

## CURRICULUM VITAE

### Personal data

*Name:* Claudio BONANNO  
*Born:* 25 July 1975, Siracusa (Italy)  
*Nationality:* Italian  
*Present position:* Associate Professor of Mathematical Physics, University of Pisa (Italy)  
*Work address:* Department of Mathematics  
Largo Bruno Pontecorvo, 5  
56127 Pisa  
Italy  
*Telephone:* +39 050 2213883  
*E-mail:* claudio.bonanno@unipi.it  
*Marital Status:* Married, 3 sons

### Education and employment

- 1993/98 *Degree in Mathematics* with full grades and distinction at the University of Pisa (Italy).
- 1998/99 *Certificate of Advanced Studies in Mathematics* at the University of Cambridge (UK) with full grades and distinction.
- 2000/02 *Ph. D. in Mathematics* at the University of Pisa (Italy), defending on the 1 July 2003 the dissertation “Applications of information measures to chaotic dynamical systems”, supervised by Prof. Vieri Benci and Prof. Stefano Isola.
- 2003 *Post-doc position* at the University of Pisa (Italy). Research on: “Applied Mathematics”. Period: 1 July - 31 December.
- 2004 *Post-doc position* at the University of Camerino (Italy). Research on: “Ergodic and information theory methods applied to complex systems”. Period: 1 January - 31 December.
- 2005 *Post-doc position* for the *Istituto Nazionale di Alta Matematica “F.Severi”*. Period: 1 April - 31 October.
- 2005/07 *Temporary position as assistant professor of Mathematical Analysis*, University of Pisa (Italy). Period: 2 November 2005 - 19 December 2007.
- 2006 *Visiting researcher* at the Centre de Physique Theorique of the École Polytechnique, Palaiseau Cedex (France). Period: 22 May - 30 September.
- 2007/16 *Assistant Professor of Mathematical Analysis*, University of Pisa (Italy).
- 2016/today *Associate Professor of Mathematical Physics*, University of Pisa (Italy). Since November, 1st.
- 2017 *Italian qualification for the role of Full Professor of Mathematical Physics*.

### Publications

- *Ergodic theory*

1. C. Bonanno, R. Castorrini, “Dynamical zeta functions for differentiable parabolic maps of the interval”, arXiv:2403.17700 [math.DS]

2. C. Bonanno, T.I. Schindler, “Almost sure limit theorems with applications to non-regular continued fraction algorithms”, arXiv:2304.01132 [math.DS]
3. C. Bonanno, A. Del Vigna, S. Isola, “A Poincaré map for the horocycle flow on  $PSL(2, \mathbb{Z}) \backslash \mathbb{H}$  and the Stern-Brocot tree”, *Annali della Scuola Normale Superiore di Pisa, Classe di Scienze*, in press
4. W. Baalbaki, C. Bonanno, A. Del Vigna, T. Garrity, S. Isola, “On integer partitions and continued fraction type algorithms”, *The Ramanujan Journal*, **63** (2024), no. 3, 873–915
5. M. Lenci, C. Bonanno, G. Cristadoro, “Internal-wave billiards in trapezoids and similar tables”, *Nonlinearity*, **36** (2023), no. 2, 1029–1052
6. C. Bonanno, “On the generalised transfer operators of the Farey map with complex temperature”, *Mathematics*, **11** (2023), no. 1, art. no. 134
7. C. Bonanno, G. Cristadoro, M. Lenci, “Maximal escape rate for shifts”, *Discrete and Continuous Dynamical Systems*, **42** (2022), no. 12, 6007–6029
8. C. Bonanno, T.I. Schindler, “Almost sure asymptotic behaviour of Birkhoff sums for infinite measure-preserving dynamical systems”, *Discrete and Continuous Dynamical Systems*, **42** (2022), no. 11, 5541–5576
9. C. Bonanno, S. Marò, “Chaotic motion in the breathing circle billiard”, *Annales Henri Poincaré*, **23** (2022), no. 1, 255–291
10. C. Bonanno, A. Del Vigna, “Representation and coding of rational pairs on a Triangular tree and Diophantine approximation in  $\mathbb{R}^2$ ”, *Acta Arithmetica*, **200** (2021), no. 4, 389–427
11. C. Bonanno, A. Del Vigna, S. Munday, “A slow triangle map with a segment of indifferent fixed points and a complete tree of rational pairs”, *Monatshefte für Mathematik*, **194** (2021), 1–40
12. C. Bonanno, M. Lenci, “Pomeau-Manneville maps are global-local mixing”, *Discrete and Continuous Dynamical Systems*, **41** (2021), 1051–1069
13. C. Bonanno, S. Isola, “Series expansions for Maass forms on the full modular group from the Farey transfer operators”, *Journal of Number Theory*, **210** (2020), 183–230
14. C. Bonanno, P. Giulietti, M. Lenci, “Infinite mixing for one-dimensional maps with an indifferent fixed point”, *Nonlinearity*, **31** (2018), 5180–5213
15. C. Bonanno, P. Giulietti, M. Lenci, “Global-local mixing for the Boole map”, *Chaos Solitons and Fractals*, **111** (2018), 55–61
16. C. Bonanno, I. Chouari, “Escape rates for the Farey map with approximated holes”, *International Journal of Bifurcation and Chaos*, **26** (2016), issue 10, art. id. 1650169
17. S. Ben Ammou, C. Bonanno, I. Chouari, S. Isola, “On the spectrum of the transfer operators of a one-parameter family with intermittency transition”, *Far East Journal of Dynamical Systems*, **27** (2015), 13–25
18. S. Ben Ammou, C. Bonanno, I. Chouari, S. Isola, “On the leading eigenvalue of transfer operators of the Farey map with real temperature”, *Chaos Solitons and Fractals*, **71** (2015), 60–65
19. C. Bonanno, S. Isola, “A thermodynamic approach to two-variable Ruelle and Selberg zeta functions via the Farey map”, *Nonlinearity*, **27** (2014), 897–926
20. C. Bonanno, C. Carminati, S. Isola, G. Tiozzo, “Dynamics of continued fractions and kneading sequences of unimodal maps”, *Discrete and Continuous Dynamical Systems*, **33** (2013), 1313–1332
21. C. Bonanno, “Entropy and complexity in dynamical systems and PDEs”, in J.S.Cánovas editor, “*Advances in discrete dynamics*”, pp. 189–224, Series: Mathematics Research Development, Nova Science Publishers, 2012
22. C. Bonanno, J.R. Chazottes, P. Collet, “Estimates of Kolmogorov complexity in approximating Cantor sets”, *Nonlinearity*, **24** (2011), 459–479

