LONDON MATHEMATICAL SOCIETY

NEWSLETTER

No. 412 March 2012

Society Meetings and Events

2012

26–30 March
LMS Invited Lectures, Glasgow

Wednesday 18 April
LMS Meeting at BMC [*page* 5]

Friday 27 April
Women in Mathematics Day, London [*page* 21]

Saturday 19 May
Poincaré Meeting, London [*page* 13]

Wednesday 6 June
Northern Regional Meeting, Newcastle [*page* 9]

Tuesday 26 June
LMS Popular Lectures, London [*page* 5]

Friday 29 June
Meeting and Hardy Lecture, London

Monday 3 September
Midlands Regional Meeting, Aberystwyth

NEWSLETTER ONLINE:

Go to www.lms.ac.uk/newsletter

LMS COUNCIL DIARY

27 January 2012

A personal view

This was the first Council meeting of the year and the first with our new President, Dr Graeme Segal, in the chair. Graeme began by welcoming the new Council Officers and members-at-large: Robert Curtis (Treasurer), Tony Gardiner (Education Secretary), Elizabeth Mansfield and John Hunton; and thanking Robert Wilson for taking on the position of Programme Secretary. Then Graeme gave us the wonderful news that Council member Simon Donaldson had received a knighthood in the New Year Honours, and the Hardy Room rang out with enthusiastic applause as we all joined in with our congratulations to Simon.

Under President's business, Graeme provided Council with spirited descriptions of the functions he had attended while wearing his Presidential hat, including the presentation of the *Légion d'honneur* to Sir Michael Atiyah at the French Embassy. Graeme also set out his Presidential stall, saying that he hoped Council would be able to direct itself towards matters that it would wish to achieve rather than concentrating too much on process.

The most substantial item for discussion concerned the activities of the Joint Mathematical Council (JMC). Former Council member and LMS representative on JMC, Elizabeth Winstanley, who is also member of the JMC Executive, gave us a clear presentation of the structure and remit of JMC. From Elizabeth we learnt that since JMC acts only when there is a feeling of consensus, responses to consultations happen very rarely and that, more generally, JMC collates responses from member organizations. Council voiced its concern about communication between JMC and the LMS and improvements will be sought in this respect.

Don Collins reported on the work of the Scrutineers of the LMS elections in 2011. This was the first year in which ordered lists showing the ranking of all candidates had been presented at the AGM and published on the LMS website. Although this had been done with the best intentions and in the interest of openness, several Council members expressed unease and in particular felt that such a practice might deter younger members from standing for election. After a vigorous discussion, Council agreed that in future the published list would show only the successful candidates and in alphabetical order. Council also agreed that any candidate could, in confidence,

ask for more detailed information about the election results but that any information released would have all names bar that of the candidate making the enquiry blanked out.

Ken Brown, one of our two Vice-Presidents, reported on the EPSRC Pure Mathematics Workshop held in Bath from 19 to 20 January. It was clear that he and his fellow mathematicians had found it a profoundly depressing experience. Nothing of substance was discussed, with Shaping Capability and Post-Doctoral Research Fellowships not even appearing on the Agenda. All in all, the Workshop was judged to be a wasted opportunity by EPSRC to grapple with the real issues affecting pure mathematics. Ken told us that a joint letter from the mathematicians attending expressing their concerns was in the process of being written to the EPSRC.

The *MathsCareers* website was discussed. The site was developed and is maintained by the IMA, with funding contributions from the DfE and HE-STEM, as well as from the IMA itself. The LMS supports the site by contributing annually towards the running costs. The site is a useful careers resource for those interested in pursuing mathematics. Having been informed by the IMA of an intent to increase the IMA branding on the site we agreed that it would be appropriate for the LMS to explore with the IMA the possibility of increased LMS involvement. Any members with ideas for content for the site should get in touch with Tony Gardiner, Education Secretary.

Unfortunately we did not receive good news from the Website Working Group. Despite strenuous efforts, they have yet to find a developer to implement Phase 2 of the website but are searching hard. On a brighter note, Council agreed the Group's recommendation that, in a return to previous practice, a printed Members' Handbook should be prepared every two years, and it is expected that one will appear not long after the end-of-year membership renewal.

Finally, Martin Hyland, the General Secretary, brought to our attention that nowhere among all our paperwork do we appear to have any statement on the quorum required for decisions taken at Council meetings or indeed for decisions taken at meetings of any of the Society's Committees. Since it is important that we as Trustees act collectively and take decisions only when there is a healthy majority of Council members present, Martin recommended that we should set the quorum at two thirds and rounded down. After some discussion, Council agreed Martin's recommendation, an alternative recommendation of one half and rounded up being rejected.

June Barrow-Green

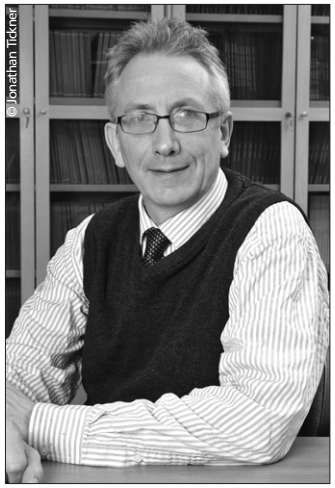
A LEADER IN HIS FIELD

LMS Council member Professor Simon Donaldson, FRS, has received a knighthood in the New Year Honours list. It is a hugely inspiring award and Sir Simon richly deserves the honour for his contribution to mathematics.

His distinguished career so far is summed up very well by the LMS President Dr Graeme Segal, FRS. 'Simon Donaldson revolutionised geometry in the 1980s by applying the Yang–Mills equations – the nonlinear partial differential equations that describe the "strong interactions" in particle physics – to the study of four-dimensional manifolds. It was a completely startling development, which settled long-standing questions and opened up whole new areas of progress. He has continued to lead the field ever since, and has supervised and inspired an enormous number of graduate students who have come from all over the world to work with him, as well as many more senior mathematicians.'

Sir Simon's interest in mathematics goes back to his early teens. As he says, 'At around 13 years old I became very interested in mathematics. I liked designing boats and started to read books on the subject and this led to mathematics becoming my primary interest'.

Sir Simon was educated at Pembroke College Cambridge where he graduated in 1979. He then moved to Oxford to work with Nigel Hitchin and Sir Michael Atiyah, and in 1983 he published his seminal paper entitled *Self-dual connections and the topology of smooth 4-manifolds*. This was the foundation of what would become known as Donaldson Theory. Today Sir Simon continues with his work, now centered on difficult problems in complex differential geometry, particularly the existence of the Kähler–Einstein metrics, making substantial progress in the area.



Sir Simon K. Donaldson

Sir Simon was awarded his DPhil in 1983 and was appointed a Junior Research Fellow at All Souls College, Oxford. From 1983 to 1984 he spent time at the Institute for Advanced Study at Princeton University, USA, returning to Oxford as Wallis Professor of Mathematics in 1985. He moved to Imperial College London in 1999 after spending a year at Stanford University, USA. He is currently Royal Society research professor in Pure Mathematics.

A number of prominent mathematicians have influenced Sir Simon throughout his career, including his supervisors at Oxford Sir Michael Atiyah and Nigel Hitchin. 'I learned much during my time at Oxford and in particular certain ways of thought'. He also admires the Russian mathematicians Grigori Perelman and Mikhail Gromov. Sir Simon is very effusive in his praise of both men. 'The things Perelman has done, in the depth and difficulty of his proof of the Poincaré conjecture, are really extraordinary. Gromov is a genius, completely exceptional.'

The future of mathematics is a concern for Sir Simon and he is critical of current EPSRC policies and the potential impact on UK mathematics. He also believes that 'the way mathematics is taught in schools is really the most important thing' and that 'there needs to be a continued supply of suitably qualified students'.

As well as gaining distinction in his research Sir Simon has also received various prestigious honours including the Fields Medal in 1986, at the age of 29. The previous year he had been awarded the Junior Whitehead Prize from the LMS and in 1987 he was elected a Fellow of the Royal Society.

Sir Simon's contributions to mathematics over the past 25 years have been remarkable and he joins the list of eminent mathematicians and scientists to receive a knighthood, which he received from Her Majesty the Queen in February. As Dr Graeme Segal said, 'I can think of no-one more deserving of a knighthood'.

URSULA MARTIN, CBE

The LMS would also like to congratulate Ursula Martin, Professor of Computer Science, Queen Mary, University of London on her award of a CBE 'for services to computer science'. Professor Martin has had a distinguished career, including becoming the first female professor in the history of St Andrews University. She is a member of the London Mathematical Society, having been actively involved for a number of years. She has served on both Council and the Women in Mathematics Committee and has also previously chaired the LMS Computer Science Committee.

A full-length article will be published in the April *Newsletter.*

CMS SUBMISSION TO HOUSE OF LORDS

In December the Council for the Mathematical Sciences (CMS) submitted a response to the call for evidence from the House of Lords Science and Technology Sub-Committee I, which is carrying out an investigation into 'Higher education in STEM subjects'. The submission is now available at www.cms.ac.uk/submissions.

I hope that the data and arguments which it contains will be useful for individuals, departments and institutions engaged in the defence of the mathematical sciences in the UK. The submission contains discussion of undergraduate and postgraduate numbers, employability of graduates, and funding of postgraduates and of research, and highlights the interconnectedness of these issues. Much of this builds on earlier policy documents, also available on the LMS web pages, but it also includes new material, perhaps most notably the results of a survey of the educational backgrounds of appointments to UK universities' mathematical science departments. The survey was carried out by the LMS in November 2011, specifically for this submission.

Preparation of the submission was led by the LMS, but involved substantial efforts by a number of people from all the participating societies of the CMS. Particular thanks should go to Penny Davies (Strathclyde), who did extensive archaeological work unearthing funding data; and to David Mond (Warwick), who organised and collated the survey of departments. Comments, queries and suggestions for further work are all welcome, and should be sent to myself (Ken.Brown@glasgow.ac.uk) or to Anne Bennett (Anne.Bennett@lms.ac.uk).

Ken Brown
LMS Vice-President

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Typeset by the London Mathematical Society 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.

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

THREE DECADES OF POPULAR LECTURES 1982–2012

The annual LMS Popular Lectures, delivered in London and held in some other centre, are entering a fourth decade. The lecture series started almost by chance after a small piece of coverage in *The Daily Telegraph* of a lecture to be given by Professor Enrico Bombieri resulted in a significant number of people contacting the Society asking to attend the lecture, which was intended for a quite different audience. Given the interest, the LMS in 1982 decided to host genuinely popular lectures aimed at a lay audience. Thirty years on, the event is still as strong as ever.

New Scientist (see http://tinyurl.com/7rtewsb) covered the first Popular Lectures in 1982, given by Professor Keith Devlin and Sir James Lighthill. Since then, a wide range of mathematical topics have been covered. The lectures now attract audiences of hundreds each year to venues in London and Birmingham.

To mark the 2012 event, Roger Penrose and Tim Gowers have agreed to give this year's Lectures. Advertising and details will follow in the next edition of the *Newsletter*, however members might like to note that the dates will be 26 June (London) and 26 September (Birmingham). We hope to welcome as many people as possible.

Tony Gardiner
Education Secretary

WOLF PRIZE 2012

The 2012 Wolf Prize in Mathematics has been awarded to **Michael Aschbacher** (Caltech), for his work on the theory of finite groups, and **Luis Caffarelli** (University of Texas at Austin), for his work on partial differential equations. The awards will be presented in May at the Knesset in Jerusalem. For further information about the Wolf Prize visit the website at www.wolffund.org.il.

