LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 438 July 2014

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LMS AGM
London

**NEWSLETTER ONLINE:**
newsletter.lms.ac.uk

The London Mathematical Society is pleased to announce its

# *150th Anniversary Celebrations*

***(1865 – 2015)***

We invite you to join us in celebrating this historic occasion.

**Themes for the Anniversary**

*150 Years of the LMS and Mathematics*

*Mathematics as Part of our Culture*

*New ways of Communicating Mathematics*

There will be an extended and varied programme of events throughout 2015 in celebration of the vitality of mathematics in the UK, looking back over 150 years of achievements and looking forward to exciting opportunities in mathematics for future generations.

For information and an up-to-date calendar, please visit www.lms.ac.uk/2015

To receive regular updates about events and lectures occurring during the 150th Anniversary Year, please sign up to the emailing list located at the above address.

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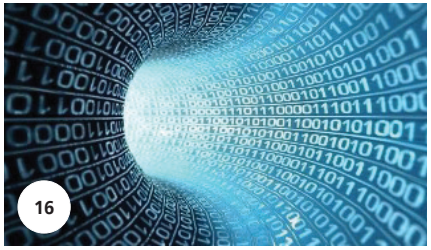








# LMS PRIZES 2014

The winners of the LMS Prizes for 2014 were announced at the Society meeting on 4 July 2014. The Society extends its congratulations to these winners, and its thanks to all the nominators, referees and members of the Prizes Committee for their contributions to the Committee's work this year.

**PROFESSOR MILES REID, FRS**, of the University of Warwick, is awarded a **Pólya Prize** for his exceptionally creative work on higher dimensional algebraic geometry; in particular, on canonical singularities, the MacKay correspondence, the explicit study of 3-dimensional flips, the structure of Gorenstein rings, and for his inspired expositions.

**PROFESSOR MARTIN HAIRER, FRS**, of the University of Warwick, is awarded a **Fröhlich Prize** for his work on the interface between probability theory and partial differential equations; a body of work that is widely recognised as revolutionizing an entire field of research.

**PROFESSOR CAROLINE SERIES**, of the University of Warwick, is awarded a **Senior Anne Bennett Prize** in recognition of her leading contributions to hyperbolic geometry and symbolic dynamics, and of the major impact of her numerous initiatives towards the advancement of women in mathematics.

**PROFESSOR DANIEL FREED, PROFESSOR MICHAEL HOPKINS** and **PROFESSOR CONSTANTIN TELEMAN** are awarded a **Senior Berwick Prize** in recognition of their paper "Loop groups and twisted K-theory", *Journal of Topology*, 4 (2011), 737-799. The paper sets out the foundations of twisted equivariant K-theory, and prepares the ground for the proof that the twisted equivariant K-theory of a compact Lie group is isomorphic to the Verlinde algebra of its loop group.

**PROFESSOR CLÉMENT MOUHOT**, of the University of Cambridge, is awarded a **Whitehead Prize** for fundamental mathematical contributions to the foundations of statistical mechanics and the Boltzmann equation.

**PROFESSOR RUTH BAKER**, of the University of Oxford, is awarded a **Whitehead Prize** for her outstanding contributions to the field of Mathematical Biology.

**DR TOM COATES** of Imperial College London is awarded a **Whitehead Prize** for his influential work in Gromov-Witten theory: the quantum Lefschetz theorem, the crepant resolution conjecture, the quantum cohomology of stacks, the higher genus theory of Calabi-Yau manifolds, and the Fanosearch program.

**PROFESSOR DANIELA KUHN** and **PROFESSOR DERYK OSTHUS**, of the University of Birmingham, are jointly awarded a **Whitehead Prize** for their many results in extremal graph theory and related areas. Several of their papers resolve long-standing open problems in the area.

# QUEEN'S BIRTHDAY HONOURS 2014

Congratulations to the following who have been recognised in the Queen's Birthday Honours list:

**Dame Commander of the Order of the Bath (DCB)**

Ms Jilian Norma Matheson, National Statistician and Permanent Secretary, Office for National Statistics and Chief Executive, UK Statistics Authority, for services to Government Statistics.

**Knights Batchelor (KB)**

Professor David John Spiegelhalter, OBE, FRS, Winton Professor for the Public Understanding of Risk, University of Cambridge, for services to statistics.

**Commander of the Order of the British Empire (CBE)**

Professor Denise Anne Lievesley, Professor of Statistics and Head of School of Social Science and Public Policy, King's College London, for services to social science.

**Office of the Order of the British Empire (OBE)**

Dr Penelope Jane Davies, Senior Lecturer in Mathematics, University of Strathclyde, for services to mathematics.

# CONGRATULATIONS

Congratulations to **Professor Atwell R. Turquette** (elected an LMS member 21 October 1971), who celebrates his 100th birthday on 14 July 2014.

# MATHEMATICS POLICY ROUND-UP

## June 2014

### RESEARCH

**The importance of engineering and the physical sciences to the health and life sciences**

EPSRC invited an independent review group chaired by Professor Patrick Maxwell, Regius Professor of Physic and Head of the School of Clinical Medicine at the University of Cambridge, to explore the relationship between engineering and the physical sciences and the health and life sciences.

The report concluded that engineering and physical sciences research, including mathematics, statistics and computer science, has played a major role in advancing health and life sciences, for example in biomaterials, microscopy, DNA sequencing and magnetic resonance imaging.

Academic and industry figures including Lord Darzi (Imperial College London), Professor Sir John Bell (University of Oxford) and Professor Patrick Vallance (GlaxoSmithKline) discussed the increasing importance for the future of various areas of research - from big data and genomics, to new drug discovery techniques, to medical devices for surgery.

The review group made several recommendations to ensure that institutions effectively supported the increasing integration between disciplines. These included:

- proposals to encourage interdisciplinary working;
- the role for challenge-driven research
- the need for doctoral training in interdisciplinary research
- incorporating engineering and physical sciences into the UK strategy for life sciences
- regular reviews of activity at the interface between disciplines

EPSRC will be discussing the report and its recommendations with key partners such as BBSRC, MRC, Cancer Research UK, the Wellcome Trust and other stakeholders over the coming months. The review is available at http://tinyurl.com/pbb9cnn.

**Universities to contribute to new Science and Innovation Strategy for the UK**

The four UK higher education funding bodies and Research Councils UK (RCUK) have written to the heads of all UK higher education institutions inviting input into the science and innovation strategy.

The Department for Business, Innovation and Skills (BIS) will be gathering a wide range of contributions on the development of a new strategy in May and June. The new strategy is due to be announced in autumn 2014. The funding bodies and RCUK are working in partnership to gather evidence from the higher education sector to inform their contributions to the strategy. Institutions were invited to provide views and any available evidence by 30 June 2014.

**EPSRC SATs conference**

The 2014 EPSRC SATs conference was held in May and brought together members of the Strategic Advisory Teams across the engineering and physical sciences to seek advice and share plans for the future.

EPSRC's new CEO, Philip Nelson opened the conference, introducing himself and his early thinking on taking up the role. All SAT members, including new members joining from April, had the opportunity to input into the Monitoring Portfolio Evolution exercise as part of the Shaping Capability strategy and start to engage with the BIS consultation for a share of £1.1 billion capital investment.

A summary of outputs will be available at www.epsrc.ac.uk.

**Report on the economic significance of the UK science base**

'A new report commissioned by the Campaign for Science and Engineering (CaSE) provides crucial economic evidence to support claims that government can boost growth by investing in science and engineering research'.

The new report, *The Economic Significance of the UK Science Base*, extends previous studies by examining the contribution of the UK science base to our economy at the level of industry, universities and individual researchers. It shows that, in each case, public investment in science and engineering leads to economic growth.

The full report is available at http://sciencecampaign.org.uk/UKScienceBase.pdf.

### SCHOOLS AND COLLEGES

**Your Life maths and science campaign**

The campaign was launched by the Chancellor of the Exchequer, the Rt. Hon. George Osborne MP, and the leading organisations and entrepreneurs taking part in it. The Chancellor was joined by Education Minister Liz Truss MP, Minister for Skills and Enterprise Matthew Hancock MP and Financial Secretary to the Treasury and Minister for Women, Nicky Morgan MP.

Organisations such as Google, Arup, L'Oreal, Microsoft, Ford, BP, BSkyB, Airbus, Balfour Beatty, Laing O'Rourke, IBM, Nestle, Samsung, the Science Museum and the Royal Academy

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**Publication dates and deadlines**

Published monthly, except August. Items and advertisements by the first day of the month prior to publication, or the closest preceding working day. Notices and advertisements are not accepted for events that occur in the first week of the publication month.



**Charity registration number: 252660.**

of Engineering have pledged to do more to highlight the career opportunities open to those studying STEM subjects, committing to create over 2,000 new entry level positions including apprenticeships, graduate jobs or paid work experience posts.

The campaign will also have targeted advertising and a new scheme to boost the number of high-skilled science teachers alongside the pledges from businesses. More information is available at www.yourlife.org.uk/.

**NUS and OCR publish research on student views to A-level reforms**

New research *Informing the reforms* released by NUS is the first national survey of students' views about the reform of A-Levels. NUS conducted the survey in collaboration with exam board OCR (Oxford, Cambridge and RSA Examinations).

Among other issues the research stated that: 'There was also a perception that new A-levels will be harder and that students may choose to move away from STEM subjects'.

More information is available at www.nus.org.uk/Global/informing-the-reforms.pdf.

## OTHER

**Women in scientific careers**

The Science and Technology Select Committee has received a response from the government to the *Women in Scientific Careers* report produced in February 2014. The government response is available at http://tinyurl.com/mkwumem.

**RCUK announces Chair of Open Access Review**

Research Councils UK (RCUK) has announced that Professor Sir Bob Burgess will Chair the 2014 review of the implementation of the RCUK policy on Open Access. Amongst other issues, the review will examine the impact of the policy since its introduction in April 2013, the process of implementation and its effects across the disciplines.

More information is available at www.rcuk.ac.uk/media/news/140509/.

Dr John Johnston
Joint Promotion of Mathematics

# LMS COUNCIL DIARY

## 9 May 2014
## A personal view

We could see, as we gathered in the Hardy Room at De Morgan House, that the work of remodelling the garden was now complete. This should, when the weather permits, provide a useful and pleasant area for refreshment breaks at meetings held at DMH.

As usual, the President impressed us with how many events he had attended on the Society's behalf since the previous meeting; I counted at least five. It was worrying to hear from the meeting of presidents of European mathematical societies how downbeat the mood had generally been; the situation in Germany and in the UK seemed not to be so gloomy.

A very successful joint meeting between the LMS and the Royal Meteorological Society had involved half-hour talks. It was agreed that the Programme Committee should discuss whether this format should be used more often.

From the meeting of Heads of Departments of Mathematical Sciences Terry reported concern that proposed changes in secondary schools could dramatically affect the numbers studying mathematics at universities.

Vice-President Ken Brown had deputized for the President at the Women in Mathematics Day. He found the ten-minute mathematical biographies with which the longer talks began fascinating and wondered whether this could be implemented more widely.

Before lunch Sarah Main, the Director of the Campaign for Science and Engineering (CaSE), gave a presentation entitled "How to persuade a politician — making the case for science investment". The LMS is one of around 100 organisations which are members of CaSE. Sarah outlined the approach that CaSE has used, with some success, to influence politicians, a key aspect of which involved providing arguments and information to those to whom the politicians listen. CaSE is already planning a series of events to raise the profile of science and engineering in next year's General Election.

Council received the final report from Mentoring African Research in Mathematics (MARM). Administered by the LMS, MARM was funded 2006–12 by the Leverhulme Trust and the Nuffield Foundation, and since then the IMU and the LMS have provided funds for four more mentoring partnerships while further sponsorship is sought. The aim of the programme was to combat the 'brain drain' of mathematicians from sub-Saharan Africa. The report concludes that, though it is too early to evaluate this long-term aim, MARM has achieved a definite impact on the development of mathematics in Africa.

Ken Brown reported on the work of the Research Policy Committee. Three data-gathering projects are coming to completion: a document on research funding in Mathematics, complementing last year's report on the staffing of UK mathematics departments; a CMS document on admissions, graduations and employment destinations in the mathematical sciences; an LMS online database as a successor to the old *Who's Where in UK Mathematics* directory.

Also in the Research Policy Committee's remit is a recent request for views (and evidence) for a review that the HEFCE is undertaking on the role of metrics in research assessment. Since the deadline for a reply falls before the next Council meeting, Council will have to approve a response by email.

Finally, it was reported that membership application forms were now online, and grant application forms will follow shortly.

Francis Clarke

# LMS GRANT SCHEMES

## Next Closing Date for Research Grant Applications: 15 September 2014

Applications are invited for the following grants:

**Conferences (Scheme 1)**
Grants of up to **£7,000** are available to provide partial support for conferences held in the United Kingdom. This includes a maximum of **£4,000** for principal speakers, **£2,000** to support the attendance of research students who are studying at universities in the UK, and **£1,000** to support the attendance of participants from Scheme 5 or former Soviet Union countries.

**Celebrating New Appointments (Scheme 1)**
Grants of up to **£600** are available to provide partial support for meetings held in the United Kingdom to celebrate the new appointment of a lecturer at a UK university.

**Postgraduate Research Conferences (Scheme 8)**
Grants of up to **£4,000** are available to provide partial support for conferences held in the United Kingdom, which are organised by and are for postgraduate research students.

**Visits to the UK (Scheme 2)**
Grants of up to **£1,500** are available to provide partial support for a visitor to the UK, who will give lectures in at least three separate institutions. Awards are made to the host towards the travel, accommodation and subsistence costs of the visitor.

**Joint Research Groups (Scheme 3)**
Grants of up to **£2,000** are available to provide support to research groups of mathematicians to enable them to engage in collaborative activities through holding regular meetings (the maximum award is for four meetings held in the academic year). Groups should be made up of mathematicians who are working in at least three different locations and who have a common research interest.

**Joint Research Groups (Scheme 3) – Renewal procedure**
ALL renewal applications MUST be accompanied by a Financial and Academic Report for the previous year's activities. Please note that full reports should always be submitted ('light touch' refers to the application procedure

only). Grant holders wishing to renew their application may use the Light Touch Application Form if the original or last full renewal application was made in the last TWO years, and NONE of the following have changed:

- the grant holder
- the supporters, and
- the amount requested.*

*Please note that with the increased maximum awards, grant holders may still apply using the Light Touch scheme and request the increased award per meeting (**£500**), e.g. up to **£2,000** for 4 meetings, provided that no other details have changed and that the number of meetings has not changed.

