NEWSLETTER

NEXT DIRECTOR OF THE ISAAC NEWTON INSTITUTE

In October 2016 David Abrahams will succeed John Toland as Director of the Isaac Newton Institute for Mathematical Sciences and NM Rothschild and Sons Professor of Mathematics in Cambridge.

David, who is a Royal Society Wolfson Research Merit Award holder, has been Beyer Professor of Applied Mathematics at the University of Manchester since 1998. From 2014-16 he was Scientific Director of the International Centre for Mathematical Sciences in Edinburgh and was President of the Institute of Mathematics and its Applications from 2007-2009.

David's research has been in the broad area of applied mathematics, mainly focused on the theoretical understanding of wave processes including scattering, diffraction, localisation and homogenisation. In recent years his research has broadened somewhat, to now cover topics as diverse as mathematical finance, nonlinear viscoelasticity and glaciology. He has close links with a number of industrial partners.

David plays an active role within the international mathematics community, having served on over 30 national and international working parties, panels and committees over the past decade. This has included as a Member of the Applied Mathematics sub-panel for the 2008 Research Assessment Exercise and Deputy Chair for the Mathematics sub-panel in the 2014 Research Excellence Framework, and Chair of EPSRC's Mathematical Sciences Strategic Advisory Team (2014-15).

He has also been involved in a range of public engagement activities over the years. He regularly offers mathematics talks of interest to school students and the general public, and ran the annual *Meet the Mathematicians* outreach events for sixth form students with Chris Howls (Southampton). With Chris Budd (Bath) he has organised a training conference in 2010 on *How to Talk Maths in Public,* and in 2014 co-chaired the inaugural *Festival of Mathematics and its Applications.*

David will be the sixth Director of the Institute.

SOCIETY MEETINGS AND EVENTS

Contents
No. 458 May 2016

GENERAL MEETING

There will be a General Meeting of the Society on Friday 8 July 2016 at 3.30 pm, to be held at JZ Young Lecture Theatre, University College London, Anatomy Building, Gower Street, London WC1E 6BT. The business shall be:

1) the appointment of Scrutineers
2) to approve the minutes of the Special General Meeting held on 5 February 2016
3) announcement of Council's recommendation for Election to Honorary Membership
4) announcement of LMS prize winners for 2016

The General Meeting will be followed by a Society meeting. It is hoped that as many members as possible will be able to attend.

Fiona Nixon
Executive Secretary

LMS GRANT SCHEMES

Next Closing Date for Research Grant Applications: 15 May 2016

Applications are invited for the following grants:

Conferences (Scheme 1)

Grants of **up to £7,000** are available to provide partial support for conferences held in the United Kingdom. This includes a maximum of £4,000 for principal speakers, £2,000 to support the attendance of research students who are studying at universities in the UK, and £1,000 to support the attendance of participants from Scheme 5 or former Soviet Union countries.

Celebrating new appointments (Scheme 1)

Grants of **up to £600** are available to provide partial support for meetings held in the United Kingdom to celebrate the new appointment of a lecturer at a UK university.

Postgraduate Research Conferences (Scheme 8)

Grants of **up to £4,000** are available to provide partial support for conferences held in the United Kingdom, which are organised by and are for postgraduate research students.

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Visits to the UK (Scheme 2)
Grants of **up to £1,500** are available to provide partial support for a visitor to the UK, who will give lectures in at least three separate institutions. Awards are made to the host towards the travel, accommodation and subsistence costs of the visitor.

Research in Pairs (Scheme 4)
Grants of **up to £1,200** are available to support a visit for collaborative research either by the grant holder to another institution abroad, or by a named mathematician from abroad to the home base of the grant holder. Grants of **up to £600** are available to support a visit for collaborative research either by the grant holder to another institution within the UK, or by a named mathematician from within the UK to the home base of the grant holder.

International Short Visits (Scheme 5)
Grants of **up to £3,000** are available to support a visit for collaborative research by a named mathematician from a country in Africa (or countries where mathematics is in a similar position) to the home base of the grant holder. Grants of **up to £2,000** are available to support a visit for collaborative research by the grant holder to a country in Africa (or countries where mathematics is in a similar position).

For full details of these grant schemes, and to download application forms, please visit the LMS website: www.lms.ac.uk/content/research-grants.
• Applications received by **15 May 2016** will be considered at a meeting in June.
• Applications should be submitted well in advance of the date of the event for which funding is requested.
• Normally grants are not made for events which have already happened or where insufficient time has

been allowed for processing of the application.

Queries regarding applications can be addressed to the Grants Administrators, Anthony Byrne and Elizabeth Fisher (tel: 020 7927 0807 / 020 7291 9973, email: grants@lms.ac.uk) who will be pleased to discuss proposals informally with potential applicants and give advice on the submission of an application.

OTHER LMS GRANTS AND FUNDING

Research Workshop Grants
The Society offers grants to support Research Workshops held in the UK. Requests for support (for travel and subsistence of participants, and reasonable associated costs) in the range **£1,000-£10,000** will be considered. The maximum award is **£10,000,** but a typical award is in the range of **£3,000 - £5,000**. Applications for partial support of workshops with other sources of support will be considered. Applications should normally be submitted 12 months in advance of the proposed workshop. For further information visit: www.lms.ac.uk/content/research-workshops-grants.

Spitalfields Days
Next Deadline: 15 May 2016
Grants of **up to £1,000** are available to support an LMS Spitalfields Day, which have been run since 1987 and are in honour of the Society's predecessor, the Spitalfields Mathematical Society (1717-1845). A Spitalfields Day is a one-day meeting, which is usually associated with a long-term symposium on a specialist topic at a UK university. Selected participants, often distinguished experts from overseas, give survey lectures (or other types of lecture accessible to a general mathematical audience) on topics in the field of the symposium. Please see the website for further details: www.lms.ac.uk/content/spitalfields-days.

Grace Chisholm Young Fellowship

Next deadline: 30 June 2016

The Society offers two fellowships of **£1,000** (consisting of £500 personal support and £500 contribution to a host institution) each year to mathematicians who need support when their mathematical career is interrupted by family responsibilities, relocation of partner, or other similar circumstance.

These fellowships, named after Grace Chisholm Young, aim to provide some support, making possible some continuous mathematical activity, so enabling the fellow to be in a position to apply for posts when circumstances allow. The Fellowship will give an endorsement of the holder's status as a mathematician, so that the break in formal employment should not prevent them from resuming a career as a mathematician at a later stage. Please see the website for further details: www.lms.ac.uk/grants/grace-chisholm-young-fellowships.

Small Grants for Education

Next Deadline: 31 August 2016

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

Teacher CPD Grants

Next Deadline: 31 August 2016

Funding for grants **up to £400** is available to provide opportunities for mathematics teachers to attend training which is *specifically* mathematical. It is intended to facilitate mathematical professional development to allow teachers in UK schools/educational institutions to:

a) Develop their subject knowledge.

b) Engage in a deeper understanding of how to develop mathematical thinking

c) Appreciate the interconnectivity of mathematical topics

d) Update themselves on mathematics curriculum reform

e) Use technology when and where appropriate

Please see the website for further details: www.lms.ac.uk/grants/teacher-cpd-grants.

Computer Science Small Grants (Scheme 7)

Next Deadline: 15 November 2016

Funding for grants **up to £500** is available to support a visit for collaborative research at the interface of Mathematics and Computer Science either by the grant holder to another institution within the UK or abroad, or by a named mathematician from within the UK or abroad to the home base of the grant holder. Please see the website for further details: www.lms.ac.uk/content/computer-science-small-grants-scheme-7.

Caring Supplementary Grants

Next deadline: 15 May 2016

Grants of **up to £200** are available to parents and carers working in mathematics to help with the cost of care when attending a conference or research meeting. The Society believes that all parents and carers working in mathematics should be able to attend conferences and research meetings without being hindered by care costs. Institutions are expected to make provision for care costs and parents and carers are encouraged to make enquiries. However, where this is not available, the Society administers a Caring Supplementary Grants Scheme. Please see the website for further details: www.lms.ac.uk/grants/caring-supplementary-grants.

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LMS PROSPECTS IN MATHEMATICS MEETING

CALL FOR EXPRESSIONS OF INTERESTS FOR 2017

The London Mathematical Society and the Prospects in Mathematics Meeting Steering Group invite Expressions of Interest from departments to host the next LMS Prospects in Mathematics Meeting to be held in the UK in 2017.

Up to £7,000 is available to support each of the LMS Prospects in Mathematics Meetings, which are annual two-day events (usually taking place in September) for Finalist Mathematics Undergraduates who are considering apply for a PhD after they have completed their current studies.

The meetings feature speakers from a wide range of mathematical fields across the UK who discuss their current research and what opportunities are available to prospective PhD students.

Funding is available to cover fares and accommodation for up to 50 students, travel and accommodation for speakers and subsistence for participants including a social event.

Prospective organisers should send an outline proposal to Marta Mazzocco (Chair of the Prospects in Mathematics Steering Group) (lmsmeetings@lms.ac.uk) by **1 June 2016**.

- Expressions of interest should be short (max. one A4 side in length) and include:
- Confirmation of support from the department.
- Reasons for wanting to host the LMS Prospects in Mathematics Meeting.
- A provisional list of speakers should be included. Speakers should be representative of the UK research landscape both in geographical terms and in scientific terms.
- Speakers from under-represented groups should be included and women speakers should account for at least 40% of the invited speakers.
- Confirmation that prospective organisers have read and understood the terms and conditions in the Guidelines for Organisers (available from www.lms.ac.uk/events/lms-prospects-mathematics-meeting).
- Willingness to attend an upcoming LMS Prospects in Mathematics Meeting to get an idea of the event. The next event will be held at York in December 2016.

All Expressions of Interest will be considered by the Prospects in Mathematics Steering Group, who will recommend a short-list to the LMS Programme Committee.

Short-listed applicants will then be invited to submit a grant application to the LMS Programme Committee for funding.

For further details about the LMS Prospects in Mathematics Meetings, please visit: www.lms.ac.uk/events/lms-prospects-mathematics-meeting. A list of previously supported LMS Prospects in Mathematics Meetings, can be found at: www.lms.ac.uk/events/previous-prospects-in-maths-meetings.

Before submitting: Organisers are welcome to discuss informally their ideas with the Marta Mazzocco (Chair of the Prospects in Mathematics Steering Group) (lmsmeetings@lms.ac.uk).

Mentoring African Research in Mathematics (MARM)
Call for prospective mentors

The London Mathematical Society (LMS) and the International Mathematical Union (IMU) Commission for Developing Countries in association with the African Mathematics Millennium Science Initiative (AMMSI) are seeking applications for grants to support mathematics and its teaching in universities in Africa. Four mentoring partnerships are to be awarded, each for a duration of two years.

The project is designed to counter the mathematics 'brain-drain' by supporting qualified mathematics professionals in situ. Continuing professional links to a centre in the developed world, professional mentoring and opportunities for periodic research travel will contribute to the possibility and relative attractiveness of contributing one's mathematical expertise at home rather than moving permanently to the developed world.

The MARM awards will focus on building infrastructure and networking in mathematics in Africa. They offer postgraduate scholarships, visiting lectureships and conference support for the benefit of advanced students and young researchers in the mathematical sciences, helping to improve research and graduate education in the longer term.

The MARM programme will support mentoring relationships between mathematicians in countries with a strong mathematical infrastructure and their African colleagues, together with their students. Its sharpest focus is on cultivating longer-term mentoring relations between individual mathematicians and students.

17 mentoring relationships have previously been supported through a MARM project (funded by the Nuffield Foundation and Leverhulme Trust) in Cameroon, Congo, Ethiopia, Ghana, Ivory Coast, Kenya, Morocco, Nigeria, Rwanda, South Africa, Tanzania and Uganda. This further initiative aims to build on these successes and to continue to support mathematics in Africa.

We are looking for mathematicians interested in being part of such mentoring collaborations. We welcome applications from those with no prior experience of collaborating with research workers in Africa, as well as from those with existing links with African research.

Prospective mentors are required to consider the list of African Institutions and proposed collaboration areas (lms.ac.uk/grants/mentoring-african-research-mathematics) and to indicate which Institution they would like to collaborate with.

