LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 440 October 2014

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NEWSLETTER ONLINE:
newsletter.lms.ac.uk

FIRST WOMAN TO RECEIVE A FIELDS MEDAL

Maryam Mirzakhani from Stanford University has become the first woman to receive a Fields Medal in its nearly 80 year history. Professor Mirzakhani was presented with her medal by the President of South Korea, Park Geun-hye, at the opening ceremony of this year's International Congress of Mathematicians held in Seoul from 13 to 21 August 2014. She received the award for her 'outstanding contributions to the dynamics and geometry of Riemann surfaces and their moduli spaces'. In essence for her contributions to the fields of topology, geometry, and dynamical systems.

Most recently, Mirzakhani and her co-workers produced the long sought-after proof of the conjecture that – while the closure of a real geodesic in moduli space can be a fractal cobweb, defying classification – the closure of a complex geodesic is always an algebraic subvariety.

Mirzakhani was born in Tehran in 1977 and obtained her BSc in Mathematics (1999) from the Sharif University of Technology. She then moved to the US to begin her doctorate work with Curtis McMullen at Harvard University, where she received her PhD in 2004. From 2004 to 2008 she was a Clay Mathematics Institute Research Fellow and an assistant professor at Princeton University. She has been a professor of mathematics at Stanford since 2008.

Photo courtesy of Maryam Mirzakhani

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While she dreamed of being a writer as a young girl, she chose to follow through her passion for solving mathematical problems.

She hopes her award will motivate young girls to pursue STEM subjects. 'I will be happy if it encourages young female scientists and mathematicians' Mirzakhani told the Stanford website. 'I am sure there will be many more women winning this kind of award in coming years'.

The London Mathematical Society is committed to addressing the issues faced by women in mathematics through its Women in Mathematics Committee and has led the way in providing support and guidance on these issues. This work has become increasingly high profile following the launch at the House of Commons in 2013 of the LMS report *Advancing Women in Mathematics: Good Practice in UK University Departments* (www.blitzadv.co.uk/LMS-BTL-17Report.pdf) and the most recent LMS Women in Maths Day was heavily oversubscribed.

Professor Gwyneth Stallard, Chair, LMS Women in Mathematics Committee, commented; 'The award of the Fields medal to Maryam Mirzakhani marks a turning point in the history of women in mathematics. I was thrilled to hear of the award and fascinated by the story of her life so far (tinyurl.com/mdrwcez) which is truly inspirational'.

ANNUAL LMS SUBSCRIPTION 2014-15

Members are reminded that their annual subscription, including payment for publications, for the period November 2014 - October 2015 is due on **1 November 2014** and should be paid no later than 1 December 2014.

In September, the Society sent a reminder to all members to renew their subscription for 2014-15. If you have not received a reminder, please email membership@lms.ac.uk.

Further information about subscription rates for 2014-15 and a subscription form may also be found on the Society's website: www.lms.ac.uk/content/paying-your-subscription.

The Society encourages payment by direct debit. If you do not already pay by this method and would like to set up a direct debit (this requires a UK bank account), please visit the LMS website to download the direct debit mandate form: www.lms.ac.uk/sites/default/files/Membership/ Direct%20Debit%20Form.pdf.

The Society also accepts payment by cheque or credit/debit card.

Elizabeth Fisher
Membership & Activities Officer

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GRACE CHISHOLM YOUNG FELLOWSHIP

Three New Fellows

The London Mathematical Society is pleased to announce the awards of three new Grace Chisholm Young Fellowships:

Dr Shabnam Beheshti will undertake a Fellowship at Queen Mary, University of London. Her primary research involves systematic investigation of integrability and dressing of harmonic maps, admitting elegant connections between differential geometry and relativity (e.g. chiral field models and nonlinear sigma-models). It is her aim to eventually create a niche interdisciplinary research group at the interface of Analysis and PDEs with Combinatorics, General Relativity and Fluid Dynamics.

Dr Ye Sle Cha will undertake a Fellowship at the University of Oxford. She will be conducting research under the guidance of Dr Qian Wang and the PDE group of the Mathematical Institute. She is also planning to teach some courses related to her field, geometric analysis.

Dr Cristina Sargent will undertake a Fellowship at Imperial College London. She will be working with Professor John Elgin on developing a mathematical representation of the electromagnetic field in media with doubly negative refractive index. She also plans to develop some of her computational abilities and learn/become more familiar with additional scientific programming languages.

The Fellowship offers support to mathematicians when their mathematical career is interrupted by family responsibilities, relocation of partner or other similar circumstances. As well as providing a small grant and making possible some continuous mathematical activity, the Fellowship aims to give endorsement of the holder's status as a mathematician and to afford them a meaningful connection with an institution. This enables the Fellow to be in a much better position to apply for posts when circumstances allow.

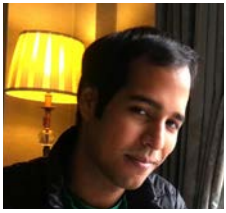
Further information on the Grace Chisholm Young Fellowships and how to apply can be found on the website: lms.ac.uk/grants/grace-chisholm-young-fellowships. Often the people who would most benefit from the Fellowship are outside the usual means of communicating the availability of such grants, so the Women in Mathematics Committee very much welcomes members sharing information about the scheme with anyone who might be eligible. The Society is delighted to have awarded three Fellowships and wishes the Fellows the best of luck in their research.

150TH ANNIVERSARY POSTDOCTORAL MOBILITY GRANTS

The first ever round of awards under the Society's 150th Anniversary Postdoctoral Mobility Grants has been announced. Fourteen grants have been awarded by the Society's Research Meetings Committee for the academic year 2014-15 to UK-based early career researchers to visit institutions ranging across the UK, Europe and USA. The grants are intended to support promising researchers during the transitional period between having submitted

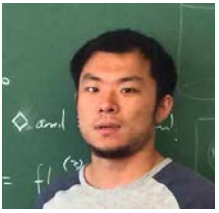
their PhD and the start of their first post-doctoral employment. The inaugural round of the scheme, implemented by the Society as one of the many activities that will be celebrating the Society's 150th Anniversary in 2015, received a significant number of high-quality applications.

Marc Briant
(University of Cambridge)
Visiting: Brown University



Alonso Castillo-Ramirez
(Imperial College London)
Visiting: Universidad de Zaragoza

Eugenio Gianelli
(Royal Holloway)
Visiting: Technische Universität Kaiserslautern



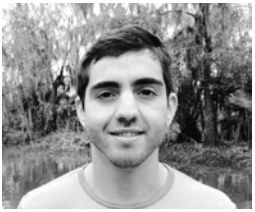
Zhenlin Guo
(University of Dundee)
Visiting: University of California, Irvine

César Lecoutre
(University of Kent)
Visiting: University of Edinburgh and University of Glasgow

Arnaud Lionnet
(University of Oxford)
Visiting: University of Edinburgh, Humboldt-Universitat zu Berlin and Weierstrass Institute

Andrew McDowell
(Royal Holloway)
Visiting: Carnegie Mellon University

Alasdair Routh
(University of Cambridge)
Visiting: University of Groningen



Liron Speyer
(Queen Mary, University of London)
Visiting: University of East Anglia

Efthymios Sofos
(University of Bristol)
Visiting: University of Göttingen

Stephen Tate
(University of Warwick)
Visiting: University of Sussex

Adam Thomas
(Imperial College London)
Visiting: University of Cambridge

Jan Vonk
(University of Oxford)
Visiting: University of Chicago

Polina Vytnova
(University of Warwick)
Visiting: Imperial College London

2014 ELECTIONS TO COUNCIL AND NOMINATING COMMITTEE

LMS members will be contacted directly by the Electoral Reform Society (ERS), who will send out the election material for the 2014 elections to Council and Nominating Committee. This year, all LMS members registered for electronic communication will receive an online ballot only, though may subsequently request a paper ballot if so desired.

In advance of this, an email will be sent by the Society to all members who are registered for electronic communication informing them that they can expect to shortly receive some election correspondence from the ERS.

Those not registered to receive email correspondence will receive all communications in paper format, both from the Society and from the ERS. Members should check their post/email regularly in October for communications regarding the elections.

With respect to the election itself, there are 10 candidates proposed for six vacancies for Member-at-Large. One candidate has been nominated for the role of Member-at-Large (Librarian). Four candidates have been proposed for two vacancies in the membership of Nominating Committee. The slates and candidate biographies for the election can be found on the LMS website at www.lms.ac.uk/about/council/lms-elections.

For both electronic and postal voting the deadline for receipt of votes is **Thursday 6 November**.

Members may like to note that an LMS Election blog, moderated by the Scrutineers, can be found at: http://discussions.lms.ac.uk/elections2014/.

Future elections

Members are invited to make suggestions for future nominees for election to Council. These should be addressed to Dr Penny Davies, Chair of the Nominating Committee (nominations@lms.ac.uk). Members may also make direct nominations: details will be published in the March 2015 *Newsletter* or are available from Duncan Turton at the LMS (duncan.turton@lms.ac.uk).

MENTORING AFRICAN RESEARCH IN MATHEMATICS

Four Awards

The London Mathematical Society is pleased to announce awards made in association with the IMU and AMMSI under the fourth round of the Mentoring African Research in Mathematics (MARM) programme. The aim of the programme is to enable all mathematicians in Africa to pursue academic careers of the highest standard by enhancing and developing academic research and research institutions in Africa, ultimately helping to ensure that pursuing world-class mathematical careers within Africa will be both achievable and a more attractive opportunity than moving permanently to the developed world. To achieve this MARM provides funding for professional mentoring partnerships between African mathematicians and their European counterparts.

Partnerships receive funding for a two-year project. The recently awarded partnerships have been made to the following:

Dr Panagiotis Besbeas from the Athens University of Economics and Business will be mentor to the Department of Statistical Sciences at the University of Cape Town, for a project led by Dr Res Altwegg. The partnership plans to work on Integrated Population Modelling and will undertake activities including workshop sessions, collaborative research and mentoring.

Professor Michael Dritschel from Newcastle University will be working with

the Department of Mathematics at University Mohammed V-Agdal in Rabat, Morocco, with Professor Omar El Fallah and Professor Nouzha El Yacoubi. The partnership will initially focus on delivering Masters level lectures and providing research internships particularly around Operator Theory and Function Theory.

Professor Balázs Szendrői from the University of Oxford will be working with Dr Damian Maingi at the University of Nairobi's School of Mathematics. The partnership aims to strengthen research in Algebraic Geometry within the Geometry Group and plans a number of activities including working with Masters level projects, specialised talks and mentoring and co-supervision.

Professor Alain Yger from the Université de Bordeaux is partnered with the Department of Mathematics at Marien Ngouabi University, Brazzaville, Congo, with Dr Basile Bossoto. The partnership initially plans to deliver courses on Algebraic and Complex Geometry integrated into the Masters programme with a view to exploring various possible future research directions.

