

Gioia CARINCI

Curriculum Vitae

PERSONAL INFORMATION

Surname: Carinci
Name: Gioia
Date of birth: 17-02-1982
Nationality: Italian
Research Identifier: **Gioia Carinci - ORCID: 0000-0002-8364-5896**

CURRENT POSITION

Nov 2022 - present: Associate Professor of Probability at:
Department of Physics, Informatics and Mathematics
University of Modena and Reggio Emilia

NATIONAL SCIENTIFIC ABILITATION

- 2018, Abilitazione Scientifica Nazionale alle funzioni di professore di II fascia – settore concorsuale 01/A4 – FISICA MATEMATICA con validità dal 13/07/2018 al 13/07/2028.
<https://asn16.cineca.it/pubblico/miur/esito-abilitato/01%252FA4/2/5>
- 2018, Abilitazione Scientifica Nazionale alle funzioni di professore di II fascia – settore concorsuale 01/A3 – ANALISI MATEMATICA, PROBABILITÀ E STATISTICA MATEMATICA con validità dal 27/07/2018 al 27/07/2028.
<https://asn16.cineca.it/pubblico/miur/esito-abilitato/01%252FA3/2/5>

ACADEMIC EDUCATION AND DEGREES

- Ph.D. in Mathematics
July 2010, Department of Mathematics, L'Aquila University (Italy)
PhD Supervisor: Errico Presutti
Thesis Title: *Stochastic effects in critical regimes*
- Master Degree in Mathematics
July 2006, Department of Mathematics, L'Aquila University (Italy)
Grade: 110/110 *cum laude*
Supervisor: Anna De Masi
Thesis Title: *A variational study of nucleation problems and interface dynamics*
- Bachelor's Degree in Mathematics
April 2004, Department of Mathematics, L'Aquila University (Italy)
Grade: 110/110 *cum laude*
Supervisor: Antonella Marini

PREVIOUS POSITIONS

Nov 2019 - Oct 2022: RTD-B (Tenure-Track Assistant Professor) of Probability at:
Department of Physics, Informatics and Mathematics
University of Modena and Reggio Emilia

Oct 2015 - Oct 2019: Assistant Professor of Probability at:
Department of Applied Mathematics
Delft University of Technology

Feb 2012 - Sep 2015: Postdoc Fellow (Assegnista di Ricerca) at:
Department of Physics, Informatics and Mathematics
University of Modena and Reggio Emilia

Feb 2011 - Jan 2012: Borsa di Ricerca e Formazione avanzata,
Department of Mathematics
University of Modena and Reggio Emilia

Oct - Dec 2010: Visiting scholar at
LATP, *Laboratoire d'Analyse Topologie et Probabilités*
Aix Marseille University

LANGUAGES

Italian (mother tongue), English (fluent - C1 IELTS Qualification), French (basic)

INTERNATIONAL ACTIVITIES

MEDIUM-TERM RESEARCH VISITS

Over the past years I have made several medium-term international research visits.

- Feb 2025:** *Universidad de Buenos Aires (UBA) - Argentina*
collaboration with Pablo Ferrari
- Jan - Feb 2020:** *CPHT – Ecole Polytechnique - Palaiseau Cedex - France*
collaboration with J. René Chazottes
- Feb 2019:** *GSSI – Gran Sasso Science Institute - L’Aquila*
collaboration with Errico Presutti
- June - July 2017:** *IHP - Institut Henri Poincaré - Paris - France*
Trimester Program : Stochastic Dynamics out of Equilibrium
- Jan - Mar 2015:** *IHP - Institut Henri Poincaré - Paris - France*
Trimester Program : Disordered systems, random spatial processes
and some applications
- Mar - May 2014:** *Delft University of Technology - The Netherlands*
collaboration with Frank Redig
- Apr 2013:** *Delft University of Technology - The Netherlands*
collaboration with Frank Redig
- Jul-Aug 2012:** *HIM - Hausdorff Research Institute for Mathematics - Bonn - Germany*
collaboration with Stephan Luckhaus
- Apr-May 2011:** *University of Nijmegen - The Netherlands*
collaboration with Frank Redig
- Oct-Dec 2010:** *LATP - Laboratoire d’Analyse Topologie et Probabilités*
Université Aix Marseille - France
collaboration with Pierre Picco
- May-Jul 2009:** *MPI - Max Plank Institute - Leipzig - Germany*
collaboration with Stephan Luckhaus

INVITED PRESENTATIONS

Since 2007 I gave several invited lectures at international conferences, workshops and summer schools.

