

NEWSLETTER

No. 461 September 2016

COUNCIL FOR THE MATHEMATICAL SCIENCES EU REFERENDUM STATEMENT

Following the results of the UK Referendum on membership of the EU, the Council for the Mathematical Sciences (CMS) takes the following view:

- The focus will remain on collaboration in the mathematical sciences as currently exists.
- All academic/research/professional mathematical societies will continue to work with their counterparts in other countries as closely and respectfully as possible, regardless of the political arrangements in place.
- Currently all EU arrangements remain in force as the UK has not yet left the EU and current arrangements are being kept in place during any transition phase eg access to student loans for EU students will continue for those in receipt of such loans and for those currently applying for a loan.
- Whatever the final arrangements, the aim will be to sustain collaboration in the mathematical sciences with EU and international partners on an equally open and reciprocal basis.

LMS HONORARY MEMBERS 2016





LMS Honorary Members for 2016: Professor Idun Reiten and Professor Maxim Kontsevich; see text on page 3

SOCIETY MEETINGS AND EVENTS

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- 21 September: Popular Lectures, Birmingham page 28
- 27 October: Joint Meeting with the RSS and Fisher Memorial Trust, London page 9
- 11 November: Graduate Student Meeting, London
- 11 November: Annual General Meeting, London
- 20 December: SW & South Wales Regional Meeting, Bath
- 24 February 2017: Mary Cartwright Lecture, London
- 3–7 April 2017: LMS Society Meeting at BMC, Surrey



http://newsletter.lms.ac.uk

LMS NEWSLETTER

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LMS HONORARY MEMBERS 2016 (continued from page 1)

The London Mathematical Society has elected Professor Idun Reiten, of the Norwegian University of Science and Technology (NTNU) in Trondheim, to Honorary Membership of the Society. Professor Reiten is a world-leading mathematician whose work has revolutionized the representation theory of finite dimensional algebras. The fundamental notions she has introduced, and important results she has proved, form

a large part of the language and context for current work in this field.

The LMS has also elected Professor Maxim Kontsevich, of the Institut des Hautes Études Scientifiques, to Honorary Membership of the Society. Professor Kontsevich has made fundamental contributions to many areas of mathematics, primarily in geometry and topology using ideas from theoretical and mathematical physics.

SIMON DONALDSON AWARDED **DOCTOR HONORIS CAUSA**



Professor Sir Simon Kirwan Donaldson FRS. permanent member of the Simons Center for Geometry and Physics at Stony Brook University (US) and Professor in Pure Mathematics at Imperial College London (United Kingdom), will be awarded the honorary degree Doctor Honoris Causa by Universidad Complutense de Madrid (Spain).

The ceremony will take place on 20 January 2017 at 12:00 in the Aula Miguel de Guzmán of the Faculty of Mathematics of Universidad Complutense de Madrid. There will also be a Colloquium on 19

January 2017 at 13:00 at the Faculty of Mathematics.

For further information visit the website at www.ucm.es/geometria topologia or contact Vicente Muńoz (vicente.munoz@mat.ucm.es).

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http://newsletter.lms.ac.uk

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Articles Send articles to newsletter@lms.ac.uk

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Charity registration number: 252660.

ANNUAL LMS SUBSCRIPTION 2016-17

Members are reminded that their annual subscription, including payment for publications, for the period November 2016 - October 2017 is due **on 1 November 2016** and <u>payment should be received by 1 December 2016</u>.

Membership subscription rates

The annual subscription to the London Mathematical Society for 2016-17 is:

Ordinary membership	£75.00	US\$150.00		
Concessions on Ordinary membership:				
Reciprocity	£37.50	US\$75.00		
Career break or part-time working	£18.75	US\$37.50		
Associate membership	£18.75	US\$37.50		

Please note that **only** members who were elected at a Society Meeting in 2015 **and** who have set up a direct debit to pay their subscription fees will be entitled to a 50% discount on the above prices (excluding concessionary membership).

LMS journal prices

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The prices of the Society's periodicals for 2017 are: :

	Online only	Print & online	
ulletin Free		£86.00	
Journal	Free	£424.00	
Proceedings	Free	£424.00	
Nonlinearity	Free		

We would like to draw members' attention to the following changes regarding the Society's journals:

- 1. The Society now offers free online access to the Bulletin, Journal and Proceedings of the London Mathematical Society and to Nonlinearity for personal use only. To receive free electronic access for personal use, please note this on your subscription form when returning it to the Membership Department.
- 2. Please note that for online journal subscriptions it is essential that members

provide the Society with an up-to-date email address as the email address will be passed to:

- i. Wiley for subscriptions to the Bulletin, Journal and Proceedings of the London Mathematical Society
- ii. Institute of Physics for subscriptions to Nonlinearity.

The relevant publisher will then contact members with further details about their subscription.

3. Council has agreed the Society will no longer offer the "Print & online" option for *Nonlinearity* from 1 January 2017.

Subscription rates for the European Mathematical Society and Journal of the European Mathematical Society via the LMS

Members also have the option to pay their European Mathematical Society subscription via the LMS and subscribe to the Journal of the EMS:

EMS Subscription (via the LMS)	£22.00	US\$44.00
JEMS Subscription (via the LMS)	£120.00	US\$240.00

Renewal and payment

Members can now renew and pay for their Society membership online via the Society's website: http://lms.ac.uk/user

Members can now log on to their LMS user account and make changes to their contact details and journal subscriptions. Please note members may not change their membership type e.g. from Ordinary to Reciprocity without first contacting the Membership Department (membership@ Ims.ac.uk; 020 7927 0807; 020 7291 9973).

A subscription form will be sent by email or post to all members for reference and/or to complete and return with payment. If you do not receive your subscription form by 30 September 2016, please contact the Membership Department (membership@ Ims.ac.uk; 020 7927 0807; 020 7291 9973).

Payment by Direct Debit

Setting up a direct debit: new direct debit payers

The Society encourages payment by direct debit. If you do not already pay by this method and would like to set up a direct debit (this requires a UK bank account), please visit the LMS website to download *Guidance on Setting Up a Direct Debit:* www.lms.ac.uk/membership/paying-yoursubscription for further information on setting up a direct debit online with Go-Cardless.com

Setting up or making changes to a direct debit: current direct debit payers

If you do already pay by direct debit and would like to make changes or set up a new direct debit (this requires a UK bank account), please visit the LMS website to download Guidance on Setting Up a Direct Debit (Current Direct Debit Payers): www.lms.ac.uk/membership/paying-yoursubscription for further information on making changes or setting up a direct debit online with GoCardless.com

Payment by credit/debit card

The Society now accepts payment by credit/ debit card online via its website **only**. *Please note the Society no longer accepts card payments by telephone*.

Payment by cheque

The Society also accepts payment by cheque either in GBP or US\$.

Please note that subscriptions become due on **1 November 2016** and payment should be received by 1 December 2016. Please note that payments received after this date may result in a delay in journal subscriptions being renewed.

LMS member benefits

Members are reminded that their annual subscription entitles them to the following range of benefits:

- Membership of a vibrant, national and international mathematics community.
- Networking opportunities.
- Opportunities to influence national policy.
- Full voting rights in Society elections your chance to shape the future of the LMS.
- A complimentary monthly Newsletter available in print and online; to keep up-to-date with the latest mathematical developments, including policy issues, details of forthcoming events, book

reviews and more.

- Regular LMS e-Updates.
- Opportunities to attend events hosted by the Society.
- Free online subscriptions to the Bulletin of the London Mathematical Society, Journal of the London Mathematical Society and Proceedings of the London Mathematical Society. Free online subscription to Nonlinearity (published jointly with the Institute of Physics).
- Members discount on other selected LMS publications; 25% discount on the LMS Lecture Note Series, 25% discount on the LMS Student Texts.
- Discounted membership of the European Mathematical Society, when joining

via the LMS, and an option to subscribe to the Journal of the European Mathematical Society.

- Use of Verblunsky Members' Room at De Morgan House, Russell Square, London.
- Use of University College London library where the Society's Library is housed.
- The opportunity to sign the LMS Members' Book, which dates back to 1865 when the Society was founded and contains signatures of members throughout the years, including Augustus De Morgan, Henri Poincaré, G.H. Hardy and Mary Cartwright.

Elizabeth Fisher Membership & Activities Officer

6 LMS ELECTIONS 2016

Voting for the LMS 2016 Elections will open on 6 October. All members who are registered for electronic contact and who are eligible to vote will receive an e-mail with instructions on how to vote, paper copies will not now be sent automatically to those so registered. Paper copies may be requested. Members eligible to vote who are **not** registered for electronic communication will be sent a paper copy, though such members are able to vote online and are encouraged to do so.

Members are asked to regularly check their post/email in October for communications from the Electoral Reform Society regarding the elections.

Prior to this, a communication will be sent by the Society to all members who are registered for electronic communication informing them that they can expect to shortly receive some election correspondence from the ERS. Those not registered to receive email correspondence from the LMS will receive all communications in paper format, both from the Society and from the ERS.

The Society will also host an Elections

Forum on the LMS website for use by candidates and members. All members are encouraged to make use of the Forum. The slate of candidates appears on the LMS website at www.lms.ac.uk/about/council/ lms-elections.

It is hoped as many members as possible will vote in the 2016 LMS Elections. Results will be announced at the Society's AGM to be held on 11 November 2016.

Ensure that your details are current

All members are strongly encouraged to ensure that their e-mail and postal contact details registered with the Society are up-to-date to enable the election process to run smoothly. All members can electronically update their personal contact details on the Members Section of the LMS website and all members are encouraged to use this facility. Any changes to personal details would be required no later than **7 September 2016** for election purposes.

> Fiona Nixon Executive Secretary

LMS Midlands Regional Meeting and Workshop on Interactions of

Harmonic Analysis and Operator Theory

Birmingham, 13-16 September 2016

MINI-COURSES

Kaj Nyström

Javier Parcet

SPEAKERS

Pascal Auscher

Tony Carbery University of Edinburgh

Martin Dindoš University of Edinburgh

Dorothee Frey Delft University of Technology

Sylvie Monniaux Aix-Marseille Université

> Fulvio Ricci Scuola Normale Superiore

Charles Batty University of Oxford

Andrea Carbonaro Università degli Studi di Genova

Véronique Fischer University of Bath

José María Martell Instituto de Ciencias Matemáticas

Detlef Müller Christian-Albrechts-Universität zu Kiel

Maria Vallarino Politecnico di Torino

Jim Wright University of Edinburgh

Organisers: Alessio Martini and Andrew Morris (Birmingham)



UNIVERSITY^{OF} BIRMINGHAM School of Mathematics



LONDON MATHEMATICAL SOCIETY EST. 1865

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





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

Thursday 3rd November 2016, 6:00pm



Professor Muffy Calder (University of Glasgow)

Probabilistic formal analysis of software usage styles in the wild

Discrete mathematics and logics are used to analyse the intended behaviour of software systems. Statistical methods are used to analyse the logged data from instrumented systems. So what happens when we instrument software: can we bring the two techniques together to analyse how people actually use software?

