ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES: THE NEXT FIVE YEARS

An interview with John Toland, new Institute Director from October 2011, by Ben Mestel, INI Deputy Director

Ben Mestel: Next year the Institute will celebrate its 20th anniversary. What do you think are the principal achievements of the Institute over its first 20 years?

John Toland: Although the work was not done here, the most prominent single incident in the history of the Institute to date was the announcement by Andrew Wiles of his ultimately successful assault on Fermat’s Last Theorem. Of course that particular event was not in the original plan, but the intention always has been, and will remain, to create and develop one of the premier mathematical institutes of its kind, cultivating research of the very highest quality, attracting the best scientists and mathematicians from around the globe. At first I think the Institute was regarded by UK colleagues with suspicion, as an elite institution with programmes that benefited Cambridge most. Twenty years later, when large numbers of UK mathematicians have benefited from its ever-widening portfolio of activities, the mood has changed. That represents real success in what it set out to do.

What is your vision for the Institute over the next 20 years? Over the next 20 (or fewer) years the Institute will have to confront a broad range of difficult issues, some of which are commented upon in responses to subsequent questions. On the one hand it is small, but at the same time it is expected to deliver high-quality, visible, achievements across a huge range of activities in the mathematical sciences. On the other it has to continue its support for the individual researcher, working alone or in collaboration, on fundamental problems, to achieve research outputs of the highest international quality. It has to be alert to new developments and prepared to pump-prime emerging ideas, and it has to recognise that not all projects will be equally successful. The role of the director is to maintain an atmosphere and promote a culture of creativity. On a related note, I hope that in 20 years’ time there will be a much larger proportion of women participants than now. The Institute needs to make its activities accessible through a broad range of measures.
What do you think are the challenges and opportunities for the Institute in the next five years?

Challenges: to maintain the high quality and level of the Institute’s activities in the information age, when there are many more institutes worldwide than 20 years ago and when travel costs, visas issues, availability of long-term participants and the green agenda impinge on its everyday activities. This is to say nothing of the financial threat following cutbacks in public funding in real terms.

Opportunities: the Institute is well placed to play a prominent role in what is undoubtedly a golden age for mathematics and it is the only institute of its kind serving colleagues across the UK with long-stay programmes of such breadth and depth. It has an increasingly successful fund-raising Development Committee. The opportunity to support and extend its work must be grabbed with both hands.

The 2010 International Review of Mathematical Sciences has published its draft report. How do you think the Institute can help with the development of the Mathematical Sciences in the UK?

This is a very big question, parts of which have been answered in response to other questions and I will say only this. I think the Institute aspires only to support the best mathematics being done today in whatever context in which it is to be found.

How do you think the Institute can respond to the ‘Impact’ agenda?

I believe that a significant concern for mathematics in the context of impact is that in law you cannot patent a theorem. When a good and entirely original mathematical idea becomes ‘a method’, without acknowledgement as so often happens, its impact cannot be tracked, and credit is attributed to the sciences in which the final outcomes are described. This is inevitable and it was always thus. Mathematicians need to maintain confidence that the value of their work is not diminished by the lack of auditable impact and to recognise that its all pervasive influence and relevance across science and technology is beyond question. They need also to be conscious of the need where possible to explain what they are doing, sometimes at public expense, to a wider audience, including politicians.

(This is an edited version of the full interview, which will appear in the Newsletter of the European Mathematical Society, issue 80 (June 2011), www.euro-math-soc.eu.)
GENERAL MEETING

There will be a General Meeting of the Society on Friday 20 July 2011, to be held at 3.30 pm at Goodenough College, Large Common Room, London House, Mecklenburgh Square, London WC1N 2AB. The business shall be:
1) the appointment of scrutineers
2) announcement of Council’s recommendation for Election to Honorary Membership
3) announcement of Prize winners for 2011

The General Meeting (see below) will be followed by a Society Meeting. I hope that as many members as possible will be able to attend.

Fiona Nixon
Executive Secretary

LONDON MATHEMATICAL SOCIETY
MEETING AND FIELDS MEDALLIST LECTURE

Friday 1 July 2011
Goodenough College, Large Common Room, London House, Mecklenburgh Square, London WC1N 2AB

3.30 Opening of the meeting and LMS business, including the announcement of the 2011 Prizewinners (open to all)
3.45 Robert McCann (Toronto)
4.45 Tea/Coffee
5.15 Cédric Villani (Lyon), Fields Medallist
6.30 Reception

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

A reception will be held at the LMS at 6.30 pm with a dinner afterwards at the British Museum Restaurant. The cost to attend the dinner will be £35 per person. Those wishing to attend the dinner should contact Isabelle Robinson (isabelle.robinson@lms.ac.uk) before Friday 24 June.

There are funds available to contribute in part to the expenses of members of the Society or research students wishing to attend the meeting. Contact Isabelle Robinson (isabelle.robinson@lms.ac.uk) for further information.
EMS PRIZES

Call for nominations

The 6th European Congress of Mathematics (6ECM) will be held in Kraków, Poland, from 2 to 7 July 2012. Up to ten European Mathematical Society (EMS) prizes will be awarded at the Congress to outstanding young mathematicians from Europe, and everyone is encouraged to nominate candidates.

Principal guidelines

Any European mathematician who has not reached his/her 35th birthday on 30 June 2012, and who has not previously received the prize, is eligible for an EMS Prize at 6ECM. Up to ten prizes will be awarded. The maximum age may be increased by up to three years in the case of an individual with a broken career pattern. Mathematicians are defined to be European if they are of European nationality or their normal place of work is within Europe. Europe is defined to be the union of any country or part of a country which is geographically within Europe or that has a corporate member of the EMS based in that country. Prizes are to be awarded for work accepted for publication before 31 October 2011.

Nominations for the award

The Prize Committee is responsible for the evaluation of nominations. Nominations can be made by anyone, including members of the Prize Committee and candidates themselves. It is the responsibility of the nominator to provide all relevant information to the Prize Committee, including a résumé and documentation. The nomination for each award must be accompanied by a written justification and a citation of about 100 words that can be read at the award ceremony. The prizes cannot be shared.

