

LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 430 November 2013

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NEWSLETTER ONLINE: newsletter.lms.ac.uk

ONE THOUSAND AND COUNTING

Three hundred people visited De Morgan House on Sunday 22 September 2013 as part of the annual London Open House event. Since first participating in Open House three years ago over 1,000 people have visited De Morgan House, learning about the Society and mathematics more generally.



At this year's event visitors were given a short tour of selected rooms in the building by LMS staff and Open House volunteers. As well as discussing the architectural features of De Morgan House and its place in the history of Bloomsbury, the event is an opportunity to publicise LMS activities and mathematics more generally, and leave with a range of publications including the Annual Review and information about membership, grants and Women in Mathematics.

The feedback from visitors was again very positive. The LMS will continue to develop its presence at the event and is already discussing a more comprehensive programme for next year.

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2013 ELECTIONS TO COUNCIL AND NOMINATING COMMITTEE

Members should now have received a communication from the Electoral Reform Society (ERS) for both e-voting and paper ballot. For online voting, members may cast a vote by going to www.votebyinternet.com/LMS2013 and using the two part security code on the email sent by the ERS and also on their ballot paper.

All members are asked to look out for communication from the ERS. We hope that as many members as possible will cast their vote. If you have not received ballot material, please contact dun can.turton@Ims.ac.uk, confirming the address (post or email) you would like material sent to.

With respect to the election itself, there are seven candidates

http://newsletter.lms.ac.uk

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proposed for five vacancies for Member-at-Large. One candidate has been nominated for the new role of Member-at-Large (Librarian). Four candidates have been proposed for two vacancies in the membership of Nominating

LMS Newsletter

http://newsletter.lms.ac.uk

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For both electronic and postal voting the deadline for receipt of votes is **7 November 2013**. Members may still cast a vote in person at the AGM.

Members may like to note that the LMS Election blog, moderated by the Scrutineers, can be found at http://discussions.lms.ac.uk/ elections2013.

Future Elections

Members are invited to make suggestions for nominees for future election to Council. These should be addressed to the Nominating Committee (nominations@lms.ac.uk). Members may also make direct nominations: details will be published in the April 2014 *Newsletter* or are available from Duncan Turton at the LMS (duncan.turton@lms.ac.uk).

ANNUAL GENERAL MEETING

The Annual General Meeting of the Society will be held at 3.00 pm on Friday 15 November 2013 in the Jeffrey Hall at the Institute of Education, 20 Bedford Way, London WC1H 0AL. The business shall be:

- 1. Elections to Council and Nominating Committee
- 2. Report of the President
- 3. Report of the Treasurer:
- a. adoption of the Trustees Report for 2012/13
- b. appointment of Auditors
- 4. Presentation of De Morgan medal and certificates to LMS Prize winners

It is hoped that as many members as possible will be able to attend. The Annual General Meeting will be followed by a Society meeting, with the Presidential address given by Graeme Segal and a lecture by Simon Donaldson (see page 5).



LMS PRIZES 2014 Call for Nominations

The London Mathematical Society welcomes nominations for the 2014 prizes, to recognise and celebrate achievements in and contributions to mathematics.

In 2014 the LMS Council expects to award:

- **The Polya Prize** in recognition of outstanding creativity in, imaginative exposition of, or distinguished contribution to, mathematics within the United Kingdom.
- The Fröhlich Prize for original and extremely innovative work in any branch of mathematics.
- The Senior Berwick Prize awarded in recognition of an outstanding piece of mathematical research actually published by the Society during the eight years ending on 31 December 2013.
- The Senior Anne Bennett Prize for work in, influence on or service to mathematics, particularly in relation to advancing the careers of women in mathematics.
- The Whitehead Prizes for work in and influence on mathematics.

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

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

Closing date for nominations Monday 20 January 2014

Charity registration number: 252660.

Fiona Nixon Executive Secretary

LONDON MATHEMATICAL SOCIETY GRADUATE STUDENT MEETING

Friday 15 November 2013

Russell Room, CIPR, 52-53 Russell Square, London WC1B 4HP

(Nearest tube: Russell Square)

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

Preliminary Programme

- 09.30 Coffee and Registration
- 10.00 Richard Thomas (Imperial College)
- 11.00 Coffee/Tea
- 11.15 Graduate student talks
- 12.45 Lunch
- 13.40 Award prizes
- 13.45 David Evans (Cardiff)
- 14.45 Close of Meeting

15.00 LMS Annual General Meeting and Society Meeting at the Institute of Education

Registration

To register, please email Elizabeth Fisher (Imsmeetings@Ims.ac.uk) by email by **8 November**. Places are free and all refreshments including lunch will be provided.

Student talks

Students are invited to give short talks (15 minutes) aimed at a general mathematical audience. Prizes will be awarded for the best two talks. If you would like to give a talk, please email Richard Thomas (richard.thomas@imperial.ac.uk).

Travel

The lectures will be held in the Russell Room, CIPR, 52-53 Russell Square, London WC1B 4HP. For directions, see: http://www.cipr.co.uk/content/venue-and-room-hire/location.

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

LMS Annual General Meeting and Society Meeting

The LMS Annual General Meeting is a Society Meeting, which is open to all. **Simon Donaldson** (Imperial College) will give the first lecture on *Geometry of Kahler Metrics* and **Graeme Segal** (Oxford) will give the Presidential Address. The meeting will be held in the Jeffrey Hall at the Institute of Education, 20 Bedford Way, London WC1B 4HP.

After the AGM, there will be a reception at De Morgan House, 57-58 Russell Square.

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

LONDON MATHEMATICAL SOCIETY ANNUAL GENERAL MEETING

Friday 15 November 2013 3.00 – 6.00 pm Jeffrey Hall, Institute of Education

(20 Bedford Way, London, WC1H 0AL. Nearest tube: Russell Square)

Programme Annual General Meeting The meeting will include the presentation of certificates to the LMS

Simon Donaldson (Imperial College) Geometry of Kahler metrics

Abstract: A Kahler metric is a particular kind of Riemannian metric, adapted to a complex structure on a manifold. The title of the talk is meant to be bear to different interpretations. In one direction, the infinite dimensional space of all Kahler metrics on a given complex manifold has the structure of an infinite-dimensional symmetric space, related to the group of symplectic diffeomorphisms, and there are certain important convex functionals on this space. By arguments related to geometric quantisation these spaces and functionals can be "approximated" by finite dimensional ones (in the case when the complex manifold is algebraic). In another direction, the Kahler condition allows a more detailed undertanding of certain questions in Riemannian geometry involving Gromov-Hausdorff limits. In this lecture we will give an overview of this general area, and say something about recent work with Chen and Song, on an algebro-geometric criterion for the existence of Kahler-Einstein metrics, which involves many of the ideas.

Tea/Coffee

Announcement of Election Results

Graeme Segal (Oxford) Presidential Address: Space and spaces

Abstract: The idea of space is central to the way we think. It is the technology we have evolved for interpreting our experience of the world. But space is presumably a human creation, and even inside mathematics it plays a variety of different roles, some modelling our intuition very closely and some seeming almost magical. I shall point out how the homotopy category in particular breaks away from its own roots. Then I shall describe how quantum theory leads us beyond the well-established notion of a topological space into the realm of noncommutative geometry. One might think that noncommutative spaces are not very space-like, and yet it is noncommutativity that makes the world look as it does to us - as a collection of point-particles.

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 (AnnualDinner_RSVP@lms.ac.uk) by Monday 4 November.

For further details about the AGM contact Elizabeth Fisher (Imsmeetings@Ims.ac.uk).

LMS UNDERGRADUATE RESEARCH BURSARIES IN MATHEMATICS 2014



Nature of Awards

The purpose of the awards is to give experience of research to undergraduates with research potential and to encourage them to consider a career in scientific research.

The awards provide support for the student at a rate of \pounds 180 per week (or \pounds 190 per week in London), for a period of between six and eight weeks.

The scheme will open to applications in mid-November 2013. The closing date for receipt of applications is 5 pm Friday 7 February 2014.

Eligibility

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- Open to Undergraduate Students in the **intermediate years** (i.e. 2/3, 2/4 or 3/4) of their undergraduate degree to undertake the project during the summer vacation between their intermediate years. Students in the final year of their degree intending to undertake a **taught Masters** degree may apply. (Applications on behalf of first-year undergraduates will not be considered.)
- Mature students are eligible to apply, but must not have a previous degree in any subject.
- Students must be registered at a UK institution for the majority of their undergraduate degree.
- Bursaries will not be awarded for projects that are a part of degree work, or that take place overseas for more than 50% of the project time.
- Researchers in Mathematics at universities and research institutions within the UK are eligible to apply. Interdisciplinary projects will be considered providing the project has significant mathematical content.
- **Postdoctoral researchers** and **new lecturers**, early in their careers are also encouraged to apply, and should note this on the application form.
- Only one application should be submitted by a supervisor.
- Normally no more than **four** awards will be made to an individual department or subject area within multidisciplinary departments or schools. <u>Please bear in mind that this is a national scheme</u> with a limited number of bursaries.
- Bursaries will only be granted for the student named on the application form; awards are not transferable between students.

