NEWSLETTER

RICHARD GUY AT 100

Whilst Littlewood notes in his *Miscellany* that mathematicians have a tendency for longevity, reaching a century is still quite rare. Richard Guy, an LMS member since 1960, celebrated his 100th birthday on 30 September 2016 and, moreover, continues to be mathematically and physically active.

Richard was born in Nuneaton in 1916, his father having survived the Gallipoli campaign. After attending Warwick School, he graduated in mathematics at Gonville and Caius College, Cambridge. He trained and worked as a school teacher, interrupted by war service as a meteorologist, until 1949 when he joined Goldsmith's College, followed by university positions in Malaya and New Delhi. In 1965 he moved to The University of Calgary where he has remained ever since. Richard started research relatively late on, publishing his first paper of many in 1956. He had no doctorate, though Calgary remedied this in 1991 with an Honorary Degree. He has made numerous significant contributions to number theory, game theory, graph theory and geometry. Richard thrives on easily explained 'intuitive' problems, and inspires many by his enthusiasm and his writing, not least through his
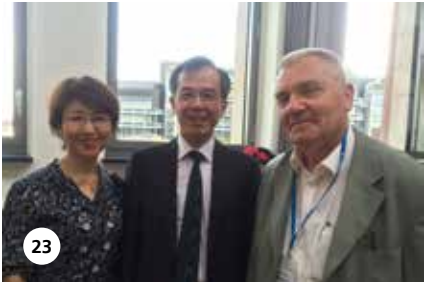

Louise and Richard Guy

seven books including *Unsolved Problems in Number Theory*, now in its 3rd edition, and its companion volume on geometry.

In 1940 Richard married Louise, not herself a mathematician, but one who well-understood their quirks. She shared Richard's other passion of mountaineering, and together they climbed many peaks in the Rockies and elsewhere. Since she passed away in 2010, Richard has each year, including this year, climbed the 802 steps of the Calgary Tower to raise money for charity in her memory.

SOCIETY MEETINGS AND EVENTS

Contents
No. 462 October 2016

I first met Richard in the mid-1970s when he visited Cambridge to work on *Winning Ways* with John Conway and Elwyn Berlekamp, a classic on the theory and practice of a huge variety of mathematical games which continues to instruct and entertain a wide audience. Amongst my encounters with Richard, I particularly remember an occasion when he was staying in my flat in Bristol. I returned home from hospital around 5 am to find him still up and working, and informed him that my wife had just given birth. 'Yes,' he replied. '– I have calculated the volume of that extremal tetrahedron we were discussing yesterday...'. Maths is never far from his mind!

Richard's centenary was celebrated at a special session of the Canadian Number Theory Association, held in Calgary in June. His colleague Hugh Williams reviewed Richard's life and work, and afterwards Richard talked about aliquot sequences and Conway's Game of Life, before receiving a standing ovation from a large audience. This presentation is available at www.mathtube.org/lecture/video/life-and-numbers-richard-guy

We send Richard our warmest congratulations and best wishes.

Kenneth Falconer
University of St Andrews

ANNUAL GENERAL MEETING

The Annual General Meeting of the Society will be held at 3.00 pm on Friday 11 November 2016 at BMA House, Tavistock Square, London WC1H 9JP. The business shall be:

1. Elections to Council and Nominating Committee
2. Review of Society Activities 2015-16
3. Report of the Treasurer
4. Resolutions
    a. Adoption of the Trustees' Report 2015-16
    b. Appointment of the Auditors

5. Presentation of Certificates to the 2016 LMS Prize Winners

It is hoped that as many members as possible will be able to attend. The Annual General Meeting will be followed by a Society Meeting at which Professor S. Jon Chapman (Oxford) will give the Naylor Lecture. Also speaking will be Professor Alan Champneys (Bristol). See page 7 for further details.

Fiona Nixon
Executive Secretary

3

2016 ELECTIONS TO COUNCIL AND NOMINATING COMMITTEE

The Electoral Reform Society (ERS) will once again be managing the LMS elections to Council and Nominating Committee. LMS members will be contacted directly by the Electoral Reform Society (ERS), who will send out the election material for the 2016 elections. All LMS members registered for electronic communication will receive an online ballot only, though may subsequently request a paper ballot if so desired. In advance of this, an email will be sent by the Society to all members who are registered for electronic communication informing them that they can expect to shortly receive some election correspondence from the ERS.

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

With respect to the election itself, there are 12 candidates proposed for six vacancies for Member-at-Large of Council. All of the vacancies are for terms of two years. One candidate has been nominated for the role of Member-at-Large (Librarian). Six candidates have been proposed for four vacancies in the membership of Nominating Committee. The slates and candidate biographies for the election can be found on the LMS website at www.lms.ac.uk/about/council/lms-elections.

For both electronic and postal voting the deadline for receipt of votes is **Thursday 3 November 2016.**

Members may like to note that a LMS Election Forum, moderated by the Scrutineers, can be found at http://discussions.lms.ac.uk/elections2016/.

Future elections
Members are invited to make suggestions for future nominees for election to Council. These should be addressed to The Chair of the Nominating Committee (nominations@lms.ac.uk). Members may also make direct nominations: details will be published in the February 2017 Newsletter or are available from Duncan Turton at the LMS (duncan.turton@lms.ac.uk).

LMS INVITED LECTURE SERIES 2018
Call for proposals

Proposals for the Invited Lecture Series 2018 are now being sought. Proposers are invited to suggest a topic and Lecturer for the lecture series, which they should be prepared to organise at their own institution or a suitable conference centre within the UK.

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

The format of an annual Invited Lectures series should:

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

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

Enquiries about the Invited Lectures should be directed to the Programme Secretary at the Society (lmsmeetings@lms.ac.uk). The deadline for the submission of proposals is **3 February 2017.**

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

The Invited Lecturer for 2017 is Professor Jim Agler (University of California, San Diego), who will visit Newcastle University from 18 to 22 April to give a series of lectures on *Function theory by Hilbert space methods*.

Recent previous lecturers have been:

2016   E. Knobloch (UC Berkeley)
Dynamics, patterns and spatially localised structures

2015   M. Shapiro (Michigan State)
Cluster algebras and integrable systems

2014   J. Väänänen (Helsinki and Amsterdam)
Games, trees and models, foundations of mathematics and second order logic and The mathematical theory of dependence and independence

2013   F. Bogomolov (NYU)
Birational geometry and Galois groups

2012   A. Borodin (MIT)
Determinantal point processes and representation theory

5

LMS HARDY LECTURESHIP TOUR 2018
Nominations sought

The Society is seeking nominations for a Hardy Lecture Tour in 2018.

The Hardy Lecturer visits the UK for a period of about two weeks, and gives the Hardy Lecture at a Society meeting, normally held in London in late June or early July. The Hardy Lecturer will also give at least six other lectures, on different topics, at other venues in the UK.

The schedule is decided by the Programme Secretary in consultation with the Hardy Lecturer, and will be designed to allow as many UK mathematicians as possible to benefit from the Hardy Lecturer's presence in the UK.

The holder of the Hardy Lectureship shall be a mathematician who has not been normally resident in the United Kingdom of Great Britain and Northern Ireland for a period of at least five years, at the time of the award. Grounds for the award of the Lectureship include:

- the achievements of the Hardy Lecturer;
- including work in, influence on, and general service to mathematics; lecturing gifts; and breadth of mathematical interests;
- the overall benefit the UK mathematical community might derive from the visit;

- the possibility of bringing to the UK a mathematician who might otherwise visit rarely or never.

The Hardy Lectureship is not restricted to mathematicians working in any specific area of mathematics.

Previous lecturers include: 2016 **Jacob Lurie** (Harvard), 2015 **Nalini Joshi** (Sydney), 2014 **Percy Deift** (NYU), 2012 **Etienne Ghys** (Lyon).

The London Mathematical Society will fund:
- the honorarium - £2,000 paid directly to the Hardy Lecturer;
- travel expenses (including travel to/from the UK and within the UK) - up to £2,500;
- accommodation expenses - up to £1,500

- a contribution to the host department to hold a dinner for the Hardy Lecturer/Hardy Lecturer - up to £100 per institution.

The host department(s) will be expected to provide office accommodation and the academic support normally offered to a distinguished visitor.

Nominations must have the support of the host department(s), and should be sent by the Head of Department to the Programme Secretary (lmsmeetings@lms.ac.uk). The closing date for proposals is **31 January 2017.**

For further details and guidance on how to submit a nomination, please visit the Society's website: www.lms.ac.uk/events/lectures/hardy-lectureship.

150TH ANNIVERSARY POSTDOCTORAL MOBILITY GRANTS

The third round of awards under the Society's 150th Anniversary Postdoctoral Mobility Grants has been announced. Ten grants have been awarded by the Society's Research Meetings Committee for the academic year 2016-17 to UK-based early career researchers to visit institutions ranging across the UK, Europe and Canada. The grants are intended to support promising researchers during the transitional period between having submitted their PhD and the start of their first post-doctoral employment.

