

SOCIETY 150 years

LONDON

NEWSLETTER

150TH ANNIVERSARY LOCAL HEROES EXHIBITIONS

MATHEMATICAL

As part of the programme to celebrate the 150th Anniversary, the London Mathematical Society is pleased to be sponsoring Local Heroes Exhibitions at **Dundee** (22 August to 1 November), **Tenby** (7 September to 23 October), **Carrickfergus** (26 September to 31 October), **Lincoln** University Library and Lincoln Cathedral (5 July to 6 September) and **Banff** Museum in Scotland (dates to be confirmed). The five exhibitions are part



of the Society's work in providing mathematical resources and outreach across the UK during its Anniversary Year.

These exhibitions are aimed at the general public, and we encourage LMS members and their friends and family to visit to learn more about the history of mathematics in their area. Dates and further details of the exhibitions can be found on the LMS website at www.lms.ac.uk/2015.

The Banff Museum will be focusing on the life and works of James Ferguson, FRS (25 April 1710 – 17 November 1776), a Scottish astronomer, instrument and globe maker.

While still a small child Mr Ferguson acquired an interest in mechanics, and although already working at the age of ten - tending sheep - he was able to study the stars at night and make models of spinning-wheels and mills during the day. Largely uneducated, he ended his formal schooling at the age of seven, but pursued studies in his own time, teaching himself mathematics, mechanics, and astronomy. Ferguson moved to London in 1743 where he became a fellow of the Royal Society and one of the most successful popular lecturers of the time. Ferguson's work is strongly tied to his construction of intricate models, including abstract mechanisms, astronomical models, and map-making.

The Lincoln University Library and Lincoln Cathedral will be celebrating one of the most influential UK mathema-

ticians, Professor George Boole, FRS (2 November 1815 - 8 December 1864). Professor Boole's work on differential equations and algebraic logic was revolutionary, leading to the creation of Boolean Logic, a theory that underpins much of modern computing theory.

(Continued on page 3)

SOCIETY MEETINGS AND EVENTS

- 3 July: Graduate Student Meeting, London
- 3 July: Society Meeting, Hardy Lecture, London
- 7 July: Midlands Regional Meeting, Warwick page 13
- 18-20 September: LMS-EMS Anniversary Weekend, Birmingham page 25
- 23 September: Popular Lectures, Birmingham page 26
- 21 October: Popular Lectures, Glasgow page 26
- 11 November: Popular Lectures, Leeds page 26



Contents No. 449 July 2015



42

150th Anniversary Events

Anniversary Celebrations Events	.24
Anniversary Dinner	.10
Departmental Celebrations	.5
LMS-EMS Mathematical Meeting	.25
Local Heroes Exhibitions	.1

Awards

Collingwood Memorial Prize	.35
LMS Prizes 2015	.14
Queen's Birthday Honours 2015	.17

Calendar of Events

LMS Items

LMS Meetings
Mathematics for the Masses8
Zeeman Award Celebration:
Bursaries 201516
Undergraduate Research
Council Diary29

Midland	s Regional	Meeting	J	.13
Popular	Lectures			.26

Meetings

Advances in Geometric Analysis	33
Algebraic and Geometric Aspects of	
Integrable Systems	31
British Science Festival	30

			-
15	0.	***	A .
18	4	APP A	An

Calculus of Variations32
Function Theory Meeting32
Interfaces in Fluids33
INI New Mathematical and
Computational Problems34
Operational Research33
Operator Algebras and Dynamical
Systems32
Young Researchers in Mathematics31
News
Athena Forum Statement22
European News28
Mathematics Policy Round-up12
The First Female Head of Department21
Obituary
Michael Powell35
Reports
It All Adds Up18
Mathematics of Quantum Uncertainty
Spitalfields Day23
Reviews
An Equation for Every Occasion40
John Napier: Life, Logarithms and
Legacy
My Life and Functions36

No. 449 July 2015

newsletter@lms.ac.uk



Boole, like Ferguson, was largely self-taught, working as a junior teacher while teaching himself calculus from books. After founding his own school at 19, he took over Hall's Academy in 1838, before moving back to Lincoln. Following this move Boole began speaking extensively with other British mathematicians, studying Algebra and publishing papers. In recognition of his burgeoning mathematical talents, Boole was awarded a medal by the Royal Society, before being granted a Professorship at Queen's College, Cork in 1849. Boole was a close friend of De Morgan, who often commented on the early drafts of his paper.

The University of Dundee will be focusing their exhibition on Sir D'Arcy Wentworth Thompson, CB FRS, FRSE (2 May 1860 – 21 June 1948), a Scottish biologist, mathematician and classics scholar. He was a pioneer of mathematical biology and went on collecting expeditions to the Bering Straits, holding the position of Professor of Natural History at St Andrews for 31 years.

Thompson is mainly remembered as the author of the distinctive 1917 book *On Growth and Form*, written largely in Dundee in 1915. Peter Medawar, the 1960 Nobel Laureate in Medicine, called it 'the finest work of literature in all the annals of science that have been recorded in the English tongue'. The book led the way for the scientific explanation of morphogenesis, the process by which patterns are formed in plants and animals. Thompson recognised, however, that the book was descriptive, and did not present experimental hypotheses.

Thompson's description of the mathematical beauty of nature stimulated thinkers as diverse as Alan Turing and

Claude Levi-Strauss; and artists including Henry Moore, Salvador Dali and Jackson Pollock. The Zoology Museum in Dundee, named for Thompson, displays a collection of artworks inspired by his ideas. He was elected a Fellow of the Royal Society, was knighted, and received the Darwin Medal and the Daniel Giraud Elliot Medal.

(Continued on page 4)

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Carrickfergus Museum's Local Hero is Robert Adrain, who immigrated to the United States from Ireland in 1798, when he was about twenty-three years of age. This followed a period as an officer in the United Irishmen Army during their uprising in 1798. Adrain was appointed as a master at Princeton Academy, before becoming principle of the York Country Academy. During the ensuing years Adrain became a leader in the American mathematical community as a teacher, proposer and solver of problems, and as an editor of mathematical journals. Adrian's work in journals was particularly important, as mathematical academic publishing was a difficult endeavour during this period of American history. Indeed, it is widely held that Adrain and Nathaniel Bowditch were the only two American mathematicians working at an international standard at the time. Adrain is particularly known for publishing two proofs of the exponential law of error independently of Gauss.

FROM THE FRIENDS OF TENBY MUSEUM & ART GALLERY SPRING 2015 NEWSLETTER LOCAL HERO WINS £4K PROJECT FOR MUSEUM

Tenby Museum has won a grant of up to £4,000 to celebrate Robert Recorde, the 16th century mathematician born in the town. Recorde, who was the subject of a special display by the museum in 2010 to mark his 500th birthday, is one of a handful of 'local heroes' in the field of mathematics to be honoured on their home turf as part of the London Mathematical Society's 150th anniversary activities.

Under the title *Mathematics: Unlocking Worlds*, the LMS programme spans the whole year, and its main themes are 'mathematics as part of our culture' and 'new ways of com-

municating mathematics'. Tenby museum's part, called *Robert Recorde: All Angles Covered*, will run for eight weeks, from 7 September to the end of October, and will feature



talks, events with schools (including a project in which local artist Guy Manning, a former art teacher at Whitland School who has twice exhibited at the museum, will explore the use of Euclidian geometry in painting) and a display with panels on Recorde's life, work and academic legacy. The LMS will cover the cost of this up to a limit of £4,000, and will collaborate with the museum in preparing it.

Born in Tenby to a father from the town and a mother from Machynlleth, Robert Recorde left home in his teens to study at Oxford, where he gained a BA degree and was elected a

Fellow of All Souls. He later studied medicine at Cambridge, and served for a time as a royal physician, first to Edward VI and then, after the young king's early death, to Queen Mary.

He was also a public servant, given charge first of the royal mint in Bristol and then of mines in Ireland. His fame, however, rests on his work as a teacher and author of books on mathematics, including *The Whetstone of Witte*, in which he introduces the = sign, as shown in the page reproduced on the previous page.

During his career as an official, Recorde fell out with Sir William Herbert, later the first Earl of Pembroke, and died in a debtor's prison after a failed action against the earl for defamation, resulting in a £1,000 fine which he could not pay.

A room is named after him in Swansea University's department of computer science, where there is also a memorial plaque in Welsh slate. His 500th birthday in 2010 was marked at Tenby museum by various activities, including an art show with over 50 artists and the theme of mathematics in art, and a full-day event with numerous guest speakers about his work.

an event has been organised for your depart-

ment, visit www.lms.ac.uk/2015-events-listing.

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

UNIVERSITY OF EAST ANGLIA

On 28 April 2015 the School of Mathematics at the University of East Anglia (UEA) celebrated mathematical research in Norwich and more broadly in the UK at a reception marking the 150th anniversary of the LMS. UEA is part of the Norwich Research Park and apart from those from the School itself, mathematical science researchers attended from the School of Computing Sciences, the Institute of Food Research, The Genome Analysis Centre, The Sainsbury Laboratory and the John Innes Centre.



The reception was an opportunity for many of them to introduce themselves, and to strengthen the links between mathematics researchers across the campus. The LMS departmental representative, Jonathan Kirby, said a few words about the LMS, particularly the small grants scheme which many of us have benefited from, and we all toasted the continued success of the LMS and of mathematics at UEA, on the Norwich Research Park, and more widely in the UK.

> Jonathan Kirby University of East Anglia

NS MATHEMATICAL SOCIETY 150 YEARS the LMS. For further details, and to see if such

LONDON

UNIVERSITY OF LEICESTER

Our wine reception held on Wednesday 3 June 2015 in Leicester for the LMS 150th Anniversary went very well. There were about 60 people from the Department of Mathematics, the participants and speaker of the LMS sponsored research network *Transpennine Topology Triangle* (TTT) meeting TTT96 and the participants and speakers of the LMS sponsored workshop on *Cluster Algebras and Finite Dimensional Algebras*.



We made a toast on the LMS with best wishes for its future and to say deeply thank you for its fantastic services to the UK and world mathematics community. I attach some photos from yesterday celebration event.

Dr Frank Neumann University of Leicester

UNIVERSITY OF MANCHESTER

Jonathan Fraser, Hendrik Suess and I organised a pure mathematics colloquium and wine reception at the University of Manchester. This was held on the 20 May 2015. The colloquium was funded by the Manchester Institute for Mathematical Sciences (MIMS) and the reception was funded by MIMS and the LMS. At the reception, we raised a toast `to the continued health of mathematics and the London Mathematical Society'.

The speakers at the colloquium were Chris Hughes (York) How big is the Riemann Zeta function?, John Mackay (Bristol) Fixed point properties for groups acting on L_p spaces and Colva Roney-Dougal (St Andrews) Generation of finite groups.





The meeting was a great success, with approximately 40 people attending the talks. Many also attended the reception after, and then some of us went for dinner (funded by MIMS).

Gareth Jones University of Manchester

UNIVERSITY OF GLASGOW AND UNIVERSITY OF GREENWICH

Celebrations took place at the University of Glasgow on 22 April and the University of Greenwich on 14 May 2015.



University of Glasgow



University of Greenwich

Second call for departmental celebrations

If your department is interested in taking part in the Departmental Celebrations Grant Scheme, please contact Dept.Celebrations@lms.ac.uk, or look online at www.lms.ac.uk/grants/dept-cel ebrations for more information on how to apply. The deadline for this second round of applications is **1 September 2015**.



Call us now on 0207 927 0800 or email roombookings@demorganhouse.co.uk to check availability, receive a quote or arrange a visit to our venue.

