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, *ESABAC Double Diploma*)

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*