

THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 206

June 1993

FORTHCOMING SOCIETY MEETINGS

Friday 18 June 1993, Burlington House
R.W.K. Odoni, W. Feit

Friday 15 October 1993, Burlington House
Symplectic Geometry and Hamiltonian Dynamics

Friday 19 November 1993, Burlington House
D.G. Crighton, M.V. Berry

RETIREMENT OF J.R. RINGROSE

As announced in the November issue of the Newsletter, a meeting to mark the retirement of Professor J.R. Ringrose will be held in Newcastle starting at 3.00 pm on Friday 24th September and ending at 12.30 pm on Saturday 25th September. The mathematical programme is Friday 24th, 3.00 pm: Dr H.R. Dowson (Glasgow) "The Commutant of a Complete Boolean Algebra of Projections"; 4.30 pm: Dr J.A. Erdos (King's College London) "Nest Algebras Then and Now"; Saturday 25th, 10.00 am Professor E.C. Lance (Leeds) "Hilbert C^* -Modules and Some of Their Uses"; 11.30 am: Dr R.J. Archbold (Aberdeen) "Applications of the Dixmier Process and its Variants in Operator Algebras".

These lectures, which will be accessible to mathematicians without a specialised knowledge of the subjects concerned, will be given in Room L101 Merz Court, University of Newcastle upon Tyne. All interested are very welcome to attend.

The social programme will consist of a dinner for Professor and Mrs Ringrose at Henderson Hall, Redhall Drive, High Heaton, Newcastle upon Tyne 7 on Friday 24th September at 7.00 for 7.30 pm. The dinner will cost £15 per person, including wine. Those attending the meeting may stay overnight at Henderson Hall at a cost of £16.50 per person, including breakfast. These

prices do not include VAT and we have made an application, which we are told will be successful, for VAT exemption. We are proceeding on the assumption that VAT will not be charged. If VAT is charged it will be necessary to pass this charge on to participants. Transport between Merz Court and Henderson Hall will be provided. There are no charges for attendance at the lectures.

Booking for the dinner and/or accommodation should be made by writing to the undersigned and should be received by 9th July. Bookings should either be accompanied by payment in full or by a deposit of £5 per person for dinner and £5 per person for overnight accommodation. For those adopting the latter alternative, the balance must be received by 27th August 1993. While the organisers will make every attempt to refund money to people who cancel bookings, such refunds are not guaranteed. Payment should be made by cheque payable to Professor B.E. Johnson.

The meeting is supported by grants from the London Mathematical Society and the University of Newcastle upon Tyne and is organised by Professor B.E. Johnson and Professor E.C. Lance. Enquiries and bookings should be sent to Professor B.E. Johnson, Department of Mathematics & Statistics, University of Newcastle, Newcastle upon Tyne NE1 7RU.

LONDON MATHEMATICAL SOCIETY

1993 HARDY LECTURE TOUR

In June, the 1993 Hardy Lecturer, Professor Walter Feit (Yale), will give the following lectures.

- | | |
|-------------------|---|
| Tuesday June 1 | University of Oxford
Steinberg Characters
4.30 pm Mathematics Institute |
| Wednesday June 2 | University of Warwick
Representation of quivers and the generalised
McKay Correspondence
4.00 pm Mathematics Institute |
| Friday June 4 | University of Birmingham
The existence of algebraic number fields with given
Galois group and maximal subfields of division rings
4.15 pm Lecture Room B, Watson Building |
| Monday June 7 | University of Wales
Steinberg Characters
2.00 pm Video Conferencing Room, Llanbarn
Campus, Aberystwyth |
| Tuesday June 8 | University of Manchester
Steinberg Characters
4.00 pm Mathematics Tower, Oxford Road |
| Thursday June 10 | University of Dublin
Representation of quivers and the generalised
McKay Correspondence
4.30 pm Hamilton Lecture Theatre 1, Trinity College |
| Friday June 11 | Edinburgh Mathematical Society
The existence of algebraic number fields with given
Galois group and maximal subfields of division rings
4.30 pm. Lecture Theatre B, David Hume Tower,
George Square |
| Tuesday June 15 | University of Newcastle
The existence of algebraic number fields with given
Galois group and maximal subfields of division rings
4.00 pm Room M421 Merz Court |
| Wednesday June 16 | University of Leeds
The existence of algebraic number fields with given
Galois group and maximal subfields of division rings
4.00pm Classroom E |
| Friday June 18 | London Mathematical Society
Representation of quivers and the generalised
McKay Correspondence
5.00 pm, Burlington House, London |

