Curriculum vitae

Address

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Nationality:	Italian
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Present position:	Project leader (senior researcher), Faculty of Mathematics, University of Vienna

Present research interests

- Explainable and sustainable artificial intelligence
- Mathematical theory of human inspired AI
- Mathematical theories of complex systems
- Mathematical modelling of complex systems and their applications
- Nonlinear theories of generalized functions
- Transportation modeling and related decision support systems
- Mathematical modeling of urban growth and housing markets
- Non-Archimedean mathematical analysis
- Foundation of infinite-dimensional analysis and differential geometry

At present, my research projects have been funded for about **3.06 million of Euro** from 2002 to 2024.

Education

- *University of Bonn*, Ph.D. in Mathematics awarded in December 2009. In the thesis we use methods of non-Archimedean analysis to study non-normable infinite dimensional spaces. Title: “Fermat reals: nilpotent infinitesimals and infinite dimensional spaces”. Supervisor Prof. S. Albeverio. Degree "Very good + (0.7)"; overall grade of the promotion "magna cum laude".
- *Università degli Studi di Milano*, M.Sc. in Mathematics. Title: “A model of extended line with actual infinitesimals”. Supervisor Prof. L. Galgani. Degree 110/110 Cum laude.
- *Habilitation* (venia docendi in Mathematics), University of Vienna, Austria, November 2019. External habilitation committee: V. Benci (University of Pisa), C. Garetto (Loughborough University), I.V. Melnikova (Ural Federal University).

Academic experiences

Main research activities as principal investigator and awards

- May 2024 - April 2028: project leader of FWF (Austrian Fund for the Promotion of Scientific Research) stand alone research project *Singular dynamical systems and Picard solutions of PDE*. Co-applicant and collaborator of the project is Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - The four years project aims at continuing the development of *interaction spaces theory*, as the first universal mathematical theory of complex systems, with applications in artificial general intelligence. We also want to develop the theory of singular dynamical systems with generalized functions and general inverse function theorems for singular PDE.
  - In this project I am the postdoc supervisor of S. Nugraheni at the University of Vienna.
  - The project funding is of 488'000 Euro.

- August 2020 - July 2024: project leader of FWF stand alone research project *Functional analysis of infinite bounded operators*. Co-applicants and collaborators of the project are Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria) and Prof. H. Vernaeve (Dep. of Mathematics, University of Ghent, Belgium).
  - The three years project aims at showing the flexibility of a non-Archimedean framework in strongly extending classical results of functional analysis using a simpler setting, and in applications to singular PDE and QM.
  - In this project I am the Ph.D. supervisor of D.E. Kebiche at the University of Vienna.
  - The project funding is of 407'000 Euro.

- February 2021 - January 2024: project leader of FWF stand alone research project *Applications of generalized smooth functions*. Co-applicant and collaborator of the project is Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - In the three years project we study the Pontryagin's maximum principle of optimal control and numerical visualization tools for generalized smooth functions.
  - In this project I am the Ph.D. supervisor of K. Islami and supervisor of post-doc A. Bryzgalow at the University of Vienna.
  - The project funding is of 210'000 Euro.

- August 2021 - July 2024: project leader of FWF stand alone research project *Fourier transforms and Cauchy-Kowalevski theorem for generalized smooth functions*. Co-applicant and collaborator of the project is Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - In the one year project we finish the study of hyperfinite and classical Fourier transforms and prove the Cauchy-Kowalevski theorem for generalized smooth functions and a large class of Schwartz distributions.
  - The project funding is of 82'000 Euro and aims to complete the PhD studies of A. Mukhammadiev and D. Tiwari.

- October 2021 - September 2024: PhD supervisor of S. Nugraheni at the Faculty of Mathematics of the University of Vienna in the framework of Ernst Mach Grant - ASEA-UNINET scholarship *Solving PDE with infinite bounded operators* (40'000 Euro). Co-supervisor Prof. M. Kunzinger.

- August 2017 - July 2021: project leader of FWF stand alone research project *Hyperfinite methods for generalized smooth functions*, Wolfgang Pauli Institute, Vienna. Co-applicant and collaborator of the project is Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - The three years project concerned the study of hyperfinite methods for generalized functions, the proof of general theorems for the solutions of singular nonlinear PDE and the study of a Fourier transform that applies to every generalized function (not only to those of tempered type).

  - In this project I was the Ph.D. supervisor of A. Mukhammadiev and D. Tiwari at the University of Vienna.
  - The project funding is of 397'000 Euro.

