



Leonardo Ermann

Personal Data

Date of birth: August 15th, 1979
Place of birth: San Juan, Argentina
e-mail: ermann@tandar.cnea.gov.ar
webpage: <http://www.tandar.cnea.gov.ar/~ermann>
Office address: Gerencia Investigación y Aplicaciones, CAC Comisión Nacional de Energía Atómica, Av. Gral Paz 1499, (CP1650), San Martín, Buenos Aires, Argentina
Off. phone/fax: (+54) 11 6772 7055 / 7121

Current Positions

from March 2013 **Head of the Theoretical Physics Department – CNEA,**
Quantum Chaos Group, Gerencia Investigación y Aplicaciones,
Comisión Nacional de Energía Atómica (CNEA), Buenos Aires, Argentina.

from February 2012 **Researcher in the Theoretical Physics Department – CNEA.**

from March 2013 **Research Associate - CIC - CONICET,**
Consejo Nacional de Investigaciones Científicas y Técnicas.

from August 2012 **Teaching assistant,** *Escuela de Ciencia y Tecnología*, Universidad Nacional de San Martín.

Degrees

2005–2009 **PhD,** *University of Buenos Aires – Lab. Tandar (CNEA), Buenos Aires, Argentina,*
Advisor: Prof. Marcos Saraceno,
Title: *Transport and localization in a periodic chain of chaotic quantum map.*

1999–2005 **Licenciatura thesis,** *University of Buenos Aires, Argentina,*
Advisor: Prof. Marcos Saraceno.

Previous positions

Research positions

- May 2011 **Invited Researcher**, *Quantum Coherence Group (Prof. D. Shepelyansky)*, Laboratoire de Physique Théorique, UMR 5152 du CNRS, IRSAMC, Université Paul Sabatier, Toulouse, France.
- August 2011
- September 2009 **Postdoctoral Position**, *Laboratoire de Physique Théorique*, UMR 5152 du CNRS, IRSAMC – Université Paul Sabatier, Toulouse, France.
- April 2011
- 2005–2009 **CONICET**, *Doctoral Fellowship*, Buenos Aires, Argentina.

Academic Positions

- 2003–2009 **Teaching assistant**, *Physics departament*, FCEN, University of Buenos Aires, Argentina. Courses: *Quantum Mechanics, Electromagnetism, Optics Laboratory, Physics for Biologists*
- 2002–2004 **Teaching assistant**, *Mathematics departament*, CBC, University of Buenos Aires, Argentina. Courses: *Calculus and Analysis*.

Grants, Fellowships and Awards

- 2015–2016 **Agencia grant**, *PICT - 2014-2243: Grant for Young Researcher*, Transporte y redes complejas.
- 03.2012–03.2014 **CONICET grant**, *PIP 11220110100703*, Transporte y localización en sistemas cuánticos complejos.
- 09.2009–06.2011 **Postdoctoral Fellowship from ANR**, *Advisor: Dr. Dima Shepelyansky*, France.
- 04.2005–08.2009 **CONICET Fellowship**, *Doctoral Fellowship from CONICET*, Advisor: Dr. Marcos Saraceno.

Work as reviewer for physics journals and institutions

- from 2015 **CONICET PIP project evaluator**.
- from 2015 **Referee of “International Journal of Bifurcation and Chaos”**.

Publications

Published papers

- **29. L. Ermann, K.M. Frahm and D.L. Shepelyansky**, *Google matrix analysis of directed networks*, Rev. Mod Phys. **87**, 1261 (2015)
- **28. L. Ermann, E. Vergini and D.L. Shepelyansky**, *Dynamical thermalization of Bose-Einstein condensate in Bunimovich stadium*, Eur. Phys. Lett. **111**, 50009 (2015)
- **27. R. Pálovics, B. Daróczy, A. Benczúr, J. Pap, L. Ermann, S. Phan, A.D. Chepelianskii, and D.L. Shepelyansky**, *Statistical analysis of NOMAO customer votes for spots of France*, Eur. Phys. J. B **88**, 194 (2015)

