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Born: 1994
Citizenship: Republic of North Macedonia

Appointments

05/2027–08/2027	Visiting Fellow, Imperial College London.
2024–	Junior Researcher, Inria Paris.
2022/2023	Postdoctoral Associate, Massachusetts Institute of Technology. Mentors: Laurent Demanet and Philippe Rigollet.
2021	Software engineer, Sherpa.ai.
2021	Ph.D. in Mathematics, Universidad Autónoma de Madrid. Advisor: Enrique Zuazua.

Recognitions

Google research gift ($80,000).

Abraham le Moivre Imperial College London–CNRS Fellowship.

ANR JCJC project MUSCAT, principal investigator (€335,960).

ANR project INFERNO, local coordinator (€156,000 local, €624,000 total).

MIT–France Seed Funding ($29,700).

Sorbonne Université Emergences (€15,000).

Supervision

Ph.D.

10/2027–	Adrien Chivet.
10/2025–	Hugo Koubbi, co-supervised with Antonin Chambolle.

Postdoc

01/2027–	Kilian Lutz.

M.Sc.

04/2027–08/2027	Adrien Chivet, ENS Ulm.
04/2026–08/2026	Azamat Kazimbekov, École Polytechnique.
10/2025–08/2026	Thomas Giarrizzi, ENS Ulm.
04/2024–08/2024	Hugo Koubbi, ENS Paris-Saclay.
04/2023–08/2023	Gatien Dony, Massachusetts Institute of Technology.
04/2022–08/2022	Rui Sun, Massachusetts Institute of Technology.

Articles

20 A Lloyd-stabilized Voronoï particle method.
With Bruno Després.
Preprint, 2026.

19 Kinetic theory for Transformers and the lost-in-the-middle phenomenon.
With Mitia Duerinckx and Stefano Rossi.
Preprint, 2026.

18 Homogenized Transformers.
With Hugo Koubbi and Philippe Rigollet.
Preprint, 2026.

17 Constructive conditional normalizing flows.
With Domènec Ruiz-Balet.
Preprint, 2026.

16 Perceptrons and Localization of Attention's Mean-Field Landscape.
With Antonio Alvarez-Lopez and Domènec Ruiz-Balet.
International Conference on Machine Learning, 2026 (Spotlight).

15 Attention's forward pass and Frank-Wolfe.
With Albert Alcalde and Domènec Ruiz-Balet.
International Conference on Machine Learning, 2026.

14 Constructive approximate transport maps with normalizing flows.
With Antonio Alvarez-Lopez and Domènec Ruiz-Balet.
Applied Mathematics and Optimization, 2025.

13 On the number of modes of Gaussian kernel density estimators.
With Philippe Rigollet and Yihang Sun.
Bernoulli, 2026.

12 Measure-to-measure interpolation using Transformers.
With Philippe Rigollet and Domènec Ruiz-Balet.
Foundations of Computational Mathematics, 2026.

11 Dynamic metastability in the self-attention model.
With Hugo Koubbi, Yury Polyanskiy and Philippe Rigollet.
Preprint, 2024.

10 A mathematical perspective on Transformers.
With Cyril Letrouit, Yury Polyanskiy and Philippe Rigollet.
Bulletin of the American Mathematical Society, 2024.

9 The emergence of clusters in self-attention dynamics.
With Cyril Letrouit, Yury Polyanskiy and Philippe Rigollet.
Advances in Neural Information Processing Systems, 2024.

8 Control of the Stefan problem in a periodic box.
With Debayan Maity.
Mathematical Models and Methods in Applied Sciences, 2023.

7 Turnpike in optimal control of PDEs, ResNets, and beyond.
With Enrique Zuazua.
Acta Numerica, 2022.

6 Optimal controller design via Brunovsky's normal form.
With Enrique Zuazua.
IEEE Transactions on Automatic Control, 2023.

