European Mathematical Society

NEWSLETTER No. 16

JUNE 1995

Editors

EUROPEAN MATHEMATICAL SOCIETY

Report on the Meeting of the Executive Committee
Krakow (Poland),10-12 March 1995

Eva Bayer Fluckiger, Jean-Pierre Bourguignon, Alberto Conte, Aatos Lahtinen, László Márki, Peter Michor, Andrzej Pelczar and V.A. Solonnikov were present. Isabel Labouriau and David Wallace sent apologies.

Mireille Chaleyat-Maurel (Public Relations Officer), Jean-Marc Deshouillers (Chairperson of the Support of Eastern European Mathematicians Committee), Kazimierz Goebel (President of the Polish Mathematical Society), Friedrich Hirzebruch (former President of the European Mathematical Society), Stewart Robertson (Chairperson of the Publications Committee), Tuulikki Mäkelainen (Secretary of the European Mathematical Society) were present by invitation.

The Committee thanks A.Pelczar for the extraordinary hospitality experienced during this meeting.

EDUCATION

Some domains for action suggested are :
Activity for mathematics teachers.
European Science Foundation (ESF), European Union (EU) support for report/research.
Using the model of the American Association for the Advancement of Science (AAAS) with the project 2061 : Goals for the teaching of mathematics. A round table could be organized on this theme at the Budapest Congress. The aim should be to identify the core knowledge in Mathematics to be achieved at each level of education.

CONFERENCES

Diderot Mathematical Forum

A cycle of conferences, called "Diderot Mathematical Forum" will feature two conferences a year taking place simultaneously in three European cities exchanging information by telecommunication and addressing in their programmes three different aspects : fundamental mathematics, applications of mathematics and their relation to society (e.g., ethical and epistemological dimensions).

For 1996, the following two conferences are in the making : "Mathematics and Finance" (H.Föllmer) (London, Moscow, Zürich) and "Mathematics and Space" (J.L.Lions) (Amsterdam, Münich, Toulouse).

EMS Lectures

Every second year, the EMS will invite a distinguished mathematician to visit an institution and to give a series of lectures of an advanced expository nature on a topic of current research interest. The first EMS lecturer is Professor H.W.Lenstra Jr from UC Berkeley who will give lectures on algebraic number theory. These lectures will take place in Besançon (France) on June 12-15, 1995.

INFORMATION SERVICES

Newsletter

It was agreed to consider the introduction of new material : mathematics, interviews with mathematicians and abstracts of Euroconferences lectures. The editors wish to receive more material for publication in the Newsletter so that a balanced choice can be made for each issue.

Advertising in the Newsletter ought to be increased. The possibility of having job advertisements and publicity for recruitment of students was raised. It is desirable to have a uniform presentation of conference announcements even if this is difficult to obtain.

Many libraries have shown interest in the Newsletter; it was agreed to charge them a subscription fee of 30ECUs to be collected through member societies where possible.

All material from the Newsletter can be used freely provided the source is acknowledged in print.

Journal of the European Mathematical Society (JEMS)

A letter of intent was signed with Springer-Verlag in December 1994. It was agreed to have an Editor in chief and 2 or 3 Assistant Editors who should decide jointly on each paper, as well as an editorial board, whose members should collect papers and organize the refereeing process.

The journal is to have a distinct European flavour and a strong emphasis on survey articles. The journal should carry articles in as wide a variety of fields of mathematics as possible, keeping in mind the balance between mathematics and its applications.

Towards a European Bibliographical Database

At present, Zentralblatt für Mathematik is a joint venture of FachInformations-Zentrum-Karlsruhe (in short, FIZ-Karlsruhe), Springer-Verlag and the Heidelberg Academy. France is considering stepping in, in the near future, with the aim of forming

the seed of a European database. A scientific committee came up with the following recommendations :

The technical committee should try to improve the quality and organize itself to find out readers' reactions.

Zentralblatt should be put on a broader European basis, and EMS should be the carrier of the scientific part of this change.

Particular care should be taken of the 'visibility' of Zentralblatt.

The Committee for reviewing journals was reconstituted as follows and called The Committee for a European Bibliographical Database: J. Coates (chair), A. Dold, L. Guillopé, P. Michor, U. Mosco, B. Wegner and two persons from the Referativni Journal.

Server

It was decided that FIZ-Berlin will be the location of the server of the Society, with mirror servers at various locations. The services will include :

● Mathematical services :

Electronic journals. One could collect all freely available electronic journals in Europe, and also those from elsewhere which are willing to be mirrored here.

Refereed conference proceedings.

Pointers to other mathematical services. (Zentralblatt, Libraries,...)

● Organizational services :

List of addresses of personal members of EMS.

List of all mathematical societies in Europe.

List of forthcoming conferences in Europe and/or worldwide, with contact addresses.

Openings and positions available.

Article of general interest for mathematicians.

...

To see the whole list, just login at : URL http://www.emis.de

"emis" stands for "European Mathematical Information Services"

SUMMER SCHOOLS

In order to foster the circulation of young mathematicians, a series of summer schools, one each year in mathematics and one in applications of mathematics, will bring together about a hundred predoctoral students to attend advanced courses and to exchange their research experiences. The first one will be on Algebraic Geometry in Eger (Hungary), in 1996.

EASTERN COUNTRIES

The meeting in Krakow included a special meeting with the committee on Eastern European countries. It was noted that the needs of libraries in Eastern European countries are the top priority but that grants to travel at home and abroad are also important. EMS will try to negociate free or reduced rate subscriptions of journals to some libraries in the countries in need. Information on the possibility for individuals to give their books to libraries in need should be published in the Newsletter and passed on to member societies.

EUROPEAN MATHEMATICAL CONGRESS (EMC)

● EMC July 22-26, 1996 Budapest (Hungary)

Topics for the 9 round tables are now fixed :

Communications and mathematics

Mathematical games

Goals for mathematical education

Demography of mathematicians

Women and mathematics

Public image of mathematics

Mathematics and Eastern Europe

The career role of publication

It appeared that there has not yet been effective publicity and information about the congress. Posters and information material should be sent out quickly, to be distributed through the national mathematical societies. There will also be 19 satellite conferences.

● EMC 2000

Four bids to host the congress were received. A special committee of 4 persons shall visit the sites in order to make a decision at the meeting of the Executive Committee in October, 1995.

WORLD MATHEMATICAL YEAR 2000 (WMY 2000)

The composition of the EMS Committee for WMY 2000 will be decided later. One should look for correspondents in each country.

As a special project in France, 6 postage stamps with portraits of mathematicians are in preparation. A common German-French stamp with portraits of Poincaré and Hilbert is also contemplated.

RELATIONS WITH EUROPEAN MATHEMATICAL INSTITUTIONS

● **Tbilisi International Centre (Georgia).**

The EMS will send three representatives to be appointed on their board.

● **Banach Centre (Poland).**

Of great concern to the Centre is the possible loss of buildings because of property rights legislation. The Society considers the Banach Centre an important institution and supports the effort to make the continuation of the work of the Centre possible.

MISCELLANEOUS

● **Visibility.**

The Society should try to become more visible. A brochure could be prepared (in English) and distributed on several occasions. Member societies can produce a leaflet in the local languages to be issued with the brochure.

The member societies are to be asked to designate contact persons responsible for communications with the EMS. See page 6 for the current list of correspondents. Those marked with an asterist have recently confirmed willingness to continue. Dr Pick is a new addition to the list.

At the Budapest congress the Society is to have a booth and a press conference.

Publicity Officer

Professor Mireille Chaleyat-Maurel has been appointed to the post of Publicity Officer of the Society, *vice* Professor D.A.R. Wallace (now Vice-President). She plans to take fresh initiatives to disseminate information on the work and aims of the Society, and to increase opportunities for individual and corporate members to influence the directions in which the life and work of the Society might develop.

It would be of great help to her in this respect if members would communicate their views on, for example, the form and content of the Newsletter, or on any other issue.

Member societies have appointed local correspondents, as listed below, who have undertaken to collect and transmit comments in their own region or country. Individuals may also communicate directly to the Publicity Officer by telephone, fax, e-mail or conventional mail at the addresses printed here.

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*   Those marked with an asterist have recently confirmed their willingness to continue. Dr. Pick is a new addition to the list

Euroconferences Spring-Autumn 1995

(funded by the European Community Human Capital and Mobility Programme)

Organizers of Euroconferences have been provided with funds under the European Community's *Human Capital and Mobility Programme* to support the participation of a limited number of young researchers (generally up to age 35). These young researchers must be citizens of the European Union or researchers working long term in a country of the EU. For some conferences, young researchers from the Associated States (currently Iceland and Norway) are also eligible to benefit.[1]

Each 'Euroconference' usually comprises a series of conferences. The list below, which covers events scheduled March-December 1995, gives the series title (and the conference title, where this differs from the series title). Dates and venues should, however, be considered provisional. Enquiries for further details should be made directly to the co-ordinator or contact point indicated.

The conferences have been classified by broad scientific discipline; conferences which are of cross-disciplinary interest have been placed in more than one list. There are seven lists as follows:
1. mathematics and information sciences
2. physics
3. chemistry
4. life sciences
5. earth sciences
6. engineering sciences
7. economics, social and human sciences

Conference organizers interested in applying for support should note that the *Human Capital and Mobility Programme (1990-94)* has been superceded by the *Training and Mobility of Researchers Programme (1994-98)*. For further information on funding possibilities for Euroconferences, Summer Schools, and Practical Training Courses - which will take place from 1996 - apply for an Information Package from:

Training and Mobility of Researchers
European Commission
DGXII-G Science, Research and Development
Office 5/34
Rue Montoyer 75
B-1040 Bruxelles

fax: +32 2 2956995

specify: 'Information Package for Euroconferences, Summer Schools and Practical Training Courses'

Commission Contact:
Mr. E. Whitehead *or*
Ms. I. Brach

fax: +32 2 2963270

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1. For some Euroconferences (where funds were committed before 1 January 1994), researchers from Austria, Finland, Iceland, Norway and Sweden, are, however, not eligible to benefit.

Mathematics and Information Sciences Euroconferences 1995

Series:
Algebraic geometry (EUROPROJ)
co-ordinator: HIRSCHOWITZ Andre
fax: +33 93817348
Conference 1995:
• OSLO (NO) 18-JUN-95 - 25-JUN-95

Series:
Mathematical analysis [ESF line 79]
co-ordinator: HENDEKOVIC Josip
fax: +33 88366987
Conference 1995:
• **Local singularities of solutions to nonlinear and singular PDEs**
SAN FELIU DE GUIXOLS (ES) 19-SEP-95 - 24-SEP-95

Series:
The transputer consortium conference, tutorial and workshop programme
co-ordinator: JANE Michael
fax: +44 1235445893
Conference 1995:
• **Transputer congress, tutorials and workshops 1995**
HARROGATE (GB) 02-SEP-95 - 06-SEP-95

Series:
Operator algebras
co-ordinator: PEDERSEN Gert
fax: +45 35320704
Conference 1995:
• **C*-algebras and their invariants**
CORK (IE) MAY-95
contact: MURPHY Gerard
fax: +353 21272642
• **Quantum analysis in operator algebras**
ROMA (IT)

Series:
Symposium on theoretical aspects of computer science - STACS
co-ordinator: PETRUCCI-DAUCHY
fax: +33 1 42679312
Conference 1995:
• MUENCHEN (DE) 02-MAR-95 - 04-MAR-95
contact: MAYR Ernest
fax: +49 89 21058183

Series:
Newton Institute
co-ordinator: ATIYAH Michael
fax: +44 1223330508
Conferences 1995:
• **Exponential asymptotics in action**
CAMBRIDGE (GB) spring 95
contact: HOWLS Chris
fax: +44 1223330508
• **Finite to infinite dimensional dynamical systems**
CAMBRIDGE (GB) SEP-95
contact: SPARROW Colin
fax: +44 1223330508
• **Advances in type systems for computing**
CAMBRIDGE (GB) SEP-95
contact: ABRAMSKY S.
fax: +44 1223330508

Series:
ICTP Conferences in mathematics 1995
co-ordinator: NARASIMHAN Mudumbai
fax: +39 40224163
Conference 1995:
• **Topological & geometrical problems related to quantum theory**
TRIESTE (IT) 13-MAR-95 - 24-MAR-95
• **Workshop on dynamical sytems**
TRIESTE (IT) 22-MAY-95 - 02-JUN-95
• **Partial differential equations & applications to geometry**
TRIESTE (IT) 21-AUG-95 - 01-SEP-95
• **Workshop on general theory of partial differential equations & microlocal analysis**
TRIESTE (IT) 04-SEP-95 - 15-SEP-95

Mathematics and Information Sciences Euroconferences 1995

Series:
Workshop on analysis of several complex variables
co-ordinator: REES Elmer
fax: +44 1316506553
Conference 1995:
• EDINBURGH (GB) 20-MAR-95 - 01-APR-95

Series:
Advanced information systems engineering (CAISE)
co-ordinator: BRINKKEMPER Gerard
fax: +31 30545948
Conference 1995:
• JYVÄSKYLÄ (FI) 12-JUN-95 - 16-JUN-95
contact: IIVARI Juhani Prof.
fax: +35 8 41603011

Series:
Mathematics
co-ordinator: PAPADOPOULOU Susanna
fax: +30 81234516
Conference 1995:
• CRETE (GR) summer 95

Series:
Autour des groupes réductifs finis, représentations
co-ordinator: CABANES Marc
fax: +33 144322080
Conference 1995:
• Meetings on finite reductive groups
PARIS (FR) 01-OCT-95 - 07-OCT-95

Series:
Formes quadratiques, algèbre à division et groupes algébriques linéaires - relations avec la géometrie algébrique et la K-théorie
co-ordinator: BAYER-FLUCKIGER Eva
fax: +33 81666526
Conference 1995:
• Linear algebraic groups and related sructures
BIELEFELD (DE) summer 95

Series:
Mathematics at Pisa (MAP)
co-ordinator: GALBIATI Margherita
fax: +39 50599524
Conference 1995:
• Computer vision
PISA (IT)
Series:
Group theory
co-ordinator: GERARDIN Paul
fax: +33 1 44277818
Conference 1995:
(ES) summer 95
contact: RODRIGUEZ M.A.
fax: +34 1 3945197