23. C. Bonanno, S. Isola, “Orderings of the rationals and dynamical systems”, *Colloquium Mathematicum*, **116** (2009), 165–189
  24. C. Bonanno, S. Isola, “A renormalization approach to irrational rotations”, *Annali di Matematica Pura e Applicata*, **188** (2009), 247–267
  25. C. Bonanno, S. Graffi, S. Isola, “Spectral analysis of transfer operators associated to Farey fractions”, *Atti Accad. Naz. Lincei Cl. Sci. Fis. Mat. Natur. Rend. Lincei (9) Mat. Appl.*, **19** (2008), 1–23
  26. C. Bonanno, P. Collet, “Complexity for extended dynamical systems”, *Communications in Mathematical Physics*, **275** (2007), 721–748
  27. C. Bonanno, G. Menconi, V. Benci, P. Cerrai, “Computable information content and boolean networks dynamics”, *Complex Systems*, **16** (2005), 155–174
  28. C. Bonanno, S. Galatolo, “Algorithmic information for interval maps with an indifferent fixed point and infinite invariant measure”, *Chaos*, **14** (2004), 756–762
  29. V. Benci, C. Bonanno, S. Galatolo, G. Menconi, M. Virgilio, “Dynamical systems and computable information”, *Discrete and Continuous Dynamical Systems - Series B*, **4** (2004), 935–960
  30. C. Bonanno, “The Algorithmic Information Content for randomly perturbed systems”, *Discrete and Continuous Dynamical Systems - Series B*, **4** (2004), 921–934
  31. C. Bonanno, S. Galatolo, S. Isola, “Recurrence and algorithmic information”, *Nonlinearity*, **17** (2004), 1057–1074
  32. C. Bonanno, M.S. Mega, “Toward a dynamical model for prime numbers”, *Chaos Solitons Fractals*, **20** (2004), 107–118
  33. C. Bonanno, “Applications of information measures to chaotic dynamical systems”, *PhD dissertation, Università di Pisa*, 2003
  34. C. Bonanno, G. Menconi, “Computational information for the logistic map at the chaos threshold”, *Discrete and Continuous Dynamical Systems - Series B*, **2** (2002), no. 3, 415–431
  35. C. Bonanno, S. Galatolo, G. Menconi, “Information of sequences and applications”, *Physica A*, **305** (2002), no. 1-2, 196–199
  36. C. Bonanno, V. Manca, “Discrete dynamics in biological models”, *Romanian Journal of Information Science and Technology*, **5** (2002), no. 1-2, 45–67
- *Nonlinear time serie analysis*
    1. M. Bianco, A. Scarciglia, C. Bonanno, G. Valenza, “Heart rate variability series is the output of a non-chaotic system driven by dynamical noise”, arXiv:2404.11385 [eess.SP]
    2. A. Scarciglia, V. Catrambone, M. Bianco, C. Bonanno, N. Toschi, G. Valenza, “Stochastic brain dynamics exhibits differential regional distribution and maturation-related changes”, *NeuroImage*, **290** (2024), art. no. 120562
    3. A. Scarciglia, V. Catrambone, C. Bonanno, G. Valenza, “Physiological noise: definition, estimation, and characterization in complex biomedical signals”, *IEEE Transactions on Biomedical Engineering*, **71** (2024), no. 1, 45–55
    4. A. Scarciglia, V. Catrambone, C. Bonanno, G. Valenza, “Characterization of physiological noise in complex cardiovascular variability series”, proceedings della *45th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2023, online early access
    5. A. Scarciglia, F. Gini, V. Catrambone, C. Bonanno, G. Valenza, “Estimation of dynamical noise power in unknown systems”, *IEEE Signal Processing Letters*, **30** (2023), 234–238

