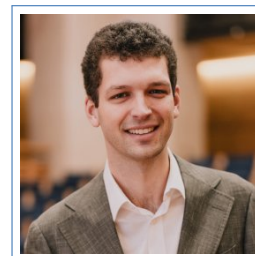


Cyril Letrouit

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Born on April 7, 1996



Employment

- 2023- **CNRS researcher**, *Laboratoire de mathématiques d'Orsay*, Université Paris-Saclay
Recruited in April 2022.
- 2022-2023 **Postdoctoral associate**, *Massachusetts Institute of Technology*
- 2019-2022 **Teaching assistant**, *Département de mathématiques et applications*, École Normale Supérieure (Paris)

Education

- 2018-2021 **PhD in mathematics**, *Laboratoire J.-L. Lions (LJLL)*, Sorbonne Université, Paris
Under the supervision of Emmanuel Trélat and Yves Colin de Verdière.
- 2018 **M.A. in mathematics**, *Sorbonne Université (Jussieu)*, Paris, with highest honors
- 2016 **B.A. in mathematics**, *Université Paris VI (Jussieu)*, Paris, with highest honors
- 2015-2019 **Studies in Mathematics at the École Normale Supérieure (Paris)**
Admission in 2015, concours Maths-Physique, ranked 1st.
- 2013 - 2015 **Classes préparatoires MPSI/MP***, *Lycée Louis le Grand*, Paris

Publications and preprints

- 16. **Stability of optimal transport maps on Riemannian manifolds**, with Jun Kitagawa and Quentin Mérigot.
Preprint arXiv:2504.05412 (2025).
- 15. **Gluing methods for quantitative stability of optimal transport maps**, with Quentin Mérigot.
Preprint arxiv:2411.04908 (2024).
- 14. **Delocalized eigenvectors of transitive graphs and beyond**, with Nicolas Burq.
Preprint arxiv:2407.12384 (2024).
- 13. **Generic controllability of equivariant systems and applications to particle systems and neural networks**, with Andrei Agrachev.
To appear in *Annales de l'Institut Henri Poincaré, Analyse Non Linéaire*.
- 12. **A mathematical perspective on Transformers**, with Borjan Geshkovski, Yury Polyanskiy and Philippe Rigollet.
To appear in *Bulletin of the AMS*.
- 11. **Maximal multiplicity of Laplacian eigenvalues in negatively curved surfaces**, with Simon Machado.
Geometric and Functional Analysis (2024).
- 10. **The emergence of clusters in self-attention dynamics**, with Borjan Geshkovski, Yury Polyanskiy and Philippe Rigollet.
NeurIPS (2023).
- 9. **Nodal sets of eigenfunctions of sub-Laplacians**, with Suresh Eswarathan.
International Mathematics Research Notices (2023).

8. **Quantum limits of sub-Laplacians via joint spectral calculus.**
Documenta Mathematica (2023).
7. **Propagation of singularities for subelliptic wave equations.**
Communications in Mathematical Physics (2022).
6. **Propagation of well-prepared states along Martinet singular geodesics**, with Yves Colin de Verdière.
Journal of Spectral Theory (2022).
5. **Observability of Baouendi-Grushin-type equations through resolvent estimates**, with Chenmin Sun.
Journal de l'Institut Mathématique de Jussieu (2023).
4. **Observability and controllability for the Schrödinger equation on quotients of groups of Heisenberg type**, with Clotilde Fermanian Kammerer.
Journal de l'École Polytechnique (2021).
3. **Subelliptic wave equations are never observable.**
Analysis and PDEs (2023).
2. **Catching all geodesics of a manifold with moving balls and application to controllability of the wave equation.**
Annali della Scuola Normale Superiore di Pisa Cl. Sci. (2023).
1. **From internal to pointwise control for the 1D heat equation and minimal time.**
Systems and Control Letters (2019).

Other writings

- **Exact observability properties of subelliptic wave and Schrödinger equations.**
Actes du séminaire de Théorie Spectrale et Géométrie.
- **On a new generalization of the Droz-Farny line.**
Forum Geometricorum (2016).

