

Curriculum Vitae

Name : Alejandro Maass
Date and Place of Birth : November 11, 1965, Santiago, Chile
Nationality : Chilean
Position : Full Professor
Department of Mathematical Engineering U. Chile
Center of Mathematical Modeling U. Chile-CNRS
Center for Genome Regulation U. Chile
Address : Av. Blanco Encalada 2120, 7mo piso, Santiago, Chile
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Academic Degrees

- Mathematical Engineering, University of Chile, June 1990.
- Ph.D. Mathematics, Math. Institute of Luminy, CNRS, July 1994.
- Habilitation “à diriger des Recherches”, Math. Institute of Luminy, CNRS, February 2000.

Research Interests

Ergodic Theory, Topological Dynamics, Symbolic Dynamics, Bioinformatics.

Teaching

Undergraduate courses: Algebra and Linear Algebra, Probability Theory

Mathematical Engineering courses: Complex Analysis, Measure Theory, Information Theory, Bioinformatics

Graduate courses: Symbolic Dynamics, Dynamical Systems, Ergodic Theory

Prizes and Honors

- Member of the *Chilean Academy of Engineering* since 2009.
- *Latin American and Caribbean Mathematical Union Prize* 2009: in recognition for remarkable work and as a stimulus for further contributions to Mathematics.
- Chevalier de l'Ordre National du Mérite, France, May 2007.
- President of the National Council of Sciences FONDECYT-CONICYT, 2006-2008.
- Member *Grupo Ciencia de Frontera* of the Chilean Academy of Sciences 2004-2006.

- Marcos Orrego Puelma prize of the Chilean Institute of Engineering: best undergraduate student in engineering at University of Chile (1990).

Responsibilities

- President Chilean-Frech cooperation committee ECOS-Conicyt.
- Director Bioinformatics and Mathematics of the Genome Laboratory **Math^{omics}**, U. Chile.
- Member of the “Executive Scientific Committee of the International Collaboration to Sequence the Atlantic Salmon Genome” (ICSASG).

Direction of Ph.D. Theses

1. Pierre-Paul Romagnoli: (co-direction François Blanchard)
Ph.D. University of Chile and University of Aix-Marseille II, 2002. Actual job: Assistant Professor Universidad Andrés Bello, Chile.
2. María Isabel Cortez: (co-direction Jean Marc Gambaudo)
Ph.D. University of Chile and University of Burgundy, 2005. Actual job: Assistant Professor Universidad de Santiago, Chile.
3. Camilo Jadur:
Ph.D. University of Chile, 2005. Actual job: Associate Professor Universidad de Salta, Argentina.
4. Jorge Yazlle:
Ph.D. University of Chile, 2005. Actual job: Associate Professor Universidad de Salta, Argentina.
5. Mathieu Sablik: (co-direction François Blanchard)
Ph.D. University of Chile and University of Aix-Marseille II, 2006. Actual job: Assistant Professor Université d’Aix-Marseille I, France.
6. José Aliste: (co-direction Jean Marc Gambaudo)
Ph.D. University of Chile and University of Nice, June 2009. Actual job: Postdoctoral position Center of Mathematical Modeling U. Chile.
7. Alvaro Coronel: (co-direction Jean Marc Gambaudo)
Ph.D. University of Chile and University of Nice, June 2009. Actual job: Postdoctoral position Mathematics Department P. Catholic University, Chile.
8. Guillermo Espinoza: (co-direction Elisabeth Pécou)
Ph.D. University of Chile and University of Nice, December 2010. Actual job: Postdoctoral position Department of Biology P. Catholic University, Chile.
9. Maximiliano Velardez: (co-direction Michael Schraudner)
Ph.D. Mathematics University of Chile, First Year 2010.
10. Alexander Franck:
Ph.D. Mathematics University of Chile, First Year 2010.
11. Sebastián Donoso:
Ph.D. Mathematics University of Chile, First Year 2011.

