LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 428 September 2013

Society Meetings and Events

2013

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2014

Friday 28 February
Mary Cartwright Lecture, York

Monday 31 March
Northern Regional Meeting, Durham

NEWSLETTER ONLINE:
newsletter.lms.ac.uk

HONORARY MEMBERSHIP 2013

The LMS has elected **Professor Margaret Wright**, Silver Professor of Computer Science at the Courant Institute of Mathematical Sciences at New York University, USA and **Professor Dennis Sullivan**, Einstein Chair at the City University of New York Graduate Centre and professor at Stony Brook University, USA to Honorary Membership of the Society.

Professor Margaret Wright

Professor Dennis Sullivan

Professor Wright has had a distinguished career. As well as making outstanding contributions to mathematics in her own research fields of optimization, numerical linear algebra and scientific computing, she has served the academic community in many high-profile roles. In particular, she was Chair of the International Review of Mathematical Sciences in the UK commissioned by the EPSRC. In its careful assessment of the strengths and needs of research in the UK the report has been invaluable to the UK mathematical sciences community.Professor Sullivan is one of the world's most outstanding mathematicians, and has made fundamental contributions in many different areas of the subject. His first and most striking work was in topology, both algebraic and geometrical, proving (simultaneously with Quillen) the Adams conjecture about the homotopy groups of spheres, transforming surgery theory and elucidating the structure of manifolds, and inventing an effective new way of treating rational homotopy theory. Subsequently he changed direction and worked on dynamical systems, especially the Feigenbaum universality properties and complex dynamics. Later still he turned to the mathematics of quantum field theory, inventing the new subject of string topology, and he also embarked on a study of the Navier-Stokes equation.

Full citations for Professor Wright and Professor Sullivan will appear in the LMS *Bulletin.*

MATHEMATICS POLICY ROUND-UP

August 2013

RESEARCH

EPSRC Strategic Advisory Process

An independent review of how the Engineering and Physical Sciences Research Council (EPSRC) obtains and uses strategic advice in its decision-making is published in a recent report.

The review was commissioned by EPSRC Chair, Dr Paul Golby, following discussions with members of the academic community and learned societies, some of whom had publicly voiced criticisms of the organisation's methods of consultation and engagement. It was carried out by a distinguished panel chaired by Dr Suzanne Fortier, Past President of the Natural Sciences and Engineering Research Council (NSERC), Canada.

In the report the panel recognised that the EPSRC has built an extensive and agile series of mechanisms to seek high quality strategic advice. However, they also believe that the current structure could be improved to become more transparent and inclusive. The report is available at http://tinyurl.com/kqvke8h.

Royal Society – EPSRC announce Fellowships partnership

A new collaboration has been announced between the Royal Society and the Engineering and Physical Sciences Research Council (EPSRC) that will support early career Royal Society research fellows who are working within EPSRC's priority areas.

Researchers recently awarded Royal Society University Research Fellowships (URFs) and Dorothy Hodgkin Fellowships by the Royal Society will receive further research funding from the EPSRC. The first seven fellowship awards range between £90k - £320k and are spread across six of the UK's leading universities. More information is available at http://tinyurl.com/n6avam2.

Inquiry into research and development funding

The National Audit Office has issued a call for written evidence to the inquiry into Research and Development funding for science and technology in the UK. More details are available at http://tinyurl.com/m35taya.

LMS Newsletter

http://newsletter.lms.ac.uk

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Charity registration number: 252660.

HIGHER EDUCATION

Investment in removing barriers to postgraduate study

Students from disadvantaged backgrounds will be supported in postgraduate study with up to £125 million of extra funding,

The Department for Business, Innovation and Skills (BIS) and the Higher Education Funding Council for England (HEFCE) are focusing on increasing access to postgraduate education, which has been identified as a potential barrier to social mobility.

An initial £25 million fund will distribute grants of between £500,000 and £3 million to universities and colleges to attract and support disadvantaged students into postgraduate education. More information is available at http://tinyurl.com/pzr82yv.

Higher education national statistics released

The Department for Business Innovation and Skills has released national statistics on higher education. The statistics are available at www.gov.uk/government/publications/national-statistics-releases.

SCHOOLS AND COLLEGES

'Post-16 Mathematics: Engaging the new cohort'

This discussion paper adds to ACME's previous work on Post-16 Mathematics. ACME proposes the development of a new qualification for students who do not achieve a Grade C in GCSE Mathematics or equivalent.

ACME supports the aspiration that everyone should be actively engaging in mathematics until they are functioning at the equivalent of at least Level 2 in mathematics.

From 2015 all 16 year olds will be required to work towards a Level 2 Mathematics qualification. Those who reach 16 without achieving this will therefore make up a new and large post-16 cohort which is likely to increase in the short term.

GCSE Mathematics provides a measure of threshold mathematical functioning. It also is a gatekeeper qualification for employers and higher education institutions.

However, ACME has been considering an alternative qualification to better meet the needs of those who reach 16 without GCSE Mathematics Grade C or equivalent, and believes that there is a demand in the mathematics community for such a qualification. The discussion paper is available at http://tinyurl.com/m9uz96a.

Post-16 core mathematics: ACME to convene expert panel

The Government intends to introduce core mathematics qualifications to meet the needs of students who have achieved a grade C or higher at GCSE, but do not progress to AS or A level mathematics. At DfE's request, ACME is convening an expert panel on post-16 core mathematics qualifications. More information is available at http://tinyurl.com/mbe9z5p.

Ofqual: Open letter to schools on changes to qualifications

Ofqual has published an open letter to schools in England on changes being made to GCSEs and A-levels.

The letter summarises a number of important changes that have been made to the qualifications in England, or which have been announced for the future. The letter covers Ofqual's on-going work to strengthen and improve these qualifications and includes information about longer term reforms.

Among the changes mentioned in the letter are new science GCSEs, resit opportunities, the move to end of course exams and timescales for longer term reform. The letter is available at http://tinyurl.com/lr4nqte.

GCSE multiple entry

The Education Select Committee's report on the administration of examinations for 15-19 year olds in England1 recommended that the Government should "ask Ofqual to gather data from the exam boards to enable it to identify the extent of multiple en-

try and then offer advice on whether, and what, action is needed to limit the practice". The memorandum on multiple entry is available at http://tinyurl.com/m6huhko.

OTHER

Spending Review – 26 June 2013
The Chancellor announced that the science R&D budget is to be kept at its current level through to the next election. This figure, which amounts to about £4.6bn per year, has been held flat since 2011. There will be an increase in the capital budget from the current £0.6bn to £1.1bn. More information is available at http://tinyurl.com/nvyo6ud.

Women in STEM careers consultation
The House of Commons Science and Technology Select Committee has agreed to hold an inquiry into women in academic STEM careers and is asking for written submissions on the following:

- Why do numbers of women in STEM academic careers decline further up the career ladder?
- When women leave academia, what careers do they transition into? What are the consequences of scientifically trained women applying their skills in different employment sectors?
- What should universities and the higher education sector do to retain women graduates and PhD students in academic careers? Are there examples of good practice?
- What role should the Government have in encouraging the retention of women in academic STEM careers?

The closing date for submissions is **Tuesday 3 September 2013**. More information is available at http://tinyurl.com/pm2lp8y.

Education and skills survey published
The CBI has published its annual education and skills survey – *Changing the Pace*. Section 3 looks at meeting the demand for STEM skills. The full report is available at http://tinyurl.com/ldojqan.

Open access consultation launched
Views are invited on the open access proposals for the post-2014 Research Excellence Framework (REF).

The four UK higher education funding bodies aim to further increase the proportion of research outputs published in open-access form by introducing this as a requirement in the next REF. This is in line with the funding bodies' policy that the outputs from all research supported by our funding should be as widely and freely accessible as the available channels for dissemination permit. Responses to this consultation should be made online by **17.00 on 30 October 2013**. More information is available at http://tinyurl.com/kf8l85r.

Dr John Johnston
Joint Promotion of Mathematics

LMS ELECTIONS 2013

Members will recall that in 2012 the LMS introduced an e-voting option for elections to Council and Nominating Committee which saw a 120% rise in the number of members voting compared to the previous year. As last year, LMS members will be able to cast ballots electronically through the Electoral Reform Services (ERS) website and, although paper votes will still be available this year, it is hoped that members will make use of the e-voting option. In 2012 more than two-thirds of all votes cast were e-votes, and it is hoped that this will increase at the 2013 elections.

Members who are eligible to vote will be contacted directly by the ERS who will send out ballot papers and candidate profiles in both paper and electronic formats. Prior to this, a communication will be sent by the Society to all members who are registered for electronic communication informing them that they can expect to shortly receive some election correspondence from the ERS. Those not registered to receive email correspondence form the LMS will receive all communications in paper format, both from the Society and from the ERS. Members should check their post/e-mail regularly in October for communications regarding the elections.

The Society will host an Elections Blog on the LMS website for use by candidates and members.

It is hoped as many members as possible will vote in the 2013 LMS Elections. Results will be announced at the Society's AGM on 15 November 2013.

Ensure that your details are current

All members are strongly encouraged to ensure that their e-mail and postal contact details registered with the Society are up-to-date to enable the ERS process to run smoothly. Any changes would be required no later than **21 September 2013** for election purposes.

Fiona Nixon
Executive Secretary

ANNE BENNETT PRIZES

At its May meeting the LMS Council approved the establishment of a new prize. The Anne Bennett and Senior Anne Bennett Prizes will be added to the list of LMS prizes, beginning with the 2014 round of awards.

The Senior Anne Bennett Prize will be awarded triennially in recognition of work in, influence on, or service to mathematics, particularly in relation to advancing the careers of women in mathematics.

The Anne Bennett Prize will be awarded for work in and influence on mathematics, and particularly for acting as an inspiration for women mathematicians. It will be awarded two out of every three years, and will be open to mathematicians with fewer than 10 years (full time equivalent) of involvement in mathematics at post-doctoral level, allowing for breaks in continuity.

