LONDON MATHEMATICAL SOCIETY

EST. 1865

ATHENA PRIZE

The London Mathematical Society Women in Mathematics Committee was presented with the inaugural Royal Society Athena Prize (see November *LMS Newsletter*) at the Royal Society Diversity Conference on 31 October 2016. The medal was presented by Dr Julie Maxton, Executive Director, Royal Society. See page 3 for images of the medal.
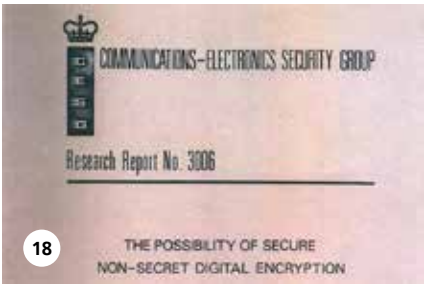

Dr Julie Maxton, Executive Director, Royal Society; Professor John Greenlees, LMS Vice President; Dr Cathy Hobbs; Professor Gwyneth Stallard; Dr Eugenie Hunsicker, Chair, Women in Mathematics Committee

SOCIETY MEETINGS AND EVENTS

- 16–17 December: Prospects in Mathematics Meeting, York *page 16*
- 20 December: SW & South Wales Regional Meeting, Bath *page 15*
- 18–22 April 2017: LMS Invited Lectures, Newcastle *page 24*
- 5 May 2017: Mary Cartwright Lecture, London
- 1 June 2017: Northern Regional Meeting, York
- 30 June 2017: Graduate Student Meeting, London
- 30 June 2017: Society Meeting, London

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No. 464 December 2016

The Athena Prize Medal

DAVID CRIGHTON MEDAL 2017
Call for nominations

The David Crighton Medal was established by the Councils of the LMS and IMA in 2002 in order to pay tribute to the memory of Professor David George Crighton, FRS. The silver gilt medal will be awarded to an eminent mathematician for services **both** to mathematics and to the mathematical community, who is normally resident in the mathematical community represented by the two organisations on the 1 January of the year of the award.

In 2015 the Councils of the Institute and the Society agreed that the frequency of the award should be increased, and the award is now considered biennially by the Councils. The medal-winner will normally be presented with the award at a joint meeting of the IMA and the LMS, and will be invited to give a lecture.

The David Crighton Medal was awarded in 2015 to Professor Frank Kelly, FRS. Previous winners of the Medal are Professor Arieh Iserles and Dr Peter Neumann, OBE (2012), Professor Keith Moffat, FRS (2009), Professor Sir Christopher Zeeman, FRS (2006) and Professor Sir John Ball, FRS (2003).

Nominations are now invited. These should be made on a nomination form available on both Societies' websites (https://www.lms.ac.uk/prizes/ima-lms-prizes) or from the Secretary to the David Crighton Committee (prizes@lms.ac.uk).

Nominations must be received by **28 February 2017**.

SPITALFIELDS DAY 2017
Call for proposals

The London Mathematical Society is pleased to offer grants of up to **£1,000** towards the cost of a Spitalfields Day.

A Spitalfields Day is a one-day event at which selected participants, often eminent experts from overseas, give survey lectures or talks, which are accessible to a general mathematical audience. The Spitalfields Day is often associated with a long-term symposium and speakers will generally give lectures on topics of the symposium.

The name honours the Society's predecessor, the Spitalfields Mathematical Society, which flourished from 1717 to 1845, and Spitalfields Days have been held each year since 1987.

The grant of £1,000 is intended to cover actual supplementary costs for the event, e.g. subsidising the cost for a lunch for participants, and for small travel grants of £50 to enable LMS members and research students to attend the event.

Previously supported Spitalfields Days have included:

2015: York *Mathematics of Quantum Uncertainty: New Advances and Prospects*
Speakers:
• Pekka Lahti (Turku, Finland)
• Reinhard Werner (Hannover, Germany)
• Madalin Guta (Nottingham)
• Paul Busch (York)
2014: INI, Cambridge *Theory of Water Waves*
Speakers:
• Professor Mark Groves (Loughborough)
• Professor Guido Schneider (Stuttgart)
• Professor Steve Shkoller (Oxford)
• Dr Eugene Varvaruca (Reading)

If you are interested in organising a Spitalfields Day, please write to the Society (grants@lms.ac.uk). The format need not be precisely as described, but should be in a similar spirit.

The next deadline for proposals is **31 January 2017**. Subsequent deadlines are 15 May and 15 September 2017. Please note the Society cannot fund events retrospectively so applicants are advised to apply well in advance of the event.

CHERN MEDAL 2018
Call for nominations

The Chern Medal is a relatively new prize, awarded once every four years jointly by the IMU and the Chern Medal Foundation (CMF) to an individual whose accomplish-

ments warrant the highest level of recognition for outstanding achievements in the field of mathematics. Funded by the CMF, the Medalist receives a cash prize of US$250,000. In addition, each Medalist may nominate one or more organizations to receive funding totalling US$250,000, for the support of research, education, or other outreach programs in the field of mathematics.
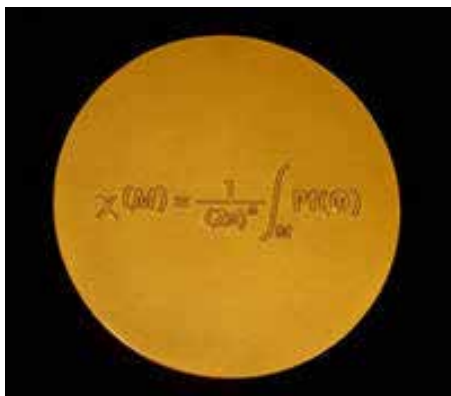
Professor Chern devoted his life to mathematics, both in active research and education, and in nurturing the field whenever the opportunity arose. He obtained fundamental results in all the major aspects of modern geometry and founded the area of global differential geometry. Chern exhibited keen aesthetic tastes in his selection of problems, and the breadth of his work deepened the connections of geometry with different areas of mathematics. He was also generous during his lifetime in his personal support of the field.

Nominations should be sent to the Prize Committee Chair: Caroline Series, email: chair@chern18.mathunion.org by **31 December 2016**. Further details and nomination guidelines for this and the other IMU prizes can be found at www.mathunion.org/general/prizes/.

CARING SUPPLEMENTARY GRANTS

The LMS acknowledges that a barrier to some mathematicians attending conferences/going on research visits can be the additional costs incurred to cover their caring duties, e.g. childcare or care for other dependents. Typically, these costs, although very real to the individual, are not considered by funding bodies. This gap was noted by the LMS Women in Mathematics (WiM) Committee some years ago and childcare supplementary grants were introduced to support parents (often, but not exclusively, women) with a maximum of £200 per claim. More recently, this scheme has broadened to cover all types of caring.

As part of the process of requesting a grant through this scheme, applicants are asked to enquire of their own institution and the conference organisers whether any caring grants are available. If their institution does not support claiming supplementary caring costs, a letter is sent from the Chair of the LMS WiM Committee to the Head of Department suggesting that such funding ought to be in place (note that the letter does not name the applicant but is couched in general terms). Some institutions have claimed that providing childcare funds would be against Inland Revenue rules. The LMS has thoroughly investigated this and discerned that this is not the case where caring funding is required to allow someone to attend activities outside their normal working hours (e.g. undertaking extra work-related training, of which attending conferences is an example). Full details of the HMRC rules on this are available on the LMS website.

Recipients of the caring grants are required to complete a short report about the use of their grant. It is very interesting to note from recent reports that the number of institutions now providing funding towards supplementary caring costs is increasing. It was always an aim of the LMS WiM Committee that by setting the precedent it would encourage others to provide such funding so that eventually the LMS would not need to do so. We are very pleased that this is becoming a reality (if slowly).

Up to now, all requests for funding have been for extra childcare costs incurred when the parent (or parents) attend a conference or a short research visit. Most have been from women but there have been a number of applications from men. One of the principles of offering the grants is that the recipient can use it to provide care in the way most appropriate to them

and their children. A very small number of conferences offer childcare on site, but for most the sensible approach is either to pay for extra childcare at home (e.g. extended nursery hours, after school club costs) or to take the child(ren) with them and use the grant towards the extra costs of travel, accommodation and possibly an accompanying child carer. Of course, £200 does not go far in this situation but it is at least a contribution. The evidence from the reports received is that it has made a difference to many recipients, enabling them to continue attending conferences and meeting research colleagues during a phase of life which often comes at a critical point in their career.

If you or a colleague would like to apply for funding to support additional caring costs the details of the scheme are available on the LMS website under Grants and Prizes. Any mathematician may apply. If the applicant is not an LMS member, the application must be countersigned by a member. Funding is not guaranteed, as budgets are not infinite, but each case is considered carefully against the criteria set out in the scheme. There are three deadlines per year; the next one is **22 January 2017**.

Case Study

Dr Dimitra Kosta is a Daphne Jackson Trust Research Fellow at the University of Edinburgh. She applied for supplementary childcare funding to cover the additional costs of bringing her two children, aged 2 and 4, with her to the British Applied Mathematics Colloquium in Oxford during Easter 2016. The benefit to her research was the opportunity to participate in a mini-symposium on Applied and Computational Algebra during the conference and to interact with other researchers in the emerging field of Algebraic Statistics. Funding was requested for accommodation costs for the children and childcare during the conference. Dimitra also applied to the University of Edinburgh for supplementary funds. Between the two funders the extra costs were covered and she was able to attend the conference and give a talk in the mini-symposium. Most notably, this visit facilitated important discussions with colleagues in Oxford which led to initiating a UK research network in Applied Algebra and Geometry.

