

CENTRE DE RECERCA MATEMÀTICA

RECORD OF ACTIVITIES 1999

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The activity of the Centre de Recerca Matemàtica (CRM) has been growing steadily throughout its sixteen years of existence, serving the Catalan mathematical community, empowering research in all the universities of Catalunya, with its programmes of visiting researchers, postdoctoral grants, conferences and advanced courses. The CRM's intense presence in international, and especially European, forums gives it the position of a leading research institute in Europe.

Of special note in the European arena is the CRM's presence in ERCOM (European Research Centers on Mathematics), an international organisation which promotes cooperation among mathematics institutes, whose directors meet annually, in Cambridge in 1999 and in Barcelona in the year 2000.

The participation of the CRM in the different Improving Human Research Potential subprogrammes of the European Union, and the positive results achieved in the various research applications reflect the strength and dynamism of the CRM. During 1999 two Marie Curie postdoctoral fellowships were awarded to the CRM, as well as approval

for three conferences, one advanced course, a research network and its designation as a Marie Curie Training Site. In 1999 the CRM has accommodated a total of 70 researchers, 8 of whom are postdoctoral fellowship holders; it has organised two international conferences, *The Fifth International Seminar on the Mathematical Analysis of Algorithms* and the *Joint Conference of the 5th Barcelona Logic Meeting and the 6th Kurt Gödel Colloquium*, two specialist Advanced Courses, on Image Processing and Integral Geometry, and a total of 153 lectures. There have been 32 new issues in the *Preprints* series, as well as 3 new *Quaderns*, where reports on the specialised activities are collected.

Important activities this year also included two semesters of specialised research, dedicated to complex analysis and to differential geometry, the latter with the collaboration of the European research network *Singularités d'équations et feuilletages*.

The secretaries of the CRM have been, as always, fundamental for the successful achievement of such a volume of activity, even though for obvious reasons their good work is not directly reflected in this Record.

Manuel Castellet
Director

Contents

1	The Centre de Recerca Matemàtica	1
1.1	The Institut d'Estudis Catalans	1
1.2	The Centre de Recerca Matemàtica	1
2	Governing body and structure	2
2.1	The Council	2
2.2	The Director	2
2.3	The Scientific Committee	2
2.4	Secretariat	2
3	Facilities	3
3.1	Premises	3
3.2	Computing facilities	3
3.3	Library	3
3.4	Accommodation	3
4	Visiting Scientists	4
5	Scientific Activities	8
5.1	Semester on Analysis	8
5.2	Mathematics and education: Principles and state of the art	9
5.3	VI Encuentro de Topología	10
5.4	The Fifth International Seminar on the Mathematical Analysis of Algorithms	11
5.5	Joint Conference of the 5th Barcelona Logic Meeting and the 6th Kurt Gödel Colloquium	12
5.6	Semester on Geometry	15
5.7	CRM Advanced Courses	16
5.8	Other Lectures and Seminars	18
5.9	Publications	22
6	Ferran Sunyer i Balaguer Prize	24
7	Finances	25
7.1	Institutionals awards	25
7.2	Budget	26

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 so-

ciety 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 8,000 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 pre-prints 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://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:

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

2.2 The Director

The Council elects a Director to serve for a period of four years. The current Director is Dr. 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: Dr. Jaume Agudé (UAB), Dr. Lluís Alsedà (UAB), Dra. Pilar Bayer (UB), Dr. Josep Blat (UPF), Dr. Joaquím Bruna (UAB), Dr. Joan Elias (UB), Dra. Núria Fagella (UB), Dr. Jaume Moncasi (UAB), Dr. David Nualart (UB), Dr. Oriol Serra (UPC), Dr. Joan Solà-Morales (UPC).

2.4 Secretariat

Mrs. Consol Roca and Mrs. Maria Julià 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.

During this year Mr. Xavier Montes has been doing their social service at the CRM. He has welcomed the visitors, providing them with cultural information and helping them in their legal needs, such as obtaining visas or other official documents. Moreover, he has also updated all the information about the CRM on Internet.

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:

- 3 work stations IBM Power-PC and Risc 6000.
- 17 PC pentium with 17" colour monitor and network card.
- 2 MacIntosh.
- 4 printers: HP Laserjet III, HP Laserjet IV M Plus, HP Laserjet 6MP and HP Desk Writer 600.

- 2 external tape streamers for making security copies for UNIX and PCs.
- 2 SAI for the work stations and the secretaries.

All computers are connected to a network. Besides the software needed to run the network, the centre is also well-equipped with scientific software for UNIX, as well as for PCs.

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 442 journals and 11,000 books.

3.4 Accommodation

The CRM has 12 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 Visiting Scientists

<i>J. Scherer</i>	Algebraic Topology, 01.10.97 – 31.07.99 Université de Lausanne
<i>D. Hartig</i>	Dynamical Systems, 01.09.98 – 31.01.99 California Polytechnic State University
<i>F. Gautero</i>	Dynamical Systems, 01.10.98 – 30.09.00 Université de Nice-Sophia Antipolis
<i>I. Morrison</i>	Algebraic Geometry, 01.01.99 – 31.12.99 Fordham University
<i>K. Barański</i>	Analysis, 01.11.98 – 31.10.99 Uniwersytet Warszawski
<i>Ph. N. Anh</i>	Algebra, 11.11.98 – 31.07.99 Hungarian Academy of Sciences
<i>V. Olevskii</i>	Analysis, 01.10.98 – 31.08.99 Tel Aviv University
<i>J. Seimenis</i>	Dynamical Systems, 11.01.99 – 21.02.99 University of the Aegean
<i>P. Koskela</i>	Analysis, 01.01.99 – 31.12.99 Jyväskylä Universitet
<i>P. Thomas</i>	Analysis, 25.01.99 – 06.02.99 Université Paul Sabatier
<i>E. Formanek</i>	Algebra, 01.02.99 – 07.02.99 Penn State University
<i>G. de Abreu</i>	Mathematical Education, 01.02.99 – 15.02.99 University of Luton
<i>X. Zhang</i>	Dynamical Systems, 01.03.99 – 31.03.01 Nanjing University
<i>P. Paramonov</i>	Analysis, 01.02.99 – 31.08.99 Moscow State University
<i>H. Pajot</i>	Analysis, 07.02.99 – 28.02.99 Université de Cergy-Pontoise
<i>G. Brousseau</i>	Mathematical Education, 23.02.99 – 12.03.99 Université de Bordeaux I
<i>B. Karpińska</i>	Dynamical Systems, 01.03.99 – 27.03.99 Technical University of Warsaw
<i>C. Pérez</i>	Analysis, 08.03.99 – 27.05.99 Universidad Autónoma de Madrid