In addition to the prize award, the winners of the prize will be invited to give a lecture at the LMS Women in Mathematics Day in the year following the award.

The Society has instituted these prizes in memory of Anne Bennett, who died suddenly whilst working for the Society in 2012. An obituary was published in the October 2012 Newsletter. Anne took a strong interest in women in science, and the prizes will recognise both excellent mathematical research and contributions to the advancement of women in mathematics.

It is hoped that a strong field of nominees, both male and female, will be put forward to the Prizes Committee from members when the call for nominations is made later in 2013. The senior prize will be awarded for the first time in 2014, with the Anne Bennett Prize being awarded in 2015 and 2016.

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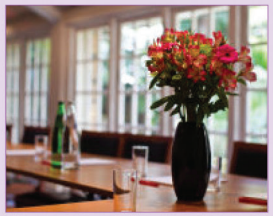
De Morgan House offers 40% discount on room hire to all Mathematical charities and 20% to all not for profit organisations. Support the LMS by booking your next London event with us.



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

ANNUAL LMS SUBSCRIPTION 2013-14

Members are reminded that their annual subscription, including payment for publications, for the period November 2013-October 2014 is due on **1 November 2013**.

Membership Subscription Rates
The annual subscription to the London Mathematical Society for 2013-14 is:

Ordinary membership	£60.00
Concessions on Ordinary membership:	
- Reciprocity	£30.00
- Career break or part-time working	£15.00
Associate membership	£15.00

LMS Journal Prices
The prices of the Society's periodicals for 2014 are:

	Print only	Online only	Print & online
Bulletin	N/A	Free	£81.00
Journal	N/A	Free	£145.00
Proceedings	N/A	Free	£155.00
	Rest of World		**North America**
Nonlinearity	£81.00		£100.00 ($200.00)
JCM (electronic)	Free		

We would like to draw members' attention to the following changes regarding the Society's journals:

1. Council has agreed the Society will no longer offer print-only copies of the *Bulletin, Journal and Proceedings of the London Mathematical Society* to members from 1 January 2014.
2. Council has agreed the Society will offer free electronic access to *Bulletin, Journal and Proceedings of the London Mathematical Society* to members for personal use from 1 January 2014. **To receive free electronic access for personal use, members must note this on their subscription form when returning it to Membership.** Please note that for online journal subscriptions it is essential that members provide the Society with an up-to-date email address as the email address will be passed to Oxford University Press who will send further details to subscribers.
3. Council has agreed the Society will continue to offer the "Print & online" option for the *Bulletin, Journal and Proceedings of the London Mathematical Society* to members from 1 January 2014.

Subscription Rates for the European Mathematical Society and JEMS via the LMS
Members also have the option to pay their European Mathematical Society subscription via the LMS and subscribe to the *Journal of the European Mathematical Society (JEMS)*:

EMS subscription (via the LMS)	£22.00
JEMS subscription (via the LMS)	£120.00

We would like to notify members that there will be an increase from 6 issues to 12 issues of the JEMS *in* 2014.

Renewal and Payment
Members may now electronically update their personal contact details on the members' section of the LMS website and all members are encouraged to use this facility.

A subscription form will be sent by email or post to all members to complete and return with payment in the enclosed envelope. If you do not receive your subscription form by 30 September, please contact Membership (membership@lms.ac.uk; 020 7291 9973).

Please note all members will be asked to complete and return the subscription form as it also requests permission to include members' details in the Members' Handbook 2014.

The Society encourages payment by direct debit. If you do not already pay by this method and would like to set up a direct debit (this requires a UK bank account), please visit the LMS website to download the direct debit mandate form: www.lms.ac.uk/sites/default/files/Membership/Direct%20Debit%20Form.pdf.

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

Please note that subscriptions **become due on 1 November 2013** and payment should be received by 1 December 2013.

Elizabeth Fisher
Membership & Activities Officer

LMS – NZMS AITKEN UK LECTURE TOUR 2013

The 2013 LMS Aitken Lecturer is Professor Robert McLachlan (Massey University).

The Forder-Aitken lectureship scheme is a collaboration between the London Mathematical Society and the New Zealand Mathematical Society in which each society invites an eminent mathematician from the other country to give lectures at different universities around the country.

Robert McLachlan is the second Aitken Lecturer to visit the UK and he will give talks on ***Successes and Prospects of Geometric Numerical Integration*** at:

Strathclyde

24 September

Organiser: Gabriel Barrenchea (gabriel.barrenechea@strath.ac.uk)

Warwick

27 September at 4 pm
Mathematics Institute

Organiser: Robert MacKay (R.S.MacKay@warwick.ac.uk)

Leeds

30 September at 3 pm
MALL, School of Mathematics.

Organiser: Alison Parker (A.E.Parker@leeds.ac.uk)

Cambridge

3 October at 3 pm
MR5, Centre for Mathematical Sciences

Organiser: Arieh Iserles (ai10@cam.ac.uk)

Bath

4 October at 3.15 pm, Wolfson Lecture Theatre (4WI.7)
(part of the departmental colloquium "Landscapes in Mathematical Sciences")
Organisers: Chris Budd (mascjb@bath.ac.uk), Robert Scheichl (R.Scheichl@bath.ac.uk)

For further information on attending each lecture, please contact the local organisers.

Abstract: Geometric numerical integration emerged in the 1990s. Its roots lie in successful and widely used algorithms of computational physics, especially the symplectic leapfrog method, and in the numerical analysis of classical families of numerical integrators such as Runge-Kutta. Combining these two strands has led to better algorithms for physical simulations and also to a better understanding of the process of numerical integration. Today the behaviour of integration algorithms is studied with respect to a range of geometric properties, including preservation of invariant (symplectic and volume) forms and invariant sets, including those that emerge in an asymptotic limit. The seminar will serve as an introduction to geometric numerical integration, its practical and theoretical successes, and its open questions.

Biography: Robert McLachlan FRSNZ studied at the University of Canterbury and Caltech; since 2002 he has been Professor of Applied Mathematics at Massey University. In 2007 he was awarded the SIAM Dahlquist Prize for his research in geometric numerical integration.

For general enquiries about the Aitken Lectures, please contact Elizabeth Fisher (meetings@lms.ac.uk).

LMS GRANT SCHEMES

Next Closing Date for Research Grant Applications: 15 September 2013

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 £2000** 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, visit the LMS website: www.lms.ac.uk/content/research-grants. Applications received by 15 September 2013 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 and (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

LMS-CMI Research Schools
The Society and the Clay Mathematics Institute offer funding of **up to £31,000** (including honoraria for organisers) towards the cost of running a one-week Research School which provides high quality training for postgraduate students in core areas of mathematics. For further information on Research Schools and how to submit a proposal, please visit: www.lms.ac.uk/events/lms-cmi-research-schools.

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. For further information and application forms, visit: www.lms.ac.uk/content/research-workshops-grants.

Young British and Russian Mathematicians Scheme

a) 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:

1. 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).
2. A brief CV (no more than one side of A4).
3. A brief budget.
4. 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.

b) 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:
1. Name and brief CV of the visitor.
2. A brief budget
3. A brief description of the course of lectures.
4. 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#YBR. Applications received by 15 September 2013 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
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#applications.

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 http://lms.ac.uk/grants/grace-chisholm-young-fellowships

Small Grants for Education
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. The next deadline for applications is 31 August 2013. Please see the website for further details: www.lms.ac.uk/content/small-grants-education.

Computer Science Small Grants (Scheme 7)
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. The next deadline for applications is **15 November 2013**. 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.

LMS COUNCIL DIARY

5 July 2013

A personal view

At the Council meeting on 5 July we were very pleased to learn that since the previous meeting the interests of the Society had been presented to Members of Parliament on no less than four occasions. At the beginning of June the President, Graeme Segal, and other Officers and Members of Council attended the CMS launch of the Deloitte Report, *Measuring the Economic Benefits of Mathematical Science Research in the UK*, at the House of Commons. At this event, politicians, representatives from industry, as well as key figures from the mathematical sciences community, were gathered together in recognition of the vital and on-going contribution made by mathematical sciences research to the UK economy. (Printed copies of the Deloitte Report can be obtained from john.johnston@lms.ac.uk.) Later in the month, Graeme and John Greenlees (Vice President) attended the Parliamentary Links Day – the largest science day on the annual Parliamentary events calendar – which this year focused on diversity in science and included an all-woman panel, with Cathy Hobbs representing the LMS, discussing the loss of talent from women leaving science and which called for more 'policy-muscle' to speed up improvements in diversity. Representatives of the LMS were also present at two meetings with the Minister of State for Universities and Science, David Willetts. The first, a CMS/STEM learned societies meeting, was attended by the President Designate, Terry Lyons, who reported that the Minister seemed genuinely interested in supporting STEM subjects and was looking to learned societies to help him do this. Terry also noted that the Minister was very pleased to have the Deloitte Report, considering it an important tool for himself and the Treasury. The second, a CMS/Department for Business, Innovation and Skills round table meeting specifically for mathematics, was attended by John Greenlees and the Education Secretary, Alice Rogers, who agreed that the Minister seemed genuinely supportive of mathematics, but noted that it was important to keep up the momentum if we want to ensure that financial commitments are made.

On the fund-raising front, the President reported on the great success of the first De Morgan dinner at which seven guests had been entertained. (The aim of the De Morgan dinners is to bring together supporters of mathematics external to the usual academic community in order to share ideas and aspirations, including for the future funding of the Society.) The Treasurer thanked the DMH staff for the excellent way they had arranged the dinner which had been an important factor in its success.

The Treasurer then began his report by informing us that, on current projections, we are heading for a significant underspend on our 2012-13 income and expenditure budget, due mostly to a larger than anticipated income from publications and a lower take-up of grants than expected. However, he also pointed out that we cannot expect income from publications to continue at the current rate, and that the take-up of grants is expected to improve, especially since there are now Society representatives in mathematics departments promoting the Society's grant schemes. We then gave our approval for the

income and expenditure budget for 2013-14 and the planning figures for 2014-16, having first been taken carefully through each of the different sections.

