# Mathurin Massias

## Machine Learning researcher


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## Research experience

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| Nov. 2021 – present | INRIA (ENS Lyon, France): Tenured researcher (*chargé de recherche*). OCKHAM Team.<br>Efficient and frugal machine learning<br>Publications: [4, 5, 6, 15] |
| Jan. 2020 – Oct. 2021 (2 years) | Università di Genova (Genova, Italy): Post-doctoral researcher with L. Rosasco and S. Villa.<br>Statistical learning and optimisation, designing new implicit regularization methods machine learning and inverse problems<br>Publications: [1, 2, 7, 8] |
| Sep. 2016 – Dec. 2019 (3 years) | INRIA (Université Paris-Saclay, France): PhD, supervised by A. Gramfort and J. Salmon. "*High dimensional sparse regression with heteroscedastic noise: application to neural source localization*", obtained Summa cum laude.<br>Keywords: optimisation, neuro-imaging, inverse problems, sparsity, high dimension<br>Publications: [3, 9, 10, 11, 12, 13] |
| Feb. 2019 – May 2019 (3 months) | U. of Tokyo/RIKEN (Japan), Deep Learning Theory team: intern, supervised by T. Suzuki.<br>Work on gradient Langevin dynamics for non-convex regression in RKHS<br>Keywords: stochastic differential equations<br>Publications: [14] |

## Education

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| Sep. 2014 – Apr. 2015 | **ENS Cachan** (Cachan, France): MSc in Machine Learning (MVA) |
| Sep. 2011 – Apr. 2015 | **Ecole Centrale Paris** (Paris, France): Major in Applied Mathematics and Data Science |

## Publications

### Journal publications


[1] C. Molinari, M. Massias, L. Rosasco, and S. Villa. Iterative regularization for low-complexity regularizers. *Numerische Mathematik*, 2023.

[2] Q. Bertrand, Q. Klopfenstein, M. Massias, M. Blondel, S. Vaiter, A. Gramfort, and J. Salmon. Implicit differentiation for fast hyperparameter selection in non-smooth convex learning. *Journal of Machine Learning Research*, 2022.

[3] M. Massias, S. Vaiter, A. Gramfort, and J. Salmon. Dual extrapolation for sparse Generalized Linear Models. *Journal of Machine Learning Research*, 21(234):1–33, 2020.


### Proceedings of international conferences


[4] J. Larsson, Q. Klopfenstein, M. Massias, and J. Wallin. Coordinate descent for SLOPETUC. In *AISTATS*, 2023.

[5] T. Moreau, M. Massias, A. Gramfort, P. Ablin, P.-A. Bannier, B. Charlier, M. Dagréou, T. Dupré la Tour, G. Durif, C. Dantas, Q. Klopfenstein, et al. Benchopt: reproducible, efficient and collaborative optimization benchmarks. In *NeuRIPS*, 2022.

[6] Q. Bertrand, Q. Klopfenstein, P.-A. Bannier, G. Gidel, and M. Massias. Beyond l1: faster and better sparse models with skglm. In *NeurIPS*, 2022.

[7] C. Molinari, M. Massias, L. Rosasco, and S. Villa. Iterative regularization for convex regularizers. In *AISTATS*, 2021.

[8] Q. Bertrand and M. Massias. Anderson acceleration of coordinate descent. In *AISTATS*, 2021.

[9] M. Massias*, Q. Bertrand*, A. Gramfort, and J. Salmon. Support recovery and sup-norm convergence rates for sparse pivotal estimation. In *AISTATS*, 2020.

[10] P. Ablin, T. Moreau, M. Massias, and A. Gramfort. Learning step sizes for unfolded sparse coding. In *NeurIPS*, 2019.

[11] Q. Bertrand*, M. Massias*, A. Gramfort, and J. Salmon. Concomitant Lasso with repetitions: beyond averaging multiple realizations of heteroscedastic noise. In *NeurIPS*, 2019.

[12] M. Massias, A. Gramfort, and J. Salmon. Celer: a fast solver for the Lasso with dual extrapolation. In *ICML*, 2018.