LONDON MATHEMATICAL SOCIETY

MEETING AT THE BMC

Wednesday 18 April 2012 at 11.30 am

Keynes Lecture Theatre 1, University of Kent

Idun Reitun (Trondheim)

Quivers in representation theory

For further information email Elizabeth Fisher (meetings@lms.ac.uk).

The 2012 British Mathematical Colloquium (BMC) will take place at the Canterbury campus of the University of Kent from 16 to 19 April.

CRAFOORD PRIZE 2012

The Royal Swedish Academy of Sciences has awarded the 2012 Crafoord Prize in Mathematics to **Jean Bourgain** (IAS, Princeton) and **Terence Tao** (University of California, Los Angeles) 'for their brilliant and groundbreaking work in harmonic analysis, partial differential equations, ergodic theory, number theory, combinatorics, functional analysis and theoretical computer science'. For further information about the Crafoord prize visit the website at www.crafoordprize.se.

RAMANUJAN PRIZE

Award 2011

Professor **Philibert Nang** (École Normale Supérieure, Laboratoire de Recherche en Mathématiques, Libreville, Gabon) has been named the winner of the 2011 Ramanujan Prize for Young Mathematicians from Developing Countries.

The prize is in recognition of Professor Philibert Nang's outstanding contributions to the algebraic theory of *D*-modules. He has important classification theorems for equivariant algebraic *D*-modules, in terms of explicit algebraic invariants, and his results complement the insights obtained by others using perverse sheaves, and thus shedding new light on the Riemann–Hilbert correspondence. It is also in recognition of Professor Nang's determined pursuit of high-level research while engaged in an academic career in his home country of Gabon, Africa. It is hoped that his example will inspire other young African mathematicians working at the highest levels while based in Africa.

Philibert Nang

Call for Nominations 2012

Nominations for the 2012 award of the Ramanujan Prize for Young Mathematicians from Developing Countries are now sought.

The prize is awarded jointly by the Abdus Salam International Centre for Theoretical Physics, the Niels Henrik Abel Memorial Fund, and the International Mathematical Union. It is awarded annually to a researcher from a developing country less than 45 years of age on 31 December of the year of the award, who has conducted outstanding research in a developing country. Researchers working in any branch of the mathematical sciences are eligible. The prize is a $15,000 cash award supported financially by the Norwegian Niels Henrik Abel Memorial Fund. For further information visit the website http://prizes.ictp.it/Ramanujan. The deadline for receipt of nominations is **1 April 2012.** Nominations are to be sent to math@ictp.it.

VISIT OF S. NIVOCHE

Professor Stephanie Nivoche (University of Nice Sophia-Antipolis, France) will visit the UK from 19 to 27 March 2012. Her research is concerned with complex analysis in several variables, and in particular with the application of techniques from pluripotential theory to solve problems in approximation theory. Professor Nivoche will give seminars at:

- Queen Mary, University of London, 20 March
- University of Nottingham, 21 March
- King's College London, 22 March

Professor Nivoche will be based at Queen Mary, University of London during her visit. For further information contact the host Oscar Bandtlow (o.bandtlow@qmul.ac.uk). This visit is supported by an LMS Scheme 2 grant.

VISIT OF M. MARVAN

Professor Michal Marvan (Silesian University, Opava, Czech Republic), will be visiting the Department of Mathematical Sciences at Loughborough University during March 2012. His main research expertise is geometric theory of integrable partial differential equations. For details contact Professor E. Ferapontov (E.V.Ferapontov@lboro.ac.uk). The visit is supported by an LMS Scheme 4 grant.

VISIT OF I. KRASILSHCHIK

Professor Iosif Krasilshchik (Independent University of Moscow and Russian State University for the Humanities) will be visiting the Department of Mathematical Sciences at Loughborough University during March 2012. His main research expertise is geometric theory of integrable partial differential equations. Professor Krasilshchik will give the following talks:

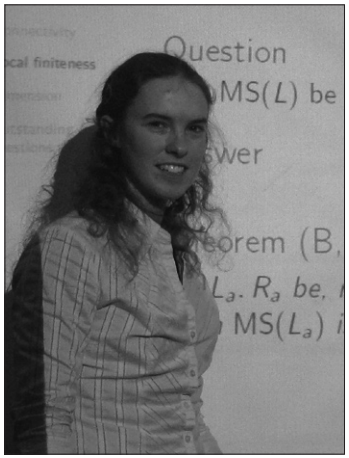
- Loughborough University *Natural coverings over PDEs and integrability*
- University of Leeds *Some algebraic constructions related to geometry of PDEs*
- Imperial College London *Cohomological invariants of integrable systems*

For further details contact Professor E. Ferapontov (E.V.Ferapontov@lboro.ac.uk). The visit is supported by an LMS Scheme 2 grant.

LMS CECIL KING TRAVEL SCHOLARSHIP 2011

Jessica Banks

Jessica Banks is a final-year doctoral student at the Mathematical Institute, University of Oxford working in low-dimensional topology, particularly knot theory. Thanks to the funding provided by the LMS Cecil King Travel Scholarship, Jessica had the unique opportunity to visit several institutions in the US for 12 weeks at the end of 2011. This included the University of California, Davis, the University of California, Santa Barbara, the University of California, Berkeley and Brigham Young University as well as the *Knots in Washington XXXIII* conference at George Washington University, Washington DC.



Jessica Banks

In her visit proposal, she laid out three main aims:

- to meet others working in low-dimensional topology and present her work
- to begin to collaborate with those in Davis who work in closely related areas
- to extend her knowledge of topics adjacent to her work

There are a number of world-class researchers based in California and over the course of her travels Jessica met topologists from different institutions and at different stages in their careers. At UC Davis she spoke at a student-run Geometry/Topology seminar and also had opportunities to talk about her work informally, with both mathematicians and non-mathematicians. At each of UC Santa Barbara, UC Berkeley and BYU Jessica presented her work at research seminars and spoke with a number of those who attended.

At Santa Barbara Jessica was particularly interested in the work of Yeonhee Jang on bridge spheres and three-bridge knots. Her results are very similar to those achieved by Jessica in her own work, but make use of different methods of proof. She hopes to take this further and examine whether their two sets of work can interact. She also had the opportunity to attend a graduate level course at Davis, *Differential Topology*, covering material such as the definition of smooth manifolds, differentials and de Rham cohomology, and Morse functions.

During her visit Jessica also heard a number of talks about other areas of mathematics, e.g. *Mathematics and the melting polar ice-caps*, which was presented at a one-day conference at Davis, aimed particularly at graduate students. The final session of *Knots in Washington XXXIII* focused on quantum computing, beginning with an introduction for those outside the field.

Not only did Jessica find her visit rewarding from a mathematical research viewpoint but it also highlighted some broader education issues. As she points out, 'in addition to having more emphasis on breadth than the UK [education] system, the US system is more individualistic and less linear in approach, with a greater focus on vocabulary and specific facts. This has the effect of meaning, when teaching mathematics, that less background knowledge can be assumed.'

For more information about the Cecil King Scholarship visit the LMS website at www.lms.ac.uk/content/cecil-king-travel-scholarship.

LONDON MATHEMATICAL SOCIETY

NORTHERN REGIONAL MEETING

Wednesday 6 June 2012

CCE-1 002 Lecture Theatre, Business School Building, Northumbria University

Programme:

2.00 Opening of the Meeting

Michael Mackey (McGill University)
A mathematical modeling study of neutrophil dynamics in response to chemotherapy and G-CSF

3.15 **Anthony Shannon** (University of Technology, Sydney)
Empirical approaches to the application of mathematical techniques in health technologies

4.30 Tea/Coffee

5.00 **Eytan Domany** (Weizmann Institute of Science)
Complex dynamics of cellular transcriptional response: how do cells get on the fast lane?

7.00 Dinner at The Assembly Rooms

These lectures are aimed at a general mathematical audience. All interested, whether LMS members or not, are most welcome to attend this event.

For further details, to register or to reserve a place at the dinner, email the organisers (maia.angelova@northumbria.ac.uk). The cost of the dinner will be approximately £30, including drinks.

The meeting forms part of a workshop on ***Mathematics of Human Biology*** from 6 to 8 June. For further details contact the organisers or visit the website at http://group28.northumbria.ac.uk/biomath.

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

Institute of mathematics & its applications

LONDON MATHEMATICAL SOCIETY

The 2012 Christopher Zeeman Lecture

Professor John Barrow FRS

Wednesday 21 March 2012 at 6.00 pm followed by a reception

at The Royal Society, Carlton House Terrace, London, SW1

Maths, Sport, and the Olympics

Abstract We will reveal some of the many ways in which simple mathematics helps us understand and improve sporting performance. Running, throwing, cycling, jumping, and weightlifting are among the examples we will take a look at from a new perspective. Along the way we will also see how Usain Bolt can break his world 100m record and investigate some odd scoring systems.

Before the lecture, Professor John Barrow will be presented with the Christopher Zeeman award. This medal is awarded triennially to recognize and reward the contributions of mathematicians involved in promoting mathematics to the public, with a view to encouraging others by demonstrating that such activities are valued as part of the role and responsibilities of a mathematician. It is jointly awarded by the Institute of Mathematics and its Applications and the London Mathematical Society.

Admission

To the lecture is by ticket only.

For tickets please contact Mrs Lynn Webster at the IMA (email lynn.webster@ima.org.uk or Catherine Richards House, 16 Nelson Street, Southend-on-Sea, SS1 1EF) by 28 February 2012. Tickets are free of charge and will be allocated on a first come, first served basis.

JOHN HOWIE

Professor John Howie, CBE, FRSE, who was elected to the London Mathematical Society on 20 December 1962, Vice President 1984–86 and 1990–92, died on 26 December 2011 aged 75.

Edmund Robertson writes: John was born in Chryston, Lanarkshire, but moved to Keith when one year old. John's father was a Church of Scotland minister and a new appointment saw another move to Aberdeen where John attended Robert Gordon's College. After becoming Modern Dux of the College, he had an outstanding undergraduate career at Aberdeen University. He remained as assistant lecturer for a year before going to Balliol College, Oxford, to undertake research.

Although formally supervised by Graham Higman, it was supervision from Gordon Preston which led to John's lifelong interest in semigroup theory. He taught at Glasgow University for six years, joining the new University of Stirling when it opened in 1967. Douglas Munn had been appointed Professor of Mathematics, so Stirling became a centre for semigroups.

John was appointed Regius Professor of Mathematics at the University of St Andrews in 1970. He was an outstanding lecturer and a talented writer, using both talents to promote semigroup theory worldwide. His book *An introduction to semigroup theory* (1976) became a classic, attracting many students to the topic. He also became a major figure in mathematical education with his work on various national committees such as the Dunning Committee, which reviewed school examinations, and the Howie Committee which reviewed upper secondary education in Scotland.

Early retirement saw him continue to collaborate with colleagues from around the world and write some fine undergraduate texts, all showing his outstanding skill in explaining mathematical ideas. As he had done throughout his life, he continued his passion for music. He sang in local choirs and was a church organist for over 30 years.

More details are available at www-history.mcs.st-and.ac.uk/Biographies/Howie.html.

PHILIP BATCHELOR

Dr Philip Batchelor, who was elected a member of the London Mathematical Society on 22 May 1998, died on 30 August 2011 in a tragic climbing accident, aged 43.

Tobias Schaeffter writes: Philip worked in Imaging Sciences at King's College London since the late 1990s and although he went to University College London for a short period, he returned in 2006 as a Senior Lecturer, where he was a great scientist and teacher. He was quiet, unassuming and modest and yet was a very talented mathematician who made substantial contributions to the field of MRI reconstruction and was very highly thought of internationally. He had many collaborators from different disciplines in the UK and around the world and is going to be sorely missed by the Imaging scientific community.

