

Lorenzo Rizzi

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EDUCATION

École Normale Supérieure (ENS - PSL)

Feb 2026 - Apr 2026

Visiting Student at CSD (Centre des Sciences des Données, Group of Prof. Loureiro)

Paris, France

- Building on the group's framework, investigating the **kernel regime limit** of Random Feature Models, specifically how **power-law distributed covariates** influence the spectral properties of the kernel operator.
- Deriving analytical **neural scaling laws** for the generalization error of Kernel Ridge Regression to characterize learning performance in high-dimensional settings.

University of Padova

2024 - Present

M.Sc. in Physics of Data

Padova, Italy

- Current GPA: **29.93/30**
- **Core Curriculum:** Advanced training combining Theoretical Physics with Data Science, Machine Learning and Bayesian Statistics.
- **Key Courses:** Statistical Mechanics of Complex Systems, Numerical Methods for Soft Matter, Machine Learning, Computational Physics Lab, Advanced Bayesian Statistics, Complex Networks.

Scuola Galileiana di Studi Superiori (Galilean School of Higher Studies)

2024 - Present

Honours Programme of Excellence of the University of Padova

Padova, Italy

- **Selection:** Admission based on a highly competitive nationwide exam (merit-based).
- **Benefits:** Full scholarship, free accommodation, and personal academic tutor.
- **Education:** Advanced interdisciplinary training via dedicated seminars and technical lectures.

University of Bologna

2021 - 2024

B.Sc. in Physics

Bologna, Italy

- Final Grade: **110/110 cum laude**. Final GPA: 29.67/30.
- **Thesis Project:** Developed a C++ agent-based model to investigate the **phase transition** from free-flow to gridlock in urban networks, analyzing critical behavior under an Origin-Destination paradigm.
- **Resources:** [📄 Read Thesis \(IT\)](#) · [🔗 View Code \(EN\)](#)

Collegio Superiore di Bologna

2021 - 2024

School of Excellence of the University of Bologna

Bologna, Italy

- **Overview:** Merit-based Honours College offering high-level interdisciplinary training parallel to standard university courses.
- **Selection:** Admission based on a highly competitive entrance examination.

SKILLS AND LANGUAGES

Programming	C/C++ & OOP, Python (PyTorch, NumPy, Pandas, Dask), R
HPC & Tools	CUDA C (GPU Computing), OpenMP & MPI, Docker, Linux/Bash, Git, LaTeX
Languages	Italian (Native), English (C1), French (C1, <i>ESABAC Double Diploma</i>)

ACADEMIC PROJECTS

Bayesian Analysis for T2K Experiment

2025 - Present

Research Project with Prof. A. Longhin (INFN Padova)

- Examining the architecture of **MaCh3** (Markov Chain 3), the Bayesian fitting framework used by the T2K collaboration.
- Investigating the behavior of the MCMC algorithm by isolating specific **neutrino interaction samples** to validate the fitting pipeline.

Numerical Methods for Soft Matter

2026

 [View Code on GitHub](#)

- Developed a C++ library for Statistical Mechanics simulations from scratch.
- Implemented Molecular Dynamics engines (Verlet, thermostats) and MCMC algorithms.
- Analyzed critical phenomena in 2D Ising models and Active Matter systems.

Urban Network Phase Transitions

2024

 [View Code on GitHub](#)

- Designed an agent-based model to simulate traffic flow and gridlock transitions.
- Analyzed dynamical properties and phase transitions.

HONORS & AWARDS

- **2024:** Full Scholarship, Scuola Galileiana di Studi Superiori (Padova).
- **2021:** Full Scholarship, Collegio Superiore (Bologna).
- **2021:** Silver Medal @ *Olimpiadi della Fisica*, National Physics Olympics (Italy).

SCHOOLS AND CONFERENCES

GraSPA 2024

Annecy, France · July 2024

Summer School on Particle and Astroparticle Physics (LAPTh). *Selected Participant.*

ACML 2023

Istanbul, Turkey · Nov 2023

Asian Conference on Machine Learning. *Attendee.*

SELECTED ACADEMIC TRANSCRIPT

M.Sc. in Physics of Data

University of Padova

Current GPA: 29.93/30 · Expected Graduation: Jul 2026

Physics of Complex Systems	30 cum laude
Numerical Methods for Soft Matter	30 cum laude
Modern Computing for Physics	30 cum laude
Structure of Matter	30 cum laude
Advanced Statistics for Physics Analysis	30 cum laude
Laboratory of Computational Physics	30 cum laude
Machine Learning	30 cum laude
Management and Analysis of Physics Datasets	30 cum laude
Physics of Complex Networks	30 cum laude
Statistical Mechanics of Complex Systems	30 cum laude
Information Theory and Inference	30 cum laude
Statistical Mechanics	30
Models of Theoretical Physics	29

Scuola Galileiana di Studi Superiori

Internal Courses

Requires maintaining an average grade above 27/30 in all university exams.

Introduction to Scientific Computing (OpenMP, MPI)	30 cum laude
Path Integral in Quantum Mechanics	29
Topological States in Condensed Matter, Cold Atoms and Photonics	Ongoing