There have now been 17 partnerships funded to date in Cameroon, Congo, Ethiopia, Ghana, Ivory Coast, Kenya, Morocco, Nigeria, Rwanda, South Africa, Tanzania and Uganda. MARM was recently showcased at the Mentoring Emerging Nations: Achievements and Opportunities (MENAO) Symposium at the International Congress of Mathematicians 2015. The Society is actively seeking further sponsorship to build upon the extensive work and successes already achieved by the programme.

ANNUAL GENERAL MEETING

The Annual General Meeting of the Society will be held at 3.00 pm on Friday 14 November 2014 in the Jeffrey Hall at the Institute of Education, 20 Bedford Way, London, WC1H 0AL.

The business shall be:

1. Elections to Council and Nominating Committee
2. Review of Society Activities 2013-14
3. Report of the Treasurer
4. Resolutions
   a. Adoption of the Trustees' Report 2013-14
   b. Appointment of the Auditors
5. Presentation of Certificates to the 2014 LMS Prize Winners

It is hoped that as many members as possible will be able to attend. The Annual General Meeting will be followed by a Society Meeting (see page 11).

Fiona Nixon, Executive Secretary

BSHM NEUMANN BOOK PRIZE

The British Society for the History of Mathematics (BSHM) is pleased to announce the biennial Neumann Prize for 2015. The prize is awarded for a book in English (including books in translation) containing historical material and aimed at a non-specialist readership and published in 2013 or later. The prize is named in honour of Peter M. Neumann, OBE, a former President and longstanding contributor to the Society. The value of the prize is £600.

Nominations for the prize are invited from individuals and publishers. Nominations should be sent to the chair of the judging panel, Martin Perkins, at martin@perkinstowers.freeserve.co.uk. Publishers should send three copies of their nominated book(s) to Martin Perkins, Chair, BSHM Neumann Prize Panel, 5 Tower Road, Orpington, Kent BR6 0SG, United Kingdom.

ANNOUNCEMENT

The LMS Council regrets to announce that Professor Rob Wilson has stepped down as LMS Programme Secretary for health reasons. In addition to his role as Programme Secretary, which he has held since 2011, Professor Wilson has also been an active member of the LMS Council from 2009-2014, a member of the Finance & General Purposes Committee, a member of the Website Working Group, and has previously acted as Council Webmaster.

During his term as LMS Programme Secretary, Professor Wilson has overseen the comprehensive increase of the maximum awards of the Society's Scheme Grants, the establishment of the Aitken Lectureship (in partnership with the New Zealand Mathematical Society), and the preparation of various activities to celebrate the Society's 150th Anniversary in 2015. He has also represented the Society at numerous Society Meetings across the UK and abroad, in particular the 6ECM in Krakow and the ICM2014 in Seoul.

The Council, on behalf of the Society and the wider UK mathematical community, extends its sincere thanks to Professor Wilson for his hard work and dedication to the Society over the years and wishes him well for the future.

Professor Terry Lyons
President, LMS

150TH ANNIVERSARY
LMS NORTHERN REGIONAL MEETING

Department of Mathematics and Statistics, Lancaster University

7 April 2015

2.00 pm	Opening of the meeting
	Peter Neumann (Oxford)
3.00 pm	**Dennis Sullivan** (SUNY, Stony Brook)
4.00 pm	Tea/Coffee
4.30 pm	**Ieke Moerdijk** (Radboud University Nijmegen/ Sheffield)
6.00 pm	Reception and Dinner

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 and to register and to reserve a place at the dinner, visit the website at www.lancaster.ac.uk/maths/research/homotopical/

The cost of the dinner will be approximately £30, including drinks.

The meeting forms part of a workshop on ***Homotopical Algebra and Geometry*** from 7 - 11 April 2015. The speakers at the workshop include: D.-C. Cisinski, V. Ginzburg, M. Gross, I. Grojnowski, V. Hinich, D. Joyce, A. King and M. Livernet. For further details visit the website above or contact the organiser (j.grabowski@lancaster.ac.uk).

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.

INTERNATIONAL CENTRE FOR MATHEMATICAL SCIENCES

David Abrahams

Scientific Director
This month, after four years in the role, Keith Ball, University of Warwick, steps down as Scientific Director of ICMS and the director ship passes to David Abrahams, University of Manchester.

Call for ICMS workshop proposals
Proposals are invited for workshops to be held at ICMS in Edinburgh in 2016 and beyond.

The Programme Committee will consider workshop proposals twice per year. Proposals should be received by 31 October 2014 or by 31 March 2015.

Successful applicants will be offered a funding package to contribute to the travel and accommodation of a proportion of the participants. ICMS staff will undertake all non-scientific administration connected with the workshop. Potential organisers should contact ICMS to discuss ideas and timetables before submitting a firm proposal.

ICMS particularly welcomes proposals for workshops in rapidly developing and newly emerging areas where there is a need to evaluate new developments quickly.

We aim to include appropriate Knowledge Transfer (KT) activities in as many ICMS workshops as possible. These need not be fully formed in the submitted proposal. Once a workshop is part of the ICMS programme, our KT Officer will work with the organisers to create specific activities for individual workshops. These early discussions are the key to ensuring each workshop has the opportunity for the optimum KT. By tailoring the approach to each workshop, ICMS has enjoyed a varied KT programme in recent years. This has included, industry-led problem sessions, cross-discipline workshops, lots of opportunities for PhD students and early career researchers to engage with the wider community as well as a range of innovative public outreach activities.

For full details of how to submit a proposal please see the ICMS webpages at: www.icms.org.uk/proposals/currentcall

Buildings alterations
We are soon to be joined in 15 South College Street by two groups from The University of Edinburgh, School of Informatics and also by the Maxwell Institute Graduate School in Analysis and its Applications (MIGSAA). Bringing new groups into the building means that the way the space is used is changing.

Whilst building works take place, ICMS will not be able to host any meetings from October to the end of 2014. A new seminar room and dining area for events will be created on the ground floor. This will be ready by January 2015. The lecture theatre will stay as it is but will be used by the MIGSAA until their facilities are ready in January 2015.

When the work is completed we will have a flexible facility for hosting events. We look forward to welcoming you to our new-look facilities in 2015

Office staff
At the time of writing, we are in the midst of recruiting a part-time conference co-ordinator and a full-time receptionist/finance clerk. Our new team members will join us in the autumn.

Madeleine Shepherd
Communications Officer, ICMS

MATHEMATICS POLICY ROUND-UP

September 2014

RESEARCH

EPSRC Strategic Plan
A draft of the updated *Strategic Plan* is available and views have been sought. More information and a copy of the draft plan are available at www.epsrc.ac.uk/newsevents/news/strategicplaninput1.

SCHOOLS AND COLLEGES

Mathematics maintains its increased popularity
The number of A-level mathematics entries across the UK is marginally up by 0.9% on last year, with 88,816 students sitting the exam. Figures released by the Joint Council for Qualifications also show that:

- A-level further mathematics has maintained popularity, with entries increasing by 1.5% (to 14,028)
- AS mathematics entries increased by 7.2% (to 161,711)
- AS further mathematics entries have increased by 8.5% (to 24,530).

Developing maths teachers of the future
The government has launched a scheme to help raise maths standards of young people and adults by investing in the teachers of the future. The initiative will see further education colleges and providers given grants to support training of maths graduates employed to teach the subject at GCSE level and above.

The initiative is specifically designed to help colleges and providers with the training of graduate maths teachers who are completing their teaching qualifications while working in the classroom, reflecting the further education sector's preferred method of training new recruits while they teach. Colleges and training providers will be able to apply for a payment of £20,000 per graduate trainee and will be given the freedom and flexibility to provide the support and training that best meets the needs of each graduate.

More information is available at tinyurl.com/n6hkxgo.

Dr John Johnston
Joint Promotion of Mathematics

CECIL KING TRAVEL SCHOLARSHIP 2014

The 2014 Cecil King Travel Scholarship was won by **Jack Shotton** of Imperial College London. Jack will be using the scholarship to visit the University of Chicago in autumn 2014. In Chicago he will work with Professor Matthew Emerton, a renowned figure in the study of arithmetic aspects of the Langlands program and Shimura varieties. Specifically he will work on the interpolation of the local Langlands correspondence in p-adic families, conjectured by Emerton and David Helm. The local Langlands correspondence is a bijection between certain representations of two groups which is important in number theory, playing a role in the conjectural association of automorphic representations to Galois representations (the global Langlands correspondence).

LMS ANNUAL GENERAL MEETING

14 November 2014

3.00 – 6.00 pm

Jeffrey Hall, Institute of Education

20 Bedford Way, London WC1H 0AL. (Nearest tube: Russell Square)

Programme

Annual General Meeting

Brian Davies (King's College, London)

Tea/Coffee

Announcement of Election Results

Nick Trefethen (Oxford)
Naylor Lecture

The meeting will include the presentation of certificates to the LMS Prize-winners in 2014.

The meeting will be followed by a reception at De Morgan House, Russell Square, and the Society's Annual Dinner at the Montague Hotel, 15 Montague Street, London, WC1B 5BJ. The cost to attend the dinner will be £53 per person.

Those wishing to attend the dinner should contact Carol Chessis (AnnualDinner_RSVP@lms.ac.uk) by **Monday 3 November**.

For further details about the AGM, please contact Elizabeth Fisher (lmsmeetings@lms.ac.uk).

ZEEMAN MEDAL WINNER - MARCUS DU SAUTOY

The IMA and LMS are pleased to announce the award of the 2014 Christopher Zeeman Medal to Marcus du Sautoy of the University of Oxford for his contributions to the public understanding of the mathematical sciences.

Marcus du Sautoy has, since 2008, held the Charles Simonyi Chair for the Public Understanding of Science at the University of Oxford. In fact he has been communicating mathematics to the general public for more than 20 years with considerable intensity and impact. Of particular note is his talent for engaging young people and inspiring them to follow mathematics.

His emphasis is to show the beauty of mathematics to wide audiences. This proves to be a powerful motivator for many people, young and old alike. Marcus has used all kinds of media to promote mathematics including appearing on and presenting radio and TV programmes, writing popular books and contributing to theatrical productions. He has shown particular skill in finding ways of explaining concepts of mathematics to audiences without specialist knowledge and who often believe the mathematical sciences are something for experts alone. Examples are programmes such as *School of Hard Sums* and *TalkSport* as well as news programmes on the World Service, BBC Radio 4, 5 Live and local radio. In 2006 Marcus become only the third mathematician to deliver the Royal Institution Christmas Lectures, which were widely regarded as exceptional.

