

CHIARA FRANCESCHINI

Curriculum Vitæ

PERSONAL DATA

Gender & Nationality: Female, Italian
Date & Place of Birth: June 10, 1990, Reggio Emilia (RE), Italy
Languages: Italian, English, Portuguese



WORKING POSITION

- January 2022 - current:** Ricercatrice a tempo determinato at:
Università degli Studi di Modena e Reggio Emilia (Italy)
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🌐 <https://cfrances.weebly.com>
- August 2021 - December 2021:** Postdoctoral Fellowship at:
Mathematical Sciences Research Institute
Berkeley, California (USA)
- January 2019 - July 2021:** Postdoc Fellow for:
Center for Mathematical Analysis, Geometry and Dynamical Systems
Instituto Superior Técnico (Portugal)
Scientific Advisor: Patrícia Gonçalves, ERC Starting Grant
Hydrodynamic Limits and Equilibrium Fluctuations:
universality from stochastic systems

ACADEMIC EDUCATION AND DEGREES

- National Scientific Qualification (ASN):
 - i. Mathematical analysis, probability and statistics - Academic Recruitment Field 01/A3. 29/10/2025 - 29/10/2037
 - ii. Mathematical physics - Academic Recruitment Field 01/A4. 13/11/2025 - 13/11/2037
- Doctor of Philosophy in Mathematics
February 2018, Università degli Studi di Ferrara (Italy)
Thesis Advisor: Prof. Cristian Giardinà
Thesis title: *Orthogonal stochastic duality from an algebraic point of view*
- Master Degree in Mathematics
December 2016, University of Wisconsin -Madison (USA)
Academic Advisor: Prof. Timo Seppäläinen
- Laurea Specialistica in Mathematics
July 2014, Università degli Studi di Modena e Reggio Emilia (Italy)
Grade: 110/110 *cum laude*
Thesis Advisor: Prof. Cristian Giardinà

RESEARCH INTERESTS

My research activity regards probability theory and its application to interacting particle systems and statistical physics. My work and my interests cover the following topics:

- *Duality between stochastic processes.* Duality theory is a powerful technique to investigate properties of Markov processes. It is possible to study a continuous time Markov process through its dual, that is usually simpler. The connection between the two processes is given by a set of functions called duality functions.
- *Interacting particle systems and their scaling limits.* Interacting particles systems are microscopic models for which one is interested to study the macroscopic behavior, i.e. following the time-space evolution of the density field. This evolution is described by the so-called hydrodynamic equation. Following the dual process one can have an heuristic idea of the PDE which arises from the hydrodynamic limit.
- *Non-equilibrium statistical mechanics.* Markov processes studied in the context of an open boundary can be used as models to inspect non-equilibrium properties. Since many phenomenological laws of non-equilibrium are not yet understood at the microscopical level, the study of diffusion processes under a dual point of view, i.e. using the particle system associated by duality, can be convenient.