- **Invited Seminars at Workshops and Conferences:**

- Oct 2026, ”Two and a Half Decades of the Macroscopic Fluctuation Theory”, ICTS-TIFR, Bangalore, India
- Aug 2026, Random Interacting Systems, StatMech Summer School 2026, Padova
- Aug 2026, Frontiers in Interacting Particle Systems and Statistical Physics, Delft, The Netherlands

- June 2026, Particle Systems and PDEs XIV, Toulouse, France
- Sept 2025, "A special day in Statistical Mechanics and beyond: remembering Errico Presutti", CNR, Roma
- Aug 2024, XXVII Brazilian School of Probability, Salvador de Bahia, Brasil
- June 2024, 4th Italian Meeting on Probability and Mathematical Statistics, Rome
- Dec 2022, Workshop: Recent Developments in Stochastic Duality, Eurandom, Eindhoven, The Netherlands
- June 2022, Third Italian Meeting on Probability and Mathematical Statistics, Bologna
- July 2021, Bernoulli-IMS 10th World Congress in Probability and Statistics, Organized Session 04: Interacting Particle Systems and Inclusion Process, Seoul
- Apr 2021, Probability and Stochastic Analysis Seminar, Lisbon, (Joint session with Seminário Brasileiro de Probabilidade, IMPA)
- May 2021, Seminars in Probability and Finance, Università degli Studi di Padova,
- Sept 2019, XXI Congresso U.M.I., Pavia
- June 2019, Seminar in PDE and Applications, Delft University of Technology, The Netherlands
- June 2019, Workshop Women in Probability, Technische Universität München, Germany
- Nov 2018, Particle Systems and PDE's VII, Palermo, Italy
- Sept 2018, Young Women in Mathematical Physics 2018, HSM Bonn, Germany
- Apr 2018, Mark Kac Seminar, Utrecht, The Netherlands
- Jan 2018, Workshop: Inhomogeneous Random Systems, IHP, Paris, France, *Particle Systems and Free Boundary Problems*
- Dec 2017, Séminaire Hypatie, Marseille, France, *Inclusion process: two particles dynamics and applications in fluctuations theory*
- July 2017, Trimester Program on *Stochastic Dynamics out of Equilibrium*, IHP, Paris, France
- Mar 2016, YEP XIII, Eurandom, Eindhoven, The Netherlands
- Sept 2015, Rencontres de Probabilités, Rouen, France
- Aug 2015, 8th ICIAM, Beijing, China
- Mar 2015, Workshop on *Interacting particle systems and non-equilibrium dynamics*, IHP, Paris, France
- Mar 2014, YEP XI, EURANDOM, Eindhoven, Netherlands
- Nov 2010, IV Workshop on Random Dynamical Systems, Bielefeld, Germany
- Sep 2009, 5th Annual PhD Student Conference in Probability, MPI, Max Planck Institute, Leipzig, Germany
- Feb 2009, Sviluppi Recenti in Fisica Matematica, University of L'Aquila.
- Sep 2007, XXXII Scuola estiva di Fisica Matematica, Ravello

• Invited Courses

- May 2019, Course on *Duality Theory and Applications*, Departamento de Matemática, Instituto Superior Técnico Lisboa, Portugal.
- Sep 2014, XXXIX Scuola estiva di Fisica Matematica, Ravello, course on *Recurrence and transience via Fourier analysis*.
- Aug 2013, XVII Brazilian School of Probability, Mambucaba, Brazil, *Stochastic Interacting Particles and Statistical Mechanics*.

In the Past years I was invited to speak in seminars in several universities such as CPHT, Ecole Polytechnique, FR; University of Reading, UK; Leiden University, NED; University of Roma Tor Vergata; University of L'Aquila, University of Padova; University of Buenos Aires, Argentina; Federal University of Rio de Janeiro, Brasil.

ORGANIZATIONAL ACTIVITY

- Dec 2025, Organization of the conference: PSPDE XIII – Particle Systems and PDE's, Modena.
- Sept 2024, Organization of the conference: PSPDE XII – Particle Systems and PDE's, Trieste.
- 2011-2015, organizer of the Mathematical Physics and Probability seminars at Modena University.
- 9-13 March 2013. Organizer of the poster-session of the Workshop: Interacting Particles Systems and Non-equilibrium Dynamics, Institut Henri Poincaré, Paris, Trimester Program: Disordered systems, random spatial processes and some applications.
- 2016-2019: organizer of the Probability and Statistics seminar series at Delft University of Technology.

