

THE LONDON MATHEMATICAL SOCIETY NEWSLETTER

No. 264

October 1998

FORTHCOMING SOCIETY MEETINGS

Friday-Saturday 16-17 October 1998 - London

Harmonic Analysis

Friday 20 November 1998 - London

Annual General Meeting

L.C. Evans, J.M. Ball (Presidential Address)

Friday-Saturday 12-13 February 1999 - Leeds

Proof and Computation

Friday-Sunday 14-16 May 1999 - Brussels

Joint meeting with the Belgian Mathematical Society

ANNUAL GENERAL MEETING

The Annual General Meeting of the London Mathematical Society will be held on Friday 20 November 1998 at 3.15 pm in the Harrie Massey Lecture Theatre, University College, London WC1.

At the Annual General Meeting the report of the Treasurer will be read, the Council and Officers of the Society for the coming year will be elected, and Auditors appointed. The election of Council and Officers is governed by Article 9 of the Charter of the Society, by Articles 18, 24 and 31 of the Statutes of the Society and by By-Law I of the By-Laws of the Society.

A Ballot Paper is enclosed which contains a list of those persons nominated for election to Council either by Members of the Society in accordance with By-Law I.5 or by the present Council in accordance with By-Laws I.3 and I.6.

The elections for Officers and for Members-at-Large are uncontested. It should be noted that the following three Members-at-Large of Council elected for two-year terms at the last AGM have one remaining year to serve: C.A. Hobbs,

M.A.H. MacCallum and I.A. Stewart.

A Member of the Society is entitled to vote in the election by striking out on the ballot paper those names for which he/she does not vote. The Member should then place the completed ballot paper inside the voting envelope, seal the envelope, and then validate the envelope with her/his signature and legibly written name on the back.

Voting envelopes, duly sealed and validated, should either be brought to the AGM or sent to "The Scrutineers, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP.", to arrive at least three hours before the time of the AGM.

J.S. Pym

Council and General Secretary

INVITED LECTURES SERIES

The Society's Invited Lectures series consists of meetings at which a single speaker gives a course of about ten expository lectures, examining some subject in depth,

over a five day period (Monday to Friday) during a University vacation. The meetings are residential and open to all interested. It is intended that the texts of the lectures given in the series shall be published. In addition to full expenses, the lecturer is offered a fee of £1000 for giving the course and a further fee of £1500 on delivery of the text in a form suitable for publication. Recent lecturers in the series have been P.F. Baum (1995), F.J. Almgren (1996), J. Alperin (1997) and D. Zagier (1998). The 1999 lectures will be given at the University of Bath by A. Mielke.

For the meeting in 2000, proposals are now invited from any member who, in addition to suggesting a topic and lecturer, would be prepared to organize the meeting at the member's own institution or a suitable conference centre. Enquiries about this series should be directed to Dr D.J.H. Garling, the Executive Secretary at the London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP (e-mail: lms@lms.ac.uk, tel: 0171 637 3686, fax: 0171 323 3655) to whom proposals should be sent no later than 30 November 1998.

ANNUAL SUBSCRIPTION

The LMS annual subscription, including publications, for the session November 1998 - October 1999 is due on 1 November 1998. Together with this Newsletter is a renewal form to be completed and returned with your remittance in the enclosed envelope.

No action is required if you are already paying by Direct Debit, and do not wish to change your choice of publications. Fully complete and return the form if you are paying by Direct Debit but wish to change your choice of publications or add/delete a subscription to the European Mathematical Society. Bank accounts of members paying by Direct Debit will be debited with the appropriate amount on 15 January 1999. Other members should either enclose a cheque (£ sterling or US\$) with their form or, if they have a UK bank account and wish to take advantage of this

convenient form of payment, request a Direct Debit mandate. Although the facility to pay by credit card is open to all members of the Society, it is our preference that members continue to pay by direct debit.

If the renewal form is missing from this Newsletter, contact the Society's Office (De Morgan House, 57-58 Russell Square, London WC1B 4HP, tel: 0171 637 3686, fax: 0171 323 3655, e-mail: lms@lms.ac.uk).

PUBLICATIONS PRICING POLICY

The London Mathematical Society has a pricing structure for its journals, which allows individual members to purchase them at a substantial discount. These discounted prices are intended for personal use only and the journals should be kept among your personal belongings and not deposited, even temporarily, in a library, common room or other public area. Issues of the journals should be accessible to other mathematicians or students only with your permission, given individually in each instance.

1998 ANNUAL DINNER

The 1998 Annual dinner will be held after the Annual General Meeting on Friday 20 November at 6.30 pm for 7.00 pm at The Montague Hotel, 15 Montague Street, London WC1. The Hotel requests that whilst on its premises, visitors should dress smartly and, in particular, gentlemen wear a jacket and tie. The cost is £30.00 per person and members may book places for guests. The booking form enclosed with this Newsletter, should be returned together with payment to the London Mathematical Society office by Monday 9th November.

ANDRÉ WEIL

Professor André Weil, who was elected an honorary member of the London Mathematical Society on 21 May 1959, died on 6 August 1998, aged 92.

