CENTRE DE RECERCA MATEMÀTICA

RECORD OF ACTIVITIES 2000

Cover designed by Carola Ribas.
Legal Deposit:
Printed by .....

The World Mathematical Year, which we celebrated in the year 2000, the last of the 20th century, was especially intense for the Centre de Recerca Matemàtica (CRM) in Barcelona, a research institute serving the whole mathematical community, not just in the regions of Catalan language and culture but in the wider international community.

Apart from the usual activities of the CRM, which include a programme of invited researchers, postdoctoral fellowships, congresses and advanced courses, and its own series of publications, there have been a number of special events this year which have consolidated the CRM's position as a leading research institute in Europe.

In March of the year 2000, the CRM hosted the annual meeting of ERCOM (European Research Centres on Mathematics), an organisation which promotes cooperation between mathematics institutes at the international level which have stable programmes of visiting researchers.

In July of this year, the CRM was an active collaborator of the Catalan Mathematics Society in the organisation of the Third European Mathematical Congress, for which more than 1500 participants gathered in Barcelona from all over the world. I was honoured to be given the opportunity to speak at the inaugural session, as president of the Institut d'Estudis Catalans, the highest Catalan academic institution, which includes Centre de Recerca de Matemàtica, the Catalan Mathematics Society and the Ferran Sunyer i Balaguer Foundation. My opening address is included in this Record.

Since September 2000 the CRM has been a member of the European Postdoctoral Institute (EDPI) for the Mathematical Sciences, which currently includes 9 institutes, led by the Institut des Hautes Études Scientifiques in Paris, the Max-Planck-Institut des Mathematik in Bonn and the Isaac Newton Institute in Cambridge. One objective of the EDPI is to award each year a number of postdoctoral grants at a European level.

I would like to highlight several successes achieved by the CRM in submissions for the European Commission programme *Improving Human Research Potencial*: 100 % of our applications for *High-Level Scientific Conferences* were granted, the *Barcelona Algebraic Topology Group* (mainly formed by staff of the Universitat Autònoma de Barcelona) was designated as one of the two *Marie Curie Training Sites* in mathematics in Spain —this group forms part of the network *Modern Homotopy Theory* of the subprogramme *Research Training Networks*— and 4 *Marie Curie Individual Fellowships*

were awarded to young European researchers to carry out their work for two years at the CRM.

At a local level, the Generalitat de Catalunya awarded the CRM this year the *Narcís Monturiol Medal* for scientific and technical merit, the highest honour which can be bestowed on a research institute in our country. This distinction must be understood as recognition of the work carried out by the CRM over the 17 years of its existence, work which has been empowering for mathematical research in all the universities in our scope.

Finally, I want to mention that the CRM was happy to contribute to the celebration of the World Matematical Year with the organisation of the Maths Quiz 2000, a competition played via the internet simultaneously all around the world over a 24-hour period, for which 378 teams from 65 countries were registered.

Among the more usual activities of the CRM we can note the 36 researchers invited by the CRM, of whom ten were postdoctoral fellows, the organisation of three congresses and courses, as well as 180 seminars given over the year. The "Preprints" series has increased by 29 numbers and the "Quaderns" series by one, which contains the notes of an Advanced Course. We also point out the publication of the book *Matemáticas y Educación. Retos y cambios desde una perspectiva global*, which arose from the activities of the Intensive Term on Mathematical Education organised by the CRM in 1998.

Manuel Castellet
Director

Contents

1 The Centre de Recerca Matemàtica

The Centre de Recerca Matemàtica is a university institute of the Institut d'Estudis Catalans associated with the Universitat Autònoma de Barcelona.

1.1 The Institut d'Estudis Catalans

The *Institut d'Estudis Catalans*, founded in 1907, is an academic, scientific and cultural body whose sphere of activities includes all aspects of Catalan language and culture.

The aim of the IEC is to advance scientific research, in particular research into all elements of Catalan culture. It contributes to the planning, coordination and implementation of research in different fields of science, technology and humanities. Moreover, its own activities further the progress and development of society in general, and, when necessary, it acts as an advisor to the government and other institutions.

The IEC is made up of five different sections defined by broad subject units in science, technology and the humanities. Each section is formed by a maximum of twenty-one full members. There are 25 affiliated societies to the IEC, with more than 9,000 members.

The headquarters of the IEC are the former Convalescent Home building, carrer del Carme 47, Barcelona (CP 08001).

1.2 The Centre de Recerca Matemàtica

In 1984, the *Institut d'Estudis Catalans* created the *Centre de Recerca Matemàtica*, with the main goal of providing Catalan mathematicians with a research institute which would stimulate the improvement of mathematical research in Catalonia, both qualitatively and quantitatively. To achieve this aim, the CRM invites outstanding mathematicians for research visits, facilitates scientific contacts between these visitors and our young local researchers, carries out research programmes, organises lectures, conferences and other scientific meetings, and disseminates research results through its preprints series.

The CRM is located in the Science building of the *Universitat Autònoma de Barcelona* (UAB), on its campus at Bellaterra, in accordance with an agreement signed by the IEC and the UAB.

The address of the CRM is:
Centre de Recerca Matemàtica (IEC)
Apartat 50, E-08193 Bellaterra
Telephone: (34) 935 811 081
Fax: (34) 935 812 202
Electronic mail: `crm@crm.es`
web: `http://www.crm.es`

2 Governing body and structure

2.1 The Council

The CRM is directed by a Council consisting of four members in the area of mathematics of the *Institut d'Estudis Catalans* and a representative of the *Societat Catalana de Matemàtiques* (SCM). The members of the Council are:

Eduard Bonet (IEC)
Manuel Castellet (IEC)
Joan Girbau (IEC)
Sebastià Xambó (SCM)
Josep Vaquer (IEC).

2.2 The Director

The Council elects a Director to serve for a period of four years. The current Director is Manuel Castellet who was re-elected for the period 2000–2003 at the meeting of October 1999.

2.3 The Scientific Committee

At the meeting of May 1994, the CRM's Council, following a suggestion made by some members of the mathematical community, agreed to create a Scientific Committee.

The members of the Committee are: Jaume Aguadé (UAB), Lluís Alsedà (UAB), Pilar Bayer (UB), Josep Blat (UPF), Joan Elias (UB), Núria Fagella (UB), Jaume Moncasi (UAB), David Nualart (UB), Oriol Serra (UPC), Mercè Ollé (UPC).

2.4 Secretariat

Maria Julià and Consol Roca are the persons in charge of the administration of the CRM. They also look after the guests and take care of the preparation of the scientific papers.

3 Facilities

3.1 Premises

The CRM is located in the Science building at the Universitat Autònoma de Barcelona (UAB). It occupies a total of 940 square metres, containing 8 single offices, 2 doubles, 3 triples, a secretarial office, a director's office, a computer room, a storage room, 2 lecture rooms (one for 50 people and another one for 25 people), a meeting room and an informal meeting space. All the rooms have central heating and air conditioning.

3.2 Computing facilities

The CRM has the following computer equipment:

One Unix server (SUN Ultra 10) and one NT server (Netserver LH3) to provide network services for visitors, and allowing computing on the Unix machine.

In the computer room there are two IBM workstations (Power-PC), one Macintosh, two laser printers and two PCs available to everyone.

There are also nearly twenty PCs, one in each office, and a good selection of scientific software for Unix and windows (like TeX). There is also a computer administrator to help the visitors.

We also have a projector with a computer to make presentations in the conference room.

3.3 Library

The visitors to the CRM may use, without any limitation, the UAB's science library, which contains a mathematics corpus consisting of 447 journals and 11,424 books.

3.4 Accommodation

The CRM has 10 permanently rented furnished apartments for its guests. They are located in Sant Cugat del Vallès and in the Vila Universitària, in the Bellaterra Campus.

4 3ecm: Opening Address

The opening of the Third European Congress of Mathematics in Barcelona gives me special satisfaction in my double capacity of mathematician and of president of the Institut d'Estudis Catalans. The Institut d'Estudis Catalans, Institute for Catalan Studies, is the National Academy of Catalonia and the parent body of the Catalan Mathematical Society, organiser of this Congress, which I hope will be to the satisfaction of all of you.

Catalonia is a small country in surface area and population, a country which never had a strong mathematical tradition. If you consult the Zentralblatt für Mathematik or the Mathematical Reviews for the 1970s you will notice that the probability of finding an article by a Catalan mathematician, even by a Spanish one, is effectively less than any epsilon. But now, 25 years later, there is an abundance of Catalan mathematical research published in prestigious journals, and there are outstanding Catalan mathematicians in all areas.