Name	Home institution	Visiting institution(s)
Dimitrios Chatzakos	University College London	University of Bristol
George Chkadua	King's College London	University of Reading
Vasiliki Evdoridou	The Open University	Universitat de Barcelona
Niamh Farrell	City University London	Technische Universität Kaiserslautern, Bergische Universität Wuppertal
Tao Gao	University College London	Imperial College London
Valentina Grazian	University of Birmingham	University of Aberdeen
Simon Gritschacher	University of Oxford	University of British Colombia
Marco Marengon	Imperial College London	University of Cambridge
Natasha Morrison	University of Oxford	ENS de Lyon, ETH Zürich
Sina Salek	University of Bristol	University of Oxford

LONDON
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LMS ANNUAL GENERAL MEETING
Friday 11 November 2016
BMA House, Tavistock Square, London WC1H 7JP

Programme – Annual General Meeting, Black Suite

15.00   Opening of the Meeting & Society Business
15.30   **Alan R. Champneys (Bristol)**
        Title: TBC
16.30   Coffee/Tea
16.55   Election results
17.00   **S. Jon Chapman (Oxford) – Naylor Lecture**
        Asymptotics beyond all orders: the devil's invention?
        "Divergent series are the invention of the devil, and it is shameful to base on them any demonstration whatsoever." — N. H. Abel.
        The lecture will introduce the concept of an asymptotic series, showing how useful divergent series can be, despite Abel's reservations. We will then discuss Stokes' phenomenon, whereby the coefficients in the series appear to change discontinuously. We will show how understanding Stokes phenomenon is the key which allows us to determine the qualitative and quantitative behaviour of the solution in many practical problems. Examples will be drawn from the areas of surface waves on fluids, crystal growth, dislocation dynamics, localised pattern formation, and Hele-Shaw flow.
18.00   Close of meeting
18.15   Wine reception at BMA House, Paget Suite

The meeting will include the presentation of certificates to all 2016 LMS prizewinners.
The meeting will be followed by a reception as well as the Society's Annual Dinner, which will also be held at BMA House.
For further details about the AGM, please contact Elizabeth Fisher (lmsmeetings@lms.ac.uk)

7

The cost to attend the dinner is £53 per person. To book, please Carol Chessis
by Friday 28th October: AnnualDinner_RSVP@lms.ac.uk

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LMS Joint Meeting with the RSS and Fisher Memorial Trust

Data Science: The View from the Mathematical Sciences
27th October 2016
Royal Statistical Society, 12 Errol Street, London EC1Y 8LX

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

Final Programme

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

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

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

There is no charge to attend but registration is required

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

ROYAL
STATISTICAL
SOCIETY

1865 - 2015

GRADUATE STUDENT MEETING

BMA House, Tavistock Square, London

(nearest tube stations: Euston Square, Warren Street)

11 November 2016 10:00 – 15:00

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

Speakers: Dr Philippe Trinh (Oxford) and Professor Chris J. Howls (Southampton)

Student talks (6 slots available)

Students are invited to give short talks (15 minutes) aimed at a general mathematical audience. Prizes will be awarded for the best two talks. If you would like to give a talk, please email Anthony Byrne (lmsmeetings@lms.ac.uk) by **21 October**.

Travel grants

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

LMS General Meeting and Naylor Lecture, 11 November 2016, 15:00–16:00, BMA House

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

Alan R. Champneys (Bristol) Title: TBC

S. Jon Chapman (Oxford), Naylor Lecturer, will give the 2016 Naylor Lecture: *Asymptotics beyond all Orders: The Devil's Invention?*

After the Society Meeting, there will be a reception at De Morgan House.

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

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

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1865 - 2016

9

ROB EASTAWAY AWARDED THE IMA–LMS ZEEMAN MEDAL

The 2016 IMA-LMS Christopher Zeeman Medal is awarded to Rob Eastaway for excellence in the promotion of mathematics to the public.

Rob is without doubt one of the leading promoters of mathematics in the UK. Rob's outreach over many years has engaged and continues to engage and inspire great numbers of diverse audiences, in particular, primary and secondary school children, and their parents. Rob is also a highly effective role model for others who wish to develop a career in the promotion of mathematics to the general public.

Rob's career of promoting mathematics began during his late teenage years with his first puzzles being published in the *New Scientist* and *The Sunday Times*. As an undergraduate at Christ's College, Cambridge (MA in Engineering Science, in Part 2 of which Rob specialised in Operational Research), Rob edited *Enigmas,* a collection of puzzles from the *New Scientist* column.

From 1984–1990 Rob worked as a management consultant at Logica and subsequently Deloitte, using mathematical modelling to advise decision makers in public sector bodies and other organisations. While at Deloitte, Rob developed (with Ted Dexter and Gordon Vince) the 'Deloitte Ratings', a mathematical system for ranking international cricketers, subsequently adopted by the ICC and still used as cricket's official world rankings. During this time, Rob also had his first experience of giving maths presentations to the general public.

Rob has written and/or co-written a number of books for a range of audiences, including school children and their parents. It was the success of his first book *What is a Googly?*, an explanation of cricket for non-cricketers, which created the opportunity for Rob to write maths books. Notably, a copy of this book was presented by Prime Minister John Major to President George Bush (Snr) at Camp David in 1992.

Further books engendered invitations to give talks at schools. *Why do buses come in threes?*, written with Jeremy Wyndham, became a best-seller, topping the Science Museum bookshop chart for five years, and, as a direct result, teachers around the UK requested talks by Rob at their schools. Rob also made his first national radio appearances in 1998.

Outreach activity grew to include Royal Institution talks and Year 9 Maths Masterclass sessions. Rob became involved in the Maths Year 2000 initiative, which led to him visiting schools to give maths-and-magic talks for primary pupils and 'everyday maths' talks to secondary school children.

These talks led to the development of his seminal contribution in promoting mathematics to school students: the first Maths Inspiration shows for Year 11/12 students took place in 2004 at the Royal Exchange Theatre, Manchester, for audiences of 300 per show. These shows grew to provide very high quality lectures to large audiences (often close to 1,000) of 15–17 year olds in theatres across the country. Rob has made this into an immense success story for maths promotion which has had a huge impact on the perceptions and interests of tens of thousands of young people considering studying maths at university.

As well as delivering first rate talks himself, Rob has built up an extraordinarily effective team of maths presenters, and in many cases has given them a major boost in their own careers in bringing maths to the public, thus multiplying his effectiveness many times over. It is no coincidence that just about all of the UK's maths presenters who have come to prominence in the last 15 years have been

supported by Maths Inspiration. Rob insists on nothing but the highest quality in the presentations. The time and effort he puts into working with each presenter to make sure that their talks will have a powerful impact on his audiences is highly evident. By 2016, the number of school pupils who have attended Maths Inspiration shows has exceeded 130,000.

As part of his engagement with schools, Rob has run many workshops for primary and secondary teachers on the creative side of maths. He was also President of the Mathematical Association from 2007–8, which brought him much closer to the teaching community.

Not content with aiming inspiration solely at school children, Rob has worked to engage their parents with maths. *Maths for Mums & Dads*, written by Rob and Mike Askew, has sold over 100,000 copies and led to a huge number of family and parent events, including Rob speaking at the Hay Literary Festival in 2014 to an audience of 1,000 children. *Maths on the Go* (2016), also by Rob and Mike Askew, has led to collaboration with National Numeracy on workshops to engage with parents.

In 2016, the National Theatre agreed to let Maths Inspiration shows perform on the mathematical set of *The Curious Incident of the Dog in the Night-Time*, a smash-hit West End stage adaptation of the novel by Mark Haddon.

Therefore, it is fitting that the award of the Christopher Zeeman Medal which was created to recognise and acknowledge the contributions of mathematicians involved in promoting mathematics to the public and engaging with the public in mathematics in the UK, is made to Rob Eastaway in 2016. The medal was named in honour of Professor Sir Christopher Zeeman, FRS (1925–2016), who in 1978, became the first mathematician to deliver the Royal Institution's Christmas Lectures, and his *Mathematics into Pictures* series is now cited as an important influence to many young mathematicians.

The Christopher Zeeman Medal lecture will take place at the Royal Society on 22 March 2017. Further details will be announced in the *LMS Newsletter* in due course.

Professor Sir Christopher Zeeman passed away earlier this year. A detailed tribute can be found in the May 2016 issue of the *LMS Newsletter*.

The online archive of Sir Christopher's lifetime work including published work, lectures and lecture notes, interviews, and more can be seen at www.lms.ac.uk/2015/zeeman_archive.

MATHEMATICS POLICY ROUND-UP
September 2016

RESEARCH

Safeguarding funding for research and innovation
The government has provided reassurance to UK participants of the European Union's Horizon 2020 Programme with a commitment to safeguard funding for research and innovation projects.
• The Treasury will underwrite funding for approved Horizon 2020 projects applied for before the UK leaves the European Union.
• The commitment will provide reassurance to applicants from the UK's research and innovation base when applying for EU research funding.
More information is available at http://tinyurl.com/hxj9ler and http://tinyurl.com/zbwpdsc.

SCHOOLS AND COLLEGES

Review of Functional Skills qualifications
The Education and Training Foundation was

asked by Minister Nick Boles to undertake a review of Mathematics and English Functional Skills qualifications. The overview of the Review is available at http://tinyurl.com/zgpnrak.

As part of the Functional Skills Reform Programme there will be a revision of the national standards for adult literacy and numeracy. Once finalised, these standards will be used to underpin a range of qualifications – including Functional Skills – up to and including level two and establish the skills, knowledge and understanding that is expected at each level.

A second draft of the standards was published in early August and the deadline for receiving comments was 19 August 2016. Content specifications and core curricula for Functional Skills qualifications will also be produced.

ACME wrote to the Education and Training Foundation outlining further opportunities in terms of the Functional Skills mathematics review. The letter is available at http://tinyurl.com/hqphno7 and the response is available at http://tinyurl.com/zl6gj3o.