Grant holders MUST use the Full Renewal Application Form if the original or last full renewal application was made THREE years ago, and/or ANY of the following have changed:

- the grant holder
- the supporters or
- the amount requested.

If a renewal application is unsuccessful, normally the grant will be terminated at the end of the calendar year. A supplementary grant will be available to cover actual expenditure for a meeting held during the autumn term. This will normally be the equivalent of the grant awarded for one meeting, eg **£500**, and will not usually exceed one third of the previous year's grant.

**Research in Pairs (Scheme 4)**

Grants of up to **£1,200** are available to support a visit for collaborative research either by the grant holder to another institution abroad, or by a named mathematician from abroad to the home base of the grant holder. Grants of up to **£600** are available to support a visit for collaborative research either by the grant holder to another institution within the UK, or by a named mathematician from within the UK to the home base of the grant holder.

**International Short Visits (Scheme 5)**

Grants of up to **£3,000** are available to support a visit for collaborative research by a named mathematician from a country in Africa (or countries where mathematics is in a similar position) to the home base of the grant holder. Grants of up to **£2,000** are available to support a visit for collaborative research by the grant holder to a country in Africa (or countries where mathematics is in a similar position).

For full details of these grant schemes, and to download application forms, please visit the LMS website: www.lms.ac.uk/content/research-grants.

- Applications received by 15 September 2014 will be considered at a meeting in October.
- Applications should be submitted well in advance of the date of the event for which funding is requested.
- Normally grants are not made for events which have already happened or where insufficient time has been allowed for processing of the application.

Queries regarding applications can be addressed to the Grants Administrators or the Programme Secretary (see below) who will be pleased to discuss proposals informally with potential applicants and give advice on the submission of an application.

- Grants Administrators: Sylvia Daly and Elizabeth Fisher (tel: 020 7291 9971/3, email: grants@lms.ac.uk).
- Programme Secretary: Rob Wilson (r.a.wilson@qmul.ac.uk).

## OTHER LMS GRANTS AND FUNDING

**Research Workshop Grants**

The Society offers grants to support Research Workshops held in the UK. Requests for support (for travel and subsistence of participants, and reasonable associated costs) in the range **£1,000-£10,000** will be considered. The maximum award is **£10,000**, but a typical award is in the range of **£3,000-£5,000**. Applications for partial support of workshops with other sources of support will be considered. Applications should normally be submitted 12 months in advance of the proposed workshop. For further information visit: www.lms.ac.uk/content/research-workshops-grants.





**Young British and Russian Mathematicians Scheme**

Next Deadline: 15 September 2014.

**Visits to Russia**

Applications are invited from young British postdoctoral mathematicians who wish to spend a few weeks in Russia giving a series of survey lectures on the work of their school. The LMS is offering grants of up to **£500** to meet the travel costs, while the host should apply to the Russian Academy of Sciences for funding towards local expenses for accommodation and subsistence. Please contact Sylvia Daly (grants@lms.ac.uk) for information before contacting the Russian Academy of Sciences for funding. Applications to the LMS should include the following:

- A brief academic case for the visit, including a description of your current research interests, and an outline of your planned work during the visit (no more than one side of A4).
- A brief CV (no more than one side of A4).
- A brief budget.
- A letter of invitation from the head of the host department in Russia, which must state explicitly that your accommodation and subsistence expenses will be met by them. This should include provisional dates for the visit.

Financial and academic reports will be required after the visit. In exceptional circumstances, applications may be considered from strong research students who are close to finishing their doctorates. Applications should include a strong case and the student should obtain a letter of recommendation from his/her supervisor.

**Visits to Britain**

Under this Scheme, applications may also be made by any mathematician in Britain wishing to host a visit by a young Russian postdoctoral mathematician who wishes to spend a few weeks in Britain giving a series of survey lectures on the work of their Russian seminar. The LMS is offering grants to the host institution to meet the visitor's actual travel and accommodation costs of up to **£1,500**. Applications should include the following:

- Name and brief CV of the visitor
- A brief budget
- A brief description of the course of lectures
- A letter or email of agreement from the head of the host department, including the proposed dates of the visit.

Financial and academic reports will be required after the visit.

Further details of the Scheme can be found on the LMS website: www.lms.ac.uk/content/international-grants. Applications received by 15 September 2014 will be considered at a meeting in October. Enquiries should be made to the Grants Administrators: Sylvia Daly and Elizabeth Fisher (tel: 020 7291 9971/3, email: grants@lms.ac.uk).

**Spitalfields Days**

Next Deadline: 15 September 2014

Grants of up to **£1,000** are available to support an LMS Spitalfields Day, which have been run since 1987 and are in honour of the Society's predecessor, the Spitalfields Mathematical Society (1717-1845). A Spitalfields Day is a one-day meeting, which is usually associated with a long-term symposium on a specialist topic at a UK university. Selected participants, often distinguished experts from overseas, give survey lectures (or other types of lecture accessible to a general mathematical audience) on topics in the field of the symposium. Please see the website for further details: www.lms.ac.uk/content/spitalfields-days.

**Grace Chisholm Young Fellowship**

The Society offers two fellowships of **£1,000** (consisting of **£500** personal support and **£500** contribution to a host institution) each year to mathematicians who need support when their mathematical career is interrupted by family responsibilities, relocation of partner, or other similar circumstance.

These fellowships, named after Grace Chisholm Young, aim to provide some support, making possible some continuous mathematical activity, so enabling the fellow to be in a position to apply for posts when circumstances allow. The Fellowship will give an endorsement of the holder's status as a mathematician, so that the break in formal employment should not prevent them from resuming a career as a mathematician at a later stage. Please see the website for further details: www.lms.ac.uk/grants/grace-chisholm-young-fellowships.

**Small Grants for Education**
Next Deadline: 31 August 2014
Funding for grants up to **£800** is available to stimulate interest and enable involvement in mathematics from Key Stage 1 (age 5+) to Postgraduate level and beyond. Anyone working/based in the UK is eligible to apply for a grant. If the applicant is not a member then the application must be countersigned by an LMS member or another suitable person such as a Head teacher or senior colleague. Please see the website for further details: www.lms.ac.uk/content/small-grants-education.

**Computer Science Small Grants (Scheme 7)**
Next Deadline: 15 November 2014
Funding for grants up to **£500** is available to support a visit for collaborative research at the interface of Mathematics and Computer Science either by the grant holder to another institution within the UK or abroad, or by a named mathematician from within the UK or abroad to the home base of the grant holder. Please see the website for further details: www.lms.ac.uk/content/computer-science-small-grants-scheme-7.

**Childcare Supplementary Grants**
Grants of up to **£200** are available to parents working in mathematics to help with the cost of childcare when attending a conference or research meeting. The Society believes that all parents working in mathematics should be able to attend conferences and research meetings without being hindered by childcare costs. Institutions are expected to make provision for childcare costs and parents are encouraged to make enquiries. However, where this is not available, the Society administers a Childcare Supplementary Grants Scheme. Please see the website for further details: www.lms.ac.uk/content/childcare-supplementary-grants.



# SOCIETY SEEKS INFORMATION FROM MATHEMATICAL COMMUNITY ON THE CHALLENGES FOR UK MATHEMATICAL SCIENTISTS IN HIGHER EDUCTION

**Ken Brown**
**Vice President, LMS**

Some current developments in UK Higher Education Institutions raise serious concerns for mathematicians. The issues involve complex changes in the relationships between career development, the impact agenda, and external funding. While many of these changes affect academics in other fields, I will concentrate here on their particular effects on those working in the mathematical sciences. These effects are, broadly speaking, of two sorts: changes in our working conditions as individual mathematical scientists, and changes in the overall structure of academic mathematical science in the UK. Here are some examples of the sort of thing I have in mind: the first six predominantly concern individuals, at least initially, while the remainder are more structural:

1. award of sabbatical leave only to those winning Research Council (RC) grants;
2. allocation of PhD students only to those winning RC grants;
3. supervision of research student(s) a necessary condition for promotion;
4. substantial external research income a necessary condition for promotion;
5. move to "tenured" status dependent on winning external income and/or PhD supervision;
6. non-submission of an individual's outputs to the REF, despite availability of a full set of internationally-published outputs;
7. departmental decisions on number of outputs submitted to the REF influenced by the number of sufficiently strong Impact Statements;
8. decisions on research fields to support or appointments to make dependent on likelihood of future Impact Statements being generated;
9. loss of service teaching leading to reduced student FTE numbers and reductions in staffing.

The purpose here is not to provide a detailed analysis of each of the above issues – rather, I want to open a dialogue, letting others develop topics which they feel are of particular concern, whether from the above list or not. Instead, I'll simply comment briefly below on a couple of the points.

Of course, not everyone will think that each of these developments is by definition "a bad thing". Regarding point 8, for instance, areas of research focus and consequently of appointments must change over time if our subject is to remain vital. The increased focus on Impact in the UK is part of a world-wide trend which we as mathematical scientists cannot and should not try to oppose – rather we must continue with and redouble our efforts to make funders' definitions of and ways of measuring impact more in tune with the full range of our activities. We must also continue to emphasise the huge long-term impact of the mathematical sciences, as catalogued for example in the Deloitte report; and we should develop a portfolio of examples of the profound influence of the mathematical sciences on all aspects of our lives – one excellent example is the USA's National Research Council report "The Mathematical Sciences in 2025"[1].

On point 4, we all know that RC grant income in the mathematical sciences is very low compared to many other STEM subjects. This is in part because the main costs of much of most of the research in the mathematical sciences has been for people and for time, costs which, though very significant, have in the past been adequately covered for many of us in the UK by the dual support system of funding. Perhaps also it is the case that what we do has historically been undervalued, thanks to long lag times for impact, but also – let's be honest – thanks to our sometimes relaxed attitude in the past to the need to make the case for more funding. The LMS, both on its own and in conjunction with the Council for the Mathematical Sciences, has been working hard to make these cases and to assemble relevant data, for grant income and more broadly: for example, the Deloitte report[2], produced with CMS backing last year, has generated a lot of publicity, and the LMS is producing data documents on UK HEI staffing in the mathematical sciences[3] (Nov 2013), and on UK research funding in the mathematical sciences (to be published July 2014). A CMS report on the "people pipeline" in the mathematical sciences will come out later this year.

I should also briefly explain what I have in mind with point 5. At least two Russell Group universities have recently introduced contracts for newly-appointed lecturers, which lead the appointee through a career path set up to complete probation in two to three years, with an expectation of promotion to Senior Lecturer or Reader (possibly called something different), within five to seven years of initial appointment. All to the good, you might think - except that milestones expected to be passed en route to promotion include winning substantial RC grant income, and supervising a PhD student to completion. The consequences of failing to achieve these targets in the specified time frame are left unclear.

So, why am I writing this article? The first and very important reason is to gather information. At the moment our community has no way of knowing how widespread are these and similar changes. Those directly affected can feel isolated, powerless and undervalued. I am therefore inviting two sorts of response. First, I will very much welcome information about particular cases along the lines of those listed above. It will be equally valuable to learn of examples of good practice with regard to these issues. Naturally, I'll treat all such communications in the utmost confidence, but will hope to share what global data I can gather, in due course. More generally, it will be good to hear other views on the issues raised here: perhaps, for example, some of these changes should be welcomed? Most importantly, we need to consider what we as a community should be doing in the face of these developments. What should the LMS be doing?

Comments can be sent for inclusion in the *Newsletter*, to newsletter@lms.ac.uk, or, in the case of more confidential material, sent to me at Ken.Brown@glasgow.ac.uk. Do also feel free to make use of the LMS blog, at http://discussions.lms.ac.uk/members/, where a copy of this article has been placed.

[1]Available as a free download at www.nap.edu/catalog.php?record_id=15269
[2]http://tinyurl.com/p3y5u3f
[3]www.lms.ac.uk/policy/statistics-mathematics

LONDON MATHEMATICAL SOCIETY

Isaac Newton Institute for Mathematical Sciences

# LMS SPITALFIELDS DAY

## ADVANCES IN THE MATHEMATICS OF WATER WAVES

**Wednesday 23 July 2014**

Isaac Newton Institute for Mathematical Sciences
20 Clarkson Road, Cambridge CB3 0EH

As part of the programme *Theory of Water Waves* (14 July - 8 August 2014) the Isaac Newton Institute will be holding an LMS Spitalfields Day on 23 July 2014. This special event consists of four lectures surveying the state of the art in selected areas of the rigorous mathematical theory of water waves. The lectures will be accessible to a general mathematical audience, including graduate students.

Speakers are:

- **Mark Groves** (Loughborough, Saarland)
  *Three-dimensional water waves*
- **Guido Schneider** (Stuttgart)
  *Validity and non-validity of the NLS approximation for the water wave problem - recent developments and open problems*
- **Steve Shkoller** (Oxford)
  *Interface singularities for the Euler equations*
- **Eugene Varvaruca** (Reading)
  *Singularities of steady free surface water flows*

Register by **13 July 2014** (www.newton.ac.uk/cgi/ wsapply?CODE=TWWW02). There are limited funds available to assist in the travel cost of research students. If you require support towards travel, advise an estimated amount in the space provided on the online registration form.

The organiser is Professor Mark Groves (M.D.Groves@lboro.ac.uk).