☎ (+5411) 67 72 70 55 • ☎ (+5411) 67 72 71 21
• ✉ ermann@tandar.cnea.gov.ar

- **26. L. Ermann and D.L. Shepelyansky,**
Google matrix analysis of the multiproduct world trade network,
EPJB **88**, 84 (2015)
- **25. L. Ermann, and G.G. Carlo,**
Quantum Parameter Space of Dissipative Directed Transport,
Phys. Rev. E (rapid comm.) **91**, 010903(R), (2015)
- **24. L. Ermann, and G.G. Carlo,**
Symbolic walk in regular networks,
J. Phys. A: Math. Theor. **48** 035102, (2015)
- **23. L. Ermann and D.L. Shepelyansky,**
Destruction of Anderson localization by nonlinearity in kicked rotator at different effective dimensions,
J. Phys. A: Math. Theor. **47**, 335101 (2014)
- **22. L. Ermann and M. Saraceno,**
The Quantum Baker Map ,
Scholarpedia, 7(12):9860. doi:10.4249/scholarpedia.9860
http://www.scholarpedia.org/article/Quantized_baker_map
- **21. L. Ermann and D.L. Shepelyansky,**
Quantum Gibbs distribution from dynamical thermalization in classical nonlinear lattices,
New Journal of Physics **15**, 123004 (2013)
- **20. L. Ermann, K.M. Frahm and D.L. Shepelyansky,**
Spectral properties of Google matrix of Wikipedia and other networks,
Eur. Phys. J. B **86**, 193 (2013)
- **19. L. Ermann, A.D. Chepelianskii and D.L. Shepelyansky,**
Symmetry breaking for ratchet transport in presence of interactions and magnetic field ,
Phys. Rev. E **87**, 022912 (2013)
- **18. G.G. Carlo, D.A. Wisniacki, L. Ermann, R.M. Benito, F. Borondo,**
Classical transients and the support of open quantum maps,
Phys. Rev. E **87**, 012909 (2013)
- **17. L. Ermann and D.L. Shepelyansky,**
Ecological analysis of the world trade,
Phys. Lett. A **377**, 250-256 (2013)
- **16. L. Ermann, A.D. Chepelianskii and D.L. Shepelyansky,**
Towards two-dimensional search engines,
J. Phys. A: Math. Theor. **45**, 275101 (2012); <http://www.quantware.ups-tlse.fr/QWLIB/tradecheirank/index.html>
- **15. L. Ermann, G.G. Carlo. J.M. Pedrosa and M. Saraceno,**
Transient features of Quantum Open Maps,
Phys. Rev. E **85**, 066204 (2012).
- **14. L. Ermann and D.L. Shepelyansky,**
Arnold cat map, Ulam method and time reversal,
Physica D **241**, 514-518 (2012).
- **13. L. Ermann and D.L. Shepelyansky,**
Google matrix of the world trade network,
Acta Physica Polonica A **120**, A-158 (2011); (Proceedings of the 5th Workshop on Quantum Chaos and Localisation Phenomena Warsaw, Poland, May 20-22, 2011)
webpage: <http://www.quantware.ups-tlse.fr/QWLIB/tradecheirank/index.html>

- **12. L. Ermann and D.L. Shepelyansky,**
Relativistic graphene ratchet on semidisk Galton board,
Eur. Phys. J. B **79**, 357 (2011).
- **11. G.G. Carlo, L. Ermann, F. Borondo and R.M. Benito,**
On the environmental stability of quantum chaotic ratchets,
Phys. Rev. E **83**, 011103 (2011)
- **10. L. Ermann, A.D. Chepelianskii and D.L. Shepelyansky,**
Fractal Weyl law for Linux Kernel Architecture,
Eur. Phys. J. B **79**, 115 (2011).
- **9. L. Ermann and D.L. Shepelyansky,**
Ulam method and fractal Weyl law for Perron–Frobenius operators,
Eur. Phys. J. B **75**, 299 (2010).
- **8. L. Ermann and D.L. Shepelyansky,**
Google matrix and Ulam networks of intermittency maps,
Phys. Rev. E **81**, 036221 (2010).
- **7. L. Ermann, G.G. Carlo and M. Saraceno,**
Localization of resonance eigenfunction on quantum repellers,
Phys. Rev. Lett. **103**, 054102 (2009).
- **6. J.M. Pedrosa, G.G. Carlo, D. Wisniacki and L. Ermann,**
Distribution of resonances in the quantum open baker map,
Phys. Rev. E **79**, 016215 (2009).
- **5. L. Ermann, G.G. Carlo and M. Saraceno,**
Behavior of the current in the asymmetric quantum multibaker map,
Phys. Rev. E **79**, 056201 (2009).
- **4. L. Ermann and M. Saraceno,**
A periodic orbit basis for the quantum baker map,
Phys. Rev. E **78**, 036221 (2008).
- **3. L. Ermann, G.G. Carlo and M. Saraceno,**
Transport phenomena in the asymmetric quantum multibaker map,
Phys. Rev. E **77**, 011126 (2008).
- **2. L. Ermann and M. Saraceno,**
Generalized Quantum Baker Maps as perturbations of a simple kernel,
Phys. Rev. E **74**, 046205 (2006).
- **1. L. Ermann, J.P. Paz and M. Saraceno,**
Decoherence induced by a chaotic environment: A quantum walker with a complex coin,
Phys. Rev. A **73**, 012302 (2006).