We will expect a willingness to make at least one short visit to Africa and to host a short visit from Africa, as well as a commitment to a continuing mentoring responsibility.

The success of the collaborations will be evaluated by asking whether the research collaboration has:

- resulted in a mathematical publication in a research mathematics journal of international standing;
- produced an MSc or PhD thesis;
- formed the basis of an on-going research group; or
- resulted in programmatic improvements in or outside support for advanced mathematics at the host institution

To discuss potential partnerships please contact: Frank Neumann, by email: fn8@mcs.le.ac.uk

Further information is available and submission forms can be downloaded from the LMS website (lms.ac.uk/grants/mentoring-african-research-mathematics).

Application forms should be sent to: Katy Henderson, Council and Society Officer marm@lms.ac.uk; tel: +4420 7927 0809

The deadline for the receipt of applications is Friday **13 May 2016.**

MATHEMATICS POLICY ROUND-UP
April 2016

RESEARCH

Response to Stern Review
The Council for the Mathematical Sciences (CMS) has responded to the Stern Review of the Research Excellence Framework (REF). The response is available on the CMS website at http://tinyurl.com/zh6snr6.

Balancing Capability call for evidence
Balancing Capability is one of three strategies in the EPSRC *Strategic Plan* and EPSRC is reviewing the research area rationales to reflect how the research base has changed over the past five years. EPSRC is inviting input from the research base and wider stakeholders to help identify further evidence to support its own evidence, knowledge and analysis.

For the Mathematical Sciences the guidance document states that EPSRC is particularly interested to receive evidence in the following research areas:

Algebra; Complexity Science; Continuum Mechanics; Geometry & Topology; Logic and Combinatorics; Mathematical Analysis; Mathematical Biology; Mathematical Physics; Non-linear systems; Numerical Analysis; Operational Research; and Statistics and Applied Probability.

The returns period opened on **11 April** and will close on **3 June 2016**. More information is available at http://tinyurl.com/zmx4ew3.

EPSRC Deputy CEO announced
Professor Tim Rodden has been appointed as the Deputy CEO of EPSRC, a new position created to work alongside CEO Professor Philip Nelson while he also acts as Chair of RCUK Strategic Executive.

Professor Rodden joins EPSRC on secondment from the University of Nottingham where he is currently Professor of Computing. More information is available at http://tinyurl.com/je3th56.

HIGHER EDUCATION

Funding of £3.7 billion for higher education in 2016-17
HEFCE will invest £3.7 billion in recurrent and capital funding for universities and colleges in the academic year 2016-17. The breakdown of funding is research £1.6bn; teaching £1.4bn; knowledge exchange £0.2bn; capital funding £0.2bn; national facilities and initiatives £0.1bn

Funding for recurrent research has increased by £20 million compared with 2015-16. Funding for teaching has been reduced by £21 million. Within teaching, the total budget for high-cost subjects such as science, technology, engineering and mathematics will be maintained in real terms. More information is available at http://tinyurl.com/jz34lk8.

SCHOOLS AND COLLEGES

Far reaching review of 16-18 mathematics education
In his recent budget the Chancellor George Osborne announced that he has asked Professor Sir Adrian Smith, Chair, Council for the Mathematical Sciences, to review the case for how to improve the study of mathematics from 16 to 18, to ensure the future workforce is skilled and competitive, including looking at the case and feasibility of all students continuing to study Mathematics to 18, in the longer term. The review will report during 2016. More information will be available in due course.

How demanding are questions in new A-level mathematics?
Ofqual is planning to conduct a research study to support the accreditation process for new A-level mathematics qualifications.

The research will take place in July this year and aims to 'compare the level of

difficulty of exam boards' sample assessment materials by having judges compare pairs of exam questions'. The qualifications are being taught for the first time in September 2017. More information is available at http://tinyurl.com/zofqpwh.

Mathematics A-level adds 11% to earnings

A study published in the *British Education Research Journal* has found that students who take A-level mathematics receive an 11 per cent premium on their salary by the time they are 34 years old.

Academics from the University of Nottingham examined data from more than 2,000 people born in 1970. Those people who had taken A-level mathematics earned between 2 and 21 per cent on top of the salary predicted by all other contributing factors. This equated to an average salary premium of 11 per cent. No other A-level subject attracted a wage premium in the same way.

The full paper is available at http://tinyurl.com/zd44hne.

Dr John Johnston
Joint Promotion of Mathematics

CHALKDUST EVENTS

The end of the winter drew near and with it, the final touches were firmly applied to the magazine. As the temperature of the air and soil warmed up and flowers started to blossom, the birth of the *Chalkdust* Spring Issue drew ever closer. At precisely 3.14 pm (∏ to two decimal places) on the 14 March (American Pi Day), the mathematics department common room at University College London opened its doors, welcoming the multitude of students, staff members, colleagues and friends who were waiting to celebrate the release of the third issue, on a special day marked by a rather special number. Möbius strips hung above huddles of curious readers, with hundreds of copies of *Chalkdust* impeccably arranged alongside a selection

Students reading Chalkdust

LMS NEWSLETTER

of treats. Some people queued up for the mathematically-themed tombola (primes for prizes), while others purchased the stylish Chalkdust T-shirts. A perfect atmosphere for maths lovers wanting to fulfil the desires of their minds and stomachs.

Chalkdust had made it to its first birthday and had published three issues along the way. In order to mark this anniversary, it felt fitting that this issue should have a second celebration. So on the 16 March, a mathematical pub quiz was held at UCL's Print Room Café, with many of our readers taking part. The battle of mathematical minds was under way: an hour and a half of mathematical challenges, maths-related news questions and spot the fake paper titles. In the end, one team stood above the others and was declared victorious. If you couldn't attend, fear not: the quiz is on our website (www.chalkdustmagazine.com).

The magazine's stunning cover — adapted from Mark J. Stock's *Spherical Dendrite* — draws readers to the marvels within: a mathematical view of voting systems, the half derivative of functions, how to teach matchboxes to play noughts and crosses, and a history of analogue computing. This issue also contains a biography of Martin Gardner as well as an in-depth interview with one of the UK's most prolific popularisers of mathematics, Ian Stewart (who between 1968 and 1980 was involved in a similar magazine called *Manifold*). If that wasn't enough, lie back and enjoy our hilarious Dear Dirichlet column, where our agony professor answers your personal problems. Or, if you're feeling competitive, enter our fiendishly difficult Crossnumber and stand a chance of winning £100 worth of maths goodies.

Thanks to the growing backing of sponsors, we have already delivered close to 2,500 copies of *Chalkdust* to mathematics departments across the country, completely free of charge. If you are at a university and would like some copies to be distributed there, please get in touch with us directly at contact@chalkdustmagazine.

com. The magazine is available online at www.chalkdustmagazine.com, where you can also request copies for your institution (if you are not at a university), sign up to our newsletter or read our weekly blog.

Chalkdust's existence would not be possible without the wonderful support and contribution of our colleagues and growing readership, many of whom have dedicated their time to create the thought-provoking, fun content that you can find in the magazine and weekly blog. We would like to thank you all.

Preparation for Issue 4 is well underway, and we look forward to receiving articles or content ideas for it from you, our readers. Please get in touch with us at contact@chalkdustmagazine.com. Issue 4 will be published in Autumn 2016, but in the meantime, as well as following our weekly blog, you can keep in touch with us on Twitter (@Chalkdustmag) and Facebook (/Chalkdustmag).

Ehsan Shahriari
Chalkdust Secretary

LMS Midlands Regional Meeting
and Workshop on

Interactions of Harmonic Analysis and Operator Theory

Birmingham, 13-16 September 2016

MINI-COURSES

Kaj Nyström
Uppsala Universitet

Javier Parcet
Instituto de Ciencias Matemáticas

CONFIRMED SPEAKERS

Pascal Auscher
Université Paris-Sud

Charles Batty
University of Oxford

Tony Carbery
University of Edinburgh

Andrea Carbonaro
Università degli Studi di Genova

Dorothee Frey
Delft University of Technology

Véronique Fischer
University of Bath

José María Martell
Instituto de Ciencias Matemáticas

Sylvie Monniaux
Aix-Marseille Université

Detlef Müller
Christian-Albrechts-Universität zu Kiel

Fulvio Ricci
Scuola Normale Superiore

Maria Vallarino
Politecnico di Torino

Organisers: Alessio Martini and Andrew Morris (Birmingham)

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http://web.mat.bham.ac.uk/lmsmidlands2016/

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General Society Meeting & Hardy Lecture 2016

Friday 8 July 2016
BMA House, Tavistock Square, London (Nearest Tube: Euston)

3.30   Opening of the meeting and LMS business, including the announcement of the 2016 Prize winners (open to all)

Tony Scholl
Plectic Structures in Number Theory and Geometry
Abstract: *Many spectacular results in number theory have been obtained through the study of Shimura varieties. These are algebraic varieties, defined initially as quotients of Hermitian symmetric spaces by arithmetic groups, which have a very rich arithmetic structure. Joint work with Jan Nekovář suggests that there a large class of Shimura varieties which even more symmetry. This "plectic structure" should have striking arithmetic consequences. In this talk we will describe this (for now largely conjectural) picture.*

4.45   Tea/Coffee

5.15   Jacob Lurie (Harvard) – Hardy Lecture
Weil's Conjecture for Function Fields
Abstract: *Let q be a positive definite quadratic form with integer coefficients. We say that another such quadratic form q' is in the genus of q if, for every positive integer n, the quadratic forms q and q' differ by a change of variable when reduced modulo n. Up to a change of variables, there are only finitely many quadratic forms in a genus. Moreover, there is a formula (the "mass formula" of Smith-Minkowski-Siegel) which counts the number of quadratic forms within a genus. This mass formula was reformulated by Tamagawa and Weil as a statement about the volume of certain adelic homogeneous spaces for the special orthogonal group SO(n). This led Weil to conjecture an analogous statement for the volumes of homogeneous spaces for other groups, which he verified in a number of cases and has subsequently been proven by Langlands, Lai, and Kottwitz. In this lecture I'll describe joint work with Dennis Gaitsgory which establishes the function field analogue of Weil's conjecture, using techniques inspired by algebraic topology*

6.30   Reception at De Morgan House
7.30   Society Dinner to be held at a 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. To register for your place at the meeting, please email Elizabeth Fisher (lmsmeetings@lms.ac.uk). If you would like to attend the Society Dinner, please email Elizabeth Fisher (lmsmeetings@lms.ac.uk). The cost to attend the Society Dinner is £35.00 per person (inclusive of wine).

1865 - 2015

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LMS GRADUATE STUDENT MEETING

London (UCL, JZ Young, Lecture Theatre, Gower Street, London)
8th July 10.00 - 15.30

This meeting is intended as an introduction to the Society Meeting later in the day. All graduate students (and indeed any other mathematicians) are welcome.

Speakers: **Ian Grojnowski (Cambridge)** and **Ambrus Pal (Imperial College)**

Student Talks (Six slots available)

Students are invited to give short talks (15 minutes) aimed at a general mathematical audience. Prizes will be awarded for the best two talks. If you would like to give a talk, please email Anthony Byrne (lmsmeetings@lms.ac.uk) by 24 June

To register, please email Anthony Byrne (lmsmeetings@lms.ac.uk) by email by 1 July. Places are free and all refreshments including lunch will be provided.

Travel grants of up to £50 are available for students who attend both the Graduate Student Meeting and the LMS General Meeting.

The LMS General Meeting is a Society Meeting, which is open to all.

Tony Scholl (Cambridge) will give the first lecture on *Plectic Structures in Number Theory and Geometry.* **Jacob Lurie (Harvard)** will give the **2016 Hardy Lecture;** *Weil's Conjecture for Function Fields.*

The meeting will also be held at the JZ Young Lecture Theatre, UCL.

After the Society Meeting, there will be a reception at De Morgan House, 57-58 Russell Square. WC1B 4HS

For further details see: www.lms.ac.uk/content/society-meetings

1865 - 2015

IN HONOUR OF SOPHIE GERMAIN

As part of the activities of the French annual *Week of Mathematics* Sophie Germain was honoured at the Institut Henri Poincaré, Paris, on 18 March 2016 in collaboration with the postal service who put on sale a new stamp dedicated to the mathematician, the realisation of a proposal of an anonymous philatelist of 2014. To date, there seems to be only one other woman mathematician, Sofia Kovaleskaya, celebrated by a stamp (USSR, 1951 and Russia 1996).