Philip's research interests included MRI reconstruction, motion correction in MRI, diffusion tensor MRI, mathematical methods in MRI and in image reconstruction, general medical image processing (registration, segmentation, quantification), surface geometry, and all mathematics applied to these topics. He developed a number of new MR-reconstruction techniques for parallel MRI and motion correction using numerical linear algebra and functional analysis. For further information on Philip's life and work please refer to his page on Wikipedia http://en.wikipedia.org/wiki/Philip_Batchelor.

A memorial event to celebrate Philip's life and contributions was held at King's College London in mid-September.

TONNY SPRINGER

Professor Tonny Albert Springer, who was elected a member of the London Mathematical Society on 15 June 1967, died on 7 December 2011, aged 85.

Jan Stegeman, Gerrit van Dijk and Eric Opdam write: Tonny Springer was born in The Hague on 13 February 1926. After he finished high school in 1942 he had to wait until after the war before he could start his university studies in Leiden. He obtained his PhD on 17 October 1951 with a dissertation on symplectic transformations, under the guidance of his promotor H.D. Kloosterman. After that he spent one year at the Université de Nancy. After a few more years in Leiden he was appointed Lector at the University of Utrecht in 1955. Two years later he became professor, which he remained for the rest of his career. He retired in 1991, but remained mathematically active for over twenty years afterwards.

Springer will be remembered as the person who has shown that mathematics is a dynamical science. Inspired by his great example Kloosterman he brought his students and members of staff in contact with the latest developments in mathematics. He lectured on a wide range of subjects and arranged a great many seminars. Here the emphasis was on algebra, number theory and geometry, but primarily on the interaction between these subjects. In this way the Utrecht Mathematical Institute became a prominent centre of activities. Through his international network many visitors came to Utrecht and many members of staff and PhD students got the opportunity to visit prestigious centres of mathematics in other countries. One might say that for PhD students that time was a Walhalla.

Until very late in life Springer remained active in research. Age should not play a role, so he used to say. His work in the area of algebraic groups, partly in collaboration with Armand Borel, is internationally famous. Furthermore, he was intensively working in the area of Hecke algebras and reflexion groups. Notions such as Springer representation and Springer resolution bear his name. He also used to emphasize the importance of studying the history of mathematics.

Tonny Springer is survived by his wife Tijnie, one daughter and four grandchildren.

THOMAS HARRIOT SEMINAR

The Thomas Harriot Seminar (THS) exists to promote the study of the life and times of the Elizabethan mathematician and natural philosopher Thomas Harriot (1560–1621). The THS meets bienially in Durham (in December) and features papers both on the work of Harriot himself, and on various aspects of the history of sixteenth- and early-seventeenth century science and mathematics (including the history of navigation) and the discovery and colonisation of the New World. It publishes an occasional newsletter, and a series of Occasional Papers.

The **2012 Thomas Harriot Seminar** will be held at St Chad's College, University of Durham from 15 to 17 December. Speakers will include: Matteo Valleriani, Adam Mosley, Alexander Marr, Jim Bennett, Philip M. Sanders, Makiko Okamura, Jackie Stedall and Robert Goulding.

The **2012 Thomas Harriot Lecture** given by Professor Lesley Cormack (University of Alberta) will take place on 31 May, organised and hosted by Oriel College, Oxford.

If you have any news items relating to Thomas Harriot, or you would like to hear more about the Seminar and its activities, please contact the Vice-Chairman of the Seminar, Dr Stephen Clucas (s.clucas@bbk.ac.uk). More details of both events and further information about THS can be found on the website at www.bbk.ac.uk/english/our-research/research_seminars/thomas-harriot-seminar.

LONDON MATHEMATICAL SOCIETY MEETING

Poincaré Anniversary

Saturday 19 May 2012; 10.00 am – 5.30 pm

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

To mark the 100th anniversary of Henri Poincaré's death, join us for a day of talks which look at the mathematician and the man:

10.00 ***Arrival and Coffee***

10.15 ***Opening of the Meeting***

10.30 **Jeremy Gray** (OU)
Poincaré and the Idea of a Group

11.15 **Gerhard Heinzmann** (Poincaré Archives, University of Nancy)
Poincaré, a Philosopher of Analytic Tradition?

12.00 **June Barrow-Green** (OU)
Poincaré's Last Geometric Theorem and its Legacy

12.45 ***Lunch***

2.00 **Scott Walter** (Poincaré Archives, University of Nancy)
Poincaré's Discovery of the Lorentz Group and its Upshot for 20th Century Physics

3.00 **John Stillwell** (San Francisco)
Poincaré and Topology

4.00 ***Tea***

4.30 **Marc Lackenby** (Oxford)
The Poincaré Conjecture

5.30 ***Reception***

An exhibition from the Poincaré Archives by Philippe Nabonnand (Poincaré Archives, University of Nancy) will be on display during lunch.

The reception will be followed by a dinner at The Blue Door Bistro, Montague on the Gardens Hotel, at a cost of £35 per person, inclusive of wine. If you would like to attend the dinner, please contact Elizabeth Fisher (meetings@lms.ac.uk) by **11 May**.

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

MATHEMATICS POLICY ROUND-UP

February 2012

HIGHER EDUCATION

Funding for higher education in England for 2012–13

The Secretary of State for Business, Innovation and Skills (BIS) and the Minister for Universities and Science have confirmed funding allocations to the Higher Education Funding Council for England (HEFCE) for 2012–13 and the Government's priorities for the Council for the coming year.

The grant letter confirms government funding and priorities for HEFCE and for higher education in a year when the new financial arrangements for higher education in England will be implemented. The ring-fenced settlement for science and research means that overall funding for research can be maintained at the same cash levels as for 2011–12. A copy of the letter is available at http://tinyurl.com/89v249d.

Higher Education Policy Institute (HEPI) publishes new report

The report *Institutional Diversity in UK Higher Education* was published at the end of January. One finding of the report says that 'there have clearly been major changes in the balance of subject provision of undergraduate courses, notably a decline in Science and Technology subjects, alongside a significant increase in Creative and Performing Arts, Media Studies and Politics. However, in general, the major changes in subject provision have matched the changes in demand – although mathematics is a notable exception to this. 'Applications for mathematics degrees grew by 87%, far outstripping most other subjects, but the number of institutions offering mathematics fell.' The full report is available at http://tinyurl.com/7loxa95.

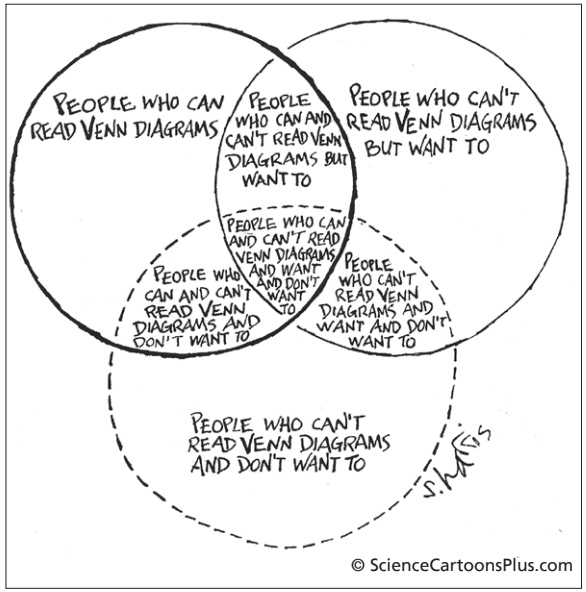
University applications

Figures published by UCAS show the number of applicants from the UK has decreased by 8.7% overall. There has been a 2.8% decrease in applications to the mathematical & computer sciences. This is compared to a 0.6% drop for physical sciences and a 4.4% decrease for biological sciences. The full data set is available at http://tinyurl.com/7t7vvs7.

SCHOOLS AND COLLEGES

ACME new Post-16 Mathematics project

ACME will shortly be launching a call for views to guide the development of a challenging qualification for students who do not currently take A-level mathematics but will still need to continue with mathematics. More information about the project is available at http://tinyurl.com/7dqtksh.



The administration of examinations for 15–19 year olds

As part of its inquiry the Education Select Committee took oral evidence in January. The transcript of this evidence is available at http://tinyurl.com/7oz44zy. The LMS response can be found at http://tinyurl.com/8yc3dk3.

Vision for science and mathematics education 5–19

The Royal Society is undertaking a new project to set out an evidence-based vision for a future world-class, high-performing 5–19 education system, particularly with respect to science and mathematics.

Five specific areas for inquiry have been identified, all of which are essential considerations for establishing and sustaining a high-performing and well-respected science and mathematics education system:

- teachers (and the wider workforce);
- leadership and ethos;
- skills, curriculum and assessment;
- infrastructure; and
- accountability.

This new project is hoping to find out what needs to be done to help ensure that all young people have an inspiring introduction to science and mathematics, and that those who wish to pursue these subjects further are enabled to do so.

More information is available at http://royalsociety.org/education/policy/vision/?f=1. Information on the Vision committee members is available at http://royalsociety.org/news/vision-launch.

Mathematics for Engineering: A new Level 3 qualification

The Royal Academy of Engineering and Engineering Professors' Council, together with many other leading institutions in engineering, have developed a new Level 3 maths qualification called Mathematics for Engineering. OCR awarding body is successfully offering this qualification and more information can be found on the OCR website at http://tinyurl.com/6nn8zxu.

The qualification is specifically designed to boost the mathematics content of the Engineering Diploma and can also be studied as a standalone module alongside A-level. More information is available at http://tinyurl.com/6uxjlze.

ICT in schools

The Royal Society has published a report entitled *Shut down or restart?: The way forward for computing in UK schools.* This follows Michael Gove's announcement that the ICT curriculum in schools needs a 'radical revamp' http://royalsociety.org/news/computing-report.

Dr John Johnston
Mathematics Promotion Unit

MEDIA FELLOWSHIP

Mathematicians can experience life in the heart of the newsroom by applying for a British Science Association '2012 Media Fellowship'. Spend three to eight weeks this summer working with hosts including the *BBC, The Guardian* and *Nature* to produce accurate, well-informed news about developments in science, and work alongside the UK's top science editors in the British Science Festival Press Centre.

The deadline to apply on line is **11 March 2012**. For eligibility criteria, experiences from past Media Fellows, and the application form, go to www.britishscienceassociation.org/mediafellows. For further information contact Amy Lothian, Science in Society Officer (amy.lothian@britishscienceassociation.org).

LONDON MATHEMATICAL SOCIETY

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Tuesday 15th May 2012

6:00pm at Barnard's Inn Hall

Home Office Mathematics

Professor Bernard Silverman, FRS

Chief Scientific Adviser, Home Office

The Chief Scientific Adviser is the head of Home Office Science, which provides scientific advice and support to the whole range of the Home Office's work as the lead government department for immigration and passports, drugs policy, crime, counter-terrorism and police. Many aspects of our scientific work involve mathematics, and in this talk a selection will be presented. These show not only how mathematics is used by one particular government department, but also how wide the range of topics is where mathematical thinking and methods are important.

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Isaac Newton Institute
for Mathematical Sciences

BRANES AND BLACK HOLES

(A satellite meeting at King's College London)

28 May – 1 June 2012

in association with the Newton Institute programme
Mathematics and Applications of Branes in String and M-Theory
(3 January – 29 June 2012)

Organisers: Jan de Boer (Universiteit van Amsterdam), Sunil Mukhi (Tata Institute of Fundamental Research), Ashoke Sen (Harish-Chandra Research Institute) and Andy Strominger (Harvard University).