# LMS UNDERGRADUATE RESEARCH BURSARIES 2014

The London Mathematical Society is pleased to announce the list of successful applicants to its second round of Undergraduate Research Bursaries. For the 2014 round 20 awards were made to students from 16 different institutions to undertake a research project alongside a research supervisor. The purpose of the Bursaries is to enable undergraduates with research potential to experience research and to encourage them to consider a career in scientific research.

| Institution | Research Supervisor | Student | Research |
|---|---|---|---|
| University of Bath | Professor David Calderbank | Charles Craven | *Functoriality in geometry and representation theory* |
| University of Bath | Professor Peter Morters | Tom Crawley | *Spread of rumours in preferential attachment networks* |
| University of Belfast | Dr Martin Matthieu | Victoria Coombe | *Spectral graph theory beyond finite dimensions* |
| University of Birmingham | Dr Richard Mycroft | Candida Bowtell | *Investigating external set systems* |
| University of Bristol | Professor Guy Nason | Lewis Rendall | *A new test of stationarity for network time series* |
| University of Bristol | Dr Nina Snaith | Patrick Morris | *Modelling elliptic curves with random matrix theory* |
| University of Cambridge | Dr Thomas Montenegro-Johnson | David Baker | *Dynamics of cilia observed in developing zebrafish* |
| Cardiff University | Dr Andreas Artemiou | Luke Smallman | *Dimension reduction with reweighted large margin classifiers* |
| Cardiff University | Dr Jonathan Gillard | Holly Butcher | *Low rank approximations of matrices, with a view towards statistical applications* |
| University of Durham | Dr Athanasios Bouganis | Francesca Bianchi | *Special values of L-functions attached to Hecke characters* |
| University of East Anglia | Dr Robert Gray | David Reed | *The directed geometry of finitely generated amendable semigroups* |
| University of East Anglia | Professor Shaun Stevens | Elaine Barker | *Counting cuspidal representations of finite and p-adic reductive groups* |
| University of Glasgow | Dr Christina Cobbold | Remus Stana | *Can organisms with a non-motile life-stage keep pace with climate change?* |
| Imperial College London | Professor Alessio Corti | Ben Wormleighton | *Hilbert functions of orbifold del Pezzo surfaces* |
| University of Nottingham | Dr Alexander Ossipov | Thomas Cope | *Quantum wavefunctions in disordered topological insulators* |
| University of Oxford | Dr Tobias Dyckerhoff | Lothar Krapp | *Unoriented surfaces, Moebius graphs and outer space* |
| University of Portsmouth | Dr James Burridge | Steven Kenney | *Power laws and power law crossover in cascading systems* |
| Royal Holloway, University of London | Dr Martin Widmer | Sahana Seetharaman | *Counting points of bounded height in certain infinite extensions* |
| University of Strathclyde | Dr Michael Grinfeld | Maciej Buze | *Non-local models of phase transitions* |
| University of Surrey | Dr Bin Cheng | Timothy Burchell | *Accuracy and validation of barotropic fluid models on a sphere* |





# LONDON MATHEMATICAL SOCIETY MEETING AND RECEPTION

## Tuesday 19 August 2014

International Congress of Mathematicians
Seoul, South Korea

The London Mathematical Society will be holding a meeting and reception during the next International Congress of Mathematicians, in Seoul from 13-21 August 2014.

**Jean-Pierre Bourguignon** will give a talk on *The life of a mathematician has several sides*.

The Society meeting and reception will be held from 5.00 pm – 9.00 pm on Tuesday 19 August. LMS members will have the opportunity to sign the Members' Book, which dates back to 1865.

LMS members who wish to attend the meeting and reception should apply for their free ticket to Elizabeth Fisher, (lmsmeetings@lms.ac.uk) no later than **Friday 25 July**. The Society hopes to entertain as many as possible of its members, but numbers are limited by the capacity of the room.

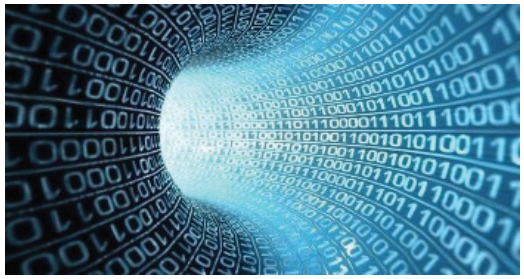
The LMS will also host a stand during the ICM and would like to invite members to drop by, see the latest publications and meet the LMS Officers and staff.

## OPEN HOUSE 2014

The LMS will once again open its doors to the public as part of this year's Open House London event. De Morgan House will be open on Sunday 21 September from 11am until 4 pm. Visitors will be given a tour of the building and there will also be a presentation on mathematics through the years. Over 300 people visited the building in 2013 and we hope to continue this success in 2014.

## TURING GATEWAY TO MATHEMATICS

### Post-Quantum Research



Over 50 people attended the *Post-Quantum Research – Identifying Future Challenges and Directions Workshop* from 8 to 9 May 2014 at the Isaac Newton Institute in Cambridge. This was organised by the Turing Gateway to Mathematics, with support from GCHQ, with the aim to bring mathematicians and computer scientists together to build UK capacity in the post-quantum research area. Participants included academics, researchers and those representing industry.

This event was the first of a programme of activities to develop and broaden the post-quantum research community in the UK. This is largely based on the realistic possibility that in the medium term the power of quantum computation will have the potential to compromise some cyber security systems. Therefore, there is a current need to develop classical cryptographic security into schemes that are resistant to quantum computer attack.

The event sought to identify future challenges and directions for post-quantum cyber-security research and to generate ideas for developing UK research and teaching in the area.

The workshop included a selection of presentations that identified the possible challenges that could be faced and how these might be addressed. It also enabled discussion between those in industry who had identified problems and the academics who might work to solve these. Short talks were also given by next generation researchers which brought some new ideas to the audience. Facilitated discussion sessions set out to explore and identify what is the state-of-the-art in quantum algorithms, what are the mathematical challenges in quantum algorithms, what are the cyber security issues today and what are the challenges for mathematicians in cyber security arising out of quantum computing?

Overall feedback from those who attended the event was positive and highlighted the benefit of having a wide spread of backgrounds in attendance. These were advantageous in helping facilitate the range of discussions that took place, allowing for good exploration of the issues/threats that could potentially be faced in the future.

A second workshop will take place from 18 to 19 September 2014 in Cambridge. This will take forward ideas generated in this first workshop, with a key aim to gain consensus in identifying the mathematical challenges in post-quantum cryptography. There will also be a focus on setting the agenda for future research directions and the event will be open to a wider audience, including public and industrial stakeholders.

For more details see www.turing-gateway.cam.ac.uk/gchq_may2014.shtml.





## LONDON MATHEMATICAL SOCIETY

# POPULAR LECTURES 2014

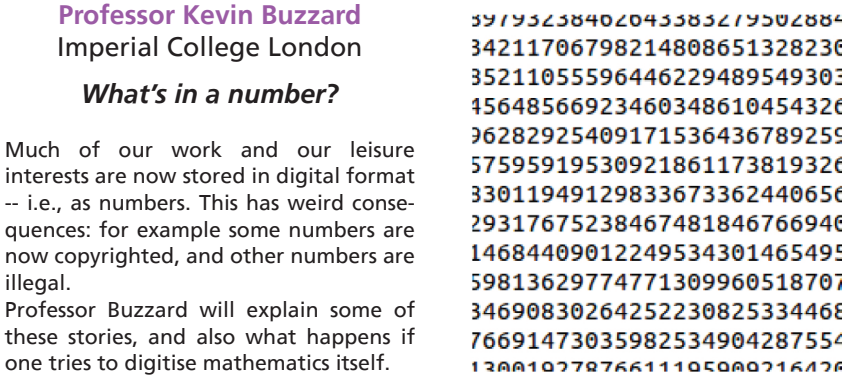
**Institute of Education, London – Wednesday 9 July**

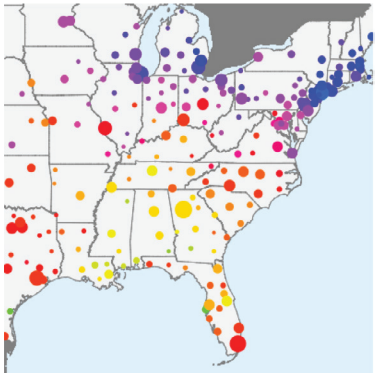
**University of Birmingham – Wednesday 24 September**

### Professor Kevin Buzzard
Imperial College London

***What's in a number?***

Much of our work and our leisure interests are now stored in digital format -- i.e., as numbers. This has weird consequences: for example some numbers are now copyrighted, and other numbers are illegal.
Professor Buzzard will explain some of these stories, and also what happens if one tries to digitise mathematics itself.





### Dr Julia Gog
University of Cambridge

***Epidemics and viruses: the mathematics of disease***

Dr Gog will look at how mathematics has been applied to help understand and control infectious diseases, from the scale of a single virus particle through to a global influenza pandemic, and considers some mathematical challenges for the future.

**LONDON:** Commences at 7.00 pm, refreshments at 8.00 pm, ends at 9.30 pm
Admission is free, with ticket. **Register by Thursday 3 July.**

**BIRMINGHAM:** Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 pm
Admission is free, with ticket. **Register by Thursday 18 September.**

To register for tickets, please email popular.lectures@lms.ac.uk or visit the LMS website for abstracts and a registration form (www.lms.ac.uk/events/popular-lectures).

# EUROPEAN NEWS

## Who are the Invited Speakers at ICM 2014?

The purpose of this study by Martin Andler (Université de Versailles St Quentin, France) is to give an overview of the ICM 2014 speakers - not to say something about their mathematics but to answer questions about their gender, geographic origin, where they went to school at the various stages of their lives, etc. This list of 206 excellent mathematicians provides a good sample of our community, and hence of the globalisation of higher education and of the academic job market.

[Source: *EMS Newsletter* June 2014, pp. 38-44]

## Shaw Prize in Mathematical Sciences 2014

George Lusztig, the Abdun-Nur Professor of Mathematics at MIT (Cambridge, MA, USA) was awarded the Shaw Prize in Mathematical Sciences for 2014. The Shaw Foundation cited Lusztig 'for his fundamental contributions to algebra, algebraic geometry, and representation theory, and for weaving these subjects together to solve old problems and reveal beautiful new connections.' Further details at www.shawprize.org/en/ and http://tinyurl.com/mtedydm.

[Source: www.euro-math-soc.eu/news.html]

## The Ferran Sunyer i Balaguer Prize 2014

The Ferran Sunyer i Balaguer Prize 2014 winners were Professors Véronique Fischer and Michael Ruzhansky (Imperial College London), for the work *Quantization on Nilpotent Lie Groups*. See http://ffsb.iec.cat for further details, including those for submission for the 2015 prize.

[Source: *EMS Newsletter* June 2014, p.12]

## Clifford Prize

David Eelbode (University of Antwerp, Belgium) has been selected as the recipient of the second W.K. Clifford Prize, for his outstanding mathematical research achievements in the fields of harmonic and Clifford analysis with applications in theoretical physics. He received his PhD from Ghent University with a thesis titled *Clifford analysis on the hyperbolic unit ball* (supervisor Franciscus Sommen).

The W.K. Clifford Prize will be presented to David Eelbode at the ICCA10 Conference at Tartu, (4-8 August 2014). David Eelbode will give the second special W.K. Clifford Prize Lecture at University College London on 7 November 2014. Further details at http://wkcliffordprize.org/2014-tartu-laureate.html.

[Source: www.euro-math-soc.eu/news.html]

## Barcelona Dynamical Systems Prize 2015

With the patronage of Professor Carles Simó, the Societat Catalana de Matemátiques will award a prize to the author or authors of a paper or research work in the area of Dynamical Systems, published or accepted for publication between 1 May 2013 and 31 April 30 2015. Further details available at http://tinyurl.com/qev3znv.

[Source EMS e-News 11 May 2014]

## Federigo Enriques Prize 2014

The Unione Matematica Italiana, in collaboration with Centro Studi Enriques, announces the Federigo Enriques Prize, to be awarded to a doctoral dissertation on subjects related to Federigo Enriques' mathematical thought and defended in the last two years. Applications must be sent to UMI, Piazza di Porta San Donato 5, 40126 Bologna, not later than **30 November 2014**. More information at http://umi.dm.unibo.it/premi/premio-federigo-enriques/.

[Source EMS e-News 11 May 2014]

## UMI Book Prize

The Unione Matematica Italiana (UMI) has established a Prize of €4,000, sponsored by Springer-Verlag, for an excellent, original monograph in any field of mathematics. The first edition of the Prize will be awarded at the general UMI congress which will take place in Siena, September 2015. Applications and nomination letters must be sent to the UMI office (Piazza di Porta San Donato 5, I-40126 Bologna) not later than **30 November 2014**. More information at http://tinyurl.com/le4ez29.

[Source EMS e-News 11 May 2014]

## IMAGINARY – Mathematics Communication for the 21st Century

IMAGINARY is the name of a collaborative mathematics outreach project that aims to improve the image and understanding of mathematics and in this way awake an interest and fuel passion for the subject in children and adults. This goal is achieved in different ways: on the one hand by showing the beauty and art in mathematics and on the other hand through surprising applications. To best understand the project we have to go back to its beginning.

IMAGINARY was born at the Mathematische Forschungsinstitut Oberwolfach (MFO) in conjunction with the Year of Mathematics in 2008 in Germany. It started with the travelling exhibition IMAGINARY – through the eyes of mathematics shown in 12 German cities. Due to its tremendous success, follow up exhibitions were soon organised in Austria, Switzerland, Spain, UK and Ukraine. The program SURFER, developed for IMAGINARY, became a centrepiece of the exhibition. It teaches in a playful way the connection between formula and form, between algebra and geometry through beautiful 3D surfaces. In this way, it bridges the gap between art and mathematics. An example of such a surface, Citrus, is seen on the front cover of the current issue of the *EMS Newsletter*. The visitors of the exhibition get the chance to alter the algebraic equations, see the effects on the displayed surfaces in real time and even get to take a printout back home.

Since 2008, the IMAGINARY exhibition has been shown in over 60 cities in Germany alone but has also travelled further afield to four continents, 29 countries and over 120 cities with more than 1 million visitors in total. In Europe, IMAGINARY has been presented in 17 countries with talks, workshops, media activities and, in most cases, exhibitions.

For more details and some striking images from the exhibition see the full article in the *EMS Newsletter* June 2014, pp. 3-6, as well as the website www.imaginary.org.

[Source: *EMS Newsletter* June 2014, p. 3-6]

## New Service by EU-MATHS-IN

The association EU-MATHS-IN (promoted by the EMS and the ECMI) has launched a new service: a website for advertising jobs for mathematicians in companies or institutions working on industrial contracts. See www.eu-maths-in.eu/jobs .

[Source: *EMS Newsletter* June 2014, p.10]

## New Editorial Board of the Journal of the European Mathematical Society

The Executive Committee of the EMS has appointed a new editorial board of its flagship journal, *JEMS*. The EMS is greatly indebted to the departing editorial board, which under the leadership of Professor Brézis has raised the journal to its current high rank. This board is responsible for the handling of papers submitted to *JEMS* before 1 June 2014; it will terminate its functions by September 2015.

