Emanuele Pasqui

Curriculum Vitae

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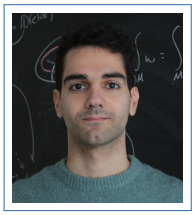

Current position

Oct 2023 – Now **Ph.D. student in Mathematical Sciences**, *University of Padua*
Subject: Probability
Research topic: Gaussian Free Field in Random Environment
Supervisor and co-supervisor: Prof. Alberto Chiarini and Prof. Giambattista Giacomin
Expected graduation year: 2026

Articles

2025 **Hard wall repulsion for the discrete Gaussian free field in random environment on $\mathbb{Z}^{\mathbf{d}}$, $\mathbf{d} \geq \mathbf{3}$**
with Alberto Chiarini. arXiv preprint 2510.24562

Education

Main education

Sep 2019 – Mar 2022 **Master's Degree in Mathematics**, *Sapienza University of Rome*
Subject: Applied Mathematics
Thesis title: Oil And Water and Internal Diffusion Limited Aggregation
Supervisor: Prof. Lorenzo Taggi
Abstract: Oil And Water and Internal Diffusion Limited Aggregation are two randomly interacting particle systems on graphs. The aim of the thesis was to investigate, for both, two aspects:

1. Starting from a particle configuration distributed on the whole graph as a product measure, the phase transition with respect to the initial particle density μ between the two regimes of *fixation* (when on each vertex the dynamics stops in finite time) and *activity* (when it does not);
2. the asymptotic shape of the visited cluster when the underlying graph is the square integer d-dimensional lattice and all particles start from the origin. Since Oil And Water has not a complete theory on this aspect, we analyzed a conjecture. For that purpose, we introduced a new, simpler model which was not present in the scientific literature, showing that its cluster has the same growth rate as Oil And Water.

At the end, we analytically studied how particles distribute in the final cluster for Oil And Water, in comparison with Internal Diffusion Limited Aggregation, and numerically analyzed the fluctuations for both. This work also covered the topics of Abelian Networks and Activated Random Walks, identifying the studied systems in these sets.
Grade: 110 with honors/110

Sep 2016 – Sep 2019 **Bachelor's Degree in Mathematics**, *Sapienza University of Rome*
Subject: Mathematics
Thesis title: Mathematical formalization of the financial market and CRR Model
Supervisor: Prof. Gustavo Posta
Abstract: The thesis was a mathematical formalization of the financial market with a probabilistic approach, to then study the Cox-Ross-Rubinstein model and the Black-Scholes model for derivative pricing, and to introduce the concept of Greeks for derivatives.

Sep 2011 – Jul 2016 **High School Diploma**, *Liceo Scientifico Giuseppe Peano, Monterotondo (Rome)*

Additional education

Apr 2022 – Jul 2022 **"Machine Learning for Finance" course**, *University of Eastern Piedmont*
Course of affiliation: Management and Finance
Language of the course: English
Summary: Machine Learning techniques applied to the financial field. Supervised Learning (Support Vector Machines, Decision Trees, Random Forests), Unsupervised Learning (Clustering and PCA), Neural Networks (modeling, activation function and regularization methods), advanced Neural Network structures (Siamese Networks and AutoEncoders)

Interests

What I am working on: **Probability, statistical mechanics, Gaussian free field**

What I am also interested in: Percolation, stochastic calculus, particle systems, finance.

Visiting

Oct 2025 - Dec 2025 **Alessandra Cipriani at University College London**

Visiting Professor Alessandra Cipriani at University College London for a research stay.

Contributions

20th Nov 2025 Talk *"Extremes and hard wall repulsion for the Gaussian free field in random environment on $\mathbb{Z}^d$, $d \geq 3$"* at *"Probability reading group"*, King's College London, UK

29th May 2025 Talk *"Hard wall repulsion for the discrete Gaussian free field in random environment on $\mathbb{Z}^d$, $d \geq 3$"* at *"Bloomsbury Probability Seminar"*, University College London, UK

29th May 2025 Talk *"Hard Wall event for the Gaussian free field in random environment on $\mathbb{Z}^d$ with $d \geq 3$"*, University of Padova, Italy

17th-28th Feb 2025 Poster at *"Winter school on Statistical Mechanics, Nonequilibrium Processes and Probability"*, Sapienza University of Rome, Italy

10th and 12th Sep 2024 Poster at *"Particle Systems and PDE's XII"*, University of Trieste, Italy

17th Jun 2024 Poster at *"Workshop on Probabilistic Field Theories"*, Aalto University, Finland

Other relevant attended conferences and workshops

30th Jun - 4th Jul 2025 *"Random Geometric Structures and Statistical Physics"*, Sapienza University of Rome, Italy

5th-9th May 2025 *"Conference on Mixing Times between Probability, Computer Science and Statistical Physics"*, International Centre for Theoretical Physics, Trieste, Italy

11th Apr 2025 *"A Spring Day in Probability and Statistical Physics 2025"*, University of Florence, Italy