LONDON MATHEMATICAL SOCIETY

TWO-DAY MEETING

Friday 16th and Saturday 17th October 1998

HARMONIC ANALYSIS

Friday

- 2.15 pm A. Carbery (Edinburgh) *Inverting the n -dimensional Fourier transform: convergence, divergence and localisation*
- 3.20 pm G. David (IHES) *Regularity properties for global minimizers of the Mumford-Shah functional*
- 4.25 pm Tea
- 5.00 pm C. Kenig (Chicago) *On free boundary regularity for harmonic measure and Poisson kernels*

Saturday

- 9.15 am T.A. Gillespie (Edinburgh) *Spectral decompositions and ergodic multiplier theory*
- 10.20 am C. Thiele (Kiel) *Bilinear singular integrals*
- 11.30 am Coffee
- 12.00 noon A. Volberg (Michigan State University) *Nonhomogeneous harmonic analysis and capacities*

The meeting will be held in Room 505, 5th floor of the Mathematics Department, University College London, 25 Gordon Street, London WC1

All interested are very welcome

A dinner will be held at The Old Amalfi, 107 Southampton Row, London WC1 on the Friday evening at 6.20 pm for 7.00 pm. The cost will be £20.00 per person, inclusive of wine. Those wishing to attend should inform Miss Susan M. Oakes London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP, enclosing a cheque payable to 'The London Mathematical Society' to arrive no later than **Tuesday 13th October**.

There are limited funds available to help research students attend the meeting. Request for support and any other enquiries may be addressed to Dr D.J.H. Garling, London Mathematical Society, De Morgan House, 57-58 Russell Square, London WC1B 4HP (e-mail: lms@lms.ac.uk)

NEWS FROM DE MORGAN HOUSE

On September 8th we sadly said goodbye to Harvinder Lotay, who has faithfully served the Society as Assistant Administrator since 1991, looking after membership, subscriptions and the Society's accounts. We wish her all the best with her new activities.

On a more cheerful note, the establishment that was set up by Council on the recommendation of the Working Group on Administration and Staffing is now complete. The team will be:

- Ben Garling (Executive Secretary, part-time), whose concern will be meeting the needs of Council and its Committees, and looking after the scientific and academic activities of the Society,
- Susan Oakes (Administrator), who will continue to carry out and supervise the administration of the Society,
- Susan Hezlet (Publications Manager), who will be responsible to the Publications Secretary and Publications Committee for managing the publication activities of the Society,
- Nilesh Shah (Systems Network Manager, part-time), who is concerned with the Society's computing, e-mail, telephone needs and electronic matters,
- Ephrem Belay (Accounts/Administrative Assistant), who will keep the Society's day-to-day accounts, and look after members' subscriptions,
- Sylvia Daly (Secretarial Assistant, part-time), whose principal concern is the administration of the grants that the Society makes, and
- Lee-Anne Taylor (Receptionist), who will handle initial enquiries, and will also deal with membership of the Society.

By the time that this appears, each will have his or her e-mail address, of the form surname@lms.ac.uk (for example, belay@lms.ac.uk), and individual phone number (not at present known - please consult the Society's web pages). There will also be generic e-mail addresses lms@lms.ac.uk and publications@lms.ac.uk.

DEPARTMENTAL NEWS

University of Essex Peter Higgins has been promoted from Senior Lecturer to Reader as from 1 October 1998.

University of Surrey Tom Bridges has been promoted to Professor of Applied Mathematics with effect from 1 July 1998. Professor Bridges was formerly a Reader in Mathematics at Surrey. Sebastian Reich has been appointed to the Foundation Lecturership in Mathematics from 1 September 1998. Dr Reich was formerly a Research Associate at the Konrad-Zuse Zentrum and the Freie Universität in Berlin.

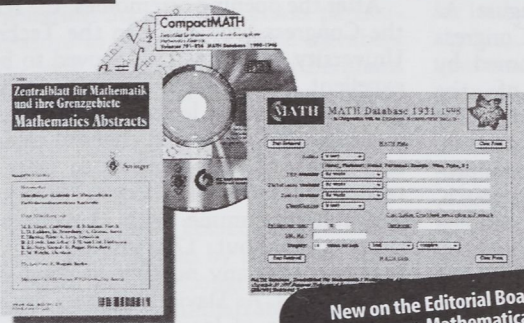
ALAN TURING

All over London, there are houses with blue plaques marking the fact that some famous individual was born there, or perhaps lived there for a while. Now, finally, there is one on the birth place of Alan Turing, 2 Warrington Crescent, London W9, which is now the Colonnade Hotel. The unveiling was on 23 June, the 86th anniversary of Turing's birth and also almost exactly the 50th anniversary of the first operation of the computer at Manchester University. Turing is described as "Code-breaker and Pioneer of Computer Science". LMS members may regret that there is nothing to tell the passer-by that he was also an outstanding mathematician, but there wasn't really room on the plaque. Few people are remembered for so many different accomplishments. The event was celebrated by an address by Andrew Hodges and a reception given by the owners of the hotel.

P.T. Saunders



Zentralblatt MATH



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Retrieval Modules

Local server installation

Unix module: free of charge for subscribers of CompactMATH

CD-ROM

PPS 2000 DOS module (English): free of charge for subscribers of CompactMATH
PPS 2000 Windows module: DM 100

CD-ROM prices apply to a one-site network as well as to single-user usage.
Please note: All prices for non-print media are suggested list prices plus local VAT.
Plus carriage charges.