At the same time, the EMS expresses its gratitude to the new editorial board for having accepted this important responsibility, and welcomes warmly all its members. From the 1 June 2014, authors submitting articles to the journal are directed to an electronic submission system, and the new editorial board will handle these articles. For more information including lists of members of the new and of the departing editorial board see www.euro-math-soc.eu/node/4791.

[Source: www.euro-math-soc.eu/news.html]

David Chillingworth
LMS/EMS Correspondent

# LMS WOMEN IN MATHEMATICS DAY 2014

## Report

This year the LMS Women in Mathematics Day was held on 25 April 2014 at the LMS headquarters in central London. After the opening welcome from LMS Vice-President Ken Brown, we had a programme packed with excellent speakers from a variety of mathematical and personal backgrounds and at various stages of their careers.

Laura Watkin (EPSRC)

The morning speakers Sarah Hart (Birkbeck College), Katia Babbar (Lloyds) and Anne Juel (University of Manchester) spoke about their mathematical research/applications and also included some stories and insight into their career progressions. It was inspiring and useful to learn in person, in particular as a junior mathematician, their individual climb to successful careers (academic and financial), which involved having potential barriers which were often non-female specific and/or common in academia especially.


Layal Hakim (Brunel University)
poster competition winner

The three afternoon speakers Sian Fryer (University of Manchester), Mareike Haberichter (University of Kent), and Masha Jankovic (University of Leicester) spoke on their PhD research and during tea breaks and lunch, we were also able to peruse posters submitted by 19 student participants on a diverse range of pure and applied mathematical research. Layal Hakim, of Brunel University, won the poster prize by vote, for her submission on *Numerical Analysis of Cohesive Zone Model Approach for Time and History Dependent Materials*.

Following the talks, we split into three discussion groups focussing on "Next steps in your career" , "General issues in the life of a mathematician" , and "Funding opportunities"; the latter included a presentation by Laura Watkin, the Mathematical Sciences portfolio manager from the EPSRC.

The very friendly forum atmosphere allowed participants to raise and explore questions including, but not restricted to, how/when to change/broaden research areas, taking the next step in one's careers, balancing with personal wants, job hunting issues if you have a partner also in academia, and good/bad practices in university departments. Several of the younger mathematicians expressed that, despite almost all their queries being non-gender specific issues which can affect mathematicians or even a person in the early stages of their career in general, they felt more comfortable approaching female mathematicians.

The whole day, finished off by the conference dinner, provided all of us with a wonderful opportunity and sociable setting in which to swap amusing anecdotes, share concerns and experiences, and in general be encouraged and informed by the academic and non-academic experiences of others.

Discussion group

The entire meeting was an enriching day, and certainly I wish I knew about earlier meetings. I wholeheartedly encourage mathematicians to participate in these meetings, no matter what stage of career they are in and whether they are aiming for a career in academia or otherwise.

Shona Yu
University of Leeds

# RECORDS OF PROCEEDINGS AT LMS MEETINGS

## ORDINARY MEETING

held on *8 April 2014* at Queen Mary College, University of London, during the British Mathematical Colloquium. Over 150 members and visitors were present for all or part of the meeting.

The meeting began at 11.30 am with The President, Professor Terry Lyons FRS, in the Chair.

The Treasurer, Professor Robert Curtis, presented a report on the Society's activities.

No members were elected to membership.

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

The President, on Council's behalf, presented a certificate to Dr Corinna Ulcigrai, the winner of a Whitehead Prize in 2013.

Professor Lyons introduced a lecture given by Professor Claire Voisin on *Points, zero cycles, and rationality questions.*

The Chair expressed the thanks of the Society to the speaker for giving an interesting lecture.

The Chair also expressed thanks to Ivan Tomasic and Behrang Noohi for organising a successful BMC.

# LMS GRESHAM COLLEGE LECTURE 2014

## Report

The 2014 LMS Gresham College Lecture given by Professor Marcus du Sautoy on *The Secret Mathematicians* took place on 21 May 2014. The lecture theatre at the Museum of London was completely full for this annual lecture which is a joint venture by the LMS and Gresham College. Marcus started by reminiscing about his school-days where he seemed to be presented with a choice: Art v. Science. He was attracted by the excitement of Science and realised that mathematics seemed to forge a link between these two apparently different areas and decided that there was really a false dichotomy.

We are familiar with the idea that mathematicians often have other strings to their bows – music, chess, or even cricket (think G.H. Hardy – see later) and what was to be presented in this lecture were five 20th century practitioners in other fields for whom mathematics was an integral part of their activities.

The first was the composer Olivier Messiaen, who in the prison camp where he was interned wrote his famous *Quatuor pour la Fin du Temps*. In one movement, the *Liturgie de Cristal*, he writes a 17-note rhythm repeated over and over set against a 29-note harmonic sequence, so that, because of the primes involved, the two things never come back together during the course of the movement. This use of primes was illustrated again with *magicicada septendecim*, a cicada with a 17-year cycle. Other species apparently use 13 – was there a predator they were trying to avoid?

We then had a brief foray into the world of Fibonacci numbers, with numbers of petals and breeding rabbits, and a reminder that the Indian mathematician Hemachandra (1089-1172) had looked at them rather earlier. And so to architecture, with Le Corbusier. He produced two series of numbers, his Série Rouge and Série Bleue, made up of Fibonacci-type numbers, which he used in creating living spaces in his buildings. Fibonacci also led to the spiral and the golden ratio as exemplified in many buildings. Palladio, however, preferred whole numbers, and for Zaha Hadid the mathematics definitely came first. The golden ratio apparently fascinated Mozart, to the extent that there is a crucial 83/130 bar split in the overture to his *Magic Flute*.

The artist came next – Salvador Dali. His *Visage of War* shows a skull with the eye sockets and mouth filled with smaller versions and so on... like the Sierpinski gasket. And his *Crucifixion* is set against a 4-dimensional cube unwrapped in 3 dimensions. Professor du Sautoy also told us that Jackson Pollock's works also show fractal qualities, which is how some people have managed to show that some works purporting to be his are actually fakes!

Marcus du Sautoy

The poet chosen was Jorge Luis Borges. He is obsessed with paradox, and in his *The Library of Babel* he looks at something which is infinite and cyclical. (What is the shape of our universe?)

And finally to Rudolf Laban, the choreographer. He has invented a way of representing the movements of dancers in 3-D shapes. (And here our lecturer mentioned his involvement in X&Y, a collaboration with Victoria Gould at the Science Museum.)

And to come full circle we had a quotation from G.H. Hardy, in *A Mathematician's Apology*, 'I am interested in mathematics only as a creative art.'


Marcus du Sautoy

An interesting and enjoyable evening.

Martin Perkins
Gresham College

The report is also on the Gresham College website at www.gresham.ac.uk/lectures-and-events/the-secret-mathematicians

## STRUCTURE, FUNCTION AND DYNAMICS IN MICROBIAL COMMUNITIES

**Isaac Newton Institute**
for Mathematical Sciences

**30 - 31 October 2014**

in association with the Newton Institute programme
*Understanding Microbial Communities; Function, Structure and Dynamics*
(11 August – 19 December 2014)

**Organisers:** Rosalind Allen (University of Edinburgh), Thomas Curtis (Newcastle University), Thomas Pfeiffer (Massey University), William Sloan (University of Glasgow), Orkun Soyer (University of Warwick) and Carsten Wiuf (University of Copenhagen).

**Background:** In recent years, our understanding of how microbial communities develop and function has been revolutionized by advances in both DNA sequencing and microscopy. Mathematical tools provide a powerful tool for making sense of such data. This workshop will bring together leaders in the field, both from the experimental and theoretical sides, to highlight the current state of our understanding of microbial community structure, function and dynamics, and to discuss productive future directions. The workshop will focus on ecology, evolution and dynamics. The workshop will take place at the Isaac Newton Institute, Cambridge, UK, as part of a longer-term research programme on the study of function and structure of microbial communities. It will be preceded by a training event, aimed at early career researchers but all are welcome also to attend.

Closing date of the receipt of applications is **10 August 2014**.
Further information and application forms are available from the website at
www.newton.ac.uk/programmes/UMC/umcw03.shtml

# LMS NORTHERN REGIONAL MEETING 2014

## Report

Dmitry Badziahin (Durham) , Tim Austin (NYU), Alex Gorodnik (Bristol)

The 2014 LMS Northern Regional Meeting took place at Durham University on Monday 31 March and was followed by the Easter School *Dynamics and Analytic Number Theory* from 1 to 4 April 2014. The event was jointly organised by three Durham organisers (D. Badziahin, N. Peyerimhoff and T. Ward) together with A. Gorodnik (Bristol), A. Ghosh (TIFR) and B. Weiss (Tel Aviv). The intention of this event was to communicate remarkable recent developments at the interface between Number Theory and Dynamical Systems.

The LMS meeting was opened by the President of the LMS, Professor Terry Lyons, who introduced new LMS members, and invited members at the meeting, who had not previously done so, to sign the prestigious Membership Book. The following three survey talks were aiming at a broader audience of nonspecialists. The first afternoon speaker was Sanju Velani (York), who introduced and discussed two fundamental results in the classical theory of metric Diophantine approximation, Khintchine's and Jarnik's theorem, and who presented a surprising modern take on the connections between these two results. The next talk by Manfred Einsiedler (ETH Zurich) was about dynamical theorems on homogeneous spaces and how they can be applied in Diophantine analysis. The final afternoon talk was given by Giovanni Forni (Maryland), who described a geometric viewpoint on renormalization and discussed applications to linear skew-shifts and billiards in rational polygons. The meeting ended with a wine reception and a dinner at Collingwood College, where all the participants were accommodated.

Attendees





Alex Gorodnik (Bristol), Pankaj Vishe (York), Trevor Wooley (Bristol), Sanju Velani (York)

The following four day Easter School on *Dynamics and Analytic Number Theory* was mainly aiming at young scientists working in one of the two above mentioned mathematical disciplines. The speakers were internationally recognized experts giving a series of minicourses: T. Austin (Courant) on *Multiple Recurrence and Finding Patterns in Dense Sets*, Y. Bugeaud (Strasbourg) on *Exponents of Diophantine Approximation*, M. Einsiedler (ETH Zurich) on *Diophantine Problems and Homegeneous Dynamics*, G. Forni (Maryland) on *Effective Equidistribution for Some Homogeneous Flows*, A. Kontorovich (Yale) on *Applications of Thin Orbits*, S. Velani (York) on *Metric Diophantine Approximation* and T. Wooley (Bristol) on *Exponential Sums Associated with Translation-invariant Systems*.

Discussion during the coffee break

The Easter School was very well received by more than 60 young researchers, many of them PhD students from all around the world. Besides the financial support of the LMS there was also additional financial support via an ERC grant of A. Gorodnik (Bristol).

The timeliness of the event is confirmed by other forthcoming events on similar research topics like the *Activity Dynamics and Numbers* at the Max Planck Institute for Mathematics (Bonn) during June/July 2014 and the Programme *Interactions between Dynamics of Group Actions and Number Theory* during June/July 2014 at the Isaac Newton Institute for Mathematical Sciences.

Dmitry Badziahin and
Norbert Peyerimhoff
Durham University

# RECORDS OF PROCEEDINGS AT LMS MEETINGS

## ORDINARY MEETING

held on *31 March 2014* at the University of Durham as part of the Northern Regional Meeting and Easter School on *Dynamics and Analytic Number Theory*. Over 70 members and visitors were present for all or part of the meeting.

The meeting began at 2.00 pm with The President, Professor Terry Lyons FRS, in the Chair.

Thirteen members were elected to Ordinary membership: Katia Babbar, Márton Balázs, Gergely Berczi, Andrew Brooke-Taylor, Panagiotis Doukakis, Tamara Grava, Timothy McNicholl, Reto Mueller, David Platt, Peter Rowlett, John Smillie, Michael Todd, Alexandra Tzella.

Eleven members were elected to Associate membership: Thomas Booker-Price, Pierre Dechant, Grahame Erskine, Thomas Harris, Wilfred Itankan, Madeleine Jotz Lean, Sheng Li, Stuart Litobarski, Charles Muli, Jean-Frances Niglio, Luke Vorhies.

Two members were elected to Reciprocity membership: Avery Carr, Bruce McNeil.

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

Dr Dmitry Badziahin introduced a lecture given by Professor Sanju Velani on *Metric Diophantine approximation: the Lebesgue and Hausdorff theories*.

Dr Badziahin then introduced a lecture given by Professor Manfred Einsiedler on *Diophantine Problems and Homogeneous Dynamics*.

After tea, Dr Badziahin introduced the final lecture given by Professor Giovanni Forni on *Beyond Renormalization in Parabolic Dynamics*.

The President, Professor Lyons, expressed the thanks of the Society to the speakers and to Norbert Peyerimhoff, Dmitry Badziahin, Anish Ghosh, Alexander Gorodnik, Tom Ward and Barak Weiss for putting on such a wonderful meeting.

Afterwards, the reception and Society Dinner were held at Collingwood College.







# LMS SOCIETY MEETING
# *MATHEMATICS AND THE FIRST WORLD WAR*

**Saturday 6 September 2014**

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

| | |
|---|---|
| 10:00 | Coffee and Registration |
| 10:30 | **Reinhard Siegmund-Schultze** (Agder) *German and Austrian mathematical efforts during the First World War* |
| 11:30 | **David Aubin** (Paris) *The Total War of Paris Mathematicians* |
| 12:15 | **June Barrow-Green** (Open University) *What did Cambridge mathematicians do during the First World War?* |
| 1:00 | *Lunch* |
| 2:15 | **Rossana Tazzioli** (Lille) *The reaction of Italian mathematicians to the entrance of Italy in the First World War* |
| 3:00 | **Deborah Kent** (Drake University) *Developing a theory of ballistics from experimentation and mathematics: O. Veblen, F.R. Moulton, and the Aberdeen Proving Ground Project* |
| 3:45 | *Tea* |
| 4:15 | **Joseph Dauben** (CUNY) *The international diplomacy of G.H. Hardy* |
| 5:15 | Close of meeting. Wine Reception |
| 7:00 | Society Dinner |

To register contact Elizabeth Fisher (lmsmeetings@lms.ac.uk) by **Monday 1 September**. Late registrations for places may still be accepted, subject to availability.