Direction of Engineering and Master Theses

1. Pierre-Paul Romagnoli: Mathematical Engineering, U. Chile, 1997.
2. Fernando Schwartz: Mathematical Engineering, U. Chile, 1999.
3. Andrés Moreira: Mathematical Engineering, U. Chile, 1999.
4. Rodrigo Radisz: Electrical Engineering, U. Chile, 2000.
5. María Isabel Cortez: Mathematical Engineering, U. Chile, 2002.
6. Vicente Acuña: Mathematical Engineering and Master Computer Science, U. Chile, 2004.
7. Rodolfo Tapia: Mathematical Engineering, U. Chile, 2004.
8. Carito Vargas: Computer Science, U. Chile, 2004 (co-direction Gilles Didier).
9. Alvaro Coronel: Mathematical Engineering, U. Chile, 2005 (co-direction Pierre-Paul Romagnoli).
10. Felipe Torres: Mathematical Engineering, U. Chile, 2005.
11. José Luis González: Mathematical Engineering, U. Chile, 2005.
12. Alonso Silva: Mathematical Engineering, U. Chile, 2006.
13. Felipe Olmos: Mathematical Engineering and Computer Science, U. Chile, 2009 (co-direction Steffen Hartel and Nancy Hitschfeld).
14. Raul Aliaga: Mathematical Engineering and Computer Science, U. Chile, 2010 (co-direction Nancy Hitschfeld).
15. Sebastián Donoso: Mathematical Engineering, U. Chile, 2011.
16. Italo Cipriano: Mathematical Engineering, U. Chile, 2011.
17. Guillermo Rodríguez: Master in Biotechnology, U. Chile, expected June 2012.
18. Ángel Pardo: Mathematical Engineering, U. Chile, expected June 2012.

Publications

Articles in mathematics

- (1) P. Dong, S. Donoso, **A. Maass**, S. Shao, X. Ye, Infinite-step nilsystems, independence and complexity, to appear Ergodic Theory and Dynamical Systems 2011.
- (2) B. Host, B. Kra, **A. Maass**, Nilsequences and a structure theorem for topological dynamical systems. Advances in Mathematics 224 (1) (2010) 103-129.
- (3) X. Bressaud, F. Durand, **A. Maass**, Continuous and measurable eigenvalues of finite rank Bratteli-Vershik dynamical systems. Ergodic Theory and Dynamical Systems 30 (3) (2010) 639664.
- (4) X. Bressaud, P. Hubert, **A. Maass**, Persistence of wandering intervals in self-similar affine interval exchange transformations. Ergodic Theory and Dynamical Systems 30 (3) (2010) 665686.
- (5) A. Coronel, **A. Maass**, S. Shao, Sequence entropy and rigid σ -algebras. Studia Mathematica 194 (2009) 207-230.
- (6) T. Downarowicz, **A. Maass**, Smooth interval maps have symbolic extensions. Inventiones Mathematicae 176 (3) (2009) 617-636.

- (7) T. Downarowicz, **A. Maass**, Finite rank Bratteli-Vershik diagrams are expansive, *Ergodic Theory and Dynamical Systems* 28 (3) (2008) 739-747.
- (8) B. Host, **A. Maass**, Nilsystèmes d'ordre deux et parallélépipèdes, *Bulletin de la Société Mathématique de France* 135 (1) (2007) 367-405.
- (9) **A. Maass**, S. Shao, Structure of bounded sequence entropy systems and sequence entropy tuples, *Journal of the London Mathematical Society* 76 (3) (2007) 702-718.
- (10) M.I. Cortez, J.M. Gambaudo, **A. Maass**, Rotation topological factors of minimal \mathbb{Z}^d -actions on the Cantor set, *Transactions American Mathematical Society* 359 (2007) 2305-2315.
- (11) V. Acuña, G. Didier, **A. Maass**, Coding with variable block maps, *Theoretical Computer Sciences* 369 (2006) 396-405.
- (12) **A. Maass**, S. Martínez, M. Sobotka, Limit measures for affine cellular automata on topological Markov subgroups, *Nonlinearity* 19 (9) (2006) 2137-2147.
- (13) **A. Maass**, S. Martínez, M. Pivato, R. Yassawi, Asymptotic randomization of subgroup shifts by linear cellular automata, *Ergodic Theory and Dynamical Systems* 26 (2006) 1203-1224.
- (14) **A. Maass**, S. Martínez, M. Pivato, R. Yassawi, Attractiveness of the Haar measure for linear cellular automata on Markov subgroups, *Dynamics and Stochastics: Festschrift in honour of Michael Keane, Lecture Notes Monograph Series of the Institute for Mathematical Statistics*, Vol. 48 (2006) 100-108.
- (15) X. Bressaud, **A. Maass**, S. Martínez, J. San Martín, Stationary processes whose filtrations are standard, *Annals of Probability* 34 (4) (2006) 1589-1600.
- (16) X. Bressaud, F. Durand, **A. Maass**, Necessary and sufficient conditions to be an eigenvalue for linearly recurrent dynamical Cantor systems, *Journal of the London Mathematical Society* 72 (3) (2005) 799-816.
- (17) W. Huang, **A. Maass**, X. Ye, Sequence entropy pairs for a measure, *Annales de l'Institut Fourier* 54 (4) (2004) 1007-1030.
- (18) W. Huang, **A. Maass**, P.-P. Romagnoli, X. Ye, Entropy pairs and a local Abramov formula for the entropy of open covers, *Ergodic Theory and Dynamical Systems* 24 (2004) 1127-1153.
- (19) F. Blanchard, F. Durand, **A. Maass**, Substitution minimal systems and other examples with countable scrambled sets, *Nonlinearity* 17 (2004) 817-833.
- (20) B. Host, **A. Maass**, S. Martínez, Uniform Bernoulli measure in dynamics of permutative cellular automata with algebraic local rules, *Discrete and Continuous Dynamical Systems* 9 (6) (2003) 1423-1446.
- (21) P. Dartnell, **A. Maass**, F. Schwartz, Combinatorial constructions associated to the dynamics of onesided cellular automata, *Theoretical Computer Science* 304 (2003) 485-497.
- (22) M.I. Cortez, F. Durand, B. Host, **A. Maass**, Continuous and Measurable Eigenfunctions of Linearly Recurrent Dynamical Systems, *Journal of London Mathematical Society* 67 (3) (2003) 790-804.