Marcus has a particular talent for music and the creative arts. He took part in the *Maestro at the Opera* series on BBC2 in 2012. Though not about mathematics this appearance demonstrated to the viewing public that mathematicians have broad interests and talents. His play *X&Y* which grew out of his collaboration with Complicité Theatre Company's production of *A Disappearing Number* is an illuminating, thrilling work of theatre with mathematics genuinely at its core. His work with audiences exploring the mathematics in Mozart's *Magic Flute* is similarly remarkable as a piece of mathematical communication.

Marcus's popular books have also been exceptionally well-received and have brought mathematics to wide audiences. His *The Music of the Primes* has been translated into 11 languages and sold more than 100,000 copies.

In addition to his work with public engagement Marcus has had a distinguished research career in the mathematical sciences, which has been marked by invitations to lecture at high profile international conferences, publication in leading journals and prestigious prizes. His academic research has straddled many areas of mathematics including group theory, number theory, model theory and algebraic geometry, with a primary focus on zeta functions of groups, functions first introduced by Grunewald, Segal and Smith in 1988. Marcus's research has transformed the study of these zeta functions, revealing hidden depths and unexpected applications.

LONDON MATHEMATICAL SOCIETY
GOOD PRACTICE SCHEME

GOOD PRACTICE SCHEME WORKSHOP

21 October 2014

Registration is now open for a Good Practice Scheme Workshop to be held on Tuesday 21 October 2014 in London.

The workshop will provide individuals and departments with knowledge and tools they can use to improve recruitment and retention of women in mathematics. This may include making an application for Athena SWAN status. This workshop will particularly focus on 'Unconscious Bias' with a training session provided by the Equality Challenge Unit.

Participants will:

- participate in an 'Unconscious Bias' training session, with the intention of learning the skills and accessing materials that can be used to deliver sessions within their own departments
- hear about how the LMS Good Practice Scheme can support departments working towards recruiting and retaining more women in mathematics
- hear from departments already engaged in the process of applying for Athena SWAN status
- make useful contacts with other departments active in promoting the careers of women in mathematics

To register for the workshop please email womeninmaths@lms.ac.uk by **14 October 2014** (attendance is free, but numbers are required for catering purposes).

The workshop will be held at De Morgan House, 57-58 Russell Square, London WC1B 4HS starting at 11 am. Full timings will be confirmed at a later date. Visit the website at www.lms.ac.uk/women/good-practice-scheme-events.

The LMS report ***Advancing women in mathematics: good practice in UK university departments*** is available to download from www.lms.ac.uk/women-mathematics.

RECORDS OF PROCEEDINGS AT LMS MEETINGS

GENERAL MEETING

held on *4 July 2014* at BMA House, London. Over 60 members and visitors were present for all or part of the meeting.

The meeting began at 3.30 pm with the President, Professor Terry Lyons, FRS, in the Chair.

Details of the proposed change to the By-laws with respect to Members-at Large of Council, (By-law I.5) had been made available to members prior the General Meeting.

The President invited members to vote to pass these resolutions. Members were asked to vote by a show of hands and the count was undertaken by the Scrutineer, Professor Saunders. The resolution was passed by more than a two-thirds majority.

On a recommendation from Council it was agreed to elect Professor Chris Lance and Professor Rodney Sharp as scrutineers in the forthcoming Council elections.

Fourteen people were elected to Ordinary Membership: Mehsin Atteya, Yemon Choi, Ibrahim El Haitami, Layal Hakim, Haslifah Hashim, Maggie Holland, Mahesh Kakde, Robert Magnus, Joanne Mason, Hakim Mezali, Vladimir Novikov, Christopher Saker, Simon Tavare, Lewis Topley.

Fifteen people were elected to Associate Membership: Ahmed Aden, Mohammad Al-Mamun, Antonietta Ambuehl, Johar Ashfaque, Florian Bouyer, Ilke Canakci, Joseph Co, Josephine French, Sam Jones, Robert Kropholler, Sam Morley, Muhammad Shafiq ur Rehman Paswal, Andrea Pizzoferrato, Petra Staynova, Kate Vokes.

One person was elected to Reciprocity Membership: Rehana Naz.

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

The President, on Council's behalf, proposed that Professor Donald Dawson, of Carleton University and McGill University, and, Professor Cheryl Praeger, of the University of Western Australia, be elected to Honorary Membership of the Society. This was approved by acclaim. The President read a short version of the citation, to be published in full in the *Bulletin*.

The President then announced the awards of the prizes for 2014:

Pólya Prize	Professor Miles Reid, FRS (University of Warwick)
Fröhlich Prize	Professor Martin Hairer, FRS (University of Warwick)
Senior Anne Bennett Prize	Professor Caroline Series (University of Warwick)
Senior Berwick Prize	Professor Daniel Freed, Professor Michael Hopkins and Professor Constantin Teleman – joint award
Whitehead Prizes	Professor Ruth Baker (University of Oxford) Dr Tom Coates (Imperial College, London) Professor Daniela Kühn and Professor Deryk Osthus (University of Birmingham) – joint award Professor Clément Mouhot (University of Cambridge)

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

The President introduced a lecture given by Professor Nina Snaith (University of Bristol) on *Random matrix theory and number theory*.

Following a break for tea, the President introduced the Hardy Lecture by Professor Percy Deift (Courant Institute, NYU) on *Universality in numerical computations with random data. Case studies.*

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

After the meeting, a reception was held at BMA House, followed by a dinner at the Number Twelve Restaurant in the Ambassador Hotel.

RECORDS OF PROCEEDINGS AT LMS MEETINGS

ORDINARY MEETING

held on *19 August 2014* during the International Congress of Mathematicians (ICM) 2014 at the COEX Conference Centre, Seoul. Over 160 members and visitors were present for all or part of the meeting.

The meeting began at 5.00 pm with the President, Professor Terry Lyons, FRS, in the Chair.

No applicants were elected to Membership.

The President introduced a lecture given by Professor Jean-Pierre Bourguignon (ERC/IHES) on *The life of a mathematician may have several sides*.

At the end of the lecture, the President thanked Professor Bourguignon for his wonderful lecture.

After the lecture, a reception was held in the Grand Ballroom (Room 102) of the COEX Conference Centre.

The President proposed a toast of thanks to the Chairman of the ICM organising committee, Professor Hyunju Park and a second toast of thanks to all who work for mathematics.

The President introduced the Charge d'Affaires from the UK Embassy in South Korea, Mr Andrew Dalgleish.

Mr Dalgleish thanked the Society for its invitation to the reception and congratulated the Fields Medal winners, in particular, Professor Martin Hairer, FRS who had become the ninth UK-based Fields Medal winner.

The President then thanked Mr Dalgleish and invited members, who had paid their first subscription, to sign the Members' Book, if they had not already done so.

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

The President then closed the meeting.

THE LMS AT ICM 2014

Terry Lyons, LMS President, Martin Hairer, Fields Medallist and Andrew Dalgleish, Charge d'Affaires from the UK Embassy in South Korea

Ben Green signing the Membership Book

Shiv Kumar Gupta signing the Membership Book

Ice sculpture at the LMS reception

LMS stand

ICM 2014

Report

The 2014 International Congress of Mathematicians (ICM) began on 13 August 2014 at the COEX Convention Centre in Seoul, South Korea, where an estimated 5,000 mathematicians from all over the world came together to celebrate, share and reflect on the last four years of their mathematical works.

The first day began with the award of the 2014 Fields Medals. The winners included Martin Hairer from the University of Warwick, and Maryam Mirzakhani from Stanford University, who is the first female Field Medallist since the awards started in 1936. I have to say that the special lecture entitled *Rational points on elliptic and hyperelliptic curves* given by one of the Field Medallists, Manjul Bhargava from Princeton University, was amongst the best talks at the Congress, after which I am sure almost all the audience was suddenly interested in and had an urge to know more about this area of research. The Abel Lecture by John Milnor from Stony Brook University, entitled *Topology through four centuries*, was another highlight of the Congress; the audience wished the talk could have lasted longer! He was surrounded by enthusiasts, old and young ones alike, soon after his talk had finished, and at the end he had to be rescued from his devoted fans. In total, 19 Plenary Lectures were given during the Congress, along with 58 Invited Section Lectures and 232 Short Talks in various areas of mathematics, where the audience had an opportunity to be engaged, stimulated and inspired by beautiful insights, ideas and developments in our world-wide mathematical community. In my case, two of those Plenary Lectures were especially memorable: one was entitled *Mori geometry meets Cartan geometry* given by Jun-Muk Hwang from KIAS, and the other one was *Random geometry on the sphere* given by Jean-François Le Gall from Université Paris-Sud; somehow theses lectures also revived my memories, how much I had enjoyed geometry at school.

During the nine-day event, our sense of belonging to the wider mathematical community as a whole had grown, and our shared joy and hardship in mathematical research had started to shine through each one of us. Getting together at one of the biggest international mathematical events benefits not only current mathematicians, but also future generations of mathematicians and beyond. There were many exhibitions, talks and events concerning mathematical education, and perspectives for the future. Numerous school pupils enjoyed and participated in several of these, and I even witnessed a young schoolboy taking careful notes during one of the public lectures; I had the impression that mathematics is a very popular subject to study at school in South Korea.

On Tuesday 19 August the London Mathematical Society Meeting took place in the COEX Grand Ballroom, with a talk entitled *The life of a mathematician has several sides* given by Jean-Pierre Bourguignon. The Society Meeting was followed by the Reception, where members had the opportunity to sign the Members' Book, which dates back to 1865. I was overwhelmed when I found the signature of Frank Adams, my mathematical grandfather, in the Book! My time at the Seoul ICM taught me how wonderful it is to be a part of the world-wide mathematical community, and allowed me to talk with experienced people I would not normally meet, about my project and its future directions. I am grateful that I was able to take part in sharing recent mathematical progress, and in learning how precious it is to grow together in search of mathematical truth.

As a PhD student, this was my first ICM, and I was lucky enough to be given the opportunity to contribute a short talk about my work. My visit was mainly funded by the London Mathematical Society and EPSRC, and the whole experience was like 'my dreams come true!' Meeting, talking and listening to the international experts in various areas of mathematics deepened my love of mathematics and widened my perspectives of mathematical research.

Yumi Boote
PhD student at the University of Manchester

ICWM 2014

Report

The second International Congress of Women Mathematicians (ICWM) took place in Seoul, Korea, on 12 and 14 August 2014, just before and simultaneously to the ICM in Seoul. There were 52 countries represented in the registration and 97 contributed posters. The program included seven plenary talks, a special lecture by IMU President Ingrid Daubechies on *Image and signal analysis to build tools for art conservation and art history*, a workshop on geometric constructions of mosaic designs, and a panel discussion on the topic *Mathematics and women: Different regions, similar struggles*. The meeting concluded with a 'networking' banquet to which were invited talented Korean female high school students who have shown an interest in mathematics; they were given the opportunity to spend time with professional mathematicians, and discuss their own aspirations and learn about the career paths of some women mathematicians.

