THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 316 **June 2003**

FORTHCOMING SOCIETY MEETINGS

Friday 20 June 2003 – London
J.C. Rickard, M.J. Taylor (Fröhlich Lecture)
Tuesday 22 July 2003 – Edinburgh
Hodge Centenary Meeting
Joint Meeting with the Edinburgh Mathematical Society
24 October 2003 - Southampton
South West and South Wales Regional Meeting
Nonlinear Dynamics
21 November 2003 - London
L.C.G. Rogers, M.H.A. Davis (Naylor Lecture)

PRESIDENCY OF THE SOCIETY

The President, Professor Peter Goddard, has informed Council that he has been appointed Director of the Institute for Advanced Study in Princeton, USA, from 1 January 2004. Consequently, and with great regret, he will be standing down from the Society's Presidency at the AGM on 21 November 2003.

Council has expressed its congratulations to Professor Goddard on this very prestigious appointment – and regrets that it will be losing him so soon.

Council is delighted to announce that Professor Frances Kirwan FRS has indicated that, subject to election at the AGM, she will be happy to take up the appointment from November 2003, rather than a year later as would normally have been the case.

Professor Kirwan has been a Fellow of Balliol College, Oxford since 1986 and has held the title of Professor in Mathematics at the University of Oxford since 1996. She studied for her doctorate in symplectic and algebraic geometry under Sir Michael Atiyah, then spent two years at Harvard and the IHES before returning to Oxford. She was awarded the Society's Whitehead Prize in 1989, served on the LMS Council from 1996–98 and was elected a Fellow of the Royal Society in 2001.

INTERNATIONAL REVIEW OF MATHEMATICS
Report 4

The major news in this month's report is the announcement of the full 13-person International Panel. It comprises:

Jean-Pierre Bourguignon, Director, IHES, France.
Michel Broué, Director, Institut Henri Poincaré, Paris, France.
Stephen Davis, Department of ESAM, Northwestern University, USA.
Don Dawson, School of Mathematics and Statistics, Carleton University, Canada.

Robbert Dijkgraaf, Korteweg-de Vries Institute for Mathematics, University of Amsterdam, The Netherlands.

Ron Graham, Cal-(IT)², University of California, San Diego, USA.

John Guckenheimer, Center for Applied Mathematics, Cornell University, USA.

Peter Hall FRS, Centre for Mathematics and its Applications, Australian National University, Canberra**,** Australia.

Steffen Lauritzen Department of Mathematical Sciences, Aalborg University, Denmark.

Susan Murphy, Institute for Social Research, University of Michigan, USA.

Hans Othmer, Department of Mathematics, University of Minnesota, USA.

Peter Sarnak FRS, Department of Mathematics, Princeton University, USA.

Margaret Wright, Computer Science Department, New York University, USA.

At the meeting of the International Review Steering Group on 8 May, the Group considered the feedback from the various presentations to BMC, BAMC, HoDoMS and COPS. Concerns expressed over the selection of venues for visits, and the programmes for the visits, were particularly important, and the Steering Group spent much of its meeting considering how to ensure that the regional visits were a good representation of the best mathematics in the region, wherever done, by large or small groups. It is hoped to be contacting the proposed venues for the visits soon.

Readers are encouraged to keep an eye on the Review's website (www.cms.ac.uk/irm/). All information will be announced there, as well as a facility for you to email your comments to the Review Steering Group (irm@lms.ac.uk).

2003 WOLF PRIZE

The 2003 Wolf Prize has been awarded to Mikio Sato of the Research Institute for Mathematical Sciences, Kyoto University, Japan, and to John T. Tate, Department of Mathematics, University of Texas, Austin, USA. Sato is honoured "for his creation of 'algebraic analysis' including hyperfunction and microfunction theory, holonomic quantum field theory, and a unified theory of soliton equations." Tate is honoured "for his creation of fundamental concepts in algebraic number theory." The two share the $100,000 prize. John Tate is an Honorary Member of the London Mathematical Society.

ERRATUM

Donald Coxeter died on 31 March 2003, not 7 April as stated on page 3 of the May *Newsletter.*

FREE BOUNDARY PROBLEMS IN FLUID MECHANICS

A conference on Free Boundary Problems in Fluid Mechanics is to be held at the University of Nottingham from 15-18 September. Topics to be covered include: Hele-Shaw flow, Stokes flow, water waves, impact problems, thin films and contact lines. The meeting is supported by the EPSRC and the London Mathematical Society and, in particular, funds are available to support the attendance of a limited number of postgraduate students. Further information can be obtained by emailing Linda.Cummings@nottingham.ac.uk or John.King@nottingham.ac.uk, or from the conference website (www.maths.nott.ac.uk/Conference).

CONVEXITY AND DISCRETE GEOMETRY

The University of Alicante is organizing a Summer School on Convexity and Discrete Geometry from 8-19 September 2003. The Summer School is an introduction to research in Convexity and Discrete Geometry. The programme consists of short courses addressed at young researchers and graduate students; the level of the courses is introductory. The participants will be introduced to open problems in the field, suitable for young researchers. Exercises will be supplied, to be discussed with tutors. The Scientific Committee is Peter Gruber (Technische Universität Wien) (Chairman), Jörg Wills (Universität Siegen) and María Hernández Cifre (Universidad de Murcia). For further information contact Salvador S. Gomis, Universidad de Alicante (Salvador.Segura@ua.es) or visit the website (www.sri.ua.es/congresos/convexity).

VIRTUAL LEARNING ENVIRONMENTS

A course on Virtual Learning Environments: Potential and Pitfalls will be given by Bill Foster on 17 June, from 10.00 am to 4.30 pm, at Newcastle University. The purpose of the course is to:

- describe and disseminate the experiences at the University of Newcastle and other institutions in the use of VLEs and other distributed systems for teaching mathematics and statistics;
- demonstrate present developments and projects;
- focus on web-based assessment of mathematics and statistics using VLEs;
- discuss good practice in the use of VLEs.