MEMBERSHIPS OF SCIENTIFIC SOCIETIES

- Member of GNFM, National Group of Mathematical Physics.

MAJOR COLLABORATIONS

- Pablo Ferrari, Buenos Aires University, Chiara Franceschini, Nicola Manelli, Modena University (auction models).
- Frank Redig (duality theory and applications) and Wolter Groenewelt (algebraic approach to duality theory), Delft University of Technology.
- Errico Presutti, Anna De Masi, Davide Gabrielli, Dimitrios Tsagkarogiannis (large scale phenomena for interacting particle systems), Gran Sasso Science Institute (L'Aquila) and L'Aquila University, Italy.
- Cristian Giardinà, Claudio Giberti, Rouven Frassek, Chiara Franceschini (transport phenomena in non equilibrium statistical mechanics), Modena University, Italy.
- Tomohiro Sasamoto (duality and exact probability), Tokyo Institute of Technology, Japan.
- Jean René Chazottes (large deviation theory for Nonconventional ergodic averages), Centre de Physique Theorique, Ecole Polytechnique, France.
- Stephan Luckhaus, (stochastic effects in critical regimes), University of Leipzig and Max-Planck Institute, Germany
- Mario Ayala, (scaling limits in interacting particle systems), TU Munich, Germany.
- Simone Floreani, (duality for transport models in the continuum), University of Oxford, UK.

GRANTS

- PI of the PRIN 2022 grant "Emergence of condensation-like phenomena in interacting particle systems: kinetic and lattice models" funded by the National Recovery and Resilience Plan (NRRP), European Union – NextGenerationEU – Project code (202277WX43) – CUP (E53D23005500006) - Grant Assignment Decree No. 973 adopted on 30.06.2023 by the Italian Ministry of University and Research (MUR). Duration: September 2023 – February 2026
- PI of the research project funded by GNFM (Gruppo Nazionale Fisica Matematica, Italy): *Non-equilibrium dynamics via current reservoirs*. Duration June 2014-June 2015.

- Scholarship *Borsa Regionale per attività di ricerca e trasferimento dei risultati della R&S (POR C3/IC1E)*, funded by Regione Abruzzo. Duration 2007-2008.
- Member of the FIRB-research project *Stochastic processes in interacting particle systems: duality, metastability and their applications* coordinated by Cristian Giardinà, funded by MIUR. Duration 2012-2015.
- Member of the research project *Competitions and cooperation in biological and social systems: the statistical mechanics approach*, coordinated by Cristian Giardinà, funded by UniMoRe and Cassa di Risparmio di Modena. Duration 2010-2012.
- Member of the PRIN-research project, *Dal microscopico al macroscopico: analisi di strutture complesse e applicazioni*, coordinated by Errico Presutti, funded by MIUR. Duration 2009-2010.
- Member of the PRIN-research project, *Fenomeni di grande scala in sistemi di molte particelle e microstrutture in meccanica dei continui*, coordinated by Errico Presutti, funded by MIUR. Duration 2007-2008.
- Project *Microscopic models for Free Boundary Problems* (P.I. Gioia Carinci, year 2016) -admitted to the selection procedure for the TOP2 Research Grant, funded by NWO (Dutch Research Agency). The proposal received the assessment A+ by all referees and has been admitted to the final selection stage (interview). The project was not funded due to lack of funds.

TEACHING QUALIFICATIONS

- 2012, French Abilitation as Maitre de Conference, Sections 25 (Mathematiques).
- 2017, UTQ (University Teaching Qualification), Dutch Qualification for Academic Teaching. The achievement of UTQ is a requirement to teach in dutch univerities as Assistant Professor. The qualification must be obtained within 3 years from the recruitment.
- 2017, Education on Stage, course for the improvement of performance skills as a teacher.

SUPERVISION OF GRADUATE AND UNDERGRADUATE STUDENTS

- Tutor of the following research fellows (assegnisti di ricerca):
 - **2024-25**, Nicola Manelli, University of Modena and R. Emilia.
- Supervision of the following PhD students:
 - **2025-present**, Nicola Manelli, University of Modena and R. Emilia.
 - **2017-21**, Mario Ayala Valenzuela, Delft University of Technology (Co-supervisor).
 - **2015-17**, Chiara Franceschini, University of Modena and R. Emilia (Co-supervisor).
- Supervision of the following Master thesis:
 - **2013-14**, Co-supervision of the Master student Chiara Franceschini, University of Modena and R. Emilia.
 - **2023-24**, Supervision of the Master student Nicola Manelli, University of Modena and R. Emilia.
- Supervision of the following Bachelor thesis:
 - 2021, Sjoerd Wiarda, Delft University of Technology;
 - 2022, Agnese Zironi, University of Modena and R. Emilia;
 - 2025, Brayan Beye, University of Modena and R. Emilia.