This reality is demonstrated by a recent study carried out by the Institut d'Estudis Catalans into mathematical research in Catalonia. The ratio between the number of articles published in Catalonia and the total population, scaled by the Gross National Product, is similar to the ratio in Norway, Great Britain or Germany; furthermore, 8.2% of all mathematical articles are published in the top quality journals. This situates Catalonia, according to these criteria, among the most scientifically significant countries of the world.

Doubtless this situation is fruit not only of the labours of recent generations of Catalan mathematicians, but also of the efforts of our whole society and of the recent entry of the country into the current democratic framework. But this alone would not be sufficient. It must also be because the famous phrase from Cicero's *Tusculanae* suits us perfectly: "Nature has placed in our spirit an insatiable desire to know the truth".

A truth which this country in its thousand year history has always sought, with more or less success, and almost always with limited resources. A truth which the Catalan countries, scientifically, have always sought looking towards Europe, a Europe of which we were an important nucleus in the Middle Ages, before a sharp decline, and of which we have been steadily forming a more integral part since the beginning of this 20th century. The Institut d'Estudis Catalans, founded in 1907, is an academic, scientific and cultural institution which has been an important factor in this cultural and scientific integration.

The aim of the Institut d'Estudis Catalans is to advance research, both in science and in all areas of Catalan culture. It contributes to the planning, co-ordination and realisation of research in various fields of science, technology and the humanities. It works to stimulate the progress and general development of Catalan society and, on occasion, serves as a consultancy for public bodies and institutions. The Institut d'Estudis Catalans is divided by broadly-defined subject areas into five sections (including the academy of the Catalan language) each of which has a maximum of 21 full fellows; associated to it there are also 25 scientific societies, one of which is the Catalan Mathematical Society, with a total of more than nine thousand members altogether.

Stand of the CRM and the SCM at the 3ecm

Let me now give a brief review of our mathematical history in Catalonia.

Did you know that Gerbert d'Orlhac, a monk from the Catalan Pyrenees who in the year 1000 was better known as Pope Sylvester II, made an in-depth study of the *Quadrivium*, transformed calculation methods throughout Europe two centuries before Fibonacci, and built an original abacus?

Did you know that the Majorcan Ramon Llull, one of the most important writers in the Catalan language of the 13th century, already understood that the Earth was a sphere and wrote *Ars Combinatoria* and *Art de Navegar*, a book unsurpassed until the 16th century which describes the astrolabe and refers to the use of the magnetic compass? Alexander von Humboldt maintained over 100 years ago that these scientific advances were transmitted from Catalonia via other Mediterranean nations to the rest of the civilised world.

Did you know that in 1375 the Majorcan Jew Abraham Cresques drew the world map known as the *Catalan Atlas*, a representation of the known world which was essential for the navigators of the epoch?

Did you know that the second book of mathematics ever printed (after the anonymous arithmetic text of Treviso) was *Summa de l'art d'Aritmetica* by Francesc Santcliment, printed in Catalan in Barcelona in 1482? And that the first mathematics book printed in Spain was the Spanish translation of Santcliment's book?

Did you know that the Valencian Josep Chaix, author of works on differential and integral calculus, carried out with Pierre Mechain in 1793 the calculations to measure the meridian arc between the Pyrenees and Barcelona?

I do not wish to bore you with this history lesson, but I must mention two outstanding contemporary researchers from our country: Lluís Santaló, born in Girona and emigrated to Argentina, pioneer of integral geometry, stereology and geometric probability, who cannot attend this conference due to his delicate state of health. And Ferran Sunyer i Balaguer, possibly the greatest Catalan mathematician through the 1950s and 60s, born a tetraplegic, friend of Hadamard, Mandelbrot and Malliavin, among others, whose theorem on polynomials you can read on the stand of the Catalan Mathematical Society and in whose honour the Institut d'Estudis Catalans awards each year a prize which bears his name for a monograph which best expounds and summarises advances in an active area of mathematics.

But the greatest change, the integration of Catalan mathematicians to the ideas and scientific trends, both European and international, has happened in the last twenty or twenty-five years, when some of us made contact with André Lichnerowicz, Beno Eckmann or Paul Malliavin, to choose just three truly significant names of European mathematicians. The mathematics departments of the universities of Barcelona started to become active research centres and with great effort and dedication were able to gradually break

through the scientific and cultural isolation to which we had been subjected by a dictatorial government and a closed society.

At the beginning of the 1980s the Catalan universities, that of Barcelona, the Autonomous University and the Polytechnical University, began to discover that they could compete in high quality mathematical research. The various mathematics departments have intensified the training of doctoral students and the production of research work. But to do so they had to keep in touch with the mathematical research being carried out in the developed world. Thus the Institut d'Estudis Catalans, in view of these changes, created in 1984 the Centre de Recerca Matemàtica, the only research institute in Spain, with the objective of facilitating contact between Catalan mathematicians and the European and international scientific elite; an institute for visiting professors and young researchers, whose aim is to stimulate growth in quality and quantity of Catalan mathematical research, organising specialised research semesters, awarding postdoctoral grants, inviting outstanding researchers, organising seminars, conferences, advanced courses, etc. The Centre de Recerca Matemàtica, which is a member of ERCOM (European Research Centres on Mathematics) has been and continues to be an infrastructure at the service of all Catalan mathematicians to facilitate access to the most advanced scientific trends and the incorporation of our local community in the international mathematical community.

It is not an isolated fact, then, that there are five mathematical events being held in Barcelona this year with the support of the European Commission: this Large Euroconference which we inaugurate today, two Euroconferences on Logic and on Algebraic Topology, a PhD Euroconference on Complex Dynamics, and a Euro Summer School on Quantum Groups; next year we celebrate the new century with six Euroevents organised by the Centre de Recerca Matemàtica: a Euroconference on Combinatorics and Graph Theory, a PhD Euroconference on Algebraic Topology, and four Euro Summer Schools on Modular Forms, Hamiltonian Systems, Riemannian Geometry and Algebraic Topology.

Neither is it an isolated fact that eight research groups in Catalonia (four at the Universitat Autònoma, one at the Politècnica and three at the Universitat de Barcelona) form part of various research training networks of the Improving Human Research Potential programme and that two of these groups, those of Operator Theory and of Algebraic Topology, both at the Universitat Autònoma, are the only mathe-

matics groups in all of Spain which have been selected as Marie Curie Training Sites. The Centre de Recerca Matemàtica will host five Marie Curie postdoctoral fellows, during the next academic year.

For the first time in Catalonia, and in Spain, the words of Konrad Knopp, pronounced at the 1927 inaugural lecture of the University of Tübingen, are being understood: "Mathematics is the basis of all knowledge and contains all other culture". Certainly our world is more complex every day and the complexity of any system increases with the degree of interconnection. A more interconnected world, then, is a more complex system and at the same time more fragile and unstable. Mathematics has an increasingly decisive role to play in the management of complex systems, be they technological, financial or social, in the century we now enter. Mathematics will increasingly be an instrument of power which is sometimes dangerously underestimated.

I think all of you are aware that these words are not intended to convince mathematicians but rather the political and administrative authorities that we have with us here at the presidential table. Catalonia is prepared to face the complexity of the 21st century. In recent years a real effort has been made towards technological renovation and measures have been taken which have encouraged spectacular economic development and ensured good levels of social welfare. One must also take into account, however, that the intellectual resources of a country are at least as important, or even more important, than the material resources. Our administrators and governors should not forget that mathematics is the cheapest of all the sciences: it takes little more than brains, and networks for communication. And our country, rich in brains, must protect the second aspect, strengthening, for example, the two networks of mathematical communication that we have: the Centre de Recerca Matemàtica and the Catalan Mathematical Society.

I will close this parenthesis addressed to our authorities, and return to the desire of the Catalan mathematicians for a place in the European and international scientific community. It is true that there have always been internationally recognised Catalan researchers in some scientific areas and that in recent years this recognition has extended to areas where previously we had no presence, as is the case for mathematics; it is also true that our research groups are beginning to be visible in the literature. But it is one thing to be known and recognised individually and quite another for the country to be recognised in this way. Without the first we could not achieve the sec-

ond, but this latter must always be our objective. We want Barcelona, and Catalonia, to be known internationally not just for Gaudí or Barça. We want to be recognised also as a scientific community, as a mathematical community, and this is the role of the Catalan Mathematical Society.