All interested are welcome to attend any of the meetings addressed by the Hardy Lecturer, but it is advisable to check the time and venue with the department concerned. General enquiries about Professor Feit's visit may be directed to the LMS Administrator, Miss Susan Oakes, telephone 071-437-5377.

LONDON MATHEMATICAL SOCIETY

FRIDAY 18 JUNE 1993

3.30 R.W.K. Odoni (Glasgow)
will speak at 3.30
on

Random Walks and Cusp-Form Coefficients

W. Feit (Yale)
will give the 1993 Hardy Lecture at 5.00
on

Representations of Quivers and the Generalised McKay Correspondence

The meeting will be held at the Geological Society
Burlington House, Piccadilly, London W1.

All interested are very welcome.

Tea will be served at 4.30

LONDON MATHEMATICAL SOCIETY MONOGRAPH SERIES

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If you have an idea for a book or wish for further information, please contact the Editors direct: Professor P.M. Cohn FRS, Department of Mathematics, University College London, Gower Street, London WC1E 6BT and Professor H.G. Dales, Department of Pure Mathematics, University of Leeds, Leeds LS2 9JT, email pmt6hgd@uk.ac.leeds.gps, or write to the Publishers: Elizabeth Johnston, Mathematics Editor, Oxford University Press, Walton Street, Oxford OX2 6DP, telephone: 0865 56767, fax: 0865 56646, email: oupeaj@uk.ac.ox.vax.

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MATHEMATICS AND COMPUTING



FEASIBLE FUNCTIONS

It is common to identify the class of computable functions with the class of functions computable by a Turing machine. The identification is done on the ground of the famous Church-Turing thesis. In fact, the thesis justifies only one implication: computable functions are Turing computable. The other implication is quite obviously false if computability means practical computability. I am not trying to mock the Turing machine or recursion theory. They brought about a major advance in our understanding of computations. In particular, assuming the Church-Turing thesis, logicians were able to prove that some important decision problems, like Hilbert's Tenth Problem [M], are not solvable by any algorithm. But the fact is that some "computable in principle" functions are not computable *in principle* in any practical sense.

It is common to identify feasible functions (that is, feasibly computable functions) with those computable in polynomial time. Since a great many useful decision problems are NP [GJ], this identification makes the famous question $P = ?NP$ so central in complexity theory.

On the first glance, the claim $PTime \rightarrow$ feasible seems silly. The time complexity of computing a PTime function may have a terrible lower bound, like n^{1000} . No technological progress will allow us to compute such a function. Fortunately, PTime functions of practical interest tend to have low-polynomial time complexity. It seems reasonable that, given an n -bit input, we should be able, at least in principle, to spend time $7n$, $n \log n$ or n^2 to work on it. One famous proponent of the thesis feasible \leftrightarrow PTime is Steve Cook, of the University of Toronto. He and I debated the issue during the 1991 Annual Meeting of the Association for Symbolic Logic. It

would be only fair to represent here the arguments of both sides, but the format of this short article does not allow me to do so. Cook's position is reflected in the paper [C]. I describe briefly my objections to the thesis.

First, there are different kinds of feasibility. (There are also different degrees of feasibility. The proponents of Turing computability win a point: it is absolute.) What is feasible in one application may be infeasible in another. In some applications, time isn't the most important resource, and feasibility may be a function of memory size or money or a combination of various resources. Even if time is the only limiting resource, it may be more appropriate in some applications to measure time complexity in terms of the output size rather than the input size. For example, consider the task of printing out all primes $\leq N$ on input N (in decimal notation).