Dr John Johnston
Joint Promotion of Mathematics

CHALKDUST RELEASES ISSUE 04

In October, Chalkdust releases the fourth issue of their magazine for the mathematically curious. Since the launch of the last issue, things have been busy at Chalkdust HQ. We hosted the Carnival of Mathematics on our weekly blog and held a competition to guess how many paper cups it would take to construct a sphere (455!). More recently, Matthew Wright had an article posted in the *Guardian* regarding Southern Rail's Brighton-London train. You can keep up to date with all of our mathematical escapades by subscribing to our monthly newsletter, following us on Twitter (@chalkdustmag) or on Facebook (/chalkdustmag).

With the next paper instalment of the magazine due, some of the team recently came together (appropriately dressed for the occasion) for the infamous 'Chalky Saturday' to put together the finishing touches (see picture). This issue's cover features artwork by John Crabtree – an early pioneer of digital artwork and a former member of UCL's Department of Experimental and Electronic Art

in the 1970s – and his reflections on the connections between mathematics and art form the basis of our accompanying *On the Cover* article. Inside, you can find our interview with Andrea Bertozzi about her career in mathematics, fluids and crime; as well as a biography about the actress who invented some of the technology now used in Wi-Fi. Alongside this, our magazine features articles about prime numbers and bead crochet, problem solving techniques, mathematical doodles, storytelling and the atomic bomb. But there's more! A mathematical flowchart makes its debut appearance, *What's Hot and What's Not* is back and this issue's *Top Ten* focuses on colours of chalk. You might even like to enter this issue's complex and challenging prize cross-number (always popular with our readers) to be in with a chance of winning £100 worth of maths goodies. And if that wasn't enough, Professor Dirichlet returns with his hilarious agony uncle's column.

Chalkdust continues to thrive and this is all down to the support from our contributors and sponsors, such as the London Mathematical Society who have supported this project since our first issue, as well as our ever-growing readership. We have almost reached 1,500 subscribers to our monthly newsletter and our weekly blog is as popular as ever. We hope to

deliver a significant number of copies of Issue 04 to universities across the country, completely free of charge. If you are a university and would like copies of the magazine to be distributed there, please get in touch with us directly at contact@chalkdustmagazine.com. The magazine will also be available online at www.chalkdustmagazine.com, where you can also request copies for your institution, purchase Chalkdust T-shirts or catch up with the weekly blog.

Although Issue 04 will soon be at your door, we are already thinking about the next stage. Issue 05 will be published in Spring 2017 and we really encourage our readers to share their exciting mathematical ideas with us. If you have an article you think is worth sharing,

please get in touch with us at contact@chalkdustmagazine.com. In the meantime keep in touch with us on Twitter and on Facebook.

Rob Beckett
Communications Officer

COMMITTEE FOR WOMEN IN MATHEMATICS

Funding - call for applications

The IMU's Committee for Women in Mathematics (CWM) invites proposals for funding of up to €3,000 for activities or initiatives taking place in 2017, aimed at either:

a) Establishing or supporting networks for women in mathematics, preferably at the continental or regional level, and with priority given to networks in developing or emerging countries. Help could include, for example, funding meetings, travel for individuals for consultation purposes, or advice and support in creating websites. Please note that CWM will not normally fund activities taking place in the same or nearby location as one it has already funded in 2015 or 2016.

b) Organizing a mathematical school open to all with all women speakers and mainly women organisers. This type of mathematical school, which should include a significant proportion of time devoted to background and introductory material, can be a very effective way of showcasing the contributions of women mathematicians and creating an opportunity for female students to be in touch with women leaders, without excluding

male students. Expenses covered by CWM could include, for example, costs for speakers, women organisers, or for women participants.

c) Other ideas for researching and/or addressing issues encountered by women in mathematics may also be considered.

Proposers should write a short account (no more than two pages) explaining the nature of their activity and how it fulfils one of the above aims, as well as indications on how the CWM money would be spent and other funding which may be available. This is the one and only call for applications regarding activities in 2017 with the deadline of **15 December 2016**.

Applications should be sent to info-for-cwm@mathunion.org. Successful applications will be informed no later than 31 January 2017. Depending on demand, successful applications may not be funded in full.

Successful applicants will be asked to send a short report of the activity with details of how the budget was spent before the end of 2017.

IMU-CWM Committee
www.mathunion.org/cwm/

MATHEMATICS SPECIALISTS NEEDED FOR ECU'S ATHENA SWAN CHARTER

The Athena SWAN Charter is a peer-reviewed recognition scheme of commitment to promoting and advancing gender equality in higher education institutions and research institutes. Equality Challenge Unit, which runs Athena SWAN, is recruiting additional specialists to take part in panels assessing applications, and is particularly looking for Mathematics specialists.

As a panellist, you will join a number of peers to evaluate applications from departments related to your discipline. This is an opportunity not only to further gender equality, but also to share and develop your own equality and diversity knowledge, gain insight into the equality charter process and current good practice across the sector, and to build your own professional networks and experience.

If you are interested in lending your discipline-specific experience to help promote and advance gender equality in higher education and research institutes, complete the brief online form to register your interest (http://tinyurl.com/j6bfr3q). You'll also find further information on the role of Athena SWAN panellists. All panellists will receive training via live webinars and receive ongoing support throughout the process.

If you'd like further information contact athenaswan@ecu.ac.uk.

14

EUROPEAN MATHEMATICAL SOCIETY PUBLISHING HOUSE

Included with this October issue of the *LMS Newsletter* is the 2017 book catalogue of the European Mathematical Society Publishing House. It lists the more than 150 books that have been published since 2004, all of which are also available for download. Information is also provided regarding the *EMS Monograph Award* which is assigned every year.

The EMS Publishing House is a not-for-profit organization dedicated to the publication of high-quality books and top-level peer-reviewed journals, on all academic levels and in all fields of pure and applied mathematics. The proceeds from the sale of its publications are used to keep the Publishing House on a sound financial footing; any excess funds are spent in compliance with the purposes of the European Mathematical Society. The prices of its products are set as low as is practicable in the light of its mission and the market conditions.

For any further information visit the EMS homepage at www.ems-ph.org or write to info@ems-ph.org.

ABOUT THE KONINLIJK WISKUNDIG GENOOTSCHAP

The Dutch Royal Mathematical Society, the **Koninlijk Wiskundig Genootschap** (KWG), has the distinction of being the oldest of all present-day national mathematical societies. Founded in 1778, it still carries its 18th century motto *Untiring labor overcomes all*. In all other respects, the Society has adapted to the 21st century. It now serves as the professional organization of all Dutch-speaking individuals whose activities are somehow related to mathematics.

The Society organizes a variety of conferences and symposia focused at different groups of mathematicians. The Dutch Mathematical Congress is an annual two-day conference that attracts a large part of the Dutch mathematical community. Some years, the Dutch Mathematical Congress is organised in collaboration with one or several of fellow mathematical societies. For example, in March 2016 there was a BeNeLux Mathematical Congress attended by over 250 mathematicians from Belgium, the Netherlands and Luxembourg. Once every three years, the Brouwer Medal is awarded during the congress to a prominent mathematician — the next Brouwer Medal is to be awarded in Utrecht in 2017. The KWG also organizes a Winter Symposium aimed at high school teachers, and supports the yearly Study Group 'Mathematics with Industry' to promote the knowledge transfer between academic mathematicians and industry.

The Society publishes the *Nieuw Ar-chief voor Wiskunde*, a quarterly for all of its members with a famous problem section. It also publishes *Pythagoras*, a mathematics magazine for high school students, and *Indagationes Mathematicae*, a quarterly research journal. The KWG has reciprocity agreements with the American (AMS and SIAM), Australian, Belgian, French, German, Indian, UK and South-African mathematical societies, with the Netherlands Society for Mathematics Teachers, and with the Netherlands Society for Statistics and Operations Research.

L. E. J Brouwer

This year, the Society is paying special attention to the famous Dutch mathematician L. E. J. Brouwer, as on 2 December 2016 it will be exactly fifty years ago that he died in a tragic traffic accident. Among the activities that are being organized is a special edition of *Indagationes Mathematicae* dedicated to Brouwer's work and its influence on today's topology, philosophy, and logic. In addition, there will be a Brouwer symposium on 9 December 2016, at the Science Park in Amsterdam (registration is still open!). Finally, during a festive ceremony at the Hodsonhuis in Haarlem Brouwer's archives were transferred to the the Noord-Hollands Archief.

For more information about our society visit our website at www.wiskgenoot.nl.

Sonja Cox
Secretary, KWG

15
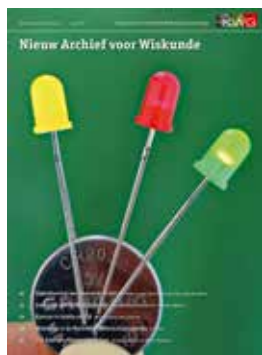
EUROPEAN NEWS

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

EMS Monograph Award

The **EMS Monograph Award** is assigned every year to the author(s) of a monograph in any area of mathematics that is judged by the selection committee to be an outstanding contribution to its field. The prize is endowed with €10,000, and the winning monograph is published by the EMS Publishing House in the series *EMS Tracts in Mathematics*. Deadline for submissions for the next award is **30 June 2017**. For further information see www.ems-ph.org/EMS_Monograph_Award.php.

Mathematical Biology 2018

Together with the *European Society for Mathematical and Theoretical Biology* (ESMTB) the EMS will organize the *Year of Mathematical Biology 2018*. This year will feature events related to mathematical biology at the European level, including the *European Conference on Mathematical and Theoretical Biology* (ECMTB) 2018 in Lisbon, a thematic program at the Mittag-Leffler Institute in Stockholm and various other initiatives and events. The *Society for Mathematical Biology* (SMB) has also joined this initiative, transforming it into a world-scale event. The list of activities and the list of members of the organizing committee, chaired by José Antonio Carrillo (Chair of the EMS Applied Mathematics Committee), is maintained at www.euro-math-soc.eu/year-mathematical-biology-2018.