The first day of the meeting was held at Ewha Womans University, the largest women's university in the world (boasting a student body of over 20,000 students). The campus is quite beautiful and the buildings and grounds are architecturally impressive. The second day of the meeting was at the COEX Conference Centre, where the ICM was held, running parallel to the afternoon session of ICM invited lectures. In between these two days, the opening ceremony of the ICM was held, and the recognition of Maryam Mirzakhani's work by the attribution of a Fields Medal gave a feeling of special significance to this year's event. The seven plenary lectures over the two days covered a wide range of topics and were given

Attendees at the ICWM 2014

by mathematicians at various stages in their careers. They were given by:

- Donna Testerman (EPF Lausanne) *Semisimple groups: Subgroup structure and representation theory*
- Hee Oh (Yale) *Apollonian circle packings: Dynamics and number theory*
- Gabriella Tarantello (Tor Vergata, Rome) *Analytical, geometrical and topological aspects in the study of Chern-Simon vortices*
- Laura Demarco (Northwestern, Illinois) *Complex and arithmetic dynamics in dimension 1*
- Motoko Kotani (AIMR, Tohoku, Japan) *Mathematical challenges for structural understanding of materials*
- Jaya Iyer (Institute for Mathematical Sciences, Chennai, India) *Invariants of vector bundles with additional structure*
- Isabel Dotti (FAMAF-CIEM, Cordoba, Argentina) *Conformal Killing-Yano tensors on homogeneous manifolds*

Panel discussion at the ICWM 2014

At the end of the second day, Georgia Benkart gave the Emmy Noether Lecture on *Connecting the McKay correspondence and Schur-Weyl duality* at the ICM, after which the concluding banquet of the ICWM took place at the COEX.

The panel discussion was chaired by Professor Barbara Keyfitz and the members of the panel represented China, Burkina Faso, Japan, Korea, and France. Each of the panel members gave an overview of the situation of women in mathematics in their respective countries, the percentages of women at different stages in their careers, the obstacles encountered specifically by women and the mechanisms which in some cases have been put in place to encourage women to pursue careers in mathematics and to overcome the aforementioned obstacles. Members of the audience were then given the opportunity to supplement the discussion with information about their own countries or experiences; this included contributions by participants from Mexico, Germany, Kenya and Indonesia. One thing which was made evident by these presentations and discussions is that the issues affecting women in mathematics in the different countries depend in an essential way on the general economic and social situation. For example, in some places, childcare is not a problem as it is not difficult to find people who are willing to care for children; but on the other hand the general infrastructure is lacking (eg, library and computer facilities). While in other places where there are sufficient funds for infrastructure, the obstacles are the lingering stereotypes which prevent women from pursuing (scientific) careers.

The local organizing committee, chaired by Dr Sunsook Noh, launched a fund-raising drive during the months preceding the meeting in order to be able to offer travel grants to 100 attendees from developing countries. This drive was quite successful, with individual and institutional support from around the world. The meeting, at which there were about 500 attendees, was exceptionally well-organized, thanks to the local organizing committee, the Korean Women in Mathematical Sciences, and a team of student interns and volunteers.

Donna Testerman
École Polytechnique Fédérale de Lausanne

INTERNATIONAL MATHEMATICAL UNION

Report

The four-yearly General Assembly (GA) of the International Mathematical Union (IMU) was held in the Korean city of Gyeongju from 10 to 11 August 2014, just before the ICM in Seoul. The LMS is the UK's adhering organisation, and nominates five delegates (voting rights are proportional to dues paid). This year's delegates were Terry Lyons, Mihalis Dafermos, Colva Roney-Dougal, Rob Wilson and myself.

The IMU is responsible for running the ICM and appointing the committee which awards the Fields Medals and other prizes, and for a number of other programmes, including the International Commission on Mathematical Instruction, the Commission for Developing Countries CDC and the Mathematics of Planet Earth. This year's GA was, like the ICM, majestically presided by Ingrid Daubechies, IMU President.

The GA's business is fairly predictable; debate takes place elsewhere. The main business was to elect officials for the next period of four years. The nominating committee, NC, appointed by the previous IMU GA, proposed one candidate for each of the four senior posts, and the new president (Shigefumi Mori), vice-presidents (Alicia Dickenstein and Vaughan Jones) and general secretary (Helge Holden) were elected unopposed. For the six members-at-large on the Executive Committee (EC) the NC proposed eight candidates, whose CV was provided to delegates; the papers listed seven more who had been nominated by adhering organisations but not selected by the NC. For these, no CV was provided. To enable any of these seven to be included in the vote, signatures by delegates from a number of countries were required. One of the seven was re-nominated in this way during the GA, but was not in the end elected. The NC's selection is published in March, so in principal can be contested at the GA with proper preparation. In the event, we elected Benedict Gross, Hyungju Park, Christiane Rousseau, Vasudevan Srinivas, John Toland and Wendelin Werner – the last two having been proposed by the LMS. Two more of the LMS's proposed candidates were not nominated by the NC. One unfortunate result of this process is that there is no Russian representation on the EC. To my surprise, no Russian delegates attended the GA. We also elected regional members of the CDC, and officers for the other organisations for which it is responsible.

We approved a resolution from the LMS delegation (due to Terry Lyons) calling on the EC to ensure that ICMs achieve gender and geographical balance among plenary and sectional speakers and that the structure of the programme reflects the current state and development of all mathematical areas. We agreed to establish a committee to review the prize regulations. We heard an appeal from a group of Venezuelan mathematicians for intervention to protect the situation of mathematics in Venezuela: we expressed our solidarity with the Venezuelan mathematical community, and President Daubechies will write a letter on their behalf. Papua New Guinea and Senegal were admitted to the IMU. A number of countries were deprived of their voting rights due to unpaid dues, but none was expelled (yet). More details of these and other resolutions can be found at www.mathunion.org/fileadmin/IMU/Organization/GA/Resolutions/RESOL2014.pdf.

We heard a report on a visit to the IMU's new Berlin offices (its first stable home), and, last but not least, a report on a visit to Rio de Janeiro to assess the Brazilian proposal to hold the 2018 ICM there. On the basis of the report, the GA unanimously approved the proposal. Next time in Rio!

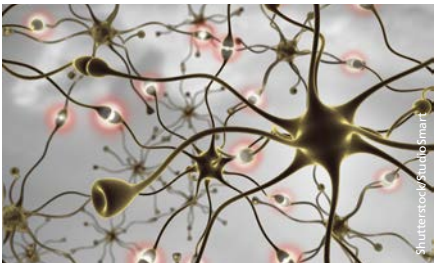
David Mond
Warwick University

The London Mathematical Society Computer Science Colloquium 2014

COMPUTATIONAL AND MATHEMATICAL MODELLING FOR IMPROVED UNDERSTANDING OF BIOLOGICAL SYSTEMS

Wednesday 29 October, 10.30 – 16.30

De Morgan House, 57-58 Russell Square, London, WC1B 4HS. (Nearest tube: Russell Square)



In recent years the development and application of computational and mathematical models of a range of processes has supported significant advances in our understanding of a wide variety of complex biological systems. The colloquium provides examples of this approach, from biological networks and biochemical signalling pathways through to models of a simple animal and of the human brain. In each case the use of techniques from mathematics and computer science allows basic questions about complex biological processes and systems to be addressed.

Luca Cardelli (Microsoft Research & University of Oxford)
Morphisms of reaction networks

Netta Cohen (University of Leeds)
Adaptive search behaviours in worms

Aldo Faisal (Imperial College, London)
From noise in the nervous system to the variability of behaviour

Jane Hillston (University of Edinburgh)
Embedding machine learning in formal stochastic models of biological processes

Full abstracts and timetable for the day can be found at:
http://www.lms.ac.uk/events/computer-science-day

The Computer Science Colloquium is part of an LMS initiative of activities at the interface between Mathematics and Computer Science.

To register, please contact Duncan Turton (computerscience@lms.ac.uk) The day is free for students and £5 for all others which is payable on the day. A sandwich lunch will be provided. Limited funds are available to help with students' travel costs. Further details are available from Duncan Turton at the Society (computerscience@lms.ac.uk).

INNER AND OUTER MODEL THEORY MEETING

Report

Andrew Brooke-Taylor (Bristol)

Modern set theory can deal with very particular questions concerning how the analyst sees the real line, and concerning applications to C^* = algebras, to ergodic theory, or to the theory of polish group actions, to give just a few examples. Also it can investigate pure problems in the subject concerning the whole universe of sets of mathematical discourse (which set theorists denote by V). The theme of this meeting was of the latter type. It was the final meeting of a 30 month EPSRC project at Bristol on Inner Models in Outer Models. This slightly convoluted title reflects the juxtaposition of the two main forces in modern pure set theory. The first, on 'inner models', was initiated in effect by Gödel in the late 1930s by defining the sub-universe of V called L, his 'constructible sets', and thereby showing the consistency of the Continuum Hypothesis and the Axiom of Choice with the other axioms of sets theory. But V may well not be L, and since the late 1970s set theorists have been at work constructing a whole spectrum of ever wider, or 'fuller', inner models generalising L that hopefully 'fill-out' V. The second force (no pun will be intended) was Cohen's 1962 method of forcing to create 'outer models' - a structure in which the continuum could have size $\aleph_2$ say.

The research project was devoted principally to investigating how Cohen's method of forcing can also be used to construct outer models in which 'inner model' structure can also occur. We should like to know how much of the regular, smooth structure of the inner models is compatible with strong axioms of infinity. To illustrate, Peter Holy (Bristol) presented results on the compatibility of the failure of certain combinatorial principles of ordinals obtained by Cohen's method, with the kind of 'condensation' or 'regularity' properties that inner models enjoy.

Mirna Dzamonja (UEA)

The meeting (supported by EPSRC as well as an LMS Conference grant) presented new results in this direction together with other contributions of research from UEA, Bonn, Torino, Prague, Kobe, and Paris. The morning of the first day concentrated on how forcing allows us to view sets of small cardinalities in different ways. Set theorists think these days that they have a good understanding of hereditarily countable sets, and the next stage is to look at those of hereditary cardinality ω_1. Forcing hypotheses are much studied as a

Daisuke Ikegami (Kobe)

method to obtain knowledge in this way and the lectures of Daisuke Ikegami (Kobe), Matteo Viale (Torino) and Philipp Lücke (Bonn) were all in this direction. Boban Velickovic (Paris) started the second day with a talk on how to arrange and simplify a radical method due to Neeman (UCLA) on *iterating* the forcing process transfinitely to obtain so-called strong forcing axioms at $\aleph_3$ which were hitherto unknown. Mirna Dzamonja (UEA) gave some global results on forcing related to universal graphs at successors of singular cardinals, and Andrew Brooke-Taylor (Bristol) on large cardinals related to Vopenka's principle.