But users are difficult – they adopt different styles at different times! What characterises usage style, of a user and of populations of users, how should we characterise the different styles, how do characterisations evolve over an individual user trace, and/or over a number of sessions over days and months, and how do characteristics of usage inform evaluation for redesign and future design? Can we formalise these concepts and construct effective procedures?

Professor Calder will outline a novel mathematical/computational approach that aims to answer all these questions. The approach is based on discrete space stochastic models, statistical inference of those models, and stochastic temporal logics and model checking for investigating hypotheses about use, all applied to longitudinal sets of logged usage data. The approach is the result of a five year collaboration between software developers, statisticians, HCI, and formal methods experts. She will illustrate by way of a mobile app that is used by tens of thousands of users worldwide; a new version of the app, based on the analysis and evaluation, has just been deployed. This is formal analysis in the wild!

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

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



Joint Meeting with the RSS and Fisher Memorial Trust

Data Science: The View from the Mathematical Sciences 27th October 2016

Royal Statistical Society, 12 Errol Street, London ECIY 8LX

The 35th Fisher Memorial Lecture will be given by Professor Nancy Reid (University of Toronto) as part of this half-day conference

Final Programme

13.00	Lunch
14.00-14.45	Professor Neil Lawrence (University of Sheffield)
	Computational Perspectives: Fairness and Awareness in the
	Analysis of Data
14:45-15:30:	Dr Johan Koskinen (University of Manchester)
	Generative and Estimable Models for Longitudinal Social
	Networks
15.30-16.00	Tea/Coffee
16.00-17.15	The Fisher Memorial Lecture
	Professor Nancy Reid (University of Toronto)
	Statistical Science and Data Science: Where do we go from he
17.15	Drinks and light refreshments

We are grateful to the London Mathematical Society for sponsoring lunch and the post-lecture refreshments

Register here: https://events.rss.org.uk/rss/55/register

There is no charge to attend but registration is required

Organiser Name: Paul Gentry (p.gentry@rss.org.uk)



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OPEN HOUSE 2016



For the sixth year the LMS will open its doors to the public as part the Open House London event. De Morgan House will be open on Sunday 18 September from 10 am until 5 pm. Visitors will be given a tour of the building and there will be presentations on mathematics and the work of the Society.

Since the LMS opened its doors in 2011 there have been over 1,500 visitors.

LMS COUNCIL DIARY

8 July 2016: A personal view

This diary entry covers the 8 July 2016 Council meeting. After agreeing on the minutes of the previous Council meeting and noting the unconfirmed minutes of the Finance and General Purposes Committee meeting, the Council received an update on the activities of the President undertaken since the last meeting of the Council. The main activities included attendance at: the Abel Prize Ceremony, the Standing Orders Review Group, and the meeting of the LMS Departmental Representatives. There was a further discussion about the plans for the Strategic Retreat 2017, and the President reminded Council of the importance of focusing on strategic matters at the meeting, rather than details.

Council was very pleased to note the decision of the Presidential Search Group to nominate Caroline Series for election as President in November 2017.

Vice-President John Greenlees informed Council about the Parliamentary Links Day held at Westminster on the day after the EU Referendum. He noted that both the Council for Mathematical Sciences and European Mathematical Society had issued statements following the Referendum result.

There was a discussion on financial matters, including accounts review, budget alloca-

tion for 2016-2017, and budget planning for 2017-2019. Council agreed the income and expenditure for 2016-2017 and the planning figures for 2017-2019.

The President informed the Council about the progress of discussions on how the Society might support the area of mathematics and computation. Professor Arieh Iserles is to help the Society in this matter by assembling a group of specialists to consider possibilities.

Council continued to discuss the Newsletter Review and agreed that expressions of interest should be invited for the position of Editor-in-Chief and a shortlist submitted to Council for consideration.

Council agreed the recommendation of the Prizes Committee that the 2016 Zeeman Medal be awarded to Rob Eastaway.

Other activities to note were an update by Vice-President Brown on analysing the effects of the allocation of Doctoral Training funding; a proposal by Eugenie Hunsicker, as Chair of the Women in Mathematics Committee, to encourage expressions of interest from departments to host Women in Mathematics Days and Girls in Mathematics events; our response to the consultation on the Teaching Excellence Framework.





MS Prospects in Mathematics Meeting

16-17 December 2016

Department of Mathematics, University of York, Heslington, York YO10 5DD, UK.



University of York

All Finalists Maths Undergraduates, who are considering applying for a Maths PhD in 2017, are invited to attend the 2016 LMS Prospects in Mathematics Meeting.

The meeting will feature a range of speakers from a wide range of mathematical fields across the UK who will discuss their current research and what opportunities are available to you:

Statistics, Probability and Finance

- Martin Hairer (University of Warwick) Stochastic analysis and Probability
- Vicky Henderson (University of Warwick) *Mathematical Finance*
- Julie Wilson (University of York) Applications of Statistics
- Alastair Young (Imperial College) Statistical Methodology

Applied Mathematics and Mathematical Physics

- Mark Chaplain (University of Dundee) Mathematical Biology and Theoretical Ecology
- Ruth Gregory (Durham University) General Relativity and Cosmology

- Tim Spiller, (University of York) Quantum Physics and Quantum Information
- Sarah Waters (University of Oxford) Fluid Dynamics

Pure Mathematics

- Victor Beresnevich (University of York) Analytic Number Theory
- Peter Cameron (University of St Andrews) Algebra and Combinatorics
- Tony Carbery (University of Edinburgh) Harmonic Analysis and PDEs
- Katrin Leschke (University of Leicester) Geometry

50 places are available, including overnight accommodation and some funding towards travel costs.

To apply: Please email Claire Farrar/Linda Elvin (math515@york.ac.uk); headed Prospects 2016 Application with the statement: "I am on track academically to begin Ph.D. studies in 2017" with evidence of your predicted degree classification.

Application deadline is Friday 11 November 2016. Late application will be considered at the organisers' discretion .

LMS NEWS FOR UNDERGRADUATES, MASTERS STUDENTS, PHD STUDENTS, POST-DOCS AND EARLY CAREER RESEARCHERS

UNDERGRADUATES

Date for your diary: 16-17 December 2016 Application deadline: 11 November 2016

The next LMS Prospects in Mathematics Meeting will be held in York. Further details are available online: www.lms.ac.uk/events/ lms-prospects-mathematics-meeting.

Funding for Undergraduate Society Meetings: Up to £500 available

Looking to organise a meeting for your Society? Apply to the LMS for funding to support costs for a speaker and to cover catering costs e.g. a wine reception after the meeting. Further information and an application form are available online: www.lms. ac.uk/grants/LMS-Funding-Undergrad-Soc-Meetings.

MASTERS STUDENTS

Dates for your diary:

11 November 2016: Graduate Student Meeting, BMA House, London

Join us for a morning of talks, including the chance to give your own talk, prior to the LMS AGM and guest lectures by Alan Champneys (Bristol) and the Naylor Prize Lecture; Jon Chapman (Oxford). Further details available online: www.lms.ac.uk/ events/society-meetings.

16-17 December 2016

Application deadline: 11 November 2016

The next LMS Prospects in Mathematics Meeting will be held in York. Further details are available online: www.lms.ac.uk/events/ lms-prospects-mathematics-meeting.

PhD STUDENTS

Dates for your diary:

15 September 2016: Application deadline for Postgraduate Conference Grants (Scheme 8). Thinking of organising your own UK conference for your peers? Apply to the LMS for support of up to £4,000. Further details online: www.lms.ac.uk/grants/postgraduate-research-conference-grants-scheme-8.

11 November 2016: Graduate Student Meeting, BMA House, London

Join us for a morning of talks, including the chance to give your own talk, prior to the LMS AGM and guest lectures by Alan Champneys (Bristol) and the Naylor Prize Lecture; Jon Chapman (Oxford). Further details available online: www.lms.ac.uk/events/society-meetings.

POST-DOCS AND EARLY CAREER RESEARCHERS

Date for your diary: 15 September 2016 Application deadline for Research Grants.

· Have you recently been appointed to your



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newsletter@lms.ac.uk



first positions as a new lecturer? Why not host a scientific meeting to celebrate this important milestone in your career. Grants of up to £600 are available from the LMS Celebrating New Appointments scheme: www.lms.ac.uk/grants/celebrating-new-appointments-scheme-1.

• Planning a research visit with your col-

laborator? Apply to the LMS for support of up to £1,200 from a Research in Pairs Grant (Scheme 4). Further details online: www.lms.ac.uk/grants/ research-pairs-scheme-4.

 The LMS also runs other grant schemes. For more information, visit www.lms. ac.uk/grants or email grants@lms.ac.uk.



Advanced Postgraduate Courses in Mathematics

The MAGIC group runs a wide range of PhD level lecture courses in pure and applied mathematics, using IOCOM's Visimeet Video Conferencing technology supported by Janet.

MAGIC stands for Mathematics Access Grid Instruction and Collaboration and is a consortium of 20 UK mathematics departments who jointly deliver the programme of lectures over the web. Their students are able not only to receive the lecture live, but also to interact in real time with the lecturers.

Students from universities outside of the MAGIC consortium can subscribe to MAGIC and join courses, including assessment, on a term-by-term basis, for a small fee.

Details of all the courses MAGIC provide can be found at: **www.maths-magic.ac.uk**

Awards

LMS UNDERGRADUATE RESEARCH BURSARIES 2016

The London Mathematical Society is pleased to announce the list of successful applicants to its third round of Undergraduate Research Bursaries. For the 2016 round 36 awards were made to students from 18 different institutions to undertake a research project alongside a research supervisor. The purpose of the Bursaries is to enable undergraduates with research potential to experience research and to encourage them to consider a career in scientific research. *Indicates that the institution agreed to match-fund the award.