An exhibition on Sophie Germain prepared for this occasion by historians of mathematics Catherine Goldstein and Jenny Boucard is on display. Talks on *The Sophie Germain Primes* by Goldstein and on *Sophie Germain in the Face of Prejudices* by Anne Boyé were both aimed at high school students while a round table discussion around Germain was steered by Cedric Villani.

Sophie Germain (1776-1831) was born in Paris and started studying mathematics all by herself at the age of 13 when the French revolution broke out. Her family tried unsuccessfully to prevent her from pursuing this inacceptable passion. At 18, unable to enter the newly founded all-male École Polytechnique she nevertheless obtained the course material. She corresponded with stalwarts of the time like Gauss and Lagrange under the male pseudonym of Antoine-August Le Blanc, unsure of revealing her female identity. She was later unmasked and yet continued to impress them by her work. Germain was the first woman scientist allowed to participate in the events of the Institut de France and was posthumously awarded an honorary doctorate by the University of Göttingen.

The stamp highlights *Sophie Germain's Theorem* which occurs as a footnote in Legendre's 1823 memoirs and is perhaps her only widely known result. It establishes, for both p and $2p + 1$ being odd primes, the *first case* of Fermat's Last Theorem, i.e. when the equation $x^p + y^p = z^p$ is satisfied for integers x, y, z and an odd prime p, then p divides

the product xyz. Recent studies of her unpublished manuscripts and letters show that her work is actually more general than this one special case.

Other than Number Theory she contributed to Mathematical Physics and explained the experimentally obtained curves of vibrations of elastic surfaces of Chladni with a mathematical model opposed to that suggested by Poisson. She ultimately won the *Grand Prix of the Academie des Sciences* (1816) for this. The stamp reproduces one of her drawings.

Her work on the philosophy of science, published posthumously, influenced positivists like August Comte. Yet in general Germain had remained isolated and under acknowledged, with no institutional support.

The stamp has been designed by Edmond Baudoin who despite a long illustrious career had not drawn a postage stamp before. The artist confides to being apprehensive of his responsibility and says that he had to put aside his awe of the future consequences of this drawing to work with a certain lightness of spirit! Baudoin is quoted as saying: "It was important for me that the face resembled as much as possible that of a contemporary woman's while using the strokes of the period." The intaglio print engraving is due to Elsa Catelin.

Gautami Bhowmik
Université de Lille 1

CHERN ENDOWMENT

The Mathematical Sciences Research Institute (MSRI) is very pleased to announce a new $5 million endowment, named in honor of Shiing-Shen Chern. Chern (an LMS Honorary Member, elected in 1986), was one of the three University of California, Berkeley professors who founded MSRI in the early 1980s, and the fund will support the most distinguished mathematicians participating in MSRI's programs.

© David Eisenbud, MSRI

MSRI is one of the world's preeminent research centres for mathematics, overlooking the UC Berkeley campus. Mathematicians from around the world – over 1,700 per year – come to MSRI for focused periods of research and collaboration with colleagues in their particular field. The Institute was envisioned by Chern and two other UC Berkeley mathematics professors, Calvin Moore and I.M. Singer, in response to a 1979 call for proposals from the National Science Foundation (NSF). MSRI is one of the largest single projects funded by the NSF's Division of Mathematical Sciences and has received continuous US government support for more than three decades, in addition to substantial support from other government agencies, private foundations, corporations, individual donors, and more than 100 academic institutions.

In 1982, MSRI began full scientific operation with Chern as the founding director, and by 1984, a new building was constructed, which was greatly expanded in 2006 with state of the art facilities. The renovated building was named in Chern's honor, as in addition to his role in the development of MSRI, he gave the first significant gift to kick off the capital campaign. Chern remained active in MSRI through the late 1990s, and a reminder of his presence can be found in the statue by sculptor Wei Li (Willy) Wang which greets visitors to MSRI.

Chern's legacy was not limited to his work in Berkeley; among his great mathematical accomplishments were the generalization of the Gauss-Bonnet theorem and the definition of characteristic classes in complex geometry. Through Chern's influence, Chinese government leaders brought Western mathematicians to China and sent Chinese students to study abroad. His establishment of the Nankai Institute of Mathematics, known today as the Chern Institute of Mathematics, provides a base for international interaction and research collaboration, and upon his death in 2004 in Tianjin, over 20,000 people attended his funeral.

The Shiing-Shen Chern Endowment is funded by Chern's children, Paul Chern and May Chu; and by one of Chern's collaborators, Jim Simons, and Marilyn Simons. (Simons, now retired from a successful career in finance, co-authored papers with Chern when he was a mathematician, including the 1974 development of Chern-Simons theory.) Starting soon, MSRI will name at least one 'Chern Professor' each semester. This generous endowment will help the Institute to invite more of the most distinguished mathematicians to Berkeley, as they are the core of MSRI's scientific programs, taking the lead in mentoring postdoctoral fellows and other junior members.

For more information about MSRI, visit www.msri.org or contact Jennifer Murawski (jmurawski@msri.org).

Jennifer Murawski
MSRI Communications and Events Coordinator

LMS NEWSLETTER   http://newsletter.lms.ac.uk

SIR CHRISTOPHER ZEEMAN: A CELEBRATION

There will be a meeting celebrating Christopher Zeeman's life on 11 June 2016 at the Warwick Mathematics Institute. It will commence with lunch from 12:00 to 14:00, the main event from 14:00 to 16:00 followed by tea and coffee from 16:00 to 17:00. If you are attending the event, or if you intend to come to the lunch before the event register at http://tinyurl.com/j36334n. Further details can be found from the link on the Mathematics Institute website at http://warwick.ac.uk/czc

EUROPEAN NEWS

IHES Summer Schools

Since 2006, IHES (Paris) has been organising Summer Schools aiming to provide PhD students, post-docs and young researchers with an overview of recent developments in key subjects of mathematics and/or theoretical physics. In order to perpetuate this important activity, IHES is launching a call for proposals for future Summer Schools on any discipline of mathematics and theoretical physics to be held in July 2018 and 2019 over two-week periods.

Hosting a Summer School has become a priority in the scientific policy conducted by IHES, and the Institute allocates substantial funds to it. However, search for additional funding is crucial and the Institute is supporting prospective organisers to make proposals that will be discussed after the selection. IHES can also provide help in submitting funding applications. The deadline is 20 May 2016. For further information visit www.ihes.fr.

The following items are from the European Mathematical Society web page www.euro-math-soc.eu/recent-news.

Planet Earth: Competition

IMAGINARY, UNESCO, the International Mathematical Union (IMU), and the International Commission on Mathematical Instruction (ICMI) are opening a second international competition for exhibition modules to enrich the current Mathematics of Planet Earth (MPE) virtual exhibition. The competition aims in particular to address the challenges in Africa, as well as in other regions of the world. The deadline is 30 June 2017. For further details (including information about prizes) go to http://imaginary.org/content/new-mpe-exhibits.

EMS Council

The EMS supreme authority, the Council, will convene from 16 to 17 July in Berlin. There will be much to discuss, most importantly the choice of the site of the next European Congress in 2020, and the renewal of the Executive Committee (EC). Members are encouraged to nominate candidates who could stand to fill vacancies in the EC.

Simons Foundation in Africa

The EMS expresses its gratitude to the Simons Foundation which has offered a substantial sum to support young African mathematicians. The EMS Committee for Developing Countries is currently working on concrete proposals for its use.

EMS Newsletter

The March edition of the Newsletter is available online at http://tinyurl.com/jw5gyc5 under the new editorship of Valentin Zagrebnov of the Analysis-Geometry-Topology group at the Institut de Mathématiques de Marseille. As well as the usual reports, problems and book reviews there are substantial mathematical articles on geometric complexity theory (J.M. Landsberg), nonintegrable distributions (F. Presas) and geometry of polynomial ODEs (S. Yakovenko), and an article of wider interest on How Mercator Did It in 1569 by J.A. Gaspar and H. Leitão. Christine Laurent-Thiébaut offers an account of the mathematical works of Pierre Dolbeault who died last year, Virginia Agostiniani writes about being a Mum and a Postdoc at SISSA, Trieste, while our own Stephen Huggett contributes a piece on the 150th anniversary of the LMS. As always, a very good read.

David Chillingworth
LMS/EMS Correspondent

LMS INVITED LECTURER 2017: PROFESSOR JIM AGLER

Professor Agler will give the LMS Invited Lecture Series 2017 on *Function theory by Hilbert space methods* at the Herschel Building of Newcastle University 18 to 22 April 2017.

Jim Agler is a Professor of Mathematics at the University of California, San Diego. He has made deep contributions to mathematical analysis; he is also an outstanding expositor. His work has had a profound influence on operator theory, interpolation theory, several complex variables and noncommutative analysis.

Many of his papers are on the topic of analytic functions in one or more variables, and show how quite elementary facts about operators on Hilbert space can be used to solve problems in function theory and complex geometry. His ideas about the function theory and complex geometry of polydiscs have led to the widespread study of what is now called the Schur-Agler class of functions on the polydisc.

He is co-author with J.E. McCarthy of an elegant graduate text *Pick Interpolation and Hilbert Function Spaces*.

In 2016 he was elected a Fellow of the AMS for outstanding contributions to operator theory and the theory of analytic functions of several complex variables.

The annual Invited Lecturers scheme aims to bring a distinguished overseas mathematician to the United Kingdom to present a small course of about ten lectures spread over a week. Each course of Invited Lectures is on a major field of current mathematical research, and is instructional in nature, being directed both at graduate students beginning research and at established mathematicians who wish to learn about a field outside their own research specialism.

Dr Zinaida Lykova
Newcastle University
zinaida.lykova@newcastle.ac.uk

IMU BREAKOUT GRADUATE FELLOWSHIP PROGRAM

The International Mathematical Union (IMU) has recently launched the novel IMU Breakout Graduate Fellowship Program.

Thanks to a generous donation by the winners of the Breakthrough Prizes in Mathematics – Ian Agol, Simon Donaldson, Maxim Kontsevich, Jacob Lurie, Terence Tao and Richard Taylor – IMU with the assistance of FIMU (Friends of the IMU) and TWAS (The World Academy of Sciences) has launched a fellowship program to support postgraduate studies in a developing country, leading to a PhD degree in the mathematical sciences. The IMU Breakout Graduate Fellowships will offer a limited number of grants for excellent students from developing countries. The program will be administered by CDC (Commission for Developing Countries), a commission of IMU.

Professional mathematicians are invited to nominate highly motivated and mathematically talented students from developing countries who plan to complete a doctoral degree in a developing country, including their own home country. Nominees must have a consistently good academic record from the high school level and must be seriously interested in pursuing a career of research and teaching in mathematics.

The deadline for online nominations (http://tinyurl.com/gov7yfv) is 9:00 am CET on **22 June 2016**. Please help in making this initiative widely known.

Martin Raussen
Aalborg University, Denmark

MARY CARTWRIGHT LECTURE

Report

The Mary Cartwright Lecture 2016 was held at De Morgan House, London on Friday 26 February 2016. The Mary Cartwright Lecture is an annual Women in Mathematics event organised by the London Mathematical Society and forms part of the annual programme of Society Meetings. The meeting brought together over 40 mathematicians from all over the country.

Professor Simon Tavaré, President of the LMS, opened the meeting and shortly after Dr Eugenie Hunsicker, Chair of the LMS Women in Mathematics Committee, spoke about the importance of these meetings to encourage early-stage researchers to pursue a career in mathematics. She then introduced the first speaker, Professor Lasse Rempe-Gillen from the University of Liverpool, who gave the opening lecture on *Hairs, dreadlocks and Cantor bouquets*.

Following an introduction to the iteration of transcendental entire functions and an overview of the history of the area, Professor Rempe-Gillen explained the dynamics of a function that was already considered by Fatou in 1926. He then presented some of his many contributions on the subject mostly regarding the escaping set, a set that arises naturally in the iteration of transcendental entire functions. In particular, he gave a positive answer to a question of Fatou by presenting a large class of functions for which the escaping set consists of *hairs* going off to infinity (a *Cantor bouquet*). Finally, he spoke about functions without hairs and what we can say in this case which led him to introduce some topologically intricate sets called *dreadlocks*.

