FABRIZIO BONCORAGLIO

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CURRENT POSITION

2nd Year PhD Student in Computer Science

École Polytechnique Fédérale de Lausanne (EPFL)

Doctoral School in Computer and Communication Sciences (EDIC)
EDIC Fellowship Scholar

📅 September 2024 – Present   📍 Lausanne, Switzerland

Supervised by Prof. Lenka Zdeborová

Topics: Machine learning, statistical physics and analytical approaches, attention mechanisms and transformers.

Papers published:
- "Bayes optimal learning of attention indexed models", NeurIPS (poster, San Diego 2025). Also presented in ICML Workshop (Vancouver 2025) and StatPhys29 (oral, Florence 2025).
- "Inference in Spreading Processes with Neural-Network Priors", PRE 2025 (Editors' suggestion).
- "Inductive Bias and Spectral Properties of Single-Head Attention in High Dimensions", Arxiv 2025.
Teaching Assistant in the Fall Semester 2024/2025 and 2025/2025 of the course of "Machine Learning for Physicists".

EDUCATION

Master Degree in Physics of Complex Systems, International Track

Politecnico of Turin, SISSA and ICTP (Trieste)
Université Paris-Saclay, Sorbonne Université, Université Paris Cité

Final GPA in Italy: *30/30 (Highest in my track)*
M2 S3 GPA in France : *18.5/20 (1/40 in the M2)*
Degree and Grade in Italy: 26/07/2024 - 110 cum Laude
Degree and Grade in France: 03/07/2024 - Mention Très Bien

📅 September 2022 – July 2024   📍 Turin, Trieste, Paris

Double-Degree programme between Italy (first semester at SISSA and ICTP, second semester at Politecnico of Turin) and France (M2 level between Université Paris-Saclay, Sorbonne Université, and Paris Cité).

Main topics: probability and information theory, machine learning, algorithms for optimization and learning, Bayesian inference, stochastic processes, random matrix theory, statistical physics and disordered systems.

Bachelor's Degree in Physics and Alumnus of Scuola Superiore di Catania (SSC)

University of Catania (UNICT), Department of Physics
Final grade (UNICT): *110/110 cum Laude*
Final grade (SSC): *70/70 cum Laude*
Final GPA: *29.54/30*

📅 October 2019 – 7th October 2022

Title of the thesis: "High-Order Interactions in Social Contagion: Competitive Epidemics Spreading on Simplicial Complexes".
Supervisor: Prof. Vito Latora (Queen Mary University of London).
In consortium with Scuola Normale Superiore of Pisa, SSC offers integrative training, specialistic courses and involves students into an early contact with research.
Main research topics in network theory and opinion dynamics.

ACHIEVEMENTS

Bronze Medal in the National Mathematics Olympics

Awarding institution: Unione Matematica Italiana

📅 May 2019   📍 Cesenatico (BO)

I was selected to the national phase after winning the analogous competition in my high school and then in my region in Italy.

International Master's Scholarship Program IDEX

📅 May 2023   📍 Paris, France

Designed for excellent international students of Université Paris-Saclay. Scholarship within the double-degree program in "Physics of complex systems".

Ermenegildo Zegna Founder's Scholarship

📅 May 2023   📍 Milan, Italy

Designed for supporting excellent students who demonstrate leadership skills and are willing to pursue their studies outside of Italy, in my case in Paris.

Study Award for Merit

📅 2020-2021-2022   📍 UNICT, Catania

Award given each year by University of Catania to the top 5 students of each faculty in terms of GPA. I was selected for all the three years of Bachelor for the Physics department.

LANGUAGES

English   ●●●●●
IELTS Score: 8.0/9.0 (C1)

French   ●●●●○

RESEARCH EXPERIENCE

Research Internship at Sony CSL Paris
Supervisors: Professor Vittorio Loreto (Sapienza and Sony CSL Rome)
Dr. Pietro Gravino (Sony CSL Paris, Rome and CREF)
Professor Luca Dall'Asta (Politecnico of Turin)

📅 January 2024 - July 2024 　　📍 Paris, France

Research internship finalized to my final dissertation for the Master in "Physics of Complex Systems".
Title of the thesis: "Polarization in Social Systems: Dynamics of Quotes and Retweets Networks". The thesis aims to investigate and characterize the presence and impact of polarisation on X/Twitter. Real quote and retweet networks are reconstructed from Italian twitter data, extracted through X/Twitter API. Natural language processing (NLP) and moral foundation theory are employed for detecting antagonist polarization.
Tools employed: network theory, machine learning, NLP, opinion dynamics, statistical physics.

Research Internship at UNamur
Supervisors: Professor Timoteo Carletti (UNamur)
Professor Vito Latora (Unict-QMUL)

📅 February 2022 　　📍 Namur, Belgium

Research on dynamical processes on complex networks and their generalization to high-order structures, e.g. simplicial complexes and hypergraphs.
This research period has led to the article: "Complex contagion in social systems with distrust", ACS (2024).

OTHER EXPERIENCE

Alumnus of Alta Scuola Politecnica
Politecnico of Turin (PoliTO), Politecnico of Milan (PoliMI)

📅 December 2022 – September 2024 📍 Turin, Milan

The Alta Scuola Politecnica (ASP) selects each year the top 150 talented and motivated master students among PoliMI and PoliTO. I followed business-oriented courses and laboratories about dynamics of innovation, design theory, leadership and communication skills. I was involved in a startup-oriented project about designing and developing a blockchain-based music platform for the whole program.

Leadership Skills Course at TU Delft

📅 September 2023 　　📍 Delft, Netherlands

Learn-by-doing approach, leadership skills course. Intensive school in: Negotiating, Public Speaking, Politics Comunication Strategies, Networking, Feedback, Pitching.

ASSOCIATIONS

Aspen University Fellow - The Aspen Institute
📅 Dicember 2023 - December 2025

Program of Aspen Institute Italia designed for excellent students in the later stages of their university studies. Its main objectives are to emphasize leadership, fostering increased interaction between Aspen University Fellows and members of the Aspen Institute Italia.

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Scuola di Politiche - IMPACT Torino
📅 March – May 2023 　📍 PoliTO (TO)

Founded by the former Italian Prime Minister Enrico Letta, I was selected with other 40 students to partecipate actively to a politics school about the effectiveness of public policies on innovation and sustainable technologies.

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Youth Group 104 - Amnesty International
📅 2017 – 2018 　　📍 Modica (RG)

I was founder of the A.I. Youth Group in my hometown in Sicily. I was the head of the Education Group, spreading public awareness on gender equality, respect of human rights and fighting against homophobia and racism. I organized laboratories in primary and secondary schools for Amnesty International campaigns.

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Educational Volunteering
📅 05/23 – 03/2024 　📍 I.C. Pertini, Turin (TO)

Helping middle school children with learning difficulties in maths both in presence and online.