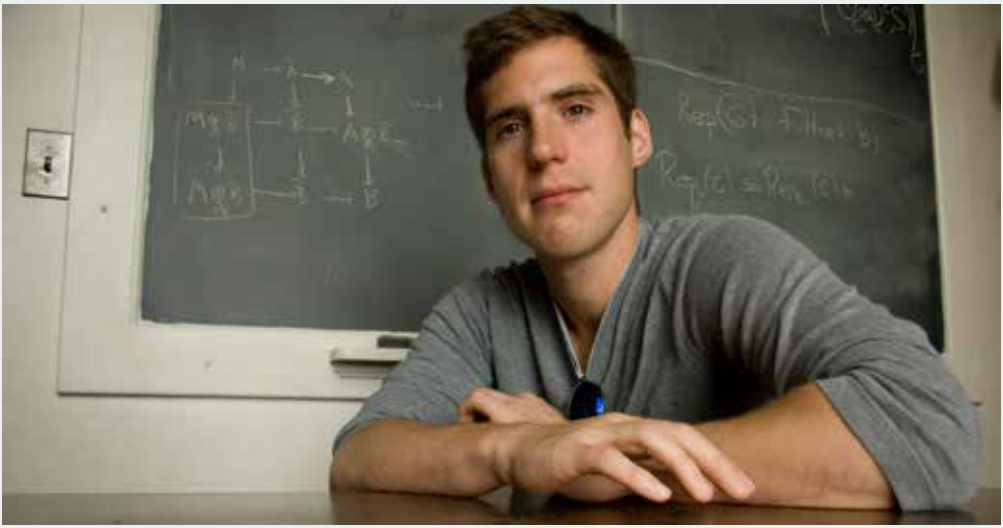
LONDON MATHEMATICAL SOCIETY
150 YEARS

NEWSLETTER No. 452 November 2015

LMS HARDY FELLOW 2016



The London Mathematical Society is pleased to announce that the LMS Hardy Fellow 2016 is **Professor Jacob Lurie** (Harvard University).

The Hardy Fellowship was founded in 1967 in memory of G.H. Hardy in recognition of outstanding contribution to both mathematics and the Society. The Hardy Fellow is always a leading mathematician and undertakes a lecture tour within the UK.

Professor Lurie's lecture tour will end with the Hardy Lecture at the Society Meeting on **Friday 8 July** in London.

Professor Lurie has had a major impact on modern day pure mathematics, in particular through his seminal work on derived algebraic geometry, higher category theory, stable homotopy theory and topological field theory. His earliest published work on surreal numbers was carried out while still at school, and since his PhD in 2004 he has held professorships at MIT and Harvard University.

Professor Lurie is an outstanding presenter of mathematics both in written form (he has already published an important text book on *Higher Topos Theory* and made available versions of his notes on various aspects of his work), and in lectures which are always well prepared and have great impact on audiences.

SOCIETY MEETINGS AND EVENTS

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LMS ANNUAL SUBSCRIPTION 2015-16

Members are reminded that their annual subscription, including payment for publications, for the period November 2015-October 2016 due on **1 November 2015** should be paid no later than 1 December 2015.

In October, the Society sent a reminder to all members to renew their subscription for 2015-16. If you have not received a reminder, please email membership@lms.ac.uk.

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

Further information about subscription rates for 2015-16 and a subscription form may also be found on the Society's website: www.lms.ac.uk/content/paying-your-subscription.

The Society encourages payment by direct debit. If you do not already pay by this method and would like to set up a direct debit (this requires a UK bank account), please set up a direct debit to the Society via GoCardless.com: www.lms.ac.uk/gocardless-payment/lms-set.

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

Elizabeth Fisher
Membership & Activities Officer

LMS ANNUAL GENERAL MEETING 2015

The Annual General Meeting of the Society will be held at 3.00 pm on Friday 13 November 2015 in The Great Hall, BMA House, Tavistock Square, London WC1H 9JP. The business shall be:

1. Elections to Council and Nominating Committee
2. Review of Society Activities 2014-15
3. Report of the Treasurer
4. Resolutions
   a. Adoption of the Trustees' Report 2014-15
   b. Appointment of the Auditors
5. Presentation of certificates to the 2015 LMS Prize Winners

It is hoped that as many members as possible will be able to attend. The Annual General Meeting will be followed by a Society Meeting at which Terry Lyons, FRS and Bill Cook will speak (see page 13).

Fiona Nixon
Executive Secretary

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Charity registration number: 252660.

SOCIETY CONFERENCE GRANTS

The Society is pleased to report that in 2014-15, awards totalling £232,515 were made in the support of mathematics conferences. Funds are granted to the organisers of conferences to be held in the United Kingdom, and may be used to cover the expenses of principal speakers, and to provide support for research students and for participants from Scheme 5 or former Soviet Union countries. For Postgraduate Research Conferences, funds are granted to support speakers and participants. Applicants wishing to apply for funding for a conference will find further details on the Society's website at www.lms.ac.uk/content/research-grants.

Conference grants awarded during 2014-15

Conference	Dates, Place	Applicant	Grant
British Mathematical Colloquium 2017	3-6 April 2017, Durham	A. Lobb	£15,540
BAMC 2016	5-8 April 2016, Oxford	C. Breward	£5,000
Well-posedness and Singularity Formation for Nonlinear Evolution Problems	27 January 2016, King's College London	M. Hadzic	£600
Adaptive Algorithms for Computational PDEs	5-6 January 2016, Birmingham	A. Bespalov	£4,720
Ada Lovelace 200: A Celebration	9-10 December 2015, Oxford	U. Martin	£5,580
London Conference in Geometry	23-27 November 2015, King's College London	J. Lotay	£6,000
The Science of Beauty	10-11 November 2015, Edinburgh	M. Atiyah	£4,000
Integrable Systems in Newcastle	2-3 October 2015, Northumbria	B. Huard	£2,000
Mathematical and Computational Modelling of Biological Systems	23 September 2015, Chester	N. Kavallaris	£600
Operator Algebras and Dynamical Systems	22 September 2015, Queen Mary University London	X. Li	£600
Moduli Spaces and Their Applications	21 September 2015, Liverpool	N. Pagani	£600
Non-Combinatorial Combinatorics	14-16 September 2015, Warwick	O. Pikhurko	£5,049
Trends and Directions of Approximate Dynamic Programming: Solving the Curse of Dimensionality	11 September 2015, Essex	X. Yang	£600
Nonlinear Dynamics: A Meeting to Celebrate the 65th Birthday of Professor Tom Mullin	10-11 September 2015, Manchester	A. Juel	£5,975
A Posteriori Error Control and Mesh Adaptivity for Time Dependent and Nonlinear Problems	10 September 2015, Chester	F. Karakatsani	£600

Conference	Dates, Place	Applicant	Grant
The Cauchy Problem in Kinetic Theory: Recent Progress in Collisionless Models	7-11 September 2015, Imperial College London	J. Ben-Artzi	£7,000
30th British Topology Meeting	7-9 September 2015, Queen's University Belfast	D. Barnes	£4,600
Conference on Calculus of Variations, Partial Differential Equations and Geometric Analysis	7-8 September 2015, Sussex	F. Cagnetti	£6,000
One Day Function Theory Meeting	7 September 2015, De Morgan House	D. Cheraghi	£1,669
Dynamics Days Europe 2015	6-10 September 2015, Exeter	C. Bick	£3,000
British Logic Colloquium 2015	1-4 September 2015, Cambridge	A. Dawar	£3,930
Advances in Geometric Analysis, in Honour of Rick Schoen's 65th Birthday	20-24 July 2015, Warwick	M. Micallef	£2,000
Fractal Geometry and Dimension Theory	22 July 2015, Manchester	J. Fraser	£600
38th Conference on Stochastic Processes and their Applications	13-17 July 2015, Oxford	B. Hambly	£3,000
Iwasawa 2015	13-17 July 2015, King's College London	M. Kakde	£6,000
13th EUROPT Workshop on Advances in Continuous Optimization	8-10 July 2015, Edinburgh	J. Gondzio	£750
International Symposium on Symbolic and Algebraic Computation 2015	6-9 July 2015, Bath	J.H. Davenport	£6,820
Model Theory, Topological Dynamics and Real Algebraic Geometry	25 June 2015, Central Lancashire	D. Penazzi	£570
Celebrating New Appointments in Mathematics	23 and 30 June 2015, South Wales	N. Gill	£1,780
Fifth Biennial Conference on Mathematics and Computation in Music (MCM2015)	22-25 June 2015, Queen Mary University London	O. Bandtlow	£4,000
Groups, Representations and Cohomology	19-26 June 2015, Isle of Skye	M. Linckelmann	£5,000
13th International Conference on Permutation Patterns	15-19 June 2015, De Morgan House	R. Brignall	£1,908

Conference	Dates, Place	Applicant	Grant
Fourier-Mukai, 34 years on	15-19 June 2015, Liverpool	P. Newstead	£7,000
ICFT2015: 19th UK Meeting on Integrable Models, Conformal Field Theory and Related Topics	12-13 June 2015, Durham	A. Taormina	£1,300
Geometric Rigidity	10-11 June 2015, Lancaster	D. Kitson	£600
Cluster Algebras and Finite Dimensional Algebras	3-5 June 2015, Leicester	S. Schroll	£6,570
One-Day Meeting in Combinatorics	27 May 2015, Oxford	A. Scott	£2,450
Random Walks on Graphs and Potential Theory	18-22 May 2015, Warwick	A. Georgakopoulos	£5,000
Wales Mathematical Colloquium 2015	18-20 May 2015, Powys	K. Evans	£2,165
The Dynamics of Complex Systems: A Meeting in Honour of the 60th Birthday of Robert MacKay	18-20 May 2016, Warwick	C. Baesens	£6,000
UKMHD 2015	14-15 May 2015, Northumbria	G. Botha	£2,000
Two Linked One-Day Colloquia in Combinatorics	13-14 May 2015, Queen Mary University London; London School of Economics	J. Skokan	£3,970
Variational Methods for Stationary and Evolutionary Problems	12 May 2015, Warwick	F. Rindler	£300
Integrability and All That	8-9 May 2015, Loughborough	A. Bolsinov	£2,680
Optimization and Big Data 2015	6-8 May 2015, Edinburgh	Z. Qu	£4,000
Mathematical and Computational Models in Evolutionary Biology: Shifting the Existing Paradigms	28 April - 1 May 2015, Leicester	A. Morozov	£5,650
Profinite Groups	23 April 2015, Lancaster	N. Mazza	£1,522
Computational Complex Analysis for Free Surface Flows	20-22 April 2015, University College London	N.R. McDonald	£6,000
Spring School on Combining Probability and Logic: The Seventh Workshop on Combining Probability and Logic	20-21 April 2015, 22-24 April 2015, Kent	J. Landes	£1,770
30th International Workshop on Water Waves and Floating Bodies	12-15 April 2015, Bristol	R. Porter	£2,375