THE ZEEMAN AWARD CEREMONY: MATHEMATICS FOR THE MASSES

Marcus Du Sautoy was presented with the prestigious Sir Christopher Zeeman Medal on 19 March by the London Mathematical Society and the Institute of Mathematics and its Applications for his efforts to communicate and promote mathematics to the public. The ceremony took place at the Royal Society in front of an enthusiastic audience of mixed ages and backgrounds. After the ceremony, Du Sautoy gave a lively and engaging talk about his development as a communicator of mathematics – beginning with his childhood.

He was initially interested in studying languages he said, but soon turned to mathematics when his school teacher impressed on him the value and beauty of the discipline and set about encouraging him to take an interest in it. He was introduced to two books: *The Language of Mathematics* by Frank Lard and *A Mathematician's Apology* by G.H. Hardy. Both gripped Du Sautoy from beginning to end and they became the foundations of Du Sautoy's journey into numbers, in addition to Sir Christopher Zeeman's inspiring Christmas Lectures at the Royal Institution in 1978.

As a slightly older schoolboy, his interests extended beyond mathematics into other creative disciplines such as art and literature, which he soon realised were not altogether unrelated to mathematics. His belief in the



Audience



Professor Marcus De Sautoy

compatibility of these seemingly disparate disciplines was inspired by a quote by Hardy in *A Mathematician's Apology*, wherein "A mathematician" he claimed, "like a painter or poet, is a maker of patterns."

After school, Du Sautoy studied mathematics at Wadham College, Oxford, where he eventually completed a DPhil. After a few years as a post-doctoral researcher, he also became interested in communicating mathematics through journalism following a chance encounter with a persuasive *Times* editor. In 1994 he had his first article published on 12 December, titled, 'Why doesn't maths have mass appeal?'

He received two letters in response to his

article, neither of which were complimentary, but he soon learned that in order to be a successful communicator and reach out to the public, he had to develop a thick skin. Far from being put off by his first foray into journalism, Du Sautoy quickly became hooked on the process – everything from finding stories and generating interest from newsdesks and editors, to researching articles and subsequently seeing them in print.

In 1995 he was looking for a

No. 449 July 2015



Dame Celia Hoyles, LMS President Professor Terry Lyons, Professor Marcus Du Sautoy

second article to pitch to *The Times* and since Fermat's Last Theorem had recently been proved by Andrew Wiles he set his sights on writing about a new mathematical problem with similarly broad and lasting intrigue.

He approached Andrew Wiles and asked for his advice, and eventually settled on the Riemann Hypothesis as a possible replacement for the public imagination. He drafted an article and sent it to his editor but to his dismay she rejected it, finding it too dry a subject and unlikely to capture the attention of the masses. The article drifted away and Du Sautoy found himself back at the drawing board.

It took him a while to understand how to communicate a good news story he admits, and while he was honing his instincts as a journalist back in the mid to late 90s, he was appointed a Royal Society Fellow and spent the following decade researching and writing popular books. His publication was a book on prime numbers, titled *Music of the Primes*.

The turning point for him as a journalist, he claims, was his realisation that newspaper editors need a hook or tag on which to hang an article. News stories, however interesting, generally need a context with mass appeal. Du Sautoy, realising his earlier mistakes, set about finding commonplace scenarios for real mathematics. His interest in prime numbers serendipitously led him to an article on footballer David Beckham's move from Manchester United to Real Madrid in 2003. On moving to Madrid, Beckham had chosen the number 23 shirt, which Du Sautoy immediately recognised as a prime number. After further research, he noticed that a number of top footballers were wearing prime number shirts. He put an article together on the subject, and it was picked up by *The Telegraph* without hesitation. By this point he'd developed a keen sense of what the public like to read and hear, and found himself in a unique position of being able to understand complex mathematics and explain it

in approachable terms.

A number of subsequent articles followed in most of the UK's national newspapers, as well as three more books: *Finding Moonshine* (2007), *Symmetry: A Journey into the Patterns* of Nature (2008), and The Num8er My5teries: A Mathematical Odyssey Through Everyday Life (2010). Several successful radio and TV programmes also followed for the BBC and Dave, and it seems wherever possible he continued tirelessly to promote mathematics to new audiences, adapting to ever-changing technologies and platforms.

It was with those efforts in mind that he was presented with the 2014 Zeeman Award by the London Mathematical Society and the Institute of Mathematics and its Applications. Talking about the award ceremony, Diane Crann of the Royal Institution said, "The talk by Marcus showed exactly why he was awarded the Zeeman Medal – his articles, books, radio and television, in particular the Royal Institution Christmas Lectures, have always been so well received by academics, professionals from industry, families and children. He has an engaging manner and the ability to explain complex mathematics to a broad audience without dumbing down."

Jesse Garrick LMS Anniversary Communications Assistant

Marcus Du Sautoy is the Simonyi Professor for the Public Understanding of Science and a Professor of Mathematics at the University of Oxford.

THE LMS 150TH ANNIVERSARY DINNER

The LMS's 150th Anniversary Dinner took place in the magnificent surroundings of Goldsmith's Hall, in the City of London, on 18 June 2015. The guests included trustees of the London Mathematical Society, representatives of other mathematical learned societies, several past LMS presidents, and distinguished individuals from outside academia. The guest of honour was Dr Jim Simons.

Guests sat at tables named in memory of mathematicians who had contributed to the LMS, rather than enumerated by the integers 1 to 9 and heard the Society's president,

Terry Lyons, give his speech of welcome. He reflected on the role of the LMS and the mathematical sciences more generally in shaping the society of today: figures such as Clerk Maxwell, Turing and Florence Nightingale have left an indelible mark and our world would be unimaginably different without them (Florence Nightingale's love of mathematics and statistics contributed directly to her effectiveness as a nurse in the Crimean war).

Looking to the future, Professor Lyons suggested that the Society needs to redouble its efforts not only in supporting math-



Professor Terry Lyons, Dr Jim Simons, Professor Simon Tavaré

ematical scientists in academia, but also in promoting, to the widest possible audience, the national importance of the mathematical sciences. We also need to do our utmost to secure the 'pipeline' of young people who will make up the next generation of mathematical scientists.

After dinner, Jim Simons gave a very engaging account of his remarkable career. He started conventionally enough as a pure mathematician in the US with research interests in geometry. The breadth of his interests began to emerge, however, when he started to spend time as a code-breaker for

> the NSA in the mid-1960s. He recalled being sacked for not being a fan of the Vietnam War, and saying so. Being sacked, as long as it doesn't happen too often, can be a positive: he accepted the job of Chair of the Mathematics Department at the State University of New York at Stony Brook and succeeded in turning it from one of the weakest to one of the strongest departments in the United States.

His work on Chern–Simons invariants originated at that



Guests sit down to dinner

No. 449 July 2015



Dr Jim Simons addresses the guests

time, as an intellectually driven study of differential invariants in algebraic topology. This is a great example of 'not knowing where research will lead': Chern–Simons theory became very important and influential in mathematical physics about a decade later.

Dr Simons changed direction and set up a hedge fund in 1982: he appeared modest about the fact that Renaissance Technologies rapidly became one of the most successful hedge funds in the world. Success was built by careful analysis of trading data, by the development and use of mathematical models, and by a hiring strategy which emphasizes first-class research ability rather than experience in finance.

Around 1994 he set up the Simons Foundation with his wife Marilyn. Today, this



George Legendre (Artist Associate), Mark Francis (Artist Associate), Professor Terry Lyons, Barry Phipps (Curator)

supports fundamental research in the life sciences, mathematics and the physical sciences, and autism. Also supported are educational programmes such as 'Math for America'.

The approach of his Foundation is very different from what most of us are used to. In deciding where to make major investments, he invites top experts for brainstorming discussions and sees what ideas emerge. For example, this approach led to the establishment of the Simons Center for Data Analysis. He likes to invest long-term: projects of a

seven to 10-year duration are typical; and he values the quality of people above all else. This approach leads to adventurous research; projects get funded which may appear risky, but where the potential payoff is very great. Crucially, he invests in 'don't know where it will lead' fundamental science, in contrast to the impact driven agenda of many governments. All grants are peer-reviewed: Dr Simons finds spending money much harder than making it!

Sir Michael Atiyah (Fields Medallist, former president of the LMS, and the only person present to have been at the LMS's centenary dinner) proposed the vote of thanks for Dr Simons' speech and applauded his efforts in supporting science around the world. The success of the Simons Foundation's phil-

> anthropic efforts have much to do with having a scientist directly involved in the decision-making (Simons himself), a willingness to take risks and a strong commitment to investing in people. Sir Michael's speech brought a memorable evening to a close, the room buzzing with the excitement of hearing a man who has changed the world talking about his life.

Michael Singer, UCL Member at Large

The Dinner was recorded in the *Livery Briefing*, a newsletter distributed to livery clerks around London.

MATHEMATICS POLICY ROUND-UP

June 2015

RESEARCH

Howard Covington named as chair of the Alan Turing Institute

The Engineering and Physical Sciences Research Council (EPSRC) has announced the appointment of Howard Covington as the Chair of The Alan Turing Institute. The Institute will build on the



UK's existing academic strengths and help position the country as a world leader in the analysis and application of big data and algorithm research. Its headquarters will be based at the British Library at the centre of London's Knowledge Quarter. More information is available at http://tinyurl.com/op9pmh4.

SCHOOLS AND COLLEGES

Students studying A-level subjects in England

New statistics reveal that more needs to be done to encourage girls to study physics and mathematics. For AS Mathematics the representation of girls is seven for every 10 boys, and for Further Mathematics, four girls for every 10 boys study the subject. The national average for all AS-level subjects, including the sciences, is slightly tipped in favour of girls, with 13 girls taking AS-levels for every 10 boys.

The Ofsted numbers show that the percentage of girls that go on to study mathematics at A-level is 70% compared with 79% of boys. More information is available at http://tinyurl. com/ngx8735.

Mathematics GCSEs too hard

Exam boards have been told to re-write their new mathematics GCSE exams. English examsregulator Ofqual analysed the results of 4,000 mock tests of sample papers for GCSEs due to be studied in schools starting in September 2015. Three of the four main exam boards had made their papers too hard for the broad spread of candidates. Exam boards have been drawing up new, tougher mathematics and English GCSEs in response to government demands to introduce more rigour into secondary school examinations.

OTHER

New Minister

Jo Johnson MP has been appointed as the Minister of State for Universities and Science. He replaces the Rt Hon Greg Clark MP. Johnson will report to the new business secretary, Sajid Javid.

New Commons Select Committee Chair

Nicola Blackwood has been elected as Chair of the House of Commons Science and Technology Select Committee. More information can be found at http://tinyurl.com/ogruebg.

New Chief Scientific Adviser at BIS

Professor Timothy Richard Dafforn has been appointed Chief Scientific Adviser at the Department for Business, Innovation and Skills (BIS) Professor Dafforn is currently the Entrepreneur in Residence for Synthetic Biology at BIS and brings extensive valuable experience to his new role, not least through his work as the Director of Knowledge Transfer, Life and Environmental Sciences at the University of Birmingham. More information is available at http://tinyurl.com/ okex8tv.

Chair of ACME

Professor Philip England, Chair of Geology at the University of Oxford is the new Chair of the Advisory Committee on Mathematics Education (ACME).

IOP's President-Elect



Professor Dame Julia Higgins is to be the Institute of Physics' next president-elect, taking up the role on 1 October 2015. Professor Higgins will serve as president-elect for a two-year term until 30 September 2017,

then as president from 1 October 2017 until 30 September 2019. More information is available at http://tinyurl.com/ghwy7nk.