Series:
Advanced topics in applied mathematics and theoretical physics
co-ordinator: ORLANDI Enza
fax: +39 862433180
Conference 1995:
• Stochastic methods in classical and quantum physics
BOCHUM (DE) JUNE-95
contact: ALBEVERIO S.
fax: +49 234 7094242

Series:
Computer science logic
co-ordinator: BOERGER Klaus
fax: +39 050 887 226
Conference 1995:
• PADERBORN (DE)

Series:
International workshops on artificial neural networks (IWANN)
co-ordinator: CABESTANY Joan
fax: +34 34016756
Conference 1995:
• MALAGA (ES) 07-JUN-95 - 09-JUN-95

Series:
Intelligent robotics systems (SIRS)
co-ordinator: CROWLEY James
fax: +33 76574602
Conference 1995:
• summer 95

Mathematics and Information Sciences Euroconferences 1995

Series:
Computational plasticity
co-ordinator: ONATE Eugenio
fax: +34-3-4016517
Conference 1995:
• Fundamentals and applications (COMPLAS IV)
BARCELONA (ES) 03-APR-95 - 06-APR-95

Series:
Chaos: towards the next century
co-ordinator: CASATI Giulio
fax: +39 31573395
Conference 1995:
• COMO (IT)

Series:
Nonlinear dynamics in physics and related sciences
co-ordinator: ARIMONDO Ennio
fax: +39-50-48277
Conference 1995:
• (IT) SEP-95

Series:
Cognitive science
co-ordinator: DE WEERT Charles M.M.
fax: +31 80615938
Conference 1995:
• Computational modelling in psychology
CAMBRIDGE (GB) summer 95
• Cognitive neuropsychological analyses and modelling
BIRMINGHAM (GB) autumn 95
• Visual information processing
HAMBURG (DE) autumn 95

Series:
Fundamental studies in turbulence and applications to simple models
co-ordinator: MATHIEU Jean Emile
fax: +33 72189070
Conference 1995:
• Multifractal analysis
CAMBRIDGE (GB) spring 95
contact: VASSILICOS M.
fax: +44 1223337918
• Direct numerical simulation
KARLSHRUE (DE) summer 95
contact: RODI M.
fax: +49 7216084290

Series:
Mathematiques et applications
co-ordinator: BRASSELET Jean-Paul
fax: +33 91412786
• A series of sixty tutorial workshops on themes in Pure and Applied Mathematics
LUMINY (FR) *and* OBERWOLFACH (DE) : *throughout 1995.*

Series:
Pure and Applied Mathematics (INDAM meetings)
co-ordinator: GIUSTI M.
fax: +39 64462293
Conferences 1995
• Recent developments in calculus of variations nonlinear elasticity
CORTONA (IT) JUNE 95
contact: PEPE L.
fax: +39 53247292
• Geometria convessa analitica
CORTONA (IT) JUNE 95
contact: CATANESE F.
fax: +39 50599524

Series:
European Symposium on artificial neutral networks (ESANN)
co-ordinator: VERLEYSEN M.
fax: +32 10 452272
Conferences 1995:
• consult co-ordinator for details

Series:
Algebraic geometry: effective methods
co-ordinator: MORA
fax: +39 103538028
Conferences 1995:
• Computational commutative algebra
GENOVA (IT) 29-MAY-95 - 2-JUN-95
contact: ROBBIANO Lorenzo
fax: +39 103538769
• Research trends in polynomial system solving
HERAKLION (GR) 6-JUN-95 - 10-JUN-95
contact: TRAVERSO Carlo
fax: +39 50599524

ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

An International Institute in Cambridge

INTRODUCTION

In recent years there have been exciting developments in many branches of the mathematical sciences. New and deep connections have emerged between subjects which previously appeared unrelated or had little impact on one another. A new international institute has recently been established in Cambridge devoted to the study of all branches of the mathematical sciences, including pure mathematics, statistics, numerical methods, applied mathematics, theoretical physics, theoretical chemistry, mathematical economics, theoretical computer science and mathematical biology.

The Newton Institute aims to stimulate research in all these fields by organising a series of visitor programmes. These will bring together mathematical scientists from UK universities and leading experts from overseas. They will meet together for concentrated research on specialised topics, and to exchange ideas and expertise through lectures, seminars, and informal contacts made possible by their extended interaction in an attractive purpose-designed building.

The visitor programmes each last for about 6 months and have about 20 to 25 mathematical scientists in residence at any one time. There are two programmes running at any time so that there are four programmes each year. The topics chosen for them will be focused, but each will aim to bring together several areas of expertise so as to encourage the cross-fertilisation of ideas between different disciplines. The programmes which have taken place and been selected for the Institute so far are:

Low-dimensional Topology and Quantum Field Theory
(July to December 1992)
Dynamo Theory   (July to December 1992)
L-functions and Arithmetic   (January to June 1993)
Epidemic Models   (January to June 1993)
Computer Vision   (July to December 1993)
Random Spatial Processes   (July to December 1993)

Geometry and Gravity   (January to June 1994)
Cellular Automata, Aggregation and Growth
(January to June 1994)
Topological Defects   (July to December 1994)
Symplectic Geometry   (July to December 1994)
Exponential Asymptotics   (January to June 1995)
Financial Mathematics   (January to June 1995)
Semantics of Computation   (July to December 1995)
From Finite to Infinite Dimensional Dynamical Systems
(July to December 1995)
Dynamics of Complex Fluids   (January to June 1996)
Computer Security, Cryptology and Coding Theory
(January to June 1996)

The structure of the Newton Institute is modelled on that of other highly successful research institutes, such as the Institut des Hautes Etudes Scientifiques in France, the Institute for Theoretical Physics of the University of California at Santa Barbara, the Institute for Mathematics and its Applications in Minnesota, and the Mathematical Sciences Research Institute at Berkeley. Each of these institutes has its own particular character. While acting as international centres for research, they have served to enhance the strength of mathematical science in their own countries. The Newton Institute will build on the many strengths that already exist in UK universities. It will also generate new ones, and generally stimulate research on mathematics and its applications throughout the country.

THE INTERNATIONAL CHARACTER OF THE NEWTON INSTITUTE

It is important to make it as easy as possible for researchers from other universities, both in the UK and overseas, to participate fully in the activities of the Institute. The Institute provides office space, subsistence expenses and a contribution towards travel expenses for a large proportion of the participants, and assistance with finding living accommodation. Each scientific programme is organised by three or four experts in the subjects covered. Normally these

organisers come from outside Cambridge and many are from overseas, and the Institute aims to provide sufficient support to enable them to take leave from their home institutions. Visitors to the Institute from overseas will be encouraged to visit other UK universities, and funds are being sought for this purpose.

Each programme normally includes periods when lectures which are accessible to graduate students are given. These are also valuable for more established researchers who are contemplating a change of direction in their research, or who want to put themselves in a position of being able to interact usefully with those working in an area different from their own. The

programmes also include a number of workshops concentrating on more specialised topics, and these vary in length from one-day meetings organised during the course of the programme to larger one or two week conferences advertised internationally and organised well in advance. Financial support is usually available for a proportion of the participants at these workshops. In particular, some funds are available for the support of UK participants attending the shorter more informal meetings.

The scientific work of the Institute is guided by a Scientific Steering Committee, whose membership at present is:

Professor Sir Christopher Zeeman FRS (Oxford, *Chairman*);
Sir Michael Atiyah OM PRS (*Director of the Institute*);
Professor J M Ball FRS (Heriot-Watt);

Professor M V Berry FRS (Bristol);
Professor J M Bismut FRS (Paris);
Professor M E Cates (Edinburgh);
Professor S K Donaldson FRS (Oxford);
Professor T W B Kibble FRS (Imperial College);
Professor J Moser (Zürich);
Professor T J Pedley (Leeds);
Professor B D Ripley (Oxford);
Professor A F M Smith (Imperial College);
Professor C T C Wall FRS (Liverpool).

THE BUILDING AND FACILITIES

St John's College has constructed a purpose-designed building and has made it available to the Institute largely rent-free for five years. The site, in one corner of a seven acre field in Clarkson Road, is in a pleasant area in the west of Cambridge, about one mile from the centre of the City and from the two existing University mathematics departments. It is close to the Department of Physics, the Institute of Astronomy and the new Royal Greenwich Observatory, to several of the newer colleges, and to the University Library.

Work on the building, designed by Annand and Mustoe, began in April 1991 and was completed at the end of June 1992. The scientific work of the Institute was inaugurated on 3 July 1992 and the first programmes began a few days later. The building was formally opened by HRH The Duke of Edinburgh, Chancellor of Cambridge University, on 30 October 1992. The building has office space for 40–50 researchers, together with two seminar rooms, a library and common areas.

The Institute's library aims to provide a good selection of current and classic books, at the graduate text level, covering the mathematical sciences. It also acquires, using the advice of the organisers, books of a more specialised nature, relating to each of the current programmes. The Library receives approximately 60 scientific periodicals as well as the major abstracting journals. There is also a reference section containing dictionaries, encyclopedias, etc. Of course, it is not possible for the library of a new

Institute to cover the entire range of the mathematical sciences and members have access to the central libraries of the University and the libraries of relevant University departments. The Library takes national daily newspapers and a collection of leaflets about places to visit, the arts and leisure activities in Cambridge, and further afield, is maintained there.

First-class computer facilities are of central importance. The Institute has a network of Hewlett-Packard 700 series workstations, Sun SPARCstations and Apple Macintosh Quadra workstations, connected to the University's new Granta fibre-optic network, for computation, word-processing, and electronic mail communications, as well as laser printers and a Canon CLC-10 colour printer.

The building has facilities for lunch, to encourage easy interaction among the participants, and the design of the building makes informal contacts between participants both frequent and natural, promoting the exchange of ideas.

FUNDING

The Institute was initiated through the generosity of two Cambridge Colleges. St John's College has given a subvention totalling £750,000 to cover most of the first 5 years' rent. The Newton Trust (established by Trinity College) has made a grant of £1 million for other expenditure over this period. Other Cambridge Colleges, including Gonville and Caius, Emmanuel, Jesus and Christ's, have also given grants.

The first grant from outside Cambridge came from the London Mathematical Society. Further support has come from, amongst others, the Institute of Physics, N.M. Rothschild & Sons, Daiwa Anglo-Japanese Foundation, the French CNRS, the Gabriella and Paul Rosenbaum Foundation (U.S.A.), and the Prudential Corporation plc. The U.K. Engineering and Physical Sciences Research Council have awarded the Institute a 'rolling' grant of about £450,000 per year, together with a grant of £100,000 towards setting up costs. By the time the first programmes started, over £5 million had been firmly promised with continuing efforts being made to secure more visiting professorships and fellowships. Since much of the initial financial support is intended as 'pump-priming', the Institute needs to continue to seek substantial funds to secure its future.

MANAGEMENT

Sir Michael Atiyah has been appointed as the first Director of the Institute. Because he is also Master of Trinity and President of the Royal Society, Professor Peter Goddard FRS was appointed as the first full-time Deputy Director. He was succeeded by Professor John Wright on 1 October 1994. The Director and Deputy Director are helped by a Management Committee which meets at least three times each year. Most of its membership is local, but also with represent-ation from major sources of funding.

The subjects to be covered by the visitor programme are proposed to the Management Committee by the Director, on the advice of the Scientific Steering Committee. When a proposal has been agreed, the three or four mathematical scientists, who will organise the programme, are appointed.
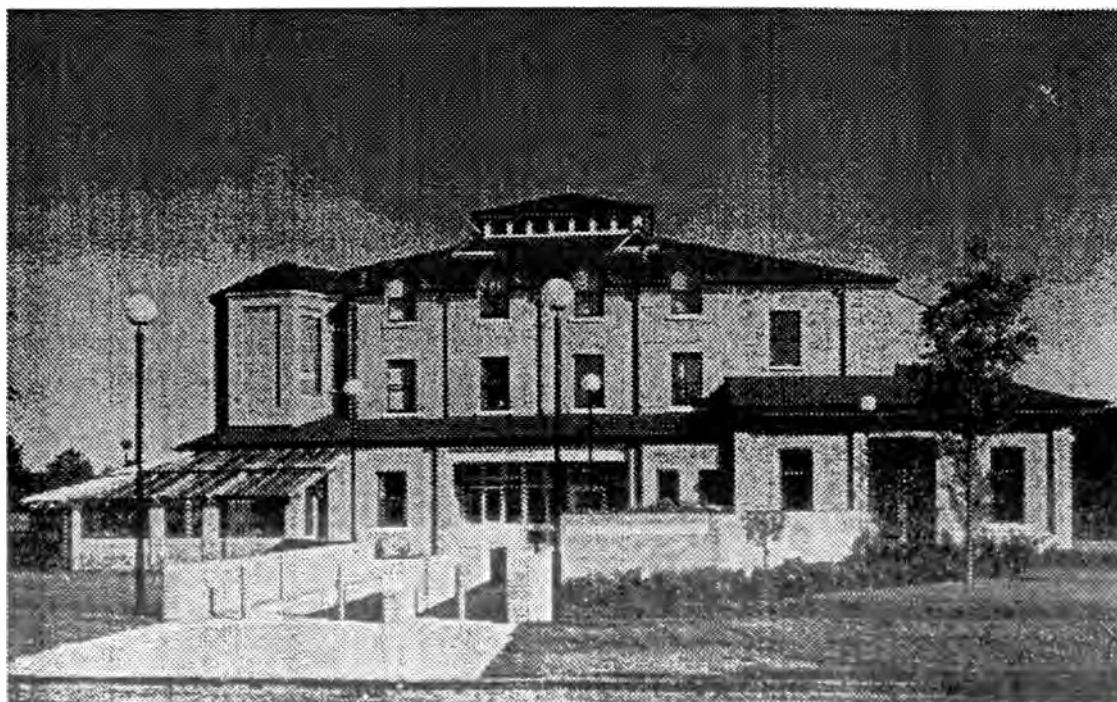
The Director, the Deputy Director and the Management Committee run the Institute in the interests of the UK mathematical community. They report to the University's General Board, and so the Institute benefits from the expertise of the University's central offices in such matters as financial management and fund-raising, the issuing of contracts, and building design and management; also, the Institute's participants are able to use University facilities such as the libraries, the Granta network and the graduate centre.

