

Curriculum Vitæ Idriss Mazari-Fouquer (Last update: March 28, 2024)

PERSONAL DATA

Date and place of birth 1994, Rouen (Normandie, France),

Institutional address CEREMADE, Université Paris Dauphine - PSL Place du Maréchal De Lattre de Tassigny 75016 PARIS

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PROFESSIONAL EXPERIENCE & EDUCATION

Since September 2021: *Maître de conférences* (permanent position as assistant professor), Université Paris Dauphine, au CEREMADE.

September 2020-August 2021: Post-doctoral researcher in the Research Group Multiscale Calculus of Variations and PDEs (Leader: E. Davoli), Institute of Analysis and Scientific Computing, TU Wien (funded by the Austrian Science Fund FWF).

September 2017-August 2020: PhD student (Laboratoire Jacques-Louis Lions, Paris Sorbonne Université, Paris) under the supervision of G. Nadin and Y. Privat. My PhD *Shape optimization & Spatial heterogeneity in reaction-diffusion equations* was defended on the 6th of July, 2020. Funding: École Normale Supérieure de Lyon doctoral grant for Normaliens students (*Bourse normalien*).

September 2013-August 2017: Normalien student (status obtained after a competitive exam), École normale supérieure de Lyon in Advanced Mathematics (Master's degree in partial differential equations obtained in Université Paris Jussieu, *with highest honors* in 2016). The year 2016-2017 was spent on a research internship under the supervision of G. Nadin and Y. Privat, Université Paris Jussieu.

DISTINCTIONS, GRANTS, PROJECTS

- 2023: Laureate of a PSL Starting Grant (150k€).
- 2023: Selected by the EMS committee to be a member of the first promotion of the European Mathematical Society Young Academy, following a nomination by the Société Mathématique de France.
- 2022: Karl-Peter Hadeler Prize 2022 of the Journal of Mathematical Biology and of the ESMTB, awarded to D. Ruiz-Balet and myself for our paper *Spatial ecology, optimal control and game theoretical fishing problems*.
- 2021: I was awarded one of the two PHD prizes from the PGMO program (Programme Gaspard Monge pour l'Optimisation, with the ROADEF and the SMAI Group MODE). Two PGMO PHD awards a year are given, for "significant contributions in optimisation and operational research".
- 2021: I was a laureate of a Lise Meitner Research post-doctoral fellowship (164k€) of the Austrian FWF, for the research project "Optimal control & design problems for piezoelectric materials" (Host: Elisa

Davoli, Host institution: TU Wien). This project was declined when I obtained a permanent position in Paris Dauphine Université.

LIST OF PUBLICATIONS

Publications in international peer-reviewed journals

1. I. Mazari-Fouquer, Maximising the biomass with respect to the carrying capacity: some qualitative results.
Journal of Differential Equations, 2024.
DOI:10.1016/j.jde.2024.02.007
2. I. Mazari-Fouquer, Existence of optimal shapes in parabolic bilinear optimal control problems.
Archive for Rational Mechanics and Analysis, 2024.
DOI: 10.1007/s00205-024-01958-0
3. F. Auricchio, M. Marino, I. Mazari-Fouquer, U. Stefanelli, Analysis of a combined filtered/phase-field approach to topology optimization in elasticity.
Applied Mathematics and Optimization, 2024.
DOI: 10.1007/s00245-024-10104-x
4. P. Baumann, I. Mazari-Fouquer, K. Sturm, The topological state derivative: an optimal control perspective on topology optimisation.
Journal of Geometric Analysis, Special Issue: Differential Geometric PDE Control, Shape Optimization and Applications, 2023,
DOI:10.1007/s12220-023-01295-w
5. I. Mazari, The bang-bang property in some parabolic bilinear optimal control problems via two-scale asymptotic expansions,
Journal of Functional Analysis, 2023,
DOI:10.1016/j.jfa.2023.109855
6. I. Mazari, Y. Privat, Qualitative analysis of optimisation problems with respect to non-constant Robin coefficients.
Annali della Scuola Normale Superiore di Pisa, Classe di Scienze, accepted for publication, 2022.
7. E. Davoli, I. Mazari, U. Stefanelli, Spectral optimization of inhomogeneous plates.
SIAM Journal on Control and Optimization, accepted for publication, 2022.
ArXiv:2107.11207
8. I. Mazari, D. Ruiz-Balet, Spatial ecology, optimal control and game theoretical fishing problems.
Journal of Mathematical Biology, 2022.
DOI:10.1007/s00285-022-01829-w
9. I. Mazari, D. Ruiz-Balet. Quantitative stability for eigenvalues of Schrödinger operator, Quantitative bathtub principle & Application to the turnpike property for a bilinear optimal control problem.
SIAM Journal on Mathematical Analysis 54(3):3848–3883, 2022.
DOI:10.1137/21M1393121