How to apply

- Application forms can be downloaded from the Society's website: www.lms.ac.uk/content/grants.
- Applications must be made by the project supervisor on behalf of the student, and not by the student.
- Applications should be discussed with the nominated student, who should also contribute to the project design.
- Applications should include the student's academic record and a supporting statement from his/her academic tutor.
- Applications must be signed by the Head of Department to confirm his/her approval for the award to be administered by the department. (Awards are not offered directly to individual researchers but to the institutions to which they belong).

Further information including the guidelines on *How to Apply* are available from the Society website: www.lms.ac.uk/content/grants. Queries may also be addressed to Katy Henderson (urb@lms.ac.uk).

A WARM RECEPTION FOR FRANK KELLY

The Council for the Mathematical Sciences (CMS) held a reception on Thursday 19 September 2013 at the Royal Society to celebrate the achievements of outgoing CMS Chair Professor Frank Kelly. The reception was attended by over 50 friends and colleagues from government, academia, the mathematics community and other STEM organisations.

Professor Robert McKay, President, Institute of Mathematics and its Applications (IMA) praised Professor Kelly's contribution in uniting the five constituent bodies of CMS on many of the major issues in mathematical sciences over the past three years. He went on to highlight Professor Kelly's quiet authority and the evident respect from all corners of the mathematics community, which had been instrumental in his successful term. Professor McKay ended by thanking Professor Kelly for helping to shape the future di-

rection of the mathematical sciences and his enduring legacy in bringing the mathematical bodies together as one voice.



Professor Frank Kelly and Professor Robert McKay



David Youdan (IMA), Paul Golby (EPSRC), Frank Kelly (CMS), Fiona Nixon (LMS), Adrian Smith (CMS), Hetan Shah (RSS), Paul Glendinning (IMA), Ken Brown (LMS)



John Pullinger (RSS), Celia Hoyles (IMA), Terry Lyons (LMS), Frank Kelly (CMS), Geoff Royston (ORS), Lindsay Walsh (CMS), Robert McKay (IMA)

Professor Kelly replied by thanking the individual society presidents and chief executives, past and present, for their support

and advice. He also thanked the many staff and officers who supported CMS activities over the past three years. The groundbreaking Deloitte report was a particular highlight along with the round-table meeting with David Willetts, which brought together a wide range of mathematicians and those from industry with a particular interest in the mathematical sciences. Professor Kelly had enjoyed his time as CMS Chair and felt sure that the new Chair, Professor Sir Adrian Smith, would consolidate a powerful and coordinated voice through the CMS. 7

http://newsletter.lms.ac.uk

MATHEMATICS POLICY ROUND-UP

October 2013

HIGHER EDUCATION

New Year start for HEFCE Chief Executive Professor Madeleine Atkins CBE, Vice-Chancellor of Coventry University, will take up her post as Chief Executive of the Higher Education Funding Council for England on 1 January 2014. Professor Atkins was appointed to the position in July 2013. Further information is available at http://tinyurl.com/ pqkgbca.

HEFCE's outgoing Chief Executive, Sir Alan Langlands, will take up the post of Vice-Chancellor of the University of Leeds on 1 October 2013. Pending Professor Atkins' arrival at HEFCE, Deputy Chief Executive Steve Egan will act as interim Chief Executive

SCHOOLS AND COLLEGES

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A-level and GCSE reform timetable

Ofqual has published an exchange of letters with the Secretary of State about the next steps for A-level and GCSE reform. Ofqual has stated that it is apparent that mathematics and further mathematics are going to require more work than other subjects. It is now planned that the reformed A-levels in these two subjects should be in place for teaching from September 2016. The correspondence is available at http://ofqual.gov. uk/news/publication-notice/.

Launch of 2014 National Curriculum

The national curriculum framework has been published and is available at http:// tinyurl.com/oh9swhp. It includes programmes of study and attainment targets for key stages 1 to 4.

Elizabeth Truss speech on curriculum reform The Parliamentary under Secretary of State for Education and Childcare spoke to the CBI about improving education and the importance of curriculum reform. Mathematics is one of the key areas covered. The full transcript of the speech is available at http://tiny url.com/lk6a2gd.

Open access report

OTHER

The Business, Innovation and Skills Select Committee has published a report on the issue of open access. The Report calls on the government and RCUK to reconsider their preference for Gold open access during the five year transition period, and give due regard to the evidence of the vital role that Green open access and repositories have to play as the UK moves towards full open access. The report is available at http://tinyurl. com/ohzc5vd.

New President for Society of Biology

Professor Dame Jean Thomas Hon FSB will succeed Professor Dame Nancy Rothwell Hon FSB as the Society's president. Dame Jean has been master of St Catharine's College, Cambridge, since 2007 and is emeritus professor of macromolecular biochemistry at the university. More information is available at http://tinyurl.com/ge8gbzr.

New President for the Institute of Physics

Dr Frances Saunders became president of the Institute of Physics (IOP) on 1 October 2013. She takes over from Professor Sir Peter Knight, and will be the IOP's president until 30 September 2015.

> Dr John Johnston Joint Promotion of Mathematics

BSHM UNDERGRADUATE ESSAY PRIZE

The British Society for the History of Mathematics (BSHM) is pleased to invite submissions for its 2013-14 undergraduate essay prize. The essay, which may be on any topic within the history of mathematics, should be between 2,000 - 2,500 words. The prize is open to any person who is enrolled as an undergraduate in a UK or Irish university during the academic year 2013-14. The value of the prize will be £100, plus free membership of the Society for a year.

Essays in submission for the prize should be sent via email attachment to Dr Mark McCartney (m.mccartney@ulster.ac.uk). Applicants should also give details of their place and year of study and the title of the degree programme on which they are enrolled. The deadline for receipt of submissions is **1 May 2014**.

SET STUDENT OF THE YEAR AWARD

The winners of the 2013 SET Awards were announced at a ceremony in Kensington Town Hall attended by students, academics and business leaders. A record number of entries were received for the 2013 awards.

The Award for the Best Mathematics Student, judged by the Institute of Mathematics and its Applications and the London Mathematical Society, went to William Perry, University of Oxford for his work on spin two-dimensional local field theories. According to the judges the entries for this year's mathematics category were of an extremely high standard.

Professor Alice Rogers, Education Secretary of the London Mathematical Society, and one of the judging panel was particularly impressed with Perry's creativity and technical ability. 'He was able to express some complex ideas very well to non-specialist mathematicians and there is no doubt that he was an outstanding candidate with great potential'.

Information about the SET Student of the Year Awards is available at http://tinyurl.com/ p3p7t2t.



William Perry (University of Oxford) receives his award from Malcolm Turner (President, The SET Awards)

INSTITUT DES HAUTES ÉTUDES SCIENTIFIQUES

The Institut des Hautes Études Scientifiques (IHÉS), located in Bures-sur-Yvette, France, welcomes each year up to 200 mathematicians and theoretical physicists from all over the world for research periods ranging from two to three weeks up to one or two years.

Created in 1958, IHÉS is an international research institute, registered as a foundation in the public interest since 1981. Its mission is to support and develop theoretical research in mathematical sciences, physics and more recently, at the interface with biology and medicine. Support for IHÉS comes from several sources: the French Ministry of Research, several European research agencies among which the Engineering and Physical Sciences Research Council (EPSRC), the US National Science Foundation, the Max-Planck Gesellschaft, the Swiss National Science Foundation, and also some private foundations and companies.

EPSRC has been supporting IHÉS for a number of years, fostering closer links between British and French mathematical research centres. British mathematicians and theoretical physicists are invited to apply to IHÉS for visits (for more information visit the website at www.ihes.fr). Their visit can be an opportunity to work with researchers from other research groups in the Paris area.

Director: Emmanuel Ullmo

Permanent Professors: Thibault Damour, Mikhael Gromov, Maxim Kontsevich, Laurent Lafforgue, Nikita Nekrasov Honorary Professor: David Ruelle Léon Motchane Chair: Alain Connes Louis Michel Chairs: Ali Chamseddine, Samson Shatashvili

Long term CNRS visitors: Ahmed Abbes, Francis Brown, Ofer Gabber, Christophe Soulé External Members of the Scientific Council: Costas Bachas, Robert Bryant, Emmanuel Candčs, Bertrand Duplantier, Raymond E. Goldstein, Gabriele Veneziano

William Hodge Fellowships 2014 / 2015

In 2000 the EPSRC committee reviewing IHÉS suggested that the EPSRC and IHÉS offer each year two one-year or two-year fellowships bearing the name of Sir William Hodge, the eminent British mathematician. The fellowships enable outstanding young mathematicians and theoretical physicists to spend time at IHÉS. Fellows are encouraged to have a UK-based mentor and to be in contact with the UK mathematics community.