Among the updates from the Committees was one from the Women in Mathematics Committee on the Good Practice Scheme. It is impressive to see how much has been achieved by the WIM Committee on this front, including workshops as well as the production and launch of the Benchmarking Survey and Report (reported in a previous *Newsletter*), and the publication of the GPS booklet. And it should not go unremarked that the WIM Committee is the first Committee of the Society to have a Twitter account!

The Society's Strategic Plan has now become a regular item on the Agenda and this time we spent quite a bit of time discussing various ways in which the Society could best support early career researchers. We eventually agreed to launch a post-doctoral fellowship scheme covering travel grants of six months. The scheme is to begin with a two-year trial period, with the first grants being awarded in the 2014-15 financial year.

Under Membership, we were asked to consider a recommendation from Publications Committee, namely, that from 2014 onwards members should receive free access to electronic-only versions of the *Bulletin, Journal* and *Proceedings*, with the print-only option for Members being discontinued, and the print and online members' subscription price increased by 10% each year to encourage the move to electronic-only subscriptions. The recommendation, which would be of low-cost to the Society, came as a nice and unexpected surprise to several of us, and we all readily accepted it as a good benefit to members.

Sadly, we ended on a very worrying note, the proposal by the Russian Government to liquidate the Russian Academy of Sciences. Council unanimously agreed that the Society should send a letter of protest and delegated the matter to the President.

June Barrow-Green

GENERAL MEETING OF THE SOCIETY

Report

This year's Society meeting took place on Friday 5 July 2013, a rather nice sunny day in London. The meeting itself was attended by quite a range of mathematicians: from graduate students and teachers to esteemed professors, among whom were this year's speakers, Professor Karl-Theodor Sturm of Universität Bonn and Professor S.R.S. Varadhan of the Courant Institute, NYU.

The meeting was opened by Professor Graeme Segal, who acted as Chair of the Society meeting for his last time as President. To begin, as is customary, the names of new members were displayed on the screen and were met with approval. Following this, the winners of the Society's prestigious De Morgan medal, Naylor Prize and both Senior and Junior Whitehead prizes were announced. In particular, Professor Luis Alday, Dr André Neves, Dr Tom Sanders and Dr Corinna Ulcigrai were those young mathematicians honoured by the Junior Whitehead Prizes for their achievements in the areas of mathematical physics, geometric analysis, additive combinatorics and dynamical systems, respectively.

With Society business addressed, the main attraction of the afternoon could begin. Professor Sturm delivered an interesting talk on the geometric structure of the space X of all metric measure spaces. Sturm presented the basic properties of this object before leading the audience all the way to the study of gradient flows on X. After a rather pleasant coffee break in the De Morgan House garden, Professor Varadhan spoke beautifully on that subject for which he is so well known - large deviations.

A wine reception followed the talks, and those who could attend joined the speakers for an enjoyable meal at the Grange White Hall Hotel.

We thank the LMS for its kind support which made this event possible.

Mark Wilkinson
University of Oxford

RECORDS OF PROCEEDINGS AT LMS MEETINGS

GENERAL MEETING

held on *5 July 2013* at De Morgan House, London. Over 50 members and visitors were present for all or part of the meeting.

The meeting began at 3.30 pm with the President, Dr Graeme Segal, FRS, in the Chair.

Eleven people were elected to Ordinary Membership: Bruce Bartlett, Oren Ben-Bassat, David Foster, Joe Gildea, Aoife Hunt, Christian Johansson, Nikolaos Katzourakis, Yakov Kremnitzer, Mathew Pugh, Jennifer Ryan, Paul-James White.

Thirteen people were elected to Associate Membership: Aisha Algahtani, Rebecca Cornwell, Elizabeth Howarth, Rahul Jha, Liliane Merzougui, Jamie Phillips, Tahel Ronel, Ana Rovi, Carmen Rovi, Neil Saunders, Inga Schwabrow, Richard Skillicorn, Ansgar Wenzel.

One person was elected to Reciprocity Membership: Andrzej Frydryszak.

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

On a recommendation from Council it was agreed to elect Dr Don Collins and Professor Chris Lance as scrutineers in the forthcoming Council elections.

The President, on Council's behalf, proposed that Professor Dennis Sullivan of Stony Brook University and Professor Margaret Wright of the Courant Institute, NYU, be elected to Honorary Membership of the Society.

The President then announced the awards of the prizes for 2013:

De Morgan Medal	Professor John Thompson, FRS (University of Cambridge)
Senior Whitehead Prize	Professor Frances Kirwan, FRS (University of Oxford)
Naylor Prize and Lectureship for Applied Mathematics	Professor Nick Trefethen, FRS (University of Oxford)
Whitehead Prizes	Professor Luis Alday (University of Oxford) Dr André Neves (Imperial College, London) Dr Tom Sanders (University of Oxford and from September 2013, University of Cambridge) Dr Corinna Ulcigrai (University of Bristol)

The President read short versions of the citations, to be published in full in the *Bulletin*.

The President introduced a lecture given by Professor Karl-Theodor Sturm (University of Bonn) on *Geometric Analysis on the Space of Metric Measure Spaces*.

Following a break for tea, the President introduced a lecture by Professor S.R. Srinivasa Varadhan (Courant Institute, NYU) on *Probability, Counting and Large Deviations*.

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

After the meeting, a reception was held at De Morgan House, followed by a dinner at the English Garden Restaurant in the Grange White Hall Hotel.

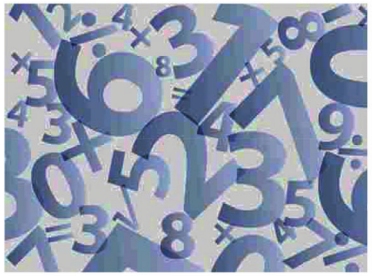
LMS POPULAR LECTURES 2013

King Edward School, Birmingham – Thursday 26 September

Professor Ray Hill
University of Salford

Mathematics in the Courtroom

In this talk, Professor Ray Hill shows how the misuse of mathematics can lead to miscarriages of justice, and how the correct use of mathematics can help to prevent them.



Dr Vicky Neale
University of Cambridge

Addictive Number Theory

For hundreds of years, mathematicians have asked intriguing questions about adding whole numbers, for example concentrating on particularly important sequences such as the prime numbers and the square numbers.

Dr Neale will discuss some of these problems (solved and unsolved), and some of the elegant techniques from across mathematics that have been used to tackle these problems.

Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00pm

Admission is free, with ticket. **Register by Friday 20 September.**

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

POPULAR LECTURES 2013

Report

On Tuesday 25 June 2013, some mathematics department school teachers and students visited the Institute of Education, University of London, to hear two lectures organised by the London Mathematical Society. The first lecture was entitled *Mathematics in the Courtroom*. In this talk, Professor Ray Hill from the University of Salford showed how the misuse of mathematics can lead to miscarriages of justice, and how the correct use of mathematics can help to prevent them. It was fascinating to learn how important an understanding of probability is in accurately and effectively interpreting different pieces of evidence.

The second lecture was called *Addictive Number Theory* and was delivered by Dr Vicky Neale of the University of Cambridge. Dr Neale illustrated several interesting number facts about prime and square numbers by asking and answering some intriguing questions about adding whole numbers. We learnt about how number theory was defined as an area of mathematics to the variety of approaches different mathematicians have used to define and resolve fundamental questions of number.

This was an excellent opportunity to hear practising mathematicians explaining their work and its applications and we hope to attend future lectures in this series next year.

Photographs can be found on the back cover of this *Newsletter*.

Produced by pupils of Grey Coat Hospital

OPEN HOUSE LONDON 2013

After the success of last year's event, which attracted around 300 visitors to De Morgan House, the LMS is once again taking part in Open House London. De Morgan House will be open from 11 am till 4 pm on Sunday 22 September 2013 and visitors will be able to enjoy a guided tour of the building, and receive information about the London Mathematical Society and mathematics.

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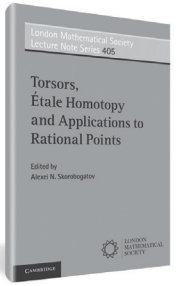
LONDON MATHEMATICAL SOCIETY

To see the full list of LMS titles published by Cambridge University Press go to

www.cambridge.org/LMS

Torsors, Étale Homotopy and Applications to Rational Points

Alexei N. Skorobogatov,
Imperial College London



- Lecture notes will benefit those who wish to learn about the theory and application of torsors
- Introduction to étale homotopy opens up new avenues for research
- The research papers within are of interest to researchers in algebraic and arithmetic geometry

London Mathematical Society Lecture Note Series, No. 405
Paperback | 9781107616127 | April 2013 | £45.00

www.cambridge.org/lms405

www.cambridge.org

CAMBRIDGE UNIVERSITY PRESS

EUROPEAN NEWS

Science Europe is the newly-created association of European Research Funding and Research Performing Organizations. Recently-appointed members of its Physical, Chemical and Mathematical Sciences Committee include Laszlo Lovasz (Budapest) and Karl Sigmund (Vienna). For more information see http://tinyurl.com/l5uyyfv.

Russian Academy of Sciences The Russian government recently launched a bill proposing fundamental changes to the Russian Academy of Sciences, founded in 1724 by Peter the Great. The plan is for the academy to merge with two minor societies: the Russian Academy of Medical Sciences and the Russian Academy of Agricultural Sciences. The responsibility for the more than 400 research institutes now under the academy's auspices would be transferred to a new government-run agency. Strong protests by scientists in Russia and from all over the world have resulted in a three-year transition period and parliamentary vote on a second modified version is postponed to the Autumn.

European Mathematical Society Publications Committee is preparing a position paper on open access (OA) publication that includes (among many other topics) consideration of an EMS common platform for European Mathematics. The Chair is Bernard Teissier (Paris).

Lagrange Days: 18-19 October 2013 at CIRM Luminy, France. A conference to commemorate the 200th anniversary of Lagrange's death (http://tinyurl.com/ltewmf3).

