LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 434 March 2014

Society Meetings and Events

2014

Monday 31 March
Northern Regional Meeting, Durham
page 8

Tuesday 8 April
Society Meeting at BMC, London
page 13

14–17 April
Invited Lectures, University of East Anglia
page 24

Wednesday 16 April
Joint Meeting with the Royal Meteorological Society, London
page 27

Friday 25 April
Women in Mathematics Day, London
page 7

Monday 16 June
Midlands Regional Meeting, Loughborough

NEWSLETTER ONLINE:
newsletter.lms.ac.uk

ANNUAL ELECTIONS TO LMS COUNCIL

The Nominating Committee is responsible for proposing slates of candidates for vacancies on Council and vacancies on its own membership. The Nominating Committee actively welcomes suggestions from the membership.

Anyone who wishes to suggest someone for a position as an Officer of the Society or as a Member-at-Large of Council (now or in the future) is invited to send their suggestions to Dr Penny Davies, the current Chair of Nominating Committee (nominations@lms.ac.uk). Please provide the name and institution of the suggested nominee, his/her mathematical specialism(s), and a brief statement to explain what s/he could bring to Council/Nominating Committee.

Nominating Committee seeks to maintain a balance in gender, subject area and geographical location when drawing up its list of prospective nominees, and LMS members should bear in mind that it is to the benefit of the Society that Council is balanced and represents the full breadth of the mathematics community. Further details about the work of the Nominating Committee are on the LMS website at www.lms.ac.uk/about/nominating-committee.

Nominations should be received by Friday 2 May 2014 in order to be considered by the Nominating Committee.

In addition to the above there exists the option for members to make direct nominations for election to Council or to the Nominating Committee. Direct nominations must be sent to the Executive Secretary's office (nominations@lms.ac.uk) to arrive before noon on 1 September 2014. Nominations can be submitted in hard copy or via email. All nominations must bear the signatures of the nominator and three seconders and of the nominee. For hard copy, a letter with the relevant names and signatures is sufficient or submissions can be made via a form available from the LMS website at http://tinyurl.com/q28lrvp. For email submissions nominations and statements from seconders must be sent from a verifiable email address to nominations@lms.ac.uk. Members considering making a direct nomination are asked to bear in mind the desirability of Council being balanced with regard to

cont'd

the full range of mathematical specialisms, UK regions and gender-balance.

The slate proposed by the Nominating Committee, together with other direct nominations received up to that time, will be posted on the LMS website in early August for members to see before deciding whether they wish to make any further direct nominations.

Further nominations will be posted onto the website as they are received.

LMS Newsletter
http://newsletter.lms.ac.uk

Editorial office: London Mathematical Society,
De Morgan House, 57–58 Russell Square, London WC1B 4HS (t: 020 7637 3686; f: 020 7323 3655)

Articles: send articles to newsletter@lms.ac.uk

Events calendar: updates and corrections to calendar@lms.ac.uk

Advertising: for rates and guidelines see www.lms.ac.uk/newsletter/ratecard.html

General Editor: Mr A.J.S. Mann (a.mann@gre.ac.uk)

Reports Editor: Professor R.A. Wilson (r.a.wilson@qmul.ac.uk)

Reviews Editor: Professor D. Singerman (d.singerman@soton.ac.uk)

Administrative Editor: S.M. Oakes (newsletter@lms.ac.uk)

Typeset by the LMS at De Morgan House; printed by Holbrooks Printers Ltd.

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

News items and notices in the *Newsletter* may be freely used elsewhere unless otherwise stated, although attribution is requested when reproducing whole articles. Contributions to the *Newsletter* are made under a non-exclusive licence; please contact the author or photographer for the rights to reproduce. The LMS cannot accept responsibility for the accuracy of information in the *Newsletter*. Views expressed do not necessarily represent the views or policy of the London Mathematical Society.

Charity registration number: 252660.

MATHEMATICS POLICY ROUND-UP

February 2014

RESEARCH

New CEO for EPSRC

Professor Philip Nelson

The Minister for Universities and Science, David Willetts, has announced the appointment of Professor Philip Nelson as the next Chief Executive and Deputy Chair of the Engineering and Physical Sciences Research Council (EPSRC).

Professor Nelson is a leading figure in the academic community and joins EPSRC on secondment from the University of Southampton, where he was until recently Pro Vice- Chancellor. Professor Nelson takes up his role at the beginning of April for a four year appointment. More information is available at http://tinyurl.com/ndlhufl and http://tinyurl.com/pj43n2w.

New post for outgoing EPSRC Chief Executive

Professor David Delpy will take up the post of Defence Scientific Advisory Council chair from 1 April 2014.

The Defence Scientific Advisory Council (DSAC) is a non-departmental public body of the Ministry of Defence consisting of world-renowned scientists and engineers from UK industry and academia. It is the main source of independent advice on non-nuclear science, technology, engineering, analysis and mathematics issues to ministers and senior MOD officials.

HIGHER EDUCATION

Inquiry into international STEM students

The House of Lords Science and Technology Select Committee has undertaken an inquiry into the effect that immigration rules may be having on international students. The deadline for responses was 20 February 2014. A report will be published in due course. More information is available at http://tinyurl.com/ols5olh.

SCHOOLS AND COLLEGES

National Curriculum reform at Key Stage 4

The LMS has responded to the consultation on draft programmes of study for mathematics at Key Stage 4. The response is available on the LMS website at http://tinyurl.com/pbt74xw.

Ofqual consultation on new A-level regulatory requirements

The Advisory Committee on Mathematics Education (ACME) has published a response to the Ofqual consultation. In this response, ACME sets out:

- priorities and objectives of AS and A level qualifications in mathematics
- the need to improve the validity of assessment at A level
- the need for flexibility within AS/A level Mathematics and Further Mathematics
- concerns with the timescales and transparency of the A level reform process
- detrimental impacts that reform could have upon the uptake of AS and A level Mathematics and Further Mathematics

The full response is available at http://tinyurl.com/q6swxjt.

Policy statement on post-16 core mathematics qualifications

The Department for Education has published a policy statement on the introduction of post-16 'Core Mathematics' qualifications in response to ACME's independent Expert Panel on Core Mathematics report (October 2013). ACME welcomes the introduction of these new qualifications and in principle supports the breadth of measures outlined in this paper. In general they are consistent with the recommendations for post-16 mathematics qualifications and their implementation that ACME proposed in two recent reports. The time scales outlined for the development of these qualifications are, however, ambitious. More information is available at http://tinyurl.com/pboxn3m.

Making Education Work

A recent report urges the government to radically overhaul the way the current school curriculum is developed to ensure it better meets the needs of the future economy. The report, *Making Education Work*, follows a six-month review of England's education system by an independent advisory group consisting of prominent business leaders and chaired by leading academic Professor Sir Roy Anderson. The report's key recommendations are:

- a cross-party body should ensure the school curriculum is aligned with the future economy:
- A-levels should be slowly replaced by a Baccalaureate system: and
- the importance of interpersonal skills should be recognised and evidenced,

The report is available at http://tinyurl.com/o9qm64h.

OTHER

Aspires project: Final report

The Science Aspirations and Career Choice: Age 10–14 project was a five year longitudinal study, funded by the Economic and Social Research Council (ESRC) as part of their Targeted Initiative on Science and Mathematics Education (TISME). The project started in 2009 and has been based at King's College London. One of the main objectives of the project was to investigate some of the factors influencing the educational choices made by children in this age

group. Particular interest focused on the influence of peers, parents and schools, and on the role gender, class and ethnicity play in shaping these choices. The final report is available at http://tinyurl.com/p36llo8.

Inequality in skills

Social class background is still exerting a powerful influence on the skills of England's adults, according to a new study from the Institute of Education (IOE) in London.

It shows how England's exceptionally large attainment gap carries on into adulthood and demonstrates that the gulf between the highest and lowest achievers in literacy and numeracy is wider than in the great majority of the 24 countries recently surveyed by the OECD. The only countries with more unequal scores in numeracy are France and the US. The report is available at www.llakes.org.

Dr John Johnston
Joint Promotion of Mathematics

OSTROWSKI FOUNDATION

The Ostrowski Prize for 2013 has been awarded to Yitang (Tom) Zhang, lecturer in mathematics at the University of New Hampshire, for his ground breaking work on the Twin Prime Conjecture.

The aim of the Ostrowski Foundation is to promote the mathematical sciences. It provides a prize for recent outstanding achievements in pure mathematics or theoretical foundations of numerical mathematics.

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

The Leverhulme Trust

Philip Leverhulme Prizes in Mathematics and Statistics

Philip Leverhulme Prizes recognise the achievement of outstanding early career researchers whose work has already won international recognition and whose future is exceptionally promising. In 2014 there are thirty prizes available across six broad subject areas, with **up to five prizes offered for researchers in Mathematics and Statistics**.

Prizes offer **£100,000** over two or three years and may be used for any purpose that advances the prize-winner's research, with the following exceptions: salary costs for the prize-winner, capital costs, and institutional overheads.

To be eligible, applicants must hold a post in a UK university or research institution and must have received their highest degree no earlier than 14 May 2004 (exceptions will be considered where applicants have had a career break).

Applicants must be nominated by their head of department (or equivalent). Full details of the nomination process are available on the Leverhulme Trust website.