6. A. Scarciglia, V. Catrambone, C. Bonanno, G. Valenza, “Multiscale partition-based Kolmogorov-Sinai entropy: a preliminary HRV study on heart failure vs. atrial fibrillation”, proceedings della *44th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2022, pp. 131–134
7. A. Scarciglia, V. Catrambone, C. Bonanno, G. Valenza, “A multiscale partition-based Kolmogorov-Sinai entropy for the complexity assessment of heartbeat dynamics”, *Bioengineering*, **9** (2022), no. 2, 80
8. A. Scarciglia, V. Catrambone, C. Bonanno, G. Valenza, “Quantifying partition-based Kolmogorov-Sinai entropy on heart rate variability: a young vs. elderly study”, proceedings della *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC)*, 2021, pp. 5469–5472
9. G. Menconi, M. Franciosi, C. Bonanno, J. Bellazzini, “Information content towards a neonatal disease severity score system”, in *Mathematical Modeling of Biological Systems*, Vol. I, A. Deutsch, L. Bruschi, H. Byrne, G. de Vries and H.-P. Herzel (eds), Birkhauser, Boston, pp. 323–330, 2007

- *Solitons in field theories*

1. C. Bonanno, “A complexity approach to the soliton resolution conjecture”, *Journal of Statistical Physics*, **160** (2015), 1432–1448
2. C. Bonanno, “Long time dynamics of highly concentrated solitary waves for the nonlinear Schrödinger equation”, *Journal of Differential Equations*, **258** (2015), 717–735
3. C. Bonanno, P. D’Avenia, M. Ghimenti, M. Squassina, “Soliton dynamics for the generalized Choquard equation”, *Journal of Mathematical Analysis and Applications*, **417** (2014), 180–199
4. C. Bonanno, “Solitons in gauge theories: existence and dependence on the charge”, *Advances in Nonlinear Analysis*, **3** (2014), issue S1, s1–s18
5. C. Bonanno, M. Ghimenti, M. Squassina, “Soliton dynamics of NLS with singular potentials”, *Dynamics of Partial Differential Equations*, **10** (2013), 177–207
6. J. Bellazzini, V. Benci, C. Bonanno, E. Sinibaldi, “On the existence of hylomorphic vortices in the nonlinear Klein-Gordon equation”, *Dynamics of Partial Differential Equations*, **10** (2013), 1–24
7. V. Benci, C. Bonanno, “Solitary waves and vortices in non-Abelian gauge theories with matter”, *Advanced Nonlinear Studies*, **12** (2012), 717–735
8. J. Bellazzini, C. Bonanno, “Nonlinear Schrödinger equations with strongly singular potentials”, *Proceedings of the Royal Society of Edinburgh Sect. A*, **140** (2010), 707–721
9. J. Bellazzini, V. Benci, C. Bonanno, A.M. Micheletti, “Solitons for the nonlinear Klein-Gordon equation”, *Advanced Nonlinear Studies*, **10** (2010), 481–499
10. C. Bonanno, “Existence and multiplicity of stable bound states for the nonlinear Klein-Gordon equation”, *Nonlinear Analysis. Theory Methods & Applications*, **72** (2010), 2031–2046
11. J. Bellazzini, V. Benci, C. Bonanno, E. Sinibaldi, “Hylomorphic solitons in the nonlinear Klein-Gordon equation”, *Dynamics of Partial Differential Equations*, **6** (2009), 311–334
12. J. Bellazzini, C. Bonanno, G. Siciliano, “Magnetostatic vortices in two-dimensional abelian gauge theories”, *Mediterranean Journal of Mathematics*, **6** (2009), 347–366
13. V. Benci, C. Bonanno, A.M. Micheletti, “On the multiplicity of solutions of a nonlinear elliptic problem on Riemannian manifolds”, *Journal of Functional Analysis*, **252** (2007), 464–489

- *Celestial mechanics*

1. N. Bertozzi, C. Bonanno, “Asymptotic behaviour of the confidence region in orbit determination for hyperbolic maps with a parameter”, *Physica D: Nonlinear Phenomena*, **470** (2024), part A, art. no. 134403

