



CLÉMENT

Helsens

Senior Data Scientist & ML Engineer

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TECHNICAL STACK

ML & Vision

CoTracker3 ResNet Deep Learning
Computer Vision

AI-augmented Dev

Claude Cursor Copilot
Vibe coding

Data & Infra

MariaDB Spark Docker CI/CD
500 TB+

Web & Viz

Django Bokeh Panel

Languages

Python C++ R SQL

Physics & Instruments

Geant4 Bayesian stats
Microscopy control SLIMS

EDUCATION

Ph.D. Particle Physics

Univ. Paris XI & CEA Saclay
2006 – 2009

M.Sc. Fundamental Physics

University of Paris XI
2003 – 2006

HONORS

2025 Breakthrough Prize — Fundamental Physics

2013 Higgs boson discovery (co-author, ATLAS)

TEACHING & OUTREACH

Supervision: 5 PhD students & 2 postdocs (CERN, EPFL).

Outreach: CERN visitor guide; science talks in schools.

LANGUAGES

FR Native EN Fluent DE Intermediate

INTERESTS

Trail running & ultra-distance events, permaculture gardening.

PROFILE

Ph.D. physicist turned senior data scientist & ML engineer with 15+ years shipping end-to-end data products across High Energy Physics, Life Sciences, and Sports Analytics. Deployed production computer-vision systems (CoTracker3, ResNet), managed 500 TB+ data pipelines, and built interactive analytics platforms used daily by 10+ researchers. Strong across the full ML lifecycle — data modelling and feature engineering through training, evaluation, and production deployment. Solid background in Bayesian and frequentist statistical modelling; author of open-source tooling adopted by multiple international collaborations.

EXPERIENCE

- Independent Contractor** 2026 – present
Sports Performance & Nutrition · Self-employed
 Sports Performance Platform (Django): Full-stack app integrating HRV, continuous glucose monitoring, training logs, nutrition tracking, and a custom race pacing model — pilot with ~10 athletes, targeting ultra-distance events.
- Scientific Data Manager & R&D Physicist** 2023 – present
EPFL · Lausanne, Switzerland
 Computer-Vision System (CoTracker3 fine-tuned): end-to-end pipeline for live biological imaging — sub-second inference, from acquisition through tracking to interactive dashboard. In production for 12+ months.
 Laser Ablation Control: Full Bokeh dashboard — region selection, laser parameterisation, real-time acquisition control — replacing manual workflows entirely.
 Drug Screening Pipeline: automated phenotyping platform (zebrafish) — SLIMS ↔ VAST ↔ Leica integration with 3 ResNet models (orientation, QC, somite counting). Reduced assay turnaround from days/weeks to minutes; now one of the lab's flagship workflows.
 Adaptive Acquisition (Nikon): two-stage pipeline — cell detection at 10× then optimised imaging path at 40× — sharply increases usable cells per imaging session.
 Data Platform (500 TB+): built from scratch a MariaDB single-cell image database (300 k+ entries) and a raw-data catalog with metadata framework; currently leading lab-wide tape migration.
 Researcher Tooling: Bokeh & Panel analytical dashboards used daily by 10+ scientists across the lab; full publication list below.
- Research Physicist & Software Coordinator** 2013 – 2022
CERN · Geneva, Switzerland · FCC Study & ATLAS Experiment
 Key4HEP (co-founder): built an open-source software platform from scratch, now the de-facto standard across multiple major detector projects. Coordinated a 15-researcher international team.
 Tech Leadership: ran FCC computing (6 yr) and ATLAS analysis (3 yr) — 50+ researchers across continents, 4 major spec releases, long-term architectural roadmap.
 Lead Physicist on Major Measurements: led prospect studies for τ -leptonic decays of B^+ and B_c^+ at FCC-ee (first-author JHEP 2021 & EPJC 2024); led the ATLAS top-quark charge-asymmetry measurement at $\sqrt{s} = 8$ TeV (EPJC 2016); main author of the heavy-resonance physics review at future hadron colliders (EPJC 2019).
 Instrument Engineering & Computing R&D: designed and built from scratch an automated X-ray scanning rig (mechanical design, motion control, real-time DAQ software) to characterise the response uniformity of a new ATLAS Micromegas muon detector across its large active surface. Also led hadronic-shower characterisation studies for future colliders (JINST 2016) and the FCC-ee offline-computing architecture (EPJ Plus 2021).
 Public speaking: ~30 invited talks at international scientific conferences (ICHEP, EPS, SUSY, Higgs Couplings, CHEF, La Thuile).
- Research Associate** 2009 – 2013
IFAE · Barcelona, Spain
 Lead Analyst at IFAE: pioneered vector-like quark / four-top final-state searches in ATLAS (first-author JHEP 2015) and led precision top-quark pair cross-section measurements at $\sqrt{s} = 7 / 8$ TeV.
 Statistical Methodology (introduced in ATLAS Exotic group): introduced and championed profile-likelihood techniques for systematic-uncertainty profiling within the BSM-search programme — adopted broadly across the group and codified into reusable open-source tooling.
 Open-Source Statistical Tooling: author of two libraries adopted across the international ATLAS community — a C++ frequentist hypothesis-testing library (20+ teams, 15+ peer-reviewed studies) and pyFBU, the first Python multi-channel Bayesian unfolding library (cited in 6+ studies, pioneered PyMC use in the field).
 Detector Calibration (built from scratch): designed and deployed end-to-end calibration pipelines across 10 000+ channels of the ATLAS calorimeter — underpinned the detector's energy-scale consistency through Run-1.