<i>M. J. González</i>	Analysis, 15.03.99 – 15.06.99 Universidad de Cádiz
<i>J. Duoandikoetxea</i>	Analysis, 04.04.99 – 30.04.99 Universidad del País Vasco
<i>B. Branner</i>	Dynamical Systems, 06.04.99 – 20.04.99 Danmarks Tekniske Universitet
<i>S. Treil</i>	Analysis, 06.04.99 – 05.05.99 Michigan State University
<i>S. Tindel</i>	Probability, 10.04.99 – 15.05.99 Université de Paris XIII
<i>J. Cannon</i>	Algebra, 03.05.99 – 30.05.99 Brigham Young University
<i>A. Stray</i>	Analysis, 04.05.99 – 15.05.99 University of Bergen
<i>J. M. Wu</i>	Analysis, 16.05.99 – 12.06.99 University of Illinois at Urbana
<i>R. Kauffman</i>	Analysis, 16.05.99 – 12.06.99 University of Illinois at Urbana
<i>B. Bowditch</i>	Algebra, 17.05.99 – 15.06.99 Université de Lille 1
<i>K. Seip</i>	Analysis, 30.05.99 – 31.07.99 Trondheim Universitet
<i>C. Pereyra</i>	Analysis, 01.06.99 – 30.06.99 University of New Mexico
<i>P. Ahern</i>	Analysis, 01.06.99 – 10.07.99 University of Wisconsin-Madison
<i>V. Caselles</i>	Analysis, 01.06.99 – 18.07.99 Universitat de les Illes Balears
<i>D. Marshall</i>	Analysis, 01.06.99 – 15.07.99 University of Washington
<i>A. Adem</i>	Algebraic Topology, 10.06.99 – 23.07.99 University of Wisconsin-Madison
<i>D. Pigozzi</i>	Logic, 14.06.99 – 29.07.99 Iowa State University
<i>S. Mallat</i>	Analysis, 05.07.99 – 16.07.99 École Polytechnique, Palaiseau
<i>Y. Meyer</i>	Analysis, 05.07.99 – 16.07.99 École Normale Supérieure de Cachan

<i>J. M. Morel</i>	Analysis, 05.07.99 – 16.07.99 École Normale Supérieure de Cachan
<i>J. Serra</i>	Applied Mathematics, 05.07.99 – 16.07.99 École Normale Supérieure des Mines, Paris
<i>J. A. Crespo</i>	Algebraic Topology, 01.09.99 – 31.08.00 Universitat de les Illes Balears
<i>S. Lamy</i>	Differential Geometry, 01.09.99 – 30.06.00 Université de Rennes
<i>C. Tarquini</i>	Differential Geometry, 01.09.99 – 30.06.00 Université de Rennes
<i>K. Faure</i>	Differential Geometry, 01.09.99 – 30.06.00 Université de Toulouse
<i>O. Watanabe</i>	Algorithmics, 05.09.99 – 19.09.99 Tokyo Institute of Technology
<i>J. L. Balcázar</i>	Algorithmics, 05.09.99 – 10.12.99 Universitat Politècnica de Catalunya
<i>I. Verbitsky</i>	Analysis, 06.09.99 – 30.09.99 University of Missouri-Columbia
<i>M. Mathieu</i>	Algebra, 12.09.99 – 24.09.99 The Queen's University of Belfast
<i>R. Langevin</i>	Differential Geometry, 13.09.99 – 24.09.99 Université de Bourgogne
<i>R. Schneider</i>	Differential Geometry, 15.09.99 – 23.09.99 Albert-Ludwigs-Universität
<i>F. X. Dehon</i>	Algebraic Topology, 01.10.99 – 30.09.01 École Polytechnique, Palaiseau
<i>M. Mimura</i>	Algebraic Topology, 01.10.99 – 30.11.99 Okayama University
<i>H. R. Morton</i>	Applied Mathematics, 02.10.99 – 31.10.99 University of Liverpool
<i>F. Loray</i>	Differential Geometry, 24.10.99 – 20.11.99 Université de Lille 1
<i>J. J. Loeb</i>	Differential Geometry, 01.11.99 – 15.11.99 Université d'Angers
<i>J. Ribon</i>	Differential Geometry, 01.11.99 – 15.11.99 Universidad de Valladolid
<i>B. Deroin</i>	Differential Geometry, 01.11.99 – 14.11.99 École Normale Supérieure de Lyon

<i>S. Dumitrescu</i>	Differential Geometry, 01.11.99 – 17.11.99 Université de Lyon
<i>A. Guillot</i>	Differential Geometry, 01.11.99 – 20.11.99 École Normale Supérieure de Lyon
<i>E. Ghys</i>	Differential Geometry, 07.11.99 – 21.11.99 École Normale Supérieure de Lyon
<i>M. Brunella</i>	Differential Geometry, 07.11.99 – 28.11.99 Université de Bourgogne
<i>M. McQuillan</i>	Differential Geometry, 07.11.99 – 03.12.99 University of Oxford
<i>J. M. Gambaudo</i>	Differential Geometry, 07.11.99 – 19.11.99 Université de Bourgogne
<i>G. Méndes</i>	Differential Geometry, 07.11.99 – 28.11.99 Université de Bourgogne
<i>M. Lagrange</i>	Differential Geometry, 08.11.99 – 19.11.99 Université de Bourgogne
<i>L. Meerseman</i>	Differential Geometry, 08.11.99 – 24.11.99 Université de Rennes
<i>A. Verjovsky</i>	Differential Geometry, 10.11.99 – 15.12.99 Universidad Nacional Autónoma de México
<i>A. Candel</i>	Differential Geometry, 15.11.99 – 05.12.99 Caltech University
<i>W. Chacholski</i>	Algebraic Topology, 28.11.99 – 18.12.99 Yale University
<i>J. Seade</i>	Differential Geometry, 30.11.99 – 14.12.99 Universidad Nacional Autónoma de México
<i>F. Sánchez-Bringas</i>	Differential Geometry, 01.12.99 – 15.12.99 Universidad Nacional Autónoma de México

5 Scientific Activities

5.1 Semester on Analysis

Under the scientific supervision of professor A. Nicolau of the UAB, the CRM organised a Semester on Analysis held from January 10 to July 17, 1999.

This semester was partially supported by the CIRIT (ACES98-20/2) and by the DGESeIC (CO97-0418).