Conference	Dates, Place	Applicant	Grant
UK Easter Probability Meeting 2016: Random Structures Arising in Physics and Analysis	4-8 April 2016, Lancaster	A. Turner	£7,000
Elliptic Curves, Modular Forms and Iwasawa Theory	25-27 March 2015, Cambridge	V. Dokchitser	£1,000
Limit Theorems in Probability	23-25 March 2015, Imperial College London	A. Mijatovic	£5,840
UCL Geometric Group Theory Day	18 March 2015, University College London	L. Louder	£600
Geometric Structures in Materials	5 March 2015, Sussex	M. Palombaro	£520
Day on Random Media	4 March 2015, Sussex	N. Georgiou	£530
Phase Transitions Day	3 March 2015, Sussex	D. Tsagkarogiannis	£595
Recent Developments in Calculus of Variations and Geometric Measure Theory	2 March 2015, Sussex	F. Cagnetti	£598
Graph Theory in Design and Evaluation of Algorithms	6 February 2015, King's College London	T. Radzik	£620

Postgraduate Research Conference grants awarded during 2014-15

Conference	Dates, Place	Applicant	Grant
British Postgraduate Model Theory Conference	20-22 January 2016, Manchester	L. Gregory	£4,000
PGR Workshop on Algebraic and Geometric Aspects of Integrable Systems	17-18 September 2015, Loughborough	M. Mazzocco	£2,000
Postgraduate Conference in Complex Geometry	9-11 September 2015, Cambridge	J. Ross	£2,000
Young Researchers in Mathematics 2015	17-20 August 2015, Oxford	K. Kremnitzer	£5,800
17th Postgraduate Group Theory Conference	30 June - 3 July 2015, Bristol	T. Burness	£4,000
Early Career Students in Topology AT Imperial College (ECSTATIC)	11-12 June 2015, Imperial College London	A. Corti	£2,000
Young Functional Analysts' Workshop	10-12 June 2015, Imperial College London	B. Zergarlinski, M. Ruzhansky	£4,000
2015 Postgraduate Combinatorial Conference	13-15 April 2015, Queen Mary University London	B. Jackson	£4,000
Postgraduate Conference in Complex Dynamics	11-13 March 2015, De Morgan House	I. Short	£3,969

LMS 150TH ANNIVERSARY

DEPARTMENTAL CELEBRATIONS

These events are part of a series of receptions being hosted across the UK by mathematics departments, celebrating the 150th Anniversary of the LMS. For further details, and to see if such an event has been organised for your department, visit www.lms.ac.uk/2015-events-listing.

UNIVERSITY OF ABERYSTWYTH

The University of Aberystwyth's departmental celebration of the LMS's 150th anniversary was held on 3 September 2015, following an invited lecture by Massimiliano Gei (Cardiff) on the *Mechanics of Pre-stressed Thin Films*, which formed part of the CERMAT summer school held here. Alun Morris, former Treasurer of the Society, gave a short address about Aberystwyth's links with the LMS, which extend right back to its foundation, and we toasted the health of mathematics and the LMS.

UNIVERSITY OF BRIGHTON

The new and existing undergraduate students were invited to join the academic staff for a lunchtime event on Wednesday 1 October 2015 to celebrate the 150th Anniversary of the London Mathematical Society. Dr John Taylor invited those present to raise their glasses to "The continued health of UK Mathematics and the London Mathematical Society". All those present cheered and drank to the continued success of the LMS.

After the toast, the prizes for the teams which came first and second in the mathematical quiz held the previous Monday and the mathematics University of Brighton treasure hunt held the previous Tuesday were handed out to the winning teams.

CARDIFF UNIVERSITY

A toast to the LMS and UK mathematics was made on the occasion of a visit and talk by Neil Sloane (Rutgers and OEIS) on *My favourite Integer Sequences, or, Confessions of a Sequence Addict* in May 2015. The OIES - Online Encyclopaedia of Integer Sequences (oeis.org) was founded by Neil Sloane and also celebrated its 50th anniversary in the last academic year.

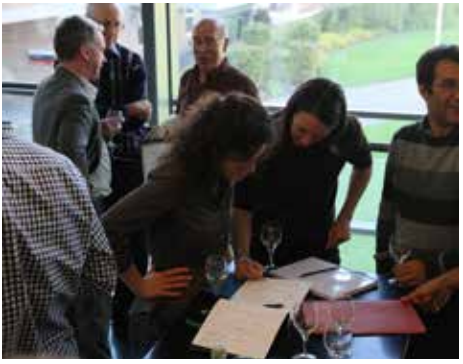
UNIVERSITY OF SUSSEX

On 19 February 2015, the birthday of Nicolas Copernicus, the Wine and Cheese celebration ended a series of three hour-long talks by Alex Bespalov (University of Birmingham), Panagiotis Chatzipantelidis (University of Crete) and Adrian Muntean (Technical University of Eindhoven). While the talks were very well attended by (mostly) the mathematical faculty and students, the Wine and Cheese session saw additional influx from our Physical Sciences colleagues with whom we share School and building. Long time LMS members were also present and the informal chatter was interrupted by a couple of short speeches explaining the LMS to outsiders and the benefits of joining. We all toasted to its first 150 years, and, after agreeing with some cosmologists that Time could be considered infinite for all practical purposes, we toasted once more for the future of the LMS.

LANCASTER UNIVERSITY

The Department of Mathematics and Statistics at Lancaster University held a drinks reception on Wednesday 30 September 2015, to celebrate the 150th anniversary of the London Mathematical Society. This event was attended by more than 30 people, including academic, professional and support staff, students and visitors to the department. A toast was raised "to the continued health of mathematics and the London Mathematical Society".

The reception took place between two seminars. Before the reception, Professor Alexander Helemskii (Moscow State University) gave a talk entitled *On the way, with A. Lambert, from classical to quantum functional analysis*. After the reception, Professor Maria Fragoulopoulou (University of Athens) spoke on *Some recent results on Allan's GB*–algebras*. The visit of Professors Fragoulopoulou and Helemskii to the UK is supported by an LMS Scheme 2 grant.



UNIVERSITY OF LIVERPOOL

A wine reception to mark the 150th anniversary of the London Mathematical Society was held in the Department of Mathematical Sciences of the University of Liverpool on 21 September 2015 at the end of the one-day conference *Moduli Spaces and their Applications*. The wine reception was attended by staff members, conference participants and PhD students. During the reception a toast was raised to celebrate the anniversary and to thank the London Mathematical Society for its continuous support of mathematics in the UK, including the LMS Conference grant support for the conference. (See photographs at top of opposite page.)

PLYMOUTH UNIVERSITY

On 26 June 2015 mathematicians and statisticians in Plymouth enjoyed their summer party even more than usual, thanks to some unusually good wine, and were very happy to raise their glasses to the London Mathematical Society and the health of mathematics.

UNIVERSITY OF ST ANDREWS

The toast to the LMS at the University of St Andrews was part of the annual 'Welcome to new staff and postgraduate students' wine reception in the common room of the School of Mathematics and Statistics on Friday 2 October, 2015. The Head of School, Professor Thomas Neukirch, thanked the London Mathematical Society for their contribution to the event, and all present enthusiastically toasted 'to the continued health of mathematics and to the London Mathematical Society'.

LONDON MATHEMATICAL SOCIETY
150 YEARS

LMS 150th Anniversary

Graduate Student Meeting

BMA House, Tavistock Square, London, WC1H 9JP (Nearest tube: Euston)

13 November 2015

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

Programme (09.30 – 15.00)

Coffee and Registration

Dan Crisan (Imperial College)

Integration: Past, Present and Future

Graduate Student Talks

Horatio Boedihardjo (Reading)

Rough paths in stochastic analysis and beyond

LMS Annual General Meeting and Society Meeting (see below)

Registration: To register, please email Elizabeth Fisher (lmsmeetings@lms.ac.uk) by **6 November**. Places are free and all refreshments including lunch will be provided.

Student Talks: Students are invited to give short talks (15 minutes) aimed at a general mathematical audience with prizes awarded for the best two talks. If you want to give a talk, email Elizabeth Fisher (lmsmeetings@lms.ac.uk) with a title and short abstract by **23 October**.

Funding for Travel and Accommodation: For students who attend both the Graduate Student Meeting and the LMS AGM, the Society offers funding of up to £50 towards travel costs, and funding of up to £50 towards accommodation costs (for those travelling long distances).

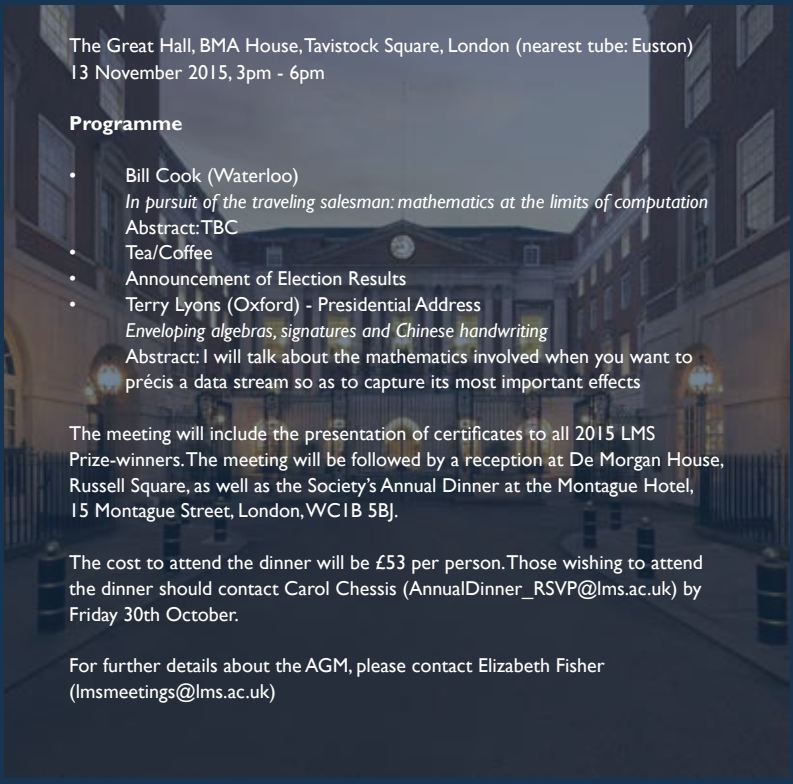
LMS Annual General Meeting and Society Meeting: The LMS Annual General Meeting is a Society Meeting, which is open to all. Bill Cook (University of Waterloo) will give the first Lecture and Terry Lyons (Oxford) will give the Presidential Address. The meeting will be held in the Great Hall at BMA House. After the AGM, there will be a reception at De Morgan House, 57-58 Russell Square.