Second, let us examine the feasibility reflected in the thesis feasible \leftrightarrow PTime. "For natural problems, PTime computability implies feasibility, but feasibility does not necessarily imply PTime computability", says Leonid Levin, a smart kid on the block who influenced this author [L]. I agree with the second part. Indeed, some non-polynomial bounds on computation time, e.g. bounds of the form $n^{c \log \log n}$, do not seem to contradict feasibility. Notice that $n^{1/5 \log \log n} > n^2$ if and only if $n > e^{c10}$. Bounds of the form $n^{c \log \log n}$, do appear in practice. The fastest known (deterministic) primality test runs in time $O(n^{c \log \log n})$ for some c (where n is the length of, say, decimal notation for the given number N) [APR] though I do not know any natural decision or search problem whose time complexity is provably of the form $n^{c \log \log n}$.

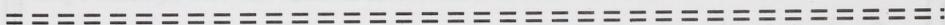
Many useful decision and optimization problems are known to be NP hard. Those problems are not decidable in PTime. But some such optimization problems are approximately solvable in PTime in a satisfying way [GJ], and some of those decision problems are decidable very quickly on average. For example, under the assumption that all n -vertex graphs are equally probable, the expected time of the backtracking algorithm for 3-colourability is ... constant. Specifically, "the average number of nodes in the backtrack search tree for this problem is about 197, averaged over graphs of all sizes" [W]. The explanation is simple. Statistically, the overwhelming majority of graphs are not 3-colourable and there are very simple witnesses for non-3-colourability, e.g. a clique of 4. If you design your algorithm to look for a 4-clique first, you can decrease the expected time substantially. Of course, not all examples are that simple [GS]. My point is that some presumably infeasible problems are solvable quickly on average, and of course the average running time may be more important in practice than the worst-case time. Elsewhere we argued that the average-time version of the $P \stackrel{?}{=} NP$ question is preferable to the original one [G].

Finally, the weakest point of the feasible \leftrightarrow PTime thesis is the asymptotic approach. In applications, one deals with input sizes in a certain range. This is, however, a weak point of almost all current complexity theory. A good theory of non-asymptotic complexity is the biggest challenge of all in the area.

References

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- [W] Herbert S. Wilf. "Algorithms and Complexity", Prentice-Hall, 1986.

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This occasional column is for the discussion of topics on the boundary between mathematics and computer science, thus covering both applications of mathematics in computer science and uses of computers in mathematics. Relevant material such as opinions, notices about Maths & CS meetings and reviews of research, teaching and support software is solicited. Contributions should be sent to the editors of the column: rd@dcs.st-and.ac.uk (Roy Dyckhoff, University of St Andrews) dfh@maths.warwick.ac.uk (Derek Holt, University of Warwick).

THE SUSLIN FOUNDATION

Michal Yakovlevich Suslin, famous as the founder of the Descriptive Set Theory and the author of many outstanding theories, was born in 1894 in Krasavka which is not far from the ancient Russian city of Saratov. It is in the centre of Russia, by the river Volga. The mathematicians at Saratov have held study groups on Suslin's work on two occasions. They have also formed The Suslin Foundation, a public society aimed at supporting fundamental mathematical research and organising regular meetings on Suslin's work. The main tasks of the Suslin Foundation are: holding scientific conferences; arranging visits by distinguished scholars; publishing scientific literature; providing financial support for young scientific talent; promoting activities in memory of Suslin; maintaining and developing the

Suslin Library of mathematical literature.

Anyone who supports the aims and work of The Suslin Foundation can become a member. Its financial base is formed by members' subscriptions, sponsorship, etc. We appeal to mathematicians everywhere for their support. A cycle of international scientific conferences on Suslin's areas of interest is to be held in September 1994 as part of the Suslin Jubilee, marking the centenary of Suslin's birth. We invite mathematicians from any part of the world to contribute to the organisation and programme of these events. For further information, please write to: Vladimir Molchanov, Executive Director of the Suslin Foundation, Faculty of Mathematical Studies, The Pedagogical Institute, ul. Michurina 92, Saratov, Russia.

VISIT OF PROFESSOR J.-M. LEMAIRE

Professor J.-M. Lemaire will be visiting the United Kingdom from Nice in the week beginning 15th June. He will give a seminar on Algebraic Homotopy Theory at 5 p.m. on Monday 14th June at the Mathematical Institute, Oxford,

and will then go on to lecture at Bangor (enquiries to Professor Brown) and Edinburgh (enquiries to Professor Rees). Professor Lemaire's visit has been made possible by a Scheme II travel grant from the London Mathematical Society.