> Dr John Johnston Joint Promotion of Mathematics



7th July

2015

LMS 150th Anniversary

Midlands Regional Meeting

University of Warwick

Schedule

- Opening of the meeting
- R. Guralnick (Los Angeles)
 Title TBC
- C. Roney-Dougal (St Andrews)
 Title TBC
- Tea/Coffee
- Poster Session
- Wine Reception and Dinner

These lectures are aimed at a general mathematical audience. All interested, whether LMS members or not, are most welcome to attend this event. For further details and to register and to reserve a place at the dinner, please visit www2. warwick.ac.uk/fac/sci/maths/research/events/2014-15/nonsymposium/lmsreg/

The cost of the dinner is to be confirmed, but will include drinks.

The meeting forms part of a workshop on Finite Simple Groups and Related Topics from 8-10 July 2015. For further details visit www2.warwick.ac.uk/fac/sci/maths/ research/events/2014-15/nonsymposium/Imsreg/ or contact the organiser, Inna Capdeboscq.

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



http://newsletter.lms.ac.uk

LMS PRIZES 2015

The winners of the LMS Prizes for 2015 were announced at the Society meeting on Friday 3 July 2015. The Society extends its congratulations to these winners, and its thanks to all the nominators, referees and members of the Prizes Committee for their contributions to the Committee's work this year.

PROFESSOR BORIS ZILBER, of the University of Oxford, is awarded a **Pólya Prize** for his visionary contributions to model theory and its applications.

PROFESSOR KEITH BALL, FRS, of the University of Warwick, is awarded a **Shephard Prize** for his many beautiful results in geometry (particularly the geometry of convex shapes), number theory, and probability theory.

PROFESSOR ROBERT MACKAY, FRS, of the University of Warwick, is awarded a **Senior Whitehead Prize** for his outstanding contributions to research in dynamical systems and its applications. A remarkably creative and prolific mathematician, in addition to the broad impact of his research, he has made an outstanding contribution to the mathematical community generally.

PROFESSOR STEPHEN JONATHAN CHAPMAN, of the University of Oxford, is awarded a **Naylor Prize and Lectureship in Applied Mathematics** for his outstanding contributions to modelling and methods development in applied mathematics.

PROFESSOR PIERRE-EMMANUEL CAPRACE of Université Catholique de Louvain and **PROFESSOR NICOLAS MONOD** of Ecole Polytechnique Federale de Lausanne, are awarded a **Berwick Prize** in recognition of their papers Isometry groups of non-positively curved spaces: structure theory, and Isometry groups of non-positively curved spaces: discrete subgroups, J. Topol. 2 (2009), no. 4, 661-700 and 701–746.

PROFESSOR PETER KEEVASH, of the University of Oxford is awarded a **Whitehead Prize** for his work in combinatorics, in particular his stunning proof of the existence of combinatorial designs for all parameters satisfying the obvious necessary conditions.

DR JAMES MAYNARD, of the University of Oxford, is awarded a **Whitehead Prize** for his spectacular results on gaps between prime numbers. He simplified and extended the work of Zhang on bounded gaps between primes, then made the most substantial advance on how large the gap between consecutive primes can be for 75 years, in particular answering a 10000dollar conjecture of Erdős.













PROFESSOR CHRISTOPH ORTNER, of the University of Warwick is awarded a **Whitehead Prize** for contributions to the mathematical foundations, development and implementation of the quasicontinuum method.

PROFESSOR MASON PORTER, of the University of Oxford is awarded a **Whitehead Prize** in recognition of his outstanding interdisciplinary contributions and in particular to the emerging field of network science, where he has combined unique analysis of biological, social and political data sets with novel methods for community detection and other forms of coarse graining.

PROFESSOR DOMINIC VELLA, of the University of Oxford, is awarded a **Whitehead Prize** for his spectacular contributions to the modelling of instability and interfacial phenomena in fluids and solids.

DR DAVID LOEFFLER of the University of Warwick and DR SARAH ZERBES of University College London are awarded jointly a Whitehead Prize for their work in number theory, in particular for their discovery of a new Euler system, and for their applications of this to generalisations of the Birch–Swinnerton-Dyer conjecture.

DR APALA MAJUMDAR, of the University of Bath, is awarded an **Anne Bennett Prize** in recognition of her outstanding contributions to the mathematics of liquid crystals and to the liquid crystal community.

DR JOHN O'CONNOR and PROFESSOR EDMUND ROBERTSON, of the University of St Andrews are awarded a Hirst Prize and Lectureship for their creation, development and maintenance of the MacTutor History of Mathematics web site.

PROFESSOR CHRISTOPHER BUDD, of the University of Bath, is awarded a **Communication Prize** in recognition of his sustained excellence and innovation in the communication of mathematics.











No. 449 July 2015

LMS UNDERGRADUATE RESEARCH BURSARIES 2015

The London Mathematical Society is pleased to announce the list of successful applicants to its second round of Undergraduate Research Bursaries. For the 2015 round 21 awards were made to students from 13 different institutions to undertake a research project alongside a research supervisor. The purpose of the Bursaries is to enable undergraduates with research potential to experience research and to encourage them to consider a career in scientific research.

Institution	Research Supervisor	Student	Research
University of Bath	Professor David Calderbank	Edward Jones- Healey	Vertex operator algebras, from theory to examples and applications
University of Bath	Dr Simon Harris	Stephen Pidgeon	Catalytic branching Brownian motion
University of Bath	Professor Andreas Kyprianou	Emma Horton	Stable processes through the Kelvin transform
University of Bath	Dr Mark Opmeer	Philip Hanson	Rational Krylov subspaces for differential operators
University of Birmingham	Dr Nikolaos Fountou- lakis	Charlie Dickens	Reconstructing hidden clus- tering in a graph: randomness and inhomogeneity
Durham University	Dr Dzmitry Badziahin	Matthew Northey	Checking p-adic Littlewood conjecture for certain types of numbers
Durham University	Dr Dirk Schuetz	Lewin Strauss	Steenrod Square calculations in the Khovanov homotopy type
University of East Anglia	Dr Richard Purvis	Aimee Mulcahy	Surface tension and inertia effects on air cushioning in droplet impacts
University of Edinburgh	Professor Andrew Ranicki	Jaan-Eerik Past	Applications of persistent homology to image process- ing
University of Edinburgh	Dr Susan Sierra	Rebecca Wood	Point representations of the Witt algebra
University of Edinburgh	Dr Joan Simon	David Grabner	Minimal surfaces in asymp- totically AdS spaces
University of Glasgow	Dr Brendan Owens	Lavinia Bulai	Unlinking numbers of 10-crossing links
University of Leeds	Dr Oleg Chalykh	Akshar Nair	Quasi-invariant polynomials
Heriot-Watt University	Dr Mark Lawson	Anna Suarez	Non-communitative frame theory
Imperial College London	Professor Mauricio Barahona	Ioannis Papadopoulos	Network theoretic approach- es for the segmentation of a population using genetic data

No. 449 July 2015

University of Nottingham	Dr Stephen Cox	James Lalyk	Mathematical modelling of self- oscillating class-D amplifies
University of Nottingham	Dr Silke Weinfurtner	Andrew Scoins	Hydrodynamic simulations of rotating black holes
University of Oxford	Professor Alison Etheridge	Yue Hui	A stochastic approach to the Fisher KPP equation with a fractional Laplacian
University of Oxford	Dr James Maynard	Chun Pong Lau	A study on gaps between primes and their distributions
Plymouth University	Dr Thomas McCourt	Kyle Bonetta- Martin	The canonical groups of properly face 2-coloured triangulations of the sphere: What groups can you get?
University College London	Professor Gavin Esler	Leo Middleton	Point vortex equilibria: Solutions of the sinh-Poisson Equation - from low to high energy

PROFESSOR CHRIS BUDD RECEIVES OBE IN BIRTHDAY HONOURS

Chris Budd, professor of applied mathematics at the University of Bath, has received an OBE in the Queen's Birthday Honours for outstanding services to science and maths education, having been a passionate advocate for STEM teaching and outreach for many years.

In 2001 he founded *Bath Taps into Science*, an annual event which aims to promote scientific literacy across a wide range of demographics in the Bath area. In particular, the event aims to develop scientific awareness among under-represented groups of HE and school-age students with a view to position science as an accessible and realistic option for those with the academic ability. His other outreach projects have included a maths trail on the London Underground as part of its 150th anniversary celebrations and an exhibition to celebrate the 350th anniversary of the Royal Society.

In addition to his current post at Bath, Professor Budd is Director of the Centre for Nonlinear Mechanics, Chair of Mathematics at the Royal Institution of Great Britain, Director of the Bath Institute for Complex Systems. From 2006 to 2011 he was the LMS Education Secretary and he is currently Vice-President



of the IMA. Prior to his current post he was a Lecturer/Reader in numerical analysis at the University of Bristol (1989-95) and a CEGB Research Fellow in numerical analysis at the Oxford University Computing Laboratory and Hertford College Oxford (1986-89).

On hearing the news LMS President Professor Terry Lyons FRS said, "Chris Budd is an exemplar for his tireless efforts to bridge the communication gap between state of the art mathematical sciences and the wider public. I am delighted that his contribution has been recognised in this way."

IT ALL ADDS UP: CELEBRATING WOMEN ACROSS THE MATHEMATICAL SCIENCES

In 2015, the Society's annual *Women in Mathematics Day* was expanded to four days, as part of the Society's 150th Anniversary celebrations, with two days for school students and two days for university mathematicians and mathematical scientists. Over 650 delegates attended the events, participating in an inspiring programme of talks, panel discussions, crafts, games and parallel sessions. The event was supported by the London Mathematical Society, University of Oxford Mathematical Institute, University of Oxford Vice-Chancellor's Diversity Fund, Oxford University Press, Jane Street and Schlumberger.

For more information on the work the LMS does to promote women in mathematics, please visit www.lms.ac.uk/women-mathematics.

REPORTS

Days One and Two: 14 and 15 April 2015

"How is maths used to help people in everyday life?", "Are there infinite possibilities to what our minds can know about maths or is there a limit to what we can know? Or does it just expand as time goes on?", and "Have you ever had a problem that you couldn't and still can't solve?" were just some of the questions posed by school students to mathematicians at the annual LMS Women in Mathematics event. Unlike in previous years the event was expanded to last four days, as part of the 150th Anniversary, and for the first time it involved school students too. The first day saw 250 girls in school years 9, 10 and 11 (age 13 to 16) together with 40 of their teachers come to the Andrew Wiles Building, home of the Mathematical Institute at the University of Oxford, for a packed day of inspiring lectures, stimulating workshops, challenging hands-on mathematical activities, and even a mathematical treasure hunt. Then on Wednesday over 120 girls studying A-level Further Maths (or equivalent) plus teachers came to Oxford for their own programme. On both days Oxford maths students were on hand to help out and to chat to the school students.



18

Plenary lectures for the students by Hannah Fry (UCL), Julia Gog (Cambridge), Vicky Neale (Oxford), and Nina Snaith (Bristol) received excellent feedback ("awesome", "inspiring", and "best lecture ever"), with students saying they enjoyed "learning how maths is involved in linking everything together". Emails from parents and teachers after the event highlighted how students had come home "full of enthusiasm for maths"; this is particularly important given the disproportionate decline of female students in post-compulsory study (only 30% of students studying Further Mathematics at A-level are female).

In order to showcase the present and future of mathematics all the participants were invited to bring small photos to be assembled into a collage (which inevitably resulted in

Days Three and Four: 16 and 17 April 2015

This year's a pretty big one for the LMS, and their Women in Mathematics conference is no exception: usually a one day affair, this year it was scaled up to a magnificent four day extravaganza for mathematicians of all ages. As the name suggests, the emphasis is on promoting and celebrating the achievements of female mathematicians in the UK, but with attendees of all genders and many different ethnicities it is also one of the most inclusive and diverse conferences around. some recursive selfies). Although the school students didn't attend at the same time as the older participants, they were nonetheless able to interact with them via questions and answers on sticky notes. As well as the questions in the opening paragraph, others included "What is your fave thing about maths?", which received the answer "You can apply it to ANYTHING and EVERYTHING", and "Why choose maths?", which had multiple answers including "To get to change the world, even if it's only by epsilon".