Institution	Research Supervisor	Student	Research
Aberdeen	Ellen Henke	Gyan Singh	Identifying Mathieu groups
Bath*	Jonathan Dawes	Anvarbek Atayev	Thermal convection in non-Newtonian fluids
Bath*	Melina Frietag	Paul Russell	Projection based preconditioners for linear discrete ill-posed problems arising in image processing
Bath*	Simon Harris	Philip Cohen	Characteristics of vortex motion of closed surfaces of revolution
Bath*	Peter Postl	Ludi Wang	Incentive mechanisms for research and innovation
Bristol*	Márton Bálazs	Magnus Bennett	Interacting walkers: stationarity and fluctuations
Bristol*	Thilo Gross	Salvador Catsis	Effective degree in epidemic spreading on complex networks
Cambridge*	Carola-Bibiane Schonberg	Georg Maierhofer	Bilevel optimisation for learning the sampling pattern in magnetic resonance tomography
Cambridge*	Natalie Vriend	Katarzyna Warburton	Silo honking: experimental investiga- tion into the origins and characteris- tics of sound emission from granular flow in a vertical tube
Durham*	Vitaliy Kurlin	Philip Smith	Superpixel meshes for faster image and video processing
Durham*	Simon Ross	Danny Vagnozzi	Tensor networks and holography
East Anglia*	Joseph Grant	Audie Warren	Constructing finite Frobenius rings for application in algebraic coding theory
East Anglia*	David Proment	Benjamin Young- Longstaff	Vortices in superfluids
Edinburgh*	Ruth King	Martin Trimmel	Exploring spatially explicit capture- recapture models
Glasgow*	Christophe Athorne	Ionut Paun	Geometry of low genus Riemann surfaces
Glasgow*	Ludger Evers	Aleksandra Boicuka	Smoothing methods for data from time-of-flight experiments

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Glasgow*	Luigi Vergori	Theodora Torcea	A rigorous mathematical deriva- tion of the Oberbeck-Boussinesq approximation	
Glasgow*	Andrew Wilson	Sebastian Cultrera di Montesano	Phylogenic algebraic geometry: local description of the Kimura 2-parameter model	
Imperial College*	Paolo Cascini	Federico Bongiorno	Study of elliptic curves and its ap- plications	
Nottingham*	Joel Feinstein	William Reynolds	Removability of exceptional sets for Hölder continuous functions on compact plane sets	
Nottingham*	John King	Jack Fellerman	Exponential asymptotics	
Nottingham*	Matthias Kurzke	Timothy Espin	Point vortex configurations	
Nottingham*	Yves van Gennip	Zhaoyuan Zou	Optimal parameter selection in topic models	
Nottingham Trent*	Jonathan Crofts	Daniel Crookes	Multiplex network models of the brain	
Oxford*	Yves Cadebosq	Lorenzo Sarnataro	On maximum principle for systems of 2nd order elliptic PDE	
Oxford*	Kobi Kremnitzer	Daniel Fletcher	Kac-Moody groups as algebraic groups and their quantum versions	
Oxford*	Tom Sanders	Ana-Eliza Casapopol	Sumsets of very large density	
Plymouth	Daniel Robertz	Edward Kitcher	Exact solutions of PDEs and symmetries	
Portsmouth*	Thomas Kecker	Callum Waite	Investigation of lattice reduction algorithms for the NTRU encryp- tion scheme	
Portsmouth*	William Lee	Michael Castle	Mathematical modelling of a new design of wave energy converter	
St Andrews*	David Dritschel	Sarah Stirrat	Characteristics of vortex motion of closed surfaces of revolution	
University College London*	Karen Page	Luzie Helfmann	Game theoretic investigation of the roles of trust and reputation in online retail	
University College London*	Dmitri Vassiliev	Mihal Barbu	Spectral analysis of the operator curl on a closed Riemannian 3-manifold	
Warwick*	Weiyi Zhang	Jonah Duncan	Zoli manifolds and their inter- actions with complex and symplectic geometry	
York	Martin Bees	Euan Smithers	Modelling flow fields due to microorganisms in confined envi- ronments	
York	Victor Beresnevich	Lawrence Lee	Rational points near manifolds	

http://newsletter.lms.ac.uk

EMS PRIZES 2016

The 2016 prizes of the European Mathematical Society (EMS) were announced at the 7ECM in Berlin. The prizes were awarded by the President of the EMS, Pavel Exner, together with representatives of the prize committees. Each award comprises a certificate and a cash prize of \in 5,000.

EMS Prizes

The prize is awarded to mathematicians under 35 years of age of European nationality or working in Europe. The ten winners were:

- Mark Bravermann (Princeton, USA)
- Vincent Calvez (ENS Lyon, France)
- Guido De Philippis (SISSA Trieste, Italy)
- Hugo Duminil-Copin (Geneva, Switzerland)
- James Maynard (Oxford, UK)
- Peter Scholze (Bonn, Germany)
- Peter Varjú (Cambridge, UK)
- Geordie Williamson (MPI Bonn, Germany)
 - Thomas Willwacher (ETH Zurich, Switzerland)
 - Sara Zahedi (KTH, Sweden)

Felix Klein Prize

The prize was awarded to Patrice Hauret (Michelin, France). The prize is awarded to a young scientist or a small group of young scientists (normally under the age of 38) for using sophisticated methods to give an outstanding solution, which meets with the complete satisfaction of industry, to a concrete and difficult industrial problem.

Otto Neugebauer Prize

The prize was awarded to Jeremy Gray (Open University, UK). The prize is awarded for highly original and influential work in the field of history of mathematics that enhances the understanding of either the development of mathematics or a particular mathematical subject in any period and in any geographical region.

More information on each prize winner is available at http://tinyurl.com/gqjotje.

STEPHEN SMALE PRIZE: CALL FOR NOMINATIONS

The third Stephen Smale Prize will be awarded at the conference of the *Foundations of Computational Mathematics* (FoCM) being held in Barcelona from 10 to 19 July 2017 (www.ub.edu/focm2017).

The Society for the Foundations of Computational Mathematics was created in the summer of 1995, following a month-long meeting in Park City, Utah, which was principally organized by Steve Smale "to strengthen the unity of mathematics and numerical analysis, and to narrow the gap between pure and applied mathematics". Smale's vision has been the Society's inspiration for all these years. The journal Foundations of Computational Mathematics was created; several colloquia and research semesters were organized, and an international conference is held every three years. After fifteen years of existence, with an established and recognized position in the scientific community, the Society created the Stephen Smale Prize whose objective is to recognize the work of a young mathematician in the areas at the heart of the society's interests and to help to promote his or her integration among the leaders of the scientific community. The first Stephen Smale Prize was awarded in 2011 to Snorre H. Christiansen; the second recipients in 2014 were Carlos Beltran and Mark Braverman.

More information and prize rules can be found at www.ub.edu/focm2017/smaleprize. html.

Nominations should be sent to the FoCM Secretary Angela Kunoth (kunoth@math. uni-koeln.de) as a single pdf-file by 24:00 (GMT) on **9 October 2016**.

CECIL KING TRAVEL SCHOLARSHIP 2016

The London Mathematical Society annually awards a \pm 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.

The 2016 Cecil King Travel Scholarship has been awarded to **Brendan Nolan** of the University of Kent. He is currently a PhD student, supervised by Dr Stéphane Launois, expecting to submit his thesis in early 2017.

Brendan will travel to the University of Waterloo, Canada where he will work with Professor Jason Bell. In particular the visit will cover noncommutative geometry, representation theory and ideal theory. Brendan will also collaborate with the wider algebra community during his time at Waterloo.

NEW GRESHAM COLLEGE PROFESSOR ANNOUNCED



Gresham College has announced the appointment of Chris Budd, OBE, Professor of Applied Mathematics, University of Bath, to the oldest mathematical chair in Britain, the Professorship of Geometry

and Other Mathematical Sciences at Gresham College. In his role as Professor of Geometry at Gresham College, Chris Budd will continue the 419-year-old tradition of delivering free public lectures in the City of London and beyond.

As well as his new position at Gresham College, Chris Budd is Professor of Applied Mathematics and Director of the Centre of Nonlinear Mechanics, University of Bath. His broad research interests are based on interdisciplinary industrial and applied mathematics, particularly in complex nonlinear problems arising in real applications. He was awarded his OBE in 2015 for services to science and mathematics education.

More information about the Gresham Geometry Professorship can be found at www.gresham.ac.uk/professorships/geometry-professorship/.

The series of free public lectures to be delivered during 2016-17 will be on Mathematics and the Making of the Modern and Future World. The six lectures will investigate how mathematics is relevant to all of our lives, and the process by which mathematical ideas move from the abstract to the practical, and also how technology is transferred between very different disciplines. The lectures will show the role of mathematics both in the technology that we all take for granted, and also its major applications to some of the Eight Great Technologies, recently identified by HM Government. The hour-long free public lectures will take place at the Museum of London, EC2:

What have mathematicians done for us? 1 pm, Tuesday 11 October 2016 The challenge of Big Data 1 pm, Tuesday 15 November 2016 Mathematics goes to the movies 1 pm, Tuesday 10 January 2017 How much maths can you eat? 1 pm, Tuesday 14 February 2017 Mathematical materials 1 pm on Tuesday 14 March 2017 Energetic mathematics 1 pm on Tuesday 25 April 2017

1 pm on Tuesday 25 April 2017

More information about the lectures can be found at http://tinyurl.com/zc3apc3.

SUBLIME SYMMETRY

William De Morgan was one of the most creative and inventive ceramicists of the 19th century. His bold, colourful designs have long been look to as pivotal in the Arts and Crafts movement, through De Morgan's association with Morris & Co. Sublime Symmetry is an exhibition which looks past the glorious lustre glazed vases and tiles to De Morgan's design and pattern making process, which singles him out as a designer with extraordinary mathematical skill. De Morgan's father was the notable Victorian mathematician and logician, Augustus De Morgan, the first President of the London Mathematic Society who undoubtedly sparked his son's interest in geometry, allowing him to utilise it with such conviction and flair.

The De Morgan Foundation, who have organised this touring exhibition of William De Morgan's ceramics and design on paper, would like to invite you to the private view at Torre Abbey in Torbay, Devon, on Friday 9 September, to see first-hand this wonderful synergy of mathematics and art. The exhibition will be open at Torre Abbey until 4 December 2016.

> Sarah Hardy, Exhibition Curator Sublime Symmetry

MATHEMATICS REMAINS TOP A-LEVEL SUBJECT

Mathematics continues to be the top A-level subject in spite of a decrease in the number of A-level Mathematics entries across the UK. While the number of students sitting the exam is down by 0.6% on last year to 92,163, the percentage of the total A-level cohort represented by mathematics has risen slightly from 10.9% to 11%.

Figures released today by the Joint Council for Qualifications also show that A-level Further Mathematics has continued to rise in popularity, with entries increasing by 1.8% (to 15,257).

However, a worrying trend is that AS Mathematics entries decreased by 1.6% (to 162,741), while AS Further Mathematics entries decreased 1.1% (to 26,742). The reformed A-level in Mathematics has not yet been introduced, so this may be an early warning sign that the changing funding regime and the decoupling of AS from A-level already underway in almost all subjects are combining to reduce the number of students taking a fourth subject at AS.

The London Mathematical Society (LMS) and the Institute of Mathematics and its Applications (IMA) extend their congratulations to all students receiving their AS and A-level results today.

The skills students develop in studying Mathematics open up a wide choice of rewarding careers. Mathematical sciences play a vital role in all aspects of modern society, including cybersecurity, manufacturing sectors such as aerospace, finance and meeting the new challenges of 'big data'. Maintaining the pipeline of well-trained mathematicians is vital for the future prosperity of the UK and its position in the world economy.

Professor Peter Giblin, Chair of the Higher Education Committee at the IMA, and Professor Alice Rogers, Chair of the Education Committee at the LMS added, 'It is excellent news that the proportion of A-level entries in both Mathematics and Further Mathematics continues to rise, and candidates are to be congratulated on a further increase in high grades achieved. The more worrying trends at AS will need to be monitored carefully, since both AS Mathematics and Further Mathematics are useful qualifications in their own right as well as providing a stepping stone to the full A-level'.

SUBLIME SYMMETRY

The Mathematics behind De Morgan's Ceramic Designs



EXHIBITION OPEN 10 September -4 December 2016

Open daily throughout September, Weds to Sun from October to December, 10am - 5pm

> Tickets: Adult £7.85 Concession £6.45 Under 18s free entry

You are invited

to the private view of SUBLIME SYMMETRY at Torre Abbey

9 September 2016 6 - 8.30pm

Speeches at 7pm

Please RSVP to jane.palmer@torbay.gov.uk

Torre Abbey, The King's Drive, Torquay TQ2 5JE www.torre-abbey.org.uk 01803 293593

OPENING WEEKEND FREE ENTRY FOR ALL!











