

# Curriculum Vitae of Sandro Vaienti

Updated April 2013

## 1 Positions Held

**1993-present** Full Professor ( classe exceptionnelle) of mathematics, University of *Sud Toulon et du Var*, and researcher at the *Centre de Physique Théorique* (CPT) at Luminy, Marseille. The CPT is a laboratory of the French CNRS (Centre National de la Recherche Scientifique).

**1992-1993** One year position as *Directeur de recherche associé au CNRS* at the Insitut of Mechanics and Statistics of Turbulence of Marseille and at the *Ecole Supérieure de Mécanique (ESM-2)* of the University of Aix-Marseille 2.

**1990-1992** Two-years fellowship of the EEC at the CPT in Marseille under the direction of Prof. J. Bellissard.

**1989-1990** Visiting Assistant Professor at the Département of Mathematics of the University of Southern California, Los Angeles, California.

**1987-1989** Post-Doctoral Fellowship, CNR-NATO at the CPT in Marseille.

## 2 Education and Degrees

**Graduate Studies** at the University of Bologna (Italy), from 1984 to 1987. Advisor: Prof. G. Turchetti. Subject of the Ph. D. thesis: *Ergodic and geometric properties of mixing repellers*.

**Undergraduate Studies** at the University of Bologna (Italy), Department of Physics, from 1975 to 1982. *Tesi di laurea*, under the direction of Prof. G. Turchetti, title *Application of KAM theorem to relativistic hamiltonian systems*.

### 3 Service to Profession

- 2001-2011: Director of the *Fédération de Recherche des Unités de Mathématiques de Marseille* (FRUMAM), FR 2291, which is a structure of the french CNRS composed by three mathematical laboratories in Marseille:
  - the *Institut de Mathématique de Luminy* (IML)
  - the *Centre de Physique Théorique* (CPT)
  - the *Laboratoire d'Analyse, de Topologie et de Probabilité* (LATP).
- From November 2011 I am an appointed member of the *Scientific Advisory Board* (Conseil Scientifique), of INSMI: Institut National des Sciences Mathématiques et de leurs interactions, CNRS.
- From October 2011 I am elected member of the French CNU *Conseil National des Universités*, Sect. 26.
- From January 2002 to December 2007: I was Vice-Director of the *Centre de Physique Théorique* in Marseille.
- I am the coordinator of the team *Dynamical Systems and Ergodic Theory* at the Centre de Physique Théorique in Marseille.
- From 2005 to 2012, I was the French coordinator of the European Group of Research (GDRE) *Grefi-Mefi* in Mathematical-Physics between France and Italy.
- From 2012 I am in charge of the first year of the *Master* in mathematics at the University of Toulon.
- In the period 2006-2011 I had in charge the allocation of fellowships and other fundings for PhD students of my University ( chargé de mission *Recherche/Relations Internationales*). I am still in charge of the *International Exchanges* at the Faculty of Sciences.
- From 2009 to 2012, I was member of the School of Doctoral Studies *College de l'Ecole Doctorale* of the University of Toulon.
- From 1997 to 2001 I was the Director of the Mathematics Department of the University of Toulon.

- From 1997 to 2002, I was the chief of *Group 3: Classical and Quantum Dynamical Systems*, at the Centre de Physique Théorique in Marseille.
- From 1994 to 2002 I was member of the Faculty Council (Sciences) of the University of Toulon.
- Since 1997, I am in the Promotion Committee (mathematics) at the University of Toulon.
- I am member of boards in some local institutions: Marseille Town Hall (*Ville de Marseille*) and the *Provence Region* for the allocation of foundings and the assessment of projects.
- From 2009, I am member of the Steering Committee of *IMERA* (Institut d'études avancées d'Aix-Marseille).

## 4 International Funded Research and Grants

- Since 1996 I hold the **PEDR**, successively **PES** (*Prime d'excellence scientifique*); it is a bonus given by the University for high standard research and supervision of PhD students.
- **International Funded Research** I got the following International Funded Research (*Délegations*) from CNRS:
  - to work in my laboratory in the periods: February-July 2006 and February-July 2007;
  - from February 2012 and for six months: UMI 2807-CMM, *Center for Mathematical Modeling*, University of Santiago, Chili.
- **ANR** Grant from the *Agence Nationale de la Recherche*, Project *PERTURBATIONS*, for four years: 2011-2014, principal investigator.
- **PICS** Grant from the CNRS for the Program PICS *Projet International de Coopération Scientifique*, for three years starting 2012 with the University of Houston: *Propriétés statistiques des systèmes dynamiques déterministes et aléatoires*, principal investigator.
- **PEPS** Grant from *Projets Exploratoires Pluridisciplinaires*, CNRS, Project *Mathematical method of climate models*, 2010 to renew in 2011, principal investigator.