The Catalan Mathematical Society is a scientific society that, in a country with a population of six million, has 1000 members and acts on two different fronts: as a meeting ground for all Catalan mathematicians, organising conferences, courses, publishing periodically a *Butlletí* and a *Notícies* in Catalan; and on the other hand as a nucleus for direct connection with mathematical institutions of other countries and especially with the European Mathematical Society.

The participation of the Catalan Mathematical Society in the European Mathematical Society has been intense since the outset, collaborating on the Council and on the Executive Committee, and ultimately presenting its candidature four years ago now to host this Third European Congress of Mathematics, which was awarded to us at the Council meeting in Budapest.

We want not just to offer you good organisation, a welcoming city and country, a good climate and lots of sun; all this we do offer, but on top of all these ingredients we hope that you, the European mathematicians, and by extrapolation all the international mathematical community, take note that Catalonia is a country which is mathematically developed and prepared to face the complexities of which I spoke to you a moment ago.

I thank you for your attention.

Palau de Congressos de Barcelona
July 10th, 2000

5 Visiting Scientists

5.1 Schedule of visitors

F. Gautero	Dynamical Systems, 01.10.98 – 30.09.00 Université de Nice – Sophia Antipolis
X. Zhang	Dynamical Systems, 01.04.99 – 31.03.01 Nanjing University
J. A. Crespo	Algebraic Topology, 01.09.99 – 31.08.01 Universitat Autònoma de Barcelona
S. Lamy	Differential Geometry, 01.09.99 – 30.06.00 Université de Rennes
C. Tarquini	Differential Geometry, 01.09.99 – 31.12.00 Université de Rennes
K. Faure	Differential Geometry, 01.09.99 – 30.06.00 Université de Toulouse
F. X. Dehon	Algebraic Topology, 01.10.99 – 31.01.02 École Polytéchnique, Palaiseau
R. Levi	Algebraic Topology, 09.01.00 – 23.01.00 University of Aberdeen
A. Borisenko	Differential Geometry, 15.01.00 – 08.04.00 Charkov State University
R. Bruner	Algebraic Topology, 28.01.00 – 15.03.00 Wayne State University
M. Eddahbi	Statistics, 01.02.00 – 31.12.00 Université Cadi Ayyad
D. Schlomiuk	Dynamical Systems, 01.01.00 – 31.05.00 Université de Montréal
M. Falconi	Dynamical Systems, 28.02.00 – 31.08.00 Universidad Nacional Autónoma de México
B. Eckmann	Algebra, 29.02.00 – 08.03.00 ETH, Zürich
G. W. Mackey	Algebraic Geometry, 01.03.00 – 30.03.00 Harvard University
W. Li	Dynamical Systems, 01.04.00 – 31.08.00 Peking University

J. Brennan	Analysis, 05.04.00 – 31.05.00 University of Kentucky
R. Griess	Algebra, 25.04.00 – 17.05.00 University of Michigan
F. Soria	Analysis, 01.05.00 – 31.05.00 Universidad Autónoma de Madrid
N. Kitchloo	Algebraic Topology, 15.06.00 – 31.07.00 Northwestern University
C. Burdzy	Stochastic Analysis, 01.06.00 - 31.08.00 University of Washington
B. Oliver	Algebraic Topology, 01.07.00 – 23.07.00 Université de Paris XIII
C. Miyazaki	Commutative Algebra, 26.08.00 – 16.11.00 University of the Ryukyus
M. Ollé	Dynamical Systems, 01.09.00 – 31.08.01 Universitat Politècnica de Catalunya
J. M. Font	Logic, 01.09.00 – 15.02.01 Universitat de Barcelona
B. Boe	Analysis, 01.09.00 – 31.12.00 Universitetet i Bergen
G. Granja	Algebraic Topology, 01.09.00 – 31.08.01 Instituto Superior Técnico, Lisboa
P. Vuillermot	Probability, 01.09.00 – 31.12.00 Université Henri-Poincaré
K. Goodearl	Algebra, 02.09.00 – 24.09.00 University of California at Santa Barbara
K. Brown	Algebra, 05.09.00 – 16.09.00 University of Glasgow
K. O'Meara	Algebra, 17.09.00 – 08.10.00 University of Canterbury
F. Neumann	Algebraic Topology, 01.10.00 – 30.09.01 Universität Göttingen
N. Dutertre	Differential Geometry, 01.10.00 – 30.09.02 Université de Rennes 1
I. Leary	Algebraic Topology, 02.10.00 – 26.11.00 University of Southampton

M. Sierakowski	Dynamical Systems, 23.10.00 – 31.07.01 Uniwersytet Warszawski
G. Swirszcz	Dynamical Systems, 15.11.00 – 30.09.01 Uniwersytet Warszawski

5.2 Postdoctoral Fellows

Among the researchers to visit the CRM during the year 2000 we note the presence of 10 postdoctoral fellows with stays of more than 9 months, fulfilling one of the foundational aims of the CRM: facilitate the research of young investigators and their contact with established scientific figures. They were:

F. Gautero	01.10.98 – 30.09.00
X. Zhang	01.04.99 – 31.03.01
J. A. Crespo	01.09.99 – 31.08.01
F. X. Dehon	01.10.99 – 31.01.02
M. Eddahbi	01.02.00 – 31.12.00
G. Granja	01.09.00 – 31.08.01
N. Dutertre	01.10.00 – 30.09.02
F. Neumann	01.10.00 – 30.09.01
M. Sierakowski	23.10.00 – 31.07.01
G. Swirszcz	15.11.00 – 30.09.01

The CRM's own postdoc grants were awarded to J. A. Crespo and M. Eddahbi in 1999 and to J. A. Crespo and G. Swirszcz in the year 2000, from a total of 51 and 36 applications received, respectively.

6 Scientific Activities

6.1 PhD EuroConference on Complex Analysis and Holomorphic Dynamics (CAD2000)

From June 7 to 11, 2000 the *PhD EuroConference on Complex Analysis and Holomorphic Dynamics* took place at Platja d'Aro (Girona) organised by the CRM. The organising committee was formed by N. Fagella (UB), J. González-Llorente (UAB), X. Jarque (UAB), X. Massaneda (UB), J. Ortega-Cerdà (UB), and the scientific committee by J. Ortega-Cerdà (UB), R. Pérez-Marco (UCLA), S. Rhode (University of Washington). 76 researchers from all over the world attended the meeting. This meeting was supported by the European Commission in the programme High-Level Scientific Conferences, (contract number HPCF-CT-1999-00054), by the Dirección General de Enseñanza Superior e Investigación Científica (ref. CO99-0504), by the Direcció General de Recerca (2000ARCS 00189) and by the Universitat de Barcelona.

The following plenary lectures were given:

- X. Buff, *Root finding algorithms.*
- G. T. Buzzard, *Hyperbolic automorphisms and holomorphic motions in* $\mathbb{C}^2$.
- M. Jonsson, *Dynamics in the complex projective plane.*
- R. Pérez-Marco, *The new renormalization.*
- S. Rohde, *The Loewner differential equation.*

Other lectures given:

- K. Barański, *Iteration of cubic rational maps: bifurcations of Mandelbrot-like sets.*
- I. Binder, *Harmonic measure and polynomial Julia sets.*
- J.-Y. Briend, *Ergodic properties of holomorphic self-maps of* $\mathbb{P}^2$.
- M. Comerford, *Hyperbolic random Julia sets.*
- R. Debalme, *Complete hyperbolic neighbourhoods in almost complex surfaces.*
- J. A. Diller, *Iteration and degree growth for birational maps.*
- A. Epstein, *Boundedness and unboundedness in the moduli space of quadratic rational maps.*
- C. Favre, *Equidistribution towards the Green current.*
- M. Flores, *On complete holomorphic vector fields.*
- L. Geyer, *Linearization of fixed points and circle diffeomorphisms.*
- V. Guedj, *Dynamics of polynomial mappings of* $\mathbb{C}^2$.
- P. Haissinsky, *J-equivalent perturbation of geometrically finite polynomials.*

- C. Inninger, *A class of rational functions whose Julia set is the whole Riemann sphere.*
- B. Kra, *Denjoy maps and dimension.*
- F. Lárusson, *A survey of the theory and applications of disc functionals.*
- M. Moreno-Rocha, *Geometry of the antennas in the Mandelbrot set.*
- M. Ounaies, *Zeros of entire maps and pre-image of discrete unavoidable sets.*
- J. Pau, *Thin separated sequences for* $H^\infty(\mathbb{D})$.
- K. Pilgrim, *Decompositions and combinations of tame holomorphic dynamical systems.*
- I. Popovici, *Hölder Julia sets, uniform hyperbolicity, and Collet-Eckmann condition.*
- D. Schleicher, *Escaping points of exponential maps.*
- S. Smirnov, *Dynamics and dimension estimates in complex analysis.*
- D. Varolin, *Open problems in the theory of large holomorphic diffeomorphism groups.*
- C. Wolf, *Hausdorff dimension for polynomial diffeomorphism in* C^2.
- S. Zakeri, *Siegel disks revisited.*

Participants in the CAD2000

6.2 Neurocolt Workshop on Applications of Learning Theory

From June 13 to 15, 2000 the *Neurocolt Workshop on Applications of Learning Theory* took place at the CRM, organized by the CRM together with the *Neurocolt group* of the Universitat Politècnica de Catalunya. The organising committee was formed by Albert Atserias and José L. Balcázar of the UPC. 37 researchers from all over the world attended the meeting.

