PERSONAL INFORMATION

Gabriele Perugini

📱 +39 3206615307

✉ gabriele.perugini@unibocconi.it

RESEARCH EXPERIENCE

February 2024 – Present — ### Lecturer (with tenure track)
Bocconi University
Department of Computing Sciences

December 2022 – January 2023 — ### Research Assistant
Bocconi University
Department of Computing Sciences

November 2021 – November 2022 — ### Research Assistant
Politecnico di Torino
DISTAT (Applied Science and Technology Department)

June 2021 – present — ### Academic Fellow
Bocconi University
Department of Computing Sciences

February 2018 – June 2021 — ### PostDoc
Bocconi University
Artificial Intelligence Lab
Supervisor: Prof. Riccardo Zecchina

EDUCATION

2014–2018 — ### PhD in Physics
University of Rome "La Sapienza"
Thesis Title: "On the optimal use of the Bethe approximations for models on graphs with loops"
Advisor: Prof. Federico Ricci-Tersenghi

2011–2013 — ### Master of Science in Physics
University of Rome "La Sapienza"
Thesis Title: "Finite size correction to disordered models on random graphs"
Advisor: Prof. Federico Ricci-Tersenghi
Grade: 110/110 cum laude
Exams average mark: 30/30

2008–2011 — ### Bachelor of Science in Physics
University of Rome "La Sapienza"
Thesis Title: "Optimized algorithms for spin glass simulations"
Advisor: Prof. Enzo Marinari
Grade: 110/110 cum laude
Exams average mark: 29/30

HONORS

2024 "Bocconi Research Awards ($\times 2$)"
Bocconi University monetary prizes for papers published in top journals.

2014 "Graduate of the Year Award"
Sapienza University Alumni Association
A prize given to the best 100 students who graduated at La Sapienza in the a.y. 2012-2013 (among over 16000 graduated students in the a.y. 2012-2013)

2011–2013 "Excellence Path Fellowship (M.Sc.)"
Physics Department, Sapienza University
Additional exams and tax refunding for top 10 students

2008–2010 "Excellence Path Fellowship (B.Sc.)"
Physics Department, Sapienza University
Additional exams and tax refunding for top 30 students

TEACHING

2016–2017 Computational Physics Lab
Teaching Assistant
University of Rome "La Sapienza", Undergraduate Course.

2020–2022 Methods and Data Analytics for Risk Assessment
Teaching Assistant
Bocconi University, Master Course.

2021–2023 Fundamentals of Computer Science
Teaching Assistant
Bocconi University, Undergraduate Course.

2022–2023 Mathematical Modeling in Machine Learning
Teaching Assistant
Bocconi University, Undergraduate Course.

2022–2023 AI Lab
Teaching Assistant
Bocconi University, Undergraduate Course.

2022-2023 Complex Systems and Social Physics
Course Director
Verona University, Master Course.

2023 AXA - Mastering Data in Insurance
Tutor
Bocconi Business School, Master Course.

2023 Coding for AI - Preparatory Course
Lecturer
Bocconi University, Preparatory Master Course.

2024   Computer Science

Lecturer
Bocconi University, Undergraduate Course.

2024   AXA - Mastering Data in Insurance

Lecturer (Machine Learning module)
Bocconi Business School, Master Course.

SCHOOLS AND CONFERENCES

2013   Introduction to GPU and CUDA programming

Cineca Course
One week, Roma

2013   Introduction to HPC Scientific Programming: tools and techniques

Cineca Course
One week, Roma

2013   Statistical Physics, Optimization, Inference and Message-Passing algorithms

Ecole de Physique des Houches
Two weeks, Les Houches

2015   Spring college on the Physics of Complex Systems

ICTP spring school
Four weeks, Trieste

2016   Statistical Physics methods in Biology and Computer Science

StatPhys26 Satellite Meeting
One week, Paris

2016   Renormalization Group Theory of Disordered Systems

StatPhys26 Satellite Meeting
One week, Paris

2016   StatPhys26

StatPhys26 Meeting
One week, Lyon

2017   Workshop on Statistical Physics, Learning, Inference and Networks

Ecole de Physique des Houches
One week, Les Houches

2020   Quantum Physics and Machine Learning (QPhML)

ELLIS Workshop
Three days
Organizer, Virtual Event

2021   Quantum Algorithms and Machine Learning for Huge Data Analysis, Simulation and Potential Earth Observation Application