The opening lecture was followed by a break with tea and coffee which gave the opportunity for discussions among participants.

After the break, Dr Eugenie Hunsicker introduced this year's Mary Cartwright lecturer, Professor Gwyneth Stallard from The Open University, highlighting some of her achievements as a mathematician and also as a former Chair of the LMS Women in Mathematics Committee. Professor Stallard has recently been awarded an OBE for her contributions to the promotion of women in mathematics. Her talk was titled *Pits, gaps and spiders' webs*.

Her talk started by presenting two famous open problems in the area of holomorphic dynamics (Baker's conjecture and Eremenko's conjecture) that have motivated her research. She then introduced a structure called a *"spider's web"* which has surprising connections to these two conjectures and gave some classes of functions
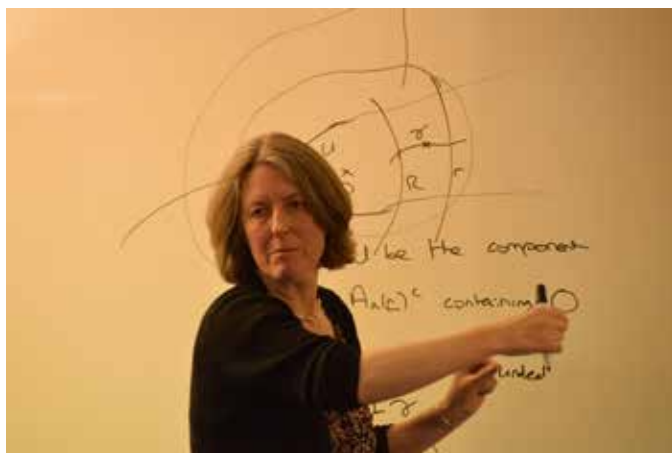
Professor Gwyneth Stallard
Mary Cartwright Lecturer

for which a subset of the escaping set, known as the *fast escaping set*, is a spider's web. Halfway through the talk Professor Stallard spoke about Mary Cartwright's home village, showing some pictures, and described some of her contributions on the minimum modulus which have connections to Professor Stallard's work. After that, she presented her result (joint work with Professor Philip Rippon) that all the components of the fast escaping set are unbounded, an important result towards Eremenko's conjecture. Finally, Professor Stallard talked about her work in progress which shows,

roughly speaking, that a certain subset of the fast escaping set is either a Cantor bouquet or a spider's web. During her talk, Professor Stallard described how crucial it had been to receive the support of her colleagues in certain moments of her career, especially after maternity leave, so that she could continue doing research.

After the Mary Cartwright Lecture there was a wine reception at De Morgan House which was followed by a dinner at the Thistle Bloomsbury Park Hotel.

Vasiliki Evdoridou and David Martí-Pete
The Open University

SUBLIME SYMMETRY: MATHEMATICS AND ART

What follows is a fragment of my talk at the opening of the Exhibition Sublime Symmetry: The Mathematics behind De Morgan's Ceramic Designs, in Towneley Hall, Burnley, on 5 March 2016. The Exhibition is the first one in Sublime Symmetry Tour, www.demorgan.org.uk/ sublime-symmetrytouring-exhibition, organised by The De Morgan Foundation and supported by the LMS.

Alexandre Borovik
University of Manchester

Last year, the London Mathematical Society celebrated its 150th Anniversary; it was founded in 1865 by Augustus De Morgan, father of William De Morgan.

Augustus De Morgan obviously influenced his son's world view, mathematical in its nature. This is why I will try to explain the roles of symmetry in mathematics and in the Art – as we understand them now.

Mathematics is the art of precision; it deals with mental constructions and procedures which can be reproduced with arbitrary (you may wish to say, absolute) precision. A theorem proved by Euclid (and William De Morgan was an admirer of Euclid) is just as true and valid now,

two millennia after Euclid's time. Transfer of mathematical knowledge from generation to generation has never resulted in schisms of the kind that triggered one religious war after another – and these wars continue to burn right now, as we speak here.

I'll show you now a simple example of high precision reproduction of a mathematical object. As you see, I hold two paper napkins, and I'll fold them for you in two different ways.

I fold the first napkin that way:
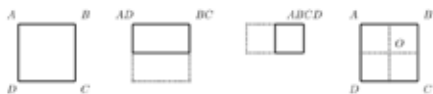
and another napkin that way:
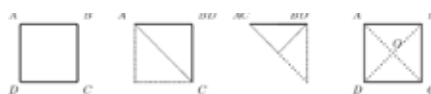
As you can see, in the both napkins the point, where the two creases intersect, is the same point, the centre of the square. And this is a mathematical fact: it was true 2,000 years ago, and it is true now. Please notice also that the

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resulting patterns of creases are very symmetric – moreover, they have well established symbolic meanings: for example, in the second napkin it is the distinctive St. Andrew's cross.

And now I can formulate a simple principle:

Symmetry of an object is a proof of precision of the process that led to its creation.

This is almost a banality; but this is one of really important roles of symmetry: it acts as a certificate of precision of reproduction, and this equally applies to Mathematics, to Nature and to Art.

Let us have a look at one of the most elaborate objects of beauty in Nature: a peacock's tail. It has attracted the attention of artists over millennia, and was noticed by William De Morgan, you have of course seen his Peacock Dish at this exhibition.

The wonderful ornament of a peacock's tail makes sense only if it is appreciated by peahens. What kind of message does it send to a peahen? That a high precision, high symmetry ornament of a feather (the famous eye) formed by thousands of individually colored hairs independently growing from the feather's stem could be produced only by an exceptionally fine-tuned copying mechanism. And


William De Morgan: Peacock dish

this mechanism is encoded in a peacock's genes. Hence a peacock with an elaborate tail can be a good biological father of peahen's chicks – her own genes will benefit from high precision copying.

Why are peacocks' tails attractive to humans? Because in humans as a species, biological beauty is a marker for healthy genes. A beautiful face is, first of all, a bilaterally symmetric face. A beautiful body is (almost) bilaterally symmetric.

And, not surprisingly, beauty as a biological stimulus is the basis of visual art, bringing with it artists' and spectators' attention to (and maybe even obsession with) symmetry. As we can see in this Exhibition:

Symmetry in art is the human face of mathematics

William De Morgan's art shows that mathematics is human. From the bottom of my heart – thanks to everyone who helps to spread this message.
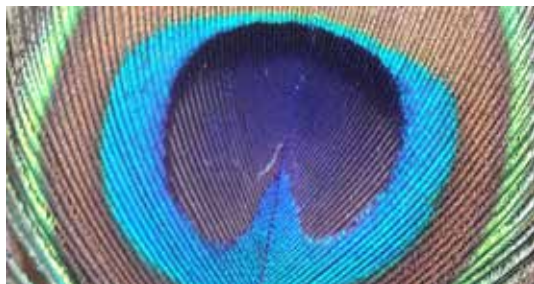
Close-up of a peacock feather

CECIL KING TRAVEL SCHOLARSHIP

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

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

Applicants must be nationals of the UK or the Republic of Ireland, either registered for or having completed a doctoral degree within 12 months of the closing date.

Applications should be made using the form available on the Society's website (**www.lms.ac.uk/prizes/cecil-king-travel-scholarship**) or by contacting education@lms.ac.uk. The closing date for applications is **Monday 6 June 2016**. It is expected that interviews will take place in London in late June or early July.

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

The London Mathematical Society is a registered charity for the promotion of mathematical knowledge.

Combinatorics and Operators in Quantum Information Theory

LMS Research School
Queen's University, Belfast
5-9 September 2016
Organisers: I. G. Todorov (QUB) and S. Severini (UCL)

Course outline
In the past decade, progress on zero-error quantum information has not only strength-ened the existing links with graph theory, but has also uncovered new and unexpected connections with operator algebras and optimisation. This has led to the formation of a new area on the crossroad of quantum computing, combinatorics, operator theory and mathematical programming. The purpose of the School is to introduce PhD students and young researchers to both its methods and problems, discussing topics such as zero-error capacities, graph entropy, quantum graph parameters, games for quantum players, quantum correlations, conic optimisation and communication complexity.

The three main lecture courses are:

- *Graphs and information theory* (Andreas Winter, Barcelona/Bristol)
- *Non-commutative order in quantum games* (Vern Paulsen, Waterloo)
- *Optimisation methods in quantum information theory* (Monique Laurent, Amsterdam/Til-burg and Jop Briët, Amsterdam)

These lecture courses will be supplemented by tutorial sessions.
For further information please visit: http://www.qciao.org

Apply by Friday 27 May 2016 using the registration form available at:
https://www.surveymonkey.co.uk/r/RS-23ApplicationForm

Research students, post-docs and those working in industry are invited to apply.
Numbers will be limited and those interested are advised to make an early application.
Registration Fees: Graduate Students(£150); Early Career Researchers (£250)

1865 - 2015

Queen's University Belfast

Heilbronn Institute for Mathematical Research

CMI

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Modern topics in Nonlinear PDE and Geometric Analysis

LMS-CMI Research School, Reading, 4-8 July 2016

Organisers: Stefanos Aretakis (Princeton, USA) and Nikos Katzourakis (Reading, UK). For further information please visit: http://ow.ly/VA0cK. The three main lecture (6+2)-hour courses will be:

- Course 1: Nonlinear PDE and Calculus of Variations
  Lawrence C. Evans (Berkeley, USA) - *Nonlinear PDE and optimisation*
  Jan Kristensen (Oxford, UK) - *Convexity notions in the Calculus of Variations*
- Course 2: Geometric Hyperbolic PDE, General Relativity & Fluid Dynamics
  Mihalis Dafermos (Princeton, USA - Cambridge, UK) - *The stability problem for black holes*
  Gustav Holzegel (Imperial College, UK) - *The formation of shocks in three dimensional fluid dynamics*
- Course 3: Geometric Nonlinear PDE
  Bernard Dacorogna (EPFL, Switzerland) - *The pull-back equation for differential forms*
  Spyros Alexakis (Toronto, Canada) - *On dynamical stability of singular Ricci solitons under Ricci flow*
- The distinguished guest lecturers are **Robert Jensen** (Chicago, USA) and **Juan Manfredi** (Pittsburgh, USA)

Applications should be made by 11 April using the form at http://ow.ly/VA0i0. Research students, post-docs and those working in industry are invited to apply. Numbers will be limited and those interested are advised to make an early application. *All applicants will be contacted within two weeks after the deadline.

All research students will be charged a registration fee of £150 and all early career researchers will be charged a registration fee of £250. There will be no charge for subsistence costs fro these groups. All other participants (e.g. those working in industry) will be charged a registration fee of £250 plus the full subsistence costs.

All UK-based participants must pay their own travel costs. For overseas participants, support will be available to contribute towards travel costs. Fees are not payable until a place on the course is offered but will be due by Friday 27 May 2016.

