CARLANGELO LIVERANI

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EDUCATION

1988 Ph.D. in Mathematics, Rutgers University, New Brunswick, New Jersey, U.S.A. (Thesis Advisor: J.L. Lebowitz).
1980 B.A. in Physics, *cum laude*, Università degli Studi di Bologna, Bologna, Italy (Thesis Advisor: G. Turchetti).

ACADEMIC APPOINTMENTS

–01 Professor, University of Rome *Tor Vergata*, Rome, Italy.
2010 Visiting Professor, Fields Institute, Toronto, Canada (four months).
2010 Visiting Professor, Universite Paris Dauphine, Paris, France (one month).
2008 Visiting Professor, Ecole Normale Superiore, Paris, France (one month).
2008 Visiting Professor, Universite Paris Dauphine, Paris, France (one month).
2007 Visiting Professor, CIRM, Marseille, France (one month).
2007 Visiting Professor, Penn State University, State College, PA, USA (one month).
2006 Visiting Professor, Universite Paris Dauphine, Paris, France (one month).
2006 Visiting Professor, Universite Paris XIII, Paris, France (one month).
2006 Visiting Professor, University of Maryland, College Park, M.D., USA (one month).
2005 Visiting Researcher, CNRS, Paris, France (three months)
2004 Visiting Professor, Universite Paris VII, Paris, France (one month).
2001 Visiting Scholar, Courant Institute, New York University, New York, USA (one month).
2001 Visiting Professor, IHES, Paris, France (six months).
01–99 Associate Professor, University of Rome II, Rome, Italy.
99–88 Ricercatore (Tenured Assistant Professor), University of Rome II, Rome, Italy.
1992 Visiting Prof., Institute for Math.Sciences, Stony Brook University, Stony Brook, New York (one year).
1991 Visiting Scientist, Center for Applied Math., Cornell University, Ithaca, New York (six months).
1990 Visiting Scientist, Center for Applied Math., Cornell University, Ithaca, New York (six months).
1989 Visiting Professor, University of Arizona, Tucson, Arizona (one year).

AREAS OF INTEREST AND SPECIALIZATION

- *Dynamical Systems*–ERGODIC THEORY: Study of the statistical properties of Dynamical Systems with particular emphasis on physics related issues. In particular, I obtained results in the following topics: Limit Laws for Dynamical Systems with applications to non-equilibrium Statistical Mechanics. Piecewise expanding coupled map lattices in the weak coupling regime. Dynamical determinants and zeta functions for Anosov systems. Geodesic flows in negative curvature. New techniques to investigate the decay of correlations, convergence to equilibrium and various limit theorems in hyperbolic systems and their random perturbations, both for maps and flows. General techniques for establishing ergodicity of piecewise smooth Hamiltonian Systems or Symplectic Maps. Concrete examples of ergodic Hamiltonian Systems.
  KAM THEORY: In particular I am interested in the application of KAM theory to physically realistic situations (e.g. computer assisted strategies.)
- *Quantum Mechanics*–LONG TIME BEHAVIOUR: In particular, I am interested to, and I obtained results in, the ergodic properties of non-KMS states for non linear quantum evolutions. Decoherence and problems related to measurement.
- *Statistical Mechanics*–NON EQUILIBRIUM: I obtained results for infinite dynamics and invariant measures for Hamiltonian systems with small noise; hydrodynamics. Microscopic models for the Fourier law.

- *Probability*–LIMIT THEOREMS: I obtained sharp conditions implying the CLT for observables of chaotic deterministic systems. I have obtained several results concerning random walks in random (evolving) environment.

PUBLICATIONS

Most of the articles are downloadable from the web page: `http://www.mat.uniroma2.it/~liverani`

1 *Approximate Solution of KdV Equation from Perturbation Expansion*, with G. Turchetti, *Lettere al Nuovo Cimento*, **30**, 1, p. 9, (1981).

2 *Approximate Solutions of Some Solitonic Equations*, *Lettere al Nuovo Cimento*, **34**, 16, pp. 481–486, (1982).

3 *Existence and Asymptotic Behavior of Padè Approximants to the KdV Multisoliton Solutions*, with G. Turchetti, *Journal of Mathematical Physics*, **24**, 1, pp. 53–64, (1983).

4 *Some KAM Estimates for the Siegel Center Problem*, with G. Servizi, G. Turchetti, *Lettere al Nuovo Cimento*, **39**, pp. 417–423, (1984).

5 *Improved KAM Estimates for the Siegel Radius*, with G. Turchetti, *Journal of Statistical Physics*, **45**, 5/6, pp. 1071–1086, (1986).

6 *Quantum System in Contact with a Thermal Environment: Rigorous Treatment of a Simple Model*, with P. de Smet, D. Dürr, J.Lebowitz, *Communications in Mathematical Physics*, **120**, pp. 195–231, (1988).

