

François-Marie LE RÉGENT

Quantum Error Correction Engineer at Pasqal

  
[fm.le.regent\[at\]gmail.com](mailto:fm.le.regent[at]gmail.com)

Experience

- 2024–present **Quantum Error Correction Engineer**, *Pasqal*, Massy.
Design and simulations of physical gates, error correction circuits and fault-tolerant quantum computing applications for a neutral-atom quantum computer. Management of interns and a PhD student (together with Anthony Leverrier from INRIA about quantum LDPC codes). Project management of the QEC implementation project.
- 2025–present **Lecturer**, *Master QLMN*, Palaiseau.
Course: [Experimental Quantum Computing and Error Correction \(Master 2\)](#).
Co-taught with [Antoine Broaways](#) and Pascal Scholl.
Delivering lectures on Superconducting qubits (LC circuit, transmons and cat qubits), QEC and FTQC applications.
Designing problem sets and evaluating students.
- 2020–2024 **PhD Candidate**, *Alice & Bob*, Paris.
Between the QUANTIC team at INRIA and Alice & Bob.
Quantum error correction for bosonic codes, concatenated fault-tolerant quantum computing architectures, numerical model reductions.
- 2022 **Quantum Hackathon**, *QuantX*, *Atos campus*, Grenoble.
Five Alice & Bob-member team, 1st prize. Approximate the linear structures of Boolean functions. Advanced Encryption Standard (AES) and Hadamard-Walsh transform.
- 2020 **Master 2 research internship**, *QUANTIC team at INRIA*, Paris.
“Quantum operations on repetition cat qubits”, under the supervision of Mazyar Mirrahimi and Jérémie Guillaud.
Topics: Lattice surgery, magic state preparation and quantum teleportation to perform logical gates.
- 2019 **Quantum Hackathon**, *Le lab quantique*, Paris.
Four-member team. Pan-European Quantum Internet hackathon. Distributing Graph States Over Arbitrary Quantum Networks using Simulaqron.
- 2019 **Web Hackathon**, *École polytechnique*, Palaiseau.
Two-member team, 1st prize. Development of a mobile app using VueJS+Postgres for an association providing residential care for 120 child-welfare teenagers placed aged 14 to 21, both boys and girls.
- 2019 **Research internship**, *Atos and Argonne National Laboratory*, Chicago.
Tensor slicing algorithm on QAOA for running large scale quantum circuits with Atos and IBM Python libraries & comparing results from Quantum Computers and simulators.
- 2019 **Research Project**, *École polytechnique & Collège de France*, Paris.
Random Phase Approximation model for the calculus of the correlation length of electrons in solids. Under the supervision of Thomas Schäfer & Michel Ferrero.
- 2018 **Global External Manufacturing intern**, *Sanofi*, Paris, Scoppito, Lüleburgaz, Budapest.
Creation and implementation of an energy assessment tool to monitor the data of the HVAC (Heating, Ventilation, Air conditioning) systems.
- 2017–2020 **Website and application**, *Platal*, Paris.
Entrepreneurial project of a personalized & geolocation-based timetable for the students and the museum of the École polytechnique.
- 2016–2017 **Officer**, *French Navy*, Brest, Indian Ocean.
Assistant to the second-in-command and officer in charge of public relations on “le Malin”, a French Navy vessel with a mission to Reunion Island as pilot officer.

Education

- 2020–2024 **PhD, Quantum Physics**, *QUANTIC team at INRIA (National Institute for Research in Digital Science and Technology) in collaboration with Alice & Bob*, Paris.
“Optimal architecture for a fault-tolerant universal quantum computer based on cat-qubits”, under the supervision of Mazyar Mirrahimi, Pierre Rouchon and Jérémie Guillaud.
Presentations at international conferences (2022 and 2023 American Physical Society’s March Meetings), submission to scientific journals, intern supervisions, three patents filed. Defended on March 2024.
- 2019–2020 **International Center for Fundamental Physics (ICFP) Master, Quantum Physics track**, *École Normale Supérieure Ulm*, Paris.
Quantum information, communication and computing.
- 2016–2020 **Engineering student**, *École polytechnique*, Palaiseau.
Quantum Physics, Materials Science, Computer Science, Mechanics.
- 2013–2016 **Preparation for competitive entrance exams to engineering schools**, *Lycée Marcelin Berthelot*, Saint-Maur-des-Fossés.
Mathematics, Physics, Chemistry.