ADVANTAGES OF CAMBRIDGE

The establishment of the Institute has been possible only because of the existence in Cambridge of colleges that have pump-priming funds available for the initiation of new academic projects. Cambridge has two leading mathematics departments, which provide a supportive environment for the activities of the Institute. There are also a large number of gifted graduate students and undergraduates, many of whom go on to do research in other universities. Every effort is made to bring these into contact with the visitors, who, it is hoped, will find this an attractive feature of the Institute. And the general strength of Cambridge in the physical and biological sciences, technology and computing help to promote the interdisciplinary nature of the Institute, which is one of its important aims.

Cambridge is a pleasant small city with excellent facilities. It is attractive to visitors from abroad. Stansted Airport is nearby and developing into a major international airport, and there are now good connections to other parts of the country by the M11 motorway and the A1. The Institute provides visitors with help in finding accommodation. A new block of eleven small flats, furnished for the Institute, and a recently renovated eighteenth century house, used as a lodging house with six rooms and communal facilities, have been rented by the Institute on a long-term basis. For visiting members who are accompanied by their families, the Institute arranges the rental of houses or larger flats, for example the homes of Cambridge academics who are away on sabbatical leave.

FURTHER INFORMATION

Enquiries about the Institute, including requests for information about future activities or the procedure for making proposals for future programmes, should be addressed to

> The Deputy Director
> Isaac Newton Institute
> for Mathematical Sciences
> 20 Clarkson Road
> Cambridge CB3 0EH
> UK

or to the email address

> `i.newton@newton.cam.ac.uk`

Information about the Institute is also available from our www, gopher and ftp servers (hostnames for the servers are `www.newton.cam.ac.uk`, `gopher.newton.cam.ac.uk` and `ftp.newton.cam.ac.uk`).

The Institute's telephone number is (01223) 335999 from within the UK, +44 1223 335999 from abroad, and its fax number is (01223). 330508 [+44 1223 330508].
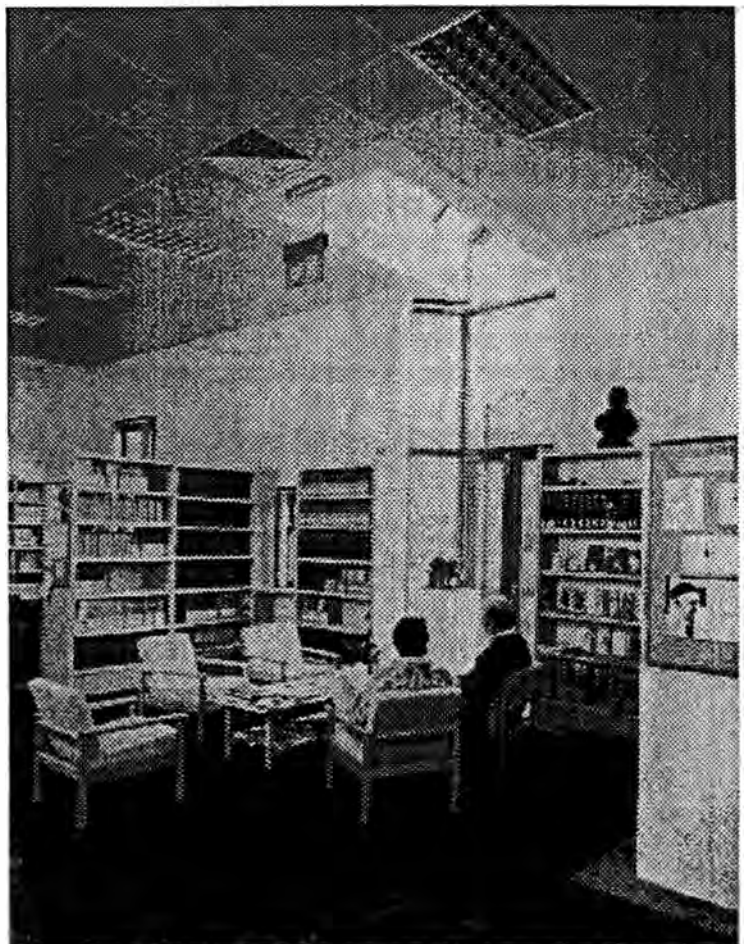
Some future visitor programmes at the Isaac Newton Institute

July - December 1995

Semantics of Computation

Organizers:	S. Abramsky (Imperial), G. Kahn (INIRIA Sophia-Antipolis), J.C. Mitchell (Stanford), A.M. Pitts (Cambridge).
Enquiries:	For enquiries related to the programme, please contact:
	Andrew Pitts, Cambridge University, Computer Laboratory, Pembroke Street, Cambridge CB2 3QG, UK. E-mail: Andrew.Pitts@c1.cam.ac.uk

July - December 1995

From Finite to Infinite Dimensional Dynamical Systems

Organizers:	P. Constantin (Chicago), J.D. Gibbon (Imperial), J. Hale (Georgia), C.T. Sparrow (Cambridge).
Enquiries:	For enquiries related to the programme, please contact: Colin Sparrow, Newton Institute, 20 Clarkson Road, Cambridge CB3 0EH, UK. E-mail: c.sparrow@newton.cam.ac.uk

January to June 1996

Dynamics of Complex Fluids

Organizers:	M.E. Cates (Cambridge), J.R.A. Pearson (Schlumberger Cambridge Research), K. Walters (Aberystwyth).
Enquiries:	For enquiries related to the programme, please contact: JRA Pearson, Schlumberger Cambridge Research, Madingley Road, Cambridge CB3 0EL, UK. E-mail: pearson@cambridge.scr.slb.com

January - June 1996

Computer Security, Cryptology and Coding Theory.

Organizers:	Ross Anderson (Cambridge), Paddy Farrell (Manchester), Peter Landrock (Århus), Roger Needham (Cambridge).
Enquiries:	For programme-specific enquiries, please contact: Ross Anderson, Computer Laboratory, University of Cambridge, Pembroke Street, Cambridge CB2 3QG; UK. E-mail: rja14@cl.cam.ac.uk

Information about the Newton Institute and the programmes running here is available from our anonymous ftp *archive. To access this you need to have access to the 'file transfer protocol',* ftp, *which is standard on most Internat sites. The command to use is*

ftp ftp.newton.cam.ac.uk

logging in as ftp, *when prompted for a userid, and using your email address as a password. Change directory to pub, the command is* cd pub, *and you will find the files located in the subdirectories there. To retrieve files for reading, you should use the command* get *followed by the filename. The Institute's World Wide Web server is situated at the URL:*

http://www.newton.cam.ac.uk/

and this provides a more convenient means of access for those with the appropriate software. There is a gopher server at the Institute so that the command gopher gopher.newton.cam.ac.uk *can be used by those with* gopher *installed on their local network.*

The Isaac Newton Institute for Mathematical Sciences welcomes proposals for research programmes. The main scientific activities of the Institute are four six month research programmes, two running from July to December and two from January to June each year. The Scientific Steering Committee meets twice a year to make recommendations on which programmes to adopt.

There are about twenty scientists associated with each programme in residence at any time, with more during the vacations. The scientific planning and organisation are the responsibility of a team of three or four organisers (aided in some cases by a group of scientific advisers). Each programme is provided with a budget for salary support, subsistence allowances and travel expenses but, because space and financial support are limited, all formal invitations are issued, and all commitments entered into, by the Director or Deputy Director.

Proposals should in the first instance be no longer than two sides of A4 and should be formulated under the following headings:

1. name of the author(s) of the proposal;

2. scientific case for the proposal, preferably set out under the following headings:
    a. scientific background/history of proposed topic;
    b. recent progress;
    c. possible future directions and developments;
    d. why the topic is particularly suited to the Newton Institute at this time;

3. possible organisers;

4. about 30 to 60 possible participants, listed in the categories 'essential', 'desirable' and 'reserve'.

It is expected that each of the organisers will be present for the major part of the programme. Appropriate financial arrangements will be made. Participants should be selected not necessarily for their seniority but for their active involvement in current research. Proposals should list the affiliations of possible organisers and participants.

Proposals will be welcomed at any time. They should be submitted to

> *The Deputy Director*
> *Isaac Newton Institute for Mathematical Sciences,*
> *20 Clarkson Road,*
> *Cambridge, CB3 0EH,*
> *UK.*

The Deputy Director, Professor John Wright, will be glad to answer any queries about the submission of proposals (tel. 0223 335999; fax 0223 330508; e-mail `i.newton@newton.cam.ac.uk`). The Scientific Steering Committee meets in October and March each year to consider proposals for programmes to run about two years later. Proposals for consideration at these meetings should reach the Deputy Director preferably at least two months before the meeting but late proposals will be given preliminary consideration.

In making their recommendations, the Scientific Steering Committee will be concerned to see that the programmes taken together reflect the broad scope within the mathematical sciences which the Institute is intended to cover. Preference will be given to programmes which will facilitate cross-fertilisation between different disciplines within the mathematical sciences. Successful proposals are usually the subject of discussion between the authors and the Committee conducted through the agency of the Deputy Director and aimed at the development of the proposal. They are usually considered at at least two meetings of the Committee before selection is recommended.

ICME8 - 8th International Congress on Mathematical Education, July 14-21, 1996

The Spanish National Committee for ICME-8 on behalf of the International Commission on Mathematical Instruction (ICMI) and the Federación Española de Sociedades de Profesores de Matemáticas (FESPM), is pleased to announce that the Eighth International Congress on Mathematical Education will be held in the city of Seville, Spain, from July 14 to 21, 1996. Previous ICME's were held in Lyon (France), Exeter (United Kingdom), Karlsruhe (Germany), Berkeley (U.S.A.), Adelaide (Australia), Budapest (Hungary) and Quebec (Canada), under the auspices of the ICMI, a Commission of the International Mathematical Union (IMU). The ICME-8 intends to continue this series of congresses with the objective of increasing the development of mathematical education in order to improve the learning and teaching of mathematics. We invite you to participate in ICME-8, the program of which will include a wide variety of scientific activities and an extensive cultural and social program for delegates and their companions, where you will have the opportunity to exchange views and discuss new ideas about the basics of mathematical education, in an international setting.

In order to achieve a greater participation of teachers from developing countries and in the spirit of the ICMI Solidarity Fund, the ICME-8 Organisation will divert some of its income towards Grants. More detailed information about this point will be provided in the second announcement.

Program of the Congress

The ICME-8 includes a rich scientific program, which will cover the most important areas in mathematical education and will confront the crucial problems which will be of interest to the 3,500 to 4,000 participants we expect to welcome to this Congress.

Principal activities include plenary and ordinary Lectures, Working Groups, Topic Groups, Round Tables, Workshops, National Presentations, Short Presentations, Projects, Films and Special Exhibits. There will also be Exhibitions of textbooks, software and various teaching materials. The Study Groups of the ICMI will contribute to the program, presenting reports on their activities. Special meetings will also be arranged (ICMI Assembly, Associations, Magazines, etc.). Each participant will receive a copy of the Official Proceedings.

English and Spanish will be the official languages. French and Portuguese, being the languages of neighbouring countries, may be spoken and translated informally in the working groups, topic groups and study groups. However, it is anticipated that most sessions will be conducted in English. Some informations, services and translations will be available in other languages.

For proposals concerning the scientific program, please write to the Chair of the International Program Committee at the congress address.

SEVILLE

A city situated in the South of Spain, 80 kms from the Atlantic Ocean and traversed by the River Guadalquivir. Seville is the capital of Andalusia, has over 2000 years of history and is the origin of such universal myths as Don Juan, Figaro and Carmen. It was the birth place of Roman Emperors such as Trajan and Hadrian and of famous painters such as Velázquez and Murillo.

Seville has one of the largest historic centres in Europe with remarkable ancient monuments: the Cathedral, the Giralda Tower, the Archive of the Indies, the Alcazar, etc.

The traditional charm of its streets, its hospitality and the gaiety of its inhabitants and its traditions, preserved over centuries, from part of the Seville of today, a modern city of great commercial and touristic activity and seat of the last University Exposition in 1992.

Despite its proximity to the sea, the climate of Seville is Mediterranean with a strong Continental slant, with a mean annual temperature of 18.8° C. At the time of the Congress the average temperature will be 27.1° C, the mean maximum being 35.5°C and minimum 18.6° C (with a relative humidity of 47%).

Electronic information via Mosiac

From the 1st of March 1995, you will be able to consult Mosiac for ample information on all aspects of ICME-8 (program, committees, infrastructure, congress venue, services, etc.). This information will be up-dated periodically.

The URL will be: http://icme8.us.es/ICME8.html

SECOND ANNOUNCEMENT

The Second Announcement to be published in the second half of 1995, will contain full and detailed information about the scientific and social program of the Congress, together with registration and accommodation forms and submission of short presentations. If you would like to receive this, please return the application form as soon as possible.

Working Groups		Topic Groups	
WG1	Communication in the classroom.	TG1	Primary school mathematics
WG2	Forms of mathematical knowledge	TG2	Secondary school mathematics
WG3	Students' attitudes and motivation	TG3	University mathematics
WG4	Students' difficulties in learning mathematics	TG4	Distance learning of mathematics
WG5	Teaching mixed-ability classes	TG5	Education for mathematics in the working place
WG6	Gender and mathematics		
WG7	Mathematics for gifted students	TG6	Mathematics teaching from a constructivist point of view
WG8	Mathematics for students with special needs		
WG9	Innovation in assessment	TG7	The fostering of mathematical creativity
WG10	Languages and mathematics	TG8	Proofs and proving: Why, when and how
WG11	A curriculum from scratch (zero-based)	TG9	Statistics and probability at the secondary level
WG12	Curriculum changes in the primary school	TG10	Problem solving throughout the curriculum
WG13	Curriculum changes in the secondary school	TG11	The future of calculus
WG14	Linking mathematics with other school subjects	TG12	The future of geometry
WG15	The impact of technology on the mathematics curriculum	TG13	The future of algebra and arithmetic
		TG14	Infinite processes throughout the curriculum
WG16	The role of technology in the mathematics classroom	TG15	Art and mathematics
		TG16	History of mathematics and the teaching of mathematics
WG17	Mathematics as a service subject at the tertiary level		
		TG17	Mathematical modelling and applicants
WG18	Adults returning to mathematics education	TG18	Roles of calculators in the classroom
WG19	Preparation and enhancement of teachers	TG19	Computer-based interactive learning
WG20	Evaluation of teaching, centers and systems	TG20	Technology for visual representation
WG21	The teaching of mathematics in different cultures	TG21	Mathematics instruction based on manipulative materials
WG22	Mathematics, education, society and culture	TG22	Mathematical games and puzzles
WG23	Cooperation among countries and regions in mathematics education	TG23	Future ways of publishing in mathematics education
		TG24	Mathematics competitions
WG24	Criteria for quality and relevance in mathematics education research	TG25	Mathematics clubs
		TG26	International comparative investigations
WG25	Didactics of mathematics as a scientific discipline		
WG26	Connections between research and practice in mathematics education		

Problem Corner   Paul Jainta

The Leningrad Mathematical Olympiads

Dr Mark Saul from Bronxville Schools, president of the *New York City Interscholastic Mathematics League*, has a trained eye for the varied landscape revealed after the lifting of the Iron Curtain, particularly in Russian mathematics education. In his foreword to a fine book containing the problems (and solutions) of the five *Leningrad Mathematical Olympiads (LMO) from 1987 through 1991* he appreciates without envy the conspicuous achievements of Soviet mathematicians in education and the encouragement of mathematical talents. For, says Dr Saul, mathematics, along with great orchestral music, thick novels, and classic ballet, is among the great achievements of Russian culture. Nobody will deny that the Russian school of mathematics has contributed a stream of ideas to the field since Catherine the Great summoned Euler to St. Petersburg. During the Soviet period of Russian history this stream became a flood. Soviet mathematicians contributed enormously to the fields of number theory, analysis, and probability. Some of this increase in mathematical activity was due to a sentient investment on the part of the Soviets in science and technology. The prevailing ideology gave a central place to the sciences as crowning human achievements. But government support did not come without a price. Many have noted the strong political influence on who might write or win contests. Anti-Semitism plagued the mathematical professions. Indeed, many gifted mathematicians who were out of favour politically or ethnically found second careers in education and made remarkable contributions.

