

Sékolène Martin

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Birthdate: June 1996

Work experience

Feb 2024–ongoing **Math+ post-doctorate researcher at the Technische Universität, Berlin**, in the group of [Gabriele Steidl](#).
My work is at the interface between optimization, optimal transport and generative learning.

Education

Sep 2020–Jan 2024 **Ph.D. studies at Université Paris-Saclay, Inria, CentraleSupélec, Centre de Vision Numérique**, *Majorization-Minimization algorithms for constrained optimization with application to image processing*, co-supervised by [Jean-Christophe Pesquet](#) and [Ismail Ben Ayed](#), and in collaboration with [Emilie Chouzenoux](#) .

My thesis focused on designing new optimization methods for high-dimensional problems (convex and non-convex, smooth and non-smooth), with applications to inverse problems in image processing (restoration, reconstruction) and machine learning (few-shot learning, clustering, text-vision models). In particular, I studied the theoretical convergence of algorithms and their numerical efficiency.

2019 **French Agrégation of Mathematics**.

National competition to become a teacher.

2018 **Admitted to the competitive examination of the ENS Paris-Saclay (second concours)**.

2016–2020 **ENS Paris-Saclay, Cachan**.

- Second year of Research Master, “Mathématiques, Vision et Apprentissage” (MVA), with highest honors. Specialization in Optimization and Image Processing.
- Second year of Teaching Master to prepare Agrégation. With honors.
- First year of Master of mathematics, “Jacques Hadamard” track, with honors. Fellowship from FMJH.
- Last year of Bachelor of mathematics, with honors.

2014–2016 **PSL University, Paris**.

Two-year selective program “Cycle Pluridisciplinaire d’Etudes Supérieures”, major mathematics.

2011–2014 **Lycée Blaise Pascal, Orsay**.

Baccalauréat, with highest honors.

Internships

2020 **Research internship at Université Paris-Saclay, CentraleSupélec, Inria, CVN** . *New Constrained Majorization-Minimization algorithms for image restoration*, supervised by [Jean-Christophe Pesquet](#) and [Emilie Chouzenoux](#), 5 months.

The goal of the M2 internship was to improve the existing 3MG algorithm, which is an algorithm for non-convex differentiable optimization, to take into account multiple diverse constraints.

2018 **Research internship at Université Savoie Mont Blanc, LISTIC**, *Computation of a Cramèr-Rao bound for the evaluation of the performance of radar interferometry for land displacement measurement*, supervised by [Yajing Yan](#) et [Guillaume Ginolhac](#), 4 months.

The goal of the internship was to provide a mathematical bound (hybrid Cramèr-Rao bound) on the error committed on the glacier displacement speed estimation, where the estimation had been acquired from radar images (SAR).

- 2017 **Research internship at ENS Paris-Saclay, CMLA**, *Bundle adjustment with known positions*, supervised by [Jean-Michel Morel](#) and [Carlo De Franchis](#), 4 months.
The internship aimed at developing a 3D reconstruction method from satellite images without using known ground control points.
- 2016 **Research internship at University Paris-Dauphine, CEREMADE**, *Grid construction for almost periodic approximations of images*, supervised by [Dario Prandi](#), 1 month.

Publications

Publication preceded with a ★ are the ones where I am the main author.

Journal articles

- ★ J. Ajdenbaum, E. Chouzenoux, S. Martin, C. Lefort, J.-C. Pesquet, “A novel variational approach for multiphoton microscopy image restoration : from PSF estimation to 3D deconvolution”, Submitted, in *hal-04296247*, 2023.
J.-B. Fest, T. Heikkilä, I. Loris, S. Martin, L. Ratti, S. Rebegoldi, G. Sarnighausen, “On a fixed-point continuation method for a convex optimization problem”, *Advanced Techniques in Optimization for Machine learning and Imaging (ATOMI)*, 2023.
- ★ E. Chouzenoux, S. Martin, J.-C. Pesquet, “A Local MM Subspace Method for Solving Constrained Variational Problems in Image Recovery”, *Journal of Mathematical Imaging and Vision*, 2022.