David Chillingworth
LMS/EMS Correspondent

16

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

Thursday 3rd November 2016, 6:00pm

Picture courtesy University of Glasgow

Professor Muffy Calder
(University of Glasgow)

Probabilistic formal analysis of software usage styles
in the wild

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

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

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

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

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

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CECIL KING TRAVEL SCHOLARSHIP

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

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

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

Applications should be made using the form available on the Society's website (https://www.lms.ac.uk/prizes/cecil-king-travel-scholarship) or by contacting education@lms.ac.uk. The closing date for applications is **Friday 31 March 2017**. It is expected that interviews will take place in London in late May or early June.

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

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

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LMS Good Practice Scheme Workshop

Good Practice in Recruitment

12 October 2016 – London

LONDON MATHEMATICAL SOCIETY
GOOD PRACTICE SCHEME

Registration is open for a LMS Good Practice Scheme workshop to be held on Wednesday 12 October in London.

The workshop will provide individuals and departments with knowledge and tools they can use to improve recruitment and retention of women in mathematics.

De Morgan House, 57-58 Russell Square, London, WC1B 4HS at 11.00am

This workshop will particularly focus on Good Practice in recruitment practices and processes.

Participants will:

- Hear about how the LMS Good Practice Scheme can support Departments working towards recruiting and retaining more women in mathematics.
- Hear from Athena SWAN about the process of applying for departmental awards.
- Make useful contacts with other departments active in promoting the careers of women in maths.

To register for this workshop please email womeninmaths@lms.ac.uk by **5 October 2016**

Attendance is free but numbers are required for catering purposes.

Further information on the Good Practice Scheme and Women in Mathematics can be found on the Society's website: lms.ac.uk/women-mathematics

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www.bristol.ac.uk

School of Mathematics

Heilbronn Research Fellowships

Salary: £35,609 - £40,082 per annum
Fixed term contract staff
Full-time   **Job number: ACAD102217**

The School of Mathematics invites you for one or more Research Fellowships in association with the Heilbronn Institute for Mathematical Research. You will divide your time equally between your own research and the research programme of the Heilbronn Institute.

Research areas of interest include but are not restricted to Number Theory, Algebraic Geometry, Algebra, Combinatorics, Probability, Quantum Information, Computational Statistics and Data Science. These areas are interpreted broadly: Fellows have previously been appointed with backgrounds in most areas of Pure Mathematics and Statistics, and in several areas of Mathematical/ Theoretical Physics.

For more information about the Heilbronn Institute, see heilbronn.ac.uk

Due to the nature of the Heilbronn Institute's work, you must satisfy vetting before appointment. UK resident UK nationals will normally be able to meet this condition: other potential applicants should consult the Heilbronn Manager (see below) about their eligibility before applying. You may become a member of the USS pension scheme. Research expenses of at least £2,000 per annum will also be available.

There is a salary supplement of £3.5K pa, in recognition of the distinctive nature of these Fellowships. Payment of this supplement is conditional on a finished thesis having been accepted in final form because we expect Heilbronn Fellows to hold PhDs before working at the Heilbronn Institute.

The Fellowships will be for three years, with a preferred start date in October 2017, though another date may be possible by agreement.

To apply please visit our website at www.bris.ac.uk/jobs, enter the vacancy number into the job search and follow the link to the online application process.

The closing date for applications is 30 November 2016.

The University of Bristol is committed to equality and we value the diversity of our staff and students.

Heilbronn
Institute for
Mathematical
Research

University of
BRISTOL

The Leverhulme Trust

2017 AWARDS

The Leverhulme Trust is currently accepting applications for the following awards:

RESEARCH FELLOWSHIPS enable experienced researchers – whether employed in academia or as established independent researchers – to undertake a programme of research on a topic of their choice. Up to £50,000 is available for research costs, replacement teaching costs, or loss of earnings. Fellowships are offered for periods of 3 to 24 months, and must begin between 1 June 2017 and 1 May 2018. Approximately 95 fellowships are available in 2017.
Closing date: Thursday 10 November 2016.

INTERNATIONAL ACADEMIC FELLOWSHIPS provide established UK researchers with an opportunity to spend a concentrated period of time in one or more research centres outside the UK, in order to develop new knowledge, skills and ideas, for example by learning new techniques, collaborating with colleagues overseas, or developing innovations in teaching. Up to £40,000 is available to provide replacement teaching costs and research and travel costs. Fellowships are offered for periods of 3 to 12 months, and must begin between 1 June 2017 and 1 May 2018. Approximately 15 fellowships are available in 2017.
Closing date: Thursday 10 November 2016.

EMERITUS FELLOWSHIPS enable retired academics from UK institutions to complete a body of research for publication. Up to £22,000 is available for research costs directly related to the project. Fellowships are offered for periods of 3 to 24 months, and must begin between 1 August 2017 and 1 July 2018. Approximately 35 fellowships are available in 2017.
Closing date: Thursday 2 February 2017.

STUDY ABROAD STUDENTSHIPS enable a period of advanced study or research anywhere in the world, except for the UK and USA. To qualify, applicants need to: hold an undergraduate degree; have been resident in the UK for at least five years; hold a degree at any level from a UK university; and either currently be registered as a student, or have been a registered student within the last eight years. Up to £18,000 a year is available for maintenance and travel; additional help with fees, research costs, and maintenance for dependents may also be provided. Studentships are offered for periods of 12 to 24, and must begin between 1 June 2017 and 1 May 2018. Approximately 20 studentships are available in 2017.
Closing date: Monday 9 January 2017.

For further details and applications please visit the Trust's website:
www.leverhulme.ac.uk/funding

For more information call 020 7042 9861/9862 or email grants@leverhulme.ac.uk

21

RECORDS OF PROCEEDINGS AT LMS MEETINGS
ORDINARY MEETING, 8 JULY 2016

held at University College London. Over 80 members and visitors were present for all or part of the meeting.

The meeting began at 3.30 pm with the President, Professor Simon Tavaré, FRS, in the Chair.

The Minutes of the Special General Meeting, which was held on 5 February 2016, had been circulated to members 21 days in advance of this meeting. Copies of those Minutes were also available at the meeting.

Attendees were reminded that the President had written to all members to invite suggestions as to how best Council might continue supporting the discipline around the interface between mathematics and computation.

Members were asked to ratify the Minutes of the Special General Meeting as an accurate record of the meeting and this was approved by a simple majority.

On a recommendation from Council it was agreed to elect Professor Chris Lance and Professor Rodney Sharp as scrutineers in the forthcoming Council elections. The President invited members to vote, by a show of hands, to ratify Council's recommendation. The recommendation was ratified unanimously.

Nine people were elected to Ordinary Membership: Hamid Ahmadinezhad, Janka Chlebikova, Sira Gratz, Karen Henderson, Matthew Hughes, Andrew Morris, Simon Leo Rydin Myerson, George Walendowski and Colin Wilmott.

Seven people were elected to Associate Membership: Arezour Akbari Fallahi, Gregorio Benedetto Benincasa, Richard Burgess, Ellis-Fauve Cresswell, Channa Gamage, Goran Malic and Amir Yaakbarieh.

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

The President, on Council's behalf, proposed that following people be elected to **Honorary Membership** of the Society: Professor Idun Reiten of the Norwegian University of Science and Technology in Trondheim and Professor Maxim Kontsevich of the Institut de Hautes Études Scientifiques.

This was approved by acclaim. The President read a short version of the citations, to be published in full in the *Bulletin of the London Mathematical Society*.

The President then announced the awards of the prizes for 2016:

De Morgan Medal: Professor Sir Timothy Gowers, FRS (University of Cambridge)

Fröhlich Prize: Professor Dominic Joyce, FRS (University of Oxford)

Senior Berwick Prize: Dr Keisuke Hara (Mynd. Inc) and Professor Masanori Hino (University of Kyoto) – joint award

Whitehead Prizes: Dr Arend Bayer (University of Edinburgh); Dr Gustav Holzegel (Imperial College London); Dr Jason Miller (University of Cambridge); Dr Carola-Bibiane Schönlieb (University of Cambridge)

Anne Bennett Prize: Dr Julia Wolf (University of Bristol)

The President introduced a lecture given by Professor Tony Scholl (University of Cambridge) on *Plectic Structures in Number Theory and Geometry*.

Following a break for tea, the President introduced the 2016 Hardy Lecture by Professor Jacob Lurie (Harvard University) on *Weil's Conjecture for Function Fields*.

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

The President also thanked Toby Gee (Imperial College London) for organising the Graduate Student Meeting in the morning and Ambrus Pal (Imperial College London) and Ian Grojnowski (University of Cambridge), who gave talks at the Graduate Student Meeting. Scott Harper (University of Bristol) was also congratulated on winning the prize for the best Graduate Student talk.

After the meeting, a reception was held at De Morgan House, followed by a dinner at the Blue Door Bistro in the Montague on the Gardens Hotel.

RECORDS OF PROCEEDINGS AT LMS MEETINGS
ORDINARY MEETING, 21 JULY 2016

held at the Technische Universität, Berlin (TU Berlin), as part of the 7th European Congress of Mathematics (7ECM) 2016. Over 60 members and guests were present for all or part of the meeting.

The meeting began at 4.30 pm with The President, Professor Simon Tavaré FRS, in the Chair.

There were no members elected to Membership at this Society Meeting.

