Curriculum Vitae

of

Rui Manuel Agostinho Dilão
Résumé of Rui Dilão

Rui Dilão is Professor of Mathematical Physics and Dynamical Systems at Instituto Superior Técnico of the Technical University of Lisbon. In 1986, he obtained the PhD in Physics (Mathematical Physics) from the Technical University of Lisbon and, in 1997, the Habilitation from the same university. In the period 1986-1988 he has been fellow at CERN, where he collaborated in the planning of the Large Hadron Collider. He has been collaborator of the scientific program associated with the Portuguese satellite PoSAT-1 (1992-93). In 1999, together with two colleagues, he received the LabMed prize for original research work on laboratorial research medicine. He is author of more than 70 research publications, distributed among dynamical systems theory, chaos theory, celestial mechanics, ecological and economic modelling, mathematical biology, biophysics, morphogenesis and nonlinear reaction-diffusion equations. He has presented more than 100 research lectures or communications in the academia and research meetings. He has supervised 4 PhD thesis, more than 50 students at the master level, and has served as advisor of 4 postdoc researchers. He coordinated and participated in 18 research projects. He wrote a book on dynamical systems, co-authored a book on dynamical system techniques for the design of particle accelerators. He wrote two books and several monographs for undergraduate teaching, and a two-booklet set with a kit for the awareness of the concepts of latitude and longitude, at the middle school level. On a regular basis, he serves as referee for several academic journals, served as member of the steering committees of two research programs of the European Science Foundation and participates as expert in the evaluation of the Marie Sklodowska-Curie Individual Fellowships. He participated as principal investigator in one of the work packages of the project GENNETEC (2006-2009) supported by the European Commission. He organized several research meetings in Portugal and abroad and has edited several proceedings monographs. He is member of several professional societies.
Name: Rui Manuel Agostinho Dilão

Date of Birth: 13 July, 1955, Lisbon, Portugal

Profession: Mathematical Physicist, Theoretical Physicist
University Professor

Business Address: Instituto Superior Técnico
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1400-043 Lisbon, Portugal

Phone: +(351) 213015039

Education: 1997 Habilitation in Physics, Instituto Superior Técnico, Technical University of Lisbon.
1986 PhD in Physics, Instituto Superior Técnico, Technical University of Lisbon.
1984 Master in Physics (scientific and pedagogic), Instituto Superior Técnico, Technical University of Lisbon.
1980 “Licenciatura” in Physics (5 years of University Studies), Faculty of Sciences, Classical University of Lisbon.

Professional History:

May 2023
Curriculum Vitae


2020-2024 Member of the Scientific Advisory Board of Labex SIGNALIFE, Université Nice Sophia Antipolis.


2014 Member of the Scientifique International board of the Workshop sur les Mathématiques pour les Sciences de la Vie, Sidi Bel Abbès, Algeria, 14th-16th September.


2011 Organizer and member of the Scientific Committee of the Workshop “Basic Experimental Techniques in Biological Dynamics”, 5-9 September 2011, ITQB-ESF, Oeiras, Portugal.

2010 Organized with Felix Ritort the session of Biological Physics of the IV Spanish-Portuguese Biophysical Congress, 7-10 July, 2010, Zaragoza, Spain.

2009 Member of the Organizing Committee of the conference “From Biological Networks to Cellular Function: Evolution, Dynamics and Spatial Organization”, 8-12 June 2009, ICTP, Trieste, Italy.

2009-2010 Member of the European Science Foundation Pool of Reviewers.

2009 Organizer of the Third European Science Foundation Conference on Functional Dynamics, 2-5 March 2009, Cascais, Portugal.

2009 Visitor of the Biophysics Group of the Otto-von-Guericke University, Magdeburg, Germany.

2008 Member of the Scientific Committee of the GENNETEC International Conference, Gene Regulatory Networks: Dynamics, Spatial Organization and Inference, Institute for Scientific Interchange Foundation, Torino, Italy.