LMS COUNCIL DIARY

14 October 2016: A personal view

The October Council meeting included, among other significant items, a noting of the Education Committee's response to the Higher Education and Research Bill, and a report from Vice-President Brown about meetings he had attended of the EPSRC Strategic Advisory Team and also with the new Deputy Chief Executive Officer of EPSRC.

In this diary entry, however, I'd like to highlight part of the President's update that personally resonated. When my family relocated to the UK eight years ago, my older daughter had only recently had her first birthday. I was deeply impressed by, and directly benefitted from, the support available to people with caring responsibilities in the mathematics community here, and soon learned this was down to the incredible activity and persistence of the LMS and its Women in Mathematics Committee. Over the years I learned of the many other ways in which the LMS values and celebrates diversity in mathematics and in particular celebrates the contributions of women through programmes such as its Grace Chisholm Young fellowships and the Mary Cartwright Lectures.

I was delighted, then, when October's Council meeting began with the President sharing the wonderful news that the LMS had been awarded the inaugural 'Athena Prize' by the Royal Society for its Women in Mathematics work. The President noted that the prize was a result of a large amount of teamwork involving a number of people, particularly including current Council member Gwyneth Stallard who had chaired the Women in Mathematics Committee for ten years.

The President also congratulated Gwyneth Stallard on her receiving a 'Suffrage Science' award from the Royal Society, in the first round of these awards that had been made to women in computing and mathematics. The award ceremony took place on Ada Lovelace Day (11 October 2016) at Bletchley Park. Professor Stallard had with her the actual prize, a specially designed piece of heirloom jewellery inspired by mathematics and designed to be passed on from prize winner to prize winner; a photo and further details can be found at http://csc.mrc.ac.uk/celebrating-women-science-ada-lovelace-day-2016/.

I heartily join the rest of Council in congratulating Professor Stallard and all those involved in the work recognised by these awards!

Tara Brendle

WOMEN OF MATHEMATICS THROUGHOUT EUROPE

This touring exhibition, born from the enthusiasm and tenacity of mathematicians Sylvie Paycha and Sara Azzali together with photographer Noel Tovia Matoff, started at the 7th European Congress of Mathematics held in July 2016 in Berlin. The project was supported by the Humboldt Foundation in the form of a Prize, the 'Humboldt Alumni Award 2015 for Innovative Networking Initiatives', as well as various other organisations among which is the LMS. It stems from the observation that nowadays, women still find it difficult to embrace a career in the mathematical academic world and that the disparity between the proportion of men and that of women among professional mathematicians is still shamefully large.

The thirteen women mathematicians portrayed on 0.8m x 1.6m panels share their experience, thus serving as role models to stimulate young women scientists to trust their own strength. In presenting mathematics through women mathematicians' perspectives and samples of their life stories, the exhibit hopes to highlight the human aspects of producing mathematics, making this discipline more tangible and therefore more accessible to outsiders or newcomers.

Following the opening in Berlin, the exhibit will travel to several other cities in Europe. This touring format is envisaged as a networking opportunity, reinforcing collaborations and exchanges between mathematicians in different European countries, and stimulating dialogue around the themes of the exhibition between the general public and mathematicians.

So far, five venues have been confirmed in the UK:
- 3-7 April 2017, Durham (during the British Mathematical Colloquium 2017); contact Anne Taormina (anne.taormina@durham.ac.uk)
- 25 April 2017 onwards, Cambridge; contact Carola Schoenlieb (cbs31@cam.ac.uk)
- 5-12 June 2017, York; contact Julie Wilson (Julie.wilson@york.ac.uk)
- 29 July – 16 August 2017, Oxford; contact Dyrol Lumbard (Dyrol.lumbard@maths.ox.ac.uk)
- 18 September – 10 October 2017,

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Katrin Wendland (Freiburg University Germany)

Leeds; contact Elena Issoglio (E.Issoglio@leeds.ac.uk)

King's College London will host the exhibit in early 2017; contact Lucy Ward (lucy.ward@kcl.ac.uk).

The International Congress of Mathematicians (ICMS) has a copy of the exhibition that will be on display during ICMS events in 2017 and at other times and venues which have yet to be announced; contact Madeleine Shepherd (madeleine. shepherd@icms.org.uk).

If you are interested in hosting the exhibition, please contact Ammar Alsaedy (alsaedy@math.uni-potsdam.de)   to obtain information on the logistics, in particular on how to obtain the posters.

The website of the touring exhibition is http://womeninmath.net/.

A taster of the exhibition

What would you recommend to a young woman in your country wanting to start a career in mathematics?

A young woman who has just finished school I would advise to give it a try, and be honest with herself as to whether she enjoys mathematics or not. I would recommend that she be patient, and to keep on trying when an obstacle comes in the way. If doubts emerge later on in her career, such as thinking that she is not "good enough", I would ask her why and tell her to trust her own abilities. Such doubts often arise from a mere lack of self-confidence. It is a good thing to be self-critical, but you should not put yourself down!

Anne Taormina
University of Durham

MATHEMATICS POLICY ROUND-UP

November 2016

RESEARCH

HEFCE to develop the next REF
Following the publication of Lord Stern's Independent Review of the Research Excellence Framework (REF) and confirmation from the Minister for Universities, Science, Research and Innovation, Jo Johnson, HEFCE will work with the other UK higher education funding bodies to develop the next REF. More information is available at http://tinyurl.com/hz6rxtq.

New UK research and innovation governing body

Information has been published about a new UK research and innovation (UKRI) governing body as set out in the Higher Education and Research Bill. Details include UKRI's, role and purpose, funding principles and governance structures.

There is also information on Innovate UK, which includes its role in the new structure as one of nine UKRI councils and its current and future role supporting innovative organisations. More information is available at http://tinyurl.com/zur4sjt.

OTHER

Leaving the EU: Implications and opportunities for science and research

A transcript of evidence was given by Mr Robin Walker MP, Parliamentary Under-Secretary of State, Department for Exiting the European Union, Jo Johnson MP, Minister for Universities, Science, Research and Innovation, and Gareth Davies, Director General, Business and Science, Department for Business, Energy and Industrial Strategy. Details are available at http://tinyurl.co m/hb9x8mo.

Dr John Johnston
Joint Promotion of Mathematics

WHY YOU SHOULD JOIN THE EUROPEAN MATHEMATICAL SOCIETY

Following a recent rule change, students are now entitled to three years' free membership of the European Mathematical Society. Here is why you might want to join.

Last year, as the LMS was celebrating its 150th birthday, the European Mathematical Society (EMS) reached the more youthful milestone of 25 years. It was founded in Madralin in Poland in 1990, as a means for national mathematical societies to collaborate. Its inauguration followed a decade-long debate about whether a purely meta-society was desirable, or whether it should admit individual members. With the 1989 fall of the Berlin Wall as a catalyst, the EMS was born, and offers membership in three categories: member societies (the LMS, IMA, Edinburgh Mathematical Society and over 50 others), institutional members (over 40, with Cambridge's *Isaac Newton Institute* and Edinburgh's *International Centre for Mathematical Sciences* currently the only UK representatives), and individual members (currently around 3000 in total, of which only 230 are UK-based).

The EMS is itself a member of the *Initiative for Science in Europe*, through which it cooperates with other learned societies and accesses the ears of Brussels policy-makers. The EMS also boasts close links with the European Research Council (the current ERC President, Jean-Pierre Bourguignon, was the second EMS President).

What does the EMS do?

The EMS aims to support working mathematicians in a wide range of ways, from organising graduate student Summer Schools to protesting the persecution of academics in Turkey. Its work is carried out largely through its standing committees: Applied Mathematics, Developing Countries, Education, Electronic Publishing, ERCOM (= Scientific Directors of European Research Centres in the Mathematical Sciences), Ethics, European Solidarity, the Executive Committee, Meetings, Publications, Raising Public Awareness, and Women.

…and what about Brexit?

The EMS has always reflected Europe, broadly construed. (The Belarusian, Moscow, and Swiss mathematical societies are full

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members.) So there is no prospect of LMexit! Nevertheless, current events will have an impact on UK mathematicians. More than ever, we need friends across Europe. EMS President Pavel Exner attended a meeting at the Houses of Parliament on the scientific impact of Brexit; the EMS is pushing the message that UK science should remain open and connected to Europe, and is monitoring the situation closely.

Why should you join?
The main answer is to engage with and support our European community of mathematicians. Individual benefits include free access to zbMATH and the online *Journal of the European Mathematical Society* (JEMS), reduced registration fees for our marquee event the quadrennial European Congress of Mathematicians, and for numerous other meetings, and discounts on EMS books and journals.

Information (including how to join) is on our website www.euro-math-soc.eu where you can also read all issues of the *EMS Newsletter*. Plus, LMS members receive 50% off EMS membership. You can join through the LMS: just add EMS to your membership profile under the "journal subscriptions" tab, or mention your LMS membership when joining the EMS directly.