Perhaps the event can best be summed up by thoughts from the students themselves: "The enthusiasm of the speakers was fantastic", and "Everyone else here likes maths!".

> Rebecca Cotton-Barratt and Vicky Neale University of Oxford

The final two days were aimed at university mathematicians, and during that time we were treated to five plenary talks covering an impressive range of subjects and interests. Kicking off the talks on the Thursday morning was Caroline Series (Warwick), who gave an introduction to some of the hyperbolic geometry underlying the ground-breaking work of Fields Medallist Maryam Mirzakhani; we also heard from Christl Donnelly (Imperial) about her work on modelling disease outbreaks such

> as SARS and Ebola, and from Nathalie Vriend (Cambridge) on studying granular materials in nature (e.g. sand dunes, snow avalanches) which has taken her and her PhD students as far afield as Qatar!

> Of course, academia isn't the only destination for excellent mathematicians and this was reflected in the talks: Miranda Mowbray of HP Labs gave us a snapshot of some of the problems that data scientists work on, while Kristin Lauter of Microsoft Research spoke about her work on devising cryptographic algorithms that

Caroline Series



can withstand a (still mostly theoretical!) quantum computer. It was especially interesting to see the different career routes the speakers had taken: Kristin moved from an academic post to the research division at Microsoft in order to work on more applied realworld problems, while Miranda hasn't worked with her specialist subject (Lie algebras) since finishing her thesis but makes daily use of the problem-solving skills and mathematical background she developed during her PhD.

Scattered between these talks were numerous panel sessions (on careers, funding, diversity and how to balance

career and family, among other topics) and half-hour talks by postgraduates and early career researchers on their research subjects. Many undergraduates and postgraduates also contributed posters, with the prizes for best poster going to Nina di Cara (Undergraduates) and Catherine Lamstaes (Graduates and Early Careers Researchers).

Mixing things up a bit, there were also mathematical craft sessions for those who wanted



Miranda Mowbray

to try something a bit different; participants triumphantly carrying around origami dodecahedra became quite a common sight by the Friday afternoon! Combined with a room set aside for quiet contemplation and leisurely coffee and lunch breaks, this made it a far more relaxed and accessible event than the usual hectic conference atmosphere.

> Sian Fryer University of Leeds



http://newsletter.lms.ac.uk

Photo collage of some of the participants

THE FIRST FEMALE HEAD OF DEPARTMENT OF MATHEMATICAL SCIENCES?

I was recently asked who was the first ever female Head of Department of a Mathematical Sciences Department at a UK University. I didn't know but it struck me as an interesting question to answer. Of course, being a Head of Department now may be a very different role than in the past. We live in a higher education world full of key performance indicators and strategic plans, line management responsibilities and health and safety requirements. As a job it has certainly changed in recent years. However, it is surely the case that being nominated Head of Department has always conveyed that the post holder is held in some regard within a group of staff. In many universities, being Head of Department is a professorial role, and with only 7% of professors of mathematics in the UK being female even today, one imagines that not many women have been Head.

My source of information so far has been the Heads of Departments of Mathematical Sciences (HoDoMS) email list, which connects Heads of Departments across the UK. Starting with the question of who had been the first female Head of Department, HoDoMS members and their connections were able to provide the following examples:

- Miss Dorothy S. Meyler, Acting Head of Department, University of Aberystwyth, 1968-9.
- Mrs M.A.E. Nutkins, Northern Polytechnic, precursor of London Metropolitan University, 1969.
- Professor Violet Cane, Department of Statistics, Victoria University of Manchester, early 1970s.
- Dr Rosa Morris, Reader in Fluid Dynamics was Head of Department at Cardiff University in the 1970s for a year.
- Ann F.S. Mitchell, Department of Statistics, Imperial College, 1970s.

Dr Colin Fletcher, who supplied the information about Miss Meyler at Aberystwyth, provided the following rather fascinating details about her appointment: "Miss D.S. Meyler was appointed Acting Head of the Department of Pure Mathematics in 1968. The Professor of Pure Mathematics, Barry Pennington died suddenly on 5 March 1968. Dorothy was appointed Acting Head of Department for the remainder of the Lent Term and for the Easter Term 1968 with an honorarium at the rate of £100 per term. while a new Chair was appointed. However it was not possible to make an early appointment and she was subsequently made Acting Head for the session 1968-9. In my previous email I mentioned the possibility of her acting in a similar capacity in the 1950s. This story is more complicated (and sensational). The Principal at the time was Goronwy Rees. In February 1956 the spies Burgess and Maclean fled to Moscow. In March and April articles appeared anonymously in the Sunday People about Burgess written by a personal friend of his. This friend turned out to be Goronwy Rees and he was forced to resign in 1957. The Vice Principal at the time happened to be V.C. Morton who was the Professor of the Pure Mathematics Department. and he became Acting Principal. The Council minutes in June 1957 recommended that 'for the Session 1957-8 the general supervision of the Department be undertaken by Miss D.S. Meyler' and that 'the Finance and General Purposes Committee be asked to consider the payment of an honorarium of £250 to Miss Meyler for extra responsibility'. It seems therefore that in this case she wasn't made the Acting Head, presumably because Morton was still around and nominally in charge."

It is also interesting to note that at the time of her death in 2006, Miss Meyler was the longest standing member of the LMS.

We thus have a partial answer to the original question – Miss Meyler's acting role (without the title) in 1957 may be the earliest example of a female Head of Department. Mrs Nutkins could claim to be the first officially designated Head in 1969 (date yet to be corroborated), although the question had explicitly asked about heads of department of *university* departments of mathematics, so perhaps Violet Cane or Rosa Morris should be recorded as the first Heads of University departments as at the time Northern



Violet Cane

Polytechnic was not a university.

However. there may well be readers out there whose memory goes back further than I was able to reach through HoDoMS. Any further information on the topic would be welcome, and, in particular, anv information about

source material where actual dates and titles are recorded formally would be helpful.

It is sobering to note that many university mathematics departments have yet to have a female Head of Department, even though the requirement to be a professor in order to be Head of Department has been somewhat relaxed in many universities. Having been Head of Department myself at two different institutions I have every sympathy with the idea that it might not be a role that many people aspire to! However, as the proportion of undergraduates in mathematics who are female continues to rise (it is currently around 44%) as well as the proportion of academic staff who are female, we might expect to reach a point where a female Head of a Mathematical Sciences Department ceases to become an appointment of note. We are still somewhat far from this point today.

> Cathy Hobbs Chair of HoDoMS

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22 TAX EXEMPTION FOR CHILDCARE COSTS: ATHENA FORUM STATEMENT

Athena Forum members have reported confusion in the community as to whether childcare costs incurred to allow researchers with childcare responsibilities to attend conferences and research visits should be tax exempt. The Forum has sought guidance and clarification from HMRC on this issue, and it is clear that these childcare expenses are tax exempt.

The Athena Forum has received the following statement from HMRC confirming that if the activity meets the definition of 'work related training' as set out in the statement below, then childcare costs incurred as a result of the activity will be exempt from income tax. There is no doubt that researchers attending conferences and research visits meet the definition of 'work related training' set out by HMRC.

"There is an exemption from income tax for expenditure on the provision of work-related training and on the payment of related costs. This includes (i) costs which are incidental to the employee undertaking the training; (ii) costs incurred in connection with an assessment of what the employee has gained from the training; and (iii) the cost of obtaining for the employee any qualification, registration or award where entitlement is as a result of the training or assessment in question.

The term 'work related training' is defined as any training course or other activity which is designed to impart, instil, improve or reinforce any knowledge, skills, or personal qualities which:

- are, or are likely to prove, useful to the employee when performing his/her duties or
- will qualify or better qualify the employee to undertake the employment, or to participate in charitable or voluntary activities arising through the employment.

The training must relate to the employee's current employment or to a 'related employment."

The London Mathematical Society is a member of the Athena Forum. Specific queries should be directed to the HMRC not the LMS or Athena Forum. Further details can be found in the employment income manual published on HMRC's website, or by emailing the HMRC (employmentincome.policy@hmrc.gsi.gov.uk). The Athena Forum Statement is available on the Athena Forum website (www.athenaforum.org.uk).

MATHEMATICS OF QUANTUM UNCERTAINTY

Spitalfields Day Report

A Spitalfields Day Mathematics of Quantum Uncertainty was held on 29 May 2015 as the first part of a two-day conference Quantum Uncertainty Days @ York. The meeting was organised by Paul Busch (York) with support from his colleagues Roger Colbeck and Stefan Weigert.

The focus of the conference was on recent developments in the elucidation of a long-neglected facet of the quantum mechanical uncertainty principle – fundamental limitations of measurements and the inevita-

ble error-disturbance trade off known as the Heisenberg effect. Day one – the Spitalfields Day – offered four survey lectures on mathematically rigorous formulations of quantum incompatibility (Pekka Lahti, Turku), measurement uncertainty relations (Reinhard Werner, Hannover, and Paul Busch, York), and uncertainty in the context of quantum metrology (Mădălin Guță, Nottingham). Day two was a specialist research workshop with lectures on incompatibility in the wider context of generalised probabilistic physical theories (Teiko Heinosaari, Turku), uncertainty in the context of multislit interferometry (Jukka Kiukas, Nottingham), applications of uncertainty relations



Reinhard Werner, Robin Hudson, Pekka Lahti, Mădălin Guță, Edward Corrigan FRS, Paul Busch

for quantum information tasks (Roger Colbeck, York, and Joseph Renes, Zürich), and limitations to quantum measurements due to symmetry (Leon Loveridge, Oxford).

The talks were attended not only by members of the recently established York Centre for Quantum Technologies and the White Rose Quantum Information Research Community, but also by researchers and postgraduate students from the UK and abroad, including visitors to the UK from Algeria, Brazil, Germany, Italy, Poland, Switzerland, and the USA.

> Paul Busch University of York



Attendees

CELEBRATING 150 YEARS OF THE LONDON MATHEMATICAL SOCIETY



http://newsletter.lms.ac.uk

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

University of Kent, 1 July University of Chester, 3 July University of Birmingham, 18 September University of Lancaster, 30 September Queen Mary University, 12 October

LOCAL HEROES EXHIBITIONS

Banff Museum in Scotland dates TBC Carrickfergus 26 September – 31 October Dundee 22 August – 1 November Lincoln University Library and Lincoln Cathedral 5 July – 6 September Tenby 7 September – 23 October

JULY - AUGUST

LMS-CMI Research School Regularity and Analytic Method in Combinatorics 1-5 July, University of Warwick LMS Graduate Student Meeting 3 July, London LMS Meeting & Hardy Lecture: Nalini Joshi 3 July, London LMS-CMI Research School Developments in Modern Probability 5-10 July, University of Oxford **Enhanced Midlands Regional Meeting** 7-10 July, University of Warwick (see page 13) **Durham Symposium** Permutation Groups and Transformation Semigroups 20-30 July, Durham University **Durham Symposium** New Moonshines, Mock Modular Forms and String Theory 3-12 August, Durham University Young Researchers in Mathematics Conference 17-20 August, University of Oxford

SEPTEMBER - OCTOBER

LMS-CMI Research School **Diophantine Equations** 15-19 September, Hay-on-Wye **Computer Science Colloquium** 17 September, The Royal Society, London Joint Anniversary Mathematical Weekend Meeting with the European Mathematical Society 18-20 September, University of Birmingham (see page 25) **Open House** 20 September, De Morgan House, London **Popular Lectures Birmingham** 23 September (see page 26) **Popular Lectures Glasgow** 21 October (see page 26) **Bloomsbury Festival** 22-25 October, London

NOVEMBER - DECEMBER

Popular Lectures Leeds 11 November (see page 26) LMS Anniversary Prize Giving AGM and Annual Dinner 13 November, London Mathematics Festival @ The Science Museum 24-29 November, London Joint Meeting with the Institute of Physics and Royal Astronomical Society 28-29 November, QMUL, London Joint Meeting with the Edinburgh Mathematical Society 10-11 December, ICMS, Edinburgh **Enhanced South West and South Wales Regional Meeting** 14-17 December, University of Southampton LMS Prospects in Mathematics 15-16 December, Loughborough

No. 449 July 2015





Joint Anniversary Weekend LMS-EMS Mathematical Meeting

Birmingham, 18-20 September, 2015

To celebrate the I 50th year of the London Mathematical Society (LMS) and the 25th year of the European Mathematical Society (EMS) we are organising a mathematical weekend, to be held in Birmingham from Friday I 8th to Sunday 20th September 2015. All mathematicians, from Europe and elsewhere, are warmly invited to participate.

