

(For more details see: <http://pil.phys.uniroma1.it/~luciano>)

Born in Roma on 15/12/1949, married, two sons

Professional positions	1971 Nov.	Laurea in Physics, Univ. of Roma (110+L).
	1972-73	CNR fellowship, Univ of Roma and Orsay (F).
	1974-75	Xerox Webster Research Center, N.Y. USA; Associate Scientist.
	1975-83	Brown Boveri Research Center, Baden (CH). Theoretical Physics Group – Member of the Staff.
	1983-87	Professor of Condensed Matter Theory. University of Groningen, The Netherlands.
	1987- Now	Professor of Condensed Matter Physics, University of Roma “La Sapienza”
	1992-95	Director of the Theory Group, Dep. of Physics, Univ. La Sapienza (about 150 members in all fields of theoretical physics)
	1995-2001	Director of the INFM Unit, Univ. of Roma La Sapienza. The Unit consists of about 200 scientists in the area of Condensed Matter Physics and it is the largest in Italy
	2001-	Founder of the “Centro di Ricerca e Sviluppo” (CRS): Statistical Mechanics and Complexity (SMC) then directed by G. Parisi
	2001- 2003	Director (Commissario) of the CNR Institute Corbino (IDAC)
2002- 2005	Member of the Board (CdA) of the Center E. Fermi (Via Panisperna, Roma)	
2004 – Now	Co-founder and director of the CNR Institute of Complex Systems (ISC). The Institute includes more than 200 scientists (in various locations in Rome and Florence) from different groups of CNR, INFM, INOA and Universities.	
Leaves and temporary positions	1982 Summer	Institute of Theoretical Physics, Univ. of S. Barbara, USA
	1982 Fall	Lyman Lab. Of Physics, Harvard Univ., Boston USA
	1988	ICTP, Trieste
	1999 Summer	Mc Minn Lecturer, Vanderbilt Univ. USA
Teaching	1983 -87	Univ. of Groningen, The Netherlands. Lectures on Advanced Condensed Matter Physics,
	1987 - 2007	Univ. di Roma La Sapienza
	1987 - 2007	Lectures of Solid State Physics, Various graduate (Ph D) lectures in the areas of Statistical Physics, Complexity and High Tc Superconductivity
	2005 - 2007	Lectures on Physics of Complex Systems
Ph D and Laurea Thesis	Director of about 70 research Thesis at the level of PhD or Laurea (undergraduate) at the University of Roma La Sapienza and the University of Groningen (NL). Many of these students are young scientists who continued their scientific career and occupy important scientific positions at the national and international level.	
Publications and Scientific Activity	Author of about 350 scientific papers, mostly in the leading international scientific journals: Phys. Rev. Letters; Rev. Mod. Phys.; Nature; Physics Reports; Phys. Rev. B ed E; Europhys. Lett.; Physica A; J. of Physics etc. (Above 5000 ISI citations).	
	Author of a monographic volume and editor of several volumes of proceedings.	
	Broad international experience in academic and industrial environments. The scientific activity is of both fundamental and applied nature, with an interdisciplinary perspective.	

Invited lecturer at about 120 International Conferences. Currently invited or plenary speaker at the main Conferences and Schools in the fields of Statistical Physics, Complexity and High Tc Superconductivity, among which:

STATPHYS (1989 e 2001); APS General (March) Meeting (1998); EPS Trends in Physics (1987 e 1990); EPS Cond. Matt. (various); Aspen Institute of Physics (2000); International Conf. on High Tc SC (2003 e 2006); Cargese (various); Erice (various); ICTP (various).

Main fields of activity and collaborators:

- Inertial dragging in General Relativity (with B. Touschek 1972-73)
- Electronic properties of molecular crystals and electron-phonon interaction in molecular crystals (F. Bassani; C.B. Duke; M.J. Rice; S. Strassler; H.R. Zeller; 1973-1976)
- Ionic conductors and disordered systems (S. Strassler; W.R. Schneider; P. Fulde; H.U. Beyeler; P. Bruesch; H.R. Zeller; 1975-1982)
- One-dimensional electronic systems and Peierls instability (S. Strassler; H.R. Zeller; 1974-78)
- Electronic transport in synthetic metals and carbon polymers (S.Strassler; 1980-83)
- Theory of surface melting in solids (E. Tosatti; 1979-84)
- Random Walks and polymes statistics (J. Bernasconi; L. Peliti; 1985-88)
- **Physical models of Fractal Growth. Dielectric Breakdown Model (L. Niemeyer; H.J. Wiesmann; W. Schneider 1984-90). This model of 1984 has opened (together with DLA) a vast area of theoretical and applied developments with applications in various fields. It provides one of the first and more general physical mechanism for the self-organization of complex structures.**
- Fractal and Multifractal properties in various models and systems (A.P.Siebesma; A. Erzan; E. Tosatti; M. Marsili; G. Paladin 1986-97)
- Nonlinear transport and critical properties in 1-d Charge density Waves (S. Strassler; A. Erzan; G. Parisi 1983-92)
- **Theory of Fractal Growth (*Fixed Scale Transformation*) for Laplacian Fractal models (1992-98, C. Eversz; B.B. Mandelbrot; A. Erzan; A. Vespignani; R. Cafiero; G. Caldarelli; S. Sidoretti). Introduction of a new theoretical framework for several problems related to Self-Organized-Critical Phenomena (see also following points).**
- Generalization of the theory to models with quenched disorder (*Invasion Percolation*) and development of the method of the **Run Time Statistics** (W. Schneider; A. Stella; A. Gabrielli; G. Caldarelli; A. Vespignani)
- Development of the method **Dynamically Driven Renormalization Group** for problems of Self-organized Criticality (*Sandpile; Self-Organized Criticality*) (S. Zapperi; A. Vespignani; G. Caldarelli; V. Loreto; A. Gabrielli 1993-2003)
- Renormalization Group theory for the dynamics of rough surfaces (KPZ) (1998-2004) (M. Marsili; C. Castellano; M. Munoz, A. Gabrielli; G. Bianconi)
- **Complexity in cosmic structures (1987-2006, P. Coleman; F. Sylos Labini; M. Montuori; M. Joyce; R. Durrer; A. Gabrielli; S. Torquato; Y. Baryshev; J. Lebowitz; P.W. Anderson (Nobel laureate). This interdisciplinary application of modern Statistical Physics to Cosmic Structures (galaxy correlations) led to a broad debate on the foundations of the field which is reported in detail in the volume: Y. Baryshev e P. Teerikorpi, *Discovery of Cosmic Fractals*, World Scientific, Singapore (2002); Italian translation Boringhieri (2005). (See also the highlights of 2007)**
- Applications of the methods of Complex systems to Self-similar Networks, Information theory and Socio-economic systems (1999-2006, G. Caldarelli; V. Loreto; C. Castellano; C. Cattuto; V. Alfi; F. Coccetti; A. Petri; A. Baldassarri; F. Colaiori; F. Rao; V. Servedio; A. Baronchelli; B. Cerruti)
- New approach to the study of Spatio-temporal correlations of earthquakes (2004-2006, V. Loreto; V. De Rubeis; P. Tosi; V. Beato; S. Zapperi)
- Models and properties of Granular Systems (2004-2006, A. Petri; V. Loreto; S. Zapperi; F. Dalton)

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- **High Temperature Superconductivity and related problems:**
 - **Charge distribution and properties of High Tc Superconducting cuprates (1999; K.A. Müller (Nobel laureate))**
 - **Development of the Theory of Nonadiabatic Superconductivity (1992-2006). Generalization of the many Body Theory beyond Migdal's theorem (Born Oppenheimer) for the normal and superconducting state. These studies lead to a new type of complex Fermi liquid with direct relevance to the Cuprate high Tc Superconductors, the Fullerene compounds and MgB2 (1992-2006, S. Strassler; C. Grimaldi; E. Cappelluti; P. Paci; G. Bachelet; S. Ciuchi; L. Boeri; O. Andersen)**
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Present Activities and Projects

Director of the PIL group of the Physics Department, University of Roma, La Sapienza
WEB page: <http://pil.phys.uniroma1.it>

The group consists of scientists from various institutions: University; INFN; CNR; Fermi Center; European and national contracts. In total there are about 30 scientists of which: 3 permanent; 3 tenure track; 13 with contracts of various types from 2 to 5 years; 5 Ph D students and a variable number of undergraduate thesis students.

Present Research Projects:

2 Projects MIUR-FIRB coordinated by PIL group

3 Projects MIUR-PRIN (Cofin) in which PIL group is the main partner

6 European Projects (EEC) of which 3 are coordinated by PIL group (underlined): COSIN (2002-2005); DELIS (2003-2006); ECAGENTS (2003-2007); TAGORA (2006-2009); COMPLEXITY-NET (2006-2009); TRIGS (2006-2009).