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

LONDON MATHEMATICAL SOCIETY
150 YEARS

LMS 150th Anniversary

Annual General Meeting



The Great Hall, BMA House, Tavistock Square, London (nearest tube: Euston)
13 November 2015, 3pm - 6pm

Programme

- Bill Cook (Waterloo)
  In pursuit of the traveling salesman: mathematics at the limits of computation
  Abstract: TBC
- Tea/Coffee
- Announcement of Election Results
- Terry Lyons (Oxford) - Presidential Address
  Enveloping algebras, signatures and Chinese handwriting
  Abstract: I will talk about the mathematics involved when you want to précis a data stream so as to capture its most important effects

The meeting will include the presentation of certificates to all 2015 LMS Prize-winners. The meeting will be followed by a reception at De Morgan House, Russell Square, as well as the Society's Annual Dinner at the Montague Hotel, 15 Montague Street, London, WC1B 5BJ.

The cost to attend the dinner will be £53 per person. Those wishing to attend the dinner should contact Carol Chessis (AnnualDinner_RSVP@lms.ac.uk) by Friday 30th October.

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

OPEN HOUSE 2015

On 20 September 2015 the Society was pleased, for the fourth successive year, to take part in Open House London. Open House is a campaign that began in 1992 and encourages an awareness and appreciation of the capital's architecture by inviting notable businesses and institutions to open their doors to the public once a year.

The campaign provides an excellent channel for public engagement and this year in particular it allowed the Society to promote its 150th Anniversary year, promoting and celebrating its work to people who are perhaps outside of the mathematical community but have a clear interest in the history of mathematics. Such an expression of public engagement is consistent with one of the tenets of this anniversary year, namely that 'mathematics is everywhere and for everyone'.

LMS staff and volunteers from Open House welcomed around 300 visitors and were on hand to offer refreshments and tours of De Morgan House. The tours focussed on the building's history, particularly on its early days as a family residence, and also on its many impressive architectural features. The tour also drew attention to the anniversary year and to the work the Society does to promote mathematics around the UK.

The Society received widespread praise and thanks by visitors for the quality of the information given during the tours and there was significant interest in the De Morgan Exhibition that was initially created for De Morgan Day 2015. The Society would like to thank all those who came; the Open House London volunteers who kindly gave up their time to help; and Dr A.E.L Davis who provided a background on the Society's Philippa Fawcett book collection.

For more information on Open House London please visit www.openhouselondon.org.uk/about.

LONDON MATHEMATICAL SOCIETY
150 YEARS

LMS PRIZES 2016

CALL FOR NOMINATIONS

The London Mathematical Society welcomes nominations for the 2016 prizes, to recognise and celebrate achievements in and contributions to mathematics.

In 2016, the LMS Council expects to award:

De Morgan Medal

The Society's premier award; the only grounds for the award of the Medal are the candidate's contributions to mathematics.

Fröhlich Prize

Awarded for original and extremely innovative work in any branch of mathematics.

Senior Berwick Prize

Awarded in recognition of an outstanding piece of mathematical research actually published by the Society during the eight years ending on 31 December 2015.

Whitehead Prizes

Awarded for work in and influence on mathematics.

Anne Bennett Prize

Awarded for work in and influence on mathematics, particularly acting as an inspiration for women mathematicians.

For further information and nomination forms, please visit the LMS website (www.lms.ac.uk/content/nominations-lms-prizes) or contact Duncan Turton, Secretary to the Prizes Committee at the Society (tel: 020 7927 0801, email: prizes@lms.ac.uk).

The Prizes Committee is keen to increase the number of nominations it receives and, in particular, the number of nominations for women, which are disproportionately low each year. The prize regulations refer to the concept of 'academic age' — rather than date of birth — in order to take account more fully of broken career patterns.

Closing date for nominations:
Monday 25 January 2016

LONDON MATHEMATICAL SOCIETY 150 YEARS

CELEBRATING 150 YEARS OF THE LONDON MATHEMATICAL SOCIETY

The following meetings and events are part of the year-long programme celebrating the 150th LMS Anniversary in 2015. Full details of the Anniversary Programme of Activities are available on the LMS website at www.lms.ac.uk/2015.

DEPARTMENTAL CELEBRATIONS

Aberdeen: 4 December
Nottingham: 4 November
Oxford: TBC
Portsmouth: TBC
Southampton: 14 December

NOVEMBER

Popular Lectures Leeds
11 November
Graduate Student Meeting
BMA House, London
13 November *(see page 12)*
LMS Anniversary Prize Giving, AGM and Society Meeting
BMA House, London
13 November *(see page 13)*
Annual Dinner
Montague Hotel, London
13 November *(see page 13)*
Mathematics Festival at The Science Museum
25, 27-29 November,
London *(see pages 24–25)*
Joint Meeting with the Institute of Physics & Royal Astronomical Society
28-29 November, QMUL, London
(see page 21)

DECEMBER

Joint Meeting with the Edinburgh Mathematical Society
10-11 December, ICMS, Edinburgh
(see page 33)
Enhanced South West and South Wales Regional Meeting
14-17 December, University of Southampton *(see page 32)*
LMS Prospects in Mathematics
15-16 December, Loughborough
(see page 22)

RAMANUJAN PRIZE 2015

The 2015 Ramanujan Prize has been awarded to **Amalendu Krishna** jointly by the International Centre for Theoretical Physics, the Department of Science and Technology, Government of India and the International Mathematical Union. The Prize recognizes Krishna's outstanding contributions in the area of algebraic K-theory, algebraic cycles and the theory of motives. Krishna had all his education in India; after schooling and college in Bihar, he obtained a Masters degree from the Indian Statistical Institute, followed by a PhD in 2001 from the Tata Institute of Fundamental Research. After postdoctoral visits abroad, he rejoined the Tata Institute as a faculty member, and is now an Associate Professor.

The Ramanujan Prize is awarded

annually to a researcher from a developing country who is less than 45 years of age on 31 December of the year of the award, and who has conducted outstanding research in a developing country. Researchers working in any branch of the mathematical sciences are eligible. For more information visit the website at www.ictp.it/about-ictp/prizes-awards/the-ramanujan-prize.aspx.

LMS ELECTIONS TO COUNCIL AND NOMINATING COMMITTEE 2015

Members should now have received a communication from the ERS for both e-voting and paper ballot. For online voting, members may cast a vote by going to www.votebyinternet.com/LMS2015 and using the two part security code on the email sent by the ERS and also on their ballot paper.

All members are asked to look out for communication from the ERS. We hope that as many members as possible will cast their vote. If you have not received ballot material, please contact Duncan Turton (duncan.turton@lms.ac.uk) confirming the address (post or email) to which you would like material sent.

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

For both electronic and postal voting the deadline for receipt of votes is **5 November 2015**. Members may still cast a vote in person at the AGM, although an in-person vote must be cast via a paper ballot.

Members may like to note that a LMS Election blog, moderated by the Scrutineers, can be found at http://discussions.lms.ac.uk/elections2015.

Future Elections

Members are invited to make suggestions for nominees for future election to Council. These should be addressed to the Nominating Committee (nominations@lms.ac.uk). Members may also make direct nominations: details will be published in the March 2016 edition of the *LMS Newsletter* or are available from Duncan Turton at the LMS (duncan.turton@lms.ac.uk).

Fiona Nixon
Executive Secretary

CECIL KING TRAVEL SCHOLARSHIP 2015

The Cecil King Travel Scholarship 2015 has been awarded to **Marcus Webb** (Cambridge). Marcus is currently a PhD student under the supervision of Professor Arieh Iserles, and in January 2016 he will travel to the University of Sydney to work for three months with Dr Sheehan Olver. His visit will involve work on Computational Spectral Theory, focusing on approximating the spectrum and spectral measures of linear operators on Hilbert space.

MATHEMATICS POLICY ROUND-UP

October 2015

RESEARCH

Revised timetable for consultation on next REF

Following a request from the Minister for Universities and Science HEFCE, in partnership with the other UK funding bodies, has agreed to delay publishing a consultation on the next Research Excellence Framework (REF) until the conclusion of the spending review. More information is available at www.hefce.ac.uk/rsrch/REFreview/.

HIGHER EDUCATION

Quality assessment in universities

The Business, Innovation and Skills (BIS) Select Committee launched an inquiry into quality assessment in Higher Education (HE). The inquiry looked into proposed changes to quality assessment in universities and the potential impact of introducing a Teaching Excellence Framework. The closing date for submissions was 31 October. More information is available at http://tinyurl.com/ns98an4.

SCHOOLS AND COLLEGES

New practical mathematics lessons to prepare students for world of work

Students will be taught how to apply their maths skills to calculate interest, work out profit margins and get the best currency exchange rates thanks to a new suite of practical mathematics courses that started in schools in early September.

The core maths qualifications, backed by some of the country's biggest employers, are designed to give young people the mathematics knowledge they need in everyday life - whether they want to run their own business or lead a company.

The new courses address the 'mathematics gap' where students often forget the vital maths knowledge they have learned because they do not keep using it. It is hoped that the courses will help students to:

- increase their confidence in managing their personal finances, including examples on interest rates, mortgage repayments and tax contributions;
- better understand which mathematical approach to use to help them solve problems across a range of workplace and commercial settings; and
- present real-life situations in mathematical terms and use their own maths skills to answer related questions and issues.

More information is available at http://tinyurl.com/p3r7osn.

ACME correspondence with the Standards and Testing Agency (STA)

Earlier this year ACME wrote to the STA noting a number of concerns regarding the Key Stages 1 and 2 sample test materials and the Mathematics Test Framework performance descriptors. The messages in performance descriptors and assessment items are used by teachers and school leaders to exemplify curriculum intentions and are one of the strongest levers in bringing about changes in teaching and learning. ACME noted that:

- the aims of the primary National Curriculum and the sample Key Stage 2 arithmetic paper seemed to be at odds with each other;
- there were a number of deletions in the performance descriptors from the test framework at Key Stage 2, which will impinge greatly on the teaching and learning of the National Curriculum; and
- the current iteration of the mathematics test framework could mean that students do not all develop a strong foundation at Key Stage 2 and therefore will not be able to meet the challenges of the new GCSE Mathematics.

The STA has responded to ACME's concerns, More information is available at http://tinyurl.com/ovba5k4.

GCSE, AS and A-level reform

Jeremy Benson Executive Director for Vocational Qualifications at Ofqual, presented the organisation's perspective on the reforms to GCSEs, AS and A-levels in England at a recent mathematics conference. A full transcript of his presentation is available at http://tinyurl.com/py7br5t.

OTHER

Science Council appoints new CEO

The Science Council has announced the appointment of Belinda Phipps as its new CEO to replace Diana Garnham. Phipps studied microbiology at university and spent the first ten years of her working life at Glaxo as a sales and marketing executive. After receiving an MBA she moved into the public sector, becoming Chief Executive at East Berks Community Health NHS Trust in 1996. In 1999 she took on the CEO role at the National Childbirth Trust (NCT). More information is available at http://tinyurl.com/nhsfbya.