Publications

Journal Articles

- 2025 **Le Régent, François-Marie** (July 2025). “Awesome Quantum Computing Experiments: Benchmarking Experimental Progress Towards Fault-Tolerant Quantum Computation”. In: arXiv: 2507.03678 [quant-ph]. <http://arxiv.org/abs/2507.03678>.
- 2024 **Le Régent, François-Marie** and Pierre Rouchon (Mar. 2024). “Adiabatic elimination for composite open quantum systems: Reduced-model formulation and numerical simulations”. In: *Physical Review A* 109.3, p. 032603. <https://link.aps.org/doi/10.1103/PhysRevA.109.032603>.
- 2023 Gouzien, Élie, Diego Ruiz, **François-Marie Le Régent**, Jérémie Guillaud, and Nicolas Sangouard (July 2023). “Performance Analysis of a Repetition Cat Code Architecture: Computing 256-bit Elliptic Curve Logarithm in 9 Hours with 126133 Cat Qubits”. In: *Physical Review Letters* 131.4. <http://dx.doi.org/10.1103/PhysRevLett.131.040602>.
- 2023 **Le Régent, François-Marie**, Camille Berdou, Zaki Leghtas, Jérémie Guillaud, and Mazyar Mirrahimi (Dec. 2023). “High-performance repetition cat code using fast noisy operations”. In: *Quantum* 7, p. 1198. <http://dx.doi.org/10.22331/q-2023-12-06-1198>.
- 2021 Ayral, Thomas, **François-Marie Le Régent**, Zain Saleem, Yuri Alexeev, and Martin Suchara (Mar. 2021). “Quantum Divide and Compute: Exploring the Effect of Different Noise Sources”. In: *SN Computer Science* 2.3. <http://dx.doi.org/10.1007/s42979-021-00508-9>.
- 2021 Schäfer, Thomas, Nils Wentzell, Fedor Šimkovic, Yuan-Yao He, Cornelia Hille, Marcel Klett, Christian J. Eckhardt, Behnam Arzhang, Viktor Harkov, **François-Marie Le Régent**, Alfred Kirsch, Yan Wang, Aaram J. Kim, Evgeny Kozik, Evgeny A. Stepanov, Anna Kauch, Sabine Andergassen, Philipp Hansmann, Daniel Rohe, Yuri M. Vilk, James P.F. LeBlanc, Shiwei Zhang, A.-M.S. Tremblay, Michel Ferrero, Olivier Parcollet, and Antoine Georges (Mar. 2021). “Tracking the Footprints of Spin Fluctuations: A MultiMethod, MultiMessenger Study of the Two-Dimensional Hubbard Model”. In: *Physical Review X* 11.1. <http://dx.doi.org/10.1103/PhysRevX.11.011058>.

In Conference Proceedings

- 2023 **Le Régent, François-Marie** and Pierre Rouchon (2023). “Heisenberg formulation of adiabatic elimination for open quantum systems with two time-scales”. In: *Proceedings of IEEE 62st Conference on Decision and Control (CDC 2023)*. arXiv: 2303.17308 [quant-ph].

- 2020 Ayral, Thomas, **François-Marie Le Régent**, Zain Saleem, Yuri Alexeev, and Martin Suchara (July 2020). “Quantum Divide and Compute: Hardware Demonstrations and Noisy Simulations”. In: *2020 IEEE Computer Society Annual Symposium on VLSI (ISVLSI)*. IEEE. <http://dx.doi.org/10.1109/ISVLSI49217.2020.00034>.

Patents

Quantum architecture, quantum gates, quantum simulation (undisclosed).

- 2025 Berdou, Camille, **François-Marie Le Régent**, Jérémie Guillaud, Zaki Leghtas, and Mazyar Mirrahimi (2025). *Asymmetric repetition code for a cat-qubit*. US Patent App. 18/846,501. <https://patents.google.com/patent/US20250190839A1/en>.
- 2024 Rouchon, Pierre and **François-Marie Le Régent** (2024). *Device and method for simulating an open quantum system*. US Patent App. 18/597,954. <https://patents.google.com/patent/US20240303519A1/en>.

Computer skills

Languages **Python**, git, LaTeX, MATLAB, bash, slurm, HTML, CSS, JavaScript, SQL.

Software Vim, Github, Gitlab, VSCode, PyCharm.

Python package QuTiP, PyMatching, Stim, MyQLM, Qiskit, Pytest.

Communication

French:	Mother tongue		English:	C1 level		Spanish:	B2 level
---------	---------------	--	----------	----------	--	----------	----------