It was very difficult, during the Soviet era, to do research in the humanities while fending off the intellectual barriers imposed by the totalitarian state. Researchers in physics, chemistry and medicine for instance were severely hampered by political constraints, since their work might depend on costly equipment, or could be tied to military or industrial priorities. The need for laboratories, and the tendency of government to direct research into particular areas led to a heavy political presence in the field. But mathematicians were lucky. With their pencils and notepads, they were relatively free to work. The applications of much of their work were sufficiently general or far removed from their own lives to pre-empt serious political interference. For this reason, young people with intellectual ability would turn to mathematics, where they found ready role models and relatively few constraints for thought. And they were escorted by mentors among working mathematicians. That's all there is to the extolled Soviet mathematical culture: the close connections between research and education, between university and high school, between professor and teacher. Mathematicians at the highest levels of their profession in the main didn't consider working with young people in elementary and high schools beneath them. Such world-class mathematicians as Kolmogorov, Dynkin or Gelfand founded schools and journals, wrote articles, and gave talks to students at (pre-)college levels. The Russian-language journal *kvant* and the nearly legendary mathematical competitions are outstanding monuments to this culture. Among these exciting and interesting mathematical events the Leningrad Olympiads are coming to the fore. They must be seen against this background and they are the product of much thought by some of the most able mathematical minds to be found anywhere. The labour-intensive form of the olympiad program, and especially of the oral round, could only have evolved in an environment rich in mathematics, and possessing a tradition of cooperation and communication between people doing mathematics at every level.

In their preface to *Leningrad Mathematical Olympiads*, edited by Stanley Rabinowitz, Math. Pro Press, Westford, Massachusetts, USA, the authors *Dmitry Fomin* and *Alexey Kirichenko*, both graduates of Leningrad State University, are not exaggerating when writing that the LMO...is perhaps a unique phenomenon in the world of mathematics competitions. Dmitry Fomin, now an Assistant Professor at the Chair of High Geometry in the faculty of Mathematics and Mechanics of St. Petersburg State University, and Alexey Kirichenko, currently a visiting lecturer of mathematics at St. Petersburg Electro-Technical University, offer two reasons for this. First, almost all problems proposed at the LMO are new and original. Second, the LMO is the only official competition in Russia (and perhaps in the world) in which the final rounds are held in *oral* form. Rather, it is like a series of conversations between contestants and jury members.

A thumbnail sketch of the LMO

The LMO takes place in four rounds:
1. School level, for the top six grades, held at local schools in December and January.
2. Regional level, held in each of the 22 Leningrad regions in February. Originally, only winners of the school round may compete at this level, but meanwhile any student can write a paper in the competition of his or her region. This round is organized as a traditional olympiad.
3. All-city-level, the main round, held in February and March. About 90-130 students take part in each grade. These trials are oral and last 3½-4 hours.
4. Final level, the elimination round, held in March. About 80-100 students participate in the three senior grades. This round is oral, too, and lasts 5 hours.

The problems below represent a narrow look into significant mathematical though by some of the most able minds of their Russian country. It is rare, in any country, to find a group of mathematicians so able, and so motivated, to provide for the future of their own profession. For it is estimated that more than 60% of the mathematics faculty of Leningrad State University would have a hand in writing, grading, or judging each Olympiad. Even in the (former) Soviet Union, this is unique.

Because of its peculiarity I am considering the idea of dealing with the structure of the LMO in depth another time. For, in addition to being divided into levels, the LMO is split into age groups. Students in grades 6-8 participate in the junior olympiad, while those in grades 9-11 compete in the senior olympiad. For this quarter's contest we give five problems of the fifty-seventh Olympiad (1991), main round, grades 10 and 11.

Q22. Given the positive real numbers, A,B,C and D, prove the inequality
$$\max(A^2\text{-}B, B^2\text{-}C, C^2\text{-}D, D^2\text{-}A) \geq \max(A^2\text{-}A, B^2\text{-}B, C^2\text{-}C, D^2\text{-}D).$$
Here $\max(x,y, \ldots)$ denotes the greatest number from the set $\{x,y, \ldots\}$.

Q23. Two circles with centers O_1 and O_2 intersect at points A and B. A circle passing through points O_1, B and O_2 intersects the circle with centre O_2 at point P. Prove that points O_1, A and P are collinear.

Q24. Given a continuous monotonically increasing function f such that $f(0)=0$ and $f(1)=1$, prove that
$$f\left(\frac{1}{10}\right)+f\left(\frac{2}{10}\right)+\ldots+f\left(\frac{9}{10}\right)+f^{-1}\left(\frac{1}{10}\right)+f^{-1}\left(\frac{2}{10}\right)+\ldots+f^{-1}\left(\frac{9}{10}\right) \leq \frac{99}{10}.$$

Q25. Can one split the numbers $1,2,\ldots,100$ into three groups so that the sum of the numbers in the first group is divisible by 102, the sum of the numbers in the second group is divisible by 203, and the sum of the numbers in the third group is divisible by 304?

Q26. Do there exist four distinct real numbers such that any two of them — say, x and y — are connected by the relation
$$x^{10}+x^9y+x^8y^2+\ldots+xy^9+y^{10} = 1 ?$$

Q27. (A somewhat analogous version of Q16, proposed by *François Sigrist*, Neuchâtel)
Five spherical caps of the same radius are disjoint on a sphere. Prove that one can move them so as to make room for a sixth one.

SOLUTIONS

No solutions were submitted to questions Q11—Q15, so I give brief solutions by the proposers.

Q11. Starting with any three digit number n we obtain a new number $f(n)$ which is equal to the sum of the three digits of n , their three products in pairs, and the product of all three digits.

   (i)   Find the value of $n/f(n)$ when $n = 625$.

   (ii)   Find all three digit numbers such that the ratio $n/f(n) = 1$.

Solution:

(i)   When $n = 625$ the value is 5 .

(ii)   Let $n = \overline{abc} = 100a + 10b + c$. Then $f(n) = a + b + c + ab + bc + ca + abc$, so $n = f(n)$ can be rewritten in the form

$$a[100 - (b+1)(c+1)] = b(c-9).$$

Since $0 \le a,b,c \le 9$, **LHS** ≥ 0 while **RHS** ≤ 0. For equality to hold we require both sides of this expression to be zero.

LHS $= a[100 - (b+1)(c+1)] = 0 \Rightarrow$ (since $a \ne 0$) $(b+1)(c+1) = 100$ whence $b = c = 9$. In this case the above equation is automatically satisfied, and the possible answers are then $n = 199, 299, 399, 499, 599, 699, 799, 899, 999$.

   □

Q12. In triangle ABC the point X lies on BC.

   (i)   Suppose that $\angle BAC = 90°$, that X is the midpoint of BC , and that $\angle BAX$ is one third of $\angle BAC$. What can you say (and prove!) about triangle ACX?

   (ii)   Suppose that $\angle BAC = 60°$, that X lies one third of the way from B to C , and that AX bisects $\angle BAC$. What can you say (and prove!) about triangle ACX?
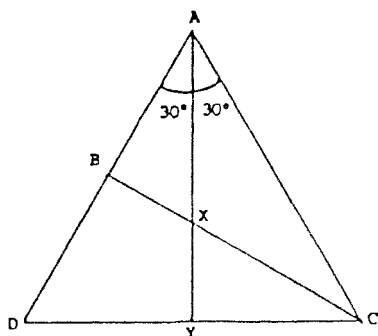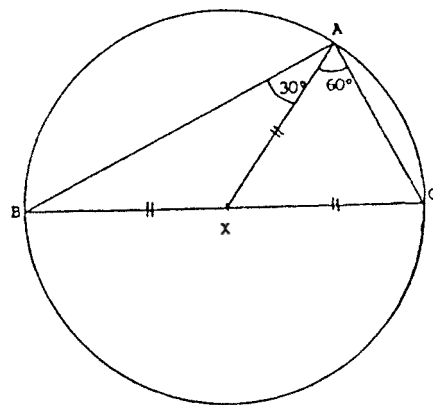
Solution:

(i)   By the converse of *Angle in a Semicircle*, BC is the diameter of the circle through ABC having centre X and radius AX=BX=CX. It follows that $\triangle$ ACX is isosceles with one of its angles ($\angle$XAC) equal to 60° , from which it follows that the remaining two angles are also 60°, and $\triangle$ ACX is thus equilateral.

(ii)   By the *Angle Bisector Theorem*, $\dfrac{BA}{AC} = \dfrac{BX}{XC} = \dfrac{1}{2}$.
Produce AB to D so that AB=BD, in which case AD=AC, and $\triangle$ ADC is equilateral. If AX produced meets DC at Y, then AY and CB are medians of $\triangle$ ADC and $\angle$ACX= $\angle$CAX=30° so that $\triangle$ ACX is isosceles.

   □

Q13   The sequence of integers $u_0, u_1, u_2, u_3, \ldots$ satisfies $u_0 = 1$ and $u_{n+1} \cdot u_{n-1} = k \cdot u_n$ for each $n \geq 1$, where k is some fixed positive integer. If $u_{2000} = 2000$, determine all possible values of k.

Solution:

Call $u_1 = u$. Then $u_0 = 1$, $u_1 = u, u_2 = ku, u_3 = k^2, u_4 = \dfrac{k^2}{u}$, $u_5 = \dfrac{k}{u}, u_6 = 1$ and $u_7 = u$. Since the sequence is *second-order* and we now have $u_6 = u_0$ and $u_7 = u_1$, it follows that the sequence is periodic with period 6; that is, $u_{6p+q} = u_q$ for all integers $p \geq 0$ and $0 \leq q \leq 5$.

Then $2000 = u_{2000} = u_{6 \times 333 + 2} = u_2 = ku$.

Now u_5 an integer $\Rightarrow u \mid k$, i.e. $k = mu$ for some integer m (in particular, $u < k$), from which it follows that $2000 = mu^2$ and $u^2 \mid 2000$. Also, $k > 0 \Rightarrow u > 0$.

$2000 = 4^4 . 5^3$ has $(4+1)(3+1) = 20$ factors and hence 10 factorisations ku, with $k > u$; these are $(k,u) = (2000,1)^*, (1000,2)^*, (500,4)^*, (400,5)^* (250,8), (200,10)^*, (125,16),(100,20)^*,(80,25)$ and $(50,40)$.

In order to satisfy $u^2 \mid 2000$ only those starred (*) solutions suffice and there are six possible values of k, namely $k = 2000, 1000, 500, 400, 200$ and 100.

□

Q14   The points Q,R lie on the circle γ , and P is a point such that PQ, PR are tangents to γ. A is a point on the extension of PQ, and γ' is the circumcircle of triangle PAR . The circle γ' cuts γ again at B , and AR cuts γ at the point C . Prove that $\angle$PAR $= \angle$ABC .

Solution:
There are many ways of approaching this problem. I have chosen a more concise approach which requires the construction of no additional lines to the obvious ones.
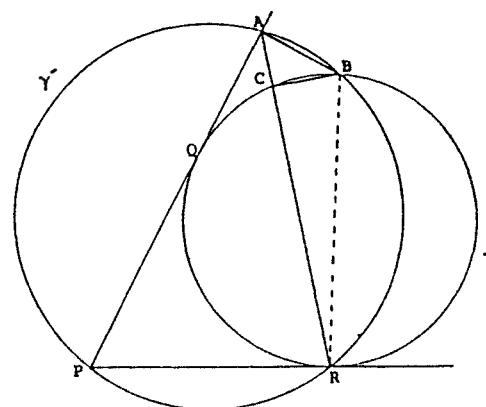Joining BR, we have $\angle$ABR$=180° - \angle$APR
(opposite angles of cyclic quadrilateral

APRB) $\Rightarrow \angle$ABC $+ \angle$CBR $= \angle$PAR $+ \angle$PRA (from $\triangle$APR). (*)
Since PR is a tangent to γ, $\angle$PRC $= \angle$CBR (Alternate Segment Theorem) $\Rightarrow \angle$PRA $= \angle$CBR.

Equation (*) then gives $\angle$ABC $= \angle$PAR as required.

□

Q15   An *increasing* sequence of integers is said to be alternating if it *starts* with an *odd* term, the second term is even, the third term is odd, the fourth is even, and so on. The empty sequence (with no term at all!) is considered to be alternating. Let $A(n)$ denote the number of alternating sequences which only involve integers from the set $\{1,2,\ldots,n\}$. Show that $A(1) = 2$ and $A(2) = 3$. Find the value of $A(20)$, and prove that your value is correct.

Solution: A simple enumeration of cases up to $n = 3$ yields
       n = 0 : {}   A(0) = 1.
       n = 1 : {},{1}   A(1) = 2.
       n = 2 : {},{1},{1,2} A(2) = 3.