10. I. Mazari, A note on the rearrangement of functions in time and on the parabolic Talenti inequality.
Annali dell'Universita di Ferrara, 2022.
DOI:10.1007/s11565-022-00392-y
11. I. Mazari, D. Ruiz-Balet, E. Zuazua. Constrained controls of gene-flow models.
Annales de l'Institut Henri Poincaré-C-Analyse Non-Linéaire, 2022.
DOI:10.4171/AIHPC/52
12. I. Mazari, Some comparison results and a partial bang-bang property for two-phases problems in balls.
Mathematics in Engineering, Special Issue Calculus of Variations and Nonlinear Analysis: Advances and Applications, 2023.
DOI:10.3934/mine.2023010
13. I. Mazari, G. Nadin, Y. Privat, Optimisation of the total population size for logistic diffusive equations: bang-bang property and fragmentation rate.
Communications in Partial Differential Equations, 2022.
DOI:10.1080/03605302.2021.2007533
14. I. Mazari, G. Nadin, Y. Privat. Shape optimization of a weighted two-phase Dirichlet eigenvalue.
Archive for Rational Mechanics and Analysis, 2021.
DOI:10.1007/s00205-021-01726-4
15. I. Mazari. Quantitative estimates for parabolic optimal control problems under L^∞ and L^1 constraints.
Nonlinear Analysis, 215, 2022.
DOI:10.1016/j.na.2021.112649
16. A. Isis Toledo Marrero, I. Mazari, G. Nadin, Optimisation of the total population size with respect to the initial condition for semilinear parabolic equations: Two-scale expansions and symmetrisations.
Nonlinearity, 34, 2021.
DOI:10.1088/1361-6544/ac23b9
17. I. Mazari, D. Ruiz-Balet. A fragmentation phenomenon for a non-energetic optimal control problem: optimisation of the total population size in logistic diffusive models.
SIAM Journal on Applied Mathematics, 81-1 (2021), pp. 153-172.
DOI:10.1137/20M132818X
18. I. Mazari, A. Henrot, Y. Privat. Shape optimization of a Dirichlet type energy for semilinear elliptic partial differential equations.
ESAIM: Control, Optimisation and Calculus of Variations, 27 (2021) S6,
DOI:10.1051/cocv/2020052
19. I. Mazari. A quantitative inequality for the first eigenvalue of a Schrödinger operator.
Journal of Differential Equations Vol. 269 (2020), pp 10181-10238.
DOI:10.1016/j.jde.2020.06.057

20. I. Mazari, G. Nadin, Y. Privat. Optimal location of resources maximizing the total population size in logistic models.
Journal de Mathématiques Pures et Appliquées 134 (2020), pp. 1-35.
DOI:10.1016/j.matpur.2019.10.008
21. I. Mazari. Trait selection and rare mutations: The case of large diffusivities.
Discrete and continuous dynamical systems, Series B 24 (2019), pp. 6693-6724.
DOI:10.3934/dcdsb.2019163

Proceedings

22. I. Mazari, G. Nadin, Y. Privat. Optimal control of resources for species survival.
Proceedings in Applied Mathematics and Mechanics 18 (Special Issue: 89th Annual Meeting of GAMM) (2018).
DOI:0.1002/pamm.201800086.