ELLIS Workshop
One day
Organizer, Virtual Event

2023 StatPhys28

StatPhys28 Meeting
One week, Tokyo

2024 Bocconi Workshop on Conceptual Challenges in AI

Organizer
Bocconi University
One week, Milan

COMPUTER SKILLS

Programming Languages

- `C`, `Julia`, `Python` (more than 5 years of research and teaching experience)
- `Unix Shell scripting` (intermediate knowledge)
- `C++`, `R`, `Matlab` (occasionally used in past)

Scientific Software

- `Wolfram Mathematica`, `gnuplot`, LaTeX

PUBLICATIONS

[1] M. Negri, C. Lauditi, G. Perugini, C. Lucibello, and E. Malatesta. "Storage and Learning Phase Transitions in the Random-Features Hopfield Model". In: *Phys. Rev. Lett.* 131 (25 Dec. 2023), p. 257301. URL: https://link.aps.org/doi/10.1103/PhysRevLett.131.257301.

[2] Brandon Livio Annesi, Clarissa Lauditi, Carlo Lucibello, Enrico M. Malatesta, Gabriele Perugini, Fabrizio Pittorino, and Luca Saglietti. "Star-Shaped Space of Solutions of the Spherical Negative Perceptron". In: *Phys. Rev. Lett.* 131 (22 Nov. 2023), p. 227301. URL: https://link.aps.org/doi/10.1103/PhysRevLett.131.227301.

[3] Matteo Negri, Clarissa Lauditi, Gabriele Perugini, Carlo Lucibello, and Enrico Maria Malatesta. "Random Feature Hopfield Networks generalize retrieval to previously unseen examples". In: *Associative Memory & Hopfield Networks in 2023*. 2023. URL: https://openreview.net/forum?id=bv2szxARh2.

[4] Carlo Baldassi, Enrico M. Malatesta, Gabriele Perugini, and Riccardo Zecchina. "Typical and atypical solutions in nonconvex neural networks with discrete and continuous weights". In: *Phys. Rev. E* 108 (2 Aug. 2023), p. 024310. URL: https://link.aps.org/doi/10.1103/PhysRevE.108.024310.

[5] Matteo Negri, Enrico Malatesta, Clarissa Lauditi, Gabriele Perugini, and Carlo Lucibello. "The Hidden-Manifold Hopfield Model shows storage-to-learning phase transitions and is able to generalize". In: *Bulletin of the American Physical Society* (2023).

[6] Carlo Lucibello, Fabrizio Pittorino, Gabriele Perugini, and Riccardo Zecchina. "Deep learning via message passing algorithms based on belief propagation". In: *Machine Learning: Science and Technology* 3.3 (2022), p. 035005.

[7] Carlo Baldassi, Clarissa Lauditi, Enrico M Malatesta, Rosalba Pacelli, Gabriele Perugini, and Riccardo Zecchina. "Learning through atypical phase transitions in overparameterized neural networks". In: *Physical Review E* 106.1 (2022), p. 014116.

[8]   Fabrizio Pittorino, Antonio Ferraro, Gabriele Perugini, Christoph Feinauer, Carlo Baldassi, and Riccardo Zecchina. "Deep networks on toroids: removing symmetries reveals the structure of flat regions in the landscape geometry". In: *International Conference on Machine Learning*. PMLR. 2022, pp. 17759–17781.

[9]   Carlo Baldassi, Clarissa Lauditi, Enrico M Malatesta, Gabriele Perugini, and Riccardo Zecchina. "Unveiling the structure of wide flat minima in neural networks". In: *Physical Review Letters* 127.27 (2021), p. 278301.

[10] Fabrizio Pittorino, Carlo Lucibello, Christoph Feinauer, Gabriele Perugini, Carlo Baldassi, Elizaveta Demyanenko, and Riccardo Zecchina. "Entropic gradient descent algorithms and wide flat minima". In: *Journal of Statistical Mechanics: Theory and Experiment* 2021.12 (2021), p. 124015.

[11] Gabriele Perugini and Federico Ricci-Tersenghi. "Improved belief propagation algorithm finds many Bethe states in the random-field Ising model on random graphs". In: *Physical Review E* 97.1 (2018), p. 012152.