Dr John Johnston
Joint Promotion of Mathematics

EUROPEAN NEWS

European Mathematical Society Newsletter

The September issue of the *EMS Newsletter* is available online (http://tinyurl.com/pqn6ldn) and contains several retrospective articles on the first 25 years of the EMS including a piece by Sir John Kingman who was the President 2003-2006. There is also a long interview with Abel Laureate John F. Nash Jr which took place the day before the prize ceremony in Oslo in May 2015 and only five days before the tragic accident that led to the death of John and his wife Alicia.

The mathematical articles are an entertaining investigation of soap bubbles by Frank Morgan, and an account by Gilles Christol of the seemingly elementary diagonal rational functions that play a strangely important role in theoretical physics and combinatorics and lead to brushes with the Weil conjectures and theory of motives. Gert-Martin Greuel gives a lively discussion on the usefulness (or otherwise) of mathematics and public perceptions of it entitled Mathematics between Research, Application and Communication. There are as usual book reviews and problems (solved and unsolved).

David Chillingworth
LMS/EMS Correspondent

ISAAC NEWTON INSTITUTE

Call for Proposals

The Institute now invites proposals for one, four and six month research programmes in any branch of the mathematical sciences. Please note a special case should be made for shorter proposals and there is no guarantee these will be held in the summer. The deadline for submission is **31 January 2016**, for consideration at the meeting of the Scientific Steering Committee in May 2016. Details on submitting proposals are at www.newton.ac.uk/callprop.html.

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

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

LMS INVITED LECTURE SERIES 2017

CALL FOR PROPOSALS

Proposals for the Invited Lecture Series 2017 are now being sought. Proposers are invited to suggest a topic and Lecturer for the lecture series, which they should be prepared to organise at their own institution or a suitable conference centre within the UK.

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

The format of an annual Invited Lectures series should:

- include meetings at which a single speaker gives a course of about ten expository lectures, examining some subject in depth;
- be held over a five day period (Monday to Friday) during a University vacation;
- be residential and open to all interested.

A grant of up to £4,000 is available to the host department to support attendance at the lectures. In addition to full expenses, the lecturer is offered an honorarium of £1,250 for giving the course. It is intended that the texts of the lectures given in the series shall be published and an honorarium of £1,500 is also available upon receipt of lecture notes in a publishable form.

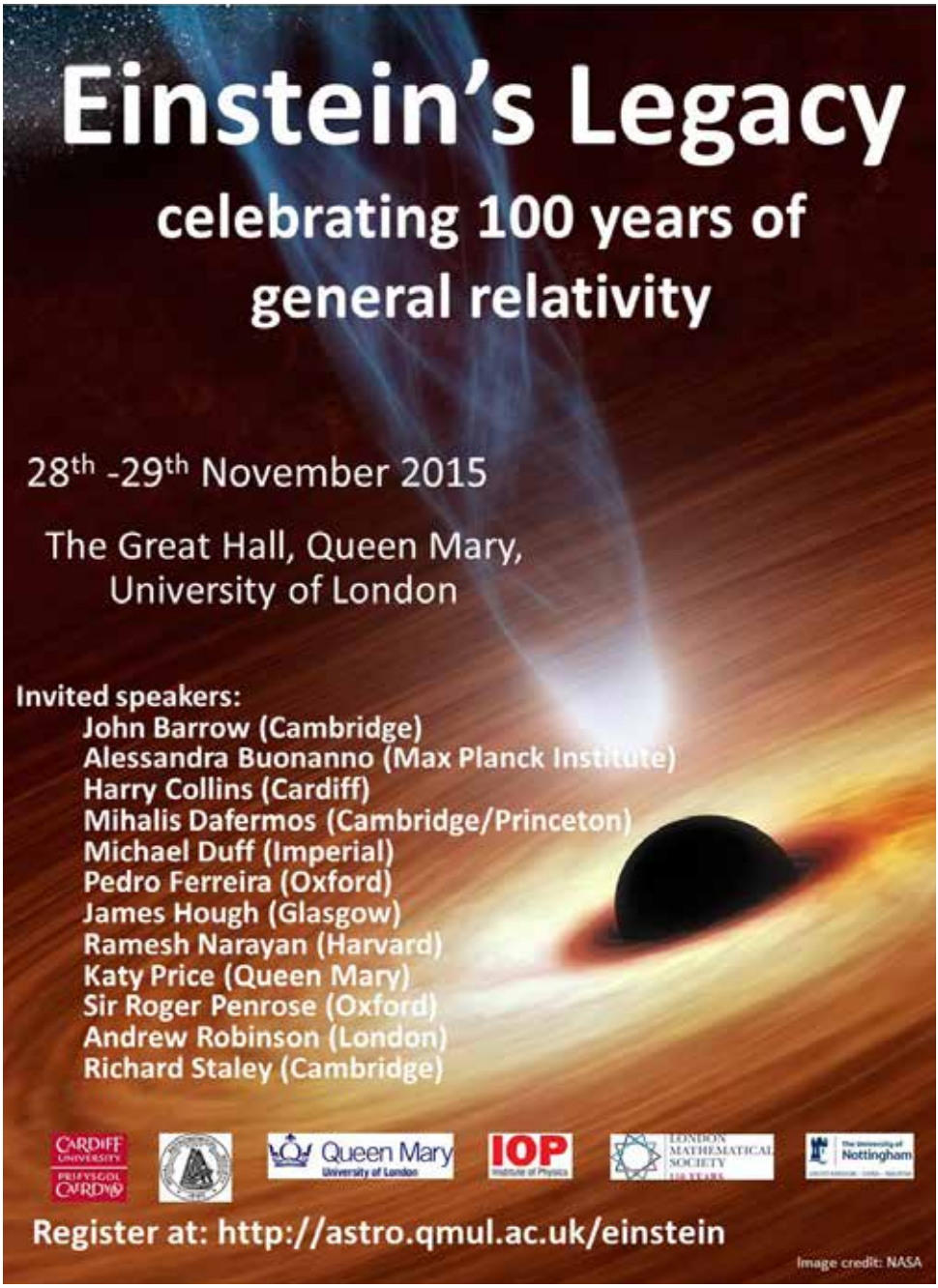
Enquiries about the Invited Lectures should be directed to the Programme Secretary at the Society (lmsmeetings@lms.ac.uk). The deadline for the submission of proposals is **5 February 2016**.

For more information about the scheme and how to submit a proposal, please visit: www.lms.ac.uk/events/lectures/invited-lecturer-proposals

The Invited Lecturer for 2016 is **Professor Edgar Knobloch** (UC Berkeley), who will visit Loughborough from 21-25 March 2016 to give a series of lectures on *Dynamics, Patterns and Spatially Localised Structures*.

Recent previous lecturers have been:

2015	M. Shapiro (Michigan State University) *Cluster algebras and integrable systems*
2014	J. Väänänen (University of Helsinki and University of Amsterdam) *Games, trees and models, foundations of mathematics and second order logic* and *The mathematical theory of dependence and independence*
2013	F. Bogomolov (NYU) *Birational geometry and Galois groups*
2012	A. Borodin (MIT) *Determinantal point processes and representation theory*
2011	E. Candes (Stanford) *Compressed sensing*
2010	M. Bramson (University of Minnesota) *Stability of queuing networks*


Einstein's Legacy
celebrating 100 years of general relativity
28th -29th November 2015
The Great Hall, Queen Mary, University of London
Invited speakers:
John Barrow (Cambridge)
Alessandra Buonanno (Max Planck Institute)
Harry Collins (Cardiff)
Mihalis Dafermos (Cambridge/Princeton)
Michael Duff (Imperial)
Pedro Ferreira (Oxford)
James Hough (Glasgow)
Ramesh Narayan (Harvard)
Katy Price (Queen Mary)
Sir Roger Penrose (Oxford)
Andrew Robinson (London)
Richard Staley (Cambridge)
CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD
Queen Mary University of London
IOP Institute of Physics
LONDON MATHEMATICAL SOCIETY
Nottingham
Register at: http://astro.qmul.ac.uk/einstein
Image credit: NASA

Loughborough University

LONDON MATHEMATICAL SOCIETY
150 YEARS

LMS 150th Anniversary

LMS Prospects in Mathematics

A Symposium for Potential Research Students in Mathematics

Department of Mathematical Sciences, Loughborough University
15-16 December 2015

Are you considering applying for PhD study in mathematics for entry in 2016? If the answer is yes, this meeting is for you!

List of speakers

Stephen Coombes (Nottingham)
Martin Huxley (Cardiff)
Natalia Janson (Loughborough)
Daniela Kuhn (Birmingham)
Tanniemola Liverpool (Bristol)
Diane Maclagan (Warwick)
Paul Milewski (Bath)
Konstanze Rietsch (KCL)
Anna Taormina (Durham)
Richard Thomas (Imperial)

How to participate

Funding is available - register at the conference webpage:
http://homepages.lboro.ac.uk/~maap/LMS/

Organisation and Support

The event is sponsored by the London Mathematical Society and supported by the Department of Mathematical Sciences, Loughborough University.

The local organisers are Karima Khusnutdinova, Marta Mazzocco, and Artie Prendergast-Smith. For more information email a.prendergast-smith@lboro.ac.uk.

Background image: "Loughborough Carillon" - Chris J Dixon (Creative Commons)

1865 - 2015

LMS-EPSRC DURHAM SYMPOSIA

CALL FOR PROPOSALS

The London Mathematical Society invites proposals for Durham Symposia in 2017 and beyond.

The LMS and the EPSRC intend to support at least two Durham Symposia in 2017.

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

Prospective organisers should send a formal proposal to the Durham Representative, Dirk Schuetz (dirk.schuetz@durham.ac.uk) by **Friday 20 November 2015**.

Proposals should include:

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

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

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

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

LMS 150th Anniversary

Mathematics Festival at the Science M

Science Museum, Exhibition Road, London SW7 2DD (nearest tube: S

Wednesday 25 November 2015 (evening only; Science Museum Lates)
Saturday 28 - Sunday 29 November 2015 (daytime)

The LMS is collaborating with the Science Museum and interactive theatre company non zero one to create an exciting and immersive Mathematics Festival, entitled *What's Your Angle? Uncovering Maths*. Audiences of all ages will be invited to adopt the role of an undercover journalist to discover how mathematics relates to everyday life. The festival aims to be an inspiring and memorable experience that challenges the common perception of mathematics as difficult and esoteric, and to show visitors how contemporary mathematics transforms people's lives and affects everyone.

Einstein's Amazing Theory of Gravity: Black Holes and Novel Ideas in Cosmology
Talk by Roger Penrose: 25 November 2015, 7:10pm - 8:10pm

As an introduction to the festival and part of the 'Lates' event to be held on the evening of 25 November, Roger Penrose will be giving a talk on the subject of general relativity, in light of the 100th anniversary of Einstein's seminal paper "The Field Equations of Gravitation".