We hope to see you in Birmingham.

Plenary speakers

- Noga Alon, Tel Aviv, Princeton
- Keith Ball, Warwick
- Béla Bollobás, Cambridge, Memphis
- Timothy Gowers, Cambridge
- Stefanie Petermichl, Toulouse
- Aner Shalev, Jerusalem

Invited Special Lecture Speakers

Algebra Special Lectures

- Ben Klopsch, Düsseldorf
- Martin Liebeck, London
- Gunter Malle, Kaiserslautern
- Bob Oliver, Paris
- Cheryl Praeger, Western Australia
- Donna Testerman, Lausanne

Analysis Special Lectures

- Franck Barthe, Toulouse
- Tony Carbery, Edinburgh
- Tuomas Hytönen, Helsinki
- Sandra Pott, Lund
- Christoph Thiele, Bonn
- Luis Vega, Bilbao
- Julia Wolf, Bristol



Organising Committee Chris Parker, Anton Evseev, Maria Reguera Andrew Treglown Scientific Committee Gabriel Navarro, Valencia Angelika Steger, Zürich Ana Vargas, Madrid

Combinatorics Special Lectures

- Jozsef Balogh*, Illinois
- Mihyun Kang, Graz
- Michael Krivelevich, Tel Aviv
- Marc Noy, Barcelona
- Wojciech Samotij, Tel Aviv
- Mathias Schacht, Hamburg
- Benny Sudakov, Zurich

History Special Lectures

Niccolò Guicciardini, Bergamo

To register, please visit web.mat. bham.ac.uk/emslmsweekend/spkrs. html



Popular Lectures 2015

Save The Date!

The London Mathematical Society Popular Lectures present exciting topics in mathematics (and its applications) to a wide audience. As a part of the celebrations to mark the LMS 150th anniversary there are four popular lectures being held this year rather than the normal two. For 2015, the popular lecturers are **Professor Martin Hairer**, FRS (University of Warwick), **Professor Ben Green**, FRS (University of Oxford), **Dr Hannah Fry** (UCL) and **Dr Ruth King** (University of St Andrews). The London venue took place in June. The forthcoming Popular Lectures are:

• **Birmingham** 23 September at 6.30 pm (Bramall Music Building, University of Birmingham)

Martin Hairer: The mathematics of randomness Ben Green: A good new millennium for prime numbers

- Glasgow 21 October at 6.30 pm (Main Auditorium, Technology and Innovation Centre, University of Strathclyde)
 Hannah Fry: Patterns in human behaviour
 Ruth King: How many.....? (Estimating population sizes)
- Leeds 11 November at 6.30 pm (The Great Hall, University of Leeds) Hannah Fry: Patterns in human behaviour Ben Green: A good new millennium for prime numbers

Entrance is free with registration. Attendees are asked to register online if possible. For full details including abstracts for the talks and to register on-line visit the LMS website at ww.lms.ac.uk/events/popular-lectures.

Image: By Calvinius [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons

Entry is free with registration. Register at Ims.ac.uk/events/popular-lectures

William Benter Prize in Applied Mathematics 2016

Call for NOMINATIONS

The Liu Bie Ju Centre for Mathematical Sciences of City University of Hong Kong is inviting nominations of candidates for the William Benter Prize in Applied Mathematics, an international award.

The Prize

The Prize recognizes outstanding mathematical contributions that have had a direct and fundamental impact on scientific, business, financial, and engineering applications.

It will be awarded to a single person for a single contribution or for a body of related contributions of his/her research or for his/her lifetime achievement.

The Prize is presented every two years and the amount of the award is US\$100,000.

Nominations

Nomination is open to everyone. Nominations should not be disclosed to the nominees and self-nominations will not be accepted.

A nomination should include a covering letter with justifications, the CV of the nominee, and two supporting letters. Nominations should be submitted to:

Selection Committee

c/o Liu Bie Ju Centre for Mathematical Sciences City University of Hong Kong Tat Chee Avenue Kowloon Hong Kong

Or by email to: lbj@cityu.edu.hk

Deadline for nominations: 30 September 2015

Presentation of Prize

The recipient of the Prize will be announced at the **International Conference on Applied Mathematics 2016** to be held in summer 2016. The Prize Laureate is expected to attend the award ceremony and to present a lecture at the conference.

The Prize was set up in 2008 in honor of Mr William Benter for his dedication and generous support to the enhancement of the University's strength in mathematics. The inaugural winner in 2010 was George C Papanicolaou (Robert Grimmett Professor of Mathematics at Stanford University), the 2012 Prize went to James D Murray (Senior Scholar, Princeton University; Professor Emeritus of Mathematical Biology, University of Oxford; and Professor Emeritus of Applied Mathematics, University of Washington), the winner in 2014 was Vladimir Rokhlin (Professor of Mathematics and Arthur K. Watson Professor of Computer Science at Yale University).

The Liu Bie Ju Centre for Mathematical Sciences was established in 1995 with the aim of supporting world-class research in applied mathematics and in computational mathematics. As a leading research centre in the Asia-Pacific region, its basic objective is to strive for excellence in applied mathematical sciences. For more information, visit *bttp://www.cityu.edu.bk/lbj/*





EUROPEAN NEWS

The following items are from the EMS webpage www.euro-math-soc.eu/news.

European Mathematical Society EC meeting

At its spring meeting in March in Prague, the European Mathematical Society (EMS) Executive Committee approved two applications for institutional membership and also welcomed 80 new individual members. The EC appointed Roberto Natalini (Rome) as Chair of the Committee for Raising Public Awareness of Mathematics and Patrick Foulon (CIRM) as Vice Chair of the ERCOM (European Research Centres on Mathematics) Committee. Bids have been received from the Universities of Sevilla (Spain) and Primorska (Slovenia) to host the 8th ECM in 2020. The 7th Congress will be held from 18 to 22 July 2016 at the Technische Universität Berlin, Germany.

EMS Summer Schools

The next European Summer School in Financial Mathematics will take place from 31 August to 4 September 2015 at Le Mans, France, with mini-courses by Thomas Hurd, Stephane Gaiffas and Emmanuel Bacry. For more information on EMS Summer Schools, see http://tinyurl.com/qgwfpdv.

News from EMS Member Societies

The first Joint Brazil - Italy Mathematics Meeting will take place from 29 August to 2 September 2016 in Búzios, Brazil. The programme will include both plenary lectures and special sessions (symposia), in any field of current research in Mathematics and its applications. For more information, see: www. sbm.org.br/jointmeeting-italy.

Royal Spanish Mathematical Society (RSME)

The first joint meeting of the Sociedade Brasileira de Matemática, the Sociedade Brasileira de Matemática Aplicada e Computacional and the Real Sociedad Matemática Española will be held at Universidade Federal do Ceará (Fortaleza, Brazil), from 7 to 10 December 2015. The main goal is to strengthen partnerships and collaborations between researchers and institutions in Brazil and Spain. For more information, see: www.sbm.org.br/ jointmeeting-spain/.

Stefan Bergman Prize

The Vice-President of the Polish Mathematical Society, Professor Sławomir Kołodziej (Institute of Mathematics of Jagiellonian University, Cracow, Poland), was named Laureate of the 2014 Stefan Bergman Prize, for his contributions to the theory of the complex Monge-Ampère equation and pluripotential theory. Since 1989 the Stefan Bergman Prize has been awarded every year or two by the AMS for work in complex analysis. For more information, see: http://tinyurl.com/njlcleg.

EMS Newsletter



The lune 2015 edition is now available online at www.ems-ph.org/ journals/journal. php?jrn=news, and includes the scientific program of 7ECM and details of the many cultural satellite activities. New articles continue

the series about the EMS's 25th anniversary: A. Lahtinen and J.-P. Bourguignon tell us about the Society's first eight years, while the movie maker F. Tisseyre delivers some souvenirs from the 1st ECM, on which he made a film. There is a piece on the 100th anniversary of the Mittag-Leffler Institute, an interview with Jacob Murre remembering Grothendieck, plus, of course, mathematical surveys, and lots more news from your European neighbours. The first edition of the brand new Young Mathematicians' Column (YMCo) also appears.

> David Chillingworth LMS/EMS Correspondent

LMS COUNCIL DIARY 24 April 2015

A personal view

After formal matters, we began a particularly full agenda with the President's report on his activities since the last meeting. The Mary Cartwright lecture had been excellent and there had been a wonderful meeting at the BMC/BAMC in Cambridge. The Women in Mathematics event at Oxford was a tremendous success; the talks had been outstanding and the atmosphere brilliant.

Philip Nelson, Chief Executive of the EPSRC had given a positive talk on the impact of mathematics at the BMC/BAMC. Vice-President Ken Brown reported that he had attended the joint meeting of EPSRC's Strategic Advisory Teams where similar support for mathematics had been apparent. EPSRC was concerned about the outcome of the spending review due at the end of this year. Ring-fencing of the science budget in the last parliament had meant a 17% cut in real terms, and neither of the main parties (we were just under a fortnight away from the General Election at this point) had made any commitment that ring-fencing would continue.

The half-yearly financial review was dealt with quickly. Treasurer Rob Curtis reported that there were no significant unexpected or unexplained variations from the budget. Electronic voting had reduced the cost of the elections, as well as increasing the number of members casting their vote.

Council discussed draft regulations for a new prize. It is proposed that the prize should be jointly awarded by the LMS and the Société de Mathématiques Appliquées et Industrielles. The regulations were approved, subject to replacing an age restriction with a condition based on a candidate's "(full-time equivalent) involvement in mathematics at post-doctoral level", which is the wording currently used in LMS prize regulations.

As a member of the Publications Committee I've been aware of the enormous amount of careful work that the Journal Tenders Group have devoted to the task of choosing a new publishing partner from 2017 as they have whittled down the nine bids received from publishers to the three who were interviewed in February. Publications Secretary John Hunton brought to Council the group's recommendation that Wiley should be the Society's next publisher. He reminded Council of the Society's dual publishing aims: the dissemination of mathematics and, where appropriate, the creation of an income stream to fund the Society's grants and other activities. He said the group had the greatest confidence in Wiley for producing the journals and getting them to new mathematicians worldwide, while producing the best returns. Council accepted the recommendation; the detailed contract is expected to be agreed in November.