EMS Presidents: Pavel Exner (since 2015), Marta Sanz-Solé (2011-2014), Jean-Pierre Bourguignon (1995-1998), Ari Laptev (2007–2010)

Follow us on Twitter @emsnewsletter, Facebook @EMSnewsletter, and Google Plus +EuromathsocEurope.

Richard Elwes
Publicity Officer, EMS

EUROPEAN NEWS

Job market

Two graduate students from Berlin have designed a new tool *MathHire* for the job market for mathematicians that turns more and more global. Apart from facilitating publication of easily searchable job advertisements, it contains a web interface allowing confidential review and evaluation of uploaded applications by an assessment committee set up by an employer. Job advertisements are free of charge for academic employers, and so is searching and uploading of documents for an applicant. The full management of an assessment process is available for a fee. The European Mathematical Society has signed a cooperation agreement with MathHire; the tool is linked to the society's web site. As part of the cooperation, the institutional members of the EMS receive one free listing per year and a 20% discount on every paid listing thereafter. See https://mathhire.org.

Comenius

The EU *Comenius Project: DQME* (Develop-

ing Quality in Mathematics Education) has produced an enormous amount of practical classroom materials, as well as many new ideas for learning and teaching mathematics. These materials have been available throughout the 11 partner countries and in ten languages, via the DQME project website. This website has changed address to www.dqime.uni-dortmund.de.

Research Chair at AIMS

The *Alexander von Humboldt Foundation* is announcing a research chair, financed by the German Federal Ministry of Education and Research (BMBF), at the *African Institute for Mathematical Sciences* in Bagamoyo, Tanzania. AIMS Tanzania (www.aims.ac.tz) is part of the AIMS-Next Einstein Initiative (AIMS-NEI, www.nex-teinstein.org) seeking to establish a coordinated network of 15 supra-regional centres of excellence in Africa during the next ten years to help meet the need for scientists trained in mathematics. The first AIMS centres in South Africa, Senegal, Ghana and Cameroon are models for AIMS Tanzania and other institutes being created in Africa. The internationally advertised research chair is designed to help strengthen university education in mathematics and research in Africa, promote networking between AIMS Tanzania and German universities, and support networking amongst the various AIMS centres in Africa. The application deadline is **1 February 2017**. See http://tinyurl.com/ja9f6ze.

David Chillingworth
LMS/EMS Correspondent

2017 HEILBRONN FOCUSED RESEARCH GRANTS

Call for proposals

Heilbronn Institute for Mathematical Research

The Heilbronn Institute for Mathematical Research is offering a number of grants of up to £7.5K to fund focused research groups to work on adventurous and challenging mathematical problems, or to discuss important new developments in mathematics.

These grants will support travel and local expenses for groups to come together to focus intensively on a problem or to discuss a significant new development in mathematics. We expect these groups to be normally 12 or fewer people. Groups are encouraged to include international participants, but should also involve a substantial UK-based component.

Open to all mathematicians and to any department in the UK.

Proposals of no more than one page of A4 should be sent by **16 January 2017** to: heilbronn-manager@bristol.ac.uk

For further particulars and additional information, please visit our website: http://heilbronn.ac.uk/opportunities/

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LMS PRIZES 2017
CALL FOR NOMINATIONS

The London Mathematical Society welcomes nominations for the 2017 prizes, to recognise and celebrate achievements in and contributions to mathematics.

In 2017, the LMS Council expects to award:

PÓLYA PRIZE is awarded in recognition of outstanding creativity in, imaginative exposition of, or distinguished contribution to, mathematics within the United Kingdom.

SHEPHARD PRIZE is awarded to a mathematician or mathematicians for making a contribution to mathematics with a strong intuitive component which can be explained to those with little or no knowledge of university mathematics, though the work itself may involve more advanced ideas.

SENIOR WHITEHEAD PRIZE – grounds for the award may include work in, influence on or service to mathematics, or recognition of lecturing gifts in the field of mathematics

NAYLOR PRIZE AND LECTURESHIP IN APPLIED MATHEMATICS – grounds for the award may include work in, and influence on, and contributions to applied mathematics and/or the applications of mathematics, and lecturing gifts.

SENIOR ANNE BENNETT PRIZE – grounds for the award are work in, influence on or service to mathematics, particularly in relation to advancing the careers of women in mathematics.

WHITEHEAD PRIZES – for work in and influence on mathematics.

BERWICK PRIZE is awarded to the author(s) of a definite piece of research actually published by the Society during the eight years ending on 31 December 2016.

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

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

Closing date for nominations: Tuesday 24 January 2017

Heilbronn Institute for Mathematical Research

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LMS RESEARCH SCHOOLS
CALL FOR PROPOSALS

The London Mathematical Society invites proposals for Research Schools to be held in the UK in 2018.

Up to £20,000 is available per Research School which provides training for young researchers in a core area of mathematics. The new series of courses builds on the research schools, previously supported by the Society and Clay Mathematics Institute, and aims at the highest international standing by allowing for support of both international lecturers and participants. The Research Schools are also supported by the Heilbronn Institute for Mathematical Research.

Prospective organisers should send an outline proposal to Elizabeth Fisher (Research.Schools@lms.ac.uk) by **31 January 2017**.

Outline proposals should discuss:

- The general mathematical area of the proposed Research School and its importance.
- The aims of the Research School, its appropriateness to the Research School programme and the likely level of demand for the Research School.
- The names and affiliations of the lecturers, titles of their courses and brief syllabuses.
- The provision for tutorial support.

Outline proposals should be no more than two A4 sides in length.

For further details about the Research Schools, please visit the Society's website: www.lms.ac.uk/events/lms-research-schools.

A list of previously supported Research Schools and Short Courses can be found at: www.lms.ac.uk/events/past-research-schools-and-short-courses.

Before submitting: Organisers are welcome to discuss informally their ideas with the Chair of the Research Meetings Committee, Professor Chris Parker (RMC.Chair@lms.ac.uk).

Institute of
mathematics
& its applications

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Christopher Zeeman Lecture and Medal Presentation

Rob Eastaway

**Wednesday 22 March 2017 at 6.00 p.m. followed by a reception
at The Royal Society, Carlton House Terrace,
London, SW1Y 5AG
Registration will open at 5.30 p.m.**

Maths, Teamwork and Googlies

Abstract: Maths is usually regarded as a solo activity, yet some of the richest mathematical experience can come from collaboration: think of Hardy and Ramanujan...Lovelace and Babbage... Duckworth and Lewis. Rob Eastaway takes a light-hearted look back at some of his own mathematical partnerships that have explored games, puzzles, mathematical modelling of everyday life... and even (a little bit of) cricket.

Rob Eastaway will give the Christopher Zeeman Lecture and be presented with the Christopher Zeeman Medal, which is awarded biennially by the Institute of Mathematics and its Applications and the London Mathematical Society.

Admission to the lecture and reception is by ticket only.
For tickets please contact Alison Penry at the IMA, Catherine Richards House, 16 Nelson Street, Southend-on-Sea, SS1 1EF or email alison.penry@ima.org. uk by **1 March 2017**. Tickets are free of charge and will be allocated on a first come, first served basis.
Please confirm whether you wish to attend the lecture and reception, or the lecture only.

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SOUTH WEST & SOUTH WALES REGIONAL MEETING

BATH
Tuesday 20 December 2016

2.15 – 2.30	Welcome
2.30 – 3.30	**Professor 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	**Professor 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 contact the organisers Johannes Nordström, Apala Majumdar and Jonathan Dawes at e.n.ritchie@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.

LMS NEWSLETTER

UNIVERSITY of York

LONDON MATHEMATICAL SOCIETY
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LMS Prospects in Mathematics Meeting

16-17 December 2016

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

© Georgi Mabee

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

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

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

Pure Mathematics
o   Victor Beresnevich (University of York) *Analytic Number Theory*
o   Peter Cameron (University of St Andrews) *Algebra and Combinatorics*
o   Tony Carbery (University of Edinburgh) *Harmonic Analysis and PDEs*
o   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 .

MATHEMATICS IN THE REGIONS AND NATIONS

Report

On Thursday 13 and Friday 14 October 2016, the inaugural *Mathematics in the Regions and Nations* conference took place at The Open University, Milton Keynes. This event, recognising the contributions of the university's regional academics to research and scholarship, was supported by the London Mathematical Society under the "Celebrating New Appointments" scheme to mark the appointment of four staff tutors in recent years.

Staff Tutors Gareth Williams, Carol Calvert, Rachel Hilliam and Alison Bromley at tea

Over the two days, 25 attendees (and three delegates attending remotely) heard a mixture of talks covering aspects of applied mathematics, statistics, and methods in mathematical education. On Thursday, the talks were: Jonathan Wattis (Nottingham) on *Solitary waves in nonlinear lattices*, Sue Pawley (OU) on *Provision of online support for mathematical techniques*, Katrine Rogers (OU) on *Optimising optical superoscillations for sub-wavelength focussing*, and Giampaolo D'Alessandro (Southampton) on *Multiscale models of liquid crystals with inclusions*. In the evening, discussion continued while we enjoyed the conference dinner at a nearby pub.