DR CHARLES PLUMPTON - MEMORIAL SERVICE

Dr Charles Plumpton died in December 1992. Queen Mary & Westfield College are holding a Memorial Service for him on 24th June at 2.00 p.m. Please ring 071 975 5455 for details.

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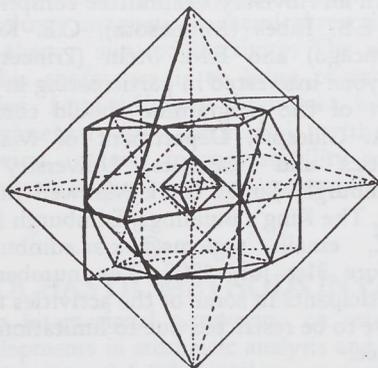
LONDON MATHEMATICAL SOCIETY

1993 POPULAR LECTURES

Edinburgh University - Thursday 24 June

Leeds University - Friday 25 June

Imperial College - Friday 2 July



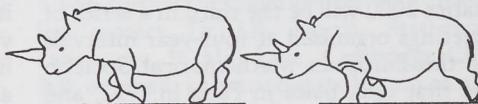
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Four Dimensions

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Optimization of Running
and Jumping



EDINBURGH Commences at 2.00 pm, 3.00 pm refreshments, ends 4.30. Lecture Theatre 4, Appleton Tower, George Square, Edinburgh EH9 3JZ. Admission is free. Enquires to Dr P. Heywood, Department of Mathematics & Statistics, Edinburgh University, James Clerk Maxwell Building, The King's Buildings, Edinburgh EH9 3JZ.

LEEDS Commences at 7.00 pm, 8.00 pm refreshments, ends at 9.30. Rupert Beckett Lecture Theatre, Arts Building, University of Leeds. Admission free, with ticket in advance. Apply by Monday 21 June to Mr L. Smith, Department of Mathematics, University of Leeds, Leeds LS2 9JT. A stamped addressed envelope would be appreciated.

LONDON Commences at 7.30 pm, 8.30 pm refreshments, ends at 10.00 pm. The Great Hall, Sherfield Building, Imperial College, South Kensington, London SW7. Admission free, with ticket in advance. Apply by Monday 28 June to Miss S.M. Oakes, London Mathematical Society, Burlington House, Piccadilly, London W1V 0NL. A stamped addressed envelope would be appreciated.

HARMONIC ANALYSIS AND PARTIAL DIFFERENTIAL EQUATIONS

Under the auspices of the International Centre for Mathematical Sciences, and with financial support from SERC, a research programme on Harmonic Analysis and Partial Differential Equations will be held in Edinburgh from 1st April to 31st July 1994. One of the main aims of the programme will be to focus on the interaction between these two areas of analysis. A number of analysts will be resident in Edinburgh for substantial periods of time, with informal activities and seminars taking place throughout. In addition, there will be three periods of more concentrated activity as follows.

5th - 15th April: An Instructional Conference consisting of expository lectures by E.M. Stein and C.E. Kenig, with introductory series by A. Carbery and F. Soria. Professor Stein will lecture on "Aspects of Harmonic Analysis related to Curvature and Oscillatory Integrals" and Professor Kenig on "Well-posedness and local smoothing effects in nonlinear hyperbolic and dispersive partial differential equations".

29th May - 4th June: A Workshop on harmonic and oscillatory integrals, together with their uses and applications in hyperbolic and dispersive partial differential equations.

17th - 23rd July: A Workshop focusing on elliptic partial differential equations and related areas of harmonic analysis.

The programme is being directed jointly by A. Carbery and D.E. Edmunds (Sussex) and T.A. Gillespie (Edinburgh), with an Advisory Committee comprising of E.B. Fabes (Minnesota), C.E. Kenig (Chicago) and E.M. Stein (Princeton). Anyone interested in participating in any part of the programme should contact T.A. Gillespie, Department of Mathematics and Statistics, University of Edinburgh, James Clerk Maxwell Building, The King's Buildings, Edinburgh EH9 3JZ, email: tagicms@uk.ac.edinburgh, before 31st July 1993. The number of participants in some of the activities may have to be restricted due to limitations of space.