EMS Women in Mathematics Committee has been involved in setting up a Summer School on *Apollonian Circle Packings* at the Institut Mittag Leffler, Stockholm from 23 to 27 June 2014. Main speakers are Hee Oh (Brown) and Elena Fuchs (UC Berkeley), and organizers include Lillian Pierce (lillian.pierce@maths.ox.ac.uk).

Plans are already under way for the 2014 International Congress of Women Mathematicians which will take place immediately before the Seoul ICM. The Committee Chair is Caroline Series (Warwick).

The Spanish BBVA Foundation *Frontiers of Knowledge Awards* presented in Madrid in June included awards in basic sciences to mathematicians Ingrid Daubechies and David Mumford for their development of mathematical tools of transcendental value for efficient data compression and computer vision technology http://tinyurl.com/ltcgkbr (go to Press Release).

VU Amsterdam As a result of a restructuring plan the Free University Amsterdam (VU) formally terminated the Geometry/Topology research programmes in May. The VU did not dismiss the members of the Geometry Section as originally planned, but the development has had serious consequences for several VU researchers. For more information see http://euro-math-soc.eu/node/3833.

EMS NEWSLETTER

The following two items are taken, with permission, from the *EMS Newsletter* issue 88 (www.ems-ph.org/journals/journal.php?jrn=news).

Science City burned down

On 4 March 2013 the 'Città della Scienza' (Science Centre) in Naples burned in a fire. The Science Centre was located in the Bagnoli area, on the coast, in the northern part of Naples, at the border with the city of Pozzuoli. The area occupied by the Science Centre was part of a huge industrial environment devoted to a steel plant which closed down in 1992. The whole area, of about 120 hectares, has been abandoned since then, with the only exception being the Science Centre, which has been a great driving force for the cultural and economic rebirth of the whole neighbourhood and a mark of distinction and excellence for the city of Naples. The Science Centre was a Science Museum, opened to the public in 1996 thanks to the collaboration between scientists and people of culture, the Idis Foundation, the managing agency of the centre, the Italian Ministry of University and Research, Local Institutions, etc. The Science Centre, visited by more than 300,000 people, especially schoolchildren, included a planetarium, a theatre (the Galilei 104 Theatre), a conference centre and a science store, and it hosted children's workshops, international activities, exhibitions, conferences, etc. These activities were highly recognised at an international level, with the partnership of UNICEF, UNESCO, ANMS (National Association of Natural Science Museums), ECSITE (European Network of Science Centres and Museums) and Hands on! Europe (Association of children's museums), etc.

The Science Centre was an attempt to create in Italy a centre of distinction for high level popularisation and diffusion of science, at a level comparable with the best international experiences in this field. Its location in Naples, in the south of Italy, a region which particularly suffers from economic depression, was also meaningful as a sign of commitment to cultural and social development. Its destruction is therefore a grave event for the Italian scientific community and for the entire society.

The Science Centre burned on a Monday night, the day in which the centre is closed. This is seen as a sign of malice. Hence, the suspicion that we are facing arson is very high. If so, one might be tempted to think that somebody, to be identified, wanted to destroy an institution which was important not only from a cultural but also from a social and economic viewpoint. This would be further evidence of savagery to which too often our society exposes us. Against it, as human beings, and citizens and scientists, we have to raise our voices and fight. The Italian Mathematical Union has put the problem on its agenda, in order to study possible actions to encourage the reconstruction of the Science Centre and to show that the will of knowledge can be fostered even amongst the ruins. Meanwhile, the Science Centre appeals to the good-will of people for concrete help; see http://tinyurl.com/lthz8ay.

Ciro Ciliberto
University of Roma 'Tor Vergata'

[Full article from page 12.]

EU research budget

From 7 to 8 February 2013, the heads of state or government of the European Union convened to a decisive meeting to determine the budget priorities of the EU for the years 2014–2020. Strong pressure to cut on the overall EU budget came from net-payers, in particular from the UK, in the months ahead of the summit. On the other hand, several countries, in particular France and the Eastern European countries, are known to be strong defenders of the large spending blocks of agriculture and cohesion. As a consequence, other budget headings, in particular the research budget of the European Union, were highly endangered as a target for substantial cuts. Luckily, however, in the early morning hours of 8 February, a specific sentence was inserted in the agreement of the EU leaders: "[T]he funding for Horizon 2020 and ERASMUS for all programmes will represent a real growth compared to 2013 level."

How did that happen? What made EU leaders acquiesce to a move that has saved the research communities from stronger cuts?

[From *Can Science Advocacy Make a Difference?* by Wolfgang Eppenschwandtner, pp. 51-53. For background to the effective campaign that brought this about see the complete article.]

David Chillingworth
LMS/EMS Correspondent

VISIT OF CHRISTOPHER DODD

Dr Christopher Dodd (University of Toronto) will visit the UK from 22 October to 7 November 2013. Dr Dodd's interests include geometric representation theory, in particular with regards to finite W-algebras, sheaves of deformation-quantization algebras, and sheaves of differential operators in both characteristic zero and positive characteristic. He will give seminars on the following provisional dates:

- 22 October, University of Edinburgh
- 30 October, University of Glasgow
- 5 November, University of Oxford

Dr Dodd will also give a mini lecture series at the universities of Edinburgh and Oxford, aimed at PhD students, on topics in geometric representation theory. For further information contact Gwyn Bellamy (Gwyn.Bellamy@glasgow.ac.uk). The visit is supported by an LMS Scheme 2 grant.

LONDON MATHEMATICAL SOCIETY
SOUTH WEST & SOUTH WALES REGIONAL MEETING

Monday 16 December 2013

Mathematics Department, College of Science, Swansea University

Opening of the meeting
- S. Caenepeel (VUB, Brussels)
- S. Majid (QMUL)
- J.T. Stafford (Manchester)

Wine Reception/Dinner

The meeting will be held in the afternoon. These lectures are aimed at a general mathematical audience. All interested, including nonmembers of the LMS, are most welcome to attend this event.

The meeting forms part of a workshop on ***Categorical and Homological Methods in Hopf Algebras*** from 16-19 December. The speakers of the workshop include: M. Aguiar, J. Bichon, A. Bruguieres, J. Gomez Torrecillas, U. Kraehmer, G. Militaru, C. Menini, D. Stefan (to be confirmed), K. Szlachanyi, M. Wambst and R. Wisbauer. The workshop will finish at lunchtime on 19 December.

For further details, to register for a place at the meeting and workshop and/or to reserve a place at the dinner, please contact Tomasz Brzezinski (t.brzezinski@swansea.ac.uk).

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

ANNUAL GENERAL MEETING

Friday 15 November 2013
3.00 – 6.00pm

Jeffrey Hall, Institute of Education
20 Bedford Way, London, WC1H 0AL. (Nearest tube: Russell Square)

Programme

Annual General Meeting

Simon Donaldson (Imperial College)

Title tbc

Tea/Coffee

Announcement of Election Results

Graeme Segal (Oxford)
Presidential Address

The meeting will include the presentation of certificates to the LMS prize winners in 2013.

The meeting will be followed by a reception at De Morgan House, Russell Square, and the Society's Annual Dinner at the Montague Hotel, 15 Montague Street, London WC1B 5BJ. The cost to attend the dinner will be £53 per person.

Those wishing to attend the dinner should contact Leanne Marshall (lmsmeetings@lms.ac.uk) by **Monday 4 November**.

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

Clay Mathematics Institute:

Clay Research Conference

Mathematical Institute Opening Conference

September 29 – October 4, 2013

University of Oxford
Mathematical Institute
Radcliffe Observatory Quarter

Clay Research Conference | Wednesday, October 2

- **Peter Constantin** (Princeton University)
- **Lance Fortnow** (Georgia Institute of Technology)
- **Fernando Rodriguez Villegas** (University of Texas at Austin)
- **Edward Witten** (Institute for Advanced Study)

Associated workshops will be held throughout the week of the conference:

29 Sept – 1 Oct: The Navier-Stokes Equations and Related Topics
30 Sept – 4 Oct: New Insights into Computational Intractability
30 Sept – 4 Oct: Number Theory and Physics
30 Sept – 4 Oct: Quantum Mathematics and Computation

For more information and to register, visit **www.claymath.org/CRC13/**

Mathematical Institute Opening Conference | Thursday, October 3

To celebrate the opening of its new building, the Mathematical Institute of the University of Oxford is sponsoring a one-day conference.

- **Ingrid Daubechies** (Duke University)
- **Raymond Goldstein** (University of Cambridge)
- **Sir Andrew Wiles** (University of Oxford)

For more information and to register, visit **www.maths.ox.ac.uk/opening**

www.claymath.org **www.maths.ox.ac.uk**

HIGHER STRUCTURES IN ALGEBRAIC ANALYSIS

The *Higher Structures in Algebraic Analysis Winter School and Workshop* will be held at the Department of Mathematics, University of Padova from 10 to 21 February 2014. The School will take place during the first week and centre around four mini courses complemented by daily exercise and open discussion sessions. The lecturers are:

- Francesco Bottacin (Università di Padova, Italy)
- Damien Calaque (ETH Zürich, Switzerland)
- Denis-Charles Cisinski (Universitè de Toulouse, France)
- Claude Sabbah (École Polytechnique, France)

The Workshop during the second week will include a series of colloquium-style talks. Topics will include:

- Infinity categories
- Derived Geometry
- Hodge *D*-modules
- Non-commutative Hodge Structures
- Kobayashi-Hitchin correspondence

For further information visit the website at http://events.math.unipd.it/hsaa.

ISCHIA GROUP THEORY 2014

The *Ischia Group Theory 2014* meeting will take place at the Grand Hotel delle Terme Re Ferdinando, Ischia, Naples, Italy from 1 to 5 April 2014. The scientific programme will be dedicated to the memory of David Chillag on Thursday and to the memory of Brian Hartley on Friday. The meeting will consist of talks given by invited speakers and a permanent poster session. For further information visit the website at www.dipmat.unisa.it/ischiagrouptheory.