Bill Foster has been actively engaged for the past 12 years in the use of CAL and CAA systems in the teaching of Mathematics at Brunel University and now the University of Newcastle. He is a highly experienced lecturer and teacher at all levels. At Brunel he developed the Heriot-Watt CALM system into a successful system for the teaching and assessment of engineering mathematics. Recent projects include the use of a VLE in the teaching of a Foundation Level mathematics course (2001-2002). At present he is engaged in two projects: INFORM-IT, an LTSN sponsored project on the use of VLEs in teaching mathematics and an internally funded project at the University of Newcastle. This last project is to link a powerful web-based assessment engine into a commercial VLE and is for two years.

It is planned that participants will receive the following course material.

- a survey of the use of distributed systems in the teaching of mathematics.
- a guide on the use of VLEs in mathematics and statistics teaching.
- a description of how third party software can be linked into commercial VLEs.

The course costs £40, which includes tea, coffee, lunch and course materials. Register online at http://ltsn.mathstore.ac.uk/daybreak/ or contact Brad Payne (tel: 0115 8484713, email: Bradley.payne@ntu.ac.uk).

BRITISH LOGIC COLLOQUIUM

The 2003 British Logic Colloquium will be held in St Andrews, Scotland, from dinner time on Wednesday 3 September to lunchtime on Saturday 6 September, inclusive. Accommodation will be in McIntosh Hall at the University. A General Meeting of the BLC will be held on the Thursday evening, followed by a conference dinner. The programme committee and local organisers are Roy Dyckhoff and Stephen Read. For further details visit the conference website (www.dcs.st-and.ac.uk/~blc) or email Roy Dyckhoff (rd@dcs.st-and.ac.uk). This meeting is supported by an LMS conference grant.

DIFFERENTIAL AND FUNCTIONAL EQUATIONS IN THE COMPLEX DOMAIN

There will be a meeting on Differential and Functional Equations in the Complex Domain in Loughborough from Saturday 28 June to Tuesday 1 July 2003. The aim of this meeting will be to discuss ideas that lie at the interface between complex analysis (eg, complex function theory, Riemann-Hilbert problems) and the theory of differential and functional equations (eg, Painlevé equations, asymptotics, iso-spectral problems).

Speakers will include Mark Ablowitz, Milne Anderson, Walter Bergweiler, Sarabarish Chakravarty, Peter Clarkson, Thanasis Fokas, Walter Hayman, John King, Jim Langley, Victor Novokshenov, Simon Ruijsenaars and Norbert Steinmetz.

This meeting is partially supported by the London Mathematical Society. There are some funds available for attendance by UK postgraduate students. For more information, including travel information, visit the website www.lboro.ac.uk/departments/ma/events/diff-conf-03/diff-conf.html or e-mail Rod Halburd (R.G.Halburd@lboro.ac.uk).

UNITY OF MATHEMATICS

An international conference on The Unity of Mathematics will be held in Cambridge, Massachusetts, USA, from 31 August to 4 September 2003. The meeting will also celebrate I.M. Gelfand's 90th birthday. The conference will address important recent developments in geometry/physics and representation theory. The speakers have been asked to emphasize interrelations between fields, the "unity of mathematics" and their vision of the future — a fitting tribute to Gelfand's style. The people who have agreed to speak are:

- Michael Atiyah
- Alexander Beilinson
- Joseph Bernstein
- Alain Connes
- Robbert Dijkgraaf
- Vladimir Drinfeld
- Boris Feigin
- Dennis Gaitsgory
- Alexander Givental
- Michael Hopkins
- David Kazhdan
- Maxim Kontsevich
- Bertram Kostant
- George Lusztig
- Dusa McDuff
- Sergey Novikov
- Peter Sarnak
- Albert Schwartz
- Isadore Singer
- Cumrun Vafa
- Anatoly Vershik
- Shing-Tung Yau

The talks will be held in lecture halls A and D of the Science Center at Harvard University. The organizing committee is: Pavel Etingof, Richard Falk, Victor Guillemin, Joseph Harris, David Kazhdan, Vladimir Retakh, Isadore Singer and Robert Wilson. The conference is

sponsored by the National Science Foundation (tentative), Clay Mathematics Institute and the mathematics departments of Harvard University, MIT and Rutgers University. To attend the conference, register on the "registration" link of the conference website (www-math.mit.edu/conferences/unityofmathematics). Email uom@math.mit.edu if you have any questions regarding the conference.

BRITISH TOPOLOGY MEETING

The 18th British Topology Meeting will be held in the Mathematics Department, University of Manchester, from 8-9 September 2003. The meeting will focus on Algebraic Topology and Homotopy Theory. Speakers include David Pengelley (New Mexico State), Rainer Vogt (Osnabrück) and Rade Zivaljevic (Belgrade). UK topology PhD students are particularly encouraged to attend and participate; some financial assistance is available.

The meeting is supported by an LMS conference grant. Further information, and an electronic registration form, are available on the web (www.maths.man.ac.uk/btm18). All members of the LMS, and any other interested parties, are welcome to attend.

UK AND REPUBLIC OF IRELAND SIAM SECTION

The Annual Meeting of the UK and Republic of Ireland Section of the Society for Industrial and Applied Mathematics will be held at the University of Sheffield on 9 January 2004. For further information contact Alison Ramage, Secretary, UKIE SIAM (alison@maths.strath.ac.uk) or visit the website (www.maths.strath.ac.uk/ukiesiam).

MATHEMATICS AND E-SCIENCE

The UK Research Councils' e-Science programme is a major initiative with significant investment of around £250 million over 2001-2006. E-Science offers a vision of how the scientist and engineer can generate, analyse, share and discuss insights, data, experiments and results, enabled by a computing infrastructure commonly called the Grid. This vision of a globally connected community has broader application than science, with the same technologies being used to support e-Commerce and e-Government. E-Science has stimulated a challenging research agenda for building a future e-Science infrastructure and understanding how best to exploit it.

Mathematics is at the heart of representing and reasoning about scientific and engineering data and knowledge, and the role of mathematics in e-Science is potentially profound.