Description of the award

The award comprises a certificate including the citation and a cash prize of €5,000.
Daniel Quillen died on 30 April 2011, at the age of 70. He was born in New Jersey, was an undergraduate at Harvard, and then a graduate student of Raoul Bott there. Immediately after finishing his thesis, on partial differential equations, he obtained a position at MIT, where he remained until he moved to Oxford as Waynete professor from 1984 to 2006.

He was among the most creative and influential mathematicians of his time, and was at home in many different areas of the subject. While still in his twenties he had the idea of axiomatizing a very general notion of homotopy which can be applied in the most diverse categories. Little noticed at the time, this has proved ever more important, and is now the basis of a whole area of algebraic geometry. In an amazing burst of activity around 1970 he not only created algebraic K-theory in the form we now use, and proved Serre’s conjecture that projective modules over a polynomial ring are free, but also (simultaneously with Sullivan) proved the Adams conjecture about the stable homotopy groups of spheres, and discovered the link between formal group laws and cobordism theory which dominates the field of stable homotopy to this day. At the same time he introduced a completely new perspective on the cohomology of finite groups, and, again simultaneously with Sullivan, was a pioneer of rational homotopy theory.

Not long after that he turned to quite different kinds of mathematics and introduced the Quillen metric on the determinant line of an elliptic operator, and the notion of a superconnection in differential geometry, which has become a basic tool in index theory and quantum field theory. Later still his interests became focused on cyclic homology, and he made notable contributions in that field too.

He was awarded a Fields Medal in 1978.

He leaves his wife Jean, whom he married when they were both students at Harvard, their six children, and many grandchildren.

Graeme Segal
All Souls College, Oxford

MICHAEL ZEDEK

Professor Michael Zedek, who was elected a reciprocity member of the London Mathematical Society on 16 March 1972, died on 14 December 2010, aged 84.

THE MATHEMATICS OF TURBULENT DIFFUSION

A Celebration of the Career of Philip Chatwin

A meeting to celebrate the career of Philip Chatwin, who died in September 2010, is being held from 7 to 8 September 2011 at the University of Sheffield. It will cover the different aspects of the diffusion of contaminants in fluid flows on which he worked.

A website with further information is in the process of being created; for the time being any inquiries should be addressed to Nils Mole (N.Mole@sheffield.ac.uk). The meeting is supported by the University of Sheffield and by an LMS Conference grant.
MATHEMATICS POLICY ROUND-UP
May 2011

National Curriculum Review

On 20 January 2011, the Secretary of State for Education, Michael Gove, announced a major review of the National Curriculum in England (the review does not include post-sixth secondary education). The LMS has responded to this Review, and the response is available on the LMS website at http://tinyurl.com/5rgeqcm.

A number of other STEM organisations have responded to the review:
- Institute of Mathematics and its Applications (IMA), http://tinyurl.com/6l398cv
- Royal Statistical Society (RSS), http://tinyurl.com/6ethmzg
- Advisory Committee on Mathematics Education (ACME), http://tinyurl.com/6etqqf6
- Science Community Representing Education (SCORE) – Association for Science Education, Institute of Physics, Royal Society, Royal Society of Chemistry, and Society of Biology, http://tinyurl.com/6gvzj3t
- Science Council, http://tinyurl.com/6asqa82

LMS response to White Paper

The Importance of Teaching

The Schools White Paper ‘sets out a radical reform programme for the schools system, with schools freed from the constraints of central government direction and teachers placed firmly at the heart of school improvement’.

In its response the London Mathematical Society welcomes the White Paper on The Importance of Teaching (http://tinyurl.com/2ukoqgd) and its commitment to the creation of a teaching system among the best in the world. It especially welcomes:
- the emphasis on core subjects and a stronger emphasis on content;
- the emphasis on the special importance of the teaching of STEM subjects;
- the desire to increase the number of new teachers entering the classroom;
- the focus on raising standards in the classroom;
- the provision of improved routes to initial teacher training;
- the commitment to invest in school facilities;
- the new professional development opportunities for teachers;
- the emphasis on pupil well-being.

Papers by winners of the Fields Medal

Special collection

Published in
- Izvestiya: Mathematics
- Russian Mathematical Surveys
- Sbornik: Mathematics

FREE TO READ IN 2011

Visit iopscience.org/fields-medal to discover first-class research in mathematics
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- Advisory Committee on Mathematics Education (ACME), http://tinyurl.com/6etqqf6
- Science Community Representing Education (SCORE) – Association for Science Education, Institute of Physics, Royal Society, Royal Society of Chemistry, and Society of Biology, http://tinyurl.com/6gvzj3t
- Science Council, http://tinyurl.com/6asqa82

LMS response to White Paper The Importance of Teaching
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- the emphasis on core subjects and a stronger emphasis on content;
- the emphasis on the special importance of the teaching of STEM subjects;
- the desire to increase the number of new mathematics teachers and to improve the skills of existing mathematics teachers; and
- the request to learned bodies to be involved in the reform of GCSEs and A-levels.

The LMS aims to be actively involved in these developments by, in particular,

- contributing to the specialist subject knowledge of mathematics teachers via their continuing professional development (CPD);
- contributing to the revision of the mathematics curriculum and to its assessment;
- assisting in the provision of good mathematics text books and other resources; and
- continuing its general support of a variety of enrichment activities.

The full response is available on the LMS website at http://tinyurl.com/65ugfd5.

Response to the Comprehensive Spending Review (CSR)
The Council for the Mathematical Sciences (CMS) has responded to the House of Commons Science and Technology Committee’s call for written evidence on the CSR. The full submission is available on the CMS website at www.cms.ac.uk/reports/2011/CSRfinal.pdf.

ICT in the teaching of mathematics at HE institutions
The LMS has produced a position statement on this subject and the full statement is available on the LMS website at http://tinyurl.com/5wqhwll.