Black holes have played an extremely important role in string theory during the last several years. Remarkable new developments have thrown light on the challenges of understanding black hole entropy and addressing the puzzle of information loss. More generally their study poses fascinating theoretical challenges for any theory of quantum gravity, and they are instrumental in applications of the gauge-gravity duality to strongly coupled systems at finite temperature. The aim of this workshop will be to review recent progress and to identify the most pressing open problems, to stimulate interaction and collaboration among participants, and hopefully trigger further outstanding developments in the field.

Deadline for applications is **2 April 2012**.

For more information visit the website at www.newton.ac.uk/programmes/BSM/bsmw04.html.

NEW DEVELOPMENTS IN RELATIVISTIC QUANTUM MECHANICS AND APPLICATIONS

30 July – 3 August 2012

in association with the Newton Institute programme
Spectral Theory of Relativistic Operators
(23 July – 17 August 2012)

Organisers: Malcolm Brown (Cardiff), Maria J Esteban (CEREMADE), Karl Schmidt (Cardiff) and Heinz Siedentop (Munich).

The Dirac operator and other relativistic Hamiltonians present a great variety of intriguing challenges, both regarding their physical interpretation and their mathematical analysis. Over the years, the study of these operators has been approached from many, often independent, different angles. A recent mathematical challenge posed by physics is the consistent description of relativistic multi-particle systems in particular in graphene. This workshop aims at drawing together recent work on the various aspects of the operators of relativistic quantum mechanics, to provide an overview of the problems and techniques, and to create synergy to bring the subject forward in novel ways.

Deadline for applications is **29 April 2012**.

For more information visit the website at www.newton.ac.uk/programmes/SRO/srow01.html.

Isaac Newton Institute
for Mathematical Sciences

TOPOLOGICAL ASPECTS OF DNA FUNCTION AND PROTEIN FOLDING

3–7 September 2012

in association with the Newton Institute programme
Topological Dynamics in the Physical and Biological Sciences
(16 July – 21 December 2012)

Organisers: Andy Bates (University of Liverpool), Dorothy Buck (Imperial College London), Sarah Harris (University of Leeds), Andrzej Stasiak (University of Lausanne), De Witt Sumners (Florida State University, Tallahassee)

The structure and function of DNA and proteins are affected by the topology of the DNA strands or polypeptide chains, respectively. During DNA replication, transcription or recombination, DNA molecules become supercoiled, knotted or catenated. These processes are dynamic and are modulated by the activity of site-specific recombinases, which break double stranded DNA at a specific locations, and re-assort and rejoin the ends, and DNA topoisomerases, which permit intra- or inter-molecular strand passages by mechanisms also involving the breaking and rejoining of the DNA backbone. The transient DNA breaks induced by topoisomerases have made them a fruitful target for cytotoxic antibacterial and anti-tumour drugs. Recent structural and biochemical studies have elucidated many mechanistic details of both topoisomerases and recombinases.

While supercoiling, knotting and catenation have been intensively studied for over 40 years, the realization that proteins can also be knotted dates back just one decade. The number of known proteins that form knots in their native structure is growing and we are beginning to understand how knotted proteins can fold, and the potential structural advantages of knotted proteins.

Subjects to be covered will include:
- Modelling of DNA molecules subject to topological constraints
- Mechanism of action of DNA topoisomerases
- DNA recombination and its mechanisms
- Chromosomal architecture
- Folding mechanisms of knotted proteins
- Function of knots in proteins

Deadline for applications is **3 June 2012**.

For more information visit the website at www.newton.ac.uk/programmes/TOD/todw02.html.

TOPOLOGY AND GROUPS

Summer School and Conference

The summer school will take place from 18 to 22 June 2012. There will be six lecture series, each consisting of four lectures, accompanied by tutorial sessions.
- *Topology and geometry of outer space*
  Mladen Bestvina (University of Utah, Salt Lake City)
- *Rigidity, mapping class groups and automorphism groups of free groups*
  Martin Bridson (University of Oxford)
- *A topological look at negative curvature*
  Tom Farrell (SUNY, Binghamton)
- *The Farrell–Jones conjecture*
  Wolfgang Lück (Universität Bonn)
- *Cohomology of automorphism groups of free groups*
  Karen Vogtmann (Cornell University, Ithaca)
- *Smooth maps to the plane and Pontryagin classes*
  Michael Weiss (University of Aberdeen)

The conference will take place from 25 to 29 June 2012. Confirmed speakers are:
- Alejandro Adem (British Columbia)
- Arthur Bartels (Münster)
- Mladen Bestvina (Utah)
- Martin Bridson (Oxford)
- Sylvain Cappell (New York)
- Guillermo Cortiñas (Buenos Aires)
- Benson Farb (Chicago)
- Tom Farrell (Binghamton)
- David Fisher (Indiana)
- Stefan Friedl (Köln)
- Ian Hambleton (McMaster)
- Ursula Hamenstädt (Bonn)
- Tadeusz Januszkiewicz (Warsaw)
- Roman Sauer (Regensburg)
- Thomas Schick (Göttingen)
- Andreas Thom (Leipzig)
- Karen Vogtmann (Cornell)
- Shmuel Weinberger (Chicago)
- Guoliang Yu (Vanderbilt)

In order to attend either or both events, you will need to register. Both the summer school and the conference will take place at Freie Universität Berlin and are supported by the Berlin Mathematical School. For further information visit the website at www.math.fu-berlin.de/top.

TOPOLOGICAL SOLITONS

A conference on *Topological Solitons* will take place in the Department of Applied Mathematics and Theoretical Physics in Cambridge from 19 to 22 September 2012. Topological solitons constitute a research area at the interface of geometry, nuclear and particle physics, cosmology and solid state physics. Nick Manton has fundamentally shaped the field through several pioneering contributions, among them the discovery of the sphaleron (together with Klinkhamer), the introduction of the moduli space approximation to soliton dynamics, and work on Skyrmions. The purpose of the meeting is to mark Nick Manton's 60th birthday with two days of talks reviewing recent developments in the subject.

The list of speakers includes:
- Amandine Aftalion (École Polytechnique)
- Sir Michael Atiyah (Edinburgh)
- Peter Forgacs (Tours and Budapest)
- Gary Gibbons (Cambridge)
- Peter Goddard (Princeton)
- Nigel Hitchin (Oxford)
- Martin Speight (Leeds)
- Steffen Krusch (Kent)
- Paul Sutcliffe (Durham)
- Richard Ward (Durham)
- Erick Weinberg (Columbia)
- Wojtek Zakrzewski (Durham)

To register your interest in this conference email topologicalsolitons@damtp.cam.ac.uk. For further information visit the website at www.damtp.cam.ac.uk/research/hep/conferences/topolsol. The organizers are Maciej Dunajski, Norman Rink, Bernd Schroers and Amanda Stagg. The meeting is supported by an LMS Conference grant.

Dr Ceri Fiddes (Competition Director) and Alison Zhu with the UK CGMO team (Andrea Chlebikova, Ruth Franklin, Alice Ahn and Maithra Raghu) in August 2010.

EUROPEAN GIRLS' MATHEMATICAL OLYMPIAD

The first European Girls' Mathematical Olympiad (EGMO) will take place at Murray Edwards College, Cambridge from 10 to 16 April 2012. The competition will be similar in style to the International Mathematical Olympiad, with two papers taken on consecutive days. Participating countries will send teams consisting of their strongest four female mathematicians of school age. The inspiration behind this competition is the Chinese Girls' Mathematical Olympiad (CGMO), now an international event. The UK sent a team to compete in the CGMO for the first time in August 2010. It is hoped that EGMO 2012 will be the first of many European Girls' Olympiads; EGMO 2013 will be held in Luxembourg.

The aim of this competition is to give more girls an opportunity to perform on an international stage. Through this competition and the associated talent search and preparation it is hoped to increase the participation of girls in mathematics competitions and the UK IMO squad. Those interested in finding out more about the competition or how they can be involved should visit the website at www.egmo2012.org.uk.

SIXTH EUROPEAN CONGRESS OF MATHEMATICS

The London Mathematical Society has set aside funds to be used for making grants to support the attendance of UK-based mathematicians at the *Sixth European Congress of Mathematics*, Kraków, 2–7 July 2012 (www.6ecm.pl). The Society would particularly like to support those mathematicians at an early stage in their career, including postdocs. You do not need to be an LMS member to apply.

Please contact Elizabeth Fisher for an application form (lmsmeetings@lms.ac.uk, tel. 020 7291 9973) or download one from the LMS website (www.lms.ac.uk). Applications should be submitted by **16 March 2012** and applicants will be informed of the outcome by early April.

WOMEN IN MATHEMATICS DAY 2012

The next Women in Mathematics Day will be held on **Friday 27 April 2012** at De Morgan House, 57–58 Russell Square, London. Sessions will include talks by women mathematicians in a variety of appointments and at different career stages.

The organisers would be very grateful if all members could encourage women mathematicians, particularly students (including final-year undergraduates) and those at an early stage in their career, to attend this meeting. The Women in Mathematics Day provides a valuable opportunity to meet and talk with women who are active and successful in mathematics. Participants from previous meetings have found this opportunity useful and beneficial. All mathematicians are invited to attend, but women are especially welcome.

Any postgraduates, postdocs or research assistants wishing to give a talk during the afternoon session or present a poster should contact Susan Pitts (s.pitts@statslab.cam.ac.uk) by **9 March 2012**.

To encourage high-quality posters, a £50 book token will be awarded for the poster that is judged to be the best Women in Mathematics Day Poster 2012.

Programme

10.30–11.00 Registration and Coffee

11.00–13.00 Morning Session

Jennifer Scott
(Rutherford Appleton Laboratory)
Challenges from a large sparse world

Rachel Camina (Cambridge)
The influence of conjugacy class sizes

Christina Goldschmidt (Oxford)
The scaling limit of the critical random graph

13.00–14.00 Lunch and Poster Session

14.15–16.00 Afternoon Session

Postgraduate/Postdoc speakers

16.00–16.30 Tea

2011 Poster Competition Winner: Ndifreke Udosen, Reading University

Participants are invited to join us for dinner at a local restaurant after the event. If you would like to attend, please email Elizabeth Fisher (womeninmaths@lms.ac.uk). Please note that the dinner will *not* be paid for by the Society.

Limited funds are available to help with the travel costs of students attending the event. Further details are available from Elizabeth Fisher at the Society (contact details below).

To register contact Elizabeth Fisher (womeninmaths@lms.ac.uk) by **Friday 20 April**. Late registrations for places may still be accepted, subject to availability.

The day is free for students and £5 for all others – payable on the day.

MATHEMATICAL PUBLISHING

The LMS publishes the following three different points of view about mathematical publishing to make members aware of the current debate.

None of them is intended to carry the endorsement of the LMS.

THE COST OF KNOWLEDGE

This is an attempt to describe some of the background to the current boycott of Elsevier by many mathematicians (and other academics) at http://thecostofknowledge.com, and to present some of the issues that confront the boycott movement. Although the movement is anything but monolithic, we believe that the points we make here will resonate with many of the signatories to the boycott.

The role of journals, 1: Dissemination of research

The role of journals in professional mathematics has been under discussion for some time now (see, for example, [**10**, **4**, **11**, **12**, **1**, **9**, **13**, **2**]).

Traditionally, while journals served several purposes, their primary purpose was the dissemination of research papers. The journal publishers were charging for the cost of typesetting (not a trivial matter in general before the advent of electronic typesetting, and particularly non-trivial for mathematics), the cost of physically publishing copies of the journals, and the cost of distributing the journals to subscribers (primarily academic libraries).