- Mathematics as the language of science underpins almost all scientific and business applications of the Grid. Hence new ways of doing mathematics enabled by the Grid, and the identification of how the Grid can best handle mathematical computation and data, whether numeric or symbolic, have the potential to impact mathematics itself, and mathematical modelling, such as epidemiology or weather forecasting.
- The vision of the semantic Grid conceives e-Science as a set of core knowledge services which allow the user seamless access to multiple streams of data and computation. Such mathematical Grid services will require descriptions of problems and services as ontologies in languages such as MathML/OpenMath, and techniques for giving the user increased assurance of results thus obtained.
- Mathematics, in particular the discrete mathematics and logic which underpin computer science, provides the tool for understanding and modelling the Grid itself, for example new techniques for resource allocation and modelling, handling and mining data or modelling network infrastructure. Techniques based on applied semantics and

computational logic provide profound new ways of understanding resource management, distributed data, space and mobility.

The LMS Computer Science Committee hosted an informal discussion meeting of mathematicians and theoretical computer scientists on 18 March to explore possible interactions between e-Science and mathematics and theoretical computer science: this was attended by around 20 leading industrial and academic researchers, and several representatives of EPSRC, including Tony Hey, Head of the e-Science programme and Vince Osgood, ICT Programme Manager. Talks were given by Tony Hey (EPSRC), Vince Osgood (EPSRC), Mike Dewar (NAG Ltd), Philippa Gardner (ICSTM), Ian Roulstone (Met Office) and Iain Stewart (University of Durham). There was lively and enthusiastic discussion, and a report was produced, available from the LMS website (www.lms.ac.uk). This identifies e-Science research opportunities in: mathematical modelling, scientific computation, numerical mathematics, analysis, linear algebra, inverse methods, control theory, variational methods, symbolic computation, computational logic, discrete mathematics, graph theory, operations research, economic mathematics, stochastic analysis, algorithms and applied semantics.

Further details of the UK e-Science programme can be found on the web (www.research-councils.ac.uk/escience and wwww.nesc.ac.uk).

Ursula Martin
Queen Mary University of London
Chair, Computer Science Committee

THE VOICE OF THE FUTURE

The Royal Society of Chemistry recently organised an event, ‘The Voice of the Future’, at which nearly 150 young scientists from a variety of disciplines had an opportunity to meet the eleven members of the House of Commons Science and Technology Select Committee. The meeting commenced with a welcome from the chairman, Dr Ian Gibson MP, who briefly explained the role of the committee and then invited questions from the audience. The ensuing lively question-and-answer session addressed a wide range of topics, from university top-up fees and working conditions for academics on temporary contracts, to issues relating to patent law. The members of the committee were genuinely interested in the issues raised by the audience and appeared keen to strengthen the links between the scientific community and Parliament.

The question time was followed by an address from Lord Sainsbury, the Minister of Science, after which there was an opportunity to attend a formal meeting of the committee at which government ministers and scientific advisors gave oral evidence in the committee's inquiry ‘Towards non-carbon fuel economy’.

The day provided valuable insight into the committee's work and identified opportunities for providing input into current science and technology policy. The committee always welcomes suggestions for issues that would warrant further investigation. The committee can be contacted by email (scitechcom@parliament.uk); further contact details are provided on its webpage (www.parliament.uk/commons/selcom/s&thome.htm) which also provides a summary of the committee's current programme of work.

Matthias Heil
Manchester University

THE EUROPEAN MATHEMATICAL SOCIETY PRIZES

A call for nominations for the 2004 EMS prizes has been issued and is on the European Mathematical Society's website (www.emis.de) and in the March *EMS Newsletter*.

Ten prizes (covering all areas of mathematics) were awarded by the city of Paris when the inaugural European Congress of Mathematics was held there in 1992, and the same number of EMS prizes have been awarded at each European Congress since then. These prizes are for young mathematicians, but, in response to comments at the last Congress, the age limit has now been increased to 35 and a further allowance of up to three years can be made for career breaks. The prizes are awarded to European mathematicians, meaning those whose nationality is European or whose normal place of work is in Europe. (When discussing the rules, some members of the Executive Committee felt unhappy about restricting the prizes to Europe — even if that was taken in the widest possible sense — but the Committee as a whole felt that the time was not yet ripe for removing the restriction.)

Several of the EMS prizewinners have become Fields medallists. The names of all prizewinners can be found in the information about past congresses on the EMS website.

Nominations for EMS prizes must be made (to 4ecm Organising Committee, Professor Ari Laptev, Department of Mathematics, Royal Institute of Technology, SE-100 44 Stockholm, Sweden) by **1 February 2004** and the nominees will be judged on the strength of work published by December 2003.

David Salinger
EMS Publicity Officer

CIME 2003

Centro Internazionale Matematico Estivo (CIME) in Firenze, Italy is an international mathematics summer centre. The following courses are organized for this summer:

Stochastic Methods in Finance will take place at Bressanone (Bolzano) from 6-13 July (joint course with the European Mathematical Society). Course directors are: Professor Marco Frittelli (Università di Firenze) and Professor Wolfgang Runggaldier (University di Padova).

Lectures:
Partial and asymmetric information Professor Kerry Back (University of St Louis, USA)
Stochastic methods in credit risk modeling, valuation and hedging Professor Tomasz Bielecki (Northeastern Illinois University, USA)
Finance and Insurance Professor Christian Hipp (University of Karlsruhe, Germany)
Nonlinear expectations and risk measures Professor Shige Peng (Shandong University, China)
Utility maximization in incomplete markets Professor Walter Schachermayer (Technical University of Vienna)

Hyperbolic Systems of Balance Laws will take place at Cetraro (Cosenza) from 14-21 July. Course director is Professor Pierangelo Marcati (Università de L'Aquila)

Lectures:
Viscosity solutions of systems of conservation laws Professor A. Bressan (SISSA-ISAS Trieste, Italy)
Conservation laws in continuum mechanics Professor C.M. Dafermos (Brown University, USA)
Shock profiles in scalar conservation laws Professor D. Serre (Ecole Normale Supérieure Lyon, France)

Stability of multidimensional viscous shocks Professor M. Williams (University of North Carolina, USA)
Planar stability criteria for multidimensional viscous shock waves Professor K. Zumbrun (Indiana University, USA)

Mathematical Foundation of Turbulent Viscous Flows will take place at Martina Franca (Taranto) from 1-6 September. Course directors are Professor M. Cannone (Université de Marne-la-Vallée) and Professor T. Miyakawa (Kobe University).