Introductory School to the Programme
FREE BOUNDARY PROBLEMS
AND RELATED TOPICS

6 - 10 January 2014

Isaac Newton Institute
for Mathematical Sciences

in association with the Newton Institute programme
Free Boundary Problems and Related Topics
(6 January - 4 July 2014)

Workshop organisers: Henrik Shahgholian (Stockholm) and Juan Luis Vázquez Suárez (Madrid).

The School aims at providing an introductory background on current topics of research in Free Boundary problems, that could serve the students during their stay for the Programme at Newton Institute. Among the many trends of research in FBs, we have chosen to propose views that cover the different basic aspects: applications in several directions, mathematical theory, as well as numerical studies. The level of the presentations will be mainly at the early post-doc level, with some space for advanced topics.

Closing date of the receipt of applications is **1 November 2013**. Further information and application forms are available from the website at www.newton.ac.uk/programmes/FRB/frbw01.shtml.

ABEL VISITING SCHOLAR PROGRAM

The Niels Henrik Abel Board and the International Mathematical Union invite applications from mathematicians professionally based in developing countries to visit an international research collaborator for a period of one month. The period is extendable for up to three month in the case of matching support from the host institution.

The program is designed for post doctoral mathematicians in the early stages of their professional careers. It is designed to offer the opportunity for a 'research sabbatical', a necessary complement to teaching and other academic duties for mathematicians desiring to also sustain a viable research program.

The grant will cover health insurance, visa cost, all travel (economy flights or equivalent) and living expenses including accommodation for one month for up to a total maximum amount of US$5,000 per mathematician.

Applicants must hold a PhD in mathematics and be in the early stages of their professional careers. This means that the applicant should be under 40 years on 1 July 2013 and not yet of full professorial rank. The maximum age may be increased by up to three years in the case of an individual with a broken career pattern.

Applications from women mathematicians are strongly encouraged.

The applicant should already have initiated research contact with the proposed international research partner. The collaboration should take place at the international partner's home institution.

Applications must be received at least four months before the desired starting date. The selection committee will review the applications and award fellowships every four months. Deadlines are: **1 December 2013** for research visits starting 1 April 2014 and later and **1 April 2014** for research visits starting 1 August 2014 and later.

More information can be found at www.mathunion.org/cdc/grants/abel-visiting-scholar-program.

OSTROWSKI PRIZE 2013

Call for Nominations

The aim of the Ostrowski Foundation is to promote the science of mathematics by periodically awarding an international prize for recent outstanding achievements in pure mathematics or the theoretical foundations of numerical mathematics. The value of the prize for 2013 is 100,000 Swiss Francs.

The prize has been awarded every two years since 1989. The most recent winners are Ben Green and Terence Tao in 2005, Oded Schramm in 2007, Sorin Popa in 2009 and Ib Madsen, David Preiss and Kannan Soundararajan in 2011; see www.ostrowski.ch/index_e.php?ifile=preis for the complete list.

The jury invites nominations for candidates for the 2013 Ostrowski Prize. Nominations should include a c.v. of the candidate, a letter of nomination and three letters of reference. The Chair of the jury for 2013 is Cameron Stewart of the University of Waterloo. Nominations should be sent to cstewart@uwaterloo.ca by **15 September 2013**.

C*-ALGEBRAS

This operator algebras meeting will take place at the University of Aberdeen on 26 October 2013 in celebration of the recent appointment of Aaron Tikuisis. It will consist of the following talks:

- David Evans (Cardiff University)
  K-theory and subfactors
- Aaron Tikuisis (University of Aberdeen)
  Dimension and central sequences
- Wilhelm Winter (University of Münster)
  Regularity and classification of nuclear C-algebras*
- Joachim Zacharias (University of Glasgow)
  Nuclear dimension and dynamics

For further information visit the website at http://homepages.abdn.ac.uk/a.tikuisis/Cstar Scotland.html. The meeting is supported by an LMS Conference grant to celebrate new appointments.

William Benter Prize in Applied Mathematics 2014

Call for NOMINATIONS

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

The Prize

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

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

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

Nominations

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

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

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

Or **by email to: mclbj@cityu.edu.hk**

Deadline for nominations: 31 December 2013

Presentation of Prize

The recipient of the Prize will be announced at the **International Conference on Applied Mathematics 2014** from 1 to 5 December 2014. The Prize Laureate is expected to attend the award ceremony and to present a lecture at the conference.

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

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

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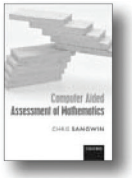
Combinatorics: Ancient & Modern
Edited by **Robin Wilson** and **John J. Watkins**
This book constitutes the first book-length survey of the history of combinatorics and uniquely assembles research in the area that would otherwise be inaccessible to the general reader.

June 2013 | 392 pages | Hardback | 978-0-19-965659-2 | ~~£55.00~~ **£44.00**



Computer Aided Assessment of Mathematics
Chris Sangwin
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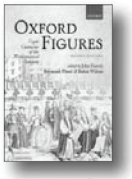

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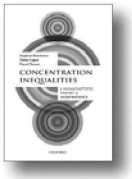

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VISIT OF PAOLO LORENZONI

Dr Paolo Lorenzoni (Department of Mathematics and Applications, University of Milano-Bicocca) will be visiting the UK from 1 to 15 October and from 1 to 15 November 2013.

His expertise in the differential geometric theory of integrable systems of hydrodynamic type and their deformations, Frobenius manifolds and their generalisations will contribute to strengthen the existing scientific collaborations between the UK mathematical physics community, in particular the newborn group of Integrable Systems at Northumbria University, and the mathematical physics group based in Milano-Bicocca University (Italy). During his visit Dr Lorenzoni will give lectures at:

- Loughborough University, School of Mathematical Sciences, Wednesday 2 October at 4 pm, Room W002,
  Deformations of Poisson pencils of hydrodynamic type: an introduction
- Northumbria University at Newcastle upon Tyne, Department of Mathematics and Information Sciences, Wednesday 9 October at 4 pm, Room PB108,
  Deformations of Poisson pencils of hydrodynamic type: an introduction
- University of Glasgow, School of Mathematics and Statistics, Tuesday 12 November at 4 pm, Maths Room 204,
  Darboux-Egorov system, bi-flat F-manifolds and Painlevé VI

Integrable Systems in Newcastle Workshop
Dr Lorenzoni will present at this workshop at Northumbria University from 4 to 5 October 2013 (see page 26).

Dr Lorenzoni will be based at the Department of Mathematics and Information Sciences, Northumbria University at Newcastle upon Tyne. For further information contact A. Moro (antonio.moro@northumbria.ac.uk).

The visit is supported by an LMS Scheme 2 grant, Milano-Bicocca University and Northumbria University.

GOOD PRACTICE SCHEME WORKSHOP

LONDON MATHEMATICAL SOCIETY
GOOD PRACTICE SCHEME

31 October 2013

Registration is now open for a Good Practice Scheme workshop to be held on Thursday 31 October 2013 in London.

The workshop will provide individuals and departments with knowledge and tools they can use to improve recruitment and retention of women in mathematics. This may include making an application for Athena SWAN status. It is aimed at those who have not previously attended a GPS workshop, although those who have are also welcome if they think it would be useful to them.

Participants will:

- hear about how the LMS Good Practice Scheme can support Departments working towards recruiting and retaining more women in mathematics
- hear from Paul Walton, former Head of Chemistry at the University of York – the first department to receive an Athena SWAN Gold award
- hear from Athena SWAN about the process of applying for Bronze, Silver and Gold Award department status
- hear from departments already engaged in the process of applying for Athena SWAN status
- make useful contacts with other departments active in promoting the careers of women in maths

To register for the workshop please email womeninmaths@lms.ac.uk (attendance is free, but numbers are required for catering purposes).

The workshop will be held at De Morgan House, 57-58 Russell Square, London WC1B 4HS.

The LMS report *Advancing Women in Mathematics: Good Practice in UK University Departments* is available to download from www.lms.ac.uk/women-mathematics or a printed copy may be requested from womeninmaths@lms.ac.uk.

CATEGORICALLY CARDIFF

A one-day meeting *Categorically Cardiff: Derived Categories and Algebraic Geometry* will be held at Cardiff University on Friday 18 October 2013. The talks will take place in the School of Mathematics from 14:00 to 18:00. There will be a small reception and a dinner afterwards. The speakers are:

- Miles Reid (Warwick) *Clusters, quivers, boats and traps*
- Richard Thomas (Imperial) *Counting curves in 3-folds and K3 surfaces*
- Timothy Logvinenko (Cardiff) *On braiding criteria for spherical twists*

Everyone is welcome to attend. Limited financial support is available for research students. For further information visit the website at www.cf.ac.uk/maths/subsites/logvinenko/2013-cc.

The meeting is supported by an LMS Conference grant to celebrate new appointments. and the School of Mathematics at Cardiff University.

INTEGRABLE SYSTEMS IN NEWCASTLE

The two-day meeting *Integrable Systems in Newcastle* will take place from 4 to 5 October 2013 at the Department of Mathematics and Information Sciences of Northumbria University, Newcastle upon Tyne. The event celebrates four newly appointed mathematicians (Dr Sara Lombardo, Dr Matteo Sommacal, Dr Antonio Moro, and Dr Benoit Huard, in order of appointment) and promotes the activity of the research group at Northumbria within the North East and in the neighbouring Universities of Newcastle and Durham, as well as Glasgow, Edinburgh, Leeds, Loughborough and Manchester.