The activities of the Semester were focused on the following research areas: Harmonic analysis with non-doubling measures. Theorems T(1) and T(b). Weights and BMO for non-doubling measures. Self-improving inequalities. Boundary behaviour of non harmonic functions and their area function. Subgaussian estimates. Sampling and interpolation theorems on function spaces. Extremal problems for quasiconformal mappings. Extremal dilatations and doubling measures.

The following lectures were given:

- J. J. Donaire, *Porositat Zygmund d'un compacte.*
- X. Massaneda, *Interpolació per espais de funcions enteres.*
- P. Koskela, *Lusin's condition N for homeomorphisms.*
- J. Kuhanen, *Lusin's condition N.*
- L. Vega, *El problema de valores iniciales para la ecuación de Korteweg-de Vries: resultados negativos.*
- P. Thomas, *Sampling sets for Hardy spaces.*
- H. Pajot, *Analysis on the boundary of hyperbolic building.*
- C. Puente, *Antenas fractals.*
- A. Olevskii, *Homeomorphisms of the circle and Fourier expansions: some old and new results.*
- C. Pérez, *Poincaré=Sobolev=BMO.*
- K. Dyakonov, *Coinvariant subspaces of the shift operator in H^p .*
- P. Paramonov, *Approximation by entire solutions of elliptic equations on closed sets in R^n . Applications.*
- L. Aizenberg, *Duality in complex analysis.*
- M. Cerne, *Perturbations of analytic varieties.*
- J. Duoandikoetxea, *Normas mixtas y operadores direccionales.*
- K. Fedorovski, *On uniform approximation of functions by solutions of second order elliptic equations on plane compacts.*
- S. Treil, *Singular integrals and a problem in robust control.*
- D. Cruz-Uribe, *The minimal operator, the geometric maximal operator and properties of doubling measures.*
- D. Varolin, *General shears and automorphisms of the affine 2-quadric.*
- A. Stray, *Joint approximation in the Dirichlet space.*
- J.-M. Wu, *Boundary Harnack principle and Martin boundaries for symmetric stable processes.*

- R. Kaufman, *Sobolev spaces, dimensions and random series.*
- C. Sadosky, *A scale of BMOs in the polydisk.*
- K. Seip, *Weighted Paley-Wiener spaces.*
- P. Ahern, *On the zeros of holomorphic vector field.*
- M. Flores, *On complete holomorphic vector fields.*
- D. Marshall, *Angular distribution of mass by Bergman functions.*
- H. Farag, *The Besicovitch 1/2-problem.*
- Y. Lyubarskii, *Complete interpolating sequences for the Fourier transforms supported by symmetric convex polygons.*
- V. Caselles, *Topographic maps, connected operators and applications to image processing.*
- C. Pereyra, *Divergence free multi-wavelets.*
- J. Duval, *Rational and polynomial envelopes and their structure* (8 sessions).

5.2 Mathematics and education: Principles and state of the art

The Professor Guida de Abreu, from the University of Luton, gave a course on Mathematics Education from February 8 to 10. The course was organised by the CRM, together with the Mathematics Education Department of the UAB and the Association of Mathematics Teachers of the Maresme. It was coordinated by N. Gorgorió (UAB) and partially supported by the CIRIT (CC-00016).

The following lectures were given:

- *Contextos, interaccions i aprenentatge matemàtic.*
- *Aprenentatge matemàtic dins i fora de l'escola des d'una perspectiva cultural.*
- *Aprenentatge matemàtic en una escola multiètnica: explorant les perspectives de l'alumne, el professor i els pares.*

5.3 VI Encuentro de Topología

From March 5 to 6, 1999, the *VI Encuentro de Topología* took place at the Universitat de les Illes Balears. The organising committee was formed by professors M. Castellet (CRM), A. Murillo (Universidad de Málaga) and J. A. Crespo (Universitat de les Illes Balears). 50 researchers from all Spain attended the meeting. This meeting was partially supported by the DGESeIC (CO97-0417) and the Universidad de Málaga.

The following plenary lectures were given:

- J. A. Crespo, *Estructura de H -espacios módulo p con cohomología finitamente generada.*
- W. Dicks, *Hyperbolic punctured-torus bundles.*
- A. Gómez Tato, *Invariantes de Hopf-Ganea y categoría débil de Lusternik-Schnirelmann.*
- M. Izquierdo, *Formas reales de una curva algebraica de género par.*
- V. Muñoz, *Conjetura de Atiyah-Floer.*
- J. J. Nuño, *Propiedades topológicas de hipersuperficies genéricas.*
- M. Bruguera, *Complejidad en grupos localmente cuasi-converjos.*
- C. Casacuberta, *Sobre la existencia de equivalencias cohomológicas universales.*
- N. Castellana, *Una construcción homotópica de la representación adjunta.*
- F. J. Díaz, *Categorías de homotopía esférica.*
- L. Español, *Lógica y convergencia: doble negación y topología canónica en monoides relacionados con la convergencia de sucesiones.*
- J. I. Extremiana, *Secciones de Postnikov en el infinito.*
- L. Fernández, *Espacios cuasi-proyectivos y categoría de $S_p(3)$.*
- J. M. García, *Homologías para la categoría de los espacios exteriores.*
- J. A. Garvín, *Acotaciones de la nilpotencia de autoequivalencias de homotopía fibrada.*
- L. Lechuga, *Problemas de decisión y el funtor Ext .*
- M. Macho Stadler, *Correspondencias de grupoides.*
- M. T. Rivas, *Secciones de Postnikov en el infinito.*
- J. L. Rodríguez, *Localizaciones de grupos finitos simples.*
- J. I. Royo, *Sucesión de Gysin.*
- M. Salami, *Homotopía generalizada en categorías de cofibraciones.*
- J. Scherer, *Espacios celulares y su grupo fundamental.*

The following posters were presented:

- G. Bastardas, *Una construcción homotópica idempotente usando grupos simpliciales.*

5.4 The Fifth International Seminar on the Mathematical Analysis of Algorithms

From June 14 to 18, 1999 the CRM organised The Fifth International Seminar on the Mathematical Analysis of Algorithms. The organising committee was formed by professors P. Flajolet (INRIA Rocquencourt), H. M. Mahmoud (George Wahsington University), C. Martínez (UPC), H. Prodinger (University of the Wit-

watersrand), R. Sedgewick (Princeton University), W. Szpankowski (Purdue University). 52 researchers from all over the world attended the meeting.

This meeting was partially supported by the CIRIT (ARCS99-9) and the Universitat Politècnica de Catalunya (UPC).