Lectures:
The Navier-Stokes equations of viscous fluids and questions of turbulence theory Professor P. Constantin (University of Chicago)
Incompressible fluids and strange attractors Professor G. Gallavotti (Università di Roma e Accademia dei Lincei)
The theory of strong approximation of weak limits via the method of averaging with applications to Navier-Stokes equations Professor A. Kazikhov (Lavrentyev Institute of Hydrodynamics, Novosibirsk)
Size estimates on solutions of nonlinear evolution equations and consequences Professor Y. Meyer (Ecole Normale Supérieure de Cachan et Institut de France):
The asymptotic analysis theory of fluid equations Professor S. Ukai (Yokohama National University)

Symplectic 4-Manifolds and Algebraic Surfaces will take place at Cetraro (Cosenza) from 2-12 September. Course directors are Professor Fabrizio Catanese (Bayreuth University) and Professor Gang Tian (MIT, Boston, USA)

Lectures:
Pseudo holomorphic curves and symplectic isotopy Professor B. Siebert and Gang Tian (University of Bochum and MIT)
Smoothing of singularities and deformation and differentiable type of surfaces Professor M. Manetti (Universita di Roma "La Sapienza")
Lefschetz pencils, branched covers and symplectic invariants Professor D. Auroux and I. Smith (MIT, Boston, USA and Cambridge University, UK)
Lagrangian spheres and Dehn twists in dimension 4 Professor P. Seidel (Imperial College, London)
Classification and deformation types of complex and real manifolds Professor F. Catanese (Bayreuth University)

CIME can offer some fellowships. An on-line application form for each course can be found on the CIME website (www.math.unifi.it/~cime).

NORTHERN REGIONAL MEETING

The third Northern Regional Meeting of the London Mathematical Society took place in Manchester on Tuesday 11 March, and was attended by about 60 people.

Following the Society's business meeting, chaired by Programme Secretary, Dr S. Huggget, the first lecture, by Professor J.C. Jantzen of the University of Aarhus, was entitled 'Representations of reductive Lie algebras in prime characteristics'. Professor Jantzen's lecture was an accessible introduction to recent advances in the theory of modular representations of Lie algebras of reductive algebraic groups over a field of prime characteristic. When dealing with irreducible representations of such Lie algebras one is reduced to the study of certain finite dimensional associative algebras, called reduced enveloping algebras. The topics discussed in Professor Jantzen's lecture were as follows:

reduction of the general case to the so-called nilpotent case; the Kac-Weisfeiler conjecture on p-divisibility of dimensions of simple modules; recent conjectures of Lusztig relating simple modules in blocks of reduced enveloping algebras with the geometry of Springer fibres.

After tea, Professor V. Ginzburg of the University of Chicago gave the second lecture, entitled 'Representation theory of Cherednik algebras and applications'. This lecture was also a prelude to the talks by Ken Brown and Iain Gordon from University of Glasgow at the following workshop on Geometric Representation and Invariant Theory. In his talk Professor Ginzburg gave a comprehensive description of the so called symplectic reflection algebras. These filtered algebras first appeared in his joint work with P. Etingof. He then gave a simple necessary and sufficient condition for a symplectic reflection algebra to possess a natural PBW basis (pointing out an important heuristic analogy with the classical Lie algebra case). Some applications of this theory were given to representation theory of rational Cherednik algebras.

The evening concluded with a reception and dinner in Staff House attended by about 50 people.

The following three and a half day workshop, sponsored by LMS and EPSRC, was organised by Alexander Premet and Mike Prest to continue the themes of Geometric Representation and Invariant Theory. It was attended by about 40 researchers and 8 PhD students. There were 18 distinguished invited speakers from Denmark, France, Germany, Georgia, Russia, Switzerland, UK and the USA. The workshop ended on Saturday 15 March.

Alexander Premet and Mike Prest

RECORDS OF PROCEEDINGS AT MEETINGS

REGIONAL ORDINARY MEETING

held on Tuesday 11 March 2003 at the University of Manchester. At least 53 members and visitors were present for all or part of the meeting. The meeting began at 3.00 pm, with the Programme Secretary, Dr S.A. HUGGETT, in the Chair.

Three people were elected to Ordinary Membership: D.O. Forfar, M. Schocker, N.C. Steele; and five were elected to Associate Membership: K.M. Goda, N. Green, S.J. Nickerson, E.R.F. Wharton, S.H. Whyte. Six members signed the book and were admitted to the Society.

Professor A. PREMET introduced a lecture given by Professor J. Carsten Jantzen on "Representations of reductive Lie algebras in prime characteristics".

After tea, Professor A. Premet introduced a lecture given by Professor V. Ginzburg on "Representation theory of Cherednik algebras and applications".

In the evening a reception and dinner were held at Staff House, University of Manchester.

COUNCIL RETREAT 2003
Recommendations and Actions

The May *Newsletter* contained the diary for the Council Retreat 2003. Council has discussed the outcomes of the Retreat – this article lists the actions that were agreed and are being (or have been) taken.

Education and young people

1. The Retreat repeatedly returned to the issue of motivating young people to continue to study mathematics. The Society is part of a CMS Group developing careers materials, and it agreed to give additional impetus to this activity, to produce a plan of action and suitable careers advisory material. In particular, it saw the following objectives for the Group.
   (i) To review the existing provision of materials aimed at young people (aged 11 upwards) encouraging them to study mathematics or to enter maths based careers.
   (ii) To consider what makes for effective careers promotion, recognising the apparent comparative ineffectiveness of much of what is being done, and drawing on the best practice of other organisations.
   (iii) To propose a framework of materials, messages, media and dissemination routes that might be used to promote mathematics and maths-based careers to pupils at different ages, including entry to university.
   (iv) To identify the most important elements of (iii) currently missing, and to draw up costed plans for producing them, in a form that might be used in approaches to sponsors.