EUROPEAN CONGRESS OF MATHEMATICS 2000 - POSSIBLE UK BID

The European Congress of Mathematics 2000 will be the third in a series of meetings organised at four-year intervals by the European Mathematical Society; the first took place in Paris in 1992, and the second is to be held in Budapest in 1996. The location of the third meeting, in the year 2000, is yet to be decided; it is expected that the European Mathematical Society will receive proposals from a number of countries that would like to host the meeting.

It is likely that the development of a successful bid will require a university institution wishing to act as host, and will also need the support of its country's national mathematical society. Interest has been expressed in the possibility of holding the European Congress of Mathematicians 2000 in the UK, and the London Mathematical Society is willing to participate in a suitable proposal from a UK institution to host the meeting.

Any UK institution interested in seeking London Mathematical Society involvement in a bid to host ECM 2000 is invited to submit an initial proposal, addressed to the Meetings and Membership Secretary, to reach the Society's office by 30 September 1993. This initial proposal should demonstrate the capacity of the institution to organise a large international meeting (perhaps about 2000 participants), and should include an indication of its plans to secure the necessary financial support and guarantees. The London Mathematical Society will consider proposals during October and November 1993, with the intention of selecting one proposal for further development before submission with London Mathematical Society support to the European Mathematical Society.

WORKSHOP ON METASTABILITY AND HYSTERESIS

A Workshop on "Metastability and Hysteresis" will be held on Thursday 8th and Friday 9th July 1993 at the Department of Mathematics, Heriot-Watt University.

Metastability and hysteresis are important in a wide variety of physical phenomena, from the longevity of a single radioactive nucleus to the storage of energy in a thundercloud. The scientific disciplines involved are equally varied: for example liquid crystals, phase transitions, metallurgy, magnetism, chemical reaction rate theory, superconductivity. The aim of this conference is to bring together workers from different disciplines, both experimental and theoretical, with a common interest in metastability and hysteresis so that they can compare and

learn from each others' approaches.

Speakers are expected to include: M.C. Calderer (Pennsylvania State), J. Gregg (Oxford), R.D. James (Minnesota), I. Müller (Berlin), E. Olivieri (Rome), J. Ortín (Barcelona), G. Sewell (London) and M. Slemrod (Wisconsin).

The meeting will take place in room 3.20, Mathematics Department, Riccarton campus. There will be a registration fee of £15 to cover the cost of administration and refreshments. For further information and registration forms please contact: Barbara Kollmer, Department of Mathematics, Heriot-Watt University, Riccarton, Edinburgh EH14 4AS, Tel: 44-31 451 3223, Fax: 44-31 451 3249, e-mail: barbara@cara.ma.hw.ac.uk. The organizers are J.M. Ball and O. Penrose.

STOCHASTIC METHODS IN PARTIAL DIFFERENTIAL EQUATIONS

An international symposium on recent developments in stochastic analysis and its relation to partial differential equations will be held at the Isaac Newton Institute for Mathematical Sciences from 13th to 17th September 1993. The meeting will focus on stochastic partial differential equations, measure-valued diffusions, stochastic methods in non-linear partial differential equations, hydrodynamic limits and large deviations. This meeting is part of a longer term programme at the Isaac Newton Institute devoted to "Random Spatial Processes".

The current list of participants consists of G. Ben Arous (Orsay), E. Bolthausen (Zürich), D.A. Dawson (Carleton), A. De Masi (L'Aquila), J.-D. Deuschel (Zürich), P. Donnelly (QMW), P. March (Ohio State), E. Pardoux (Marseille), E. Perkins (UBC), E. Presutti (Rome), T. Shiga (Tokyo), A. Sznitman (Zürich) and J.B. Walsh (UBC).

For further information on this meeting contact Dr J.R. Norris, Statistical Laboratory, 16 Mill Lane, Cambridge CB2 1SB, or email: j.r.norris@statslab.cam.ac.uk. The meeting is partially supported by the London Mathematical Society.