Smart Microscopy

CoTracker3 real-time biological tracking in production; pre-print submitted.

Drug Screen Pipeline

3 ResNet models + SLIMS + VAST/Leica mapping for zebrafish phenotyping.

pyFBU / C++ Stat Tools

Cutting-edge stat frameworks for CERN — 20+ groups, 20+ publications.

Sports Performance Platform

Django app: HRV, glucose, nutrition, training & pacing for ultra-athletes.

SELECTED PUBLICATIONS

LIFE SCIENCES · EPFL · 2023-2026

2026 Real-Time Multi-Position and Multi-ROI Tracking with LiLiTTool for Smart Light-Sheet Microscopy in Growing Samples

EPFL preprint · 1st author

doi:10.64898/2026.04.03.715281

2023 Clock-driven waves of Tbx6 expression prefigure somite boundaries

bioRxiv preprint

doi:10.1101/2023.11.09.566373

2023 Evaluation of genetic demultiplexing of single-cell sequencing data from model species

Life Science Alliance

doi:10.26508/lsa.202301979

HIGH ENERGY PHYSICS · SELECTED

2024 Prospects for B_c^+ and $B^+ \rightarrow \tau^+ \nu_\tau$ at FCC-ee*Eur. Phys. J. C*

doi:10.1140/epjc/s10052-024-12418-0

2021 Prospects for $B^+ \rightarrow \tau^+ \nu_\tau$ at FCC-ee*JHEP 12 (2021) 133*

doi:10.1007/JHEP12(2021)133

2021 Offline computing resources for FCC-ee and related challenges

Eur. Phys. J. Plus

doi:10.1140/epjp/s13360-021-02189-y

2019 Heavy resonances at energy-frontier hadron colliders

Eur. Phys. J. C

doi:10.1140/epjc/s10052-019-7062-3

2016 Containment and resolution of hadronic showers at the FCC

JINST 11, P09012

doi:10.1088/1748-0221/11/09/P09012

2016 Measurement of the charge asymmetry in top-quark pair production in the lepton-plus-jets final state at $\sqrt{s} = 8$ TeV with the ATLAS detector*Eur. Phys. J. C · ATLAS Collaboration*

doi:10.1140/epjc/s10052-016-3910-6

2015 Search for production of vector-like quark pairs and of four top quarks in the lepton-plus-jets final state at $\sqrt{s} = 8$ TeV with the ATLAS detector*JHEP 08 (2015) 105 · ATLAS Collaboration*

doi:10.1007/JHEP08(2015)105