Closing date: 4pm on 14 May 2014

Guidance and nominations: Full scheme details and the online nomination form are available on the Leverhulme Trust website: www.leverhulme.ac.uk.

LMS Advancing Mathematics London Mathematical Society

Heilbronn Institute for Mathematical Research

CMI

LMS–CMI RESEARCH SCHOOLS

CALL FOR PROPOSALS

The London Mathematical Society and Clay Mathematics Institute invite proposals for Research Schools in 2015.

Up to £31,000 is available per Research School which provides training for young researchers in a core area of mathematics. The new series of courses builds on the short courses, previously supported by the Society and EPSRC, and aims at the highest international standing by allowing for support of both international lecturers and participants.

The LMS and the CMI intend to support four Research Schools in 2015.

Prospective organisers should send an outline proposal to Elizabeth Fisher (Research.Schools@lms.ac.uk) by **Tuesday 1 April 2014**.

Outline proposals should discuss:

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

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

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

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

These Research Schools are co-sponsored by the Heilbronn Institute.

LMS 150TH ANNIVERSARY POSTDOCTORAL MOBILITY GRANTS

2014-15 Awards

The London Mathematical Society is pleased to announce the launch of a new grants scheme to celebrate its 150th anniversary in 2015. Up to £9,200 will be awarded to mathematicians of excellent promise. The purpose of the grants is to support a period of study and research in mathematics between three and six months in the academic year 2014–15 at one or more institutions other than the holder's home institution. They are intended to support promising researchers during the transitional period between having submitted their thesis and the start of their first post-doctoral employment. The value of the grant will be calculated at £1,200 per month plus a travel allowance of up to £2,000.

At the time of the closing date applicants have to be UK residents. Successful candidates must have submitted their thesis within twelve months before the start of their grant period. Grant holders are allowed to teach up to three hours a week. Otherwise they are expected to spend their working time on study and research.

Candidates are asked to provide with their application:

- a completed application form
- a cover letter;
- a CV including a list of publications (maximal two A4 pages);
- a research proposal including a rationale for the choice of institution(s) to be visited (maximal three A4 pages);
- at least two letters of reference, which should be emailed by referees directly to the LMS (to the email address below) by the closing date;
- and letter(s) of support from the host(s) at the institution(s) where the proposed visit will take place; it is expected that host institutions provide the grant holder with office space and access to computing and library facilities.

These grants have been established by the LMS to mark its 150th anniversary. They will be awarded for the academic years 2014–15 and 2015–16.

Applications should be sent by **Friday 25 April 2014** preferably by email to: pmg@lms.ac.uk.

(Posted applications will be accepted and may be sent to: Katy Henderson, Postdoctoral Mobility Grants, The London Mathematical Society, De Morgan House, 57–58 Russell Square, London WC1B 4HS.)

Queries should be referred to Katy Henderson: pmg@lms.ac.uk, tel.: +44 (0)20 7927 0809.

Applicants will be notified of the outcome of their application in late May 2014.

LMS WOMEN IN MATHEMATICS DAY 2014

The Women in Mathematics Day is an annual event organised by the London Mathematical Society. This year it will be held on Friday 25 April at De Morgan House in London. As usual, sessions will include talks by women mathematicians at different career stages and a poster session. There will also be a number of practical sessions to help women get the most out of their careers in mathematics. Sessions will include advice on how to get funding for your first postdoc and beyond and discussion groups on topics such as combining family and career, working overseas and making the next step in your career.

The event provides an opportunity to meet and talk with women who are active and successful in mathematics.

The event is open to all but would be of particular interest to women mathematicians, particularly PhD students and those at an early stage of their career.

Any postgraduates, postdocs or research assistants interested in giving a talk or presenting a poster at the meeting should contact Eugenie Hunsicker (e.hunsicker@lboro.ac.uk) by **28 March 2014**.

To encourage high quality posters, a £50 book token will be awarded for the poster that is judged to be the WiM Day Best Poster 2014.

Programme

10.30-11.00	**Registration and Coffee**
11.00-13.00	**Morning Session** Welcome from LMS President Sarah Hart (Birkbeck College) *Counting in Coxeter Groups* Katia Babbar (Lloyds) *Quantitative Finance in Practice: a Mathematician on the Trading Floor* Anne Juel (University of Manchester) *Confining bubbles in small spaces: Instabilities and Pattern Formation on the pore scale*
13.00-14.00	**Lunch and Poster Session**
14.00-16.00	**Afternoon Session** Postgraduate/Postdoctoral speakers Funding talk (EPSRC) Discussion groups
16.00-16.30	**Tea and end of Poster Session**

Participants are invited to join us for dinner at a local restaurant after the event. If you would like to attend please confirm when you register. The dinner will be at participants' own cost.

The event is free for students and speakers and £5 for all others, payable on the day.

Limited funds are available to help with the travel costs of students attending the event, please email womeninmaths@lms.ac.uk for further details.

Register by **11 April 2014** by emailing womeninmaths@lms.ac.uk (late registrations for places may be accepted, subject to availability).

Durham University

LMS Advancing Mathematics London Mathematical Society

erc European Research Council Established by the European Commission Supporting top researchers from anywhere in the world

Easter School "Dynamics and Analytic Number Theory"

LMS Northern Regional Meeting Followed by Series of Minicourses

Durham University, 31 March – 4 April 2014

We invite PhD students and researchers from both areas of analytic number theory and dynamics to attend the Easter School. This event will be a good opportunity to learn methods and to exchange ideas in these two areas.

Accommodation and meals will be provided.

Invited Speakers:

Tim Austin (Courant, NYU)
Yann Bugeaud (Strasbourg)
Manfred Einsiedler (ETH Zürich)
Giovanni Forni (Maryland)
Alex Kontorovich (Yale)
Sanju Velani (York)
Trevor Wooley (Bristol)

Organisers: D. Badziahin (Durham), A. Ghosh (UEA), A. Gorodnik (Bristol), N. Peyerimhoff (Durham), T. Ward (Durham), B. Weiss (Tel Aviv)

More information and application procedure:
http://www.maths.dur.ac.uk/users/dzmitry.badziahin/2014_Easter_school/easter_index.html
E-mail: dzmitry.badziahin@durham.ac.uk

2013 CECIL KING TRAVEL SCHOLARSHIP

Report

I used the 2013 Cecil King travel scholarship to visit Mark Gross at the University of California, San Diego, from mid-September to mid-December 2013. The purpose of the trip was to mime Mark's expertise with a view towards solving a problem in constructing so-called 'affine manifolds' from degenerating Calabi-Yau manifolds, a problem which arises in mirror symmetry. It was my plan to focus especially on the relatively well-understood case of families of Calabi-Yau surfaces.

During discussions with Mark I was able to couch the problem, in dimension two, in terms of a problem in the birational geometry of algebraic limits for the degeneration. If experts in that subject are able to address this question, it will solve the problem of constructing affine manifolds and solutions thereupon to a real Monge-Ampčre equation on surfaces. This approach is also suggestive of a more general relationship between 'tropical geometry' and the minimal model programme, a path I hope to investigate more in future.

Quite apart from any research goals that were achieved during my visit, I was able to form a friendly professional relationship with Mark Gross, a figure of substantial importance in this field. Further, I have secured the Hodge fellowship, which will fund me to work at the IHÉS with Maxim Kontsevich for the next two years. I am most grateful to the Cecil King foundation and to the LMS for having afforded me this opportunity.

Andrew MacPherson

Andrew MacPherson
Imperial College London

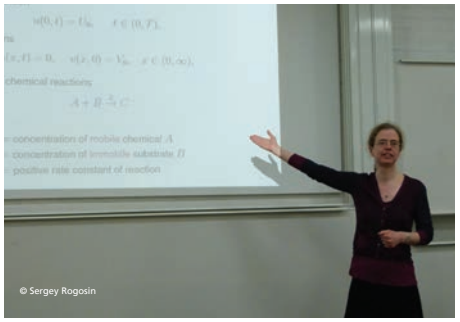
DE MORGAN HOUSE • CONFERENCE FACILITIES •
www.demorganhouse.org.uk
CONFERENCE FACILITIES
De Morgan House offers 40% discount on room hire to all Mathematical charities and 20% to all not for profit organisations. Support the LMS by booking your next London event with us.

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.

LMS-WIMCS ANALYSIS DAY

Report

The LMS-WIMCS Analysis Day was held at the Cardiff School of Mathematics on 15 January 2014. The meeting, generously co-supported by the LMS, was a much-awaited opportunity by the Welsh analysts to catch up on their latest academic achievements. Analysis in Wales has seen several years of growth, thanks to the influx of researchers seeking to establish themselves as the lifeblood of the next generation in Welsh mathematics. We feel that we will reflect the mood of the day by saying that everyone was very much looking forward to something of a summary of this recent push for new heights, and to a programme for further action. The efforts of the organisers and the support of the LMS and the WIMCS (Wales Institute for Mathematical and Computational Sciences) were well rewarded by a show of unity and by the participants' positive outlook into the future.