WOLF PRIZE

The 1993 Wolf Prize in Mathematics has been awarded jointly to Mikhael Gromov of the Institut de Hautes Etudes Scientifiques (IHES) and Jacques Tits of the Collège de France. Gromov was cited "for his revolutionary contributions to global Riemannian and symplectic geometry, algebraic topology, geometric group theory, and the theory of partial differential equations." Tits was cited "for his pioneering and fundamental contributions to the theory of the structure of

algebraic and other classes of groups and in particular for the theory of buildings." Wolf Prizes have been awarded annually for outstanding achievements in agriculture, chemistry, mathematics, medicine, physics and the arts. The prize is \$100,000 for each category. To date, 143 laureates from eighteen countries have been honoured. The Wolf Foundation was established by the late Ricardo Wolf, an inventor, diplomat, and philanthropist.

RIMS, KYOTO UNIVERSITY

The following conferences are being held at the Research Institute for Mathematical Sciences, Kyoto University, Japan, up until December 1993.

Geometry and Analysis in Dynamical Systems	6-9 July	Hidekazu Ito	Tohoku University
Operator Algebras	12-14 July	Huzihiro Araki	Kyoto University
Combinatorial Structure in Mathematical Models	13-15 July	Shinji Kuriki	Osaka Women's University
Nonlinear Evolution Equations and Their Applications	19-21 July	Hitoshi Ishii	Chuo University
Type Theory and its Application to Computer Systems	21-23 July	Tasuya Hagino	Keio University
Problems on Structure and Representations of Lie Groups	26-29 July	Toshihiko Matsuki	Kyoto University
Quantum Information Theory and Open Systems	6-8 Sept	Masanori Ohya	Science University of Tokyo
Nonlinear Analysis and Mathematical Economics	29 Sept - 1 Oct	Waturu Takahashi	Tokyo Institute of Technology
Moduli Spaces, Galois Representations and L-Functions	4-6 Oct	Yasutaka Ihara	Kyoto University
Mathematical Analysis of Phenomena in Fluid and Plasma Dynamics	18-20 Oct	Seiji Ukai	Tokyo Institute of Technology
Mathematical Topics in Biology	18-20 Oct	Msayasu Mimura	Hiroshima University
Analytic Number Theory	19-22 Oct	Yoichi Motohashi	Nihon University
The State of the Art in Numerical Algorithms and Their Prospects	25-27 Oct	Tetsuro Yamamoto	Ehime University
Mathematical Methods for Wave Phenomena in Fluids and Their Applications	27-29 Oct	Masayuki Oikawa	Kyushu University
Study of Structures of Solutions to P.D.E.	4-6 Nov	Shigetake Matsuura	Kyoto University
Spectral and Scattering Theory and Related Topics	8-10 Nov	Masaharu Arai	Ritsumeikan University
Singularities of Holomorphic Vector Fields and Related Topics	9-12 Nov	Tatsuo Suwa	Hokkaido University
Representation Theory of Finite Groups and Algebras	15-17 Nov	Shigeo Koshitani	Chiba University
Research on Algebraic Combinatorics	17-19 Nov	Tomoyuki Yoshida	Kumamoto University
Theory and Applications in Computer Algebra	24-26 Nov	Naoto Niki	Kyushu University
Linear Operators and Inequalities	1-3 Dec	Tsuyoshi Ando	Hokkaido University
Mathematical Structure of Optimization Theory	8-10 Dec	Jun-ichi Nakagami	Chiba University
Groups and Related Topics	15-17 Dec	Masahiko Miyamoto	Ehime University

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Executive Editor,
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Sheffield S3 7RH, UK.





Paul Moritz Cohn was born in Hamburg in 1924 and took his PhD from Cambridge in 1951. He lectured for 10 years in Manchester before taking up a succession of appointments at London University, finishing as Astor Professor at University College from 1986-1989. He has written on Lie groups, universal algebra, and above all on non-commutative rings. In 1980 he was elected to Fellowship of the Royal Society. The London Mathematical Society awarded him its Senior Berwick Prize in 1974 and he was the Society's 61st President, from 1982 to 1984.