System Requirements

Local Server installation

NEW Unix software available

(Copyright by Cellule MathDoc, UJF-CNRS)

Unix

SUN OS 4.1.3 and 4.1.4; Solaris 2.3 and 2.4;
Digital Unix 4.0; LINUX 2.0 (Intel); IRIX
5.3 (SGI); AIX 3.1 (RS 6000); HP/UX 9.0.

Other platforms: please contact us

CD-ROM use

DOS

IBM PC or 100 % compatible computer,
640 KB RAM with 520 KB of free Memory;
Graphic card (CGA, EGA, VGA); Hard disk;
MS-DOS or PC-DOS 5.0 or higher

Windows

MS Windows 3.1 or Windows 95, 8 MB RAM
recommended.



Springer

INTERNATIONAL CONGRESS OF MATHEMATICIANS Berlin, 18-27 August 1998

The International Congress of Mathematicians took place in August. At the opening, in the International Congress Centre, the Congress was welcomed by David Mumford, President of the International Mathematical Union, by Martin Grötschel, President of the Organising Committee, who oversaw proceedings with a light and friendly touch, by Karl-Heinz Hoffmann, President of the German Mathematical Society, and by Friedrich Hirzebruch, who was appointed President of the Congress by acclaim.

A welcome from Roman Herzog, President of Germany, was then read. This was followed by traditional speeches by various politicians: German elections were imminent, and so most of their remarks were directed at the German contingent. Happily these speeches were followed by the President of the Technical University, host to the Congress, who vigorously pointed out the discrepancy between politicians' promises and the realities of reduced funding. Some things are universal!

At last, the Fields Medals and Nevanlinna Prize were announced and awarded. With great delight, we learnt of the award of Fields Medals to two of our members, Richard Borcherds and Timothy Gowers, both of the Department of Pure Mathematics and Mathematical Statistics, Cambridge University, and Trinity College, Cambridge, together with Fields Medals for Maxim Kontsevich of I.H.E.S. in Paris and Curtis McMullen of Harvard University. Peter Shor, of A.T. and T. Laboratories was awarded the Nevanlinna Prize for his work on Quantum Computing. At the same time, a Special Tribute was paid to Andrew Wiles, and this gave universal pleasure.

The award of the Fields Medals was well covered in the British Press, with substantial articles in the Times, the Guardian and the Telegraph. These articles did not happen by accident: the Society prepared a

substantial press release, under the direction of Peter Saunders, our Press Officer. The information that this contained about Richard Borcherds and Timothy Gowers is reproduced below.

After the opening ceremonies, the rest of the Congress took place in the Technical University of Berlin. This proved to be an excellent venue: centrally placed, with good auditoria and lecture rooms, a generous supply of cheap and cheerful catering, and plenty of opportunities to meet and talk to colleagues and friends. There was a very full programme, with 21 plenary lectures and about 170 invited lectures, together with any number of short communications. As David Mumford has said, 'the tradition of International Congresses is very precious. Mathematics is still a single discipline, in the sense of having common tools and insights. The ICM is one of the few opportunities for mathematicians to present the developing perspectives of their speciality to a broad audience including all areas of mathematics.' There was a general consensus that the plenary lecturers rose magnificently to the challenge of addressing a general mathematical audience. The spectrum of topics was broad - from Dusa McDuff on Symplectic Topology to Peter Shor on Quantum Computing, to Karl Sigmund on Population Dynamics, to Michel Talagrand on the Phase Transitions of Spin Glasses - but all the speakers gave an exciting account of what has been happening in mathematics, and where we might expect mathematics to go in the future.

The Society followed its custom of holding an Ordinary Meeting at the ICM. The principal purpose of this is to welcome Honorary Members, members who live abroad, and reciprocity members, and about a hundred members and guests were present. We were delighted that these included Friedrich Hirzebruch, President of the ICM and honorary member since 1975, Vladimir Arnold, honorary member since 1976, David Mumford, President of the IMU and honorary member since 1995 and Jörgen Moser, honorary member since 1996. Ten of the Societies with whom we

have reciprocity agreements were represented. Thirteen members signed the membership book, including David Mumford, Jörgen Moser and Bodil Branner, President of the Danish Mathematical Society. There was particular pleasure in welcoming some members of very long standing, including Bernhard Neumann (1936) and E.R. Love (1938): they were able to see their signatures of more than sixty years before, made when they were originally admitted to membership of the Society.

In addition, the Society represented mathematics in Britain by having an exhibition stall at the Congress, cheerfully staffed by the Administrator and her helpers, where participants learnt about the Society's activities and publications, and about other mathematical activities in Britain. It was good to welcome Keith Moffatt, Director of the Isaac Newton Institute, who presented details of the Institute's activities, and Jack Carr, who came to answer questions about the ICIAM meeting in Edinburgh in June 1999: we also displayed information about ICMS in Edinburgh.

What are the overall impressions and memories of the Congress? A Congress of great activity, carried out in a relaxed and friendly way under Friedrich Hirzebruch's benign Presidency, a very well organised Congress, where Martin Grötschel's organisation was both unobtrusive and flexible, and above all a Congress of optimism and vitality, facing an exciting future with diversity of approach but unity of purpose.