University of Reading

Heilbronn Institute *for* Mathematical Research

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VISIT OF BRIAN WOOD

Professor Brian Wood (Oregon State University USA) will be visiting the UK between 29 May and 30 June 2016. Professor Woods works on the development and application of homogenisation techniques for systems of interacting species. Details of Professor Wood's talks during his visit are:

- Nottingham University, 31 May
  Does cell surface heterogeneity affect adhesion?
  (contact Reuben O'Dea: Reuben.O'Dea@nottingham.ac.uk)
- Oxford University, 10 June
  Does cell surface heterogeneity affect adhesion?
  (contact Sara Jolliffe: Sara.Jolliffe@maths.ox.ac.uk)
- University College London, 13 June
  Does cell surface heterogeneity affect adhesion?
  (contact Rebecca Shipley: rebecca.shipley@ucl.ac.uk)
- Glasgow University, 16 June
  Diffusion in cellular systems
  (contact Nick Hill: Nicholas.Hill@glasgow.ac.uk)

For further information about Professor Wood's visit, please contact Professor Helen Byrne (Helen.byrne@maths.ox.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF ALEXANDER KALYUZHNYI

Professor Alexander Kalyuzhnyi (Institute of Mathematics, Kiev) will be visiting the UK between 11 and 25 June 2016. Professor Kalyuzhnyi works on abstract (non-commutative) harmonic analysis and related questions of operator algebras theory. Details of Professor Kalyuzhnyi's talks during his visit are:

- Monday 13 June, York University (contact Alex Daletskii: alex.daletskii@york.ac.uk)
- Tuesday 14 June, Newcastle University (contact Evgenios Kakariadis: evgenios.kakariadis@newcastle.ac.uk)
- Friday 17 June, Swansea University (contact Eugine Lytvynov: e.lytvynov@swansea.ac.uk)

Further details of these arrangements may be obtained from Alex Daletskii (alex.daletskii@york.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF ALEXANDER SCHUSTER

Professor Alexander Schuster (San Francisco State University, California) will be visiting the UK from 5 to 17 June 2016. His research consists of the study of spaces of a single complex variable and operators that act on them with emphasis on functions analytic in the unit disk, entire functions, Bergman, Bloch and Fock spaces, and concrete operators such as multiplication, composition, Hankel and Toeplitz operators. During his visit Professor Schuster will lecture at:

- Leeds University, Thursday 9 June
  (contact Vladimir V. Kisis: kisilv@maths.leeds.ac.uk)
- University of Reading, Tuesday 14 June
  (contact Jani A. Virtanen: j.a.virtanen@reading.ac.uk)
- King's College London, Thursday 16 June
  (contact Eugene Shargorodsky: eugene.shargorodsky@kcl.ac.uk)

For further details contact Jani A. Virtanen (j.a.virtanen@reading.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF JEAN RENAULT

Professor Jean Renault (University of Orléans, France) will be visiting the UK between 6 and 18 June 2016. Professor Renault's expertise is in non-commutative dynamical systems and groupoid C*-algebras. He will give lectures at the following institutions:

- University of Aberdeen, June 6 at 4:15 pm
  Some groupoid techniques in mathematics
  (contact Dr Aaron Tikuisis: a.tikuisis@abdn.ac.uk)
- Queen Mary University of London, June 10 at 2 pm
  Random walks on Bratteli diagrams
  (contact Dr Xin Li: xin.li@qmul.ac.uk)
- Queen's University Belfast, June 17 at 2 pm
  Semigroups and higher rank graphs
  (contact Dr Ying-Fen Lin: y.lin@qub.ac.uk)

For further details please contact Ying-Fen Lin (y.lin@qub.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF ALEXANDER KOLPAKOV

Professor Alexander G. Kolpakov (Siberian State University of Telecommunications and Informatics, Novosibirsk, Russia) will be visiting UK between 1 and 24 June 2016. Professor Kolpakov has made significant contributions to Applied Mathematics and Continuum Mechanics, including development of efficient asymptotic techniques for inhomogeneous elastic structures. During his visit Professor Kolpakov will give the following presentations at:

- Keele University, 14 June
  Introduction into network approximation method for differential equations
  (contact Jonathan Healey: j.j.healey@keele.ac.uk)
- Cardiff University, 22 June
  Asymptotic decomposition in the problem of joined elastic beams and plates
  (contact Feodor Borodich: borodichfm@cardiff.ac.uk)
- Brunel University London, 23 June
  Solution of many-bodies capacity problem for a system of densely placed bodies
  (contact Aleksey Pichugin: aleksey.pichugin@brunel.ac.uk)

For further details contact Danila Prikazchikov (d.prikazchikov@keele.ac.uk). The visit is supported in part by an LMS Scheme 2 grant.

COLLOQUIA IN COMBINATORICS

Two linked one-day *Colloquia in Combinatorics* will be taking place in London. The first day will be held at Queen Mary, University of London, on Wednesday 11 May; the second will take place at the London School of Economics and Political Science on Thursday 12 May. It is hoped that the talks will be of wide interest to all those working in combinatorics or related fields. 2016 sees the tenth year of the *Colloquia in Combinatorics* and we are excited to celebrate this milestone. The schedule is as follows:

Queen Mary, University of London
11 May – 10.30 am – coffee from 10 am
Fogg Lecture Theatre, G.E. Fogg Building
- Karim Adiprasito (Jerusalem)
- Béla Bollobás (Cambridge)
- David Conlon (Oxford)
- Andrew Granville (Montréal)
- Daniela Kühn (Birmingham)
- Imre Leader (Cambridge)

London School of Economics
12 May – 10.30 am – coffee from 10 am
Wolfson Theatre, New Academic Building
- Alan Frieze (Pittsburgh)
- Monique Laurent (Amsterdam)
- Nati Linial (Jerusalem)
- James Maynard (Oxford)
- Benny Sudakov (Zürich)
- Yufei Zhao (Oxford)

Anyone interested is welcome to attend. Funds are available to contribute to the expenses of UK-based research students to attend the meetings. Further details can be obtained from tiny.cc/Colloquia or from Rebecca Lumb (r.c.lumb@lse.ac.uk).

There are also some funds available from the London Mathematical Society for help with childcare costs. Further details can be found on their website www.lms.ac.uk/content/childcare-supplementary-grants. The Colloquia is supported by an LMS Conference grant and from the British Combinatorial Committee.

ICFT 2016

The twentieth in a series of short annual meetings on integrable and conformal field theories and related topics will be held at King's College London from Friday 10 to Saturday 11 June 2016. These meetings promote the cohesion between UK researchers working in areas related to quantum integrable models, give young academics (PhD students and Postdocs) the opportunity to present their results and thereby allow them to establish themselves within the community, and showcase recent developments within the field by inviting key international speakers. The meeting consists of four long and four short talks spread over Friday afternoon and Saturday morning. Keynote speakers include:
• Olalla Castro-Alvaredo (City U. London)
• Daniele Dorigoni (Durham)
• Ingo Runkel (Hamburg)

The organisers have limited support for young UK-based researchers. The deadline for applying for support is **9 May 2016**. For more information visit the website http://tinyurl.com/icft2016 or contact the local organisers (Gerard Watts and Benjamin Doyon). The meeting is supported by an LMS Conference grant, the IOP Mathematical and Theoretical Physics Group and the Department of Mathematics, King's College London.

CELEBRATING THE NEW PROBABILITY GROUP AT LANCASTER UNIVERSITY

The working title of this meeting is *Random Permutations and Large Deviations for Markov Chains*. It will be held at Lancaster University on Wednesday 15 and Thursday 16 June 2016. The aim of this meeting is to celebrate the recent expansion of the Probability Group at the Department of Mathematics and Statistics at Lancaster University.

The aim of this event is to present the current research results in the field of random permutations, to discuss various aspects of limit theorems and large deviations for Markov chains and to discuss new approaches and new questions. Also the organisers would like to use this opportunity to share their research interests with their colleagues, including the Statistics Section.

For further information about this meeting visit the website at www.lancaster.ac.uk/maths/celeb_new_pb_group/. Anyone interested is welcome to attend. This meeting is organised by Dmitry Korshunov and Dirk Zeindler and is supported by an LMS Conference grant.

REPRESENTATIONS OF QUANTUM GROUPS AND CHEREDNIK ALGEBRAS

A one-day meeting titled *Representations of Quantum Groups and Cherednik Algebras* will be held in the School of Mathematics and Statistics at Newcastle University on 24 June 2016. It will consist of four talks in the afternoon, followed by the conference dinner. The speakers are:
• Iain Gordon (Edinburgh)
• Maxim Nazarov (York)
• Alexander Veselov (Loughborough)
• Martina Balagovic (Newcastle)

The organizer is Martina Balagovic.

Anyone interested is welcome to attend. Some funds are available to contribute to the expenses of early career researchers who wish to attend. Further details can be found at www.mas.ncl.ac.uk/representations/index.html.

The meeting is supported by an LMS Conference grant Celebrating New Appointments and by the School of Mathematics and Statistics at Newcastle University.

DISCONTINUOUS GALERKIN METHODS

The second workshop on *Recent Advances in Discontinuous Galerkin Methods* will take place at the Department of Mathematics and Statistics, University of Reading on Monday 13 June 2016. The speakers include:
- Paola Antonietti (Politecnico di Milano)
- Erik Burman (UCL)
- Alexandre Ern (CERMICS Paris)
- Charalambos Makridakis (Sussex)
- Sandra May (ETH Zurich)
- Frederick Qiu (Hong Kong)
- Jennifer Ryan (East Anglia)
- Claire Scheid (INRIA and Sophia Antipolis)
- Thomas Wihler (Bern)

Anyone interested is welcome to attend. Some funds may be available to contribute to the expenses of research students who wish to attend the meeting. The meeting is supported by an LMS Conference grant. For further information visit the website http://tinyurl.com/j8759q3 or contact the organizers Andrea Moiola and Tristan Pryer by email (ReaDG@reading.ac.uk).

MATHEMATICAL FOUNDATIONS IN BIOINFORMATICS

A post-graduate conference on *Mathematical Foundations in Bioinformatics* will be held at King's College London on 20 July 2016. This conference will bring post-graduate students and post-doctoral researchers together to present current mathematical research in the field of bioinformatics. The conference proceedings will be published in an international journal. Four key-note speakers will be in attendance. Participants are encouraged to submit their work. Financial support will be made available upon acceptance. Registration is free.

This conference is supported by an LMS Postgraduate Research Conference grant (Scheme 8) and the Department of Informatics, King's College London, UK. For further information contact Fatima Vayani (fatima.vayani@kcl.ac.uk).

ONE HUNDREDTH TRANSPENNINE TOPOLOGY TRIANGLE MEETING

The one hundredth *Transpennine Topology Triangle* (TTT100) meeting will take place at MIMS, School of Mathematics, University of Manchester from 6 to 7 September 2016

The TTT network links topologists at the Universities of Leicester, Manchester, Sheffield and beyond, and has been funded by an LMS Scheme 3 grant since 1995. The 100th meeting will be enhanced by additional LMS support to celebrate the occasion. As a result, there will be six talks over two days. These will include the Adams Memorial Lecture, delivered by Professor Hisham Sati of the University of Pittsburgh, who will speak about interactions between algebraic topology and theoretical physics. A similar theme may underlie one or two other talks. For further details, such as accommodation, programme, speakers and arrangements for the conference dinner, please see www.ma.man.ac.uk/~nige/ttt100.html or contact one of the organisers.

TTT100 will offer the usual level of

financial support to participants and speakers. Postgraduate students are particularly encouraged to attend, and may apply for funding to cover bed and breakfast at Weston Hall for the night of 6 September. Additional sponsorship is provided by MIMS, the Open University and the University of Sheffield.

Organised by Yumi Boote (yumi.boote@manchester.ac.uk), Nigel Ray (nigel.ray@manchester.ac.uk) and Gareth Williams (G.R.Williams@open.ac.uk).

THE STONE-CECH COMPACTIFICATION

A conference on *The Stone-Cech Compactification: Theory and Applications* will be hosted by the University of Cambridge between Wednesday 6 and Friday 8 July 2016. It will bring together experts from several of the areas that intersect at the Stone-Cech compactification: lectures will be given by:
- Ben Barber (Bristol)
- Mathias Beiglboeck (Vienna)
- Vitaly Bergelson (Ohio State)
- Garth Dales (Lancaster)
- Fred Dashiell (UCLA)
- Stefano Ferri (Universidad de los Andes)
- Neil Hindman (Howard University)
- Anthony Lau (Alberta)
- Imre Leader (Cambridge)
- Hanno Lefmann (Chemnitz)
- Randall McCutcheon (Memphis)
- Matthias Neufang (Carleton University)
- Ajit Iqbal Singh (Indian Statistical Institute)
- Juris Steprans (York University, Toronto)
- Dona Strauss (Leeds)
- Yevhen Zelenyuk (Witwatersrand)

The conference will run from the morning of Wednesday 6 July until lunchtime on Friday 8 July. There will be a Conference Dinner on the Thursday.

The organisers are Garth Dales (Lancaster) and Imre Leader (Cambridge).

Further information, including contact details, may be found on the website at www.dpmms.cam.ac.uk/events/stone-cech/.

There is some financial support available for UK-based research students. The meeting is supported by an LMS Conference grant and by Trinity College Cambridge.