May 2023
2006-2011 Member of the Steering Committee of the Project "FUNCDYN, Functional dynamics in Complex Chemical and Biological Systems", European Science Foundation.

2006-2009 Member of the Steering Committee of the Project “GENetic NETworks: Emergence and Complexity (GENNETEC)”, The sixth framework programme, European Commission.

2006 Member of the Editorial board of BIOMAT 2006, International Symposium on Mathematical and Computational Biology.

2005 Member of the Editorial board of the 5th Brazilian Symposium on Mathematical and Computational Biology and 2nd International Symposium on Mathematical and Computational Biology.

2004 Member of the Editorial board of the 4th Brazilian Symposium on Mathematical and Computational Biology and 1st International Symposium on Mathematical and Computational Biology.


2000 Invited Professor of the Center for Complex and Nonlinear Sciences, Technical University of Budapest, September.

2000 Invited Professor of the Fritz Haber Institut der Max Planck Gesellschaft, July.

2000-2004 Member of the Steering Committee of the Project "REACTOR, Nonlinear Chemistry in Complex Reactors: Models and Experiments", European Science Foundation.

1997 Founded the Non-Linear Dynamics Group of the Instituto Superior Superior Técnico.

1997- Auxiliary Professor with Habilitation at the Department of Physics of the Instituto Superior Técnico.

1992-1993 Collaborator of the scientific program associated with the Portuguese satellite PoSAT-1.

1987-1988 Senior Fellow at CERN.

1986-1987 Fellow at CERN.

1986-1997 Auxiliary Professor at the Department of Physics of the Instituto Superior Técnico.

1985- Reviewer of Mathematical Reviews.

1984-1986 Assistant Professor at the Department of Physics of the Instituto Superior Técnico.

1981-1984 Stagier Assistant Professor at the Department of Physics of the Instituto Superior Técnico.

**Prizes:**


May 2023
Research

Research Experience:
The main research experience is on Dynamical Systems, Mathematical Physics, Mathematical Biology and Theoretical Physics. He has also experience on general computational techniques, and on mathematical techniques in finance and economics.

Academic Monographs:


Publications (Journal Articles, Peer Reviewed):


May 2023


May 2023

Publications (Chapters in books, Peer Reviewed):


68. **R. Dilão**, Mathematical models of morphogenesis, Proceedings of the Workshop on Mathematics for Life Sciences 2014, ITM Web of


Publications (National Journal Articles, Peer Reviewed):

Other Scientific Publications (internal reports and pre-prints):


Scientific Books:

**Proceedings Books:**


**Referee of Institutions and Journals:**

**Institutions:** Agence Nationale de la Recherche, American Mathematical Society, European Science Foundation, World Scientific and Engineering and Physical Sciences Research Council, Leading Fellows Postdoc Programme (TU Delft), European Commission (Marie Skłodowska-Curie Individual Fellowships), Romanian Ministry of Education and Research, Service de la Recherche et Culture Scientifique (Region Île de France).


May 2023

**Impact of the Research Work in the International Scientific Publications:**


**Funding (Coordination and Participation in National Research Projects):**


May 2023


Funding (Participation in International Research Projects):


"Pattern transitions tuned by an inhibitor of cAMP in the Dictyostelium Discoideum colony aggregation”, European Science Foundation, 2009.

"FUNCDYN, Functional dynamics in Complex Chemical and Biological Systems”, European Science Foundation, 2006-2011.

Funding (Coordination of International Research Projects):

Basic Experimental Techniques in Biological Dynamics, European Science Foundation, 2011.


Funding (Participation in National Research Projects):

Seminars in International Conferences, Schools and Academies:

May 2023


17. Filipa Alves and Rui Dilão, Segmentation through a reaction-diffusion mechanism in Drosophila early development, International Conference on Mathematics in Biology, Annual Meeting of The Society for Mathematical Biology, August 3-5, 2000, Salt Lake City, Utah.