The following lectures were given:

- G. Gottlob, *Hypertree decompositions of hypergraphs.*
- L. Pitt, *Mining algorithms and complexity.*
- G. Lugosi, *A zero-delay sequential scheme for lossy coding of individual sequences.*
- G. Morvai, *Sequential prediction of ergodic time-series.*
- N. Cesa-Bianchi, *Adaptive learning rates for on-line classification and regression.*
- C. Gentile, *Approximate maximal margin classification with respect to an arbitrary norm.*
- N. Cristianini, *On-line support vector machines.*
- J. L. Triviño-Rodríguez, *Multiattribute prediction suffix graphs.*
- G. Ramos-Jiménez, *A new method for induction decision trees by sampling.*
- P. Sanders, *Fast concurrent access to parallel disks.*
- J. Kärkkäinen, *Tane - An efficient algorithm for discovering functional dependencies.*
- C. Domingo, *Boosting over large datasets: theory and experimentation.*
- G. Casas and J. Baixeries, *Finding frequent sets from sampling with applications to data mining in sequences and hierarchies.*
- A. Elisseeff, *Simple arguments for the foundation of Support Vector Machines.*
- L. Màrquez, *Machine learning algorithms applied to word sense disambiguation.*
- P. Goldberg, *Modeling data fusion in PAC learning: Restricted focus of attention.*
- N. Cristianini, *An introduction to support vector machines.*
- C. Watkins, *Constructing kernels.*
- B. Schoelkopf, *Unsupervised SVM learning.*
- A. Smola, *Sparse Greedy methods for learning.*
- Norbert Martínez, *Experiments with randomized chunking in SVMs.*

6.3 6th Barcelona Logic Meeting

From July 5 to 8, 2000 the *6th Barcelona Logic Meeting* took place at the Institut d'Estudis Catalans organised by the CRM. The organising and scientific committee was formed by J. Bagaria (UB), E. Casanovas (UB), R. Farré (UPC), J. M. Font (UB), J. C. Martínez (UB), H. Ono (Japan Adv. Inst. of Science and Technology) M. Otero (Universidad Autónoma de Madrid), S. Todorcevic (CNRS, Paris). 79 researchers from all over the world attended the meeting. This meeting was supported by the European Commission in the programme High-Level Scientific Conferences, (contract number HPCF-CT-1999-00058), by the Dirección General de Enseñanza Superior e Investigación Científica (ref. CO99-0501), by the Direcció General de Recerca (2000ARCS 00190) and by the Universitat de Barcelona.

The following plenary lectures were given:

- J. L. Balcázar, *Combinatorial dimensions, query learning, and the intuition of compactness.*
- J. T. Baldwin, *Constructing 'Monster' models.*
- P. Dellunde, *Model theory of modules of separably closed fields.*
- S. D. Friedman, *Aspects of pure set theory.*
- P. Koepke, *A simplified fine structure for the constructible universe.*
- J. D. Monk, *Continuum cardinals generalized to Boolean algebras.*
- Y. Peterzil, *Expansions of algebraically closed fields in 0-minimal structures.*
- A. Pillay, *Definability in compact complex manifolds.*
- Y. Venema, *Canonicity for Boolean algebras with operators.*
- M. Zakharyaschev, *On the "classical decision problem" for temporal and modal first-order logics.*

Other lectures given:

- D. Asperó, *General localized reflecting cardinals.*
- A. Baltag, *Model theory of coalgebraic logic: Characterization, preservation and definability.*
- A. Berarducci, *O-minimal fundamental group, homology and manifolds.*
- G. Bezhanishvili, *Locally finite varieties.*
- J.-Y. Béziau, *Universal logic: Towards a general theory of logics.*
- M. Dzamonja, *On D spaces.*
- W. Dzik, *On structural completeness of some intermediate and modal predicate Logics.*
- F. Esteva, *Monoidal t-norm based logic: Towards a logic for left-continuous t-norms.*
- A. J. Gil, *On the algebraic properties of the Gentzen systems associated with finite algebras.*
- J. Gispert, *Universal classes of MV-chains.*

- R. Goldblatt, *Dualizing Birkhoff's variety theorem for coalgebras.*
- E. Graczynska, *Hyperequational logic.*
- K. Hauser, *Observations on the methodology of modern set theory.*
- R. Jansana, *Bounded distributive lattices with strict implication.*
- J. J. Joosten, *Interpretability logics and the step by step method.*
- M. Junker, *Indiscernible sequences and topologies.*
- T. Kowalski, *Almost minimal varieties of residuated lattices.*
- M. S. Kurilic, *Properties of families of sets preserved in forcing extensions.*
- J. López-Abad, *Determinacy and Weakly-Ramsey sets in Banach spaces.*
- A. R. D. Mathias, *Extracting Woodin cardinals from principles of determinacy.*
- H. Ono, *The class of simple residuated lattices has the finite embedding property.*
- C. Ortiz de Landázuri, *Teoría de conjuntos y autofundamentación: ¿Reestructuración de imagen o nueva 'Mathesis universalis'?.*
- F. Paoli, *Some algebraic remarks on substructural logics.*
- A. Pascu, *A kripke semantics for object determination logic (odl).*
- V. Sotirov, *Leibniz style arithmetization of monadic predicate calculus with equality.*
- P. Wasilewski, *Generalized metric spaces.*

6.4 CRM Advanced Courses

This year for the sixth time the CRM organised a series of advanced courses on specific subjects that have seen recent development. These intensive courses are addressed to advanced Ph.D. students and recent Ph.D. graduates and taught by well known specialists in each area.

During the year 2000 was given the advanced course on ***Algebraic Quantum Groups*** from September 5 to 16, 2000, coordinated by P. Ara (UAB) and lectures given by:

- K. Brown (University of Glasgow)
- K. Goodearl (University of California at Santa Barbara).

The course treated various algebraic aspects of the theory of Quantum Groups, concentrating on the structure and representation theory of "quantum" versions of coordinate rings of algebraic groups or algebraic varieties and enveloping algebras of finite dimensional Lie algebras. The viewpoint was that of modern noncommutative algebra and representation theory. After the various "quantum algebras" had been introduced, one strand of lectures concentrated on the root-of-unity situation, while a second followed the generic case. The first track leads to the study of Noetherian Hopf algebras satisfy-

ing polynomial identities, with emphasis on good homological properties and geometric relations with the maximal ideal space of the center. In the generic situation, the lectures concentrated on the geometry of the prime and primitive spectra of quantized coordinate rings.

52 researchers and postdoctoral students attended the course and

it was supported by the European Commission in the programme High-Level Scientific Conferences, (contract number HPCF-CT-1999-00048), by the Dirección General de Enseñanza Superior e Investigación Científica (ref. CO99-0116) and by the Direcció General de Recerca (2000ARCS 00132).

Participants in the Advanced Course on Algebraic Quantum Groups

6.5 Master in "Mathematics for Finance"

This is a joint activity of the CRM and the Mathematics Department of the Universitat Autònoma de Barcelona with several financial institutions, including the Barcelona Stock Exchange, which is the sponsor. Also collaborating are the Applied Economics, Commercial Economics and Economics and History of Economics departments of the UAB, the Statistics Department of the Universitat de Barcelona, and several distinguished specialists who work in direct contact with the markets. The aim of the Master's course is to train specialists capable of developing new financial products, according to the needs of the moment, and prepared to understand and critically discuss the hypotheses and limitations of existing financial models. The Master is structured in three terms, two theoretical, with 120 hours of class each, and one pratical, working in the finance industry. The responsability for the Master lies with the Academic Commission, consisting of professors Angel Calsina, Joan del Castillo, Jaume Llibre and Frederic Utzet, and with the Advisory Council, consisting of Xavier Auguets (Caixa Catalunya), Antoni Giralt (Borsa de Barcelona), Pere Guinjoan (Caixa d'Estalvis i Pensions de Barcelona) and Joan Sueiro (Banc Sabadell). A maximum of 20 students are admitted a year, and have available in the CRM the most advanced technological installations for following the financial markets.