It is expected that some of these topics will be taken up and carried further at the Set Theory session of the Isaac Newton Institute (in Mathematical, Foundational, and Computational Aspects of the Higher Infinite Autumn 2015).

The meeting was organised by Peter Holy and Philip Welch at Bristol, and was attended by graduate students in set theory from several institutions.

Philip Welch
University of Bristol

Attendees

Formal Aspects of Computing Science Specialist Group

BCS-FACS Evening Seminar
Joint event with the London Mathematical Society

Wednesday 22 October 2014, 6:00 pm

Professor Joel Ouaknine
(University of Oxford)

Decision Problems for Linear Recurrence Sequences

Linear recurrence sequences (LRS), such as the Fibonacci numbers, permeate vast areas of mathematics and computer science. In this talk, Professor Ouaknine considers three natural decision problems for LRS, namely the Skolem Problem (does a given LRS have a zero?), the Positivity Problem (are all terms of a given LRS positive?), and the Ultimate Positivity Problem (are all but finitely many terms of a given LRS positive?). Such problems (and assorted variants) have applications in a wide array of scientific areas, such as theoretical biology (analysis of L-systems, population dynamics), economics (stability of supply-and-demand equilibria in cyclical markets, multiplier-accelerator models), software verification (termination of linear programs), probabilistic model checking (reachability and approximation in Markov chains, stochastic logics), quantum computing (threshold problems for quantum automata), discrete linear dynamical systems (reachability and invariance problems), as well as combinatorics, statistical physics, formal languages, etc.

Perhaps surprisingly, the study of decision problems for LRS involves advanced techniques from a variety of mathematical fields, including analytic and algebraic number theory, Diophantine geometry, and real algebraic geometry.

The venue is the London Mathematical Society, De Morgan House 57-58 Russell Square, London WC1B 4HS. Refreshments will be available from 5.30pm.

The seminar is free of charge and open to everyone. If you would like to attend, please register at computerscience@lms.ac.uk.

LMS SOUTH WEST & SOUTH WALES REGIONAL MEETING

17 December 2014

Centre of Mathematical Sciences, Plymouth University

2:45 pm	Opening of the meeting
3:00 pm	**Rosemary Bailey** (Queen Mary and St Andrews) *Circular designs balanced for neighbours at distances one and two*
4:00 pm	Tea/Coffee
4:30 pm	**Marius van der Put** (Groningen) *Differential Galois theory*
7:00 pm	Dinner at venue TBC

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

The meeting forms part of two workshops on ***Combinatorics*** and on ***Differential Algebra*** on 18 and 19 December 2014. For further details on the meeting and workshops please visit tinyurl.com/o88aou2 or contact the organisers thomas.mccourt@plymouth.ac.uk and daniel.robertz@plymouth.ac.uk.

To register for the meeting or the dinner please contact the organisers. The cost of the dinner will be approximately £30, including drinks.

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.

DAME KATHLEEN OLLERENSHAW

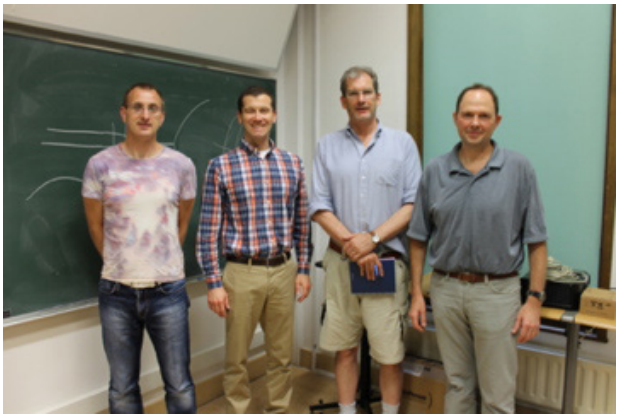
Memorial Service

A Memorial Service to celebrate the life of Dame Kathleen Ollerenshaw, former Life Member of the London Mathematical Society, distinguished mathematician and educationalist who died on 10 August 2014, will be held at Manchester Cathedral on Friday 7 November 2014 at 11.30 am. All are welcome to attend. All enquires to Albert R. Slack Ltd Funeral Directors, 84 South Oak Lane, Wilmslow, Cheshire SK9 6AT; Tel: (01625) 525063, website: www.albertrslack.co.uk. An obituary appears on page 32.

THEORY OF WATER WAVES

A Spitalfields Day report

A Spitalfields Day *Theory of Water Waves* was held on 23 July 2014 as part of a month-long research programme with the same name at the Isaac Newton Institute in Cambridge. The meeting was organised by Mark Groves (Loughborough, Saarland) with the help of the other programme organisers (Tom Bridges, Surrey; David Nicholls, Chicago; Paul Milewski, Bath).



Mark Groves, David Nicholls, Tom Bridges and Paul Milewski

The lectures focussed upon rigorous mathematics for the full water-wave problem (the Euler equations with free boundary), and two aspects were singled out for particular attention. Mark Groves and Guido Schneider discussed justifying the use of model equations for water waves, along the way establishing the existence of new kinds of three-dimensional solitary waves and describing a situation in which the weakly nonlinear theory fails. Steve Shkoller and Eugene Varvaruca considered singularities in time-dependent and steady flows, ruling out 'splash' singularities in certain circumstances and examining generalisations of the Stokes conjecture for extreme steady waves with a corner at their crests.

The talks were attended not only by visiting fellows at the Isaac Newton Institute but also by researchers and postgraduate students from all over the UK, whose participation was funded by the LMS grant.

Mark Groves
Loughborough University

Editor's note: 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. Grants of **up to £1,000** are available to support an LMS Spitalfields Day. Further details at: www.lms.ac.uk/content/spital fields-days.

SPITALFIELDS DAY SPEAKERS

- **Mark Groves** (Loughborough, Saarland)
  Three-dimensional water waves
- **Guido Schneider** (Stuttgart)
  Validity and non-validity of the NLS approximation for the water wave problem – recent developments and open problems
- **Steve Shkoller** (Oxford)
  Interface singularities for the Euler equations
- **Eugene Varvaruca** (Reading)
  Singularities of steady free surface water flow

LMS-EPSRC DURHAM SYMPOSIA
CALL FOR PROPOSALS

The London Mathematical Society invites proposals for Durham Symposia in 2016 and beyond.

The LMS and the EPSRC intend to support at least two Durham Symposia in 2016.

The Symposia began in 1974, and have now become an established and recognised series of international research meetings. They provide an excellent opportunity to explore an area of research in depth, to learn of new developments, and to instigate links between different branches. The format is designed to allow substantial time for interaction and research. The meetings are by invitation only and held in July and August, usually lasting 10 days, with up to 70 participants, roughly half of whom will come from the UK. They are held at the University of Durham.

Prospective organisers should send a formal proposal to the Durham Representative, Dirk Schuetz (dirk.schuetz@durham.ac.uk) by **Monday 24 November 2014**.

Proposals should include:

- A full list of proposed participants, divided into specific categories (please see the guidance on submission of proposals at www.lms.ac.uk/events/durham-symposia for more details). Proposers are encouraged to actively seek to include women speakers and speakers from ethnic minorities, or explain why this is not possible or appropriate.
- A detailed scientific case for the symposium, which shows the topic is active and gives reasons why UK mathematics would benefit from a symposium on the proposed dates.
- Details of additional support from other funding bodies.
- Where appropriate, prospective organisers should consider the possibility of an 'industry day'.

The Durham Representative will provide an estimated cost for accommodation for the symposium and estimated travel costs for each participant.

For further details about the Durham Symposia, please visit the Society's website: www.lms.ac.uk/events/durham-symposia.

Before submitting: Organisers are welcome to discuss informally their ideas with the Durham Representative (dirk.schuetz@durham.ac.uk) and/or the Chair of the Research Meetings Committee, Professor Ulrike Tillmann, FRS (RMC.Chair@lms.ac.uk).

VISIT OF DANIEL GRIESER

Professor Daniel Grieser (Institut für Mathematik, Carl von Ossietzky Universität Oldenburg) will be visiting the UK between 20 October and 26 November 2014. His expertise is in PDEs, geometry of singular spaces, global analysis, mathematical physics and differential geometry. During his visit Professor Grieser will lecture at:

- Loughborough University, Wednesday 22 October at 3 pm at the Analysis Seminar (contact Eugenie Hunsicker: E.Hunsicker@lboro.ac.uk)
- Cardiff, Monday 10 November at the Analysis Seminar (contact Mikhail Cherdantsev, CherdantsevM@cardiff.ac.uk)
- University College London, Thursday 13 November at 3 pm at the London Analysis Seminar (contact Leonid Parnovski: l.parnovski@ucl.ac.uk)
- Imperial College London, Friday 14 November at the Pure (PDE) Seminar (contact Michael Ruzhansky, m.ruzhansky@imperial.ac.uk)
- University of Reading, Tuesday 18 November at noon at the Departmental Seminar (contact Michael Levitin: m.levitin@reading.ac.uk)

For further details contact Michael Levitin (m.levitin@reading.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF FERESIANO MWESIGYE

Dr Feresiano Mwesigye (Mbarara University of Science and Technology, Uganda) will visit the University of Leeds from 13 November 2014 to 15 January 2015. Dr Mwesigye's research area is mathematical logic, specifically the use of Ehrenfeucht-Fraisse games to analyze the similarities and differences between structures, for instance, ordinal numbers under the usual ordering. He is a senior lecturer at Mbarara, and the visit will assist in establishing future links between Mbarara and Leeds, and other British universities.

Dr Mwesigye will be based at the University of Leeds during his stay in the UK, hosted by Professor J.K. Truss who should be contacted for further details (pmtjkt@leeds.ac.uk). This visit is supported by an LMS Scheme 5 grant.

VISIT OF ERIK VAN DOORN

Dr Erik van Doorn (University of Twente, The Netherlands) will visit the universities of Leeds, Heriot-Watt and Durham from 28 October to 12 November 2014. Dr van Doorn's main area of research is probability theory, in particular birth-death processes and related topics such as orthogonal polynomials, quasi-stationarity and aspects of convergence speed. During his visit Dr van Doorn will give the following presentations:

- 29 October, Leeds University
  Representations for the decay parameter of a birth-death process
  (contact Alexander Veretennikov: a.veretennikov@leeds.ac.uk)
- 5 November, Heriot-Watt University
  On the existence of quasi-stationary distributions for Markov chains
  (contact Damian Clancy: d.clancy@liv.ac.uk)
- 10 November, Durham University
  Spectral properties of birth-death polynomials
  (contact Frank Coolen: frank.coolen@durham.ac.uk)

For further details contact Frank Coolen (frank.coolen@durham.ac.uk). The visit is supported by an LMS Scheme 2 grant.