Submitted articles

23. I. Mazari-Fouquer, Y. Privat, E. Trélat, Large-time optimal observation domain for linear parabolic systems. Submitted, 2024.
ArXiv:
24. A. Henrot, I. Mazari-Fouquer, Y. Privat, Is the Faber-Krahn inequality true for the Stokes operator? Submitted, 2024.
ArXiv:2401.09801
25. A. Chambolle, I. Mazari-Fouquer, Y. Privat, Stability of optimal shapes and convergence of thresholding algorithms in linear and spectral optimal control problems. Submitted, 2023.
ArXiv:2306.14577
26. Z. Kobeissi, I. Mazari-Fouquer, D. Ruiz-Balet, The tragedy of commons: a Mean-Field Games approach to the reversal of travelling waves. Submitted, 2023.
ArXiv::2303.01365
27. L. Girardin, I. Mazari-Fouquer, Generalized principal eigenvalues of space-time periodic, weakly coupled, cooperative, parabolic systems. Submitted, 2021.
ArXiv:2109.09578
28. I. Mazari-Fouquer, G. Nadin, Localising optimality conditions for the linear optimal control of semilinear equations via concentration results for oscillating solutions of linear parabolic equations. Submitted, 2022.
ArXiv:2205.11847

Book chapters

29. I. Mazari, G. Nadin, Y. Privat Some challenging optimisation problems for logistic-diffusive equations and numerical issues.
Accepted for publication, *Handbook of Numerical Analysis and Control Theory* (Editors: E. Trélat and E. Zuazua), 2021.

ADVISORSHIP

- 2024: Supervision of the Master Thesis of G. Lamonaca,
- 2024: Host (3 month) of A. Gentile (PhD Student, University Federico II, Napoli; thesis advisor: C. Nitsch, C. Trombetti),
- 2023-....:Supervision of the post-doc (2 years) of R. Prunier,
- 2022: Supervision of the third year internship of T. Brun (ENS de Lyon), six weeks. Topic: "Sur l'inégalité isopérimétrique".

PHD COMMITTEES

- 2022: Member of the PHD Defence Committee (Examinateur) of S. Zerrouq, Université de Pau et des Pays de l'Adour.

COLLECTIVE RESPONSIBILITY

- 2023-....:Secretary of the Young Academy of the European Mathematical Society.
- 2023-....: Co-organiser of the Seminar of the GT CALVA (Research group in the Calculus of Variations). Organised between Université d'Orsay, Université Paris Cité and Université Paris Dauphine PSL.

UNIVERSITY COMMITTEES

- 2024: Selection committee "Parcoursup L1" for admission of 1st year students in Dauphine.
- 2023: Selection committee for admission of 3rd year students in Dauphine.

ORGANISATION OF SCIENTIFIC EVENTS

- July 2024: Co-organisation with L. Kanzler and D. Ruiz-Balet of a mini-symposium on "New trends in many particle & mean field models" at the ECM 2024.
- August 2023: Co-organisation with P. Lissy of a mini-symposium on "New trends in (optimal) control theory" at the ICIAM 2023.
- December 2023: Co-organisation with E. Davoli and K. Sturm of a workshop devoted to "New perspectives on Shape and Topology Optimisation" at the Erwin Schrödinger Institute,

PRESENTATIONS, TALKS, CONFERENCES, RESEARCH STAYS

Invited talks at conferences

1. Journées MODE de la SMAI, session “Optimisation de formes” (organisée par B. Bogosel), Lyon, Mars 2024,
2. Workshop “Regularity and geometric aspects of nonlinear PDEs”, University of Pisa, January 2024,
3. ICIAM 2023, August 2023, (minisymposium *Reaction-Diffusion models in Ecology and Evolution*, organised by K-Y. Lam, Y. Lou, D. Xiao, M. Zhou),
4. PDE Day of Le Havre, May 2023,
5. Meeting of the ANR ShapO, April 2023,
6. EMSTB Colloquium, March 2023,
7. PDE Days of the Institut Elie Cartan, March 2023,
8. *Parabolic and kinetic models in population dynamics*, Institut de Mathématiques de Toulouse, (ANR Indyana & Trimestre thématique CIMI), September 2022,
9. CANUM 2020, June 2022 (minisymposium *Geometric properties for elliptic PDEs*, organised by C. Nitsch, F. Chiacchio, F. Della Pietra),
10. Meeting of the ANR ShapO, April 2022,
11. Society of Mathematical Biology Annual Meeting, July 2021,
12. Paris Dauphine University, *Mathematical biology day*, December 2018,
13. Grenoble University, *Shape optimization (ShaPo project of the French research agency)*, December 2018,
14. Poitiers University, *Shape optimization day*, Octobre 2018,
15. Chambéry University, *Reaction-diffusion (ReaDi project of the French research agency)*, Chambéry, February 2018,
16. KTH Stockholm, *Mini-conference in PDEs*, December 2017.