6.6 Maths Quiz 2000

The CRM organized the international competition *Maths Quiz 2000*, which took place on the 4–5 December. The game or contest was a unique event in the celebrations of World Mathematical Year. The contest took place, uninterrupted, for 24 hours over the internet, in real time, simultaneously all around the world. The competitors —there was a total of 378 teams signed-up, from around the globe— had to answer highly non-trivial mathematical questions to score points. At the same time, they could follow their position in relation to all the other teams on the score board. The structure of the game was reminiscent of *bingo*: the questions appeared in the squares of a card, and the players had to complete horizontal or vertical lines to go on to the next level, where the ques-

tions on the cards scored more points (the points scored followed the Fibonacci sequence).

The *Maths Quiz 2000* was designed and put into practice by Rafel Serra and Jaume Aguadé, coordinating a team of computer staff in charge of the programming and implementing the game, and a team of mathematicians preparing the database of questions.

Supporting the game were Sun Microsystems, which offered the first prizes, consisting of a workstation for each of the top five teams, and the server for the game, Birkhäuser Verlag, which offered a substancial number of books to be given away during the contest, and Wolfram Research, which gave five licences for the program *Mathematica*. Support was also received from the Universitat Oberta de Catalunya and the Departament of Universities, Research and the Information Society of the Generalitat de Catalunya.

The CRM offered a prize (in the form of research funding) to the team from the catalan countries obtaining the best result. This prize has been awarded to a team from the Universitat Autònoma de Barcelona, who in fact were the overall winners of the *Maths Quiz 2000*.

The winning team of the MQ2000, from the Mathematics Department of the UAB

6.7 Other Lectures and Seminars

January

- J. Mateu, *Integrals singulars i fraccionàries per a mesures no doblants.*
- M. Chas, *String topology.*
- C. Casacuberta, *Classes de Bousfield i localització estable.*
- R. Levi, *Spaces of self equivalences of p-completed classifying spaces.*
- B. Opic, *Sharp embeddings of Bessel potential spaces.*
- D. Asperó, *The bounded Martin's maximum and the size of the continuum.*
- O. Serra, *On additive latin squares.*
- C. Broto, *Espais classificadors per a famílies de subgrups.*
- G. Corach, *Geometría en espacios de operadores positivos.*
- J. Villadelprat, *Isocronia en una família de camps hamiltonians al pla.*

February

- C. Broto, *Espais classificadors de grups de Kac-Moody.*
- Y. Raynaud, *Duality of certain real interpolation spaces.*
- J. M. Burgués, *Tòpics d'anàlisi complexa.*
- A. Borisenko, *Global structure of Hopf hypersurfaces in symmetric spaces of rank one.*
- M. A. Hernández Cifre, *Sistemas completos de desigualdades.*
- S. Robles, *Distributed control of connection admission to a telecommunication network: security issues.*
- J. C. Martínez, *Cadenas en álgebras de Boole.*
- I. Permanyer, *Accions pròpies i G CW-complexes.*
- M. Eddahbi, *BSDE with local time, existence and comparison theorem.*
- X. Tolsa, *Nous espais BMO i H^1 adequats per a estudiar els operadors de Calderon-Zygmund amb mesures no doblants.*
- M. Boileau, *Uniformization des petites orbifolds en dimension 3.*
- E. Casanovas, *Un nuevo ejemplo de teoría no G-compacta.*
- J. J. Gutiérrez, *G-CW-complejos. Construcción de $\underline{E}G$.*
- K. Dyakonov, *Conjuntos de unicidad para subespacios invariantes del operador de desplazamiento inverso.*
- J. Soler, *Some periodic solutions in the 3-dimensional elliptic restricted 3-body problem.*
- D. Schlomiuk, *Hilbert's 16th problem: meeting ground of analysis, algebra and geometry.*
- M. Eddahbi, *Limit theorems for BSDE with local time applications to non-linear PDE.*
- Le Dung Trang, *Combinatoire et singularités de courbes planes.*
- I. J. Dejter, *STS-Graphical invariant for perfect codes.*
- J. Aguadé, *Grups de tipos $H\mathcal{F}$.*
- E. Pustylnik, *Optimal weak type interpolation in spaces of Lorentz-Zygmund type.*
- M. Ollé, *Bifurcació de Hopf Hamiltoniana: resultats analítics i numèrics.*

- D. Schlomiuk, *Towards a more conceptual framework for the study of quadratic vector fields.*

March

- B. Eckmann, *Idempotents in group algebras, traces, and group geometry.*
- M. Ferrero, *Sobre los radicales de Brown-McCoy y fuertemente primo: anillos de polinomios.*
- M. Nicolau, *Sobre un teorema de J.-P. Jouanolou referent a les hipersuperfícies solucions d'equacions de Pfaff analítiques.*
- J. Pau, *Successions primes i separades per* $H^\infty(\mathbf{D})$.
- X. Jarque, *Isocronia en una família de camps hamiltonians al pla.*
- M. Borrell, *El riesgo de interés: de la certeza a la cobertura.*
- R. Bruner, *Lectures on Adams spectral sequence (12 sessions).*
- T. Z. Lai, *Hybrid resampling methods for confidence intervals.*
- M. A. Fiol, *On the existence of some subgraphs in distance-regular graphs.*
- T. Z. Lai, *Stochastic neural networks and their applications to financial time series.*
- O. el Idrissi, *Oscilaciones cerca del equilibrio de coexistencia en un sistema estructurado por la edad con dinámica para los recursos.*
- J. Solà-Morales, *Estabilitat d'equilibris en sistemes gradient.*
- R. Flores, *Modelos de dimensión finita para* $\underline{E}G$.
- H. J. Baues, *The classification of stable homotopy types with torsion free homology; an application of integral representation theory.*
- T. Z. Lai, *Optimal stopping and the valuation of American Options.*
- A. Borisenko, *Asymptotic properties of* λ*-convex sets in Hadamard manifolds.*
- P. Dellunde, *Teoria de models de cossos separablement tancats.*
- D. Suárez, *Funciones meromorfas en el espacio de ideales maximales de* H^∞.
- Z. Xiang, *Invariant algebraic surfaces of the Lorenz system.*
- N. Shephard, *Stochastic volatility models and some of their uses in financial economics.*
- O. Barndorff-Nielsen, *Modelling by Levy processes for financial econometrics.*
- V. Buldygin, *On exponential integrability of the convex functionals of the Gaussian vectors.*
- N. Shephard, *Non-Gaussian OU based models and some of their uses in financial economics.*
- P. Dellunde, *Cossos separablement tancats considerats com mòduls.*
- J. Minguillón, *Influence of lossy compression on hyperspectral image classification.*
- G. W. Mackey, *Unitary group representations in physics, probability and number theory: recent progress in an old program for unifying physics and number theory by including other branches of pure mathematics.*
- G. Bastardas, *Espais classificadors per a accions pròpies.*

- N. Corral, *Curvas polares de una foliación singular.*
- P. Jain, *Certain inequalities involving averaging operators.*
- J. Llibre, *Configuracions centrals del problema de n-cossos, història i alguns problemes oberts.*
- R. Navarro, *Optimización de la esperanza de la utilidad logarítmica via engrosamiento de filtraciones.*
- T. Codina, *Visió general de SAP R/3.*
- J. Fàbrega, *Memòries dinàmiques i xarxes de permutacions.*
- M. Eddahbi, *A logarithmic Sobolev inequality for one-dimensional multivalued stochastic differential equations.*
- M. Melnikov, *Extensiones y aproximaciones de funciones subharmónicas.*
- X. Jarque, *Breu introducció a les equacions diferencials ordinàries sobre els complexes.*
- M. Eddahbi, *Limit theorems for BSDE with local time applications to non-linear PDE.*
- V. Zinoviev, *On concatenated and generalized concatenated codes. The main ideas and basic constructions.*
- S. Trioni, *Los números surreales: Modelo saturado de RCF.*
- J. G. Llorente, *Geodésicas en variedades Riemannianas de curvatura negativa.*