The editorial board of a journal is a group of professional mathematicians. Their editorial work is undertaken as part of their scholarly duties, and so is paid for by their employer, typically a university. Thus, from the publisher's viewpoint the editors are volunteers.[1] When a paper is submitted to the journal, by an author who is again typically a university-employed mathematician, the editors select the referee or referees for the paper, evaluate the referees' reports, decide whether or not to accept the submission, and organize the submitted papers into volumes. These are passed on to the publisher, who then undertakes the job of actually publishing them. The publisher supplies some administrative assistance in handling the papers, as well as some copy-editing assistance, which is often quite minor but sometimes more substantial. The referees are again volunteers from the point of view of the publisher: as with editing, refereeing is regarded as part of the service component of a mathematician's academic work. Authors are not paid by the publishers for their published papers, although they are usually asked to sign over the copyright to the publisher.

This system made sense when the publishing and dissemination of papers was a difficult and expensive undertaking. Publishers supplied a valuable service in this regard, for which they were paid by subscribers to the journals, which were mainly academic libraries. The academic institutions whose libraries subscribe to mathematics journals are broadly speaking the same institutions that employ the mathematicians who are writing for, refereeing for, and editing the journals. Therefore, the cost of the whole process of producing research papers is borne by these institutions (and the outside entities that partially fund them, such as the National Science Foundation in the United States): they pay for their academic mathematician employees to do research and to organize the publications of the results of their research in journals; and then (through their libraries) they pay the publishers to disseminate these results among all the world's mathematicians. Since these institutions employ research faculty in order to foster research, it certainly used to make sense for them to pay for the dissemination of this research as well. After all, the sharing of scientific ideas and research results is unquestionably a key component for making progress in science.

Now, however, the world has changed in significant ways. Authors typeset their own papers, using electronic typesetting. Publishing and distribution costs are not as great as they once were. And most importantly, dissemination of scientific ideas no longer takes place via the physical distribution of journal volumes. Rather, it takes place mainly electronically. While this means of dissemination is not free, it is much less expensive, and much of it happens quite independently of mathematical journals.

In conclusion, the cost of journal publishing has gone down because the cost of typesetting has been shifted from publishers to authors and the cost of publishing and distribution is significantly lower than it used to be. By contrast, the amount of money being spent by university libraries on journals seems to be growing with no end in sight. Why do mathematicians contribute all this volunteer labor, and their employers pay all this money, for a service whose value no longer justifies its cost?

The role of journals, 2: Peer review and professional evaluation

There are some important reasons that mathematicians haven't just abandoned journal publishing. In particular, peer review plays an essential role in ensuring the correctness and readability of mathematical papers, and publishing papers in research journals is the main way of achieving professional recognition. Furthermore, not all journals count equally from this point of view: journals are (loosely) ranked, so that publications in top journals will often count more than publications in lower ranked ones. Professional mathematicians typically have a good sense of the relative prestige of the journals that publish papers in their area, and they will usually submit a paper to the highest ranked journal that they judge is likely to accept and publish it.

Because of this evaluative aspect of traditional journal publishing, the problem of switching to a different model is much more difficult than it might appear at first. For example, it is not easy just to begin a new journal (even an electronic one, which avoids the difficulties of printing and distribution), since mathematicians may not want to publish in it, preferring to submit to journals with known reputations. Secondly, although the reputation of various journals has been created through the efforts of the authors, referees, and editors who have worked (at no cost to the publishers) on it over the years, in many cases the *name* of the journal is owned by the publisher, making it difficult for the mathematical community to separate this valuable object that they have constructed from its present publisher.

The role of Elsevier

Elsevier, Springer, and a number of other commercial publishers (many of them large companies but less significant for their mathematics publishing, e.g., Wiley) all exploit our volunteer labor to extract very large profits from the academic community. They supply some value in the process, but nothing like enough to justify their prices.

Among these publishers, Elsevier may not be the most expensive, but in the light of other factors, such as scandals, lawsuits, lobbying, etc. (discussed further below), we consider them a good initial focus for our discontent. A boycott should be substantial enough to be meaningful, but not so broad that the choice of targets becomes controversial

[1] The editor-in-chief of a journal sometimes receives modest compensation from the publisher.

or the boycott becomes an unmanageable burden. Refusing to submit papers to all overpriced publishers is a reasonable further step, which some of us have taken, but the focus of this boycott is on Elsevier because of the widespread feeling among mathematicians that they are the worst offender.

Let us begin with the issue of journal costs. Unfortunately, it is difficult to make cost comparisons: journals differ greatly in quality, in number of pages per volume, and even in amount of text per page. As measured by list prices, Elsevier mathematics journals are amongst the most expensive. For instance, in the AMS mathematics journal price survey at www.ams.org/membership/mem-journal-survey, seven of the ten most expensive journals (by 2007 volume list price[2]) were published by Elsevier. However, that is primarily because Elsevier publishes the largest volumes. Price per page is a more meaningful measure that can be easily computed. By this standard, Elsevier is certainly not the worst publisher, but its prices do on the face of it look very high. The *Annals of Mathematics*, published by Princeton University Press, is one of the absolute top mathematics journals and quite affordably priced: $0.13/page as of 2007. By contrast, ten Elsevier journals[3] cost $1.30/page or more; they and three others cost more per page than *any* journal published by a university press or learned society. For comparison, three other top journals competing with the *Annals* are *Acta Mathematica*, published by the Institut Mittag-Leffler for $0.65/page, *Journal of the American Mathematical Society*, published by the American Mathematical Society for $0.24/page, and *Inventiones Mathematicae*, published by Springer for $1.21/page. Note that none of Elsevier's mathematics journals is generally considered comparable in quality to these journals.

However, there is an additional aspect which makes it hard to compute the true cost of mathematics journals. This is the widespread practice among large commercial publishers of 'bundling' journals, which allows libraries to subscribe to large numbers of journals in order to avoid paying the exorbitant list prices for the ones they need. Although this means that the average price libraries pay per journal is less than the list prices might suggest, what really matters is the average price that they pay per journal (or page of journal) *that they actually want*, which is hard to assess, but clearly higher. We would very much like to be able to offer more concrete data regarding the actual costs to libraries of Elsevier journals compared with those of Springer or other publishers. Unfortunately, this is difficult, because publishers often make it a contractual requirement that their institutional customers should not disclose the financial details of their contracts. For example, Elsevier sued Washington State University to try to prevent release of this information [**3**]. One common consequence of these arrangements, though, is that in many cases a library cannot actually save any money by cancelling a few Elsevier journals: at best the money can sometimes be diverted to pay for other Elsevier subscriptions.

One reason for focusing on Elsevier rather than, say, Springer is that Springer has had a rich and productive history with the mathematical community. As well as journals, it has published important series of textbooks, monographs, and lecture notes; one could perhaps regard the prices of its journals as a means of subsidizing these other, less profitable, types of publications. Although all these types of publications have become less important with the advent of the internet and the resulting electronic distribution of texts, the long and continuing presence of Springer in the mathematical world has resulted in a store of goodwill being built up in the mathematical community towards them. This store is being rapidly depleted,[4] but has not yet reached zero.

Elsevier does not have a comparable tradition of involvement in mathematics publishing. Many of the mathematics journals that it publishes have been acquired comparatively recently as it has bought up other, smaller publishers. Furthermore, in recent years it has been involved in various scandals regarding the scientific content, or lack thereof, of its journals. One in particular involved the journal *Chaos, Solitons & Fractals*, which, at the time the scandal broke in 2008–2009, was one of the highest impact factor[5] mathematics journals that Elsevier published. It turned out that the high impact factor was at least partly the result of the journal publishing many papers full of mutual citations.[6] Furthermore, *Chaos, Solitons & Fractals* published many papers that, in our professional judgement, have little or no scientific merit and should not have been published in any reputable journal.

In another notorious episode, this time in medicine, for at least five years Elsevier "published a series of sponsored article compilation publications, on behalf of pharmaceutical clients, that were made to look like journals and lacked the proper disclosures" [**8**].

Recently, Elsevier has lobbied for the Research Works Act [**6**], a proposed US law that would undo the National Institutes of Health's public access policy, which guarantees public access to published research papers based on NIH funding within twelve months of publication (to give publishers time to make a profit). Although most lobbying occurs behind closed doors, Elsevier's vocal support of this act shows their opposition to a popular and effective open access policy.

These scandals, taken together with the bundling practices, exorbitant prices, and lobbying activities, suggest a publisher motivated purely by profit, with no genuine interest in or commitment to mathematical knowledge and the community of academic mathematicians that generates it. Of course, many Elsevier employees are reasonable people doing their best to contribute to scholarly publishing, and we bear them no ill will. However, the organization as a whole does not seem to have the interests of the mathematical community at heart.

The boycott

Not surprisingly, many mathematicians have in recent years lost patience with being involved in a system in which commercial publishers make profits based on the free labor of mathematicians and subscription fees from their institutions' libraries, for a service that has become largely unnecessary.[7] Among all the commercial publishers, the behavior of Elsevier seemed to many to be the most egregious, and a number of mathematicians had made personal commitments to avoid any involvement with Elsevier journals.[8]

[2] All prices are as of 2007 because both prices and page counts are easily available online.
[3] Not including one that has since ceased publication.

[4] See for instance the recent petition to Springer by a number of French mathematicians and departments at http://www-fourier.ujf-grenoble.fr/petitions/index.php?petition=3.
[5] Elsevier currently reports the five-year impact factor of this journal at 1.729. For sake of comparison, *Advances in Mathematics*, also published by Elsevier, is reported as having a five-year impact factor of 1.575.
[6] See [**1**] for more information on this and other troubling examples that show the limitations of bibliometric measures of scholarly quality.
[7] See www.scottaaronson.com/writings/journal.pdf for Scott Aaronson's scathing but all-too-true satirical description of the publishers' business model.
[8] Some journals were also successfully moved from Elsevier to other publishers; e.g., *Annales Scientifiques de l'École Normale Supérieure*, which until recent years was published by Elsevier, is now published by the Société Mathématique de France.

One of us (Timothy Gowers) decided that it might be useful to publicize his own personal boycott of Elsevier, thus encouraging others to do the same. This led to the current boycott movement at http://thecostofknowledge.com, the success of which has far exceeded his initial expectations.

Each participant in the boycott can choose which activities they intend to avoid: submitting to Elsevier journals, refereeing for them, and serving on editorial boards. Of course, submitting papers and editing journals are purely voluntary activities, but refereeing is a more subtle issue. The entire peer review system depends on the availability of suitable referees, and its success is one of the great traditions of science: refereeing is felt to be both a burden and an honor, and practically every member of the community willingly takes part in it. However, while we respect and value this tradition, many of us do not wish to see our labor used to support Elsevier's business model.

What next?

As suggested at the very beginning, different participants in the boycott have different goals, both in the short and long term. Some people would like to see the journal system eliminated completely and replaced by something else more adapted to the internet and the possibilities of electronic distribution. Others see journals as continuing to play a role, but with commercial publishing being replaced by open access models. Still others imagine a more modest change, in which commercial publishers are replaced by non-profit entities such as professional societies (e.g., the American Mathematical Society, the London Mathematical Society, and the Société Mathématique de France, all of which already publish a number of journals) or university presses; in this way the value generated by the work of authors, referees, and editors would be returned to the academic and scientific community. These goals need not be mutually exclusive: the world of mathematics journals, like the world of mathematics itself, is large, and open access journals can co-exist with traditional journals, as well as with other, more novel means of dissemination and evaluation.

What all the signatories do agree on is that Elsevier is an exemplar of everything that is wrong with the current system of commercial publication of mathematics journals, and we will no longer acquiesce to Elsevier's harvesting of the value of our and our colleagues' work.