PARLIAMENTARY LINKS DAY 2016

With the result of the EU referendum and its potential impact on higher education, science and research it was very timely that the topic for discussion at this year's on Tuesday 28 June 2016 at the House of Commons, organised by the Royal Society of Biology, was *Science after the Referendum: What Next*? Once again the Council for the Mathematical Sciences (CMS) was represented at the event and at the following House of Lords lunch, which was attended by European Mathematical Society (EMS) President, Professor Pavel Exner, at the invitation of the LMS.

Many in the science, engineering, technology and mathematics (STEM) community had supported a remain vote as the benefits to science, research and innovation, for example through EU grants and the free movement of students and researchers, are vital to the continued position of the UK as a 'science superpower'.

The event was opened by the Rt Hon John Bercow MP, Speaker of the House of Commons, who welcomed the participants and went on to outline how STEM is 'fundamental to the country's present and future'.

The decision made by the UK public has meant the possibility of major changes for the STEM community in its dealings with Europe

and the community was anxious for reassurances of what the future might hold. The Minister of State for Universities and Sciences. Jo Johnson MP, addressed the delegates and pointed out that the community as a whole 'needs to maximise the opportunities' from the situation and that 'international collaboration will become increasingly important'. Johnson referred to a statement that had been issued by the Department for Business, Innovation and Skills (http://tinyurl.com/ jdrkcz6) which outlines that there will be no immediate changes in those areas of higher education and research that are linked to EU funding and movement of students. Johnson was confident that UK STEM will endure and that the government will continue to 'champion STEM'.

The Chair of the Science and Technology Select Committee, Nicola Blackwood MP, gave a passionate defence of the STEM community and the importance of the continued growth and sustainability of the sector through support from the government to meet the challenges that will inevitably arise in the coming months. Blackwood pointed out that in the medium term there would be uncertainty and that the Science and Technology Committee will be at the forefront of nego-

> tiations to maintain the levels of funding for the STEM community, and looking at how to engage the public in discussions affecting science. The message she said was that 'the UK is firmly open for business' and the need was to 'ensure that science and innovation are at the front and centre of the debate'. Regardless of the [referendum] decision the UK is still a science superpower'. After the event the Science and Technology Committee announced that it had decided to examine the implications and opportunities of leaving the EU for science and research and have set up an inquiry to which the





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Nicola Blackwood MP, Chair of the Science and Technology Select Committee

CMS is in the process of providing a submission on behalf of the mathematical sciences (http://tinyurl.com/gpmozjn).

Representatives from the STEM community and MPs continued the discussion in two panel sessions that covered Science and Europe and Science and the World. In the first session Dr. Sarah Main, Director, Campaign for Science and Engineering (CaSE) pointed out the imperative for the STEM community, to speak with a united voice in future negotiations and that it was very important to present a well-defined message. What in particular made the relationship with the EU work with STEM and how might we convince people of the values of STEM? Dr Main saw this as the responsibility of the entire community academia, industry, learned and professional bodies, and research charities.

Imran Khan, Chief Executive, British Science Association, went on to make a very important point that although the majority of the STEM community had advocated a remain vote in the interests of science, innovation and research, and that this message had not been listened to by the public as a whole, it was peripheral to the decision making. The guestion is, 'How does science reach out to the public more successfully?' Nicola Dandridge, Chief Executive, UUK highlighted how the UK HE sector relies on close ties with Europe and the need to maintain a close relationship going forward. The guestions concerning the HE sector 'need to be answered quickly' and UUK is committed to engaging with government and European partners, with a UUK delegation to visit Brussels to discuss the way forward.

The second panel session discussed how the STEM community already engages with the rest of the world and how this might continue and fill any gaps that arise from an EU exit. Dr Robert Parker, Chief Executive, Royal Society of Chemistry (RSC) said, 'the STEM community has a responsibility to collaborate globally. We don't want to lose our leadership position in the global scientific community'.

The closing address came from the Professor Sir Venki Ramakrishnan FRS, President of the Royal Society. Professor Ramakrishnan outlined that the UK has historically been a leader in STEM and that this must continue otherwise the UK's alobal influence would decline. Long term stable commitments were required and it was important not to lose scientists during what could be a difficult economic period. With EU funding now at risk, overall investment in STEM must continue and negotiations with government to make up any deficits in funding would be crucial. He went on to say that the UK's exclusion from any EU programmes would damage the country's ability to influence development in these areas and that the UK must continue to be an open and welcoming place to conduct research. 'Many global challenges can only be confronted by collaboration worldwide and the challenges ahead provide opportunities to look wider than Europe'.

More information about the event is available at http://tinyurl.com/hq3fsbf.

MATHEMATICS POLICY ROUND-UP

September 2016

RESEARCH

Lord Stern review of REF

The independent review of the process for assessing university research and allocating public funding was published in July, outlining proposals to protect and strengthen the UK's leadership in world-class research.

Lord Stern commissioned by the government to carry out the review of the Research Excellence Framework (REF) to ensure future university research funding is allocated more efficiently, offers greater rewards for excellent research and reduces the administrative burden on institutions.

Stern's review of the Research Excellence Framework - Building on Success and Learning form Experiences sets out proposals including:

- to count all research active staff in the REF but varying the number of pieces they might submit - currently higher education institutions select the staff that will be included and this innovation will ease pressure and encourage academics to research new areas or on a longer time-scale;
- widening and deepening the notion of research "impact" to include influence on public engagement, culture and on teaching, avoiding distortions of research choices and careers;
- introducing a new institutional level assessment to foster greater cohesiveness between academics and reward collaboration on interdisciplinary activities.

The Review also recommends that outputs should not be portable. 'HEIs hiring staff during the REF cycle would be able to include them in their staff return. But they would be able to include only outputs by the individual that have been accepted for publication after joining the institution. Disincentivising shortterm and narrowly-motivated movement across the sector, while still incentivising long-term investment in people will benefit UK research and should also encourage greater collaboration across the system'.

The report also highlights that the REF should continue to support excellence wherever it is found. The full report is available at http://tinyurl.com/jk3nl9k.

A summary of responses from the higher education community to the call for evidence for Lord Stern's review of the Research Excellence Framework (REF) is also available. It also includes the findings from 40 qualitative interviews with higher education professionals and research users. More information is available at http://tinyurl.com/jkd4xq3.

Science and Research after the EU referendum

The House of Commons Science and Technology Select Committee decided to examine the implications and opportunities of leaving the EU for science and research. More information is available at http://tinyurl.com/ gpmozjn.

The Chair of the Science and Technology Select Committee, Nicola Blackwood MP, wrote to the Chancellor of the Exchequer relating to protecting and promoting science after the EU referendum. The letter is available at http://tinyurl.com/znmskjh.

The STEM community came together at this year's Parliamentary Links Day to discuss the future for science and research after the EU referendum (see page 20).

HIGHER EDUCATION

Higher Education and Research Bill

The Bill was presented to the House on 19 May 2016. On Tuesday 19 July, the Bill received its Second Reading in the House of Commons where MPs debated the main principles of the Bill. The Bill has now been sent to the Public Bill Committee where detailed examination of the Bill will take place. The Bill Committee is expected to hold oral evidence sessions on Tuesday 6 September and the Public Bill Committee is now able to receive written evidence, the closing date

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for which is 18 October 2016. More information is available at http:// tinyurl.com/zhnjrxb.

Regius Professorships

Her Majesty the Queen has honoured 12 UK universities by creating Regius Professorships as part of her 90th birthday celebrations.

The title of Regius Professorship is a prestigious award bestowed by the Sovereign to recognise exceptionally high quality research at an institution. Only 14 have been granted since the reign of Queen Victoria, including 12 to mark Her Majesty's Diamond Jubilee.

Recipients of new Regius Professor-

ships have been selected by open competition, judged by an independent expert panel of business and academic experts. A Regius Professorship is a reflection of the exceptionally high quality of teaching and research at an institution. A new Regius Professorship in Mathematics has been awarded to the University of Oxford. More information is available at http://tinyurl.com/hlppub2

SCHOOLS AND COLLEGES

New teaching resources for sixth-form mathematics

Underground Mathematics is the culmination of a five-year project funded by the government's Department for Education and delivered by the University of Cambridge's Faculty of Mathematics.

The new website offers hundreds of free teaching resources to help make A-Level mathematics a 'richer, more coherent and more stimulating experience for students and teachers alike'. More information is available at http://tinyurl.com/zobdglc.

Assessment of problem solving

The Advisory Committee on Mathematics Education (ACME) has published a report titled *Problem solving in mathematics: realising the vision through better assessment.*



In the report ACME considers the 'desirable characteristics of questions used to assess problem solving and sets out actions for policymakers, awarding organisations and the mathematics community to improve the quantity and quality of problem solving in mathematics tests and assessments'. The full report is available at http://tinyurl.com/h6hbwkc.

Speech at ACME conference

The Schools Minister, Nick Gibb, addressed delegates at the Advisory Committee on Mathematics Education (ACME) conference, held at the Royal Society on 12 July 2016. A transcript of the speech is available at http:// tinyurl.com/hwcxgmg.

OTHER

New government departments and Ministers

Following the creation of the new Department for Business, Energy and Industrial Strategy (BEIS) the Rt Hon Greg Clark MP has been appointed Secretary of State. Jo Johnson MP, remains as Minister of State for Universities, Science, Research and Innovation. More information is available at http://tinyurl.com/ hlyhamr

The Rt Hon Justine Greening MP is the new Secretary of State for Education.

No. 461 September 2016

EU membership and UK science

The House of Lords Science and Technology Select Committee has launched a short follow-up investigation on EU membership and UK Science. This short investigation will focus on people, facilities and funding. The Committee seeks evidence on the science dimension of the negotiations on leaving the EU and to identify any wider actions which will be needed in the short and medium terms to ensure that science in the UK can continue to flourish. More information is available at http://tinyurl.com/ znjkd9d.

> Dr John Johnston Joint Promotion of Mathematics

EUROPEAN NEWS

The following items are mostly from the European Mathematical Society (EMS) webpage www.euro-math-soc.eu/news.

Turkey: EMS protests against persecutions

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More than a thousand participants of the Seventh European Congress of Mathematics, the largest professional meeting of mathematicians on our continent, representing a community tens of thousands strong, took the opportunity of the Congress's closing ceremony to protest against the current treatment of academics by the Turkish government. The government-imposed travelling ban had a direct impact on the scientific programme of the Congress, as valued participants were unable to attend. Worse, many members of the scientific community have been dismissed from their jobs and will face further restrictions of their basic rights: the justifications for these infringements appear more than dubious. Such violations of human rights generally, and to scientists and teachers in particular, occurred repeatedly over the last century, in a number of countries. We all know their tragic consequences.

We express our solidarity with our Turkish colleagues and demand that the Turkish authorities treat their citizens in accordance with internationally recognised standards of liberty.