7 *Dissipative Quantum Dynamics in a Boson Bath*, with Y.-C. Chen, J.L. Lebowitz, *Physical Review B*, **40**, 7, pp. 4664–4682, (1989).

8 *Potential on the Two-Torus for which the Hamiltonian Flow is Ergodic*, with V. Donnay, *Communications in Mathematical Physics*, **135**, pp. 267–302, (1991).

9 *Ergodic Systems of n Balls in a Billiard Table*, with L. Bunimovich, S. Pellegrinotti and Y.Suhov, *Communications in Mathematical Physics*, **146**, pp. 357-396, (1992).

10 *Generalization of the Hilbert Metric to the Space of Positive Definite Matrices*, with M.Wojtkowski, *Pacific Journal of Mathematics*, **166**, N.2, pp. 339-355, (1994).

11 *Ergodicity in Hamiltonian Systems*, with M. Wojtkowski, *Dynamics Reported*, **4**, C.K.R.T. Jones, U.Kirchgraber, H.O.Walther edts., Springer-Verlag, Berling, Heidelgerg, New York, pp. 130-202, (1995).

12 *Decay of Correlations*, *Annals of Mathematics*, **142**, pp. 239-301 (1995).

13 *Decay of Correlations in Piecewise Expanding maps*, *Journal of Statistical Physics*,**78**, 3/4, pp. 1111-1129, (1995).

14 *Decay of Correlations in Hyperbolic Systems*, *Proceedings of the International Conference on Dynamical Systems and Chaos–Tokyo 94*, World Scientific Publ. Co., Singapore, pp. 163-166 (1995).

15 *Ergodicity in Infinite Hamiltonian Systems with Conservative Noise*, with S. Olla, *Probability Theory and Related Fields*, **106**, pp. 401–445, (1996).

16 *Central Limit Theorem for Deterministic Systems*, *International Conference on Dynamical Systems, Montevideo 1995, a tribute to Ricardo Mañe*, Pitman Research Notes in Mathematics Series, **362**, editors F.Ledrappier, J.Levovicz, S.Newhouse, pp. 56–75 (1996).

17 *Reversibility in Infinite Hamiltonian Systems with Conservative Noise*, with József Fritz and Stefano Olla , *Communication in Mathematical Physics*, **189**, 2, pp. 481–496 (1997).

18 *Conformally Symplectic Dynamics and Symmetry of the Lyapunov Spectrum*, with M. Wojtkowski, *Communication in Mathematical Physics*, **194**,1, pp. 47–60 (1998).

19 *Conformal Measure and Decay of Correlations for Covering Weighted Systems*, with B. Saussol and S.Vaienti, *Ergodic Theory and Dynamical Systems*, **18**, 6, pp. 1399–1420 (1998).

20 *Flows, Random Perturbations and Rate of Mixing*, *Ergodic Theory and Dynamical Systems*, **18**, 6, pp. 1421–1446 (1998).

21 *A Probabilistic Approach to Intermittency*, with B. Saussol and S.Vaienti, *Ergodic Theory and Dynamical Systems*, **19**, pp. 671–685 (1999).

22 *Stability of the Spectral Gap for transfer operators*, with G.Keller, *Annali della Scuola Normale di Pisa, Classe di Scienze* (4) Vol. XXVIII, pp. 141–152 (1999).

23 *Ergodic Properties for a quantum nonlinear dynamics*, con F.Fidaleo, *Journal of Statistical Mechanics*, **97**, 5/6, pp. 957–1009 (1999).

24 *Interacting particles*, in "Hard Balls Systems and the Lorentz gas" D.Szasz edt., Encyclopaedia of Mathematical Sciences **101**, Springer, New York (2000).

25 *Rigorous numerical investigation of the statistical properties of piecewise expanding maps–A feasibility study*, *Nonlinearity*, **14**, n. 3, pp. 463–490, (2001).

26 *Return to equilibrium in classical and quantum systems*, in "Long Tine Behaviour of Classical and Quantum Systems" S. Graffi and A. Martinez edts, Series on Concrete and Applicable Mathematics Vol. 1, World Scientific, Singapore, pp. 1-32 (2001).

27 *Anosov diffeomorphism and coupling*, with X. Bressaud, Ergodic Theory and Dynamical Systems, **22**, n. 1, pp. 129–152, (2002)

28 *Ruelle-Perron-Frobenius spectrum for Anosov maps*, with M.Blank and G.Keller, *Nonlinearity*, **15**, n.6, pp. 1905-1973 (2002).

29 *Computing the rate of decay of correlations in expanding and hyperbolic systems*, *Markov Processes and Related Fields*, **8**, n.2, pp. 155-162 (2002).