Abstract: One hundred years ago, Albert Einstein presented the definitive version of general relativity, his theory of gravity and curved space-time structure that would come to supersede Isaac Newton's picture, seemingly unassailable for more than two centuries. Though initially greeted with much skepticism, Einstein's theory has grown in stature to become one of the most precisely tested of physical theories. Effects for which there is now considerable observational support include black holes, gravitational lensing, and energy-carrying gravitational waves.

Einstein later extended his theory to study the entire universe, introducing his cosmological constant—now referred to as "dark energy". Again, there is close accord with observation. Yet a feature of his models he much disliked was the initial singularity now referred to as

LONDON MATHEMATICAL SOCIETY
150 YEARS

luseum, London

outh Kensington)

the "Big Bang". There is, however, a novel way of dealing with this apparent blemish that might have pleased Einstein, leading to an unorthodox picture that is well in accord with modern observations.

Thinking Space

Preview screening of a film directed and produced by Heidi Morstang: 25 November 2015, 8:30pm - 9:35pm

How do mathematicians think? This 60 minute documentary film features nine UK-based mathematicians offering insights into their mathematical thinking across a broad range of mathematical research fields.

Through explorations of their various thought processes, the film portrays mathematicians who are grappling with advanced mathematical ideas. We are presented with the concepts of imagination, intuition, and wonder, as well as rigorous mathematical deduction.

The film features Kevin Buzzard, Peter Donnelly, Tim Gowers, Martin Hairer, Roger Penrose Caroline Series, Richard Thomas, Reidun Twarock and Karen Vogtmann. Interviews were conducted and selected by Martin Hyland.

These will be free ticketed events with limited capacity.

****UPDATE 29/10: Tickets for the Roger Penrose talk have now sold out.****

Tickets for the preview screening of *Thinking Space* can be reserved here: http://www.sciencemuseum.org.uk/visitmuseum/Plan_your_visit/lates/thinking-space. The film will also be shown on a rolling basis over the festival weekend.

Correction to the October issue: we are very sorry to say that the LMS Associate Artist artwork will not be shown at the Maths Festival, contrary to what was reported in the last issue.

LMS FUNDING IN AFRICA

The LMS supports mathematics in Africa by directly funding specific activities within the African Mathematics Millennium Science Initiative (AMMSI) and the Mentoring African Research in Mathematics (MARM) programme. AMMSI is building mathematical infrastructure and networking in sub-Saharan Africa and MARM has an aim of enabling all mathematicians in Africa to pursue academic careers of the highest standard. The LMS provides financial support to enable postgraduate students to attend conferences funded within the AMMSI network and this included this recent CIMPA research school on *Mathematical Modeling and Analysis of Complex Systems*.

MATHEMATICAL MODELING AND ANALYSIS OF COMPLEX SYSTEM

Report

CIMPA School Kenya 2015, entitled *Mathematical Modeling and Analysis of Complex System*, took place from 20 to 31 July 2015 in Lake Naivasha Panorama Park, Naivasha, Kenya. The School was hosted by the School of Mathematics, University of Nairobi to build the capacity of mathematical modelers in Africa.

Introductory topics in the intersection of mathematics and biology were covered, including: introduction to mathematical biology concepts, mathematical modeling, model formulation, analysis and simulation.

Mathematical Biology gives an overview of the concepts used to represent biological and technical systems to formulate models needed to study specific processes. The concepts help to model infectious diseases

Professor Peter Mbithi, the Vice Chancellor of the University of Nairobi with Dr Josephine Kagunda (on his left) poses for a photo after the opening ceremony

Professor Peter Mbithi, the Vice Chancellor of the University of Nairobi, with LOC members, CIMPA representatives and some participants

in humans, plants and animals and also in ecological, hydrological and population dynamics. In mathematical modeling, equations are used to study the long term behaviour of the developed systems, and analysis of the model is done either numerically or by use of computer software called simulation. In all the lectures, practical examples were given and the participants enjoyed the computation exercises given by each lecturer.

Recent applications of mathematical modeling to HIV/AIDS infection were explained by Dorothy Senelani, and Livingstone Luboobi gave practical applications of mathematical models on immunology in diseases spread and control. A course on *Applying Functional Analytic Techniques to Evolution Equations* was given by Wilson Lamb, and an *Introduction to Population Models* was undertaken by Jacek Banasiak. This gave the School much more modelling character. There were several short lectures by Wandera Ogana, Josephine Kagunda and Samwel Mwalili. The students were given slots for presentations lasting between 20 and 40 minutes and tutorials on computer packages and their applications to modelling were conducted by Nelson Owuor. Students were given projects to work on during their stay in Naivasha and the results were presented on the last day of the School. The participation of the students was very good, students attended all lectures, worked on the assignments, asked questions and discussed the material, both immediately after the lectures and during breaks.

The School also included opportunities for a less formal interaction among the participants. Its programme contained two social events. On the first Saturday the participants visited Lake Nakuru National Park where they had an opportunity to see many types of animals like buffaloes, zebras, lions, birds and antelopes among others. The conference reception took place in the evening before the last day of the conference after which many participants ate, enjoyed music and socialized till very late. The beautiful panorama of the hotel made the workshop very exciting with a swimming pool and outside sitting areas during meals and coffee times.

The School attracted 27 students from Nigeria (4), Cameroon (3), Sudan (1), Ghana (2), Zimbabwe (1), Tunisia (1) and Kenya (15). 10 students were female.

The School organizers are grateful to the London Mathematical Society/AMMSI, IMU/CDC, ONR Grant, CSUN, DAAD and the University of Nairobi for financial support. They are also grateful to CIMPA for their financial and logistic support as well as providing the framework which made the School become a reality. Further information about the School, including its course material, is available on its cimpa@uonbi.ac.ke.

Josephine Kagunda
University of Nairobi, Kenya

LMS UNDERGRADUATE SUMMER SCHOOLS

The aim of the LMS Undergraduate Summer School is to introduce modern mathematics to the best UK undergraduates who are not currently in their final year of study. In 2015 the first Summer School was held at Loughborough University from 20 to 31 July. The LMS provides financial support to enable undergraduate students to attend.

Reports

An incredible journey through mathematics

The LMS Summer School held at Loughborough University was an absolutely incredible experience that will forever mark my career choices as a mathematician. It was a great honour to be selected to participate, since we got to listen to lectures and colloquia by some of the best mathematicians in the world, both specializing in theory and applications, such as Tim Gowers, Tadashi Tokieda and Caroline Series, who were among my favourites.

The two weeks were packed with some of the most beautiful mathematics I've ever seen or even heard of, from Fluids Dynamics to Hyberbolic Geometry, and the lectures have definitely motivated me to continue learning and reading about these topics. It has enlightened me in terms of what a mathematician can do with their profession, and it is a lot more than I ever imagined. However, my favourite part of the School was having the opportunity to be surrounded by some of the best students in the UK, who are all incredible people, each more inspiring than the last, all with different backgrounds in mathematics and that somehow we could all unite for this one event. It was great to speak and get to know all of them, both socially and academically, and share our passion for mathematics. It was a truly inspiring environment where we all learned together and helped each other out and I will remember these weeks forever!

Alissa A. Kamilova
Swansea University

A view from outside

As part of the celebration of its 150th Anniversary the London Mathematical Society organized the first LMS Undergraduate Summer School, which took place at Loughborough University from 20 to 31 July 2015. The Scientific Committee consisted of A. Hone, F. Kirwan, S. Tabachnikov, and A. Veselov.

The participants were undergraduates from UK universities selected according to the scheme. UK Mathematics Departments were invited via LMS representatives to nominate three best Mathematics undergraduates, who are not on the final year of study, with the final selection done by

Ton Coolen

Sir Timothy Gowers

the local Organising Committee (C. Garetto, V. Novikov, A. Veselov and B. Winn). This group of 53 students spent 12 days at Loughborough University. Two days were devoted to excursions, but 10 days were filled to the brim with lectures, colloquium talks, and problem solving sessions.

The topics covered by the lecture courses (of 3-4 lectures) were quite diverse:

- *From the regular solids to quivers* (by Gwyn Bellamy, Glasgow);
- *Introduction to the theory of complex networks* (by Anthony Coolen, King's College London);
- *A complex life* (by Darren Crowdy, Imperial College London);
- *The mathematics and physics of random matrices* (by Giovanni Felder, ETH Zurich, Switzerland);
- *Introduction to tropical geometry* (by Mark Gross, Cambridge);
- *Continued fractions and hyperbolic geometry* (by Caroline Series, Warwick);
- *Mathematical billiards* (by Sergei Tabachnikov, Penn State University, USA);
- *Groups, graphs and virology* (by Reidun Twarock, York).

Each course came with a collection of exercises that were available to the participants in advance, and some of which were discussed during the problem solving sessions (one per course).

Colloquium talks were given on every work day; the goal of these talks was to provide a panoramic view of contemporary mathematics and to show the students what is happening in mathematical sciences. The speaker list comprised Sir Michael Berry, Martin Bridson, Iain Gordon, Sir Timothy Gowers, Beatrice Pelloni, Sergei Tabachnikov, Tadashi Tokieda, Reidun Twarock and Alexander Veselov.

The schedule, the description of courses with exercises, and the list of colloquium talks are available from the school website www.lms.ac.uk/events/lms-summer-schools.

I have participated in organizing and lecturing at a number of similar summer programs for students, both in Europe and the USA. The participants of the present school were extremely enthusiastic about mathematics, although they were somewhat shy to ask questions during the lectures (this was offset by Sasha Veselov who attended all the lectures and, for the benefit of the audience, actively engaged the speakers by asking questions).

To summarize, the LMS Summer School was very well organized. It was an extraordinary success, and it is likely to have a great impact on the mathematical development of its participants bringing new talent to our discipline.

Sergei Tabachnikov
Department of Mathematics
Penn State University

Iain Gordon

LMS EDUCATION GRANT

Report

The Watford African Caribbean Association is a small charitable organisation that uses local knowledge and decades of experience to transform the lives of the vulnerable, the elderly and children, whilst preserving African and Caribbean traditions.

Last year, we approached the London Mathematical Society to help support our Saturday Mathematics programme for key stage 1, 2, 3 and 4 students. An award from the LMS Education Grant scheme secured the services of Hands on Science – a leading provider of science and engineering workshops. Pupils explored rotational symmetry, matrices, probability, logic, reasoning, forward-thinking and game theory through the mediums of 3D noughts and crosses and Morse Code.

Most participants rated the workshops as excellent and were eager to share what they had learnt with family and friends. The workshops also stimulated an array of questions from parents.

The event generated a high level of interest and we witnessed our young people become more inquisitive and engaged with mathematics and how it relates to the real world. Interest was not limited by age or gender. Parents, guardians and pupils left with an appetite for more knowledge and workshops. We take this opportunity to thank the LMS for their support and providing one of the highlights in our year.

