LÉA CASSÉ

PhD Candidate
Quantum Machine Learning for Data Streams
&
Freelance AI/ML Consultant
Quantum Machine Learning for Data Streams

University of Waikato · École Polytechnique / IP Paris · France / New Zealand
+33 6 89 22 42 22 · casse.lea@gmail.com · ORCID 0009-0008-6633-4720

CORE SKILLS

Quantum ML data re-uploading, Fourier/spectral diagnostics.

ML & streams PyTorch, scikit-learn, time series, RL, XAI.

Engineering Python, NumPy, pandas, PennyLane, Qiskit, FastAPI, Git.

Languages French C2, English C1, Spanish B1.

EDUCATION

2024-2027 PhD, Quantum ML for Data Streams, Univ. of Waikato & École Polytechnique / IP Paris.

2021-2023 MSc Quantum Physics, Université de Montpellier, with honours.

2018-2021 BSc Advanced Fundamental Physics, Université Paul Sabatier, Toulouse, with honours.

2015-2018 Scientific Baccalaureate, Lycée Joseph Saverne, with honours.

AWARDS

- 2025 Global Industry Challenge — Winner, World Bank Climate Risk Challenge track, DelphiQ. Presented DelphiQ prototype at Quantum World Congress, Washington, DC.
- UNSW Peter Farrell Cup Program
- Quantum Pioneer badge
- IBM Quantum Challenge achievement.

PUBLICATIONS & SELECTED OUTPUTS

- Cassé, L.; Ponnambalam, S.; Pfahringer, B.; Bifet, A. "Quantum Reupload Units: A Scalable and Expressive Approach for Time Series Learning." IEEE Quantum Week / QCE 2025.
- Cassé, L.; Pfahringer, B.; Bifet, A.; Magniette, F. "Optimizing Hyperparameters for Quantum Data Re-Uploaders in Calorimetric Particle Identification." arXiv, 2024.
- "Quantum Re-Uploading for Streaming Time-Series: Fourier Analysis and Climate-Risk Use-Cases." AI Institute / AINZ poster, 2025.
- "Reinforcement learning for bus traffic: next-station load prediction and dispatch simulation."
- PennyLane community demo: QRU implementation with PennyLane and PyTorch.

TEACHING & COMMUNICATION

2019-present **Private Tutor** — *Superprof & independent*
- Teach mathematics, physics, quantum physics and English/French in individual remote lessons.

2024-2025 **French Teacher** — *Alliance Française; Montessori & Steiner schools, New Zealand*
- Delivered French lessons for adults and children in group and school settings.

2026 **QML science communication** — *TAIAO / AI Education NZ*
- Host and contributor for short-form Quantum Machine Learning content on climate-impact use cases and dynamic data.

PROFILE

PhD candidate in Quantum Machine Learning for Data Streams and freelance AI/ML consultant. I work on shallow variational circuits for time-series and streaming data, with a focus on QRU-based models and spectral analysis.

RESEARCH & APPLIED WORK

2024-2027 **PhD Candidate in Quantum ML for Data Streams** — *University of Waikato & École Polytechnique / IP Paris*
- Develop QRU models for streaming time series: study expressivity, trainability, gradients and spectral/Fourier structure in shallow circuits.
- Built a QRU flood-risk forecaster and QRU→QAOA/CVaR climate-insurance prototype: DelphiQ won the World Bank track of the Global Industry Challenge and presented at QWC Washington DC.
- Developed 1-qubit QRU models for calorimetric particle identification with systematic hyperparameter sweeps under NISQ constraints.
- Prototyped QLSTM and quantum-enhanced RL directions for bus headway regulation and next-station passenger-load prediction.

2026-present **AI / ML Research Consultant** — *InvestMint Inc.*
- Design semantic-banking and governance logic: synthetic data contracts, forecasting, audit/provenance, XAI hooks and human-in-the-loop review.
- Build evaluation gates and client-facing prototype logic using Python, FastAPI-style interfaces and reproducible test fixtures.

2026-present **Natural Events Research Consultant** — *OMVIUS*
- Work on diagnostic design for natural-event regime shifts and pre-event signals, with an emphasis on reproducibility, dataflow clarity and interpretable outputs.

2026-present **XAI Research Collaborator** — *EMG gesture-classification project*
- Analyse model behaviour on multi-channel EMG signals under cross-day/domain-shift settings, using attribution methods to separate physiologically meaningful regions from unstable artefacts.

EARLIER RESEARCH EXPERIENCE

2023 **Research internship — Quantum ML for data streams** — *AI Lab, University of Waikato*
- Worked on streaming quantum ML under Prof. Albert Bifet; this work led into the current PhD direction.

2022 **Experimental internship — NV centres in diamond** — *L2C Montpellier*
- Contributed to experimental quantum-physics work on NV centres under Dr. Vincent Jacques.

2021 **Quantum computing project — Bell violations** — *Quantumalta, University of Malta*
- Studied Bell violations and quantum-computing concepts under Dr. André Xuereb.

2020-2022 **Physics projects** — *Toulouse & Montpellier*
- Worked on quantum chaos and Bell inequalities through university research projects.