

Personal details

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Current Position

Ramon y Cajal fellow (post-doctoral researcher) at the University of the Basque Country (Biophysics Research Unit / Dept. of Logic and Philosophy of Science).

Academic and professional background

First Degree (5-year degree) **in Physics**. (Specialization: *Solid State Physics*.) University of the Basque Country (UPV/EHU) (1989-94).

Master in “European Studies on Society, Science and Technology” (EEST) by the Univ. of Notre Dame de la Paix in Namur (Belgium) and the UPV/EHU (1994-95).

Ph. D. in Sciences (Complex Systems) by the University of the Basque Country (1996-2001). Ph. D. Program in ‘Complex Systems’: *Quality Program MEC: 1995-97*. UNESCO-Specialization Code: 720501-720102. Highest mark possible (sobresaliente ‘cum laude’) obtained. Two years later: *Excellent Dissertation Award by the University of the Basque Country*.

Lectureship of Physics and Mathematics at the Department of Fundamental Sciences of Mondragon Polytechnic School in MU-Mondragon University, Basque Country, Spain. (Sept. 2002 – Feb. 2003 and Sept. 2003 – Feb. 2004).

Main research interests

Complex Systems, Biophysics, Bioenergetics, Minimal Cellular Systems, Origins of Life, Theoretical Biology, Artificial Life, Astrobiology.

Previous research fellowships

Erasmus grant (for ‘post-graduates’) to stay at the University of Notre Dame de la Paix of Namur (Belgium) and carry out the second half (6 months) of the Master in “European Studies on Society, Science and Technology” (March-Sept. 1995).

Pre-doctoral fellowship provided by the University of the Basque Country (UPV-EHU), during 4 consecutive years, to do research leading to the development of a Ph. D. dissertation on “Physical conditions for the appearance of autonomous systems with open-ended evolutionary capacities”. (October 1996 - November 2000) -- *Excellent Dissertation Award*.

Invited student to the “1998 Complex Systems Summer School”, organized by the Santa Fe Institute (SFI), held at The College of Santa Fe, New Mexico, USA, during the four weeks of June 1998.

Invited researcher for a two-month stay (July-September, 1999) at the University of Newcastle (Australia), to work with the Complex Dynamic Systems Research Group led by Professor Cliff Hooker.

Post-doctoral fellowship provided by the National Institute of Aerospace Technology (INTA) of the Spanish Government to work at the Centre for Astrobiology (CAB) in Madrid (April 2002 - September 2002)

Post-doctoral fellowship provided by the MECD (Spanish Government) to collaborate with Pier Luigi Luisi’s group at ETH-Zürich (Switzerland), studying proto-cellular systems in vitro. (February – September 2003). Continuation in Rome, Italy, with the same research group (Dept. of Biology, Roma Tre University). (January 2004 – March 2005).

Post-doctoral fellowship provided by the Basque Government to become re-inserted in Alvaro Moreno’s research group on philosophy of biology. (Oct 2005 – Dec. 2006).