30 *Lasota-Yorke maps with holes: conditionally invariant probability measures and invariant probability measures on the survivor set*, with V. Maume-Deschamps, *Annales de l'Institut Henri Poincar Probability and Statistics*, **39** (3), 385-412 (2003).

31 *Ergodic properties of a model related to disordered quantum anharmonic crystals*, with F.Fidaleo, *Communications in Mathematical Physics*, **235**, 169-189 (2003).

32 *Invariant measures and their properties. A functional analytic point of view*, *Dynamical Systems. Part II: Topological Geometrical and Ergodic Properties of Dynamics. Pubblicazioni della Classe di Scienze*, Scuola Normale Superiore, Pisa. Centro di Ricerca Matematica "Ennio De Giorgi" : Proceedings. Published by the Scuola Normale Superiore in Pisa (2004).

33 *Statistical properties of disordered quantum systems*, with F.Fidaleo, *Operator Theory: Advances and Applications*, **153**, Proceedings of the XIXth International Conference on Operator Theory, Timisoara (Romania), 2002; D.Gaspar. I.Gohberg, D.Timotin, F.H.Vasilescu and L.Zsido editors, Birkhauser Verlag Basel/Switzerland, pp. 123-141 (2004)

34 *Birth of an elliptic island in a chaotic sea*, *Mathematical Physics Electronic Journal*, **10**, 1 (2004).

35 *On Contact Anosov flows*, *Annals of Mathematics*, **159**, 3, 1275–1312 (2004).

36 *Coupled map lattices without cluster expansion*, with G.Keller, *Discrete and Continuous Dynamical Systems*, **11**, n.2, 3, 325–335 (2004).

37 *Fredholm determinants for Anosov maps*, *Discrete and Continuous Dynamical Systems*, **13**, 5, 1203-1215 (2005).

38 *Spectral gap for a one-dimensional lattice of coupled piecewise expanding interval maps*, with G.Keller, in "Dynamics of Coupled Map Lattices and of Related Spatially Extended Systems", J.Chazottes and B.Fernandez Eds., *Lecture Notes in Physics*, Lecture Notes in Physics, Vol. **671**, pp. 115–151, Springer (2005).

39 *Convergence to equilibrium for intermittent symplectic maps*, with M.Martens, *Communications in Mathematical Physics*, **260**, n.3, pp. 527–556 (2005).

40 *Banach Spaces adapted to Anosov Systems*, with S.Gouezel, *Ergodic Theory and Dynamical Systems*, **26**, 1, 189–217, (2006).

41 *Uniqueness of the SRB measure for piecewise expanding weakly coupled map lattices in any dimension*, with G.Keller, *Communications in Mathematical Physics*, **262**, 1, 33–50, (2006).

42 *Special Issue on Ergodic Theory and Non-uniform Dynamical Systems*, Guest Editor with Xavier Bressaud, Yves Lacroix, and Sandro Vaienti, Discrete and Continuous Dynamical Systems - Series A, **15**, 1, (2006).

43 *Stability of Statistical Properties in Two-dimensional Piecewise Hyperbolic Maps*, with Mark F. Demers, *Transactions of the American Mathematical Society*, **360** (2008), 4777-4814.

44 *Zeta functions and Dynamical Systems*, with M.Tsujii, *Nonlinearity*, **19**, No 10 (October 2006) 2467-2473.

45 *Compact locally maximal hyperbolic sets for smooth maps: fine statistical properties*, with S.Gouëzel, *Journal of Differential Geometry*, **79** (2008) 433-477.

46 *Smooth Anosov flows: correlation spectra and stability*, with Oliver Butterley, *Journal of Modern Dynamics*, **1**, 2, (2007) 301-322.

47 *Random Walk in Markovian Enviroment*, with Dmitry Dolgopyat and Gerhard Keller, *Annals of Probability*, **36**, Number 5 (2008), 1676-1710.

48 *Random Classical Fidelity*, with Ph. Marie and S.Vaienti, *Journal of Statistical Mechanics* **128**, n. 4, (2007) 1079-1091.

49 *Random Walk in Deterministically Changing Environment*, with Dmitry Dolgopyat, *ALEA*, **4**, 89-116 (2008).

50 *Quenched CLT for random toral automorphism* , with Arvind Ayyer and Mikko Stenlund, *Discrete and Continuos Dynamical Systems*, **24**, 2, 331-348 (2009).