Among the schemes that the Research Meetings Committee has charge of are the Undergraduate Research Bursary Scheme and the 150th Anniversary Postdoctoral Mobility Grants, A review of the former, which the LMS took over from the Nuffield Foundation in 2012 concluded that the scheme had been a great success. The feedback from Bursary holders provided to Council was extremely positive. Council supported the proposal from the Committee's Chair Beatrice Pelloni that the scheme should be continued for a year beyond the three initially agreed, while recommending that ways should be found for departments to contribute some of the costs. The Mobility Grants are only just into a second year, making it rather too soon to judge their success. Council agreed to extend this scheme for a further, third year after which a meaningful review could be conducted.

Council approved plans from the Women in Mathematics Committee for events to encourage more female undergraduates to consider undertaking PhDs. Aimed at 2nd year students, these would complement the Prospects meetings for final-year undergraduates. Committee Chair Gwyneth Stallard reported that discussions had taken place with representatives of the mathematics Centres for Doctoral Training who, together with host departments, would be providing funding.

BRITISH SCIENCE FESTIVAL 2015

The Festival is organized by the British Science Association (a.k.a. the British Association for the Advancement of Science) and takes place this year in Bradford from Monday 7 to Thursday 10 September 2015 (www.britishscienceassociation.org/bradford-2015). This year there will also be a Fringe Festival from 11 to 18 September, aimed at young audiences, families and schools.

These are some of the mathematical sciences events in the main programme.

Presidential Lecture and Reception

(sponsored jointly by the Operational Research Society and the LMS)



Operational Research: Advanced airports, on-time ambulances and much else besides Kevin Glazebrook (Lancaster) and Vincent Knight (Cardiff)



Operational Research (OR) is often concerned with the development of mathematics to explore how to make the best use of limited resources. Contemporary issues to be discussed include airport infrastructures and optimization of emergency medical services.

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From storm warnings to mobile apps: what the big data revolution can learn from weather forecasters

Ian Roulstone (Surrey) and the European Centre for Medium Range Weather Forecasts (Reading)

How do weather forecasters identify order within chaos? Can you decide when their predictions will be accurate? What developments in forecasting are expected over the next few years? The event will discuss the latest developments in numerical weather prediction, and how this technology is shaping the big data revolution.

A mathematical view of terrorism

Hannah Fry (University College London)

Behind the scenes, a new way of looking at attacks is being developed: a method that hinges on the hidden mathematical patterns being discovered in global terrorism and one which may have the potential to unlock insights into our counter-terrorism strategies of the future.

Peter Giblin (pjgiblin@liv.ac.uk) and Tony Mann (a.mann@gre.ac.uk) Mathematical Sciences Section of the BSA



Quartet of Lows © NEODAAS, University of Dundee

YOUNG RESEARCHERS IN MATHEMATICS CONFERENCE 2015

The Young Researchers in Mathematics Conference (YRM), being held at the University of Oxford from 17 to 20 August 2015, is the premier UK conference dedicated to doctoral students in mathematics. The conference consists largely of talks given by the attending graduate students, with keynote talks by established mathematicians. The Plenary Speaker is Frances Kirwan (Oxford) and the LMS Public Lecture will be given by Vicky Neale (Oxford). There will be talks from a wide range of tracks:

- Mathematical Physics
- Mathematical Biology
- Dynamical Systems
- Number Theory
- Machine Learning
- Computer Science
- Logic and Set Theory
- Mathematical Finance
- Probability and Stochastic Processes
- Algebra
- Combinatorics and Graph Theory
- Analysis
- PDEs
- Geometry
- Numerical Analysis
- Fluid Mechanics
- Computational Biology
- Statistics
- Topology

For more information visit www. yrm2015.co.uk or contact the organisers at info@yrm2015.co.uk. The conference is supported by an LMS Postgraduate Research Conference grant (Scheme 8), the IMA, SIAM, the Heilbronn Institute, Winton Capital, ThinkTank Maths, G-Research, Santander Universities and Oxford University Press.

The LMS have also provided some bursaries covering the registration fee of the YRM (\pounds 60) to any PhD students who also attended the B(A)MC 2015 in Cambridge.

ALGEBRAIC AND GEOMETRIC ASPECTS OF INTEGRABLE SYSTEMS PGR WORKSHOP

The PGR Workshop on Algebraic and Geometric Aspects of Integrable Systems will take place at Loughborough University from Thursday 17 to Friday 18 September 2015. This conference would be a way to gather UK postgraduate research students working in the field of integrable systems, in honour of the 150th anniversary of the London Mathematical Society.

Starting with the pioneering works of Isaac Newton and Johannes Kepler in the seventeenth century, the theory of integrable systems has flourished into a beautiful subject, rich with scientific understanding of how our universe works. In recent times, many contributions have been made by UK universities. By bringing together researchers and students from mathematical backgrounds across the UK, this conference will help to excel the UK's lead in this area.

The aim of the workshop is to forge new relationships between PhD students in integrable systems groups in UK universities. This will lead to future collaborations among a new generation of UK mathematicians. The invited speakers are:

- Khadija Al-Amoudi (UCL)
- Alexis Arnaudon (Imperial College London)
- Lucy Barnes (University of Kent)
- Gregorio Benincasa (UCL)
- Bjorn Berntson (UCL)
- Pierpaolo Calligaris (Loughborough University)
- Katarzyna Kozlowska (University of Reading)
- Rudi Kusdiantara (University of Essex)
- Richard Stedman (University of Glasgow)
- Magdalena Zajaczkowska (University of Warwick)

Participants are encouraged to present posters. Limited funding towards travel and or accommodation expenses are available

for PhD students. For more information http://homepages.lboro.ac.uk/~mapc3/. see or contact the organisers Andrea Savoldi (A.Savoldi@lboro.ac.uk), Pierpaolo Calligaris (P.Calligaris@lboro.ac.uk), Calum Horrobin (C.Horrobin@lboro.ac.uk) and Kathryn Spalding (K.Spalding@lboro.ac.uk). The workshop is supported by an LMS Postgraduate Research Conference grant (Scheme 8) and the School of Science of Loughborough University.

FUNCTION THEORY MEETING

This year's One-Day Function Theory Meeting will be held on Monday 7 September 2015 at De Morgan House in London. This popular meeting, well attended by function theorists from the UK and Ireland, has been held annually for over thirty years. Speakers will include:

- Dmitry Belyaev (Oxford) Fine structure of harmonic measure and random fractals
- Jasmin Raissy (Universite Paul Sabatier, Toulouse) Wandering Fatou components in dimension two

There is a £10 registration fee (waved for PhD students and retired). Funding is available for a significant number of PhD students to attend the meeting. For more information, see the meeting website at: https://sites.google.com/site/ functiontheorymeeting/. The meeting is supported by an LMS Conference grant.

OPERATOR ALGEBRAS AND DYNAMICAL SYSTEMS

A half-day workshop on *Operator Algebras* and *Dynamical Systems* will take place at the School of Mathematical Sciences, Queen Mary University of London, on Tuesday 22 September 2015. The aim of the workshop is to bring together experts working in operator algebras and dynamical systems and to discuss interactions between these two areas of mathematics. The speakers are:

• Wilhelm Winter (University of Muenster)

- Xin Li (Queen Mary University of London)
- Stuart White (University of Glasgow)

Limited funding is available to contribute to the expenses of research students to attend the workshop. For further details contact the organiser (xin.li@qmul.ac.uk) or visit the organiser's homepage: www.maths. qmul.ac.uk/~li.

The meeting is supported by an LMS Conference grant celebrating new appointments and by the School of Mathematical Sciences at Queen Mary University of London.

CALCULUS OF VARIATIONS, PDE AND GEOMETRIC MEASURE THEORY

A conference on *Calculus of Variations, PDE* and *Geometric Measure Theory* will take place at the Department of Mathematics, University of Sussex from 7 to 8 September 2015. The purpose of this meeting is to discuss recent developments in these areas, and to explore future directions for common interaction. Invited Speakers include:

- Gianni Dal Maso (SISSA, Trieste)
- Irene Fonseca (Carnegie Mellon University)
- Jan Kristensen (University of Oxford)
- Giovanni Leoni (Carnegie Mellon University)
- Bernd Kirchheim (University of Leipzig)
- Jan Malý (Charles University in Prague)
- Giuseppe Mingione (University of Parma)
- Maria Giovanna Mora (University of Pavia)
- Massimiliano Morini (University of Parma)
- Neshan Wickramasekera (University of Cambridge)
- Michael Struwe (ETH, Zurich)

Financial support will be available for a limited number of UK based PhD students. The meeting is supported by an LMS Conference grant, by the School of Mathematics and Physical Sciences and by the Department of Mathematics at the University of Sussex. Further information can be found at the website www.sussex.ac.uk/maths/research/ calcvargmt.

ADVANCES IN GEOMETRIC ANALYSIS

A conference on Advances in Geometric Analysis in honour of Rick Schoen's 65th birthday will be held at the Mathematics Institute, University of Warwick from Monday 20 to Friday 24 July 2015. Warwick's connection with Geometric Analysis goes back to its very beginnings with the appointment of Jim Eells and the symposia he ran. The field has been developing rapidly over the past fifty years or so and Rick Schoen has been a towering and influential leader of these developments. Rick, and his contributions, will be honoured by many of the world's eminent Geometric Analysts who have agreed to speak at this conference. The meeting will offer a golden opportunity for participants to interact with world leaders in the field. generate new ideas and reinforce existing collaborations.

A list of speakers and further information is available at http://tinyurl.com/qer3euc. Participants should register at this website or, in case of difficulty, email one of the organisers at M.J.Micallef@warwick.ac.uk.

The meeting is supported by an LMS Conference grant, the EPSRC (Platform and Programme grants) and Stanford University.

OPERATIONAL RESEARCH

The European Conference on Operational Research - Operational Research in Practice which takes place at the University of Strathclyde, Glasgow from 12 to 15 July 2015, has received to-date more than 2,500 abstracts. Well-known speakers in the field, which include R.Tyrrell Rockafellar (University of Washington), Sir Alan Wilson (University College London), M. Grazia Speranza (University of Brescia) have confirmed to give the plenary talks.

The local organizers are currently working

on an engaging programme that will use a variety of locations across campus. The EURO2015 social programme has something for everyone, including an informal networking night set in Merchant Square, a diverse and quirky venue a few minutes' walk from the Strathclyde University campus.

Practitioners, students, researchers and academics interested in any branch of Operational Research, mathematical modelling or economic analysis are invited to attend EURO2015. There's special attention for practitioners with the 'Making An Impact' activities. More information on such details as the main topical areas registration, is available on the website www.euro2015.org.

INTERFACES IN FLUIDS

The first meeting of the newly-established research network COSI (*Complex Systems with Interfaces*) with take place in the School of Mathematics, University of Birmingham, on Thursday 17 September 2015. The network is hosted by the University of Birmingham, the University of Nottingham and the University of East Anglia. It aims to hold three meetings per year, with one meeting at each of these institutions. Each meeting will cover a different theme and will include talks from Faculty, PhD students and postdocs.

The theme of the first meeting is *Interfaces in Fluids*. The Invited Lecture will be given by Serafim Kalliadasis (Imperial College London). The speakers are:

- David Needham (Birmingham)
- Mark Blyth (East Anglia)
- Dominic Henry (Birmingham)
- Aytul Gokce (Nottingham)
- Jack Keeler (East Anglia)
- Rosemary Dyson (Birmingham)
- Emilian Parau (East Anglia)

All are welcome to attend. There is no registration fee. If you would like to attend, contact Dr Jamal Uddin (J.Uddin@bham. ac.uk). Further information is available from the website at: www.uea.ac.uk/~h007/COSI/. The network supported by an LMS Scheme 3 grant.