April

- J. Soria, *Conjuntos decrecientes y reordenada en dimensiones superiores (a 1).*
- R. Ramírez, *Problemas inversos en la dinámica.*
- S. Balfego, *La teoría de p-grupos libres y nilpotentes de exponente finito.*
- A. Torrens, *Àlgebres lliures en varietats de BL-àlgebres amb retracte Booleà.*
- C. Polo, *Introducción a la Contabilidad Nacional.*
- A. Gillespi, *Spectral decompositions and ergodic multipliers.*
- M. Junker, *Strong types.*
- J. M. Brunat, *Homomorfismes de grafs (7a sessió).*
- R. J. Flores, *Espais classificadors per a accions pròpies.*
- C. Tarquini, *Feuilletages transversalement conformes analytiques.*
- V. Zinoviev, *On completely regular and completely transitive codes, correcting* 4 *errors.*
- J. M. Font, *Lukasiewicz i la lògica modal.*
- E. Vives, *Tècniques de teoria de grafs per a l'estudi de l'estat fonamental de sistemes desordenats.*
- J. Ll. Raymond, *Los rendimientos de la educación en España.*

May

- R. Trias, *Una aproximación al Riesgo de Crédito.*
- G. Lugosi, *Worst-case bounds for the logarithmic loss of predictors.*
- S. Todorcevic, *Coherent sequences.*
- J. Gispert, *Classes universals de MV-cadenes.*

- L. Levy, *Modules over hereditary noetherian prime rings.*
- G. T. Toussaint, *Recent results on untangling unknots in space.*
- F. X. Dehon, *K-theory for proper G-actions.*
- S. Lamy, *Grupos de automorfismos de* $\mathbf{C}^2$ *y corrientes invarientes.*
- G. Garrigós, *Descomposiciones de Littlewood-Paley para espacios de Bergman en tubos cónicos.*
- A. Gasull, *Monodromia i estabilitat per a una família genèrica de punts crítics degenerats.*
- P. Guitart, *On the complexity of three classic approximation algorithms for the Steiner problem in graphs.*
- J. Paradís, *The derivative of Minkowski's* $?(x)$ *function.*
- S. Lamy, *Grupos de automorfismos de* $\mathbf{C}^2$ *y corrientes invariantes.*
- J. Brennan, *The integrability of derivative in conformal mapping: 1978-2000.*
- D. Asperó, *Generic elementary embeddings.*
- O. Serra, *Expanders (XI).*
- A. Tonks, *K-theory for proper G-actions.*
- J. Porti, *Regeneració d'estructures geomètriques.*
- F. Soria, *Operadores maximales asociados a medidas no doblantes.*
- W. de Melo, *Hyperbolicity of renormalization.*
- P. Macmanus, *Medidas doblantes y subconjuntos de la recta.*
- J. Mir, *A practical anonymous channel without MIX's.*
- D. Asperó, *Coding real numbers by ordinals.*
- E. Pardo, *Finite projections in multiplier algebras of* C^**-algebras.*
- S. Bauer, *Loops on the orthogonal group.*
- J. M. Burgués, *Teorema de Newlander-Nirenberg: demostració de Folland i Kohn.*
- M. Villanueva, *Rank and Kernel of 1-perfect code.*
- P. Mancosu, *Mathematical explanation.*
- M. A. Fiol, *Coloración de grafos.*
- R. Adillón, *Lògiques intuïcionistes sense contracció.*

June

- F. Perera, *Algebraic relatives of extremally rich* C^**-algebras.*
- C. Broto, *Tipus d'homotopia de la p-compleció d'espais classificadors de grups finits.*
- P. Mancosu, *The russellian influence on Hilbert's program.*
- H. Harutyunyan, *On broadcast graphs.*
- I. Gálvez, *Invariants eta i cohomologia el·líptica.*
- C. Christopher, *Classifying centres in systems of Kukles-type.*
- G. Uzquiano, *A no-class theory of classes.*
- C. Padró, *Sistemes criptogràfics distribuïts i esquemes per compartir secrets.*
- S. Elizalde, *Counting of permutations avoiding a fixed subword.*

- K. Fedorovski, *Approximation and boundary properties of polyanalytic functions.*
- K. Burdzy, *Heat equation and reflected Brownian motion in time-dependent domains.*
- P. Ara, *C^*-àlgebres de grup i teoria K.*
- A. Eremenko, *Meromorphic functions, negative curvature and spherical geometry.*
- J. C. Cifuentes, *Introducción a la matemática fuzzy, II: Retículos ultraregulares, el álgebra de Lindenbaum de la lógica fuzzy, las L-álgebras de Boole.*

September

- P. Vuillermot, *Analysis of the long-time behavior of solutions to a class of nonlinear SPDE's.*
- P. Vuillermot, *Exchange of stability results for a class of nonlinear SPDE's driven by Wiener Processes.*
- S. Bonaccorsi, *Stochastic partial differential equations with boundary noise.*
- P.-L. Lions, *Utility approach to various stochastic control and finance problems.*
- K. O'Meara, *Separative cancellation and multiple isomorphism in abelian groups.*

October

- B. Boe, *Fine topology and boundary behaviour for functions in Besov spaces.*
- M. Sampels, *From degree/diameter to mean distance optimization.*
- C. Broto, *p-compact groups and finite groups.*
- U. Küchler, *On stochastic differential equations with memory.*
- P. Viader, *The derivative of Minkowski's ?(x) function.*
- A. Gasull, *Una caracterització dels centres isocrons en termes de simetries.*
- J. Llibre, *Configuracions centrals del problema de 4 cossos amb tres masses iguals.*
- R. Cramer, *Secure homomorphic multi-party computation: Efficient constructions from homomorphic threshold encryption and applications to secure distributed linear algebra.*
- J. Escofet, *Aplicació de la transformada de Fourier i de la wavelet de Gabor en la caracterització de teixits textils.*
- J. Llibre, *Sobre la injectivitat de les aplicacions C^1 del pla real, amb aplicacions a la conjectura jacobiana.*
- C. Padró, *A ramp model for distributed key distribution schemes.*
- J. Bagaria, *Descriptive set theory and the strength of generic absoluteness.*
- J. Bonet, *Operadores de composición y de multiplicación en espacios ponderados de funciones holomorfas en el disco.*
- A. Palmigiano, *Connections between Gentzen systems and normal deduction systems in the classical case.*
- Natàlia Castellana, *Homology approximations.*
- F. Neumann, *Etale homotopy types of moduli stacks of curves.*
- I. Leary, *Examples of universal proper G-spaces.*

- G. Weiss, *Ondículas contínuas: generalizaciones y discretización.*

November

- O. Devillers, *Delaunay triangulations: towards simple and efficient algorithms.*
- F.-X. Dehon, *Additive and unstable algebra structure for the MU-cohomology of a (profinite) space, resolutions and application to the cohomology of mapping spaces from* $\mathbb{C}\mathrm{P}^\infty$.
- M. J. González, *Medidas doblantes y sus aplicaciones.*
- J. Llibre, *Teoria de la integrabilitat de Darboux i el invers de factor integrant.*
- J. Gascón, *Investigacions didàctiques sobre la prova i la demostració en matemàtiques.*
- X. Cabré, *Una aplicació de la descomposició de Calderon-Zygmund a les estimacions ABP i als principis del màxim per EDPs no lineals.*
- R. Jansana, *Lògiques subintuicionistes.*
- C. Casacuberta, *Derivatives of homotopy functors.*
- J. Porti, *Alexander polynomial and representations into* $SL_2(\mathbf{C})$.
- N. Dutertre, *Sur le nombre de branches d'un germe de courbe analytique.*
- G. Hellman, *Three varieties of mathematical structuralism.*
- D. Pascuas, *Balayage multiple per a la transformada de Fourier i mostreig multiple pels espais de Bernstein.*
- K. Josic, *Unfolding theory approach to bursting in fast-slow systems.*
- G. Hellman, *Maximality vs. extendability: on Zermelo 1930.*
- J. Gascón, *Interpretacions epistemològiques de la prova i de la demostració en matemàtiques.*
- J. Gutiérrez, *Analytic functors.*
- A. Hartmann, *Interpolation in Hardy-Orlicz spaces and questions related to the extension to the Nevanlinna class.*
- X. Jarque, *Processos de negociació.*
- A. Atserias, *Inductive definitions in finite set theory.*
- M. Bosch, *La demostració en la teoria de situacions didàctiques. La "detransposició didàctica".*