- **NEWTON INSITUTE** I am the organizer together with M. Cullen, K. Fraedrich, V. Lucarini and B Pelloni, of the Project *Mathematics for the Fluid Earth*, at the Isaac Newton Institute for Mathematical Sciences in Cambridge from October 21 to December 20, 2013.
- **BREUDS** I was member of the Project **DynEurBra**, between France and Bresil and in the framework of the *Seventh Program* "Marie Curie Actions", 2009-2012. The project has been renewed under the name of *Breuds* for the period 2013-2016
- **INVITATIONS** I got several grants from local universities in Toulon and Marseille for one month invitations. In the last 10 years I also got three months financial supports from CNRS (*postes d'accueil*) which allowed me to invite: M Abadi, A. Goetz, H. Bruin, H. Hu, N. Haydn, I. Melbourne, J. Alves, M. Nicol, H.-K. Zhang.
- **PORTUGAL** I was member of the project *Leis de acontecimentos raros e outras propriedades estatísticas de Sistemas Dinâmicos*, PTDC/MAT/120346/2010, of the *FCT* (Portuguese Science Foundation), ruled out by J. Freitas in 2011-2013.
- **GDR** I am MEMBER of the CNRS-GDR *Multifractal Analysis*, coordinated by S. Jaffard.
- **CAPES-COFECUB** I was in charge of the French part of the project *Modélisation et récurrence stochastique dans les systèmes en évolution*, *CAPES-COFECUB* between France and Brazil, for the period 2007-2008.

## 5 Scientific organisation

- Mathematical-Physics seminar chair from 1996 to 1998 at CPT.
- In charge of the *Socrates-Erasmus* Project between the Department of Mathematics of the University of Toulon and the Universities of: Bologna (Italy); Como (Italy); Porto (Portugal), Cosenza (Italy).
- Summer School and Conference em Dynamical systems, from cristal to chaos, organised (with S. Ferenczi, P. Hubert, R. Lima) at CIRM in Luminy, Marseille June-July 1998.

- Summer School and Conference *Return times, entropy and complexity*, organised (with A. Asselah, X. Bressaud, P. Picco) at CIRM (Luminy), March 2000.
- Summer School and Conference *Dynamical Systems 2001: a Dynamic Odissey* (organised with X. Bressaud, J-Y. Briend, J. Cassaigne, P. Hubert, P. Liardet, J. Los, M. Lustig, C-A. Pillet, S. Troubetzkoy) at CIRM and IML (Luminy), from January 29 to March 2 2001.
- Conference on *Piecewise Isometries*, co-organised at IML in Marseille, June 2002.
- Conference and Summer School *Systèmes dynamiques multidimensionnels non-uniformement hyperboliques*, at CIRM 17-28 Mai 2004
- Member of the organization committee of the Summer School and Conference on *Probability, Dynamical Systems and Statistical Mechanics* at CIRM (Luminy, France) in February 2008 (5 weeks)
- Co-organiser with I. Melbourne, M. Nicol and D. Volny of the Conference at CIRM *Large Deviations and Dynamical Systems*, 4-8 July 2011.
- Co-organiser with B. Hasselblatt, J. Schmeling, Y. Pesin and S. Troubetzkoy, of the Conference at CIRM *Hyperbolicité et dimension*, 2-6 December 2013.
- Co-organiser with V. Lucarini of the Conference *Non-equilibrium Statistical Mechanics and the Theory of Extreme Events in Earth Science*, Newton Institute for Mathematical Science, Cambridge, 29 October 2013 - 1 November 2013.
- Co-organiser with M. Cullen, K. Fraedrich, V. Lucarini and B. Pelloni, of the two months Workshop *Mathematics for the Fluid Earth*, at the Newton Institute for Mathematical Science, Cambridge, 21 October - 20 December 2013.
- Co-organiser of the two Conferences at CIRM:  
- 7 july-11 july 2014: *Limit Theorems in Dynamics and Applications*, with D. Volny, G. Reinert and S. Olla;

- 14 july-18 july 2014 *Extreme Value Theory and laws of rare events*, with A. C. Freitas, J. Freitas and M. Todd.

## 6 Teachnig Experience

*University of Toulon*: Calculus; Advanced calculus; Measure theory; Theory of distributions; Probability theory; Topology; Ergodic Theory and Dynamical Systems.