2. S. Marò, C. Bonanno, “Asymptotic behaviour of orbit determination for hyperbolic maps”, *Celestial Mechanics and Dynamical Astronomy*, **133** (2021), no. 6, art. no. 29
3. A. Milani, D. Vokrouhlicky, D. Villani, C. Bonanno, A. Rossi, “Testing general relativity with the BepiColombo radio science experiment”, *Physical Review D*, **66** (2002), 082001
4. C. Bonanno, A. Milani, “Symmetries and rank deficiencies in the orbit determination around another planet”, *Celestial Mechanics and Dynamical Astronomy*, **83** (2002), 17–33
5. A. Milani, A. Rossi, D. Vokrouhlicky, D. Villani, C. Bonanno, “Gravity field and rotation state of Mercury from the BepiColombo Radio Science Experiments”, *Planetary and Space Sciences*, **49** (2001), no. 14-15, 1579–1596
6. C. Bonanno, “An analytical formulation for the MOID and its consequences” *Astronomy and Astrophysics*, **360** (2000), 411–416

### Editorial activity

- Guest editor of the journal *Bollettino dell’Unione Matematica Italiana* for the special issue “Advances in Dynamical Systems by the DinAmicI group”, vol. 16, issue 2, June 2023.
- Editor together with Alfonso Sorrentino and Corinna Ulcigrai of the book “Modern Aspects of Dynamical Systems”, Lecture Notes in Mathematics, C.I.M.E. Foundation Subseries, Springer, 2024.

### Conferences, workshops and seminars

#### As member of the scientific committee

- CIME Foundation School *Modern Aspects of Dynamical Systems*, 2 - 6 August 2021, Cetraro (Italy)
- Workshop *Regular and stochastic behaviour in dynamical systems*, 5 - 9 June 2023, Centro di Ricerca Matematica “De Giorgi”, Pisa (Italy).

#### As member of the organizing committee

- Conference *Chaos, complexity, information: perspectives and methods*, 17 - 19 March 2003, University of Pisa (Italy)
- Conference *Mathematical problems in dynamics and statistical physics*, 27 - 30 September 2004, University of Camerino (Italy)
- Meeting *Statistical properties of dynamical systems and information*, 10 - 11 January 2005, University of Pisa (Italy)
- Workshop *Variational and Topological Methods in Nonlinear Phenomena*, 1 - 5 May 2008, Otranto (Italy)
- Workshop *Variational and Topological Methods in Nonlinear Phenomena*, 20 - 23 September 2010, Cortona (Italy)
- *Second Meeting of the Young Italian Hyperbolicians - a workshop on hyperbolic and anomalous dynamics*, 20 - 23 September 2011, University of Pisa (Italy)
- *Critical Point Theory and Nonlinear Differential Problems*, 2 - 4 September 2015, Alba di Canazei, Val di Fassa (Italy)
- *Renormalization in Dynamics*, 4 - 8 April 2016, Centro “De Giorgi”, Pisa (Italy)

- *First DinAmicI Day*, 25 November 2016, Gran Sasso Science Institute, L'Aquila (Italy)
- *Workshop INdAM - DinAmicI V - Modern Trends in the Ergodic Theory of Dynamical Systems*, 5 - 9 June 2017, Roma (Italy)
- *Second DinAmicI Day*, 21 December 2018, Accademia dei Lincei, Roma (Italy)
- Workshop *Dynamical Systems and Beyond*, 25 - 27 March 2019, University of Pisa (Italy)
- Workshop *DinAmicI VI*, 4 - 7 June 2019, Centro di Ricerca Matematica "De Giorgi", Pisa (Italy)
- Workshop *Probabilistic methods in dynamics*, 29 May - 1 June 2023, Centro di Ricerca Matematica "De Giorgi", Pisa (Italy)
- *XXII Congress of the Italian Mathematical Union*, 4 - 9 September 2023, Pisa (Italy)

Talks - (IS) = invited speaker

- *International School and Workshop on Nonextensive Thermodynamics and Physical Applications*, 23 - 30 May 2001, Villasimius (Italy), talk "*Algorithmic complexity for the Manneville map*"
- Meeting *CELMEC III - A Celestial Mechanics meeting*, 18 - 22 June 2001, Monte Porzio Catone (Italy), talk "*Symmetries and rank deficiency in the orbit determination around another planet*"
- (IS) Workshop *Non-stationary Time Series: a Theoretical and Computational Challenge*, 13 - 20 October 2002, University of North Texas, Denton TX (USA), talk "*An approach to prime numbers using complexity methods*"
- Workshop *Chaos, complexity, information II*, 10 - 12 May 2004, Bologna (Italy), talk "*Some compression data experiments on networks*"
- Conference *Mathematical problems in dynamics and statistical physics*, 27 - 30 September 2004, University of Camerino (Italy), talk "*Algorithmic information for intermittent systems and some observations on the decay of correlations*"
- Conference *Nonlinear analysis and calculus of variations*, 17 - 22 October 2005, Scuola Normale Superiore, Pisa (Italy), talk "*Statistical properties for Markov interval maps*"
- (IS) Workshop *Variational and Topological Methods in Nonlinear Phenomena*, 1 - 5 May 2008, Otranto (Italy), talk "*Hylomorphic solitons: existence, properties and dynamics*"
- (IS) *First Meeting of the (mostly) Young Italian Hyperbolicians*, 8 - 12 June 2009, Corinaldo (Italy), talk "*Generalized transfer operators for the Farey map*"
- (IS) Workshop *Dynamics and Computation*, 8 - 12 February 2010, CIRM, Marseille (France), talk "*Applications of Kolmogorov complexity to dynamical systems*"
- (IS) Meeting *Nonlinear Phenomena: A View From Mathematics And Physics*, 10 - 14 January 2011, National Taiwan University, Taipei (Taiwan), talk "*Solitary waves and vortices in non-Abelian gauge theories*"
- (IS) Workshop *Cocompact Imbeddings, Profile Decompositions, and their Applications to PDE*, 5 - 9 January 2012, Tata Institute of Fundamental Research, Bangalore (India), talk "*Solitons and vortices for nonlinear field equations*"
- (IS) Workshop *New Perspective in Nonlinear PDE's*, 24 - 28 September 2012, Argiletum, Rome (Italy), talk "*Nontopological solitons in dynamical systems*"