- December 2012 - May 2016: project leader of FWF stand alone research project *Analysis and Geometry based on generalized numbers*, Dep. of Mathematics, University of Vienna. Co-applicant and collaborator of the project is Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - The four years project concerned the development of a new theory of generalized functions as set-theoretical maps on a non-Archimedean ring of generalized numbers. These generalized functions extend Schwartz distributions but are closed with respect to composition.
  - The project funding was of 321'000 Euro.

- June 2013 - May 2016: project leader of FWF stand alone research project *Non-Archimedean Geometry and Analysis*, Dep. of Mathematics, University of Vienna (AT). Co-applicants of the project: Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria) and Prof. V. Benci (Dep. of Mathematics, University of Pisa, Italy).
  - The three years project concerned the development of the theory of Fermat reals for the study of non-normable infinite dimensional spaces and its applications, as well as the relationships with other branches of Non-Archimedean analysis.
  - In this project I supervised two senior post-docs: L. Luperi Baglini (at present, he is associate professor at the University of Milan) and E. Wu (at present, he is professor at Shantou University, CN).
  - The project funding was of 349'000 Euro.

- October 2010 - September 2012: project leader of the research project *Nilpotent Infinitesimals and Generalized Functions*, Dep. of Mathematics, University of Vienna, supported by an FWF Lise Meitner grant. Co-applicant of the project: Prof. M. Kunzinger (Dep. of Mathematics, University of Vienna, Austria).
  - The project concerned the application of non-Archimedean analysis to generalized functions.
  - The project funding was of 115'200 Euro.

- June 2006 - July 2009: director, together with A. Vancheri, of the research project *Supporto alle decisioni basato su modello matematico per il problema dei "grandi generatori di traffico"*, Dep. of Mathematics, University of Italian Switzerland.
  - The project funding from Canton Ticino's administration was of 89'577 Euro.

- February 2005 - June 2009: director of the European Commission research project (Marie Curie reintegration grant MERG-CT-2005-014906) *Continuum State Cellular Automata and Random Equations*, Dep. of Mathematics, University of Italian Switzerland.
  - The project funding was of 40'000 Euro.

- March 2002 - February 2004: Marie Curie individual fellowship of the European Commission HPMF-CT-2002-01792, *A new approach to differential geometry of spaces of mappings and its applications,* Institute of Applied Mathematics, University of Bonn.
  - The project funding was of 140'200 Euro.

- June 2001 - November 2001: DAAD (Deutscher Akademischer Austausch Dienst, German academic exchange service) fellowship at the Dep. of Mathematics of the University of Bonn.

Research activities as co-director

- May 2007 - December 2009: co-director of the SNSF research project *Effects of Neighborhood Choice on Housing Markets: a model based on the interaction between microsimulations and revealed/stated preference modeling*, Dep. of Mathematics, Accademia di architettura, University of Italian Switzerland (CH). Director of the project: Prof. Dr. R. Maggi, Istituto di Ricerche Economiche, University of Italian Switzerland.

  - In this context I was PhD co-advisor of M. Esmaeili.
  - The project funding was of 241'650 Chf.

- September 2006 - December 2009: co-director of the Swiss National Science Foundation research project *Mathematical modeling of on-line communities*, Dep. of Mathematics, University of Italian Switzerland. Director of the project: Prof. Dr. A. Vancheri.
  - In this context I was PhD co-advisor of G.L. Ciampaglia (at present, he is professor at University of South Florida).
  - The project funding was of 120'800 Chf.

Main invited lectures

1. Main speaker at the workshop "Explainable and sustainable artificial intelligence", Universitas Gadjah Mada, 20.10.2025 - 24.10.2025

2. Plenary speaker at the conference "Toposes in Mondovì 2024" organized by O. Caramello, A. Connes and L. Lafforgue, September 2024. Title: "The Grothendieck topos of generalized smooth functions".

3. Invited speaker at the conference "Building-up Differential Homotopy Theory at Osaka", March 2024. Three talks with titles: "A conceptual introduction to Schwartz distributions and Colombeau generalized functions", "How to deal with continuous functions as if they were smooth: Generalized smooth functions", and "Ideas about the Grothendieck topos of generalized smooth functions".

4. Plenary speaker at the conference 9th SEAMS-UGM 2023, International Conference on Mathematics and Its Applications. Title: "Artificial general intelligence based on mathematical theory of complex systems".