The workshop covers a wide range of topics in the field of integrable systems and nonlinear waves, bringing together experts from the UK community and from abroad. The list of speakers includes:

- F. Calogero (Università di Roma "La Sapienza")
- A. Degasperis (Università di Roma "La Sapienza")
- G. El (Loughborough University)
- E. Ferapontov (Loughborough University)
- B. Huard (Northumbria University)
- S. Lombardo (Northumbria University)
- P. Lorenzoni (Università di Milano "Bicocca")
- M. Mazzocco (Loughborough University)
- Moro (Northumbria University)
- J. Sanders (Vrije Universiteit Amsterdam)
- P. Santini (Università di Roma "La Sapienza")
- M. Sommacal (Northumbria University)
- P. Sutcliffe (Durham University)
- J.P. Wang (University of Kent)

For further information visit the website at http://group28.northumbria.ac.uk/IS/ or contact Sara Lombardo (sara.lombardo@northumbria.ac.uk). The meeting is supported by an LMS Conference grant to celebrate new appointments.

PANDA

The next meeting in the PANDA series (Patterns, Nonlinear Dynamics and Applications) will be held in the Department of Mathematical Sciences, University of Bath, on Tuesday 10 September 2013. The invited speakers will be:

- Istvan Kiss (Sussex) *Formulating exact and approximate epidemic models on networks*
- Rebecca Hoyle (Surrey) *Quantitative genetics and maternal effects*

Contributed talks will include:

- Luke Heaton (Oxford) *Growth and transport in fungal networks*
- Neville Boon (Surrey) *Foot stomping in myosin-V the molecular motor*
- Samuel Johnson (Imperial) *Modelling food-web structure without niche dimensions*

There is no registration fee. Further details can be found at http://people.bath.ac.uk/jhpd20/panda or by contacting Jonathan Dawes (J.H.P.Dawes@bath.ac.uk).

The PANDA network is organised by Jonathan Dawes (Bath), Rebecca Hoyle (Surrey), Paul Matthews (Nottingham) and Alastair Rucklidge (Leeds). The meeting is supported by an LMS Scheme 3 grant.

MATHEMATICAL CHALLENGES IN BUBBLES AND BIOLOGICAL FLUID MECHANICS

A one-day meeting on *Mathematical Challenges in Bubbles and Biological Fluid Mechanics* will be held at the University of Birmingham on 19 September 2013. The meeting coincides with the retirement of Professor John Blake and will celebrate the areas of mathematics to which he has contributed, and will provide an opportunity for academics and students to interact with some of the world leaders in biological fluids and bubble dynamics. The invited speakers are:

- Rachel Bearon (University of Liverpool)
- Christopher Brennan (CALTECH)
- Georges Chahine (Dynaflow Inc.)
- Suzanne Fielding (University of Durham)
- Ray Goldstein, FRS (University of Cambridge)
- Nick Hill (University of Glasgow)
- Anne Juel (University of Manchester)
- Eric Lauga (University of Cambridge)
- Werner Lauterborn (Third Inst. Physics, Göttingen)
- Xiaoyu Luo (University of Glasgow)
- Tim Pedley, FRS (University of Cambridge)
- John Ockendon, FRS (University of Oxford)

No registration fee will be charged; assistance with travel expenses will be provided for PhD student attendees. All early career attendees are encouraged to present a poster on their research. For more information or to register, email Dr Dave Smith (d.j.smith.2@bham.ac.uk) or Dr David Leppinen (d.m.leppinen@bham.ac.uk), or visit http://web.mat.bham.ac.uk/D.Smith/bubbles_and_bio.htm.

The meeting is supported by an LMS Conference grant and the Institute of Mathematics and its Applications.

INFERENCE FOR CHANGE-POINT AND RELATED PROCESSES

Isaac Newton Institute for Mathematical Sciences

13 – 17 January 2014

in association with the Newton Institute programme
Inference for Change-Point and Related Processes
(13 January – 7 February 2014)

Workshop organisers: John Aston (Warwick), Idris Eckley (Lancaster), Paul Fearnhead (Lancaster) and Georgy Sofronov (Macquarie).

In many applications data is collected over time or can be ordered with respect to some other criteria (e.g. position along a chromosome). Often the statistical properties, such as mean or autocovariance, of the data will change across the data. This feature of data is known as non-stationarity. An important and challenging problem is to be able to model and infer how these properties change.

Two possibilities for modelling non-stationarity are change-point models and locally-stationary models. One of the goals of the workshop is to investigate and develop links between these two approaches.

This workshop will start with overview lectures that introduce change-point and locally-stationary models and approaches to inference for these models. There are opportunities for participants to present their work as a talk or poster. If you wish to do so, please include a short abstract (max 1 page) with your application.

Closing date of the receipt of applications is **1 October 2013**. Further information and application forms are available from the website at www.newton.ac.uk/programmes/ICP/icpw01.

SHEFFIELD PROBABILITY DAY

A *Sheffield Probability Day* will take place on Wednesday 9 October 2013 in Lecture Theatre 6, Hicks Building, Sheffield University. The speakers are:

- Andreas Kyprianou (Bath) at 2.15 pm
  Censored stable processes
- Thomas Mikosch (Copenhagen) at 3.45 pm
  The 2013 Applied Probability Trust Lecture
  Power law tails in applied probability - some recent developments

Tea and coffee will be available at 3.15 pm in Room I15, Hicks Building. All are welcome. For further information please contact Ursula McGuone (tel: 0114 222 3752, email: u.mcguone@sheffield.ac.uk). The meeting is sponsored by the Applied Probability Trust.

CLASSICAL AND COMPLEX FLUIDS

A workshop on *Recent Trends in Classical and Complex Fluids* will be held at the University of Sussex from Thursday 5 to Saturday 7 September 2013. Recent years have witnessed a strong development in the analytical study of complex fluids (such as liquid crystals or polymeric fluids) through non-trivial extensions of techniques used in classical fluids. On the other hand questions motivated by the study of complex fluids have raised new and non-trivial questions in the analysis of classical fluids, such as the ones related to singular forcings.

The aim of the workshop is to further stimulate these type of interactions focusing in particular on topics such as: weak solutions for complex physically relevant systems, regularity issues and long-term behaviour. Confirmed speakers are:

- John Ball (University of Oxford)
- Jean-Yves Chemin (Pierre and Marie Curie University)
- Gui-Qiang Chen (University of Oxford)
- Alexey Cheskidov (University of Illinois at Chicago)
- Gianluca Crippa (University of Basel)
- Eduard Feireisl (Czech Academy of Sciences)
- Pierre-Gilles Lemarie-Rieusset (University of Evry)
- Chun Liu (Penn State University)
- Josef Malek (Charles University)
- James Robinson (University of Warwick)
- Jose Rodrigo (University of Warwick)
- Giulio Schimperna (Universitiy of Pavia)
- Edriss Titi (Weizmann Institute of Science)
- John Toland (University of Cambridge)
- Vlad Vicol (Princeton University)

For further information, including how to register visit the website www.sussex.ac.uk/Users/az73/SussexPDE2013.html. The conference is partially supported by an LMS Conference grant.

OBITUARIES

HARLEY FLANDERS

Professor Harley M. Flanders, who was elected a member of the London Mathematical Society on 16 January 1958, died on 26 July 2013, aged 87.

Zvi Flanders writes: Harley completed his PhD in mathematics at the University of Chicago in 1949. Until 1960 he was a professor at the University of California, Berkeley. During part of this time he was a National Science Foundation Fellow at both Cambridge and Hebrew Universities. In 1960 he was appointed full professor at Purdue and later at Tel Aviv University. In 1977 he returned to the United States where he held several positions, most recently as a visiting scholar at the University of Michigan.

Harley authored an important book *Differential Forms with Applications to the Physical Sciences* (Academic Press), nearly 100 scientific papers as well as a number of textbooks on algebra, trigonometry, calculus and *Scientific Pascal*. From 1958-63 he was the Associate Editor of the *Transactions of the American Mathematical Society*. Between 1966 to 1973 he served first as Associate Editor and later as Editor-in-Chief of the *American Mathematical Monthly*. He was the recipient of the NCRIPTAL/EDUCOM Distinguished Software Award for his MicroCalc educational software program.

Harley is survived by his ex-wife, M. June Flanders; sons Daveed and Zvi; three grandchildren Tal, Nathan and Louis; and two great-grandchildren, Yosef and Batsheva.

RAYMOND CUNINGHAME-GREEN

Professor Raymond Cuninghame-Green MA, PhD, DSc, FBCS, FIMA who was elected a member of the London Mathematical Society on 18 May 1961, died on 9 June 2013, shortly before his 80th birthday.

Peter Butkovic writes: Ray was Professor of Industrial Mathematics at the School of Mathematics in Birmingham 1975-99 and the Head of School 1994-97. He lay the foundations of management mathematics at Birmingham. Ray retired in 1999 but remained research active.

Ray Cuninghame-Green is known as one of the first pioneers of max-algebra, today also known as tropical mathematics. His first paper on max-algebra was published in 1960. Ray was probably the first who realised that the maximum cycle mean of a matrix is its principal max-eigenvalue (1962). He achieved fundamental results in the theory of max-linear systems, including linear independence, tropical rank, residuation, duality, maxpolynomials, the discovery of the characteristic maxpolynomial, rational functions and the proofs of several results for irreducible or finite matrices proved in full generality in the 1980s and 1990s by other authors, such as the complete description of (max-algebraic) eigenspaces, the cyclicity theorem or spectral projector. Most of these appear in his publication *Minimax Algebra*, Lecture Notes in Economics and Math. Systems 166, Berlin: Springer, 1979. This work has been cited by hundreds of authors worldwide and contains material that is still relevant for researchers in tropical linear algebra today.

Ray was a kind, tolerant and highly respected man. He will be missed very much by his family, friends, colleagues and former students.

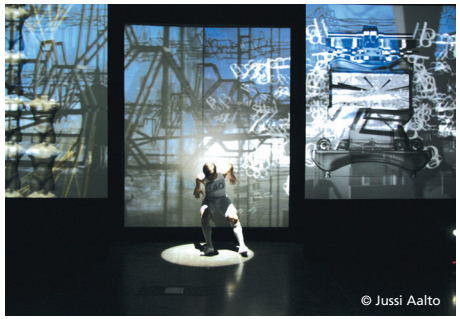
ALAN TURING OPERA

Report

The UK premier of the multimedia opera *Turing Machine* took place in the Capitol Theatre in the campus area of the University of Manchester, as part of the *International Congress for the History of Science, Technology and Medicine*, held from 21 to 24 July 2013. It was performed by the Helsinki Skaala Opera. We include a report by their Managing Director Satu Strömberg.

