

Curriculum Vitae

I. Personal details

Name and surname: **Pedro (Kepa) Ruiz-Mirazo**
Place and date of birth: Madrid, 9th of December, 1970
IC (and Passport) number: 30.638.582-Y
Civil Status: Married
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II. Current Position

Post-doctoral researcher at the Dept. of Logic and Philosophy of Science (San Sebastian Group of Theoretical Biology) of the University of the Basque Country.

III. 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 University of Notre Dame de la Paix in Namur (Belgium) and the UPV/EHU (1994-95).

Ph. D. in Sciences (Physics section) 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. Public defense of the dissertation: on the 23rd of Nov. 2001, at San Sebastián-Donostia (Spain). 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. (Sept. 2002 – Feb. 2003 and Sept. 2003 – Feb. 2004)

IV. Various skills of possible interest

Basic computer programming skills (Fortran 77, C – beginners level).

High School Teaching Degree (“Curso de Adaptación Pedagógica”). Educational Sciences Institute of the UPV/EHU (1995-1996).

Languages:

Spanish	Mother tongue
Basque	Fluent (second language) <i>EGA Certificate</i>
English	Fluent. One-year stay in the U.K. (1988-89) <i>Cambridge First Certificate (Grade A)</i> <i>Cambridge Proficiency (Grade A)</i>
French	Preliminary level. Half-year stay in Belgium (French speaking area) (1995). <i>U.F.D.A. Certificate "Niveau Debutant" (94%)</i>
German	Rudimentary. Half-year stay in Switzerland (Zürich, German speaking area) (2003).
Italian	Basic -mainly speaking- abilities. A year stay in Rome, Italy (2004).

V. Grants/fellowships and participation in research projects

Grants/fellowships:

Erasmus grant (for ‘third-cycle’ degrees) 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. Seminar sessions (both given and attended) and different types of constructive interaction with the group.

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

Post-doctoral fellowship provided by the MEC (Spanish Government) to do research with Pier Luigi Luisi's group at ETH-Zürich (Switzerland) on the project "Autonomy: a fundamental concept to understand the origin and nature of biological organization", studying proto-metabolic 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).

Research Projects:

Collaboration with the *EMSTES Research Project in Science Teaching*, of the University of Notre Dame de la Paix (Belgium), in the context of The European Interuniversity Master Program ESST. This included writing up a **Master dissertation: "World-views while introducing quantum mechanics"** (under the supervision of Gérard Fourez), where the current way of popularizing and teaching quantum physics is criticized (Feb.-Sept. 95).

Participation in the project: *Science of complexity and artificial simulations. The impact of AL in some aspects of contemporary evolution theory.* **Main researcher:** Alvaro Moreno Bergareche. **Place:** Dept. of Logic and Philosophy of Science, University of the Basque Country, Spain. **Financed by:** DIGCYT (MEC) PB95-0502. **Dates:** 1996-1999.

Participation in the project: *Identity and individuation in biology and artificial life.* **Main researcher:** Arantza Etxeberria Agiriano. **Place:** Dept. of Logic and Philosophy of Science, University of the Basque Country, Spain. **Financed by:** University of the Basque Country (UPV-EHU) 003.230-HA079/99. **Dates:** 1999-2000.

Participation in the project: *Interactions between proteins and liposomes.* **Main researcher:** Pier Luigi Luisi. **Place:** Institute for Polymers, ETH-Zürich, Switzerland. **Financed by:** Swiss Federal Government. **Dates:** 2002-2003.

Participation in the project: *Functionalized self-reproducing vesicles as precursors for early cells. (COST-Chemistry Action D27)* **Main researcher:** Pier Luigi Luisi. **Place:** Dept. of Biology, Roma Tre University, Rome, Italy. **Financed by:** European Commission. **Dates:** 2003-2006.

VI. Publication list

1. **Author:** Kepa Ruiz-Mirazo
Title: World-views while introducing quantum mechanics
Ref.: Publishing Services of the University of the Basque Country and the University of Notre Dame de la Paix in Namur (Belgium) (1995)
Key: Master Dissertation.