The reception will be followed by a dinner at venue (tbc), at a cost (tbc) per person, inclusive of wine. If you would like to attend the dinner, please contact Elizabeth Fisher (lmsmeetings@lms.ac.uk) by **Monday 1 September**.

There are limited funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting. Please contact Elizabeth Fisher (lmsmeetings@lms.ac.uk) for further information.

## VISIT OF GERHARD KELLER

Professor Gerhard Keller (Mathematics, University of Erlangen, Germany) will be visiting the UK from 24 September to 2 October 2014. His expertise is in ergodic theory and dynamical systems, especially the thermodynamic formalism, equilibrium states and spectral theory of dynamical systems. During his visit, Professor Keller will give lectures at the following locations:

- University of Exeter, 25 September , 4-5 pm (contact Peter Ashwin: P.Ashwin@ex.ac.uk). This lecture will be broadcast via the access grid system available to some UK mathematics departments as an *AG Dynamics Seminar*; see www1.maths.leeds.ac.uk/~rsturman/ag_dynamics_seminar/
- Imperial College London, 29 September (contact Sebastian van Strien: s.van-strien@imperial.ac.uk)
- University of Warwick, 30 September (contact Ian Melbourne: I.Melbourne@warwick.ac.uk)

Further details about the visit can be obtained from Peter Ashwin (P.Ashwin@ex.ac.uk). The visit is supported by an LMS Scheme 2 grant.

## BMC/BAMC JOINT MEETING 2015

The organisers invite you to Cambridge for the 2015 combined British Mathematical Colloquium (BMC) and British Applied Mathematics Colloquium (BAMC) to **commemorate the 150th Anniversary of the London Mathematical Society.**

Combined BMC/BAMC meetings takes place every five years, and this meeting, hosted by the University of Cambridge, will include a special set of sessions and plenaries in honour of 150 years of the LMS.

Keynote speakers at the meeting will include Robert Calderbank, Ingrid Daubechies, Jacques Dumais, Phil Hall, Sylvia Serfaty, Wendelin Werner and Andrew Wiles, and a public lecture is scheduled to be given jointly by Stephen Hawking and Michael Green.

The combined BMC/BAMC meeting will run from 11:00 on Monday 30 March 2015 to 13:00 on Thursday 2 April 2015, with the celebration of the 150th anniversary of the LMS taking place during Wednesday 1 April 2015 followed by the conference dinner that evening. For further details visit www.bmc-bamc.org.uk.

Limited accommodation in Cambridge colleges will be available during the meeting to those who book early. Registration and abstract submission opens on **1 December 2014**. To sign up for a reminder of this date visit www.bmc-bamc.org.uk/preregistration.

## CSTAR

***C**lassification, **ST**ructure, **A**menability and **R**egularity* (CStar) is a two week event consisting of a masterclass from 25 to 29 August 2014 and a conference from 1 to 5 September 2014 on classification of nuclear C*-algebras and will take place at the University of Glasgow.

The classification programme started around 1990 and there have been some spectacular recent developments. Both events are devoted to the latest exciting developments. The masterclass provides an opportunity to learn about key techniques at the heart of current research in this area.

Aimed at PhD students and early career researchers, the masterclass will consist of two introductory courses on the classification programme given by Marius Dadarlat (Purdue) and Nate Brown (Penn State) and a further longer course on more specialised techniques (central sequences) given by Mikael Roerdam (Copenhagen). There will be further introductory lectures by Wilhelm Winter (Münster) and various local speakers. Moreover there will be opportunities for participants to present their work.

The masterclass will be followed by a research conference devoted to the latest activity in the area, emphasising connections to dynamics and topology. The speakers are:

- Joachim Cuntz (Münster)
- Marius Dadarlat (Purdue)
- Siegfried Echterhoff (Münster)
- Ilijas Farah (York, CA)
- George Elliott (Toronto)
- Gwion Evans (Aberystwyth)
- Ilan Hirshberg (Be'er Sheva)
- Eberhard Kirchberg (Humbold Berlin)
- David Kerr (Texas A&M)
- Nadia Larsen (Oslo)
- Xin Li (Queen Mary)
- Narutaka Ozawa (RIMS Kyoto)
- Francesc Perera (Barcelona)
- N. Christopher Phillips (Oregon)
- Yasuhiko Sato (Copenhagen)
- Aaron Tikuisis (Aberdeen)

There are 25 funded places (accommodation, fees and further support) for the masterclass.

Some further funding is available to support local accommodation and travel for the conference. For more information, and to register, visit the website at www.maths.gla.ac.uk/~saw/CStar14/main.html.

The organisers are: Joan Bosa, Stuart White, Joachim Zacharias (Glasgow) and Wilhelm Winter (Muenster). The event is supported by an LMS conference grant and EPSRC.

## ANALYTIC NUMBER THEORY

An international conference on *Analytic Number Theory and its Applications* will be held from 14 to 18 July 2014 at Perrotis College (Thessaloniki, Greece) in honour of Jeff Hoffstein. The conference aims to enable exchange of ideas and information among workers on Dirichlet series and automorphic forms, areas to which Jeff Hoffstein has made fundamental contributions. The structure of the conference will consist of research lectures, discussion and problem sessions.

The organizers are B. Brubaker (Minnesota), N. Diamantis (Nottingham) and D. Goldfeld (Columbia). The conference is supported by the Clay Foundation, the Compositio Foundation and the NSF. Details of the meeting can be viewed at http://math.umn.edu/~brubaker/jh2014c.html.

## DISCONTINUOUS GALERKIN METHODS

A meeting on the *Recent Advances in Discontinuous Galerkin Methods* will take place at the Department of Mathematics and Statistics at the University of Reading from 11 to 12 September 2014 and is dedicated to recent advances in various aspects related to discontinuous Galerkin methods.

The discontinuous Galerkin Method is a well-established approach for the numerical solution of PDEs with applications ranging from electromagnetic scattering to fluid and structural mechanics. One of the reasons of the success of the DG paradigm is its flexibility and capability to incorporate different numerical methodologies: high order approximation, a posteriori error control, Trefftz approximation, *hp* time stepping. The aim of the workshop is to bring together the leading scientists and active young researchers, mostly from the UK, working in the field of discontinuous Galerkin methods and initiate intensive idea exchanges and new collaborations. The speakers include:

- Blanca Ayuso de Dios (KAUST)
- Gabriel Barrenechea (Strathclyde)
- Andrea Cangiani (Leicester)
- Andreas Dedner (Warwick)
- Herbert Egger (TU Darmstadt)
- Emmanuil Georgoulis (Leicester)
- Stefano Giani (Durham)
- Edward Hall (Leicester)
- Paul Houston (Nottingham)
- Foteini Karakatsani (Strathclyde)
- Irene Kyza (Dundee)
- Omar Lakkis (Sussex)
- Matthias Maischak (Brunel)
- Charalambos Makridakis (Sussex)
- Iain Smears (Oxford)

The registration fee is £30 (research students and postdoctoral researchers within three years of the completion of their PhDs are exempt). For further information visit the workshop website www.personal.reading.ac.uk/~st904897/ReaDG.html or contact the organizers Alexey Chernov, Andrea Moiola and Tristan Pryer by email (ReaDG@reading.ac.uk). The meeting is supported by an LMS Conference grant.

## UNIVERSITY OF CAMBRIDGE
## FACULTY OF MATHEMATICS

# ADAMS PRIZE

**Algebraic Geometry**

The University of Cambridge has announced the subject for one if its oldest and most prestigious prizes. The Adams Prize is named after the mathematician John Couch Adams and was endowed by members of St John's College. It commemorates Adams's role in the discovery of the planet Neptune, through calculation of the discrepancies in the orbit of Uranus.

The Chairman of the Adjudicators for the Adams Prize invites applications for the 2014-15 Prize which will be awarded this year for achievements in the field of algebraic geometry.

The prize is open to any person who, on 31 October 2014, will hold an appointment in the UK, either in a university or in some other institution; and who is under 40 (in exceptional circumstances the Adjudicators may relax this age limit). The value of the prize is expected to be approximately £14,000, of which one third is awarded to the prize-winner on announcement of the prize, one third is provided to the prize-winner's institution (for research expenses of the prize-winner) and one third is awarded to the prize-winner on acceptance for publication in an internationally recognised journal of a substantial (normally at least 25 printed pages) original article, of which the prize-winner is an author, surveying a significant part of the winner's field.

Applications (email and two hard copies), comprising a CV, a list of publications, the body of work (published or unpublished) to be considered, and a brief non-technical summary of the most significant new results of this work (designed for mathematicians not working in the subject area) should be sent to:

**The Secretary of the Adams Prize Adjudicators,**
**Undergraduate Office, Centre for Mathematical Sciences,**
**Wilberforce Road, Cambridge, CB3 0WA**

***(Email: adamsprize@maths.cam.ac.uk)***

**The deadline for receipt of applications is 31 October 2014.**





University of St Andrews | FOUNDED 1413

## School of Mathematics and Statistics

## Regius Professor of Mathematics

The School of Mathematics and Statistics at the University of St Andrews is looking to appoint a Regius Professor of Mathematics. This prestigious chair was established in 1668, and the first holder was James Gregory.

We are looking for candidates with an outstanding track record of research and academic achievement in any of the key areas of mathematical sciences. The ability to lead the strategic development of mathematical sciences in St Andrews, and to represent the School prominently within the UK and internationally are essential. We expect the appointment to expand our existing research portfolio in a significant way, with the possibility of forming a new research group. Nonetheless, synergies with the current expertise -- algebra, analysis, combinatorics, solar MHD, fluid dynamics, and statistics -- will be welcome.

The University, the oldest in Scotland and third oldest in the UK, is consistently highly ranked in national league tables. It was voted Scottish University of the Year 2013/14 by the Times and Sunday Times, and the School was ranked top in the UK in the Guardian University Guide 2015.

The University is committed to equality of opportunity. The School of Mathematics & Statistics prides itself on its inclusive and family-friendly work environment, actively striving to achieve diversity and equality of opportunity for all of its staff, students and visitors.

For further details and an informal discussion please contact Professor Nik Ruskuc, the Head of School, mathshead@st-andrews.ac.uk.

For full details see http://www.st-andrews.ac.uk/employment/.

We encourage applicants to apply online at www.vacancies.st-andrews.ac.uk/welcome.aspx. However if you are unable to do this, please call +44 (0)1334 462571 for an application pack.

Closing Date: 15 September 2014

Please quote ref: ME837R

The University of St Andrews is a charity registered in Scotland (No SC013532).

Heilbronn Institute *for* Mathematical Research

# 2014 Annual Conference

The 2014 Heilbronn Annual Conference will be held at the University of Bristol on the 11–12 September. A number of distinguished mathematicians are invited to present lectures, intended to be accessible to a mixed audience of mathematicians. Invited speakers:

**Nalini Anantharaman**, Universite Paris-Sud
**Emmanuel Breuillard**, Universite Paris-Sud
**Martin Bridson**, University of Oxford
**Nick Duffield**, Rutgers University
**Alexander Holroyd**, Microsoft Research
**Hendrik Lenstra**, University of Leiden
**James Maynard**, University of Oxford
**Ashkan Nikeghbali**, University of Zurich
**Emily Shuckburgh**, British Antarctic Survey

There is no registration fee but to enable estimation of numbers, please complete this on-line form:
**survey.bris.ac.uk/mathematics/heilbronnregistration2014**

UK graduate students and postdoctoral fellows who would like to attend and need support should contact heilbronn-coordinator@bristol.ac.uk before 15 July detailing their requirements, enclosing a brief CV, and explaining why other support is not available. The final programme and additional details will be posted on the Institute website in due course.

**Venue**
Pugsley Lecture Theatre, 1.40 Queens Building, University Walk, Bristol, BS8 1TR

maths.bris.ac.uk/events/meetings

University of BRISTOL

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# Institute of mathematics & its applications

List of upcoming conferences:

- **4th IMA Conference on Numerical Linear Algebra and Optimisation**
  University of Birmingham, 3-5 September 2014
  http://tinyurl.com/IMAConfNLAO
- **IMA Conference on Mathematical Modelling of Fluid Systems**
  Engineers' House, Bristol, 10-12 September 2014
  http://tinyurl.com/IMAConfFluid
- **IMA Early Career Mathematicians' Autumn Conference 2014**
  Queen Mary University London, 22 November 2014
  www.ima.org.uk/conferences/conferences_calendar.cfm
- **IMA Conference on Applications of Game Theory**
  St Anne's College, University of Oxford, 8-10 December 2014
  http://tinyurl.com/IMAConf-GameTheory
- **10th IMA Conference on Maths in Signal Processing**
  IET, Austin Court, Birmingham, 15-17 December 2014
  http://tinyurl.com/IMAConf-SignalProcessing10
- **IMA Conference on the Mathematical Challenges of Big Data**
  Woburn House, London, 16-17 December 2014
  http://tinyurl.com/IMAConf-BigData
- **IMA Conference on Research in Mathematics and its Applications: Eight Great Technologies**
  University of Bath, 9 January 2015
  http://tinyurl.com/IMAConfResearch
- **IMA Mathematics 2015**
  Mary Ward House, London, 19 March 2015
  www.ima.org.uk/conferences/conferences_calendar.cfm
- **3rd IMA Conference on Flood Risk Assessment**
  Swansea University, 30-31 March 2015
  http://tinyurl.com/IMAConf-FloodRisk
- **8th IMA Conference on Mathematical Education of Engineers**
  Loughborough University, 20 April 2015
  http://tinyurl.com/IMAConfMEE
- **IMA International Conference on Barriers and Enablers to Learning Maths: Enhancing Learning and Teaching for All Learners**
  University of Glasgow, 10-12 June 2015
  http://tinyurl.com/IMAConfTeach

Visit www.ima.org.uk/conferences/conferences_calendar.cfm to keep up to date with the conference programme, and for further information or to register your interest any of the above conferences, please contact Lizzi Lake, Conference Officer, email: conferences@ima.org.uk, tel: +44 (0) 1702 354 020, fax: +44 (0) 1702 354 111, Institute of Mathematics and its Applications, Catherine Richards House, 16 Nelson Street, Southend-on-Sea, Essex SS1 1EF, UK.


The Festival is organized by the British Science Association (a.k.a. the British Association for the Advancement of Science) and takes place this year in Birmingham from Saturday 6 to Thursday 11 September 2014.

These are the mathematical sciences related events in the main programme, with provisional timings.

