BAPTISTE GOUJAUD

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EDUCATION

Ecole Polytechnique — *Palaiseau, France*
PhD candidate in Optimization for Machine Learning — *1 Oct. 2020 – 5 Apr. 2024*
- Supervision: Aymeric Dieuleveut, Adrien Taylor.

Ecole normale supérieure de Cachan — *Cachan, France*
Master of Science in Applied Mathematics: MVA — *2016 – 2017*
Master of Science in Fundamental Mathematics leading to "Agrégation de mathématiques", ranked 18^{th} nationally — *2014 – 2016*
Bachelor of Mathematics — *2013 – 2014*
Bachelor of Computer science — *2013 – 2014*

EXPERIENCE

INRIA — *Palaiseau, France*
***Postdoctoral Research Associate**, advised by Thomas Moreau and Pierre Ablin (from Apple)* — *Sep. 2024 – current*
- Research Area: Bilevel optimization, application to fine-tunings with few data, application to large language models training.

Teaching assistant
- Optimization, Distributed learning, Python.

Ecole Polytechnique — *Palaiseau, France*
***Postdoctoral Research Associate**, advised by Aymeric Dieuleveut and Adrien Taylor (from INRIA)* — *Feb. 2020 – Aug. 2024*
- *Research Area*: Applications of systematic approaches to performance analyses to design practical first-order algorithms, line-search methods, Hölderian smoothness, second-order methods, generalization in Machine Learning, compression in Federated Learning, correlated noise for differential privacy.
- Several research papers to be submitted soon, *not* listed in the "Publications" section.

Ecole Polytechnique — *Palaiseau, France*
***Doctoral Research Assistant**, advised by Aymeric Dieuleveut and Adrien Taylor (from INRIA)* — *Oct. 2020 – Jan. 2024*
- *Research Area*: Numerical optimization for Machine Learning, first-order algorithms, and systematic approaches to performance analyses and design of practical algorithms, Deep Learning.
- 8 research papers, 1 tutorial paper, and 1 blog post, listed in the "Publications" section.
- Developed the python package PEPit to ease the discovery of performance guarantees for numerical optimization.
  ↳ **Downloaded around 30k times with pip.**
- Co-organized the workshop PEP talks uniting researchers on the topic of performance certification for numerical optimization.

Teaching assistant
- Statistics, Machine Learning, Deep Learning, Optimization, Python (Scikit-learn, Keras, PyTorch), R.

Montreal Institute for Learning Algorithms (MILA) — *Montreal, Canada*
***Research engineer**, advised by Ioannis Mitliagkas* — *2019 – 2020*
- *Research Area*: Optimization for Machine Learning
- Published the paper A Study of Condition Numbers for First-Order Optimization at AISTATS2021.

Montreal Institute for Learning Algorithms (MILA) — *Montreal, Canada*
***Research engineer**, advised by Yoshua Bengio* — *2018 – 2019*
- *Research Area*: Deep Learning, Continual Learning
- Published the paper Gradient-based sample selection for online continual learning at NeurIPS2019.

Apple, Advanced Computation Group — *Portland, Oregon, USA*
***Machine Learning Research Intern**, advised by Bruno Conejo* — *2017 – 2018*
- *Research Area*: Computer Vision, Dense Image Registration, Deep Learning, Optimization
- Developed the Portrait mode deployed on iOS12, iphone Xs and Xs max.

Owkin — *Paris, France*
Machine learning research intern — *Apr. – Sep. 2017*
- *Research Area*: Statistics, Clinical trials
- Published the paper Robust Detection of Covariate-Treatment Interactions in Clinical Trials at ISCBASC2018.

SUPERVISION

Si Yi Meng, INRIA *Jan. – Jul. 2025*
• Cornell's final year (PhD) internship on using large step-sizes to accelerate neural network training, in cosupervision with Aymeric Dieuleveut and Adrien Taylor.