"It was a unique experience for us to perform at a science congress and especially at a university where Turing has worked. It made the atmosphere truly magical. The *Turing Machine* opera is composed by Eeppi Ursin and Visa Oscar and based on the play *Turing* (2000) by Milo Jaakkola and Jussi Lehtonen. It weaves together soaring emotionally charged vocal lines with atmospheric ambient sounds capes and sampled electronic rhythms. The intimate and intense opera for two singers is set off by stunning 3D graphics – a visual element ultimately based on the innovations of Alan Turing himself.

Simoneh Turchetti, who is part of the congress organising committee, admits that the opera had not been a big interest for him before.



'After I saw a recording of the *Turing Machine* opera, I definitely wanted to invite the captivating production to be part of the international congress' said Turchetti.

Though Turing spent his life at the forefront of technological innovation, his true goal was the scientific understanding of the mind. Turing was also a modest and unpretentious man trying to live in a society that criminalized his sexual orientation, ultimately driving him to suicide. Turing's death in 1954 remains one of the many enigmas in an astonishing life story. On 20 July 2013 The Independent wrote that Turing is set to be posthumously pardoned for a homosexuality conviction.

'I met people that came to see both of our performances. It's a touching story, the music is beautiful, and the visual design puts the final touch to it. It is definitely not a traditional opera' Strömberg describes.

Helsinki Skaala Opera crew had also the chance to visit the Alan Turing memorial statue in the campus area. The statue is played by the tenor Juha Hostikka in the opera production.

The tour was sponsored by the City of Helsinki Cultural Office, Music Finland, the Finnish Music Foundation and the Arts Promotion Centre, Finland."

Additional information is available from Satu Strömberg, Managing Director, satu.stromberg@oopperaskaala.fi, tel. +358 45 1511 185.

By googling *Turing Machine Skaala Opera* readers are able to see a YouTube video of this opera.

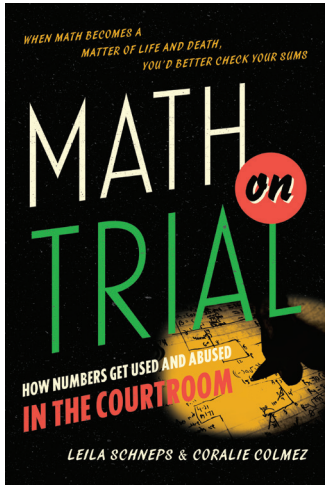
MATH ON TRIAL: HOW NUMBERS GET USED AND ABUSED IN IHE COURTROOM by Leila Schneps and Coralie Colmez, 2013, Perseus Books Group. 272 pp, £17.99, ISBN: 978-0465032921.

This fascinating book considers ten cases where the use, or more often the misuse, of mathematics has played an important role. Each chapter comprises a brief preview of a relevant mathematical argument, usually with an illustration, followed by a vivid account of the case in question. Although the authors (a mother and daughter team) are both mathematicians, the book is intended for a much wider readership. In my view, they have struck the right balance of providing enough mathematics for the specialist to check out the details, but not so much as to overwhelm the general reader.

The first case is that of Sally Clark and the infamous statistic, quoted by paediatrician Professor Sir Roy Meadow, that the chances of her having two natural cot deaths were one in 73 million. Several pages are devoted to the earlier career of Professor Meadow, and in particular his role in the conviction of serial killer nurse Beverley Allitt. Thus, without seeking to excuse the serious misuse of probability in the Sally Clark trial, the authors give a rationale for Meadow's views. This typifies the objective and even-handed approach taken by the authors throughout the book.

Chapter 4 concerns the murder of Meredith Kirchner in Italy and the convictions of Amanda Knox and Raffaele Sollecito, which were subsequently quashed on appeal. The chapter ends on an intriguing note, with a retrial recently announced and the possibility that a further DNA test (advocated by the authors) might now be carried out.

Chapter 6 begins with a particularly nice example of Simpson's paradox. Over a twenty year period, the overall average score of students on a certain test remained the same, yet every one of the six ethnic groups making up the cohorts improved their average score! The main thrust of the chapter concerns a 1975 inquiry into whether the University of California at Berkeley was discriminating against women applicants. After all, in 1973-74, the University admitted 44% of all male applicants, but only 35% of all female applicants. So, was the University discriminating and, if so, which were the guilty departments? Read this chapter to find the answers.



Netherlands nurse Lucia de Berk had the misfortune to be on duty for an unusually large number of baby deaths. An expert testified that there was only a one in 342 million chance that she could coincidentally have been present at so many natural deaths. Was this figure correct, and was it necessarily indicative of guilt? Lucia served eight years of a murder sentence awaiting the answers.

Chapter 8 is a highly entertaining account of the life of Charles Ponzi and his recent reincarnation in the form of Bernie Madoff. A minor criticism I have here is that the final sentence *'Beware exponential growth investment – it cannot work!'* is too simplistic. All savings at fixed compound interest rates will achieve exponential growth. The point at issue surely is that one should beware of promised rates which are unfeasibly higher than the prevailing inflation rate. So Ponzi's promise to double investments every ninety days clearly couldn't work, at least for the vast majority of investors. But could the same be said of Madoff, whose targeted rates of around 10% per annum were not so obviously outside the realms of feasibility by legitimate means? Of course, Madoff's 'investments' turned out to be nothing more than a Ponzi scheme, and it is extraordinary that the regulators were duped by him for so long. But it seems to me to be harsh on the investors to suggest that it should have been obvious to them that Madoff could not have been running a legitimate business.

The final chapter gives an account, taken largely from original French sources, of the Dreyfus affair, which I found to be both gripping and shocking. The roles of Émile *(J'Accuse)* Zola and mathematicians such as Henri Poincaré are highlighted in the eventual triumph of reason and justice over the forces of corruption and cover-up.

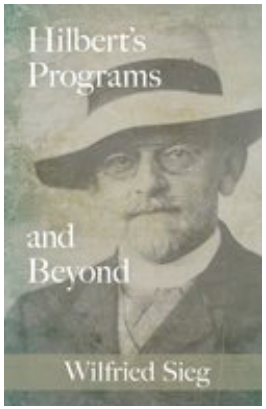
A concluding section briefly reviews the earlier cases and takes stock of the role of mathematics in present-day justice. A minor quibble here concerns the assertion that the Sally Clark case was not eventually resolved by correcting the math, but by introducing new medical evidence of infection. While it is true that it was the medical evidence which prompted the prosecution to throw in the towel after the first day of the second appeal and before the statistical arguments had been heard, the written judgement went on to say that 'it seems likely that if statistics had been argued before us, it would have provided a quite distinct basis on which the appeal had to be allowed'.

A few minor quibbles are probably inevitable in a book of this nature, but I believe they are vastly outweighed by the considerable merits. The authors have set out to show to a general audience how the misuse of mathematics has led to miscarriages of justice, and how the correct use of mathematics has helped to rectify them. They have by and large succeeded in this aim. The book is packed with interest and drama and I strongly recommend it.

Ray Hill
University of Salford

REVIEWS

HILBERT'S PROGRAMS AND BEYOND by W. Sieg, Oxford University Press, 2013, 464 pp, £55, US$85, ISBN 978-0-19-537222-9.



David Hilbert's work on logic, set theory, and the foundations of mathematics began over a century ago, and has naturally been overshadowed by some of the developments it inspired and which led to the triumphant development of the field of mathematical logic. As a result, exactly what Hilbert did or did not do, how it was affected by such discoveries as Gödel's incompleteness theorems, and how indeed Hilbert himself reacted to that work, has slipped into the confused realm of folklore. Wilfried Sieg has for a long time been one of those keeping an accurate, insightful appreciation of Hilbert's aims and achievements in plain view, and this book helpfully draws together ten of his papers over the last 25 years with a number of fresh essays.

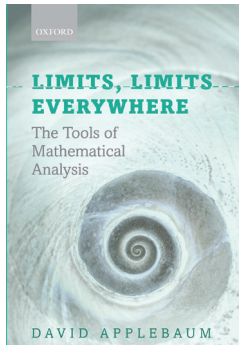
Sieg situates his analysis of Hilbert's work in a deep appreciation of Dedekind's explanations of what the natural numbers and the real numbers are, and sees Hilbert as thoroughly inspired by Dedekind's point of view well before he turned to foundational questions. Accordingly, he writes (with Dirk Schlimm) a long essay on the evolution of Dedekind's ideas, based on surviving unpublished sources as well as the famous published accounts. This essay, and accompanying passages in several other essays reprinted here, make it very clear that Dedekind's approach was the key insight for Hilbert once he turned from providing arithmetic models for axioms systems in geometry to seeking foundations for arithmetic. The abundance of quotations from Hilbert's lecture courses, and also Bernays', serve to enrich and enlarge our understanding of Hilbert's evolving concerns.

While quite a lot is known about the reaction of, for example, von Neumann to the work of Gödel, rather less is generally known about Hilbert's own response. In the essay reprinted here *In the shadow of incompleteness: Hilbert and Gentzen Sieg* shows how Hilbert tried to establish the contentual correctness of a constructivist or finitist theory. He also demonstrates the influence this idea had on Gentzen. In a further paper *Hilbert and Bernays: 1939* Sieg shows that they now attempted to respond to the incompleteness theorems by exploring the extent of finitist methods and demarcating appropriately the methodological standpoint for proof theory. As he notes, Gödel himself did not think that the second incompleteness theorem contradicted Hilbert's formalist point of view, although Herbrand and von Neumann disagreed. Inevitably, results in this area at the time were inconclusive.