- (IS) *DinAmicI - Third Workshop of the (Young) Italian Dynamicists*, 11 - 14 June 2013, Corinaldo (Italy), talk “*On the generalized transfer operators of the Farey map*”
- (IS) Workshop *Variational and Topological Methods in Nonlinear Phenomena*, 24 - 28 June 2013, Alghero (Italy), talk “*Stability of solitons via local minimization*”
- (IS) *International Workshop on Variational Problems and PDE's*, 2 - 6 September 2013, Universidade de São Paulo, Saõ Paulo (Brasil), talk “*Solitary waves and vortices in gauge theories*”
- (IS) Workshop *Dispersive PDE's: models and dynamics*, 18 - 20 September 2013, University of Pisa (Italy), talk “*Variational methods in soliton dynamics*”
- (IS) Workshop *PDE days in Roma*, 3 - 4 October 2013, University of Roma “La Sapienza” (Italy), talk “*Variational methods in soliton dynamics*”
- (IS) *Congreso de la Real Sociedad Matemática Española*, session *Elliptic and parabolic PDEs*, part of the , 2 - 6 February 2015, Granada (Spain), talk “*Dynamics of solitons in nonlinear Schrödinger equations*”
- (IS) *DinAmicI IV*, 22 - 26 June 2015, Corinaldo (Italy), talk “*A lecture on generalized transfer operators for intermittent maps and the special case of continued fractions*”
- (IS) Workshop *Dynamical systems in logic, complex analysis and ergodic theory*, 8 - 9 February 2016, University of Pisa (Italy), talk “*The Farey map and its role in ergodic and spectral theory*”.
- *7th European Congress of Mathematics*, 18 - 22 July 2016, Berlin (Germany), talk “*New series expansions for Maass wave forms on the full modular group from eigenfunctions of the transfer operator of the Farey map*”
- (IS) *Pisa-Hokkaido-Roma2 Summer School on Mathematics and Its Applications 2018*, 27 August - 8 September 2018, Centro di Ricerca Matematica “Ennio De Giorgi”, Pisa (Italy), lecture course on “*Infinite Ergodic Theory*”
- (IS) Workshop *DCP'19 - Dynamics and Complexity, Pisa*, 1 - 3 July 2019, CNR, Pisa (Italy), talk “*Mixing in infinite measure-preserving systems*”
- (IS) *XXI Congress of the Italian Mathematical Union*, session *ODE and dynamical systems*, 2 - 7 September 2019, Pavia (Italy), talk “*Intermittency in a two-dimensional continued fraction system*”
- (IS) Workshop *Advances and Challenges in Nonlinear Analysis...and Beyond!*, 24 - 27 September 2019, Bari (Italy), talk “*A quick journey through complexity and solitons*”
- *International Congress of Mathematical Physics*, 2 - 7 August 2021, Geneva (Switzerland), talk “*Almost sure limit theorems for Birkhoff sums of integrable and non-integrable observables over an infinite measure space*” speaker Tanja Schindler, based on the paper arXiv:2104.10458 [math.DS]
- (IS) Workshop *DCP '22 - Dynamics and Complexity, Pisa*, 26 - 28 May 2022, Pisa (Italy), talk “*Strong laws of large numbers in infinite ergodic theory*”

#### Other seminars

- “*Applications of a method from Information Theory to the study of chaotic dynamical systems*”, University of Camerino (Italy), 29 October 2002
- “*An approach to complexity: compressibility of orbits*”, University of Pisa (Italy), 31 May 2004
- “*Nonuniformly expanding one-dimensional maps I-II*”, Centro di Ricerca Matematica “Ennio De Giorgi”, Pisa (Italy), 26 April and 2 May 2006