INII Isaac Newton Institute for Mathematical Sciences

NEW MATHEMATICAL AND COMPUTATIONAL PROBLEMS INVOLVED IN CELL MOTILITY, MORPHOGENESIS AND PATTERN FORMATION

7 – 11 December 2015

in association with the Isaac Newton Institute programme Coupling Geometric PDEs with Physics for Cell Morphology, Motility and Pattern Formation

(13 July - 18 December 2015

Organisers: Alan Champneys (Bristol), John King (Nottingham), John Mackenzie (Strathclyde) and Christina Surulescu (TU Kaiserslautern).

Workshop theme: Cell motility, morphogenesis, and pattern formation are essential features of cell dynamics. The involved biochemical processes and biomechanical properties range from the intracellular level over cell surface dynamics, cell-cell and cell-tissue interactions up to the scale of cell population behaviour influencing organ formation and functioning.

Mathematical models handling biological events taking place on one or several such scales can provide a powerful framework to understand these phenomena, test experimentally suggested conjectures, and make predictions about the behaviour of the studied system. Current modelling approaches are often continuous, involving systems of partial differential equations of various kinds (eq, reaction-diffusion-transport, taxis, kinetic transport, population balance), possibly coupled to ordinary, random, or stochastic differential equations. Furthermore, the so-called agent-based approaches (eg, cellular automata, Potts models, etc.) characterize the behaviour of individual cells or intracellular particles in a discrete way, permitting rather detailed descriptions of motions, interactions etc. Yet other model types are hybrids between discrete and continuous descriptions. Applications include, but are not restricted to embryogenesis, tumour growth and invasion, wound healing, tissue bioengineering, biofilms, etc. The models lead to highly complex analytical and numerical problems, which often call for the development of new mathematical tools or for the enhancement of existing ones. At the same time recent mathematical developments for example in nonlinear waves and coherent structures, in solid mechanics and in dynamical systems theory can help shed light on generic mechanisms; as well as the biology providing challenges to the mathematical state of the art.

Therefore, the aim of this workshop is to bring together scientists working on these timely and challenging topics of mathematical biology, analysis and numerics. It will provide both an international framework and motivation to further develop the modelling of the mentioned biological phenomena and to strengthen the synergies between the involved branches of applied mathematics, but also between mathematics and life sciences.

Further information and application forms are available from the website: www.newton.ac.uk/event/cgpw04

Closing date of the receipt of applications 27 September 2015.

COLLINGWOOD MEMORIAL PRIZE 2015

The 2015 Collingwood Memorial Prize has been awarded to Robert James Little, Van Mildert College, Durham University. The Collingwood Memorial Prize, established in memory of Sir Edward Collingwood FRS, President of the Society 1969-1970, is awarded to a final-year mathematics student at the University of Durham who intends to continue to a higher degree in mathematics.

OBITUARY MICHAEL POWELL



Professor Michael J.D. Powell, who elected a was member of the London Mathematical Society on 16 November 1979. awarded the Navlor Prize and Lectureship in Applied Mathematics in 1983 and the Senior

Whitehead Prize in 1999, died on 19 April 2015, aged 78.

John Reid writes: Mike Powell has made an enormous contribution to numerical analysis, mainly in the areas of optimization and approximation.

In optimization, his ground-breaking results involve useful Jacobian and Hessian approximations of various kinds, augmented-Lagrangian and sequential-quadraticprogramming methods for constrained optimization, and trust-region methods. He provided many clever examples to explain the limitations of commonly-used algorithms. His most recent work focused on problems for which derivatives are unavailable or do not exist.

In approximation, he has shown how radial basis functions can be used effectively for multivariable functions. His text book is a standard work in the area.

Mike graduated from Cambridge in 1959, worked at Harwell until 1976, and has been at Cambridge since then. He was very early to realize the importance for numerical methods both of rigorous theoretical foundations and of the availability of computer codes for use by scientists. He established the Harwell Subroutine Library in 1963, originally to make codes available to Harwell scientists, but soon around the world, too. He continued to write codes while at Cambridge and was a firm advocate of making them freely available.

In 1982, he was an initial recipient of the Dantzig Prize from the Mathematical Programming Society and SIAM. He was elected as an FRS in 1983, as a Foreign Member of the US National Academy of Sciences in 2001 and as a Corresponding Fellow to the Australian Academy of Science in 2007.

Mike's standards of rigour were high and he always expected this of others. As Editor of the IMA *Journal of Numerical Analysis* (he was a founding editor), he often started a fresh correspondence with an author who had already satisfied the referees. The result was always a better paper.

Mike always took a lively interest in the work of others and encouraged them. I personally benefited from this during an early stage of my career when I was the only numerical analyst at the new University of Sussex. At his funeral, we heard of the enormous respect he gained for his recent encouragement of students in China, where he was known as "grandpa", for his work with students of former students.

He is survived by his wife Caroline, daughters Catherine and Alice, and granddaughters Georgia and Charlie.

REVIEWS

MY LIFE AND FUNCTIONS

by Walter K. Hayman, published by Logic Press, printed and distributed by Lulu.com, 2014, pp 172, hb €29.99, ISBN 9781326032241, pb €14.99, ISBN 9781326030209.

Walter Hayman was born in Cologne, Germany, in 1926 into a relatively privileged family. His father Franz Haymann was professor of Roman law in Cologne. His mother Ruth Hensel was the daughter of Kurt Hensel, the mathematician of p-adic number fame, and was the greatgranddaughter of Fanny Mendelssohn, the sister of Felix Mendelssohn. Walter had an older brother Roland who died in his early twenties, and a sister llse to whom Walter was close throughout her life. In fact, the cover photo in this account of his life and times is of Ilse and himself. Walter's education began at Salem School where Kurt Hahn was headmaster. Having had to leave Germany in the early 1930's because of his stance against Hitler, Hahn founded Gordonstoun School in Scotland which counts both Prince Philip and Prince Charles, as well as other well-known personages, among its alumni.

Fascist anti-Semitism in the years leading up to World War II had a profound effect on the Hayman family. Ilse found precarious refuge in Rome with her future husband Elio Pedroni. Walter was sent to England, travelling alone across Europe at the age of 11, to study at Gordonstoun for part of the summer of 1937, moving there permanently a year later. Walter's parents escaped to England in April 1939, living on the most modest resources. Walter writes that a benefactor, a descendent of Mendelssohn at Magdalen College Oxford, 'provided 5 pounds per week for my parents throughout the war on which they managed to live'. The matter of fact manner in which these recollections of his childhood are recounted belies the chilling reality of events at that time. Walter was in England, Ilse in Italy, while his parents had been encouraged to return to Italy to visit llse by a customs officer, a former student of Franz Hayman. On Kristallnacht 'The Nazis came to our house to take us to a concentration camp, but we were all abroad'. It could so very easily have ended differently, as indeed it did for Franz's only sibling Anna and her husband.

Although Walter very much enjoyed his time at Wester Elchies, the prep school for Gordonstoun, he was unhappy at Gordonstoun itself with ethos of mens sana in corpore sano. Walter admits to being lazy when it comes to exercise of any kind, even walking! Though 'hopeless at games', he 'quite liked cricket, which offered plenty of opportunity for contemplation'. Gradually, 'mathematics became more and more [his] main interest', winning out over a lifelong love of languages and literature. He obtained a major scholarship to St. John's College, Cambridge, in December 1942, waiting until the following October until he could go up. By the summer of 1945, he had completed Parts II and III of the Mathematical Tripos, and wished to use his third undergraduate year to start research. He was influenced by Littlewood, Besicovitch, and by his research supervisor Cartwright. Walter's first mathematical paper was published in 1947 in the Proceedings of the Cambridge Philosophical Society. Walter recounts how his fiancée's father stipulated that he could marry his daughter subject to him becoming British and getting a job. He dropped one 'n' from Haymann by deed poll and applied for naturalization, and met the second condition when awarded a lectureship in Newcastle in 1947. Later that year he moved with his new wife Margaret to Exeter where he won a lectureship. He was promoted to Reader in 1953 and remained there until 1956, apart from a year at Brown University and a summer at Stanford. Walter's mathematical reputation grew ever stronger.

his rise to fame being swift and unequivocal. In 1956 he was elected to the Royal Society and appointed to the Chair of Pure Mathematics at Imperial College London. This was the defining position of his career, spanning thirty years, and even now he holds the position of Senior Research Fellow at Imperial College.

This published account of Walter

My Life and

Functions

Falter K. Hayman

Hayman's life to date is not a mathematics book per se, though it does include some mathematics. It may best be described as a personal account of the life of an influential man who happened to be а mathematician. I doubt that mathematicians alone comprise the intended audience. with Those an interest in social history will profit from reading his of life account under the strengthening Nazi regime, his account of Gordonstoun, of life in England during the war, as well as the

passages on student life at Cambridge. The book evokes, in its style, Wordsworth's description of poetry as originating from 'emotion recollected in tranquility'. It is peppered with many examples of Walter's deadpan sense of humour. He describes how, when forced to go riding while at prep school, 'there was a sudden noise, the pony bolted around the corner and I being a good Newtonian, went straight on'. Recounting Offord's description of his collaboration with Littlewood on 'almost all integral functions' he writes 'He used to write a draft and Littlewood suggested changes. He would do this several times until the paper was finally more or less back to its original form.'

In putting on record the events of his life, Walter Hayman has given us an open, honest, personal account of his family and friends, of the women in his life, and of the importance to him of music, religion, and friendship. He writes frankly of his

wives Margaret and Waficka, both deceased. and devotes the final chapter to his wife and Marie the wonderful life they have enjoyed together. It is with great sadness that we learnt of Marie's passing towards the end of April 2015. This book also serves as a welcome addition the to history of British mathematics and has a lovely account of Cambridge life in the war years. Now that he has so vividly captured not only his times but also his character and individuality, there is

scope for Walter to expand on the subject of his mathematical work and on his philosophy of mathematics, even if both are touched on to some extent in this volume.

Walter Hayman is renowned for his technical prowess in hard analysis, clearing a path through seemingly impenetrable mathematical jungle and enabling others to follow. The technical power of his research sometimes masks the remarkable imaginative qualities of his results and his deep understanding of the general principles that are at work. Of the wide range of problems that Walter tackled, I mention

No. 449 July 2015

only very few examples. At a time when the Bieberbach Conjecture was one of the outstanding problems in the theory of schlicht functions and very little progress was being made, Hayman's Regularity Theorem reveals that something which is, in a certain sense, deeper is actually true. Time and again, he proves theorems that leave one wondering how he might even have imagined that such a strong result could be true. A case in point is the Hayman-Wu Theorem that there is an absolute constant which bounds the total length of the preimage of any line or circle under a conformal mapping of the unit disk. Or that the difference in moduli of successive coefficients of a normalized univalent function in the unit disk is bounded by an absolute constant. Many other examples could be given where Hayman's insights are forerunners of techniques and approaches that experts now take for granted. Taking account of the range and exceptional quality of his mathematical output, fellow mathematicians would welcome greater insight into his method of working, how he chose which problems to work on, where his inspiration came from (if that is not a mawkish question), and his approach to mathematical research both practically and philosophically. In the meantime, we have in this volume a fulsome account of a life lived in mathematics at the highest level, of the mathematical landscape in Britain and internationally, especially during the war and in the early post-war years, together with a forthright, unconventional account of his personal and family life, written by a foremost analyst in the tradition of Hardy and Littlewood. I very much enjoyed reading this book and judge that this pleasure will be shared avidly, by mathematicians and non-mathematicians alike.

> Tom Carroll University College Cork



JOHN NAPIER: LIFE, LOGARITHMS AND LEGACY

by Julian Havil, Princeton University Press, 2014, pp 296, £24.95, ISBN 978-0-691155-70-8.