5. Invited speaker at the conference 9th SEAMS-UGM 2023, International Conference on Mathematics and Its Applications. Title: "Generalized smooth functions for nonlinear singular PDE".

6. Plenary speaker at the conference "Generalized Functions 2022", September 2022. Title: "Consequences of neglecting infinitesimals (and infinities) from mathematics".

7. Invited speaker at the "Seminario di Analisi Matematica", Dipartimento di Matematica *Federigo Enriques*, Università degli Studi di Milano, January 2020. Title: "A Grothendieck topos of generalized functions".

8. Invited speaker at the "Seminario di Logica Matematica", Dipartimento di Matematica *Federigo Enriques*, Università degli Studi di Milano, January 2020. Title: "A universal mathematical theory of complex systems".

9. Invited speaker at the conference "Souriau 2019", May 27-31 2019, Paris-Diderot University; title: "The Grothendieck topos of generalized functions".

10. Invited talk at Institute for Scientific Interchange (ISI), Turin, 30 November 2016, "MaTryCS - A mathematical theory of complex systems".

11. Invited plenary lecture at the conference "Algebra, Geometry and Mathematical Physics", Brno, Czech Republic, September 12-14, 2012; title: "Infinitesimal without Logic".

12. Invited talks at the University of Pisa, January 21, 2015: title: "Generalized smooth functions", "Fermat reals".

13. Invited opening talk at the workshop "Workshop on diffeologies etc", Aix en Provence, France, June 25 - 27, 2014. Title: "Theory of infinitely near points in smooth manifolds: the Fermat functor".

Reviewing activities

I am reviewer for: ERC Synergy, Acta Mathematica, Transaction of the American Mathematical Society, Proceedings of the American Mathematical Society, American Mathematical Monthly, Journal of the London Mathematical Society, Nonlinearity, Monatshefte für Mathematik, Integral Transforms and Special Functions, Asymptotic analysis, Topology proceedings, São Paulo Journal of Mathematical Sciences, Arabian Journal of Mathematics, Commentationes Mathematicae Universitatis Carolinae, Novi Sad Journal of Mathematics, International Journal of Applied Mathematics and Computer Science, Advances in Complex Systems, Environmental modelling and software, Physics Letters A.

Teaching activities

- 2024 - 2025: online teaching of *Introduction to complex systems modelling* at Universitas Gadjah Mada, Indonesia. The course is addressed to professors, researchers, postdoc and master students.
- 2021 - present: Ph.D. supervisor of 3 students and 1 post-doc at the Faculty of Mathematics, University of Vienna, AT.
- 2018 - 2022: Ph.D. supervisor of 2 students at the Faculty of Mathematics, University of Vienna, AT.
- 2012 - 2015: research supervisor of 2 senior post-docs, Faculty of Mathematics, University of Vienna, AT.
- 2010 - 2014: teaching of the 1st year master course *Metodi quantitativi per l'analisi del territorio*, Accademia di architettura di Mendrisio, University of Italian Switzerland.
- 2009: co-teaching of the 1st year master course *Metodi quantitativi per l'analisi del territorio*, Accademia di architettura di Mendrisio, University of Italian Switzerland, together with A. Vancheri.
- 2006 - 2009: Ph.D. co-advisor of M. Esmaeili and G.L. Ciampaglia.
- 2004 - 2005: lecturer of the courses MATLAB I and Probability I for the researchers of the SNSF research project *Mathematical modeling of urban growth processes: a cellular automata and statistical mechanical based approach.*
- 1999: lecturer of the course *Programming language MATLAB* at the Politecnico di Milano, Italy, Mechanics and Aeronautics Engineering courses.
- 1999 - 2003: teaching assistant, Dep. of Mathematics, Università della Svizzera Italiana.
- 1997 - 1999: lecturer of the 1st year course of Mathematics, Dep. of Economics of the II facoltà di Economia di Novara, Italy.

Publications

In my publications, where my name appears as the last one, I proposed and supervised the majority of ideas as well as actively contributed in developing them.
All the following publications have been peer-reviewed and listed in ISI Web of Science, Scopus or DOAJ. Non indexed publications are: 25, 28, 29, 38.
For the links to these publications, see my home page: www.mat.univie.ac.at/~giordap7/

1. Center for AI Safety., Scale AI. & P. Giordano as member of the HLE Contributors Consortium. A benchmark of expert-level academic questions to assess AI capabilities. Nature 649, 1139–1146 (2026). https://doi.org/10.1038/s41586-025-09962-4
2. Nugraheni, S., Giordano, P., Dirac delta as a generalized holomorphic function. Nonlinear Analysis, Volume 262, 2026, 113921.
3. Phan, L., Gatti, A., Han, Z., Li, N., Giordano, P. (Dataset Contributor) Humanity's Last Exam. SuperIntelligence - Robotics - Safety & Alignment, 2(1), 2025.