Implementing the EPSRC Delivery Plan
At the end of December 2010 the EPSRC published its Delivery Plan providing a high-level overview for 2011–2015. The EPSRC has stated that ‘While the direction and ambitions set out within our Delivery Plan will remain
unchanged over the spending review period, the priorities and the portfolio we will develop will, by necessity, be dynamic. As these evolve over the next four years we will publish further details on our website. For more information on the implementation, visit http://tinyurl.com/5v4gl_dx.

**Education Select Committee calls for fundamental reform of Ofsted**

The House of Commons Education Select Committee has published a report calling for separate education and children’s care inspectorates to raise the quality of inspection and restore confidence. The Committee concludes that splitting Ofsted into two new organisations – the Inspectorate for Education and the Inspectorate for Children’s Care – will help to focus and improve inspection. The report is available at http://tinyurl.com/5rlka7x.

**Education Select Committee takes evidence on the English Baccalaureate**

The Education Select Committee has taken evidence from Nick Gibb MP, Minister of State for Schools, Department for Education. The Committee examined issues arising from the introduction of the English Baccalaureate (EBac) and its impact on students and schools. The Committee considered the choice of subjects and qualifications included in the EBac, the value of the EBac as a performance measure and the implications of the EBac for young people’s progression in education, or to employment.

**HEFCE annual conference 2011**

HEFCE’s annual conference, *Achieving excellence in a new world*, was held in Birmingham in April. The conference attracted heads of HEFCE-funded higher-education institutions and leaders of partner organisations. The conference theme of achieving excellence in a new world, in view of the planned changes to higher education funding and finance, and the anticipated government White Paper on higher education provided a forum for discussion. The speakers included HEFCE Chief Executive Sir Alan Langlands, Secretary of State for Business, Innovation and Skills, Vince Cable and Professor Brian Cox. The presentations are available at www.hefce.ac.uk/news/events/2011/annconf.

**Quality Assurance Agency for Higher Education (QAA)**

The QAA is launching a new process for reviewing academic quality and standards in higher education institutions in England and Northern Ireland in September 2011. The new process is called Institutional Review and replaces the current institutional audit. For more information about the new process visit www.qaa.ac.uk/reviews/institutionalreview.

**Royal Society Summer Science Exhibition**

The Annual Royal Society Summer Science Exhibition will be held from 5 to 10 July 2011 at the Royal Society in central London. The exhibition is free to attend and showcases a wide range of cutting-edge science and technology research. The exhibition is open to the public as well as students and teachers, scientists, policymakers, and the media. More information about the event is available at http://royalsociety.org/summer-science.

Dr John Johnston
Mathematics Promotion Unit

**VISIT OF PROFESSOR A.V. CHECHKIN**

Professor Aleksei V. Chechkin (Institute for Theoretical Physics, Kharkov, Ukraine) will be visiting Dr Rainer Klages (Queen Mary University of London) from 6 June to 4 July 2011. They will be collaborating on fluctuation relations for anomalous dynamics.

This visit is supported by an LMS International Short Visit Scheme 5 grant. For further information email Rainer Klages (r.klages@qmul.ac.uk).
VISIT OF PROFESSOR L. VAINE RMAN

Professor Leonid Vainerman (University of Caen, France) will be visiting the UK from 5 to 18 June 2011. Professor Vainerman is a well-known expert in the theory and applications of operator algebras. In particular, he has been working on general duality theory, theory of quantum groups and groupoids, and their applications. During his visit Professor Vainerman will give lectures at:

- University of York, Wednesday 8 June; contact Alexei Daletskii (alex.daletskii@york.ac.uk)
- University of Wales Swansea, Tuesday 14 June; contact Eugene Lytvynov (e.lytvynov@swansea.ac.uk)
- University of Nottingham, Wednesday 15 June; contact Viacheslav Belavkin (vpb@maths.nottingham.ac.uk)

For further information contact Alexei Daletskii (alex.daletskii@york.ac.uk). The visit is supported by an LMS Scheme 2 grant.

VISIT OF PROFESSOR H. OMBAO

Professor Hernando Ombao will be visiting the UK from 4 to 23 July 2011. His research concerns time series analysis, in particular methods for the analysis of non-stationary time series and change-point detection. Professor Ombao is also well known for his work on the analysis for brain imaging spatio-temporal data sets. Professor Ombao will give lectures at:

- Warwick, Short Course, 6–8 July; contact John Aston (j.a.d.aston@warwick.ac.uk)
- Bristol, 12 July; contact Guy Nason (g.p.nason@bristol.ac.uk)
- Lancaster, 18 July; contact Idris Eckley (i.eckley@lancaster.ac.uk)

Professor Ombao will be based in Warwick, hosted by John Aston. His visit is supported by an LMS Scheme 2 grant.

VISIT OF PROFESSOR A. GRIGORYAN

Professor Alexander Grigoryan (University of Bielefeld) will be visiting the UK from 4 to 12 June 2011. His research area includes a number of aspects of geometric and stochastic analysis. During his visit he will give talks at:

- Warwick, Wednesday 8 June: Escape rate of Brownian motion on complete Riemannian manifolds
- London, Thursday 9 June: On positive solutions of semi-linear elliptic inequalities on Riemannian manifolds
- Cambridge, Newton Institute, Friday 10 June: Stochastic completeness for random walks and jump processes

For further information contact Boguslaw Zegarliński (b.zegarliński@imperial.ac.uk). The visit is supported by an LMS Scheme 2 grant.
William Benter Prize in Applied Mathematics

Call for NOMINATIONS

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

The Prize

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

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

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

Nominations

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

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

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

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

Deadline for nominations: 30 September 2011

Presentation of Prize

The recipient of the Prize will be announced at the International Conference on Applied Mathematics 2012: Modeling, Analysis, and Computation from 28 May to 1 June 2012. The Prize Laureate is expected to attend the award ceremony and to present a lecture at the conference.

The Prize was set up in 2008 in honor of Mr William Benter for his dedication and generous support to the enhancement of the University’s strength in mathematics. The first Prize was presented in 2010 to George Papanicolaou, Robert Grimmett Professor of Mathematics at Stanford University.