Research visits and invited talks

- 2015 **Visit,**
Jun 25– Jul 14 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2015 **Visit,**
Mar 04–26 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2014 **Visit,**
Nov 05–25 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2014 **Visit,**
Jan 28– Feb 1 and Feb 09–17 IRSAMC – Université Paul Sabatier, Toulouse, Francia.

- 2013 **Visit**,
Jul 07–14 and Jul 21–27 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2013 **Visit**,
Apr 17–12 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2012 **Talk and visit**, *Spectral properties of transport on complex networks*,
Jul 12–17 Universität Potsdam, Potsdam, Germany.
- 2012 **Visit**,
Jul 17–21 and Jul 28– Aug 01 IRSAMC – Université Paul Sabatier, Toulouse, Francia.
- 2011 **Visit**,
Nov 06–19 IRSAMC – Université Paul Sabatier, Toulouse, France.
- 2011 **Talk**, *Google matrix of the world trade network*,
Oct 05 IRSAMC – Université Paul Sabatier, Toulouse, France.
- 2010 **Talk and visit**, *Ulam method, fractal Weyl law, and complex networks*,
Nov 29– Dic 04 Laboratoto Tandar, CNEA, Buenos Aires, Argentina.
- 2010 **Talk**, *Two perspectives in ratchet transport: Symmetry breaking induced by interactions, and nanostructres in graphene.*,
May 05 LNCMI–CNRS, Grenoble, France.
- 2006 **Talk**, *Simplifying Quantum Chaos: The quantum baker map as perturbations of a simple kernel.*,
Jul 03 Universidad Autónoma de Barcelona, Barcelona, Spain.

Workshops, Schools and Conferences

I have co-organized 3 international workshops and participated in 16 international workshops, 8 schools, and 3 national meetings, where I have contributed with 15 posters and 10 talks.

Workshop Organizations

- 2012 Dic 27–29 **Workshop “Complex Systems”, Coorganized with Miguel Angel Virasoro and Marcos Saraceno**,
UNGS - GlyA, CNEA, Buenos Aires, Argentina.
- 2009 Dic 01–04 **3rd International workshop “Quantum Chaos: theory and applications”, Dedicated to the 65th birthday of Marcos Saraceno**,
Laboratorio Tandar - CNEA, Buenos Aires, Argentina.
- 2007 Mar 12–17 **International workshop “Quantum Chaos: theory and applications”,**
Laboratorio Tandar - CNEA, Buenos Aires, Argentina.

International Workshops

- 2015 Jun 27– Jul 11 **Networks and data mining**,
School for advanced sciences of Luchon, Luchon, Francia.