What future do we envisage for all the papers that would otherwise be published in Elsevier journals? There are many other journals being published; perhaps they can pick up at least some of the slack. Many successful new journals have been founded in recent years, too, including several that are electronic (thus completely eliminating printing and physical distribution costs), and no doubt more will follow. Finally, we hope that the mathematical community will be able to reclaim for itself some of the value that it has given to Elsevier's journals by moving some of these journals (in name, if possible, and otherwise in spirit[9]) from Elsevier to other publishers.

None of these changes will be easy; editing a journal is hard work, and founding a new journal, or moving and re-launching an existing journal, is even harder. But the alternative is to continue with the status quo, in which Elsevier harvests ever larger profits from the work of us and our colleagues, and this is both unsustainable and unacceptable.

[9] One notable example is the August 10, 2006 resignation of the entire editorial board of the Elsevier journal *Topology* and their founding of the *Journal of Topology*, owned by the London Mathematical Society.

[10] Elsevier's electronic preprint policy [**7**] is unacceptable, because it explicitly does not allow authors to update their papers on the arXiv to incorporate changes made during peer review. See, for example, [**5**]. When signing copyright transfer forms, we recommend amending them (if necessary) to reserve the right to make the author's final version of the text available free online from servers such as the arXiv.

Signed by:

Scott Aaronson
Massachusetts Institute of Technology

Douglas N. Arnold
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Appendix: Recommendations for mathematicians

All mathematicians must decide for themselves whether, or to what extent, they wish to participate in the boycott. Senior mathematicians who have signed the boycott bear some responsibility towards junior colleagues who are forgoing the option of publishing in Elsevier journals, and should do their best to help minimize any negative career consequences.

Whether or not you decide to join the boycott, there are some simple actions that everyone can take, which seem to us to be uncontroversial:

1. Make sure that the final versions of all your papers, particularly new ones, are freely available online – ideally both on the arXiv[10] and on your home page.

2. If you are submitting a paper and there is a choice between an expensive journal and a cheap (or free) journal of the same standard, then always submit to the cheap one.

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LMS PUBLISHER'S RESPONSE

With the launch of the Elsevier boycott, the example of the new *Journal of Topology* has come up several times. Some scientists are proposing that other journal boards resign and move to new publishers. It is not that simple. In recent years the London Mathematical Society has taken on three journal projects whose different stories illustrate the problems along with the benefits to be gained if you get it right. What follows is a personal account of the journal moves.

Case 1. *Compositio Mathematica*

The journal, founded by Brouwer in the 1930s, is owned by the Dutch Foundation Compositio Mathematica. It was published for many years by Kluwer (now a part of Springer) but, in reaction to increasingly high prices, the Foundation looked for an alternative cooperation with a learned Society and agreement was reached with the LMS. The LMS negotiated a separate agreement with Cambridge University Press that they would print, host online and sell the journal.

Kluwer did not own the journal and handed over the subscription data along with the archive for a small fee. At the time, the Foundation received none of the journal profits so the LMS had to bear any financial risk in the move. However, because the Foundation had ownership and rights, the risks were minor and the LMS was very proud to be chosen above a number of strong contenders. Together with the Foundation, we redesigned the journal format and increased the content of the journal to remove an inherited backlog of papers, and dropped the price by a third. The drop in price had no effect on the subscriptions which actually fell during the move. We even received some negative reactions, including a claim by a well-known topologist that the journal had increased in price! He had not checked the increase in page size or the number of pages per volume. The lesson we learnt was that libraries do not reward good behaviour through subscriptions, even though the mathematical community later acknowledged and appreciated the change.

Since then, the journal price increases have been very modest and the journal has grown in size. A few years ago the French project NUMDAM offered to retrodigitize the early volumes and make them freely available. The Foundation also requires us to provide a five year moving wall so that all the content older than five years is free. This is not something we do on our own journals; however *Compositio Mathematica* makes a healthy profit and the LMS is happy to comply. The healthy profit is fed back to the LMS society activities and to the Foundation who now support meetings and, most notably, the European Mathematical Society prizes to ten young researchers (a total of €50,000) which will be awarded this summer.

Case 2. The *Journal of Topology*

Once upon a time there was a distinguished board of an Elsevier journal who were unhappy with the large price increases and found they were unable to persuade Elsevier to make the changes they wanted. After many years of unsuccessful negotiations, the Board approached the LMS and we agreed to launch a brand new journal. We took legal advice and were very careful to make it clear that the *Journal of Topology* is a new journal, wholly owned by the London Mathematical Society, which does not lay claim to any benefit that Elsevier may have given to the community through the publication of its journal, *Topology*. It is easy for us to do this because we have shown that the major benefit comes from the community, not the publisher. A journal is not just an Editorial Board, it requires authors, referees and readers to support its existence. We received the support of excellent authors and the whole community moved behind the launch of the new journal.

From the business side, of course we had no initial subscriber list to work with, and we agreed a contract with Oxford University Press to print, host and sell the journal on our behalf. They also sell our three core journals, and that is why we decided to make a special discount to any library that takes all four journals; so yes, we are also guilty of 'bundling'! Growing a brand new journal from scratch is not easy. If you put it into large-scale library consortia deals, it has no basic subscriber list and its sole income comes from the premium which does not grow as the journal grows. OUP added the journal to consortia deals for three years but we asked them to remove the journal when we found the net income per library was £19.

Now, the hard fact is that the journal is not covering all its costs and unless more libraries take subscriptions, we cannot reduce the price per page without losing even more money. We know from the *Compositio* example that libraries take little notice of price, but it is very difficult to persuade a library to pay for a new journal outside of their bundle deals. Despite the support that the new journal has received from authors, referees and editors, we also need readers to persuade their libraries to support these projects. I find it depressing that some of our best endowed libraries – in universities whose mathematicians are clamouring for change – do not subscribe to the journal. (You know who you are and, if you don't, why not check with your librarian!)

Of course the problem of readership stems from the fact that while authors appreciate the benefits of being published, most people would say that they rarely bother to read the published article when they have already read the math arXiv version. However, some money has to go into the system somewhere and if they don't support a journal through subscriptions, the alternative is paid open access. Most mathematicians have no access to grant funding on the scale of 'big science' and prefer the subscription model to open access fees.

Case 3. ***Mathematika***

This journal was founded by Harold Davenport in the 1950s and is owned by the Mathematics department at University College London. The department was responsible for the choice of Editorial Board, the publication of the issues and sales; they did everything! Despite an uncertain production schedule and no attempt at marketing, the journal retained many traditional subscriptions because its price was so low that it kept below the radar of many library cuts. UCL asked us if we could take on the management of the journal, from providing an article management service through to finding a large publisher to host and sell the journal to libraries in all the ways they expect, i.e. pay-per-view, traditional subscriptions and consortia agreements. We agreed a contract with Cambridge University Press, and both the LMS and CUP took the financial risk that moving the journal would lead to cancellations, as happened with *Compositio Mathematica*.

The Managing Editor, Alex Sobolev, and the editorial board put in extra hours to solicit good papers for the 'relaunch'. In several cases they volunteered papers that would have found homes in more distinguished journals to help the journal back on its feet. This has worked: the journal is still small but receives sufficient papers to put out regular issues and it is slowly growing.

We recognised the value of the early volumes; some very good papers were published in the early years and were only available in print. We retrodigitised the archive and this is available to subscribers who hold a current subscription as an incentive to keep the subscriptions alive. Why not make it freely available? Because it is the value of the archive as well as the new research being published that puts the journal on a secure financial footing; i.e. the income we receive covers the costs and gives a small return to the LMS. As in the other cases, the 'small return' gets put back into supporting mathematical activities.

Dr Susan Hezlet
LMS Publisher

ELSEVIER'S RESPONSE TO 'THE COST OF KNOWLEDGE'

During the last month, we have spoken to many people in the community about the move by Timothy Gowers and some colleagues to declare their wish not to work with Elsevier and the subsequent boycott movement.

At the end of this article, I summarise both how we are responding to the feedback from the community and the very specific, first steps that we are taking. But I'd first like to address the concerns raised and some of the arguments.

We're the leading journal publisher in scientific publishing and so will attract criticism that is directed at publishing as a whole. While we may disagree with much that has been said, we also recognise that Elsevier has not done a good job communicating about what we do and how publishers support both the peer review process and the dissemination of work. In particular, we have left authors, editors, reviewers and board members with the impression that we are focussed on restricting access rather than making their research as widely available as possible.

Helping editors, authors, reviewers and board members to work easily on journals is central to us and generally we do it well. We make it easier for editors to run large journals, some of which are dealing with thousands of submissions each year, something which most smaller publishers would struggle to do. There will, of course, be people who argue against the involvement of privately owned organisations in academic publishing but we believe that a mixed economy brings benefits to mathematics.

Professor Gowers's protest is concerned with three issues: the pricing of journals, the practice of offering journals in large "bundles", and, in particular, Elsevier's support, along with others, of a set of legislation, including the Research Works Act in the US.

Pricing

Elsevier's mathematics journals are larger than most others, but on a price-per-article level the subscription prices are typically lower than other mathematics publishers.

The Cost of Knowledge statement selects ten (of 38) Elsevier journals to quote an average 2007 price per page of $1.30 and compares this to prices per page ranging from $0.13 to $1.21 for selected journals from other publishers. However, the average price per page for all 38 Elsevier journals in the AMS dataset for that year is $0.76 per page with several below $0.50 per page and as low as $0.35 per page. This is below the average for all mathematics journals in the AMS dataset. The document mentions that seven of the top ten most expensive journals are from Elsevier but does not show that the average price per page for those seven Elsevier journals is $0.61.

However, these figures are five years old and in recent years, we have made moves to reduce or freeze the prices of a number of our mathematics titles, recognising that this field is not well funded and the articles are used intensively rather than frequently.

Journals such as the *Journal of Algebra*, *Topology and its Applications* and the *Journal of Number Theory*, among others, have all seen price reductions in recent years. **Our target is for all of our core mathematics titles to be at or below US$11 per article (roughly equivalent to 50–60 cents per normal typeset page) by next year**, placing us below most University presses, some societies and all other commercial competitors. That will lead to a number of our titles seeing further and significant price reductions from their next volumes.

'Bundling'

Most journals are subscribed to as part of large deals or national consortia agreements, and so Universities receive access to many more journal titles than they individually subscribe to, and thus pay less than the list price described above.

Although such packages are offered by virtually all publishers, many mathematicians have expressed dislike for such policies.

To describe this concisely, such agreements involve Universities maintaining a core holding of journals and then, depending upon the size of their institution, having the option to subscribe to sub-collections, such as in mathematics, or to all our titles at a discount of the normal journal subscription list price. These collections can be as low as 2.5% of the catalogue value of the collection, which is one of the reasons why they have been so popular. A similar arrangement allows national consortia of Universities to share electronic access to all their subscribed journals between them, without each University needing to hold an individual subscription.

We therefore disagree with the term "bundling"; it is not mandatory for a customer to enter into such a large deal. Libraries can decide what they want to subscribe from us, whether that is individual titles or individual titles within a collection or to join a national consortium. We do recognize the wish for more choice and flexibility, especially within departments, and we are currently experimenting with new ways of doing this. But switching off such schemes would, in our view, have a detrimental impact on access to the research literature.

US legislation

I am conscious that much of what triggered Professor Gowers's original posting was the support that Elsevier, along with others, gave to proposed US legislation concerned with state mandates for publishing final versions of articles.

This is clearly controversial and many of our Editors have engaged us actively on this issue, including through the editorial pages of the *Lancet*, see www.thelancet.com/journals/lancet/article/PIIS0140-6736%2812%2960125-1/.

Almost all Publishers are uncomfortable about laws determining what's published, and

under what conditions, but the critical feedback on this issue has been very sobering for many of us and has led to much reflection in the company.