- (23) F. Durand, **A. Maass**, A note on limit laws for minimal Cantor systems with infinite periodic spectrum, *Discrete and Continuous Dynamical Systems* 9 (3) (2003) 745-750.
- (24) F. Blanchard, E. Glasner, S. Kolyada, **A. Maass**, On Li–Yorke Pairs, *Journal für die reine und angewandte Mathematik* 547 (2002) 51-68.
- (25) P. Kůrka, **A. Maass**, Stability of Subshifts in cellular automata, *Fundamenta Informaticae* 52 (1-3) (2002) 143-155.
- (26) F. Durand, **A. Maass**, Limit laws of entrance times for low complexity dynamical systems, *Nonlinearity* 14 (4) (2001) 683-700.
- (27) P. Kůrka, **A. Maass**, Recurrence dimension in Toeplitz subshifts. *Dynamical systems (Luminy-Marseille, 1998)*, 165–175, World Sci. Publ., River Edge, NJ, 2000.
- (28) P. Kůrka, **A. Maass**, Limit sets of cellular automata associated to probability measures, *Journal of Statistical Physics* 100 (5/6) (2000) 1031-1047.
- (29) F. Durand, P. Dartnell, **A. Maass**, Orbit and Kakutani equivalence with Sturmian subshifts, *Studia Mathematica* 142 (1) (2000) 25-45.
- (30) V. Afraimovich, **A. Maass**, J. Urías, Symbolic dynamics for sticky sets in Hamiltonian systems, *Nonlinearity* 13 (2000) 617-637.
- (31) M. Boyle, **A. Maass**, Expansive invertible one sided cellular automata, *Journal of Mathematical Society of Japan* 52 (4) (2000) 725-740.
- (32) P. Ferrari, **A. Maass**, S. Martínez, P. Ney, Cesàro mean distribution of group automata starting from measures with summable decay, *Ergodic Theory and Dynamical Systems* 20 (2000) 1657-1670.
- (33) **A. Maass**, S. Martínez, Time averages for some classes of expansive cellular automata, *Nonlinear phenomena and Complex Systems, Cellular Automata and Complex Systems*, Kluwer Academic Publishers, Vol.3, 37–54 (1999).
- (34) F. Blanchard, B. Host, **A. Maass**, Topological Complexity, *Ergodic Theory and Dynamical Systems* 20 (2000) 641-662.
- (35) **A. Maass**, P. Kurka, Realtime Subshifts, *Theoretical Computer Science* 237 (1-2) (2000) 307-325.
- (36) **A. Maass**, S. Martínez, On Cesàro Limit Distribution of Permutative Cellular Automata, *Journal of Statistical Physics* 90 (1998) 435-452.
- (37) **A. Maass**, S. Martínez, Coding nested mixing one-sided subshifts of finite type as Markov shifts having exactly the same alphabet, *Proceedings of AMS* 126 (1998) 1219-1230.
- (38) F. Blanchard, P. Kůrka, **A. Maass**, Topological and measure-theoretic properties of one-dimensional cellular automata, *Physica D* 103 (1997) 86-99.
- (39) F. Blanchard, **A. Maass**, Dynamical properties of expansive one-sided cellular automata, *Israel Journal of Mathematics* 99 (1997) 149-174.
- (40) **A. Maass**, Some dynamical properties of one–dimensional cellular automata, *Nonlinear phenomena and Complex Systems, Dynamics of Complex Interacting Systems*, Kluwer Academic Publishers, Vol.1, 35-80 (1996).