2. There are several major initiatives looking at education for the 14–19 age range, not least the Adrian Smith Inquiry into post-14 mathematics education. The concept of a baccalaureate-style examination is being discussed and the Retreat concluded that the Society should develop a position statement on the question of a baccalaureate-style examination at age 18/19. The Education Secretary is establishing a group with the following terms of reference.

   To develop a position statement on the desirability of a baccalaureate-style qualification at age 18/19, with the perspective of focus of higher education, in particular (a) the benefits to mathematics education and entry to university, (b) attributes that would be needed or desired in such a qualification, and (c) attributes that would not be desirable.

   The Chair of the Schools Education Committee and Professor A. Chetwynd will be members; others are being approached. The group will consult other bodies, including the IMA and RSS, and is expected to report back to Council in the Autumn.

3. The Education Secretary will discuss with Education Committee and Schools Education Committee, as appropriate, taking forward a number of issues, in particular:
   (i) To explore ways in which university mathematics departments can assist and support mathematics teaching in schools, and mathematics teachers; in particular (a) the role of mathematics departments in providing CPD for teachers, (b) the establishment of school-university links, including the use of teaching assistants.
   (ii) To recommend ways of maximising the use of Society activities and resources (e.g. the Holgate lectures, videos, etc) to enrich mathematics teaching in schools.
   (iii) To consider the effect of the use of the UCAS "tariff" system on entries into mathematics, and ways to avert negative effects.

4. The Society reaffirmed its support for the Advisory Committee on Mathematics Education (ACME) and its intention to work with it through its members. This does not mean that the Society will not continue to be proactive in the area of education, but in doing so it will complement and support ACME's position.

Maths in universities

5. In respect of mathematics in universities, the Retreat agreed to establish a Study Group to refine the Society's policy statement on the position of mathematics in higher education. The remit for the Group is:
   (i) To review and revise the Society's statement of policy on mathematics in universities, in particular to incorporate arguments on the costs of good mathematics teaching and the links between teaching and research.
   (ii) To develop a statement of the "recommended norms" for resources required to deliver good mathematics teaching in universities.
   (iii) To consider the practicalities of mathematics departments assisting mathematics teaching in schools in the form of CPD or classroom assistants through (a) the use of PhD students, (b) the use of departmental capacity resulting from falling student entry numbers.

   The Group comprises the Education Secretary, Professor R.T. Curtis, Professor M. MacCallum and Dr E. Winstanley. It was noted that the revised statement of policy might be needed soon for sending to Vice Chancellors of Universities where mathematics is under threat. The Group will work in co-operation with other bodies, in particular the IMA and HoDoMS.

6. Several issues of concern to Council would be strengthened by obtaining an international perspective. It was agreed, therefore, to write to the International Review Steering Group asking that the International Panel should be asked to comment on three issues:
   - an international comparison of the quality of the output from PhD courses;
   - the relationship between interdisciplinary research and core mathematics research;
   - the balance between concentration of research into large centres and research in small units, compared with the situation in other countries.

   The letter was received positively by the International Review Steering Group, and the points will be put to the International Panel.

7. It was agreed that the Society should respond to the recent White Paper on "The Future of Higher Education", drawing on the discussions and conclusions at the Retreat. (The Society's response has now been submitted – see p.XX.)

8. The Society must be ready to respond at the next consultative stage of the Funding Councils' review of research assessment (chaired by Sir Gareth Roberts). The Society is discussing at the next CMS meeting how the three societies can best to work together on this.

9. It was agreed to invite the new Chair of HoDoMS (Duncan Lawson, Coventry) and his predecessor (Charles Goldie, Sussex) to discuss ways that the two organisations can work together, or complement each other's activities, especially in relation to understanding and supporting mathematics in universities.

Other

10. Council was keen to invite the new Mathematics Programme Manager at EPSRC, Dr Annette Bramley, to meet the President and some other Council members. The special

features and requirements of mathematics, and the need for EPSRC to respond to those attributes in order to maintain a strong maths base, will be stressed in that discussion.

11. The growth in the Society's activities to raise the profile of mathematics led to the suggestion that the Society should establish a Mathematics Promotion Unit to collect data, to undertake activities promoting mathematics to key audiences, and co-ordinate activities promoting mathematics and careers in schools.

    The proposed remit for such a Unit would be as follows.

    (i) To promote mathematics education and mathematics research to particular target audiences, particularly to policy makers and policy advisers in government, parliament, and secondary and higher education.

    (ii) To collect, maintain and publish a comprehensive data set on mathematics education and mathematics research.

    (iii) To promulgate the Society's policies on mathematics, including through submissions to inquiries, reports and meetings.

    (iv) To work with the media to fulfil the Unit's objectives.

    (v) To maintain a database of mathematicians able to speak to the media on mathematics or policy for mathematics.

    (vi) To co-ordinate activities aimed at promoting mathematics education to young people in schools, in particular by means of an 'Ambassadors' scheme, links with universities, and access to information on mathematics in universities and careers from a mathematics-based education.

    (vii) To consult and coordinate with the IMA and RSS.

Plans for the Unit are being developed, together with an outline budget, before Council approves what would be a substantial commitment. The Unit would be overseen by the General Purposes Committee, and reports on its plans and activities would be brought regularly to Council.

THE FUTURE OF HIGHER EDUCATION

A response to the Government's White Paper 'The Future of Higher Education' has been prepared by a group comprising Dr W.B. Stewart (Education Secretary), Professor R.T. Curtis, Professor M.A.H. MacCallum and Dr E. Winstanley, and submitted on behalf of the Society. The response is available through the website (www.lms.ac.uk) under the 'Policy' channel.

NO ROOM AT HILBERT'S HOTEL

A review of "Infinities" by John Barrow and Luca Ronconi.

