

Lai Gui

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Interactive Profile & Research Portfolio: www.laigui.ch

Education

EPFL (École Polytechnique Fédérale de Lausanne) Lausanne, Switzerland
Master of Science in Physics 2024 – Present

- Averaged result: 5.17/6.00 (Excl. Master Thesis). Concentration in High Energy Physics.

Imperial College London London, United Kingdom
Bachelor of Science in Physics with Theoretical Physics 2021 – 2024

- Averaged result: 77.88%. Graduated First Class Honours Degree.
- President and representative competitor of the Imperial College Kendo Club.
- Japanese language teacher at the Imperial College Japanese Society.

Maranatha Christian School Melbourne, Australia
Secondary School, Victorian Certificate of Education – Baccalaureate 2017 – 2019

- ATAR (Australian Tertiary Admission Rank): 99.85 (top 0.15% percentile).
- Graduated as the valedictorian.

Selected Research Projects

Specialisation Project | EPFL (LHCb Experiment) Lausanne, Switzerland
[Signal Classification Using Boosted Decision Trees on Imbalanced Collider Datasets](#) Nov 2025 – Jan 2026

- **Advanced Imbalance Classification:** Optimised a Boosted Decision Tree (BDT) model (XGBoost, scikit-learn) to isolate rare $B_s^0 \rightarrow \tau^+\tau^-$ signal events from an ultra-highly imbalanced background dataset with a $10^7:1$ noise-to-signal ratio.
- **Feature Engineering:** Engineered high-dimensional input variables across particle kinematics; evaluated feature interactions using Pearson correlation matrix and SHAP feature importance to eliminate redundancy while preserving model interpretability.
- **Performance Benchmark:** Deployed the model onto production-scale datasets to maximise true-positive rates; raised the baseline AUC score from 0.932 to 0.957 and slashed the background misclassification rate from 0.70% to 0.46%.

Summer Internship | Imperial College London London, United Kingdom
[Neuromorphic Computing and Multi-Horizon Time-Series Forecasting](#) Aug – Sept 2023

- **Next-Gen AI Research:** Built a Gated Recurrent Unit (GRU) using PyTorch to replicate high-dimensional nanomagnetic array output to investigate the potential hardware-level acceleration of computationally intensive matrix operations.
- **Neural Network Topology:** Engineered hybrid, series-parallel network topologies using frozen digital twins and trainable interconnections to forecast a highly chaotic, non-linear Mackey-Glass time series across 20 simultaneous future horizons.
- **Structural Performance Evaluation:** Demonstrated that series-connected topologies significantly outperformed single-array and parallel baselines; co-authored a noise-aware neural-SDE framework published in *Nature Communications* ([9192 \(2025\)](#)).

Extracurricular Experiences

Ski & Snowboard Instructor Villars-sur-Ollons, Switzerland
[École Suisse de Ski \(Swiss Ski School\) - Villars](#) Dec 2025 – Apr 2026

- **Client Relationship Establishment:** Logged 182.5 hours of private lessons for international English- and Mandarin-speaking clients, dynamically tailoring complex technical skill development to individual fitness and capability profiles.
- **Risk Mitigation & Management:** Managed real-time situational safety, mountain navigation, and terrain hazard evaluation across challenging alpine environments, executing rapid emergency protocol responses during on-slope accidents.
- **Operational Support & Logistics:** Coordinated daily guest relations, teaching resource allocation and class distribution to maximise peak-season throughput, streamline multi-day client scheduling and enhance overall customer experience.

Student Mountain Guide Switzerland
[Crazy Hikers Hiking Club](#) Jun 2025 – Present

- **Risk Assessment & Planning:** Designed hiking routes across challenging Swiss alpine terrain by evaluating real-time weather data, topographical maps, and terrain hazards to ensure participant safety and optimise attendee experience.
- **Technical Instruction & Mentorship:** Educated novice hikers on technical equipment selection, weather forecasting, and mountain navigation to ensure autonomous and safe route execution across diverse and complex alpine environments.
- **Group Leadership & Crisis Adaptability:** Co-led alpine excursions for groups of 10 to 30 participants, coordinating logistics and maintaining group cohesion under variable and demanding mountain conditions to mitigate operational risk.

Additional Information

Nanodegrees: “Claude Code in Action” and “AI Capabilities and Limitations” courses by Anthropic

Computing Skills: Python, C++, AI Agents, PyTorch, XGBoost, Scikit-learn, Transformers, Monte Carlo Simulation

Interests: Alpine skiing & snowboarding, windsurfing, tennis, kendo, bouldering, hiking, marathon running

Languages: Mandarin Chinese and English (native), Japanese (fluent), French (intermediate)