

LUCA RUGGIERO

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linkedin.com/in/lucaruggiero133 · github.com/lucaruggiero133 · Italian citizen (EU) · willing to relocate

MSc in Physics of Complex Systems (Politecnico di Torino, 2027): statistical mechanics, stochastic modelling and machine learning. Applied LLM research at École Polytechnique with CFM; built a multi-agent LLM system for Hitachi Rail that cuts requirement triage from about fifteen minutes to two.

EDUCATION

Politecnico di Torino

2025 – 2027

MSc in Physics of Complex Systems · Turin, Italy

Thesis: *Do Large Language Models Agree with Humans on Color Harmony?* [final title, once fixed]

Coursework: Statistical Learning and Neural Networks; Algorithms for Optimization, Inference and Learning; Stochastic Simulation Methods; Physics of Interacting Agents; Statistical Physics

Università degli Studi di Torino

2021 – 2025

BSc in Physics (2025) · BSc in Natural Sciences, cum laude (2022) · Turin, Italy

Thesis (Physics): *WKB Method and Resurgence Theory*

EXPERIENCE

École Polytechnique — EconophysiX Chair, with Capital Fund Management

Oct 2026 – Mar 2027

Research intern (Erasmus+ traineeship), MSc thesis project · Paris

- [Result: do N LLMs reproduce the eigenspectrum of human colour harmony? subspace alignment $A_K = \dots$ against the lab's 13-hue baseline]
- Built a logit-level evaluation protocol (restricted score tokens, expectation under the constrained softmax) benchmarking LLM preference matrices against a psychophysical baseline [confirm, Mar 2027; code link].

Hitachi Rail — Challenge@PoliTo by Firms

Feb 2026 – Jun 2026

Architecture, development and team coordination — six-person student team · Turin

- Built an end-to-end multi-agent LLM system (Python, LangGraph, Llama 3.1 8B quantised on-premise, FastAPI, Flask, Docker) that turns unstructured client e-mail threads into standard-compliant requirements: parser, drafter and judge agents, privacy guardrails, self-healing JSON validation, human-in-the-loop review.
- Cut triage from about 15 minutes per requirement (Hitachi's estimate of the manual process) to a 2-minute pipeline, 117 s measured end-to-end; designed the architecture, wrote core components, coordinated the team.

Riga Technical University — Erasmus+ Blended Intensive Programme “Nonlinear Life”

Jul 2026

Selected participant (Erasmus+ funded), five-person international team · Riga

- Owned the algorithm of BioLattice, a proof-of-concept path planner for 3D-printed bioresorbable bone scaffolds: cast the print path as a Chinese Postman problem and solved it with repeated Dijkstra, blossom matching and Hierholzer's circuit (Python, NetworkX), minimising the non-extruding “dry travels” that degrade the metal; proposed a GNN heuristic for scaling.

PROJECTS

Optimal liquidation under the Adaptive Market Hypothesis

Dec 2025 – Jan 2026

Julia — course project (Physics of Interacting Agents), with E. Milione · GitHub: [physics-interacting-agents](https://github.com/physics-interacting-agents)

- Built a chartist–fundamentalist agent-based market reproducing fat tails and volatility clustering; solved the inventory-liquidation MDP by closed-form approximation, backward dynamic programming on a discretised (q, P, F) grid and tabular Q-learning (10^6 episodes), mapping how impact cost, inventory penalty and discounting shape the schedule.

SKILLS, LANGUAGES & ACTIVITIES

Programming Python (NumPy, SciPy, pandas, PyTorch, Transformers), Julia, C++ · Git, Linux, Docker, LaTeX

LLM systems LangGraph multi-agent pipelines, local quantised Llama-family models, FastAPI, Flask

Methods stochastic processes, statistical mechanics, reinforcement learning, agent-based models

Languages Italian (native) · English (C2, Cambridge CPE, 2025) · French (B2 [confirm]) · Spanish (B1)

Grants Erasmus+ traineeship grant, Paris (2026–27) · Erasmus+ BIP mobility grant, Riga (2026)

Volunteering Telefono Amico Italia — volunteer listener, national emotional-support helpline, since Feb 2026

Part-time Peer tutor for students with learning disorders and disabilities; lab assistant (Turin, 2023–2026)