In Milan last month it was not tickets for the Champions League game at the San Siro or Domingo at La Scala that were commanding exorbitant prices on the black market. Instead, an esoteric play about mathematics was the talk of the town. Tickets for the Piccolo Teatro's production of "Infinities" sold out within hours of going on sale as long ago as last February. The play was first premiered in the spring of 2002 when its three week run received over 70 rave reviews culminating in the award in December 2002 of Italy's version of the Olivier award for best play.

"Infinities" is the result of a collaboration between cosmologist John Barrow in Cambridge and the Italian theatre director Luca Ronconi. Barrow is director of the hugely successful Millennium Mathematics Project, a web-based initiative to bring the excitement of mathematics into schools. He is also author of many popular mathematics books including his

book about zero "The Book of Nothing". But when asked to write something for the theatre by Pino Donghi, the director of the popular science event at the Spoleto Festival, it was to the other end of the mathematical spectrum that Barrow went for inspiration.

"I proposed this idea of infinity because I thought it was an abstract idea yet it was an idea that the average person on the street did not regard as alien or unintelligible. Everybody had some notion, whether it was religious or not what this was about, whilst if we had chosen complex numbers or something we would not get very far."

There have been many plays over the last few years that have taken science as their inspiration: Tom Stoppard's "Arcadia" plays with ideas of chaos theory, Michael Frayn's "Copenhagen" explores quantum physics as a metaphor for interpreting history, a great unsolved problem about prime numbers is at the heart of David Auburn's play "Proof". But Italian director Ronconi believes that these plays are not really about science but the characters behind the science. "They were fine. They just happened to be about scientists. Human dramas," Barrow explains. "Ronconi was very keen to create a play about scientific ideas. He wanted something that wasn't like traditional drama, not about personalities."

The idea of infinity that Barrow suggested following the Spoleto festival in 2001 was the perfect foil for Ronconi's fertile theatrical imagination. The piece evolved during several meetings over the next year and a half. "It was like being involved in a collaborative research project where you don't quite know what is going to come out at the end of it." When Barrow explained the ideas behind Hilbert's infinite hotel, where guests can be accommodated even if the hotel is full, Ronconi's eyes lit up. He knew the perfect space to create Hilbert's hotel. The splendid sets for the lavish operas performed in La Scala are prepared in a large warehouse. Rather than erecting scaffolding for the painters to climb, the warehouse has a huge wall with hundreds of doors through which the painters can emerge to paint the backdrops hung against the wall. But remove the backdrop and what you have is Hilbert's hotel - hundreds and hundreds of doors lining the wall stretching into the rafters of the warehouse. The stage was set for the first of their scenes exploring the infinite.

After experiencing the delights of Hilbert's hotel, the audience moves around the unusual space provided by the warehouse to four further scenarios created by Ronconi and Barrow. The second scene is more sociological, exploring the impact on society of immortality. How society would split into two groups: one manically active, the other for whom there would always be a mañana. The set again is unusual as actors were moved around on a monorail running above the audience on girders that had once been used as hoists for moving around heavy props.
The third scenario explores the idea of the infinite replication paradox – that if there is a non-zero chance of something happening in an infinite universe then it must have happened infinitely often. The set took its inspiration from Borges' story "The Garden of Forking Paths". The audience gathers around the perimeter of a criss-cross of walkways, a labyrinth of possibilities. The walls of the walkways were cupboards from which actors would emerge and disappear.

Cantor is the subject of the fourth scene whilst the final scene discusses the joys of time travel. Again the set is an integral part of the drama. Bright squares on the walls give the illusion of windows looking out onto the outside world. But then through these bright squares of lights, actors would emerge as if stepping out of another time. The scene explores why, if time travel is permissible, the great events of history haven't be crowded out by tourists from the future.

Barrow believes Italy is much more open to this crossover between art and science. "I think it is something to do with Leonardo in the sense that there is no division between art and science in the way there is here. Popular science is actually reported in the cultural pages of the newspaper." The play was so successful during its first run that hundreds of people were

arriving without tickets, unable to get in. “They eventually took sympathy and told them to come back at 11 and they’d do another performance. The poor actors ended up doing three more performances. Things ended at 1am.”

It is a truly European style of theatre – almost installation art rather than the drawing-room dramas that are served up in London’s West End. In fact Ronconi was rather concerned that Barrow would not like what they’d done. “He was worried I was expecting it to be some amusing English style thing.”

So, is there any chance we can get to see the play in London? Unfortunately, with a market dominated by performances for American tourists, it seems unlikely. But according to Barrow, the Middle East might be your best bet for catching the next performance of this mathematical extravaganza. “The Egyptian government want to have a performance in Arabic in the library of Alexandria. The interest is probably not surprising given the Islamic mathematical tradition. They feel there is a strong resonance there with their history. They liked the labyrinth garden of forking paths idea. They felt the great hall of the library has that labyrinthine type texture which the audience could sit in.”

Judging by the reaction of the Milanese audiences, it might be worth booking now. Despite their successful recreation of Hilbert’s hotel, Barrow and Ronconi could not perform the same trick of accommodating the many disappointed punters who were unable to find room at the Piccolo Teatro last month.

Useful Links
http://mmp.maths.org/
www.piccoloteatro.org/infinities/

Professor Marcus du Sautoy
Mathematical Institute, Oxford

VISIT OF DR C. GEISS

Dr Christof Geiss (Ciudad Universitaria, Mexico) will be visiting the Department of Pure Mathematics, University of Leeds during June. During his visit he will give talks at University of Leicester (12 June at 3.30 pm) on ‘Varieties of modules over preprojective algebras’, University of Oxford (19 June at 2.30 pm) on ‘The indecomposable representations of the quaternion algebra’ and University of Leeds (23 June at 4.00 pm). His visit is funded by an LMS Scheme 2 grant. For further information contact Jan Schroer (jschroer@maths.leeds.ac.uk).