23th-27th Sep 2024 *"Long-range phenomena in Percolation"*, University of Cologne, Germany

18th-20th Sep 2024 *"Large scale behaviour of interacting diffusions: from stochastic control to functional inequalities"*, University of Padua

10th-14th Jun 2024 *"4th Italian Meeting on Probability and Mathematical Statistics"*, Sapienza University of Rome, Italy

19th Apr 2024 *"A Spring Day in Probability and Statistical Physics 2024"*, University of Florence, Italy

Professional experiences

Oct 2025 – Jan 2026 **Tutor for the course "Foundations of mathematical analysis and probability" for the a.y. 2025-2026**, *University of Padua*

Dec 2024 – Apr 2025 **Tutor for initiatives of diffusion of the scientific culture of the National Institute for Nuclear Physics**, *Legnaro (Padua)*

Oct 2024 – Jan 2025 **Tutor for the course "Foundations of mathematical analysis and probability" for the a.y. 2024-2025**, *University of Padua*

Nov 2022 – Sep 2023 **Deloitte Touche - Analyst in the "Actuarial and Insurance Solutions" division**, *Rome*

Description: Financial consulting for insurance companies. The main duties were to manage Matlab and R codes to project the number of financial assets that an insurance company must buy or sell at any given time to aim for a predetermined return at the end of the considered period, in shock scenarios.

Sep 2016 – Oct 2022 **University, High School and Middle School Private Tutor**, *Rome*

Attended doctoral courses

- *Random graphs and networks* (by Giambattista Giacomin)
- *Products of random matrices: theory and applications* (by Giambattista Giacomin)
- *Statistical Mechanics and Disordered Systems* (by Quentin Berger)
- *A renormalisation group approach to log-Sobolev inequalities* (by Alberto Chiarini and Giovanni Conforti)
- *Stability of queuing networks* (by Bernardo D'Auria)
- *Hawkes processes: from theory to financial practice* (by Simone Scotti)
- *Stochastic and mean field optimal control* (by Alekos Cecchin)
- *Bessel, Cox-Ingersoll-Ross, Ornstein-Uhlenbeck and Gaussian-Volterra processes with Wiener and fractional drivers* (by Yuliya Mishura)
- *Introduction to optimal transport* (by Laura Caravenna)
- *Flows of Sobolev vector fields* (by Elio Marconi)
- *Integral operators in Hölder spaces* (by Massimo Lanza De Cristoforis)
- *Perturbative methods in dynamical systems* (by Christos Efthymiopoulos)
- *Mathematical Climate Finance* (by Andrea Macrina)

Honors and Awards

Sep 2023 *Sapienza University of Rome*

I won a PhD position without funding at Sapienza University of Rome.

Sep 2023 *KTH Royal Institute of Technology Stockholm*

I was shortlisted and invited for an on-site interview for a PhD position in Applied Mathematics (spec. Mathematical Statistics) at KTH Stockholm.

Jan 2023 *Humboldt University - University of Oxford*

I won a public competition for a PhD position in the IRTG 2544 "Stochastic Analysis in Interaction", a collaboration between University of Oxford, HU Berlin, TU Berlin, FU Berlin and WIAS Berlin. The position I won was at HU in collaboration with the Oxford University. Due to family problems, I had to reject the offer for this position.

Nov 2022 *Sapienza University of Rome - Bank of Italy*

I won a public competition for a traineeship for the university in collaboration with Bank of Italy.

Secondary research experiences

Apr 2020 – Jun 2020 *Analysis of the inflammatory process after hemorrhagic shock*

Qualitative study of the effect of several substances in the inflammatory process caused by hemorrhagic shock in mice, using ordinary differential equations to find the substances able to attenuate the acute inflammation sometimes caused by Sars-Cov-2 infection.

Jan 2020 *Development of a software for the expansion of numbers in continued fraction with no rounding errors*

Languages

Italian fluent
English fluent
Spanish advanced
German basics

Programming and markup languages

Matlab excellent
Mathematica advanced
VBA basics
C excellent
FreeFEM basics
Scilab basics
Python excellent
R excellent

Secondary skills

Main

Probability Stochastic Processes, Probabilistic Potential Theory, Particle systems
Statistical Mechanics, Mathematical Physics, Operator Theory
Activated Random Walks, Automata Abelian Networks
Stochastic Analysis, Kinetic Theories, ODEs, PDEs, SDEs

Numerical, Physics and Finance Programming, Numerical Methods for ODEs, PDEs and matrices
Data Sequences Analysis, Simulations, (Least-Squares) Monte Carlo methods
Financial Derivatives, Asset Pricing
Hamiltonian Mechanics, Sturm-Liouville Problems, Mathematical Analysis

Algebra Group, Ring and Field Theories, Cryptography, Elliptic curves

Other

Geometry
Physics
Qubit
Calculus of Variations
Machine Learning, Neural Networks, Convolutional Neural Networks, Reinforcement Learning

Padova, 6 December 2025