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

Professor Tavaré introduced the LMS Lecture given by Professor Terry Lyons FRS, University of Oxford, on *From Hopf Algebras to Machine Learning via Rough Paths*.

Professor Tavaré expressed warm thanks to Professor Lyons and invited the audience to ask questions.

Afterwards, a wine reception was held in Room 3005 of the main building at TU Berlin.

Simon Tavaré (LMS President) welcomes new members

Colva Roney-Dougal,
Cedric Villani, Cheryl Praeger

Simon Tavaré (LMS President), Volker Bach
(DMV President)

Mrs Mori, Shigefumi Mori (IMU President), Jean-Pierre Bourguignon

LMS GENERAL MEETING AND HARDY LECTURE
Report

More than 80 were present in the JZ Young Lecture Theatre at University College London on 8 July 2016 to hear Jacob Lurie's Hardy Lecture, preceded by a talk from Tony Scholl of Cambridge University. Jacob Lurie is a Professor at Harvard University. He was an inaugural recipient of a Breakthrough Prize in Mathematics in 2014 "for his work on the foundations of higher category theory and derived algebraic geometry; for the classification of fully extended topological quantum field theories; and for providing a moduli-theoretic interpretation of elliptic cohomology". President Simon Tavaré began proceedings with the announcement of Caroline Series as President Designate and of this year's LMS Prize Winners – the details were published in the July 2016 issue of the *LMS Newsletter*.

After several participants had signed the Members' Book, the President introduced Tony Scholl, whose title was *Plectic structures in number theory and geometry*. He began by noting that by combining the Künneth formula for the cohomology of a product with the Hodge decomposition of the co-homology of a smooth complex variety, one obtained a quadruple grading on the cohomology of the product of two smooth varieties. It was this extra structure that his work, joint with Jan Nekovář, intended to generalize. The aim was to analyze the structure of certain varieties that were not products but were 'trying hard to be'. Tony explained that for the case of non-smooth varieties a more general *mixed Hodge structure* applied, but probably wisely for a general audience, he did not go into any details about what this meant, beyond saying that it involved filtrations rather than gradings. Parallel to the complex case was the *l*-adic cohomology of varieties defined over number fields.

Key examples of the varieties under consideration were Hilbert-Blumenthal Modular Varieties, which behaved, in certain respects, as though they were products. In particular their *l*-adic cohomology had a 'plectic' structure, the action of the *plectic group*, a wreath product of the Galois group. Tony told us that the word 'plectic' was not a back formation from 'symplectic', but referred to the wreath product involved in the definition. Indeed Wikipedia tells us that the word comes from the Latin *plectere* – to plait or interweave.

The final part of the lecture was devoted to explaining the motivation for this work. We were reminded that the Birch–Swinnerton-Dyer conjecture related the structure of the rational points of an elliptic curve to the order of the zero of an *L*-function at 1. (Bryan Birch, who had supervised the speaker's doctoral thesis, was in the audience.) Gross-Zagier and Kolyvagin had proved a special case of the BSD conjecture – when the order of the zero was one. Their approach involved Hilbert Modular Surfaces, the simplest case of Hilbert-Blumenthal Modular Varieties. It was this approach that Scholl and Nekovář hoped to generalize in order to study the case of a non-simple zero at 1. The lecture ended with an outline of a 'speculation' of how this programme might be realized.

Following a break for refreshments, Jacob Lurie gave his Hardy Lecture, entitled *Weil's Conjecture for Function Fields*. This was the eighth and final stage of a tour which, in under three weeks, had ranged from Southampton to Aberdeen. The first task was to explain Weil's Conjecture. The story began with quadratic forms, initially over the real numbers, and so classified by their signature. But the focus was to be on positive-definite forms over **Z**. Forms linearly equivalent over the integers would have to be equivalent modulo *N* for all *N*, but was the converse true? The answer was no, but for a given form *q* there were, up to equivalence, only finitely many possible forms *q*' which were equivalent to *q* modulo *N* for all *N*, and

the *Siegel Mass Formula* told us how many (weighting each form by the reciprocal of the order of its automorphism group). In the *unimodular* case (where the form was non-degenerate modulo each prime), the formula involved a product of values of the gamma and zeta functions. It showed, for example, that there are billions of inequivalent unimodular forms in 32 variables.

Jacob now proceeded to reformulate Siegel's result. That forms q and q' were equivalent modulo N for all N, amounted to saying that they were equivalent over the profinite completion of the integers. This led to the result that the possible forms q' were classified by a double coset of the locally compact group of linear symmetries of q of determinant 1 defined over the ring of adèles. There was a canonical *Tamagawa measure* on this group and the Siegel Mass Formula was equivalent to the fact that the quotient by the subgroup of symmetries defined over the rationals had volume 2. Calculations made by André Weil in 1959 suggested that a corresponding result held for all simply-connected semisimple algebraic groups defined over a number field. Thanks to the work of several authors,

by 1988 what had become known as Weil's conjecture on Tamagawa numbers had been proved in general.

Many results involving number fields (finite extensions of the rational field) have analogues involving function fields (finite extensions of the field of rational functions over a finite field). Jacob explained that understanding the function-field analogue of Weil's conjecture had proved substantially more challenging than the original formulation. This was unusual; often the function-field case turns out to be more tractable because of the availability of geometric tools.

Having explained Weil's conjecture so clearly, Jacob had just enough time to mention very briefly his recent proof, joint with Dennis Gaitsgory, of the function field case. It did indeed involve geometric ideas, but of a high level of sophistication.

The meeting was followed by a wine reception at De Morgan House, where it was apparent that the audience had been dazzled by two talks which had provided a glimpse into some exciting and beautiful mathematical developments.

Francis Clarke
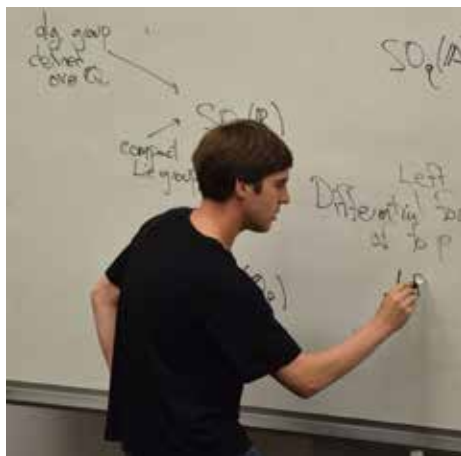
Jacob Lurie (Harvard University)
Hardy Lecturer

Tony Scholl
(Cambridge University)

LMS SUMMER SCHOOL 2016
Report

The second LMS Undergraduate Summer School was held in the School of Mathematics, Statistics & Actuarial Science at the University of Kent, from 10 to 22 July 2016, following the precedent set by the first school in Loughborough last year. The aim of the school was to present topics in modern mathematics to the UK's best and keenest students, before their final year of undergraduate studies, and to encourage them to consider a further career in mathematics. Institutions throughout the UK were invited to nominate potential candidates at the end of last year. After selection there were 50 participants from 36 different universities, who came to Canterbury for a fortnight of lectures and colloquia introducing them to a variety of topics outside the usual undergraduate curriculum.

In the first week there were three lecture courses: John Talbot introduced extremal graph theory, starting with classical results of Mantel and Turan before moving on to more recent developments including a graphical calculus (flag algebra) developed by Razborov, and indicating how this can be used in computer-assisted proofs; Paul Sutcliffe gave an overview of topological solitons, beginning with sine-Gordon kinks in one dimension, then describing two-dimensional models of ferromagnets (magnetic Skyrmions), and ending with numerical simulations of knotted vortices (Hopfions) and 3D Skyrmions in nuclear physics; and Shaun Stevens discussed local-global principles in number theory, going on from elementary properties of congruences and quadratic residues to define p-adic number fields, and finishing with the Hasse principle for quadratic forms. Each course consisted of three hours of lectures together with two exercise classes, which gave the students the opportunity to solve problems (alone and in collaboration) and interact more closely with the lecturers.

Another three courses were held in the second week: analysis was represented by Olga Maleva, who began with a proof of the Baire category theorem, then described the Banach-Mazur game on the real line, before discussing the situation for a general topological space, and ended with an application to function spaces; Sasha Veselov talked about polyhedra, giving an overview of Erhart's theory of convex integral polytopes, and finishing with the problem of how to reconstruct a polyhedron from its skeleton graph; and Gwyn Bellamy's course was a whirlwind

Summer School 2016 attendees

26

tour of representation theory, going from root systems and Coxeter graphs to quivers and path algebras, and managing to both state and sketch the proof of Gabriel's theorem. As the different lecture courses progressed, the students noted how the same structure (e.g. Coxeter-Dynkin diagrams) can reappear in apparently unrelated areas of mathematics, and this gave them a greater awareness of the unity of the subject.