Applicants must have a PhD in Mathematical Sciences or Theoretical Physics obtained in 2012, 2013 or in early 2014. One of the two grants will be awarded to an applicant who has spent at least the preceding nine months at a UK academic institution or has just graduated from a UK institution Applications will be reviewed and selection made based on the sole criterion of excellence in research by the IHÉS Scientific Council in December 2013. The Committee consists of the Permanent Professors. the Director, and the external members (the list can be found on page 9). The fellowship would start in Autumn 2014.

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Applications should be made on the IHÉS website (www.ihes.fr) and should include: the application form, a cover letter, a CV, a publication list, a research project, two or three letters of recommendation, and a proposal for a UK mentor. Deadline for applications: 14 November 2013.

For more information contact: IHÉS, 35 route de Chartres, F-91440 Bures-sur-Yvette, France, (tel: +33 1 6092 6605, fax: +33 1 6092 6609, email: hodge@ihes.fr).

EUROPEAN LEVEL ORGANISATIONS FOR WOMEN MATHEMATICIANS

There are several organisations and committees supporting women mathematicians in Europe. The first and best known is the membership organisation European



rino, Italy), and a standing committee. Every other year, EWM has a general meeting which this year took place in the Hausdorff Center,

ropeanwomeninmaths.org).

Women in Mathematics (EWM) (www.eu

dred members and coordinators in over 30

European countries. Its executive consists of

a convenor, currently Susanna Terracini (To-

Founded in 1986, EWM has several hun-

Bonn. It has an email network and publishes an electronic newsletter. It also runs a biennial summer school: the 2013 school was held at ICTP Trieste as part of the Mathematics for Planet Earth programme. EWM also organises or supports other women in maths activities: this year in France there will be a meeting Women in Numbers in Luminy this October and in November a forum for young women in mathematics in Lyon. EWM has produced several videos which can be found on its website: watching them is a good way to get a taste of the unique atmosphere of EWM meetings. To join in the UK, either go to the EWM website or contact the UK coordinator Jennifer Scott (iennifer.scott@stfc.ac.uk). British readers may also be interested in the Proceedings of the 2007 Cambridge meeting (www.worldscibooks.com/mathematics/7352.html). whose final section comprises several interesting articles, biographical and otherwise, about women mathematicians in Cambridge.

EWM is independent from, but has links to, its sister organisation the Association for Women in Mathematics (AWM) based in the United States. It also works closely with various national level organisations, for example the LMS Women in Mathematics Committee and femmes et mathématiques in France. A variety of links can be found on the EWM website.

The second organisation for women mathematicians in Europe is the European Mathematical Society's Women and Mathematics Committee (www.euro-math-soc.eu/commwomen2.html), currently chaired by Caroline Series (Warwick). The committee's remit is to address issues relating to the involvement and progression of women in mathematics, and to support and promote the recognition of the achievements of women mathematicians. It acts largely as a liaison body between the EMS. EWM and other similar organisations on these issues. Past activities have included gathering statistics on the numbers of women mathematicians in different European countries, setting up a blog (now incorporated into the EWM website), and organising panel discussions at European Congresses.

Finally, in 2008, EWM and the EMS Women in Maths Committee jointly set up the EWM/ EMS Scientific Committee (www.euro-mathsoc.eu/comm-women2.html). Its members are twelve distinguished women mathematicians. among them Dusa McDuff, Ursula Hamenstaedt and Ragni Piene. Currently chaired by Cornelia Drutu (Oxford), the main function of this committee is to advise EMS and EWM on scientific programmes and speakers for events aimed at emphasizing women's scientific contributions, such as those organised separately or jointly by EWM and the EMS. Together the three groups have recently been instrumental in setting up a majority female summer school

International Congress of Women Mathematicians Seoul, Korea

2014

on Apollonian Packings to be held in Institut Mittag Leffler in June 2014 (www.math. ucsd.edu/~alina/ewm).

There is currently no international organisation for

women mathematicians. However under the direction of Ingrid Daubechies, current president of the IMU, progress towards further international coordination is being made. Following the first International Conference for Women Mathematicians (ICWM) which took place just before the 2010 ICM in Hyderabad, a second ICWM will be held in Seoul immediately before the ICM in August 2014 (sites.google. com/site/icwm2014/).

The ICWM is an opportunity to meet other ICM participants in a relaxed atmosphere and hear talks by prominent female mathematicians, and we encourage any interested readers to consider taking part.

> Caroline Series Chair, EMS Women in Maths Committee

International Centre for Mathematical Sciences **Scientific Director**

The International Centre for Mathematical Sciences (ICMS) in Edinburgh is seeking to appoint a scientific director to succeed Professor Keith Ball FRS FRSE, from September 2014 or other mutually agreed date.

ICMS is an important part of the UK's mathematical infrastructure. It runs high-guality international workshops in all areas of the mathematical sciences, and supports the mathematical community in a variety of other ways. Further information about ICMS and its activities is available on the website www.icms.org.uk. The Scientific Director plays a leading role in ICMS and has a major influence on its development.

The Scientific Directorship is funded at about 50% FTE by a grant from EPSRC – normally under a secondment arrangement, but alternative arrangements may be considered if appropriate. Applications are invited from experienced mathematicians with a broad knowledge of the UK and international mathematical scenes.

Closing date for applications is 20 December 2013. Full details of how to apply are available at www.icms.org.uk/scientificdirector. Informal enquiries can be addressed to Professor Jim Howie (J.Howie@hw.ac.uk, 0131 451 3240).

http://newsletter.lms.ac.ul

vsletter@lms.ac.uk

EUROPEAN NEWS

New ERC Advanced Grant results

In its sixth and last Advanced Grant competition under the EU's Seventh Research Framework Programme (FP7), the European Research Council (ERC) is awarding over 660 million to 284 senior research leaders, among them 11 mathematicians. They will carry out their research in 18 different countries across the European Research Area. Funding is up to 3.5 million per grant. The next Advanced Grants call will fall under the 'excellence pillar' of the new Framework Programme 'Horizon 2020'.

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

The European Research Council (ERC) an-

ERC joins arXiv

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nounced that it has joined an international partnership supporting arXiv, one of the major scientific repositories in the areas of physics and mathematics which is operated by Cornell University Library (New York, US). The ERC is the first European research funding organisation to join the arXiv initiative. By doing so, the ERC reaffirms its commitment to open access and to ensuring that the fruits of the research it funds can be freely accessed, read and used, both by scientists working in relevant areas and by the public.

[Source: http://euro-math-soc.eu/news.html] News/etter readers might also like to note that the EMS website has direct links to several preprint archives and digital libraries: see http://tinyurl.com/kxes7jc.

International Commission on Mathematical Instruction (ICMI)

From 1 January 2013 to 31 December 2016 the ICMI has a new President: Ferdinando Arzarello, a full professor at the Department of Mathematics, University of Turin, Italy. An interview with the new president, to capture his feelings and plans for the ICMI, can be seen in EMS *Newsletter* September 2013, pp. 48-49.

Mathematical Formula Search

EMS Newsletter September 2013, pp 56-57.

Have you ever in a paper you are reading encountered an unfamiliar symbol and immediately wanted to know more about the object it denotes? Or an expression in a calculation for which you would like to analyse relevant literature? Or have you gotten stuck in a proof and wanted to know which identities are applicable so that you can progress? A traditional approach to such situations would be to consult an expert in the field, and this is certainly still a good idea in many cases. But you may not know of the right person, and even with an expert available one can hardly be sure that they will cover the vast complexity of modern development in mathematics. In particular, the retrieval of non-English literature remains a real difficulty here. You could also post your question on a forum like mathoverflow.net but, again, you have to hold to luck that the right person comes across this.

Maybe you would not even be desperate enough to try to employ a search engine like Google or Bing even though you know that they are optimised for finding word occurrences in documents. But formulae are not words and so results from traditional search engines are erratic. What we really need in the situations described above is a formula search engine.

To remedy this lack and to support mathematics research, the German Leibniz Association has funded a collaborative research project by ZentralblattMATH(zbMATH) and a group of computer scientists from Jacobs University Bremen. The goal of the three year MathSearch project, which started in March 2012, is to develop tools for information retrieval and literature access for mathematics. A first prototype is already available at zbmath.org and is ready to be explored by mathematicians; later, improved versions will be permanently integrated into the new zbMATH interface as an additional facet.

For the complete article see http://tinyurl. com/ljefx3s.