LIST OF PAPERS

ORCID: 0000-0003-0616-1481

Ciência ID: 1D14-6F13-8947

Scopus Author ID: 57204033749

MR Author ID:1289774

Submitted

Published

1. C. Franceschini, P. Gonçalves, K. Hayashi, M. Sasada “Hydrodynamic limit for some gradient and attractive spin models”. *Journal of Statistical Physics*, 193(1), 3. (2026).
2. C. Franceschini, E. Saada, G.M. Schütz, S. Velasco “Duality for some models of epidemic spreading”. *Stochastic Processes and their Applications*, 104773 (2025).
3. G. Carinci, C. Franceschini, R. Frassek, C. Giardinà, F. Redig “The open harmonic process: non-equilibrium steady state, pressure, density large deviation and additivity principle”. *Communications in Mathematical Physics*. 406.5 103 (2025).
4. C. Franceschini, P. Gonçalves, M. Jara, B. Salvador “Non-equilibrium fluctuations for $SEP(\alpha)$ with open boundary”. *Stochastic Processes and their Applications* 178 104463 (2024).
5. C. Franceschini, J. Kuan, Z. Zhou “Orthogonal polynomial duality and unitary symmetries of multispecies ASEP(q, θ) and higherspin vertex models via \star -bialgebra structure of higher rank quantum groups”. *Communications in Mathematical Physics*. 405.4 96 (2024).
6. G. Carinci, C. Franceschini, D. Gabrielli, C. Giardinà, D. Tsagkarogiannis “Solvable stationary non equilibrium states”. *Journal of Statistical Physics* 191.1 10 (2024).
7. G. Carinci, F. Casini, C. Franceschini “Duality for a boundary driven asymmetric model of energy transport”. *Journal of Physics A: Mathematical and Theoretical* 57-8 085204 (2024).
8. P. A. Ferrari, C. Franceschini, D. G. E. Grevino, H. Spohn “Hard Rod Hydrodynamics and the Levy Chentsov Fields”. *SBM, Ensaios Matemáticos* 38, 185–222 (2023).
9. C. Franceschini, R. Frassek, C. Giardinà “Integrable heat conduction model”. *Journal of Mathematical Physics* 64.4 (2023).

10. C. Franceschini, P. Gonçalves, B. Salvador “Hydrodynamical behavior of generalized symmetric exclusion with open boundary”. *Mathematical Physics, Analysis and Geometry* 26.2: 11 (2023).
11. C. Franceschini, P. Gonçalves, S. Sau “Symmetric inclusion process with slow boundary: hydrodynamics and hydrostatics”. *Bernoulli*, 28(2), 1340–1381 (2022).
12. G. Carinci, C. Franceschini, W. Groenevelt “ q -Orthogonal dualities for asymmetric particle systems”. *Electronic Journal of Probability* 26: 1–38 (2021).
13. R. De Paula, C. Franceschini “Porous medium model: an algebraic perspective and the Fick’s law”. *From Particle Systems to Partial Differential Equations*. Springer International Publishing, 195–225 (2021).
14. C. Franceschini, P. Gonçalves “Where Lie algebra meets probability?”. *Bulletin CIM - Centro Internacional da Matemática*, 42, 11-21 (2020).
15. G. Carinci, C. Franceschini, C. Giardinà, W. Groenevelt, F. Redig “Orthogonal dualities of Markov processes and unitary symmetries”. *Symmetry, Integrability and Geometry: Methods and Applications (SIGMA)* 15, 053 (2019).
16. C. Franceschini, C. Giardinà “Stochastic duality and orthogonal polynomials”. *Soujourns in Probability and Statistical Physics*, Springer 187–214 (2019).
17. C. Franceschini, C. Giardinà, W. Groenevelt “Self-duality of Markov processes and intertwining functions”. *Mathematical Physics, Analysis and Geometry* 21: 1–21 (2018).

Miscellaneous

1. L. Bedogni, C. Franceschini, F. Montori “A Joint Evaluation Methodology for Service Quality and User Privacy in Location Based Systems”. Proceedings of the 2023 ACM Conference on Information Technology for Social Good. 110–116 (2023).
2. C. Franceschini, P. Gonçalves “An interview with Martin Hairer”. *Bulletin CIM - Centro Internacional da Matemática*, 41, 55–59 (2019).

ACTIVITIES ORGANIZED

- 2024 - 2026: Weekly seminars *Seminário de Probabilidade e Mecânica Estatística (SPMES)*
All online via Zoom - [here](#)
- 1-5/12/2025: Conference *Particle Systems and PDE's XIII*
University of Modena e Reggio Emilia, Italy
- 9-13/9/2024: Conference *Particle Systems and PDE's XII*
University of Trieste, Italy
- 10-14/6/2024: Session “Interacting systems in statistical physics II”
Fourth Italian Meeting on Probability and Mathematical Statistics. Rome, Italy
- 16/6/2022: Session “Scaling limits for interacting particle systems”
Third Italian Meeting on Probability and Mathematical Statistics. Bologna, Italy
- 5/1/2022: Colloquium on Interacting Particle System
Hybrid event - [here](#)
- 12-16/7/2021: Session organizer “Stochastic duality for Markov processes”
Encontro Nacional da Sociedade Portuguesa de Matemática (SPM). Lisbon, Portugal
- 19-23/7/2021: Conference *Particle Systems and PDE's IX*
University of Minho, Braga
- Fall 2020: Monthly seminars *Probability and Stochastic Analysis (PSA)*
All online via Zoom - [here](#)