23. Rui Dilão, Activity waves from excitable dynamics in extended chemical and neuronal systems. 4th Gulbenkian Autumn Meeting/1st Portuguese Meeting on Theoretical and Computational Biology, 23rd-26th of October 2001, Instituto Gulbenkian de Ciência, Oeiras.

24. Filipa Alves and Rui Dilão, Mathematical models for positive and negative regulation of gene expression. 4th Gulbenkian Autumn Meeting/1st Portuguese Meeting on Theoretical and Computational Biology, 23rd-26th of October 2001, Instituto Gulbenkian de Ciência, Oeiras.


29. Filipa Alves and Rui Dilão, Mathematical models for the regulation of gene expression in prokaryotes, Gordon Research Conference on Theoretical Biology and Biomathematics, June 9-14, 2002, Tilton, NH, USA.


32. Rui Dilão, Patterns and forms in Physics, Chemistry and Biology. Instituto Superior Técnico. 17 October 2002.


36. Rui Dilão, From mathematical models to theoretical biology, or the origin of forms in biology. Complexo II (IFM), 12 March 2003.


46. Rui Dilão, Statistical Mechanics of Two-players Iterated Games, 2nd Shanghai International Symposium on Nonlinear Science and Applications - 2005 (Shanghai NSA'05), June 3-7, 2005, Chinese Academy of Science, Shanghai, China.

47. Rui Dilão, Morphogenesis, 2nd Shanghai International Symposium on Nonlinear Science and Applications - 2005 (Shanghai NSA'05), June 3-7, 2005, Chinese Academy of Science, Shanghai, China.


May 2023


52. Rui Dilão, Morphogenesis or the development of form and shape in organisms. Trends in Chemistry and Biology, Seminar Series at ITQB, ITQB, 15 February 2006, Oeiras.


54. Rui Dilão, A general framework to describe the regulation of gene expression: Applications to segmental patterning in Drosophila, and to eyespot pattern formation in butterflies. GENetic NETworks: Emergence and Complexity, Evry, Genopole, 9-13 October 2006.


57. Rui Dilão, A general framework to describe the regulation of gene expression: Applications to segmental patterning in Drosophila, and to eyespot pattern formation in butterflies. “FUNCDYN Workshop 2007” (Functional dynamics in Complex Chemical and Biological Systems), Haslev, Haslev Udvidede Højskole, Copenhagen, Denmark, 2-5 May 2007.

58. Rui Dilão, On the transition to turbulence in reaction-diffusion systems. Fourteenth International Workshop on Dynamics and Control, dedicated to Professor Angelo Miele on the occasion of his 85th birthday, Zvenigorod, Moscow, Russia, May 28 – June 2, 2007.


May 2023


May 2023


79. R. Dilão, From the glycolytic oscillations to the control of the cell cycle: a minimal biological oscillator, invited lecture at Séminaire BIOCORE, Sophia-Antipolis, 20 May 2011, Sophia-Antipolis, France.

81. R. Dilão, Mathematical complexity theory in systems biology: several success stories and new problems, From Chaos to Complexity, University of Warwick, 6-8 July 2011.


87. Rui Dilão, Gradient formation in regeneration, Interdisciplinary Workshop on Stem Cells and Regeneration, IHÉS, 24-29 June 2013, Bures-sur-Yvette, France.

88. Rui Dilão, Models of gene regulatory networks and signalling pathways in development, Interdisciplinary Workshop on Stem Cells and Regeneration, IHÉS, 24-29 June 2013, Bures-sur-Yvette, France.

89. Rui Dilão, Chemotherapy in heterogeneous cultures of cancer cells with interconversion, Genopole, ISSB, University of Évry, 5 July 2013.

90. Rui Dilão, Developing a mathematical model for tissue formation, autopoiesis, regeneration and morphogenesis (partial results), Biologically Inspired Information Processing 2014, Mathematical Models of Pattern Formation, Tufts University, 14th-16th May, 2014.