4. Giordano, P., Luperi Baglini, L., Beyond Cauchy-Kowalewsky: a Picard-Lindelöf theorem for PDE. Journal of Fixed Point Theory and Applications, April 2025.

5. Kebiche, D., Giordano, P., Universal properties of spaces of generalized functions. Journal of Mathematical Analysis and Applications, Volume 551, Issue 2, Part 1, 15 November 2025, 129687.

6. Bryzgalov, A., Islami, K., Giordano, P., Infinitesimal and infinite numbers in applied mathematics. Nonlinear Dynamics, (2024) 112:20573–20609, https://doi.org/10.1007/s11071-024-10223-8

7. Giordano, P., Kunzinger, M., Vernaeve, H., A Grothendieck topos of generalized functions I: basic theory. Dissertationes Mathematicae, 592 (2024), 74 pp. DOI: 10.4064/dm230920-7-3.

8. Nugraheni, S., Giordano, P., Generalized holomophich functions: sketches of a new theory. To appear in the volume "Women is Analysis and PDE", series "Research Perspectives Ghent Analysis and PDE Center", Birkhäuser, 2023.

9. Mukhammadiev, A., Tiwari, D., Giordano, P., A Fourier transform for all generalized functions, 2023. Accepted in Dissertationes Mathematicae, 2023.

10. Tiwari, D., Mukhammadiev, A., Giordano, P., Hyper-power series and generalized real analytic functions, 2023. Monatshefte für Mathematik.
https://doi.org/10.1007/s00605-023-01849-8.

11. Tiwari, D., Giordano, P., Hyperseries of Colombeau generalized numbers, 2021. Monatshefte für Mathematik 197, 193–223 (2022).
https://doi.org/10.1007/s00605-021-01647-0

12. Gastão, S.F., Giordano, P., Bryzgalov, A., Lazo, M.J., Calculus of variations and optimal control for generalized functions. Nonlinear Analysis, Vol. 216, 2022.
https://doi.org/10.1016/j.na.2021.112718

13. Mukhammadiev A., Tiwari D., Apaaboah G., Giordano P., Supremum, infimum and hyperlimits in the non-Archimedean ring of Colombeau generalized numbers. Monatshefte für Mathematik, 2021.
https://doi.org/10.1007/s00605-021-01590-0

14. Giordano P., Kunzinger M., A convenient notion of compact set for generalized functions. Proceedings of the Edinburgh Mathematical Society, Volume 61, Issue 1 February 2018 , pp. 57-92, 2018. DOI: https://doi.org/10.1017/S0013091516000559

15. Lecke A., Luperi Baglini L., Giordano P., The classical theory of calculus of variations for generalized functions. Advances in Nonlinear Analysis, Vol. 8, Issue 1, 2017. DOI: https://doi.org/10.1515/anona-2017-0150.

16. Luperi Baglini L., Giordano P., The category of Colombeau algebras. Monatshefte für Mathematik, 2017, Volume 182, Issue 3, pp. 649–674, 2017. DOI https://doi.org/10.1007/s00605-016-0990-1.

17. Giordano P., Kunzinger M., Inverse Function Theorems for Generalized Smooth Functions. In: Oberguggenberger M., Toft J., Vindas J., Wahlberg P. (eds) Generalized Functions and Fourier Analysis. Operator Theory: Advances and Applications, vol 260. Birkhäuser, Cham, 2017. DOI: https://doi.org/10.1007/978-3-319-51911-1_7

18. Giordano P., Wu E., Calculus in the ring of Fermat reals. Part I: Integral calculus. Advances in Mathematics, Vol. 289, pp. 888–927, 2016. DOI: https://doi.org/10.1016/j.aim.2015.11.021

19. Giordano P., Luperi Baglini L., Asymptotic gauges: Generalization of Colombeau type algebras. Math. Nachr. Volume 289, Issue 2-3, pages 247–274, 2016. DOI: https://doi.org/10.1002/mana.201400278

20. Giordano P., Nigsch E., Unifying order structures for Colombeau algebras. Math. Nachr. 288, No. 11–12, 1286–1302, 2015. DOI https://doi.org/10.1002/mana.201400277