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

Tuesday 14 June 2011
Lecture Room A, Watson Building, University of Birmingham

Programme:

2.00 Opening of the meeting
   Miles Reid (Warwick)
   Rings and varieties

3.15 Shaun Stevens (University of East Anglia)
   Representations of p-adic groups and the local Langlands conjectures

4.15 Tea/Coffee

4.45 Catharina Stroppel (Bonn)
   Algebraic categorification: ideas and examples

6.30 Dinner at University Staff House

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 (goodwin@maths.bham.ac.uk). The cost of the dinner will be approximately £25, including drinks.

The meeting precedes a workshop on Representation Theory from 15 to 18 June. For further details visit http://web.mat.bham.ac.uk/S.M.Goodwin/lms20/ or contact the organisers.

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.
TWISTORS, GEOMETRY AND PHYSICS

A meeting on *Twistors, Geometry and Physics* to mark the 80th birthday of Sir Roger Penrose will take place from 21 to 22 July 2011 at the Mathematical Institute, Oxford. Twistor theory is one of his most remarkable discoveries and continues to have applications across pure mathematics and mathematical physics. This meeting will focus on some recent developments with speakers both on geometry and physics. The speakers are:

- Nima Arkani-Hamed (IAS, Princeton)
- Mike Eastwood (ANU) *CR geometry and conformal foliations*
- Nigel Hitchin (Oxford) *Twistors and octonions*
- Andrew Hodges (Oxford) *Polytopes and amplitudes*
- Claude LeBrun (Stonybrook) *On Hermitian, Einstein 4-manifolds*
- David Skinner (Perimeter Institute) *Scattering amplitudes as holomorphic linking in twistor space*

Talks will start at 2 pm on the 21st and finish by 4.30 pm on the 22nd. Research students are welcome. Book by 28 June if you wish to attend the dinner on 21 July at 6.45 pm (pre-dinner drinks) for 7.15 pm at Wadham College. There will be a registration fee of £15 to cover teas, coffee and sandwich lunch.

To register, book for the dinner and further details visit the website at [www.maths.ox.ac.uk/~lmason/rp80.html](http://www.maths.ox.ac.uk/~lmason/rp80.html) or email rp80@maths.ox.ac.uk. The conference is supported by an LMS Conference grant.

IWASAWA ALGEBRAS

A one-day workshop on *Iwasawa Algebras* will be held on 21 June 2011 at the University of Cambridge. The speakers are:

- Konstanin Ardakov (Nottingham) *Simple modules over the rational Iwasawa algebra in the semisimple case*
- Simon Wadsley (Cambridge) *Introduction to Iwasawa algebras*
- Christian Wuthrich (Nottingham) *How we use Iwasawa algebras in number theory*

The workshop is part of the South England Profinite Groups Meetings and is supported by an LMS Scheme 3 grant. For more information visit the website at [www.dpmms.cam.ac.uk/~rdc26/meeting.html](http://www.dpmms.cam.ac.uk/~rdc26/meeting.html) or contact Rachel Camina (rdc26@dpmms.cam.ac.uk).
IWASAWA ALGEBRAS

A one-day workshop on Iwasawa Algebras will be held on 2 June 2011 at the University of Cambridge. The speakers are:

- Konstanstin Ardakov (Nottingham) Simple modules over the rational Iwasawa algebra in the semisimple case
- Simon Wadsley (Cambridge) Introduction to Iwasawa algebras
- Christian Wuthrich (Nottingham) How we use Iwasawa algebras in number theory

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LONDON MATHEMATICAL SOCIETY

POPULAR LECTURES 2011

Institute of Education, London – Wednesday 29 June
University of Birmingham – Thursday 29 September

Dr Colva Roney-Dougal
St Andrew’s University

Symmetry, Chance & Determinism

By playing some games with symmetries, we’ll discover the surprising fact that choosing randomly can give the same answer (almost) every time!

Dr Hilary Weller
University of Reading

How Climate Models Work and Could They Be Better?

Hilary Weller will describe some of the physics behind how the real climate works, some of the mathematics involved in creating a computer model of the climate to make climate predictions and how climate data is gathered in order to test the models.

We will see that, although climate models are far from perfect, some predictions can be made with confidence.

LONDON: Commences at 7.00 pm, refreshments at 8.00 pm, ends at 9.30 pm. Admission is free, with ticket. Register by Friday 24 June.

BIRMINGHAM: Commences at 6.30 pm, refreshments at 7.30 pm, ends at 9.00 pm. Admission is free, with ticket. Register by Friday 23 September.

To register for tickets, please email Lee-Anne Parker (leeanne.parker@lms.ac.uk) or visit the LMS website for a registration form (www.lms.ac.uk).

The lectures are intended to be suitable for a general audience and no specific mathematical knowledge will be assumed. Although the talks are not primarily intended for professional mathematicians, everyone is welcome and some members may wish to apply for tickets for friends and relatives.
LONDON MATHEMATICAL SOCIETY
NORTHERN REGIONAL MEETING

Tuesday 19 July 2011
MALL Seminar Room, Mathematics Building, University of Leeds

Programme:

2.30  Opening of the meeting

    Gregory Cherlin  (Rutgers)
    The classification of homogeneous combinatorial structures

3.45  Tea/Coffee

4.15  Alexander Kechris  (California Institute of Technology)
    The dynamics of automorphism groups of homogeneous structures

6.00  Dinner at University House

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 (J.K.Truss@leeds.ac.uk). The cost of the dinner will be approximately £30, including drinks.

The meeting forms part of a workshop on Homogeneous Structures from 19 to 22 July. For further details visit the website at www.maths.leeds.ac.uk/events/lmsnorth2011 or contact the organisers.