Invited seminars

1. PDE Seminar, Imperial College London, February 2024,
2. Seminar of Applied mathematics, Versailles University, December 2023,
3. Math Bio Seminar, Institut Denis Poisson, Orléans, November 2023,
4. Seminar of Applied Mathematics, Iowa State University, October 2023,
5. Seminar of Mathematical Biology, Iowa State University, October 2023,
6. Seminar of the Math Department, Ohio State University, October 2023,

7. Seminar of the Parisian group of game theory, Institut Henrit Poincaré, October 2023,
8. Seminar of the Mathematics Department Giuseppe Luigi Lagrange, Politecnico di Torino, May 2023,
9. Oberseminar Analysis, Hausdorff Center for Mathematics, Bonn, April 2023,
10. Seminar of the Dipartimento di Matematica e Applicazioni "Renato Caccioppoli" dell'Università degli Studi di Napoli Federico II, March 2023,
11. Séminaire du Pôle Analyse, Centre de Mathématiques Appliquées, École Polytechnique, November 2022,
12. Seminar of the Dipartimento di Matematica, Università di Pisa, October 2022,
13. Séminaire de Mathématiques Appliquées, Collège de France, January 2022,
14. Séminaire Analyse-EDP, Dauphine, January 2022,
15. PDE seminar, University of Tennessee, Knoxville, October 2021,
16. Vienna Seminar on Calculus of Variations, May 2021,
17. Groupe de travail Calcul des Variations (CalVa), March 2021,
18. Séminaire du groupe de contrôle et modélisation, Strasbourg, February 2021,
19. Séminaire de l'IECL, Nancy, February 2021,
20. Séminaire du LAMA, Chambéry, February 2021,
21. Séminaire MACS, Lyon, January 2021,
22. Séminaire de math-bio, Toulouse, January 2021
23. Münster-München-Wien research group on calculus of variations, December 2020,
24. Laboratoire de Mathématiques d'Aix-Marseille Université (visioconférence), Novembre 2020,
25. PDE Afternoon (University of Vienna) (visioconférence), Novembre 2020,
26. University of Western Australia (videoconference), June 2020,
27. Friedrich Alexander Universität, Erlangen, February 2020,
28. Chair of computational mathematics, DeustoTech, September 2019,
29. Jacques-Louis Lions laboratory, *PhD students' seminar*, Avril 2019,
30. Mathematics laboratory of the Catholic University of Brescia, Italy, February 2019,
31. Applied mathematics laboratory of Compiègne, February 2018,
32. Nantes University, *PhD students' seminar*, February 2018,
33. Jacques-Louis Lions laboratory, *PhD students' seminar*, October 2017.

Research Stays

1. Università degli studi Federico II, Napoli, March 2023 (1 week), *at the invitation of C. Nitsch and C. Trombetti*,
2. Università di Pisa, Italy, October 2022 (1 week), *at the invitation of G. Buttazzo*.
3. TU Wien, Uni. Wien, (Austria), September 2021 (1 week), April 2022 (2 weeks), July 2022 (2 weeks), *at the invitation of E. Davoli, U. Stefanelli, K. Sturm*,
4. Erlangen (Germany), (1 week) February 2020, *at the invitation of E. Zuazua*,
5. Bilbao (Spain), September-December 2019, *at the invitation of E. Zuazua*,
6. Brescia (Italy), (1 week) February 2019, *at the invitation of D. Mazzoleni*

Reviewing activities

I am currently reviewing or have reviewed papers for the following journals:

Journal de Mathématiques Pures et Appliquées, Journal of Geometric Analysis, SIAM Journal on Control and Optimization, Inverse Problems in Engineering, Journal of Differential Equations, SIAM Journal on Mathematical Analysis, SIAM Journal on Applied Mathematics, Nonlinear Analysis, Discrete and Continuous Dynamical Systems-B, Journal of Mathematical Biology, Nonlinear Differential Equations and Applications NoDEA, ESAIM: Control, Optimization and Calculus of Variations, Handbook of Control Theory, Journal of Optimization Theory and Applications, Annales de l'Institut Henri Poincaré-C-Analyse Non-linéaire.