On Friday, the talks were Chris Hughes and Karen Vines (both OU), jointly speaking on *Listening to graphs*, Ben Wells (Schlumberger) on *The anatomy of a reservoir simulator*, Andrew Jenkins (UCL) on *Who upgrades to higher-level qualifications in mid-life? Some evidence from British birth cohort data*, and Carol Calvert (OU) on *Making the most of the data you have – love the uncertainty!*

At a time of significant change for the regional academics in the OU, this meeting brought a welcome focus on the role of research and scholarship. Discussions are already underway for this meeting to become an annual recurrence.

Robert Brignall
The Open University

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Delegates during the afternoon tea break

BRITISH SCIENCE FESTIVAL, Swansea, 6-9 September 2016
GWYL WYDDONIAETH PRYDAIN, Abertawe, 6-9 Medi 2016
Report

This year's Festival, hosted by Swansea University and with main sponsor Siemens, attracted large and enthusiastic audiences for all the events which I attended. Here I shall concentrate on the five events particularly associated with mathematical sciences, though mathematics, often in the form of data handling, featured strongly in other events – there were even some explanatory graphs in a highly entertaining talk *Why we laugh*. Also, for the Family Weekend after the main Festival, there was *Mathematical Circus*, contributed by the Further Maths Support Programme Wales.

© Peter Giblin

Jason Lotay and Katie Steckles

The President of the Mathematical Sciences 'Section' of the 2016 Festival was the well-known number theorist Richard Pinch, who is Strategic Advisor, Mathematics and Security Research at GCHQ. Richard's presidential lecture was *Post-modern cryptography: the unbreakable code?* He emphasized the critical importance of 'cyber-security': cyber-attacks are classified as a 'Tier 1 risk' along with international terrorism, military crises and major accidents or natural hazards. Modern cryptography dates from the 1970s with the independent discovery of public-key techniques by Clifford Cocks at GCHQ and the trio of RSA = Rivest, Shamir and Adelman. All such public-key methods depend for their security on the intractability of reversing certain mathematical operations; however, recent developments in quantum computing suggest that these problems might be solvable sufficiently quickly to render current public-key methods unsafe. Post-modern cryptography will find ways to combat these advances, but also we are entering the era of quantum cryptography itself. Some names to look for

here are quantum key distribution (QKD) and SOLILOQUY: GCHQ's proposed new public-key cryptosystem – and the quantum algorithm they devised to break it! Whatever happens, mathematics will continue to be at the centre of developments. Richard's talk was followed by a reception, sponsored by a donor to the Institute of Mathematics and its Applications.

Jason Lotay's *Adventures in the 7th dimension* took the audience carefully through the spatial dimensions: point, segment, square, cube, tesseract, with glances at *Flatland*, W.I. Stringham's 1880 drawings of 4-dimensional figures and the 2014 film *Interstellar*. Jason then discussed holonomy, the transformation of vectors transported round a loop in a curved manifold, including the exceptional G_2 holonomy in 7 dimensions. This led into gravity, quarks and the quest to connect them via the many models of string theory, requiring an increase to 10 dimensions. Finally, Jason coaxed the audience into the rarefied atmosphere of Witten's 'M-theory' which shows that moving to 11=4+7 dimen-

sions (with the 7 having the symmetry properties discussed at the lecture) all the various 10-dimensional models are really equivalent.

Alan Hawkes (Swansea University Business School) spoke about *Predicting the unpredictable*. 'Hawkes processes' model events occurring in time sequence (possibly with spatial variables too) where one type of event influences the probability of another type of event occurring at some future time (or time and place). Many examples were given, including the incidence of gang warfare in Los Angeles, earthquakes in Japan, quantitative finance, neuroscience and social networks. Spatio-temporal Hawkes processes applied to gang warfare or car theft can in principle alert police in advance to where trouble is likely to erupt.

Adam Kucharski (London School of Hygiene and Tropical Medicine, author of *The Perfect Bet* on the mathematics of gambling) gave the Rosalind Franklin Award Lecture in Physical Sciences on the modelling of epidemics with the title *The calculus of contagion*. He looked at the recent Ebola epidemic and the lessons learned, including retrospective analysis which showed that interventions were very effective, but would have been even more so had they happened slightly earlier. He talked about the difficulties of testing vaccines: by the time a vaccine is developed, epidemics are probably in the declining stage so it is difficult to measure their effectiveness. He also discussed the problems presented by different diseases; for example influenza is particularly difficult to tackle because it develops so fast.

Philip Aston (University of Surrey) and Manasi Nandi (KCL) presented their work
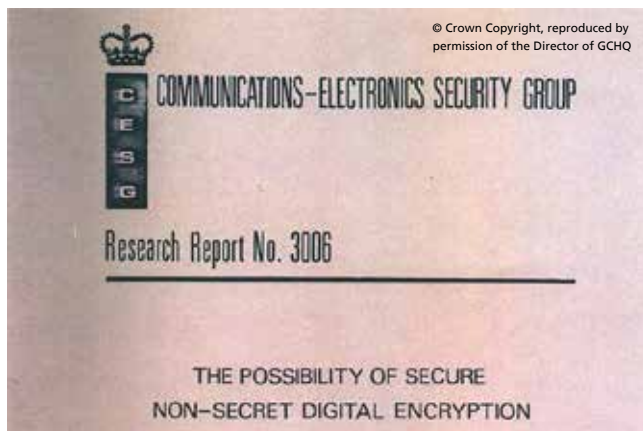
Clifford Cocks invented public key cryptography in this 1973 report

on analysing heartbeats in *Can mathematics solve sepsis?* Sepsis (blood poisoning which can lead quickly to organ failure and death) kills about 44,000 people just in the UK each year. The speakers proposed a technique which samples three points from the moving waveform of a person's cardiac signal and displays relevant information quickly as a *cardiomorph*, which is a 'diagonal view' of the resulting plot in 3-dimensional phase space. Changes in this display—a slightly curvy, rotated, thickened, colour-coded equilateral triangle, give early warning that something is going seriously wrong.

Special thanks to Katie Steckles, Publicity Officer of the Mathematical Sciences Section of the Festival, who introduced four of the five talks (even she cannot be in two places at the one time) with wit and expedition.

The 2017 Festival will be in Brighton (see http://www.britishscienceassociation.org/british-science-festival) with maths president Colva Roney-Dougal. Anyone with an idea for an event, or an Award Lecture by a young and gifted speaker, should contact myself (Peter Giblin, pjgiblin@liv.ac.uk) or the Chair of the Mathematical Sciences Section, Tony Mann, a.mann@gre.ac.uk.

Peter Giblin
University of Liverpool

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ALGEBRAIC, TOPOLOGICAL AND COMPLEXITY ASPECTS OF GRAPH COVERS

The 8th workshop on *Algebraic, Topological and Complexity Aspects of Graph Covers* (ATCAGC 2017) takes place at Durham University from Monday 9 January to Friday 13 January 2017. The workshop's main focus is on graph coverings and their applications in different areas of theoretical computer science and mathematics, such as models of computation, computational complexity, and algebraic graph theory. The aim of the workshop is to bring together researchers working on these diverse aspects of graph coverings, and to provide an opportunity for them to introduce their approaches and results to one another and to try to pursue joint research. The plan is a small number of survey talks, several open problem sessions, and ample time for discussions and problem solving. Invited speakers are:

- Pavol Hell (Simon Fraser University)
- Daniel Kráľ (University of Warwick)
- Edita Máčajová (Comenius University)

See http://community.dur.ac.uk/atcagc.2017/ for more information. There is some financial support available for UK-based research students. The workshop is supported by an LMS Conference grant and Durham University.

BRITISH POSTGRADUATE MODEL THEORY CONFERENCE 2017

The *British Postgraduate Model Theory Conference* will take place from Wednesday 25 to Friday 27 January 2017 at the University of Leeds. The conference is aimed at postgraduate students and postdoctoral researchers in model theory, and it provides a great opportunity for them to present and discuss their work in front of young and established researchers coming from the UK, Europe, and the rest of the world. Model theory is a branch of mathematical logic whose purpose is to study the interaction between mathematical structures and the formal languages used to describe them.

The conference programme includes one mini course consisting of three one-hour lectures, and three main talks given by established researchers. In addition, there are around twelve talks to be given by young researchers. The invited speakers are:

- Zoe Chatzidakis (Ecole Normale Supérieure, Paris)
- Amador Martin- Pizarro (Université Claude-Bernard Lyon 1)
- Jaroslav Nesetril (Charles University, Prague)
- Boris Zilber (University of Oxford)

The conference is supported by an LMS Postgraduate Research Conference grant (Scheme 8), the School of Mathematics, University of Leeds, and the British Logic Colloquium. For more information visit the website http://modeltheory leeds.wixsite.com/bpgmtc2017 or send an email to (modeltheory.leeds@gmail.com).

BIOMATHEMATICS@ SWANSEA 2017

On 5 May 2016, the College of Science, Swansea University, officially launched the Centre for Biomathematics. The Head of College, Matt Jones and the co-directors of the Centre, Elaine Crooks, Mathematics, and Luca Börger, Biosciences, outlined their vision for the Centre together with examples of joint PhD projects, joint postdoctoral research projects, PhD opportunities and events.

By exploiting complementary and wide-ranging knowledge across disciplines, the aim of the Centre is to develop novel biologically-informed predictive mathematical and statistical models and computational approaches to tackle topical questions in biology and medicine and, hopefully, at the same time lead to new theoretical developments in mathematics and computer science.