51 *Non-perturbative approach to random walk in markovian environment*, with Dmitry Dolgopyat, *Electronic Communications in Probability*, **14** (2009), 245-251.
52 *Rare events, escape rates and quasistationarity: some exact formulae*, with Gerhard Keller, *Journal of Statistical Physics*, **135**, Issue 3 (2009), Page 519-534.
53 *Map Lattices coupled by collisions*, with Gerhard Keller, *Communications in Mathematical Physics*, **291**, Issue 2 (2009), 591–597.
54 *On the work and vision of Dmitry Dolgopyat*, *Journal of Modern Dynamics*, 4, n. 2 (2010) 211–225.
55 *Heat equation from microscopic dynamics: a weak coupling approach*, *XVIth International Congress on Mathematical Physics*, 397–400, World Sci. Publ., Hackensack, NJ, 2010.
56 *Energy transfer in a fast-slow Hamiltonian system*, with Dmitry Dolgopyat, *Communications in Mathematical Physics*, Volume 308, Number 1, 201-225 (2011).
57 *Toward the Fourier law for a weakly interacting anharmonic crystal*, with Stefano Olla, *Journal of the American Mathematical Society*, **25** (2012) 555-583.
58 *Multidimensional expanding maps with singularities: a pedestrian approach*. To appear in *Ergodic Theory and Dynamical Systems*. Preprint arXiv:1110.2001v1.
59 *Exponential decay of correlations for piecewise cone hyperbolic contact flows*, with Viviane Baladi, preprint. arXiv:1105.0567v1, To appear in *Communications in Mathematical Physics*.
60 *Anosov Flows and Dynamical Zeta Functions*, with Paolo Giulietti and Mark Pollicott. Preprint arXiv:1203.0904v1

LANGUAGES

Italian (mother tongue), English (fluent), French (reading knowledge).

TEACHING EXPERIENCE

2009 Calculus 3, Computer Sciences (*Tor Vergata*, Roma).
2004-8 Calculus 1, Computer Sciences (*Tor Vergata*, Roma).
2005-09 Dynamical Systems, Laurea Specialistica (*Tor Vergata*, Roma).
2007 Dynamical Systems, Ph.D. Program (*La Sapienza*, Roma).
2004 Dynamical Systems, Laurea Specialistica and Ph.D. Program (*Tor Vergata*, Roma).
2003 Analisi Matematica 2, Informatica (*Tor Vergata*, Roma).
2003 Fisica Matematica 2 (PDE) (*Tor Vergata*, Roma)
2003 University of Roma II: Dynamical Systems (Ph.D. course)
2002 University of Trieste (SISSA): Dynamical Systems (Ph.D. course)
02-00 University of Roma II: Calculus I, II.
1999 University of Rome II: Calculus I; University of Padova: Dynamical Systems (Ph.D. course); University of Rome II: Dynamical Systems (Ph.D. course)
1998 University of Rome II: Istituzioni di matematica I (Calculus I); University of Rome II: Analytical Mechanics (O.D.E., Variational Principles, Lagrangian and Hamiltonian Systems).
1997 University of Rome II: Dynamical Systems; University of Rome II: Analytical Mechanics.
1996 University of Rome II: Analytical Mechanics.
1995 University of Rome II: Dynamical Systems; University of Rome II: Analytical Mechanics.
1994 University of Rome II: analysis II (Multivariable Calculus, introduction to Differential Geometry); University of Rome II: Analytical Mechanics.
1993 University of Rome II: Analytical Mechanics.
1992 SUNY at Stony Brook: second semester calculus.
1991 University of Rome II: analysis II; University of Rome II: Analytical Mechanics.
1989 Arizona University : second semester calculus.
1988 University of Rome II : Analytical Mechanics.
84-87 Rutgers University : Pre-Calculus, First Semester Calculus, Second Semester Calculus, Third Semester Calculus, Ordinary Differential Equation.

OTHER PROFESSIONAL ACTIVITIES

- **Grants Awarded and managing of Scientific Projects or Organizations**
  - Principal Investigator of the European Advanced Grant *Macroscopic Laws and Dynamical Systems* (MALADY, ERC AdG 246953), 2010-2015.
  - Member of the Scientific Committee of the GNFM (Gruppo Nazionale di Fisica Matematica, 544 members) (2009-present).

- Principar Investigator the PRIN Grant *Dynamical Systems and applications* (PRIN 2007B3RBEY), 2008-2009.
- Italian coordinator of the GDRE (Groupement de Recherche Européen) *GREFI-MEFI*, created by an agreement between CNRS and INDAM (2005-2009). Member of the GDRE Scientific Committee (2009-present).
- Coordinator of the project *Interacting Dynamical Systems*, INDAM, 2003.
- Member of the *Steering Commitee* of the European Science Foundation Program *Probabilistic methods in Non-Hyperbolic Dynamics* (PRODYN) (1998-2002).