- Intensive period *Dynamical Systems and Number Theory*, Centro di Ricerca Matematica “Ennio De Giorgi”, 16 April - 13 July 2007, Pisa (Italy), talk “*The transfer operator of the Farey map and zeta functions*”
- “*Approximation in metric spaces and fractals*”, University of Verona (Italy), 22 May 2007
- “*Complexity in metric spaces and applications to dynamical systems in infinite dimension*”, University of Bologna (Italy), 12 November 2007
- “*A class of soliton-like solutions to field equations*”, University of Camerino (Italy), 28 May 2008
- “*Poincaré - Selberg - Ruelle: a mathematical golden braid*”, University of Pisa (Italy), 7 April 2009
- “*Solitary waves and vortices in gauge theories*”, Department of Mathematics, King Saud University, Riyadh (Saudi Arabia), 4 December 2011
- “*Solitons and vortices for nonlinear field equations*”, University of Basilicata, Potenza (Italy), 19 September 2012
- “*A generalisation of the thermodynamic approach to the Selberg zeta function via the Farey map*”, Department of Mathematics, Friedrich-Alexander-Universität Erlangen-Nürnberg, Erlangen (Germany), 20 December 2012
- “*The eigenfunctions of the transfer operator of the Farey map and their role in the spectral theory on the modular surface*”, University of Bologna (Italy), 24 February 2014
- “*On an unexpected connection between the bifurcation parameters of two families of dynamical systems and applications*”, University of Roma Tre (Italy), 23 May 2014
- “*Variational methods in soliton dynamics*”, University of Camerino (Italy), 1 July 2014
- “*Complexity and solitons*”, Université de Cergy-Pontoise, Cergy-Pontoise Cedex (France), 13 April 2015
- “*Complexity and solitons*”, University of Milano (Italy), 28 May 2018
- “*Zero entropy - mathematics and applications*”, University of Bologna (Italy), 30 January 2019
- “*Asymptotic behaviour of chains of interacting particles*”, University of Roma “Tor Vergata” (Italy), 26 February 2019
- “*Infinite ergodic theory and a tree of rational pairs*”, One World Numeration Seminar (online), 25 January 2022
- “*Closed horocycles and trees of rational numbers*”, Centro di Ricerca Matematica “Ennio De Giorgi”, Pisa (Italy), 11 February 2022
- “*Flows on the modular surface and trees of fractions*”, Fakultät für Mathematik, Universität Wien, Vienna (Austria), 14 July 2022
- “*Extending the Birkhoff Ergodic Theorem to systems preserving an infinite measure*”, University of Milano-Bicocca (Italy), 15 November 2022
- “*The billiard-like motion of waves in stratified fluids*”, Billiard Online Meetings (online), 12 May 2023
- “*Asymptotic behaviour of the sums of the digits for continued fraction algorithms*”, One World Numeration Seminar (online), 28 November 2023



## Research projects

### Principal investigator

- Research project GNAMPA - INdAM, “Solitons in classical and semi-relativistic field theories”, 2012
- Research project “MIUR - PRIN2017 - Regular and stochastic behaviour in dynamical systems”, principal investigator of the University of Pisa unit (national principal investigator Prof. C. Liverani)
- Research project “MUR - PRIN2022 - Stochastic properties of dynamical systems”, principal investigator of the University of Pisa unit (national principal investigator Prof. C. Liverani)

### Participant

- Research project GNFM - INdAM “Complexity, statistics and spectral properties at the chaos edge”, 2002 (principal investigator Prof. S. Isola)
- Research project INdAM “Does noise simplify or not the dynamics of nonlinear systems?”, 2003 (principal investigator Prof. L. Sacerdote)
- Research project MIUR - PRIN2003, “Variational and Topological Methods in the Study of Nonlinear Phenomena”, 2003 (principal investigator Prof. V. Benci)
- Research project GNAMPA - INdAM “Dynamical systems and computable information”, 2004 (principal investigator Prof. V. Benci)
- Research project MIUR - PRIN2005, “Variational and Topological Methods in the Study of Nonlinear Phenomena”, 2005 (principal investigator Prof. V. Benci)
- Research project MIUR - PRIN2007, “Variational and Topological Methods in the Study of Nonlinear Phenomena”, 2007 (principal investigator Prof. V. Benci)
- Research project MIUR - PRIN2009, “Variational and Topological Methods in the Study of Nonlinear Phenomena”, 2009 (principal investigator Prof. V. Benci)
- Research project GNAMPA - INdAM, “Dynamics and properties of concentrated solutions in nonlinear field theories”, 2011 (principal investigator Dr. M. Ghimenti)
- Research project “Distinguished Scientist Fellowship Program (DSFP)”, King Saud University, Riyadh, Saudi Arabia (principal investigators Prof. V. Benci and Prof. M.A. Al-Gwaiz), 2011-2013
- Research project GNAMPA - INdAM, “Solitons in nonlinear dispersive equations”, 2013 (principal investigator Dr. J. Bellazzini)
- Research project “BREUDS (Brazilian-European partnership in Dynamical Systems)”, supported by an FP7 International International Research Staff Exchange Scheme (IRSES) grant of the European Union, 2013-2017, member of the University of Pisa team, coordinated by Dr. S. Galatolo
- Research project “Métodos Variacionais e problemas elípticos não-lineares” supported by Conselho Nacional de Desenvolvimento Científico e Tecnológico, Brasil, (principal investigator Dr. G. Siciliano), 2013-2016
- Research project GNAMPA - INdAM, “Nonlinear field equations: solitons and dispersion”, 2014 (principal investigator Dr. M. Ghimenti)
- Research project funded by the University of Pisa, “Connections between holomorphic dynamics, ergodic theory and mathematical logic in dynamical systems”, 2015 (principal investigator Prof. M. Abate)