Damien Ferbach, CMAP, Ecole Polytechnique *Apr. – Sep. 2023*
• ENS Ulm's final year (M.Sc.) internship on aligning Neural networks, in cosupervision with Aymeric Dieuleveut.
• Published the paper Proving linear mode connectivity of neural networks via optimal transport at AISTATS2024.

Darya Todoskova, CMAP, Ecole Polytechnique *Jan. – Mar. 2023*
• Bachelor thesis supervision on proof techniques in first-order optimization.

SELECTED HONORS AND AWARDS

Top reviewer at NeurIPS 2022 *2022*
Best student paper award in the Workshop OPT20 at NeurIPS *2020*
Ranked 18^{th} at the "agrégation de mathematiques" *2016*

TEACHING EXPERIENCE

ENSTA, SOD314 Cooperative Optimisation for Data Science *Winter 2025*
• Third year ENSTA engineering course, part of IPP shared Data Science (DS) M.Sc. Taught in English
• Introduction to distributed optimization and implementation using Python.

ENSTA, OPT202 Differentiable Optimisation: Theory and Algorithms *Winter 2025*
• Second year ENSTA engineering course Taught in English
• Advanced optimization concepts and implementation using Python.

ENSAE, UE1-06TC Optimisation différentiable *Winter 2025*
• First year ENSAE engineering course Taught in French
• Introduction to fundamental optimization concepts.

Université Catholique de Louvain, Performance certification for numerical optimization *Summer 2022*
• TraDE-OPT Doctoral summer school Taught in English
• Computer-assisted proofs of performance certification for numerical optimization.
• Link to practical exercises in Python.

Ecole Polytechnique, MAP545 Deep Learning and Optimization *Winter 2021, Winter 2022, Winter 2023*
• Master X-HEC Data science for business (DSB) Taught in English
• Deep learning with Keras and PyTorch and Optimization with Python.

Ecole Polytechnique, MAP531 Statistics with R *Fall 2022*
• Master X-HEC Data science for business (DSB) Taught in English
• Statistics, hypothesis testing, bayesian statistics, R.

Ecole Polytechnique, MAP534 Machine Learning *Fall 2020, Fall 2021*
• Master X-HEC Data science for business (DSB) Taught in English
• Machine Learning from Linear regression to random forest, Python and scikit-learn.

Ecole Polytechnique, MAP361P Python *Spring 2021, Spring 2022, Spring 2023*
• First year Polytechnique engineering course Taught in French
• Introduction to Python, numpy, matplotlib.

Lycée Blaise Pascal, Khôlles *2014-2015, 2016-2017*
• First year (MPSI) and second year (MP) Taught in French
• Mathematics.

PUBLICATIONS *: co-first author

Preprints

Provable non-accelerations of the heavy-ball method. Presented in EUROPT2024, EURO2024
Goujaud B., Taylor A., Dieuleveut A. (2023).

Optimal first-order methods for convex functions with a quadratic upper bound.
Goujaud B., Taylor A., Dieuleveut A. (2022).

Journal publications

PEPit: computer-assisted worst-case analyses of first-order optimization methods in Python. Math. Prog. C
Goujaud B., Moucer, C., Glineur F., Hendrickx J., Taylor A., Dieuleveut A. (2024). Also presented in TRADEOPT2022, ICCOPT2022, LOL2022.

Quadratic minimization: from conjugate gradient to an adaptive Heavy-ball method with Polyak step-sizes. OJMO
Goujaud B., Taylor A., Dieuleveut A. (2024). Also presented at OPT2022.

Counter-examples in first-order optimization: a constructive approach. L-CSS
Goujaud B., Dieuleveut A., Taylor A. (2023). Also presented at FoCM23, SIAMOP23 and CDC2023.

