

Enrico Scalas

Born: 11/01/1964

Italian citizen

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links to preprints and working papers: <http://ideas.repec.org/e/psc89.html>;

http://arxiv.org/find/grp_physics/1/au:+Scalas_Enrico/0/1/0/all/0/1

Education:

1994: PhD in Physics, Physics in 2d, diffusion and growth of aggregates. Advisors: Andrea C. Levi and Alessandra Gliozzi.

1989: Degree in Physics, Dynamics of the gel-to-liquid crystal phase transition in lipid systems. Advisors: Andrea C. Levi and Alessandra Gliozzi.

Professional Experience:

Current position

1998 to present: *Assistant Professor* of Physics at Università del Piemonte Orientale, Italy.

Visiting professorships

October-November 2010: *Visiting Scientist* at Departament d'Economia, Universitat Jaume I, Castellón de la Plana, Spain.

November 2006: *Visiting Professor* at Division of Social Sciences, International Christian University, Tokyo, Japan.

2005 September to 2006 August: *Senior researcher* at the Multi-Agent Division of ISI, Turin, Italy.

November/December 2005: *Visiting Professor* at Department of Applied Mathematics, Research School for Physical Sciences and Engineering, Australian National University, Canberra, Australia.

Postdoctoral grants

1997-1998: *Post-doc* at INFM (Italian Institute for the Physics of Matter), Genoa, Italy.

1995-1997: *Post-doc* at the Physics Department, Genoa University, Italy.

1994-1995: *Post-doc* at the Institute of Physical Chemistry, Mainz University, Germany, in the group of Prof. Dr. Helmuth Möhwald.

Research activities:

Past research:

1990-1998:

Physical properties of surfactant monolayers at the air-water interface, with emphasis on phase transitions. This included experimental work at synchrotron radiation facilities.

Theory of diffusion in lattice-gas models of solid surfaces.

1998-2002:

Heavy-ion physics. This included experimental work at CERN.

Current research:

Anomalous diffusion and its applications to complex systems. This includes the application of Fractional Calculus and Continuous-Time Random Walks to Finance. Started in 1999, this research line has been very successful in two respects: it has given rise to a series of papers on the waiting-time properties in financial markets by other independent authors and to a long series of theoretical and empirical work.

Foundations of Statistical Mechanics. This includes activity on the Ehrenfest Urn model and investigations on the role of statistical equilibrium in Physics and Economics

Agent-based simulations in Physics, Finance and Economics. This includes the application and validation of large-scale simulations to complex systems in different scientific fields.

Highlights

A short description of some recent results obtained by Enrico Scalas is included below.

1. In 1998, Enrico proposed the use of continuous-time random walks as a model for tick-by-tick financial data. Relevant paper: SCALAS E, GORENFLO R, MAINARDI F. (2000). Fractional calculus and continuous-time finance. PHYSICA. A. vol. 284, pp. 376-384.
2. In 2003, Enrico introduced a Mittag-Leffler generalization of the Poisson process. Relevant papers: SCALAS E, GORENFLO R, MAINARDI F. (2004). Uncoupled continuous-time random walks: Solution and limiting behavior of the master equation. PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS. vol. 69, 011107. MAINARDI F., GORENFLO R. and SCALAS E. (2004): A fractional generalization of the Poisson process, Vietnam Journal of Mathematics 32 (SI), 53–64. E-print: arxiv.org/abs/math/0701454.

3. In 2007, Enrico showed that Markovianism is compatible with classical dynamics. Relevant paper: SCALAS E., MARTIN E, GERMANO G. (2007). Ehrenfest urn revisited: Playing the game on a realistic fluid model. PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS. vol. 76, 011104.
4. In 2009, Enrico showed that the quadratic variation for an important class of continuous-time random walks (compound renewal processes) is related to the M-functions of Wright type. Relevant paper: GERMANO G, POLITI M, SCALAS E., SCHILLING R.L (2009). Stochastic calculus for uncoupled continuous-time random walks. PHYSICAL REVIEW E, STATISTICAL, NONLINEAR, AND SOFT MATTER PHYSICS, vol. 79, 066102.

Proposal evaluation:

Evaluator of research proposals for the following countries: Colombia, Finland, France, Estonia, Israel, The Netherlands

Research grants:

July 2003 – July 2007: *Ultra-high frequency dynamics of financial markets*

February 2007- March 2009: *Information filtering in gene expression from DNA-microarray experiments.*

December 2008- December 2009: *Biofuel production from the viewpoint of complex systems.*

Some academic co-workers:

Tomaso Aste at the School of Physical Sciences, University of Kent, Canterbury, UK.

Tiziana Di Matteo at King's College, London, UK.

Ubaldo Garibaldi at IMEM-CNR, Genoa, Italy.

Guido Germano at the Institute of Physical Chemistry, Marburg University, Germany.

Rudolf Gorenflo at the First Mathematical Institute, Free University of Berlin, Germany.