21. Giordano P., Wu E., Categorical framework for generalized functions. Arabian Journal of Mathematics, Volume 4, Issue 4, pp 301–328, 2015. DOI: https://doi.org/10.1007/s40065-015-0126-9

22. Giordano P., Kunzinger M., Vernaeve H., Strongly internal sets and generalized smooth functions. Journal of Mathematical Analysis and Applications, volume 422, issue 1, 2015, pp. 56-71.
DOI: https://doi.org/10.1016/j.jmaa.2014.08.036

23. Vancheri A., Giordano P., Andrey D., Fuzzy logic based modeling of traffic flows induced by regional shopping malls. Advances in Complex Systems Vol. 17, N. 3 & 4, 2014, (39 pages).
DOI: https://doi.org/10.1142/S0219525914500179

24. Giordano P., Caputo P., Vancheri A., Fuzzy evaluation of heterogeneous quantities: measuring urban ecological efficiency. Ecological Modelling 288, 2014, pp. 112–126.
DOI: https://doi.org/10.1016/j.ecolmodel.2014.06.001

25. Giordano P., Which numbers simplify your problem?. Invited contribution for the volume: Mathematics without boundaries: surveys in pure mathematics. T. Rassias and P. Pardalos (Eds.), Springer 2014, XIII, pp. 181-220. See www.springer.com/mathematics/analysis/book/978-1-4939-1105-9

26. Giordano P., Fermat reals: infinitesimals without Logic. Miskolc Mathematical Notes, Vol. 14 (2013), No. 2, pp. 407–422. DOI: https://doi.org/10.18514/MMN.2013.902

27. Giordano P., Kunzinger M., New topologies on Colombeau generalized numbers and the Fermat-Reyes theorem. Journal of Mathematical Analysis and Applications, Vol. 399, Issue 1, pp. 229–238, 2013.
DOI: https://doi.org/10.1016/j.jmaa.2012.10.005

28. Vancheri A., Giordano P., Caputo P., A 2009 European index of urban metabolism efficiency, in A new urban metabolism, J.A. Acebillo, A. Martinelli (eds), Actar, 2013. See searchworks.stanford.edu/view/10196912

29. Esmaeili M., Vancheri A., Giordano P., Modeling housing market dynamics using a multi-agent simulation of participants' cognitive behavior. In L. Diappi (editor) Emergent phenomena in housing markets: gentrification, housing search, polarization. Physica-Verlag, 2012, pp. 43-83.
See www.springer.com/economics/regional+science/book/978-3-7908-2863-4

30. Giordano P., Kunzinger M., Topological and algebraic structures on the ring of Fermat reals. Israel Journal of Mathematics, January 2013, Volume 193, Issue 1, pp. 459-505. DOI: https://doi.org/10.1007/s11856-012-0079-z

31. Giordano P., Fermat-Reyes method in the ring of Fermat reals. Advances in Mathematics 228, pp. 862-893, 2011. DOI: https://doi.org/10.1016/j.aim.2011.06.008

32. Giordano P., Infinite dimensional spaces and Cartesian closedness. Journal of Mathematical Physics, Analysis, Geometry, vol. 7, No. 3, pp. 225-284, 2011.
See www.mathnet.ru/php/archive.phtml?wshow=paper&jrnid=jmag&paperid=514&option_lang=eng

33. Giordano P., The ring of fermat reals, Advances in Mathematics 225 (2010), pp. 2050-2075.
DOI: https://doi.org/10.1016/j.aim.2010.04.010

34. Giordano P., Infinitesimals without logic, Russian Journal of Mathematical Physics, 17(2), pp.159-191, 2010.
DOI: https://doi.org/10.1134/S1061920810020032

35. Esmaeili M., Vancheri A., Giordano P., Mathematical and Computational Modeling of Housing Market Dynamics. Systems Conference, 2010 4th Annual IEEE, pp. 29 - 34, 2010.
DOI: https://doi.org/10.1109/SYSTEMS.2010.5482468

36. Vancheri A., Giordano P., Andrey D., Albeverio S., A model for urban growth processes with continuous state cellular automata, multi-agents and related differential equation. Part 1: Theory. Environment and Planning B: Planning and Design 2008, volume 35, issue 4, pages 723-739. DOI: https://doi.org/10.1068/b31080a