DIARY

The diary lists Society meetings and other events publicised in previous issues of the Newsletter. For further information, refer to the figure in brackets, which is a cross reference to the LMS Newsletter Number.

1993

JUNE

- 4-7 European Women in Mathematics, Warsaw, Poland (201)
- 6-12 Potential Theory and Analysis Spring School, Czechoslovakia (201)
- 7-18 Analysis, ICMS Short Course, Edinburgh (201)
- 18 London Mathematical Society Meeting, London
- 20-2 Jul Real and Complex Dynamical Systems, Hillerod, Denmark (201)
- 24 LMS Popular Lectures, University of Edinburgh (205)
- 25 LMS Popular Lectures, University of Leeds (205)
- 25 GruenbergFest, Queen Mary & Westfield College, London (205)
- 28-2 Jul Integrability and Chaotic Behaviour Conference, Torun, Poland (201)
- 29-2 Jul Number Theoretic and Algebraic Methods in Computer Science, Moscow, Russia (197)
- 29-9 Jul Proof Theory and Foundations of Programming, France (203)

JULY

- 2 LMS Popular Lectures, Imperial College, London (205)
- 4-11 Analytic and Geometric Aspects of Hyperbolic Space, LMS Durham Symposia, Durham University (200)
- 4-16 Probability Theory of Spatial Disorder and Phase Transition, Cambridge (202)
- 5-9 14th British Combinatorial Conference, Keele University (188)(200)
- 5-9 Annual Meeting of the Australian Mathematical Society, Wollongong, Australia (198)
- 11-16 Computational Techniques in Spectral Theory and Related Topics Workshop, Gregynog, Wales (201)
- 11-21 Complex Dynamics, LMS Durham Symposia, Durham University (188)(200)
- 12-16 Combinatorial Mathematics and Combinatorial Computing Conference, Adelaide, Australia (189)
- 12-16 Algebraic Graph Theory, ICMS, Edinburgh (197)
- 22-1 Aug Vector Bundles in Algebraic Geometry, LMS Durham Symposia, Durham University (200)
- 26-30 Randomness and Computation Workshop, Edinburgh (197)
- 26-30 Classical and Axiomatic Potential Theory Workshop, France (202)
- 26-6 Aug Séminaire de Mathématiques Supérieures, Montreal, Canada (199)

AUGUST

- 1-14 Groups Galway/St Andrews 1993, Galway, Ireland (201)
- 3-6 Transformation Semigroups and Their Applications Conference, University of Essex (205)
- 7-21 Semigroups, Formal Languages and Groups, University of York (205)
- 17-20 The Mathematical Heritage of Sir William Rowan Hamilton, Dublin, Ireland (193)
- 18-22 Differential Equations, Plovdiv, Bulgaria (197)
- 23-25 Twistor Theory Conference, Plymouth (201)
- 23-26 Perturbations of Black Holes and Relativistic Stars, Sixth Gregynog Relativity Workshop, Gregynog, Powys (205)
- 23-4 Sep Polytopes, Ontario Canada (200)

SEPTEMBER

- 6-9 Bubble Dynamics & Interface Phenomena Conference, Birmingham (188)
- 12-16 Differential Equations Meeting, Dublin (201)
- 13-17 Computer Science Logic 1993 Conference, University College, Swansea (201)
- 17-20 Technology in Mathematics Teaching, University of Birmingham (200)
- 19-25 Algebraic Groups and Lie Theory, LMS-SERC Postgraduate Short Course, University of Lancaster (205)
- 20-24 Ordinary Differential Equations and Their Applications, Florence, Italy (198)
- 23-24 Higher Order Algebra, Logic and Term Rewriting Workshop, Amsterdam, Holland (204)
- 24 Retirement J.R. Ringrose - Meeting, Newcastle upon Tyne (199)

The Newsletter is published monthly except in August. Items and advertisements for inclusion in the Newsletter should be sent to the Editor, Susan Oakes, London Mathematical Society, Burlington House, Piccadilly, London W1V 0NL, to arrive before the first day of the month prior to publication. Telephone 071- 437 5377, Fax 071-439 4629, E-mail lms@uk.ac.kcl.cc.oak.