The following lectures were given:

- R. Arratia, *Euler circuits, DNA sequencing by hybridization, and a new graph polynomial that counts Euler circuit decompositions.*
- R. Brent, *Revisiting the binary Euclidean algorithm.*
- P. Chassaing, *Phase transition for parking blocks, Brownian excursion and coalescence.*
- W.-M. Chen, *Generalized heap recurrence and its applications to the analysis of algorithms.*

- K. Compton, *Densities of partition sets in number systems.*
- L. Devroye, *Random multidimensional search trees.*
- M. Drmota, *Systems of functional equations and patterns in random trees.*
- J. A. Fill, *Explicit bounds on the distribution of runtime for Quicksort.*
- P. Flajolet, *A general analysis of trie structures.*
- M. Hofri, *An efficient algorithm for the approximate median selection problem.*
- H.-K. Hwang, *Distribution of the number of consecutive records in random permutations.*
- P. Jacquet, *Optimality of pattern matching predictors.*
- S. Janson, *Linear probing hashing, parking, random forests, Brownian excursions, etc.*
- M. Karonski, *On the distributed complexity of computing maximal matchings.*
- R. Kemp, *On leftist simply generated trees.*
- C. Krattenthaler, *An algorithm for the random generation of plane partitions and rhombus tilings.*
- J. Liebehenschel, *Ranking and unranking of a generalized Dyck language and the application to the generation of random trees.*
- G. Louchard, *Analytic variations on the Airy distribution.*
- G. Lugosi, *A new concentration inequality.*
- H. Mahmoud, *On generalized Pólya urn models.*
- J.-F. Marckert, *Tight bounds for the moments of the width of rooted labeled trees.*
- C. Martínez, *Systems of divide and conquer recurrences.*
- M. Nebel, *Further results on the stack-size of trees.*
- R. Neininger, *Limit laws for partial match queries in random trees.*
- D. Panario, *Smallest components in random combinatorial structures.*

5.5 Joint Conference of the 5th Barcelona Logic Meeting and the 6th Kurt Gödel Colloquium

From June 16 to 19, 1999 the Joint Conference of the 5th Barcelona Logic Meeting and the 6th Kurt Gödel Colloquium, organised by the CRM together with the Kurt-Gödel-Society, took place at the *Casa de la Caritat*, Barcelona. The organising

committee was formed by professors E. Casanovas (UB), R. Farré (UPC), R. Jansana (UB) and V. Verdú (UB). The scientific committee consisted of professors M. Baaz (Technische Universität Wien), E. Casanovas (UB), R. Farré (UPC), R. Jansana (UB),

A. Leitsch (Technische Universität Wien), H. Veith (Technische Universität Wien) and V. Verdú (UB). 63 researchers from all over the world attended the meeting.

The meeting was partially sup-

ported by the Kurt-Gödel-Society, the DGESeIC (CO97-0453), CIRIT (ARCS99-8), UPC, Universitat de Barcelona (UB) with the contribution of the *Diputació de Barcelona*.



The following plenary lectures were given:

- V. Danos, *Sequent calculus and continuation passing style compilation.*
- L. van den Dries, *Making model theory more intrinsic.*
- M. Foreman, *Partition relations for successor cardinals.*
- I. Juhasz, *Cardinal sequences of locally scattered spaces.*
- B. Kim, *Hyperimaginaries and definability.*
- L. Libkin, *Embedded finite models and constraint databases.*
- A. Macintyre, *Vapnik-Chervonenkis dimension and measure theory in model theory of fields.*
- H. Ono, *Algebraic analysis of logics without the contraction rule.*
- D. Pigozzi, *The algebraic theory of Gentzen calculi: an abstract algebraic logic approach.*
- J. P. Ressayre, *Computer science and the fine structure of Borel sets.*

Other lectures given:

- D. Asperó, *Strong versions of bounded forcing axioms.*
- A. Avron, *On the expressive power of three-valued and four-valued languages.*
- A. Avron, *Safety and limitation of size in query languages, and in set theory.*
- M. Baaz, *Term induction.*
- A. Berarducci, *Intersection theory for o-minimal manifolds.*
- W. Carnielli, *Modulated logics and uncertain reasoning.*
- W. DePauli-Schimanoric, *Calculus of winning.*
- C. Fermüller, *A new type of analytic calculi.*
- A. Fernández-Margarit, *A hierarchy for $\Delta_n + 1(T)$ -induction.*
- J. Flum, *Model theory and parametrized complexity.*
- J. M. Font, *Combining modality and four-valuedness: an abstract algebraic logic approach.*
- A. J. Gil, *Multseq: Sequents, equations, and beyond.*
- M. C. Graciani, *Initial segments maximal σ_n -definable sets in fragments of arithmetics.*
- K. Hauser, *Gödel's program revisited.*
- J. Hernández-Orallo, *Unified information Gain measures for inference processes.*
- A. J. Hurkens, *The relation $\mathcal{P}(x \cap y) \subseteq y$ is well-founded.*
- M. Junker, *On equational theories.*
- B. Konikowska, *Introducing a third logical value into reasoning about concurrency.*
- P. Kowalski, *Stable groups and algebraic groups.*
- F. F. Lara Martín, *A hierarchy for $\Delta_n + 1(T)$ -induction.*
- P. Larson, *A maximal model for $H(\omega_2)$.*
- J. López, *Weakly-Ramsey sets in Banach spaces.*
- G. Moser, *Term induction.*
- M. Pérez, *Initial segments maximal σ_n -definable sets in fragments of arithmetics.*
- D. Pierce, *Differential fields and model completions.*
- N. Preining, *How many points fit on a sphere? A logical analysis of Schütte's proof.*
- A. Romero, *Initial segments maximal σ_n -definable sets in fragments of arithmetics.*
- J. M. Sagüillo, *Omega-arguments in the formalisms of Gödel, Peano and Whitehead-Russell.*
- G. Salzer, *Multseq: Sequents, equations, and beyond.*
- F. Sancho, *Initial segments maximal σ_n -definable sets in fragments of arithmetics.*
- A. Ursini, *Positive classical logic.*

5.6 Semester on Geometry

Under the scientific supervision of professor M. Nicolau of the UAB, the CRM organised a Semester on Geometry, held from October 1 to December 20, 1999.

This semester was possible due to the contribution of the network of the European Union *Singularités d'équations différentielles et feuilletages* that consists of research groups of the universities of Lisboa, Valladolid, Universitat Autònoma de Barcelona (UAB), Toulouse, Rennes, Dijon, Limburg. The semester was partially supported by the CIRIT (ACES99-00021).