37. Vancheri A., Andrey D., Giordano P., Albeverio S., A model for urban growth processes with continuous state cellular automata, multi-agents and related differential equation. Part 2: Computer Simulations. Environment and Planning B: Planning and Design 2008, volume 35, pages 863-880. DOI: https://doi.org/10.1068/b31080b

38. Albeverio S., Giordano P., Minazzi F., Introduzione a Matematica e Filosofia, il problema dei fondamenti oggi. Atti del convegno di Mendrisio, 16 novembre 2001. PRISTEM/Storia 14-15, 2006. See matematica-old.unibocconi.it/pubblicazioni/notestoria14-15.htm

39. Giordano P., Infinitesimal Differential Geometry, Acta Mathematica Universitatis Comenianae, 2004, LXIII, 2, pp. 235-278. See www.emis.de/journals/AMUC/_vol-73/_no_2/_giordano/giordano.html

40. Giordano P., Nilpotent infinitesimals and synthetic differential geometry in classical logic. In Berger, Osswald, and Schuster, editors, "Reuniting the Antipodes - Constructive and Nonstandard Views of the Continuum". Peer reviewed conference paper: see proceedings of the Symposion in Venice, May 17-22, 1999. Vol. 306 of Synthese Library, Kluwer Academic Publishers, Dordrecht, 2001, pp. 75-92. DOI 10.1007/978-94-015-9757-9_7

41. Bussotti F., Ferretti M., Giordano P. and Mazzali C., A synthetic index to estimate tree condition in the Permanent Monitoring Plots of the CONECOFOR programme, Annali dell'Istituto Sperimentale per la Selvicoltura, volume 30, pp. 67-72, 1999.
See www.corpoforestale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/D.c8dc2e20c6ec76375728/P/BLOB%3AID%3D1017

42. Ferretti M., Giordano P. and Mazzali C., Methods of analysis of the Integrated and Combined (I&C) evaluation system. Annali dell'Istituto Sperimentale per la Selvicoltura, volume 30, pp. 33-42, 1999.
See www.corpoforestale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/D.c8dc2e20c6ec76375728/P/BLOB%3AID%3D1017

43. Ferretti M., Giordano P. and Mazzali C., Definitions of risk, status and changes in the Permanent Monitoring Plots in Italy – A preliminary attempt. Annali dell'Istituto Sperimentale per la Selvicoltura, volume 30, pp. 135-149, 1999.
See www.corpoforestale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/D.c8dc2e20c6ec76375728/P/BLOB%3AID%3D1017

44. Ferretti M., F. Alianiello, S. Allavena, T. Amoriello, E. Amorini, F.A. Biondi, A. Buffoni, F. Bussotti, G. Campetella, R. Canullo, A. Costantini, A. Cutini, G. Fabbio, C. Ferrari, P. Giordano, E. Magnani, A. Marchetto, G. Matteucci, C. Mazzali, G. Mecella, R. Mosello, R. Nibbi, B. Petriccione, E. Pompei, F. Riguzzi, G. Scarascia-Mugnozza, M. Tita, The Integrated and Combined (I&C) Evaluation System – Achievements, Problems and Perspectives. Annali dell'Istituto Sperimentale per la Selvicoltura, volume 30, pp. 151-156, 1999.
See www.corpoforestale.it/flex/cm/pages/ServeAttachment.php/L/IT/D/D.c8dc2e20c6ec76375728/P/BLOB%3AID%3D1017

Books

1. Albeverio S., Andrey D., Giordano P., Vancheri A. (Eds.) (2007) *The Dynamics of Complex Urban Systems. An Interdisciplinary Approach.* Springer, Berlin Heidelberg New York. Proceedings of the conference held in Monte Verità (Ascona) 4-6 November 2004, 350 pages, Physica-Verlag Heidelberg.

2. Albeverio S., Giordano P., Vancheri A. (2021) *Metodi e modelli matematici per le dinamiche urbane.* Unitext series of Springer Verlag Italy.

Contributions to conferences and invited lectures

1. Main speaker at the workshop "Explainable and sustainable artificial intelligence", Universitas Gadjah Mada, 20.10.2025 - 24.10.2025.

2. Invited speaker at the Department of Mathematics, Universitas Gadjah Mada, October 2025. Titles: "Generalized smooth functions", "Functional analysis and its role in various disciplines", "Fuzzy logic based modeling of traffic flows induced by regional shopping malls".

3. Plenary speaker at the conference "Toposes in Mondovì 2024" organized by O. Caramello, A. Connes and L. Lafforgue, September 2024. Title: "The Grothendieck topos of generalized smooth functions".