- **Editorial and refereeing activities**
  - Member of the Editorial Board of *Discrete and Continuous Dynamical Systems-A* since 2003.
  - Member of the Editorial Board of *Nonlinearity* since 2002.
  - Member of the Editorial Board of *Mathematical Physics Electronic Journal* since 2002.
  - Member of the Editorial Board of *Ergodic Theory and Dynamical System*, since 2000.
  - Acted as referee for the following journals: *Acta Mathematica, Acta Mathematica Sinica, Advances in Mathematics, Annales de l'I.H.P. Analyse Non Linéaire, Annales de l'I.H.P. Probabilités et Statistiques , Annales Scientifique de l'Ecole Normale Supérieure, Annals of Mathematics, Annals of Probability, Annali della Scuola Normale di Pisa, Bollettino UMI, Chaos, Communications in Mathematical Physics, Discrete and Continuous Dynamical Systems, Ergodic Theory and Dynamical Systems, Europhysics Letters, Israel Journal of Mathematics, Inventiones, Journal of Mathematical Physics, Journal of Modern Dynamics, Journal of Physics A: Mathematical and General, Journal of Statistical Physics, Journal of the American Mathematical Society, Forum Mathematicum, Linear Algebra and its Applications, Mathematical Physics Electronic Journal, Mathematical Reviews, Nonlinearity, Physica D, Potential Analisis, Probability Theory and Related Fields, Stochastics and Dynamics, SIAM Journal on Control and Optimization, The Open Mathematics Journal, ZAMP.*
  - Acted as referee for the following istitutions: *European Research Council (Europe), Royal Society (London, England), Agence Nationale de la Recherche (France), Ministero dell'Istruzione, dell'Universitá e della Ricerca (Italy), National Commission for Scientific & Technological Research (FONDECYT, Santiago, Chile), Natural Sciences and Engineering Research Council (Canada), OTKA (Hungary); University of Bristol (England), Bryn Mawr College (Pennsylvania, U.S.A.), Queen Mary London University (London, England), University of Maryland (MD, USA), Université de la Méditerranée (Marseille, France), University of Padua (Italy), The Hebrew University of Jerusalem (Israel), University of Stony Brook (USA).*
  - Member of the *Ph.D. Committee* for: Paolo Giulietti [*Advisor*] (Roma-2011), Marco Discendenti [*Advisor*] (Roma-2010), Agustine de Maere [*Referee*] (Louvain-la-Neuve-2009), Loic Dubois [*Referee*] (Paris-2009), Manuela Giampieri [*Advisor*] (Roma-2006), Imre Peter Toth [*Referee*] (Budapest-2006), Stefano Galatolo [*Referee*] (Pisa-2002), Benoit Saussol (Marseille-1999) and Véronique Maume-Deschamps [*Referee*] (Dijon-1999).

- **Organization of Conferences and Schools**
  - Organizer, with Stefano Olla and Lai-Sang Young of *Workshop on the Fourier Law and Related Topics* April 4-8, 2011. Fields Institute, Toronto, Canada.
  - Organizer, with Antonio Giorgilli, Stefano Marmi and Giancarlo Benettin of *Sistemi dinamici nonlineari e applicazioni.* Pisa, Centro Ennio de Giorgi (Italy) 18-19 February 2011.
  - Organizer of *A Dynamics Day in Tor Vergata.* Roma, Dipartimento di Matematica, Universti di Roma Tor Vergata (Italy) 11 February 2011.
  - Organizer, together with Viviane Baladi and Gerhard Keller of the miniworkshop *Spectrum of Transfer Operators*, Oberwolfach, Germany, November 2009.
  - Organizer, together with Stefano Olla, Pierre Picco and Sandro Vaienti of the workshop *Grefi-Mefi 2008, From dynamical systems to Statistical Mechanics*, Marseille, February 2008.
  - Organizer, together with P.Collet, V.Baladi, J.Bricmont, F.Ledrappier of the trimester "TIME AT WORK" at the Institut Henri Poincaré, Paris, April-June 2005.
  - Organizer, together with G.Forni and R.de la Llave of the workshop *Recent and future developments in Hamiltonian Systems: theory and applications* at the Institut Henri Poincaré, Paris, 24-27 May 2005.
  - Organizer, with M.Abate and S.Marmi of the workshop *Dinamica Italiana*, Pisa 25–27 June 2003.

- Organizer, with M.Berti, A.Ambrosetti and S.Luzzatto, of the Prodyn-Sissa trimester *Geometric, Probabilistic, and Variational Methods in Dynamical Systems*, SISSA, Triestre (2002).
- Organizer, with A.Celletti, L.Chierchia and G.Mancini, of the international conference *Regular and unstable motion in Hamiltonian Systems*, Rome, Italy from 5 to 9 Settembre 2000.
- Organizer, together with Viviane Baladi, of the *Winter School on Smooth ergodic Theory*, Sils-Segl-Maria (Switzerland) from 24-1-99 to 31-1-99.
- Organizer, together with D. Szasz and P. Choquard, of the "Workshop on Hyperbolic Systems with Singularities," Vien, Austria, form 1 settembre 1996 to 30 dicembre 1996 at the Ervin Schrödinger Institute.
- Member of the Scientific Committee for the following conferences: *Hyperbolic Dynamical Systems in the Sciences*, Corinaldo, Italy, May 31-June 4, 2010. *AIMS' Sixth International Conference on Dynamical Systems, Differential Equations and Applications*, University of Poitiers, Poitiers, France, June 25-28, 2006. *Ergodic Theory and non-uniformly Hyperbolic Dynamical Systems*, Marseille, France, 23-28 May 2004.