COMPLEX GEOMETRY AND SYMPLECTIC TOPOLOGY

A meeting on *Complex Geometry and Symplectic Topology* will be held at University of Warwick on Monday 3 November 2014 in celebration of the recent appointment of Weiyi Zhang. It will consist of three talks given by the following speakers:

- Nigel Hitchin (Oxford)
- Ivan Smith (Cambridge)
- Weiyi Zhang (Warwick)

The event will be followed by a reception and dinner. Funds are available to UK academics for housing and travel. If you are interested in attending this event, please register at the webpage tinyurl.com/p93tmtl.

The meeting is supported by an LMS Conference grant under the Celebrating New Appointments scheme and by the University of Warwick.

INTERNATIONAL CENTRE FOR MATHEMATICAL SCIENCES

Workshops in 2015:

- 9-13 March
  Stochastic systems simulation and control
  http://icms.org.uk/workshops/stochasticsystems
- 23-27 March
  Galerkin methods with applications in weather and climate forecasting
  http://icms.org.uk/workshops/galerkinmethods
- 13-17 April
  Mathematics for health and disease
  EPSRC-DST Indo-UK Initiative
  http://icms.org.uk/workshops/health
- 20-24 April
  Gradient flows: from theory to application
  http://icms.org.uk/workshops/gradient
- 5-8 May
  Solving big data challenges from modern science through statistical modelling
  EPSRC-DST Indo-UK Initiative
  http://icms.org.uk/workshops/solvingbigdata
- 25-29 May
  Security of symmetric ciphers in network protocols
  http://icms.org.uk/workshops/security
- 1-5 June
  Minimal free resolutions, Betti numbers and combinatorics
  http://icms.org.uk/workshops/betti
- 22-26 June
  Computational and multiscale mathematical modelling of cancer growth and spread
  http://icms.org.uk/workshops/modelling
- 29 June - 3 July
  Shape optimization and spectral geometry
  http://icms.org.uk/workshops/shape
- 20-24 July
  Topological methods in singularity theory
  http://icms.org.uk/workshops/topological
- 27-31 July
  Harmonic Analysis and Partial Differential Equations
  http://icms.org.uk/workshops/harmonicPDE
- 7-11 September
  Prospects for causal set quantum gravity
  http://icms.org.uk/workshops/prospects
- 21-25 September
  Computational information geometry for image and signal processing
  http://icms.org.uk/workshops/infogeom

TOPOLOGY AND INTEGRABILITY

UK-Japan Winter School

The UK-Japan Winter Schools have been held annually since 1999. The aim of the Schools is to bring together Japanese and UK scientists, in particular young researchers and students, in a relaxing and stimulating atmosphere. The next UK-Japan Winter School *Topology and Integrability* will take place at Loughborough University from 5 to 8 January 2015. There will be three short lecture courses plus a number of individual talks. The lecturers and titles of the short courses are:

- Alexey Bolsinov (Loughborough University)
  Topology and singularities of integrable Hamiltonian ODEs
- Mark Gross (University of Cambridge)
  Mirror symmetry and tropical geometry
- Paul Sutcliffe (Durham University)
  Instantons and Monopoles

For further information visit the website tinyurl.com/kmqr3kk or contact one of the following conference organisers: Evgeny Ferapontov (E.V.Ferapontov@lboro.ac.uk), Vladimir Novikov (V.Novikov@lboro.ac.uk) or Yoshiaki Maeda (ymkeiomath@gmail.com). The series of UK-Japan Winter Schools is supported by an LMS Conference grant.

RANDOM MATRIX THEORY

The 10th Brunel-Bielefeld workshop on *Random Matrix Theory* (RMT) *and Its Applications* will take place at Brunel University London from 12 to 13 December 2014. This is a two-day international event that builds on a series of RMT workshops organised by the Mathematical Physics group at Brunel every year since 2005, and jointly on a two-year rotation schedule with Bielefeld University (Germany) since 2011.

This year's event aims to bring together an international group of leading researchers in RMT and other areas of mathematics, with particular focus on connections to integrable systems, random processes including growing complex networks, information theory, quantum and statistical physics. The program of the workshop will include invited talks and a poster session with around 12 to 15 contributed posters. The invited speakers are:

- Eugene Bogomolny (Paris)
- Alexander Bufetov (Marseille)
- Clare Dunning (Kent)
- Yan Fyodorov (London)
- Mario Kieburg (Bielefeld)
- Marta Mazzocco (Loughborough)
- Ralf Müller (Erlangen)
- Sebastian Müller (Bristol)
- Mark Newman (Michigan)
- Marcel Novaes (Uberlandia)
- Maciej Nowak (Kraków)
- Neil O'Connell (Warwick)
- Tiago Peixoto (Bremen)
- Roger Tribe (Warwick)
- Karol Zyczkowski (Warsaw)

Deadline for requesting participation is **Monday 3 November 2014**. A registration fee of £40 (£20 for PhD students) applies to all workshop participants. Some funding is available for young researches presenting a poster. For more information, including how to register visit the website at tinyurl.com/kmewd23 or contact any of the organisers: Gernot Akemann (akemann@physik.uni-bielefeld.de), Igor Krasovsky (i.krasovsky@imperial.ac.uk), Dmitry Savin (Dmitry.Savin@brunel.ac.uk), Igor Smolyarenko (Igor.Smolyarenko@brunel.ac.uk), Oleg Zaboronski (O.V.Zaboronski@warwick.ac.uk).

The workshop is supported by an LMS Conference grant, DAAD (Germany) and the Department of Mathematics at Brunel.

Isaac Newton Institute
for Mathematical Sciences

REGULATING SYSTEMIC RISK: INSIGHTS FROM MATHEMATICAL MODELLING

15 – 19 December 2014

in association with the Newton Institute programme

Systemic Risk: Mathematical Modelling and Interdisciplinary Approaches

18 August – 19 December 2014

Organisers: Rama Cont (Imperial College), Martin Hellwig (Max Planck Institute) and Jean-Charles Rochet (Zurich).

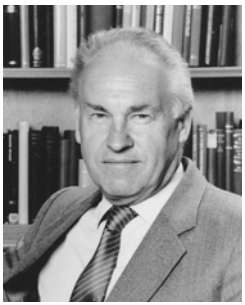
Background: The purpose of this workshop is to gather an international panel of mathematical scientists, economists, regulators and risk professionals to discuss insights from mathematical models and empirical studies on the modelling, measurement and regulation of systemic risk in the financial system, with the aim of fostering interdisciplinary exchanges and collaborations on these important topics.

Closing date for receipt of applications is **26 October 2014**.

Further information and application forms are available from the website at www.newton.ac.uk/event/syrw03.

OBITUARIES

JOHN BRYCE MCLEOD



Professor John Bryce McLeod, FRS, FRSE, who was elected a member of the London Mathematical Society on 18 December 1958, died on 20 August 2014, aged 84.

Sam Howison writes: Bryce McLeod's early education was at Aberdeen Grammar School, where his grandfather had been Head of Mathematics and Science. As was then not uncommon in the Scottish education system, he followed an accelerated path through school and moved to the University of Aberdeen aged 16, receiving a First-Class BA degree in Mathematics & Natural Philosophy in 1950. He was awarded a scholarship to Oxford University, where he received a second First-Class BA degree in 1952. His tutor there, T.W. Chaundy, a specialist in differential equations, was influential in shaping Bryce's intellectual path; he co-authored the first of Bryce's 150-plus papers. Following a year as a Rotary Foundation Fellow in Vancouver and two years' National Service, Bryce returned to Oxford to complete a DPhil with Titchmarsh in 1958. He and Eunice married in 1956. After a spell of two years as a Lecturer in Mathematics at the University of Edinburgh, during which the first of their four children was born, Bryce returned to Wadham College, Oxford in 1960 and remained there until 1988, becoming a University Lecturer in 1970.

Throughout his early career, Bryce maintained regular contact with applied analysts in the US, especially in Madison, where he spent a number of sabbatical years, greatly expanding his range of contacts. He had many offers to cross the Atlantic and in 1988, facing imminent mandatory retirement in the UK and feeling that (unlike today) applied analysis was not properly appreciated at Oxford, he moved to Pittsburgh, where he remained until 2007. He and Eunice had retained their house in Abingdon, however, and after Bryce retired from Pittsburgh they returned to the UK, while Bryce based himself in the Oxford Centre for Nonlinear PDEs for the remainder of his career.

Bryce was elected FRSE in 1974 and FRS in 1992. He received the Whittaker Prize of the Edinburgh Mathematical Society in 1965, the Keith Medal and Prize of the Royal Society of Edinburgh in 1987, and the Naylor Prize and Lectureship in Applied Mathematics of the London Mathematical Society in 2011 and gave the Naylor Lecture in 2012.

Bryce considered himself a problem-solving mathematician rather than a builder of general theories. He liked to focus on a specific hard problem and to find something new to say about it that was at the same time rigorous, interesting and useful. He solved problems with consummate skill across an extraordinary range of areas, including fluid mechanics, general relativity, plasma physics, mathematical biology, superconductivity, Painlevé equations, coagulation processes, nonlinear diffusion and pantograph equations, among many others. He had long-lasting and productive collaborations with very many distinguished mathematicians, both applied analysts like himself and modellers whose differential equation had caught his interest: he often looked at new problems unearthed by colleagues working in a more applications-focused way. His work was characterised by great lucidity of thought and ingenuity of argument. Although he worked on many different problems some general themes did emerge, in particular the importance of similarity solutions as indicators of more general behaviour, and the development of powerful techniques for 'shooting' methods, especially with

several shooting parameters. A McLeod seminar or lecture was a model of clarity: as the subject unfolded, the board was filled from left to right with economical, spare notes in his characteristic hand, and the audience invariably left feeling they had witnessed a *tour de force* of applied analysis.

Many, many people throughout the mathematical community remember Bryce with great fondness: for his kindness and support for students and colleagues alike; for his intensely amused laughter, or his rapt concentration on an explanation; for his zest for life and mathematics. Just as he was adventurous in his research topics, Bryce and his family had many adventures along the way. For example, as they visited the US so often, they bought what Bryce termed a 'motor caravan' (in fact, a huge Winnebago) and took the family round that vast country on 'a blissful combination of vacation and mathematics'. Let the last word be Bryce's: when asked [1] what advice he would give a young mathematician, he replied simply: "Have fun". Bryce certainly did that.

[1] Interview with John Ball, www.maths.ox.ac.uk/node/24862

DAME KATHLEEN OLLERENSHAW

Dame Kathleen Ollerenshaw, who was a Life Member of the London Mathematical Society, died on 10 August 2014, aged 101.

Ray King writes: It was typical of her irrepressible spirit that she attributed pre-eminence in mathematics to a profound handicap. In 1921, aged eight, she was diagnosed almost completely deaf but overcame all odds to become a distinguished exponent of mathematics and statistics, educationalist and sportswoman. She entered public life in the 1950s commanding widespread respect in political and academic arenas; there has been no prouder Lord Mayor nor Freeman of Manchester.