Let $\{a_1, a_2, \ldots, a_r\}$ be an alternating sequence on $\{1,2,\ldots,n\}$. Then either $a_1 = 1$ or $a_1 \geq 3$ (and a_1 is odd). If $a_1 = 1$, then the sequence $\{a_2 - 1, a_3 - 1, \ldots, a_r - 1\}$ is alternating on $\{1,2,\ldots,n-1\}$ and there are $A(n-1)$ such sequences. If $a_1 \geq 3$, or if the sequence is empty, then $\{a_1 - 2, a_2 - 2, \ldots, a_r - 2\}$ is alternating on $\{1,2,\ldots,n-2\}$, there being $A(n-2)$ such sequences. Moreover, all alternating sequences on $\{1,2,\ldots,n\}$ arise in exactly one such way. Hence we have $A(n) = A(n-1) + A(n-2)$, with $A(1) = 2$ and $A(2) = 3$, representing the *Fibonacci* sequence, so that $A(20) = F_{22} = 17711$.

□

Q16 *Proposed by François Sigrist, Neuchâtel, Switzerland.*

An equilateral triangle is covered by five smaller equilateral triangles congruent to each other. Prove that it is possible to move the smaller triangles so as to cover the big triangle with four of them.

Solution:

Consider six points: the vertices of the triangle and the midpoints of its sides. One of the five smaller triangles must cover two (or more) of these six points. Therefore, its side length is not less than half the side length of the big triangle. So each of the four triangles into which the big triangle is divided by its midlines can be covered by one of the smaller triangles.
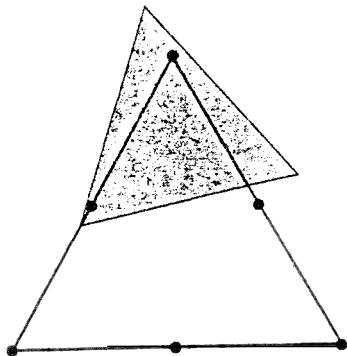
(**Note:** F.Sigrist is not the *father* of this question. Dr.Christian Blatter, professor of mathematics at ETH Zürich, published an article in *unizürich*, the magazine of the Zürich University, 2/94, based on this question, entitled: *Are you mathematically gifted?*

Moreover, Q16 stems from a Moscow mathematical competition and has appeared previously — what a coincidence! — in the fabulous journal *kvant*, one of the mainstays of the rich Russian mathematical culture depicted above.

□

Finally, propose problems for which readers will send in solutions. Proposals should, whenever possible, be accompanied by a solution, references, and other insights which are likely to be of help to the editor. They can be anything from elementary to advanced, from easy to difficult. Original problems are particularly sought. So, please submit any interesting problems you come across, especially those from (problem) books and contests that are not easily accessible. Original problems are particularly sought. But other interesting problems may also be acceptable provided they are not too well known and references are given as to their provenance. Ordinarily, if the originator of a problem can be located, it should be submitted by somebody else without permission. I hereby invite my readers to share them with their colleagues and students.

In future we will complete this section with new problem sets of *Pre-Olympiad type* from time to time. It seems a good idea to acknowledge the interests of those readers who are beginning to try their hand at problem solving or who are looking for materials to use with mathematics clubs and in the classroom. So we will be giving contest questions, sometimes in short answer or multiple choice format, when we will give the answers only in the next issue. I welcome your input, and especially problem sets and solutions for use!

That fills the space we have available this issue. Send me your nice solutions, Olympiads, and pre-Olympiad contest materials.

Paul Jainta, Werkvolkstr. 10, D-91126 Schwabach, Germany

EUROPEAN NEWS: Country by Country

● BELGIUM

PRIX DE LA FOUNDATION DU 150éme ANNIVERSAIRE DE LA SOCIETE ROYALE DES SCIENCES DE LIEGE

La Société des Sciences a le plaisir de vous informer que cette année quatre prix internationaux (troisième période quinquennale 1990-1995) seront décernés à de jeunes chercheurs agés de moins de 35 ans au 31 décembre 1995.

Ces prix d'un montant de 75.000 francs belges chacun ont pour but de récompenser un ensemble de travaux publiés par un auteur seul ou en collaboration dans les domaines suivants:

Biologie	:	Prix Edouard VAN BENEDEN
Chimie	:	Prix Louis D'OR
Mathématique	:	Prix Lucien GODEAUX
Physique	:	Prix Pol SWINGS

Toute demande d'information doit être adressée **le plus tôt possible** au Professuer G. HAMOIR, c/o Secrétariat de la Sociéte Royale des Sciences de Liège, Institut de Mathématique, Université de Liège, 15, avenue des Tilleuls, B-4000 LIEGE (Belgique). FAX: --32(41) 66 95 47.

Dès réception de cette demande, la documentation permettant (d'introduire) un dossier complet sera transmise à l'intéressé.

La date limite de dépôt des dossiers est fixée au ler octobre 1995.

PRIZES OF THE 150th ANNIVERSARY FOUNDATION OF THE ROYAL SOCIETY OF SCIENCES OF LIEGE

The Society of Sciences is pleased to inform you that this year it will award four international prizes (3rd quinquennial period 1990-1995) to young researchers, whose age is under 35 on December 31st 1995.

These prizes, amounting to 75.000 Belgian francs each, will reward a collection of published work either by a single author or in collaboration, in the following fields:

Biology	:	Edouard VAN BENEDEN Prize
Chemistry	:	Louis D'OR Prize
Mathematics	:	Lucien GODEAUX Prize
Physics	:	Pol SWINGS Prize

Any request for more information can be addressed **as soon as possible** to Professor G. HAMOIR, c/o Secretariat of the Royal Society of Sciences of Liège, Institute of Mathematics, 15, Avenue des Tilleuls, B- 4000 LIEGE (Belgium). FAX: --32(41)66 95 47.

On receipt of that request, instructions for completing the application form will be sent to the nominee.

The deadline for application is October 1st 1995.

- **CATALONA**

The Ferran Sunyer i Balaguer Prize 1995

Ferran Sunyer i Balaguer (1912-1967) was a self-taught Catalan mathematician who, in spite of a serious physical disability, was very active in research in classical Mathematical Analysis, an area in which he acquired international recognition.

Each year in honor of the memory of Ferran Sunyer i Balaguer, the Institut d'Estudis Catalans awards an international mathematical research prize bearing his name. This prize has been 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. 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 Birkhäuser 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 chosen by a Scientific Committee consisting of:
    Prof. Gerhard Frey (Universität Essen),
    Prof. Joan Girbau (Universitat Autònoma de Barcelona),
    Prof. Paul Malliavin (Université de Paris VI),
    Prof. Joseph Oesterlé (Université de Paris VI),
    Prof. Alan Weinstein (University of California at Berkeley)

5. Monographs, preferably typeset in $T_{E}X$, should be sent to the following address, and must arrive there before December 15, 1995 in order to be considered:
    Institut d'Estudis Catalans
    Carme, 47
    08001 Barcelona
    Spain
    e-mail: crm@crm.es

6. The name of the prize-winner will be announced in Barcelona in April, 1996.

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

Barcelona, April 1995

·DESTVDIS·
INSTITVT CATALANS
BARCELONA

● FRANCE

A new journal :

Revue d'histoire des mathématiques.

The *Revue d'histoire des mathématiques*, edited under the auspices of the French Mathematical Society (Société mathématique de France) publishes original papers on the history of mathematics, concentrating on the period from the seventeenth century to the present day. The *Revue* welcomes manuscripts dealing with the mathematical sciences from an internal standpoint as well as papers bearing on relationships to other fields or on the institutional, cultural and social context. The *Revue d'histoire des mathématiques* is an international journal, addressing itself to teachers of mathematics, mathematicians, historians and philosophers of science, and to all those interested in understanding mathematics.

Editor : C. Gilain.

Managing Editors: J.-L. Chabert, A. Dahan.

Editorial Board: E. Bayer, R. Bkouche, P. Cartier, J.-L. Chabert, K. Chemla, P. Crépel, A. Dahan, J. Dhombres, P. Dugac, C. Gilain, H. Gispert, C. Houzel, J.-P. Kahane, J. Peiffer, R. Rashed, H. Sinaceur, J.-L. Verley.

Advisory Board: C. Alvarez (Mexico), L.C. Arboleda (Colombia), E. Ausejo (Spain), L. Beaulieu (Canada), B. Belhoste (France), U. Bottazzini (Italy), J. Buchwald (United States), B. Bru, J.-P. Bourguignon, A. Chenciner (France), J. Cross (Australia), S. Demidov (Russia), B. Diagne (Senegal), J. Gray (Great Britain), G. Israël (Italy), E. Knobloch (Germany), P. Lelong (France), J. Lützen (Denmark), J. Mawhin (Belgium), H. Mehrtens (Germany), S. Petrova (Russie), J.-P. Pier (Luxemburg), V. Poenaru (France), J.-C. Pont (Switzerland), S. Roero (Italy), C. Sasaki (Japan), E. Scholz (Germany), S. Stigler (United States).

Secretariat : N. Hermellin.
Two issues, each of 150 pages, will come out every year.

Contents number 1 (February 1995)

U.BOTTAZZINI et R. TAZZIOLI
"Naturphilosophie and its role in Riemann's mathematics".

H.GISPERT "La théorie des ensembles en France avant la crise de 1905 : Baire, Borel Lebesgue...et tous les autres".

L.SINÉGRE "Les quaternions et le mouvement du solide autour d'un point fixe chez Hamilton".. MARTIN "Probabilités et philosophie des mathématiques chez Cournot".

P. LELONG "D'une variable à plusieurs variables en analyse complexe : les fonctions plurisousharmoniques et la positivité".

Manuscripts or Subscriptions (360F) should be addressed to :

> *Revue d'histoire des mathématiques*
> Société Mathématique de France
> Institut Henri Poincaré
> 11 rue Pierre & Marie Curie
> 75231 Paris cedex 05
>
> Tél : (1) 44 27 67 97
> Fax : (1) 40 46 90 96
> E-mail : rhm@dmi.ens.fr

WORKSHOP ON "NONSMOOTH ANALYSIS AND ITS APPLICATIONS"

27-29 June 1995   **Pau, France**

Scope of the conference: The development of analysis has known a breakthrough with the discovery of differential calculus at the end of the seventeen century. by Newton, Leibniz (and many other mathematicians who played a role of one sort or another such as Cavalieri, Fermat, L'Hospital, Roberval, Saint-Vincent, Torricelli, Wallis...). Many other branches of science have taken advantage of this breakthrough (astronomy, mechanics, physics...). The end of the present century experiences various tentatives, in order to launch a broader framework as several problems from mathematics or mechanics (one-sided analysis, convex and nonconvex optimization, optimal control theory...) or economics (marginal analysis...) do not enter in the realm of classical differential calculus.

Nonsmooth analysis is now mature. It has now strong ramifications in other fields of mathematics. Its tools and its methods are now clearly delineated. Many applications can be credited to it. Algorithms have been devised and tested for nonsmooth problems It is the purpose of the workshop to give an idea of the state of the art in the field and to shed light on its latest developments.

Topics: Main concepts of nonsmooth analysis and their applications to optimization.

Penalization, sensitivity analysis.
Applications to optimal control and the calculus of variations.
Applications to shape optimisation.
Applications to nonlinear analysis.

Scientific Committee: J. Borwein (Vancouver), F.H.Clarke (Lyon), A.D.Ioffe (Technion, Haifa), C.Lemaréchal (INRIA), L.Thibault (Montpellier)

Contact: J.-P. Penot, Maths appliquées
  Faculté des Sciences
  Av. de l'Université, 6400 PAU
  France
  Tel: 33 16 59 92 30 73
  E-mail: jean-paul.penot@univ-pau.fr
  Fax: 33 59 92 32 00

Deadline for the submission of abstracts: May 24 1995.

CIRM

Centre International de Recontres Mathématiques, Luminy Case 916, 13288 Marseille Cedex 9, FRANCE.

Tel: 91 83 30 00
Fax: 91 41 47 86
E-mail: azm@cirm.univ.mrs.fr

Colloques mathematiques 1995

3-7 July
Systèmes dynamiques et théorie des nombres
P. Liardet (U. d'Aix-Marseille I), D. Lind (U. of Washington, Seattle)

10-14 July
Réseaux d'interconnexion
P. Fraigniaud (ENS-Lyon), D. Sotteau (U. de Paris-Sud)

17-21 July
Perturbations singulières
P. Brunovski (U. de Bratislava), M. Diener (U. de Nice)

28 August - 1 September
Géométrie et arithmétique des espaces de modules de courbes
P. Lochak (CNRS, ENS-Paris), L. Schneps (CNRS, Besancon)

4-8 September
V_e *colloque international de théorie des graphes et de combinatoire*
C. Berge, V. Giakoumakis (EHESS, Paris), J.-F. Maurras (GIA, Marseille)

11-15 September
Problèmes bien posés et stabilité en optimisation
Y. Sonntag (U. d'Aix-Marseille I)

18-22 September
Géométrie des équations différentielles
J.P. Francoise (U. Paris 6), R. Roussarie (U. de Dijon)

25-29 September
Cryptographie
J. Stern (ENS-Paris)

2-6 October
Introduction aux systèmes d'Euler
J.-B. Bost (IHES) et F. Loeser (École Polytechnique, Palaiseau)

9-13 October
Fonctions zêta dynamiques
V. Baladi (ETH Zentrum, Zürich), D. Ruelle IHES, Bures sur Yvette)

16-20 October
Histoire de la lecture des anciens en mathématiques
K. Chemla (Eq. REHSEIS, CNRS, Paris), J. Pfeiffer (CNRS, Paris) E. Knobloch (TU Berlin)

30 October - 4 November
Théorie des opérateurs
B. Chevreau, N. Nikolski (U. de Bordeaux), J.-P. Labrousse (U. de Nice), M. Mbekhta, F. Vasilescu (U. de Lille)

13-17 November
Systèmes d'équations algébriques
J.-P. Dedieu (U. de Toulouse III)

20-24 November
Groupes quantiques; représentations et cohomologie d'algèbres quantiques
N. Desolneux (U. de Lyon 1)

27 November - 1 December
Langages synchrones
N. Halbwachs (CNRS, Grenoble), G. Berry (Ecole des Mines, Sofia Antipolis)

Déc. 95 ou Jan.96
Femmes & Mathematiques France-Russie
S. Paycha (U. L. Pasteur, Strasbourg)

● GEORGIA

Prize:

During the Georgian Congress of Mathematicians in June 1994, organized by the Georgian Mathematical Union (GMU), the prize of the Union was awarded to Dr. Ramaz Bochorishvili for a monograph "Numerical Methods that Converge in Minimal a Priori Estimates for Nonlinear Scalar Laws", Tbilisi, 1993. This work was published according to the decision of Publishing Council of Vekua Institute of Applied Mathematics of Tbilisi State University.