P-ADIC L-FUNCTIONS DAY IN CAMBRIDGE

A conference on *p-adic L-functions and Related Topics* will be held on 1 June 2016 at the Department of Pure Mathematics and Mathematical Statistics in Cambridge. This one day conference will be an opportunity for people in Number Theory and Arithmetic Geometry to approach a new fascinating topic and for people with a good background to learn the state of art in the subject. There will be both introductory and research focused talks. The list of speakers includes:
- Yukako Kezuka (Cambridge)
- David Loeffler (Warwick)
- Guhan Venkat (UCL and Warwick)
- Christopher Williams (Warwick)
- Sarah Zerbes (UCL)

More information can be found on the conference webpage at http://tinyurl.com/hpvmxge. Registration is mandatory. Funding for travel and local expenses is available for UK based PhD students or young post-docs. When registering specify that you are applying for support. The conference is funded by an LMS Conference grant.

MACTUTOR CELEBRATION

A two-day conference on *Mathematical Biography* will be held at the University of St Andrews, the home of the MacTutor biographical website, from 16 to 17 September 2016. The aim of the meeting is to bring together mathematicians, biographers, historians, readers, and popular-

isers to discuss mathematical biographies, their cultural role, and the opportunities and challenges facing authors.

Invited speakers include: Jeremy Gray (Open University), Dagmar Mrozik (Wuppertal), Sydney Padua, Steven Skiena (Stony Brook), Graham Farmelo (Cambridge), Eva Kaufholz (Johannes Gutenberg), and Edmund Robertson (St Andrews).

Anyone interested is welcome to attend. Some funds are available to contribute to the expenses of research students who wish to attend. For more details, and registration, see www.mcs.st-and.ac.uk/mathbiog/.

The conference is organised by the British Society for the History of Mathematics and the School of Mathematics and Statistics, St Andrews University. It is supported by an LMS Conference grant and the Edinburgh Mathematical Society.

REPRESENTATION THEORY AND PHYSICS

A conference on *Representation Theory and Physics* will take place at Leeds University from 18 to 22 July 2016. There is a diverse range of international speakers with different aspects of representation theory and its application to physics represented. Covering the physics side will be speakers such as Saleur (as well as local participants such as Kadar and Martin). For Brauer algebras and blob algebras there are Daugherty, De Visscher, Doty and Ram. Other topics will be covered by Benkart (Kronecker products, Temperley-Lieb algebras), Erdmann (finite dimensional algebras), Graham (cellular algebras), Mazorchuk (partition algebras), Stroppel (KLR algebras, Brauer algebras and algebraic groups) and Ryom-Hansen (diagram algebras).

The organisers are Oliver King, Paul Martin and Alison Parker (Leeds), Stephen Doty (Loyola, Chicago), Karin Erdmann (Oxford) and Changchang Xi

(Beijing). Further information, including registration and contact details, can be found on the website at www.maths.leeds.ac.uk/representation-theory-and-physics.html.

There is some financial support available for research students and early career researchers. Enquiries should be made to the local organisers. The meeting is supported by an LMS Conference grant, the University of Leeds, and EPSRC.

INTERACTIONS OF OPERATOR THEORY WITH QUANTUM PROCESSES

A half-day workshop on *Interactions of Operator Theory with Quantum Processes* will take place on Friday afternoon 10 June 2016 at the School of Mathematics and Statistics, Newcastle University. The topic includes connections of Operator Algebras with Quantum Physics, Abstract Harmonic Analysis and Statistical Mechanics. The three talks will be given by:

- Ivan Todorov (Queens University of Belfast)
- Christian Voigt (Glasgow University)
- Evgenios Kakariadis (Newcastle University)

To register send an email to the organiser Evgenios Kakariadis (evgenios.kakariadis@ncl.ac.uk). Some funds may be available to cover standard rail fares of PhD students and it will be distributed according to the number of registered participants. For additional information visit the website at http://tinyurl.com/jtu8t2o. A reception will follow after the talks.

The meeting is supported by an LMS Conference grant Celebrating New Appointments, for the new appointment of Evgenios Kakariadis as a Lecturer at Newcastle University, with additional support from the School of Mathematics and Statistics in Newcastle.

LONDON
MATHEMATICAL
SOCIETY
EST. 1865

Society Meeting & Reception

At the 7ECM, Berlin, Germany
Thursday 21 July 2016

Lecture Theatre, Main Building, TU Berlin

4.30 Opening of the meeting, **Terry Lyons (Oxford)**
From Hopf Algebras to Machine learning via Rough Paths

Rough path theory aims to build an effective calculus that can model the interactions between complex oscillatory (rough) evolving systems. At its mathematical foundations, it is a combination of analysis blended with algebra that goes back to LC Young, and to KT Chen. Key to the theory is the essential need to incorporate additional non-commutative structure into areas of mathematics we thought were stable. At its high points, there are the regularity structures of Martin Hairer that allow robust meaning to be given to numerous core nonlinear stochastic pdes describing evolving interfaces in physics.

Classic results, by Clark, Cameron and Dickinson, demonstrate that a nonlinear approach to the data is essential. Rough path theory lives up to this challenge and can be viewed as providing fundamentally more efficient ways of approximately describing complex data; approaches that, after penetrating the basic ideas, are computationally tractable and lead to new scalable ways to regress, classify, and learn functional relationships from data. One non-mathematical application that is already striking is the use of signatures on a daily basis in the online recognition of Chinese Handwriting on mobile phones.

6.00 Reception (Ticket required)

LMS members will have the opportunity to sign the Membership Book which dates back to 1865. For a ticket to the reception, please email Elizabeth Fisher (lmsmeetings@lms.ac.uk)

1865 - 2015

7ECM
BERLIN 2016

Northern Regional Meeting

The University of Manchester
23 June 2016

12.50 pm - Opening

1.00 pm - Plenary speaker 1: Professor Sanju Velani (The University of York)

2.00 pm - coffee break

2.30 pm - Plenary speaker 2: Professor Julien Barral (Paris 13)

3.30 pm - minibreak

3.45 pm - Public lecture: Henna Koivusalo (The University of York)

4.45 pm - Wine reception (Alan Turing Building)

7.00 pm - Dinner at EastZeast

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, please visit.
http://personalpages.manchester.ac.uk/staff/jonathan.fraser/LMSregionalmeeting16.html

The meeting forms part of a workshop on Dynamical systems, ergodic theory and applications from 23-24 June 2016. There will talks on Thursday morning and all day Friday with plenary lectures from Ian Melbourne and Dejun Feng.

For further details visit:
http://personalpages.manchester.ac.uk/staff/jonathan.fraser/LMSregionalmeeting16.html
or contact the organisers. (Jonathan Fraser; jon.fraser32@gmail.com)

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.

1865 - 2015

LMS HARDY LECTURE TOUR 2016

G.H. Hardy, LMS President 1926–1928 and 1939–1941
Photo Courtesy of Master and Fellows of Trinity College Cambridge

Jacob Lurie (Harvard) Hardy Lecturer 2016

The 2016 LMS Hardy Fellow is **Professor Jacob Lurie** (Harvard).

The Hardy Lectureship was founded in 1967 in memory of G.H. Hardy in recognition of outstanding contribution to both mathematics and to the Society. The Hardy Lectureship is a lecture tour of the UK by a mathematician with a high reputation in research.

Jacob Lurie will visit the UK in June and July 2016 and he will give talks at:

Oxford
20 June
Organiser: Ulrike Tillmann

Southampton
22 June
Organiser: Jelena Grbic

Aberdeen
24 June
Organiser: Assaf Libman

Glasgow
27 June
Organiser: Andy Baker

Leicester
30 June
Organiser: Frank Neumann

Sheffield
5 July
Organiser: John Greenlees

Cambridge
6 July
Organiser: Julius Ross

Hardy Lecture, London

Weil's Conjecture for Function Fields

8 July at 3.30 pm, London
Organiser: London Mathematical Society

For further information on attending each lecture, please contact the local organisers.
For general enquiries about the Hardy Lectures, please contact Elizabeth Fisher (lmsmeetings@lms.ac.uk).

LONDON
MATHEMATICAL
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LMS Popular Lectures 2016

LONDON (UCL Institute of Education)
29th June 19:00

BIRMINGHAM (University of Birmingham)
21st September 18:30

Heather Harrington (University of Oxford) - *The shape of data in biology*. In recent years, areas of pure mathematics (maths for maths' sake) such as algebra, geometry and topology, are being applied to problems in biology. Dr Harrington will describe how to understand living systems using cutting-edge mathematics.

Julia Wolf (University of Bristol) - *One, Two, Red, Blue*. Ever wondered why noughts and crosses always results in a draw? In this talk Dr Wolf will explore the surprisingly deep mathematics behind this popular game and its variants.

LONDON: Commences at 7.00 pm, refreshments at 8.00 pm, ends at 9.30 pm

Admission is free, with ticket. Register by Thursday 23 June.

BIRMINGHAM: Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 pm

Admission is free, with ticket. Register by Thursday 15 September.

Register for tickets online at:
www.lms.ac.uk/events/popular-lectures

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CHRISTOPHER ZEEMAN

Sir Christopher Zeeman, FRS, who was elected a member of the London Mathematical Society on 21 January 1954, died on 13 February 2016, aged 91. Sir Christopher was LMS Vice-President from 1968-1969 and became the Society's 63rd President from 1986-88. He was awarded the Senior Whitehead Prize of the Society in 1982, and was the Society's first Forder lecturer, in 1987.

David Rand writes: A brilliant mathematician, exceptional lecturer, prodigious polymath and deep-thinking leader and administrator, Christopher Zeeman had a remarkable influence on British mathematics. He made major research contributions to topology, dynamical systems, catastrophe and singularity theory, and applied mathematics, and had many other achievements, most notable of which was his foundation of the Warwick Mathematics Institute.

Following a period being trained as a navigator in the RAF during the Second World War, his PhD and early academic career were in Cambridge (and briefly in the USA) as a geometric topologist. He rapidly established himself as a leader in the field and was particularly proud of his work unknotting spheres in 5-dimensions, spinning lovely examples of knots in 4-dimensions, and proving the Poincaré Conjecture in 5-dimensions. This work and his subsequent topological activity at Warwick is characterised by a pure mathematical depth and elegance difficult for the non-specialist to understand but crystal clear to the expert.

In the late 60s Christopher started working in dynamical systems and became fascinated by applying mathematics to biology. He was strongly influenced by C H Waddington's theory of epigenetic landscapes, René Thom's Théorie des Catastrophes and also theories about the brain and perception. This led to him becoming the world's leading exponent of applications of catastrophe theory to physics, biology and the social sciences where he made many lasting contributions. He listed his favourite areas of application as buckling, capsizing, embryology, evolution, psychology, anorexia, animal behaviour, ideologies, committee behaviour, economics and drama. In catastrophe theory he complemented Thom's more philosophical approach with an Anglo-Saxon clarity.

Christopher was a hugely charismatic character: his enthusiasm, intellectual excitement and breadth of interests were combined with an old fashioned charm and the ability to make people feel the centre of his attention. He was a brilliant lecturer, meticulously prepared and brilliantly delivered. But his was a style very different from today's glossy Powerpoint performances. Mainly delivered via the blackboard, his talks were perfectly judged to maintain attention and excite interest, and were given at a speed and with a clarity that allowed the audience to take in complex ideas.

He was equally at home lecturing to school children, students, academic staff and non-university audiences. His outstanding 1978 Royal Institution Christmas Lectures for children on the BBC and the way he charmed and surprised Warwick alumni in 2004 with his mathematical models of how to get committees to do what they don't want to do were perfect examples of this versatility. He was a pioneer in the area of public engagement with mathematics and early on was heard on radio and had a strong involvement with school mathematics, starting masterclasses at Warwick that led to the Royal Institution Mathematics Masterclasses following his Christmas Lectures. His lovely book *Three-dimensional Theorems for Schools* was based on his 2004 Presidential Address to the Mathematical Association. In 1988 he received the prestigious Royal Society Faraday Medal for his public understanding work.

Appointed in 1963 along with eight other foundation professors, he played a key role in deciding the University of Warwick's founding principles such as the departmental structure, the dominance of single honours degrees and the absence of a layer of deans. For the Mathematics Institute's 40th anniversary he wrote a personal history of the University describing

these early discussions and it is remarkable how many of the principles still hold. I believe that they provided the foundations for the University of Warwick's success.