4. Invited speaker at the conference "Building-up Differential Homotopy Theory at Osaka", March 2024. Three talks with titles: "A conceptual introduction to Schwartz distributions and Colombeau generalized functions", "How to deal with continuous functions as if they were smooth: Generalized smooth functions", and "Ideas about the Grothendieck topos of generalized smooth functions".

5. Invited speaker at the online series "Diffeology seminars". Title: "How to deal with continuous functions as if they were smooth: generalized smooth functions", 2023. See https://diffeology.net/index.php/seminar/

6. Speaker at the "Seminari di Matematica Applicata", Dipartimento di Matematica, Università di Pavia, April 2022; title: "The Picard-Lindelöf theorem for smooth singular PDE"

7. Speaker at the conference "ISAAC 2021", August 2021, Ghent University; title: "The Picard-Lindelöf theorem for smooth PDE".

8. Speaker at the conference "GF 2020", September 2020, Ghent University; title: "Recent results in generalized smooth functions theory".

9. Invited speaker at the "Seminario di Analisi Matematica", Dipartimento di Matematica *Federigo Enriques*, Università degli Studi di Milano, January 2020.

10. Invited speaker at the "Seminario di Logica Matematica", Dipartimento di Matematica *Federigo Enriques*, Università degli Studi di Milano, January 2020.

11. Invited speaker at the conference "Souriau 2019", May 27-31 2019, Paris-Diderot University; title: "The Grothendieck topos of generalized functions".

12. Speaker at the conference "MLFTA 18", University of Torino, July 2018; title: "The Grothendieck topos of generalized functions".

13. Speaker at the conference "ISAAC 2017", Linnaeus University (Sweden), August 2017; title: "A Picard-Lindelöf theorem for singular nonlinear PDE".

14. Invited talk at Institute for Scientific Interchange (ISI), Turin, 30 November 2016, "MaTryCS - A mathematical theory of complex systems".

15. Speaker at the workshop WING 2016, June 29 – July 3, 2016, University of Innsbruck, Austria. Title: "Some ideas on generalized smooth functions".

16. Invited speaker at the "Mini-workshop sulle matematiche non-Archimedee", University of Pisa, January 22, 2015: title: "Reali di Fermat".

17. Invited talk at the University of Pisa, January 21, 2015: title: "Funzioni lisce generalizzate".

18. Speaker at the conference "Generalized Functions 2014", Southampton, UK, September 8 - 12, 2014. Title: "Unifying order structures for Colombeau algebras".

19. Invited talk at the conference "13th International Conference on p-adic Functional Analysis", Paderborn, Germany, August 12–16, 2014. Title: "Theory of infinitely near points in smooth manifolds: the Fermat functor".

20. Invited opening talk at the workshop "Workshop on diffeologies etc", Aix en Provence, France, June 25 - 27, 2014. Title: "Theory of infinitely near points in smooth manifolds: the Fermat functor".

21. Speaker at the conference "18th ÖMG Congress and Annual DMV Meeting", Innsbruck, September 23 – 27, 2013; title: "Theory of infinitely near points in smooth manifolds: the Fermat functor".

22. Invited speaker at the University of Bonn, May 28, 2013; title: "Generalized functions as a category of smooth set-theoretical maps".

23. Speaker at the conference "9th International ISAAC Congress", August 5-9, 2013, Krakow, Poland; title: "Generalized functions as a category of smooth set-theoretical maps".

24. Speaker at the conference "XXII St. Petersburg Summer Meeting in Mathematical Analysis", St. Petersburg, Russia, June 25-30, 2013; title: "Generalized functions as a category of smooth set-theoretical maps".

25. Invited plenary lecture at the conference "Algebra, Geometry and Mathematical Physics", Brno, Czech Republic, September 12-14, 2012; title: "Infinitesimal without Logic".

26. Speaker at the conference "PDE, Microlocal and Time-frequency Analysis", Novi Sad, Serbia, September 3-8, 2012; title: "Generalized functions as a category of smooth set-theoretical maps".

27. Speaker at the conference "Mathematical Logic and General Topology", Novi Sad, Serbia, September 5-8, 2012; title: "Ultrafilter sets smaller than their complements".

28. Speaker at the conference "XVII Geometrical Seminar", Zlatibor, Serbia, September 3-8, 2012; title: "Theory of infinitely near points in smooth manifolds: the Fermat functor".