91. Rui Dilão, Drosophila Morphogenesis: what can we learn from mathematical modelling (public lecture), Biologically Inspired Information Processing 2014, Mathematical Models of Pattern Formation, Tufts University, 14th-16th May, 2014.

92. Rui Dilão, Mathematical models in morphogenesis and bioelectricity (two plenary lectures), Workshop sur les Mathématiques pour les Sciences de la Vie, Sidi Bel Abbès, Algeria, 14th-16th September, 2014.


May 2023


96. Rui Dilão, The mechanism of wound healing through the fibroblast switching between two states, CNC.IBILI Seminars, UC-Biotech, Cantanhede, 9 January 2019.


99. Rui Dilão, Diffusion as a morphogenesis mechanism. Two case studies: Drosophila early development, and fibroblast dermal maturation and wound healing, Escola de Verão em Biologia Computacional, Departamento de Física da Universidade de Coimbra, 7 September 2019.

Posters in Conferences:
1. Rui Dilão, Non-linear Phenomena in Particle Accelerators, Dynamics Days 1993, Poznam, July 8-11, Poland.


Mathematical Biology, July 16-19, 2001, University of Hawaii at Hilo, Hawaii.

7. Rui Dilão, Emergence of a collective steady state and symmetry breaking in plexus of two and three identical cells. “FUNCDYN Workshop 2007” (Functional dynamics in Complex Chemical and Biological Systems), Haslev, Haslev Udvidede Højskole, Copenhagen, Denmark, 2-5 May 2007.


Teaching

Teaching Experience:
Technical Books for University Courses:


Texts for University Courses:


Computational Applications:


Experimental Prototypes:


**Supervision of PhD Thesis:**


**Pos-Doc Training:**


**Supervision of Master Thesis:**

1. Luís Carlos Gomes Pereira, "Modelling the eukaryotic cell cycle”. Instituto Superior Técnico, Technical University of Lisbon, November 2012.


May 2023


**Supervision of Graduation Thesis**


May 2023


May 2023
27. Martim Pardal, “Growth, Division and Instabilities in Morphogenesis,” 2018.


41. Lízia Branco, The role of ion channels in the transmissions of signals along axons, 2022.


May 2023
Supervision of Research Projects for Undergraduates:


2. José Amaral (25037), “Abundance of aperiodic behaviour in the map of the interval f(x)2 m x+1-2m”, 1990.


May 2023


May 2023


**Transfer of knowledge and awareness of science**

**Participation and Organization of Scientific Fairs:**


**Journal Articles for the Public Awareness of Science:**


May 2023


**Science and Society:**


**Books for the Public Awareness of Science:**


**Author Rights:**


Consulting:

Management

Management:
1997-
Coordinator of the Non-Linear Dynamics Group of Instituto Superior Técnico.
1990-1998
Representative of the Department of Physics to the Council of Libraries of Instituto Superior Técnico.

Member of the Jury of Habilitations:
-Nadya Morozova, Formalization, modeling and analysis of cell fate decision mechanisms in normal and cancer cells. Université Paris-Sud XI, April, 2014.

Member of the Jury of PhD Thesis (no supervision):
-Sara Pinto Correia, Phase Space Reconstruction of Multivariate Time Series from Molecular and Field Biology, ITQB, New University of Lisbon, 2005.
-Paulo Ricardo Ferreira Pinto, Density of first Poincaré returns and periodic orbits, Departamento de Matemática, Faculdade de Ciências da Universidade do Porto, 11 de Junho de 2012.

**Member of the Jury of Master Thesis (no supervision):**
- Miguel Tavares Aleluia, Teacher demand model for basic education, IST, 14 November 2014.
- Sérgio David Vitorino Ramos, Study and development of an autonomous computational system for intraday trading (In Portuguese: Estudo e desenvolvimento de um sistemas computacional de intraday trading autônomo), IST, April 2016.
- Marta Sofia Galrito Pinto, Passive Exoskeletons to Support Human Locomotion - a computational study), IST, Novembro 2017.