H2020 grant success

An application from the mathematical community finally made it in the European Commission's Horizon 2020 programme on user-driven e-infrastructure innovation. The proposal MSO4SC - Mathematical Modelling. Simulation and Optimization for Societal Challenges with Scientific Computing was approved on 15 July 2016. Seven countries - Spain, Germany, Hungary, Netherlands, Norway, Sweden and France – within the framework of the European initiative EU-MATHS-IN joined forces to construct an einfrastructure in the Cloud for Modeling, Simulation and Optimization that provides, in a user-driven, integrative way, tailored access to the necessary services, resources and tools. See www.cemosis.fr/projects/ mso4sc/

EMS Council 2016

One of the most important tasks of the Council of the European Mathematical Society that convened at the Humboldt University in Berlin during the weekend 16-17 July 2016 was the renewal of the EMS Executive Committee (EC). Volker Mehrmann (Berlin; 2017-18) and Armen Sergeev (Moscow; 2017-20) were elected as new Vice-Presidents of the society by a vast majority of the delegates. It was much more difficult to determine the composition of the members at large of the EC for the next four years. Thirteen renowned mathematicians stood as candidates for

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election, and two rounds of voting were necessary to come to the conclusion that the following five were selected by the 80 voting delegates: Betül Tanbay (Istanbul), Vicente Muńoz (Madrid), Beatrice Pelloni (Edinburgh), Stefan Jackowski (Warsaw) and Nicola Fusco (Naples). President Pavel Exner, Treasurer Mats Gyllenberg and Secretary Sjoerd Verduyn Lunel will continue to serve the EMS in these capacities until 2018.

8ECM 2020 at Portoroz

The second important decision to be taken by the delegates of the Council of the European Mathematical Society was the choice of the location of the next **European** **Congress of Mathematics** in 2020. Delegations from the two bidders Seville (Spain) and Portoroz (Slovenia) presented two attractive proposals to the EMS Council on 17 July 2016. The outcome of the subsequent vote was that European mathematicians will meet for the 8ECM in Portoroz during the week 5 to 11 July 2020 (www.8ecm.si).

Brexit blues

One way to combat any withdrawal symptoms would be to join the EMS as an individual member: see www.euro-math-soc.eu/individual-members for details.

David Chillingworth LMS/EMS Correspondent

BRITISH SOCIETY FOR THE HISTORY OF MATHEMATICS NEWS

The papers of the late historian of mathematics and former BSHM President, Ivor Grattan-Guinness, including his extensive correspondence, have been provisionally sorted and are now in the safe keeping of the Archive of American Mathematicians (AAM) based at the University of Texas, in Austin. The AAM is running an appeal for funds so that that the papers can now be properly catalogued and archived in order to provide a major resource for people working on the history of mathematics. Up to now half the target of \$10,000 has been reached, and members of the BSHM who would like to contribute are kindly requested in the first instance to contact the Council Secretary, Fenny Smith (contact@bshm.ac.uk).

The following are details of the meetings for the rest of this year.

Mathematical Biography: A Celebration of MacTutor, St Andrew's University, 16-17 September 2016. The programme and on-line booking are available at http://www. mcs.st-and.ac.uk/mathbiog/.

Curves in Honour of Leibniz's Tercentenary, Gresham College, London, Thursday 27 October 2016. As usual, although the event is free, it will be necessary to book your place and secure a ticket via the Gresham College website at http://tinyurl.com/ hma9np9. The meeting is administered by Gresham College and not BSHM; the event is very popular, open to the general public and places are limited. Every year this meeting sells out quite early. Thus disappointment is inevitable for any member who either leaves booking very late or seeks entry on the day without a ticket. If you intend to come, you are strongly advised to take action now. As last year, the Society's AGM will be held at Birkbeck College in the early afternoon prior to this event.

BSHM Christmas Meeting, BMI, Birmingham, 3 December 2016. Programme and booking arrangements will be posted on the website shortly.

Most meetings can be now booked and paid for on-line. Participants are encouraged to book by this simple method sooner rather than later. Full details are on the website at www.bshm.ac.uk including a number of non-BSHM meetings. 26

LMS NEWSLETTER

GEOFFREY SHEPHARD

Professor Geoffrey C. Shephard, who was elected a member of the London Mathematical Society on 15 February 1952, died on 3 August 2016, aged 88.

Following a very generous donation made by Professor Shephard, the London Mathematical Society in 2015 introduced a new prize. The prize, known as the Shephard Prize is awarded biennially. The first Shephard Prize was awarded to Professor Keith Ball FRS (University of Warwick) in 2015. The Shephard Prize is awarded for making a contribution to mathematics with a strong intuitive component, which can be explained to those with little or no knowledge of university mathematics, though the work itself may involve more advanced ideas. Professor Shephard's main fields of interest were in convex geometry and tessellations. He was one of the longest-standing members of the LMS, having given more than sixty years of membership.

It is anticipated that an obituary will be published in the *LMS Newsletter* in due course.

INFORMAL MEETING BETWEEN THE DMV AND THE LMS Report

On 18 July 2016, during the 7th European Congress of Mathematics (ECM) in Berlin, the Presidium of the Deutsche Mathematiker-Vereinigung (DMV) invited six members of the LMS Council to a working dinner, during which we were to learn more about our two Societies and explore possible common areas of concern.

Volker Bach, Christian Bär, Wolfram Koepf, Jürg Kramer and Michael Röckner attended from the DMV, and Tony Gardiner, Stephen Huggett, Beatrice Pelloni, Iain Stewart, Simon Tavaré and Alina Vdovina from the LMS.

Among the many issues discussed were the following:

- The problem of game-playing and consequent distortion and damage to our research landscape resulting from evaluations such as the Research Excellence Framework (REF), and the potential for more of the same for our teaching from the Teaching Excellence Framework (TEF).
- The LMS's intention to encourage undergraduates to become members of the Society.
- The DMV's *High School Graduate Prizes*, of which about 3,500 are awarded each year.

- The shared concern about transition from school to university: in Germany there are transition courses in September before the semester begins.
- The pattern in Germany whereby almost all mathematics departments live from having two categories of students: (a) those aiming to do an academic major, and (b) those aiming to become teachers, who take some of the same courses.
- The scientific programme of the ECM, in particular how to include recent developments in the subject while avoiding making the programme too sensitive to shifts and swings in fashion.

The elephant in the room (this is unfair to elephants) was the British exit from the EU. Note that the meeting was arranged well before the UK referendum, but of course much of our discussion focussed on possible consequences. The meeting underlined for the LMS delegation the importance of maintaining and improving our understanding of and good relations with our sister Societies in Europe, and we are very grateful to our hosts for their invitation and hospitality.

> Stephen Huggett LMS General Secretary

7ECM PANEL SESSION

How to get your papers published – meet the Editors

A panel session on this topic was hosted by the LMS on Wednesday 20 July 2016, at the 7th European Congress of Mathematics in Berlin, with the aim of aiding understanding between early career researchers and those making editorial decisions for mathematical journals. The event attracted about forty early career (and not so early career) mathematicians, journal editors and representatives of mathematics publishers. The main topics discussed included how to choose the right journal for a paper, what are the editors' thought processes and perspectives when selecting papers for acceptance, what should an author do if there are problems or delays in the peer review process, and how might an author improve their chances of getting their paper accepted for publication.

Various remarks were made regarding the dual purpose that a publication fulfils for an author: to disseminate their ideas, and to position the author for appointments and promotions. This gave rise to a lively discussion where some lamented that the latter was perhaps becoming the chief (if not only) purpose of publishing. In this context, the choice of journal had turned into a fine balancing act: not to overreach and be rejected; not to undersell and be accepted by a journal with lower reputation which could harm the author's career aspirations.

Some authors may have been surprised by the great emphasis and importance assigned by the panel of editors to a wellwritten introduction and an accurate and complete list of references. The main point was that shortcomings here serve as 'red flags' lowering the editors' expectations in reading the rest of the paper and alerting the editors to look for further flaws.

The panel was chaired by Professor John Hunton, the LMS Publications Secretary, and included Professor Karen Vogtmann (University of Warwick), Professor Radha Kessar (City University, London) and Professor Carles Casacuberta (University of Barcelona).

> Dr Ola Törnkvist Editorial Manager, LMS



Carles Casacuberta, Karen Vogtmann, Radha Kessar, John Hunton



LMS POPULAR LECTURES 2016

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.

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 online at www.lms.ac.uk/events/popular-lectures

1865 - 2015

LMS POPULAR LECTURES 2016 Report

On 29 June 2016 the Institute of Education in London hosted the 2016 LMS Popular Lectures. A diverse audience, including many students, enjoyed an evening of mathematics with topics ranging from the use of data in biology to playing noughts and crosses.

Dr Heather Harrington from the University of Oxford kicked off the evening with *The Shape of Data in Biology*. She compared the spread of a biological contagion with the spread of the ice bucket challenge on Facebook. How many of your friends needed to take part in the challenge before you were prompted to take part yourself, if at all? This analogy gave our Year 12 students a better understanding of mathematical modelling, and how mathematical networks can be used to model this behaviour.

After the break, Dr Julia Wolf from the University of Bristol had us playing noughts

and crosses with her talk *One*, *Two*, *Red*, *Blue*. Not the usual game, of course, but larger grids in higher dimensions. She used the card game SET to demonstrate how to play in four dimensions and it was refreshing to see teenagers engaged in a card game rather than a phone app. The pursuit of winning strategies for these games may seem trivial, however the methods developed to solve them have been used in other problems such as understanding large and complex networks.

The evening was enjoyable and informative. Our students appreciated learning how mathematics is used beyond the classroom and we are looking forward to a return visit next year.

> Louisa Yena Second in Charge of Mathematics St Francis Xavier College, London





Heather Harrington

Julia Wolf

LMS NORTHERN REGIONAL MEETING

Report

An LMS Northern Regional Meeting was hosted in the Mathematics Department of the University of Manchester in June this year. The scope of the meeting was *Dynamical Systems, Ergodic Theory and Applications*, and what resulted was an extremely pleasurable event. Over the two days around 55 people attended, many of whom were students and most of whom had travelled from other universities to join us in Manchester.

The official LMS meeting took place on the afternoon of Thursday 23 June and consisted of plenary talks from Professors Sanju Velani (York) and Julien Barral (Paris 13). There was also a public lecture delivered by Dr Henna Koivusalo (York). These talks were very wellreceived and appropriate for the broad scope of the meeting. Velani spoke on recent and on-going progress in Diophantine approximation, which brought in connections with number theory and hyperbolic geometry. Barral spoke on the fine structure of certain projected measures connected with Mandelbrot percolation and Mandelbrot cascades. This talk was more probabilistic in nature and also had links to fractal geometry and dimension theory. Finally, the public lecture



Julian Barral



Sanju Velani

concerned aperiodic order in connection with quasi-crystals.

Over the rest of the two-day workshop, there were a further two plenary talks given by Professors Ian Melbourne (Warwick) and De-Jun Feng (Chinese University of Hong

> Kona). Melbourne discussed the infamous Lorentz attractor and. in particular, the recent breakthrough that it is exponentially mixing. Feng spoke on exact dimensionality of self-affine measures and, notably, announced a major, as yet unpublished, result of his that any self-affine measure is exact dimensional and satisfies well-studied the Ledrappier-Young formula. There were also nine contributed talks on a wide range of topics including statistical stability, group actions, escape rates and spectral theory. Additionally, the meeting provided ample opportunity for collabora-

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tion and extra-curricular discussions, which often went on into the evening.