December

- G. Granja, *The Taylor tower of the identity for odd spheres.*
- J. A. Crespo, *Hopf spaces, from finiteness to non finiteness.*
- P. Mardesic, *Normalización, integrabilidad y linearización de puntos silla en sistemas cuadráticos complejos en* C^2.
- B. Boe, *Interpolating sequences for Besov spaces.*
- T. Lázaro, *Aproximació al problema Centre-Focus mitjançant pseudo formes normals.*
- J. C. Martínez, *Densidad y altura en espacios Booleanos.*
- J. A. Mesa, *An introduction to location analysis and an overwiew of some current lines of research.*
- J. Mateu, *Sobre la norma 2 dels commutadors de Calderón.*
- F. Neumann, *Goodwillie calculus and algebraic K-theory of spaces.*

6.8 Publications

During the year 2000 the CRM has continued the three series of publications, *Preprints, Conferències* and *Quaderns.*

PREPRINTS. During this year, 29 preprints have been published:

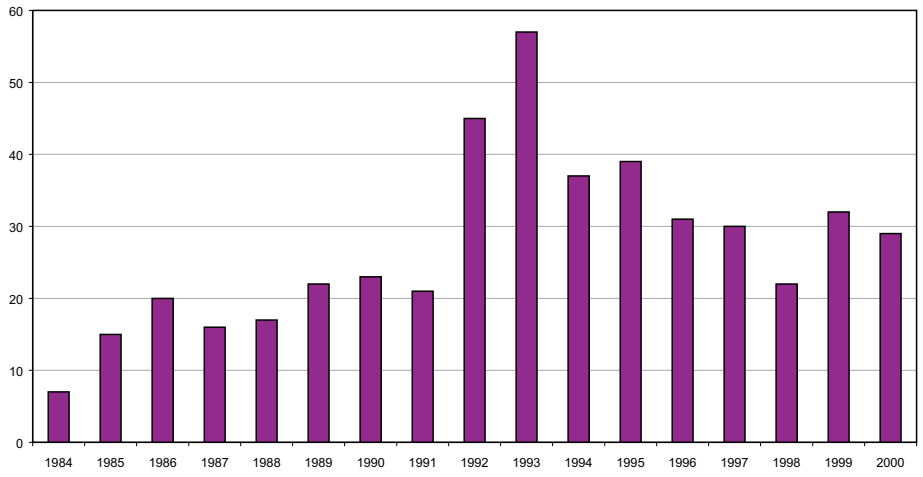
- *A_p weights for nondoubling measures in R^n and applications.* J. Orobitg, C. Pérez (n. 432).
- *Fregean logics with the multiterm deduction theorem and their algebraization.* J. Czelakowski, D. Pigozzi (n. 433).
- *A new abstract combinatorial dimension for exact learning via queries.* J. L. Balcázar, J. Castro, D. Guijarro (n. 434).
- *Relation between area and volume for λ-convex sets in Hadamard manifolds.* A. A. Borisenko, E. Gallego, A. Reventós (n. 435).
- *On the chaos expansion of some additive functionals of the Brownian motion and applications.* M. Eddahbi, M. Erraoui, J. Vives (n. 436).
- *Homological localizations preserve 1-connectivity.* C. Casacuberta, J. Scherer (n. 437).
- *Limit theorems for BSDE with local time applications to non-linear PDE.* M. Eddahbi, Y. Ouknine (n. 438).
- *Homotopy equivalences of p-completed classifying spaces of finite groups.* C. Broto, R. Levi, B. Oliver (n. 439).
- *Fregean Logics.* J. Czelakowski, D. Pigozzi (n. 440).
- *On the invariant algebraic surfaces of the Lorenz systems.* J. Llibre, X. Zhang (n. 441).
- *Invariant algebraic surfaces of the Rikitake system.* J. Llibre, X. Zhang (n. 442).
- *C^1- approximation and extension of subharmonic functions.* M. S. Melnikov, P. V. Paramonov, J. Verdera (n. 443).
- *Monodromy, stability, and bifurcation of a limit cycle from degenerate singular points of certain planar vector fields.* V. Mañosa (n. 444).
- *Théorèmes limites pour certaines fonctionnelles associées aux processus stables sur l'espace de Hölder.* M. Ait Ouahra, M. Eddahbi (n. 445).
- *Invariant algebraic surfaces of the Belousov–Zhabotinskii systems.* J. Llibre, X. Zhang (n. 446).
- *Brownian motion reflected on Brownian motion.* K. Burdzy, D. Nualart (n. 447).
- *On the differentiability of first integrals of two dimensional flows.* W. Li, J. Llibre, M. Nicolau, X. Zhang (n. 448).
- *Melnikov functions for period annulus, nondegenerate centers, heteroclinic and homoclinic Cycles.* W. Li, J. Llibre, X. Zhang (n. 449).
- *Bounding the orders of finite subgroups.* Ian J. Leary (n. 450).
- *Extension of Floquet's theory to nonlinear periodic differential systems and embedding diffeomorphisms in differential flows.* W. Li, J. Llibre, X. Zhang (n. 451).

- *Cross-sections to semi-flows on 2-complexes.* F. Gautero (n. 452).
- *The Euler class of a Poincaré duality group.* I. J. Leary (n. 453).
- *Planar analytic vector fields with generalized rational first integrals.* W. Li, J. Llibre, X. Zhang (n. 454).
- *Local first integrals of differential systems and diffeomorphisms.* W. Li, J. Llibre, X. Zhang (n. 455).
- *A new criterium to control the number of limit cycles of some generalized Liénard equations.* A. Gasull, H. Giacomini (n. 456).
- *On Lukasiewicz's four-valued modal logic.* J. M. Font, P. Hájek (n. 457).
- *Axiomatic definition of the topological entropy on the interval.* Ll. Alsedà, S. Kolyada, J. Llibre, L. Snoha (n. 458).
- *On topological invariants associated to a polynomial with compact critical set.* N. Dutertre (n. 459).
- *Multiplicative square functions.* M. J. González, A. Nicolau (n. 460).

CONFERÈNCIES. The fifth volume of this series has been published. It compiles the extended abstracts of the lectures and seminars given at the CRM during the year 1999.

QUADERNS. They compile the content of specialized activities. The following volume has been published:

- *Advanced Course on Algebraic Quantum Groups.* Editor: P. Ara (n. 17).



Number of preprints

7 The Narcís Monturiol Medal

This year the Generalitat de Catalunya, at the proposal of the Minister for Research, Universities and the Information Society, awarded the *Narcís Monturiol Medal* for scientific and technological merit to the Centre de Recerca Matemàtica (Decree 361/2000, published in the DOGC 3265 of 15 November 2000). This award, the highest that the Catalan Government conceeds to a scientific organisation, was given for "carrying out important work in the development of research mathematics in Catalunya, as a centre of visiting professors and postdoctoral fellows, at the service of all Catalan mathematicians and universities, while at the same time promoting internationally the scientific activity of our country". The medal was presented on the 30th of November by the president of the Generalitat de Catalunya in the Saló Sant Jordi of the Generalitat and received on behalf of the Centre de Recerca Matemàtica by its Director.

Narcís Monturiol Medal of the Catalan Government

8 The EPDI

In August of the year 2000, the Centre de Recerca Matemàtica was invited to join the *European Postdoctoral Institute for the Mathematical Sciences* (EPDI), which became effective from September.

The EPDI is a network of European research institutes which each year awards a number of highly competitive postdoctoral grants. Created initially by the Institut des Hautes Études Scientifiques in Bures, the Max-Planck-Institut für Mathematik in Bonn and the Isaac Newton Institute for the Mathematical Sciences in Cambridge, it currently consists of nine mathematics research institutes: the three above, the CRM, the Max-Planck-Institut für Mathematik in den Naturwissenschaften in Leipzig, the Institut Mittag-Leffler in Djursholm, the Banach Center in Warsaw, the Erwin Schrödinger Institut in Vienna and the Forschungsinstitut für Mathematik (FIM) in Zurich.

The EPDI in October invited applications for five two year grants (2001–2003), offered to young European scientists who obtained their PhD in mathematics (pure or applied) or mathematical physics since 1999 or later.

In meetings in Vienna and Cambridge the selection of candidates was made after studying the applications and the experts' reports. Two of the five successful candidates will spend a year visiting the CRM.

9 The Algebraic Topology Group

The *Barcelona Algebraic Topology Group*, headed by Jaume Aguadé, consists of 2 full university professors, 6 full-time lecturers, 5 doctors and 5 doctoral students; most work at the Universitat Autònoma de Barcelona, but there is also participation from the universities of Barcelona, Almería, Málaga and Granada. This group has been designated this year a *Marie Curie training site* by the European Commission, one of only two such sites in Spain. It is a *Grup de Recerca Consolidat* of the CIRIT of Catalunya since 1995 and forms part of the European research training network *Modern Homotopy Theory*, together with other groups from the universities of Aberdeen, Aarhus, Sheffield, Paris-Nord, Leuven Catholic University and the CNRS.