David Chillingworth LMS/EMS Correpsondent

LONDON MATHEMATICAL SOCIETY SOUTH WEST & SOUTH WALES REGIONAL MEETING

Monday 16 December 2013

Robert Recorde Room, Faraday Building, Swansea University

2 pm Opening of the meeting

- 2:10 pm Shahn Majid (Queen Mary, University of London) Reconstruction and quantisation of Riemannian manifolds
- 3:15 pm **Toby Stafford** (University of Manchester) Classifying noncommutative projective surfaces

4:20 pm Tea/Coffee

4:50 pm **Stefaan Caenepeel** (Vrije Universiteit Brussel) Bicategories, two-dimensional cohomology, Galois coobjects, pseudomonoids and the Brauer group

7 pm Dinner at Fulton House

These lectures are aimed at a general mathematical audience. All interested, whether LMS members or not, are most welcome to attend this event. To register and to reserve a place at the dinner, please contact the organisers (T.Brzezinski@swansea.ac.uk). The cost of the dinner will be approximately £30.

The meeting is a part of and is followed by a workshop on *Categorical and Homological Methods in Hopf Algebras* (17-19 December 2013). For further details contact the organizers (T.Brzezinski@swansea.ac.uk) or visit www.lms. ac.uk/events/meeting/South-West-and-South-Wales

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 estimate of expenses, may be addressed to the organisers.

http://newsletter.lms.ac.uk



FROM SPECTRAL GAPS TO PARTICLE FILTERS

Report

The talks at our workshop, held from 17 to 18 September 2013 at the University of Reading, varied from very theoretical to very applied topics. However, the main line of the meeting, namely pectral theory was represented in different proportions in most of them. In fact, it was even surprising how many connections between different areas have been become apparent.

There were three talks on the spectral properties of semigroups related to diffusions, affine processes, particle systems and self-similar Markov processes. The presentations focused on the fundamental questions related to the description of eigenfunctions, spectral expansions and spectral gaps, and open problems and challenges in this area. From these talks it became clear that these questions are of a high importance for the understanding of the behaviour of many stochastic processes, e.g. the first eigenfunction and the spectral gap between the smallest eigenvalue and the rest describe the quasistationary distribution and the speed of convergence towards it of the stochastic process conditioned to stay within a certain region or the particle system assumed to obey certain behaviour as a depiction of real world phenomena. These talks attracted several questions and discussions.

There was a special talk by E.B. Davies, FRS, who spoke on general difficulties arising from the spectral study of seemingly simple non-self-adjoint finite matrices. The message was clear – one must not expect the generality of results that we have for self-adjoint operators in the field of nonself-adjoint operators. The talk was very illuminative especially for the young researchers dealing with spectral theory.

A theoretical basis for a couple of applied talks was provided by the presentation of B. Lemmens on *Hilbert's metrics and positive*

operators. For the non-specialist it was very interesting to see how the action of positive operators to cones (suitable subsets of more general spaces) can have an analogue of the spectral gap and this can guarantee a geometric norm convergence to an eigenvector. The restriction of the operators on cones often suffices for applications. This was extremely well demonstrated by the talks of D. Steinsaltz, G.L. Magno and J. Broecker. The first focused on population growth rates in random environments, and some new theoretical results on the evolution of diapause and migration whereas the latter two focused on random maps and their invariant measures. Thus, the applications varied from biology to meteorology and this spurred huge interest. The topic of particle filters was covered in the talks of G.L. Magno and J. Broecker.

D. Crisan spoke about stochastic filtering and his latest contributions to the area of approximating the semigroup of perturbed diffusion. There were more statistical talks at our workshop too. T. Kypriaos and R. Everitt presented their results and methods related to approximations in various statistical models, including particle systems.

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There were also several talks that added to the content of the workshop. G. Fort spoke about latest developments in MCMC (Markov chain Monte Carlo) and M. Holland introduced to us the problems arising in the extreme value theory, whereas K. Law made a presentation about recent progress in the area of filtering the Navier-Stokes equation.

In general the workshop presented a very wide range of topics, the speakers complemented the talks of each other and there were many interesting questions and discussions. We would like to thank very much the London Mathematical Society as well as the Department of Mathematics and Statistics of the University of Reading for their strong support of this workshop.

> Richard Everitt University of Reading

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MATHEMATICAL CHALLENGES IN BUBBLES AND BIOLOGICAL FLUID DYNAMICS

Report

On Thursday 19 September 2013, the School of Mathematics, University of Birmingham hosted a conference to celebrate the career of Professor John Blake, titled *Mathematical Challenges in Bubbles and Biological Fluid Dynamics*, bringing together thirteen internationally-distinguished speakers, plus 36 participants. The meeting included many of John's current and former colleagues and students, representing 16 academic institutions and five companies. The meeting was generously supported by the London Mathematical Society and the Institute of Mathematics and its Applications.

The first session of the meeting focused on mathematical modelling of bubbles and particulate flows. The opening speaker was Professor Werner Lauterborn (Third Institute of Physics, Germany), focusing on ultra high speed imaging and the use of finite volume codes for approximating solutions to the Navier-Stokes equations, simulating the jetting process, and taking into effects such as fluid compressibility. This presentation was followed by Professor Chris Brennen (CALTECH, USA), who gave a very entertaining talk titled *Bubbles I Have Known and Loved*, with highlights including the role of mathematical modelling in the de-



Mathematical Challenges in Bubbles and Biological Fluid Dynamics Conference held at the University of Birmingham on 19 September 2013

sign of the liquid fuel pumps in the Space Shuttle, and footage of his exploits on the 'vomit comet' zero gravity aircraft! Dr Georges Chahine (Dynaflow Inc., Maryland, USA), followed, with a talk on Material Pitting from Collapsing Bubbles. A Boundary Integral technique was used to model the dynamics throughout most of the bubble's lifetime, with a Finite Element method used to model the final stage of the bubble collapse and the interaction with the underlying solid surface. Professor Andrea Prosperetti (John Hopkins University, USA), then discussed how combining classical mathematical solutions (Lamb's solution of the Stokes flow equations) with finite difference solution of Navier-Stokes, implemented on state of the art GPU technology, can be used to provided efficient and accurate computation of flow with suspended particles. The final talk in the session was given by Dr Steve Otto (Roval and Ancient Golf Club of St. Andrew's), on the mathematics of golf. Steve traced the recent history of modelling and experiment applied to control technical developments in the sport, originating from work initiated by John Blake in Birmingham. An informal buffet lunch followed the first session, including posters by early career attendees working on bubble dynamics and free surface problems.

The second session of the meeting began with a talk on experiments and lubrication theory models of geometry-induced bubble instability by Professor Anne Juel (University of Manchester), followed by a discussion of a diverse set of *Industrial Free Boundary Problems*,

> including glass manufacture, chocolate, semiconductors, injection moulding and shipbuilding, given by Professor John Ockendon, FRS. The remainder of the session addressed the other major topic of the meeting and John Blake's career, *biological flow.* Dr Suzanne Fielding (University of Durham), discussed *Hydrodynamics and Phase Behaviour of Active Fluids*, including

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the effect of dimensionality on clustering of model microorganisms; Dr Rachel Bearon (University of Liverpool), described how the popular concept of plankton as *Passive Drifters* does not do justice to the complex dynamics of active suspensions, presenting new predictions on the role of helical swimming behaviour.

The final session continued the theme of biological flow, with Dr Eric Lauga (University of Cambridge), returning to John Blake's 1971 work on the method of images for elementary Stokes flows near a plane boundary, and the continuing influence this method has on biological fluid dynamics. Professor Xiaoyu Luo brought in the theme of physiological mechanics, and the role of fibre orientation in abdominal arteries, via nonlinear elasticity modelling. This talk was followed by Professor Tim Pedley FRS, who returned to John Blake's earliest research study on squirming spheres. and its continuing influence today, for example in modelling Volvox colony dynamics. Professor Ray Goldstein FRS was unable to be at the meeting in person, but instead sent slides and an audio recording, titled A Short Story in Honour of John Blake. Though not present in person, Ray nevertheless captivated the audience with his audio description and images, closing by explaining, via the Blake method of images, the dependence of Volvox bound-state dynamics on colony size. Dr Dave Smith then gave a talk on John Blake's contributions to the problem of left-right symmetry breaking in the vertebrate embryo, showing how another elementary formula accurately describes the dependence of the earliest left-right asymmetric

flows on cilia geometry.

Bringing the friendly and informal meeting to a close, John Blake thanked each speaker individually, all of the attendees, and LMS and IMA, before paying tribute to absent friends. In particular John mentioned the major influences of the late Professors James Lighthill and Ernie Tuck, and Dr Don Gibson. Reflecting on his career so far, John remarked, 'I've had a lot of fun!' reminding everyone that academic work should always be a pleasure and a privilege.