Alejandro Raul Hernandez Montoya at Universidad Veracruzana, Xalapa, Mexico.

Jun-Ichi Inoue at Complex Systems Engineering, Graduate School of Information Science & Technology, Hokkaido University, Sapporo, Japan.

Taisei Kaizoji at Economics Division of Social Sciences, International Christian University, Tokyo, Japan.

Francesco Mainardi at the Physics Department, Bologna University, Italy.

Mark M. Meerschaert at the Department of Statistics and Probability, Michigan State University, USA.

Fabio Rapallo at DISTA, East Piedmont University, Italy.

René Schilling at the Institute for Mathematical Stochastic, Technical University Dresden, Germany.

Students

Among the students whom he has totally or partially advised there are:

Gilles Daniel, Market Risk Analyst, Emerging Markets, UBS Investment Bank, Zurich, Switzerland.

Giancarlo Mosetti, Quantitative Analyst at FMR Consulting, Voghera, Italy.

Mauro Politi, Postdoctoral fellow, International Christian University, Tokyo, Japan.

Marco Raberto, Assistant Professor, School of Science and Engineering, Reykjavik University, Iceland.

Bence Toth, Postdoctoral fellow, Santa Fe Institute, Santa Fe, NM, USA.

Editorial activity:

Journals:

He is a member of the editorial board of the *Journal of Economic Interaction and Coordination*: <http://www.es-hia.org/magazine/> and he joined the Society for Economic Science with Heterogeneous Interacting Agents

He is an academic editor of the open access Journal *PLoS ONE*:
<http://www.plosone.org/home.action>

In September 2004, in Alessandria, he has organized a conference devoted to young researchers: the First Bonzenfreies Colloquium on Market Dynamics and Quantitative Economics. He has been a guest editor of the special issue of *Physica A* devoted to this conference. The volume has been published as:

Physica A Volume 355, Issue 1, Pages 1-232 (1 September 2005)
Market Dynamics and Quantitative Economics; Selection of papers presented at the First Bonzenfreies Colloquium on Market Dynamics and Quantitative Economics, 09-10 September 2004
Edited by Enrico Scalas

He has been a guest editor of a second *Physica A* volume published in 2007:

Physica A Volume 383, Issue 1, Pages 1 – 169 (1 September 2007)
Proceedings of the 2006 edition of the Econophysics Colloquium and the Bonzenfreies Colloquium, 23-25 November 2006
Edited by Taisei Kaizoji, Akira Namatame and Enrico Scalas

Together with Taisei Kaizoji and Akira Namatame, he has been a guest editor of a special issue of the *Journal of Economic Interaction and Coordination* in which ten papers appear discussed at the 2006 Econophysics Colloquium which was held in Tokyo at the International Christian University (ICU) in November 2006.

Currently, the issue is available on-line: <http://www.springerlink.com/content/120105/>

Referee

He has served as a referee for the following journals: *Physica A*, *Physical Review E*, *Physical Review Letters*, *International Journal of Physics A: Mathematical and Theoretical*, *European Journal of Physics B*, *Advances in Complex Systems*, *Journal of Economic Dynamics and Control*, *Journal of Economic Behavior and Organization*, *Quantitative Finance*, *Journal of Economic Interaction and Coordination*, *PLoS ONE*, *Economics e-journal*, *Journal of Evolutionary Economics*. He is a reviewer for *Mathematical Reviews*.

Organization of conferences and workshops:

He has recently been a member of the Scientific and/or Organizing Committee of the following conferences:

Econophysics Colloquium, Canberra, Australia, 14 - 18 November 2005;

<http://www.rsphysse.anu.edu.au/econophysics/index.php>

Fractal 2006, Vienna, Austria, 12 – 15 February 2006;

<http://www.kingston.ac.uk/fractal/>.

Econophysics Colloquium 2006 and Third Bonzenfreies Colloquium, Tokyo, Japan, 23 – 25 November 2006;

<http://subsite.icu.ac.jp/ssri/EconophysicsColloquium2006/EconophysicsColloquium.html>

ESHIA School on Agent Based Models for Spatial Systems in Social Sciences and Economic Science with Heterogeneous Interacting Agents, La Londe les Maures, Var, France. 17 – 22 September 2007.

<http://perso.univ-rennes1.fr/denis.phan/laLonde/>

Econophysics Colloquium 2007 and Beyond, Ancona, Italy, 27 – 29 September 2007;

<http://econophysics.econ.univpm.it/>

Artificial Economics 2008, Innsbruck, Austria, 12-13 September 2008;

<http://www.uibk.ac.at/ibf/ae08/>

New Trends in Science and Technology, Ankara, Turkey, 03-04 November 2008;

<http://ntst08.cankaya.edu.tr/index.html>

3rd IFAC Workshop on Fractional Differentiation and its Applications, Ankara, Turkey, 05-07 November, 2008; <http://fda08.cankaya.edu.tr/index.html>

Econophysics Colloquium 2009, Erice, Italy, 25-31 October 2009,

<http://pil.phys.uniroma1.it/~gcalda/EC2009/>.