The Centre for Biomathematics is running a four-day workshop and training event, *BioMathematics@Swansea 2017*, to celebrate the launch of the Centre and promote its activities.

The event will comprise two thematic components, both held at Swansea University and lasting for two days each. The first session will focus on mathematical medicine and pharma-

cology and take place from 2 to 3 February 2017, and the second, planned from 27 to 28 April 2017, will concentrate on mathematical ecology. Each two-day session will contain research talks from established researchers, early career researchers, and research students.

Further information can be found at the webpage http://www.swansea.ac.uk/science/researchcentresandinstitutes/centreforbiomathematics/.

The event is supported by an LMS Conference grant, the Swansea University College of Science, and the EPSRC-funded network POEMS (Predictive mOdelling for hEalthcare through MathS).

BRITISH COMBINATORIAL CONFERENCE

The 26th *British Combinatorial Conference* (BCC), hosted by the Department of Computer and Information Sciences, University of Strathclyde, Glasgow, will take place from 3 to 7 July 2017 at the Technology & Innovation Centre. The aim of this conference is to cover a wide range of topics in Combinatorial Mathematics. Plenary speakers are:

- Rosemary Bailey (University of St Andrews and Queen Mary University of London)
- Julia Böttcher (London School of Economics)
- Bill Chen (Nankai University)
- Antonio Cossidente (Universitŕ degli Studi della Basilicata)
- Daniel Horsley (Monash University)
- Vít Jelínek (Charles University)
- Rob Morris (IMPA, Rio de Janeiro)
- Benny Sudakov (ETH, Zürich)
- Julia Wolf (University of Bristol)

Also, to mark the occasion of Bill Tutte's centenary, Graham Farr (Monash University) will deliver a lecture entitled *W.T. Tutte: Graph theory as he had grown it*.

The conference will host three mini-symposia:

- **Emerging Methods in Extremal Combinatorics** (run by Andrew Treglown) speakers: Jan Hladký, Peter Keevash, Dan Král, Mathias Schacht
- **Graph Colouring** (run by Jan van den Heuvel) speakers: Maria Axenovich, Marthe Bonamy, Jessica McDonald, Maya Stein

- **Patterns in Permutations and Words** (run by Sergey Kitaev) speakers: Alex Burstein, Jeff Remmel, Bruce Sagan, Vincent Vajnovszki

All participants are invited to submit an abstract and give a 20-minute presentation. For more information visit website http://combinatorics.cis.strath.ac.uk/bcc2017/.

The conference is supported by an LMS Conference grant, the Edinburgh Mathematical Society and the Glasgow Mathematical Journal Trust.

YOUNG THEORISTS' FORUM

The ninth *Young Theorists' Forum Conference* (YTF) will take place at Durham University from 11 to 12 January 2017, immediately following the *Young Experimentalists and Theorists Institute School* (YETI), also at Durham. The purpose of YTF is to bring together postgraduate students working in theoretical physics, providing them the opportunity to present their work to a friendly audience. The aim is to foster development of early career researchers and encourage collaboration between different universities.

The plenary talk will be presented by Dr Donal O'Connell, who researches baryogenesis and scattering amplitudes in quantum field theories at the University of Edinburgh. Participants will also be able to present a 20 minute talk on their research or submit a poster. Topics covered will include:

- Beyond Standard Model Physics
- String Phenomenology
- Holography
- Cosmology
- Amplitudes
- Solitons
- Standard Model Phenomenology
- String Theory
- QCD
- Gravity

For more information, visit the website maths.dur.ac.uk/YTF/9 or email durhamytf@gmail.com. The conference is supported by an LMS Postgraduate Research Conference grant (Scheme 8), the Institute of Physics, the Scottish Universities Physics Alliance, the Durham University Centre for Particle Theory and the Durham University Institute for Particle Physics Phenomenology.

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Microlocal Analysis and Applications
LMS-CMI Research School
Cardiff
26 June – 1 July 2017

Organisers: S. Eswarathasan (Cardiff), C. Guillarmou (ENS, Paris), R. Schubert (Bristol)

Microlocal analysis is a study of partial differential equations through the lens of symplectic geometry and Fourier analysis. The field has a wide range of applications towards, and not limited to, spectral theory, scattering theory, inverse problems, and dynamical systems. The purpose of this school is to introduce graduate students and young researchers to both its foundations and recent applications.

Lecture Courses

Alexander Ströhmaier (Loughborough) & **Jared Wunsch** (Northwestern University)
Basic ideas in Microlocal Analysis

Stephane Nonnenmacher (Université de Paris-Sud, 11) & **Andrew Hassell** (Australian National University)
Scattering Theory and Spectral Theory

Viviane Baladi (Institut de Mathématiques de Jussieu) & **Colin Guillarmou** (Ecole Normale Supériore, Paris)
Pollicott-Ruelle Resonances, Mixing in Dynamical Systems, and X-ray Transform

These lecture courses will be supplemented by tutorial sessions.

Distinguished Speakers

Maciej Zworski (Spectral Theory, University of California, Berkeley), Gunther Uhlmann (Inverse Problems, University of Washington, Seattle), Mark Pollicott (Dynamical Systems, University of Warwick)

A website with further information will be available by December 2016.

Apply online (www.surveymonkey.co.uk/r/RS-32-MicrolocalAnalysis) by **31 March 2017**. Research students, post-docs and those working in industry are invited to apply.

All applicants will be contacted within three weeks after the deadline; information about individual applications will not be available before then.

Fees

Research students: **£150**. There will be no charge for subsistence costs.

Early career researchers: **£250**. There will be no charge for subsistence costs.

Other participants (e.g. those working in industry): **£250** plus subsistence costs.

All UK-based participants must pay their own travel costs. For overseas-based participants, support will be available to contribute towards travel costs. Fees are not payable until a place at the Research School is offered but will be due by 12 May 2017.

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New Trends in Representation Theory - The Impact of Cluster Theory in Representation Theory

LMS-CMI Research School

University of Leicester
19-23 June 2017

Organisers: Karin Baur (U Graz) and Sibylle Schroll (Leicester)

The focus of the course is on recent advances that have emerged in representation theory through cluster theory: n-representation theory, integrable systems and friezes, and silting and infinite dimensional representations. These areas of mathematics are enriched by their interactions with other areas of mathematics such as category theory, dynamical systems and mathematical physics.

Lecture Courses

Peter Jorgensen (Newcastle) *n-representation theory*

Sophie Morier-Genoud (Paris) *Integrable systems and friezes*

Lidia Angeleri-Hügel (Verona) *Infinite dimensional representations*

These lecture courses will be supplemented by tutorial sessions.

Guest lectures: M. Herschend (Uppsala), **P.-G. Plamondon** (Orsay) and **M. Prest** (Manchester)

For further information, please visit: https://sites.google.com/site/clustertheoryinreptheory/

Apply online (www.surveymonkey.co.uk/r/RS-28-NewTrendsInRepresentationTheory) by **24 March 2017**. Research students, post-docs and those working in industry are invited to apply.

All applicants will be contacted within three weeks after the deadline; information about individual applications will not be available before then.

Fees

Research students: **£150**. There will be no charge for subsistence costs.

Early career researchers: **£250**. There will be no charge for subsistence costs.

Other participants (e.g. those working in industry): **£250** plus subsistence costs.

All UK-based participants must pay their own travel costs. For overseas-based participants, support will be available to contribute towards travel costs. Fees are not payable until a place at the Research School is offered but will be due by 12 May 2017.

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LMS INVITED LECTURER 2017
Professor Jim Agler (UCSD)
Function Theory by Hilbert Space Methods
18-22 April 2017, Herschel Building, Newcastle University

Our topic will be a powerful machinery that has been developed in the last 60 years both to discover and to prove theorems about analytic functions in one and several complex variables through the construction of operators on Hilbert space.

The lectures will begin with expositions of the elementary operator theory that is required to achieve interesting results in function theory.

Next we will show how a number of classical results in the theory of analytic functions in one variable, when cast in a Hilbert space setting, can be proved by operator-theoretic methods which are largely algebraic in nature. These results will include the Herglotz Representation Theorem, the Carathéodory and Pick Interpolation Theorems, Nevanlinna's Representation Theorems, the Carathéodory-Julia Theorems, and Loewner's Theorem.

The remainder of the talks will focus on how the operator-theoretic proofs of these one- variable theorems can be generalized to yield a variety of new results in several complex variables.

Guest Lectures
There will also be supplementary lectures by:

Professor John McCarthy (Washington University in St. Louis, USA)
Research interests: Analysis, especially Operator Theory and one/several Complex Variables

Associate Professor Greg Knese (Washington University in St. Louis, USA)
Research interests: Complex Function Theory, Operators, Harmonic Analysis

Assistant Professor Kelly Bickel (Bucknell University, Lewisburg, PA, USA)
Research interests: Multivariate Operator Theory, Several Complex Variables, Harmonic Analysis

Accommodation, Travel Funding and Registration
Accommodation will be provided at the Osborne Hotel.

Limited financial support is available with preference given to UK research students. Please contact the organiser for further details: Zinaida Lykova zinaida.lykova@newcastle.ac.uk. **Deadline for funding: 1 April 2017.**

For further details and how to register for the 2017 Invited Lectures please visit:
http://www.mas.ncl.ac.uk/~nek29/lmslectures2017/function_theory.html

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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.