> Dave Smith University of Birmingham





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CECIL KING TRAVEL SCHOLARSHIP

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

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

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

Applications should be made using the form available on the Society's website (www.lms.ac.uk/content/cecil-king-travel-scholarship) or by contacting education@lms.ac.uk. The closing date for applications is **Friday 7 March 2014**. It is expected that interviews will take place in London in late April or early May.

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



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.

Application deadline is 31 December 2013.

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)

A. Gorodnik (Bristol)

B. Weiss (Tel Aviv)

Organisers: D. Badziahin (Durham) N. Peyerimhoff (Durham) A. Ghosh (UEA) T. Ward (Durham)

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

BRITISH MATHEMATICAL COLLOOUIUM 2014

The 66th British Mathematical Colloquium will take place at Queen Mary University of London from 7 to 10 April 2014.

Plenary speakers:

- Michael Atiyah (University of Edinburgh)
- Persi Diaconis (Stanford University)
- Robert Guralnick (University of Southern California)
- Ngô Bào Châu (University of Chicago)
- Endre Szemerédi (Rutgers University)
- Cédric Villani (Université Lyon 1)
- Claire Voisin (École Polytechnique)
- Don Zagier (MPIM Bonn)

Professor Perise Diaconis will give a public lecture on the life and work of Martin Gardner on the occasion of the centenary of his birth.

Morning speakers will include:

Christine Bachoc (Bordeaux)

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- Alexandre Borovik (Manchester)
- Martin Bridson (Oxford)
- Toby Gee (Imperial College)
- Daniela Kühn (Birmingham)
- Vladimir Markovic (Cambridge)
- Corinna Ulcigrai (Bristol)
- Andrei Yafaev (University College London)

Afternoon workshops:

- Combinatorics
- Ergodic Theory
- Geometry
- Group Theory
- Number Theory

Scientific Advisory Committee:

- Peter Cameron (Queen Mary University of London)
- Ben Green (Cambridge)
- Minhyong Kim (Oxford)
- Angus Macintyre (Queen Mary University of London)
- Richard Thomas (Imperial College London)

Registration opens on 1 November 2013 through the conference website: www.maths.qmul.ac.uk/bmc2014.

Contact: Ivan Tomašić or Behrang Noohi at bmc2014@qmul.ac.uk.

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

MATHEMATICS AT THE **BRITISH SCIENCE FESTIVAL**

Newcastle, 6-12 September 2013

Report

The British Science Festival has been running, under a variety of names, since 1831.

The Mathematical Sciences Section of the Festival is a small committee which solicits ideas for events from the mathematical sciences community and aims to put on a programme covering a wide range of interests within the discipline, including statistics and aspects of computer science. Each vear they choose a Presi-



the best.

of interested members of the public, schoolchildren and the press. There are always well-known scientists giving 'star lectures' but the majority of the programme is, like the contribution from mathematical sciences, less sensational but no less authoritative for that. There are also intermedi-

Climate Change: Does it Add Up?

dent from among those well-known for their ability to communicate to a wide audience; recent Presidents have included Simon Singh. David Spiegelhalter, Caroline Series and John Barrow: this year's President is Celia Hoyles OBE, of the Institute of Education and President-Elect of the IMA. For 2014, when the Festival will be in Birmingham, the President will be Professor Peter McOwan, a Vice-Principal at OMUL and author with Matt Parker of The Magic of Computer Science. Matt, the Standup Mathematician, regularly presents their joint show The Maths and Computing Magic Show at the Festival and this year there were two performances during the Family Weekend, on

Saturday, attracting audiences of adults and children to the Discovery Museum in Newcastle. On a similar theme, Steve Humble, Dr Maths and now based at Newcastle University, presented his Randomness Show on the Sunday. Maths Busking in the City Centre was organized by Sara Santos. Sara also introduced the public to the idea of a Museum of Mathematics (MathsWorldUK) at sessions in the International Centre for Life

maths underlying Google Search, the Clay Millennium Prizes (principally boundedness of solutions to the Navier-Stokes equations and including the famous film of the collapse of the Tacoma Narrows Bridge in 1940) and the early history of the solution of cubic equations, where the issue was not so much winning large sums as Be a Maths Millionaire preserving your reputation or

avoiding being killed in a duel. lain Bethune (EPCC, Edinburgh) talked about the hunt for ever larger explicit primes, and the involvement of huge numbers of personal computers through the PrimeGrid initiative.

Celia Hovles in her Math Sciences Presidential Lecture, Do The Maths: Potential and Challenges of the Digital Age, made

and, together with Katie Steckles, a colleague

of Matt Parker's, represented Maths at a 'Sec-

tions Evening' on Tuesday where the different

disciplines could entertain the public. Everyone

I spoke to agreed that the 'Maths Table' was

The main thrust of the Festival is presenta-

ate examples; one is the extraordinary Festival

of the Spoken Nerd in which the irrepressible

Matt Parker also participates, combining real

science with songs and stand-up comedy. An-

other very different example was provided

by the European Mathematical Society, in a

session Be a Maths Millionaire given by Sara

Santos, Ehrhard Behrends (Berlin) and Jorge

Buescu (Lisbon). This was a rapid tour of the

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Mun

Ehrhard Behrends

the case for judicious introduction of digital technology into the classroom. She started with altogether alarming archive footage of



Teaching Mafrom chines 1950s the moved but through to video games, computer programming and anima-

B.F. Skinner's

Celia Hoyles

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tion, suggesting that even though these could not be fully explained, there was considerable value in digging down a little of the way below the surface to show how they work, allowing school students, for example, to design their own simple mobile games. Celia's lecture was followed by a wine and sandwiches reception generously sponsored by the IMA.

Chris Budd, together with Peter Cox from Exeter and Vicky Pope from the Met Office, gave a presentation, followed by lively discussion, on Climate Change: Does it Add Up? They took the large audience through simple climate models based on physical laws; uncertainty, caused both by nature's randomness and by human ignorance; calibration of models using historical data: and the new weatherforecasting and climate predication models being used at the Met Office using smaller grids and increased computing power. These can take into account such seasonal variation as the movement of the jet stream, the El Nińo phenomenon, ice retreat in the Arctic and the solar cycle, though not as yet the melting of the permafrost for which the science is not yet

understood. Chris and his team had a successful news conference after their event. The Mathematical Sciences Section is actively seeking proposals for the 2014 Festival and

ideas and offers of help should be sent to Peter Giblin (pigiblin@liv.ac.uk) Chair of the Section.

> Peter Giblin FIMA Recorder (i.e. Chair) Mathematical Sciences Section

LMS POPULAR LECTURES

King Edward's School Birmingham 26 September 2013

Report

Dimmed lights. The hubbub of a chattering audience. Anticipation tangible in the air.

The lectures begin. First up, Professor Ray Hill on how maths is used in the courtroom. After explaining the intricacies of DNA evidence, Profiling Evidence, Salt Poisoning and his own area of expertise 'Cot Deaths', Professor Hill leads us down the many small roads and alleyways that illustrate the deceiving powers of statistics in the courtroom, covering many cases and showing many potential fallacies that can mislead the jury (such as confusing the probability of a match in a DNA turning up with the chance that the defendant were guilty). With many different formulae and probabilities floating around in our heads, each new case presented and each new concept explained adds a layer of truth to our perception of use of evidence in the courtroom and how we, as mathematicians, should view this evidence as weak or strong while constantly avoiding dangerous fallacies that could lead to a miscarriage of justice.

After an hour of thought-provoking material, and half an hour of light-hearted refreshments, the second lecture commences: Dr Vicky Neale on 'addictive number theory', a subject title humorously inspired by a typing error. After considering some squares and some prime numbers, Dr Neale moves the subject onto some of the great unsolved problems in number theory, such as the Goldbach Conjecture and the problem of the twin primes. After giving a fleeting view of these famous problems, she shifts onto a seemingly more complicated problem of how many nth powers of numbers are needed to make any number. And suddenly in one slide of mathematics, the presentation gets more complicated with lines of error terms and complex sigma notation. But the audience are not left completely stranded: after explaining her deep love for

number theory and for mathematics, Dr Neale leaves us with at least one comforting thought which I personally shall never forget "If it looks difficult, approximate".

Two talks, two tales of dedication and love of maths, two intriguing subjects. What more could a mathematician want?