In addition to the lectures, there were seven colloquium talks on a diverse range of topics. Ben Green presented an unsolved problem - what is the size of the largest subset of the first N integers with no 3-term arithmetic progression? - and described the best known lower and upper bounds, before explaining state of the art results (in a preprint of Gijswijt from this May) for an analogous finite field version known as the capset problem. Martina Balagovic gave a fascinating discussion of apparent paradoxes associated with the axiomatization of mathematics, ranging from the axiom of choice and Banach-Tarski to an amusing puzzle about smurfs, and ending with the Kirby-Paris hydra game, which is related to the consistency of Peano arithmetic. Andrew Hodges talked about the geometry of the rotation group in three dimensions, giving an idea of how this is related to electron spin, and indicating how to extend this geometrical understanding to the Lorentz group in special relativity. The talk by Malwina Luczak, on modelling infectious diseases, highlighted how mathematical and statistical techniques are relevant to public health professionals; random graph models were briefly mentioned, and deterministic models (based on logistic-type ordinary differential equations) were compared with their stochastic counterparts (based on Markov processes). Gwyneth Stallard discussed fractals in complex dynamics, introducing the notion of box dimension and presenting properties of Julia sets of quadratic maps, before going on to say something about her own work on exponential functions, as well as a recent result by her student Bishop. John Pearson described the possibilities of numerical analysis: weather forecasting, the eigenvalue problem used in Google's page ranking algorithm, and optimization problems with partial differential equations as constraints. Yosef Rinott gave a highly thought-provoking talk about the difficulties of multiple testing and estimation in statistics, starting with Simpson's paradox, and described how the false discovery rate can be used to test large numbers of hypotheses e.g. in epidemiology or genetics.

In the middle of the first week there was also a visit by Ekaterina Eremenko, a film director based in Berlin, with an exclusive screening of her film *The Discrete Charm of Geometry* in the Gulbenkian Cinema; she answered questions afterwards, and showed us her film *Colors of Math* in the Maths Lecture Theatre later that evening. She also gave the students a prize problem from the first film: what is the area of the largest triangle that fits on a flat torus? David Sheard from Durham won the prize by coming up with an original solution, based on calculus, before the start of the second film; by the next day Jakob Supel from Cambridge had found a more geometrical argument, and both David and Jakob got the chance to present their solutions to the others.

The students were really dedicated and their enthusiasm was impressive; after the first week some even complained that the breaks for tea/coffee were too long, saying that they wanted more lectures and classes! They also enjoyed the social and cultural activities at the end of the week, including a dinner in Canterbury, and a coach trip to Dover Castle and the white cliffs. Some of them also walked to the harbour at Whitstable, while others stayed in Canterbury to visit the cathedral or spend more time with their new-found friends. I think that the breaks were better appreciated during the second week, when we experienced some of the hottest days of the summer.

It was a great privilege for me to hear all the talks and absorb the wonderful atmosphere at the summer school. Apart from the academic benefits, the students said they really enjoyed being in a group of like-minded people, and they learned a lot about the collaborative nature of modern mathematics. The input of

the other members of the scientific committee was invaluable in the preparation of the school, while the practical details were all dealt with admirably by the local committee and the PhD student helpers at Kent. I am also grateful to the LMS Education Committee for their support.

The 2017 Summer School will be held in Manchester and the LMS will be approaching departments to nominate students to attend. I encourage all departments to take the opportunity.

Andy Hone
University of Kent

LMS SUMMER SCHOOLS
Call for Expressions of Interest

Since 2015, the London Mathematical Society has held an annual summer school, aimed at introducing strong undergraduates to modern mathematical research. The Summer Schools take place for a two-week period in July and have proved very popular. The Society now seeks expressions of interest in hosting the Summer School.

The host institution will be responsible for providing the infrastructure of the School. This will include:

- Catered accommodation for up to 60 undergraduates.
- Accommodation for c.15 lecturers.
- Developing, in association with the School Scientific Committee, the programme of scientific content.
- Lecture room(s) for the talks.
- Providing PhD students to assist the school e.g in exercises.
- Organising social activity and weekend excursions.

The host organisation will be expected to establish a local organising committee to manage the schools, and must provide a specific local lead who will be an academic in the Mathematics Department of the host institution. The local organising committee should also make certain that there is a designated contact in the institution's finance department who can manage payments.

The LMS will arrange for the collating of nominations from departments, will collect the departmental contributions and will advertise the schools around the UK.

The Schools are funded by an LMS Grant to be made to the host institution and by payments made by home departments of participating undergraduates.

Whilst expressions of interest in hosting the school would be welcome from any institution, the Society is keen that the School moves through the full geography of the UK. Previous hosts have been Loughborough (2015), Kent (2016) and Manchester (2017). Host institutions may send three eligible undergraduates to the school.

Departments interested in hosting the School in 2018 or 2019 are now asked to send a short (two sides maximum) expression of interest to Duncan Turton (lmssummerschool@lms.ac.uk) by **31 October 2016**. Whilst the expression need not be detailed it should include the name of the person in the department who would act as local organiser. The expression of interest should be signed by the head of department.

In terms of timing, Nominations open in September/October of the year prior to the School being held. That is, for 2018, nominations would open in September/October 2017.

At this stage, interested departments are asked to outline what facilities they can offer and talk about their experience in hosting other events. More detailed work would be undertaken with potential hosts in due course. Host institutions are welcome to make proposals for the scientific content of the summer school.

We hope that departments will be interested in helping to continue the summer school, which is regarded as a great success UKby both the Society and HoDoMS.

28

GALWAY TOPOLOGY COLLOQUIUM
Report

The 19th *Galway Topology Colloquium* took place on 1 August 2016 at the University of Leicester. This series of meetings began 19 years ago in Galway with the intention of bringing together general topologists from the UK and Ireland. The past two years the *Colloquium* has been coupled with the annual Summer Conference on Topology and its Applications, with a more inclusive atmosphere and a focus on the PhD students and early career mathematicians in all areas of topology. This year's meeting was quite successful with roughly 60 participants from six continents.

The meeting began with elevator pitches, consisting of short introductions to the research topics of the participants, along with an accompanying explanatory slide. This helped bridge the gap between the more experienced and the less experienced participants and gave the early career researchers exposure to the more established mathematicians. At the same time, this stimulated further discussion in different settings throughout the day.

The elevator pitches were followed by a plenary talk by Krystyna Kuperberg (Auburn, USA), who was a guest of honour in the Summer Conference on Topology and its Applications. Next came two parallel sessions of lectures by distinguished researchers: Jean Goubault-Larrecq (CNRS, France), Ieke Moerdijk (Utrecht, NL and Sheffield), Dona Strauss (Leeds) and Boaz Tsaban (Bar Ilan, Israel). These lectures were of an extended format (1.5 hours), which allowed for interaction and ample time for questions and discussion, thus preparing students for talks on related topics in the subsequent conference.

Krystyna Kuperberg and her mathematical granddaughter, Petra Staynova

Finally, there was a Careers Panel featuring the two co-founders of the *Galway Colloquium* – Paul Gartside (Pittsburgh) and Aisling McCluskey (NUI Galway) – as well as Krystyna Kuperberg (Auburn, USA) and Ulrike Tillmann (Oxford). The lively discussion provided a good setting for experienced mathematicians to share their expertise with early career mathematicians and to advise them on how to launch a successful career.

This conference was supported by the London Mathematical Society and the Leverhulme Trust.

Alexander Clark
University of Leicester

Attendees

29

YOUNG RESEARCHERS IN MATHEMATICS CONFERENCE
Report

YRM2016 attendees

The first week of August (1st - 4th) saw the annual *Young Researchers in Mathematics* conference come to St Andrews. Roughly 100 participants from all across the UK and abroad travelled to Scotland to give talks, listen to their peers and established researchers, and take part in several workshops during the week. A very high proportion (~70%) of postgraduate participants gave contributed talks in addition to 14 keynotes by established researchers representing many, if not most, branches of pure and applied mathematics. There were three plenary talks by Peter Cameron, Clément Mouhot and Graeme Segal, who talked, respectively, about the use of the classification of finite simple groups in mathematics, a history and journey into modern analysis of PDEs, and the ubiquity of homotopy theory in many fields beyond topology. Tuesday evening featured a public talk by Michael E. McIntyre, who delighted the audience by talking about the link between the Antarctic ozone hole and biological evolution, which was widely attended by the St Andrean public.

Michael E McIntyre delivering the public talk

Clément Mouhot (plenary speaker)

During the week several workshops were held for students to enhance their transferable skills repertoire. St Andrews University's newly acquired Jonathan Fraser held a workshop on giving talks, ThinkTank Maths Limited gave a workshop on using mathematics to tackle real-world problems, and The Brilliant Club taught participants how to teach their research to non-experts. A poster competition was held on Monday with Charles Cox (Southampton), Tse Leung So (Southampton) and Daniel Rogers (Warwick) taking first, second, and third place, respectively. Apart from the many talks and workshops, the obligatory wine reception and conference dinner, the participants were encouraged to dance the night away at a traditional Scottish Ceilidh in Upper College Hall. Many young -and some not so young- mathematicians proceeded to "Strip the Willow" and dance "The Dashing White Sergeant".

Judging by the participants' feedback, many left the meeting with new collaborative links forged, skills learned, and enjoyment having been had. One participant commented that "YRM2017 will have a hard time topping [this year]". I am certainly looking forward to them doing so.

Sascha Troscheit
University of St Andrews

TOPOLOGY AND ITS APPLICATIONS CONFERENCE
Report

The 31st summer conference on *Topology and its Applications* took place at the University of Leicester from 2 to 5 August 2016.