Various other smaller projects both national and European.

Among the previous projects we have coordinated the EEC Network: *Fractal Structures and Self-organization* (1997-2003) which included 11 Teams from 8 countries and it has been probably the largest European Network in the field of Statistical Physics.

Main areas of present activity:

- Solid state and Condensed Matter Theory
- Theory of High Tc superconductivity and related problems
- Statistical physics, fractal and Complex structures
- Interdisciplinary applications of Statistical Physics in Astrophysics, Seismology, Networks and Biophysical problems and Socio-economic problems and Information Theory

Responsible of the Fermi Center Program on:
Complexity from the Nanometric to the Cosmic Scale

Organizer of about 15 International Conferences in the fields of Statistical Physics, Fractal structures and Self-organized criticality, Complex systems and High Tc Superconductivity.

Promotor e Co-director of the *Erice School Series on Complex Systems*, which started in 2004 and organizes 2-3 schools per year.

Chairman of the general INFN Conference with 1100 participants (Congress Center Roma EUR, 2001)

Chairman of STATPHYS 23 (Genova 9-13 July 2007). This Conference represents the main international event in the field of Statistical Physics. It is organized every three years and it is assigned by the IUPAP Commission. There have been about 1300 participants from 52 countries.

Diffusion of Scientific Culture

Author of various articles (not included in the publication list) and interviews related to the diffusion of scientific culture. Invited to several meeting and events about scientific divulgation and organization with particular focus on the planning of innovation and creativity.

Promotor and scientific director of the theater text: *Il Tempo al di la del Mare*, inspired to the debate related to the measurement of the Longitude. Premiere in Roma, Teatro Valle (2001) and then represented for more than one year in the main theaters of Genova, Milano, Napoli, Bologna, Firenze etc.

Various

Member of the editorial board of: *Physica A*; *Il Nuovo Cimento D: Int. J. of Fractals*; *Europhysics Letters* (1994-97).

Member of the IUPAP Commission on Condensed Matter (1987-93)

Fellow of the American Physical Society (1990-)

Consultant: IBM Zurich laboratories (1992); IBM T.J. Watson Laboratories, Yorktown Heights USA (1994); London School of Economics (2003-)

Member of the International SISSA (Trieste) Evaluation Committee (1994-);
Int. Eval. Committee of the Bogoliubov Lab. of Theoretical Physics, Dubna, Russia (1995-)
International Evaluation Committee of the Max Planck Institute for Complex Systems,
Dresden (2003-).

Selected publications:

- Book: A. Gabrielli, F. Sylos Labini, M. Joyce, and L. Pietronero *Statistical Physics For Cosmic Structures* Springer Verlag Inc. (New York-Berlin, 2004)
 - L. Pietronero, The mechanics of particles inside a rotating mass shell, *Annals of Physics* 79, 250-260 (1973).
 - M. Di Stasio, K.A. Müller and L. Pietronero: "Nonhomogeneous charge distribution in layered High Tc Superconductors", *Phys. Rev. Letters* Vol. 64, 2827 (1990).
 - C. Grimaldi, L. Pietronero and S. Strässler: "Nonadiabatic Superconductivity: Electron Phonon Interaction beyond Migdal's Theorem" *Phys. Rev. Lett.* 75, 1158 (1995)
 - L. Pietronero, S. Strässler and C. Grimaldi: "Nonadiabatic Superconductivity I & II", *Phys Rev. B* 52, 10516 & 10530 (1995)
 - C. Grimaldi, E. Cappelluti and L. Pietronero: "Isotope Effect on m^* in High Tc materials due to the Breakdown of Migdal's Theorem" *Europhys. Lett.* 42, 667 (1998)
 - L. Niemeyer, L. Pietronero and H.J. Wiesmann: "Fractal Dimension of Dielectric Breakdown" *Phys. Rev. Lett.* 52, 1033 (1984)
 - G. Parisi and L. Pietronero: "Theory of the Depinning transition in Charge density Waves" *Europhys. Lett.* 16, 321 (1991)
 - Erzan, L. Pietronero and A. Vespignani: "The Fixed Scale Transformation Approach to Fractal growth" *Rev. Mod. Phys.* 67, 545-604 (1995)
 - L. Pietronero, A. Vespignani and S. Zapperi: "Renormalization study of Self-Organized Criticality in Sandpile Models", *Phys. Rev. Lett.* 72, 1690 (1994)
 - Castellano, M. Marsili and L. Pietronero: "Non-perturbative renormalization of the KPZ Growth Dynamics", *Phys. Rev. Lett.* 80, 4830 (1998)
 - Castellano, M. Marsili, M. Munoz and L. Pietronero: "Scale Invariant Dynamics of Surface Growth" *Phys. Rev E* 59, 6460 (1999)
 - P. Coleman and L. Pietronero: "The Fractal Structure of the Universe", *Phys. Rep.* 213, 311-389 (1992)
 - F. Sylos Labini, M. Montuori and L. Pietronero: "Scale Invariance of Galaxy Clustering" *Phys. Rep.* 293, 61-226 (1998)
 - M. Joyce, P.W. Anderson, M. Montuori, L. Pietronero and F. Sylos Labini: "Fractal Cosmology in an Open Universe" *Europhys. Lett.* 50, 416 (2000)
 - E. Cappelluti, S. Ciuchi, C. Grimaldi, L. Pietronero and S. Strässler: High Tc superconductivity in MgB2 by nonadiabatic pairing *Phys. Rev. Lett.* 88, 117003 (2002)
 - Garlaschelli, G. Caldarelli, L. Pietronero: "Universal Scaling Relations in Food Webs", *Nature* 423 165 (2003)
 - Dalton, F. Farrelly, A. Petri, L. Pietronero, L. Pitolli and G. Pontuale: "Shear Stress Fluctuations in the Liquid-Solid Granular Transition", *Phys. Rev. Lett.* 95, 138001 (2005)
 - A. Baldassarri, F. Dalton, A. Petri, S. Zapperi, G. Pontuale, and L. Pietronero: "Brownian Forces in Sheared Granular Matter", *Phys. Rev. Lett.* 96, 118002 (2006)
 - C. Cattuto, V. Loreto and L. Pietronero: "Semiotic Dynamics and Collaborative Tagging", *PNAS* 104, 1461 (2007)
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Highlights of the PIL group in 2007

- Organization of the Statphys 23 International Conference (<http://www.statphys23.org>).
 - Organization of four satellites of the Statphys 23 International Conference:
 - Complex Optics In Mesoscopic Materials, School on Complex Systems, 6-th Course, Erice, Italy; 4-7 July 2007
 - Statistical Physics Of Social Dynamics: Opinions, Semiotic Dynamics, Language, Erice School of Complex Systems, Italy: 7-th Course; 14-19 July 2007
 - Complex Networks: From Biology To Information Technology, Pula (Cagliari), Italy; 2-6 July 2007
 - Dynamics And Thermodynamics Of Systems With Long Range Interactions, Assisi, Italy; 4-8 July 2007
 - How people react to a deadline: the example of conference registration, V. Alfi, G. Parisi, L. Pietronero, Nature Physics, V.3, p. 746 (2007)
 - Self-Organised Network Evolution coupled to Extremal Dynamics, D. Garlaschelli, A. Capocci, G. Caldarelli, Nature Physics, V.3, p. 813 (2007)
 - Reverse Age Discrimination, F. Sylos Labini, S. Zapperi, Nature Physics V.3, p. 582 (2007)
 - Emergence of Language, V. Loreto and L. Steels, Nature Physics V.3, p. 758 (2007)
 - Don't mention the F word (<http://pil.phys.uniroma1.it/%7Egcalda/fractaluniverse.pdf>), A. Gefter, New Scientist (March 2007)
 - Colossal void may spell trouble for cosmology (<http://pil.phys.uniroma1.it/~sylos/gefter.tiff>), A. Gefter, New Scientist (September 2007)
 - Topological change of the Fermi surface in low-density Rashba gases: application to superconductivity, E. Cappelluti, C. Grimaldi and F. Marsiglio, Phys. Rev. Lett. 98, 167002 (2007)
 - Scaling and Universality in Proportional Elections, S. Fortunato and C. Castellano, Phys. Rev. Lett. 99, 138701 (2007)
 - Social networking may determine political success (<http://www.newscientist.com/channel/being-human/mg19626254.400-social-networking-may-determine-political-success.html>), M. Buchanan, New Scientist (october 2007)
 - Book: G. Caldarelli, Scale Free Networks, Oxford Univ. Press (2007)
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