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.
THEORETICAL FLUID DYNAMICS
LMS–EPSRC Short Course
Heriot-Watt University, 29 August – 2 September 2011
Organiser: Dr Simon Malham

Course outline and prerequisites
As observers of Nature, experimentalists and mathematicians, we marvel at the beauty and intricacies of real physical fluid flows: from cloud patterns to the turbulent intertwined tumbling mass of swirling vortices alongside a riverbank. Nearly eighty years ago Leray suggested that Navier–Stokes singularities may signify the onset of turbulence in a real fluid flow. During this five-day residential school, world authorities on these topics will provide intensive courses on contemporary theoretical fluid dynamics, juxtaposing the latest exciting developments in Navier-Stokes regularity against the leading models of turbulent fluid flow. The courses will be accessible to first-year PhD students in mathematics with some knowledge of partial differential equations, but a background in fluid mechanics is not required.

The three main lecture course topics are:

- **Fundamental mechanisms of fluid flow** (Simon Malham, Heriot-Watt; three lectures)
- **Navier–Stokes equations: regularity and singularity** (Charlie Doering, Michigan, and James Robinson, Warwick; three lectures each)
- **The physical nature of turbulence** (Emmanuel Leveque, ENS Lyon; five lectures)

These will be supplemented by tutorial sessions. There will also be guest lectures by John Gibbon (Imperial College London) and Sergei Kuksin (École Polytechnique). For further information, see: www.ma.hw.ac.uk/~simonm/lms-epsrc_short_course_2011.

Application
Applications should be made using the registration form available via the Society’s website at: www.lms.ac.uk/content/short-instructional-courses.

The closing date for applications is **Friday 1 July 2011**. Numbers will be limited and those interested are advised to make an early application. All applicants will be contacted approximately two weeks after this deadline; we will not be able to give information about individual applications before then.

Fees
- All research students registered at a UK university will be charged a registration fee of £100. They will **not be charged for subsistence costs**.
- UK-based postdocs will be charged a registration fee of £100, plus half the subsistence costs (£160), £260 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 (£320), £570 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.

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

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.
ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

IS CRYPTOGRAPHIC THEORY PRACTICALLY RELEVANT?

31 January – 2 February 2012
in association with the Newton Institute programme
Semantics and Syntax: A Legacy of Alan Turing
(9 January – 6 July 2012)

The workshop aims to bring together researchers who work in theoretical aspects of cryptography (principally, provable security of protocols) with people working on applied aspects of cryptography, particularly people involved in standardization and in industrial deployment of cryptography. The main goal of the workshop is to strengthen the dialogue between these two groups of people, which is currently perceived to be quite weak. Ultimately, we aim to make a start on bridging the divide between what academic cryptographers believe should be the goals of cryptographic protocol design and what is actually deployed in the real world. The potential benefits of doing so are:

- To bring a better understanding of real-world cryptographic issues to the theoretical community, helping to inform their research and set new research challenges for the theoretical community;
- Enabling practitioners to develop a clearer view of the current state-of-the-art in cryptographic research and what it offers to practice;
- Providing a forum for exchanging ideas and building relationships between researchers from the different communities.

Further details including speakers will be added in due course. Registration will open at a later stage. Further information and application forms are available from the website at: www.newton.ac.uk/programmes/SAS/sasw07.html.

The workshop is supported by the Newton Institute, the eCrypt-2 European Network of Excellence in Cryptography and by the EPSRC Leadership Fellowship award of Professor Kenny Paterson.

STOCHASTIC ANALYSIS

A UK–China Workshop

A UK–China workshop on Stochastic Analysis will take place from 25 to 29 July 2011 at Loughborough University. Most of the leading researchers in stochastic analysis in China and the UK have agreed to participate. The workshop has been timed to coincide with the awarding of an honorary Doctor of Science degree to Shige Peng.

Apart from the talks, time will be made available for discussion and to allow the formation of new collaborations, especially among young researchers. The latter are strongly encouraged to attend and there will be special sessions for short talks and/or poster presentations. Limited financial assistance is available for PhD students, and

PDMS THE...
they should apply to one of the two local organisers: Huaizhong Zhao (H.Zhao@lboro.ac.uk) or David Elworthy (K.D.Elworthy@warwick.ac.uk). For further information visit the workshop website linked to www.lboro.ac.uk/departments/ma/events/index.html.

The Scientific Committee is: Mufa Chen (Beijing Normal), Terry Lyons (Oxford), James Norris (Cambridge), Shige Peng (Shandong), Aubrey Truman (Swansea) and Jiaan Yan (CAS, Beijing). The workshop is supported by an LMS Conference grant and by Loughborough University.

PDEs AND SPECTRAL THEORY

This four-day analysis meeting on Partial Differential Equations and Spectral Theory will take place at Imperial College London from 5 to 8 September 2011. The conference is organised jointly by Imperial College in collaboration with King’s College and University College London to mark the 80th birthday of Professor Michael Solomyak. The list of invited speakers includes world-renowned mathematicians specializing in different aspects of spectral theory and partial differential equations:

• M. Solomyak (Weizmann Institute)
• D. Crisan (Imperial College London)
• E.B. Davies (King’s College)
• D.E. Edmunds (Cardiff University)
• M. Esteban (Université Paris Dauphine)
• R. Frank (Princeton University)
• T. Hoffman-Ostenhof (Vienna University)
• V. Ivrii (University of Toronto)
• A. Kiselev (University of Wisconsin)
• V. Kozlov (Linköping University)
• N. Nikolski (Université Bordeaux 1)
• L. Pastur (Institute for Low Temperature Physics & Engineering, Kharkov, Ukraine)
• G. Rozenbum (Chalmers University)
• M. Ruzhanski (Imperial College London)
• B. Simon (Caltech)
• N. Ural’tseva (St Petersburg University)
• T. Weidl (Universität Stuttgart)
• D. Yafaev (Université Rennes)
• B. Zegarlinski (Imperial College London)

The conference is supported by an LMS Conference grant and an Imperial College–EPSRC Programme Grant (Research Workshop Grant RW001 AL). Limited financial assistance will be available for PhD students.

For further information contact the organisers: Ari Laptev (a.laptev@imperial.ac.uk), Yuri Safarov (yuri.safarov@kcl.ac.uk) or Alexander Sobolev (a.sobolev@ucl.ac.uk).