An opposition to government mandates does not mean that we are opposed to wider access or to Open Access, but that is the impression which has been created and which we now need to dispel. I am confident that Open Access will be a large part of what Elsevier does in the future but we will also need to take the opportunity to make journals more accessible in other ways too.

Quality of Journals

The discussion about publishing and large subscription agreements has highlighted concerns around the quality of particular journals.

In the specific case of *Chaos, Solitons and Fractals*, this is a journal which has been rebuilt, with a new set of Editors – whose work and commitment is insufficiently acknowledged – and much involvement from in-house Elsevier staff. I think that we did the right thing to seek to rebuild this journal. This journal has changed and informed the way in which we work from our basic editorial contracts with Editors, to the use of much more formal editorial processes, electronic peer review, clearer statements on ethical issues and the introduction of additional staff in support of journals.

We have put a great deal of effort, in recent years, to developing our support for journals including significant editorial changes. Publishing judgment can go wrong and that will happen in any organization. But, we learn from our mistakes and make considerable efforts that we undertake to address and resolve them.

We do, however, need to be more open about the actions that we have taken when things go wrong. Specifically, we need to develop a better forum for listening to the mathematics community, to hearing specific criticism and to jointly developing policies and to hearing critical feedback.

How Elsevier is responding to feedback from the Community

I have touched on some of our response in the article above but our goal is to do whatever it takes to ensure that the leading mathematics journals that we publish are as valuable and respected – and contribute as much back to the community – as any journal published by a society or University Press.

We are therefore taking the following steps now:

1. To make clear our commitment to wider access, we have made the archives of 14 core mathematics journals open, from four years after publication, back to 1995, the year when we started publishing digitally;
2. On subscription pricing, we will target a price of US$10–US$11 per article (equivalent to 50–60 cent a page) for our core mathematics journals, below that of most of our competitors.
3. On 'bundling', we are open to engaging with the mathematics community on how the system could work better, with greater flexibility and choice, and especially for small institutions without access to wider institutional resources.
4. We will create a scientific council for mathematics, to ensure that we are working in tandem with the mathematics community to address feedback and to give greater control and transparency to the community.

We do not regard this as the end of our discussion with mathematicians but rather the continuation of our efforts.

We are very open to talking with anyone in the community about what we do and how we do it. Some fair criticism has come to us which we will address.

More generally, we seek out and welcome the views of any concerned member of the mathematics community.

Sincerely,
David Clark
david.clark@elsevier.com

EPSRC Pioneering research and skills

Continuum Mechanics in Biology and Medicine

LONDON MATHEMATICAL SOCIETY

LMS-EPSRC Short Course

University College London
17-22 June 2012

UCL

Organisers: Nick Ovenden & Frank Smith

Course outline

There is a continuing upsurge of research in the area of mathematical biology and medicine, principally due to technological advancements in imaging and treatment along with increased computational power. This upsurge, however, relies to some extent on a great deal of fascinating mathematics, some of which this course aims to present in a clear and concise manner for the benefit of postgraduate students and early-stage researchers.

The specific focus of the lectures is on continuum mechanics in biology and medicine, with mathematical modelling, problem construction and analysis together forming the main thrust of the course. A variety of problems from different areas will be discussed providing breadth of understanding for the students as well as increased depth of experience in medical modelling. The mathematical tools highlighted include both novel techniques within the lecturers' very own up-to-date hot research topics alongside broader subjects that are beneficial for the course attendees. The course aims to cater for applied mathematics, engineering and physical science students and researchers possessing a diverse range of biological and medical research interests involving continuum mechanics.

The three main lecture course topics are:

- *Modelling the Circulation* (**Nick Hill**, Glasgow)
- *Physiological Fluid Mechanics* (**Sarah Waters**, Oxford)
- *Cardiovascular Fluid-Mechanical Frameworks* (**Nic Smith**, King's College London)

These lecture courses will be supplemented by tutorial sessions.

An introductory module on *Principles of Fluid Dynamics* will be given by **Nick Ovenden** (UCL).

A guest lecture will be given by **Tim Pedley** (University of Cambridge).

For further information please visit: www.ucl.ac.uk/medical-modelling/shortcourse

Applications should be made using the registration form available via the Society's website at: www.lms.ac.uk/content/short-instructional-courses. Research students, post-docs and those working in industry are invited to apply.

The closing date for applications is **Monday 7 May 2012.** 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

In the event of over-subscription preference will be given to UK-based research students

Fees

- All research students registered at a UK university will be charged a registration fee of **£100**. **There will be no charge for subsistence costs**.
- UK-based postdocs will be charged a registration fee of £250, plus half the subsistence costs (£250) **£500** in total.
- All others (overseas students and postdocs, those working in industry) will be charged a registration fee of £250 plus the full subsistence costs (£500) **£750** in total.

All participants must pay their own travel costs (for EPSRC funded students, this should be covered by their DTA). Fees are not payable until a place on the course is offered but will be due by Friday 8 June.

LMS-EPSRC Short Courses *aim to provide training for postgraduate students in core areas of mathematics. Part of their success is the opportunity for students to meet other students working in related areas as well as the chance to meet a number of leading experts in the topic.*

INTERNATIONAL PURE MATHEMATICAL CONFERENCE 2012

The *International Pure Mathematical Conference 2012* (IPMC 2012) will take place from 1 to 3 September 2012. This is the 13th international conference in the series of *Pure Mathematics Conferences* that takes place in Islamabad every year in August/September. It is a thematic conference on Algebra, Geometry, and Analysis held under the auspices of the Pakistan Mathematical Society (www.pakms.org.pk) and Algebra Forum (www.algebraforum.org.pk).

There will be free housing for foreign participants. Some travel grants are available for foreign speakers. For further information and to register on-line (by **15 April**) visit the website at www.pmc.org.pk. The conference is convened by Professor Dr Qaiser Mushtaq, Department of Mathematics, Quaid-i-Azam University, Islamabad (president@pakms.org.pk).

MATHEMATICS OF STRING THEORY AND GAUGE THEORY

City University, London and King's College, London are jointly holding a workshop on the mathematics of string and gauge theory from 3 to 5 May 2012 in London. This workshop will explore recent advances in our understanding of the mathematics of string and gauge theory, with particular focus on:

- Localisation, geometrical invariants and supersymmetric gauge theories.
- The AdS/CFT correspondence.
- Supersymmetric vacua and operators of gauge theories.
- New integrable systems and strongly coupled gauge theories.

Confirmed speakers include:

- N. Beisert (ETH Zürich)
- A. Dabholkar (Paris VI)
- F. Denef (KU Leuven)
- S. Donaldson (Imperial)
- S. Franco (Durham)
- J. Gomis (Perimeter Institute)
- D. Jafferis (Harvard)
- V. Kazakov (ÉNS)
- S. Lee (Cambridge)
- J. Minahan (Uppsala)
- A. Neitzke (Austin)
- N. Nekrasov (IHÉS)
- L. Rastelli (SUNY Stony Brook)
- N. Seiberg (IAS)
- S. Shatashvili (Trinity College Dublin)
- J. Sparks (Oxford)
- M. Staudacher (Humboldt)
- B. Szendrői (Oxford)
- H. Verlinde (Princeton)

The registration deadline is **12 April 2012**. Further details can be found at http://kings-city.wikidot.com. The workshop is supported by an LMS Conference grant.

YORKSHIRE AND DURHAM GEOMETRY DAY

Sculpture unveiling

On the afternoon of 14 March 2012, a sculpture in stone of a 4-lobed Willmore torus will be unveiled on the Science Site of Durham University. This major work of art will celebrate the impact on mathematics of the work of Tom Willmore, who was Professor of Pure Mathematics at Durham from 1965 until his retirement in 1984.

The event will be marked by a public lecture by Professor Franz Pedit (Amherst and Tübingen), in which he will explore the significance of Willmore surfaces and their relation to Tom and Durham. Professor Pedit has played a prominent role in the study of Willmore surfaces since his first extended visit to Durham in 1987 as a post doc of Tom Willmore.

To further mark the day, there will be a meeting in the series of Yorkshire and Durham Geometry Days, starting at 11:00 am in the Department of Mathematical Sciences at Durham. Tea and coffee will be available from 10:30 am.

Speakers in addition to Professor Pedit will be Brendan Guilfoyle (Tralee) and André Neves (Imperial).

All interested are welcome to attend both events, although the organisers would appreciate your letting them know if you plan to come to the YDGD. For further information, please email Wilhelm Klingenberg (wilhelm.klingenberg@durham.ac.uk) or John Bolton (john.bolton@durham.ac.uk), or visit the website http://maths.dur.ac.uk/~dma0wk/ydgd.html.

The universities of Durham, Leeds and York gratefully acknowledge the long-standing financial support of the London Mathematical Society for the series of Yorkshire and Durham Geometry Days.

FREE BOUNDARY PROBLEMS IN FLUID MECHANICS

Report

This conference, supported by an LMS Conference grant and ESF's programme in *Harmonic and Complex Analysis and its Applications*, took place in the School of Mathematical Sciences, University of Nottingham, from 9 to 11 January 2012. Over 40 people attended the conference, with participation from Australia, Japan, USA and across Europe and with a significant proportion of early career, as well as of distinguished well-established, researchers.

The conference in particular honoured the contributions of the late Stan Richardson, whose influence on the field is significant and ongoing, for example in recent results relating Hele-Shaw flows to integrable systems. This influence was reflected in many of the presentations and in the reminiscences of David Parker (a former colleague of Stan's at the University of Edinburgh) at the conference reception (which was supported by the *European Journal of Applied Mathematics*) that highlighted some of Stan's important unpublished work.

The conference focussed on the mathematics of specific classes of free boundary problem (boundary-value problems in which the boundary is itself an unknown) traditionally associated with viscous fluid flows, but the range of applications described was highly varied (including to materials science, biological tumour growth, plant systems biology, and quantum gravity, as well as to many varieties of fluid flows), as was the range of mathematical and other approaches described.

There was thus considerable scope for interactions between workers from diverse disciplines and much enthusiastic, and at times heated, discussion resulted. Many attendees commented positively on how well interconnected the talks were, with ample cross references, while each talk shed various new insights. Early-career researchers had numerous opportunities to engage fully with leading experts in the break-out spaces in the new mathematics building at Nottingham. A further outcome will be a Special Issue of the *European Journal of Applied Mathematics* dedicated to original research articles or definitive reviews on topics within the scope of the meeting.

Speaking at the meeting were Martine Ben Amar (ÉNS, Paris), Darren Crowdy (Imperial), Linda Cummings (NJIT, USA), Ute Ebert (CWI, Amsterdam), Charlie Elliot (Warwick), Björn Gustafsson (KTH, Stockholm), Sam Howison (Oxford), Anne Juel (Manchester), Andrew Lacey (Heriot-Watt), Robb McDonald (UCL), Mark Mineev-Weinstein (Los Alamos, USA), Georg Prokert (Eindhoven), Giles Richardson (Southampton), Mike Siegel (NJIT, USA), Saleh Tanveer (Ohio State, USA) and Stephen Wilson (Strathclyde). The organisers thank the speakers for their excellent presentations and the LMS for the generous support that contributed enormously to the success of the meeting. A photograph can be found on the back cover of this *Newsletter*.

David Riley and John King
University of Nottingham

BRITISH POSTGRADUATE MODEL THEORY CONFERENCE

Report

Model theory studies the classification of mathematical structures with an aim to creating a 'geography of mathematics'. Via model-theoretic methods, it can be seen that many seemingly different mathematical structures share certain fundamental properties; one can then apply the results of this classification to mathematical problems in the original structures. This method can be surprisingly fruitful, often leading to new and clearer proofs of results in the specific structures. On occasion the theory has even provided answers to long-standing open questions, for example Hrushovski's proof of the Mordell–Lang conjecture on function fields of characteristic $p>0$.