VISIT OF PHILLIP WESOLEK

Dr Phillip Wesolek (Binghamton University, NY, USA) will visit the universities of Lincoln, Leeds and St Andrews from 12 to 26 February 2017. Dr Wesolek has made significant contributions to the theory of totally disconnected locally compact groups, and his work lies at the intersection of geometric group theory, descriptive set theory and topological group theory. Dr Wesolek will give talks on:

• Wednesday 15 February, University of Lincoln, *The structure of simple totally disconnected locally compact groups via embeddings with dense image* (contact Simon Smith: SiSmith@lincoln.ac.uk)

• Tuesday 21 February, University of Leeds, *Chief factors and chief series in locally compact groups* (contact Dugald Macpherson: H.D.MacPherson@leeds.ac.uk)

• Thursday 23 February, University of St Andrews, *Commensurated subgroups and periodic subgroups of tree almost automorphism groups* (contact Martyn Quick: mq3@st-andrews.ac.uk)

For further details contact Simon Smith (SiSmith@lincoln.ac.uk). The visit is supported by an LMS Scheme 2 grant.

IINI Isaac Newton Institute for Mathematical Sciences

APPROXIMATION, DEFORMATION, QUASIFICATION

8 – 12 May 2017

in association with the Isaac Newton Institute programme
Non-Positive Curvature Group Actions and Cohomology
(3 January – 23 June 2017)

Studying how a mathematical object or theory is affected by small perturbations is a standard and usually useful technique to improve our understanding thereof. The goal of this workshop is to provide an overview of the current trends and future challenges related to that technique in the context of geometric group theory. A special emphasis will be put on the following topics and on their inter-relations: approximate groups, hyperlinear groups, metric approximations, quasi-isometries, quasi-morphisms, quasi-cocycles, representation varieties, rigidity, sofic groups, Ulam stability.

Further information available from the website
www.newton.ac.uk/event/npcw04

Closing date for receipt of applications 5 February 2017

LMS HARDY LECTURESHIP TOUR 2018

Nominations Sought

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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.

Jacob Lurie (Harvard) 2016 Hardy Lecturer

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

GEOFFREY SHEPHARD

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

Shaun Stevens writes: Geoffrey Shephard completed his PhD in 1954 at the University of Cambridge, under the direction of John Todd. After some years in Birmingham, he was appointed as Professor of Mathematics at the University of East Anglia in 1967, where he is remembered by former students as an accomplished and inspiring lecturer. Following his retirement in 1984, he taught as a Professorial Fellow for three years, before being appointed Emeritus Professor in 1987. He continued to be a regular visitor to the School of Mathematics at UEA since that time; it is only in the last few years that these visits became less frequent.

Geoffrey was a prolific mathematician, writing more than 150 books and articles over his research career; his most recent article appeared just this year. His principal interests were in geometry in two, three and higher dimensions, in particular on polyhedra and tilings. Among his most famous results is the Shephard–Todd Theorem on the classification of complex reflection groups: though it dates from 1954, it has been cited 100 times in the last five years. He also had a long-standing and fruitful collaboration with Branko Grünbaum (University of Washington), most significantly resulting in the monograph *Tilings and Patterns* (1987), which remains a definitive reference for mathematicians and yet is intelligible to non-specialists.

Geoffrey had a particular interest in making mathematics accessible to wider audiences and generously endowed a prize of the London Mathematical Society to this end: the Shephard Prize is awarded for making a contribution to mathematics with a strong intuitive component which can be explained to those with little or no knowledge of university mathematics.

JOHN BLAKE

Professor John Blake, who was elected a member of the London Mathematical Society on 16 March 1990, died on 10 June 2016, aged 69.

Michael Grove and Joe Kyle write: For over twenty years, and until his retirement in 2013, John was Professor of Applied Mathematics at the University of Birmingham, where he held the Headship of the School of Mathematics on two occasions; he was also Dean of the Faculty of Science. Through his research John played a leading role in establishing and maintaining the UK mathematical community's activity in Bubble Dynamics and Low Reynolds number biological flows. He published profusely, producing over 40 papers on Bubble Dynamics alone. John was also generous in his support for younger colleagues, supervising 22 PhD students and mentoring 17 postdoctoral researchers.

In addition to this commanding profile in mathematical research, John was amongst the first true champions of teaching and learning within higher education which led him, in typical fashion, to establish the U.K. Mathematics Courseware Consortium (MATHWISE), a ground-breaking forerunner of later innovative uses of software in teaching and learning. In 2000, John became inaugural Director of the highly-regarded Mathematics, Statistics & Operational Research Network under the auspices of the national Learning and Teaching Support Network. As Director,

he shaped a number of important initiatives through the Network and many regard this as his greatest legacy. That legacy, and work that flowed from it, thrives to this day.

John was a kind and loving father to his children Nick, Samantha, Andrew, Ben and Emily, maintaining his academic career while caring for them after the tragically early death of his first wife Denise. In 2002 John married Rachel with whom, along with their son Adam, he spent many happy and memorable years.

We, who knew John as a friend as well as a colleague, will long cherish our memories of this remarkable man. He will be deeply missed, but remembered fondly. His influence will continue to live on in anyone who was fortunate enough to know or work with him.

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### DIFFERENTIAL GALOIS THEORY THROUGH RIEMANN-HILBERT CORRESPONDENCE
An Elementary Introduction

Jacques Sauloy, Institut de Mathématiques de Toulouse

Offers a hands-on transcendental approach to differential Galois theory, based on the Riemann-Hilbert correspondence. Along the way, it provides a smooth, down-to-earth introduction to algebraic geometry, category theory and tannakian duality. Since the book studies only complex analytic linear differential equations, the main prerequisites are complex function theory, linear algebra, and an elementary knowledge of groups and of polynomials in many variables.

Graduate Studies in Mathematics, Vol. 177
Jan 2017 279pp 9781470430955 Hardback £89.95
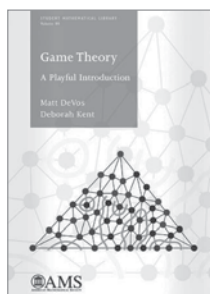
GAME THEORY
A Playful Introduction

Matt DeVos, Simon Fraser University & Deborah Kent, Drake University

Offers a gentle introduction to the mathematics of both sides of game theory: combinatorial and classical. The combination allows for a dynamic and rich tour of the subject united by a common theme of strategic reasoning. Instructors, students, and independent readers alike will appreciate the flexibility in content choices as well as the generous sets of exercises at various levels.

Student Mathematical Library, Vol. 80
Jan 2017 360pp 9781470422103 Paperback £49.95

UNIVERSITY OF LEEDS

Three Externally Funded University Academic Fellow Positions in Applied Mathematics, Pure Mathematics, Statistics and Financial Mathematics

The School of Mathematics invites applications from academics working in any area of Pure Mathematics, Applied Mathematics, Statistics or Financial Mathematics, who have an excellent research record and proven success in obtaining funding, a passion for delivering first-class inspirational teaching and supervision in a top School (in the top 10 in REF2014) in a research-intensive UK University, and an aspiration to become an academic leader in their field.

As a University Academic Fellow, you will carry out research, teaching and associated administration within the School of Mathematics and contribute to academic leadership in any field of Pure Mathematics, Applied Mathematics, Statistics or Financial Mathematics. You will embark on a five-year development programme, successful completion of which will lead to your promotion to Associate Professor.

These posts are for people who currently hold a substantial fellowship that can be brought to Leeds. Examples of substantial fellowships include EPSRC Early Career Fellowships, Royal Society University Research Fellowships and European Research Council Starting Grants. Those who are currently candidates for such a fellowship are welcome to apply, and should give details of their date of application and when the outcome is expected to be known.

The Faculty of Mathematics and Physical Sciences holds the Athena SWAN Bronze Award in recognition of our success in recruiting, retaining and developing/promoting women in Science, Engineering and Technology (SET). The School of Mathematics also offers a number of family-friendly employment practices that are designed to enable a good work-life balance.

More information and to apply online can be found at:

University Academic Fellow in Applied Mathematics:
http://jobs.leeds.ac.uk/MAPMA1045

University Academic Fellow in Statistics:
http://jobs.leeds.ac.uk/MAPMA1047

University Academic Fellow in Pure Mathematics:
http://jobs.leeds.ac.uk/MAPMA1046

A BRIEF HISTORY OF NUMBERS by Leo Corry, Oxford University Press, 2015, pp 336, £24.99, US$49.95, ISBN: 978-0198702597.
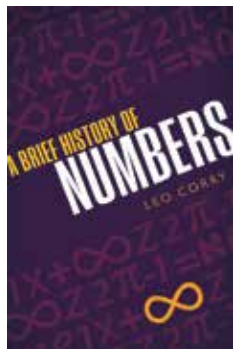
Corry's title deliberately echoes Hawking's *A Brief History of Time* but his *A Brief History of Numbers* is fortunately far less brief, but certainly not prolix, and does not spare on equations (and includes many geometric diagrams too). Corry's intent is to present a history of what one might call the main stream of the development of numbers from the early notations of the Babylonians and Egyptians to the current hierarchy of number systems, ranging from the naturals to the complexes, which emerged clearly in the work of Dedekind. He concentrates mainly on Ancient Greece, the medieval Islamic world and Europe from the twelfth century onwards. Consequently there is little here on mathematical traditions outside this axis, in particular the mathematics of China and India.