Elaine Crooks

There were four speakers, Elaine Crooks from Swansea, Ralf Gohm and Sergey Rogosin from Aberystwyth, and our 'overseas' guest from Bath, Johannes Zimmer. The topics chosen for talks covered a good range of analysis disciplines: rigorous asymptotic analysis of systems of reaction-diffusion equations (Crooks), functional models and liftings of linear contracting maps (Gohm), Wiener-Hopf factorisations for matrix functions (Rogosin) and microscopic-to-macroscopic descriptions of thermodynamic systems (Zimmer). Each of the talks combined a good beginner introduction into the relevant subject and a highlight of two or three cutting-edge results, which we think all the participants much appreciated. As a result no one was feeling left out of the event: the coffee breaks and the lunch saw PhD students as well as more senior colleagues all having excited discussions about the contents of the talks. The scientific programme was followed by a dinner at the Bellini's restaurant, where the friendly atmosphere of the day was sealed by a few toasts to the speakers, participants and the organisers.

Sergey Rogosin

This workshop is one of a series of three events (Cardiff in January, Aberystwyth in May, Swansea in September), where the described format will be implemented. We all very much look forward to the second meeting in May, and welcome everyone to join us. Please contact Vitaly Moroz (v.moroz@swansea.ac.uk) for further details. Finally, many thanks to the LMS for their continued support of this initiative.

Kirill Cherednichenko
Marco Marletta
Cardiff University

INTERFACES BETWEEN NUMERICAL ANALYSIS AND COMPUTATIONAL STATISTICS WORKSHOP

Report

On 15 January 2014 the University of Southampton hosted an LMS workshop on the Interfaces between Numerical Analysis and Computational Statistics. The list of attendees included numerical analysts and statisticians from various UK institutions (Imperial, Oxford, Southampton, St Andrews, UCL and Warwick) and from abroad (Geneva), with the total number of attendees being around 25.

In the last few years there has been a significant number of advances arising from research at the interface of statistics and numerical analysis. Prime examples of the results of such a synergy include both the analysis and design of improved algorithms used in the field of Markov Chain Monte Carlo (MCMC) methods. The aim of this workshop was to further promote dialogue between the two disciplines. In particular, the workshop programme comprised three talks on the topics of numerical analysis of stochastic differential equations, Bayesian Inverse problems and MCMC methods, in the following order of appearance:

Konstantinos Zygalakis (University of Southampton) on *Numerical Analysis on Ergodic Stochastic Differential Equations* described some recent results relating to the long time behaviour of numerical solutions to ergodic SDEs and their possible connections with the behaviour of MCMC methods in high dimensions.

Andrew Stuart (University of Warwick) on *Gibbs Sampling on Hierarchical Inverse Problems* discussed various issues related with trying to recover a signal from indirect noisy observations using the hierarchical Bayesian approach, and the effect of the choice of the hierarchical parameters on the Gibbs sampler when the dimension of the signal to be recovered is large.

Mark Girolami (University of Warwick) on *The Potential of Differential Geometric Sampling Methods for Bayesian Inverse Problems* described his recent work on Riemann manifold Langevin and Hamiltonian Monte Carlo methods and discussed their potential for improving MCMC methods for challenging problems arising from applications such as for example parameter estimation in Systems Biology.

The presentation slides from all the three talks are available to download from the organizer's website (www.personal.soton.ac.uk/kz1e11/workshop.htm). The broad range of topics offered the attendees different viewpoints on many things that they were familiar with in their own research, while the relaxed atmosphere of the workshop allowed time for discussions not only during the coffee break but also in between talks. The end of the talks was followed by a drinks reception as well as a dinner that provided attendees with more opportunities for socializing.

We thank the LMS and the University of Southampton for their generous support, which made this event possible.

Kostantinos Zygalakis
University of Southampton

BMC 2014

British Mathematical Colloquium 2014
07–10 April 2014
Queen Mary University of London

Plenary speakers include:

- Michael Atiyah (University of Edinburgh)
- Persi Diaconis (Stanford University)
- Robert Guralnick (University of Southern California)
- Ngô Bảo Châu (University of Chicago)
- Endre Szemerédi (Rutgers University)
- Cédric Villani (Université Lyon 1, IHP Paris)
- Claire Voisin (CNRS, École Polytechnique)
- Don Zagier (MPIM Bonn, Collège de France)

With workshops on:

Combinatorics
Ergodic Theory
Geometry
Group Theory
Number Theory

Google is funding PhD student bursaries and we are inviting applications via the conference website.

The conference is supported by an LMS Conference Grant and by the Clay Mathematics Institute.

LONDON MATHEMATICAL SOCIETY CMI Google

Further Information:
Contact Ivan Tomasic
or Behrang Noohi at
bmc2014@qmul.ac.uk

www.maths.qmul.ac.uk/bmc2014

Queen Mary University of London

LMS Advancing Mathematics London Mathematical Society

LMS SOCIETY MEETING AT THE BMC

8 April 2014 at 11.30 am

Queen Mary, University of London

Claire Voisin
(CNRS and École Polytechnique)

Points, zero cycles, and rationality questions

Claire Voisin

ABSTRACT

A very classical question in algebraic geometry is whether a given smooth projective variety is rational, that is, birationally isomorphic to projective space, or to give necessary criteria for rationality. Assuming we work over the complex numbers, this is very restrictive on the geometry of the considered variety seen as a complex manifold. Still, if we restrict to the so-called rationally connected varieties, proving that X is non rational is delicate. I will describe classical and more recent methods to approach this problem.

The British Mathematical Colloquium will take place in the School of Mathematics, Queen Mary, University of London, from 7 to 10 April 2014. The first talk will start at 15:30 on Monday 7 April, and the last talk will end at 12:30 on Thursday 10 April. To register, visit www.maths.qmul.ac.uk/bmc2014/registration.

BRITISH POSTGRADUATE MODEL THEORY CONFERENCE

BPGMT2014

Report

Model theory emerged as a subdiscipline of mathematical logic around the middle of the twentieth century, but since the seminal work of Shelah in the 1970s it has come into its own, growing from strength to strength and finding applications in areas as diverse as arithmetic geometry, tame topology and integrable systems, to mention but a few. The fundamental notion of model theory is that of first-order definability. Whilst the restriction to first-order expressibility might appear a priori to be an overly burdensome restriction, it turns out to sit in the compelling zone between too little and too much strength, and the techniques developed to investigate it have yielded some very deep results, notably Hrushovski's systematic proof of – and improvement on – the Mordell–Lang conjecture.

The annual *British Postgraduate Model Theory Conference* (BPGMT), which rotates each January between Leeds, Oxford and Manchester, is now firmly established in the European model-theory calendar. This, the fourth instantiation of BPGMT, saw a return to Leeds, where it began three years ago. The conference took place from 13 to 15 January 2014 and was attended by over thirty-five participants from a wealth of different countries and institutions. The majority of the talks were given by postgraduate students, but there were also three plenary talks and a short course, as well as three postdoctoral talks.

Mark Carney and John Truss

Poster session

The first two postgraduate talks had a combinatorial flavour, looking at permutation groups and then indivisibility. The opening morning also saw the first of three lectures in a short course by Professor Dugald Macpherson (Leeds) on Vapnik–Chervonenkis density, a notion originally developed in statistical learning theory that has recently found applications in model theory. The rest of the day's talks focused more on pure aspects of model theory, in particular the notion of NTP2. This topic formed the core of the first plenary talk of the conference, where Professor Martin Hils (Paris 7) spoke about the preservation of NTP2 in valued difference fields. The evening finished with a poster session and wine reception, which saw live music from some multi-talented postgraduate mathematics students, as well as Leeds' very own maestro pianist, Professor John Truss.

The second day of the conference saw a number of algebraically and geometrically themed talks on the topics of quasiminimal pregeometry classes, K-theory, modules of semi-algebraic functions, and Cartan subgroups. The day's talks ended with Professor Paola D'Aquino (Caserta), who spoke about exponential polynomials. After a chance to go back to the hotel, meet in the pub or even play some mathematical Pictionary, everyone reconvened for the conference dinner, which took place at Hansa's Gujarati Restaurant, an award-winning vegetarian restaurant that lived up to its reputation for excellent food and service.

(left to right) Silvain Rideau, winner of the Best Talk by a PhD student, with judges William Anscombe and Immanuel Halupczok

The two postgraduate talks on the final day had a field-theoretic theme, which was continued by Professor Françoise Point (Mons/Paris 7) in the final plenary talk of the conference. The meeting finished with two postdoctoral talks, one about internality and analysability in groups and the other on clones and clausal relations. The final day also saw the announcement of the award for Best Talk by a PhD Student, as judged by Dr William Anscombe (Leeds) and Dr Immanuel Halupczok (Leeds), which was awarded to Silvain Rideau (Orsay) for his talk *Analytic difference fields: Elimination of field quantifiers and the Ax–Kochen–Eršov principle*.

The conference provided a useful opportunity for students to meet one another and discuss their research. The atmosphere of the meeting was one of congeniality and optimism: model theory is a burgeoning subject and it is a very exciting time to be a model theorist!

Attendees

The conference was supported by an LMS Postgraduate Research Conference Scheme 8 grant and a BLC guarantee. Slides, posters and other materials can be found on the conference's website: www1.maths.leeds.ac.uk/~bpgmt2014/.