INSTITUTIONAL RESPONSABILITIES

- **2023**, Member of the evaluation committee for admission to the XXXIX cycle of the PhD Program in Mathematics, University of Parma, Modena-Reggio Emilia, Ferrara.
- **2022-present**, Coordinator of TOLC Test and OFA Test (student admission Test) for FIM (Mathematics, Computer Science and Physics Department), University of Modena and R. Emilia.
- **2022-24**, Member of the *Research Ethics Committee of the University of Modena and R. Emilia* (“Comitato Etico per la Ricerca dell’Università degli Studi di Modena e R. Emilia”).
- **2020-present**, Member of the Council of the PhD in Mathematics of the Universities of Parma, Ferrara, Modena-Reggio Emilia.
- Member of the following PhD committees:
 - 2023, Simone Baldassarri, University of Florence;
 - 2021, Mario Ayala, Delft University of Technology;
 - 2019, Thien Thu Nguyen Dang, Gran Sasso Science Institute, L’Aquila;
 - 2017, Chiara Franceschini, University of Modena and R. Emilia.
- Member of the following Master Degree committees:
 - 2021, Beatriz Salvador, Técnico Lisboa.

EDITORIAL ACTIVITY

- Editor of the collected work “From particle systems to partial differential equations 2023-2024 editions”, edited in collaboration with Chiara Franceschini, Patricia Goncalves, Federico Sau, Ana Jacinta Soares. The work will be published in the book series *Springer Proceedings in Mathematics and Statistics*.
- Referee for several scientific journals in the fields of probability theory and statistical physics, such as: *Annals of Applied Probability*, *Annals of Probability*, *Stochastic Processes and their Applications*, *Annales de l’Institut Henri Poincaré (B) - Probability and Statistics*, *Journal of Statistical Mechanics: Theory and Experiment*, *Mathematical Physics, Analysis and Geometry*, *Electronic Journal of Probability*, *Indagationes Mathematicae*, *Methodology and Computing in Applied Probability*, *Annali dell’Università di Ferrara*, *Communications in Mathematical Physics*

TEACHING ACTIVITY

- **2020-present**: University of Modena and Reggio Emilia
 - **2025-present**: *Probability and Statistics*, Bachelor’s Degree in Computer Science
 - **2024-present**: *Theory of stochastic phenomena*, Bachelor’s Degree in Electronic Engineering
 - **2024**: *Applied Mathematics*, Bachelor’s Degree in Management Engineering
 - **2021-present**: *Duality Theory of Markov Processes*, PhD course
 - **2021- 24**: *Applied Mathematics and Statistics*, Bachelor’s Degree in Computer Engineering
 - **2021-present**: *Markov Chains*, Bachelor’s Degree in Mathematics
 - **2020-present**: *Interacting Particle Systems*, Master’s Degree in Mathematics
 - **2020**: *Computational Methods and advanced Statistics Tools*, Master’s Degree in Mechanical Engineering

- **2020:** exercises for the course *Geometry and Linear Algebra*, Bachelor's Degree in Civil and Environmental Engineering
- **2020:** exercises for the course *Analysis II*, Bachelor's Degree in Vehicle Engineering
- **2015-2019:** Delft University of Technology
 - **2018:** *Mathematical Statistical Physics*, Master's Degree in Mathematics
 - **2018:** exercises for the course *Calculus I*, Bachelor's Degree in Aerospace Engineering
 - **2017:** exercises for the course *Analysis*, Bachelor's Degree in Physics
 - **2017-19:** exercises for the course *Probability and Statistics*, Bachelor's Degree in Physics
 - **2016-19:** *Mathematics for Nanobiology* , Master's Degree in Nanobiology
 - **2016-19:** *Probability and Statistics*, Bachelor's Degree in Nanobiology
 - **2016-18:** *Probability and Statistics*, Bachelor's Degree in Aerospace Engineering
 - **2016:** exercises for the course *Probability*, Bachelor's Degree in Mathematics
- **2011-15:** University of Modena and Reggio Emilia
 - **2013-15:** *Probability and Statistics*, Bachelor's Degree in Civil and Environmental Engineering
 - **2012:** exercises for the course *Applied Mathematics and Statistics*, Bachelor's Degree in Industrial Engineering
- **2009-10:** University of L'Aquila
 - **2009-10:** exercises for the course *Stochastic Processes II*, Master's Degree in Mathematics