Almost every year for more years than I care to remember (well. OK - 16, since you ask) I have taught logarithms engineering to students. and every year when I introduce the laws of logs I wax lyrical on how remarkable they

are, converting multiplication to addition, division to subtraction, and roots to multiplication. And, alas, every year the students look at me blankly. Whereas I sat my 'O' level mathematics in the last year before calculators were permitted and was taught how to use log tables, many of my students no longer even own a scientific calculator, rather they have an app on their phone.

I expect however that John Napier (1550-1617) would have been excited by the technological progress, rather than crestfallen that his revolutionary gift of logarithms had lost its use as a huge calculational time saver. In Havil's biography, Napier is revealed as a man of significant mathematical prowess, but primarily as a man whose concerns were with the practical, and very pressing, matters of speeding up calculation. Thus we have logarithms, Napier's bones and 'local arithmetic' (a form of multiplication and division with counters on a chess board of arbitrary size) all with the same aim, that of making life easier and calculation faster for those who had to use mathematics in their daily life, be they navigator or banker. Napier's introduction of logarithms in the early seventeenth century was at least as significant as the introduction of the electronic calculator in the 1970s. However at the very beginning of the seventeenth century it was not for mathematics that John Napier of Merchiston was known. It was for his A Plaine Discoverv

of the Whole Revelation of Saint John, a systematic and thorough commentary on the last book of the New Testament, in which amongst other things he concluded that the Final Judgement would take place between 1688 and 1700. It was a book that went through many editions, was translated into French, German and Dutch, and was, in Napier's view, his most important work. It is also a book which indicates the multiple aspects of Napier's character and, for the biographer, the difficulties of setting that character in its proper social and scientific context. However, these are difficulties which Julian Havil deals with well.

In the introduction Havil states that this is a scientific biography of Napier (p4). Thus the first chapter gives a 27 page overview of Napier's life, while the next six chapters examine in some detail his work published both during his lifetime and posthumously. This includes, in chapter 2, a full discussion of A Plaine Discovery and, in chapter 4, a thorough description of how Napier constructed his tables of logarithms (based on the posthumous 1619 Mirifici Logarithmorum Canonis Constructio or The Construction of the Marvellous Canon of Logarithms).

Though concentrating on the science. Havil keeps the historical context well in view as he goes along, making the book a rich and rewarding read. This book fills a clear gap in published work on Napier and is likely to be the standard point of departure for those interested in his life and work for some years to come. That said, given he thought the end of the world would more than three centuries ago. Napier would be shocked to know it had been written. But, after recovering from that shock, he may have been inclined to say, as Henry Briggs (1561-1630) said when he read Napier's own Logarithmorum Canonis Descriptio, 'I never saw a book, which pleased me better, and made me more wonder'.

> Mark McCartney University of Ulster

AN EQUATION FOR EVERY OCCASION Fifty-Two Formulas and Why They Matter

by John M. Henshaw, John Hopkins University Press, 2014, pp 200, £19.50, US\$29.95, ISBN 978-1-4214-1491.

This is a popular book about equations which you meet in mathematics and science in general and even better those that you can find in nature. It is a collection of 52 engaging bite-sized stories of two to three pages, one to ponder over for each week of the year.

First of all it is an intriguing, thought provoking and humorous book which

centred around is equations that have had а remarkable impact on our lives (whether we are aware of this or not. it does not matter). The scope is vast, from Zero, to One to Infinity, (for the meaning check the story with the same title), the choice is vours.

This is not a science book from which you will learn any phenomena formally. John Henshaw does not attempt to explain the mathematics nor does he describe the technicalities of how the equations have

been used or derived. You will not learn how one proves these equations. The author however tends to at least spell out what the symbols represent and explain them in a way that is not too abstract and technical. In the end, the equations are used more as milestones rather than as intensively studied subjects. In these treatises the equations are brought to life and one is inspired to take a fresh look at them. The author does a very fine job of both setting the stage for the starring equation and talking about the history and applications and at the same time



mentioning the greatest names in mathematics, science and art. For more formally inquisitive minds and those who want to explore in more depth these phenomena, a bibliography is included.

I am quite sure that anyone who opens the book will be inspired to understand the laws of nature. You might come to an idea that the nature is highly organised

> and that our small insight into its structure might as well be through the world of equations raising again the same old question whether scientists discover or merely describe the world around us.

> This witty book is full of adventures and is a real page-turner. Each story is only two or three pages long and when you have finished а section you have to decide whether to continue quickly to another story and amusing discovery or to think more of what you

have just read.

I very much like the title and the cover, which like the whole book is rather witty. However, I have to admit it took me some time to figure out the cover equation.

Overall, fascinating highly entertaining treatises for nature lovers as well as science, mathematics and art enthusiasts. John Henshaw's book is so anecdotal that it will provide material for many entertaining grandparents' stories as well as for quirky party gags.

> Jelena Grbic University of Southampton

No. 449 July 2015





EXPERIMENTAL MATHEMATICS

V.I. Arnold Translated by Dmitry Fuchs & Mark Saul

Presents several new directions of mathematical research. All of these directions are based on numerical experiments conducted by the author, which led to new hypotheses that currently remain open, i.e., are neither proved nor disproved. The hypotheses range from geometry and topology (statistics of plane curves and smooth functions) to combinatorics (combinatorial complexity and random permutations) to algebra and number theory (continuous fractions and Galois groups).

Written in Arnold's unique style, the book is intended for a wide range of mathematicians, from high school students interested in exploring unusual

areas of mathematics on their own, to college and graduate students, to researchers interested in gaining a new, somewhat non-traditional perspective on doing mathematics.

MSRI Mathematical Circles Library, Vol. 16

Aug 2015 163pp 9780821894163 Paperback £23.50

A co-publication of the AMS and the Mathematical Sciences Research Institute



LARS AHLFORS At the Summit of Mathematics

LARS AHLFORS - AT THE SUMMIT OF MATHEMATICS

Olli Lehto, University of Helsinki Translated by William Hellberg

Tells the story of the Finnish-American mathematician Lars Ahlfors (1907-1996). At the age of twenty-one Ahlfors became a well-known mathematician having solved Denjoy's conjecture, and in 1936 he established his world renown when he was awarded the Fields Medal, the "Nobel Prize in mathematics". In this book the description of his mathematics avoids technical details and concentrates on his contributions to the general development of complex analysis.

Jul 2015 122pp 9781470418465 Paperback £31.50

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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. Ims.ac.uk/content/calendar). Please send updates and corrections to calendar@Ims. ac.uk.

JULY 2015

1 Hardy Lecture, University of Kent (448) 1-5 Regularity and Analytic Methods in Combinatorics, LMS-CMI Research School, University of Warwick (446) 3 LMS Graduate Student Meeting, London (448)3 Hardy Lecture, LMS Meeting, London (448)5-10 Developments in Modern Probability LMS-CMI Research School, University of Oxford (446) 6-9 Symbolic and Algebraic Computation Conference, Bath (446) 6-10 Design and Analysis of Experiments in Healthcare INI Workshop, Cambridge (446) 6-10 British Combinatorial Conference, Warwick (447) 7 LMS Midlands Regional Meeting, Warwick (449) 8-10 Advances in Continuous Optimization, Edinburgh (447) 12-15 Operational Research European Conference, University of Strathclyde (449) 13 Iwasawa 2015, King's College London

(447) 13-15 Simple Groups, Representations and Related Topics Conference, Cambridge

Related Topics Conference, Cambridge (447)

13-17 Quantum Groups and Quantum Information Theory, Sussex (445)13-17 Stochastic Processes and their Applications Conference, Oxford (446) http://newsletter.lms.ac.uk

20-24 Advances in Geometric Analysis, Warwick (449)

20-30 Permutation Groups and Transformation Semigroups LMS-EPSRC Durham Research Symposium, Durham (443)

20-31 LMS Undergraduate Summer School, Loughborough (444)

22 Fractal Geometry and Dimension Theory, Manchester (448)

27-31 Metric and Analytic Aspects of Moduli Spaces INI Workshop, Cambridge (446)

27-2 Aug International Mathematics Competition for University Students, Bulgaria (446)

AUGUST 2015

3-12 New Moonshines, Mock Modular Forms and String Theory LMS-EPSRC Durham Research Symposium, Durham (444)17-20 Young Researchers in Mathematics Conference, Oxford (449) 17-28 George Boole Mathematical Sciences Conference, Cork (448) 23-28 Heidelberg Laureate Forum. Heidelberg (444) 24-28 European Set Theory INI Conference, Cambridge (445) 30-1 Sep Modern Mathematical Methods in Science and Technology, Kalamata, Greece (445) 31-3 Sep Finiteness Conditions in Topology and Algebra, Belfast (448) 31-4 Sep Financial Mathematics European Summer School, Le Mans, France (449)

SEPTEMBER 2015

1-4 Numerical Methods for Simulation IMA Conference, Oxford (448)2-4 British Logic Colloquium, Cambridge (448)

No. 449 July 2015

6-10 Dynamic Days Europe, Exeter (447) 7 One-Day Function Theory Meeting, De Morgan House, London (449) 7-8 Calculus of Variations. PDE and Geometric Measure Theory, Sussex (449) 7-9 British Topology Meeting, Belfast (447) 7-10 British Science Association, Bradford (449)9-11 Mathematics of Robotics IMA Conference, Oxford (448) 7-11 Cauchy Problem in Kinetic Theory, Imperial College London (447) 10 A Posteriori Error Control and Mesh Adaptivity for Time Dependent and Nonlinear Problems, University of Chester (448)10-11 Challenges in Nonlinear Systems, Manchester (448) 11 Approximate Dynamic Programming, Essex (448) 14-16 Non-Combinatorial Combinatorics, Warwick (448) 14-18 Cell Mechanics, Morphogenetics

and Pattern Formation INI Workshop, Cambridge (448)

15-19 Diophantine Equations LMS-CMI Research School, Baskerville Hall, Hay-on-Wye (448)

17 Interfaces in Fluids, Birmingham (449) 17 LMS Computer Science Colloquium, The Royal Society London

17-18 Algebraic and Geometric Aspects of Integrable Systems PGR Workshop, Loughborough (449)

18-20 LMS/EMS Joint Anniversary Mathematical Meeting, Birmingham (449) 21 Moduli Spaces and their Applications, Liverpool (448)

22 Operator Algebras and Dynamical Systems, Queen Mary University of London (449)

23 LMS Popular Lectures, Birmingham (449)

23 Sheffield Probability Day, Sheffield 30 Clay Research Conference, Oxford (447)

OCTOBER 2015

21 LMS Popular Lectures, Glasgow (449) 22 Challenges for the Next 25 Years, EMS Meeting, Institut Henri Poincaré, Paris (448)

26-28 Women in Applied Math & Soft Matter Physics, Mainz, Germany

NOVEMBER 2015

11 LMS Popular Lectures, Leeds (449)
13 LMS AGM, London
26 Mathematics in Defence IMA
Conference, Harwell, Oxford (448)
28-29 Joint Meeting with IoP and RAS, QMUL, London

DECEMBER 2015

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 10-11 LMS Joint Meeting with the Edinburgh Mathematical Society, Edinburgh (443) 14-17 LMS South West & South Wales **Regional Meeting, Southampton** 15-16 LMS Prospects in Mathematics, Loughborough 15-17 Cryptography and Coding IMA Conference, Oxford (448)

MARCH 2016

21-24 British Mathematical Colloquium 2016, Bristol

APRIL 2016

5-8 British Applied Maths Colloquium 2016, Oxford

LMS 150TH ANNIVERSARY

IT ALL ADDS UP

(see report on page 18)



Poster competition



Discussion group



Kristen Lauter



Alison Etheridge and Christl Donnelly



Questions



Katy Gaythorpe