Conference proceedings

- ★ S. Martin, Y. Huang, F. Shakeri, J.-C. Pesquet, I. Ben Ayed, “Transductive zero-shot and few-shot CLIP”, Accepted at the *2024 IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR) 2024*.
- ★ A. Sadraoui, S. Martin, E. Barbot, A. Laurent-Bellue, J.-C. Pesquet, C. Guettier, “A transductive few-shot learning approach for classification of liver cancer histopathology images”, Accepted at the *2024 IEEE International Symposium on Biomedical Imaging (ISBI)*, 2024.
- ★ S. Martin, M. Boudiaf, E. Chouzenoux, J.-C. Pesquet, I. Ben Ayed, “Towards Practical Few-shot Query Sets : Transductive Minimum Description Length Inference”, *Neural Information Processing Systems (NeurIPS)*, 2022.
M. Kahanam, L. Le-Brusquet, S. Martin, J.-C. Pesquet, “A Non-Convex Proximal Approach for Centroid-Based Classification”, *IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2022.
- ★ S. Martin, E. Chouzenoux, J.-C. Pesquet, “A Penalized Subspace Strategy for Solving Large-Scale Constrained Optimization Problems”, *IEEE 29th European Signal Processing Conference (EUSIPCO)*, 2021.

Talks

- 2023 “Unbalanced few-shot learning”, DATAIA workshop on *Mathematical foundations of artificial intelligence*, Sorbonne Center for AI, Paris, France.
- 2022 “Towards practical few-shot query sets : transductive minimum description length inference”, Seminar of the ILLS laboratory, Montreal, Canada.
- 2022 “Numerical restoration of multiphoton images”, Seminar of the XLIM, Limoges, France.
- 2022 “Penalized methods for solving constrained variational problems in image recovery”, Mini-Symposium : Variational Methods for Inverse Problems in Imaging, *10th International Conference Inverse Problems Modeling and Simulation*.
- 2022 “A Penalized Subspace Strategy for Solving Large-Scale Constrained Optimization Problems”, Mini-Symposium : Novel Perspectives in Optimization and Machine Learning for Imaging, *SIAM Conference on Imaging Science*.

Computer languages and tools

Advanced practical skills in **Python** (Numpy, PyTorch, Cuda, cluster-based computing), **Github**, **LaTeX**, **Beamer**.

Teaching

- 2020–2023 Refresher exercises in optimization for Master MVA, ENS Paris-Saclay.
- 2023 Practical sessions of the optimisation class for master students, CentraleSupélec.
- 2020–2022 64 annual hours of teaching for first and second year bachelor students, IUT, Orsay.
- 2019–2020 Oral examinations in second year preparatory class, Lycée Fénélon, Paris.
- 2019 Intensive pre-entry courses in mathematics for preparatory classes, GroupeRéussite, Paris.
- 2017-2020 Private lessons for high school and preparatory class students.

Other academic experiences

- Jun - Oct 2023 **Supervision** of Eliott Barbot, intern with Jean-Christophe Pesquet, on few-shot classification of histopathology images.
- Feb 2023 Participation to the Biomedical and Astronomical Signal Processing (BASP) **conference**, Villars-sur-Ollon, Switzerland.
- Nov 2022 Instructor at a 2-day mathematic workshop for high school students in the aim of promoting scientific careers for women
- Jun 2022 **Reviewer** for ICIP conference.
- Jan - Dec 2022 **Supervision** of a 1st and 2nd year research project at CentraleSupélec, with Jean-Christophe Pesquet, on unbalanced classification.
- Jul - Dec 2022 **Supervision** of Julien Ajdenbaum, intern with Emilie Chouzenoux, in the context of a project on multi-photon microscopy.
- Sep - Dec 2022 4 months **visit** at the ETS Montreal, International Laboratory on Learning Systems (ILLS).
- Jul 2022 **Visit** at XLIM, Limoges in the context of a collaboration with [Claire Lefort](#), physicist at XLIM.
- May 2022 Participation to the *Advanced Techniques in Optimization for Machine learning and Imaging (ATOMI)* **workshop**, Rome.

Languages

French, mother tongue.

English, Advanced. TOEFL® iBT : 97/120, Cambridge English Advanced (level C1).