- **Students and Post-Docs** I had the following official Ph.D. students: Manuela Giampieri, Marco Discendenti, Paolo Giulietti. In addition, I have, unofficially, followed the Ph.D. thesis of Benoit Saussol and Oliver Butterley. I had also strict collaborations with Veronique Maume-Deschamp and Sebastien Gouezel during their Post-Docs.

PROFESSIONAL AFFILIATION

American Mathematical Association, USA (since 1984). Unione Matematica Italiana (since 2007). International Association of Mathematical Physics (since 2007). National Group for Mathematical Physics, Italy (since 1981). Institute of Physics, UK (since 2004).

INVITED CONFERENCES AND SEMINARS (2000- present)

2011 *Conference* "Toward the rigorous derivation of the Fourier law", in "Weak chaos, Infinite Ergodic Theory, and Anomalous Dynamics" Max-Planck, Dresden, Germany, July.

- *Workshop* Minicourse "Fourier Law from a Dynamical Systems point of view" in Summer school on "Non-equilibrium statistical mechanics", Montreal, Canada, July.
- *Conference* "Spectral gap in dynamical systems, number theory and PDE" in Peyresq, France, May 30 - June 3.
- *Conference* "Fourier law and the weak coupling limit", 105th Statistical Mechanics Conference, Rutgers, USA.
- *Workshop* "Stochastic Interacting Systems and Hydrodynamic Limits" Graduate corse, Fields Institute, Toronto, Canada.

2010 Some models related to the derivation of the Fourier Law, INdAM Meeting Hyperbolic Dynamical Systems in the Sciences, May 31 - June 4, 2010, Corinaldo, Italy.

- *Conference* "Ruelle zeta functions for smooth Anosov flows," EPSRC Symposium Workshop on Ergodic Theory and Dynamical Systems: 30th Anniversary of the Journal, Warwick, UK.
- *Conference* "Energy transport in weakly coupled mixing Hamiltonian flows," Journe Dynamique P6 - P7, Vendredi 19 novembre 2010, Paris.
- *Conference*: "Zeta functions for Anosov flows", Workshop Periodic Approximation in Dynamics, CRM, Pisa, Italy (January).
- *Conference*: "Toward the rigorous derivation of the Fourier law," Celebrating Joel Lebowitz 80th birthday, MEETING OF STATISTICAL MECHANICS AT IHP, IHP, Paris.
- *Workshop*: "Concerning the derivation of the Fourier Law", Dynamics and PDE's, Institut Mittag-Leffler, Stockholm, Sweeden.
- *Workshop*: "Something I learned from Dolgopyat (he claims is Varadhan's)", Dynamics and PDE's, Institut Mittag-Leffler, Stockholm, Sweeden.

2009 *Conference*: "Zeta functions for Anosov flows", School in Periodic Approximation in Dynamics, Centro Ennio de Giorgi, Pisa, Italy.

- *Seminar*: "Some rigorous results in linear response theory", Warwick University, UK.
- *Conference*: "Various attempts toward deriving the Fourier Law", EPSRC Symposium Workshop on Space-time phases for spatially extended systems, Warwick University, UK
- *Conference*: "Random walks in evolving environments", Dynamic Random Environments, Eurandom, Holland.

- *Conference*: "Transfer operators of Uniformly Hyperbolic Dynamical Systems, a review", New directions in Dynamical Systems, Lorentz Center, Leiden, Holland.
- *Conference*: "On the work and vision of Dmitry Dolgopyat", keynote speech for the awarding of the Brin Prize to Dmitry Dolgopyat, Penn. State, USA.
- *Conference*: "Limit theorems for hyperbolic systems ", series of 3 lectures at the International Workshop on Global Dynamics Beyond Uniform Hyperbolicity, Beijing, China.
- *Conference*: "Toward the Fourier law for a weakly interacting anharmonic crystal", SPA, 33rd Conference of Stochastic Processes and Their Applications, Berlin, Germany.
- *Seminar*: "Systems with mixed phase space", ICTP, Trieste, Italy.
- *Seminar*: "Toward the Fourier law for a weakly interacting anharmonic crystal", Louvain, Belgium.
- *Conference*: "I have a dream", Dynamics and Statistics of Spatially Extended Systems (dedicated to 60th birthday of Leonid Bunimovich), Banff International Research Station, Banff, Alberta, Canada.