LONDON MATHEMATICAL SOCIETY

Friday 20 June 2003

J.C. Rickard (Bristol University)
Senior Berwick Prizewinner 2002
will speak at 3.30 pm on
The stable module category of a finite group algebra

M.J. Taylor, FRS (UMIST)
will give the first Fröhlich Lecture
at 5.00 pm on

Die Fröhliche Wissenschaft

The meeting will be held at the Chemistry Lecture Theatre, Christopher Ingold Building, University College, 20 Gordon Street, London WC1. Tea will be served at 4.30 pm.

A dinner will be held at Poons Restaurant, 50 Woburn Place, London WC1 at 7.30 pm. The cost will be £22.00 per person, inclusive of wine, and a reception at De Morgan House beforehand. Those wishing to attend should inform Susan Oakes, Administrator, London Mathematical Society, enclosing a cheque payable to the 'London Mathematical Society' to arrive no later than **Tuesday 17 June.**

There are limited funds available to contribute in part to the expenses of members of the Society or research students to attend the meeting. Requests for support, including an estimate of expenses, may be addressed to the Programme Secretary at the Society (web: www.lms.ac.uk; email: grants@lms.ac.uk).

LONDON MATHEMATICAL SOCIETY
AND
EDINBURGH MATHEMATICAL SOCIETY
JOINT MEETING

Tuesday 22 July 2003, Edinburgh

As part of the International Centre for Mathematical Sciences (ICMS) conference 'Hodge Theory in a New Century' the London Mathematical Society and the Edinburgh Mathematical Society are jointly hosting an afternoon of more general talks likely to be of interest to a broad range of mathematicians.

14.00	Introduction: LMS/EMS Business
14.15	**Michael Atiyah:** Sir William Hodge – the man and the mathematician
15.15	**Roger Penrose**: Mathematical experiences as a Cambridge research student under William Hodge
16.00	Tea
16.45	**Fritz Hirzebruch:** Hodge numbers, Chern numbers, Catalan numbers
17.30	Finish

A conference banquet will take place in the Playfair Library on Tuesday 22 July (at 1930 for 2000) and will cost around £30.

The meeting will be held in the Michael Swann Building in the University of Edinburgh's Kings Buildings (entry via Gate 4 on Mayfield Road).

All are welcome and there is no charge for attendance. It is, however, necessary to reserve a place, either by completing the online form on the website (www.ma.hw.ac.uk/icms/meetings/2003/HODGE/LMS-EMSmtg.html) or by contacting ICMS, 14 India Street, Edinburgh EH3 6EZ (tel: +44 (0)131 220 1777; fax: +44 (0)131 220 1053; email: icms@maths.ed.ac.uk).

There are limited funds available to contribute in part to the expenses of members of the London Mathematical Society or research students to attend the meeting. Requests for support, including estimates of expenses, may be addressed to the Programme Secretary at the Society (web: www.lms.ac.uk; email: grants@lms.ac.uk).

TOPICS IN ALGEBRAIC GEOMETRY

LMS/EPSRC Short Course

University of Bath, 15-19 September 2003
Organiser: G.K. Sankaran

Algebraic geometry occupies a central place in modern pure mathematics, with connections to number theory, theoretical physics and differential geometry in particular. For example, elliptic curves and modular curves play vital roles in arithmetic; startling advances in the theory of higher-dimensional varieties and moduli spaces have emerged from, and contributed to, physics; and the theory of real 4-manifolds has similarly interacted with complex algebraic surfaces. One of the most influential problems for computer algebra has been to carry out explicit calculations in algebraic geometry.

Within algebraic geometry, there has been great progress over the last few years. The study of algebraic varieties of dimension three and more, initiated by Mori and others in the 1970s, has reached an advanced stage. Major results have been proved in enumerative geometry, especially on moduli spaces. The geometric meanings contained in resolutions of ideals (syzygies) have been much better explained and can be applied very directly, often with computer assistance.

In part because of its many connections, algebraic geometry is often seen as being hard to learn, and is left in the hands of specialists. This course will try to broaden the appeal of the subject by presenting three different topics at a level suitable to graduate students in algebraic geometry but in a style accessible to those working in related fields.

The course will take place at the University of Bath, within easy reach of the city of Bath.

There will be three courses of lectures:

- **Vector bundles:** Dr Peter Newstead (Liverpool)
- **Abelian varieties:** Dr Gregory Sankaran (Bath)
- **Higher-dimensional geometry:** Dr Alessio Corti (Cambridge)

There will be tutorial support for the courses, and workshops on other related topics. Further details of the programme may be found on the web (www.bath.ac.uk/~masgks/ShortCourse).

The registration fee is £100, which for all UK-based research students includes the cost of course accommodation and meals. Participants must pay their own travel costs. EPSRC-supported students can expect that their registration fees and travel costs will be met by their department's EPSRC Doctoral Training Account.

Application forms may be obtained from Isabelle Robinson, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HS (robinson@lms.ac.uk) or from the LMS website (www.lms.ac.uk/activities/research_meet_com/short_course/16_form.html)

Numbers will be limited and those interested are advised to make an early application. The closing date for applications is **Monday 8 July 2003.**

Workshop

Computational Modelling in Medicine

17-19 September 2003, Edinburgh

www.ma.hw.ac.uk/icms/meetings/2003/cmm/index

The meeting will be organised around the two interlinked themes of the "Vascular and pulmonary systems and soft tissue mechanics". The purpose is to bring together people who work on mathematical modelling, numerical analysis, simulation and direct medical applications related to these areas, and to act as a focus to stimulate further research and the development of ever more realistic medical simulations.

Registration closes on **5 July**. Contributed papers are invited, and funds are available to support the attendance of participants based at UK Higher Education Institutions. The webpages and online application form contain further details.

The meeting also incorporates (on Wednesday 17 September) the twelfth Scottish Computational Mathematics Symposium.

Scientific Organising Committee:
Joe Barbenel (Strathclyde), Sir Alfred Cuschieri (Dundee), Penny Davies (Strathclyde), Dugald Duncan (Heriot-Watt), Nick Hill (Glasgow), Oliver Jensen (Nottingham), Chris Johnson (Utah), Jonathan Sherratt (Heriot-Watt), David Sloan (Strathclyde).