The activities of the Semester were focused on the following two research areas: geometry of complex manifolds and the theory of holomorphic foliations and singularities. The dynamical aspects relating these themes were specially emphasized. Some of the topics considered were: Rigid geometric structures, entire curves in algebraic surfaces, construction of non-algebraic complex manifolds, holomorphic foliations in complex surfaces, singularities of complex differential equations, topological rigidity and moduli problems for holomorphic foliations, holomorphic Lie group actions, automorphisms groups of complex manifolds, Kleinian groups, laminations.

The lectures given during the semester were:

- C. Tarquini, *Feuilletages transversalement conformes*.
- H. Kitahara, *On a de Rham cohomology associated with Riemannian foliations*.
- S. Lamy, *Densité d'orbites pour des groupes d'automorphismes de \mathbf{C}^2* .
- G. Solanes, *Geometria integral conforme*.
- S. Lamy, *Automorphismes polynomiaux de \mathbf{C}^3 préservant une forme quadratique*.
- E. Paul, *Cohomologie relative d'une singularité de type noeud-col*.
- A. El Kacimi, *Sur le problème de Cousin basique pour les feuilletages transversalement holomorphes*.
- D. Marín, *Problemas de módulos para una clase de formas diferenciales en el plano complejo*.
- B. Deroin, *Majoration de la dimension du groupe d'automorphismes d'une variété complexe compacte homogène, d'après Akhiezer*.
- T. Zamfirescu, *Patological properties of convex surfaces*.
- J. J. Loeb, *Enveloppes d'holomorphic de domaines invariants par $\mathbf{SL}(2, \mathbf{Z})$* .
- F. Loray, *Construction de champs de vecteurs rationnels stablement chaotiques sur \mathbf{CP}^n* .
- M. McQuillan, *Mori theory of foliations*.
- L. G. Méndes, *Bounding the degree of solutions to Pfaff equations*.

- J. M. Gambaudo, *On the dynamics of minimal Cantor sets.*
- S. Dumitrescu, *Structures géométriques holomorphes et isométries locales.*
- B. Deroin, *Des exemples de variétés complexes compactes tres homogènes.*
- M. Lagrange, *Topological lower bounds on the distance to identity between area preserving diffeomorphisms.*
- E. Ghys, *Osculating circles and conics.*
- A. Verjovsky, *Kleinian groups.*
- L. Meersseman, *Fibrés principaux en tores au dessus des variétés toriques projectives.*
- A. Candel, *Generic geometry of leaves.*
- A. Candel, *Introducción a las medidas armónicas.*
- A. Verjovsky, *Estructuras exóticas de R^4 y conjeturas de Poincaré.*
- F. Sánchez-Bringas, *Vector fields on singular surfaces which admit a C^* action.*
- J. Seade, *Clases características para variedades singulares.*

5.7 CRM Advanced Courses

This year for the fifth 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 1999 the following courses were given:

Advanced Course on Mathematical Aspects of Image Processing: from July 6 to 16, 1999, coordinated by J. Bruna (UAB) and J. Saludes (Centre de Visió per Computador) and lectures given by:

- **V. Caselles, J. M. Morel** (Universitat de les Illes Balears; É. N. S., Cachan. *Mathematical models in image processing* (18 hours).

The role of partial differential equations in image processing was explained by the modelling of some basic problems: image contrast, invariant smoothing, image interpolation and classification of non linear filters. Applications were given to image intersection, denoising and disocclusion, shape analysis, image interpolation and deblurring.

- **J. Serra** (École de Mines, Paris) *Mathematical morphology* (12 hours).

Two aspects of mathematical morphology were presented. The first one, morphological filtering, involved idempotent operators on complete lattices and connected operators. The second aspect dealt with segmentation based on the watershed approach. Both aspects were then associated to multimedia applications (indexation, tracking, compression).

- **S. Mallat, Y. Meyer** (École Polytechnique, Palaiseau; É. N. S., Cachan) *Signal processing with wavelets* (18 hours).

The wavelet transform, the wavelet orthonormal bases associated to multiresolution approximations and their relation with filter banks were presented. Applications were given to edge detection, image compression, denoising and their relation with approximation theory (linear and nonlinear) and the theory of minimax estimation.

100 researchers and postdoctoral students attended the course and it was supported by the European Commission with the Training and Mobility of Researchers Programme (contract n. ERBFMMACT980428) and by the CIRIT (CC99-2).

Advanced Course on Integral Geometry: from September 15 to 23, 1999, coordinated by E. Gallego and A. Reventós of the UAB, and lectures given by:

- **R. Langevin** (Université de Bourgogne, Dijon) *Introduction to Integral Geometry* (12 hours).

The course consisted in a survey of three periods of integral geometry:

the birth of geometric probabilities, local riemannian invariants and their relations with projections and sections, integral geometry and topology. The main part of the course was concerned with theorems of the form “topology implies geometry”. The last part was devoted to questions and first results in conformal integral geometry.

- **R. Schneider** (Albert-Ludwigs-Universität, Freiburg). *Integral Geometry —measure theoretic approach and stochastic applications* (12 hours).

Integral geometry, as it is understood here, is concerned with the computation and application of mean values arising from the interaction of fixed and moving geometric objects. The course developed the local integral geometry of convex bodies and polyconvex sets for the Euclidean motion group including the principal kinematic formula and the Crofton formulas for curvature measures, and described applications in stochastic geometry, in particular to random sets and particle processes.

40 researchers and postdoctoral students attended the course and it was partially supported by the DGE-SeIC (CO97-0456) and the CIRIT (CC99-3).