5 Sparsity in long-time control of neural ODEs.
With Carlos Esteve-Yagüe.
Systems & Control Letters, 2023.

4 Turnpike in Lipschitz-nonlinear optimal control.
With Carlos Esteve-Yagüe, Dario Pighin and Enrique Zuazua.
Nonlinearity, 2022.

3 Large-time asymptotics in deep learning.
With Carlos Esteve-Yagüe, Dario Pighin and Enrique Zuazua.
Unsubmitted preprint, 2021.

2 Controllability of one-dimensional viscous free boundary flows.
With Enrique Zuazua.
SIAM Journal on Control and Optimization, 2021.

1 Null-controllability of perturbed porous medium gas flow.
ESAIM Control, Optimisation and Calculus of Variations, 2020.

Teaching

01/2025– Gradient flows and interacting particles in learning theory, annual M2 course at Sorbonne Université.

02/2023–05/2023 Principles of Continuum Applied Mathematics, 18.300, Massachusetts Institute of Technology.
Instructor.

Invited talks

2027

University of Edinburgh Probability Seminar

Chinese Academy of Sciences – Chinese-French Workshop on PDEs

CIRM Conference on Real Algebraic Geometry, Optimization, and Machine Learning

Université de Nantes Applied Mathematics Seminar

INSA Rouen Normandie Applied Mathematics Seminar

Sorbonne Université – Séminaire de statistique des processus

2026

IHP Legendre Seminar

NYU Courant Analysis Seminar

Georgetown Mathematics Colloquium

Carnegie Mellon Nonlinear Analysis Seminar

Yale Mathematics Colloquium

Prometheus, San Francisco

Aspen Center for Physics Meeting on Foundation Models

IMJ-PRG Geometry Seminar

WCCM–ECCOMAS, Munich

UNAM Conference on Mathematical Foundations of Artificial Intelligence, Mexico City

Kunming University Mathematics Department Seminar

Oberwolfach Workshop on Flows on Measure Spaces and Applications in Machine Learning

Sapienza University of Rome – Round Mean Field V

CRM Barcelona Workshop on Mathematical Foundations of Machine Learning: PDEs, Probability, and Dynamics

2025

Università Iuav di Venezia – Round Mean Field IV

IHP – Séminaire francilien de géométrie algorithmique et combinatoire

University of Hamburg Workshop on the Mathematics of Transformers

NYU Paris Workshop on Mean Field Games, Optimal Transport and Machine Learning

IHP Workshop on Analysis and Computation of Dispersive PDE and Fluid Dynamics

Sorbonne Université Conference in Honor of Bruno Després's 60th Birthday

IHP Mathematic Park Seminar

FAU Erlangen Workshop on Machine Learning and PDEs

Laboratoire de Mathématiques d'Orsay OT-PDE-ML Seminar

IHP – Séminaire parisien d'optimisation

RWTH Aachen Applied Mathematics Colloquium

Les Houches Workshop on the Physics of AI Algorithms

2024

Université d'Évry Probability Seminar
École des Ponts CERMICS Applied Mathematics Seminar
Aussois Workshop on Modeling, Theory and Numerics for PDEs
Université de Poitiers – Journées SMAI MAS
IBM New York Seminar
Université de Strasbourg Workshop on Scientific Machine Learning
Caltech CMX Seminar
Universidad de Oviedo – French-German-Spanish Conference on Optimization, Gijón
IHP – Séminaire parisien de statistique
Laboratoire Jacques-Louis Lions Seminar
Université Gustave Eiffel – Groupe de travail Monge
L2S CentraleSupélec – Séminaire d'automatique
LPSM – Séminaire de statistiques
Cargèse Workshop on Optimal Transport
INSA Lyon – Journées SMAI MODE
CEREMADE – Groupe de travail PDE-AI
SIAM Conference on Uncertainty Quantification, Trieste
University of Liverpool MIF++ Seminar[v]
LJLL PEPR PDE-AI Kickoff Meeting
National University of Singapore Program on the Mathematics of Data