Her passion continued despite ever-worsening eyesight, and she continued to attend many civic and academic events. At 94 she was awarded a prestigious prize by *Mathematics Today* for an article about magic squares. And famously she was one of the first to solve Rubik's cube from a random start with an average 80 moves. It triggered her fascination with magic squares and on a short train journey she identified an error in the 22nd edition of W.W. Rouse Ball's classic textbook, *Mathematical Recreations and Essays*.

Kathleen Mary Timpson was born into the famous shoe dynasty on 1 October 1912 in Withington, Manchester. From the age of six she attended Ladybarn House School, where she acquired her love of mathematics and first met future husband, Robert Ollerenshaw. In 1926 Kathleen followed her elder sister Betty to St Leonard's School, where her interest in mathematics – "the one subject in which I was at no disadvantage" – intensified.

Kathleen won an Open Scholarship to Somerville College, Oxford, lip-reading through her interview – it would be 1949 before she got her first "crude but wonderful" hearing aid - re-encountering Robert whom she married in the first week of the war. A hockey 'Blue', she was also a skilled ice skater - runner up in the British Pairs Championship in 1939 - and an accomplished skier taking trips to the Tyrol between 1933 and 1939. She caught a close-up glimpse of Hitler in open car during the 1936 Winter Olympics at Garmische-Partenkirchen in Austria. "If I'd had a bomb I would have thrown it," she reflected.

She graduated in 1933, finding work at the Shirley Institute textile research establishment, but was persuaded to return

to Oxford in 1943 by Kurt Mahler whom she impressed by finding the answer to an unsolved problem on critical lattices within a few days. While working as a temporary wartime don she wrote five original research papers, earning her a DPhil degree, conferred in 1945.

As part-time lecturer at Manchester University, Kathleen was co-opted onto the city's education committee in 1954, later winning a council seat for the Conservative Party and holding it for 25 years. In 1960 she joined the Central Advisory Council for Education and was shocked by the state of many secondary moderns whose lack of mathematics had "frightened" her. Though an admirer of Manchester's state grammar schools, she accepted comprehensives as inevitable.

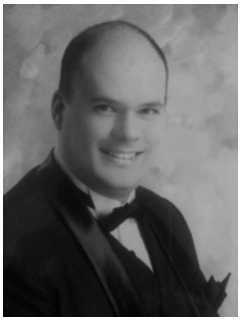
She succeeded Prince Philip as president of the Institute of Mathematics and its Application and aged 78 became a keen amateur astronomer; a friend of Sir Bernard Lovell and Sir Patrick Moore, she gave her name to the observatory at Lancaster University, where she was former Deputy Pro-Chancellor. Kathleen had senior positions at Manchester, Manchester Metropolitan and Salford Universities. She became president of the Manchester Statistical Society on its 150th anniversary in 1983.

Despite her deafness, she loved music, never missing a Hallé concert, watching the musicians and following the musical scores in the programmes. Her own huge contribution was being prime mover in the establishment of the Royal Northern College of Music.

She outlived her husband by 28 years and both their children. Florence died in 1972 aged 26 and Charles in 1999. Save for her school and university days, Kathleen lived all her life in south Manchester, celebrating her 100th birthday at a party in the garden of her home. Shortly afterwards she suffered a fall and moved into a nursing home.

A memorial service will be held at Manchester Cathedral at a later date.

DAVID CARIOLARO



Dr David Cariolaro, who was elected a member of the London Mathematical Society on 23 August 2002, died on 10 January 2014, aged 44.

David Cariolaro was an Associate Professor in the Department of Mathematical Sciences at Xi'an Jiaotong-Liverpool University near Shanghai in China. He suffered a serious accident on 20 September 2013 and was in hospital in Suzhou. From there, after a campaign to raise money for his treatment, he was flown home to Padua in a coma. There he regained consciousness, but died after a month, due to complications.

He studied for a PhD at Reading (2000-2004). His studies were funded at different times by his adoring brother Dimitri, and by his father Professor Gianfranco Cariolaro. His supervisor, Professor Anthony Hilton, reports that David was a diligent, hard-working student, who found it quite difficult to get to grips with his research topic, but eventually showed considerable insight and imagination. Together with Matthew Johnson, he organized a conference in Reading for graduate students studying Combinatorics. On occasions he would entertain others by performances on the clarinet. After obtaining a PhD, but before leaving Reading, he married his wife, Shu Ning.

For his thesis he worked in the 1-factorization conjecture posed by Anthony Hilton and Amanda Chetwynd in a paper in 1985. This conjecture is that if a regular graph with an even number, n, of vertices has degree $d(G)$ at least $n/2$, then it is 1-factorizable – that is, its edge set can be expressed as the union of $d(G)$ edge-disjoint regular subgraphs each of degree 1. Chetwynd and Hilton

had proved that if then $d(G) \geq 6/7n$ could be 1-factorized, and later this was improved to $d(G) \geq 1/2(1+\sqrt{7})n$. As the degree gets lower G assumes one of two approximate structures: either it is like a bipartite graph with some additional edges, or it is like the complement of such a graph, and this fact seems to offer the hope of a complete solution eventually. David Cariolaro managed to make a good improvement in one of the two cases. Recently the 1-factorization conjecture has been proved for very large n by a team at Birmingham University.

Before coming to Reading, David Cariolaro had obtained a Laurea in Mathematics at the University of Pavia (Italy), and had spent periods at the Universities of Kent in the UK, Konstanz University (Germany), and Aalborg (Denmark). After Reading he had postdoctoral fellowships at University of Bordeaux 1 (France), EPFL (Lausanne, Switzerland), Tamkang University (Taiwan), Academia Sinica (Taiwan). From 2009 he was a Lecturer, later Associate Professor at Xi'an Jiaotong-Liverpool University.

He published about 20 papers, mainly on edge-colouring graphs. Some of these are unusual and interesting, such as one with his father, Gianfranco Cariolaro, on colouring the petals of a graph, and others on excessive factorizations of graphs (with variously Bonisoli, Rizzi, and Hung-Lin Fu).

With Tommy Jensen he founded an internet discussion group on graph theory called Graphs (Yahoo Group). It has about 130 members.

He offered a prize of £300 to the first person to produce a computer-free self-contained proof that every graph with 23 vertices has either three mutually adjacent vertices or seven mutually non-adjacent vertices. In other words, the problem is to show that the Ramsey number R(3,7) is at most 23.

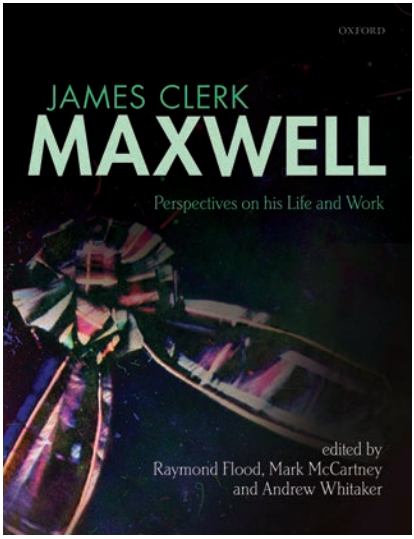
He leaves his wife, Shu-Ning, and their two children Gabriele and Elena. They are currently living with David's parents, Gianfranco and Tina, in Padua.

REVIEWS

JAMES CLERK MAXWELL: PERSPECTIVE ON HIS LIFE AND WORKS edited by Raymond Flood, Mark McCartney and Andrew Whitaker, Oxford University Press, 2014, pp 384, £39.99, US$69.95, ISBN 978-0-19-966437-5.

Then summon up your grasp of mind
    Your fancy scientific
Till sights and sounds with thought combined
    Become of truth prolific.

The exuberance of the poetry of James Clerk Maxwell (here from his *To the chief musician upon Nabla: a Tyndallic ode*) may appear far removed from the stark beauty of Maxwell's equations for the electromagnetic field, or his many other contributions to 19th century physical science. Various aspects of this remarkable and complex Victorian scientist are brought together with depth and panache in *James Clerk Maxwell: Perspectives on his Life and Work*, edited by Raymond Flood, Mark McCartney and Andrew Whitaker.



The fifteen chapters are arranged in three sections. The first covers Maxwell's life as Professor of Natural Philosophy at Marischal College, Aberdeen; as Professor of Natural Philosophy at King's College, London (where, 150 years ago, he worked out his theory of electromagnetism); and as the first Professor of Experimental Physics at what became to be known as the Cavendish Laboratory in Cambridge. The second deals with Maxwell's physics. These include his theory of colours (which led Maxwell to create the first colour photograph - a tartan ribbon - lovingly recreated on the book's cover by Peter Reid); the theory of Saturn's rings (which are, as Maxwell demonstrated, not solid or fluid, but made up of many small unconnected particles); his various contributions to the dawn of statistical physics (such as kinetic theory of gases, liquids, and Maxwell's infamous 'demon', introduced to emphasise his conviction that the second law of Thermodynamics is purely statistical); his approach to fluids (presenting Maxwell's ideas alongside more recent developments); and of course Maxwell's electromagnetic theory, and how his ideas were developed at the end of the 19th century by the 'Maxwellians'. The final section is devoted to other aspects of Maxwell the man: his striking and diverse poetry, his deep and unwavering Christian faith, and his status amongst his contemporaries and successors in the 20th century.

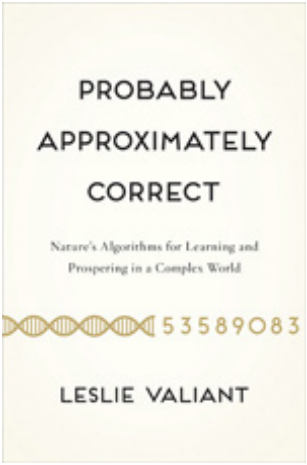
Maxwell's whimsical spirit consistently shines through, particularly in his correspondence with his close friends such as P.G. Tait and W. Thomson (later Lord Kelvin), in which he gives his demon's 'catechism', coins the term 'curl' in differential calculus, and jokingly refers to himself as dp / dt (from a thermodynamic equation $dp / dt = J\ C\ M$). More seriously, however, the reader is given the sense that Maxwell's major legacy to modern physics was as a

'Natural Philosopher', whose depth of physical insight was more important than his analytic ability, and whose contributions are in elucidating the very concepts that we take for granted in contemporary mathematical physics, such as role of statistics in thermodynamics, or the mathematical notion of a field. Although Heinrich Hertz famously remarked "Maxwell's theory is Maxwell's system of equations," Maxwell himself emphasised the importance of understanding underlying principles in physics, without which "formulae are mere mental rubbish."

The book adds to a substantial literature already published about Maxwell (including his complete correspondence, and several biographies, of which the earliest, by Campbell and Garnett, is now in the public domain); the structure here, with thirteen different authors, allows a refreshingly detailed treatment of Maxwell's great contributions to science and its contextualisation in late Victorian scientific life. The book should appeal to all interested in the history of physics and its development prior to the 20th century, as well as those who find Maxwell and his work a source of fascination and inspiration.