Noel Akers
Watford African Caribbean Association

LMS COMPUTER SCIENCE COLLOQUIUM

Report

The LMS Computer Science Colloquium on *Algorithms and Cryptography – Apology Accepted*, held on 17 September 2015 at The Royal Society, gave much insight to a variety of concepts in modern day cryptography. Expert speakers gave excellent introductions to their topics as well as giving some idea of the complexity of the issues at hand.

Lance Fortnow began proceedings with an insight into the P vs NP problem - one of the Millennium Prize Problems. The problem is concerned with proving or disproving that any problem for which potential solutions can be easily verified is such that it can easily solved. Lance highlighted the major proofs and disproofs that have been attempted.

Shafi Goldwasser followed, underlining the increasing influence of cryptography research on fields such as Computer Science and Mathematics. She went on to give an overview of recent developments in zero knowledge proofs, which allow an entity to prove that they hold a secret without revealing it. Nigel Smart, on the same track as Shafi, spoke about secret sharing, and presented how interactive proofs can provide forward secrecy guarantee on protocols such as TLS.

After lunch, Mike Paterson spoke about how coin tosses are efficient at generating arbitrary probabilities, and proposed his approach to computing this efficiency for biased coins.

Adi Shamir then explained how a Rubik's cube and knapsack problems can be thought of as cryptosystems (specifically, n-layers DES), and we can use cryptanalysis techniques to solve them. Jon Kleinberg finished the day by talking about social networks graphs. When Facebook is considered not as a single large graph but as a collection of billions of sub-graphs, it is possible to analyse social behaviour. Jon proposed and evaluated techniques for identifying someone's partner or colleagues, by looking at their social graph.

With breaks throughout the day and a wine reception to finish, there was ample opportunity to interact and ask questions to the speakers and meet other participants. The day was highly informative and enjoyable.

Ela Berners-Lee and Giovanni Cherubin
Royal Holloway, University of London

LONDON MATHEMATICAL SOCIETY
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LMS 150th Anniversary

LMS South West and South Wales Regional Meeting and Workshop *Aspects of Homotopy Theory*

14 December 2015
School of Mathematics, University of Southampton

1:00	Registration
1:30-2:30	**Ralph Cohen (Stanford University)**
	Topological Field Theories and How to Compare Them
2:30-3:00	Tea/coffee break
3:00-4:00	**Jie Wu (National University of Singapore)**
	Combinatorial Approaches to Homotopy Theory
4:00-4:30	Tea/coffee break
4:30-5:30	**Ian Leary (University of Southampton)**
	Uncountably Many Groups of Type FP
6:00	Wine reception

Workshop Speakers (15-17 December):

- Alexander Berglund (Stockholm University)
- Piotr Beben (University of Southampton)
- Natalia Castellana (Universitat Autònoma de Barcelona)
- Alexander Gaifullin (Steklov Mathematical Institute, Moscow)
- John Greenlees (University of Sheffield)
- Brendan Owens (University of Glasgow)
- Nansen Petrosyan (University of Southampton)
- Oscar Randal-Williams (University of Cambridge)
- Svjetlana Terzic (University of Montenegro, Podgorica)
- Sarah Whitehouse (University of Sheffield)

More information is available at www.personal.soton.ac.uk/jg1u11/LMSregional.html

EDINBURGH MATHEMATICAL SOCIETY

LONDON MATHEMATICAL SOCIETY
150 YEARS

LMS 150th Anniversary

London Mathematical Society & Edinburgh Mathematical Society Joint Meeting 2015

ICMS Edinburgh, 10-11 December 2015

Programme

Thursday:	10:00 - 10:30	Coffee & Registration
	10:30 - 11:30	Opening of the Joint Society meeting: Eva Tardos, Cornell
	11:45 - 12:45	Jarek Brodzki, Southampton
	Lunch	
	14:00 - 15:00	Ilias Diakonikolas, Edinburgh
	15:15 - 16:15	Marian Scott, Glasgow
	16:15 - 16:45	Coffee
	16:45 - 17:45	Igor Rivin, St. Andrews
Friday:	10:00 - 10:30	Coffee & Registration
	10:30 - 11:30	Ronald Coifman, Yale
	11:45 - 12:45	Colin McDiarmid, Oxford
	Lunch	
	14:00 - 15:00	Coralia Cartis, Oxford
	15:15 - 16:15	Sofia Olhede, UCL
	16:15 - 16:45	Coffee

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

For further details and to register and to reserve a place at the dinner, please visit http://129.215.255.70/workshop.php?id=391 or contact Jane Walker (jane.walker@icms.org.uk). The cost of the dinner will be approximately £24.00, including drinks.

There are funds available to contribute in part to the expenses of research students to attend the meeting. Requests for support, including an estimate of expenses, may be addressed to the organisers.

1865 - 2015

LMS BATH-WIMCS ANALYSIS DAY

The fourth workshop in the 2015 series will take place at the Department of Mathematical Sciences, University of Bath, on Friday 4 December 2015 from 10:00 to 18:00. The meeting, which is open to all, will highlight topics in analysis and its applications. The speakers are:

- Sabine Boegli (Bern and Cardiff)
- Suresh Eswarathasan (Cardiff)
- Alberto Farina (Picardie)
- Veronique Fischer (Bath)
- Massimo Lanza de Cristoforis (Padova)
- Eugene Shargorodski (King's College London)

The meeting is supported by: LMS Joint Research Groups in the UK (Scheme 3); Institute of Mathematics, Physics and Computer Science (Aberystwyth University); Bath Institute for Mathematical Innovation (University of Bath); Cardiff School of Mathematics (Cardiff University); and the Department of Mathematics (Swansea University). For further information visit http://tinyurl.com/o527p37.

WELL-POSEDNESS AND SINGULARITY FORMATION

A mini workshop on *Well-posedness and Singularity Formation for Nonlinear Evolution Problems* will take place on 27 January 2016 at King's College London. The speakers are:

- Mahir Hadžić (King's College London)
- Clement Mouhot (Cambridge)
- Pierre Raphaël (Nice)

Further details will be made available soon on the website of the Department of Mathematics, King's College London. This meeting is part of an LMS Conference grant, aimed at celebrating a new appointment. For further information contact Mahir Hadžić (mahir.hadzic@kcl.ac.uk).

CRYPTOGRAPHY

A one-day workshop on *Interactions between Algebra, Coding Theory and Cryptography* will take place at the Department of Mathematical Sciences, Durham University on 5 January 2016. Algebra has intimate connections with coding theory as well as other branches of information theory and theoretical computer science. This one-day workshop is designed to bring together researchers working in algebra, coding theory or cryptography. The aim is to look for points of connection: places where one field could help solve problems or provide interesting research questions in another. The speakers are:

- Simon R. Blackburn (Royal Holloway)
- Marcus Greferath (UCD/Aalto)
- Johan Peder Hansen (Aarhus)
- Laura Luzzi (ENSEA)

The workshop consists of presentations from leading experts aimed at a broad audience. Between the talks there will be ample time for discussion in the hope that this will inspire future interactions. The organisers are: Jokke Häsä, Andrea Vera-Gajardo and Alexander Stasinski. The workshop is funded by EPSRC grant EP/K024779/1. For further information visit the website at www.maths.dur.ac.uk/~lfvx79/workshop2016.html.

ADAPTIVE ALGORITHMS

A workshop on *Adaptive Algorithms for Computational PDEs* will be held from 5 to 6 January 2016 at the University of Birmingham. Adaptive algorithms and the associated software are ubiquitous in numerical solution of partial differential equations (PDEs). In many application areas, adaptive solution procedures offer the most efficient way to achieve the required accuracy in numerical simulations through effective use of available computational resources.

This workshop aims to bring together researchers working on mathematical

foundations, design and implementation of adaptive algorithms for numerical solution of PDE problems to discuss recent developments in this field and initiate new collaborations.

The programme of the workshop will comprise 12 invited lectures and up to six contributed talks. Invited speakers are:

- Mario Arioli (Wuppertal)
- Gabriel Barrenechea (Strathclyde)
- Andreas Dedner (Warwick)
- Emmanuil Georgoulis (Leicester)
- Paul Houston (Nottingham)
- Natalia Kopteva (Limerick)
- Omar Lakkis (Sussex)
- Claudia Schillings (Warwick)
- David Silvester (Manchester)
- Rob Stevenson (Amsterdam)
- Kris van der Zee (Nottingham)
- Martin Vohralik (INRIA Paris-Rocquencourt)

The organisers are Alex Bespalov and Daniel Loghin (University of Birmingham). Detailed information about the meeting is on the webpage at http://tinyurl.com/q6tglof.

The workshop is supported by an LMS Conference grant and by the School of Mathematics at the University of Birmingham. Due to the LMS grant, a limited funding is available to support travel and accommodation of UK-based research students who do not have other means of support. The deadline for registration, funding application, and abstract submission is **16 November 2015**.

MODEL THEORY

The University of Manchester will be hosting the 6th *British Postgraduate Model Theory Conference* from 20 to 22 January 2016. The event aims to bring together postgraduates and postdocs working in model theory and related topics. Talks will be on a range of topics in modern model theory, including a short course on the model theory of modules, and an overview of the development of model theory. Invited speakers are:

- Wilfrid Hodges
- Giuseppina Terzo
- Jonathan Kirby
- Mike Prest

Participants are encouraged to contribute talks of 45 minutes. There is a registration fee of £30 and subsidised accommodation will be offered at £10 per night. For more information visit https://sites.google.com/site/bpgmtc2016/home or contact Samuel Dean by email (pgmodeltheory@gmail.com). The conference is supported by an LMS Postgraduate Conference grant (Scheme 8) and the British Logic Colloquium.

INTEGRABLE DAY AT LOUGHBOROUGH

A half-day workshop on *Algebra, Geometry and Integrability* will be held at Loughborough University on 27 November 2015, in Room SCH.1.05 from 1.30 pm. The speakers are:

- Paul Johnson (Sheffield)
  Topology of Hilbert schemes and combinatorics of partitions
- Anna Felikson (Durham)
  Coxeter groups, quiver mutations and hyperbolic manifolds
- Robert Marsh (Leeds)
  Braid groups and quiver mutation
- Alexei Bolsinov (Loughborough)
  Jordan-Kronecker invariants of Lie algebras

The meeting is part of a collaborative workshop series on *Classical and Quantum Integrability,* involving Edinburgh, Glasgow, Leeds and Loughborough Universities, supported by an LMS Scheme 3 grant. Funds may be available to support the attendance of research students. Enquiries should be addressed to the organiser Sasha Veselov (A.P.Veselov@lboro.ac.uk). Further information about the workshop is available at http://www1.maths.leeds.ac.uk/cnls/research/integrable/cqi/cqi.html.

CHARLES HUTTON (1737–1823)

Being mathematical in the Georgian period

A research symposium on Charles Hutton, will take place at All Souls College, Oxford from 17 to 18 December 2015. This workshop is part of an Arts and Humanities Research Council-funded project on Charles Hutton and his mathematics. It will explore Hutton's life, location and legacy, and the ambitions, limitations, and changing place in culture of British mathematics in his period.