Journals:

The bimonthly "Proceedings of the Georgian Acad. Sci. Mathematics" was announced in the 7th issue of the present newsletter(1993). Its first and last volume (6 issues) appeared in 1993. Last year that volume was republished by the Plenum Publishing corporation, New York and London as vol 1 of the "GEORGIAN MATHEMATICAL JOURNAL" (GMJ). Plenum continues this title. First two issues of vol 2 of GMJ are already published this year. The international editorial board remains the same as of "Proceedings...". For the subscription (price 195 USD for vol 1 and 205 USD for vol 2).

Contact:
Subscr. Dept. Plenum Publ. Corporation, 233, Spring, Str., New York, N.Y.10013-1578, U.S.A.

Papers should be sent to:
Prof.I. Kiguradze
Editor-in Chief of GMJ
Razmadze Mathematical Institute
Georgian Academy of Sciences
1, Rukhadze Str., Tbilisi 380093
Republic of Georgia

Another new journal "Memoirs on Differential Equations and Mathematical Physics" is established by the Razmadze Mathematical Institute. It is designed particularly for long (up to 140 p.) research papers on partial and ordinary differential equations. Editorial board: H. Antosiewicz (Los Angeles), N. Azbelev (Perm), R. Bantsuri and T. Burchuladze (Tbilisi),M. Drakhlin (Ariel),R. Finn(Stanford),R. Gamkrelidze (Moscow), N. Isobov (Minsk), L. Jentsch (Chemnitz), G. Kharatishvili and I. Kiguradze (Tbilisi),K .Kreith (Davis),L. Kudrjavtsev (Moscow), Yu. Mitropolsky (Kiev),F.Neuman (Brno), B. Pobedrja and N. Rozov (Moscow). Subscriptions and orders for publication should be addressed to the editorial office of "Memoirs..." at the Razmadze Mathematical institute. Subscription price for vol 1(3 issues)is 138 USD.

GERMANY

Max-Planck-Institut für Mathematik

Gottfried-Claren-Straße 26, D-53225 Bonn

Permanent Members:

Scientific Members: F.Hirzebruch (Director), G.Faltings, G.Harder, Yu. Manin, D.Zagier

Head, Topology Group: H. Baues

Scientific Assistants: D.Huybrechts, R. Kellerhals

Visiting Research Mathematicians Spring/Summer 1995

Akbulut, S., MSU	5/95	Akt."Gauge Theory and 4-Mfds"
Alekseevsky, D., Moskau	3/95–2/96	Quaternional Mfds
Anosov, D.V., Moskau	1/95–5/95	Differential Geometry
Askitas, A., Cambridge	10/94–9/96	Low-dim.Topology
Baum, P., Penn.State	5/95	Algebraic Topology
Behrend, K., M.I.T.	10/94–9/95	Algebraic Geometry
Bilu, Yu., Ben Gurion U.	4/95–3/96	Number Theory, Alg.Geometry
Boden, H., U. of Michigan	9/93–8/95	Geometry, Gauge Theory
Buium, A., I.A.S.	9/94–8/95	Algebraic Geometry
Chai, Ching-Li, U. of Penn.	2 Monate	Alg.Geometry, Number Theory
Chmutov, S.G., Pereslavl	5/95–9/95	Knots, Singularities
Cohen, H., Bordeaux	6/95	Number Theory
Conolly, F., U. of Notre Dame	10/94–6/95	Geometric Topology
Degtyarev, A., POMI	4/95–6/95	Topology, Alg.Geometry

Edmonds, A., Bloomington	3/95–4/95	Akt. "Gauge Theory and 4-Mfds"
Eholzer, W., Bonn	3/95–9/95	Mathematical Physics
Frøyshov, K., Oxford	3/95–5/95	Akt. "Gauge Theory and 4-Mfds"
Galicki, K., U. of New Mexico	15.5.–15.7.95	Differentialgeom.,Math.Physics
Göttsche, L., Trento	8/93–7/95	Algebraic Geometry
Guerzhoy, P., Haifa	4/95–7/95	Arithmet.Alg.Geometry
Hambleton, I., McMaster U.	7/94–6/97	Algebraic Topology
Herald, Ch., UC Irvine	1/95–6/95	Akt. "Gauge Theory and 4-Mfds"
Huebschmann, J., Lille	9/94–8/95	Symplectic Geometry
Kashin, B., Moskau	7/95–8/95	Harmon.Analysis,Operator Theory
Kim, Jongsu, Seoul	6/95–7/95	Differential Geometry
Kontsevich, M., UC Berkeley	6/95–8/95	Geometry,Combinatorics,Math.Phys.
Kordyukov, Yu., Ufa	3/95–8/95	Analysis on Manifds.
Küchle, O., Bayreuth	9/94–8/95	Algebraic Geometry
Lang, S., Yale U.	6/95	Algebr.Geometry,Number Theory
Le, Hong Van, Hanoi	since 1992	Minimal Surfaces,Sympl.Geometry
Leary, I., Barcelona	1/95–12/95	Algebraic Topology
Leprévost, F., Paris VII	11/94–10/95	Number Theory
Leznov, A., Moskau	4/95–3/96	Integrable Systems
Li, Weiping, Yale	5/95	Akt. "Gauge Theory and 4-Mfds"
Lisca, P., Rom	5/95	Akt. "Gauge Theory and 4-Mfds"
Maslen, D.K., Harvard	10/93–9/95	Harmonic Analysis
Matic, G., U. of Georgia	4/95–6/95	Akt. "Gauge Theory and 4-Mfds"
Mikhalkin, G., Michigan St.U.	6/94–5/95	Alg.Geometry a.Topology
Murakami, J., Osaka	6/95–7/95	Knot Theory
Namikawa, Yoshinori, Sophia U.	10/94–9/95	Calabi-Yau-Manifds.
Nenashev, A., POMI	4,8-12/95	Algebraic K-Theory
Ozvath, P., Princeton	4/95–5/95	Akt. "Gauge Theory and 4-Mfds"
Pedersen, E., SUNY	7/94–6/95	Algebraic Topology
Pirashvili, T., Tiflis	11/94–6/95	Homolog.Algebra,K-Th.,Homotopy Th.
Platonov, V.P., Minsk	5/95–11/95	Algebraic Groups
Polyak, M., UC Berkeley	9/94–8/95	Low-dim.Topology
Popov, V., Sydney	5/95–7/95	Invariant Theory
Pragacz, P., Torun	9/93–6/96	Algebraic Geometry
Prokhorov, Yu., Moskau	2/95–4/95	Birat.Geometry of Alg.Varieties
Raina, A., Tata Inst.	1 Mo	Mathematical Physics
Roberts, B., U. of Chicago	10/94–9/95	Number Theory,Modular Forms
Rodriguez Villegas, F., Princeton	9/94–8/95	Number Theory
Rudnick, Z., Tel-Aviv	8/95	Number Theory,Autom.Forms
Schmutz, P., Lausanne	10/94–9/95	Differential Geometry
Schulze-Pillot, R., Köln	4/95–7/95	Number Theory,Modular Forms
Schwachhöfer, L., U. of Pennsylvania	9/94–8/95	Differential Geometry
Shimada, I., Hokkaido	4/95–3/96	Algebraic Geometry
Sibner, L., New York	1/95–5/95	Gauge Field Theory
Sibner, R., CUNY	1/95–5/95	Gauge Field Theory
Sofer, A., Princeton	9/94–8/95	Number Theory
Stipsicz, A., Rutgers	4/95–5/95	Akt. "Gauge Theory and 4-Mfds"
Sun, Xiaotao, Acad.Sinica	10/94–9/95	Algebr.a.Arithmet.Surfaces
Tabachnikov, S., Cambridge	7/95–6/96	Glob.Analysis,Sympl.Geom.,Knots
Terao, H., U. of Wisconsin	6/95–7/95	Geometry
Tonks, A., Bangor	9/94–9/96	Alg.Topology,Homotopy Theory
Tsafriri, L., Jerusalem	7/95–8/95	Harmon.Analysis,Operator Theory
Tumanov, A., U. of Illinois	15.5.–15.8.95	Complex Analysis
Turner, P.R., Oxford	1/95–12/95	Algebraic Topology
Tyurin, A., Moskau	5/95	Akt. "Gauge Theory and 4-Mfds"
Vasiu, A., Princeton	9/94–8/95	Alg.Geometry,Number Theory
Voisin, C., Pari-Sud	7/95	Algebraic Geometry
Wajnryb, B., Haifa	8/94–7/95	Algebraic Geometry
Wang, R., IHES	1/95–12/95	Differential Geometry,Gauge Theory
Wentworth, R., Harvard	7/95	Gauge Theory,Alg.Geometry

● HUNGARY

This year there will be the following conferences in Hungary

1. Hypergraphs and symmetric structures
   18-23 June, 1995. Balatonlelle
2. Approximation theory and function series
   20-26 August, 1995. Budapest
3. Intuitive Geometry
   3-9 September, 1995. Budapest

These are organized by:

Bolyai Mathematical Society
E-mail h3341sza@ella.hu

There will be a workshop in Ilieni Romania jointly organized by Babes-Bolyai University (Cluj Napoca)=Kolozsvar and Eotvos Lorand Univeristy Budapest.

First Joint Workshop on Modern Applied Mathematics

12-17 June   Ilieni=Illyefalva Romania

Organizers:

S.Horvath   horvath@konig.elte.hu
T.Illes   illes@konig.elte.hu
G.Goldner, M.Muresan   ubbmail@utcluj.ro
Babes Bolyai, University (Cluj-Napoca)

For 1996 beside the European Congress of Mathematics in Budapest 21-27 July the following conference is organized:

Summer School in Algebraic Geometry

29 July - 9 August   Eger

Organizer: Janos Kollar (Salt Lake City, USA)

Contact: Karoly Boroczki
Jr. Mathematical Institute of the
Hung. Acad. Sci.
Budapest Pf.127. 1364 HUNGARY
E-mail carlos@konig.elte.hu

● ITALY

Announcing the Foundation of the

Istittuto per la Ricerca di Base

Castello Pignatelli del Comune di Monteroduni
I-86075 Monteroduni (IS), Molise, Italy

Inauguration Ceremony
August 7 1995, 10-12 am

Invited Lectures for the General Public
August 7 1995, 2-6 p.m.

I.R.B. International Workshops
August 8-12 1995

o **New Frontiers in Multivalued Hyper-Structures.** Coordinator Prof. T. Vougiouklis, Department of Mathematics, Democritus University, 67100 Xanthi, Greece. Fax: +30-541-26146 and I.R.B.

o **New Frontiers in Integro-Differential Geometries.** Coordinator Professor G.T. Tsagas, Department of Mathematics, Aristotle University, 54006 Thessaloniki, Greece. Fax: + 30-31-991512 and I.R.B.

o **New Frontiers in Clean Hadronic Energy.** Coordinator Professor R.M. Santilli, Istituto per la Ricerca di Base, I-86075 Monteroduni (IS), Molise, Italy. E-mail: ibrrms@pinet.aip.org Fax: 39 865 491145; and Professor N. Tsagas, Chair of Nuclears Physics, Democritos University, 67100 Xanthi, Greece.

o **New Frontiers in Gravitation.** Coordinator Professor G. Sardanashvily, Department of theoretical Physics, Moscow State University, 117234 Moscow, Russia. E-mail: sard@grav.phys.msu.su and IRB

o **New Frontiers in Theoretical Biology.** Coordinators Professor C.A.C.Dreismann, I.N. Strnski Institute for Physical and Theoretical Chemistry, Technical University of Berlin, D-10623 Berlin, Germany. Fax: 49-30-31426602; and Professor C. Illert, Institute for Basic Research, 2/3 Birch Crescent, East Corrimal, N.S.W. 2518, Australia, phone/fax +61-42-833009.

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Centre International de Sciences Mécanique International Centre for Mechanical Sciences

Programme 1995

5-9 June
New design concepts for high speed air transport

10-14 July
Bone cell and tissue mechanics

17-21 July
Liquid bridge theory and applications

4-8 Sept.
Mathematical modelling for arch dam design and safety evaluation

11-15 September
Mechanics of solids and phase changes

18-22 September
Control of flow instabilities and unsteady flows

18-22 September
Modelling and simulation of hypersonic flows for spatial flights

25-29 September
Advanced Methods of Tunnelling

2-6 October
Earthquake resistant design

9-13 October
The flow of particles in suspension

For further information contact:
CISM, Palazzo del Torso
Piazza Garibaldi 18, 33100 Udine (Italy)
Tel: +39 0432-294989 or 508251
Fax: 501523

SCUOLA MATEMATICA INTERUNIVERSITARIA

SUMMER COURSE IN MATHEMATICS - PERUGIA 1995

In Summer 1995 graduate courses in mathematics will be organized under the sponsorship of the Italian National Research Council, at the University of Perugia, Perugia (Italy); the courses will take place between July 23 and August 26, 1995.

The courses are directed towards young graduates wishing to study mathematics at a graduate level.

The list of courses offered is attached. Each participant is required to choose two courses for a total of 10 hours a week of lectures in addition to problem sessions. Daily attendance is compulsory for participants. Although written tests will be given by the lecturers, no certification of proficiency will be issued.

Ten fellowships, of 520.000 Italian lire each, will be available to foreign participants to help cover their living expenses during the course. All the participants will be lodged, at no cost, in the Casa dello Studente. Text books, lecture notes and photocopies will be provided by the School.

NO TRAVEL EXPENSES WILL BE REIMBURSED

Applications should be sent to:
Professor Graziano GENTILI
Scuola Matematica Interuniversitaria
Summer Course in Mathematics
Via S. Marta 13/A, 50139 - Firenze, Italy
E-mail: smi@ds.iaga.fi.cnr.
Fax: +39-55-475915

Preference will be given to applications received before April 30, 1995. A selection committee will meet shortly afterwards and all foreign applicants will be notified of the result before June 20, 1995. Applications should contain a brief curriculum vitae and a **detailed curriculum studiorum** (including a list of university courses taken and corresponding grades). Applicants are requested to state if their participation is conditioned by the allotment of a fellowship. They should indicate very clearly the exact address to which all correspondence concerning the Summer Course should be mailed.