29. Invited speaker at the symposium "Theories of Continua: Logical and Philosophical Reflections" as part of the 14th *Congress of Logic, Methodology and Philosophy of Science* in Nancy, France, July 2011; title: "Knowledge comes from the dialectic between two worlds: the case of Fermat reals".

30. Speaker at the conference "Generalized functions 2011", Fort de France, Martinique, April 2011; Title: "Interacting worlds: transfer of ideas from Fermat ring to Colombeau's ring".

31. Invited lecturer at the course "Metodi matematici per la progettazione" of Prof. E. Marchetti, Polytechnic of Milan. Title: "Evidence based design: ovvero le interazioni tra matematica e urbanistica". Milan, December 2009.

32. Speaker at the conference "Logic and Mathematics", York, August 2009; title: "Fermat reals: An example of dialogue between formalism and intuition".

33. Invited speaker at the colloquium of the Interdiziplinäre Zentrum für Komplexe Systeme (IZKS, Bonn, Germany), June 2009; title: "Dynamics of cities: A mathematical planning tool for shopping malls".

34. Invited speaker at the conference "INPUT08", Lecco, March 2009; title: "Planning of a complex system: the problem of big traffic generators".

35. Invited lecturer at the course "Metodi matematici per la progettazione" of Prof. E. Marchetti, Polytechnic of Milan. Title: "Matematica dei sistemi complessi e decisioni in urbanistica". Milan, November 2008.

36. Invited speaker at the conference "S4 modeling tour", Milan, April 2008; title: "Interaction Spaces: a language for the collaboration between MAS and hard sciences".

37. Speaker at the conference "Innovation for Sustainable Production 2008", i-SUP 2008, April, 22-25, 2008, Bruges, Belgium; title: "A mathematical model of complex mobility patterns for big traffic generators competition and sustainability".

38. Invited speaker at the conference VIIth AESOP workshop, Thematic Group on Planning and Complexity, Milan, 22 - 23 February 2008; title: "Interaction Spaces Theory: modeling complex systems with the details of MAS and the mathematics of Synergetics".

39. Invited lecturer at the course "Metodi matematici per la progettazione" of Prof. M.S. Vianello, Polytechnic of Milan. Title: "Supporto alle decisioni in urbanistica mediante modello matematico". Milan, November 2006.

40. Invited speaker at the conference "Systemic approach and microscale urban complexity", February 2006; title: "Interaction Spaces: cellular automata + multi-agents models with sound mathematical properties".

41. Invited speaker at the conference "Herbsttagung Schweizerische Mathematische Gesellschaft", Lugano, 22-24 September 2005; title: "A mathematical model of urban systems".

42. Speaker at the conference "Computer in Urban Planning and Urban Management", London, July 2005; title: "Continuous valued cellular automata and decision processes of agents for urban dynamics".

43. Invited speaker at the Bonn International Graduate School seminars, July 2003; title: "Infinitesimal Differential Geometry".

44. Invited speaker at the conference "I numeri infinitesimi – Aspetti storici, filosofici, scientifici e didattici di una grande controversia", Pisa November 2002; title: "Infinitesimi nilpotenti: metodo e creatività".

45. Invited speaker at the Institute of Applied Mathematics of Bonn in October 2002, title "Differential geometry in spaces of mappings".

46. Invited speaker at the conference "NSA 2002", satellite conference of the meeting UMI-AMS, Pisa, June 2002. Title "'Standard infinitesimals': actual nilpotent infinitesimals in standard analysis".

47. Invited speaker at the University of Trento (I), March 2001. Title: "Geometria Differenziale con infinitesimi nilpotenti".

48. Speaker at the conference "Quantitative methods for applied sciences" Siena, June 2000. Title: "Quantifying changes in ecosystem status as measured by multiple indicators".

49. Invited speaker at the "Workshop multitematico in Fisica e Matematica", 9th September 2000, CERFIM Locarno (CH). Title: "Nilpotent infinitesimals in differential geometry, analysis and physics".

50. Invited speaker at the Institute of Applied Mathematics of Bonn in June 1999, title "Nilpotent infinitesimals in infinite dimensional differential geometry".

51. Speaker at the conference "Reuniting the antipodes: constructive and non-standard views of the continuum", Venice, 17-23 May 1999, title "Nilpotent infinitesimals and Synthetic Differential Geometry in classical logic".

52. Speaker at the conference "Non-standard Analysis and Related Methods" (Oberwolfach, Germany), February 1999, title "An extension of the hyperreals with nilpotent infinitesimals".