The predominantly historical essays are complemented by a matching amount of more reflective or analytical ones. Sieg argues that at least four notions are central to an understanding of modern mathematics: structural definition, rigorous proof, accessible domains, and mechanical procedures. The first of these Hilbert picked up from many sources, but in an exemplary fashion from Dedekind's work. Attention to the issue of what constitutes a rigorous proof came to Hilbert from Frege's work via Russell and Whitehead. Accessible domains are a more technical concept that Sieg uses for parts of mathematics that admit inductive definitions and allow proof by induction. The idea of mechanical procedures is in one way a refinement of the idea of a rigorous proof, but it also points towards a purely formal, axiomatic, and syntactic idea of mathematics that allows rigorous mathematics to be done when conceptual understanding may be lacking and need not, perhaps, be attempted. Two concerns stand out: the issue of what mixture of logic and set theory is needed to secure actual mathematics (which may be rather less than is generally assumed), and the implications of purely formal proofs for our ideas of what it is to understand mathematics. Finally, two interesting essays *Beyond Hilbert's reach?* and Searching for proofs (and uncovering capacities of the mathematical mind) conclude the book, but they open the prospect that the ideas of Hilbert, and more especially Bernays, if taken in their broadest sense as reflections upon actual mathematics, may well still have much to say to us.

Jeremy Gray
Department of Mathematics and Statistics
Open University

LIMITS, LIMITS EVERYWHERE: THE TOOLS OF MATHEMATICAL ANALYSIS by David Applebaum, 2012, Oxford University Press, 224 pp, £20.99, ISBN: 978-0-19-964008-9.



Hardy wrote *A Course of Pure Mathematics* with a proselytising zeal that prompted Littlewood's comparison with a missionary talking to cannibals. In these latter days when mathematics is gaining popularity in secondary schools and mathematics degree courses are recruiting strongly, Analysis is once more a stumbling block. A text that renders it approachable is therefore worthy of notice.
The comparison with Hardy is rather unfair because David Applebaum's intended readership encompasses not only mathematics students but a wider numerate community. This book does not offer an easy ride but its informal and enthusiastic literary style hold one's attention. Perhaps mindful of the content of much current popular mathematical exposition, the author draws many illustrations from number theory.

The principal subject matter of Part I is the convergence of real sequences and series. The central idea of limit is kept to the forefront by postponing set theoretic notation to a later appendix, so that, for example, the supremum and infimum of a sequence are defined, rather than those of a set of numbers. There is considerable discussion of numbers, which concentrates on the essential points and emphasises inequalities while avoiding axiomatisation. Proof by induction is also avoided. The author strives to keep his exposition elementary but some of the examples are technically quite tricky.

Part II contains many applications, especially to number theory, introducing the reader to the Golden Ratio, Fibonacci sequences, continued fractions, the Riemann zeta function, the distribution of primes and the irrationality of ϖ and e. Here the lack of calculus is a drawback and a self-contained account is not possible. Much of the material is therefore best seen as encouragement to look elsewhere for fuller treatment (preferably after a few more Analysis courses!). Towards the end of the book there are brief discussions of the real number system, including Dedekind sections, set theory (including countability and Cantor's diagonal argument) and calculus.

If a second edition is published it is to be hoped that it will be better proof-read: I noticed *Augustus* Louis Cauchy, *Mobiüs, Encyclopčdie*, an exponential series beginning at $n = 1$ and extraneous paragraph breaks.

Who should read this book? Mathematics students about to enter university will find it an appetising foretaste of things to come and for many of them it will be a valuable aid to their first Analysis course. They will however need a separate source for differentiation and integration. Those whose courses adopt a more foundational approach or include more technical concepts such as *limsup* will also need to look elsewhere. Mathematically literate non-specialists will find the book a readable introduction to an unfamiliar subject and will recognise topics seen in the media as well as glimpsing new ones; those who reach the later parts of the book will find it challenging.

Geoffrey Burton
University of Bath

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.

SEPTEMBER 2013

2 Function Theory Meeting, De Morgan House, London (427)
2 Heilbronn Day, Groups and Their Representations, Manchester (423)
2-4 Advanced Decomposition Methods for Partial Differential Equations Minisymposium, Kingston (424)
2-5 Mechanics of Fibre-Reinforced Materials Euromech Colloquium, Nottingham
2-5 Algebra, Combinatorics, Dynamics and Applications Workshop, Queen's University Belfast (426)
2-6 New Mathematical Directions for Quantum Information INI Workshop, Cambridge (423)
3-6 Brauer's Problems in Representation Theory – 50 years on, Manchester (423)
4-7 British Logic Colloquium and Dummett Day, Leeds (426)
5-7 Recent Trend in Classical and Complex Fluids Workshop, Sussex (428)
7-12 British Science Festival, Newcastle (427)
8-11 Finite Groups and Related Topics Conference, CMS, Cambridge (427)
9-11 British Topology Meeting, Aberdeen (427)
9-13 Spectral Geometry, Chaos and Dynamics, Loughborough (426)
10 PANDA Meeting, Bath (428)
10-11 Next Steps CETL-MSOR 2013 Conference, Coventry (425)
11 The Mathematics of CCC, Oxford (427)
11-13 Mathematics of Surfaces 14th IMA Conference, University of Birmingham (416)
15-21 Quantum (semi)groups and (co)actions Meeting, Leeds (423)
16–20 Holography: From Gravity to Quantum Matter INI Workshop, Cambridge (424)
16–20 Operator Algebras Conference, Aberystwyth (427)
17-18 From Spectral Gaps to Particle Filters Conference, Reading (427)
19 Mathematical Challanges in Bubbles and Biological Fluid Mechanics Meeting, Birmingham (428)
22 De Morgan House Open Day, London (428)
22-25 Zeta Functions of Groups and Related Algebraic Structures Workshop, University of Padova, Italy (426)
22-27 Heidelberg Laureate Forum, Heidelberg (422)
23-27 Stochastic Analysis and Applications, Oxford-Man Institute and Mathematical Institute University of Oxford (427)
24-4 Oct LMS-NZMS Aitken UK Lecture Tour (428)
26 LMS Popular Lectures, Birmingham (428)
27 A Day in Analysis and Geometry Meeting, Warwick (427)
29–1 Oct The Navier-Stokes Equations and Related Topics Clay Research Workshop, Oxford (425)
30-4 Oct New Insights into Computational Intractability Clay Research Workshop, Oxford (425)
30-4 Oct Number Theory and Physics Clay Research Workshop, Oxford (425)
30-4 Oct Quantum Mathematics and Computation Clay Research Workshop, Oxford (425)

OCTOBER 2013

2 Clay Research Conference, Oxford (425)
3 University of Oxford's Mathematical Institute Opening Conference (425)
4-5 Integrable Systems in Newcastle Meeting, Northumbria University (428)
9 Sheffield Probability Day, Sheffield (428)
14–18 Quantum Marginals INI Workshop, Cambridge (425)
18 Categorically Cardiff: Derived Categories and Algebraic Geometry Meeting, Cardiff (428)
18-19 Lagrange Days: at CIRCM Luminy, France (428)
24 Mathematics in Defence IMA Conference, Tom Elliot Conference Centre, Qinetiq
26 C* Algebras Meeting, Aberdeen, (428)
29 Oct – 1 Nov Non-Equilibrium Statistical Mechanics and the Theory of Extreme Events in Earth Science INI Workshop, Cambridge (424)
31 LMS Good Practice Scheme Workshop, De Morgan House, London (428)

NOVEMBER 2013

6 Network Coding, Partitions and Security, Durham
15 Graphs, Groups & Probability, Warwick
15 LMS AGM, London (428)
16 Early Career Mathematicians' IMA Autumn Conference, University of Strathclyde, Glasgow
29 Noncommutative Geometry, Glasgow

DECEMBER 2013

16 Interfaces between Numerical Analysis and Computational Statistics, Southampton
16 LMS South West & South Wales Regional Meeting, Swansea (428)
16-19 Categorical and Homological Methods in Hopf Algebras Workshop, Swansea (428)
17-19 Workshop on Combinatorial Physics, Cardiff
17-19 Cryptography and Coding IMA Conference, St Anne's College, Oxford

JANUARY 2014

6-10 Free Boundary Problems and Related Topics, INI, Cambridge (428)
13-17 Inference for Change-point and Related Processes INI Workshop, Cambridge (428)

FEBRUARY 2014

10-21 Higher Structures in Algebraic Analysis Winter School and Workshop, Padova, Italy (428)
24-28 Foams and Minimal Surfaces - 12 Years On, INI Cambridge
28 Mary Cartwright Lecture, York

MARCH 2014

31 LMS Northern Regional Meeting, Durham

APRIL 2014

1-5 Ischia Group Theory 2014, Naples, Italy (428)
7-10 British Mathematical Colloquium, QMUL

JULY 2014

13-15 Modelling in Industrial Maintenance and Reliability IMA Conference, St Catherine's College, Oxford

AUGUST 2014

13-21 ICM 2014, Seoul, Republic of Korea (427)
17-19 Mathematical Cultures Conference, De Morgan House, London (417)

SEPTEMBER 2014

3-5 International Workshop on Operator Theory, Queen's University Belfast

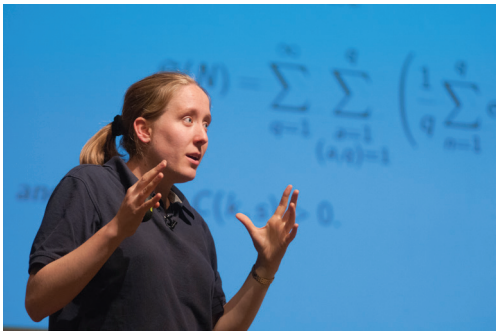
MARCH 2015

30-2 April Joint meeting of the British Mathematical Colloquium and British Applied Mathematics, Cambridge

LMS POPULAR LECTURES 2013

25 June 2013 at the Institute of Education, University of London

(report on page 15)



Dr Vicky Neale (University of Cambridge

Professor Ray Hill (Salford University)

The audience

LMS stand