Corry is at pains to insist that the job of the historian is to understand the mathematics of the past in terms of the historical imperatives in force at the time of its creation, rather than just as a precursor to the mathematics of today. He largely succeeds in his aim, but inevitably his selection of topics does emphasise those involved in the evolution of mathematics towards contemporary practice.

A highlight of his treatment of Greek mathematics is his discussion of Eudoxus's theory of proportion. Corry resists treating this as an anticipation of Dedekind's theory of cuts, at least until discussing Dedekind's own work towards the end of the book where he stresses Dedekind's key new insight that cuts have their own form of arithmetic.

The chapter on Islamic mathematics emphasises the work of Al-Khwarizmi and Al-Khayyam. To mathematicians, Al-Khayyam is remembered more for his study of cubic equations than his poetry. Al-Khayyam describes seven classes of cubics (he had no negative numbers) and Corry gives an account of Al-Khayyam's geometric solution of one of these involving a hyperbola.

The domination of Western European mathematics began with Fibonacci in the early thirteenth century. European mathematics became increasingly symbolic, but geometric methods remained important. In the seventeenth century Wallis and Barrow clashed over the primacy of algebra and geometry. Isaac Newton argued strongly for the primacy of geometry in his book *Universal Arithmetick*. Ironically this book showed in practice the extreme efficacy of algebraic methods.

By the nineteenth century we reach what is now recognisably modern mathematics. Hamilton defined complex numbers as pairs of real numbers with specific rules governing their addition and multiplication (and of course also quaternions as quadruples of reals) an early example of the formalist definitions which permeate contemporary mathematics. Dedekind completed the arithmetisation of the real numbers by defining real numbers in terms of cuts of rationals. The book ends with an account of Cantor's work and its ramifications in the twentieth century.

Corry has compiled a readable account of the history of mathematics focusing on numbers, although for most of the period in question, arithmetic and geometry are not easily separable. The required level of sophistication of the reader is not great, it is certainly at the level of a first-year undergraduate, or a keen sixth-former who is studying mathematics. Even as an experienced university mathematician, the reviewer learnt many interesting things, and has some misconceptions remedied, on reading Corry's *Brief History*.

Robin Chapman
University of Exeter

HIDDEN HARMONY – GEOMETRIC FANTASIES: The Rise of Complex Function Theory by Umberto Bottazzini and Jeremy Gray, Springer, 2013, pp 868, £126, ISBN 978-1461457244.
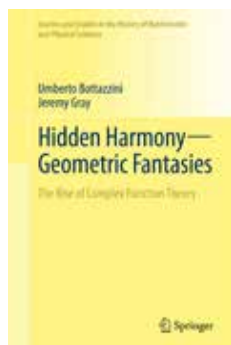
I am at a loss to find a suitable framework for this report on a book covering the historical development of complex analysis. A topic which took over a century to develop is presented in a form difficult to assimilate in as many hours; there is no hope of doing it all justice, so let us pretend we are going to the theatre.

Prelude: preliminary musings about the task/topic while finding one's seat.
i) Unspoken question: where on earth did they dream up that title ?
Note. See the end of the review for a possible answer.

ii) How to wade through 750 pages? Useless to begin at page 1, so try the table of contents; well, helpful introduction and plenty of familiar names, and it seems to follow the timeline more or less. Plunge in and don't get bogged down: ignore all formulae.

Prologue: a soliloquy.
The goal is to provide a thorough investigation of the origins of complex analysis. For me, this topic marked my first encounter with a kind of mathematics I never saw at school. It presents an attractive self-contained nature and there are many quick gains, including juicy calculations of contour integrals - clear-cut evaluation techniques for otherwise insoluble real integrals - along with other highly valuable insights and applications; complex analysis has a rare coherence and unity of purpose often missing in other courses. But this polished maturity did not come easily: slow beginnings in rudimentary algebra fed into a century-long period of uncertainty about which formulae and methods could be rendered valid for complex or imaginary numbers, as they were called, suddenly upstaged by the emergence of an entirely new class of complex functions soon after 1800. This provides the starting point of the book.

Act 1: much activity in the complex plane.
Enter the elliptic functions, studied at first via the inversion of real elliptic integrals such as

$$\int_a^x \left(1 - x^4\right)^{-1/2} dx$$

by Fagnano, Euler, Legendre and Gauss, then extended by Abel and Jacobi after 1820. As perhaps the hottest topic of the day, it was largely ignored by Cauchy, the foremost (perhaps the only true) complex analyst of the time. Having devoted his early career to establishing a proper approach to basic real and complex analysis, he spent eight years from 1830 in political exile in Italy, before returning to Paris, finally publishing his main work on complex integration in the 1840's. The dramatis personae of this play was completed soon afterwards with the entry of Riemann and Weierstrass, who each quickly assembled a group of keen followers and went on to (between them but not in collaboration) establish the foundations of the field. Riemann's inaugural thesis gave a proper formulation of what a complex analytic function is (see below for more details) and created powerful geometric methods to study them. Weierstrass preferred to see formulae and developed methods of calculation and convergence to provide a more constructive approach. His formulation of elliptic functions, based on infinite product

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and series expansions, continues to provide the best path into this area and essential ingredients of the arithmetic structure.

Act 2: the main action.
The twin capitals of mathematics during much of the 19th century, Paris and Berlin provided the main arena for a long struggle between rival factions for the soul of the growing theory, the followers of Cauchy and Riemann on the one hand, promoters of intuitive ideas and geometric, often physically motivated, methods in contrast with (and sometimes opposed by) the skeptical attitude and stricter, more analytically focussed, approach of Weierstrass and his followers. With occasional excursions to Italy, much of the action was concentrated in these two cities and Göttingen. As one learns in a proper first course, the mere assumption of differentiability in the complex sense for a complex-valued function $f(x + iy) = u + iv$ leads to the Cauchy–Riemann equations $u_x = v_y$, $u_y = -v_x$ for the derivatives $u_x = \partial u / \partial x$ etc., and has strong implications as soon as the domain of definition is an open set in the plane: these go far beyond anything seen in real analysis, leading quickly via the Cauchy integral theorem to existence of a convergent Taylor series and, soon enough, to issues in topology relating to the question of how to define appropriately the notion of a largest domain of definition for such a function. It was Riemann, building on the work of Cauchy and Gauss, Abel and Jacobi who was first to place the concept of algebraic function on a coherent footing, creating for a given function the global surface on which all the local representative Taylor series are to be found, each one representing a piece of the whole and possessing the capability to be extended into all other parts by analytic continuation. He furthermore expanded the study of periodic functions to the general algebraic framework, introducing to the world the algebraic structure and period relations satisfied by all Abelian integrals.

Unfortunately, he died early, like Abel, Galois and Eisenstein before him, leaving a treasure trove of beautiful ideas and difficult problems for his followers and the Weierstrass school to resolve. The theory these men and their students created has attracted many of the greatest mathematical minds from the late 1800s on, and proved a powerful stimulus for research in other areas such as algebraic geometry and number theory, which continues today. It also exposed a fundamental fault-line, created by the clash between rigour and geometric intuition, which began in earnest with Weierstrass's famous criticism of the Dirichlet Principle used by Riemann to construct harmonic and analytic functions: this kind of argument continues to this day, of course, and let us hope it always will. What is mathematics without both geometric intuition and formulae?

Interlude: philosophical musings.
History - and certainly mathematical history- can be less than exciting to read and at its worst risks complete irrelevance in the face of modern developments, but it remains an essential task if we want to be ready to face the future. To bring it to life calls for skills distinct from those of the mathematician, and often there is continuing controversy even within the usual sort of historical narrative: was Napoleon a military genius or just lucky? a civilising force or charismatic villain? Was the Weierstrass school fair in their criticisms of Riemann? Which point of view proved more important? Here one anticipates differences depending on the nationality of the observer (French or Russian, say), and the eminence or sheer style of the author plays a part in forming one's own opinion: Tolstoy's verdict on Napoleon, for instance, is hard to gainsay. In physics of course, it is experimental evidence that counts; in the case of mathematics, we tend to let time and results decide. On the evidence here, we should perhaps withhold final judgment but favour Riemann.

Final Act. **Prologue:** drawing to a close.
Enter Chorus. Vouchsafe to those that have not read the story
That I may prompt them; and of such as have, I humbly pray them to admit the excuse
Of time, of numbers and due course of things....
(W. Shakespeare, *Henry V*, Act V).

The next two chapters discuss (at length) special functions and differential equations before casting an eye over more advanced material on geometric function theory and applications, some of it germane to the development of fundamentals – conformal mapping, the Schwartz reflection principle, the work of Klein and Hurwitz, Fuchs, Koebe and Poincaré, culminating in the famous uniformisation theorem – and some of independent interest, such as minimal surfaces and the spinning top. A brief account of several complex variables follows and the book ends with a helpful survey of the classic textbooks, which takes note of the somewhat distinctive traditions of the countries involved.