D.J.H. Garling

Professor R.E. Borcherds

Richard Borcherds is 38. He was a Scholar at Trinity College Cambridge and completed his PhD at Cambridge under the direction of John Conway. After a Junior Research Fellowship at Trinity College, Cambridge, he became a Lecturer at Cambridge, then Professor of Mathematics at the University of California at Berkeley. Since 1996 he has been a Royal Society Research Professor in the Department of Pure Mathematics and Mathematical

Statistics, University of Cambridge. He is a Fellow of Trinity College. In 1992 he was awarded a Junior Whitehead Prize of the London Mathematical Society.

Borcherds was awarded his Fields Medal for initiating a whole new field of study in algebra, called "Vertex Algebras". This new mathematical concept has profound connections with other well-established areas of pure mathematics and with some of the latest developments in theoretical physics.

Borcherds has shown the power of his new ideas by using them to prove the so-called "moonshine conjectures" of John Conway and Simon Norton, which concern the "Monster Group". The idea of a group is one of the most fundamental in modern mathematics; it is essentially the abstract way of describing symmetry in mathematics. The group of symmetries of an object, such as a geometric figure, is the collection of operations which can be performed on it which leave its form unchanged.

The Monster Group, first constructed by Robert Griess, is the largest group of a certain exceptional sort: it is the largest sporadic finite simple group. It is a truly enormous and remarkable object composed of more than 8×10^{33} operations or 'elements'. Borcherds has shown that the Monster Group is the group of symmetries of one of the vertex algebras he has introduced, and, using this way of thinking of it, Borcherds was able to prove the tantalising and mysterious "moonshine conjectures".

An important idea in Borcherds' proof is the introduction of another new sort of algebra, called "generalised Kac-Moody algebras". Many of the powerful theorems which have been found to hold for algebras already well-studied hold for these new generalisations of Borcherds. This has enabled him to find a remarkable collection of identities relating products of infinite numbers of algebraic terms to infinite sums of such terms. Many of the new equations found in this way were previously unsuspected and are a revelation to experts in the area of mathematics in which they occur, the theory of modular

forms.

Borcherds' vertex algebras are closely connected with, and were in part motivated by, a theory developed by physicists called string theory. String theory is aimed at providing a unified understanding of all the basic forces and fundamental particles of nature. Borcherds uses theorems from string theory in his work and, in turn, his new generalised Kac-Moody algebras seem to be playing a rôle in the latest developments in string theory.

Borcherds' triumph has been not only to introduce completely new subjects within algebra but also use his new structures to prove challenging conjectures and to establish startlingly unexpected results in established areas of mathematics.

Professor W.T. Gowers

Professor Timothy Gowers is 34. He was a King's Scholar at Eton, and a Scholar at Trinity College, Cambridge, where he also took his PhD at Cambridge under the direction of Bela Bollobás. After a Junior Research Fellowship at Trinity College Cambridge, he was a Lecturer and then Reader at University College London. He returned to Cambridge in 1995 as a Lecturer and Fellow of Trinity College. This year he was elected to the Rouse Ball Chair in Mathematics at Cambridge University. In 1995 he was awarded a Junior Whitehead Prize of the London Mathematical Society, and in 1996 a European Mathematical Society Prize.

Timothy Gowers was awarded a Fields Medal for a succession of spectacular results in the theory of Banach spaces, and for more recent work in number theory concerning arithmetic progressions. Banach spaces are named after the Polish mathematician Stefan Banach, who wrote a classic book *Théorie des Opérations Linéaires* (Theory of Linear Operations) on them in 1932. They are a generalisation of finite-dimensional spaces of vectors (such as the familiar three-dimensional Euclidean space) to infinite dimensions, and are of basic importance for understanding problems with infinitely many degrees of freedom, such as the motion of a

fluid.

Infinite-dimensional geometry is different in many ways from the more familiar geometry of two and three dimensions. For example, a single linear equation in three-dimensional space defines a two-dimensional plane, which is quite different from the whole three-dimensional space. In contrast, a single linear equation in infinite-dimensional space defines a linear subspace (*a hyperplane*) which is still infinite-dimensional. Moreover, in all the natural examples of Banach spaces, this subspace has exactly the same structure as the whole space.

One of several outstanding results of Gowers has been to show that this property of infinite-dimensional Banach spaces is not generally true - that is, there exist such spaces that are not 'isomorphic' to any of their hyperplanes. This amazing counterexample resolved a long-standing question that had been originally posed by Banach in his book. It is just one of an extraordinary set of examples of infinite-dimensional Banach spaces with unusual structure discovered by Gowers, and beautifully and lucidly presented in his research papers. These examples, and other deep results of his concerning the structure of Banach spaces, have revolutionised the subject and led to a completely new understanding of infinite-dimensional geometry in which combinatorial ideas play a central rôle.