List of (most relevant) publications

- RUIZ-MIRAZO, K, MORENO, A., & MORAN, F. (1998): Merging the Energetic and the Relational-Constructive Logic of Life. In Adami, C, Belew, R, Kitano, H. & Taylor, C.(eds) *Artificial Life VI*, Cambridge MA: MIT Bradford Books, pp. 448-451.
- RUIZ-MIRAZO, K & MORENO, A. (1998): Autonomy and emergence: how systems become agents through the generation of functional constraints. *Acta Polytechnica Scandinavica* **Ma91** Emergence, Complexity, Hierarchy, Organization. Special Issue Farre, G.L. & Oksala, T.(eds) The Finnish Academy of Technology, pp.:273-282.
- MORENO, A. & RUIZ-MIRAZO, K. (1999): Metabolism and the problem of its universalization. *BioSystems* **49 (1)**: 45-61.
- RUIZ-MIRAZO, K. MORENO, A, MORAN, F, PERETO, J & MERELO, J. (1999): Designing a Simulation Model of a Self-Maintaining Cellular System. In *Advances in Artificial Life*. D. Floreano, J.Nicoud & F. Mondada (eds.) Berlin Springer Verlag, pp. 379-388.
- RUIZ-MIRAZO, K., ETXEBERRIA, A., MORENO, A., & IBAÑEZ, J. (2000): Organisms and their place in biology. *Theory in Biosciences* **119**: 43-67.
- RUIZ-MIRAZO, K., MORENO, A. (2000): Searching for the roots of autonomy: the natural and artificial paradigms revisited. In *CC AI: Communication and Cognition-Artificial Intelligence*, **17(3-4)**: 209-228.
- MORENO, A, RUIZ-MIRAZO, K. (2002): Key issues regarding the origin, nature and evolution of complexity in nature: information as a central concept to understand biological organization. *Emergence* **4.1/4.2**: 63-76.
- RUIZ-MIRAZO, K, PERETO, J. & MORENO, A. (2004): A Universal Definition of Life: Autonomy and Open-ended Evolution. *Origins of Life and Evolution of the Biosphere* **34 (3)**: 323-346.
- RUIZ-MIRAZO, K & MORENO, A. (2004): Basic Autonomy as a fundamental step in the synthesis of life. *Artificial Life* **10 (3)**: 235-259.
- MORENO, A. & RUIZ-MIRAZO, K. (2006): The maintenance and open-ended growth of complexity in nature: information as a decoupling mechanism in the origins of life. In Capra F, Sotolongo P, Juarrero A. & van Uden J. (eds) *Rethinking Complexity* ISCE Publisher. (pp. 55-72)
- RUIZ-MIRAZO, K & MORENO, A. (2006): On the origins of information and its relevance for biological complexity. *Biological Theory* **1(3)**: 227-229.

- RUIZ-MIRAZO, K., STANO, P. & LUISI, P.L. (2006): Lysozyme effect on oleic acid/oleate vesicles. *Journal of Liposome Research* **16(2)** 143–154.
- MAVELLI, F. & RUIZ-MIRAZO, K. (2007): Stochastic simulations of minimal self-reproducing cellular systems. *Philosophical Transactions of the Royal Society of London B*. **362 (1486)**: 1789-1802 (*Special Issue: 'Towards the Artificial Cell'*).
- RUIZ-MIRAZO, K. & MAVELLI, F. (2007): Modelling minimal lipid-peptide cells. *Origins of Life and Evolution of the Biosphere* **37**: 433-437.
- MAVELLI, F. & RUIZ-MIRAZO, K. (2007): Bridging the gap between in silico and in vitro approaches to minimal cells. *Origins of Life and Evolution of the Biosphere* **37**: 455-458.
- RUIZ-MIRAZO, K. & MAVELLI, F. (2007): Simulation model for functionalized vesicles: lipid-peptide integration in minimal protocells. In: *Advances in Artificial Life (Proceedings of ECAL 2007)*, Almeida e Costa et al. (eds), pp. 32-41 . Springer, Berlin.
- MAVELLI, F. & RUIZ-MIRAZO, K. (2007): Stochastic simulation of fatty-acid protocell models. In: *Noise and Fluctuations in Biological, Biophysical, and Biomedical Systems*. (SPIE Proceedings vol. 6602, pp. 1B1-1B10). Sergey M. Bezukrov (eds.). Bellingham, Washington (USA). ISBN:9780819467393.
- RUIZ-MIRAZO, K., UMEREZ, J. & MORENO, A. (2008): Enabling conditions for ‘open-ended evolution’. *Biology and Philosophy* **23(1)**: 67-85.
- BARANDIARAN, X. & RUIZ-MIRAZO, K. (2008): Modelling autonomy: simulating the essence of life and cognition. (Editorial Intro to the Special Issue). *BioSystems* **91(2)**: 295-304.
- RUIZ-MIRAZO, K. & MAVELLI, F. (2008): Towards ‘basic autonomy’: stochastic simulations of minimal lipid-peptide cells. *BioSystems* **91(2)**: 374-387.