5.8 Other Lectures and Seminars

January

- K. Barański, *Brennan's conjecture and the Mandelbrot set.*
- J. M. Peris, *Grups discrets lliures i dinàmica caòtica en teoria de Galois diferencial.*
- J. C. Tougeront, *Classes de fonctions et developements asymptotiques.*
- A. Tonks, *Operades.*
- F. Gautero, *Dynamical 2-complexes and free-group automorphisms.*
- A. El Kacimi, *Cohomologie des formes automorphes pour un groupe kleinéen élémentaire.*
- I. Gálvez, *El gènere el·líptic com a mòdul sobre una àlgebra de vèrtexs* (3 sessions).
- J. C. Tatjer, *Difeomorfismes dissipatius en dimensió 3 amb tangències homoclíniques.*
- X. Buff, *Julia sets in parameter planes.*
- J. Porti, *Geometries a la Thurston* (2 sessions).
- J. Llibre, *Nous resultats sobre la teoria de la integrabilitat de Darboux.*
- J. Llibre, *Sobre les diferents proves del Teorema de Pitàgores.*
- I. Jané, *Origen i ús dels ordinals en cantor.*
- V. Navarro, *Variacions d'estructures de Hodge mixtes unipotents i el teorema de Hain-Zucker.*
- J. Wildeshaus, *Polylogarithms* (5 sessions).
- J. Scherer, *Espacios de torsión y celularización de grupos.*
- J. Girbau, *Estabilitat per linealització de les equacions d'Enstein en els models de Robertson-Walker* (2 sessions).
- A. Gasull, *Llibre d'en Roussarie I: Un exemple de "versal unfolding".*
- X. Xarles, *El teorema de Hain-Zucker per a feixos 1-àdics mixtes unipotents.*
- P. Hell, *Generalizations of Matching.*
- J. L. Rodríguez, *Localitzacions de grups finits simples.*

February

- J. Seade, *Grupos kleinianos en espacios proyectivos.*
- C. Simó, *Simultaneous binary collisions in the planar four body problem.*
- J. Seade, *Libros abiertos: singularidades reales con una fibración de Milnor.*
- C. Casacuberta, *Reticles i àlgebres de Kac-Moody generalitzades.*
- D. Garba-Belko, *Cohomologia relative de formes non exceptionelles.*

March

- C. Camacho, *Una fórmula de índices para campos de vectores holomorfos.*
- C. Bodelon, *Dinàmica simbòlica per superfícies hiperbòliques d'àrea finita.*
- R. Jansana, *Bisimulacions: lògica modal i lògica de primer ordre.*
- P. Pascual, *Teoria K i reguladors.*
- P. Hell, *List partitions.*
- B. Karpinska, *Cantor bouquets for exponential maps.*

- J. Villadelprat, *Conjunts periòdics límits*.
- M. Fornasiero, *the projective version of Malcomson's theorem*.
- J. Serra-Sagristà, *On coordination sequences and ν series of lattices*.
- J. I. Burgos, *La conjectura de Zagier*.
- J. Villadelprat, *Un teorema de Poincaré-Hopf per varietats no compactes*.
- L. Perko, *Limit cycles for bounded quadratic systems*.
- E. Freire, *On the triple zero degeneracy*.
- E. Ponce, *Some generic limit cycle bifurcations in planar piecewise linear systems*.
- C. Simó, *Simultaneous binary collisions in the planar four body problem. Regularity of the regularization in the cases reducible to 1D*.
- P. Koskela, *Quasiconformal mappings in Mathematics*.
- J. M. Font, *Sobre una lògica modal a quatre valors amb interpretació epistèmica*.
- L. Schwartz, *The cohomology of spaces and the Krull filtration of the category U* .
- P. Malliavin, *Tangent processes and theirs applications*.
- J. Oesterlé, *Torsion of elliptic curves over number fields*.
- M. Nicolau, *Curvatura i singularitats complexes*.
- X. Cabré, *Equacions lineals de la calor amb potencials singulars: existència i explosió instantània de solucions*.
- I. Permanyer, *Una generalització del teorema d'Hurewicz*.

April

- W. Malfait, *Anosov diffeomorphisms on (infra-)nilmanifolds*.
- J. Minguillon, *A progressive classification scheme for document layout recognition*.
- Cl. Valls i A. Pumariña, *Splitting of separatrices for a "wide" open set of frequencies*.
- J. Porti, *Introducció a les varietats geomètriques de dimensió tres*.
- G. Solanes, *Conjunts convexos al pla hiperbòlic*.
- P. Le Calvez, *Indices of the iterate of an homeomorphism of the plane at a fixed point*.
- J. Villadelprat, *Limit periodic sets*.
- M. Mathieu, *What is non-commutative functional analysis about?*.
- J. Rifà, *Quantum computing and quantum error-correcting codes*.
- J. C. Martínez, *Cuestiones de consistència sobre espacios inicialmente compactos*.
- S. Chesley, *Close earth approaches of asteroids. Resonant and nonresonant returns*.
- T. M. Seara, *Matching complex i mètodes KAM en el càlcul del domini d'analiticitat de corbes invariants*.
- J. Porti, *Varietats de Seifert*.
- S. Kolyada, *Topological entropy of maps on function spaces*.
- L. Snoha, *On minimal dynamical systems*.

- J. López, *Weakly-Ramsey sets in Banach spaces*.
- A. N. Sharkovskii, *Boundary value problems and dynamical systems*.
- A. Teruel, *Blowing up and quasi-homogeneous blowing up of singularities for planar vector fields*.
- J. López, *Weakly-Ramsey sets in Banach spaces*.
- G. Bastardas, *La geometria \mathbb{S}^3* .
- J. Torregrosa, *La ciclicitat dels focus dèbils i dels centres*.
- E. Ventura, *Interseccions de subgrups fixos d'un grup lliure finitament generat*.
- J. Bagaria, *On the consistency of "every set is weakly-ramsey"*.
- C. Seara, *Separabilidad de objetos en el plano*.
- F. Chazal, *Un teorema de extensión de aplicaciones meromorfas*.

May

- M. Farré, *Moviment brownià i edp's*.
- M. A. Teixeira, *Hopf 0 bifurcation of reversible vector fields*.
- A. Teruel, *Teorema de desingularización de Dumortier*.
- J. López, *Determinacy and weakly-Ramsey sets in Banach spaces*.
- S. Tindel, *Integral forward i espai de llacets*.
- J. Porti, \mathbb{R}^3 .
- S. Dumitrescu, *Holomorphic geometric structures on complex compact manifolds*.
- J. A. Rodríguez, *Coexistencia y persistencia de infinitos atractores extraños*.
- R. Ortega, *Puntos fijos estables y aislados de transformaciones que conservan áreas*.
- R. Benazic, *Singularidades dicríticas de un campo vectorial holomorfo*.
- I. Permanyer, *Les geometries $\mathbb{S}^2 \times \mathbb{R}$ i $\mathbb{H}^2 \times \mathbb{R}$* .
- K. Barański, *Iteration of cubic rational maps, bifurcations of the Mandelbrot-like sets*.

- J. L. Rodríguez, *La geometria Nil*.
- J. Burillo, *Mètriques i subgrups quasi-isomètrics dels grups de Thompson*.
- R. Jansana, *Dualitat de Priestley per a les àlgebres modals positives*.
- M. Manjarín, *La geometria \widetilde{SL}_2* .
- J. Llibre, *On the weakened 16th Hilbert problem (2 sessions)*.
- J. Torregrosa, *La ciclicitat dels centres*.