The Chairman of S.M.I.
(Prof. Graziano Gentili

LIST OF COURSES - Perugia 1995

o **Algebra** - Prof. L. Kovacs, Univ. Sydney (lectures in English)

o **Complex Analysis** - Prof. I. Graham, Univ. Toronto (lectures in English)

o **Functional Analysis** - Prof. N. Fusco, Univ. Napoli (lectures in Italian)

o **Numerical Analysis** - Prof. D. Kershaw, Univ. Lancaster (lectures in English)

o **Differential Equations of Mathematical Physics** - Prof. C. Schwab, Univ. Maryland (lectures in English)

o **Mathematical Finance** - Prof. D. Heath, Cornell Univ. (lectures in English)

○ **Algebraic Geometry** - Prof. W. Barth, niv.Erlangen (lectures in English)

○ **Differential Geometry** - Prof. W. Goldman, Univ. Maryland (lectures in English)

○ **Introduction to Progrmaming and Computer Science** - Prof. J. Simon, Univ.Chicago (lectures in English)

○ **Probability** - Prof. H. Teicher, Rutgers Univ. (lectures in English)

○ **Mathematical Statistics** - Prof. E. Regazzini, Univ.L.Bocconi (lectures in Italian)

SCUOLA MATEMATICA INTERUNIVERSITARIA

SUMMER COURSE IN MATHEMATICS - CORTONA 1995

During Summer 1995, graduate courses in mathematics will be held, under the sponsorship of the National Research Council, in Cortona at the Scuola Normale Superiore. The courses will take place during the periods July 2-July 22, July 23-August 12 and August 13-August 26 1995.

The courses are directed towards young graduates who would like to engage in research in one of the following fields :

July 2 - July 22

○ **Computational Complexity** - Prof. B. Codenotti (I.E.I. Pisa)
Prof. M. Pellegrini (King's College, London)

July 23 - August 12

○ **Probability** - Prof. P. Billingsley (Univ. Chicago), Prof. D.M. Cifarelli (Univ. L. Bocconi)

August 13 - August 26

○ **Algebraic Geometry** - Prof. W. Decker (Univ. Saarlandes), Prof. G. Ottaviani (Univ.L'Aquila)

Each participant is required to choose one topic for a total of 12 hours a week of lectures.

In addition, the participants themselves will be asked to participate in the problem sessions and in the seminars that will be organized in the afternoons.

Six fellowships, of 250.000 Italian lire each, will be available to foreign participants to help cover their living expenses. The participants will be lodged at no cost in the Palazzone; furthermore breakfast and lunch (the latter only from Monday through Saturday) will be offered by the organization. The School will also

provide text books, lecture notes and photocopies.

NO TRAVEL EXPENSES WILL BE REIMBURSED

Applications should be sent to addres on previous page

Preference will be given to applications received before April 15, 1995 for the first period and before May 15, 1995 for second and third period.

A selection committee will meet shortly afterwards and all foreign applicants will be notified of the result before June 1, 1995.

Applications should contain a **brief curriculum itae and a detailed curriculum studiorum** and hould indicate which course the candidate would like to follow. Applicants are requested to state if their participation is conditioned by the allotment of a fellowship. The exact address to which all correspondence concerning the Summer courses as to be mailed should be clearly stated.

The Chairman of S.M.I.
(Prof. Graziano Gentili)

● POLAND

**Stefan Banach International Mathematical Center
25 Mokotowska St., Warsaw, Poland**

BANACH CENTER CONFERENCE ON TOPOLOGICAL ALGEBRAS

23 - 27 October 1995

Organizer: W. Żelazko

Members of the Programme Committee:
Graham R. Allan (Cambridge), H.Garth Dales (Leeds), Aleksander Helemskii (Moscow), Anastasios Mallios (Athens), Wieslaw Żelazko (Warsaw) Chairman.

Main topics:

1. Locally convex and locally pseudoconvex algebras
2. General topological algebras
3. A-convex and quasi-A-convex algebras
4. Semitopological algebras
5. Open Problems in topological algebras

Information:
W. Żelazko, Institute of Mathematics
Polish Academy of Sciences
Śniadeckich 8, PO Box 137
00-950 Warszawa, POLAND

E-mail: zelazko@impan.impan.gov.pl

UNITED KINGDOM

University of Cambridge
ISAAC NEWTON INSTITUTE FOR MATHEMATICAL SCIENCES

Director: Sir Michael Atiyah, OM, PRS

20 Clarkson Road, Cambridge, CB3 0EH, UK
Tel: (01223) 335999   Fax: (01223) 330508
e-mail: i.newton@newton.cam.ac.uk

A Newton Institute Euroconference

ADVANCES IN TYPE SYSTEMS FOR COMPUTING
14-18 August 1995

Programme committee:
S.Abramsky (Imperial), L.Cardelli (DEC),
J.Mitchell (Stanford) Chair, A.Pitts
(Cambridge), A.Yonezawa (Tokyo)

First Call for Registration and Contributed Talks

The workshop on Advances In Type Systems For Computing is being held as part of a six-month research programme on Semantics of Computation at the Isaac Newton Institute for Mathematical Sciences, a new international research centre in Cambridge UK. The workshop programme will consist of a combination of invited and contributed talks presenting recent developments in the use of typing in computing, with particular emphasis on the following three related areas:

* extensions of the ML type system *

* types in object-oriented programming *

* type theories for reactive systems *

Invited speakers will include: M.Abadi (DEC), R.Harper (CMU), J.Palsberg (Aarhus), S.Smith (John Hopkins), K.Brude (Williams), X.Leroy (INRIA), B.Pierce (Cambridge), M.Tofte (DIKU), L.Cardelli (DEC), D.MacQueen (AT&T), V.Saraswat (Xerox), A.Yonczawa (Tokyo).

More details and future conferences at Isaac Newton Institute for Mathematical Sciences see pages 12-17.

LONDON MATHEMATICAL SOCIETY

Stochastic Analysis

20 - 21 October 1995
Friday pm - Saturday am

Venue: Scientific Societies' Lecture Theatre
New Burlington Place
London W1, UK

Speakers: D. Bakry, E. Bolthausen, L. Gross, J.F. LeGall, D. Nualart, H.T. Yau

Contact: London Mathematical Society
Burlington House, Piccadilly
London W1V 0NL, UK

Tel: 0171 437 5377
Fax: 0171 439 4629
E-mail: lms@kcl.ac.uk

NOTICE FOR MATHEMATICAL SOCIETIES

Please note labels are prepared during the second half of the month before the next issue. Would you please send your updated lists before this time.

Many thanks.   Ms T Mäkeläinen

BRIEF REVIEWS

Edited by Ivan Netuka and Vladimír Souček. Books submitted for review should be sent to the following address: Ivan Netuka, MÚUK, Sokolovská 83, 186 00 Praha 8, Czech Republic.

Y.Meyer, S. Roques (Eds.): Progress in Wavelet Analysis and Applications. Proceedings of the International Conference "Wavelets and Applications" Toulouse, France-June 1992, Editions Frontieres, Paris, 1993, xv+785 pp., $ 87.00, ISBN 2-863-32130-7

This volume includes almost 100 papers presented at the international conference "Wavelets and applications - Toulouse, France - June 1992" dedicated to a celebration of the tenth birthday of wavelet analysis. Two introductory talks by J.Morlet - A. Grossman and by Y. Meyer are followed by 12 plenary talks. In order to indicate the diversity of themes involved we give the section headings for the rest of the book. Part I: coding, signals, fractals, statistics, imagic. Part II: turbulence, geophysics, astrophysics, physics. Part III: medical applications, industrial applications, applications in economics, target detection. Part IV: fast algorithms, mathematics, mathematical physics. The volume concludes with an extensive bibliography (including 849 items) illustrating the rapid development of the subject. (jokr)

T.S.Blyth, J.C.Varlet: Ockham Algebras, Oxford University Press, Oxford, 1994, 241 pp., ISBN 0-198-59938-2

The book is a detailed study of Ockham algebras, giving a well-written exposition, and collecting together various results of the authors and other specialists. Ockham algebras are a generalization of de Morgan algebras. An Ockham algebra is a bounded distributive lattice with a dual endomorphism f, i.e., a mapping satisfying $f(x \wedge y) = f(x) \vee f(y)$, $f(x \vee y) = f(x) \wedge f(y)$, $f(0) = 1$ and $f(1) = 0$; de Morgan algebras satisfy, moreover, $f^2 x = x$. The book is written in a clear, self-contained style. After the introductory chapters, Priestley duality is explained and applied in Chapter 4. The uncountable lattice of subvarieties is discussed in Chapter 5 which is very interesting; for example, it turns out that some fundamental problems that are open for varieties of lattices have analogies for Ockham algebras, but their solution for Ockham algebras is given. The next chapters are concerned with more special topics. The last four chapters are devoted to the closely related topic of double algebras. The book contains many illustrative examples and diagrams; it was written with graduate students in mind. The bibliography contains a fairly complete list of references. (jez)

S.A.Nazarov, B.A.Plemenevsky: Elliptic Problems in Domains with Piecewise Smooth Boundaries, De Gruyter Expositions in Mathematics, vol.13, Walter de Gruyter, Berlin, 1994, vii+524 pp., DM 278.00, ISBN 3-110-13522-1

In this monograph linear elliptic boundary value problems in domains with edges of various dimensions (polygons, cones, lenses, polyhedrons) are systematically studied. The local results concern asymptotic behaviour of solutions near the edges of the boundary and the singularities of coefficients. The global results describe, among others, the index of operators and the dependence on the choice of suitable function spaces. In Chapter 1, the results for elliptic boundary value problems in smooth domains are summarised and operator pencils as an important tool for the investigation of the local behaviour of solutions near singular points of the boundary are also considered here. Chapters 2 - 7 contain the systematic explanation of the situation when the boundary has a "conic" point. In the second part of the book (Chapters 8 - 12) the domains with "multidimensional" singularities are analyzed. This comprehensive work of leading specialists in the field is an important contribution to a rapidly developing discipline. Simply and concisely written, amply illustrated both by motivating examples (Chapter 2) and deep applications (Chapter 7 - the crack theory) the book is directed to mathematicians interested in situations when the so often pronounced phrase "Let $\partial\Omega$ be as smooth as we need" is nothing but wishful thinking. (oj)

J.O'Rourke: Computational Geometry in C, Cambridge University Press, Cambridge, 1994, xi+346 pp., 35.00, ISBN 0-521-44034-3, ISBN 0-521-44592-2

'Computational geometry' is a relatively new area of activity dealing with the study of algorithms for solving geometric problems with the help of computers. The first steps were taken in Shamos's famous thesis of 1978. Now, the field is developing extremely quickly and a wide community of researchers is involved, but there are still very few monographs on the subject available. The book under review is one of the rare exceptions. It covers the core of computational geometry: the convex hull algorithms, the triangulations, Voronoi diagrams, arrangements of lines, geometric searching, etc., in a nice and accessible way. The author himself states: '...it is a written record of what I cover with undergraduates in one 40 class-hour semester...' His approach is based on quite elementary plane or space geometry, some of the algorithms are explained including a complete implementation in the C language, other ones are just sketched. The whole book is very readable, even for students with nearly no prerequisites from calculus or linear algebra. The text is provided with about 200 exercises and many links to further literature. The C code of all the implemented algorithms is available from 131.229.64.23 in /local/ftp/pub/comp-

geom by anonymous ftp. The book should be very helpful for those interested in a deeper background for algorithms in computer graphics and several other areas of applications. (jslo)

E.Guadagnini: The Link Invariants of the Chern-Simons Field Theory. New developments in Topological Quantum Field Theory, de Gruyter Expositions in Mathematics, vol.10, Walter de Gruyter, Berlin, 1993, ix+312 pp., DM 148.00, ISBN 3-11-014028-4

This book is an extended version of the lectures delivered by the author at the Laboratoire d'Annecy-le-Vieux de Physique des Particules (France) in April 1991. It is based on the fact that Chern-Simons theory is a topological field theory, and consequently any observable and any result obtained there has a topological origin and a topological interpretation. The main aim of the book is to show how various topological and related algebraic structures arise in physical considerations. The book contains also very recent and interesting results about Chern-Simons theory in any closed, connected and orientable 3-manifold, which is deeply interrelated with the topology of 3-manifolds. This Chern-Simons model is considered to be a promising starting point for new developments in quantum field theory. Reading the book requires some familiarity with the relevant physical notions. It is very nicely written, the mathematical ideas are carefully explained (with interesting physical interpretations), but the physical background is only sketched. On the other hand, the book is so interesting that the mathematicians (especially the topólogists) will gladly look for the physical information elsewhere. (jiva)

C.Dong, J.Lepowsky: Generalized Vertex Algebras and Relative Vertex Operators, Progress in Mathematics, vol.112, Birkhäuser, Boston, 1993, 208 pp., DM 98.00, ISBN 3-764-33721-4, ISBN 0-817-63721-4

This book belongs to a rapidly developing field which finds applications both in mathematics and physics. As for mathematics, let us mention the Monster finite simple group, the highest weight modules for affine Lie algebras and Virasoro algebras and the braid group theory. As for physics, we can mention the dual resonance theory, string theory and conformal field theory. It is an advanced text, and though it is thoroughly written and quite self-contained, we can hardly recommend it to beginners because they will not understand deeply enough the motivation for this research. Even the authors recommend the reader to be a little familiar with the books I. B. Frenkel, J. Lepowsky, A. Meurman: Vertex Operator Algebras and the Monster, Pure and Applied Math., vol. 134, Academic Press, 1988 and I. B. Frenkel, Y. Z. Huang, J. Lepowsky: On Axiomatic Approaches to Vertex Operator Algebras and Modules, Memoires AMS, vol. 104, 1993. The main aim of the book under review is namely the investigation of three natural generalizations

of the concept of vertex operator algebras called generalized vertex operator algebras, generalized vertex algebras and abelian intertwining algebras, respectively. The authors mention that their original motivation was to place the theory of Z-algebras (and their physical counterpart - parafermion algebras appearing in the parafermionic conformal field theory) into an elegant axiomatic context. It is the last chapter of the book that is devoted to the study of these algebras. The bibliography has 68 items. (jiva)

N.Biggs: Algebraic Graph Theory. Second Edition, Cambridge Mathematical Library, Cambridge University Press, Cambridge, 1993, vi+205 pp., 14.95, ISBN 0-521-45897-8

