois ever since reading about him ten years ago, but "whenever I tried to turn the story into a show it would either veer into mawkish sentimentality or sound completely overwrought with meaning in the works possible way." But in collaboration with Sandy Grierson – astonishingly, introducing Julian Assange was the key – and the result was Tenet, *A True Story About the Revolutionary Politics of Telling the Truth as Edited by Someone Who is Not Julian Assange in Any Literal Sense,* presented by Greyscale Theatre at the Gate Theatre in London during May.

This turned out to be an astonishing night at the theatre, with sensational performances by the two actors, Lucy Ellinson as Assange and Jon Foster as Galois. There was a lot of mathematics in the play, and it was presented intelligently and accurately, but there was much more to the play than that.

Galois's concern is pure, abstract, mathematical truth: if humans had never lived, then Galois's mathematical structures would still exist (or so many of us like to believe). Assange is concerned with revealing the truth about the very human world around us. But the personal circumstances of both are extremely murky. We don't know why Galois fought the duel in which he died (indeed, it has apparently been suggested that there never was such a duel) and what we do or do not know about Assange is equally complicated.

So the parallels are fascinating: two revolutionaries, fighting for truth where truth is very slippery. Having gone to the theatre out of curiosity, expecting (to be frank) at best an interesting failure, I found this to be an exceptionally rich experience, leaving the audience with much to think about regarding politics, mathematics and truth. I was fortunate that on the evening I went, there was a post-performance discussion with Peter Neumann, whose insights and good humour added to the occasion.

It is rare for theatre to explore mathematics so provocatively. I very much hope that there will be further opportunities to see *Tenet:* I certainly want to see it again!

Tony Mann
University of Greenwich

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/content/calendar).

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

JULY 2012

2-3 Numerical Linear Algebra, Control Theory and Data Assimilation Conference, Reading (414)
2-3 Branes, Supergravity and M-Theory Conference, Cambridge (414)
2-6 Applied and Computational Topology ICMS Workshop, Edinburgh (415)
2-7 6th European Congress of Mathematics, Kraków, Poland (409)
2-7 Interactions of Birational Geometry with Other Fields LMS Durham Symposium, Durham (413)
3 LMS Meeting, 6ECM, Kraków (415)
8-15 ICME12, Seoul, Korea
9-11 15th Galway Topology Colloquium, Oxford (414)
9-12 Postgraduate Group Theory Conference, York (415)
9-13 Additive Combinatorics in Paris 2012 Conference, Paris, France (409)
9-17 Grand Biological Challenges for Mathematicians LMS Durham Symposium, Durham (413)
12-13 CETL-MSOR Conference 2012, Sheffield (414)
12-18 Logic Colloquium 2012, Manchester (415)
16-20 Cubical Complexes and Applications ICMS Workshop, Edinburgh (415)
23-27 Topological Fluid Dynamics IUTAM Symposium, INI, Cambridge (414)
23-27 Probability at Warwick Young Researchers Workshop, Warwick (414)
23-27 Enhancing Mathematics Research in African Universities through International Collaboration Meeting, Strathmore University, Nairobi, Kenya (414)
25 Infinite Combinatorics 2012, LSE, London
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

15-17 Postgraduate Combinatorial Conference, Warwick (415)
20-24 Finite Groups, Representations and Related Topics, Oxford (416)
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)
29-31 Physics and Computation 2012 Workshop, Swansea University (415)

SEPTEMBER 2012

1-3 International Pure Mathematical Conference 2012, Islamabad, Pakistan (412)
3 LMS Midlands Regional Meeting, Aberystwyth (416)
3 Function Theory Meeting, De Morgan House, London (416)
3-7 Quantum Probabilistic Symmetries Workshop, Aberystwyth (416)
3-7 Topological Aspects of DNA Function and Protein Folding INI Workshop, Cambridge (412)
3-7 Geometry, Mechanics and Control Ibero-american Meeting, Salamanca, Spain
3-7 String Theory and Arithmetic Geometry Heilbronn Workshop, Bristol (415)
4-9 British Science Festival, Aberdeen (416)
5-7 Stochastic Methods and Nonlinear PDEs, Cardiff
6-8 British Topology Meeting, Cambridge (415)
6-8 Future Directions for Quantum Groups Conference, Lancaster (414)
7-12 Stochastic and PDE Methods in Financial Mathematics Workshop, Armenia
10-12 Numerical Linear Algebra and Optimisation 3rd IMA Conference, Birmingham (416)
10-13 Nonlinear PDE Conference, Oxford (416)
10-14 Stochastic Partial Differential Equations INI Workshop, Cambridge (415)
12-14 Lattices and Relations Workshop, Amsterdam (415)
12-14 Nonlinear Waves in Fluids Conference, Loughborough (415)
14-15 Free Surface and Interface Problems Workshop, Oxford (414)
15-16 Mathematicians and their Gods, Oxford (415)
17-19 Mathematics of Medical Devices and Surgical Procedures IMA Conference, University College London (416)
19-22 Topological Solitons Conference, Cambridge (412)
20-21 Heilbronn Annual Conference, Bristol (415)
22 De Morgan House Open Day, London (416)
24-28 Categorical Methods in Representation Theory Conference/Workshop, Bristol (415)
26 LMS Popular Lectures, Birmingham (416)
27-30 Mathematics of John Thompson, CMS
27-30 Finite Groups and Related Topics Conference (415)

OCTOBER 2012

1 LMS South-West and South Wales Regional Meeting, Bristol (415)
1-3 *L*-Functions of Curves Workshop, Bristol (415)
3-6 International Conference on Applied and Computational Mathematics, Ankara, Turkey
15-19 Tangled Magnetic Fields in Astro- and Plasma Physics INI Satellite Meeting, ICMS Edinburgh (415)
22-25 Weather and Climate Prediction on Next Generation Supercomputers INI Satellite Meeting, Met Office (413)

NOVEMBER 2012

16 LMS AGM, London
24 Early Career Mathematicians' Autumn Conference, University of Greenwich (416)
26-30 Algebraic Geometry, Modular Forms and Applications to Physics ICMS Workshop, Edinburgh (415)

DECEMBER 2012

3-7 Quantized Flux in Tightly Knotted and Linked Systems INI Workshop, Cambridge (416)
15-17 Thomas Harriot Seminar, St Chad's College, Durham (412)
17-20 Mathematics in Signal Processing 9th IMA International Conference, Austin Court, Birmingham (416)

MARCH 2013

1 LMS Mary Cartwright Lecture, London
18 LMS Northern Regional Meeting, Newcastle
25-27 Quantitative Modelling in the Management of Health and Social Care 7th IMA Conference, Central London (416)
25-28 BMC 2013, Sheffield

APRIL 2013

8-9 Mathematics in Finance IMA Conference, Heriot-Watt University (416)

JULY 2013

1-2 Bifurcation Theory, Numerical Linear Algebra and Applications, Bath
5 LMS Meeting, London
1-4 Dense Granular Flows 2nd IMA Conference, Isaac Newton Institute, Cambridge (416)

AUGUST 2013

3-11 Groups St Andrews 2013, St Andrews (410)

LMS Poincaré Day Meeting
Saturday 19 May 2012

(left to right) Speakers: John Stillwell, June Barrow-Green, Gerhard Heinzmann, Philippe Nabonnand (Poincaré Archivist), Jeremy Gray, Graeme Segal (LMS President), Serge Plattard (Science and Technology Counsellor, French Embassy), Scott Walter

Exhibition of the Poincaré Archives from the Poincaré Archives, University of Nancy