The conference was a great success and gathered the participation of over 180 mathematicians from many different countries around diverse areas of topology as well as their applications to dynamics and to computer science. This year Algebraic Topology had a very strong representation. The special session in Algebraic Topology, supported by an LMS Conference grant, saw the participation of over 40 mathematicians, with 20 speakers including top leaders in the field as well as some PhD students. In connection with the Algebraic Topology session there were plenary and semi-plenary talks by Ulrike Tillmann (University of Oxford) and Ieke Moerdijk (Utrecht University and University of Sheffield) as well as a workshop
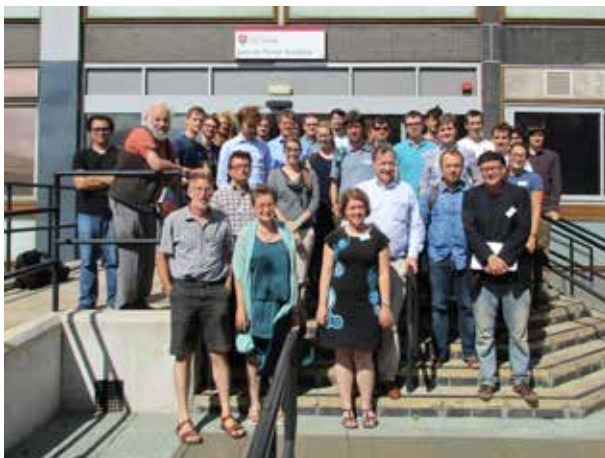
Algebraic Topology session

by Mike Hill (UCLA) on the solution to the Kervaire invariant one problem.

The title and abstracts of the talks are available at the conference website https://sites.google.com/site/summertopology/home.

Simona Paoli
University of Leicester

TOPOLOGICAL DYNAMICAL SYSTEMS AND OPERATOR ALGEBRAS

A one-day meeting on the connections between operator algebras and dynamical systems will take place at the University of Glasgow on Friday 2 December 2016. The aim of the workshop is to show how dynamical systems are studied through the lens of associated C*-algebras, which provide dynamical invariants in a noncommutative framework. The speakers are:

- Nadia Larsen (University of Oslo)
- Xin Li (Queen Mary University London)
- Mike Whittaker (University of Glasgow)

Further information is available on the workshop website (www.michaelwhittaker.ca/conference.html). The workshop will be followed by a *Scottish Operator Algebra Research Meeting* (http://tinyurl.com/glmznw7) on Saturday 3 December 2016. Participants are encouraged to attend both events.

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

MATHEMATICAL MODELS IN ECOLOGY AND EVOLUTION

City, University of London will host the sixth bi-annual *Mathematical Models in Ecology and Evolution Conference* from 10 to 12 July 2017. The conference will combine a series of talks and a mini-symposia discussing the latest developments in the field. It will also examine the importance of mathematical modelling to a new generation of researchers. Keynote speakers include:

- Nick Chater (University of Warwick)
- Caroline Colijin (Imperial College London)
- Ross Cressman (Wilfrid Laurier University)
- Hanna Kokko (University of Zurich)
- Nuala Sheehan (University of Leicester)

Abstract submission will open on 15 January 2017. Submission for the mini-symposia is now open. Visit the website for conference and submission details at www.city.ac.uk/mathematical-models-in-ecology-and-evolution.

The conference is supported by an LMS Conference grant.

32

VISIT OF YURI ANTIPOV

Dr Yuri Antipov (Louisiana State University, Baton Rouge, USA will visit the UK from 9 to 19 November 2016. He will deliver lectures on applications of constructive algebra-geometric methods, including Wiener-Hopf and Riemann-Hilbert techniques, to problems in solid and fluid mechanics. Dr Antipov's itinerary is:

• Brunel University, London – 9 November
• University of Cambridge – 10 November
• University of Liverpool – 11-12 November
• University of Bath – 13-14 November
• Imperial College London – 15-19 November

The visit is supported by an LMS Scheme 2 grant. Enquiries should be made to Professor Darren Crowdy (d.crowdy@ imperial.ac.uk).

RON SHAW

Professor Ron Shaw, who was elected a member of the London Mathematical Society on 15 June 1990, died on 21 June 2016.

Marion Shaw writes: In the 1950s my former husband, the mathematician Ron Shaw, who has died aged 86, derived a theory from what was understood about the elementary particles known as photons. The maths was very elegant, but it appeared to have no application in nature. Therefore Ron and his supervisor at Cambridge, Abdus Salam, later a Nobel laureate, decided not to submit the work for publication, though it did form part of Ron's doctoral thesis.

Meanwhile, in the US, the physicists C-N Yang and RL Mills had independently had exactly the same idea, publishing their work in 1954. In the early 1970s, it emerged that the Yang-Mills-Shaw theory underlies nuclear forces, although in a hidden and unexpected way. Not only that, but the theory also, in a different hidden manner, accounts for the weak radioactive decays of nuclear particles. And in the 1980s, it was used to prove important new mathematical theorems in geometry.

Ron was born in Stoke on Trent, the only child of working-class parents, Sam Shaw, and his wife, Emmie (nee Frost). His grammar school headmaster suggested that he apply to study at Trinity College, Cambridge.

Before taking up his place there, he undertook national service in Derby (1947-49). When his sergeant found that a severe astigmatism prevented him from firing a rifle accurately, he was sent to the dental corps, where he quite happily mixed amalgam for two years and cultivated the benefits of solitude. While at Trinity he made lifelong friends and found success as a leading college chess and bridge player.

In 1955 Ron became an assistant lecturer at Hull University. In 1989 he was appointed professor there, and six years later retired as emeritus professor. He remained passionately active in research, and contributed new structures and classifications to the study of finite geometry.

Until recently he played tennis, holding his own with younger members of his local club. Everyone misses his uncommon intellect, sense of humour and joyousness.

Ron and I married in 1967, and he is also survived by our daughter, Elizabeth, and a grandson. His second marriage, to Peak Yuen in 1988, ended in separation four years ago.

33

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LMS Prospects in Mathematics Meeting

16-17 December 2016

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

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University of York

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

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

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

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

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

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

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

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

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

34

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SOUTH WEST & SOUTH WALES REGIONAL MEETING

BATH

Tuesday 20 December 2016

2.15 – 2.30	Welcome
2.30 – 3.30	**Prof Simon Donaldson FRS**
	(Simons Center for Geometry and Physics and Imperial College London)
	Progress and problems on G_2 manifolds
3.30 – 4.00	Coffee break
4.00 – 5.00	**Prof Carlos Conca**
	(Universidade de Chile)
	An inverse problem in biological olfactory cilium
5.00 – 6.30	Wine reception
7.00	Dinner at Woods Restaurant

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 go.bath.ac.uk/lms2016/. The cost of the dinner will be approximately £40 including wine.

The meeting forms part of two regional workshops on *New Developments at the Interface between Geometry and Physics* (19–20 December 2016) and *Partially Ordered Materials – Mathematical Perspectives and Challenges* (21 December 2016). For further details visit: www.bath.ac.uk/imi/events or contact the organisers Johannes Nordstrom, Apala Majumdar and Jonathan Dawes at imi@bath.ac.uk .

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

PROBLEMS FOR METAGROBOLOGISTS by David Singmaster, World Scientific Publishing, pp 248, 2016, hb £48.00, ISBN 978- 9814663632, pb £23.00, ISBN 978-9814663649.

When I was first approached and invited to review this book it was suggested that since the book is (allegedly) aimed at puzzle specialists, it would seem that I was particularly well qualified. It was only much later that I wondered whether such praise was simply a ploy to make it more likely that I would agree.

As it happens, no such ploy was necessary. The book has been a delight to read, reuniting me with some old friends, and introducing me to many new ones. Further, it's quite clear that the book's audience isn't limited to specialists of any kind – there are puzzles of all types and levels here.

The sub-title *A Collection of Puzzles with Real Mathematical, Logical or Scientific Content* is disturbing in its lack of an Oxford Comma, and might also be regarded as a little over ambitious. Some of the puzzles, while admittedly excellent, do not (immediately) admit to any real depth of insight. Even so, the introduction subsequently makes it clearer that the real aim here is to present the puzzles, and then for the solution section not simply to state the answer, but to muse over it, giving some history, some explanation of the result, and in some cases to explore possible generalisations. And to give the book its proper due, some of the puzzles do lead to some very deep waters indeed, if the reader is prepared to wade in.

Especially lovely is the presentation of apparently familiar puzzles that turn out to have a surprising twist, catch, or other pitfall for the insufficiently cautious reader. I will not spoil the fun by naming any of them here, but I caught myself more than once grinning inanely at the trap that had been set. I'm sure I did not find them all.

It is in the nature of a collection such as this that not every puzzle will appeal to every reader - that is unavoidable. Some of them lack the elegance that makes a puzzle attractive, but both "elegant" and "attractive" are somewhat subjective terms, and so different puzzles will appeal to different readers. Even so, some of those puzzles that appear at first to be uninteresting can, in some instances, become more interesting because of the discussion of the solution. And therein lies the main difference between this book and many of the other compendia on my bookshelf.

But it is also the nature of books like this that one can't include everything, or please every reader. Some of the solutions are shorter than I would have liked, or more limited in scope. But expanding the solutions would require including fewer puzzles, so the trade-off had to be made. The balance struck is a reasonable one, but it puts the onus on the reader to become an active participant. One could simply read the puzzles, and read their solutions, but as with mathematics in general, the greatest benefit is obtained by engaging
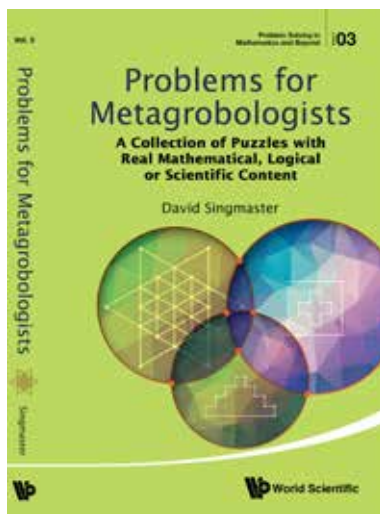
the problems and their solutions in hand-to-hand combat.

How can one engage a solution in combat? By looking not just at the solution given, but to ask whether there are other approaches, other techniques, and whether the problem can be generalised. It's by taking an active, investigative approach to the problems and solutions that the real mathematical content can be found.