Invited Speakers:

J. Barbenel (Strathclyde, UK)
A. Cuschieri (Dundee, UK)
M. Heil (Manchester, UK)
N. Hill (Glasgow, UK)
J. Humphrey (Texas A&M, USA)
O. Jensen (Nottingham, UK)
C. Johnson (Utah, USA)
A. Quarteroni (Lausanne, Switzerland)
S. Shaw (Brunel, UK)
J.A. Sherratt (Heriot-Watt, UK)
R.T. Tranquillo (Minnesota, USA)

Supported by The Engineering and Physical Sciences Research Council and the London Mathematical Society.

THE INTERNATIONAL CENTRE FOR MATHEMATICAL SCIENCES
14 India Street, Edinburgh EH3 6EZ
tel: +44 (0)131 220 1777; fax: +44 (0)131 220 1053; email: icms@maths.ed.ac.uk

ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

TOWARDS A PREDICTIVE BIOLOGY?

20 – 23 January 2004

in association with the Newton Institute programme
Statistical Mechanics of Molecular and Cellular Biological Systems
(19 January to 9 July 2004**)**

Organiser: Professor Tom McLeish (Leeds)

Conference theme: This opening conference will take a long view of the increasingly multidisciplinary exploration of microscopic biological systems. The invited speakers are world-leading biologists, physicists and mathematicians whose background qualifies them to speak not only on current programmes of research, but also on the concepts and tools that we may be missing. Just how "predictive" could biology ever be? What is the relationship between biology, physics and mathematics as disciplines, and what might it become?

Speakers: These are a few of the accepted speakers, with examples of the subjects they will tackle.

David Bensimon (CNRS)	*Single molecule study of DNA/protein interactions*
Dennis Bray (Cambridge)	*Intracellular signalling in a molecular jungle: insights from bacterial chemotaxis*
Richard Durbin (Sanger, Cambridge)	to be announced
Alexei Finkelman (IPR, Russia)	*Two bottlenecks for ab initio prediction of protein structures*
Michael Fisher (Maryland)	to be announced
Daan Frenkel (Amsterdam)	*Random design: a litany of ignorance*
Jean-Pierre Hansen (Cambridge)	*Simple models for ion channels: selectivity, intermittency and ion transport*
Stan Leibler (Rockefeller)	*Genetic and biochemical networks: a physicist's perspective*
Michael Levitt (Stanford)	be announced
Janet Thornton (EBI, Cambridge)	*Protein solubility and evolution*
John Trinick (Leeds)	*Linear molecular motors*
Sir John Walker (Cambridge)	to be announced

Application form: Further information and application forms are available from the website (www.newton.cam.ac.uk/programs/SMC/smcw01.html). Completed application forms should be emailed to Tracey Andrew (t.andrew@newton.cam.ac.uk).

Supported participants: Limited support is available for participants in this meeting. In particular, support for younger researchers is available under the Newton Institute Junior Membership scheme.

Accommodation: The Institute has limited accommodation available. On receipt of your formal workshop acceptance letter (which will be sent in late August) you are strongly advised to confirm your accommodation requirements immediately. Once all Institute accommodation has been allocated, you are likely to have to arrange your own.

Closing date for the receipt of applications is **31 July 2003.**

WILLIAM BURNSIDE
DE MORGAN MEDALLIST 1899

William Burnside received the De Morgan Medal on 9 November 1899. Burnside, bred as an applied mathematician in the Cambridge School of Natural Philosophy with a special mastery of hydrodynamics, turned in maturity to pure mathematics. He made a profound study of elliptic functions. Another subject which absorbed his attention was differential geometry. In 1892, work on automorphic functions led Burnside into the theory of groups, though scattered references to discontinuous groups of finite order occur in some of his earlier papers. From the early nineties onwards he concentrated on this subject. Paper after paper appeared in an ordered development, each providing some fresh contribution. His *Theory of Groups* was published in 1897.

DIARY

June 2003

17 Virtual Learning Environments Course, Newcastle University (316)

28 – 1 July Differential and Functional Equations in the Complex Domain Meeting, Loughborough University (316)

July 2003

10-11 Vision, Video and Graphics, IMA Conference, Bath University (316)

22 London Mathematical Society and Edinburgh Mathematical Society Joint Meeting, Edinburgh (316)

28-30 Bifurcations: The Use and Control of Chaos, IMA Conference, Southampton University (316)

August 2003

31 – 3 Sep Unity of Mathematics, Harvard University, USA (316)

September 2003

3 British Logic Colloquium, St Andrews (316)

15-18 Free Boundary Problems in Fluid Mechanics Conference, Nottingham University (316)

15-17 Mathematics of Surfaces X, IMA Conference Leeds University (316)

17-19 Computational Modelling in Medicine Workshop, ICMS, Edinburgh (316)

December 2003

16-18 Cryptography and Coding IX, IMA Conference, Royal Agricultural College, Cirencester (316)

January 2004

9 UK & Republic of Ireland SIAM Section Annual Meeting, Sheffield University (316)

20-23 Towards a Predictive Biology Conference, INI, Cambridge (316)

March 2004

30-1 April Modelling Permeable Rocks IV, IMA Conference, Southampton University, (316)

31–2 April Quantitative Modelling in the Management of Healthcare IV, IMA Conference, Salford University (316)

April 2004

5-7 Modelling in Industrial Maintenance and Reliability V, IMA Conference, Salford University (316)

19-22 British Applied Mathematics Colloquium, University of East Anglia

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September 2004
14-18 Boundary Integral Methods III: Theory and Applications, IMA Conference, Brunel University (316)

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Change to (316)
June 2003
20 LMS Meeting, Fröhlich Lecture, University College, London (316)

July 2003
22 LMS/Edinburgh Mathematical Society Joint Meeting, Hodge Centenary, Edinburgh University (316)

September 2003
15-19 Topics in Algebraic Geometry, LMS/EPSCR Short Course, Bath University (316)