[13] M. Massias, O. Fercoq, A. Gramfort, and J. Salmon. Heteroscedastic multitask concomitant Lasso for sparse multimodal regression. In *AISTATS*, 2018.

[14] B. Muzellec, K. Sato, M. Massias, and T. Suzuki. Dimension-free convergence rates for gradient Langevin dynamics in RKHS. In *COLT*, 2022.

### Preprints

[15] A. Gagneux, M. Massias, and E. Soubies. Automated and unbisaed coefficients clustering. 2024.

## Teaching

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| 2022 – 2024 (2 × 32 h) | École Normale Supérieure de Lyon: Optimization for huge scale machine & deep learning (M2). |
| 2023 – 2025 (2 × 14 h) | École Normale Supérieure de Lyon: Nonlinear optimization (M1). |
| Feb. 2023 (6 h) | OLISSIPO Winter school (Lisbon): Dimensionality reduction. |
| Since 2022 (10 h/year) | CNRS Formation: Fondements et pratique du machine learning et du deep learning. |
| Jul. 2022 (6 h) | Wroclaw University of Science and Technology: Linear regression and convex optimization. |
| Dec. 2021 (30 h) | EMINES Marrakech: Teacher for the one week *Data Science* class. |
| Since 2020 (30 h/year) | École Polytechnique Executive Education: Teacher for the *Data Science Starter Program*. |
| 2019 – 2024 (42 h/year) | École Polytechnique/HEC "Data Science for Business" Master: Teacher for the *Python for Data Science* class. |
| 2017 – 2019 (2 × 40 h) | Université Paris-Saclay "Data Science" Master: Teaching assistant and partial lecturer for the *Optimization for Data Science* class. |

## Students and alumni

- Anne Gagneux, M2 intern and Phd Student. With Emmanuel Soubiès and Rémi Gribonval (2023–2026)
- Can Pouliquen, PhD Student. With Titouan Vayer and Paulo Gonçalves (2022 – 2025)
- Badr Moufad, research engineer (Apr. 2022 – Dec. 2023)

## Open source Python software

Summary on my GitHub page: https://github.com/mathurinm

- celer and skglm (state-of-the-art algorithms to solve sparse problems): lead developer
- benchopt (automatic benchmarking of optimization packages on standard ML tasks): core developer
- scikit-learn (machine learning in python): contributor
- sparse-ho (hyperparameter tuning for sparse machine learning models): core developer

## Community service

- Co-organizer of *Learning and optimization in Lumigny* at CIRM, 17-21 June 2024, 60 participants
- Co-organizer of *SMAI MODE days* in Lyon, 27-29 March 2024, 150 participants
- Co-organizer of *Dimensionality reduction day* at ENS Lyon, November 10th 2023, 50 participants
- Associate Editor and Managing Editor for Computo
- Conference reviewer for NeurIPS since 2018 (2018 Top 800 reviewers, 2019 Top 400, 2020 Top 10 %), ICML since 2019, AISTATS since 2020, ICLR since 2023 (best reviewer 2023) and others
- Journal reviewer JMLR, SIAM OPT, OJMO, IEEE TSP, Signal Processing and others.
- Member of PhD defense committees for Gilles Bareilles (Université Grenoble Alpes, 12/22), Florent Bascou (Université Montpellier, 09/22).
- Member of the 2023 PGMO PhD prize committee.

## Grants and awards

- 2023: 7000 € from GDR ISIS, *PROSSIMO* project
- 2021: 5000 € from ENS Lyon for starting researcher support
- 2019: Best PhD prize of Programme Gaspard Monge Optimisation (PGMO) and Best PhD prize of Télécom Paris
- 2018: 1500 € from the GdR ISIS to fund a 1 month visit to the University of Washington (Seattle, USA)
- 2018: 1000 € from the STIC doctoral school to fund SPARS 2017 conference and summer school attendance
- 2017: Best presentation award at JDSE conference (Orsay, France)