ASPECTS OF HYPERBOLICITY

A conference on Aspects of Hyperbolicity in Geometry, Topology and Dynamics will take place at the Mathematics Department, University of Warwick from 25 to 27 July 2011. This is a workshop and celebration of Caroline Series’ 60th birthday. Confirmed speakers are:

• Jack Button (Cambridge)
• Francis Bonahon (USC)
• Ken Bromberg (Utah)
• Dick Canary (Michigan)
• David Dumas (UIC)
• Vaibhav Gadre (Harvard)
• Bill Goldman (Maryland)
• Steve Kerckhoff (Stanford)
• Frédéric Paulin (Paris-Sud)
• Kasra Rafi (Oklahoma)
• Makoto Sakuma (Hiroshima)
• Jean-Marc Schlenker (Toulouse)
• Corinna Ulcigrai (Bristol)

Limited funds are available for participants. If you plan to attend, please register online or contact the organisers. For more information visit the website at www.warwick.ac.uk/~masgar/Conference/Series60.html. The conference is supported by EPSRC grant AHGTD(EP/I04985/1).
2011 HEILBRONN ANNUAL CONFERENCE

The 2011 Heilbronn Annual Conference will be held at the University of Bristol from 8 to 9 September, commencing at lunchtime. A number of distinguished mathematicians are invited to present lectures, intended to be accessible to a mixed audience of mathematicians. Confirmed speakers include:

- Dave Benson (Aberdeen University)
- Bruno Buchberger (Johannes Kepler University)
- William Kahan (Berkeley)
- Wilfrid Kendall (Warwick University)
- Jean-François Le Gall (University of Paris-Sud 11)
- Tandy Warnow (University of Texas)

All interested mathematicians are invited to attend. There is no registration fee but to enable estimation of numbers, intending participants are requested to inform Claire Barr (claire.barr@bristol.ac.uk). UK graduate students and postdoctoral fellows who would like to attend and need support should contact Claire Barr before 15 July detailing their requirements, enclosing a brief CV and explaining why other support is not available. The final programme and additional details will be posted in due course at www.maths.bris.ac.uk/research/Heilbronn_institute.

ENUMATH 2011

The European Numerical Mathematics and Advanced Applications (ENUMATH) conferences are a forum for discussion of basic aspects and new trends in numerical mathematics and challenging scientific and industrial applications at the highest level of international expertise. They started in Paris in 1995 and were subsequently held at the universities of Heidelberg (1997), Jyväskylä (1999), Ischia Porto (2001), Prague (2003), Santiago de Compostela (2005), Graz (2007) and Uppsala (2009).

The 2011 ENUMATH Conference will take place at the University of Leicester from 5 to 9 September 2011. The invited speakers are:

- J-F. Gerbeau (Inria-Rocquenc, France)
- Vivette Girault (Paris, France)
- Ivan Graham (Bath, UK)
- Tony Lelièvre (Cermics/Univ. Paris 6, France)
- Valeria Simoncini (Bologna, Italy)
- Chi-Wang Shu (Brown, USA)
- Andrew Stuart (Warwick, UK)
- Stefan Turek (Dortmund, Germany)
- Karsten Urban (Ulm, Germany)
- Ragnar Winther (Oslo, Norway)

The Public Lecture Speaker is Nick Higham (Manchester, UK) The programme also includes a number of organised minisymposia. For further information visit the website at www2.le.ac.uk/departments/mathematics/research/enumath2011.

USING MAPLE

Adept Scientific will be working once again with Manchester Metropolitan University (MMU) to deliver a one-day conference on 30 June 2011 that demonstrates how Maple can be used to help deepen students’ understanding of a variety of mathematics and technical concepts.

Maple has a 25-year track record of delivering significant teaching benefits to leaders of a wide range of mathematics-based courses at school, college and university level. MAPLE experts and novices alike will see how this software delivers real results in the classroom environment. The speakers are:

- Surak Perera, MAPLE Product Specialist, Adept Scientific
- Stephen Lynch, MMU, author of Dynamical Systems with Applications using Maple
- Grahame Smart, Mathematics Department, Forest Hill School, Lewisham, South London

Space is limited and registration is required. More information and registration details can be found at www.scmdt.mmu.ac.uk/maple_maths_conference.
USING MAPLE
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Maple has a 25-year track record of delivering significant teaching benefits to leaders of a wide range of mathematics-based courses at school, college and university level. MAPLE experts and novices alike will see how this software delivers real results in the classroom environment. The speakers are:

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Space is limited and registration is required. More information and registration details can be found at www.scmdt.mmu.ac.uk/maple_maths_conference.

The 20 ENUMATH Conference will take place at the University of Leicester from 5 to 9 September 2011. The invited speakers are:

- J-F. Gerbeau (Inria-Rocquenc, France)
- Vivette Girault (Paris, France)
- Ivan Graham (Bath, UK)
- Tony Lelievre (Cermics/Univ. Paris 6, France)
- Valeria Simoncini (Bologna, Italy)
- Chi-Wang Shu (Brown, USA)
- Andrew Stuart (Warwick, UK)
- Stefan Turek (Dortmund, Germany)
- Karsten Urban (Ulm, Germany)
- Ragnar Winther (Oslo, Norway)

The Public Lecture Speaker is Nick Higham (Manchester, UK). The programme also includes a number of organised minisymposia. For further information visit the website at www2.le.ac.uk/departments/mathematics/research/enumath20.

Discrete and Computational Geometry
Satyan L. Devadoss & Joseph O’Rourke

Discrete geometry is a relatively new development in pure mathematics, while computational geometry is an emerging area in applications-driven computer science. Their intermingling has yielded exciting advances in recent years, yet what has been lacking until now is an undergraduate textbook that bridges the gap between the two. *Discrete and Computational Geometry* offers a comprehensive yet accessible introduction to this cutting-edge frontier of mathematics and computer science.