- (41) F. Blanchard, **A. Maass**, Dynamical Behavior of Coven's aperiodic cellular automata, *Theoretical Computer Science* 163 (1996) 291-302.
- (42) F. Blanchard, B. Host, **A. Maass**, Représentation par automate des fonctions continues du tore, *Journal de Theorie des Nombres de Bordeaux* 8 (1996) 205-214.
- (43) F. Blanchard, **A. Maass**, On dynamical properties of generalized toggle automata, *Lecture Notes in Computer Science* 911 (1995) 84-98.
- (44) F. Blanchard, B. Host, **A. Maass**, S. Martínez, D. Rudolph, Entropy pairs for a measure, *Ergodic Theory and Dynamical Systems* 15 (1995) 621-632.
- (45) **A. Maass**, On the Sofic limit sets of cellular automata, *Ergodic Theory and Dynamical Systems* 15 (1995) 663-684.
- (46) **A. Maass**, Some Coded Systems that are not unstable limit sets of CA, *Cellular Automata and Cooperative Systems*, NATO-ASI series, Kluwer Ac. Publ. 396 (1993) 433-449.
- (47) E. Goles, **A. Maass**, S. Martínez, On the limit set of some universal cellular automata, *Theoretical Computer Science* 110 (1993) 53-78.
- (48) **A. Maass**, Universal Cellular Automaton Simulating Any Programmable Machine, *Revista de Matemáticas Aplicadas* 12 (1991) 107-126.

Articles in mathematical biology and bioinformatics

- (49) A. Di Genova, A. Aravena, Luis Zapata, **A. Maass**, M. González, P. Iturra, SalmonDB: A bioinformatics resource for *Salmo salar* and *Oncorhynchus mykiss*, to appear *Database* 2011.
- (50) C. Hodar, P. Moreno, A. di Genova, M. Latorre, A. Reyes-Jara, **A. Maass**, M. González, V. Cambiazo, Genome wide identification of *A. ferrooxidans* (ATCC 23270) transcription factors and comparative analysis of ArsR and MerR metal regulators, to appear *Biometals* 2011.
- (51) W. Davidson, B. Koop, S. Jones, P. Iturra, R. Vidal, **A. Maass**, I. Jonassen, S. Lien, S. Omholt, Sequencing the genome of the Atlantic salmon (*Salmo salar*). *Genome Biology* (2010) 11: 403.
- (52) C. Hodar, R. Assar, M. Colombres, A. Aravena, L. Pavez, M. González, S. Martínez, N. C. Inestrosa, **A. Maass**, Genome-wide identification of new Wnt/ β -catenin target genes in the human genome using CART method. *BMC Genomics* (2010) 11:348.
- (53) J. Briche, Y. Lacroix, **A. Maass**, Adaptation d'un algorithme génétique pour la reconstruction de réseaux de régulation génétique: COGARE. *Revue d'Intelligence Artificielle* 24 (2010) 7-26.
- (54) M. Arrázola, L. Varela-Nallar, M. Colombres, R. Assar, A. Aravena, **A. Maass**, S. Martínez, N. C. Inestrosa, Calcium /calmodulin-dependent protein kinase type IV (CaMKIV) is a target gene of the Wnt/ β -catenin signaling pathway. *Journal of Cellular Physiology* 221 (2009) 658-667.