PUBLICATION LIST

Books:

1. Free Boundary Problems in PDEs and particle systems,
with *A.De Masi, C.Giardinà, E.Presutti*,
SpringerBriefs in Math.Phys. 2016
<http://www.springer.com/gp/book/9783319333694>

Articles:

2. Nonconventional averages along arithmetic progressions and lattice spin systems,
with *J.R.Chazottes, C.Giardinà, F.Redig*,
Indag.Math. **23** 3 589-602, 2012
3. Langevin dynamics with a tilted periodic potential,
with *S.Luckhaus*,
J.Stat.Phys. **151** 5 870-895, 2013
4. Duality for Stochastic Models of Transport,
with *C.Giardinà, C.Giberti, F.Redig*,
J.Stat.Phys. **152** 4 657-697, 2013
5. Random Hysteresis Loops,
Ann.Inst.H.Poincaré(B) **49** 2 307-339, 2013
6. Hydrodynamic limit in a particle system with topological interactions,
with *A.De Masi, C.Giardinà, E.Presutti*,
Arab.J.Math. **3** 381-417, 2014
7. Super-hydrodynamic limit in interacting particle systems,
with *A.De Masi, C.Giardinà, E.Presutti*,
J.Stat.Phys. **155** 5 867-887, 2014
8. Dualities in population genetics: a fresh look with new dualities,
with *C.Giardinà, C.Giberti, F.Redig*,
Stoc.Proc.Appl. **125** 3 941-969, 2015
9. Asymmetric stochastic transport models with $SU_q(1, 1)$ symmetry,
with *C.Giardinà, F.Redig, T.Sasamoto*,
J.Stat.Phys. **163** 239-279, 2016
10. A generalized Asymmetric Exclusion Process with $U_q(sl_2)$ stochastic duality,
with *C.Giardinà, F.Redig, T.Sasamoto*,
Prob.Th.Relat.Fields **166** 887-933, 2016
11. Quantitative Boltzmann-Gibbs principle via orthogonal polynomial duality,
with *M.Ayala, F.Redig*,
J.Stat.Phys. **171** 6 980-999, 2018
12. Orthogonal dualities of Markov processes and unitary symmetries,
with *C.Franceschini, C.Giardinà, W.Groenewelt, F.Redig*,
SIGMA **15** 053, 2019
13. Stationary States in Infinite Volume with Non-zero Current,
with *C.Giardinà, E.Presutti*,
J.Stat.Phys **180** 1 366-397, 2020

14. Exact formulas for two interacting particles and applications in particle systems with duality,
with *C.Giardinà, F.Redig*,
Ann.Appl.Prob. **30** 4 1934-1970, 2020
15. Higher order fluctuation fields and orthogonal duality polynomials,
with *M.Ayala, F.Redig*,
El.J.Prob. **26** 1-35, 2021
16. Consistent particle systems and duality,
with *C.Giardinà, F.Redig*,
El.J.Prob. **26** 1-31, 2021
17. q -Orthogonal dualities for asymmetric particle systems,
with *C.Franceschini, W.Groenewelt*,
El.J.Probab. **26** 1-38, 2021
18. Condensation of SIP particles and sticky Brownian motion,
with *M.Ayala, F.Redig*,
J.Stat.Phys. **183** 31-42, 2021
19. Boundary driven Markov gas: duality and scaling limits,
with *S.Floreani, C.Giardinà, F.Redig*,
Ensaios Matemático **38**, 141-183, 2023
20. Solvable stationary non equilibrium states,
with *C.Franceschini, D.Gabrielli, C.Giardinà, D.Tsagkarogiannis*,
J.Stat.Phys. **191** (1), pg. 10 , 2024
21. Duality for an asymmetric energy transport model with open boundaries,
with *F.Casini, C.Franceschini*,
Journ. Phys. A: Mathematical and Theoretical **57** 8, 085204, 2024
22. Large Deviations and Additivity Principle for the Open Harmonic Process,
with *C.Franceschini, R.Frassek, C.Giardinà, F. Redig*,
Comm. Math. Phys. **406** (5), pg. 103, 2025
23. Continuous auction models,
with *P. Ferrari C.Franceschini, N. Manelli*,
ArXiv **2609.27645**, preprint, 2026