More recently, Gowers has begun to work in combinatorial number theory, introducing completely new methods which go far beyond what was previously known. Everyone is familiar with arithmetic progressions, sequences of whole numbers such as 3,5,7,9,11,13 ... or 1,8,15,22,29,36 ... in which the difference between successive numbers is the same. An old theorem of Van der Waerden says that if you divide all the whole numbers into any collection of k distinct classes, then at least one class will contain arbitrarily long arithmetic progressions. By combining analytical and combinatorial ideas in an elegant way, Gowers is able to show that a sufficiently large set of whole numbers between 1 and N contains k

numbers in arithmetic progression, a result previously proved for $k=3$ by Klaus Roth, an earlier UK Fields medallist, and then by Szemerédi and Furstenberg in general. Gowers' methods give new explicit estimates, much stronger than those previously known, on how large the set of numbers has to be (in fact for $k=4$ it is sufficient that it contains $N/(\log \log N)^c$ numbers, for N large enough, where c is a positive constant).

WMY 2000

Issue 5 of the World Mathematical Year 2000 Newsletter has appeared recently. Electronic versions of issues 1, 2, 3, 4 and 5 are available on Internet (<http://www.math.jussieu.fr>).

HISTORY SEMINAR

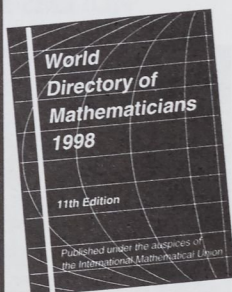
The initial meeting of the tripartite seminar on the History of Mathematics will be held at the Mathematical Institute, Oxford, in the afternoon of Monday 16 November, with the following programme.

- 2.15 Dr Jeremy Gray, Open University
"The early history of the Riemann-Roch theorem"
- 5.00 Dr Moritz Epple, Heinrich Heine University, Mainz
"The history of the theory of knots"

The meeting is supported financially by the LMS. Anyone interested would be most welcome to attend. Further information is available from Professor I.M. James, FRS, Mathematical Institute, 24-29 St Giles, Oxford OX1 3LB (tel: 01865 273541, fax: 01865 273583, e-mail: imj@maths.ox.ac.uk).

AMERICAN MATHEMATICAL SOCIETY

World Directory of Mathematicians 1998



This 11th edition of the *World Directory of Mathematicians 1998* incorporates updates and corrections to the 1994 edition, and includes nearly 30 percent more names. Published by the International Mathematical Union, this valuable reference contains the names and addresses of over 50,000 mathematicians from 69 countries. There is also an increase in the number of fax numbers and email addresses in this edition. Listings for the directory are arranged both alphabetically and geographically and are based on information supplied by National Committees for Mathematics (or corresponding organizations).

Libraries, mathematics departments, and individuals will find this new edition to be a valuable resource for its extensive coverage of the international mathematical community.

Contents: Preface; Ordering; List of Main Abbreviations; Members of the International Mathematical Union; List of Mathematical Organizations; Alphabetical List of Mathematicians; Geographical List of Mathematicians.

Published by the International Mathematical Union.

1998; 1093 pages; Softcover; List \$65; All individuals \$40; Order code WRLDIR/11LMS98



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AMERICAN MATHEMATICAL SOCIETY

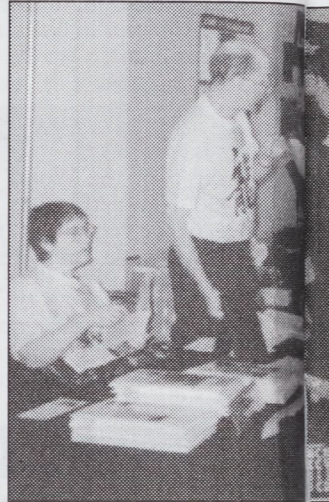
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INTERNATIONAL CONGRS

18-28 August 1



Ben Garling, David Wallace, Aatos Lahtinen



THE IN S

LMS MEETING A



John Ball, Ben Garling, Bernhard Neumann



Jörgen Moser, Friedrich Hitz

GRESS OF MATHEMATICIANS

us 1998, Berlin

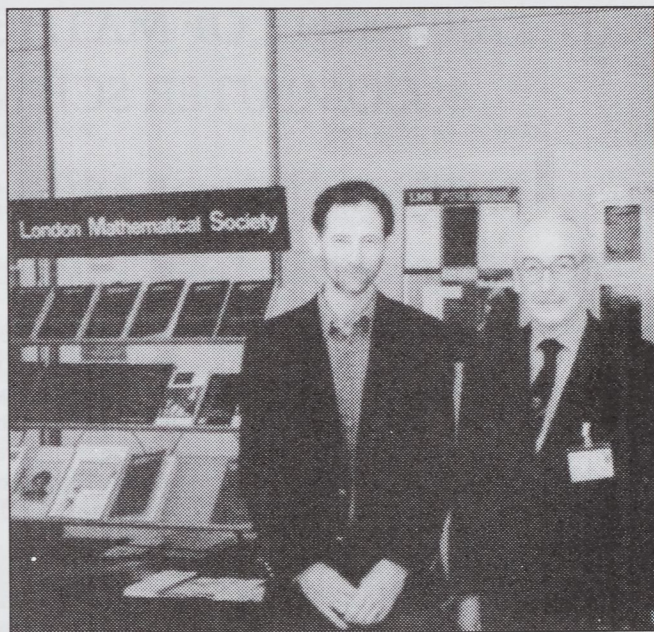


IN STAND

TM AND RECEPTION



ch Hirzebruch, David Mumford



John Ball LMS President and Alberto Conte
Presidente dell'Union Matematica Italiana



E R Love and David Mumford

DEPARTMENT OF MATHEMATICS & COMPUTER SCIENCE

UNIVERSITY OF LEICESTER

Lectureship in Applied Mathematics

Applications are invited for a Lectureship in Applied Mathematics in the Department of Mathematics and Computer Science at the University of Leicester. Applicants should have a strong research record in any branch of Applied Mathematics. Applications are particularly welcome from mathematicians whose research interests intersect with existing research strengths. These are Approximation Theory, Numerical Solution of Spectral Problems and Ordinary Differential Equations, and Partial Differential Equations.