Since 1982 it has organised every 4 years the *Barcelona Conference on Algebraic Topology*, a series of conferences of worldwide reference, the proceedings of which have been published since 1986 in series of Springer or Birkhäuser Verlag. In July 2001, the younger members of the Algebraic Topology Group will organise the *Barcelona 2001 EuroPhD Topology Conference* and in September the *Proper Group Actions* euro summer school, both events with the financial support of the European Commission.

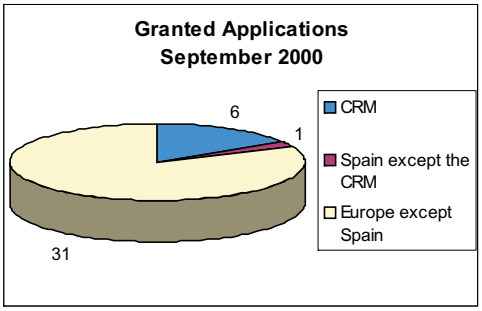
The group has several postdoctoral fellows, 4 in the year 2000, and from 2001 will also take on doctoral research students from algebraic topology programmes from several European universities.

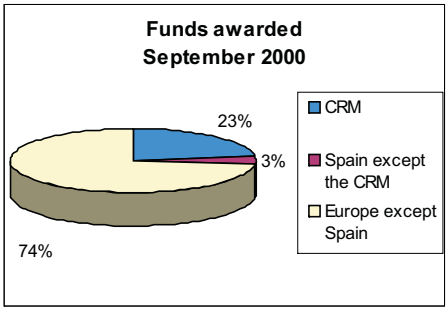
10 High-Level Scientific Conferences

The Centre de Recerca Matemàtica has presented a total of 10 proposals of congresses and advanced courses in the two calls for applications of the European Community in the framework of the *Increasing Human Research Potential* programme, 4 for the 1999 submission and 6 for the 2000. All 10 events were approved by the European Commission, meaning that, in a period of 2 years, from the summer of the year 2000 to that of 2002, the CRM will have organised 2 EuroConferences, 2 PhD EuroConferences and 6 Advanced Euro Summer Schools, as well as those which might be approved in the 2001 round. The following is a list of the events:

- *PhD Euroconference on Complex Analysis and Holomorphic Dynamics*
- *The 6th Barcelona Logic Meeting*
- *Advanced course on Algebraic Quantum Groups*
- *Barcelona 2001 EuroPhD Topology Conference: Homotopy Theory and Applications*
- *Advanced course on Symplectic Geometry of Integrable Hamiltonian Systems*
- *Advanced course on Global Riemannian Geometry: curvature and topology*
- *Advanced course on Modular forms and p-adic Hodge Theory*
- *Combinatorics and Graph Theory: Algebraic, Algorithmic, Geometric and Probabilistic Aspects*
- *Advanced course on Proper Group Actions*
- *Advanced course on Mathematical Finance: Further models*
- *Advanced course on Geometric 3-Manifolds*

The high percentage of success achieved by the CRM in these proposals to the EC is remarkable, as we show in the enclosed graphic, which refers to the year 2000.





11 Ferran Sunyer i Balaguer Prize

The International Ferran Sunyer i Balaguer Prize was announced this year for the ninth time. This prize is awarded to a monograph which updates the progress in research in a mathematical area which has recently been developed. The prize consists of 10,000 euros and the winning monograph is published by Birkhäuser Verlag in the "Progress in Mathematics" series.

In the 1999 announcement, 2 monographs by authors from different countries were submitted. The scientific Committee consisting of Professors Pilar Bayer (Universitat de Barcelona), Antonio Córdoba (Universidad Autónoma de Madrid), Paul Malliavin (Université de Paris VI), Joseph Oesterlé (Université de Paris VI), and Alan Weinstein (University of California at Berkeley) recommended that the Foundation should award the prize to the monograph:

Hamiltonian singular reduction

by J. P. Ortega and T. Ratiu (École Polytéchnique Federal de Lausanne).

At the committee meeting of the Ferran Sunyer i Balaguer Foundation of 23 November, Jaume Aguadé was named as the new director of the Foundation, replacing Joaquim Bruna, director since 1995, who we thank for his valuable work.

12 Institutional awards

12.1 Visiting professors on sabbatical leave

D. Schlomiuk	01.01.00 – 31.05.00
K. Burdzy	01.07.00 – 30.09.00
P. A. Vuillermot	01.09.00 – 31.12.00

12.2 Visiting professors CIRIT

W. Li	01.03.00 – 31.07.00
J. Brennan	05.04.00 – 29.05.00
I. J. Leary	02.10.00 – 26.11.00

12.3 Marie Curie Individual Fellowships EC

F. Gautero	01.10.98 – 30.09.00
F. X. Dehon	02.02.00 – 28.02.00
N. Dutertre	01.10.00 – 30.09.02

12.4 Grants for foreign scientists and technologists DGESeIC

X. Zhang 01.04.99 – 31.03.01

12.5 Fellowships of the network *Modern Homotopy Theory* EC

F. Neumann 01.10.00 – 30.09.01

12.6 Agencia Española de Cooperación Internacional (AECI)

M. Sierakowski 23.10.00 – 31.07.01

The Banco Bilbao Vizcaya Foundation funded P. A. Vuillermot for the period 01.09.00 to 31.10.00.

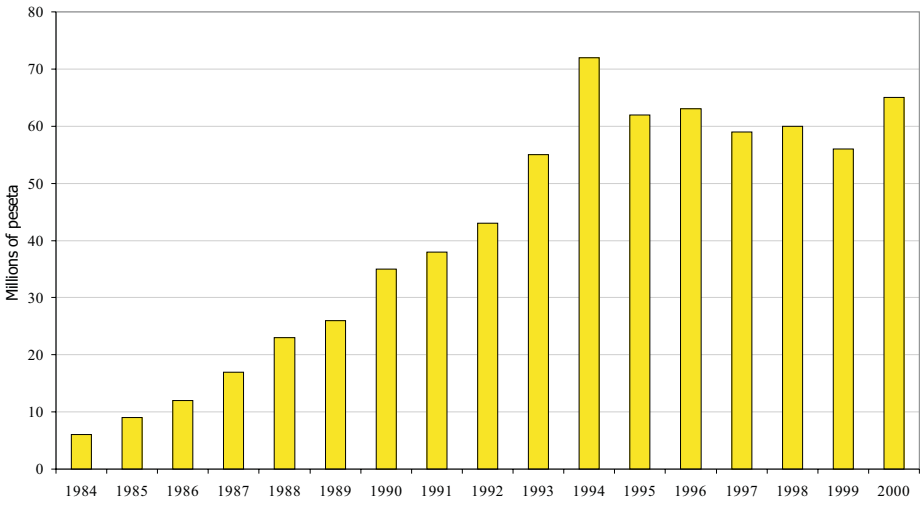
12.7 Organisation of Conferences and Seminars

PhD Euroconference on Complex Analysis and Holomorphic Dynamics (EC,[1] CIRIT,[2] DGESeIC,[3] UB[4]).

6th Barcelona Logic Meeting (EC, CIRIT, DGESeIC, UB).

Advanced Course on Algebraic Quantum Groups (EC, CIRIT, DGESeIC).

Maths Quiz 2000(CIRIT).



Budget of the CRM

[1]European Commission.
[2]Comissió Interdepartamental de Recerca i Innovació Tecnològica.
[3]Dirección General de Enseñanza Superior e Investigación Científica.
[4]Universitat de Barcelona

13 Budget

Funding sources

	PTA
CIRIT	15.000.000
DGESeIC	9.965.000
Generalitat (applications)	4.940.000
EC	25.311.922
UAB (facilities)	3.500.000
UAB (activities)	860.000
UB (activities))	600.000
Foundation FSB	1.663.860
Registration fees	1.095.395
Foundation BBV	1.600.000
Others	877.156
Total	65.413.333

Expenditure

	PTA
Travels	1.568.587
Visitors	10.202.116
Postdoctoral grants	15.065.327
Conferences and courses	7.271.832
Maintenance	3.500.000
Accommodation	6.711.363
Long-term material	2.557.463
Day-to-day material	862.937
Secretariat	10.236.283
Director	1.000.000
Publications	1.538.100
Prizes	1.663.860
Miscellaneous	685.465
MQ2000	2.550.000
Total	65.413.333