# Baptiste Lerat

Quantum Physics PhD candidate

+33788329058
baptiste.lerat22@imperial.ac.uk
linkedin.com/in/baptiste-lerat
github.com/balerat


## Education

**Imperial College of London**
**MSc in Physics with Quantum dynamics – 3.77/4 GPA, Distinction** *Oct 2022 – Oct 2023*
Coursework: Quantum Information, Quantum Optics, Nonlinear Optics, Atomic structure, Cold Atomic Systems, Hybrid Quantum Systems, Quantum theory of matter, Quantum dynamics, Quantum error correction.

**Ecole Centrale de Lyon**
**MSc in Engineering – 3.86/4 GPA** *Sep 2020 – Present*
Coursework: Electromagnetism, Laser science, Nuclear Science, Machine learning, Deep learning, Electronics, OOP, Algorithms, Probabilities & Statistics, Economics, Sociology and Ethics.

**CPGE « classes préparatoires » MP*** *Sep 2018 – April 2020*
Bachelor level in Math and Physics: Algebra, Analysis, Discrete Probabilities, Electromagnetism and Chemistry

## Experience

**Atos, Eviden – Research Intern – Quantum Algorithm** *Jan 2024 - Present*
- Conducted comprehensive research on quantum algorithms, focusing on their application in physics problems.
- Tensor network simulation of Hubbard physics with MPS and mean field approach.
- Simulation of open systems with quantum trajectories and tensor networks.

**Imperial College – Master Thesis – Wigner Tomography of Transmon qubits** *May 2023 – Oct 2023*
- Took part in a research group to study novel use of readout capabilities for Transmon qubit.
- Python simulation of two transmon coupling systems via a microwave resonator for parameter optimization in python with Bayesian optimization. Analysis of the shifts induced in the system with Mathematica.
- Design of a Wigner Tomography experiment protocol of transmon qubit for possible patented application.
- Mathematical formalism of transmon qubit coupling in superconducting circuits with Laplacian discretization

**IBM – Spring Quantum Challenge 2023** *April 2023*
- Participated in the spring 2023 edition of the IBM Quantum Challenge on dynamical quantum circuits.
- Qiskit programming to solve problems on qubit error correction, quantum teleportation and iterative phase estimation with simulation on a real quantum computer with IBM cloud.

**CNRS – Research Intern – Nanotechnologies and Photonics** *May 2022 – Aug 2022*
- Studied the Klein paradox in an optical fishbone structure, a relativistic quantum tunneling effect on photons.
- Literature review, simulation on RSoft and MATLAB to characterize the material and to highlight the effect and the main parameter susceptible to affect the relativistic tunneling of the photons.

**Centrale Lyon – Research project – Strong coupling of light and matter** *Sep 2021 – Sep 2022*
- Creation of a Fabry-Perot cavity to study strong coupling of light with perovskite cavity polaritons.
- Design of dielectric Bragg mirror and cavity spectrum on MATLAB. Fabrication of the cavity in cleanroom environments with spin coating technique. Conducted an optical experiment to visualize the strong coupling of light inside the cavity and spectrum analysis to quantify the coupling of the polaritons.

## IT Skills and Interests

**Programming:** Python, NumPy, SciPy, Qutip, MATLAB, Mathematica, Qiskit, TensorFlow, Pennylane, Rust

**Stanford & Deeplearning.ai – Machine learning specialization**
Coursera formation: Neural Network, TensorFlow, Clustering, XGBoost, K-means, Decision trees, Linear regression

**Centrale Lyon – Math and Physics Club – Founder**
Founded the first math and physics club in Centrale Lyon with the objective of giving student interested fundamentals science and testing their problem-solving skills.