The post is tenable from 1st January 1999 or as soon as possible thereafter. Initial salary, dependent upon qualifications and experience, will be on the Lecturer Grade A or B scale £16,655 to £29,048 pa.

Candidates are invited, if they so wish, to contact Professor W.A. Light (e-mail: pwl@mcs.le.ac.uk), Dr J. Levesley (e-mail: jl1@mcs.le.ac.uk; tel: 0116 252 3897) or Dr M. Marletta (e-mail: mm7@mcs.le.ac.uk; tel: 0116 252 3899) who will be pleased to discuss the Lectureship further. Information about the Department is also available on [<http://www.mcs.le.ac.uk>].

Further particulars (which are also available on the web) and application forms are available, by quoting reference A5220/GD, from the Personnel and Planning Office (Academic Appointments), University of Leicester, University Road, Leicester LE1 7RH, telephone +44 (0) 116 252 2758.

The closing date for applications is **30 October 1998**.

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Research Notes in Mathematics

Abelian ℓ -adic Representations and Elliptic Curves

Jean-Pierre Serre
Hardcover, 208 pp.

1-56881-077-6, \$32.00, £22.00

This classic book contains an introduction to systems of ℓ -adic representations, a topic of increasing importance in number theory and algebraic geometry.

Polynomial Invariants of Finite Groups

Larry Smith
Hardcover, 376 pp.

1-56881-053-9, \$64.00, £46.00

This well-written book is a compilation of the most essential and interesting results and methods in the theory of polynomial invariants of finite groups.

Operator Algebras, Mathematical Physics, and Low Dimensional Topology

Richard Herman,
Betül Tanbay, eds.
Hardcover, 336 pp.

1-56881-027-X, \$65.00, £48.00

This volume explores recent developments and the interactions between mathematical theory and physical phenomena.

The Atiyah-Patodi-Singer Index Theorem

Richard Melrose
Hardcover, 392 pp.

1-56881-002-4, \$66.00, £48.00

This sophisticated treatment leads to a variety of current research topics and serves as a guide to further studies.

Differential Algebras in Topology

David Anick
Hardcover, 304 pp.

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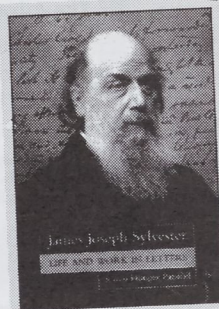
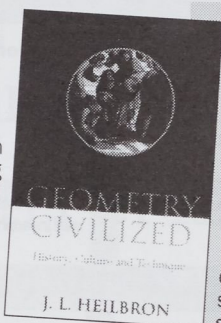
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BOOK REVIEW

The Mathematical Olympiad Handbook: An introduction to problem solving based on the first 32 British Mathematical Olympiads by A. Gardiner (Cambridge University Press, 1997) ISBN 0-532-38334-X, 654 pp, £65, US\$95.

Show that, for any positive integers n and k , there is a triangular number congruent to k modulo 2^n . Given 50 subsets of a finite set X , each containing more than half of the points of X , show that there is a subset of X , of size at most 5, that meets all of the given subsets. If f is a function from the positive integers to the positive integers, satisfying $f(n+1) > f(n)$ and $f(f(n)) = 3n$ for every n , determine the value of $f(1992)$.

These three are typical British Mathematical Olympiad questions. The BMO is a yearly very challenging exam, taken by the 800 or so best school pupils in Britain. Students have three and a half hours to solve five questions. The questions are unusual ones. They never require knowledge beyond A-level, and in fact rarely even require knowledge beyond GCSE. Rather, they test genuine mathematical ability. Officially, the BMO has a dual role: to stimulate mathematically gifted school students, and to select - the BMO is part of the selection procedure for the International Mathematical Olympiad, a competition to which each participating country sends a team of six.

Tony Gardiner has been a prime mover in the recent development of the BMO. He has pioneered several other mathematics contests, some of quite enormous appeal nationally. And now he has written a book about Olympiads in general and the BMO in particular.

The book has two main parts. The first is a review of the mathematics that a keen student (school student, that is) should know. It covers things like the remainder theorem, the binomial theorem, recurrence relations, induction, elementary number theory (congruences, Euclid's algorithm, prime factorisation), plane geometry, and trigonometric formulae.

This is a fairly standard collection of

material, although it is very nicely and clearly presented here. For example, the binomial theorem is proved by considering what a binomial coefficient actually means, as opposed to the usual awful (unenlightening) induction proof.

The second part of the book is a list of all the questions from past BMO papers, together with outline solutions. And it is here that the book really comes into its own. Usually, model solutions are a great evil: if a student reads a model solution, it gives him no idea at all whether the problem was easy or hard - after all, nearly every problem seems easy with hindsight, with a solution in front of one. And most books giving solutions do just that: they provide neat answers, with no chat about whether or not the student should be frightened when faced with the problem, what sort of things he should try, and so on.