- Research project GNAMPA - INdAM, “Nonlinear dispersive equations”, 2016 (principal investigator Dr. J. Bellazzini)
- Research project funded by the University of Pisa, “Dynamical systems in analysis, geometry, logic and celestial mechanics”, 2017 (principal investigator Prof. M. Abate)
- Research project funded by the University of Pisa, “Combining biomedical signal processing and proteomics for a new quantitative stress”, 2020 (principal investigator Dr. G. Valenza)
- H2020 FET-Proactive European collaborative project “EXPERIENCE” at University of Pisa (coordinator Prof. G. Valenza)

### **Post-doc mentoring at University of Pisa**

2017/18 Sara Munday.

2021 Alessio Del Vigna.

2022/23 Roberto Castorrini.

2024/26 Sharvari Tikekar.

### **Ph.D. students**

2012/15 Imen Chouari, “Opérateurs de transfert en Théorie Ergodique associés à la transformation de Farey”, University of Tunis El Manar (Tunisia).

2021/24 Andrea Scarciglia, “Physiological noise in complex neuro-cardiovascular systems”, University of Pisa.

2022/25 Nicola Bertozzi, “”, University of Pisa.

2024/27 Martina Bianco, “”, University of Pisa

### **Member of the committee for Ph.D. theses defenses**

- Daniele Galli, “A cohomological approach to Ruelle-Pollicott resonances and speed of mixing of Anosov diffeomorphisms”, University of Bologna, June 30, 2023

### **Undergraduate students**

2005/06 Eleonora Castaldo, “An application of Markov chains to self-reproducing automata” (in Italian), University of Pisa

2005/06 Roberto Pacella, “Non-equilibrium entropy and Kolmogorov entropy” (in Italian), University of Pisa

2006/07 Irene Caivano, “The complexity of the advertising marketing” (in Italian), University of Pisa

2008/09 Giacomo Biagini, “Multi-variate analysis methods for the segmentation of marketing” (in Italian), University of Pisa

2015/16 Arianna Santini, “Universal properties of families of unimodal maps” (in Italian), University of Pisa

2017/18 Roberto Paoli, “Chaos in the Anisotropic Kepler Problem”, University of Pisa

- 2018/19 Nicola Bertozzi, “Hyperbolic billiards: geometrical principles to have chaotic orbits” (in Italian), University of Pisa
- 2018/19 Federico Carta, “Different versions of Szemerédi Theorem and the Green-Tao Theorem” (in Italian), University of Pisa
- 2018/19 Daniele Galli, “The Selberg Zeta Function: a golden thread through hyperbolic geometry, dynamics and number theory”, University of Bologna
- 2018/19 Francesco Zigliotto, “Billiards with positive entropy” (presentation), Scuola Normale Superiore
- 2019/20 Guglielmo Baldi, “Ergodic theory and applications to the continued fraction expansions of real numbers” (in Italian), University of Pisa
- 2019/20 Martina Bianco, “Dynamical systems and noise estimates in time series”, University of Pisa
- 2019/20 Gabriele Nemanò, “Decay of correlations and dynamical zeta functions” (in Italian), University of Pisa
- 2019/20 Andrea Scarciglia, “Embedding and complexity of time series: theory and applications”, University of Pisa
- 2020/21 Elettra Apolloni, “Complexity and entropy for strings”, University of Pisa
- 2020/21 Silvia Ballotta, “Dynamics of bouncing balls” (in Italian), University of Pisa
- 2020/21 Gabriel Franceschi, “On the dynamics of bouncing balls” (in Italian), University of Pisa
- 2020/21 Federica Sasseti, “Entropy of random perturbations of dynamical systems” (in Italian), University of Pisa
- 2021/22 Alessio Bernazzi, “Open dynamical systems”, University of Pisa
- 2021/22 Nicola Bertozzi, “Asymptotic behaviour of the confidence region in orbit determination problems”, University of Pisa
- 2021/22 Simona Felice, “On the hyperbolic dynamics of geodesic flows” (in Italian), University of Pisa
- 2021/22 Agostino Pigozzi, “The geodesic flow on the modular surface and the Gauss map” (in Italian), University of Pisa
- 2021/22 Sara Rossi, “Parametric resonance in Hamiltonian systems” (in Italian), University of Pisa
- 2022/23 Lorenzo Femia, “Dynamics on the quotients of the hyperbolic plane and ergodicity of the Gauss map”, (in Italian), University of Pisa
- 2022/23 Francesca Rindi, “Twist maps and billiards in convex domains” (in Italian), University of Pisa
- 2022/23 Martina Bianco, “The 0-1 test for chaos and applications to time series”, University of Pisa

## Teaching

- Ph.D. level

2012 Part of the course “Variational tools in nonlinear elliptic equations” for the Graduate Studies in Mathematics, University of Basilicata, Potenza.