Daniel Wood
University of Leeds

BOUNDED GAPS BETWEEN PRIMES

LMS-CMI Research School

Oxford 22-26 September 2014

Organisers: Ben Green and Roger Heath-Brown (Oxford)

In a spectacular breakthrough, Yitang Zhang proved that there are infinitely many pairs of primes differing by at most 70 million. Due to further advances of Maynard and Tao and the collaborative Polymath Project, 70 million has been reduced to a few hundred. This course will introduce attendees to the mathematics surrounding these developments. There will be four lecture courses:

- *Introduction to prime number theory. ζ- and L-functions, the prime number theorem* (Andrew Granville, Montreal)
- *The Bombieri-Vinogradov theorem about distribution of primes in progressions. Introduction to sieve theory* (Kannan Soundararajan, Stanford)
- *The methods of Goldston, Pintz and Yıldırım and Maynard-Tao* (James Maynard, Montreal/ Oxford)
- *Inputs from algebraic geometry* (Emmanuel Kowalski, ETH Zurich)

These lecture courses will be supplemented by tutorial sessions.

Distinguished guest lectures will be given by Terence Tao (UCLA) and Yitang Zhang (University of New Hampshire).

Applications: Research students, post-docs and those working in industry are invited to apply. The closing date for applications is **15 June 2014**. For further information, please visit the website: www.claymath.org/events/bounded-gaps-between-primes. Applications should then be made using the registration form available via the Society's website at: www.lms.ac.uk/events/lms-cmi-research-schools.

Fees: For participants from outside Oxford (except those working in industry), fees include conference fee, accommodation, meals and conference dinner. PhD students: £150; Early-career researchers: £250. For Oxford University participants, fees include conference fee, lunches and conference dinner only. PhD Students and Early Career Researchers: £100.

For all other participants (e.g. those working in industry), fee includes conference fee, lunches and conference dinner only. Registration fee: £250. (Accommodation and evening meals can be requested at a further cost of £650.) All UK-based participants must pay their own travel costs. For overseas-based participants, support will be available on application if contribution towards travel costs is required. Fees are not payable until a place on the course is offered but will be due by 1 August 2014.

These Research Schools are co-sponsored by the Heilbronn Institute.

LMS-CMI Research Schools *aim to provide training for young researchers in core areas of mathematics. Students and post-docs can meet a number of leading experts in the topic as well as other young researchers working in related areas.*

The LMS is the UK's learned society for mathematics. Registered charity no. 252660 (www.lms.ac.uk)
The CMI is charitable private operating foundation, incorporated in the USA.

ALGEBRAIC LIE THEORY AND REPRESENTATION THEORY

LMS-CMI Research School

Glasgow 25-29 August 2014

Organisers: Gwyn Bellamy (Glasgow) and Simon Goodwin (Birmingham)

Course outline
The school is aimed at PhD students and early postdocs wanting to learn about topics in algebraic Lie theory and representation theory that are currently of great interest. The three main courses are:

- *Rational Cherednik Algebras*. (Iain Gordon, Edinburgh)
- *Quiver Hecke Algebras*. (Andrew Mathas, Sydney)
- *Categorification in Lie Theory*. (Catharina Stroppel, Bonn)

These lecture courses will be supplemented by tutorial sessions. For further information please visit: www.maths.gla.ac.uk/~gbellamy/summer.

In the following week there will be a workshop at ICMS in Edinburgh with the same title, see www.icms.org.uk/workshop.php?id=299.

Applications: Applications should be made using the registration form available at: www.surveymonkey.com/s/GG2Y6DN. Research students and post-docs are invited to apply. Applications from those working in industry are welcome, please contact the organisers for further information. Participants are encouraged to also apply to participate in the ICMS workshop and should indicate this in their application. The closing date for applications is **11 April 2014**. Numbers will be limited and those interested are advised to make an early application.

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

Fees: All research students will be charged a registration fee of **£150**. **There will be no charge for subsistence costs.**
All early career researchers will be charged a registration fee of **£250**. **There will be no charge for subsistence costs.**
All UK-based participants must pay their own travel costs. For overseas-based participants, support will be available to contribute towards travel costs.

Fees are not payable until a place on the course is offered but will be due by 30 June 2014.

These Research Schools are co-sponsored by the Heilbronn Institute.

LMS-CMI Research Schools *aim to provide training for young researchers in core areas of mathematics. Students and post-docs can meet a number of leading experts in the topic as well as other young researchers working in related areas.*

The LMS is the UK's learned society for mathematics. Registered charity no. 252660 (www.lms.ac.uk)
The CMI is charitable private operating foundation, incorporated in the USA.

EUROPEAN NEWS

Horizon 2020

The EU's new programme for research and innovation has been approved by the European Parliament. It will run from 2014 until 2020 with a budget of about 70 billion. More information at http://ec.europa.eu/research/horizon2020/.

Under 'Excellent Science Priority' one can find the most suitable opportunities for mathematics. In particular, we point out the Marie Sklodowska Curie Actions (MSC), the European Research Council (ERC) and Future Emerging Technologies (FET).

First calls of HORIZON 2020 are expected to be published either at the end of 2013 or early in 2014. The tentative deadlines for submission of proposals to MSC actions are as follows.

- Innovative training networks (ITN): 8/04/2014
- Individual fellowships (IF): 10/04/2013
- Co-funding of regional, national and international programmes (COFUND): 18/11/2014

Mathematics has its own evaluation panel. The distribution of the budget of the call over the disciplines will be proportional to the number of eligible proposals received in each panel. Hence, we strongly encourage brilliant researchers to apply.

Calls for Starting, Consolidator, Advanced and Proof of Concept Grants published by the ERC are expected to have as deadlines 25/03/2014, 3/06/2014, 21/10/2014 and 28/04/2014, respectively.

[Slightly adapted from EMS e-News, 9 Nov 2013]

Meeting of EMS Presidents

The European Mathematical Society is extremely grateful to the Turkish Mathematical Society for its invitation to hold the next Meeting of Presidents in Istanbul. The meeting will take place in the Rectorate Conference Hall of Boğaziçi University. Details will be available at the website www.euro-math-soc.eu.

[Source: EMS Newsletter, Editorial, Dec 2013, p 3]

King Faisal Prize

Gerd Faltings, Director at the Max Planck Institute for Mathematics in Bonn and Professor at the University of Bonn, was awarded the 2014 King Faisal International Prize for Science for his groundbreaking contributions to algebraic geometry and number theory. This was announced by the president of the King Faisal Foundation, Prince Khaled Al-Faisal, on 14 January 2014. Previous prize-winners within mathematics are Michael Atiyah (1987), Dennis P. Sullivan (1994), Andrew J. Wiles (1998), Yuri I. Manin and Williston Shor (2002), Simon Kirwan Donaldson and Mudumbai Seshachalu Narasimhan (2006), and Enrico Bombieri and Terence Chi-Shen Tao (2010). For details see www.mpim-bonn.mpg.de/de/node/5144.

[Source: http://euro-math-soc.eu/news.html, 21 Jan 2014]

ERC Consolidator Grants

The European Research Council (ERC) has selected 312 top scientists in its first Consolidator Grant competition. These mid-career scientists are awarded a total of nearly €575 million. Grants are worth up to €2.75 million each, with an average of €1.84 million per grant. Twelve of these grants went to European mathematicians. For details see http://tinyurl.com/pdc8k4q.

[Source: http://euro-math-soc.eu/news.html, 21 Jan 2014]

Oberwolfach Prize, John Todd Award and Heinz Gumin Award 2013

The Oberwolfach Prize 2013 for excellent achievements in Stochastics and Statistics is awarded to Hugo Duminil-Copin (Genève). The John Todd Award 2013 for excellent achievements in Numerical Analysis is awarded to Markus Bachmayr (Aachen).

Stefan Müller (Bonn) has been awarded the Heinz Gumin Preis of the Carl Friedrich von Siemens Stiftung for his groundbreaking contributions to the calculus of variations and to elliptic regularity theory which were often motivated by innovative applications in the theory of solid mechanics.

[Source: http://euro-math-soc.eu/news.html, 22 Jan 2014]

David Chillingworth
LMS/EMS Correspondent

AN INVITATION TO GEOMETRY & TOPOLOGY VIA G_2

LMS–CMI Research School

Imperial College 7-11 July 2014

Organisers: Mark Haskins (Imperial), Jason Lotay (UCL) and Simon Salamon (KCL)

The aim of the research school will be to give a thorough introduction to G_2 geometry, starting from fundamental material and progressing through to recent breakthroughs and current research in which the UK plays a leading role. The school will also introduce participants to topics of broader interest in algebra (e.g. representation theory), analysis (e.g. elliptic regularity), geometry (e.g. holonomy) and topology (e.g. characteristic classes). The course will also indicate some connections beyond mathematics to contemporary theoretical physics (M-theory). The three main courses are:

- *Special holonomy* (**Robert Bryant**, Duke)
- *Calibrated submanifolds* (**Jason Lotay**, UCL)
- *G_2 manifolds* (**Johannes Nordström**, Bath)

There will be three guest lectures by:

- **Nigel Hitchin** (Oxford) *Title TBC*
- **Bobby Acharya** (KCL) *Theoretical physics and its connections with G_2 geometry*
- **Mark Haskins** (Imperial) *Recent advances in research in G_2 geometry*

These lecture courses will be supplemented by tutorial sessions.