Cloth $49.50 978-0-691-14553-2

Weyl Group Multiple Dirichlet Series
Type A
Combinatorial Theory
Ben Brubaker,
Daniel Bump &
Solomon Friedberg

Weyl group multiple Dirichlet series are generalizations of the Riemann zeta function. Like the Riemann zeta function, they are Dirichlet series with analytic continuation and functional equations, having applications to analytic number theory. By contrast, these Weyl group multiple Dirichlet series may be functions of several complex variables and their groups of functional equations may be arbitrary finite Weyl groups. Furthermore, their coefficients are multiplicative up to roots of unity, generalizing the notion of Euler products. This book proves foundational results about these series and develops their combinatorics.

Paper $49.50 978-0-691-15066-6
Cloth $85.00 978-0-691-15065-9

Validated Numerics
A Short Introduction to Rigorous Computations
Warwick Tucker

This textbook provides a comprehensive introduction to the theory and practice of validated numerics, an emerging new field that combines the strengths of scientific computing and pure mathematics. In numerous fields ranging from pharmaceuticals and medicine, to weather prediction and robotics, fast and precise computations are essential. Validated numerics yields rigorous computations that can find all possible solutions to a problem while taking into account all possible sources of error—fast, and with guaranteed accuracy.

Cloth $45.00 978-0-691-14781-9

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REVIEW


This is a fascinating book on the nature of science, and its relationship to our beliefs about the world. The main scientific areas covered are mathematics and physics (plus a little biology), with topics including the scientific revolution, the Platonic idea of mathematical reality, and the relationship between science and religion. Davies is arguing on several fronts, so it’s difficult to sum up his ideas briefly, but broadly speaking he is in favour of a Pluralist approach, arguing that the science that we, as humans, develop is inevitably determined by our biological nature. He posits that a purely reductionist approach to understanding the human condition will never succeed, and that with our limited intellectual capacity we will always need more than one explanation for why higher-level facts are true: for example, we should never expect physics to cast light on ethical questions, even though the two areas can occasionally intersect.

On the mathematical front, he argues strongly against Platonism, mocking the idea that when we do research we are stumbling blindly around a world of ideal mathematical forms, eventually deducing something about their shape which we then bring back to our physical universe and christen a theorem. Instead, he advocates a Pluralist approach, rejoicing in intellectual ingenuity, seeking constructivist proofs where possible, and (possibly a big ask!) retaining a clear idea of which parts of mathematics can be proved constructively and which cannot.

Standard theories of science present it as developing from hypothesis, to observation, to either rejection of, or increased confidence in, the hypothesis. Eventually the hypothesis is either disproved or becomes an accepted fact. Davies argues that this description is flawed in several respects. The practice of science depends strongly on both intuition and the availability of technology, and it is manifestly not the case that a single observation which ran contrary to the predictions of a well-known theory would make one throw away the entire theory. Davies also disagrees vehemently with those postmodernists who argue that science is just a cultural phenomenon: “science is important because it works, not because it has advocates in high places”.

On the relationship between science and religion, Davies surveys a huge range of thinkers, from Dawkins, to Swinburne, to Keith Ward. He concentrates on Christianity, but most major religions are mentioned. A description of the religious beliefs of ten eminent scientists shows conclusively (and unsurprisingly) that it is impossible to generalise about scientists’ attitude to religion. More unexpectedly, a discussion of some leading Christian thinkers goes on to conclude that it is difficult to find any common core beliefs amongst them, either! Ultimately the chapter is inconclusive, and is clearer about what Davies disagrees with than what he agrees with, but this does not feel like a weakness.

Davies is not afraid to pick a fight, and he attacks both individuals such as Feyerabend, and whole disciplines such as multiverse theory, with verve, wit and not a little acidity. For example, in the middle of a discussion of determinism we get the lovely sentence “Replacing the phrase ‘in principle’ by ‘not’ often makes a sentence correspond more closely with reality”, which I’ve been mentally applying to news broadcasts ever since! Although some of the ideas in the book are complex, the presentation
p-ADIC FUNCTION THEORY
AND ARITHMETIC DYNAMICS

This will be the second of four EPSRC-funded meetings on the Frontiers of Nevanlinna Theory. The workshop will be held at University College London from 27 to 29 June 2011. The main themes of the meeting are classical and non-Archimedean Nevanlinna theory, p-adic differential equations and dynamical systems. Speakers will include:

- Francesco Baldassarri (Università di Padova, Italy)
- Abdelbaki Boutabaa (Université Blaise Pascal Clermont-Ferrand II, France)
- William Cherry (University of North Texas, USA)
- Lucia di Vizio (University of North Texas, France)
- Branko Dragovich (Institute of Physics, Belgrade, Serbia)
- Alain Escassut (Université Blaise Pascal Clermont-Ferrand II, France)
- Pei-Chu Hu (Shandong University, PRC)
- Franco Vivaldi (Queen Mary, University of London)

For more information visit the website at www.homepages.ucl.ac.uk/~ucahrha/conferences/frontiers/frontiers2.html. Subsequent meetings in this series are Applications of Nevanlinna theory to differential and functional equations (17–19 April 2012) and Nevanlinna theory and number theory (18–20 June 2012).

Contact Rod Halburd (R.Halburd@ucl.ac.uk) if you would like to attend.
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.