CONFERENCES, WORKSHOPS AND SCHOOLS

- October 2025: **PRISMA Seminar** *with Fededrico Sau*
Online - [here](#)
- October 2025: **Seminar** *Osaka Probability Seminar*
Osaka University - Japan
- September 2025: **Workshop** *Interacting particle systems and related fields in honor of Claudio Landim*
CIRM - France
- July 2025: **Conference** *Non-equilibrium statistical physics: mathematical and physical advances*
Florence - Italy
- May 2025: **Workshop** *Statistical Physics Out of Equilibrium: Quantitative Results and Universality*
Oberwolfach - Germany
- August 2024: **Short talk** *VII Congreso Latinoamericano y del Caribe de Matemática*
João Pessoa - Brasil
- August 2024: **Short talk** *XXVII Brazilian School of Probability*
UFBA, Savador - Brasil
- June 2024: **Invited Speaker** *Integrable Systems: Geometrical and Analytical Approaches*
SISSA, Trieste - Italy
- June 2024: **Short talk** *Fourth Italian Meeting on Probability and Mathematical Statistics*
Roma, - Italy
- January 2024: **Invited Speaker** *Inhomogeneous Random Systems 2024*
Institut Henri Poincaré, Paris - France
- September 2023: **Invited Speaker** *Rencontres de Probabilités en Rouen*
Rouen - France
- June 2023: *Mathematical Physics of Complex Systems*
Cortona - Italy
- June 2023: **Invited Speaker** *Séminaire de Probabilités*
University of Lyon - France
- April 2023: **Invited Speaker** *Seminário de Probabilidade e Mecânica Estatística*
IMPA - [Available on YouTube](#)
- March 2023: *Scaling limits and generalized hydrodynamics*
Gran Sasso Science Institute, L'Aquila - Italy
- February 2023: **Invited Speaker** *Società Italiana di Fisica Statistica*
Young Seminars SIFS - [Available on YouTube](#)
- December 2022: **Invited Speaker** *Recent Developments in Stochastic Duality*
EURANDOM - The Netherlands
- November 2022: **Invited Speaker** *Rencontres de Probabilités 2022*
University of Rouen, LMRS - France
- October 2022: **Invited Speaker** *Asymmetry in interacting particle systems: microscopic and macroscopic effects*
University of Lille, INRIA - France

- September 2022: **Invited Speaker** *Integrable systems, exactly solvable models and algebras*
Centre de Recherches Mathématiques, Montréal - Canada
- June 2022: **Invited session** Stochastic Interacting Systems. *IMS Annual Meeting in Probability*
London - UK
- June 2022: **Invited speaker** *Population Genetics, Interacting Particle Systems and Stochastic Flows*
Hausdorff Center for Mathematics, Bonn - Germany (*video available*)
- June 2022: **Invited Speaker** *Third Italian Meeting on Probability and Mathematical Statistics*
Bologna - Italy
- May 2022: *Excursion in integrability*
SISSA, Trieste - Italy
- April 2022: **Invited Speaker** *Randomness, Integrability and Universality*
Galileo Galilei Institute, Firenze - Italy (*video available*)
- March 2022: **Invited Speaker** *Interacting Particle Systems and Hydrodynamic Limits*
Centre de Recherches Mathématiques, Montréal - Canada
- March 2022: **Invited Speaker** *Population Dynamics and Statistical Physics in Synergy*
MFO, Oberwolfach Research Institute for Mathematics - Germany
- September 2021: **Invited Speaker** MSRI seminars
MSRI, Berkeley - California, USA (*slides available*)
- August 2021: **Short talk** *Young European Probabilists (YEP) XVII*
EURANDOM - Eindhoven (Zoom)
- July 2021: **Invited Speaker** *Limits and control of stochastic reaction networks*
AIM San Jose - California, USA (Zoom)
- June 2021: **Invited Speaker** DISMA, Eccellenza 2018-2022
Politecnico di Torino (*video available*)
- June 2021: **Invited Speaker** Algebraic duality methods in probability
Online (*video available*)
- April 2021: **Speaker** for the Seminars in Probability and Finance
Zoom - Università degli studi di Padova
- March 2021: **Speaker** for the Probability-Analysis Seminar at Cermade
Zoom - Université Paris-Dauphine
- March 2021: **Speaker** for the Purdue Probability Seminar
Zoom - Purdue University, Indiana - USA
- November 2019: Northeast Probability Seminar
CUNY Graduate Center - NYC
- July 2020: **Speaker** 3rd Colloquium on Interacting particle Systems
Instituto Superior Técnico - Lisbon
- July 2019: 1st Women in Mathematics Meeting
Faculdade de Ciências e Tecnologia, Universidade Nova de Lisboa - Caparica