2008 *Seminar*: "Some microscopic models for the heat equation and the Fourier law", Ecole Normale Superiore, Lyon.

- *Seminar*: "Coupled map lattices", Ecole Normale Superiore, Paris.
- *Conference*: "Probability and uniformly hyperbolic systems", course at the Summer School in Dynamical Systems, Coimbra - Portugal
- *Conference*: "Statistical properties of infinite dimensional systems", minicourse at the programme "Hyperbolic Dynamical Systems", Erwin Schroedinger Institute, Vienna.
- *Conference*: "Heat equation and Non-equilibrium (Classical) Statistical Mechanics," 7th AIMS International Conference on Dynamical Systems, Differential Equations and Applications, May 18 - 21, 2008, The University of Texas at Arlington, Texas, USA. **Plenary speaker**.
- *Conference*: "Random walks in deterministic dynamical environents," Marches aleéatoires, milieux aléatories, Cergy-Pontoise, Paris, France.
- *Seminar*: "Fourier law and random walks in random environment," École Polytechnique, Sèminaire sur les problèmes alatoires dans les EDP et systémes de grande dimension, 14 April.
- *Seminar*: "Statistical properties of infinite dimensional dynamical systems," Jussieu, Sminaire de Systmes Dynamiques, 11 April.
- *Conference*: "Transfer operator methods in dynamical systems," Workshop on Ergodic Theory and Geometry, Manchester Institute for Mathematical Sciences, University of Manchester Tuesday 1st April 2008 to Friday 4th April 2008, U.K.
- *Seminar*: "Fourier Law And Random Walks In Dynamical Environment", Scuola Normale Superiore, Pisa.

2007 *Seminar*: "CLT for iterated map systems", Roma III, Roma.

- *Conference*: "Fourier Law And Random Walks In Dynamical Environment", Microscopic Origins of Dissipation and Noise, Leipzig. Germany.
- *Colloquium*: "Statistical Properties of Dynamical Systems with many degree of freedom," CPT, Marseille, France.
- *Conference*:"Fourier Law And Random Walks In Dynamical Environment," Miniworkshop de Biomathematique et Systemes Dynamiques: Bifurcations et symetries en genetique et en neurosciences; Proprietes statistiques des systemes dynamiques, CIRM, Marseille, France.
- *Conference*:"Random Walks in dynamical environment", Rencontres de Probas a Rouen, Rouen, France .
- *Seminar*: "Transfer operators and limit laws", Penn State, State College, PA, USA.
- *Seminar* "Dependence of the statistical properties of a Dynamical Systems from a parameter", Courant, NYU, New York, Usa.

2006 *Conference*:"Random Walks in evolving environment", Dynamical Systems: Classical, Quantum and Stochastic, Rome, Italy.

- *Conference*:"Random Walks and Dynamical Systems", Randomness and Hyperbolicity in Dynamical systems: Workshop dedicated to Domokos Szasz on occasion of his 65th Birthday, Budapset, Hungary.
- *Conference*:"Random Walks in evolving environment", International Congress of Mathematical Physics, Rio, Brasil.
- *Conference*:"Fourier law and random walks in evolving environments", Mathematics and its Application, joint Meeting of UMi and SMF, Torino, Italy.

- *Seminar*:"Dynamical systems from a functional analytic point of view: a brief overview", University of Paris XIII, Paris, France.
- *Seminar*: "Dynamical systems from a functional analytic point of view: a brief overview", University of Marylands, College Park, MD, USA.
- *Seminar*: "Stability of Statistical Properties in Two-dimensional Piecewise Hyperbolic Maps," Technical University Budapest, Hungary.

2005 *Conference*:"Markov chains and Coupled Map lattices", Chaos and disorder in mathematics and physics, A conference in honor of the seventieth birthday of Yakov G. Sinai, Bressanone, South Tirol, Italy.

- *Conference*:"Dynamical Systems as degenerated Markov Chains", Nonlinarity Scientific Meeting, Lonndon, U.K.
- *Seminar*: "Dynamics of almost product dynamical systems", Warwick, U.K.
- *Conference*: "Hyperbolic systems as Markov Chains",Propriétés Stochastiques des Systèmes Dynamiques et Milieux aléatoires, Roscoff, France.
- *Conference*: "Coupled Markov chains and coupled map lattices", Rencontres de Probabilitès Systémes de Particules, Mécanique Statistique, Rouen, France.
- *Conference*: "Stability of spectral data and related limit laws for Anosov systems", Workshop on Probabilistic Limit Laws for Dynamical Systems, Edinburgh, England.
- *Conference*: "Banach spaces adapted to Anosov systems", Colloquium on Dynamical Systems and Smooth Ergodic Theory, Bordeaux, France

2004 *Conference*: "Statistical Properties of certain Coupled map lattices", Mathematical Problems in Dynamics and Statistical Physics, Camerino, Italy.