2015 Part of the course “Nonlinear field equations: stationary solutions and solitons” for the Graduate Studies in Mathematics, University of Pisa.

- 2024 “Nonlinear dynamical systems and complexity” for the Graduate Studies in Information Engineering, University of Pisa.
- 2025 “Ergodic theory of geodesic flows” for the Graduate Studies in Mathematics, University of Pisa.

- Undergraduate level

- 2000/01 “Mathematical Analysis I” for Information Theory Degree, University of Pisa.
- 2002/03 “Mathematics” for Engineering Degree, University of Pisa.
- 2003/04 “Mathematics and Statistics” for Molecular Biological Sciences Degree, University of Pisa.
- 2003/04 “Complexity, chaos and information” for Mathematics Degree, University of Camerino.
- 2004/05 “Complexity, chaos and information” for Mathematics Degree, University of Camerino.
- 2004/05 “Biological Information Theory” for Bioinformatics Degree, University of Camerino.
- 2005/06 “Nonlinear dynamics and chaos” for Engineering Degree, University of Pisa, with Prof. Benci.
- 2006/07 “Mathematical III” for Engineering Degree, University of Pisa.
- 2006/07 “Dynamical systems” for Engineering Degree, University of Pisa, with Prof. Benci.
- 2007/08 “Mathematical Analysis III” for Engineering Degree, University of Pisa.
- 2007/08 “PDEs for Mathematical Physics” for Engineering Degree, University of Pisa, with Prof. Benci.
- 2008/09 “Mathematical Analysis III” for Engineering Degree, University of Pisa.
- 2009/10 “Mathematical Analysis I” for Engineering Degree, University of Pisa.
- 2009/10 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2010/11 “Linear Algebra” for Engineering Degree, University of Pisa.
- 2011/12 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2011/12 “Ergodic theory” for Engineering Degree, University of Pisa
- 2012/13 “Complements of Mathematics and Physics” for Environmental Sciences, University of Pisa.
- 2012/13 “Ergodic theory” for Mathematics Degree, University of Pisa.
- 2013/14 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2014/15 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2015/16 “Mathematical Physics” for Master in Mathematics, University of Pisa.
- 2015/16 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2016/17 “Advanced Mechanics” for Master in Mathematics, University of Pisa.
- 2016/17 “Mathematical Analysis I” for Engineering Degree, University of Pisa.
- 2016/17 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2017/18 “Principles of Mathematical Physics” for Master in Mathematics, University of Pisa, with Prof. Gronchi
- 2017/18 “Mathematical Physics” for Master in Mathematics, University of Pisa.
- 2017/18 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2018/19 “Advanced Mechanics” for Master in Mathematics, University of Pisa.
- 2018/19 “Dynamical Systems” for Mathematics Degree, University of Pisa.
- 2018/19 “Mathematical Analysis II” for Engineering Degree, University of Pisa.
- 2019/20 “Mathematical Physics” for Master in Mathematics, University of Pisa.
- 2019/20 “Dynamical Systems” for Mathematics Degree, University of Pisa.

2019/20 “Mathematical Analysis II” for Engineering Degree, University of Pisa.  
2020/21 “Advanced Mechanics” for Master in Mathematics, University of Pisa.  
2020/21 “Dynamical Systems” for Mathematics Degree, University of Pisa.  
2020/21 “Probability and Statistics” for Computer Science Degree, University of Pisa.  
2021/22 “Mathematical Physics” for Master in Mathematics, University of Pisa.  
2021/22 “Dynamical Systems” for Mathematics Degree, University of Pisa.  
2021/22 “Statistics” for Computer Science Degree, University of Pisa.  
2022/23 “Advanced Mechanics” for Master in Mathematics, University of Pisa.  
2022/23 “Dynamical Systems” for Mathematics Degree, University of Pisa.  
2022/23 “Mathematical Physics” for Master in Mathematics, University of Pisa.  
2023/24 “Advanced Mechanics” for Master in Mathematics, University of Pisa.  
2023/24 “Dynamical Systems” for Mathematics Degree, University of Pisa.  
2023/24 “Mathematical Physics” for Master in Mathematics, University of Pisa.  
2024/25 “Dynamical Systems” for Mathematics Degree, University of Pisa.  
2024/25 “Mathematical Physics” for Master in Mathematics, University of Pisa.  
2024/25 “Elements of Mathematics and Statistics” for Engineering Degree, University of Pisa.