- July 2019: **Speaker** 2nd Colloquium on Interacting particle Systems
Instituto Superior Técnico - Lisbon
- June 2019: Workshop on Phase Transitions and Particle Systems
Weierstrass Institute (WIAS) - Berlin
- June 2019: **Speaker** at the Second Italian Meeting on Probability and Mathematical Statistics
Vietri sul Mare - Salerno
- June 2019: Workshop “Nonlinear PDEs in Braga”
University of Minho, Auditorium of the Congregados - Braga
- April 2019: Conference “Population Dynamics and Statistical Physics in Synergy II”
Centro De Giorgi - Pisa
- November 2018: Conference “Particle Systems and PDE’s VII”
University of Palermo - Palermo
- September 2018: Conference “Young Women in Mathematical Physics”
University of Bonn - Bonn
- April 2018: **Speaker** at the Workshop “Teaching and Learning Statistical Physics”
Sede del Consorzio del Vino Nobile di Montepulciano - Siena. Youtube video [here](#)
- August 2017: Workshop “Genealogies of Interacting Particle Systems”
Institute for Mathematical Sciences of NUS - Singapore
- June 2017: **Contributed talk** for the Workshop “Stochastic dynamic out of equilibrium”
Henri Poincaré Institute - Paris
- May 2017: **Speaker** at the assemblea scientifica G.N.F.M.
Montecatini Terme - Pistoia
- April 2016: 4th Midwest Women in Mathematics Symposium
University of Illinois at Urbana-Champaign - USA
- October 2015: 37th Midwest Probability Colloquium
Northwestern University - USA
- March 2015: Workshop “Interacting particles systems and non-equilibrium dynamics”
Henri Poincaré Institute - Paris
- January 2015: Introductory school of the trimester “Disordered systems, random spatial processes and some applications”
Centre International de Rencontres Mathématiques (CIRM) - Marseille
- September 2014: **Contributed talk** for the XXXIX Summer School on Mathematical Physics
Organized by Istituto Nazionale di Alta Matematica - Ravello
- August 2014: Workshop “Population Dynamics and Statistical Physics in Synergy”
Eurandom - Eindhoven
- May 2014: Training week “Advances in non-equilibrium statistical mechanics”
Galileo Galilei Institute - Florence

AWARDS

- Fondo di Ateneo per la Ricerca 2025, project *From Microscopic Interactions to Macroscopic Laws: Duality, Algebraic Structures and Universality in Interacting Particle Systems*, CUP E93C25002460005, 2026.
- Coordinator Progetto Giovani *Non-equilibrium stationary state for Partial Exclusion Process*, CUP E5324001950001, awarded by the Gruppo Nazionale di Fisica Matematica, 2025
- Italy (MAECI) - Brazil (CONFAP) research projects, 2024
- Borsa di studio per l'estero awarded by the Istituto Nazionale di Alta Matematica (INdAM), 2024.
- Member of the PRIN project with local PI Professor Gioia Carinci *Emergence of condensation-like phenomena in interacting particle systems: kinetic and lattice models*, Grant No. 202277WX43, CUP E53D23005500006, 2022.
- Kovalevskaya grant for ICM, 2022.
- **Uhlenbeck Postdoctoral Fellowship** awarded by the Mathematical Sciences Research Institute (MSRI) in UC-Berkeley. One post-doc per year is selected, 2021.
- IMS New Researcher Travel Award, 2020.
- Best Phd Thesis of cycle XXX, awarded by the University of Ferrara, 2018.