**SATURDAY 6 SEPTEMBER**

**10:00-11:30** *From Dürer to Sudoku: 500 Years of Recreational Maths,* organized by Peter Rowlett (Nottingham Trent)

Geometry and magic squares, inspired by the 500th anniversary of Dürer's Melencolia I, with John Sharp, Robin Wilson and Peter McOwan.

**12:00-13:00** The *Darwin Award Lecture: What Can Maths Tell Us about How an Animal is Feeling?* Lisa Collins (Lincoln)

Explore a wonderland of animal behaviours that are hidden to the human eye, but not to an algorithm. We will seek to explain how mathematics can help to understand some complicated and bizarre behaviours, and what it can tell us about the feelings of the animals performing them.

**15:00-16:00** *The Improbability Principle,* David Hand (Imperial College)

The improbability principle says extremely improbable events are commonplace. The five basic laws underlying the principle are all based on solid and well-understood probability theory, and there are many striking examples.

**SUNDAY 7 SEPTEMBER**

**10.00-11.00** *Seventeen or Bust*, Iain Bethune (EPCC, University of Edinburgh)

The Sierpinski conjecture, and what you can do to help.

**13:30-14:30** *Sex, Maths and the Brain: Where Have All the Girl Scientists Gone?*, Gina Rippon (Aston)

Is there such a thing as a maths brain? Are mathematicians born or made? Can brain imaging help us understand gender differences in the world of mathematics?

**16:00-17:30** *When Fridges Attack: Big Data Meets Intelligent Machines The 2014 Mathematical Sciences Presidential Lecture* by Peter McOwan (QMUL), with Louis McCallum (QMUL).

Computers, and the maths powering them, are starting to link everything around us with the sea of personal data we all now swim in. What could happen when everyday things get smart?

Followed by a wine reception sponsored by the Operational Research Society.

**MONDAY 8 SEPTEMBER**

**11:00-12:00** *Pocket Doctor,* Max Little (Aston)

Cheap phones are capable of recording voice, activity, movement, location – all data which can reveal signs of illness. Mathematical algorithms can detect problems such as depression, post-traumatic stress disorder and Parkinson's. New technologies will monitor vital signs continuously - a true doctor in your pocket.

**TUESDAY 9 SEPTEMBER**

**16:30-17:30** *The Royal Society Vision for the Future of Science and Mathematics Education*

Learn more about the Royal Society's vision for how the UK can develop an inspiring and high performing science and mathematics education system over the next 15 to 20 years.





**WEDNESDAY 10 SEPTEMBER**

**13:00-14:30** *Life Saving Mathematics*, Thomas Woolley, Helen Byrne and Gary Mirams (Oxford). Applying mathematics to biological problems in medicine: brain tumours, cancer and modelling of the heart.

**THURSDAY 11 SEPTEMBER**

**12:00-13:00** *The Rosalind Franklin Award Lecture: Our Dynamical Sun: a 21st Century View,* Ineke De Moortel (St Andrews)

A journey from the Sun's nuclear core, through the solar surface, into its atmosphere, on towards Earth and finally out into space, showing how we can create mathematical models of solar activity.

**IN ADDITION**

Katie Steckles will be running *Think Maths* Workshops on Saturday 6 September, and there will be several events in the Young People's Programme, including *Modular Arithmetic* by Joe Watkins (Kent), *Maths Saves Lives* by Louise Orpin (OR Society); and *Codes and Codebreaking* by Corneliu Hoffman, *Designing and Making a Calculator* by David Leppinen, *Using Maths to Survive the Zombie Apocalypse* by Sara Jabbari and *Using Maths to Win at Gameshows* by Simon Goodwin (all from Birmingham).

*The Maths and Computing Magic Show,* Matt Parker and Peter McOwan (QMUL).

Magic tricks and fun with a basis in mathematics or computer science [day and time to be decided].

For further details visit the website at www.britishscienceassociation.org/british-science-festival/birmingham-2014.

**FESTIVAL 2015**

The format of a Festival of Science in 2015 is not yet settled. If there is a call for event proposals as in previous years then I shall be circulating notices to email lists in the autumn of this year. Any queries please to the Chair of the Mathematical Sciences Section, Peter Giblin (pjgiblin@liv.ac.uk).

## GENERALIZED FUNCTIONS

An international conference on *Generalized Functions* (GF2014) will take place at the Department of Mathematical Sciences, University of Southampton from 8 to 12 September 2014. This conference continues a long-standing tradition of international conferences on generalized functions gathering researchers working in all branches of the field. Topics include:

- Distribution theory, hyperfunctions, algebras of generalized functions, Integral transforms,
- Linear and nonlinear differential equations, solvability, regularity, stochastic analysis,
- Pseudodifferential operators and microlocal analysis,
- Geometric problems and nonlinear distributional geometry,
- Applications in mathematical modelling and mathematical physics, applied analysis,
- Harmonic analysis, modulation spaces, time-frequency analysis.

Confirmed speakers are:

- Pedro Catuogno (University Estadual de Campinas)
- Sandro Coriasco (University of Turin)
- Claudia Garetto (Loughborough University)
- James Grant (University of Surrey)
- Eduard Nigsch (University of Vienna)
- Michael Oberguggenberger (University of Innsbruck)
- Stevan Pilipovic (University of Novi Saad)
- Luigi Rodino (University of Turin)
- Michael Ruzhansky (Imperial College, London)
- Roland Steinbauer (University of Vienna)
- Joachim Toft (Växjö University)
- Jasson Vindas (University of Ghent)

For details and registration form see the conference webpage at www.ocs.soton.ac.uk/index.php/gf2014/gf2014 or contact the organising committee at gf2014@soton.ac.uk or the Chair of the Organising Committee: James Vickers (J.A.Vickers@soton.ac.uk).

The conference may be able to offer

some degree of financial support to participants giving contributed talks, to postgraduate students, and to others unable to cover costs from their own sources. Contact gf2014@soton.ac.uk if you would like to request financial support. The conference is supported by an LMS Conference grant and the University of Southampton.

## FUNCTION THEORY MEETING

This year's *One Day Function Theory Meeting* will be held on Monday 1 September 2014 at De Morgan House in London. This popular meeting, well attended by function theorists from the UK and Ireland, has been held annually for over thirty years.

Speakers will include Professor Nuria Fagella (University of Barcelona) who will speak on *Hyperbolic entire functions with bounded Fatou components*, and Professor Lasse Rempe-Gillen (University of Liverpool) who will speak on *Arc-like continua, Julia sets of entire functions, and Eremenko's conjecture*.

Email the organiser (odftm.mail@gmail.com) if you are interested in attending. Information about past meetings and the location of De Morgan House can be found on the One Day Function Theory Meeting website at https://sites.google.com/site/functiontheorymeeting/.

The meeting is supported by an LMS Conference grant

## THE HUXLEY MEETING ON ANALYTIC NUMBER THEORY

This meeting will take place in the School of Mathematics at Cardiff University from Wednesday 17 September to Friday 19 September 2014. The focus of the meeting will be on recent developments in analytic number theory. This meeting is being held on the occasion of Martin Huxley's 70th birthday minus epsilon. The confirmed speakers so far are:

- Antal Balog (Hungarian Academy of Sciences)
- Ben Green (University of Oxford)
- Roger Heath-Brown (University of Oxford)
- Harald Helfgott (École Normale Supérieure)
- Christopher Hooley (University of Bristol)
- Jens Marklof (University of Bristol)
- James Maynard (Universities of Montreal and Oxford)
- Nina Snaith (University of Bristol)
- Trevor Wooley (University of Bristol)

There is a £45 registration fee (£15 per day) to cover coffee/tea and lunches. Some funding is available to contribute to the expenses of research students. For more information, including how to register, see the meeting website http://mathsevents.cf.ac.uk/huxleymeeting/index.html or contact the organiser, Matthew Lettington (LettingtonMC@cardiff.ac.uk). The meeting is supported by an LMS Conference grant and by Cardiff University.

## BRITISH ALGEBRAIC GEOMETRY

The first *British Algebraic Geometry Meeting* (BrAG) will take place at the Mathematics Institute at the University of Warwick from 22 to 24 September 2014. The conference will start on Monday at 2.30 pm and finish on Wednesday at 2.30 pm.

This will be the inaugural meeting of a planned series of regular meetings of British algebraic geometers. The goal is to create a series that further strengthens the British algebraic geometry community, in particular by integrating PG students and young researchers. The first meeting will feature a number of pre-talks for graduate students, a poster session, and will include plenty of time for informal interactions between the participants. The speakers are:

- Tom Bridgeland (Sheffield)
- Lucia Caporaso (Roma Tre)
- Paolo Cascini (Imperial College)
- Mark Gross (Cambridge)





- Anne-Sophie Kaloghiros (Imperial College)
- Jonathan Pridham (Edinburgh)
- Orsola Tommasi (Hannover)
- Claire Voisin (Ecole Polytechnique)
- Geordie Williamson (Bonn)

There is a £25 registration fee (£20 for PhD students). Funding is available for a significant number of PhD students and post-docs. For more information, including how to register, see the meeting website https://sites.google.com/site/bragmeeting/. The meeting is supported by an LMS Conference grant, EPSRC and the Warwick MRC.

## UK PROBABILITY MEETING 2014

The next *UK Probability Meeting From Microscopic Randomness to Macroscopic Phenomena* will take place at Imperial College London from 15 to 19 September 2014. As with previous meetings, the general aim of the conference is to bring together the UK probability community, showcase recent developments, and invite leading international researchers to give short courses on topical and emerging areas in the field.The meeting is organised by the Imperial Probability Centre and will include mini-courses by:

- Krzysztof Burdzy (Washington)
- Gareth Roberts (Warwick)
- Walter Schachermayer (Vienna)

and a number of invited one-hour talks. Confirmed invited speakers include:

- Mathias Beiglböck (Vienna)
- Nathanael Berestycki (Cambridge)
- Franco Flandoli (Pisa)
- István Gyöngy (Edinburgh)
- Saul Jacka (Warwick)
- Ioannis Karatzas (Columbia)
- Vassili Kolokoltsov (Warwick)
- Claudio Landim (IMPA-Rio de Janeiro and CNRS)
- Sylvie Méléard (Ecole Polytechnique)
- Ashkan Nikeghbali (Zurich)
- Sandrine Péché (Paris VII)
- Vitali Wachtel (Ludwig-Maximilians-Universität München)

Registration is now open via the conference website at www2.imperial.ac.uk/~amijatov/IP/EPM2014/EPM.html

Some support for PhD students will be available. Details on how to apply can be found on the conference website (deadline **31 July 2014**).

The meeting traditionally takes place in April of every other year. However, in 2014 the meeting has been moved to September due to the temporal proximity of other large events in probability in the UK. The meeting is organised by Nick Bingham, Rama Cont, Dan Crisan, and Alex Mijatovic. It is supported by an LMS Conference grant, EPSRC, CFM-Imperial Institute of Quantitative Finance, and the Department of Mathematics at Imperial. The meeting is sponsored by the Bernoulli Society.

## BRITISH LOGIC COLLOQUIUM 2014 and BLC PHD DAY 2014

The *British Logic Colloquium* (BLC) 2014 will be held at the University of Central Lancashire from 3 to 5 September 2014. It will be preceded by a *BLC PhD Day* from 2 to 3 September. This is a general Logic meeting and will cover a variety of topics within the subject. Invited speakers are:

- Natasha Alechina (Nottingham)
- Ann Copestake (Cambridge)
- Anuj Dawar (Cambridge)
- Immanuel Halupczok (Leeds)
- Johnathan Kirby (UEA)
- Graham Leigh (Oxford)
- Jeff Paris (Manchester)
- Alex Simpson (Edinburgh)
- Boban Velickovic (Paris)

The organisers welcome contributions for the main conference and the PhD Day. For details of how to submit a contributed talk or poster visit the website at http://www.blc-logic.org/2014-Lancashire. The meeting is supported by an LMS Conference grant and the British Logic Colloquium.

## BRITISH TOPOLOGY MEETING

The *29th British Topology Meeting* will take place in the School of Mathematical Sciences at the University of Southampton from 8 to 10 September 2014. It will showcase recent developments in topology and their connections with other areas of mathematics. The speakers include:

- Tara Brendle (University of Glasgow)
- Ib Madsen (University of Copenhagen)
- Aniceto Murillo (Universidad de Malaga)
- Taras Panov (Moscow State University)
- Birgit Richter (University of Hamburg)
- Vladimir Vershinin (Université Montpelier)
- Henry Wilton (University College London)

There are also open slots for contributed talks. The registration fee is £30 (research students are exempt). Some funding is available to contribute to the travel and accommodation expenses of research students. For further information, including how to register or apply to give a contributed talk, visit the meeting's website www.personal.soton.ac.uk/ijl1y09/btm14/, or contact one of the organisers: Jelena Grbic (J.Grbic@soton.ac.uk), Ian Leary (I.J.Leary@soton.ac.uk) and Stephen Theriault (S.D.Theriault@soton.ac.uk). The meeting is supported by an LMS Conference grant.

## LIMIT THEOREMS

A one-day workshop on *Limit Theorems, Probability Approximations and Related Areas* will be held at Heriot-Watt University on Friday 12 September 2014. Speakers for the event are:

- Gesine Reinert (University of Oxford)
- Sergey Utev (University of Leicester)
- Fraser Daly (Heriot-Watt University)

For further information see the workshop website www.macs.hw.ac.uk/~fd78/ltpara or contact Fraser Daly (F.Daly@hw.ac.uk). The meeting is supported by an LMS Conference grant under the Celebrating New Appointments scheme.

**Isaac Newton Institute**
for Mathematical Sciences

# METHODS FOR MATHEMATICAL AND EMPIRICAL ANALYSIS OF MICROBIAL COMMUNITIES

## PhD Summer School

## 27 - 29 October 2014

in association with the Newton Institute programme
*Understanding Microbial Communities; Function, Structure and Dynamics*
(11 August – 19 December 2014)

**Organisers:** Rosalind Allen (University of Edinburgh), Thomas Curtis (Newcastle University), Thomas Pfeiffer (Massey University), William Sloan (University of Glasgow), Orkun Soyer (University of Warwick) and Carsten Wiuf (University of Copenhagen).