- *Conference*: "Coupled Map lattices", Nonlinear Dynamics, Ergodic Theory and Renormalization, Lorentz Center, Leiden, The Netherlands.
- *Conference*: "Uniqueness of the SRB measure for piecewise expanding coupled map lattices in any dimension", ICTP Triestre.
- *Conference* "Banach spaces adapted to Anosov systems", ESF Exploratory Workshop, Bonn.
- *Conference* "Entropy and Chaos, ambiguous liaisons", Padova, Italy.
- *Seminar* " Banach spaces adapted to Anosov systems", U. of Maryland, Washington D.C., USA.
- *Seminar* "Banach spaces adapted to Anosov systems", U. of Arizona, Tucson, USA.
- *Seminar* "Birth of an elliptic island in a chaotic sea," Georgia Institute of Technology, Atlanta, USA.
- *Seminar* "Banach spaces adapted to Anosov systems", Université Paris VII, Paris, France.
- *Seminar* "Coupled map lattices without cluster expansion," Université Paris VII, Paris, France.
- *Conference* "Proprietà statistiche dei sistemi dinamici: passato e futuro", Assemblea GNFM, Montecatini, Italy.
- *Seminar* "Banach spaces adapted to Anosov systems", Université de Lille, Lille, France.

2003 *Conference*:"Coupled map lattices without cluster expansion," Coupled Map Lattices workshop, Centre Emil Borel, IHP, Paris, France.

- *Seminar*:"Birth of an elliptic island in a chaotic sea," Imperial College, London, UK.
- *Conference*:"Transfer operators in dynamical systems (a brief idiosyncratic review of Perron-Frobenius operators theory)", three lectures, LMS Durham Symposium: Markov Chains, University of Durham, UK.
- *Conference*: "Statistical properties of dynamical systems", two lectures, Geometric and Probabilistic Aspects of Dynamical Systems, Warwick, UK.
- *Conference*:"Strong statistical properties of geodesic flows," Dynamical Systems, Denton, USA.
- *Conference*: "Ergodic properties of a family of area preserving maps" , Symplectic Geometry and Physics Workshop II: Chaotic Dynamics and Transport, IPAM, UCLA, Los Angeles, USA.
- *Seminar*: "Geodesic flows",Cambridge University, Cambridge, UK.

2002 *Seminar*: "On Anosov Flows", KTH, Stockholm, Sweden.

- *Conference*: "Geodesic flows", Perspectives in mathematical Physics, Rome, Italy.
- *Conference*: "Invariant measures and their properties. A functional analytic point of view", Research Trimester on Dynamical Systems Pisa, Italy.
- *Conference*:"Geodesic flows", AMS-UMI first Joint meeting, Pisa, Italy.
- *Conference*:"Spectral stability", Recent trend in Dynamical Systems III, Porto, Portugal.

2001 *Seminario*: "Piecewise expanding maps with Holes," Polytechnique, Paris, France.

- *Colloquium*::"Spectral properties of Dynamical Systems," Dijon University, Dijon, France.

- *Conference*:"Ruelle-Perron-Frobenius spectrum for Anosov system," Queen Mary College, London, UK.
- *seminar*:"Ruelle-Perron-Frobenius spectrum for Anosov systems", Paris VII, Paris, France.
- *seminar*:"On the physical relevance of the Ruelle-Perron-Frobenius spectrum", Rutgers University, New Jersey, USA.
- *Seminar*: "Ruelle-Perron-Frobenius spectrum for Anosov Systems", Courant Institute, New York University, USA.
- *Conference*: "Computing the rate of decay of correlations in expanding and hyperbolic systems," Workshop *Rapidity of convergence to equilibrium or stationary states*, Paris, France.
- *Seminar*: "On Anosov Systems," Universitá di Bologna, Bologna, Italy.

2000 *Conference*: "Perron-Frobenius spectrum for Anosov maps," Karuizawa, Japan.

- *Seminar*: "Ergodic Properties of an infinite Quantum System," Tokyo Technical University, Japan.
- *Conference*: "Convergence to equilibrium in deterministic systems," conference *Dynamical Systems, classical, quantum, stochastic*, Porto Malu, Teulada (Cagliari), Italy.
- *Conference*: "Ergodicity in infinite systems," Workshop on Statistical Mechanics of Space-Time Chaos, Max Planck Institute, Dresda, Germany.
- *Conference*: "On the spectrum of the transfer operator," Workshop on Transfer Operators, Paderborn, Germany.