Clement Chan

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VISIT OF RUSTEM GARIFULLIN

Dr Rustem Garifullin (Department of Differential Equations, Institute of Mathematics of RAS, Ufa Branch, Russia) will be visiting the UK from 26 November to 14 December 2013. His expertise is in the discrete and continuous integrable systems and their symmetries, asvmptotic expansions for the solutions of nonlinear equations and resonances in non-linear equations. During his visit Dr Garifullin will give lectures at:

- · Loughborough University, School of Mathematical Sciences, Wednesday 27 November. Generalized symmetry classification of discrete equations of a class depending on twelve parameters (Contact: V. S. Novikov -V.Novikov@lboro.ac.uk)
- University of Kent at Canterbury, School of Mathematics. Statistics and Actuarial Science, Tuesday 3 December, Quad equation with a non-standard generalized symmetry structure (Contact: Jing Ping Wang - J.Wang@kent.ac.uk)
- University of Leeds, School of Mathematics, Fridav 13 December, Affine and finite Lie algebras and integrable Toda field equations on discrete spacetime (Contact: A. V. Mikhailov - A.V.Mikhailov@leeds. ac.uk)

Dr Garifullin will also attend the Integrable Systems Day at Loughborough University. Friday 29 November and the workshop Algebraic Methods in Theory of Differential and Difference Equations which will be held at University of Kent at Canterbury from 6 to 7 December 2013.

Dr Garifullin will be based at the Depart-

ment of Applied Mathematics, University of Leeds. For further information contact A. V. Mikhailov (A.V.Mikhailov@leeds.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF FRANCOISE DAL'BO

Professor Francoise Dal'Bo (University of Rennes 1) will visit the UK from 8 to 13 December 2013. Professor Dal'Bo's research interests include topological and metrical dynamical systems in negative curvature, with applications to number theory. Her text Geodesic and Horocyclic Trajectories has recently been published in English by Springer. She will lecture at the following institutions:

- University of York, Monday 9 December at 14.00
- University of Warwick, Tuesday 10 December at 14.00
- Open University, Thursday 12 December at 16.00

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Further details about the visit can be obtained from Ian Short (ian.short@open.ac.uk). The visit is supported by an LMS Scheme 2 grant.

NUMERICAL ANALYSIS AND COMPUTATIONAL **STATISTICS**

A half day event, Interfaces between Numerical Analysis and Computational Statistics, will be held at the University of Southampton. The meeting will take place in the Mathematics Building at Highfield campus on Wednesday 15 January 2014, with the talks starting in the early afternoon and followed by a reception and dinner. Speakers will be:

- Mark Girolami (University College London)
- Andrew Stuart (University of Warwick)
- Konstantinos Zygalakis (University of Southampton)

If you are interested in attending this event or would like further information send an email to Konstantinos Zygalakis (k.zygalakis@ soton.ac.uk). There is a registration fee of

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£15 while a small amount of funding to support travel (by rail) for graduate students and young researchers might be available. Further details can be obtained at the webpage www.personal.soton.ac.uk/kz1e11/workshop. htm. The meeting is supported by an LMS Conference grant to celebrate new appointments and the University of Southampton.

GRAPHS, GROUPS AND PROBABILITY

A meeting on *Graphs, Groups and Probability* will be held at the University of Warwick on Thursday 28 November 2013 in celebration of the recent appointment of Agelos Georgakopoulos. It will consist of talks given by the following speakers:

- Nathanael Berestycki (University of Cambridge) Condensation of random walks and Wulff crystal
- Imre Leader (University of Cambridge) Euclidean Ramsey theory

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• Agelos Georgakopoulos (University of Warwick) Discrete Riemann mapping and the Poisson boundary

If you are interested in attending please contact Agelos Georgakopoulos (a.georgakopoulos@warwick.ac.uk). The meeting is supported by an LMS Conference grant to celebrate new appointments. For further information visit the website at http:// homepages.warwick.ac.uk/~maslar/Nov28. html.

COMBINATORIAL PHYSICS

A workshop on *Combinatorial Physics* will be held at the School of Mathematics, Cardiff University from Tuesday 17 to Thursday 19 December 2013. Combinatorial physics refers to both the use of combinatorial theory to interpret or understand phenomena in physics, and conversely the use of techniques from physics to solve purely combinatorial problems. The workshop will aim to bring together mathematical physicists and pure mathematicians working on a range of topics within combinatorial physics. Speakers will include:

- Mireille Bousquet-Mélou (Bordeaux)
- Luigi Cantini (Cergy-Pontoise)
- Mark Dukes (Strathclyde)
- Ilse Fischer (Vienna)
- Paul Martin (Leeds)
- Paul Zinn-Justin (UPMC, Paris)

Anyone interested is welcome to attend. Further information can be obtained from http:// mathsevents.cf.ac.uk/combphys2013/ or from Roger Behrend (behrendr@cardiff.ac.uk). The workshop is supported by an LMS Conference grant, the Mathematical and Theoretical Physics Group of the Institute of Physics, and the Wales Institute of Mathematical and Computational Sciences. Limited funds are available to support research students who wish to attend.

NETWORK CODING, PARTITIONS AND SECURITY

The Network Coding, Partitions and Security meeting will be held at the School of Engineering and Computing Sciences, Durham University on 20 November 2013 in celebration of the recent appointment of Maximilien Gadouleau. It will consist of talks given by the following speakers:

- Rosemary A. Bailey (St Andrews and Queen Mary)
- Simon Blackburn (Royal Holloway)
- Maximilien Gadouleau (Durham)

The meeting is free of charge, though if you are interested in attending please register by contacting Maximilien Gadouleau (m.r.gadouleau@durham.ac.uk). The meeting is supported by an LMS Conference grant to celebrate new appointments. For further information visit the website at www. dur.ac.uk/m.r.gadouleau/networkcoding.html.

2013 COLLINGWOOD LECTURE

Professor Peter Higgs (Nobel Prize in Physics 2013) will deliver this year's Collingwood Lecture at 4.15 pm on Tuesday 5 November, in the Calman Learning Centre at Durham University. He will give an overview of his insightful theoretical prediction of the so-called Higgs boson, an elementary particle recently observed at CERN. In order to put his

presentation into context, it will be preceded by an introduction to the topic by Professor Steve Abel.

Admission is by (free) ticket, allocated on a first-come-first-served basis: register at www.. dur.ac.uk/conference.booking/details/?id=251

This annual lecture series was established in memory of Sir Edward Collingwood, President of the London Mathematical Society (1969-70). The lectures are given by mathematicians of international renown, and are suitable for a general audience. More details may be found at www.dur.ac.uk/mathemati cal.sciences/events/collingwood.

6TH DIDEROT MATHEMATICAL FORUM

The cycle of conferences 'Diderot Mathematical Forum' was introduced by the EMS in 1996. Each conference takes place simultaneously in three European cities exchanging information by telecommunication, addresses a specific topic, and has both a research and a public component. So far, there have been five Diderot Mathematical Forums: Mathematics and finance (London, Moscow, Zürich, 1996), Mathematics and environment: Problems related to water (Amsterdam, Madrid, Venice, 1997), Mathematics as a force of cultural evolution (Berlin, Florence, Krakow, 1998), Mathematics and music (Lisbon, Paris, Vienna, 1999, Mathematics and telecommunications (Eindhoven, Helsinki, Lausanne, 2001).

As 2013 is the International year of Mathematics of planet Earth (MPE2013, http://mpe2013.org/), the Committee for Raising the Public Awareness of Mathematics of the EMS initiated the renewal of the cycle for 2013, with the topic Mathematics of Planet Earth.

Professors Mireille Chaleyat-Maurel (UFR Mathématique et Informatique, Université Paris Descartes, Paris) and Franka Miriam Brueckler (Department of Mathematics, Faculty of Science, Zagreb) have been chosen as coordinators of the event.

The conference is to be held on 17 December 2013 in Berlin (Germany), Exeter (United Kingdom) and Zagreb (Croatia). The sites of the conference will be:

- Urania Berlin e. V., An der Urania 17, 10787 Berlin
- College of Engineering, Mathematics and Physical Sciences, University of Exeter, North Park Road, Exeter EX4 4QF
- Department of Mathematics, Faculty of Science, University of Zagreb, Bijenička 30, 10000 Zagreb

The local organisers are as follows: Ehrhard Behrends (behrends@mi.fu-berlin. de); Iva Kavčič (I.Kavcic@exeter.ac.uk) and Margriet Groenendijk (M.Groenendijk@ex eter.ac.uk); Marko Vrdoljak (marko@math.hr) and Goran Igaly (igaly@math.hr).

In each of the cities several talks on applications of mathematics to various topics related to planet Earth (meteorology and climate, oceanology, ecology, crystallography, etc.) will be given, and the conference will end with a round table discussion held simultaneously in all the three cities. All the talks will be broadcast over the Internet, as well as recorded to be available online later. The tentative list of speakers is as follows:

- Berlin : Rupert Klein, Björn Stevens, Carlo Jäger
- Exeter: Mark Baldwin, Robert Beare (to be confirmed), Matthew Collins, Peter Cox, David Stephenson
- Zagreb: Eduard Marušić-Paloka, Branko Grisogono, Senka Maćešić & Nelida Črnjarić-Žic (joint talk), Franka Miriam Brueckler & Vladimir Stilinović (joint talk).

