Dario Bocchi

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LinkedIn

Education

2023 – Expected 2026 — **PhD, "La Sapienza" University of Rome** in Theoretical physics
Scholarship: *Free topic, "Sapienza" scolarship*
Curriculum: *Statistical mechanics and complex systems*

2021 – 2023 — **Master's Degree, "La Sapienza" University of Rome** in Theoretical physics
Curriculum: *Statistical mechanics and complex systems*
Dissertation title: *Beyond Hopfield models: from structured synthetic datasets to real images*
Graduation mark: *110/110 with honors*
Weighted average of exam grades: *30/30*

2018 – 2021 — **Bachelor's Degree, University of Turin** in Physics
Dissertation title: *Unsupervised machine learning techniques for cosmic electron selection in Fermi-LAT data*
Graduation mark: *110/110 with honors*
Weighted average of exam grades: *29.7/30*

2013 – 2018 — **Scientific high school, Liceo "Galileo Ferraris" in Turin**
Graduation mark: *100/100*

Research Publications

Journal Articles and Preprints

1. B. L. Annesi, D. Bocchi, and C. Cammarota, "Overparametrization bends the landscape: Bbp transitions at initialization in simple neural networks," *arXiv preprint arXiv:2510.18435*, 2025.
2. S. Bae, D. Bocchi, L. M. Del Bono, and L. Leuzzi, "Learning and testing inverse statistical problems for interacting systems undergoing phase transition," *arXiv preprint arXiv:2507.02574*, 2025.
3. F. D'Amico, D. Bocchi, L. M. Del Bono, S. Rossi, and M. Negri, "Pseudo-likelihood produces associative memories able to generalize, even for asymmetric couplings," *arXiv preprint arXiv:2507.05147*, 2025.
4. F. D'Amico, D. Bocchi, and M. Negri, "Implicit bias produces neural scaling laws in learning curves, from perceptrons to deep networks," *arXiv preprint arXiv:2505.13230*, 2025.
5. L. Serricchio, D. Bocchi, C. Chilin, *et al.*, "Daydreaming hopfield networks and their surprising effectiveness on correlated data," *Neural Networks*, p. 107 216, 2025.

Presentations and Talks

Genuary 2026 — **Contributed talk**
"BBP transitions in optimization landscapes". 4th Workshop of UMI Group "Mathematics for Artificial Intelligence and Machine Learning

Presentations and Talks (continued)

December 2025 — **Group Seminar**
"Discontinuous BBP Transitions". Seminar for the Chimera Group at Sapienza University

September 2025 — **Poster presentation**
"Overparametrization bends the landscape: BBP transitions at initialization in simple Neural Networks". Poster presented at the summer school "Mathematical methods for high-dimensional data."

June 2025 — **Poster presentation**
"Implicit bias produces neural scaling laws in learning curves, from perceptrons to deep networks". Poster presented at Beg Rohu Summer School.

June 2024 — **Poster presentation**
"Daydreaming Hopfield Networks and their surprising effectiveness on correlated data". Poster presented at Beg Rohu Summer School.

Awards and honors

2022 - 2023 — **Excellence track**, "La Sapienza" University of Rome
Topics studied: Mapping between the Variational Renormalization Group and Deep Learning (2 CFU), Statistical inference and machine learning in statistical physics: the inverse Ising problem (1 CFU), The critical Karp-Sipser core of random graphs (1 CFU).
Ranked admission for the year 2022-2023.

2021 - 2023 — **Merit student**, "La Sapienza" University of Rome
Exemption from payment of tuition fees for study merits for the years 2021/2022 and 2022/2023.

2021 — **"Wanted the best" two-year scholarship**, "La Sapienza" University of Rome
Scholarship with ranking and two-year validity for the years 2021/2022 and 2022/2023.

2018 — **Contribution for graduation with 100/100**, Liceo "Galileo Ferraris" in Turin
Contribution to students who, at the end of the state examinations, received a grade of 100/100

Experiences

08/09/2025 - 12/09/2025 — **Summer school: Mathematical methods for high-dimensional data**
The school will open the thematic period on Data Science and will be dedicated to the mathematical foundations and methods for high-dimensional data analysis. It will provide an in-depth introduction to key mathematical techniques that underpin modern approaches to machine learning and statistical inference.

Experiences (continued)

02/06/2025 - 14/06/2025 — **Beg Rohu Summer School of physics 2025**
Summer school focused on advanced topics in statistical physics and condensed matter, combining in-depth blackboard-based lectures with a strong emphasis on interaction and collaboration. The program was designed to guide participants from fundamental principles to the forefront of current research, fostering exchange between students and leading researchers from diverse perspectives.

03/06/2024 - 15/06/2024 — **Beg Rohu Summer School of physics 2024**
Summer school focused on advanced topics in statistical physics and condensed matter, combining in-depth blackboard-based lectures with a strong emphasis on interaction and collaboration. The program was designed to guide participants from fundamental principles to the forefront of current research, fostering exchange between students and leading researchers from diverse perspectives.

2021 — **Internship at INFN, Turin section**
Analysis of Fermi-LAT telescope data with machine learning techniques.

09/09/2019 - 13/09/2019 — **Summer School of Mathematics "Alfaclass" ("Politecnico di Torino", in collaboration with the University of Turin)**
Summer school of five days on topics ranging from algebraic geometry to game theory, from probability to differential equations and dynamical systems, and more, under the guidance of world-class faculty and researchers.

2013 – 2018 — **Math Olympiad, Liceo "Galileo Ferraris" in Turin**
Member of the first team of "Galileo Ferraris" for the Math Olympiad in the years 2018 (national finals), 2017 (national finals) and 2016 (national finals).
Member of the second team of "Galileo Ferraris" for the Math Olympiad in the year 2015 (regional Gauss Cup competition).

Skills

Analytical skills
Experience in data analysis, development and study of theoretical models, and development and study of numerical simulations.
Experience in the field of machine learning from theoretical and application perspectives.

Computer skills
Excellent knowledge of *Python* and corresponding libraries for data analysis (*Numpy*, *Matplotlib*, *Pandas* etc.) and machine learning (*Pytorch*, *Keras*, *Tensorflow* etc.).
Excellent knowledge of *Julia*
Excellent knowledge of *Wolfram Mathematica* for symbolic calculus.
Good knowledge of *C++*.
Good knowledge of *Root* for data analysis.
Good knowledge of *Godot Engine* for multiplatform game development.
Good knowledge of *Flutter* for mobile development.

Language skills
Native speaker of Italian.
B2 First certification in English.