2023

MIT nmPDE Seminar
NeurIPS (poster), New Orleans
University of Arizona Applied Mathematics Colloquium[v]
LAAS Toulouse EDP-COSy Workshop
Harvard Probabilitas Seminar
UIUC CSL Seminar
Allerton Conference on Communication, Control, and Computing
Harvard Quantum Optics Meeting
MIT ERL Annual Meeting

2022

IRMA Strasbourg PDE Seminar
LJLL – Groupe de travail Contrôle
MIT ERL Annual Meeting
SIAM Conference on Imaging Science[v]
University of Cambridge Image Analysis Seminar[v]
FAU Erlangen Dynamics, Control and Numerics Seminar[v]

2021

CSIC Machine Learning in Madrid Seminar[v]
FAU Erlangen Mathematics of Deep Learning Seminar[v]

2020

Fields Institute Symposium on Machine Learning and Dynamical Systems[v]

2019

Benasque Science Center Workshop on PDE, Optimal Design and Numerics

ICMAT Workshop on Homogenization, Spectral Theory and Other Topics in PDEs

Invited lectures

06/2027 Radboud University – Mathematical Foundations of Modern AI Summer School (5 h)

04/2026 Tianyuan Mathematics Research Center (4 h)

11/2024 Oberwolfach Seminar on Control and Machine Learning (6 h)

Visits

$\geq$ 1 week MIT (10/2026), IMS Singapore (01/2024), UIUC (09/2023), Strasbourg (11/2022), LJLL (11/2022), FAU Erlangen (01/2020, 11/2019).

Public outreach

04/2025 IHP Mathematic Park Seminar

Two interviews in *Epsiloon*, a French popular-science magazine.

Service

Organization of seminars

Founder and co-organizer of Analyse, Algorithmique, Apprentissage (with F. Bach and R. Berthier).

Automath (with F. Marbach, A. Hayat, M. Lelarge and G. Peyré).

Organization of conferences

07/2027 **Institut Mittag-Leffler**, Geometry, Dynamics and Particles in Deep Learning (with Sylvia Serfaty, Klas Modin and Philippe Rigollet).

01/2027 **Les Diablerets**, Dynamics of Information in Neural Networks (with Andrea Agazzi and Philippe Rigollet).

06/2025 Sorbonne Université, Bruno Després 60th Birthday Conference.

11/2024 **Oberwolfach**, Control and Machine Learning Seminar (with Enrique Zuazua and Domènec Ruiz-Balet).

Committees

MCF Recruitment Committee, Sorbonne Université.

Ph.D. Jury Committee, R. Barboni (ENS Ulm).

Reviewing

Journal reviewer: Foundations of Computational Mathematics (x4), Nature Communications, Journal of Functional Analysis, Journal de Mathématiques Pures et Appliquées, M3AS (x2), Philosophical Transactions of the Royal Society A, Information and Inference: A Journal of the IMA, Mathematical Statistics and Learning, Journal of Differential Equations, Journal of Machine Learning Research (x3), IEEE Transactions on Automatic Control (x6), SIAM Journal on Control and Optimization, SIAM Journal on Scientific Computing, Journal of Computational Physics, ESAIM: COCV, Portugaliae Mathematica, Nonlinear Analysis, Mathematics of Control, Signals and Systems, Systems & Control Letters (x2), Mathematical Control and Related Fields (x2), Advances in Differential Equations, Computational and Applied Mathematics.
Quick opinion: Inventiones Mathematicae, Journal of the American Mathematical Society, Communications on Pure and Applied Mathematics, Annales de l'Institut Henri Poincaré C, Analyse non linéaire.
Conference reviewer: NeurIPS 2025, ICML 2026 (Silver Reviewer), ICML 2025, STOC 2024, CDC 2022, ECC 2022.
Grant reviewer: ANR (France), DFG (Germany).