Talks at conferences and workshops

- Jul. 2025 **Control of PDEs and related topics**, Toulouse
- Jun. 2025 **Hypoellipticity in Lund**, Lund University, Sweden
- Jun. 2025 **Meeting of the ANR GeoDSIC**, Nantes
- May. 2025 **Optimal control theory and sub-Riemannian geometry in Paris**, Paris
- Mar. 2025 **PDE AI annual meeting**, Paris
- Dec. 2024 **IMS International Conference on Statistics and Data Science**, Nice
- Nov. 2024 **Workshop “Random hyperbolic surfaces and random graphs”**, CIRM, Marseille
- Jul. 2024 **Workshop “Paris-Padova sub-Riemannian geometry”**, Università di Padova
- Jun. 2024 **Conference “Learning and Optimization in Luminy”**, CIRM, Marseille
- Mar. 2024 **Workshop “Particle systems in dynamics, optimization and learning”**, Lagrange Center, Paris
- Dec. 2023 **Conference NeurIPS@Paris 2023**, Sorbonne Center on Artificial Intelligence
- Sept. 2023 **Meeting of the ANR Adyct**, Nice
- Aug. 2023 **High frequency analysis: from operator algebras to PDEs**, Angers
- Oct. 2022 **Workshop on control problems**, TU Dortmund (Germany), Online
- Mar. 2022 **Journées Jeunes EDPistes**, Institut Camille Jordan, Lyon
- Feb. 2022 **14èmes rencontres du GDR Dynamique Quantique**, Toulouse
- Feb. 2022 **Mathematics of Wave Phenomena**, Karlsruhe Institute of Technology (Germany), Online
- Nov. 2021 **Conference in memory of Geneviève Raugel**, LMO, Orsay

Oct. 2020 **Spectral theory and geometry**, *Chalès*
Sept. 2020 **Sub-Riemannian Geometry and Interactions**, *Paris*

Talks in seminars

May 2025 **Séminaire de systèmes dynamiques**, *LAGA, Paris 13*
Apr. 2025 **Séminaire de physique mathématique**, *Institut Fourier, Grenoble*
Feb. 2025 **Online seminar on interactions between geometry and statistics**
Dec. 2024 **Problèmes spectraux en physique mathématique**, *Institut Henri Poincaré*
Nov. 2024 **Analysis seminar**, *Université Versailles-Saint-Quentin*
Oct. 2024 **Analysis seminar**, *Yale University, New Haven*
Sep. 2024 **Math of Data seminar**, *Courant Institute, New York*
May 2024 **Analysis seminar**, *Laboratoire Jean Leray, Nantes*
Apr. 2024 **Groupe de travail Neural networks**, *Université Paris-Cité*
Apr. 2024 **Harmonic analysis seminar**, *LMO, Orsay*
Apr. 2024 **Machine Learning and Signal Processing**, *ENS Lyon*
Mar. 2024 **Probability and statistics seminar**, *Laboratoire Jean Dieudonné, Nice*
Feb. 2024 **FLAIR seminar**, *EPFL (Switzerland)*
Feb. 2024 **CSD (Centre de science des données) seminar**, *ENS Paris*
Feb. 2024 **Geometry and topology seminar**, *Institut de Mathématiques de Jussieu*
Jan. 2024 **Applied Analysis seminar**, *Institut de Mathématiques de Marseille*
Jan. 2024 **PDE seminar**, *Institut de Mathématiques de Bordeaux*
Jan. 2024 **SISSA seminar**, *Trieste (Italie)*
Nov. 2023 **Spectra and Moduli seminar**, *Durham University (England)*
Oct. 2023 **Harmonic Analysis e-Seminar**, *Online*
Oct. 2023 **GdT Transport Optimal, EDP et Machine Learning**, *LMO, Orsay*
Sep. 2023 **Spectral geometry in the clouds seminar**, *Online*
Mar. 2023 **Analysis and PDE seminar**, *University of North Carolina, Chapel Hill (USA)*
Feb. 2023 **Analysis and PDE seminar**, *MIT, Cambridge (USA)*
Feb. 2023 **PDE seminar**, *Brown University, Providence (USA)*
Jan. 2023 **CRM/Montreal/Québec Analysis Seminar**, *UQàM, Montreal (Canada)*
Nov. 2022 **Analysis Seminar**, *Northwestern University (USA)*
Mar. 2022 **Analysis seminar**, *University of Bologna (Italy)*, *Online seminar*
Oct. 2021 **PDE seminar**, *Laboratoire Jean Dieudonné, Nice*
June 2021 **Semiclassical analysis and representation theory seminar**, *Dep. of Math. and Computer Sc., Cologne (Germany)*, *Online seminar*
May 2021 **Applied analysis seminar**, *I2M, Marseille*, *Online seminar*
Mar. 2021 **Analysis seminar**, *IMT, Toulouse*
Feb. 2021 **Webinar “Control in Time of Crisis”**, *Online seminar*
Dec. 2020 **“Applications of mathematics” seminar**, *ENS Rennes*, *Online seminar*
Nov. 2020 **Analysis seminar**, *IRMA, Strasbourg*, *Online seminar*
June 2020 **PhD students seminar**, *LMO, Orsay*, *Online seminar*
Apr. 2020 **Open PDE & Analysis Seminar**, *LMO, Orsay*, *Online seminar*
Mar. 2020 **Analysis seminar**, *Laboratoire Jean Leray, Nantes*
Mar. 2020 **PDEs and Spectral theory seminar**, *LAREMA, Angers*
Jan. 2020 **Spectral theory and geometry seminar**, *Institut Fourier, Grenoble*
Apr. 2019 **Seminar of the Inria team CAGE**