*Centre de Physique Théorique* (Master Research): Dynamical Systems.

## 7 Ph. D. thesis

Supervisor of 12 doctoral thesis:

S. Siboni; B. Saussol; V. Penné ; J. Luevano; G. Poggiaspalla; M.Kupsa; L. Rossi; J. Nilsson; Ph. Marie; H. Aytach (co-direction with J. Freitas); R. Aimino (from 2011), R. Lambert (co-direction with M. Abadi, from 2011).

## 8 Referee

I am REFEREE of the journals: *Mathematical Reviews*, *Nonlinearity*, *Journal of Physics A: Math. and Gen.*, *Annales de l'IHP: Probabilités et Statistiques*, *Physical Review E*, *Phys. Rev. Letts.*, *Commun. Math. Phys.*, *Discrete and continuous Dynamical Systems*, *Lett. in Math. Phys.*, *Chaos*, *Mathematical Models in Applied Sciences*, *Ergodic Theory and Dynamical Systems*, *Probability theory and related fields*, *Transactions of the American Mathematical Society*.

## 9 Visits, Conferences, Talks: last 10 years

### 9.1 Research visits ( I gave talks during these visits)

- Institute of Scientific Interchange (ISI), Torino (Italy), Workshop "Complexity and Chaos", July 1996 and September 1997

- Erwin Schrodinger International Insitute for Mathematical Physics, Vienne, Workshop "Hyperbolic Dynamical Systems with Singularities", September 1996
- Mathematics Department, University Rome 2, November 1996, April 1997, July 1997
- Physics Department University of Bologna, Socrates-Erasmus project, from one to two weeks par year from 1997
- Mathematics Department University St. Chasles, Prague, August 1998
- Mathematical Insitut of the Academy of Sciences, Cluji (Roumania), August 1998
- Mathematics Department Penn State University, October 1998
- Mathematics Department Insituto Superior Tecnico, Lisbon, April 1999
- Mathematics Departement University of Southern California, Los Angeles, June 1999
- Mathematics Department University of Como , Socrates-Erasmus project, from one to two weeks par year from 2000
- Mathematics Departement University of Southern California, Los Angeles, January 2001
- Mathematics Departement University of Southern California, Los Angeles, October 2002
- Mathematics Department University of Lund (Sweden), December 2002
- Three weeks in April 2004 in Japan: seminars given at the universities of Keio (Tokyo), Kanasawa and Sapporo.
- Two weeks at the University of Michigan(East Lansing), April 2005, invited by H. Hu.
- Three weeks in Bresil (Agust 2005), invited by the University of Sao Paulo.

- Two weeks in England, September 2005, with a grant of the London Mathematical Society, to visit the universities of Guildford, Exeter and the Imperial College in London.
- Two weeks at the University of Michigan(East Lansing), Mai 2006, invited by H. Hu.
- Two weeks at the University of Porto (Portugal), September 2006, to visit J. Alves.
- Invited on a research contract by the University of Insubria (Como, Italie), November 2006.
- Invited on the research agreement GDRE "Grefi-Mefi" by the University of Rome 2 (December 2006)
- One month invitation (Y. Pesin) at the Mathematics Department of the University of Penn State (February 2007)
- One month invitation ( Nicolai Haydn) at USC (University of Southern California), April 2007.
- Two weeks invitation (May 2007) at the Academy of Sciences in Beijing (China): semester in Ergodic Theory (Huyi Hu)
- Several weeks at the University of Porto, joint cooperation with Marseille (J. Alves, J. Freitas), in 2007 and 2008.
- Ten days invitation ( Nicolai Haydn) at USC (University of Southern California), May 2010.
- Two weeks in December 2010 at the University of Surrey (Guildford, UK), invited by I Melbourne.
- One week in December 2010 at the University of Loughborough (UK), invited by W. Bahsoun (talk given).
- May- August 2012: CNRS International Funded Research at UMI 2807-CMM, *Center for Mathematical Modeling*, University of Santiago, Chili.
- Departement of Mathematics, University of Lund, Sweden, (J. Schmeling), 18-27 December 2013 in the framework of the *CNRS-GDR- Multifractal Analysis*.