All information can be found at mathemat ics-in-europe.eu, at the EMS webpage, and on local pages of the organising institutions. To register please email dmf_fmb_mcm@yahoo. com or contact a local organiser.

INTEGRABLE DAY AT LOUGHBOROUGH

A half-day workshop on *Integrable Systems and Quantum Geometry* will be held at Loughborough University on 29 November 2013, Room KG107 from 1.30 pm. The speakers are:

• Leonid Chekhov (Loughborough) Quantum Riemann surfaces

er@lms.ac.uk

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- Kirill Krasnov (Nottingham) Quantization of geometric structures
- Alexander Molev (Sydney)
 Commutative subalgebras in Lie-Poisson
 algebras and their guantization
- Konstanze Rietsch (King's College London) Grassmannians through the mirror

The meeting is part of a collaborative workshop series on Classical and Quantum Integrability, supported by an LMS Scheme 3 grant, involving Edinburgh, Glasgow, Leeds and Loughborough Universities. Funds may be available to support the attendance of research students. Enquiries should be addressed to the organiser: A.P.Veselov@ Iboro.ac.uk or 01509 222866.

BSHM CHRISTMAS MEETING

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This year's British Society for the History of Mathematics (BSHM) Christmas Meeting also celebrates its President Robin Wilson's 70th birthday. The meeting takes place from 10.00 – 17.00 on Saturday 7 December 2013 in the Birmingham and Midland Institute, Margaret Street, Birmingham B3 3BS. Speakers include: • Allan Chapman (Oxford)

- Gareth Roberts (Bangor)
- Jane Wess (London)
- Leo Rogers (Oxford)

Robin Wilson (OU and Oxford) will give his Presidential Address: *In the footsteps of Major MacMahon: the combinatorics that counts*. For further details see the BSHM website www. bshm.ac.uk.

NONCOMMUTATIVE GEOMETRY

A one-day meeting on *Noncommutative Geometry* will be held in Glasgow on Friday 29 November 2013. The meeting will take place in the School of Mathematics and Statistics of the University of Glasgow, with talks starting at 2:30 pm. The speakers are:

- Jacek Brodzki (Southampton)
- Ryszard Nest (Copenhagen)
- Christian Voigt (Glasgow)

Anyone interested is welcome to attend. Some funds are available to contribute to travel expenses of external participants. Further details can be obtained from the webpage at www.maths.gla.ac.uk/~cvoigt/ncgglasgow. html. The meeting is supported by an LMS Conference grant and the Glasgow Mathematical Journal Trust.

OBITUARIES JOHN WATSON

Dr John Waton, who was elected a member of the London Mathematical Society on 17 February 1995, died on 16 July 2013, aged 83. *Trevor Stuart writes*: John

Watson was born in 1930 in the Scottish County of Fife, living as a child in Cellardvke, which is close to Anstruther on the Firth of Forth. His father was the captain of a fishing boat from Anstruther. His mother, whom I met in 1958 in Cellardyke during a break from the International Congress of Mathematicians in Edinburgh. was very hospitable. He had two brothers. After attending a primary school in Fife, John entered Robert Gordon's College in Aberdeen for his secondary education and followed this by joining the University of Aberdeen to study mathematics, which was by far his major love academically. It was in Aberdeen that he met his future wife, Eve, who hailed from the Orkneys and whom he married in 1955. After graduation from Aberdeen he was awarded a scholarship to study for a post graduate degree in Aeronautical Engineering in the University of Cambridge. following which he joined the National Physical Laboratory (NPL) in its Aerodynamics Division, which was natural in view of his studies in Cambridge. It was there that I first met John in 1954. as he and I worked in the same Theoretical Section. From 1966 until his retirement in 1995 he was a member of the Faculty of the School of Mathematics (initially the school of Mathematics and Physics) at the University of East Anglia. where he was a dedicated teacher who was well-liked by all his students; there he showed a preference for the purer aspects of mathematics.

which was ironic as his research achievements lay in applied mathematics, as is emphasized below. During the 1960s John spent a year as a visitor at the Rensselaer Polytechnic Institute in Troy, New York, where he pursued his research and commenced teaching of mathematics.

In his research John was primarily distinquished for his work on nonlinear instability waves in fluid flows, as one possible precursor to turbulence; in this he followed in the tradition of the theoretical physicist L.D. Landau in the early 1940s and the present writer in the late 1950s. They had outlined the way in which nonlinear waves might be studied by means of an amplitude equation. Details were left to other mathematicians to study and to clarify, one of whom was John, who took up the challenge and was, I believe, the first to calculate higher-order terms beyond the cubic term in an equation of the form dA[t]/dt = aA + higher powers of Aand |A| for the amplitude A of the wave, where a is a known parameter. This was a fine achievement, which is regularly guoted today (much to the astonishment of John, who was so modest).

John was such a likeable, albeit modest, man, who was respected by all who met him and who will be long remembered for his personal qualities as well as for his research achievements.

REVIEWS

ELLIPTIC TALES by Avner Ash and Robert Gross, Princeton University Press, 2012, 280 pp, £19.95, ISBN: 978-0-691-15119-9.

This book aims to explain, to a beginning

mathematics student, confident in calculus and prepared to engage with formulas, the ideas and mathematical terms that appear in the celebrated Birch--Swinnerton-Dyer conjecture, or the 'BSD conjecture' as we are encouraged to call it. The BSD conjecture is one of the milliondollar Clay problems, so this is a not a walk in the park. The authors, who are practising number theorists rather than primarily mathematics popularisers, have form — this book follows their elementary introduction to Fermat's Last Theorem *Fearless Symmetry*.

If you don't know the BSD conjecture, here is a guick idea of it. Plane conics, the circle v^2 = $1 - x^2$ for example, can be solved by rational numbers x,y. There are either no solutions at all, or infinitely many that you can reasonably treat as being a copy of the rationals and then enumerate. The answer is algorithmic in either case, and in this example you know x=3/5, y=4/5 and all their Pythagorean buddies. One might think of plane cubics, $y^2 = x^3 + 1$ for example, as being just one degree harder, but the truth is a lot more fun. The rational solutions form a group. the Mordell-Weil group, and its rank, the number of independent copies of the integers in it, is an invariant of the cubic; the rank of the example above is zero. There is no known algorithm to calculate this rank in general (although in many practical cases it is possible). The BSD conjecture includes a formula that relates this rank in a very precise way to a range of other arithmetic data, in particular to the order of pole at s=1 of and L-function constructed from the number of solutions of the very same plane cubic over all finite fields.

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The book does a far better job of explaining the BSD conjecture, of course, and in some technical detail. It tells the story in 15 chapters, the `tales' of the title, under three broad headings. First some background algebra: fields and their closures, curves and projective geometry, and intersection theory and Bézout's theorem. Then the basic arithmetic theory of elliptic curves: adding points as a group law, singulari-

ties, and the group structure over the rationals. Thirdly a ground-up account of generating functions, Dirichlet series, Zeta-functions, analytic continuation, L-functions, all finally tied together in the sttement of the BSD conjecture.

This is certainly not a text book. Although you might recognise the outline of a senior undergraduate coursein elliptic curves from the list of subjects above, this book does not teach that material. But it does give a real flavour of all of those



http://newsletter.lms.ac.ul

topics, and it goes out of its way to motivate them in elementary terms, and to explain what benefits come from the various abstract machines it introduces. And ultimately it succeeds in exposing the workings of the BSD conjecture.

What about the claim that a beginner, with only basic calculus and algebra, and some nerve for formulas, could read this book? Can they seriously learn what a torsion point is? I think yes (although I didn't manage to test drive it). There are no proofs, but there are precise statements, and honesty about tricky points where some things are swept under the rug. There are even a few simple exercises.

The book certainly gets tougher towards the end, and the target reader would have to be determined to get through. But the authors have done a remarkable job, and even if one doesn't quite finish, there are dozens of great ideas and results and stories to read throughout the text.

It may also have a good market at a slightly more advanced level. First-year undergraduates wanting to see abstract ideas being used for concrete purposes might enjoy the style. Final-

year undergraduates trying to navigate courses in elliptic curves or algebraic geometry, or to read casually in advance, might follow the ideas here as a companion to conventional lecture notes or textbooks.

This book is a lot of fun, and easy to recommend; indeed Swinnerton-Dyer himself does just that on the dust jacket.

Gavin Brown Loughborough University

LOVE & MATH The Heart of Hidden Reality by Edward Frenkel, Basic Books, 2013, 292 pp, £18.99, ISBN: 978-0-4650-5074-1.