Which brings us back to where we started. Perhaps the sub-title is appropriate after all, but not to the casual reader. Certainly the book is entertaining as it stands, but its real value lies in the opportunity it provides, showing the way with clearly communicated solutions that are examples, but not the whole story.

Colin Wright, Solipsys Ltd
Mathematics Department,
Keele University

PROF: ALAN TURING DECODED by Dermot Turing, The History Press, 2016, pp 320, pb £9.99, ISBN: 978 1841656601.

The author is Alan Turing's nephew, so he is writing about a member of his family. This is one of many ways that this book differs from the famous biography, *Alan Turing: The Enigma,* by Andrew Hodges. This is a book that Dermot praises and says that "nothing can possibly stand up to it". So in what ways is this book different? Firstly, it is much shorter than Hodge's book. It is better illustrated; there are 90 illustrations. Dermot, like Alan, also attended Sherborne School and King's College, Cambridge and the chapters on Alan's education are most interesting.

Why did Dermot write this book? This is explained in the introduction. "We all have our personal image of Alan Turing, and it is easy to imagine him as a solitary genius who periodically presented the world with stunning new ideas. I am sceptical about that solitary genius picture of Alan Turing.

It doesn't fit well with what was said about him at home during my childhood". Benedict Cumberbatch in a recent film played him as a rather bad-tempered geek, and reading this book makes one realise that this was not the case. There are numerous occasions where he is shown to have a good sense of humour and he also had very many very close friends. A word about the title. Alan Turing was never a professor. "Prof" was his nickname at Bletchley and it stuck.

Chapter 1 concerns Alan and Dermot's not always well-behaved ancestors going back to the 18th century. In chapter 3, Alan goes up to Sherborne. As an old boy of the school I got the feeling that Dermot was less critical of the school than Hodges. Before Alan got there the school concentrated on the classics, (in particular the three Rs, Religion, Rugby and Relentless Latin!) But in 1909 a new head was
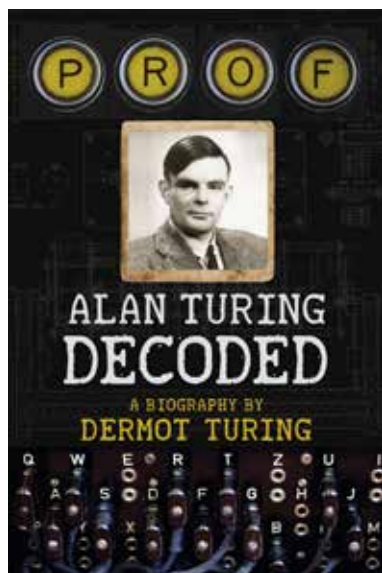
appointed who gave more emphasis to Science. At Sherborne Alan met his first love Christopher Morcom with whom he could discuss Maths and Science. Christopher would have gone up to Trinity, Cambridge, but he tragically died, which profoundly affected Alan and, some say, influenced his later work on machines which could think. Curiously there is no photograph of Christopher but there is a full page photo of his mother with whom Alan later became close.

Also discussed are Alan's other interests, particularly rowing and running. He was a keen rower at King's winning trophies. But he is better known as a marathon runner in which he also participated. A marathon time of 2hrs 46min. was recorded in 1947 and he might have won an Olympic place if it weren't for a leg injury.

Of course there is much about his work at Bletchley and the breaking of the Enigma code. This is now well-known but this was not always the case. Its secrets were not divulged until the eighties.

Chapter 5, Machinery of Logic, discusses Hilbert's program and discussed the Entscheidungsproblem. Turing solved this in his paper *Computable numbers*, where he introduced Turing Machines. The mathematics is discussed clearly but not in as much detail as Hodges. This paper laid the foundation for Computer Science and led to the development of computers which Alan worked on after the war, first at the National Physical Laboratory, Teddington and later at the University of Manchester. The book's emphasis is not so much on the scientific achievements, but on what circumstances got Alan to do what he did, i.e. what brought him to his ideas and how he interacted with the people around him. An interesting chapter is about his trial on charges of gross indecency. Dermot uses his legal training to comment closely on this. We find that Alan was treated more severely than others being tried at the same time including the person with whom he committed the offence who was basically let go. Dermot comments that "Alan's sentencing was procedurally flawed, partly illegal and ineffective".

In 1947, Alan gave a lecture implying that machines could think. To quote "In the way that Darwin's evolutionary theory had caused an irruption in the establishment of the nineteenth century, the Mechanical Brain had electrified the conservatives of the twentieth." An opponent was Sir Geoffrey Jefferson, a pioneering neurosurgeon, who questioned whether machines could write a sonnet. This controversy found its way into The Times and the *Third Programme*, a forerunner of Radio 3 in 1950, Turing wrote his famous (non-mathematical) paper *Computing Machinery and Intelligence* where he introduced *The Turing Test*. There is also a chapter on Morphogenesis.

Alan Turing died on 7 June 1954, official verdict, suicide. In a moving epilogue there is quoted a letter from Geoffrey Jackson which finishes "He had real genius, it shone from him". I quote further from this epilogue: "In the course of his short life he had solved one of the great theoretical problems of mathematics; laid down the theory of multipurpose computing machines; designed a codebreaking machine which provided priceless intelligence to the Allied war effort and used them to explain patterns found in living things. Yet Alan Turing's name was hardly known until the present century. Why is that? We now know this is due to the secrecy around his war work."

In 1992 there was a BBC *Horizon* programme about Turing. Marvin Minsky, who founded the MIT computer science and artificial intelligence laboratory, said "I don't know anything about this figure, one of the key figures of our century, and I wish I did". Dermot Turing's wonderful book would have helped him.

David Singerman
University of Southampton

CALENDAR OF EVENTS

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

OCTOBER 2016

12 LMS Good Practice Scheme Workshop, De Morgan House, London (462)

13-15 Mathematics in the Regions and Nations, Open University (461)

27 Curves in Honour of Leibniz's Tercentenary, Gresham College, London (461)

27 Data Sciences: Joint LMS meeting with the RSS and Fisher Memorial Trust, London (462)

28 Privacy: Recent Developments at the Interface between Economics and Computer Science INI Workshop, Cambridge (459)

NOVEMBER 2016

3 Probabilistic Formal Analysis of Software Usage Styles in the Wild, BCS-FACS Evening Seminar, London (462)

7-10 Statistical Modelling of Scientific Evidence INI Workshop, Cambridge (460)

11 LMS Graduate Student Meeting, London (462)

11 LMS AGM, London (462)

28-2 Dec Advances in Ergodic Theory, Hyperbolic Dynamics & Statistical Law Workshop, ANU, Canberra (461)

DECEMBER 2016

2 Topological Dynamical Systems and Operator Algebras Workshop, Glasgow (462)

3 Scottish Operator Algebra Research Meeting, Glasgow (462)

3 BSHM Christmas Meeting, BMI, Birmingham (461)

5-8 Australian Mathematical Society Annual Meeting, ANU, Canberra (461)

5-9 New Developments in Data Privacy INI Workshop, Cambridge (460)

9-10 Random Matrix Theory Brunel-Bielefeld Workshop, Brunel (461)

9-13 Nonlinear and Geometric Partial Differential Equations Workshop, ANU, Canberra (461)

12-16 Dynamic Networks INI Workshop, Cambridge (460)

16-17 LMS Prospects in Mathematics Meeting, York (462)

20 LMS South West & South Wales Regional Meeting, Bath (462)

JANUARY 2017

23-27 Structure of Operator Algebras: Subfactors and Fusion Categories INI Workshop, Cambridge (461)

MARCH 2017

22 Christopher Zeeman Medal Lecture, London (462)

APRIL 2017

3-6 BMC, Durham

10-12 BAMC, Surrey

MAY 2017

5 Mary Cartwright Lecture, London

JULY 2017

3-7 BSDEs, SPDEs and their Applications Workshop, Edinburgh

3-7 British Combinatorial Conference, Strathclyde

10-12 Mathematical Models in Ecology and Evolution Conference, City, University of London (462)

10-19 Foundations of Computational Mathematics Conference, Barcelona (461)

SEPTEMBER 2017

10-15 Mathematics Education for the Future Decade, Balatonfüred, Hungary (460)

LMS GRADUATE STUDENT MEETING
held on 8 July 2016 at University College London
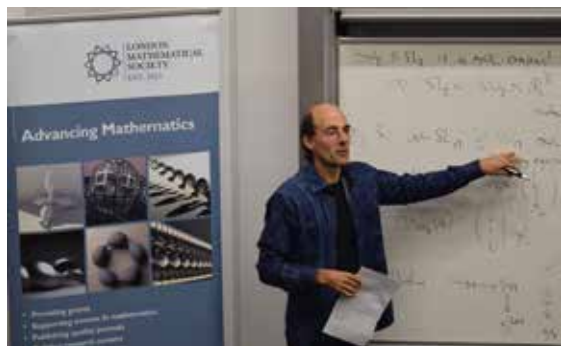
Ian Grojnowski (Cambridge)

Ambrus Pal (Imperial College London)
Massey Products in Galois Cohomology

Katie Vokes (Warwick)
Mapping Class Groups and How to Study Them

Scott Harper (Bristol)
Generating Graphs of Finite Groups

Rudradip Biswas (Leicester) *A Theorem of Gauss
and a Curious Classification of Primes into Classes
using Mechanism from the Theorem's Proof*

James Judd (King's College London)
*Tropical Version of the Critical Points of the Superpotential
from the Mirror Symmetry of Flag Varieties*