But this book emphatically avoids that trap. It stresses precisely how one should come to a problem. It constantly asks the reader: "Do you know how to proceed? Do you see a foothold, or no foothold?" And as such it is providing an invaluable service to students who may be too frightened to even attempt these kinds of problems.

For example, let us consider the third problem mentioned above, which the reader might (correctly) guess comes from the BMO of 1992. Gardiner starts by pointing out that we are asked to deduce something about a function for which we have no feel at all, and so we need to do some calculating to get involved. Where should we start? At $f(1)$, of course, as this should be the simplest place. Gardiner gently nudges the reader towards discovery of the value of $f(1)$, and shows how one can then quite easily obtain the values of $f(2)$, $f(3)$, $f(6)$ and then $f(4)$, $f(5)$. He then notes that one can then obtain a few more values, and writes: "It may still not be clear what is going on, but at least the horrible feeling that you cannot even begin should have begun to recede".

In this respect, the book goes far beyond

the usual sort of advice on problem-solving: things like "if you need to prove an inequality, try using the arithmetic-geometric mean inequality or the fact that squares are non-negative". To be sure, there is plenty of that, but the book really does delve beyond that, to help people conquer their fear of impossible-looking problems.

I think that the book will have two quite separate audiences. One is lecturers or schoolteachers who are looking for something challenging, while still elementary, for their bright students. And the other is bright school students themselves, who will gain a huge amount from trying the problems and reading the commentary. For both audiences, this book is a must-buy.

Imre Leader
University College London

BIOMATHEMATICS AND BIOSTATISTICS

A Symposium on the History of Biomathematics and Biostatistics, organized by the Wellcome Institute for the History of Medicine, will be held on Friday 9 October 1998 in the Auditorium of the Wellcome Building, 183 Euston Road, London NW1. For further information, contact Ms F. Houser (Wellcome Institute, 183 Euston Road, London NW1; tel: 0171-611-8619; fax: 0171-611-8862).

SECANTS

Following the renewal of its Scheme 3 grant for a fourth year, SECANTS (South of England Computational and Algorithmic Number Theory Seminars) will hold its tenth meeting in Oxford on Saturday 5 December 1998. The speakers will be Thomas Papanikolaou (Bordeaux), Peter Bending (Kent) and Zafer Djabri (Kent). Additional funding is provided by Hewlett-Packard. For details of the programme, as well as general information about SECANTS, and how to be put on the e-mail mailing list, see <http://www.maths.ex.ac.uk/~cremona/secants/secants10.html>.

GLASGOW MATHEMATICAL JOURNAL

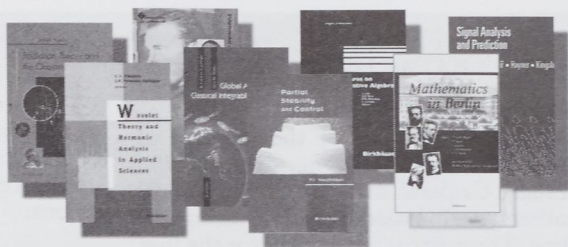
From 1999 the Glasgow Mathematical Journal will be published by Cambridge University Press. The GMJ will continue as a general journal publishing papers over a broad range of mathematics. Plans are in hand for improvements to the Journal to take effect from the 1999 volume. There will be a 25% increase in size to 480 pages per year. An international team of editors comprising eminent mathematicians covering a range of areas will be established. The CUP GMJ webpage will carry titles and abstracts of all articles. A full online version of the Journal will be produced by "Cambridge Journal Online" with access to members of institutions with an institutional subscription. Authors are invited to send high-quality submissions to the Editor-in-Chief, Dr A.W. Mason (Department of Mathematics, University of Glasgow, Glasgow G12 8QW, UK). A subscription for the 1999 volume (as paid by institutions) will cost £90/\$165, but individual LMS members may subscribe (simultaneously with their Society subscriptions) at a special rate of £35.

A.W. Mason
University of Glasgow

VISIT OF PROFESSOR V. BULDYREV

Professor Vladimir Buldyrev is a Professor at the Department of Mathematical Physics, St. Petersburg State University, Russia. His main interests are the mathematical theory of wave propagation, high-frequency theory of diffraction and asymptotic method in the theory of wave propagation. Professor Buldyrev is one of the creators of the canonical problem method as applied in wave propagation theory. He will visit the South Bank University, London for four weeks from 1 October 1998, supported by the LMS. Further details can be obtained from Dr Larissa Fradkin (fradkil@sbu.ac.uk).