## 9.2 Talks and Conferences

- Conference "Disorder and Chaos", Rome September 1997
- 1ère rencontre du nonlinéaire français, Paris Institut Poincaré , January 1998
- Workshop on Dynamical Systems, Physics Department University of Bologna, June 1998
- Academy of Sciences, Budapest, September 1998
- Conference on Dynamical Systems, Penn State University, October 1998
- AMS Conference on Dynamical Systems, Denton, Texas (USA), May 1999
- Three talks in South California, june 1999, at: UCLA; CALTECH; IRVINE.
- Colloque "Épistémologie des Systèmes Dynamiques", Paris, November 1999
- Workshop on "Transfer Operator", Paderborn Allemagne March 2000
- Non-linear Insitute, Nice, May 2000
- Dynamical Systems Conference, Amiens, France, May 2002
- Geometric aspects of dynamical systems, Warwick, July 2003
- Chaotic Dynamics and Transport, Cargese, Août 2003
- Three conferences in Japan (Avril 2004), see preceding section "Research visits".
- Seminar given at the University of Bordeaux (Mai 2004).
- Seminar given at the University of Guildford (England), November 2004.

- During my visits in Brazil, Michigan and England in 2005 (see preceding section "Research visits"), I gave seminars. In particular I gave invited speeches at the 9a Escola Brasileira de Probabilidade (Sao Sebastiao, July 31-August 6, 2005), at East Lansing, in Guildford, Exeter and at Imperial College (Londres).
- I gave a seminar during my visit at the University of Porto, in September 2006.
- I gave a seminar during my visit at Penn State University in February 2007.
- Talk given at the University of Southern California in April 2007.
- Talk given at the University of Lund (Sweden), December 2007.
- Talk given at the Schrödinger Institute in Wien, Ergodic theory Conference (invited), December 2007.
- Talk given at the "Institut d'Etudes Scientifiques de Cargèse", Conference "Chaos and Dynamics in Biological Networks" (invited), 5-9 Mai 2008.
- Talk given at EURANDOM (Eindhoven), Conference " Hitting, returning and matching in dynamical systems, information theory and mathematical biology" (invited), 3-7 November 2008.
- Talk given at ICTP (International Center of Theoretical Physics), Trieste, August 2009.
- Talk given at the Conference, Nonlinear Dynamics: New Directions Centro de Investigaciòn en Matemàticas, Guanajuato May 11-14, 2010.
- Talk given at the meeting *Indicatori dinamici e modelli per plasmì, atmosfera, clima*, Bologna, 19 July 2010.
- Talk given at the Conference Statistical properties of rare events, Exeter September 27/28 2010.
- MedCLIVAR Final Conference, Lecce, Italy, 6-9 June 2011

- Final Meeting: Ergodic Theory and Dynamical Systems, Warwick, 11-15 Juillet 2011, invité.
- EQUADIFF Conference, Loughborough, 31/07, 5/08 2011, invited.
- Workshop on Dynamical Systems, Salvador (Brezil), 17-21 October 2011, invited.
- 7-10 May 2012; *Progress and Problems in Dynamics*, Houston, 14-16 May 2012, invited.
- Pontificia Universidad Catòlica de Chile (Santiago), 28 May 2012 : Escape Rates Formulae and Metastabililty for Randomly perturbed maps.
- Pontificia Universidad Catòlica de Valparaiso , 6 July 2012 : Extreme value theory for randomly perturbed dynamical systems.
- USACH (Universidad de Santiago de Chile) : 23 July 2012 : On the extreme value Theory in Dynamical Systems
- Centro de Modelamiento Matematico (Santiago) : 27 July 2012 : On statistical properties of randomly perturbed dynamical systems.
- Congreso de Matemàtica Capricornio (CONCA 2012), Antofagasta (Chili), 1-4 August 2012 (invited) : On some properties of randomly perturbed dynamical systems.
- Montevideo Dynamical Systems, Montevideo (Uruguay), 13-17 August 2012, (invited) : A survey on new results about statistical properties of deterministic and random dynamical systems.
- Conference *Non-equilibrium Statistical Mechanics and the Theory of Extreme Events in Earth Science*, January 8th-11th, 2013, University of Reading, UK, invited.
- Conference *Large deviations and thermodynamical formalism* - 18 to 22 March 2013 and 2 to 8 June 2013 - EPFL, Lausanne, invited.

## 10 Research activity

The major field of interest of my work is in *Dynamical Systems and Ergodic Theory*. I briefly list some of the subjects investigated: thermodynamic formalism of strange repellers; large deviations for Axiom-A systems; ergodicity and other statistical properties (invariance principle) for a class of discontinuous maps of the torus; invariant measures and decay of correlations for maps of the interval, even non-uniformly hyperbolic; invariant measures for multidimensional non-uniformly expanding maps; statistics of recurrence; stochastic perturbations of dynamical systems; piecewise isometries, wavelets analysis of fractal sets; diffusion properties of area-preserving maps; passive scalar turbulence; orthogonal polynomials and spectral measures.