ESHIA/WEHIA 2010, Alessandria, Italy, 23-25 June 2010;

<http://sites.google.com/site/eshia2010/home>.

MAFIN 2010, Reykjavik, Iceland, 23-25 September 2010;

<http://sites.google.com/site/mafin2010/>

4th IFAC Workshop on Fractional Differentiation and its Applications, Badajoz, Spain, 18-20 October 2010; <http://web.tuke.sk/fda10/index.html>.

Invited talks

Recent invited talks were presented at the following international meetings:

Econophysics: Trends & Challenges, Niels Bohr Institute, Copenhagen, Denmark, 08-09 May 2008.

New Trends in Science and Technology, Çankaya University, Ankara, Turkey, 03-04 November 2008.

3rd IFAC Workshop on Fractional Differentiation and its Applications, Çankaya University, Ankara, Turkey, 05 - 07 November, 2008.

Workshop on kinetic and macroscopic modeling for socio-economic and related problems Vigevano, Italy, 27-29 November 2008.

Workshop on Jump Processes - JUMPS 09, Technische Universität Dresden, Germany, 15-17 January 2009.

MAFIN '09 (First International Workshop on Managing Financial Instability in Capitalistic Economies), Reykjavik, Iceland, 3-5 September 2009.

4th IFAC Workshop on Fractional Differentiation and its Applications, Special session on *Fractional Calculus: Basic Theory and Neighbouring Fields*, dedicated to Professor emeritus Rudolf Gorenflo (FU Berlin) on the occasion of his 80th anniversary. University of Extremadura, Badajoz, Spain, October 18-20, 2010.

Teaching:

Since 1998, he has introduced the elements of modern Statistical Mechanics in the curriculum of undergraduate Physics students at East Piedmont University. From 1998 to 2002, he has taught a course of exercises on Condensed Matter Structure. From 2003, he has taught an introductory course in modern statistical mechanics, based on the book of Julia M. Yeomans, *Statistical Mechanics of Phase Transitions*, Clarendon 1992. Moreover, since 2002, he has taught other two courses: an introductory course on measurement theory, probability and statistics for Materials Science students and an introductory course in Physics for Computer Science students. He is currently teaching courses in Econophysics where he usually presents an introduction to stochastic processes and the valuation of derivatives.

Courses:

In January 2003, he has taught an introductory course on *Semiconductor Physics* to French students at the IUT in Montluçon, France.

In October 2008, he has taught a course on *Probability for Economists* for the Ph.D students of the International Doctoral Program in Economics at Sant'Anna School of Advanced Studies in Pisa, Italy.

In February 2010, he has taught a course on *Stochastic Processes in Finance* for physics Ph.D Students at Pavia University, Italy.

Vision and mission

Enrico Scalas strongly believes in the quantitative effectiveness of probabilistic and statistical methods applied to exciting research fields which have often been the realm of qualitative, even if sophisticated, analyses and researches, including Biology, Economics, Finance and History. He has established an interdisciplinary and international research group working both empirically and theoretically on the full spectrum of complex systems.

Other activities

He has been a member of Amnesty International since 1982.

He is also a supporter of two Italian NGOs: Emergency (www.emergency.it) providing life support to civilian war victims through emergency surgery and CICAP (www.cicap.it), an Italian skeptical organization promoting science and rational thought.

Languages

Italian: mother tongue

English: good working knowledge in all the language aspects;

French: he can speak and read French;

German: he can speak and read German;

With the help of a dictionary, he can read and translate documents written in Spanish, Portuguese, Dutch, Swedish, Danish and Norwegian.

Enrico Scalas: List of publications

Bibliometric data

At present, Enrico Scalas is co-author of 90 published peer-review papers with 1304 citations as of June 30th, 2010. His Hirsch index h is 20.

[Only publications in peer-reviewed journals are considered].

Recent preprints and working papers are available from:

<http://ideas.repec.org/e/psc89.html>

http://arxiv.org/find/grp_physics/1/au:+Scalas_Enrico/0/1/0/all/0/1

2010:

[90] GERMANO G, POLITI M, SCALAS E., SCHILLING R.L (2010). Ito and Stratonovich integrals on compound renewal processes: the normal/Poisson case. COMMUNICATIONS IN NONLINEAR SCIENCE & NUMERICAL SIMULATION, vol. 15; p. 1583-1588, ISSN: 1007-5704, doi: 10.1016/j.cnsns.2009.06.010.

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PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS Volume: 387 Issue: 8-9 Pages: 2025-2034. ISSN: 0378-4371.

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[80] LIM G., KIM S., SCALAS E., KIM K., CHANG K.H. (2008). Analysis of price fluctuations in futures exchange markets. PHYSICA A-STATISTICAL MECHANICS AND ITS APPLICATIONS Volume: 387 Issue: 12 Pages: 2823-2830 Published: MAY 1 2008. ISSN: 0378-4371.

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2007:

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