**Background:** Theoretical and computational techniques to model microbial communities are essential tools for making sense of the massive amounts of new data emerging from DNA sequencing. This two-day workshop will feature tutorial-style lectures on a number of themes that are emerging in this field, ranging from understanding and interpreting microbial evolution experiments, through individual-based modelling, to analysis of sequence data. The meeting is open to all, but aimed at early career researchers, whom will be given the opportunity to present their work in short talks and posters. The workshop will take place at the Isaac Newton Institute, Cambridge, UK, as part of a longer-term research programme on the study of function and structure of microbial communities.

Closing date of the receipt of applications is **10 August 2014**.

Further information and application forms are available from the website at
www.newton.ac.uk/programmes/UMC/umcw02.shtml

# MEMBERS' OPINIONS ..... have your say

All opinions submitted to this section are strictly those of the contributor and do not necessarily represent the views of the London Mathematical Society.

These two opinions close this particular debate.

We would welcome opinions on other topics relevant to mathematics (newsletter@lms.ac.uk). Items are accepted at the discretion of the Editor and subject to available space in any given edition. Items may also be reproduced on the LMS Membership blog to allow debates to continue for a longer period of time.

# SHOULD MATHEMATICIANS COOPERATE WITH GCHQ?

**Trevor Jarvis (University of Hull - ret'd)**

This question was posed by Tom Leinster in the April LMS *Newsletter*. His quite reasonable article referred to widespread allegations that the security services monitor much of our lives.

Richard Pinch (May LMS *Newsletter*) and Malcolm MacCallum (June LMS *Newsletter*) each make a valiant attempt to stave off the question.

Their defence is basically 'we don't believe the allegations but we can't say why.'

"Allegations about GCHQ's activities are not going to be confirmed or denied. Either would be helpful to hostile nations, terrorists or criminals."

That is very puzzling. In what way would it help "hostile nations, terrorists or criminals" to know their every moves were being watched? Haven't they caught on yet?

Malcolm MacCallum says that the intelligence services have thwarted 34 terrorist plots. Well, maybe they have, maybe they haven't. We don't know. Mathematicians don't usually take things on trust. In any case, if the plots have been foiled shouldn't the would-be perpetrators be publicly exposed – pour décourager les autres?

Praising the work of GCHQ and the intelligence agencies in stopping innocent people being killed, Malcolm MacCallum says "Deaths at 9/11 and 7/7 were narrowly avoided..." That is a very strange statement; were those attacks foreseen?

As for the statement by the Foreign Secretary in the House of Commons – "It is my belief... that GCHQ staff conduct themselves with the highest level of integrity and legal compliance" – many people no longer trust the Orwellian statements of government ministers. Who carries out the 'independent' scrutiny of GCHQ?

Finally, can I make a request to Malcolm MacCallum and Richard Pinch: please will you give me an assurance that this email won't be read by the security services?

**Tom Leinster (School of Mathematics, University of Edinburgh)**

Two mathematicians associated with GCHQ, Richard Pinch and Malcolm MacCallum, have now replied to my April LMS *Newsletter* article, which consisted mostly of factual statements based on the Snowden leaks, followed by the mild opinion that mathematicians can choose whether to give GCHQ their cooperation.

Neither of them disputes any specific factual statement that I made.[1] Neither engages with the fact that the intelligence agencies intercept not just terrorists' communications, but everyone's (over 50 billion communications/day, according to GCHQ). Neither discusses the total surveillance mission of GCHQ's closest partner, the US National Security Agency:

*Collect it all. Sniff it all. Know it all.*

*Process it all. Partner it all. Exploit it all.*

Neither addresses any of the facts revealed by the leaks. Both say, effectively: "Trust us."

But no one needs to trust Pinch or MacCallum, or me, because we now have detailed documentary evidence of what GCHQ and its partners are doing. We can simply test claims against that evidence.

For example, Pinch quotes GCHQ director Iain Lobban's claim that if his staff "were asked to snoop, I would not have the workforce. They would leave the building." By contrast, GCHQ's own documents detail how it secretly captured webcam images, many sexually explicit, from millions of ordinary people. If that is not "snooping", what is?

We all want spies to spy on terrorists. We all agree that the secret services must have secrets. We all support targeted surveillance. But what is at issue is mass surveillance: the monitoring of everyone, all the time.

Pinch and MacCallum blur that distinction. Thus, MacCallum cites MI5 head Andrew Parker's statement that the agencies and police have disrupted many "plots towards terrorism". But Parker did not credit mass surveillance; on the contrary, he added that almost all the plots came from a known pool of several thousand individuals. Even less relevant is MacCallum's observation that phone billing records can be useful in criminal trials. These are obtained from phone companies, not GCHQ.

Heads of mathematics departments would probably like to "stay out of politics". This is wishing for the impossible. It is illogical to maintain that dissenting from cooperation with GCHQ is a political act, but assenting is not. A HoD who runs a working relationship with GCHQ is implementing a political view just as surely as one who declines.

HoDs should at least consult openly. In London, resentment has been caused by the establishment of joint positions with GCHQ without proper consultation. Medicine and psychology departments routinely make ethical assessments. Maybe it is time for mathematics departments to draw up their own ethical policies.

We now have detailed evidence of what we are supporting when we collaborate with the secret services, and we can use it to have a properly evidence-based discussion. Instead of seeking refuge in the comforting myth of political neutrality, we should take responsibility for our actions.

[1]MacCallum disputes one I didn't make; see the longer online version of this article at www.maths.ed.ac.uk/~tl. In both that and my previous article, every factual statement is hyperlinked to supporting evidence.

# OBITUARIES

## MURRAY MACBEATH


© Julie MacBeath

Professor AM Macbeath, who was elected a member of the London Mathematical Society on 16th January 1947, died on 26 May 2014, aged 90.

*Bill Harvey writes:* Born in Glasgow, his early education was at Royal Belfast Academy and Queen's College, Belfast. On moving to Clare College, Cambridge in 1943, his precocious mathematical abilities were recognised and he joined the code-breakers at Bletchley Park (1943-45). After the war, a glittering educational career followed: wrangler in the Mathematical Tripos, MA (Cantab) 1948 and Smith's Prize in 1949. Two years as a Commonwealth fellow in Princeton led to a PhD under Emil Artin, after which a return to Cambridge, marriage to his wife Julie (who survives him) and a post as lecturer at Keele University in 1951. He was appointed professor at Queen's College, Dundee in 1953, and his research broadened from geometry of numbers and convex measure theory into low-dimensional topology. Discrete groups and transformation group theory formed the central core of his work, in particular Fuchsian and non-Euclidean crystallographic groups and finite group actions on Riemann surfaces, where he reactivated and modernised an area largely untouched since the days of Hurwitz and Klein. He moved in 1962 to the Mason Chair at the University of Birmingham and a taxing life as HOD from 1962 until 1979, when he migrated back to the USA to take up the chair at the University of Pittsburgh vacated by his friend Joseph Lehner. On retirement, a conference was held in his honour at Birmingham in 1992, funded by the Society. He maintained over four decades an international reputation in discrete groups and Riemann surfaces, writing seminal papers on geometry of numbers, measure theory, discrete groups and Teichmüller theory, finite group actions on surfaces and algebraic curves, over 55 publications in all, with a final contribution in 1998 to an MSRI volume *The Eightfold Way* on Klein's quartic curve.

Murray had a broad circle of friends within the international community, ensuring a healthy flow of postdoctoral visitors to Birmingham and lively seminars. The style and quality of his teaching enriched a generation of students at all levels, including the fortunate few postgrads (12 or more) directly supervised by him. His lectures *Discontinuous groups and birational transformations* from the 1961 Dundee Conference were very influential in fostering interest in finite group actions on surfaces, group presentations and the topology of 2- and 3-dimensional orbifolds. He spent several periods in visiting positions including Caltech and Pittsburgh, St. Andrews and Warwick. He will be greatly missed by all who knew him and his work.

As a postgraduate student of Murray Macbeath in Birmingham from 1962, I was privileged to gain the best possible introduction to research, with fascinating new ideas at play fostered by a friendly and encouraging supervisor. His complete honesty, lack of pretension and unfailing good humour made the transition from undergraduate to research student almost painless. His own innovative work on presentations of discrete groups blended naturally with the development of quasiconformal mappings and moduli of Riemann surfaces at that time by Lars Ahlfors, Lipman Bers and Harry Rauch; these ideas have proved inspirational to a host of researchers around the world.

Murray had a gift for friendship which enriched life among us graduate students and this together with his academic reputation drew many important visitors to the Birmingham department. He had a quietly mischievous sense of humour and a quick



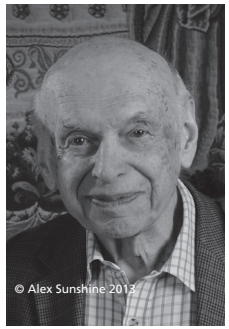


line of wit and aphorism delivered in his very own soft highland brogue. This never deserted him and throughout his retirement he and Julie continued to make new friends: his funeral was a standing-room-only affair. For me, with his high intelligence, kindness and innate modesty, he has been a model as mathematician and human being. An independent observer might note the lack of any formal recognition for his achievements from the British science establishment. He would smile and refer us to the bard:

*For a' that, and a' that*
*Our toils obscure and a' that,*
*The rank is but the guinea's stamp,*
*The man's the gowd for a' that.*

I can see him still, at a workshop on Dessins d'enfant in Southampton in Millennium year, sitting happily with his old friend Robert Rankin and enjoying the fare: the talks, the chat and the conviviality. RIP, Murray.

## ADAM GELBTUCH


© Alex Sunshine 2013

Adam Gelbtuch, Chairman of Pion Ltd Publishers, died on 3 April 2014 aged 93.

*Robert Welham writes:* He was born in 1921 in Krakow. He came to the UK in 1938 to study aeronautical engineering at Imperial College London. Returning to visit his parents in the summer of 1939 he was caught up in the invasion of his country and was captured by the Russians and held in harsh conditions of captivity in a labour camp, where his father died. In 1941 those conditions eased but ill-health prevented his being drafted into the Polish armies then being formed. He found himself in Tashkent where evacuated Russians and internees had formed a university. He studied there under the famous Academician Abram Ioffe but also found time to set up a successful ice-cream business. That combination of science and commerce was to be the pattern of his life.

Adam returned to the UK in 1947. His contacts and language skills led him into the translation of accounts of Russian science and technology and with John Ashby, a biochemist, he formed Pion to publish translations of Russian-language journals in conjunction with the British Library (which ran a government-sponsored programme for that purpose) and to publish academic journals and books on its own account.

Pion was involved in the publishing of a translation of *Russian Mathematical Surveys* for the LMS and the British Library from the late 1970s. From 1990 onwards, Adam orchestrated discussions, in collaboration with the LMS and the Department of Mathematics of the Russian Academy of Sciences, that led to the translations of *Sbornik: Mathematics and Izvestiya: Mathematics* leaving the American Mathematical Society and being published in 1995 in conjunction with the LMS by Turpion, the company he had earlier formed jointly with the Royal Society of Chemistry. Such was the success of the move that *Russian Mathematical Surveys* followed in 1998.

Many, both in the UK and Russia, contributed to these projects but Adam's role was both central and essential. Honest, direct, and always even-tempered he dissolved difficulties and united all parties in the atmosphere of mutual trust in which the publication of these journals continues.

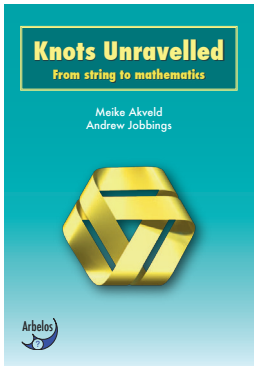
He lived his private life to the full. He shared an enjoyment of good food and wine, music and the arts with his wife, Helen - herself a professional singer. He continued with his annual skiing holiday until his late eighties and travelled widely for business and pleasure.

He continued daily attendance at his office into his 92nd year. He leaves Helen, whom he married in 1949, their daughter, Maya, a university lecturer in Japan and specialist in the social and cultural anthropology of that country, and a grandson, Misha, as well as many friends around the world.

# REVIEWS

## KNOTS UNRAVELLED: From String to Mathematics

by Meike Akveld and Andrew Jobbings, Arbelos, 2011, pp 129, £8, ISBN 978-0-9555477-2-0.




This is the blurb from the back of the book:

*Knots Unravelled is a guide to the fascinating world of knots, from the familiar realm of knotted string to the less familiar branch of mathematics known as knot theory.*

- *Are two given knots the same or different?*
- *How many knots are there?*
- *Can knots be classified?*

*Questions like this are easily asked, but finding answers requires more effort. Mathematical ideas help to put the study of knots on a firm footing, and also either answer such questions, or explain why an answer cannot be found. The core chapters of Knots Unravelled lead the reader through this mathematics, from the basics to the frontiers of current work in knot theory.*

*Between the main chapters, the 'interludes' reveal some of the rich variety of ways in which knots appear throughout human culture, drawing attention to related mathematics and making connections with other material in the book.*

*A key feature of the text is the range of tasks and activities for the reader to work through--with string, rope, or pencil and paper to hand! Complete solutions are provided at the back of the book.*

*The book makes full use of clear diagrams, and a table of knots, a glossary and an index are included.*

The question now is, how successful have the authors been in their endeavours?

Before answering this, here is a list of contents:

1. Introduction: Knots everywhere, Knots in rope, Knot science, History.
   *Interlude:* Knots in paper
2. Working with diagrams:
   Describing knots, Mathematical knots, Projections and knot diagrams, knotted or not? The same or different? Reidemeister moves.
   *Interlude:* Celtic knots
3. Counting crossings:
   Telling knots apart, The crossing number, Which crossing numbers are possible? Does the crossing number classify knots? Classifying knots.
   *Interlude:* Tie knots
4. New knots from old:
   Mirror images, Combining knots, Changing crossings.
   *Interlude:* The figure of eight
5. Using colours:
   Knot invariants, three-colourability.
   *Interlude:* Hunter's bend
6. Links:
   What is a link? The Borromean rings, Components, The linking number, three-colourability.
   *Interlude:* Torus knots
7. Knot polynomials:
   The bracket polynomial, the writhe, The X-polynomial, The Jones polynomial.
   *Postlude:* A special trefoil

Tables of links and knots.

This is an impressive list of contents and the authors introduce us to these subjects in an easy yet rigorous manner.

The readership is claimed to consist of school children. In fact the early chapters is intended for 12/13 year olds.

Quite possibly this may be correct but if I were a teacher I would expect a much greater expansion of the solution section. In fact this would be a much better and more useful book if this were the case.