June

- B. Bowditch, *Planar groups*.
- A. Puiggené, *An introduction to Turbo Codes*.
- S. Skiena, *Jai-Technology: Computers, Gambling, and mathematical modeling to Win*.
- M. Kirkilionis, *Structured population models in technical applications*.
- J. J. Gutiérrez, *La geometría Sol*.
- A. Delshams i T. Guillamon, *Funcions de Melnikov i integrals abelianes*.
- J. Hortalà, *L'àmbit conceptual de la Borsa de Valors*.
- X. Vicente, *Valoració d'opcions financeres*.

- R. J. Flores, *La geometría \mathbb{H}^3* .
- A. Guillamon, *Integrals abelianes*.
- F. Mañosas, *Condicions de LaSalle per estabilitat assimptòtica global per a sistemes dinàmics, discrets i continus*.
- A. Viruel, *Grupos finitos e invariantes de Dickson*.
- A. Alegre, *La investigación en matemática actuarial*.
- M. Vinyals, *Los principales retos del sector asegurador*.
- M. Dyachenko, *Hardy-Littlewood inequalities in the multi-dimensional case*.
- J. Bagaria, *Reflection in set theory*.
- H. Morton, *Interplay between knot theory and algebra*.
- F. X. Dehon, *BP-cohomology of mapping spaces from BS^1* .
- J. González, *Llei del logaritme iterat i funció d'àrea*.
- D. Asperó, *A maximal bounded forcing axiom*.

July

- A. Adem, *Periodicidad, clases de Euler y acciones de grupos*.
- N. Kitchloo, *Uniqueness of trivial spherical fibrations over $BSO(3)$* .
- P. Huovinen, *The existence of principal values for singular integrals and rectifiability*.
- A. Kohatsu, *Modelització d'actius i algunes de les seves conseqüències*.
- H. R. Morton, *Some knot theoretical constructions related to field theories*.
- E. Casanovas, *Hiperimaginarios* (2 sessions).

September

- M. Mathieu, *Ten years of local multipliers*.
- I. Verbitsky, *The best constant for the Riesz projection*.
- Y. Brudnyi, *Geometry arising from Whitney's extension problem*.
- J. Flum, *Descomposiciones arbóreas y lógica*.

October

- Y. Rudyak, *Category weight: new ideas concerning Lusternik-Schnirelmann category*.
- S. Yakovenko, *Oscillation of trajectories of polynomial vector fields and tangential Hilbert 16th problem*.

November

- M. Mimura, *The twisted tensor product and its application to the cohomology of finite Chevalley groups*.
- F. Romero Ruíz del Portal, *Índice de punto fijo en hiperespacios: un índice tipo Conley para sistemas dinámicos discretos*.
- A. Nicolau, *Regularitat de mesures doblants*.
- J. Llibre, *Sobre les òrbites periòdiques del problema $3x + 1$* .
- V. Mañosa, *L'estructura de l'aplicació de transició associada a una sella hiperbòlica*.

- J. Gutiérrez, *Axiomes per a l'homotopia estable*.
- M. J. Carro, *Interpolación y extrapolación de desigualdades modulares*.
- A. Gasull, *Cicles límit d'una pertorbació d'un centre isòcron via el mètode de Petrov*.
- J. López, *Teorema de Hindman y conjuntos w -Ramsey en C_0* .
- G. Bastardas, *Categories derivades*.
- J. Orobitg, *Pesos per a mesures no doblants en \mathbf{R}^n* .
- J. Llibre, *Uniqueness of algebraic limit cycles of degree 4 for quadratic systems* (2 sessions).
- R. Prohens, *Equacions diferencials amb una línia de discontinuïtats*.
- R. Farré, *Teoria de Galois*.
- J. R. Hubbuck, *$\Omega Sp(4)$. Is it stably indecomposable?*.
- A. Gulisashvili, *Smoothing properties of Schrodinger semigroups*.
- A. O'Farrell, *Pervasive function spaces*.
- V. Mañosa, *Estabilitat d'una classe de policicles no acotats*.
- V. Sokolov, *Symmetry approach to classification of integrable PDEs*.

December

5.9 Publications

During the year 1999 the CRM has continued the three series of publications, *Preprints*, *Conferències* and *Quaderns*.

PREPRINTS. During this year, 32 preprints have been published:

- *The rank three case of the Hanna Neumann Conjecture*. W. Dicks, E. Formanek (n. 400).
- *Stability of Hilbert points of generic $K3$ surfaces*. I. Morrison (n. 401).
- *Some unexpected properties of limit cycles of quadratic systems in the plane*. L. A. Cherkas, S. I. Dovnar (n. 402).
- *A note on Fourier multipliers and Sobolev spaces*. V. Olevskii (n. 403).
- *Embeddings of DI_2 in F_4* . C. Broto, J. M. Møller (n. 404).
- *Sharp two-weight, weak-type norm inequalities for singular integral operators*. D. Cruz-Uribe, SFO, C. Pérez (n. 405).
- R. Farré, *Teoria de Galois imaginària*.
- A. Tonks, *Mòduls sobre l'espectre de les esferes*.
- W. Chachólski, *Projective spaces and Bousfield localizations*.
- J. J. Carmona, *Aproximació per polinomis en z i z conjugat*.
- F. Mañosas, *Equacions diferencials lineals en temps complexe* (2 sessions).
- F. X. Dehon, *Espectres simètrics*.
- J. Ortega Cerdà, *Sèries de Fourier no harmòniques*.
- E. Casanovas, *El grupo de Lascar*.