ORGANIZATION AND RESPONSIBILITIES

- 2019: Scientific commissioner for the “L’X: l’équation du mérite” Exhibition, École Polytechnique, Palaiseau, (with J. Dhombres and F. Brechenmacher)
- 2018: Scientific commisssioner for the “Joseph Fourier, de la Révolution Française à la Révolution Numérique” Exhibition, Institut Henri Poincaré, Paris, (with J. Dhombres and A. Juhel)
- 2017-2018: Co-organizer of the PhD students’ Seminar, Laboratoire Jacques-Louis Lions, Paris
- 2014-2015: Director of the Student’s Mathematics’ Journal, ENS de Lyon
- 2014-2015: Organizer of the Students’ History of Science’s Seminar, Lyon
- 2014: Local Organization Committe of the ISSMYS Summer School, Lyon

TEACHING AND COMMUNICATION EXPERIENCE

Teaching Experience

- 2023-...: *Numerical methods and linear algebra*, second year (L2), PARIS DAUPHINE UNIVERSITÉ PSL, Exercise classes, class by G. Legendre.
- 2022-2023: *Optimization*, fourth year (M1), PARIS DAUPHINE UNIVERSITÉ PSL, Exercise classes, class by Y. Viossat.
- 2021-...: *Numerical methods and optimisation*, third year (L3), PARIS DAUPHINE UNIVERSITÉ PSL. Lectures, Python classes, Exercise classes.
- 2017-2020: *Exercices sessions*, PARIS SORBONNE UNIVERSITÉ Analysis, Linear Optimization, Python, Series and Integrals
- 2017: *Teacher for the SummerIA Summer School*, Lyon
- 2017: *Teacher (One week course)* PRISTINA UNIVERSITY, Kosovo, Optimization and calculus of variations
- 2015-2017: *Oral Examiner* LYCÉE LOUIS LE GRAND, Paris
- 2016: *Teacher for the Mathsinfoly Summer School*, Lyon
- 2014-2015: *Oral Examiner*, LYCÉE AUX LAZARISTES, Lyon

Science and History of Science Communication

- 2019: Production of written supports for the “L’X: l’équation du mérite” Exhibition, École Polytechnique, Palaiseau, (with J. Dhombres and F. Brechenmacher),
- 2019: Instructor for the Mathsinfoly Summer School, Lyon *In collaboration with P. Lafourcade, I was in charge of helping a group of high-school students design SAT-solvers*,
- 2018: Production of written supports for the “Joseph Fourier, de la Révolution Française à la Révolution Numérique” Exhibition, Institut Henri Poincaré, Paris, (with J. Dhombres and A. Juhel),
- 2018: *Meeting Joseph Fourier*, McGill Journal of Undergraduate Mathematics,
- 2017: Instructor for the SummerIA Summer School, Lyon *I was in charge of introducing high-school students to calculus of variations for applications to artificial intelligence*,
- 2017: *Le théorème de Birkhoff: géodésiques fermées des surfaces*, Journal de Mathématiques des élèves de l’ENS de Lyon,
- 2016-2017: Animator at a stand at the Paris Mathematical Fair (Salon des jeux mathématiques)
- 2016: Instructor for the Mathsinfoly Summer School, Lyon *I was in charge of introducing high-school students to dynamical systems and to advise their mini-research project on billiards*,
- 2016: *Une balade en compagnie de Monge et Lagrange*, Journal de Mathématiques des élèves de l’ENS de Lyon,
- 2015: *L’inégalité isopérimétrique et l’inégalité de Faber-Krahn*, Journal de Mathématiques des élèves de l’ENS de Lyon,
- 2014: Scientific Assistant for the MOMISS Summer School in Lyon. *I was interacting with high-school students on scientific matters.*