For further information visit: www.claymath.org/events/invitation-geometry-and-topology-g2

Applications: Applications should be made using the registration form available via the Society's website at: www.lms.ac.uk/events/lms-cmi-research-schools. Research students and post-docs in mathematics and in theoretical physics are particularly encouraged to apply.

The closing date for applications is **Monday 12 May 2014**. Numbers will be limited and those interested are advised to make an early application.

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

Fees: All research students and early career researchers will be charged a registration fee of **£150**. **There will be no charge for subsistence costs.**

Other participants will be charged a registration fee of £250 plus the full subsistence costs (£350) **£600** in total. Some contribution to travel costs will be available for both UK-based and overseas-based participants.

Fees are not payable until a place on the course is offered but will be due by 9 June 2014.

These Research Schools are co-sponsored by the Heilbronn Institute.

LMS-CMI Research Schools *aim to provide training for young researchers in core areas of mathematics. Students and post-docs can meet a number of leading experts in the topic as well as other young researchers working in related areas.*

The LMS is the UK's learned society for mathematics. Registered charity no. 252660 (www.lms.ac.uk)
The CMI is charitable private operating foundation, incorporated in the USA.

VISIT OF CLAIRE POSTLETHWAITE

Dr Claire Postlethwaite (Department of Mathematics, University of Auckland, New Zealand) will be visiting the UK in late April/early May 2014. Her interests include the dynamical systems of ODEs and applications to modelling of biological systems. She will give lectures at:

- University of Leeds on 29 April
  host Alastair Rucklidge (A.M.Rucklidge@leeds.ac.uk)
- University of Exeter on 6 May
  host Peter Ashwin (P.Ashwin@exeter.ac.uk)
- University of Nottingham on 14 May
  host Paul Matthews (Paul.Matthews@nottingham.ac.uk)

For more details of the visit and lectures, please check the departmental websites and/or contact the hosts. The visit is partially supported by an LMS Scheme 2 grant.

VISIT OF IGOR ANDRIANOV

Professor Igor Andrianov (RWTH Aachen University, Germany) will visit the UK in March 2014. He is an expert in applications of analytical, predominantly asymptotic, techniques to the solution of problems arising in applications of structural and continuum mechanics. During his visit Professor Andrianov will give lectures at:

- Loughborough University, Wednesday 19 March at 1.30 pm
  Asymptotic methods in thin-walled structure mechanics
- Brunel University, Thursday 20 March at 4 pm
  Analytical homogenization approach in the theory of plates and shells
- Keele University, Wednesday 26 March at 2.30 pm
  Asymptotic homogenization and nonlinear elastic waves in periodic composite materials

Further details about the visit can be obtained from Aleksey Pichugin (aleksey.pichugin@brunel.ac.uk). The visit is supported by an LMS Scheme 2 grant.

ATIYAH85

A one-day meeting will be held at the Mathematical Institute in Oxford on Tuesday 22 April 2014 to celebrate the 85th birthday of Sir Michael Atiyah OM and the publication by OUP of a seventh volume of his collected works. The speakers are expected to include:

- Robbert Dijkgraaf (Princeton)
- Sergei Gukov (Caltech)
- Nigel Hitchin (Oxford)
- Graeme Segal (Oxford)

Please contact Frances Kirwan (kirwan@maths.ox.ac.uk) if you would like to attend the meeting.

THE MATHEMATICS OF BRAIN DYNAMICS

The meeting *The Mathematics of Brain Dynamics* will take place in the School of Mathematics at the University of Birmingham on Tuesday 8 April 2014. The focus of the meeting will be on the important role that mathematics has to play in determining the functional roles of brain oscillations and rhythms. The speakers are:

- Peter Ashwin (University of Exeter)
- Marc Goodfellow (University of Exeter)
- Jaroslav Hlinka (Academy of Sciences of the Czech Republic)
- Zoe Kourtzi (University of Cambridge)
- John Terry (University of Exeter)
- Yulia Timofeeva (University of Warwick)
- Kyle Wedgwood (University of Nottingham)

There is a £10 registration fee. Some funding is available to contribute to the travel expenses of research students. For more information, including how to register, see the meeting website http://web.mat.bham.ac.uk/R.Nicks/meeting.html, or contact the organiser, Rachel Nicks by email (R.Nicks@bham.ac.uk). The meeting is supported by an LMS Conference grant.

INTEGRABLE MODELS, CONFORMAL FIELD THEORY

The 18th UK meeting on *Integrable Models, Conformal Field Theory (ICFT) and Related Topics* will take place at the School of Mathematics & Statistics, University of Glasgow from 11 to 12 April. The series of ICFT meetings in the UK was initiated with the following objectives in mind:

- to promote the cohesion between UK researchers working in areas related to quantum integrable models;
- to give young academics (PhD students and postdocs) the opportunity to present their results and thereby allow them to establish themselves within the community;
- to showcase recent developments within the field by inviting international speakers and, thus, to relate UK research to developments on the international level.

The meeting will start around lunch time on Friday 11 April and close on Saturday afternoon 12 April 2014. The invited speakers are:

- Olaf Lechtenfeld (Leibniz Universität Hannover)
- Neil O'Connell (University of Warwick/Trinity College Dublin)
- Vincent Pasquier (CEA Saclay)
- Simon Ruijsenaars (University of Leeds)

In addition, there will be shorter presentations (20-30 minutes) by young researchers disseminating their results as well as a poster session open to everybody. Please provide details at registration (deadline **14 March**). The online registration form and further information can be found at www.maths.gla.ac.uk/~ck/ICFT2014.html or email Dr Christian Korff (Christian.Korff@glasgow.ac.uk) with subject line 'ICFT2014'.

The meeting is supported by the Institute of Physics and an LMS Conference grant. There is some limited funding available to support PhD students. Participants with childcare responsibilities should be aware of the supplementary grants offered by the LMS and IoP.

CLASSICAL AND QUANTUM INTEGRABILITY

The next meeting of the LMS collaborative workshop series on *Classical and Quantum Integrability* will take place from 21 to 22 March 2014 at the University of Glasgow. The speakers are:

- Sergey Oblezin (Nottingham)
  Baxter operators for particle systems and local L-functions
- Pavol Severa (Geneva)
  Moduli spaces of flat connections and quantization of Lie bialgebras
- Claudio Sibilia (Zürich)
  Chen homological connection for G-spaces
- Tom Sutherland (Sheffield)
  Hitchin systems and stability conditions
- Bart Vlaar (Amsterdam)
  Reflection quantum Knizhnik-Zamolodchikov equations and Bethe vectors
- Dafeng Zu (Hefei, China)
  Local matrix generalizations of W-algebras

Further details of the meeting can be found at http://abrochier.org/cqi2014/ and anyone interested is welcome to attend. Funds may be available to support the attendance of research students, please contact one of the organisers Misha Feigin (Misha.Feigin@glasgow.ac.uk, tel. 0141 330 6293). The meeting is supported by an LMS Scheme 3 grant and the Glasgow Mathematical Journal Trust.

BUILDING BRIDGES: 2ND EU/US SUMMER SCHOOL ON AUTOMORPHIC FORMS AND RELATED TOPICS

LMS–CMI Research School

Bristol

30 June–5 July 2014

Organisers: Lynne Walling (Bristol), Jennifer Beineke (Western New England University)

Automorphic forms are present in almost every area of modern number theory. In recent decades there has been a starburst of activity and progress in this broad area, leading to many new directions, applications, and connections with other areas within mathematics and mathematical physics. The purpose of the research school is to provide graduate students and early career researchers with training on some topics that are having great impact on current research in automorphic forms, allowing them to make new connections, with areas related to their current research programs and with other researchers. The school will be comprised of three 2-day intensive mini-courses, each team-taught by a pair of experts, and supplemented by afternoon problems sessions.

- *Explicit Methods for Modular Forms and L-functions* (**John Cremona**, University of Warwick and **Tim Dokchitser**, University of Bristol)
- *The Legacy of Ramanujan* (**William Duke**, UCLA and **Ozlem Imamoglu**, ETH Zurich)
- *The Langlands Program* (**James Cogdell**, Ohio State University and **Solomon Friedberg**, Boston College)

For further information please visit: www.maths.bris.ac.uk/~mamjd/bb/index.html.

Applications: Research students, post-docs and those working in industry are invited to apply. The closing date for applications is **15 March 2014**. Numbers will be limited and those interested are advised to make an early application. Applications should be made using the registration form available via the Society's website at: www.lms.ac.uk/events/lms-cmi-research-schools and applicants should have a letter of support sent to the organisers at: eu.us.afw.2014@gmail.com.

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

Financial support: There is some support available for travel and local costs; requests for support should be indicated on the application form.

Fees: Registration for a graduate student is £150, and for an early career researcher it is £250, although these fees may be lowered or waived as is appropriate. Fees are not payable until a place on the course is offered but will be due by **15 May 2014**.

These Research Schools are co-sponsored by the Heilbronn Institute.

LMS-CMI Research Schools *aim to provide training for young researchers in core areas of mathematics. Students and post-docs can meet a number of leading experts in the topic as well as other young researchers working in related areas.*

The LMS is the UK's learned society for mathematics. Registered charity no. 252660 (www.lms.ac.uk)
The CMI is charitable private operating foundation, incorporated in the USA.