The way he so quickly got the Mathematics Institute recognised as a leading international player is testament to his vision and remarkable skills as a leader and planner. He was rare in always applying the same level of rigour and intellectual energy to questions of planning and management as to mathematics. For example, in the 1960s he produced a beautifully argued paper about how to design a Mathematics Institute building that was so insightful that it was used again to guide the architectural design of the new 2004 building that is now named after him. He could also be creatively mischievous in such matters as demonstrated by the way he persuaded the first five academics to join him. Legend has it that having identified those he really wanted to start things (all topologists including David Epstein, Colin Rourke and Brian Sanderson), they all turned him down. So he wrote to them all again saying "But the other four say yes," and then they all said yes.

These topologists were followed in later years by coherent groups of firstly algebraists and then analysts, all pure mathematicians happy to be away from the pure-applied quarrels seen at some other universities. In the early 80s probably as a result of his growing interest in applications and his desire to keep the department developing, he persuaded me, a pure mathematician at the time but a little sullied by my links to theoretical physics, to take on the task of building applied maths. These developments were the foundation of today's very successful department on which Zeeman's influence was so huge. Christopher left Warwick in 1988, to become Principal of Hertford College, Oxford and professor of geometry at Gresham College in London.

Christopher was a very active and innovative president of the London Mathematical Society from 1986 to 1988. He received the Senior Whitehead Prize of the Society

in 1982 and the David Crighton medal of the Society and the Institute of Mathematics and its Applications in 2006. In 2007 the Society created the Christopher Zeeman Medal to recognise and acknowledge the contributions of mathematicians involved in promoting mathematics to the public and engaging with the public. His many other awards include a knighthood (1991) and fellowship of the Royal Society (1975).

He is survived by his wife, Rosemary Zeeman, an acclaimed jeweller, who he married in 1960, and his six children. His daughter Mary Lou is a mathematician and Christopher was very proud that he had written three joint papers with her. There will be an opportunity to donate to a fund to support young mathematicians, being set up in Christopher's name, under the auspices of the London Mathematical Society.

JAMES RILES

Professor James B. Riles, who was elected a member of the London Mathematical Society on 15 November 1962, died on 30 November 2015, aged 77.

Christine Stevens and Russell Blyth write: James B. Riles completed the PhD in 1967 at Queen Mary College, University of London, under the direction of Karl Gruenberg and Kurt Hirsch. In the same year, he joined the mathematics department of Saint Louis University in the USA, where he served as a professor and administrator for more than three decades, attaining the rank of Professor of Mathematics and Computer Science in 1976. He spent sabbatical leaves at Queen Mary College (1975) and Cambridge University (1983 and 1990). Jim was the adviser of three

PhD students: Richard Scherer, Mohammad Azarian and Mark Hopfinger.

Jim's mathematical interests focused on the study of infinite groups, to which he contributed the notions of nearly maximal subgroups, near and non-near generators, and thence of near Frattini subgroups. He also introduced the notion of a near complement of a normal subgroup of a group. He developed these concepts in a pair of papers, the second of which was published in the Journal of the London Mathematical Society. His work was subsequently used by Azarian and R.B.J.T. Allenby, among others, to establish results about generalized amalgamated free products of groups. An enthusiastic lecturer, Jim was always eager to learn new mathematics, and his carefully prepared seminar talks were models of precision in which the completion of a tricky proof was often punctuated with a twinkle in his eye.

Although mathematics was Jim's passion, he was deeply interested in music, as well. He had played the French horn in the All Southern California Junior High School Orchestra and could always be counted upon for a knowledgeable and enlightening commentary on any concert that he attended. Jim was also a keen mountaineer who enjoyed climbing, without special equipment, some of the highest peaks in Rocky Mountain National Park.

Jim is survived by his wife, Linda, their three children, and six grandchildren.
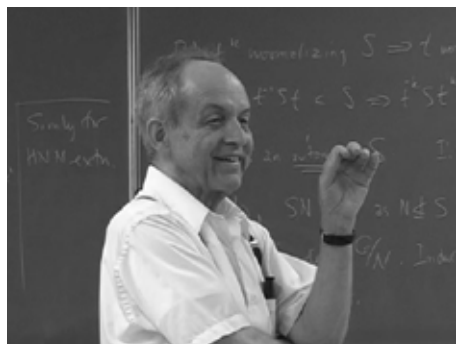
LONDON MATHEMATICAL SOCIETY EST. 1865

GRESHAM COLLEGE Founded 1597

THE LONDON MATHEMATICAL SOCIETY
JOINTLY WITH GRESHAM COLLEGE

Tuesday, 24 May 2016
6:00pm at The Museum of London

Mathematics, Measurement and Money

Professor Norman Biggs

London School of Economics

Throughout its brief history, mathematics has been closely linked with measurement and money. In the ancient settlements the rules of arithmetic and geometry were used to solve problems about the allocation of food and resources. When life became more complex, the use of coined money led to computational problems that required good algorithms for their solution.

Nowadays we rely on mathematics for security, and the links between information and money have become blurred. Can mathematics keep us safe?

ADMISSION FREE

NO RESERVATIONS REQUIRED – FIRST COME, FIRST SERVED

Museum of London, London Wall, London EC2Y 5HN
Nearest underground stations: Barbican, St Paul's, and Moorgate

020 7831 0575 enquiries@gresham.ac.uk www.gresham.ac.uk

SCHOLAR, COURTIER, MAGICIAN: THE LOST LIBRARY OF JOHN DEE
Royal College of Physicians, Regent's Park, London
18 January - 29 July 2016, Monday-Friday only, 9 am - 5 pm. Free entry.

To modern eyes, apt to see the past as a foreign country, John Dee (1527-1609) has become a quintessentially Renaissance figure. The subject of multiple biographies and specialist studies, his name can be confidently dropped in academic discussions of mathematics, astronomy, philosophy, alchemy, astrology, navigation, geography, the occult and magic, in the sure knowledge that he will be a familiar point of reference. Beyond the academy he has reached that point of self-reinforcing celebrity where his name pops up in children's fantasy books, in graphic novels and in literary fiction set around the court of Queen Elizabeth. He even appeared centre stage in a recent English National Opera production of Damon Albarn's pop-opera *Dr Dee*.

Intellectually, Dee seems impossibly widely-spread to a modern specialist. How and why did he aspire to such all-encompassing knowledge? The answer is through his books. Dee built an extraordinarily large library – easily the most impressive in Tudor England – in which the broad extent of Renaissance learning was captured. He could reasonably suppose that he had not only surveyed the boundaries of human knowledge, but had warrant to explore beyond, into the realm of the supernatural.

The dispersal of Dee's library began in his own lifetime, and the volumes are now widely scattered. The largest surviving group of his books is to be found in London's Royal College of Physicians. Given to the College in the late 17th century, they now form the basis for a compelling exhibition which provides both an overview of Dee's life and an intimate glimpse into the minute detail of his scholarly formation and habits.

© Wellcome Library, Wellcome Collection, London

John Dee performing an experiment before Elizabeth I by Henry Gillard Glindoni (1852-1913)

The exhibition reveals for a larger public than ever before just what it meant to be a Renaissance intellectual. Dee did not just own his books, he actively digested them. Once past a title page with his name and often the place and date of purchase, we see his underlinings and marginalia, as he extracted headings and topics for later retrieval. Occasionally there are doodles and notes which reveal personal snippets but it is the annotations' collective impression of order and engagement that most impresses.

The books are skilfully displayed and there will be individual volumes to appeal to the subject interests of almost anyone. Mathematics is represented in texts such as Copernicus on trigonometry, but in following Dee wholeheartedly we are taken not just through the fields he himself published on, but into natural and human histories, to the origins of language and to such classical authors as Cicero and Ovid, essential to the formation of any self-respecting Tudor humanist.

The exhibition is installed on a gallery in the large entrance space of Denys Lasdun's striking 1960s modernist creation overlooking Regent's Park. The building – worth seeing in its own right – provides an open rather than immersive experience for the show, whose main sequence ends with some judicious loans of magical objects that point to Dee's pious but now notorious conversations with angels. Upstairs there is a short addendum on Dee's subsequent reputation, right up to the present day. Recommended!

Stephen Johnston
The Museum of the History of Science,
Oxford

THE PROOF AND THE PUDDING: WHAT MATHEMATICIANS, COOKS, AND YOU HAVE IN COMMON by Jim Henle, Princeton University Press, 2015, pp 176, £19.95, US$26.95, ISBN 978-0691164861.

In 1975 Jon Barwise's *Admissible Sets and Structures* appeared under the Springer imprint. At the end of Section 6 of the second chapter, Barwise suggests that the material be 'supplemented with coffee (not decaffeinated) and a light refreshment'. He then provides a recipe for Heatherton Rock Cakes and ends with the observation that they taste better than they sound. At that time James Henle (now at Smith College, Northampton, Massachusetts) was a young logician and Barwise's inclusion of a recipe in a logic text may have struck a chord. At any rate, Henle has produced a volume which seeks to draw parallels between cookery and mathematics, and it includes no shortage of recipes.

I had been looking forward to Henle's book, since I found much to enjoy in his paper 'The Happy Formalist', which appeared in *The Mathematical Intelligencer* in 1991. What may have struck observers of mathematical publishing as odd was that two books relating mathematics and cooking appeared in the same year. Eugenia Cheng's *Cakes, Custard and Category Theory* was reviewed in this *Newsletter* in October 2015, and she has indicated that she was unaware of Henle's book as she worked on her own. If one is looking for an explanation of the coincidence, perhaps the general shift in academic treatises toward putting something about bodies in either the title or the contents may be to blame. There is no danger of confusing either the methods or the contents of Cheng's and Henle's books, neither of them aimed at students of domestic science figuring out how to multiply ingredients by a factor of 2.5.

Henle is legitimately proud of his accomplishments as a mathematician, and this book provides many examples of his accomplishments in the kitchen. While the list of recipes given in the index is extensive, his description of how he came up with each one adds interest to the guidelines. He is not inclined

to follow anyone's suggestions slavishly, and he would rather err on the side of unsuccessful experimentation than rest content with traditional ways of preparing a dish.

That is, in fact, one of the recommendations that he offers to the mathematical students of readers of the book. Henle notes the extent to which students are encouraged to avoid making mistakes and warns that such an attitude is likely to inhibit creativity. By contrast, just as great cooks achieve their goals by taking chances, so good mathematicians have to be ready to be wrong a number of times before they can expect significantly to change the field in which they are working.

Henle examines the characteristics of good mathematics and argues that they are similar to those of good cooking. He quotes the words of mathematicians, whose description of their profession could also be applied to the culinary arts. He quotes the words of cooks, whose description of their activities could also be applied to mathematics. Sometimes he is even able to find an explicit comparison in the words of others, e.g., Keith Devlin's comparison of 'solving a challenging math problem' to 'baking a soufflé'. He pays tribute to Julia Child for her role in altering the attitude toward food in the United States and to Martin Gardner for his role in altering the attitude toward mathematics there as well.

The book is divided up into bite-sized chapters, with the result that nothing (math-ematical or culinary) is pursued at length. Cheng's book has a more easily identified central theme from the mathematical point of view. Henle is happy to be making criticisms of the way people cook in between his drawing on examples of solving problems by virtue of looking at them the right way. He disowns the intention of providing a unified text, even about the recreational mathematics that is the subject of most of the mathematical examples. In the midst of his defense of recreational mathematics as a genuinely serious topic, one can even hear echoes of the philosophical formalism about which he wrote a quarter of a century ago.