- (55) N. Ehrenfeld, A. Aravena, A. Reyes-Jara, N. Barreto, R. Assar, **A. Maass**, P. Parada, Design and use of oligonucleotide microarrays for identification of Biomining microorganisms. *Advanced Materials Research* 71-73 (2009) 155-158.
- (56) G. Levicán, J. A. Ugalde, N. Ehrenfeld, **A. Maass**, P. Parada, Comparative genomic analysis of carbon and nitrogen assimilation mechanisms in three indigenous bioleaching bacteria: predictions and validations. *BMC-Genomics* 9 (2008) 581.
- (57) R. Uauy, **A. Maass**, M. Araya, Estimating risk from copper excess in human populations. *The American Journal of Clinical Nutrition* 88 (2008) 867S-871S.
- (58) M. González, A. Reyes, M. Suazo, T. del Pozo, C. Hodar, E. Pécou, **A. Maass**, Cellular metabolism of copper in pro- and eukaryotes: Comparative analysis of their transcriptional regulation mechanisms. *Placenta* 27 (1) (2006) 29-29.
- (59) E. Pécou, **A. Maass**, D. Remenik, J. Briche, M. González, A Mathematical model for copper homeostasis in *Enterococcus hirae*. *Mathematical Bioscience* 203 (2) (2006) 222-239 .
- (60) **A. Maass**, A. Moreira, TIP: Protein Backtranslation Aided by Genetic Algorithms. *Bioinformatics* 20 (13) (2004) 2148-2149.
- (61) **A. Maass**, S. Martínez, Evolution of probability measures by cellular automata on algebraic topological Markov chains. *Biological Research* 36 (2003) 107-112.

Submitted articles and preprints in mathematical biology and bioinformatics

- (62) L. Padilla, M. Budinich, M. P. Cortés, D. Maturana, G. Levicán, R. Bobadilla, **A. Maass**, P. Parada, Comparative analysis of iron oxidation of *Leptospirillum ferrooxidans* and *Acidithiobacillus ferrooxidans* using metabolic models. Submitted 2011.
- (63) R. Bobadilla-Fazzini, M. P. Cortés, L. Padilla, D. Maturana, M. Budinich, **A. Maass**, P. Parada, Stoichiometric Modeling of Oxidation of Reduced Inorganic Sulfur Compounds (RISCs) in *Acidithiobacillus thiooxidans*, to appear *Geobiology* 2011.

Edition of Books

- (64) **A. Maass**, S. Martínez, J. San Martín, Information and Randomness, Collection Travaux en Cours 66, Hermann Editeurs, Paris, 2006.
- (65) **A. Maass**, E. Pécou, Sa. Martínez, Mathematical and Computational Methods in Biology, Collection Travaux en Cours 65, Hermann Editeurs, Paris, 2005, 300 p.
- (66) **A. Maass**, S. Martínez, J. San Martín, Dynamics and Randomness II, Non-Linear Phenomena and Complex Systems, Volume 8, Kluwer Academic Publishers, 2004.
- (67) **A. Maass**, S. Martínez, J. San Martín, Dynamics and Randomness, Non-Linear Phenomena and Complex Systems, Volume 7, Kluwer Academic Publishers, 2002.
- (68) F. Blanchard, **A. Maass**, A. Nogueira, Topics in Symbolic Dynamics and Applications, London Mathematical Society, Lecture Notes Series 279, Cambridge University Press, 2000.

Patents

- (1) **A. Maass**, A. Aravena, M. González, S. Martínez, P. Parada, K. Ehrenfeld, Method for designing oligonucleotides for molecular biology techniques. Obtained in: 1) USA, Number: US 7 853 408, Date: 14/12/2010; 2) South Africa, Number: 2006/06828, Date: 26/03/2008; 3) Australia, Number: 2006203551, Date: 17/05/2011. Pending in: Argentina, Mexico, Peru.
- (2) P. Parada, K. Ehrenfeld, I. Pacheco, **A. Maass**, A. Aravena, M. González, S. Martínez, Method of identification and quantification of microorganisms useful in the process of bioleaching. Obtained in: 1) South Africa, Number: 2006/07131, Date: 30/05/07; 2) Chile, Register Number: 46,739, Date: 31/08/10. Pending in: Argentina, Australia, Mexico, Peru.
- (3) R. Badilla, **A. Maass**, P. Parada, A. Aravena, P. Moreno, S. Martínez., K. Ehrenfeld, Arrangement of DNA fragments of bioleaching microorganisms and method for their detection. Obtained in: 1) South Africa, Number: 2006/09650, Date: 27/12/07; 2) Argentina, Number: AR057612B1, Date: 09/09/2010; 3) Peru, Number: 1432-2010, Date: 29/10/2010. Pending in: Chile (DPI-3033, 2005), USA, Mexico.
- (4) K.Ehrenfeld, J. Ugalde, A. Aravena, N. Loira, **A. Maass**, P. Parada, Arrangement of nucleotide sequences for the detection and identification of genes encoding proteins with relevant activities in biotechnology in a microbiological sample and method for using such an arrangement. Obtained in: 1) South Africa, Number: 2008/02344, Date: 26/11/2008. Pending in: Chile (DPI-660, 2007), USA, Argentina, Australia, China, Japan, Mexico, Peru, USA.
- (5) M. Barreto, M. Budinich, **A. Maass**, P. Moreno, L. Padilla, P. Parada, Método para favorecer la producción de sustancias poliméricas extracelulares (EPS) en un cultivo de *A. ferrooxidans* inhibiendo enzimas del ciclo de ácidos tricarbóxicos. Pending in: Chile (DPI-178, 2010).

