Emanuele Pasqui

Curriculum Vitae

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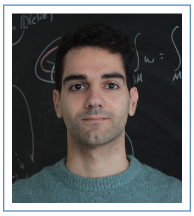

Personal information

Date of birth **October 28th, 1997**
Place of birth **Rome, Italy**

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

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 interacting particle systems on graphs, where particles move randomly, and the aim of the thesis was to answer, for both, two questions:

1. the phase transition with respect to the initial particle density between two regimes: fixation, when on each vertex the dynamics stops in finite time, and activity, when it does not. Starting from a particle configuration distributed on the whole graph as a product measure with expected value μ, the question was if there exists a critical threshold μ_c such that if $\mu < \mu_c$ one has fixation and if $\mu > \mu_c$ one has activity;
2. internal aggregation, namely the shape of the visited cluster when the underlying graph is the integer lattice $\mathbb{Z}^d$ and all particles start from the origin. Since Oil And Water has not a complete theory about internal aggregation, 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 the one of Oil And Water.

At the end, we analytically studied how particles distribute in the final cluster for Oil And Water, also comparing it with the one of Internal Diffusion Limited Aggregation, and numerically analyzed the fluctuations of the cluster around its predicted shape. We also covered Abelian Networks (automata networks whose final configuration does not depend on the order in which the individual automata act) 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 aim was to mathematically formalize the structure of the financial market with a probabilistic approach, to study in this formalization 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)

Programming and markup languages

Matlab excellent	**C** excellent	**Python** excellent
Mathematica advanced	**FreeFEM** advanced	**R** excellent
LaTex excellent	**VBA** basic	**Scilab** basic

Languages

Italian mother tongue
English fluent (writing and speaking) - *B2 level in CEFR standard*
Spanish fluent (writing and speaking)

Interests

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

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

Professional experiences

Main

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.

Other

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

Sep 2024 – Oct 2024 **Tutor for the course "Foundations of mathematical analysis and probability"**, *University of Padua*

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

Contributions

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

10th, 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

Relevant attended conferences and workshops

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"*, University of Florence, Italy
17th-28th Feb 2025	*"Winter school on Statistical Mechanics, Nonequilibrium Processes and Probability"*, Sapienza University of Rome, 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
9th-13th Sep 2024	*"Particle Systems and PDE's XII"*, University of Trieste, Italy
17th-19th Jun 2024	*"Workshop on Probabilistic Field Theories"*, Aalto University, Finland
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"*, University of Florence, Italy

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*

Attended doctoral courses

Products of random matrices
A renormalisation group approach to log-Sobolev inequalities
Stability of queuing networks
Hawkes processes: from theory to financial practice
Stochastic and mean field optimal control
Introduction to optimal transport
Flows of Sobolev vector fields
Integral operators in Hölder spaces
Perturbative methods in dynamical systems

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

Other information

B driving licence

Apr 2020 – Feb 2022 *1st Clarinet and Member of the Board of Directors at "Associazione Musicale Eretina" music school, Monterotondo (Rome)*

Padua, 9 May 2025