2. **Authors:** Kepa Ruiz-Mirazo, Alvaro Moreno & Federico Morán
Title: Merging the energetic and the relational-constructive logic of life
Ref.: Adami, C., Belew, R., Kitano, H. & Taylor, C. (eds.), *Proceedings of The Sixth International Conference on Artificial Life (ALIFE VI)*, Cambridge, MA: MIT Bradford Books, pp. 448-451 (1998)
Key: BC
3. **Authors:** Kepa Ruiz-Mirazo & Alvaro Moreno
Title: Autonomy and emergence: how systems become agents through the generation of functional constraints.
Ref.: Farre, G.L. & Oksala, T. (eds.), *Acta Polytechnica Scandinavica Ma91, Special Issue on Emergence, Complexity, Hierarchy, Organization*. The Finnish Academy of Technology, Helsinki, pp.: 273-282 (1998)
Key: A
4. **Authors:** Alvaro Moreno & Kepa Ruiz-Mirazo
Title: Metabolism and the problem of its universalization
Ref.: *BioSystems* 49 (1), pp. 45-61 (1999)
Key: A
5. **Authors:** Kepa Ruiz-Mirazo, Alvaro Moreno, Federico Morán, Juli Peretó & J.J. Merelo.
Title: Designing a simulation model of a self-maintaining cellular system
Ref.: Floreano, D., Nicoud, J-D Nicoud & Mondada, F. (eds.), *Advances in Artificial Life, Proceedings of the 5th European Conference ECAL'99*, Berlin, Springer-Verlag, pp. 379-389 (1999)
Key: BC
6. **Author:** Kepa Ruiz-Mirazo
Title: Raíces del concepto de autonomía en biología: una crítica al concepto de autopoiesis
Ref.: Mary Sol de Mora, Andoni Ibarra, Eulalia Pérez Sedeño, Isabel Sánchez Balmaseda (eds.), *Actas del III Congreso de la Sociedad de Lógica, Metodología y Filosofía de la Ciencia en España*, Publicaciones del Departamento de Filosofía de la UPV-EHU, San Sebastián -- Donostia, pp. 609-617 (2000)
Key: BC
7. **Authors:** Kepa Ruiz-Mirazo, Arantza Etxeberria, Alvaro Moreno & Jesús Ibáñez
Title: Organisms and their place in biology.
Ref.: *Theory in Biosciences*, 119, pp. 43-67 (2000)
Key: A
8. **Authors:** Kepa Ruiz-Mirazo & Alvaro Moreno
Title: Searching for the roots of autonomy: the natural and artificial paradigms revisited
Ref.: *CCAI (Special issue on autonomy)*, 17(3-4), pp. 209-228 (2000)
Key: A
9. **Author:** Kepa Ruiz-Mirazo
Title: Condiciones físicas para la aparición de sistemas autónomos con capacidades evolutivas abiertas (Physical conditions for the appearance of autonomous systems with open-ended evolution capacities).

Ref.: Publishing Services of the University of the Basque Country (2001)
Key: Ph.D. Dissertation.

10. **Authors:** Alvaro Moreno & Kepa Ruiz-Mirazo

Title: Key issues regarding the origin, nature and evolution of complexity in nature: information as a central concept to understand biological organization

Ref.: *Emergence (Special Issue)* 4.1/4.2, pp. 63-76 (2002)

Key: A

11. **Author:** Kepa Ruiz-Mirazo

Título: Biziazen sorrera berrir sortzen? (¿Re-originando el origen de la vida?)

Ref.: *Elhuyar*, 191, pp. 22-25 (2003)

Key: A

12. **Authors:** Kepa Ruiz-Mirazo, Juli Peretó & Alvaro Moreno

Title: A universal definition of life: autonomy and open-ended evolution

Ref.: *Origins of Life and Evolution of the Biosphere* 34, pp. 323-346 (2004)

Key: A

13. **Authors:** Kepa Ruiz-Mirazo & Alvaro Moreno

Title: Basic autonomy as a fundamental step in the synthesis of life

Ref.: *Artificial Life*, 10(3), pp. 235-259 (2004)

Key: A

14. **Authors:** Kepa Ruiz-Mirazo, Pasquale Stano & Pier Luigi Luisi

Title: Lysozyme effect on oleic acid/oleate vesicles.

Ref.: Accepted for publication (forthcoming) *Journal of Liposome Research*.

Key: A

15. **Authors:** Kepa Ruiz-Mirazo & Alvaro Moreno

Title: On the origins of information and its relevance for biological complexity

Ref.: Accepted for publication (forthcoming) *Biological Theory*.

Key: A

16. **Authors:** Kepa Ruiz-Mirazo & Alvaro Moreno

Title: The maintenance and open-ended growth of complexity in nature: information as a decoupling mechanism in the origins of life.

Ref.: In Capra F., Sotolongo P., Juarrero A. & van Uden J. (eds) ISCE Publish. Accepted for publication.

Key: BC

17. **Authors:** Fabio Mavelli & Kepa Ruiz-Mirazo

Title: A stochastic simulation model of self-(re-)producing cellular systems

Ref.: *Philosophical Transactions of the Royal Society (Special Issue: 'Towards the Artificial Cell')*. In preparation

Key: A

Authors: Kepa Ruiz-Mirazo, Jon Umerez & Alvaro Moreno

Title: 'Open-ended evolution' requires informational constraints.

Ref.: In preparation.

Key: A

(**Note:** the keys 'A' and 'BC' mean 'article' and 'book chapter' respectively. Authors are cited in the original order of publication.)