Henle has produced a book that can be enjoyed by a wide variety of audiences. He spins stories about what he has done in his kitchen and what he has done to solve mathematical problems. He demonstrates some of the ways in which he feels that he has been practicing similar arts in both pursuits. There has been much written on the relationship of mathematics and the fine arts. While Henle might be prepared to defend cookery as a fine art when finely practiced, he has given mathematicians another field with which to compare their subject when seeking to explain its interest and value to those who have no qualms about defending the usefulness of food.
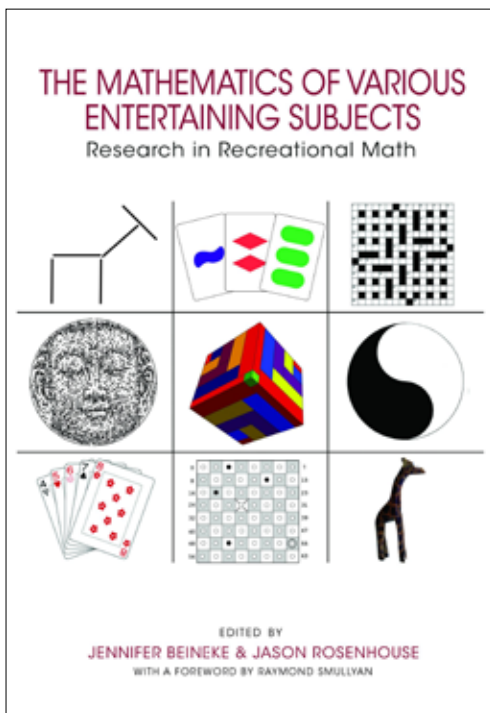
Thomas Drucker
University of Wisconsin–Whitewater

Jim Henle

THE PROOF AND THE PUDDING

What Mathematicians, Cooks, and You Have in Common

THE MATHEMATICS OF VARIOUS ENTERTAINING SUBJECTS: RESEARCH IN RECREATIONAL MATH edited by Jennifer Beineke and Jason Rosenhouse, foreword by Raymond Smullyan, Princeton University Press, 2015, pp 288, £55.95, US$75.00, ISBN 978-0691164039.

Most mathematicians, if asked about the level of enthusiasm the general public would show for a Museum of Mathematics, would express at least some scepticism. Most would say that while math is definitely fun, a public museum would most likely end up being too didactic or outright boring. Fortunately, enough people thought otherwise, and the National Museum of Mathematics, nicknamed MoMath, opened in New York in 2012 with the mission of `conveying the magic of math'. In addition to housing a number of exhibits that popularize mathematical ideas through catchy instalments involving, among others, toy trains fashioned into beavers, hands-on Family Fridays, or a gallery linking together math and art, the museum also supports the research community in the appropriately chosen area of recreational math.

The **M**athematics **o**f **V**arious **E**ntertaining **S**ubjects consists of some of the contributions presented at MOVES 2013, organized at MoMath as the first instalment of a biannual event bringing together researchers in game theory, puzzles, and recreational math, as well as game and puzzle enthusiasts, students and teachers. The collection's 17 articles offer something for each of these groups. The articles range from mostly entertainment to mostly research, with all of them written at a high level of mathematical rigor and language accuracy. The editors have rightly decided to apply the usual strict rules we expect of research publications, while at the same time allowed the authors to show their (highly contagious) love for their subject. One of the editors even contributed an article co-authored with her father that leaves no one doubting that love for serious recreational mathematics runs in the family.

The collection is thematically divided into five areas: Vignettes, Problems Inspired by Classic Puzzles, Playing Cards, Games, and Fibonacci Numbers, with the longest section devoted to problems related to puzzles. The foreword by Raymond Smullyan centres on the by now classical examples from propositional logic of lying and truth telling, and is itself an example where recreational mathematics leads to the deepest topics in logic. Peter Winkler's *Should*

You Be Happy explores the pitfalls of understanding more subtle points of elementary probability. *One-Move Puzzles with Mathematical Content* include a combination of sophisticated ideas with games whose solutions perplex the reader. Jennifer and Lowell Beineke's *Some ABCs of Graphs and Games* do not disappoint graph enthusiasts. And the list goes on. We enjoyed the nice survey of *Parallel Weighings of Coins* or the interesting take on analyzing the difficulty of crossword puzzles due to John K. McSweeney (who is a former colleague of the second author of this review, but whom we did not know to be interested in the mathematics of crosswords). *The Cookie Monster Problem,* strangely similar in flavour to *Solving the Tower of Hanoi with Random Moves,* is connected to Fibonacci numbers, while it also involves a fair amount of cookie eating. The majority of the topics demonstrate connections to non-trivial mathematics. Some involve affine planes, some others explore error correcting codes, Sperner's Lemma, or the representation of numbers. All of them provide a well-motivated gateway to further research, and could also serve as an inspiration for exciting projects for students of all levels.

We apologize to those whose contributions we failed to specifically mention in our review - we hope our readers will decide to reach for the book. It is a very nice book in many different ways. It can be read straight through, and it can be read at random order. It is entertaining, and at the same time presents deep mathematics. It proves the point made by establishing the MoMath museum: Well done popularization of mathematics does not have to be boring and it does not have to be shallow either. Next time you visit New York, you should probably add MoMath to your schedule; meanwhile, enjoy reading this book.

Robert Jajcay and Tatiana Jajcayova
Comenius University, Bratislava
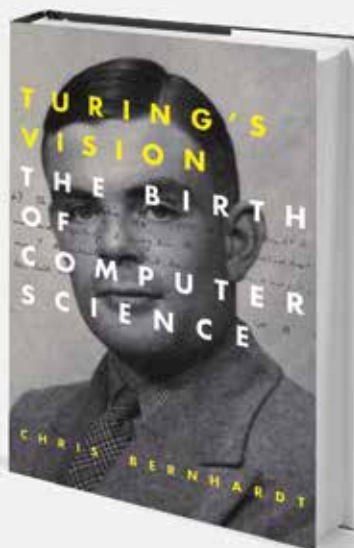
SBORNIK MATHEMATICS

Highlights from the past **150 years**

150th anniversary
1866–2016
Sbornik: Mathematics
Matematicheskii Sbornik

Special collection

This year we are celebrating the 150th anniversary of *Matematicheskii Sbornik*, and to mark the occasion, we have put together a collection of the most influential work published in the English translation of the journal, *Sbornik: Mathematics*, in 1967–2015.

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Isaac Newton Institute
for Mathematical Sciences

DATA LINKAGE: TECHNIQUES, CHALLENGES AND APPLICATIONS

12 – 16 September 2016

in association with the Isaac Newton Institute programme
Data Linkage and Anonymisation
(4 July – 21 December 2016)

The overall aim of the programme is to bring together researchers and practitioners from various research disciplines and application domains to foster exchange between different parts of the mathematical sciences where the topics of data linkage and anonymisation are being addressed, as well as between researchers investigating data linkage and privacy protection. These topics have so far often been considered separately. This aim of the programme is quite different from other very topic and domain specific INI programmes.

With this in mind, the objective of this second workshop on data linkage is to strongly encourage interaction between participants from different disciplines, to facilitate cross-disciplinary learning, and to set an agenda of the big challenges in the area of data linkage. Topics to be covered and discussed will range from computational and statistical aspects of data linkage, to privacy and confidentiality, and application case-studies and examples.

To encourage cross-disciplinary interactions, besides invited presentations by world leading researchers and practitioners in data linkage, there will to be several interactive sessions that follow a 'speed-dating' approach where participants in short pair-wise discussions present to each other their background and interests, and issues and challenges they see in the area of data linkage from their perspective. The key ideas and challenges will then be synthesised on the last workshop day with the aim of producing an interdisciplinary position / state-of-play / call for action / great challenges paper. This paper is to be refined by key workshop participants and the workshop organisers into a potentially full journal article after the workshop. Some of the identified challenges and problems will be worked on during the remainder of the main programme.

We also plan to have a practical 'Hackathon' directly following the workshop (Thursday 15 and Friday 16 September) to allow interested participants to collaborate on solving some of the challenges identified in the workshop by developing initial prototypes or fleshing out research directions.

Further information available from the website
www.newton.ac.uk/event/dlaw02

Closing date for receipt of applications 13 June 2016

Hitchin 70
5-16 September 2016

Triple event in honour of Nigel Hitchin's 70th birthday and his contributions to mathematics

Aarhus 5-8 Sept 2016
Hitchin 70: Differential Geometry & Quantization

Confirmed speakers
Christian Bär
David Calderbank
Vladimir Fock
Paul Gauduchon
Sergei Gukov
Tamás Hausel
Lisa Jeffrey
Thomas Bruun Madsen
Sergei Merkulov
Simon Salamon
Jörg Teschner

Oxford 9-11 Sept 2016
Hitchin 70

Confirmed speakers
Michael Atiyah
Sasha Beilinson
Fedor Bogomolov
Philip Candelas
Bill Goldman
Klaus Hulek
Maxim Kontsevich
Marta Mazzocco
Shigefumi Mori

Madrid 12-16 Sept 2016
Hitchin 70: Celebrating 30 years of Higgs bundles & 15 years of generalized geometry

Confirmed speakers
David Baraglia
Olivier Biquard
Philip Boalch
Gil Cavalcanti
Brian Collier
Xenia de la Ossa
Mario García-Fernandez
Peter Gothen
Marco Gualtieri
Sergei Gukov
Tamás Hausel
Jacques Hurtubise
François Labourie
Rafe Mazzeo
Bảo Châu Ngô
Ana Peón-Nieto
Brent Pym
Laura Schaposnik
Anna Wienhard

Organising Committee
Luis Álvarez-Cónsul
Jørgen Ellegaard Andersen
Steven Bradlow
Andrew Dancer
Oscar García-Prada
Frances Kirwan
Henrik Pedersen
Yat Sun Poon
Andrew Swann

This event is organised in partnership with the **Clay Mathematics Institute**

Photo: Elyce Winters

Information & registration:
http://projects.au.dk/hitchin70/

With funding from:

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Isaac Newton Institute
for Mathematical Sciences
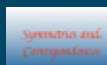
THE NATURE OF QUESTIONS ARISING IN COURT THAT CAN BE ADDRESSED VIA PROBABILITY AND STATISTICAL METHODS

30 August – 2 September 2016

in association with the Isaac Newton Institute programme
Probability and Statistics in Forensic Science
(18 July – 21 December 2016)

Proper use of statistics and probabilistic reasoning has the potential to improve dramatically the efficiency, transparency and fairness of the criminal justice system and the accuracy of its verdicts, by enabling the relevance of evidence – especially forensic evidence - to be meaningfully evaluated and communicated. However, its actual use in practice is minimal, and indeed the most natural way to handle probabilistic evidence (Bayes) has generally been shunned. This workshop seeks to understand the scope, limitations, and barriers of using statistics and probability in court.

Further information available from the website
www.newton.ac.uk/event/fosw01

Closing date for receipt of applications 27 May 2016

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.

MAY 2016

2-4 Hilbert's Sixth Problem Workshop, Leicester (455)
11 Colloquia in Combinatorics, Queen Mary, University of London (458)
12 Colloquia in Combinatorics, London School of Economics (458)
12 The David Crighton Lecture, Professor Frank Kelly, The Royal Society, London (458)
16-19 Operators, Operator Families and Asymptotics, Bath (455)
18-20 The Dymamics of Complex Systems, Warwick (454)
20-21 Groups in Galway, National University of Ireland, Galway (454)

21 The History of Number Theory, Birkbeck, University of London (455)
23-25 Wales Mathematics Colloquium, Gregynog Hall, Powys (455)
24 LMS/Gresham College Lecture, Professor Norman Biggs, London (458)
26-27 Young Applied Analysts in the UK, Bath (456)

JUNE 2016

1 *p*-adic *L*-functions Day, Cambridge (458)
1 Combinatorics at Oxford (457)
6-9 Computational and Analytic Problems in Spectral Theory, Cardiff (457)
6-10 Quantum Physics and Logic, Strathclyde (457)
6-10 From the Continuum to the Tectonic INI Workshop, Cambridge (455)
9-10 Scottish Partial Differential Equations Colloquium, Dundee (457)
10 Interactions of Operator Theory with Quantum Processes, Newcastle (458)
10-11 ICFT 2016, King's College London (458)
11 Sir Christopher Zeeman: A Celebration, Warwick (458)

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MARY CARTWRIGHT LECTURE 2016

Professor Simon Tavaré, FRS
LMS President

Dr Eugenie Hunsicker
Chair of the LMS Women in Mathematics Committee

First speaker, Professor Lasse Rempe-Gillen
(University of Liverpool)

Maryam Argungu signing the Membership Book

Attendees

Wine reception