- *Localizations associated to semidirect products.* J. L. Rodríguez, D. Scevenels (n. 406).
- *Cellular approximations using Moore spaces.* J. L. Rodríguez, J. Scherer (n. 407).
- *Dynamical CW-complexes.* F. Gautero (n. 408).
- *Two-weight, weak-type norm inequalities for fractional integrals, Calderón-Zygmund operators and commutators.* D. Cruz-Uribe, SFO, C. Pérez (n. 409).
- *Exceptional sets for definition of quasiconformality.* S. Kallunki, P. Koskela (n. 410).
- *Polynomial systems: a lower bound for the weakened 16th Hilbert problem.* Chengzhi Li, Weigu Li, J. Llibre, Zhifen Zhang (n. 411).
- *Linear estimation of the number of zeros of Abelian Integrals for some cubic isochronous centers.* Chengzhi Li, Weigu Li, J. Llibre, Zhifen Zhang (n. 412).
- *Bifurcation of limit cycles from quadratic isochronous centers.* Chengzhi Li, Weigu Li, J. Llibre, Zhifen Zhang (n. 413).
- *Radial growth of solutions to Poisson equation.* M. J. González, P. Koskela (n. 414).
- *On uniform approximation by polyanalytic polynomials and the Dirichlet problem for bianalytic functions.* J. J. Carmona, K. Yu. Fedorovski, P. V. Paramonov (n. 415).
- *Field theory and the cohomology of some Galois groups.* A. Adem, W. Gao, D. B. Karagueuzian, J. Mináč (n. 416).
- *On realizability of branched coverings of the sphere.* K. Barański (n. 417).
- *On the cohomology of Galois groups determined by Witt rings.* A. Adem, D. B. Karagueuzian, J. Mináč (n. 418).
- *Smallness sets for bounded holomorphic functions.* A. Nicolau, J. Pau, P. J. Thomas (n. 419).
- *The cohomology of the Sylow 2-subgroup of the Higman-Sims group.* A. Adem, J. F. Carlson, D. B. Karagueuzian, R. J. Milgram (n. 420).
- *On spaces of self homotopy equivalences of p -completed classifying spaces of finite groups and homotopy group extensions.* C. Broto, R. Levi (n. 421).
- *Fully adequate Gentzen systems and the deduction theorem.* J. M. Font, R. Jansana, D. Pigozzi (n. 422).
- *Chebyshev property of complete elliptic integrals and its application to abelian integrals.* A. Gasull, W. Li, J. Llibre, Z. Zhang (n. 423).
- *Center-focus and isochronous center problems for discontinuous differential equations.* B. Coll, A. Gasull, R. Prohens (n. 424).
- *Divergence-free multiwavelets on rectangular domains.* J. Lakey, M. C. Pereyra (n. 425).
- *One dimensional sets and planar sets are aspherical.* J. W. Cannon, G. R. Conner, A. Zastrow (n. 426).
- *Univalent Baker domains.* K. Barański, N. Fagella (n. 427).
- *Polynomial first integrals of quadratic systems.* J. Llibre, X. Zhang (n. 428).

- *On the number of limit cycles for some perturbed Hamiltonian polynomial systems.* J. Llibre, X. Zhang (n. 429).
- *Topological phase portraits of planar semi-linear quadratic vector fields.* J. Llibre, X. Zhang (n. 430).
- *Structures exotiques de \mathbb{R}^4 et conjectures de Poincaré.* L. Meersseman, A. Verjovsky (n. 431).

CONFERÈNCIES. The fourth volume of this series has been published. It compiles the extended abstracts of

the lectures and seminars given at the CRM during the year 1998.

QUADERNS. They compile the content of specialized activities. The following volumes have been published:

- *VI Encuentro de Topología.*
Editor: J. Aguadé (n. 14).
- *Semester on Algebraic Topology.*
Editor: J. Aguadé (n. 15).
- *Advanced Course on Integral Geometry.* Editor: E. Gallego, A. Reventós (n. 16).

6 Ferran Sunyer i Balaguer Prize

The International Ferran Sunyer i Balaguer Prize was announced this year for the eighth 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 1.800.000 pta and the winning monograph is published by Birkhäuser Verlag in the “Progress in Mathematics” series.

In the 1998 announcement, 15 monographs by authors from different countries were submitted. The scientific Committee consisting

of Professors Friedrich Hirzebruch (Max-Planck Institut, Bonn), Paul Malliavin (Université de Paris VI), Joseph Oesterlé (Université de Paris VI), Joan Solà Morales (Universitat Politècnica de Catalunya) and Alan Weinstein (University of California at Berkeley) recommended that the Foundation should award the prize to the monograph:

Braids and self-distributivity

by P. DEHORNOY (Université de Caen).

7 Finances

7.1 Institutionals awards

7.1.1 Visiting professors on sabbatical leave

Ph. N. Anh	11.11.98 – 31.07.99
I. Morrison	01.01.99 – 31.12.99
P. Paramonov	01.02.99 – 31.08.99

7.1.2 Visiting professors DGU

P. Ahern	01.06.99 – 10.07.99
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7.1.3 Grants for foreign scientists and technologists DGESeIC

P. Koskela	01.01.99 – 31.12.99
X. Zhang	01.03.99 – 31.03.01

7.1.4 Postdoctoral fellowships

In December 1998, the CRM announced two postdoctoral fellowships available to young doctors with less than 3 years of postdoctoral research. 39 applications were submitted. Fellowships were awarded to:

J. Scherer	01.09.98 – 31.07.99
J. A. Crespo	01.09.99 – 31.08.00

The European Commission assigned a Marie Curie postdoctoral grant to F. Gautero from 01.10.98 to 30.09.99 through the Department of Mathematics of the UAB.

7.1.5 Organisation of Conferences and Seminars

Semester on Analysis (CIRIT¹, DGESeIC²).

Mathematics and education: Principles and state of the art (CIRIT).

VI Encuentro de Topología (DGESeIC, Universidad de Málaga).

The Fifth International Seminar on the Mathematical Analysis of Algorithms (DGESeIC, CIRIT).

Joint Conference of the 5th Barcelona Logic Meeting and the 6th Kurt Gödel Colloquium (Kurt-Gödel-Society, DGESeIC, CIRIT, UPC, UB).

Advanced Course on Mathematical Aspects of Image Processing (EU³ CIRIT, FCR⁴, UAB).

Advanced Course on Integral Geometry (DGESeIC, CIRIT).

Semester on Geometry (EU, CIRIT).

¹Comissió Interdepartamental de Recerca i Innovació Tecnològica, Catalan Government.

²Dirección General de Enseñanza Superior e Investigación, Spanish Government.

³European Union.

⁴Fundació Catalana per a la Recerca.

7.2 Budget

Founding sources

	PTA
CIRIT	15.000.000
DGESeIC	20.625.000
Generalitat (applications)	5.600.000
EU	4.159.650
UAB (facilities)	3.500.000
UAB (activities)	361.000
Foundation FSB	1.800.000
Kurt-Gödel-Society	597.000
Registration fees	4.010.578
Others	248.510
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Total	55.901.738

Expenditure

	PTA
Travels	817.957
Visitors	10.544.403
Postdoctoral grants	8.474.396
Conferences and courses	5.406.759
Maintenance	3.500.000
Accommodation	8.507.030
Long-term material	3.077.779
Day-to-day material	820.420
Secretariat	9.934.478
Director	1.000.000
Publications	1.219.816
Prizes	1.800.000
Miscellaneous	798.700
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Total	55.901.738