Peer-reviewed conference proceedings

Proving linear mode connectivity of neural networks via optimal transport. AISTATS2024
Ferbach D., Goujaud B., Gidel G., Dieuleveut A. (2024)

On Fundamental Proof Structures in First-Order Optimization. CDC2023
Goujaud B., Dieuleveut A., Taylor A. (2023).

Gradient descent is optimal under lower restricted secant inequality and upper error bound. NeurIPS2023
Guille-Escuret C., Ibrahim A., Goujaud B., Mitliagkas I. (2023).

Super-acceleration with cyclical step-sizes. AISTATS2022
Goujaud B., Scieur, D., Dieuleveut A., Taylor A., Pedregosa F. (2022).

A Study of Condition Numbers for First-Order Optimization. AISTATS2021
Guille-Escuret C.*, Goujaud B.*, Girotti M., Mitliagkas I. (2021) Also presented at OPT20.

Gradient-based sample selection for online continual learning. NeurIPS2019
Aljundi R., Lin M., Goujaud B., Bengio Y. (2019).

Robust Detection of Covariate-Treatment Interactions in Clinical Trials. ISCBASC2018
Goujaud B., Tramel E., Courtiol P., Zaslavskiy M., Wainrib G. (2018).

Blog post

On the Link Between Optimization and Polynomials: Cyclical Step-sizes.
Goujaud B., Pedregosa F. (2022).

SOFTWARE

- PEPit, a Python package available on PyPI, assisting in finding proofs of inequalities. Downloaded ≈ 30k times.
- Apple portrait mode on iOS12. Used daily by millions of users.

RESEARCH TALKS

Conference and invited talks

- EURO2024, Copenhagen, Denmark. *Heavy-ball does not accelerate* *Jul. 2024*
- EUROPT2024, Lund, Sweden. *Heavy-ball does not accelerate* *Jun. 2024*
- CDC2023, Singapore. *On Fundamental Proof Structures in First-Order Optimization* *Dec. 2023*
- CDC2023, Singapore. *Finding Counter-Examples in First Order Optimization. Application to the Heavy-Ball Method* *Dec. 2023*
- SIAMOP23, Seattle, Washington, USA. *Finding Counter-Examples in First Order Optimization* *Jun. 2023*
- LOL2022, Marseille, France. *PEPit: a computer assistant to study first-order optimization methods* *Oct. 2022*
- ICCOPT2022, Bethlehem, Pennsylvania. *PEPit: a computer assistant to study first-order optimization methods* *Jul. 2022*
- TRADEOPT2022, Louvain-la-Neuve, Belgium. *PEPit: a computer assistant to study first-order optimization methods* *Jul. 2022*
- MLOPT, Montreal, Quebec, Canada. *Super-Acceleration with Cyclical Step-sizes* *Jun. 2021*

Internal talks

Team building seminars

- Hyeres, France. *Understanding proof structures in first-order optimization* *Mar. 2023*
- Font Romeu, France. *PEP: a general framework to study first-order optimization methods* *Mar. 2022*
- Marseille, France. *Super-Acceleration with Cyclical Step-sizes* *Jun. 2021*

Simpas Group Meetings

- Palaiseau, France. *Heavy-ball does not accelerate* *Mar. 2024*
- Palaiseau, France. *PEP: a general framework to study first-order optimization methods* *Oct. 2021*

SERVICE

Workshop organizer
- PEP talks

Knowledge diffusion
- Participatory workshop in a high school as part of the MATh.en.JEANS association actions
- Outreach talk on mathematics applications in a high school

Area Chair
Machine Learning conference
- AISTATS2023

Reviewer
Machine Learning journal
- JMLR
- Mathematical Programming

Machine Learning conference
- AISTATS2022
- NeurIPS2024
- NeurIPS2023
- NeurIPS2022 (Top reviewer)
- NeurIPS2021
- L4DC 2024

Optimization workshop
- OPT24 at NeurIPS2024
- OPT23 at NeurIPS2023
- OPT22 at NeurIPS2022
- OPT21 at NeurIPS2021