Charles Hutton was a Tyneside coal hewer, Professor of Mathematics at the Royal Military Academy in Woolwich, Fellow of the Royal Society, and an author whose books were read across the entire English-speaking world. His was one of the more spectacular examples of the power of mathematics to change individual lives in the Georgian period. In 1783–4 his celebrated row with Joseph Banks, President of the Royal Society, crystallised debates about the nature of British science and the place of mathematics within it. His publications, including his textbooks and his celebrated mathematical dictionary, were widely read into the second half of the nineteenth century, and attracted translations into at least five languages: but they also exemplified the limitations of mathematics as a subject for polite discourse and the limitations of British mathematics in the period of fluxions.

Confirmed speakers are: Olivier Bruneau, Jenny Bulstrode, Ken Clements, Shelley Costa, Alex Craik, Mary Croarken, Jo Elcoat, Nerida Ellerton, Rebekah Higgitt, Alan Morton, Benjamin Wardhaugh, Jane Wess, Emily Winterburn.

To reserve a place, or for any enquiries email Benjamin Wardhaugh (enquiries@benjaminwardhaugh.co.uk). For further information visit the website www.benjaminwardhaugh.co.uk/workshops/index.html.

GÜNTER KRAUSE

Professor Günter Krause, who was elected a member of the London Mathematical Society on 17 March 1978, died on 29 August 2015, aged 73.

Tom Lenagan writes: Günter Krause was born in Frankfurt in 1941 and brought up and educated there. He was a PhD student of Reinhold Baer, graduating in 1967. Immediately afterwards, he went to Washington State University in Pullman for two years and then to the University of Manitoba in Winnipeg, where he remained for the rest of his career, going half-time in 2013. He held several administrative positions within the Mathematics Department in Winnipeg. He served as Head of Department from 2003 until 2010, and also was Acting Head for two periods before and after this stint.

Günter's research was mainly in ring theory, very much in the tradition of the Leeds School founded by A.W. Goldie. Indeed, he wrote several papers with Goldie, and also published papers with J.T. Stafford and T.H. Lenagan.

I first met Günter in Oberwolfach in 1974. At the time, we were both interested in noncommutative Krull dimension, where Günter had established the key result that a ring with Krull dimension had finite Goldie dimension, and so had much to discuss. From then on we collaborated over a number of years and met in several places, including Edinburgh, Winnipeg, Salt Lake City and Seattle. As well as mathematics, we spent much time hill-walking, running, eating and drinking. Günter liked cross-country skiing and was also a strong swimmer: I have vivid memories of him disappearing in the distance in Lake Winnipeg, but eventually returning, much to my relief.

During a visit to Salt Lake City in the early 1980s, Günter suggested that we collaborate on some notes about Gelfand-Kirillov dimension. From that suggestion arose our joint book *Growth of Algebras and Gelfand-Kirillov Dimension*, which was published by Pitman in 1985, and eventually republished in a revised edition by the American Mathematical Society in 2000. The book remains a standard reference in the subject.

ROY CHISHOLM

Professor Roy Chisholm, who was elected a member of the London Mathematical Society on 16 May 1986, died on 10 August 2015, aged 88.

Ruth Farwell writes: Roy was the founding Professor of Applied Mathematics at the University of Kent, influencing the development of applied mathematics at Kent over nearly 30 years. A highly regarded mathematical physicist, he is remembered with much affection and respect by those who had the good fortune to collaborate with him.

Roy studied mathematics at Christ's College, Cambridge, a Wrangler in part 2 and achieving a distinction in part 3 of the tripos. In 1952 he obtained a doctorate from Cambridge, with research into Feynman graphs, breaking new ground with his derivation of the 'symmetric integration' formula.

After Cambridge, he moved to Glasgow University and then to University College, Cardiff. His research into different particle interactions and their equivalencies continued. He also published on statistical mechanics, and co-authored a text book on mathematical methods for scientists and engineers.

Many institutions, including Texas A&M, Stanford and CERN, welcomed Roy as a visiting academic over the years. At CERN in the early sixties, Roy developed the full set of algorithms for scalar products of the Dirac gamma algebra, to which his name is attached – the Chisholm-Caianiello-Fubini Identities.

Roy returned from CERN in 1963 to spend two years in his first chair at Trinity College, Dublin, then spending a year in the US prior to taking up the Chair at Kent in 1966. He built up the applied group with specialisms in numerical analysis and numerical computations applied to physics, including Padé approximants. A successful Summer School which he organised at Kent in 1972, and which brought together mathematicians and physicists, stimulated Roy to develop multivariate Padé approximants with which the name of the group at Kent then became associated.

In the mid 1970's Roy's research took a new direction inspired by the algebras of William Clifford. Roy's and my 'spin gauge theories' are Lagrangian field theories unifying the interactions of the fundamental particles based on Clifford algebras of higher dimensions. The most notable achievement was predicting the mass of the top quark which was very close to the experimental measurement.

Roy's positive experience of the earlier Padé conference led him to organise an international conference at Kent to bring together small research groups from around the world interested in Clifford algebras. It triggered a series of conferences which still continue; Roy is recognised internationally as one of the founding fathers of mathematical applications of Clifford algebras.

For Roy, the work on Clifford algebras opened new avenues. William Clifford, with his wife, Lucy, was at the centre of scientific and literary culture in London in the late nineteenth century. With his wife, Monty, Roy found himself moving into new aspects of research: history and philosophy inspired by the lives of William and Lucy.

Although Roy's health deteriorated in recent years, he remained active with an enquiring mind, even publishing his first novel, Changing Stations, in 2014. He is survived by his wonderful wife, by his three beloved children and his granddaughters, of whom he was immensely proud. I and many others feel privileged to have been able to have him as part of our professional lives.

More details of Roy's career and his work can found in his memories on www.roy-chisholm.com.

BILL BONNOR

Malcolm MacCallum writes: Professor William ("Bill") Bowen Bonnor died on 17 August 2015, aged 94. He was a leading figure in gravitational theory, especially general relativity.

He worked for Shell post-war. His PhD (1946), and his earliest publications, are in chemistry. This was followed by a part-time BSc in Mathematics during which he devised a system for the football pools which eventually brought a large enough win to enable him to spend 1948-9 at University College London, obtaining a Distinction in Advanced Mathematics. He then registered for an MSc in Mathematics, but withdrew on becoming a Lecturer in Mathematics at Liverpool.

In 1957 Bill was appointed Reader and Head of the new Mathematics Department at Queen Elizabeth College (QEC). He stayed there until his retirement, taking a DSc in relativity in 1960 and being promoted to Professor in 1962.

Two 1956 papers on gravitational instability, one which played an important part in the development of ideas about galaxy formation, and one in star formation, where the Bonnor-Ebert mass is still studied, made major advances. He wrote many important papers on stationary axisymmetric systems in general relativity, on their Newtonian counterparts and on their physical interpretation. He was a pioneer in the use of generating techniques for the resulting integrable systems, methods which were very greatly extended in the 1970s and 1980s. A particular one of these processes has been named 'Bonnorisation'.

Other works considered gravitational radiation, the clarification of the rather confused literature on junction conditions, the "Bonnor beam", which models the gravitational field of a beam of light, and cosmological models. His papers are notable for the surprising and interesting uses and interpretations he extracted by careful investigation even in situations intensively studied by earlier authors.

The QEC department initially taught for a general B.Sc. and provided 'service teaching', but in 1963 the first postgraduates and BSc (Special) undergraduates were recruited. From the start both programmes attracted good students, who are still grateful for Bill's mentoring and leadership. He personally supervised 17 of the 33 PhD degrees gained at QEC.

He was also very active internationally, especially in making contacts with workers in the socialist countries of Eastern Europe, in particular with the group in Jena led by Professor Ernst Schmutzer, and he held visiting appointments at the Universities of Illinois at Urbana, Otago and Cape Town.

After retirement he continued to publish extensively (averaging more than two papers per year throughout the last 30 years, and having a paper in refereeing when he died), to be a very active seminar participant, and to work with and encourage (my) graduate students.

He met and married his wife Jean while at Liverpool. Their two children, Richard and Helen, survive him. He retained his interest in football and cricket (the latter as a member of the famous M.C.C.) and became a keen golfer, playing until he was about 90, and a bridge player. He had a formidable knowledge of British and world history, and enjoyed art and music. For the many who interacted with him professionally and were inspired by his unflagging enthusiasm for his subject, he will remain, as a colleague put it, 'the personification of the classical mathematical relativist'.

BENFORD'S LAW: THEORY AND APPLICATIONS edited by Steven J. Miller, Princeton University Press, Princeton, 2015, pp 438, £52.00, $75.00, ISBN: 9780691147611.

Benford's Law (henceforth, *BL*) is truly remarkable. Discovered by Simon Newcomb (1881) and, independently, Frank Benford (1938), *BL* states that the leading digits of numbers from diverse sources are heavily biased toward the low end: the probability that the leading digit is at most d is $\log_{10}(d + 1)$. In more familiar form: the probability of d is $\log_{10}[(d + 1)/d]$. So a leading 1 occurs 30.1% of the time and is more than six times as likely as a leading 9 (4.6%). A stronger Benford Law for data X states (loosely speaking) that for $s \leq 1$ and x in X, the probability that the fractional part of $\log_{10}x$ is in $[0, s)$ is s; i.e., the fractional parts of log10x are uniform in [0, 1). The strong version yields probabilities for the occurrence of the first two digits, the first three, etc. The book under review has twenty chapters by different authors on a variety of topics in the theory and application of this intriguing and counterintuitive law.

Many people have opinions on why *BL* so often holds, but it has proved difficult to explain exactly why, say, the areas of countries should follow *BL*. Populations are easier because they generally grow exponentially; for data following such a time-dependent rule, *BL* is easy to motivate. An exponentially growing value spends a certain time, t, between 9000 and 9999; but once it passes 10000, the time spent between 10000 and 19999 will be much greater than t. But this observation does not apply to area or other natural data sets (such as radioactive half-lives of particles, or file sizes on a computer's hard drive) that are not time-dependent but do follow *BL*.

Benford experts Arno Berger and Ted Hill, who have worked extensively on the mathematical underpinnings of the law, concluded a recent paper (*The Mathematical Intelligencer* 33:1 (2011) 85–91) with: "Although many facets of *BL* now rest on solid ground, there is currently no unified approach that simultaneously explains its appearance in dynamical systems, number theory, statistics, and real-world data. In that sense, most experts seem to agree with Fewster that the ubiquity of *BL*, especially in real-life data, remains mysterious."

The book's first chapter (by editor Miller) is an excellent introduction to *BL*, with a survey of various published explanations for why *BL* holds. For example, it is clear that the data needs to cover several orders of magnitude (i.e., *spread* is large): the mean life expectancy (in years) in countries will clearly not be biased towards 1 as the leading digit! But spread cannot explain everything and this chapter discusses other features of the data that might be relevant. This chapter is online at http://press.princeton.edu/titles/10527.html.