Mark Dennis
Bristol University

PROBABLY APPROXIMATELY CORRECT by Leslie Valiant, Basic Books, 2013, pp 208, £17.99, ISBN 978-0-4650-3271-6.



Professor Valiant has made major contributions in several fields. I was introduced to his work on Bulk Synchronous Parallelism by David May at Inmos; his ideas were a major influence on the T9000 Transputer design, and also drove a big effort at Oxford in the 1990s. The area is still academically respectable, but the late 20th century flowering, which saw parallel programming as more naturally expressive than sequential algorithms, has been overwhelmed by multi-threaded C.

This should be an important book. There is early promise of controversy; the references in chapter one to *miracles*, to *eating spaghetti*, and to *Darwin* offer early promise of a Pastafarian attack on organised religion. We are taken in a different direction; much of the book compares the, in evolutionary terms, hopelessly slow deductions of traditional formal reasoning with the much higher performance of modern machine learning algorithms. The author easily makes the case that conventional reasoning could not achieve human performance in a realistic timescale. On the other hand, he feels the need only to demonstrate that *probably approximately correct* (PAC) reasoning can be achieved in polynomial time. Here he may be led astray by his computer science background. While the computation theorist devotes much attention to the distinction between algorithms that can or cannot run in polynomial time, the physical scientist has a more hard-nosed approach to the numbers.

To an engineer, the replacement of the $O(N^2)$ Fourier transform with the $O(N \log N)$ FFT opened new application vistas for digital signal processing; elsewhere unfortunate large constant factors overwhelm the asymptotic performance advantages of, say, a fast matrix multiply. The evolutionary biologist wants to know whether the appropriate evolution could actually

be achieved in the available generations; merely telling her that the task is not hopelessly, exponentially, unreachable does not get her very far.

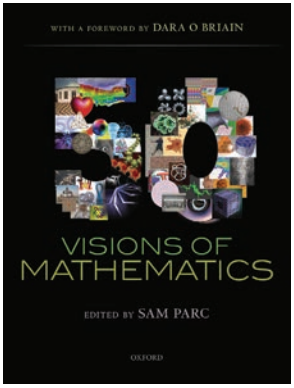
There are interesting insights into the characteristics of PAC learning. The relationship between evolutionary and experienced learning - between nature and nurture - could have been explored further. The idea is that our genetic code evolves relatively slowly and that much of the resulting wiring has evolved to help our brains learn quickly after birth. Indeed, we are hard-wired for gullibility; we have evolved for an environment in which we are trained by well-meaning parents or tribal elders. This could be pushed further. The old trusted family/tribe which is fighting outsiders and animals has been replaced by the modern city of *every man for himself*. Do we need a new kind of human who has evolved to be less trusting and to take a more objective view of the world?

Another useful feature of modern machine learning, present in PAC, is that it learns slowly but decides quickly. Humans too show prejudice and rush to judgement; this is seen as a valuable feature of our brains. A soldier under attack must make a decision: any decision. He might charge, retreat or dig in; all are reasonable. He must not stand in the battlefield and think.

Overall, an interesting work from a giant in the field; it opens more questions than it answers. We can look forward to further progress for many years. Professor Valiant references the works of both his children.

Denis Nicol
Electronics and Computer Science
University of Southampton

VISIONS OF MATHEMATICS edited by Sam Parc, Oxford University Press, 2014, pp 208, £24.99, US$44.95, ISBN 978-0-198-70181-1.



This is a collection of fifty articles and fifty illustrations to celebrate the fifty years of the Institute of Mathematics and its Applications. The book is beautifully produced by Oxford University Press which is especially important for the illustrations. The collection was edited by Sam Parc who has done an excellent job, especially as many of the articles have appeared elsewhere in different places and forms, as a consequence some of these articles might be familiar to some readers. In the preface she says "Each article is designed to be read in one sitting and to be accessible to a general audience". The first of these aims is definitely achieved. However, I am not so sure that all the articles are accessible to a general audience. A number use calculus, at least in the formulae, which will frighten quite a number of the general public.

The articles certainly cover a wide range of topics from geometry to champagne bubbles, via the risk to your health and two articles which connect Sherlock Holmes and Moriarty to mathematics. As someone who is not a great Sherlock Holmes fan I was unaware that Professor Moriarty was a professor of mathematics! The authors are as diverse and as impressive as the range of topics and I feel it would be invidious to pick any one article for either praise or criticism. There is something in this collection for everybody including some short but interesting biographical notes.

One final comment is that Sam Parc points out that $3^2+4^2+5^2=50$ and uses this to contribute three entertaining sections on the theorem of Pythagoras.

Alan Camina
University of Norwich

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 is given on the Society's website (www.lms.ac.uk/content/calendar). Please send updates and corrections to calendar@lms.ac.uk.

OCTOBER 2014

1 Clay Research Conference, Oxford (436)
8 Brian Hartley Memorial Day, Manchester (439)
8 Continued Fractions and Geometry of Lattices Meeting, Liverpool (439)
8–10 Maxwell Institute Graduate School on Evolution Equations, Edinburgh (439)
17–18 Cluster Algebras and Preprojective Algebras Workshop, Cardiff (439)
21 LMS Good Practice Scheme Workshop, London (440)
22 Decision Problems for Linear Recurrence Sequences, BCS-FACS Evening Seminar, London (440)
27–29 Methods for Mathematical and Empirical Analysis of Microbial Communities INI PhD Summer School, Cambridge (438)
29 Computational and Mathematical Modelling for Improved Understanding of Biological Systems, LMS Computer Science Colloquium, London (440)
30 History of Statistics, BSHM–Gresham College Joint Meeting, London (437)
30–31 Structure, Function and Dynamics in Microbial Communities INI Workshop, Cambridge (438)
31 Multiscale PDE Systems of Fluid Models and Applications in Geophysics, Surrey (439)

NOVEMBER 2014

3 Complex Geometry and Symplectic Topology Meeting, Warwick (440)
14 LMS AGM, London (440)
22 Early Career Mathematicians' Autumn IMA Conference, Queen Mary University London (438)
26–28 Engineering and Control of Natural and Synthetic Microbial Communities, INI Workshop, Cambridge (439)

DECEMBER 2014

8–10 Applications of Game Theory IMA Conference, Oxford (438)
12-13 Random Matrix Theory Workshop, Brunel University (440)
15–17 Maths in Signal Processing IMA Conference, Birmingham (438)
15-19 Regulating Systemic Risk: Insights from Mathematical Modelling, INI Workshop, Cambridge (440)
16–17 Mathematical Challenges of Big Data IMA, Woburn House, London (438)
17 SW & South Wales Regional Meeting, Plymouth (440)
18 Combinatorics Workshop, Plymouth (440)
19 Differential Algebra Workshop, Plymouth (440)

JANUARY 2015

5-8 Topology and Integrability, UK-Japan Winter School, Loughborough (440)
5–16 Periodic, Almost-Periodic, and Random Operators Introductory School, INI, Cambridge (439)
6–9 Bruhat-Tits Buildings Winter Meeting, Imperial College London (439)
9 Research in Mathematics and its Applications IMA Conference, Bath (438)
12–23 Random Geometry Instructional Workshop for Younger Researchers, INI, Cambridge (439)
16 150th Anniversary Launch, London
26–30 Conformally Invariant Scaling Limits, INI Workshop, Cambridge (439)

FEBRUARY 2015

4–8 CERME 9, Prague (439)
27 Mary Cartwright Lecture, London

MARCH 2015

9-13 Stochastic Systems Simulation and Control ICMS Workshop, Edinburgh (440)

19 Mathematics 2015 IMA Conference, Mary Ward House, London (438)
23-27 Galerkin Methods with Applications in Weather and Climate Forecasting ICMS Workshop, Edinburgh (440)
30–31 Flood Risk Assessment IMA Conference, Swansea (438)
30–2 Apr Joint Meeting of the BMC and BAMC, Cambridge (438)

APRIL 2015

7 Northern Regional Meeting, Lancaster (440)
7-11 Homotopical Algebra and Geometry Workshop, Lancaster (440)
13-17 Mathematics for Health and Disease ICMS Workshop, Edinburgh (440)
20 Mathematical Education of Engineers IMA Conference, Loughborough (438)
20-24 Gradient Flows: From Theory to Application ICMS Workshop, Edinburgh (440)

MAY 2015

5-8 Solving Big Data Challenges from Modern Science through Statistical Modelling ICMS Workshop, Edinburgh (440)
25-29 Security of Symmetric Ciphers in Network Protocols ICMS Workshop, Edinburgh (440)

JUNE 2015

1-5 Minimal Free Resolutions, Betti Numbers and Combinatorics ICMS Workshop, Edinburgh (440)
10–12 Barriers and Enablers to Learning Maths IMA International Conference, Glasgow (438)
10–13 AMS–EMS–SPM International Meeting, Portugal (439)
18–19 Mathematics in Finance IMA Conference, Manchester
22-26 Computational and Multiscale Mathematical Modelling of Cancer Growth and Spread ICMS Workshop, Edinburgh (440)
29-3 Jul Shape Optimization and Spectral Geometry ICMS Workshop, Edinburgh (440)

JULY 2015

13–17 Conference on Stochastic Processes and their Applications, Oxford
20-24 Topological Methods in Singularity Theory ICMS Workshop, Edinburgh (440)
27-31 Harmonic Analysis and Partial Differential Equations ICMS Workshop, Edinburgh (440)

SEPTEMBER 2015

1–4 Numerical Methods for Simulation IMA Conference, Oxford
7-11 Prospects for Causal Set Quantum Gravity ICMS Workshop, Edinburgh (440)
9–11 Mathematics of Robotics IMA Conference, Oxford
21-25 Computational Information Geometry for Image and Signal Processing ICMS Workshop, Edinburgh (440)

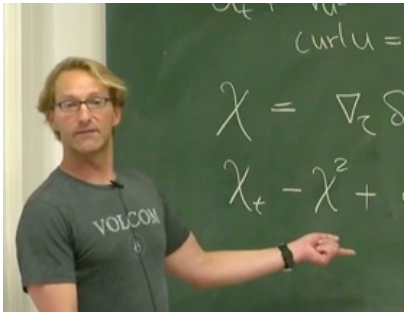
LMS SPITALFIELDS DAY

Theory of Water Waves

held on 23 July 2014 at the Isaac Newton Institute, Cambridge

(report on page 26)

Attendees



Steve Shkoller (Oxford)
Interface singularities for the Euler equations

Eugene Varvaruca (Reading)
Singularities of steady free surface water flow

Breaking waves such as these were among the topics discussed at the *Theory of Water Waves* LMS Spitalfields Day