VII. Contribution to workshops and conferences

- **Title:** Merging the energetic and the relational-constructive logic of life
Contribution: Poster
Conference: ALIFE VI
Place and dates: University of California, Los Angeles USA, 26-29 June 1998.
- **Title:** Autonomy and emergence: how systems become agents through the generation of functional constraints.
Contribution: Oral presentation
Conference: ECHO III
Place and dates: University of Technology, Helsinki, 3-7 August 1998.
- **Title:** A conceptual approach to the idea of organism.
Contribution: Oral presentation
Conference: ISHPSSB'99
Place and dates: Oaxaca (Mexico), 7-11 July 1999.
- **Title:** Designing a simulation model of a self-maintaining cellular system
Contribution: Oral presentation
Conference: ECAL 99
Place and dates: Ecole Polytechnique Fédérale de Lausanne (Swiss Federal Institute of Technology), Lausanne, 13-17 September 1999.
- **Title:** Las raíces del concepto de autonomía en biología: una crítica a la idea de autopoiesis. (On the roots of the concept of autonomy in biology: a critical review of autopoiesis)
Contribution: Oral presentation
Conference: III Congreso SLMFCE
Place and dates: University of the Basque Country (UPV-EHU), San Sebastián-Donostia, 26-29 April 2000.
- **Title:** A universal definition of life: autonomy and open-ended evolution
Contribution: Oral presentation
Conference: ISSOL '02 (Meeting of the International Society for the Study of the Origin of Life)
Place and dates: Oaxaca (Mexico), 30 June – 5 July 2002.
- **Title:** (Basic) autonomy: a fundamental concept to understand the origins and nature of living systems.
Contribution: Oral presentation

Conference: ISHPSSB'03 (Meeting of the International Society for the History, Philosophy and Social Studies of Biology)

Place and dates: Wien-Viena (Austria), 16-20 July 2003.

- **Title:** Interaction of basic proteins and peptides with oleate vesicles.

Contribution: Poster

Conference: Third Workshop on Prebiotic Chemistry and Early Evolution (COST Chemistry -- Action D27)

Place and dates: Hersonissos, Crete (Greece), 30 Sept. – 3 Oct. 2004.

- **Title:** Informational constraints: the last step of the origin of life and the beginning of open-ended evolution

Contribution: Invited lecture.

Conference: Workshop on Evolution, Information and Computation: from living to non-living matter.

Place and dates: European Center for Living Technology, Venice, Italy, 22 – 27 May 2005.

- **Title:** Working towards the ‘minimal cell’: a bottom-up proposal.

Contribution: Invited lecture.

Conference: ISSOL'05 (Meeting of the International Society for the Study of the Origin of Life)

Place and dates: Beijing, China, 19 – 24 June 2005

- **Title:** Simulation model of a minimal self-maintaining lipid-peptide cell.

Contribution: Poster

Conference: Chembiogenesis 2005 (COST Chemistry -- Action D27)

Place and dates: Venice International Univ., Venice, 28 Sept. – 1 Oct. 2005

VIII. Additional information of academic interest

Member of the Local Organizing Committee of the IV International Conference on Artificial Life and Artificial Intelligence “On the Origins of Cognition” (Donostia, Palacio Miramar, 13-14 December 1996).

Participation in an Advanced Course on Bioenergetics (VII Advanced Course on Theoretical Biochemistry), organized by the Dept. of Biochemistry and Molecular Biology of the University of La Laguna, and held in Tenerife (Canary Islands) in April 1997.

Lecturer of the Summer School of the Basque University UEU (Title of the lecture: “Galbahe metodologikoak: zientzi testuen azpian dagoen ideologia aztertzeko modu praktiko bat”; Pamplona-Iruñea, 21 July 1997).

Attendance to the International Conference on Thermodynamics “Time, Heat and Order”, held at the University of Aarhus (organized by the Dept. of Philosophy of that University), Aarhus, Denmark, 8-11 September 1997.

Attendance to the Summer School of the University of the Basque Country. Two different courses: “Life in the universe. Horizons y boundaries” (Palacio Miramar, Donostia-

San Sebastián, July 1998) and “Science and Society: The role of interactive science museums” (Palacio Miramar, Donostia-San Sebastián, August 1998).

Attendance to the 2nd Iberian (Portuguese-Spanish) Conference on Biophysics, held at the University Complutense of Madrid, 4-7 December 1998.

Participation in the International Seminar on Closure. Emergent organizations and their dynamics, held at the University of Gent, Belgium, May 3-5, 1999.

Participation in the Workshop on Astrobiology: Is life a result of the evolution of the universe?, held at the ‘CosmoCaixa’ Science Museum, Alcobendas, Madrid, Nov. 29 – Dec. 1, 2001.

Invited lecturer at the Dept. of Microbean Biotechnology of the CNB (Spanish National Center for Biotechnology), Universidad Autónoma de Madrid (Cantoblanco), on the 27th of March of 2003, to speak about: “The origin of genetic information as a late transition in the process of origin of life”.

Participation in the 7th International European Conference on Artificial Life (ECAL’03), in Dortmund, Germany, on Sept. 14-17, 2003.

Participation in the International School on Complexity (1st Course: ‘Towards the Minimal Cell’) EMFCSC (Ettore Majorana Foundation and Centre for Scientific Culture). Erice, Sicily (Italy), 7 – 10 Dec. 2004.

Leioa (Bilbao), January 2006.

Signature:

Pedro (Kepa) Ruiz-Mirazo