Postlude: a Personal View.
One may wonder with André Weil – in his article *History of Mathematics, Why and How?* in *Proc. ICM* (Helsinki, 1978) – what is the appropriate manner of presentation for a historian of mathematics, what audience to be expected? For more on the art of the mathematical historian, do not miss Weil's article and also the famous account by C.L. Siegel of the Frankfurt Seminar in its pre-Nazi heyday, reprinted (in English translation) in the *Mathematical Intelligencer*, vol. 1 (4), 1979. But certainly one of the key points is to pose questions which are interesting and capable of an answer within reasonable limits, which brings up a bone of contention I have with the present book. In the final chapters, which look at more recent developments in areas such as the extension to periodic functions of several complex variables, topics which proved too difficult for Weierstrass and even for Poincaré are out of reach here too. The tools from single variable theory are simply inadequate, even for attempting a survey, much less an evaluation; we had to await the analytical skills of Siegel (see his masterly lectures in the 3 volume *Topics in Complex Function Theory*, J.Wiley Interscience, 1971) to resolve the construction of Abelian function fields in higher dimensions, and only the invention of sheaf theory allied with new methods of algebra and geometry opened the way to progress beyond Riemann and Weierstrass. It is a matter for regret that this valuable account ends on such a low note.

Reading this book has rekindled my enthusiasm for the classical ideas of complex function theory, and for this I am very grateful. It would be impossible to provide a proper evaluation of it without much further reading and sampling from the huge bibliography, but there is no doubt that the authors have striven mightily to deliver their goals. But these were Herculean and, as such, unattainable: after all, uniformisation on its own deserves a book, as does differential equations - each has several - and the theory of several complex variables cannot proceed from the example of the periodic functions. It would surely have been better to close their (very ambitious) project either at the end of the formative period with Schwartz and Hurwitz, or in 1913, with the publication of Hermann Weyl's classic text, *Die Idee der Riemannschen Fläche* (B.G.Teubner), by which time all the basic facts and tools were in working order.

On the title. In Riemann's inaugural thesis, he refers to the (complex analytic) harmony hidden beneath the abstract framework he has constructed as a surface. As to geometric fantasies, one may look in Weyl's foreword (*op. cit.*) where his enthusiastic assessment of the impact of uniformisation takes us (in my loose translation) within 'the temple of the goddess of non-Euclidean geometry' to expose to view the 'pure essence of a Riemann surface, free and undimmed by harsh reality'.

W.J. Harvey
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SOCCERMATICS by David Sumpter, Bloomsbury Sigma, 2016, pp 303, hb £16.99, ISBN 978-1472 924124.

The author, who is head of the Collective Behaviour Group and Professor of Applied Mathematics at the University of Uppsala, has a passion for both mathematics and soccer. This book examines patterns and structures found in football, seeking to give a fresh perspective on ways to analyse "the beautiful game". Readers are assumed to be soccer fanatics, nodding knowledge-ably at throwaway lines such as "Beckham's halfway-line goal against Wimbledon" or "Barcelona's wonder season of 2010/11", with a whole chapter on Ibrahimovic's spectacular overhead goal against England.

In his day job, Sumpter interacts with biologists, ecologists, teachers, etc., looking at (say) the behaviour of fishes, slime moulds, or children, and exploring how a mathematician could help his colleagues understand the patterns that emerge. He has an impressive list of research publi-cations that testify to his success in these endeavours; he believes that professional soccer teams, including the most successful, would also benefit from the insights that an analysis of the vast amount of data now collected during a game could provide.

But can mathematics tell experienced football managers something useful, that they do not already know? As examples of when even basic arithmetic has been ignored at top level sport, I offer two recent instances: in the 2015 Rugby World Cup, the scorer of England's last-minute try against Fiji was unaware that his action had just gained a potentially vital bonus point; and in 2013, with Manchester City leading Bayern Munich 3-2, both teams already guaranteed the top two places in their Champions League Group, City's players were not told that one more goal would put them top of the group, with an easier progression path, and no downside if seeking a goal led to a failure to win.

The book begins with an account of how the Poisson distribution can help predict match outcomes, given the expected number of goals for each team, leading on to an examination of the different formations and playing styles used by successful teams from different eras, ranging from Hungary in the 1950s to present-day Barcelona. Conven-tional extreme value theory is used to assess the pattern of records.

Much of the content is less familiar. Parallels are drawn between the tactics used by lionesses in hunting and defenders in soccer pressurising their opponents. Formal decision theory is used to confirm that introducing the three points for a win system would be expected to lead to more exciting games; a parallel with Robert Axelrod's tournaments based on the Pris-oner's Dilemma suggests how teams might
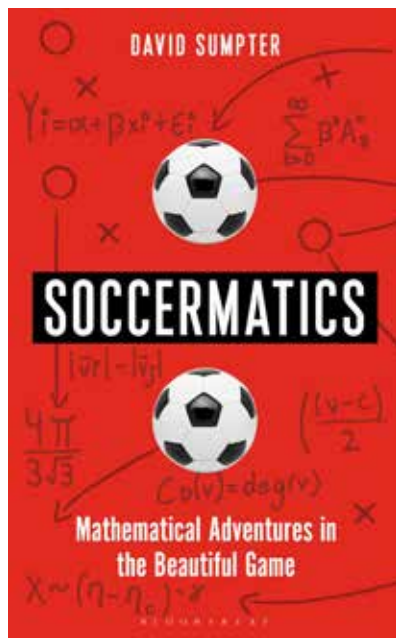
decide whether their best strategy against particular opposition should be attack or defence. Given the complete data on passes made during a match, by dividing the pitch into 25 zones, we are shown how different (very successful) teams build their attacks. Evolutionary Game Theory is used to indicate how leaders within teams can help raise the performance level higher than the sum of its parts. There are accounts of how Mexican waves evolve, and how mathematical modelling has been used to make venues safer for spectators.

The final part of the book looks at the possibilities of making a profit when betting on soccer. It is less successful than the earlier chapters, relying too much on the actual experiences of the author (and his wife) over a very short period. Nevertheless, the principles identified are sound: the best bet available on a given match may well be on a rather unlikely event; by having accounts with several different bookmakers, you can occasionally construct a Dutch book, i.e. a certain profit, whatever the match outcome; if you have a sound model, bet early, to take advantage of others' ignorance.

This book reads well throughout. The footnotes are consigned to an appendix (which has useful references), the diagrams are apposite and well-positioned. Sumpter confesses that he is not aware of the extent to which top clubs use visualisation tools, such as the way he assesses how Juventus, Barcelona, Bayern Munich and Real Madrid organised themselves in their 2015 Champions League semi-final matches. But he gives a catalogue of circumstances, with evidence, from player recruitment to changes of tactics at halftime, in which an objective analysis of the data available can lead to success on the field.
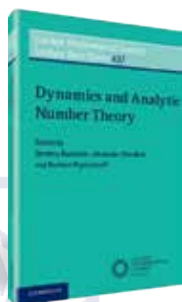
John Haigh
University of Sussex

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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.

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 (464)
20 LMS South West & South Wales Regional Meeting, Bath (464)

JANUARY 2017

4–6 Twistor Theory and Related Areas, Oxford (463)
4–7 Mathematics on Singularities, Symmetries and Submanifolds UK-Japan Winter School, University College London (463)
9–13 Algebraic, Topological and Complexity Aspects of Graph Covers, Durham (464)
11–12 Young Theorists' Forum, Durham (464)
12 T-time Meeting, Manchester (463)
23–27 Structure of Operator Algebras: Subfactors and Fusion Categories INI Workshop, Cambridge (461)
25–27 British Postgraduate Model Theory Conference, Leeds (464)

FEBRUARY 2017

2–3 Mathematical Medicine and Pharmacology Workshop, Swansea (464)
20–21 Origins of Numerical Abilities Royal Society Scientific Discussion Royal Society London (463)

MARCH 2017

22 Maths, Teamwork and Googlies, Rob Eastaway, Christopher Zeeman Medal Lecture, London (464)

APRIL 2017

3–6 BMC, Durham (463)
10–12 BAMC, Surrey (463)
18–22 Function Theory by Hilbert Space Methods, Jim Alger, LMS Invited Lecturer, Newcastle (464)
27–28 Mathematical Ecology Workshop, Swansea (464)

MAY 2017

5 Mary Cartwright Lecture, London
8–12 Approximation, Deformation, Quasification INI Workshop, Cambridge (464)

JUNE 2017

1 LMS Northern Regional Meeting, York
19–23 New Trends in Representation Theory LMS–CMI Research School, Leicester (464)
26–1 Jul Microlocal Analysis and Applications LMS–CMI Research School, Cardiff (464)
30 LMS Graduate Student Meeting, London
30 LMS Society Meeting, London

JULY 2017

3–7 BSDEs, SPDEs and their Applications Workshop, Edinburgh
3–7 British Combinatorial Conference, Strathclyde (464)
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)

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The Book of Presidents
1865 – 1965

The Book of Presidents
1865-1965

London Mathematical Society

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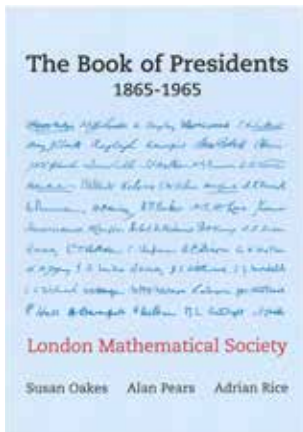
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