Organization of International Conferences and Schools

- (1) CIMPA–UNESCO Summer School on Symbolic Dynamics and Applications, Temuco, Chile, January 1997.
- (2) Workshop on Dynamics and Randomness, Santiago, Chile, December 2000.
- (3) Workshop on Dynamics and Randomness II, Santiago, Chile, December 2002.
- (4) CIMPA Summer School on Mathematical and Computational Methods in Biology, Valdivia, Chile, January 2004.
- (5) Workshop on Information and Randomness, Santiago, Chile, December 2004.
- (6) III Chilean Workshop on Bioinformatics, Santiago, Chile, September 2005.
- (7) Workshop on Information and Randomness, Santiago, Chile, December 2006.
- (8) School on Information and Randomness, Santiago, Chile, December 2008.
- (9) Journée on Mathematical Modeling in Geobiometallurgy, Santiago, Chile, October 2009.
- (10) School on Information and Randomness, Pucón, Chile, December 2010.
- (11) Bioinformatics Workshop on Metabolomics Analysis of Massive Data Sets, Santiago, Chile, September 2011.

- (12) AUTOMATA 2011, 17th International Workshop on Cellular Automata and Discrete Complex Systems, Santiago, Chile, November 2011.
- (13) Premier CongrÈs Franco-Chilien en Dynamique et Combinatoire, Cap Hornu, Baie de Somme, France, January 2012.
- (14) ICGEB-Chile Theoretical and Practical Course Advances in Bioinformatics Tools for the Analysis of High-throughput Omics Data, Santiago, Chile, July 2012.

Invitations to International Conferences

- (1) I Escuela de Verano en Física Estadística y Sistemas Cooperativos, Santiago, Chile, 1988.
- (2) II Taller de Redes Neuronales y Autómatas, Bogotá, Colombia, 1989.
- (3) Workshop on Cooperative Systems and Cellular Automata, Les Houches, France, 1992.
- (4) Workshop on Symbolic Dynamics, MSRI (Mathematical Science Research Institute) Berkeley, 1992.
- (5) Workshop on Number Theory and Ergodic Theory, Math. Research Center University of Warwick, 1994.
- (6) Fourth School on Statistical Physics and Cooperative Systems (FIESTA 94), 1994.
- (7) Workshop on Symbolic Dynamics, University of Maryland at College Park, 1995.
- (8) Second Latin American Symposium (LATIN'95), Chile, 1995.
- (9) Workshop on Lattice Dynamics, Université de Paris VI, 1995.
- (10) Workshop on Ergodic Theory, CIRM–France, 1995.
- (11) Fifth School on Complex Systems (FIESTA 96), 1996.
- (12) I Congreso Latino Americano de Matemáticos, 2000, IMPA, Brasil.
- (13) L'ODYSEE DYNAMIQUE, Marseille- Luminy (Centre de formation du CNRS), 2001.
- (14) V Joint Meeting AMS-SMM, 2001, Morelia, MEXICO.
- (15) AUTOMATA 2002, Eighth International Workshop on Cellular Automata, Prague, 2002.
- (16) Spring 2004 Maryland-Penn State Dynamics Workshop, Washington, 2004.
- (17) Max-Planck-Institut für Mathematik, Bonn, Germany: Algebraic and Topological Dynamics activity, 2004.
- (18) VIII Brazilian School of Probability, Ubatuba, 2004.
- (19) I Regional Meeting of Probability and Statistics ERPEN, B. Aires, 2004.
- (20) ICALP 2004, Turku, Finland.
- (21) Visegard Conference on Dynamical Systems, Prague, July 2005.
- (22) IV Workshop on Dynamical Systems, San Pedro de Atacama, August 2005.
- (23) Workshop on Ergodic Theory and Dynamical System, Poland, June 2006.
- (24) Aperiodic Order: new connections and old problems revisited, Marseille, France, September 2007.
- (25) Mathematical Sciences Research Institute, Berkeley, California: 2008. Program in Ergodic Theory and Additive Combinatorics (August 30, 2008 to November 21, 2008)
- (26) I Discrete Mathematics Workshop, Salta, Argentina, March 2009.
- (27) Workshop in “Dynamical Numbers: Interplay between Dynamical Systems and Number Theory”, Bonn, Germany, June 2009.
- (28) Pyrenees International Workshop on Statistics, Probability and Operations Research, SPO 09, Jaca, Spain, September 2009.