So in conclusion, this is a good book and could be a useful addition to a school's library but I

look forward to a second edition with a greatly expanded solution set.

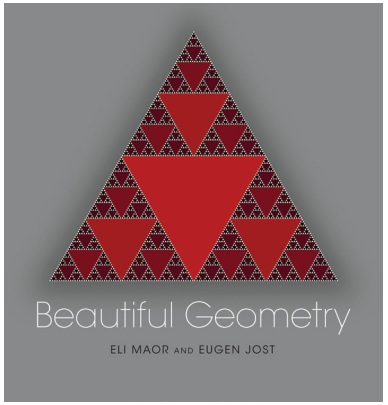
For a short list of errata go to www.arbelos.co.uk/Resources/KU-errata.pdf

Roger Fenn
University of Sussex

## BEAUTIFUL GEOMETRY

by Eli Maor and Eugen Jost, Princeton University Press, 2014, pp 208, £19.95, $27.95, ISBN 9780691150994, eBook ISBN 9781400848331.

People who are spontaneously attracted to mathematics do find that a certain kind of beauty emanates from the conceptual constructions: the simplicity and yet profoundness of the equations, the subtlety and yet universality of the concepts, the durability of the proofs etc. This beauty is regrettably difficult to convey to the uninitiated, which is probably why people in general would be embarrassed if they had to admit they didn't know who Shakespeare or Mozart is, but are unaware of their loss by not being familiar with Euclid or Euler, say. This highly stimulating book by historian of mathematics Eli Maor and artist Eugen Jost is a very competent and enjoyable attempt to explicate the beauty of geometry. The book consists of 51 chapters each consisting of a plate created by Jost accompanied by a couple of pages in which Jost explains the mathematical context and historical background to the topic being considered. The chapters can be read in any order the reader might fancy and although the title focus on the beauty of geometry the two authors have cleverly included chapters on e.g. prime numbers, infinite series, the number 11, the Golden ratio, Fibonacci Numbers, the number e together with a lot of classical geometry.



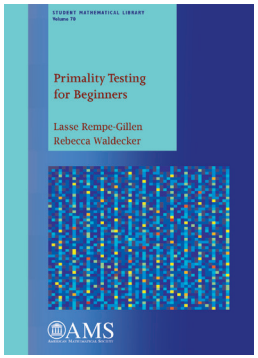

Some of the plates, e.g. Plate 40.2, are essentially profoundly decorative comments but others are more than that. I find e.g. that Plate 1 brilliantly aids the understanding of what the invariance theorem by Thales of Miletus is about and Plate 37 greatly enhances and aids the discussion of the Euler Line. One can definitely enjoy the book simply as a collection of intriguing and appealing plates if one is so minded. However, I do believe that the plates in general manage to relate to the beauty of the mathematics at a deep and very informative level. I would imagine that the plates would make most readers curious about the mathematics underlying the plates.

This brings us to the main question, namely is the book able to convince people of the beauty of mathematics? Can it be used as an eye opener? I think so – especially among students in secondary school and others who have an open mind and are curious but never found the right inroad to mathematics. At the moment mathematics is often presented in school as a boring, difficult, dead subject one just have to put up with for exams purposes and because accountants and some engineers actually need to be able to use some of it. The insight that mathematics can be conceptually stimulating and may help one to learn how to think straight seems to have been lost. This wasn't always so. In the preface to Einstein's popular book "Relativity" from 1916 the great man finishes the preface with the words: "May the book bring some one a few happy hours of suggestive thoughts!" Yes, thinking about mathematics may indeed make the soul see glimpses of sunshine. Contemplating ideas whether they are from literature, philosophy or science and mathematics is good for growth. A mental growth that cannot be brought about if mathematics is taught with the depressing attitude that makes the students learn the bare minimum which will allow some good marks at the exams but leaves everyone empty handed when facing non-standardised questions. The book by Maor and Jost should be given to everyone – young or old – embarking on the study of mathematics or anyone teaching mathematics. The book will act as a source of inspiration and as a reminder of why it is that mathematics has fascinated the human race for millennia.

Henrik Jeldtoft Jensen
Imperial College London

## PRIMALITY TESTING FOR BEGINNERS

by Lasse Rempe-Gillen and Rebecca Waldecker, Student Mathematical Library Vol 70, American Mathematical Society, 2014, pp 244 , $45.00, £33.95, ISBN 978-0-8218-9883-3.




This book aims to take the reader from a pre-university knowledge of mathematics to the Agrawal-Kayal-Saxena (AKS) polynomial time primality test of 2004 in barely 200 pages. That is certainly an ambitious aim, so we need to ask to what extent the authors succeed, and what else does one learn along the journey.

To understand and prove correctness of the AKS test one needs the basics of elementary number theory and abstract algebra (group theory and the theory of polynomial rings) but to understand its significance as the first deterministic polynomial time primality test one also needs the rudiments of the theory of algorithms.

The first part of the book, deals with elementary number theory as well as algorithmic complexity. The authors develop number theory from scratch up to Fermat's little theorem and Euler's generalization. They discuss the Fermat and Miller-Rabin tests in detail. Applications to cryptography are touched on but not dwelt on. In preparation for the AKS test they include a very careful discussion of polynomial arithmetic over the integers modulo an integer or modulo a polynomial or modulo both. This is presented in a leisurely way with plenty of examples. The discussion of algorithms not only delineates the complexity classes P and NP but also gives a lucid explanation of the distinction between Monte Carlo and Las Vegas algorithms.

The second part presents the AKS algorithm itself. This algorithm relies on the analogue of Fermat's little theorem in polynomial rings. The authors mention the precursor to this algorithm, the Monte Carlo test of Agrawal and Biswas, but devote most attention to the AKS test itself. They give a complete proof of the correctness of the AKS test and also of its polynomial running time.

Throughout the book, the authors give complete proofs but also plenty of examples and exercises. The exposition is never rushed, and the authors are happy to take a page where many textbooks would take a paragraph. They finish with an appendix on open problems in number theory, and solutions for selected exercises. As the title suggests, this is a good book for beginners, but while it does touch on many aspects of number theory, it is not and does not claim to be a comprehensive introduction to number theory. Ambitious sixth-formers and beginning undergraduates should enjoy it, while more advanced students will find it an interesting complement to the more conventional texts on number theory.

Robin Chapman
Exeter University

## CALENDAR OF EVENTS

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

## JULY 2014

**3–4** Higher Structures in Number Theory Workshop, Nottingham (436)
**4 Hardy Lecture, LMS Meeting, London (437)**
**4 LMS Graduate Student Meeting, London (437)**
**5–10** Activities on Symmetries and Correspondences Conference, Oxford (436)
**6–7** Set Theory: Inner and Outer Model Theory Meeting, Bristol (437)
**7–11** Symmetries in Graphs, Maps and Polytopes Workshop, ELIM Conference Centre, West Malvern (436)
**7–11** An Invitation to Geometry & Topology Via $G_2$, LMS–CMI Research School, Imperial College London (436)
**9 LMS Popular Lectures, London (438)**
**13–15** Modelling in Industrial Maintenance and Reliability IMA Conference, Oxford
**14–16** Representations of Symmetric Groups, Hecke Algebras and KLR Algebras, Birmingham (437)
**14–16** Bianchi and Siegel Modular Forms, Sheffield (437)
**14–18** Analytic Number Theory and its Applications, Thessaloniki, Greece (438)
**17–18** Projection and Slicing Theorems in Fractal Geometry, Bristol (437)
**21–24** Kent Algebra Days Young Researchers, University of Kent (437)
**23 LMS Spitalfields Day, Advances in the Mathematics of Water Waves, INI Cambridge (438)**
**23–25** ISSAC 2014 Kobe University, Japan
**28–1 Aug** Mathematical Relativity, ESI-EMS-IAMP Summer School, Vienna
**29–4 Aug** International Mathematics Competition for University Students, Blagoevgrad, Bulgaria (435)
**28–1 Aug** Contact Geometry in Dimension Three and Higher Workshop, University College London (437)

## AUGUST 2014

**4–8** Principles and Applications of Control to Quantum Systems INI Workshop, Cambridge (436)
**6–8** Water Waves INI Summer School, Cambridge (437)
**12 & 14** International Congress for Women in Mathematics 2014, Seoul, Republic of Korea (433)
**13–21** ICM 2014, Seoul, Republic of Korea (437)
**18–21** Operator Methods in Harmonic Analysis Workshop, Queen's University Belfast (437)
**19 LMS Meeting and Reception, ICM, Seoul, Republic of Korea (438)**
**25–29** Algebraic Lie Theory and Representation Theory, LMS–CMI Research School, Glasgow (435)
**25–5 Sept** Classification, Structure, Amenability and Regularity Masterclass and Conference (438)
**28–30** 15th International Pure Mathematics Conference, Islamabad

## SEPTEMBER 2014

**1** Function Theory Meeting, London (438)
**2–3** British Logic Colloquium PhD Day, University of Central Lancashire (438)
**3–5** British Logic Colloquium, University of Central Lancashire (438)
**3–5** Stable Homotopy Theory Conference, Manchester (437)
**3–5** Numerical Linear Algebra and Optimisation IMA Conference, Birmingham (438)
**3–5** Jordan Geometric Analysis and Applications, Queen Mary, University of London (432)
**3–5** Operator Theory Workshop, Queen's University, Belfast (435)
**5–6** Caucasian Mathematical Conference Tbilisi, Georgia
**6 Mathematics and the First World War, LMS Meeting, London (438)**
**6–11** British Science Festival, Birmingham (438)
**8–10** British Topology Meeting, Southampton (438)
**8–12** Generalized Functions, Southampton (438)
**10–12** Interdisciplinary Approaches to Understanding Microbial Communities INI Workshop, Cambridge (437)
**10–12** Mathematical Modelling of Fluid Systems IMA Conference, Bristol (438)
**11–12** Recent Advances in Discontinuous Galerkin Methods, Reading (438)
**11–12** Heilbronn Annual Conference 2014, Bristol (438)
**12** Limit Theorems, Probability Approximations and Related Areas Workshop, Heriot-Watt University (438)
**15–19** UK Probability Meeting from Microscopic Randomness to Macroscopic Phenomena, Imperial College London (438)
**17–19** Huxley Meeting on Analytic Number Theory, Cardiff (438)
**18** Additive Combinatorics Meeting, Bristol (437)
**18** Recent Advances in Orthogonal Polynomials and its Interactions with Integrable Systems Meeting, University of Kent (437)
**18–19** Post-Quantum Research Workshop, INI, Cambridge (438)
**22–24** British Algebraic Geometry Meeting, Warwick (438)
**22–26** Bounded Gaps Between Primes, LMS–CMI Research School, Oxford (437)
**24 LMS Popular Lectures, Birmingham (438)**
**28–2 Oct** Advances in Probability Clay Research Workshop, Oxford (436)
**29–3 Oct** Analytic Number Theory Clay Research Workshop, Oxford (436)
**29–3 Oct** Functional Transcendence around Ax–Schanuel Clay Research Workshop, Oxford (436)
**29–3 Oct** Symplectic Topology Clay Research Workshop, Oxford (436)

## OCTOBER 2014

**1** Clay Research Conference, Oxford (436)
**27–29** Methods for Mathematical and Empirical Analysis of Microbial Communities INI PhD Summer School, Cambridge (438)
**30** History of Statistics, BSHM–Gresham College Joint Meeting, London (437)
**30–31** Structure, Function and Dynamics in Microbial Communities INI Workshop, Cambridge (438)

## NOVEMBER 2014

**14 LMS AGM, London**
**22** Early Career Mathematicians' Autumn IMA Conference, Queen Mary University London (438)
**26–28** Engineering and Control of Natural and Synthetic Microbial Communities, INI Workshop, Cambridge

## DECEMBER 2014

**8–10** Applications of Game Theory IMA Conference, Oxford (438)
**15–17** Maths in Signal Processing IMA Conference, Birmingham (438)
**16–17** Mathematical Challenges of Big Data IMA, Woburn House, London (438)

## JANUARY 2015

**9** Research in Mathematics and its Applications IMA Conference, Bath (438)

## MARCH 2015

**19** Mathematics 2015 IMA Conference, Mary Ward House, London (438)
**30–31** Flood Risk Assessment IMA Conference, Swansea (438)
**30–2 Apr** Joint Meeting of the BMC and BAMC, Cambridge (438)

## APRIL 2015

**20** Mathematical Education of Engineers IMA Conference, Loughborough (438)

## JUNE 2015

**10–12** Barriers and Enablers to Learning Maths IMA International Conference, Glasgow (438)
**18–19** Mathematics in Finance IMA Conference, Manchester

## JULY 2015

**13–17** Conference on Stochastic Processes and their Applications, Oxford

## SEPTEMBER 2015

**1–4** Numerical Methods for Simulation IMA Conference, Oxford
**9–11** Mathematics of Robotics IMA Conference, Oxford

# LMS WOMEN IN MATHEMATICS DAY

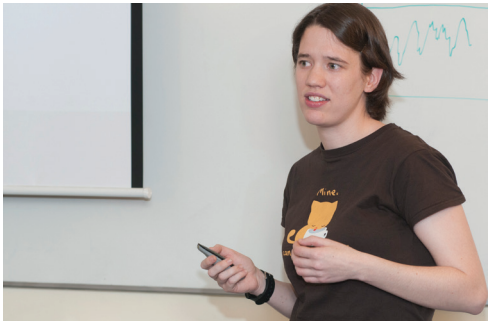
**held at De Morgan House, London, on 25 April 2014**

(report on page 20)

Katia Babbar (Lloyds)

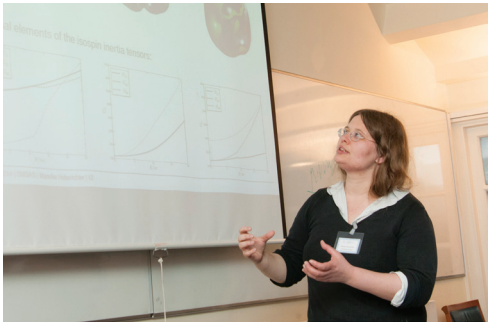
Sarah Hart (Birkbeck College)

Masha Jankovic (University of Leicester)



Sian Fryer (University of Manchester)

Anne Juel (University of Manchester)



Mareiek Haberichter (University of Kent)