Other talks

Oct. 2023 **Journée de rentrée de l'équipe d'analyse du LMO**
 Nov. 2021 **LJLL "Journée Interne"**
 Dec. 2019 **Talk for students of classes préparatoires scientifiques visiting ENS**
 Nov. 2019 **Talk at the master/PhD meeting of LJLL**
 Oct. 2019 **ENS maths department "Journée de rentrée de l'équipe d'analyse"**
 Oct. 2019 **ENS maths department "Journée de rentrée"**
 Feb. 2019 **LJLL PhD students workshop**

Referee

Referee for the following journals: Duke Mathematical Journal, Communications in Mathematical Physics, Annales Henri Poincaré, Mathematische Annalen, Journal de l'École Polytechnique, Proceedings of the AMS, Advanced Nonlinear Studies, Revista Matematica Iberoamericana, Vietnam Journal of Mathematics, SIAM Journal on Control and Optimization ($\times 3$), ESAIM: COCV ($\times 4$), Quarterly of Applied Mathematics.

Quick opinion for several journals.

Teaching

Cours Peccot du Collège de France 2024-2025

"Stabilité quantitative du transport optimal"

Graduate courses

2025: "Eigenfunctions of the Laplacian" (Orsay, Master AMS).

Organisation of the "Maths-industry workshop" at ENS

Every year from 2019 to 2022, with Bertrand Maury, we submitted problems raised by industrials to master students at ENS and we supervised their work. Problems came from transport industries (Vallée Sud, Urbanloop, IFPEN), PharmaTech industry (Aqemia), bio industry (Greenweez, Tenko), big companies (EDF, Michelin, Criteo, Google).

Teaching assistant

2018-2019: "Vectorial analysis and multiple integrals" (Sorbonne Université, L2).

2018-2019: "Linear algebra II, affine geometry" (Sorbonne Université, L2).

2019-2021: "Partial Differential Equations" (ENS Paris, M1).

2023-2024: "Integration" (Laboratoire de mathématiques d'Orsay, L3).

Reading seminar for 1st year students at ENS

2019: "Celestial mechanics, N -body problem and optimal control".

2021: "Variational problems, optimization and control".

Mentoring/Supervision

Adviser of master thesis (M2)

Will Ford (2025)

Adviser of bachelor theses (L3)

"Eigenvalues, curvature and heat equation" (2022), "Spectrum of graphs" (2024), "Random matching" (2025).

Tutor of 6 students per year at ENS between 2019 and 2022

Member of committees

Member of comité Maître de conférence

Versailles (2025).

Member of jury for PhD defense

Adam Arras (2024), Michael Sander (2024).

Jury for the defense of master thesis

Julien Moy (2023), Romeo Taboada (2023).

Jury for the diploma defense of 4th year students at ENS in 2019-2020

Responsibilities

- 2023- **Organizer of the Analysis and PDEs seminar in Orsay (LMO)**
- 2023- **Member of the scientific committee of RT Tétraèdre**
- 2015-2017 **Representative of the students at the departement of mathematics (ENS)**

Organization of conferences

- 2025 **3-days workshop “Regards croisés sur l’hypoellipticité”, *Toulouse***
- 2024 **Festum Pi summer school and conference, *Chania (Crete)***

Funding and awards

- 2024-2025 **Cours Peccot, *Collège de France***
- 2024-2028 **ANR JCJC, *With Laure Dumaz and Cyril Labbé***

Outreach activities

- 2016-2017 **Organizer and speaker at the “Math for all” seminar at ENS**
- 2015-2018 **Lectures at a maths club for high school students called Parimaths**
On functional equations, polynomials, interpolation, Markov chains, differential equations.