- (29) Math-Info 2010, Towards new interactions between mathematics and computer science, Marseille, France, February 2010 (Invited Speaker FRUMAM).
- (30) Workshop on Dynamical Systems and Related Topics in honor of Dan Rudolph, U. Maryland, USA, April 2010.
- (31) Nonlinear Dynamics: New Directions, Guanajuato, Mexico, May 2010.
- (32) Dynamical Systems Meeting, Lower Silesia, Poland, May 2010.
- (33) XIV Brazilian School of Probability and Clay Mathematical Institute Summer School, Buzios, Brazil, August 2010.
- (34) 13th Mons Theoretical Computer Science Days, Amiens, France, September 2010.
- (35) Workshop on Dynamical Systems and Related Topics with a special session in honor of Mike Boyle on his 60th birthday, U. Maryland, USA, April 2011.
- (36) Trends in Dynamics, Chicago, USA, April 2011.
- (37) International Conference on Measurable and Topological Dynamics and Related Topics, Yellow-Mountains, China, June 2011.
- (38) XII Latin American Workshop on Nonlinear Phenomena (LAWNP-2011), San Luis Potosí, Mexico, October 2011.

Invited Positions

- (1) Institut de Mathématiques de Luminy, CNRS-France (about 15 months since 1994).
- (2) University of Maryland at College Park, USA: 1995, 2004, 2010.
- (3) University of Torún, Poland: 1993.
- (4) University of Palermo, Italy: 1993.
- (5) University of Sao Pablo, Brasil: 1997.
- (6) University of Marne la Vallée, France: 1998, 2000, 2001, 2009, 2010, 2012.
- (7) University of Brest, France: 1994.
- (8) Instituto de Investigación en Comunicación Optica, Mexico: 1998, 2001.
- (9) University Charles at Prague, Check Republic: 1997.
- (10) University of Haute Picardie Jules Verne, France: 1999, 2000, 2002, 2005.
- (11) University of Bourgogne, France: 2002, 2004.
- (12) University of Science and Technology of China: 2001, 2006, 2011.
- (13) Max Planck Institute Bonn, Germany: 2004.
- (14) Mathematical Sciences Research Institute, Berkeley, California: 2008. Program in Ergodic Theory and Additive Combinatorics (August 30, 2008 to November 21, 2008).
- (15) Max Planck Institute Bonn, Germany: 2009. Activity: “Dynamical Numbers: Interplay between Dynamical Systems and Number Theory”.
- (16) Northwestern University, USA: 2011.

Main Research Projects

Fundamental Research

- (1) BASAL Project “Center for Mathematical Modeling”, May 2008 to April 2018. Key Researcher.

- (2) FONDAP Project “Center for Genome Regulation”, January 2011 to December 2020. Key Researcher.
- (3) Project FONDECYT “Gene regulatory network of iron metabolism in *E. faecalis*: functional analysis of Fur, perR and Zur regulon”, March 2011 to February 2015. Associate Researcher.
- (4) FONDAP Project “Center for Mathematical Modeling”, 1997-2002. Associate Researcher.
- (5) Project Millennium Nucleus “Information and randomness: laboratories in bioinformatics and mathematics of the genome and stochastic simulation”, 2003-2005 Associate Researcher, 2006-2008 Deputy Director.
- (6) Project FONDECYT “Combinatorial complexity of orbits in topological dynamical systems”, 2001-2004. Main Researcher.
- (7) Project FONDECYT “Cesàro Limit Distribution of Cellular Automata”, 1998-2000. Main Researcher.
- (8) Project FONDECYT “Topological and Symbolic Dynamics of Cellular Automata”, 1996-1997. Main Researcher.