This is a remarkable book. It has three; strands; firstly it is about Edward Frenkel's struggle, as a young Jew in the in the Soviet Union in the early 1980s to become a mathematician, secondly about the author's love affair with mathematics and thirdly, about explaining to the layperson some of the ideas about his research leading eventually to the Langland's programme. In the first chapter Edward tells



us that at first he found the maths he learned at school was boring, but he was fascinated by

at school was boring, but he was fascinated by quantum physics. A professor at a local college in the small town where he lived told him that to understand quantum physics he needed to understand group theory and

Love

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Math

The Heart of Hidden Realit

EDWARD

FRENKEL

began teaching it to him. Then he understood what real maths was about and became hooked. He writes "the deeper I delved into maths, the more my fascination began, the more I wanted to know. This is what happens when you fall in love." He was advised to apply to Moscow State University (MGU) and then his problems began. Frenkel's father was Jewish

and all sorts of obstacles were put in his way. It seems shocking that in 1984, only 30 years ago, anti-semitism was prevalent in many aspects of Soviet life, in particular at MGU. He did extremely well in his entrance exams but restrictions were put in his way. For example, he was asked in his oral exam to define a circle. He answered " a circle is the set of points in a plane equidistant from a single point. Wrong, said the examiner cheerfully. It is the set of *all* points in the plane equidistant from a given point." (This anti-Jewish discrimination is now well-documented, see for example "You failed your Math test, comrade Einstein", by M. Shifman.) Needless to say, Edward failed to get into MGU.

He was advised to attend the applied mathematics programme at the institute for oil and gas, where there was no anti-Jewish discrimination. There Mathematics was taught at a high level, but there was no really pure maths, so Edward found a sneaky way of attending seminars at MGU, and there he met many mathematicians. One of them, Dmitri Fuchs suggested he work on the problem of computing the Betti numbers of the commutator subgroup of the nth Braid group Bn. At the same time he attended the seminars of Gelfand, and worked with Boris Fegin on Kac-Moody algebras. As a result he was invited to Harvard in 1990 and later wrote his PhD thesis under Joseph Bernstein. We are now in the era of Gorbachev and Perestroika which resulted in many Russian mathematicians finding employment in the USA, many of whom Frenkel made contact with such as Vladmir Drin-

feld. Chapter 15, is written in the form of a screenplay. It starts in Drinfeld's office in Harvard. Drinfeld: "so the Shimura-Taniyama-Weil conjecture gives us a link between cubic equations and modular forms, but Langlands went much further than this. He envisioned a more general relation in which the role of a modular form is played by automorphic representations of a Lie group" Edward. "What's an automorphic representation?" and so it goes on. You don't get to understand the Langlands program but you are led to believe that something exciting is going on.

While telling his story, various ideas of mathematics are introduced: symmetry

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groups, braid groups, Galois theory, Fermat's last theorem, (elliptic curves, modular forms and Riemann surfaces), Lie groups, Kac-Moody algebras, the Langland's programme and its connections to physics. Throughout, the essential unity of mathematics is emphasised. A crucial chapter is Chapter 9, Rosetta Stone. This is based on a letter Andé Weil wrote to his sister while in prison during the second world war. Here Weil tells us about the role of analogy in mathematics, in particular between number theory and geometry. The Rosetta stone tells us how to translate between, number theory, curves over finite fields and Riemann surfaces. Frenkel sees the Langlands program as being an extension of this: relating representations of Galois groups of number fields, (number theory) to automorphic functions, (harmonic analysis.)

The final chapter is *Searching for the Formula* of *Love*. It is about a film the author wrote with Reine Graves (the director) and in which he plays one of the two characters. This has already been reviewed in the *Newsletter* (September 2010.) In this short and rather beautiful film, inspired by the Japanese film *The Rite of love and Death* by Yukio Mishima, a mathematician tattoos a mathematical formula on the body of his lover. In the words of the author

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"I wanted to show the intensity and passion involved in mathematical research. People tend to think of math as a stale, boring subject, and of mathematicians as bookworms, which couldn't be further from the truth. When you try to discover something new, something that no one has ever seen or understood before, you have to be very passionate about it, you have to be in love with it. It is a war with the unknown, a struggle unto death and the formulas you discover really get under your skin, that's how the idea of tattooing a formula came about."

Throughout the book the author write with passion about his subject. All mathematicians should be inspired by it.

This book has a facebook page www.face book.com/loveandmath.

> David Singerman University of Southampton

30 SEVENTEEN EOUATIONS THAT SAVED THE WORLD by Ian Stewart, Profile Books, 2012, pp 352, £8,99, ISBN 9781846685316

> This book takes an historical tour of the most fundamental, influential and important equations in mathematics. The book ranges from pure geometry in the form of Pythagoras' theorem, to physics via relativity and Schrödinger's equation, and even the world of finance, ending with the Black-Scholes equation.

Each chapter builds on what has gone before. The chapters on thermodynamics and gravity, for example, make clear that they fundamentally rely on the previously discussed concepts of Fourier transforms and calculus. Especially for the lav reader. this helps stress that even the most abstract ideas are used in day-to-day life (albeit often indirectly). Mentioning ideas more than once also adds a feeling of continuity – rather than an endless string of facts, one thinks of a web of ideas. The further one progresses through the book

context.

Stewart does not shy away from going into details. Some of these are relegated to the appendices (I can appreciate that not every

reader will want to see the formal definition of a limit), but it is nice to see them included. The majority of the details are in the main content however, and a good job is done of mixing them with examples and analogies. This allows the insightful reader to infer more than is written, whilst the content is still understandable to evervone.

There is an ongoing social commentary, especially in terms of historical context, making the equations and the mathematics more memorable. A particular highlight of this is the final chapter, which discusses the Black-Scholes equation. Great care is taken to show the very real effects that one equation can have on our world (no matter how abstract it may be). Ian Stewart points out that the current global financial problems were predicted in the mathematics community, and were contributed to by the misuse and misunderstanding of a simple mathematical equation. He takes the time to explain that whilst one can blindly use an equation and get a meaningful result, a lack of understanding and context will almost invariably lead to the result being misused.

In conclusion, this book gives a well rounded history of mathematics in a novel and interesting manner. By giving himself the broad topic of equations, Stewart has managed to present



a medley of different link them to each other This also limits the detail with which any one topic can be considered. Thus the book is probably best suited to mathematical enthusiasts. Such a reader will have a chance to see the beauty in mathematics that can be discovered in a short time by considering the right ideas. However,

the more one can place these ideas in a larger even the seasoned academic should appreciate this reminder of the breadth of his or her field.

> Joe Tait Southampton

CALENDAR OF EVENTS

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

NOVEMBER 2013

5 Collingwood Lecture 2013, Durham (430) 15 LMS Graduate Student Meeting, London (430)

15 LMS AGM, London (430)

16 Early Career Mathematicians' IMA Autumn Conference, University of Strathclyde, Glasgow

20 Network Coding, Partitions and Security, Durham (430)

28 Graphs, Groups and Probability Meeting, Warwick (430)

29 Integrable Systems and Quantum Geometry, Loughborough (430)

29 Noncommutative Geometry, Glasgow (430)

DECEMBER 2013

7 BSHM Christmas Meeting, Birmingham (430)

16 Interfaces between Numerical Analysis and Computational Statistics, Southampton 16 LMS South West & South Wales **Regional Meeting, Swansea (430)**

16-19 Categorical and Homological Methods in Hopf Algebras Workshop, Swansea (430)

17 6th Diderot Mathematical Forum 2013, Berlin, Exeter, Zagreb (430)

17-19 Combinatorial Physics Workshop, Cardiff (430)

18-20 LMS Prospects in Mathematics, **Durham University (430)**

JANUARY 2014 6-10 Free Boundary Problems and Related Topics, INI, Cambridge (428) 13-15 British Postgraduate Model Theory Conference, Leeds (429) 13-17 Inference for Change-point and

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Related Processes INI Workshop, Cambridge (428) 15 Interfaces between Numerical Analysis and Computational Statistics Meeting, Southampton (430)

17-19 Cryptography and Coding IMA Conference, St Anne's College, Oxford

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 (429) 28 Mary Cartwright Lecture, York

MARCH 2014 31 LMS Northern Regional Meeting, **Durham (430)**

APRIL 2014

1-5 Ischia Group Theory 2014, Naples, Italy (428)7-10 British Mathematical Colloquium. Queen Mary, University of London (430)

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



LMS-FUNDED MEETINGS

From Spectral Gaps to Particle Filters Workshop held at the University of Reading from 17 to 18 September 2013 (report on page 15)



Dan Crisan (Imperial College London)



Mark Holland (University of Exeter)

Mathematical Challenges in Bubbles and Biological Fluid Dynamics Conference held at the University of Birmingham on 19 September 2013 (report on pages 16-17)





Professor Tim Pedley, FRS (University of Cambridge)

Professor John Blake (University of Birmingham)