Graph Theory itself is a discipline that provides a close connection between pure mathematics and computer science. There is no doubt that Graph Theory gained a lot on the fast development of computers. Not only because computing facilities enable one to give computer aided proofs of theorems which are (so far) unprovable by hand, but mainly because computer science serves as an inexhaustible source of questions and problems. One might be, however, be afraid that Graph Theory could become just a technical tool, could lose the touch of art which is present in building mathematical theories and proving theorems. All thoughts about such dangers vanish after reading a book like the one under review. There are not many books which combine purely mathematical theories and practically applicable subjects as successfully as the Algebraical Graph Theory of Biggs. The first edition, published in 1974, became a very popular monograph and has found its place on bookshelves of all discrete mathematicians and theoretical computer scientists, and even some chemists or biologists. Progress in Graph Theory is very rapid and Biggs has added many new results in the second edition of his book. To keep the book of reasonable size, the subsections of 'Additional Results' (adjoined to all sections of the first edition) are rather brief descriptions of the new results. Thus part of the monograph becomes an excellent encyclopaedia, with an extensive bibliography as a suggested source for detailed proofs and further study. The second edition certainly deserves its place on our bookshelves, next to the first edition of this book. (jk)

A.Fomenko: Visual Geometry and Topology, Springer-Verlag, Berlin, 1994, ix+324 pp., 287 fig., DM 128.00, ISBN 3-540-53361-3, ISBN 0-387-53361-3

It is difficult to guess the contents of this book simply from the title, but those who know the author, the outstanding mathematician and artist, probably could. On the one hand it is a fascinating survey of concepts, results and relations touching many areas of mathematics where the common points are geometric intuition, the reflection of geometric concepts in abstract structures, the help of visual methods in handling abstract formalisms, etc. On the other hand, there is

the Gallery of 50 full-page graphics made in pencil and Indian ink, extremely impressive in themselves, but all of them presented as reflections of concrete mathematical concepts and ideas. The text is structured into quite separate chapters and it is not strictly necessary to read them in any prescribed order. Also the level of the general mathematical knowledge required from the reader differs from section to section. However the book as a whole will be accessible for nearly everybody, starting with second-year students of mathematics or physics. The material is mostly presented as a sort of mathematical essay, but with exact formulations of theorems. The visualisation of many ideas is drawn very explicitly in the margins of the pages as some sort of 'visual marginal comments'. The author distinguishes very nicely between the 'geometrically clear theorems', the correctness of them, and the proofs of them. The book can be used by people preparing themselves to the study of the subject to find some initial motivation but, it will be equally interesting for experts because of the deep insight. Among the topics touched on are simplicial and cell homologies, differential geometry, low-dimensional manifolds, cohomologies, symplectic topology and Hamiltonian mechanics, integration of differential equations, minimal surfaces, fractal geometry, computer geometry. The publisher has done a perfect type-setting job and I believe strongly that the book and its beauty will address at least all people interested in mathematics or mathematical physics. (jslo)

G.R.Kempf: Algebraic Varieties, London Mathematical Society Lecture Notes Series 172, Cambridge University Press, Cambridge, 1993, x+163 pp., 22.95, ISBN 0-521-42613-8

The aim of this book is to serve as an introduction to the theory of algebraic varieties from a modern sheaf theoretic point of view. In 145 pages of text, the author presents in a self-contained way the basic properties of algebraic varieties, the sheafs and their cohomologies, an illustration of the theory on curves and a lot of applications. The scheme language is not mentioned, but the book is certainly a very good preparation for further study of algebraic geometry. As written in the introduction, '...the main battle was to teach the reader to think in sheaf-theoretic language...' The exposition is very clean, supported with many exercises. It requires the active cooperation of the reader, but it will be accessible and attractive for newcomers to the topic, graduate students and anyone preparing himself for the study of modern algebraic geometry. (jslo)

F.DeClerck et al. (Eds.): Finite Geometry and Combinatorics, London Mathematical Society Lecture Note Series 191, Cambridge University Press, Cambridge, 1993, vii+412 pp., 27.50, ISBN 0-521-44850-6

These proceedings present 35 talks (from the total of 52) delivered at the Second International Conference on Finite Geometry and Combinatorics (31 May - 6 June, 1992, Astene - Deinze, Belgium). The main subject of the conference was finite geometries, which are naturally closely related to combinatorics. The articles in the proceedings are of very good quality and create a good picture of current research in the field. The main topics covered are: generalized polygons, graphs and their groups, finite Desarguesian planes, higher dimensional projective spaces, non-Desarguesian planes, polar spaces and diagram geometries. Though a non-specialist in the field who is not familiar with many relevant ideas and results will encounter problems when trying to understand the articles, he will without any doubt find the reading of them very interesting and will appreciate the nice ideas of their authors. The reader will find here, or will be able to formulate many problems the solution of which is not known. (jiva)

D.J.A.Welsh: Complexity: Knots, Colourings and Counting, London Mathematical Society. Lecture Notes Series 186, Cambridge University Press, Cambridge, 1993, viii+163 pp., 19.95, ISBN 0-521-45740-8

This book represents the lecture notes of a series of lectures the author delivered at the Advanced Research Institute of Discrete Applied Mathematics in June 1991. As the author remarks in the Preface, the lectures were addressed to an audience of discrete mathematicians and computer scientists. This means that even if the author explains all the basic ideas, some knowledge of concepts of computational complexity and combinatorics is assumed. The book is about knots, their applications and about the computational complexity of problems arising in connection with them. We can say it is a concise book but it is very nicely written. Maybe, we should not recommend it to a complete beginner in knot theory but nevertheless even a beginner can learn and understand a lot here. It is true that proofs are often only sketched, but the main idea is always very clearly presented, and the exact references are given. We find here applications of knot theory in chemistry (enzyme actions, topology of polymers) and in statistical physics (there is a whole chapter devoted to various models). The main thrust of the book is towards algorithms and computational complexity questions in knot theory. There is a lot of space devoted to these questions. For example the author investigates the complexity of the Tutte plane, knot polynomials, the Ising model in the statistical physics, and there is a whole chapter devoted to the complexity of uniqueness and parity. We can also find here very recent results, unsolved problems and conjectures. The references are not numbered, but there are about 240 items. Reading this book would be very interesting even for non-specialists. (jiva)

W.Hackbusch: Elliptic Differential Equations. Theory and Numerical Treatment, Springer Series in Computational Mathematics, vol.18, Springer-Verlag, Berlin, 1992, xvi+311 pp., 40 fig., DM 128, ISBN 3-540-54822-X, ISBN 0-387-54822-X

The book presents a modern and concise treatment of the theory of *linear* elliptic partial differential equations, as well as their numerical solution. The following subjects are contained in the book: classification of partial differential equations, theory of the potential and Poisson equation, elements of the classical theory of general boundary value problems, integral equation method, variational formulation, theory and numerical realization of the approximate solution of elliptic problems by finite difference methods and finite element methods. Special attention is also paid to the biharmonic problem, Stokes problem and problems with discontinuous coefficients. The book is written in a precise and clear style, it is easy to read and understand. The reader will obtain a good knowledge of important results from the theory as well as computational methods for elliptic partial differential equations. The book can be recommended to students and researchers interested in partial differential equations and their numerical solution. (mf)

S.Martin: Schur Algebras and Representation Theory, Cambridge Tracts in Mathematics, vol.112, Cambridge University Press, Cambridge, 1993, xv+232 pp., GBP 30.00, ISBN 0-521-41591-8

Let K be an infinite field of arbitrary characteristic and let Γ_K denote the group $GL_n(K)$ for a fixed natural number n. The main notion of Martin's book is the so called Schur algebra $S_K(n,r), r \in Z, r \geq 0$, which is the dual of the "Schur coalgebra" $A_K(n,r)$ of r-homogeneous polynomial functions on $\Gamma_K : S_K(n,r) = A_K(n,r)^* = \text{Hom}_K(A_K(n,r), K)$. The significance of this idea is that it provides a connection between the representation theory of the symmetric group Σ_r and that of the general linear group Γ_K. Further, in place of polynomial representations of Γ_K of degree r one may consider $S_K(n,r)$-modules. In seven chapters the author develops the basic theory of Schur algebras, their representation theory and related areas (polynomial functions and combinatorics, representation theory of the Schur algebra, Schur functors and the symmetric group, block theory, the q-Schur algebra and representation theory of $S_q(n,r)$. As an appendix, a review of algebraic groups is given. (tk)

M.Stoll: Invariant Potential Theory in the Unit of Ball of C^n, London Mathematical Society Lecture Note Series 199, Cambridge University Press, Cambridge, 1994, x+173 pp., GBP 19.95, ISBN 0-521-46830-2

Potential theory with respect to the Laplace-Beltrami operator on the ball represents one of the natural extensions to several complex variables of potential theory in the unit disc. This type of potential theory is called invariant, since the Laplace-Beltrami operator is invariant with respect to the biholomorphic mappings of the domain. Invariant potential theory shows specific features in comparison with the higher dimensional potential theory in Euclidean spaces. It is closely related to the non-euclidean geometry of the ball and the fact that invariant harmonic functions are not preserved under dilations requires new methods and techniques. The book which is based on a seminar recently given by the author at the University of South California, provides a nice, almost self contained treatment of the subject. The Bergman kernel and the Bergman metric are studied and properties of the Laplace-Beltrami operator and corresponding invariant harmonic and subharmonic functions are investigated. The Poisson-Szegö integrals and their boundary limit behaviour are described in detail. The Riesz decomposition theorem is proved and boundary limits of potentials are treated. Further topics, e.g. spaces of invariant harmonic functions or gradient estimates and Riesz potentials are also covered. This is a well written monograph which gives an exposition of invariant potential theory accessible to anyone with basic knowledge of several complex variables, measure theory and functional analysis. (in)

T.H.Koornwinder (Ed.): Wavelets: An Elementary Treatment of Theory and Applications, Series in Approximations and Decompositions, vol.1, World Scientific Publishing, Singapore, 1993, xii+225 pp., 8 fig., $ 34.00, ISBN 9-810-21388-3

The present first volume of the Series in Approximations and Decompositions is based on a four-day intensive course on wavelets given at CWI, Amsterdam. The book consists of twelve chapters on various aspects of wavelets. The first six papers form together a good introduction to wavelet theory. The book starts with an overview by Nico M.Temme. The next contribution, by Pitter W.Hemker, Tom H.Koornwinder, and Nico M.Temme, give preliminaries on Hilbert spaces, the Fourier transform, and Riesz bases and frames. Next follow two expositions about the two main themes within wavelet theory - the continuous wavelet transform (by Tom H.Koornwinder) and discrete orthonormal wavelets generated by multiresolution analysis (by Henk J. A. M. Heijmans). Both contributions give a detailed mathematical treatment. The following two papers Image Compression using Wavelets (by Peter Nacken) and Computing with Daubechies Wavelets (by Adri B. Olde Daahuis), are already of a more applied nature and complete a first course on the theory of wavelets. The remaining six papers deal with various aspects and applications of wavelets. Most of the papers describe material already known in the literature, but in a rephrased form. A few papers contain new results. As well as many exercises and remarks one finds lists references after each chapter. These make the book valuable not only for graduate students but also for researchers. (kn)

V.I.Arnol'd (Ed.): Dynamical Systems V. Bifurcation Theory and Catastrophe Theory, Encyclopaedia of Mathematical Sciences, vol.5, Springer-Verlag, Berlin, 1994, 271 pp., 130 fig., DM 144.00, ISBN 3-540-18173-3, ISBN 0-387-18173-3

This fifth volume of the Russian encyclopaedia on dynamical systems consists of two parts. The larger one (about three quarters of the volume) is devoted to bifurcation theory in a rather wide sense (sudden changes of complete phase portraits of ordinary differential equations). This part is a comprehensive and condensed survey which is based on the original Russian text from 1985 together with eight new topics. The titles of the first four chapters are: bifurcation of equilibria, bifurcation of limit cycles, nonlocal bifurcations and relaxation oscillations. The second part, written by V.I.Arnol'd, can be considered as an essay on the state of catastrophe (more accurately, singularity) theory and its historical sources from C.Huyghens to R.Thom. The exposition is a more sophisticated continuation of the previous author's booklet "Catastrophe Theory" (English edition in Springer-Verlag, 1986). Both parts of the book are accompanied with many references (230, resp. 125 items) with a slight emphasis towards Russian titles. (jm)

G.Kaiser: A Friendly Guide to Wavelets, Birkhäuser, Boston, 1994, xiv+300 pp., DM 78.00, ISBN 0-817-63711-7, ISBN 3-764-33711-7

This book consists of two parts. Part I (Chapters 1-8), Basic Wavelet Analysis, is intended for graduate students or advanced undergraduate in science, engineering and mathematics. This part gives a basic introduction to wavelets and time-frequency analysis and can also be used for self-study or references by practising researchers in signal analysis and related areas. The reader is not presumed to have a sophisticated mathematical background, the only prerequisites are matrix theory, Fourier series and Fourier integral transform. Each chapter ends with a set of straightforward exercises designed to drive home the concepts. Part II (Chapters 9-11), called Physical Wavelets, is at a more advanced level and represents original research. It can be used for a research seminar. Whereas the wavelets of Part I can be any function of "time", physical wavelets are functions of space-time constrained by differential equations. In Chapter 9 electromagnetic wavelets specifically dedicated to Maxwell's equations are constructed. It is shown that every electromagnetic wave may be composed from such wavelets. In Chapter 10 the electromagnetic wavelets are applied to radar and other electromagnetic imaging. In the final Chapter 11 A similar set of wavelets is developed for acoustics. This book is beautifully and very well written and I can certainly recommend it both to beginners and specialists in the subjects. (kn)

UNIVERSITY OF OXFORD

Junior Lecturership in Mathematics

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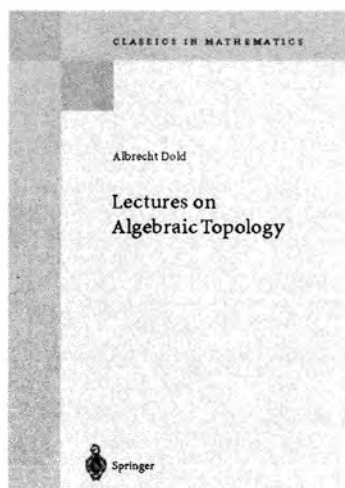
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