

SÉBASTIEN DUBOIS

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ENS Paris-Saclay *Normalien* and **Scientific Software Engineer (Python/C++)** building robust workflows for AI/physics research. Develop production-grade APIs and tools with **FastAPI**, **Python/C++**, and reproducible orchestration (Redis, Slurm, Docker); focus on testing, reliability, and collaboration with scientists.

PROJECTS

Entrepreneurial project - AutoPerf (LLM-assisted performance optimization SaaS)

Aug 2025 – Present

- Building the AutoPerf MVP, a hosted SaaS for LLM-guided code optimisation.
- Exposed **FastAPI** endpoints and CLI tools; packaging with **poetry**; **pytest** coverage.
- Operate a Redis-based orchestrator; allocate AWS/GCP resources for iterative, hierarchical profiling; S3-compatible storage.
- Use **Postgres** and a vector database; instrument with **Sentry**; Dockerised and deployed via GitHub Actions/Terraform.

Personal project - Neural Networks for distributed systems (HPC)

- Crafted a **sparse neural network** library with an **MPI** backend for **distributed training**; leveraged *Kokkos* and *Kokkos-Kernels* for performance portability (CUDA backend) and sparse ops; implemented Adam optimizer and pruning strategies.

Personal project - 3D CFD physical simulation using Neural networks, GPU backends

- Designed and trained a **U-Net** to infer pressure and velocity fields from CFD snapshots (CUDA backend).
- Implemented direct simulation in **C++** with efficient data structures using *Kokkos* (CUDA backend, hierarchical parallelism) to generate training data.

WORK EXPERIENCE

Ecole Polytechnique - Center of Applied Mathematics (X/CMAP)

Research Engineer in High Performance Computing

Palaiseau, France

Sep 2024 – Present

- Lead the **Numpex** modernisation of the *Samurai* solver; coordinate releases with research users.
- Own regression and performance testing with the **ReFrame** HPC framework; gate changes with reproducible multi-node benchmarks.
- Build internal CLIs and tooling, maintain **CMake/Spack** pipelines, and document incident/runbook procedures.
- Pair with scientists (ONERA, CMAP) to translate research code into maintainable components; code reviews and design notes.

Office National d'Etudes et de Recherches Aéropatiales (ONERA)

Research position in High Performance Computing and Linear Algebra

Palaiseau, France

Sep 2022 – May 2024

- Contributed **C++** features to the *elsA* industrial CFD solver, improving multi-node **MPI/OpenMP** workflows.
- Integrated Fortran linear-algebra kernels into research prototypes and validated them against datasets with scientists.
- Performed 800+ rank **Slurm** benchmarks; produced tuning notes and user support for engineering teams.

Commissariat à l'Energie Atomique et aux Energies Alternatives (CEA)

Research Internship

Paris-Saclay, France

Apr 2021 – Aug 2021

- Achieved real-time *Material Point Method (MPM)* simulations in industrial scenarios by optimizing GPU (CUDA) pipelines.
- Authored comparative studies on physical fidelity and numerical stability; recommendations adopted for industrial rollout and knowledge base.

SKILLS & LANGUAGES

- **Languages:** French (Native speaker), English (Professional)
- **Python & APIs:** Python (FastAPI, CLI tooling), Packaging with poetry, C/C++ interop where needed
- **Orchestration & Data:** Redis (job orchestration), Slurm, Docker, S3-compatible storage, Postgres, vector databases
- **Quality & Reliability:** pytest (coverage), GitHub Actions CI/CD, Sentry instrumentation, ReFrame regression/perf tests
- **Collaboration:** Partnering with scientists (CMAP/ONERA), Design docs & code reviews

EDUCATION

Ecole Normale Supérieure Paris-Saclay (Previously ENS Cachan)

Normalien Elève in Computer Science and HPC

Gif-Sur-Yvette, France

Aug 2018 – Jun 2022

- Coursework in scientific computing, numerical optimisation, and HPC software engineering.

Université Paris-Saclay

Master of Science in High Performance Computing and Simulation (CHPS)

Guyancourt, France

Sep 2021 – Jun 2022

CentraleSupélec

Master of Science in Modeling and Simulation in Structural Mechanics and Coupled Systems (MS2SC)

Gif-Sur-Yvette, France

Sep 2020 – Jun 2021