Chapter 2, by Hill and Berger, presents several important mathematical results that are critical to understanding *BL* in the context of probability distributions. The rest of the book has some chapters with a theoretical flavor, like Chapter 2, and many that deal with applications. The latter are fascinating, often turning on the fundamental question: when should one expect data to satisfy *BL*? In forensic accounting or other fraud investigations, the law's failure might mean nothing more than that certain recurring fixed expenses exist. So it is all a bit delicate; nevertheless, adherence to the Benford predictions are used to analyze data reliability in a wide variety of fields. This part of the book contains interesting applications related to scientific fraud, lotteries, elections, and possible deception in important economic statistics. It is noteworthy that the tax services of the US and some other countries use *BL* as a tool in fraud detection.

A serious error occurs in Chapter 11 where some figures are misplaced. The

printed Figures 11.2 and 11.3 are wrong. The printed Figure 11.2 (the social data for Greece) should be at Figure 11.3, and the proper Figure 11.2 arises from the economic data, not given in the paper but available at the cited paper by the authors. A corrected version of the chapter is online at the previously cited website.

As noted in the context of forensic accounting, there is no clear statistical criterion when it comes to using *BL* to evaluate data quality. But *BL* can indicate, among different data sets, which ones deserve further investigation; that is the point of the comparison of Greece's economic data with its social data or, in the source paper, Greek economic data with the same for other European countries. Indeed, Chapter 11 observes that Greece "has been convicted of data manipulation".

A minor omission occurs in the Table of Contents, where the authors of the chapters are not listed; they should be.

The book has this surprising tidbit: When numbers are rounded to one significant digit, a 2 is *more* likely than a 1. I mentioned this fact to various people, and David Broadhurst (Open University, UK) observed that in base 5, such rounding leads to exactly equal probabilities for digits 1 and 2; that is the only case in which this happens. There is a very nice foreword by Frank A. Benford, the grandson of Frank A. Benford (1883–1948). The book ends with dozens of exercises, keyed to the chapters, that will surely be useful to anyone teaching about *BL*.

Speaking as one who has followed the Benford Law developments in recent years, I found having a single volume with coherent expositions of diverse aspects and applications very valuable. The same publisher just released another book about *BL* that presents the mathematical theory in more detail (Berger and Hill, *An Introduction to Benford's Law*, Princeton University Press, 2015).

Stan Wagon
Macalester College, Minnesota

MATHEMA: AN INTERACTIVE BOOK FOR IPAD by Hugo Parlier and Paul Turner, Tombooks, 2015, £7.99, available on the App Store

Mathema is another attempt at making mathematics and the work mathematicians do more accessible to a general audience. This time, it is not a book, but an interactive app designed for use on iPads. Apps are new, widely used, and tremendously popular among the young. This is why Hugo Parlier and Paul Turner chose this format and created *Mathema* · an interactive book or an app. As a book, the text is well written, it includes interesting examples and a number of nice insights, but it is not terribly innovative. The authors manage a precarious balance between simultaneously explaining the mathematics, the language of mathematics, the contributions and concerns of the mathematicians, and the exhilaration of making new discoveries. Another iPad mathematics app *Incredible Number* by Ian Stewart was reviewed in the *LMS Newsletter* in May 2015.

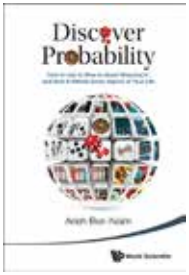
It is, however, the interactive side of *Mathema* and its added features which are meant to lift the text from being `just a book' to being an app. Unfortunately, they fail to do the lifting. The result feels like a book that, instead of illustrations, contains some games, some neat objects that can be manipulated, and some audio explanations accompanying

slide presentations. These work well in the first part devoted to the idea of a proof, but in later parts turn less effective and may fail to capture the interest or the imagination of the reader.

Allowing for all this criticism, writing books about mathematics and mathematical work, especially books that take advantage of the new technology, is commendable and needed. *Mathema* is a serious attempt that might find its audience among gifted beginners, educators looking for ways to enhance their classes, and an occasional mathematician who might disagree with some of the choices, but might enjoy fellow mathematicians' attempt at something that has over and over proved very hard: explaining what mathematicians do.

Robert Jajcay and Tatiana Jajcayova,
Comenius University, Bratislava

DISCOVER PROBABILITY: HOW TO USE IT, HOW TO AVOID MISUSING IT, AND HOW IT AFFECTS EVERY ASPECT OF YOUR LIFE by Arieh Ben-Naim, World Scientific, 2014, pp 340, hb £51, ISBN 978-981-4616-31-7, pb £18, ISBN 978-981-4616-32-4.



Mathematics with its rigour and abstractions suffers a bit of a bad image problem, even with students of mathematics. Often it is not easy to engage students with abstract mathematical concepts beyond real life examples. Recent research [1,2] shows that anxiety is the feeling often related to mathematics.

Ben-Naim is one of those brave authors who are trying to attract readers who might be scared of mathematics or who might believe they cannot do mathematics. He has written an unusual book on probability, a highly sophisticated mathematical topic, for the readers who are curious about "the 'laws' that govern all of the events that we observe in our lives every day " but "mathematics is their Waterloo". From his readers he requires no knowledge of mathematics. The only prerequisite is "common sense and a strong determination to use it".

Ben-Naim is teaching his readers "how to use probability, how to avoid misusing it" and showing "how it affects every aspect of their lives" . He is doing this in a very gentle and creative way using well-chosen examples, cartoons, personal stories and anecdotes, trying to avoid formulae whenever possible.

The book covers topics usually included in basic probability books and it is organized into eight sessions: What is Probability?; How do we calculate probabilities?; The axiomatic approach to probability, Independence and dependence between events; Bayes' Theorem and Its Applications; Average, Variance and Random Variable'; Probability Distributions and Shannon's Measure of Information.

The sessions are carefully structured aiming to gain readers' appreciation and to develop understanding first on an intuitive level and from there he is trying to take it further. In a persuasive way he encourages his readers to try, to think, to calculate.

Each session starts with an introduction to a topic on well chosen 'warming up' simple examples, followed by discussions on a more formal level supported with more tricky and less intuitive examples. The sessions end with a summary what have been learnt in the session. The writing style is clear, gentle and highly narrative.

In the first session a reader is invited to explore the notion of probability from different perspectives including a fascinating research on children's perception of the notion of probability over to a personal interpretation. Ben-Naim includes even his

father's perception of probability.

Now equipped with a good intuition the reader is taken on a guided tour to learn how to calculate probability of an event. After discussing a huge number of more or less classical examples, the defining triple (Ω, L,P) of the probability space is introduced and the Kolmogorov's axioms of probability are listed in the third session.

A huge attention has been given to the notion of conditional probability as a concept that makes theory of probability so distinguished and exciting. I found especially interesting the examples to illustrate that 'conditional probability might or might not be transitive'. A careful reader probably will not be confused by a typo here.

Excitement continues with the examples of use, misuse and sometimes even abuse of the Bayes' theorem , which is just 'a small variation on the theme of conditional probability'. The concept of the random variables and probability distributions are presented towards the end of the book.

My favourite part of the book is the last session on Shannon's measure of information where the two concepts are linked together in the way I haven't seen before.

In the line with 'repetitio est mater studiorum' Ben-Naim often repeats his arguments to make sure the message has reached his readers. Sometimes it might feel that the explanations are too wordy and more elegant maths expressions would be preferred.

In conclusion, this is not a book for the LMS readership, but I do hope it will find its targeted readers.

Vesna Perisic
University of Southampton

References:

1. Kotecha, M., *Addressing mathematics & statistics anxiety by enhancing self -belief*, IMA International Conference on Barriers and Enablers to Learning Maths, 10-12 June 2015, University of Glasgow, Proceedings

2. Strawbridge, S., *Overcoming maths anxiety: some practical ideas and personal reflections*, CETL-MSOR Conference 2015, 8-9 September 2015, University of Greenwich

CALENDAR OF EVENTS

This calendar lists Society meetings and other mathematical events. Further information may be obtained from the appropriate LMS Newsletter whose number is given in brackets. A fuller list is given on the Society's website (www.lms.ac.uk/content/calendar). Please send updates and corrections to calendar@lms.ac.uk.

NOVEMBER 2015

3 The Mathematics of Program Construction, BCS-FACS Evening Seminar, London (451)
10-11 The Science of Beauty, Royal Society of Edinburgh (451)
11 LMS Popular Lectures, Leeds (451)
13 LMS Graduate Student Meeting, London (452)
13 LMS AGM, London (452)
26 Mathematics in Defence IMA Conference, Harwell, Oxford (448)
27 Algebra, Geometry and Integrability Workshop, Loughborough (452)
28-29 Einstein's Legacy, Celebrating 100 years of General Relativity, Joint Meeting with IOP & RAS, QMUL, London (452)

DECEMBER 2015

4 LMS-BATH-WIMCS Analysis Day, Bath (452)
7-11 Combinatorial Mathematics and Combinatorial Computing Australasian Conference, Brisbane, Australia (445)
7-11 New Mathematical and Computational Problems, INI Workshop, Cambridge (449)
9-10 Ada Lovelace 200 Symposium: Celebrating the Life and Legacy of Ada Lovelace, Oxford (451)
10-11 LMS Joint Meeting with the Edinburgh Mathematical Society, Edinburgh (452)
14-17 LMS South West & South Wales Regional Meeting and Aspects of Homotopy Theory Workshop, Southampton (452)
14-18 Geometric Analysis, King's College London (450)
14-18 The Role of the Higher Infinite in Mathematics and other Disciplines, INI Workshop, Cambridge (450)
15-16 LMS Prospects in Mathematics, Loughborough (452)
15-17 Cryptography and Coding IMA Conference, Oxford (448)
17-18 Charles Hutton Research Symposium, All Souls College, Oxford (452)

JANUARY 2016

5 Algebra, Coding Theory and Cryptography Workshop, Durham (452)
5-6 Adaptive Algorithms for Computational PDEs, Birmingham (452)
20-22 British Postgraduate Model Theory Conference, Manchester (452)
27 Well-posedness and Singularity Formation for Nonlinear Evolution Problems, King's College London (452)

MARCH 2016

21-24 BMC 2016, Bristol
21-25 LMS Invited Lectures, Edgar Knobloch (Berkeley), Loughborough (451)

APRIL 2016

5-8 BAMC 2016, Oxford

JULY 2016

18-22 7ECM, TU Berlin (451)

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LMS UNDERGRADUATE SUMMER SCHOOL

held at Loughborough University from 20 to 31 July 2015

(see reports on pages 28–30)

Attendees

Sasha Veselov

Mark Gross

Tadashi Tokieda

Sir Michael Berry and Giovanni Felder

Caroline Series