JUNE 2011

6-8 Nonlinear Diffusion: Algorithms, Analysis and Applications Workshop, Warwick (395)
6-10 Oscillatory Integrals in Harmonic Analysis ICMS Workshop, Edinburgh (398)
7-10 14th Applied Stochastic Models and Data Analysis International Conference, Rome, Italy
8-9 Variational Multiscale Methods Workshop, Strathclyde (402)
13-17 Stabilization of Dynamical Systems and Processes ICMS Workshop, Edinburgh (398)
13-17 Arithmetic of Function Fields Workshop, Imperial College London (403)
14 LMS Midlands Regional Meeting, Birmingham (404)
15-18 Representation Theory Workshop, Birmingham (404)
16-17 UK Magnetohydrodynamics Meeting, City University London (403)
17 Symbolic Computation for Analysis Meeting, Canterbury (403)
20-24 Geometric Group Theory Workshop, Heilbronn Institute, Bristol (402)
20-24 Geometric Analysis ICMS Workshop, Edinburgh (398)
21 Iwasawa Algebras Workshop, Cambridge (404)
23-25 Postgraduate Group Theory Conference, Aberdeen (403)
26 - 1 Jul Spectral Analysis and Its Applications LMS–EPSRC Short Course, University College London (402)

JULY 2011

1 LMS Meeting, London (404)
1 Developing Mathematical Thinking Through Problems, Puzzles and Games Workshop, Greenwich (402)
3-8 British Combinatorial Conference, Exeter (403)
3-8 Tropical Geometry and Integrable Systems Conference, Glasgow (403)
4-8 Theories of Infinity ICMS–ESF Meeting, Edinburgh (398)
4-23 Gauge Theory and Complex Geometry Conference and Workshop, Leeds (402)
5-10 Royal Society Summer Science Exhibition, London (404)
9-11 Quantum Cohomology, Symplectic Resolutions and Representation Theory Meeting, Oxford (403)
11-15 Numerical Relativity Beyond Astrophysics ICMS Workshop, Edinburgh (398)
13-15 Mathematics of Filtering and its Applications Workshop, Brunel University (402)
16-24 International Mathematical Olympiad, Amsterdam
18-20 Toric Methods in Homotopy Theory Conference, Belfast (398)
26-2 Jul New Developments in Non-Commutative Algebra and Applications ICMS Workshop, Sabhal Mor Ostaig, Isle of Skye (398)
27-29 Frontiers of Nevanlinna Theory 2: p-adic Function Theory and Arithmetic Dynamics, University College London (404)
27 - 1 Jul Moduli Spaces Closing Conference, INI, Cambridge (401)
27 - 1 Jul Signal Processing with Adaptive Sparse Structured Representations, ICMS Workshop, Edinburgh (398)
29 LMS Popular Lectures, Institute of Education, London (404)
29 - 1 Jul Recent Advances in Geometric Group Theory Workshop, Southampton (403)
30 Providing a Mathematics and Statistics Support Service Using Elluminate, Loughborough (402)
30 Using Maple Conference, Manchester (404)

AUGUST 2011

1-5 Inverse Problems in Analysis and Geometry ICMS Workshop, Edinburgh (398)
9-12 Linear and Generalised Linear Models INI Workshop, Cambridge (404)
15-19 Numerical Relativity Beyond Astrophysics ICMS Workshop, Edinburgh (398)
21 - 24 Jul Frontiers of Nevanlinna Theory 2: p-adic Function Theory and Arithmetic Dynamics, University College London (404)
27-29 Frontiers of Nevanlinna Theory 2: p-adic Function Theory and Arithmetic Dynamics, University College London (404)
18-22 Experiments for Processes with Time or Space Dynamics INI Workshop, Cambridge (400)
18-22 Duality, BSDEs and Malliavin Calculus in Mathematical Finance LMS–EPSRC Short Course, Oxford (403)
18-22 ICIAM 2011, Vancouver, Canada (400)
19 Olga Taussky-Todd Lecture (B. Pelloni), ICIAM 2011, Vancouver, Canada (402)
19 LMS Northern Regional Meeting, Leeds (404)
19-22 Homogeneous Structures Workshop, Leeds (404)
21-22 Twistor, Geometry and Physics Meeting, Oxford (404)
25-27 Aspects of Hyperbolicity in Geometry, Topology and Dynamics Conference, Warwick (404)
25-29 Introductory Workshop on Inverse Problems, INI, Cambridge (400)
25-29 Stochastic Analysis UK-China Workshop, Loughborough (404)
28-3 Aug International Mathematics Competition, Blagoevgrad, Bulgaria (402)
29-31 IPMC 2011, Islamabad, Pakistan (402)

AUGUST 2011
1-5 EQUADIFF 2011, Loughborough (400)
1-5 Inverse Problems in Analysis and Geometry INI Workshop, Cambridge (400)
9-12 Optimum Design for Mixed Effects Non-Linear and Generalised Linear Models INI Workshop, Cambridge (399)
15-17 Galway Topology Colloquium, Belfast (403)
15-19 Design of Experiments in Healthcare INI Workshop, Cambridge (400)
17-19 Mathematical Models in Ecology and Evolution, Groningen, The Netherlands (403)
22-26 Analytic and Geometric Methods in Medical Imaging INI Workshop, Cambridge (400)
29-1 Sep Algebra, Combinatorics, Dynamics and Applications, Queen’s University, Belfast

SEPTEMBER 2011
5-8 Partial Differential Equations and Spectral Theory Meeting, Imperial College London (404)
5-9 European Women in Mathematics General Meeting, Barcelona (396)
5-9 Accelerating Industrial Productivity via Deterministic Computer Experiments and Stochastic Simulation Experiments Workshop, INI, Cambridge (402)
5-9 Mathematical Imaging in Interaction with Biomedicine ICMS Workshop, Edinburgh (398)
5-9 ENUMATH Conference 2011, Leicester (404)
7-8 The Mathematics of Turbulent Diffusion Meeting, Sheffield (404)
8-9 Heilbronn Annual Conference, Bristol (404)
11-17 Turning Dreams into Reality ICME, South Africa (388)
12-16 Networks: Stochastic Models for Populations and Epidemics ICMS Workshop, Edinburgh (398)
12-16 Perspectives in Algebraic Lie Theory Workshop, INI, Cambridge (403)
19-23 Hyperbolic Conservation Laws and Related Analysis with Applications ICMS Workshop, Edinburgh (398)
29 LMS Popular Lectures, Birmingham (404)

OCTOBER 2011
7-8 LMS South-West and South Wales Regional Meeting, Exeter
20 Mathematics in Defence Conference, Shrivenham (401)

NOVEMBER 2011
18 LMS AGM, London
R. TOWNSEND
LMS member 1866–1883

Rev. Richard Townsend, MA, FRS
Fellow of Trinity College, Dublin
Professor of Natural Philosophy, University of Dublin