Heilbronn Institute *for* Mathematical Research

Probability, Analysis and Dynamics

23–25 April 2014

Invited speakers:
Itai Benjamini (Rehovot)
Neil O'Connell (Warwick)
Paul Bourgade (Princeton/Cambridge)
Stefano Olla* (Paris)
Hugo Duminil-Copin (Geneva)
Gábor Pete (Budapest)
László Erdős* (Vienna)
Laure Saint-Raymond (Paris)
Haya Kaspi (Haifa)
Timo Seppäläinen (Madison-Wi)
Konstantin Khanin (Toronto)
Domokos Szász (Budapest)
Jean-Francois Le Gall (Paris)
Corinna Ulcigrai (Bristol)
Ian Melbourne (Warwick)
Péter Varjú (Cambridge)
James Norris (Cambridge)
*to be confirmed

Organisers:
Márton Balázs (Bristol)
Edward Crane (Bristol)
Nic Freeman (Bristol)
Jens Marklof (Bristol)
Bálint Tóth (Bristol/Budapest)

Venue
Room SM2, School of Mathematics,
University Walk, Bristol, BS8 1TW

maths.bris.ac.uk/events/meetings

University of BRISTOL

LMS INVITED LECTURER 2014

Professor Jouko Väänänen

(University of Helsinki and University of Amsterdam)

14–17 April 2014

University of East Anglia

Games, trees and models: This is a new approach to mathematical properties of uncountable structures. We relate it to certain transfinite games, mathematics of trees, and a branch of model theory called stability theory.

Foundations of mathematics and second order logic: The role of second order logic is a source of a lot of debate in the area of foundations and philosophy of mathematics. In this topic we give a mathematical approach to second order logic, using methods from the first topic, and discuss a foundational and philosophical interpretation of the results.

The mathematical theory of dependence and independence: A topic introduced by Väänänen in his 2007 monograph Dependence Logic. The general methodology introduced in the previous two topics is used to analyse dependence and independence concepts throughout mathematics with applications to computer science, and a number of other fields of science, where dependence and independence concepts have a crucial role.

There will also be supplementary lectures by:

- S. Abramsky (Oxford)
- J. Bagaria (ICREA, Barcelona)
- M. Dzamonja (UEA)
- D. Isaacson (Oxford)
- P. Galliani (Clausthal University of Technology)
- P. Welch (Bristol)

Lectures on April 14 will take place in London, other lectures in Norwich. University accommodation will be available. Limited financial support is available with preference given to UK research students. Please contact the organisers for further details: M.Dzamonja@uea.ac.uk

For further details on the 2014 Invited Lectures please visit:
www.uea.ac.uk/~h020/Jouko.html

GEOMETRY DAY V

Geometry Day V is a one-day conference focusing on recent results in Geometric Analysis. It will take place on Friday 9 May 2014 at King's College London. The speakers are:

- Andrea Malchiodi (University of Warwick)
- Laurent Hauswirth (University Paris-Est Marne-la-Vallée)
- Theodora Bourni (Free University, Berlin)
- Pablo Mira (University of Cartagena)

Everybody is welcome to attend the meeting as well as the dinner scheduled to take place afterwards. If you would like to attend, contact James Mabbett (james.1.mabbett@kcl.ac.uk) with your name, email address and institution. Indicate whether you are interested in attending the dinner for which there will be a nominal fee. Further information can be obtained from the website at http://tinyurl.com/o7jej8h. The meeting is supported by an LMS Conference grant.

WALES MATHEMATICS COLLOQUIUM 2014

The *Wales Mathematics Colloquium* is a forum for the promotion and discussion of current research in Mathematics in Wales. The principal themes of the colloquium in 2014 are codes, networks and mathematical biology, but there will be other talks covering a wide range of topics in pure and applied mathematics. The meeting will be held at Gregynog Hall, Tregynon, near Newtown, Powys, beginning with tea at 4 pm on 19 May and finishing after lunch on the 21 May 2014. Invited speakers are:

- Simon Blackburn (Royal Holloway)
  An Introduction to random network coding
  and
  Combinatorics and network coding
- Christina Cobbold (Glasgow)
  The mathematics of biodiversity
  and
  How do organisms cope with heterogeniety?

The meeting is organised by mathematics departments of universities in Wales in conjunction with the Wales Institute of Mathematical and Computational Sciences, and most participants will be staff or research students from those universities. Any others who would like to attend will be very welcome. The registration fee is about £200, to include all meals and accommodation. Please note that the organisers are unable to give financial support to outside participants. Owing to limited accommodation, places will be allocated on a first come, first served basis. If you are interested, contact S. Williamson (administrator@wimcs.ac.uk) or visit the website www.wimcs.ac.uk/gregynog.html for an application form.

The meeting is supported by an LMS Conference fund and the Gregynog Fund.

SIR DAVID WALLACE LECTURE

The Department of Mathematical Sciences at Loughborough University is launching a new series of annual lectures in Mathematics intended for a wide audience, including PhD students and mathematics undergraduates. The Sir David Wallace Lecture is named after the Vice-Chancellor of Loughborough University (1994-2006). The first Sir David Wallace Lecture will be given by:

Sir Michael Atiyah (Edinburgh)
Solitons in Analysis, Geometry and Physics

The lecture will take place in room T003 at Loughborough University on 13 March 2014 at 5.15 pm. Enquiries should be sent to Catherine Wright (C.Wright@lboro.ac.uk). For further information visit the website at www.lboro.ac.uk/departments/maths/news/sir-david-wallace-lecture.html.

CELEBRATING 50 YEARS OF THE APPLIED PROBABILITY TRUST

The Applied Probability Trust and the Royal Statistical Society present the

50th Anniversary

Journal of Applied Probability special lectures

Sir John Kingman	Applied Probability and applied probability; now, then and in the future
Dan Crisan (Imperial)	Classical and modern results in the theory and applications of stochastic filtering
Alexander Gnedin (Queen Mary)	A survey of lambda-coalescents

Wednesday 9 April 2014, 2–5pm

The lectures will take place at

The University of Sheffield
Hicks Building
Lecture Theatre 7
Hounsfield Road, UK

For further information, please contact Sue Boyles by email s.c.boyles@sheffield.ac.uk or visit **http://www.appliedprobability.org**

ROYAL STATISTICAL SOCIETY

LMS Advancing Mathematics London Mathematical Society

RMetS Royal Meteorological Society

JOINT SOCIETY MEETING with The Royal Meteorological Society

Blackett Laboratory, Lecture Theatre 1, Imperial College London, South Kensington Campus, London, SW7 2BW

Wednesday 16 April 2014 at 2pm

THE MATHS OF PLANET EARTH

Speakers:

Chris Budd (University of Bath)
Tamsin Edwards (University of Bristol)
Chris Jones (The University of North Carolina)
Ted Shepherd, FRMetS (University of Reading)
Emily Shuckburgh (British Antarctic Survey)
John Taylor (DAMTP, University of Cambridge)

Mathematics has always played a crucial role in modelling the weather and climate. Today, scientists and policy makers are demanding ever-more detailed information from simulations of the Earth system, and our strategy for model development requires concomitant advances in mathematics. The international programme 'Mathematics of Planet Earth 2013 (MPE2013)' is devoted to advancing research programmes in all areas of environmental and biological modelling in which maths plays a crucial role, and the organizers hope that the initiative will have a lasting impact.

In this Society Meeting of the LMS, in collaboration with the Royal Meteorological Society (www.rmets.org) presentations will be made by those who have been involved with MPE2013 in the fields of weather, climate and environmental prediction. This meeting will focus on Earth observation and Earth system modelling, and will discuss how improvements in models, and the optimal exploitation of observations, depends on advances in mathematics.

This meeting is sponsored by The Grantham Institute for Climate Change, an Institute of Imperial College London, and the London Mathematical Society. Non-members are welcome to attend these meetings. Where seating capacity is limited, priority will be given to members.

BRITISH APPLIED MATHEMATICS COLLOQUIUM 2014

Cardiff University: 28-30 April 2014

Plenary Speakers

- Martine Ben Amar (Ecole Normale Supérieure, Paris)
  Morphogenesis and Embryogenesis
- Helen Byrne (University of Oxford)
  Angiogenesis under the Microscope: New Mathematical Perspectives on an Old Problem
- Michael Graham (University of Wisconsin at Madison)
  The Stewartson Lecture
  Drag Reduction and the Dynamics of Turbulence in Simple and Complex Fluids
- Ross McPhedran (University of Sydney)
  Ruling the Waves: from Photonic Crystals to Metamaterials
- Alfio Quarteroni (Ecole Polytechnique Federale de Lausanne and Politecnico di Milano)
  The IMA Lighthill Lecture
  The Challenge of Complexity in Numerical Simulations

Public Lecture

- Mary Lou Zeeman (Bowdoin College)
  Harnessing Maths to Understand Tipping Points in Climate and Sustainability

Further details on registration and submission of abstracts may be found on the BAMC website: http://mathsevents.cf.ac.uk/bamc2014/. Deadline for Early Bird registration is **1 March 2014**. The colloquium is supported by an LMS Conference grant.