International Cooperation

- (1) Project INRIA-Conicyt French Cooperation “Intégration dynamique de données grande-échelle et hétérogènes en biologie moléculaire: application à l’identification de régulateurs de la bio-lixiviation du cuivre minier”, 2011-2012. Main Researcher. Associate Research Team INRIA 2011-2013.
- (2) Project PICS-CNRS French Cooperation “Dynamics and Combinatorics”, U. Chile-U. Picardie Jules Verne-U. Marne la Vallée, 2009-2011. Main Researcher.
- (3) Project CNRS-Conicyt French Cooperation “Study of linearly recurrent tilings, combinatorial and ergodic aspects”, U. Chile-U. Picardie Jules Verne-U. Marne la Vallée, 2004. Main Researcher.
- (4) Project ECOS-Conicyt French Cooperation “Tiling systems and standardness”, U. Chile-U. Bourgogne-Institut de Math. de Luminy-U. Picardie Jules Verne-U. Marne la Vallée, 2004-2006. Main Researcher.
- (5) Project ECOS-Conicyt French Cooperation “Algebraic aspects and complexity of topological dynamical systems”, U. Chile-Institut de Math. de Luminy-U. Picardie Jules Verne-U. Marne la Vallée, 2000-2002. Main Researcher.
- (6) Project CNRS-Conicyt French Cooperation “Discrete Dynamical Systems, Complexity and Automata”, U. Chile-Institut de Math. de Luminy, 1997-1999. Main Researcher.

Applied Research

- (1) Project “Genomics of Chilean populations: genetic profiles necessities in clinic research, public health and forensic medicine”. Bioinformatics part. Funded by Fondef D10I1007, November 2011 to October 2014. Director Bioinformatics Team.
- (2) Project “Application of metabolomics to the mining industry to improve processes associated with the bioleaching of mineral resources”. Bioinformatics part. Funded by INNOVA-Corfo 09CN14-585, January 2010 to December 2012. Director Bioinformatics Team.
- (3) Project “Implementation of a database with the potato genome and transcriptomics data of genotypes DM and RH and bioinformatics analysis”. Funded by INIA, January 2011 to June 2011. Director.
- (4) Project “Implementation of a platform for the bioinformatics analysis and storage of databases of genomics information coming from different vegetables of interest for the programs of genetic improvement at La Platina-INIA”. Funded by INIA, January 2010 to June 2010. Director.
- (5) Project “Identification of genes related to berry development and growth in seedless table grapes by means of functional genomics”. Bioinformatics part. Funded by Fondef G07I1002, January 2008 to December 2011. Director Bioinformatics Team.
- (6) Project “Salmonid genomics: identification of genes related to protein and vegetal oil usage in Atlantic Salmon and Rainbow Trout nutrition”. Bioinformatics part. Funded by Aqua Innova and Corfo-INNOVA 07CN13PBT-41, December 2007 to November 2011. Director Bioinformatics Team.
- (7) Project “Information biomining laboratory: organization and statistical processing of biomining data, modeling and networks”. Funded by BioSigma S.A. (joint venture Codelco/Nippon Mining & Metals). January 2003 to June 2010. Director.
- (8) Project “Development of a scientific-technological capacity in mathematical modeling and simulation for the control of biological networks in productive processes: application to bacterial bioleaching”. Funded by BioSigma S.A. and FONDEF D04I1257, December 2005 to August 2008. Director.
- (9) Project “Bioidentification system for industrial relevant microorganisms: application to avian and winery sectors”. Funded by Fundación Copec-Universidad Católica, in cooperation with Viña San Pedro, July 2007 to December 2008. Director.
- (10) Project “Academic industrial network for development of applications of probabilities and information theory to biosciences”. Funded by Programa Bicentenario en Ciencia y Tecnología. Cooperation with “Centro para el análisis de la función génica en el desarrollo neuronal”, Fac. Medicine, U. Chile and “Centro de Regulación Celular y Patologías Joaquín V. Luco”, Facultad de Biología, P.U. Católica de Chile, March 2008-June 2009. Director.