JOSEPH EL-FORZLI

Le Havre, France - 24 years old - jelforzli.webapp@gmail.com

Physics graduate from EPFL and ETH Zurich with a strong focus on computational methods. I have developed a solid foundation in both the theoretical and computational aspects of physical modelling.

EDUCATION

MSc in Physics - *Eidgenössische Technische Hochschule Zurich (ETHZ)* — Sept. 2022 – Aug. 2024
Relevant courses: Computational Statistical Physics, Computational Quantum Physics, Quantum simulations of Gauge Theories, Quantum Field Theory, General Relativity — Zurich, Switzerland
Thesis: Renormalization of the vector current using thermal boundary conditions

Exchange Year - *École Normale Supérieure (ENS-Ulm)* — Sept. 2021 – July 2022
Relevant courses: Statistical Physics, Quantum Mechanics, Electromagnetism and Relativity, Introduction to Machine Learning — Paris, France
Academic tournament: Preparation of a team for the French Physicist Tournament

BSc in Physics - *École Polytechnique Fédérale de Lausanne (EPFL)* — Sept. 2019 – July 2022
Relevant courses: Advanced Linear Algebra, Advanced Analysis, Numerical Physics, C++, Analytical Mechanics, Physics — Lausanne, Switzerland
Project: Numerical simulation of spinning tops in C++

ACADEMIC & INDUSTRY PROJECTS

Research Internship - *Hitachi Ltd. R&D department* — Nov. 2024 – May 2025
Investigated the decomposition mechanisms of a dielectric gas using ab initio computational methods, ranging from density functional theory (DFT) to chemical kinetics solvers, with the goal of reducing the environmental impact of electrical grids. Developed reusable Python libraries to process large datasets and model multiscale gas dynamics. — Baden, Switzerland

Master's Thesis - *High Performance Computing Group - ETHZ* — Feb. 2024 – Sep. 2024
Performed an analytical study of the renormalization and convergence properties of an operator implementation in lattice QCD simulations, in the context of the muon g-2 problem. — Zurich, Switzerland

Proseminar - *ETHZ* — Sept. 2023 – Dec. 2023
Reviewed and presented research articles on phase transitions and universality classes in long-range Ising models, including detailed analytical derivations. — Zurich, Switzerland

Semester project - *ETHZ* — Feb. 2023 – June 2023
Implemented and analysed the performance of the Barnes-Hut algorithm for the N-body problem. Used Python for prototyping and C++ for high-performance computation and parallelisation. — Zurich, Switzerland

Research Project - *Kastler-Brossel Laboratory* — May 2022
Designed and characterised a high-precision optical gyroscope based on the Sagnac effect. Conducted end-to-end experimental work, from optical setup and electronic signal acquisition to data analysis in Python. — Paris, France

PERSONAL PROJECTS

For more information, visit my scientific blog: **josephelf.fr**

Cloud Chamber: Built a DIY particle detector to visualise radioactive particle trajectories using a supersaturated vapour environment.
Tesla Coil: Designed and built a spark-gap Tesla coil producing high-voltage discharges, complemented by a full-scale physics simulation.
Experimental Rocket: Designed and built a chemically propelled rocket with an onboard flight computer and radio telemetry for real-time data acquisition, alongside a full-scale physics simulation.
LLM: Implemented a small language model from scratch to explore transformer architectures.

PRACTICAL SKILLS

Programming: C++, Python (NumPy, SciPy, Matplotlib, PyTorch), MATLAB, Arduino, Git/GitHub (joseph-elf)
Scientific computation: Numerical integration, Monte-Carlo methods, Density Functional Theory, regression and optimisation techniques
Hands-on: Electronics design and assembly, mechanical building, sensor integration and data acquisition.
Languages: French (native), English (C1), Italian (B1)

HOBBIES

Associative: coaching EPFL (student association), scouting.
Sports: long-distance walking, running, trekking.
General interests: history, literature, and science.
Travel: Six-month journey to the Orient following Chateaubriand's *Itinerary from Paris to Jerusalem*.