- * charla: *Multiproduct world trade network*
- 2015 Mar 14–21 **Quantum chaos: fundamentals and applications**,
School for advanced sciences of Luchon, Luchon, France.
* talk: *Google matrix analysis of the multiproduct world trade network*
- 2014 Oct 27–31 **Quantum Optics VII**,
, Mar del Plata, Argentina.
- 2014 Feb 03–07 **Workshop Weak Chaos and Weak Turbulence**,
Max Planck Institute für Komplexer Systeme, Dresden, Germany.
* talk: *Quantum Gibbs distribution from dynamical thermalization in classical nonlinear lattices*
- 2013 Nov 05–07 **Workshop on Dynamic Networks 2013**,
*ECT**, Buenos Aires, Argentina.
* talk: *Spectral properties of Google matrix and two-dimensional search engines analysis*
- 2013 Jul 15–19 **Advanced Workshop on Nonlinear Photonics, Disorder and Wave Turbulence**,
*ECT**, Trieste, Italia.
* poster: *Quantum Gibbs distribution from dynamical thermalization in classical nonlinear lattices*
- 2012 Jul 23–27 **Spectral Properties of Complex Networks**,
*ECT**, Trento, Italy.
* talk: *Google matrix of the World Trade Network*
- 2011 Nov 23–25 **New frontiers in the physics of two dimensional electron systems**,
ICAM, Buenos Aires, Argentina.
• poster: *Ratchet effect in 2-dimensional nanostructures*
- 2011 Nov 3–4 **2011 Conference “Complex systems: Towards a better understanding of financial stability and crises”**,
De Nederlandshe Bank, Amsterdam, Netherlands.
* talk (with Dima Shepelyansky): *Google Matrix of the World Trade Network*
- 2010 Sep 13–17 **4th Workshop on Quantum Chaos: Theory and Applications**,
CIEM – Castro Urdiales, Cantabria, Spain.
* talk: *Ulam method, fractal Weyl law, and complex networks*
- 2010 Aug 23–
Sep 03 **Advanced Workshop on Anderson Localization, Nonlinearity and Turbulence: a Cross-Fertilization**,
ICTP, Trieste, Italy.
• poster: *Turbulent ratchet transport of interacting particles*,
L. Ermann, A.D. Chepelianskii and D.L. Shepelyansky
• poster: *Fractal Weyl Law for Linux Kernel Architecture*,
L. Ermann, A.D. Chepelianskii and D.L. Shepelyansky
- 2010 Mar 24–26 **Second meeting of the GDR "Quantum Dynamics"**,
Bourgogne University, Dijon, France.

- 2009 Dic 10–11 **Workshop PageRank Matrix Days. Dedicated to 100 Year Anniversary of Stanislaw Ulam,**
LPT IRSAMC, UPS–CNRS, Toulouse, France.
* talk: *Google Matrix and Ulam networks*
- Sep 21–25 2009 **Pseudochaos and Stable-Chaos in Statistical Mechanics and Quantum Physics Workshop,**
ICTP, Trieste, Italy.
 - poster: *Transport phenomena in the asymmetric quantum multibaker map,*
L. Ermann, G.G. Carlo and M. Saraceno
 - poster: *Fractal Weyl law for Ulam approximant of the Perron–Frobenius operator,*
L. Ermann, D. Shepelyansky
- 2008 Aug 11–15 **Workshop: Quantum Dynamical Concepts: From Path Integrals to Semiclassics,**
Max Planck Institute für Komplexer Systeme, Dresden, Germany.
 - poster: *A periodic orbit basis for the quantum baker map*
L. Ermann and M. Saraceno
- 2008 Aug 18–22 **Seminar: Quantum Dynamical Concepts: From Path Integrals to Semiclassics,**
Max Planck Institute für Komplexer Systeme, Dresden, Germany.
- 2008 Feb 11–15 **2nd Workshop on Quantum Chaos: Theory and Applications,**
Universidad Politécnica de Madrid, Madrid, Spain.
* talk: *Transport phenomena in the asymmetric quantum multibaker map*
- 2007 Dic 10–12 **Workshop on the "Physics of Nanostructures and Nanomaterials",**
Instituto Balseiro, San Carlos de Bariloche, Argentina.
 - poster: *Transport phenomena in the asymmetric quantum multibaker map,*
L. Ermann, G.G. Carlo and M. Saraceno
- 2007 Mar 12–17 **Workshop on Quantum Chaos: theory and applications,**
Laboratorio Tandar - CNEA, Buenos Aires, Argentina.
* talk: *Two different approaches to a chaotic spectrum*
- 2006 Jun 18–30 **Workshop on Quantum–Classical Transition and Quantum Information,**
Benasque Center of Science, Benasque, Spain.
 - poster: *Generalized Quantum Baker Maps as perturbations of a simple kernel.,*
L. Ermann and M. Saraceno
- 2005 Oct 03–07 **Workshop on Noise and Inestabilities in Quantum Mechanics,**
ICTP Abdus Salam, Trieste, Italy.
 - poster: *Decoherence with a chaotic environment: QW with the quantum baker map*
L. Ermann, J.P. Paz and M. Saraceno
- 2005 Sep 26–30 **Conference on Quantum Information,**
Max Planck Institute für Komplexer Systeme, Dresden, Germany.
 - poster: *Decoherence with a chaotic environment: QW with the quantum baker map*
L. Ermann, J.P. Paz and M. Saraceno
- [Schools and courses](#)
- 2010 Jun 20–25 **École thématique “L’acoustique non linéaire, de la Terre au nano” ,**
CNRS, Ile d’Oleron, France.