The conference reception was held on the Atrium Bridge in the Alan Turing building and was followed by the conference dinner in EastZeast; an old favourite of the faculty in Manchester. We were joined at the dinner by LMS representatives lain Stewart, Fiona Nixon and Elizabeth Fisher.

The webpage for the conference can be found at: http://tinyurl.com/h95ljhj and includes photos from the event, the schedule itself, along with titles and abstracts, and the conference poster.

> Jonathan Fraser University of St Andrews



De-Jun Feng



Wine reception

RECORDS OF PROCEEDINGS AT LMS MEETINGS ORDINARY MEETING, 23 JUNE 2016

held at the University of Manchester as part of the Northern Regional Meeting and Workshop on *Dynamical Systems, Ergodic Theory and Applications*. Over 50 members and visitors were present for all or part of the meeting.

The meeting began at 1.20 pm with the Programme Secretary, Professor lain A. Stewart, in the Chair. There were 20 members elected to membership at this Society Meeting. Six members were elected to Associate membership: Matthew Dawes, Gareth Davies, Ruadhai Dervan, Ana Rojo, William Rushworth and Sacha van Tienhoven. Eleven members were elected to Ordinary membership: Winda Charles Akatch, Peter D. Allen, Pritpal Singh Chadha, Steven Green, Vic Grout, Jayapal Ravi, Enrico Scalas, Hideyasu Shimadzu, Daniel Shiu, Fiona Skerman and Simon Stringer. Three members were elected to Reciprocity membership: Greg Minshall, Ajit Iqbal Singh and George Yiannakopoulos.

Three members signed the Members' Book and were admitted to the Society.

Dr Jonathan Fraser introduced a lecture given by Professor Sanju Velani (York) on Diophantine Approximation in Kleinian Groups: Extremality and All That.

After tea, Dr Fraser introduced a lecture given by Professor Julien Barral (Paris 13) on *Projections of Planar Mandelbrot Measures*.

Dr Fraser then introduced the Public Lecture given by Dr Henna Koivusalo (York) on A Short History of Aperiodic Order - From Crystals to Quasicrystals.

The Programme Secretary, Professor Stewart, expressed the thanks of the Society to the speakers and to Jonathan Fraser for putting on such a wonderful meeting.

Afterwards, the reception was held in the Alan Turing Building and the Society Dinner was held at a nearby restaurant, EastZeast.

SCOTTISH PARTIAL DIFFERENTIAL EQUATIONS COLLOQUIUM

Report

The 4th Scottish Partial Differential Equations Colloquium (SPDEC 2016) took place from 9 to 10 June 2016 at the University of Dundee, as part of a series of annual meetings. The primary aim of this meeting, and the SPDEC series at large, is to bring together young researchers, mostly from Scotland, and experts from the UK and abroad whose work features PDEs and their analysis and applications. We are happy to report that this goal was fulfilled, and the SPDEC 2016 was a great success.

The colloquium included four plenary talks given by Professor Sir John Ball (Oxford), Professor Willi Jäger (Heidelberg), Professor Charalambos Makridakis (Sussex) and Professor Barbara Niethammer (Bonn), 15 invited talks given by young researchers from six Scottish and three English universities, and 14 poster presentations given by 13 PhD students, from five Scottish and two English universities, and one lecturer. The plenary and invited talks and poster presentations covered a wide range of research areas related to the analysis and numerical analysis of PDEs, Scientific Computing, Stochastic PDEs and Multiscale Analysis. Titles and abstracts of the plenary and invited talks, as well as titles of the poster presentations, can be found on the website of SPDEC 2016 at www.maths. dundee.ac.uk/spdec2016/index.shtml.

The Colloquium was supported by the London Mathematical Society Conference grant, the Edinburgh Mathematical Society Research Support Fund, the Glasgow Mathematical Journal Learning and Research Support Fund, and the University of Dundee.

> Irene Kyza and Mariya Ptashnyk Division of Mathematics University of Dundee



Attendees

LMS HARDY LECTURER JACOB LURIE AT THE UNIVERSITY OF LEICESTER Report



Jacob Lurie and Frank Neumann

As part of the LMS Hardy Lecture Series, Professor Jacob Lurie from Harvard gave a lecture on 30 June 2016 at the University of Leicester on *Weil's Conjecture for Function Fields*.

Professor Lurie reported on his spectacular recent breakthrough with Dennis Gaitsgory, also at Harvard, on their proof of the Weil Conjecture on Tamagawa numbers for algebraic groups G over function fields. He started by giving a fascinating overview of the original conjecture as stated for number fields.

The Weil conjecture on Tamagawa numbers says that the Tamagawa number of a simply connected algebraic group defined over a number field is 1. Weil himself calculated the Tamagawa number in many special cases in



Jacob Lurie



lain Gillespie, Pro-Vice-Chancellor for Research and Enterprise, University of Leicester

1959. Several authors then checked this in other cases. For example, Langlands showed it for Chevalley groups in 1966, Lai extended the cases further to all guasisplit reductive groups in 1980 and finally Kottwitz and Chernousov settled it finally for all groups at the end of the 1980s. In the second part of his lecture Professor Lurie indicated the ideas and challenges to proof the Weil Conjecture for algebraic groups over function fields. Contrary to other problems, the function field case is actually more challenging and the impressive work by Lurie and Gaitsgory introduces many new groundbreaking ideas, like nonabelian Poincare duality and factorisation homology based on a thorough understanding of the topology of the moduli

stack of principal G-bundles over an algebraic curve to settle the function field case of the Weil Conjecture.

The lecture of Professor Lurie was very well attended by more than sixty mathematicians. Besides the local mathematics faculty and their graduate students, many mathematicians and students from the Midlands region also attended. Professor Iain Gillespie, Pro-Vice-Chancellor for Research and Enterprise of the University of Leicester, introduced the speaker and the lecture was followed by a reception with the event ending with a dinner in a local South Indian restaurant.

> Frank Neumann Department of Mathematics University of Leicester

34 INSTITUTE FOR MATHEMATICAL INNOVATION UNDERGRADUATE RESEARCH INTERNSHIP PROGRAMME Report

This summer, eighteen students at the University of Bath spent the holiday period gaining valuable mathematical research experience and getting a feel for what a career in science has to offer. Participating in the Institute for Mathematical Innovation's (IMI) Undergraduate Research Internship Programme, the students spent up to 10 weeks working on a research project supervised by academic staff at the University of Bath.

The IMI research internship programme fills an important gap between undergraduate and PhD study where students must be able to work independently. Importantly,

> the programme also gives students an opportunity to research a specific topic and establish a closer relationship with faculty members, who they can use as referees when applying for future jobs.

> Three of the students taking part in the research internship programme, Ludi Wang, Anvarbek Atayev and Paul Russell, received an Undergraduate Research Bursary from the London Mathematical Society (LMS).



Speaking of her experience of doing a research internship, Ludi Wang said: "Doing a research internship has been a great opportunity for me to explore a topic which is considered too risky for coursework. Not only have I gained first-hand experience of doing research in a topic that is related to my Economics studies, but I could also fit the work in around the other things I did this summer as the programme was flexible."

Anvarbek Atayev, who also received an LMS bursary, added: "During my internship, I learnt how to use mathematics to solve a real-world problem and research the literature on my own, which has given me more confidence in terms of doing a PhD".

Alongside their research, this year's un-

dergraduate students received training in academic report writing and referencing, and how to typeset mathematics using LaTeX. They also met PhD students from the EPSRC Centre for Doctoral Training in Statistical Applied Mathematics (SAMBa) to hear firsthand what it is like starting out in research. Students were also offered the opportunity to join a journal club to learn how to analyse and interpret mathematical research papers.

Alongside the LMS, the IMI research internship programme was supported by SAMBa and the Biotechnology and Biological Sciences Research Council (BBSRC).

Sanne Terry Marketing & Communications Officer, IMI University of Bath

RANDOM MATRIX THEORY BRUNEL-BIELEFELD WORKSHOP

The 12th Brunel-Bielefeld Workshop on Random Matrix Theory (RMT) and its applications will take place at Brunel University London from 9 to 10 December 2016. This is a two-day international event that builds on a series of RMT workshops organised by the Mathematical Physics group at Brunel every year since 2005, and jointly on a two-year rotation schedule with Bielefeld University (Germany) since 2011. This event aims to bring together an international group of leading researchers in RMT and related areas of probability theory and mathematical physics, with particular focus on connections to both traditional and novel applications, such as statistical physics, complex networks, big data and machine learning. The program of the workshop will include invited talks and a poster session with around 15 to 20 contributed posters. The invited speakers are:

- Romain Couillet (Paris)
- Fabio Cunden (Bristol)
- Benjamin Fahs (Louvain)

- Tamara Grava (Trieste)
- Alice Guionnet (Lyon)
- Alexander Its (Indianapolis)
- Boris Khoruzhenko (London)
- Holger Koesters (Bielefeld)
- Gaultier Lambert (Stockholm)
- Anna Maltsev (Bristol)
- Aris Moustakas (Athens)
- Alexander Ossipov (Nottingham)
- Nina Snaith (Bristol)
- Martin Venker (Bielefeld)
- Oleg Zaboronski (Warwick)

Deadline for requesting participation is 1 November 2016. A registration fee of £40 (£20 for PhD students) applies to all workshop participants. Some funding is available for young researches presenting a poster. Additional information, including how to register, can be found on the workshop's website at http://tinyurl.com/hcqpnr9 or by contacting any of the organisers: Gernot Akemann (akemann@physik.unibielefeld.de), Igor Krasovsky (i.krasovsky@ imperial.ac.uk), Dmitry Savin (Dmitry.Savin@ brunel.ac.uk), Igor Smolyarenko (Igor.Smolvarenko@brunel.ac.uk). The workshop is supported by an LMS Conference grant, DAAD (Germany) and the Department of Mathematics at Brunel.

The Australian Mathematical Society this year celebrates its 60th anniversary. For most of its 60 years it has had a reciprocity agreement with the LMS. This agreement enables LMS members to obtain discounts on the Society's three journals, the Journal of the Australian Mathematical Society, the Bulletin of the Australian Mathematical Society and the ANZIAM Journal, as well as the Australian Mathematical Society Lecture Series, all published for the Society's Gazette, which has many similarities with the LMS Newsletter, is available freely online at www.austms.org. au/gazette.

The Society welcomes members from all branches of the mathematical sciences and has two Divisions, ANZIAM and ANZAMP, for those with interests in industrial and applied mathematics (ANZIAM) or mathematical physics (ANZAMP). These Divisions also include members from New Zealand. In addition to holding an annual conference, the Society supports regular meetings organised by its Divisions and by various Special Interest Groups within the Society. Jointly with the Australian Mathematical Sciences Institute (AMSI) it also supports Special Interest Meetings. These meetings are open to all, although there are reduced registration fees for Society members. This year, in collaboration with AMSI and in celebration of our 60th anniversary, there are two special meetings adjoining the Society's





annual conference. The resulting Mathsfest is publicised on the opposite page: members of the LMS are very welcome at these events.