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THE FERRAN SUNYER I BALAGUER PRIZE

1999 Competition

Each year in honour of the memory of Ferran Sunyer i Balaguer, the *Institut d'Estudis Catalans* awards an international mathematical research prize bearing his name. This prize was awarded for the first time in April 1993. The competition is open to all mathematicians, subject to the following conditions:

1. The prize will be awarded for a mathematical monograph of an expository nature presenting the latest developments in an active area of research in Mathematics, in which the applicant has made important contributions.
2. The monograph must be original, written in English, and of at least 150 pages. The monograph must not be subject to any previous copyright agreement. In exceptional cases, manuscripts in other languages may be considered.
3. The prize, amounting to 1,800,000 pta, is provided by the Ferran Sunyer i Balaguer Foundation. The winning monograph will be published in Birkhauser Verlag's series "Progress in Mathematics", subject to the usual regulations concerning copyright and author's rights.
4. The winner of the prize will be proposed by a Scientific Committee consisting of: Professor Friedrich Hirzebruch (Max-Planck Institute), Professor Paul Malliavin (Universite de Paris V1), Professor Joseph Oesterle (Universite de Paris V1), Professor Joan Sola Morales (Universitat Politecnica de Catalunya), Professor Alan Weinstein (University of California at Berkeley).
5. Monographs should preferably be typeset in TEX. Authors should send a hard copy of the manuscript and two disks, one with the DVI file and one with the PS file (PostScript), and enclosing an accompanying letter to the Ferran Sunyer i Balaguer Foundation. Submissions should be sent before **5 December 1998** to the following address: Centre de Recerca Matematica (IEC),

Ferran Sunyer i Balaguer Foundation, Apartat 50, 08913 Bellaterra, Spain (e-mail: crm@crm.es).

6. The name of the prize-winner will be announced in Barcelona in April, 1999.

7. The submission of a monograph implies the acceptance of all of the above conditions.

For further information on the Ferran Sunyer i Balaguer Foundation, see web: <http://crm.es/info/ffsb.htm>.

1998 Award

The *Institut d'Estudis Catalans* has awarded the sixth Ferran Sunyer i Balaguer Prize to Juan J. Morales Ruiz for his monograph entitled "Differential Galois Theory and Non-integrability of Hamiltonian Systems". Juan J. Morales is an associate professor in the Departament de Matematica Aplicada II at the Universitat Politecnica de Catalunya. The monograph will be published in Birkhauser Verlag's series "Progress in Mathematics".

COPLEY MEDAL

Sir James Lighthill, FRS, has been posthumously awarded the Copley Medal of the Royal Society. The award is in recognition of his profound contributions to many fields within fluid mechanics, including important aspects of the interaction of sound and fluid flow and numerous other contributions which have had practical applications in aircraft engine design.

SCHRÖDINGER LECTURE

Professor J.B. Hartle of the Institute of Theoretical Physics, Santa Barbara, California, will give the 1998 Schrödinger Lecture on "Quantum Origin of the Universe". This will take place on Thursday 5 November at 5.30 pm in the Great Hall of Imperial College, London SW7. Tea will be served at 4.45 pm. For tickets contact Miss Elizabeth Bowden, The Registry, Imperial College, London SW7 2AZ, telephone 0171 589 5111.



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DIARY

The diary lists Society meetings and other events publicized 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.

OCTOBER 1998

8-10 Quantization Operator Algebras and Knot Theory Workshop, Technical University Twente, Enschede, Netherlands (263)

16-17 Two-day London Mathematical Society Meeting - Harmonic Analysis

23 Edinburgh Mathematical Society AGM, Edinburgh (263)

30-31 North British Functional Analysis Seminar, Glasgow University (263)

NOVEMBER 1998

20 London Mathematical Society Meeting, Annual General Meeting

20 Edinburgh Mathematical Society Meeting, Strathclyde (263)

DECEMBER 1998

11 Edinburgh Mathematical Society Meeting, Napier (263)

16-22 Symmetry and Perturbation Theory Workshop, Rome, Italy (258)

JANUARY 1999

15 Edinburgh Mathematical Society Meeting, Edinburgh (263)

25-27 Phase-Transition Phenomena in Combinatorial Problems EPSRC/LMS MathFit Workshop, Liverpool (261)

FEBRUARY 1999

12 Edinburgh Mathematical Society Meeting, Edinburgh (263)

12-13 Two-day LMS Meetings, Proof and Computation, Leeds University.

MARCH 1999

12 Edinburgh Mathematical Society Meeting, Abertay (263)

29 - 1 Apr British Mathematical Colloquium, Southampton University

APRIL 1999

6-9 LMS Invited Lectures - Professor A. Mielke, University of Bath (262)

MAY 1999

7 Edinburgh Mathematical Society Meeting, Stirling (263)

14-16 Belgian Mathematical Society and London Mathematical Society Joint Meeting, Université de Bruxelles (260)(261)

JUNE 1999

4 Edinburgh Mathematical Society Meeting, Aberdeen (263)

JULY 1999

5-9 International Congress of Industrial and Applied Mathematics (ICIAM 99), Edinburgh University (252)

12-16 British Combinatorial Conference, Kent University (254)

12-16 American Mathematical Society and Australian Mathematical Society Joint Meeting, University of Melbourne (260)

AUGUST 1999

22-29 Hall Algebras Summer School, Hesselberg, Germany (263)

APRIL 2000

17-20 British Mathematical Colloquium, Leeds University

JULY 2000

17-22 International Congress of Mathematical Physics, Imperial College, London (257)

APRIL 2001

9-12 British Mathematical Colloquium, Glasgow University

The Newsletter is published monthly except in August. Items and advertisements for inclusion in the Newsletter should be sent to the Editor, Susan Oakes, by e-mail, fax or post to the LMS office (addresses below), to arrive before the first day of the month prior to publication.

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