CAMBRIDGE

Representation Theory and Harmonic Analysis of Wreath Products of Finite Groups

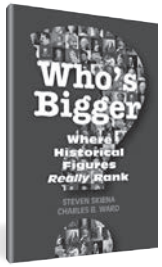
Tullio Ceccherini-Silberstein,
Università degli Studi del Sannio, Italy
Fabio Scarabotti,
Università degli Studi di Roma 'La Sapienza', Italy
Filippo Tolli, *Università degli Studi Roma Tre*

- A self-contained treatment of the topic, complete with examples and exercises, suitable for graduate students
- The authors present an original approach to the subject using harmonic analysis
- The text contains recent results concerning Gelfand pairs, some of which appear in book form for the first time

London Mathematical Society Lecture Note Series, No. 410
Paperback | 978-1-107-62785-7 | January 2014 | £45.00
www.cambridge.org/lms410

Who's Bigger?

Where Historical Figures Really Rank



Steven Skiena,
State University of New York, Stony Brook
Charles B. Ward,
Google, Inc., Mountain View, California

'This is all fun: reputational face-offs are great entertainment. And, shrewdly, Skiena and Ward have an app. More seriously, historians will put quantitative analysis to good use – and their model may help historiographers grapple with Wikipedia.'
New Scientist

'I confess to simply liking the book. I still do not care about the great order of things; nonetheless, I very much appreciate a huge amount of fascinating detail that the book makes available at one's fingertips, and the orderly manner in which it does that.'
Alex Bogomolny, MAA Reviews (maa.org/publications/maa-reviews)

Hardback | 978-1-107-04137-0 | December 2013 | £18.99
www.cambridge.org/SkienaWard

www.cambridge.org CAMBRIDGE UNIVERSITY PRESS

Queen Mary University of London

School of Mathematical Sciences
Professor in Pure Mathematics

Applications are invited for a Professorship in Pure Mathematics. We are seeking to appoint an outstanding candidate in either combinatorics or geometry and analysis, however particularly outstanding applicants in any area of pure mathematics will be considered.

The successful applicant will have an outstanding international profile and a world-leading research record. They will also have a record of excellence in leadership including a demonstrable ability to attract funding to their research programme, and be able to lead a research group or develop one within the School. They will also have the ability and flexibility to teach across a range of topics in mathematics at various levels.

Queen Mary has made a strategic commitment to the highest quality of world-class research across all its disciplines. The School of Mathematical Sciences has a very strong research presence across the spectrum of pure mathematics, including a strong tradition in combinatorics, and a growing focus on geometry and analysis. The School has large and popular undergraduate and graduate teaching programmes.

This is a full time and permanent position starting 1 September 2014 or as soon as possible thereafter. The salary will be negotiable within the Professorial range.

Women are currently under-represented in the School of Mathematical Sciences; therefore we particularly welcome applications from women for this post.

Informal enquiries may be made to either the Head of School, Professor Boris Khoruzhenko (b.khoruzhenko@qmul.ac.uk / +44 20 7882 5495) or the Director of Pure Mathematics, Dr Matthew Fayers (m.fayers@qmul.ac.uk / +44 20 7882 5479).

To apply for this position and for full job details including a job description and person specification please visit http://www.jobs.qmul.ac.uk/ and search with the vacancy reference **QMUL3167**.

The closing date for applications will be **Friday 10 April 2014**. Interviews will be held on 21 May 2014. The shortlisted candidates will also be asked to give a presentation about their research on 20 May 2014.

Athena SWAN Bronze Award

LONDON MATHEMATICAL SOCIETY GOOD PRACTICE SCHEME

Valuing Diversity & Committed to Equality

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Professor of Mathematics (Mathematical Physics)

The Department of Mathematics (www.math.ethz.ch) at ETH Zurich invites applications for a full professor position in Mathematics with a focus in Mathematical Physics. We are seeking candidates with an outstanding research record and a proven ability to direct research work of high quality. Willingness to participate in collaborative work both within and outside the school is expected. Furthermore, the new professor will be responsible, together with other members of Department, for teaching undergraduate (German or English) and graduate courses (English) for students of mathematics, natural sciences and engineering.

Please apply online at www.facultyaffairs.ethz.ch

Applications should include a curriculum vitae, a list of publications, and a statement of your future research and teaching interests. The letter of application should be addressed **to the President of ETH Zurich, Prof. Dr. Ralph Eichler. The closing date for applications is 30 April 2014.** ETH Zurich is an equal opportunity and family friendly employer and is further responsive to the needs of dual career couples. In order to increase the number of women in leading academic positions, we specifically encourage women to apply.

ETH

Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

Assistant Professor of Mathematical Finance

The Department of Mathematics (www.math.ethz.ch) at ETH Zurich invites applications for the above-mentioned professorship. The research activities should be related to Mathematical Finance, for example computational and/or statistical and/or probabilistic aspects of quantitative finance and risk management. Duties of this position include an active participation in the teaching of courses for students of mathematics, natural sciences and engineering. The successful candidate holds a PhD degree and has demonstrated the ability to carry out independent research. It is expected to collaborate with colleagues and industry and to teach undergraduate level courses (German or English) and graduate level courses (English).

This assistant professorship has been established to promote the careers of younger scien-tists. The initial appointment is for four years with the possibility of renewal for an additional two-year period.

Please apply online at www.facultyaffairs.ethz.ch

Applications should include a curriculum vitae, a list of publications, and a statement of your future research and teaching interests. The letter of application should be addressed **to the President of ETH Zurich, Prof. Dr. Ralph Eichler. The closing date for applications is 15 April 2014**. ETH Zurich is an equal opportunity and family friendly employer and is further responsive to the needs of dual career couples. In order to increase the number of women in leading academic positions, we specifically encourage women to apply.

OBITUARY

HEINI HALBERSTAM

Professor Heini Halberstam, who was elected a member of the London Mathematical Society on 25 November 1954, died 25 January 2014 in Champaign, Illinois, aged 87.

Harold Diamond writes: Born in Brux, Czechoslovakia, Heini came to Britain in the Kindertransport program in 1939. With the care and support of Anne Welsford, Heini attended University College, London, where he earned his PhD degree in 1952 under the direction of T. Estermann. In 1987, he was elected a Fellow of University College.

After positions in Exeter, Royal Holloway, and Dublin, Heini moved in 1964 to Nottingham, where he served at times as Department Head and Dean of Faculty. Heini came to the University of Illinois in Urbana-Champaign in 1980, was eight years Department Head, and retired as an emeritus professor in 1996. He also held several visiting positions.

Heini's research ranged over several areas of analytic number theory, most importantly, sieve theory. His conjecture with P.D.T.A. Elliott about the distribution of prime numbers in arithmetic progressions is one of the outstanding open problems in this area. Heini was an author of several influential research monographs. Sequences, with K.F. Roth, made accessible such areas as sums of integers from given sequences and the probabilistic method of Erdös and Renyi. Sieve Methods, with H.E. Richert, provided accounts (some for the first time) of important work of Brun, Selberg, Rosser-Iwaniec, and J.R. Chen. A Higher Dimensional Sieve Method grew out of his research with Richert and H. Diamond.

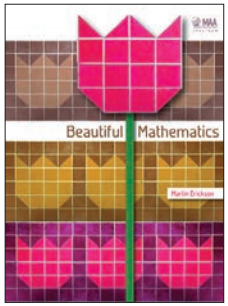
Heini supervised 14 PhDs and many masters students and post-docs, several of whom are now distinguished number thorists. He also was a force for mathematical education in both Nottingham and the U.S.

Heini was active in the LMS and served as a Vice President and as Secretary of the *LMS Journal*. Also, he was a long-time member and a Fellow of the American Mathematical Society. He was on the editorial board of several journals and wrote over 150 Mathematical Reviews. Heini edited or co-edited the collected mathematical papers of W.R. Hamilton, H. Davenport, J.E. Littlewood, and L.K. Hua, and he co-edited the proceedings of two conferences.

Heini's first wife, Heather, died in 1971. He is survived by his second wife, Doreen, who lives in Champaign, IL; by two children living in the U.S.; by two children and two step children in Britain; and by eight grandchildren, all in Britain.

REVIEWS

BEAUTIFUL MATHEMATICS by Martin Erikson, Mathematical Association of America, 2011, pp 191, US$63.95, ISBN: 978-1-61444-509-8.



The introduction of Beautiful Mathematics by Martin Erikson describes, in concise, literary, stirring prose, precisely the sorts of sentiments that any self-respecting mathematician wishes would go into a text on mathematics, and are particularly essential to a book intended for a wide audience. From the introduction:

"My approach to mathematics is as an art form, like painting, sculpture, or music.....As with other arts, mathematical ideas have an aesthetic appeal that can be appreciated by those willing to investigate."

"Who should read this book? I believe that there is something new in it for any mathematically-minded person."

Unfortunately, the introduction was by far the most enjoyable part of the book. The eloquence of the introduction was replaced with a dry textbook manner that at times could be quite misleading (though mostly not outright incorrect); topic selection was a hodgepodge of topics that, contrary to the claims of the introduction, were of random difficulty, and with no connection between one idea and the next; no sense of the relative importance of the mathematical concepts (deep ideas treated on equal footing with mere diversions); and only a half-hearted attempt to provide at most one additional source for each topic (and frequently no sources for additional reading were provided).

Any potential reader is cautioned not to read the book sequentially from cover to cover. This is decidedly the wrong (and a most incredibly painful) way to read this book. It would be much more pleasant as an 'encyclopaedia-like' experience, where the casual mathematically sophisticated reader simply opens the book at a random page, dips in and enjoys whatever they happen to find there. And the book does contain a lot of interesting titbits.