CO-SUPERVISION OF STUDENTS

- 4 Carlo Arena, Bachelor Degree student in physics, University of Modena e Reggio Emilia. Thesis (July 2026).
- 3 Nicola Manelli, Master Degree student in mathematics, University of Modena e Reggio Emilia. Thesis *Non-equilibrium stationary measure and dynamics for the Harmonic process* (April 2024).
- 2 Beatriz Costa Salvador, Master Degree student in mathematics, Instituto Superior Técnico. Thesis *Stochastic Duality for Symmetric Simple Exclusion and Inclusion in contact with reservoirs* (December 2021).
- 1 Leonor Botelho de Sousa Barata, Master Degree student in mathematics, Instituto Superior Técnico. Thesis *Neutral population-genetics evolution for Wright-Fisher and Moran models* (December 2019).

TEACHING ACTIVITY

- Spring 2026: University of Modena and Reggio Emilia. Lecturer for *Matematica Applicata e Statistica*, Bachelor Degree, Computer Science.
- Spring 2026: University of Modena and Reggio Emilia. Lecturer for *Matematica II con elementi di statistica*, Bachelor Degree, Chemistry.
- Spring 2025: University of Modena and Reggio Emilia. Lecturer for *Matematica Applicata e Statistica*, Bachelor Degree, Computer Science.
- Spring 2025: University of Modena and Reggio Emilia. Lecturer for *Matematica II con elementi di statistica*, Bachelor Degree, Chemistry.
- Fall 2024: Lahore University of Management Sciences (LUMS). Lecturer for *Probability and Statistics*, International Mathematics Master.
- Spring 2024: University of Modena and Reggio Emilia. Lecturer for *Fisica Matematica A*, Bachelor Degree, Mathematics.

- Fall 2023: University of Modena and Reggio Emilia. Lecturer and Exerciser for *Meccanica Razionale*, Bachelor Degree.
- Fall 2022: University of Modena and Reggio Emilia. Exerciser for *Meccanica Razionale*, Bachelor Degree.
- Spring 2022: University of Modena and Reggio Emilia. Lecturer for *Matematica applicata e statistica*, Bachelor Degree.
- Fall 2019: Instituto Superior Técnico, Lisboa. Exerciser for the course *Teoria das probabilidades*, Master Degree.
- Fall 2018: University of Modena and Reggio Emilia. Lecturer for the course *Obblighi Formativi Aggiuntivi (OFA)*, Bachelor Degree.
- Spring 2018: University of Modena and Reggio Emilia. Exerciser for the course *IG-004 Matematica applicata*, Bachelor Degree. Exerciser for the course *MN1-1037 Probabilità e statistica*, Bachelor Degree.
- Spring 2017: University of Modena and Reggio Emilia. Exerciser for the course *RM263-009 Modelli probabilistici*, Master Degree.
- Fall 2016: University of Wisconsin - Madison. Lecturer for the course *Math 130 - Mathematics for Teaching: Numbers and Operations*, Bachelor Degree.
- Spring 2016: University of Wisconsin - Madison. Lecturer for the course *Math 132 - Problem solving in Algebra, Probability and Statistics*, Bachelor Degree.
- Fall 2015: University of Wisconsin - Madison. Teaching assistant for the course *Math 221 - Calculus and Analytic Geometry I*, Bachelor Degree.

LONG RESEARCH VISITS

- Univeristy of Buenos Aires (UBA), Argentina. May 2023
- University of Tokyo, Graduate School of Mathematical Sciences, Japan. October 2024

REFeree ACTIVITY

I am referee for the following journals (on average 2 reviews per year)

- Stochastic Processes and their Applications
- Annales de l'Institut Henri Poincaré
- Electronic Communications in Probability
- Electronic Journal of Probability
- Probability Surveys
- The Annals of Probability