Louis Follet

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Summary

PhD student at MIT specializing in **AI for Science**, **quantum optics**, and **photonics**. I work at the intersection of machine learning and physics, building methods that bridge simulation and experiment to create reliable, generalizable models for real-world scientific and engineering challenges.

Current Research

Massachusetts Institute of Technology - Quantum Photonics & AI Group Sep. 2023 – Present
Graduate Research Assistant - EECS | Advisor : Prof. D. Englund *Cambridge, MA, USA*

- Bridging automated, high-throughput optical experiments and physics-aware surrogates for inverse modeling of semiconductor fabrication variations. Collaboration with NVIDIA.
- Developing physics-constrained neural operators for quantum dynamics.
- Designing and characterizing foundry-fabricated photonic devices (GlobalFoundries, AIM Photonics) via inverse design and GPU-accelerated FDTD simulations, for various applications [3][4].
- Contributing to theoretical work on optimal control and entanglement of solid-state qubits [1].

Prior Research

Collège de France - Laboratoire Kastler Brossel Mar. 2023 – Jul. 2023
Research Intern - Ultracold Atoms | Advisor : Prof. S. Nascimbene *Paris, FR*

- Modeled and built an experimental setup to optimize atom transport in an optical dipole trap.
- Skills: physics-based modeling & simulation, Python (data analysis & image processing), hardware design & integration.

University of Cambridge - Cavendish Laboratory Mar. 2022 – Aug. 2022
Research Intern - Quantum Optics | Advisor : Prof. M. Atatüre *Cambridge, UK*

- Spectroscopy of spin-active defects in hexagonal Boron Nitride films, published in Nature Materials [2][5].
- Skills: experimental automation (Python/Qudi), synchronized microwave-optical control, model-based fitting of spin-resonance data.

NTT Research - Physics and Informatics laboratory May 2021 – Aug. 2021
Research Intern - Nonlinear Optics | Advisor : Dr. MG. Suh *Sunnyvale, CA, USA (remote)*

- Simulated nonlinear wave propagation in optical resonators to study stability and pattern formation.
- Skills: numerical modeling of nonlinear dynamical systems, spectral solver implementation (MATLAB), parameter-sweep automation.

Education

Massachusetts Institute of Technology | EECS department 2023 – Present
PhD Student

- Research in the **Quantum Photonics & AI Group**, supervised by Professor Dirk Englund.
- Courses: Deep Learning, Applied Quantum and Statistical Physics, Numerical simulations, Silicon Photonics. (GPA: 5.0/5.0)

École Normale Supérieure (ENS) Paris-Saclay | Physics department 2019 – 2023
Diplôme de Normalien - Bachelor and Master of Science in Physics

- Included a **specialization year in Quantum Technologies** (ARTeQ), providing interdisciplinary training in computer science, fundamental physics, and applied physics.
- Double diploma with the Institut d'Optique Graduate School.

Institut d'Optique Graduate School – Paris-Saclay University 2019 – 2023
Diplôme d'ingénieur - Bachelor and Master of Science in Engineering

- Double diploma with the École Normale Supérieure Paris-Saclay.

Publications

[1] P. Anand*, **L. Follet***, O. Hooybergs*, D. R. Englund, "*Programmable Quantum Matter: Heralding Large Cluster States in Driven Inhomogeneous Spin Ensembles*", **arXiv preprint** arXiv:2509.02992 (2025).

[2] H. Stern, C. Gilardoni, Q. Gu, S. Eizagirre Barker, O. Powell, X. Deng, **L. Follet**, C. Li, A. Ramsay, H. Tan, I. Aharonovich, M. Atatüre, "*A quantum coherent spin in hexagonal boron nitride at ambient conditions*", **Nature Materials** (2024).

* *Equal contribution.*

Conferences

[3] **L. Follet**, J. Goldstein, C. Panuski, I. Christen, D. Englund, *"Thermal Infrared Detection with an Optically-Probed Photonic Crystal Bolometer"*, Conference on Lasers and Electro-Optics (CLEO), 2025.

[4] **L. Follet**, I. Berkman, Q. Gu, C. Panuski, I. Christen, D. Englund, *"Pathway towards large-scale characterization of Er^{3+}-doped state-of-the-art Si nanophotonic cavities"*, QSEC Annual Research Conference (QuARC), 2024.

[5] O. Powell, H. Stern, C. Gilardoni, Q. Gu, S. Eizagirre Barker, X. Deng, **L. Follet**, C. Li, A. Ramsay, H. Tan, I. Aharonovich, M. Atatüre, *"Spin and optical properties of two-dimensional single color centers in hexagonal boron nitride"*, Bulletin of the American Physical Society, 2024.

Awards - Scholarships

IDEX Excellence Scholarship 2022

- Delivered by the Paris-Saclay University for international mobility, upon excellent academic results.

Quantum Paris-Saclay Scholarship 2021-2022

- Delivered to top students majoring in Physics with an emphasis on Quantum Technologies, within the framework of the French Quantum Plan.

Skills

- **Languages**: English (Proficient), French (Native).
- **Programming**: Python (PyTorch, QuTiP, GDSFactory, data analysis & hardware control), MATLAB.
- **Machine Learning**: Deep Learning (CNNs, GNNs, Transformers), Generative Models (VAEs, Diffusion), Neural Operators, PDE solving, physics-constrained modeling, inverse problems.
- **Tools & Software**: Ansys Lumerical, FlexCompute Tidy3D, COMSOL Multiphysics, Tesselmax.EM, SolidWorks, Zemax. Experience with agentic AI systems and MCP-based lab automation.
- **Experimental Techniques**: Automated optical characterization, optical metrology, balanced homodyne detection, free-space & integrated photonics.
- **Soft Skills**: Problem-solving, clear communication, interdisciplinary collaboration, leadership in technical projects.

Extracurricular activities

Graduate Application Assistance Program (GAAP) 2023 – Present

- Mentoring underrepresented students in their PhD application process, offering guidance on research statements and academic positioning.

MIT's annual quantum hackathon (iQuHACK) 2024

- Member of the volunteers team, helping students among the 1300 participants overcoming technical challenges posed by industry partners.