However, the book does not come across as a book for a wide audience. It would be a challenging book for a mathematics instructor to use as a reference as it is very hard to search for particular ideas (as the table of contents lists by title only, and the index is unusable as the page numbers have nothing whatsoever to do with the pages of the book), very little cross-referencing of ideas, and no way to find where the cross-referencing takes place.

Furthermore, there is a bias in problem selection toward combinatorial problems and high school Euclidean geometry, and away from probability, statistics, group theory, and applied math problems in general (which is fine if the book was being sold as what the author finds interesting, but not if the book is meant to range over the spectrum of modern day mathematical thought).

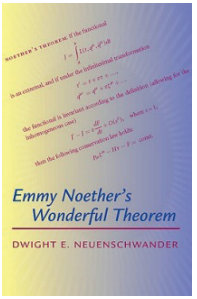
The book is also not geared for the mathematically unsophisticated reader. Descriptions were uneven in quality, and though for the most part correct, they could be misleading and frustrating to follow. In general, (and especially when the author tries to prove something as he does frequently throughout the book) the book is written with more mathematical sophistication in mind than is usually possessed by the average high school or beginning college student.

I suspect that the book (as is true alas for many books) was written with the author alone as the intended audience. Assuming this to be the case, it is best to sell the book for what it is; the author's personal scrapbook of mathematical bits he finds interesting or exciting.

In short Beautiful Mathematics is a promising premise tripped up by lack of focus and execution.

Owen Patashnick
Bristol University

EMMY NOETHER'S WONDERFUL THEOREM by Dwight E. Neuenschwander, The John Hopkins University Press, 2010, pp 264 , £15.50 pbk, ISBN 978-0801896941, £39.00 hbk, ISBN 9780801896934.



The deep relationship between the symmetries of a physical theory and conserved quantities is a cornerstone of modern theoretical physics. The fact that translational symmetries of space result in conservation of momentum, and rotational symmetries give rise to conservation of angular momentum was known to Jacobi, but these ideas were radically extended by Emmy Noether who in 1918 published a ground breaking paper which gave a precise and general relationship between symmetries and conservation laws for differential equations arising from critical points in the calculus of variations.

Given the wide ranging application of these ideas and the generality of the results obtained by Noether it is astonishing that it is only in the last 50 years that this work has taken centre stage, although even today the extent of her contribution is not always fully appreciated (see The Noether theorems. Invariance and conservation laws in the twentieth century by Yvette Kosmann-Schwarzbach [1] for more details). As someone who has taught undergraduate courses on Lagrangian mechanics and the Calculus of Variations I have always been disappointed by the absence of a suitable undergraduate

textbook which covers Noether's work relating invariance of the action to conserved quantities. Many textbooks omit the topic entirely and Goldstein's comprehensive textbook on Classical Mechanics [2] devotes only nine pages to it. I was therefore very excited by the prospect of a book aimed at senior undergraduate physics students written by someone with 30 year's experience teaching the subject.

The book assumes the reader has no previous knowledge of the calculus of variations and begins by introducing functionals, the concept of extremal and shows how this condition results in the Euler-Lagrange equations. The enthusiasm of the author for the subject matter is obvious and the style is very readable with many examples of real and interesting physical problems that can be formulated in terms of an extremal problem. Strong features of the book are the exercises at the end of each chapter together with the more wide ranging 'questions for reflection and discussion' which would be very useful to someone teaching this subject. Part II looks at 'When Functionals are Invariant' and goes on to prove (part of) Noether's first theorem showing that if a functional is invariant under an infinitesimal transformation then the extremal solutions give rise to conserved quantities. The natural mathematical language to describe such symmetries would involve looking at Lie groups, one-parameter subgroups, flows generated by vector fields and Lie derivatives. Presumably because of the intended audience the author instead adopts a direct calculational approach which avoids these concepts. In my opinion this is a pity since these ideas are central to applications of symmetry to physics and would help to clarify many of the calculations.

Section III extends the ideas of the earlier sections to the multiple-integral functionals required for field theory. The author derives the Euler-Lagrange equations for fields and explains why a space-time conservation law for fields takes the form of a conserved current and that this becomes an equation of continuity when written as an evolution equation for a conserved density in three-dimensional space. He then goes on to generalise the earlier proof of Noether's theorem based on the Rund-Trautman identity to show that invariance of an extremal leads to the existence of a conserved current constructed from the momentum and the Hamiltonian tensor. The direct calculational approach is less effective here as the physical meaning of the Hamiltonian tensor is not explained. In Chapter 7 the concept of gauge invariance is introduced and it is shown how this naturally leads to the notion of covariant derivative and Yang-Mills fields. This is the appropriate setting for Noether's second theorem which covers gauge invariance and leads to differential identities in the form of vanishing covariant divergences (such as the contracted Bianchi identities in General Relativity). These ideas are hinted at towards the end of the chapter but not really developed. The book ends by looking at invariance in phase space and introducing the idea of invariance and conserved quantities in quantum mechanics.

Despite the title this book does not provide a historical account of the Noether theorems, nor a comprehensive account of the underlying mathematics (for these the reader should turn to [1] and [3]), instead it provides a very readable and concrete introduction to symmetry and invariance in physics with Noether's (first) theorem providing a unifying theme. The transition from student lecture notes to published book has perhaps been too rapid and has resulted in a lack of precision as well as misprints and errors. However the style of writing is very engaging and conveys the enthusiasm of the author for teaching students about the calculus of variations, classical field theory, and how invariance leads to conserved quantities. The book contains many interesting examples as well as excellent exercises and used carefully would form the basis of an exciting course aimed at final year Mathematics and Physics students.

James Vickers
University of Southampton

References

[1] Y. Kosmann-Schwarzbach, The Noether Theorems: Invariance and Conservation Laws in the Twentieth Century, Springer (2011)
[2] H. Goldstein, Classical Mechanics, 2nd Edition, Addison-Wesley (1980)
[3] P.J. Olver, Applications of Lie Groups to Differential Equations, Springer (1993)

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.

MARCH 2014

13 Sir David Wallace Lecture, Loughborough University (434)
21–22 Classical and Quantum Integrable Meeting, Glasgow (434)
22–23 Mathematical Logic, Bristol (433)
31 LMS Northern Regional Meeting, Durham (434)
31–3 Apr Aspects of Random Walks, Durham University (432)

APRIL 2014

1–5 Ischia Group Theory 2014, Naples, Italy
2–4 Distinguished Lecture Series 2014, Heilbronn Institute, Bristol
7–10 British Mathematical Colloquium, Queen Mary, University of London (434)
8 The Mathematics of Brain Dynamics, Birmingham (434)
8 LMS Meeting at the BMC, Queen Mary, University of London (434)
9 APT 50th Anniversary Special Lectures, Sheffield (434)
11–12 Integrable Models, Conformal Field Theory Meeting, University of Glasgow (434)
14–17 Kent Spectral Theory Meeting, Canterbury (433)
14–17 LMS Invited Lecturer 2014, University of East Anglia (434)
16 Joint Society Meeting with the Royal Meteorological Society, Imperial College London (434)
22 Atiyah85 Meeting, Oxford (434)
23–25 Probability, Analysis and Dynamics, Bristol (434)
23–25 Young Functional Analysts' Workshop, Lancaster University (433)
25 Women in Mathematics Day, London (434)
28–30 BAMC 2014, Cardiff University (434)
28–1 May Probability and Statistics Research Students Conference, Nottingham (431)

MAY 2014

9 Geometry Day V, King's College London (434)
15–17 Norrie Everitt Memorial Meeting, Cardiff (432)
19–21 Wales Mathematics Colloquium, Gregynog Hall, Powys (434)
21 LMS-Gresham College Joint Meeting, London (433)

JUNE 2014

16 Midlands Regional Meeting, Loughborough
30–5 Jul Building Bridges, LMS-CMI Research School, Bristol (434)

JULY 2014

7–12 An Invitation to Geometry & Topology Via G2, LMS–CMI Research School, Imperial College London (434)
13–15 Modelling in Industrial Maintenance and Reliability IMA Conference, Oxford
23–25 ISSAC 2014 Kobe University, Japan

AUGUST 2014

12 & 14 International Congress for Women in Mathematics 2014, Seoul, Republic of Korea (433)
13–21 ICM 2014, Seoul, Republic of Korea (427)
17–19 Mathematical Cultures Conference, De Morgan House, London (417)
25–29 Algebraic Lie Theory and Representation Theory, LMS–CMI Research School, Glasgow (434)

SEPTEMBER 2014

3–5 Jordan Geometric Analysis and Applications, Queen Mary, University of London (432)
3–5 Operator Theory Workshop, Queen's University, Belfast
22–26 Bounded Gaps Between Primes, LMS–CMI Research School, Glasgow (434)

MARCH 2015

30–2 April Joint Meeting of the BMC and BAMC, Cambridge

LMS-FUNDED MEETINGS

LMS-WIMCS Analysis Day
held at the Cardiff School of Mathematics on 15 January 2014
(report on pages 10–11)

Interfaces between Numerical Analysis and Computational Statistics Workshop
held at the University of Southampton on 15 January 2014
(report on page 11)