The Society's two major awards for a body of work by members of the Society are the Australian Mathematical Society Medal, introduced in 1981, for distinguished research in the mathematical sciences by those under 40, and the George Szekeres Medal, introduced in 2002, for a sustained outstanding contribution to research in the mathematical sciences. In addition, in 2011 the Society introduced the Gavin Brown Prize, for an outstanding and innovative piece of research in the mathematical sciences published by a member or members of the Society. The past winners of these awards can be found at http://tinyurl.com/ju9g86r (AustMS Medal), http://tinvurl.com/zv3bvvm (George Szekeres Medal) and http://tinyurl.com/zkfb7nl (Gavin Brown Prize).

In 2016, the Society will introduce the Mahoney-Neumann-Room Prize, named after the inaugural editors of its three journals. This prize, for the author or authors of an article in the mathematical sciences published in one of the three journals, is

> not restricted to members of the Society. The Society's Council hopes that many members of the LMS will continue to choose to publish articles in our journals and hence become eligible for this prize in future years.

> Further information on the Society can be found on the website www.austms.org.au or from the secretary, Peter Stacey (secretary@austms.org.au).

Peter Stacey Honorary Secretary Australian Mathematical Society

MATHS FEST 2016

The Australian Mathematical Sciences Institute (AMSI) and the Australian Mathematical Society are organising a 3-in-1 event in Canberra, Australia in November/ December. The three events collectively are being called Maths Fest 2016 and the details of the individual events are as follows:

Advances in Ergodic Theory, Hyperbolic Dynamics & Statistical Law

The Australian National University, Canberra, ACT, Australia

28 November - 2 December 2016

This workshop brings together Australian and international researchers interested in theoretical and applied areas of dynamical systems, ergodic theory and probability, with expertise in topics such as hyperbolic dynamics, thermodynamic formalism, statistical properties of dynamical systems, quantum ergodicity, infinite-dimensional ergodic theory, stochastic processes, data assimilation and computational dynamics. For further details see: http://tinyurl.com/zq7t82p.

60th Annual Meeting of the Australian Mathematical Society

The Australian National University, Canberra, ACT, Australia

5-8 December 2016

The 60th annual meeting of the Australian Mathematical Society will feature an impressive list of both international and domestic speakers and will be hosted by the Mathematical Sciences Institute at the Australian National University. For further details see: http://tinyurl.com/gmm6y2e.

Nonlinear and Geometric Partial Differential Equations

The Australian National University, Canberra, ACT, Australia

9-13 December 2016

This workshop gathers Australian and international researchers in the areas of geometric analysis and geometric and nonlinear partial differential equations, ranging from geometric variational problems such as minimal surfaces, harmonic maps and the theory of optimal mass transport, to geometric flows such as mean curvature flow and Ricci flow, and aspects of geometric PDE including eigenvalue problems and isoperimetric inequalities. For further details see: http://tinyurl.com/zjfuvr7.

MATHEMATICS IN THE REGIONS AND NATIONS

The Open University is pleased to announce an inaugural two-day conference to celebrate the contributions of the university's regional academics to research and scholarship in the mathematical sciences and its teaching. This event additionally marks the appointment in recent years of four new staff tutors in mathematics and statistics – Carol Calvert, Chris Hughes, Sue Pawley and Katrine Rogers – and is supported by the London Mathematical Society under the Celebrating New Appointments grant.

The external speakers are: Giampaolo D'Alessandro (Southampton), Andrew Jenkins (UCL), Jonathan Wattis (Nottingham) and Ben Wells (Schlumberger).

The event will take place from 13 to 15 October 2016 in Christodoulou Meeting Room 15 on the Open University campus in Milton Keynes. Attendance is open to everyone and there is no registration fee, but participants are asked to register on the website by 15 September 2016 for catering purposes. Further details, including a schedule once available, can be found on the event's website: https://sites.google.com/site/ mathsintheregions.

SHEFFIELD PROBABILITY DAY

The Sheffield Probability Day will take place on Wednesday 21 September 2016 in Lecture Theatre 10, Hicks Building. This year's Sheffield Probability Day is dedicated to the memory of Joe Gani (1924-2016), the founder

of the Applied Probability Trust. The lectures will be given by:

- Antal Járai (Bath) at 2.15 pm Sum of inverse powers of Poisson distances
- Jan Swart (UTIA) at 3.45 pm The 2016 Applied Probability Trust Lecture Self-organised criticality on the stock market

Tea and coffee will be available at 3.15 pm in Room 115, Hicks Building. All are welcome. For further information contact Emma Talib (tel. 0114 222 3924, email: e.talib@sheffield. ac.uk). The meeting is supported by the Applied Probability Trust.

DIRECTIONS IN COMPUTABILITY THEORY

A Meeting in Memory of Barry Cooper

A meeting in memory of Barry Cooper, who died last autumn, will be held In the School of Mathematics, University of Leeds, on Saturday 17 September 2016. All friends and former students of Barry's, as well as anyone interested in Mathematical Logic, is welcome to attend. The focus will be on Computability Theory, particularly with reference to Barry's work.

Barry was a central figure in the study of Computability Theory in the UK, and had a large number of research students and postdoctoral assistants. He was a founding member and president of the Association Computability in Europe (CiE). In recent years, he also achieved a high profile because of his work in promoting awareness of the Alan Turing Centenary.

The meeting will consist of four talks followed by a dinner in the evening, together with a jazz performance. (Barry was a founder and keen member of the Leeds Jazz Club). The speakers are:

- Marat Arslanov (Kazan State University)
- Andrew Lewis-Pye (London School of Economics)
- Theodore A. Slaman (University of California, Berkeley)
- Andrea Sorbi (University of Siena)

You are invited to register as soon as possible. There is no registration fee, but a contribution will be requested for those coming to the dinner. Information on registration and further details of the meeting can be found at the webpage: http:// tinyurl.com/ jhddyxk. Current and recent PhD students are encouraged to attend. The organisers may be able to provide modest travel grants for these. (Please refer to the webpage.)

The meeting is organised by Charles Harris (C.M.Harris@leeds.ac.uk), John Truss (J.K.Truss@leeds.ac.uk) and Stan Wainer (S.S.Wainer@leeds.ac.uk), supported by the School of Mathematics, University of Leeds and the British Logic Colloquium.

ONE DAY FUNCTION THEORY MEETING

The One Day Function Theory Meeting will be held at De Morgan House, London, on Monday 12 September 2016. This is an annual meeting of complex analysts and function theorists. The speakers are:

- Alan Beardon (University of Cambridge)
- Eleanor Lingham (Sheffield Hallam University)
- Eugenia Malinnikova (Norwegian University of Science & Technology)
- Patrick, Tuen Wai Ng (University of Hong Kong)
- Joaquim Ortega-Cerdr (University of Barcelona)
- Leticia Pardo Simón (University of Liverpool)

The event is open to all. There is no need to register in advance, although there is a small registration fee, payable on the day, which is waived for the retired or unemployed. There is some support available for travel for UK students without other means of support contact the organisers for information. The contact details of the organisers and further details of the event can be found on the meeting website https://sites.google.com/ site/functiontheorymeeting.

The meeting is supported by an LMS Conference grant.

VISIT OF OLEG SMOLYANOV

Professor Oleg Smolyanov (Moscow State University) will be visiting the UK from 31 October to 26 November 2016. He is best known for his many contributions to infinite dimensional analysis, and more recently to measure theory in topological vector spaces, and consequent understanding of Feynman integrals and transformations. Professor Smolyanov will give (at least) three seminars during his stay as follows:

- Thursday 10 November, Imperial College London: Feynman path integrals and quantum anomalies; contact Dimitry Turaev (d.turaev@imperial.ac.uk)
- Thursday 17 November, University of Manchester: Noether theorems and quantum anomalies; contact James Montaldi (j.montaldi@manchester.ac.uk)
- Wednesday 23 November, Aberystwyth

University: *Noether type theorems*; contact John Gough (jug@aber.ac.uk)

For further information contact James Montaldi (j.montaldi@manchester.ac.uk). The visit is partially funded by an LMS Scheme 2 grant.

VISIT OF IGOR VELCIC

Dr Igor Velcic (University of Zagreb, Croatia) is visiting the UK from 18 September to 17 October 2016. He is an expert in calculus of variations, especially in homogenisation in nonlinear elasticity theory. During his visit, Dr Velcic will collaborate and give talks at:

- Bath: Monday 26 September
- Cardiff: Monday 3 October
- Oxford: Monday 10 October
- Reading: Tuesday 11 October For further details contact Dr Nikos Katzourakis (n.katzourakis@reading.ac.uk). The visit is supported by an LMS Scheme 2 grant.

STRUCTURE OF OPERATOR Isaac Newton Institute ALGEBRAS: SUBFACTORS AND FUSION CATEGORIES

23 – 27 January 2017

in association with the Isaac Newton Institute programme *Operator Algebras: Subfactors and their Applications* (9 January – 23 June 2017)

The opening workshop will focus on introducing the theoretic foundations of the six month programme. In particular, the workshop will feature both algebraic and analytic aspects of subfactors and fusion categories, including the classification of low index subfactors, modular tensor categories and their module categories, but also exposing the infinite depth, infinite index subfactors and exploiting free probability and planar algebras.

Non unitary and non-semisimple fusion systems are coming to the fore (e.g. related to logarithmic conformal field theories) being studied through non-unitary Leavitt algebras.

Further information available from the website www.newton.ac.uk/event/oasw01

Closing date for receipt of applications 27 October 2016.

MATHEMATICS IN ANCIENT EGYPT: A CONTEXTUAL HISTORY

by Annette Imhausen, Princeton University Press, 2016, £34.95, US\$45.00, ISBN 978-0691117133.

The history of mathematics isn't what it used to be. Especially with respect to ancient cultures, through the 1970's studies tended to emphasize comprehension of the mathematics within a text, assessments of its sophistication, and parallels to modern techniques. These days, social history has taken over. What the distinctive system of unit fractions. In her coverage of the Middle Kingdom Imhausen introduces the algorithmic presentation of Egyptian problem texts that she and Jim Ritter have been promoting as an effective medium to reflect the intentions of the ancient writers. We suffer from a lack of mathematical texts in

was the mathematics used for? How did it emerge, and how was it understood then? *Mathematics in Ancient Egypt* is a conscious attempt to apply these new perspectives to perhaps the most ancient mathematical culture of them all.

We see the difference already in the table of contents. Whereas the previous survey (Gillings, Mathematics in the Time of the Pharaohs, 1972) structured its chapters by mathematical topic, this book is organized by time period. When

that period is millennia in duration, this seems appropriate. Imhausen does bring out, as much as the manuscripts allow, growths and differences between the five main periods: prehistoric/early dynastic; the Old, Middle, and New Kingdom; and Greco-Roman.

After a brief taste of the Egyptian number system in the section on the early dynastic period, Imhausen gives us a sample of arithmetic in the Old Kingdom in the context of systems of measurement. It is here that we have our first look at



the New Kingdom; instead Imhausen treats us with а series of texts that mention mathematics in the contexts of state administration, land measurement. architecture, scribal education, art, and wisdom literature. The problems and the explanations are more difficult, partly due to the inception of "suprautilitarian" problems that have the trappings of practical use, but are clearly mathematical exercises. Imhausen emphasizes context over content throughout, which

may be jarring to a traditional reader but plays well into the project of restoring "history" to the history of mathematics.