The *British Postgraduate Model Theory Conference* held in Oxford from 4 to 6 January 2012 was an excellent opportunity for young model theorists to meet and discuss ideas with students from other universities, attracting 40 delegates from a range of British and European institutions. Notably we had attendance and talks by students not overtly working in model theory, giving us an insight into how model theory is being applied in the wider sphere of mathematics. This meeting was made possible by an LMS Postgraduate Research Conference Scheme 8 grant, for which we are very grateful. A photograph can be found on the back cover of this *Newsletter*.

Over the three days of the conference, fifteen talks were given by postgraduate students, each of length between 30 and 45 minutes, as well as a short course and two plenary lectures by noted academics. There was also an evening session in which posters by postgraduates describing their research were displayed and discussed, as well as a conference dinner at the university club. The short course was given by Katrin Tent of the University of Münster, entitled *Amenability, Ampleness, and Simplicity of Automorphism Groups*, and detailed how the nature of the automorphism group of a structure is related to certain model-theoretic properties of the structure. Angus Macintyre gave a talk on the history of model theory, describing the subject from its genesis with the work of Skolem in the 1930s, through its cultivation over the decades, right up to the flurry of activity going on in the present day. Our final speaker of the conference was Boris Zilber, who described his latest work on non-commutative coordinate algebras and sheaves of Zariski geometries, which may have consequences in the study of the mathematical foundations of physics.

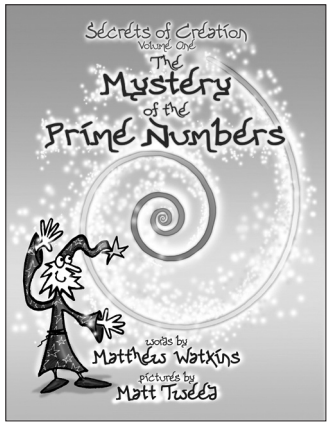
The conference was deemed a great achievement, bringing young mathematicians together to learn about each other's research in a relaxed and congenial environment. Relationships have been forged between postgraduates which will become invaluable in their future study. The response of participants to the conference, and similarly last year's conference in Leeds, serve to emphasise the importance of this annual event to the mathematical postgraduate community. We are planning for next year's conference to take place in Manchester, January 2013, and we look forward to making it an even greater success.

Robert Henderson
University of East Anglia

REVIEW

Secrets of Creation – Volume 1: The Mystery of the Prime Numbers by Matthew Watkins, The Inamorata Press, 2010, 362 pp, £15, ISBN 978-0-9564879-0-2.

As the title of this volume, and that of the proposed trilogy which it begins (*Secrets of Creation*), suggest, Matthew Watkins thinks someone or something has a secret. His opening observations concern the over-quantification of the world, the use of numbers where they are inappropriate, and the marginalisation of what cannot be quantified. These opening sentiments are typical of a volume where the expression of opinions is neither restrained nor limited to the topic at hand. He complains about how few, even in the mathematical community, know the prime number theorem, to say nothing of the improvements that go back to Riemann. What he proposes to do, in this volume and those to follow, is to make the material accessible to those with limited mathematical background. He seeks to avoid algebra except in the appendices, and the result is an unhurried survey of the interaction between addition and multiplication.



One of the notions the author employs crucially is that of a spiral. First, he wants to give readers still wary of logarithms from school the chance to appreciate what a logarithm is, by counting windings of a spiral. Then he turns to spirals as a way of generating the kind of waves into which he decomposes the function that represents the deviations between what appears in the prime number theorem and the count of something he calls 'primeness'. These so-called 'spiral waves' appear in the title of the second volume of the series, and his development of them here gives the reader a sense of how they are a generalization of sine waves.

Ramanujan is said to have known numbers as individuals. In a similar way, Watkins argues that primes can be studied by a sort of 'social statistics' rather than like pebbles. He decries the value of 'prime hunting', the quest for yet larger prime numbers, by comparison with understanding the distribution of primes. His plentiful use of analogies should aid the reader for whom the underlying algebraic 'reality' would be a formidable challenge.

The author displays a touching confidence in logic, as he repeatedly observes that its conclusions generate absolute confidence. He argues that the prime numbers are as close to fundamental as anything studied by human beings, and speculates about how efficient they might be for communication with other civilisations. There is an unevenness in his historical observations, as he is careful to point out the lack of evidence that Euclid discovered the fundamental theorem of arithmetic, but then unreservedly gives him credit for the proof of the infinitude of primes. He has striking images, like the notion of a function as a spell cast on the number line. When he finds a couple of authors referring to the primes as 'weeds', he takes the occasion to criticize the notion of 'weed' as a byproduct of capitalism run amok.

Even those for whom all the mathematics in the volume is familiar are bound to find Watkins' presentation original. It would have benefited from some editing to remove repetitions of text and especially of quotations. The illustrations are entertaining without always helping to illuminate the argument further. It is perhaps unfair to judge the volume by itself when it is only the first of a trilogy. There is, however, the assurance that readers are likely to be eager to follow the story of spiral waves as the basis for the prime numbers in subsequent volumes.

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Note: Volume 2 of the trilogy was published in December 2011: *The Enigma of the Spiral Waves*, 249 pp, £12.50, ISBN 978-0-9564879-1-9.

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 of meetings and events is given on the Society's website (www.lms.ac.uk/newsletter/calendar.html).

Please send updates and corrections to calendar@lms.ac.uk.

MARCH 2012

4 Neurodynamics Workshop Tutorial Day, Edinburgh (409)
5-7 Neurodynamics Workshop, Edinburgh (409)
14 Yorkshire and Durham Geometry Day, Durham (412)
14-16 Pattern Formation: The Inspiration of Alan Turing INI Satellite Meeting, Oxford (408)
15-17 The Big Bang Science and Engineering Fair, NEC Birmingham (407)
18-23 Stochastic Modelling in Biological Systems LMS–EPSRC Short Course, Oxford (410)
21 Zeeman Medal 2011 Award Ceremony, The Royal Society, London (412)
21-22 Young Functional Analysts' Workshop, Oxford (411)
22 Mathematics 2012, IMA Conference, London
23-24 North British Functional Analysis Seminar, Oxford (411)
26-27 Asymptotic Group Theory and Model Theory Workshop, Royal Holloway, University of London (411)
26-29 Ischia Group Theory Conference 2012, Ischia, Naples, Italy (411)
26-30 LMS Invited Lectures, Alexei Borodin, Glasgow (411)
26-30 Logical Approaches to Barriers in Complexity II, INI Workshop, Cambridge (410)
27 *On the Waterfront*, Gresham College Lecture, Museum of London (409)
27-29 BAMC 2012, University College London (409)

APRIL 2012

2-3 Biological Flow Conference, Cambridge (411)
2-4 Young Researchers in Mathematics Conference, Bristol (411)
2-4 Recent Advances in Scattering Amplitudes INI Workshop, Cambridge
2-5 British Colloquium for Theoretical Computer Science, Manchester (410)
10-13 Formal and Computational Cryptographic Proofs INI Workshop, Cambridge (408)
10-16 European Girls' Mathematical Olympiad, Oxford (412)
13-14 Integrable Models, Conformal Field Theory and Related Topics Meeting, York (411)
16-19 BMC 2012, University of Kent, Canterbury (409)
16-19 Distinguished Lecture Series, Bristol (411)
16-20 Noncommutative Geometry INI–WIMCS Meeting, Cardiff (410)
16-20 Condensed Matter, Black Holes and Holography INI Workshop, Cambridge
17-19 Frontiers of Nevanlinna Theory 3: Applications of Nevanlinna Theory to Differential and Functional Equations, University College London (401)
18 LMS Meeting at BMC, University of Kent (412)
20-21 Elmer Rees' 70th Birthday Celebration Conference, Bristol (409)
24 *Final Score*, Gresham College Lecture, Museum of London (409)
27 Women in Mathematics Day, De Morgan House, London (412)

MAY 2012

3-5 Mathematics of String and Gauge Theory Workshop, London (412)
15 *Home Office Mathematics,* LMS–Gresham Lecture, London (412)
19 LMS Poincaré Meeting, London (412)
19 IMA Early Career Mathematicians' Spring Conference 2012, Manchester
28-1 Jun Branes and Black Holes INI Satellite Meeting, King's College London (412)
28-1 Jun Boundary Value Problems for Linear Elliptic and Integrable PDEs: Theory and Computation ICMS Workshop, Edinburgh (405)
28-1 Jun Infinite Ergodic Theory Workshop, Surrey
30 Combinatorics Meeting, Oxford
31 Thomas Harriot Lecture, Oriel College, Oxford (412)

JUNE 2012

2-3 Numerical Linear Algebra, Control Theory and Data Assimilation Conference, Reading
5-8 Higher Order Problems in Geometric Analysis Workshop, Bath (409)
6 LMS Northern Regional Meeting, Northumbria University, Newcastle (412)
6-8 Mathematics of Human Biology Workshop, Northumbria University, Newcastle (412)
11-12 Numerical Analysis of Stochastic Partial Differential Equations, Warwick
12-15 The Incomputable Workshop, Chicheley Hall, North Buckinghamshire (407)
12-15 Chaotic Modeling and Simulation International Conference, Athens, Greece
17-22 Continuum Mechanics in Biology and Medicine LMS–EPSRC Short Course, University College London (412)
18-20 Frontiers of Nevanlinna Theory 4: Nevanlinna Theory and Number Theory, University College London (401)
18-22 Topology and Groups Summer School, Berlin, Germany (412)
18-23 Turing Centenary Conference, Cambridge (407)
25-29 Topology and Groups Conference, Berlin, Germany (412)
25-29 String Phenomenology INI Workshop, Cambridge (411)
26 LMS Popular Lectures, London (412)
29 LMS Meeting and Hardy Lecture, London

JULY 2012

2-7 6th European Congress of Mathematics, Kraków, Poland (409)
9-11 15th Galway Topology Colloquium, Oxford
9-13 Additive Combinatorics in Paris 2012 Conference, Paris, France (409)
23-27 Topological Fluid Dynamics, INI Workshop, Cambridge
30-3 Aug New Developments in Relativistic Quantum Mechanics and Applications INI Workshop, Cambridge (412)

AUGUST 2012

26-28 Modern Mathematical Methods in Science and Technology Conference, Kalamata, Greece (411)
27-30 Algebra, Combinatorics, Dynamics and Applications Workshop, Queen's University, Belfast (410)

SEPTEMBER 2012

1-3 International Pure Mathematical Conference 2012, Islamabad, Pakistan (412)
3 LMS Midlands Regional Meeting, Aberystwyth
3-7 Topological Aspects of DNA Function and Protein Folding INI Workshop, Cambridge (412)
4-9 British Science Festival, Aberdeen (408)
10-14 Stochastic Partial Differential Equations INI Workshop, Cambridge
19-22 Topological Solitons Conference, Cambridge (412)
26 LMS Popular Lectures, Birmingham (412)

OCTOBER 2012

1 LMS South-West and South Wales Regional Meeting, Bristol
3-6 International Conference on Applied and Computational Mathematics, Ankara, Turkey

NOVEMBER 2012

16 LMS AGM, London

LMS-FUNDED MEETINGS

British Postgraduate Model Theory Conference
held in Oxford from 4 to 6 January 2012 (report on page 36)

Delegates enjoy refreshments while discussing postgraduates' posters
Free Boundary Problems in Fluid Mechanics Conference
held at University of Nottingham, from 9 to 11 January 2012 (report on page 35)