- 2010 May 17–20 **Intensive course in C++: “Formation Langage C++”**,
CNRS, Toulouse, France.
- 2009 Jul 27–Aug 07 **Eleventh J.J. Giambiagi winter school: The Quantum Mechanics of the XXI Century: Manipulation of Coherent Atomic Matter.**,
UBA, Buenos Aires, Argentina.
- 2007 Dic 02–08 **School on "Physics of Transport in Nanostructures"**,
Instituto Balseiro, San Carlos de Bariloche, Argentina.
- 2007 Jul 30–Aug 03 **Ninth J.J. Giambiagi Winter School, *Physics and the Computers of the Future***,
FCEN UBA, Buenos Aires, Argentina.
- poster: *Transport phenomena in the asymmetric quantum multibaker map*,
L. Ermann, G.G. Carlo and M. Saraceno
- 2006 Jun 11–24 **Summer School on Scalable Quantum Information Processing and Computing**,
Benasque Center of Science, Benasque, Spain.
- 2005 Aug 29 – Sep 25 **International Summer School on Quantum Information**,
Max Planck Institute für Komplexer Systeme, Dresden, Germany.
- * talk: *Decoherence with a chaotic environment: QW with the quantum baker map*
- 2003 Jul 18 – Aug 01 **Fifth J.J. Giambiagi Winter School on Physics, *Precision Cosmology***,
FCEN - UBA, Buenos Aires, Argentina.

National meetings

- 2014 22–25/09 **99 Reunión Nacional de la Asociación Física Argentina (AFA)**,
, Tandil, Buenos Aires, Argentina.
- 2013 Sep 24–27 **98 meeting Argentinian Society of Physics (AFA)**,
San Carlos de Bariloche, Argentina.
- 2012 Sep 25–28 **97 meeting Argentinian Society of Physics (AFA)**,
Villa Carlos Paz, Córdoba, Argentina.
- division talk of Quantum Information: *Quantum Repeller*
- 2009 Oct 21–23 **Les Journées Nationales en Nanosciences et Nanotechnologies (J3N)**,
Agence Nationale de la Recherche - Pnano, Toulouse, France.
- poster: *NANOdetectors of microwave and TERahertz radiation based on Ratchet effect*,
Partners: H. Bouchiat, D.L. Shepelyansky, H. Aubert, J.C. Portal
- 2008 Sep 15–19 **93 meeting Argentinian Society of Physics (AFA-SUF)**,
UBA, Buenos Aires, Argentina.
- poster: *Base sobre órbitas periódicas para el mapa del panadero cuántico*,
L. Ermann and M. Saraceno
 - poster: *Comportamiento de la corriente en el mapa del panadero múltiple asimétrico*,
L. Ermann, G.G. Carlo and M. Saraceno
- 2003 Sep 22–15 **88 meeting Argentinian Society of Physics (AFA)**,
Instituto Balseiro, San Carlos de Bariloche, Argentina.
- poster: *Espectroscopía solar como experiencia para un laboratorio de enseñanza avanzado*
C. Cormick, R. Díaz, L. Ermann y L. Pelliza González

Language and computer skills

Spanish	First language
English	Spoken, read and written, advanced level
French	Spoken, read and written, intermediate level
Computer skills	Fortran programmer, high knowledge of linux, and basic knowledge of C++

Scientific Interests

- Complex networks
- Quantum chaos, Semiclassics
- Transport phenomena
- Quantum information
- Econophysics
- Class-Quant transition, Decoherence
- Complex dynamics, Chaotic systems
- Quantum Computation