The evidence for Egyptian mathematics is scanty; Imhausen deals with parts of most of those manuscripts that are available, whether on papyri, ostraca, or leather rolls. She stresses the valid point that the data are likely skewed toward preserved texts often in funerary contexts, since they have had the good fortune to be buried in dry environments rather than wetter settings close to the Nile that are destructive to papyri. Her explanations are thorough and generally easy to understand, even for an interested lay person.

Although there is much to learn about Egyptian mathematics that is not within these pages, Imhausen has succeeded in producing a clear and innovative introduction. Even more importantly, she has provided a clear example of how to write the history of mathematics with social rather than mathematical values. Whether or not her approach is to the reader's taste, she has done a service by helping to expand the history of mathematics "tent". We now have more available questions, more available sources to answer them, and ultimately, more relevance.

> Glen Van Brummelen Cameron Friend Quest University, Canada

MATHEMATICAL MINDSETS

by Jo Boaler, John Wiley, 2015, pp 320, £13.00, €18.20, ISBN: 978-0470894521.

This is the second review of this book in the *LMS Newsletter*. The first, by David Sixsmith, was in the July edition. In that review he concentrated on a somewhat controversial claim by the author. Julian Gilbey felt that there are other aspects of this book that should be addressed which he has done in his review.

Jo Boaler has worked for many years to understand the impact of school structures and teaching approaches to the mathematical progress of students. While this easily-readable book appears to be aimed

primarily at school teachers and secondarily at parents, many of the ideas apply equally well to those working with undergraduates. should perhaps say that I have taught mathematics in both secondary schools (for ten years) and university, and am currently developing A-level teaching resources for Underground Mathematics.

In this book, Boaler draws on the work of Carol Dweck, a

professor of psychology at Stanford who has developed a theory of "mindsets". This is a description of how individuals perceive the source of their abilities: is it innate and fixed (giving a "fixed mindset"), or is it the result of hard work and practice (giving a "growth mindset")? Boaler translates this into the mathematical teaching context: many students have a "fixed mindset" with

> respect to mathematics, and this is a significant factor holding them back from progressing. (In my own teaching experience, I once asked a middleset GCSE group why they were not going to get A*s, and the dominant response was because thev were "thick", while they regarded the top set as "smart". Unsurprisingly, they were reluctant to put in much effort.) Boaler offers a whole panoply of tested techniques

to help students to develop a mathematical growth mindset, and this pervades the book. Many of these are now being used in the UK and the USA; search Twitter for



hashtags such as #WithMathICan, #Math-Mindset and #YesUCan to see some of the impact this work is already having.

Boaler has courted considerable controversy by publishing research findings which fly in the face of "conventional wisdom", and which are therefore uncomfortable to many in the field of education, including some in government. She claims, as Dave Sixsmith noted in July issue of the LMS Newsletter, that "for the vast majority of children - about 95% - any levels of school math are within their reach". This statement is provocative, as Boaler herself acknowledges, and is incomprehensible in the majority of UK schools today. But there are already examples of astonishing student progress when different teaching approaches are used; one unrelated to this book was recently described by John Mighton [1]. So the current status guo may not actually be a necessary state of affairs.

In this book, Boaler repeats the message given in her earlier books that setting students (called "tracking" in American schools) in mathematics is damaging to students' learning, and that there can be better progress in heterogeneous groups. Some schools have begun to try this, and the book offers some interesting case studies. This does, however, demand a fundamental change in the way we teach mathematics, moving from a "chalk-andtalk" approach (where the teacher demonstrates a method and then students practise it) to a much richer teaching style, with a focus on thinking mathematically, developing understanding of the subject and building connections between ideas. Which university department or employer would not want students who have learnt how to think mathematically rather than just how to follow the rules? Boaler gives examples of rich tasks (many taken from the NRICH project) which promote rich mathematical thinking and offers some ideas as to how they may be used in the classroom.

Boaler also addresses some other aspects

of mathematics education in this book. The theme of equity in mathematics education (offering all students the opportunity to succeed, regardless of gender, race, and so on) pervades the text; this is another area in which she has a strong interest. There is also a chapter devoted to effective assessment (building on the pioneering work of Paul Black and Dylan Wiliam [2]), which contains a variety of practical techniques for immediate classroom use.

One frustrating aspect of the book (at least for British readers) was the repeated sales pitch to take her online course. There is also one major area in which I felt the book was lacking. Teaching mathematics involves far more than choosing a good task: the mathematical understanding of the teacher, the guestions which they ask (or don't ask) of students during an activity, and how they manage group and class discussion to elicit mathematical understanding, are vital to the effectiveness of a task, yet there is relatively little discussion of this or acknowledgement of its significance. Relatedly, there is little on how to construct a course using these rich tasks to actually cover an externally-imposed syllabus (which may be more of a British issue than an American one) or on the significant challenges involved in migrating a school mathematics department from using setting to mixed-ability teaching. So by the end of reading the book, I felt very inspired, with ideas for how things could be done differently, but realising that there were still many unanswered questions and a long journey ahead.

> Julian Gilbey Underground Mathematics University of Cambridge

References

[1] John Mighton, JUMP Math: Multiplying Potential, Notices of the AMS, February 2014, 61:2, pp 144-147

[2] Paul Black and Dylan Wiliam, *Inside the Black Box*, 1998, London: King's College

I FTTERS TO THE EDITOR

The G. H. Hardy Reader: edited by D.J. Albers, G.L. Alexanderson and W. Dunham, Cambridge University Press and MAA Press, 2016, pp 410, £34.99, US\$49.99, ISBN 978-1107594647.

Once again: The G.H. Hardy Reader

Almost everybody agrees that mathematics should reach out for a broader public understanding. Therefore The G.H. Hardy Reader, the richly illustrated collection of 38 documents by and about G.H. Hardy, the leading English mathematician of the first part of the 20th century and a moving spirit in the LMS, should be welcome. The American editors deliberately and explicitly aim at a broader readership including mathematics teachers and beyond. The documentation is generally reliable but the aim of the book seems to have been misinterpreted in the review of the book published in the July issue of the LMS Newsletter. We welcome the great service to the historiography and public awareness of English mathematics done



CAMBRIDGE

by the American editors in collaboration with Cambridge University Press.

June Barrow-Green **Reinhard Siegmund-Schultze** 4 August 2016

Response

I do not believe that I misinterpreted the aims of the G.H. Hardy Reader. My review was for members of the Society, who usually have a degree in mathematics, but, like me, are not historiographers. I observed (contrary to my initial expectation that I would receive the book from Cambridge University Press in England) that the Reader was principally published by the Mathematical Association of America with its members in mind, and that the level of mathematics assumed was not higher than high school level. May I repeat that I welcome the book, although my detailed criticisms remain.

> Ben Garling 12 August 2016



De Morgan House offers a 40% discount on room hire to all mathematical charities and 20% to all not-for-profit organisations. Support the LMS by booking your next London event with us.

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The evaluation process will start on November 1st, 2016; however applications arriving after that date may also be considered.

Committee

Email: mathhiring2017@epfl.ch include the tag "[Math2017]" in the subject field of your email.

Applications including a letter The School of Basic Sciences aculty, and female candidates are

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.

SEPTEMBER 2016

1-2 Invariant Subspaces and Banach Algebras, Leeds (459)

5-8 Hitchin 70, Aarhus (458)

5-9 Combinatorics and Operators in Quantum Information Theory LMS Research School, Belfast (458)

5-9 Kronecker Coefficients and their Applications to Complexity Theory and Quantum Information Theory, City University London (459)

6-7 Transpennine Topology Triangle, Manchester (458)

6-9 British Science Association, Swansea (460) 7 O-Minimality and Diophantine Geometry, Manchester (459)

10-12 Stochastic Analysis in honour of István Gyöngy's 65th Birthday, Edinburgh (460) 9-11 Hitchin 70, Oxford (458)

12 One Day Function Theory Meeting, De Morgan House, London (461)

12-15 LMS Midlands Regional Meeting and Workshop, Birmingham (460)

12-15 Geometric Models of Nuclear Matter, Kent (460)

12-16 Hitchin 70, Madrid (458)

12-16 Data Linkage: Techniques, Challenges and Applications INI Workshop, Cambridge (458) 13 Random Matrix Theory: Perspectives and

Applications, Canterbury (459) 13-16 LMS Midlands Regional Meeting and

Workshop, Birmingham (461) 15-16 Heilbronn Annual Conference. Bristol (459)

16-17 Mathematical Biography, A MacTutor Celebration, St Andrews (461)

17 Directions in Computability Theory Meeting in Memory of Barry Cooper, Leeds (461)

18-23 Heidelberg Laureate Forum (454)

19 Topics in SDEs and their Link to (S)PDEs, Leeds (460)

21 LMS Popular Lectures, Birmingham (461)

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21 Sheffield Probability Day, Sheffield (461) 22 Representations and Homology, University of East Anglia (460)

23 CSAC Conference, Barcelona (460)

26-29 Bayesian Networks and Argumentation in Evidence Analysis INI Workshop, Cambridge (459) 26-30 Clay Research Workshops, Oxford (459) 28 Clay Research Conference, Oxford (459)

OCTOBER 2016

13-15 Mathematics in the Regions and Nations, Open University (461)
27 Curves in Honour of Leibniz's Tercentenary, Gresham College, London
27 Data Sciences: Joint LMS meeting with the RSS and Fisher Memorial Trust, London (461)
28 Privacy: Recent Developments at the Interface between Economics and Computer Science INI Workshop, Cambridge (459)

NOVEMBER 2016

3 Probabilistic Formal Analysis of Software Usage Styles in the Wild, BCS-FACS Evening Seminar, London (461) 7-10 Statistical Modelling of Scientific Evidence

INI Workshop, Cambridge (460)

11 LMS Graduate Student Meeting, London

11 LMS Annual General Meeting, London 28-2 Dec Advances in Ergodic Theory, Hyperbolic Dynamics & Statistical Law Workshop, ANU,

Canberra (461)

DECEMBER 2016

3 BSHM Christmas Meeting, BMI, Birmingham (361) 5-8 Australian Mathematical Society Annual Meeting, ANU, Canberra (461) 5-9 New Developments in Data Privacy INI Workshop, Cambridge (460) 9-10 Random Matrix Theory Brunel-Bielefeld Workshop, Brunel (461) 9-13 Nonlinear and Geometric Partial Differential Equations Workshop, ANU, Canberra (461) 12-16 Dynamic Networks INI Workshop, Cambridge (460) 16-17 LMS Prospects in Mathematics Meeting, York (461) 20 LMS South West & South Wales Regional Meeting, Bath



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LMS POPULAR LECTURES 2016 held on 29 June 2016 at the Institute of Eduction, London

(report on page 29)



Audience participation



Alice Rogers, Chair of LMS Education Committee



Heather Harrington (University of Oxford) The Shape of Data in Biology



Julia Wolf (University of Bristol) One, Two, Red, Blue